Hybrid Inverter

User Manual

SUN-E/I Series

(SUN8000T-E/I, SUN10000T-E/I, SUN12000T-E/I, SUN15000T-E/I)

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SUN-E/I Series

Type	Parameter
Product Name	Hybrid Inverter
Product Model	SUN8000T-E/I, SUN10000T-E/I, SUN12000T-E/I, SUN15000T-E/I
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Revision Records

Version	Date	Modify the content	Revised by
V1.0	December 06 , 2024	First Revision	
V1.1	April 24 , 2025	Updated Chapter 4.7 and 4.8 content	
V1.2	July 10 , 2025	Update of overall content	

Catalogue

Preface

About this manual

This manual introduces the installation, connection, debugging, and maintenance of energy storage equipment. Please read this manual and related documents carefully before using this product, and store them in a place where installation, operation, and maintenance personnel can access them at any time. The illustrations in this user manual are for reference only, please refer to the actual object for details . This user manual is subject to change without prior notice, please download the latest user manual from the official website.

Target group

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

Safety instructions

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

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

1. Safety

Before using the energy storage all in one, please read all instructions and cautionary markings on the unit and manual. Put the instructions where you can take them easily.

The inveter of ours strictly conforms to related safety rules in design and test. Local safety regulations shall be followed during installation, operation and maintenance. Incorrect operation work 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.

Storage

Store in a dry environment, avoid any form of liquid contact, the recommended temperature range is -40°C to +65°C.
Cool: Avoid direct sunlight and high temperature environment.
Ventilation: The storage area should be well ventilated.
Place it on a stable and non-vibrating surface, off the ground to avoid moisture or flooding.
Keep away from flammable and explosive items.

transportation

It is recommended to use the original packaging box.
The inside of the carton should be filled with high-strength cushioning materials such as pearl cotton or customized foam. Make sure that the box is firmly fixed and cannot shake.
Try to handle it with care, avoid any falling, throwing, rolling, severe collision or vibration, and place it steadily.

Symbols Used

Safety Symbol	Description
	Danger of high voltage and electric shock! Only qualified personnel may perform work on the inverter.
	Danger of high voltage. Residual voltage in the inverter need 5 mins to discharge, wait 5 mins before operation.
	Danger of hot surface
	Watch out for danger
	Environmental Protection Use Period
	Refer to the operating instructions
	Product should not be disposed as household waste.
	Grounding terminal

Safety Precaution

- Installation, maintenance and connection must be performed by qualified personnel, in compliance with local electrical standards, wiring rules and requirements of local power authorities and companies.

● It is forbidden to carry out installation, wiring and other operations with power on. Before installation,DC input and AC output of the inverter must be terminated at least 5 minutes before performing any installation or maintenance. For equipment that needs to be grounded, a protective ground wire must be installed first during installation. When dismantling the device, the protective earth must be removed last.

● The temperature of some parts of the inverter may exceed 60℃ during operation. To avoid being burnt.

● Ensure children are kept away from inverters.

● 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.

● Appropriate measures must be taken to prevent damage to the inverter from static electricity, as it may cause harm to electronic components. Failure to do so could result in damage to the inverter and voiding of its warranty.

● 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 a dangerously high DC voltage. Please follow our instructions carefully to avoid any potential 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.

● Before maintenance, the inverter must be completely isolated. This involves switching off the PV switch, disconnecting the PV terminal, disconnecting the battery terminal, and disconnecting the AC terminal.

● Prohibit to insert or pull the AC and DC terminals when the inverter is running.

● Don't connect ESS inverter in the following ways:

EPS Port should not be connected to grid.

The single PV panel string should not be connected to two or more inverters.

● When a battery fault occurs, the temperature may higher than the burn threshold of touchable surface. Please do not touch it.

● Please do not short circuit battery terminals as it may cause fire.

● Before connecting or disconnecting battery terminals, please disconnect charging power, and make sure no-power at the power supply with multimeter.

● Please do not place any flammable items around the equipment. Please do not place the battery module in water or other liquids.

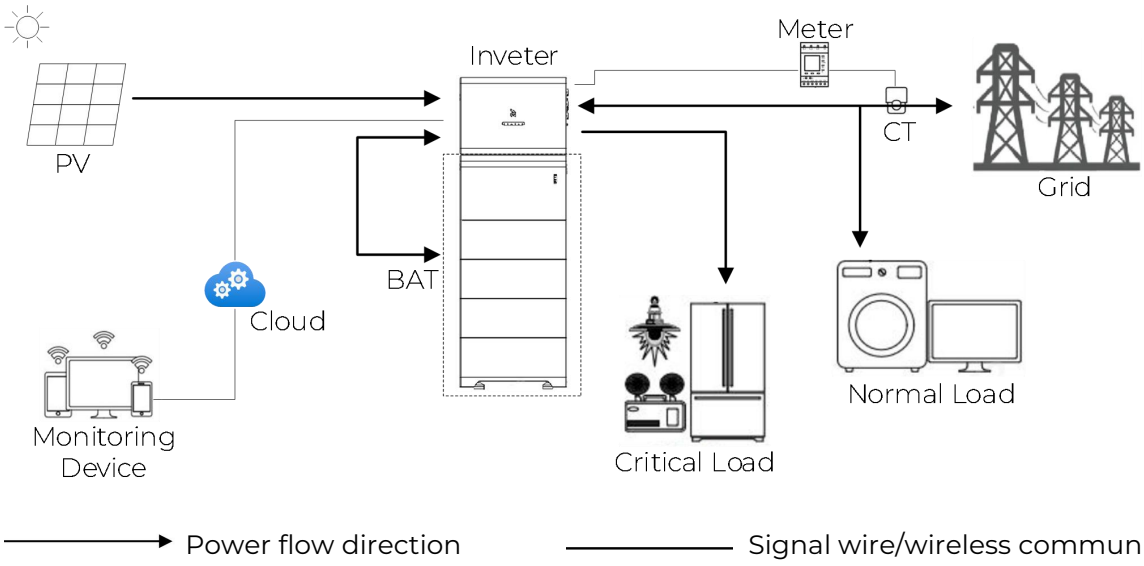
● For indoor installation, smoke alarms must be installed in accordance with building and fire regulations.

2. Product introduction

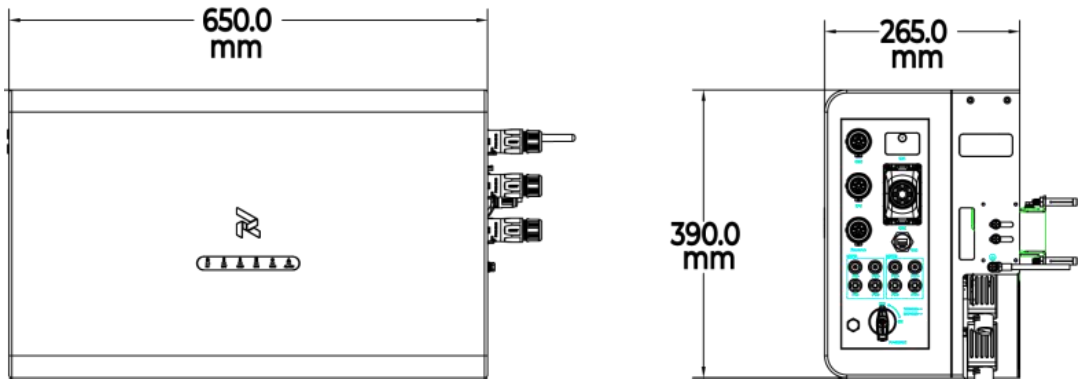
2.1 Overview

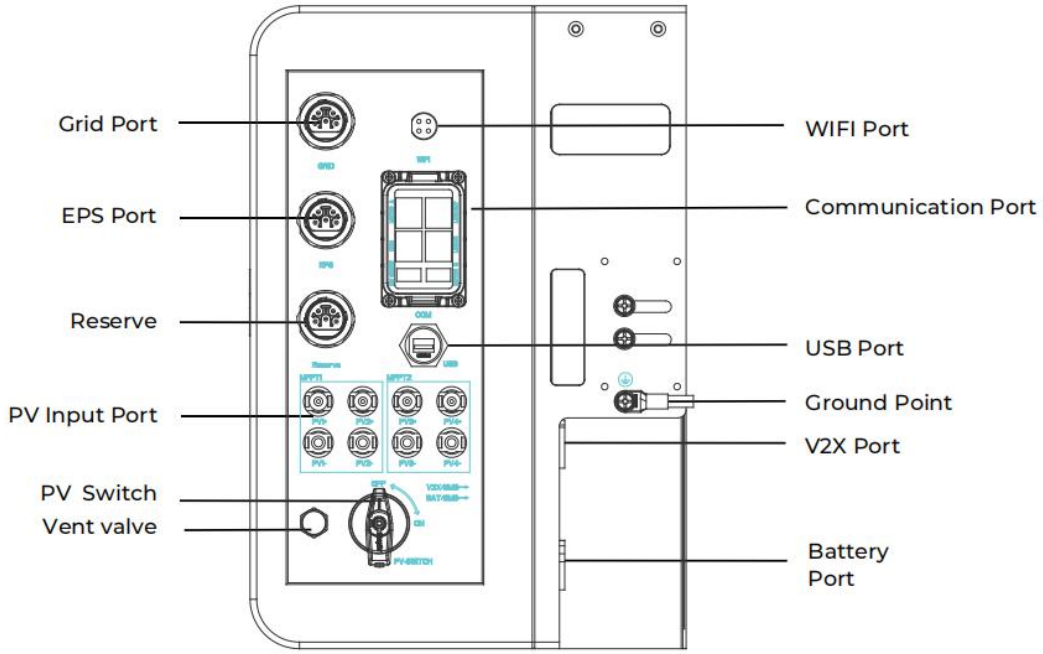
The inveter converts the DC power generated by the photovoltaic string into AC power, and sends the power to the grid. At the same time, it can also store the photovoltaic power in the battery and then supply power to the load.

Inverters can be used to optimize their own consumption, stored in batteries for future use or fed into the public grid. The working mode depends on the photovoltaic energy source and the user's preference. It can use energy generated by batteries and inverters (generated by photovoltaics) to provide emergency power in the event of a grid loss.



2.2 Product appearance





2.3 Product nameplate

ROYPOW
Name: Three-phase Hybrid inverter
Model: SUN8000T-E/I

PV Input	
Max. PV Input Power:	20kW
Max. PV Voltage*1:	1000Vd.c.
MPPT Voltage Range:	160-950Vd.c.
Max. PV Current:	30Ad.c./20Ad.c.
Max. PV Isc:	40Ad.c./30Ad.c.
Battery	
Battery Type	Li-ion
Battery Voltage Range:	550-950Vd.c.
Max. Battery Charge/Discharge Current:	20Ad.c./16Ad.c.
AC Output/Input(On-grid)	
Rated AC Voltage:	3W/N/PE, 220/380Va. c. 230/400Va.c.
Rated AC Frequency:	50/60 Hz
Rated AC Output apparent power:	8kVA
Max. AC Output Power:	8.8kVA
Rated AC Output Current:	3*11.6Aa.c.
Max. AC Output Current:	3*12.8Aa.c.
Max. AC Input Power*2:	22.5kVA
Max. AC Input Current:	3*32Aa.c.
Power Factor:	0.8 leading-0.8 lagging
AC Output (Back-up)	
Rated Back-up Voltage:	3W/N/PE, 220/380Va.c. 230/400Va.c.
Rated Back-up Frequency:	50/60 Hz
Rated Back-up Power:	8.8kW
Rated Back-up current	3*12.8 Aa.c.
Power Factor:	0.8 leading-0.8 lagging
Max. Back-up Power:	16 kW (10S)
Max. Bypass Power From Grid:	22.5kW
General	
Operating Temperature:	-25~60℃
Protection Class:	ClassI
Ingress Protection:	IP65
Overvoltage Category:	II(PV、BAT)/ III(AC)
Inverter Topology:	non-isolated

*1 When altitude>3000m, the Max. PV Voltage derating to 980V.
*2 Only when the AC voltage is ≥235V, the AC input power can reach 22.5kVA.

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ROYPOW
Name: Three-phase Hybrid inverter
Model: SUN10000T-E/I

PV Input	
Max. PV Input Power:	20kW
Max. PV Voltage*1:	1000Vd.c.
MPPT Voltage Range:	160-950Vd.c.
Max. PV Current:	30Ad.c./20Ad.c.
Max. PV Isc:	40Ad.c./30Ad.c.
Battery	
Battery Type	Li-ion
Battery Voltage Range:	550-950Vd.c.
Max. Battery Charge/Discharge Current:	20Ad.c./20Ad.c.
AC Output/Input(On-grid)	
Rated AC Voltage:	3W/N/PE, 220/380Va. c. 230/400Va.c.
Rated AC Frequency:	50/60 Hz
Rated AC Output apparent power:	10kVA
Max. AC Output Power:	11kVA
Rated AC Output Current:	3*14.5Aa.c.
Max. AC Output Current:	3*16Aa.c.
Max. AC Input Power*2:	22.5kVA
Max. AC Input Current:	3*32Aa.c.
Power Factor:	0.8 leading-0.8 lagging
AC Output (Back-up)	
Rated Back-up Voltage:	3W/N/PE, 220/380Va.c. 230/400Va.c.
Rated Back-up Frequency:	50/60 Hz
Rated Back-up Power:	11kW
Rated Back-up current	3*16 Aa.c.
Power Factor:	0.8 leading-0.8 lagging
Max. Back-up Power:	20 kW (10S)
Max. Bypass Power From Grid:	22.5kW
General	
Operating Temperature:	-25~60℃
Protection Class:	ClassI
Ingress Protection:	IP65
Overvoltage Category:	II(PV、BAT)/ III(AC)
Inverter Topology:	non-isolated

*1 When altitude>3000m, the Max. PV Voltage derating to 980V.
*2 Only when the AC voltage is ≥235V, the AC input power can reach 22.5kVA.

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ROYPOW
Name: Three-phase Hybrid inverter
Model: SUN12000T-E/I

PV Input	
Max. PV Input Power:	30kW
Max. PV Voltage*1:	1000Vd.c.
MPPT Voltage Range:	160-950Vd.c.
Max. PV Current:	30Ad.c./30Ad.c.
Max. PV Isc:	40Ad.c./40Ad.c.
Battery	
Battery Type	Li-ion
Battery Voltage Range:	550-950Vd.c.
Max. Battery Charge/Discharge Current:	27Ad.c./24Ad.c.
AC Output/Input(On-grid)	
Rated AC Voltage:	3W/N/PE, 220/380Va. c. 230/400Va.c.
Rated AC Frequency:	50/60 Hz
Rated AC Output apparent power:	12kVA
Max. AC Output Power:	13.2kVA
Rated AC Output Current:	3*17.4Aa.c.
Max. AC Output Current:	3*19.2Aa.c.
Max. AC Input Power*2:	22.5kVA
Max. AC Input Current:	3*32Aa.c.
Power Factor:	0.8 leading-0.8 lagging
AC Output (Back-up)	
Rated Back-up Voltage:	3W/N/PE, 220/380Va.c. 230/400Va.c.
Rated Back-up Frequency:	50/60 Hz
Rated Back-up Power:	13.2kW
Rated Back-up current	3*19.2 Aa.c.
Power Factor:	0.8 leading-0.8 lagging
Max. Back-up Power:	24 kW (10S)
Max. Bypass Power From Grid:	22.5kW
General	
Operating Temperature:	-25~60℃
Protection Class:	ClassI
Ingress Protection:	IP65
Overvoltage Category:	II(PV、BAT)/ III(AC)
Inverter Topology:	non-isolated

*1 When altitude>3000m, the Max. PV Voltage derating to 980V.
*2 Only when the AC voltage is ≥235V, the AC input power can reach 22.5kVA.

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ROYPOW
Name: Three-phase Hybrid inverter
Model: SUN15000T-E/I

PV Input	
Max. PV Input Power:	30kW
Max. PV Voltage*1:	1000Vd.c.
MPPT Voltage Range:	160-950Vd.c.
Max. PV Current:	30Ad.c./30Ad.c.
Max. PV Isc:	40Ad.c./40Ad.c.
Battery	
Battery Type	Li-ion
Battery Voltage Range:	550-950Vd.c.
Max. Battery Charge/Discharge Current:	27Ad.c./27Ad.c.
AC Output/Input(On-grid)	
Rated AC Voltage:	3W/N/PE, 220/380Va. c. 230/400Va.c.
Rated AC Frequency:	50/60 Hz
Rated AC Output apparent power:	15kVA
Max. AC Output Power:	15kVA
Rated AC Output Current:	3*21.8Aa.c.
Max. AC Output Current:	3*21.8Aa.c.
Max. AC Input Power*2:	22.5 kVA
Max. AC Input Current:	3*32Aa.c.
Power Factor:	0.8 leading-0.8 lagging
AC Output (Back-up)	
Rated Back-up Voltage:	3W/N/PE, 220/380Va.c. 230/400Va.c.
Rated Back-up Frequency:	50/60 Hz
Rated Back-up Power:	15kW
Rated Back-up current	3*21.8 Aa.c.
Power Factor:	0.8 leading-0.8 lagging
Max. Back-up Power:	30 kW (10S)
Max. Bypass Power From Grid:	22.5kW
General	
Operating Temperature:	-25~60℃
Protection Class:	ClassI
Ingress Protection:	IP65
Overvoltage Category:	II(PV、BAT)/ III(AC)
Inverter Topology:	non-isolated

*1 When altitude>3000m, the Max. PV Voltage derating to 980V.
*2 Only when the AC voltage is ≥235V, the AC input power can reach 22.5kVA.

