



User Manual

Voltronic ESS II-4810

Standalone Lithium-Iron Phosphate Battery Module 5.16kW

Version: 1.1



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Thank you for purchasing ESS II-4810 Lithium battery module. Please read this manual before you install the battery. Follow the instruction carefully during the installation process.

1. Safety Precautions

Reminder

- 1) It is very important and necessary to read the user manual carefully before installing or using the battery. Failure to do so or to follow any of the instructions or warnings in this document can result in electrical shock, serious injury, or death, or can damage the battery, potentially rendering it inoperable.
- 2) If the battery is stored for a long time, it is required to charge them every six months, and the SOC should be no less than 90%;
- 3) Battery needs to be recharged within 12 hours, after fully discharged;
- 4) Do not expose cable outside;
- 5) All the battery terminals must be disconnected for maintenance;
- 6) Do not use cleaning solvents to clean the battery;
- 7) Do not expose battery to flammable or harsh chemicals or vapors;
- 8) Do not paint any part of the battery, include any internal or external components;
- 9) Do not connect the battery with PV solar wiring directly;
- 10) The warranty claims are excluded for direct or indirect damage due to the items above.
- 11) Any foreign object is prohibited to insert into any part of the battery.

Warning

1.1 Before Connecting

- 1) After unpacking, please check the product and packing list first, if the product is damaged or missing parts, please contact the local retailer;
- 2) Before installation, be sure to cut off the grid power and make sure the battery is in the turned-off mode.
- 2) Wiring must be correct. Do NOT misconnect the positive and negative cables, and ensure no short circuit with the external device.
- 4) It is prohibited to connect the battery and AC power directly.
- 5) The embedded BMS in the battery is designed for 48VDC, please DO NOT connect the battery in series.
- 6) Please ensure the electrical parameters of the battery system are compatible with related equipment.
- 7) Keep the battery away from water and fire.

1.2 In Use

- 1) If the battery system needs to be moved or repaired, the power must be cut off and the battery is completely shutdown
- 2) It is prohibited to connect the battery with a different type of battery
- 3) It is prohibited to put the batteries working with faulty or incompatible inverter;
- 4) It is prohibited to disassemble the battery (QC tab removed or damaged);
- 5) In case of fire, only dry powder fire extinguisher can be used, liquid fire extinguishers are prohibited.
- 6) Please do not open, repair, or disassembly the battery except staff authorized. We do not undertake any consequences or related responsibility which because of violation of safety operation or violating of design, production, and equipment safety standards.

2. Introduction

ESS II-4810 Lithium iron phosphate battery modules are new energy storage products. It is designed to integrate with reliable inverter modules.

It is built-in smart BMS battery management system, which can manage and monitor cells' information including voltage, temperature, current, etc. Moreover, BMS can balance cells charging and discharging to extend cycle life. Battery modules can be used alone or in parallel, to expand capacity for different requirements.

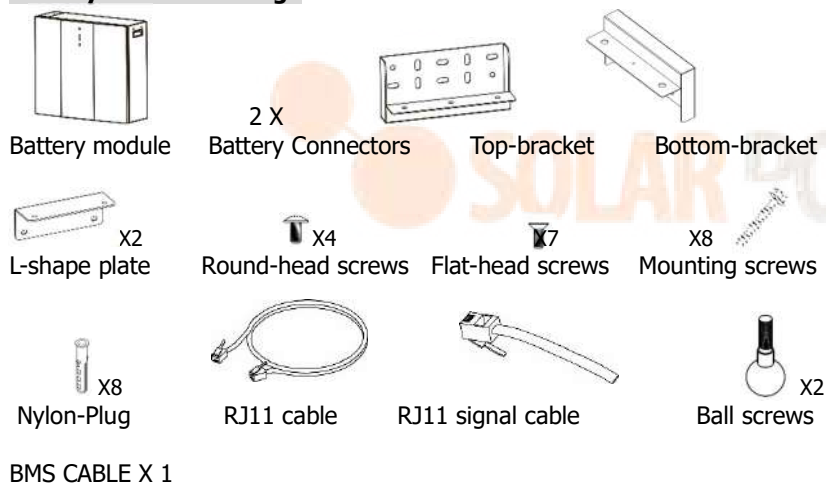
2.1 Features

- Non-Toxic, non-polluting, and friendly to the environment.
- LiFeO4 cell material, safety performance, and long cycle life.
- Smart BMS protection functions: over-discharge, high temperature, over-charge, over-current.
- Flexible configuration, multiple battery modules can be easily stacked and added for energy expansion.
- Working temperature range is from 0°C to 50°C with excellent discharge performance and cycle life.

2.2 Package Contents

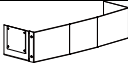





Before installation, please inspect the unit. Be sure that nothing inside the package is damaged. To guarantee goods in good condition during transportation, we offer separate packages for inverter and battery unit.

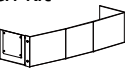
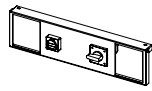

Battery Module Package



Optional Accessory

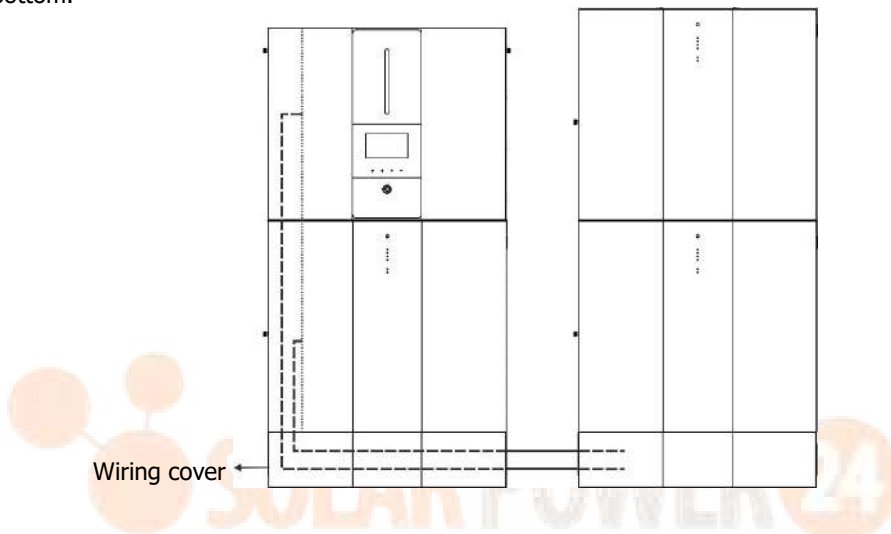
There are some optional accessories for purchase separately.

