



# Hybrid Inverter

**SUN-14K-SG05LP3-AU-SM2**

**SUN-15K-SG05LP3-AU-SM2**

**SUN-16K-SG05LP3-AU-SM2**

**SUN-18K-SG05LP3-AU-SM2**

**SUN-20K-SG05LP3-AU-SM2**

## 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

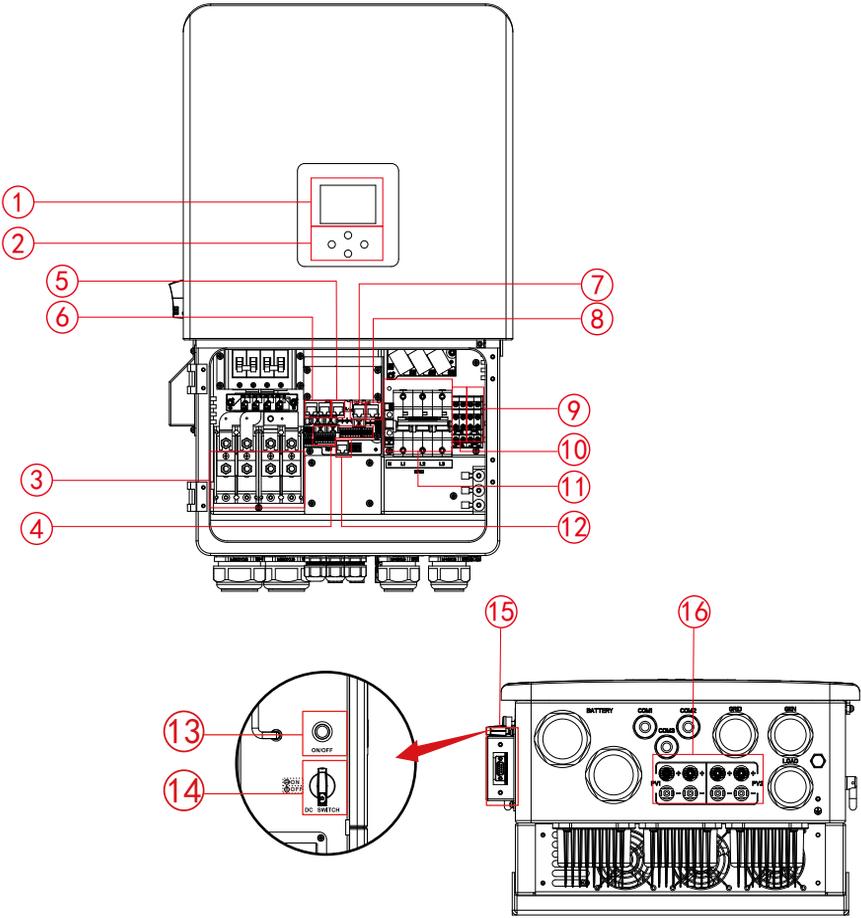
Label	Description
	Caution, risk of electric shock symbol indicates important safety instructions, which if not correctly followed, could result in electric shock.
	The DC input terminals of the inverter must not be grounded.
	Surface high temperature, Please do not touch the inverter case.
	The AC and 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
	RCM 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.

- 
- 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 Introductions**

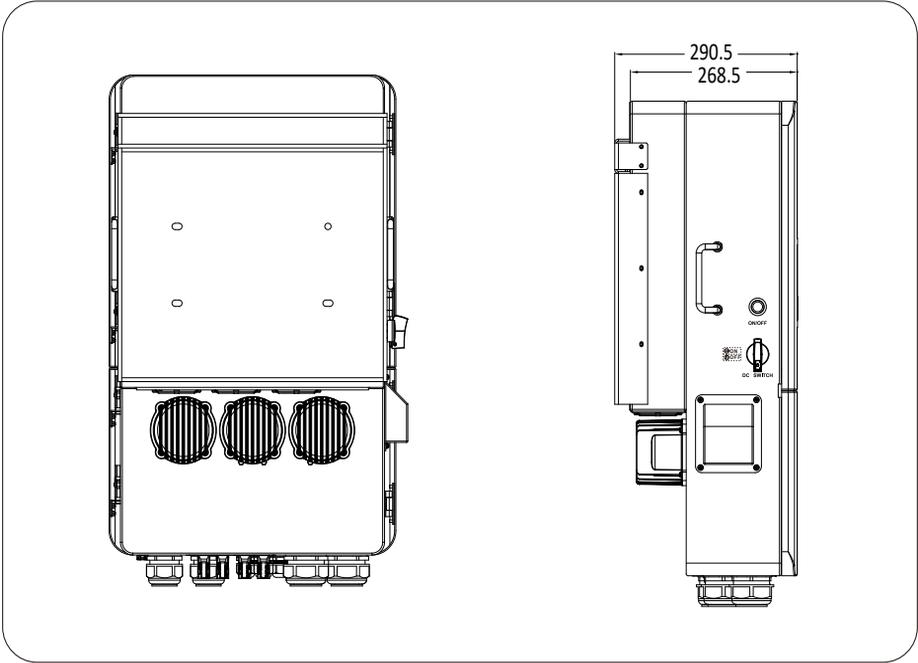
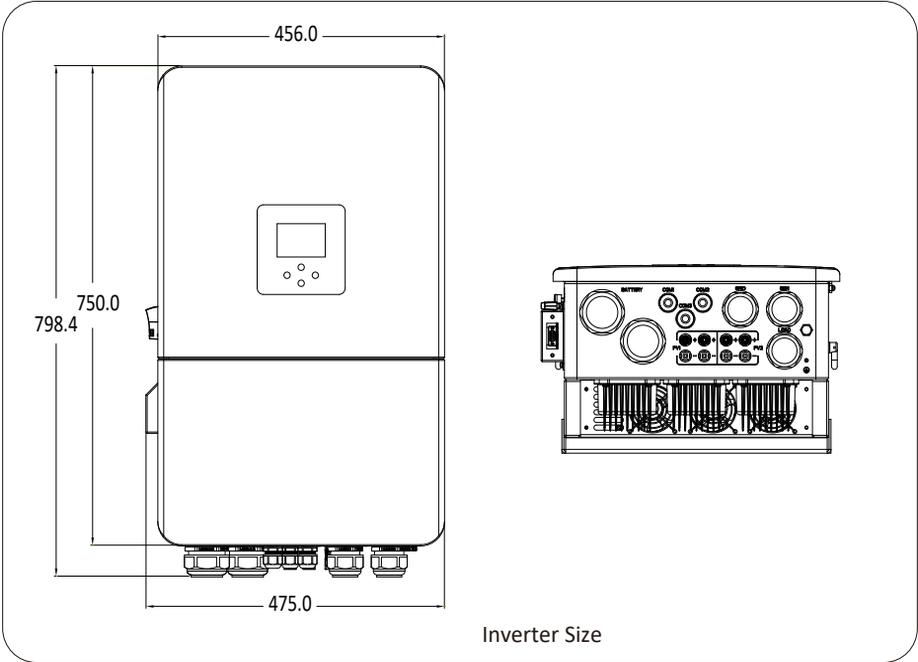
This is a multifunctional inverter, combining functions of inverter, solar charger and battery charger to offer uninterruptible power support with portable size. Its comprehensive LCD display offers user configurable and easy accessible button operation such as battery charging, AC/solar charging, and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

## 2.1 Product Overview



- |                             |                    |                         |
|-----------------------------|--------------------|-------------------------|
| 1: LCD display              | 6: Paralle port    | 11: Grid                |
| 2: Function buttons         | 7: Modbus port     | 12: DRM port            |
| 3: Battery input connectors | 8: BMS port        | 13: Power on/off button |
| 4: Function port            | 9: Generator input | 14: DC switch           |
| 5: Meter-485 port           | 10: Load           | 15: WiFi Interface      |
|                             |                    | 16: PV input            |

## 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 of MPPT 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

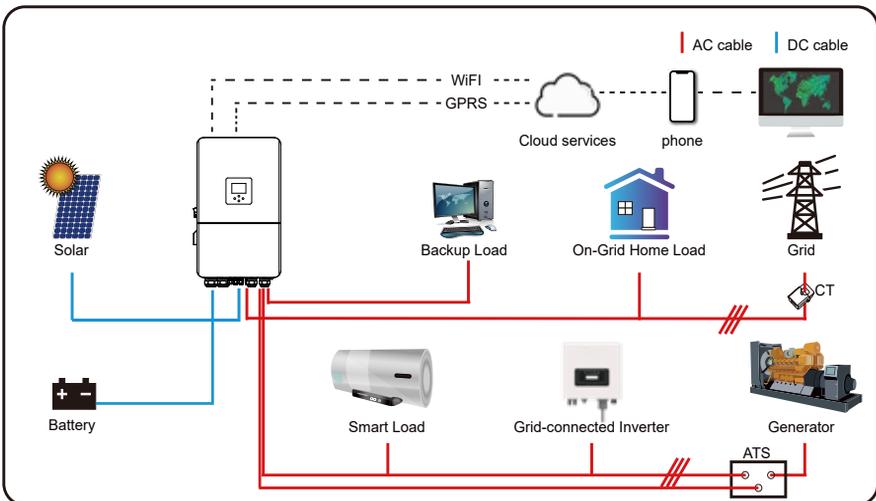
Consult with your system integrator for other possible system architectures depending on your requirements.

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

## 2.5 Maintenance of the System

The inverter is low maintenance, however, it is important that at least twice a year (for dusty environments this may need to be carried out weekly) all the cooling fans, air ducts are cleaned and dust free. Check if there are no fault codes and Lithium battery communication is correct.

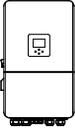
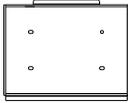
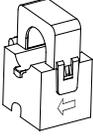
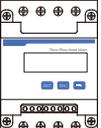
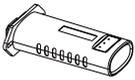
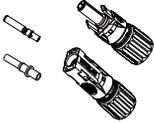
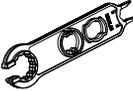
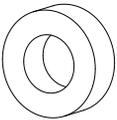
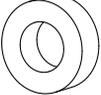
Weekly cleaning statement: Suggest micromesh filters as an available option.



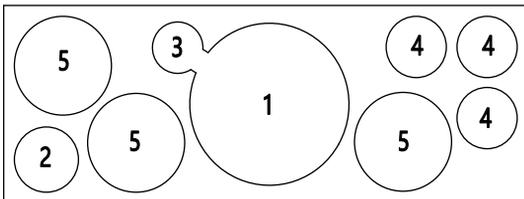
### 3. Installation

#### 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:

 <p>Hybrid inverter x1</p>	 <p>Wall mounting bracket x1</p>	 <p>Stainless steel anti-collision bolt M8x80 x4</p>	 <p>Parallel communication cable x1</p>
 <p>Sensor Clamp x3</p>	 <p>Battery temperature sensor x1</p>	 <p>User manual User manual x1</p>	 <p>Meter (optional) x1</p>
 <p>Datalogger (optional) x1</p>	 <p>DC+/DC- Plug connectors including metal terminal xN</p>	 <p>Solar Photovoltaic Connector Special Spanner x1</p>	<p>1</p>  <p>Magnetic ring for battery x2</p>
<p>2</p>  <p>Magnetic ring for BMS and Meter communication cable x2</p>	<p>3</p>  <p>Magnetic ring for external temperature sensor x1</p>	<p>4</p>  <p>Magnetic ring x3</p>	<p>5</p>  <p>Magnetic ring for AC wires x3</p>

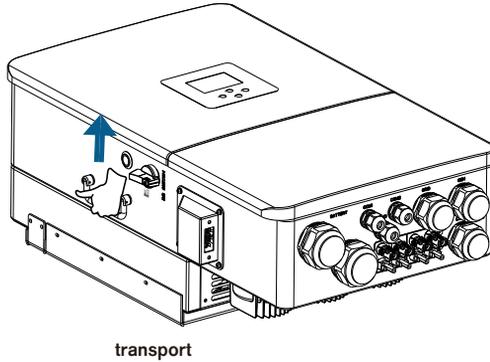
#### Packing box of magnetic ring



- \*1: 78x51x22 mm
- 2: 33x23x15 mm
- 3: 25.9x28x13 mm
- 4: 31x29x19 mm
- 5: 55.5x33x23 mm

