SP-LV5120-W Series

Low Voltage Energy Storage Battery

Installation and Operation Manual

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To be the leading provider of PV,
Energy storage and Charging solutions globally.

This manual introduces SP-LV5120-W from SUNPLUS. Please read this manual before you install the battery and follow the instruction carefully during installation process. Please contact SUNPLUS immediately for advice and clarification if you have any question.

Catalogue

Contents

1. Symbol Description

	Do not placenear openfire or flammable materials.
	A potentialhazard exists when the equipment is working. Wear personal protective equipment during operation.
	Warning electricshock. Power off the equipment before any operation.
	Grounding: indicate PE cable connection position.
	Do not place in areas accessible to children.
	Keep the battery away from open fire or ignition sources.
	Read the product and operation manual before operating the battery system.
	Label for Waste Electrical and Electronic Equipment (WEEE) Directive (2012/19/EU)
	The certificate label for CE.
	Recycle label.

2. Safety Precautions


Alert

(1)It is important and necessary to read the user manual carefully (and attachment) before installing or using battery. Failure to do so or to follow any instruction or warning in this document can result in electrical shock, serious injury, and death, or damage battery, potentially rendering it unusable.
(2)When battery is stored for a long time, it is required to charge once every 6 months, and the SOC should be no less than 85%.
(3)After battery module cannot be discharged, it needs to be recharged within 12h.
(4)Do not connect power terminal reversely.
(5)All power supplies must be disconnected during maintenance.
(6)Please contact the supplier within 24 hours if there is something abnormal.
(7)Do not use any liquid to clean the battery.
(8)Do not expose battery to flammable or irritating chemicals or vapor.
(9)Do not paint any part of battery, including any internal or external components.
(10)Do not connect battery with PV solar wiring directly.
(11)Do not install or use this product beyond provisions of the manual.
(12)Direct or indirect damages caused by the above reasons are not covered by warranty claim.


Warning

2.1 Before Connecting

(1)Please check the external packaging condition before unpacking. If it is damaged, contact corresponding local retailer.
(2)After unpacking, please check the products and spare parts according to spare parts list. If the product is damaged or missing, please contact your local retailer.
(3)Connect to specified matching inverter.
(4)Before installation, be sure to cut off the grid power and make sure battery is in turned-off mode.
(5)It is prohibited to connect the battery and AC power directly.
(6)All electrical wiring must be connected in accordance with local regulations.
(7)Please ensure that electrical performance of battery system is compatible with the equipment.
(8)The installation onsite shall be equipped with fire-fighting facilities that meet relevant requirements, such as fire sand, dry powder fire extinguisher, etc.

2.2 In Using

(1)If battery system needs to be moved or repaired, power must be cut off and battery is completely shut down.
(2)It is prohibited to connect battery with different types of battery.
(3)Do not connect battery to faulty inverter.
(4)In case of fire, only dry powder fire extinguisher can be used, liquid fire extinguishers are prohibited.
(5)Do not open, repair or disassemble the battery except Far East Battery personnel or other authorized personnel. The company shall not bear any liability or responsibility caused by violation of any safety operation or design standard, production standard, equipment safety standards or any other standards or requirements.

3. Introduction

LV5120-W energy storage system battery is a new energy storage product developed and produced by Sunplus, which can provide reliable power supply for all kinds of equipment or systems.

3.1 Features

(1)When multiple modules are parallel connected, module addresses are set automatically.
(2)Support for upgrading the battery module from the upper controller through RS232 communication.
(3)The module is non-toxic, non-polluting and environmentally friendly.
(4)Cathode material is made from LiFePO4 with safety performance and long cycle life.
(5)Battery management system (BMS)has protection functions including over-discharge, over-charge, over-current and high/low temperature.
(6)The system can automatically manage charge and discharge state and balance voltage of each cell
(7)Flexible configuration, multiple battery modules can be in parallel for expanding capacity and power.
(8)Adopted self-cooling mode rapidly reduced system entire noise.
(9)The module has less self-discharge, up to 6 months without charging it on shelf, no memory effect, excellent performance of shallow charge and discharge.
(10)Small size and light weight, wall mounted and ground mounted designed module is comfortable for installation and maintenance.

