



# Hybrid Inverter

SUN-8K-SG04LP3

SUN-10K-SG04LP3

SUN-12K-SG04LP3

## 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.** The latest manual can be acquired via [service@deye.com.cn](mailto:service@deye.com.cn)

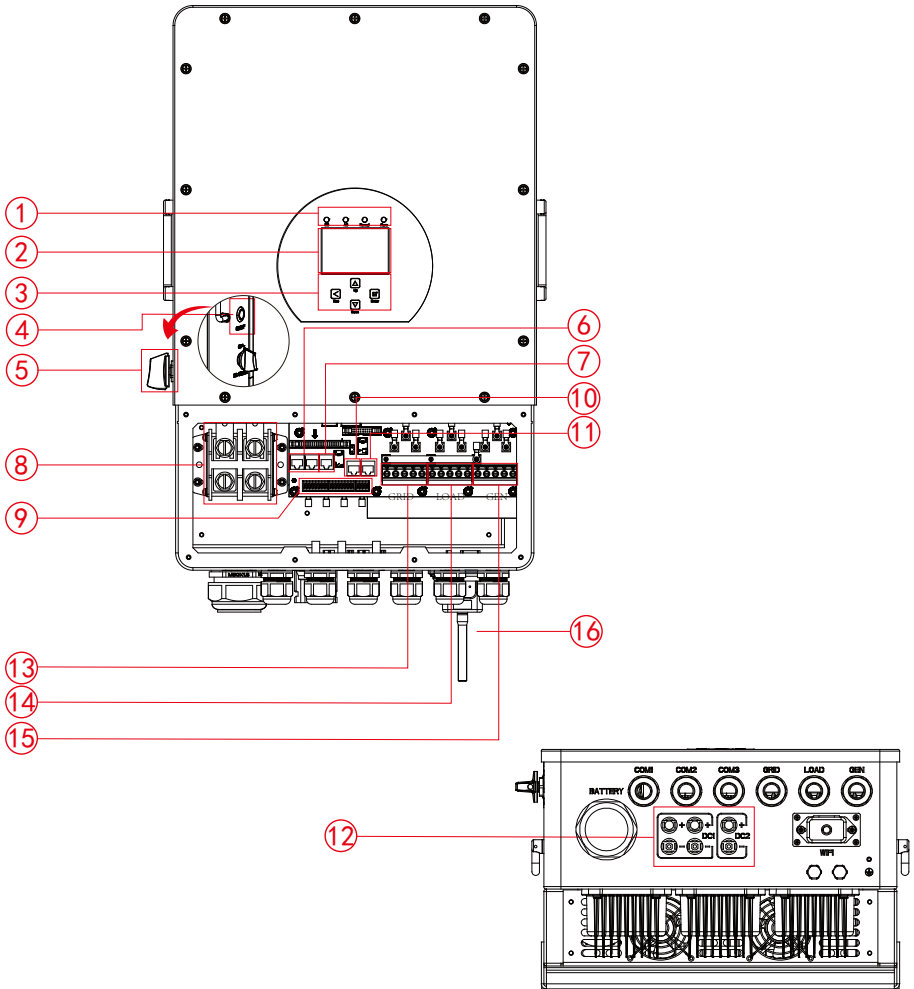
## 1. Safety Introductions

- 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

2: LCD display

3: Function buttons

4: Power on/off button

5: DC switch

6: Parallel port

7: Meter-485 port

8: Battery input connectors

9: Function port

10: ModeBUS port

11: BMS port

12: PV input with two MPPT

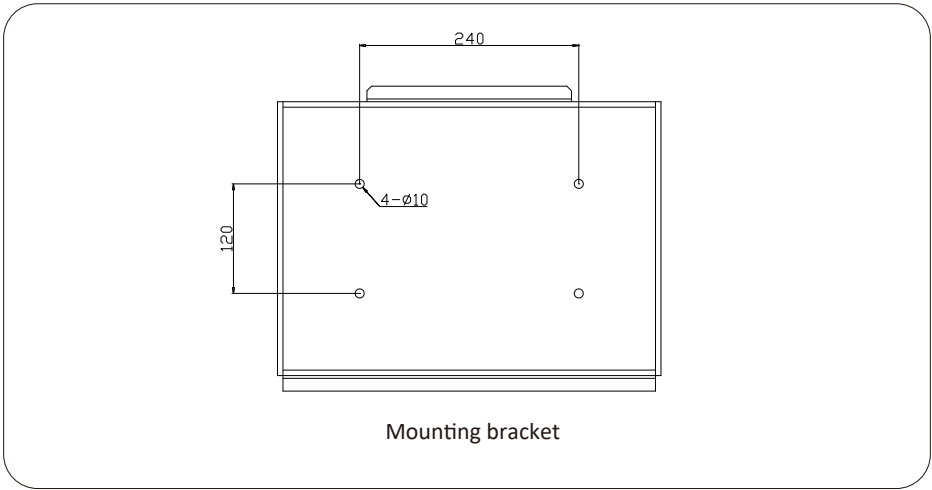
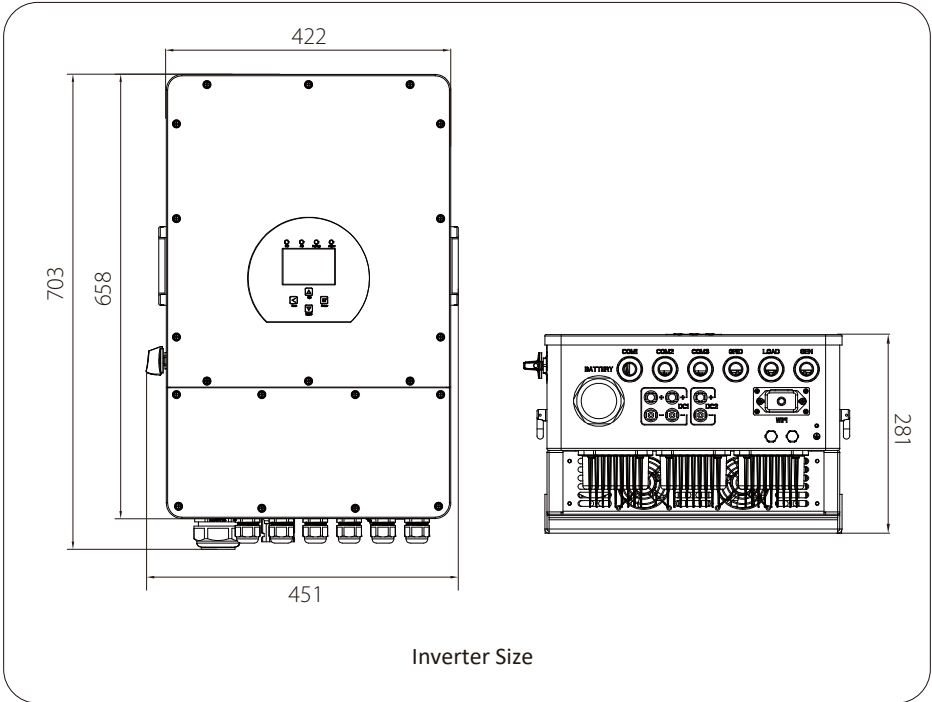
13: Grid

14: Load

15: Generator input

16: WiFi Interface

## 2.2 Product Size



## 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

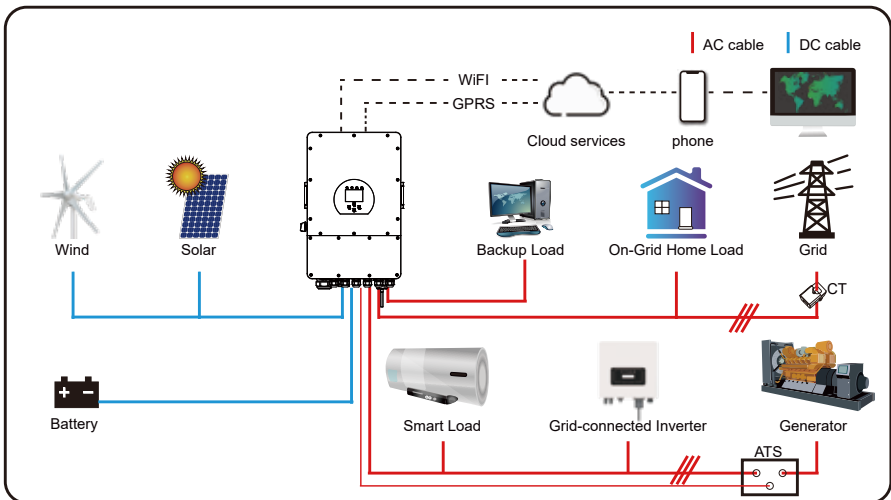
The following illustration shows basic application of this inverter.

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.

