



# Hybrid Inverter

SUN-5K-SG05LP2-US-SM2

SUN-6K-SG05LP2-US-SM2

SUN-8K-SG05LP2-US-SM2

SUN-10K-SG05LP2-US-SM3

SUN-12K-SG05LP2-US-SM3

## 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

### Labels description

| Label                                                                               | Description                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | Caution, risk of electric shock symbol indicates important safety instructions, which if not correctly followed, could result in electric shock.                                                                                                                                                                                                                                                                                                        |
|    | The DC input terminals of the inverter must not be grounded.                                                                                                                                                                                                                                                                                                                                                                                            |
|    | Surface high temperature, Please do not touch the inverter case.                                                                                                                                                                                                                                                                                                                                                                                        |
|    | The AC and DC circuits must be disconnected separately, and the maintenance personnel must wait for 5 minutes before they are completely powered off before they can start working.                                                                                                                                                                                                                                                                     |
|  | CE mark of conformity                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|  | Please read the instructions carefully before use.                                                                                                                                                                                                                                                                                                                                                                                                      |
|  | Symbol for the marking of electrical and electronics devices according to Directive 2002/96/EC. Indicates that the device, accessories and the packaging must not be disposed as unsorted municipal waste and must be collected separately at the end of the usage. Please follow Local Ordinances or Regulations for disposal or contact an authorized representative of the manufacturer for information concerning the decommissioning of equipment. |

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- 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.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

**FCC warning:**

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

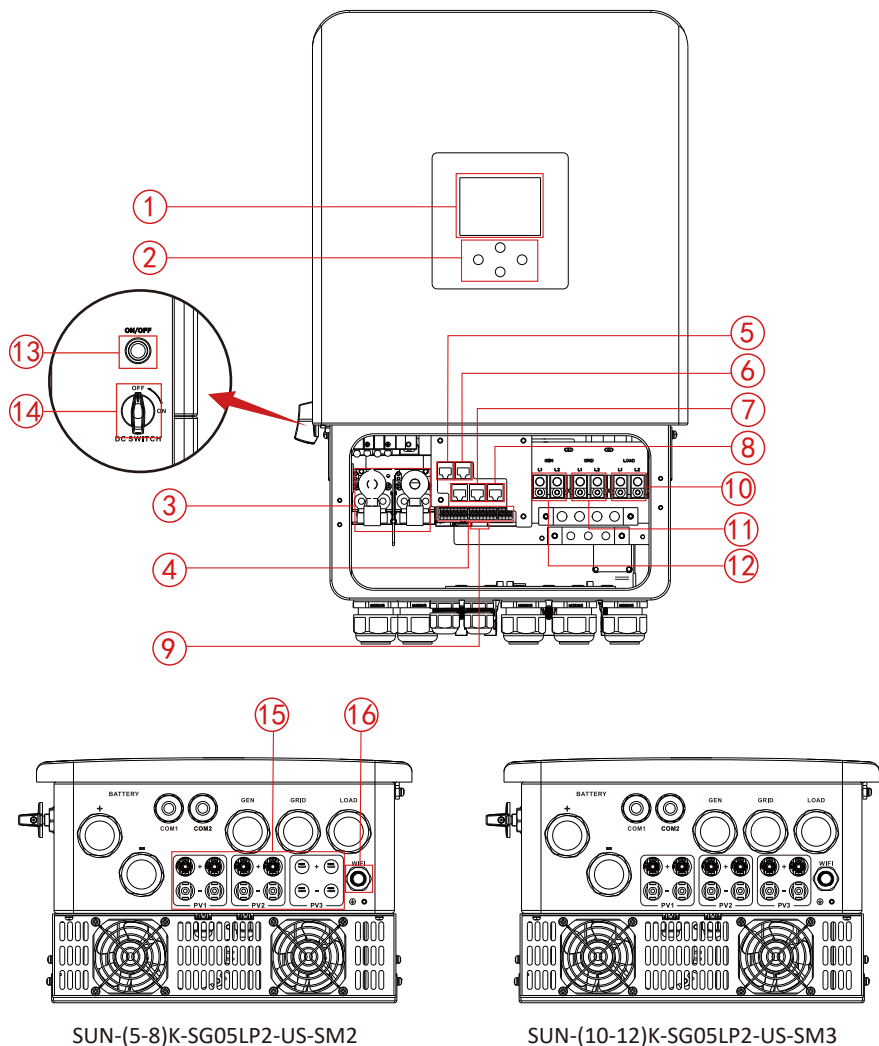
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

## 2. Product Introductions

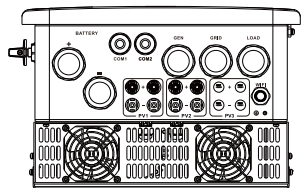
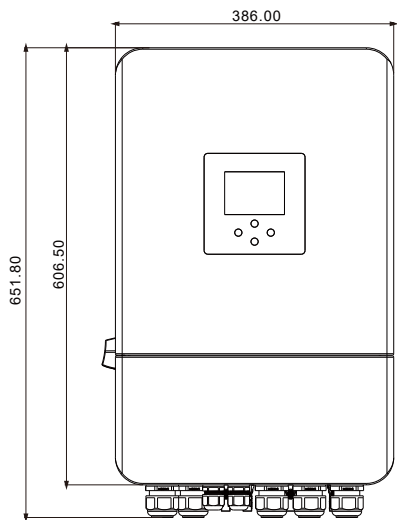
This is a multifunctional inverter, combining functions of inverter, solar charger and battery charger to offer uninterruptible power support with portable size. Its comprehensive LCD display offers user configurable and easy accessible button operation such as battery charging, AC/solar charging, and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