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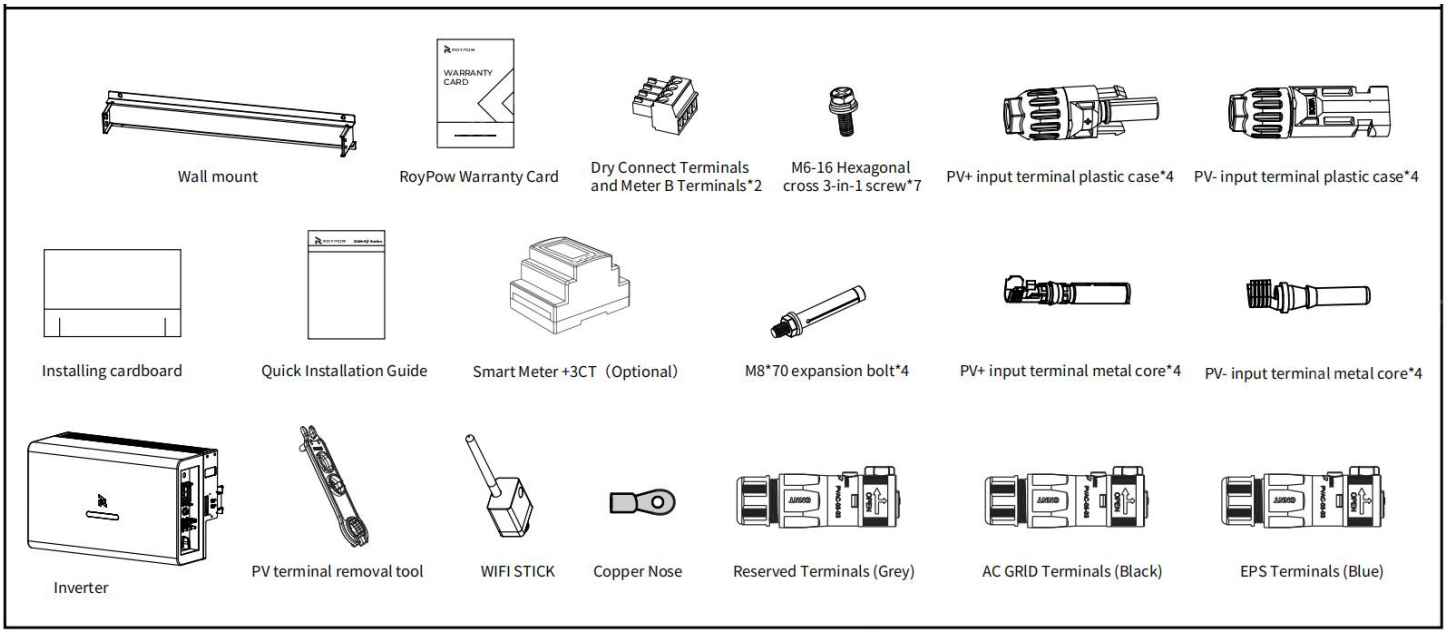
15K

3. Installation

3.1 Packing list

After unpacking, please carefully check the following packing list for damage or missing items. In the event of any damage or missing parts, please contact the supplier for assistance.



3.2 Selecting the mounting location

3.2.1 Installation environment requirements

● The mounting location must be inaccessible to unrelated personnel since the enclosure and heat sinks are extremely hot during operation.

● Do not install the product in areas containing highly flammable materials or gases.

● To ensure optimum operation and long service life, the ambient temperature must be below 50℃.

● The product must be mounted in a well ventilated environment to ensure good heat dissipation.

● To ensure long service life, the product must not be exposed to direct solar irradiation, rain, or snow. It is recommended that the product be mounted in a sheltered place.

● The carrier where the product is mounted must be fire-proof. Do not mount the product on flammable building materials.

● Do not install the product in a rest area since it will cause noise during operation.

● The installation height should be reasonable and make sure it is easy to operate and view the display.

● Product label and warning symbols shall be clear to read after installation.

● If the inverter is installed outdoors, please avoid direct sunlight and rain.

● Choose a wall capable of supporting the full weight of product, with one of the following Characteristics:

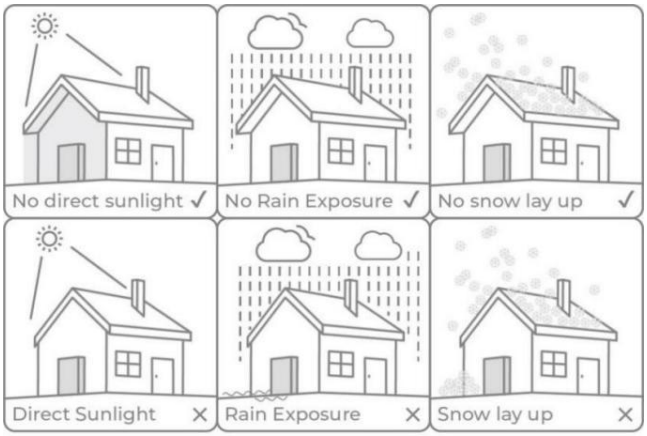
· Wood studs at regular intervals
· Plywood sheeting of sufficient thickness
· Solid concrete or masonry
· Metal studs of sufficient gauge

● Concrete or Masonry:

Minimum strength must be 2500 PSI (concrete) or 1500 PSI (masonry).

Use at least four (one in each corner) 1/4-inch fasteners with washers, of sufficient length for at least 1.5 in (38 mm) embedment into the material. Ensure that all fasteners are at least 1.5 in (38 mm) away from the edges of masonry blocks or bricks.

● Indoor installations are recommended in attached or detached garages, sheds, and locations more than 152.4 cm (5 feet) from the residence and not in bedrooms and living spaces of the residence, including bathrooms, toilets, closets, halls, and storage spaces.



Note: The protection grade of the inverter is IP65, which is suitable for indodr and outdoor installation.

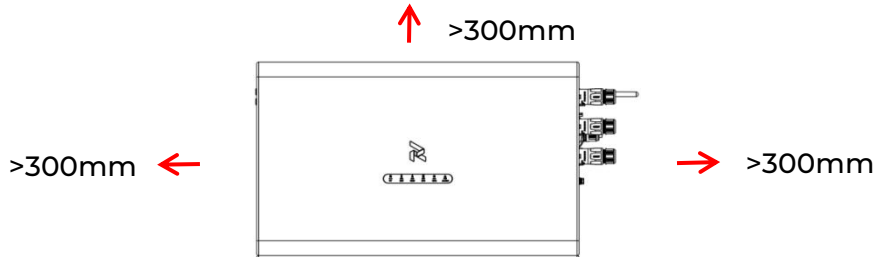
3.2.2 Installation angle requirements

Recommended device installation angle: vertical.

Do not turn the device upside down, or install it horizontally.

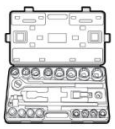
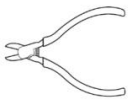
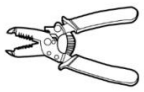
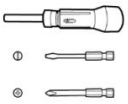
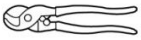
3.2.3 Installation space requirements

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



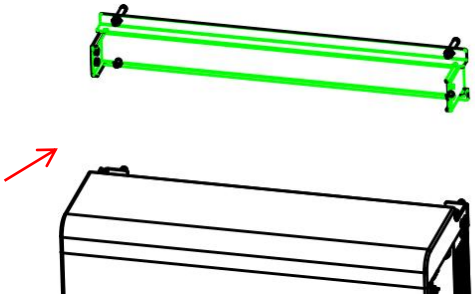
3.3 Installation tool requirements

The following tools are recommended when installing the equipment. use other auxiliary tools if necessary.Please refer to the actual usage scenario.

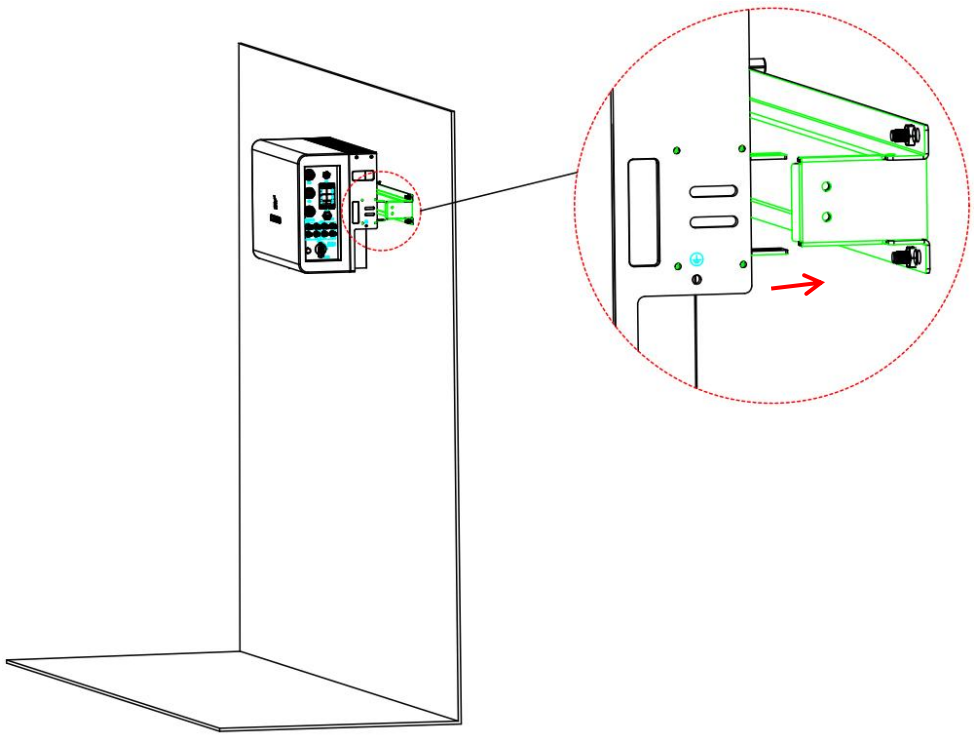
				
Hammer drill	Torque socket wrench	Torque wrench	Diagonal plier	Wire stripper
				
Torque screwdriver	Rubber mallet	Utility knife	Cable cutter	Heat shrink tubing
				
Heat gun	Cable tie	Vacuum cleaner	Multimeter (DC voltage measurement range ⩾ 600 VDC)	Marker
				
Measuring tape	Level	Stud finder	Hex key (M6)	Safety shoes
				
Safety gloves	Safety goggles	Anti-dust respirator	Safety ladder	Safety Helmet Hat

3.4 Installation diagram

①Use expansion bolts to fix the inverter wall mount bracket to the wall (torque 15N.m);

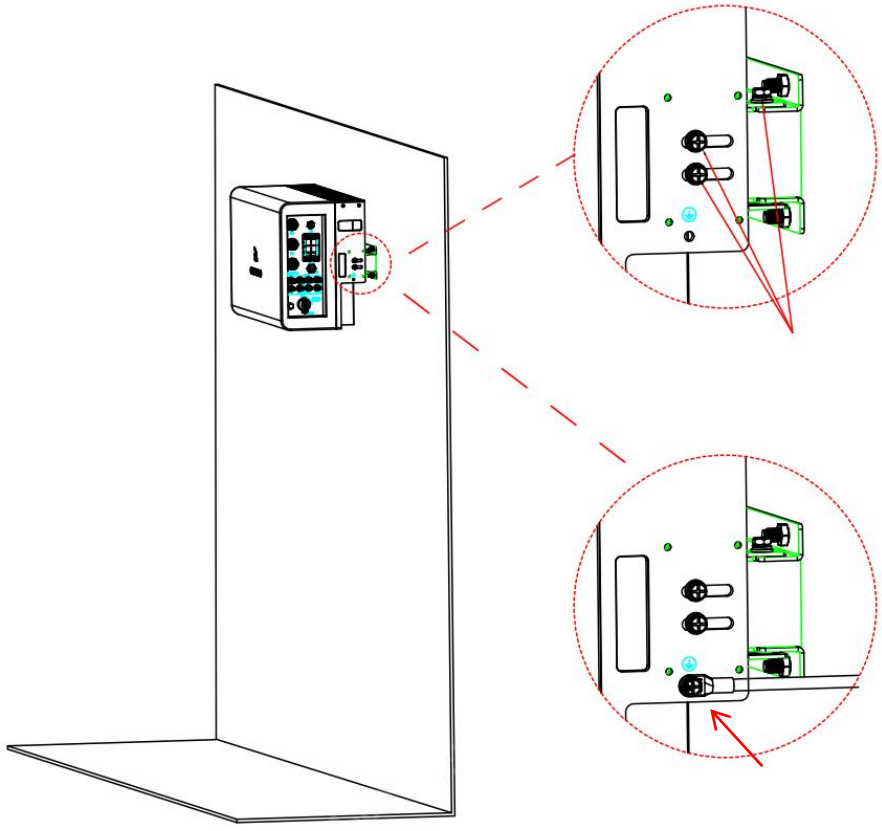


② Align the fixing plate with the wall-mounted bracket and push the inverter backwards;



③ Use three M6 bolts to lock the inverter and the wall bracket (torque 6.5Nm)

Then use an M6 bolt to fix the system ground wire (6.5Nm torque) ;



4. Electrical connections

Before wiring, please turn “OFF” the breakers.

● All operations, cables, and component specifications used during the electrical connection must comply with local laws and regulations.

● Before making electrical connections, please disconnect the DC switch and AC output switch of the inverter to ensure that the equipment is powered off. It is strictly forbidden to operate with power on, otherwise there may be dangers such as electric shock.

● Cables of the same type should be bundled together and arranged separately from cables of different types. Intertwining or crossing arrangement is prohibited.

● If the cable bears too much tension, it may lead to poor wiring. When wiring, please reserve a certain length of the cable before connecting it to the inverter wiring port.

● When crimping the terminal, please ensure that the conductor part of the cable is in full contact with the terminal. Do not crimp the cable insulation and the terminal together, otherwise the device may fail to operate, or the device may become overheated due to unreliable connection after operation. The inverter terminal block is damaged, etc.

● When making electrical connections, please wear personal protective equipment such as safety shoes, protective gloves, and insulating gloves as required.

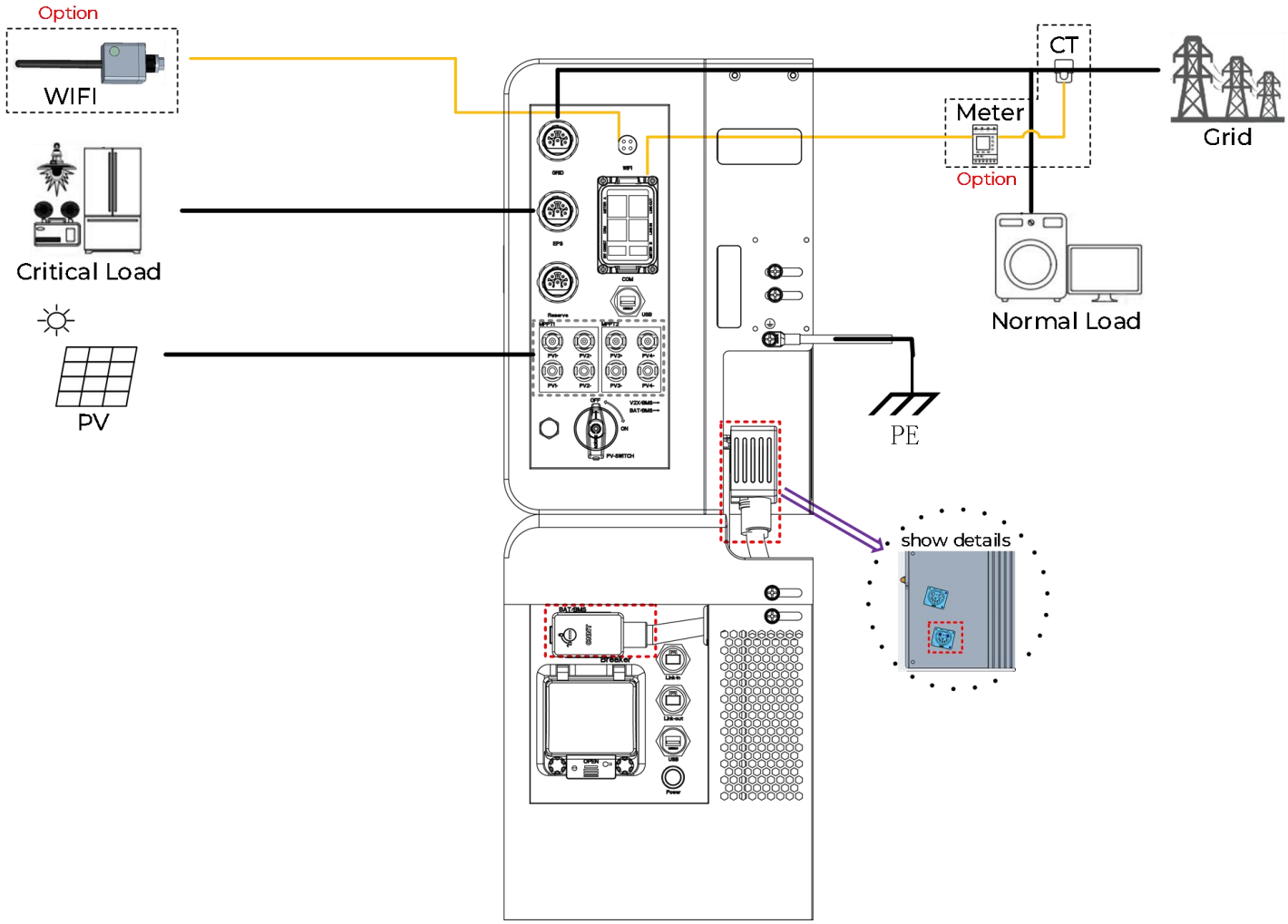
● Only professionals are allowed to perform operations related to electrical connection.
● The cable colors in this document are for reference only, and the specific cable specifications must comply with local regulations.

● According to the regulatory requirements of different regions, the N and PE wires of the ON-GRID and EPS ports of the inverter are connected in different ways. For details, the local regulatory requirements shall prevail.

● The ON-GRID andEPS ports of the inverter are equipped with internal relays. When the inverter is in the off-grid mode, the built-in ON-GRID relay is in the disconnected state; when the inverter is in the grid-connected mode, the built-in ON-GRID relay is in the closed state.

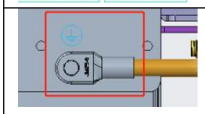
● When the inverter is powered on, the EPS port is charged. If you need to maintain the EPS load, please power off the inverter, otherwise it may cause electric shock.