 Wiring cover	 Thumb screws x 4	  Battery cable #B2-I	  Battery cable #B2-B
---	---	---	---

 Wiring cover	 Assembled switch set	 Thumb screws x 6
---	---	---

Wiring cover (optional)

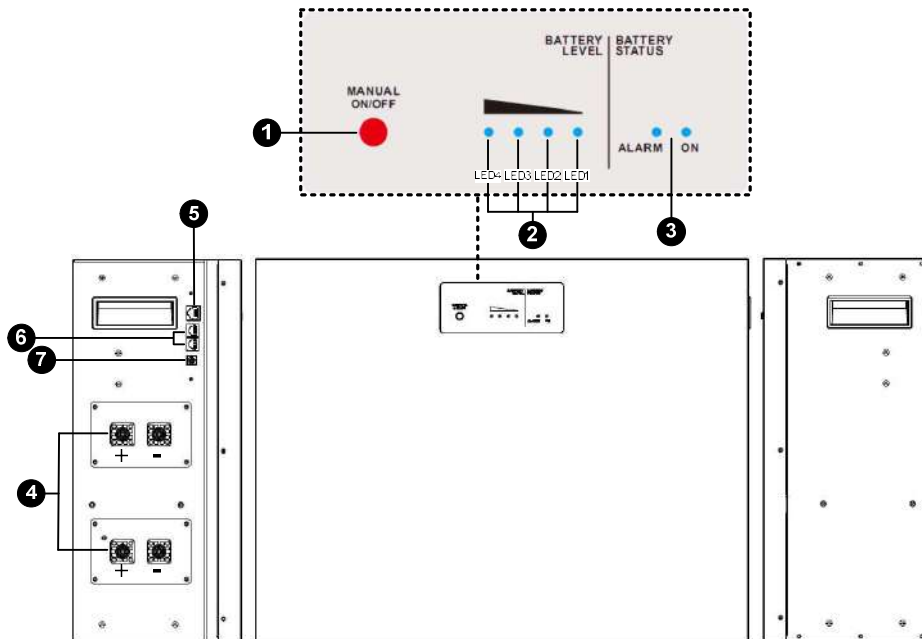
There is a separate part called "wiring cover". If connecting parallel battery modules, you may purchase "wiring cover" separately to cover all cables on the bottom.



2.3 Specifications

Model	ESS II-4810
Capacity (Wh)	5120 Wh
PARAMETERS	
Nominal Voltage	51.2 VDC
Typical Capacity(Ah)	100 Ah
Full Charge Voltage (FC)	56 V ± 0.1 V
Full Discharge Voltage (FD)	42 V
Max. Continuous Discharge Current	150 A
Max. Peak Discharge Current	192 A at 1min
Protection	BMSr
Max. Charge Voltage	52.5 V ± 0.1 V
Max. Charge Current	100 A
Standard Charge Method	0.2C CC (Constant Current) charge to FC, CV (Constant Voltage) charge till charge current decline to <0.05C
Inner Resistance	≤20mΩ
Storage Temperature	-20°C ~ 60 °C 20°C±5°C is the recommended storage temperature
Dimension (D x W x H) mm	185 x 540 x 420
Dimension with stand feet (D x W x H) mm	185 x 540 x 530
Net Weight (kg)	48
Operation Temperature	Charge : 0°C ~ 50 °C Discharge : 0°C ~ 50 °C
Communication	RS485 (RJ45), extension port (RJ11)
Certifications	UN38.3, IEC 62619

2.4 Product Indicator & Setting



- 1 Manual power on/off button** - to wake up or shut down the battery module.
 - If battery module is off, press and hold the button over 5 seconds to turn on the module.
 - If battery module is working, press and hold the button for approximately 5 seconds to shut down the module.
- 2 Battery Level LEDs** - Indicates battery level. Please refer to the LED indicator table for the details.
- 3 Battery Status LEDs** - Indicates battery module status. Please refer to the LED indicator table for the details.

LED Indicator:

Battery Status		Battery Status LEDs		Battery Level LEDs				
Status	SOC	ON	ALARM	LED1	LED2	LED3	LED4	
Normal Mode	Charging	0%~25%	ON	OFF	Flash	OFF	OFF	OFF
		26%~50%	ON	OFF	ON	Flash	OFF	OFF
		51%~75%	ON	OFF	ON	ON	Flash	OFF
		76%~100%	ON	OFF	ON	ON	ON	Flash
	Discharging	0%~25%	ON	OFF	ON	OFF	OFF	OFF
		26%~50%	ON	OFF	ON	ON	OFF	OFF
		51%~75%	ON	OFF	ON	ON	ON	OFF
		76%~100%	ON	OFF	ON	ON	ON	ON
Alarm mode	Warning	-	OFF	Flash	-			
	Fault	-	OFF	ON	-			
Power Off		-	OFF	OFF	OFF	OFF	OFF	

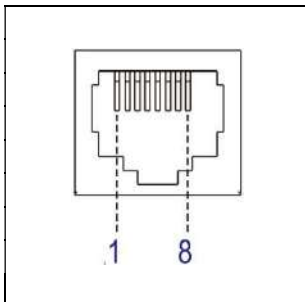
4 External Battery Connector

There are two sets of battery connectors in parallel. Positive terminals are marked in "BAT+" and Negative terminals are marked in "BAT-".

5 RS485 Port (BMS Communication Port)

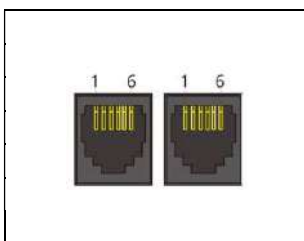
- Connector type: RJ45
- Function: communication between battery module and inverter module.

- Pin Definition:

	PIN	Definition
	1	RS485B
2	RS485A	
3	NC2	
4	RS485B	
5	RS485A	
6	PresentA	
7	PresentB	
8	NC1	

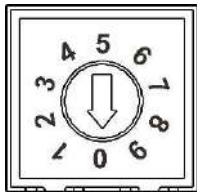
6 Extension Port

- Connector type: RJ11
- Function: BMS signal transmission for battery module and for battery capacity extension in parallel.
- Pin Definition

	PIN	Definition
	1	CANH
2	CANL	
3	PresentA	
4	PresentB	
5	NC	
6	NC	

7 ID Switch

- ID Switch indicates the unique ID code for each battery module. It's required to assign a unique ID to each battery module for normal operation.
- We can set up the ID code for each battery module by rotating the PIN number on the ID switch. From number 0 to 9, the number can be random; no particular order.
- If more than one battery module in the parallel system, the battery pack connected to the inverter module is the Master battery and the ID code should be set as 0. The ID code of the remaining battery module **MUST** be unique. Do not set the same number for 2 battery modules in the parallel system.
- Maximum 10 battery modules can be operated in parallel.

