



User Manual

Home Energy Storage System

Model: ESS R050100



Catalogue

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1. Safety instructions

Before installing, using and servicing the product, users must read the manual carefully and follow the safety precautions required in the manual. The safety precautions mentioned in this manual are only to supplement the local safety regulations.

1.1 Safety precautions

- The product must be installed and maintained by professionals in accordance with local standards and regulations, and in strict accordance with the manual installation steps.
- Before installation and maintenance, make sure that the power supply is off to prevent electric shock or fire.
- During normal operation, it is strictly prohibited to directly touch the output and input terminals to avoid the risk of electric shock.
- During normal operation, do not directly open the machine casing, otherwise it may cause electric shock.
- Keep the equipment away from flammable and explosive materials, and away from heat sources.
- It is forbidden to modify the equipment by yourself to avoid serious accidents.

1.2 Symbol interpretation

	Note! Failure to operate as required may result in moderate or minor injury to the person and damage to the product!		DO NOT dispose of the battery in normal waste. DO NOT include battery with Lead Acid battery recycling
	Danger: Risk of high voltage, be careful of electric shock!		Recyclable!
	No smoking!		This face should not be tilted upside down!
	Do not step on!		Please read the manual carefully before use!
	The air outlet of the device is hot and carefully touched!		Protective grounding!
	Wait 5 minutes after power off to ensure the machine is fully discharged!		Grounding general identification!

2. Product description

2.1 Product overview

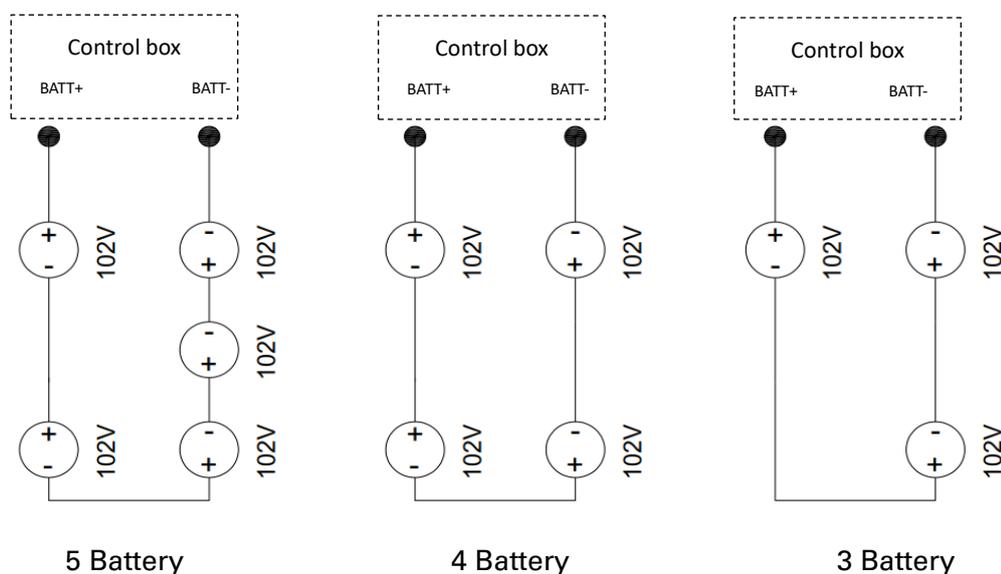
ESS R050100 home energy storage system products are composed of lithium batteries and bidirectional energy storage inverters (hereinafter referred to as PCS), providing renewable energy applications and uninterruptible power supply support services. The system can be used in scenarios where photovoltaics are used spontaneously and the excess is connected to the Internet: during the day, photovoltaic power generation first meets the power demand of the load, and the excess electricity charges the battery or the grid; when there is no photovoltaic at night, the load can choose to use the grid or battery power supply.

2.1.1 Battery

ESS R050100 Battery Cabinet components are defined as below:

- Battery module H102025M-S: The Battery module provides the energy and sends the information about the cell voltage and cell temperature in the battery module to the upper layer BMU. The nominal capacity of the battery is 2.5kWh, and the open circuit voltage of the battery is 102 ~ 106V.
- Battery control box H100030H-P01: Two parts consisting of both the battery management and control component mounted on top of the battery modules as well as structural base, which physically supports the battery modules underneath. The top portion of the BCMU is responsible for communication to and connection with the inverter or BMU.

ESS R050100 battery cabinet consists of 4 battery modules (H102025M-S) and battery control box (H100030H-P01). The system voltage and total capacity can be configured according to different application scenarios and requirements.



Picture 2-1 Schematic diagram of battery connection

2.1.2 Inverter

Inverter normally has the following operation modes based on your configuration and layout conditions.



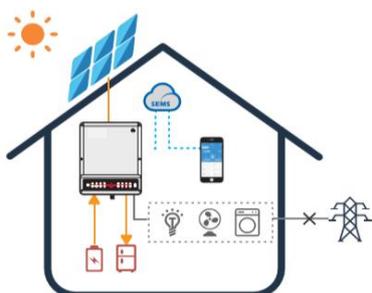
Mode I:

The energy produced by the PV system is used to optimize self-consumption. The excess energy is used to charge the batteries,



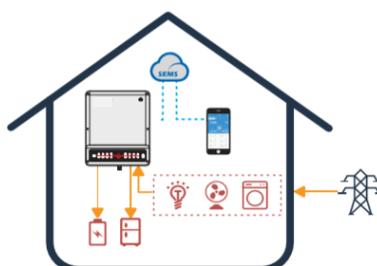
Mode II:

When there is no PV, and the battery is sufficient, it can supply



Mode III:

When grid fails, the system automatically switches to Back-Up mode. The Back-Up load can be

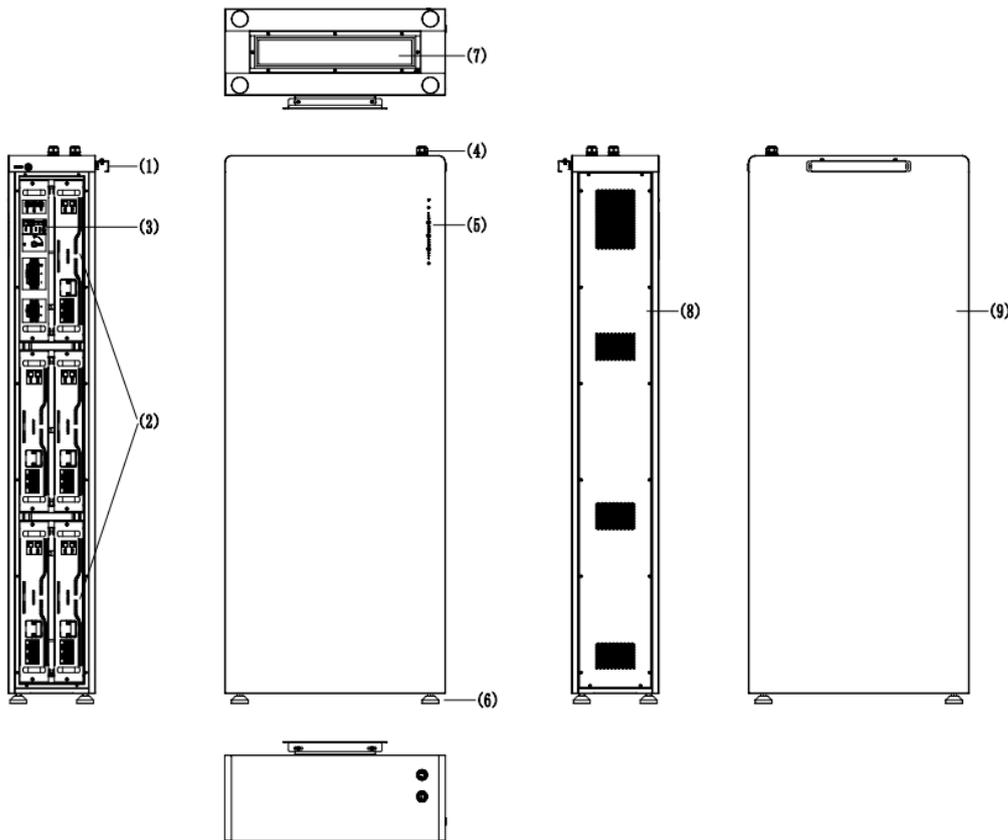


Mode IV:

Battery can be charged by grid, and charging time/power can be

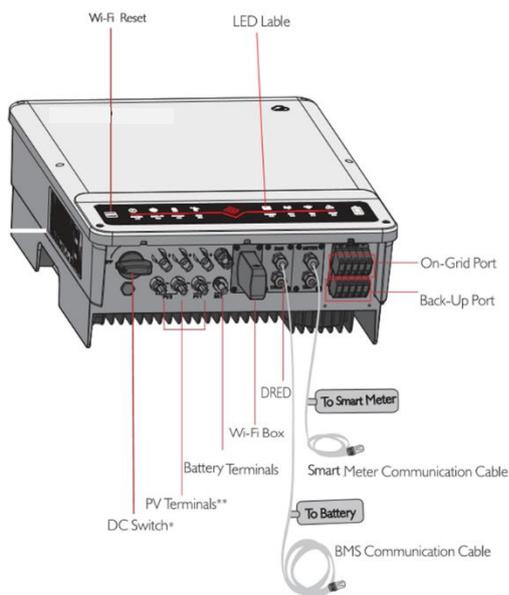
2.2 Structure and composition

The product adopts a modular design framework, and the 3/4/5 battery modules and 1 control box are assembled in components for easy replacement.

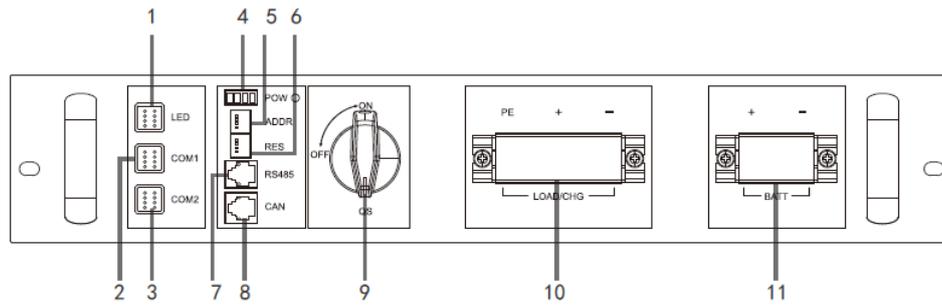


Picture 2-2 Schematic diagram of structural composition

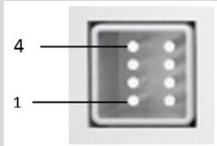
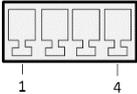
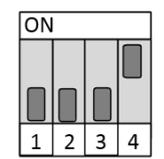
- (1) Back bracket
- (2) Battery module
- (3) Control box
- (4) Output wiring port
- (5) SOC indication
- (6) Cabinet foot
- (7) ventilation
- (8) Side door
- (9) Cabinet back side

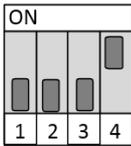
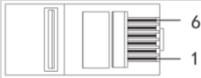
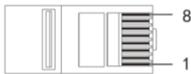


