

xStorage Hybrid system

# xStorage Hybrid Single Phase Inverter



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# 1. Introduction

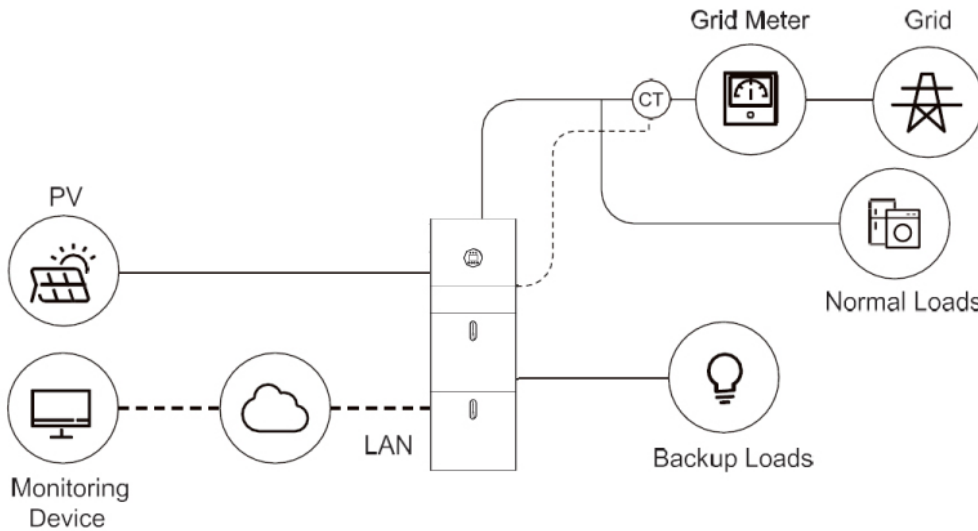
## 1.1 System Introduction

XSTHS1P050BP10V1 (incl. 2 PACK5.1 and Hybrid Inverter 1Ph 5kW) / XSTHS1P036BP05V1 (incl. 1 PACK5.1 and Hybrid Inverter 1Ph 3kW) can be applied in DC- coupled system (mostly new installation), AC-coupled system 1 (mostly retrofit) and AC-coupled system 2 (mostly retrofit, and PV capacity-increase), as the following schemes show:

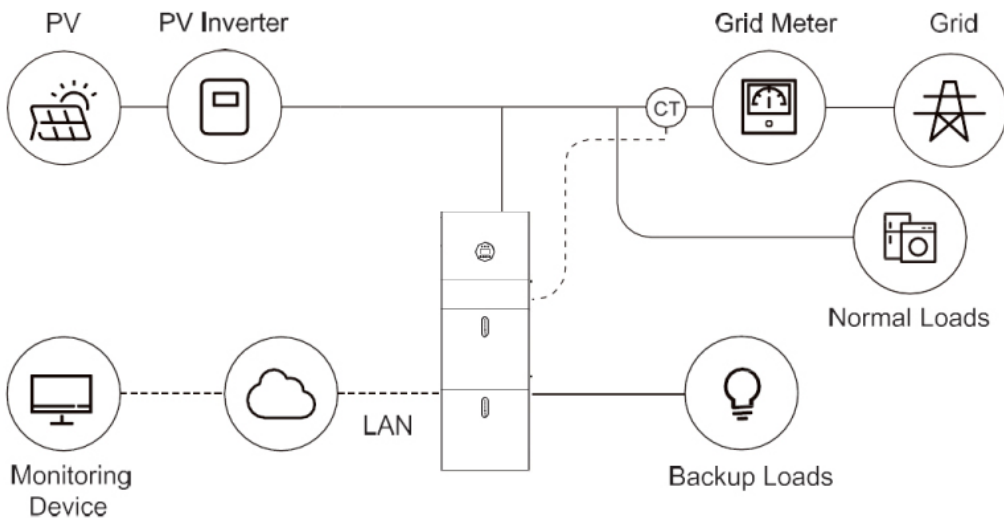
**Table 1. System components**

Solution	Configuration	
	Inverter	BESS
XSTHS1P036BP05V1	Hybrid Inverter 3.6kW	PACK5.1
XSTHS1P036BP10V1	Hybrid Inverter 3.6kW	PACK10.2
XSTHS1P050BP10V1	Hybrid Inverter 5kW	PACK10.2
XSTHS1P050BP20V1	Hybrid Inverter 5kW	PACK20.4
XSTHS1P060BP20V1	Hybrid Inverter 6kW	PACK20.4
XSTHS1P060BP25V1	Hybrid Inverter 6kW	Pack25.6

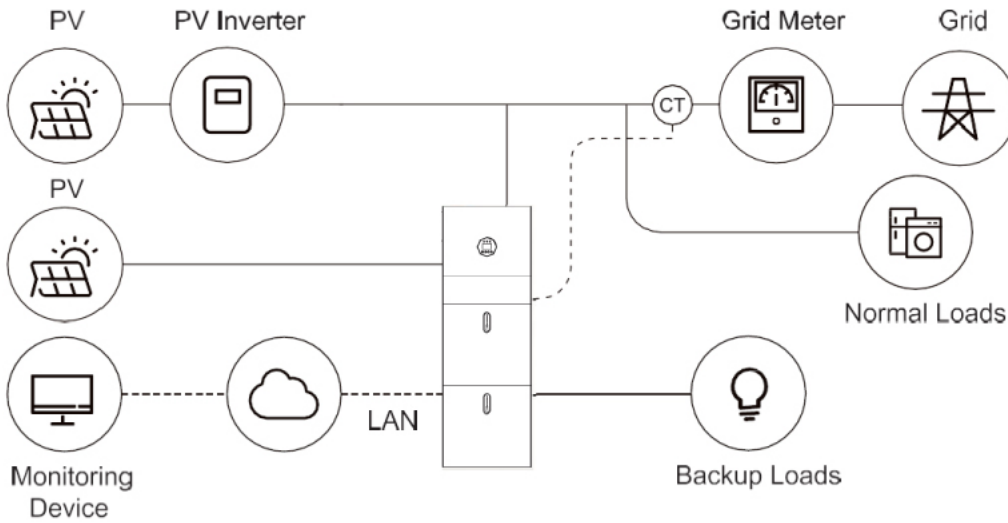
**Figure 1. DC-coupled storage system-scheme**



**Figure 2. AC-coupled storage system-scheme 1**



**Figure 3. AC-coupled storage system-scheme 2**



## 1.2 Operation Modes

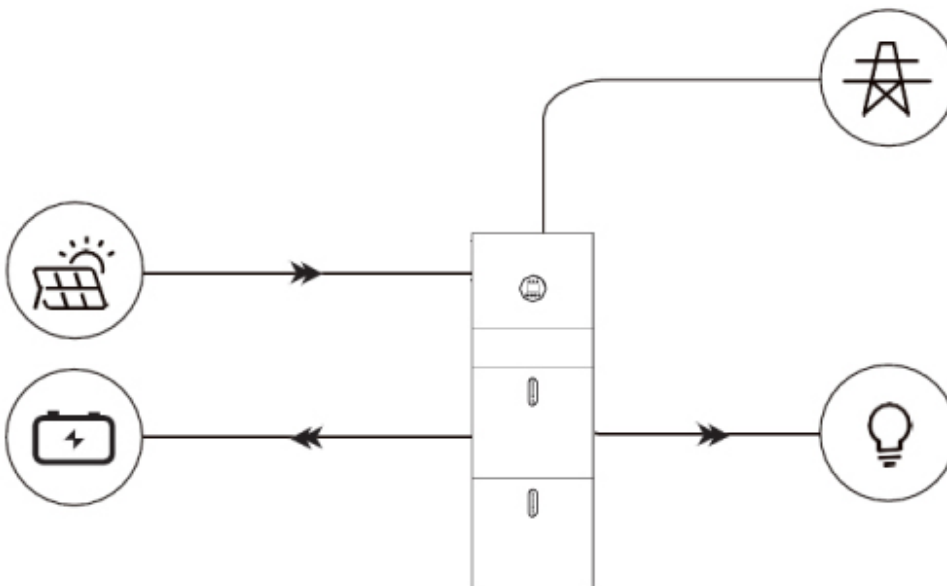
There are three basic modes that end users can choose via inverter screen/APP.

**SELF CONSUME:** The energy generated by the solar panels will be used in the following order: Feed the home loads; Charge the battery and then, feed into the grid.

When the sun is off, the load will be supported by battery to enhance self-consumption.

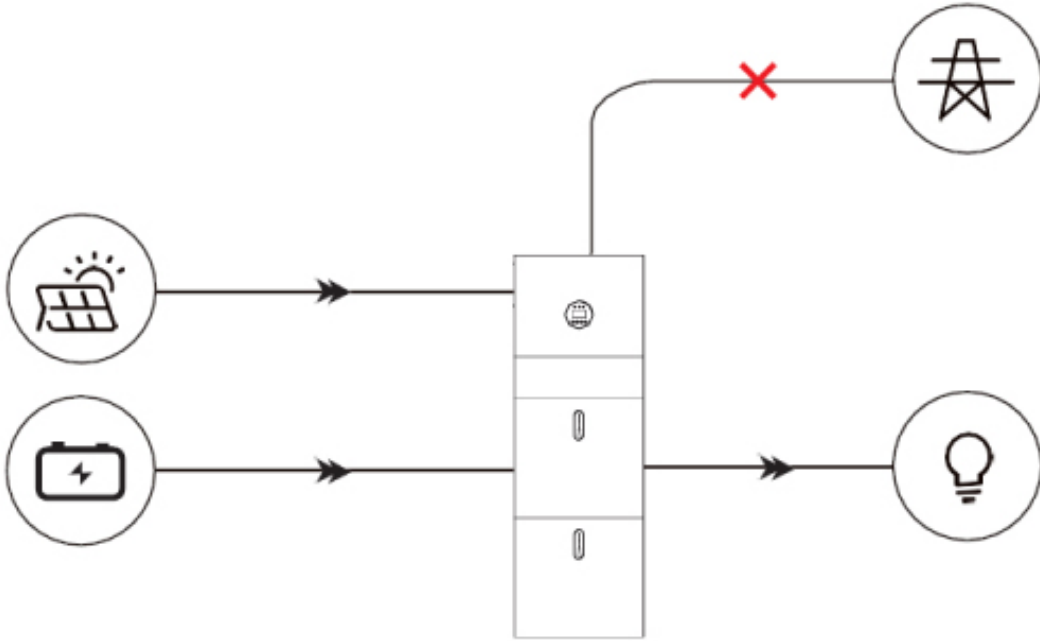
If the power supply from the batteries is not sufficient, the grid will support the load demand.

**Figure 4. Self-consume operation mode**



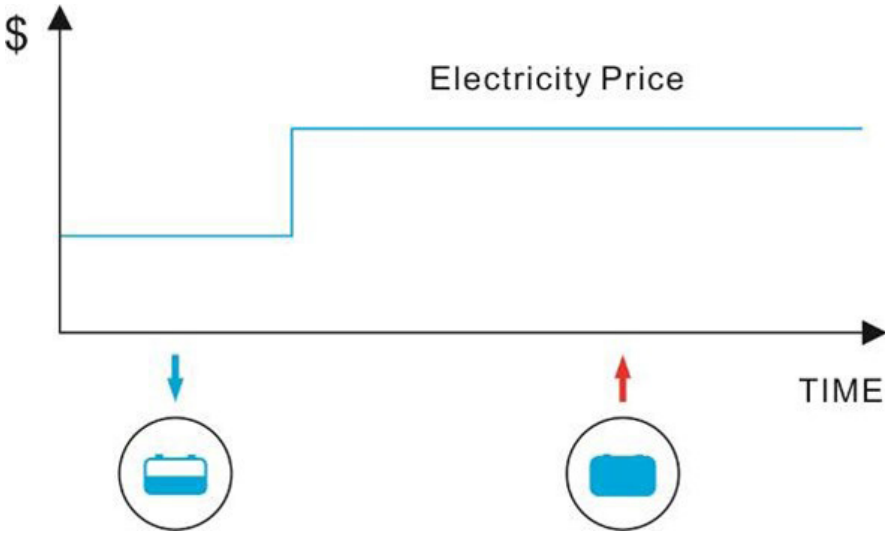
**BAT PRIORITY:** Under this mode, the battery is only used as a backup power supply when the grid fails and as long as the grid works, the batteries won't be used to power the loads. The battery will get charged with the power generated by the PV system or from the grid.

**Figure 5. Battery priority operation mode**



**PEAK SHIFT:** This mode is designed for time-use mode customer. The customer is able to set up the charging/discharging time & power via inverter screen or APP.

**Figure 6. Peak shift operation mode**





## 1.3 Safety Introduction

### 1.3.1 Manual Keeping

This manual contains important information about operating the system. Before operating, please read it very carefully. The system should be operated in strict accordance with the instructions in the manual, otherwise it can cause damages or loss to equipment, personnel and property. This manual should be kept carefully for maintenance and reparation.

### 1.3.2 Operator Requirements

The operators require a professional qualification or training.

The operators should be familiar with the whole storage system, including compositions and working principles of the system.

The operators should be familiar with the Product Instruction.

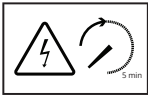
While maintaining, the maintainer is not allowed to operate any equipment until all the equipment has been turned off and fully discharged.

### 1.3.3 Protection of Warning Sign

The warning signs contain important information for the system to operate safely, and it is strictly prohibited to torn or damage them. Ensure that the warning signs are always well-functioned and correct placed. The signs must be replaced immediately when damaged.



This sign indicates a hazardous situation which, if not avoided, could result in death or serious injury!



The XSTHS1P-3.68K, XSTHS1P-5K, XSTHS1P-6K must not be touched or put into service until 5 minutes after it has been switched off or disconnected to prevent an electric shock or injury.



This sign shows danger of hot surface!



Refer to the operating instructions.

### 1.3.4 Setting of Warning Sign for Safety

During instruction, maintenance, and repair, follow the instructions below to prevent non-specialist personnel from causing misuse or accident:

- Obvious signs should be placed at front switch and rear-level switch to prevent accidents caused by false switching.
- Warning signs or tapes should be set near operating areas.
- The system must be reinstalled after maintenance or operation.

### 1.3.5 Measuring Equipment

To ensure the electrical parameters to match requirements, related measuring equipment are required when the system is being connected or tested. Ensure that the connection and use matched specification to prevent electric arcs or shocks.

### 1.3.6 Moisture Protection

It is very likely that moisture may cause damages to the system. Repair or maintaining activities in wet weather should be avoided or limited.

### 1.3.7 Operation after Power Failure

The battery system is part of the energy storage system which stores life-threatening high voltage even when the DC side is switched off. Touching the battery outlets is strictly prohibited. The inverter can keep a life-threatening voltage even after disconnecting it from the DC and / or AC side. Therefore, for safety reasons, it must be tested with a properly calibrated voltage tester before an installer works on the equipment.

### 1.3.8 Hazard Information

#### Classification of the hazardous chemical

Exempt from classification according to Australian WHS regulations.

#### Other hazards

This product is a Lithium Iron Phosphate Battery with certified compliance under the UN Recommendations on Transport of Dangerous Goods, Manual of Tests and Criteria, Part III, subsection 38.3. For the battery cell, chemical materials are stored in a hermetically sealed metal case, designed to withstand temperatures and pressures encountered during normal use. As a result, during normal use, there is no physical danger of ignition or explosion and chemical danger of hazardous materials' leakage. However, if the product is exposed to a fire, added mechanical shocks, decomposed, added electric stress by misuse, the gas release vent will be operated. The battery cell case will be breached at the extreme. Hazardous materials may be released. Moreover, if heated strongly by the surrounding fire, acrid or harmful fume may be emitted.

### 1.3.9 Safety Datasheet

For detailed information please refer to the provided battery safety datasheet.

## 1.4 General Precautions



### DANGER

Danger to life due to high voltages of the PV array, battery and electric shock. When exposed to sunlight, the PV array generates dangerous DC voltage which will be present in the DC conductors and the live components of the inverter. Touching the DC conductors or the live components can lead to lethal electric shocks. If you disconnect the DC connectors from the system under load, an electric arc may occur leading to electric shock and burns.

- Do not touch uninsulated cable ends. Do not touch the DC
- Do not open the inverter and battery.
- Do not wipe the system with damp cloth.
- Have the system installed and commissioned by qualified people with the appropriate skills only.
- Prior to performing any work on the inverter or the battery pack, disconnect the inverter from all voltage sources as described in this document.



### WARNING

Risk of chemical burns from electrolyte or toxic gases. During standard operation, no electrolyte shall leak from the battery pack and no toxic gases shall form. Despite careful construction, if the Battery Pack is damaged or a fault occurs, it is possible that electrolyte may be leaked or toxic gases formed.

- Do not install the system in any environment of temperature below -10°C or over 50°C and in which humidity is over 95%.
- Do not touch the system with wet hands.
- Do not put any heavy objects on top of the system.
- Do not damage the system with sharp objects.
- Do not install or operate the system in potentially explosive atmospheres or areas of high humidity.
- Do not mount the inverter and the battery pack in areas containing highly flammable materials or gases.
- If moisture has penetrated the system (e.g. due to a damaged enclosure), do not install or operate the system.
- Do not move the system when it is already connected with battery modules. Secure the system to prevent tipping with restraining straps in your vehicle.
- The transportation of XSTHS1P-3.68K, XSTHS1P-5K, XSTHS1P-6K must be made by the manufacturer or an authorized people. These instructions shall be recorded and repeated.
- A certified ABC fire extinguisher with minimum capacity of 2kg must be carried along when transporting.
- It is totally prohibited to smoke in the vehicle as well as close to the vehicle when loading and unloading.
- For the exchange of a battery module, please request for new hazardous goods packaging if needed, pack it and let it be picked up by the suppliers.
- In case of contact with electrolyte, rinse the affected areas immediately with water and consult a doctor without delay.



### CAUTION

Risk of injury through lifting or dropping the system. The inverter and battery are heavy. There is risk of injury if the inverter or battery is lifted incorrectly or dropped during transport or when attaching to or removing from the wall.

- Lifting and transporting the inverter and battery must be carried out by more than 2 people.





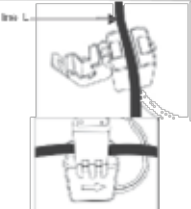

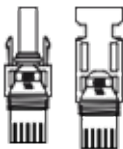





## 1.5 Parts List

Check the following parts list to ensure it is complete.

Delivers a total system separately on site to client, this consists of:





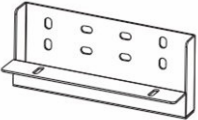
### Inverter

Figure 7. Inverter box content

					
6×M5*12	5×ST6.3*50	5×D10*50	2×CT Connector	1x CT and com cable	2×AC Collector
					
4×MC4	1×Collector	1×Mounting Panel	5×M6 Gasket	1×COM Connector	1×User Manual

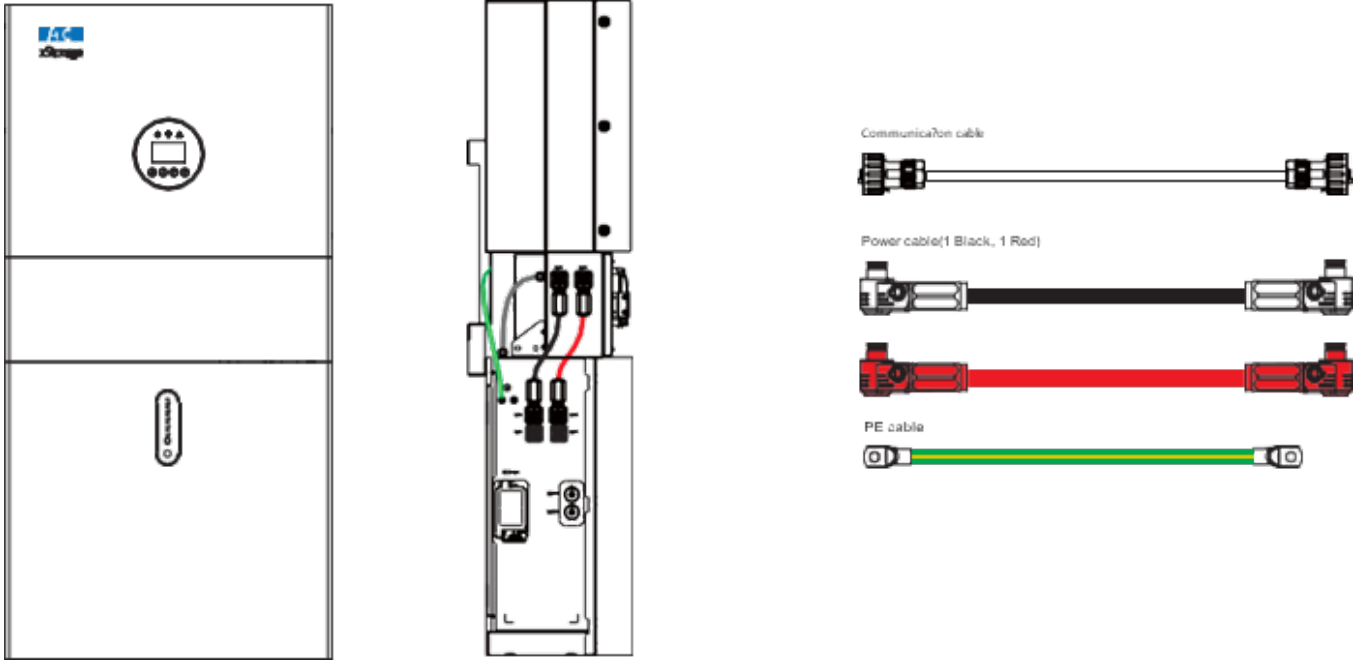
### PACK 5.1

Figure 8. Mounting panel box content

			
4×ST6.3*50	4×D10*50	2×M5*12	4×M6 Gasket
			
1×Mounting Panel			

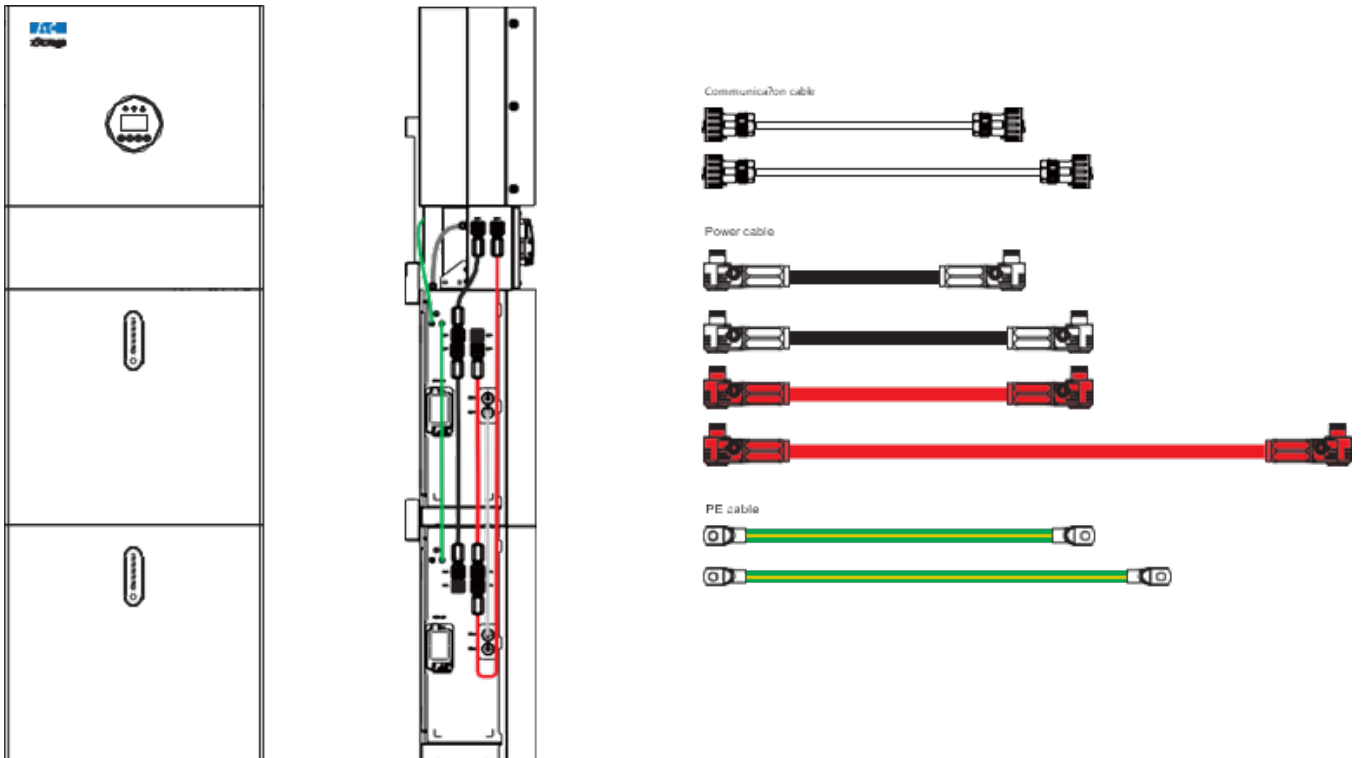
## Accessory - Cable (PACK5.1)

