



# Hybrid Inverter

APEX-E-P3-5000L

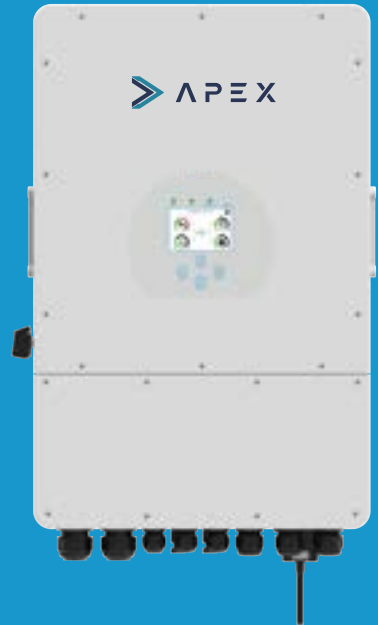
APEX-E-P3-6000L

APEX-E-P3-8000L

APEX-E-P3-10KL

APEX-E-P3-12KL

## User Manual



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## About This Manual

The manual mainly describes the product information, guidelines for installation, operation and maintenance. The manual cannot include complete information about the photovoltaic (PV) system.

## How to Use This Manual

Read the manual and other related documents before performing any operation on the inverter. Documents must be stored carefully and be available at all times.

**Contents may be periodically updated or revised due to product development. The information in this manual is subject to change without notice.**

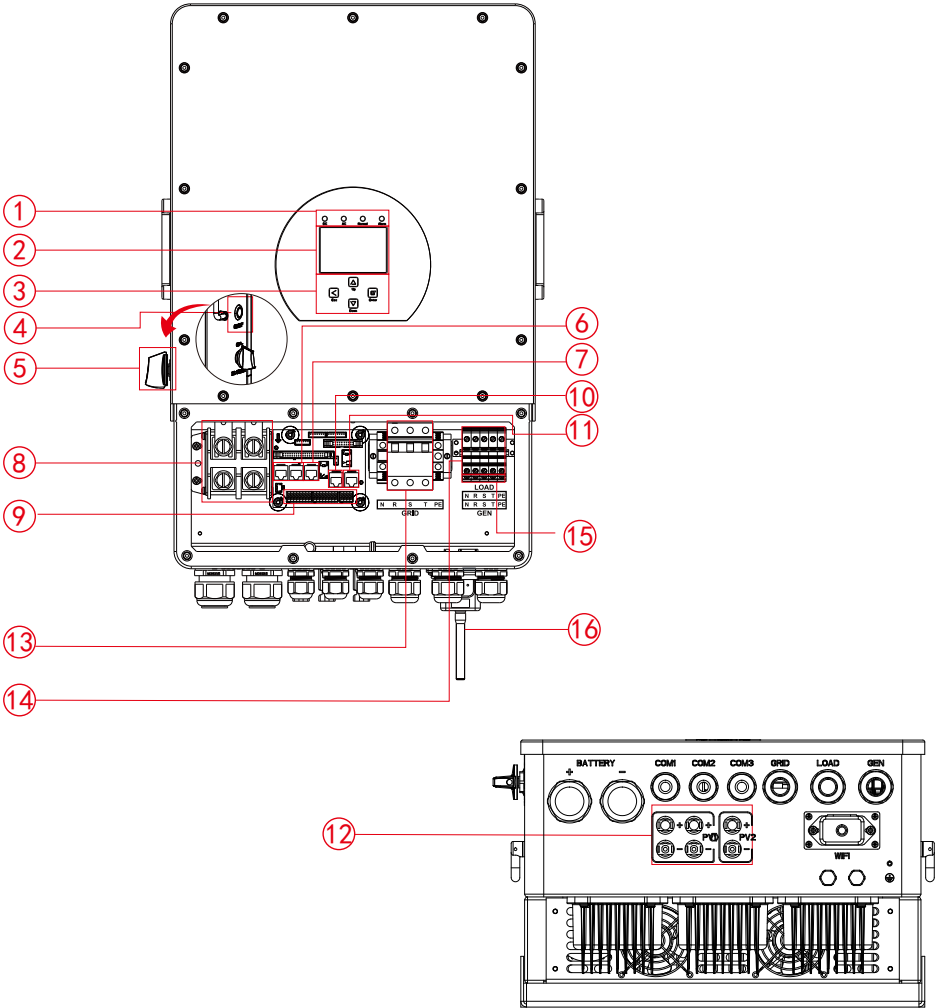
## 1. Safety Introductions

- This chapter contains important safety and operating instructions. Read and keep this manual for future reference.
- Before using the inverter, please read the instructions and warning signs of the battery and corresponding sections in the instruction manual.
- Do not disassemble the inverter. If you need maintenance or repair, take it to a professional service center.
- Improper reassembly may result in electric shock or fire.
- To reduce risk of electric shock, disconnect all wires before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk.
- Caution: Only qualified personnel can install this device with battery.
- Never charge a frozen battery.
- For optimum operation of this inverter, please follow required specification to select appropriate cable size. It is very important to correctly operate this inverter.
- Be very cautious when working with metal tools on or around batteries. Dropping a tool may cause a spark or short circuit in batteries or other electrical parts, even cause an explosion.
- Please strictly follow installation procedure when you want to disconnect AC or DC terminals. Please refer to "Installation" section of this manual for the details.
- Grounding instructions - this inverter should be connected to a permanent grounded wiring system. Be sure to comply with local requirements and regulation to install this inverter.
- Never cause AC output and DC input short circuited. Do not connect to the mains when DC input short circuits.

## 2. Product Introduction

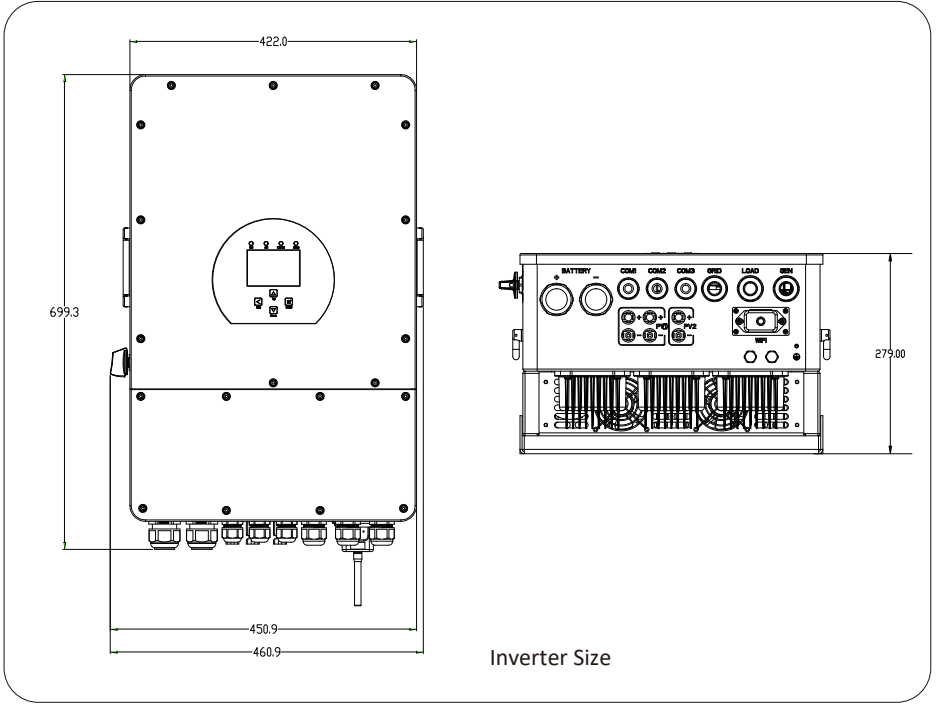
This is a multifunctional inverter, combining functions of inverter, solar charger and battery charger to offer uninterruptible power support with portable size. Its comprehensive LCD display offers user configurable and easy accessible button operation such as battery charging, AC/solar charging, and acceptable input voltage based on different applications.

## 2.1 Product Overview

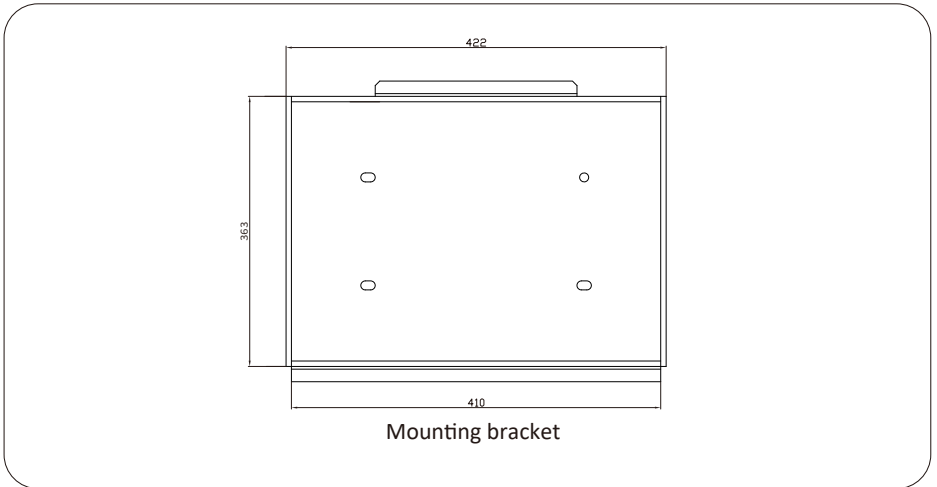


- |                        |                             |                             |
|------------------------|-----------------------------|-----------------------------|
| 1: Inverter indicators | 7: Meter-485 port           | 13:*Circuit breaker of Grid |
| 2: LCD display         | 8: Battery input connectors | 14: Load                    |
| 3: Function buttons    | 9: Function port            | 15: Generator input         |
| 4: Power on/off button | 10: ModeBUS port            | 16: WiFi Interface          |
| 5: DC switch           | 11: BMS port                |                             |
| 6: Parallel port       | 12: PV input with two MPPT  |                             |
- \* for some hardware versions, the circuit breaker of Grid is not existed

## 2.2 Product Size



Inverter Size



Mounting bracket

## 2.3 Product Features

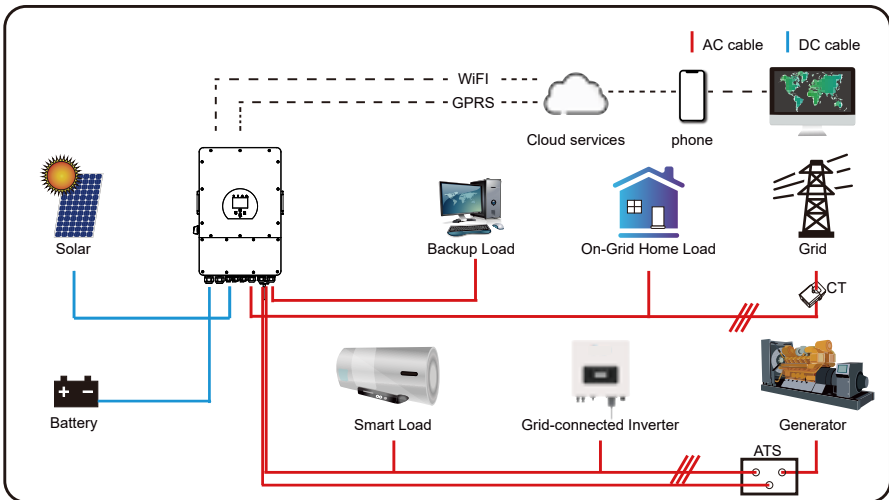
- 230V/400V Three phase Pure sine wave inverter.
- Self-consumption and feed-in to the grid.
- Auto restart while AC is recovering.
- Programmable supply priority for battery or grid.
- Programmable multiple operation modes: On grid, off grid and UPS.
- Configurable battery charging current/voltage based on applications by LCD setting.
- Configurable AC/Solar/Generator Charger priority by LCD setting.
- Compatible with mains voltage or generator power.
- Overload/over temperature/short circuit protection.
- Smart battery charger design for optimized battery performance
- With limit function, prevent excess power overflow to the grid.
- Supporting WIFI monitoring and build-in 2 strings for 1 MPP tracker, 1 string for 1 MPP tracker.
- Smart settable three stages MPPT charging for optimized battery performance.
- Time of use function.
- Smart Load Function.

## 2.4 Basic System Architecture

The following illustration shows basic application of this inverter. It also includes following devices to have a Complete running system.

- Generator or Utility
  - PV modules
- Consult with your system integrator for other possible system architectures depending on your requirements.

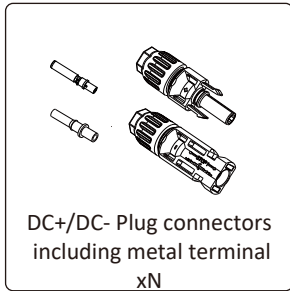
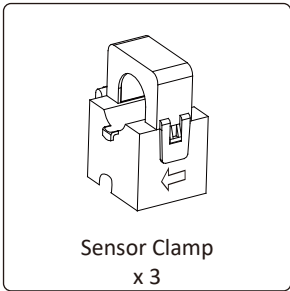
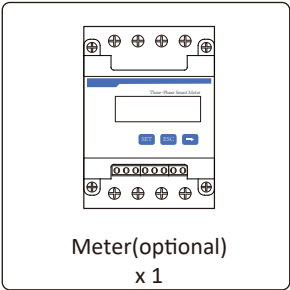
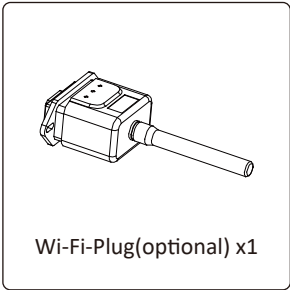
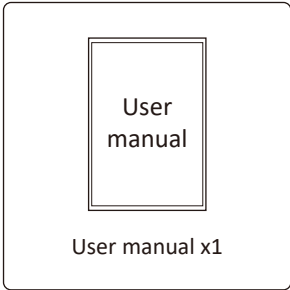
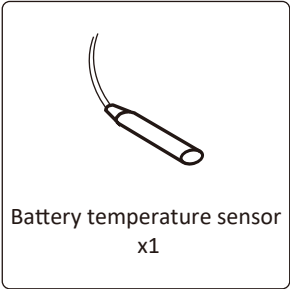
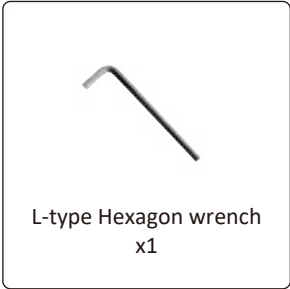
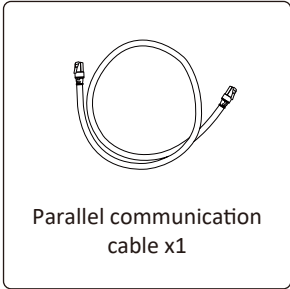
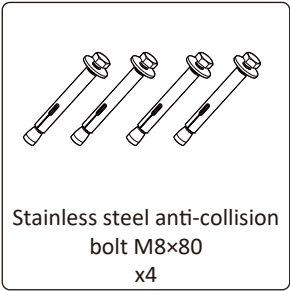
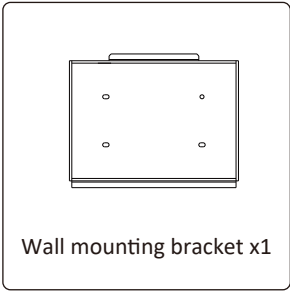
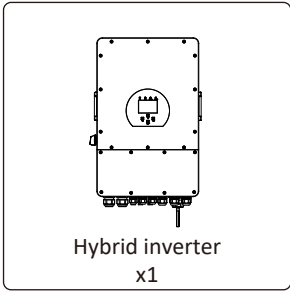
This inverter can power all kinds of appliances in home or office environment, including motor type appliances such as refrigerator and air conditioner.