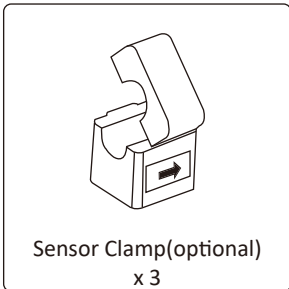
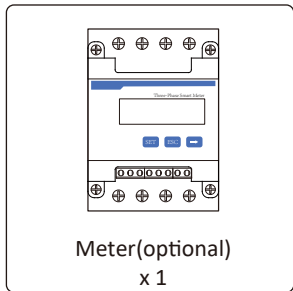
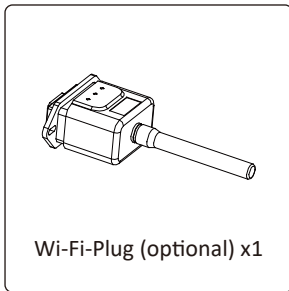
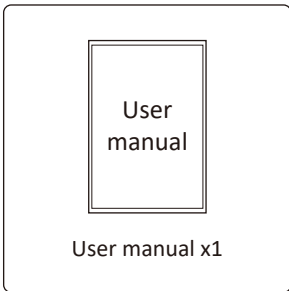
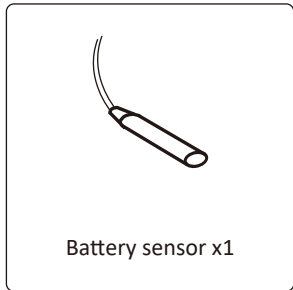
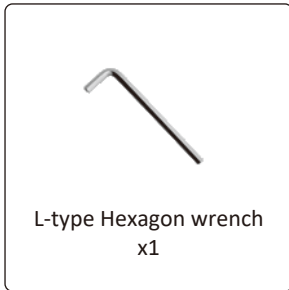
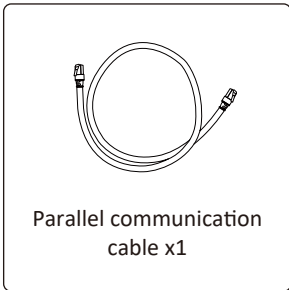
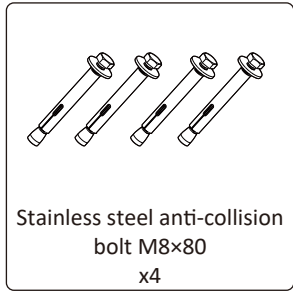
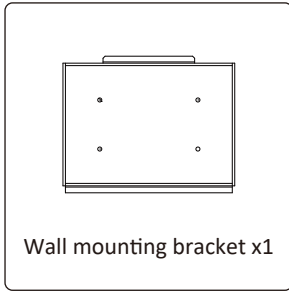
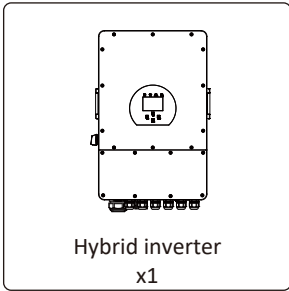
This inverter can power all kinds of appliances in home or office environment, including motor type appliances such as refrigerator and air conditioner.



### 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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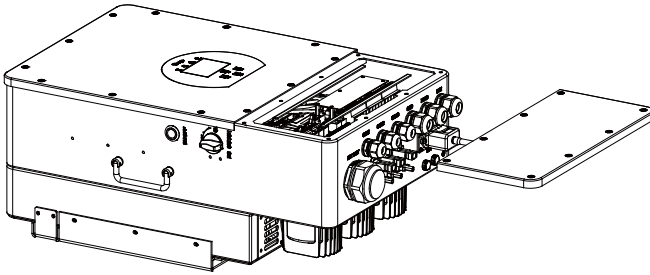
## 3.2 Mounting instructions

### 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%)

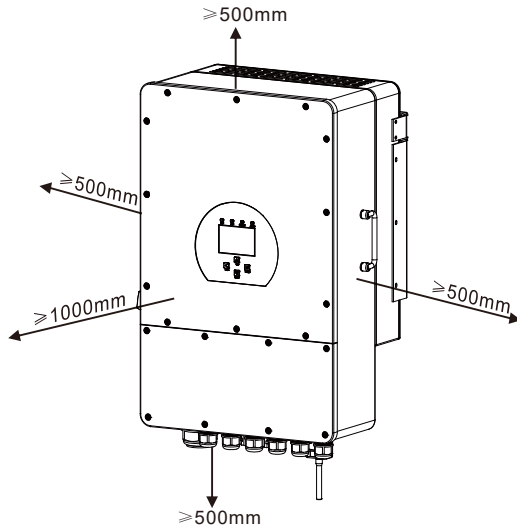
Please AVOID direct sunlight, rain exposure, snow laying up during installation and operation. Before connecting all wires, please take off the metal cover by removing screws as shown below:



### 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 should be between  $-25\sim 60^{\circ}\text{C}$  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.



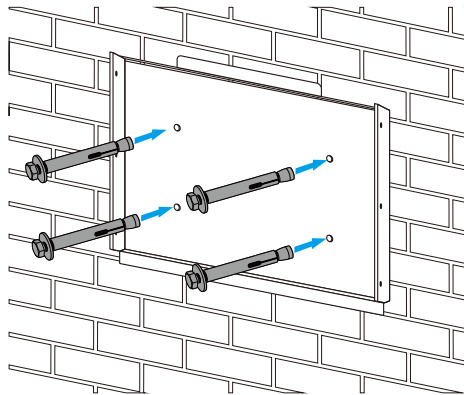


For proper air circulation to dissipate heat, allow a clearance of approx. 50cm to the side and approx. 50cm above and below the unit. And 100cm to the front.

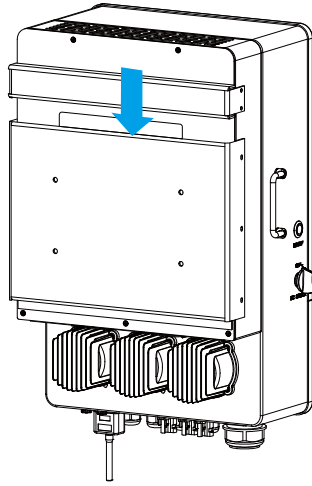
## Mounting the inverter

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, 52-60mm 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>
8Kw	1AWG	40	24.5Nm
10Kw	1/0AWG	60	24.5Nm
12Kw	1/0AWG	60	24.5Nm

Chart 3-2 Cable size



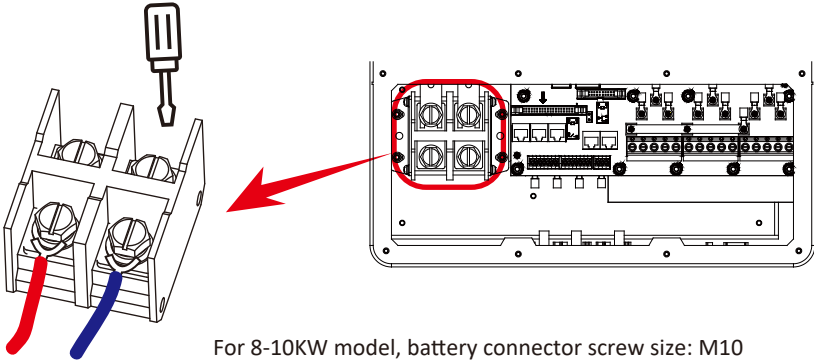
All wiring must be performed by a professional person.



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.
2. Nm in clockwise direction, make sure polarity at both the battery and inverter is correctly connected.



For 8-10KW model, battery connector screw size: M10

3. 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.

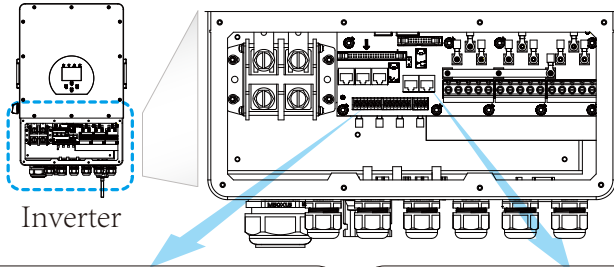


Installation must be performed with care.

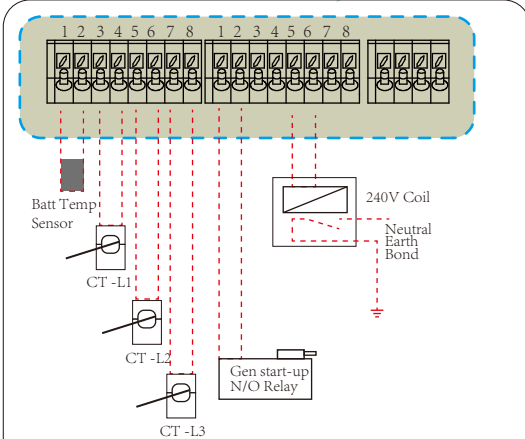


Before making the final DC connection or closing DC breaker/disconnect, be sure positive(+) must be connect to positive(+) and negative(-) must be connected to negative(-). Reverse polarity connection on battery will damage the inverter.

### 3.3.2 Function port definition



Inverter

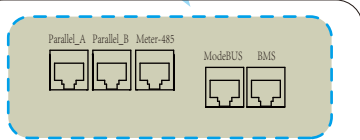


#### CN1:

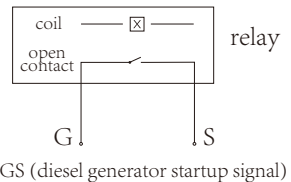
- TEMP (1,2): battery temperature sensor for lead acid battery.
- CT-L1 (3,4): current transformer (CT1) for "zero export to CT" mode clamps on L1 when in three phase system.
- CT-L2 (5,6): current transformer (CT2) for "zero export to CT" mode clamps on L2 when in three phase system.
- CT-L3 (7,8): current transformer (CT3) for "zero export to CT" mode clamps on L3 when in three phase system.

