# HYBRID INVERTER 7/8/10K EU

# USER MANUAL

Your Reliable
Energy Solution Partner

Monitor APP Download

Android

IOS

Version: EN-UM-1.0-00 SN: 092.0010000

# CONTENTS


■ **About This Manual** ..... 01

**1 Safety** ..... 01

1.1 Safety Instruction ..... 01

**2 Brief Introduction** ..... 03

2.1 System Solution ..... 03

**3 Installation** ..... 04

3.1 Packaging List ..... 04

3.2 Location Selection and Installation ..... 04

3.2.1 Requirements for installation location ..... 04

3.2.2 Installing the inverter ..... 05

3.3 Connection Overview ..... 07

3.3.1 System connection ..... 07

3.4 PV Connection ..... 08

3.5 Battery Connection ..... 10

3.5.1 Battery power cable connection ..... 10

3.5.2 Battery communication cable connection ..... 10

3.6 Grid&EPS load Connection ..... 12

3.6.1 Grid type selection ..... 12

3.6.2 Grid and EPS load connection for split-phase service ..... 12

3.6.3 AC cable connection ..... 13

3.6.4 CT/Meter connection ..... 13

3.7 Working with Generator ..... 15

3.7.1 Generator system connection ..... 15

3.7.2 Generator Startup and stop settings ..... 17

3.8 AC Coupling Installation Connection ..... 17

3.9 Parallel System Connection ..... 19

3.9.1 Connection for paralleling system ..... 19

3.10 Monitor System Setup ..... 21

3.10.1 Wifi/GPRS/4G/WLAN dongle connection ..... 21

3.10.2 Setup the Monitor system ..... 22

3.10.3 Set homewifi password to dongle ..... 22

3.10.4 Third party RS485 communication ..... 23

**4 Operation Guide** ..... 24

4.1 Operation Mode ..... 24

4.1.1 Self-usage mode (Default) ..... 24

4.1.2 Charge first mode ..... 25

4.1.3 AC charge mode ..... 26

4.2 LCD Display ..... 26

4.2.1 Viewing information and alarm/fault record ..... 26

4.2.2 Setting parameters ..... 28

4.3 Start-up and shut down the inverter ..... 30

4.3.1 Start up the inverter ..... 30

4.3.2 Shut down the inverter ..... 30

**5 Troubleshooting & Maintenance** ..... 31

5.1 Regular Maintenance ..... 31

5.2 LED Displays ..... 31

5.3 Troubleshooting Based On LCD Displays ..... 31

5.4 Fan replacement ..... 34

# 1. Safety

## 1.1 Safety Instruction

### General Safety Instructions

The inverter has been designed and tested strictly according to international safety regulations. Read all safety instructions carefully prior to any work and observe them at all times when working on or with the inverter. The operator must be qualified personnel and the installation must be capable with relevant national or international standards or regulations.

Incorrect operation or work may cause:

- injury or death to the operator or a third party
- damage to the inverter and other properties belonging to the operator or a third party.

### Important Safety Notifications

There are many safety issues need to be carefully notified before, during and after the installation, and also in future operation and maintenance, following is important safety notifications to operator, owner and user of this product in appropriate usage.

**DANGER Dangers of High Voltages and Large Current**

- Beware of high PV voltage. Please turn-off the DC switch of PV Panel output before and during the installation to avoid electric shock.
- Beware of high grid voltage. Please turn-off the AC switch of grid connection before and during the installation to avoid electric shock.
- Beware of large current of the battery output. Please turn-off the battery module before and during the installation to avoid electric shock.
- Do not open the inverter when it's working to avoid electric shock and damages from live voltage and current from the system.
- Do not operate the inverter when it's working, only the LCD and buttons can be touched in limited cases by qualified personnel, other parts of the inverter can be touched when the inverter is under a safe state (e.g. fully shut-down).
- Do not connect or disconnect any connections (PV, battery, grid, communication etc.) of the inverter when it's working.
- Make sure the inverter is well grounding, an operator should make sure himself is good protected by reasonable and professional insulation measurements (e.g. personal protective equipment (PPE)).
- Inspect relevant existed wiring on-site of the installation is under good condition before installation, operation or maintenance.
- Inspect the connections are good between inverter and PV, battery and grid during installation to prevent damages or injuries caused by bad connections.

**WARNING Avoid Misoperation and Inappropriate Usage**

- All the work of this product (system design, installation, operation, setting, configuration and maintenance must be carried out by qualified personnel as required.
- All connections must be in accordance with local and national regulations and standards.
- The inverter and system can inter-connected with the utility grid only if the utility grid permits it.
- All the warning labels or nameplates on the inverter must be clearly visible and must not be removed, covered or pasted.
- The installation should consider the safety of future users when choosing the right position and location as specified in this manual.
- Please keep the children away from touching or misusing the inverter and relevant systems.
- Beware of burning hurt, the inverter and some parts of the system could be hot when working, please do not touch the inverter surface or most of the parts when they are working. During inverter working states, only the LCD and buttons could be touched.

**NOTICE**

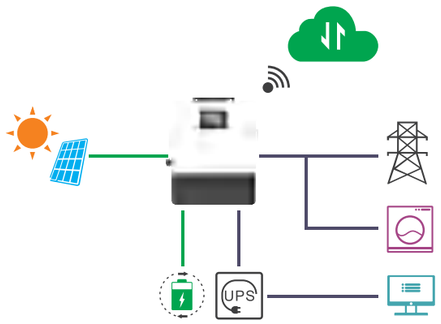
- Please carefully read this manual before any work is carried out on this inverter, the installation, please keep this manual carefully stored and easy to access at any time.
- The qualified personnel should have had training in the installation and commissioning of the electrical system as well as dealing with hazards, also they should have the knowledge of the manual and other related documents. As the installer or operator they are required to be familiar with local regulations and directives.

# 2. Brief Introduction

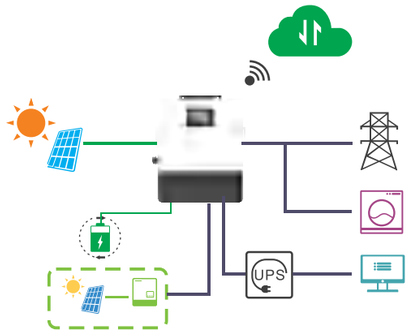
## 2.1 System Solution

This product and relevant system is suitable for following system applications (system diagram):

**A. Solar and battery storage system**

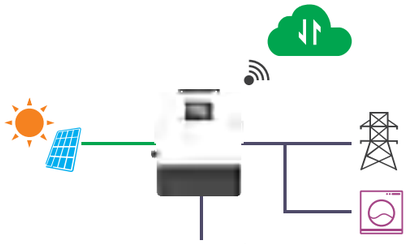



**B. AC Coupling with existed solar system**



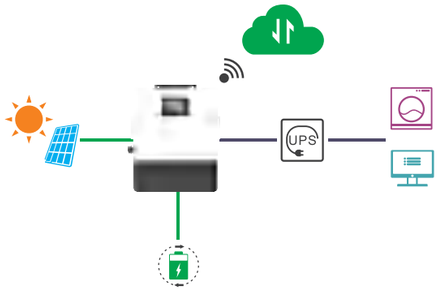

Existed On-grid Solar System

**C. On-grid solar system without battery (Support EPS even without battery)**

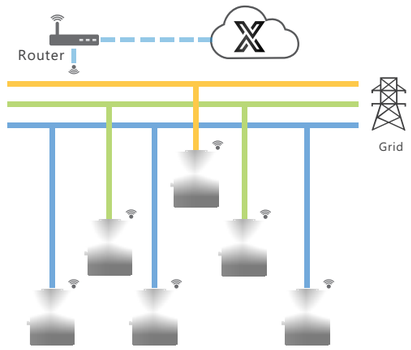


Reserved Battery&UPS Interfaces

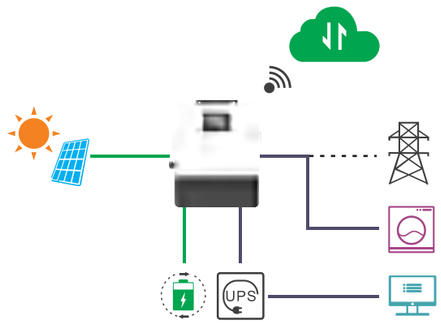
**D. Off-grid and back-up applications**




**E. Single and three phase paralleling system**




**F. Energy storage system with peak shaving Function**






# 3. Installation

## 3.1 Packaging List & Storing

**Packaging List**

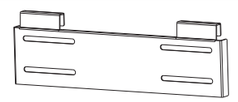
When the packaging is unpacked, the inner components should be the same as described in below packaging list.

Hybrid Inverter X1

User Manual X1

Waterproof PG Cable Gland X6

Wi-Fi dongle X1 Optional



Bracket: wall-mounted×1

Expansion Screw and Tube X4

Cross Head Screw X17

Battery communication cable Length 2mx1(Grey)

Parallel communication cable L=2m×1(Grey)

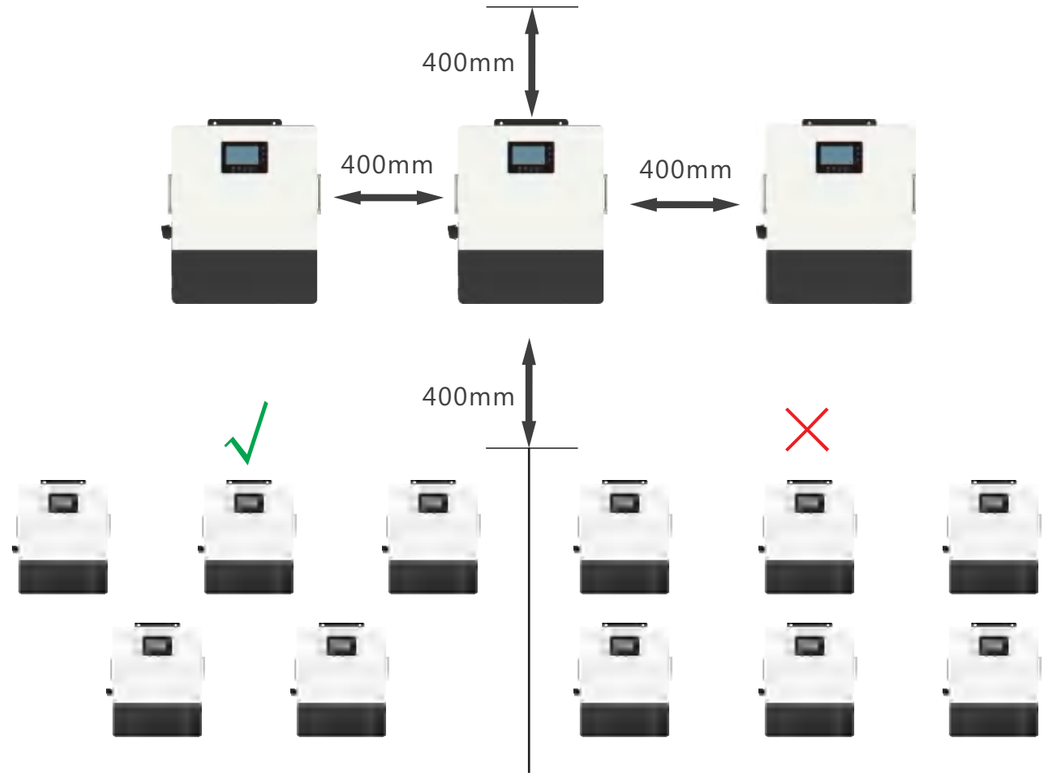
1.3" CT x1

## 3.2 Location Selection and Installation

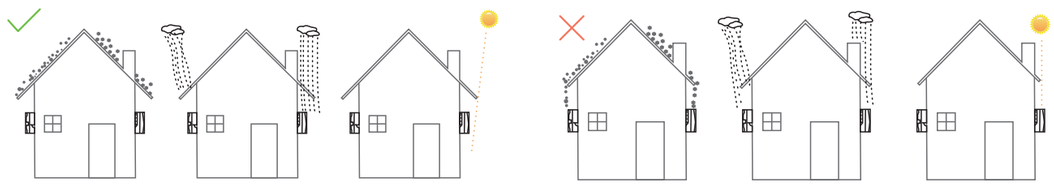
### 3.2.1 Requirements for installation location

a. The wall for mounting should be strong enough to bear the weight of inverter .

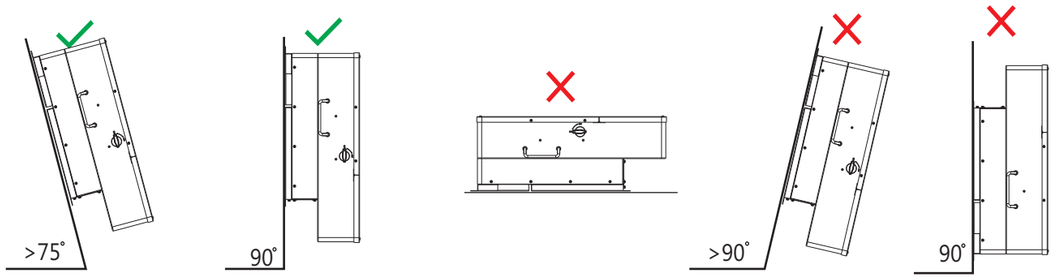
b. Please maintain the minimum clearances below for adequate heat dissipation.



c. Never install the inverter in a place with direct sunlight, rain or snow. Please refer to below figure and select a well shaded place or install a shed to protect the inverter from direct sunlight, rain and snow etc. PROTECT the LCD screen from excessive UV exposure

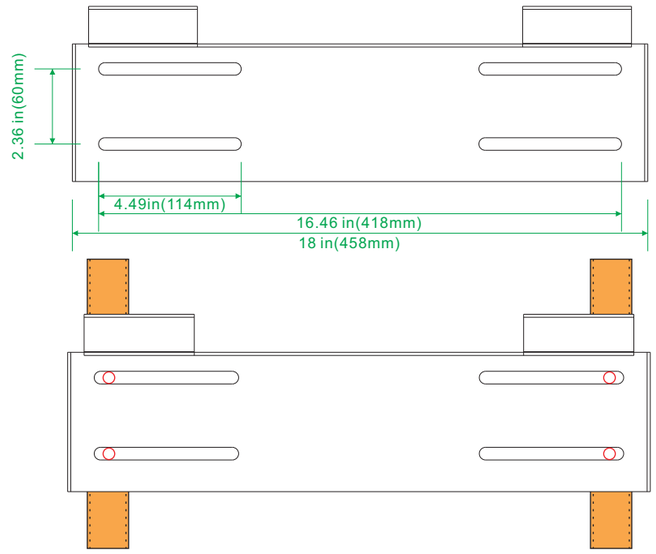


d. The inverter should be installed upright on a vertical surface.



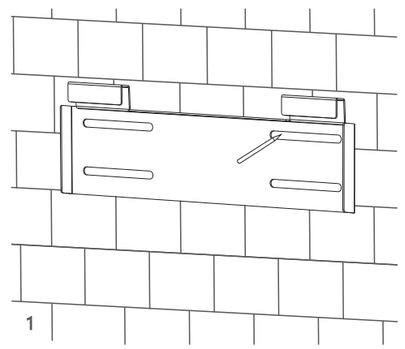

## 3.2.2 Installing the inverter

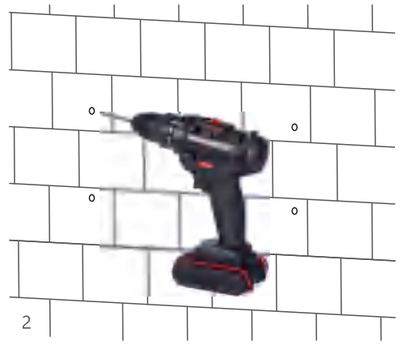
The inverter is wall-mounted type, should be installed on a vertical, solid mounting surface, such as wood studs, brick or concrete wall. Two or more persons may be needed to install the inverter due to its weight. The slots on mounting bracket can accommodate various stud spacing from 12inch(305mm) to 16.46inch(418mm).



