USER MANUAL
Single-phase ESS Inverter
Inline 12KW-ECO

History

Version	Issued	Comments
V1.0	15-Jun.-26	First release.

Preface

About This Manual

This manual describes the installation, connection, LCD/app setting, commissioning and maintenance etc. of hybrid inverter. Please first read the manual and related documents carefully before using the product and store it in a place where installation, operation and maintenance personnel can reach it at any time. The illustrations in this user manual are for reference only. This user manual is subject to change without prior notice. (Specific please in kind prevail.)

Target Group

Inverters must be installed by professional electrical engineers who have obtained relevant qualifications.

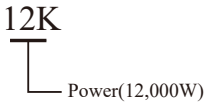
Scope

This manual is applicable to following inverter models:

Fan cooling

- 8K
- 10K
- 12K

The letters in the product model have the specific informations.
(Take the 12K as an example.)



Conventions

The following safety instructions and general information are used within this user manual.

DANGER	Indicates an imminently hazardous situation which, if not correctly followed, will result in serious injury or death.
WARNING	Indicates a potentially hazardous situation which, if not correctly followed, will result in serious injury or death.
CAUTION	Indicates a potentially hazardous situation which, if not correctly followed, could result in moderate or minor injury.
NOTICE	Indicates a potentially hazardous situation which, if not correctly followed, could result in equipment failure to run, or property damage.
NOTE	Call attention to important information, best practices and tips: supplement additional safety instructions for your better use of the hybrid inverter to reduce the waste of you resource.

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1. Safety

Before using the inverter, please read all instructions and cautionary markings on the unit and in this manual. Put this manual to a place where you can take it easily.

The inverter strictly conforms to related safety rules in design and test. Please follow the local laws and regulations during installation, operation and maintenance. Incorrect operation may cause injury or death to the operator or a third party, and damage to the inverter and other properties belonging to the operator or a third party.

1.1 Symbols Used

The following safety symbols and general information are used on the inverter.

Safety Symbol	Description
	Danger of high voltage! Only qualified personnel may perform work on the inverter.
	Residual voltage exists after the inverter is powered off. It takes 5 minutes for system to discharge to a safe voltage.
	Danger of hot surface
Do not disconnect under load!	Do not disconnect under load, otherwise there will be a danger of fire.
	Environmental Protection Use Period (years)
	Refer to the operating instructions
	Don't dispose of the inverter with the household waste.
	Grounding terminal

1.2 Safety Precaution

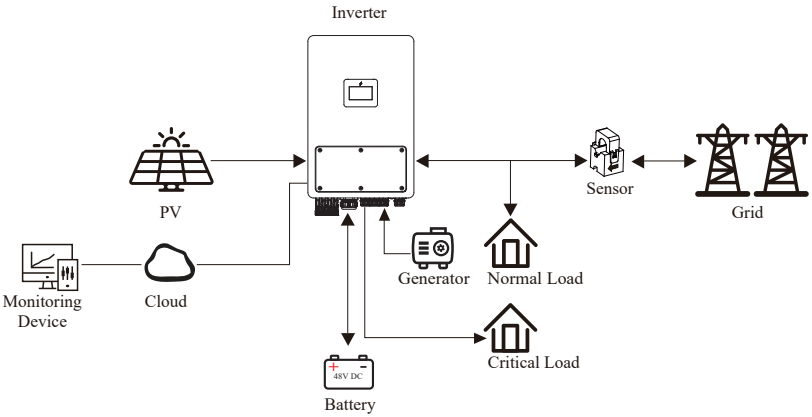
- Installation, maintenance and connection of inverters must be performed by qualified personnel, in compliance with local electrical standards, wiring rules and requirements of local power authorities and/or companies.
- The temperature of some parts of the inverter may exceed 60℃ during operation. Do not touch the inverter during operation to avoid being burnt.
- Ensure children are kept away from inverters. Don’t open the front cover of the inverter. Apart from performing work at the wiring terminal (as instructed in this manual), touching or changing components without authorization may cause injury to people, damage to inverters and annulment of the warranty.
- Static electricity may damage electronic components. Appropriate methods must be adopted to prevent such damage to the inverter, otherwise the inverter may be damaged and the warranty annulled.
- Ensure the output voltage of the proposed PV array is lower than the maximum rated input voltage of the inverter; otherwise the inverter may be damaged and the warranty annulled.
- When exposed to sunlight, the PV array generates dangerous high DC voltage. Please operate according to our instructions, or it will result in danger to life.
- PV modules should have an IEC61730 class A rating.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.
- Completely isolate the inverter before maintaining. Completely isolate the inverter should turn off the PV switch and disconnect the PV terminal, battery terminal, and AC terminal.
- After the inverter is powered off, the remaining electricity and heat may still cause electric shock and body burns. Do not touch parts of inverter for 5 minutes after disconnection from the power sources.
- Prohibit inserting or pulling the AC and DC terminals when the inverter is running.
- In Australia, the inverter internal switching does not maintain the neutral continuity. And neutral integrity must be addressed by external connection arrangements.
- Don't connect the inverter in the following ways:
  - The BACKUP Port should not be connected to the grid;
  - A single PV panel string should not be connected to two or more inverters.

2. Product Introduction

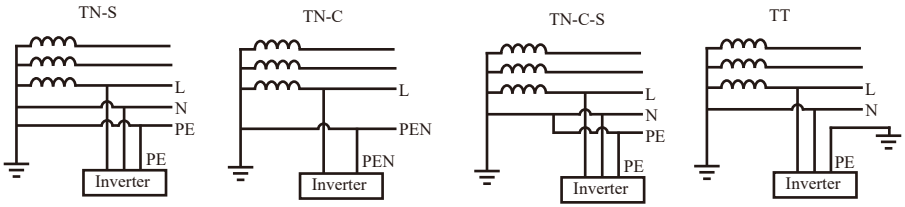
2.1 Typical Hybrid System

The hybrid inverters are high-quality inverter which can convert solar energy to AC energy and store energy into battery. Typically, a hybrid system consists of PV array, hybrid inverter, battery, loads and electricity sensor.

The energy generated by inverter can be preferentially supplied to its self-consumption, stored in the battery for future use or fed into public grid.



Supported grid types



2.2 Declaration for Off-grid Function

The following statement involves our company general policies about the hybrid inverters described in this document.

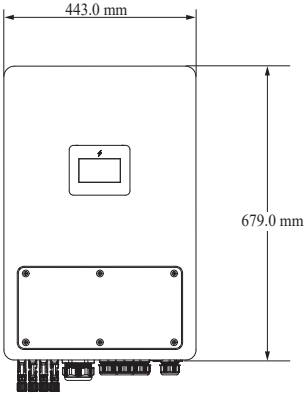
- For hybrid inverters, the electrical installation typically includes connection of the inverter to both PV modules and batteries. If there is no available power from batteries or PV modules in off-grid mode, the backup power supply will be automatically terminated. Our company shall hold no liability for any consequences arising from failing to observe this instruction.
- Normally, the Back-Up switching typical time is 10 ms. However, some external factors may cause the system to fail on off-grid mode. Therefore, the users must be aware of conditions and follow the instructions as below:
  - Do not connect loads that are dependent on a stable energy supply for a reliable operation.
  - Do not connect the loads whose total capacity is greater than the maximum Back-Up capacity.
  - Do not connect the loads that may cause very high start-up current surges, such as airconditioner, high-power pump, vacuum cleaner, and hair drier.
  - Due to the condition of the battery itself, battery current might be limited by some factors, including but not limited to the temperature and weather.

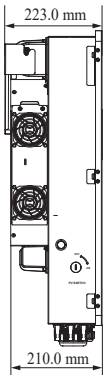
Declaration for Off-grid Overload Protection

The inverter will restart in case of overload protection. The time required for restarting will be 3 min if overload protection repeats. After the cumulative overload times up to three, the inverter will be locked. You can unlock the inverter by holding the button for 1s to clear the overload alarm. Try to reduce Back-Up load power within maximum limitation or remove the loads which may cause very high start-up current surges.

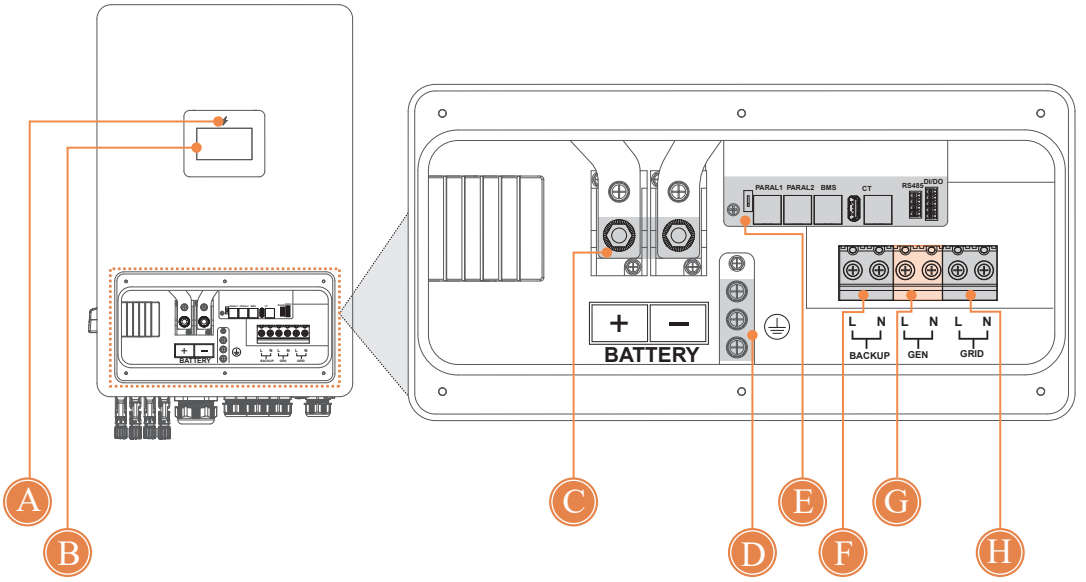
2.3 Product Appearance

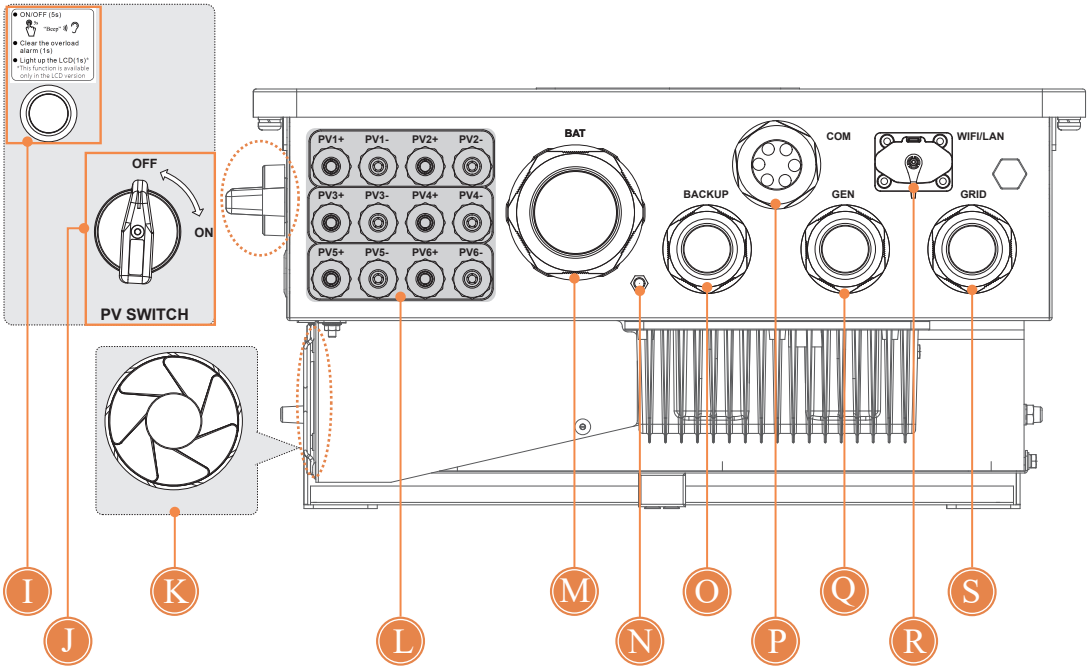
2.3.1 Dimensions





2.3.2 General Description





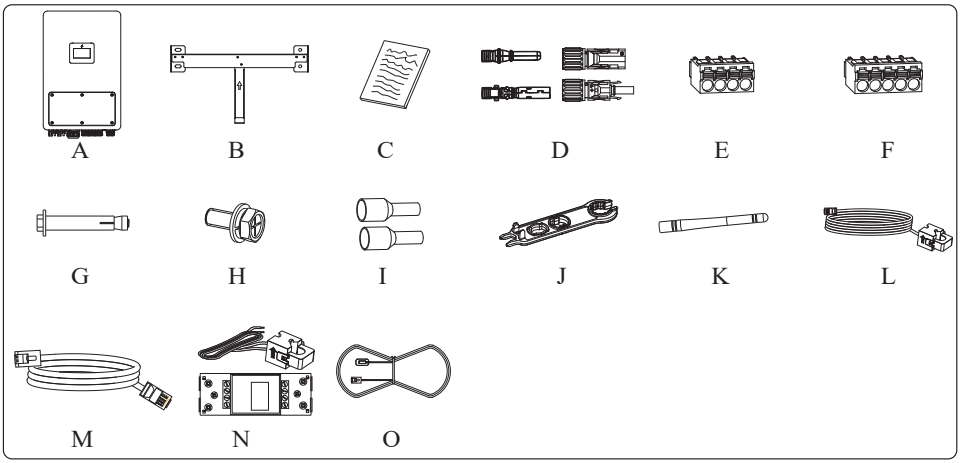
Number	Description
A	LED indicator
B	LCD screen
C	Battery connection terminal
D	Ground bus bar
E	Communication interface
F	BACKUP connection terminal
G	GEN connection terminal
H	GRID connection terminal

Number	Description
I	ON/OFF button and instruction lable
J	PV switch (Optional)
K	External fan
L	PV connection port
M	Battery connection port
N	External antenna port
O	BACKUP connection port
P	Communication connection port
Q	GEN connection port
R	WIFI/LAN/4G port (Optional)
S	GRID connection port

3. Installation

3.1 Packing List

After unpacking, please check the following packing list carefully for any damage or missing parts. If any damage or missing parts occurs, contact the supplier for help.

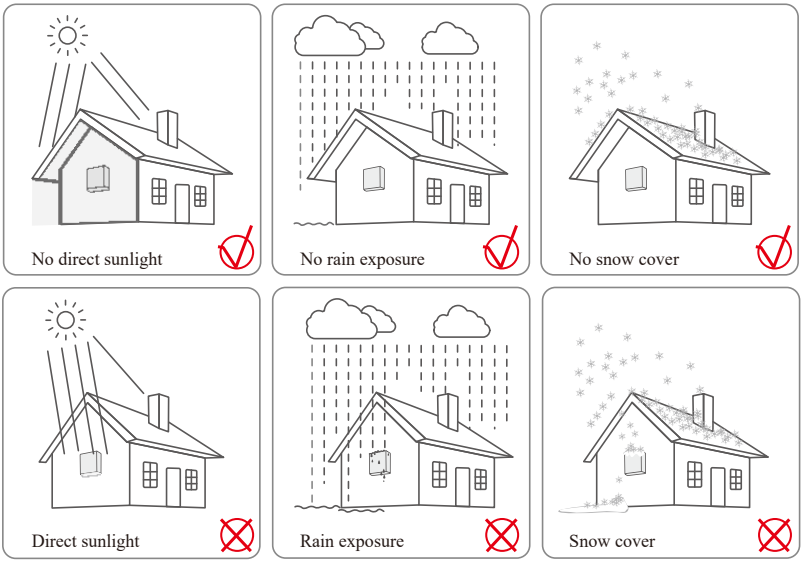


Number	Quantity	Description
A	1	Inverter
B	1	Mounting bracket
C	1	File package
D	4/4 for 8K; 6/6 for 10K~12K	PV connector group (PV+/PV-)
E	1	4-Pin terminal
F	1	5-Pin terminal
G	4	M6 Expansion bolt
H	1	M6 Security screw
I	6	Grid/Backup/Gen wire ferrule（Red for L, blue for N）
J	1	Removal tool for PV connector
K	1	External antenna
L	1	CT
M	1	Parallel communication cable (Optional)
N	1	CT+Meter (Optional)
O	1	Lead-acid Battery Temperature sensor (Optional)

3.2 Selecting the Mounting Location

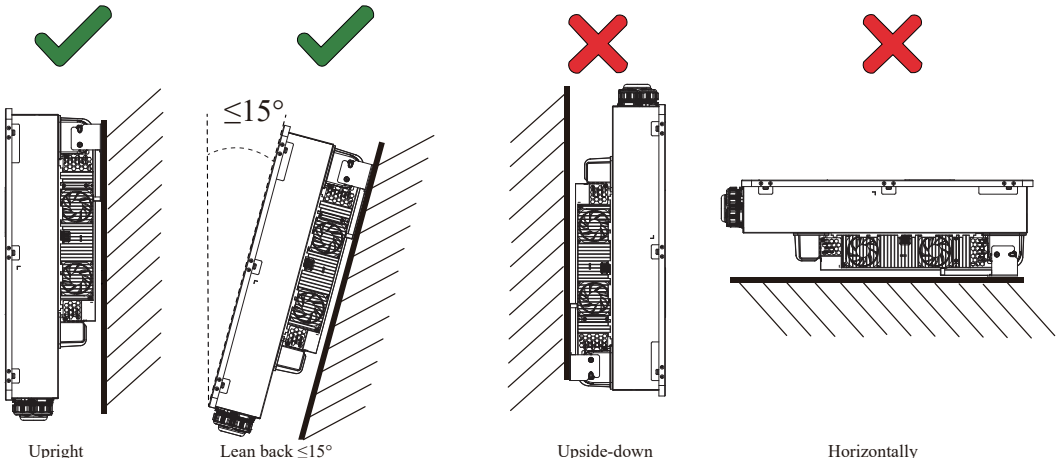
3.2.1 Installation Environment Requirements

- With an IP66 protection rating, the inverter can be mounted indoors or outdoors.
- The mounting location must be inaccessible to unrelated personnel since the enclosure and heat sinks are extremely hot during operation.
- Do not install the inverter in areas containing highly flammable materials or gases.
- To ensure optimum operation and long service life, the ambient temperature must be below 50℃.
- The inverter must be mounted in a well-ventilated environment to ensure good heat dissipation.
- The carrier where the inverter is mounted must be fire-proof. Do not mount the inverter on flammable building materials.
- Do not install the inverter in a rest area since it will cause noise during operation.
- The installation height should be reasonable, and please make sure it is easy to operate and view the display.
- Product label and warning symbols shall be clear to read after installation.
- To ensure long service life, the inverter must not be exposed to direct solar irradiation, rain, or snow. It is recommended that the inverter be mounted in a sheltered place.



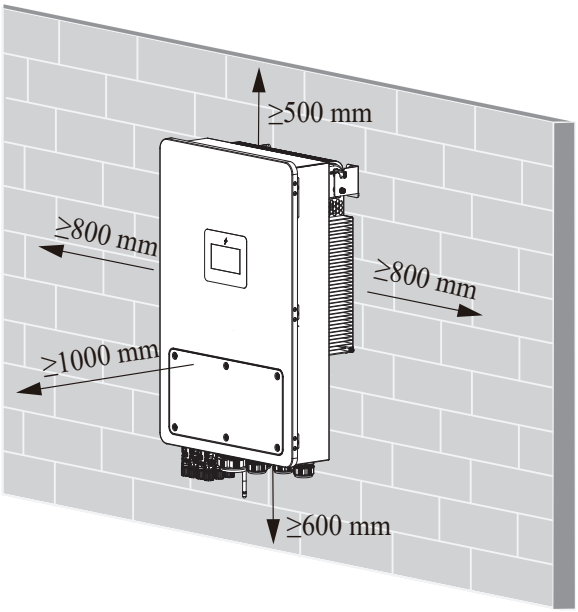
3.2.2 Mounting Requirements

Mount the inverter vertically or tilted backward by max 15°. The device can not be installed with a wrong mode and the connection area must point downward.

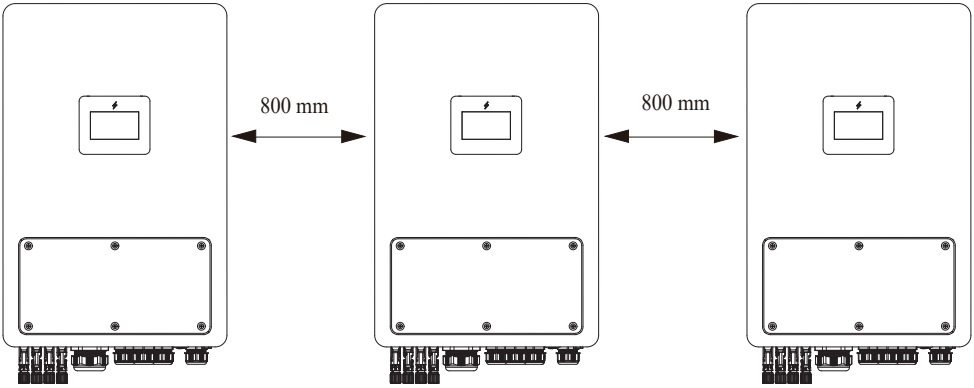


3.2.3 Installation Clearance Requirements

To ensure the inverter normally and easy to operate, there are requirements on available spaces of the inverter, e.g. to keep enough clearance. Refer to the following figures.



Installation along the same line for multiple inverter.

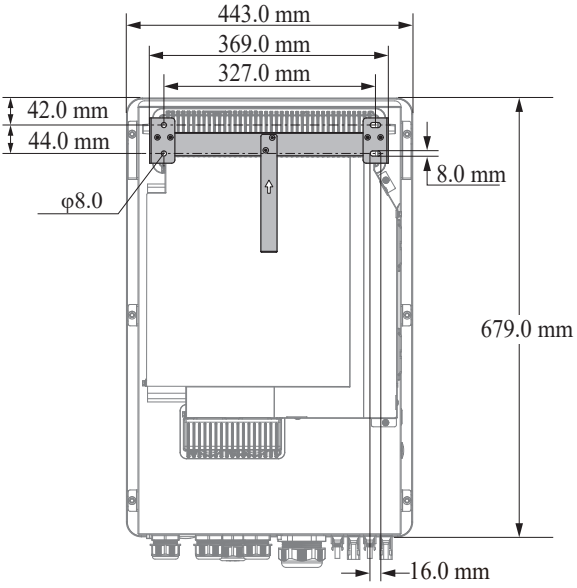


3.3 Mounting

Before mounting the inverter, you have to prepare expansion screws and a security screw.

DANGER	Before frilling the hole on the wall, ensure no damage on the electric wire and/ or water pipe inside the wall.
CAUTION	To prevent potential damages and injuries from inverter falling down, please hang the inverter on the bracket and do not loosen it unless confirm the inverter is well mounted.

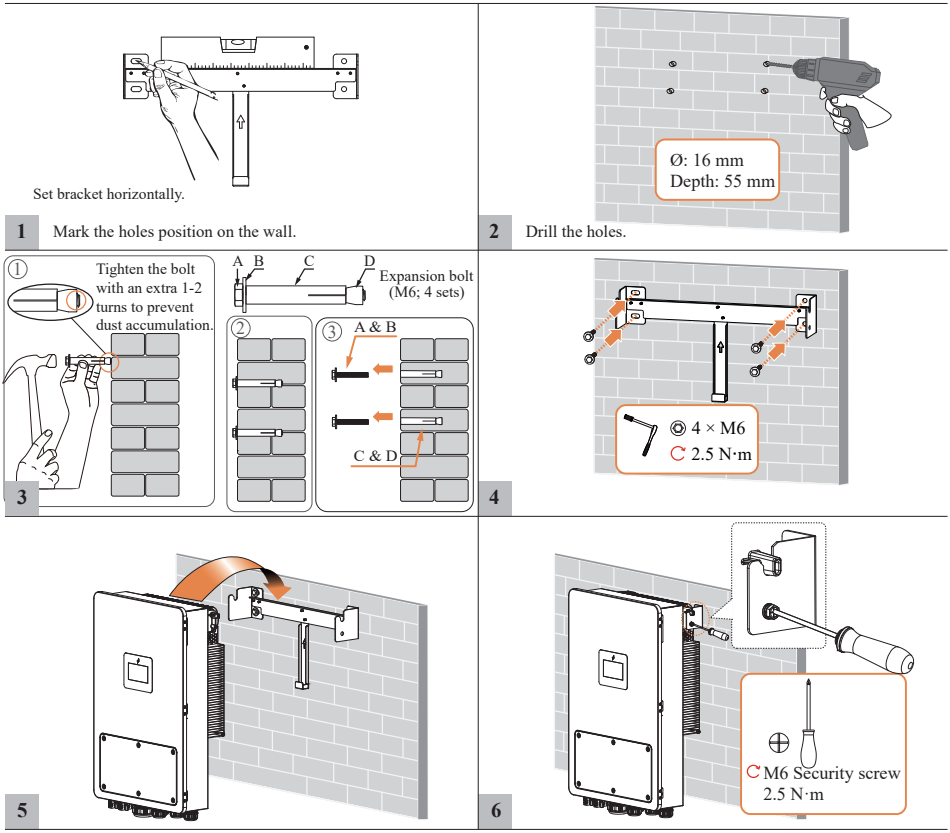
Mounting bracket location:



Step 1. Install the mounting bracket

1. Use a level ruler to mark the position of the 4 holes on the wall. Refer to Figure 1.
2. Drill 4 holes, 16 mm in diameter and 55 mm in depth. Refer to Figure 2.
3. Using a hammer to tap the expansion bolt sleeve kit into the hole. Refer to Figure 3.
4. Install and fix the mounting bracket on the wall. Refer to Figure 4.

Step 2. Install the inverter on the mounting bracket. Then lock the inverter using the security screw. Refer to Figure 5, Figure 6.