## 2.1 Product Overview

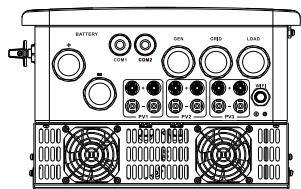


- |                             |                     |                           |
|-----------------------------|---------------------|---------------------------|
| 1: LCD display              | 7: Parallel port    | 13: Power on/off button   |
| 2: Function buttons         | 8: Meter-485 port   | 14: DC switch             |
| 3: Battery input connectors | 9: DRM port         | 15: PV input*             |
| 4: Function port            | 10: Load            | 16: The outlet of antenna |
| 5: BMS 485/CAN port         | 11: Grid            |                           |
| 6: Modbus port              | 12: Generator input |                           |
- \* For 5/6/8KW model, PV input with two MPPT;  
For 10/12KW model, PV input with three MPPT.

2.2 Product Size

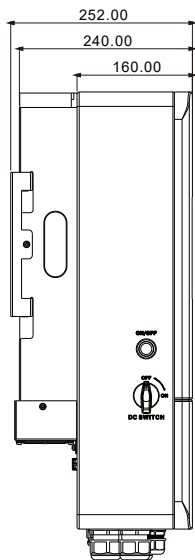
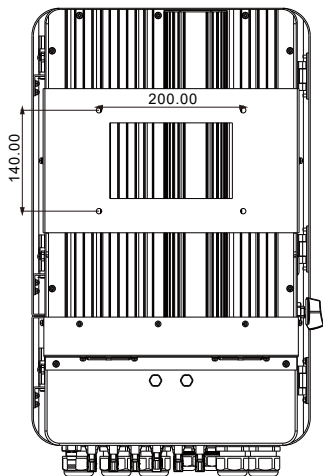


SUN-(5-8)K-SG05LP2-US-SM2



SUN-(10-12)K-SG05LP2-US-SM3

Inverter Size



## 2.3 Product Features

- 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 of MPP trackers
- Smart settable three stages MPPT charging for optimized battery performance.
- Time of use function.
- Smart Load Function.

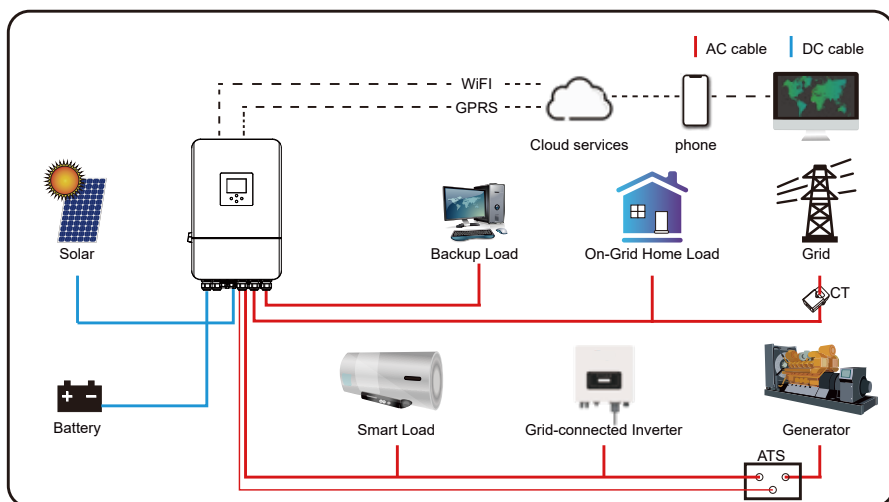
## 2.4 Basic System Architecture

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.

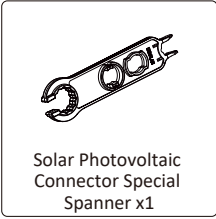
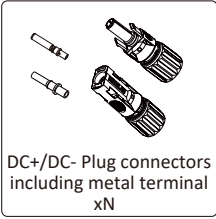
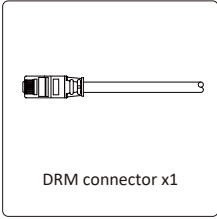
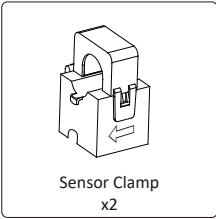
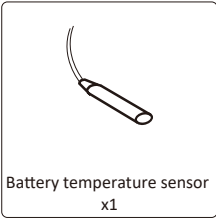
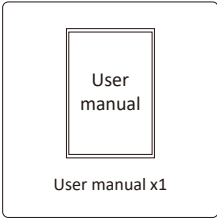
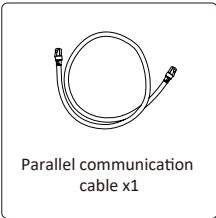
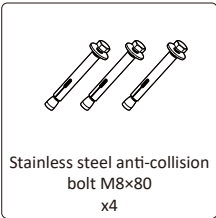
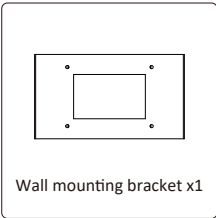
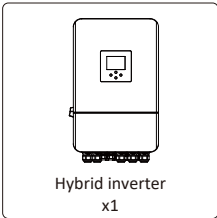
This inverter can power all kinds of appliances in home or office environment, including motor type appliances such as refrigerator and air conditioner.