### 3. Installation

#### 3.1 Parts List

Check the equipment before installation. Please make sure nothing is damaged in the package. You should have received the items in the following package:



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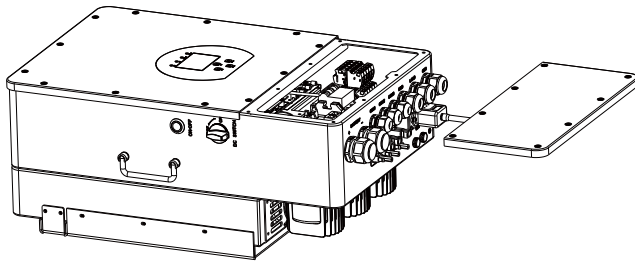
## 3.2 Mounting instructions

### Installation Precaution

This Hybrid inverter is designed for outdoor use(IP65), Please make sure the installation site meets below conditions:

- Not in direct sunlight
- Not in areas where highly flammable materials are stored.
- Not in potential explosive areas.
- Not in the cool air directly.
- Not near the television Antenna or antenna cable.
- Not higher than altitude of about 2000 meters above sea level.
- Not in environment of precipitation or humidity(>95%)

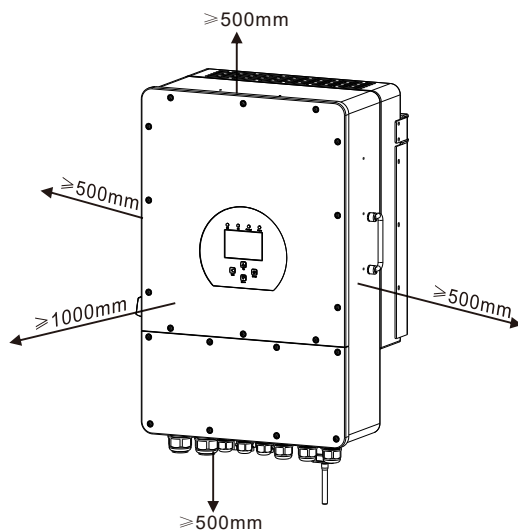
Please AVOID direct sunlight, rain exposure, snow laying up during installation and operation. Before connecting all wires, please take off the metal cover by removing screws as shown below:



### Considering the following points before selecting where to install:

- Please select a vertical wall with load-bearing capacity for installation, suitable for installation on concrete or other non-flammable surfaces, installation is shown below.
- Install this inverter at eye level in order to allow the LCD display to be read at all times.
- The ambient temperature is recommended to be between  $-25\sim 60\text{ }^{\circ}\text{C}$  to ensure optimal operation.
- Be sure to keep other objects and surfaces as shown in the diagram to guarantee sufficient heat dissipation and have enough space for removing wires.



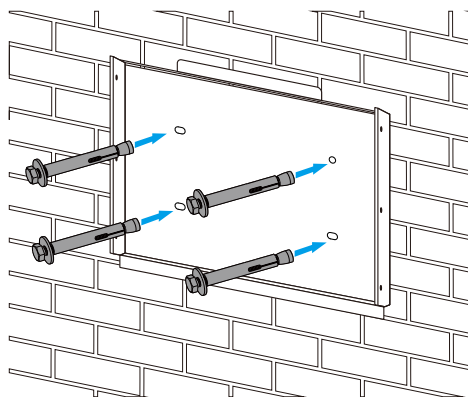


For proper air circulation to dissipate heat, allow a clearance of approx. 50cm to the side and approx. 50cm above and below the unit. And 100cm to the front.

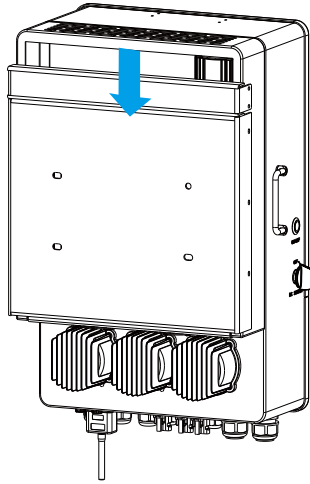
## Mounting the inverter

Remember that this inverter is heavy! Please be careful when lifting out from the package. Choose the recommend drill head(as shown in below pic) to drill 4 holes on the wall, 82-90mm deep.

1. Use a proper hammer to fit the expansion bolt into the holes.
2. Carry the inverter and holding it, make sure the hanger aim at the expansion bolt,fix the inverter on the wall.
3. Fasten the screw head of the expansion bolt to finish the mounting.



Inverter hanging plate installation



### 3.3 Battery connection

For safe operation and compliance, a separate DC over-current protector or disconnect device is required between the battery and the inverter. In some applications, switching devices may not be required but over-current protectors are still required. Refer to the typical amperage in the table below for the required fuse or circuit breaker size.

| <i>Model</i> | <i>Wire Size</i> | <i>Cable(mm<sup>2</sup>)</i> | <i>Torque value(max)</i> |
|--------------|------------------|------------------------------|--------------------------|
| 5Kw          | 2AWG             | 35                           | 24.5Nm                   |
| 6/8Kw        | 1AWG             | 50                           | 24.5Nm                   |
| 10/12Kw      | 1/0AWG           | 50                           | 24.5Nm                   |

Chart 3-2 Cable size



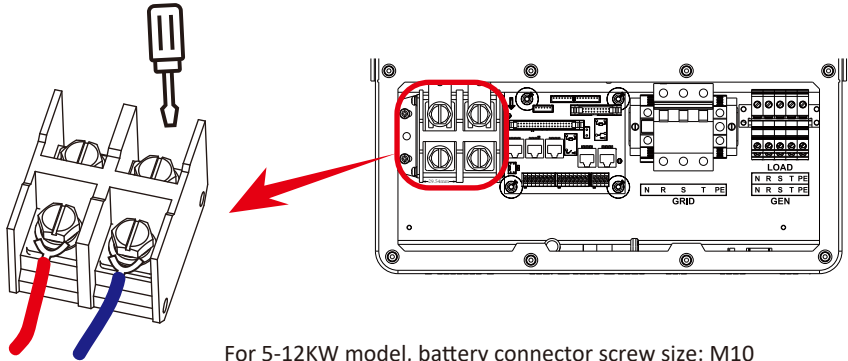
All wiring must be performed by a professional person.



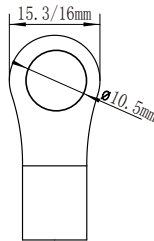
Connecting the battery with a suitable cable is important for safe and efficient operation of the system. To reduce the risk of injury, refer to Chart 3-2 for recommended cables.

Please follow below steps to implement battery connection:

1. Please choose a suitable battery cable with correct connector which can well fit into the battery terminals.
2. Use a suitable screwdriver to unscrew the bolts and fit the battery connectors in, then fasten the bolt by the screwdriver, make sure the bolts are tightened with torque of 24.5 N.M in clockwise direction.
3. Make sure polarity at both the battery and inverter is correctly connected.



For 5-12KW model, battery connector screw size: M10



DC Battery Input 2/1AWG Wire Size

4. In case of children touch or insects go into the inverter, Please make sure the inverter connector is fasten to waterproof position by twist it clockwise.

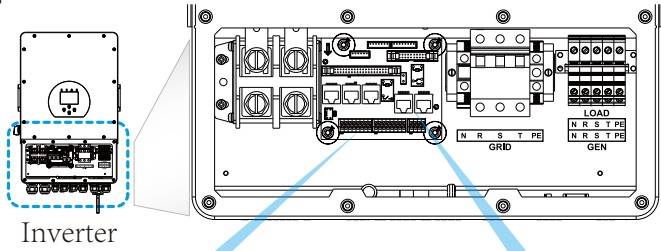


Installation must be performed with care.

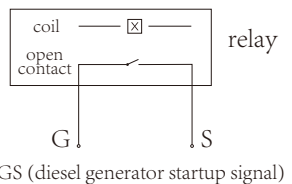
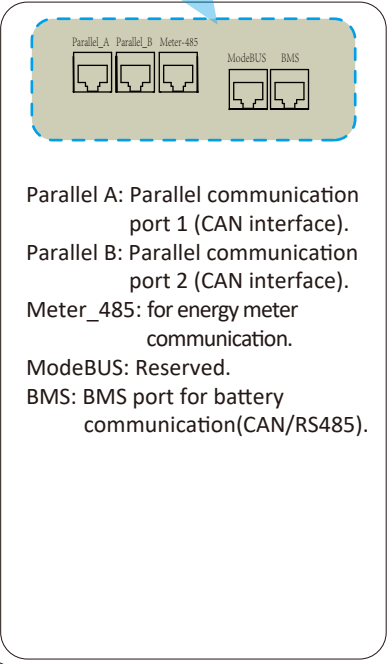
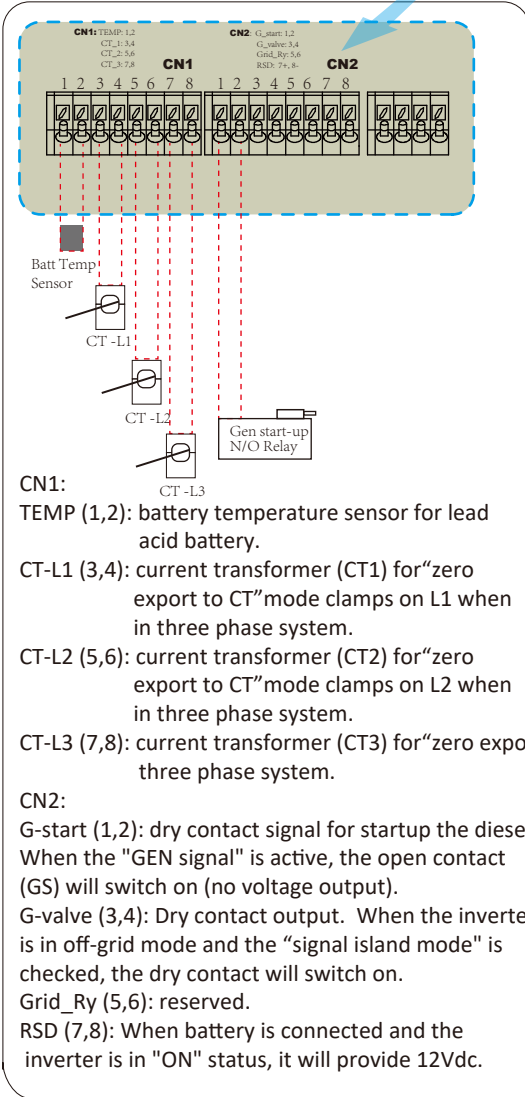


Before making the final DC connection or closing DC breaker/disconnect, be sure positive(+) must be connect to positive(+) and negative(-) must be connected to negative(-). Reverse polarity connection on battery will damage the inverter.

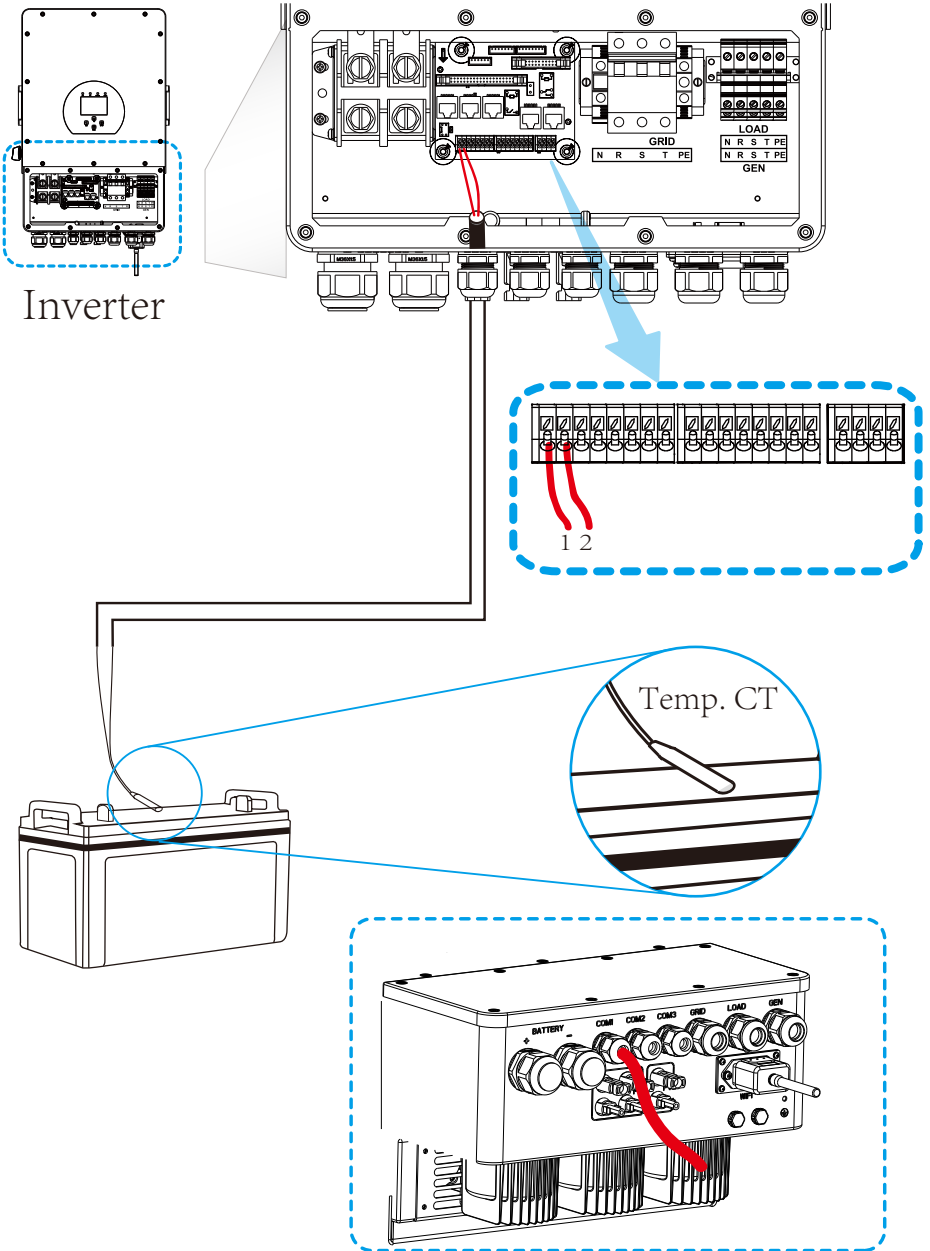
### 3.3.2 Function port definition



Inverter



### 3.3.3 Temperature sensor connection for lead-acid battery



### 3.4 Grid connection and backup load connection

- Before connecting to grid, please install a separate AC breaker between inverter and grid. Also, it is recommended that installs an AC breaker between backup load and inverter. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current. The recommended of AC breaker for the load port is 20A for 8kw, 32A for 10kw and 32A for 12KW. The recommended of AC breaker for the grid port is 63A for 8kw, 63A for 10kw and 63A for 12KW.
- There are three terminal blocks with "Grid" "Load" and "GEN" markings. Please do not misconnect input and output connectors.