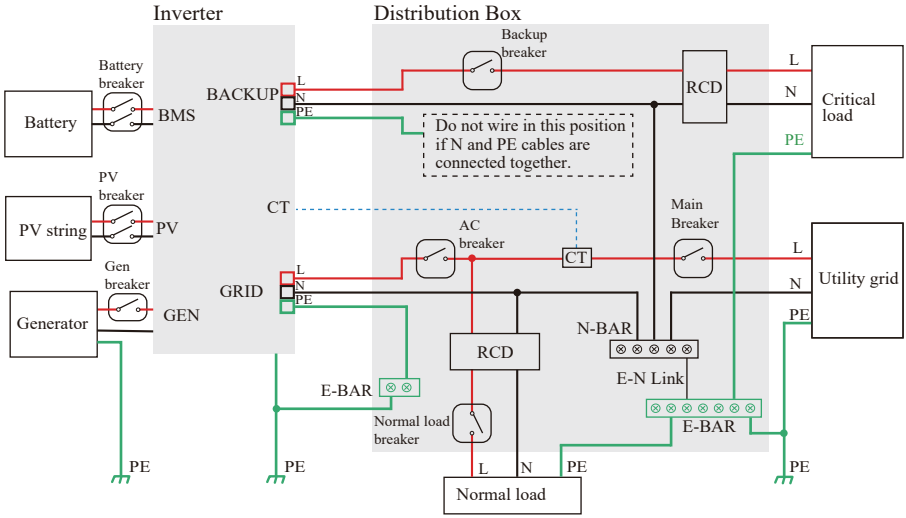
4. Electrical Connection

This chapter shows the details connection of hybrid inverter. The following illustration only uses the fan cooling series as an example.

Stand-alone application

- For AU/NZ/SA

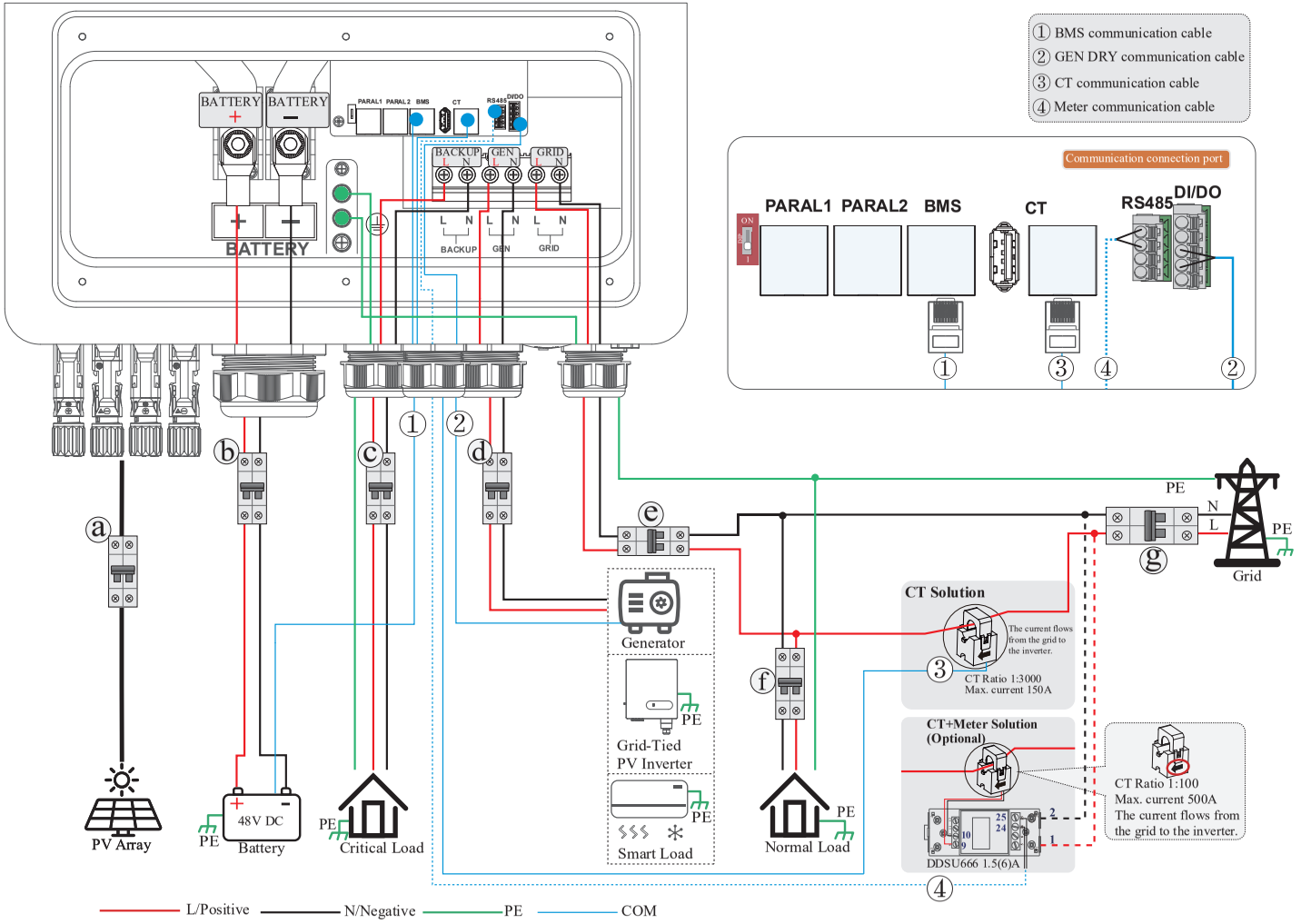
  For Australia, New Zealand and South Africa, the neutral cable of GRID side and BACK UP side must be connected together. Otherwise BACK UP function will not work.



INV.	PV breaker (a)	Battery breaker (b)	Backup breaker(c)	Gen breaker (d)	Grid breaker(e)	Normal load breaker (f)	Main breaker (g)
8K	32 A / 600 V DC (Per string)	250 A / 80 V DC	≥100 A (AC type)	≥80 A (AC type)	≥100 A (AC type)	Depends on household loads	Depends on household loads
10K		320 A / 80 V DC					
12K		350 A / 80 V DC					

- For other countries

For other countries, the following diagram is an example for grid systems without special requirement on wiring connection.



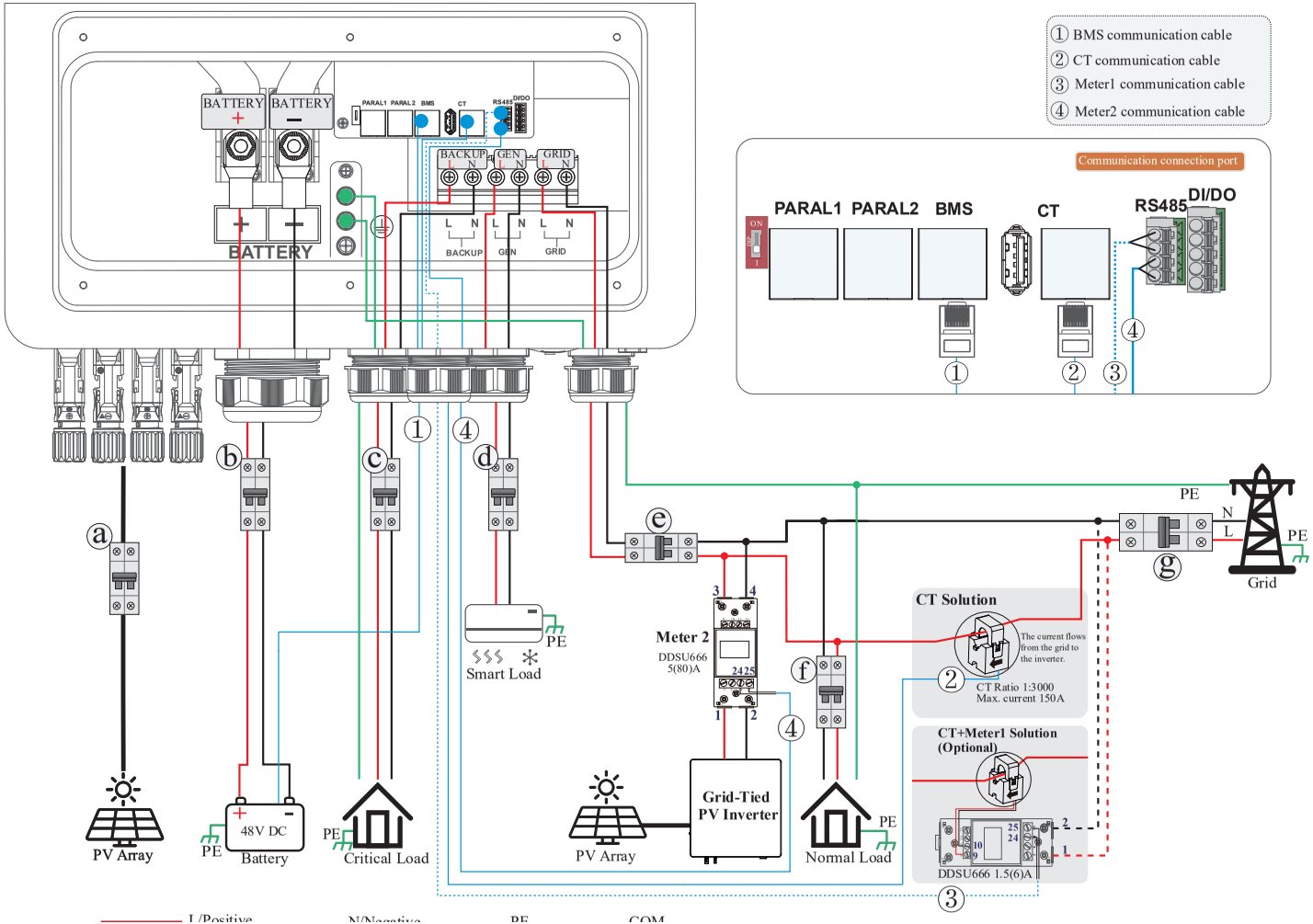
DANGER	Ensure that inverter and all cables to be installed are completely powered off during whole installation and connection. Otherwise, high voltage may result in fatal injury.

Note:

- BMS communication connection is only for lithium battery.
- Breakers recommendation:

INV.	PV breaker (a)	Battery breaker (b)	Backup breaker(c)	Gen breaker (d)	Grid breaker(e)	Normal load breaker (f)	Main breaker (g)
8K	32 A / 600 V DC (Per string)	250 A / 80 V DC	≥100 A (AC type)	≥80 A (AC type)	≥100 A (AC type)	Depends on household loads	Depends on household loads
10K		320 A / 80 V DC					
12K		350 A / 80 V DC					

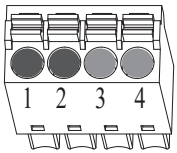
- AC coupling connection wiring diagram



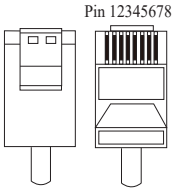
DANGER	Ensure that inverter and all cables to be installed are completely powered off during whole installation and connection. Otherwise, high voltage may result in fatal injury.

Note:

- When connecting the meter, the phase of the meter should be consistent with that of the hybrid inverter.
- Ensure that CT and meter are wired properly and correctly, otherwise unpredictable problems may occur.
- The CT and meter communication terminal pin definition:



Pin	Function Description	Pin	Function Description
1	RS485_A1 (for Meter 1)	3	RS485_A2 (for Meter 2)
2	RS485_B1 (for Meter 1)	4	RS485_B2 (for Meter 2)



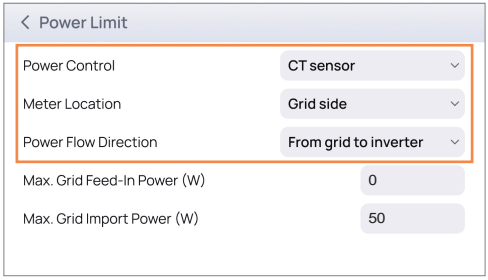
Pin	Function Description	Pin	Function Description
1	CT_CHECK+	5	I_CT-
2	NC	6	I_CT+
3	CT_CHECK+	7	CT_CHECK-
4	NC	8	CT_CHECK-

LCD setting guide for AC Coupling (Grid)

Enable AC coupling function via the LCD. The following is an example.

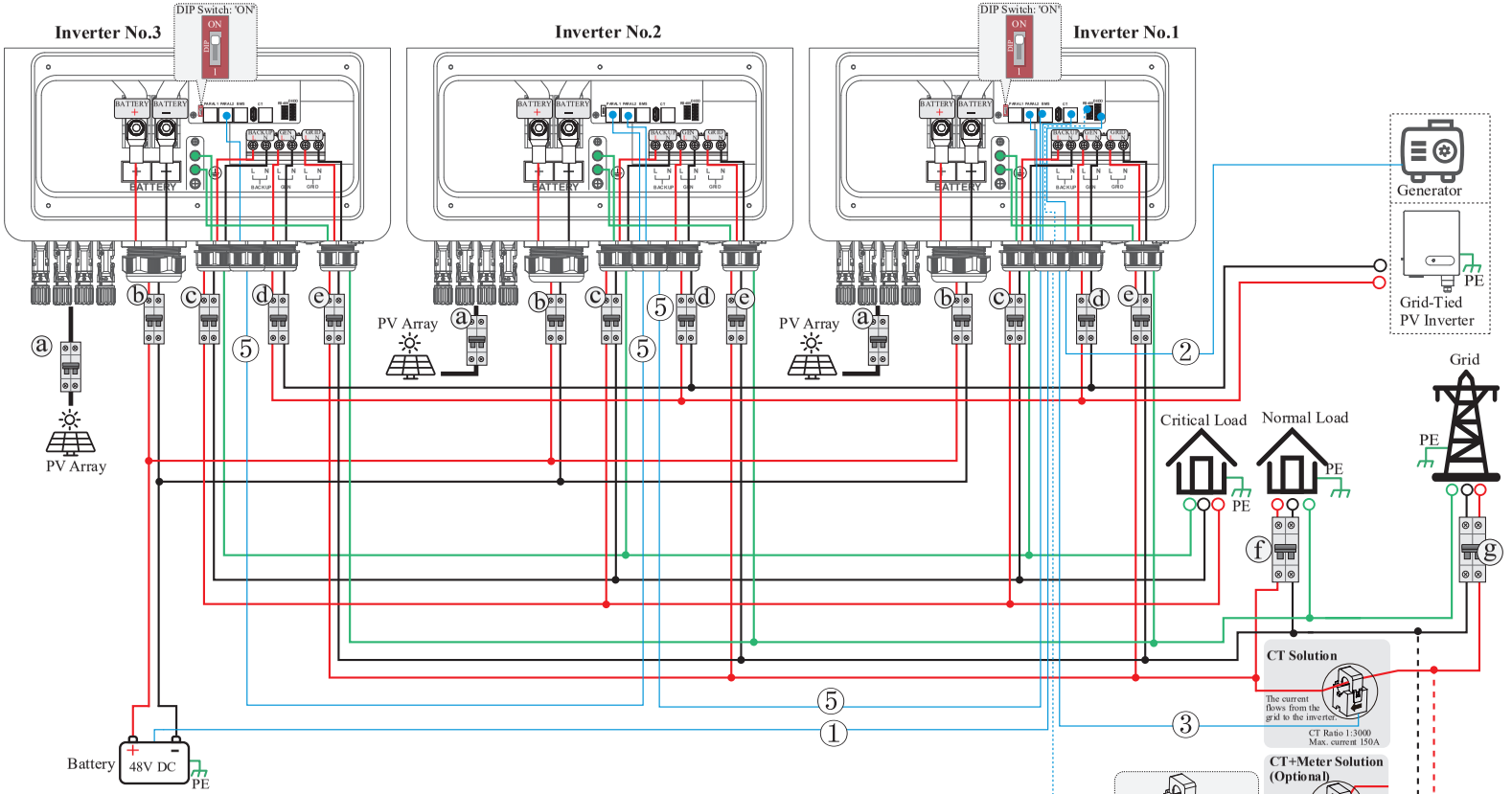
Step 1: Go to **Settings > Advanced** > **Grid** page to enable AC coupling function and set meter.

Step 2: Go to **Settings** > **Advanced** > **Power Limit** page to set the CT/Meter parameters. Take the CT as an example.



Parallel application (N≤3)

- Parallel connection wiring diagram



① BMS communication cable
② GEN DRY communication cable
③ CT communication cable
④ Meter communication cable
⑤ Parallel communication cable

* CT and BMS communication cables can be connected to any inverter of the parallel system, but they must be inserted into the same inverter and this inverter will be inverter No.1.
* Each inverter can use either an independent battery or a shared common battery.
* Ensure the conductor's materials, cross-sectional areas, and lengths of backup port cables between Inverter No. 1 and other inverters of the system are the same. Recommended length less than or equal to 2m.

L/Positive — N/Negative — PE — COM

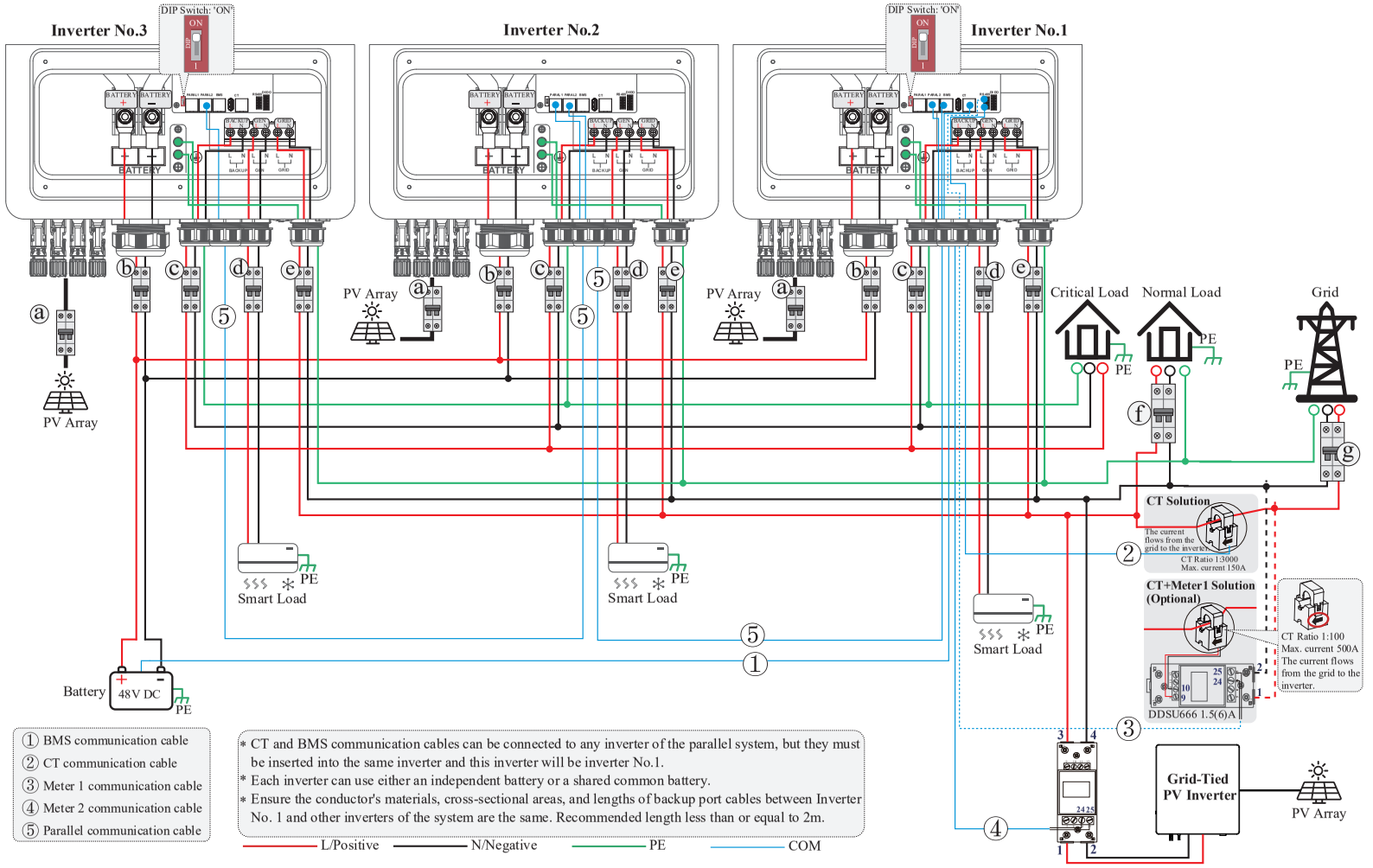
DANGER	Ensure that inverter and all cables to be installed are completely powered off during whole installation and connection. Otherwise, high voltage may result in fatal injury.

Note:

- BMS communication connection is only for lithium battery.
- It is necessary to turn the matched resistance switch of inverter No. 1 and inverter No. 3 to "ON", and keep inverter No. 2 at "1" in parallel connection mode.
- Go to **Settings > Advanced > Inverter** page to enable Parallel mode and select the **Battery Connection Type** on the LCD of any inverter.
- In one parallel system, the smart load is only allowed to be connected to GEN port in a non-parallel way.
- In one parallel system, each inverter can use either an independent battery or a shared common battery. The manual only shows the common battery. In one system connected with independent battery, the inverter connecting with the CT is the main inverter, i.e., Inverter No. 1. The BMS communication cable of each battery needs to be connected to its corresponding inverter. And the batteries connected in the system should be the same in terms of their brands and models.
- The parallel communication cable between two inverters should not exceed 5 meters. It is recommended to use twisted-pair cables to reduce interference.

INV.	PV breaker (a)	Battery breaker (b)	Backup breaker(c)	Gen breaker (d)	Grid breaker(e)	Normal load breaker (f)	Main breaker (g)
8K	32 A / 600 V DC (Per string)	250 A / 80 V DC	≥100 A (AC type)	≥80 A (AC type)	≥100 A (AC type)	Depends on household loads	Depends on household loads
10K		320 A / 80 V DC					
12K		350 A / 80 V DC					

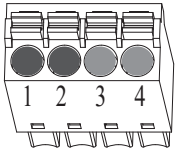
- AC coupling application of parallel system



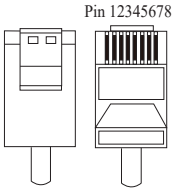
DANGER	Ensure that inverter and all cables to be installed are completely powered off during whole installation and connection. Otherwise, high voltage may result in fatal injury.

Note:

- When connecting the meter, the phase of the meter should be consistent with that of the hybrid inverter.
- Ensure that CT and meter are wired properly and correctly, otherwise unpredictable problems may occur.
- If the current flowing through the meter is too high, use CT+meter.
- The CT and meter communication terminal pin definition:



Pin	Function Description	Pin	Function Description
1	RS485_A1 (for Meter 1)	3	RS485_A2 (for Meter 2)
2	RS485_B1 (for Meter 1)	4	RS485_B2 (for Meter 2)



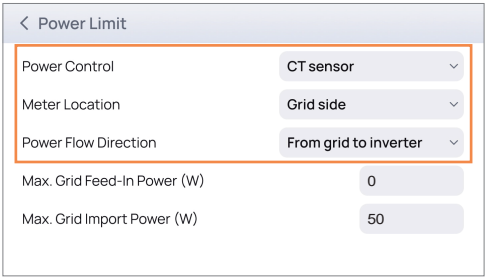
Pin	Function Description	Pin	Function Description
1	CT_CHECK+	5	I_CT-
2	NC	6	I_CT+
3	CT_CHECK+	7	CT_CHECK-
4	NC	8	CT_CHECK-

LCD setting guide for AC Coupling (Grid)

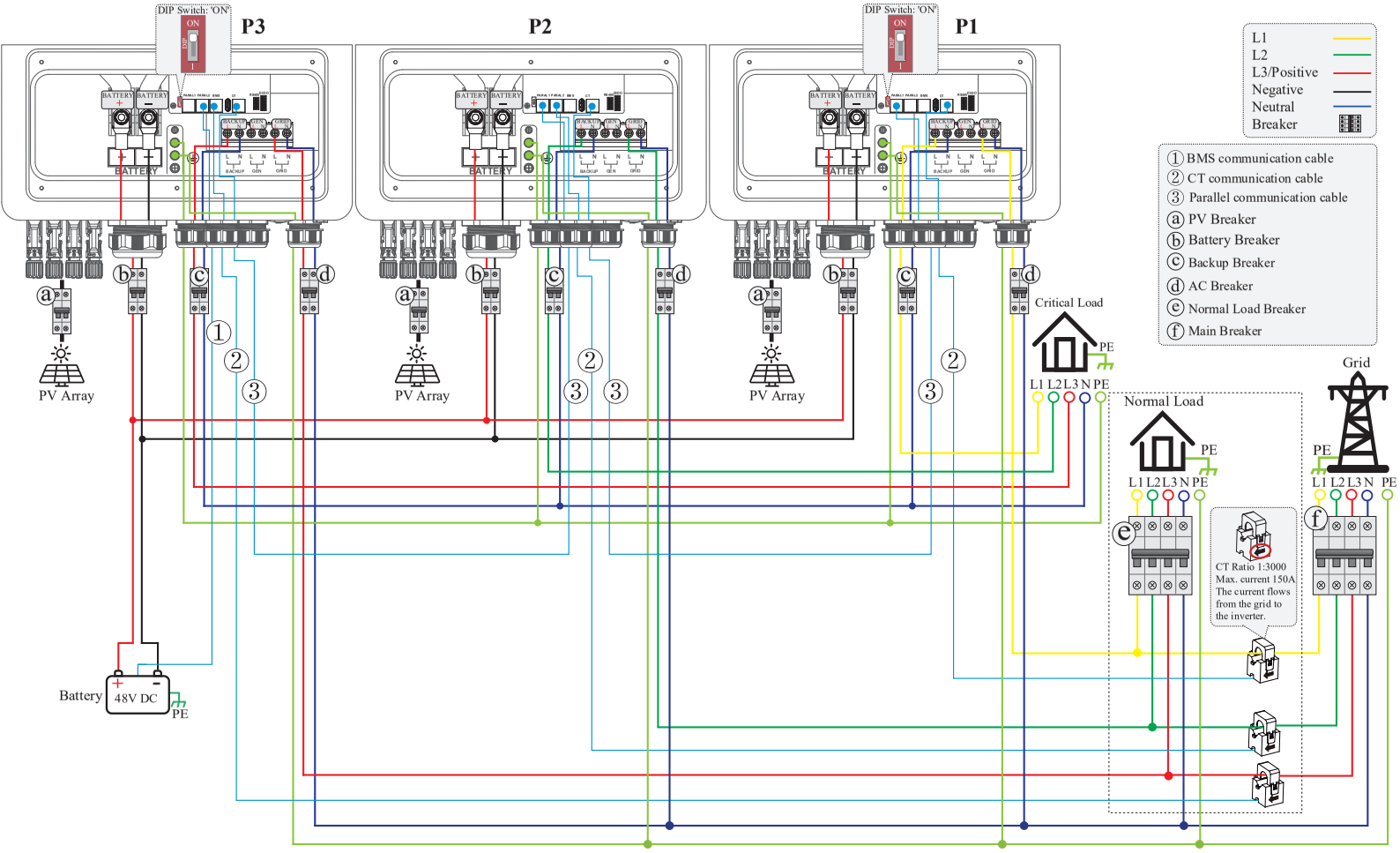
Enable AC coupling function via the LCD. The following is an example.