## 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.

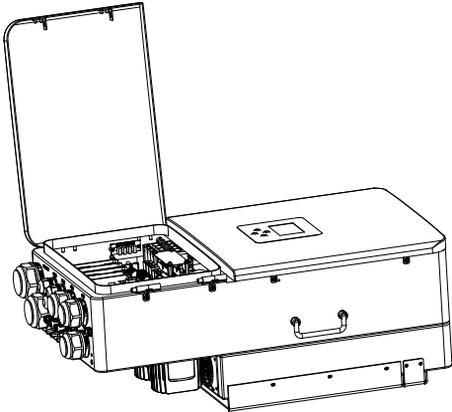
## 3.3 Mounting instructions

### Installation Precaution

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

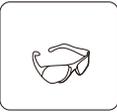
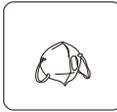
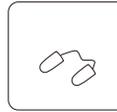
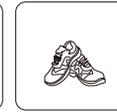
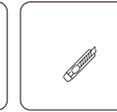
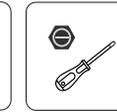
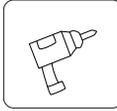
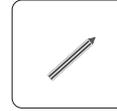
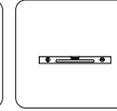
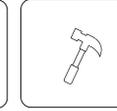
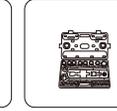
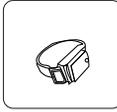
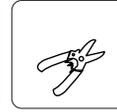
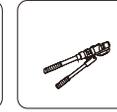
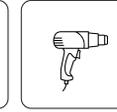
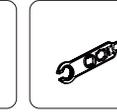
- Not in direct sunlight
- Not in areas where highly flammable materials are stored.
- Not in potential explosive areas.
- Not in the cool air directly.
- Not near the television Antenna or antenna cable.
- Not higher than altitude of about 3000 meters above sea level.
- Not in environment of precipitation 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:



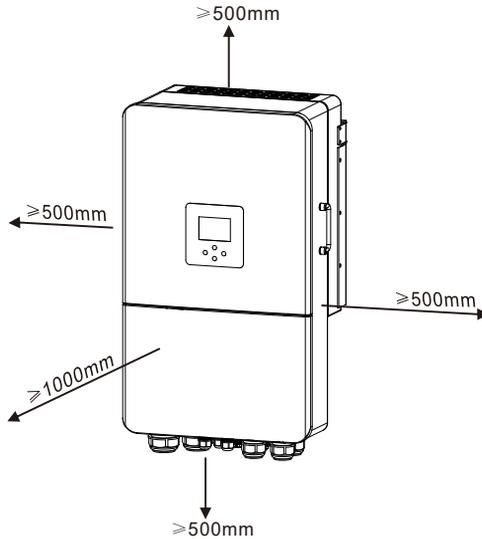
### Installations Tools

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 tool <sup>4-6mm<sup>2</sup></sup>	Solar connector wrench
						
Multimeter $\geq 1100$ 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  $-40\sim 60\text{ }^{\circ}\text{C}$  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.

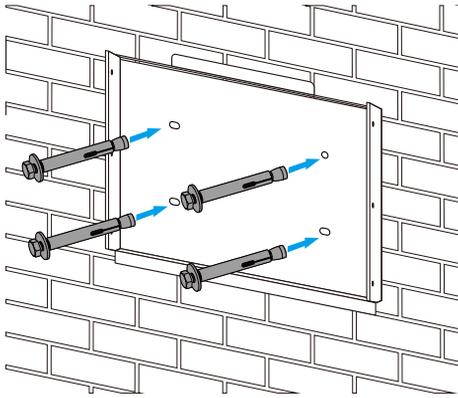


For proper air circulation to dissipate heat, allow a clearance of approx. 50cm to the side and approx. 50cm above and below the unit. And 100cm to the front.

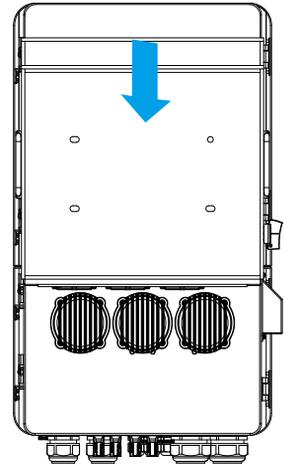
## Mounting the inverter

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



### 3.4 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>	<i>Torque value(max)</i>
14/15/16kW	0AWG	50	24.5Nm
18/20kW	3/0AWG	70	24.5Nm

Chart 3-2 Cable size



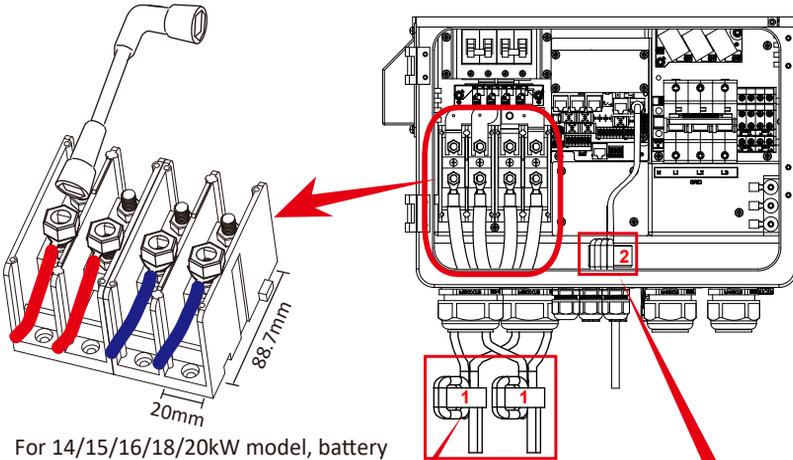
All wiring must be performed by a professional person.



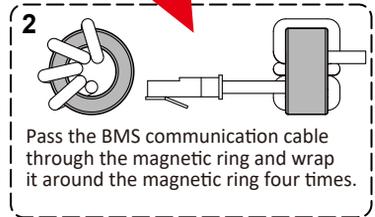
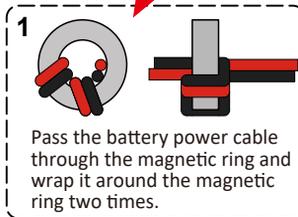
Connecting the battery with a suitable cable is important for safe and efficient operation of the system. To reduce the risk of injury, refer to Chart 3-2 for recommended cables.

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 14/15/16/18/20kW model, battery connector screw size: M8



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.

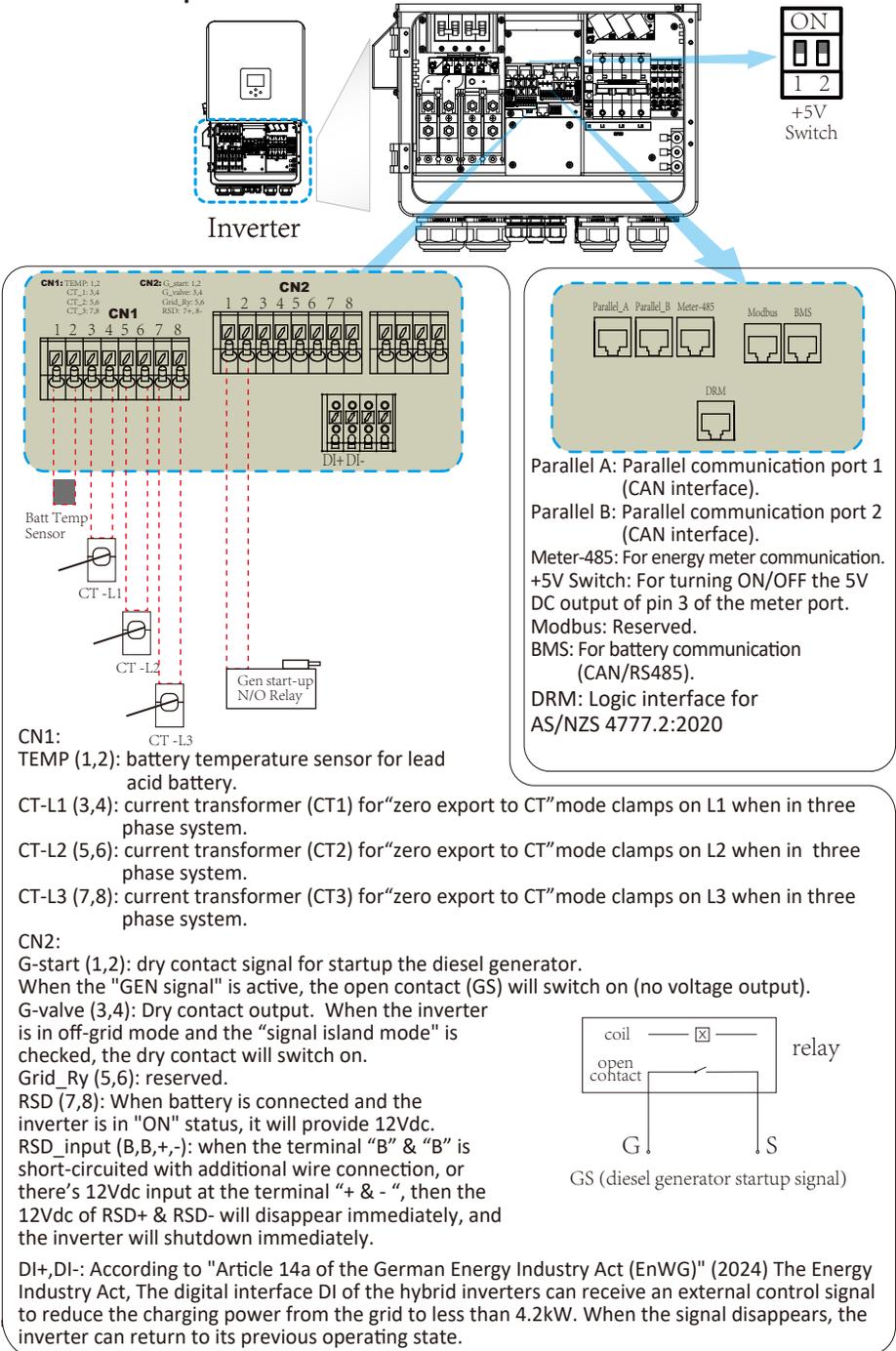


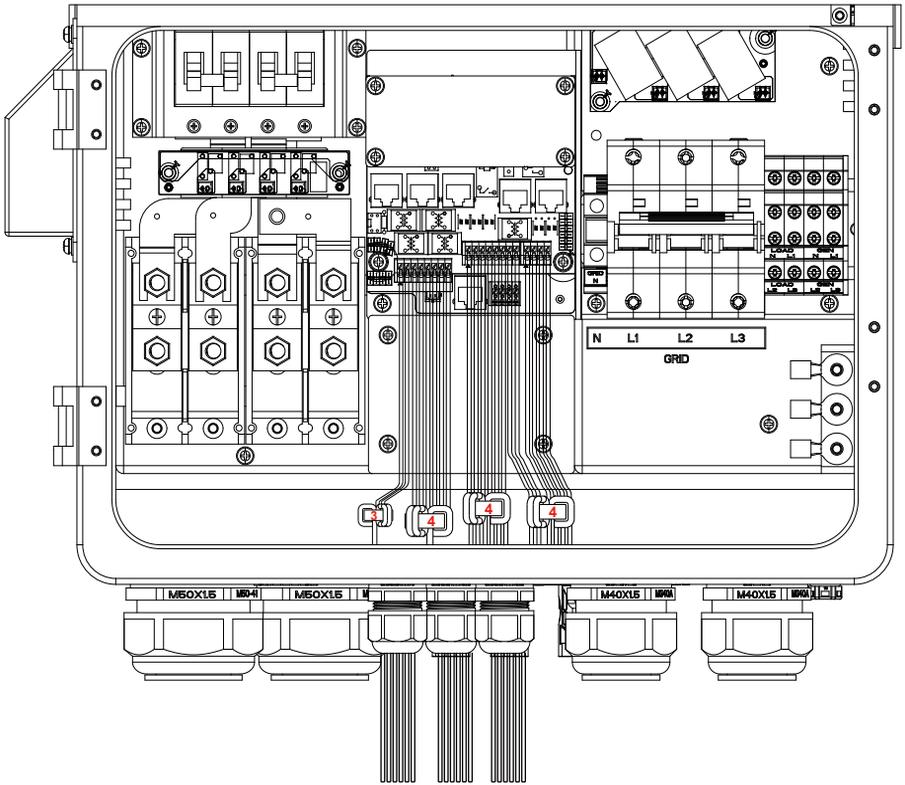
Installation must be performed with care.



