

Lithium-Iron Phosphate Battery

User Operation Manual

Product Name: PS5120E / PS5120ES

Model: 16S1P

Information Version: 2.1

Contents

1. Introduction	2
2. Function Characteristics	3
3. Parameters	4
4. Environmental Characteristics	5
5. Electrical Characteristics	6
5.1 System schematic diagram.....	6
5.2 Port Definition	6
5.3 Definition of communication port pin.....	8
5.4 DIP (SWITCH) for PS5120E/PS5120ES	10
5.5 Lights.....	12
6. Battery Pack	13
6.1 Size and Picture for PS5120E.....	13
6.2 Size and Picture for PS5120ES	13
7 Assembly Parts List.....	14
7.1 List for PS5120E.....	14
7.2 List for PS5120ES	15
8. System operation steps.....	17
9 Installation	18
9.1 Package items for battery module package of PS5120E:	18
9.2 Package items for battery module package of PS5120ES:	22
10. Safety Regulations	26
10.1 Safe handling of lithium batteries Guide	26
10.2 Warning.....	27
10.3 Against risk	28
10.4 Dangerous mode.....	28

1. Introduction

PS5120E/ PS5120ES lithium iron phosphate battery is one of new energy storage products developed and produced by manufacture, it can be used to support reliable power for various types of equipment and systems. PS5120E/ PS5120ES is especially suitable for application scene of high power, limited installation space, and restricted load-bearing and long cycle life.

PS5120E/ PS5120ES has built-in BMS battery management system, which can manage and monitor cells information including voltage, current and temperature. What's more, BMS can balance cells charging and discharging to extend cycle life. Multiple batteries can connected in parallel to expand capacity and power in parallel for larger capacity and longer power supporting duration requirements.

2. Function Characteristics

- ◆ The whole module is non-toxic, non-polluting and environmentally friendly.
- ◆ Cathode material is made from LiFePO_4 with safety performance and long cycle life.
- ◆ Provide over charge, over discharge, over current, short circuit and other protection to ensure the safe and stable operation of the system.
- ◆ Status indicator: displays SOC and fault status information.
- ◆ It can detect the temperature of battery cell, environment and power MOS, and can make alarm and protection actions when charging or discharging at high or low temperature. There are 6 channels of NTC, 4 channels of battery cell temperature detection, 1 channel of ambient temperature detection, and 1 channel of power MOS temperature detection.
- ◆ RS485 communication, CAN communication function.
- ◆ The charge balance strategy can be flexibly set (turn-on voltage, balance voltage), which can effectively improve the battery's use time and cycle life.
- ◆ It has the ability to perform various battery management parameters such as cell overvoltage and undervoltage, pack total voltage over and undervoltage, charging overcurrent, discharging overcurrent, cell high and low temperature, environmental high and low temperature, balancing strategy, battery series connection number, battery capacity, etc. It can be set to turn on and off the discharge MOS, charge MOS, current-limiting function switch, buzzer alarm switch, forced sleep switch and online upgrade function of the system software.
- ◆ Flexible configuration, multiple battery modules can be in parallel for expanding capacity and power.
- ◆ Adopted self-cooling mode rapidly reduced system entire noise.

3. Parameters

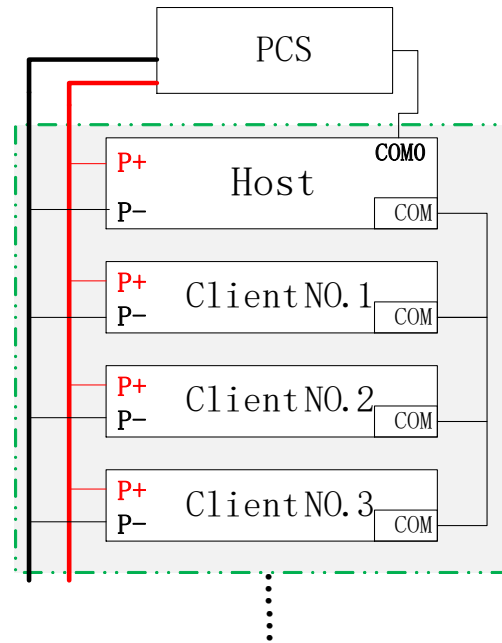
Parameter Summary			
Item	Specification		
	PS5120E	PS5120ES	Remark
Nominal voltage	51.2V	51.2V	
Operating voltage range	44.8~57.6V	44.8~57.6V	
Standard charging voltage	56.5V	56.5V	
Nominal capacity	100Ah	100Ah	
Standard Charge Current	33A	33A	Typical value: 0.33C
Max Charge Current	80A	80A	
Standard Discharge Current	33A	33A	Typical value: 0.33C
Max Discharge Current	100A	100A	
Weight	45kg	49kg	Net weight
Battery Dimensions	460*440*133 mm	505*450*205 mm	
Cycle life	6000 cycle		@25℃ 0.5C 90% DOD
In parallel	Up to 30 PCS	Up to 30 PCS	