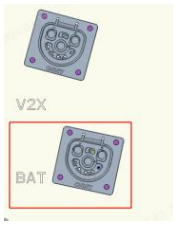
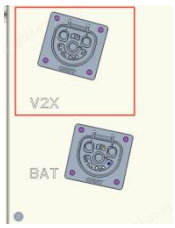
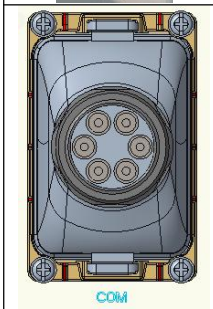
System Connection Diagram:



（Note: The red box indicates the connection cables between the inverter and the battery, including power cables and signal cables）

4.1 External port wiring cable description

Port		Definition	Cable type	Recommended Specifications	Origin
Inverter		PV1+/PV2+/PV3+/PV4+：Connect the PV string positive pole PV1-/PV2-/PV3-/PV4-：Connect the PV negative pole	Outdoor multi-core copper cable	Conductor cross-sectional area: 3mm²~5mm²	Prepared by users
		PE：Connect PE cable	Outdoor multi-core copper cable	Conductor cross-sectional area: 4mm²~6mm²	Prepared by users

		BAT/BMS: Connect the battery BAT/BMS terminal	Power cable	Outdoor multi-core copper cable	Conductor cross-sectional area: 4mm²~6mm²	Accessories for battery optimizer RMH95050
			PE cable	Outdoor multi-core copper cable	Conductor cross-sectional area: 4mm²~6mm²	
			Signal cable	Outdoor multi-core copper cable	cross-sectional area: 0.2mm²~0.4mm²	
		V2X: Connect the V2X Module V2X/BMS terminal	Power cable	Outdoor multi-core copper cable	Conductor cross-sectional area: 4mm²~6mm²	Accessories for V2X Module
			PE cable	Outdoor multi-core copper cable	Conductor cross-sectional area: 4mm²~6mm²	
			Signal cable	Outdoor multi-core copper cable	cross-sectional area: 0.2mm²~0.4mm²	
		GRID：Connect to three-phase power grid (three-phase five-wire)；	L1 L2 L3 N PE	Outdoor multi-core copper cable	cross-sectional area: 4mm²~6mm²	Prepared by users
		EPS：Connect critical loads (three- phase five -wire)；	L1 L2 L3 N PE	Outdoor multi-core copper cable	cross-sectional area: 4mm²~6mm²	Prepared by users
		**WIFI:** Connect WIFI module;	/	/	/	/
		COM: Connect multiple types of communication；	Meter DRM Link-in Link-out	Outdoor twisted pair	cross-sectional area: 0.1mm²~0.4mm²	Prepared by users
			DRY CONNECT MeterB	Outdoor multi-core copper cable		
Battery		BAT/BMS: Connect the battery BAT/BMS terminal	Same as Inverter BAT/BMS cable	Same as Inverter BAT/BMS cable	Same as Inverter BAT/BMS cable	Accessories for battery optimizer RMH95050

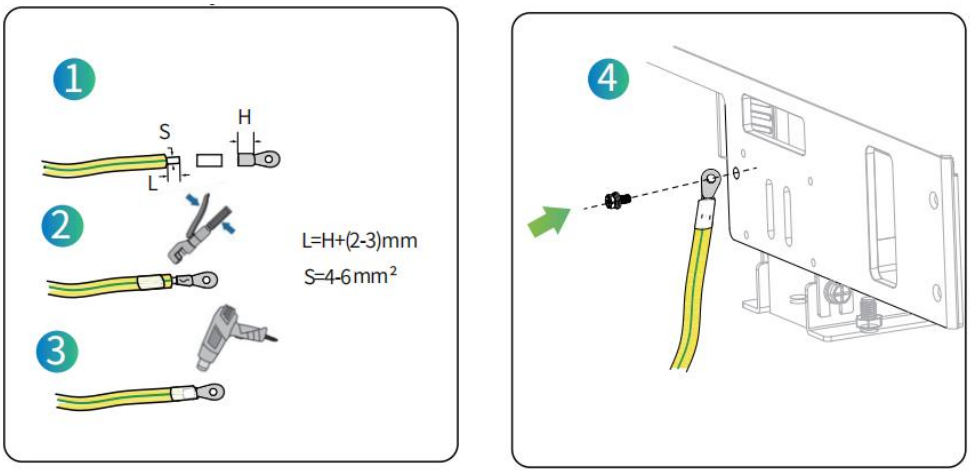
4.2 PE wiring connection

Step 1: Prepare the cable,OT terminal and heat shrink tubing . Strip the wire insulation to the appropriate length, the conduct core-section: 4-6 mm².

Step 2: Insert the stripped wire core into the conductor crimping area of the OT terminal and press it tightly with crimping pliers.

Step 3: Put on the heat shrink tubing and heat it.

Step 4: Use the screw（M6） from the accessory bag. Then fasten the cable with a screwdriver.(The torque of the M6 screw is 6.5±1.5N*m)



PV earth fault:

When the inverter is turned on, the PV insulation impedance to ground is detected. The detection circuit of the inverter calculates the impedance between PV+ and the earth and between PV- and the earth. When the impedance value is less than 33.3kΩ, the inverter ALARM light will light up in red, and the fault "Insulation earth impedance fault" can be read through the APP. The inverter will shut down due to fault until it detects that the resistance of PV to ground is greater than 33.3kΩ. The inverter fault is cleared and it will start running normally.

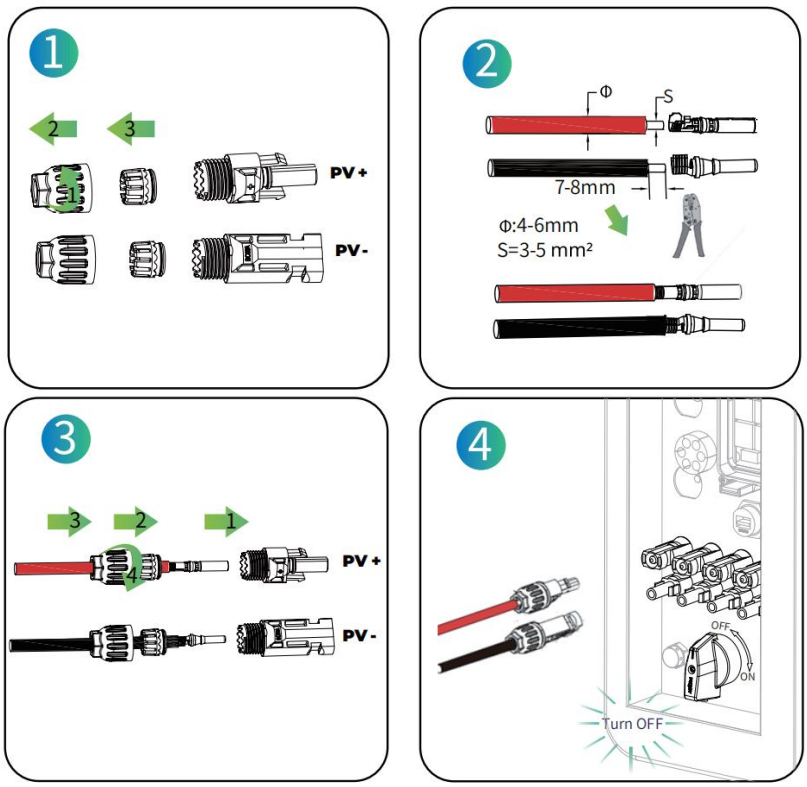
4.3 PV wiring connection

Step 1: Unscrew the PV connector counterclockwise. Remove the insulator and the inner cable gland.

Step 2: Strip the insulation from each DC cable by 7-8mm, the conduct core-section: 3-5mm². Assemble cable ends with crimp contacts by crimping pliers.

Step 3: Lead the cable through the cable gland, then insert the crimp contact into the insulator until it snaps into place. Gently pull the cable backward to ensure a firm connection. Tighten the cable gland and the insulator.

Step 4: Check the cable connection of the PV string for polarity correctness and ensure that the opencircuit voltage in any case does not exceed the inverter input limit of 1,000V. Turn off the PV switch and connect the PV connectors to the inverter.Ungrounded PV Array.



4.4 BAT/BMS wiring connection

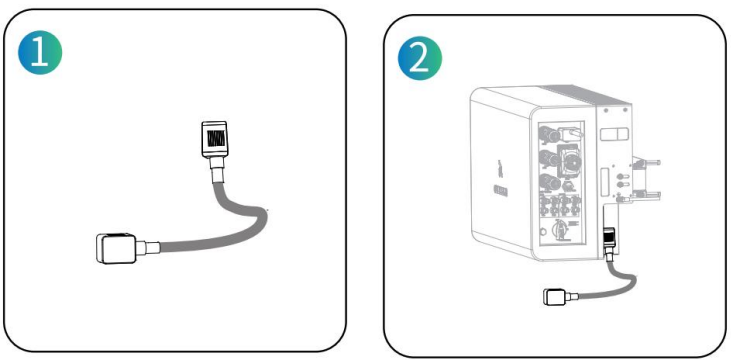
Step1: Find the BAT/BMS cable equipped with the battery optimizer RMH95050;

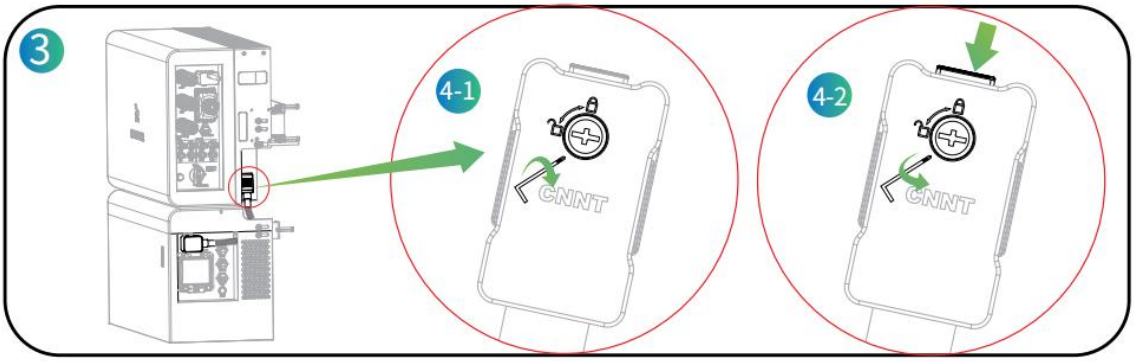
Step2: Connect one end of the cable to the BAT/BMS terminal of the radiator on the back of the inverter.(No external DC switch or circuit breaker is required as there is a dedicated direct connection line.)

Note: When connecting this line, please make sure the battery is off and there is no voltage output, otherwise the live connection will damage the inverter.

Step3: Connect the other end of the cable to the BAT/BMS terminal of the battery optimizer RMH95050.

Step4:
(1) Lock connector: Use a small L-shaped screwdriver to turn the screw 90 degrees clockwise to lock the connector;
(2) Unlock connector: Use a small L-shaped screwdriver to turn the screw 90 degrees counterclockwise to unlock the terminal, press the button on the top of the terminal, and pull out the terminal





Notice: External alarm and monitoring device should be equipped to the battery system for earth fault monitoring and earth leakage levels that indicate a fault.

4.5 GRID wiring connection

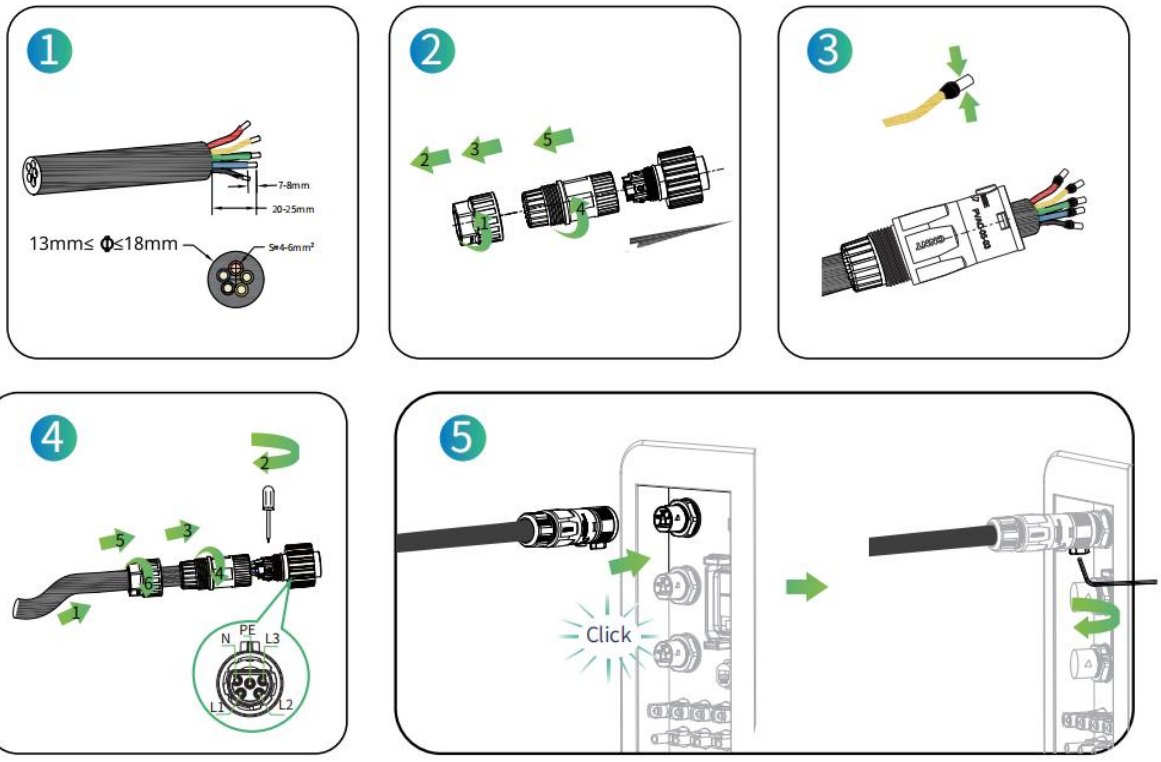
Step 1：Remove the cable jacket by 20-25mm, and strip the wire insulation by 7-8 mm, the conduct core-section: 5-7 mm².

Step 2：Unscrew the GRID connector(black) counterclockwise, disassemble the parts in sequence.

Step 3：Press the connectors tightly on the cable conductor core, make sure the cable jacket is not locked within the connector. Thread the AC cable of appropriate length through the waterproof terminal.

Step 4：Fix all cables to the corresponding terminals according to markings on the connector with a screwdriver. Make sure the L/N/PE are correctly assembled and assemble the parts in sequence.(The torque of the M3 screw is 0.6±0.2N*m)

Step 5：Connect the GRID connectors to the inverter, plug the connector in and press it forward firmly until you hear a click, indicating that the connector is connected properly. Then lock the connector.



4.6 EPS wiring connection

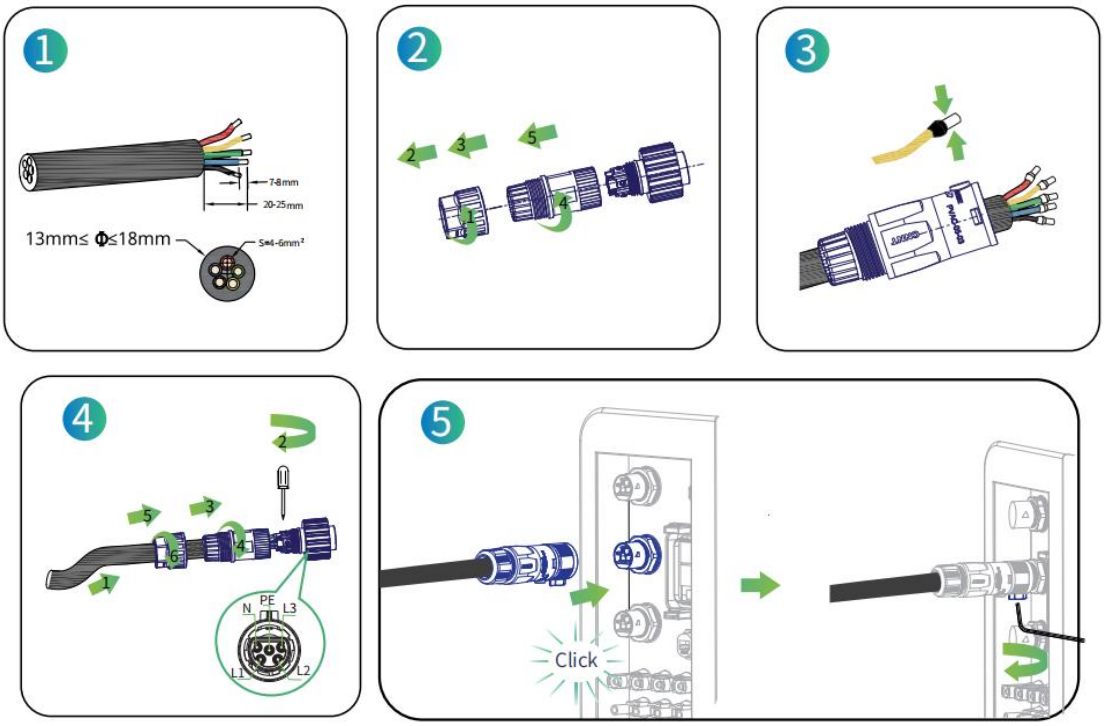
Step 1：Remove the cable jacket by 20-25mm, and strip the wire insulation by 7-8 mm, the conduct core-section: 5-7 mm².

Step 2：Unscrew the EPS connector(blue) counterclockwise, disassemble the parts in sequence.

Step 3：Press the connectors tightly on the cable conductor core, make sure the cable jacket is not locked within the connector. Thread the EPS cable of appropriate length through the waterproof terminal.

Step 4：Fix all cables to the corresponding terminals according to markings on the connector with a screwdriver. Make sure the L/N/PE are correctly assembled and assemble the parts in sequence.(The torque of the M3 screw is 0.6±0.2N*m)

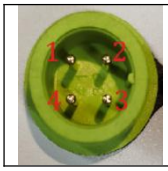
Step 5：Connect the EPS connectors to the inverter, plug the connector in and press it forward firmly until you hear a click, indicating that the connector is connected properly. Then lock the connector.



Notice： According to Australia's power distribution requirements, when the inverter is off-grid, the grid-connected N line and the off-grid N line need to remain connected, which can be achieved through an external distribution box. Please refer to item 4.9 for the wiring method.

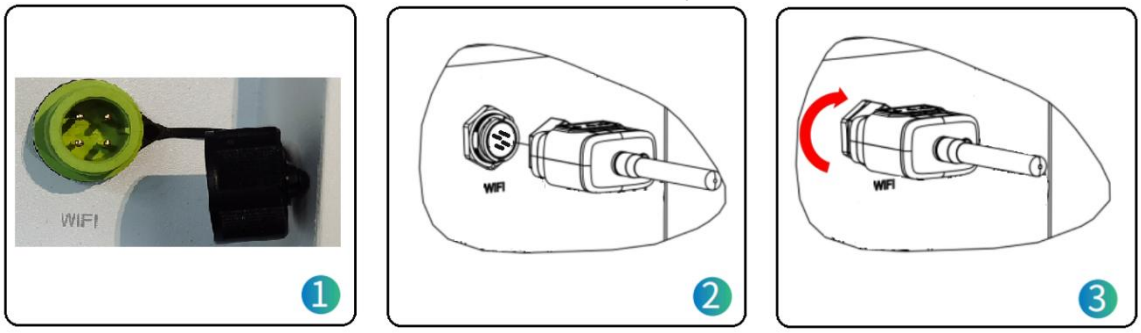
4.7 WIFI connection

Detailed pin functions of WIFI port are as follows.



Pin Functions
1 GND_S
2 485_B
3 485_A
4 VCC

Step 1： Open the WIFI cover;
Step 2：Insert the female terminal of the WiFi module into the male terminal of the WIFI port, press the WIFI module to make the module fully inserted.
Step 3：Turn the WIFI module terminal nuts to lock the WIFI port.



