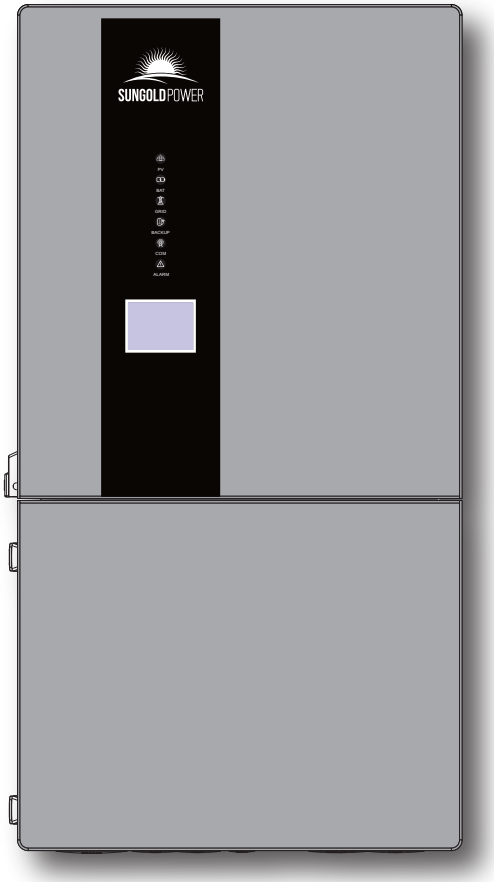



# USER MANUAL

## Energy Storage System

SGN7.6K1HB-48

# Preface

## About This Manual

This manual describes the installation, connection, APP setting, commissioning and maintenance etc. of Energy Storage System(ESS). Please first read the manual and related documents carefully before using the product and store it in a place where installation, operation and maintenance personnel can reach it 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.)

## Target Group

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

## 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: supplement additional safety instructions for your better use of the Three phase hybrid inverter to reduce the waste of you resource. |

# CONTENTS

# 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 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.

Unauthorized modifications to the product's appearance, including drilling holes or making any structural alterations, will void the warranty.

## 1.1 Symbols Used

| Safety Symbol | Description |
|---|---|
|  | Danger of high voltage and electric shock!<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 |
|  | Environmental Protection Use Period |
|  | Refer to the operating instructions |
|  | Product should not be disposed as household waste. |
|  | Grounding terminal |

## 1.2 Safety Precaution

- Installation, maintenance and connection of inverters must be performed by qualified personnel, in compliance with 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 ℃ during operation. Do not touch the inverter during operation to avoid being burnt.
- Ensure children are kept away from inverters.
- Don’t 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.
- Prohibit inserting or pulling the AC and DC terminals when the inverter is running.
- In Australia, the inverter internal switching does not maintain the neutral neutral continuity. And neutral integrity must be addressed by external connection arrangements.
- The BACKUP Port should not be connected to the grid.
- The BAT Port should not be connected to PV and AC voltage. The voltage connected to this port can not exceed 64 V DC.
- The GRID Port should not be connected to PV voltage.
- A single PV panel string should not be connected to two or more inverters.

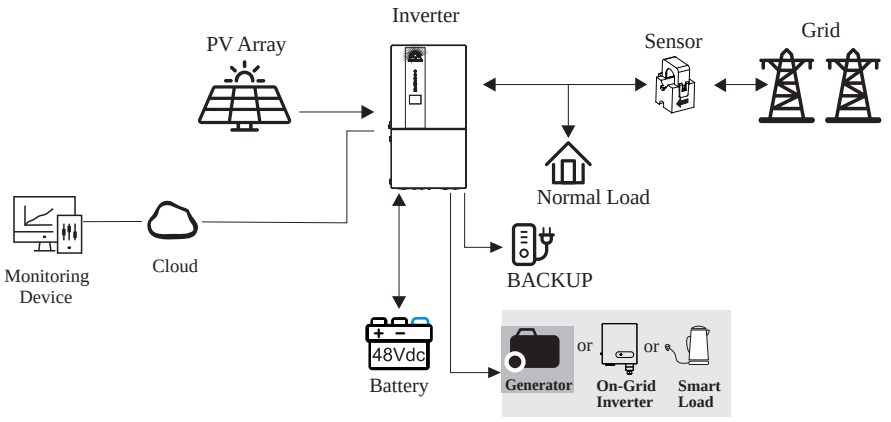
# 2 Product Introduction

## 2.1 Overview

### Energy Storage System(ESS)

Typically, an ESS consists of PV array, inverter, battery, loads and electricity sensor.

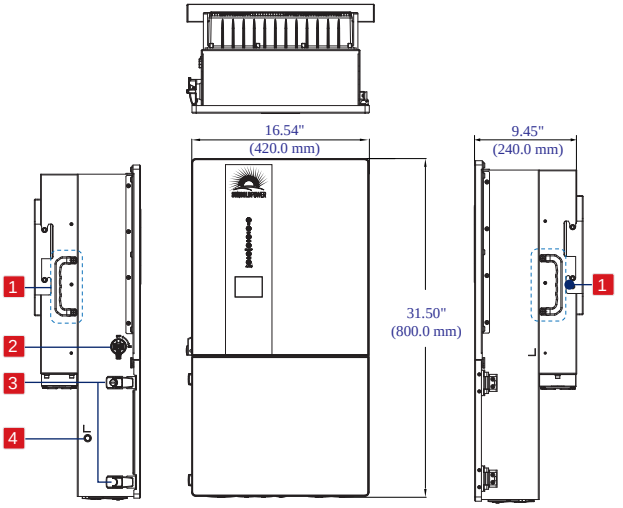
The inverter is a high-quality machine that converts solar energy to AC energy and store energy into battery. The energy generated by inverter can be preferentially supplied to its self consumption, stored in the battery for future use or fed into the public grid.




**Inverter Application System**

## 2.2 Product Appearance

- **The External View of Inverter**




| No. | Description |
|---|---|
| 1 | Handle Areas |
| 2 | PV switch |
| 3 | Locks |
| 4 | ON/OFF Button |

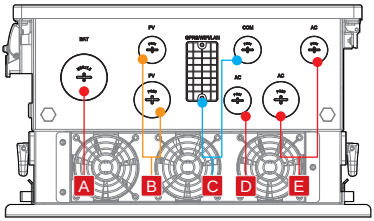
**Inverter dimensions:**

| Width | Height | Depth |
|---|---|---|
| 16.54" (420.0 mm) | 31.50" (800.0 mm) | 9.45" (240.0 mm) |

**LED Details:**

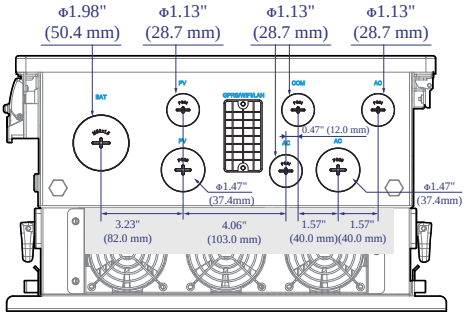
| Indicator | Description |
|---|---|
| | PV |
| | Battery |
| | Grid |
| | Backup |
| | Communication |
| | Alarm |

- **The Bottom View of inverter**

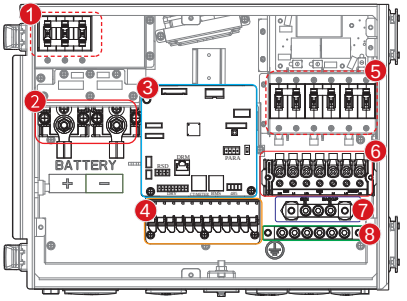



| No. | Description |
|---|---|
| A | Battery connection port |
| B | PV connection ports |
| C | Communication connection ports |
| D | Reserved AC connection port |
| E | Grounding/GRID/BACKUP/GEN connection ports |

- **The Dimensions of Waterproof Holes**




- **The Internal Structure of Wiring Box**



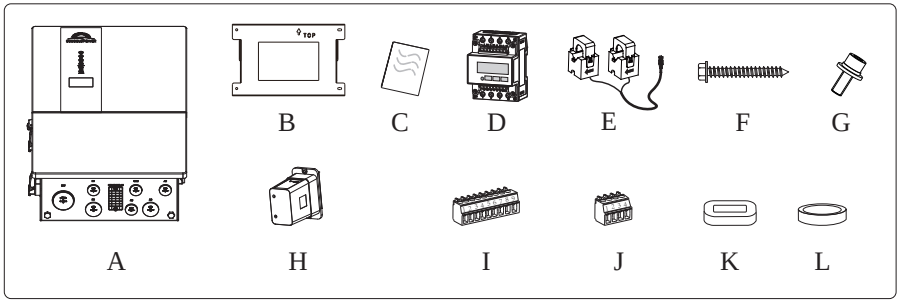

| No. | Description |
|---|---|
| 1 | Battery breaker (Optional)* |
| 2 | Battery terminals |
| 3 | Communication connection ports |
| 4 | PV input connector |
| 5 | AC breakers (Optional)* |
| 6 | GEN/GRID/BACKUP terminals |
| 7 | GEN/BACKUP neutral terminals |
| 8 | Ground bus bar |

* This series of inverters will be equipped with the internal DC (Battery) breaker and AC (Gen, Grid, Backup) breakers, components in No. 1 and No. 5 in the above illustration, by default. However, these breakers can be removed depending on the customer's needs. This user manual illustrates the default option for reference.

# 3 Installation

## 3.1 Packing List

After unpacking, please check the following packing list carefully for any damages or missing parts. If any damages or missing parts occurs, contact the supplier for help.




| Position | Quantity | Description |
|---|---|---|
| A | 1 | Inverter |
| B | 1 | Mounting bracket |
| C | 1 | File package |
| D | 1 | Meter (Optional) |
| E | 1 | CT pack |
| F | 4 | M6 Self tapping screws |
| G | 1 | M6 Security screw |
| H | 1 | WIFI Module |
| I | 1 | 9-Pin terminal |
| J | 3 | 4-Pin terminal |
| K | 1 | AC Toroid, for grid L1/L2/N cables |
| L | 1 | DC Toroid, for battery cables |

## 3.2 Selecting the Mounting Location

### 3.2.1 Installation Environment Requirements

a. With a NEMA 3R protection rating, the inverter can be mounted indoors or outdoors.

b. The inverter is suitable for use in residential non-habitable spaces.

c. The mounting location must be inaccessible to unrelated personnel since the enclosure and heat sinks are extremely hot during operation.

d. Do not install the inverter in areas containing highly flammable materials or gases.

e. To ensure optimum operation and long service life, the ambient temperature must be below 50℃.

f. The inverter must be mounted in a well-ventilated environment to ensure good heat dissipation.

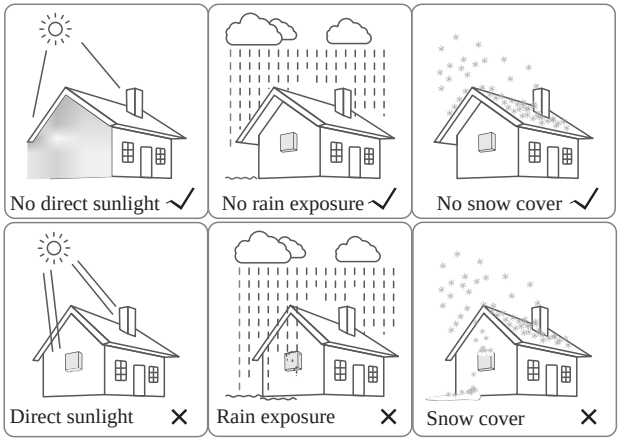
g. Identify the inverter location on a stub frame, a brick wall or a concrete wall. Ensure the carrier, where the inverter is mounted, can support the weight of the inverter.

h. Do not install the inverter in a rest area since it will cause noise during operation.

i. The installation height should be reasonable, and please make sure it is easy to operate and view the display.

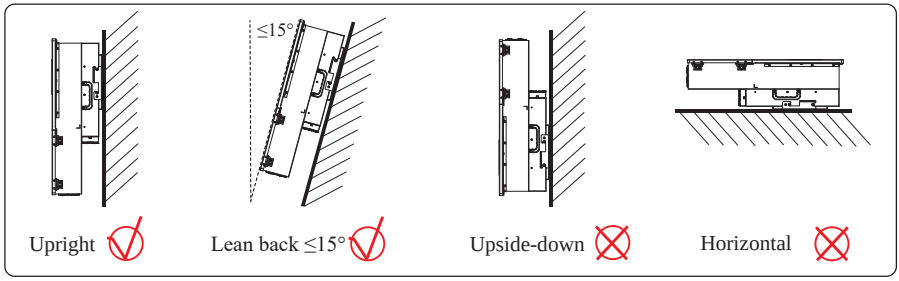
j. Product label and warning symbols shall be clear to read after installation.

k. 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.



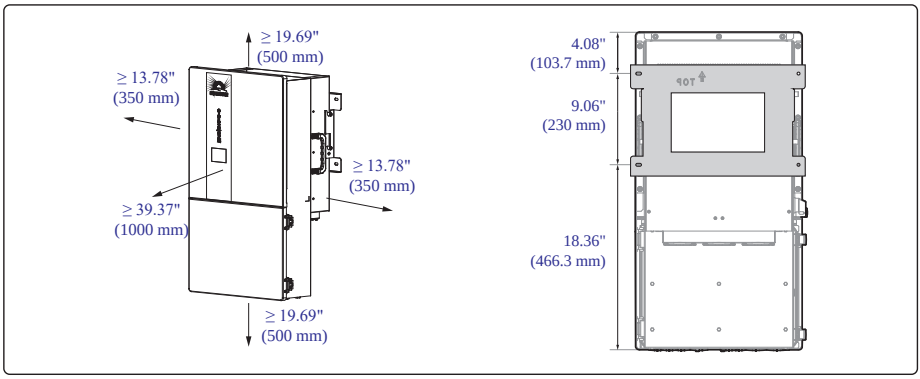

### 3.2.2 Mounting Requirements

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



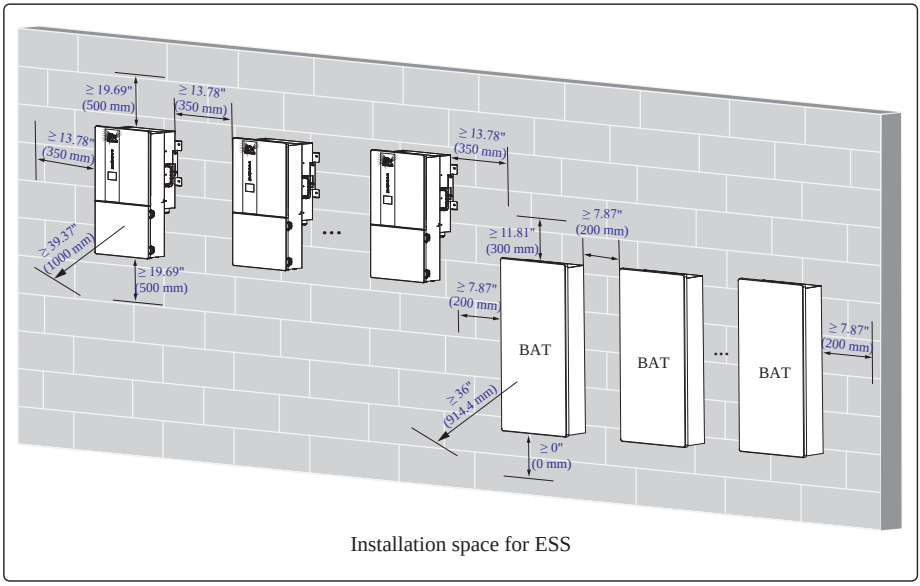
### 3.2.3 Installation Space Requirements

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




Note:
Ensure all related local laws and regulations have been complied.