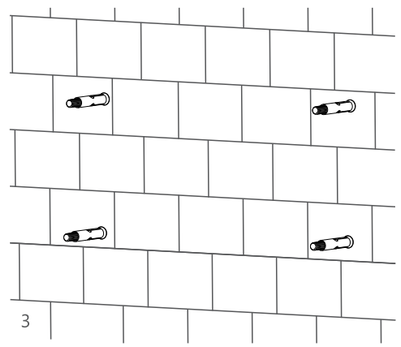

The mounting steps are as below: (Use brick wall as example)

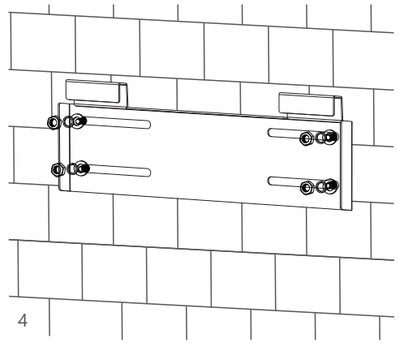
**Step1.** Mark the positions of drill holes with the mounting bracket, then drill 4 holes of 8mm(5/16inch) diameter and make sure the depth of the holes is deeper than 50mm(2inch).


1

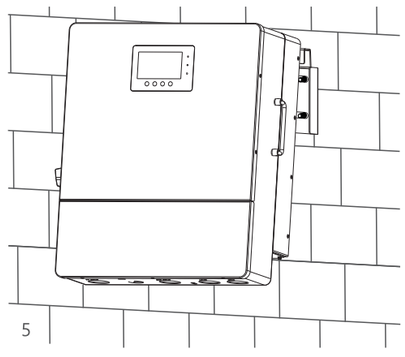

2

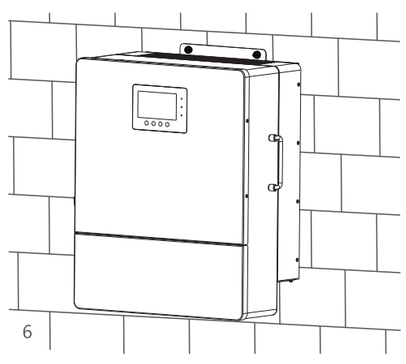
**Step2.** Install the expansion bolts into the holes and tighten them, then use the corresponding nuts and washers (packaged together with the expansion bolts) to install and fix the wall-mounting bracket on the wall.


3


4

**Step3.** Hang the inverter onto the wall-mounting bracket and lock the inverter on the wall using 2 self-tapping screws on the top of the inverter.


5


6

**For installation on wood studs**

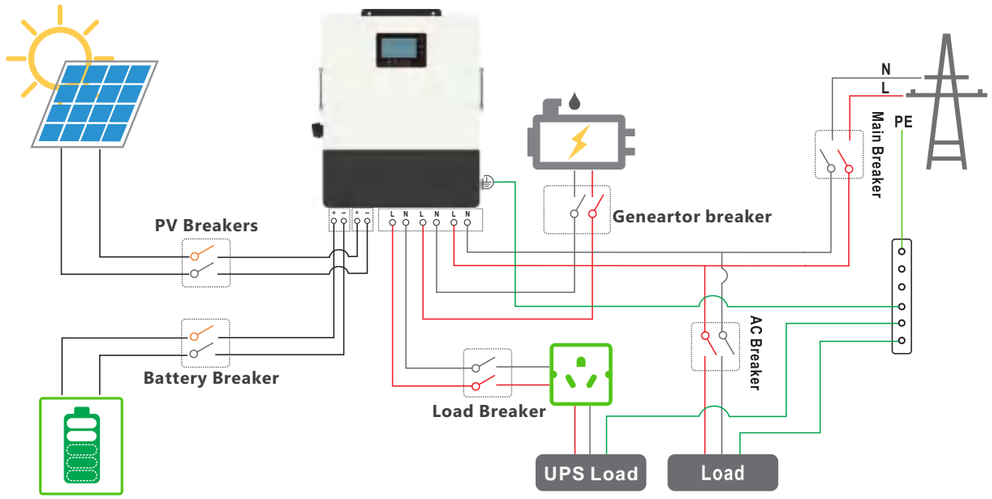
Fasten the mounting bracket on the studs with 4 wood screws, then hang the inverter onto the bracket and lock the inverter on the wall with 2 self-tapping screws.

Please note that the wood screws and self-tapping screws are not provided with the inverter. Installers need to prepare the screws before installation.

## 3.3 Connection Overview

### 3.3.1 System Connection

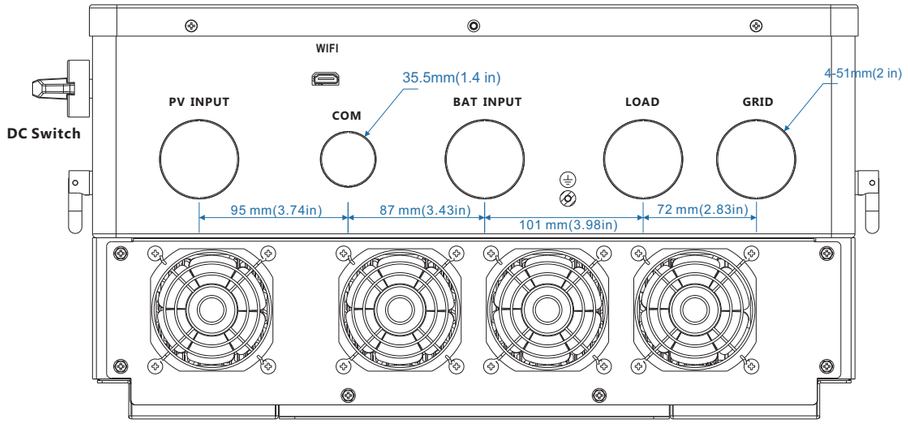
The system connection diagram is as below( for US version):



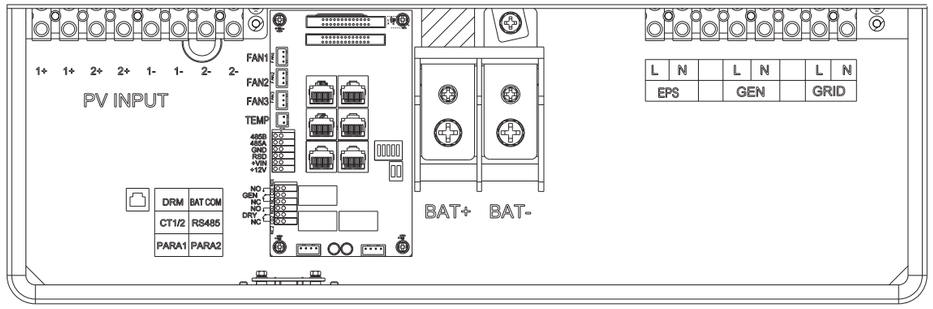

Please prepare the breakers before connetion, breakers selection recommendation for both DC and AC

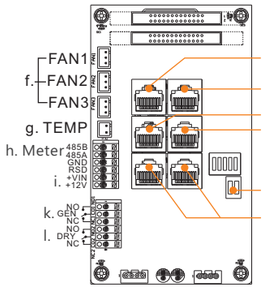
| Inverter model | 8K | 10K |
|---|---|---|
| PV Breakers(2Px4) | MPPT1 string 1 : 600V/20A<br>MPPT1 string 2 : 600V/20A<br>MPPT2 string 1: 600V/20A<br>MPPT2 string 2: 600V/20A | MPPT1 string 1 : 600V/20A<br>MPPT1 string 2 : 600V/20A<br>MPPT2 string 1: 600V/20A<br>MPPT2 string 2: 600V/20A |
| Battery Breaker(2P) | 100V/300A | 100V/300A |
| Main Breaker(2P) | 100A/230Vac | 100A/230Vac |
| Load Breaker(2P) | 63A/230Vac | 63A/230Vac |
| Geneartor breaker | 63A/230V | 63A/230V |

**Overview of Connection Ports**




**Overview of the cable box**




| |
|---|
| a). DRM port(Applied only in AU) |
| b). Battery communication port(CAN&RS485)<br>please check Chapter 3.5.2 for Pin definition |
| c). CT Interface: please check Chapter 3.6.4 for CT connection |
| d). INV 485: Debugging port |
| e). Parallel communication port<br>please check Chapter 3.9 for Parallel connection |
| f). FAN1/2/3 |
| g). TEMP: Connection for temperature sensor of lead-acid battery |
| h). Meter 485B&485A: For Meter communication |
| i). VIN/+12V: Connect a outside emergency switch on these 2 terminals |
| j). CAN Matching resistance: Set DIP switch when use inverters in parallel |
| k). GEN(NO, NC): Connection for generator auto-start function |
| l). DRY(NO,NC): reserved |

## 3.4 PV Connection

PV connection of this hybrid inverter is same as traditional on-grid solar inverter (string inverter).

**⚠ WARNING**

* Please check the lowest ambient temperature of the location of the installation. The rated Voc on solar panel nameplate is obtained at 25℃ temperature. Solar panel Voc will increase with the decreasing of ambient temperature. Please ensure the Max.solar string voltage corrected at the lowest temperature not exceed the inverter max input voltage 550V for safe.

Cable Requirement:

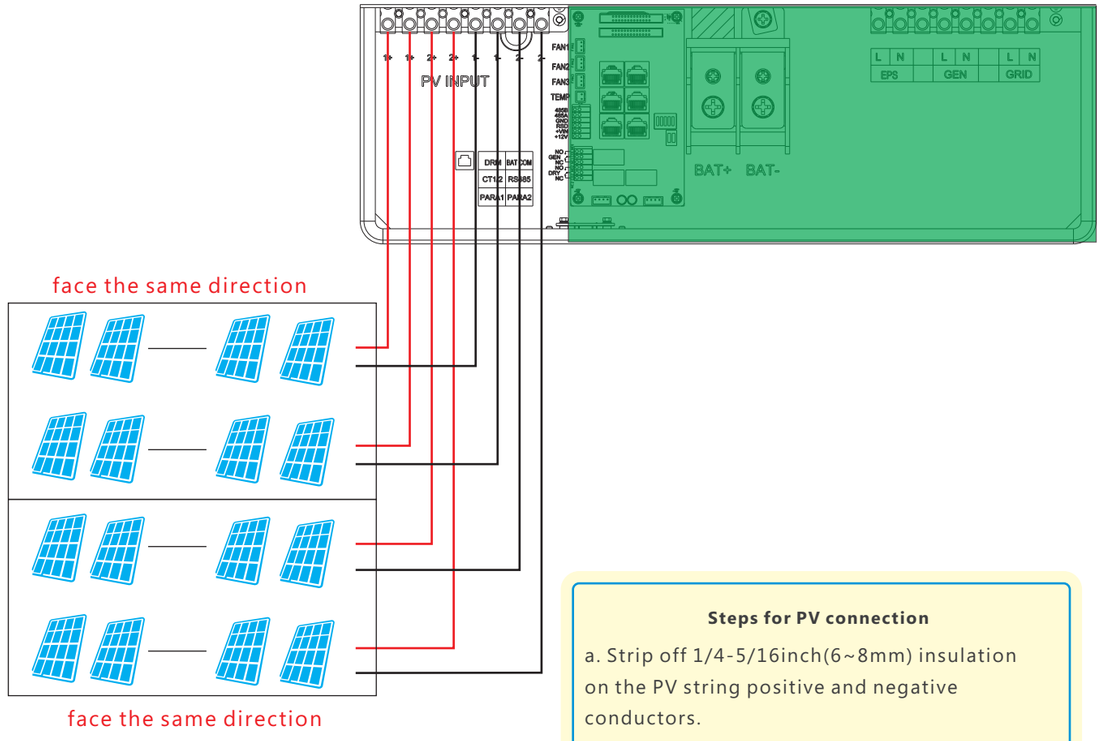
| Cable Size | Minimum Voltage |
|---|---|
| 10-8 AWG(5-8 $mm^2$) | 600V |

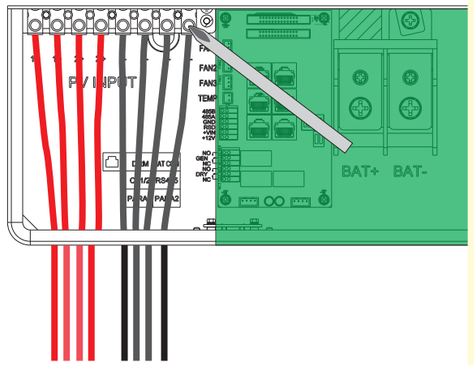
**NOTICE**

1. The inverters has two MPPTs. Both MPPT1 and MPPT2, users can connect two strings.

2. When users connect 2 strings to MPPT, make sure the two strings has same quantity of solar panels. The inverter will limit the total MPPT1 and MPPT2 input current to 25A/25A.

3. The inverter will limit the max solar input power to 15kW for 10kw model and 12kw for 8kw model totally.




**Steps for PV connection**

a. Strip off 1/4-5/16inch(6~8mm) insulation on the PV string positive and negative conductors.

b. Use wire ferrules for PV string conductors if they are stranded wire type.

c. Insert the conduit fitting to the opening for PV connection and tighten it from inside using the counter nut.

d. Route the PV conductors through the conduit and conduit fitting into the inverter.

e. Secure the cable gland in place.

f. Ensure that the cables are connected correctly and securely. Then take appropriate measures to ensure that the conduit and conduit fittings are fastened reliably, and seal the cable entry holes.

## 3.5 Battery Connection

### 3.5.1 Battery power cable connection

Cable Requirement:

| Model | Cable Size | Minimum Voltage | Torque for cable connection | OT ring |
|---|---|---|---|---|
| 8-10K | 3/0-4/0 AWG(85-100 $mm^2$) | 600V | 20(N.M) | RNB100-10 |

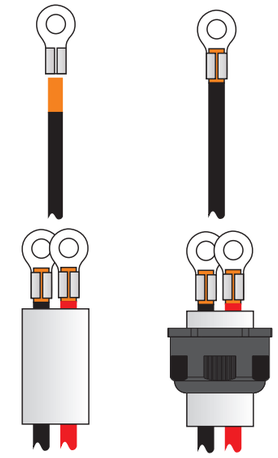
Step 1: Strip 1/4-5/16inch(6-8mm) insulation from the cable end and crimp OT rings for the cable ends.

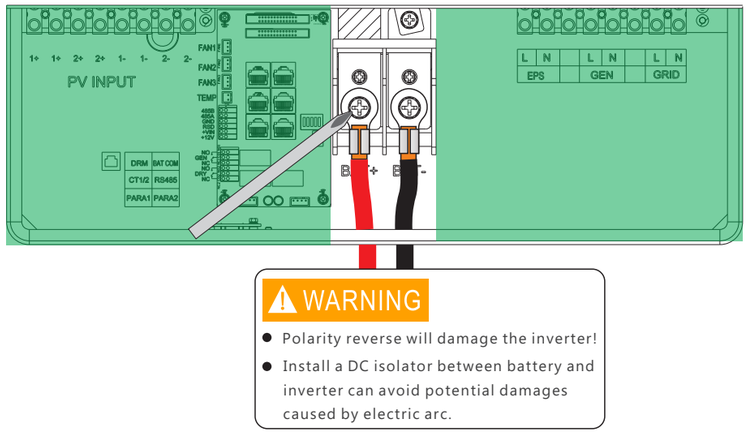
Step 2: Route the battery power cable through the cable gland, connect positive to BAT+,negative to BAT-.

Step 3: Secure the conduit fitting to the enclosure using the counter nut.

Step 4: Fasten the OT rings of battery positive and negative cables to the lugs according to the marking.

Step 5: Fix the cable gland in place.





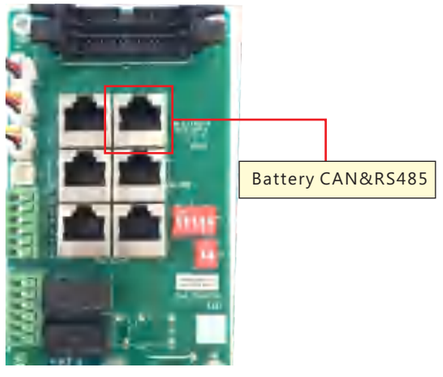

**WARNING**

- Polarity reverse will damage the inverter!
- Install a DC isolator between battery and inverter can avoid potential damages caused by electric arc.