Notice:

The WIFI stick needs to be configured through the RoyPow APP to connect to the network. For APP usage in-structions, please download the APP user manual. For details, see Section 7.2.2 of the user manual.

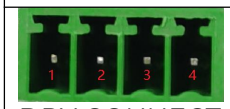
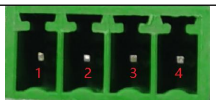
4.8 Communication wiring connection

Notice:

When laying out the signal cable, separate it from the power cable and keep it away from strong interference sources to avoid strong communication interference.

Detailed pin functions of each port on the communication interfaces are as follows.

METER A	1 NC	LINK-OUT	1 SYNC_CARRIER
	2 NC		2 SYNC_50HZ
	3 METER_485_B		3 INV_OFF
	4 NC		4 BYPASS
	5 NC		5 CONNECT_OK
	6 METER_485_A		6 GND_COM
	7 NC		7 CAN_H_PARALLEL
	8 NC		8 CAN_L_PARALLEL
	1 DRM1/5		1 SYNC_CARRIER
	2 DRM2/6		2 SYNC_50HZ
	3 DRM3/7		3 INV_OFF

DRM	4 DRM4/8	LINK-IN	4 BYPASS
	5 REF GEN/0		5 GND_COM
	6 COM LOAD/0		6 GND_COM
	7 NC		7 CAN_H_PARALLEL
	8 NC		8 CAN_L_PARALLEL
	1 GND_S		1 485B
	2 LOGIC_OFF		2 485A
	3 DO-		3 485B
DRY CONNECT	4 DO+	METER B	4 485A

Label	Description
Meter A (METER_485_A, METER_485_B)	For the Anti-backflow Smart Meter.
DRM (DRM1/5, DRM2/6, DRM3/7, DRM4/8, REF GEN/0, COM LOAD/0)	For external Demand Response Enabling Device.
Link-in (SYNC_CARRIER, SYNC_50HZ , INV_OFF, BYPASS, GND_COM, CAN_H_PARALLEL, CAN_L_PARALLEL)	For Inverter parallel communication.
Link-out (SYNC_CARRIER, SYNC_50HZ , INV_OFF, BYPASS, CONNECT_OK,GND_COM,CAN_H_PARALLEL,CAN_L_PARALLEL)	For Inverter parallel communication.
DRY CONNECT(GND_S, LOGIC_OFF)	Dry contact input for external shutdown signal.
DRY CONNECT(DO+, DO-)	Dry contact output, DO1 is set to control external relay or generator controller according to user requirements.
Meter B(485A, 485B)	AC coupling smart meter communication or off-grid parallel energy statistics communication.

4.8.1 Smart Meter and CT connection（Optional)

A Smart Meter with the CT is Optional for system installation, and is used to provide the operating condition of the inverter via RS485 communications.

Step 1 Place the smart meter near the grid distribution box right after the utility meter.

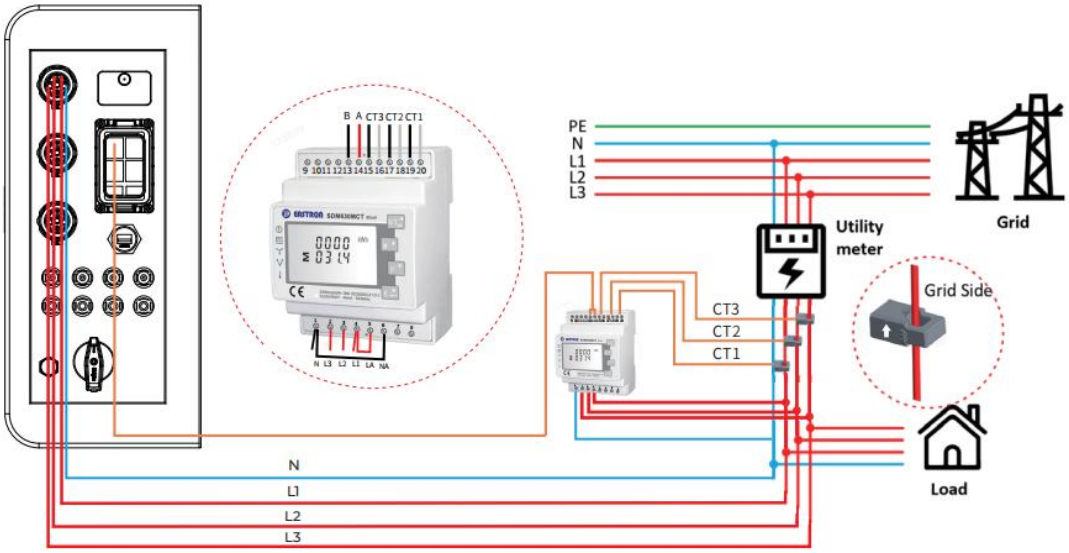
Step 2 Connect grid L1/L2/L3/N to meter's terminals 4/3/2/1;

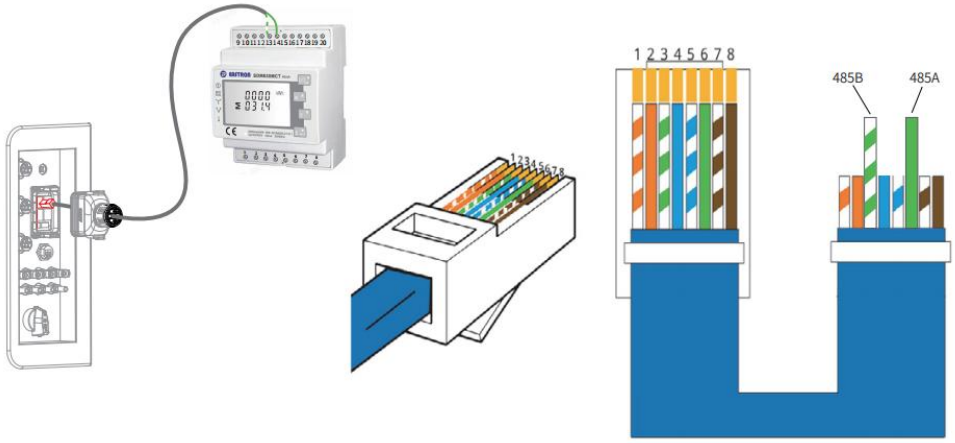
Step 3 Connect grid L1(or L2、L3)/N to meter's terminals 5/6;

Step 4 Clamp three CTs to L1/L2/L3/N and connect wirings to 20/19, 18/17, and 16/15 Respectively;

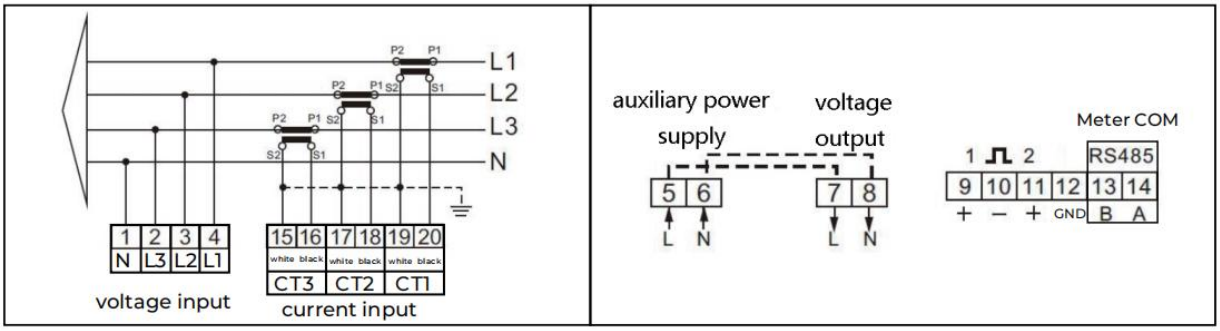
Step 5 Connect the communication cable between the inverter and smart meter.

Refer to the following figure for operation:





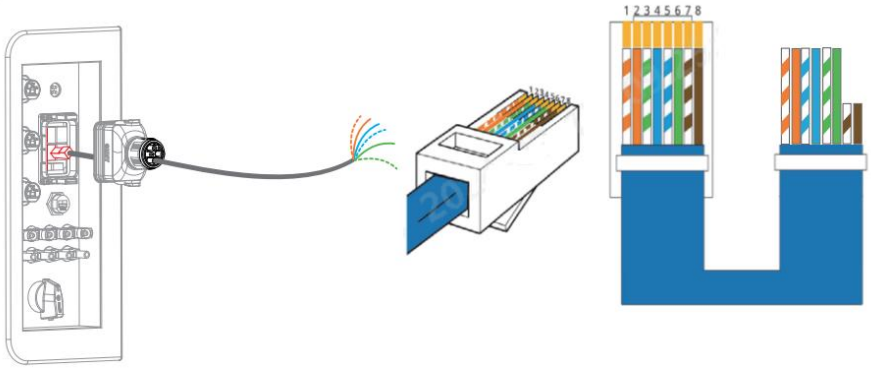
Meter pin definition:



Note: The CT position needs to be placed according to the meter requirements. CT1 measures the L1 phase current, CT2 measures the L2 phase current, and CT3 measures the L3 phase current.

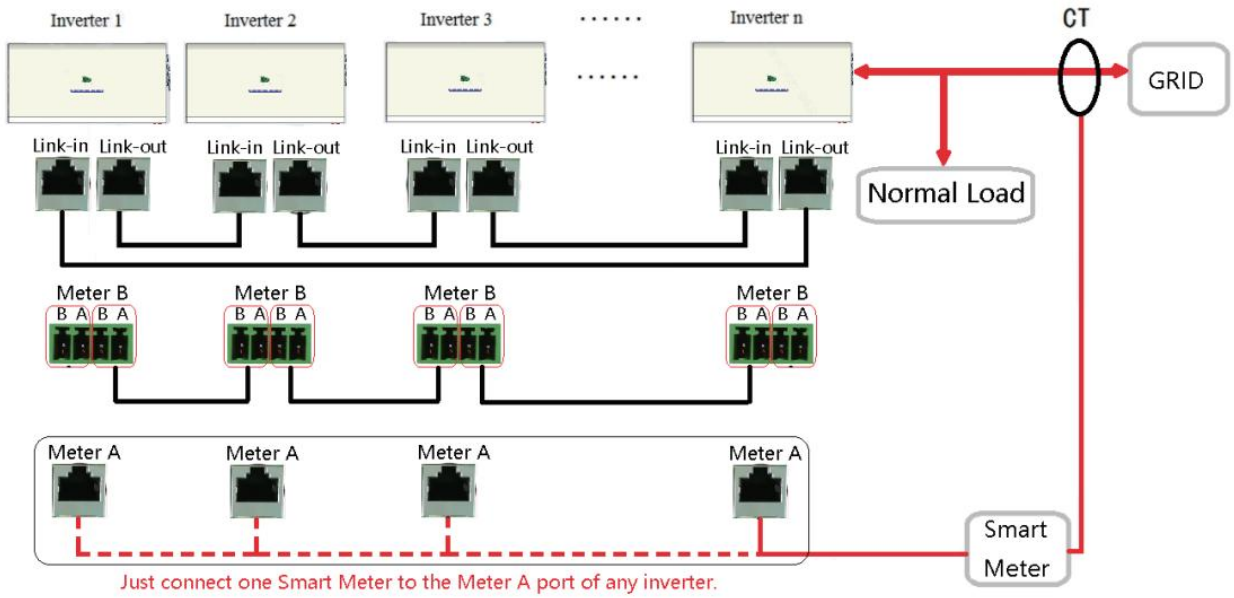
4.8.2 DRM connection (Optional)

DRM is designed to support several demand response modes by certain control signals, which are used for Australia and New Zealand. Detailed connection of DRM is shown as below.
Connect the DRM cable between the inverter and DRM Device. inverter only support DRM0.



4.8.3 Off-grid parallel

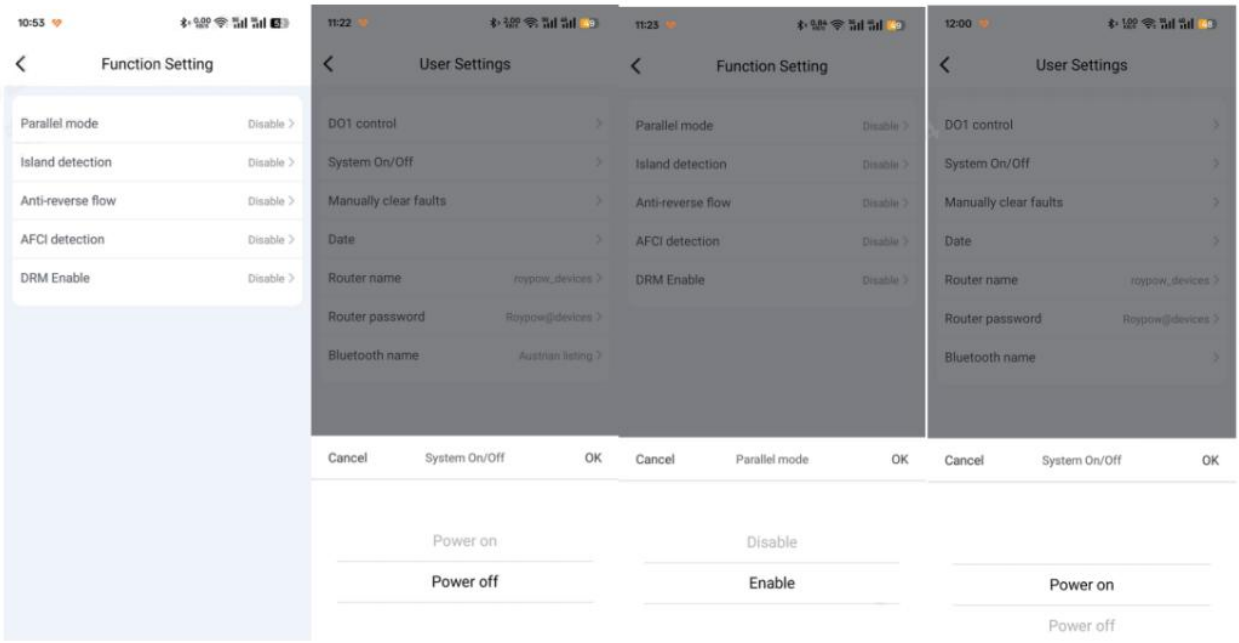
Supports up to 6 inverters in parallel . If inverter no off-grid parallel, it is not necessary to connect this terminal.



Connect the parallel communication cable as shown in the figure.The Link-out and Meter B RS485 B A (pin3, pin4) of the first inverter are connected to the Link-in and Meter B RS485 B A (pin1, pin2) of the second inverter respectively; the Link-out and Meter B RS485 B A (pin3, pin4) of the second inverter are connected to the Link-in and Meter B RS485 B A (pin1, pin2) of the third inverter respectively; connect the communication cables in this way, and the Link-out of the last inverter are connected back to the Link-in of the first inverter to form a communication ring. For parallel operation, only one smart meter needs to be connected, and the communication cable of the meter can be connected to the Meter A interface of any inverter to realize the meter connection. After the above connections are completed, log in to RoyPowAPP, and select Shutdown in System Power On/Off in User Settings. Return to Function Settings, click Parallel Enable in Function Settings, and select Enable. Similarly, after completing the settings of the inverters that need to be connected in parallel, start the inverters one by one.

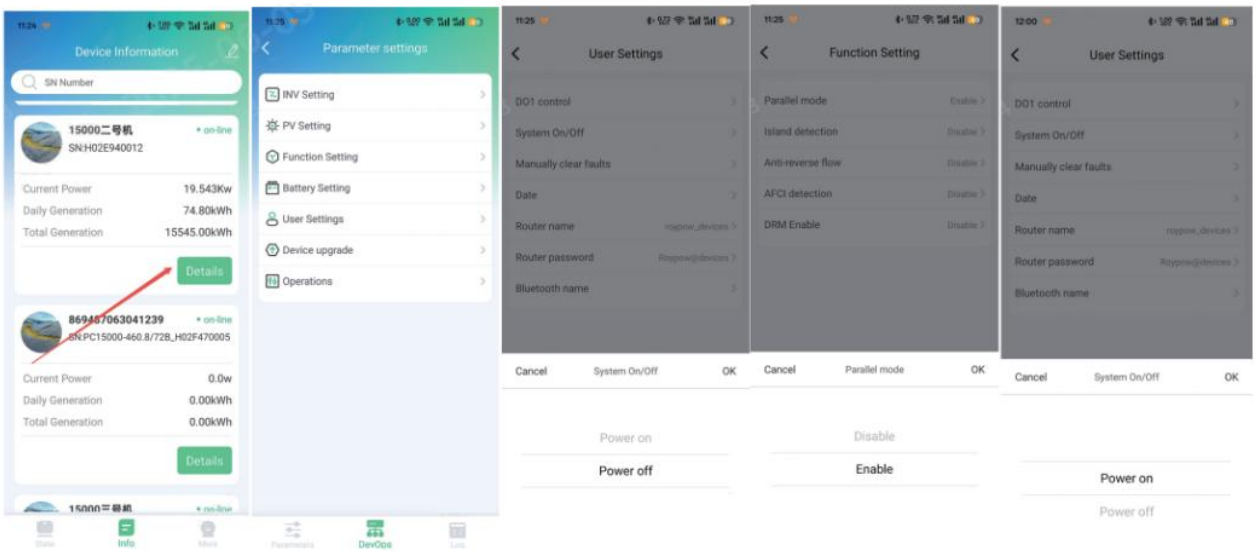
After all inverters have been set up in parallel, you can start the inverters one by one.

Bluetooth login:



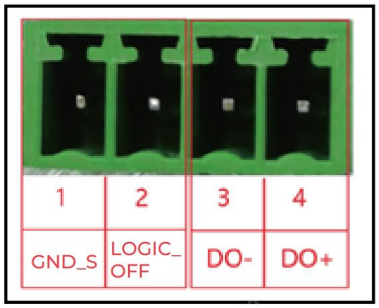
After all inverters have been set up in parallel, you can start the inverters one by one.