	PIN	Definition
	0	0x0F
	1	0x0E
	2	0x0D
	3	0x0C
	4	0x0B
	5	0x0A
	6	0x09
	7	0x08
	8	0x07
	9	0x06

3. Installation

3.1 Installation Environment

Make sure that the installation environment meets the following conditions:

- The area is completely waterproof.
- The floor is flat and level.
- There are no flammable or explosive materials nearby.
- The ambient temperature is within the range of 0~50°C.
- The temperature and humidity are maintained at a constant level.
- There is minimal dust and dirt in the area.



Caution:

ambient temperature is out of the operating range, the battery module will stop operate to protect itself. The optimal temperature range for the battery module to operate is 0°C to 50°C. Frequent exposure to harsh temperatures may deteriorate the performance and shorten the life cycle of the battery module.

3.2. Selecting Mounting Location

Consider the following points to install the energy storage system:

- Do not mount the inverter on flammable construction materials.
- Mount on a solid surface
- This energy storage system might make noises during operation which may be perceived as a nuisance in a living area.
- Install this inverter module at eye level in order to allow the readability of LCD display at all times.
- For proper air circulation to dissipate heat and further maintenance, allow a clearance of approx. 50 cm to the sides of the unit.
- Dusty conditions on the unit may impair the performance of this inverter.
- The ambient temperature should be between 0°C and 40°C and relative humidity should be between 5% and 85% to ensure optimal operation.
- The recommended installation is vertical adherence.
- For proper operation of this energy storage system, please use appropriate cables for grid connection.
- The pollution degree of the energy storage system is PD2. Select an appropriate mounting location. Install the inverter and battery modules in a protected area that is dry, free of excessive dust and with adequate air flow. Do NOT operate it in the place where the temperature and humidity is beyond the specific limits. (Please check the specs for the limitations.)
- The inverter should be installed in the position where the disconnection means is easily accessible.
- This inverter is designed with IP20 protection for indoor applications only.
- Regularly clean the fan filter.

3.3. Mounting The System

WARNING!! Remember that this inverter is heavy so please be careful when removing it from the package.

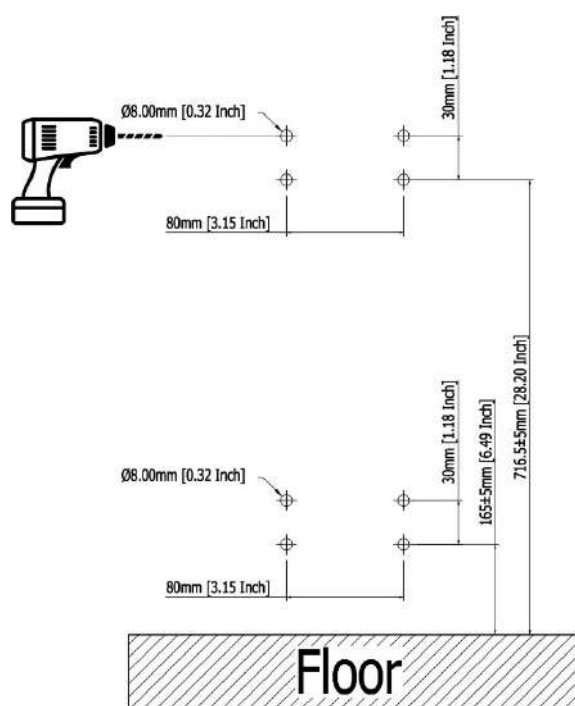
Installation to the wall should be fixed with proper screws. After that, the device should be bolted on securely.

The energy storage system can only operate in a CLOSED ELECTRICAL OPERATING AREA. Only service personnel can enter this area.

WARNING!! FIRE HAZARD.
SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACE ONLY.

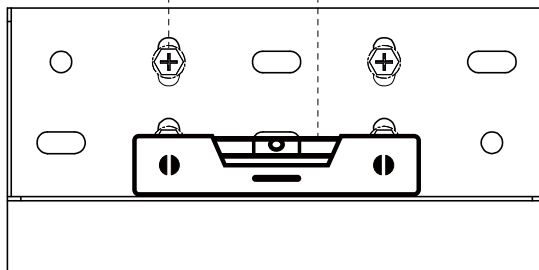
This energy storage system should be installed battery modules first on the bottom and then inverter module on the top.

Step 1: Use Ø10mm drill to drill holes at a depth about 50mm, The holes pitch are as follows: (Install the nylon-plug after drilling is completed)

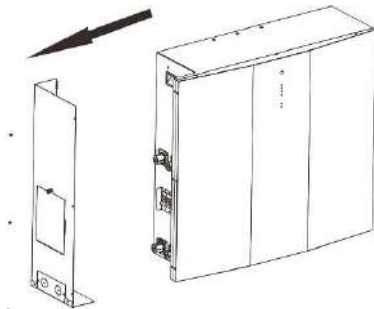


Step 2: Assembly the Bottom-bracket need to be used bubble level adjusted the bracket to center and mounting on the wall.
Mounting Screws:

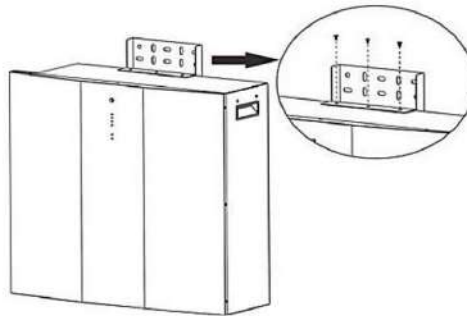
M6x40L- 4Pcs Bubble level



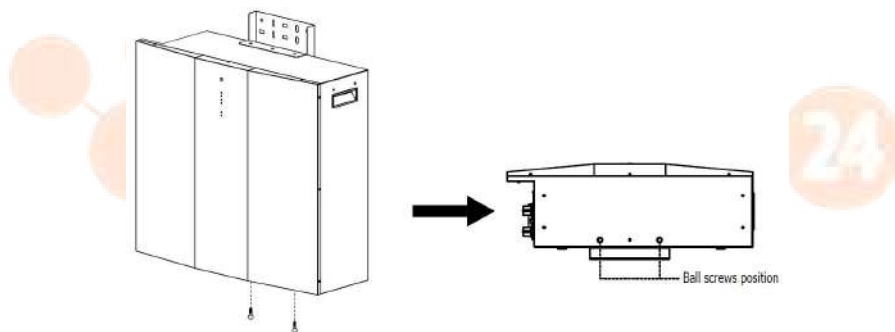
Step 3: Remove side cover of battery module first.