Step 3: Go to **Settings > Advanced** > **Grid** page to enable AC coupling function and set meter.

Step 4: Go to **Settings** > **Advanced** > **Power Limit** page to set the CT/Meter parameters. Take the CT as an example.



- Three-phase Equipment Connection Wiring Diagram (N=3)



Note:

- Make sure all inverters in parallel have the same firmware version by verifying the 'Master DSP', 'Slave DSP', and 'CSB' version numbers on LCD. It is recommended to restore the firmware before three-phase connection to ensure the same parameter for each inverter.
- A maximum of 3 single-phase inverters are connected to form a three-phase equipment and each inverter supports one phase only.
- BMS connection is only applicable to lithium battery.
  - For common lithium battery connection, please refer to Three-phase equipment connection wiring diagram to connect the BMS communication cable.
  - For independent lithium battery connection, the BMS communication cable needs to be connected to each inverter.

LCD setting guide for three-phase connection

Set the related parameters via the LCD. The following is an example for three inverters.

Step 1: Power on the inverter.

Step 2: Tap the interver icon on **Home** page to verify version number and ensure that the version number for each inverter are the same.

Step 3: Turn off the inverter: Click the ' ' button on **Home** page. Notice that all three inverters should be turned off.

Step 4: Reset the inverter: Go to **Settings > Advanced** > **Maintenance** > tap **Factory Data Reset**. Notice that all three inverters should be reset.

Step 5: Go to **Settings** > **Advanced** > **Inverter** page to enable Parallel mode on the LCD of any inverter.

Step 6: Set the phase position accordingly: Go to **Inverter** > **Single to 3-Phase**. Notice that all three inverters should be set in this step. (Figure a-c)

Step 7: Set the battery connect type: Go to **Settings** > **Advanced** > **Inverter** > **Battery Connection Type** > Select parallel/ independent battery.

Step 8: Set the other basic parameters of the inverter. Detailed setting process please refer to ***Startup Guide (LCD)***.

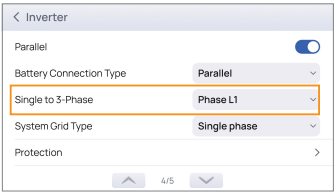


Figure a P1-Phase L1

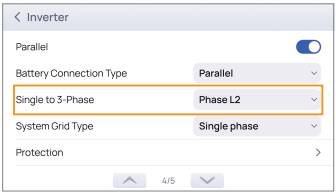


Figure b P2-Phase L2

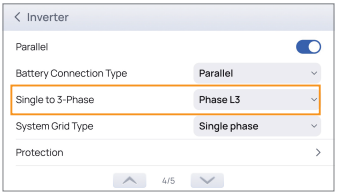
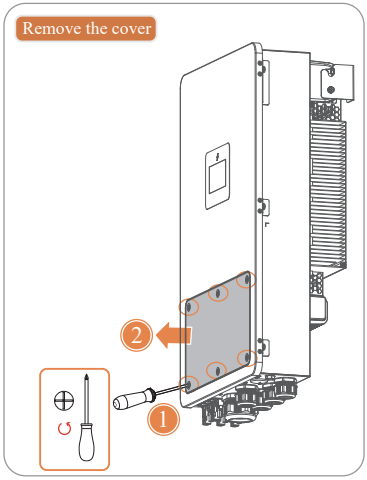
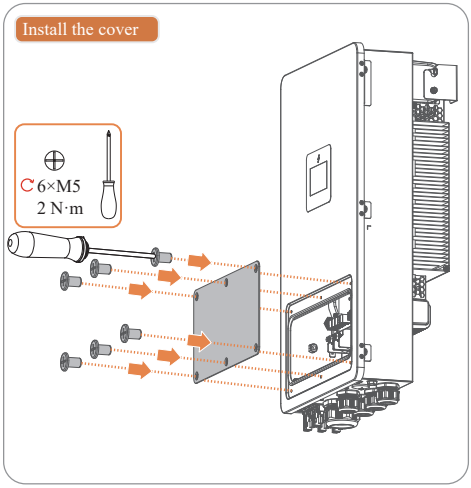


Figure c P3-Phase L3

4.1 Removing/Installing the Cover



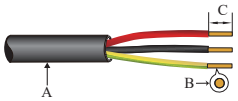


4.2 GRID/BACKUP/GEN Connection

The GEN port can work as the input port for the generator/AC Coupling, or as the output port for the Smart Load .

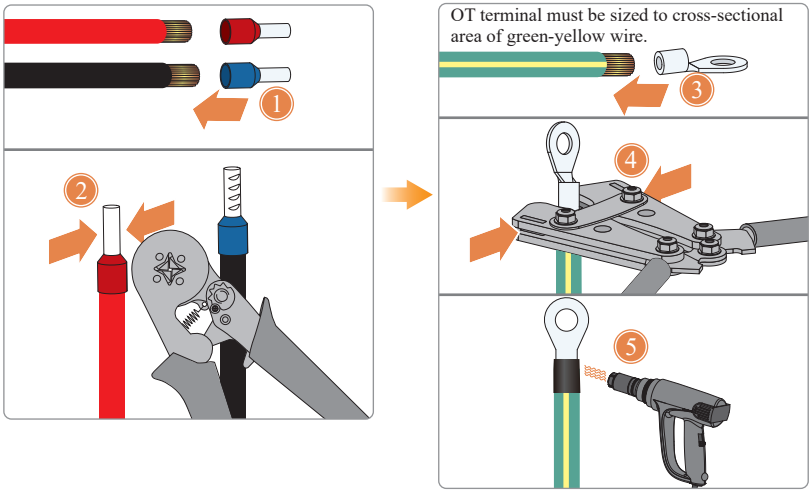
Before connecting the GRID terminal, ensure that the AC terminal, the battery terminal and the PV terminal are powered OFF. Otherwise there is a risk of high voltage shock.

Step 1: Select the cable and strip the insulation.

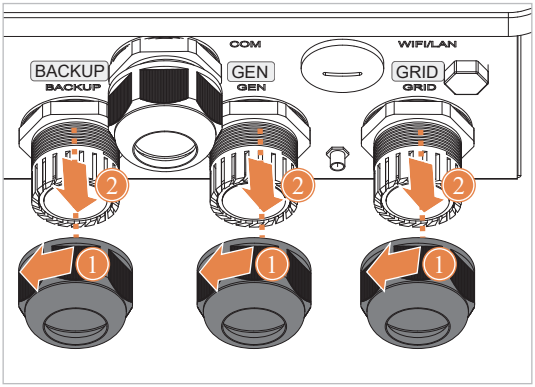


Terminal	A	B	C
GRID	18 mm to 25 mm	14 mm^2 to 22 mm^2	12±0.5 mm
BACKUP			
GEN		8 mm^2 to 22 mm^2	

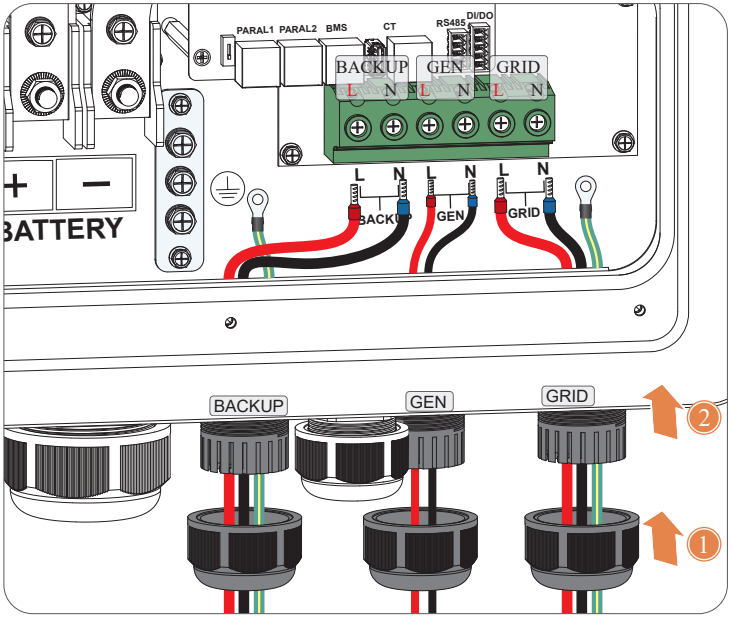
Step 2: Fit the wire ferrules and OT terminal to L/N wire and PE wire respectively, then use an appropriate tool to crimp them. Finally, use the heat shrinkable tubing to protect the PE wire.



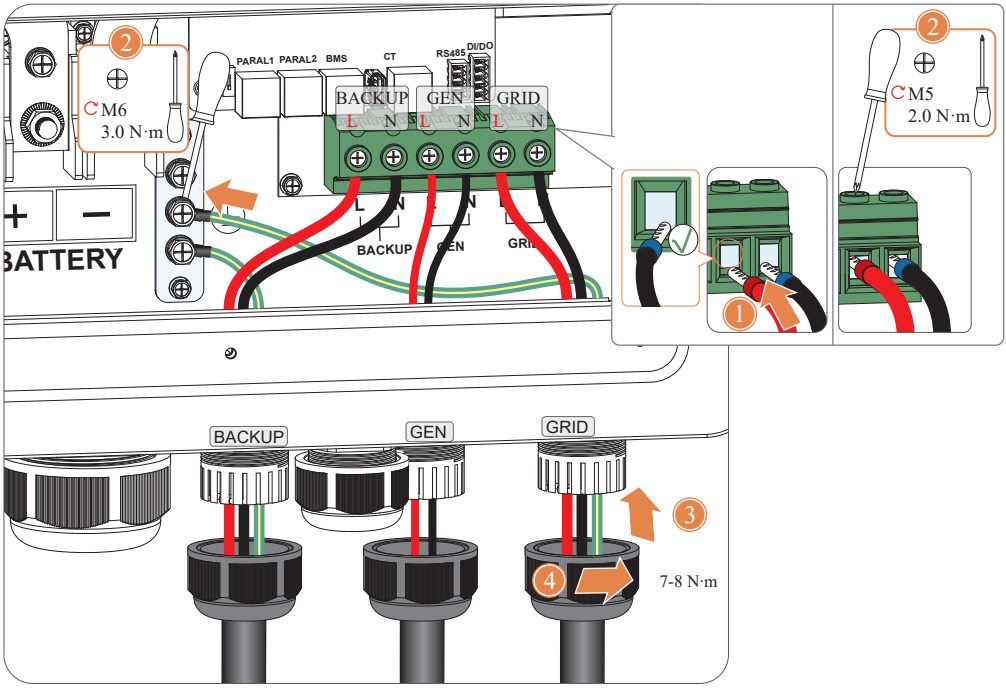
Step 3: Loosen the rubber nut.



Step 4: Lead the cable through the rubber nut. Then run the cables into wiring box through correct ports.



Step 5: The cable clamper has been opened by default. Attach the cables to the terminal blocks accordingly and tighten the screws with a torque of 2.0 N·m. Then tighten the ground screws with a torque of 3.0 N·m. Finally fasten the rubber nut.

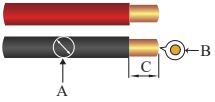


4.3 Battery Connection

This section explains the requirements and procedures of battery connection. Read carefully before connecting.

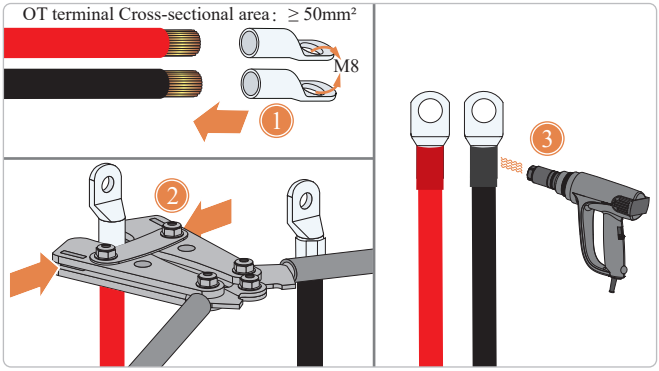
DANGER	Before connecting the battery terminal, ensure that the AC terminal, the battery terminal and the PV terminal are powered OFF. Otherwise there is a risk of high voltage shock.
WARNING	When connecting two battery packs to the inverter, the model and brand of the two battery packs should be the same. Additionally, the SOC and voltage of the two battery packs should be as consistent as possible.

Step 1: Prepare the proper cable we recommended, and strip an appropriate length of the cable insulation.

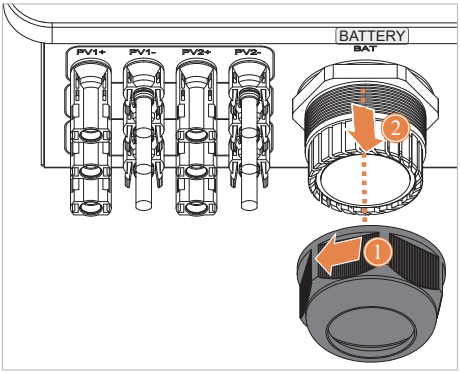


Type	A	B	C
one battery pack	36 mm to 41 mm	≥60 mm²	Depends on OT terminal specs.
two battery packs	29 mm to 34 mm	≥38 mm²	

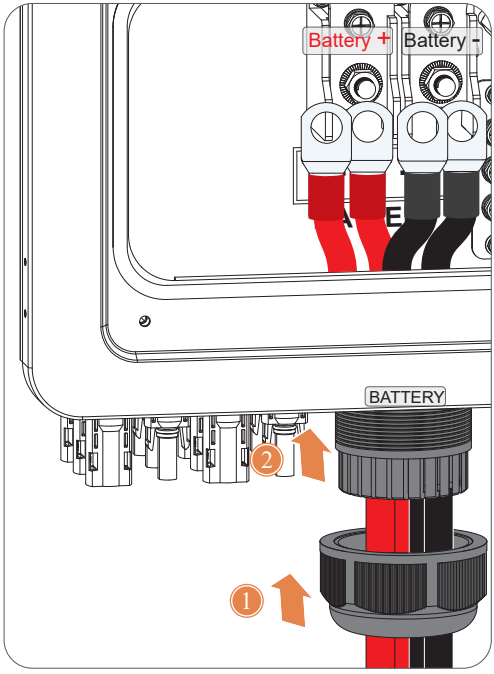
Step 2: Fit a terminal lug (not equipped) to each cable and use an appropriate tool to crimp it. Then use the heat shrinkable tubing to protect the cables.



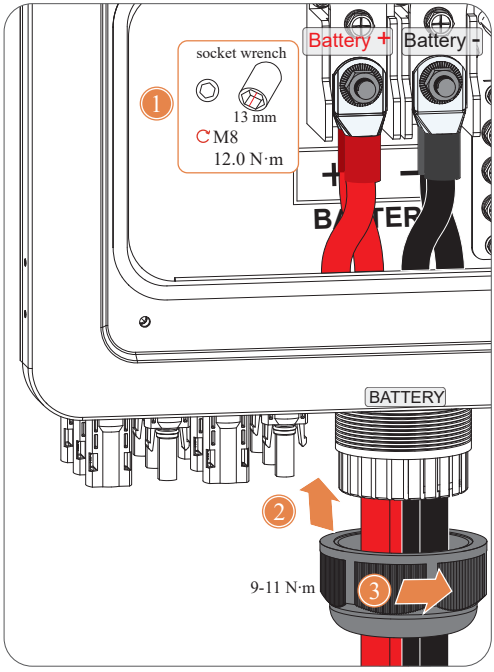
Step 3: Loosen the rubber nut.



Step 4: Lead the cable through the rubber nut. Then run the cables into wiring box through correct ports.



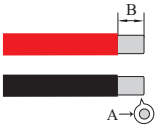
Step 5: Attach the cables to the terminal blocks accordingly and then tighten all screws with a torque of 12.0 N·m. Finally fasten the rubber nut.



4.4 PV Connection

WARNING	Please check polarity of PVconnectors! If polarity reversed, do not try to disconnect any PV connector until the irradiance declines and the DC currents fall below 0.5 A! Only then disconnect the PV plugs and correct the polarity before reconnecting.
NOTICE	• Before connection the PV panels, make sure the plug connector have the correct polarity. Incorrect polarity could permanently damage the inverter. • PV array shouldn't be connected to the grounding conductor. • The minimum insulation resistance to ground of the PV panels must exceed 18.33kΩ, there is a risk of shock hazard if the requirement of minimum resistance is not met.
NOTE	PV cable should be dedicated PV cable (suggest using 4 - 6mm² PV1-F cable).

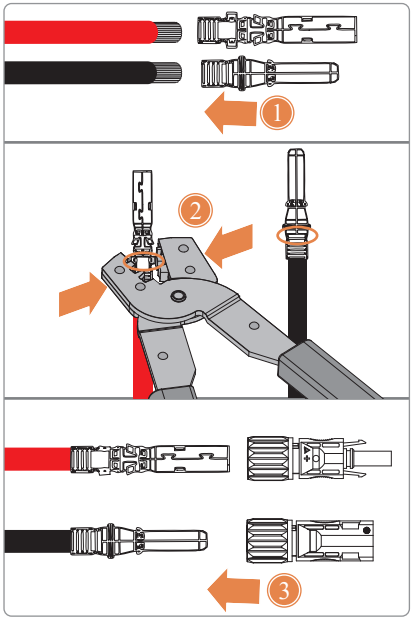
Step 1: Prepare the proper cable we recommended, and strip an appropriate length of the cable insulation.



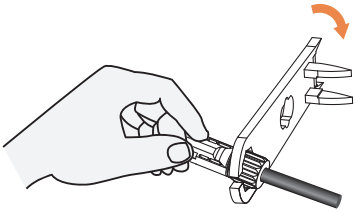
A. Cross Section	4 mm² to 6 mm²
B. Strip Length	4±0.5 mm

Note:
PV cable should be dedicated PV cable (suggest using 4 - 6mm² PV1-F cable).

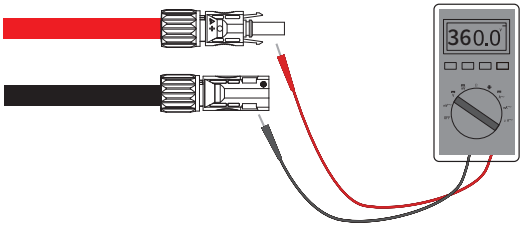
Step 2: Insert the exposed areas of the positive and negative cables into the metal terminals of the positive and negative connectors respectively and crimp them with a crimping tool. Then insert the crimped positive and negative cables into the corresponding positive and negative connectors.



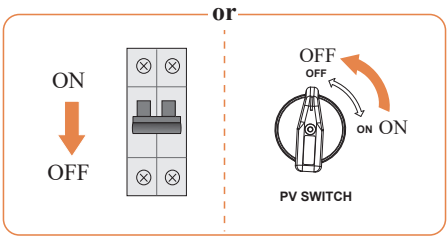
Step 3: Tighten the waterproof nuts on each connector to avoid loosening.



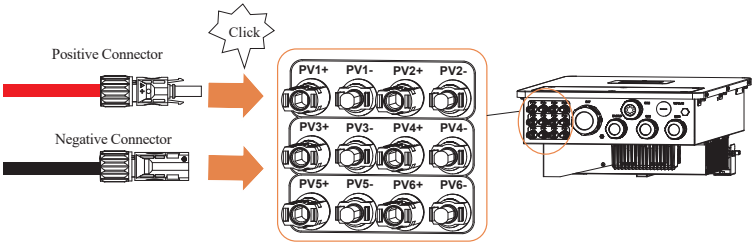
Step 4: Test string voltage and confirm string polarity.



Step 5: Ensure that the PV switch/breaker is OFF.

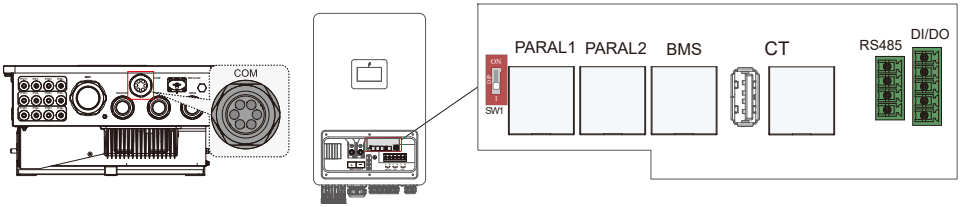


Step 6: Insert the positive and negative connectors into the PV+/PV- ports until a "click" sound is heard.



4.5 Communication Interface Connection

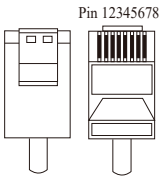
Communication interfaces layout and definition:



Interface		Description
PARAL1		RJ45 interface for parallel communication. A matched resistance switch for parallel communication.
PARAL2		
BMS		Lithium battery communication interface.
CT		RJ45 interface for grid/load current sensor.
RS485		RS485/Meter communication.
5-Pin	DI	Dry contact input control (reserved).
	DO	Dry contact output control(reserved).

4.5.1 CT Connection

Terminal Configuration of Monitoring / CT Communication.



Pin	Function Description	Pin	Function Description
1	CT_CHECK+	5	I_CT-
2	NC	6	I_CT+
3	CT_CHECK+	7	CT_CHECK-
4	NC	8	CT_CHECK-

CT / CT+Meter Connection Requirement

Inverter.Qty	Distance	CT	CT+Meter
1	≤ 3m	√	√
	3 - 10m	√	
	> 10m		
2 - 3	≤ 3m	√	√
	3 - 10m	√	
	> 10m		

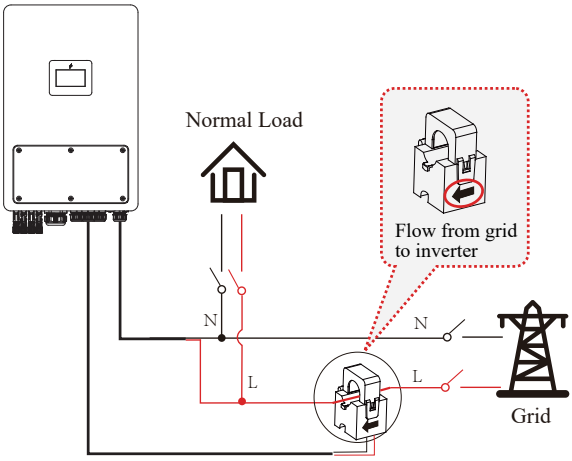
Note:

- CT cable length: 3m or 10m. Do not extend the CT cable.
- Meter (optional): wire length up to 100m.
- For CT+Meter connection, it is necessary to additionally purchase suitable CT and meter from customer service according to the specific requirements.

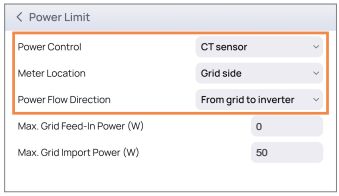
The grid voltage and current can be sampled by CT.

There are two connection diagrams of CT power cable, which are shown as below:

- CT at grid side



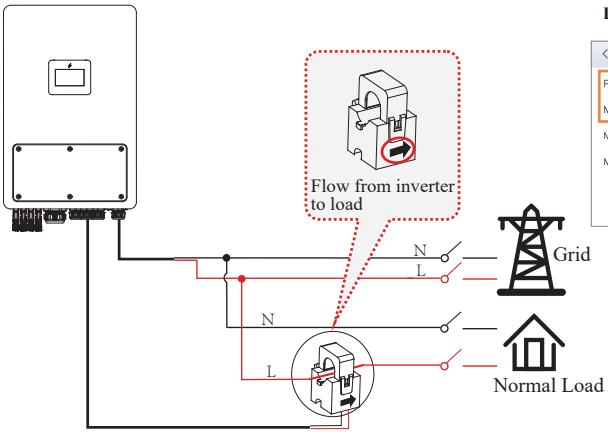
LCD Display



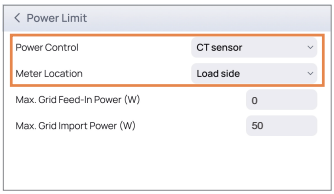
Please pay attention to the direction of current transformer (CT). The arrow on the CT indicates the current flow from grid to inverter.

NOTICE	The current direction from grid to inverter is defined as positive and current direction from inverter to grid is defined as negative.

- CT at load side



LCD Display



Please pay attention to the direction of current transformer (CT). The arrow on the CT indicates the current flow from inverter to load.

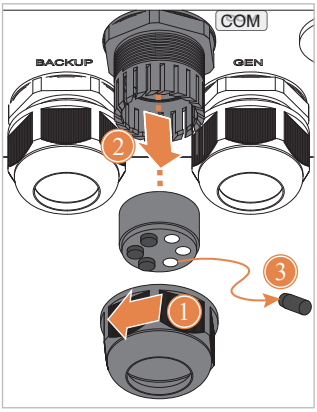
NOTICE	The current direction from inverter to load is defined as positive and current direction from load to inverter is defined as negative.