Functions

Protection and Alarm	Management and monitor
Charge/Discharge End	Cell Balance
High/Low Temperature Protection	Intelligent Charge Model
Under Voltage Discharging Protection	Charge/Discharge Current Limit
Charge/Discharge Overcurrent Protection	Capacity Retention Calculate
Short Circuit Protection	History Record

3.2 Specification Parameters

No.	Items	Specification
1	Product Name	Rechargeable Lithium Iron Phosphate Battery
2	Module Model	SP-LV5120-W
3	Battery Type	LFP 2P16S
4	Nominal Capacity	5.12kWh
5	Usable Capacity	4.86kWh(95% DOD)
6	Nominal Voltage	51.2V
7	Working Voltage	45.6~57.6V
8	Charging Voltage	56V
9	Max. Charge Current	50A
10	Max. Discharge Current	100A
11	Communication	RS485, CAN
12	Storage Temperature	0℃～45℃(Recommended)
13	Storage Humidity	≤85%(RH)
14	Working Temperature	Charging：-10℃～50℃ Discharging：-20℃～50℃
15	Working Humidity	≤95%(RH) No Condensation
16	Working Altitude	≤2000m
17	Ingress Protection	IP55
18	Protective Class	I
19	Weight	~45kg
20	Dimension(W*D*H)	510mm*385mm*175mm
21	Design Life	15Years(25℃)
22	Cycle Life	＞6000(25℃) ,60% EOL
23	Scalability	Max. 8 in parallel(40.96kWh)
24	Certification	CE, IEC62619, IEC/EN 61000-6-1/3, UN38.3

Dimensions

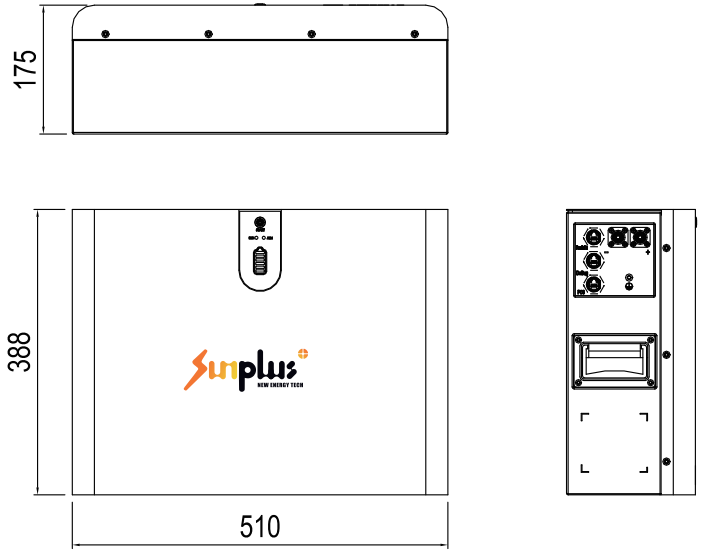


Figure 3-1

3.3 Equipment interface

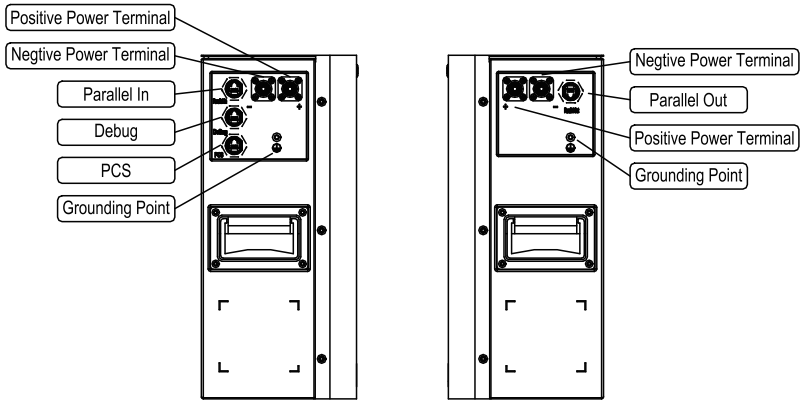


Figure 3-2

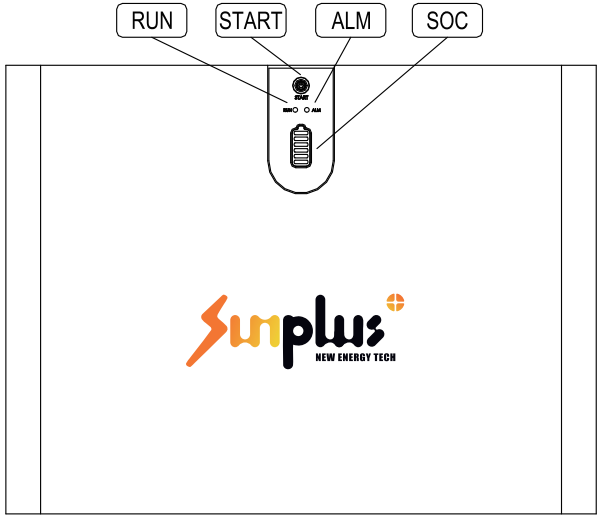


Figure 3-3

Start

Turn on: When battery is dormant, press the START button to start the battery module.
Turn off: When battery is active, press and release the START button to turn off the battery module.