Figure 9. Accessory cables 1



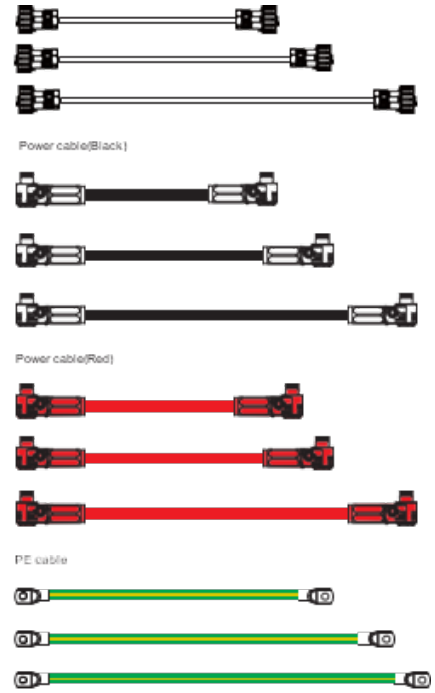
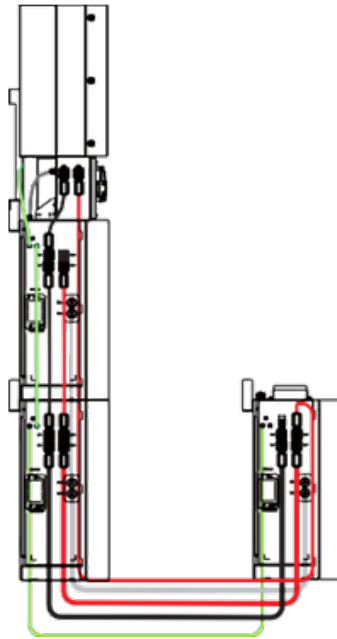
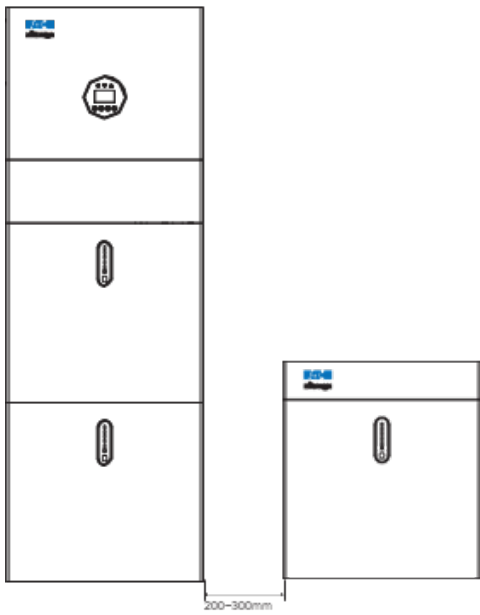
## Accessory - Cable (PACK10.2)

Figure 10. Accessory cables 2



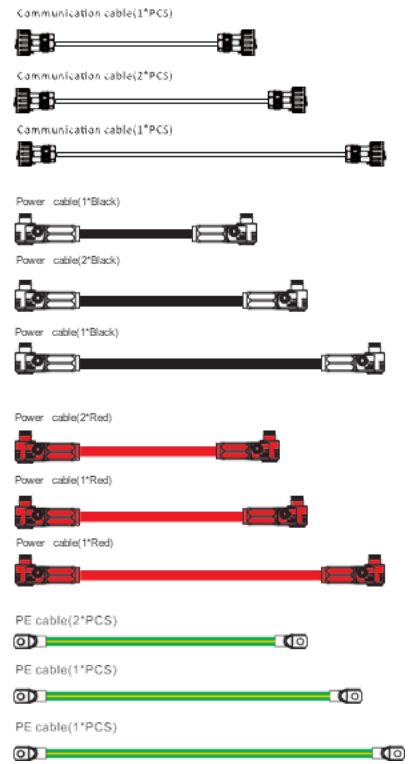
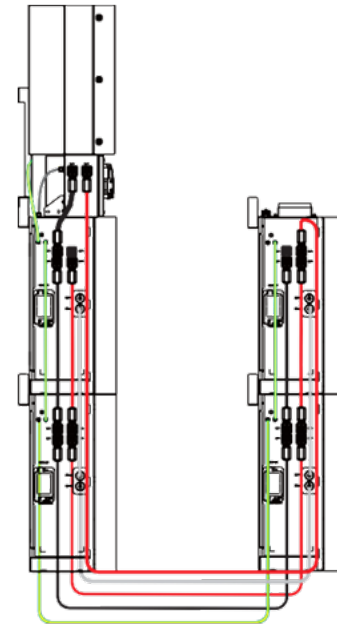
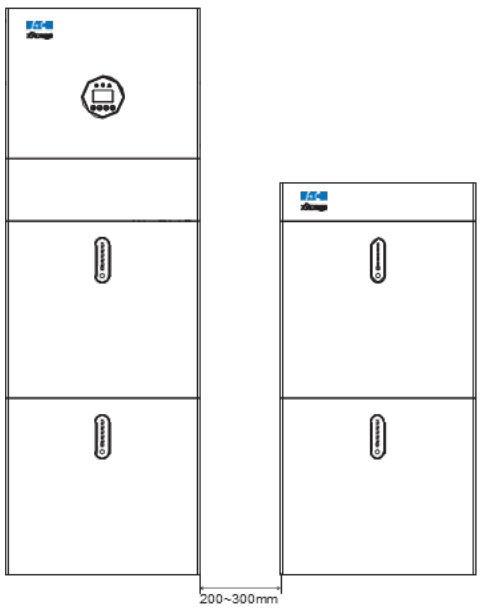
## Accessory - Cable (PACK15.3)

Figure 11. Accessory cables 3



## Accessory - Cable (PACK20.4)

Figure 12. Accessory cables 4



## Accessory - Cable (PACK25.6)

Figure 13. Accessory cables 5

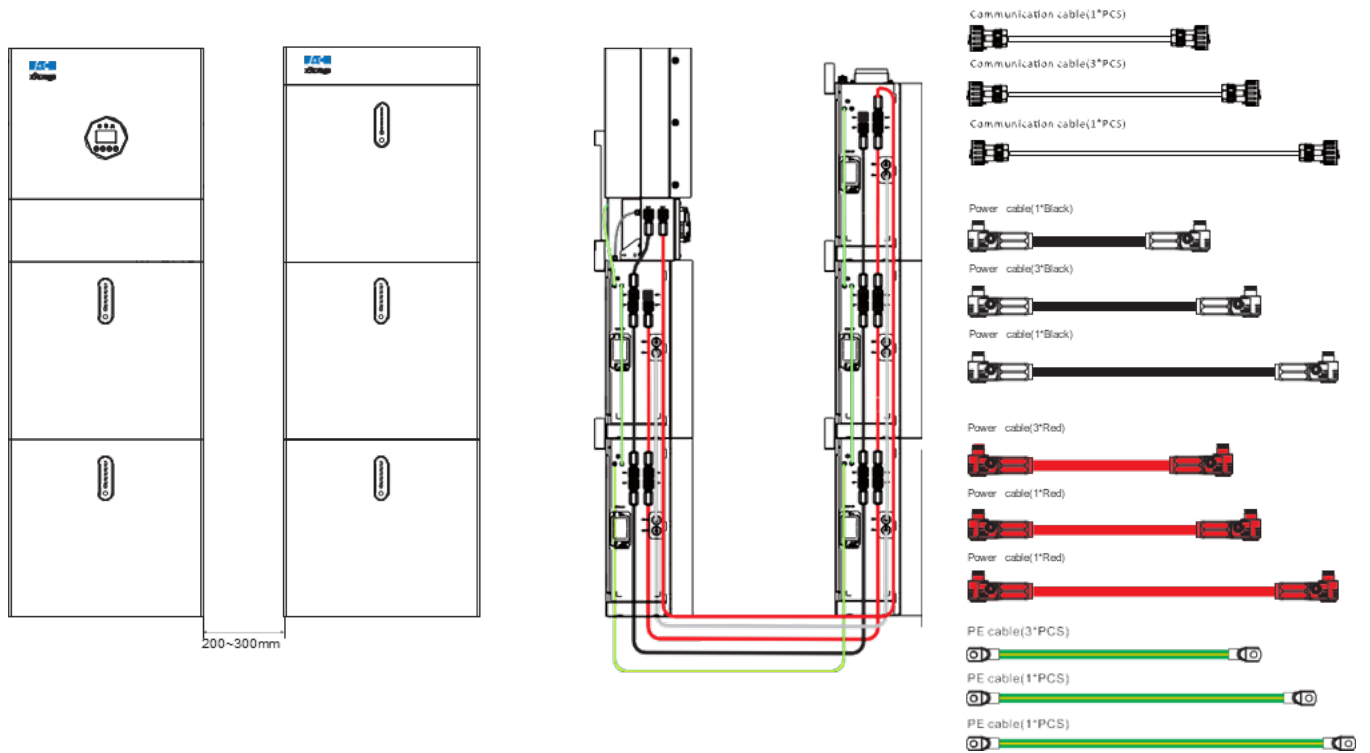
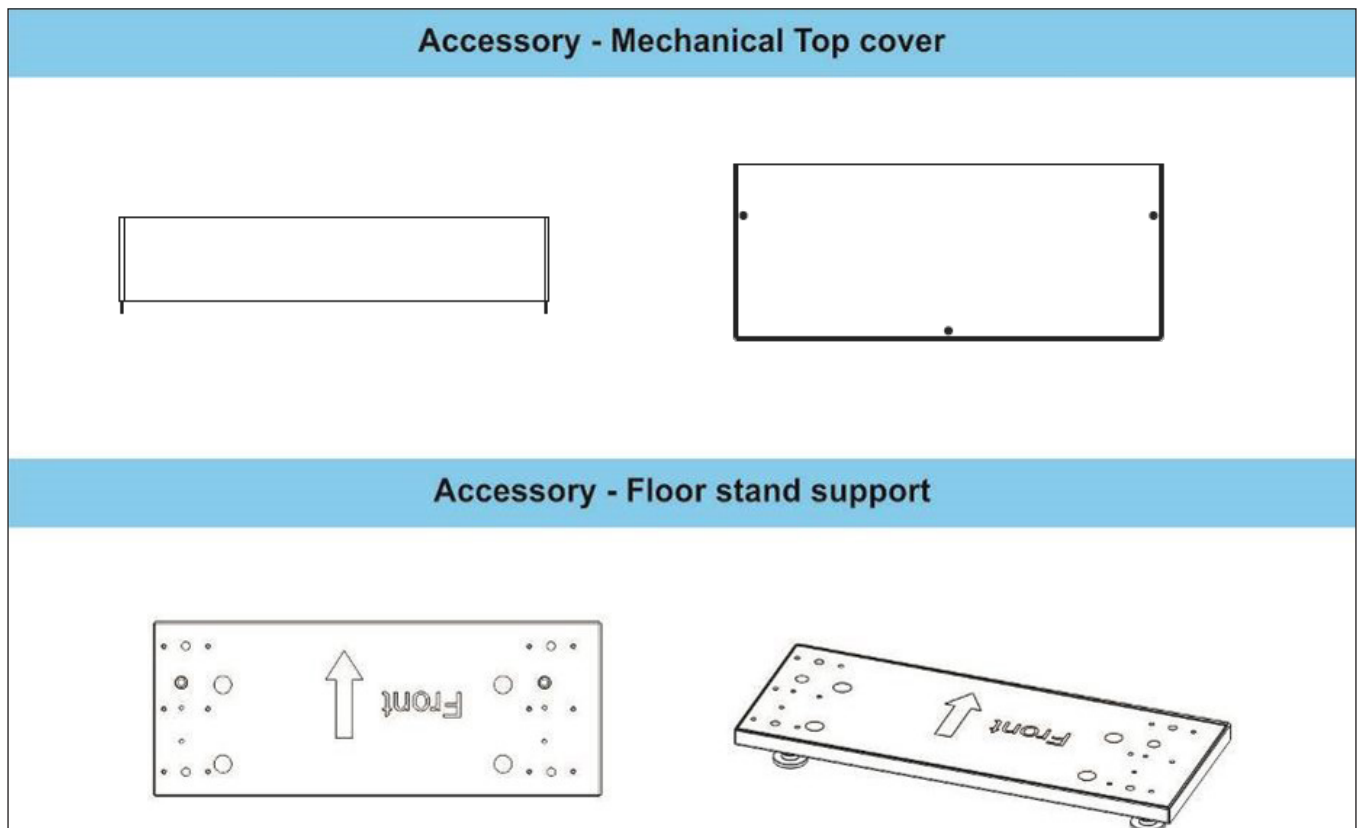
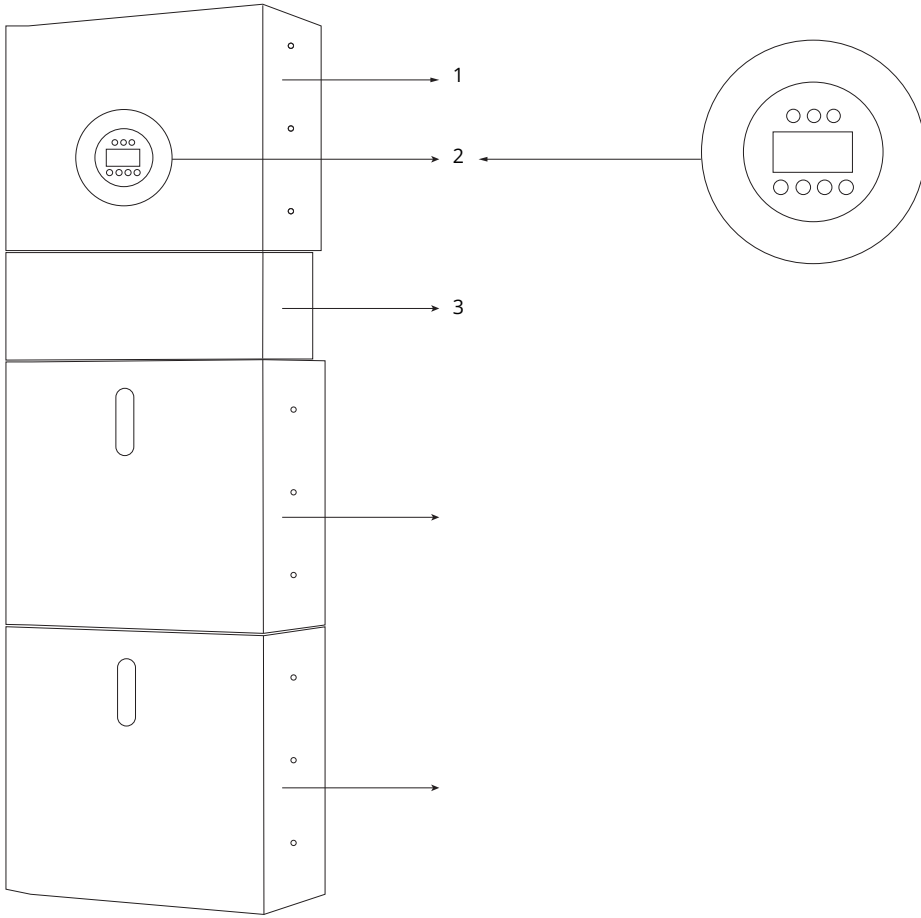


Figure 14. Accessories



## 1.6 System Appearance

Figure 15. XSTHS1P-3.68K, XSTHS1P-5K, XSTHS1P-6K Delivery Scope



Object	Description
1	Hybrid Inverter
2	EMS Display Screen
3	Cable Box (connected to Inverter)
4	PACK5.1 (Battery 1)
5	PACK5.1 (Battery 2)



## 1.6.1 Cable Box Part

Figure 16. Inverter without Cable Box Covers - Front View

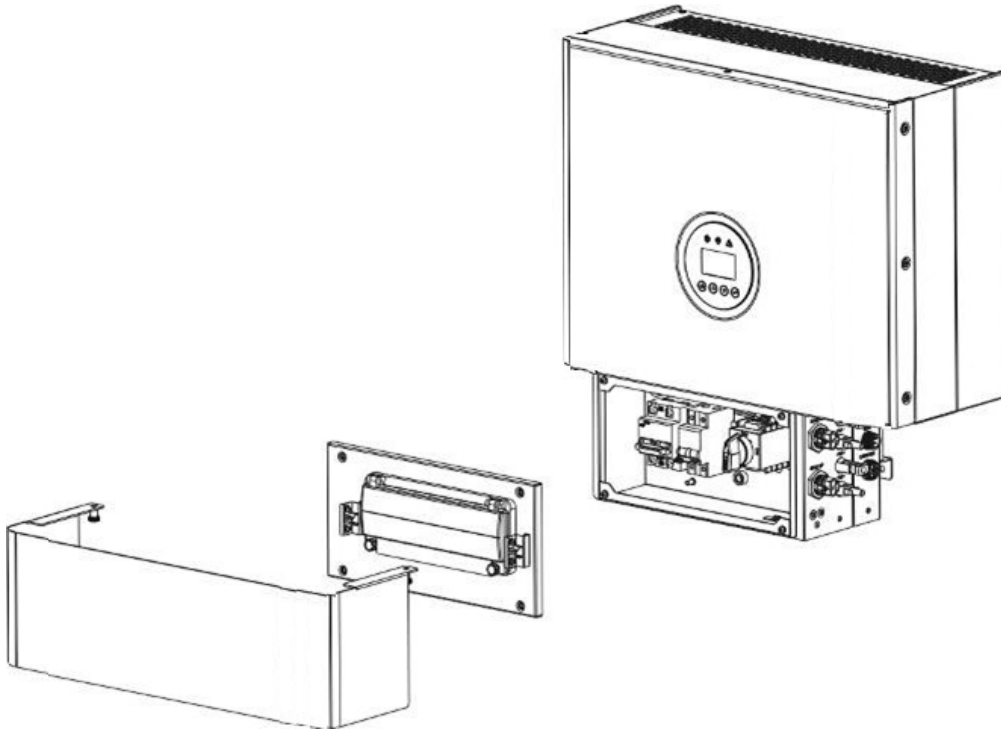
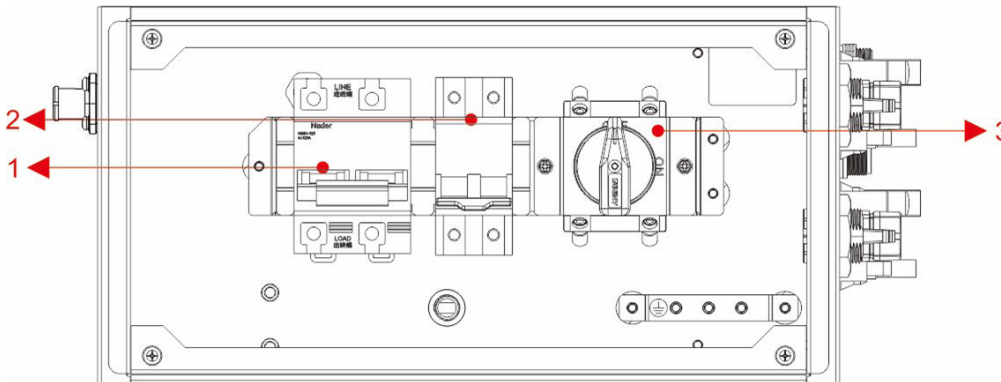
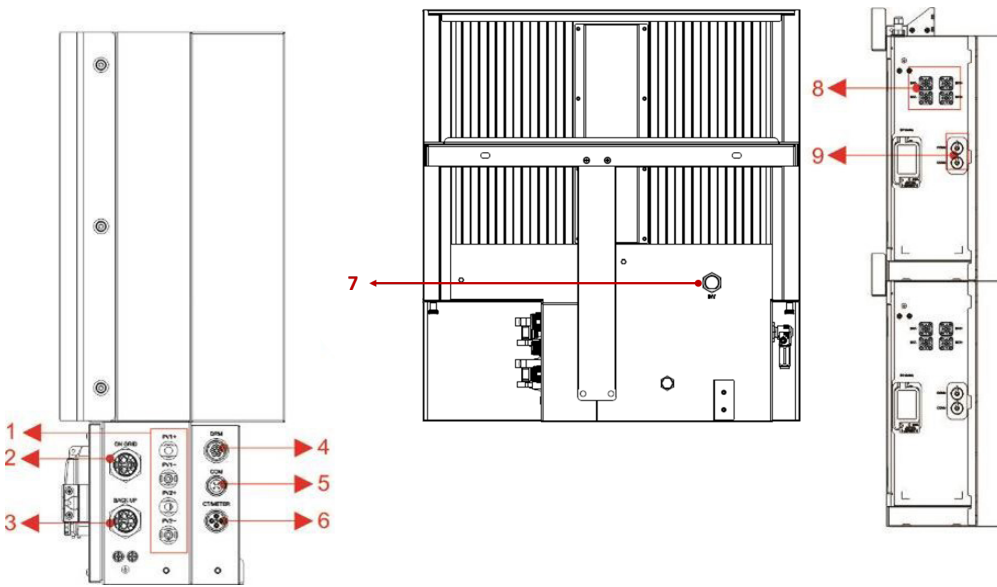


Figure 17. Cable Box Part without Covers - Front View



Object	Description
1	Battery circuit breaker
2	Output Backup circuit breaker
3	DC isolation switch

**Figure 18. Cable Box Part without Covers**



Object	Description	DVC class	Object	Description	DVC class
1	PV1, PV2	DVC C	2	GRID	DVC C
3	BACKUP	DVC C	4	DRM	DVC A
5	COM	DVC A	6	CT/METER	DVC A
7	INV	DVC C	8	BAT+,BAT-	DVC C
9	RJ45	DVC C			

## 1.7 Liability Limitation

Any product damage or property loss caused by the following conditions, does not assume any direct or indirect liability.