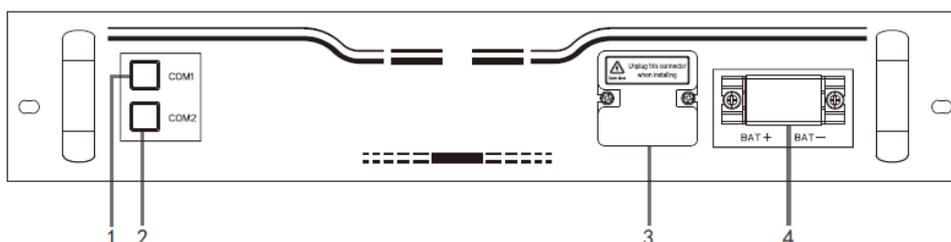
Picture 2-3 Appearance of the inverter



Picture 2-4 Appearance of the high voltage control box

NO.	Explain	Function	Definition	Note
1	LED	LED Light display interface 	1: LED1	
			2: LED2	
			3: LED3	
			4: LED4	
			5: LED5	
			6: NC	
			7: VDD	
			8: GND	
2	COM1	Communication interface with the highest battery string		
3	COM2	Communication interface with the lowest battery string		
4	POWER	Battery cabinet start switch interface③ 	1、4: SW	
			2、3: NC	
5	ADDR	Battery cabinet address setting② 	1:ADDR1	
			2:NC	
			3:NC	
			4:ADDR2	
6	RES	CAN/RS485 Optional interface for communication terminal resistance ①	1: CAN Communication resistance	"ON" means connecting terminal
			2:NC	
			3:NC	

			4:485 Communication resistance	resistance
7	RS485	<p>RS485 Interface</p> 	1:485A 2:485B 3-6:NC	
8	CAN	<p>CAN communication interface</p> 	1:CANL 2:CANH 3-8: NC	
9	QS	Battery cabinet isolation manual output switch		
10	LOAD/CHG	The output port of the battery cabinet		
11	BATT	Battery input interface		



Picture 2-5 Appearance of the battery module

NO.	Explain	Function	Note
1	COM1	Interface with high - string battery communication	
2	COM2	Interface with low - string battery communication	
3	Breaker	Battery air-switch interface	
4	BATT	Battery output interface	

3. Product installation

3.1 Installation precautions

Please follow the instructions below before starting the installation:

- Whether the ambient temperature of the installation site is within the specified range of -20°C~+55°C (recommended at 0°C~40°C).
- The installation location is well ventilated, away from inflammable and explosive materials, and it is forbidden to install and operate in salt spray environment.
- The product is prohibited from tilting or sideways.
- The product should be installed in a location that avoids sun, rain, snow, etc.



3.2 Equipment list

Before installation, please check whether the appearance of the machine is intact, and check whether the parts of the accessory package are consistent with the list.

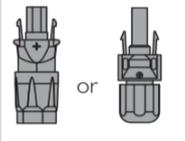
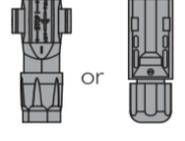
Table 3-1 Battery Cabinet list

NO.	Picture	Material Name	Specification Model	QTY.
1		Battery Cabinet	ESS R050100	1
2		Expansion Bolt	M6x60	2
3		RJ45 Connector	RJ45	2
4		PCS-BAT Power cable	UL1015 10AWG red 2500mm	1
5		PCS-BAT Power cable	UL1015 10AWG black 2500mm	1

6		PCS-BAT Communication	UL2835 2500mm	1
7		Cable tie	1.8 x 150mm Nylon; white	20
8		Terminals	RNYD5-6 Yellow	2
10		General certificate	General certificate	1
11		User Manual	English language	1
12		Drier	20g	4

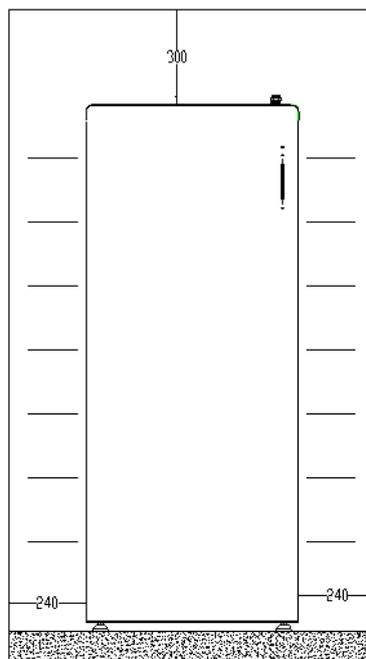
Table 3-2 Hybrid Inverter list

NO.	Picture	Material Name	NO.	Picture	Material Name
1		Inverter x 1	8		PE terminal x 1
2		Wall-mounted Bracket x 1	9		Expansion Bolts x 4
3		Smart Meter x 1 with 3 CT	10		AC Cover x 1

4		Positive PV Plug x 2	11		Pan head screw x 6
5		Negative PV Plug x 2	12		Pin Terminal x 12
6		Positive BAT Plug x 1	13		User Manual x 1
7		Negative BAT Plug x 1	14		Quick Installation Guide x 1

3.3 Installation instructions

The battery system cabinet can be installed on the floor and wall mount. The system adopts the natural heat dissipation method. When installing, 240mm of heat dissipation space is required on the left and right sides of the cabinet.



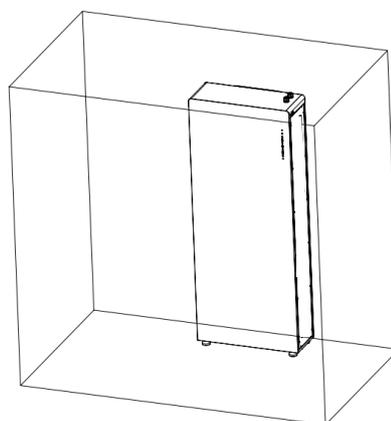
Picture 3-1 Installation Diagram

3.3.1 Battery cabinet installation guide

Use professional handling equipment to move the cabinet to the installation site. The equipment is placed on the back of the wall, and space for heat dissipation and safety is reserved. The ground is kept flat, and the cabinet is connected to the wall by mounting parts for reliable fixing.

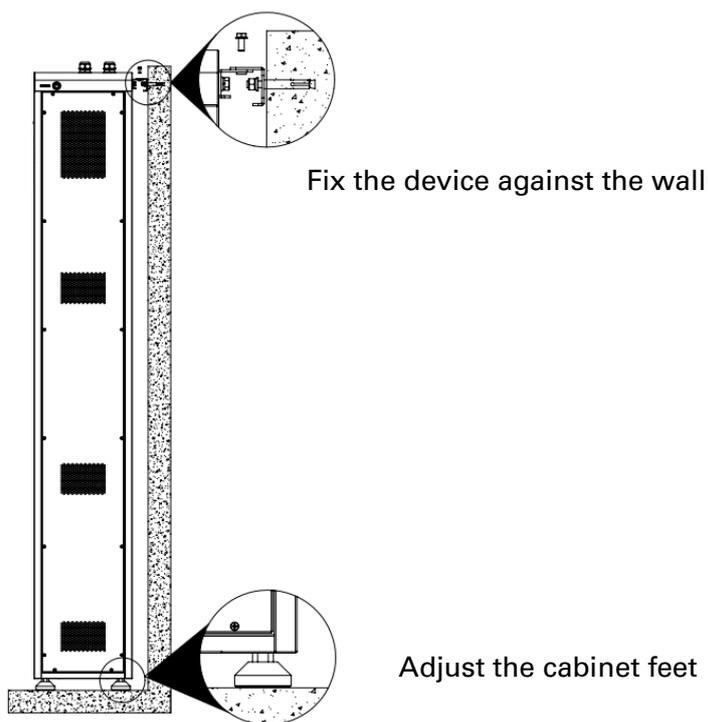


Equipment handling method



Battery cabinet

- (1) Transport the cabinet to the installation location. The floor of the cabinet installation must meet the load-bearing capacity of 1200KG/m²; measure the size of the back-fixing parts using an M8 drill bit, drill two holes with a depth of about 60mm on the wall, and knock in the expansion bolts;
- (2) Remove the back-fixing parts: use a screwdriver to unscrew the 2 fixing screws on the mounting bracket, and take off the fixing parts;
- (3) Pass the fixing parts through the expansion bolts, and fix them firmly with elastic flat washers and nuts. The torque of the wrench is $\geq 4\text{NM}$;
- (4) Place the cabinet close to the fixed wall, and use the removed screws to fix the cabinet and the fixing parts firmly according to the way when the fixing parts are removed;
- (5) Adjust the equipment foot to make the cabinet steadily placed on the ground;

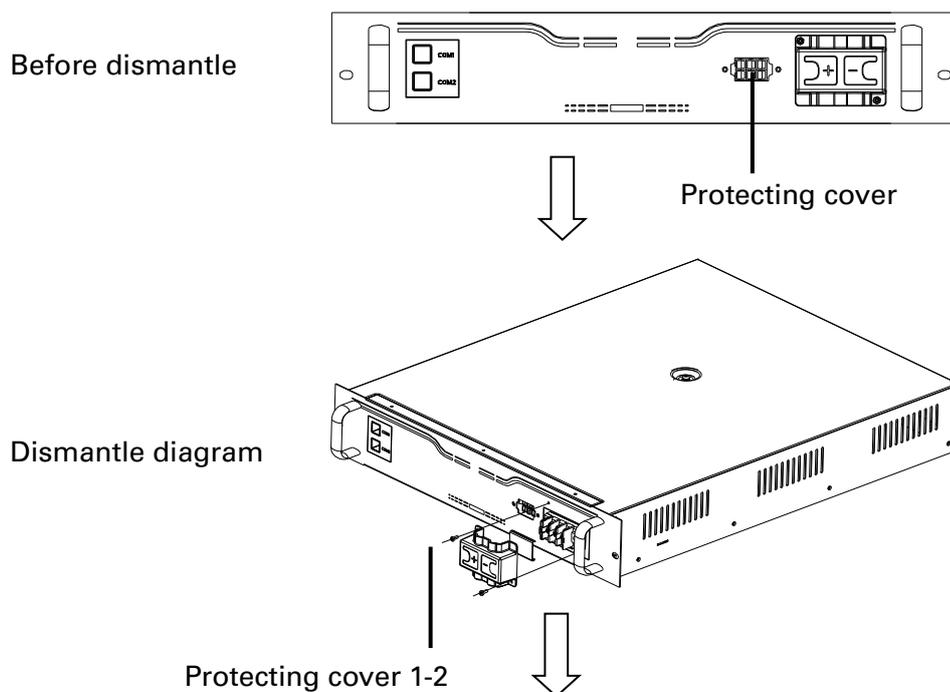


Picture 3-2 Schematic diagram of cabinet installation

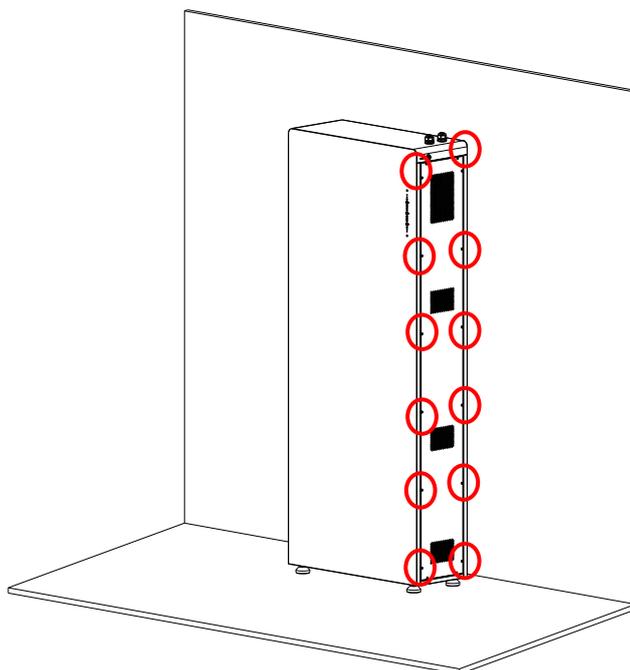
Note: If the battery packs have been installed in the cabinet, you can skip the following steps.