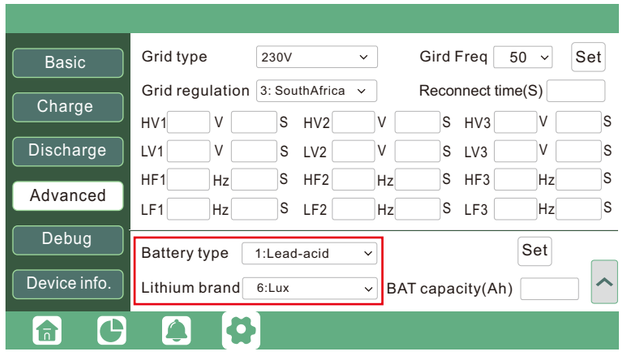
### 3.5.2 Battery communication cable connection

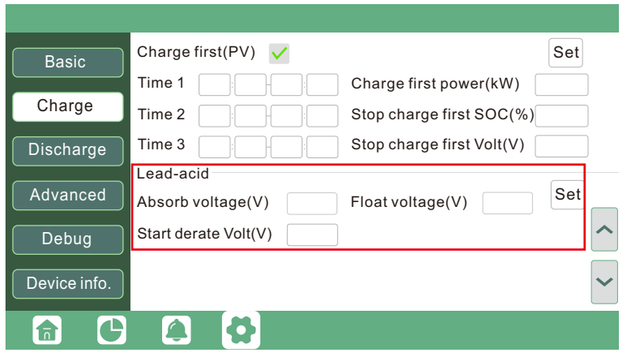
A correct battery communication cable must be used to connect the battery to the inverter when users choose lithium-ion battery type. Please select 'Lead-acid ' type if the lithium battery can not communicate with inverter. The battery communication port on inverter is a RJ45 socket, Pin for the RJ45 plug of the communication cable is as below. Make the communication cable according to the below inverter Pin and the correct pinout of communication port on battery. The inverter supports both CAN and RS485 communication.

| Pin | Description |
|---|---|
| 1 | NC |
| 2 | GND |
| 3 | NC |
| 4 | BAT CAN H |
| 5 | BAT CAN L |
| 6 | NC |
| 7 | BAT RS485 A |
| 8 | BAT RS485 B |



After battery power cable and communication cable connection, users need to enter Advanced setting and choose Battery type and brand on the inverter LCD




**NOTICE**

**For Li-ion battery**

1. Please make sure the lithium-ion battery to be used is compatible with our inverters. Please contact your distributor for updated battery compatible list.
2. If you are using multiple battery modules with the inverter, the inverter communication cable must be connected to the master battery. Please check with your battery supplier for battery master and slave settings.

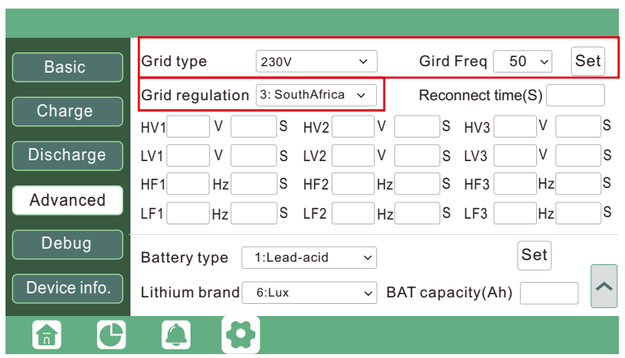
**For Lead-acid battery**

1. The temperature sensor for lead-acid battery is optional. If you need it, please contact distributor for purchasing.
2. There are three stages for lead-acid battery charging. For charging/discharge related parameters, please check charge /discharge setting page.

## 3.6 Grid&EPS load Connection

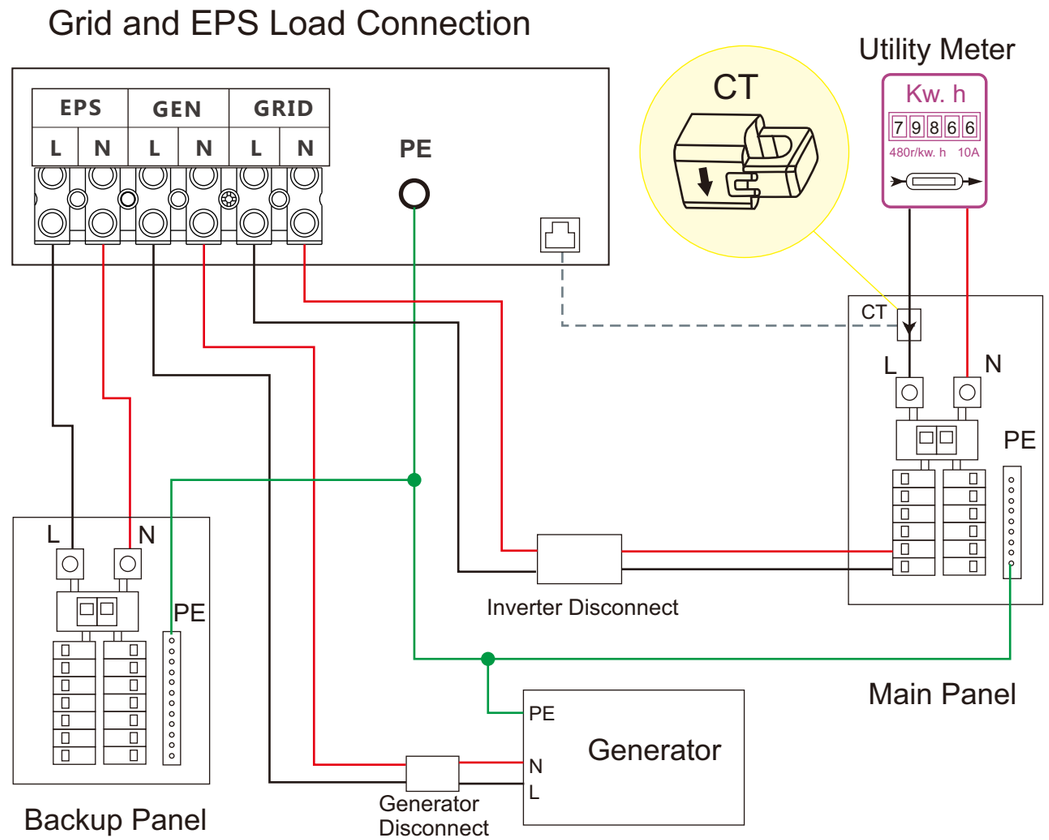
### 3.6.1 Grid regulation selection

The inverter has passed the main grid-connection regulations NRS097:




### 3.6.2 Grid and EPS load connection

The inverter can be connected to the load side of the service disconnecting means if the busbar rating in the main panel can meet the NEC705.12(B)(3) requirements. Otherwise, a Line side connection can be made to avoid an expensive main panel upgrade.



### 3.6.3 AC cable connection

Cable Requirement:

| Current | Cross-section | Cable Diameter | Minimum Voltage | Torque for cable connection | OT ring |
|---|---|---|---|---|---|
| 100A | 3-2AWG(25-35mm²) | 6-7mm | 600V | 25(N.M) | RNB38-10S |
| 200A | 2/0-3/0AWG(70-85mm²) | 9-10mm | 600V | 25(N.M) | RNB100-10 |

a. Strip off 5/16-3/8inch(8~10mm) insulation sleeve on the cables.

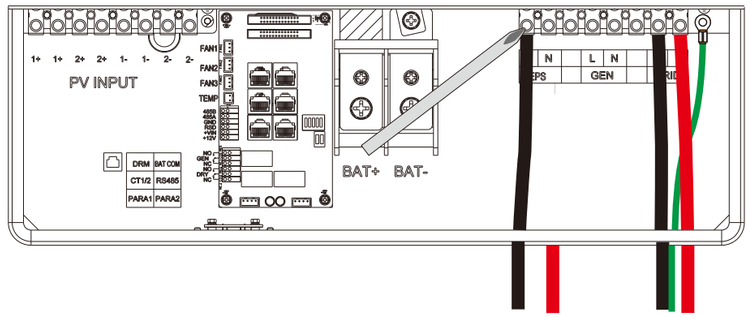
b. Use wire ferrules if the cables are made of find stranded wires.

c. Secure the conduit fitting to the enclosure using the counter nut of the fitting.

d. Fasten the grid and EPS load cables to the terminal block in accordance with the markings.

e. Secure conduit to the conduit fitting.

f. Checks that the cables are connected correctly and securely, then take appropriate measures to ensure that the conduit and conduit fitting are secured reliably, and seal the cable entry holes.



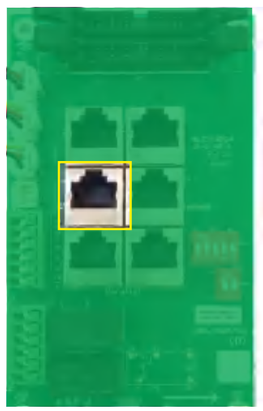

### 3.6.4 CT/Meter Connection

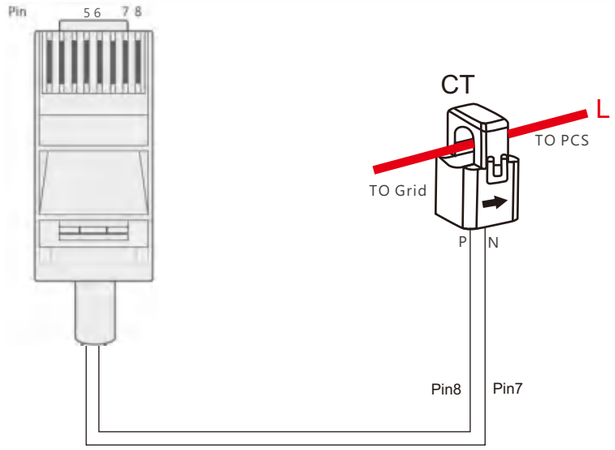
To measure the power import from and export to the grid, a pair of CT or one meter must be installed at the service entry point in or near the main service panel. We standard supply 1 CT for one inverter.

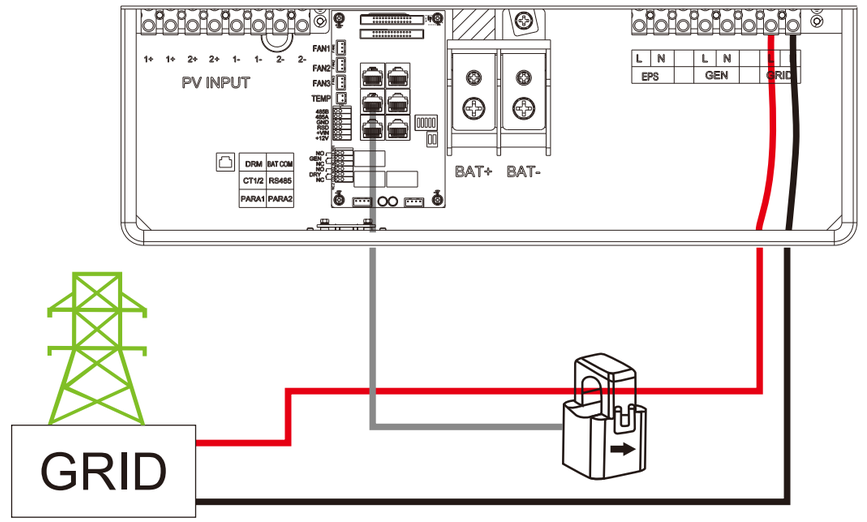
**CT Port Pin definition**

The CT interface for 1 CT connection is a RJ45 port ,we have made a RJ45 plug on those 1 CT in advance, so you can connect it to port directly.

| Pin | Description |
|---|---|
| 1-4 | reserve |
| 5 | reserve |
| 6 | reserve |
| 7 | CT1N |
| 8 | CT1P |






Please refer to the above connection diagram for the correct positions of CTs. The arrows on the CTs must point to inverter side.

**CT Clamp Ratio**

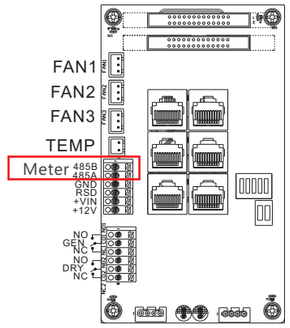
The inverter support 3 ratios of CT clamp- **1000:1** , **2000:1** and **3000:1** . The CT ratio of the CTs in the accessory bag is 1000:1. If you are using a 3rd party CT, please ensure the CT ratio is one of them, and select the correct CT ratio setting in the inverter monitor page or on the inverter LCD.

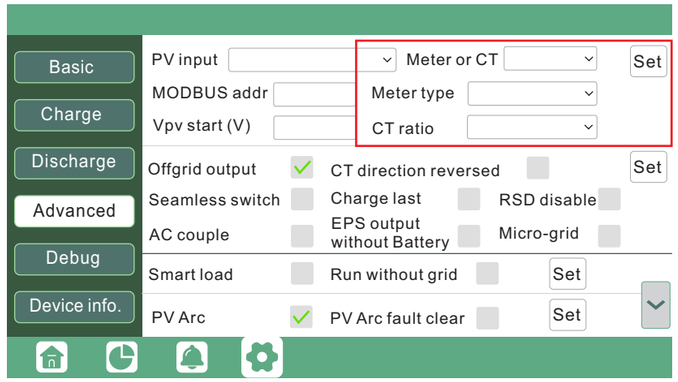
**Extend CT clamp cable**

The CT wires can be extended with a common ethernet cable if the length is not enough. An RJ45 adapter is needed for the extension. The CT wires can be extended up to 300ft(around 100m).

### Meter Connection

If you need to use a meter for import/export detection instead of CTs, you need to connect it to the Meter 485A and 485B terminals on the inverter.