- Product modified, design changed, or parts replaced without authorization;
- Changes, repair attempts and erasing of series number or seals by non-company technician;
- System design and installation are not in compliance with standards and regulations;
- Fail to comply with the local safety regulations (VDE for DE, SAA for AU);
- Transport damage (including painting scratch caused by rubbing inside packaging during shipping). A claim should be made directly to shipping or insurance company in this case as soon as the container/package is unloaded, and such damage is identified;
- Fail to follow any/all of the user manual, the installation guide and the maintenance regulations;
- Improper use or misuse of the device; Insufficient ventilation of the device;
- The maintenance procedures relating to the product have not been followed to an acceptable standard;
- Force majeure (violent or stormy weather, lightning, overvoltage, fire etc.); Damages caused by any external factors.

## 2. Installation

This Manual introduces the basic steps to install and set up.



Please be cautious unpacking the battery, otherwise components could be damaged.

### 2.1 Installation Site and Environment

#### 2.1.1 General

This xStorage Hybrid energy storage system is outdoor version and can be installed in an outdoor or an indoor location.

When xStorage Hybrid systems are installed in a room, xStorage Hybrid must not be hampered by the structure of the building, the furnishings and equipment of the room.

The xStorage Hybrid is naturally ventilated. The location should therefore be clean, dry and adequately ventilated. The mounting location must allow free access to the unit for installation and maintenance purposes, and the system panels must not be blocked.

- The following locations are not allowed for installation:
- Habitable rooms;
- Ceiling cavities or wall cavities; on roofs that are not specifically considered suitable; access / exit areas or under stairs / access walkways;
- Where the freezing point can be reached, such as garages, carports or other places as well as wet rooms (environmental category 2); locations with humidity and condensation over 95%; places where salty and humid air can penetrate;
- Seismic areas - additional security measures are required;
- Sites with altitude over 2000m;
- Places with an explosive atmosphere;
- Locations with direct sunlight or a large change in the ambient temperature;
- Places with flammable materials or gases or an explosive atmosphere.

#### 2.1.2 Restricted Locations

The xStorage Hybrid shall not be installed:

- (a) In restricted locations as defined for panels in AS / NZS 3000;
- (b) Within 600mm of any heat source, such as hot water unit, gas heater, air conditioning unit or any other appliance.
- (c) Within 600mm of any exit;
- (d) Within 600mm of any window or ventilation opening;
- (e) Within 900mm of access to 240Vac connections;
- (f) Within 600mm of side of other device.

A xStorage Hybrid installed in any corridor, hallway, lobby or the like and leading to an emergency exit shall ensure sufficient clearance for safe egress of at least 1 meter.

The xStorage Hybrid must also not be installed in potentially explosive atmospheres for gas cylinders that are heavier than air gases and have a vent clamp in accordance with AS / NZS 3000.

### 2.1.3 Barrier to Habitable Rooms

To protect against the spread of fire in living spaces where the xStorage Hybrid is mounted or on surfaces of a wall or structure in living spaces with a XStorage Hybrid on the other side, the wall or structure shall have a suitable non-combustible barrier. If the mounting surface itself is not made of a suitable non-combustible material, a non-combustible barrier can be placed between the xStorage Hybrid and the surface of a wall or structure.

If the xStorage Hybrid is mounted at a wall or at a distance of 300mm from the wall or the structure separating it from the habitable space, the distances to other structures or objects must be increased. The following distances must remain free:

600 mm beside ; 500 mm above; 600 mm before the xStorage Hybrid.

If the distance between the xStorage Hybrid and the ceiling or any object above the system is less than 500mm, the ceiling or structural surface above the system must be made of noncombustible material within a radius of 600mm around the system.

The xStorage Hybrid must be mounted to ensure the highest point is not more than 2.2m above the ground or the platform.

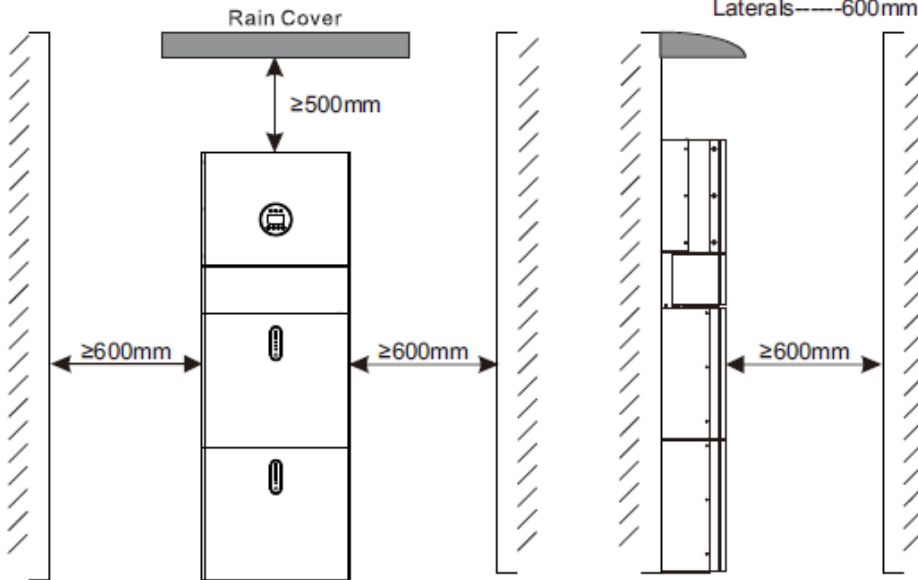


A shelter must be installed above the Energy Storage System.

**Figure 19. Limited Distance of Installation to Neighboring Objects**

Note: A shelter must be installed above the Energy Storage System.

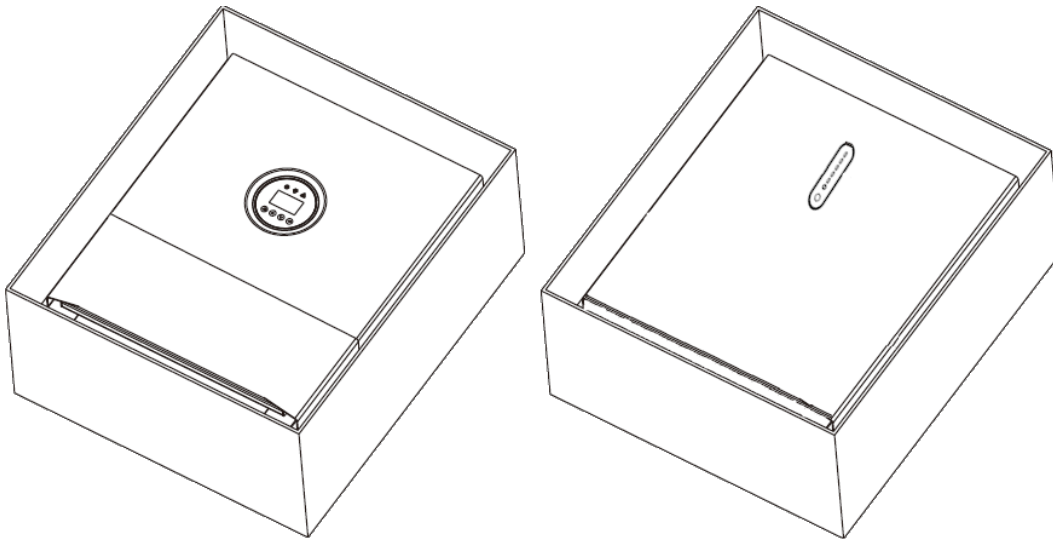
Top----- 500mm  
 Front----- 600mm  
 Laterals-----600mm



## 2.2 Installation

**Step 1.** Remove the battery and inverter from the packaging box.

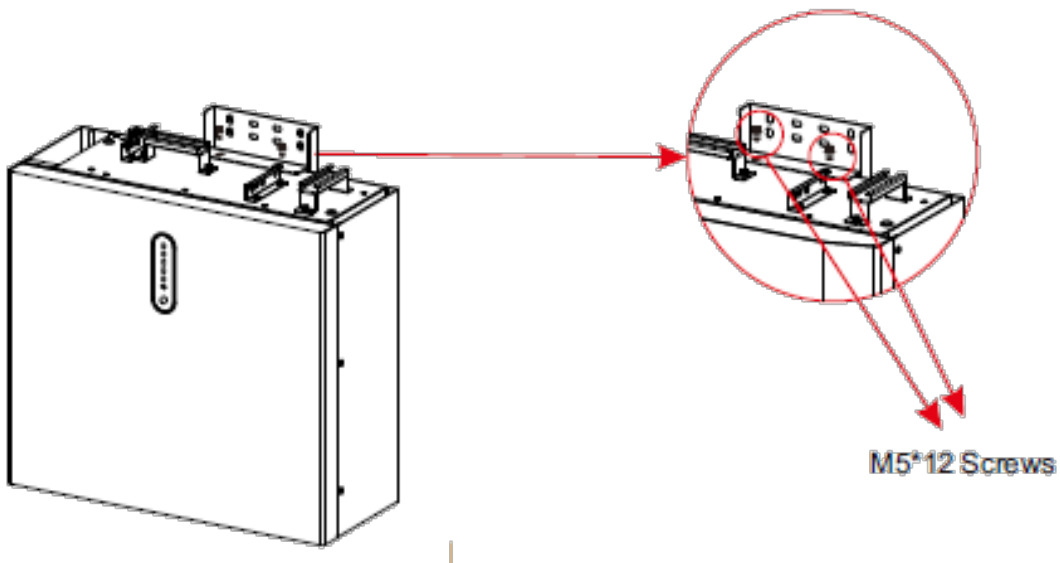
**Figure 20. Unpacking the inverter and battery**



### 2.2.1 Battery Installation

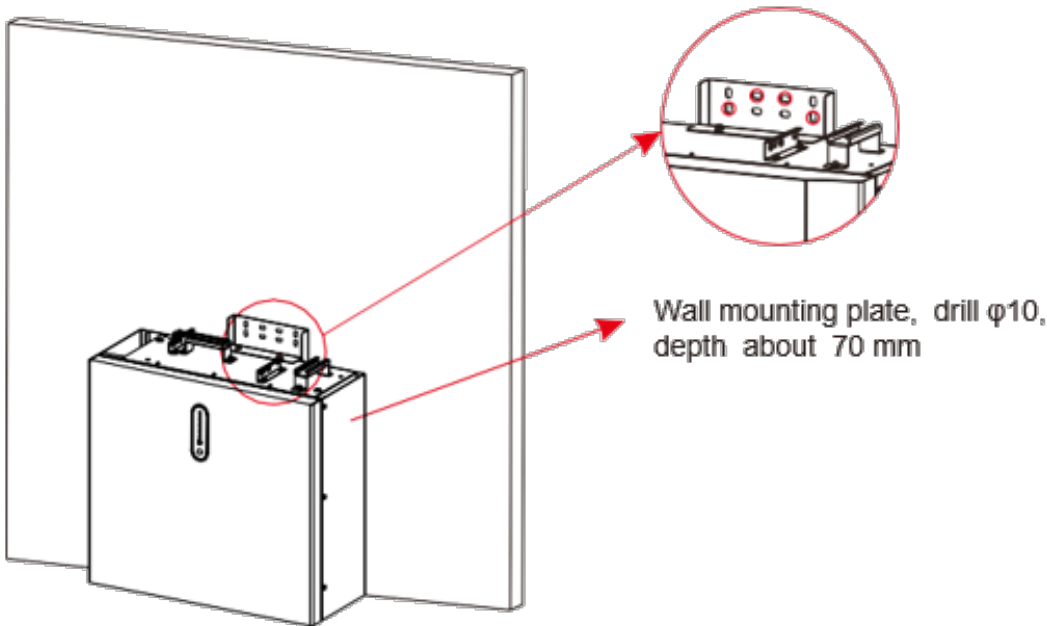
**Step 2.** Assemble the battery mounting panel on the battery.

**Figure 21. Assemble Battery Mounting Panel**



**Step 3.** Position the battery parallel to the wall and use a  $\Phi 10\text{mm}$  drill to drill holes at a depth of about 70mm in the wall for subsequent fixation of the mounting plates. > Position the battery parallel to the wall and use a  $\Phi 10\text{mm}$  drill to drill holes at a depth of about 70mm in the wall for subsequent fixation of the mounting plates.

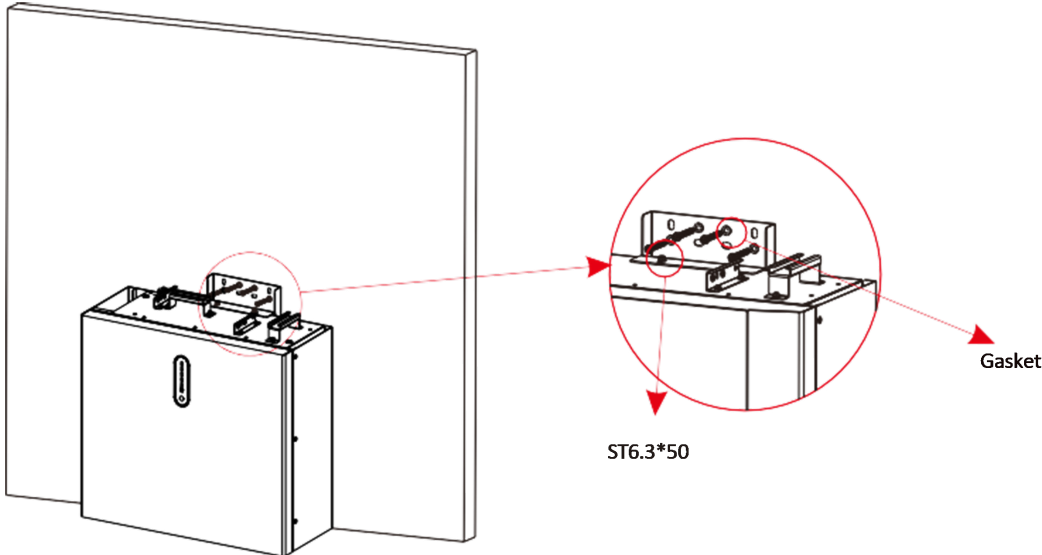
**Figure 22. Battery Installation - Drill Holes**



The inverter's built-in residual-current monitoring unit (RCMU) removes DC residual current above 6mA, so an external RCD (type A or type B) can be used with the system ( $\geq 30\text{mA}$ ). In addition, the installation of inverter must fulfill AS/NZS 3000, AS/NZS 4777.1 and AS/NZS 5033. The internal N line of converter is connected to grid neutral via internal relays, when in stand-alone mode.

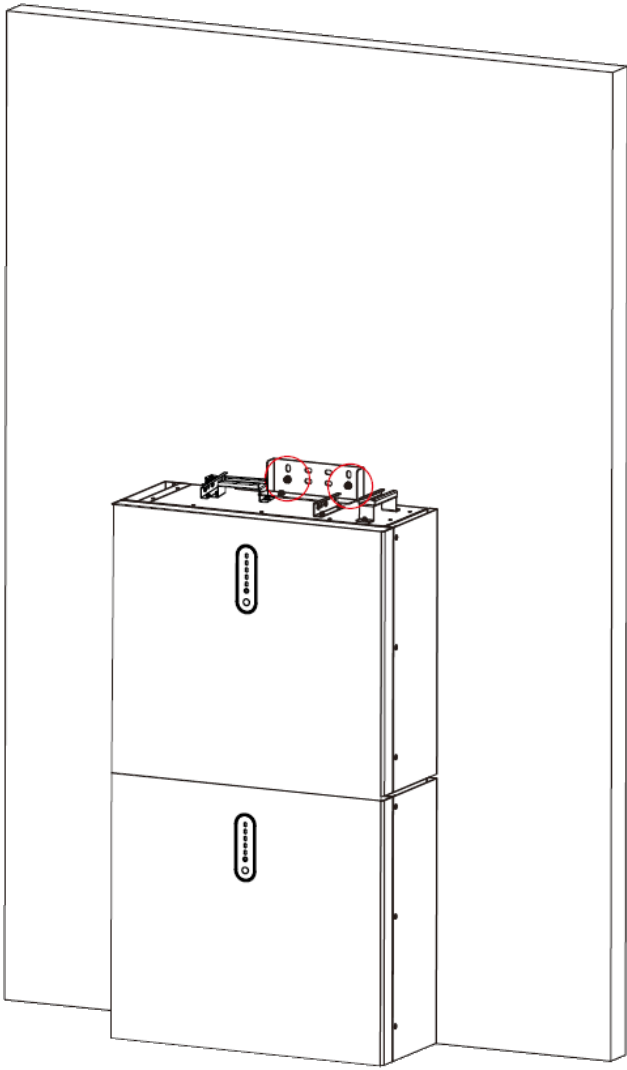
**Step 4.** Remove the debris baffle and secure the battery to the wall with screws and gaskets.

**Figure 23. Battery Installation-Mounting on the Wall**



**Step 5.** To assemble the second (and all other) battery, repeat step 6 and 7, respectively.

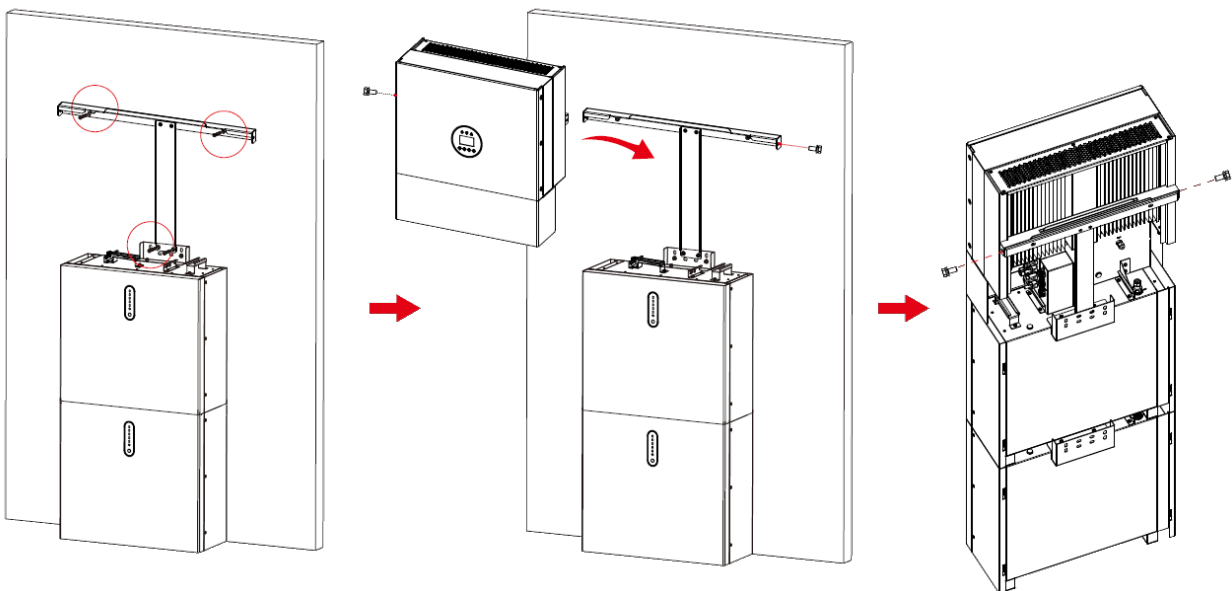
**Figure 24. Battery Installation Second Battery Installation**



## 2.2.2 Inverter Installation

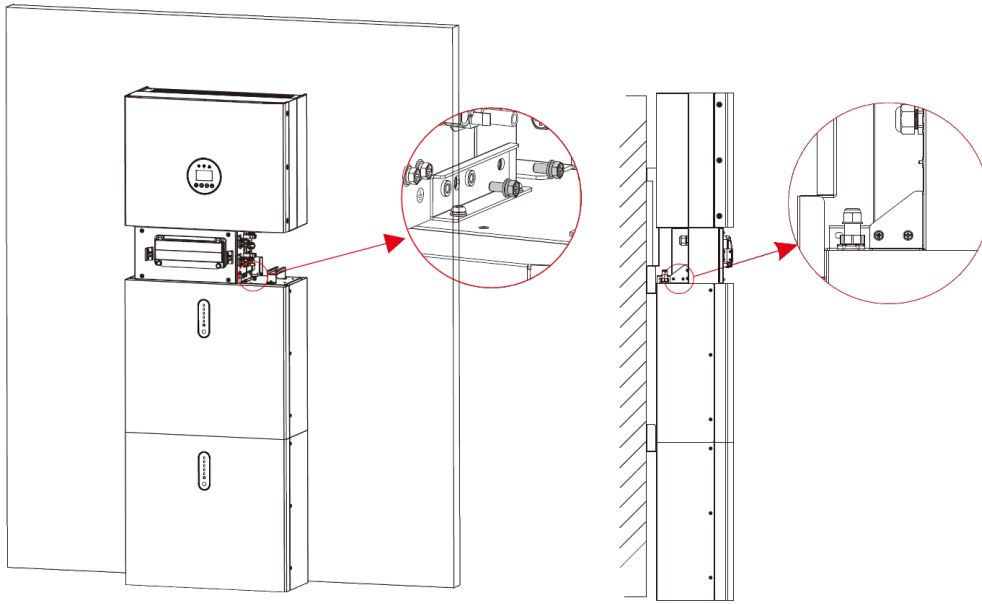
**Step 6.** To assemble the second (and all other) battery, repeat step 6 and 7, respectively.