(6) Remove the battery box and main control box protective cover

! Before installing the battery box, the breaker switch must be pulled out.

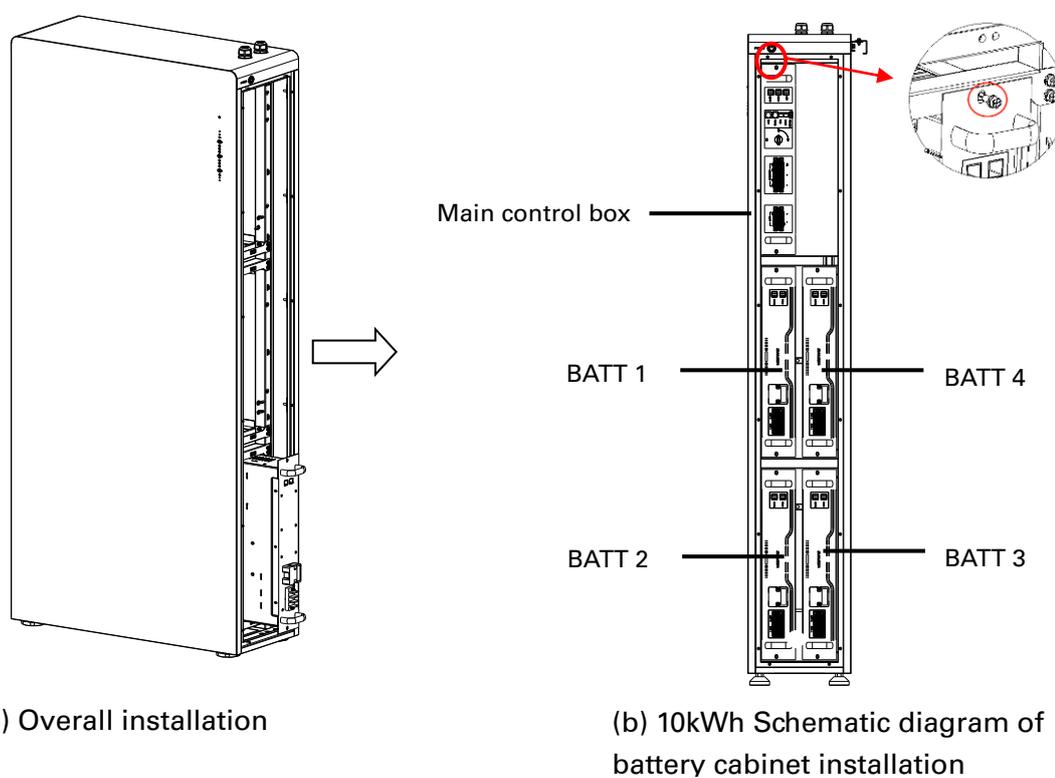


(7) Use a Phillips screwdriver to dismantle the side door screws, dismantle the side door, and place it against the wall.



Picture 3-5 Dismantle the side door of the battery cabinet

(8) Insert the battery box and the main control box into the cabinet in turn, and fix both sides with M6 screws.



(a) Overall installation

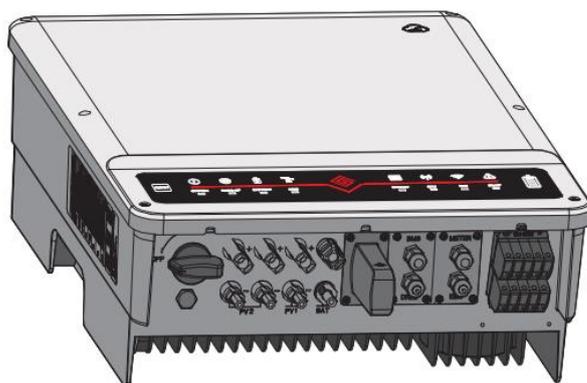
(b) 10kWh Schematic diagram of battery cabinet installation

Picture 3-6 Install battery box and main control box

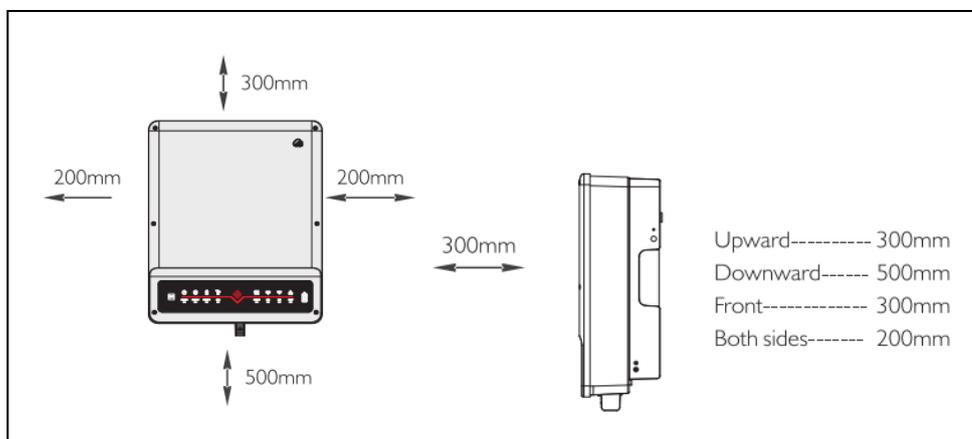
3.3.2 Hybrid inverter installation guide

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

- Not in direct sunlight.
- Not in areas where highly flammable materials are stored.
- Not in potential explosive areas.
- Not in the cool air directly.
- Not near the television Antenna or antenna cable.
- Not higher than altitude of about 2000 meters above sea level.
- Not in environment of precipitation or humidity (>95%).

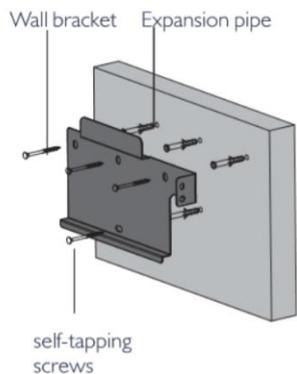


Leave enough space around inverter following the values.

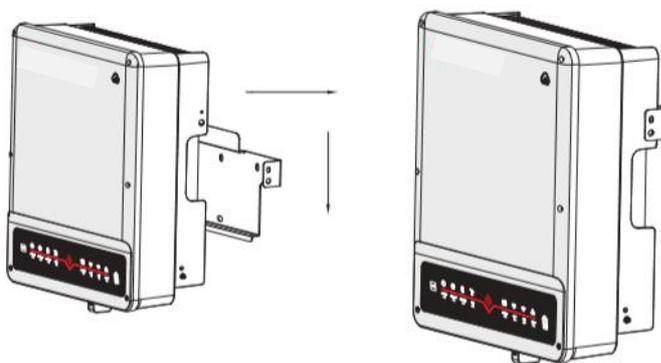


Follow the steps below to complete the inverter installation:

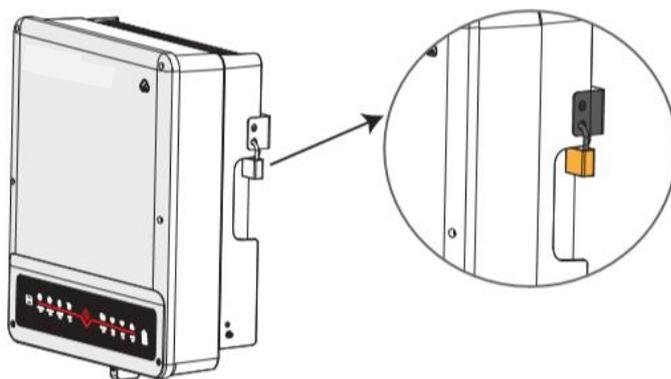
- (1) Please use the mounting bracket as a template to drill 4 holes on right positions (10mm in diameter and 80mm in depth). Use expansion bolts in accessory box and fix the mounting bracket onto the wall tightly.



(2) Carry the inverter by holding the heating sink on two sides and place the inverter on the mounting bracket.



(3) A lock could be used for anti-theft if it is necessary for individual requirement.



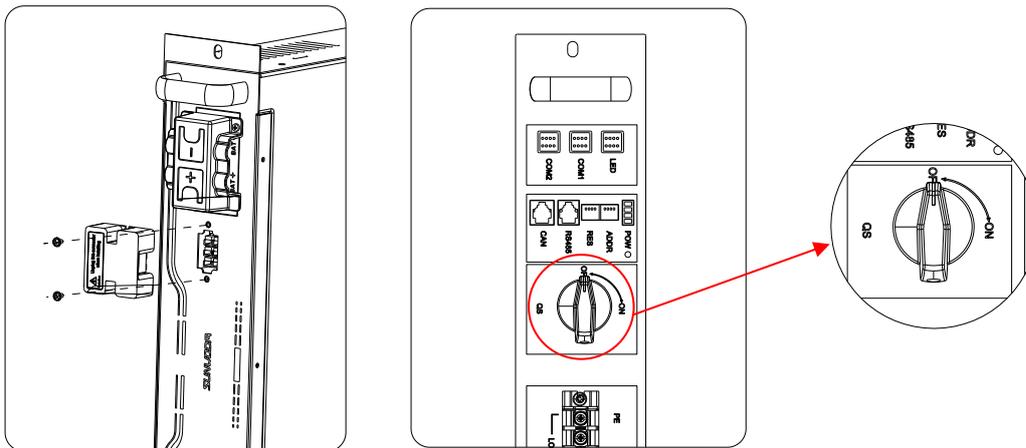
3.4 Battery system cable connection

3.4.1 Diagram of battery cabinet system connection

Note: This section mainly describes the battery module assembly instructions. If the battery packs have been installed in the cabinet, you can skip this section.

! When carrying out the internal wiring operation of the system, first pull out the circuit breaker of the battery box, the isolation switch on the control box is in the OFF state.

! When the battery circuit breaker is installed, there is a high voltage output at the battery terminal, which may cause electric shock!

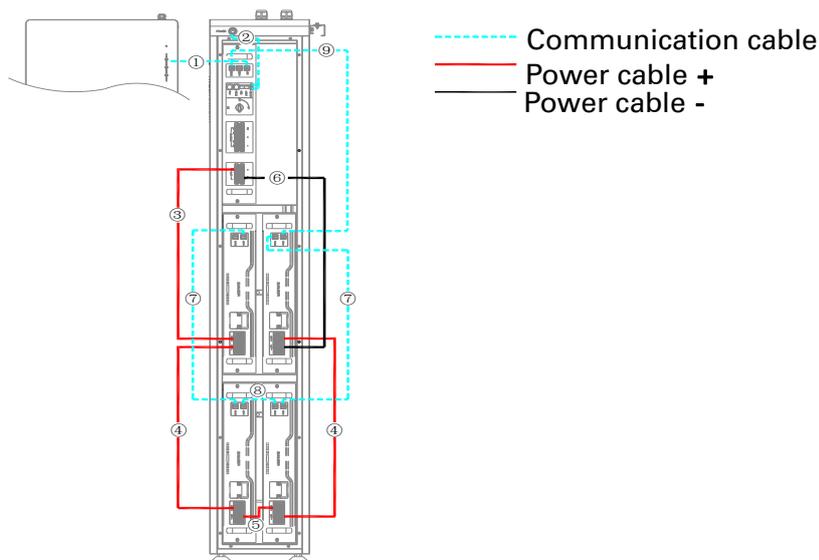


Step1: Install the power cable (solid line) first.

