



# User manual

## MHSI-12K-05LP1

# History

| Version | Issued     | Comments       |
|---------|------------|----------------|
| V1.0    | 10-Dec.-25 | First release. |

# Preface

## Purpose

This manual describes the mounting, electrical connection, system operation, user interface, commissioning, maintenance and technical specification etc. of energy storage system (ESS) inverter. Please first read the manual and related documents carefully before using the product and store them in a place where installation, operation and maintenance personnel can reach at any time. The illustrations in this user manual are for reference only. This user manual is subject to change without prior notice. (Specific please in kind prevail.)

## Scope

This manual is applicable to following inverter models:

## Target Group

Inverters must be installed by professional electrical engineers who have obtained relevant qualifications.

## Symbol Conventions

The following safety instructions and general information are used within this user manual.

|                                                                                          |                                                                                                                                                                                             |
|------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  DANGER  | Indicates an imminently hazardous situation which, if not correctly followed, will result in serious injury or death.                                                                       |
|  WARNING | Indicates a potentially hazardous situation which, if not correctly followed, will result in serious injury or death.                                                                       |
|  CAUTION | Indicates a potentially hazardous situation which, if not correctly followed, could result in moderate or minor injury.                                                                     |
|  NOTICE  | Indicates a potentially hazardous situation which, if not correctly followed, could result in equipment failure to run, or property damage.                                                 |
|  NOTE    | Call attention to important information, best practices and tips:<br>supplement additional safety instructions for your better use of the ESS inverter to reduce the waste of you resource. |

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# 1. Safety

Before using the inverter, please read all instructions and cautionary markings on the unit and in this manual. Put this manual to a place where you can take it easily.

Our ESS inverter strictly conforms to related safety rules in design and test. Please follow the local laws and regulations during installation, operation and maintenance. Incorrect operation may cause injury or death to the operator or a third party, and damage to the inverter and other properties belonging to the operator or a third party.

## 1.1 Symbols Used

The following safety symbols and general information are used on the inverter.

| Safety Symbol                                                                       | Description                                                                                                              |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
|    | Danger of high voltage!<br>Only qualified personnel may perform work on the inverter.                                    |
|    | Residual voltage exists after the inverter is powered off. It takes 5 minutes for system to discharge to a safe voltage. |
|    | Danger of hot surface                                                                                                    |
|    | Do not disconnect under load, otherwise there will be a danger of fire.                                                  |
|   | Environmental Protection Use Period (years)                                                                              |
|  | Refer to the operating instructions                                                                                      |
|  | Don't dispose of the inverter with the household waste.                                                                  |
|  | Grounding terminal                                                                                                       |

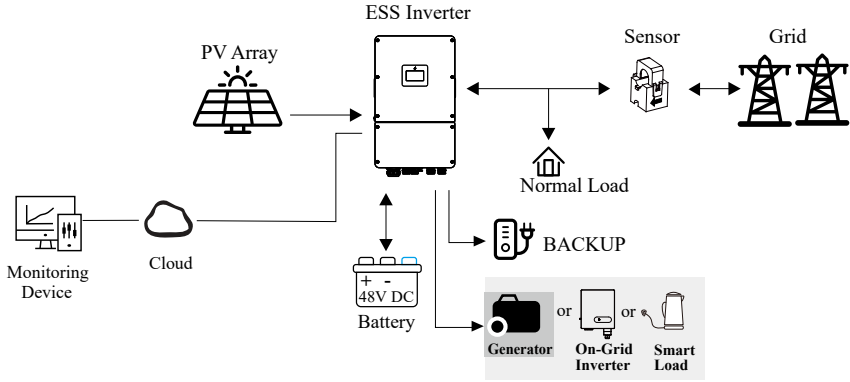
## 1.2 Safety Precaution

- The ESS inverters are certified in Australia, India, and South Africa. Installation, maintenance and connection of inverters must be performed by qualified personnel, in compliance with the local electrical standards, wiring rules and requirements of local power authorities and/or companies.
- The temperature of some parts of the inverter may exceed 60°C during operation. Do not touch the inverter during operation to avoid being burnt.
- Ensure children are kept away from inverters.
- DO NOT open the front cover of the inverter. Apart from performing work at the wiring terminal (as instructed in this manual), touching or changing components without authorization may cause injury to people, damage to inverters and annulment of the warranty.
- Static electricity may damage electronic components. Appropriate methods must be adopted to prevent such damage to the inverter; otherwise the inverter may be damaged and the warranty annulled.
- Ensure the output voltage of the proposed PV array is lower than the maximum rated input voltage of the inverter; otherwise the inverter may be damaged and the warranty annulled.
- When exposed to sunlight, the PV array generates dangerous high DC voltage. Please operate according to our instructions, or it will result in danger to life.
- PV modules should have an IEC61730 class A rating.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- Completely isolate the inverter before maintaining. Completely isolate the inverter should: turn off the PV switch and disconnect the PV terminal, battery terminal, and AC terminal.
- After the inverter is powered off, the remaining electricity and heat may still cause electric shock and body burns. Do not touch parts of inverter for 10 minutes after disconnection from the power sources.
- DO NOT insert or pull the AC and DC terminals when the inverter is running.
- In Australia, the inverter internal switching does not maintain the neutral continuity. And neutral integrity must be addressed by external connection arrangements.
- After the inverter is powered off, the remaining electricity and heat may still cause electric shock and body burns. Do not touch parts of inverter for 10 minutes after disconnection from the power sources.
- DO NOT connect ESS inverter in the following ways:  
The BACKUP Port is connected to the grid;  
A single PV panel string is connected to two or more inverters.

## 2. Product Introduction

### 2.1 Overview

The ESS inverters are high-quality inverter which can convert solar energy to AC energy and store energy into battery. Typically, an ESS inverter system consists of PV array, ESS inverter, battery, loads and electricity sensor. The energy generated by inverter can be preferentially supplied to its self-consumption, stored in the battery for future use or fed into public grid.



## 2.2 Declaration for Off-Grid Function

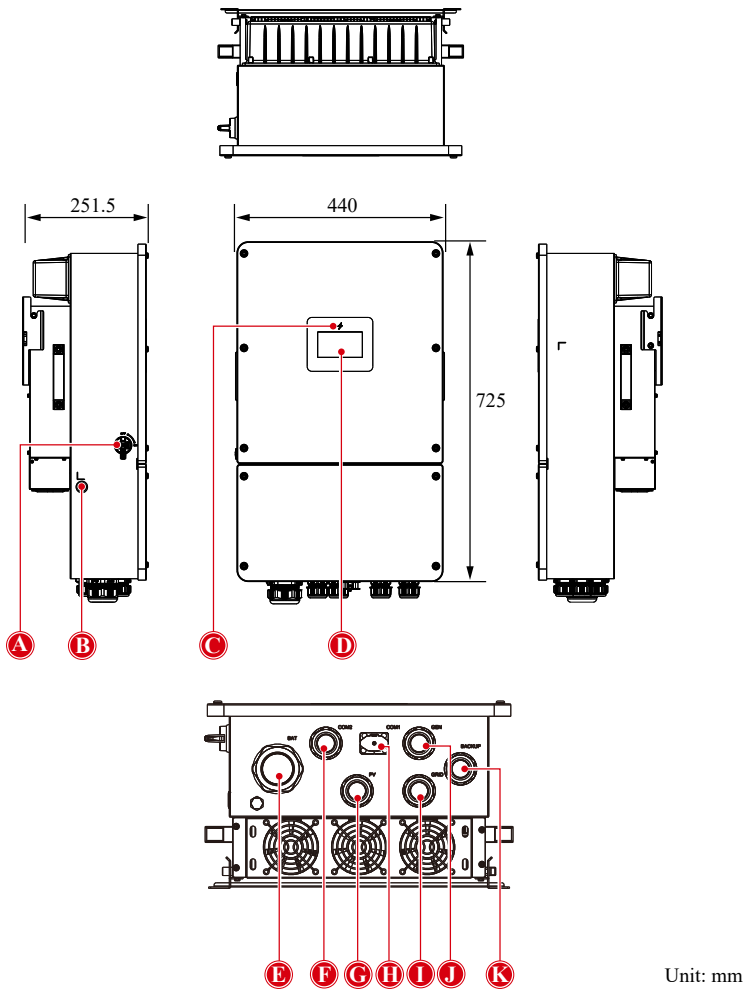
The following statement involves our company general policies about the hybrid inverters described in this document.

- For hybrid inverters, the electrical installation typically includes connection of the inverter to both PV modules and batteries. If there is no available power from batteries or PV modules in off-grid mode, the load port power supply will be automatically terminated. The manufacturer shall hold no liability for any consequences arising from failure to follow this instruction.
- Normally, the off-grid mode switchover time is less than 10 ms. However, the system may fail to enter off-grid mode due to some external factors. Therefore, the users must be aware of the conditions and comply the following instructions:
  - Do not connect loads that are dependent on a stable energy supply for a reliable operation.
  - Do not connect the loads whose total capacity is greater than the maximum back-up capacity.
  - Do not connect the loads that may cause very high start-up current surges, such as airconditioner, high-power pump, vacuum cleaner, and hair drier.
  - Due to the condition of the battery itself, battery current might be limited by some factors, including but not limited to the temperature and weather.

### Declaration for Off-Grid Overload Protection

The inverter will restart in case of overload protection. The restarting time will be 3 minutes if overload protection repeats. After the cumulative overload times up to three, the inverter will be locked. You can unlock the inverter by pressing the power button for 1s to clear the overload alarm. Try to reduce load port power within the maximum limit or remove the loads that may cause very high start-up current surges.

2.3 Appearance and Dimensions

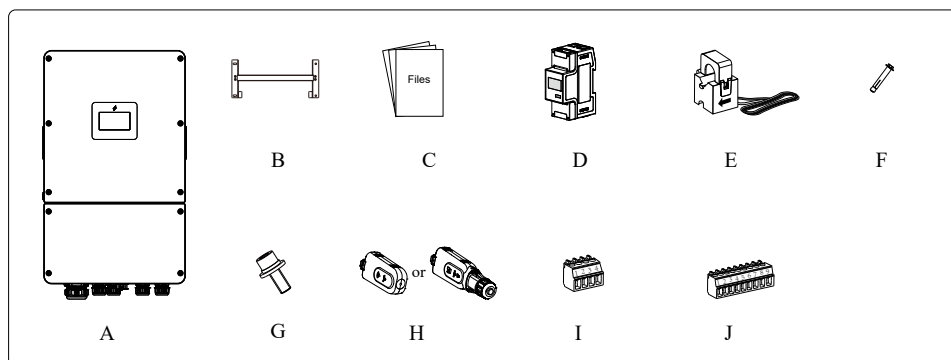


| Item | Description   | Item | Description                                                 |
|------|---------------|------|-------------------------------------------------------------|
| A    | PV switch     | E    | Battery connection port                                     |
| B    | ON/OFF button | F    | COM2 connection ports (RS485, BMS, DRM, CT, DRY, RSD, PARA) |
| C    | LED indicator | G    | PV connection port                                          |
| D    | LCD screen    | H    | COM1 connection port (WIFI/LAN/4G)                          |
|      |               | I    | GRID connection port                                        |
|      |               | J    | GEN connection port                                         |
|      |               | K    | BACKUP connection port                                      |

## 3. Mounting

### 3.1 Packing List

Check the packing list for completeness and any externally visible damage. Contact your supplier if the delivered items are incomplete or damaged.



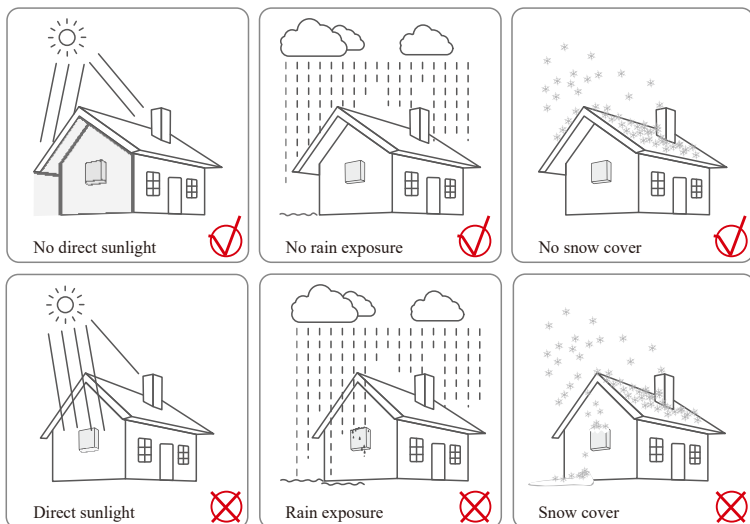
| Item | Quantity | Description                    |
|------|----------|--------------------------------|
| A    | 1        | Inverter                       |
| B    | 1        | Mounting bracket               |
| C    | 1        | File package                   |
| D    | 1        | Meter (Optional)               |
| E    | 1        | Current Transformer (CT) clamp |
| F    | 4        | M6 Expansion screws            |
| G    | 1        | M6 Security screw              |
| H    | 1        | Wi-Fi/LAN/4G module (Optional) |
| I    | 4        | 4-Pin terminal                 |
| J    | 1        | 9-Pin terminal                 |

## 3.2 Mounting Requirements

### 3.2.1 Environment Requirements

With an IP65 protection rating, the inverter can be mounted indoors or outdoors.

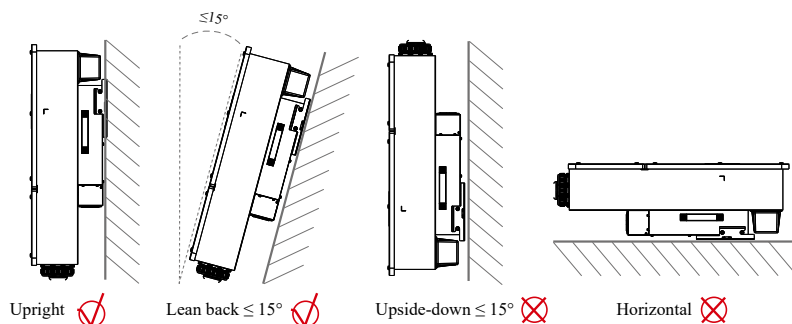
- a. The mounting location must be inaccessible to unrelated personnel since the enclosure and heat sinks are extremely hot during operation.
- b. Do not install the inverter in areas containing highly flammable materials or gases.
- c. To ensure optimum operation and long service life, the ambient temperature must be below 50°C.
- d. The inverter must be mounted in a well-ventilated environment to ensure good heat dissipation.
- e. The carrier where the inverter is mounted must be fire-proof. Do not mount the inverter on flammable building materials.
- f. Do not install the inverter in a rest area since it will cause noise during operation.
- g. The installation height should be reasonable, and please make sure it is easy to operate and view the display.
- h. Product label and warning symbols shall be clear to read after installation.
- i. To ensure long service life, the inverter must not be exposed to direct solar irradiation, rain, or snow. It is recommended that the inverter be mounted in a sheltered place.
- j. Please avoid direct sunlight, rain exposure, snow cover.





### 3.2.2 Angle Requirements

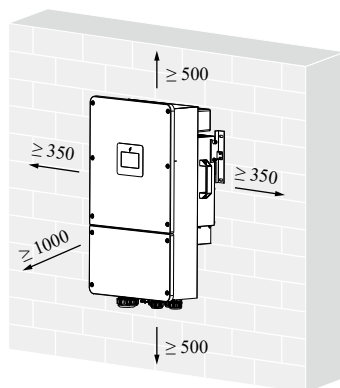
Mount the inverter vertically or at a maximum back tilt of  $15^\circ$ . Do not install the inverter in a wrong direction. Always keep the connection area downward.



### 3.2.3 Clearance Requirements

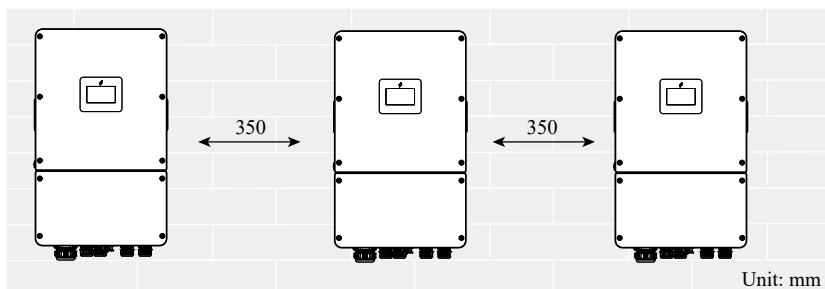
To guarantee optimal operation and adequate heat dissipation for the machine, the following requirements for clearances should be observed.

#### Clearance requirement for single installation



Unit: mm

#### Clearance requirement for multiple installation



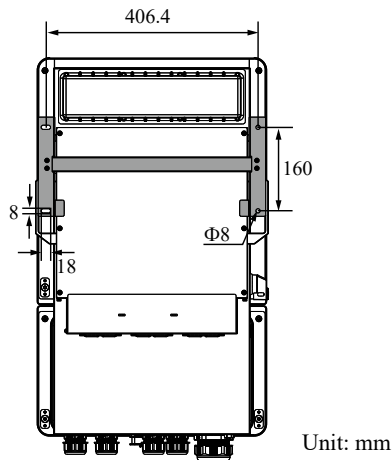
Unit: mm

### 3.3 Mounting the Inverter

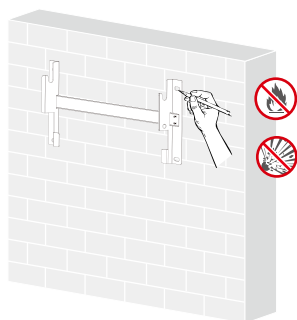
Before mounting the inverter, you have to prepare expansion screws and a security screw.

|                                                                                          |                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  DANGER  | <ul style="list-style-type: none"><li>• The installation walls must be fireproof and non-flammable materials, otherwise there is a fire risk.</li><li>• Before drilling holes, check whether there are electric power pipes or other pipes buried in the walls to avoid risks.</li></ul> |
|  CAUTION | To prevent potential damages and injuries from inverter falling down, please hang the inverter on the bracket, do not loosen grip unless confirm that the inverter is well-mounted.                                                                                                      |

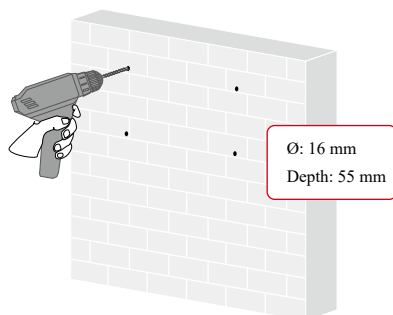
#### Mounting Bracket Location and Dimensions



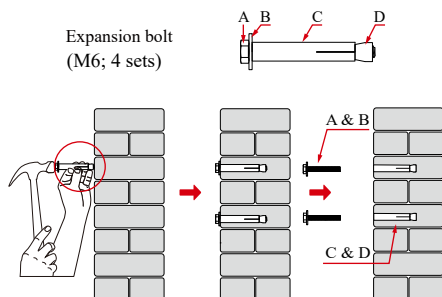
# Mounting Procedures



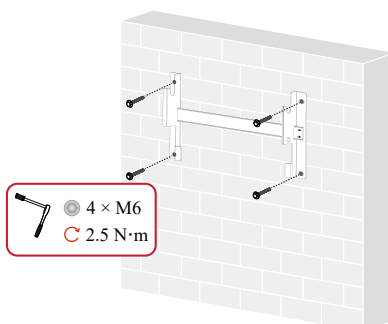
- 1 Set the mounting bracket horizontally and mark holes position on the wall.



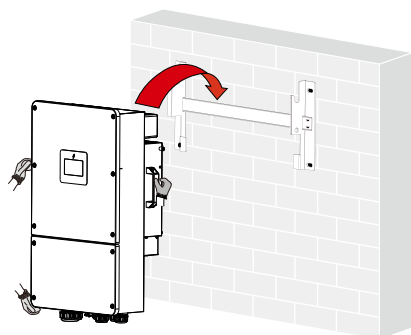
- 2 Drill holes on the marked position.



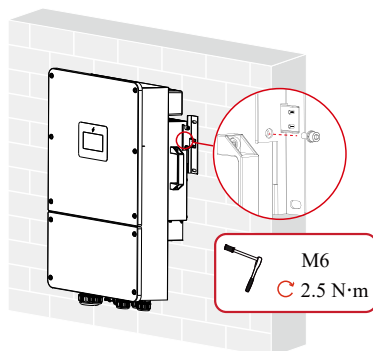
- 3 Hammer the expansion bolts into the wall.



- 4 Tighten the expansion bolts.



- 5 Mount the inverter onto the mounting bracket.



- 6 Lock the security screw.

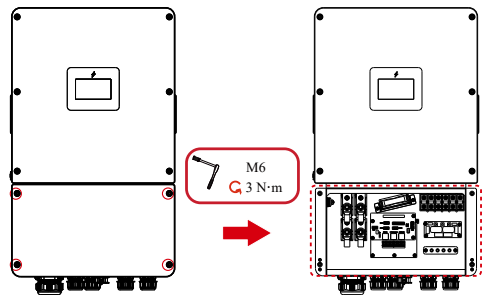
## 4. Electrical Connection

This chapter shows the detailed electrical connections of ESS inverter.

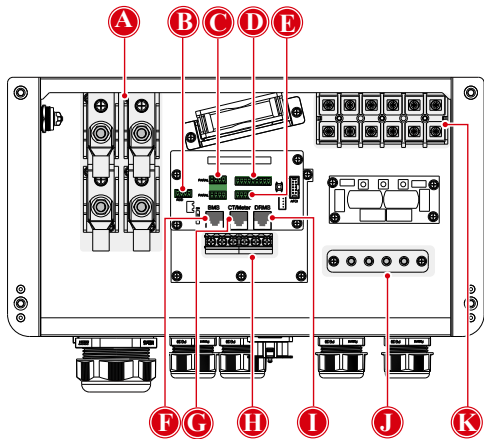
 **DANGER**

Ensure that inverter and all cables to be installed are completely powered off during whole installation and connection. Otherwise, high voltage may result in fatal injury.