**Figure 25. Inverter Installation**



**Step 7.** Hang the inverter onto the mounting panels, adjust the entire system and ensure that the battery and the inverter have been securely hung onto the panels and brackets.

**Figure 26. Inverter Installation on the Wall**



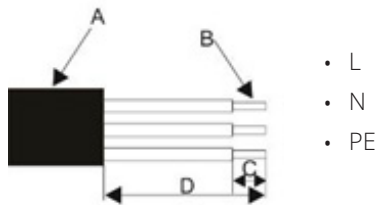
**Step 8.** Please make AC cables on site.

**Step 8-1.** Please follow the AC cable requirements below. For all AC connections, 4-10mm<sup>2</sup> 105 °C cable is required to be used. Please make sure the resistance of cable is lower than 1 ohm. If the wire is longer than 20m, it's recommended to use 10mm<sup>2</sup> cable.



There are "L" "N" "⚡" symbols marked inside the connector, the Line wire of grid must be connected to "L" terminal; the Neutral wire of grid must be connected to "N" terminal; the Earth of grid must be connected to "⚡"

**Figure 27. Cable connections**



Object	Description	Value
A	External diameter	7mm to 10mm
B	Copper conductor cross-section	4mm <sup>2</sup> to 6mm <sup>2</sup>
C	Stripping length of the insulated conductors	approx.13mm
D	Stripping length of the outer sheath of the AC cable	approx.53mm
The PE conductor must be 10mm longer than the Land N conductors		



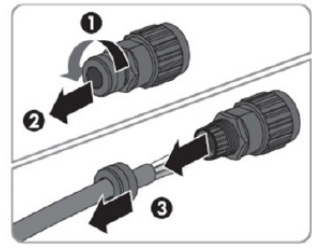
1. Insert the conductor into the suitable ferrule acc. to DIN 46228-4 and crimp the contact.

**Figure 28. Conductor cable**



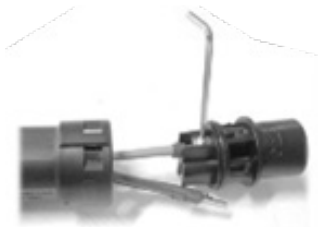
2. Unscrew the swivel nut from the threaded sleeve and thread the swivel nut and threaded sleeve over the AC cable.

**Figure 29. Threading the AC cable**



3. Insert the crimped conductors L, N and PE into the corresponding terminals and tighten the screw with a hex key wrench screwdriver (size: 2.5, 1.2~2.0 N.M). Ensure that all conductors are securely in place in the screw terminals on the bush insert.

**Figure 30. Inserting conductors**



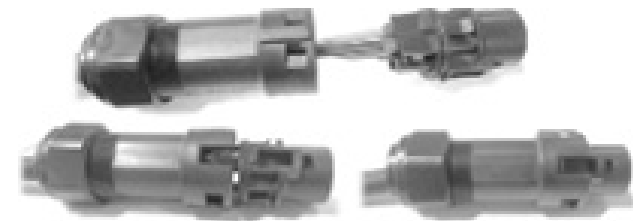
4. Screw the swivel nut onto the threaded sleeve. This seals the AC connector and provides strain relief for the AC cable. When doing so, hold the bush insert firmly by the locking cap. This ensures that the swivel nut can be screwed firmly onto the threaded sleeve.

**Figure 31. Sealing the AC connector**



5. Assembly the plug shell ,adapter as below picture, Push the adapter and shell by hand until a “Click” is heard or felt.

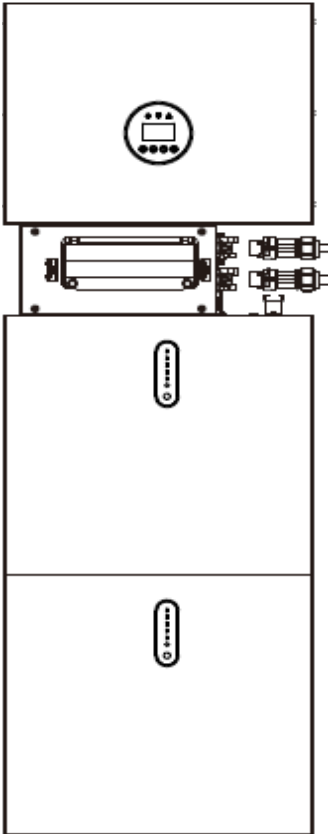
**Figure 32. Assembling the adapter**



6. Plug the AC connector into the jack for the AC connection by hand until a “Click” is heard or felt.

- Use tool to clamp the AC wiring terminal and wire rod; screw the nut, but do not tighten it. Make sure that the cable is free to pass through the waterproof components. Once the terminal is connected to the right site of the inverter, tighten the nut.

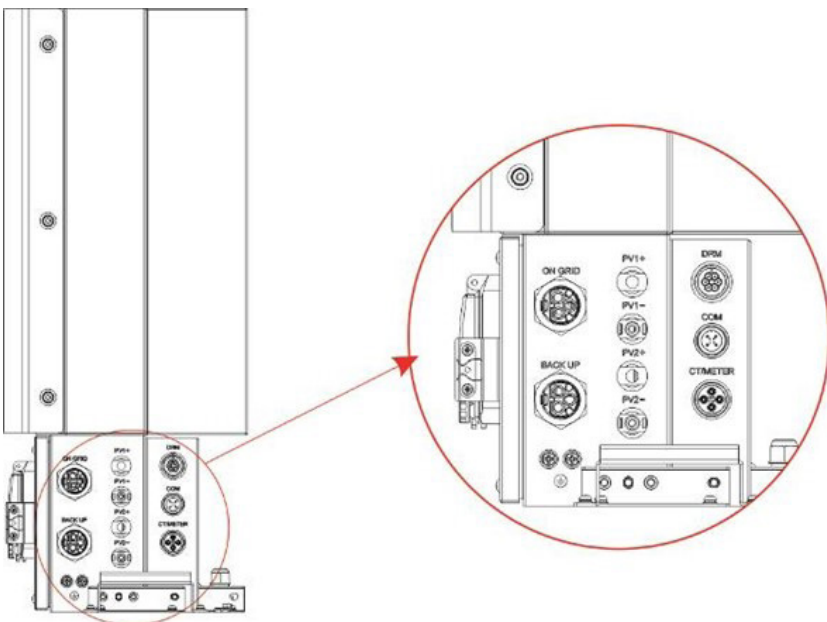
**Figure 33. Connecting the terminal**



- Connect the AC wiring terminal to the corresponding hole site of the inverter and lock it with a screwdriver or electric screw driver (suggestion: stem diameters and torsion of screwdriver or electric screwdriver should be 4mm and 8/12 cN)
- Tighten the nut.
- Circuit breaker parameters are recommended:  
 Back-up 32A/400Vac 6KA  
 On-grid 40A/400Vac 6KA

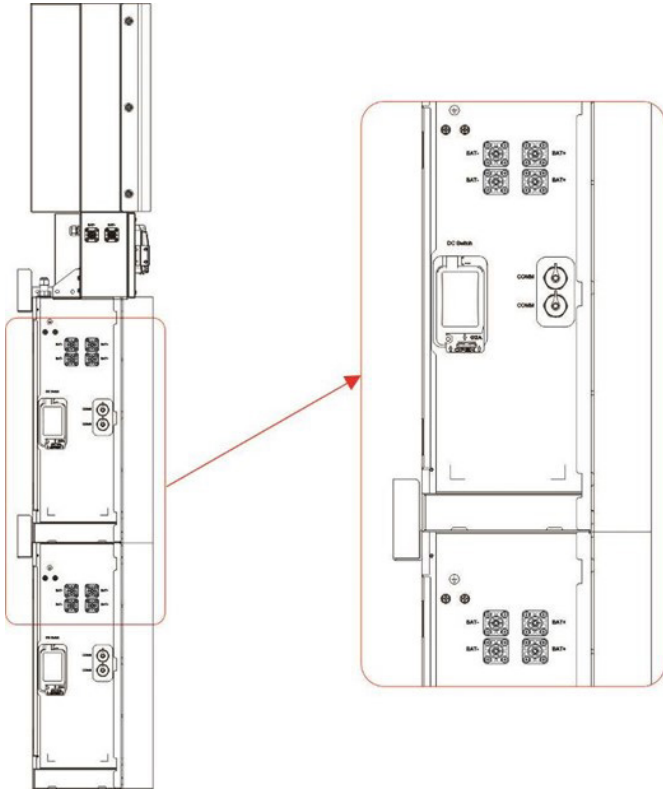
**Step 8-2.** Connect the Backup and Grid cables in advance according to the connector mode and connect them to the Backup and Grid board connectors in turn.

**Figure 34. Cable Box Bottom View, Wiring Connectors**



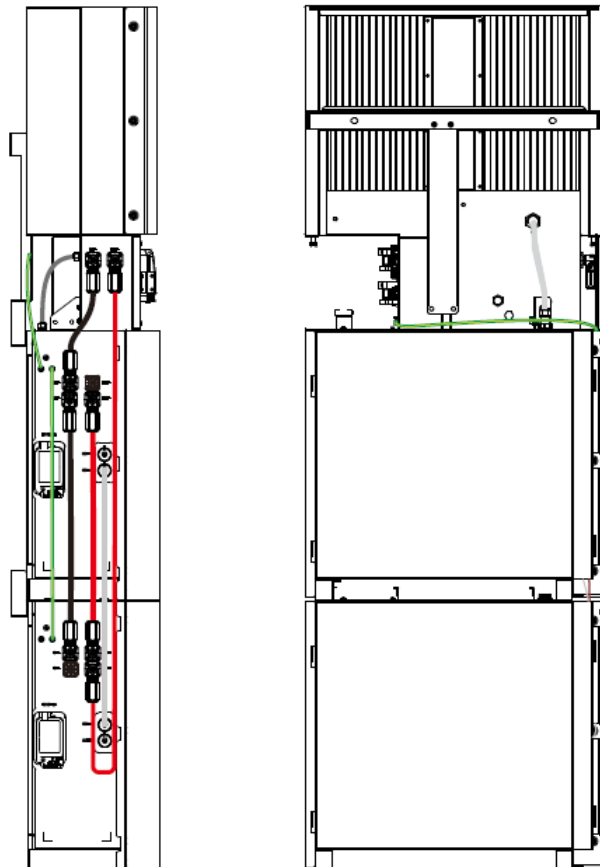
**Step 9.** Connect the BAT communication cable of the cable box from Step 13 to the topmost battery at the right side. Then use the communication cable supplied with the batteries to connect the batteries to each other via the respective connectors on the left side. After you have connected all the modules together, close all covers (if you want to connect further battery modules, you must mount them before closing).

**Figure 35. Wiring the Communication Cable**



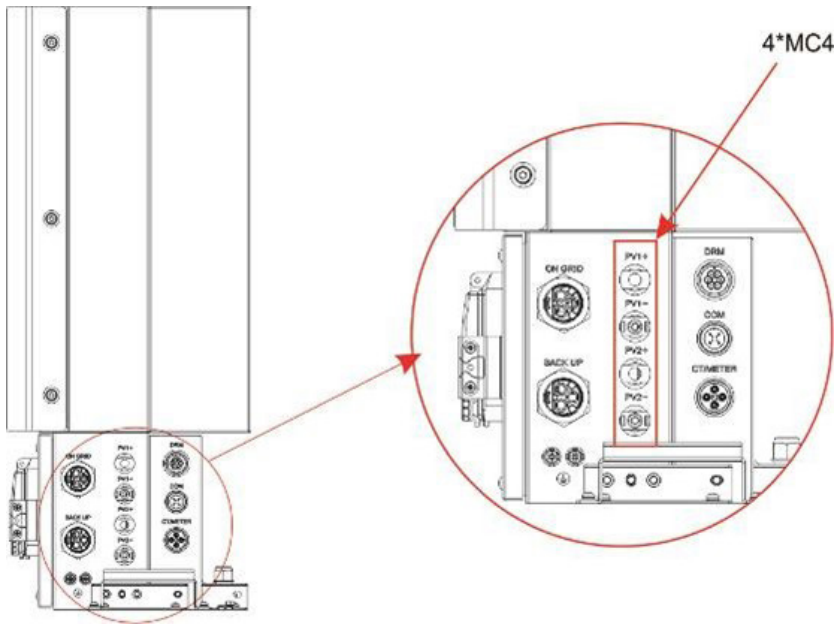
**Step 10.** Connect the power cables of the bottom battery from Step 4 to the side terminals of the top battery. Make sure that red connects to red and black connects to black.

**Figure 36. Wiring the Battery Power Cable**



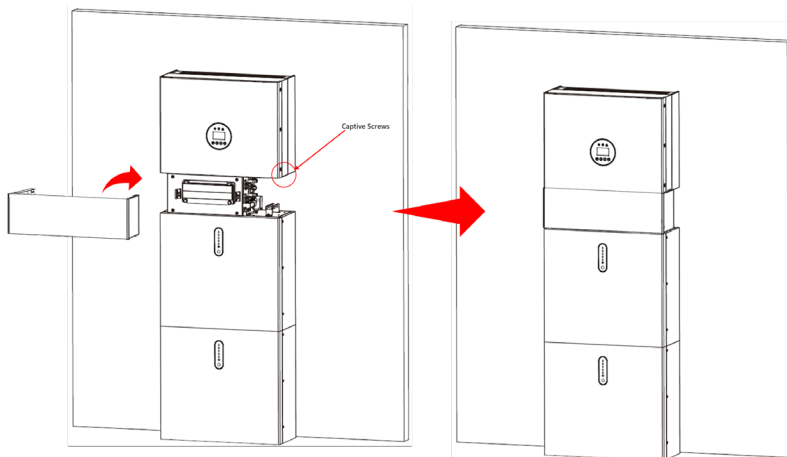
**Step 11.** Close the battery covers and connect the PV-MC4 connectors to the system (connection on both sides). Also, connect all AC cables, the meter communications cable METER, and the Ethernet cable LAN. Then close the cable box cover. The installation is now complete.

**Figure 37. PV Wiring**



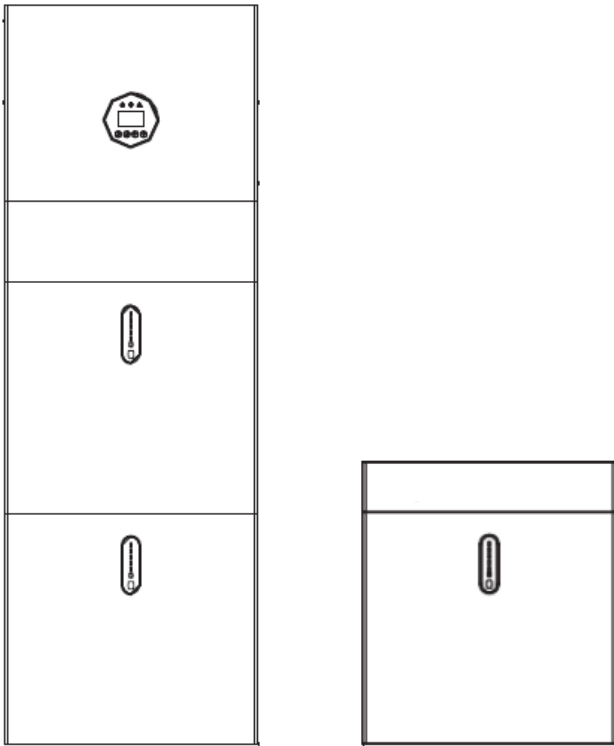
**Step 12.** Close the lid and tighten the screw.

**Figure 38. Closing the unit**



If you connect more than 2 battery modules to the system, please only install the additional batteries 3~5 on the side of the system. You can connect up to 5 batteries, 2 each mounted on top of each other, to the xStorage Hybrid. To do this, carry out the individual installation steps as for the first two batteries.

**Figure 39. Increase the Battery Modules**



**Step 13.** Commissioning of the energy storage system

After the installation of the energy storage system completed, in order to ensure the normal operation of the system, it is necessary to check the battery, PV and grid input parameters according to the following steps.

1. Manually press the reset button of the battery pack touch screen for 3-5S, then turn on the battery switch of both the battery pack and the hybrid inverter.  
After the green light of the capacity indicator on the battery pack touch screen is on and there is no red light alarm indication, check the screen Battery (chapter 4.2.4) and Battery parameter (chapter 4.2.5) interfaces after the inverter LCD screen is on for 5-10S. Check whether the temperature, voltage and capacity are normal:
  - the temperature determination is roughly based on the current ambient temperature of the system,
  - the voltage determination is in the range of  $50V \pm 3V$ ,
  - the capacity determination is 100AH for a single battery pack. When multiple battery packs are connected in parallel, the capacity is the number of battery packs multiplied by 100AH.
2. After PV input connected and PV switch of the hybrid inverter closed, check whether the voltage display on the PV input display interface is normal.
3. After connecting to the grid, check whether the voltage display on the Grid-connected output interface is normal.



The method of anti-islanding protection is Method (c)



After the first installation of the machine, the battery must be forcibly charged to 100% SOC before normal use, in order to calibrate SOC.

## 2.3 External CT Connection

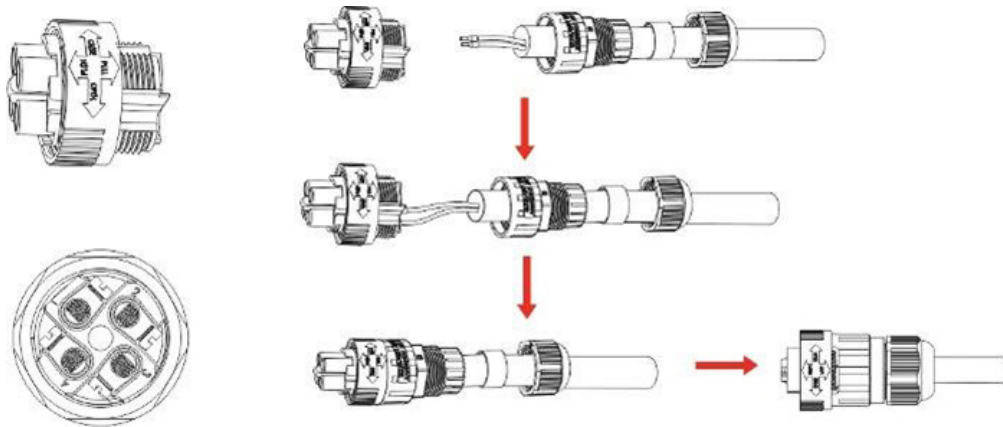
The electricity meter should be mounted and connected at the grid transition point (feed-in point) so that it can measure the grid reference and feed-in power.

1. Loosen the nut and untangle the single-aperture sealing ring.

**Table 2. External connection pins**

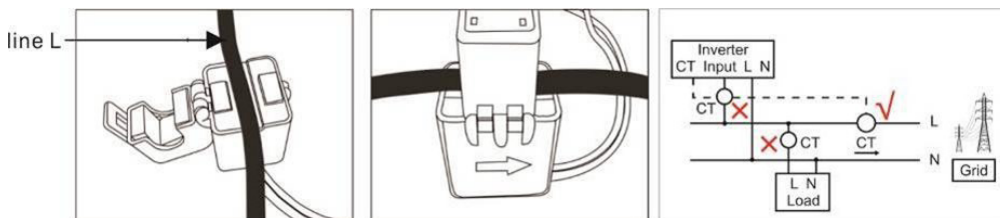
Object	Description
1	CT positive electrode (White)
2	CT negative pole (Black)
3	RS485-A
4	RS485-B

**Figure 40. External connection pins**



2. Install the waterproof component and screw on the waterproof sheath nut.
3. Open the external CT wiring port, the arrow points to the direction of the power grid, put the wire into the external CT card slot, and buckle the buckle.

**Figure 41. External wiring**



External CT should be placed near the power grid.  
If CT test pass but inverter still can't achieve export power (power is not controllable or always 0 power output).  
Please check installation location of the CT.

## 2.4 DRED/ RRCR Port Connections (optional)

DRED means demand response enable device. The AS/NZS 4777.2:2015 required inverter need to support demand response mode (DRM). This function is for inverter that comply with AS/NZS 4777.2:2015 standard. Inverter is fully comply with all DRM. A 6P terminal is used for DRM connection.

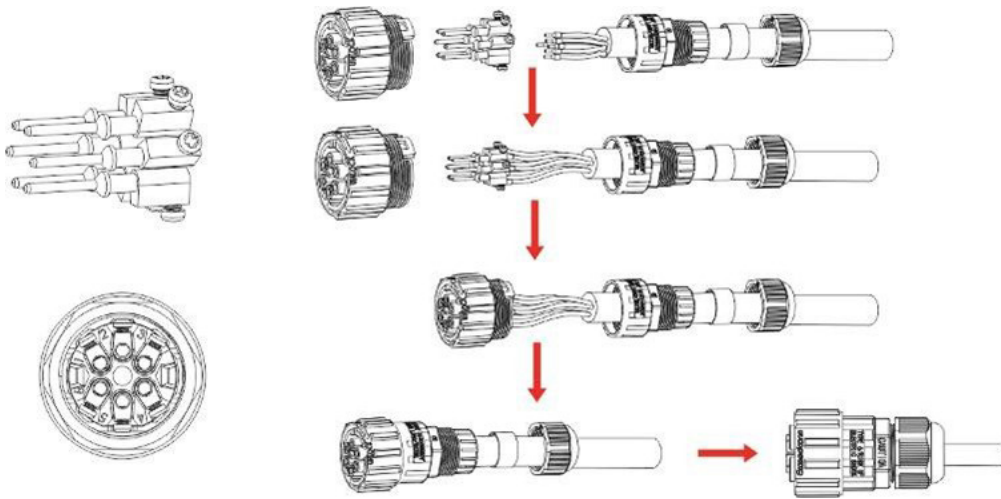
The default state of DRM/RRCR function is disabled. Only when the “DRM enabled” is enabled, the function will be activated according to the specific grid code (e.g., Australia, Germany or UK)

**Table 3. Optional DRED/RRCR ports**

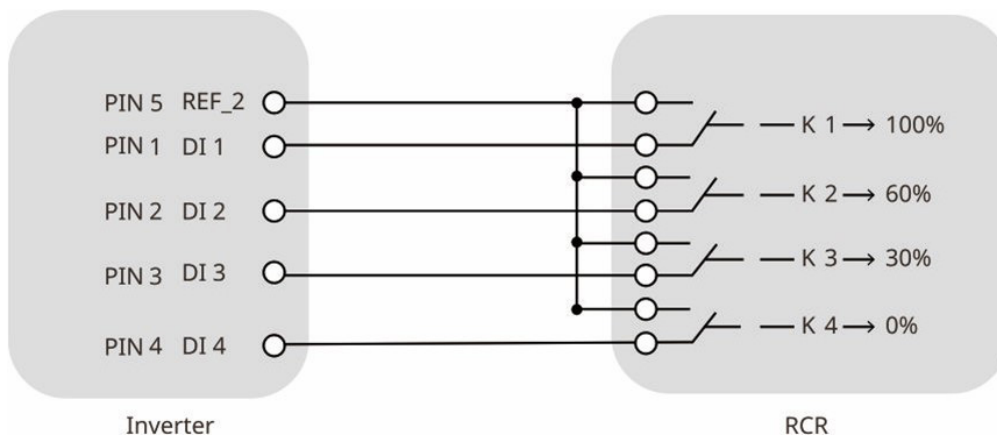
Object	Description	RRCR	Description
1	DRM 1/5	DI_1	
2	DRM 2/6	DI_2	
3	DRM 3/7	DI_3	
4	DRM 4/8	DI_4	REF_1
5	RefGen	Ref_2	DY_IN
6	Com/DRM 0		

Please follow below figure to assemble DRM connector.