CT cable connection procedure

NOTE	Ensure that the inverter is completely powered off before connecting the CT cable.

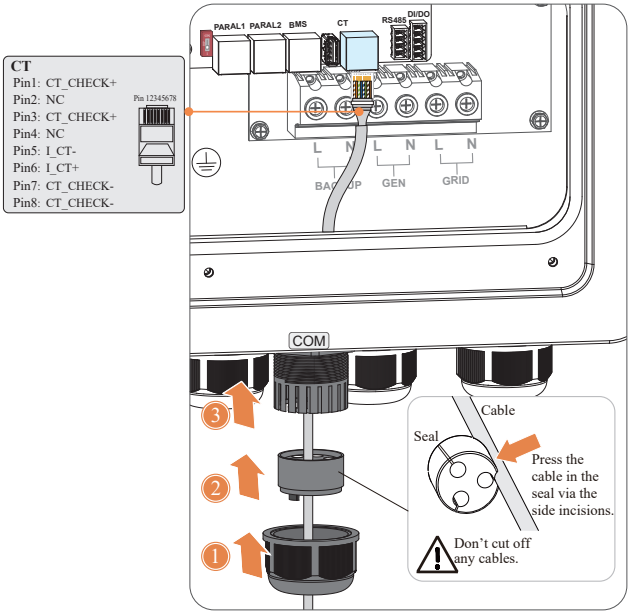
Step 1: Loosen the rubber nut, then remove the seal and sealing plugs.

DANGER	Before connecting the com cable, ensure that the AC, the battery and the PV are powered OFF. Otherwise there is a risk of high voltage shock.



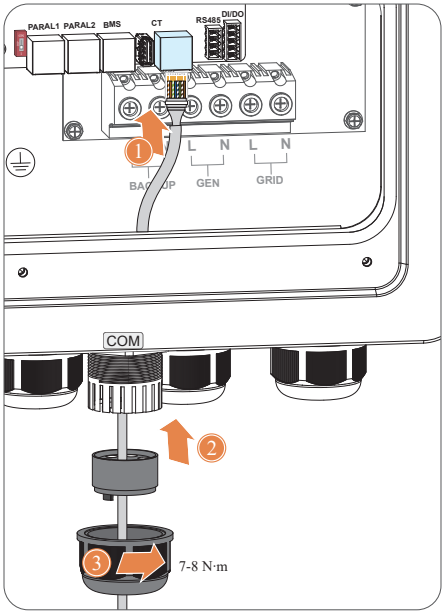
Step 2: Thread the cables.

1. Lead the cable through the rubber nut and seal in turn.
2. Run the cables into wiring box through correct ports.



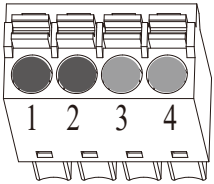
Step 3: Insert the terminal.

1. Insert the terminal into corresponding port.
2. Install the seal into the threaded sleeve.
3. Fasten the rubber nut.



4.5.2 Meter/RS485 Connection

Terminal Configuration of Monitoring / Meter Communication.



Pin	Function Description	Pin	Function Description
1	RS485_A1 (for grid side meter)	3	RS485_A2 (for AC coupling)
2	RS485_B1 (for grid side meter)	4	RS485_B2 (for AC coupling)

Meter / CT+Meter Connection Requirement

Inverter.Qty	Distance	Meter	CT+Meter
1	≤ 3m	√	√
	3 - 10m	√	
	> 10m	√	
2 - 3	≤ 3m		√
	3 - 10m		
	> 10m		

Note:

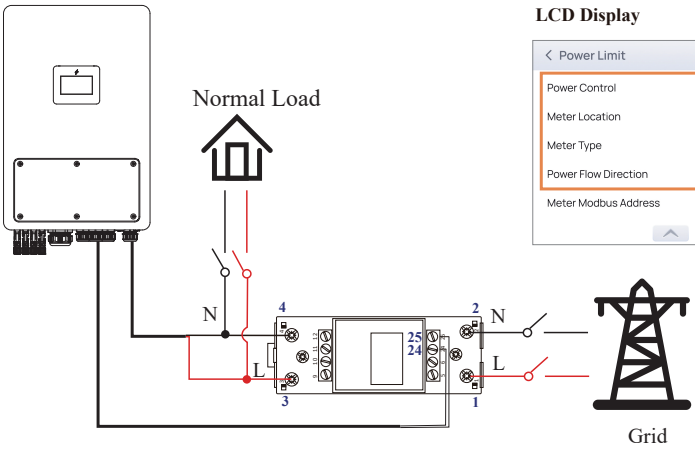
- CT cable length: 3m or 10m. Do not extend the CT cable.
- Meter (optional): wire length up to 100m.
- For CT+Meter connection, it is necessary to additionally purchase suitable CT and meter from customer service according to the specific requirements.

4.5.2.1 Meter Connection

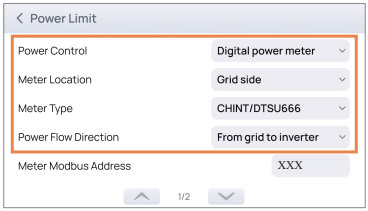
This solution only supports the CHINT-DDSU666 5(80)A meter. The meter is optional.

There are two connection diagrams of energy meter, which are shown as below:

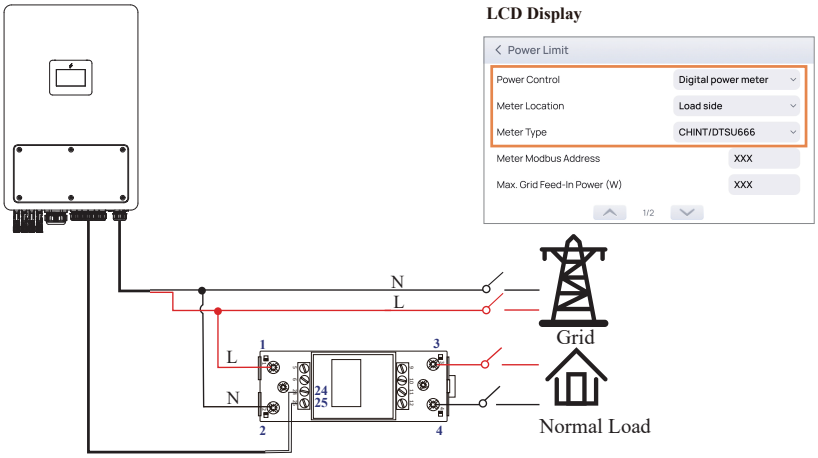
- Meter at grid side



LCD Display

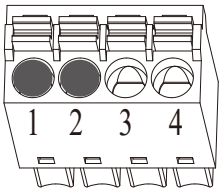


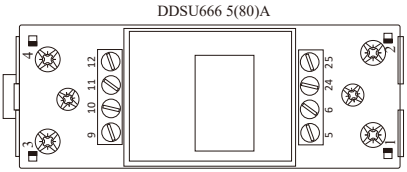
- Meter at load side



As for the detail application of meter, please refer to the meter instruction manual.

Pin definition of terminal:



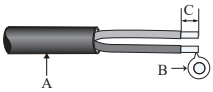


Pin (Terminal)	Function Description
1	RS485_A1
2	RS485_B1

Pin (Meter)	Function Description
1	Grid_L
2	Grid_N
3	Hybrid inverter_L
4	Hybrid inverter_N
24	RS485_A
25	RS485_B

Meter cable connection procedure

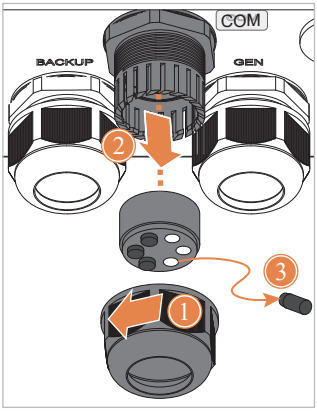
Step 1: Select the cable and strip the insulation.



A. Diameter	4.5 mm to 6 mm
B. Cross Section	0.12 mm² to 0.2 mm²
C. Strip Length	7.5 ± 0.5 mm

It is recommended to use multi-core cables.

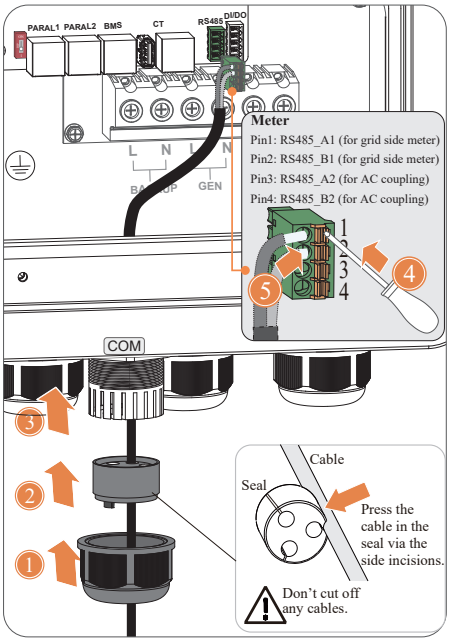
Step 2: Loosen the rubber nut, then remove the seal and sealing plugs.



DANGER	Before connecting the com cable, ensure that the AC, the battery and the PV are powered OFF. Otherwise there is a risk of high voltage shock.

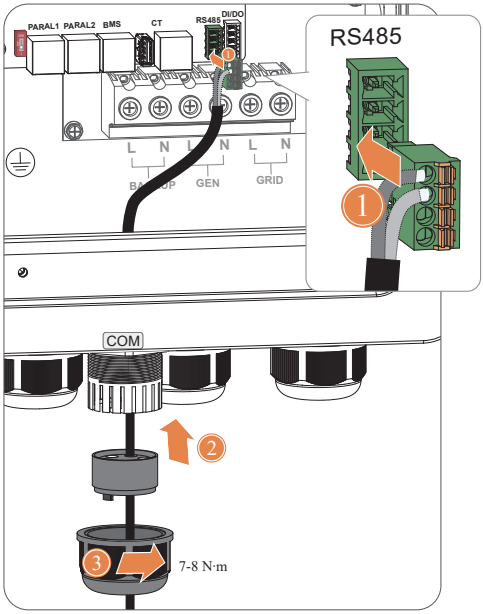
Step 3: Thread the cables and make the terminal.

1. Lead the cable through the rubber nut and seal in turn.
2. Run the cables into wiring box through correct ports.
3. Make the terminal according to the above pin definition.



Step 4: Insert the terminal.

1. Insert the terminal into corresponding port.
2. Install the seal into the threaded sleeve.
3. Fasten the rubber nut.

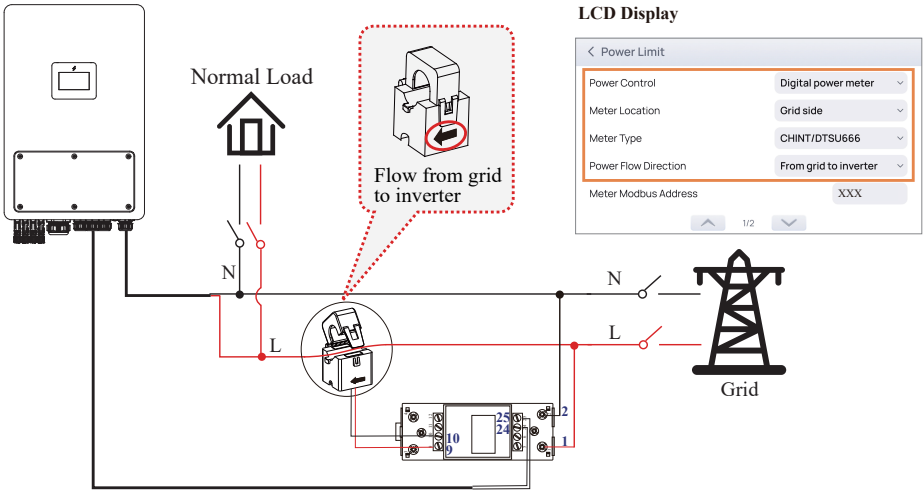


4.5.2.2 CT+Meter Connection

This solution only supports the CHINT-DDSU666 1.5(6)A meter. The CT and meter are optional.

The connection diagram for CT locating at grid side is shown as below:

- Meter at grid side

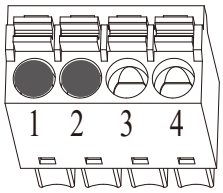


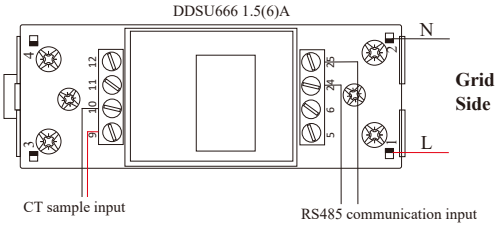
- Meter at load side

For CT locating at normal load side, please refer to the charter **CT Connection** > CT at load side.

As for the detail application of meter, please refer to the meter instruction manual.

Pin definition of terminal:





Pin (Terminal)	Function Description
1	RS485_A1
2	RS485_B1

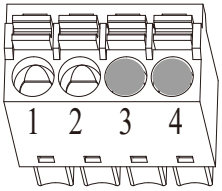
Pin (Meter)	Function Description
1	Grid_L
2	Grid_N
9	CT+
10	CT-
24	RS485_A
25	RS485_B

Meter cable connection procedure

For meter cable connection procedure, please refer to the charter **Meter Connection** > Meter cable connection procedure.

4.5.2.3 RS485 Connection

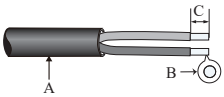
Pin definition of terminal:



Pin (Terminal)	Function Description
3	RS485_A2
4	RS485_B2

RS485 cable connection procedure

Step 1: Select the cable and strip the insulation.

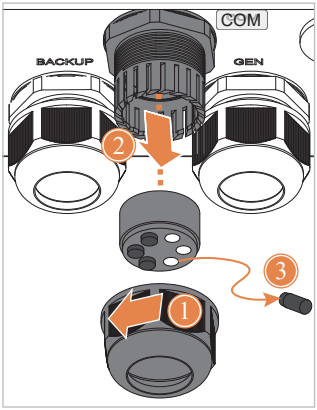


A. Diameter	4.5 mm to 6 mm
B. Cross Section	0.12 mm² to 0.2 mm²
C. Strip Length	7.5 ± 0.5 mm

It is recommended to use multi-core cables.

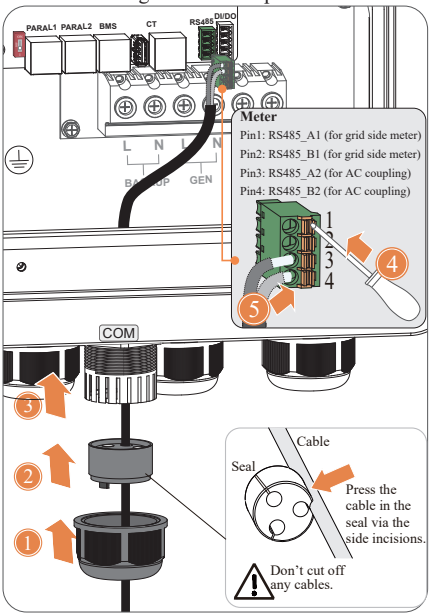
Step 2: Loosen the rubber nut, then remove the seal and sealing plugs.

DANGER	Before connecting the com cable, ensure that the AC, the battery and the PV are powered OFF. Otherwise there is a risk of high voltage shock.



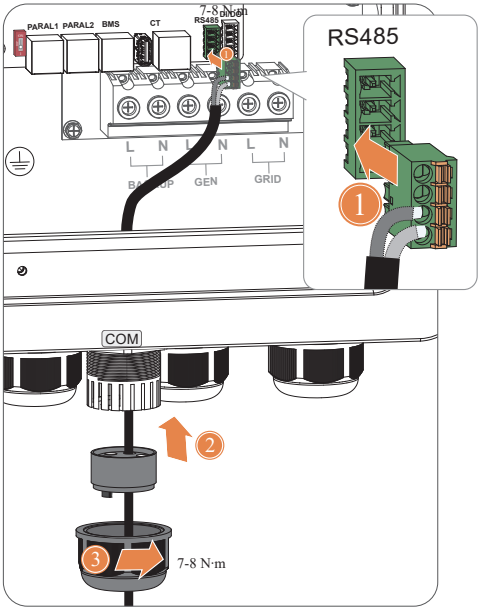
Step 3: Thread the cables and make the terminal.

1. Lead the cable through the rubber nut and seal in turn.
2. Run the cables into wiring box through correct ports.
3. Make the terminal according to the above pin definition.



Step 4: Insert the terminal.

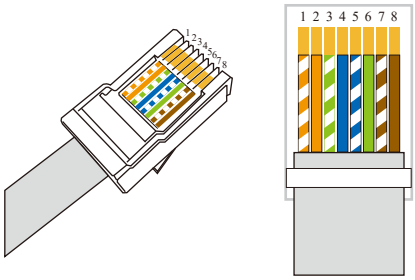
1. Insert the terminal into corresponding port.
2. Install the seal into the threaded sleeve.
3. Fasten the rubber nut.



4.5.3 BMS Connection for Lithium Battery

NOTICE	This manual ONLY illustrates the pinout sequence of BMS at INVERTER SIDE. For details about the pinout sequence at battery side, see the user manual of the battery you use, and the following pinout diagram of battery side is only for illustration.

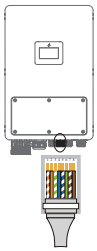
Standard RJ45 Pinout

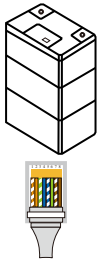


RJ45 Pin Configuration	
Pin	**Color**
1	White-Orange
2	Orange
3	White-Green
4	Blue
5	White-Blue
6	Green
7	White-Brown
8	Brown

Always face the flat side of the terminal, and count the pin slots from left to right, which correspond to 1 to 8. Read the pin definitions of both the battery and inverter carefully.

Pin definition of terminal

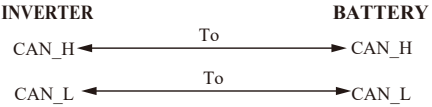




Pin (Inverter)	Function Description
1	RS485_A
2	RS485_B
3	GND_S
4	CAN_H
5	CAN_L
6	NTC
7	CAN_L
8	CAN_H

Pin (Battery (eg. Pylontech))	Function Description
1	NC
2	NC
3	GND_S
4	CAN_H
5	CAN_L
6	GND_S
7	NC
8	NC

CAN BUS connection principle

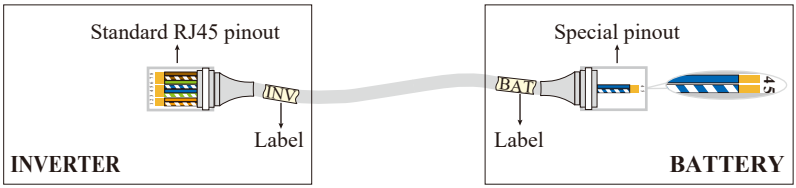


BMS communication cable prepartion

1. Prepare RJ45 terminals and strip appropriate length of COM cables.

2. According to pin definitions and cable order, assemble the RJ45 terminals and crimp communication wires.There are two methods to assemble the RJ45 terminals.

   Method 1: Use the INVERTER RJ45 pinout as the standard pinout to crimp wires, then the battery side will be a non-standard one (special pinout). Cut off the other no-used wires (1/2/3/6/7/8) for the battery RJ45 terminal.



   Method 2: Use the BATTERY RJ45 pinout as the standard pinout to crimp wires, then the inverter side will be a non-standard one (special pinout). Cut off the other no-used wires (1/2/3/6/7/8) for the inverter RJ45 terminal.

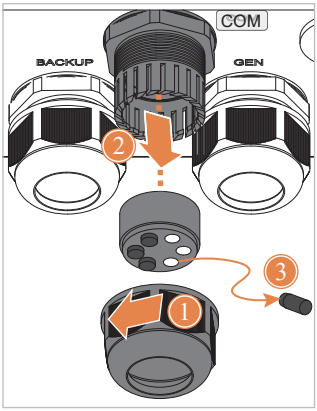
3. Then label the RJ45 terminals (BAT or INV) to avoid confusion.

4. After finishing wire-making, use a multimeter or other specific tool to check if your cable is good, bad, or wired incorrectly.

BMS communication cable connection

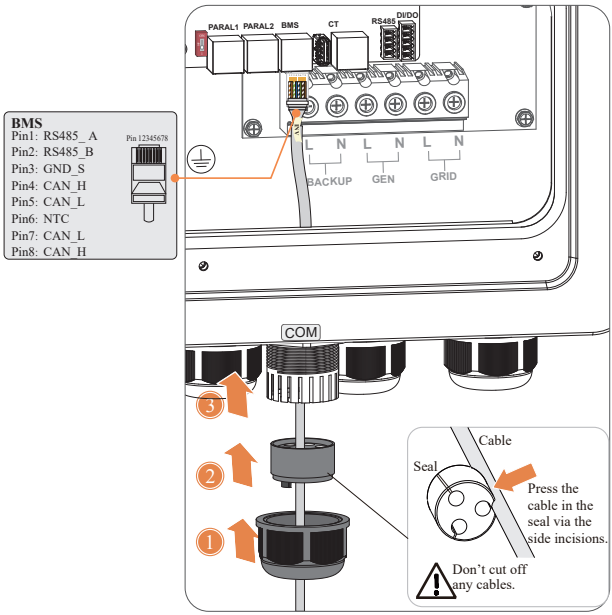
Step 1: Loosen the rubber nut, then remove the seal and sealing plugs.

DANGER	Before connecting the com cable, ensure that the AC, the battery and the PV are powered OFF. Otherwise there is a risk of high voltage shock.



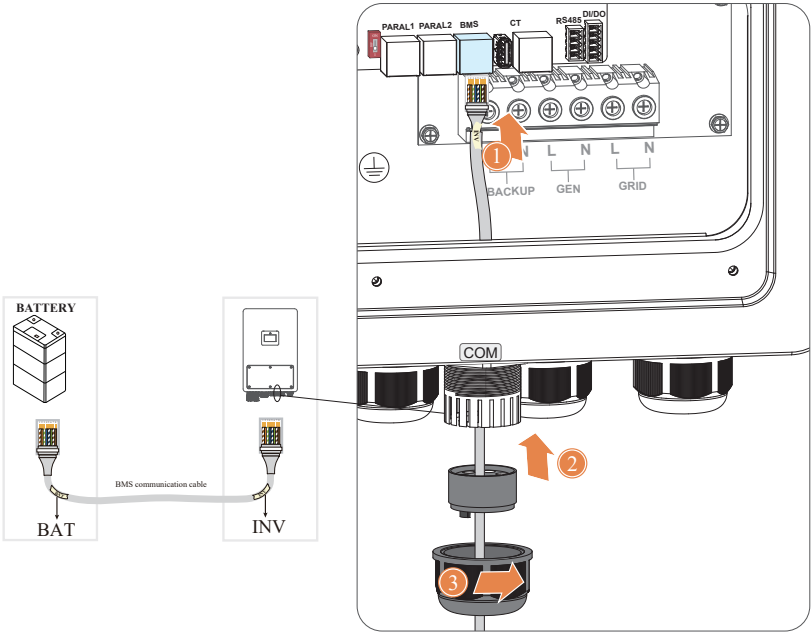
Step 2: Thread the cables.

1. Lead the cable through the rubber nut and seal in turn.
2. Run the cables into wiring box through correct ports.



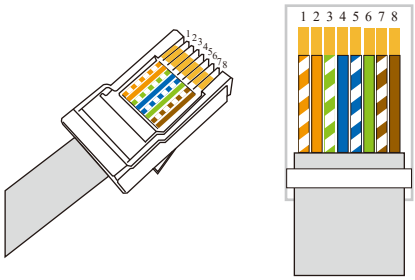
Step 3: Insert the terminal.

1. Insert the terminal into corresponding port.
2. Install the seal into the threaded sleeve.
3. Fasten the rubber nut.



4.5.4 NTC Connection for lead-acid battery (Optional)

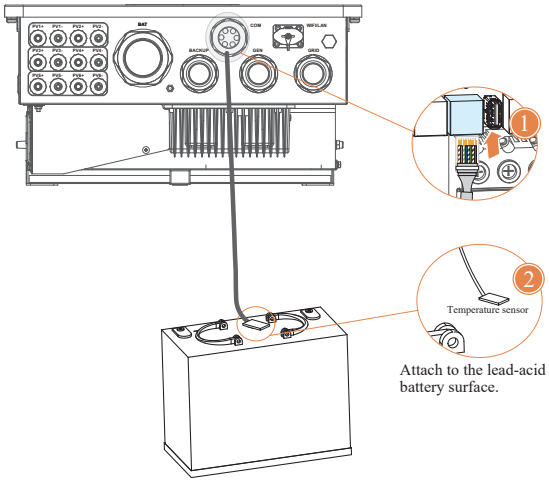
Pin definition of terminal



Pin (Terminal)	Function Description
1	NC
2	NC
3	GND_S
4	NC
5	NC
6	NTC
7	NC
8	NC

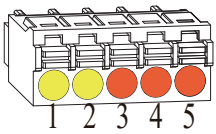
Cables connection procedure

Insert the terminal into BMS port. Then connect the other end of the lead-acid battery NTC cable.



4.5.5 DI/DO Connection

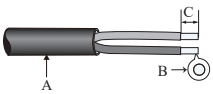
Pin definition of terminal



Pin (Terminal)	Function Description
1	GND_S
2	DI (for Data Input1)
3	NO (Normal Open)
4	COM
5	NC (Normal Close)

Cables connection procedure

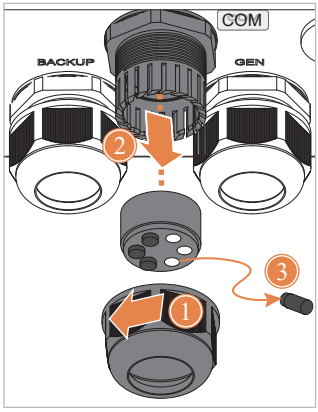
Step 1: Select the cable and strip the insulation.