#### CN2:

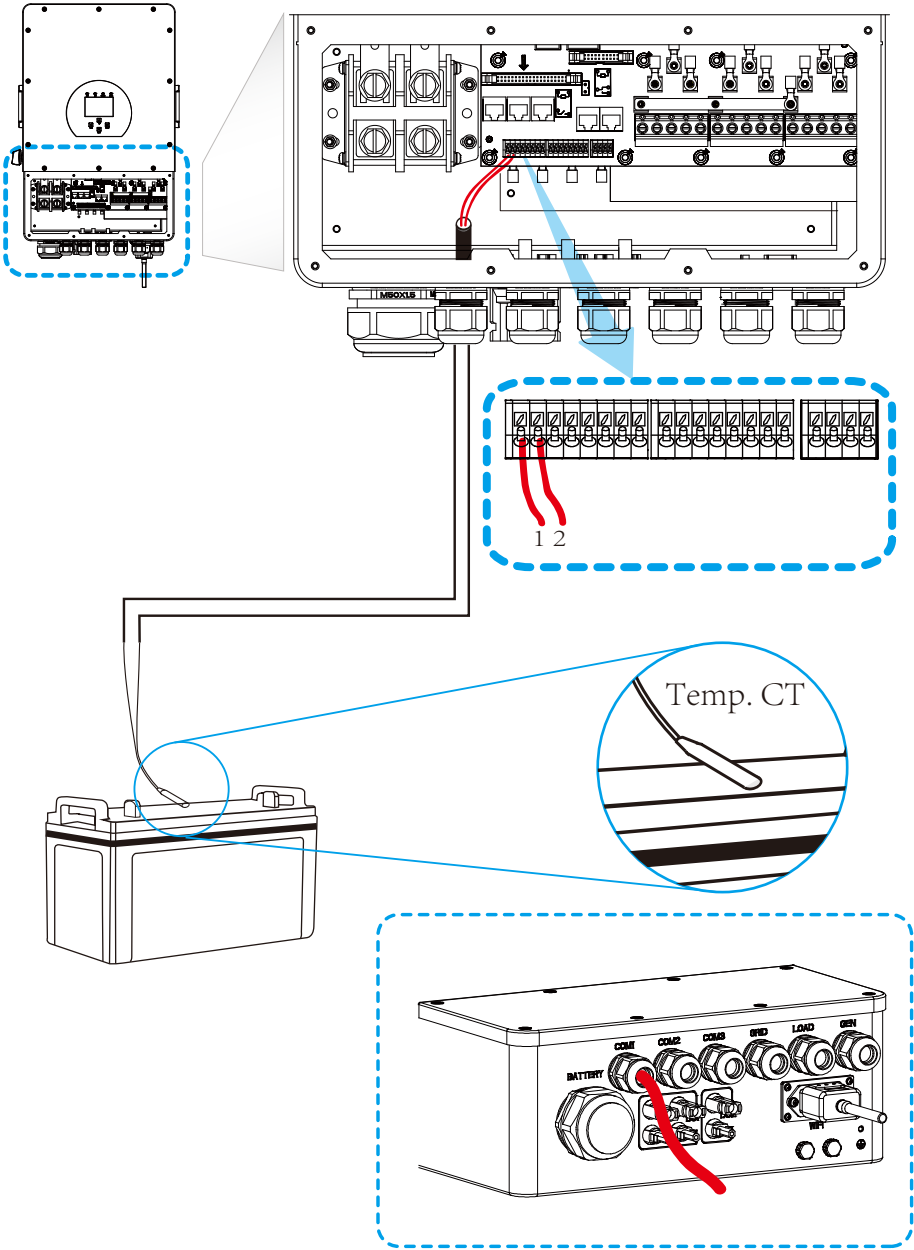
- G-start (1,2): dry contact signal for startup the diesel generator.
- When the "GEN signal" is active, the open contact (GS) will switch on (no voltage output).
- G-valve (3,4): reserved.
- Grid\_Ry(5,6): 230V output port when inverter is on
- RSD (7,8): provide 12Vdc output when inverter is on.



- Parallel A: Parallel communication port 1 (CAN interface).
- Parallel B: Parallel communication port 2 (CAN interface).
- Meter\_485: for energy meter communication.
- ModeBUS: Reserved.
- BMS: BMS port for battery communication(CAN/RS485).



### 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 is 20A for 8kw, 20A for 10kw and 20A for 12KW.
- There are three terminal blocks with "Grid" "Load" and "GEN" markings. Please do not misconnect input and output connectors.



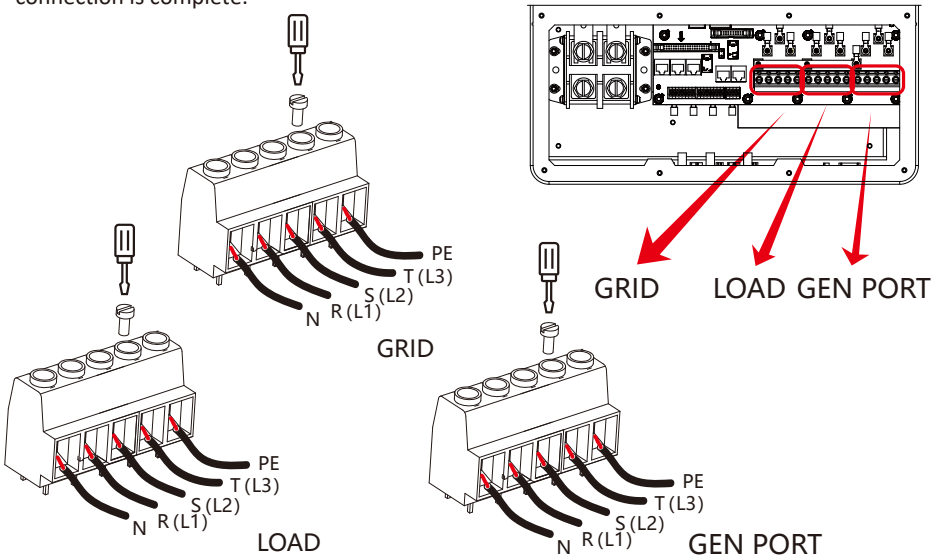
All wiring must be performed by a qualified personnel. It is very important for system safety and efficient operation to use appropriate cable for AC input connection. To reduce risk of injury, please use the proper recommended cable as below.

Model	Wire Size	Cable(mm <sup>2</sup> )	Torque value(max)
8/10/12KW	11AWG	4	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>
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 be sure NO grounding.



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.

<i>Inverter Model</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	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:**

Please don't connect PV array positive or negative pole to the ground, it could cause serious damages to the inverter.



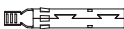
**Safety Hint:**

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

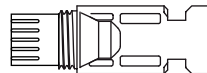


**Safety Hint:**

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



Pic 3.1 DC+connector (MC4)



Pic 3.2 DC-connector (MC4)





**Safety Hint:**

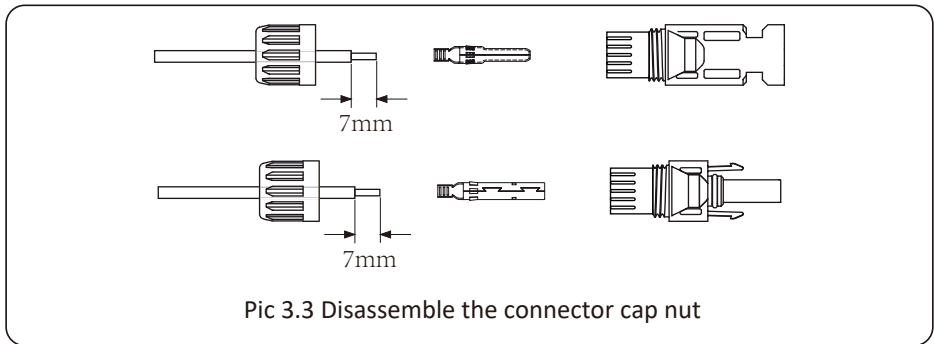
Please use approved DC cable for PV system.

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

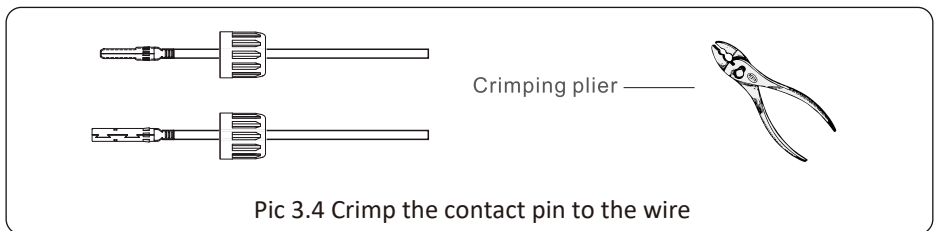
Chart 3-6

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

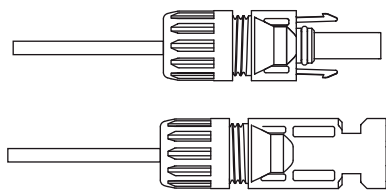
a) Strip off the DC wire about 7mm, disassemble the connector cap nut (see picture 5.3).