### 4.1 Cover Removing



#### Wiring Box Overview

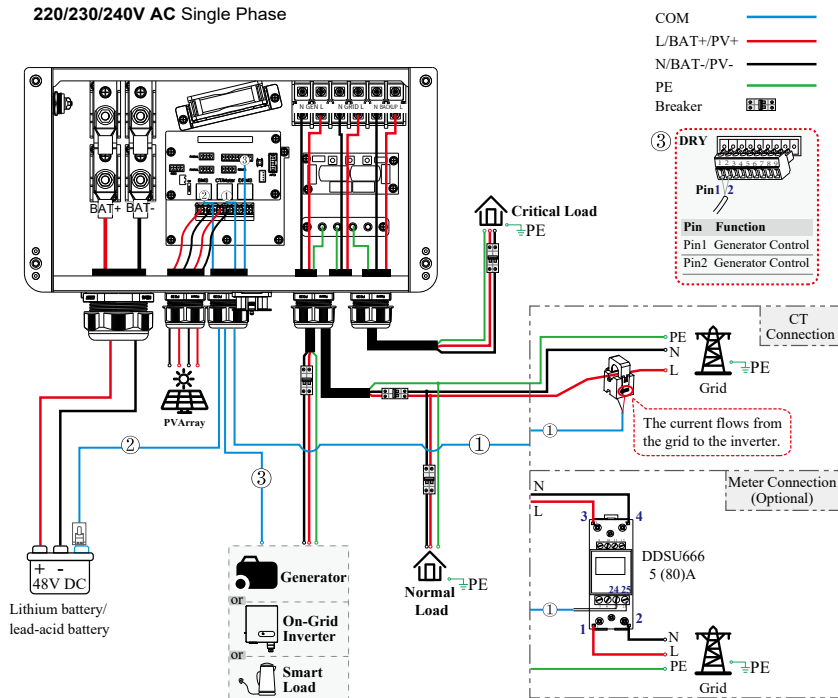


| Item | Description                                             | Item | Description                                     |
|------|---------------------------------------------------------|------|-------------------------------------------------|
| A    | Battery connection terminals                            | G    | CT/Meter connection RJ45 port                   |
| B    | RSD connection 4-pin terminal                           | H    | PV input connector                              |
| C    | Parallel connection terminal                            | I    | DRM (Demand response mode) connection RJ45 port |
| D    | GEN/NTC/RMO/DRY communication connection 9-pin terminal | J    | Ground bus bar                                  |
| E    | RS485 connection 4-pin terminal                         | K    | GEN/GRID/BACKUP connection terminals            |
| F    | BMS connection RJ45 port                                |      |                                                 |

## 4.2 Wiring Diagram

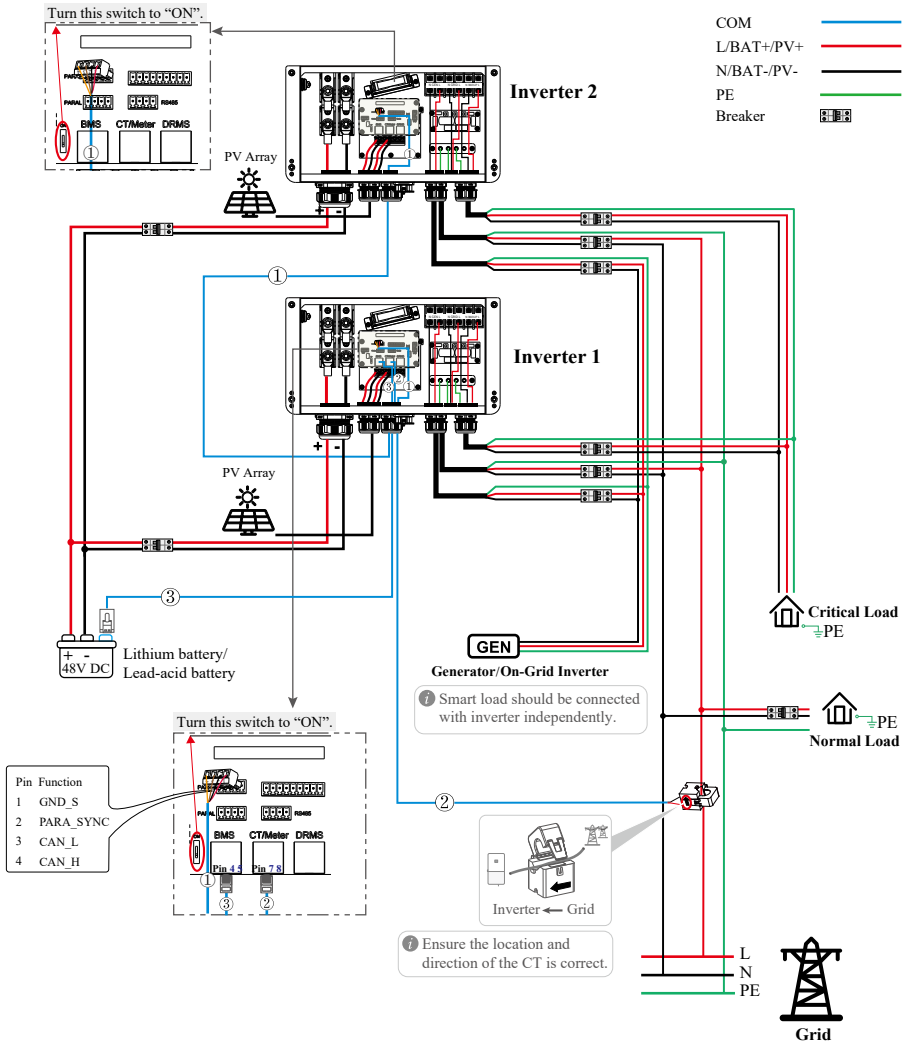
### Standard Non-parallel Wiring Diagram

### Diagram 01



Single phase parallel connection mode-Scheme A (N=2)

Diagram 02



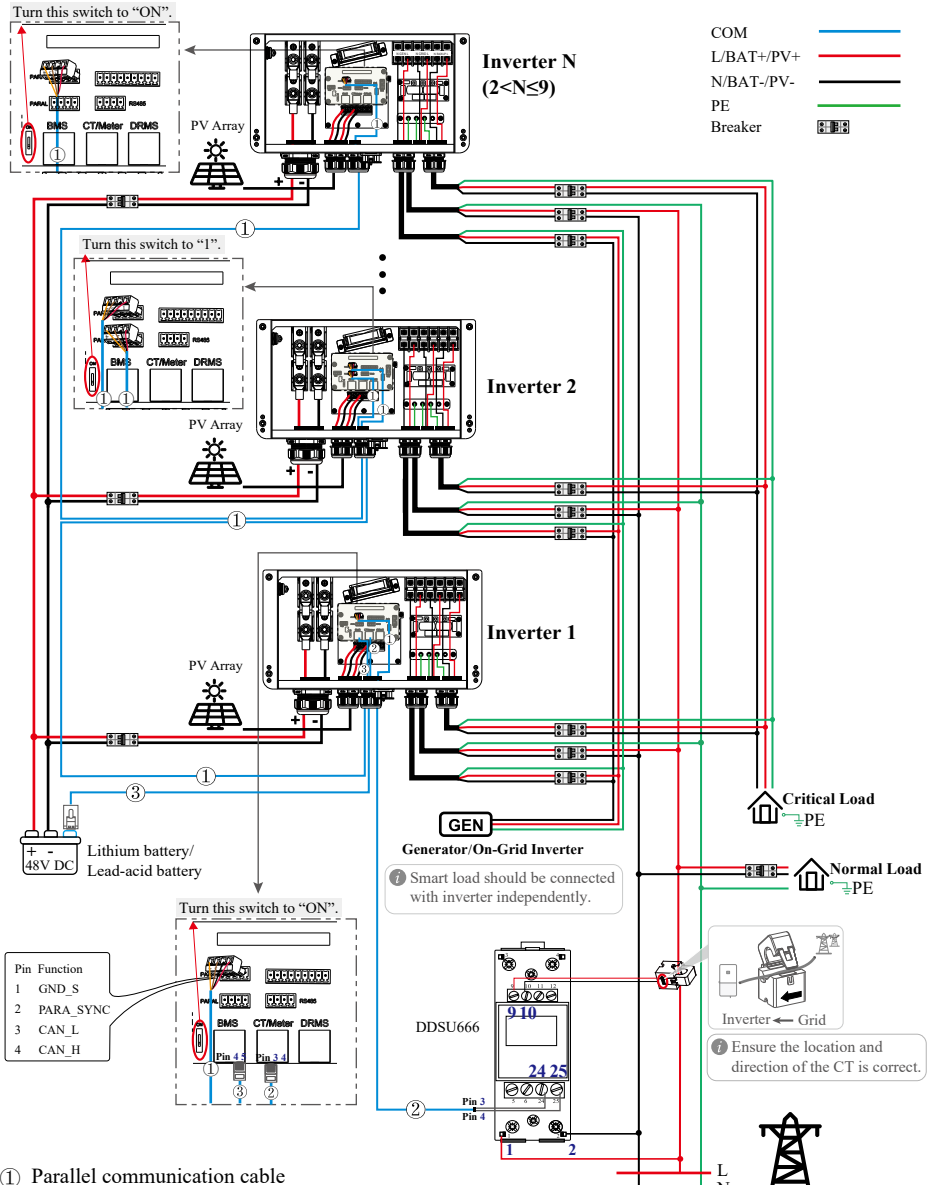
- ① Parallel communication cable
- ② CT communication cable
- ③ BMS communication cable

\*CT and BMS communication cables can be connected to any inverter of the parallel system, but they must be inserted into the same inverter and this inverter will be inverter 1.

\*Please refer to **Note for parallel wiring diagrams** to learn more information about this parallel diagram.

Single phase parallel connection mode-B ( $2 < N \leq 9$ )

## Diagram 03



\*Meter and BMS communication cables can be connected to any inverter of the parallel system, but they must be inserted into the same inverter and this inverter will be inverter 1.

\*Please refer to **Note for parallel wiring diagrams** to learn more information about this parallel diagram.

### Note for parallel wiring diagrams

1. BMS communication connection is only for lithium battery.
2. It is necessary to turn the matched resistance switch ( or DIP switch) of inverter 1 and inverter N to “ON” and others to “1” in parallel connection mode.
3. It is necessary to additionally purchase suitable CT and energy meter according to the specific requirements in parallel connection mode-Scheme B.
4. For a parallel system, it is required to enable parallel mode on one of the inverters, which can be done via the LCD (navigate to **Advanced Setting > Inverter > Parallel**) or the APP (log in as an **Installer** first, then go to **Settings > Inverter > Parallel**).
5. The external DC/AC breakers are not supplied with the inverter and must be purchased separately. Breaker recommendation for per circuit:  
DC Breaker (Battery side): 300 A / 80 V  
AC Breaker (GEN side):  $\geq 60$  A / 250 V  
AC Breaker (Grid side):  $\geq 70$  A / 250 V  
AC Breaker (Backup side):  $\geq 70$  A / 250 V
6. If it is required to install a parallel distributor, prepare the parallel DC/AC breakers with a nominal current  $\geq 2 * N * I_{max}$ . (N refers to the parallel inverter quantity;  $I_{max}$  refers to the maximum output current of the inverter.)



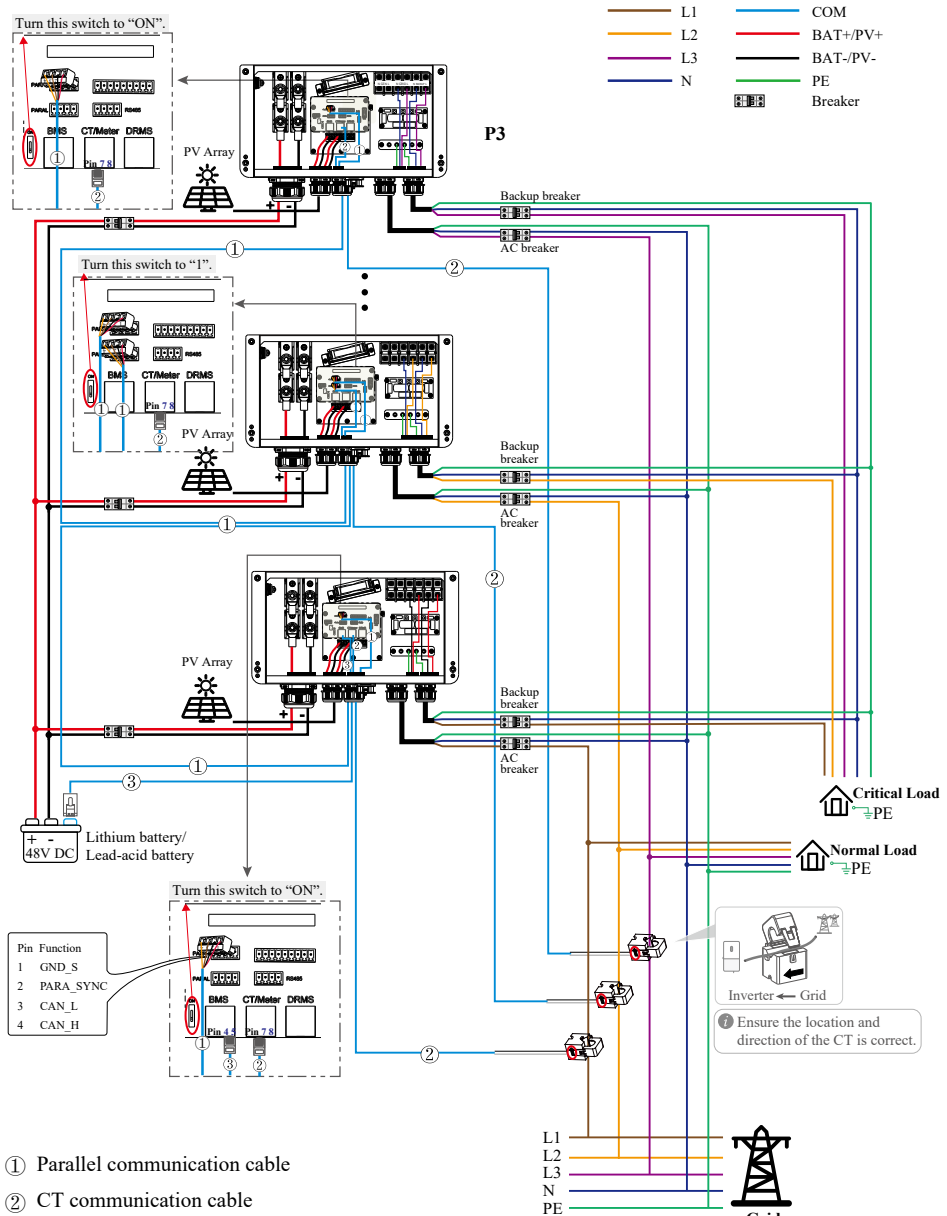
#### DANGER

Ensure that the inverter and all cables to be installed have been completely powered off during the whole process of installation and connection. Otherwise, high voltage may result in fatal injury.



## Three-phase parallel connection (N=3)

## Diagram 04



### Note for three-phase equipment wiring diagram

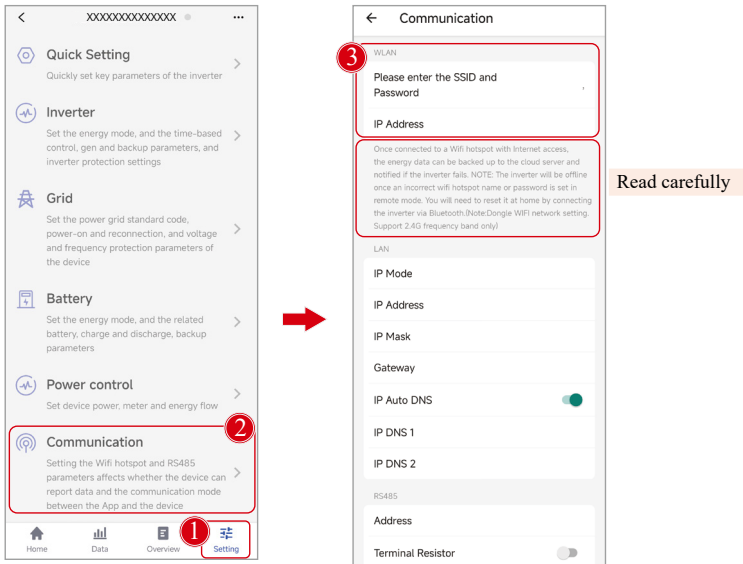
1. Before three-phase connection, please make sure all inverters in parallel have the same firmware version by verifying the 'DSP', 'CSB', and 'DC-DC converter' version numbers on App. It is recommended to reset the firmware before the three-phase connection to ensure the same parameter setting for each inverter.
2. Detailed connection steps of each port have been illustrated in the following sections of this chapter, please read carefully.
3. BMS connection is only applicable to lithium battery.
  - For shared lithium battery connection, please refer to Diagram 04 to connect the BMS communication cable.
  - For standalone lithium battery connection, the BMS communication cable needs to be connected to each inverter.

### App setting guide for three-phase connection

It is necessary to configure required parameters for successful three-phase connection.

**Step 1** Make sure the inverters are on standby. Then connect to any inverter in the three-phase system and login as an installer.

**Step 2** Wi-Fi configuration. Connect all inverters in the parallel system to the router separately.



**Step 3** Ensure the firmware versions of all inverters in the system are consistent.(Figure 4-1)

**Step 4** Reset factory data of every inverter (as shown in Figure 4-2).

 NOTE

After resetting, the inverter must be completely powered off before any other operations. Specifically, disconnect all power sources (PV, BAT, and Grid) and wait for 2 minutes until the internal power supply of the inverter is completely discharged. A full power-off cycle is required after using the reset command at any stage.

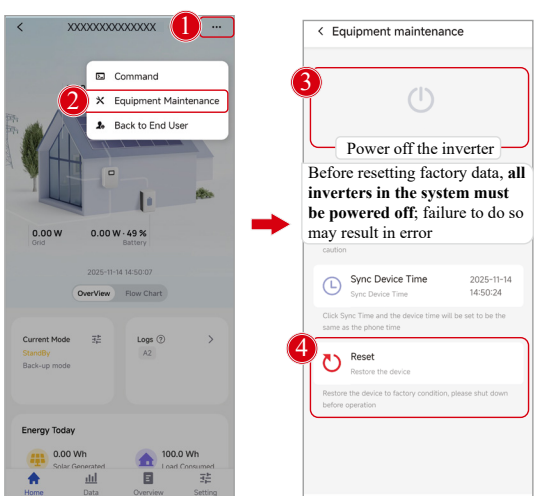
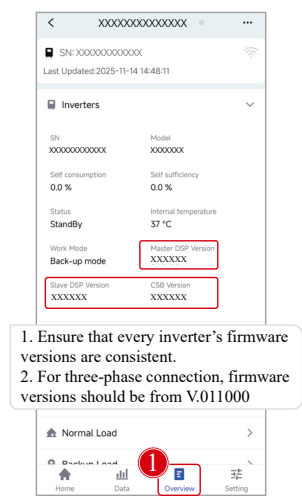


Figure 4-1 Firmware version check

Figure 4-2 Reset factory data

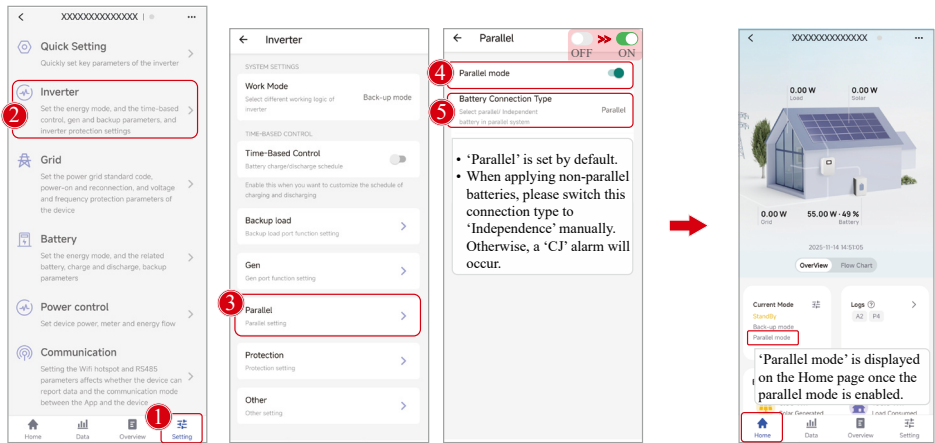
**Step 5** Enable parallel mode and configure three-phase system. Users only need to set parallel parameters on one inverter. All inverters in the parallel system will automatically synchronize the settings.

 NOTE

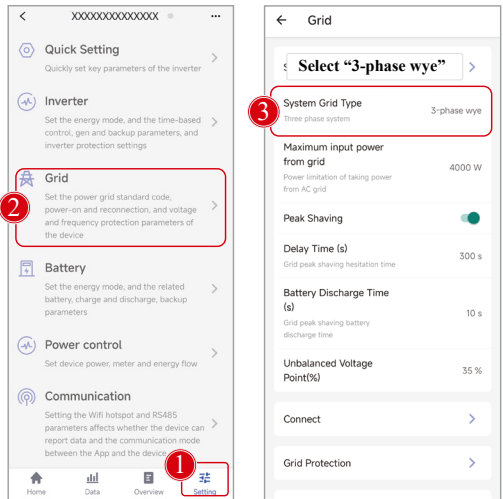
Before activating parallel mode, all inverters in the system shall finish **step a) separately**; otherwise, the parallel connection may fail.

1. After setting each parameter, please refresh the page. It is recommended to allow an interval of 3 seconds to ensure successful synchronization of the parameters.
2. When the parallel communication cable is well-connected and the function runs normally with parallel mode enabled, parameters applied on any inverter will be automatically synchronized to the others. This means parameters only need to be set on one inverter.
3. Please strictly follow the sequence for three-phase configuration:
  - a) Enable parallel mode;
  - b) Set the system grid type;
  - c) Set the three phase system (set phase position).
4. Otherwise, error alarms may occur and the inverter will not work normally.

a) Enable parallel mode

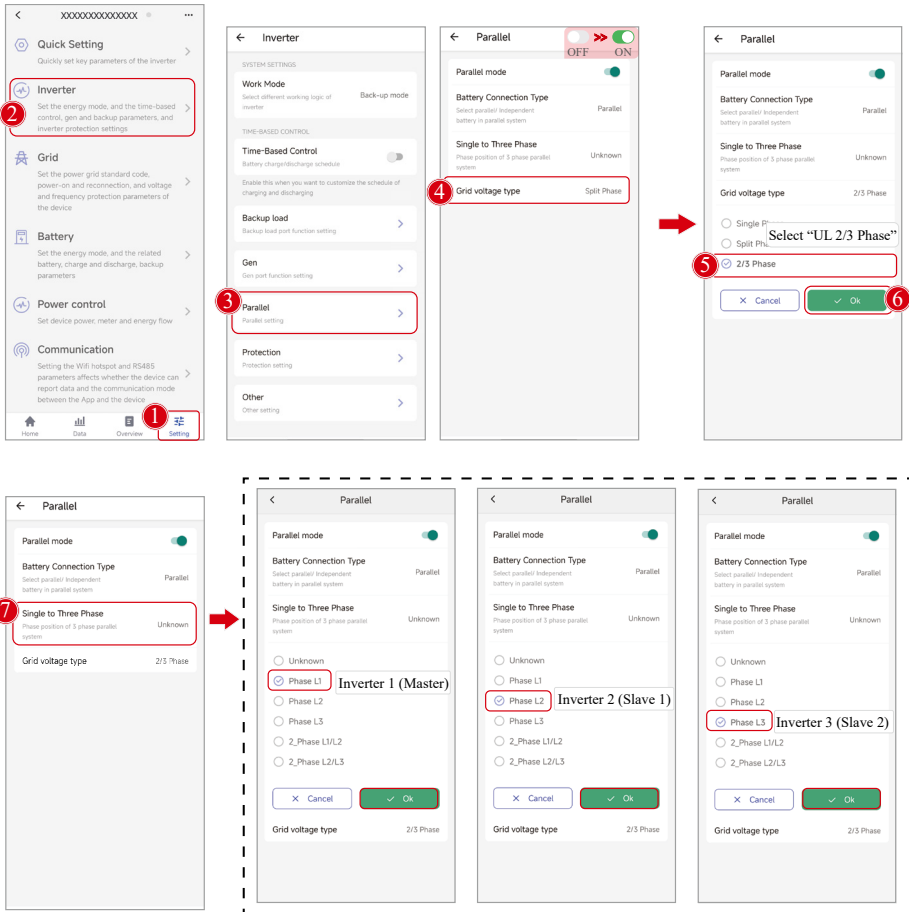


b) System Grid Type setting



### c) Grid voltage type and phase position setting.

This step should be performed separately on each parallel inverter; otherwise, the parallel connection may fail.