The detailed clearance information below are general guidelines. There should be at least 39.37 in (1000 mm) of clearance from inverters or batteries to doors or windows.



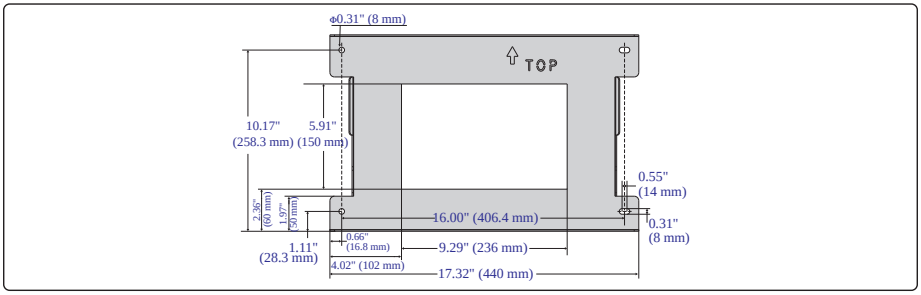

Installation space for ESS

## 3.3 Mounting

| | |
|---|---|
| **DANGER** | Before drilling the hole on the wall, ensure no damage on the electric wire and/or water pipe inside the wall. |

| | |
|---|---|
| **CAUTION** | The inverter is heavy!<br>Two or three persons are recommended to install the inverter.<br>To prevent potential damages and injuries from inverter falling down, please ensure that the inverter is well-mounted. |

Before mounting the inverter, you have to prepare an electric screwdriver and a marker. You may need expansion plugs or anchors for concrete. The dimension of mounting bracket is shown as figure below.

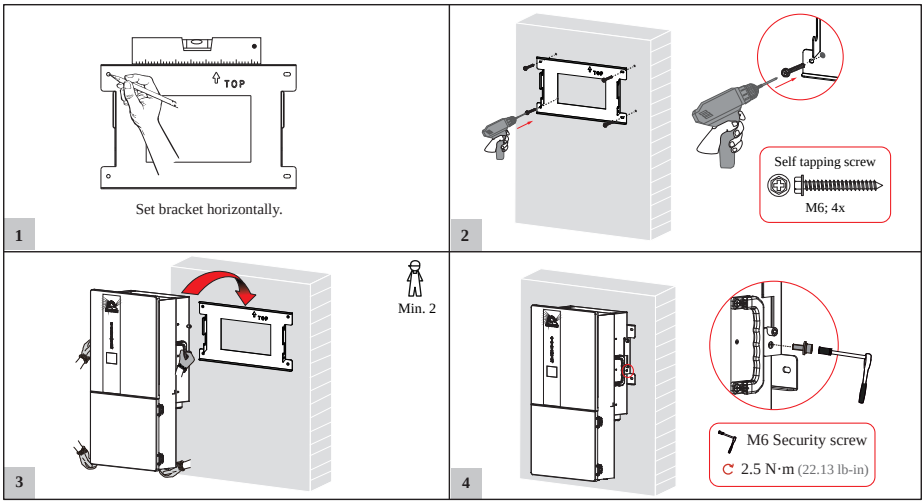



**Step 1.** Position the mounting bracket against the mounting surface, level it, and mark the mounting hole locations.

**Step 2.** Drive the screws through the mounting bracket into the mounting surface. Ensure the bracket is firmly attached.

**Step 3.** Hang the inverter onto the mounting bracket.

**Step 4.** Lock the inverter using the security screw.



# 4 Electrical Connection

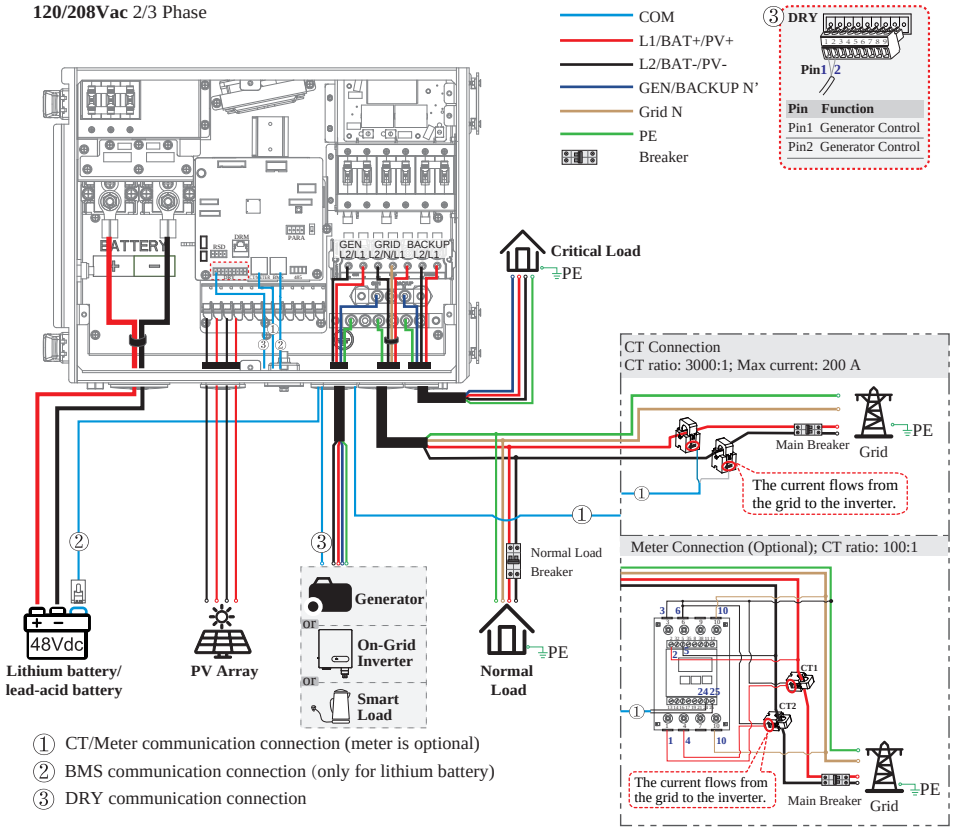
This chapter shows the detailed electrical connections of ESS inverter.

| | |
|---|---|
| **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. |

## 4.1 Wiring Diagram

**Standard Non-parallel Wiring Diagram** *Diagram 01*

**120/240Vac** Split Phase
**120/208Vac** 2/3 Phase

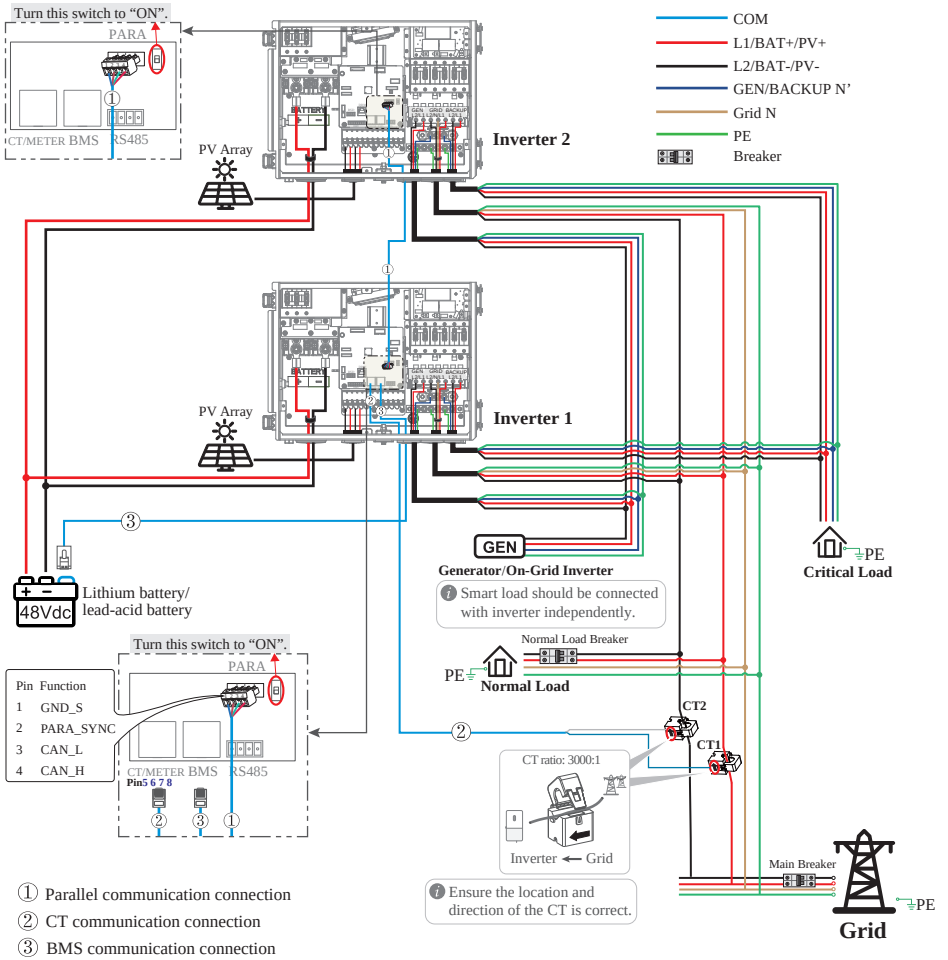



① CT/Meter communication connection (meter is optional)
② BMS communication connection (only for lithium battery)
③ DRY communication connection

- The BACKUP /GEN neutral and GRID neutral must connect to different terminals separately.
- The GEN port supports connection to generators of two voltage types: Split Phase (120/240V) and 2/3 Phase (120/208V). When using the GEN port to connect a generator, ensure that the voltage type of the inverter's grid port is consistent with that of the generator port. Then, perform the following steps via the app (log in with an Installer account):
  - First, select the Gen port type via ***Settings > Inverter > Gen > Generator***
  - Then, select correct grid voltage type via ***Setting > Grid > Grid voltage type > Split phase or 2/3 phase***
- The specification of main breaker and normal load breaker depend on household loads.

## Parallel Connection Mode-Scheme A (N=2) *Diagram 02*

**120/240Vac** Split Phase
**120/208Vac** 2/3 Phase

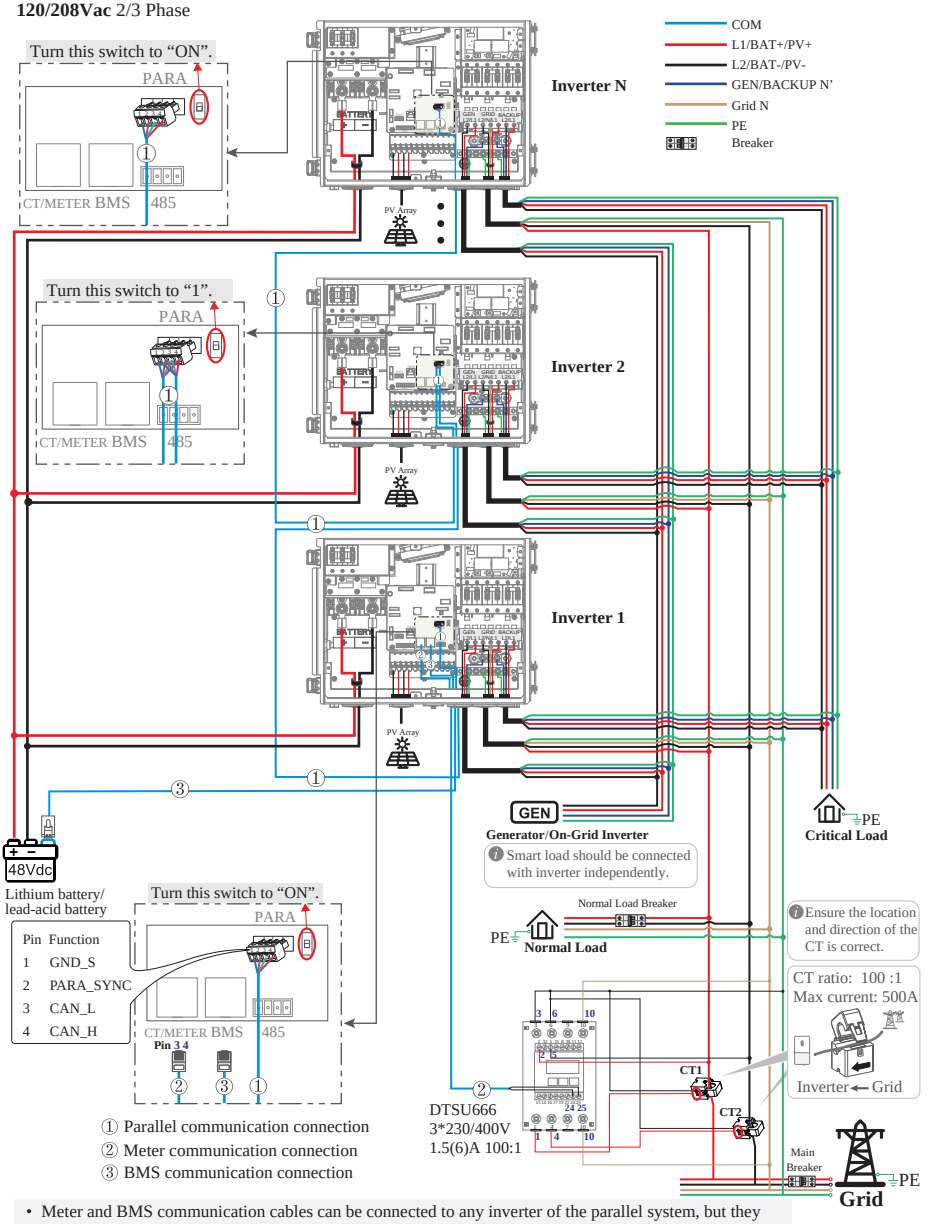



① Parallel communication connection
② CT communication connection
③ BMS communication connection

- CT 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.
- The BACKUP /GEN neutral and GRID neutral must connect to different terminals separately.
- The specification of main breaker and normal load breaker depend on household loads.
- Please refer to ***Note for parallel wiring diagrams*** to learn more information about this parallel diagram.