All wiring must be performed by a qualified personnel. It is very important for system safety and efficient operation to use appropriate cable for AC input connection. To reduce risk of injury, please use the proper recommended cable as below.

backup load connection

| Model         | Wire Size | Cable(mm <sup>2</sup> ) | Torque value(max) |
|---------------|-----------|-------------------------|-------------------|
| 5/6/8/10/12KW | 10AWG     | 4                       | 1.2Nm             |

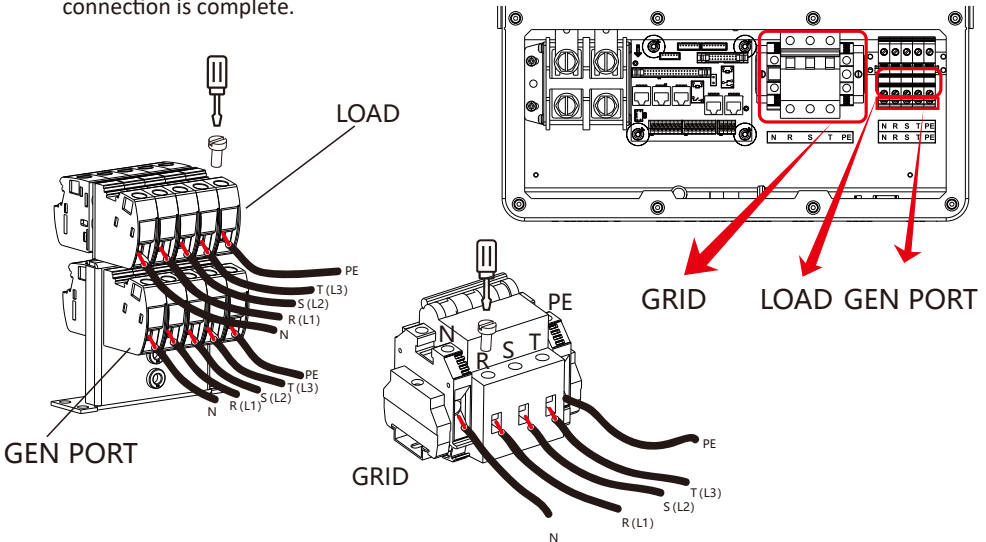
Grid connection

| Model         | Wire Size | Cable(mm <sup>2</sup> ) | Torque value(max) |
|---------------|-----------|-------------------------|-------------------|
| 5/6/8/10/12KW | 10AWG     | 6                       | 1.2Nm             |

Chart 3-3 Recommended Size for AC wires

#### Please follow below steps to implement Grid, load and Gen port connection:

1. Before making Grid, load and Gen port connection, be sure to turn off AC breaker or disconnecter first.
2. Remove insulation sleeve 10mm length, unscrew the bolts, insert the wires according to polarities indicated on the terminal block and tighten the terminal screws. Make sure the connection is complete.





Be sure that AC power source is disconnected before attempting to wire it to the unit.

3. Then, insert AC output wires according to polarities indicated on the terminal block and tighten terminal. Be sure to connect corresponding N wires and PE wires to related terminals as well.
4. Make sure the wires are securely connected.
5. Appliances such as air conditioner are required at least 2-3 minutes to restart because it is required to have enough time to balance refrigerant gas inside of circuit. If a power shortage occurs and recovers in short time, it will cause damage to your connected appliances. To prevent this kind of damage, please check manufacturer of air conditioner if it is equipped with time-delay function before installation. Otherwise, this inverter will trigger overload fault and cut off output to protect your appliance but sometimes it still causes internal damage to the air conditioner

### 3.5 PV Connection

Before connecting to PV modules, please install a separately DC circuit breaker between inverter and PV modules. It is very important for system safety and efficient operation to use appropriate cable for PV module connection. To reduce risk of injury, please use the proper recommended cable size as below.

| <i>Model</i>  | <i>Wire Size</i> | <i>Cable(mm<sup>2</sup>)</i> |
|---------------|------------------|------------------------------|
| 5/6/8/10/12KW | 12AWG            | 4                            |

Chart 3-4 Cable size



To avoid any malfunction, do not connect any PV modules with possible current leakage to the inverter. For example, grounded PV modules will cause current leakage to the inverter. When using PV modules, please ensure the PV+ & PV- of solar panel is not connected to the system ground bar.



It is requested to use PV junction box with surge protection. Otherwise, it will cause damage on inverter when lightning occurs on PV modules.

### 3.5.1 PV Module Selection:

When selecting proper PV modules, please be sure to consider below parameters:

- 1) Open circuit Voltage (Voc) of PV modules not exceeds max. PV array open circuit voltage of inverter.
- 2) Open circuit Voltage (Voc) of PV modules should be higher than min. start voltage.
- 3) The PV modules used to connected to this inverter shall be Class A rating certified according to IEC 61730.

| <i>Inverter Model</i>          | <i>5KW</i>       | <i>6KW</i> | <i>8KW</i> | <i>10KW</i> | <i>12KW</i> |
|--------------------------------|------------------|------------|------------|-------------|-------------|
| PV Input Voltage               | 550V (160V~800V) |            |            |             |             |
| PV Array MPPT Voltage Range    | 200V-650V        |            |            |             |             |
| No. of MPP Trackers            | 2                |            |            |             |             |
| No. of Strings per MPP Tracker | 1+1              | 1+1        | 1+1        | 2+1         | 2+1         |

Chart 3-5

### 3.5.2 PV Module Wire Connection:

1. Switch the Grid Supply Main Switch(AC)OFF.
2. Switch the DC Isolator OFF.
3. Assemble PV input connector to the inverter.



**Safety Hint:**

When using PV modules, please ensure the PV+ & PV- of solar panel is not connected to the system ground bar.



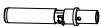
**Safety Hint:**

Before connection, please make sure the polarity of the output voltage of PV array matches the “DC+” and “DC-” symbols.



**Safety Hint:**

Before connecting inverter, please make sure the PV array open circuit voltage is within the 1000V of the inverter.



Pic 5.1 DC+ male connector



Pic 5.2 DC- female connector





**Safety Hint:**

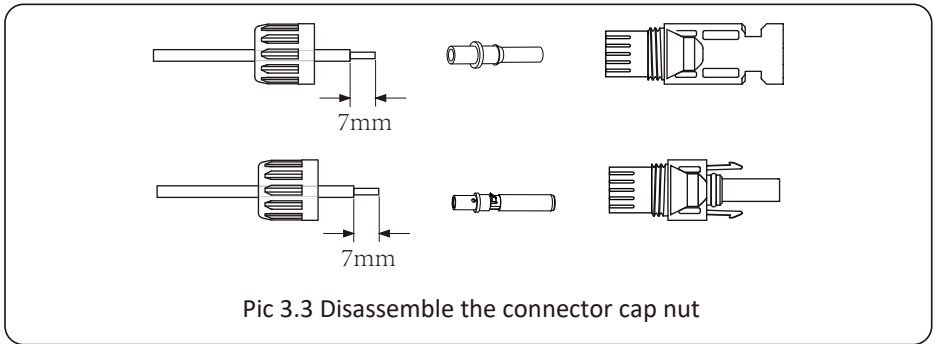
Please use approved DC cable for PV system.

| Cable type                                  | Cross section (mm <sup>2</sup> ) |                   |
|---|----------------------------------|-------------------|
|   | Range                            | Recommended value |
| Industry generic PV cable<br>(model: PV1-F) | 4.0~6.0<br>(12~10AWG)            | 4.0(12AWG)        |

Chart 3-6

The steps to assemble the DC connectors are listed as follows:

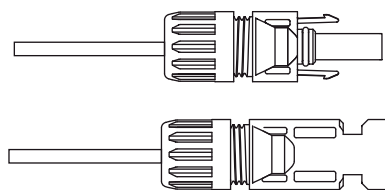
- a) Strip off the DC wire about 7mm, disassemble the connector cap nut (see picture 5.3).



- b) Crimping metal terminals with crimping pliers as shown in picture 5.4.

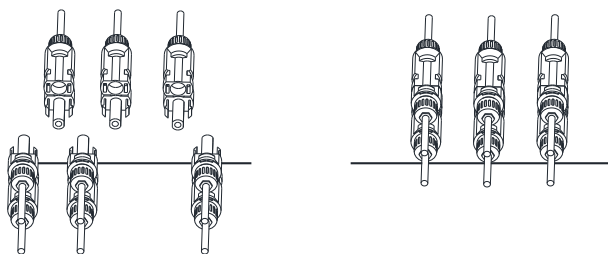


- c) Insert the contact pin to the top part of the connector and screw up the cap nut to the top part of the connector. (as shown in picture 5.5).



Pic 3.5 connector with cap nut screwed on

d) Finally insert the DC connector into the positive and negative input of the inverter, shown as picture 5.6



Pic 3.6 DC input connection



**Warning:**

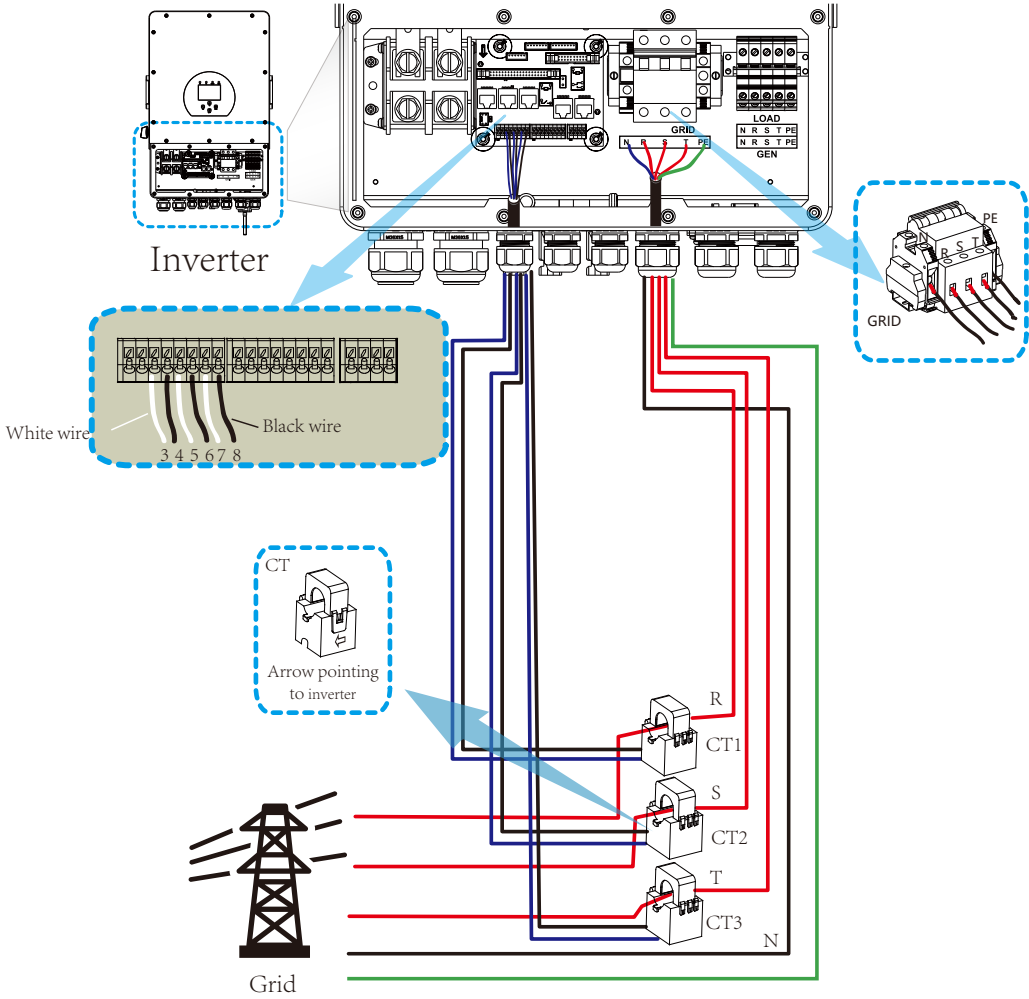
Sunlight shines on the panel will generate voltage, high voltage in series may cause danger to life. Therefore, before connecting the DC input line, the solar panel needs to be blocked by the opaque material and the DC switch should be 'OFF', otherwise, the high voltage of the inverter may lead to life-threatening conditions.



**Warning:**

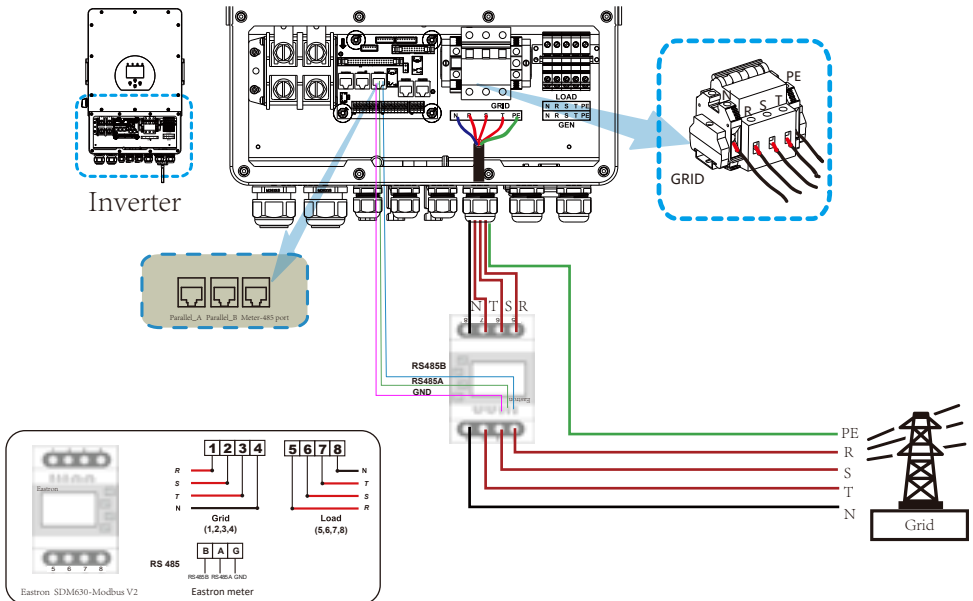
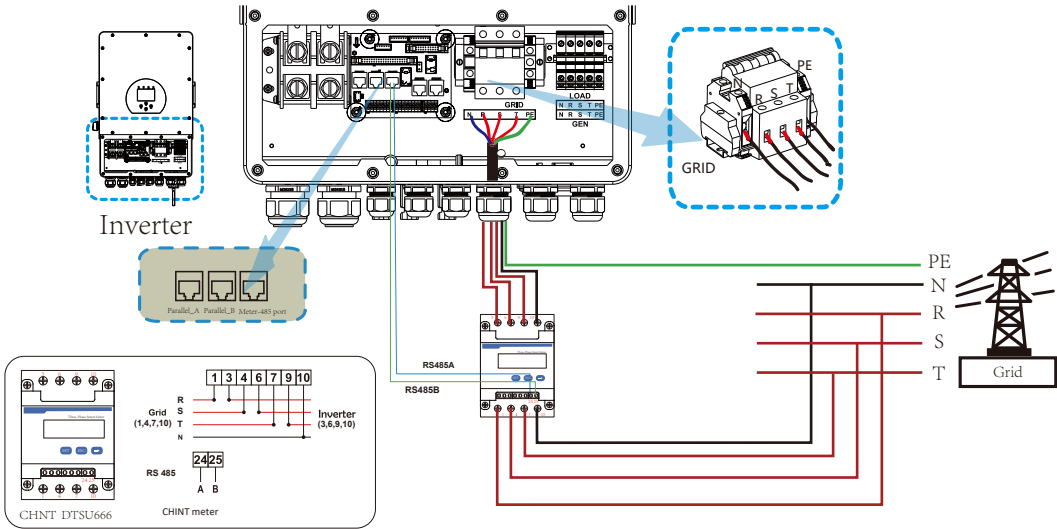
Use the DC power connector of the accessories. Do not interconnect the connectors of different manufacturers.

### 3.6 CT Connection



**\*Note:** when the reading of the load power on the LCD is not correct, please reverse the CT arrow.

### 3.6.1 Meter Connection





**Note:**

When the inverter is in the off-grid state, the N line needs to be connected to the earth.

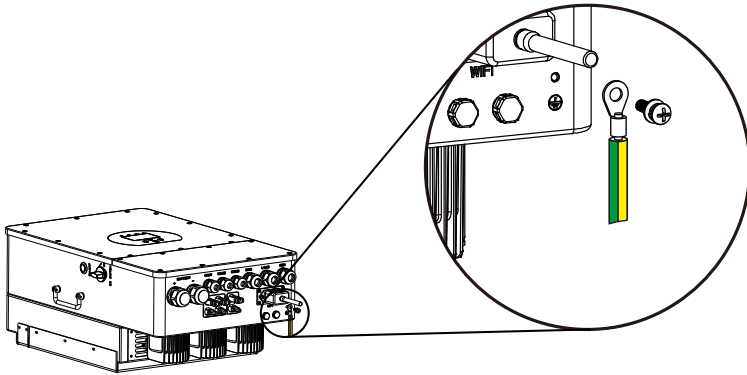


**Note:**

In final installation, breaker certified according to IEC 60947-1 and IEC 60947-2 shall be installed with the equipment.