A. Diameter	4.5 mm to 6 mm
B. Cross Section	0.12 mm² to 0.2 mm²
C. Strip Length	7.5 ± 0.5 mm

It is recommended to use multi-core cables.

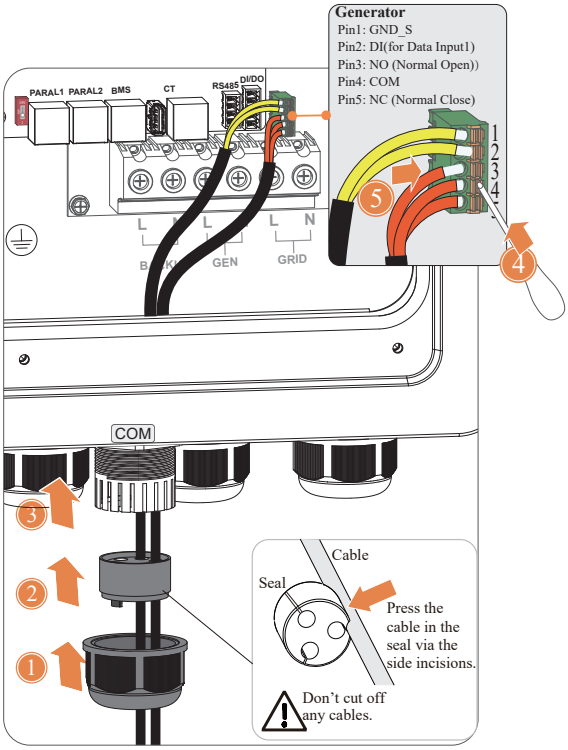
Step 2: Loosen the rubber nut, then remove the seal and sealing plugs.



DANGER	Before connecting the com cable, ensure that the AC, the battery and the PV are powered OFF. Otherwise there is a risk of high voltage shock.

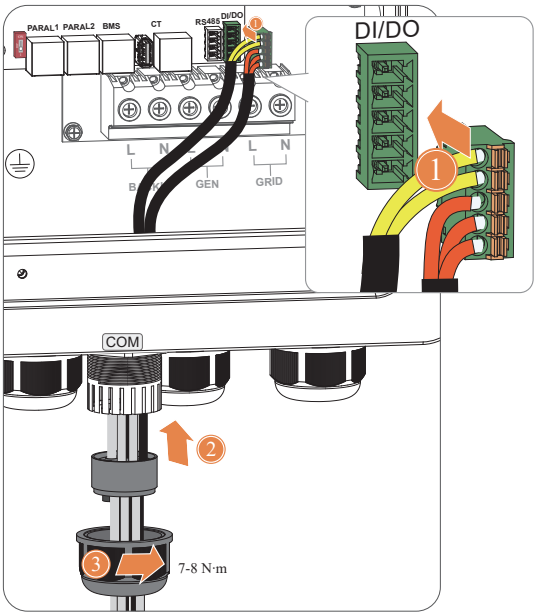
Step 3: Thread the cables and make the terminal.

1. Lead the cable through the rubber nut and seal in turn.
2. Run the cables into wiring box through correct ports.
3. Make the terminal according to the above pin definition.



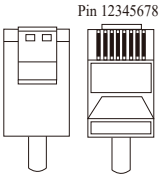
Step 4: Insert the terminal.

1. Insert the terminal into corresponding port.
2. Install the seal into the threaded sleeve.
3. Fasten the rubber nut.



4.5.6 Parallel Communication Connection

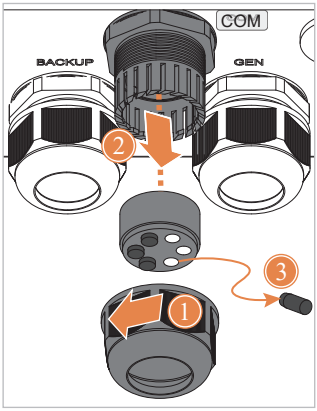
Pin definition of terminal



Pin	Function Description	Pin	Function Description
1	CAN_H	5	NC
2	CAN_L	6	NC
3	NC	7	PARA_SYNC
4	NC	8	GND_S

Parallel cable connection procedure

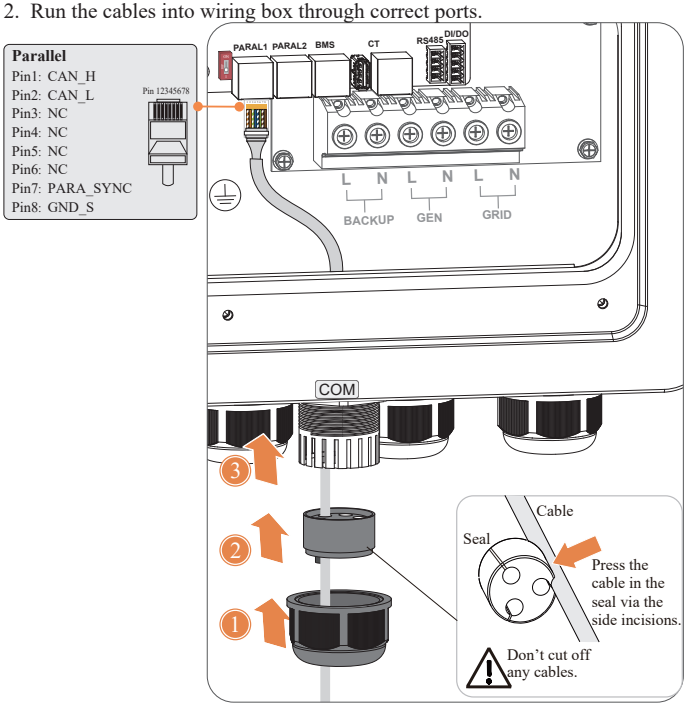
Step 1: Loosen the rubber nut, then remove the seal and sealing plugs.



DANGER	Before connecting the com cable, ensure that the AC, the battery and the PV are powered OFF. Otherwise there is a risk of high voltage shock.

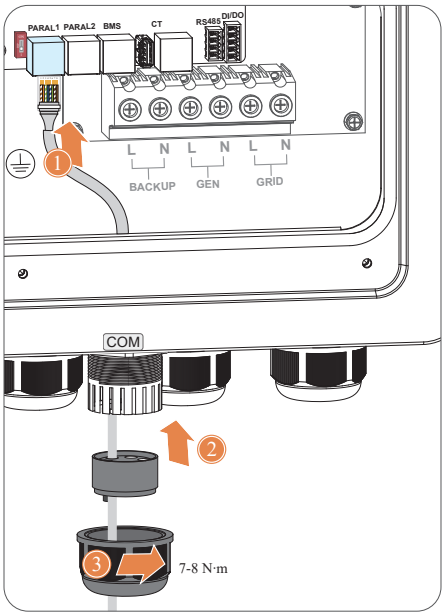
Step 2: Thread the cables.

1. Lead the cable through the rubber nut and seal in turn.
2. Run the cables into wiring box through correct ports.

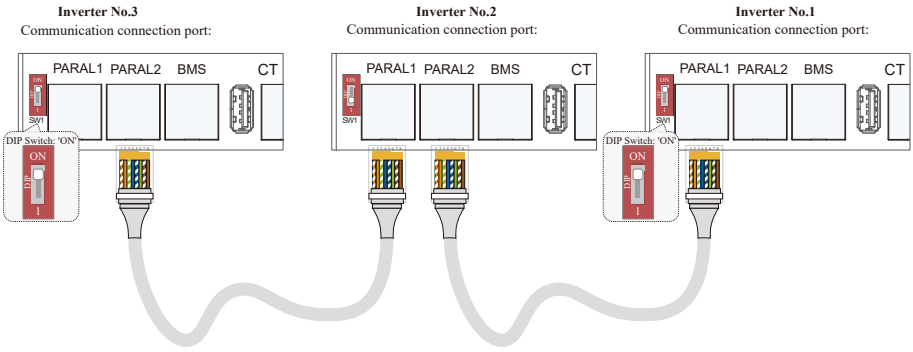


Step 3: Insert the terminal.

1. Insert the terminal into corresponding port.
2. Install the seal into the threaded sleeve.
3. Fasten the rubber nut.

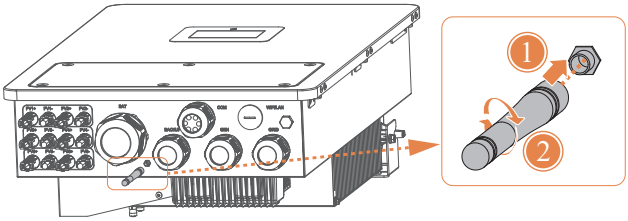


Parallel communication cables connection between different inverters.



It is necessary to turn the matched resistance switch of No. 1 inverter and No. N(≤3) inverter to "ON" in parallel connection mode.

4.5.7 External Antenna Connection

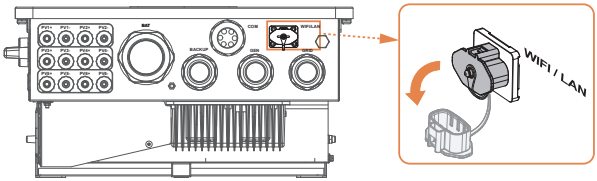


4.5.8 WIFI/LAN/4G Module Connection (Optional)

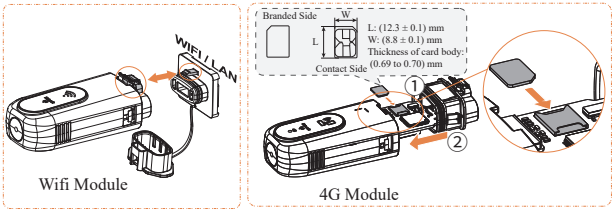
For details, please refer to the corresponding Module Installation Guide in the packing.

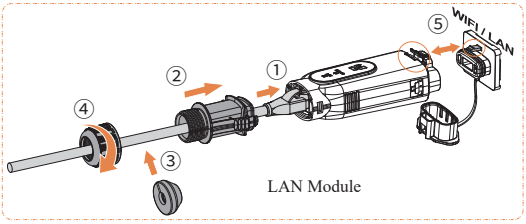
The appearance of modules may be slightly different. The figure shown here is only for illustration.

Step 1: Move the cover.



Step 2: Insert WIFI/LAN/4G module into WIFI/LAN port, and ensure that it does not fall off.





5. System Operation

5.1 Inverter Working Mode

The inverter supports several different working modes.

5.1.1 Self-consumption Mode

Go to **Settings > Advanced > Inverter** page and tap **Work mode** to select **Self-consumption mode** on LCD.

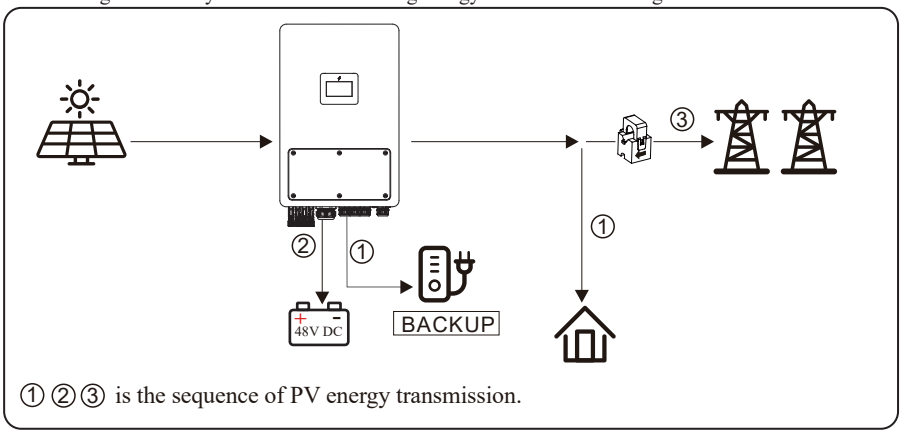
Under Self-consumption mode, the priority of PV energy consumption will be Load > Battery > Grid, that means the energy produced by PV gives priority to powering local loads, the excess energy is used to charge the battery and the remaining energy is fed into the grid.

This is the default mode to increase self-consumption rate. There are several situations of Self-consumption working mode based on PV energy.

Normal Connection

a) Wealthy PV Energy

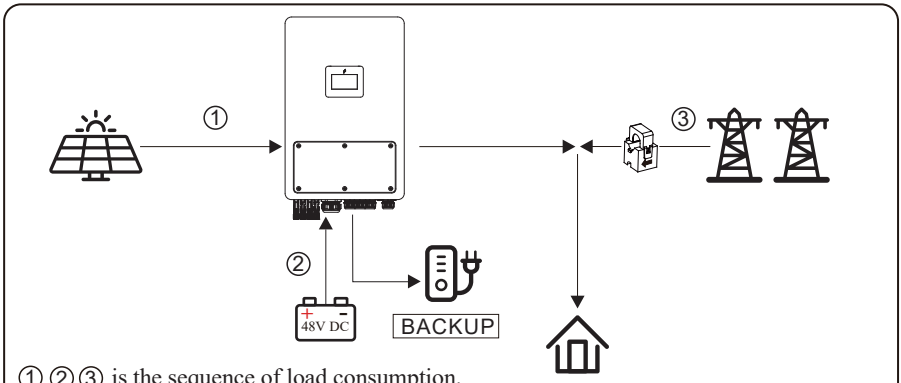
When PV energy is wealthy, the PV energy will be first consumed by loads, the excess energy will be used to charge the battery and then the remaining energy will be fed into the grid.



① ② ③ is the sequence of PV energy transmission.

b) Limited PV Energy

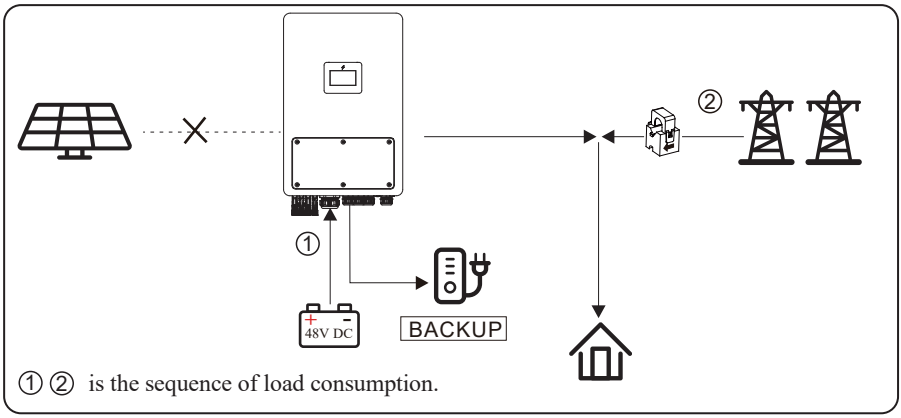
When the PV energy is not enough to cover all consumption, the PV energy will be entirely used by loads, and the insufficient part will be supplied by battery. Then still insufficient parts will be supplied by grid.



① ② ③ is the sequence of load consumption.

c) No PV Input

The inverter will first discharge the battery energy for home load consuming when no PV input (such as in the evening or some cloudy or rainy days). If the demand is not met, the loads will consume grid energy.



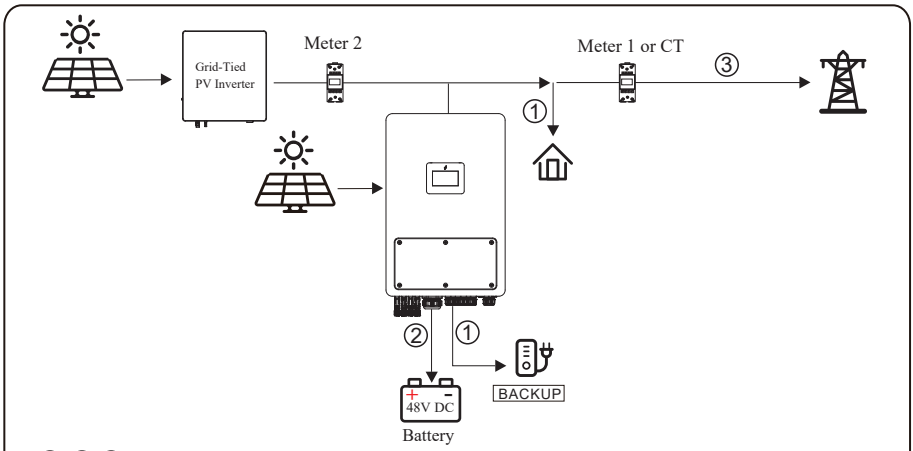
① ② is the sequence of load consumption.

AC Coupling Connection

With AC coupling connection, PV energy generated by grid-tied PV inverters should be used to optimize self-consumption first, excess energy will be used to charge the batteries. If the battery is already full, excess energy could be fed into the grid. Loads are supported in priority by the grid-tied system, then by the battery power, then by the grid. The following illustrates the genneral distribution of PV energy.

a) Wealthy PV Energy

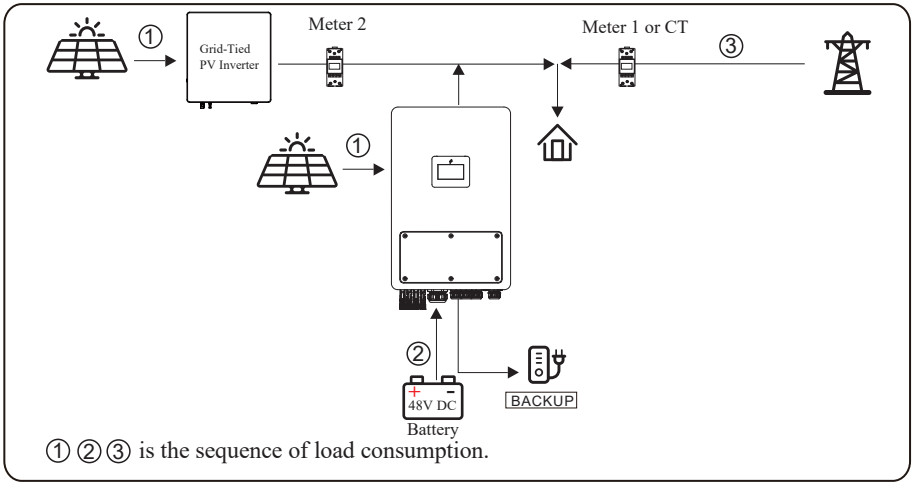
When PV energy is wealthy, the PV energy will be first consumed by loads, the excess energy will be used to charge the battery and then the remaining energy will be fed into the grid.



① ② ③ is the sequence of PV energy transmission.

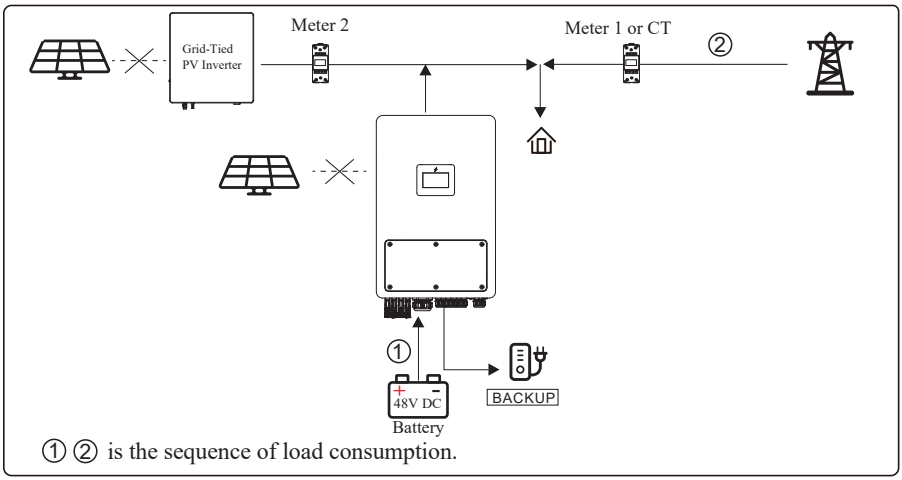
b) Limited PV Energy

When the PV energy is not enough to cover all consumption, the PV energy will be entirely used by loads, and the insufficient part will be supplied by battery. Then still insufficient parts will be supplied by grid.



c) No PV Input

The inverter will first discharge the battery energy for home load consuming when no PV input(such as in the evening or some cloudy or rainy days). If the demand is not met, the loads will consume grid energy.



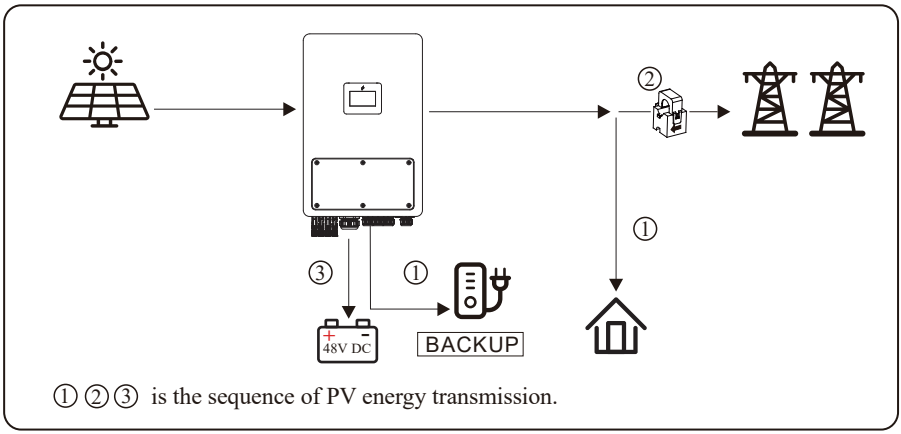
5.1.2 Feed-in Priority Mode

Go to **Settings > Advanced > Inverter** page and tap **Work mode** to select the **Feed-in priority mode** on LCD.

Under this mode, the priority of PV energy consumption will be Load > Grid > Battery, that means the energy produced by PV gives priority to powering local loads, the excess energy is fed into the grid, and the remaining energy is used to charge the battery.

a) Wealthy PV Energy

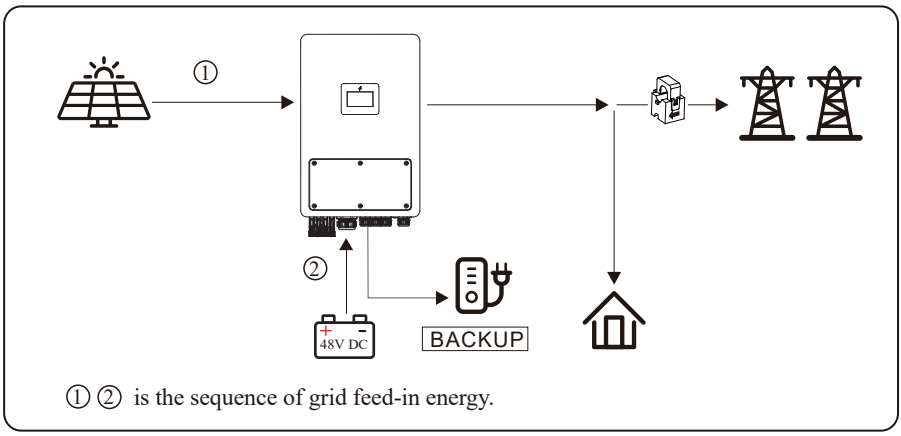
When PV energy is wealthy, the PV energy will be first consumed by loads. If there is excess PV energy, the power will be fed into grid. If there is still PV energy left after load consuming and grid feeding, then the remaining PV energy will be used to charge the battery.



① ② ③ is the sequence of PV energy transmission.

b) Limited PV Energy

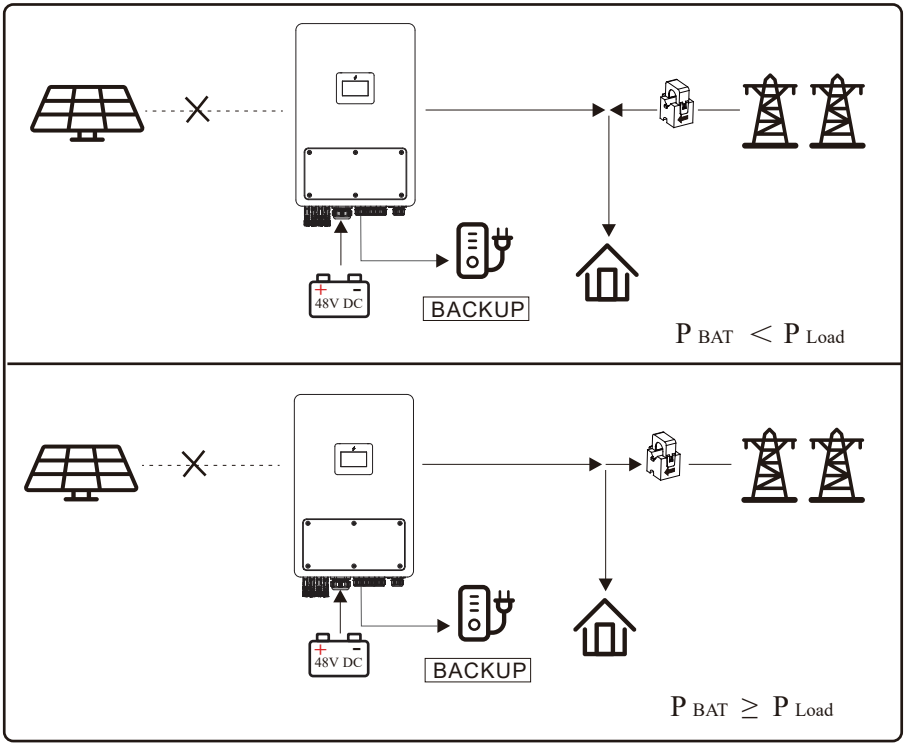
When PV energy is limited and can not meet the feed-in grid power, the battery will discharge to meet it.



① ② is the sequence of grid feed-in energy.

c) No PV Input

The inverter will first discharge the battery energy for home load consuming when no PV input (such as in the evening or some cloudy or rainy days). If the demand is not met, the loads will consume the grid energy.