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.

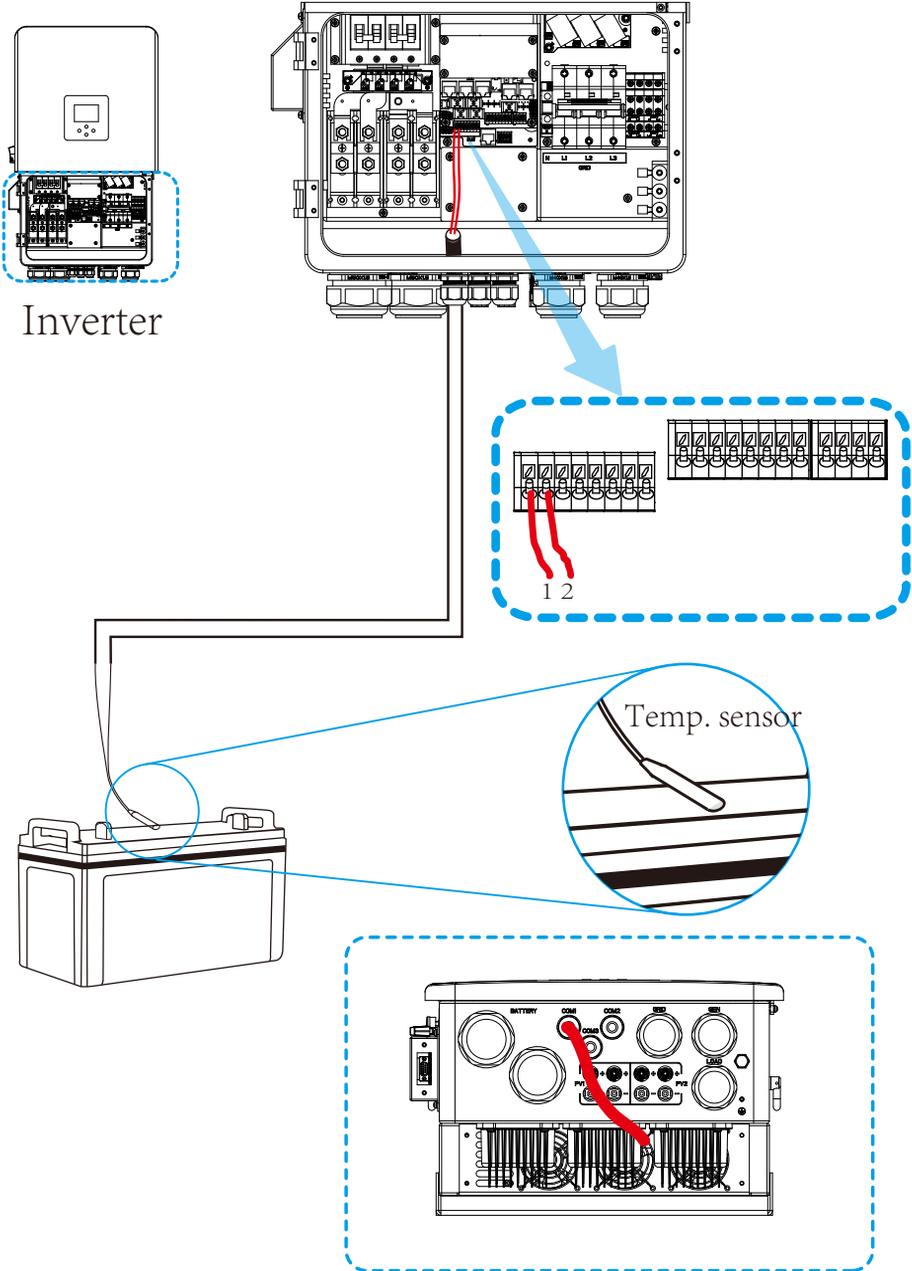
### 3.4.2 Function port definition





No.	Function Port	Installation Instructions
<b>3</b>	TEMP (1,2)	Wrap the wires three laps around the magnetic ring, then thread the end of wires through the magnetic ring.
<b>4</b>	CT_1 (3,4) CT_2 (5,6) CT_3 (7,8)	Wrap the wires three laps around the magnetic ring, then thread the end of wires through the magnetic ring.
<b>4</b>	G_start (1,2) G_valve (3,4) Grid_Ry (5,6)	Wrap the wires three laps around the magnetic ring, then thread the end of wires through the magnetic ring.
<b>4</b>	RSD (7,8) RSD_input (B,B,+,-)	Wrap the wires three laps around the magnetic ring, then thread the end of wires through the magnetic ring.

### 3.4.3 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. The recommended of AC breaker for the load port is 100A for 14/15/16/18/20kW. The recommended of AC breaker for the grid port is 100A for 14/15/16/18/20kW.
- 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)

<i>Model</i>	<i>Wire Size</i>	<i>Cable(mm<sup>2</sup> )</i>	<i>Torque value(max)</i>
14/15/16/18/20kW	6AWG	10	1.2Nm

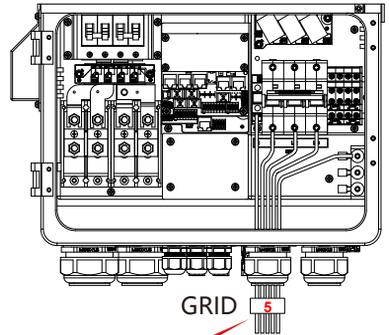
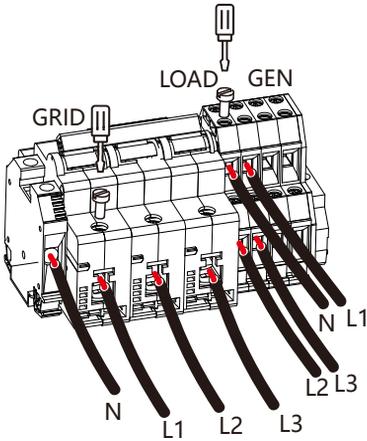
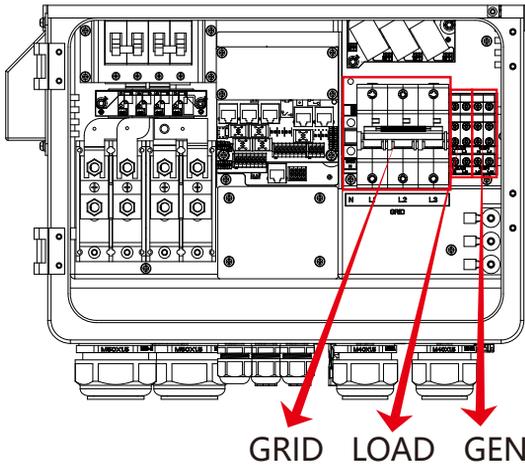
Grid connection and backup load connection (Copper wires) (bypass)

<i>Model</i>	<i>Wire Size</i>	<i>Cable(mm<sup>2</sup> )</i>	<i>Torque value(max)</i>
14/15/16/18/20kW	4AWG	16	1.2Nm

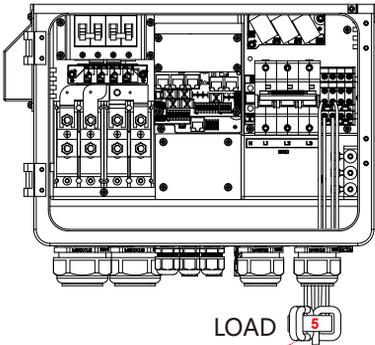
Chart 3-3 Recommended Size for AC wires

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

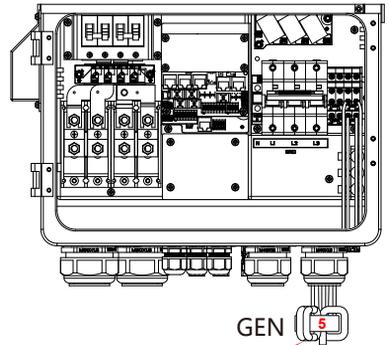
1. Before making Grid, load and Gen port connection, be sure to turn off AC breaker or disconnecter first.
2. Remove insulation sleeve 10mm length, unscrew the bolts. Thread the wires through the magnetic ring firstly, then insert these wires into the terminals according to polarities indicated on the terminal block. Tighten the terminal screws and make sure the wires are completely and safely connected.



**5**  
Thread the 5 wires of Grid terminal through the magnetic ring.



**5**  
Wrap the 4 wires of Load port one laps around the magnetic ring, then thread the end of wires through the magnetic ring.



**5**  
Wrap the 4 wires of GEN port one laps around the magnetic ring, then thread the end of wires through the magnetic ring.



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>
14/15/16/18/20kW	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>SUN-14K-SG05LP3-AU-SM2</i>	<i>SUN-15K-SG05LP3-AU-SM2</i>	<i>SUN-16K-SG05LP3-AU-SM2</i>	<i>SUN-18K-SG05LP3-AU-SM2</i>	<i>SUN-20K-SG05LP3-AU-SM2</i>
PV Input Voltage	550V (160V-800V)				
PV Array MPPT Voltage Range	160V-650V				
No. of MPP Trackers	2				
No. of Strings per MPP Tracker	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.



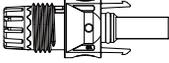
**Safety Hint:**

Before connecting inverter, please make sure the PV array open circuit voltage is within the 800V of the inverter.

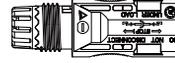


**Note:**

This inverter complies with IEC 62109-2 clause 13.9 for earth fault alarm monitoring. If an Earth Fault Alarm occurs,the inverter will not connect to the grid and will report an error F04 on its LCD.At the same time, the buzzer will sound. For the machine installed with Wi-Fi/GPRS, the alarm informa on can be seen on the corresponding monitoring website, and can also be received by the APP on the mobile phone.



Pic 3.1 DC+ male connector



Pic 3.2 DC- female connector

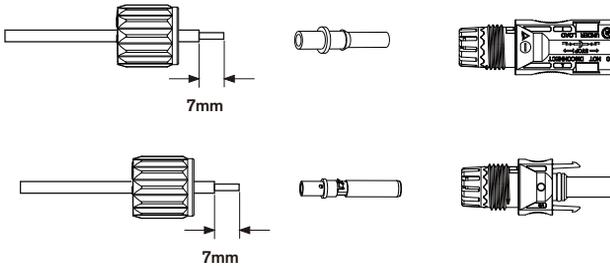


**Safety Hint:**

Please use approved DC cable for PV system.

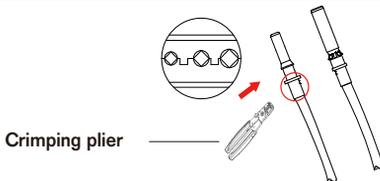
The steps to assemble the DC connectors are listed as follows:

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



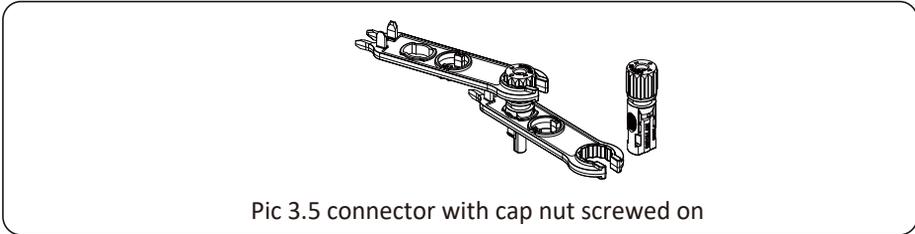
Pic 3.3 Disassemble the connector cap nut

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

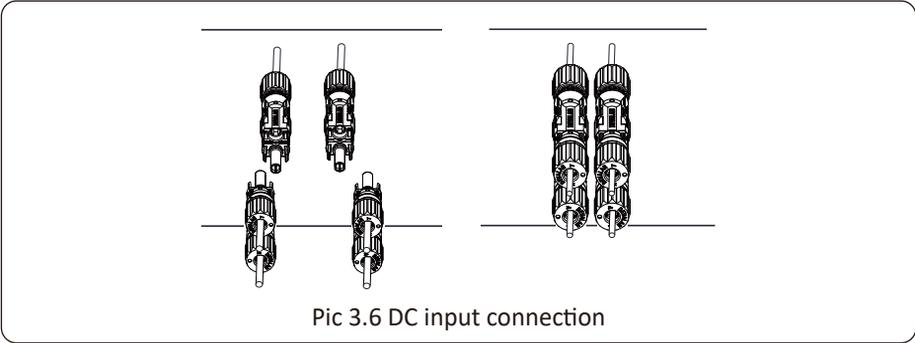


Pic 3.4 Crimp the contact pin to the wire

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).