### 3.7 Earth Connection(mandatory)

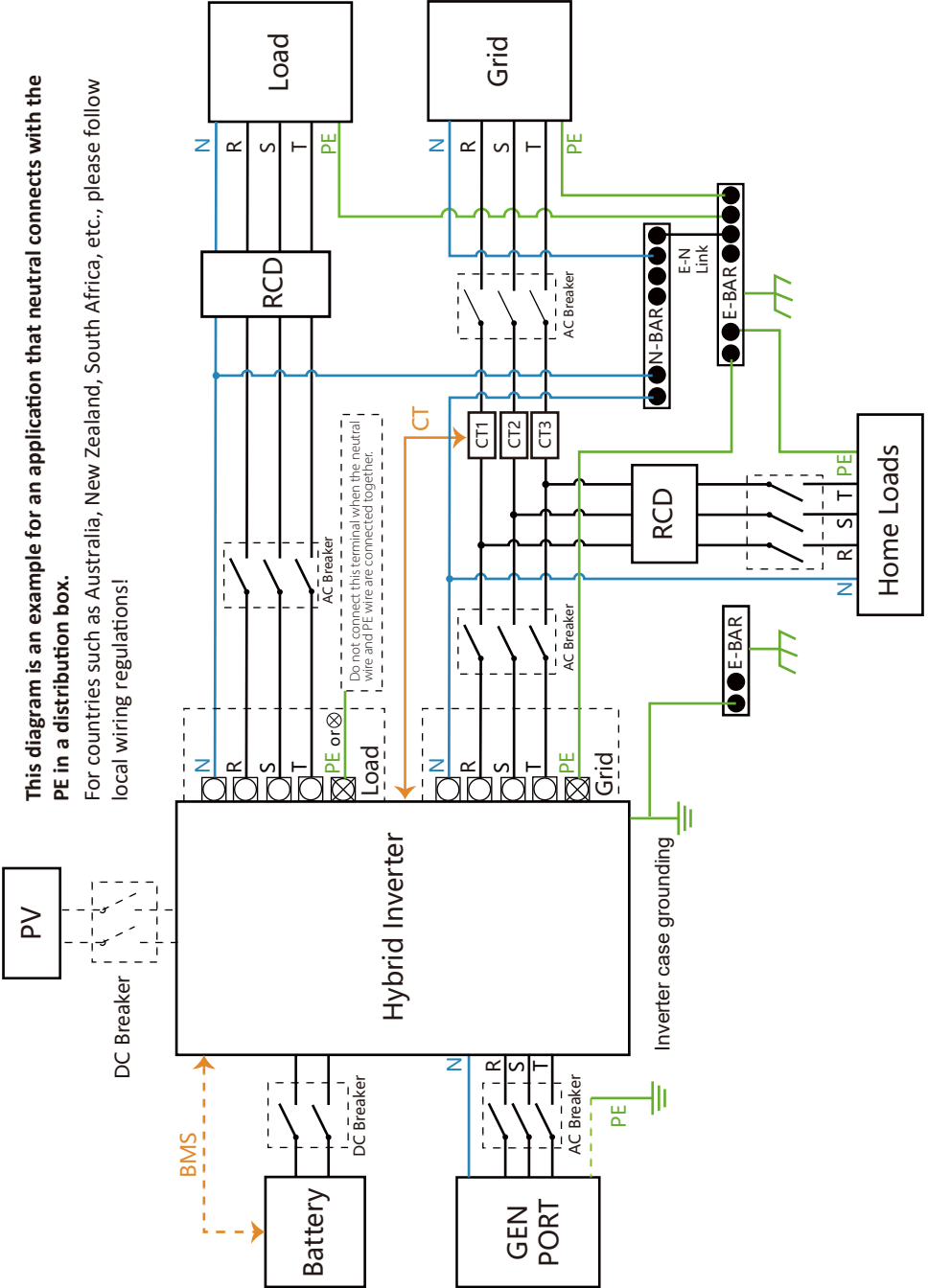
Ground cable shall be connected to ground plate on grid side this prevents electric shock if the original protective conductor fails.



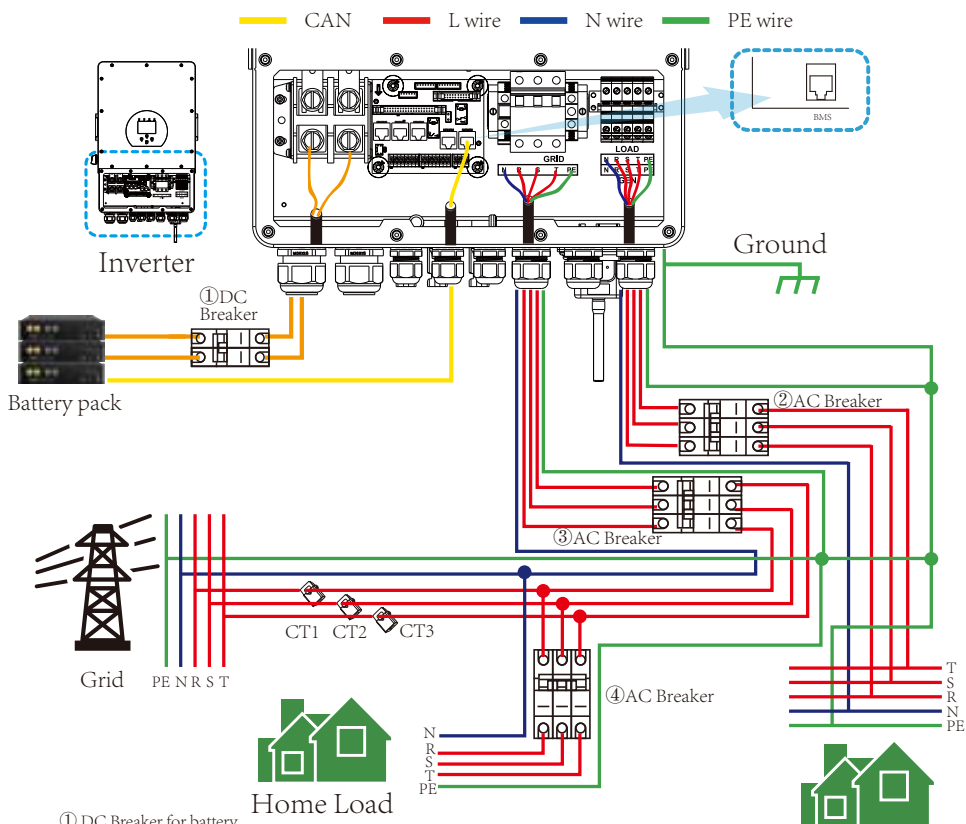
### 3.8 WIFI Connection

For the configuration of Wi-Fi Plug, please refer to illustrations of the Wi-Fi Plug. The Wi-Fi Plug is not a standard configuration, it's optional.

### 3.9 Wiring System for Inverter







① DC Breaker for battery

APEX-E-P3-5000L: 150A DC breaker  
 APEX-E-P3-6000L: 200A DC breaker  
 APEX-E-P3-8000L: 250A DC breaker  
 APEX-E-P3-10KL: 300A DC breaker  
 APEX-E-P3-12KL: 300A DC breaker

② AC Breaker for backup load

APEX-E-P3-5000L: 16A AC breaker  
 APEX-E-P3-6000L: 16A AC breaker  
 APEX-E-P3-8000L: 20A AC breaker  
 APEX-E-P3-10KL: 32A AC breaker  
 APEX-E-P3-12KL: 32A AC breaker

③ AC Breaker for grid

APEX-E-P3-5000L: 63A AC breaker  
 APEX-E-P3-6000L: 63A AC breaker  
 APEX-E-P3-8000L: 63A AC breaker  
 APEX-E-P3-10KL: 63A AC breaker  
 APEX-E-P3-12KL: 63A AC breaker

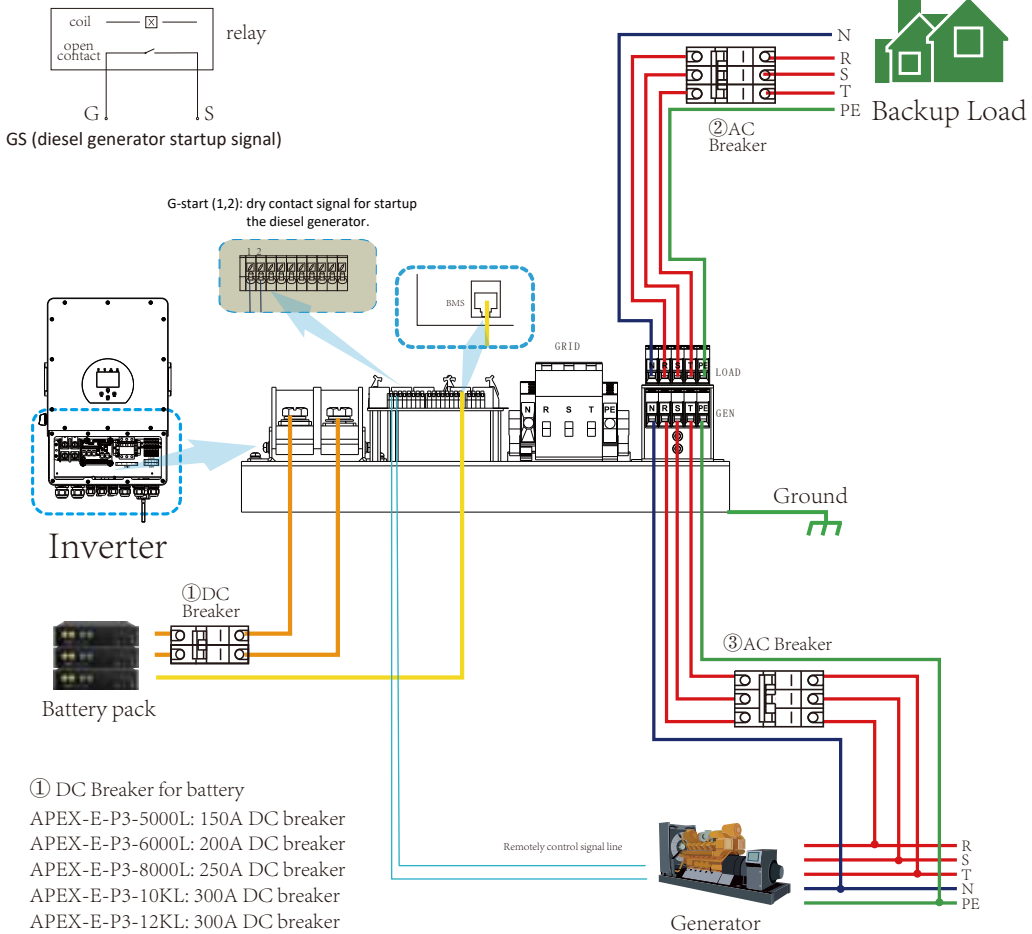
④ AC Breaker for home load

Depends on household loads



### 3.11 Typical application diagram of diesel generator

— CAN   
 — L wire   
 — N wire   
 — PE wire



#### ① DC Breaker for battery

- APEX-E-P3-5000L: 150A DC breaker
- APEX-E-P3-6000L: 200A DC breaker
- APEX-E-P3-8000L: 250A DC breaker
- APEX-E-P3-10KL: 300A DC breaker
- APEX-E-P3-12KL: 300A DC breaker

#### ② AC Breaker for backup load

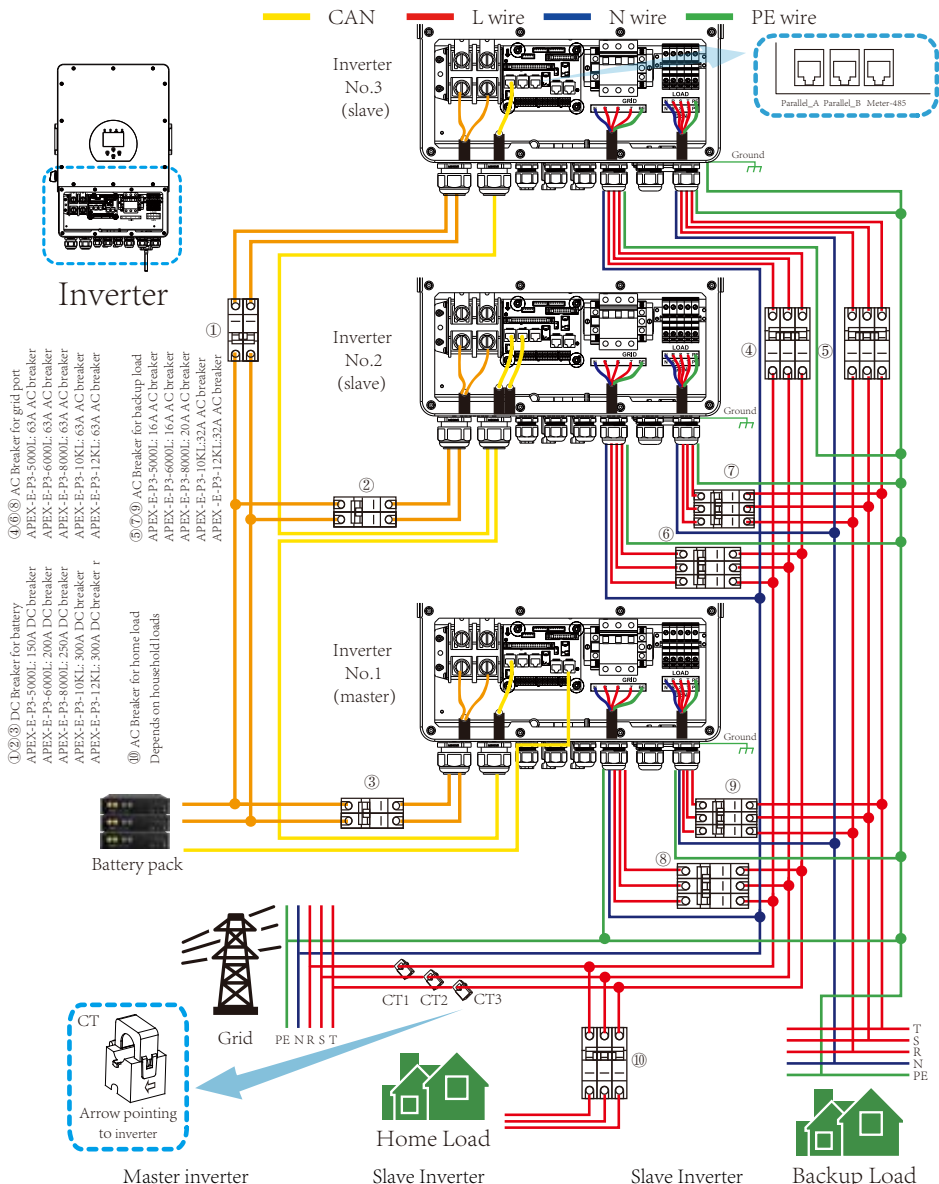
- APEX-E-P3-5000L: 16A AC breaker
- APEX-E-P3-6000L: 16A AC breaker
- APEX-E-P3-8000L: 20A AC breaker
- APEX-E-P3-10KL: 32A AC breaker
- APEX-E-P3-12KL: 32A AC breaker

#### ③ AC Breaker for Generator port

- APEX-E-P3-5000L: 63A AC breaker
- APEX-E-P3-6000L: 63A AC breaker
- APEX-E-P3-8000L: 63A AC breaker
- APEX-E-P3-10KL: 63A AC breaker
- APEX-E-P3-12KL: 63A AC breaker

### 3.12 Three phase parallel connection diagram

Max. 10pcs parallel for on-grid and off-grid operation.