Step2: Then install the communication cable (dotted cable).

Step3: Finally, install the LED light wire harness and the boot wire harness.

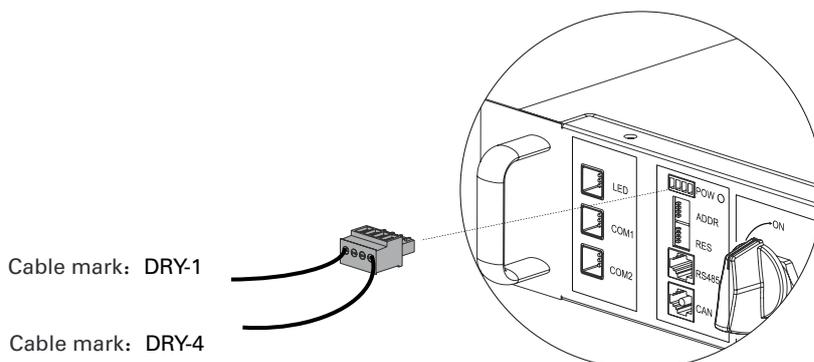
10kWh please connect the battery cabinet according to the example in the figure below and the cable mark.



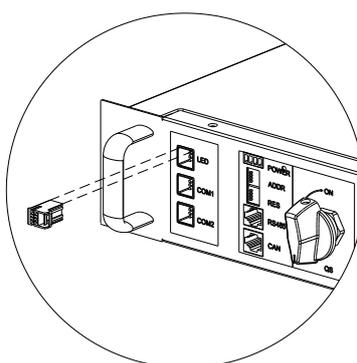
No.	Name	Spec.	L(mm)
①	LED wire harness	CON-LED,LED	650
②	Power-on wire harness	DRY-1,DRY-4	800
③	BAT Output positive cable	BAT+,CAON-BAT+	620
④	BAT Positive and negative in series cable	BAT+,BAT-	670
⑤	BAT Positive and negative in series cable	BAT+,BAT-	100
⑥	BAT Output negative cable	BAT-,CAON-BAT-	740
⑦	COM wire harness	COM	670
⑧	COM wire harness	COM	130
⑨	COM wire harness	COM	830

Note:

1. When installing the power-on wiring harness, you need to connect the wiring harness to the connector of the green four-position wiring hole, and then insert the connector to the corresponding position of the battery box. The schematic diagram is as follows:



2. When installing the LED light wire harness, insert the connector on the wire harness into the corresponding position of the main control box. The schematic diagram is as follows:



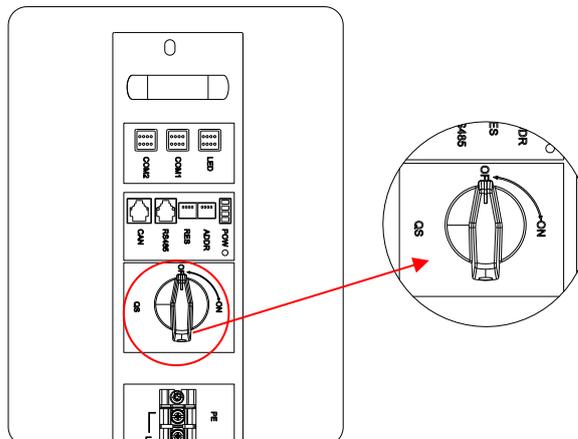
3.4.2 Connect external cables to the battery cabinet

When installing the cable between the battery system and the inverter, follow the steps below:

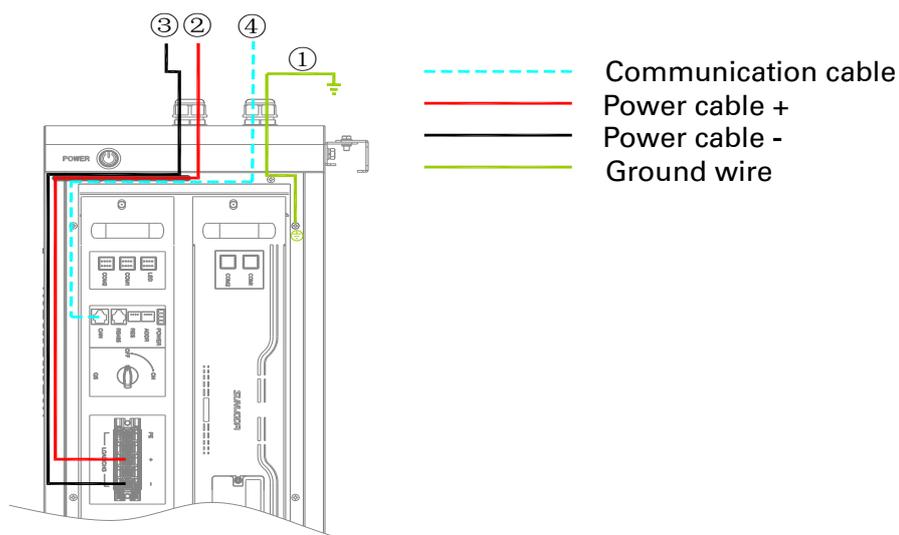
- (1) Confirm that the battery system and inverter are shut down.
- (2) Confirm that the circuit breaker on the battery box is off and the isolating switch on the control box is "OFF".

 When carrying out the external wiring operation of the system, the isolation switch on the control box is must be in the OFF state!

 When the isolation switch is closed, the output port of the battery control box has high voltage, which may cause electric shock!



(3) Pass the positive and negative power cables and communication cables through the waterproof connectors on the cabinet and connect them to the output interface and communication interface of the main control box respectively.



No.	Name	Cable mark	L(mm)
①	Ground wire	Provide local	----
②	PCS-BAT positive cable	LOAD/CHG+, PCS/BAT+	2500
③	PCS-BAT negative cable	LOAD/CHG-, PCS/BAT-	2500
④	PCS-BAT communication cable	BAT/CAN、 PCS/CAN	2500

Before connecting the BMS communication cable to inverter, please make sure that the CAN cable is connected correctly. In some cases it might be needed to make the CAN cable at the location. Find below the pin-outs. Make sure to very carefully test the cable after crimping it. Self-made cables are very often the causes of very hard to diagnose problems.

Function	Inverter	Battery
CAN-L	Pin 5	Pin 1
CAN-H	Pin 4	Pin 2

Note:

1. If you use the inverter's built-in CAN communication line, you need to re-press the battery side RJ45 port according to the above table.
2. If you use the system to configure the CAN communication line, you need to pass the communication line through the inverter's BMS waterproof connector, and then press the inverter side RJ45 port according to the above table.
3. Pass the ground wire through the waterproof connector on the cabinet and connect it to the ground point inside the cabinet.

For equipment safety, the housing of the equipment can be grounded or equipotentiality connected for the second time. When the original protective conductor fails, it prevents the current from being touched when the grounding fault occurs, causing personal harm.

The recommended wire specifications for grounding cables are as follows:

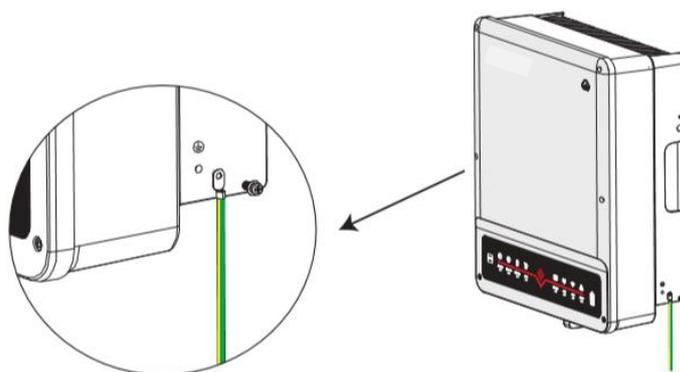
Cable requirements	10AWG, Yellow and green cable
Wire stripping size	8mm
connection terminal	the ring terminal M6

Note: The output terminal PE on the battery control box has been connected to the cabinet.

3.5 Hybrid inverter cable connection

3.5.1 Hybrid Inverter Grounding

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



3.5.2 PV connection



It is very important for system safety and efficient operation to use appropriate cable for PV module connection. To reduce risk of injury, please use the proper recommended cable size as below.

Wire Size	Cable(mm ²)
12AWG	4

When selecting proper PV modules, please be sure to consider below parameters:

1) Open circuit Voltage (Voc) of PV modules not exceeds max. PV array open circuit voltage of inverter.

2) Open circuit Voltage (Voc) of PV modules should be higher than min. start voltage.

Max. Input Current (A)	12.5A/12.5A
PV Array MPPT Voltage Range	200Vdc-850Vdc
No. of MPP Trackers	2
No. of Strings per MPP Tracker	1+1

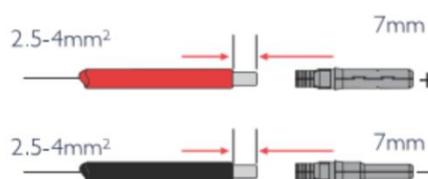
3) The minimum isolation resistance to ground of the PV string must exceed 33.33kΩ in case of any shock hazard.

Note: BAT plugs are similar with PV plugs, please confirm before use it.

Follow the steps below to complete the PV connection:

1) Prepare PV cables and PV plugs.

Note: Please use PV plugs and connectors in accessory box.

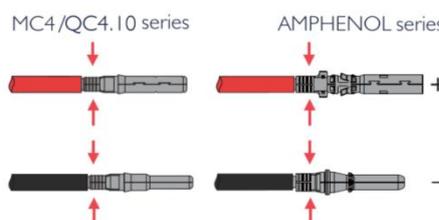


2) Connect PV cable to PV connectors.

Note: 1. PV cable must be tightly crimped into the connectors.

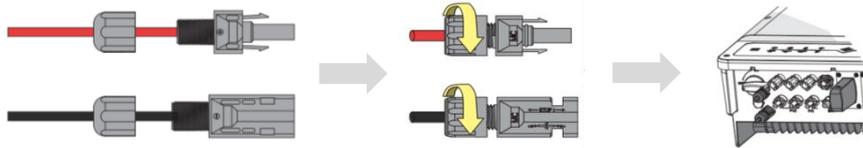
2. For Amphenol connector, the limit buckle cannot be pressed.

3. There will be a click sound if connectors are inset correctly into PV plugs.



3) Screw the cap on and plug onto inverter side.

Note: There will be a click sound if connectors are inset correctly into PV plugs.



The polarity of PV strings or on the inverter cannot be connected reversedly, otherwise inverter could be damaged.

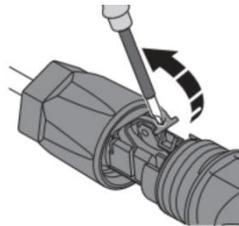
3.5.3 Battery connection



Please be careful against any electric shock or chemical hazard.