4. Environmental Characteristics

Item		Specification	Remark
Operating Temperature	Charge	0°C ~ 45°C	
	Discharge	-20°C ~ 60°C	
	Recommend	23°C ± 2°C	
Storage Temperature	1 month	-10°C ~ 60°C	High temperature storage is not recommended
	3 months	-10°C ~ 45°C	
	12 months	-10°C ~ 25°C	
	Recommend	21°C ~ 25°C	
Relative humidity		5% to 95% Relative Humidity	

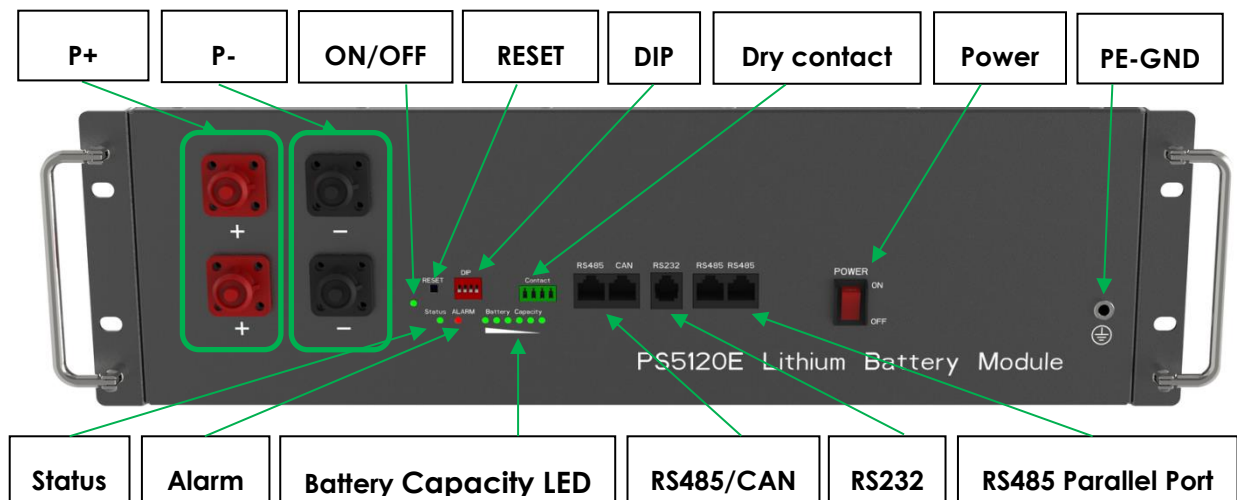
5. Electrical Characteristics

5.1 System schematic diagram

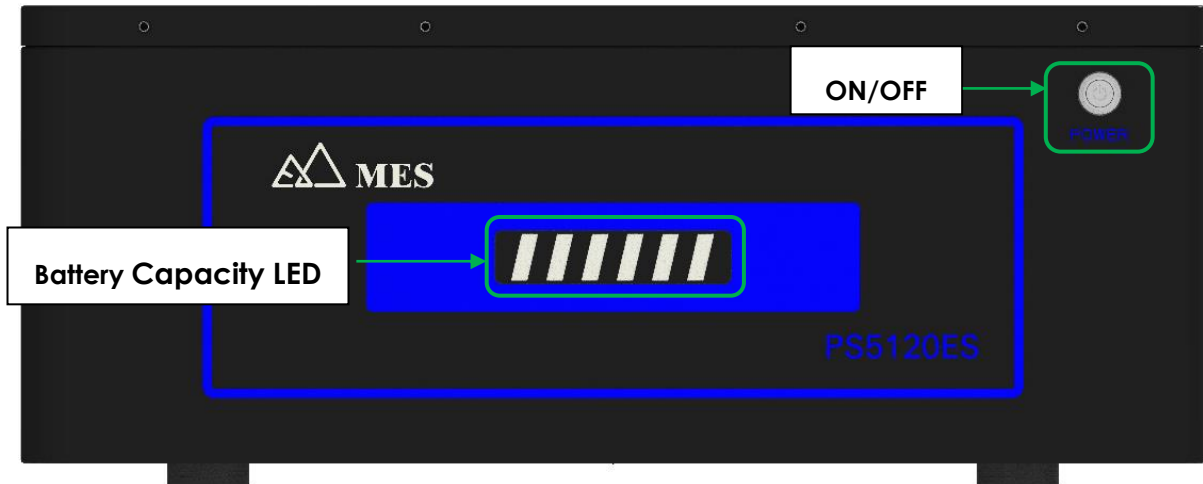


5.2 Port Definition

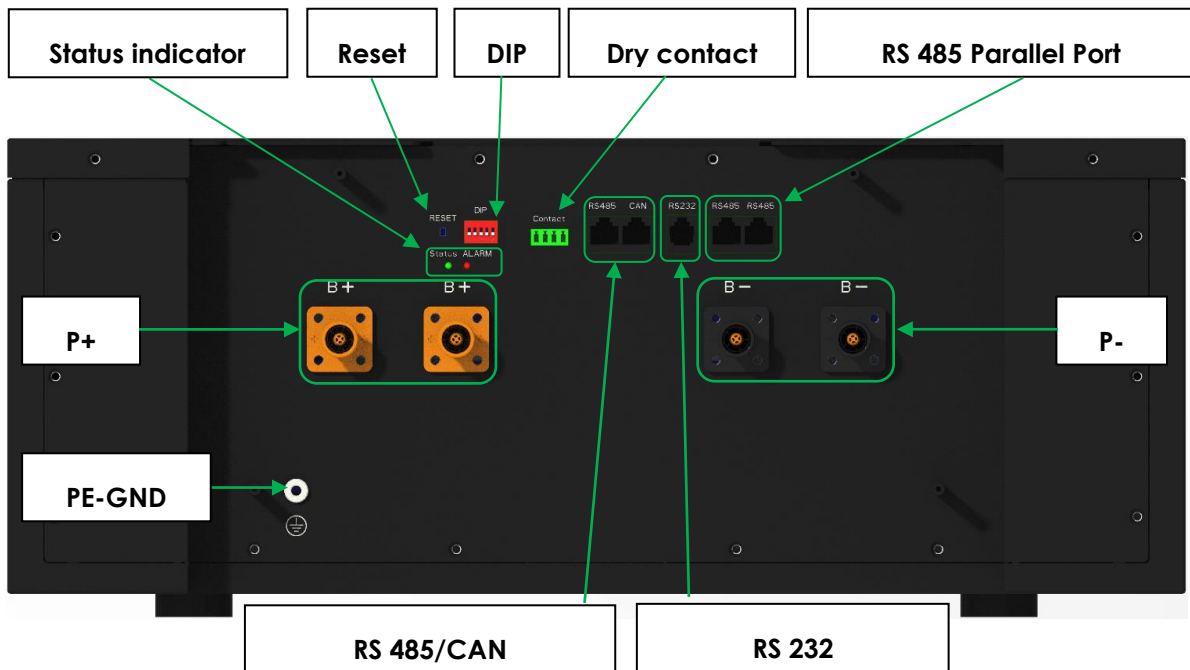
Front view: For PS5120E



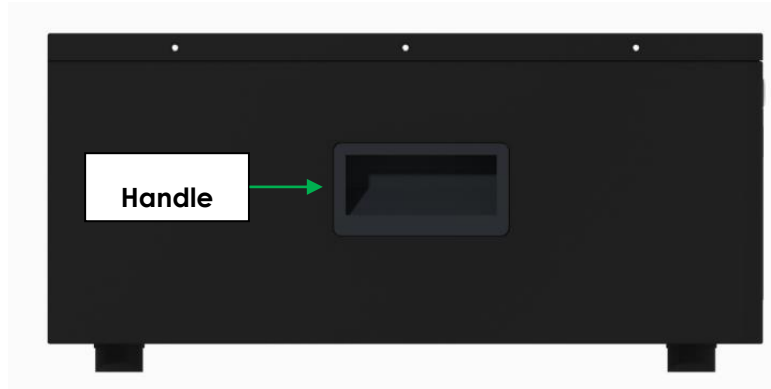
Front view: For PS5120ES



Back view: For PS5120ES

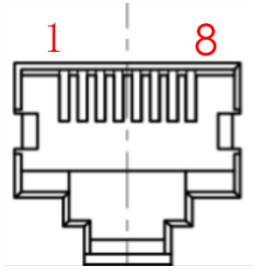
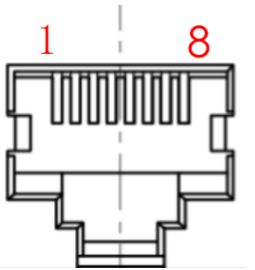


L/R view: For PS5120ES

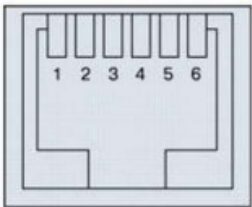