**Advanced Function**

Parallel    Modbus SN: 01

Master     Slave

↑ Parallel Set3

↓

EX\_Motor For CT    Meter Select: No Meter 03

⊗ ⊕

**Advanced Function**

Parallel    Modbus SN: 02

Master     Slave

↑ Parallel Set3

↓

EX\_Motor For CT    Meter Select: No Meter 03

⊗ ⊕

**Advanced Function**

Parallel    Modbus SN: 03

Master     Slave

↑ Parallel Set3

↓

EX\_Motor For CT    Meter Select: No Meter 03

⊗ ⊕

## 4. OPERATION

### 4.1 Power ON/OFF

Once the unit has been properly installed and the batteries are connected well, simply press On/Off button(located on the left side of the case) to turn on the unit. When system without battery connected, but connect with either PV or grid, and ON/OFF button is switched off, LCD will still light up(Display will show OFF), In this condition, when switch on ON/OFF button and select NO battery,system can still working.

### 4.2 Operation and Display Panel

The operation and display panel, shown in below chart, is on the front panel of the inverter. It includes four indicators, four function keys and a LCD display, indicating the operating status and input/output power information.

| <i>LED Indicator</i> |                       | <i>Messages</i>           |
|----------------------|-----------------------|---------------------------|
| DC                   | Green led solid light | PV Connection normal      |
| AC                   | Green led solid light | Grid Connection normal    |
| Normal               | Green led solid light | Inverter operating normal |
| Alarm                | Red led solid light   | Malfunction or warning    |

Chart 4-1 LED indicators

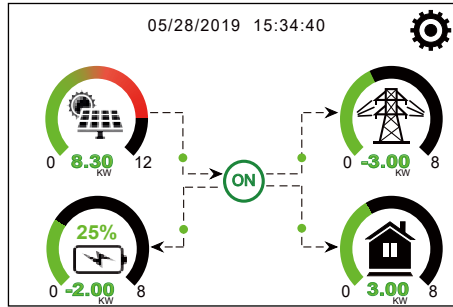
| <i>Function Key</i> | <i>Description</i>          |
|---------------------|-----------------------------|
| Esc                 | To exit setting mode        |
| Up                  | To go to previous selection |
| Down                | To go to next selection     |
| Enter               | To confirm the selection    |

Chart 4-2 Function Buttons

## 5. LCD Display Icons

### 5.1 Main Screen

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



1.The icon in the center of the home screen indicates that the system is Normal operation. If it turns into "comm./F01~F64" , it means the inverter has communication errors or other errors, the error message will display under this icon(F01-F64 errors, detail error info can be viewed in the System Alarms menu).

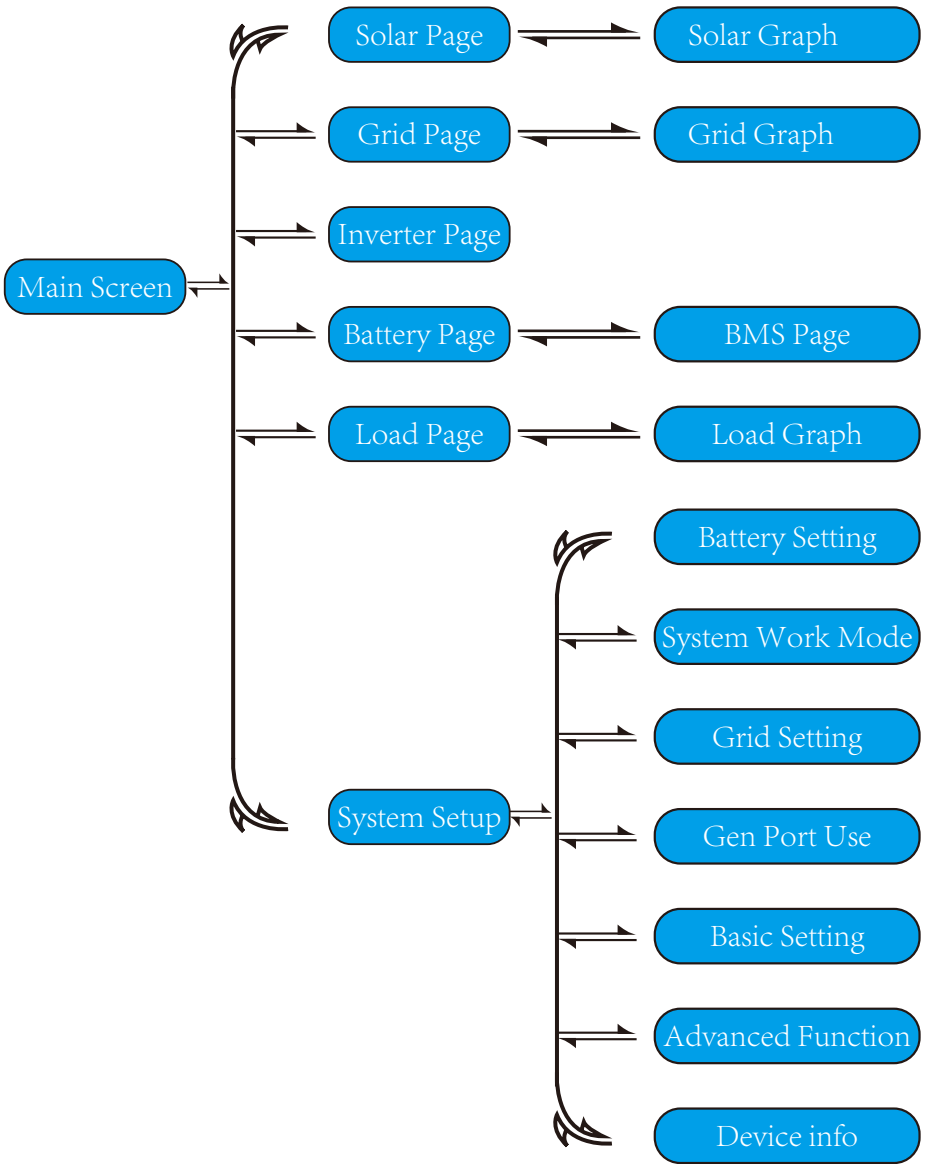
2.At the top of the screen is the time.

3.System Setup Icon, Press this set button,you can enter into the system setup screen which including Basic Setup, Battery Setup, Grid Setup, System Work Mode, Generator port use, Advanced function and Li-Batt info.

4.The main screen showing the info including Solar, Grid, Load and Battery. Its also displaying the energy flow direction by arrow. When the power is approximate to high level, the color on the panels will changing from green to red so system info showing vividly on the main screen.

- PV power and Load power always keep positive.
- Grid power negative means sell to grid, positive means get from grid.
- Battery power negative means charge, positive means discharge.

### 5.1.1 LCD operation flow chart



## 5.2 Solar Power Curve

**Solar**

|              |             |                  |   |
|--------------|-------------|------------------|---|
| Power: 1560W | ①           | Today=8.0 KWH    | ③ |
| PV1-V: 286V  | PV2-V: 45V  | Total =12.00 KWH |   |
| PV1-I: 5.5A  | PV2-I: 0.0A |                  |   |
| PV1-P: 1559W | PV2-P: 1W   |                  |   |

Energy

This is Solar Panel detail page.

- ① Solar Panel Generation.
- ② Voltage, Current, Power for each MPPT.
- ③ Solar Panel energy for Day and Total.

Press the “Energy “button will enter into the power curve page.

|                |               |                 |   |
|----------------|---------------|-----------------|---|
| 1166w          | 1244w<br>50Hz | -81w<br>50Hz    | ① |
| 221v 0w        | 222v 0.8w     | 222v 0.1A       |   |
| 229v 1166w     | 229v 5.0w     | 230v 0.1A       |   |
| 225v 0w        | 229v 0.9w     | 223v 0.1A       |   |
| <b>Load</b>    | HM: LD:       | INV_P:          |   |
| SOC:99%        | -10W 28W      | -30W            |   |
| -21w           | 5W 1192W      | -26W AC_T:      |   |
| BAT_V:53.65V   | 0W 24W        | -25W 38.8C      |   |
| BAT_I: -0.41A  | <b>Grid</b>   | <b>Inverter</b> |   |
| BAT_T: 27.0C   | DC_P1: 0W     | DC_P2: 0W       |   |
| <b>Battery</b> | DC_V1: 0V     | DC_V2: 0V       |   |
|                | DC_I1: 0.0A   | DC_I2: 0.0A     |   |
|                | <b>PV1</b>    | <b>PV2</b>      |   |

This is Inverter detail page.

- ① Inverter Generation.
- Voltage, Current, Power for each Phase.
- AC-T: mean Heat-sink temperature.

**Load**

|            |         |                 |   |
|------------|---------|-----------------|---|
| Power: 55W | ①       | Today=0.5 KWH   | ③ |
|            |         | Total =1.60 KWH |   |
| L1: 220V   | P1: 19W |                 |   |
| L2: 220V   | P2: 18W |                 |   |
| L3: 220V   | P3: 18W |                 |   |
|            | ②       |                 |   |

Energy

This is Back-up Load detail page.

- ① Back-up Power.
- ② Voltage, Power for each Phase.
- ③ Back-up consumption for Day and Total.

Press the “Energy “ button will enter into the power curve page.

**Grid**

|                |         |                     |   |
|----------------|---------|---------------------|---|
| Stand by<br>0W | ①       | BUY<br>Today=2.2KWH | ③ |
| 0.0Hz          |         | Total =11.60 KWH    |   |
| CT1: 0W        | LD1: 0W | SELL                |   |
| CT2: 0W        | LD2: 0W | Today=0.0KWH        |   |
| CT3: 0W        | LD3: 0W | Total =8.60 KWH     |   |
| L1: 0V         | L2: 0V  | L3: 0V              |   |
|                |         | ②                   |   |

Energy

This is Grid detail page.

- ① Status, Power, Frequency.
- ② L: Voltage for each Phase  
CT: Power detected by the external current sensors  
LD: Power detected using internal sensors on AC grid in/out breaker
- ③ BUY: Energy from Grid to Inverter,  
SELL: Energy from Inverter to grid.

Press the “Energy “ button will enter into the power curve page.

## Batt

Discharge

U:49.58V

I:2.04A

Power: 101W

Temp:25.0C

Energy

## Li-BMS

Mean Voltage:50.34V    Charging Voltage :53.2V  
 Total Current:55.00A    Discharging Voltage :47.0V  
 Mean Temp :23.5C    Charging current :50A  
 Total SOC :38%    Discharging current :25A  
 Dump Energy:57Ah

Sum Data

Details Data

## Li-BMS

|    | Volt   | Curr   | Temp  | SOC   | Energy | Charge Volt | Charge Curr | Fault |
|----|--------|--------|-------|-------|--------|-------------|-------------|-------|
| 1  | 50.38V | 19.70A | 30.6C | 52.0% | 26.0Ah | 0.0V        | 0.0A        | 0100  |
| 2  | 50.33V | 19.10A | 31.0C | 51.0% | 25.5Ah | 53.2V       | 25.0A       | 0100  |
| 3  | 50.30V | 16.90A | 30.2C | 12.0% | 6.0Ah  | 53.2V       | 25.0A       | 0100  |
| 4  | 0.00V  | 0.00A  | 0.0C  | 0.0%  | 0.0Ah  | 0.0V        | 0.0A        | 0100  |
| 5  | 0.00V  | 0.00A  | 0.0C  | 0.0%  | 0.0Ah  | 0.0V        | 0.0A        | 0100  |
| 6  | 0.00V  | 0.00A  | 0.0C  | 0.0%  | 0.0Ah  | 0.0V        | 0.0A        | 0100  |
| 7  | 0.00V  | 0.00A  | 0.0C  | 0.0%  | 0.0Ah  | 0.0V        | 0.0A        | 0100  |
| 8  | 0.00V  | 0.00A  | 0.0C  | 0.0%  | 0.0Ah  | 0.0V        | 0.0A        | 0100  |
| 9  | 0.00V  | 0.00A  | 0.0C  | 0.0%  | 0.0Ah  | 0.0V        | 0.0A        | 0100  |
| 10 | 0.00V  | 0.00A  | 0.0C  | 0.0%  | 0.0Ah  | 0.0V        | 0.0A        | 0100  |
| 11 | 0.00V  | 0.00A  | 0.0C  | 0.0%  | 0.0Ah  | 0.0V        | 0.0A        | 0100  |
| 12 | 0.00V  | 0.00A  | 0.0C  | 0.0%  | 0.0Ah  | 0.0V        | 0.0A        | 0100  |
| 13 | 0.00V  | 0.00A  | 0.0C  | 0.0%  | 0.0Ah  | 0.0V        | 0.0A        | 0100  |
| 14 | 0.00V  | 0.00A  | 0.0C  | 0.0%  | 0.0Ah  | 0.0V        | 0.0A        | 0100  |
| 15 | 0.00V  | 0.00A  | 0.0C  | 0.0%  | 0.0Ah  | 0.0V        | 0.0A        | 0100  |

Sum Data

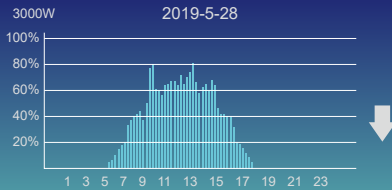
Details Data

This is Battery detail page.

if you use Lithium Battery, you can enter BMS page.

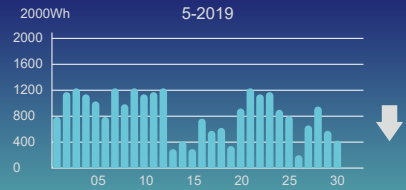
## 5.3 Curve Page-Solar & Load & Grid

### Solar Power Production:Day



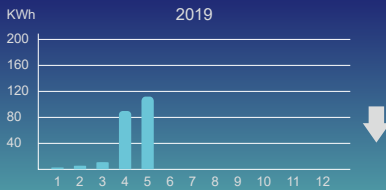
CANCEL Day Month Year Total

### System Solar Power:Month



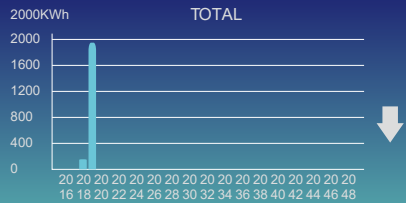
CANCEL Day Month Year Total

### System Solar Power:Year



CANCEL Day Month Year Total

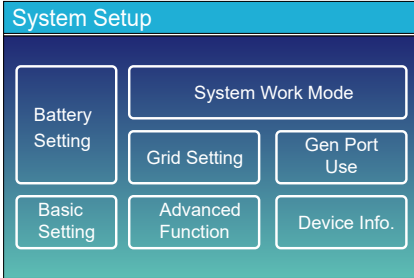
### System Grid Power:Total



CANCEL Day Month Year Total

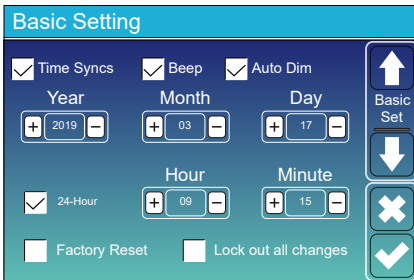
Solar power curve for daily, monthly, yearly and total can be roughly checked on the LCD, for more accuracy power generation, pls check on the monitoring system. Click the up and down arrow to check power curve of different period.

## 5.4 System Setup Menu

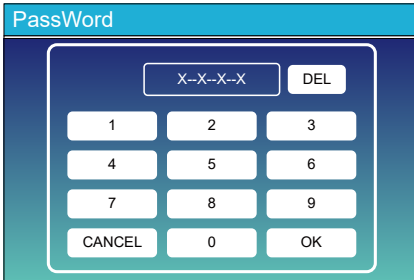


This is System Setup page.

## 5.5 Basic Setup Menu



**Factory Reset:** Reset all parameters of the inverter.  
**Lock out all changes:** Enable this menu for setting parameters that require locking and cannot be set up. Before performing a successful factory reset and locking the systems, to keep all changes you need to type in a password to enable the setting. The password for factory settings is 9999 and for lock out is 7777.