**Figure 42. DRM connector**



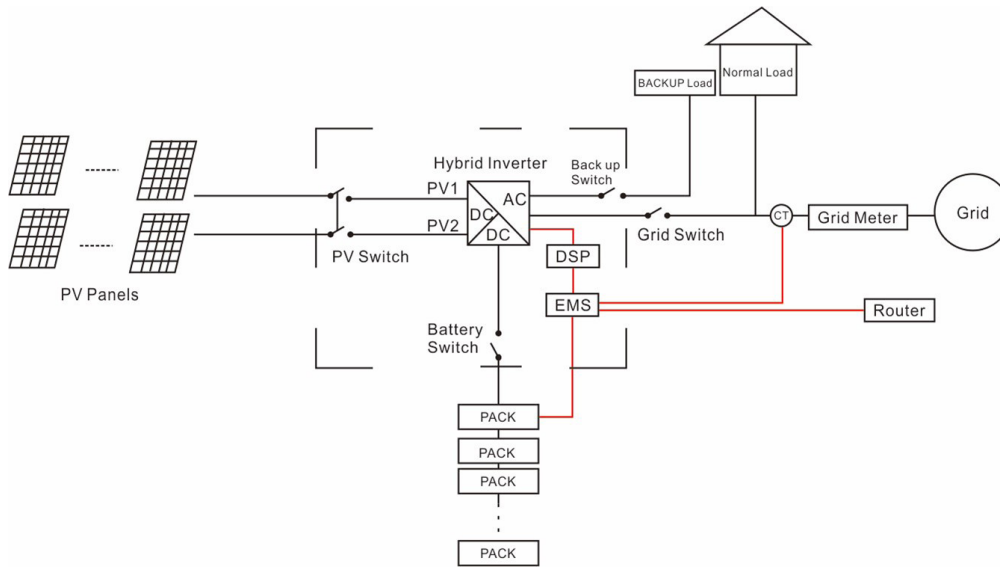
**Figure 43. RRCR**



## 2.5 Single Line Diagram

The single line diagrams of DC-, AC-coupled system are as below:

**Figure 44. DC-coupled system**



**Figure 45. AC-coupled system 1**

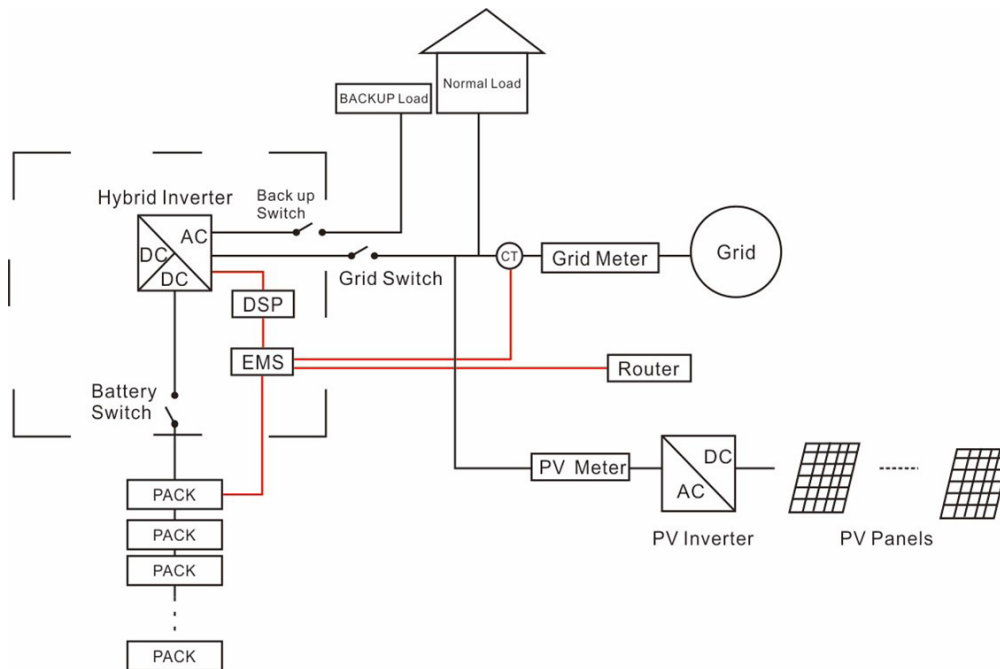
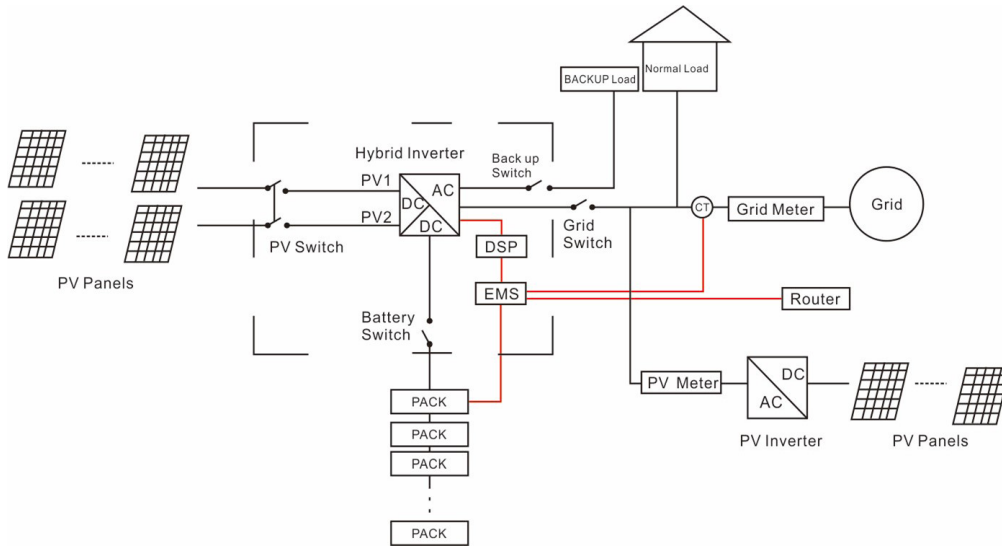




Figure 46. AC-coupled system 2

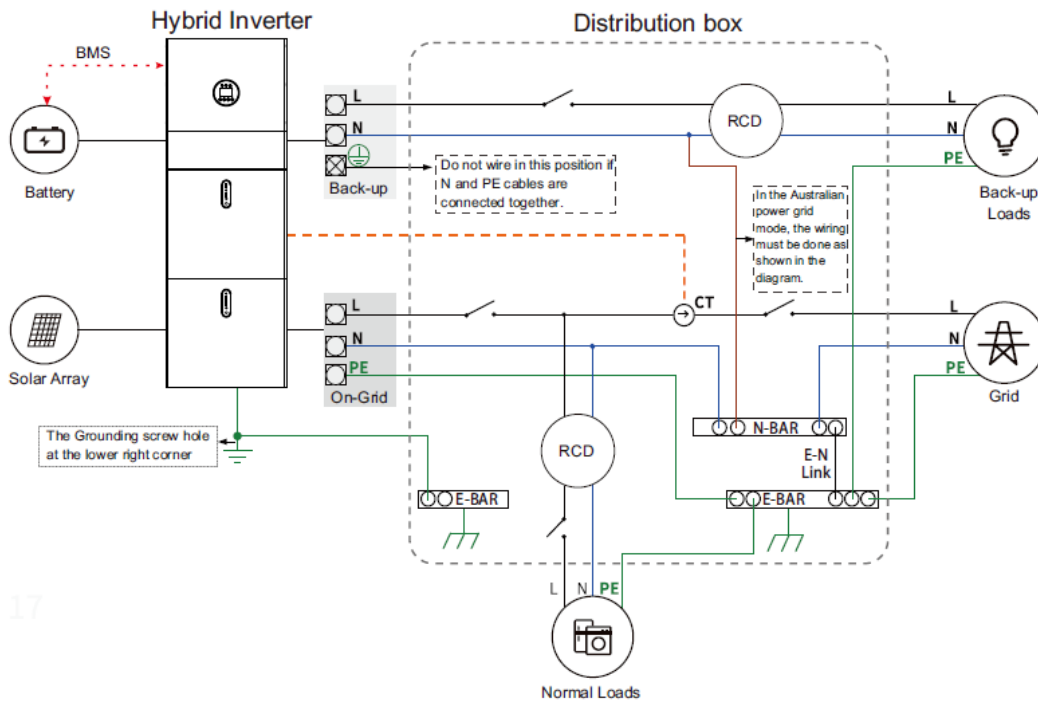


## 2.6 Wiring Diagram



Below wirings are applicable to areas in Australia, New Zealand, South Africa, etc.

**Figure 47. N and PE cables are connected together in the Main Panel for wiring.**

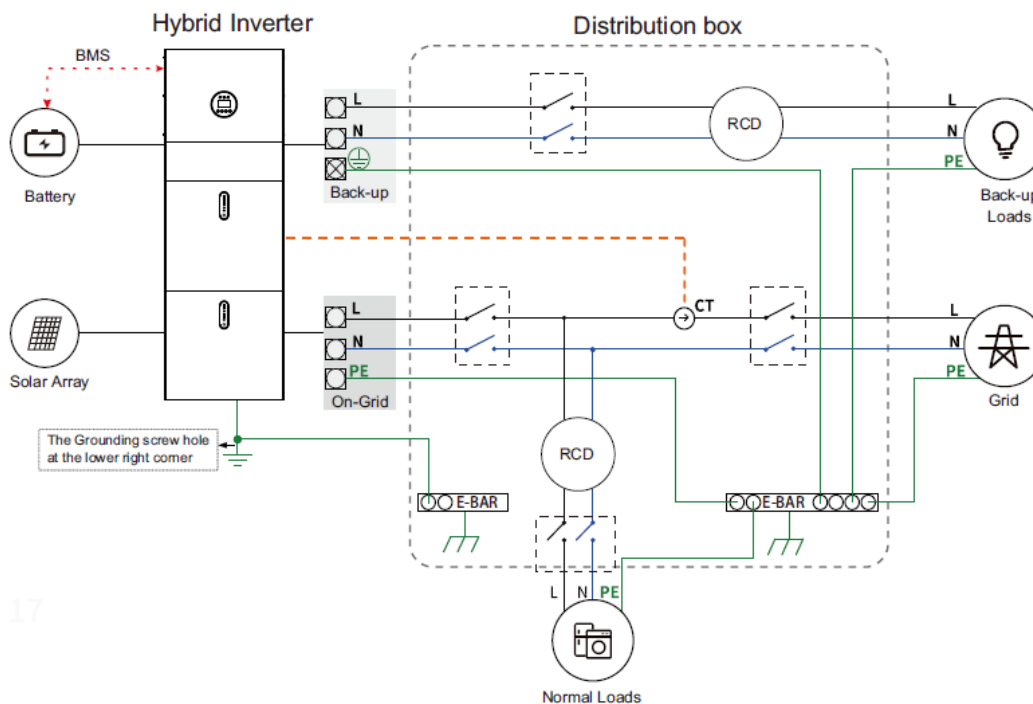


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Ensure that the grounding of BACKUP is correctly and tightened. Otherwise, the BACKUP function may be abnormal in case of grid failure. Other areas except Australia, New Zealand, South Africa, etc., are applicable to the following wirings:

**Figure 48. N and PE cables in the Main Panel shall be wired separately.**



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## 3. System Operation

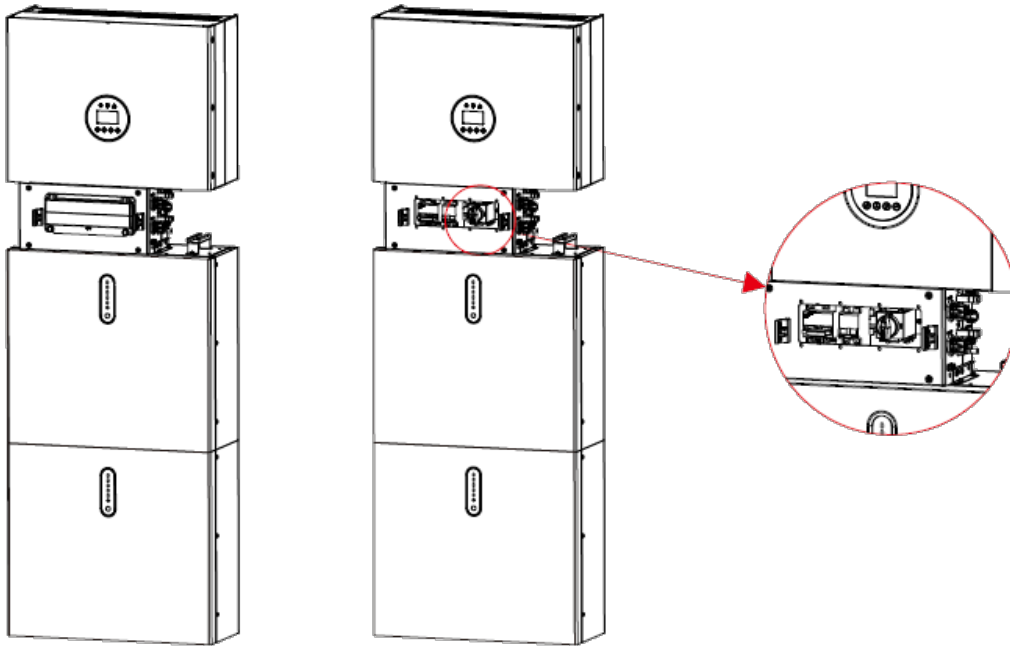
### 3.1 Switch On

When turning on the system, it is very important to follow the steps below to prevent damage to the system.



Please check the installation again before turning on the system.

**Figure 49. Turning on the system**



- Step 1.** Open the outer shell of the cable box.
- Step 2.** Turn on the external grid switch.
- Step 3.** Turn on the PV switch.
- Step 4.** Press power button on all the batteries until the indicator lights turn on.
- Step 5.** Open the battery switch cover and turn on the battery switch.
- Step 6.** Turn on the battery switch on the cable box.
- Step 7.** If backup load is applied, turn on the Backup switch.
- Step 8.** Close the battery switch cover and the outer shell of the cable box.



The Backup switch is only used when a backup load is applied.

## 3.2 Switch Off

- Step 1.** If backup load is applied, turn off the backup switch.
- Step 2.** Turn off the external grid switch.
- Step 3.** Open cable box outer shell and turn off the battery switch.
- Step 4.** Open the battery switch cover and turn off the battery switch.
- Step 5.** Press the power button on all the batteries, till the lights turn off.
- Step 6.** Turn off the PV switch on the cable box.
- Step 7.** Close the battery switch cover and the outer shell of cable box.

## 3.3 Emergency Procedure

When the xStorage Hybrid energy storage system appears to be running abnormally, you can turn off the grid-connected main switch that directly feeding the BESS, and turn off all load switches within the BESS, turn off the battery switch at the same time. To prevent a potentially fatal personal injury, if you want to repair or open the machine after the power is switched off, please measure the voltage at the input terminals with a suitably calibrated voltage tester. Before working on this equipment, please confirm that there is no grid electric supply to the BESS! The upper cover plate cannot be opened until the DC-link capacitance inside the battery modules discharges completely about 15 minutes later.

### 3.3.1 Emergency Handling Plan

1. Disconnect the AC breaker.
2. Check the control power supply. If it is OK, return the power supply to find out the reason.
3. Please record every detail related to the fault, so Company can analyses and solve the fault. Any operation of equipment during a fault is strictly forbidden, please contact Company as soon as possible.
4. As battery cells contain a little Oxygen inside and all cells have got explosion-proof valves, explosion hardly happens.
5. When the indicator light on the battery shows a red fault, check the fault type through the communication protocol, and contact our after-sales service personnel for advice.

### 3.3.2 Hazards

If the battery pack leaks electrolyte, avoid contact with the leaking liquid or gas. If one is exposed to the leaked substance, immediately perform the actions described below:

**Inhalation:** Evacuate the contaminated area and seek medical attention.

**Eye contact:** Rinse eyes with running water for 5 minutes and seek medical attention.

**Contact with skin:** Wash the affected area thoroughly with soap and water and seek medical attention.

**Ingestion:** Induce vomiting and seek medical attention.

### 3.3.3 Fire

If a fire breaks out in the place where the battery pack is installed, perform the following countermeasures:

#### Fire extinguishing media

During normal operation, no respirator is required. Burning batteries can't be extinguished with a regular fire extinguisher, this requires special fire extinguishers such as the Noves 1230, the FM-200 or a dioxin extinguisher. If the fire is not from a battery, normal ABC fire extinguishers can be used for extinguishing.

#### Fire -fighting instructions.

1. If fire occurs when charging batteries, if it is safe to do so, disconnect the battery pack circuit breaker to shut off the power to charge.
2. If the battery pack is not on fire yet, extinguish the fire before the battery pack catches fire.
3. If the battery pack is on fire, do not try to extinguish but evacuate people immediately.



There may be a possible explosion when batteries are heated above 150°C. When the battery pack is burning, it leaks poisonous gases. Do not approach.

#### Effective ways to deal with accidents.

Battery in dry environment: Place damaged battery into a segregated place and call local fire department or service engineer.

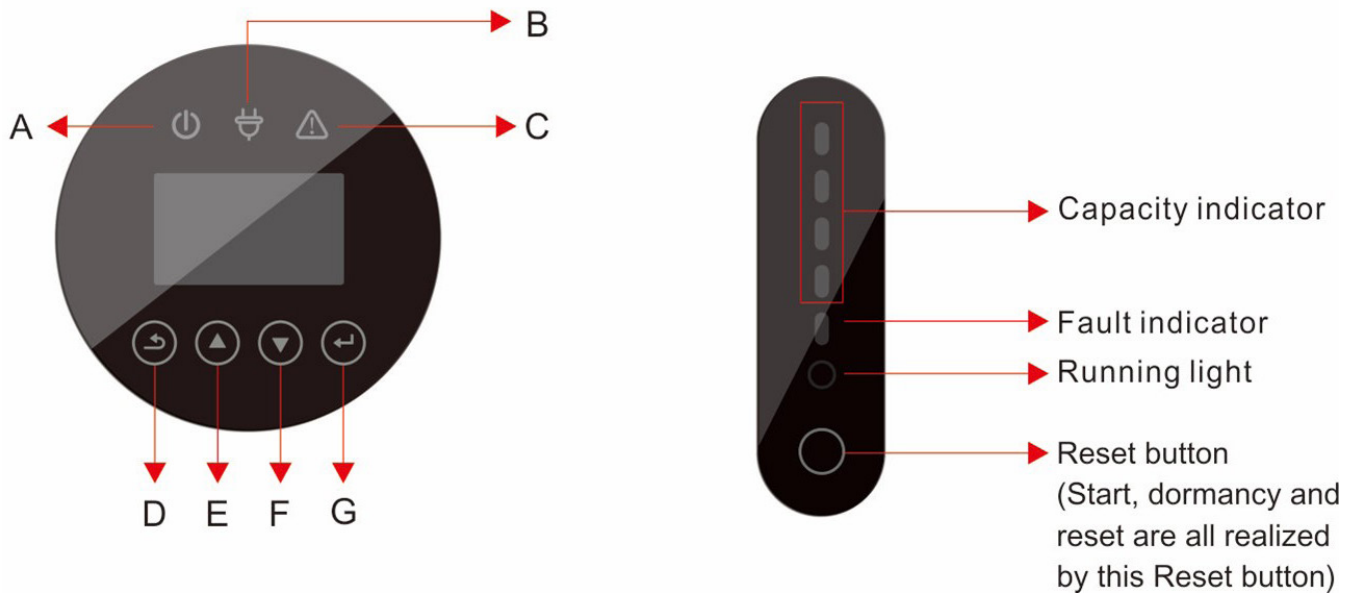
Battery in wet environment: Stay out of the water and don't touch anything if any part of the battery, inverter, or wiring is submerged.

Do not use a submerged battery again and contact the service engineer.

## 4. EMS Introduction and Set Up

### 4.1 Function Description

Figure 50. Hybrid Inverter EMS Interface and PACK interface



Object	Description	Description
A	Indicator LED	Grid connection
B		Off-grid
C		Red: The inverter is in fault.
D	Button Function	Return Button: Escape from current interface or function. Enter the setting interface.
E		Up button: Move cursor to upside or increase value.
F		Down Button: Move cursor to downside or decrease value.
G		ENT Button: Confirm the selection.