5.3 Definition of communication port pin

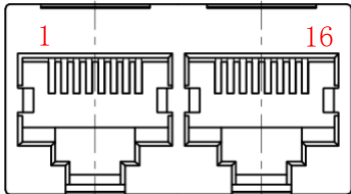
The communication port is mainly divided into three parts. See the following table for specific definitions

PCS communication(RS485)			
 RS485	Pin	Definition	Remarks
	1,8	RS485_B	
	2,7	RS485_A	
	3,6	RS485_GND	
	4,5	NC	
PCS communication(CAN)			
 CAN	Pin	Definition	Remarks
	4	CAN_H	
	5	CAN_L	
	7	CAN_GND	
	1,2,3,6,8	NC	

PC communication (232)

	Pin	Definition	Remarks
	1,2,6	NC	
	3	TXD	
	4	RXD	
	5	GND	

Parallel communication (RS485)

	Pin	Definition	Remarks
	1,8	RS485_B	
	2,7	RS485_A	
	3,6	RS485_GND	
	4,5,12,13	NC	
	9,16	RS485_B	
	10,15	RS485_A	
	11,14	RS485_GND	

5.4 DIP (SWITCH) for PS5120E/PS5120ES

DIP (ADD) Switch: 5 ADD switches, to definite different address code for each battery module when multiple modules are cascaded, up to 6 addresses.