**Factory Reset PassWork:** 9999

**Lock out all changes PassWork:** 7777



## 5.6 Battery Setup Menu

**Battery Setting**

Batt Mode

Lithium    Batt Capacity    400Ah

Use Batt V    Max A Charge    40A

Use Batt %    Max A Discharge    40A

No Batt     Activate Battery

Batt Mode

↑

↓

✕

✓

**Battery capacity:** it tells hybrid inverter to know your battery bank size.

**Use Batt V:** Use Battery Voltage for all the settings (V).

**Use Batt %:** Use Battery SOC for all the settings (%).

**Max. A charge/discharge:** Max battery charge/discharge current(0-120A for 5KW model, 0-150A for 6KW model, 0-190A for 8KW model, 0-210A for 10KW model,0-240A for 12KW model).

For AGM and Flooded, we recommend Ah battery size x 20%= Charge/Discharge amps.

. For Lithium, we recommend Ah battery size x 50% = Charge/Discharge amps.

. For Gel, follow manufacturer' s instructions.

**No Batt:** tick this item if no battery is connected to the system.

**Active battery:** This feature will help recover a battery that is over discharged by slowly charging from the solar array or grid.

**Battery Setting**

Start    30%    30% ②

A ①    40A    40A

Gen Charge     Grid Charge

Gen Signal     Grid Signal

Gen Force ③

Batt Set2

↑

↓

✕

✓

**This is Battery Setup page.** ① ③

**Start =30%:** Percent S.O.C at 30% system will AutoStart a connected generator to charge the battery bank.

**A = 40A:** Charge rate of 40A from the attached generator in Amps.

**Gen Charge:** uses the gen input of the system to charge battery bank from an attached generator.

**Gen Signal:** Normally open relay that closes when the Gen Start signal state is active.

**Gen Force:** When the generator is connected, it is forced to start the generator without meeting other conditions.

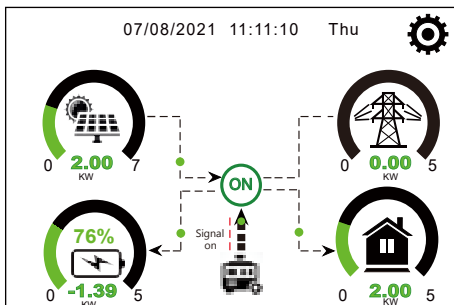
**This is Grid Charge, you need select.** ②

**Start =30%:** No use, Just for customization.

**A = 40A:** It indicates the Current that the Grid charges the Battery.

**Grid Charge:** It indicates that the grid charges the battery.

**Grid Signal:** Disable.



This page tells the PV and diesel generator power the load and battery.

### Generator

|              |               |
|--------------|---------------|
| Power: 6000W | Today=10 KWH  |
|              | Total =10 KWH |
| V_L1: 230V   | P_L1: 2KW     |
| V_L2: 230V   | P_L2: 2KW     |
| V_L3: 230V   | P_L3: 2KW     |

This page tells generator output voltage, frequency, power. And, how much energy is used from generator.

### Battery Setting

|              |                                  |   |
|--------------|----------------------------------|---|
| Lithium Mode | <input type="text" value="00"/>  | <input type="button" value="↑"/><br>Batt Set3<br><input type="button" value="↓"/><br><input type="button" value="✕"/><br><input type="button" value="✓"/> |
| Shutdown     | <input type="text" value="10%"/> |   |
| Low Batt     | <input type="text" value="20%"/> |   |
| Restart      | <input type="text" value="40%"/> |   |

**Lithium Mode:** This is BMS protocol. Please reference the document (Approved Battery).

**Shutdown 10%:** It indicates the inverter will shutdown if the SOC below this value.

**Low Batt 20%:** It indicates the inverter will alarm if the SOC below this value.

**Restart 40%:** Battery voltage at 40% AC output will resume.

### Battery Setting

|                    |  |                   |                                      |   |
|--------------------|--|-------------------|--------------------------------------|---|
| Float V <b>①</b>   | <input type="text" value="53.6V"/>     | Shutdown <b>③</b> | <input type="text" value="20%"/>     | <input type="button" value="↑"/><br>Batt Set3<br><input type="button" value="↓"/><br><input type="button" value="✕"/><br><input type="button" value="✓"/> |
| Absorption V       | <input type="text" value="57.6V"/>     | Low Batt          | <input type="text" value="35%"/>     |   |
| Equalization V     | <input type="text" value="57.6V"/>     | Restart           | <input type="text" value="50%"/>     |   |
| Equalization Days  | <input type="text" value="30 days"/>   | TEMPCO(mV/C/Cell) | <input type="text" value="2"/>       |   |
| Equalization Hours | <input type="text" value="3.0 hours"/> | Batt Resistance   | <input type="text" value="25mOhms"/> |   |
|                    |  |                   | <input type="text" value="-5"/>      |   |

**There are 3 stages of charging the Battery .** **①**

This is for professional installers, you can keep it if you do not know. **②**

**Shutdown 20%:** The inverter will shutdown if the SOC below this value.

**Low Batt 35%:** The inverter will alarm if the SOC below this value. **③**

**Restart 50%:** Battery SOC at 50% AC output will resume.

## Recommended battery settings

| Battery Type | Absorption Stage                  | Float Stage   | Torque value (every 30 days 3hr ) |
|--------------|-----------------------------------|---------------|-----------------------------------|
| AGM (or PCC) | 14.2v (57.6v)                     | 13.4v (53.6v) | 14.2v(57.6v)                      |
| Gel          | 14.1v (56.4v)                     | 13.5v (54.0v) |                                   |
| Wet          | 14.7v (59.0v)                     | 13.7v (55.0v) | 14.7v(59.0v)                      |
| Lithium      | Follow its BMS voltage parameters |               |                                   |

## 5.7 System Work Mode Setup Menu

**System Work Mode**

Selling First    12000    Max Solar Power    ↑  
 Zero Export To Load     Solar Sell    ↓    Work Mode 1  
 Zero Export To CT     Solar Sell    ×  
 Max Sell Power: 12000    Zero-export Power: 20    ✓  
 Energy pattern:  BattFirst     LoadFirst  
 Grid Peak Shaving    8000    Power    ✓

### Work Mode

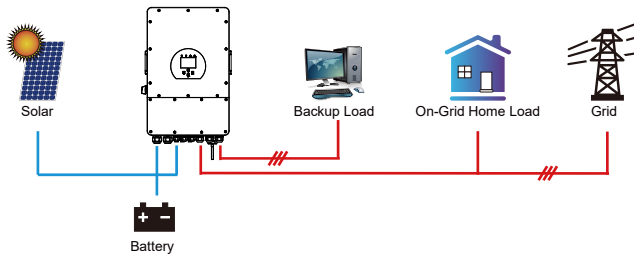
**Selling First:** This Mode allows hybrid inverter to sell back any excess power produced by the solar panels to the grid. If time of use is active, the battery energy also can be sold into grid.

The PV energy will be used to power the load and charge the battery and then excess energy will flow to grid.

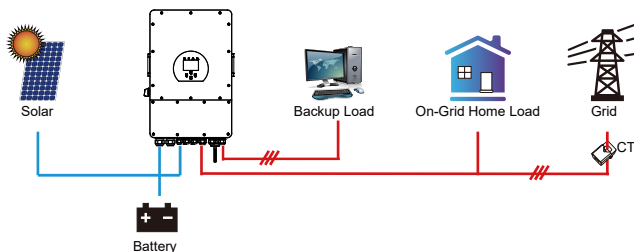
Power source priority for the load is as follows:

1. Solar Panels.
2. Grid.
3. Batteries (until programmable % discharge is reached).

**Zero Export To Load:** Hybrid inverter will only provide power to the backup load connected. The hybrid inverter will neither provide power to the home load nor sell power to grid. The built-in CT will detect power flowing back to the grid and will reduce the power of the inverter only to supply the local load and charge the battery.



**Zero Export To CT:** Hybrid inverter will not only provide power to the backup load connected but also give power to the home load connected. If PV power and battery power is insufficient, it will take grid energy as supplement. The hybrid inverter will not sell power to grid. In this mode, a CT is needed. The installation method of the CT please refer to chapter 3.6 CT Connection. The external CT will detect power flowing back to the grid and will reduce the power of the inverter only to supply the local load, charge battery and home load.



**Solar Sell:** “Solar sell” is for Zero export to load or Zero export to CT: when this item is active, the surplus energy can be sold back to grid. When it is active, PV Power source priority usage is as follows: load consumption and charge battery and feed into grid.

**Max. sell power:** Allowed the maximum output power to flow to grid.

**Zero-export Power:** for zero-export mode, it tells the grid output power. Recommend to set it as 20-100W to ensure the hybrid inverter won't feed power to grid.

**Energy Pattern:** PV Power source priority.

**Batt First:** PV power is firstly used to charge the battery and then used to power the load. If PV power is insufficient, grid will make supplement for battery and load simultaneously.

**Load First:** PV power is firstly used to power the load and then used to charge the battery. If PV power is insufficient, Grid will provide power to load.

**Max Solar Power:** allowed the maximum DC input power.

**Grid Peak-shaving:** when it is active, grid output power will be limited within the set value. If the load power exceeds the allowed value, it will take PV energy and battery as supplement. If still can't meet the load requirement, grid power will increase to meet the load needs.

### System Work Mode

| Grid Charge                         | Gen                      | Time Of Use |       |       |       |
|-------------------------------------|--------------------------|-------------|-------|-------|-------|
|                                     |                          | Time        | Power | Batt  |       |
| <input type="checkbox"/>            | <input type="checkbox"/> | 01:00       | 5:00  | 12000 | 49.0V |
| <input type="checkbox"/>            | <input type="checkbox"/> | 05:00       | 9:00  | 12000 | 50.2V |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 09:00       | 13:00 | 12000 | 50.9V |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 13:00       | 17:00 | 12000 | 51.4V |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 17:00       | 21:00 | 12000 | 47.1V |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 21:00       | 01:00 | 12000 | 49.0V |

Work Mode2

**Time of use:** it is used to program when to use grid or generator to charge the battery, and when to discharge the battery to power the load. Only tick "Time Of Use" then the follow items (Grid, charge, time, power etc.) will take effect.

**Note:** when in selling first mode and click time of use, the battery power can be sold into grid.

**Grid charge:** utilize grid to charge the battery in a time period.

**Gen charge:** utilize diesel generator to charge the battery in a time period.

**Time:** real time, range of 01:00-24:00.

**Note:** when the grid is present, only the “time of use” is ticked, then the battery will discharge. Otherwise, the battery won't discharge even the battery SOC is full. But in the off-grid mode (when grid is not available, inverter will work in the off-grid mode automatically).

**Power:** Max. discharge power of battery allowed.

**Batt(V or SOC %):** battery SOC % or voltage at when the action is to happen.

**For example**

**During 01:00-05:00,**

if battery SOC is lower than 80%, it will use grid to charge the battery until battery SOC reaches 80%.

**During 05:00-08:00,**

if battery SOC is higher than 40%, hybrid inverter will discharge the battery until the SOC reaches 40%. At the same time, if battery SOC is lower than 40%, then grid will charge the battery SOC to 40%.

**During 08:00-10:00,**

if battery SOC is higher than 40%, hybrid inverter will discharge the battery until the SOC reaches 40%.

**During 10:00-15:00,**

when battery SOC is higher than 80%, hybrid inverter will discharge the battery until the SOC reaches 80%.

**During 15:00-18:00,**

when battery SOC is higher than 40%, hybrid inverter will discharge the battery until the SOC reaches 40%.

**During 18:00-01:00,**

when battery SOC is higher than 35%, hybrid inverter will discharge the battery until the SOC reaches 35%.

### Battery Setting

Start

A

Gen Charge  Grid Charge

Gen Signal  Grid Signal

Gen Max Run Time

Gen Down Time

Batt Set2

### System Work Mode

| Grid Charge                         | Gen                      | Time Of Use |       |       |      |
|-------------------------------------|--------------------------|-------------|-------|-------|------|
|                                     |                          | Time        | Power | Batt  |      |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 01:00       | 5:00  | 12000 | 80%  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 05:00       | 8:00  | 12000 | 40%  |
| <input type="checkbox"/>            | <input type="checkbox"/> | 08:00       | 10:00 | 12000 | 40%  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 10:00       | 15:00 | 12000 | 100% |
| <input type="checkbox"/>            | <input type="checkbox"/> | 15:00       | 18:00 | 12000 | 40%  |
| <input type="checkbox"/>            | <input type="checkbox"/> | 18:00       | 01:00 | 12000 | 35%  |

Work Mode2

## 5.8 Grid Setup Menu

**Grid Setting/Grid code selection**

Grid Mode:  0/11

Grid Frequency:  50HZ  60HZ Phase Type:  0/120/240  0/240/120

Grid Level:

IT system-neutral is not grounded

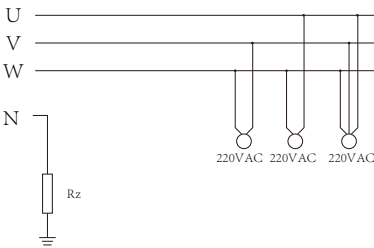
Grid Set1

**Grid Mode:** General Standard、UL1741 & IEEE1547、CPUC RULE21、SRD-UL-1741、CEI 0-21、Australia A、Australia B、Australia C、EN50549\_CZ-PPDS(>16A)、NewZealand、VDE4105、OVE-Directive R25. Please follow the local grid code and then choose the corresponding grid standard.

**Grid level:** there're several voltage levels for the inverter output voltage when it is in off-grid mode. LN:230VAC LL:400VAC, LN:240VAC LL:420VAC, LN:120VAC LL:208VAC, LN:133VAC LL:230VAC.

**IT system:** For the IT grid system, the Line voltage

(between any two lines in a three-phase circuit) is 230Vac, and the diagram is as follow. If your grid system is IT system, please enable "IT system" and tick the "Grid level" as 133-3P as below picture shows.



Rz: Large resistance ground resistor. Or the system doesn't have Neutral line

**Grid Setting/Connect**

Normal connect: Normal Ramp rate: 10s

Low frequency: 48.00Hz High frequency: 51.50Hz

Low voltage: 185.0V High voltage: 265.0V

Reconnect after trip: Reconnect Ramp rate: 36s

Low frequency: 48.20Hz High frequency: 51.30Hz

Low voltage: 187.0V High voltage: 263.0V

Reconnection Time: 60s PF: 1.000

Grid Set2

**Normal connect:** The allowed grid voltage/frequency range when the inverter first time connect to the grid.

**Normal Ramp rate:** It is the startup power ramp.

**Reconnect after trip:** The allowed grid voltage /frequency range for the inverter connects the grid after the inverter trip from the grid.

**Reconnect Ramp rate:** It is the reconnection power ramp.

**Reconnection time:** The waiting time period for the inverter connects the grid again.

**PF:** Power factor which is used to adjust inverter reactive power.

**Grid Setting/IP Protection**

Over voltage  $U > (10 \text{ min. running mean})$ : 260.0V

HV3: 265.0V HF3: 51.50Hz

HV2: 265.0V -- 0.10s HF2: 51.50Hz -- 0.10s

HV1: 265.0V -- 0.10s HF1: 51.50Hz -- 0.10s

LV1: 185.0V -- 0.10s LF1: 48.00Hz -- 0.10s

LV2: 185.0V -- 0.10s LF2: 48.00Hz -- 0.10s

LV3: 185.0V LF3: 48.00Hz

Grid Set3

HV1: Level 1 overvoltage protection point;  
 HV2: Level 2 overvoltage protection point; ① 0.10s—Trip time.  
 HV3: Level 3 overvoltage protection point.

LV1: Level 1 undervoltage protection point;  
 LV2: Level 2 undervoltage protection point;  
 LV3: Level 3 undervoltage protection point.

HF1: Level 1 over frequency protection point;  
 HF2: Level 2 over frequency protection point;  
 HF3: Level 3 over frequency protection point.