**Table 4. LED indicator description**

Product status	Mode of operation	Operation	Fault	Battery Level Indicator LED				Description
		SOC Low - High						
								Physical Picture Of Lamp
<b>OFF</b>	Hibernation	Off	Off	Off	Off	Off	Off	All off
<b>Normal</b>	Idle	1	Off	Indicates battery SoC level				Idle state (Current = 0)
	Charge	On	Off	Indicates battery SoC level				Normal (Current > 0)
	Discharge	On	1	Indicates battery SoC level				Normal (Current < 0)
<b>Low SoC</b>	Idle	1	2	Indicates battery SoC level				Module low voltage alarm (SOC<5%) Only in Idle Mode
<b>Alarm</b>	Module over voltage	3	Off	On	On	On	On	0x340 BYTE 2,3 BIT2 (Vmodule > 57.6V)
	Module Under voltage	3	Off	Off	On	On	On	0x340 BYTE 2,3 BIT3 (Vmodule < 44.8V)
	Cell over voltage	3	Off	On	Off	On	On	0x340 BYTE 2,3 BIT0 (Vcell > 3.6V)
	Cell under voltage	3	Off	Off	Off	On	On	0x340 BYTE 2,3 BIT1 (Vcell < 2.8V)
	Charge MOS fault	3	Off	On	On	Off	On	0x340 BYTE 6,7 BIT0 (Still have charge current ,when charge MOS is turned off)
	Discharge MOS fault	3	Off	Off	On	Off	On	0x340 BYTE 6,7 BIT1 (Still have discharge current ,when discharge MOS is turned off)
	Cell over temperature	3	Off	On	Off	Off	On	0x340 BYTE 2,3 BIT8 and 9 (Tcell > 55°C)
	Cell under temperature	3	Off	Off	Off	Off	On	0x340 BYTE 2,3 BIT10 and 11 (Charge Tcell < 7°C Discharge Tcell < -18°C)
	Charging Over Current	3	Off	On	On	On	Off	0x340 BYTE 2,3 BIT4 (Current > 95A)
	Discharge Over Current	3	Off	Off	On	On	Off	0x340 BYTE 2,3 BIT5 (Current > 95A)
	Cell sampling fault	3	Off	On	Off	On	Off	0x340 BYTE 6,7 BIT3 (BMS Internal fault)
	Heating fault	3	Off	Off	Off	On	Off	0x340 BYTE 6,7 BIT6 OR 0x340 BYTE 4, 5 BIT15 (BMS Internal fault)
	Low SoC	3	Off	On	On	Off	Off	0x340 BYTE 2,3 BIT15 (SOC<5%) In Discharge and Idle Mode
	Temperature sensor malfunction	3	Off	Off	On	Off	Off	0x340 BYTE 6,7 BIT2 (BMS Internal fault)
	Battery Cell malfunction	3	Off	On	Off	Off	Off	0x340 BYTE 6,7 BIT4 (voltage difference between cells exceeds 1V)
Communication failure	3	Off	Off	Off	Off	Off	0x340 BYTE 6,7 BIT5 (BMS Internal fault)	

<b>Protection</b>	Short Circuit Protection	3	On	On	On	On	On	0x340 BYTE 4, 5 BIT6 (Current > 300A)
	Charge protection Module Over Voltage	3	On	Off	On	On	On	0x340 BYTE 4, 5 BIT7 (Vmodule > 57.6V, SOC = 100%)
	Protection Module Over current	3	On	On	Off	On	On	0x340 BYTE 4, 5 BIT4 and 5 (Current > 95A)
	Protection Module Over voltage	3	On	Off	Off	On	On	0x340 BYTE 4, 5 BIT2 (Vmodule > 57.6V)
	Protection Module Under voltage	3	On	On	On	Off	On	0x340 BYTE 4, 5 BIT3 (Vmodule < 40.8V)
	Protection Reverse Polarity	3	On	Off	On	Off	On	0x340 BYTE 6,7 BIT14 (The positive and negative are reversed) 0x340 BYTE 4, 5 BIT0 (Vcell > 3.6V)
	Cell Over voltage	3	On	On	Off	Off	On	0x340 BYTE 4, 5 BIT0 (Vcell > 3.6V)
	Cell Under voltage	3	On	Off	Off	Off	On	0x340 BYTE 4, 5 BIT1 (Vcell < 2.55V)
	Cell Over Temperature Charge/Discharge	3	On	On	On	On	Off	0x340 BYTE 4, 5 BIT8 and 9 (Tcell > 57°C)
	Cell Under Temperature Charge/Discharge	3	On	Off	On	On	Off	0x340 BYTE 4, 5 BIT10 and 11 (Charge Tcell < 5°C Discharge Tcell < -20°C)
	Ambient Over Temperature	3	On	On	Off	On	Off	0x340 BYTE 4, 5 BIT13 OR 0x340 BYTE 2,3 BIT12 (Tambient > 65°C)
	Ambient Under Temperature	3	On	Off	Off	On	Off	0x340 BYTE 4, 5 BIT14 OR 0x340 BYTE 2,3 BIT13 (Tambient < -15°C)
	Mosfet Over Temperature	3	On	On	On	Off	Off	0x340 BYTE 4, 5 BIT12 OR 0x340 BYTE 2,3 BIT14 (Tmosfet > 90°C)
Locked	3	On	Off	Off	Off	Off	0x34F BYTE 4,5 [(Vcell>3.8V) 5S OR (Vcell<2.0V 5S) OR (Tcell>70°C 5min) OR (Tcell<-30°C 5min)]	

**Note:** The threshold is for reference only and it is variable.

**Table 5. LED blink description**

Blink Sequence Number	Blink Mode	Blinking (Sec)	Off (Sec)
1	Blinks once every 4 seconds	0.25	3.75
2	Blinks twice every 2 seconds	2 times of 0.25/0.25	1s
3	Blinks three times every 3 seconds	3 times of 0.25/0.25	1.5S

**Table 6. Battery level indication - when there is no fault or Alarms**

Status	Charging				Discharge				
Battery level indicator	●	●	●	●	●	●	●	●	●
Battery level (%)	0-25%	Blinks twice	Off	Off	Off	Constantly On	Off	Off	Off
	26-50%	On	Blinks twice	Off	Off	On	On	Off	Off
	51-75%	On	On	Blinks twice	Off	On	On	On	Off
	76-100%	On	On	On	Blinks twice	On	On	On	On

## 4.2 Display and Setting

### 4.2.1 PV1 input display interface

Interface	Explanation
PV1 INPUT VOLT: 33.8V CURR: 0.00A POWER: 0W	PV1 input real-time voltage PV1 input real-time current PV1 input power

### 4.2.2 PV2 input display interface

Interface	Explanation
PV2 INPUT VOLT: 49.8V CURR: 0.00A POWER: 0W	PV2 input real-time voltage PV2 input real-time current PV2 input power

### 4.2.3 Bus voltage

Interface	Explanation
DC VOLTAGE BUS: V	Bus voltage of the system

### 4.2.4 Battery

Interface	Explanation
BATTERY VOLT: 42.2V CURR: 20.2A CAPACITY: 40Ah	Battery input voltage Battery current ( + means discharge, -means charge) Battery Capacity

### 4.2.5 Battery Parameter

Interface	Explanation
BATTERY PRMETER TYPE: LFP TEMP: 0.0°C SOC: 60%	Battery input voltage Battery current ( + means discharge, -means charge) Battery Capacity



## 4.2.6 BMS parameters

Interface	Explanation
BMS PARAM	
CHAR VOLT: 54.5V	Battery charging voltage
CHARGE: 25A	Battery charging current: (select according to battery type)
DISCHARGE: 100A	Battery discharging current

## 4.2.7 Grid-connected output

Interface	Explanation
GRID DATA	
VOLT: 0.0V	Mains Real time voltage
CURR: 0.00A	CT real-time current
FREQ: 0.00Hz	Grid-connected real-time frequency

## 4.2.8 Inverter output

Interface	Explanation
INV DATA	
VOLT: 0.0V	Inverter real-time voltage
CURR: 0.00A	Inverter real-time current
FREQ: 0.00Hz	Inverter real-time frequency

## 4.2.9 Load

Interface	Explanation
BACKUP DATA	
VOLT: 0.0V	Critical load (BACKUP) voltage
CURR: 0.00A	Critical load (BACKUP) current

## 4.2.10 Power

Interface	Explanation
POWER	
INV: W	Inverter real - time total power
GRID: W	Grid real-time total power
LOAD: W	Load real-time total power

### 4.2.11 Power

Interface	Explanation
POWER PV: W BACKUP: W BAT: W	PV real-time total power BACKUP real-time power Battery real-time power

### 4.2.12 Temperature

Interface	Explanation
TEMPERATURE INV: 25°C DCDC: 26°C AMBIENT: 27°C 60%	Real-time temperature of inverter system radiator Real-time temperature of Bidirectional DCDC system radiator Internal ambient temperature

### 4.2.13 Status information

Interface	Explanation
STATE SYS: ERROR INV: STANDBY DCDC: STANDBY UNIT: SEC	<p><b>System information:</b> Power-up mode, standby mode, hybrid grid-connection, off-grid operation, mains charging mode, PV charging mode, bypass mode, fault mode, DSP programming, ARM programming.</p> <p><b>INV:</b> standby mode, off-grid inverter mode, grid-connected mode, and transition of grid-connection to off-grid, transition of off-grid to grid mode.</p> <p><b>DCDC:</b> standby mode, soft start mode, charging mode, discharging mode.</p>

### 4.2.14 Error information

Interface	Explanation
ERROR NO. WARNING: W11-1 FAULT: F10-1	Alarm code Error code

## 4.2.15 System setting.

Interface	Explanation
<div style="border: 1px solid black; padding: 10px; width: fit-content;"> SYSTEM  STATE: PEAK SHIFT  GRID: CHN  PV I/P: INDEPEN </div>	<p><b>Status mode:</b> Self-generation and self-consumption, Peak load shifting, and Battery priority.</p> <p><b>Grid-connection standards:</b> China, Germany, Australia, Italy, Spain, UK, Hungary, Belgium, Western Australia, Greece, France, Bangkok, Thailand, local and 60Hz.</p> <p><b>PV input mode:</b> independent connection parallel connection constant voltage.</p>

## 4.2.16 User setting

Interface	Explanation
<div style="border: 1px solid black; padding: 10px; width: fit-content;"> USER  1:SETUP  2: INQUIRE  3: STATISTIC  4: FCTRY RESET </div>	Press ESC on the Main Display Interface to enter the user interface. See chapter 4.3.3 for more setting details.

Enter the password before setting up the user.

Interface	Explanation
<div style="border: 1px solid black; padding: 10px; width: fit-content;"> PASSWORD  INPUT: XXXXX </div>	<p>After entering the setup interface, the system will prompt to input password.</p> <p>The default password is "00000", which can be altered in Password setting menu.</p> <p>Press UP/DOWN button to increase or decrease the figure that is input.</p> <p>Press ENTER button to move the cursor backwards or confirm the setting.</p> <p>Press ESC button to move the cursor forward.</p>



**Restrict access to the inverter to only authorised personnel.**  
**Avoid setting predictable passwords like 00000, 123456, 999999, etc.**

**It is recommended to change the PIN at frequent intervals.**

**Avoid using the same PIN for multiple inverter deployments.**

**To protect and protect yourself from any cyberattack, Eaton strongly recommends that you change your password after completing commissioning.**

## 4.3 Setting

Interface	Explanation
<pre>--SETUP-- 1:SYS SETTING 2: BAT SETTING 3: GRID STD 4: RUN SETTING 5: 485 ADDRESS 6: BAUD RATE 7: LANGUAGE 8: BACKLIGHT 9: DATE/TIME 10: CLEAR REC 11: PASSWORD 12: MAINTENANCE 13: AUTO TEST 14: OPERAT MODE 15: AFCI TEST</pre>	<p>This interface is used for various information inquiry options.</p> <p>Press UP/DOWN button to move the corresponding options.</p> <p>Press ENTER to enter the selected menu.</p> <p>Press ESC button to return to the user interface.</p> <p>There are 13 options in total, including system mode, battery parameters, grid standard, operation parameters, 485 address, 485 baud rate, language display, LCD backlight, date/time, clear history, password setting and maintenance, AUTO TEST, OPERAT MODE and AFCI TEST.</p>

### 4.3.1 System setting

Interface	Explanation
<pre>SYS SETTING 1:WORK MODE 2: PV INPUT 3: ZERO EXPORT 4: DRM ENABLE 5: EPS ENABLE 6: REMOTE CTRL 7: START DELAY 8: CEI SPI CTRL 9: GFCCHK ENB 10: DOD ENABLE 11: GENERATOR 12: CT OR METER 13: AC COUPLE 14: CT DIRECTIO 15: AFCI</pre>	<p>This interface is used to access system information.</p> <p>Press UP/DOWN button to move corresponding options.</p> <p>Press ENTER to enter the selected menu.</p> <p>Press ESC button to return to the setting interface.</p> <p>There are 15 options in total, including working mode, PV input type, zero export enable, DRM enable , EPS enable, remote controlled enable , start delay.(see from 1 to 15)</p>

## 1. Working mode

Interface	Explanation
<pre>WORKE MODE 1: SELF CONSUM E 2: PEAK SHIFT 3: BAT PRIORITY</pre>	<p>This interface is used to opt for the working mode. After selecting the three modes, the restart interface will be entered.</p> <p>Press ESC button to return to setting interface.</p>

After completing the setup of peak load shifting mode, the time for charging and discharging also needs to be set.

### Charging selection

Interface	Explanation
<pre>CHARGE FROM GRID 1: DISABLE 2:ENABLE</pre>	<p>1.DISABLE 2.ENABLE</p> <p>After selecting self-consume mode, the setting of charge from grid can be disabled or enabled. If enabled, the charging time setting page will be displayed.</p>

### Charge time

Interface	Explanation
<pre>CHARGE TIME 00:00-23:59 MAX SOC:100%</pre>	<p>1. Self-consumption mode disables grid charging: Battery pack can only be charged by PV.</p> <p>2. Self-consumption mode enables grid charging: Grid charges battery pack until MAX SOC during set time.</p>

### Time setup 1

Interface	Explanation
<pre>CHA STAR1: 00:00 CHAR END1: 00:00 DIS START1: 00:00 DISC END1: 00:00</pre>	<p>This interface is used to set the time-1 of peak load shifting.</p> <p>Press UP/DOWN button to change the value. Press ENTER to confirm.</p> <p>Press ESC button to return.</p>

### Time setup 2

Interface	Explanation
<pre>CHA STAR2: 00:00 CHAR END2: 00:00 DIS START2: 00:00 DISC END2: 00:00</pre>	<p>This interface is used to set the time-2 of peak load shifting.</p> <p>Press UP/DOWN button to change the value.</p> <p>Press ENTER to confirm.</p> <p>Press ESC button to return.</p>

## 2. Input mode

Interface	Explanation
INPUT MODE 1:INDEPENDENT 2: PARALLEL 3: CV	Setup of PV Input mode. The factory setting by default is independent mode. When parallel input is set to be independent mode, PV power will be imbalanced.

## 3. ZERO EXPORT

Interface	Explanation
ZERO EXPORT 1: ENABLE 2:POWER	Limiting inverter power to be injected into the grid, disable by default.
ZERO EXPORT 1: DISABLE 2:ENABLE	

## 4. DRM enable

Interface	Explanation
DRM ENABLE 1:DISABLE 2: ENABLE	Only applicable in Australia and New Zealand. Default option is disabling.

## 5. EPS enable

Interface	Explanation
EPS ENABLE 1:DISABLE 2: ENABLE	It should be enabled if BACKUP load needs power supply after grid black out.

## 6. Remote Control enable

Interface	Explanation
REMOTE CTRL 1:DISABLE 2: ENABLE	The power switch of the machine can be realized through remote control. Default option is DISABLE.

## 7. START-UP delay

Interface	Explanation
START-UP DELAY INPUT: 30 UNIT: SEC	Specify the delay for the start-up procedure after the unit is initialized. Default is 30 s.

## 8. CEI SPI CTRL

Interface	Explanation
CEI SPI CTRL 1.DISABLE 2. ENABLE	CEI SPI CTRL: (1. Disable 2. Enable) When the DRM signal is enabled, this is used as a local signal. When the DRM signal is enabled, when the CEI SPI Ctrl is enabled, the frequency range is 50.2Hz ~ 49.8Hz. When the CEI SPI Ctrl is disabled, the frequency range is 51.5Hz ~ 49.8Hz

## 9. GFCICLK ENB

Interface	Explanation
GFCICLK ENB 1.DISABLE 2.ENABLE	GFCICLK ENB (1. Disable 2. Enable) PV leakage protection enable.

## 10. DOD ENABLE

Interface	Explanation
DISCHGDEPTH 1. DISABLE 2.ENABLE	Discharge depth (1. Disable 2. Enable). When the battery SOC reaches (100 minus the set discharge depth), the battery will stop discharging if it is enabled. If it is disabled, the battery will discharge to 0%. Enable by default.

## 11. GENERATOR

Interface	Explanation
GENERATOR 1.DISABLE 2. ENABLE	Generator mode enabling (1. Disable 2. Enable) when the generator needs to be connected for AC measurement, the enabling generator mode is prohibited, and the generator mode is prohibited in other times. In the mode of enabling generator, the frequency protection range measured by AC will be relaxed to + -10%, the frequency protection range at 50Hz is 45Hz-55Hz, and that of 60Hz is 54Hz-66Hz.

## 12. CT OR METER

Interface	Explanation
CT OR METER 1. CT 2. METER	CT or meter (1.CT 2.meter): the energy storage inverter supports the connection of three-phase ammeter.
METER-- 1.Eastron-3PH 2. Acrel 3. Rayleigh 4. YaDa 5. Eastron-1PH	Replace CT with three-phase ammeter to detect the utility power. When connecting three-phase ammeter, select "ammeter" option, and when connecting CT, select "CT" option.

## 13. AC COUPLE

Interface	Explanation
AC COUPLE 1. DISABLE 2.ENABLE	When ESS connects to other inverter by AC side, with other inverter charging PACK please enable AC couple.

## 14. CT DIRECTION

Interface	Explanation
CT DIRECTION 1.POSITIVE 2. NEGATIVE	<p>If the CT connection is reversed, there is no need to change the direction actually but only set the direction on the interface by changing 1.POSITIVE to 2.NEGATIVE or 2.NEGATIVE to 1.POSITIVE, which is equivalent to changing the direction of the CT wiring.</p> <p>For example, when the battery is being charged and the grid power is positive "+" it means the CT connection is reversed. If the CT direction is 1. POSITIVE on the LCD, set it to 2. NEGATIVE, then the grid power will become negative "-".</p>

## 15. AFCI

Interface	Explanation
AFCI 1. DISABLE 2. ENABLE	<p>Method to detect electric arcs The inverter has an integrated AFCI function. When the inverter detects an electric arc, users can find the time of the fault and the detailed phenomenon through the app.</p>
Level INPUT: 9	<p>The alarm can be cleared automatically if the inverter triggers a fault for less than 5 times within 24 hours. The inverter locks for protection after the 5th electric arc fault. The inverter can operate normally after the fault is solved. Default Enable is Disabled If enabled options levels "1-9".</p>



### 4.3.2 Battery parameters

Interface	Explanation
<pre>--BAT SETTING-- 1:BAT TYPE 2: DISC-DEPTH 3: OFF GRID DOD 4: CHG CURR 5: DISC POWER 6: CHG POWER 7: BAT END VOLT 8: BAT WAKE-UP 9: HEATING FLIM 10: BMS DOD 11: MAINTAIN SOC 12: FORCE WAKE</pre>	<p>This interface is used to select battery parameters. Press UP/DOWN button to move corresponding options.</p> <p>Press ENTER button to enter the selected menu; Press ESC button to return to setting interface.</p>

#### 1. Battery type

Interface	Explanation
<pre>BAT TYPE 1: LFP</pre>	<p>This interface is used to select battery type. Press UP/DOWN button to move corresponding options.</p> <p>Press ENTER button to enter the selected menu; Select the OTHER_Li enters button to enter the OTHER_Li interface;</p>

## 2. Discharge depth

Interface	Explanation
<p>DISC DEPTH INPUT: 60 UNIT: %</p>	<p>Grid connected discharge depth: the maximum allowable discharge depth of the machine with normal grid connection.</p> <p>If the grid connected discharge depth is set to 80%, when the SOC of the battery is lower than or equal to 20% with normal grid connection, the battery will stop discharging. Press UP/DOWN to increase or decrease the input figure.</p> <p>Press Enter to move cursor backward, confirm input and return to battery parameters interface.</p> <p>Press ESC to move cursor forward and return to battery parameters interface.</p> <p>The value ranges between 10% and 95%.</p>

## 3. OFF GRID DOD

Interface	Explanation
<p>OFF GRID DOD Input: 0~100% Default: 90%</p>	<p>Off grid discharge depth: the maximum allowable discharge depth of the machine in off-grid mode in case of grid power failure. The settable range is 0~100%.</p> <p>If the off-grid discharge depth is set to 90%, when the SOC of the battery is less than or equal to 10% with grid power failure, the battery will stop discharging.</p> <p>Relationship between off grid discharge depth and grid connected discharge depth.</p> <p>Grid connected discharge depth &lt; off grid discharge depth. Off grid discharge depth - grid connected discharge depth = off grid standby SOC. For example, if the grid connected discharge depth is set to 80%, and the off-grid discharge depth is set to 90%, the battery will stop discharging if the SOC is equal to or lower than 20% with normal grid connection. When the grid power is off, the inverter will run in off-grid mode. At this time, 10% SOC of the battery can supply power to important loads.</p>

## 4. Charge current

Interface	Explanation
<p>CHARGE CURR INPUT: 25 UNIT: A</p>	<p>Press UP/DOWN button to increase or decrease the input figure;</p> <p>Press Enter to move cursor backward, confirm input and return to battery parameters interface;</p> <p>Press ESC button to move cursor forward and return to battery parameters interface.</p>

## 5. Discharge Power

Interface	Explanation
<pre>DISC PERCENT INPUT: 080%</pre>	<p>Press UP/DOWN button to increase or decrease the input figure.</p> <p>Press Enter button to move cursor backward, confirm input and return to battery parameters interface.</p> <p>Press ESC button to move cursor forward and return to battery parameters interface.</p>

## 6. Charge Power

Interface	Explanation
<pre>CHAR PERCENT INPUT: 020%</pre>	<p>Press UP/DOWN button to increase or decrease the input figure.</p> <p>Press Enter to move cursor backward, confirm input and return to battery parameters interface;</p> <p>Press ESC button to move cursor forward and return to battery parameters interface.</p>

## 7. BAT END VOLT

Interface	Explanation
<pre>-- BAT END VOLT-- INPUT: 43.2 UNIT: V</pre>	<p>This function is used to set the discharge cut-off voltage. When select the battery type as LFP, the default value is 43.2 V, and the setting range is between 40.0 V to 48.0 V.</p>

## 8. BAT WAKE-UP

Interface	Explanation
<pre>BAT WAKE-UP 1:ENABLE 2: TIME</pre>	<p>Enter the option 1 to enable or disable the Function.</p> <p>Enter the option 2 to adjust the value of the time.</p>

### Battery wake up enable.

Interface	Explanation
<pre>WAKE-UP ENB 1: DISABLE 2: ENABLE</pre>	<p>Battery wake-up enable setting.</p> <p>The default option is ENABLE.</p>

### Bat Wake Time

Interface	Explanation
<pre>WAKE-UP TIME INPUT: 060min</pre>	<p>Press UP/DOWN button to increase or decrease the input figure.</p> <p>Press Enter button to move cursor backward, confirm input and return to battery parameters interface.</p>

## 9. HEATING FILM

Interface	Explanation
HEATING FILM 1:AUTOMATIC 2: ON 3: OFF	<p>This setting is only applicable for battery packs with heating film.</p> <ol style="list-style-type: none"><li>1. "Automatic" means that the system detects the external temperature and opens the heating film as required.</li><li>2. "On" means that the heating film will be turned on immediately after selecting "On".</li><li>3. "Off" means that the heating film will be turned off immediately after selecting "Off". It is Automatic by default.</li></ol>

## 10. BMS DOD

Interface	Explanation
BMS DOD 1:DISABLE 2: ENABLE	<ol style="list-style-type: none"><li>1. Disable BMS DOD: It will not close the discharge circuit when BMS discharging to the set SOC.</li><li>2. Enable BMS DOD: It will close the discharge circuit when BMS discharge to the set SOC.</li></ol> <p>Note that don does not enable BMS DOD unless there's a special reason.</p>

## 11. MAINTAIN SOC

Interface	Explanation
MAINTAIN SOC 1: DISABLE 2:ENABLE	<ol style="list-style-type: none"><li>1. Disable: The minimum SOC will not be maintained.</li><li>2. Enable: The minimum SOC 2% is maintained. When the battery SOC is less than 2%, the grid charges the battery pack to 5% through the inverter.</li></ol>

## 12. FORCE WAKE

Interface	Explanation
FORCE WAKE 1:DISABLE 2: ENABLE	<ol style="list-style-type: none"><li>1. Disable: Do not force to wake up battery packs.</li><li>2. Enable: Force to wake up the battery pack immediately if the battery is not connected.</li></ol>

### 4.3.3 User setting

Interface	Explanation
GRID STD 1: China 2: Germany 3: Australia 4: Italy 5: Spain 6: U.K. ... 22: Local 23: 60Hz 24: Denmark	Press UP/DOWN button to move corresponding options. Here are 24 countries for selection, including China, Germany, Australia, Italy, Spain, and U.K. Press ENTER button to confirm the selection and enter restart interface. Press ESC button to cancel the selection and return to setting interface.