**Step 6** Set power control, power flow direction and power derating method.

Quick Setting

Inverter

Grid

Battery

**Power control**

Communication

Home

Data

Overview

**Setting**

Power Control

Digital Power Meter

Disable

CT sensor

**Digital Power Meter**

Cancel

**Ok**

Meter Location

Grid side

Meter Type

CHINT / DTSU666-UL

**Power Flow Direction**

From grid to inverter

Meter Modbus Address

Modbus address for energy meter1

**Power Derating Method**

Independent phase power

Max. Grid Feed-In Power (W)

1260 W

While "Independent phase power" is set by default, it is important to ensure that all inverters in the three-phase system are indeed set to "Independent phase power".

**LCD setting guide for three-phase connection**

**Step 1** Enter the Advanced menu of any inverter in the three-phase parallel system. The initial password is "admin".

29/09/24 13:36

⚙️

**1**

4.60 kW

1.00 kW

2.04 kW

3.56 kW

Input Advanced Settings Password

.....

**3**

123

**2**

Advanced

Inverter

Grid

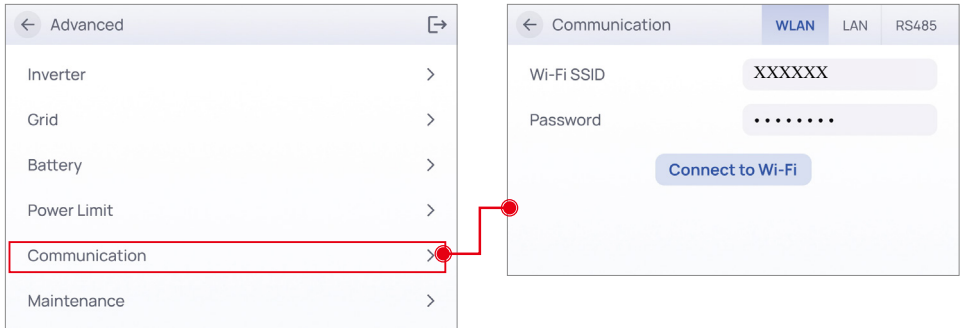
Battery

Power Limit

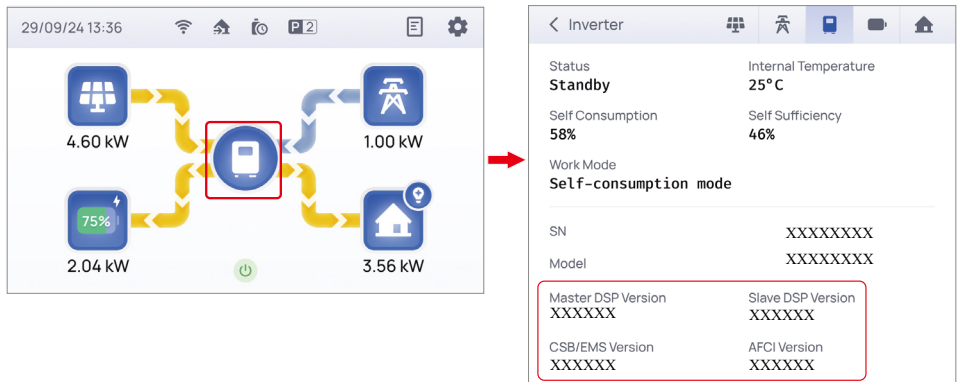
Communication

Maintenance

**Step 2** Wi-Fi configuration. Connect all inverters in the parallel system to the router separately.

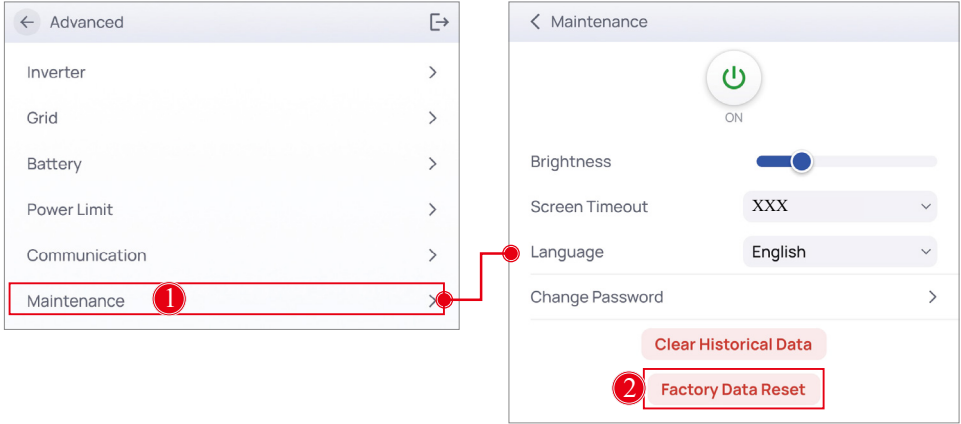


**Step 3** Make sure the inverters are on standby and ensure the firmware versions of all inverters in the system are consistent.



**Step 4** Reset factory data of every inverter.

|                                                                                   |      |                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | NOTE | <p>After resetting, the inverter must be completely powered off before any other operations. Specifically, disconnect all power sources (PV, BAT, and Grid) and wait for 2 minutes until the internal power supply of the inverter is completely discharged. A full power-off cycle is required after using the reset command at any stage.</p> |
|-----------------------------------------------------------------------------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

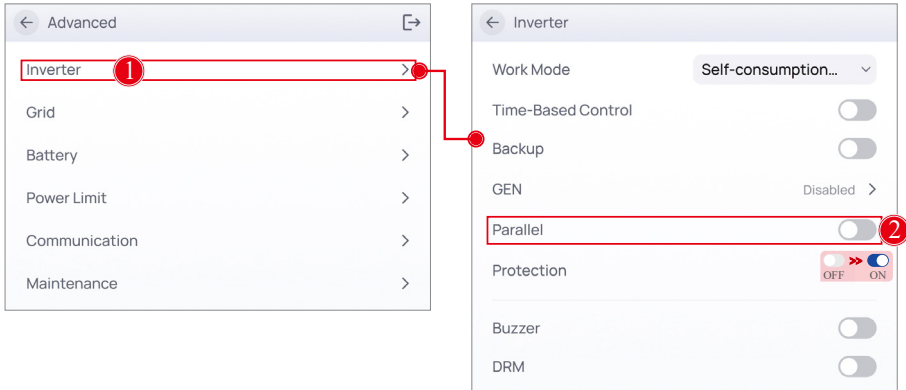


**Step 5** Enable parallel mode and configure three-phase system. Users only need to set parallel parameters on one inverter. All inverters in the parallel system will automatically synchronize the settings.

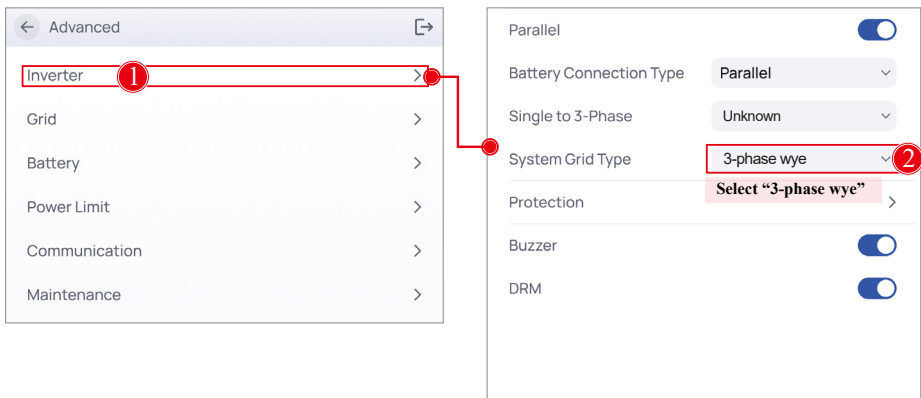
|                                                                                     |      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------------------------------------------------------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | NOTE | <ol style="list-style-type: none"> <li>1. Before activating parallel mode, all inverters in the system shall finish <b>step a) separately</b>; otherwise, the parallel connection may fail.</li> <li>2. After setting each parameter, please refresh the page. It is recommended to allow an interval of 3 seconds to ensure successful synchronization of the parameters.</li> <li>3. When the parallel communication cable is well-connected and the function runs normally with parallel mode enabled, parameters applied on any inverter will be automatically synchronized to the others. This means parameters only need to be set on one inverter.</li> <li>4. Please strictly follow the sequence for three-phase configuration: <ul style="list-style-type: none"> <li>• a) Enable parallel mode;</li> <li>• b) Set the system grid type;</li> <li>• c) Set grid voltage type;</li> <li>• d) Set phase position.</li> </ul> <p>Otherwise, error alarms may occur and the inverter will not work normally.</p> </li> </ol> |
|-------------------------------------------------------------------------------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



### a) Enable parallel mode



### b) System Grid Type setting



c) Grid voltage type and phase position setting.

This step should be performed separately on each parallel inverter; otherwise, the parallel connection may fail.

← Advanced

Grid

Battery

Power Limit

Communication

Maintenance

1

< Grid

Standard Code

Grid Voltage Type

Peak Shaving

Connect

UL (UL1741 SA)

UL 2/3 phase

Single phase

UL split phase

2

UL 2/3 phase

Select "UL 2/3 phase"

d) Phase position setting.

This step should be performed separately on each parallel inverter; otherwise, the parallel connection may fail.

← Advanced

Inverter

Grid

Battery

Power Limit

Communication

Maintenance

1

Parallel

Battery Connection Type

Single to 3-Phase

System Grid Type

Protection

Buzzer

DRM

Parallel

Parallel

Inverter 1 (Master)

2

Phase L1

Phase L1

Phase L2

Phase L3

Parallel

Battery Connection Type

Single to 3-Phase

System Grid Type

Protection

Buzzer

DRM

Parallel

Parallel

Inverter 2 (Slave1)

2

Phase L2

Phase L1

Phase L2

Phase L3

Parallel

Battery Connection Type

Single to 3-Phase

System Grid Type

Protection

Buzzer

DRM

Parallel

Parallel

Inverter 3 (Slave2)

2

Phase L3

Phase L1

Phase L2

Phase L3

**Step 6** Set power control, power flow direction and power derating method.

The image shows two screenshots from a device's configuration interface. The left screenshot shows the 'Advanced' menu with 'Power Limit' selected and highlighted with a red box and a red circle containing the number 1. A red line connects this selection to the right screenshot. The right screenshot shows the 'Power Limit' settings screen with the following items highlighted by red boxes and red circles containing numbers:

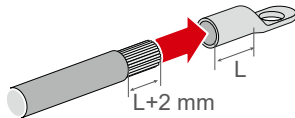
- Power Control:** Digital power meter (2)
- Power Flow Direction:** From grid to inverter (3)
- Power Derating Method:** Independent phase power (4)

Other visible settings include:

- Meter Location:** Grid side
- Meter Type:** CHINT/DTSU666
- Meter Modbus Address:** 255
- Max. Grid Feed-In Power:** Minimum phase power
- Max. Grid Import Power:** Total power

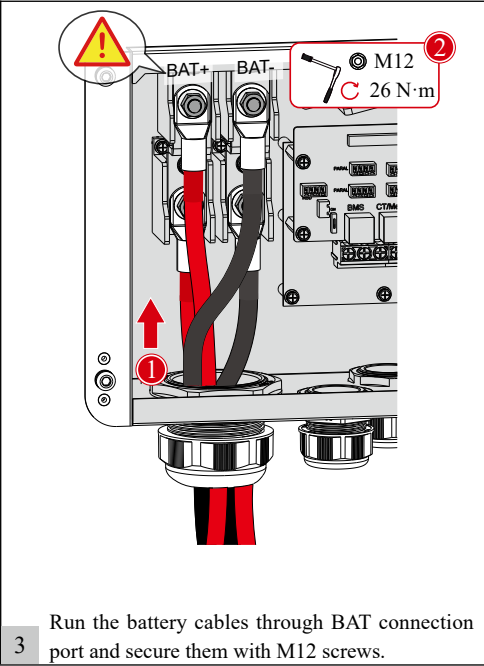
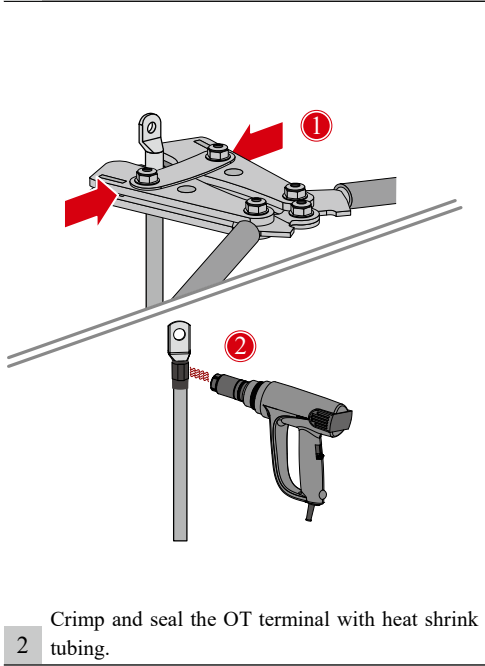
### 4.3 Battery Connection

|                                                                                                 |                                                                                                                                                                                                                                                                                                            |
|-------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <b>DANGER</b>  | <ul style="list-style-type: none"><li>• Before connecting the battery terminals, ensure that both the AC terminal and the DC terminal are powered off and the PV switch is OFF. Otherwise there is a risk of high voltage shock.</li><li>• Reverse polarity connection will damage the inverter!</li></ul> |
|  <b>CAUTION</b> | When connecting two battery circuits to the ESS inverter, the models and brands of the batteries should be the same.                                                                                                                                                                                       |



| Wire Size | OT Terminal |
|-----------|-------------|
| 4/0 AWG   | OT 100-12   |

1 Make the cables.



## 4.4 PV Connection

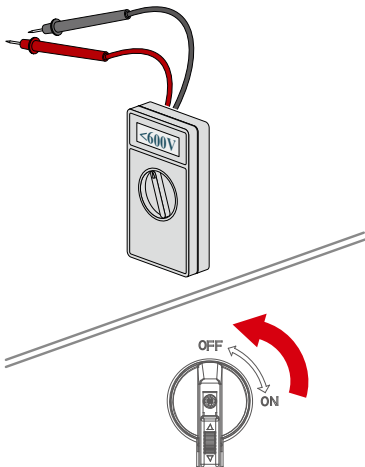
|                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <b>WARNING</b> | <ul style="list-style-type: none"> <li>• Please check polarity of PV connectors!</li> <li>• If polarity reversed, do not try to disconnect any PV connector until the irradiance declines and the DC currents fall below 0.5 A! Only then disconnect the PV plugs and correct the polarity before reconnecting.</li> </ul>                                                                                              |
|  <b>NOTICE</b>  | <ul style="list-style-type: none"> <li>• Before connecting the PV panel, make sure the polarity is correct. Reverse polarity may permanently damage the inverter.</li> <li>• DO NOT connect PV to the grounding conductor.</li> <li>• The minimum insulation resistance to ground of the PV panels must exceed 33.3 kΩ, there is a risk of shock hazard if the requirement of minimum resistance is not met.</li> </ul> |



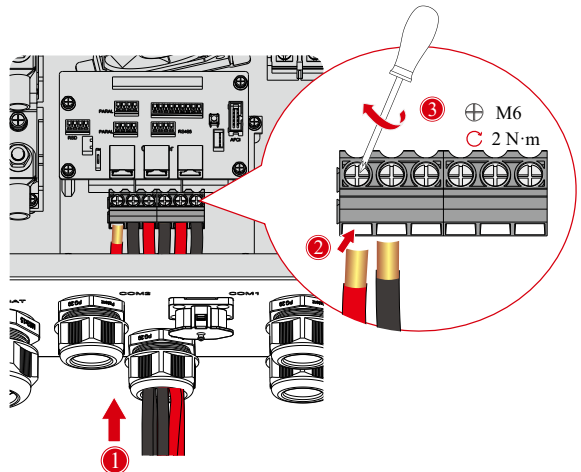
| Wire Size   | Strip Length |
|-------------|--------------|
| 8 to 10 AWG | 15 mm        |

Note: PV cable should be dedicated PV cable

### 1 Strip the cables.



Test string voltage and confirm string polarity. Ensure that the PV switch is turned to 'OFF'.



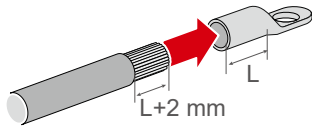
Run the PV cables through PV connection ports. Insert the PV cables into terminal blocks. Ensure that the polarity is correct and all the cables are securely in place.

4.5 GRID/GEN/BACKUP Connection



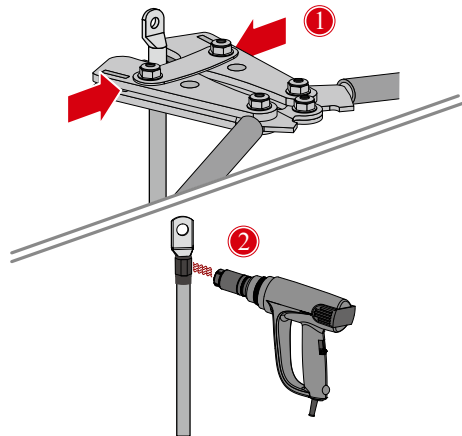
DANGER

Before connecting the GRID/GEN/BACKUP terminals, ensure that both the AC terminal and the DC terminal are powered off and the PV switch is OFF. Otherwise there is a risk of high voltage shock.

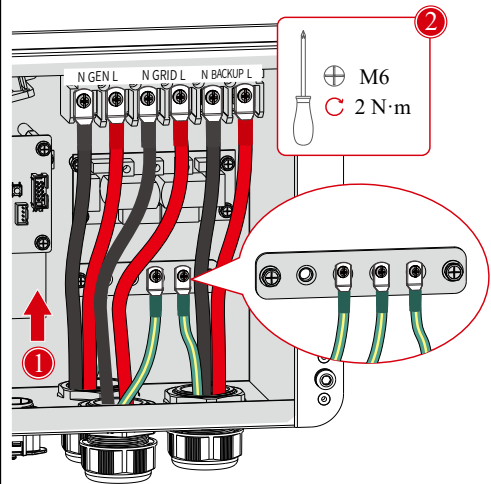


| AC     | Wire Size      | OT Terminal       |
|--------|----------------|-------------------|
| GEN    | 6 AWG to 4 AWG | OT 38-6 for 2 AWG |
| GRID   | 4 AWG to 2 AWG | OT 22-6 for 4 AWG |
| BACKUP | 4 AWG to 2 AWG | OT 14-6 for 6 AWG |

1 Strip the wires insulation.

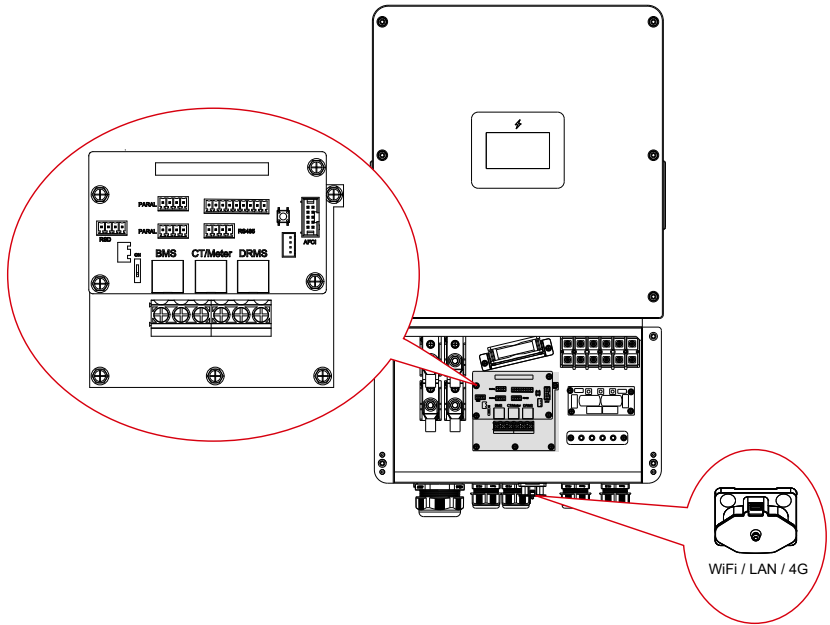


2 Crimp and seal the terminal with heat shrink tubing .



3 Run the cables into the grounding busbar and the terminal blocks through the GRID/GEN/BACKUP connection ports accordingly. Then, secure cables with M6 screws.

4.6 Communication Connection



| Interface |             | Description                                             |
|-----------|-------------|---------------------------------------------------------|
| 4-Pin     | RSD         | Rapid shutdown device control.                          |
|           | PARAL       | A matched resistance switch for parallel communication. |
|           | RS485       | RS485 communication (Monitoring).                       |
| 9-Pin     | GEN         | Generator control                                       |
|           | NTC         | Temperature sensor terminal of lead-acid battery        |
|           | RMO         | Remote off control                                      |
|           | DRY         | DI/DO control                                           |
| RJ45      | BMS         | Lithium battery communication interface.                |
|           | CT/Merter   | For CT/Meter communication or grid current sense.       |
|           | DRMS        | Demand response mode for Australia application.         |
| USB       | WIFI/LAN/4G | For Wi-Fi/LAN/4G communication.                         |

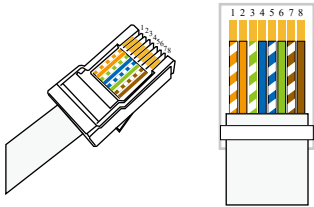
4.6.1 BMS Connection



NOTE

- BMS communication connection is only for lithium battery.
- This manual ONLY illustrates the pinout sequence of BMS at INVERTER SIDE. For details about the pinout sequence at battery side, see the user manual of the battery you use, and the following pinout diagram of battery side is only for illustration.

Standard RJ45 Pinout



| Pin | Function Description |
|-----|----------------------|
| 1   | White-Orange         |
| 2   | Orange               |
| 3   | White-Green          |
| 4   | Blue                 |
| 5   | White-Blue           |
| 6   | Green                |
| 7   | White-Brown          |
| 8   | Brown                |

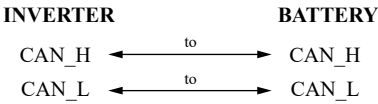
Always face the flat side of the terminal, and count the pin slots from left to right, which correspond to 1 to 8. Read the pin definitions of both the battery and inverter carefully.