5.1.3 Back-up Mode

Go to **Settings > Advanced > Inverter** page and tap **Work mode** page to select the **Back-up mode** on LCD.

Under this mode, the priority of PV energy consumption will be Battery > Load > Grid.

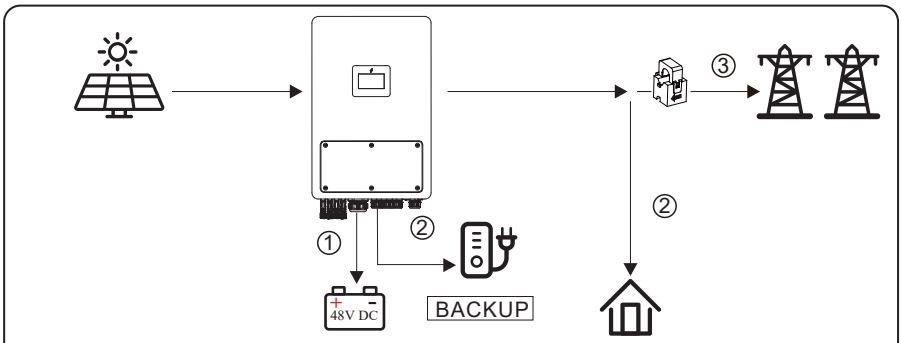
This mode aims at charging the battery quickly, and at the same time, you can choose whether to allow AC to charge the battery.

Forbid AC charging

In this mode, the battery can be charged only with PV energy, and the charging power varies with PV energy.

a) Wealthy PV energy

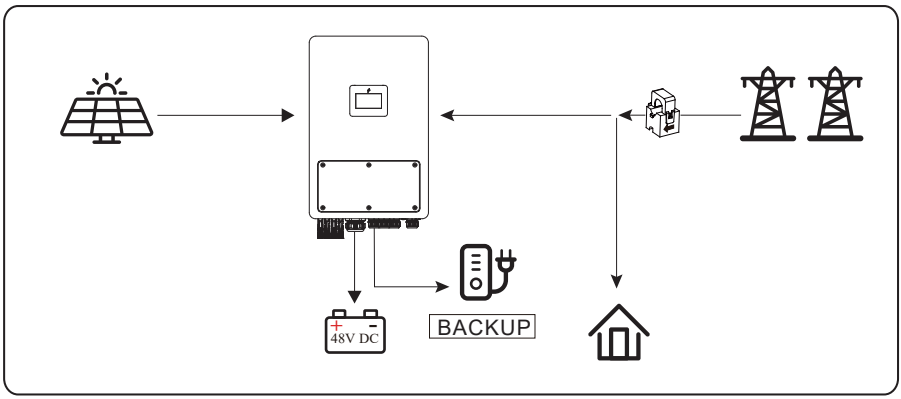
When PV energy is wealthy, PV charges the battery first, then meets the load, and the rest is fed into the grid.



① ② ③ is the sequence of PV energy transmission.

b) Limited PV energy

When PV energy is limited, PV charges the battery, and the grid meets the load demand, including normal load and backup load.

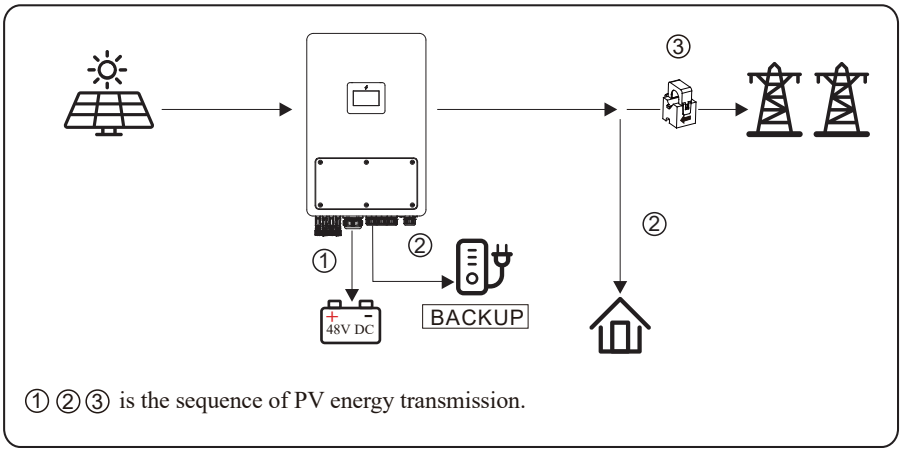


Allow AC charging

In this situation, the battery can be charged both with PV and AC.

a) Wealthy PV energy

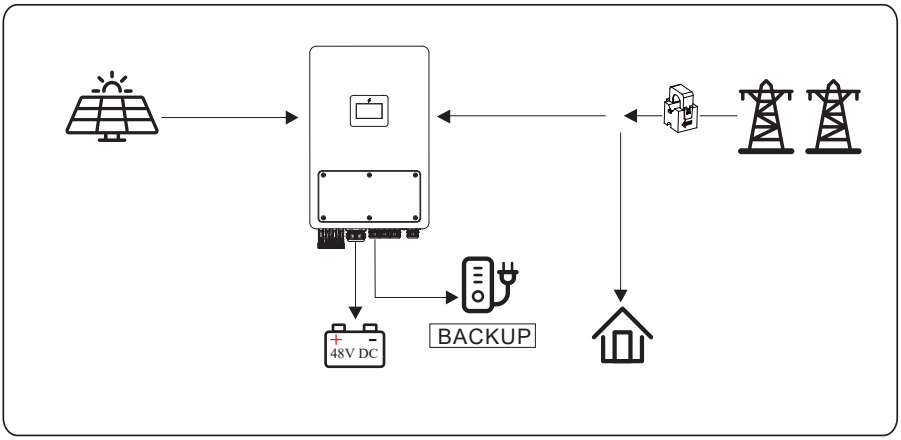
When PV energy is wealthy, PV charges the battery first, then meets the loads, and the rest is fed into the grid.



① ② ③ is the sequence of PV energy transmission.

b) Limited PV energy

When the PV energy is not enough to charge the battery, the grid energy will charge the battery as supplement. Meanwhile, the grid energy is consumed by loads.



5.1.4 Forced Charge/Discharge Function

According to the demands of application, the user can set the inverter to work on forced charge/discharge the battery in any working mode.

Please go to **Settings > Advanced > Inverter** page to enable **Time-based Control** on LCD. There are six time periods in which you can set this function. Outside of the set periods, the inverter returns to its original working mode. The forced charge/discharge function has the highest priority. For setting details, refer to ***Time-based Control*** section.

The relationship between the forced charge/discharge function and working mode shown as below.

M : Self-consumption mode/Feed-in priority mode/Back-up mode.

T1 - T6: Time period for forced charge/discharge parameter setting.

T1 - T6 priority to M.

5.1.5 Off Grid Mode

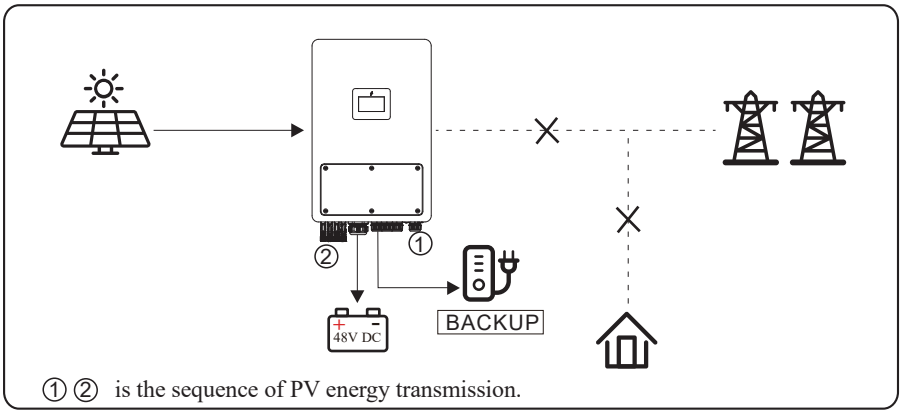
When the power grid is cut off, the system automatically switches to Off Grid mode.

Under off-grid mode, only critical loads are supplied to ensure that important loads continue to work without power failure.

Under this mode, the inverter can't work without the battery.

a) Wealthy PV energy

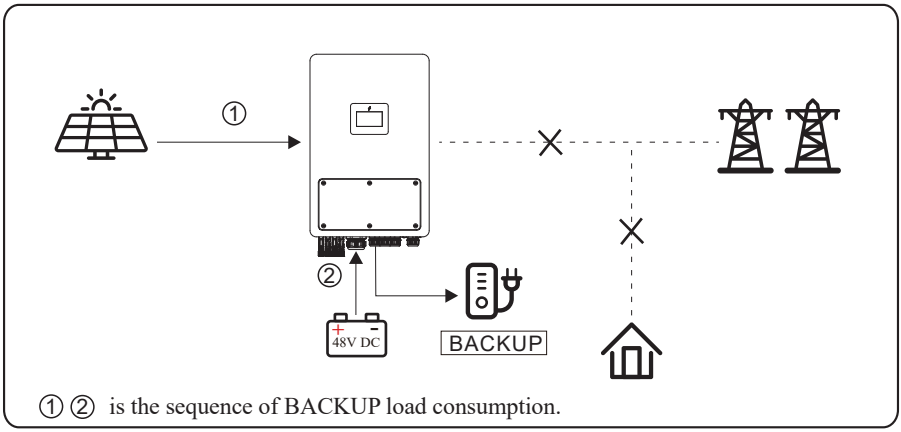
When PV energy is wealthy, the PV energy will be first consumed by critical load, then charge the battery.



b) Limited PV energy

When PV energy is limited, BACKUP loads are first powered by PV and then supplemented by battery.

NOTICE	● Under this mode, please complete the output voltage and frequency settings. ● It is better to choose the battery capacity larger than 100Ah to ensure BACKUP function work normally. ● If BACKUP output loads are inductive or capacitive loads, to make sure the stability and reliability of system, it is recommended to configure the power of these loads to be within 50% BACKUP output power range.



① ② is the sequence of BACKUP load consumption.

5.2 Startup/Shutdown Procedure

Inspection

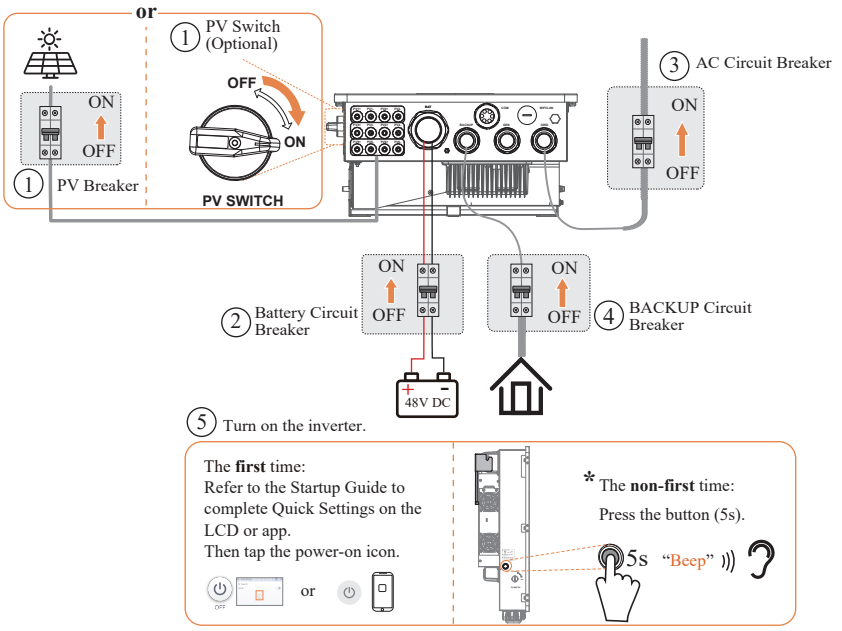
No.	Items
1	The inverter is firmly installed.
2	There is enough heat dissipation space, no external objects or parts left on the inverter.
3	It is convenient for operation and maintenance.
4	The wiring of the system is correct and firm.
5	Check whether the DC and AC connections are correct with a multimeter, and ensure there is no short circuit, break, or wrong connection.
6	Check whether the waterproof nuts of each part are tightened.
7	The vacant ports have been sealed. All gaps at the cable inlet and outlet holes have been plugged with fireproof/waterproof materials, such as fireproof mud.
8	All safety labels and warning labels on the inverter are complete and without occlusion or alteration.
9	Confirm the parameters and configurations conform to relevant requirements. ● AC Frequency: 50/60 Hz ● PV Voltage: 70 V DC to 500 V DC ● Battery Voltage: 40 V DC to 60 V DC ● Grid AC Voltage: 176 V AC to 264 V AC

5.2.1 Startup Procedure

Make sure all the above aspects are right, then follow the procedure to start up the inverter:

1) Power on PV.
2) Power on the Battery.
3) Power on the AC.
4) Power on the BACKUP.
5) Turn on the inverter. For the first startup, refer to the ***Startup Guide*** to complete Quick Settings on the LCD or app and tap the Power-on icon to turn on the inverter. For the non-first-time startup, press and hold the ON/OFF button on the side of the inverter for five seconds to turn it on.

NOTE	The PV switch is optional.

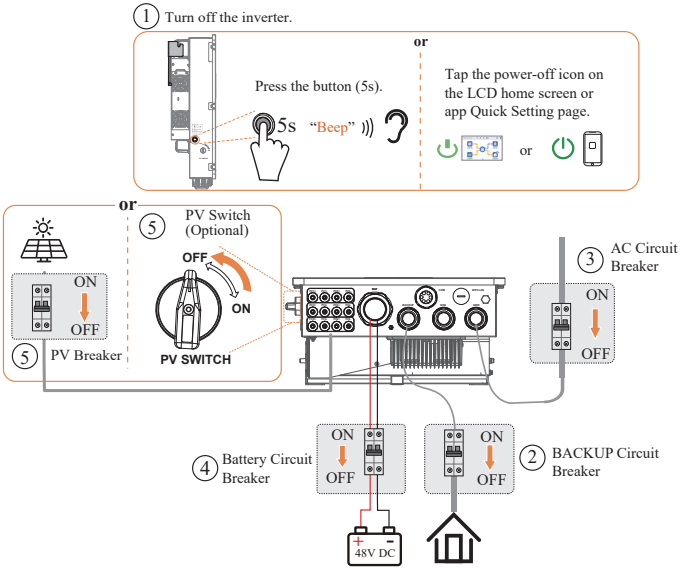


5.2.2 Shutdown Procedure

According to actual situation, if there is a must to shut-down the running system, please follow below procedure:

1) Turn off the inverter. Tap the Power-off icon on the LCD home screen or app Quick Setting page to turn off the inverter. Or you can press and hold the ON/OFF button on the side of the inverter for five seconds to turn it off.
2) Power off the BACKUP.
3) Power off the AC.
4) Power off the Battery.
5) Power off the PV.
6) If you need to disconnect the inverter cables, please wait at least 10 minutes before touching these parts of inverter.

DANGER	After the inverter is powered off, the remaining electricity and heat may still cause electric shock and body burns. If you need to disconnect the inverter cables, please wait at least 10 minutes before touching these parts of inverter.



6. Commissioning

It is necessary to fully commission the inverter system for it is essential to protect the system from fire, electric shock, other damages, and personal injury.

6.1 Inspection

Before commissioning, the operator or installer (qualified personnel) must inspect the system carefully and ensure that:

1) The system is properly installed according to the contents and instructions in this manual, and there is sufficient space for operation, maintenance, and ventilation.

2) All terminals and cables are in good conditions.

3) No objects are left in/on the inverter or within the required clearance.

4) The PV and the battery pack are working normally, the grid is normal.

6.2 Commissioning Procedure

When all items have been checked and the system is ready for use, start the commissioning procedure.

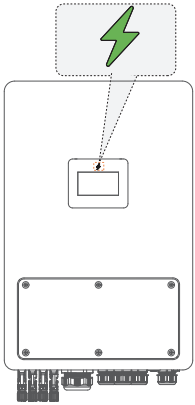
1) Power on the system by referring to the chapter Startup Procedure.

2) Set the parameters on the LCD/app according to user's needs.

3) Complete commissioning.

7. LED

This section describes the LED panel. LED indicators include a green LED, blue and red LED indicator. It includes the explanation of indicator states and summary of indicator states under the running state of the machine.



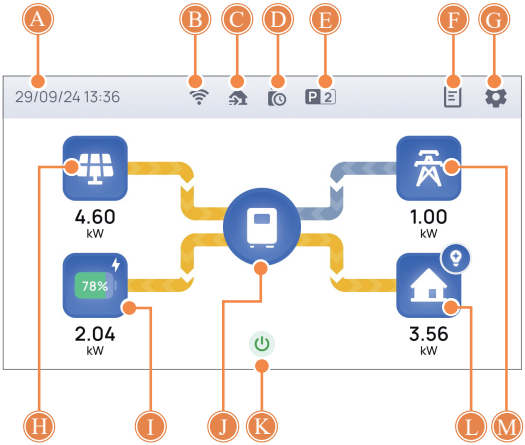
LED Indicator	Status	Description
Green led	On	On-Grid status
	Blink	Standby status
Blue led	On	Off-Grid status
Red led	On	Fault has occurred
	Light alternately (1 color /0.25s)	Upgrade code

8. LCD Screen

NOTE	The LCD screen may vary depending on the inverter model. Please refer to the actual display for operation.

8.1 Main Menus

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

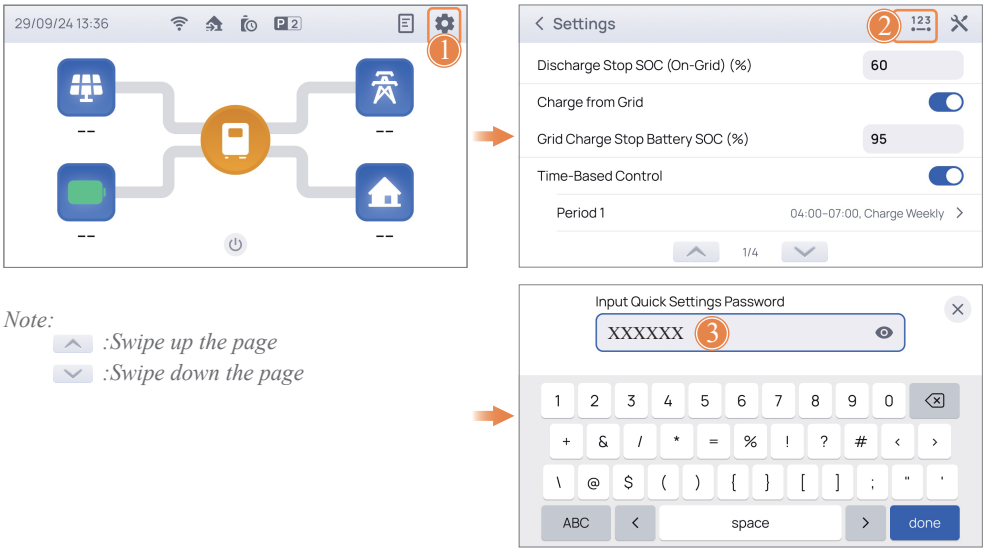


Number	Icon	Description
A	Time	The current system time
B	Wifi	Wifi connection status
C	Work mode	Currently set working mode Self-consumption mode Back-up mode Feed-in priority mode
D	Time-based control	The time-based control function is enable.
E	Parallel	Number of parallel inverters
F	Log	History log
G	Setting	Setting page
H	Solar icon and the present power	Tap the icon, you can view the solar energy production.
I	Battery icon and the present power	Tap the icon, you can view the battery basic information and charge/discharge capacity.
J	Inverter icon and the present power	Tap the icon, you can view the inverter basic information.
K	Button	Tap the button to turn on/off the inverter.
L	Home icon and the present power	Tap the icon, you can view the load consumption. When the '' icon appears at the top-right corner of the home icon, it means that the GEN Port works as an output port for the Smart Load connected to the GEN terminal.
M	Grid icon and the present power	Tap the icon, you can view the grid capacity and feed-in grid capacity.

8.2 Quick Setup

The quick setup is required when turning on the inverter for the first time.

Step 1: Go to the Quick Settings page.

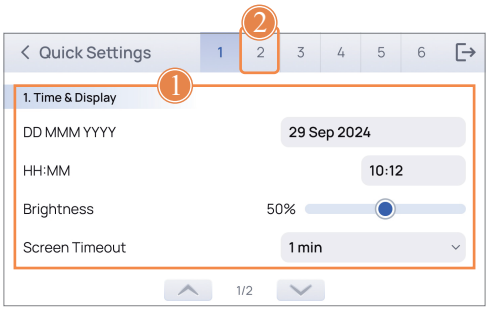


Note:

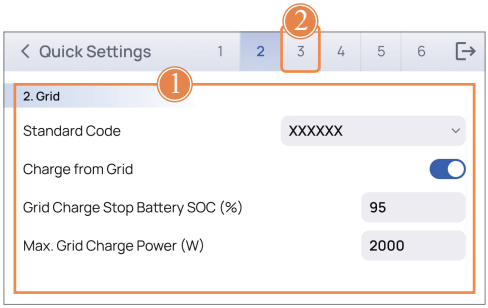
:Swipe up the page

:Swipe down the page

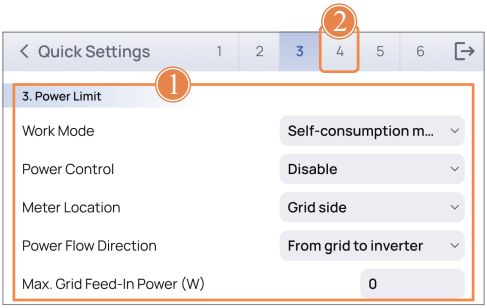
Step 2: Set the date, time and screen display and then tap the **2**.



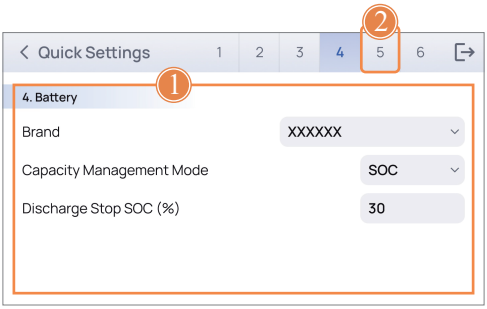
Step 3: Set grid parameters and then tap the **3**.



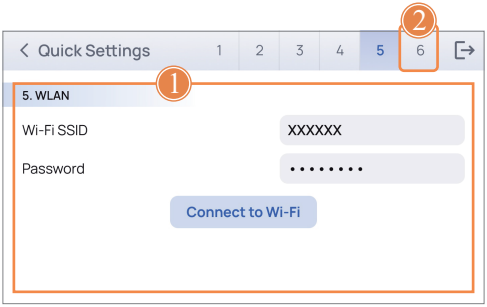
Step 4: Set power limit parameters and then tap the **4**.



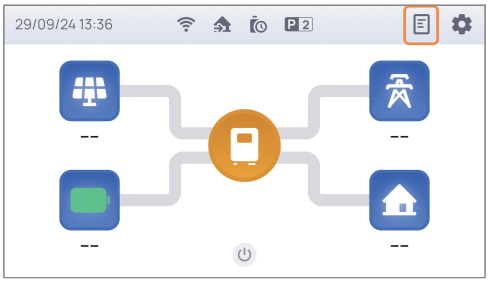
Step 5: Set battery parameters and then tap the **5**.



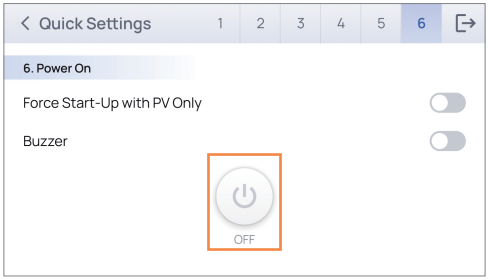
Step 6: Connect to a Wi-Fi hotspot with internet access and then tap the **6**.



Step 7: It is recommended to go to the **Home** page to ensure that there are no alarms before turning on the inverter.

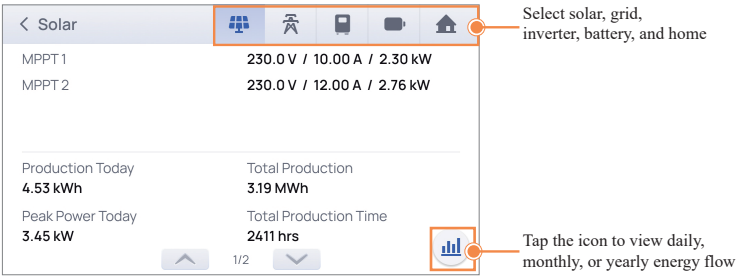


Step 8: Tap the button to turn on the inverter.



8.3 Graph

Tap any of the Solar/Grid/Inverter/Battery/Home icons, you can view the Production or Consumption data/graph and the basic information of your energy system.



Query Day/Month/Year Data

The energy graph is showed by Day, Month and Year. The daily data graph in the following figures are only for illustration.