### 3. Installation

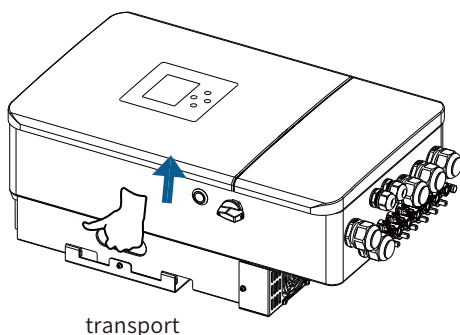
#### 3.1 Parts List

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



## 3.2 Product handling requirements

Lift the inverter out of the packing box and transport it to designated installation location.



### CAUTION:

Improper handling may cause personal injury!

- Arrange an appropriate number of personnel to carry the inverter according to its weight, and installation personnel should wear protective equipment such as anti-impact shoes and gloves.
- Placing the inverter directly on a hard ground may cause damage to its metal enclosure. Protective materials such as sponge pad or foam cushion should be placed underneath the inverter.
- Move the inverter by one or two people or by using a proper transport tool.
- Move the inverter by holding the handles on it. Do not move the inverter by holding the terminals.

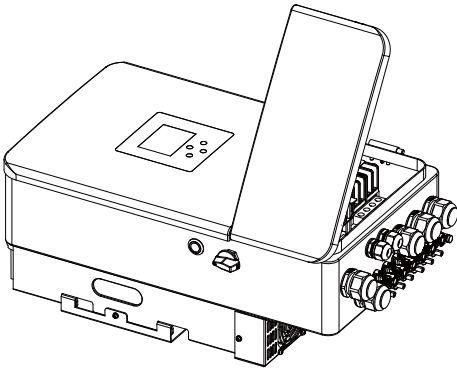
## 3.3 Mounting instructions

### 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 3000 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:



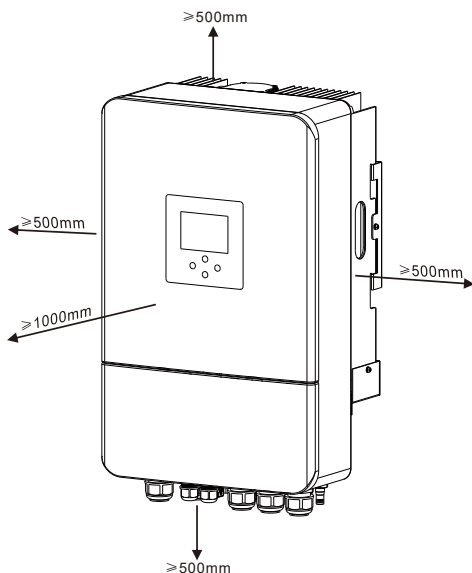
### Installations Tools

Installation tools can refer to the following recommended ones. Also, use other auxiliary tools on site.

|                         |                     |               |                  |            |                                 |                        |
|-------------------------|---------------------|---------------|------------------|------------|---------------------------------|------------------------|
|                         |                     |               |                  |            |                                 |                        |
| Protective goggles      | Anti-dust mask      | Earplugs      | Work gloves      | Work shoes | Utility Knife                   | Slotted screwdriver    |
|                         |                     |               |                  |            |                                 |                        |
| Cross screwdriver       | Percussion drill    | Pliers        | Marker           | Level      | Rubber hammer                   | socket wrenches set    |
|                         |                     |               |                  |            |                                 |                        |
| Anti-static wrist strap | Wire cutter         | Wire stripper | Hydraulic pliers | Heat gun   | Crimping tool4-6mm <sup>2</sup> | Solar connector wrench |
|                         |                     |               |                  |            |                                 |                        |
| Multimeter ≥1100 Vdc    | RJ45 crimping plier | Cleaner       |                  |            |                                 |                        |

## 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  $-40^{\circ}\text{C}$  to  $60^{\circ}\text{C}$  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.

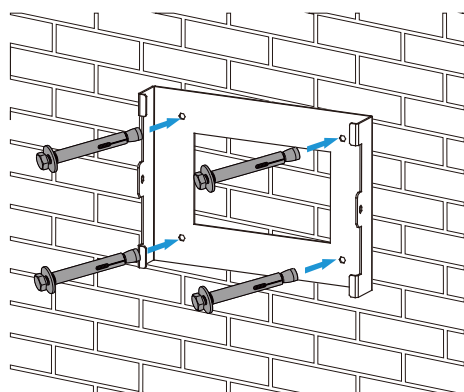


For proper air circulation to dissipate heat, allow a clearance of approx. 50cm to the side and approx. 50cm above and below the unit. And 100cm to the front.