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

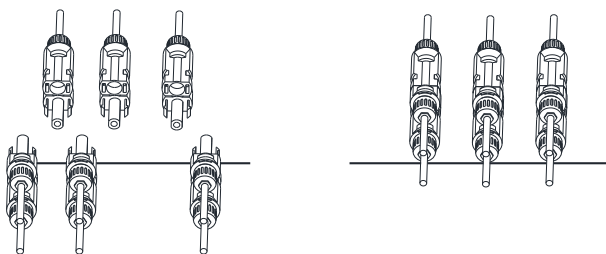


c) Insert the contact pin to the top part of the connector and screw up the cap nut to the top part of the connector. (as shown in picture 5.5).



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



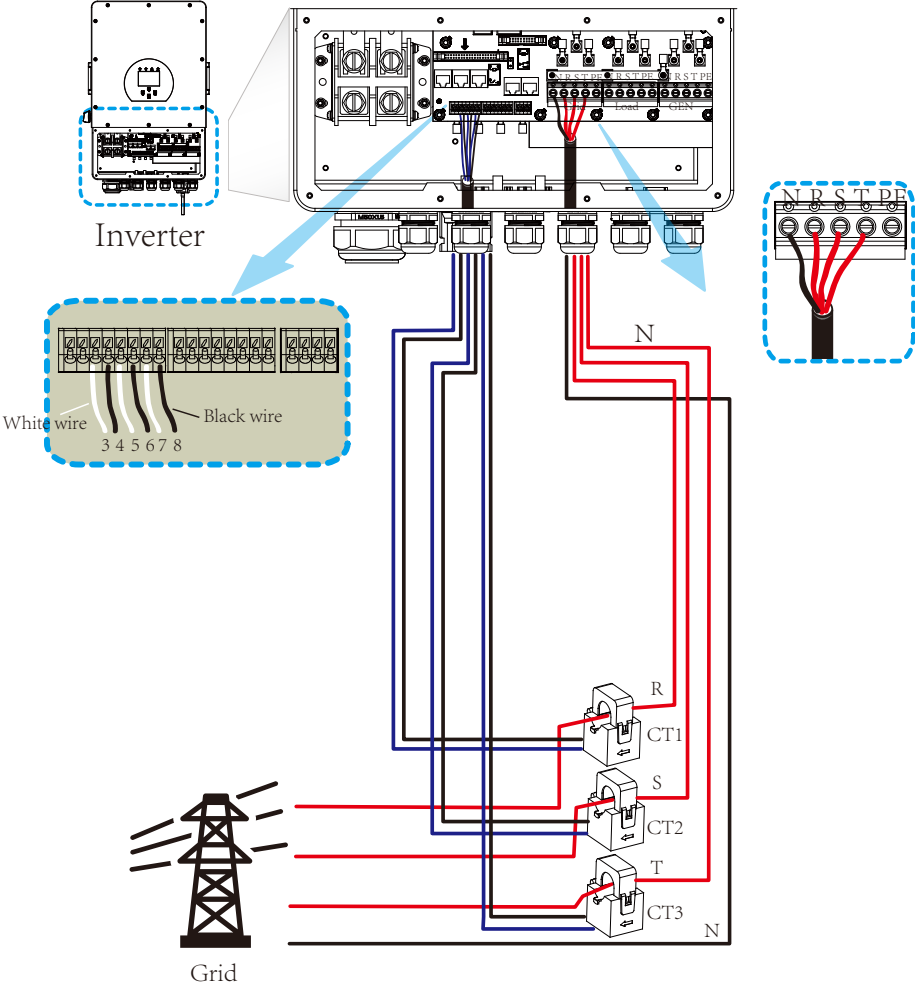
Pic 3.6 DC input connection



**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.

### 3.6 CT Connection



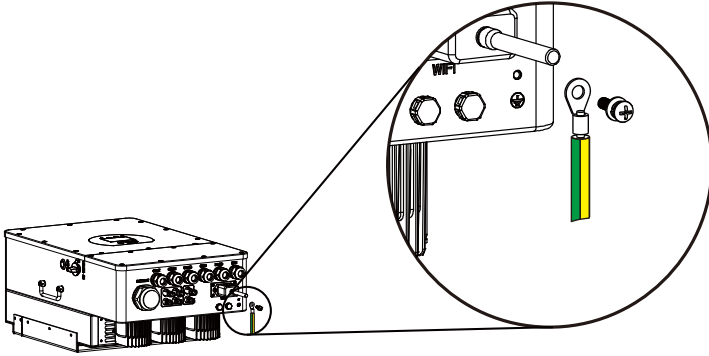


**Note:**

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

### 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.



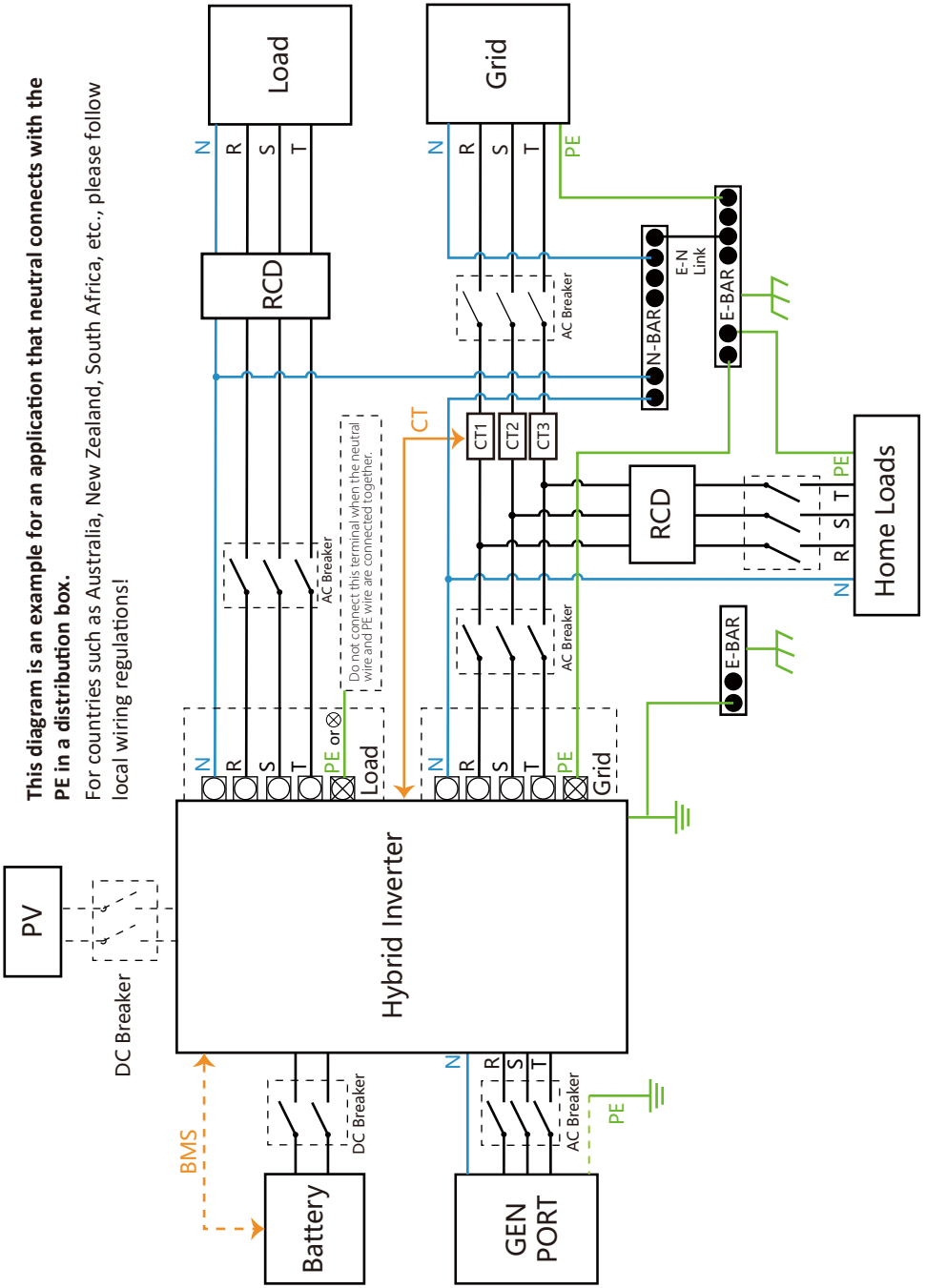
### 3.8 WIFI Connection

For the configuration of Wi-Fi Plug, please refer to illustrations of the Wi-Fi Plug.