ADD	Dial code switch position				
	1#	2#	3#	4#	5#
1	ON	OFF	OFF	OFF	OFF
2	OFF	ON	OFF	OFF	OFF
3	ON	ON	OFF	OFF	OFF
4	OFF	OFF	ON	OFF	OFF
5	ON	OFF	ON	OFF	OFF
6	OFF	ON	ON	OFF	OFF
7	ON	ON	ON	OFF	OFF
8	OFF	OFF	OFF	ON	OFF
9	ON	OFF	OFF	ON	OFF
10	OFF	ON	OFF	ON	OFF
11	ON	ON	OFF	ON	OFF
12	OFF	OFF	ON	ON	OFF
13	ON	OFF	ON	ON	OFF
14	OFF	ON	ON	ON	OFF
15	ON	ON	ON	ON	OFF
16	OFF	OFF	OFF	OFF	ON
17	ON	OFF	OFF	OFF	ON

18	OFF	ON	OFF	OFF	ON
19	ON	ON	OFF	OFF	ON
20	OFF	OFF	ON	OFF	ON
21	ON	OFF	ON	OFF	ON
22	OFF	ON	ON	OFF	ON
23	ON	ON	ON	OFF	ON
24	OFF	OFF	OFF	ON	ON
25	ON	OFF	OFF	ON	ON
26	OFF	ON	OFF	ON	ON
27	ON	ON	OFF	ON	ON
28	OFF	OFF	ON	ON	ON
29	ON	OFF	ON	ON	ON
30	OFF	ON	ON	ON	ON

NOTE: The address corresponding to ADD1 in the table is the host, and all other addresses are the clients.