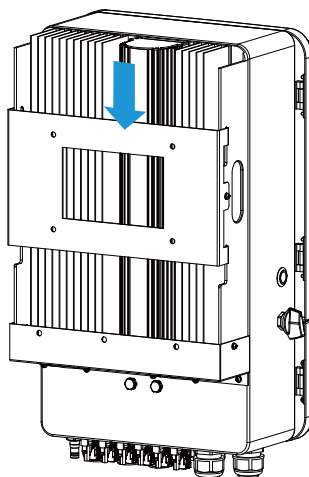
## Mounting the inverter

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, 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



### 3.4 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> |
|--------------|------------------|------------------------------|
| 5/6kW        | 4AWG             | 16                           |
| 8kW          | 2AWG             | 25                           |
| 10/12kW      | 1AWG             | 35                           |

Chart 3-2 Cable size



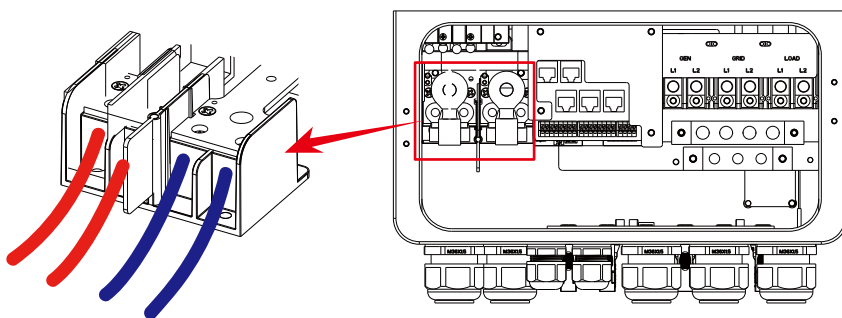
All wiring must be performed by a professional person.



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 5.2 N.M in clockwise direction
3. Make sure polarity at both the battery and inverter is correctly connected.



For 5/6/8/10/12kW model,  
battery connector screw size: M6

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.

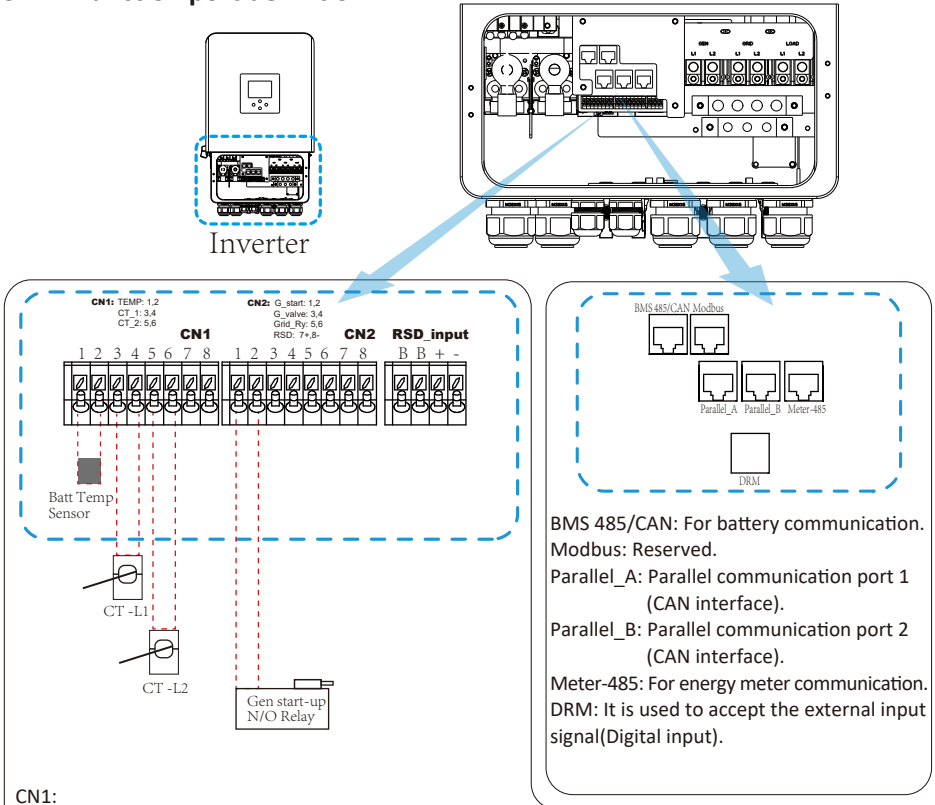


Installation must be performed with care.



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.

### 3.4.1 Function port definition



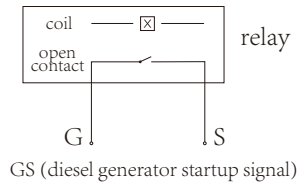
**CN1:**

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 split phase system.  
CT\_L2 (5,6): current transformer (CT2) for "zero export to CT" mode clamps on L2 when in split phase system.