Run

Green LED lighting to show the battery running status.

ALM

Red LED flashing to show the battery has alarm; lighting to show the battery is under protection.
Inform the manufacturer or professional engineer for commissioning or maintenance.
(See LED indicator table for details)

Status	Mode	ON/OFF	RUN	ALM	Capacity Indicator LED						Description
					6	5	4	3	2	1	
Power Off	Sleep	○	○	○	○	○	○	○	○	○	All OFF
Stand by	Normal	●	◐1	○	6 green LEDs to show the battery' s current capacity.						Stand by
	ALM	●	◐1	◐3							Low Voltage
CH	Normal	●	●	○	6 green LEDs to show the battery' s current capacity. (The highest LED light will flash twice.)						The highest LED light will flash twice and ALM light will not flash when overcharge occurs.
	ALM	●	●	◐3							
	OCH Protection	●	●	○	●	●	●	●	●	●	If no grid connected, it will switch to standby state
	T/OC/F Protection	●	○	●	○	○	○	○	○	○	Stop charging
DCH	Normal	●	◐3	○	6 green LEDs to show the battery' s current capacity.						
	ALM	●	◐3	◐3							
	UV Protection	●	○	○	○	○	○	○	○	○	Stop discharging
	T/OC/SC/RC/F Protection	●	○	●	○	○	○	○	○	○	Stop discharging
Failure		○	○	●	○	○	○	○	○	○	Stop charging and discharging

Note

1.Description of indicator light

○ ○ The indicator light is off.

● ● The indicator light is on.

◐ ◐ The indicator light is flashing, and below table shows the flashing type.

Flashing Type	Duration of indicator on	Duration of indicator off
◐1 ◐1	0.25s	3.75s
◐2 ◐2	0.5s	0.5s
◐3 ◐3	0.5s	1.5s

1.Description of indicator light

Please see description of abbreviation mentioned in the table below.

Abbreviation	Full Name	Abbreviation	Full Name
CH	Charge	T	Temperature
DCH	Discharge	OC	Overcharge
RUN	Work normally	SC	Short-circuit
ALM	Alarm	RC	Reverse connection
UV	Under-voltage	F	Failure
OCH	Overcharge		

SOC

6 green LEDs are used to show the battery's remaining capacity.

State		Charge						Discharge					
Capacity Indicator LED		L6	L5	L4	L3	L2	L1	L6	L5	L4	L3	L2	L1
Power	0 ~ 8%	○	○	○	○	○	◐②	○	○	○	○	○	●
	8 ~ 26%	○	○	○	○	◐②	●	○	○	○	○	●	●
	26 ~ 50%	○	○	○	◐②	●	●	○	○	○	●	●	●
	50 ~ 74%	○	○	◐②	●	●	●	○	○	●	●	●	●
	74 ~ 92%	○	◐②	●	●	●	●	○	●	●	●	●	●
	92 ~ 100%	◐②	●	●	●	●	●	●	●	●	●	●	●
Indicator Light		●						◐③					

Note

○ The indicator light is off.

● The indicator light is on.

◐ The indicator light is flashing, and below shows the flashing type.

Flashing Type	Duration of indicator on	Duration of indicator off
◐①	0.25s	3.75s
◐②	0.5s	0.5s
◐③	0.5s	1.5s

Power Terminal

Power cable terminals: there are two pairs of terminals with same function, one connects to equipment, the other one paralleling to other battery module for capacity expanding.

For power cables uses water-proofed connectors. Must keep pressing this Lock Button while pulling out the power plug.

Debug

Dry contact 1: On - closed at low capacity.（NO1 COM1）

Dry contact 2: On - closed under protection status.（NO2 COM1）

RS 232：Software upgrade and debugging port.

RJ45 Socket

Pin	Definition
1	NO1
2	COM1
3	TX (single plate)
4	RX (single plate)
5	SGND
6	NO2
7	COM2

PCS

Be used to communicate with inverter or upper battery. The default baud rate is 500 kbps.

Terminal resistance is required to connect with inverter can communication, and 120 Ω resistance is recommended.

Be used to communicate with inverter. The default baud rate is 9600 bps.