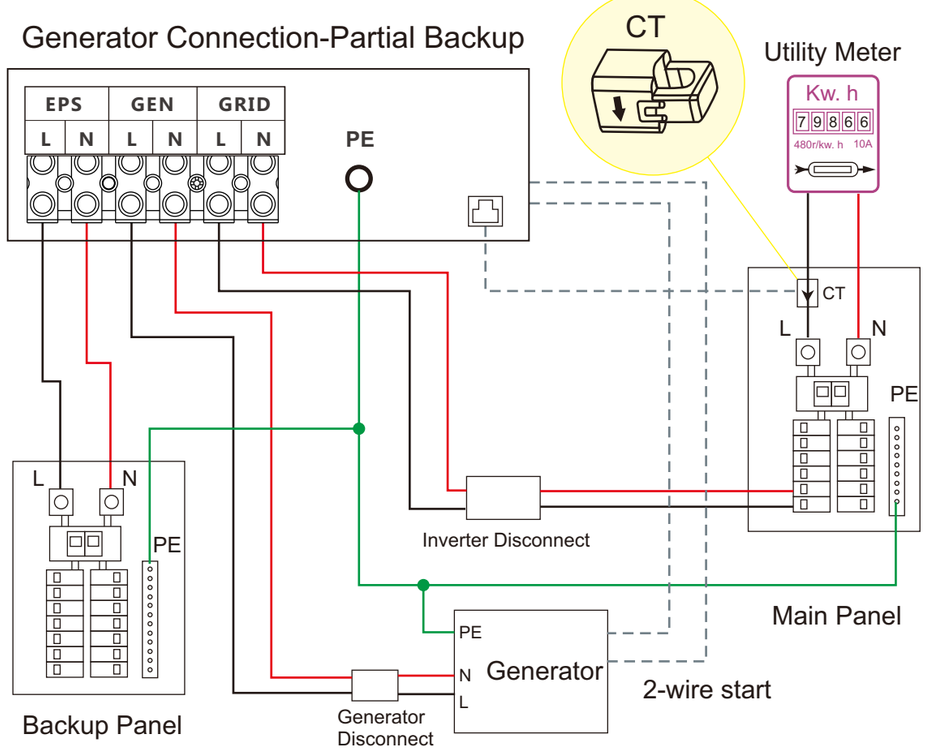


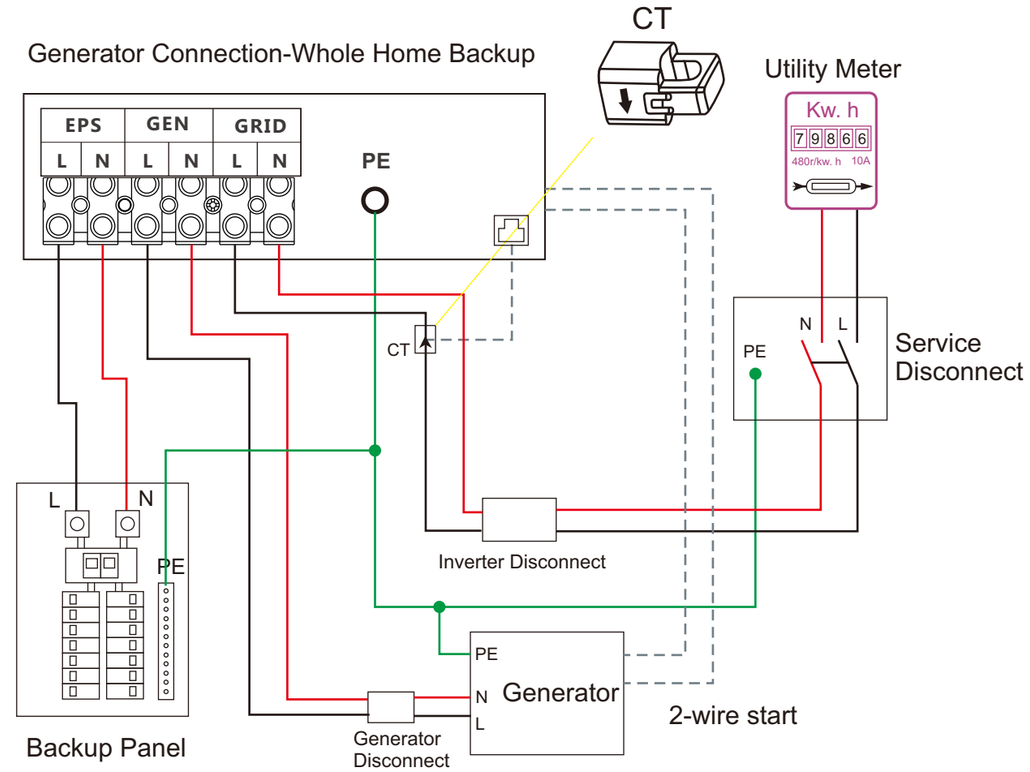




## 3.7 Working with Generator

### 3.7.1 Generator system connection

This hybrid inverter can work with generator. There are Gen ports on the inverter for generator connection.
Generator requirements: the generator capacity should be larger than 5KW.

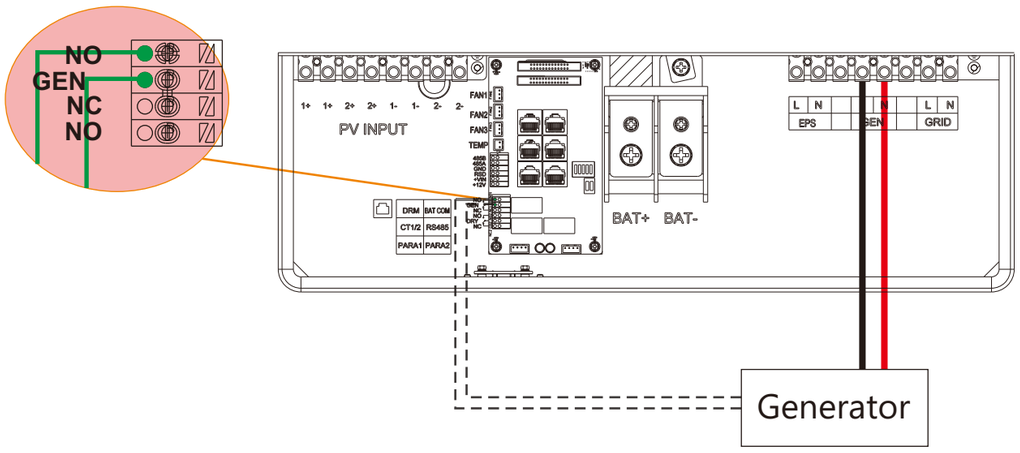


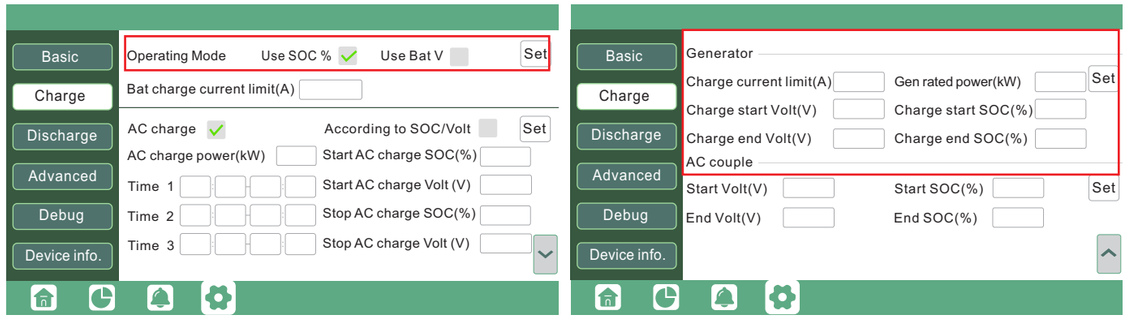

When generator is started, all the loads connected to EPS will be supplied by the generator. Meanwhile battery will be charged.

The pass-through relay on the generator port is 90A. When generator is on, please ensure the total load and charge current will not exceed 90A.

The generator start signal shall connect to COM board GEN(NO,NC port) if users want to start generator remotely.



## 3.7.2 Generator Startup and Stop settings




It depends on the Bat operating mode setting, The system will use either battery SOC or battery voltage to determine whether the system needs to start or stop the generator.

### Generator Start Conditions

When utility fails and

-When battery is discharged to cut-off settings

or there is force charge request from battery.

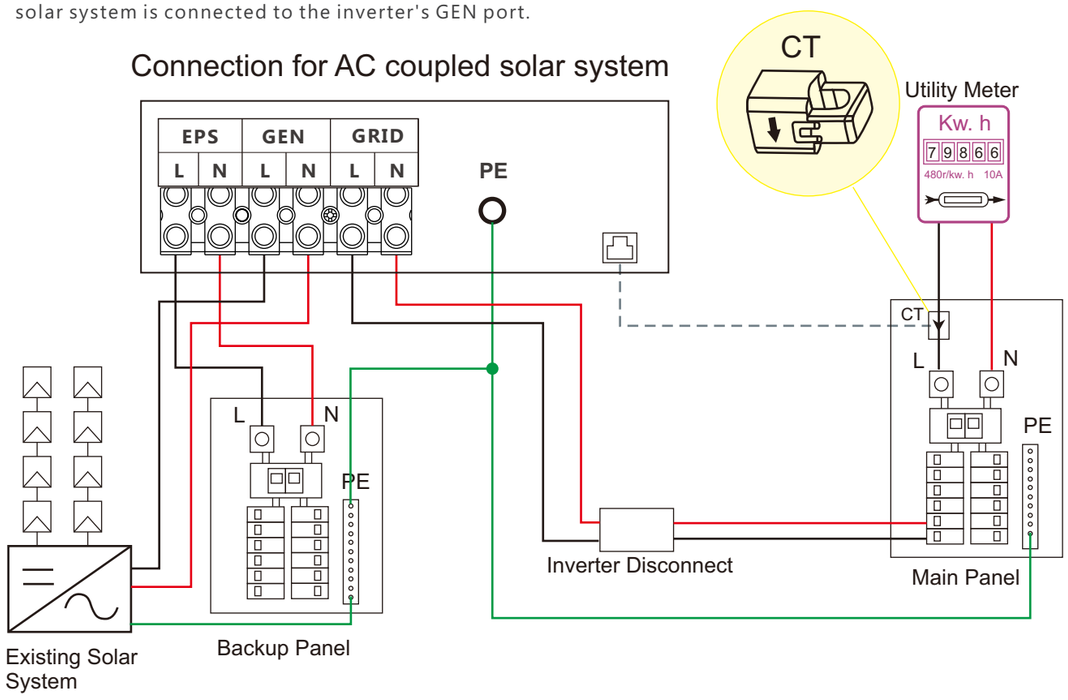
or when the battery voltage or SOC is lower than the Generator Charge start Volt/SOC settings,

### Generator Stop Conditions

when battery voltage or SOC is higher than Charge end Volt/SOC settings value.

## 3.8 AC Coupling Installation Connection

The inverter supports AC coupling connection with the existing grid-interactive solar system. The existing solar system is connected to the inverter's GEN port.



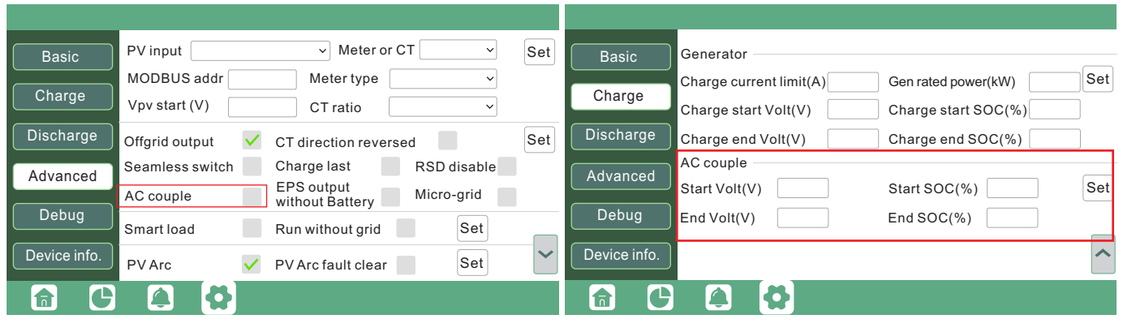



After AC couple function enabled:

When the Grid is on, the GEN terminal is connected to the grid terminal inside the inverter. In this case the hybrid inverter will bypass the interactive inverter AC to the grid and EPS.

When grid is off, The GEN terminal is connected to the EPS terminal inside the inverter. In this case, the loads will be first supplied by solar power. If solar panels are generating more power than load consumption, the excess solar power will be stored to the battery. When solar power exceeds the sum of load power and max battery charging power, e.g. when battery is nearly full. The inverter will signal the grid interactive inverter to reduce power via the frequency shifting power reduction mechanism, thus to maintain the balance of generation and consumption of the micro grid system.

### AC Coupling Settings




Users need to enable AC coupling function when they connect existing on grid system to GEN terminal

Start SOC(%): The SOC at which the AC coupled inverters are turned on when in off-grid mode.
50%~70% recommended

End SOC(%): The SOC at which the AC coupled inverters are shut down when in off-grid mode.
90% recommended

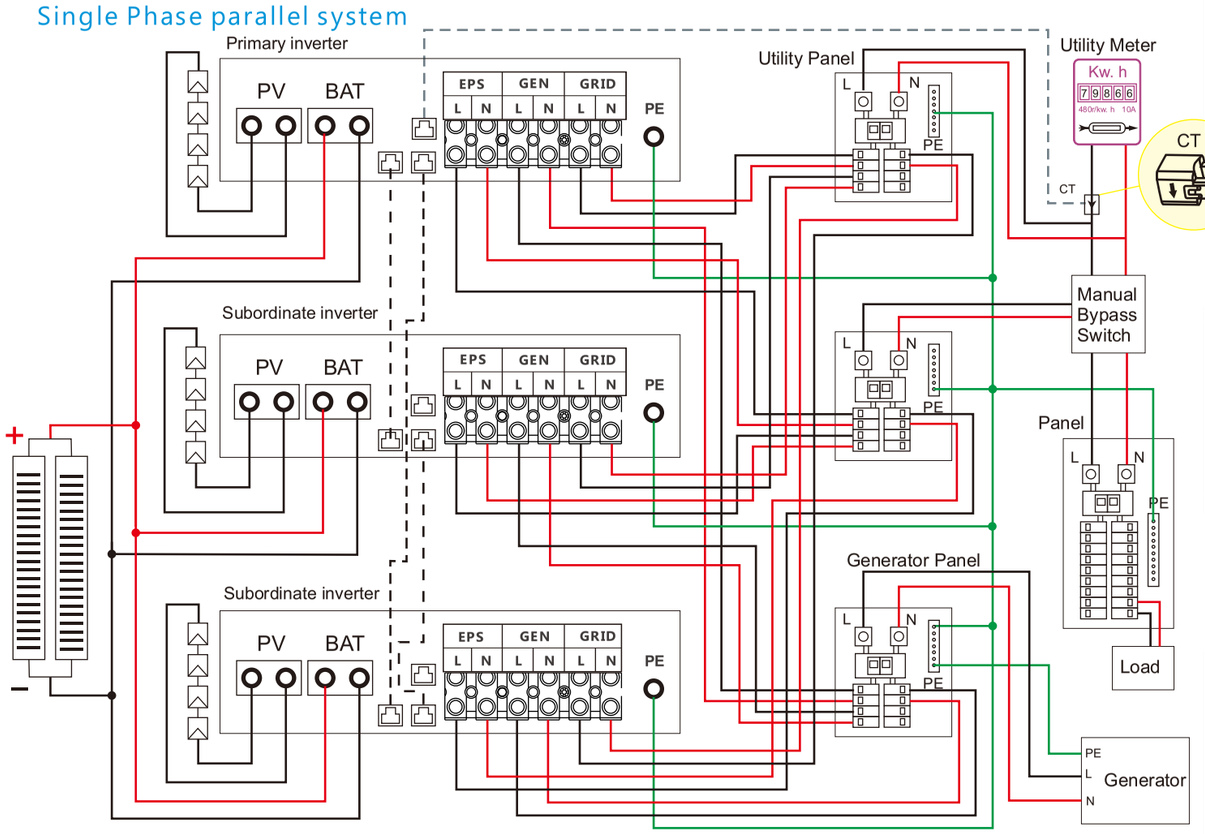
When On-Grid and Export to Grid enabled, the AC-coupled inverter will always be on, and it will sell any extra power back to the grid. Ensure you are allowed to sell power to your utility provider.
When export to Grid is disabled, the AC-coupled inverter will stay at off mode and could not work at on-grid mode to sell power.

## 3.9 Parallel System Connection

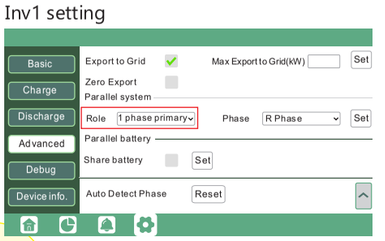
### 3.9.1 Connection for paralleling system

The hybrid inverter supports parallel connection to expand power and energy capacity to suit different using scenarios. Up to 10 units can be paralleled to reach a capacity of 80kW(for 8K mode) and 100kW(for 10K model). Wiring diagram is as below, The manual bypass switch connect loads to EPS panel for default. When inverters fail, users can switch the loads to utility.