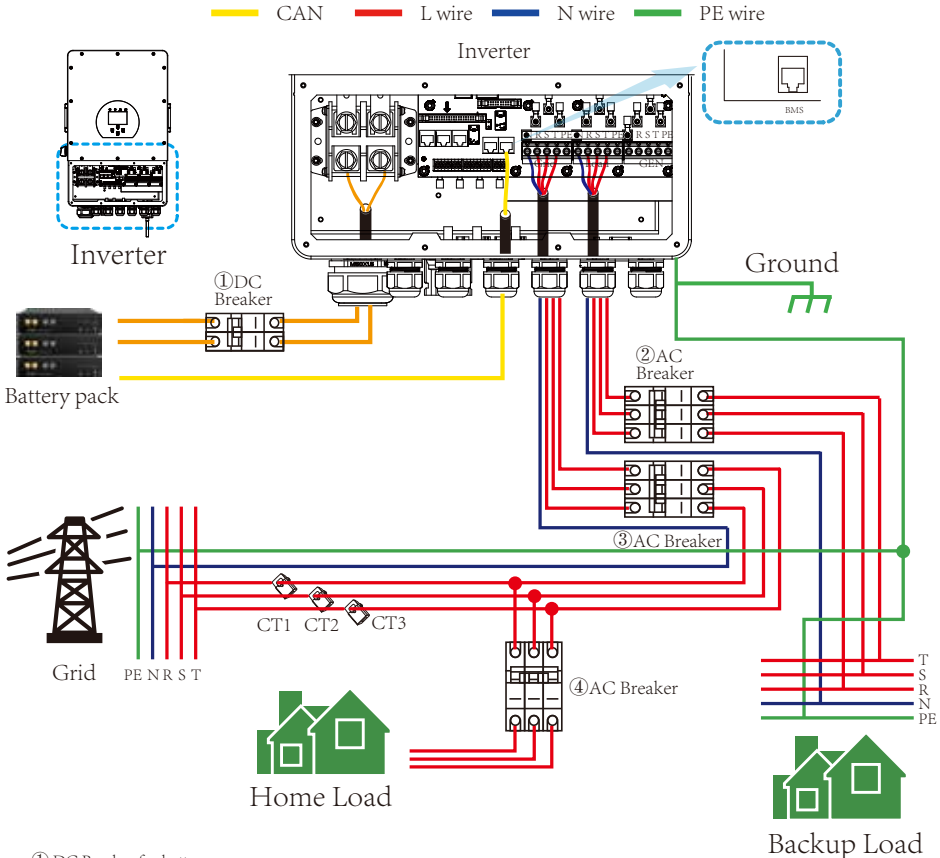
### 3.9 Wiring System for Inverter

This diagram is an example for an application that neutral connects with the PE in a distribution box.

For countries such as Australia, New Zealand, South Africa, etc., please follow local wiring regulations!



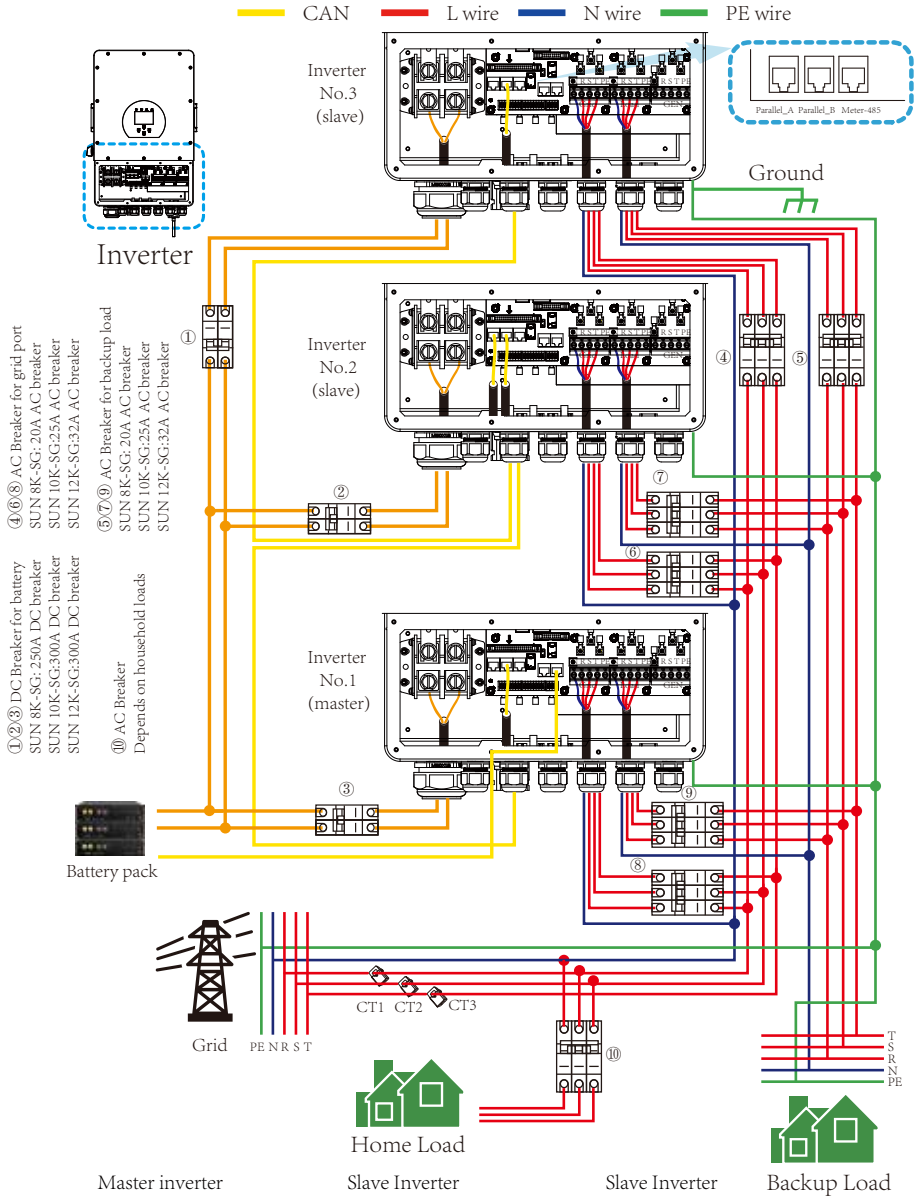
### 3.10 Wiring diagram



① DC Breaker for battery  
 SUN 8K-SG: 250A DC breaker  
 SUN 10K-SG:300A DC breaker  
 SUN 12K-SG:300A DC breaker

②③④AC Breaker for grid and backup load  
 SUN 8K-SG: 20A AC breaker  
 SUN 10K-SG:25A AC breaker  
 SUN 12K-SG:32A AC breaker

### 3.11 phase parallel connection diagram



\*Paralleling operation function is developing, and it will be available soon.

Advanced Function

<input checked="" type="checkbox"/> Parallel	Modbus SN	<input type="radio"/> A Phase	↑ Paral. Set ↓
<input type="radio"/> Master	SN	<input type="radio"/> B Phase	
<input type="radio"/> Slave		<input type="radio"/> C Phase	

Advanced Function

<input checked="" type="checkbox"/> Parallel	Modbus SN	<input type="radio"/> A Phase	↑ Paral. Set ↓
<input type="radio"/> Master	SN	<input type="radio"/> B Phase	
<input type="radio"/> Slave		<input type="radio"/> C Phase	

Advanced Function

<input checked="" type="checkbox"/> Parallel	Modbus SN	<input type="radio"/> A Phase	↑ Paral. Set ↓
<input type="radio"/> Master	SN	<input type="radio"/> B Phase	
<input type="radio"/> Slave		<input type="radio"/> C Phase	

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## 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

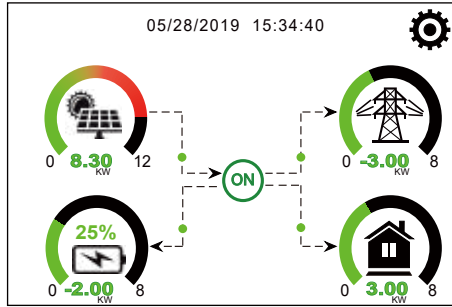
Chart 4-2 Function Buttons



## 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).

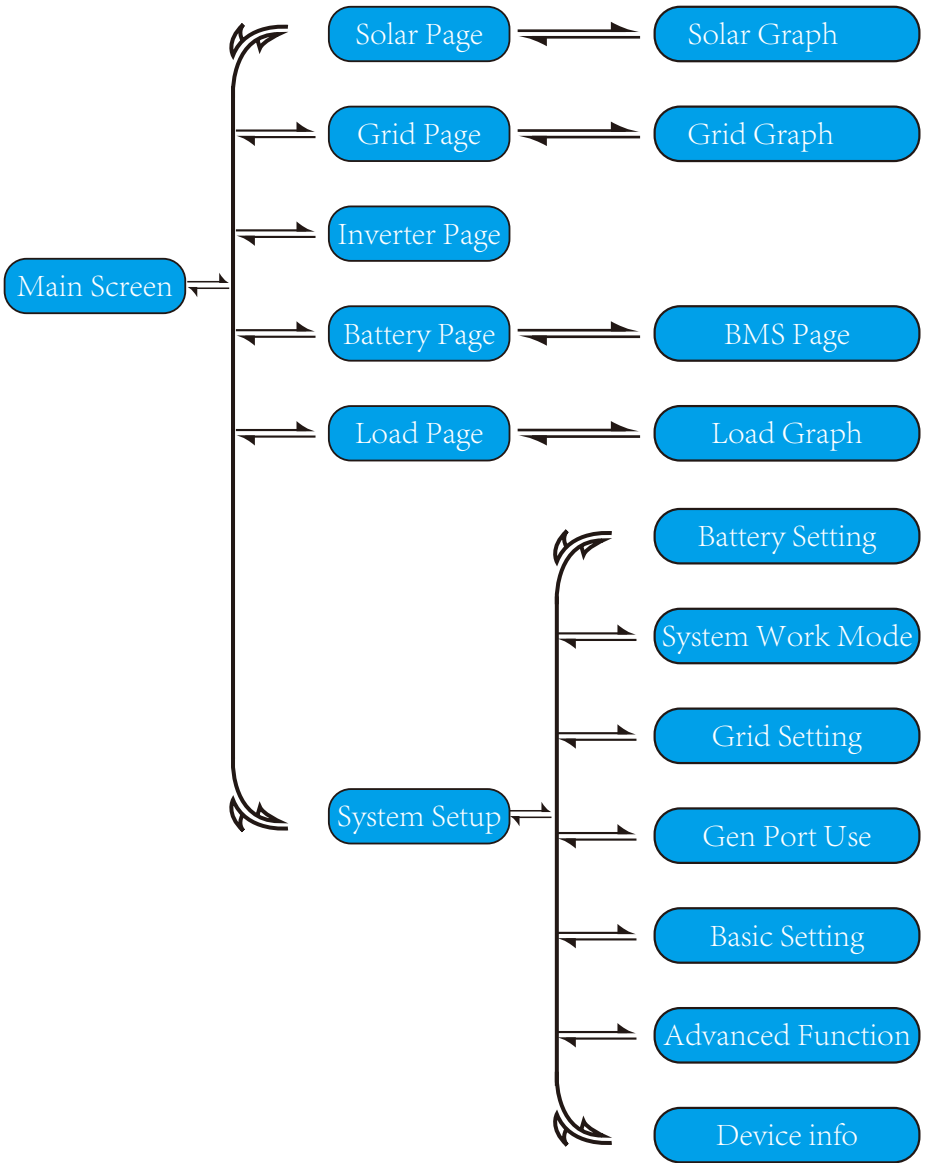
2.At the top of the screen is the time.