## Parallel Connection Mode-Scheme B (2≤N≤9) *Diagram 03*

**120/240Vac** Split Phase
**120/208Vac** 2/3 Phase




- 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.
- The BACKUP /GEN neutral and GRID neutral must connect to different terminals separately.
- The specification of main breaker and normal load breaker depend on household loads.
- Please refer to **Note for parallel wiring diagrams** to learn more information about this parallel diagram.

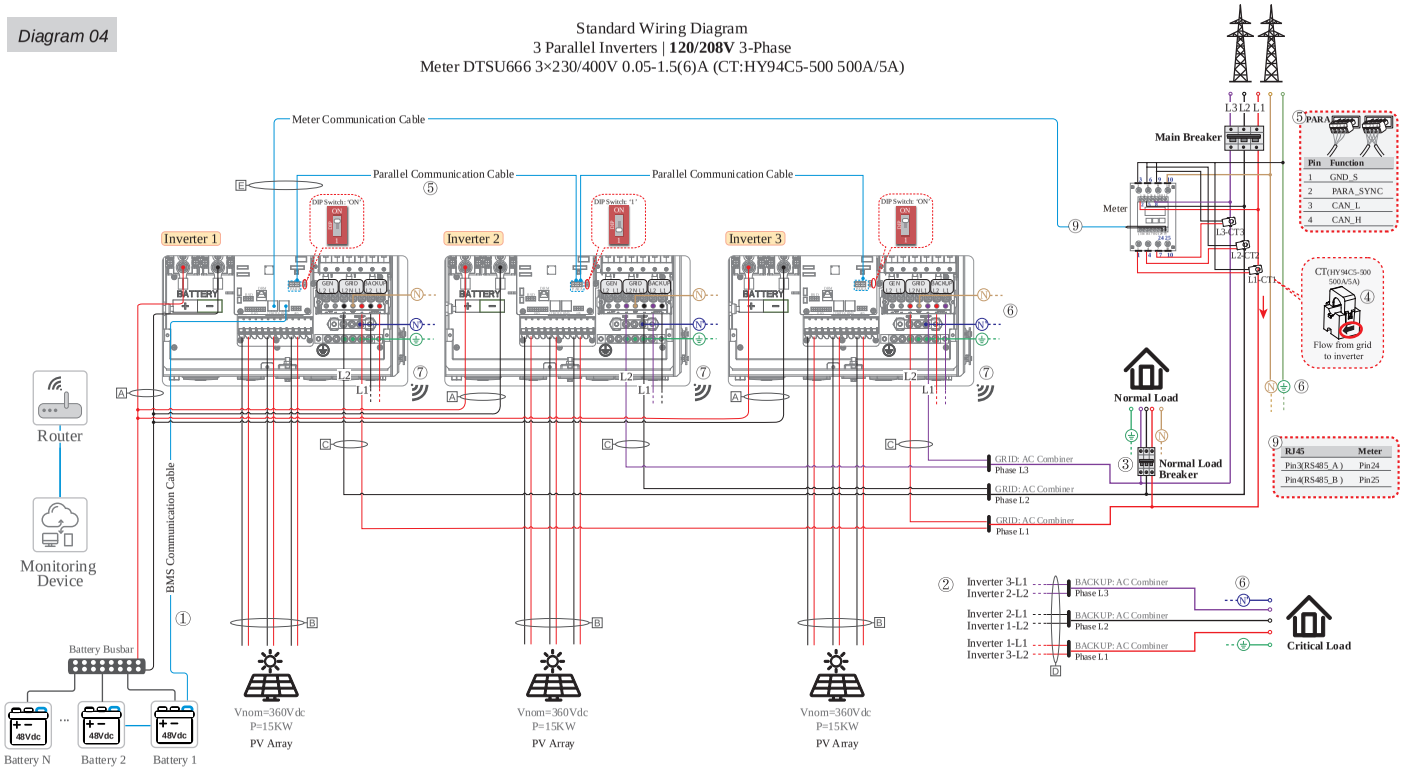
**Note for parallel wiring diagrams**

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 in which the CT ratio is 100:1.
4. For a parallel system, it is required to enable parallel mode on one of the inverters, which can be done via the APP (log in as an ***Installer*** first, then go to ***Setting > Inverter > Parallel***).
5. In one parallel system, the smart load is only allowed to be connected to GEN port in a non-parallel way.
6. The external DC/AC breakers are not supplied with the inverter and must be purchased separately. Prepare the external parallel breakers with a nominal current $\geq 2 * N * I_{max}$ (N refers to the parallel inverter quantity; Imax refers to the maximum output current of the inverter.)
7. The GEN port supports connection to generators of two voltage types:Split Phase (120/240V) and 2/3 Phase (120/208V). When using the GEN port to connect a generator, ensure that the voltage type of the inverter’s grid port is consistent with that of the generator port. Then, perform the following steps via the app (log in with an Installer account):
   - First, select the Gen port type via ***Settings > Inverter > Gen > Generator***
   - Then, select correct grid voltage type via ***Setting > Grid > Grid voltage type > Split phase or 2/3 phase***

| | |
|---|---|
| **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. |

Diagram 04

# Standard Wiring Diagram
## 3 Parallel Inverters | **120/208V** 3-Phase
## Meter DTSU666 3×230/400V 0.05-1.5(6)A (CT:HY94C5-500 500A/5A)




① BMS is only for Lithium battery.

② The wiring method of critical load is as the same as that of the grid.
In 'Inverter N-L1', 'N' represents inverter serial number; 'L' represents the phase of live wire in GRID/BACKUP connection.

③ If breakers are prepared by yourself, refer to TABLE 1 for breaker specification.

④ The arrow indicates the current in CT flows from the grid to the inverter.

⑤ Parallel communication cable connection details.

⑥ N N ⏚ These symbols represent a grid neutral/common neutral/ground connection respectively. Do not confuse the grid neutral with other neutral. Failure to do so may damage the inverter.

⑦ WLAN/Wi-Fi

⑧ Meter and BMS communication cable must be connected to inverter 1 (master inverter), and CTs are required to connect in order of CT1 , CT2, and CT3.

⑨ Meter communication cable connection details.

(AC) L1 (DC) PV+ (DC) BAT +
(AC) L2 (DC) PV- (DC) BAT -
L3
NEUTRAL (GEN/BACKUP)
NEUTRAL (Grid)
GROUND
COM

TABLE 1
BREAKER RECOMMENDATION

| LOCATION | SPECIFICATION |
|---|---|
| Battery side(DC) | 300A/80V |
| GEN side(AC) | ≥60A/250V |
| Grid side(AC) | ≥60A/250V |
| Backup side(AC) | ≥60A/250V |
| Normal load side(AC) Main load side (AC) | Depends on required pass -through current and local code requirements. |

TABLE 2
WIRE GAUGE GUIDE (COPPER)

| LABEL | CONDUCTOR |
|---|---|
| A | 4/0 AWG |
| B | 10-8 AWG |
| C | Min. 6 AWG |
| D | Min. 6 AWG |
| E | 24-23 AWG CAT6 |

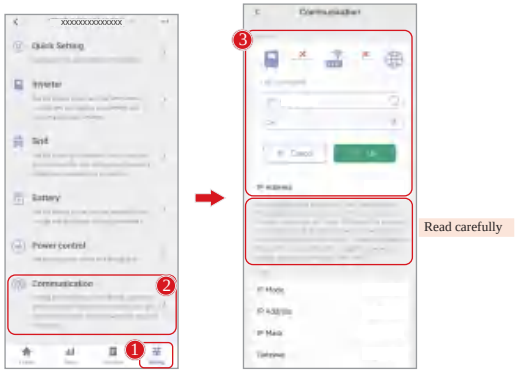
## Note for three-phase wiring diagrams

1. For three-phase connection, specific settings must be configured via the app.
2. Detailed connection steps of each port have been illustrated in the following sections, 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

In three-phase connection mode, you can connect the APP to each inverter and set related parameters by following the steps below.

1. Make sure the inverters are on standby. Then connect to any inverter in the three-phase system and login as an installer.
2. Wi-Fi configuration. Connect all inverters in the parallel system to the router separately.




3. Ensure the firmware versions of all inverters in the system are consistent.(Figure 4-1)
4. Reset factory data of every inverter (as shown in Figure 4-2).

| | |
|---|---|
| **NOTICE** | 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. |

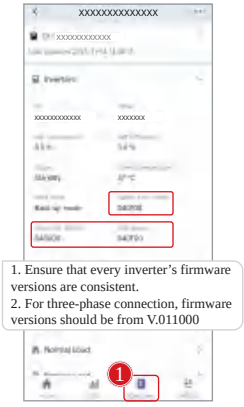



Figure 4-1

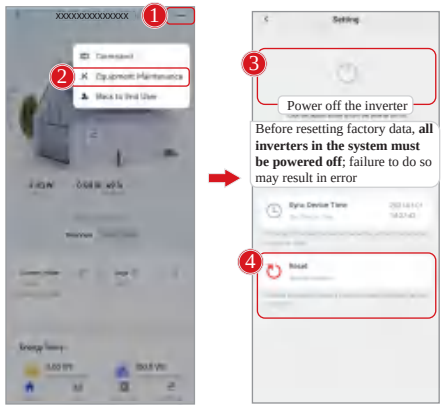
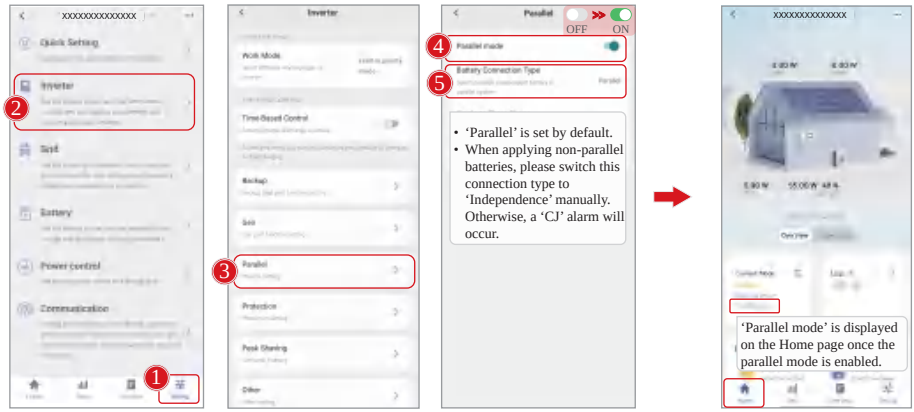



Figure 4-2

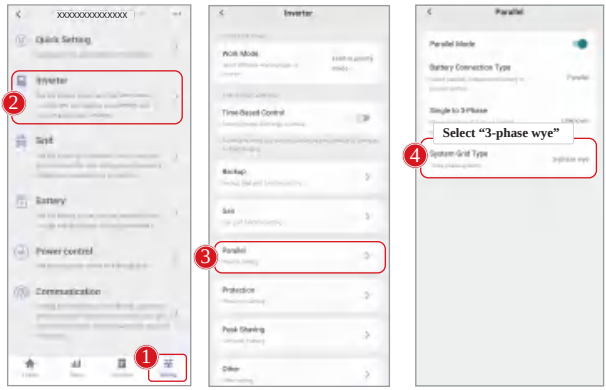
5. Enable parallel mode and configure three-phase system. Users only need to set parallel parameters on one inverter. All inverters in the parallel system will automatically synchronize the settings.

| NOTE | 1. Before activating parallel mode, all inverters in the system shall finish step 3 - 4) separately; otherwise, the parallel connection may fail.<br>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.<br>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.<br>4. Please strictly follow the sequence for three-phase configuration:<br>a) Enable parallel mode;<br>b) Set the system grid type;<br>c) Set the grid voltage type;<br>d) Set the phase position on each inverter.<br>Otherwise, error alarms may occur and the inverter will not work normally. |
|---|---|

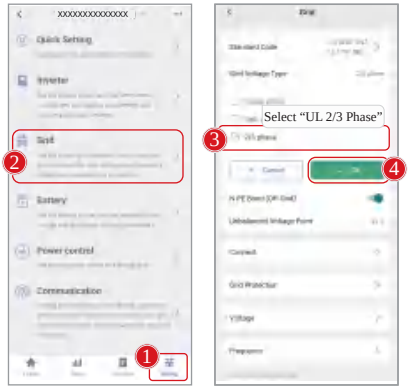
**a) Enable parallel mode**




**b) Set the System Grid Type**

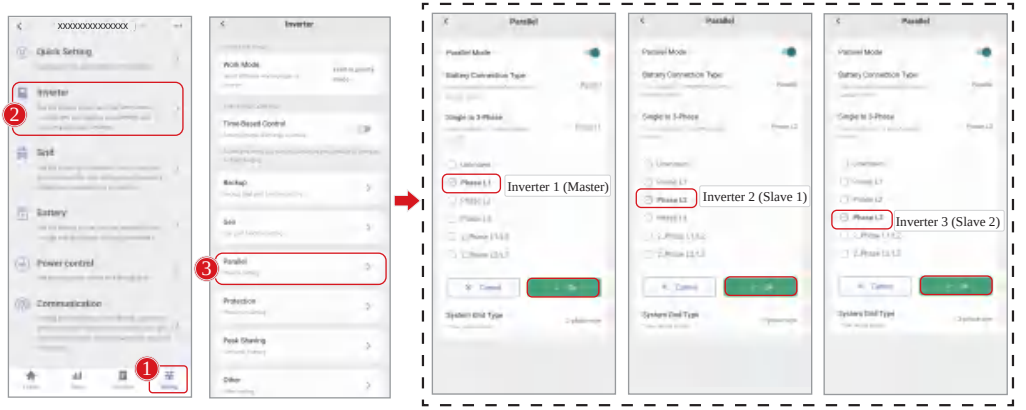


### c) Set the Grid Voltage Type

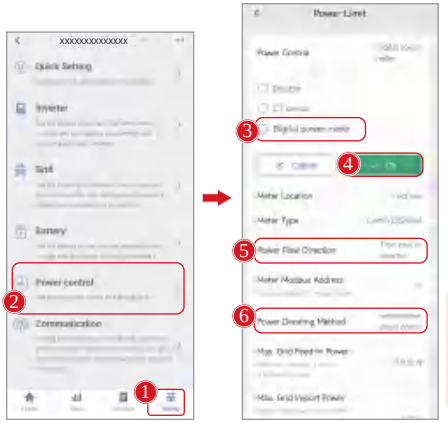



### d) Set the Phase Position

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




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



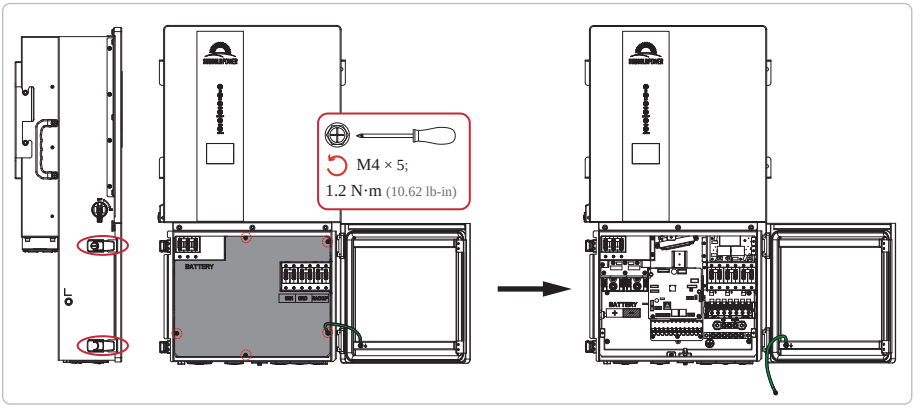
While "Independent phase power" is set by default, it is important to ensure that all inverters in the three-phase system are indeed set to "Independent phase power".