Definition of CAN、RS485Port Pins, RJ45 Socket

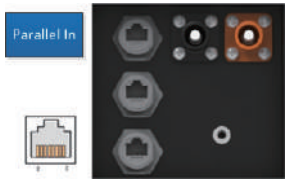
Pin	Definition
1	RS485B
2	RS485A
3	GND
4	CANH
5	CANL

Parallel RS485

For communication between multiple parallel batteries.
The parallel RS485 out interface connected to the inverter is defined as the host.
The output port of Parallel RS485 OUT is connected to the Parallel RS485 IN of the next machine, and so on. Up to 8 machines can be connected in parallel.
After the high-voltage line and communication line of the parallel machine are connected, turn on the slave battery firstly, and turn on the master battery. The system starts up and carries out automatic coding.

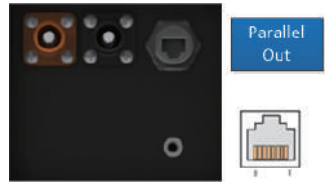
Parallel In

Pin	Definition
1，8	RS485-B
2，7	RS485-A
3，6	GND
4	UP in+
5	UP in-



Parallel Out

Pin	Definition
1，8	RS485-B
2，7	RS485-A
3，6	GND
4	DN OP+
5	DN OP-



4. Safe Handling of Lithium-iron ESS Batteries Guide

4.1 Solution Diagram

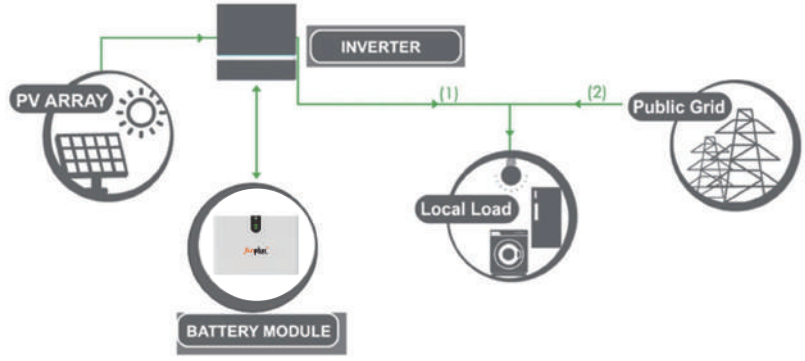


Figure 4-1

4.2 Danger Label

4.3 Tool

Wire Cutter | Modular Crimping Plier | Screwdriver | Electric Drill

Note

Properly use insulated tools to prevent accidental electric shock or short circuits. If insulated tools are not available, cover the entire exposed metal surfaces of the available tools, except their tips, with electrical tape.

4.4 Safety Gear

It is recommended to wear the following safety gear when dealing with battery pack.

Insulated Gloves | Safety Goggles | Safety Shoes

5. Installation and operation

5.1 Package items

Unpacking and check the Package items

(1)For battery module package:

Battery Module

2 * 500mm 4AWG power cables. (power cascade cable)

1 * 500mm RJ45 communication cable. (communication cascade cable)

1 * 1000mm 10AWG grounding cable.

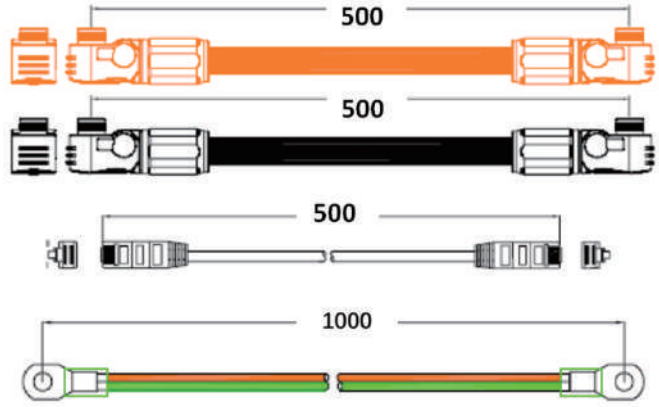


Figure 5-1

(2)For external cable kits:

Note

Power and communication cables connect to inverter belongs to an External Cable Kit, NOT include in battery carton box . They are in another extra small cable box. If there is anything missed, please contact dealer.