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



**Warning:**

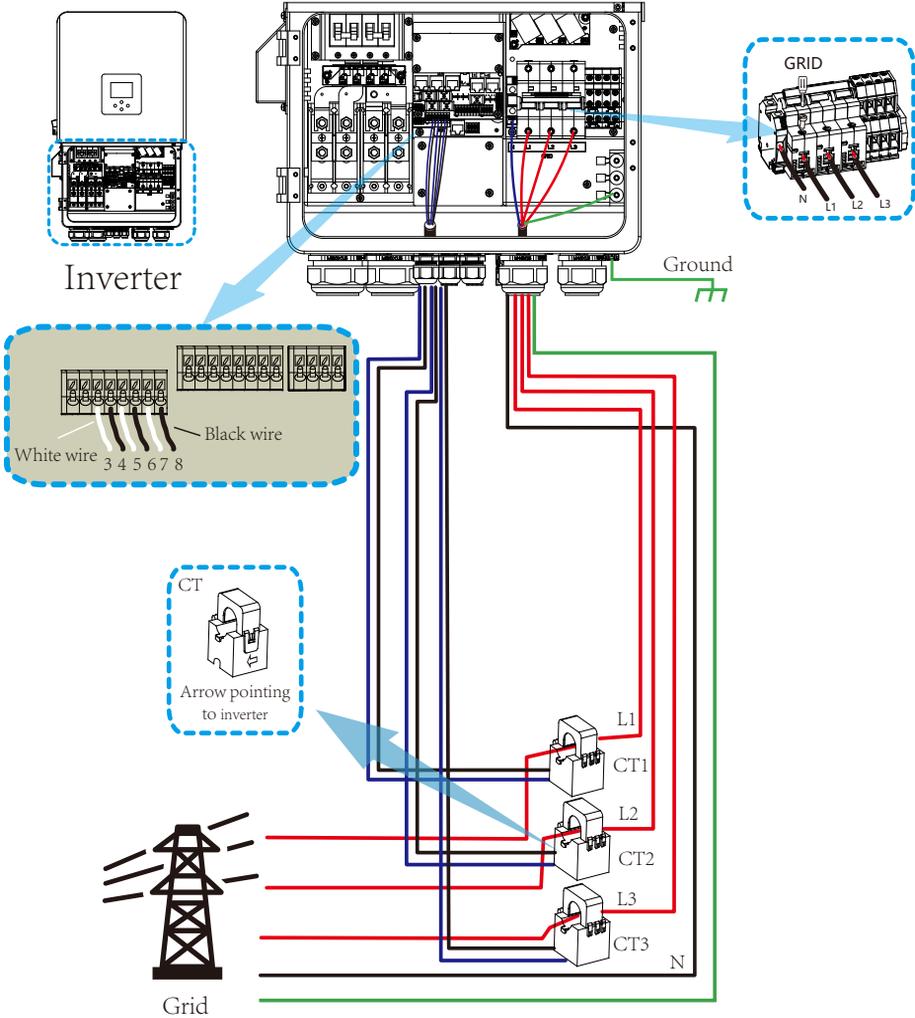
Sunlight shines on the panel will generate voltage, high voltage in series may cause danger to life. Therefore, before connecting the DC input line, the solar panel needs to be blocked by the opaque material and the DC switch should be 'OFF', otherwise, the high voltage of the inverter may lead to life-threatening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



**Warning:**

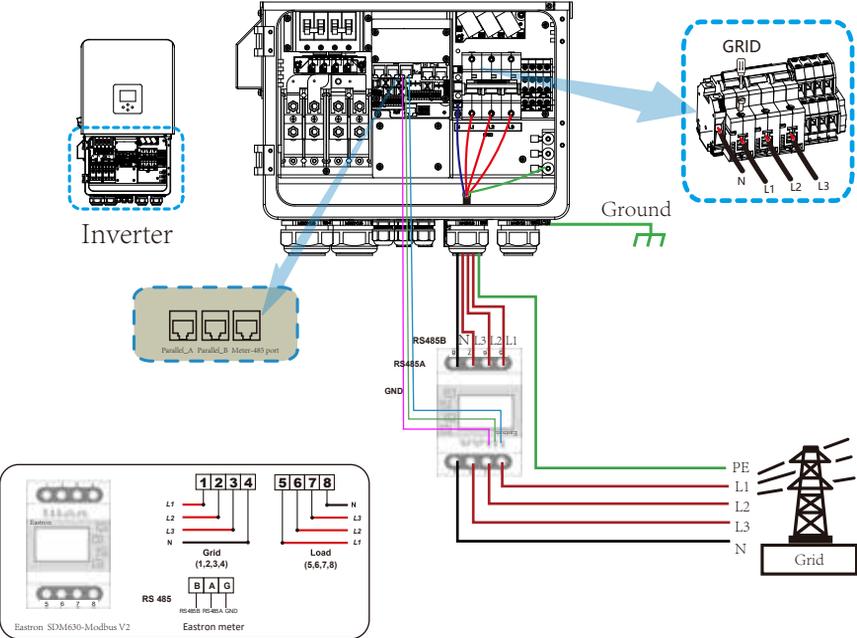
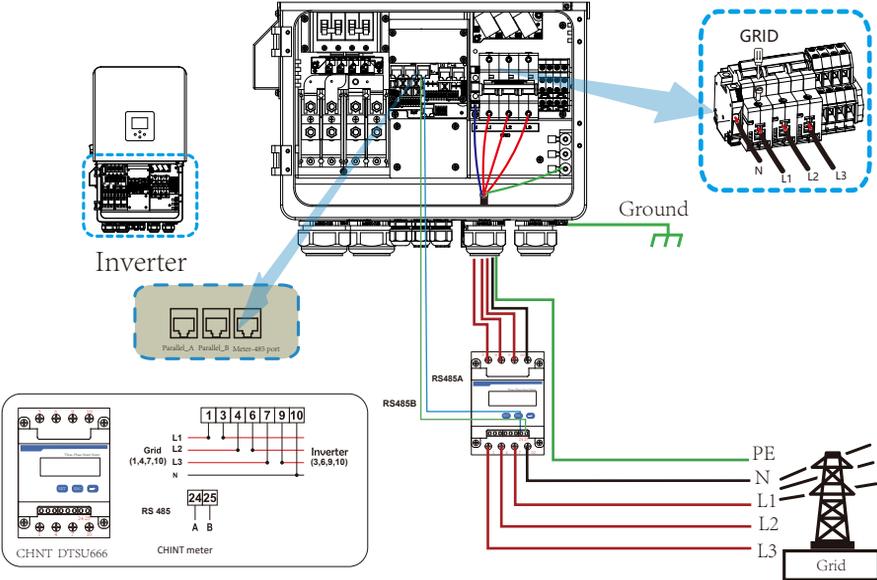
Please use its own DC power connector from the inverter accessories. Do not interconnect the connectors of different manufacturers. Max. DC input current should be 20A. if exceeds, it may damage the inverter and it is not covered by Deye warranty.

### 3.7 CT Connection



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

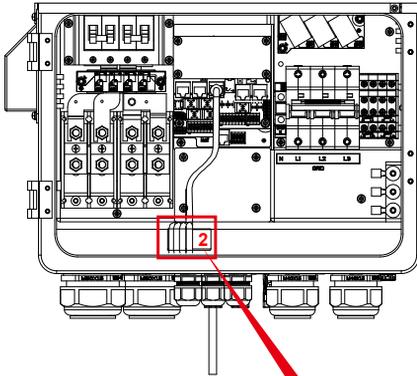
### 3.7.1 Meter Connection



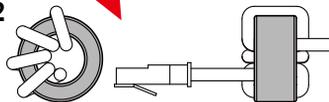


**Note:**

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



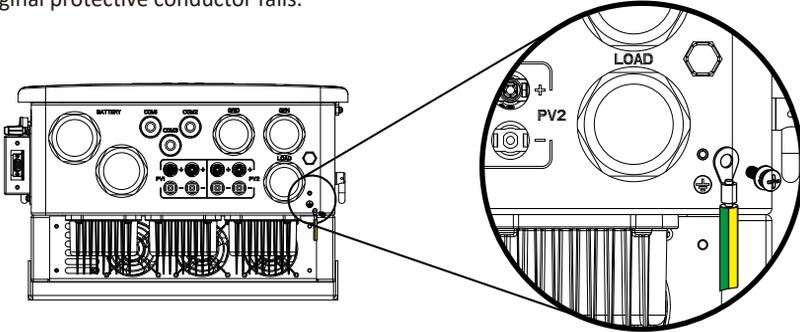
**2**



Pass the Meter communication cable through the magnetic ring and wrap it around the magnetic ring four times.

### 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)

<i>Model</i>	<i>Wire Size</i>	<i>Cable(mm<sup>2</sup>)</i>	<i>Torque value(max)</i>
14/15/16/18/20kW	6AWG	10	1.2Nm

Earth connection (Copper wires) (bypass)

<i>Model</i>	<i>Wire Size</i>	<i>Cable(mm<sup>2</sup>)</i>	<i>Torque value(max)</i>
14/15/16/18/20kW	4AWG	16	1.2Nm



**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

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.

For WIFI configuration, please check the manual of "Wi-Fi-Plug configuration manual".

For web monitoring, please visit: <https://www.deyecloud.com>.

For mobile monitoring, please scan the QR code to down load the APP.



**Deye Cloud**

All in one, Efficiency



Scan QR code to download APP



### 3.10 Communication Connection

#### 1.BMS

Please connect the cable to BMS CAN port to realize BMS communication. Otherwise, BMS communication may fail. Please refer to Annex I for the interface pin definition of BMS RJ45 port.

#### 2.DRM (Only DRM0 is available)

In Australia and New Zealand, the inverter supports the demand response modes as specified in the standard AS/NZS 4777. Please refer to Annex I for the interface pin definition of DRM RJ45 port.