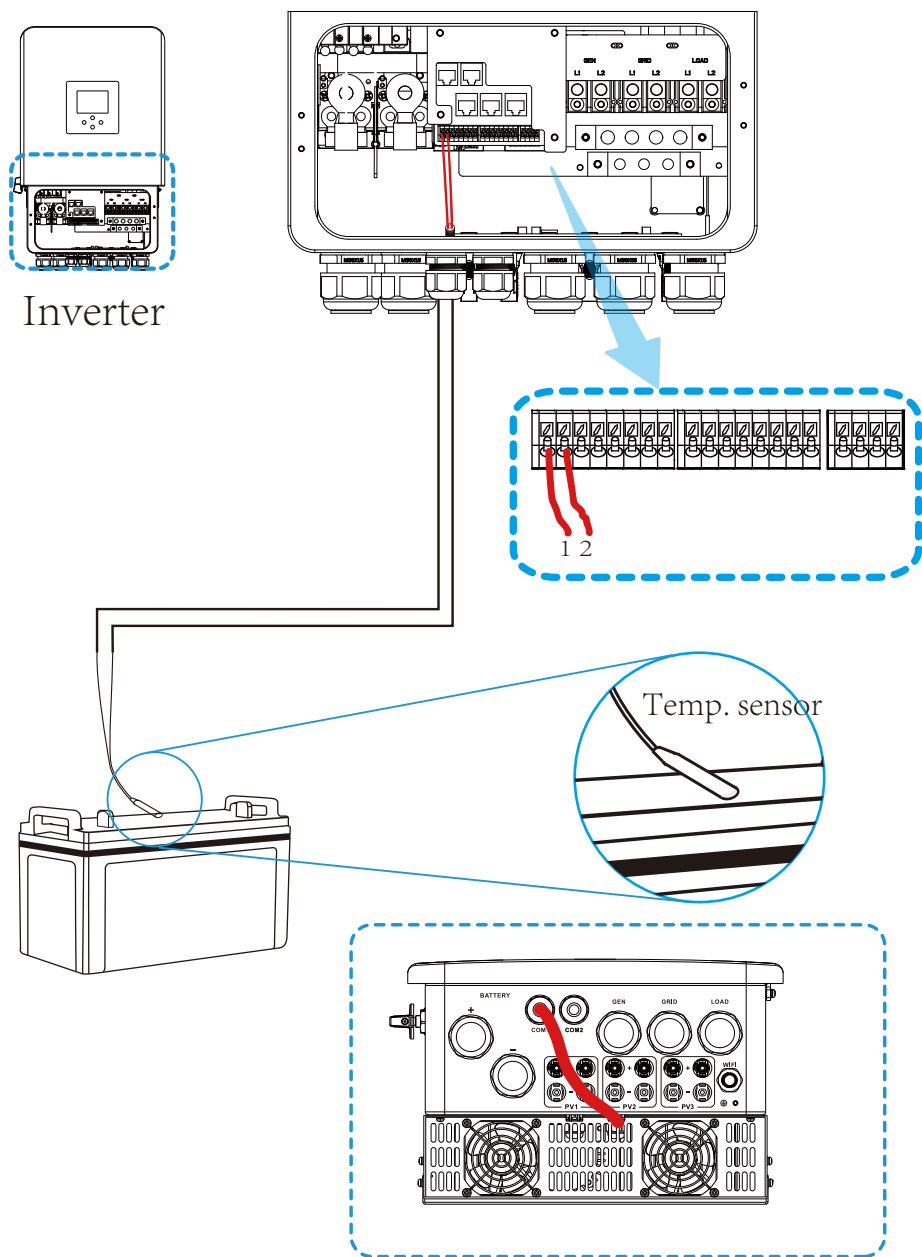
**CN2:**

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): Dry contact output. When the inverter is in off-grid mode and the "signal island mode" is checked, the dry contact will switch on.  
Grid\_Ry (5,6): reserved.  
RSD (7+,8-): When battery is connected and the inverter is in "ON" status, it will provide 12Vdc.

RSD\_Short Signal/RSD\_Voltage Signal(B,B/+, -): when the terminal "B" & "B" is short-circuited with additional wire connection, or there's 12Vdc input at the terminal "+ & -", then the 12Vdc of RSD+ & RSD- will disappear immediately, and the inverter will shutdown immediately.



3.4.2 Temperature sensor connection for lead-acid battery



### 3.5 Grid connection and backup load connection

- Before connecting to the grid, a separate AC breaker must be installed between the inverter and the grid, and also between the backup load and the inverter. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current. For the 5/6/8/10/12kW model, the recommended AC breaker for backup load is 150A. For the 5/6/8/10/12kW model, the recommended AC breaker for grid is 150A.
- There are three terminal blocks with "Grid" "Load" and "GEN" markings. Please do not misconnect input and output connectors.



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

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.

Grid connection and backup load connection (Copper wires)

| Model   | Wire Size | Cable(mm <sup>2</sup> ) |
|---------|-----------|-------------------------|
| 5/6kW   | 10AWG     | 5.3                     |
| 8kW     | 8AWG      | 8.4                     |
| 10/12kW | 6AWG      | 13.3                    |

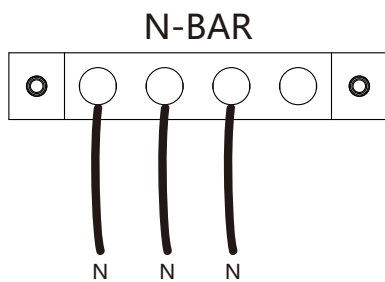
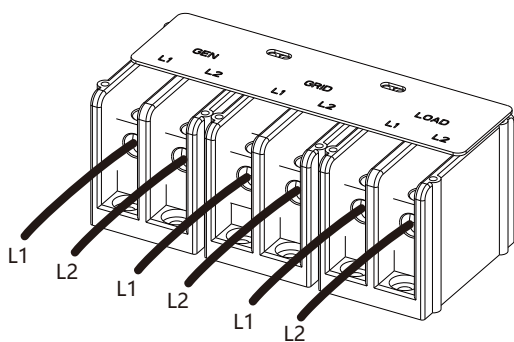
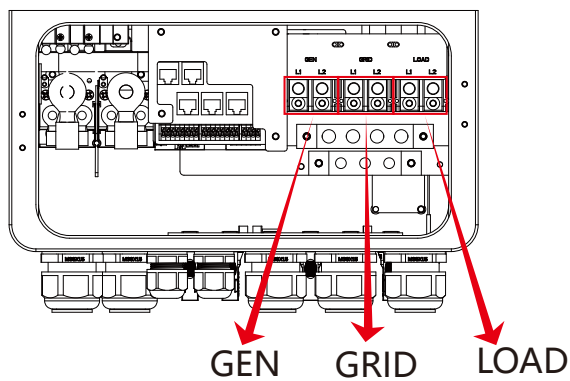
Grid connection and backup load connection (Copper wires) (bypass)

| Model         | Wire Size | Cable(mm <sup>2</sup> ) |
|---------------|-----------|-------------------------|
| 5/6/8/10/12kW | 1AWG      | 42.4                    |

Chart 3-3 Recommended Size for AC wires

#### Please follow below steps to implement AC input/output connection:

1. Before making Grid, load and Gen port connection, be sure to turn off AC breaker or disconnect 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

### 3.6 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            | 2.5                           |

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.