## 4.2 Removing Insulation Cover and Grounding Cable

A shielding cover has been installed over the wiring box of the ESS inverter to protect users from potential electrical injuries. Before removing the cover and wiring, please ensure that the inverter and all cables to be installed have been completely powered off during the whole process of installation and connection.

**Procedures:**

1. Open the side locks of the inverter.
2. Remove the screws of the insulation cover and remove the grounding cable with a torque of 1.2 N·m or 10.62 lb-in.




| | |
|---|---|
| **CAUTION** | After the electrical connections are complete, if no other connections are made in the wiring area, replace the insulation cover and ensure the grounding cable is well-connected again. |

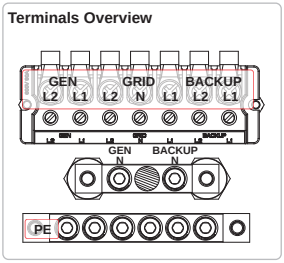
## 4.3 Internal Grounding

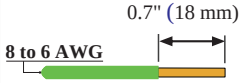
| | |
|---|---|
| **WARNING** | The inverter must be grounded; otherwise, there will be an electric shock risk. |

| | |
|---|---|
| **CAUTION** | If the positive pole or negative pole of the PV array is required to be grounded, the inverter output (to AC grid) must be isolated by transformer in accordance with IEC62109-1, -2 standards. |

A protective earth (PE) busbar is equipped inside of the inverter's wiring box. Please be sure to connect the PE cable to the PE busbar for reliable grounding.

A minimum gauge size of AWG 8 green or green-yellow wire is recommended.

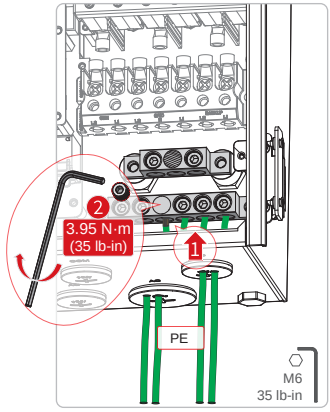



| Items | Remark |
|---|---|
| PE cable size | Min. 8 AWG |
| Strip length | 0.7" (18 mm) |
| Screw | M6 |
| Torque | 35 lb-in |

**Procedures:**

1. Thread the wires into wiring box through AC connection ports, namely Grounding/ GRID/BACKUP/GEN connection ports.
2. As shown in the illustrations, attach the PE cable to the busbar accordingly, and tighten terminal screws with a torque of 3.95 N·m or 35 lb-in.
3. Make sure that all cables are securely in place.



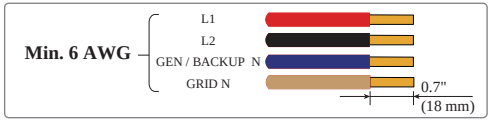
## 4.4 GRID/BACKUP/GEN Connection

This section explains the requirements and procedures of AC connection. Read carefully before connecting.

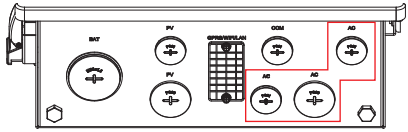
| | |
|---|---|
| **DANGER** | Before connecting the GRID/BACKUP/GEN terminal, ensure that both the AC terminal and the DC terminal are powered off and the PV switch is OFF. Otherwise there is a risk of high voltage shock. |

**Procedures:**

1. Prepare the proper cable we recommended as shown below, and strip an appropriate length of the cable insulation. It is recommended to use outdoor dedicated cables.




2. Thread the wires into wiring box through AC ports.

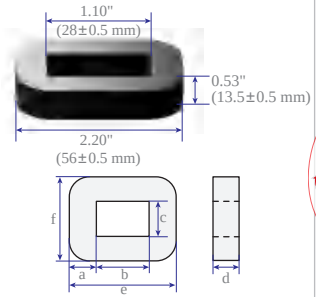


3. As shown in the figure below, insert the wire into the terminal according to the label on the terminal block, and then tighten the terminal screws with a torque of 3.95 N·m or 35 lb-in. Finally, ensure that all wires are securely in place.

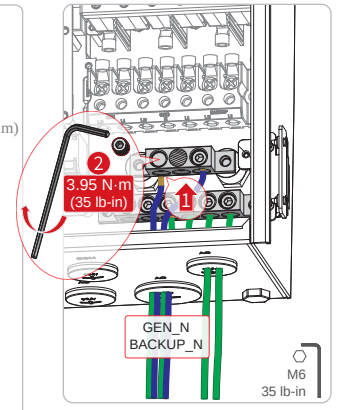
* When connecting the L1/L2/N cables to the GRID terminals, thread these three cables through an AC toroid first.

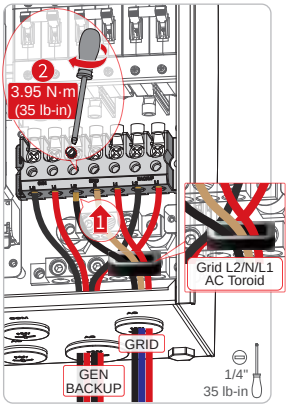
* AC cable connection ports in the illustrations are for reference only. Select appropriate ports as needed.

**AC Toroid Dimension:**




| Case Dimension | | |
|---|---|---|
| a (mm) | 14.00 | ±0.5 |
| b (mm) | 28.00 | ±0.5 |
| c (mm) | 20.00 | ±0.5 |
| d (mm) | 13.50 | ±0.5 |
| e (mm) | 56.00 | ±0.5 |
| f (mm) | 48.00 | ±0.5 |



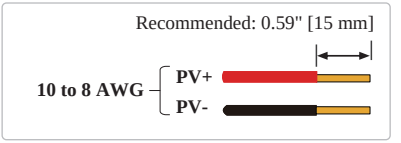
## 4.5 PV Connection

This section explains the requirements and procedures of PV connection. Read carefully before connecting.

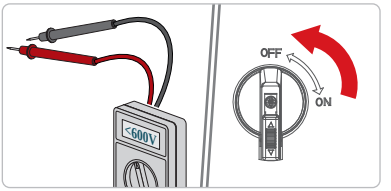
| | |
|---|---|
| **DANGER** | 1. Photovoltaic arrays exposed to sunlight will generate dangerous voltages!<br>2. Before connecting the PV terminal, ensure that both the AC terminal and the DC terminal are powered off and the PV switch is OFF. Otherwise there is a risk of high voltage shock. |

**Procedures:**

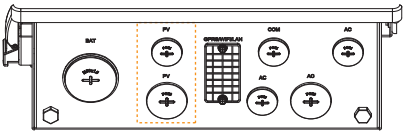
1. Prepare the proper cable we recommended as shown below, and strip an appropriate length of the cable insulation. It is recommended to use outdoor dedicated PV cables.



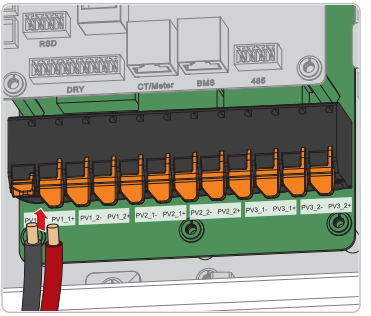

2. Inspection before connection.
   - Check correct polarity of wire connection from PV modules and PV input connectors.
   - The test voltage cannot exceed 600 V DC.
   - Ensure that the PV switch is OFF.




3. Thread the wires into wiring box through PV connection ports.



4. Open the switches of PV input connector. Insert the stripped cable into the PV input connector. When doing so, ensure that the stripped cable and the PV input connector are of the same polarity. Finally, close switches and ensure the wires are tightly fixed.



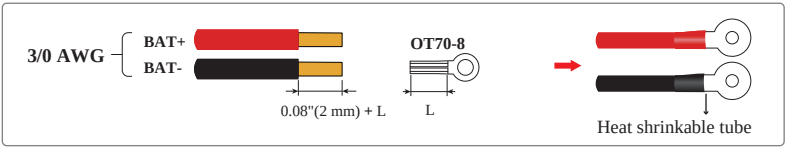
## 4.6 Battery Connection

This section explains the requirements and procedures of battery connection. Read carefully before connecting.

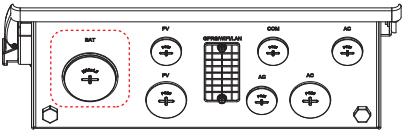
| | |
|---|---|
| **DANGER** | Before connecting the battery terminal, ensure that both the AC terminal and the DC terminal are powered off and the PV switch is OFF. Otherwise there is a risk of high voltage shock |

**Procedures:**

1. Prepare the proper cable and OT terminal we recommended as shown below, and strip an appropriate length of the cable insulation. It is recommended that the battery cable be less than or equal to 3 m.



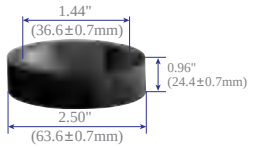

2. Thread the wires into wiring box through BAT connection port.

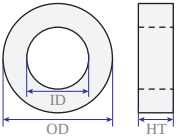


3. Insert the wires into battery terminals. A toroid is a must for our inverter to avoid interference.

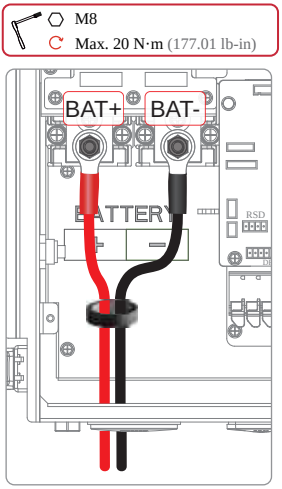
| | |
|---|---|
| WARNING | Reverse polarity will damage the inverter! |

**DC Toroid Dimension:**



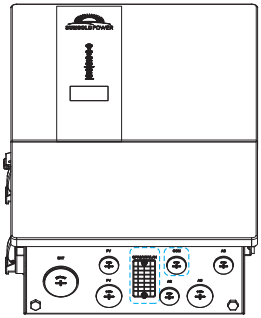



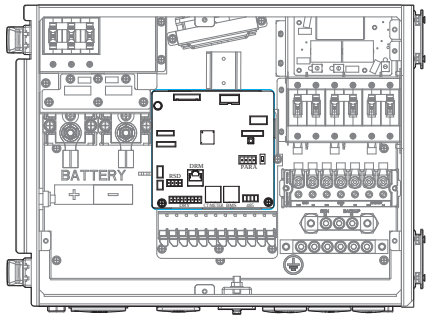

| Case Dimension | | |
|---|---|---|
| OD (mm) | 63.55 | ±0.7 |
| ID (mm) | 36.57 | ±0.7 |
| HT (mm) | 24.40 | ±0.7 |



## 4.7 Communication Connection

There are communication interfaces in the communication port on the bottom of the inverter as show below:



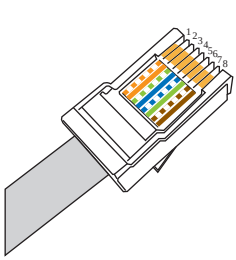



| Interface | | Descriptions |
|---|---|---|
| PARA | | 4-Pin interface for parallel communication |
| | | A matched resistance switch for parallel communication |
| 485 | | 4-Pin interface for RS485 communication |
| DRM | | Demand response mode for Australia application |
| CT/METER | | For CT/Meter communication or Grid current sense |
| BMS | | Lithium battery communication interface |
| 9-Pin | GEN | Generator control |
| | NTC | Temperature sensor terminal of lead-acid battery |
| | RMO | Remote off control |
| | DRY | DI/DO control |
| RSD | | RSD control interface |
| GPRS/WIFI/LAN | | For GPRS/WIFI/LAN communication |

### 4.7.1 BMS Connection (Only for Lithium Battery)

| NOTE | 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**




| RJ45 Pin Configuration | |
|---|---|
| **Pin** | **Color** |
| 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 from 1 to 8. Read the pin definitions of both the battery and inverter carefully.

- **Pin definition of terminal**

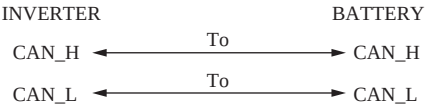
INVERTER:

| Inverter | |
|---|---|
| **Pin** | **Definition** |
| 1 | / |
| 2 | / |
| 3 | / |
| 4 | CAN_H |
| 5 | CAN_L |
| 6 | / |
| 7 | / |
| 8 | / |

BATTERY:
Taking one battery's pin configuration as an example.

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

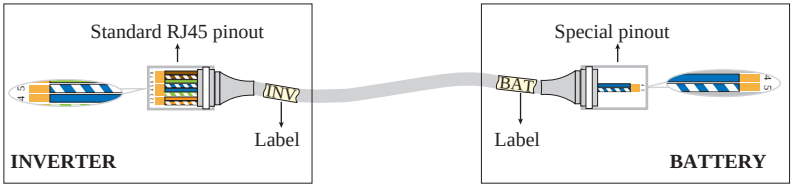
- **CAN BUS connection principle**



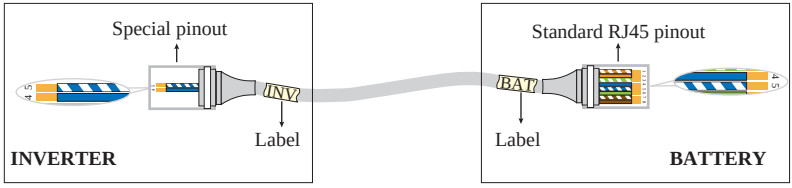
- **BMS communication cable preparation:**

① Prepare RJ45 terminals and strip appropriate length of COM cables.
② According to pin definitions and cable order, assemble the RJ45 terminals and crimp communication wires. There are two methods to assemble the RJ45 terminals.
③ Then label the RJ45 terminals (BAT or INV) to avoid confusion.
④ After finishing wire-making, use a multimeter or other specific tool to check if your cable is good, bad, or wired incorrectly.