2 * 2000mm power cables (4 AWG, peak current capacity 120A, constant 100A)

1 * 3000mm RJ45 communication cable

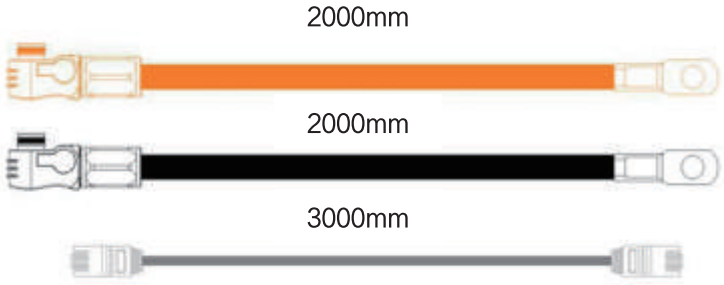


Figure 5-2

5.2 Cable Requirements

(1)Power cable

Connect orange power cable to orange harness and black power cable to black harness. The cross-sectional area of crimping part is 25 mm2. Withstand voltage is DC1500V, temperature range is -40°C~ 200°C, and stripped conductor length is18 ± 1mm. Secure back shell and check if there is any clearance. Recommended tool: manual hydraulic tong (die: 25mm) ^{2}) tensile force after crimping ≥ 1200N. If a single battery module is used, it is recommended that you connect power port of two batteries and cover other ports with a protective cover. Connect power cables between multiple batteries in parallel, which means connecting positive pole of one battery to positive pole of another battery, from negative to negative terminal. Cover and protect the last battery terminal of backup battery. The power cable between batteries shall be as short as possible and meet the following installation requirements.

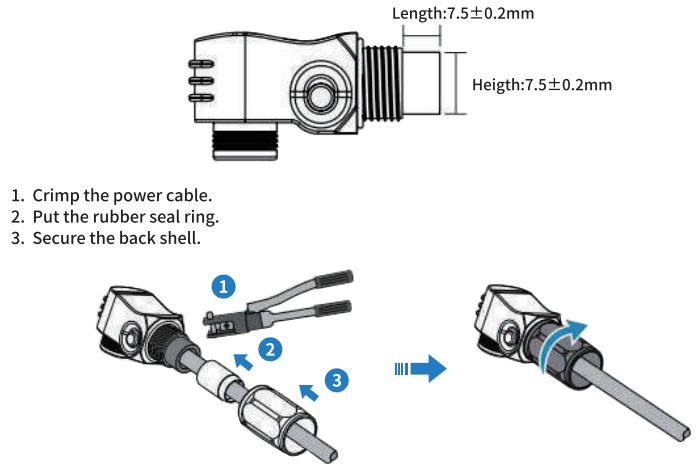


Figure 5-3

(2)PE cable

Disconnect power supply and use PE cable before disassembling equipment. After crimping, traction force of cable shall be at least 400N, and any one of the two grounding cables shall be connected to the ground. Keep other grounding cables. Specification of PE cable:10AWG, and the cable should meet the requirement for outdoor use.

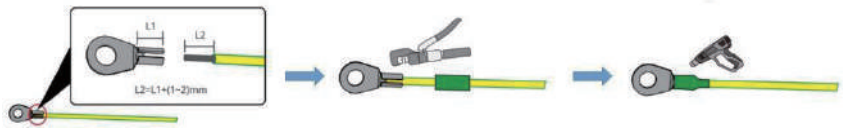


Figure 5-4

5.3 Installation Location

Make sure that installation location should meet the following condition:

(1)The area should be completely water-proof.

(2)The floor should be flat and level.

(3)No flammable or explosive materials.

(4)The ambient temperature is within the range from 0℃ to 45℃ .

(5)The temperature and humidity are maintained at a constant level.

(6)There is just a little dust and dirt in the area.

(7)The distance from heat source should be more than 2 meters.

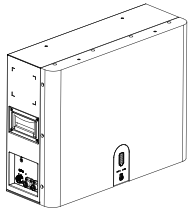
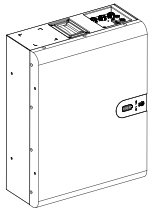
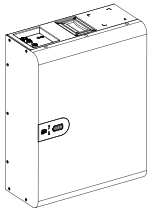
(8)The distance from air outlet of inverter is more than 0.5 meters.

(9)Installation areas should avoid direct sunlight.

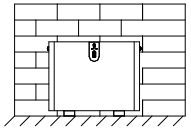
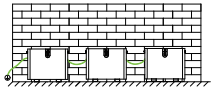
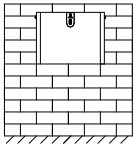
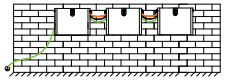
(10)No forced ventilation requirement for battery module, but please avoid installing in a closed area. Ventilation shall avoid high salinity ≤ 30%, humidity ≤ 85% and ambient temperature of 0°C ~ 45°C

5.4 Installation Direction

Warning

Upside down	Sidelong	Sidelong
		
NOT allowed	NOT allowed	NOT allowed

The following placements are recommended.