Pin Definition of RJ45 Interface

| Inverter  |     |                      |
|-----------|-----|----------------------|
| RJ45 Port | Pin | Function Description |
|           | 1   | /                    |
|           | 2   | /                    |
|           | 3   | /                    |
|           | 4   | CAN_H                |
|           | 5   | CAN_L                |
|           | 6   | /                    |
|           | 7   | /                    |
|           | 8   | /                    |

| Battery Example |                      |
|-----------------|----------------------|
| Pin             | Function Description |
| 1               | /                    |
| 2               | /                    |
| 3               | /                    |
| 4               | CAN_H                |
| 5               | CAN_L                |
| 6               | GND                  |
| 7               | /                    |
| 8               | /                    |

CAN BUS Connection Principle





## Procedure

Method 1: Use the INVERTER RJ45 pinout as the standard pinout to crimp wires, then the battery side will be a non-standard one (special pinout). Cut off the other no-used wires (1/2/3/6/7/8) for the battery RJ45 terminal.



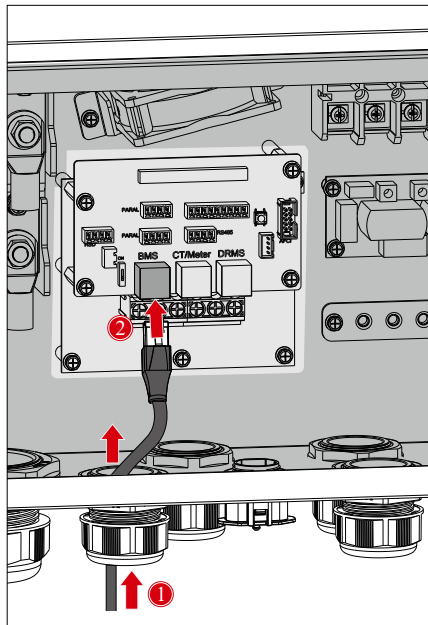
Method 2: Use the BATTERY RJ45 pinout as the standard pinout to crimp wires, then the inverter side will be a non-standard one (special pinout). Cut off the other no-used wires (1/2/3/6/7/8) for the inverter RJ45 terminal.



Prepare RJ45 terminals and strip appropriate length of COM cables.

- a. According to pin definitions and cable order, assemble the RJ45 terminals and crimp communication wires. There are two methods to assemble the RJ45 terminals.
- b. Then label the RJ45 terminals (BAT or INV) to avoid confusion.
- c. After finishing wire-making, use a multimeter or other specific tool to determine if your cable is good, bad, or wired incorrectly.

1



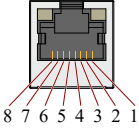
2

- ① Run the BMS cable into the wiring box through the COM port.
- ② Insert the RJ45 connector into BMS connection port.

4.6.2 CT/Meter Connection

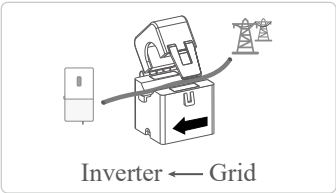
A CT/Meter is applied to monitor electricity usage of all loads.

Pin Definition of RJ45 Interface

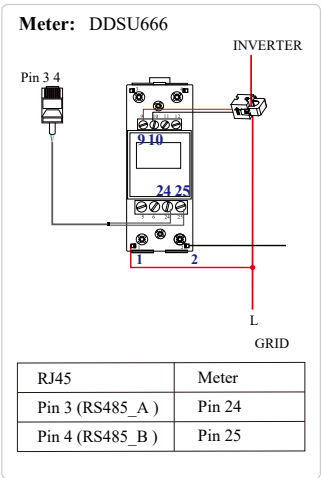
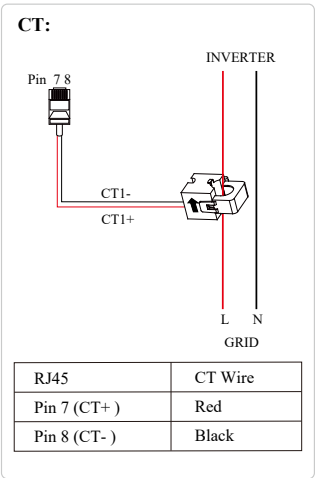
| Inverter                                                                          |     |                      |
|-----------------------------------------------------------------------------------|-----|----------------------|
| RJ45 Port                                                                         | Pin | Function Description |
|  | 1   | /                    |
|                                                                                   | 2   | /                    |
|                                                                                   | 3   | RS485_A              |
|                                                                                   | 4   | RS485_B              |
|                                                                                   | 5   | /                    |
|                                                                                   | 6   | /                    |
|                                                                                   | 7   | CT1+                 |
|                                                                                   | 8   | CT1-                 |

CT Connection Requirement

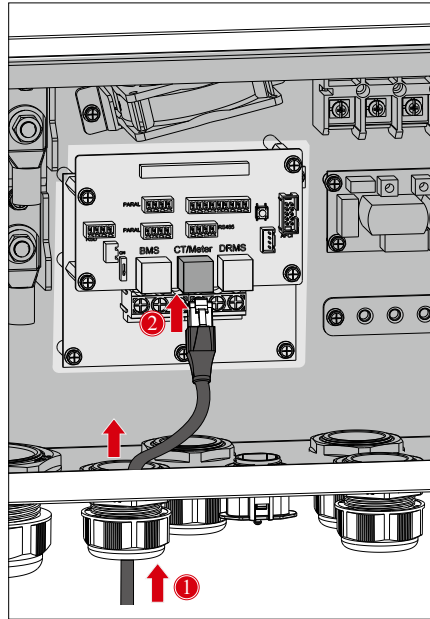
- CT clamp should be connected to Phase L
- Ensure the current arrow on the CT sensor points from the grid to the inverter



CT or Meter connection overview



## Procedure



- ① Run the CT/Meter cable into the wiring box through the COM port.

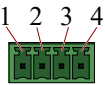
1

- ② Insert the RJ45 connector into CT/Meter connection port.

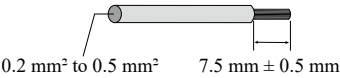
4.6.3 RS485 Communication Connection

RS485 communication is usually applied between multiple inverters or between an inverter and a data-logger. Additionally required material (not included in the scope of delivery): RS485 communication cable.

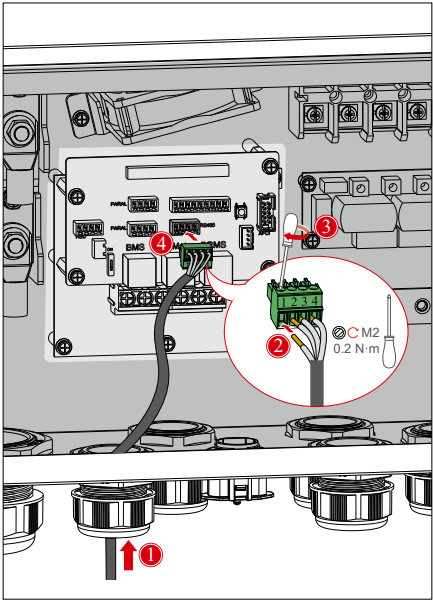
4-Pin Connection Port Configuration

| Inverter                                                                                   |     |                      |
|--------------------------------------------------------------------------------------------|-----|----------------------|
| 4-Pin Port                                                                                 | Pin | Function Description |
| <br>RS485 | 1   | RS485_A              |
|                                                                                            | 2   | RS485_B              |
|                                                                                            | 3   | PE                   |
|                                                                                            | 4   | PE                   |

Procedure



- 1
- Strip the cable insulation.



- 2
- ① Run the RS485 communication cable into the wiring box through the COM port.

② Insert the wires into a 4-pin terminal.

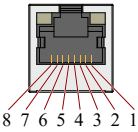
③ Secure wires with M2 screws.

④ Insert the assembled 4-pin terminal into the RS485 4-pin connection port.

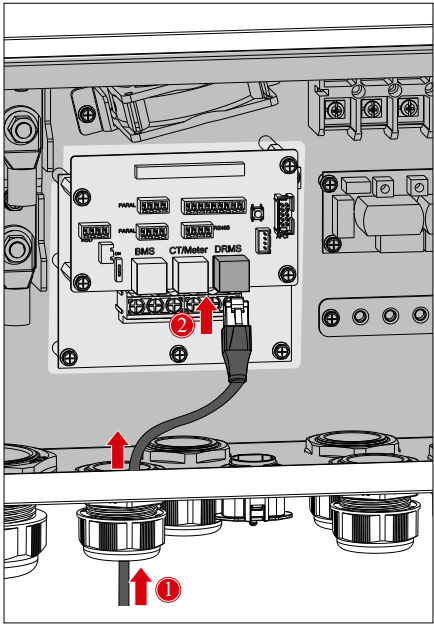
### 4.6.4 DRMs Connection

DRMs is a shortened form for "inverter demand response modes". It is a compulsory requirements for inverters in Australia.

#### 4-Pin Connection Port Configuration

| Inverter                                                                          |     |                      |
|-----------------------------------------------------------------------------------|-----|----------------------|
| RJ45 Port                                                                         | Pin | Function Description |
|  | 1   | DRMs 1/5             |
|                                                                                   | 2   | DRMs 2/6             |
|                                                                                   | 3   | DRMs 3/7             |
|                                                                                   | 4   | DRMs 4/8             |
|                                                                                   | 5   | REF                  |
|                                                                                   | 6   | GND                  |
|                                                                                   | 7   | NC                   |
|                                                                                   | 8   | NC                   |

#### Procedure



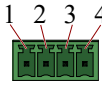
- ① Run the DRMs cable into the wiring box through the COM port.

- 1 ② Insert the RJ45 connector into DRMs connection port.

4.6.5 Parallel Communication Connection

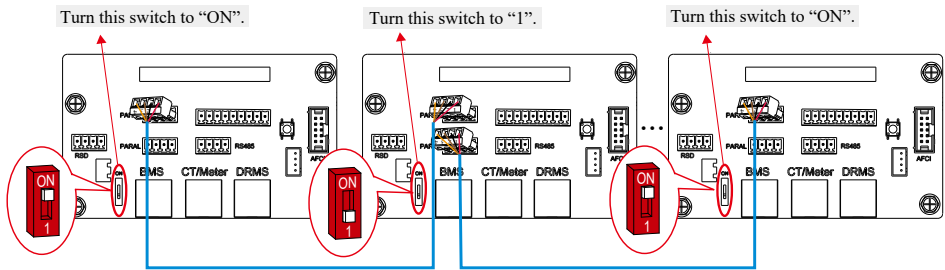
Additionally required material (not included in the scope of delivery): Parallel communication cable

4-Pin Connection Port Configuration

| Inverter                                                                                   |     |                      |
|--------------------------------------------------------------------------------------------|-----|----------------------|
| 4-Pin Port                                                                                 | Pin | Function Description |
| <br>RS485 | 1   | GND_S                |
|                                                                                            | 2   | PARA_SYNC            |
|                                                                                            | 3   | CAN_L                |
|                                                                                            | 4   | CAN_H                |

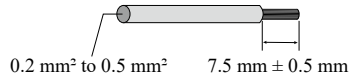
Parallel connection overview

It is necessary to turn the matched resistance switch (DIP switch) of inverter 1 and inverter N to “ON” in parallel connection mode.

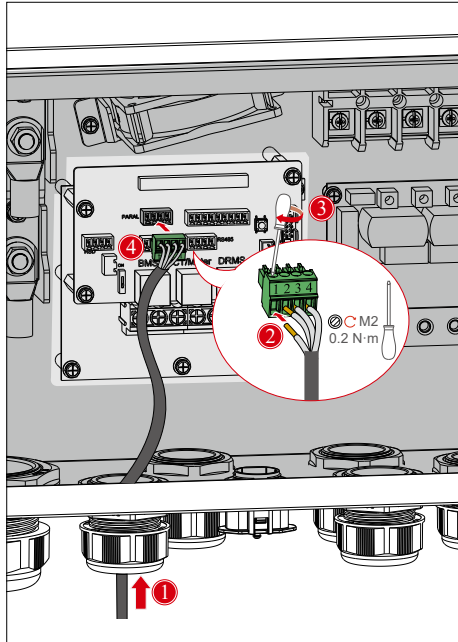


| Inverter 1       | Inverter 2       | ... | Inverter N       |
|------------------|------------------|-----|------------------|
| Pin4 (CAN_H)     | Pin4 (CAN_H)     |     | Pin4 (CAN_H)     |
| Pin3 (CAN_L)     | Pin3 (CAN_L)     |     | Pin3 (CAN_L)     |
| Pin2 (PARA_SYNC) | Pin2 (PARA_SYNC) |     | Pin2 (PARA_SYNC) |
| Pin1 (GND_S)     | Pin1 (GND_S)     |     | Pin1 (GND_S)     |

## Procedure



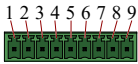
- 1 Strip the cable insulation.



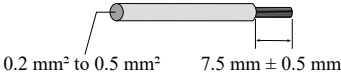
- ① Run the parallel communication cable into the wiring box through the COM port.
  - ② Insert the wires into a 4-pin terminal.
  - ③ Secure wires with M2 screws.
- 2 ④ Insert the assembled 4-pin terminal into the PARA 4-pin connection port.

4.6.6 NTC / RMO / DRY Communication Connection

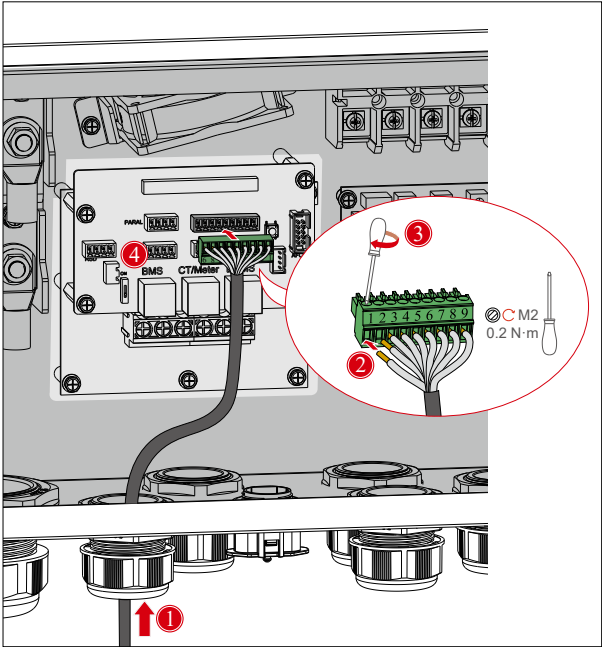
9-Pin Connection Port Configuration

| Inverter                                                                                 |     |                      |   |                    |
|------------------------------------------------------------------------------------------|-----|----------------------|---|--------------------|
| 9-Pin Port                                                                               | Pin | Function Description |   |                    |
| <br>DRY | 1   | GEN Control          | 6 | NC2 (Normal Close) |
|                                                                                          | 2   | GEN Control          | 7 | Remote OFF         |
|                                                                                          | 3   | NC1 (Normal Close)   | 8 | GND S(NTC BAT)     |
|                                                                                          | 4   | NO2 (Normal Open)    | 9 | NTC BAT+           |
|                                                                                          | 5   | N2                   |   |                    |

Procedure



- 1
- Strip the cable insulation.



- 1
- ① Run the NTC / RMO / DRY communication cable into the wiring box through the COM port.

② Insert the wires into a 4-pin terminal.

③ Secure wires with M2 screws.
- 2
- ④ Insert the assembled 9-pin terminal into the DRY 9-pin connection port.

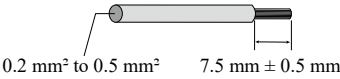


### 4.6.7 RSD Connection

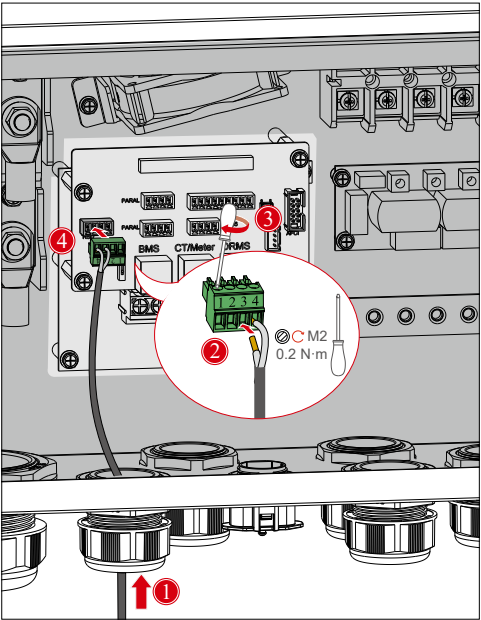
#### 4-Pin Connection Port Configuration

| Inverter                                                                          |     |                       |
|-----------------------------------------------------------------------------------|-----|-----------------------|
| 4-Pin Port                                                                        | Pin | Function Description  |
|  | 1   | /                     |
|                                                                                   | 2   | /                     |
|                                                                                   | 3   | Emergency stop signal |
|                                                                                   | 4   | Emergency stop signal |

#### Procedure



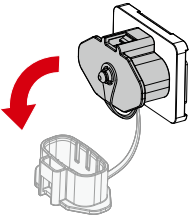
- 1 Strip the cable insulation.



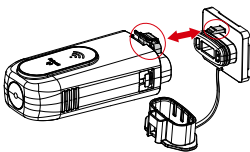
- ① Run the RSD communication cable into the wiring box through the COM port.
- ② Insert the wires into a 4-pin terminal.
- ③ Secure wires with M2 screws.
- 2 ④ Insert the assembled 4-pin terminal into the RSD 4-pin connection port.

4.6.8 Wi-Fi/LAN/4G Module Connection (Optional)

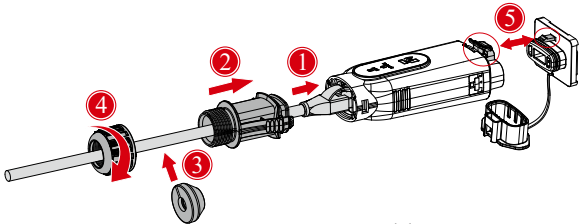
For details, please refer to the corresponding Module Installation Guide in the packing.  
The appearance of modules may be slightly different. The figure shown here is only for illustration.



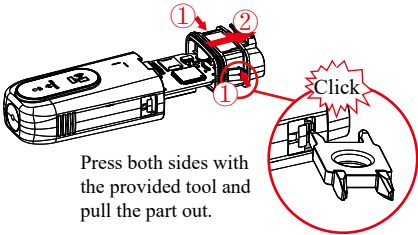
- 1 Remove the cover.



Wi-Fi Module

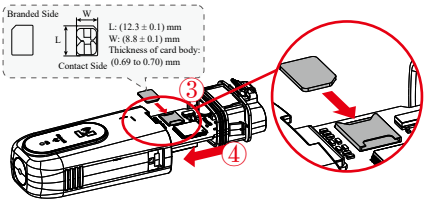


LAN Module



Press both sides with the provided tool and pull the part out.

4G Module

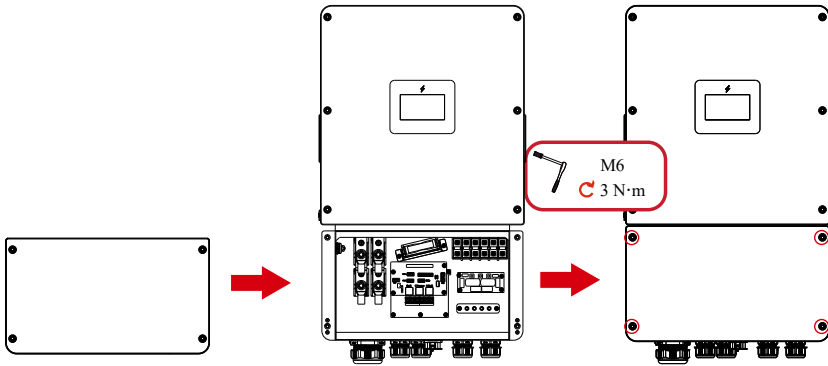


*Note: Only specific models are compatible with the 4G module. Please consult your dealer for details.*

- 2 Insert the Wi-Fi/LAN/4G module into the USB port firmly.

## 4.7 Cover Installation

Re-install the cover after wiring.



## 5. System Operation

### 5.1 Inverter Working Mode

The inverter supports several different working modes.

#### 5.1.1 Self-Consumption Mode

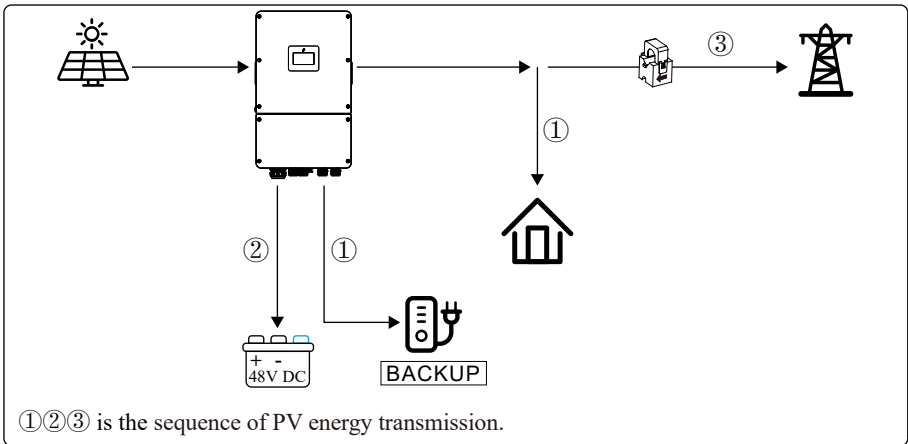
Go to **Settings > Advanced > Inverter** page and tap **Work mode** to select **Self-consumption mode** on the LCD.

In Self-consumption mode, the priority of PV energy consumption will be Load > Battery > Grid, that means the energy produced by PV gives priority to loads, the excess energy is used to charge the battery and the remaining energy is fed into the grid.

This is the default mode to increase energy efficiency. There are several situations of self-consumption working mode based on PV energy.

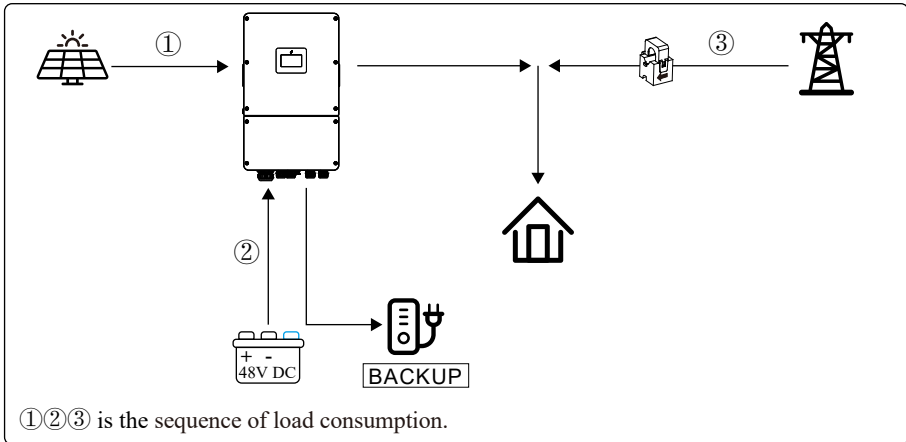
##### a) Abundant PV Energy

When PV energy is sufficient, it will give priority to local loads, the excess energy charges the battery first, then the remaining power will be fed into the grid.