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 ②  
 PV1-I: 5.5A PV2-I: 0.0A  
 PV1-P: 1559W PV2-P: 1W

Total =12.00 KWH ③

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.

**Inverter**

Power: 44W ① DC-T:52.6C ③

L1: 230V  
 L2: 230V  
 L3: 230V ②  
 I1: 0.6A  
 I2: 0.6A  
 I3: 0.6A

AC-T:41.0C ③

Energy

This is Inverter detail page.

- ① Inverter Generation.
- ② Voltage, Current, Power for each Phase.
- ③ \*DC-T: mean DC-DC temperature,  
 AC-T: mean Heat-sink temperature.  
 \*Note: this part info is not available for some LCD FW.

**Load**

Power: 55W ① Today=0.5 KWH ③

Total =1.60 KWH ③

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 ①  
 0W  
 0.0Hz

BUY ③  
 Today=2.2KWH  
 Total =11.60 KWH  
 SELL  
 Today=0.0KWH  
 Total =8.60 KWH

CT1: 0W LD1: 0W ②  
 CT2: 0W LD2: 0W  
 CT3: 0W LD3: 0W

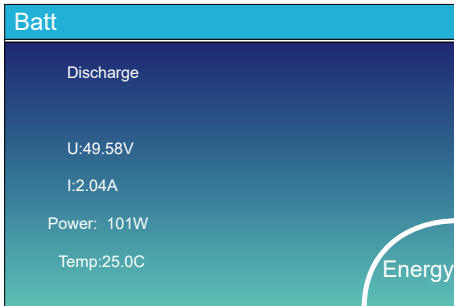
L1: 0V L2: 0V L3: 0V

Energy

This is Grid detail page.

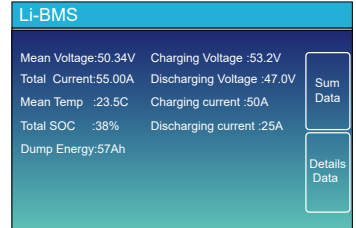
- ① Status, Power, Frequency.
- ② L: Voltage for each Phase  
 CT: Power detected by the external current sensors  
 LD: Power detected using internal sensors on AC grid in/out breaker
- ③ BUY: Energy from Grid to Inverter,  
 SELL: Energy from Inverter to grid.

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



This is Battery detail page.

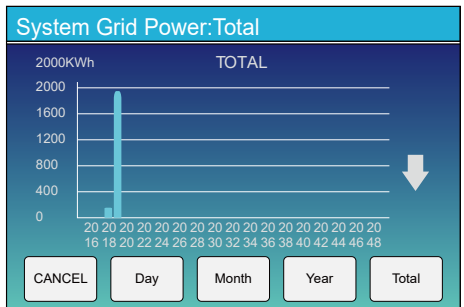
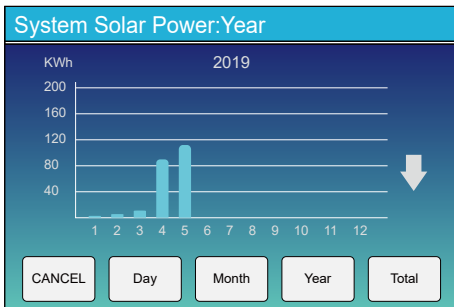
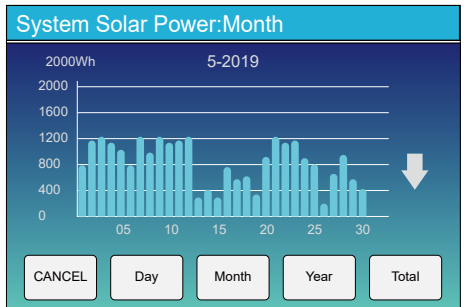
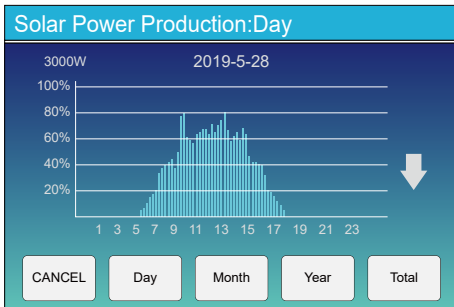
if you use Lithium Battery, you can enter BMS page.



Li-BMS

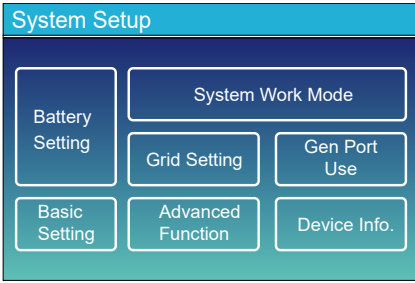
	Volt	Curr	Temp	SOC	Energy	Charge		Fault
						Volt	Curr	
1	50.35V	19.70A	30.6C	52.0%	25.0Ah	0.0V	0.0A	0/0/0
2	50.33V	18.10A	31.0C	51.0%	25.5Ah	53.2V	25.0A	0/0/0
3	50.30V	16.90A	30.2C	12.0%	6.0Ah	53.2V	25.0A	0/0/0
4	0.00V	0.00A	0.0C	0.0%	0.0Ah	0.0V	0.0A	0/0/0
5	0.00V	0.00A	0.0C	0.0%	0.0Ah	0.0V	0.0A	0/0/0
6	0.00V	0.00A	0.0C	0.0%	0.0Ah	0.0V	0.0A	0/0/0
7	0.00V	0.00A	0.0C	0.0%	0.0Ah	0.0V	0.0A	0/0/0
8	0.00V	0.00A	0.0C	0.0%	0.0Ah	0.0V	0.0A	0/0/0
9	0.00V	0.00A	0.0C	0.0%	0.0Ah	0.0V	0.0A	0/0/0
10	0.00V	0.00A	0.0C	0.0%	0.0Ah	0.0V	0.0A	0/0/0
11	0.00V	0.00A	0.0C	0.0%	0.0Ah	0.0V	0.0A	0/0/0
12	0.00V	0.00A	0.0C	0.0%	0.0Ah	0.0V	0.0A	0/0/0
13	0.00V	0.00A	0.0C	0.0%	0.0Ah	0.0V	0.0A	0/0/0
14	0.00V	0.00A	0.0C	0.0%	0.0Ah	0.0V	0.0A	0/0/0
15	0.00V	0.00A	0.0C	0.0%	0.0Ah	0.0V	0.0A	0/0/0

### 5.3 Curve Page-Solar & Load & Grid



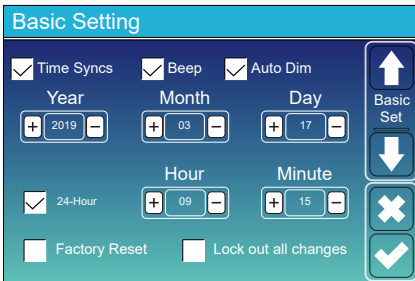
Solar power curve for daily, monthly, yearly and total can be roughly checked on the LCD, for more accuracy power generation, pls check on the monitoring system. Click the up and down arrow to check power curve of different period.

## 5.4 System Setup Menu

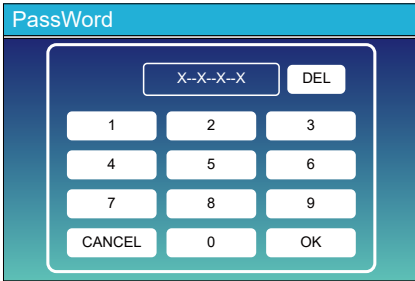


This is System Setup page.