**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.

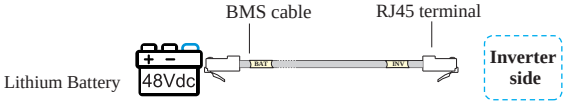



**Method 2:** Use the BATTERY RJ45 pinout as the standard pinout to crimp wires, then the inverter side will be a non-standard one (special pinout). Cut off the other no-used wires (1/2/3/6/7/8) for the inverter RJ45 terminal.

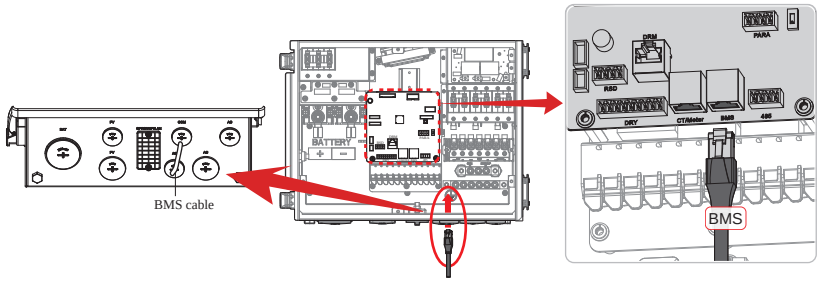



- **BMS communication cable connection steps:**

a. Lead the BMS cable through the COM port.




b. Insert the RJ45 terminal into BMS port.

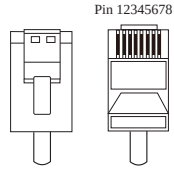


### 4.7.2 CT/Meter Connection

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

- **RJ45 Terminal Configuration for CT and Meter Communication**

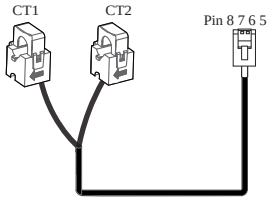
| PIN | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Function Description | / | / | RS485_ A | RS485_ B | CT2- | CT2+ | CT1+ | CT1- |




Note: The Standard RJ45 Pinout Color in BMS Connection section is also applicable to this part .

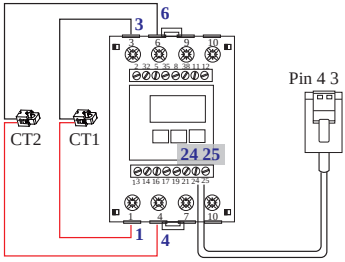
- **Cable connection overview**

**CT:**



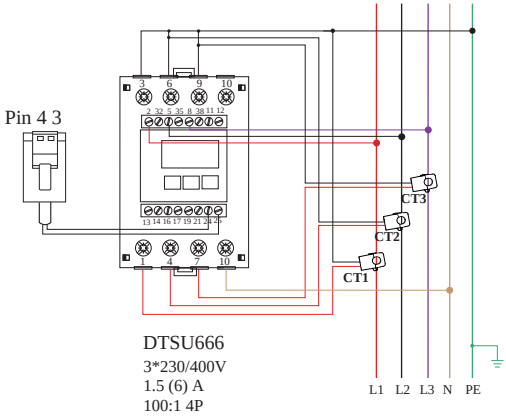

| RJ45 | CT Cable Label |
|---|---|
| Pin5(CT2-) | CT2-L2 |
| Pin6(CT2+) | |
| Pin7(CT1+) | CT1-L1 |
| Pin8(CT1-) | |

**Meter+CT:**




| RJ45 | Meter |
|---|---|
| Pin3(RS485_A ) | Pin24 |
| Pin4(RS485_B ) | Pin25 |

**Meter+CT (for three-phase connection only):**

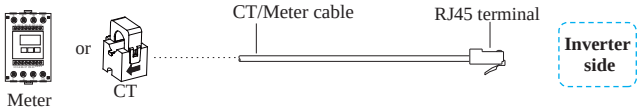



| RJ45 | Meter |
|---|---|
| Pin3 (RS485_A ) | Pin24 |
| Pin4 (RS485_B ) | Pin25 |

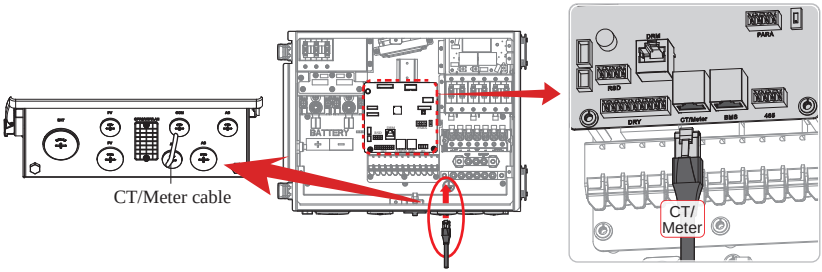
| Meter | CT | Other Wiring |
|---|---|---|
| Pin1 | CT1+ | / |
| Pin3 | CT1 - | PE |
| Pin4 | CT2+ | / |
| Pin6 | CT2 - | PE |
| Pin7 | CT3+ | / |
| Pin9 | CT3 - | PE |
| Pin2 | / | L1 |
| Pin5 | / | L2 |
| Pin8 | / | L3 |
| Pin10 | / | N |

- **CT/Meter communication cable connection steps:**

a. Make the RJ45 terminal according to above function description of each Pin definition.

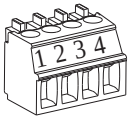



b. Lead the CT/Meter cable through the COM port. And insert the RJ45 terminal into CT/METER port.



### 4.7.3 RS485 Connection

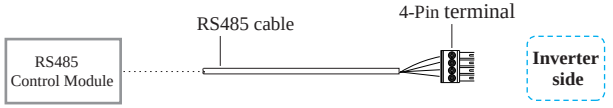
**• 4-Pin Terminal Configuration of RS485 Communication**



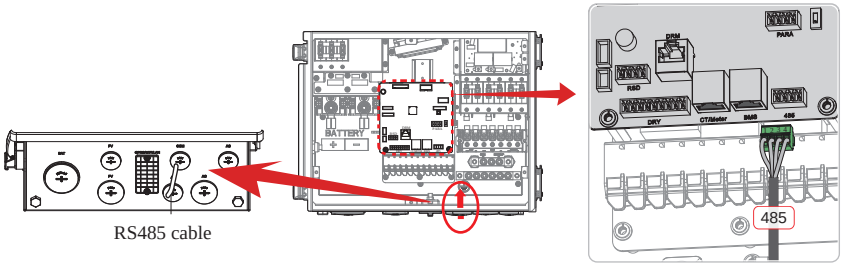

| PIN | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Function Description | RS485_A | RS485_B | PE | PE |

**• RS485 communication cable connection steps:**

a. Make the 4-Pin terminal according to above function description of each Pin definition.

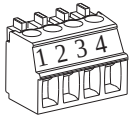



b. Lead the RS485 cable through one COM port. And insert the 4-Pin terminal into RS485 port on inverter panel.



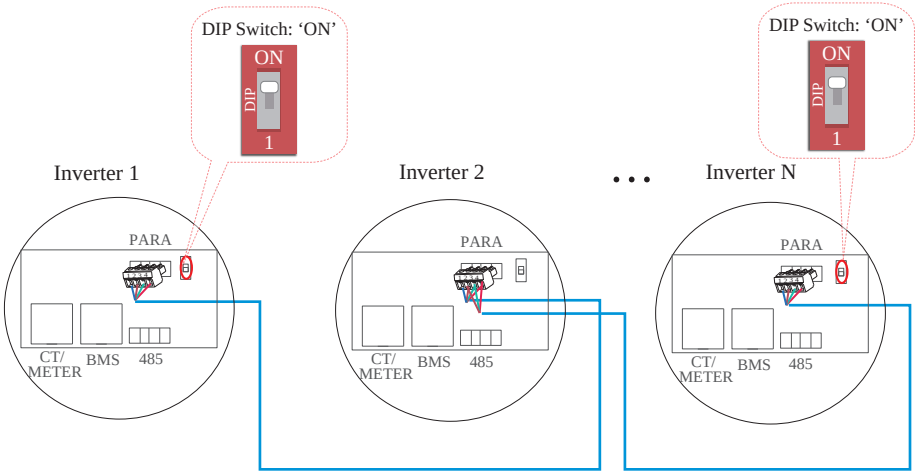
### 4.7.4 Parallel Communication Connection

**• 4-Pin Terminal Configuration of parallel Communication**




| PIN | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| Function Description | GND_S | PARA_SYNC | CAN_L | CAN_H |

**• Parallel communication cable connection overview**

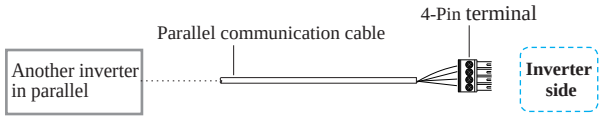



It is necessary to turn the matched resistance switch of inverter 1 and inverter N to "ON" in parallel connection mode.

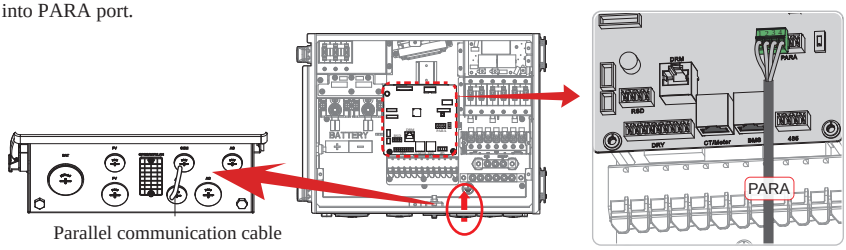
| Inverter 1 | Inverter 2 | • • • | Inverter N |
|---|---|---|---|
| Pin4 (CAN_H) | Pin4 (CAN_H) | | Pin4 (CAN_H) |
| Pin3 (CAN_L) | Pin3 (CAN_L) | | Pin3 (CAN_L) |
| Pin2 (PARA_SYNC) | Pin2 (PARA_SYNC) | | Pin2 (PARA_SYNC) |
| Pin1 (GND_S) | Pin1 (GND_S) | | Pin1 (GND_S) |

- **Parallel communication cable connection steps:**

a. Make the 4-Pin terminal according to above function description of each Pin definition.



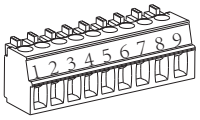

b. Lead the Parallel communication cable through one COM port. And insert the 4-Pin terminal into PARA port.



### 4.7.5 NTC/RMO/DRY Connection(s)

**• 9-Pin Terminal Configuration of Auxiliary Communication**

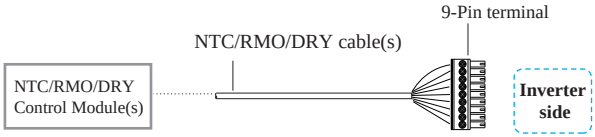
Pin 123456789



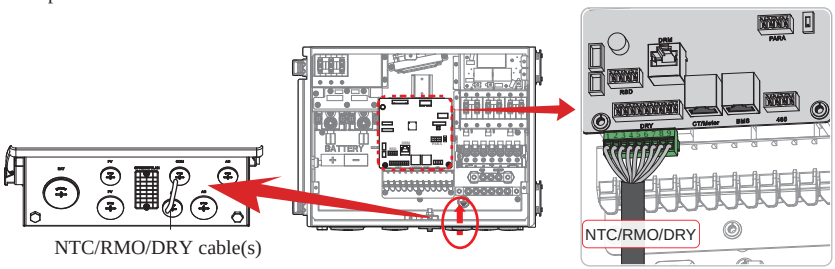

| PIN | Function Description |
|---|---|
| 1 | GEN Control |
| 2 | GEN Control |
| 3 | NC1 (Normal Close) |
| 4 | NO2 (Normal Open) |
| 5 | N2 |
| 6 | NC2 (Normal Close) |
| 7 | REMO OFF |
| 8 | GND S (NTC BAT) |
| 9 | NTC BAT+ |

**• NTC/RMO/DRY communication cable connection steps:**

a. Make the 9-Pin terminal according to above function description of each Pin definition for the auxiliary port you want to use.




b. Lead the NTC/RMO/DRY cable(s) through one COM port. And insert the 9-Pin terminal into DRY port.

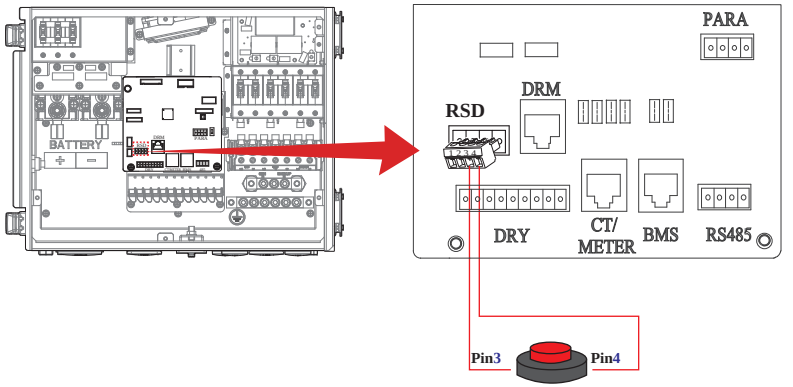


### 4.7.6 RSD Connection(s)

- **4-Pin Terminal Configuration of RSD**


| PIN | 3 | 4 |
|---|---|---|
| Function Description | Emergency Stop Signal Button | |

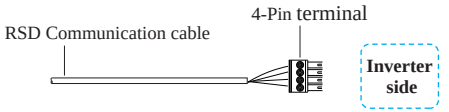
- **Emergency Stop Signal:**



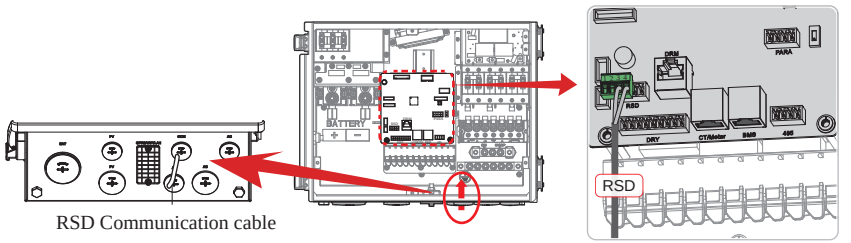

Normally Open Rapid Shutdown Signal Button

- **RSD connection steps:**

a. Make the 4-Pin terminal according to above function description of each Pin definition.