LF1: Level 1 under frequency protection point;  
 LF2: Level 2 under frequency protection point;  
 LF3: Level 3 under frequency protection point.

### Grid Setting/F(W)

F(W)

|                 |              |              |
|-----------------|--------------|--------------|
| Over frequency  | Drop F       | 40%PE/Hz     |
| Start freq F    | 50.20Hz      | Stop freq F  |
| 51.5Hz          | Stop delay F | 0.00s        |
| Start delay F   | 0.00s        | Stop delay F |
| 0.00s           | Drop F       | 40%PE/Hz     |
| Under frequency | Drop F       | 40%PE/Hz     |
| Start freq F    | 49.80Hz      | Stop freq F  |
| 49.80Hz         | Stop delay F | 0.00s        |
| Start delay F   | 0.00s        | Stop delay F |
| 0.00s           | Drop F       | 40%PE/Hz     |

Grid Set4

**FW:** this series inverter is able to adjust inverter output power according to grid frequency.  
**Drop F:** percentage of nominal power per Hz  
 For example, "Start freq F > 50.2Hz, Stop freq F < 51.5, Drop F=40%PE/Hz" when the grid frequency reaches 50.2Hz, the inverter will decrease its active power at Drop F of 40%. And then when grid system frequency is less than 50.1Hz, the inverter will stop decreasing output power.  
 For the detailed setup values, please follow the local grid code.

### Grid Setting/V(W) V(Q)

V(W)  V(Q)

|    |        |    |      |            |        |             |      |
|----|--------|----|------|------------|--------|-------------|------|
| V1 | 108.0% | P1 | 100% | Lock-in/Pn | 5%     | Lock-out/Pn | 20%  |
| V2 | 110.0% | P2 | 80%  | V1         | 94.0%  | Q1          | 44%  |
| V3 | 112.0% | P3 | 60%  | V2         | 97.0%  | Q2          | 0%   |
| V4 | 114.0% | P4 | 40%  | V3         | 105.0% | Q3          | 0%   |
|    |        |    |      | V4         | 108.0% | Q4          | -44% |

Grid Set5

**V(W):** It is used to adjust the inverter active power according to the set grid voltage.  
**V(Q):** It is used to adjust the inverter reactive power according to the set grid voltage.  
 This function is used to adjust inverter output power (active power and reactive power) when grid voltage changes.  
**Lock-in/Pn 5%:** When the inverter active power is less than 5% rated power, the VQ mode will not take effect.  
**Lock-out/Pn 20%:** If the inverter active power is increasing from 5% to 20% rated power, the VQ mode will take effect again.

For example: V2=110%, P2=80%. When the grid voltage reaches the 110% times of rated grid voltage, inverter output power will reduce its active output power to 80% rated power.  
 For example: V1=94%, Q1=44%. When the grid voltage reaches the 94% times of rated grid voltage, inverter output power will output 44% reactive output power.  
 For the detailed setup values, please follow the local grid code.

### Grid Setting/P(Q) P(PF)

P(Q)  P(PF)

|    |     |    |     |            |     |             |        |
|----|-----|----|-----|------------|-----|-------------|--------|
| P1 | 0%  | Q1 | 2%  | Lock-in/Pn | 50% | Lock-out/Pn | 50%    |
| P2 | 2%  | Q2 | 0%  | P1         | 0%  | PF1         | -0.000 |
| P3 | 0%  | Q3 | 21% | P2         | 0%  | PF2         | -0.000 |
| P4 | 22% | Q4 | 25% | P3         | 0%  | PF3         | 0.000  |
|    |     |    |     | P4         | 62% | PF4         | 0.264  |

Grid Set6

**P(Q):** It is used to adjust the inverter reactive power according to the set active power.  
**P(PF):** It is used to adjust the inverter PF according to the set active power.  
 For the detailed setup values, please follow the local grid code.  
**Lock-in/Pn 50%:** When the inverter output active power is less than 50% rated power, it won't enter the P(PF) mode.  
**Lock-out/Pn 50%:** Lock-out/Pn 50%: When the inverter output active power is higher than 50% rated power, it will enter the P(PF) mode.  
 Note : only when the grid voltage is equal to or higher than 1.05times of rated grid voltage, then the P(PF) mode will take effect.

### Grid Setting/LVRT

L/HVRT

|     |    |       |        |
|-----|----|-------|--------|
| HV3 | 0% | HV3_T | 30.24s |
| HV2 | 0% | HV2_T | 0.04s  |
| HV1 | 0% | HV1_T | 22.11s |
| LV1 | 0% | LV1_T | 22.02s |
| LV2 | 0% | LV2_T | 0.04s  |

Grid Set7

**Reserved:** This function is reserved. It is not recommended.

## 5.9 Generator Port Use Setup Menu

GEN PORT USE

**Mode**

Generator Input     GEN connect to Grid input

Rated Power:

SmartLoad Output     On Grid always on

AC Couple Frz High:     OFF(V):

Micro Inv Input    ON(V):

MI export to Grid cutoff

↑  
PORT  
Set1

↓

✕

✓

**Generator input rated power:** allowed Max. power from diesel generator.

**GEN connect to grid input:** connect the diesel generator to the grid input port.

**Smart Load Output:** This mode utilizes the Gen input connection as an output which only receives power when the battery SOC is above a user programmable threshold.

**e.g. ON: 100%, OFF=95%:** When the battery bank SOC reaches 100%, Smart Load Port will switch on automatically and power the load connected. When the battery bank SOC < 95% , the Smart Load Port will switch off automatically.

### Smart Load OFF Batt

- Battery SOC at which the Smart load will switch off.

### Smart Load ON Batt

- Battery SOC at which the Smart load will switch on. simultaneously and then the Smart load will switch on.

**On Grid always on:** When click "on Grid always on" the smart load will switch on when the grid is present.

**Micro Inv Input:** To use the Generator input port as a micro-inverter on grid inverter input (AC coupled), this feature will also work with "Grid-Tied" inverters.

\* **Micro Inv Input OFF:** when the battery SOC exceeds setting value, Microinverter or grid-tied inverter will shut down.

\* **Micro Inv Input ON:** when the battery SOC is lower than setting value, Microinverter or grid-tied inverter will start to work.

**AC Couple Frz High:** If choosing "Micro Inv input", as the battery SOC reaches gradually setting value (OFF), During the process, the microinverter output power will decrease linear. When the battery SOC equals to the setting value (OFF), the system frequency will become the setting value (AC couple Frz high) and the Microinverter will stop working.

**MI export to grid cutoff:** Stop exporting power produced by the microinverter to the grid.

\* **Note:** Micro Inv Input OFF and On is valid for some certain FW version only.

## 5.10 Advanced Function Setup Menu

Advanced Function

Solar Arc Fault ON    Backup Delay:

Clear Arc\_Fault

System selfcheck     Gen peak-shaving

DRM    2000: 1    CT Ratio

Signal Island Mode     BMS\_Err\_Stop

Asymmetric phase feeding     CEI Report

↑  
Func  
Set1

↓

✕

✓

**Solar Arc Fault ON:** This is only for US.

**System selfcheck:** Disable. this is only for factory.

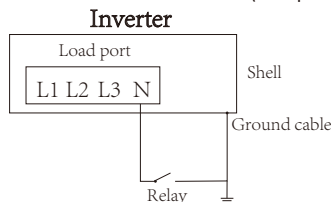
**Gen Peak-shaving:** Enable When the power of the generator exceeds the rated value of it, the inverter will provide the redundant part to ensure that the generator will not overload.

**DRM:** For AS4777 standard

**Backup Delay:** Reserved

**BMS\_Err\_Stop:** When it is active, if the battery BMS failed to communicate with inverter, the inverter will stop working and report fault.

**Signal island mode:** If "Signal island mode" is checked and When inverter is in off-grid mode, the relay on the Neutral line (load port N line) will switch ON then the N line (load port N line) will bind to inverter ground.



**Asymmetric phase feeding:** If it was checked, the excess PV energy that feeds into the grid will be balanced on the three phase.

**Advanced Function**

Parallel      Modbus SN  
 Master      00  
 Slave

EX\_Meter For CT      Meter Select  
 No Meter 0/3  
 CHNT  
 Eastron

↑ Par. Set3  
 ↓  
 ✕  
 ✓

**Ex\_Meter For CT:** when using zero-export to CT mode, the hybrid inverter can select EX\_Meter For CT function and use the different meters.e.g.CHNT and Eastron.

## 5.11 Device Info Setup Menu

**Device Info.**

APEX-E-P3-12K Inverter ID: 2102199870      Flash  
 HMI: Ver 1001-8010      MAIN:Ver2002-1046-1707

| Alarms Code           | Occurred         |
|-----------------------|------------------|
| F13 Grid_Mode_changed | 2021-06-11 13:17 |
| F23 Tz_GFCl_OC_Fault  | 2021-06-11 08:23 |
| F13 Grid_Mode_changed | 2021-06-11 08:21 |
| F56 DC_VoltLow_Fault  | 2021-06-10 13:05 |

↑ Device Info  
 ↓  
 ✕  
 ✓

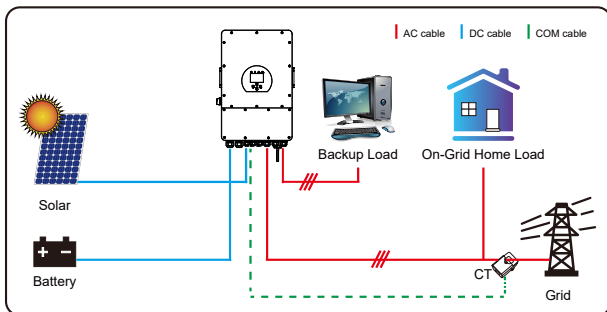
This page show Inverter ID, Inverter version and alarm codes.

**HMI:** LCD version

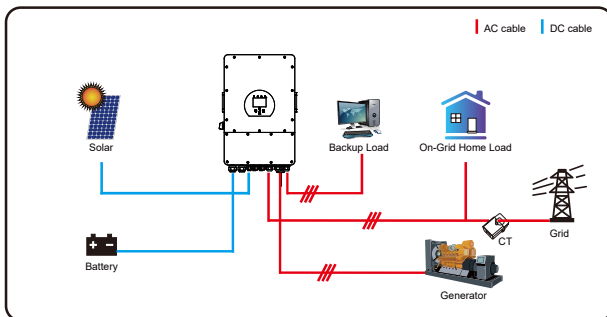
**MAIN:** Control board FW version

## 6. Mode

### Mode I:Basic

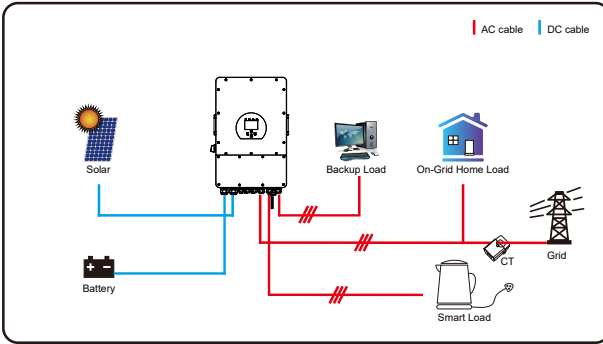


### Mode II: With Generator

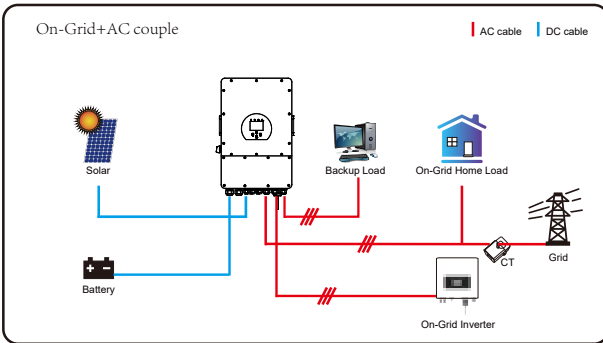




## Mode III: With Smart-Load



## Mode IV: AC Couple



The 1st priority power of the system is always the PV power, then 2nd and 3rd priority power will be the battery bank or grid according to the settings. The last power backup will be the Generator if it is available.

## 7. Limitation of Liability

In addition to the product warranty described above, the state and local laws and regulations provide financial compensation for the product's power connection (including violation of implied terms and warranties). The company hereby declares that the terms and conditions of the product and the policy cannot and can only legally exclude all liability within a limited scope.

| <b>Error code</b> | <b>Description</b>                    | <b>Solutions</b>  |
|-------------------|---------------------------------------|---|
| F01               | DC input polarity reverse fault       | <ol style="list-style-type: none"> <li>1, Check the PV input polarity</li> <li>2, Seek help from us, if can not go back to normal state.</li> </ol>   |
| F07               | DC_START_Failure                      | <ol style="list-style-type: none"> <li>1, The BUS voltage can't be built from PV or battery.</li> <li>2, Restart the inverter, If the fault still exists, please contact us for help</li> </ol>   |
| F13               | working mode change                   | <ol style="list-style-type: none"> <li>1. When the grid type and frequency changed it will report F13;</li> <li>2. When the battery mode was changed to "No battery" mode, it will report F13;</li> <li>3. For some old FW version, it will report F13 when the system work mode changed;</li> <li>4. Generally, it will disappear automatically when shows F13;</li> <li>5. If still same, and turn off the DC switch and AC switch and wait for one minute and then turn on the DC/AC switch;</li> <li>6. Seek help from us, if can not go back to normal state.</li> </ol> |
| F15               | AC over current fault of software     | <p>AC side over current fault</p> <ol style="list-style-type: none"> <li>1. Please check whether the backup load power and common load power are within the range;</li> <li>2. Restart and check whether it is in normal;</li> <li>3. Seek help from us, if can not go back to normal state.</li> </ol>   |
| F16               | AC leakage current fault              | <p>Leakage current fault</p> <ol style="list-style-type: none"> <li>1, Check the PV side cable ground connection</li> <li>2, Restart the system 2-3 times</li> <li>3, if the fault still existing, please contact us for help.</li> </ol>   |
| F18               | AC over current fault of hardware     | <p>AC side over current fault</p> <ol style="list-style-type: none"> <li>1. Please check whether the backup load power and common load power are within the range;</li> <li>2. Restart and check whether it is in normal;</li> <li>3. Seek help from us, if cannot go back to normal state.</li> </ol>  |
| F20               | DC over current fault of the hardware | <p>DC side over current fault</p> <ol style="list-style-type: none"> <li>1. Check PV module connect and battery connect;</li> <li>2. When in the off-grid mode, the inverter startup with big power load, it may report F20. Please reduce the load power connected;</li> <li>3. Turn off the DC switch and AC switch and then wait one minute, then turn on the DC/AC switch again;</li> <li>4. Seek help from us, if can not go back to normal state.</li> </ol>  |

| <b>Error code</b> | <b>Description</b>                           | <b>Solutions</b>  |
|-------------------|--|---|
| F21               | Tz_HV_Overcurr_fault                         | BUS over current.<br>1. Check the PV input current and battery current setting<br>2. Restart the system 2~3 times.<br>3. If the fault still exists, please contact us for help.   |
| F22               | Tz_EmergStop_Fault                           | Remotely shutdown<br>1, it tells the inverter is remotely controlled.   |
| F23               | Tz_GFCI_OC_current is transient over current | Leakage current fault<br>1. Check PV side cable ground connection.<br>2. Restart the system 2~3 times.<br>3. If the fault still exists, please contact us for help.   |
| F24               | DC insulation failure                        | PV isolation resistance is too low<br>1. Check the connection of PV panels and inverter is firmly and correctly;<br>2. Check whether the PE cable of inverter is connected to ground;<br>3. Seek help from us, if can not go back to normal state.  |
| F26               | The DC busbar is unbalanced                  | 1. Please wait for a while and check whether it is normal;<br>2. When the load power of 3 phases is big different, it will report the F26.<br>3. When there's DC leakage current, it will report F26<br>4. Restart the system 2~3 times.<br>5. Seek help from us, if can not go back to normal state.   |
| F29               | Parallel CAN Bus fault                       | 1. When in parallel mode, check the parallel communication cable connection and hybrid inverter communication address setting;<br>2. During the parallel system startup period, inverters will report F29. But when all inverters are in ON status, it will disappear automatically;<br>3. If the fault still exists, please contact us for help. |
| F41               | Parallel system stop                         | 1. Check the hybrid inverter work status. If there's 1 pcs hybrid inverter shutdown, all hybrid inverters will report F41 fault.<br>2. If the fault still exists, please contact us for help  |
| F42               | AC line low voltage                          | Grid voltage fault<br>1. Check the AC voltage is in the range of standard voltage inspecification;<br>2. Check whether grid AC cables are firmly and correctly connected;<br>3. Seek help from us, if can not go back to normal state.  |