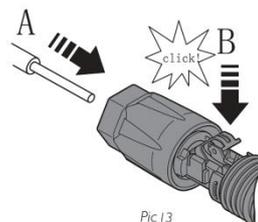
Use the right BAT plugs in the accessory box. Follow the steps below to complete the Battery connection:

(1) Open the spring using a screwdriver.



(2) Carefully insert the stripped wire with twisted litz wires all the way in (A). The litz wire ends have to be visible in the spring.

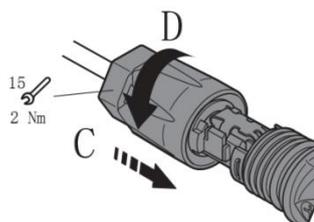
Close the spring. Make sure that the spring is snapped in (B).



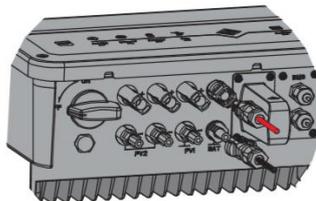
Pic 13

(3) Push the insert into the sleeve (C). Tighten the cable gland to 2 N.m (D).

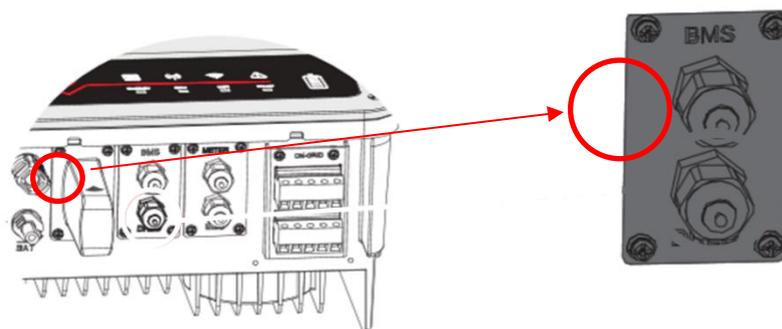
Use a suitable and calibrated torque wrench, size 15. Use an open-jaw wrench, size 16, to hold the connector in place.



(4) Fit the two connectors together until the connection audibly locks into place. Check to make sure the connection is securely locked.



(5) Connect Battery BMS CAN cable to the right position onto the inverter.



Note: Please refer to section 3.4.2 for connection details of battery BMS and inverter CAN communication line.

3.5.4 On-grid & Backup connection

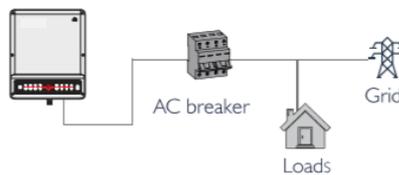
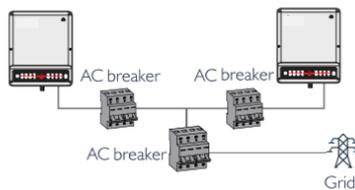
An external AC breaker is needed for on-grid connection to isolate from grid when necessary. Below are the requirements on AC breaker:

Model	AC Breaker specification
5KW	25A/400V(e.g. DZ47-60 C25)
8KW/10KW	32A/400V(e.g. DZ47-60 C32)

Note: The absence of AC breaker on back-up side will lead to inverter damage if only electrical short-circuit happened on back-up side.

1. Use separate AC breaker for individual inverter.

2. On AC side, the individual breaker should be connected before loads (between inverter and loads)



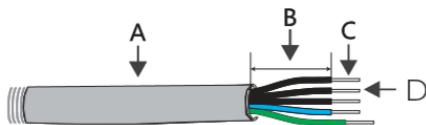
Make sure inverter is totally isolated from any DC or AC power before connecting AC cable.

Note:

- Neutral cable shall be blue, line cable or brown (preferred) and protective earth cable yellow-green.
- For AC cables, PE cable shall be longer than N& L cables, so that if in any case AC cable slips or taken out, the protecting earth conductor will be last to take the strain.

Follow the steps below to complete the AC cable connection:

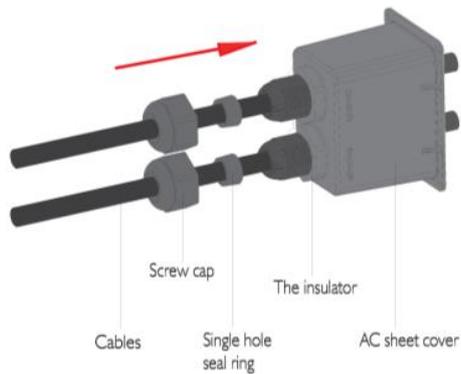
- (1) Prepare the terminals and AC cables according to the left table.



Grade	Description	Value
A	Outside Diameter	13-18mm
B	Separated wire length	20-25mm
C	Conduct wire length	7-9mm
D	Conduct core section	4-6mm ²

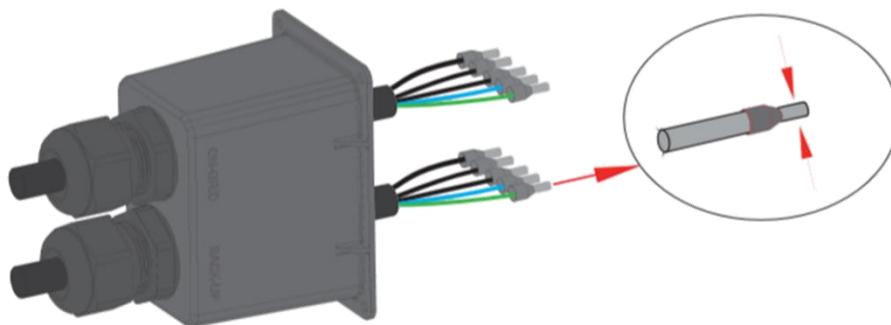
(2) Put AC cable through terminal cover follow the sequence as below.

Note: Please use the terminals in components box.



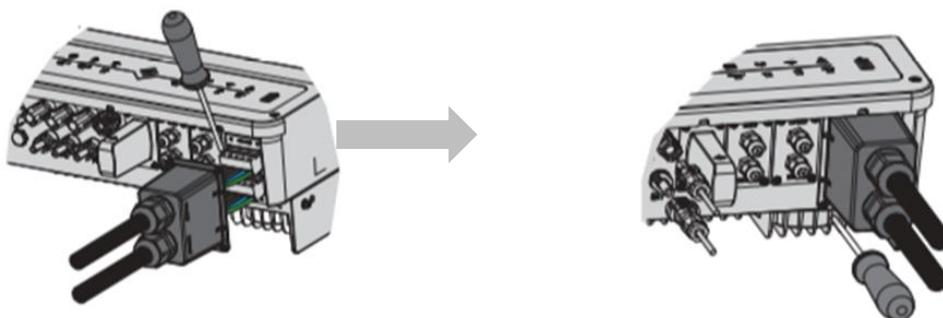
(3) Press the 10 connectors on cable conductor core tightly.

Note: Make sure cable jacket is not locked within the connector.



(4) Connect the assembled AC cables into AC terminals with fastening torque about 2.0-2.5N.m. Lock the cover and screw the cap on.

Note: Connecting Back-up terminals before connect On-grid terminals. Make sure it is not connected to a wrong side.

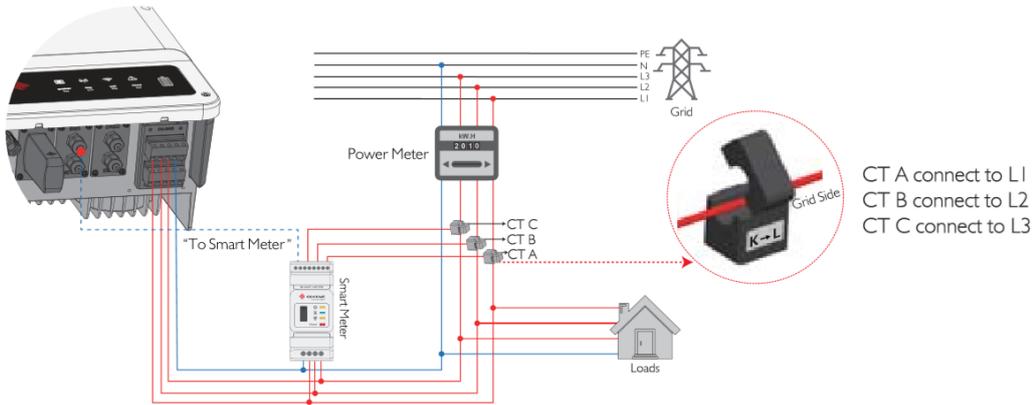


3.5.4 CT connection

The Smart Meter with CT in product box is compulsory for inverter installation, used to detect grid voltage and current direction and magnitude, further to instruct the operation condition of ET inverter via RS485 communication.

Note:

1. The meter and CT is well configured, please do not change any setting on meter;
2. One Smart meter can only be used for one ET inverter.
3. Three CTs must be used for one smart meter, and must be connected on the same phase with smart meter power cable.



Picture 3-6 Smart Meter & CT Connection Diagram

Note:

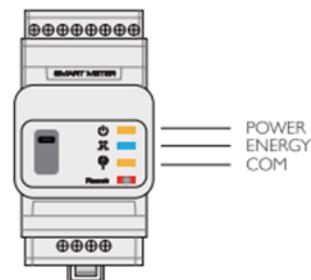
1. Please use the Smart Meter with 3 CTs in product box.
2. CT cable is 3m as default, could be extended to max 5m.
3. Smart Meter communication cable (RJ45) is attached on the inverter ("To Smart Meter " cable), could be extended to max 100m, and must use standard RJ45 cable and plug, as below:



Position	Color	BMS Function	Smart MeterFunction	RS485
1	Orange&white	485_A2	NC	485_A
2	Orange	NC	NC	485_B
3	Green&white	485_B2	485_B1	485_A
4	Blue	CAN_H	NC	NC
5	Blue&white	CAN_L	NC	NC
6	Green	NC	485_A1	485_B
7	Brown&white	NC	485_B1	NC
8	Brown	NC	485_A1	NC

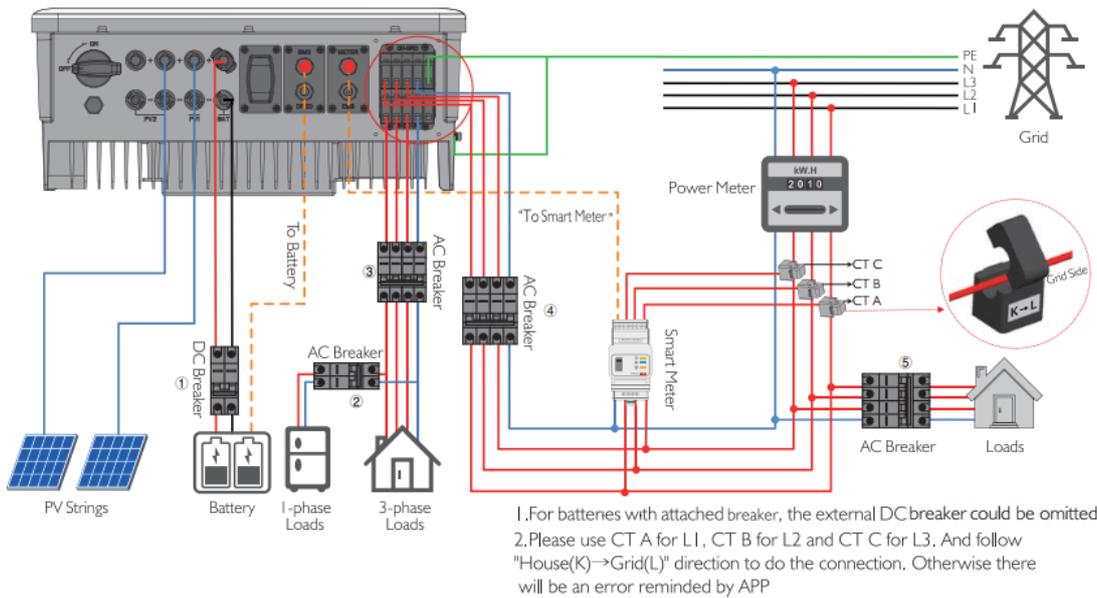
Picture 3-7 Inverter RJ45 pin definition description