### 4.3.4 Operation parameters

Interface	Explanation
RUN SETTING 1: REACT MODE 2: GRID POWER 3: VOLT MAX 4: VOLT MIN 5: FREQ MAX 6: FREQ MIN 7: OVER VOLT 8: UNDER VOLT 9: OVER FREQ 10: UNDER FREQ 11: REACT RESP 12: VRT_ENABLE 13: POW SI RATE	Press UP/DOWN button to move corresponding options. Press Enter to enter the selected menu. Press ESC button to return to setting interface. Options include reactive power compensation mode, grid power, low/high grid voltage, low/high grid frequency, Grid over/under voltage derating and Grid over/under frequency derating, etc.

#### 1. Reactive mode

Interface	Explanation
REACT MODE 1: POWER FACTOR 2: REACT POWER 3: QU CURVE 4: QP CURVE	Press UP/DOWN button to move corresponding options. Press Enter to confirm the input and enter power factor setting interface. (select 2, press Enter to confirm input and enter reactive power interface; Select 3, 4, the corresponding mode will be selected and return to the parameter setting interface). Press ESC button to cancel the input and return to operation parameters interface.

## Power factor setting

Interface	Explanation
POWER FACTOR INPUT: C1.00	Press UP/DOWN to increase or decrease the input figure. Press ENTER button to confirm or ESC button to cancel the input and return to working interface; The input value should range between L0.80 and L1.00 or C0.80 and C1.00.
Value range (L1.00~C1.00)	

## Reactive Power

Interface	Explanation
REACT POWER INPUT: +60%	Press UP/DOWN button to adjust the input figure; Press ENTER button to confirm or ESC button to cancel the input and return to working interface; The input value should range between -60% and +60%, which varies with the standard.
Value range (-60%~+60%)	

## 2. Grid Power

Interface	Explanation
GRID POWER INPUT: 100%	Press UP/DOWN button to adjust the input figure; Press ENTER button to confirm or ESC button to cancel the input and return to operation parameters interface. The input value should range between 0 and 100.
Value range (0~100)	

## 3. Volt Max

Interface	Explanation
VOLT MAX 1: INV MAX 2: GRID MAX	Enter option 1 to adjust the maximum volt of the INV. Enter option 2 to adjust the maximum volt of the grid.

## High INV voltage

Interface	Explanation
VOLT MAX 1: INV MAX 2: GRID MAX	Enter option 1 to adjust the maximum volt of the INV. Enter option 2 to adjust the maximum volt of the grid.

Interface	Explanation
INV VOLT HIGH INPUT: V	<b>INV Over Voltage Protection Point</b> Press UP/DOWN to adjust the input figure. Press Enter to confirm the input and enter restart interface.
Value range (240~280V)	Press ESC to cancel the input and return to operation parameters interface. The value should range between 240V and 280V, which varies with different standards.

## Grid Volt Max

Interface	Explanation
GRID MAX INPUT: 270V	<b>GRID Over Voltage Protection Point</b> Press UP/DOWN to adjust the input figure. Press Enter to confirm the input.

## Volt Min

Interface	Explanation
VOLT MIN 1: INV-MIN 2: GRID MIN	Enter option 1 to adjust the minimum volt of the INV. Enter option 2 to adjust the minimum volt of the grid.

## Low INV voltage

Interface	Explanation
I-INV VOLT LOW INPUT: V	<b>INV Low Voltage Protection point</b> Press UP/DOWN button to adjust the input figure; Press Enter to confirm the input and enter restart interface;
Value range (150~200V)	Press ESC button to cancel the input and return to operation parameters interface; The value should range between 150V and 220V which varies with different standards.

## Grid Volt Min

Interface	Explanation
GRID MIN INPUT: 170V	<b>GRID Low Voltage Protection Point</b> Press UP/DOWN to adjust the input figure; Press Enter to confirm the input.

## Freq Max

Interface	Explanation
FREQ MAX 1: INV-MAX 2: GRID MAX	Enter option 1 to adjust the maximum frequency of the INV. Enter option 2 to adjust the maximum frequency of the grid.

## High INV frequency

Interface	Explanation
INV FREQ HIGH INPUT: 52.0Hz	<b>INV Over Frequency Protection Point</b> Press UP/DOWN to adjust the input number. Press ENTER to confirm the input and enter restart interface. Press ESC to cancel the input and return to operational parameters interface. The value ranges between 50.5 and 55, which varies with different standards.
Value range (50.5~55)	

## GRID Freq Max

Interface	Explanation
GRID MAX INPUT: 53.5Hz	<b>GRID Over Frequency Protection Point</b> Press UP/DOWN to adjust the input figure. Press Enter to confirm the input.

## Freq Min

Interface	Explanation
FREQ MIN 1: INV-MIN 2: GRID MIN	Enter option 1 to adjust the minimum frequency of the INV. Enter option 2 to adjust the minimum frequency of the grid.



## Low INV frequency

Interface	Explanation
INV FREQ LOW INPUT: Hz	<b>INV Low Frequency Protection Point</b> Press UP/DOWN to adjust the input figure. Press Enter to confirm the input and enter restart interface. Press ESC to cancel the input and return to operation parameters interface. The value ranges between 45 and 49.8, which varies with different standards.
Value range (45-49.8)	

## GRID freq min

Interface	Explanation
GRID MIN INPUT: 50.5Hz	<b>GRID Low Frequency Protection Point</b> Press UP/DOWN to adjust the input figure. Press Enter to confirm the input.

## Over volt

Interface	Explanation
OVER VOLT 1: ENABLE 2: VOLT	Enter the option 1 to enable or disable the function that the power of inverter derates when voltage is too high. Enter the option 2 to adjust the exact value of the voltage when power starts to derate.

## Over volt enable

Interface	Explanation
OVER VOLT 1: DISABLE 2: ENABLE	Derate power when Voltage over. The default option is enabled.

## Over volt start

Interface	Explanation
OVER VOLT INPUT: 264V	Press UP/DOWN to adjust the input figure. Press Enter to confirm the input.

## Under volt

Interface	Explanation
UNDER VOLT 1: ENABLE 2: VOLT	Enter the option 1 to enable or disable the function that the power of inverter derates when voltage is too low. Enter the option 2 to adjust the exact value of the voltage when power start to derate.

## UNDER VOLT ENABLE

Interface	Explanation
UNDER VOLT 1: DISABLE 2: ENABLE	Enable or disable the function that the power of inverter derates when voltage is too low.

## UNDER VOLT START

Interface	Explanation
UNDER VOLT INPUT: 200V	Press UP/DOWN to adjust the input figure. Press Enter to confirm the input.

## OVER FREQ

Interface	Explanation
OVER FREQ 1:ENABLE 2:FREQ	Enter the option 1 to enable or disable the function that the power of inverter derates when frequency is too high. Enter the option 2 to adjust the exact value of the frequency when power start to derate.

## OVER FREQ ENABLE

Interface	Explanation
OVER FREQ 1: DISABLE 2: ENABLE	Derate power when Frequency over. The default option is "Enable".

## OVER FERQ START

Interface	Explanation
OVER FREQ INPUT: 50.50Hz	Press UP/DOWN to adjust the input figure. Press Enter to confirm the input.

## UNDER FREQ

Interface	Explanation
UNDER FREQ 1: ENABLE 2: FREQ	Enter the option 1 to enable or disable the function that the power of inverter derates when frequency is too low. Enter the option 2 to adjust the exact value of the frequency when power start to derate.

## UNDER FREQ ENABLE

Interface	Explanation
UNDER FREQ- 1: DISABLE 2: ENABLE	Derate power when frequency is too low. The default option is "Enable".

## UNDER FREQ START

Interface	Explanation
UNDER FREQ INPUT: 50.50Hz	The function that the power of inverter derates when frequency is too low. Press UP/DOWN to adjust the exact value of the frequency when power start to derate.

## REACT RESP

Interface	Explanation
REACT RESP INPUT: 10s	The input value of Reactive response time. The value ranges from 6s to 60s and default value is 10s.
Value Range (6s ~ 60s)	

## VRT\_ENABLE

Interface	Explanation
VRT_ENABLE 1: DISABLE 2: ENABLE	Enable or disable the High/Low voltage ride through capability .

## POW SI RATE

Interface	Explanation
POW SI RATE INPUT: 100%	The input value of power rising rate. Default value is 100%.

### 4.3.5 485 Address

Interface	Explanation
485 ADDRESS INPUT: 1	Press UP/DOWN button to adjust the input figure; Press ENTER button to confirm or ESC button to cancel the input and return to setup interface; the input value should range between 1 and 32.
Value range (1~32)	

### 4.3.6 485 Baud rate

Interface	Explanation
SELECT 1:2400 bps 2:4800 bps 3:9600 bps	Press UP/DOWN button to move corresponding options; Press ENTER button to confirm or ESC button to cancel the selection and return to setup interface; there are three alternative options: 2400/4800/9600.

### 4.3.7 Language

Interface	Explanation
LANGUAGE 1: 中文 2: ENGLISH 3: Italia	Press UP/DOWN button to move corresponding options. Press ENTER button to confirm or ESC button to cancel the selection and return to setup interface.

### 4.3.8 LCD backlight

Interface	Explanation
LIGHTTIME INPUT: 20 UNIT: S (seconds)	Press UP/DOWN button to adjust the input figure; Press ENTER button to confirm or ESC button to cancel the input and return to setup interface. The input value should range between 20 and 120.

### 4.3.9 Date/time

Interface	Explanation
DATE/TIME DATE: 2020-07-19 TIME: 10:01:12 WEEK: Monday	Press UP/DOWN button to adjust the input figure; Press Enter button to move cursor backward, confirm input and return to setup interface; Press ESC button to move cursor forward and return to setup interface. The input value should range between 2000 and 2099.

### 4.3.10 Clear history

Interface	Explanation
<pre>DEL REC 1: CANCEL 2: CONFIRM</pre>	Clear all the previous history in Inquiry/Record menu. Press UP/DOWN button to move corresponding options. Press ENTER button to confirm or ESC button to cancel the selection and return to setup interface.

### 4.3.11 Password Setting

Interface	Explanation
<pre>PASSWORD OLD: XXXXX NEW: XXXXX CONFIRM: XXXXX</pre>	This interface will be used to change password for entry into the setup interface. Press UP/DOWN to adjust the input figure. Press Enter to move cursor backward, confirm input and return to setup interface. Press ESC to move cursor forward and return to setup interface.

### 4.3.12 Maintenance

Interface	Explanation
<pre>12: MAINTENANCE</pre>	Maintainer use only. Press Enter to enter the selected item.

### 4.3.13 Auto Test

Interface	Explanation
<pre>PASSWORD INPUT: XXXXX</pre>	The Auto test function works only in the Italy grid standard. After entering the Auto test interface, the system will prompt to input password. The password is "00000".

#### Autotest countdown

Interface	Explanation
<pre>Auto test . . . 603 s</pre>	The self-test countdown interface. This interface will show up at the beginning of the self-test. The countdown will last for 603 seconds. You can press the ESC Key to exit the self-test.

## Autotest parameters

Interface	Explanation
<div style="border: 1px solid black; padding: 10px; margin-bottom: 10px;">           TEST LIST            1: VOLT MAX            2: VOLT MIN            3: FREQ MAX            4: FREQ MIN         </div>	<p>After the countdown there is a test list interface which is used to select the parameter for Auto test. There are four kinds of test results including Volt Max , Volt Min , Freq Max and Freq Min. After entering the submenu items, you can press the UP and Down key to scan the result.</p>

## VACMAX parameters

Interface	Explanation
<div style="border: 1px solid black; padding: 10px; margin-bottom: 10px;">           VACMAX (S1)            Set: 253.0V 30s            Tes: 229.0V 30s            Cur: 228.5V Pass!         </div>	<ul style="list-style-type: none"> <li>• Threshold setting value: The value set by upper computer software.</li> <li>• Threshold setting trip time: The trip time set by upper computer software.</li> <li>• Threshold auto test value: The value of threshold during coincidence between the threshold and current measured value.</li> <li>• Threshold auto test trip time: The time from the coincidence between the threshold and current to the trip signal of disconnection switch.</li> <li>• Current measured voltage or frequency value: The measurement value of grid voltage or frequency during the coincidence.</li> </ul>
<div style="border: 1px solid black; padding: 10px;">           VACMAX (S2)            Set: 264.5V 200ms            Tes: 229.0V 193ms            Cur: 228.3V Pass!         </div>	

## VACMIN parameters

Interface	Explanation
<div style="border: 1px solid black; padding: 10px; margin-bottom: 10px;">           VACMIN (S1)            Set: 195.5V 1.50s            Tes: 228.4V 1.50s            Cur: 228.7V Pass!         </div>	<ul style="list-style-type: none"> <li>• Threshold setting value: The value set by upper computer software.</li> <li>• Threshold setting trip time: The trip time set by upper computer software.</li> <li>• Threshold auto test value: The value of threshold during coincidence between the threshold and current measured value.</li> <li>• Threshold auto test trip time: The time from the coincidence between the threshold and current to the trip signal of disconnection switch.</li> <li>• Current measured voltage or frequency value: The measurement value of grid voltage or frequency during the coincidence.</li> </ul>
<div style="border: 1px solid black; padding: 10px;">           VACMIN (S2)            Set: 34.5V 0.2s            Tes: 228.4V 0.19s            Cur: 228.7V Pass!         </div>	

## FACMAX parameters

Interface	Explanation
<p>FACMAX (S1) Set: 50.2Hz 100ms Tes: 50.0Hz 97ms Cur: 50.0Hz Pass!</p>	<ul style="list-style-type: none"><li>• Threshold setting value: The value set by upper computer software.</li><li>• Threshold setting trip time: The trip time set by upper computer software.</li><li>• Threshold auto test value: The value of threshold during coincidence between the threshold and current measured value.</li><li>• Threshold auto test trip time: The time from the coincidence between the threshold and current to the trip signal of disconnection switch. Current measured voltage or frequency value: The measurement value of grid voltage or frequency during the coincidence.</li></ul>
<p>FACMAX (S2) Set: 51.5Hz 100ms Tes: 50.0Hz 94ms Cur: 50.0Hz Pass!</p>	

## FACMIN parameters

Interface	Explanation
<p>FACMIN (S1) Set: 49.8Hz 100ms Tes: 50.0Hz 94ms Cur: 50.0Hz Pass!</p>	<ul style="list-style-type: none"><li>• Threshold setting value: The value set by upper computer software.</li><li>• Threshold setting trip time: The trip time set by upper computer software.</li><li>• Threshold auto test value: The value of threshold during coincidence between the threshold and current measured value.</li><li>• Threshold auto test trip time: The time from the coincidence between the threshold and current to the trip signal of disconnection switch.</li><li>• Current measured voltage or frequency value: The measurement value of grid voltage or frequency during the coincidence.</li></ul>
<p>FACMIN (S2) Set: 47.5Hz 100ms Tes: 50.0Hz 98ms Cur: 50.0Hz Pass!</p>	

## 4.4 Inquiry

Interface	Explanation
INQUIRE 1: INV MODEL 2: MODEL SN 3: FIRMWARE 4: REGION 5: RUN SETTING 6: RECORD 7: BMS INFO 8: METER STATUS	Press UP/DOWN button to move corresponding options. Press Enter button to jump to the selected menu; Press ESC button to return to user interface; There are four alternative options: machine model, serial number, firmware version region, running setting, Running records, BMS information and METER STATUS. ( refer to 1 to 8).

### 1. Machine model

Interface	Explanation
INVERTER XXXXX	This interface displays machine model of the inverter. Press ESC button to return to inquiry interface.

### 2. Serial number

Interface	Explanation
SERIAL NUMBER- SN: 123456789532625	This interface displays serial number of the inverter. Press ESC button to return to inquiry interface.

### 3. Firmware Version

Interface	Explanation
FIRMWARE ARM VER: 1.0.0 DSP VER: 1.0.0	This interface displays firmware version for ARM and DSP of the inverter. Press ESC button to return to inquiry interface.
23112574	

### 4. REGION

Interface	Explanation
REGION Aus-A	This interface displays the current selection of region. Press ESC button to return to inquiry interface.



## 5. RUNSETTING

Interface	Explanation
<pre>RUN SETTING INV VOLT MAX: 200 V INV VOLT MIN: 170 V INV FREQ HIGH: 52.0 Hz INV FREQ LOW: 48.0 Hz OVER VOLT: 264 V UNDER VOLT: 200 V OVER FREQ: 50.5 Hz UNDER FREQ: 49.5 Hz GRID POWER: 100%</pre>	<p>This interface displays the current settings for grid protection and power quality response modes. Note that the parameters here are only available for view.</p> <p>Press ESC button to return to inquiry interface.</p>

## 6. Running records

Interface	Explanation
<pre>REC (500) 1:F10-1 DATE: 2018 - 12-01 TIME: 00 :01 :02</pre>	<p>SN of the fault: Fault warning codes (500 at utmost) (the latest fault or alarm marked as No.1) Time of the fault:</p> <p>Press UP/DOWN button to view the record; Press ENTER button to enter the description interface for corresponding records.</p> <p>Press ESC button to return to Inquiry interface.</p>

## 7. BMS INFO

Interface	Explanation
<pre>PACK INFO 1:PACK 1 2: PACK 2 3: PACK 3 4: PACK 4 5: PACK 5</pre>	<p>Battery information, warning records, fault records and protect information of the five battery packs can be queried in this interface.</p>
<pre>PACK 1 1: INFO 2: WARN 3: FAULT 4: PROTECT</pre>	

## 8. METER STATUS

Interface	Explanation
<pre>METER STATUS COMMUNICATE OK</pre>	<p>After connecting the meter, you can view the communication status of the meter here, success or fail. Press ESC button to return to Inquiry interface.</p>

## 4.5 Statistics

Interface	Explanation
STAT 1:TIME STAT. 2:CONNE.TIMES 3: PEAK POWER 4: E-TODAY 5: E-MONTH 6: E-YEAR 7: E-TOTAL	This interface is used to select statistics items. Press UP/DOWN button to move corresponding options. Press Enter to enter the selected menu. Press ESC button to return to user interface. There are eight alternative options in total: time accounting, grid-connection frequency/ peak power/ power generation for the day / power generation for the month/ power generation for the year/gross power generation (refer to 1 to 7).

### 1. Time accounting

Interface	Explanation
Time RUN: 5 GRID: 0 UNIT: HOUR	Operation length of inverter (hours) Grid-connection length (hours) Press ESC button to return to statistics interface.

### 2. Grid-connection frequency

Interface	Explanation
CONNE.TIMES TIMES: 0	This interface displays grid-connection frequency of the inverter. Press ESC button to return to statistics interface.

### 3. Grid-connection frequency

Interface	Explanation
PEAK POWER HISTORY: 5000 TODAY: 0 UNIT: W	This interface displays power peak in history and for the day. Press ESC button to return to statistics interface.

### 4. The day

Interface	Explanation
E-TODAY PV: 0.0KWH METER: 0.0KWH GRID: 0.0KWH LOAD: 0.0KWH CHARG: 0.0KWH DISCH: 0.0KWH	This interface displays power generation for the day (kWh). PV power generation. Electric energy selling to Grid. Electric energy buying from Grid; Power consumption of Load;

## 5. The month

Interface	Explanation
E-MONTH PV: 0.0KWH METER: 0.0KWH GRID: 0.0KWH LOAD: 0.0KWH	This interface displays power generation for the month (kWh); PV power generation; Electric energy selling to grid; Electric energy buying from grid; Power consumption of load;

## 6. The year

Interface	Explanation
E-YEAR PV: 0.0KWH METER: 0.0KWH GRID: 0.0KWH LOAD: 0.0KWH	This interface displays power generation for the year (kWh); PV power generation; Electric energy selling to grid; Electric energy buying from grid; Power consumption of load;

## 7. Gross generation

Interface	Explanation
E-TOTAL PV: 0.0KWH METER: 0.0KWH GRID: 0.0KWH LOAD: 0.0KWH CHARG: 0.0KWH DISCH: 0.0KWH	This interface displays gross power generation; PV power generation; Electric energy selling to grid; Electric energy buying from grid; Power consumption of load;

## 4.6 Factory default setting

Interface	Explanation
FACTORY RESET 1: CANCEL 2: CONFIRM	Press UP/DOWN button to move corresponding options; Press Enter to enter the selected item.

# 5. Battery storage and recharging

## 5.1 Battery storage requirements

1. Storage environment requirements:
  - Ambient temperature: -10°C~45°C; recommended storage temperature: 20°C~30°C;
  - Relative humidity: 0%RH~95%RH (No condensation);
  - In a dry, ventilated and clean place;
  - No contact with corrosive organic solvents, gases and other substances;
  - No direct sunlight;
  - Less than 2 meters from any heat source.