Account Login:



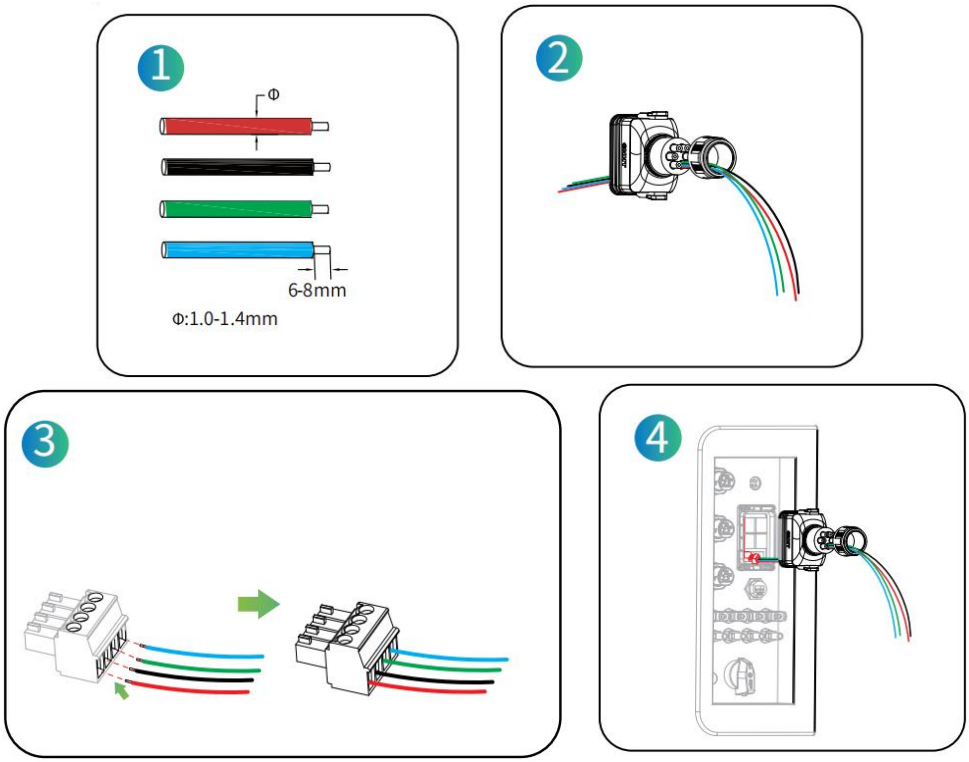
4.8.4 DRY CONNECT connection

The function of each connection position is shown below.



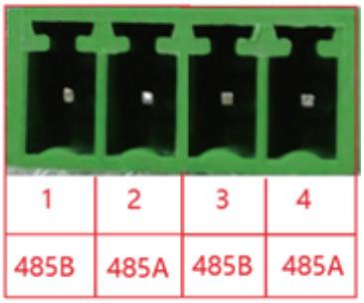
There is an integrated DI (GND_S，LOGIC_OFF) as the dry-contact input to shutdown the inverter. Wiring the pin1 and pin2 holes if used.

There is an integrated DO (DO+, DO-) as the dry-contact output is set to control external relay or generator controller according to user requirements. Wiring the pin3 and pin4 holes if used.



4.8.5 MeterB connection

The function of each connection position is shown below.

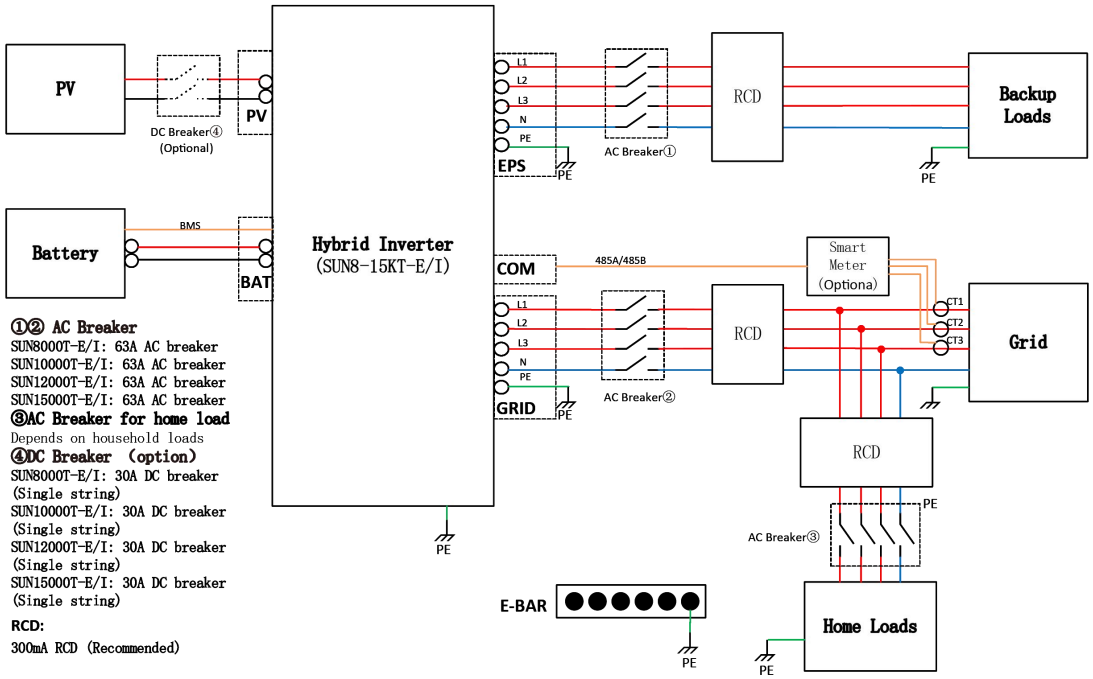


For details about how to connect cables, see 4.8.4.

4.9 Inverter wiring diagram

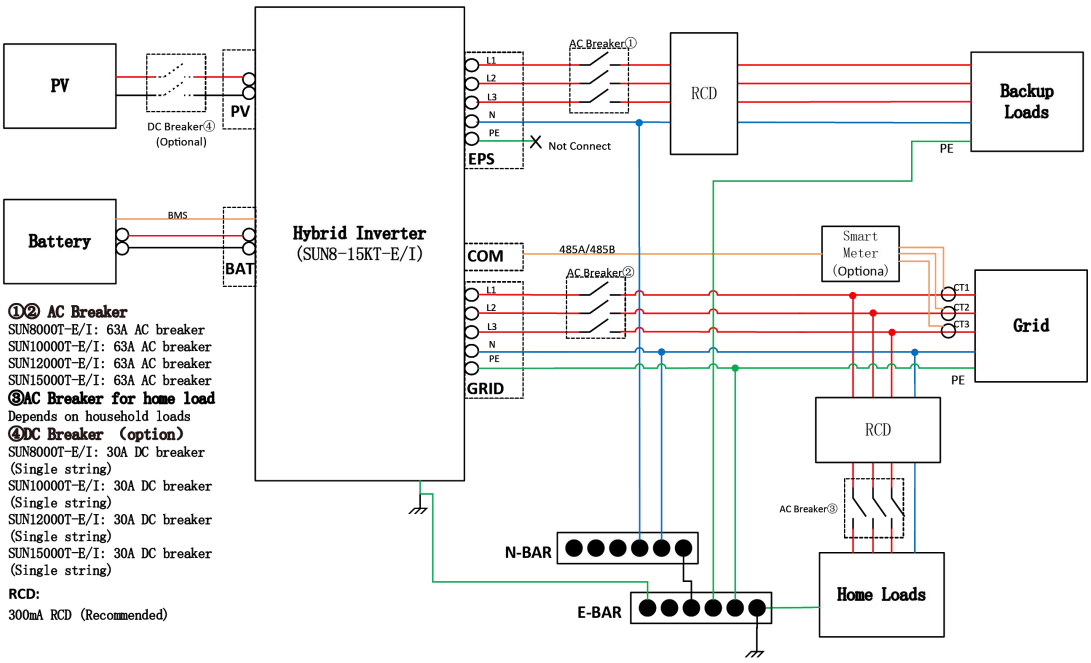
RCD Specifications requirements	
RCD Type	AorB
Action current	30mA
Rated continuous current	≥50Aa.c.
Rated voltage	3W/N/PE ≥400Va.c.

This diagram is an example for an application in which neutral is separated from the PE in the distribution box.
For countries such as China, Germany, the Czech Republic, Italy, etc., please follow local wiring reguations !



Notice: An external RCD is required for Grid port and backup port.

This diagram is an example for an application that neutral connects with the PE in a distribution box.
For countries such as Australia, New Zealand, etc., please follow local wiring regulations!



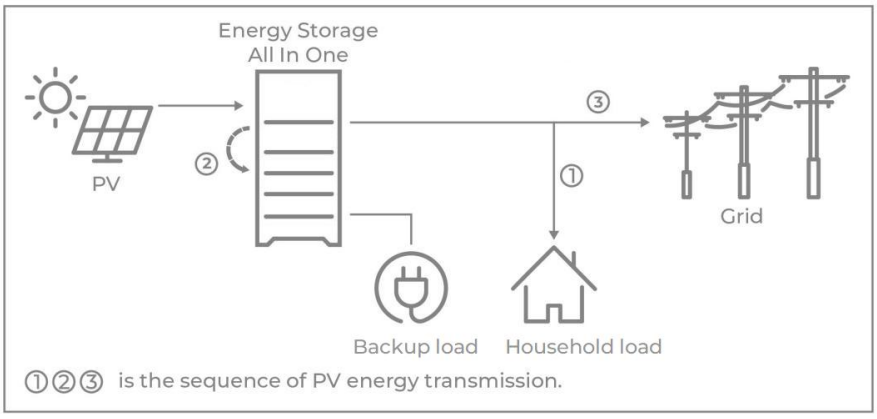
5. Inverter working mode

5.1 Load priority mode

Enter the "Working Mode" menu and select the "Load Priority" working mode. In the load priority mode, the priority of photovoltaic energy is load > battery > grid, that is, the energy generated by photovoltaic power generation is used for local loads first, the excess energy is used to charge the battery, and the remaining energy is fed into the grid. The load priority mode is divided into the following situations according to the photovoltaic energy:

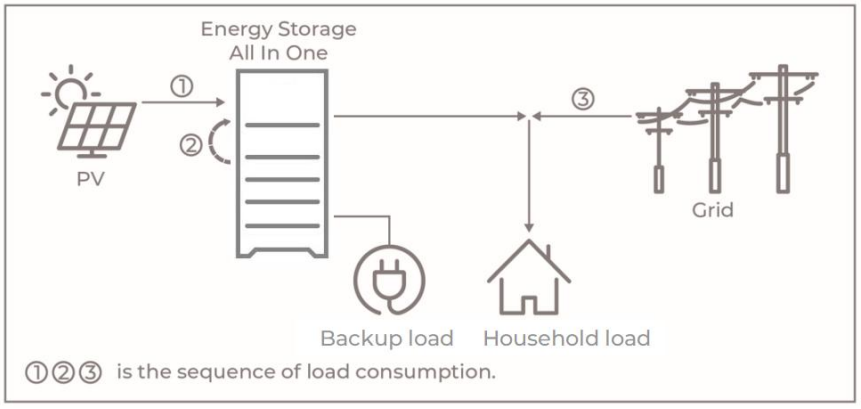
Sufficient photovoltaic energy

When the photovoltaic energy is sufficient, the photovoltaic energy is first provided to the load, and then to the battery, and the remaining energy is used to feed the grid for power generation.



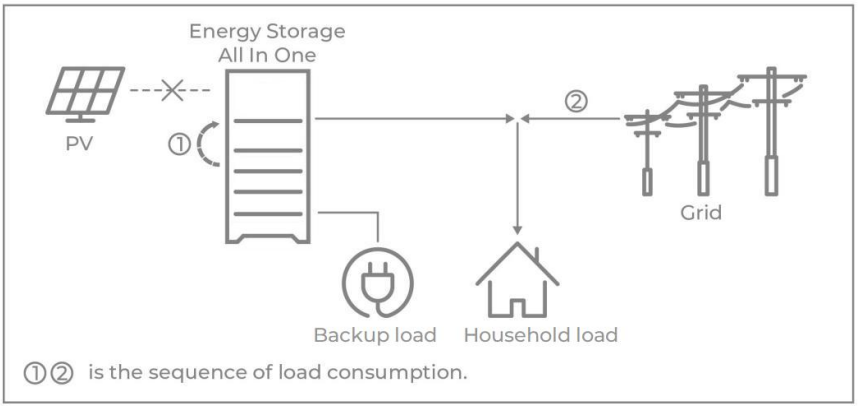
PV power limited

When the photovoltaic energy is insufficient to supply all loads, the photovoltaic energy is first supplied to the loads, the shortfall is supported by battery discharge, and the remaining shortfall is supported by the grid.



No PV input

When there is no photovoltaic energy input (such as at night or on rainy days), the inverter first releases battery energy to provide it to the load. If the demand cannot be met, it then consumes grid energy.

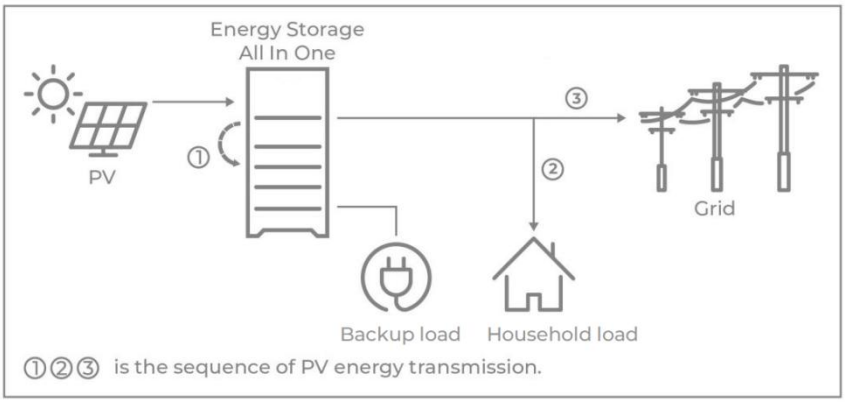


5.2 Energy storage priority mode

Enter the "Working Mode" menu and select the "Energy Storage Priority" working mode. In the Energy Storage Priority mode, the priority of photovoltaic energy is battery > load > grid. This mode is designed to charge the battery quickly.

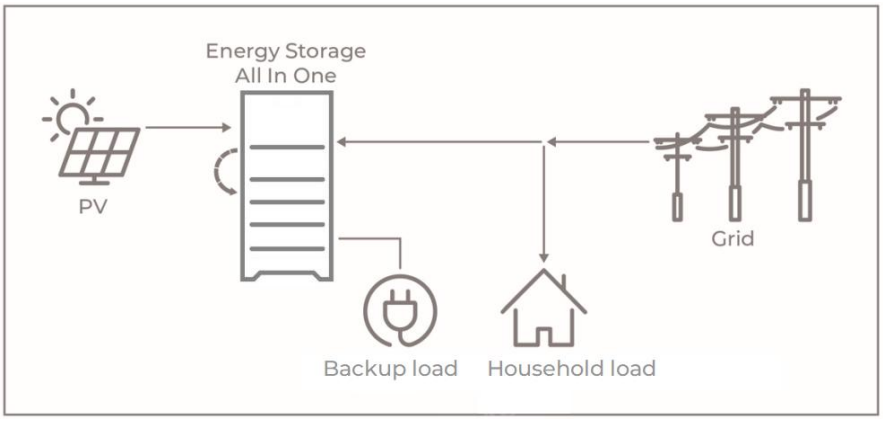
Sufficient photovoltaic energy

When there is sufficient photovoltaic energy, the photovoltaic energy is first used to charge the battery and then to meet the load, and the rest is fed into the grid.



PV power limited

When the photovoltaic energy is not enough to charge the battery, the shortfall is supported by the grid, and the grid energy is used for load consumption.

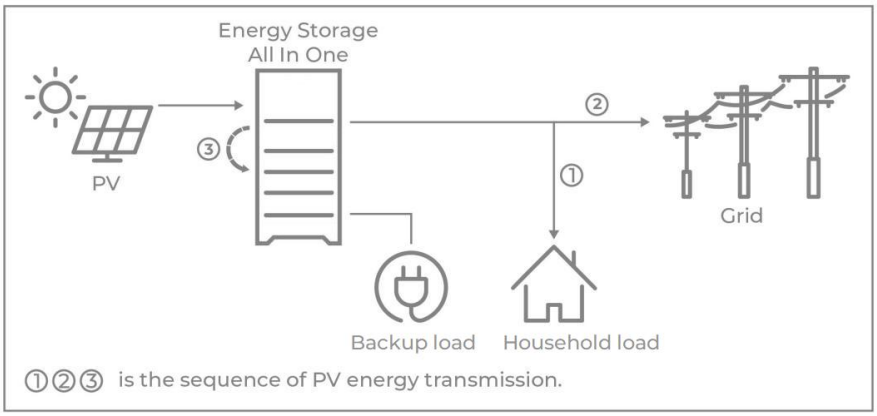


5.3 Grid priority mode

Enter the "Working Mode" menu and select the "Grid Priority" working mode.

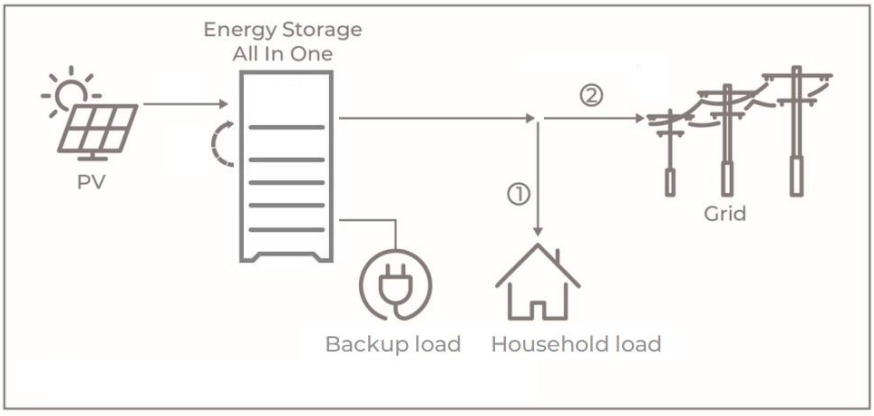
Sufficient photovoltaic energy

When there is sufficient photovoltaic energy, electricity will be sold to the grid first in accordance with local regulations, with the excess energy used to charge the battery, while giving priority to meeting the load energy demand.



PV power limited

When PV energy is insufficient, the battery discharges to meet the energy needs of the load, and the excess battery power is sold to the grid according to local regulations.



5.4 PEAK Enable

Enter the "Working Mode" menu. When "PEAK Enable " is enabled, the inverter will charge and discharge according to the set parameters. You can set the following parameters according to your requirements:

Priority: Load > Battery > Grid (when charging)
Priority: Load > Grid > Battery (when discharging)
-Charging start time: 0 to 24 hours
-Charging end time: 0 to 24 hours
-Discharge start time: 0 to 24 hours
-Discharge end time: 0 to 24 hours
This model is suitable for areas where there is a difference in peak and valley electricity prices.

Charging and discharging times can be flexibly set, and users can charge the battery using off-peak electricity prices.

Peak shaving and valley filling and the above three working modes (load priority, energy storage priority, grid priority) are combination modes. Outside the charging time period and the discharging time period, the inverter will operate according to the set operating mode.