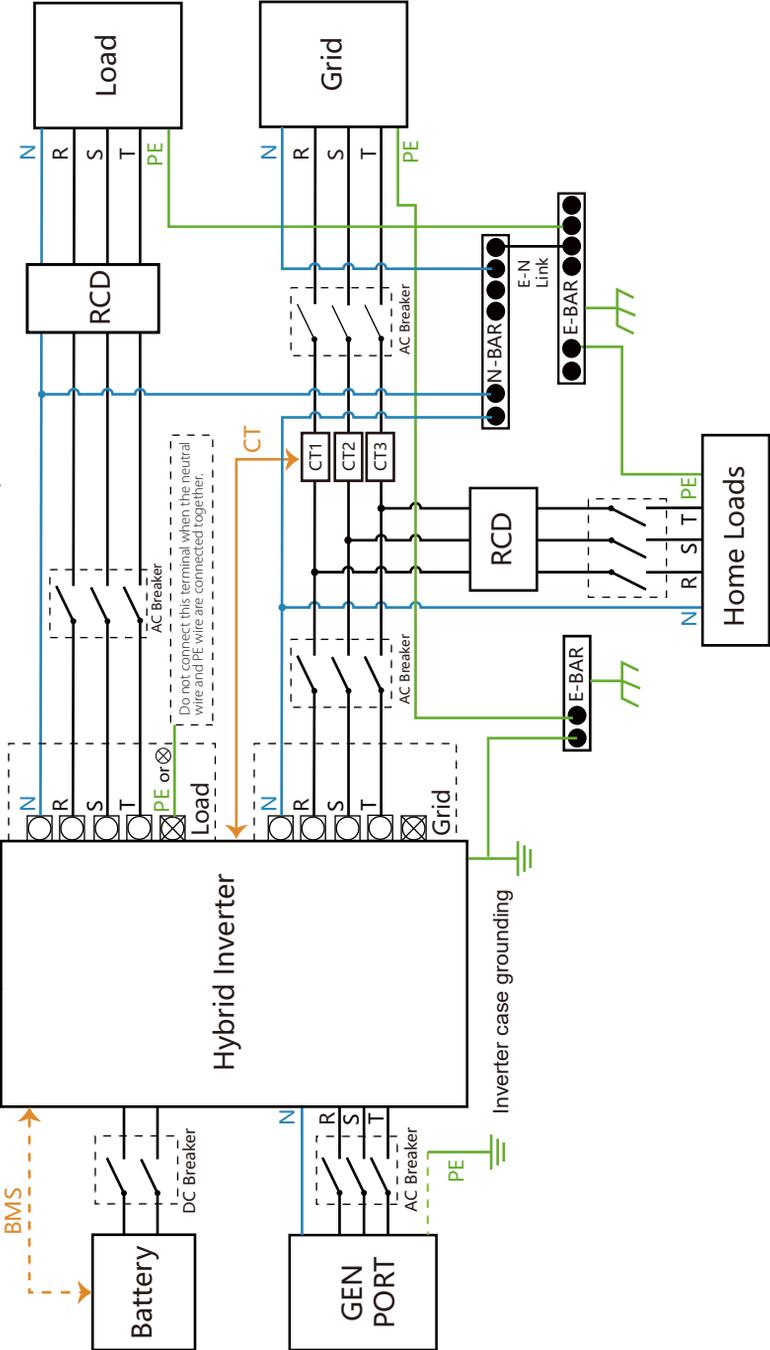
### 3.11 Wiring System for Inverter

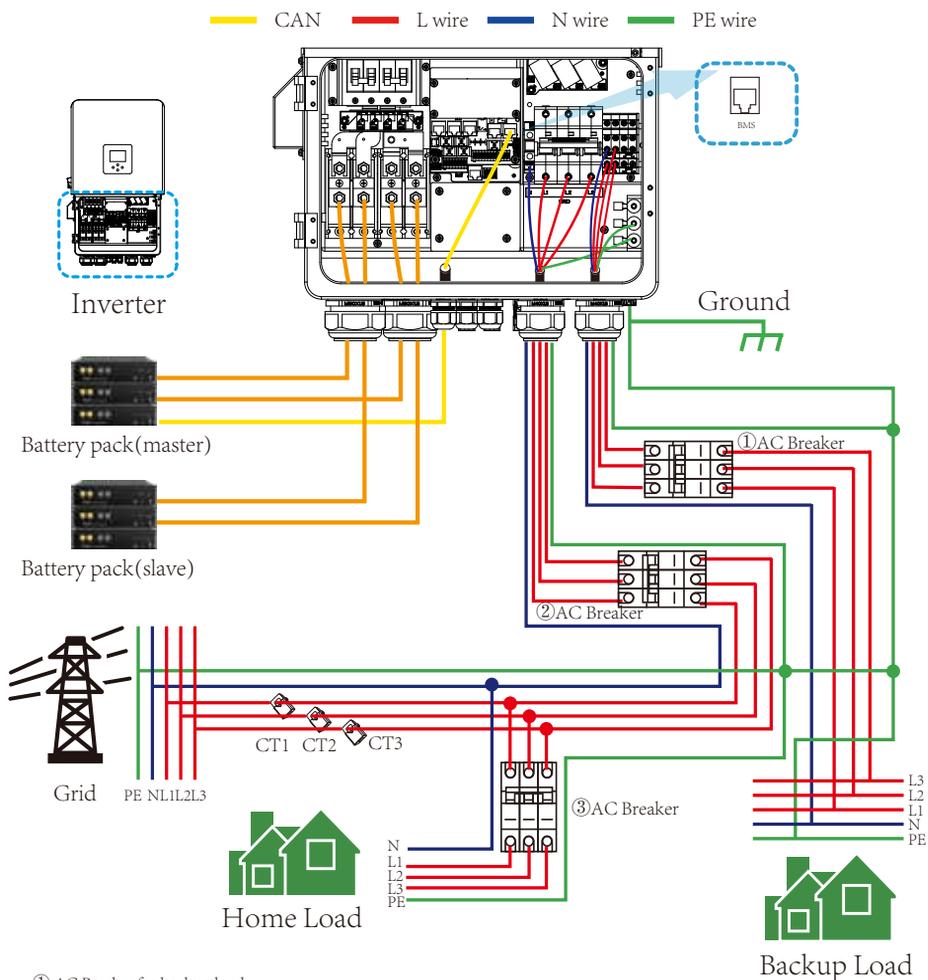
This diagram is an example for an application that neutral connects with the PE in a distribution box.

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

DC Breaker

In final installation, breaker certified according to AS60947.3 shall be installed with the equipment. All circuit breakers are external components of the inverter.





① AC Breaker for backup load

- SUN-14K-SG05LP3-AU-SM2: 100A AC breaker
- SUN-15K-SG05LP3-AU-SM2: 100A AC breaker
- SUN-16K-SG05LP3-AU-SM2: 100A AC breaker
- SUN-18K-SG05LP3-AU-SM2: 100A AC breaker
- SUN-20K-SG05LP3-AU-SM2: 100A AC breaker

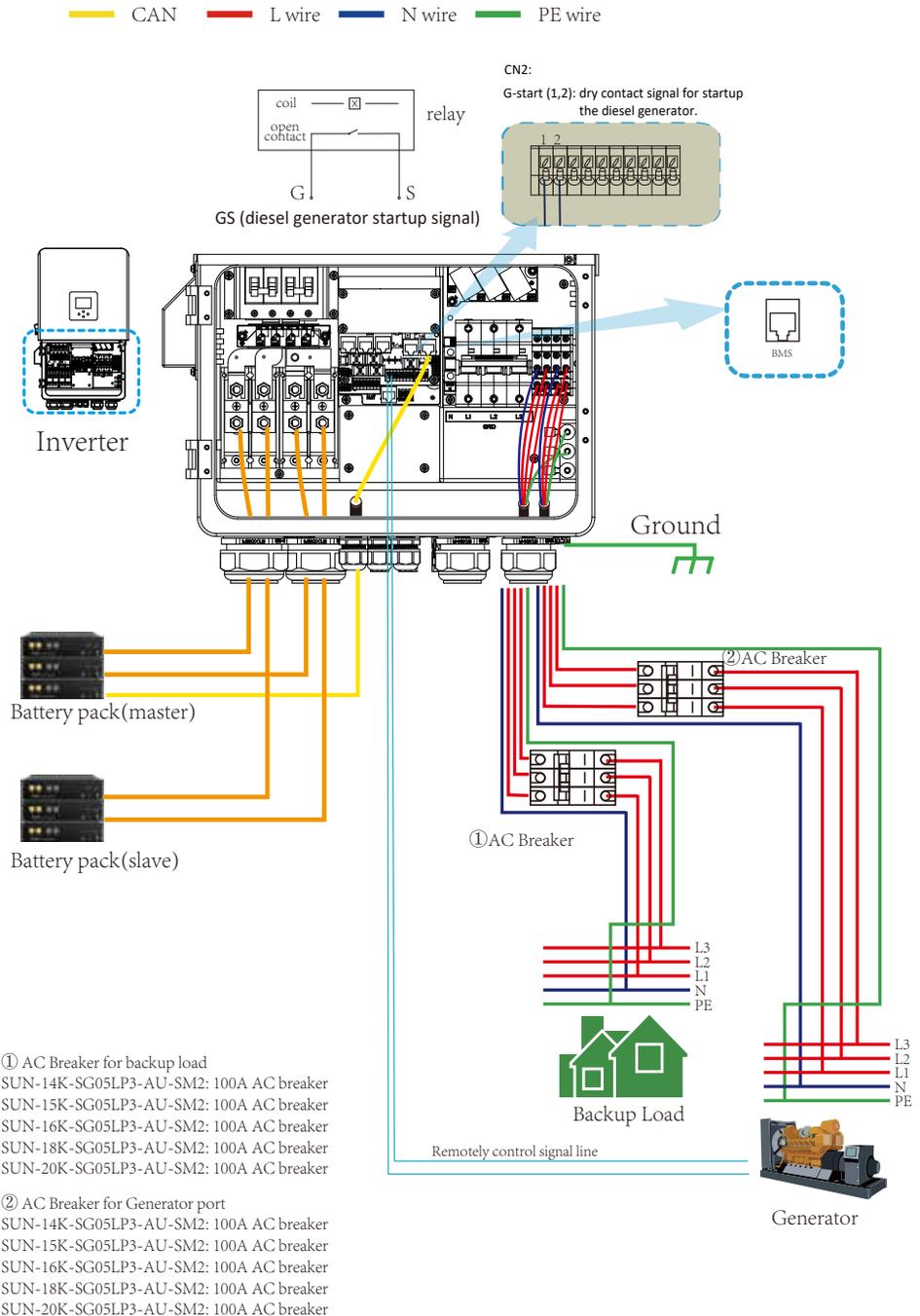
② AC Breaker for grid

- SUN-14K-SG05LP3-AU-SM2: 100A AC breaker
- SUN-15K-SG05LP3-AU-SM2: 100A AC breaker
- SUN-16K-SG05LP3-AU-SM2: 100A AC breaker
- SUN-18K-SG05LP3-AU-SM2: 100A AC breaker
- SUN-20K-SG05LP3-AU-SM2: 100A AC breaker

③ AC Breaker for home load

Depends on household loads

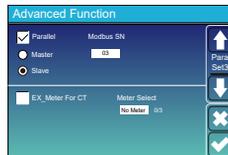
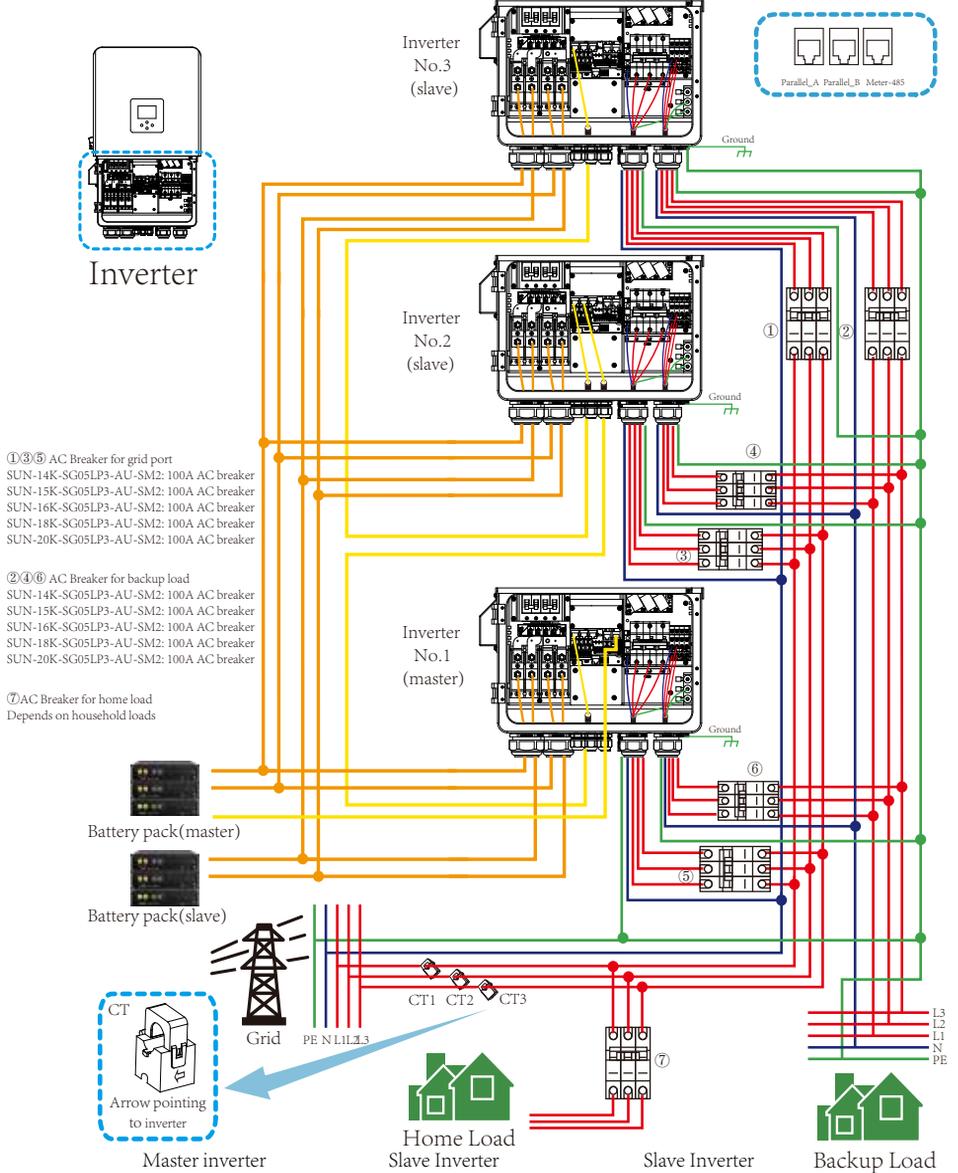
### 3.12 Typical application diagram of diesel generator



### 3.13 Three phase parallel connection diagram

Note: For the parallel system, please choose the "Zero export to CT" mode.