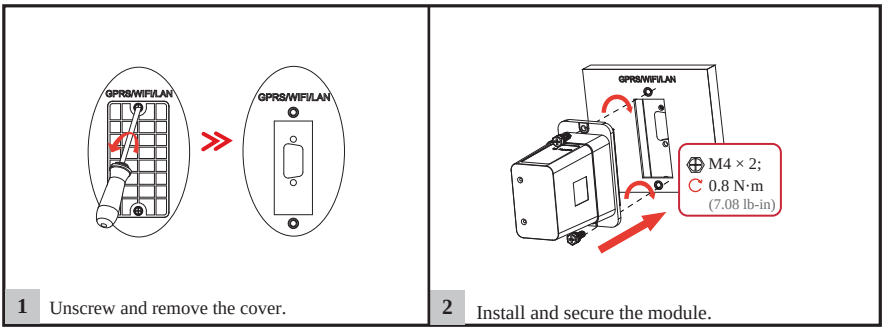

b. Lead the RSD Communication cable through one COM port. And insert the 4-Pin terminal into RSD port.



### 4.7.7 WIFI Module Connection

For details, please refer to the corresponding Module Installation Guide in the packing.

The appearance of module may be slightly different. The figure shown here is only for illustration.




**1** Unscrew and remove the cover.

**2** Install and secure the module.

# 5 System Operation

## 5.1 Inverter Working Mode

The inverter supports several different working modes.

### 5.1.1 Self-consumption Mode

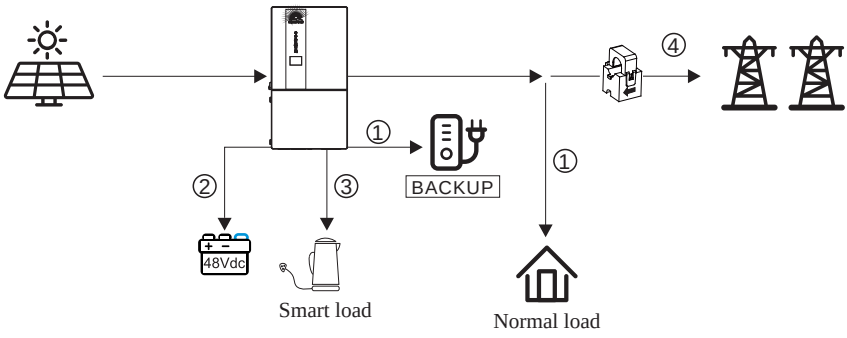
Go to ***Settings*** > ***Inverter***, and select the "Self-consumption mode".

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 powering local 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 self-consumption rate. There are several situations of self-consumption working mode based on PV energy.

**a) Abundant PV Energy**

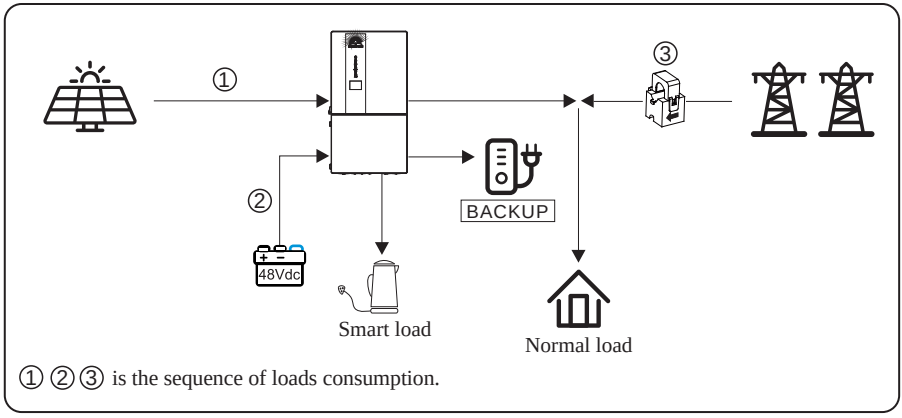
When PV energy is abundant, the PV energy will be first consumed by loads, the excess energy will be used to charge the battery and then the remaining energy will be fed into the grid.




① ② ③ ④ is the sequence of PV energy transmission.

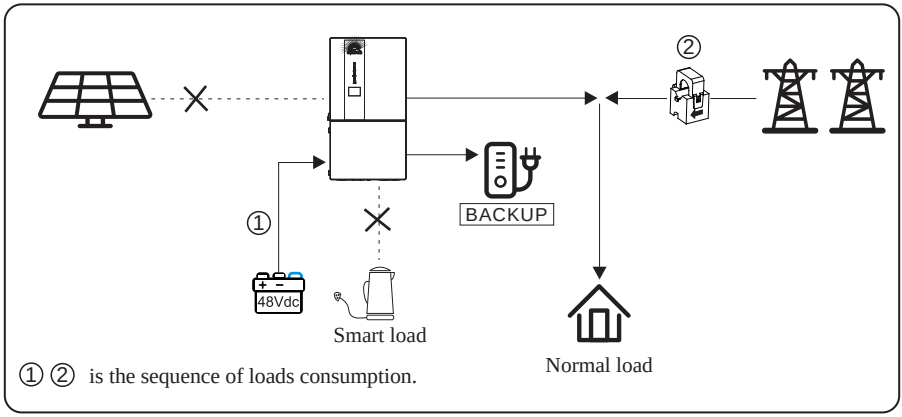
**b) Limited PV Energy**

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 demand is not met, the loads will consume grid energy.



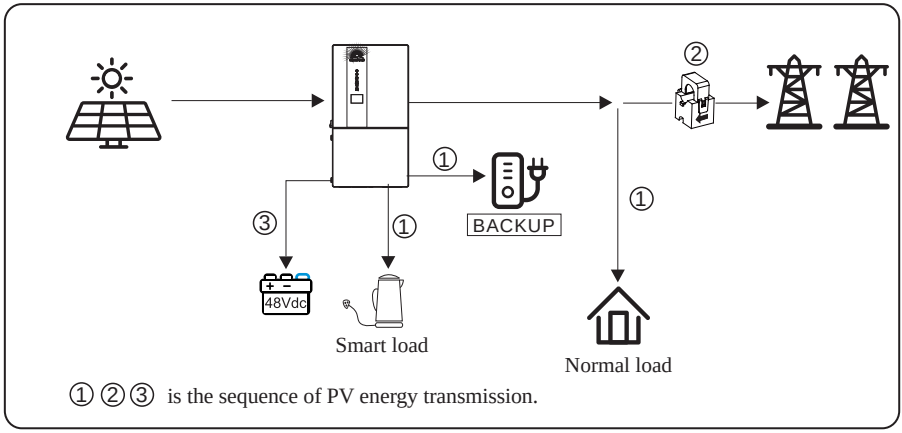

### 5.1.2 Feed-in Priority Mode

Go to ***Settings*** > ***Inverter***, and select the "Feed-in priority mode".

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

**a) Abundant PV Energy**

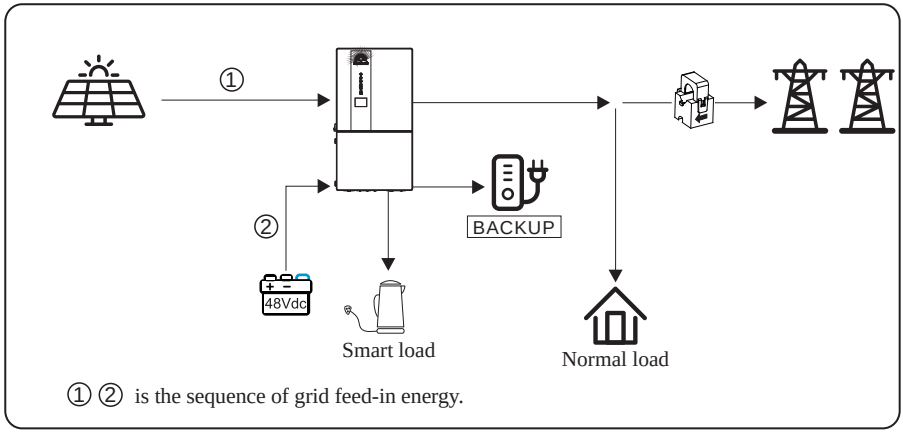
When PV energy is abundant, the PV energy will be first consumed by loads. If there is excess PV power, the power will be fed into grid. If there is still PV energy left after load consuming and grid feeding, then the remaining PV power will be used to charge the battery.




①②③ is the sequence of PV energy transmission.

**b) Limited PV Energy**

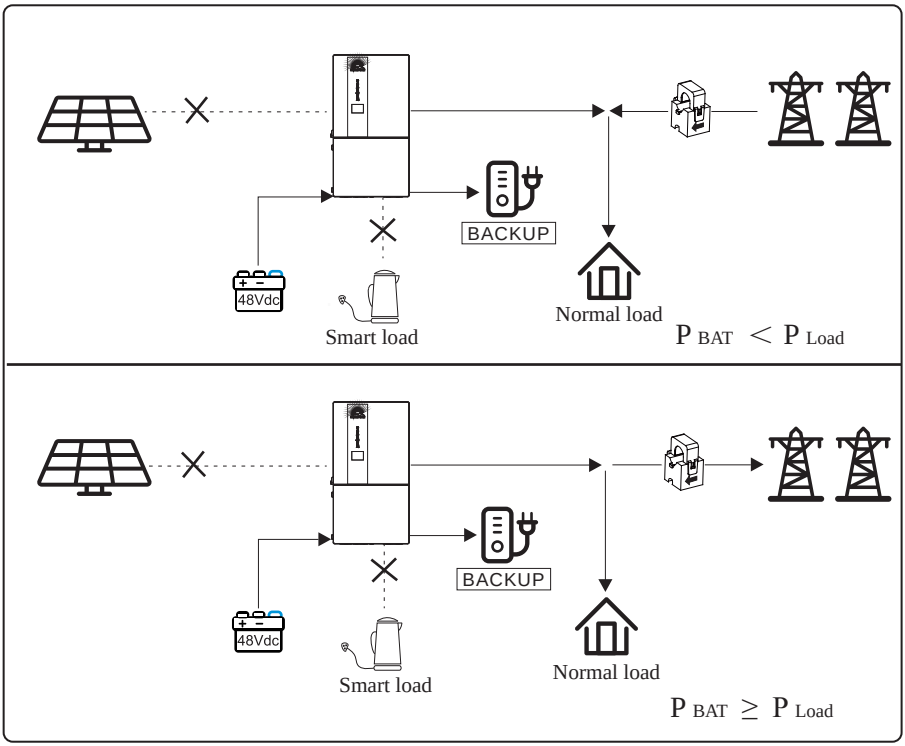
When PV energy is limited and can not meet the feed-in grid power, the battery will discharge to meet it.




①② is the sequence of grid feed-in energy.

**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 demand is not met, the loads will consume the grid energy.



### 5.1.3 Back-up Mode

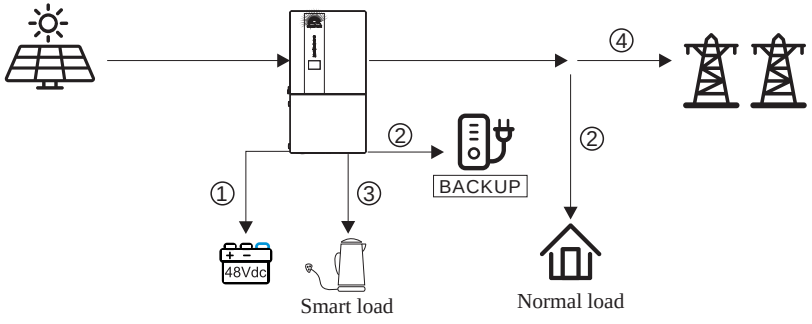
Go to ***Settings*** > ***Inverter*** and select the "Back-up Mode".
In this mode, the priority of PV energy consumption will be Battery > Load > Grid.
This mode aims at charging the battery quickly, and at the same time, you can choose whether to allow AC to charge the battery.

**Forbid AC charging**

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

**a) Abundant PV energy**

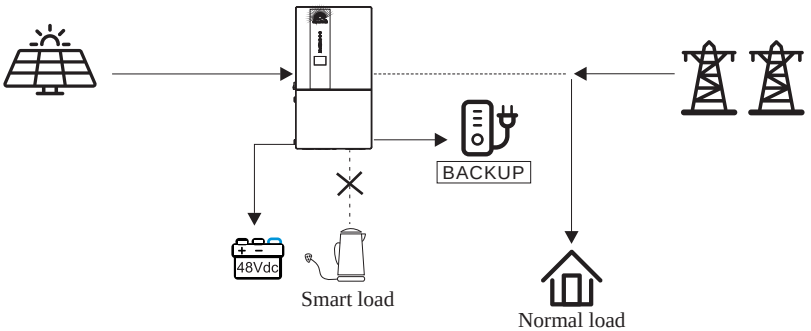
When PV energy is abundant, PV charges the battery first, then meets the load, and the rest is fed into the grid.




①②③④ is the sequence of PV energy transmission.

**b) Limited PV energy**

When PV energy is limited, PV gives priority to charging the battery, and the grid directly meets the load demand.

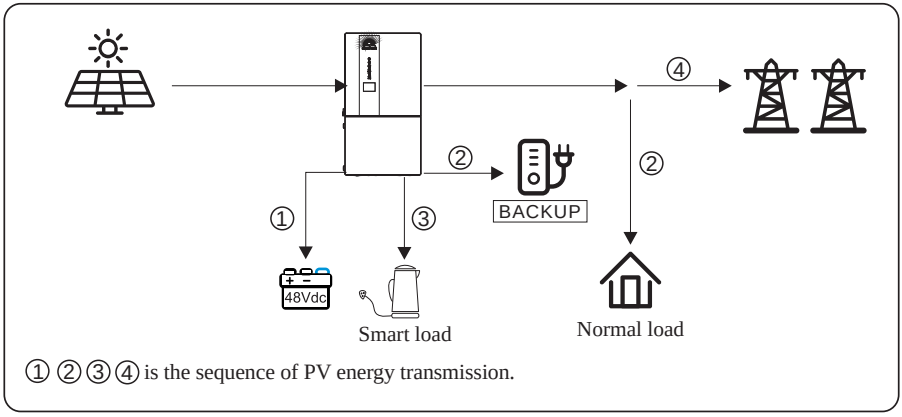


**Allow AC charging**

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

**a) Abundant PV energy**

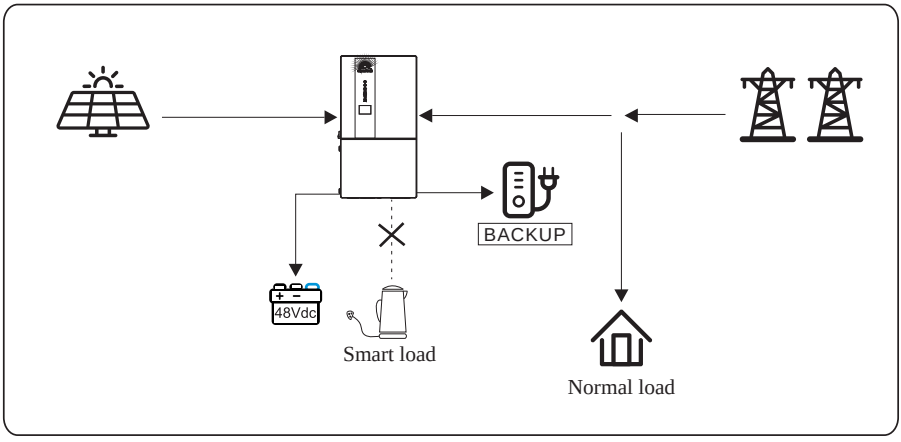
When PV energy is abundant, PV charges the battery first, then meets the loads, and the rest is fed into the grid.