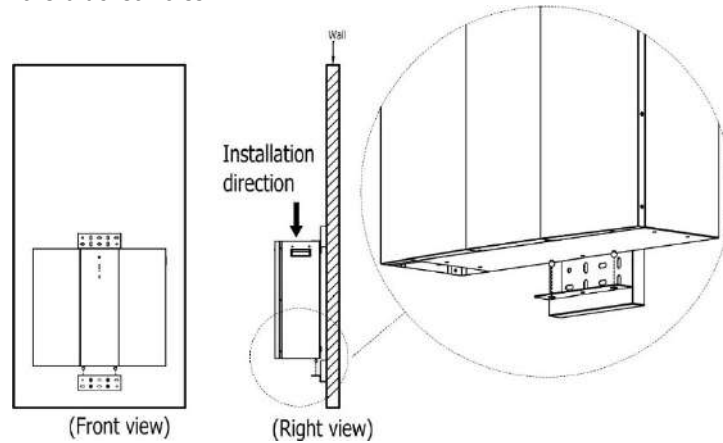
Step 4: Fix Top-bracket of the battery module separately with three flat-head screws as shown in the chart.



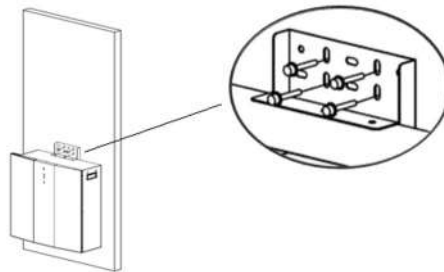
Step 5: Fix ball-screws on the battery module as shown in the chart.



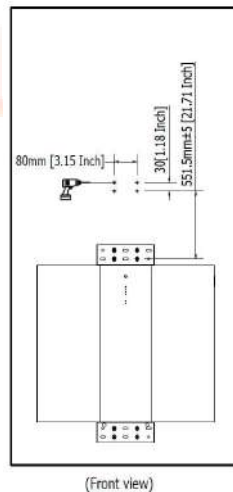
Step 6: Battery ball screws align the bracket-holes.



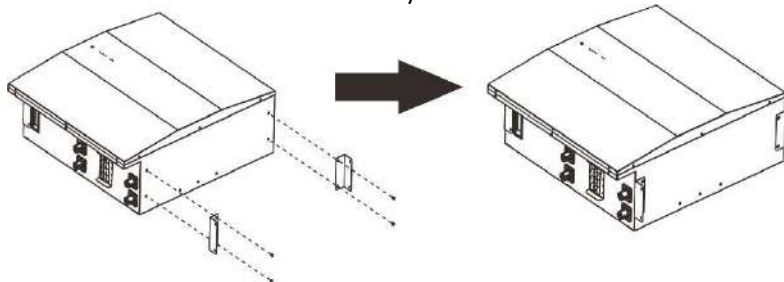
Step 7: Mounting the Top-bracket with four screws on the wall.



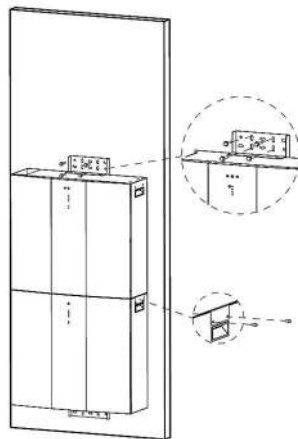
Step 8: Use Ø10mm drill to drill holes at a depth about 50mm, The holes pitch are as follows: (Install the nylon-plug after drilling is completed)



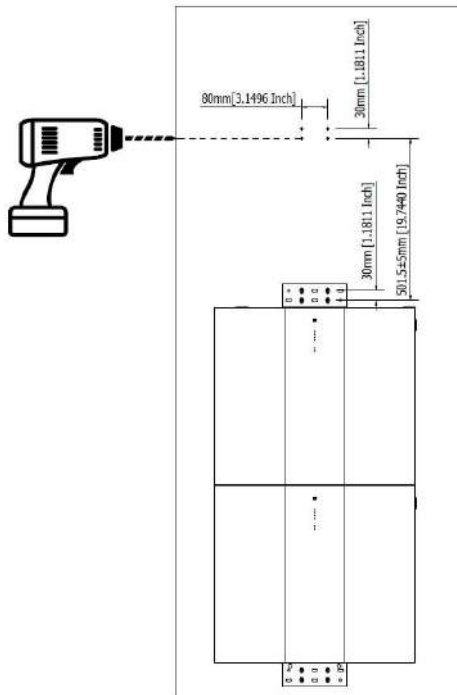
Step 9: Fix two L-shape plates on the bottom of the second battery module with four flat-head screws.



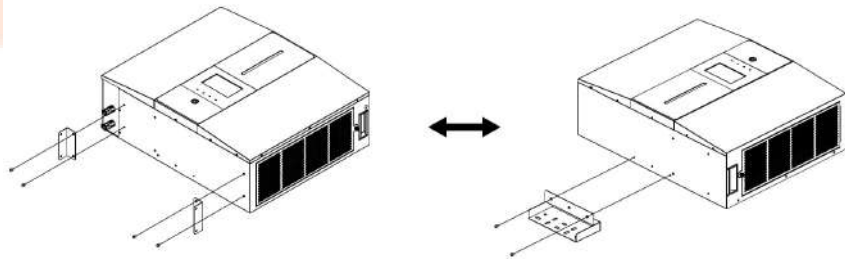
Step 10: Put the second battery module on the top of first battery module and fix two L-shape plates to the first battery module with four round-head screws.
Then, fix the second battery module to the wall with four mounting screws.



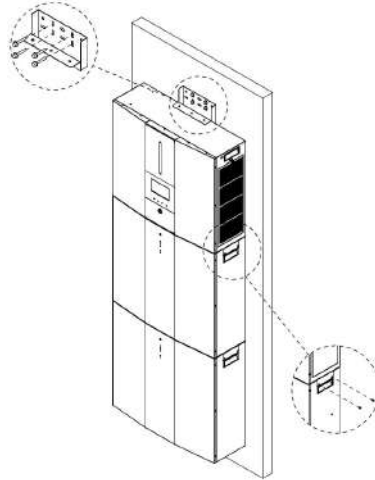
Step 11: Use $\varnothing 10\text{mm}$ to drill holes at a depth about 50mm at the wall and insert nylon-plug inside of each holes.