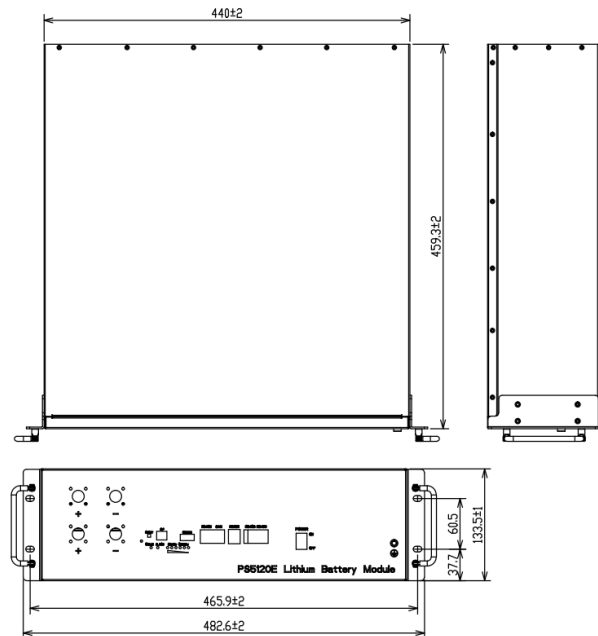
5.5 Lights

LED lights: 6 capacity indicators, in the order from left to right. (As shown here)

State	Charge						Discharge					
Capacity indicator	L1	L2	L3	L4	L5	L6	L1	L2	L3	L4	L5	L6
0~17%	Flash	OFF	OFF	OFF	OFF	OFF	ON	OFF	OFF	OFF	OFF	OFF
17~33%	ON	Flash	OFF	OFF	OFF	OFF	ON	ON	OFF	OFF	OFF	OFF
33~50%	ON	ON	Flash	OFF	OFF	ON	ON	ON	ON	OFF	OFF	ON
50~66%	ON	ON	ON	Flash	OFF	OFF	ON	ON	ON	ON	OFF	OFF
66~83%	ON	ON	ON	ON	Flash	OFF	ON	ON	ON	ON	ON	OFF
83~100%	ON	ON	ON	ON	ON	Flash	ON	ON	ON	ON	ON	ON

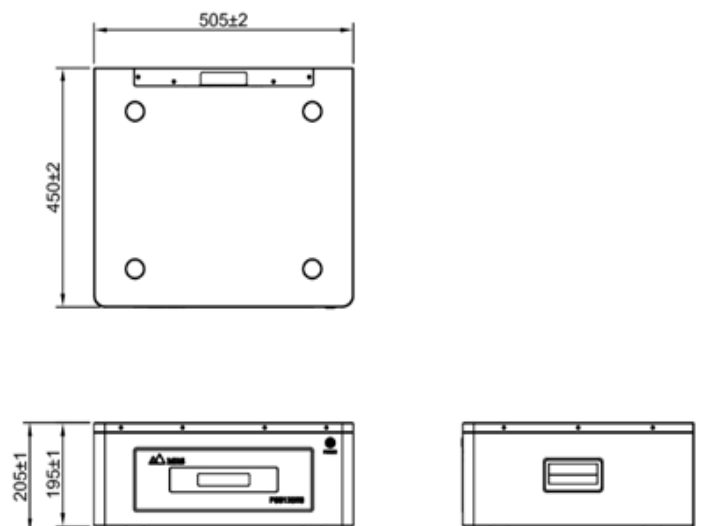
6. Battery Pack

6.1 Size and Picture for PS5120E



440*460*133 mm

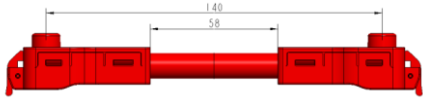
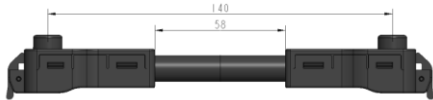
6.2 Size and Picture for PS5120ES



505*450*205 mm

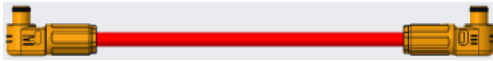
7 Assembly Parts List

7.1 List for PS5120E

Structural aspects			
Name	Illustration	Quantity	Remark
1. Parallel Cables(+)		1	
2. Parallel Cables (-)		1	
3 Internal Communication line		1	
4 Ground wire between PACK		1	
5 Cabinet screw		4	M6*16mm