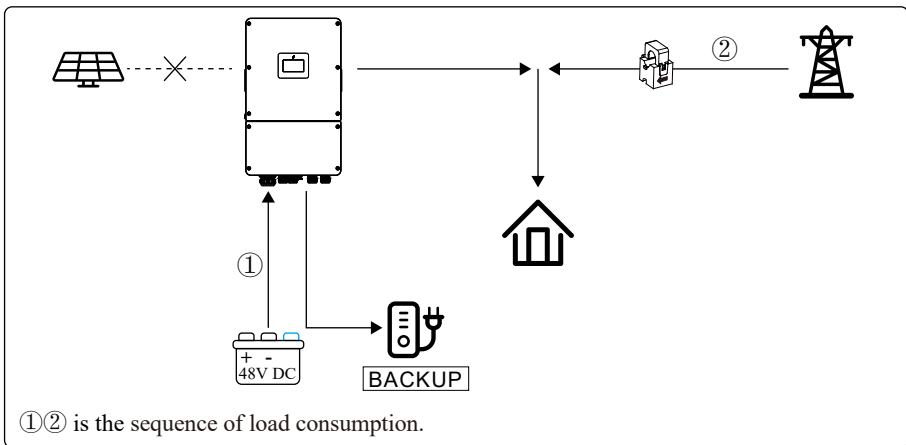
## b) Limited PV Energy

When the PV energy is not enough to cover all consumption, the PV energy will be entirely used by loads, and the insufficient part will be supplied by battery. Then still insufficient parts will be supplied by grid.



## c) No PV Input

The inverter will first discharge the battery energy for home load consuming when no PV input (such as in the evening or some cloudy or rainy days). If the battery power is not enough, the load will be supplied by the grid.



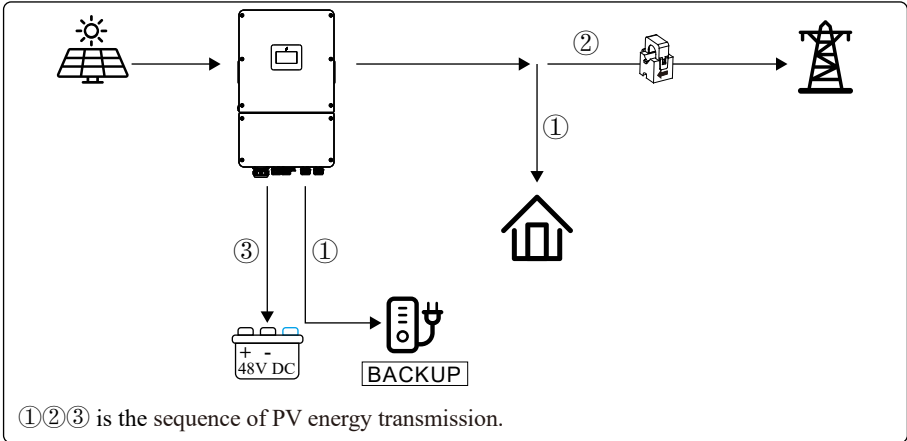
### 5.1.2 Feed-in Priority Mode

Go to **Settings > Advanced > Inverter** page and tap **Work mode** to select the **Feed-in priority mode** on the LCD.

In this mode, the supply priority of PV power will be Load > Grid > Battery, that means the power generated by PV system gives priority to local loads, the excess power will be fed into the grid first, then the remaining power charges the battery.

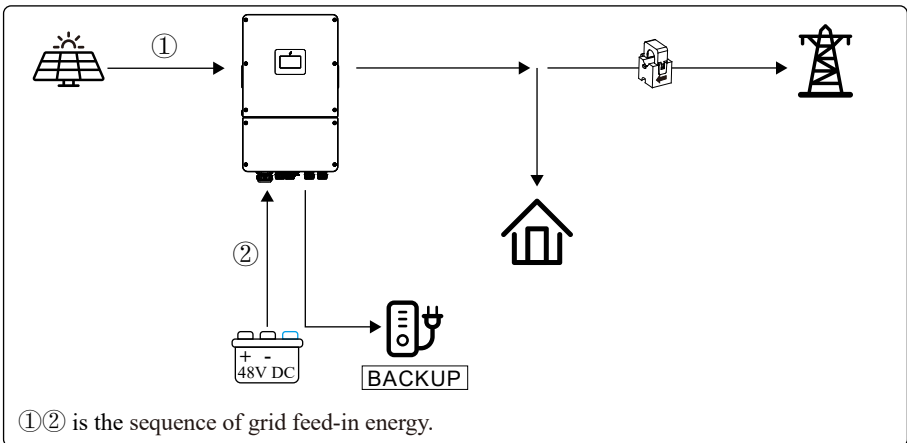
#### a) Abundant PV Energy

When PV energy is sufficient, it will give priority to local loads, the excess power will be fed into the grid first, then the remaining power charges the battery.



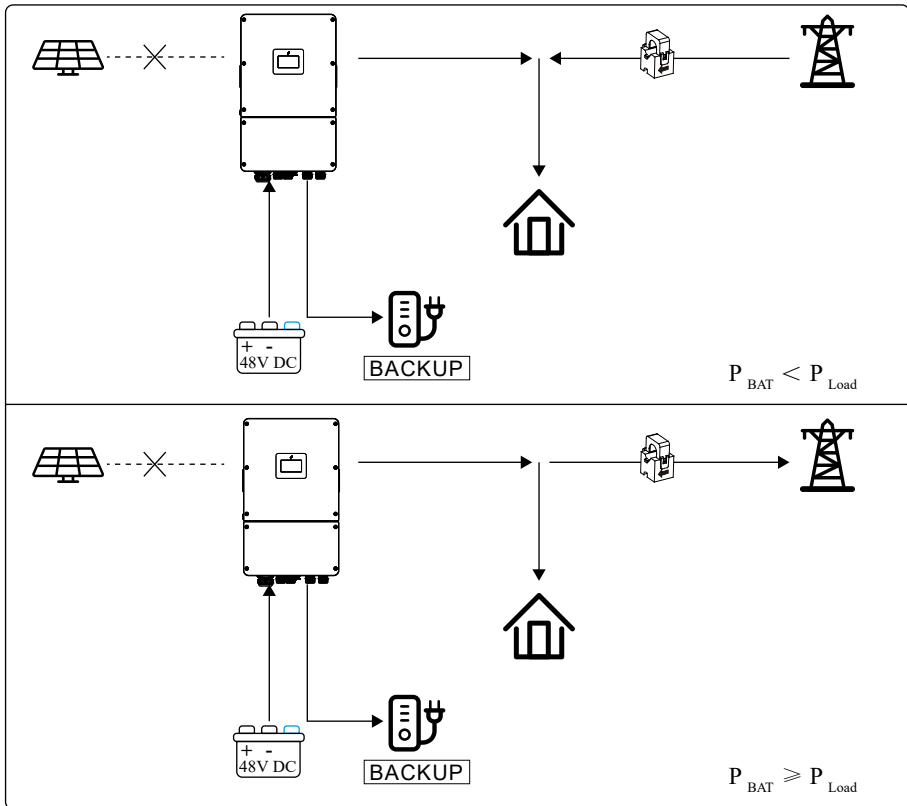
#### b) Limited PV Energy

When PV energy is limited and cannot meet the feed-in grid power, the battery will discharge to meet it.



## c) No PV Input

The inverter will first discharge the battery power for home load consuming when there is no PV input (such as in the evening or some cloudy or rainy days). If the battery power is not enough, the load will be supplied by the grid.



### 5.1.3 Back-up Mode

Go to **Settings > Advanced > Inverter** page and tap **Work mode** page to select the **Back-up mode** on LCD.

In this mode, the priority of PV energy consumption will be Battery > Load > Grid.

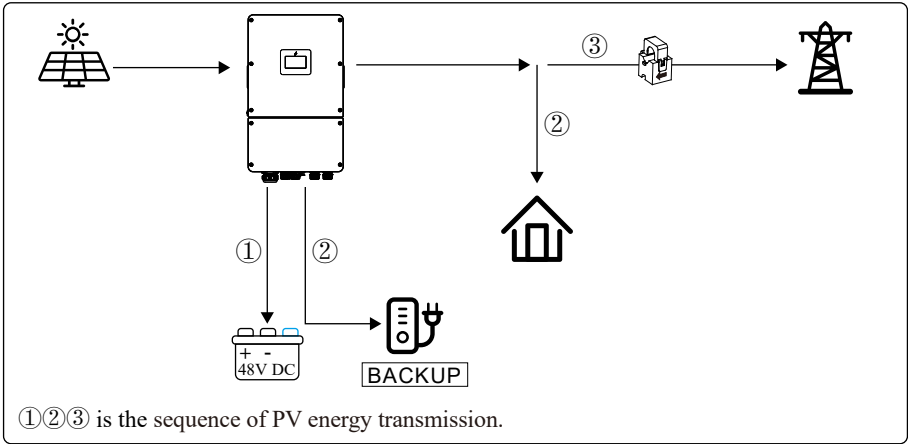
This mode aims at fast battery charging. You can set whether to allow AC charging or not.

#### Forbid AC Charging Mode

In this mode, the battery can be charged only with PV energy, and the charging power varies with PV energy.

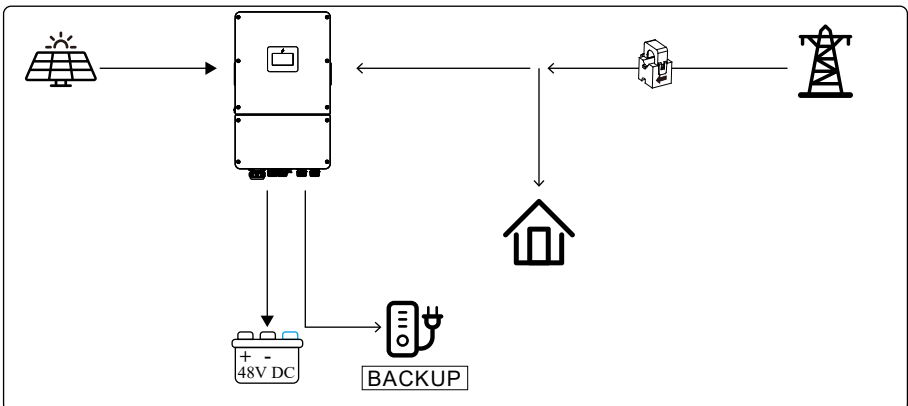
##### a) Abundant PV Energy

When PV energy is sufficient, PV charges the battery first, then meets the load, and the rest is fed into the grid.



##### b) Limited PV Energy

When PV energy is limited, PV charges the battery, and the grid meets the load demand, including normal load and backup load.



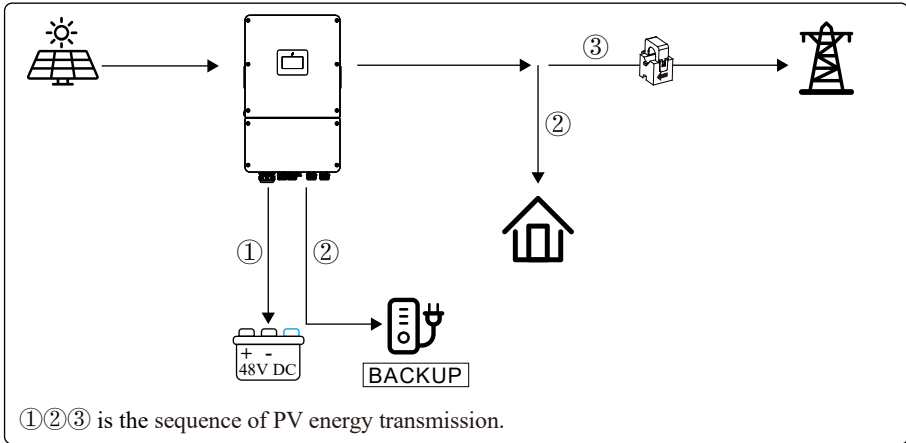


### Allow AC charging

In this situation, the battery can be charged both with PV and AC.

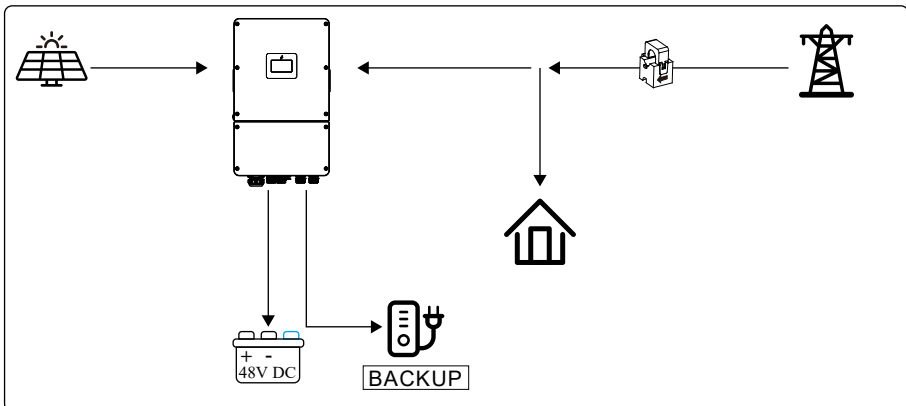
#### a) Abundant PV Energy

When PV energy is sufficient, PV charges the battery first, then meets the loads, and the rest is fed into the grid.



#### b) Limited PV Energy

When the PV energy is not enough to charge the battery, the grid energy will charge the battery as supplement. Meanwhile, the grid energy is consumed by loads.

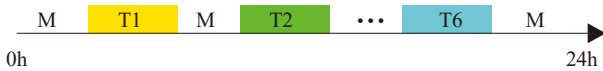


### 5.1.4 Forced Charge/Discharge Function

According to the demands of application, the user can set the inverter to work on forced charge/discharge the battery in any working mode.

Please go to **Settings > Advanced > Inverter** page to enable **Time-based Control** on the LCD. There are six time periods in which you can set this function. Outside of the set periods, the inverter returns to its original working mode. The forced charge/discharge function has the highest priority.

The relationship between the forced charge/discharge function and working mode shown as below:



M: Self-consumption mode/Feed-in priority mode/Back-up mode.

T1 - T6: Time period 1 for forced charge/discharge parameter setting.

T1 - T6 is priority to M.

### 5.1.5 Off-Grid Mode

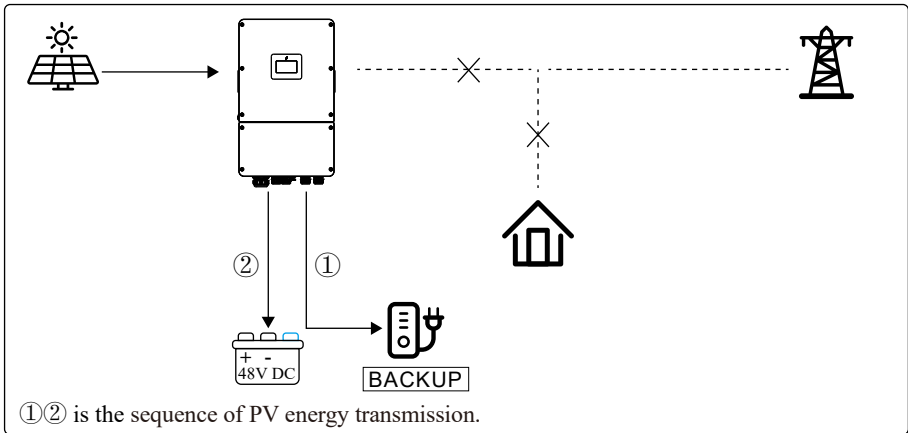
When the power grid is cut off, the system automatically switches to off-grid mode.

In off-grid mode, only critical loads are supplied to ensure that important loads continue to work without power failure.

In this mode, the inverter cannot work without the battery.

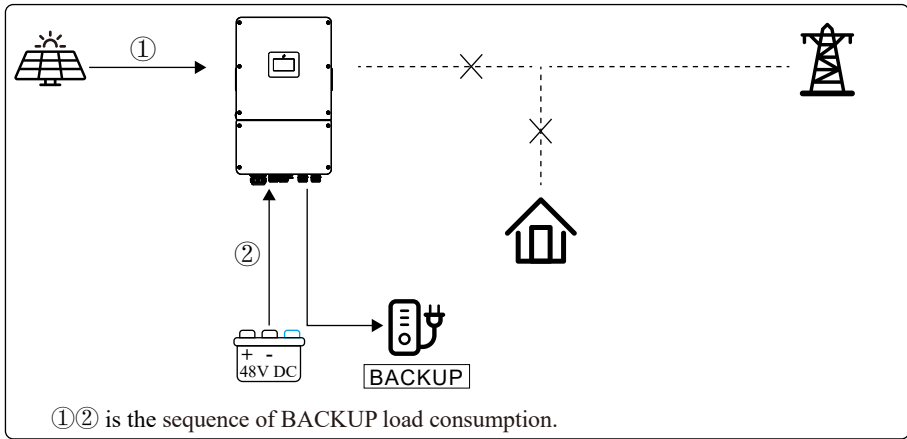
a) Abundant PV Energy

When PV energy is sufficient, the PV energy will be first consumed by critical load, then will be used to charge the battery.



## b) Limited PV Energy

When PV energy is limited, BACKUP loads are first powered by PV and then supplemented by battery.



## NOTICE

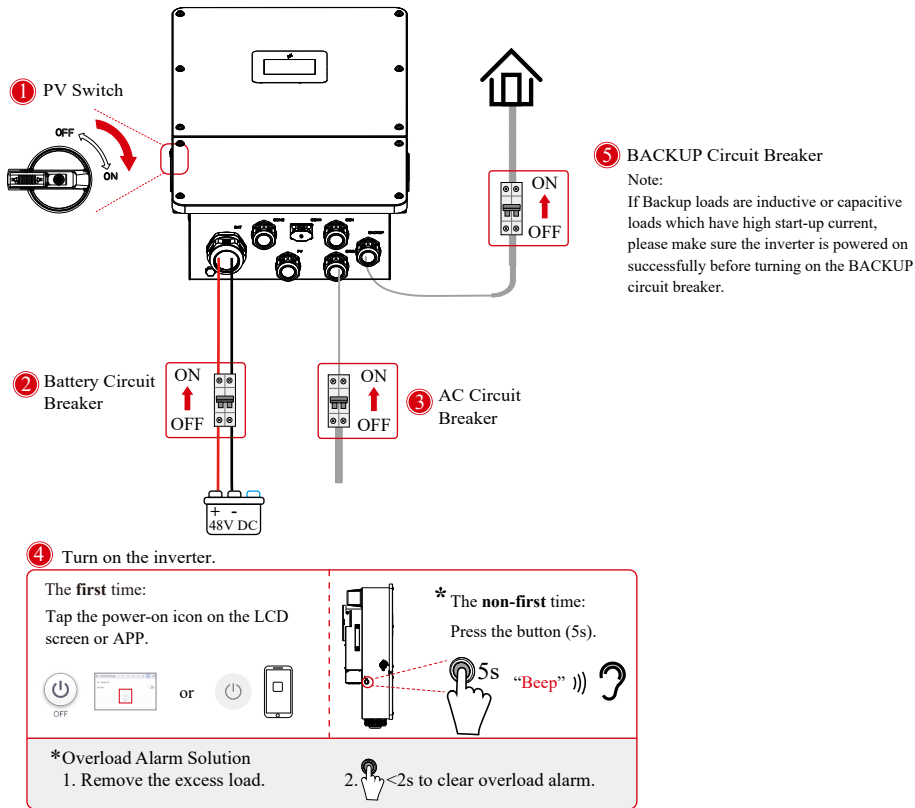
- In off grid mode, please complete the output voltage and frequency settings.
- It is better to choose the battery with sufficient capacity to ensure BACKUP function works normally.
- If BACKUP output loads are inductive or capacitive loads, to make sure the stability and reliability of system, it is recommended to configure the power of these loads to be within 50% BACKUP output power range.

## 5.2 Startup/Shutdown Procedure

Before starting up, ensure that the installation is secure and strong enough, and the system has been well grounded. Then make sure the connections of AC, battery, PV etc. are correct, and confirm the parameters and configurations conform to relevant requirements.

|                               |                                               |
|-------------------------------|-----------------------------------------------|
| AC Frequency: 50/60 Hz        | PV Voltage: 70 V to 540 V                     |
| Battery Voltage: 40 V to 60 V | Grid AC Voltage: 220/230/240 V (Single phase) |

### 5.2.1 Startup Procedure



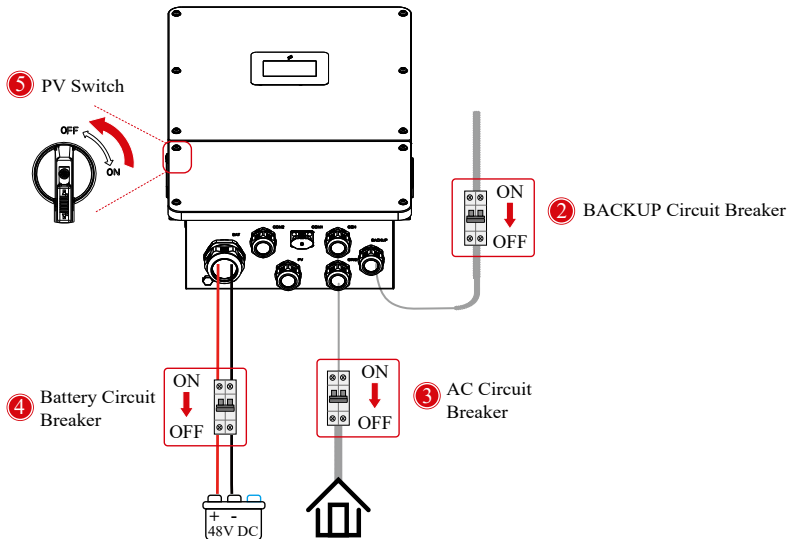
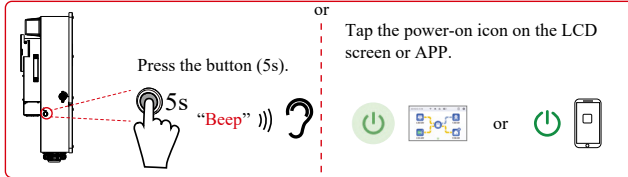
## 5.2.2 Shutdown Procedure



### DANGER

After the inverter is powered off, the remaining electricity and heat may still cause electric shock and body burns. If you need to disconnect the inverter cables, please wait at least 10 minutes before touching these parts of inverter.