Note on special circumstances:

1) When the "Anti-reverse flow enable" setting item is enabled, regardless of the working mode, the energy storage inverter will limit the power fed into the grid according to the "Anti-reverse flow power percentage" setting value.

2) If the mains is cut off or not connected, no matter which mode the user sets (load priority, energy storage priority, grid priority), the energy storage inverter is used as an emergency power supply EPS, and the load is powered by batteries and photovoltaic energy. Photovoltaic power is supplied to the load first, and the remaining energy is used to charge the battery. If the photovoltaic energy is insufficient, the battery and photovoltaic power are used to supply power to the load together.

6. Startup/Shutdown the system

6.1 Check before power on

No.	Check item
1	The inverter is firmly installed, the installation location is convenient for operation and maintenance, the installation space is convenient for ventilation and heat dissipation, and the installation environment is clean and tidy.
2	The protective ground wire, DC input wire, AC output wire, and communication wire are correctly and firmly connected.
3	The cable binding meets the routing requirements, the distribution is reasonable, and there is no damage.
4	Make sure waterproof covers are installed over unused cable holes.
5	The used cable holes must be sealed.
6	The voltage and frequency of the grid-connected access point of the inverter meet the grid-connected requirements.
7	Parameters and configurations meet relevant requirements: Photovoltaic voltage 160-1000V

6.2 Startup the system

Startup steps:

1. Close the PV switch of the inverter.

2. Close the battery optimizer circuit breaker.（If there is no PV or grid access, you need to press and hold the Power button for 3 seconds to turn on the battery.）

3. Close the AC breaker on the EPS side of the inverter.

4. Close the AC breaker on the grid side of the inverter.

6.3 Shutdown the system

According to the actual situation, if you need to shut down the running system, please follow the shutdown steps below：

1. Disconnect the AC circuit breaker on the grid side of the inverter.

2. Disconnect the AC breaker on the EPS side of the inverter.

3. Disconnect the battery optimizer circuit breaker.

4. Disconnect the PV switch of the inverter.

Notice: If you need to disconnect the inverter cables, please wait at least 5 minutes before touching these parts of the inverter.

After the inverter is powered off, it takes a certain amount of time to discharge the internal components. Please wait until the equipment is fully discharged according to the labeling time requirements.

7. Commissioning

It is necessary to make a complete commissioning of the inverter system. This will essentially protect the system from fire, electric shock or other damages or injuries.

7.1 Inspection

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

1) The system is installed correctly and securely according to the contents and prompts in this manual, and there is enough space for operation, maintenance and ventilation;

2) All terminals and cables are intact;

3) No items shall be left on the inverter or in the specified clearance area;

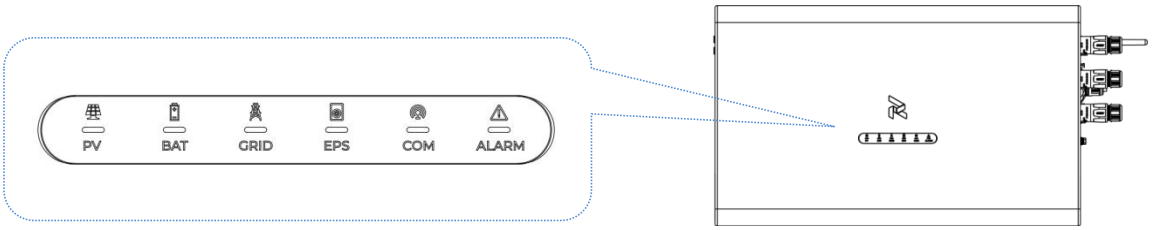
4) The photovoltaic and battery packs are working normally, and the power grid is normal;

7.2 System commissioning

1) Refer to section 6.2 to start the system and power on the system;

2) Set parameters on the APP according to user needs.

7.2.1 LED indicator Description



Inverter LED indicator	Green Light	Yellow Light	red light	Lights off
PV	Normal	Alarm	Fault	No PV
BAT	Normal	Alarm	Fault	No battery access
GRID	Normal	Alarm	Fault	Off-grid
EPS	Normal	Alarm	Fault	EPS relay is not energized
COM	Normal	Alarm	Fault	/
ALARM	Normal	Alarm	Fault	/

Note: The Troubleshooting item table in Chapter 9 contains all faults and alarms of the inverter. If the inverter fails, the ALARM light will turn red; if the inverter alarm occurs, the ALARM light will turn yell ow.

7.2.2 APP

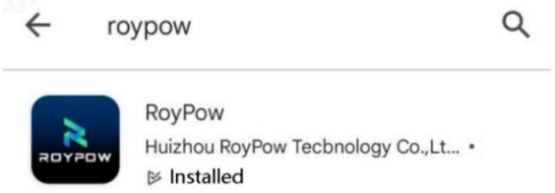
1. Introduction

The APP needs to communicate with the inverter through the built-in Bluetooth module or external WIFI stick to read and set data. The external WIFI stick can also realize remote monitoring and setting through APP or Web.

2.APP download method:

Android APP: Search for RoyPow on Google Play to download

IOS APP: Search for RoyPow in the App Store and download it.



3. APP interface operation settings:

Please refer to the APP manual.

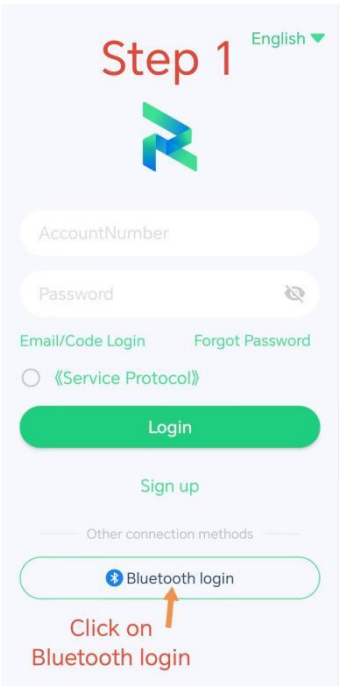
4. Country code setting.

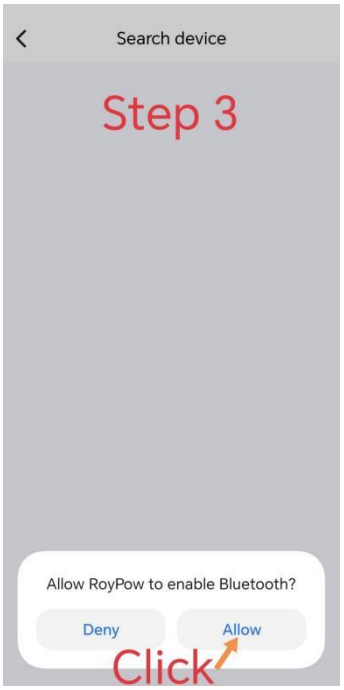
The grid connection standard is set through the country code setting item on the APP. Please set the corresponding country or regulation, refer to the table below. If the customer does not set it, the EU grid regulation EN50549-1:2019 is used by default.

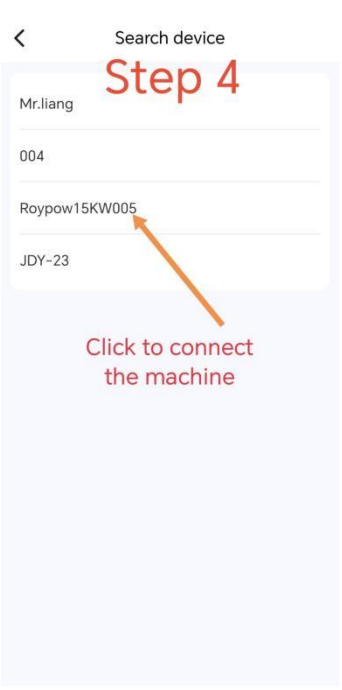
No.	COUNTRY/REGION	GRID CODE
1	Germany	VDE-AR-N 4105:2018
2	Romania	EN50549-1:2019
3	Denmark	EN50549-1:2019
4	Czech Republic	EN50549-1:2019
5	Sweden	EN50549-1:2019
6	Ireland	EN50549-1:2019
7	Norway	EN50549-1:2019
8	Cyprus	EN50549-1:2019
9	Estonia	EN50549-1:2019
10	Poland	EN50549-1:2019
11	Greece	EN50549-1:2019
12	Hungary	EN50549-1:2019
13	Lithuania	EN50549-1:2019
14	Netherlands	EN50549-1:2019
15	Other countries	EN50549-1:2019
		VDE-AR-N 4105:2018
		AS/NZS 4777.2:2020

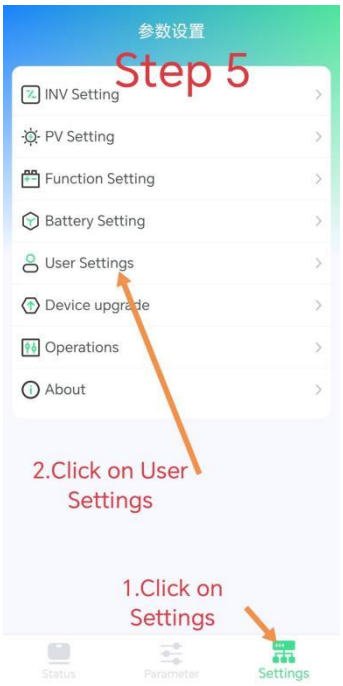
No.	COUNTRY/REGION	GRID CODE	Power Quality Setting	DNSP
1	Australia	AS/NZS 4777.2:2020	Australia A	Ausgrid Ausnet Citipower Endeavour Energy Energex Ergon Essential Energy Evoenergy Jemena SA Power Networks Ausgrid PowerCor United Energy
			Australia B	Western Power
			Australia C	Horizon Power TasNetworks
2	New Zealand	AS/NZS 4777.2:2020	/	/

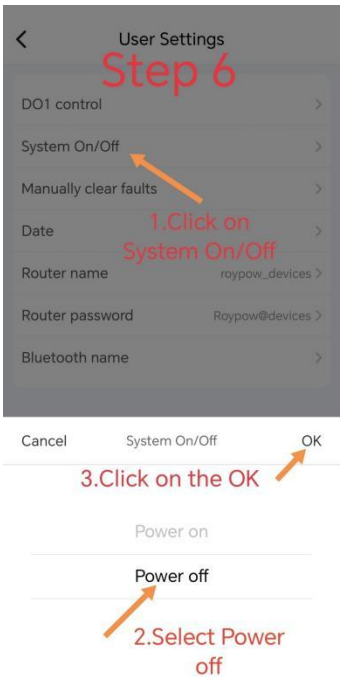
The following pictures show the steps to set the international code of the machine through the APP.

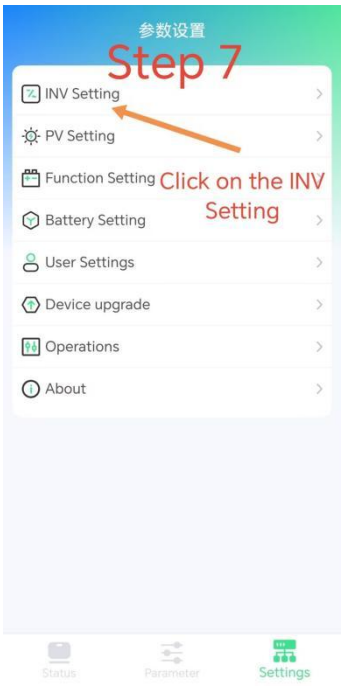


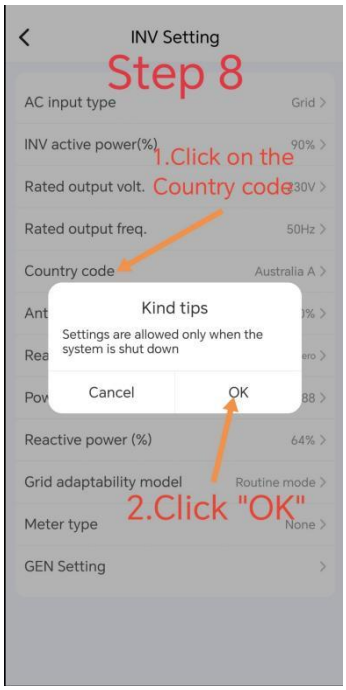


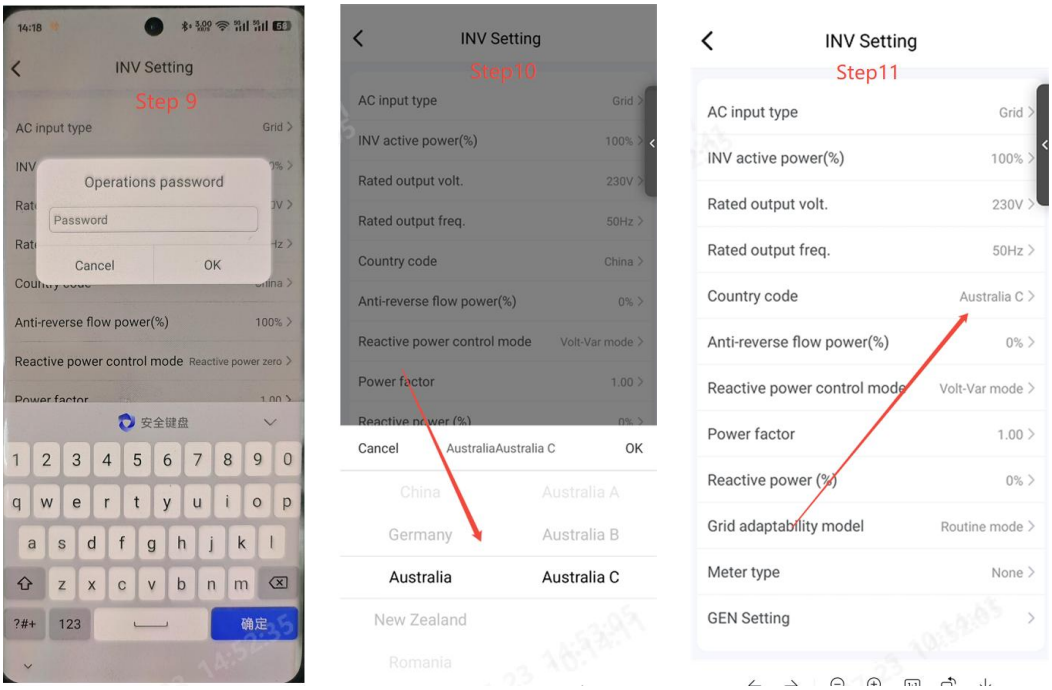












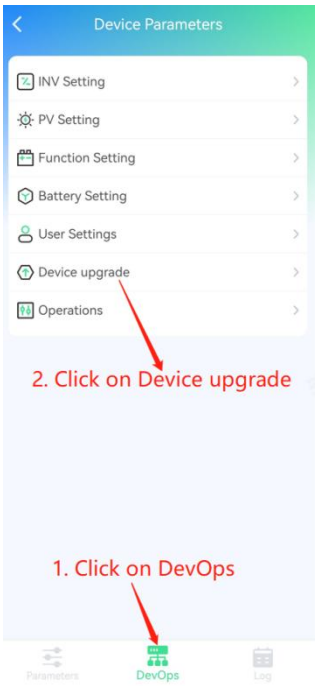
Note: The machine area code setting requires a password or it cannot be changed.

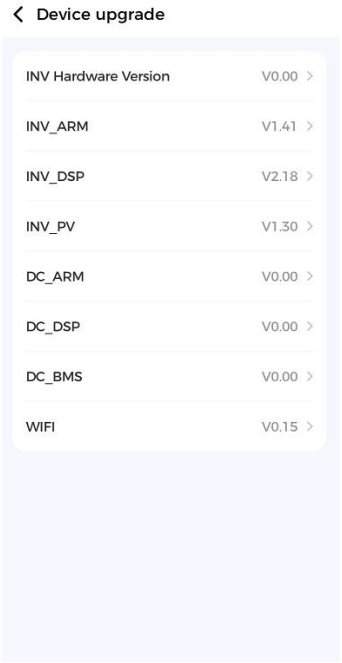
5. Over-frequency and under-frequency protection and reconnection parameters.

Region	parameter		
Australia A	Protection value F>	52	Hz
	Protection value F<	47	Hz
	Connect Frequency Upper	50.15	Hz
	Connect Frequency Lower	47.5	Hz
	Protection time F>	0.1	s
	Protection time F<	1	s
Australia B	Protection value F>	52	Hz
	Protection value F<	47	Hz
	Connect Frequency Upper	50.15	Hz
	Connect Frequency Lower	47.5	Hz
	Protection time F>	0.1	s
	Protection time F<	1	s
Australia C	Protection value F>	55	Hz
	Protection value F<	45	Hz
	Connect Frequency Upper	50.5	Hz
	Connect Frequency Lower	47.5	Hz
	Protection time F>	0.1	s
	Protection time F<	5	s

New Zealand	Protection value F>	55	Hz
	Protection value F<	45	Hz
	Connect Frequency Upper	50.15	Hz
	Connect Frequency Lower	47.5	Hz
	Protection time F>	0.1	s
	Protection time F<	1	s

6. Check the inverter software version and hardware version through the APP, and upgrade the latest software version online;)

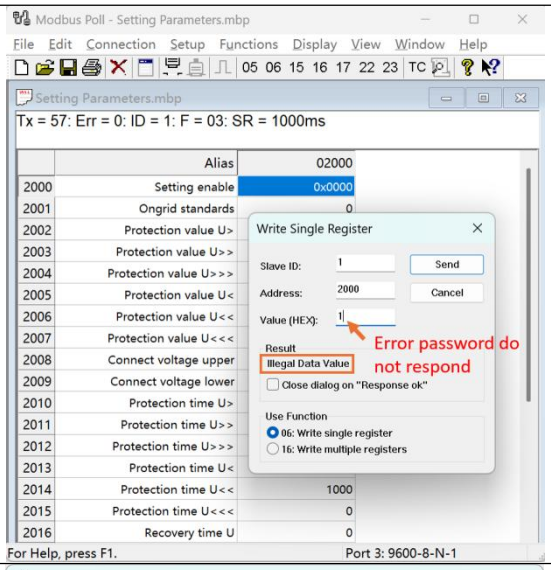


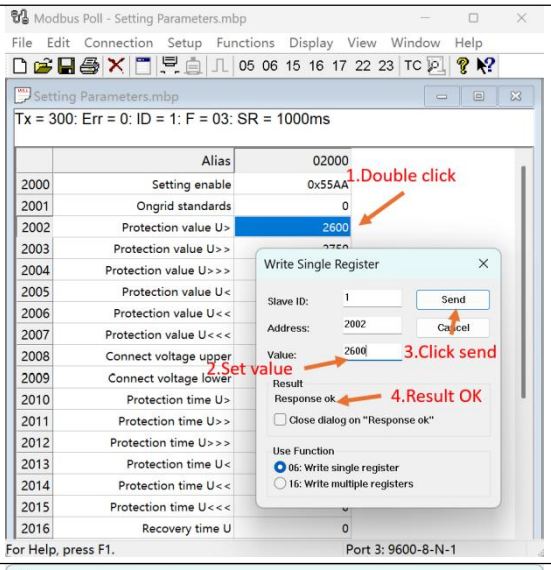


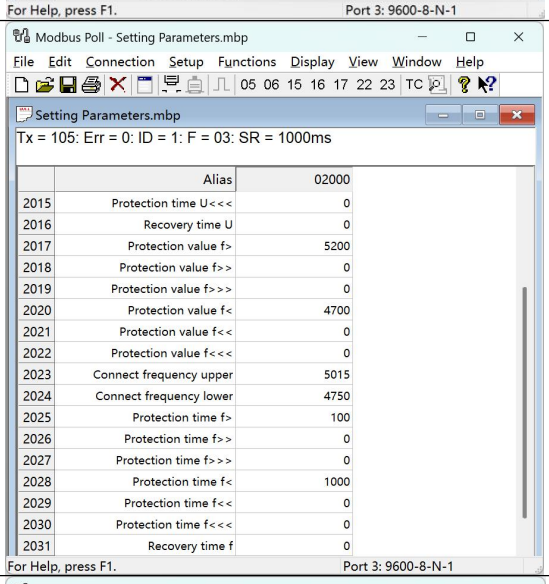
7. Special parameters setting

Special parameters include relevant parameters for grid protection settings and power quality response mode settings. To change these parameters, an RS485 communication connection with the machine needs to be established, and then modifications can be made using a Modbus upper computer. Additionally, unauthorized modifications will not receive a response.