6 Grounding cable screw		2	M5*10mm																					
7 Warranty Card	WARRANTY CARD *This card is the product warranty certificate. Please keep it properly. <table> <tr> <td>Product Name</td> <td colspan="2"></td> </tr> <tr> <td>Machine No.</td> <td colspan="2">Purchase date</td> </tr> <tr> <td>Dealer Name</td> <td colspan="2"></td> </tr> <tr> <td>Dealer Address</td> <td colspan="2"></td> </tr> <tr> <td>Customer Name</td> <td colspan="2"></td> </tr> <tr> <td>Customer Address</td> <td colspan="2"></td> </tr> <tr> <td>Customer Tel</td> <td>Fax</td> <td></td> </tr> </table> WARRANTY REGULATIONS Dear customer, Thank you for purchasing our products in order to protect your legitimate rights and interests, in order to improve the after sales service to customers, Sunway formulates this warranty regulations. Please read it carefully and welcome your valuable comments and suggestions. 1) This product from the date of purchase, 3 years of free warranty, but the accessories are not within the scope of free warranty. 2) The following conditions are not covered by the free warranty: A. Product failure caused by user's improper use or wrong operation B. Labor damage or unreasonable dismantling of equipment for repair C. Equipment failure or damage caused by natural disasters 3) Please pack and transport the products properly. Our company is not responsible for any damage or loss during transportation. 4) The company reserves the final interpretation, are subject to change without prior notice.	Product Name			Machine No.	Purchase date		Dealer Name			Dealer Address			Customer Name			Customer Address			Customer Tel	Fax		1	
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8 User Operation Manual	 	1																						

7.2 List for PS5120ES

Structural aspects			
Name	Illustration	Quantity	Remark
1. Parallel Cables(+)		1	
2. Parallel Cables(-)		1	

3 Internal Communication line		1																													
4 Ground wire between PACK		1																													
5 Rubber base		4																													
6 Warranty Card	WARRANTY CARD *This card is the product warranty certificate. Please keep it properly. <table><tr><td>Product Name</td><td colspan="3">Purchase date</td></tr><tr><td>Machine No.</td><td colspan="3"></td></tr><tr><td>Dealer Name</td><td colspan="3"></td></tr><tr><td>Dealer Address</td><td colspan="3"></td></tr><tr><td>Customer Name</td><td colspan="3"></td></tr><tr><td>Customer Address</td><td colspan="3"></td></tr><tr><td>Customer Tel.</td><td>Fax</td><td colspan="2"></td></tr></table>	Product Name	Purchase date			Machine No.				Dealer Name				Dealer Address				Customer Name				Customer Address				Customer Tel.	Fax			1	
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7 User Operation Manual		1																													

8. System operation steps

Step 1: Stack the energy storage modules on the flat ground according to the actual quantity

Step 2: Check that the switch is off.

Step 3: Select the DIP address according to the actual stack quantity and dial the code to the corresponding address bit.

Step 4: Connect the "parallel communication" of the battery with the matched communication cable.

Step 5: Correctly connect the positive and negative parallel lines of the battery.

(When the output power is required to be greater than 5KW, the dual terminal output mode must be used for connection)

Step 6: Correctly select the communication mode between the battery host and the PCS, and connect the matching communication line.

Step 7: Connect the equipment grounding wire in turn

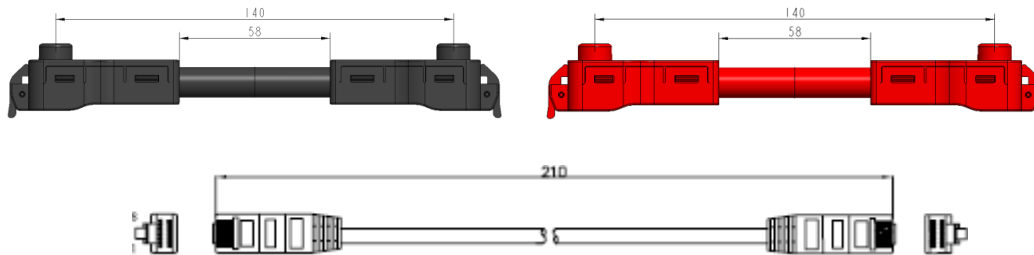
Step 8: Turn on the switches in sequence

The operation must be carried out by professional personnel

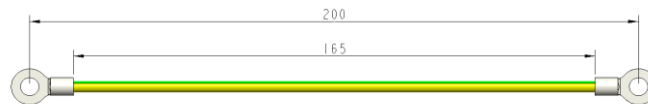
9 Installation

9.1 Package items for battery module package of PS5120E:

Two power cables and one communication cable for each battery package:

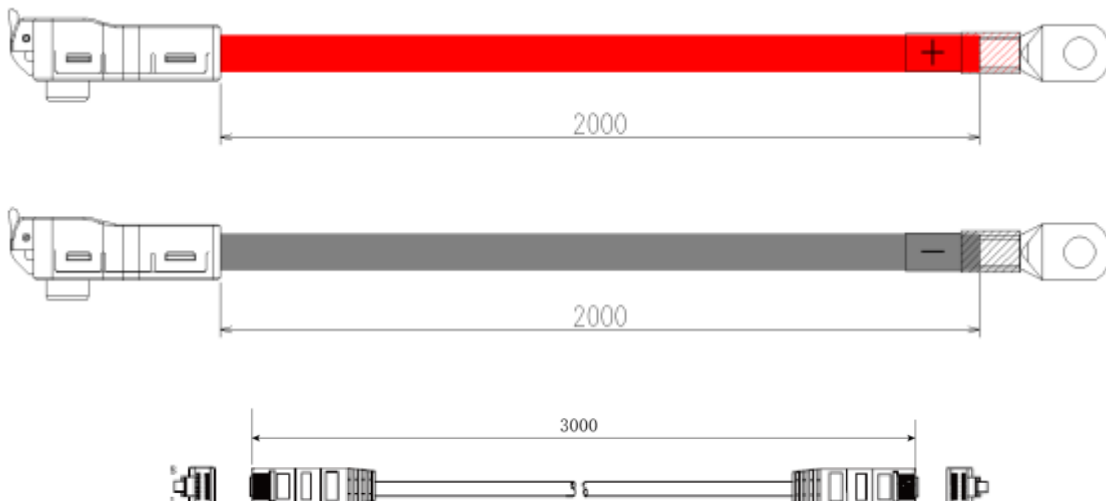


Grounding cable:



For battery system connects to inverter:

Two long power cables (current capacity 120A) and one communication cable for each energy storage system:



Note:

These three long cables are NOT in battery package, they are option for selection. If there is anything missed please contact dealer.

Installation Condition

Make sure that the installation location meets the following conditions:

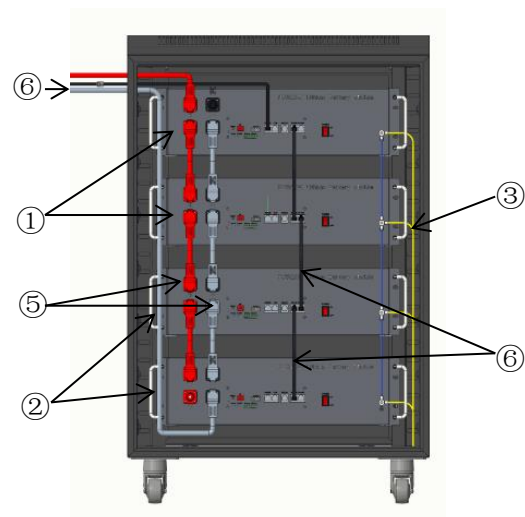
- The area is completely water proof.
- The floor is flat and level.
- There are no flammable or explosive materials.
- The ambient temperature is within the range from 0°C to 50°C.
- The temperature and humidity is maintained at a constant level.
- There is minimal dust and dirt in the area.

CAUTION

If the ambient temperature is outside the operating range, the battery pack stops operating to protect itself. The optimal temperature range for the battery pack to operate is 0°C to 50°C. Frequent exposure to harsh temperatures may deteriorate the performance and life of the battery pack.

Installation Procedure

- ① Put the battery into the cabinet;
- ② Drive the 4 pcs screws;
- ③ Connect the Ground cables between battery modules
- ④ Connect the Communication cable between battery modules
- ⑤ Connect the cables between battery modules
- ⑥ Connect the cables to inverter



Power On

Double check all the power cable and communication cable.