Icon	Description
	Solar
	Grid
	Inverter
	Battery
	Home
	Pie chart
	Graph

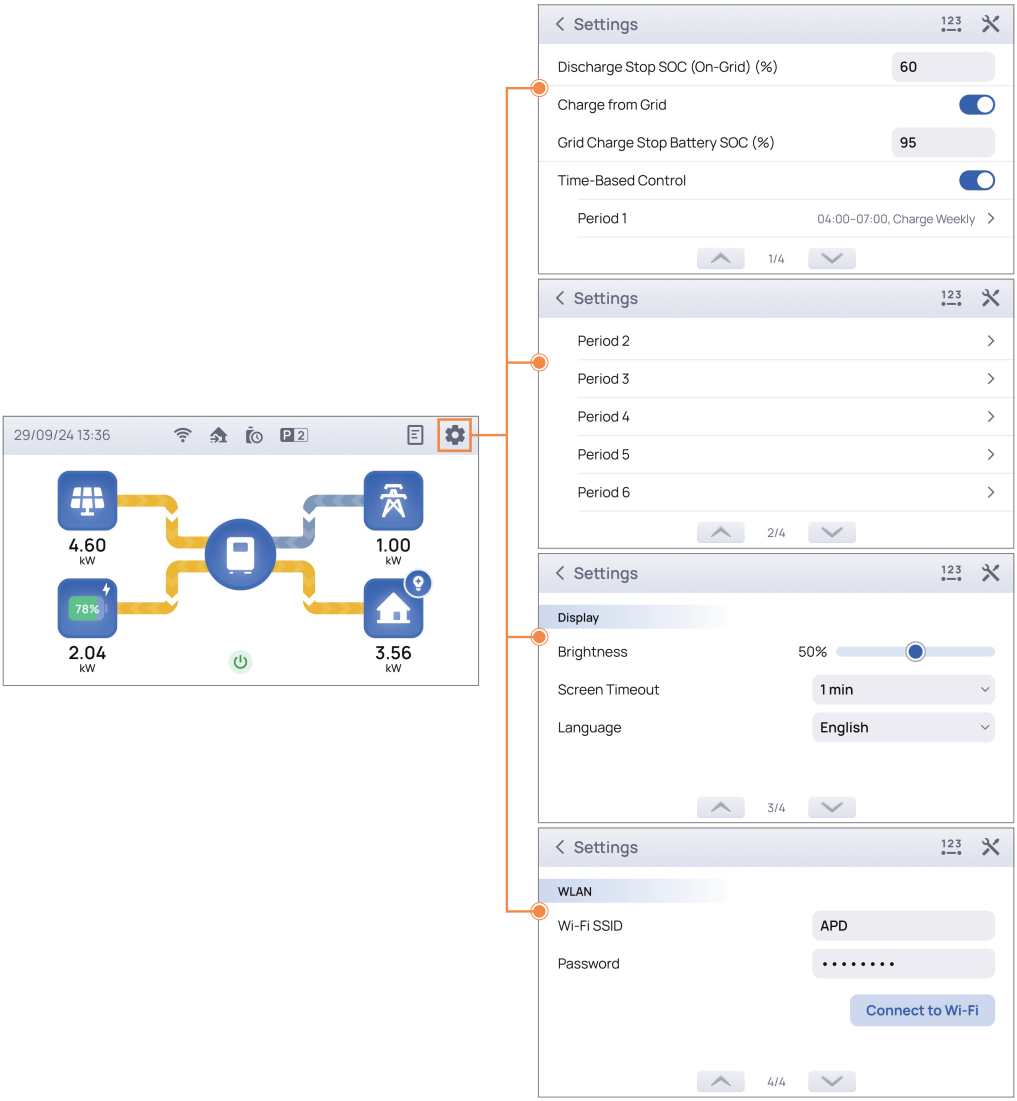
Icon	Description
	Grid capacity
	Feed-in grid capacity
	Generator capacity
	Discharge capacity
	Charge capacity
	Toggle switch

8.4 Settings

In this page, you can select an administrator account or an end user to set or modify the parameters.

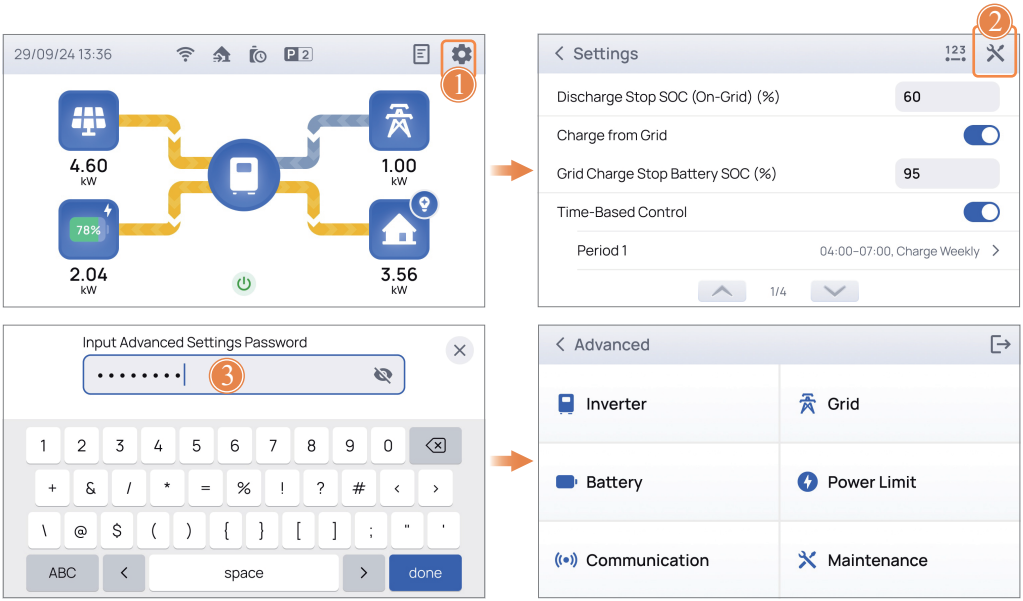
End User Setting

Tap the "⚙" to enter the **Setting** page. An end user account can configure some basic parameters including Discharge Stop SOC, grid charging, Time-Based Control, Display and WLAN.



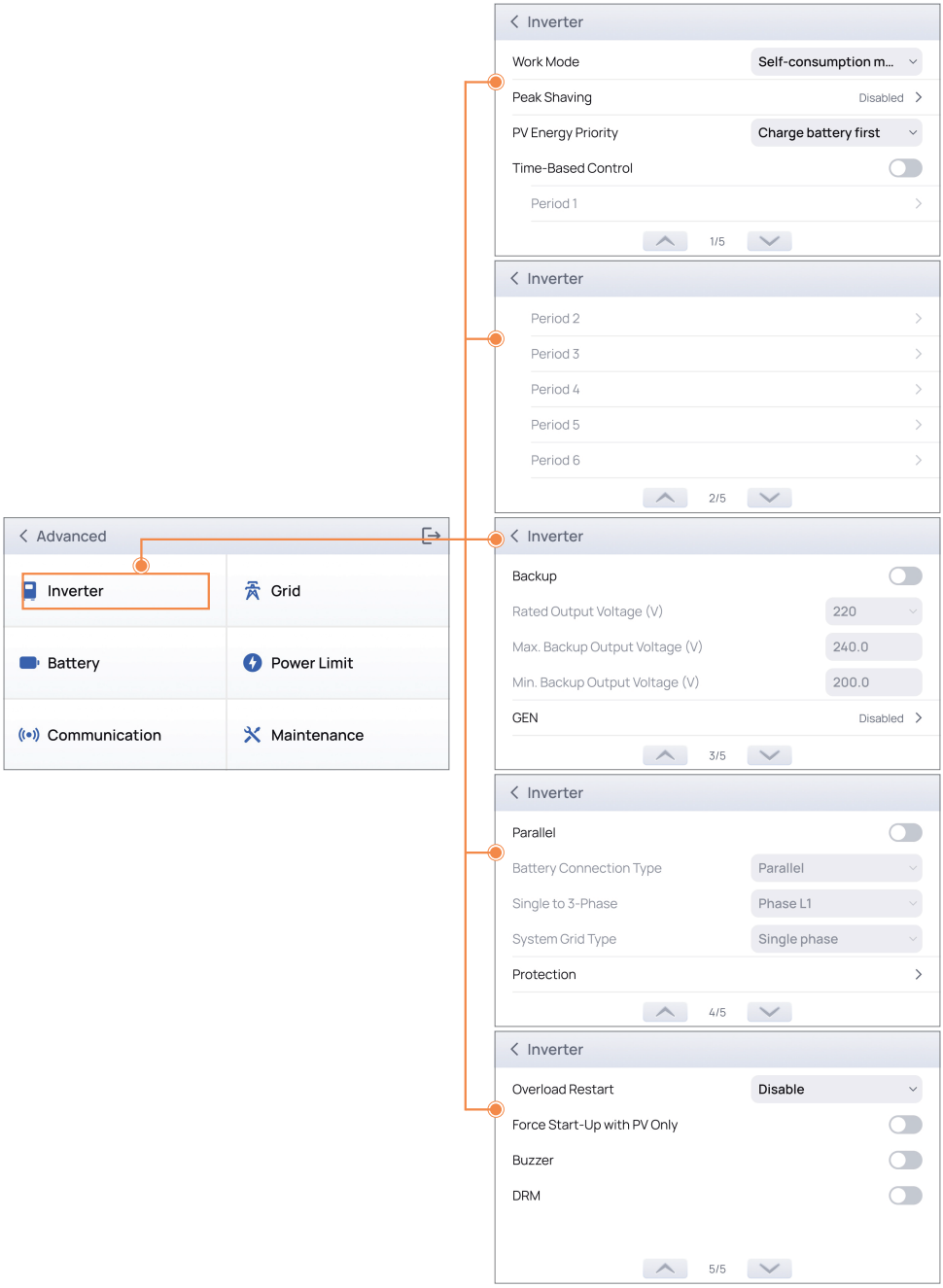
Administrator Setting

In **Setting** page, you can change your access level to an administrator account for advanced parameter settings.



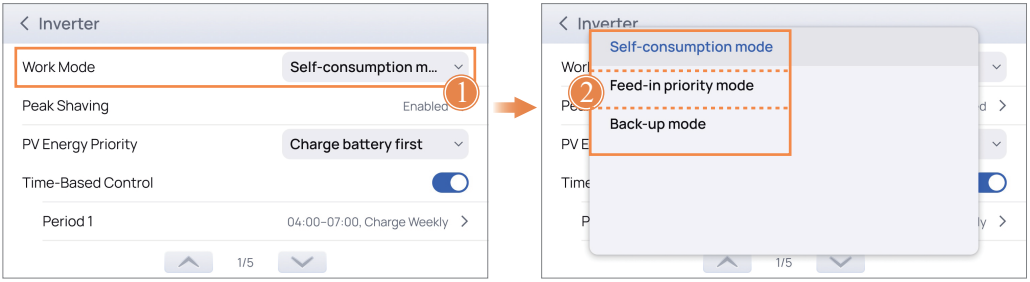
8.4.1 Inverter

In **Inverter** menu, you can configure the inverter, such as inverter work modes and battery work timesets, backup load port settings, generator port settings, and battery work timesets.



8.4.1.1 Work Mode

Tap the **Work Mode**, there are several work modes are available.



Parameter	Priority (PV Energy Consumption)
Self-consumption mode	Load > Battery > Grid
Feed-in Priority mode	Load > Grid > Battery
Back-up mode	Battery > Load > Grid

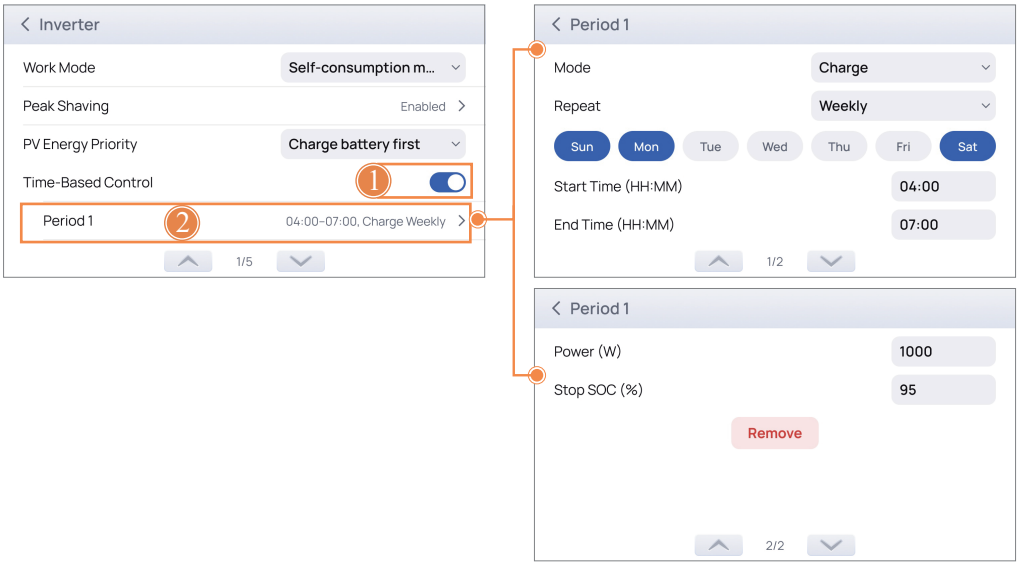
Note:

For details, please refer to the Inverter Working Mode chapter in the User Manual.

8.4.1.2 Time-based Control

This function is designed to control the time setting of charging and discharging the inverter. You can set the following parameters based on your requirements:

- Start charging/discharging time: 00:00 to 23:59
- End charging/discharging time: 00:00 to 23:59
- Run cycle: once or every week
- Run date/day: the exact date



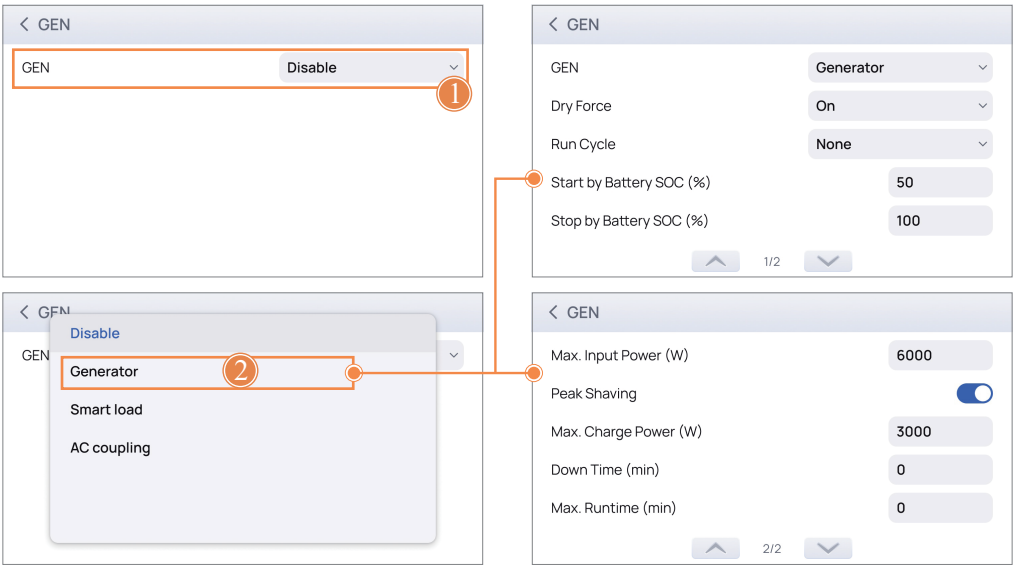
8.4.1.3 GEN

Generator

The GEN port works as an input port from the generator while under off-grid condition. The generator input can charge the battery or take the backup load. The generator has two start-stop ways, one is controlled by dry contact of inverter, the other is controlled by manual. For the former, the start and stop of the generator is completely controlled by the inverter. For the latter, the generator is started and stopped by manual control.

Note:

- If Generator and Grid are normal, preferably powered by Grid power.
- The generator capacity should be 1.3 times larger than the capacity of the hybrid inverter.
- You need to shut down the inverter to set the Generator.



All parameters have been set by default.

Parameter	Description
Dry force	When the Grid power is abnormal, the generator is forced to be turned on.
Run Cycle	Generator cycle run mode. You can select Weekly or Monthly, which means the generator runs once a week or once a month.
Day of Week/Date	The generator will run on the set date.
Start Time (HH:MM)	The time at which the generator will start running on the set date.
End Time (HH:MM)	The time at which the generator will end its running on the set date.
Start by Battery SOC (%)	Battery SOC below which the generator starts to charge the battery. Meanwhile, the generator running time should not exceed the set maximum runtime (Min).
Stop by Battery SOC (%)	Battery SOC above which the generator stops charging the battery.

Parameter	Description
Max. Input Power (W)	Limit the generator input power below the set value (W).
Peak Shaving	When the Gen output power exceeds the set Gen shaving power, the inverter switches from the discharging state to the charging state.
Max. Charge Power (W)	Maximum battery charge power from generator.
Max. Runtime (min)	When the generator running time reaches to the setting value, the inverter will disconnect the input from generator. But the generator will keep working for a while defined by "Down Time (min)". **Note:** Max. Runtime (min) = 0, means generator can run all the time.
Down Time (min)	When the inverter disconnect the input from generator, the generator will keep working for a while by the down time setting value (Min). ● For generator that switch on and off by dry contact, it will stop working automatically when the generator working time reaches to the down time setting value (Min). ● For generator that are manually switched on and off, it will stop working by manual regardless of the down time setting value (Min).
Start by Battery Voltage (V)	Battery voltage below which the generator starts to charge the battery. Meanwhile, the generator running time should not exceed the maximum runtime setting value (Min).
Stop by Battery Voltage (V)	Battery voltage above which the generator stops charging the battery.

Note:

- The total generator running time is equal to "Max. Runtime (min)" plus "Down Time (min)".
- Go to **Battery** > **Capacity Management Mode**, when you set Capacity Management Mode to voltage (V), parameter settings about **Start by Battery SOC (%)** will be changed to **Start by Battery voltage (V)**. Also, parameter settings about **Stop by Battery SOC (%)** will be changed to **Stop by Battery voltage (V)**.

Take the following parameter values as an example:
- Max. Input Power (W): 6000 W
- Max. Charge Power (W): 3000 W
- Start by Battery SOC (%): 50%
- Stop by Battery SOC (%): 100%
- Max. Runtime (min): 0 Min
- Down Time (min): 0 Min

And Capacity Management Mode was set to SOC (%), the situations are as follows:

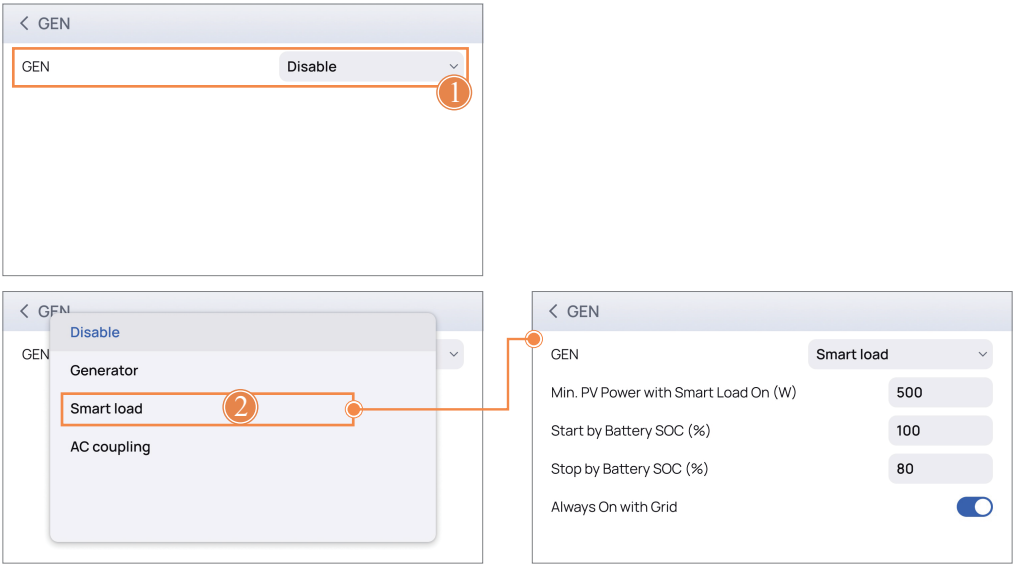
- Under Off-Grid mode, the Generator will be ON or OFF depends on the battery SOC and Generator Max Runtime.
  - When the Battery SOC ≤ 50% and the Runtime is less than Max. Runtime (min), the GEN Port function will be enabled and the Generator will be ON.
  - When the Battery SOC ≥ 100% or the Runtime is over Max. Runtime (min), the GEN port function will be disabled and the Generator will be OFF.
- Under On-Grid mode, the GEN Port function will be disabled and the Generator will be OFF.

Note:

When the Capacity Management Mode was set to voltage, the generator still follows the above logic.

Smart Load

The GEN Port works as an output port for the Smart Load connected to the GEN terminal.



All parameters have been set by default.

Parameter	Description
Min. PV Power with Smart Load On (W)	If the PV input power is higher than the setting value (Power), and the battery SOC exceeds the setting value simultaneously, the Smart Load will switch on.

Parameter	Description
Start by Battery SOC (%)	If the PV input power is higher than the setting value (Power), and the battery SOC exceeds the setting value simultaneously, the Smart Load will switch on
Stop by Battery SOC (%)	If the battery SOC is lower than the setting value, the Smart Load will switch off .
Always On with Grid	When "Always On with Grid" is enabled, the Smart Load port provides power whenever the grid is present.
Start by Battery voltage (V)	If the battery voltage is higher than the setting value, and the PV input power exceeds the setting value (Power) simultaneously, the Smart Load will switch on.
Stop by Battery voltage (V)	If the battery voltage is lower than the setting value, the Smart Load will switch off.

Note:

Go to **Battery** > **Capacity Management Mode**, when you set Capacity Management Mode to voltage (V), parameter settings about **Start by Battery SOC (%)** will be changed to **Start by Battery voltage (V)**. Also, parameter settings about **Stop by Battery SOC (%)** will be changed to **Stop by Battery voltage (V)**.

Take the following parameter values as an example:
- Min. PV Power with Smart Load On (W): 500 W
- Start by Battery SOC (%): 100%
- Stop by Battery SOC (%): 80%

And Capacity Management Mode was selected to SOC (%), the situations are as follows:

- When **Always On with Grid** is **ON**, if the grid is present, the Smart Load will be ON all the time. It is not affected by the change of above parameters. If the grid is not present, the Smart Load output will be ON or OFF depends on the PV power and the battery SOC.
  - If the PV power ≥500W and the battery SOC ≥100% , the Smart Load output will be ON. In the state of Smart Load ON, if the battery SOC <80%, the Smart Load will be OFF.
  - If the PV power <500W or the battery SOC <80%, the Smart Load output will be OFF.
- When **Always On with Grid** is **OFF**.
  - If the PV power ≥ 500W and the Battery SOC ≥ 100%, the GEN Port function will be enabled and the Smart Load will be ON. In the state of Smart Load ON, if the battery SOC <80%, the Smart Load will be OFF.
  - If the PV power <500W or the Battery SOC <80%, the GEN Port function will be disabled and the Smart Load will be OFF.

Note:

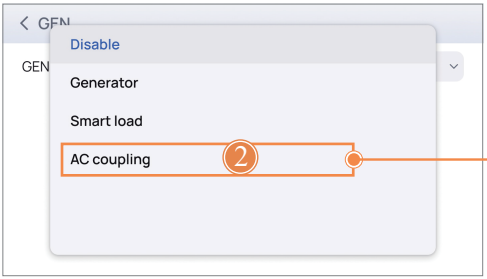
When the Capacity Management Mode was set to voltage, the Smart Load Output still follows the above logic.

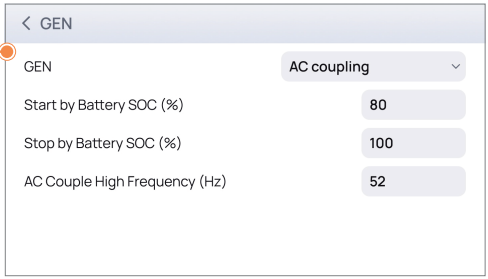
AC coupling

AC coupling Mode: Under this mode, the GEN Port works as an input port from other grid-tied inverter whose rated power should be less than the hybrid inverter. The grid-tied inverter should also support derating output power according to the output frequency.

Note:

The capacity of grid-tied inverter should be less than that of hybrid inverter.





All parameters have been set by default.

Parameter	Description
Start by Battery SOC (%)	If battery SOC is lower than the default value, the inverter powers on and starts charging the battery.
Stop by Battery SOC (%)	If battery SOC is higher than the default value, the inverter powers off and stops charging the battery.
AC Couple High Frequency (Hz)	This parameter is used to limit the output power of grid-tied inverter when the hybrid inverter works under off-grid mode. As the battery SOC reaches gradually to the setting value (Off), during the process, the grid-tied inverter output power will decrease linear. When the battery SOC is equal to the setting value (Off), the system frequency will become the setting value (AC Couple Frequency high) and the grid-tied inverter will stop working.
Start by Battery Voltage (V)	If battery voltage is lower than the setting value, the inverter powers on and starts charging the battery.

Parameter	Description
Stop by Battery Voltage (V)	If battery voltage is higher than the setting value, the inverter powers off and stops charging the battery.

Note:

Go to **Battery** > **Capacity Management Mode**, when you set Capacity Management Mode to voltage (V), parameter settings about **Start by Battery SOC (%)** will be changed to **Start by Battery voltage (V)**. Also, parameter settings about **Stop by Battery SOC (%)** will be changed to **Stop by Battery voltage (V)**.

Take the following parameter values as an example:
- Start by Battery SOC (%): 80 %
- Stop by Battery SOC (%): 100%
- AC Couple High Frequency (Hz): 52 Hz

And Capacity Management Mode was set to SOC (%), the situations are as follows:

- Under off-grid mode, the AC coupling will be ON or OFF depends on the battery SOC.
  - When the Battery SOC ≤ 80%, the GEN port function will be enabled and AC coupling will be ON.
  - When the battery charge power lower than the grid-tied inverter output power, the hybrid inverter will increase the output frequency to maximum 52Hz. Then the grid-tied inverter will work in limited power mode.
- When the Battery SOC ≥ 100%, the GEN port function will be disabled and AC coupling will be OFF. Under on-grid mode, the grid-tied inverter works as normal regardless of battery capacity.