①②③④ is the sequence of PV energy transmission.

**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.

There are three 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: Time period 1 for forced charge/discharge parameter setting

T2: Time period 2 for forced charge/discharge parameter setting

T3: Time period 3 for forced charge/discharge parameter setting

T1, T2, and T3 priority to M.

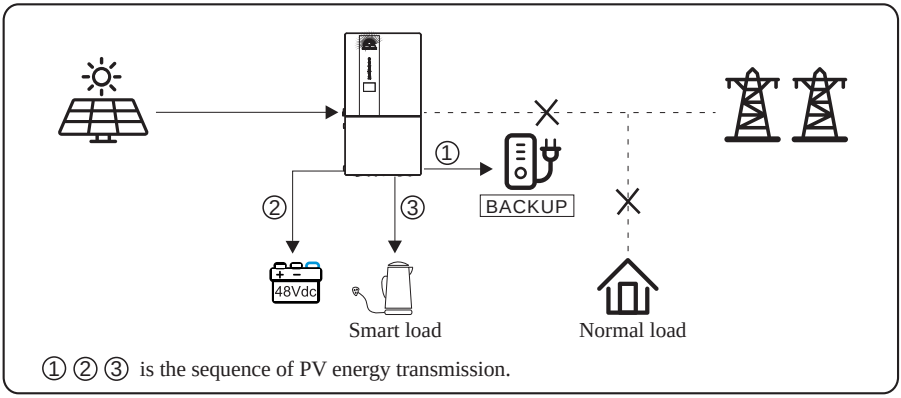
For the detail settings, please go to ***Settings*** > ***Inverter*** to enable Time-based Control on App.

### 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 applications continue to work without power failure. In this mode, the inverter can't work without the battery.

**a) Abundant PV energy**

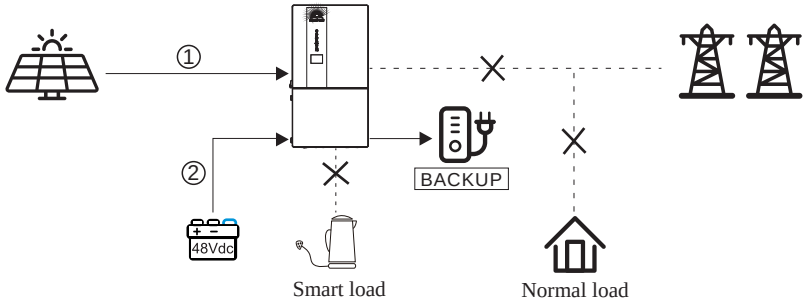
When PV energy is abundant, the PV power will be first consumed by critical load, then charge the battery.




① ② ③ is the sequence of PV energy transmission.

**b) Limited PV energy**

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




①② is the sequence of BACKUP load consumption.

**NOTICE**

- In this mode, please complete the output voltage and frequency settings.
- It is better to choose the battery capacity greater than 100 Ah 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% of BACKUP output power range.

## 5.2 Startup/Shutdown Procedure

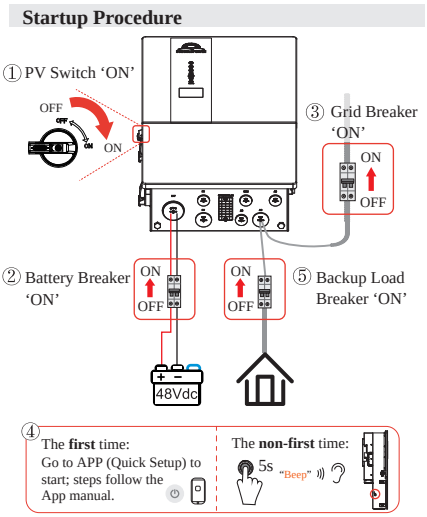
### 5.2.1 Startup Procedure

Before starting up, check whether the installation is secure and strong enough, and whether 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 64 V | Grid AC Voltage | 120/240 V (Split phase) / 208 V (2/3 phase) |

Make sure all the above aspects are right, then follow the procedures below to start up the inverter.

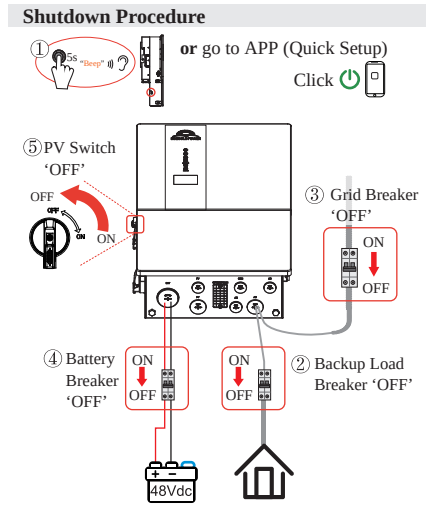
1) Power on the PV Switch.
2) Power on the DC breaker at BATTERY side.
3) Power on the AC breaker at GRID side.
4) Connect the cell phone App via Bluetooth. And click the Power ON in the App for the first time. Refer to Section 7.2 for details.
Or you can hold the ON/OFF button on the side of the inverter for 5s in this step when performing subsequent startup.
5) Power on the AC breaker at BACKUP side.




### 5.2.2 Shutdown Procedure

When it is necessary to shut down the running system, please follow the procedures below:

1) Connect the cell phone App via Bluetooth. And click the Power OFF on the App. Refer to Section 7.2 for details. Or you can hold the ON/OFF button on the side of the inverter for 5 seconds in this step when performing subsequent shutdown.
2) Power off the AC breaker at BACKUP side.
3) Power off the AC breaker at GRID side.
4) Power off the DC breaker at BATTERY side.
5) Power off the PV Switch.
6) To disconnect the inverter cables, please wait at least 5 minutes before touching them.



# 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, and 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.

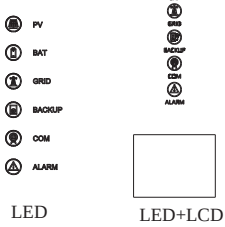
1) Power on the system by following the Startup Procedure in section 5.2.1.
2) Set the parameters on the App according to user's needs.
3) Complete commissioning.

# 7 User Interface

## 7.1 LED/LCD

### 7.1.1 LED Introduction

This section describes LED indicators, which include PV, BAT, GRID, BACKUP, COM, ALARM indicators.
The table below explains the status and description of all indicators.
Please read it carefully.




LED LED+LCD

| LED Indicator | Status | Description |
|---|---|---|
| PV | On | PV input is normal. |
| | Blink | PV input is abnormal. |
| | Off | PV is unavailable. |
| BAT | On | Battery is charging. |
| | Blink | Battery is discharging.<br>Battery is abnormal. |
| | Off | Battery is unavailable. |
| GRID | On | GRID is available and normal. |
| | Blink | GRID is available but abnormal. |
| | Off | GRID is unavailable. |
| COM | Blink | Data are communicating. |
| | Off | No data transmission. |
| BACKUP | On | BACKUP power is available. |
| | Blink | BACKUP output is abnormal. |
| | Off | BACKUP power is unavailable. |
| ALARM | On | Fault has occurred and inverter shuts down. |
| | Blink | Alarms have occurred but inverter doesn't shut down. |
| | Off | No fault. |

| Details | Code | PV LED | Grid LED | BAT LED | BACKUP LED | COM LED | ALARM LED |
|---|---|---|---|---|---|---|---|
| PV normal | | ● | ◎ | ◎ | ◎ | ◎ | ○ |
| No PV | | ○ | ◎ | ◎ | ◎ | ◎ | ○ |
| PV over voltage | B0 | ★ | ◎ | ◎ | ◎ | ◎ | ○ |
| PV under voltage | B4 | | | | | | |
| PV irradiation weak | B5 | | | | | | |
| PV string reverse | B7 | | | | | | |
| PV string abnormal | B3 | | | | | | |
| On grid<br>Bypass output | | ◎ | ● | ◎ | ◎ | ◎ | ○ |
| Grid absent | A2 | ◎ | ○ | ◎ | ◎ | ◎ | ○ |
| Grid over voltage | A0 | ◎ | ★ | ◎ | ◎ | ◎ | ○ |
| Grid under voltage | A1 | | | | | | |
| Grid over frequency | A3 | | | | | | |
| Grid under frequency | A4 | | | | | | |
| Grid abnormal | A6 | | | | | | |
| Grid over mean voltage | A7 | | | | | | |
| Neutral live wire reversed | A8 | | | | | | |
| Battery in charge | | ◎ | ◎ | ● | ◎ | ◎ | ○ |
| Battery unavailable | | ◎ | ◎ | ○ | ◎ | ◎ | ○ |
| Battery absent | D1 | | | | | | |
| Battery in discharge | | ◎ | ◎ | ★★ | ◎ | ◎ | ○ |
| Battery under voltage | D3 | ◎ | ◎ | ★ | ◎ | ◎ | ○ |
| Battery over voltage | D2 | | | | | | |
| Battery discharge over current | D4 | | | | | | |
| Battery over temperature | D5 | | | | | | |
| Battery under temperature | D6 | | | | | | |
| Communication loss (Inverter - BMS) | D8 | | | | | | |
| BACKUP output active | | ◎ | ◎ | ◎ | ● | ◎ | ◎ |
| BACKUP output inactive | | ◎ | ◎ | ◎ | ○ | ◎ | ◎ |
| BACKUP short circuit | DB | ◎ | ◎ | ◎ | ★ | ◎ | ○ |
| BACKUP over load | DC | | | | | | |
| BACKUP output voltage abnormal | D7 | | | | | | |
| BACKUP over dc-bias voltage | CP | | | | | | |

| Details | Code | PV LED | Grid LED | BAT LED | BACKUP LED | COM LED | ALARM LED |
|---|---|---|---|---|---|---|---|
| RS485/DB9/BLE/USB | | ◎ | ◎ | ◎ | ◎ | ★ | ◎ |
| Inverter over temperature | C5 | ◎ | ◎ | ◎ | ◎ | ◎ | ★ |
| Fan abnormal | C8 | | | | | | |
| Inverter in power limit state | CL | | | | | | |
| Data logger lost | CH | | | | | | |
| Meter lost | CJ | | | | | | |
| Remote off | CN | | | | | | |
| PV insulation abnormal | B1 | ◎ | ◎ | ◎ | ◎ | ◎ | ● |
| Leakage current abnormal | B2 | | | | | | |
| Internal power supply abnormal | C0 | | | | | | |
| Inverter over dc-bias current | C2 | | | | | | |
| Inverter relay abnormal | C3 | | | | | | |
| GFCI abnormal | C6 | | | | | | |
| System type error | C7 | | | | | | |
| Unbalance Dc-link voltage | C9 | | | | | | |
| Dc-link over voltage | CA | | | | | | |
| Internal communication error | CB | | | | | | |
| Internal communication loss(E-M) | D9 | | | | | | |
| Internal communication loss(M-D) | DA | | | | | | |
| Software incompatibility | CC | | | | | | |
| Internal storage error | CD | | | | | | |
| Data inconsistency | CE | | | | | | |
| Inverter abnormal | CF | | | | | | |
| Boost abnormal | CG | | | | | | |
| Dc-dc abnormal | CU | | | | | | |

Remark: ● Light on ○ Light off ◎ Keep original status

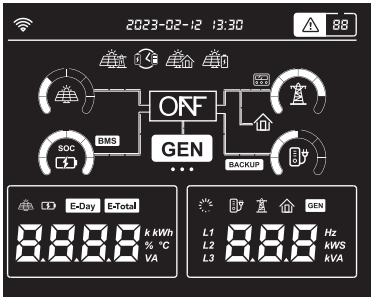
★ Blink 1s and off 1s ★★ Blink 2s and off 2s

### 7.1.2 LCD Introduction

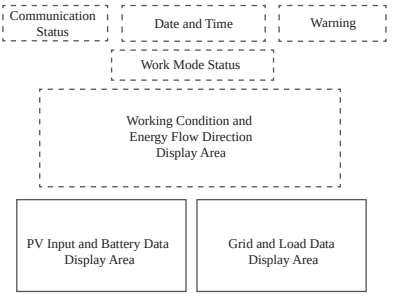
An LCD screen is optional for this series of inverters. If you choose the LCD screen, the following introduction will help you understand the function of each icon displayed.

Note:
The LCD screen will be automatically turned off if there is no operation within 10 mins (which cannot be changed by default). You can tap the ON/OFF button on the side of inverter to wake up the LCD screen.