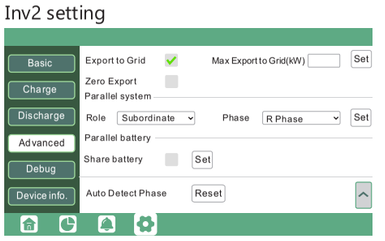
#### Single Phase parallel system



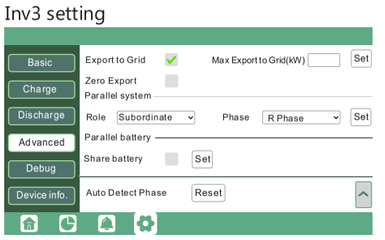

Inv1 setting




Inv2 setting

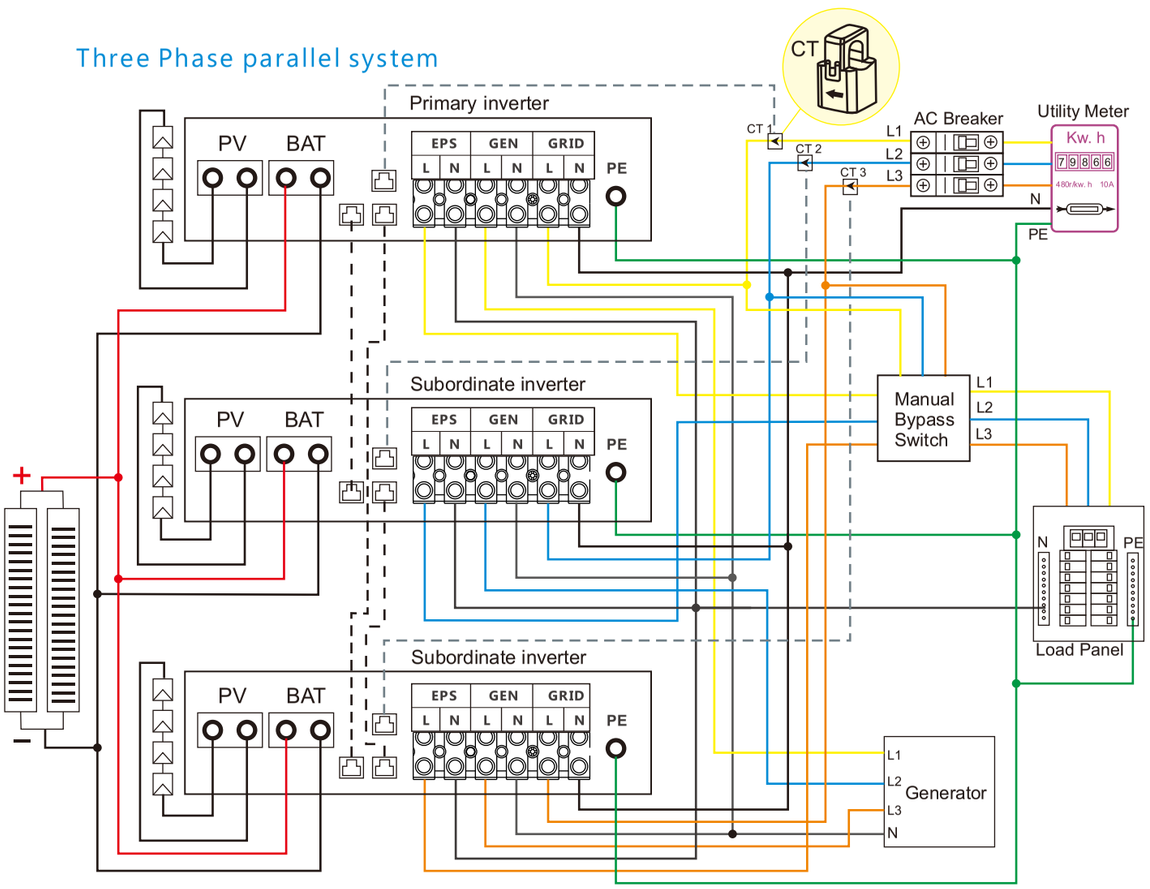



Inv3 setting

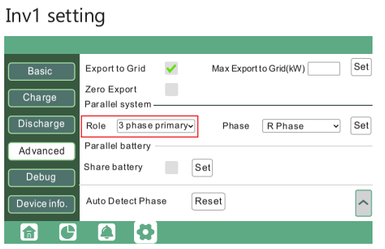



Please put the 2-bit CAN balancing resistor switch to ON status for the first and end inverter of the daisy chain loop.

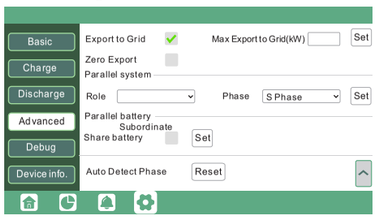
#### Three Phase parallel system



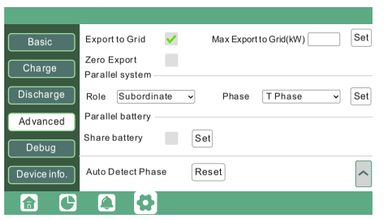

Inv1 setting



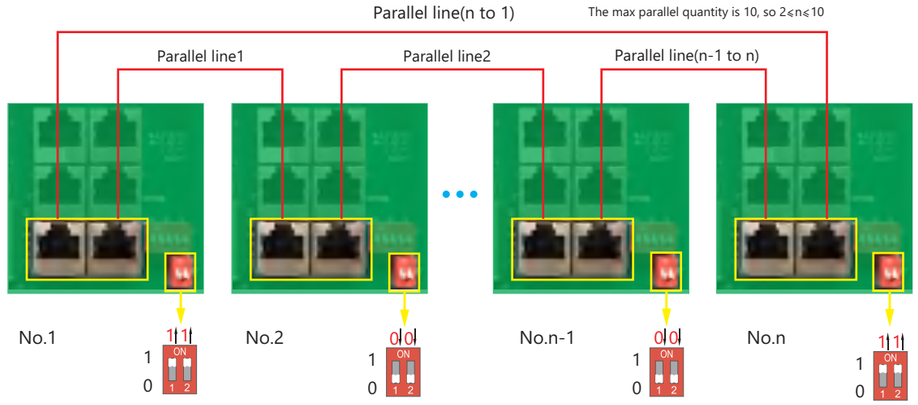

Inv2 setting




Inv3 setting



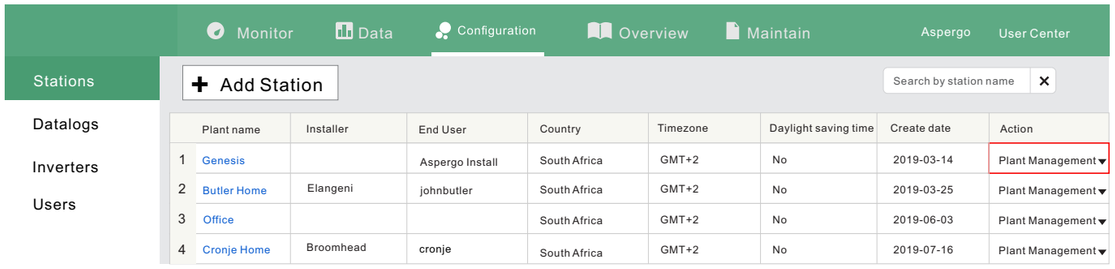
**Please put the CAN communication PIN to on status for the first and the end inverter**




If the parallel cable is not enough or long enough, please make a straight pin to pin cable

**Settings for paralleling function in monitor system**

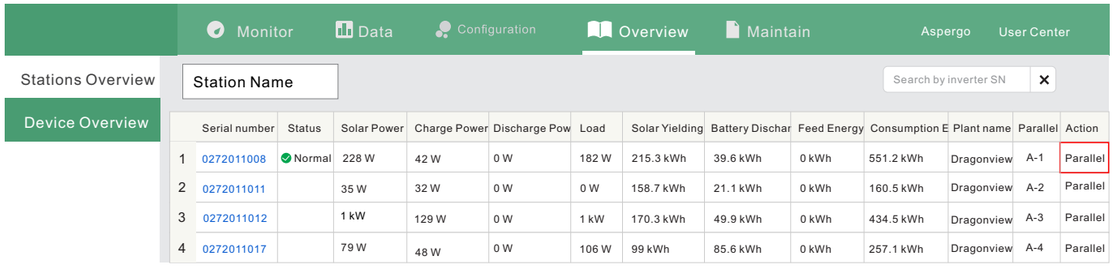
1. Set up monitoring for the system, add all dongles to one station. Users can login to visit the monitoring system, Configuration->Station->Plant Management->Add a dongle to add dongles.




| | Plant name | Installer | End User | Country | Timezone | Daylight saving time | Create date | Action |
|---|---|---|---|---|---|---|---|---|
| 1 | Genesis | | Aspergo Install | South Africa | GMT+2 | No | 2019-03-14 | Plant Management |
| 2 | Butler Home | Elangeni | johnbutler | South Africa | GMT+2 | No | 2019-03-25 | Plant Management |
| 3 | Office | | | South Africa | GMT+2 | No | 2019-06-03 | Plant Management |
| 4 | Cronje Home | Broomhead | cronje | South Africa | GMT+2 | No | 2019-07-16 | Plant Management |

2. If the system shares a single battery bank,enable the shared battery function otherwise disable the shared battery function.

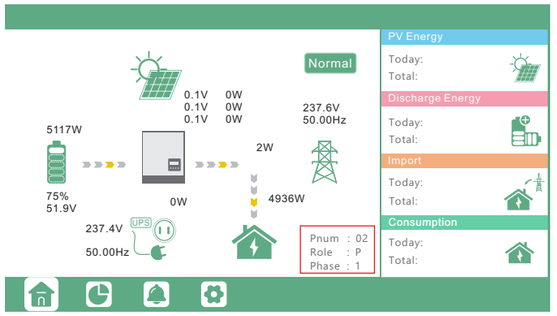
3. Set the system as a parallel group in the monitor system




| | Serial number | Status | Solar Power | Charge Power | Discharge Pow | Load | Solar Yielding | Battery Dischar | Feed Energy | Consumption E | Plant name | Parallel | Action |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0272011008 | Normal | 228 W | 42 W | 0 W | 182 W | 215.3 kWh | 39.6 kWh | 0 kWh | 551.2 kWh | Dragonview | A-1 | Parallel |
| 2 | 0272011011 | | 35 W | 32 W | 0 W | 0 W | 158.7 kWh | 21.1 kWh | 0 kWh | 160.5 kWh | Dragonview | A-2 | Parallel |
| 3 | 0272011012 | | 1 kW | 129 W | 0 W | 1 kW | 170.3 kWh | 49.9 kWh | 0 kWh | 434.5 kWh | Dragonview | A-3 | Parallel |
| 4 | 0272011017 | | 79 W | 48 W | 0 W | 106 W | 99 kWh | 85.6 kWh | 0 kWh | 257.1 kWh | Dragonview | A-4 | Parallel |

Please contact your inverter supplier for more detailed guidance for paralleling system

## 3.9.2 Parallel information display




The information in the red box shows the parallel information

Pnum: 01~10, display number of parallel units

Role: P or S, P means Primary and S means Subordinate

Phase: 1~3, 1: R Phase, 2: S Phase, 3: T Phase

**NOTICE**

Notices for parallel system:

A. Ensure the Generator is connected to all systems in parallel( if application).

B. If you cannot divide the number of PV panels connected to each inverter, it is recommended to have more PV panels in the primary inverter.

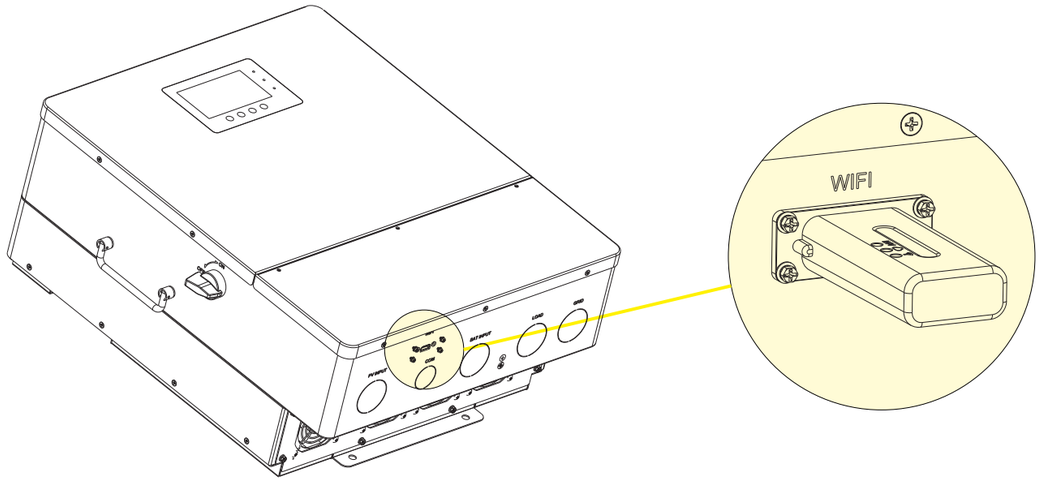
C. The values shown on the LCD of each inverter represent the inverter's contribution, not the system's total.

# 3.10 Monitor System Setup

## 3.10.1 Wifi/GPRS/4G/WLAN dongle connection

Users can use a WiFi/ WLAN /4G /2G dongle to monitor their inverter, and view the monitoring data on a computer or smart phone remotely.

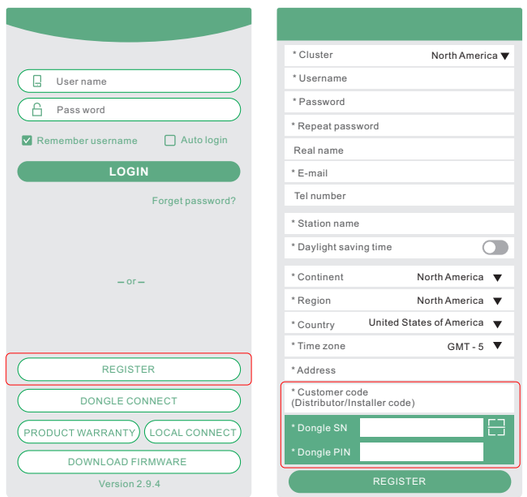
To view data on smart phone, please download APP from the Google Play or Apple APP store, then login with their user account.



## 3.10.2 Setup the monitor system

**1. Sign up an account on the mobile phone APP or Website**

The "customer code" is a code we assign to your distributor or installer. You can contact your supplier for their code.







**2. The station and wifi dongle will be created auto when you register, if you want have more stations need to be created, you can create as below**

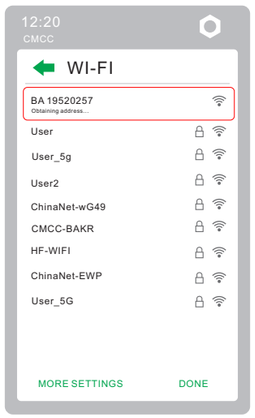
## 3.10.3 Set homewifi password to dongle

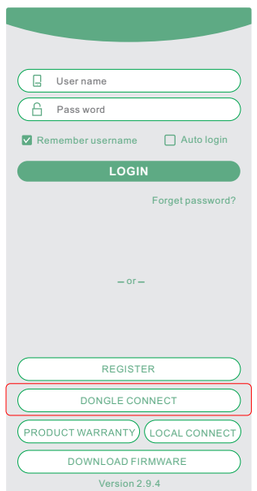
1. Connect your mobile phone to the "BAxxxxxxxx" wireless network where "BAxxxxxxxx" is the serial number of the WiFi dongle.

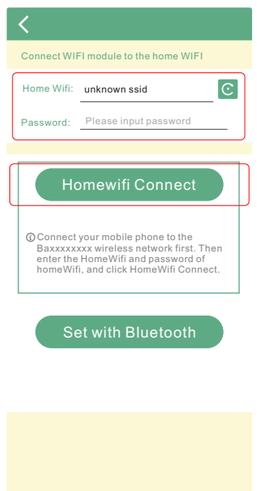
2. Click the "WiFi MODULE CONNECT" button on the APP

3. Select the home WiFi that the WiFi dongle is to be connected to,and enter the WiFi's password. And then click "HomeWifi Connect". The WiFi dongle will restart and try to connect to our server automatically.

4 .Check the LEDs' status on the WiFi dongle. The middle light should be solidly lit when the WiFi dongle connects to our server successfully.



5. Now you can disconnect your mobile phone from the "BAxxxxxxxx" wireless network. Login on the APP with your account, you'll find the inverter information already appears. Now you'll be able to monitor and control the inverter remotely on any smart phone or computer that has an Internet connection.



Please download the following guides for setting up WiFi dongle and monitoring account at

Document Reference:

1. Wifi Quick Guidance

Quick guidance for setting connection of WiFi module to home WiFi, you can also find a printed version in the packaging of the WiFi module.