## 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

Back

Confirm

**Battery capacity:** it tells Deye 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 (0-115A for 5KW model, 0-90A for 3.6KW 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    0.0V    0.0V

A    40A    40A

Gen Charge     Grid Charge

Gen Signal     Grid Signal

Gen Max Run Time    0.0 hours

Gen Down Time    0.5 hours

Batt Set2

Back

Confirm

**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 Max Run Time:** It indicates the longest time Generator can run in one day, when time is up, the Generator will be turned off. 24H means that it does not shut down all the time.

**Gen Down Time:** It indicates the delay time of the Generator to shut down after it has reached the running time.

**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.

**Battery Setting**

Float V    53.6V    Shutdown    20%

Absorption V    57.6V    Low Batt    35%

Equalization V    57.6V    Restart    50%

Equalization Days    30 days    TEMPCO(mV/C/Cell)    -5

Equalization Hours    3.0 hours    Batt Resistance    25mOhms

Batt Set3

Back

Confirm

**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  
 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 1  
↓

✕

✓

**Work Mode**

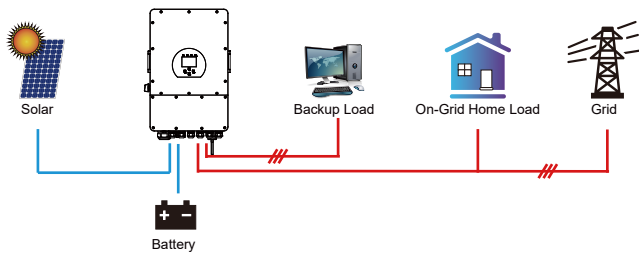
**Selling First:** This Mode allows hybrid inverter to sell back any excess power produced by the solar panels to the grid. If time of use is active, the battery energy also can be sold into grid.

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

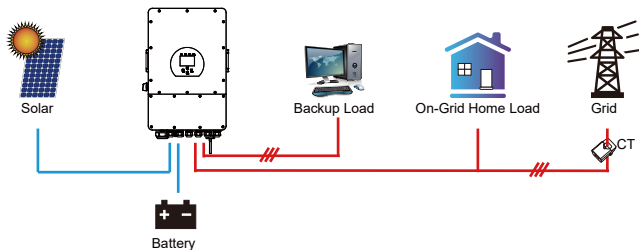
Power source priority for the load is as follows:

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 make supplement for battery and load simultaneously.

**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		Power	Batt	Work Mode2
		Time	Power			
<input type="checkbox"/>	<input type="checkbox"/>	01:00	5:00	12000	49.0V	<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>
<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	

**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.

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

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

System Work Mode						
Grid Charge	Gen	Time Of Use		Power	Batt	Work Mode2
		Time	Power			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	01:00	5:00	12000	80%	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	05:00	8:00	12000	40%	
<input type="checkbox"/>	<input type="checkbox"/>	08:00	10:00	12000	40%	
<input type="checkbox"/>	<input type="checkbox"/>	10:00	15:00	12000	80%	
<input type="checkbox"/>	<input type="checkbox"/>	15:00	18:00	12000	40%	
<input type="checkbox"/>	<input type="checkbox"/>	18:00	01:00	12000	35%	

**For example:**

During 01:00-05:00, when battery SOC is lower than 80%, it will use grid to charge the battery until battery SOC reaches 80%.

During 05:00-08:00 and 08:00-10:00, when 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%.



## 5.8 Grid Setup Menu

**Grid Setting**

Grid Mode

- General Standard
- UL1741 & IEEE1547
- CPUC RULE21
- SRD-UL-1741

Grid Level

- 220V-3P
- 230V-3P
- 240V-3P
- 120V-3P

Phase Type

- 0/120/240
- 0/240/120

Grid Set1

Grid Set2

Grid Set3

Please select the correct Grid Mode in your local area. If you are not sure, please choose General Standard.

Please select the correct Grid Type in your local area, otherwise the machine will not work or be damaged.

**Grid Setting**

Grid Frequency

- 50HZ
- 60HZ

Reconnection Time: 60S PF: 1.000

Grid HZ High: 53.0Hz Grid Vol High: 265.0V

Grid HZ Low: 49.0Hz Grid Vol Low: 185.0V

Grid Set2

Grid Set3

Grid Set4

### UL1741&IEEE1547, CPUC RULE21, SRD-UL-1741

No need to set the function of this interface.

### General Standard

Please select the correct Grid Frequency in your local area.

You can hold this in default value.

**Grid Setting**

Q(V)  FW  VW

V1:0.0V Q1:0.00 Fstart:0.00Hz Vstart:0.0V

V2:0.0V Q2:0.00 Fstop:0.00Hz Vstop:0.0V

V3:0.0V Q3:0.00 Normal Ramp rate: 0.0%/s

V4:0.0V Q4:0.00 Soft Start Ramp rate: 0.0%/s

Grid Set3

Grid Set4

Grid Set5

For California only.

**Grid Setting**

L/HVRT  L/HFRT

HV2:0.0V 0.16S

HV1:0.0V 0.16S HF2:0.00HZ 0.16S

LV1:0.0V 0.16S HF1:0.00HZ 0.16S

LV2:0.0V 0.16S LF1:0.00HZ 0.16S

LV3:0.0V 0.16S LF2:0.00HZ 0.16S

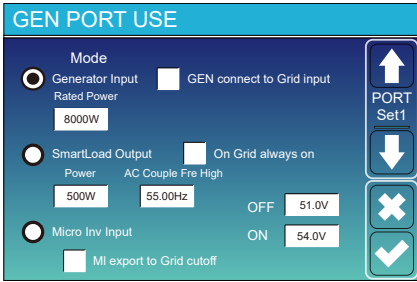
Grid Set4

Grid Set5

Grid Set6

For California only.

## 5.9 Generator Port Use Setup Menu



**GEN PORT USE**

**Mode**

Generator Input  GEN connect to Grid input

Rated Power: 8000W

SmartLoad Output  On Grid always on

Power: 500W AC Couple Fre High: 55.00Hz

OFF: 51.0V ON: 54.0V

MI export to Grid cutoff

PORT Set1 (Up Arrow)

PORT Set1 (Down Arrow)

(Close X)

(Checkmark)

**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 and PV power is above a user programmable threshold.

**e.g. Power=500W, ON: 100%, OFF=95%:** When the PV power exceeds 500W, and battery bank SOC reaches 100%, Smart Load Port will switch on automatically and power the load connected. When the battery bank SOC < 95% or PV power < 500w, 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. Also, the PV input power should exceed the setting value (Power) 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 Fre 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 Fre 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: 0S

Clear Arc\_Fault

System selfcheck       Gen peak-shaving

DRM      CT Ratio: 2000: 1

Signal ISLAND MODE

BMS\_Err\_Stop

Func Set1

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

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

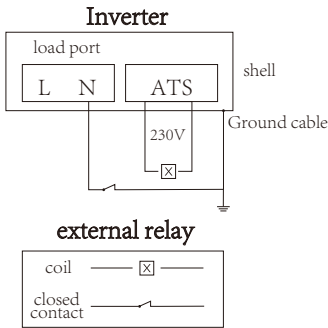
**Gen Peak-shaving:** Enable When the power of the generator exceeds the rated value of it, the inverter will provide the redundant part to ensure that the generator will not overload.

**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:** when the inverter connects grid, the ATS port will output 230Vac and it is used to cuts off Earth-Neutral(load port N line) bond via connect external relay. When the inverter disconnects from the grid, ATS port voltage will be 0 and the Earth-Neutral bond keeps on. More details, please refer to left picture.



**Advanced Function**

Parallel      Modbus SN: 00

Master       A Phase

Slave       B Phase

C Phase

Ex\_Meter For CT

A Phase

B Phase

C Phase

Paral. Set3

**Ex\_Meter For CT:** when in Three phase system with CHNT Three phase energy meter (DTSU666), click corresponding phase where hybrid inverter is connected. e.g. when the hybrid inverter output connects to A phase, please click A Phase.

**Advanced Function**

DC1 for Wind Turbine       DC2 for Wind Turbine

V1	0V	0.0A	V7	0V	0.0A
V2	0V	0.0A	V8	0V	0.0A
V3	0V	0.0A	V9	0V	0.0A
V4	0V	0.0A	V10	0V	0.0A
V5	0V	0.0A	V11	0V	0.0A
V6	0V	0.0A	V12	0V	0.0A

Wind Set2

**This is for Wind Turbine**

**Note:** This interface is not available for some firmware version

## 5.11 Device Info Setup Menu

**Device Info.**

Inverter ID: 1601012001	Flash	
HMI: Ver0302	MAIN:Ver2138	
<b>Alarms Code</b>	<b>Occurred</b>	
F64 Heatsink_HighTemp_Fault	2019-03-11 15:56	
F64 Heatsink_HighTemp_Fault	2019-03-08 10:46	
F64 Heatsink_HighTemp_Fault	2019-03-08 10:45	

↑ Device Info

↓

✕

✓

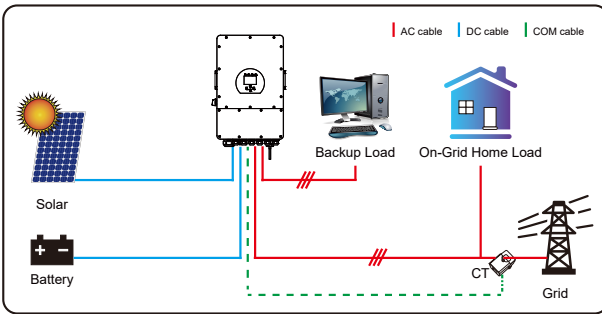
This page show Inverter ID, Inverter version and alarm codes.