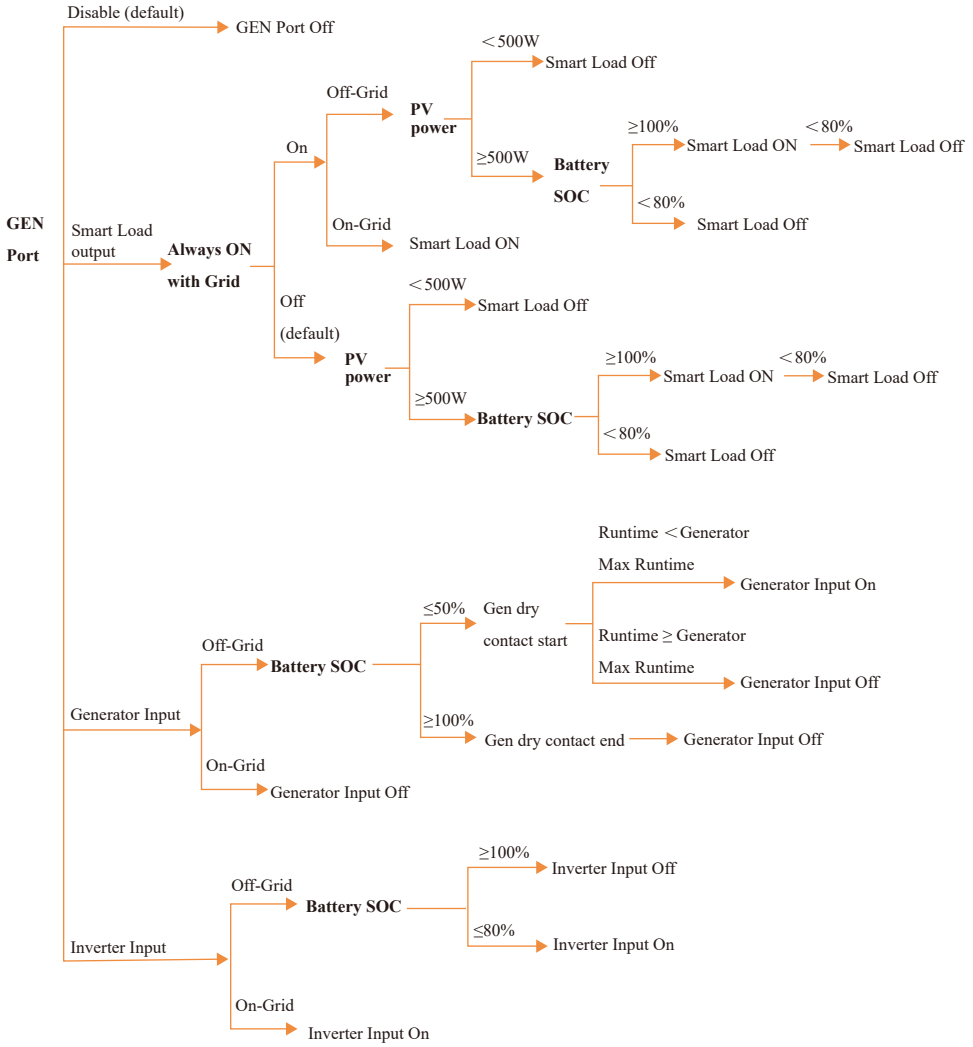
Note:

When the Capacity Management Mode was set to voltage, the AC coupling still follows the above logic.

Logic Diagram of Start/Stop Smart Load/Generator/AC Coupling Port Function.

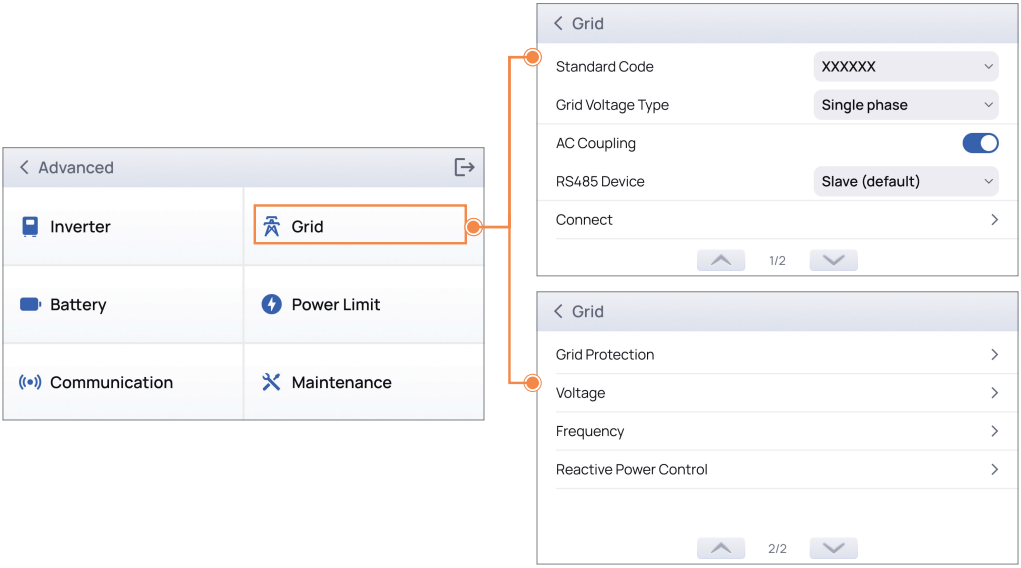
Note:

The parameter values in the following figure are examples only, please set the parameter values according to the actual situation.



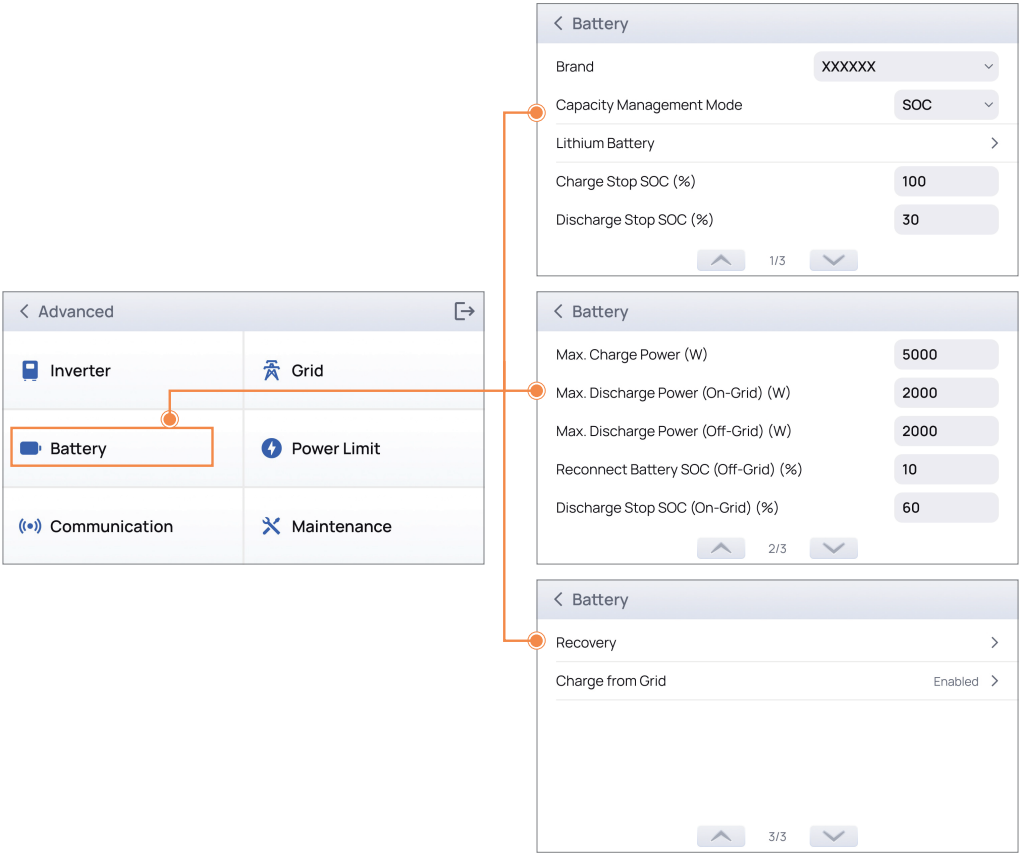
8.4.2 Grid

In **Grid** menu, you can set or change the grid parameters.



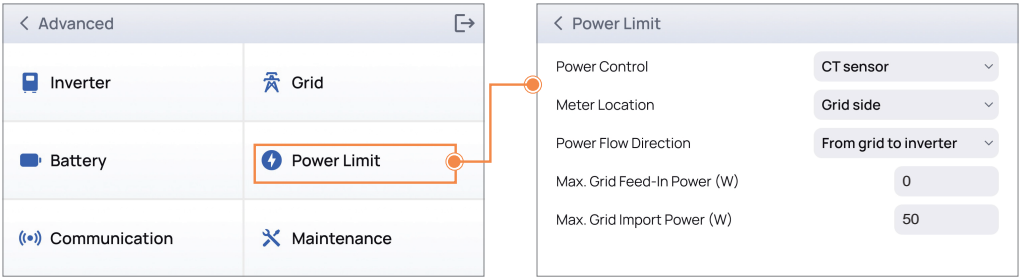
8.4.3 Battery

In **Battery** menu, you can set or change the Battery parameters.



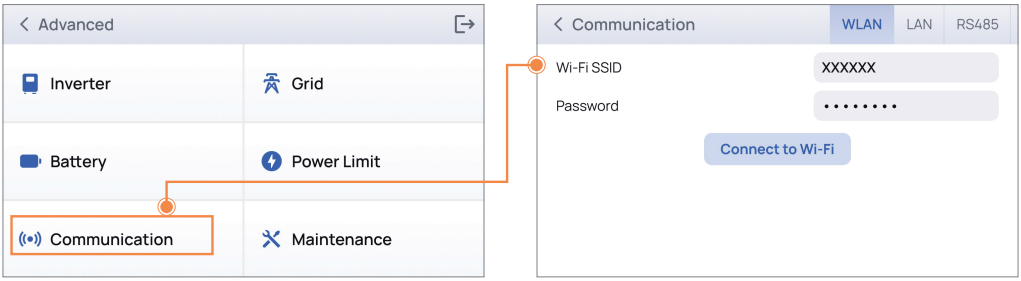
8.4.4 Power Limit

In **Power Limit** menu, you can configure the device's power settings, such as energy meter settings, energy flows, and energy export management.



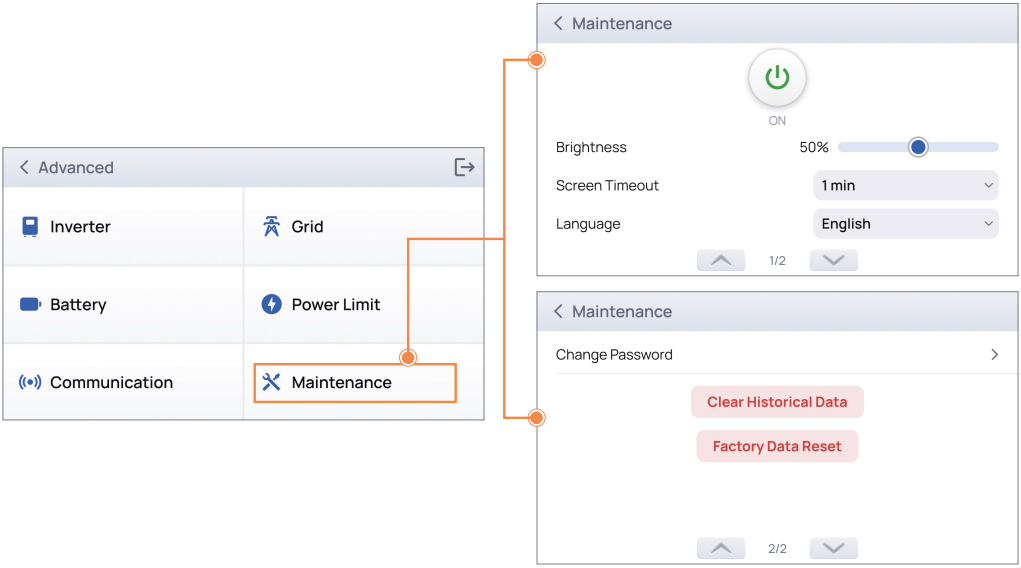
8.4.5 Communication

In **Communication** menu, you can set or change the parameters of communication settings: WiFi Setting, LAN Setting, RS485 Setting.



8.4.6 Maintenance

In **Maintenance** menu, you can turn on/off the inverter, set display, change password, delete all usage data and restore the device to factory condition.



9. App Setting Guide

The app contains "Remote Access" and "Local Access".

- Remote Access: The app reads data from cloud server through API and display inverter parameters.
- Local Access: The app reads data from inverter through Bluetooth connection with Modbus protocol to display and configure inverter parameter.

Download App

- Scan the QR code on the inverter to download the App.
- Download App from the App Store or Google Play.

For more details, refer to the **App User Manual.**

10. Maintenance

⚠ CAUTION	Before maintaining and commissioning inverter and its peripheral distribution unit, switch off all the charged terminals of the inverter and wait at least 10 minutes after the inverter is powered off.

10.1 Routine Maintenance

Items	Check Content	Maintain Content	Maintenance Interval
Inverter output status	Statistically maintain the status of electrical yield, and remotely monitor its abnormal status	N/A	Weekly
Inverter cleaning	Check periodically that the heat sink is free from dust and blockage.	Clean periodically the heat sink.	Yearly
Inverter running status	Check that the inverter is not damaged or deformed. Check for normal sound emitted during inverter operation. Check and ensure that all inverter communications is running well.	If there is any abnormal phenomenon, replace the relevant parts.	Monthly
Inverter electrical connections	Check that all AC, DC and communication cables are securely connected; Check that PGND cables are securely connected; Check that all cables are intact and free from aging.	If there is any abnormal phenomenon, replace the cable or re-connect it.	Semiannually

10.2 Inverter Troubleshooting

When the inverter has an exception, its basic common warning and exception handling methods are shown below.

FAULT	INSTRUCTION	COMMON CAUSE / REMEDY
A0	Grid over voltage	1. If the alarm occurs occasionally, possibly the power grid voltage is abnormal temporarily, and no action is required. 2. If the alarm occurs repeatedly, contact the local power station. After receiving approval of the local power bureau, revise the electrical protection parameter settings on the inverter through the LCD. 3. If the alarm persists for a long time, check whether the AC circuit breaker /AC terminals is disconnected, or if the grid has a power outage.
A1	Grid under voltage	
A3	Grid over frequency	
A4	Grid under frequency	
A2	Grid absent	Wait till power is restored.

FAULT	INSTRUCTION	COMMON CAUSE / REMEDY
B0	PV over voltage	Check whether the maximum input voltage of a single PV string exceeds the MPPT working voltage. If yes, modify the number of PV module connection strings.
B1	PV insulation abnormal	1. Check the insulation resistance against the ground for the PV strings. If a short circuit has occurred, rectify the fault. 2. If the insulation resistance against the ground is less than the default value in a rainy environment, set insulation resistance protection on the LCD/app.
B2	Leakage current abnormal	1. If the alarm occurs occasionally, the inverter can be automatically recovered to the normal operating status after the fault is rectified. 2. If the alarm occurs repeatedly, contact your dealer for technical support.
B4	PV under voltage	1. If the alarm occurs occasionally, possibly the external circuits are abnormal accidentally. The inverter automatically recovers to the normal operating status after the fault is rectified. 2. If the alarm occurs repeatedly or last a long time, check whether the insulation resistance against the ground of PV strings is too low.
B7	PV string reverse	Check and modify the positive and negative polarity of the input of the circuit string.
C0	Internal power supply abnormal	1. If the alarm occurs occasionally, the inverter can be automatically restored, and no action is required. 2. If the alarm occurs repeatedly, please contact the customer service.
C2	Inverter over dc-bias current	1. If the alarm occurs occasionally, possibly the power grid voltage is abnormal temporarily, and no action is required. 2. If the alarm occurs repeatedly, and the inverter fails to generate power, contact the customer service
C3	Inverter relay abnormal	1. If the alarm occurs occasionally, possibly the power grid voltage is abnormal temporarily, and no action is required. 2. If the alarm occurs repeatedly, pls. refer to the suggestions or measures of Grid over voltage. If the inverter fails to generate power, contact the customer service center. If there is no abnormality on the grid side, the machine fault can be determined. (If you open the cover and find traces of damage to the relay, it can be concluded that the machine is faulty.) And pls. contact the customer service.

FAULT	INSTRUCTION	COMMON CAUSE / REMEDY
CN	Remote off	1. Shut down manually via LCD/app. 2. The monitor executed the remote shutdown instruction. 3. Remove the communication module and confirm whether the alarm disappears. If yes, replace the communication module. Otherwise, please contact the customer service.
C5	Inverter over temperature	1. If the alarm occurs occasionally, the inverter can be automatically recovered. No action is required. 2. If the alarm occurs repeatedly, please check whether the installation site has direct sunlight, bad ventilation, or high ambient temperature (such as installed on the parapet). Yet, if the ambient temperature is lower than 45° C and the heat dissipation and ventilation is good, please contact customer service.
C6	GFCI abnormal	1. If the alarm occurs occasionally, it could have been an occasional exception to the external wiring. The inverter can be automatically recovered. No action is required. 2. If it occurs repeatedly or cannot be recovered for a long time, please contact customer service.
C8	Fan abnormal	1. If the alarm occurs occasionally, pls. restart the inverter. 2. If it occurs repeatedly or cannot be recovered for a long time, check whether the external fan is blocked by foreign objects. Otherwise, contact customer service.
C9	DC link unbalance or under voltage	Batteries exceeded their current discharge limit.
CA	Dc-link over voltage	1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. If the alarm occurs repeatedly, the inverter cannot work properly. Pls. contact the customer service center.
CB	Internal communication error	1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. If the alarm occurs repeatedly, the inverter cannot work properly. Pls. contact the customer service center.
CC	Software incompatibility	1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. If the alarm occurs repeatedly, the inverter cannot work properly. Pls. contact the customer service center.

FAULT	INSTRUCTION	COMMON CAUSE / REMEDY
CD	Internal storage error	1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. If the alarm occurs repeatedly, the inverter cannot work properly. Pls. contact the customer service center.
CE	Data inconsistency	1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. If the alarm occurs repeatedly, the inverter cannot work properly. Pls. contact the customer service center.
CF	Inverter abnormal	1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. If the alarm occurs repeatedly, the inverter cannot work properly. Pls. contact the customer service center.
CG	Boost abnormal	1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. If the alarm occurs repeatedly, the inverter cannot work properly. Pls. contact the customer service center.
P1	Parallel ID warning	It is Parallel ID Alarm. Pls. check the parallel communication cable, and check whether any inverter joins or exits online. All inverters are powered off completely, check the line, and then power on the inverters again to ensure that the alarm is cleared.
P2	Parallel SYN signal warning	Parallel synchronization signal is abnormal. Check whether the parallel communication cable is properly connected.
P3	Parallel BAT abnormal	The parallel battery is abnormal. Whether the battery of the inverter is reported low voltage or the battery is not connected.
P4	Parallel GRID abnormal	The parallel grid is abnormal. Whether the grid of the inverter is abnormal.
P5	Phase Sequence abnormal	Ensure that the phase sequence of power grid is consistent with that of L1/L2/L3 on LCD/app. To clear phase sequence abnormal alarm: Option 1: Power off all inverters, correct the phase sequence of each inverter and then restart the inverters. Option 2: Under inverter standby mode, correct the phase sequence of each inverter on LCD/app, power off all inverters and then restart the inverters. If the alarm continues, please contact the customer service center.

FAULT	INSTRUCTION	COMMON CAUSE / REMEDY
D2	Battery over voltage	1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. Check that the battery overvoltage protection value is improperly set. 3. The battery is abnormal. 4. If exclude the above, the alarm continues to occur, please contact the customer service center.
D3	Battery under voltage	1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. Check the communication line connection between BMS and inverter (lithium battery). 3. The battery is empty or the battery voltage is lower than the SOC cutoff voltage. 4. The battery undervoltage protection value is improperly set. 5. The battery is abnormal. 6. If exclude the above, the alarm continues to occur, please contact the customer service center.
D4	Battery discharger over current	1. Check whether the battery parameters are correctly set. 2. Battery undervoltage. 3. Check whether a separate battery is loaded and the discharge current exceeds the battery specifications. 4. The battery is abnormal. 5. If exclude the above, the alarm continues to occur, please contact the customer service center.
D5	Battery over temperature	1. If the alarm occurs repeatedly, please check whether the installation site is in direct sunlight and whether the ambient temperature is too high (such as in a closed room). 2. If the battery is abnormal, replace it with a new one. 3. If exclude the above, the alarm continues to occur, please contact the customer service center.
D6	Battery under temperature	
D7	AC output voltage abnormal	1. Check whether the AC OUTPUT voltage and frequency Settings are within the specified range. 2. Check whether the AC OUTPUT circuit is overloaded. 3. When not connected to the power grid, check whether AC OUTPUT voltage is normal. 4. If exclude the above, the alarm continues to occur, please contact the customer service center.

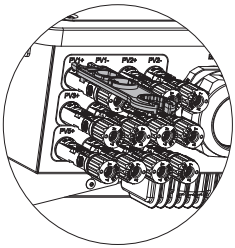
FAULT	INSTRUCTION	COMMON CAUSE / REMEDY
D8	Communication error (Inverter-BMS)	1. Check whether the battery is disconnected. 2. Check whether the battery is properly connected with the inverter. 3. Confirm that the battery is compatible with the inverter. It is recommended to use CAN communication. 4. Check whether the communication cable or port between the battery and the inverter is faulty. 5. If exclude the above, the alarm continues to occur, please contact the customer service center.
CU	Dcdc abnormal	1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. If the alarm occurs repeatedly, please check: 1) Check whether the MC4 terminal on the PV side is securely connected. 2) Check whether the voltage at the PV side is open circuit, ground to ground, etc. If exclude the above, the alarm continues to occur, please contact the customer service center.
CP	AC output over dc-bias voltage	1. If the alarm occurs occasionally, the inverter can be automatically recovered and no action is required. 2. If the alarm occurs repeatedly, the inverter cannot work properly. Pls. contact the customer service center.
DB	AC output short circuit	1. Check whether the live line and neutral line of AC OUTPUT are short-circuited. 2. If it is confirmed that the output is not short-circuited or an alarm, please contact customer service to report for repair. (After the troubleshooting of alarm problems, AC OUTPUT breaker needs to be manually turned on during normal use.)
DC	AC output over load	1.Disconnect the AC OUTPUT breaker and check whether the alarm is cleared. 2.If the load is disconnected and the alarm is generated, please contact the customer service. (After the alarm is cleared, the AC OUT breaker needs to be manually turned on for normal use.)

10.3 Removing the Inverter

WARNING	Before removing DC input connector, double check DC input switch is turned to OFF to avoid inverter damage and personal injury.

Perform the following procedures to remove the inverter:

Step 1: Disconnect all cables from the inverter, including communications cables, DC input power cables, AC output power cables, and PGND cable.



NOTE

To remove the PV connectors, insert the removal tool into the bayonet according to the position indicated in the drawing, and then take out the connector outward.

PV Connectors Removing Detail

Step 2: Remove the inverter from the mounting bracket.

Step 3: Remove the mounting bracket.

11. Technical Specifications

Model	8K	10K	12K
Input (PV)			
Max. PV Access Power	16,000W	20,000W	24,000W
Max. PV Usable Power	12,800W	16,000W	19,200W
Max. PV Input Voltage	500V		
Start-up Voltage	90V		
MPPT Operating Voltage Range	70V-450V		
Max. Input Current per MPPT	20A*2/20A*2	20A*2/20A*2/20A*2	20A*2/20A*2/20A*2
Max. Short Circuit Current per MPPT	50A/50A	50A/50A/50A	50A/50A/50A
No. of MPP Trackers	2	3	3
No. of Strings per MPP Tracker	2/2	2/2/2	2/2/2
Input/Output (BAT)			
Battery Type	Lithium-ion/Lead-acid		
Nominal Battery Voltage	48V		
Battery Voltage Range	40V-60V		
Max. Charge/Discharge Current	190A/190A	220A/220A	250A/250A
Input/Output (Grid)			
Nominal AC Output Power	8,000W	10,000W	12,000W
Max. AC Output Apparent Power	8,800VA	11,000VA	13,200VA
Nominal AC Output Current	36.4A/34.8A/33.3A	45.5A/43.5A/41.7A	54.5A/52.2A/50.0A
Max. AC Output Current	40A	50A	60A
Max. Grid Passthrough Current (grid to load)	68.2A		
Nominal Voltage	220V/230V/240V, L+N+PE		
Nominal Frequency	50Hz/60Hz		
Power Factor	> 0.99 @rated power (Adjustable 0.8 LD - 0.8 LG)		
THDI	＜3% @ 100% Pn		
Output (Back up)			
Nominal AC Output Power	8,000W	10,000W	12,000W
Max. AC Output Apparent Power	8,800VA	11,000VA	13,200VA
Nominal AC Output Current	36.4A/34.8A/33.3A	45.5A/43.5A/41.7A	54.5A/52.2A/50A
Max. AC Output Current	40A	50A	60A
Peak Output Apparent Power	200% @10s		
Nominal Voltage	220V/230V/240V, L+N+PE		
Nominal Frequency	50Hz/60Hz		
Transfer Time	＜10ms（Typical）		
THDV	＜3% @ R Load		

Model	8K	10K	12K
Protection			
Protection Category	Class I		
PV Switch	Yes		
Anti-islanding Protection	Yes		
Overcurrent Protection	Yes		
Overvoltage Protection	Yes		
AC Short Circuit Protection	Yes		
PV Reverse Polarity Protection	Yes		
Surge Protection	Type III		
General			
Max. Operation Altitude	4,000m (>2,000m derating)		
Operating Temperature Range	-25℃~60℃		
Relative Humidity	0~100%		
Ingress Protection Degree	IP66		
Cooling Method	Smart Cooling		
Mounting	Wall Bracket		
Dimensions (W*H*D)	443mm*679mm*210mm		
Weight	31.1 kg		
HMI & COM			
Display	LED+LCD		
Communication Interfaces	RS485/CAN (for BMS), RS485, CAN（for parallel), 1*DO, 1*DI , Wi-Fi, LAN(Optional)		
Certification			
Safety	IEC/EN 62109-1/-2		
EMC	IEC/EN 61000-6-1/2/3/4，IEC/EN 62920		
Warranty	**5 Years**		