2. Monitor system setup for Distributors and Monitor system setup for endusers

Account registration, the description of each items and parameters, setting parameters

## 3.10.4 4G dongle monitoring setup

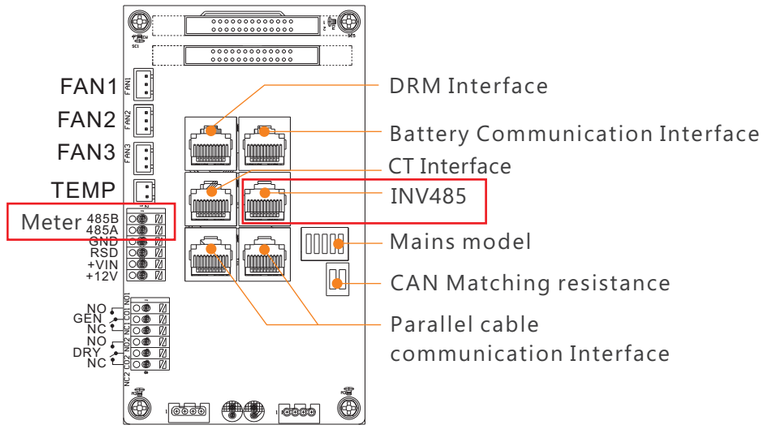
Customer should register the account as 3.10.2 first. Make sure you have put SIM card inside 4G dongle. Plug 4G dongle in, and 5 minutes later, you will be able to see your inverter online.

## 3.10.5 Third party RS485 communication

Meter 485B&485A: when the Meter is not connected. these two pin can be used to communicate with inverter using our RS485 modbus protocol.

INV485: this interface is shared with WIFI module. If WIFI module is not in use, users can use this interface to communicate with inverter.

Please contact your distributor to get the protocol for third party APP development.




| Pin | Description |
|---|---|
| 1 | 485B |
| 2 | 485A |
| 3-8 | / |

# 4. Operation Guide

## 4.1 Operation Mode and Function

The inverter has different working modes and functions to meet customers' various demands. The working modes and functions are as below.

### 4.1.1 Self-usage Mode (Default)

In this mode, the priority order of load supply source is Solar>Battery>Grid. The priority order of solar power usage is Load>Battery>Grid.

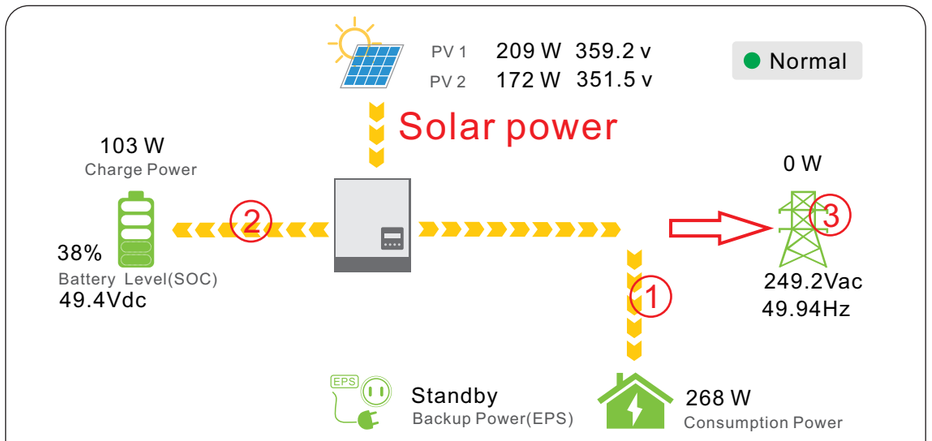
- **Application Scenarios**

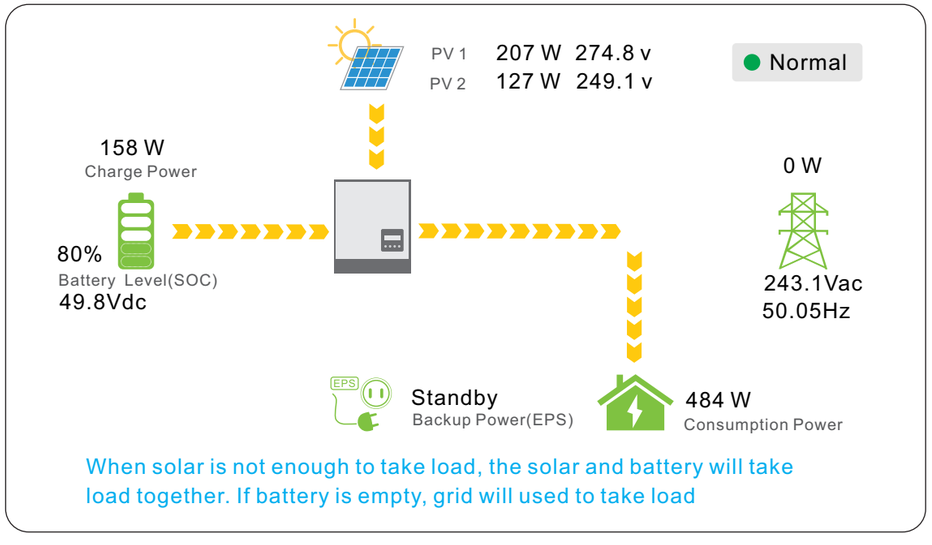
  Self consumption mode will increase self consumption rate of solar power and reduce the energy bill significantly

- **Related Settings**

  Effective when Charge Priority , AC Charge, and Forced discharge are disabled

- **Example**





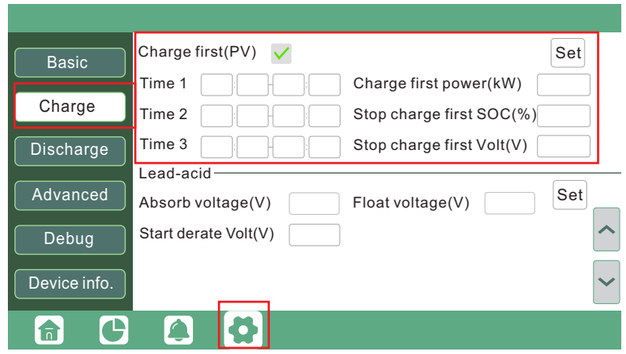

### 4.1.2 Charge First Mode

The priority order of solar power usage will be Battery >Load >Grid. During Charge Priority time period, load is first supplied with grid power. If there is excess solar power after battery charging, the excess solar power will take load together with grid power.

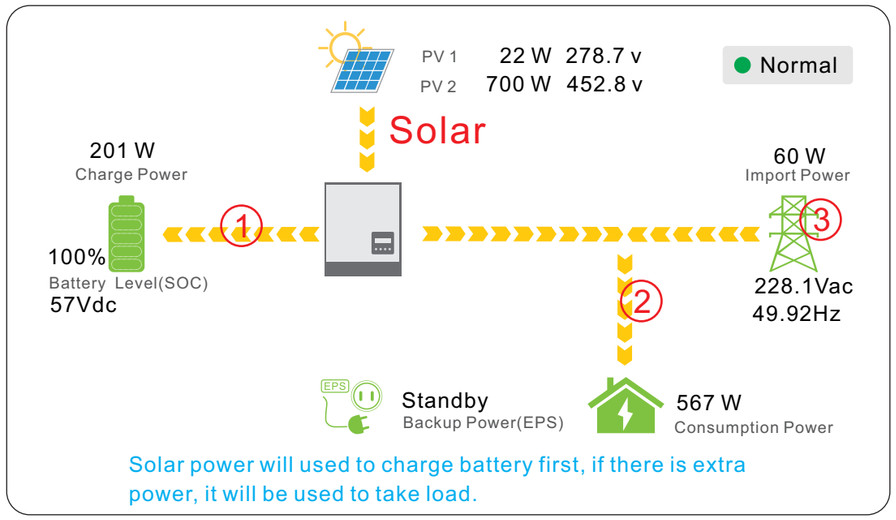
- **Application Scenarios**

  When users want to use solar power to charge battery, grid power to supply load.

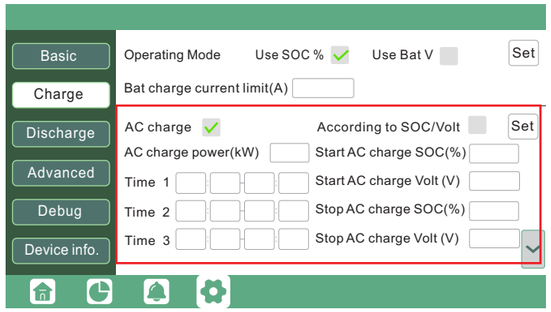
- **Related Settings**




- **Example**



### 4.1.3 AC Charge Mode



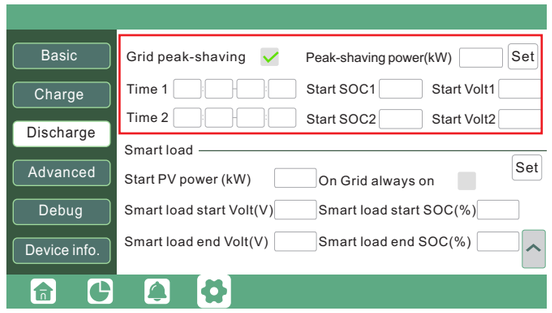

Users can charge batteries with grid power when electricity prices are cheap, and discharge battery power to supply load or export to the grid when electricity prices are high.

- **Application Scenarios**

  When users have a Time of Use(TOU) rate plan.

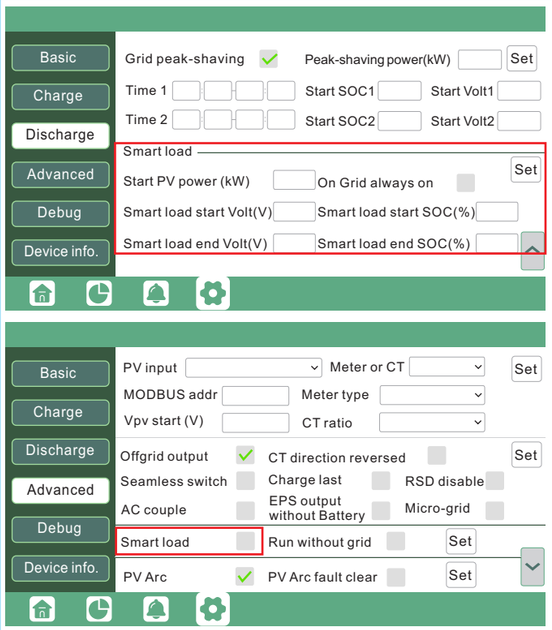
- **Related Settings**

### 4.1.4 Grid peak-shaving Function




- **Grid peak-shaving & Grid peak-shaving power(kW)**: Is used to set the maximum power that the inverter will draw from its grid power. And the Peak-shaving power needs to be set to more than 0.2(KW)

### 4.1.5 Smart load Function




- **Smart Load:** This function is to make the Gen input connection point as an load connection point, if you enable it, inverter will supply power to this load when the battery SOC and PV power is above a user setup value. e.g. Smart load start SOC=90%, Smart load end SOC=85%, Start PV power=300W, it means: When the PV power exceeds 300W, and the battery system SOC gets to 90%, the Smart Load Port will switch on automatically to supply the load which is connected on this side. When the battery reaches SOC<85% or PV power<300w, the Smart Load Port switch off automatically.

Note:

If you enable the Smart load function, it's forbidden to connect the generator at the same time, otherwise the device will be damaged!



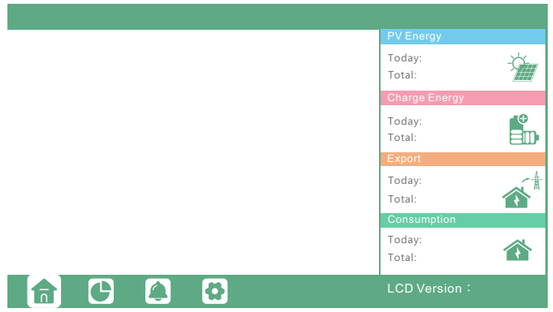
## 4.2 LCD Display

Users can view inverter running status, real time power, daily and accumulated energy information conveniently on inverter LCD. In addition to the above information, users can also check alarm and fault record on the display for troubleshooting.

### 4.2.1 Viewing information and alarm/fault record

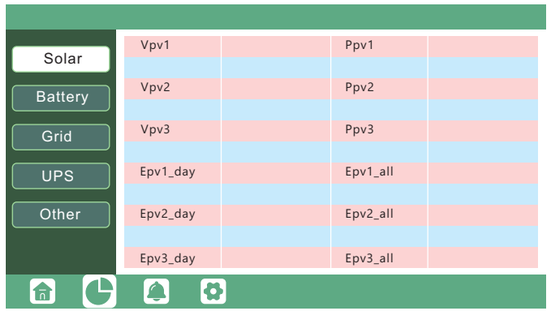
- **Home Page**

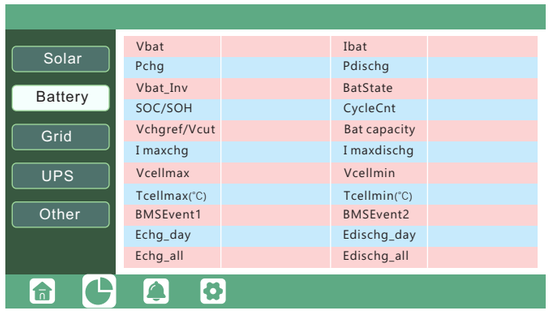
Touch the screen to light it up if it's in sleep mode. The Home page will appear on the display. Users will see a system overview diagram along with the real time information of each component, such as battery SOC, battery charging/discharging power, grid import/export power, load power, etc. On the right part of the screen, users can check daily and accumulated solar energy, battery charged/discharged energy, grid imported/exported energy, as well as load consumption.

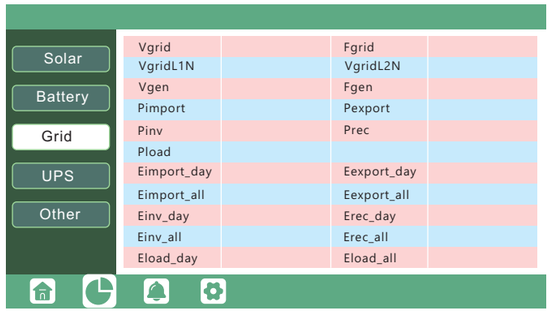


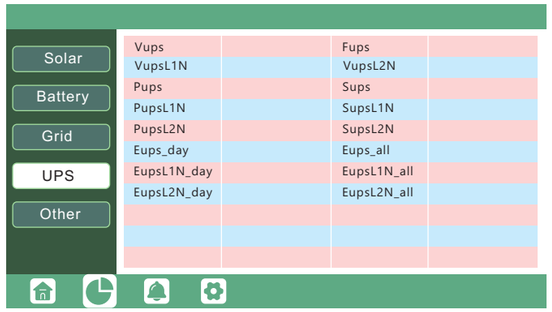

- **Detailed System Information**

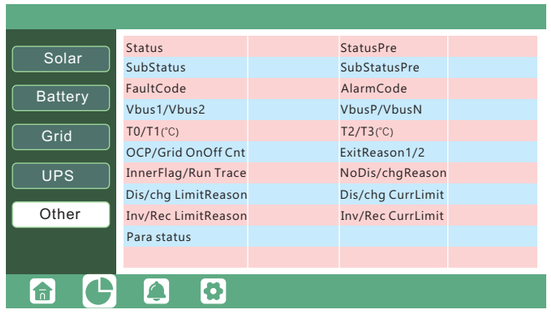
Click on the pie icon at the bottom of the screen and, you'll be able to view the detailed real time solar information, battery information, grid information and EPS output information.