#### ① Turn off the inverter.



## 6. Commissioning

It is necessary to fully commission the inverter system for it is essential to protect the system from fire, electric shock, other damages, and personal injury.

### 6.1 Inspection

Before commissioning, the operator or installer (qualified personnel) must inspect the system carefully and ensure that:

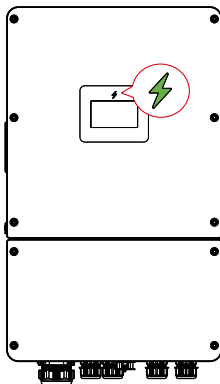
1. The system is properly installed according to the contents and instructions in this manual, and there is sufficient space for operation, maintenance, and ventilation.
2. All terminals and cables are in good conditions.
3. No objects are left in/on the inverter or within the required clearance.
4. The PV and the battery pack are working normally, the grid is normal.

### 6.2 Commissioning Procedure

When all items have been checked and the system is ready for use, start the commissioning procedure.

1. Power on the system by following the Startup Procedure in section 5.2.1 Startup Procedure.
2. Set the parameters on the app/LCD according to user's needs.
3. Complete commissioning.

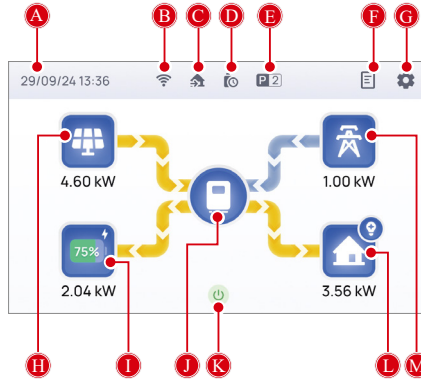
## 7. LED Indicator



| LED Indicator                                                                                                                                                                                                                                             | Status                                | Description        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------|--------------------|
| Green led                                                                                                                                                                | On                                    | On-Grid status     |
|                                                                                                                                                                                                                                                           | Blink                                 | Standby status     |
| Blue led                                                                                                                                                                 | On                                    | Off-Grid status    |
| Red led                                                                                                                                                                  | On                                    | Fault has occurred |
|  →  →  | Light alternately<br>(1 color /0.25s) | Burning code       |

## 8. LCD Screen

The LCD is a touchscreen, figure below shows the overall information of the inverter.



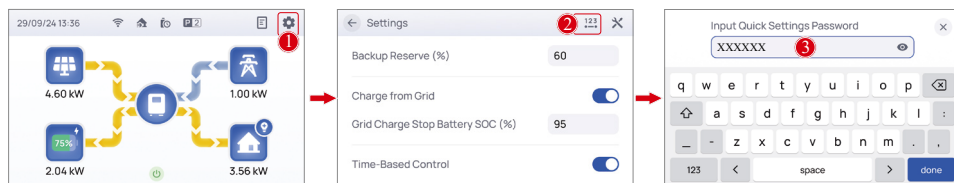
| Number | Icon                                | Description                                                                                                                                                                                                                     |
|--------|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A      | Time                                | The current system time                                                                                                                                                                                                         |
| B      | Wi-Fi                               | Wi-Fi connection status                                                                                                                                                                                                         |
| C      | Work mode                           | Currently set working mode<br><div>  Self-consumption mode            Back-up mode         </div> <div>  Feed-in priority mode         </div>                                                                                   |
| D      | Time-based control                  | The time-based control function is enabled.                                                                                                                                                                                     |
| E      | Parallel                            | Number of parallel inverters                                                                                                                                                                                                    |
| F      | Log                                 | History log                                                                                                                                                                                                                     |
| G      | Setting                             | Setting page                                                                                                                                                                                                                    |
| H      | Solar icon and the present power    | Tap the icon to view the solar energy production.<br>Note:<br>When the '☀️' icon appears at the top-right corner of the solar icon, it means that the AC coupling function is enabled.                                          |
| I      | Battery icon and the present power  | Tap the icon to view the battery basic information and charge/discharge capacity.                                                                                                                                               |
| J      | Inverter icon and the present power | Tap the icon to view the inverter basic information.                                                                                                                                                                            |
| K      | Button                              | Tap the button to turn on/off the inverter.                                                                                                                                                                                     |
| L      | Home icon and the present power     | Tap the icon to view the load consumption.<br>Note:<br>When the '🏠' icon appears at the top-right corner of the home icon, it means that the GEN Port works as an output port for the Smart Load connected to the GEN terminal. |
| M      | Grid icon and the present power     | Tap the icon to view the grid capacity and feed-in grid capacity.                                                                                                                                                               |



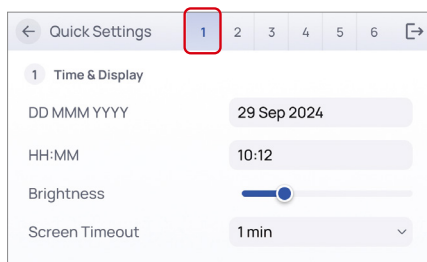
## 8.1 Quick Setup

A quick setup is required when turning on the inverter for the first time

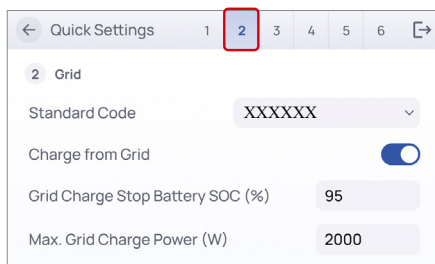
**Step 1** Enter the Quick Setup menu. The initial password is "admin".



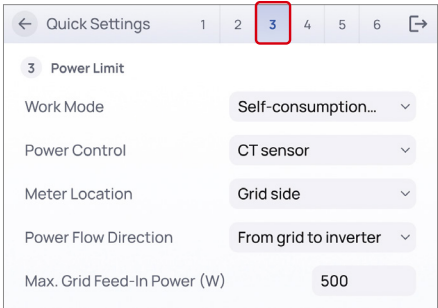
**Step 2** Set time and display parameters.



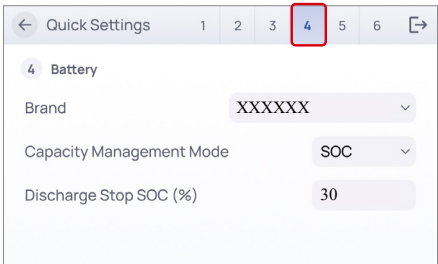
**Step 3** Set grid parameters.



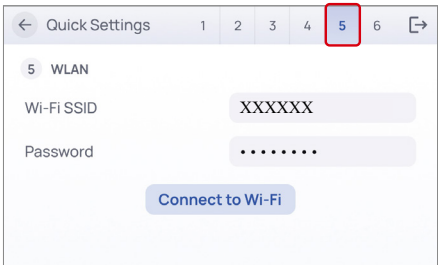
**Step 4** Set power limit parameters.



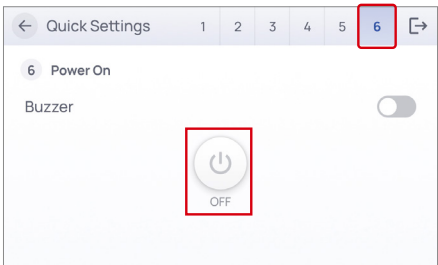
**Step 5** Set battery parameters.



**Step 6** Connect to Wi-Fi.

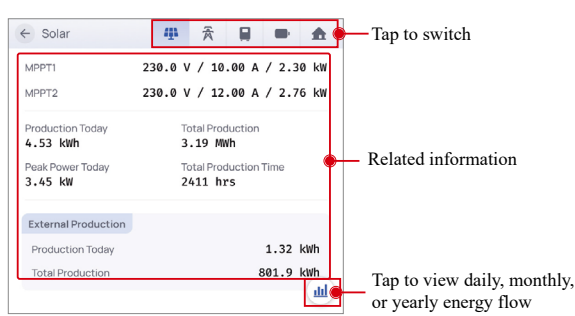


**Step 7** Turn on the inverter.



## 8.2 Data Query

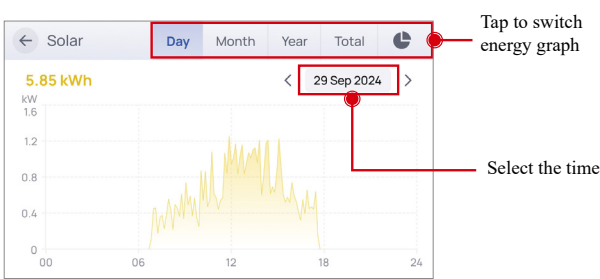
Tap the Solar/Grid/Inverter/Battery/Home icons on the mainscreen to view the production or consumption data/graphs, as well as related information of your energy system.



| Icon | Description |
|------|-------------|
|      | Solar       |
|      | Grid        |
|      | Inverter    |
|      | Battery     |
|      | Home        |
|      | Pie chart   |
|      | Graph       |

### Data Graph

The energy graph is displayed by Day, Month, Year, and Total. The daily data graphs in the following figures are for illustrative purposes only.



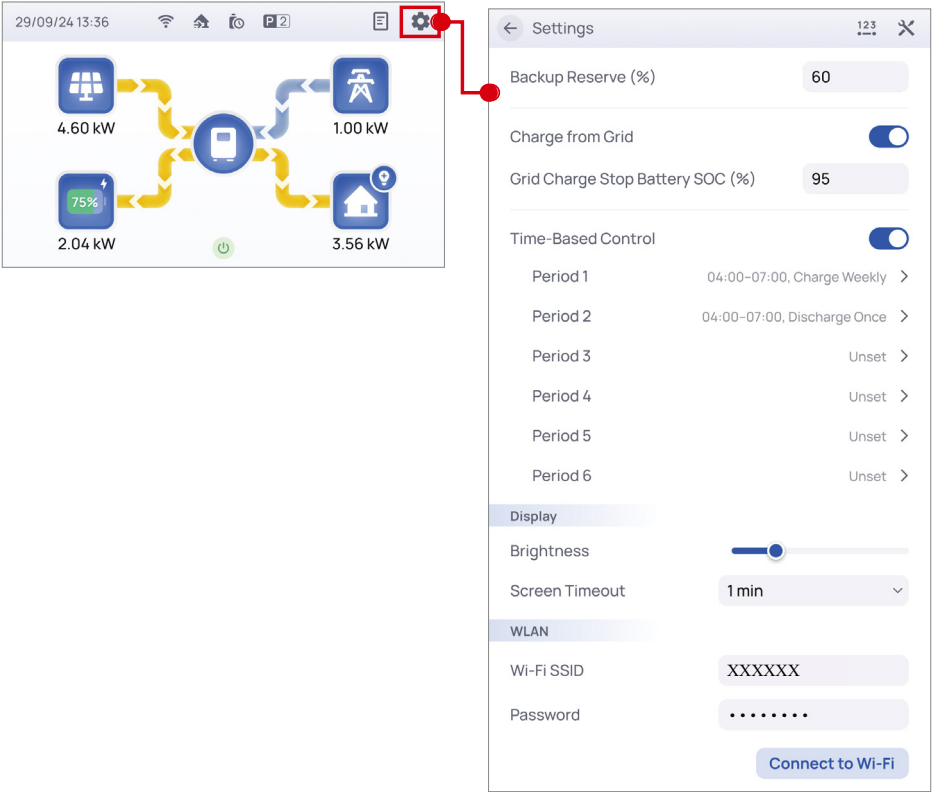
| Icon | Description           |
|------|-----------------------|
|      | Grid capacity         |
|      | Feed-in grid capacity |
|      | Generator capacity    |
|      | Discharge capacity    |
|      | Charge capacity       |
|      | Toggle switch         |

### 8.3 Settings

Configure basic or advanced parameters based on your needs.

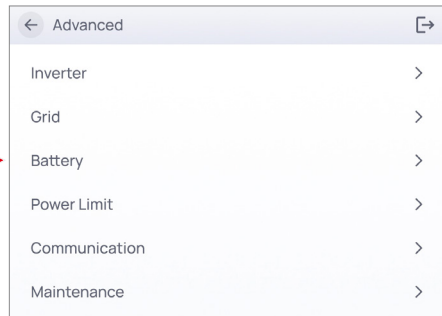
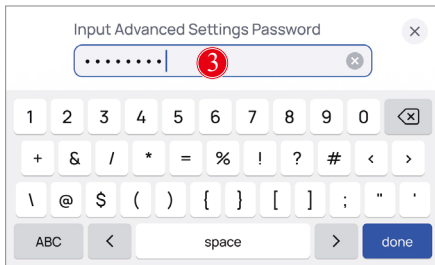
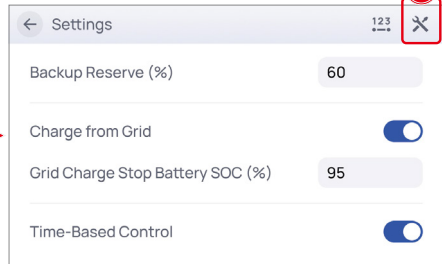
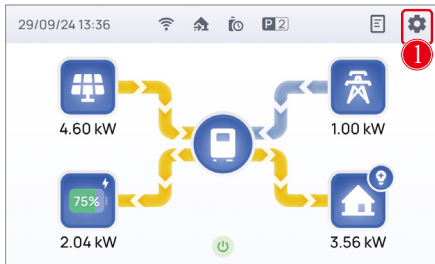
#### Basic Setting (for End-user)

Tap the “⚙️” to enter the *Setting* page and configure basic parameters.



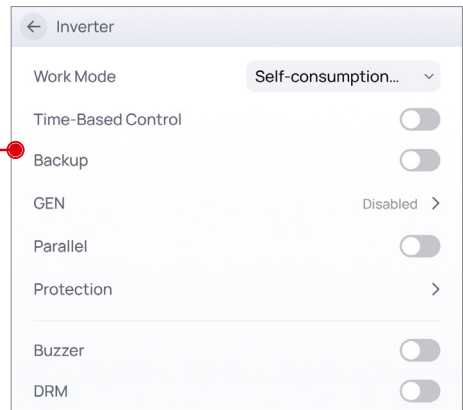
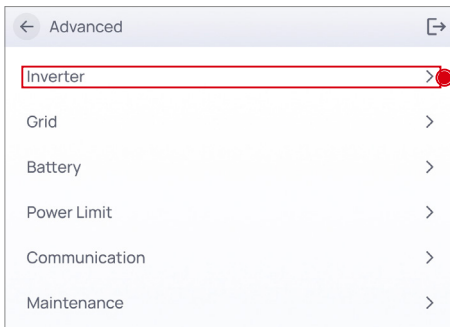
### Advanced Settings (for Installer)

Advanced settings provides more parameter configuration options. The initial password is "admin".



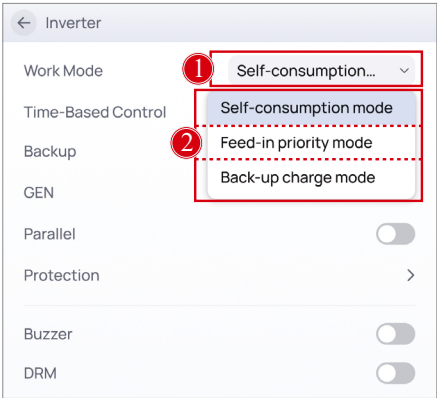
#### 8.3.1 Inverter

Tap **Inverter** to enter the Inverter menu.



Work Mode

There are several work modes available.



| Parameter             | Priority (PV Energy Consumption) |
|-----------------------|----------------------------------|
| Self-consumption mode | Load > Battery > Grid            |
| Feed-in Priority mode | Load > Grid > Battery            |
| Back-up mode          | Battery > Load > Grid            |

 Note: for work mode details, refer to the 5.1 Inverter Working Mode.

Time-based Control

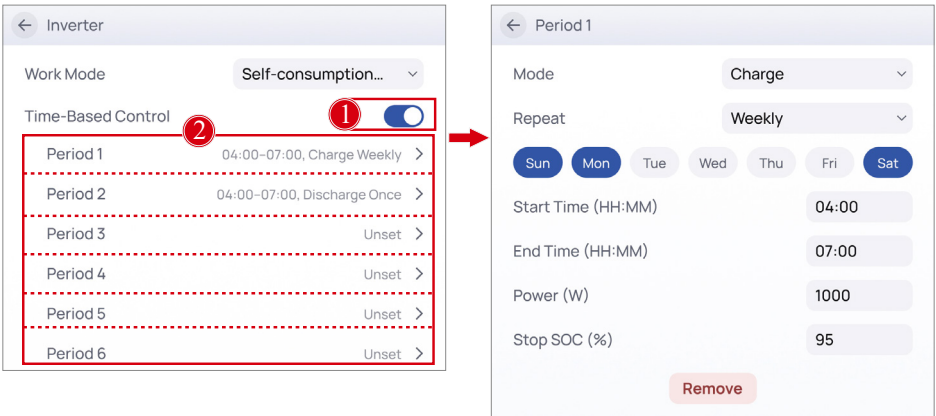
This function is designed to control the time setting of charging and discharging the inverter. You can set the following parameters based on your requirements:

Start charging/discharging time: 00:00 to 23:59

End charging/discharging time: 00:00 to 23:59

Run cycle: once or every week

Run date/day: the exact date



## GEN

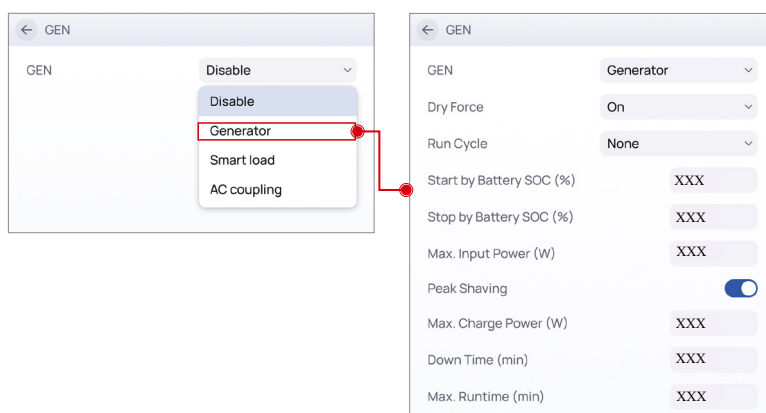
Tap **Inverter** > **GEN** to enter the GEN menu.

### > Generator

The GEN port functions as an input port from the generator in off-grid conditions. The load or the battery can be supplied by the generator input. There are two ways to start and stop the generator : via inverter dry contact or manual control. In the former case, the inverter completely controls the start and stop of the generator. In the latter case, the generator is started and stopped by manual control.

 Note:

- If Generator and Grid are normal, preferably powered by Grid power.
- The generator capacity should be 1.3 times larger than the capacity of the hybrid inverter.
- You need to shut down the inverter to set the Generator.



All parameters have been set by default. You can modify the parameters as needed.

| Parameter                | Description                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Dry force                | When the Grid power is abnormal, the generator is forced to be turned on.                                                                                                                                                                                                                                                                                                  |
| Run Cycle                | Generator cycle run mode. You can select Weekly or Monthly, which means the generator runs once a week or once a month.<br>Day of Week/Date: the generator will run on the set date.<br>Start Time (HH:MM): the time at which the generator will start running on the set date.<br>End Time (HH:MM): the time at which the generator will end its running on the set date. |
| Start by Battery SOC (%) | Battery SOC below which the generator starts to charge the battery. Meanwhile, the generator running time should not exceed the set maximum runtime (Min).                                                                                                                                                                                                                 |
| Stop by Battery SOC (%)  | Battery SOC above which the generator stops charging the battery.                                                                                                                                                                                                                                                                                                          |
| Max. Input Power (W)     | Limit the generator input power below the set value (W).                                                                                                                                                                                                                                                                                                                   |

| Parameter                      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Peak Shaving                   | When the Gen output power exceeds the set Gen shaving power, the inverter switches from the discharging state to the charging state.                                                                                                                                                                                                                                                                                                                                         |
| Max. Charge Power (W)          | Maximum battery charge power from generator.                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Max. Runtime (min)             | <p>When the generator running time reaches to the setting value, the inverter will disconnect the input from generator. But the generator will keep working for a while defined by “Down Time (min)”.</p> <p> Note:<br/>Max. Runtime (min) = 0, indicates that the generator’s runtime is not subject to the “Max. Runtime” limitation.</p>                                                 |
| Down Time (min)                | <p>When the inverter disconnect the input from generator, the generator will keep working for a while by the down time setting value (Min).</p> <p>- For generator that switch on and off by dry contact, it will stop working automatically when the generator working time reaches to the down time setting value (Min).</p> <p>- For generator that are manually switched on and off, it will stop working by manual regardless of the down time setting value (Min).</p> |
| Start by Battery Voltage (%/V) | <p>Battery voltage below which the generator starts to charge the battery.</p> <p>Meanwhile, the generator running time should not exceed the maximum runtime setting value (Min).</p>                                                                                                                                                                                                                                                                                       |
| Stop by Battery Voltage (%/V)  | Battery voltage above which the generator stops charging the battery.                                                                                                                                                                                                                                                                                                                                                                                                        |

|                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  NOTE | <ol style="list-style-type: none"> <li>1. The total generator running time is equal to “Max. Runtime (min)” plus “Down Time (min)”.</li> <li>2. You can set Capacity Management Mode to voltage (V) via <b>Battery &gt; Capacity Management Mode</b>, parameter settings about <b>Start by Battery SOC (%)</b> will be changed to <b>Start by Battery voltage (V)</b>. Also, parameter settings about <b>Stop by Battery SOC (%)</b> will be changed to <b>Stop by Battery voltage (V)</b>.</li> </ol> |
|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



Take the following parameter values as an example:

- Max. Input Power (W): 6000 W
- Max. Charge Power (W): 3000 W
- Start by Battery SOC (%): 50 %
- Stop by Battery SOC (%): 100 %
- Max. Runtime (min): 0 Min
- Down Time (min): 0 Min

When Capacity Management Mode was set to SOC (%), the situations are as follows:

- In Off-Grid mode, the Generator will be ON or OFF depends on the battery SOC and Generator Max Runtime.
  - When the Battery SOC  $\leq$  50 % and the Runtime is less than Max. Runtime (min), the GEN Port function will be enabled and the Generator will be ON.
  - When the Battery SOC  $\geq$  100 % or the Runtime is over Max. Runtime (min), the GEN port function will be disabled and the Generator will be OFF.
- In On-Grid mode, the GEN Port function will be disabled and the Generator will be OFF.



#### NOTE

1. If Generator and Grid are normal, the load and battery charging will be powered by the grid in priority.
2. If Generator Max Runtime (Min) is set to 0, the generator's runtime is not subject to the "Max. Runtime" limitation.
3. When the Capacity Management Mode was set to voltage, the generator still follows the above logic.

### ➤ Smart Load

The GEN Port works as an output port for the Smart Load.