**HMI:** LCD version

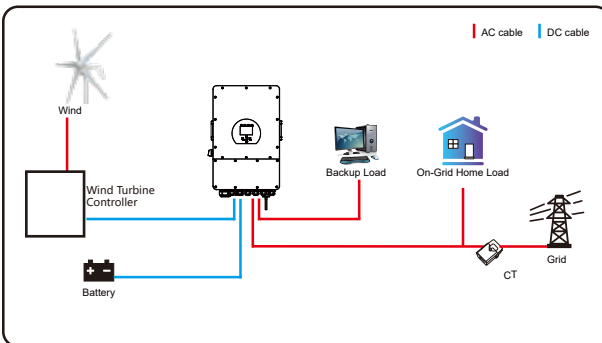
**MAIN:** Control board FW version

## 6. Mode

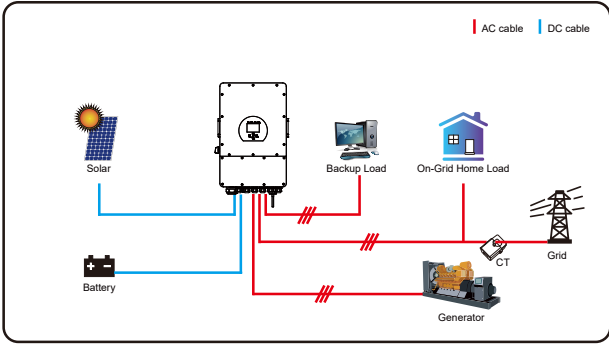
### Mode I:Basic



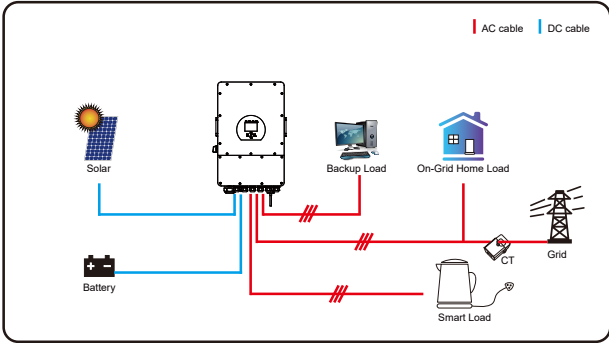
### Mode II: With Wind Turbine



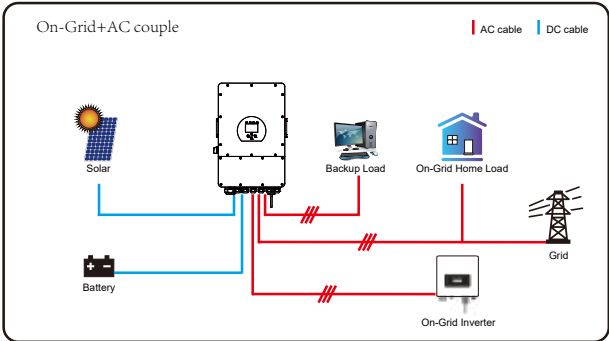
### Mode III: With Generator



### Mode IV: With Smart-Load



### Mode V: 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.

## 8. Datasheet

<b>Model</b>	<b>SUN-8K-SG04LP3</b>	<b>SUN-10K-SG04LP3</b>	<b>SUN-12K-SG04LP3</b>
<b>Battery Input Data</b>			
Battery Type	Lead-acid or Li-Ion		
Battery Voltage Range(V)	40-60V		
Max. Charging Current(A)	190A	210A	240A
Max. Discharging Current(A)	190A	210A	240A
Charging Curve	3 Stages / Equalization		
External Temperature Sensor	Optional		
Charging Strategy for Li-Ion Battery	Self-adaption to BMS		
<b>PV String Input Data</b>			
Max. DC Input Power(W)	10400W	13000W	15600W
PV Input Voltage(V)	550V (160V~800V)		
MPPT Range(V)	200V-650V		
Start-up Voltage(V)	160V		
PV Input Current(A)	12.5A+12.5A	25A+12.5A	25A+12.5A
No. of MPPT Trackers	2		
No. of Strings Per MPPT Tracker	1+1	2+1	2+1
<b>AC Output Data</b>			
Rated AC Output and UPS Power(W)	8000	10000	12000
Max. AC Output Power(W)	8800	11000	13200
Peak Power(off grid)	2 times of rated power, 10 S		
AC Output Rated Current(A)	11.6A	14.5A	17.4A
Max. AC Current(A)	12.8A	16A	19.1A
Max. output current of each phase(A)	17.4A	21.7A	26.1A
Max. Continuous AC Passthrough(A)	50A		
Output Frequency and Voltage	50/60Hz; 230/400Vac (Three phase)		
Grid Type	Three Phase		
Current Harmonic Distortion	THD<3% (Linear load<1.5%)		
<b>Efficiency</b>			
Max. Efficiency	97.60%		
Euro Efficiency	97.00%		
MPPT Efficiency	99.90%		

<b>Model</b>	<b>SUN-8K-SG04LP3 SUN-10K-SG04LP3 SUN-12K-SG04LP3</b>
<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 II
<b>Certifications and Standards</b>	
Grid Regulation	VDE 0126, AS4777, NRS2017, G98, G99, IEC61683, IEC62116, IEC61727
Safety Regulation	IEC62109-1, IEC62109-2
EMC	EN61000-6-1, EN61000-6-3, FCC 15 class B
<b>General Data</b>	
Operating Temperature Range( °C )	-25~60 °C , >45 °C Derating
Cooling	Smart cooling
Noise(dB)	<30 dB
Communication with BMS	RS485; CAN
Weight(kg)	36.8
Size(mm)	422W×658H×281D
Protection Degree	IP65
Installation Style	Wall-mounted
Warranty	5 years

## 9. Appendix I

Approved battery brand from Deye

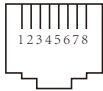
Brand	Model	48V Storage inverter	RS485 or CAN	INVERTER SETUP	note
PYLON	US2000	●	CAN	0	
		●	RS485	5	
	US2000-PLUS	●	CAN	0	
		●	RS485	5	
DYNESS	B4850	●	CAN	0	Short line 6&7 at inverter side
	POWERBOXF	●	CAN	0	
CCGX	48Vxxxx	●	CAN	0	Need confirm CAN_H CAN_L
SACRED SUN	48Vxxxx	●	RS485	1	Cut line 3,6,8
SOLAX	48Vxxxx	●	CAN	0	
UZ ENERGY	UZ-EB51.2-100-A11	●	CAN	0	
GSL ENERGY	48Vxxxx	●	CAN	0	
			RS485	12	
Herewin techlogy	HY48050	●	CAN	0	
GenixGreen		●	RS485	6	
Sunwoda	H4850M	●	CAN	0	
X-ratong	48Vxxxx	●	RS485	8	
Enershare Technology	BMS48150	●	RS485	9	
PYLON 3.0		●	RS485	12	
Murata		●	RS485	11	
GS10000		●	RS485	3	
BPE		●	CAN	0	
AOBOET		●	CAN	0	
VISION Group		●	CAN	13	
Alpha Ess		●	CAN	0	



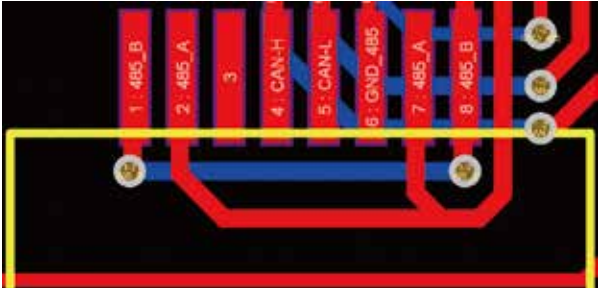
# 10. Appendix II

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

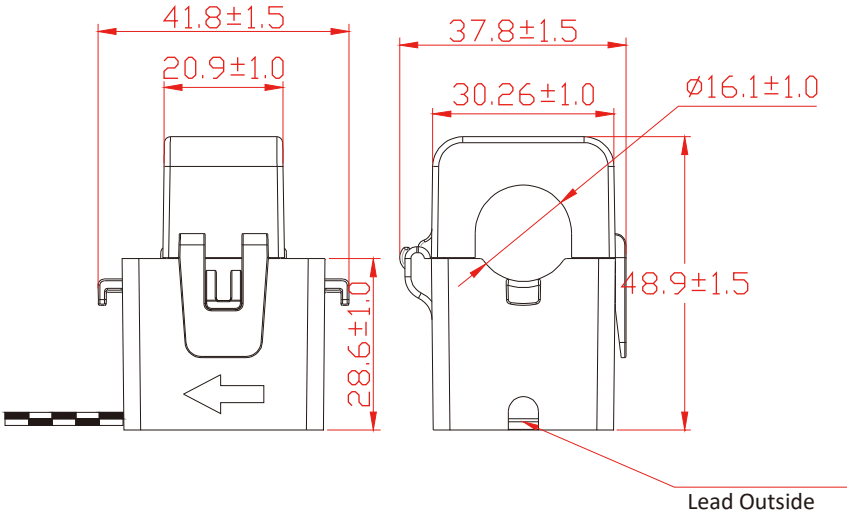


BMS Port



# 11. Appendix III

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



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