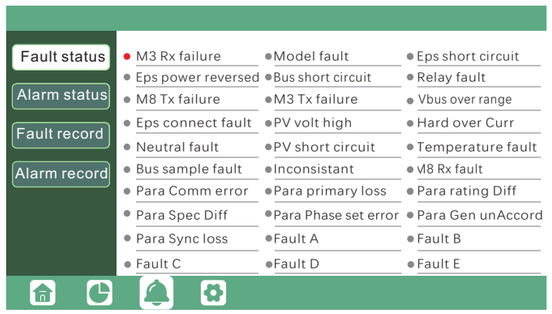



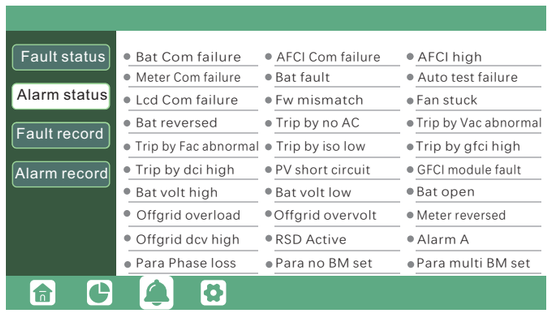



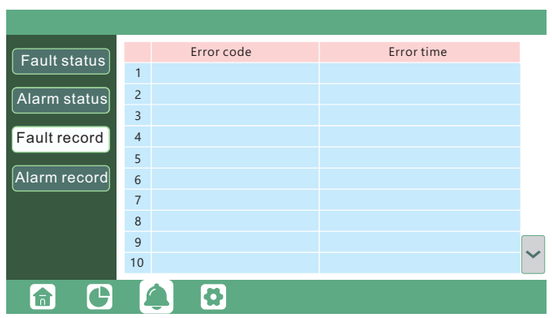



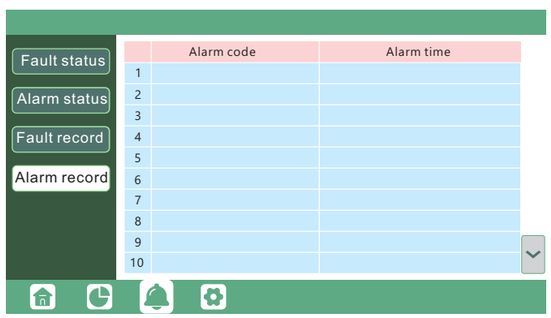

➤ **Fault/Alarm Information**

Touching the bell icon at the bottom of the screen, you'll see all the current and historical fault & warning information on this page.



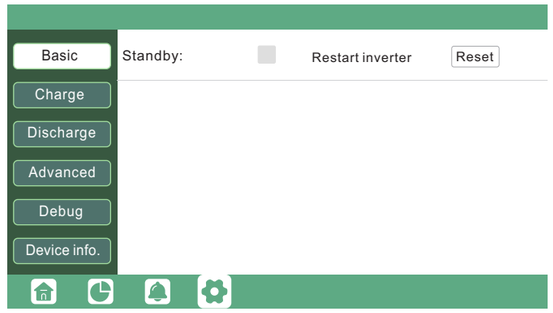






## 4.2.2 Setting Parameters

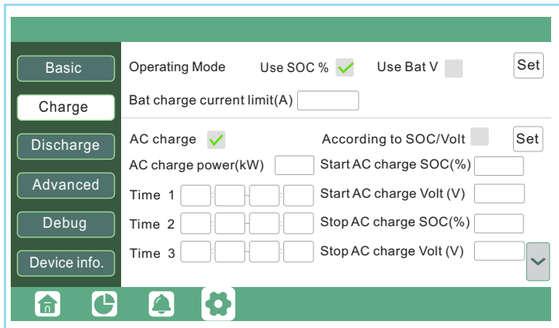
Clicking on the gear icon at the bottom of the screen, you'll get into the parameter setting page of the inverter.

a. Basic settings

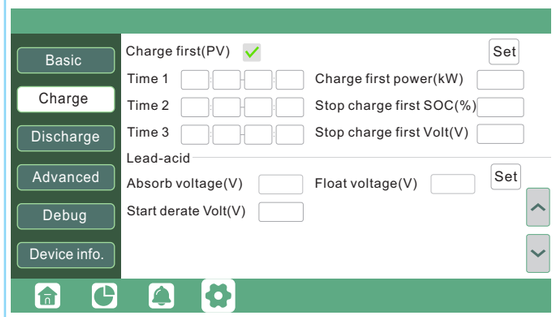



- **Standby**: Is for users to set the inverter to normal status or to standby status. In standby status, the inverter will stop any charging or discharging operations, as well as solar-feed-in.
- **Restart inverter**: Restart the system, please note the power maybe interrupted when restarted.

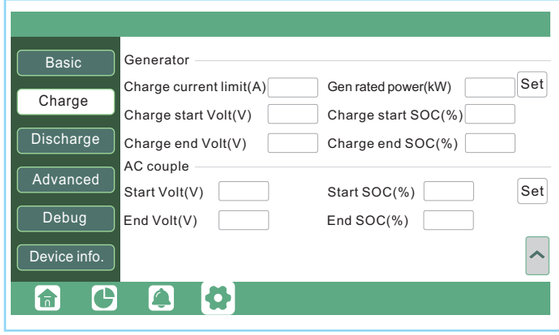
b. Charge setting




- **Operating Mode** : Users can decide to use SOC or BatV to control charge and discharge logic depending on battery type.
- **Bat charge current limit(A)**: Users can set Max charge current.
- **AC Charge**: Utility charge.configuration If users want to use grid power to charge their battery, then they can enable “AC Charge”, set time periods when AC charging can happen, AC Charge power(kW) to limit utility charging power, and “Stop AC Charge SOC(%)” as the target SOC for utility charging. “Stop AC Volt(V)” as the target battery voltage for utility charging.



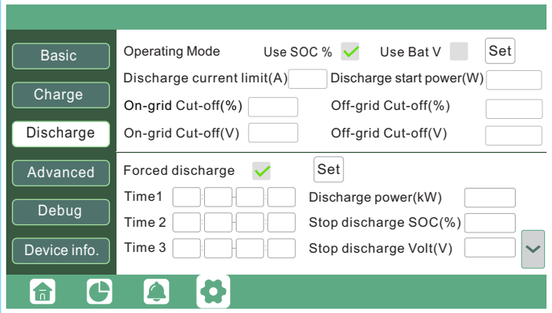

- **Charge first**: PV charge configuration. When using enable Charge first, PV will charge the battery as a priority, set time periods when PV charge can happen, charge first power(kW) to limit PV charge power, and “Charge first SOC(%)” as the target SOC for PV charge first. “Charge first Volt(V)” as the target battery voltage for PV Charge first.
- **Lead acid**: When using Lead-acid battery,you need to set parameters in these programs, Follow the battery manufacturer's recommendation.




### Generator

- **Bat charge current limit(A)**: Set the Max. battery charge current from the Generator. The Generator will start charging according to the Charge start Volt/SOC,and stop charging when the battery voltage or SOC reaches the Charge end Volt/SOC value.
- **Gen rated power:** Inverter has the peak-shaving function, when you need you can enable it and setup the Gen peak-shaving power(W)

c. Discharge setting

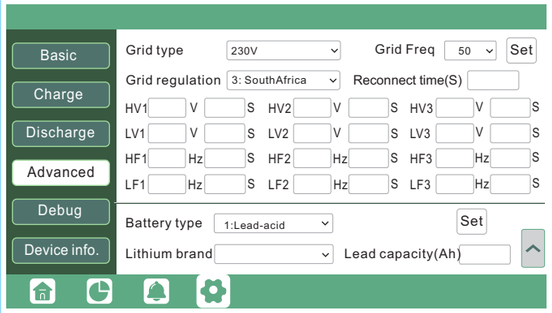



- **Operating Mode**
  You can choose "Use SOC %" or Use Bat V" to control the battery discharge state

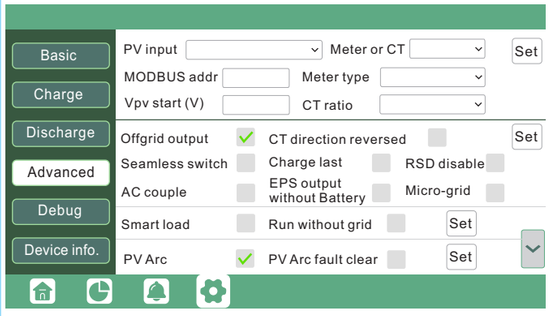
- **Discharge current limit(A)**: The Max. discharge current from battery
- **Discharge start power(W)**: The Min. value can be set to 50. When the inverter detects the import power is higher than this value, battery start discharging, otherwise battery will keep standby
- **On-grid Cut-off(%) and Off-grid Cut-off(%) /On-grid Cut-off(V) and Off-grid Cut-off(V)**: End of discharge SOC/Cut off voltage in on-grid and off-grid condition respectively.
- **Forced discharge**: Settings for battery force discharge within certain time period. In the preset time period, the inverter will discharge battery at the power set by "discharge power", until battery SOC or voltage reaches "Stop discharge "value.

d. Advanced setting

Advanced setting is mainly by installer after installation.



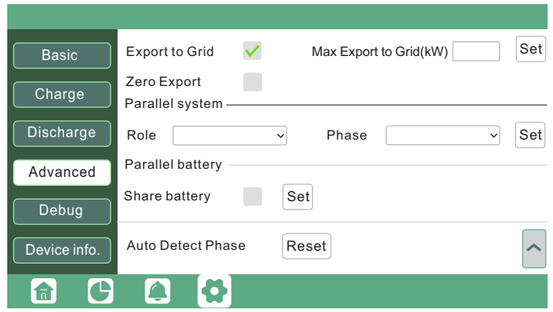

- **Grid type**: You can choose by yourself,230V
- **Grid regulation**: Please choose SouthAfrica or General
- **Battery type**: No battery, lead-acid or lithium-ion.
- If lead-acid battery is selected, please input correct battery capacity
- If lithium-ion battery is selected, please choose the battery brand in the Lithium brand drop down list.




The supported CT ratio is 1000:1, 2000:1, 3000:1. default CT ratio is 1000:1. If 3rd party CT is to be used, please ensure its CT ratio is one of them, and set it accordingly. The battery brand in the Lithium brand drop down list.

- **Meter type**: Please select it according to the meter that's to be installed.
- **Charge last**: When users want to us solar power in the order of loads -- grid export -- battery charging.

- **Offgrid output**: It is for users to set if the inverter provides backup power or not when the grid is lost. If users want the load to be seamlessly transferred to the inverter backup power, "Seamless switch" must be enabled. If customers don't have a battery installed yet, but still wish to have inverter backup power with only solar panels connected, "PV Grid Off" can be enabled to use solar power to supply load when the grid fails or load-shedding happens. Micro-grid: only needs to be set when the generator is connected to the inverter's grid port. With this option enabled, the inverter will use AC power to charge the battery and won't export any power through the grid port if AC power is present at the inverter's grid port.
- **CT direction reversed**: If the CTs are in a wrong direction which will cause the display to show incorrect information and features of the inverter will not function correctly, the installer can modify it by selecting it(only for direction not CT 1 or CT 2 placement), there is no need to reconnect the CTs and no need to go change it physically, in the order of loads--grid export--battery charging.




- **Phase:** This is the phase code setting of the EPS output. The system will automatically detect the phase sequence of the inverter (consistent with the phase sequence of the connected Grid mains) and display on the inverter after it is connected to the grid

- **Export to Grid**: Is for users to set a zero export function. If exporting solar power is not allowed, users need to disable the "Export to Grid" option. If users' utility meter is tripped with even a little solar export, "Zero export" can be enabled Thus the export detection and adjustment will take place every 20mS, which will effectively avoid any solar power being exported. If export is allowed, users can enable "Export to Grid" and set a maximum allowable export limit in "Max Export to Grid(kw)".
- **Role:** The Role setting of the parallel system. It is set to 1 phase primary by default. In a parallel system, only one inverter is allowed to be set as Primary, and the others are all Subordinate.
- **Share battery:** When the inverter is connected as a parallel system, all inverters need to share the battery, and set the"Share Battery" to "Enable" at the same time

**NOTICE**

Notice:
(1) All setting of parallel inverters need to be done in Standby or Fault Mode
(2) If the system is connected to a lithium battery, the host of the lithium battery needs to communicate with the inverter which is set as Primary in the parallel system.
(3) Please keep all the setting are same for each inverter in the parallel system on the LCD or Web monitor

## 4.3 Start-up and shut down the inverter

### 4.3.1 Start up the inverter

Step1. Turn on the battery system firstly，then turn on the DC breaker between battery and inverter.

Step2. Make sure the PV voltage of the strings are higher than 140V ,and check if the inverter works in PV charge or PV charge back-up mode.

Step3. Make sure step1and 2 above work properly before turning on the grid power or generator breaker, and check if the inverter can go to bypass mode and on-grid mode normally.

### 4.3.2 Shut down the inverter

Danger: Do not disconnect the battery , PV and AC input power under load.

If there is emergency issue , and you have to shut down the inverter ,please follow the steps as below.

Step1. Turn off the Grid breaker of the inverter.

Step2. Switch off the load breaker.

Step3. Turn off PV breaker and then battery breaker, waiting for the LCD to go off.

# 5. Troubleshooting & Maintenance

## 5.1 Regular Maintenance

- **Inverter Maintenance**

  a. Check the inverter every 6 months or 1 year to verify if there are damages on cables, accessories, terminals and the inverter itself.

  b. Check the inverter every 6 months to verify if the operating parameter is normal and there is no abnormal heating or noise from the inverter.

  c. Check the inverter every 6 months to confirm there is nothing that covers the inverter heat sink, if there is, shut-down the inverter and clear the heat sink.

- **Battery Maintenance**

  Follow the manufacturer's requirements on maintenance. When you carry out these works on batteries, please make sure to fully shut-down the inverter for safety consideration.

## 5.2 LED Displays

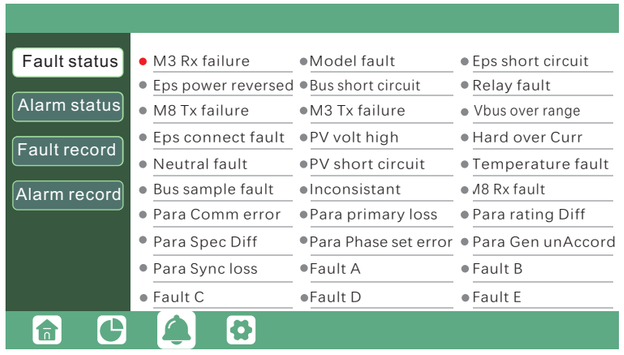
| LED | Display | Description | Suggestion |
|---|---|---|---|
| Green LED | Solid lit | Working normally | |
| | Flashing | Firmware upgrading | Wait till upgrading complete |
| Yellow LED | Solid lit | Warning, inverter working | Need troubleshooting |
| Red LED | Solid lit | Fault, inverter stop work | Need troubleshooting |

## 5.3 Troubleshooting Based On LCD Displays

Once there is any warning or fault occurring, users can troubleshoot according to the LED status and the warning/fault information on the LCD.