	OFF	ON	Blinking
POWER	Not working	Working	/
ENERGY	/	Importing	Exporting
COM	Blink one time when it transfer data to inverter		



Picture 3-8 Smart Meter LED Indications

3.6 System wiring diagram



Picture 3-9 System Wiring Diagram

4. Operation guide

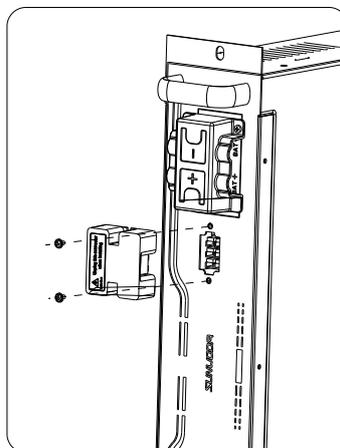
4.1 Operating instructions

4.1.1 Check before power on

- (1) Check whether the positive and negative power cables inside the battery are connected correctly according to Figure 2.1 in Chapter 2.
- (2) Check whether the positive and negative power cables connecting the battery to the inverter are connected correctly.

⚠ Be sure positive(+) must be connect to positive(+) and negative(-) must be connected to negative(-). Reverse polarity connection on battery will damage the inverter.

- (3) Install the circuit breaker on the battery box.



(4) Follow the steps below to measure whether the battery pack voltage is correct:

Use a **CAT III** (690V or better) multimeter for measuring the total voltage of a battery string. Normally, the **Negative (COM)** probe is **black**, and the **Positive (DC V)** probe is **red**.

(a) Measure the voltage(BAT+ and BAT-) for **each battery** module

- The measured module voltage $V_{BAT+,BAT-}$ shall be 102 ~ 106V

(b) Check the power cable polarity according to the system schematic diagram from picture 2-1 in section 2.1.

- Step by step measuring the battery voltage in series, the measurement should be done according to the following:

Negative (COM)	Positive (DCV)	Battery pcs.	Approx. Voltage (V)
BAT1-	BAT1+	1	102
BAT1-	BAT2+	2	204
BAT1-	BAT3+	3	306
BAT1-	BAT4+	4	408

if the measured voltage does not correspond to above, check the power **cable** as well as the safety **breaker**; repeat the measurement.

- If properly connected, the total measured voltage at the **controller module** (BATT +, BATT -) should be:

Negative (COM)	Positive (DC V)	model	Approx.VBATT+, BATT-
BATT-	BATT+	10kWh	408 V

(c) Check the protection earth (PE)

Note: the PE is shared by the **controller module** and the **cabinet**. The electric potential should be equal when measured using a multimeter.

- At normal operation condition (bootup completed), the PE is "floating" meaning:

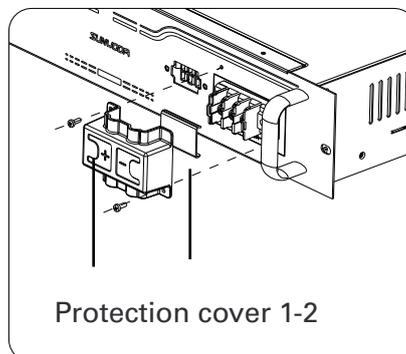
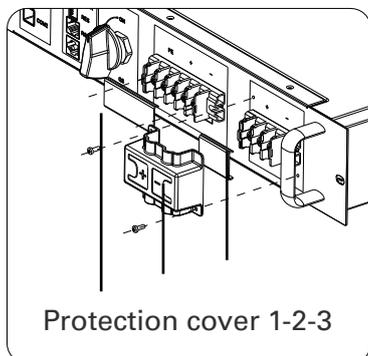
$$V_{BATT+, PE} = V_{PE, BATT-}$$

Taking 12.5kWh Battery Cabinet with 5 batteries for example, when measuring at the controller module output with a multimeter:

$$V_{BATT+, BATT-} \approx 510 V, V_{BATT+, PE} = V_{PE, BATT-} \approx 255 V$$

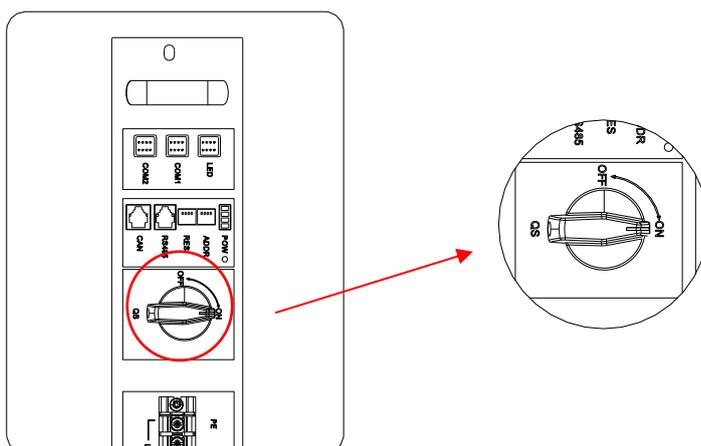
(5) Install wiring protection cover

After wiring is completed, install the protection cover on the battery box and main control box.

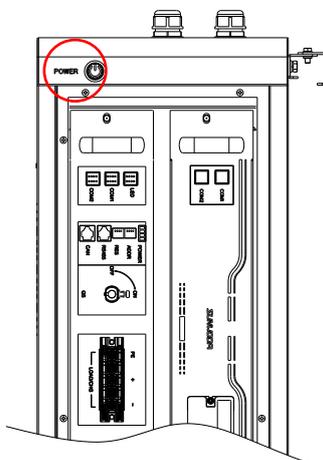


4.1.2 Power On

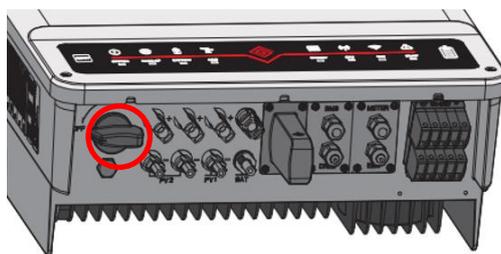
(1) Turn the battery box to "ON" state.



(2) Press the "Power" button for more than 4S, the battery indicator will light up, and the device will start working.



(3) Set the inverter DC switch to "ON".



4.1.3 Power Off

Press the "Power" button for more than 4S again, the battery indicator will go out, and the device will shut down.

Set the inverter DC switch to "OFF"; and disconnect grid input, the inverter will shut down.

4.2 Inverter APP instructions

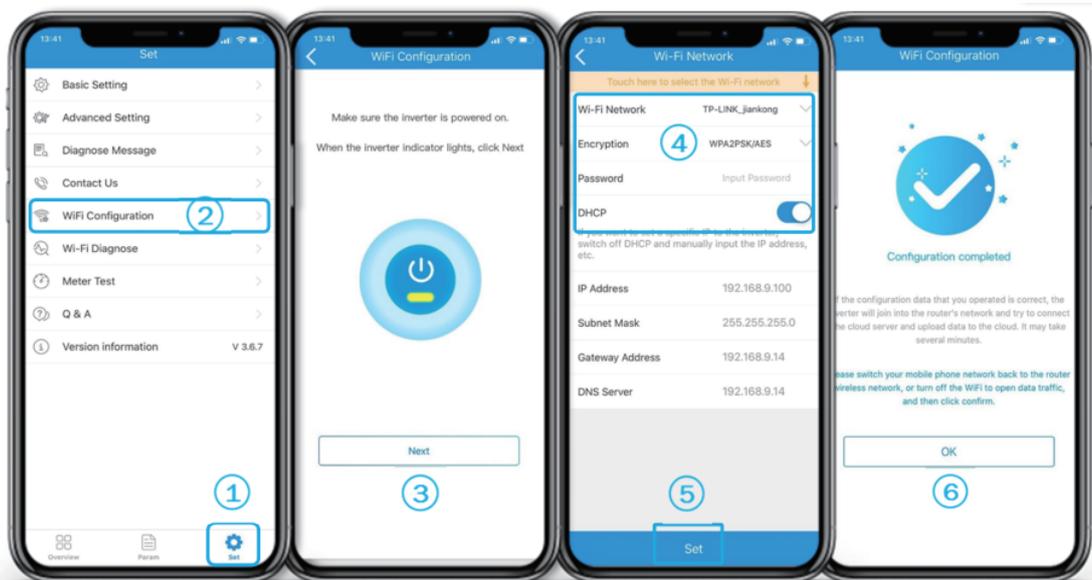
Note: "SEMS Portal" and "PV Master" are external monitoring/configuration applications for inverter, used on smart phones or pad for both Android and IOS system. Please download inverter APP "PV Master" and "SEMS Portal" from iTunes or Google play.

4.2.1 Wi-Fi configuration

(1) Wi-Fi Configuration option one

Connect inverter Wi-Fi to local network for remote monitoring on platform – SEMS Portal.

Steps: Connect "Solar-Wi-Fi" -> Open APP -> Choose the inverter you want to configure -> Click "Settings" -> "Wi-Fi Configuration" -> "Next" -> Choose network and fill in password -> Click "Set" -> Configuration Completed.



Note:

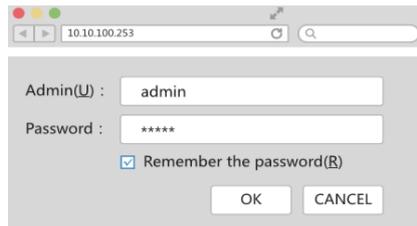
(a) "Configuration Completed" doesn't mean network connection (inverter—network—server) successfully. It means only the configuration process finished. Please follow "Wi-Fi" led statues on inverter to make sure Wi-Fi connected successfully to server or not.

(b) In step④ “DHCP” function could be closed to set fixed IP address accessible to local network (if there is firewall for local network)

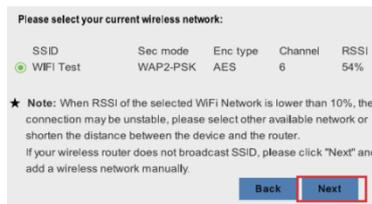
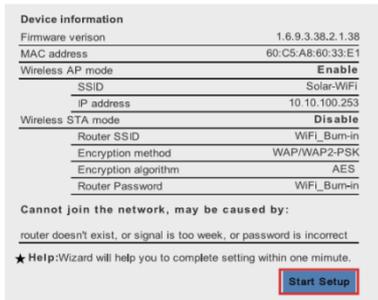
(2) Wi-Fi Configuration option two

(a) Connect Solar-WiFi* to your PC or smart phone (*means the last 8 characters of the inverter serial No.)