	Method		Cautions	
1	Ground mounted		1.Ensure that the Angle of the battery pack is less than 5° 2.The ground is smooth and there is no water 3.The recommended distance between battery packs is 200 mm to 400mm	
2	Wall mounted		1.Ensure that each installation point of the battery pack can weigh at least 50kg 2.Ensure that the bracket is close to the wall 3.Ensure that the Angle of the battery pack is less than 5° The recommended distance between battery packs is 200 mm to 400mm	

5.5 Installation Steps

Warning

(1)Follow local electric safety and installation policy, a suitable breaker between battery system and inverter is required.

(2)All installation and operation must follow local electric standard and requirements.

(3)When battery modules are paralleled, the system should be powered off before installation operation.

Method 1: Ground mounted

1.Install the rubber feet to the bottom of the battery pack using four M5 crown-bolts.

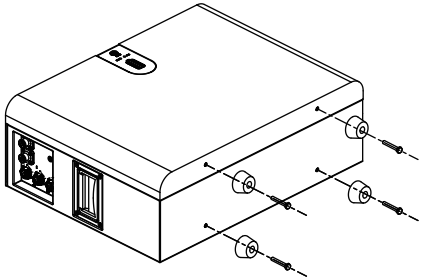


Figure 5-5

2.Install the steel brackets on bothsides of the battery pack with M6 hex socket bolts.

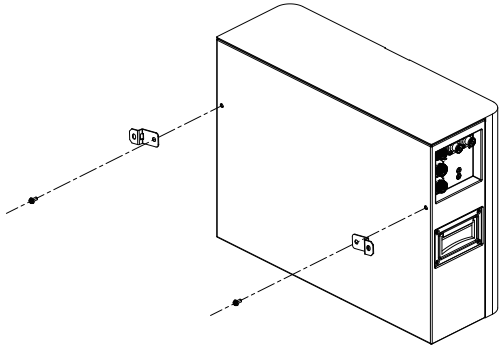


Figure 5-6

3.Mount the steel brackets on the wall with two expansion screws.

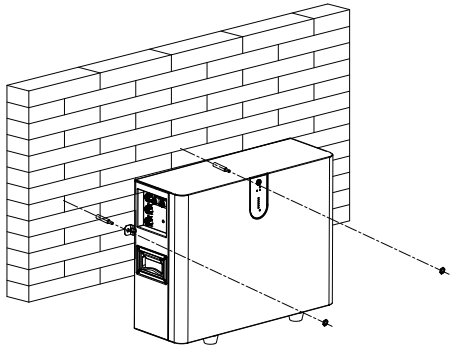


Figure 5-7

4.Ground wire connection of each module.

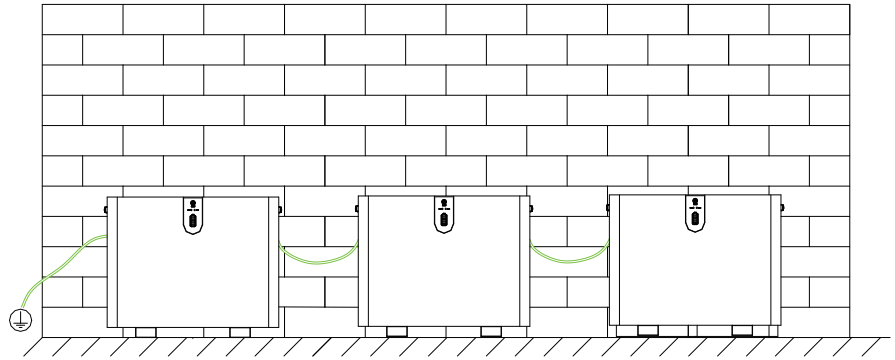


Figure 5-8

5.Connect cascade positive and negative power cables.

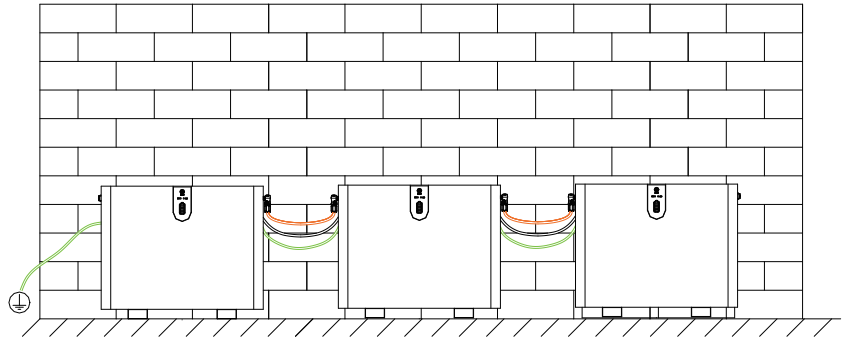


Figure 5-9

6.Connect power cable to the inverter.