All parameters have been set by default. You can modify the parameters as needed.

| Parameter                            | Description                                                                                                                                                  |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Min. PV Power with Smart Load On (W) | If the PV input power is higher than the setting value (Power), and the battery SOC exceeds the setting value simultaneously, the Smart Load will switch on. |

| Parameter                    | Description                                                                                                                                                      |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Start by Battery SOC (%)     | If the PV input power is higher than the setting value (Power), and the battery SOC exceeds the setting value simultaneously, the Smart Load will switch on.     |
| Stop by Battery SOC (%)      | If the battery SOC is lower than the setting value, the Smart Load will switch off .                                                                             |
| Always On with Grid          | When click "Always On with Grid" the Smart Load will switch on when the grid is present.                                                                         |
| Start by Battery voltage (V) | If the battery voltage is higher than the setting value, and the PV input power exceeds the setting value (Power) simultaneously, the Smart Load will switch on. |
| Stop by Battery voltage (V)  | If the battery voltage is lower than the setting value, the Smart Load will switch off.                                                                          |



## NOTE

You can set Capacity Management Mode to voltage (V) *via* **Battery > Capacity Management Mode**, parameter settings about **Start by Battery SOC (%)** will be changed to **Start by Battery voltage (V)**. Also, parameter settings about **Stop by Battery SOC (%)** will be changed to **Stop by Battery voltage (V)**.

Take the following parameter values as an example:

- Min. PV Power with Smart Load On (W): 500 W
- Start by Battery SOC (%): 100 %
- Stop by Battery SOC (%): 80 %

When Capacity Management Mode was selected to SOC (%), the situations are as follows:

- When Always On with Grid is ON, if the grid is present, the Smart Load will be ON all the time. It is not affected by the change of above parameters. If the grid is not present, the Smart Load output will be ON or OFF depends on the PV power and the battery SOC.
  - If the PV power  $\geq 500$  W and the battery SOC  $\geq 100$  % , the Smart Load output will be ON. In the state of Smart Load ON, if the battery SOC  $< 80$ %, the Smart Load will be OFF.
  - If the PV power  $< 500$  W or the battery SOC  $< 80$  % , the Smart Load output will be OFF.
- When Always On with Grid is OFF.
  - If the PV power  $\geq 500$  W and the Battery SOC  $\geq 100$  % , the GEN Port function will be enabled and the Smart Load will be ON. In the state of Smart Load ON, if the battery SOC  $< 80$  % , the Smart Load will be OFF.
  - If the PV power  $< 500$  W or the Battery SOC  $< 80$  % , the GEN Port function will be disabled and the Smart Load will be OFF.



## NOTE

When the Capacity Management Mode was set to voltage, the Smart Load Output still follows the above logic.

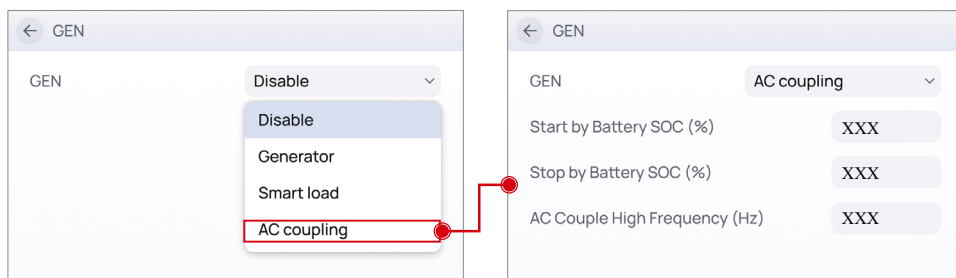
## ➤ AC Coupling

The GEN Port works as an input port from other grid-tied inverter whose rated power should be less than the hybrid inverter. The grid-tied inverter should also support derating output power according to the output frequency.



### NOTE

The capacity of grid-tied inverter should be less than that of hybrid inverter.



All parameters have been set by default. You can modify the parameters as needed.

| Parameter                     | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Start by Battery SOC (%)      | If battery SOC is lower than the default value, the inverter powers on and starts charging the battery.                                                                                                                                                                                                                                                                                                                                                          |
| Stop by Battery SOC (%)       | If battery SOC is higher than the default value, the inverter powers off and stops charging the battery.                                                                                                                                                                                                                                                                                                                                                         |
| AC Couple High Frequency (Hz) | This parameter is used to limit the output power of grid-tied inverter when the hybrid inverter works under off-grid mode. As the battery SOC reaches gradually to the setting value (Off), during the process, the grid-tied inverter output power will decrease linear. When the battery SOC is equal to the setting value (Off), the system frequency will become the setting value (AC Couple Frequency high ) and the grid-tied inverter will stop working. |
| Start by Battery Voltage (V)  | If battery voltage is lower than the setting value, the inverter powers on and starts charging the battery.                                                                                                                                                                                                                                                                                                                                                      |
| Stop by Battery Voltage (V)   | If battery voltage is higher than the setting value, the inverter powers off and stops charging the battery.                                                                                                                                                                                                                                                                                                                                                     |



### NOTE

You can set Capacity Management Mode to voltage (V) *via Battery > Capacity Management Mode*, parameter settings about **Start by Battery SOC (%)** will be changed to **Start by Battery voltage (V)**. Also, parameter settings about **Stop by Battery SOC (%)** will be changed to **Stop by Battery voltage (V)**.

Take the following parameter values as an example:

- Start by Battery SOC (%): 80 %
- Stop by Battery SOC (%): 100 %
- AC Couple High Frequency (Hz): 52 Hz

When Capacity Management Mode was set to SOC (%), the situations are as follows:

- In off-grid mode, the AC coupling will be ON or OFF depends on the battery SOC.
  - When the Battery SOC  $\leq$  80 %, the GEN port function will be enabled and AC coupling will be ON.
  - When the battery charge power lower than the grid-tied inverter output power, the hybrid inverter will increase the output frequency to maximum 52 Hz. Then the grid-tied inverter will work in limited power mode.
  - When the Battery SOC  $\geq$  100 %, the GEN port function will be disabled and AC coupling will be OFF.
- In on-grid mode, the grid-tied inverter works as normal regardless of battery capacity.



NOTE

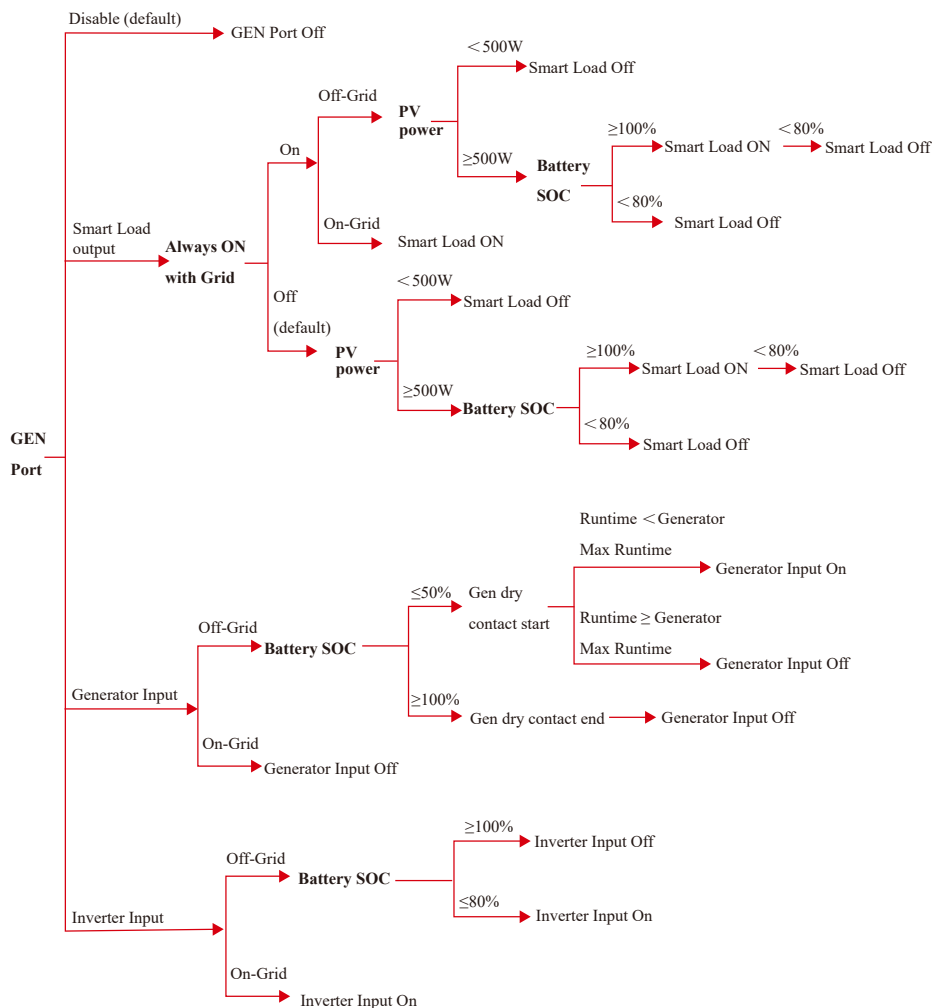
When the Capacity Management Mode was set to voltage, the AC coupling still follows the above logic.

➤ **Logic Diagram of Start/Stop Smart Load/Generator/AC Coupling Port Function.**



**NOTE**

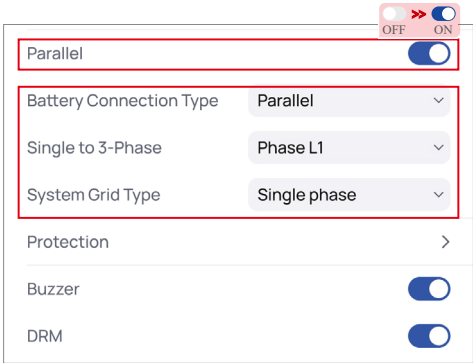
The parameter values in the following figure are examples only, please set the parameter values according to the actual situation.



Parallel

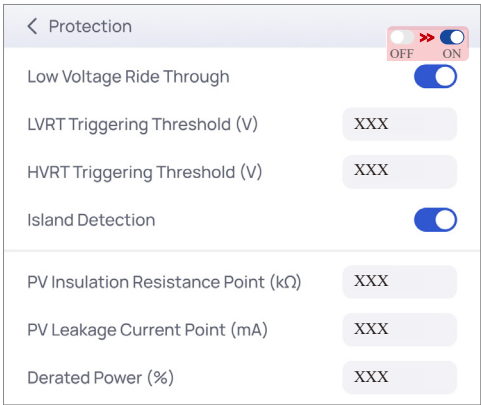
In **Inverter** menu, you can set the following parameters when the parallel function is enabled:

- Battery Connect Type
- Set phase position and System Grid Type when performing a three-phase connection (for more details, please refer to Chapter 4.)



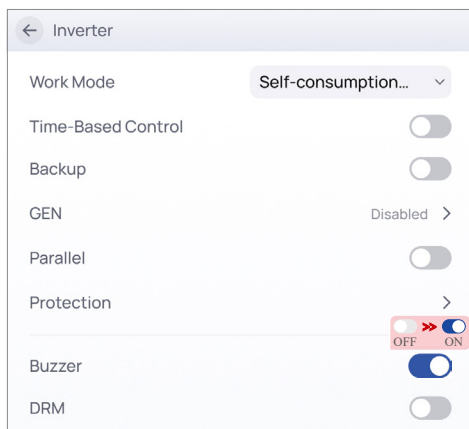
Protection

Tap **Inverter** > **Protection** to enter the Protection menu. Low Voltage Ride Through allows inverter to remain connected to the grid during voltage disturbances. Island Detection enables the inverter to disconnect from the grid when a grid failure occurs.



## Buzzer

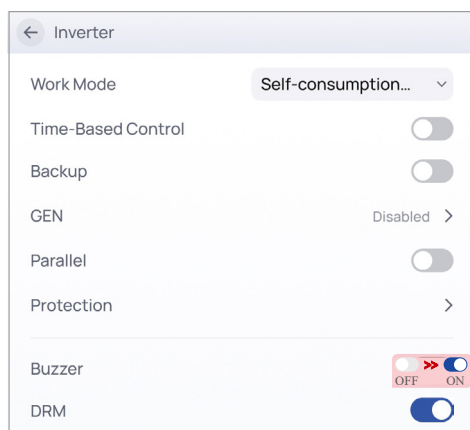
To enable buzzer, please perform the following steps:



## DRM

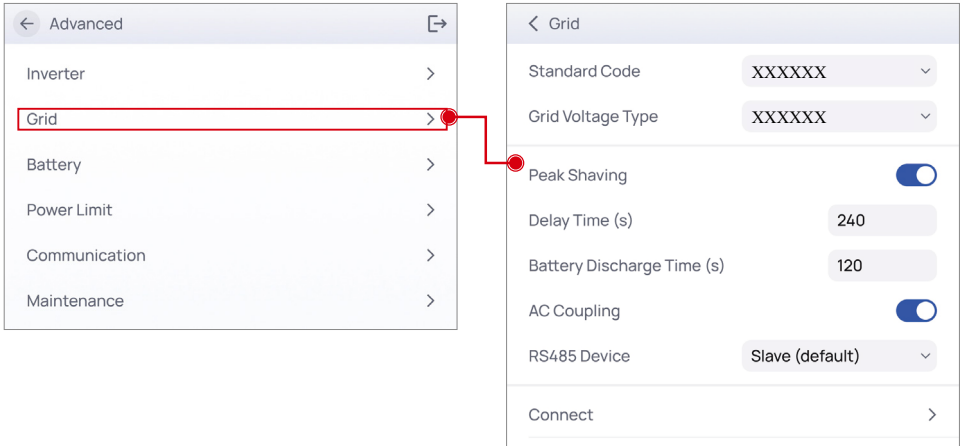
DRMs is a shortened form for “inverter demand response modes”. It is a compulsory requirement for inverters in Australia.

To enable this function, please perform the following steps:



### 8.3.2 Grid

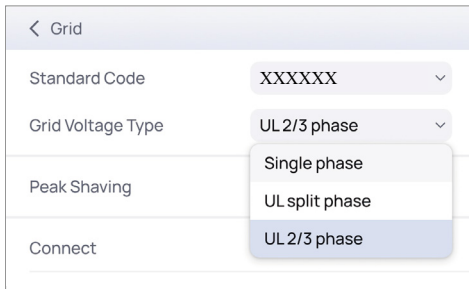
Tap **Grid** to enter the Grid menu.



➤ Note: Please follow the local grid code, and then choose the corresponding grid standard code.

#### Grid Voltage Type

Set the "Grid Voltage Type" based on the system wiring.





## Peak shaving

The peak shaving function allows you to lower the peak power drawn from grid.

< Grid

Standard Code

XXXXXX

▼

Grid Voltage Type

XXXXXX

▼

Peak Shaving

OFF

ON

ON

Delay Time (s)

XXX

Battery Discharge Time (s)

XXX

Connect

>

Grid Protection

>

Voltage

>

Frequency

>

Reactive Power Control

>

| Parameter                | Description                                                                                                                                         |
|--------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| Connect                  |                                                                                                                                                     |
| Delay Time (s)           | The waiting time for connecting the inverter to the grid.                                                                                           |
| Grid Low Voltage (V)     | The allowable range of grid voltage when the inverter is first connected to the grid.                                                               |
| Grid High Voltage (V)    |                                                                                                                                                     |
| Grid Low Frequency (Hz)  | The allowable range of grid frequency when the inverter is first connected to the grid.                                                             |
| Grid High Frequency (Hz) |                                                                                                                                                     |
| Power Gradient (%/min)   | Indicates the percentage of incremental output power per minute based on the local requirements when the inverter is powered on for the first time. |
| Reconnect                |                                                                                                                                                     |
| Delay Time (s)           | The waiting time for connecting the inverter to the grid again.                                                                                     |
| Grid Low Voltage (V)     | The allowable range of grid voltage when the inverter is reconnected to the grid.                                                                   |
| Grid High Voltage (V)    |                                                                                                                                                     |
| Grid Low Frequency (Hz)  | The allowable range of grid frequency when the inverter is reconnected to the grid.                                                                 |
| Grid High Frequency (Hz) |                                                                                                                                                     |
| Power Gradient (%/min)   | Indicates the duration for the output power increases to the rated power when the inverter reconnects to the grid due to a fault.                   |

Grid Protection

- Tap **Grid** > **Grid Protection** to enter the Grid Protection menu. Set the parameters based on the actual needs.
- \* 'N' represents level number.

< Grid Protection

Low Loss Frequency Protection

Level - 2 (Hz)XXX

Level - 1 (Hz)XXX

Time Level - 2 (ms)XXX

Time Level - 1 (ms)XXX

High Loss Frequency Protection

Level - 1 (Hz)XXX

Level - 2 (Hz)XXX

Time Level - 1 (ms)XXX

Time Level - 2 (ms)XXX

Low Loss Voltage Protection

Level - 2 (V)XXX

Level - 1 (V)XXX

Time Level - 2 (ms)XXX

Time Level - 1 (ms)XXX

High Loss Voltage Protection

Level - 1 (V)XXX

Level - 2 (V)XXX

Time Level - 1 (ms)XXX

Time Level - 2 (ms)XXX

Set the Level N low loss frequency protection point.

Set the Level N low loss frequency protection tripping time.

Set the Level N high loss frequency protection point.

Set the Level N high loss frequency protection tripping time.

Set the Level N low loss voltage protection point.

Set the Level N low loss voltage protection tripping time.

Set the Level N high loss voltage protection point.

Set the Level N high loss voltage protection tripping time.

Voltage

- Tap **Grid** > **Voltage** to enter the Voltage menu. Set the parameters based on the actual needs.

< Voltage

Moving Average Limit (V)XXX

High Voltage Derate☒

P (U) Curve Node 1 Voltage (V)XXX

P (U) Curve Node 1 Power (%)XXX

P (U) Curve Node 2 Voltage (V)XXX

P (U) Curve Node 2 Power (%)XXX

Settling Time (s)XXX

**Frequency**

Tap *Grid > Frequency* to enter the Frequency menu. Set the parameters based on the actual needs.

< Frequency

Grid Frequency

Auto detection

OFF

>>

ON

High Frequency Derate

Derate Reference Power

Base on rating power

Derate Active Point (Hz)

XXX

Derate Inactive Point (Hz)

XXX

LFSM-O Derate Power Droop (%)

XXX

Low Frequency Rise

Rise Reference Power

Base on rating power

Rise Active Point (Hz)

XXX

Rise Inactive Point (Hz)

XXX

LFSM-U Rise Power Droop (%)

XXX

**Reactive Power Control**

Tap *Grid > Frequency* to enter the Frequency menu. Set the parameters based on the actual needs.

< Reactive Power Control

Control Time (s)

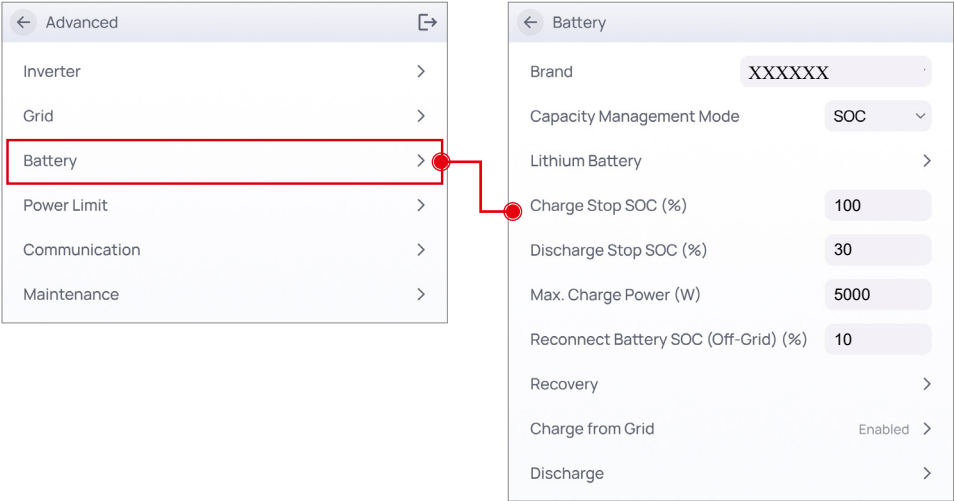
XXX

Control Mode

Pure merit

### 8.3.3 Battery

In **Battery** menu, you can set or change the Battery parameters.

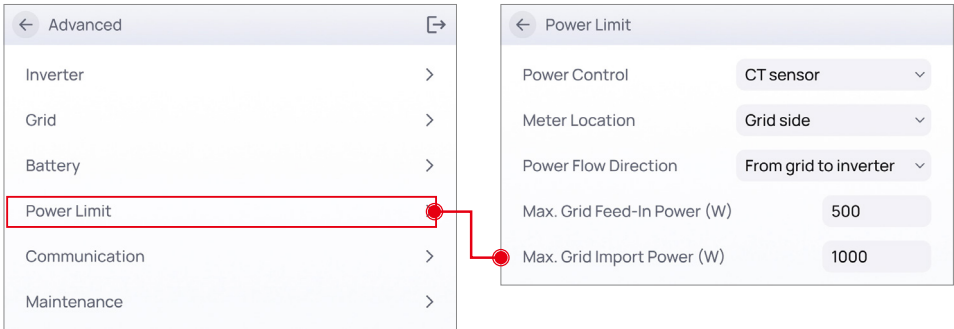


### 8.3.4 Power Limit

Tap **Power Limit** to enter the power limit menu.