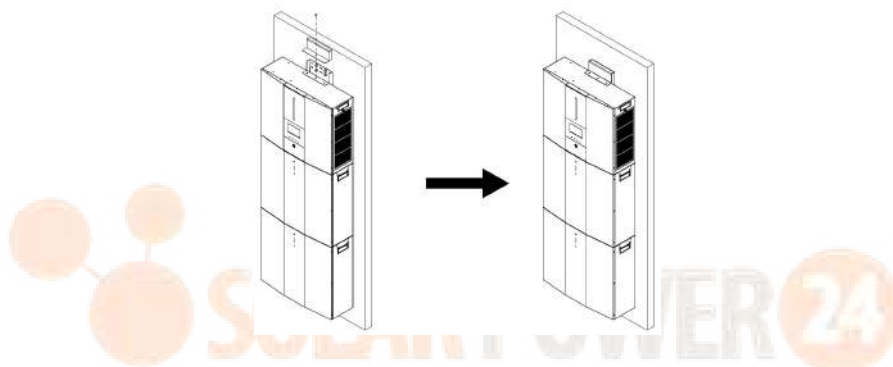
Step 12: Fix two L-shape plates on the bottom of the inverter module with four flat-head screws and also fix bracket on the top of the inverter with two flat-head screws.



Step 13: Put the inverter module on the top of second battery module. Fix mounting bracket with four mounting screws to the wall. Then, fix two L-shape plates to the second battery module with four round-head screws.

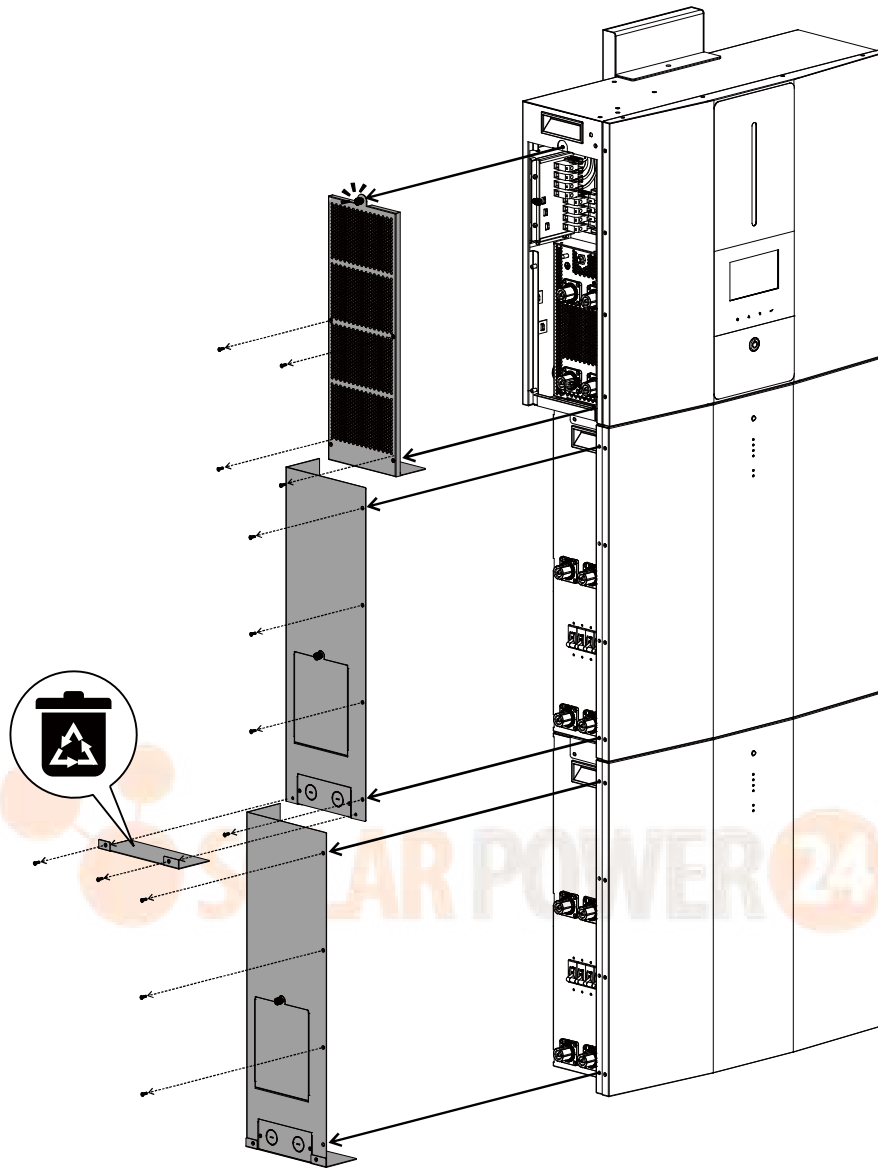


Step 14: Fix bracket cover to the mounting bracket with flat-head screws.



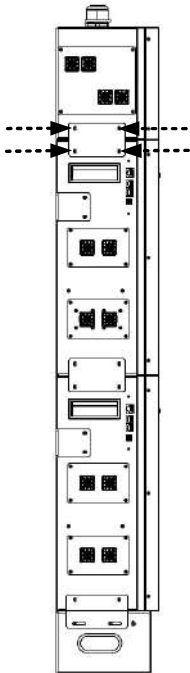
Preparation

Before connecting all wires, be sure to take off wiring cover by removing four screws and one thumb screw. Refer to below chart for the details.