**1. Fault on the LCD**

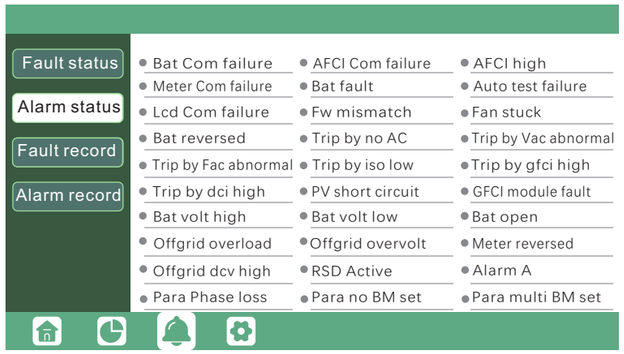
If the dot on the left of fault item is red, it means the fault is active. When it is grey, it means the fault is defective.




| Fault | Meaning | Troubleshooting |
|---|---|---|
| M3 Rx failure | M3 microprocessor fails to receive data from DSP | Restart inverter, if the error still exists, contact your supplier. |
| Model fault | Incorrect model value | |
| Eps short circuit | Inverter detected short-circuit on EPS output terminals | 1. Check if the L1, L2 and N wires are connected correctly at inverter EPS output port;<br>2. Disconnect the EPS breaker to see if fault remains. If fault persists, contact your supplier. |
| Eps power reversed | Inverter detected power flowing into EPS port | Restart inverter, if the error still exists, contact your supplier. |
| Bus short circuit | DC Bus is short circuited | |
| Relay fault | Relay abnormal | |
| M8 Tx failure | DSP fails to receive data from M8 microprocessor | |
| M3 Tx failure | DSP fails to receive data from M3 microprocessor | |
| Vbus over range | DC Bus voltage too high | Please check if the PV string voltage is within the inverter specification. If string voltage is within range, and this fault still appears, contact your supplier. |
| Eps connect fault | EPS port and grid port are connected mixed up | Check if the wires on EPS port and grid port are connected correctly. If the error exists, contact your supplier. |
| PV volt high | PV voltage is too high | Please check if the PV string voltage is within the inverter specification. If string voltage is within range, and this fault still appears, contact your supplier. |
| Hard over curr | Hardware level over current protection triggered | Restart inverter, if the error still exists, contact your supplier. |
| Neutral fault | Voltage between N and PE is greater than 30V | Check if the neutral wire is connected correctly. |
| PV short circuit | Short circuit detected on PV input | Disconnect all PV strings from the inverter. If the error persists, contact your supplier. |
| Temperature fault | Heat sink temperature too high | Install the inverter in a place with good ventilation and having no direct sunlight. If the installation site is okay, please check if the NTC connector inside the inverter is loose. |
| Bus sample fault | Inverter detected DC bus voltage lower than PV input voltage | Restart inverter, if the error still exists, contact your supplier. |
| Inconsistant | Sampled grid voltage values of DSP and M8 microprocessor are inconsistent | |
| M8 Rx fault | M8 microprocessor fails to receive data from DSP | |
| Para Comm error | Parallel communication abnormal | 1.Please check whether the connection of the parallel cable is loose, please connect the parallel cable correctly<br>2.Please check and make sure the PIN status of CAN communication cable from the first to the end inverter rightly. |
| Para primary loss | No primary in the Parallel system | 1.If a primary has been configured in the system, the fault will be automatically removed after the primary works. If so, you can ignore it.<br>2.If a primary has not been configured in the system, and there are only subordinate in the system, please set the primary first. Note: For single unit running system, the role of the inverter should be set as “1 phase primary” |

## 2. Alarm on the LCD

If the dot on the left of fault item is yellow, it means the fault is active. When it is grey, it means the fault is defective.




| Alarm | Meaning | Troubleshooting |
|---|---|---|
| Bat com failure | Inverter fails to communicate with battery | Check if communication cable is correct, and if you have chosen the correct battery brand on inverter LCD. If all is correct but this error persists, please contact your supplier. |
| AFCI com failure | Inverter fails to communicate with AFCI module | Restart inverter, if the error persists, contact your supplier. |
| AFCI high | PV arc fault is detected | Check each PV string for correct open circuit voltage and short circuit current. If the PV strings are in good condition, please clear the fault on inverter LCD. |
| Meter com failure | Inverter fails to communicate with the meter | 1. Check if the communication cable is connected correctly and in good condition.<br>2. Restart inverter. If the fault persists, contact your supplier. |
| Bat Fault | Battery cannot charge or discharge | 1.Check the battery communication cable for correct pinout on both inverter and battery end;<br>2. Check if you have chosen an incorrect battery brand;<br>3. Check if there is fault on battery's indicator. If there is fault, please contact your battery supplier. |
| Auto test failure | Auto test failed | Only applied to Italy model |
| Lcd com failure | LCD fails to communicate with M3 microprocessor | Restart inverter. If fault still exists, contact your supplier. |
| Fwm mismatch | Firmware version mismatch between the microprocessors | |
| Fan stuck | Cooling fan(s) are stuck | |
| Trip by gfci high | Inverter detected leakage current on AC side | 1.Check if there is ground fault on grid and load side;<br>2.Restart inverter. If the fault remains, contact your supplier. |
| Trip by dci high | Inverter detected high DC injection current on grid port | Restart inverter. If the fault remains, contact your supplier. |
| PV short circuit | Inverter detected short circuited PV input | 1.Check if each PV string is connected correctly;<br>2.Restart inverter. If the fault remains, contact your supplier. |
| GFCI module fault | GFCI module is abnormal | Restart inverter. If fault still exists, contact your supplier. |
| Bat volt high | Battery voltage too high | Check if battery voltage exceeds 59.9V, battery voltage should be within inverter specification. |
| Bat volt low | Battery voltage too low | Check if battery voltage is under 40V, battery voltage should be within inverter specification. |
| Bat open | Battery is disconnected from inverter | Check battery breaker or battery fuse. |
| Offgrid overload | Overload on EPS port | Check if load power on inverter EPS port is within inverter specification. |
| Offgrid overvolt | EPS voltage is too high | Restart inverter. If fault still exists, contact your upplier. |
| Meter reversed | Meter is connected reversely | Check if meter communication cable is connected correctly on inverter and meter side. |
| Offgrid dcv high | High DC voltage component on EPS output when running off-grid | Restart inverter. If fault still exists, contact your supplier. |
| RSD Active | Rapid shutdown activated | Check if the RSD switch is pressed. |
| Para phase loss | Phase losing in parallel system | Please confirm that the wiring of the inverter is correct. If the primary is set to 3 Phase primary, the number of parallel inverters needs to be ≥3. (And the grid input of each inverter should be connected with Grid L1,L2,L3 rightly). |
| Para no BM set | Primary isn't set in the parallel system | Please set one of the inverters in the parallel system as the primary |
| Para multi BM set | Multiple Primary have been set in the parallel system | There are at least two inverters set as Primary in the parallel system, please keep one Primary and the other set as Sunordinate |

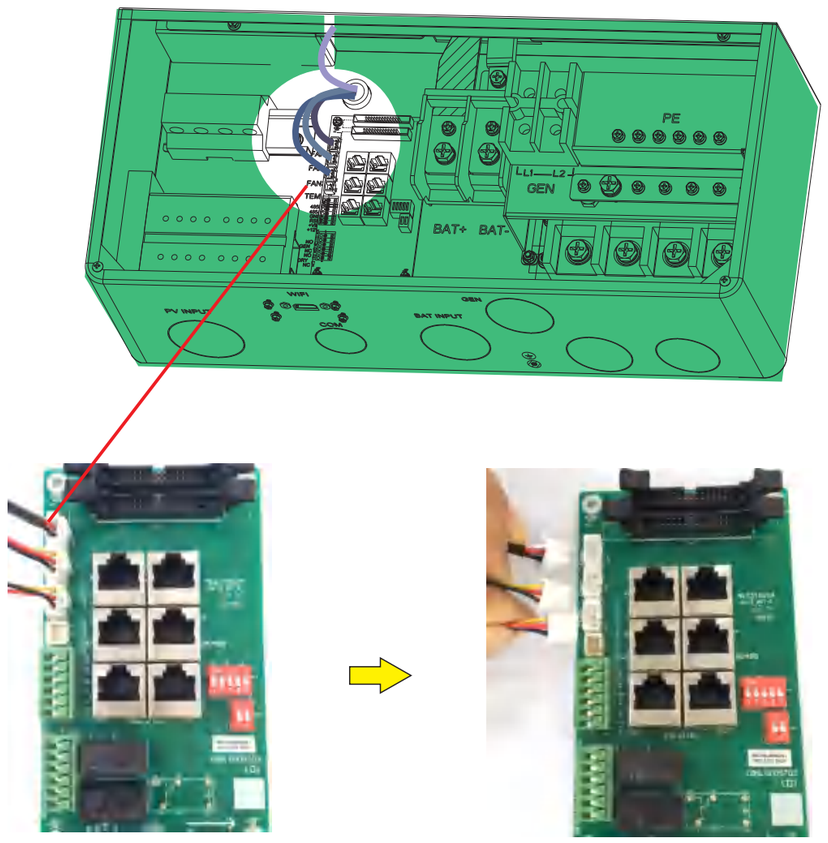
## 5.4 Fan replacement

Please check and clean the fans regularly. The recommended period is 6 months.

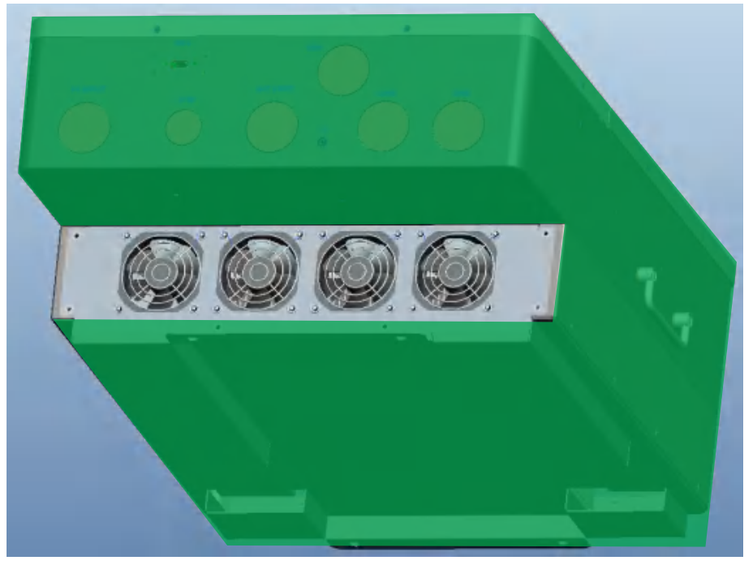
Please replace the fan following up the below diagram if there is problem with the fans. Turn off the system and wait for more than 5 minutes before disassembling the machine.

a. Open the wiring cover

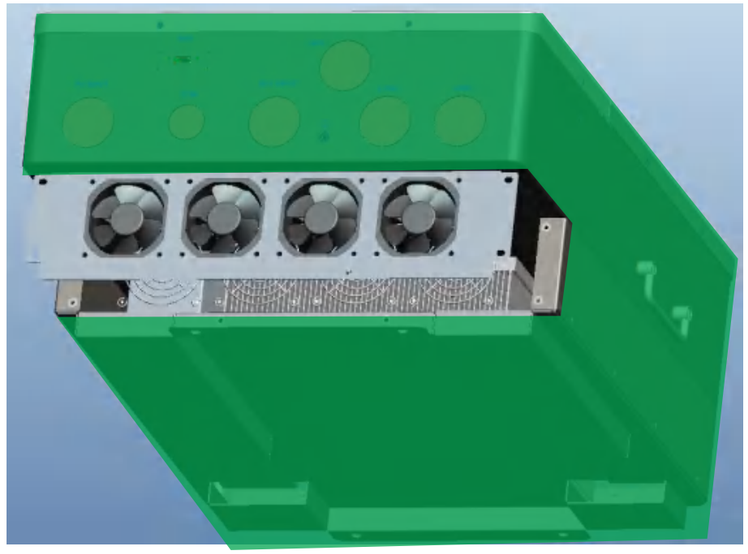
b. Unplug the fan cable




c. Loosen the screws and remove them



d. Remove the fan fixing



e. Loosen the waterproof connector

f. Remove the fan and replace it

g. After the fan is installed, follow the steps just now to push back and assemble it back

# 6. Annex2: Lithium Brand Reference

| Num | Lithium Brand Displayed on LCD | The Battery Brand |
|---|---|---|
| 0 | Lithium_0 | Standard Protocol/ Zetara / EG4 |
| 1 | Lithium_1 | HINAESS Battery |
| 2 | Lithium_2 | Pylontech/ UZ Energy |
| 3 | Rsvd | Rsvd |
| 4 | Rsvd | Rsvd |
| 5 | Lithium_5 | GSL1 Battery |
| 6 | Lithium_6 | Lux Protocol |
| 7 | Rsvd | Rsvd |
| 8 | Rsvd | Rsvd |
| 9 | Rsvd | Rsvd |
| 10 | Rsvd | Rsvd |
| 11 | Rsvd | Rsvd |
| 12 | Rsvd | Rsvd |
| 13 | Rsvd | Rsvd |
| 14 | Rsvd | Rsvd |
| 15 | Rsvd | Rsvd |
| 16 | Rsvd | Rsvd |
| 17 | Rsvd | Rsvd |
| 18 | Lithium_18 | Fortress Battery |
| 19 | Lithium_19 | Sunwoda Battery |



| PV Input data | LXP7K SPEC | LXP8K SPEC | LXP10K SPEC |
|---|---|---|---|
| Max. usable input current(A) | 25/25 | 25/25 | 25/25 |
| Max. short circuit input current(A) | 34/34 | 34/34 | 34/34 |
| Start input voltage(V) | 100 | 100 | 100 |
| Startup voltage(V) | 140 | 140 | 140 |
| Full power MPPT voltage range(V) | 150-480 | 170-480 | 200-480 |
| DC nominal voltage(V) MPPT tracker | 360 | 360 | 360 |
| DC voltage range(V) | 100-600 | 100-600 | 100-600 |
| MPP operating voltage range(V) | 120-500 | 120-500 | 120-500 |
| Max. power(W) | 12000 | 12000 | 15000 |
| Number of MPPT | 2 | 2 | 2 |
| Inputs per MPPT | 2/2 | 2/2 | 2/2 |
| **AC Grid output data** | | | |
| Nominal Output Current(A) | 30.5 | 35 | 43.5 |
| Max. Output Current(A) | 33.5 | 38.5 | 47.8 |
| Rated voltage(V) | 230 | 230 | 230 |
| Operating voltage range(V) | 180-270 | 180-270 | 180-270 |
| Nominal power output(W) | 7000 | 8000 | 10000 |
| Operating frequency(Hz) | 50 | 50 | 50 |
| Operating frequency range(Hz) | 45-55 | 45-55 | 45-55 |
| Phase shift | 0.99@full load | 0.99@full load | 0.99@full load |
| Reactive power adjust range | -0.8～+0.8 leading Adjustable | -0.8～+0.8 leading Adjustable | -0.8～+0.8 leading Adjustable |
| THDI | <3% | <3% | <3% |
| Sync inrush current(A) | 35 | 35 | 35 |
| **UPS AC output data** | | | |
| Nominal output current(A) | 30.5 | 35 | 43.5 |
| Nominal output voltage(V) | 230 | 230 | 230 |
| Rated output power(VA) | 7000 | 8000 | 10000 |
| Operating frequency(Hz) | 50 | 50 | 50 |
| Peak power(VA) | 2xPn, 0.5s | 2xPn, 0.5s | 2xPn, 0.5s |
| THDV | <3% | <3% | <3% |
| Switching Time | <20 | <20 | <20 |
| **Efficiency** | | | |
| Europe Efficiency | 96% | 96% | 96% |
| Max. Efficiency @ PV to grid | 97.5% | 97.5% | 97.5% |
| Max. Efficiency @ battery to grid | 94% | 94% | 94% |
| MPPT Efficiency | 99.9% | 99.9% | 99.9% |
| **Battery data** | | | |
| Type | | Lead-acid battery/Lithium battery | |
| Max. charge current(A) | 146 | 167 | 210 |
| Max. discharge current(A) | 146 | 167 | 210 |
| Nominal voltage(V) | 48 | 48 | 48 |
| Voltage range(V) | 40-60 | 40-60 | 40-60 |
| Max. voltage(V) | 60 | 60 | 60 |
| **General Data** | | | |
| Integrated disconnect | DC switch | DC switch | DC switch |
| Reverse polarity protection | Yes | Yes | Yes |
| DC switch rating for each MPPT | Yes | Yes | Yes |
| Output over-voltage protection varistor | Yes | Yes | Yes |
| Output over current protection | Yes | Yes | Yes |
| Ground fault monitoring | Yes | Yes | Yes |
| Grid monitoring | Yes | Yes | Yes |
| Pole sensitive leakage current Monitoring unit | Yes | Yes | Yes |
| Dimensions(mm) | | 580*490*265mm(22.8*19.3*10.4inch) | |
| Weight(kg) | 44kg(96.8 lbs) | 44kg(96.8 lbs) | 44kg(96.8 lbs) |
| Degree of protection | NEMA4X / IP 65 | NEMA4X / IP 65 | NEMA4X / IP 65 |
| Cooling concept | FAN | FAN | FAN |
| Topology | Transformer-less | Transformer-less | Transformer-less |
| Relative humidity | 0-100% | 0-100% | 0-100% |
| Altitude(m) | <2000m | <2000m | <2000m |
| Noise emission(dB) | <50dB | <50dB | <50dB |
| Internal consumption(W) | <15W | <15W | <15W |
| Display | Touch color screen | Touch color screen | Touch color screen |
| Communication interface | Rs485/ Wi-Fi/ CAN | Rs485/ Wi-Fi/ CAN | Rs485/ Wi-Fi/ CAN |
| Standard warranty | 5years | 5years | 5years |