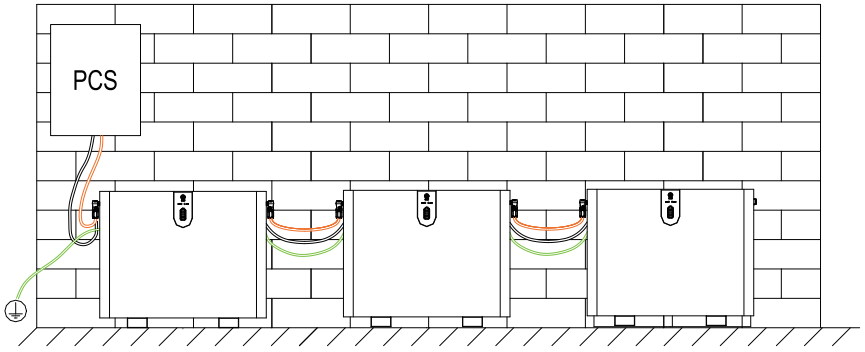


Figure 5-10

7.Connect cascade 485 communication cable.

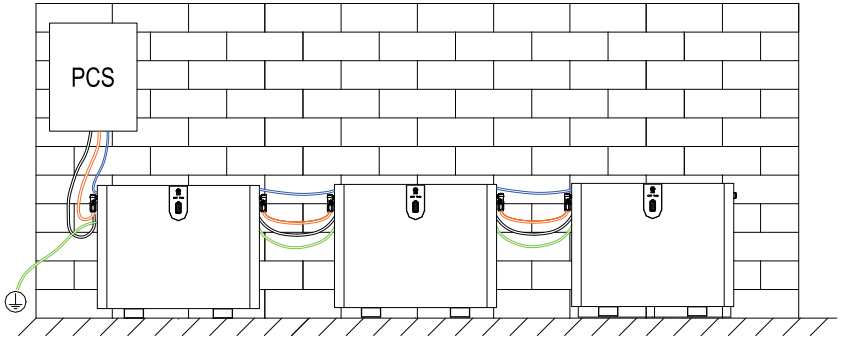


Figure 5-11

8.Press the battery START metal button in turn, turn on START metal button of theslave battery firstly, and finally turn on the START metal button of the master bat-tery (the one connected to inverter is the master battery).

Method 2: Wall mounted

1.Mount the wall bracket to the wall using six expansion screws.

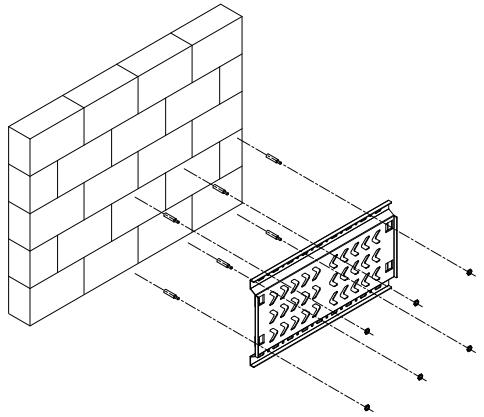


Figure 5-12

2.Install the brackets into the battery pack with 6 bolts.

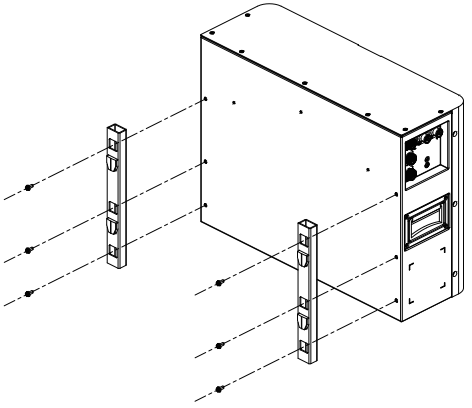


Figure 5-13

3.Install the battery pack on the wall bracket.

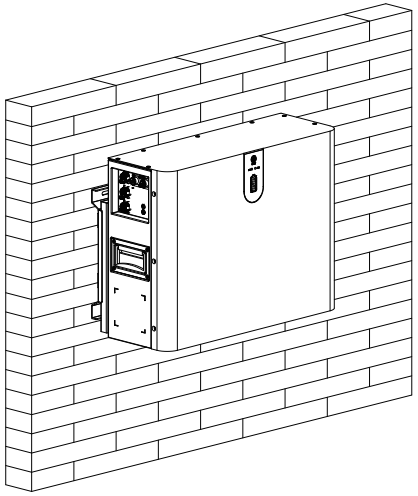


Figure 5-14

4.Connect the cables.