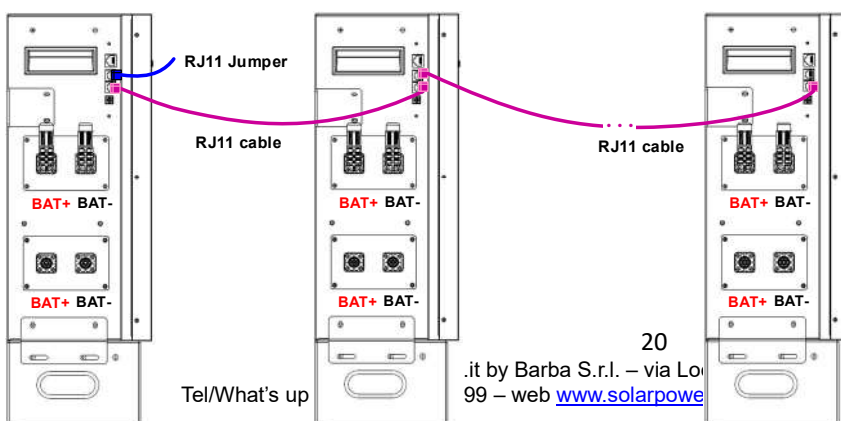
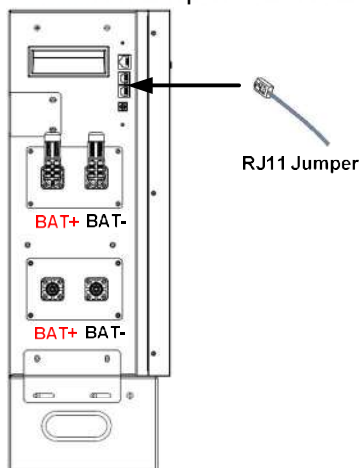
(a) Follow the same procedure as step (b) to fix the other side.

Step 4 (If an optional PDU module is required in the system): Stack the PDU module on the top of all battery modules. Install two fixing plates (supplied in PDU module package) on both sides of the modules with eight screws.



3.4 Wiring Configuration

Step 1: Insert the supplied RJ11 jumper into one of the extension port on the top of the battery module.
 *It's required to connect to the battery module for normal operation.



Step 2 (If multiple battery modules are in parallel): Insert RJ11 cable to connect the extension port of the master battery module*. The other end connects to the extension port of the #2 battery module. If there are more battery modules are connected in the system, repeat this step to connect more battery modules.

Caution: The battery module

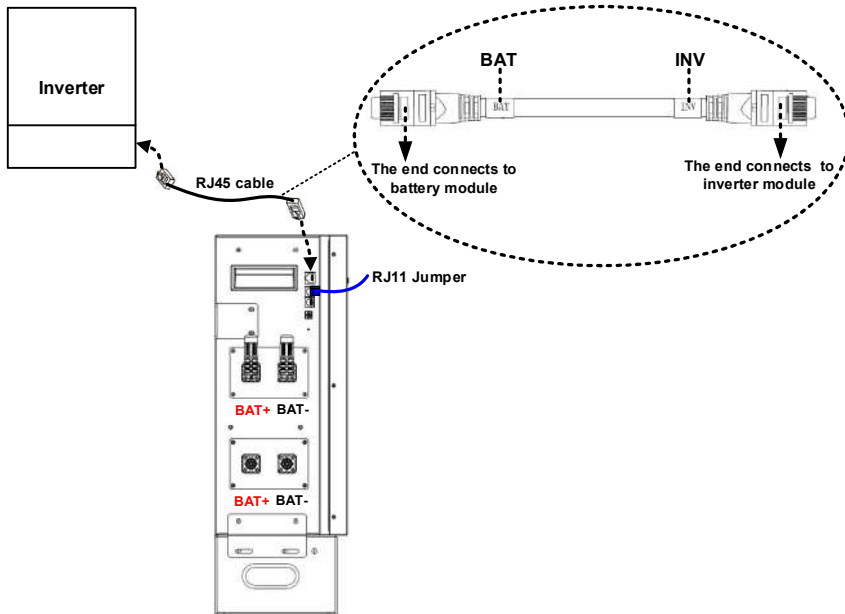


connected to the power module is the Master battery and the ID code should be set as 0.



Step 3: Insert the supplied RJ45 cable into the RJ45 communication port on the master battery module. The other end connects to BMS communication port on the inverter module.

Caution: "BAT" and "INV" are marked on the RJ45 cable. Make sure connect the battery module and inverter module with correct end.



Master battery module

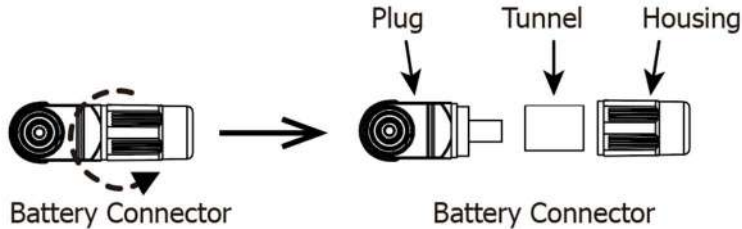
Caution: CAUTION: If more than one battery modules are connected for capacity extension, the battery module connected to inverter module directly will be defined as "Master battery module". Be sure to set ID number for Master battery module as "0".

Step 4: Please follow below steps to prepare battery cable with supplied external battery connectors. The cable length should be prepared based on the real distance between battery module and inverter module.

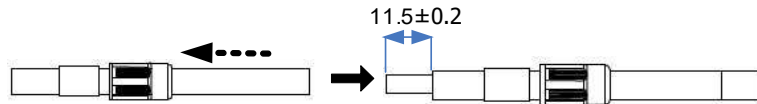
The recommended cable size is listed as below:

Wire Size	Cable mm ²
1*4AWG	25

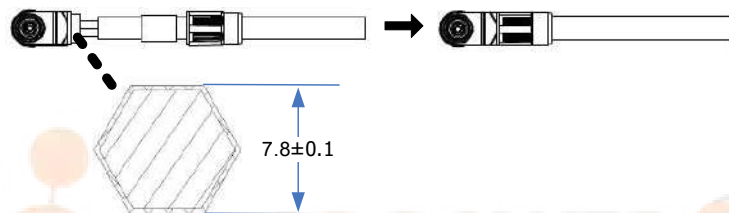
(a) Loosen and disassemble the plug of the supplied battery connector.



(b) Insert the battery cable through the tunnel and housing, and strip battery cable 11.5 ± 0.2 mm.



(c) Crimp the cable and the plug with a proper crimping tool (ex. hydraulic clamp) together into a hexagon shape as shown in below chart. Then, move the housing toward plug and tighten them.