## 5.2 Storage expiration

In principle, it is not recommended to store the battery for a long time. Be sure to use it in time. The stored batteries should be disposed according to the following requirements.

**Table 7. Stored lithium battery recharging interval**

Required Storage Temperature	Actual Storage Temperature	Recharge Interval
-10°C~+45°C	-10°C ≤ T ≤ 30°C	12 months
	30°C < T ≤ 45°C	8 months

1. If a battery is deformed, broken, or leaking, discard it immediately regardless of its storage time.
2. The allowable maximum stored battery recharging period is 3 years and the allowable maximum stored battery recharging times is 3. For example, if recharging is performed once every 8 months, the allowable maximum recharging times is 3 times; if recharging is performed once every 12 months, the allowable maximum recharging times is 3 times; if the allowable maximum stored battery recharging period or times is exceeded, it is recommended to discard the battery.
3. A lithium battery will have its capacity decreasing after being stored for a long time, and typically will have its capacity irreversibly decreasing by 3%~10% after being stored at the recommended storage temperature for 12 months. If the customer conducts the discharge test and acceptance according to the specification, there is a risk that the battery with a capacity less than 100% after being stored will fail the test.

## 5.3 Inspection before battery recharging

Before recharging a battery, check its appearance: Deformation/Shell damage/Leakage.

## 5.4 Inspection before battery recharging

**Step 1:** Connect power cables to the battery charger correctly. The maximum number of battery PACK connected parallel is 5.

**Step 2:** Turn on the battery PACK DC breaker to ON; Press the battery “start key” for 3 second to start the battery PACK. Check the LED on the battery PACK is on.

**Step 3:** Turn on the battery charger.

**Step 4:** Set charging parameter on the battery charger.

Case #1, one battery PACK is charged. Set the charge limited voltage 56.5V; Set the charge limited current 50A;

Case #2, Two ~ Five battery PACKs are charged. Set the charge limited voltage 56.5V; Set the charge limited current 100A;

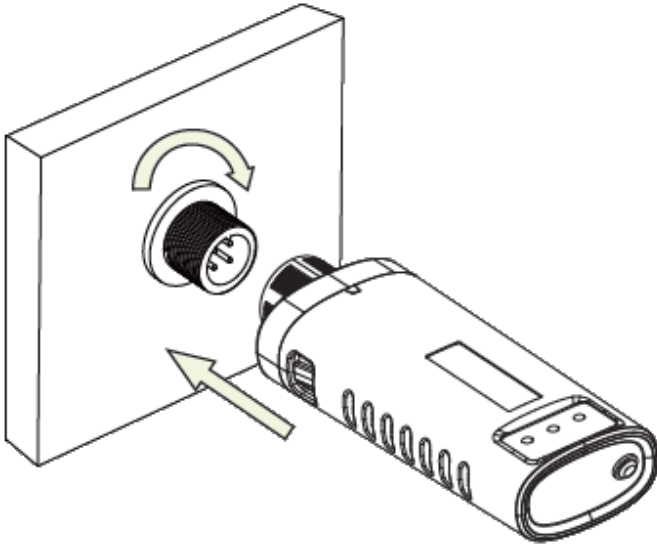
**Step 5:** after the battery is charged, switch off the battery charger and then the battery DC breaker. Disconnect the DC cables and then press the battery “start key” for 3 second to switch off the battery PACK.

## 6. Stick Logger Quick Guide

### 6.1 Stick Logger Installation

**Step 1:** Assemble logger to the inverter communication interface as shown in the diagram.

**Figure 51. Installing stick logger**






Please do not rotate the logger body while installing or removing the logger.



### 6.2 Logger Status

#### 6.2.1 Check Indicator Light

**Table 8. Indicator lights**



Lights	Implication	Status Description (All lights are single green lights.) Interval
	Communicate with router	Light off: Fail to connect to the router. On 1s/Off 1s (Slow flash): Successful connection to the router. Light keeps on: Successful connection to the server. On 100ms/Off 100ms (Fast flash): Distributing network fast.
	Communicate with inverter	Light keeps on: Logger connected to the inverter. Light off: Fail to connect to the inverter. On 1s/Off 1s (Slow flash): Communicating with inverter.
	Logger running status	Light off: Running abnormally. On 1s/Off 1s (Slow flash): Running normally. On 100ms/Off 100ms (Fast flash): Restore factory settings.

The normal operation status of the stick logger, when router connected to the network normally:

1. Successful connection status with serve: NET light keeps on after the logger powered on.
2. Logger running normally: READY light Flashes.
3. Successful connection status with inverter: COM light keeps on.


## 6.3 Abnormal State Processing

**Table 9. Abnormal state processing**

If the data on platform is abnormal	COM 	READY 	Fault Description	Fault Cause	Solution
Any state	OFF	Slow flash	Communicate with inverter abnormally	1. Connection between stick logger and inverter loosen. 2. Inverter does not match with stick logger's communication rate.	1. Check the connection between stick logger and inverter. Remove the stick logger and install again. 2. Check inverter's communication rate to see if it matches with stick loggers. 3. Long press Reset button for 5s, reboot stick logger.
OFF	ON	Slow flash	Connection between logger and router abnormal	1. Stick logger does not have a network. 2. Antenna abnormal 3.Router Wi-Fi signal strength weak.	1. Check if the wireless network configured. 2. Check the antenna if there is any damage or loose. 3. Enhance router Wi-Fi signal strength. Long press Reset button for 10s, reboot stick logger and networking again.
Slow flash	ON	Slow flash	Connection between logger and router normal, connection between logger and remote server abnormal.	1.Router networking abnormal. 2.The server point of logger is modified. 3.Network limitation, server cannot be connected.	1. Check if the router has access to the network. 2. Check the router's setting if the connection is limited.
OFF	OFF	OFF	Power supply abnormal	1. Connection between stick logger and inverter loosen or abnormal. 2. Inverter power in sufficient. 3. Stick Logger abnormal.	1. Connection between logger and router normal, connection between logger and remote server abnormal.
Fast flash	Any state	Any state	SMARTLINK networking status	Normal	1. Exit automatically after 5mins. 2. Long press Reset button for 5s, reboot stick logger. 3. Long press Reset button for 10s, restore factory settings.
Any state	Any state	Fast flash	Restore factory settings	Normal	1. Exit automatically after 1mins. 2. Long press Reset button for 5s, reboot stick logger. 3. Long press Reset button for 10s, restore factory settings.

## 6.4 Usage Methods and Notices for Reset Button

**Table 10. Usage methods and notices for the reset button**

	Keypress	Status Description	Light Status
	Short press 1s	SMARTLINK rapid networking status.	NET light flashes fast for 100ms.
	Long press 5s	Rebooting the stick logger.	All lights are extinguished immediately.
	Long press 10s	Resetting the stick logger.	1. All lights are extinguished after 4s. 2. READY light flashes fast for 100ms.



Do not remove waterproof plug.



# 7. Alarm Code and Error Code

## 7.1 Alarm Code

**Table 11. Alarm codes**

Codes	English description
W00	Grid Volt Low
W01	Grid Volt High
W02	Grid Frequency Low
W03	Grid Frequency High
W04	Solar Loss
W05	Bat Loss
W06	Bat Under Volt
W07	Bat Volt Low
W08	Bat Volt High
W09	Overload
W10	GFCI Over
W11	LN Reverse
W12	Fan Fault
W13	BAT Power Down
W14	BMS Discharge Over Current
W15	BMS charge Over Current
W16	BMS Over Volt
W17	BMS Over Temp
W18	BMS Discharge Low Temp
W19	BMS Volt Imbalance
W20	BMS Communicate Fault
W21	BMS Under Volt
W22	BMS Chg Temp Low
W23	BMS Severe Over Volt
W24	BMS Severe Over Temp
W25	BMS Updating
W26	BMS Program Version Err
W27	BMS Program Update Fail
W28	CT Reverse
W29	Clock Initiate Fail

## 7.2 Error Code

**Table 12. Error codes**

Codes	English description
F00	Soft Time Out
F01	INV Volt Short
F02	GFCI Sensor Fault
F04	Bus Volt Low
F05	Bus Volt High
F06	Bus Short Circuit
F07	PV ISO Under Fault
F08	PV Input Short Circuit
F09	Bypass Relay Fault
F10	INV Curr Over
F11	INV DC Over
F12	Ambient Over Temp
F13	Sink Over Temp
F14	Grid Relay Fault
F15	DisChg Curr Over
F16	Chg Curr Over
F17	Current Sensor Fault
F18	INV Abnormal
F19	EPS Relay Fault
F20	Always Overload
F32	SCI Fault



## 8. Fault Diagnosis and Solutions

The inverter is easy to maintain. When you encounter the following problems, please refer to the Solutions below, and contact the local distributor if the problem remains unsolved. The following table lists some of the basic problems that may occur during the actual operation as well as their corresponding basic solutions.

**Table 13. Fault diagnosis**

Types	Codes	Solutions
Soft Time Out	F00	(1) Restart the inverter and wait until it functions normally; (2) Contact customer service if error warning continues.
INV Volt Short	F01	(1) Cut off all the power and shut down all the machines; disconnect the load and plug in to restart machines, then check whether the load is short circuited if the fault has been eliminated; (2) Contact customer service if fault remains unremoved.
GFCI Sensor Fault	F02	(1) Cut off all the power, Restart the inverter and wait until it functions normally. (2) Contact customer service if error warning continues.
Bus Volt Low	F04 F05	(1) Check the input mode setting is correct. (2) Restart the inverter and wait until it functions normally. (3) Contact customer service if error warning continues.
Bus Volt Short	F06	(1) Restart the inverter and wait until it functions normally. (2) Contact customer service if error warning continues.
PV ISO Under Fault	F07	(1) Check for good ground connection; (2) Check if the earth resistance of PV+ and PV- is greater than 2MΩ; (3) If it is smaller than 2MΩ, check PV string for ground fault or poor ground insulation; if it is greater than 2MΩ, please contact the local inverter customer service once fault is not removed.
PV Input Short Circuit	F08	(1) Check the input mode setting is correct. (2) Disconnect the PV input, restart the inverter and wait until it functions normally. (3) Contact customer service if error warning continues.
Relay Fault	F09 F14 F19	(1) Disconnect the PV input, restart the inverter and wait until it functions normally. (2) Contact customer service if error warning continues.
INV Current Over	F10	(1) Wait five minutes for the inverter to automatically restart; (2) Check whether the load is in compliance with the specification; (3) Contact customer service if error warning continues.
INV DC Over	F11	(1) Restart the inverter and wait until it functions normally. (2) Contact customer service if error warning continues.
NTC/Sink Temp Over	F12 F13	(1) Restart the inverter, restart the machine after a few minutes of cooling, and observe whether the machine can return to normal. (2) Check if the ambient temperature is outside the normal operating temperature range of the machine. (3) Contact customer service if error warning continues.
Dischg Curr Over	F15	(1) Wait one minute for the inverter to restart; (2) Check whether the load is in compliance with the specification; (3) Contact customer service if error warning continues.
CHG Current Over	F16	(1) Check if battery wiring port is short circuited; (2) Check if charging current is in compliance with presetting; (3) Contact customer service if error warning continues.
Current Sensor Fault	F17	(1) Restart the inverter and wait until it functions normally. (2) Contact customer service if error warning continues.
INV Abnormal	F18	(1) Please contact the distributor.
EPS Relay Fault	F19	(1) The off-grid relay is faulty. (2) Contact customer service if error warning continues.
always Overload	F20	(1) The system load always exceeds the rated value. (2) Contact customer service if error warning continues.
Communication Fault	F32	(1) Restart the inverter and wait until it functions normally. (2) Contact customer service if error warning continues.

Types	Codes	Solutions
Grid Fault	W00 W01 W02 W03	(1) Check if the local voltage and frequency is in compliance with the machine specification; (2) If voltage and frequency are within the accepted range, then wait 2 minutes for the inverter to function normally; but if no recovery or fault repeats, please contact the local inverter customer service; (3) Contact the local power company if voltage and frequency are beyond range or unstable.
Solar Loss	W04	(1) PV is not connected; (2) Check grid connection; (3) Check PV availability.
Bat Loss	W05	(1) Battery is not connected; (2) Check if battery wiring port is short circuited; (3) Contact customer service if error warning continues.
Bat Volt Low	W06 W07	(1) Check the battery availability; (2) Contact customer service if error warning continues.
Bat Volt High	W08	(1) Check if the battery is in line with the presetting; (2) If so, power off and restart; (3) Contact customer service if error warning continues.
Overload Warning	W09	(1) Wait one minute for the inverter to restart; (2) Check whether the load is in compliance with the specification;
GFCI Over	W10	(1) Check PV string for direct or indirect grounding phenomenon; (2) Check peripherals of machine for current leakage; (3) Contact the local inverter customer service if fault remains unremoved.
LN Reverse	W11	(1) Check whether the installation follows the instructions; (2) Contact customer service if error warning continues.
Fan Fault	W12	(1) Restart the inverter and wait until it functions normally. (2) Contact customer service if error warning continues.
BMS Fault	W14-W27	(1) Please contact the distributor.
CT Reverse	W28	(1) Perform CT self-check; (2) Contact customer service if error warning continues.
Clock Initiate Fail	W29	(1) Restart the inverter and wait until it functions normally. (2) Contact customer service if error warning continues.

## 9. Product Specifications

**Table 14. Product specifications**

Battery Specifications	PACK5.1	PACK10.2
<b>Electrical</b>		
Energy Capacity	5.12kWh	10.24kWh
Battery type	LFP (LiFePO4)	
Depth of Discharge (DoD)	90%	
Rated voltage	51.2V	
Operating Voltage Range	44.8~56.5Vdc	
<b>Operation</b>		
Maximum Charging Current	50A (0.5C)	100A (0.5C)
Maximum Discharging Current	80A (0.8C)	100A (0.5C)
Operating temperature range	-10°C~+50°C	
Humidity	0~95% (No condensation)	
<b>BMS</b>		
Modules Connection	Max.5batteries in parallel	
Monitoring Parameters	System voltage, current, cell voltage, cell temperature, PCBA temperature measurement	
Communication	CAN and RS-485 compatible	
Ventilation type	Passive Cooling	
<b>Physical</b>		
Weight (Kg)	54	108
Dimension (W×H×D) mm	540* 530*240	540*1020*240
IP Protection	IP65	
Warranty	5 Year Product Warranty, 10 Year Performance Warranty	
<b>Certificate</b>		
Safety(Cell)	IEC 62619, UL 1973, UN 38.3	

MODEL	XSTHS1P-3.68K	XSTHS1P-5K	XSTHS1P-6K
<b>PV terminal</b>			
Vmax. PV	580Vd.c.		
Rated Voltage	400Vd.c.		
MPPT Voltage Range	80~550Vd.c.		
MPPT Range (full load)	165~520Vd.c.	210~520Vd.c.	250~520Vd.c.
MPPT Tracker / Strings	2		
Max. continuous PV input current	15Ad.c.×2		
Isc PV	18Ad.c. ×2		
Max. back feed current	0Ad.c.		
Max. continuous PV input power	4800W	6500W	7500W

MODEL	XSTHS1P-3.68K	XSTHS1P-5K	XSTHS1P-6K
<b>Battery terminal</b>			
Battery type	Lithium		
Voltage range	40~60Vd.c.		
Rated voltage	48Vd.c.		
Maximum charge/discharge current	50Ad.c./80Ad.c.	100Ad.c./100Ad.c.	
Maximum charge/discharge power	3000W/4000W	4600W/5000W	
<b>Grid terminal parameter</b>			
Rated voltage	230Va.c.		
Rated frequency	50Hz/60Hz		
Rated input Current	31A a.c.		
Maximum continuous input current	32A a.c.		
Maximum continuous input power	7360VA		
Rated output Current	16Aa.c.	22Aa.c.	25Aa.c.
Maximum continuous output current	16Aa.c.	22Aa.c. (20A a.c*)	25Aa.c.
Power factor (Cos phi), adjustable	0.8 leading ~0.8 lagging (0.95 leading ~0.95 lagging for Germany)		
Maximum continuous output power	3680W	5000W	6000W
Max. output fault current	102Apeak		
Grid port inrush current	less than 22Apeak		
Grid port overcurrent protection	40A		
<b>Backup load terminal parameter</b>			
Rated voltage	230V a.c.		
Rated frequency	50Hz		
Rated output Current	16Aa.c.	20Aa.c.	
Maximum continuous output current	16Aa.c.	20Aa.c.	
Rated frequency	50/60Hz (Fluctuation range±0.2%)		
Rated continuous output power	3680W	4600W	
Maximum output apparent power	4000VA	5000VA	
Max. output fault current	99Apeak		
Backup load overcurrent protection	32A		
<b>General parameters</b>			
Temperature	-25°C to +60°C, derating above 45 °C		
Protective class	Class I		
Overvoltage Category	II(DC side), III(AC side)		
Ingress protection	IP65		
Altitude	≤ 2000m		
Dimension (W×H×D)mm	540*590*240		
Weight (Kg)	32		
Relative Humidity	0~95% (No condensation)		
Topology	High Frequency Isolation		
Cooling	Natural Convection		
Display	LCD/APP		
Communication Interface	RS485/CAN2.0/WIFI/4G		

(\* ) Ratings for Germany,South Africa

MODEL	XSTHS1P-3.68K	XSTHS1P-5K	XSTHS1P-6K
Max. Conversion Efficiency (From Battery)		94.0%	
Max. Conversion Efficiency (From PV)		97.6%	
Euro Efficiency		97.0%	
MPPT Efficiency		99.5%	
Protection Function	Short Circuit Protection, AC Leakage Fault Protection, Grounding Fault Protection, Anti-islanding Protection, Overload Protection, Surge Protection , DC Polarity Protection		
<b>Certification&amp; Standard</b>			
Grid Regulation	AS/NZS 4777.2, VDE-AR-N4105, VDE0126-1-1		
Safety Regulation	IEC/EN 62109-1&2		
EMC	EN61000-6-1, EN61000-6-2, EN61000-6-3, EN61000-6-4, EN61000-3-11, EN61000-3-12		

**Table 15. Grid specification (single-phase)**

Grid Specification	Output Voltage Range (Vac)	Output Frequency Range (Hz)	Boot wait time(S)
China	187-252	49.5-50.2	30
Germany	184-264	47.5-51.5	60
Australia (AUS_A)	180-265	47-52	60
AUS_B	180-265	47-52	60
AUS_C	180-265	45-55	60
Italy	195-264	49.8-50.2	60
Spain	196-253	48-50.5	180
U.K.(UK_G98)	184-262.2	47.5-52	180
UK_G99	184-262.2	47.5-52	180
UK_NI_G98	195.5-253	48-52	180
UK_NI_G99	195.5-253	48-52	180
Hungary	196-253	49-51	300
Belgium	184-264	47.5-51.5	60
New Zealand	180-260	45-52	60
Greece	184-264	49.5-50.5	180
France	184-264	47.5-50.4	60
Bangkok	198-242	49-51	60
Thailand	198-242	47-52	60
S. Africa	180-260	47-52	60
50549	184-264	47.5-51.5	60
Brazil	184-264	59.5-60.5	60
0126	184-264	47.5-51.5	60
Ireland	184-264	47-52	180
Israel	195.5-253	47-51.5	60
Poland	195.5-253	49-50.05	60
Chile(CHILE_BT)	176-242	47.5-51.5	60
CHILE_HD	198-242	49-51	300
CHILE_LD	198-242	49-51	300
Local	150-280	45-55	30
60Hz	184-264	59.5-60.5	60
Denmark	195.5-253	47.5-51.5	60

# 10. Routine Maintenance

## 10.1 Maintenance Plan

- Check if wire connections are loose.
- Check if cables are aged/damaged.
- Check if cable insulating ribbon drops.
- Check if cable terminal is loose, any overheat sign.
- Check if ground connection is good.

### 10.1.1 Operating Environment

#### (Every six months)

Carefully observe whether the battery system equipment is ineffective or damaged;

When the system is running, listen to any part of the system for abnormal noise;

Check whether the voltage, temperature and other parameters of the battery and other equipment parameters are normal during system operation;

### 10.1.2 Equipment Cleaning

(Every six months to one year, depending on the site environment and dust content, etc.) Ensure that the ground is clean and tidy, keep the maintenance access route unblocked, and ensure that the warning and guiding signs are clear and intact.

Monitor the temperature of the battery module and clean the battery module if necessary.

### 10.1.3 Cable, Terminal, and Equipment Inspection

(Every six months to one year)

- Check if the cable connections are loose. Check whether the cables are aged / damaged.
- Check whether the cable tie of the cable has fallen off.
- Check if the cable terminal screws are loose and the terminal position has any signs of overheating.
- Check whether the management system of the system equipment, monitoring system and other related equipment are invalid or damaged.
- Check that the grounding of the equipment is good, and the grounding resistance is less than 10 ohms.

## 10.2 Notes

After the equipment is out of operation, please pay attention to following notes while maintaining:

- Related safety standards and specifications should be followed in operation and maintenance.
- Disconnect all the electrical connections so that the equipment would not be powered on.
- Wait at least 5 minutes after disconnection, so that the residual voltage of the capacitors drops to a safe voltage. Use a multimeter to make sure that the equipment is completely discharged.
- The equipment should be repaired by professional staff only and it is strictly forbidden for maintenance staff to open equipment modules on their own.
- Appropriate protective measures should be taken while maintaining, such as insulated gloves, shoes, and anti-noise ear plugs.
- Life is priceless. Make sure no one would get hurt first.
- In case of a deep discharge, the battery must be charged to a SOC rate of 30% to 50%. If the entire system is static (i.e., the battery has not been charged for two weeks or more).

Please contact us in time if there are any conditions that could not be explained in the manual.

# 11. Quality Assurance

When product faults occur during the warranty period, his partner will provide free service or replace the product with a new one.

## **Evidence**

During the warranty period, the customer shall provide the product purchase invoice and date. In addition, the trademark on the product shall be undamaged and legible. Otherwise, company has the right to refuse to honor the quality guarantee.

## **Conditions**

Please refer to the xStorage Hybrid warranty conditions documentation on the website [www.eaton.com/xstoragehybrid](http://www.eaton.com/xstoragehybrid).

## **Cybersecurity recommendations**

**To protect and protect yourself from any cyberattack, Eaton strongly recommends that you change your password after completing commissioning.**

## **Monitoring through applications**

### **Note:**

At Eaton we do not currently have a Mobile or Web application capable of connecting to products. Customer can connect their own application such as a Home assistant to monitor their production, consumption and be notified of possible events appearing on its installation. Some apps such as Solarman app, BliQ app for (NL and BE) can be used.