— CAN    — L wire    — N wire    — PE wire



## 4. OPERATION

### 4.1 Power ON/OFF

Once the system has been properly installed and the battery is connected to the inverter, follow the steps below to turn on the inverter:

1. Turn all the breakers of the installation on.
2. Turn on the DC switch of the inverter and the power button of battery (If there is one battery installed at the system), no matter the order.
3. Press the ON/OFF button (located on the left side of the inverter case) to turn on the inverter. When a system connected to either PV or Grid (without battery) is switched on, the LCD will still be lighted up displaying "OFF". In this situation, after switching ON/OFF button on, select "NO batt" at the inverter settings to make the system work.

When turning off the inverter, please follow the following steps:

1. Turn off the AC breakers on Grid port, Load port and GEN port.
2. Press the ON/OFF button of hybrid inverter and turn off the DC breaker on battery side, turn off power button of the battery.
3. Switch off the DC switch.

NOTE: Choose the correct country code. (refer to section 5.8 of this manual) Notice: Different distribution network operators in different countries have different requirements regarding grid connections of PV grid connected inverters. Therefore, it's very important to make sure that you have selected the correct country code according to requirements of local authority. Please consult qualified electrical engineer or personnel from electrical safety authorities about this.

### 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 function keys and a LCD display, indicating the operating status and input/output power information.

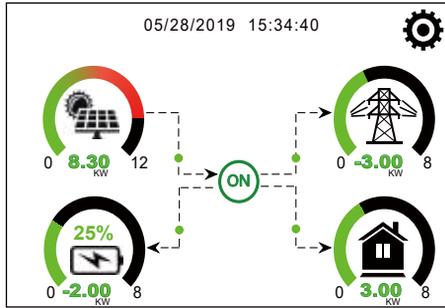
<b>Function Key</b>	<b>Description</b>
Esc	To exit setting mode
Up	To go to previous selection
Down	To go to next selection
Enter	To confirm the selection

Chart 4-1 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).

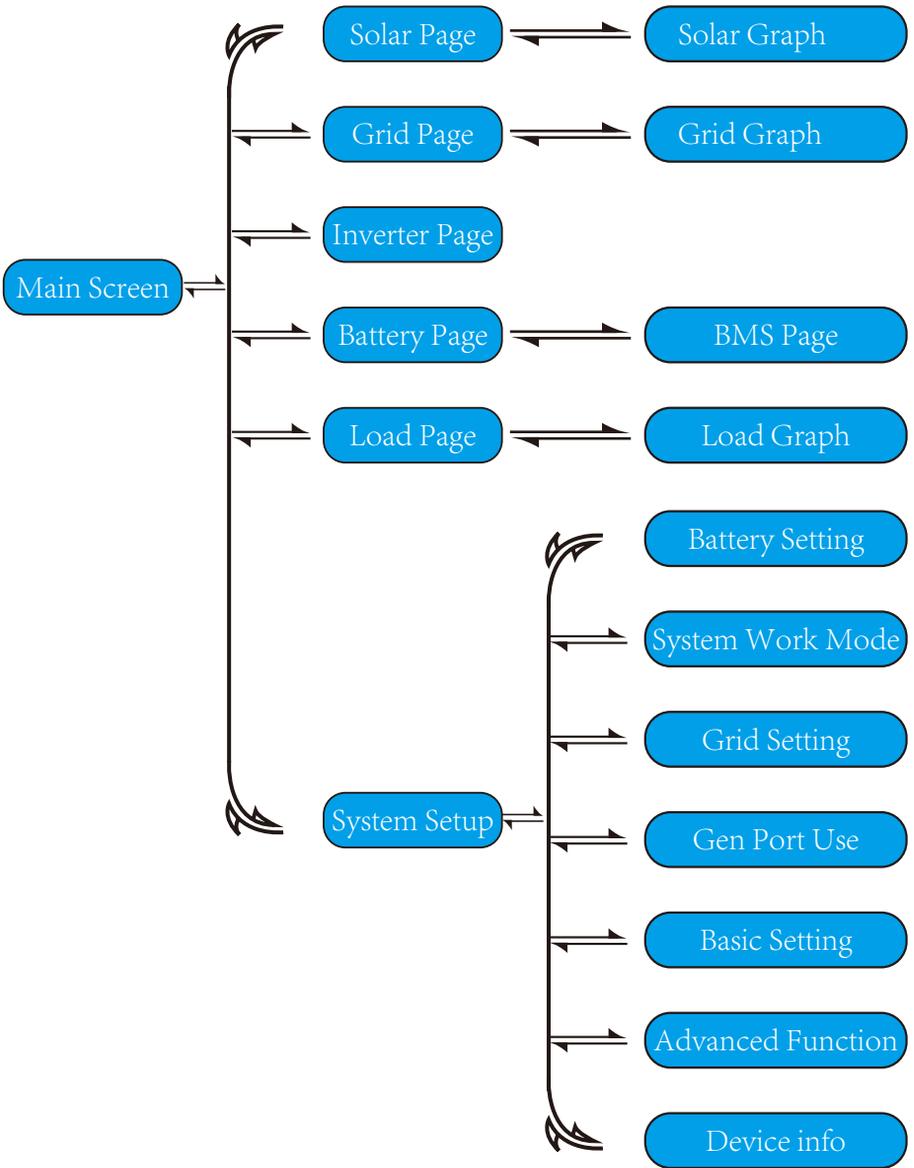
2.At the top of the screen is the time.

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  
 Total =12.00 KWH ②

PV1-V: 286V PV2-V: 45V  
 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.

75W	0W 0.0Hz	75W 50.0Hz ①
232V 25W	0V 0.0A	222V 0.0A
231V 26W	0V 0.0A	230V 0.0A
229V 24W	0V 0.0A	223V 0.0A
<b>Load</b>	HM: LD:	INV_P:
SOC:47% 97W	0W 0W	25W
BAT_V:52.45V	0W 0W	26W AC_T:
1.03 A/ 0.82 A	0W 0W	24W 49.9C
27.0C	<b>Grid</b>	<b>Inverter</b>
<b>Battery</b>	DC_P1: 0W	DC_P2: 0W
	DC_V1: 0V	DC_V2: 0V
	DC_I1: 0.0A	DC_I2: 0.0A
	<b>PV1</b>	<b>PV2</b>

Energy

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 ②

L1: 220V P1: 19W  
 L2: 220V P2: 18W  
 L3: 220V P3: 18W

Energy

This is Load detail page.

- ① Load Power.
- ② Voltage, Power for each Phase.
- ③ Daily and total Load consumption .

When you check “Selling First” or “Zero export to Load” on system work mode page, the information on this page is about backup load which connect on Load port of hybrid inverter.  
 When you check “Zero export to CT” on system work mode page, the information on this page is including backup load and home load.

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

**Grid**

Stand by 0W ① BUY Today=2.2KWH ③  
 Total =11.60 KWH ②

SELL Today=0.0KWH  
 Total =8.60 KWH ②

CT1: 0W LD1: 0W  
 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.

### 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

Request Force Charge

Sum Data

Details Data

**Request Force Charge:** It indicates the BMS requests hybrid inverter to charge the battery actively.

### Li-BMS

	Volt	Curr	Temp	SOC	Energy	Charge		Fault
						Volt	Curr	
1	50.38V	19.70A	30.6C	52.0%	25.0Ah	0.0V	0.0A	0100
2	50.33V	19.10A	31.0C	51.0%	25.5Ah	53.2V	25.0A	0100
3	50.30V	18.00A	30.2C	12.9%	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

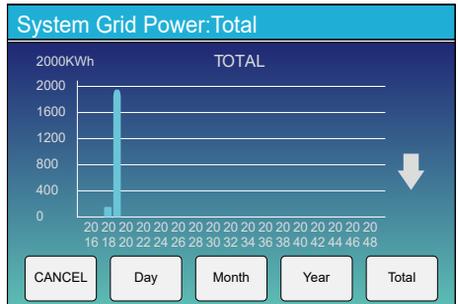
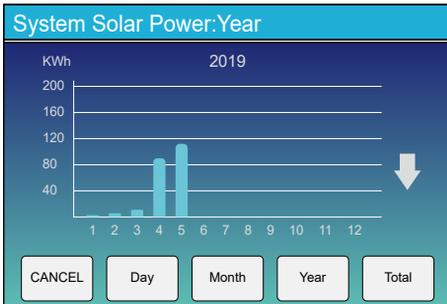
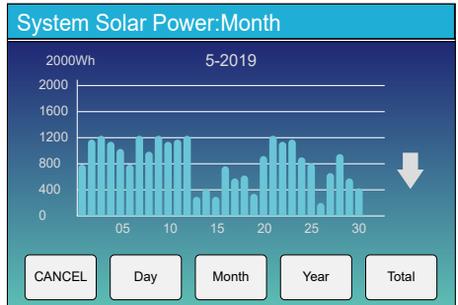
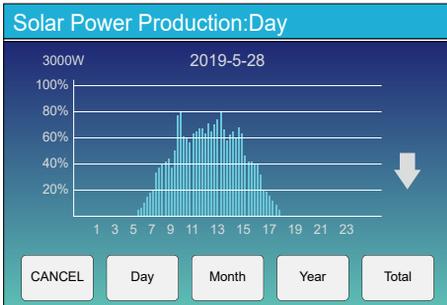
Sum Data

Details Data

This is Battery detail page.

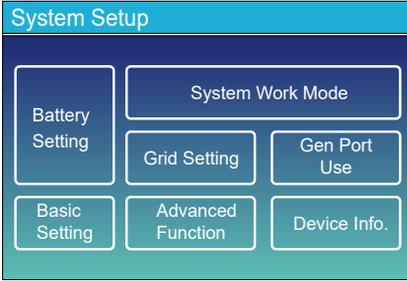
if you use Lithium Battery, you can enter BMS page.

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



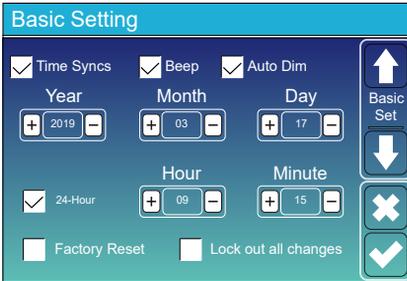
Solar power curve for daily, monthly, yearly and total can be roughly checked on the LCD, for more accuracy power generation, pls check on the monitoring system. Click the up and down arrow to check power curve of different period.

## 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.



System selfchek: After ticking this item, it needs input the password.

## 5.6 Battery Setup Menu

**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 (0-260A for 14kW model, 0-280A for 15kW model, 0-300A for 16kW model, 0-330A for 18kW model, 0-350A for 20kW 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.