| <b>Error code</b> | <b>Description</b>                 | <b>Solutions</b>  |
|-------------------|------------------------------------|---|
| F46               | backup battery fault               | <ol style="list-style-type: none"> <li>1, Please check each battery status, such as voltage/ SOC and parameters etc., and make sure all the parameters are same.</li> <li>2, If the fault still exists, please contact us for help</li> </ol>   |
| F47               | AC over frequency                  | <p>Grid frequency out of range</p> <ol style="list-style-type: none"> <li>1. Check the frequency is in the range of specification or not;</li> <li>2. Check whether AC cables are firmly and correctly connected;</li> <li>3. Seek help from us, if can not go back to normal state.</li> </ol>                                     |
| F48               | AC lower frequency                 | <p>Grid frequency out of range</p> <ol style="list-style-type: none"> <li>1. Check the frequency is in the range of specification or not;</li> <li>2. Check whether AC cables are firmly and correctly connected;</li> <li>3. Seek help from us, if can not go back to normal state.</li> </ol>                                     |
| F55               | DC busbar voltage is too high      | <p>BUS voltage is too high</p> <ol style="list-style-type: none"> <li>1. Check whether battery voltage is too high;</li> <li>2. check the PV input voltage, make sure it is within the allowed range;</li> <li>3. Seek help from us, if can not go back to normal state.</li> </ol>   |
| F56               | DC busbar voltage is too low       | <p>Battery voltage low</p> <ol style="list-style-type: none"> <li>1. Check whether battery voltage is too low;</li> <li>2. If the battery voltage is too low, using PV or grid to charge the battery;</li> <li>3. Seek help from us, if can not go back to normal state.</li> </ol>   |
| F58               | BMS communication fault            | <ol style="list-style-type: none"> <li>1, it tells the communication between hybrid inverter and battery BMS disconnected when “BMS_Err-Stop” is active”</li> <li>2, if don't want to see this happen, you can disable “BMS_Err-Stop” item on the LCD.</li> <li>3, If the fault still exists, please contact us for help</li> </ol> |
| F62               | DRMs0_stop                         | <ol style="list-style-type: none"> <li>1, the DRM function is for Australia market only.</li> <li>2, Check the DRM function is active or not</li> <li>3, Seek help from us, if can not go back to normal state after restart the system</li> </ol>  |
| F63               | ARC fault                          | <ol style="list-style-type: none"> <li>1. ARC fault detection is only for US market;</li> <li>2. Check PV module cable connection and clear the fault;</li> <li>3. Seek help from us, if can not go back to normal state</li> </ol>   |
| F64               | Heat sink high temperature failure | <p>Heat sink temperature is too high</p> <ol style="list-style-type: none"> <li>1. Check whether the work environment temperature is too high;</li> <li>2. Turn off the inverter for 10mins and restart;</li> <li>3. Seek help from us, if can not go back to normal state.</li> </ol>  |

Chart 7-1 Fault information

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Under the guidance of our company, customers return our products so that our company can provide service of maintenance or replacement of products of the same value. Customers need to pay the necessary freight and other related costs. Any replacement or repair of the product will cover the remaining warranty period of the product. If any part of the product or product is replaced by the company itself during the warranty period, all rights and interests of the replacement product or component belong to the company.

Factory warranty does not include damage due to the following reasons:

- Damage during transportation of equipment ;
- Damage caused by incorrect installation or commissioning ;
- Damage caused by failure to comply with operation instructions, installation instructions or maintenance instructions ;
- Damage caused by attempts to modify, alter or repair products ;
- Damage caused by incorrect use or operation ;
- Damage caused by insufficient ventilation of equipment ;
- Damage caused by failure to comply with applicable safety standards or regulations ;
- Damage caused by natural disasters or force majeure (e.g. floods, lightning, overvoltage, storms, fires, etc.)

In addition, normal wear or any other failure will not affect the basic operation of the product. Any external scratches, stains or natural mechanical wear does not represent a defect in the product.

## 8. Datasheet

| <i>Model</i>                                | <i>APEX-E-P3<br/>-5000L</i>                        | <i>APEX-E-P3<br/>-6000L</i> | <i>APEX-E-P3<br/>-8000L</i> | <i>APEX-E-P3<br/>-10KL</i> | <i>APEX-E-P3<br/>-12KL</i> |
|---|--|-----------------------------|-----------------------------|----------------------------|----------------------------|
| <b>Battery Input Data</b>                   |  |                             |                             |                            |                            |
| Battery Type                                | Lead-acid or Li-Ion                                |                             |                             |                            |                            |
| Battery Voltage Range(V)                    | 40-60V   |                             |                             |                            |                            |
| Max. Charging Current(A)                    | 120A   | 150A                        | 190A                        | 210A                       | 240A                       |
| Max. Discharging Current(A)                 | 120A   | 150A                        | 190A                        | 210A                       | 240A                       |
| Charging Curve                              | 3 Stages / Equalization                            |                             |                             |                            |                            |
| External Temperature Sensor                 | yes  |                             |                             |                            |                            |
| Charging Strategy for Li-Ion Battery        | Self-adaption to BMS                               |                             |                             |                            |                            |
| <b>PV String Input Data</b>                 |  |                             |                             |                            |                            |
| Max. DC Input Power(W)                      | 6500W  | 7800W                       | 10400W                      | 13000W                     | 15600W                     |
| PV Input Voltage(V)                         | 550V (160V~800V)                                   |                             |                             |                            |                            |
| MPPT Range(V)                               | 200V-650V  |                             |                             |                            |                            |
| Start-up Voltage(V)                         | 160V   |                             |                             |                            |                            |
| PV Input Current(A)                         | 13A+13A  | 13A+13A                     | 13A+13A                     | 26A+13A                    | 26A+13A                    |
| Max.PV Isc(A)                               | 17A+17A  | 17A+17A                     | 17A+17A                     | 34A+17A                    | 34A+17A                    |
| No. of MPPT Trackers                        | 2  |                             |                             |                            |                            |
| No. of Strings Per MPPT Tracker             | 1+1  | 1+1                         | 1+1                         | 2+1                        | 2+1                        |
| <b>AC Output Data</b>                       |  |                             |                             |                            |                            |
| Rated AC Output and UPS Power(W)            | 5000   | 6000                        | 8000                        | 10000                      | 12000                      |
| Max. AC Output Power(W)                     | 5500   | 6600                        | 8800                        | 11000                      | 13200                      |
| Peak Power(off grid)                        | 2 times of rated power, 10 S                       |                             |                             |                            |                            |
| AC Output Rated Current(A)                  | 7.6/7.2A   | 9.1/8.7A                    | 12.1/11.6A                  | 15.2/14.5A                 | 18.2/17.4A                 |
| Max. AC Current(A)                          | 11.4/10.9A   | 13.6/13A                    | 18.2/17.4A                  | 22.7/21.7A                 | 27.3/26.1A                 |
| Max. Continuous AC Passthrough(A)           | 45A  |                             |                             |                            |                            |
| Output Frequency and Voltage                | 50/60Hz; 3L/N/PE 220/380, 230/400Vac (Three phase) |                             |                             |                            |                            |
| Grid Type                                   | Three Phase  |                             |                             |                            |                            |
| Total Harmonic Distortion (THD)             | <3% (of nominal power)                             |                             |                             |                            |                            |
| DC current injection                        | <0.5% In   |                             |                             |                            |                            |
| <b>Efficiency</b>                           |  |                             |                             |                            |                            |
| Max. Efficiency                             | 97.60%   |                             |                             |                            |                            |
| Euro Efficiency                             | 97.00%   |                             |                             |                            |                            |
| MPPT Efficiency                             | >99%   |                             |                             |                            |                            |
| <b>Protection</b>                           |  |                             |                             |                            |                            |
| PV Arc Fault Detection                      | Integrated   |                             |                             |                            |                            |
| PV Input Lightning Protection               | Integrated   |                             |                             |                            |                            |
| Anti-islanding Protection                   | Integrated   |                             |                             |                            |                            |
| PV String Input Reverse Polarity Protection | Integrated   |                             |                             |                            |                            |
| Insulation Resistor Detection               | Integrated   |                             |                             |                            |                            |
| Residual Current Monitoring Unit            | Integrated   |                             |                             |                            |                            |
| Output Over Current Protection              | Integrated   |                             |                             |                            |                            |
| Output Shorted Protection                   | Integrated   |                             |                             |                            |                            |
| Output Over Voltage Protection              | DC Type II / AC Type III                           |                             |                             |                            |                            |

**Certifications and Standards**

|                       |   |
|-----------------------|---|
| Grid Regulation       | VDE4105,EN50549-1   |
| EMC/Safety Regulation | IEC/EN 62109-1,IEC/EN 62109-2,IEC/EN 61000-6-1,<br>IEC/EN 61000-6-2,IEC/EN 61000-6-3,IEC/EN 61000-6-4 |

**General Data**

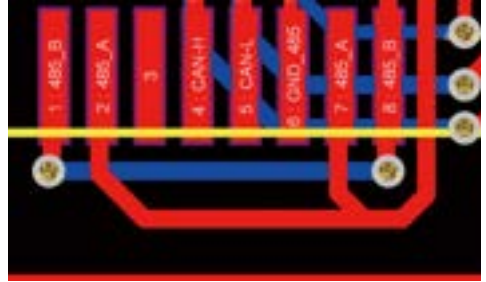
|                                   |                             |
|-----------------------------------|-----------------------------|
| Operating Temperature Range( °C ) | -40~60 °C , >45 °C Derating |
| Cooling                           | Smart cooling               |
| Noise(dB)                         | ≤45 dB(A)                   |
| Communication with BMS            | RS485; CAN                  |
| Weight(kg)                        | 33.6                        |
| Size(mm)                          | 422W×699.3H×279D            |
| Protection Degree                 | IP65                        |
| Installation Style                | Wall-mounted                |
| Warranty                          | 5 years                     |

# 9. Appendix I

## Definition of RJ45 Port Pin for BMS

| No. | RS485 Pin |
|-----|-----------|
| 1   | 485_B     |
| 2   | 485_A     |
| 3   | --        |
| 4   | CAN-H     |
| 5   | CAN-L     |
| 6   | GND_485   |
| 7   | 485_A     |
| 8   | 485_B     |

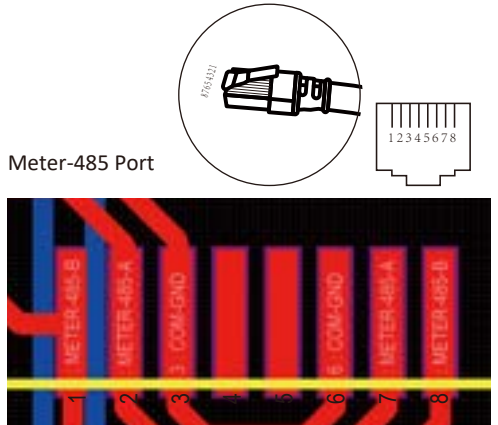
BMS Port



## Definition of RJ45 Port Pin for Meter-485

| No. | Meter-485 Pin |
|-----|---------------|
| 1   | METER-485_B   |
| 2   | METER-485_A   |
| 3   | COM-GND       |
| 4   | --            |
| 5   | --            |
| 6   | COM-GND       |
| 7   | METER-485_A   |
| 8   | METER-485_B   |

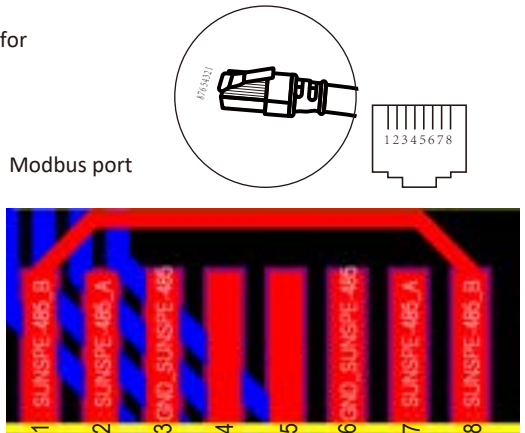
Meter-485 Port



## Definition of RJ45 Port Pin of "Modbus port" for remotely monitoring

| No. | Modbus port |
|-----|-------------|
| 1   | 485_B       |
| 2   | 485_A       |
| 3   | GND_485     |
| 4   | --          |
| 5   | --          |
| 6   | GND_485     |
| 7   | 485_A       |
| 8   | 485_B       |

Modbus port

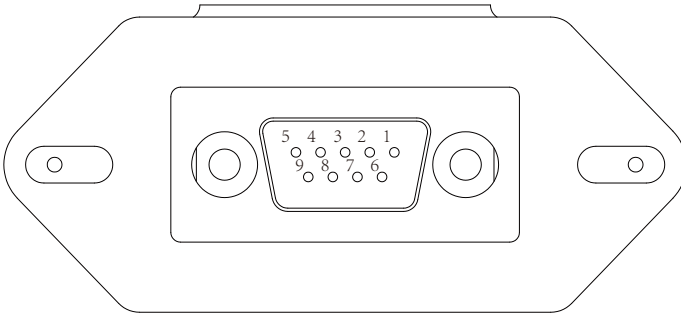


Note : for some hardware versions, this port is useless.



## RS232

| No. | WIFI/RS232 |
|-----|------------|
| 1   |            |
| 2   | TX         |
| 3   | RX         |
| 4   |            |
| 5   | D-GND      |
| 6   |            |
| 7   |            |
| 8   |            |
| 9   | 12Vdc      |

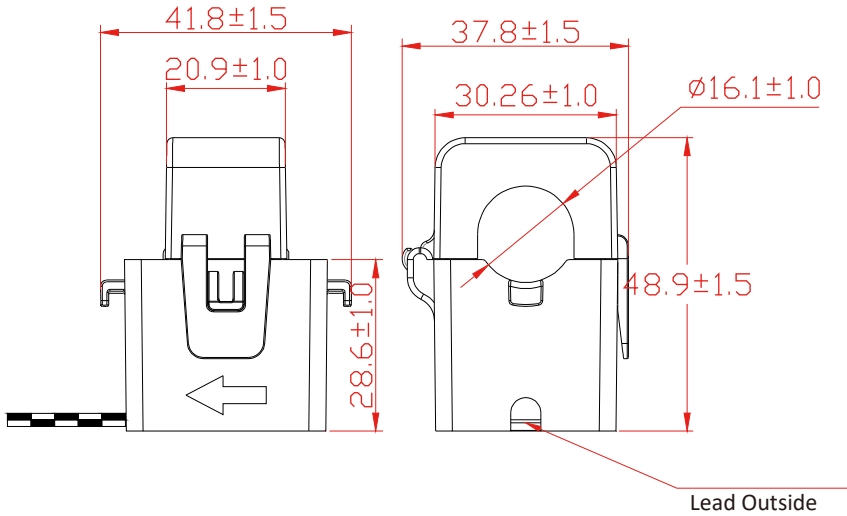


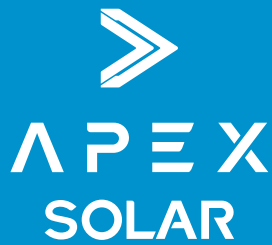
WIFI/RS232

This RS232 port is used to connect the wifi datalogger

## 10. Appendix II

1. Split Core Current Transformer (CT) dimension: (mm)
2. Secondary output cable length is 4m.





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