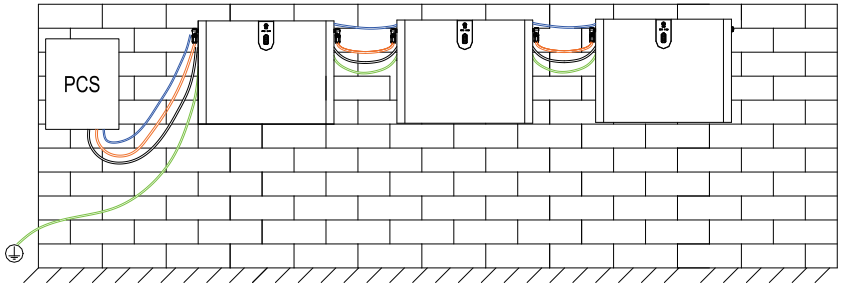


Figure 5-15

5.6 Power On

Double check that all power cables and communication cables should be properly connected.

(1)The battery that communicates with inverter is the master battery and other battery modules are slave battery. (1 master battery and 7 slave battery modules at most can be configured.).

(2) Press START metal switch of battery to start up, LED indicator lights turn on successively from “RUN” for 0.5 seconds.

(3) Press the battery START metal button in turn, turn on the START metal button of the slave module firstly, and finally turn on the START metal button connected to master battery (the one connected to inverter is the master battery).

Note

Before capacity expansion, system should be powered off. During capacity expansion or replacement, when modules with different SOC/voltages are connected in parallel, please keep the system idle for≥15 minutes or until SOC LEDs become similar (≤1 point difference).

When the system is in the sleep mode and meets any of the following conditions, the system will exit the sleep mode and enter the normal operation mode.

(1)Connect the charger, and the charger output voltage shall be greater than 48V.

(2)Press the start button (3~6s) and release the button.

(3)RS232 communication activated.

5.7 Power Off

When BMS is in activated state, press the START metal switch and release it. The system will switch to sleep mode, and all LED indicators will be off in turn.

Note

When any of the following conditions is met, the system enters the sleep mode:

(1)Single cell or module voltage over discharge protection is not released within 30 seconds.

(2)Press the start button (3~6s) and release the button.

(3)The lowest unit voltage is lower than the sleep voltage, and duration reaches sleep delay time (and also meets the no communication, no protection, no balance and no current state at the same time.)

(4)Standby time exceeds 24 hours (no communication, no charge and discharge at the same time).
(5)Forced shutdown by upper control system.
(6)System hardware failure.
Before entering sleep mode, ensure that the input side is not connected to external power, otherwise it will not be able to enter the sleep mode.

6. Emergency Situations

6.1 Battery Leakage

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.
(1)Inhalation: Evacuate contaminated area and seek medical attention.
(2)Contact with eyes: Rinse eyes with flowing water for 15 minutes and seek medical attention.
(3)Contact with skin: Wash affected area thoroughly with soap water and seek medical attention.
Ingestion: Induce vomiting and seek medical attention.

6.2 Fire

NO WATER!

Only dry powder fire or carbon dioxide extinguisher can be used; if possible, move the battery module to a safe area before it catches fire.

6.3 Wet Batteries

If the module is wet or submerged in water, do not let people access it, then contact FAR EAST BATTERY or an authorized dealer for technical support. Cut off all power switch on inverter side.

6.4 Damaged Batteries

Damaged batteries are dangerous and must be handled with utmost care. They are not fit for use and may pose a danger to people or property. If the module seems to be damaged, pack it in its original container, then return it to authorized dealer.

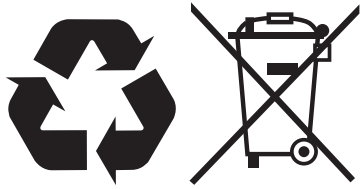
Warning

Damaged batteries may leak electrolyte or produce flammable gas.

7. Remarks

7.1 Recycle and Disposal

In case a battery (normal condition or damaged) needs disposal or needs recycling, it shall follow the local recycling regulation (i.e. Regulation (EC) N ° 1013/2006 among European Union) to process, and using the best available techniques to achieve a relevant recycling efficiency.



7.2 Maintenance

(1)It is required to charge the battery at least once every 6 months, for this charge maintenance make sure the SOC is charged to higher than 85%.
(2)Check installation environment such as dust, water, insect etc. Make sure it is suitable for IP20 battery system. Connection of power connector, grounding point, power cable and screw are suggested to be checked every year.

7.3 Declaration of conformity

The battery system described in this document complies with the applicable European directives. The certificate is available in the download area of our websites.

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