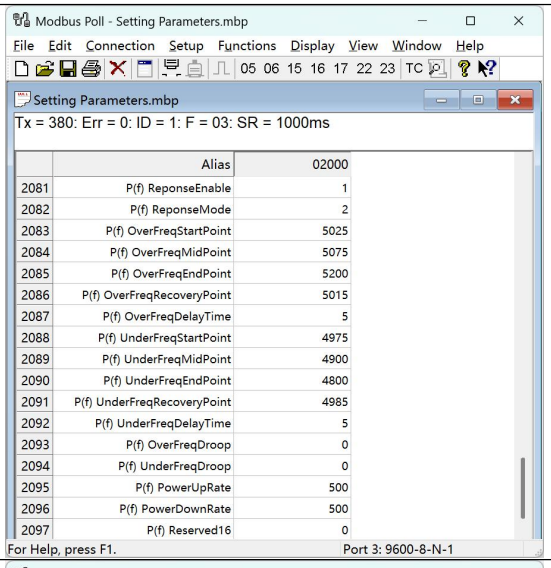
To verify the relevant parameters, insert the USB drive with the configuration file into the USB port of the inverter. Wait for 10 seconds and then you can export the table containing the grid protection settings and power quality response mode information.



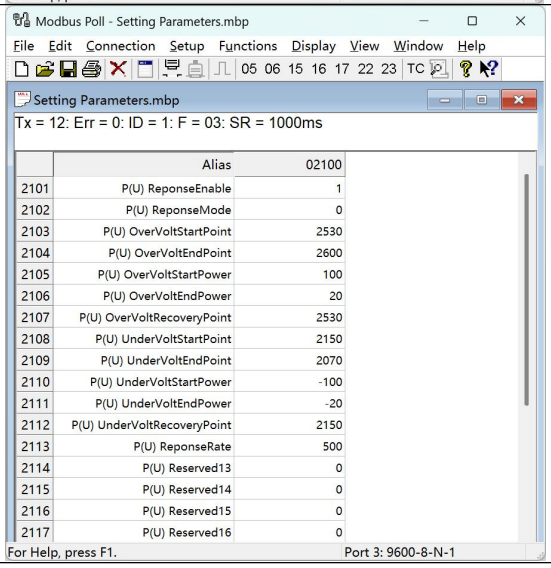




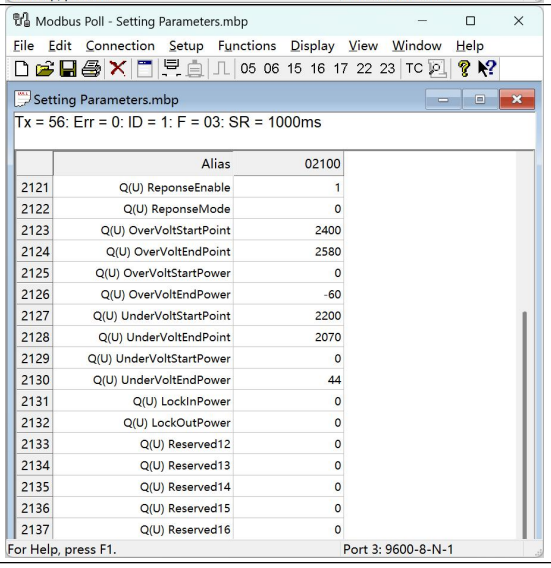
	Alias	02000
2015	Protection time U<<<	0
2016	Recovery time U	0
2017	Protection value f>	5200
2018	Protection value f>>	0
2019	Protection value f>>>	0
2020	Protection value f<	4700
2021	Protection value f<<	0
2022	Protection value f<<<	0
2023	Connect frequency upper	5015
2024	Connect frequency lower	4750
2025	Protection time f>	100
2026	Protection time f>>	0
2027	Protection time f>>>	0
2028	Protection time f<	1000
2029	Protection time f<<	0
2030	Protection time f<<<	0
2031	Recovery time f	0



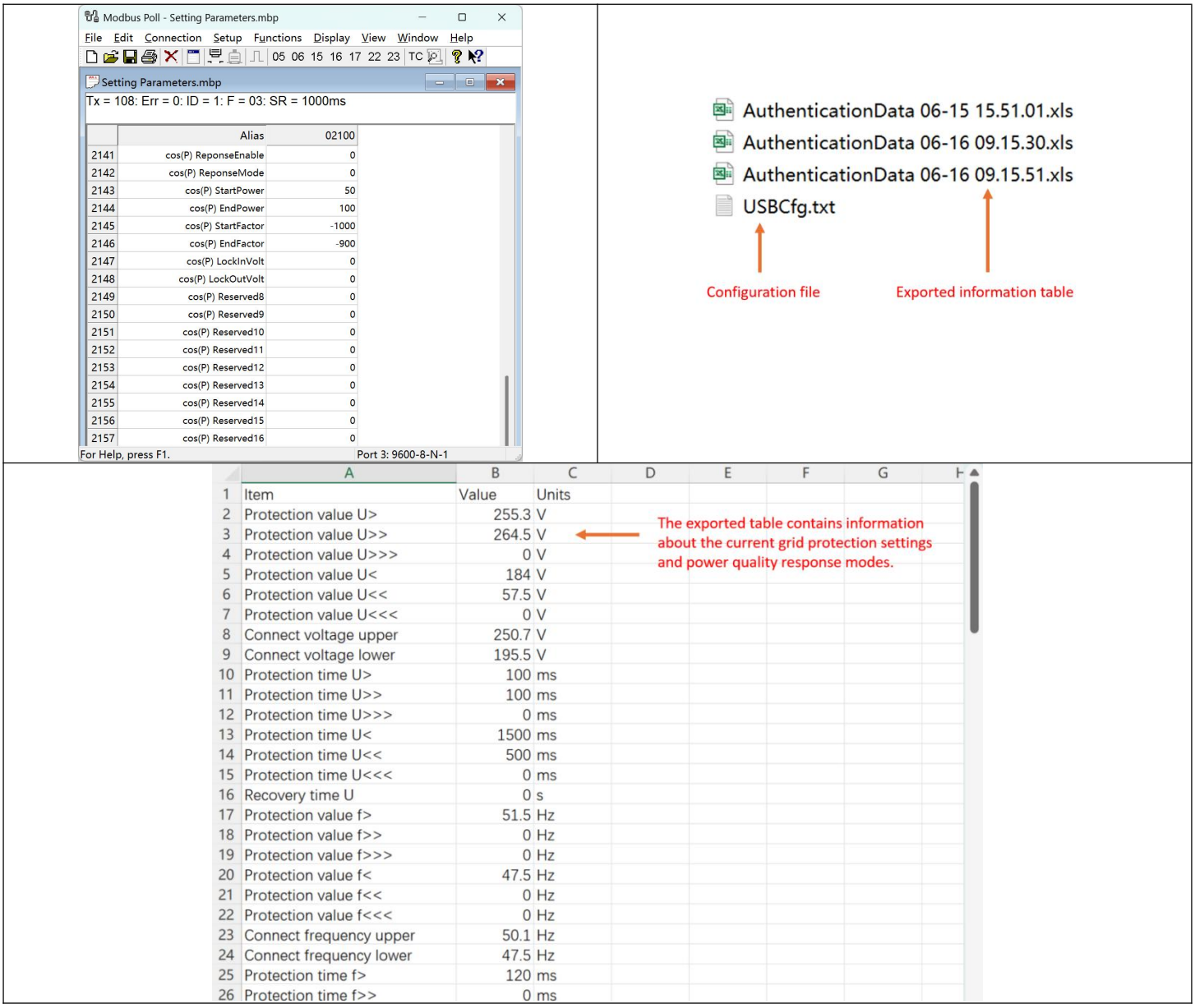
	Alias	02000
2081	P(f) ReponseEnable	1
2082	P(f) ReponseMode	2
2083	P(f) OverFreqStartPoint	5025
2084	P(f) OverFreqMidPoint	5075
2085	P(f) OverFreqEndPoint	5200
2086	P(f) OverFreqRecoveryPoint	5015
2087	P(f) OverFreqDelayTime	5
2088	P(f) UnderFreqStartPoint	4975
2089	P(f) UnderFreqMidPoint	4900
2090	P(f) UnderFreqEndPoint	4800
2091	P(f) UnderFreqRecoveryPoint	4985
2092	P(f) UnderFreqDelayTime	5
2093	P(f) OverFreqDroop	0
2094	P(f) UnderFreqDroop	0
2095	P(f) PowerUpRate	500
2096	P(f) PowerDownRate	500
2097	P(f) Reserved16	0



	Alias	02100
2101	P(U) ReponseEnable	1
2102	P(U) ReponseMode	0
2103	P(U) OverVoltStartPoint	2530
2104	P(U) OverVoltEndPoint	2600
2105	P(U) OverVoltStartPower	100
2106	P(U) OverVoltEndPower	20
2107	P(U) OverVoltRecoveryPoint	2530
2108	P(U) UnderVoltStartPoint	2150
2109	P(U) UnderVoltEndPoint	2070
2110	P(U) UnderVoltStartPower	-100
2111	P(U) UnderVoltEndPower	-20
2112	P(U) UnderVoltRecoveryPoint	2150
2113	P(U) ReponseRate	500
2114	P(U) Reserved13	0
2115	P(U) Reserved14	0
2116	P(U) Reserved15	0
2117	P(U) Reserved16	0



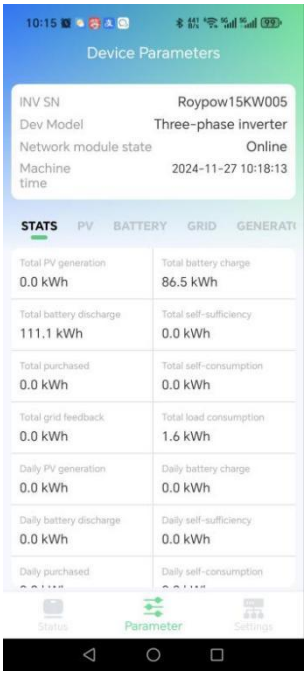
	Alias	02100
2121	Q(U) ReponseEnable	1
2122	Q(U) ReponseMode	0
2123	Q(U) OverVoltStartPoint	2400
2124	Q(U) OverVoltEndPoint	2580
2125	Q(U) OverVoltStartPower	0
2126	Q(U) OverVoltEndPower	-60
2127	Q(U) UnderVoltStartPoint	2200
2128	Q(U) UnderVoltEndPoint	2070
2129	Q(U) UnderVoltStartPower	0
2130	Q(U) UnderVoltEndPower	44
2131	Q(U) LockInPower	0
2132	Q(U) LockOutPower	0
2133	Q(U) Reserved12	0
2134	Q(U) Reserved13	0
2135	Q(U) Reserved14	0
2136	Q(U) Reserved15	0
2137	Q(U) Reserved16	0

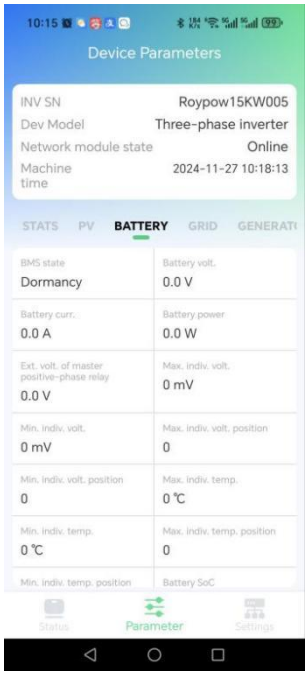


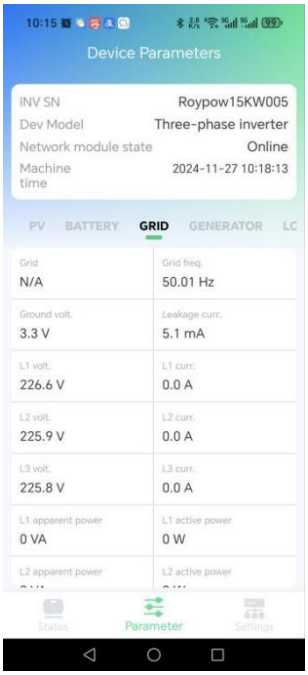
	Alias	02100
2141	cos(P) ReponseEnable	0
2142	cos(P) ReponseMode	0
2143	cos(P) StartPower	50
2144	cos(P) EndPower	100
2145	cos(P) StartFactor	-1000
2146	cos(P) EndFactor	-900
2147	cos(P) LockInVolt	0
2148	cos(P) LockOutVolt	0
2149	cos(P) Reserved8	0
2150	cos(P) Reserved9	0
2151	cos(P) Reserved10	0
2152	cos(P) Reserved11	0
2153	cos(P) Reserved12	0
2154	cos(P) Reserved13	0
2155	cos(P) Reserved14	0
2156	cos(P) Reserved15	0
2157	cos(P) Reserved16	0

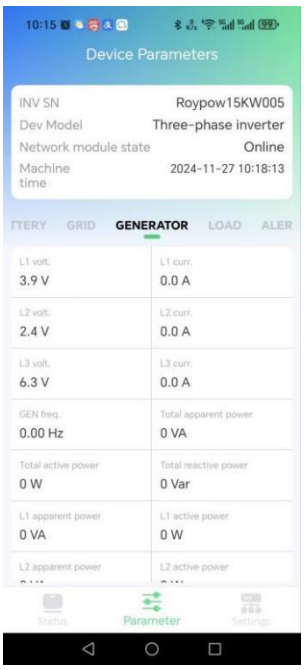
	Item	Value	Units
2	Protection value U>	255.3	V
3	Protection value U>>	264.5	V
4	Protection value U>>>	0	V
5	Protection value U<	184	V
6	Protection value U<<	57.5	V
7	Protection value U<<<	0	V
8	Connect voltage upper	250.7	V
9	Connect voltage lower	195.5	V
10	Protection time U>	100	ms
11	Protection time U>>	100	ms
12	Protection time U>>>	0	ms
13	Protection time U<	1500	ms
14	Protection time U<<	500	ms
15	Protection time U<<<	0	ms
16	Recovery time U	0	s
17	Protection value f>	51.5	Hz
18	Protection value f>>	0	Hz
19	Protection value f>>>	0	Hz
20	Protection value f<	47.5	Hz
21	Protection value f<<	0	Hz
22	Protection value f<<<	0	Hz
23	Connect frequency upper	50.1	Hz
24	Connect frequency lower	47.5	Hz
25	Protection time f>	120	ms
26	Protection time f>>	0	ms

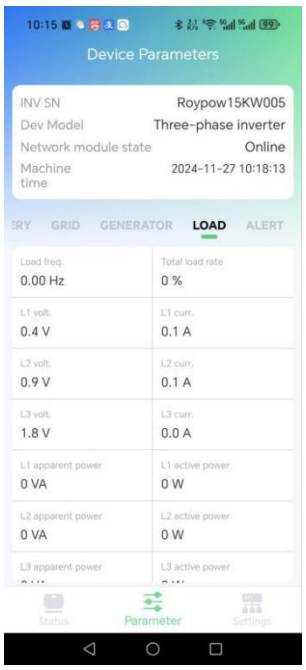
8. You can directly view the inverter parameters through the APP;

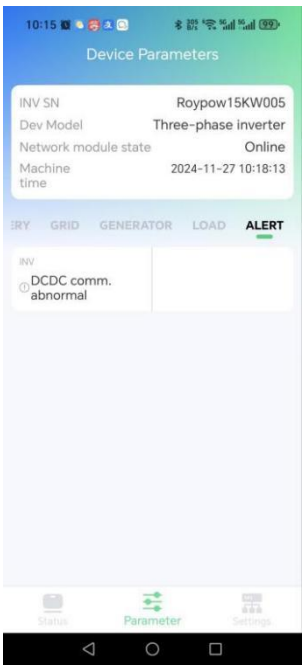












8.Maintenance

Please confirm that the equipment is powered off when operating, and wear personal protective equipment.

8.1 Inverter routine maintenance

Inverter maintenance distance is 1 meter.

maintenance content	Maintaining Method	Maintenance Interval
Systematic Clean	Check the heat sink for foreign matter or dust.	Once 4-6 months
DC switch	Turn the DC switch on and off ten consecutive times to make sure that it is working properly.	Once a year
Electrical connection	Check whether the cables are securely connected. Check whether the cables are broken or whether there is any exposed copper core.	Once 4-6 months
Sealing	Check whether all the cable hole are properly sealed. Reseal the cable hole if it is not sealed or too big.	Once a year

8.2 Removing the inverter

Make sure the power is off when operating the inverter, and please wear personal protective equipment. Proceed as follows:

1. Disconnect all electrical connections of the inverter, including: DC wire, AC wire, communication wire, communication module, and protective ground wire.

2. Remove the inverter from the wall bracket.

Please keep the inverter properly. If the inverter needs to be put into use later, ensure that the storage conditions meet the requirements:

1) Make sure that the outer packing box is not removed and the desiccant in the box is not lost.

2) Make sure the storage environment is clean, the temperature and humidity range is suitable, and there is no condensation.

3) Make sure that the stacking height and direction of the inverter are placed according to the instructions on the label on the packing box.