This is Battery Setup page. ①③

**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.

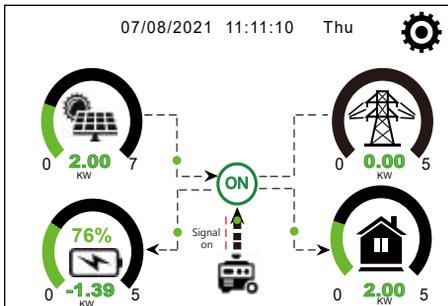
This is Grid Charge, you need select. ②

**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.



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   

Shutdown       

Low Batt        

Restart         

↑  
Batt Set3  
↓  
✕  
✓

**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 **①**   

Absorption V   

Equalization V  

Equalization Days

Equalization Hours

Shutdown **③**   

Low Batt        

Restart         

TEMPCO(mV/C/Cell)   

Batt Resistance   

↑  
Batt Set3  
↓  
✕  
✓

**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	Equalization Voltage (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

↓

✕

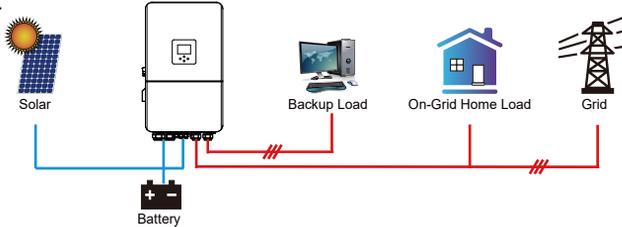
✓

### Work Mode

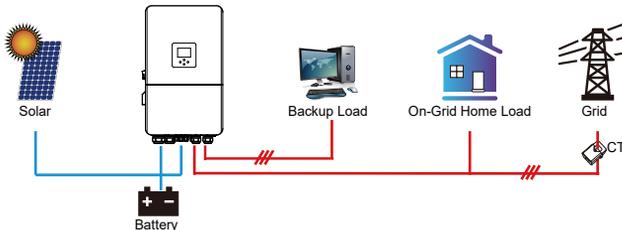
**Selling First(Generation limit control):** This Mode allows hybrid inverter to sell back any excess power produced by the solar panels to the grid. If time of use is active, the battery energy also can be sold into grid. The PV energy will be used to power the load and charge the battery and then excess energy will flow to grid. Power source priority for the load is as follows:

1. Solar Panels.
2. Grid.
3. Batteries (until programable % 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(Export limit control):** 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.



Selling First is Generation limit control function, which limits the amount of power generated by the inverter. In this state Max. sell power is the soft limit of the maximum apparent power that the inverter can generate, and Zero-export Power is the hard limit of the maximum apparent power that the inverter can generate.

Zero Export To CT is Export limit control function, it can limit the inverter export to grid active power. max. sell power is soft limit inverter export to grid max. active power, Zero-export Power is hard limit inverter export to grid.



**Note:**

Customer can only use export limit control function by CT or meter.

**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:** Max sell power limits means Soft export. 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. Zero-export Power means Hard export, if you exceed the excess power output to the grid that you set, the inverter will stop immediately.

**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	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

Time Of Use

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.

**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	Power	Batt	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	01:00	5:00	12000	80%
<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%

Time Of Use

Work Mode2

**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%.

**System Work Mode**

Mon	Tue	Wed	Thu	Fri	Sat	Sun
<input checked="" type="checkbox"/>	<input type="checkbox"/>					

Work Mode4

It allows users to choose which day to execute the setting of "Time of Use".

For example, the inverter will execute the time of use page on Mon/Tue/Wed/Thu/Fri/Sat only.

## 5.8 Grid Setup Menu

### 5.8.1 Commissioning Procedure

If all physical connection is checked ok, please follow the steps below.

1. Turn on AC circuit breaker.
2. Turn on DC circuit breaker on PV strings and battery.
3. Turn on circuit breaker on battery pack.
4. Turn on DC switch on the inverter
5. Check the inverter status by inverter indicators and battery status by battery indicators.

## 5.8.2 Grid Standard Selection

**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)、New Zealand、VDE4105、OVE-Directive R25.

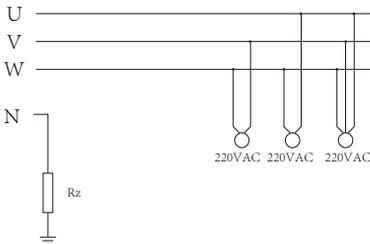
Please follow the local grid code and then choose the corresponding grid standard.

**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:** If the grid system is IT system, then please

enable this option. For example, the IT grid system voltage is 230Vac (the Line voltage between any two live lines in a three-phase circuit is 230Vac, and the diagram is as follow) then please enable "IT system" and tick the "Grid level" as LN:133VAC LL:230VAC as below picture shows.



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

**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

⌵

✕

✓

For The Australian Market:

For compliance with AS/NZS 4777.2:2020 please select from  
 • Australia A • Australia B • Australia C • New Zealand

Please contact your local grid operator for which option to select

Note: By selecting Australia A, Australia B or Australia C the power quality response mode and grid protection settings will be reset to their default values for Australia Region A, B, C respectively.

Default volt-watt settings for different regions are shown in the following table:

Region	Default value	Vw <sub>1</sub>	Vw <sub>1</sub> -ch	Vw <sub>2</sub>	Vw <sub>2</sub> -ch
Australia A	Voltage	253V	207V	260V	215V
	Inverter maximum active power output level(P) % of S <sub>rated</sub>	100%	20%	20%	100%
Australia B	Voltage	250V	195V	260V	215V
	Inverter maximum active power output level(P) % of S <sub>rated</sub>	100%	0%	20%	100%
Australia C	Voltage	253V	207V	260V	215V
	Inverter maximum active power output level(P) % of S <sub>rated</sub>	100%	20%	20%	100%
New Zealand	Voltage	242V	216V	250V	224V
	Inverter maximum active power output level(P) % of S <sub>rated</sub>	100%	20%	20%	100%

Default volt-var settings for different regions are shown in the following table:

Region	Default value	Vv <sub>1</sub>	Vv <sub>2</sub>	Vv <sub>3</sub>	Vv <sub>4</sub>
Australia A	Voltage	207V	220V	240V	258V
	Inverter maximum active power output level(P) % of S <sub>rated</sub>	44%supplying	0%	0%	60%absorbing
Australia B	Voltage	205V	220V	235V	255V
	Inverter maximum active power output level(P) % of S <sub>rated</sub>	30%supplying	0%	0%	40%supplying
Australia C	Voltage	215V	230V	240V	255V
	Inverter maximum active power output level(P) % of S <sub>rated</sub>	44%supplying	0%	0%	60%supplying
New Zealand	Voltage	207V	220V	235V	244V
	Inverter maximum active power output level(P) % of S <sub>rated</sub>	60%supplying	0%	0%	60%supplying

### Grid Setting/Connect

Normal connect	Normal Ramp rate	10s	<input type="button" value="↑"/> <input type="button" value="↓"/> <input type="button" value="✕"/> <input type="button" value="✓"/>	
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	

**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 min. running mean)		260.0V	<input type="button" value="↑"/> <input type="button" value="↓"/> <input type="button" value="✕"/> <input type="button" value="✓"/>			
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		

**HV1:** Level 1 overvoltage protection point;  
**HV2:** Level 2 overvoltage protection point; **②** 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)		<input type="button" value="↑"/> <input type="button" value="↓"/> <input type="button" value="✕"/> <input type="button" value="✓"/>		
Over frequency	Drop F		40%/Hz	
Start freq F	50.20Hz		Stop freq F	51.5Hz
Start delay F	0.00s		Stop delay F	0.00s
Under frequency	Drop F	40%/PE/Hz		
Start freq F	49.80Hz	Stop freq F	49.80Hz	
Start delay F	0.00s	Stop delay F	0.00s	

**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%/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(F)

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%**: 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	0.00s
HV2	0%	HV2_T	0.00s
HV1	0%	HV1_T	0.00s
LV1	0%	LV1_T	0.00s
LV2	0%	LV2_T	0.00s

Grid Set7

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

### Basic Setting

Time Syncs     Beep     Auto Dim

Year: 2019    Month: 03    Day: 17

Hour: 09    Minute: 15

24-Hour     Factory Reset     Lock out all changes

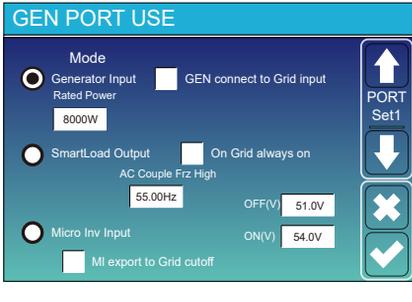
Basic Set

After setting grid parameters, please select "Lock out all changes" and enter password. If the engineer does not know the password, please contact your distributor.

### 5.8.3 Grid Parameter Check

After steps above, customers can see firmware version on main page grid parameters in grid settings on LCD.

## 5.9 Generator Port Use Setup Menu



**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.

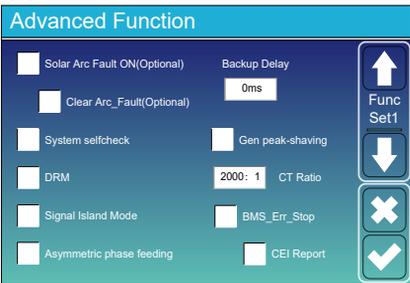
\* **Micro Inv Input ON:** when the battery SOC is lower than setting value, Microinverter or grid-tied inverter will start to work.

**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



**Solar Arc Fault ON(Optional):** This feature is optional. After enabling this function, the inverter will detect whether there is an arcing fault on the PV side. If arcing occurs, the inverter will report a fault and stop outputting power.

**Clear Arc\_Fault(Optional):** After the arc fault on the PV side is eliminated, enabling this function can eliminate the arc fault alarm of the inverter and restore normal operation of the inverter.

**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(Only DRM0 is available).

**Backup Delay:** When the grid cuts off, the inverter will give output power after the setting time.

For example, backup delay: 3ms. the inverter will give output power after 3ms when the grid cuts off.

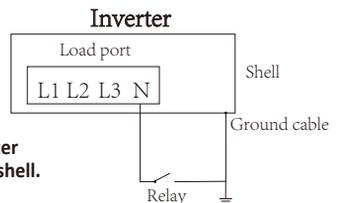
Note: for some old FW version, the function is not available.

**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.

\* **If this item was selected, please ensure that the shell of the inverter is grounded, otherwise there will be electric shock if you touch the shell.**

**Asymmetric phase feeding:** If it was checked, the inverter will take power from the grid balance of on each phase (L1/L2/L3) when needed.

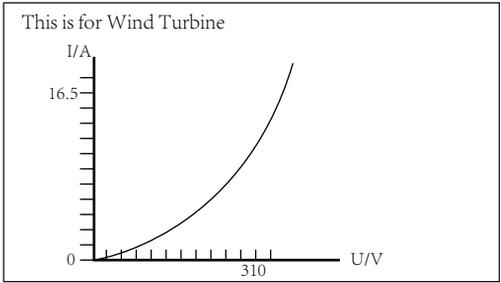


### Advanced Function

DC 1 for WindTurbine     DC 2 for WindTurbine

V1	90V	0.0A	V7	210V	9.0A
V2	110V	1.5A	V8	230V	10.5A
V3	130V	3.0A	V9	250V	12.0A
V4	150V	4.5A	V10	270V	13.5A
V5	170V	6.0A	V11	290V	15.0A
V6	190V	7.5A	V12	310V	16.5A

Wind Set2



### Advanced Function

Parallel    Modbus SN:

Master  
 Slave

EX\_Meter For CT    Meter Select:

No Meter 0/3  
 CHNT  
 Eastron

Paral. 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.

### Device Info.

18K

Inverter SN: 2404098579    Flash

HMI: Ver 1001-C047

MAIN:Ver 2021-1145-1807

ARC:VerD206

### Device Info.

Alarms Code	Occurred
F56 DC_VoltLow_Fault	2024-04-29 09:33
F13 Grid_Mode_changed	2024-04-29 07:22
F13 Grid_Mode_changed	2024-04-29 03:22
F56 DC_VoltLow_Fault	2024-04-29 03:11

Device Info

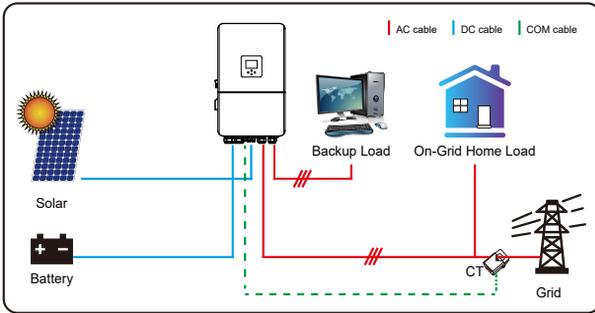
These page show Inverter ID, Inverter version and alarm codes.