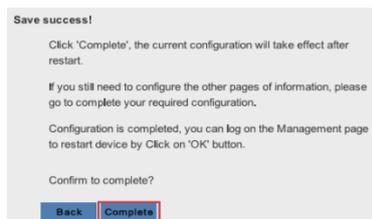
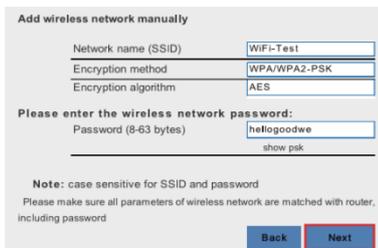
(b) Open browser and login 10.10.100.253. Admin(U): admin; Password: admin. Then click “OK”



(3) Click “Start Setup” to choose your router, then click “Next”



(4) Fill in the password of the router, then click “Next”. Click “Complete”



Note:

(a) Please make sure the password, Encryption Method/Algorithm is right the same with the router’s. If everything is right well, the Wi-Fi LED on inverter will change from double blink to quartic blink then to solid status, which means Wi-Fi is connected to inverter server successfully.

(b) Wi-Fi configuration could also be done on PV Master, detail please check on PV Master APP (Option one).

(3) Wi-Fi Reset & Reload

Wi-Fi Reset means restarting Wi-Fi module, Wi-Fi settings will be reprocessed and saved automatically.

Wi-Fi Reload means setting Wi-Fi module back to default factory setting.

Wi-Fi RESET Button



Wi-Fi Reset

short press RESET button
-Wi-Fi Led will blink for a few seconds

Wi-Fi Reload

long press RESET button (longer than 3s)
-Wi-Fi Led on inverter will double blink until doing Wi-Fi configuration again.

Note: Wi-Fi Reset & Reload function are only used when:

- (a) Wi-Fi lost connection to inverter or cannot connect to PV Master App successfully.
- (b) Cannot find "Solar-WiFi signal" or have other Wi-Fi configuration problem.
- (c) Please do not use this button if Wi-Fi monitoring works well.

4.2.2 PV Master APP operation

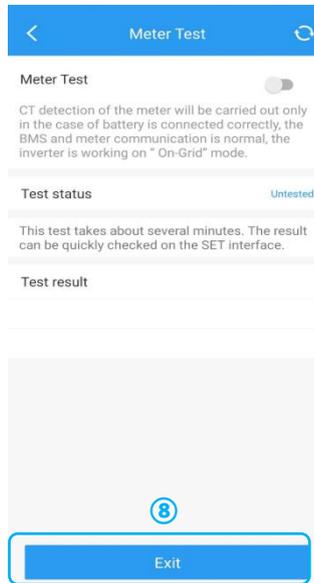
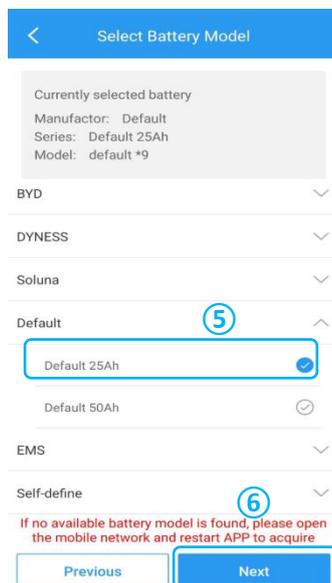
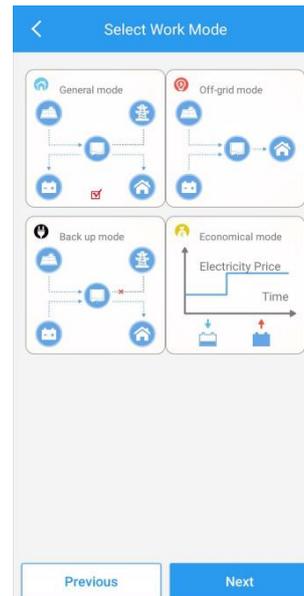
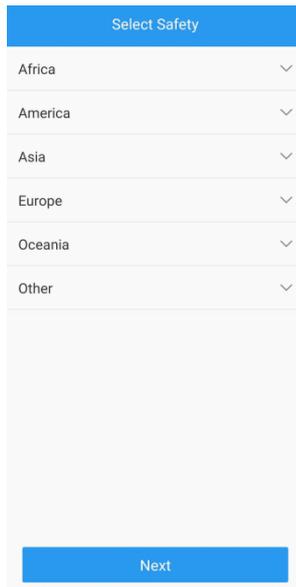
Clause Explanation:

Basic Setting: must-be settings to ensure the system work normally for all installations like safety code, battery model, operation mode etc.

Advanced Setting: specially expected functions, which is optional depends on individual requirement like export power limit, unbalance output function etc.

(1) Basic Setting:

Steps: Connect "Solar-Wi-Fi" -> Open "PV Master" APP -> Choose the inverter you want to configure -> Click "Settings" -> Choose "Basic Setting" -> Choose "Safety Country" -> Select operation mode (General mode default) -> Select battery model -> Enable "Meter Test"

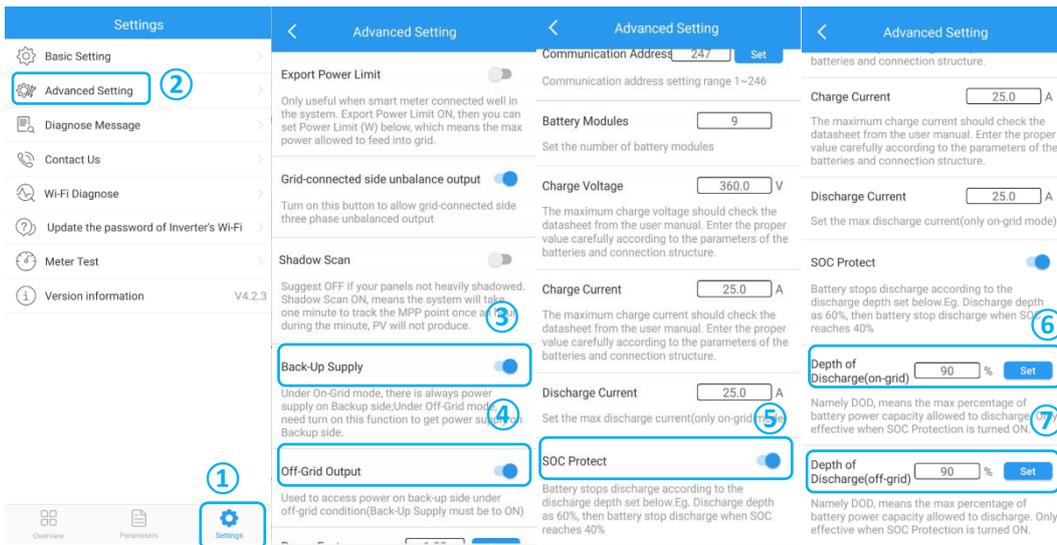


Note:

- (a) All charge or discharge settings only work when utility is available. During utility outage, economical mode does not work and whole system follow the default mode.
- (b) If an overlap of charge & discharge time happened at the same date & time, then charge logic takes the priority.
- (c) If a same charge or discharge date & time repeated in different options, then the priority drops from Group 1 to Group 4.

(2) Advanced Setting:

Steps: Connect "Solar-Wi-Fi" -> Open APP -> Choose the inverter you want to configure -> Click "Settings" -> Choose "Advanced Setting" -> Enable "Back-up Supply" -> Enable "off-Grid Output" -> Enable "SOC Protect" -> Setting "Depth of Discharge".

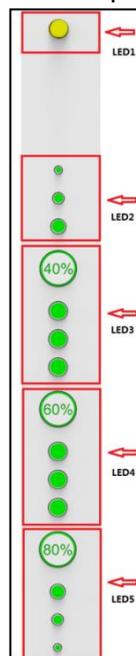


Note:

- (a) As default, Back-Up Supply function stays ON. If you want have power supply function on Back-Up side (on-grid or off-grid), this function ③ should always be ON.
- (b) As default, Off-Grid Output Switch function stays OFF. If need power supply during utility outage, this function ④ should also turn ON. This function works only if "Back-Up Supply" function is ON.
- (c) Off-Grid Output Switch will stay activated after first time being turned ON, unless the inverter is rebooted.
- (d) The maximum SOC protection depth can only be set to 90% regardless of whether the SOC protection switch is turned on.

4.3 Battery Status Display

The power indicator of the device (as shown on the right, the color of the indicator is subject to the actual situation), the specific function description is shown in the following table:



Battery status		LED Status					Description
System off		LED1	LED2	LED3	LED4	LED5	All put out
Charging	0%--20% SOC	★					LED1-LED5 flashes in the state of water lamp
	21%--40% SOC	●	★				LED2-LED5 flashes in the state of water lamp
	41%--60% SOC	●	●	★			LED3-LED5 flashes in the state of water lamp
	61%--80% SOC	●	●	●	★		LED4-LED5 flashes in the state of water lamp
	81%--100% SOC	●	●	●	●	★	LED5 flashes
	Charge over-v alarm	★	●				
	Charge over-temp alarm	★		●			
	Charge over-current alarm	★	●	●			
	Charge over-vol protection	★★	●				
	Charge over-temp protection	★★		●			
	Charge over-current alarm	★★	●	●			
	Discharging	0%--20% SOC	●				
21%--40% SOC		●	●				
41%--60% SOC		●	●	●			
61%--80% SOC		●	●	●	●		
81%--100% SOC		●	●	●	●	●	

	Discharge under-Vol alarm	★			●		
	Discharge temp protection	★	●		●		
	Discharge over-current protection	★	●	●	●		
	Discharge under-vol protection	★★			●		
	Discharge temp protection	★★	●		●		
	Discharge over-current protection	★★	●	●	●		
Failure	Detection circuit failure	★★	★	★	★	★	

(★flash, frequency is 5HZ, ★★flash, frequency is 10HZ, ●means always bright)

5. Maintenance and troubleshooting

5.1 Daily maintenance

- Calculate from the factory, the system needs to be charged once every 6 months.
- When the device is not used for a long time, discharge the battery to between 45% and 60% of the battery capacity, and disconnect the battery output to avoid the battery power being emptied.
- During system storage, the system should be checked regularly by professionals to check whether the line is loose or falling off, or to clean the surface and interior of the system; if any defects are found, please contact the dealer in time.

5.2 Battery troubleshooting

Common troubleshooting table:

Failures	Reasons	Solving methods
No response when press the start button	One-button start wire is damaged or poorly installed	Open the side door, close the POWER button on each battery module, check the turned on status.
		Repress the start button again.
		Contact with the supplier.
Short discharge time	Low battery power	Keep the product charged for more than 4 hours until fully charge the battery.
	Product overload	Check load status and remove non-critical products
	Battery aging, capacity decline	To replace the battery, please contact the supplier to get the battery and its components.
Unable to charge and discharge	Internal failure	Contact with the supplier.
	Battery over temperature	Allow to stand at room temperature for more than 3 hours
Abnormal battery input	Communication disconnection, high voltage, low voltage, high temperature, low temperature and over current alarm or fault protection	Check whether the battery communication is normal, and check the event record for alarms or failure protection.
Other alarm		According to the LED light status, find out the corresponding fault causes and eliminate them one by one.

 If the fault still cannot be solved, please contact the supplier or manufacturer as soon as possible.