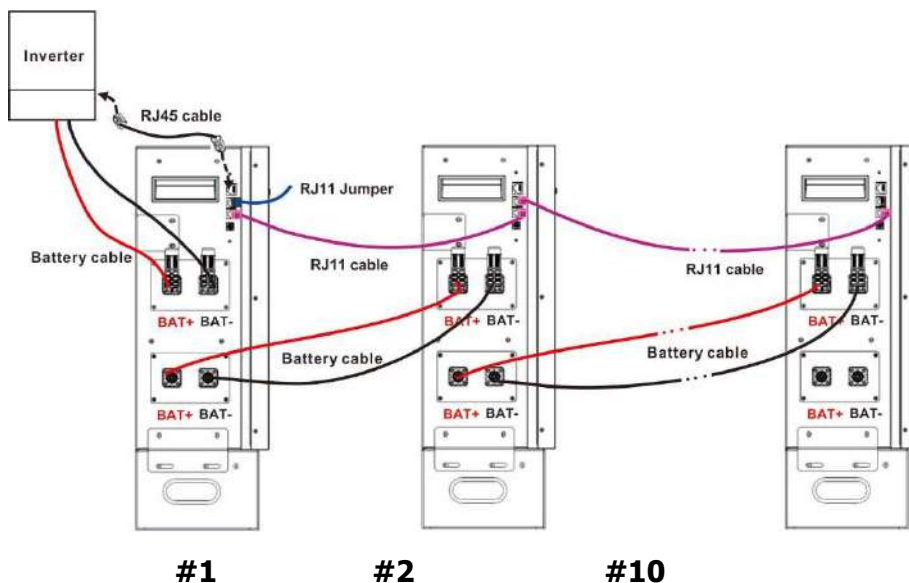


(d) Use battery cable to connect the battery module and inverter module. Make sure the polarity of battery module are correctly connected.

RED connector to the positive terminal (+)

BLACK connector to the negative terminal (-)

If more than one battery modules are connected, use battery cable to connect master battery module and remaining battery module one by one.



Master battery module

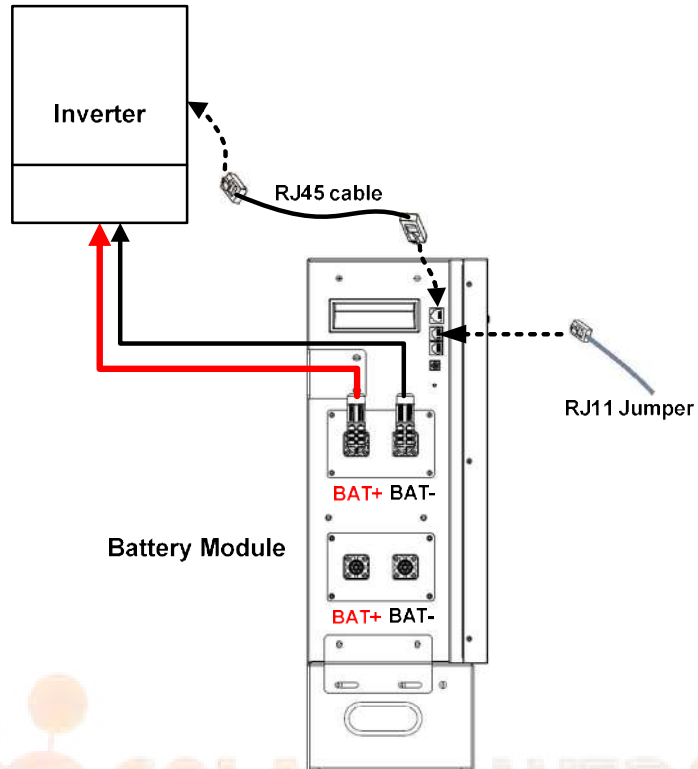


(e) After connecting all cables, the battery modules are ready for DC output.

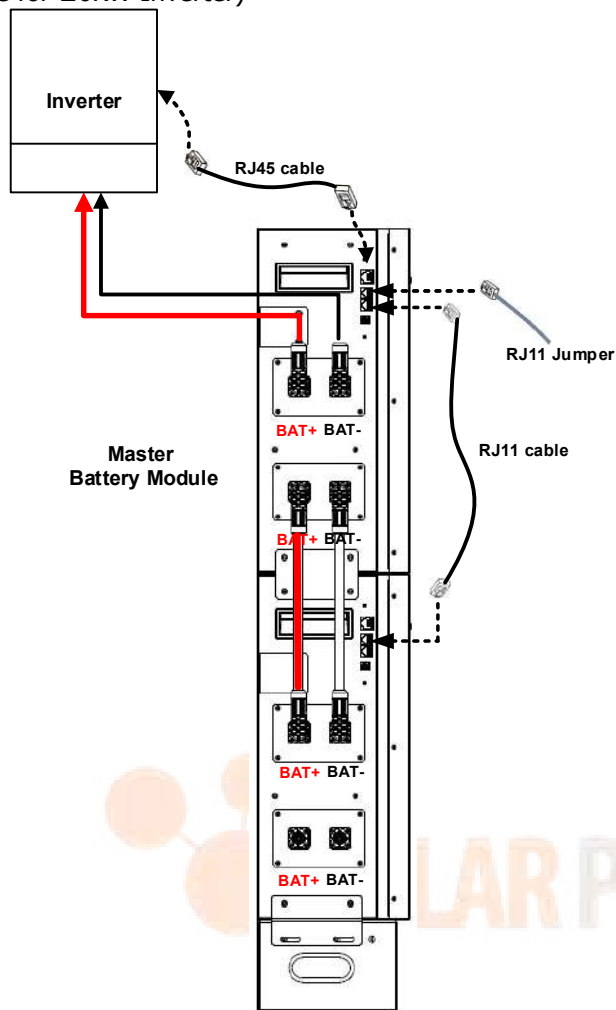


3.5 Wiring Diagrams of Diverse Applications

- (1) Single battery module connection with a max 150A current wiring:
(suitable for ≤6KW Inverter)