### 3.6.1 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               | 370V (125V-500V) |            |            |             |             |
| PV Array MPPT Voltage Range    | 150V-425V        |            |            |             |             |
| No. of MPP Trackers            | 2                |            |            | 3           |             |
| No. of Strings per MPP Tracker | 2+2              |            |            | 2+2+2       |             |

Chart 3-5

### 3.6.2 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.



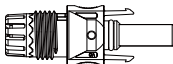
**Safety Hint:**

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

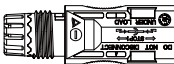


**Safety Hint:**

Before connecting inverter, please make sure the PV array open circuit voltage is within the 500V of the inverter.



Pic 3.1 DC+ male connector



Pic 3.2 DC- female connector

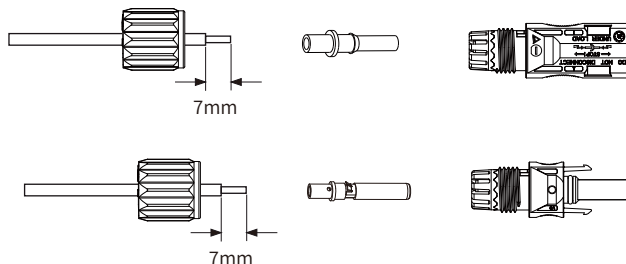


**Safety Hint:**

Please use approved DC cable for PV system.

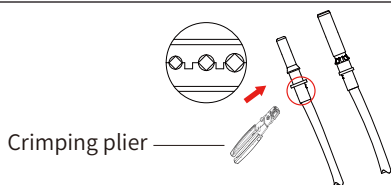
The steps to assemble the DC connectors are listed as follows:

a) Strip off the DC wire about 7mm, disassemble the connector cap nut (see picture 3.3).



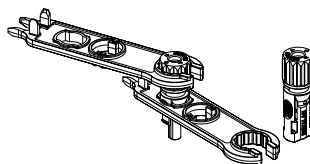
Pic 3.3 Disassemble the connector cap nut

b) Crimping metal terminals with crimping pliers as shown in picture 3.4.



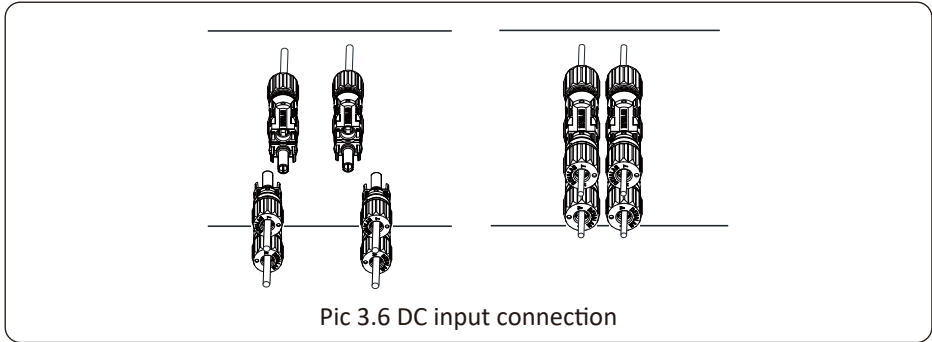
Pic 3.4 Crimp the contact pin to the wire

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 3.5).



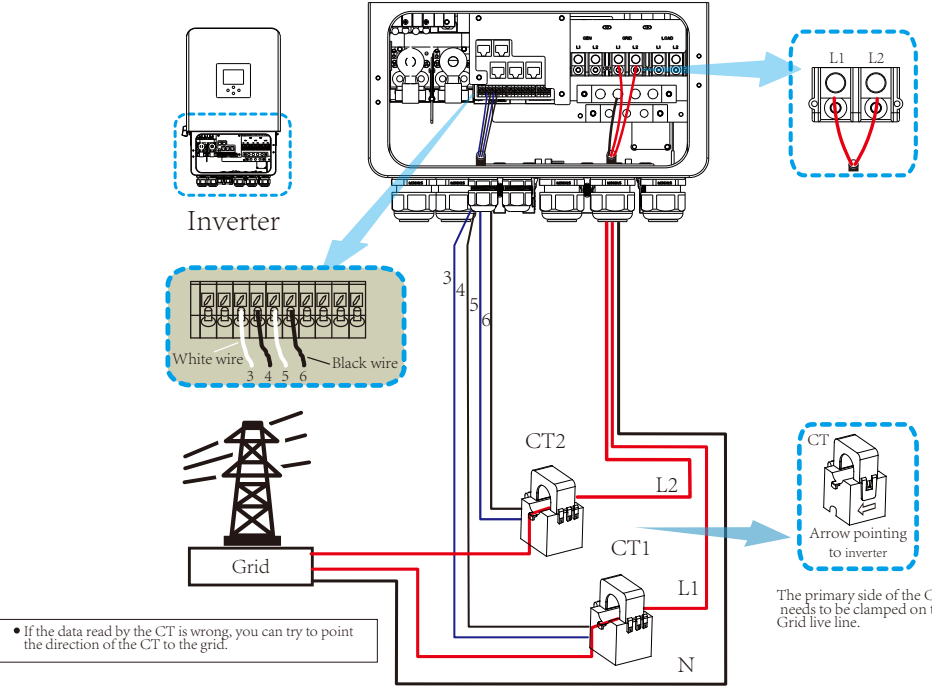
Pic 3.5 connector with cap nut screwed on

d) Finally insert the DC connector into the positive and negative input of the inverter, shown as picture 3.6.