**HMI:** LCD version

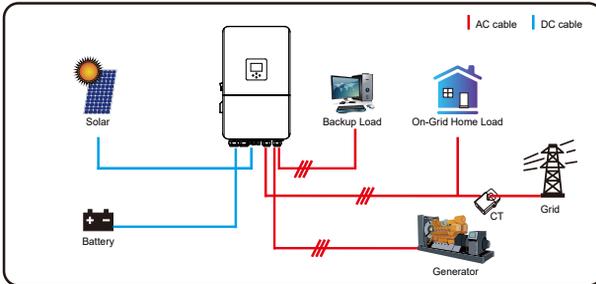
**MAIN:** Control board FW version

## 6. Mode

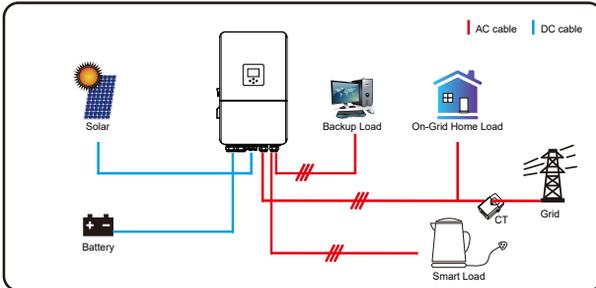
### Mode I: Basic



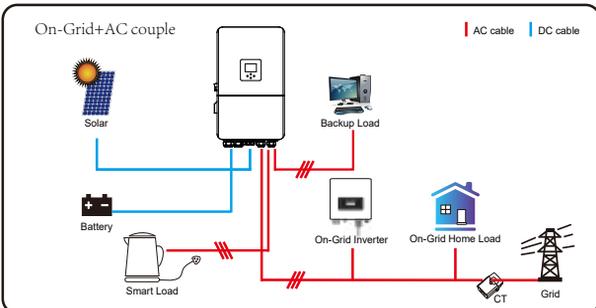
### Mode II: With Generator



### 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 alone, 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 can 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 commonload 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. 1. Check the PV input current and battery current setting 2. Restart the system 2~3 times. 3. If the fault still exists, please contact us for help.
F22	Tz_EmergStop_Fault	Remotely shutdown 1, it tells the inverter is remotely controlled.
F23	Tz_GFCI_OC_current is transient over current	Leakage current fault 1. Check PV side cable ground connection. 2. Restart the system 2~3 times. 3. If the fault still exists, please contact us for help.
F24	DC insulation failure	PV isolation resistance is too low 1. Check the connection of PV panels and inverter is firmly and correctly; 2. Check whether the PE cable of inverter is connected to ground; 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; 2. When the load power of 3 phases is big different, it will report the F26. 3. When there's DC leakage current, it will report F26 4. Restart the system 2~3 times. 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; 2. During the parallel system startup period, inverters will report F29. But when all inverters are in ON status, it will disappear automatically; 3. If the fault still exists, please contact us for help.
F34	AC Overcurrent fault	1. Check the backup load connected, make sure it is in allowed power range 2. 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. 2. If the fault still exists, please contact us for help
F42	AC line low voltage	Grid voltage fault 1. Check the AC voltage is in the range of standard voltage inspection; 2. Check whether grid AC cables are firmly and correctly connected; 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>SUN-14K-SG05LP3-AU-SM2</i>	<i>SUN-15K-SG05LP3-AU-SM2</i>	<i>SUN-16K-SG05LP3-AU-SM2</i>	<i>SUN-18K-SG05LP3-AU-SM2</i>	<i>SUN-20K-SG05LP3-AU-SM2</i>
<b>Battery Input Data</b>					
Battery Type	Lead-acid or Lithium-ion				
Battery Voltage Range(V)	40-60				
Max. Charging Current(A)	260	280	300	330	350
Max. Discharging Current(A)	260	280	300	330	350
Charging Strategy for Li-ion Battery	Self-adaption to BMS				
Number of Battery Input	2				
<b>PV String Input Data</b>					
Max. PV access power(W)	28000	30000	32000	36000	40000
Max. PV Input Power(W)	22400	24000	25600	28800	32000
Max. PV Input Voltage(V)	800				
Start-up Voltage(V)	160				
PV Input Voltage Range(V)	160-800				
MPPT Voltage Range(V)	160-650				
Full Load MPPT Voltage Range(V)	310-650	330-650	350-650	400-650	440-650
Rated PV Input Voltage(V)	550				
Max. Operating PV Input Current(A)	36+36				
Max. Input Short-Circuit Current(A)	54+54				
No. of MPP Trackers/No. of Strings MPP Tracker	2/2+2				
Max. Inverter Backfeed Current to The Array	0				
<b>AC Input/Output Data</b>					
Rated AC Input/Output Active Power(W)	14000	15000	16000	18000	20000
Max. AC Input/Output Apparent Power(VA)	14000	15000	16000	18000	20000
Peak Power (off-grid)(W)	2 times of rated power, 10s				
Rated AC Input/Output Current(A)	20.3	21.8	23.2	26.1	29
Max. AC Input/Output Current(A)	20.3	21.8	23.2	26.1	29
Max. Continuous AC Passthrough (grid to load)(A)	70				
Max. Output Fault Current(A)	46.8	50	53.4	60	66.8
Max. Output Overcurrent Protection(A)	100				
Rated Input/Output Voltage/Range(V)	230/400V,240/415V 0.85Un-1.1Un				
Grid Connection Form	3L+N+PE				
Rated Input/Output Grid Frequency/Range	50Hz/45Hz-55Hz				
Power Factor Adjustment Range	0.8 leading-0.8 lagging				
Total Current Harmonic Distortion THDi	<3% (of nominal power)				
DC Injection Current	<0.5%In				
<b>Efficiency</b>					
Max. Efficiency	97.60%				
Euro Efficiency	97.00%				
MPPT Efficiency	>99%				
<b>Equipment Protection</b>					
DC reverse polarity protection	Yes				
AC Output Overcurrent Protection	Yes				
AC Output Overvoltage Protection	Yes				
AC Output Short Circuit Protection	Yes				
Thermal Protection	Yes				
Insulation Impedance detection	Yes				

DC Component Monitoring	Yes
Arc fault circuit interrupter (AFCI)	Optional
DC Switch	Yes
Residual Current Detection	Yes
Anti-islanding protection	Yes(Active Frequency shift)
Surge Protection Level	TYPE II(DC), TYPE II(AC)
<b>Interface</b>	
Display	LCD+LED
Communication Interface	RS232, RS485, CAN
Monitor Mode	GPRS/WIFI/Bluetooth/4G/LAN(optional)
PV Connection	VP-D4
<b>General Data</b>	
Operating Temperature Range	-40 to +60 C , >45 C Derating
Permissible Ambient Humidity	0-100%
Permissible Altitude	3000m
Noise	< 60 dB
Ingress Protection(IP) Rating	IP 65
Inverter Topology	Non-Isolated
Over Voltage Category	OVC II(DC), OVC III(AC)
Cabinet size(W*H*D) [mm]	456W×750H×268.5D (Excluding connectors and brackets)
Weight(kg)	51.9
Warranty	10 Years
Type of Cooling	Intelligent Air Cooling
Grid Regulation	AS/NZS 4777.2
Safety EMC/Standard	IEC/EN 61000-6-1/2/3/4, IEC/EN 62109-1, IEC/EN 62109-2

## 9.Package and transport inverter

Usually placed inverter in the packing box with tape sealing, if the inverter cannot reoccupy, you can choose a cheap carton for packaging. Carton requirements must meet the size of the inverter and can support inverter machine overall weight.

Series frequency converter in the process of moving, please note: handle with care, do not touch the inverter, put as flat as possible.

## 10.Disposing of the inverter

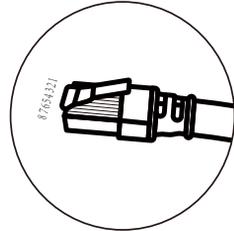
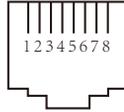
Do not dispose of inverter together with household waste. Please accordance with the disposal regulations for electronic waste which apply at the installation site at that time. Ensure that the old unit and, where applicable, any accessories are disposed of in a proper manner.

# 11. 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

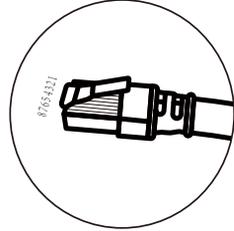
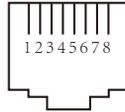
BMS 485/CAN Port



## Definition of RJ45 Port Pin for Meter-485

No.	Meter-485 Pin
1	METER-485-B
2	METER-485-A
3	COM-GND
4	METER-485-B
5	METER-485-A
6	COM-GND
7	METER-485-A
8	METER-485-B

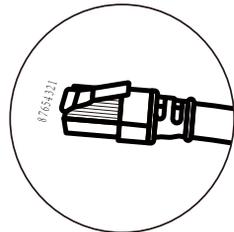
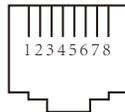
Meter-485 Port



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

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

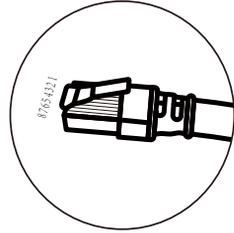
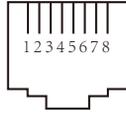
Modbus port



**Definition of RJ45 Port Pin for DRM Port**

No.	DRM Pin
1	DRM1/5
2	DRM2/6
3	DRM3/7
4	DRM4/8
5	REF-GEN/0
6	D-GND
7	NetJ4_7
8	NetJ4_7

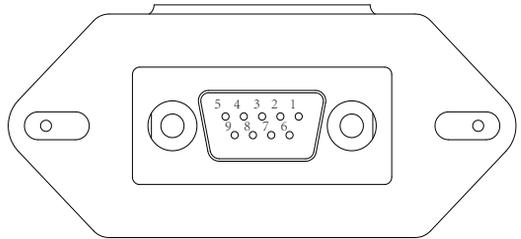
**DRM port**



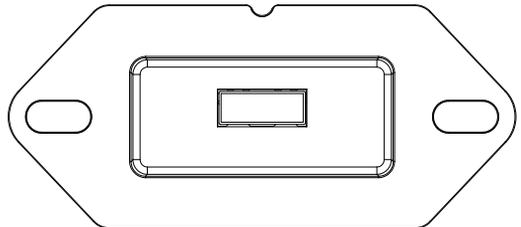
This model of inverter has two types of logger interfaces, DB9 and USB. Please refer to the actual inverter received for the actual interface type.

**RS232**

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



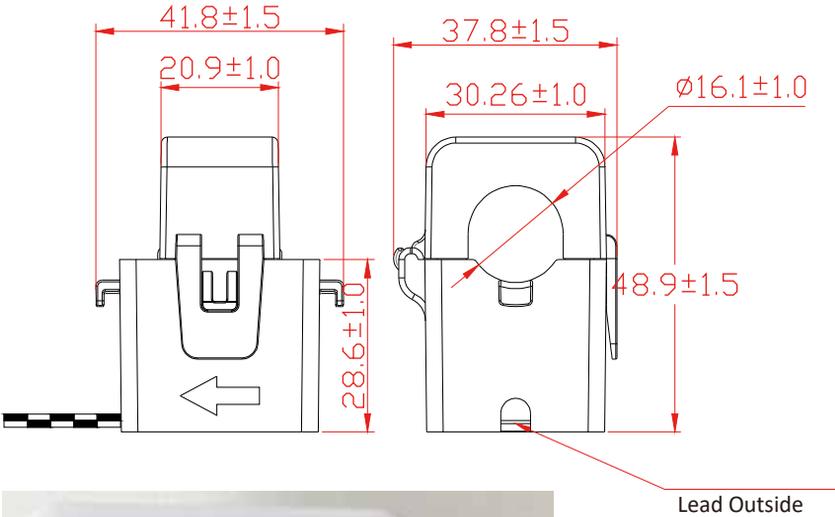
**DB9 (RS232)**



**USB**

## 12. Appendix II

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



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