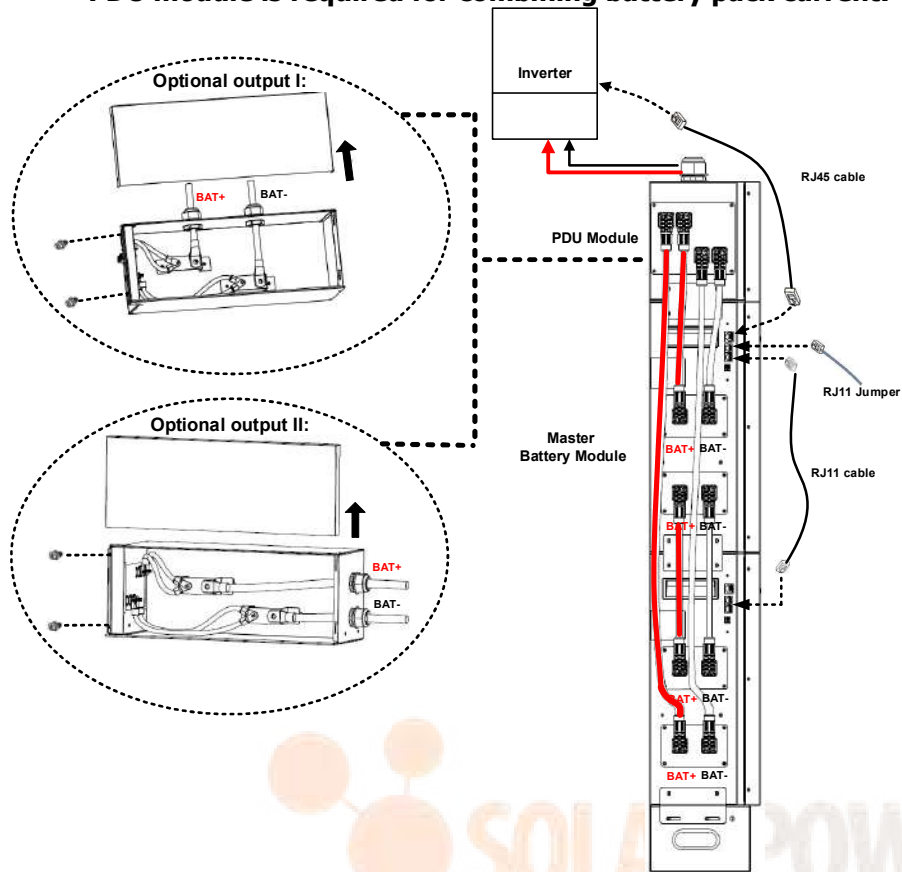
(2) Two-battery module connection for a longer backup time with a max 150A current wiring:
 (suitable for $\leq 6\text{KW}$ Inverter)



(3) Two-battery module connection for a larger-capacity Inverter:

(suitable for > 6KW Inverter)

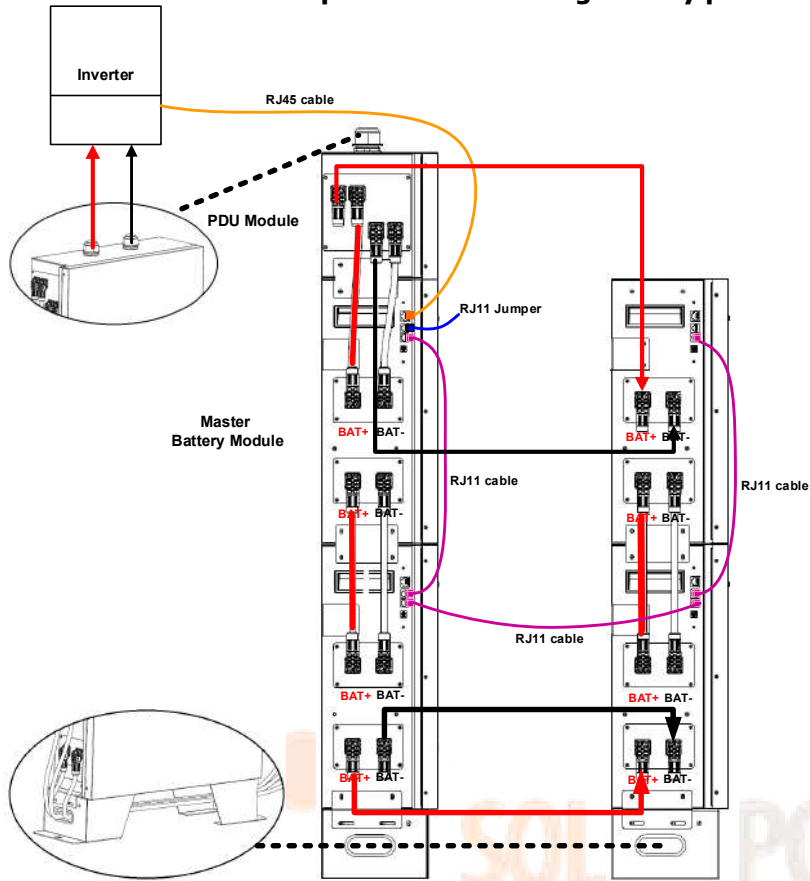
***PDU module is required for combining battery pack current!**



(4) Multiple battery modules in parallel for large-capacity inverter with a longer backup time:

(suitable for > 6KW Inverter):

***PDU module is required for combining battery pack current!**





4. Start-Up/Shut-Off the Battery Module

4.1 Start up the battery module

- (a) When battery module is in the shutdown mode, press manual ON/OFF button for over 5 seconds.
- (b) Or, simply turn on the the inverter module which is connected to a battery module already. The battery module will be automatically turned on.

*If the manual button cannot be approached, just simply turn on the Inverter module. The battery module will be automatically turned on.

4.3 Inverter Configuration

When battery module is in the operating mode, press manual ON/OFF button for 5 seconds. On/Off Light will turn ON. Please make sure RJ11 JUMBER is installed into one of the RS232 ports otherwise battery ALARM light will flash On inverter please select LIB on the menu of battery type (in most of the inverters it is menu 05) if communication is established battery frame will start to FLASH, if something wrong and inverter does not communicate with inverter you will see warning 61

4.3 Shut-off the battery module

When battery module is in the operating mode, press manual ON/OFF button for 5 seconds.



5. Trouble Shooting

Use the table below to solve minor installation and operation problems.

Situation	Fault Event Description	Solution
Battery pack no output	RJ11 jumper is missing.	Re-check if the RJ11 jumper is connected well.
Battery cannot discharge	Same ID code set in multiple battery packs.	Re-set each battery with different ID codes.
	Under-voltage protection.	Charge battery.
	Protection against over-temperature or under-temperature (cell temperature is lower than -20°C or higher than 80°C).	Regulate cell temperature in the range of -20°C to 60°C for discharge.
	Protection against over current.	Remove some non-critical load and charge battery.
	Battery output is short circuited.	Relieve short circuit and charge battery.
	System failure detected.	Shut down system and call maintenance service.
	In parallel battery packs, CAN communication lost and "parallel imbalance" occur on slave battery.	Ensure communication wires are all correctly connected well.
Battery cannot charge	Protection against over current.	Reduce the output current of power module.
	Protection against over-temperature or under-temperature (cell temperature is lower than 0°C or higher than 60°C).	Regulate cell temperature in the range of 0°C to 50°C for charge.
	System failure detected.	Shut down system and call maintenance service.
Communication failure is detected	Communication cable is not connected well.	Check if communication cable is firmly connected.
	Communication ID switch conflict.	Check the parallel batteries ID switch setting and correct them.
	System failure detected.	Shut down system and call maintenance service.