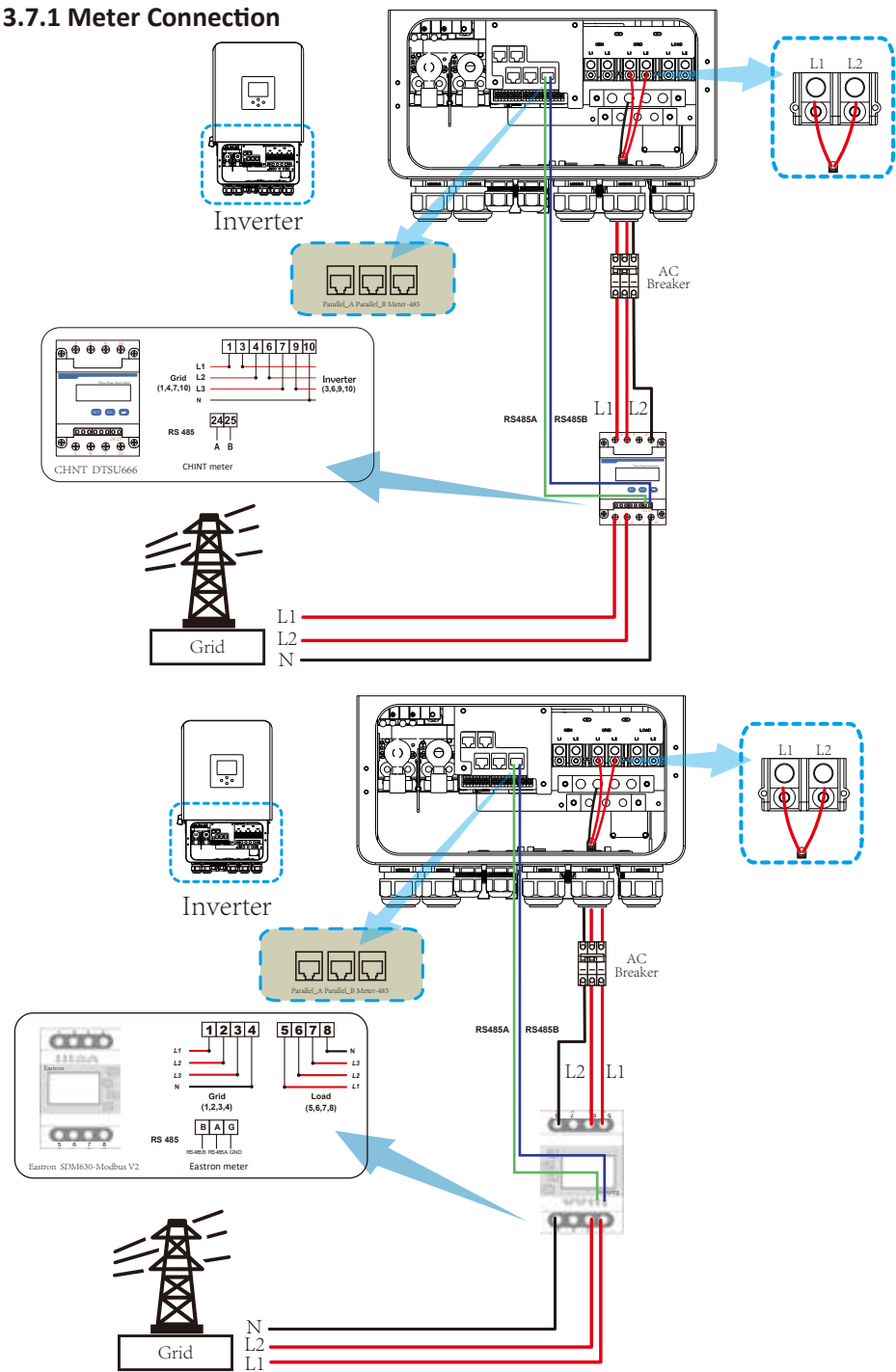


**Warning:** Sunlight shines on the panel will generate voltage, high voltage in series may cause danger to life. Therefore, before connecting the DC input line, the solar panel needs to be blocked by the opaque material and the DC switch should be 'OFF', otherwise, the high voltage of the inverter may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