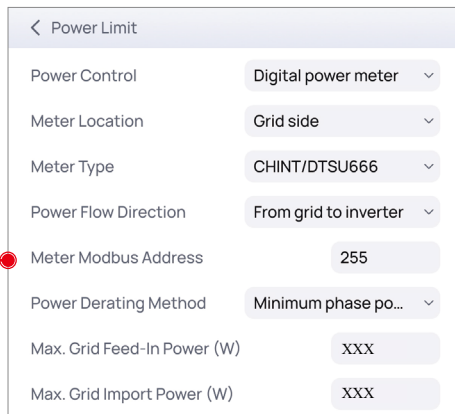
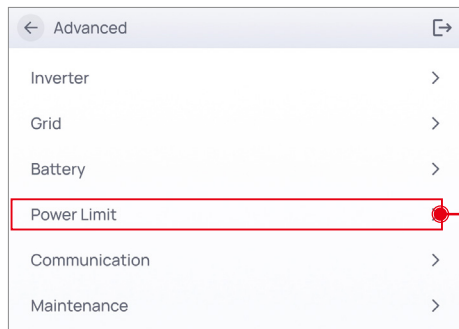
► **Inverter + CT**

- Set the "Power Control" to "CT Sensor"
- Set the "Meter Location" to "Grid side"
- Set the "Power Flow Direction" to "Flow grid to inverter"
- Set the "Max. Grid Feed-In Power (W)" if needed
- Set the "Max. Grid Import Power (W)" if needed



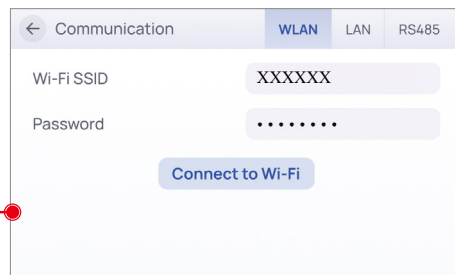
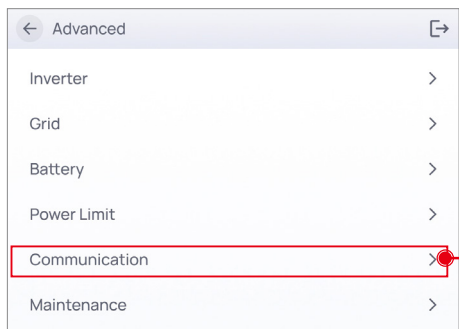
### ► Inverter + Meter

- Set the "Power Control" to "Digital power meter"
- Set the "Meter Location" to "Grid side"
- Set the "Meter Type" based on the actual situation
- Set the "Power Flow Direction" to "Flow grid to inverter"
- Set the "Meter Modbus Address" based on actual situation
- Set the "Max. Grid Feed-In Power (W)" if needed
- Set the "Max. Grid Import Power (W)" if needed



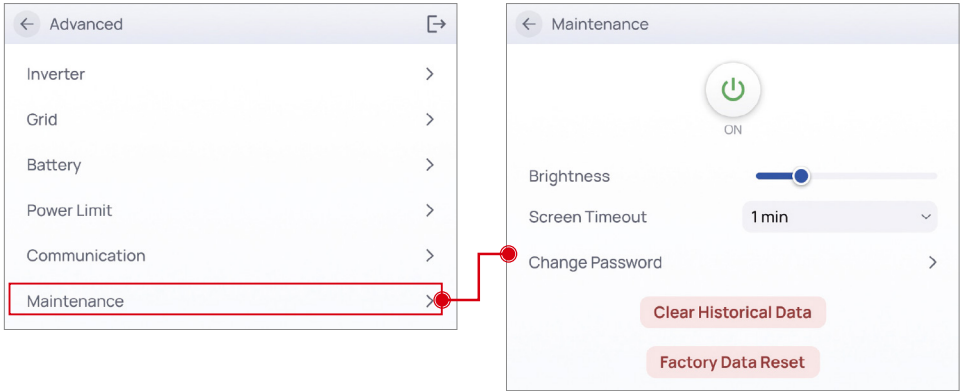
## 8.3.5 Communication

Tap **Communication** to enter the communication menu



### 8.3.6 Maintenance

In **Maintenance** menu, you can turn on/off the inverter, set display, change password, delete all usage data and restore the device to factory condition.



## 9. App

The app contains "Local Login" and "Cloud Login".

- Local login: The app reads data from inverter through Bluetooth connection with Modbus protocol to display and configure inverter parameter.
- Cloud login: The app reads data from cloud server through API and display inverter parameter.

### Download App

- Scan the QR code on the inverter to download the APP.
- Download APP from the App Store or Google Play.

For more details, refer to the ***Solarvolt User Manual***.

## 10. Maintenance



### CAUTION

Before maintaining and commissioning inverter and its peripheral distribution unit, switch off all the charged terminals of the inverter and wait at least 10 minutes after the inverter is powered off.

### 10.1 Routine Maintenance

| Items                           | Check Content                                                                                                                                                                         | Maintain Content                                                         | Maintenance Interval |
|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|----------------------|
| Inverter output status          | Statistically maintain the status of electrical yield, and remotely monitor its abnormal status.                                                                                      | N/A                                                                      | Weekly               |
| Inverter running status         | Check that the inverter is not damaged or deformed.<br>Check for normal sound emitted during inverter operation.<br>Check and ensure that all inverter communication is running well. | If there is any abnormal phenomenon, replace the relevant parts.         | Monthly              |
| Inverter electrical connections | Check that all AC, DC and communication cables are securely connected;<br>Check that PGND cables are securely connected;<br>Check that all cables are intact and free from aging.     | If there is any abnormal phenomenon, replace the cable or re-connect it. | Semiannually         |
| Inverter cleaning               | Check periodically that the heat sink is free from dust and blockage.                                                                                                                 | Clean the heat sink periodically.                                        | Yearly               |

### 10.2 Troubleshooting

When a fault occurs, please perform troubleshooting using the solutions provided below. If these solutions fail to resolve the issue, contact your dealer for further assistance.

| Code | Alarm Information    | Suggestions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A0   | Grid over voltage    | 1. If the alarm occurs occasionally, possibly the power grid voltage is abnormal temporarily, and no action is required.<br>2. If the alarm occurs repeatedly, contact the local power station. After receiving approval of the local power bureau, revise the electrical protection parameter settings on the inverter through the App.<br>3. If the alarm persists for a long time, check whether the AC circuit breaker /AC terminals is disconnected, or if the grid has a power outage. |
| A1   | Grid under voltage   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| A3   | Grid over frequency  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| A4   | Grid under frequency |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| A2   | Grid absent          | Wait till power is restored.                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |



| Code | Alarm Information              | Suggestions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B0   | PV over voltage                | Check whether the maximum input voltage of a single PV string exceeds the MPPT working voltage. If yes, modify the number of PV module connection strings.                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| B1   | PV insulation abnormal         | <ol style="list-style-type: none"> <li>1. Check the insulation resistance against the ground for the PV strings. If a short circuit has occurred, rectify the fault.</li> <li>2. If the insulation resistance against the ground is less than the default value in a rainy environment, set insulation resistance protection on the App.</li> </ol>                                                                                                                                                                                                                                                           |
| B2   | Leakage current abnormal       | <ol style="list-style-type: none"> <li>1. If the alarm occurs occasionally, the inverter can be automatically recovered to the normal operating status after the fault is rectified.</li> <li>2. If the alarm occurs repeatedly, contact your dealer for technical support.</li> </ol>                                                                                                                                                                                                                                                                                                                        |
| B4   | PV under voltage               | <ol style="list-style-type: none"> <li>1. If the alarm occurs occasionally, possibly the external circuits are abnormal accidentally. The inverter automatically recovers to the normal operating status after the fault is rectified.</li> <li>2. If the alarm occurs repeatedly or last a long time, check whether the insulation resistance against the ground of PV strings is too low.</li> </ol>                                                                                                                                                                                                        |
| B7   | PV string reverse              | Check and modify the positive and negative polarity of the input of the circuit string.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| C0   | Internal power supply abnormal | <ol style="list-style-type: none"> <li>1. If the alarm occurs occasionally, the inverter can be automatically restored, and no action is required.</li> <li>2. If the alarm occurs repeatedly, please contact the customer service.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                |
| C2   | Inverter over dc-bias current  | <ol style="list-style-type: none"> <li>1. If the alarm occurs occasionally, possibly the power grid voltage is abnormal temporarily, and no action is required.</li> <li>2. If the alarm occurs repeatedly, and the inverter fails to generate power, contact the customer service</li> </ol>                                                                                                                                                                                                                                                                                                                 |
| C3   | Inverter relay abnormal        | <ol style="list-style-type: none"> <li>1. If the alarm occurs occasionally, possibly the power grid voltage is abnormal temporarily, and no action is required.</li> <li>2. If the alarm occurs repeatedly, pls. refer to the suggestions or measures of Grid over voltage. If the inverter fails to generate power, contact the customer service center. If there is no abnormality on the grid side, the machine fault can be determined. (If you open the cover and find traces of damage to the relay, it can be concluded that the machine is faulty.) And pls. contact the customer service.</li> </ol> |

| Code | Alarm Information                  | Suggestions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|------|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CN   | Remote off                         | <ol style="list-style-type: none"> <li>1. Local manual shutdown is performed in App.</li> <li>2. The monitor executed the remote shutdown instruction.</li> <li>3. Remove the communication module and confirm whether the alarm disappears. If yes, replace the communication module. Otherwise, please contact the customer service.</li> </ol>                                                                                                                                              |
| C5   | Inverter over temperature          | <ol style="list-style-type: none"> <li>1. If the alarm occurs occasionally, the inverter can be automatically recovered. No action is required.</li> <li>2. If the alarm occurs repeatedly, please check whether the installation site has direct sunlight, bad ventilation, or high ambient temperature (such as installed on the parapet). Yet, if the ambient temperature is lower than 45° C and the heat dissipation and ventilation is good, please contact customer service.</li> </ol> |
| C6   | GFCI abnormal                      | <ol style="list-style-type: none"> <li>1. If the alarm occurs occasionally, it could have been an occasional exception to the external wiring. The inverter can be automatically recovered. No action is required.</li> <li>2. If it occurs repeatedly or cannot be recovered for a long time, please contact customer service.</li> </ol>                                                                                                                                                     |
| C8   | Fan abnormal                       | <ol style="list-style-type: none"> <li>1. If the alarm occurs occasionally, pls. restart the inverter.</li> <li>2. If it occurs repeatedly or cannot be recovered for a long time, check whether the external fan is blocked by foreign objects. Otherwise, contact customer service.</li> </ol>                                                                                                                                                                                               |
| C9   | DC link unbalance or under voltage | Batteries exceeded their current discharge limit.                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| CA   | Dc-link over voltage               | <ol style="list-style-type: none"> <li>1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required.</li> <li>2. If the alarm occurs repeatedly, the inverter cannot work properly. Pls. contact the customer service center.</li> </ol>                                                                                                                                                                                                         |
| CB   | Internal communication error       | <ol style="list-style-type: none"> <li>1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required.</li> <li>2. If the alarm occurs repeatedly, the inverter cannot work properly. Pls. contact the customer service center.</li> </ol>                                                                                                                                                                                                         |
| CC   | Software incompatibility           | <ol style="list-style-type: none"> <li>1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required.</li> <li>2. If the alarm occurs repeatedly, the inverter cannot work properly. Pls. contact the customer service center.</li> </ol>                                                                                                                                                                                                         |

| Code | Alarm Information           | Suggestions                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| CD   | Internal storage error      | <ol style="list-style-type: none"> <li>1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required.</li> <li>2. If the alarm occurs repeatedly, the inverter cannot work properly. Pls. contact the customer service center.</li> </ol>                                                                                                                                                                |
| CE   | Data inconsistency          | <ol style="list-style-type: none"> <li>1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required.</li> <li>2. If the alarm occurs repeatedly, the inverter cannot work properly. Pls. contact the customer service center.</li> </ol>                                                                                                                                                                |
| CF   | Inverter abnormal           | <ol style="list-style-type: none"> <li>1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required.</li> <li>2. If the alarm occurs repeatedly, the inverter cannot work properly. Pls. contact the customer service center.</li> </ol>                                                                                                                                                                |
| CG   | Boost abnormal              | <ol style="list-style-type: none"> <li>1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required.</li> <li>2. If the alarm occurs repeatedly, the inverter cannot work properly. Pls. contact the customer service center.</li> </ol>                                                                                                                                                                |
| CJ   | Meter lost                  | <ol style="list-style-type: none"> <li>1. Check the meter parameter Settings</li> <li>2. Local App checks that the communication address of the inverter is consistent with that of the electricity meter</li> <li>3. The communication line is connected incorrectly or in bad contact</li> <li>4. electricity meter failure.</li> <li>5. Exclude the above, if the alarm continues to occur, please contact the customer service center.</li> </ol> |
| P1   | Parallel ID warning         | It is Parallel ID Alarm. Pls. check the parallel communication cable, and check whether any inverter joins or exits online. All inverters are powered off completely, check the line, and then power on the inverters again to ensure that the alarm is cleared.                                                                                                                                                                                      |
| P2   | Parallel SYN signal warning | Parallel synchronization signal is abnormal. Check whether the parallel communication cable is properly connected.                                                                                                                                                                                                                                                                                                                                    |
| P3   | Parallel BAT abnormal       | The parallel battery is abnormal. Whether the battery of the inverter is reported low voltage or the battery is not connected.                                                                                                                                                                                                                                                                                                                        |
| P4   | Parallel GRID abnormal      | The parallel grid is abnormal. Whether the grid of the inverter is abnormal.                                                                                                                                                                                                                                                                                                                                                                          |

| Code | Alarm Information               | Suggestions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------|---------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| P5   | Phase Sequence abnormal         | <p>Ensure that the phase sequence of power grid is consistent with that of L1/L2/L3 on App. To clear phase sequence abnormal alarm:</p> <p>Option 1: Power off all inverters, correct the phase sequence of each inverter and then restart the inverters.</p> <p>Option 2: Under inverter standby mode, correct the phase sequence of each inverter on App, power off all inverters and then restart the inverters. If the alarm continues, please contact the customer service center.</p>                                                                                           |
| D2   | Battery over voltage            | <ol style="list-style-type: none"> <li>1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required.</li> <li>2. Check that the battery overvoltage protection value is improperly set.</li> <li>3. The battery is abnormal.</li> <li>4. If exclude the above, the alarm continues to occur, please contact the customer service center.</li> </ol>                                                                                                                                                                                     |
| D3   | Battery under voltage           | <ol style="list-style-type: none"> <li>1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required.</li> <li>2. Check the communication line connection between BMS and inverter (lithium battery).</li> <li>3. The battery is empty or the battery voltage is lower than the SOC cutoff voltage.</li> <li>4. The battery undervoltage protection value is improperly set.</li> <li>5. The battery is abnormal.</li> <li>6. If exclude the above, the alarm continues to occur, please contact the customer service center.</li> </ol> |
| D4   | Battery discharger over current | <ol style="list-style-type: none"> <li>1. Check whether the battery parameters are correctly set.</li> <li>2. Battery undervoltage.</li> <li>3. Check whether a separate battery is loaded and the discharge current exceeds the battery specifications.</li> <li>4. The battery is abnormal.</li> <li>5. If exclude the above, the alarm continues to occur, please contact the customer service center.</li> </ol>                                                                                                                                                                  |
| D5   | Battery over temperature        | <ol style="list-style-type: none"> <li>1. If the alarm occurs repeatedly, please check whether the installation site is in direct sunlight and whether the ambient temperature is too high (such as in a closed room).</li> <li>2. If the battery is abnormal, replace it with a new one.</li> </ol>                                                                                                                                                                                                                                                                                  |
| D6   | Battery under temperature       | <ol style="list-style-type: none"> <li>3. If exclude the above, the alarm continues to occur, please contact the customer service center.</li> </ol>                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| Code | Alarm Information                  | Suggestions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------|------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| D7   | AC output voltage abnormal         | <ol style="list-style-type: none"> <li>1. Check whether the AC OUTPUT voltage and frequency Settings are within the specified range.</li> <li>2. Check whether the AC OUTPUT circuit is overloaded.</li> <li>3. When not connected to the power grid, check whether AC OUTPUT voltage is normal.</li> <li>4. If exclude the above, the alarm continues to occur, please contact the customer service center.</li> </ol>                                                                                                                                |
| D8   | Communication error (Inverter-BMS) | <ol style="list-style-type: none"> <li>1. Check whether the battery is disconnected.</li> <li>2. Check whether the battery is properly connected with the inverter.</li> <li>3. Confirm that the battery is compatible with the inverter. It is recommended to use CAN communication.</li> <li>4. Check whether the communication cable or port between the battery and the inverter is faulty.</li> <li>5. If exclude the above, the alarm continues to occur, please contact the customer service center.</li> </ol>                                 |
| D9   | Internal communication loss(E-M)   | <ol style="list-style-type: none"> <li>1. Check whether the communication cables between AC OUTPUT, electricity meter and inverter are well connected and whether the wiring is correct (European units only).</li> <li>2. Check whether the communication distance is within the specification range</li> <li>3. Disconnect the external communication and restart the electricity meter and inverter.</li> <li>4. If exclude the above, the alarm continues to occur, please contact the customer service center.</li> </ol>                         |
| DA   | Internal communication loss(M-D)   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| CU   | Dcdc abnormal                      | <ol style="list-style-type: none"> <li>1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required.</li> <li>2. If the alarm occurs repeatedly, please check: <ol style="list-style-type: none"> <li>1) Check whether the MC4 terminal on the PV side is securely connected.</li> <li>2) Check whether the voltage at the PV side is open circuit, ground to ground, etc.</li> </ol> </li> </ol> <p>If exclude the above, the alarm continues to occur, please contact the customer service center.</p> |
| CP   | AC output over dc-bias voltage     | <ol style="list-style-type: none"> <li>1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required.</li> <li>2. If the alarm occurs repeatedly, the inverter cannot work properly. Pls. contact the customer service center.</li> </ol>                                                                                                                                                                                                                                                                 |

| Code | Alarm Information                         | Suggestions                                                                                                                                                                                                                                                                                                                                                                 |
|------|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DB   | AC output short circuit                   | 1. Check whether the live line and neutral line of AC OUTPUT are short-circuited.<br>2. If it is confirmed that the output is not short-circuited or an alarm, please contact customer service to report for repair. (After the troubleshooting of alarm problems, AC OUTPUT breaker needs to be manually turned on during normal use.)                                     |
| DC   | AC output over load                       | 1.Disconnect the AC OUTPUT breaker and check whether the alarm is cleared.<br>2.If the load is disconnected and the alarm is generated, please contact the customer service. (After the alarm is cleared, the AC OUT breaker needs to be manually turned on for normal use.)                                                                                                |
| DO   | Meter 2 lost or device communication loss | 1. Check the meter parameter Settings<br>2. Local App checks that the communication address of the inverter is consistent with that of the electricity meter<br>3. The communication line is connected incorrectly or in bad contact<br>4. electricity meter failure.<br>5. Exclude the above, if the alarm continues to occur, please contact the customer service center. |

### 10.3 Decommissioning

|                                                                                  |                                                                                                                                                |
|----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <b>WARNING</b> Before removing DC input connector, double check DC input switch is turned to OFF to avoid inverter damage and personal injury. |
|----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|

Perform the following procedures to remove the inverter:

- Step 1** Disconnect all cables from the inverter, including communications cables, DC input power cables, AC output power cables, and PE cable.
- Step 2** Remove the inverter from the mounting bracket.
- Step 3** Remove the mounting bracket.

## 11. Technical Specifications

| Model                               | MHSI-8K-05LP1                                    | MHSI-10K-05LP1      | MHSI-12K-05LP1      |
|-------------------------------------|--------------------------------------------------|---------------------|---------------------|
| Input (PV)                          |                                                  |                     |                     |
| Max. PV Usable Power                | 12,000 W                                         | 15,000 W            | 15,000 W            |
| Max. PV Voltage                     | 600 V                                            |                     |                     |
| Start-up Voltage                    | 90 V                                             |                     |                     |
| MPPT Operating Voltage Range        | 70 V to 540 V                                    |                     |                     |
| Max. Input Current per MPPT         | 20 A / 20 A / 20 A                               |                     |                     |
| Max. Short Circuit Current per MPPT | 30 A / 30 A / 30 A                               |                     |                     |
| String per MPPT                     | 1/1/1                                            |                     |                     |
| MPPT No.                            | 3                                                |                     |                     |
| Input/Output (BAT)                  |                                                  |                     |                     |
| Battery Type                        | Lithium-ion/Lead-acid                            |                     |                     |
| Nominal Battery Voltage             | 48 V                                             |                     |                     |
| Battery Voltage Range               | 40 V to 64 V                                     |                     |                     |
| Max. Charge/Discharge Current       | 210 A / 180 A                                    | 210 A / 210 A       | 210 A / 210 A       |
| Max. Charge/Discharge Power         | 10,000 W / 8,000 W                               | 10,000 W / 10,000 W | 10,000 W / 10,000 W |
| Output (Grid)                       |                                                  |                     |                     |
| Nominal AC Output Power             | 8,000 W                                          | 10,000 W            | 12,000 W            |
| Max. AC Output Apparent Power       | 8,800 VA                                         | 11,000 VA           | 12,000 VA           |
| Max. AC Output Power (PF=1)         | 8,800 W                                          | 11,000 W            | 12,000 W            |
| Max. AC Output Current              | 40 A                                             | 50 A                | 52.2 A              |
| Nominal Grid voltage                | 220 V / 230 V / 240 V, L+N+PE                    |                     |                     |
| Grid Voltage Range                  | 150 V to 300 V (Adjustable)                      |                     |                     |
| Nominal Grid Frequency              | 50 Hz/60 Hz                                      |                     |                     |
| Grid Frequency Range                | 45Hz to 55Hz/55Hz to 65Hz (Adjustable)           |                     |                     |
| Power Factor                        | > 0.99 @rated power (Adjustable 0.8 LD - 0.8 LG) |                     |                     |
| THDI                                | <3 % (Rated Power)                               |                     |                     |
| Output (Back up)                    |                                                  |                     |                     |
| Nominal Output Power                | 8,000 W                                          | 10,000 W            | 12,000 W            |
| Nominal Output Current              | 34.8 A                                           | 43.5 A              | 52 A                |
| Peak Output Apparent Power (1s)     | 16,000 VA                                        | 20,000 VA           | 20,000 VA           |
| Nominal Output Voltage              | 220 V / 230 V / 240 V, L+N+PE                    |                     |                     |

| Model                           | MHSI-8K-05LP1                                                    | MHSI-10K-05LP1 | MHSI-12K-05LP1 |
|---------------------------------|------------------------------------------------------------------|----------------|----------------|
| Nominal Output Frequency        | 50Hz/60Hz                                                        |                |                |
| Transfer Time                   | <10 ms (typical)                                                 |                |                |
| THDV                            | <3 % @100 % R Load                                               |                |                |
| Protection                      |                                                                  |                |                |
| Protection Category             | Class I                                                          |                |                |
| DC Switch                       | Yes                                                              |                |                |
| Anti-islanding Protection       | Yes                                                              |                |                |
| AC Overcurrent Protection       | Yes                                                              |                |                |
| DC/AC Overvoltage Protection    | DC Type II, AC Type III                                          |                |                |
| AC Short Circuit Protection     | Yes                                                              |                |                |
| DC Reverse Protection           | Yes                                                              |                |                |
| Surge Arrester                  | DC Type II, AC Type II                                           |                |                |
| Insulation Resistance Detection | Yes                                                              |                |                |
| Leakage Current Protection      | Yes                                                              |                |                |
| Generator                       | Yes                                                              |                |                |
| AFCI                            | Optional                                                         |                |                |
| RSD                             | Optional                                                         |                |                |
| General                         |                                                                  |                |                |
| Max. Operation Altitude         | 4000 m (> 2000 m derating)                                       |                |                |
| Ingress Protection Degree       | IP65                                                             |                |                |
| Operating Temperature Range     | -25 °C to 60 °C (> 45 °C derating)                               |                |                |
| Relative Humidity               | 0 % to 100 %                                                     |                |                |
| Cooling Method                  | Fan Cooling                                                      |                |                |
| Mounting                        | Wall bracket                                                     |                |                |
| Dimensions (W*H*D)              | 440 mm * 725 mm * 251.5 mm                                       |                |                |
| Weight                          | 39 Kg                                                            |                |                |
| HMI & COM                       |                                                                  |                |                |
| Display                         | LED+APP (Bluetooth), LCD                                         |                |                |
| Communication Interface         | CAN (for BMS), DRM/RS485 (for Meter), RS485, Optional: Wi-Fi/LAN |                |                |
| Certification                   |                                                                  |                |                |
| Safety                          | EN IEC 62109-1&2                                                 |                |                |
| EMC                             | EN IEC 61000                                                     |                |                |
| Warranty                        | 5 Years                                                          |                |                |

Remarks :

- The range of output voltage and frequency may vary depending upon different grid codes.
- Specifications are subject to change without advance notice.