4) Ensure that there is no risk of dumping after the inverters are stacked.

5) After the inverter has been stored for a long time, it must be checked and confirmed by professionals before it can continue to be used.

9. Troubleshooting

Please troubleshoot according to the following methods. If the troubleshooting methods cannot help you, please contact the after-sales service center. When contacting the after-sales service center, please collect the following information for quick problem solving.

1. Inverter information, such as: serial number, software version, equipment installation time, fault occurrence time, fault occurrence frequency, etc.

2. The installation environment of the equipment, such as: weather conditions, whether the components are blocked or shadowed, etc. The installation environment recommendation can provide

photos, videos and other files to assist in the analysis of problems.

3. Whether there is any abnormality in the actual working condition of the power grid.

No.	Fault name	Fault cause	Solution
1	Grid quick test Fail	1. The L1/L2/L3 voltage peak is greater than 426.0382V, or the R/S/T voltage instantaneous value is greater than 405V, and lasts for 250us 2.L1/L2/L3 voltage peak value is less than 162.610V, lasting 500us 3.L1/L2/L3voltage detection error, voltage zero point lost, lasting 25ms	1. If it occurs by chance, it may be a temporary abnormality in the power grid. The device will resume work after detecting that the power grid is normal. 1. If it occurs frequently, please check whether the grid voltage is within the allowable range. If not, please contact the local power operator; if so, please contact after-sales service to modify the grid protection point. 3. If it occurs for a long time, please check whether the AC grid side switch and cable are connected properly.
2	Grid volt. 10-min average	The ten-minute average value of the effective value of the L1/L2/L3 voltage is greater than the 10-minute overvoltage protection value of the power grid required by the regional safety standards.	
3	Grid L1/L2/L3 OV level1	The effective value of the L1/L2/L3 voltage is greater than the overvoltage protection value required by the regional grid connection standard and lasts for a corresponding period of time.	
4	Grid L1/L2/L3 UV level1	The RMS of the L1/L2/L3 voltage is greater than the overvoltage protection value required by the regional grid connection standard and lasts for a corresponding period of time.	
5	Grid OverFreq level1	The grid frequency is greater than the over-frequency protection value required by the regional grid connection standard and lasts for a certain period of time.	
6	Grid UnderFreq level1	The grid frequency is lower than the under-frequency protection value required by the regional grid connection standard and lasts for a certain period of time.	
7	Grid L1/L2/L3 OV level2	The RMS of the L1/L2/L3 voltage is greater than the second-stage overvoltage protection value required by the regional grid connection standard and lasts for a corresponding period of time	
8	Grid L1/L2/L3 UV level2	The RMS of the L1/L2/L3 voltage is less than the second-stage undervoltage protection value required by the regional grid connection standard and lasts for a corresponding period of time.	
9	Grid OverFreq level2	The grid frequency is greater than the second-stage over-frequency protection value required by the regional grid connection standard and lasts for a corresponding period of time.	

10	Grid UnderFreq level2	The grid frequency is lower than the second-stage under-frequency protection value required by the regional grid connection standard and lasts for a corresponding period of time.	
11	Bus Short-circuit Fail	The Bus+ or Bus- voltage is continuously reduced by more than 50V for four times, each time lasting 250us	Serious failure, please contact after-sales service for maintenance
12	Bus Rapid LowVolt	Bus voltage is less than 500V, lasting 5ms	1. The inverter has an internal fault. Please turn off the inverter, wait for about 5 minutes, and then turn it back on to check whether the problem is solved. 2. This fault will be locked after frequent occurrence. Please turn off the inverter and wait for about 1 hour before restarting or power off the inverter and restart it to check whether the problem is solved. 3. If the problem is still not resolved, please contact after-sales service.
13	Bus+/Bus- rapid OV	Bus+/Bus- voltage is greater than 530V and lasts for 2ms	
14	Bus rapid imbalance	The voltage difference between Bus+ and Bus- is greater than 100V, lasting 2ms	
15	Bus+/Bus- volt. average OV	The average value of Bus+/Bus- voltage is greater than 520V, and the duration is 200ms	The inverter has an internal fault. Please turn off the inverter, wait for about 5 minutes, and then turn it on again to check whether the problem is solved. If it is not solved, please contact after-sales service.
16	Bus+/Bus- volt. average UV	The average value of Bus+/Bus- voltage is less than 250V and lasts for 200ms	
17	Inv L1/L2/L3 rapid OC	L1/L2/L3 current instantaneous value is greater than 82A, duration 1.25ms	
18	Inv L1/L2/L3 hardware OC	L1/L2/L3 The instantaneous value of the current is less than -74A or greater than 74A, triggering the hardware over current action	Please check whether the inverter load is too much
19	Inv hardware OC shutdown	The L1/L2/L3 phase inverter inductor current hardware over current fault occurs continuously for 200ms.	The inverter has an internal fault. Please turn off the inverter, wait for about 5 minutes, and then turn it on again to check whether the problem is solved. If it is not solved, please contact after-sales service.
20	Inv L1/L2/L3 RMS volt. OV	The RMS of the L1/L2/L3 inverter voltage is 1.2 times greater than the regional rated voltage and lasts for 200ms	
21	Inv L1/L2/L3 RMS volt. UV	The RMS of the L1/L2/L3 inverter voltage is less than 0.8 times the regional rated voltage for 200ms	
22	Inv L1/L2/L3 RMS curr. OC	L1/L2/L3 inverter current RMS is greater than 50A, lasting 200ms	
23	Inv L1/L2/L3 volt. DC component OV	L1/L2/L3 inverter voltage DC component is greater than 0.5V, lasting for 3s	
24	Inv L1/L2/L3 curr. DC component OC	L1/L2/L3 The DC component of the inverter current is greater than the DC one-stage overcurrent threshold required by the regional grid connection standard, and continues for a corresponding period of time.	
25	Inv L1/L2/L3 curr. DC component OC level2	L1/L2/L3The DC component of the inverter current is greater than the DC second-stage overcurrent threshold required by the regional grid-connected standard and lasts for a corresponding period of time	

26	Output OverFreq	Output frequency is greater than the regional rated frequency + 5Hz, lasting 200ms	
27	Output UnderFreq	Output frequency is less than the regional rated frequency -5Hz, lasting 200ms	
28	Ground volt. Fault	The zero-ground voltage is greater than 50V and lasts for 1s	Please check the zero ground voltage
29	Inv self-test fail	The inverter module self-test failed.	Serious failure, please contact after-sales service for maintenance
30	Inv short-circuit	L1/L2/L3 inverter voltage RMS is less than 115V, while the current effective value is greater than 23.9129A, lasting 100ms	
31	Leakage curr. self-test failed	The leakage current detection device self-test failed during the startup process	
32	Leakage curr. OC level1	Leakage current 1 segment 30mA mutation detection exceeds the standard	1.leakage current is abnormal, please turn off the inverter, wait for about 5 minutes, and then turn it on again to check whether the problem is solved. 2. This fault will be locked after frequent occurrence. Please turn off the inverter and wait for about 1 hour before restarting or power off the inverter and restart it to check whether the problem is solved. 3. If the problem is still not resolved, please contact after-sales service.
33	Leakage curr. OC level2	Leakage current 2-stage 60mA mutation detection exceeds the standard	
34	Leakage curr. OC level3	Leakage current 3-stage 150mA mutation detection exceeds the standard	
35	Leakage curr. OC level4	Leakage current 4 stages 300mA continuous residual leakage current detection exceeds the standard	
36	Inv relay fault	inv relay short circuit or open circuit	Serious failure, please contact after-sales service for maintenance
37	Grid relay fault	Grid relay short circuit or open circuit	
38	Load relay fault	Load relay short circuit or open circuit	
39	PV1、2/PV3、4 rapid OC	Detects that the PV1/PV2 current is greater than 50A and lasts for 468.75us	1. The inverter has an internal fault. Please turn off the inverter, wait for about 5 minutes, and then turn it back on to check whether the problem is solved. 2. This fault will be locked after frequent occurrence. Please turn off the inverter and wait for about 1 hour before restarting or power off the inverter and restart it to check whether the problem is solved. 3. If the problem is still not resolved, please contact after-sales service.
40	Balance inductance rapid OC	Detects that the balanced inductor current is greater than 40A and lasts for 468.75us	
41	Bus+/Bus- rapid OV	Detects that the Bus+/Bus- voltage is greater than 520V and lasts for 2ms	
42	Bus rapid imbalance	Detect that the voltage difference between Bus+ and Bus- is greater than 100V and lasts for 3ms	
43	PV1、2/PV3、4 rapid OV	Detects that the PV1/PV2 voltage is greater than 1030V, lasting 2ms	
44	PV1、2/PV3、4 RMS OV	Detect that the RMS of PV1/PV2 voltage is greater than 1020V for 200ms	
45	PV1、2/PV3、4 RMS OC	Detects that the RMS of PV1/PV2 current is greater than 35A for 200ms	
46	Inv side radiator OverTemp	The inverter side radiator temperature is greater than 102 degrees and lasts for 1 second.	
47	DC side radiator OverTemp	The DC side radiator temperature is greater than 91 degrees and lasts for 1 second.	
48	Mppt1/MPPT2 hardware OC shutdown	The hardware over current fault occurs continuously for 300ms	
49	Bus balance inductance hardware OC shutdown	The hardware over current fault occurs continuously for 300ms	

50	Mppt1/MPPT2 hardware OC	current is greater than 72A, the hardware over current action is triggered.	Please check whether the inverter load is too much
51	Bus balance inductance hardware OC	The current is less than -35.4A. The current is greater than 35.4A. The hardware over current action is triggered.	
52	PV earth fault	±Bus insulation resistance is less than 33.3333K, lasting 200ms	Please check whether the insulation resistance between the photovoltaic array and the ground is short-circuited.± Busbar insulation resistance is greater than 33.3333K and lasts for 200ms)and then it will return to normal.If the problem cannot be solved, please contact after-sales.
53	AFCI Fault Detection	AFCI fault occurs in PV1, PV2, PV3, PV4	Please check whether the photovoltaic side cable is normal
54	PV1/PV2/PV3/PV4 AFCI fault	PV1/PV2/PV3/PV4 AFCI strength is greater than the set value	
55	Flash error	Communication Fail	The internal communication of the inverter is abnormal, please contact after-sales service.
56	Internal CAN comm. Fail	Communication Fail	
57	Internal DSP comm. Fail	Communication Fail	
58	AFCI Fail	Communication Fail	
59	AFCI module self-check failed alarm	self-test fail	
60	Bypass OverLoad	There is a bypass overload fault trigger condition, which lasts for 100ms	Please check whether the inverter load is too much
61	Bypass L1/L2/L3 OverLoad 105%	L1/L2/L3 single-phase output apparent power is greater than 7875W or L1/L2/L3 single-phase output current RMS is greater than 34.238925A, for 200ms	Please turn off the inverter, reduce the load on the inverter, wait for about 5 minutes and then turn it back on to check whether the problem is solved. If it is not resolved, please contact after-sales service.
62	Phase lock failed	The inverter fails to lock phase with the grid	Alarm, please check whether the power grid is normal
63	Islanding fault	The inverter is detected to be disconnected from the grid	1.power grid is abnormal, please turn off the inverter, wait for about 5 minutes, and then turn it on again to check whether the problem is solved. 2. Please check whether the power grid and grid-side wiring are normal. 3. If the problem is not solved, please contact after-sales service.
64	Inv OverLoad	There is an inverter overload fault trigger condition, which lasts for 100ms	Please check whether the inverter load is too much
65	Inv OverLoad 105%	The total apparent power of the inverter output is greater than 15.75KW or the total RMS of the inverter output current is greater than 68.47785A for 10 minutes	Please turn off the inverter, reduce the load on the inverter, wait for about 5 minutes and then turn it back on to check whether the problem is solved. If it is not resolved, please contact after-sales service.
66	Inv OverLoad 125%	The total inverter output power is greater than 18.75KW or the total inverter output current RMS is greater than 81.52125A for 30 seconds.	
67	Inv OverLoad 150%	The total apparent power of the inverter output is greater than 22.5KW or the total RMS of the inverter output current is greater than 97.8255A for 10 seconds	
68	Inv OverLoad 200%	The total apparent power of the inverter output is greater than 30KW or the total RMS of the inverter output current is greater than 130.434A for 200ms	

69	Inv L1/L2/L3 OverLoad 105%~150%	L1/L2/L3 single-phase output power is greater than 5250W or R/S/T single-phase output current is greater than 22.82595A, for 1 hour	
70	Inv L1/L2/L3 OverLoad 155%	L1/L2/L3 single-phase output apparent power is greater than 7750W or R/S/T single-phase output current RMS is greater than 33.69545A, and the output power difference between any two phases is greater than 2750W, for 200ms	
71	GEN L1/L2/L3 RMS OV	The RMS of the R/S/T voltage is greater than 1.2 times the set rated voltage and lasts for 200ms	Please turn off the inverter, reduce the load on the inverter, wait for about 5 minutes and then turn it back on to check whether the problem is solved. If it is not resolved, please contact after-sales service.
72	GEN L1/L2/L3 RMS UV	The RMS of the R/S/T voltage is less than 0.8 times the set rated voltage and lasts for 200ms	
73	MDSP comm. Fail	The CAN communication between ARM and main DSP is abnormal for more than 2 seconds.	Internal communication failure, please contact after-sales service.
74	SDSP comm. Fail	The communication between the ARM and the secondary DSP CAN is abnormal for more than 2 seconds	
75	Bluetooth comm. Fail	ARM configuration Bluetooth fails	
76	Grid meter comm. Fail	The abnormal communication between the ARM and the slave electric meter lasts for more than 2 seconds	Please check whether the meter communication interface is wired correctly; 1.The communication address of the electric meter is set to 1, and the communication baud rate is 9600.
77	Logical interface shutdown	Scheduling shutdown of logical interface	Please check whether the logic interface shutdown command is called.
78	DCDC1/2/3/4 comm. Fail	The communication abnormality between ARM and slave DCDC lasts for more than 2 seconds.	Check whether the inverter communication line is in good contact
79	Flash error	Flash write data exception	Internal communication failure, please contact after-sales service.

10. Technical specifications

Hybrid Inverter Specification				
Model	SUN8000T-E/I	SUN10000T-E/I	SUN12000T-E/I	SUN15000T-E/I
Input - DC (PV)				
Max. Power (Wp)	20000		30000	
Max. DC Voltage (V)	1000			
MPPT Voltage Range (V)	160~950			
MPPT Voltage Range (V, full load)	200~850	240~850	240~850	280~850
Start Voltage (V)	180			
Max. Input Current（A)	30 / 20		30 / 30	
Max. Short Current（A)	40 / 30		40 / 40	
Number of MPPT	2			
Number of String per MPPT	2-1		2-2	

Maximum inverter backfeed current to array（d.c.A)	0			
Input - DC (Battery)				
Compatible Battery	RBmax MH Battery System			
Battery type	Liion (LFP)			
Voltage Range (V)	550-950			
Max. Discharge Power (W)	8800	11000	13200	15000
Max. Charge Power (W)	11000	11000	15000	15000
Max. Charge / Discharge Current (A)	20/ 16	20/ 20	27 / 24	27 / 27
Nominal battery voltage（d.c.V)	650			
Rated current (maximum continuous) input and output（d.c.A)	16.9/13.5	16.9/16.9	23/20.3	23/23
AC (On grid)				
Rated Output Power (W)	8000	10000	12000	15000
Max. Output Apparent Power (VA)	8800	11000	13200	15000
Max. Output Power (W)	8800	11000	13200	15000
Rated Input Apparent Power (VA)	22500			
Max. Input Current (A)	32			
Rated Grid Voltage (V)	230/400, 3P+N+PE			
Rated Grid Frequency (Hz)	50			
Max. Output Current (A)	3*12.8	3*16	3*19.2	3*21.8
Rated output current（a.c.A)	3*11.6	3*14.5	3*17.4	3*21.8
Rated apparent power(VA）	8000	10000	12000	15000
THDI(Rated power)	<3%			
Power Factor	~1 (Adjustable from 0.8 leading to 0.8 lagging)			
Maximum output fault current	10uS@43.4a.c.A	10uS @54.3A	10uS @65.1A	10uS @73.9A
AC (EPS/Back Up)				
Rated Output Power (W)	8800	11000	13200	15000
Rated Output Current (A)	3*12.8	3*16	3*19.2	3*21.8
Rated Bypass Power (VA)	22500			
Rated Bypass Current (A)	32			
Rated Output Voltage (V)	230/400, 3W+N			
Rated Frequency (Hz)	50			
THDV (@linear load)	< 2%			
Overload Capacity	120% @10min / 200% @10S			
THDV	<2 (R load), <5 (RCD load)			
Scalability	Max. 6 in parallel			

Efficiency			
Max.Efficiency (PV to Grid)		98.0%	98.3%
Euro.Efficiency (PV to Grid)		97.3%	97.6%
Max. Charge Efficiency (PV to Bus)		99%	
Max. Charge/Discharge Efficiency (Grid to Bus)		99%	
Protection			
DC Switch		Yes	
GFCI		Yes	
Anti-islanding Protection		Yes	
DC Reverse-polarity Protection		Yes	
AC Over/Under Voltage Protection		Yes	
AC Over Current Protection		Yes	
AC Short Circuit Protection		Yes	
Insulation Resistor Detection		Yes	
DC/AC Surge protection Device		Type II / Type III	
GFCI		Yes	
AFCI / RSD		Optional	
Maximum output overcurrent protection		Yes	
Active anti-islanding method		Reactive power perturbation method	
General Data			
Switch Time		< 10ms	
Generator Interface		Optional	
PV Switch		Integated	
PV Connection		MC4/H4	
AC Connection		Connector	
AC port and standby port surge current		10 a.c.A 1ms	
Maximum output fault current of standby port		100a.c.A 200ms	
Maximum output overcurrent protection		85a.c.A	
Overvoltage category		II (PV,BAT), III (AC)	
DVC	**AC,PV,BAT**	DVC-C	
	COM,WIFI,USB	DVC-A	
Operating Temperature Range		-25~60℃ (-13~140°F), >50℃(113°F) derating	
Relative Humidity		0~95%	
Altitude (m)		4000	
Protection Degree		IP65	
Topology		Transformerless	

Noise（dB)	<30
Night Self Consumption (W)	<10
Cooling	Natural Convection
Display	LED + APP (Bluetooth)
Communication Interface	RS485 / CAN / USB / (WiFi / GPRS / 4G / Ethernet optional)
Dimensions (WxDxH, mm)	650 x 265 x 390
Net Weight (kg)	28
Standard Compliance	
Grid Connection standards	VDE-AR-N 4105, EN 50549, AS4777.2, CEC, RCM
Safety	EN IEC62109-1/-2, EN 61000-6-1/-2/-3/-4, EN IEC 62040

THANKS!

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