### 3.7 CT Connection



3.7.1 Meter Connection

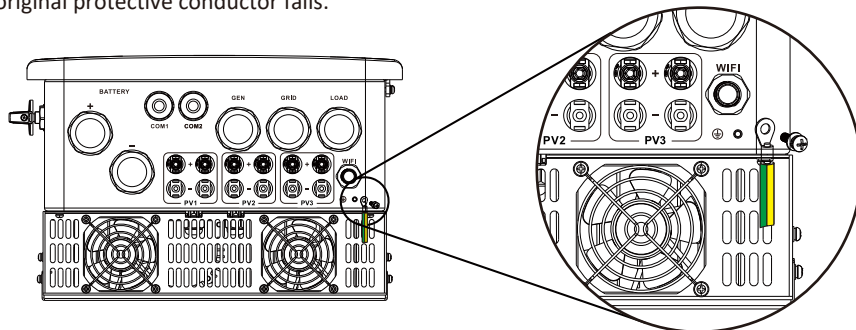


**Note:**

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

### 3.8 Earth Connection(mandatory)

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



Earth connection (Copper wires)

| Model   | Wire Size | Cable(mm <sup>2</sup> ) |
|---------|-----------|-------------------------|
| 5/6kW   | 6AWG      | 13.3                    |
| 8kW     | 4AWG      | 21.2                    |
| 10/12kW | 2AWG      | 33.6                    |

Earth connection (Copper wires) (bypass)

| Model   | Wire Size | Cable(mm <sup>2</sup> ) |
|---------|-----------|-------------------------|
| 5/6kW   | 6AWG      | 13.3                    |
| 8kW     | 4AWG      | 21.2                    |
| 10/12kW | 2AWG      | 33.6                    |

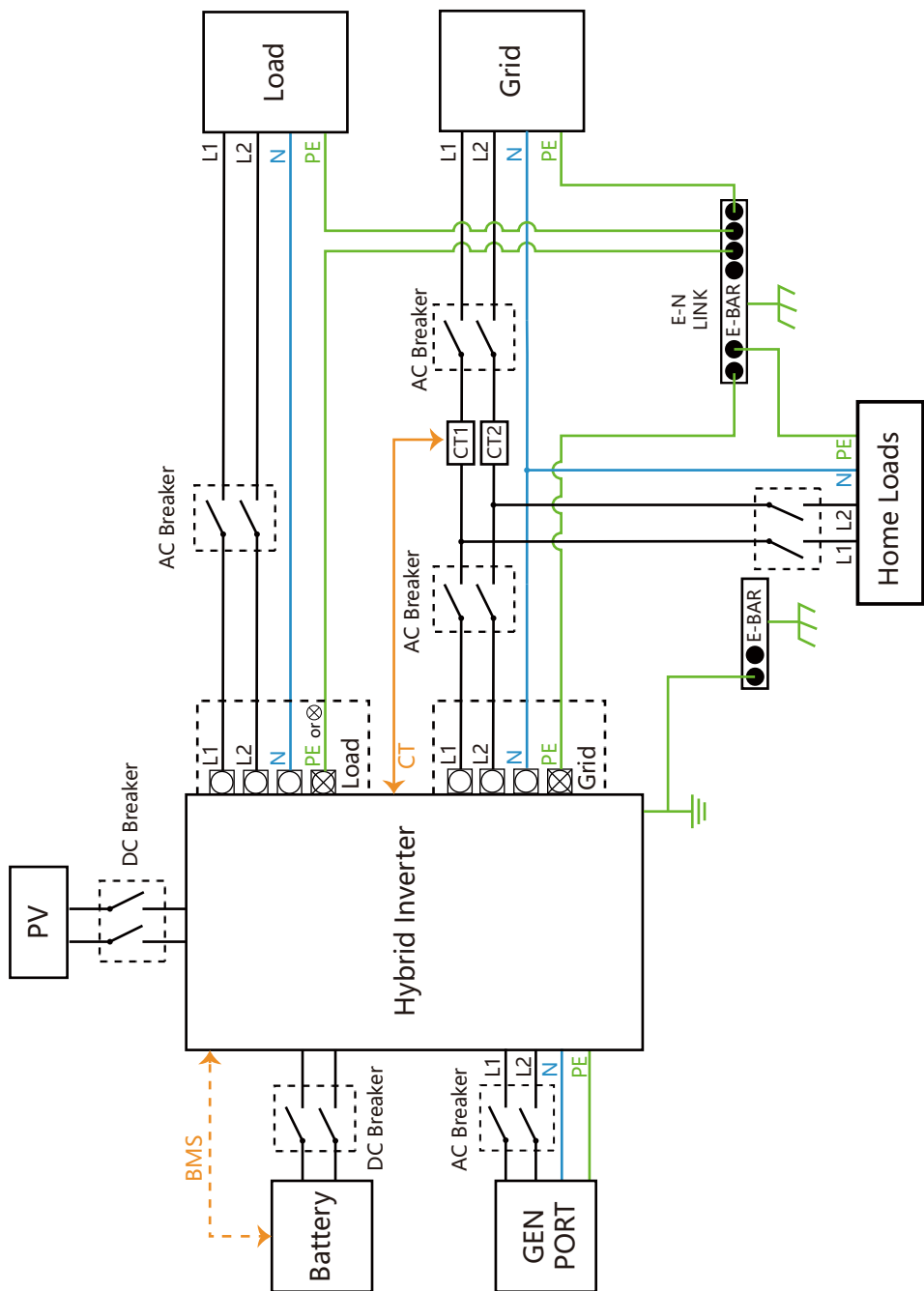
**Warning:**

Inverter has built-in leakage current detection circuit, The type A RCD can be connected to the inverter for protection according to the local laws and regulations. If an external leakage current protection device is connected, its operating current must be equal to 300 mA or higher, otherwise inverter may not work properly.

### 3.9 WIFI Connection

This series inverter has built-in WIFI modular which is able to connect Wi-Fi router directly.

3.10 Wiring System for Inverter



3.11 Typical application diagram of diesel generator