**Menu Structure Overview**



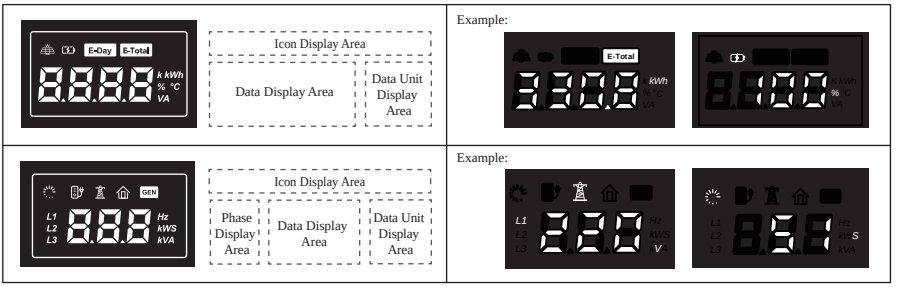

Actual LCD Screen




Function Overview

**Icon Introduction-1**

| | |
|---|---|
|  | This icon indicates **WIFI** connection status. |
|  | The **date and time** display information about year, month, day, and hour.<br>The ':' between hour and minute flashes once a second. |
|  | The **Warning icon** only displays when an error occurs. For the specific warning code explanation, please refer to the chapter Inverter Troubleshooting. |
|  | These four icons show **different operating statuses**. Please refer to Chapter Inverter Working Mode for a detailed introduction.<br>  **Feed-in Priority Mode**<br>  **Self-used Mode**<br>  **Time-based Control Function**<br>  **Back-up Charging Mode** |
|  | This area shows the **working conditions and energy flow directions**.<br>Please refer to Table Icon Status Description for a detailed introduction to each icon displayed. |
|  | The **Energy Bars** indicate the direction of energy flow.<br>Each bar lights up one by one, then turns off when all bars light and repeats this cycle again. |
|  | The **Energy Ring** indicates the battery SOC or the current power percentage.<br>Each Energy Ring definition is as follows.<br>  PV Input Power<br>  ***On-Grid Mode***: Grid Output Power<br>***Non On-Grid Mode:***<br>Bypass load consumption power + Backup consumption power<br>  Battery SOC<br>  Backup<br>  Grid undervoltage<br>  Grid overvoltage |




## Icon Introduction-2

| | |
|---|---|
| | The **PV icon** represents the power of PV. |
| | The **Battery icon** represents the current battery charge percentage or the voltage of battery. |
| E-Day | The **E-Today icon** represents the electricity energy generated today. |
| E-Total | The **E-Total icon** represents the electricity energy generated in total. |
| | When the **Loading icon** is on, it indicates that the device is starting, and the start timer countdown is displayed. The icon lights up a cluster of lights every second until all lights are on, and then it repeats the whole process again. |
| | The **Back-Up icon** represents the relevant power, frequency or voltage of Back-Up. |
| | The **Grid icon** represents the relevant power, frequency or voltage of the Grid. |
| | The **Smart Load icon** represents the power consumption. |
| GEN | The **GEN icon** represents the voltage or power of generator. |
| L1<br>L2<br>L3 | The **L1 icon** represents L1 phase of Grid/Backup/Generator.<br>The **L2 icon** represents L2 phase of Grid/Backup/Generator.<br>The **L3 icon** represents L3 phase of Grid/Backup/Generator. |
| | These two areas will display corresponding data of each lit icon mentioned above. |

## Table: Icon Status Description

| Icon Status Description | | | |
|---|---|---|---|
| **Icon** | **Name** | **Light** | **Description** |
|  | PV | ON | Any PV voltage exists ( it should be higher than the Min. PV Startup Voltage) . |
| | | OFF | PV Voltage is lower than the Min. PV Startup Voltage. |
|  | Grid | ON | Grid Voltage and frequency are normal. |
| | | OFF | Grid overvoltage / undervoltage / overfrequency / underfrequency occurs. |
|  | Battery | ON | Bat. Voltage is higher than the Rated Min. Bat Voltage. |
| | | OFF | Bat. Voltage is lower than the Rated Min. Bat Voltage. |
|  | Back-Up Load | ON | Backup relay is on. |
| | | OFF | Backup relay is off. |
|  | BMS | ON | Battery is set to BMS Type and its communication is normal. |
| | | Blink | BMS communication is abnormal.(The icon indicator on for one second, off for one second) |
| | | OFF | 1. Battery is not set to BMS Type. |
| | | | 2. Battery voltage is lower than Rated Min. Voltage |
|  | BACKUP | ON/OFF | Lights up with Back-Up Load icon simultaneously |
|  | Meter/CT | ON | Power Limit is set to CT or Meter in APP, and the CT/Meter communication is normal, the Grid side is running well. |
| | | Blink | When Meter/CT communication is lost, Meter/CT icon on for one second, off for one second) |
| | | OFF | 1. Power Limit is not set to CT or Meter. |
| | | | 2. The voltage or frequency of grid side is abnormal. |
|  | Load | ON/OFF | Lights up with Grid icon simultaneously. |
|  | ON | ON | 1. Backup relay is on. |
| | | | 2. The inverter works under On-Grid mode. |
| | | | 3. The inverter works under Off-Grid mode. |
|  | OFF | OFF | Non-on working mode. |
|  | Generator / Smart Load / Inverter | From left to right, when the three dots light up, each represents a different meaning. | |
| | | When GEN communication is lost, GEN icon will go off. | |
|  | GEN | ON | Generator relay is on. |
| | | OFF | Generator replay is off. |
|  | Generator dot | ON | In APP, the "Gen port" parameters are set to "Generator Input" and the generator relay is powered on. |
| | | OFF | APP parameter is set to Non 'Generator Input'. |
|  | Smart Load dot | ON | In APP, the "Gen port" parameters are set to "Smart Load Output" and the generator relay is powered on. |
| | | OFF | APP parameter is set to Non 'Smart Load Output'. |
|  | Inverter dot | ON | In APP, the "Gen port" parameters are set to "Inverter Input" and the generator relay is powered on. |
| | | OFF | APP parameter is set to Non 'Inverter Input'. |

## 7.2 App

The app contains "Local Access" and "Remote Access".

**Local Access:** The app reads data from inverter through Bluetooth connection with Modbus protocol to display and configure inverter parameter.
**Remote Access:** 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 operation and more details, refer to the ***APP User Manual.***

# 8 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. |

## 8.1 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 communications are 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 periodically the heat sink. | Yearly |

## 8.2 Inverter Troubleshooting

When the inverter has an exception, its basic common warning and handling methods are shown below.

| 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 along 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. |
| B0 | PV over voltage | Check whether the maximum input voltage of a single PV string exceedsthe MPPT working voltage. If yes, modify the number of PV module connection strings. |
| B1 | PV insulation abnormal | 1. Check the insulation resistance against the ground for the PV strings. If a short circuit has occurred, rectify the fault.<br>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. |
| B2 | Leakage current abnormal | 1. If the alarm occurs occasionally, the inverter can be automatically recovered to the normal operating status after the fault is rectified.<br>2. If the alarm occurs repeatedly, contact your dealer for technical support. |
| B4 | PV under voltage | 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.<br>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. |
| C0 | Internal power supply abnormal | 1. If the alarm occurs occasionally, the inverter can be automatically restored, and no action is required.<br>2. If the alarm occurs repeatedly, please contact the customer service. |

| | | |
|---|---|---|
| C2 | Inverter over dc-bias current | 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, and the inverter fails to generate power, contact the customer service. |
| C3 | Inverter relay abnormal | 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, 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. |
| CN | Remote off | 1. Local manual shutdown is performed in APP.<br>2. The monitor executed the remote shutdown instruction.<br>3. Remove the communication module and confirm whether the alarm disappears. If yes, replace the communication module. Otherwise, please contact the customer service. |
| C5 | Inverter over temperature | 1. If the alarm occurs occasionally, the inverter can be automatically recovered. No action is required.<br>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. |
| C6 | GFCI abnormal | 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.<br>2. If it occurs repeatedly or cannot be recovered for a long time, please contact customer service. |
| B7 | PV string reverse | Check and modify the positive and negative polarity of the input string. |
| C8 | Fan abnormal | 1. If the alarm occurs occasionally, please restart the inverter.<br>2. If it occurs repeatedly or cannot be recovered for a long time, check whether the external fan is blocked by other objects. Otherwise, Please contact customer service. |
| C9 | Unbalance Dc-link voltage | 1. If the alarm occurs occasionally, the inverter can be automatically recovered. No action is required.<br>2. If the alarm occurs repeatedly, the inverter cannot work properly. Please contact customer service. |
| CA | Dc-link over voltage | |

| | | |
|---|---|---|
| CB | Internal communication error | 1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required.<br>2. If the alarm occurs repeatedly, the inverter cannot work properly. Please contact the customer service center. |
| CC | Software incompatibility | 1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required.<br>2. If the alarm occurs repeatedly, the inverter cannot work properly. Please contact the customer service center. |
| CD | Internal storage error | 1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required.<br>2. If the alarm occurs repeatedly, the inverter cannot work properly. Please contact the customer service center. |
| CE | Data inconsistency | 1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required.<br>2. If the alarm occurs repeatedly, the inverter cannot work properly. Please contact the customer service center. |
| CF | Inverter abnormal | 1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required.<br>2. If the alarm occurs repeatedly, the inverter cannot work properly. Please contact the customer service center. |
| CG | Boost abnormal | 1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required.<br>2. If the alarm occurs repeatedly, the inverter cannot work properly. Please contact the customer service center. |
| CJ | Meter lost | 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. |
| 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. |

| | | |
|---|---|---|
| P5 | Phase Sequence abnormal | Ensure that Set phase position on APP is consistent with the power grid phase. There are two ways to clear this alarm:<br>1. Power off each inverter, change the phase sequence for each inverter and then power on inverter.<br>2. Standby each inverter, change the phase sequence for each inverter on APP, power off inverter, and then power on inverter.<br>If exclude the above, the alarm continues to occur, please contact the customer service center. |
| D2 | Battery over voltage | 1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required.<br>2. Check that the battery overvoltage protection value is improperly set.<br>3. The battery is abnormal.<br>4. If exclude the above, the alarm continues to occur, please contact the customer service center. |
| D3 | Battery under voltage | 1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required.<br>2. Check the communication line connection between BMS and inverter (lithium battery).<br>3. The battery is empty or the battery voltage is lower than the SOC cut-off voltage.<br>4. The battery undervoltage protection value is improperly set.<br>5. The battery is abnormal.<br>6. If exclude the above, the alarm continues to occur, please contact the customer service center. |
| D4 | Battery discharger over current | 1. Check whether the battery parameters are correctly set.<br>2. Battery undervoltage.<br>3. Check whether a separate battery is loaded and the discharge current exceeds the battery specifications.<br>4. The battery is abnormal.<br>5. If exclude the above, the alarm continues to occur, please contact the customer service center. |
| D5 | Battery over temperature | 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).<br>2. If the battery is abnormal, replace it with a new one.<br>3. If exclude the above, the alarm continues to occur, please contact the customer service center. |
| D6 | Battery under temperature | |
| D7 | BACKUP output voltage abnormal | 1. Check whether the BACKUP voltage and frequency Settings are within the specified range.<br>2. Check whether the BACKUP port is overloaded.<br>3. When not connected to the power grid, check whether BACKUP output is normal.<br>4. If exclude the above, the alarm continues to occur, please contact the customer service center. |

| | | |
|---|---|---|
| D8 | Communication error (Inverter-BMS) | 1. Check whether the battery is disconnected.<br>2. Check whether the battery is well connected with the inverter.<br>3. Confirm that the battery is compatible with the inverter. It is recommended to use CAN communication.<br>4. Check whether the communication cable or port between the battery and the inverter is faulty.<br>5. If exclude the above, the alarm continues to occur, please contact the customer service center. |
| D9 | Internal communication loss(E-M) | 1. Check whether the communication cables between BACKUP, electricity meter and inverter are well connected and whether the wiring is correct.<br>2. Check whether the communication distance is within the specification range.<br>3. Disconnect the external communication and restart the electricity meter and inverter.<br>4. If exclude the above, the alarm continues to occur, please contact the customer service center. |
| DA | Internal communication loss(M-D) | |
| CU | Dcdc abnormal | 1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required.<br>2. If the alarm occurs repeatedly, please check:<br>1) Check whether the MC4 terminal on the PV side is securely connected.<br>2) Check whether the voltage at the PV side is open circuit, ground to ground, etc.<br>If exclude the above, the alarm continues to occur, please contact the customer service center. |
| CP | BACKUP over dc-bias voltage | 1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required.<br>2. If the alarm occurs repeatedly, the inverter cannot work properly. Please contact the customer service center. |
| DB | BACKUP short circuit | 1. Check whether the live line and null line of BACKUP 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, BACKUP switch needs to be manually turned on during normal use.) |
| DC | BACKUP over load | 1.Disconnect the BACKUP load 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 BACKUP switch needs to be manually turned on for normal use.) |

# 9 Technical Specification

| Model | SGN7.6K1HB-48 |
|---|---|
| **Input (PV)** | |
| Max. PV Configuration | 200% |
| Max. PV Input Power | 12,000 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 | 30 A / 22 A / 22 A |
| Max. Short Current per MPPT | 40 A / 30 A / 30 A |
| Nos. of MPPT | 3 |
| **Input /Output(BAT)** | |
| Compatible Battery Type | Lithium-ion/Lead-acid |
| Nominal Battery Voltage (Full load) | 48 V |
| Battery Voltage Range | 40 V to 64 V |
| Max. Charge/Discharge Current | 210 A / 180 A |
| Max. Charge/Discharge Power | 10,000 W / 7,600 W |
| **Output (Grid)** | |
| Nominal AC Output Power | 7,600 W |
| Max. AC Output Apparent Power | 7,600 VA |
| Max. AC Output Power (PF=1) | 7,600 W |
| Nominal AC Output Current | 31.7 A |
| Max. AC Output Current | 31.7 A |
| Nominal Grid Voltage | 120 V / 240 V (Split phase) / 208 V (2/3 phase) V AC |
| Nominal Grid Frequency | 50/60 Hz |
| Grid Frequency Range | 45 Hz to 55 Hz / 55 Hz to 65 Hz (Adjustable) |
| Power Factor | > 0.99 @rated power (Adjustable 0.8LD to 0.8LG) |
| THDI | < 3% (Rated Power) |
| **Output (Back up)** | |
| Nominal Output Power | 7,600 W |
| Max. AC Output Power (PF=1) | 7,600 W |
| Nominal Output Current | 31.7 A |
| Peak Power（1s） | 15,200 VA |
| Nominal Output Voltage | 120 V / 240 V (Split phase) / 208 V (2/3 phase) V AC |
| Nominal Output Frequency | 50 Hz / 60 Hz |
| Transfer Time | < 10 ms (typical) |
| THDV | < 3% @100% R Load |

| Model | SGN7.6K1HB-48 |
|---|---|
| **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 IV |
| 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 |
| AFCI | Yes |
| RSD | Yes |
| Generator | Yes |
| **General** | |
| Max. Operation Altitude | 2000 m |
| Ingress Protection Degree | NEMA 3R |
| Operating Temperature Range | -25 ℃ to + 60 ℃ (> 45 ℃ derating) |
| Relative Humidity | 0 to 100% |
| Cooling Method | Fan Cooling |
| Mounting | Wall Bracket |
| Dimensions (W*H*D) | 16.5 in × 31.5 in × 9.4 in (420 mm × 800 mm × 240 mm) |
| Weight | 40 kg (88 lb) |
| PV Connection Way | Terminals |
| **HMI & COM** | |
| Display | Wireless & APP + LED, LCD(optional) |
| Communication interface | CAN (for BMS), DRM/RS485 (for meter), RS485, optional: Wi-Fi/LAN |
| **Certification** | |
| Safety | UL 1741/CSA C22.2/UL 1699B |
| EMC | FCC Part 15 ClassB |
| Warranty | 5 Years |

Remarks :
· The range of output voltage and frequency may vary depending on different grid codes.
· Specifications are subject to change without advanced notice.