Note: Do not disassemble the battery by yourself!

5.3 Inverter error message

The error messages below will be displayed on PV master APP or report by Email if the error really happen.

ERROR MESSAGE	EXPLANATION	REASON	SOLUTIONS
Utility Phase Failure	The sequence of On-grid wire is wrong	Inverter detects that phase angle of L2 and L3 are reversed	Reverse connection order of L2 and L3 cable
Utility Loss	Not available of public grid power (power lost or on-grid connection fails)	Inverter detects that AC voltage is beyond the normal range required by the safety county	<ol style="list-style-type: none"> 1.Check (use multi-meter) if AC side has voltage, make sure grid power is available 2.Make sure AC cables are connected tightly and right well 3.If all is well, please try to turn off AC breaker and turn on again after 5 mins
VAC Failure	Grid voltage is not within permissible range	Inverter detects that AC voltage is beyond the normal range required by the safety county	<ol style="list-style-type: none"> 1.Make sure safety country of the inverter is set right 2.Check (use multi-meter) if AC voltage (Between L&N or L&L) is within a normal range (Also on AC breaker side) <ol style="list-style-type: none"> a.If AC voltage is high, then make sure AC cable complies with that required on user manual and AC cable is not too long b.If voltage is low, make sure AC cable is connected well and the jacket of AC cable is not compressed into AC terminal 3.Make sure the grid voltage of your area is stable and within normal range
FAC Failure	Grid Efficiency is not within permissible range	Inverter detects that Grid frequency is beyond the normal range required by the safety county	<ol style="list-style-type: none"> 1.Make sure safety country of the inverter is set right 2.If safety country is right,then please check on inverter APP if AC frequency (Fac) is within a normal range 3.If FAC failure only appear a few times and resolved soon, it should be caused by occasional grid frequency instability.
PV/BAT Over Voltage	PV or BAT voltage is too high	The total voltage (open-circuit voltage) of each PV string is higher than the max DC input voltage of the inverter. Or the battery voltage is higher than the max BAT input voltage of the inverter	<p>Check PV string VOC is lower than Max PV Input Voltage of the inverter</p> <p>If VOC of PV string is high, please decrease panels to make sure VOC is with the max DC input voltage of the inverter</p>

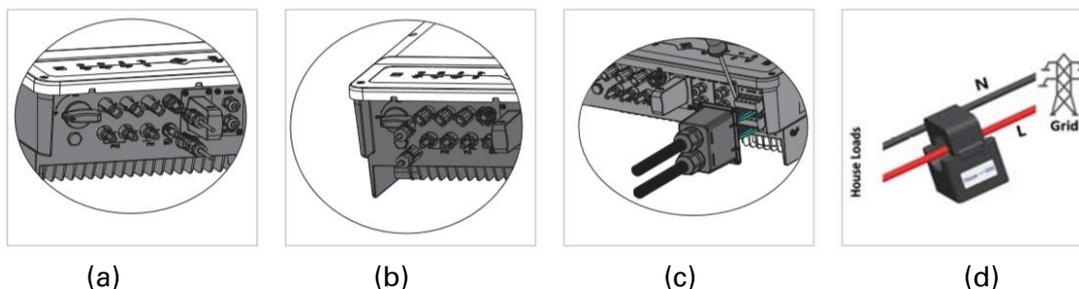
Over Temperature	Temperature inside of the inverter is too high	Inverter working environment leads to a high temperature condition	<ol style="list-style-type: none"> 1. Try to decrease surrounding temperature 2. Make sure the installation complies with the instruction on inverter user manual 3. Try to close inverter for 15 mins, then start up again.
Isolation Failure	Ground insulation impedance of PV string is too low	Isolation failure could be caused by multi reasons like PV panels are not grounded well, DC cable is broken, PV panels are aged or surrounding humidity is comparatively heavy, etc.	<ol style="list-style-type: none"> 1. Use multi meter to check if the resistance between earth & inverter frame is about zero. If it's not, Please make the connection between earth & inverter well. 2. If the humidity is very high, there maybe isolation failure occur. 3. Check the resistance between PV1+/PV2+/BAT+/PV- to earth, if the resistance is lower than 33.3k, check the system wiring connection. 4. Try to restart the inverter, check if the fault is still happens, if not, means it is just an occasional situation, or contact inverter manufacture.
Ground I Failure	Ground leakage current is over-high	neutral & ground cable are not connected well on AC side or just occasional failure	<p>Check use multi-meter if there is voltage value (normally should be close to 0V) between earth & inverter frame.</p> <p>If there is a voltage, it means the Neutral & ground cable are not connected well on AC side, if it happened only ate early morning, dawn or on rainy days with high air humidity, and recover soon, it should be normal</p>
Relay Check Failure	Self checking of relay fails	Neutral & ground cable are not connected well on AC side or just occasional failure	<p>Check use multi-meter if there is high voltage value (normally should be lower than 10V) between N&PE cable on AC side.</p> <p>If the voltage higher than 10V, it means the neutral & ground cable are not connected well on AC side or restart inverter.</p>
DC Injection High	/	Inverter detects a higher DC component in AC output	Try to restart inverter, check if it still happens, if not, means it is just an occasional situation or contact inverter manufacture
EEPROM R/W Failure	/	Caused by a strong external magnetic field etc.	Try to restart inverter, check if it still happens, if not, means it is just an occasional situation or contact inverter manufacture.

SPI Failure	Internal communication fails	Caused by a strong external magnetic field etc.	Try to restart inverter, check if it still happens, if not, means it is just an occasional situation or contact inverter manufacture
DC Bus High	BUS Voltage is over-high	/	Try to restart inverter, check if it still happens, if not, means it is just an occasional situation or contact inverter manufacture
Back-Up Over Load	Back-ip side is over loaded	Total Back-Up load power is higher than the nominal backup output power	Decrease Back-ip loads to make sure the total power is lower than Back-Up nominal output power

5.4 Inverter troubleshooting

(1) Checking Before Turing On AC Power

- Battery Connection: Confirm the connection between ET and battery: polarity (+/-) not reversed, refer to picture 5-1(a).
- PV Input Connection: Confirm the connection between ET and PV panels: polarity (+/-) not reversed, refer to picture 5-1(b).
- On-Grid & Back-Up Connection: Confirm On-Grid connection to power grid and Back-up to loads: polarity (L1/L2/L3/N are in sequence) not reversed, refer to picture 5-1(c).
- Smart Meter & CT Connection: Make sure Meter & CT are connected between house loads and grid. and follow the Smart Meter direction sign on CT, refer to picture 5-1(d).



Picture 5-1 Checking items picture

(2) Checking as Start ET up and Turn On AC Power

Battery Settings, BMS Communication and Safety Country: After connecting Solar-WiFi* (* means the last 8 characters of the inverter serial No), check on PV Master APP Param to make sure battery type is right what you have installed, and Safety Country is right. If not right, please set in right in "Set".

Note: For compatible lithium batteries, BMS status is "Normal" after select the right battery company.

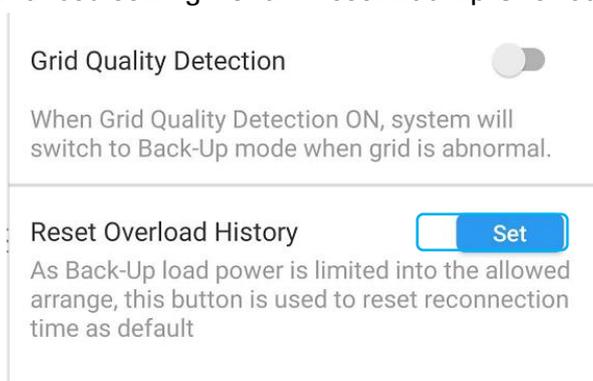


Battery(-)	
Battery Status	SOC:95%,Discharge
Battery Data	529.9V/2.9A/1.54kW
BMS Status	Normal
SOH(From BMS)	100%
Charge Current Limit(From BMS)	20A
Discharge Current Limit(From BMS)	20A
Warning(From BMS)	Normal
Temperature(From BMS)	29.0°C

(3) Declaration for Backup Overload Protection

Inverter will restart itself as overload protection happens. The preparation time for restarting will be longer and longer (max one hour) if overload protection repeats. Take following steps to re start inverter immediately:

- Decrease Back-up load power within max limitation.
- On PV master->Advanced setting->Click “Reset Backup Overload History”



6. Packaging, transportation, storage

There are two delivery methods for the system: the entire battery system is delivered and the battery pack is packaged and delivered separately.

- Delivery of the battery system as a whole
 - (1) The system cabinet is packed in wooden cases and the internal PE packaging bag is moisture-proof and waterproof.
 - (2) EPE pearl cotton foam pad packing is used to prevent damage to the system during handling and transportation.
- The battery pack is packaged and shipped separately
 - (1) The system cabinet is packed in carton cases and the internal PE packaging bag is moisture-proof and waterproof.
 - (2) Each battery module is individually packaged, and the outer packaging box should be checked that it is received intact without damage.
- Transportation must comply with UN3481's dangerous goods transportation and local laws and regulations.
- The system is heavy and must use the mechanical handling.
- Transportation temperature: -10°C~ 40°C。
- The equipment and packaging cannot be sprayed, so it cannot be transported in the open air.
- Storage temperature: -20 ° C ~ 25 ° C, 12month;
 -20 ° C ~ 45 ° C, 3month;
 -20 ° C ~ 60 ° C, 1month;

(The SOC before storage is kept in the range of 40% to 60%)

- Storage humidity: 10%~80% RH.
- The storage room should be kept ventilated, the room should be clean and dry, and it should be protected from dust and moisture.
- The storage time can be up to 6 months. It is recommended to charge and discharge the system for more than the time.
- Storage room sunlight cannot be directly exposed to the system.

Appendix A Technical Parameter Table

Technical Data	ESS R050100
PV	
Rated input power	6500W
Rated input voltage	620V
Max. input current input	12.5A/12.5A
Short circuit current	15.2A/15.2A
PV input voltage range	180~1000V
MPPT voltage range	200~850V
Number of MPPT	2
GRID	
Rated output voltage	400V, 3L/N/PE
Rated output frequency	50Hz/60Hz
Rated output power	5000VA
Rated output current	8.5A
Back-Up Load	
Rated output voltage	400V, 3L/N/PE
Rated output frequency	50Hz/60Hz
Rated output power	5000VA
Rated output current	8.5A
THD	<3%
Switching time	<20ms
Battery	
Battery type	LFP
Rated battery voltage	409.6V
Battery voltage range	345 ~ 448V
Modules in series	4
Rated battery capacity	25Ah
Rated energy (100%DOD)	10kWh
Max. charging current	14A
Max. discharging current	17A
Battery Size (W*H*D mm)	660*1650*260
Battery Weight	158kg

General Data	
Power factor range	(-0.8, +0.8)
Operating temperature range	0°C~45°C
Noise	<30db
Environment humidity	10%-80%RH
Size (W*H*D mm)	660*1650*260(Battery cabinet) 516*415*180(Inverter)
Inverter Weight	24kg
IP Class	IP55(Battery cabinet), IP65(Inverter)
Protective class	Class I
Communication with BMS	CAN
Altitude	≤2000m
Certifications & Standards	
Inverter	CEI 0-21; VDE4105-AR-N; VDE0126-1-1; EN50438; G83/2; G100; IEC62109-1&2; IEC62040-1; EN61000
Battery	IEC62619; UN38.3