(1) Switch power on

Switch on all the battery modules and the green LED light below will be on:



(2) Parallel connection mode

Note: Only the Host can communicate with the inverter

(3) Parallel connection mode A

A. The two modules are in parallel

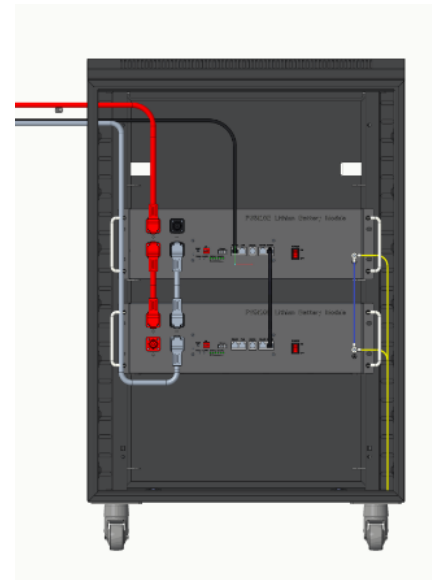
Normal parallel mode, as shown in the right picture

Parallel parameter:

Charge Voltage : 56.5V

Max Charge current : 100A

Max Discharge current : 100A



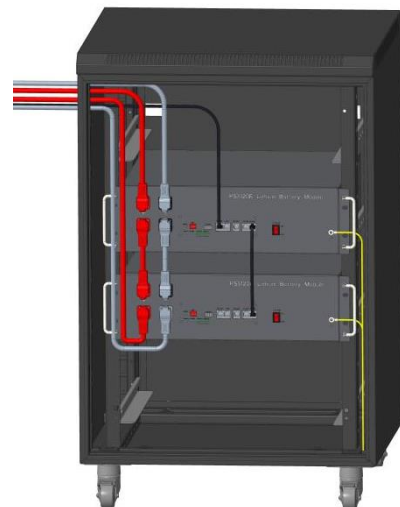
Rate parallel mode, as shown in the right picture

Parallel parameter:

Charge Voltage : 56.5V

Max Charge current : 100A

Max Discharge current : 200A



NOTE: If all the battery LED lights on, and then off, which means the battery system is good and working.

Rate parallel mode, Connect the two positive output terminals of the battery together, the two negative terminals together, and finally to the device

B. The four modules are in parallel

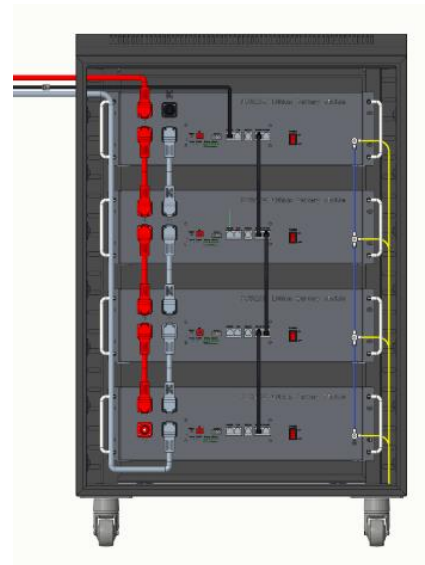
Normal parallel mode, as shown in the right picture

Parallel parameter:

Charge Voltage : 56.5V

Max Charge current : 100A

Max Discharge current : 100A



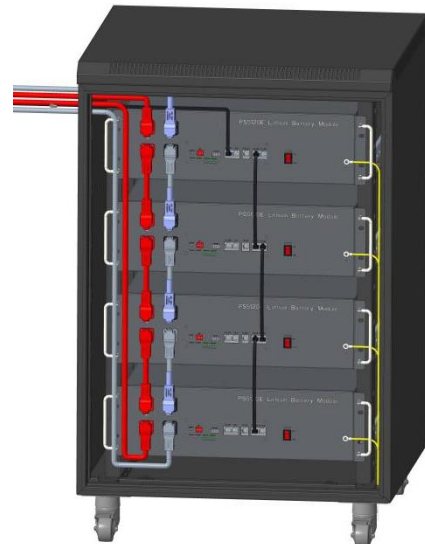
Rate parallel mode, as shown in the right picture

Parallel parameter:

Charge Voltage : 56.5V

Max Charge current : 200A

Max Discharge current : 200A

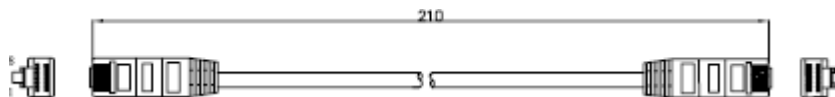


NOTE: If all the battery LED lights on, and then off, which means the battery system is good and working

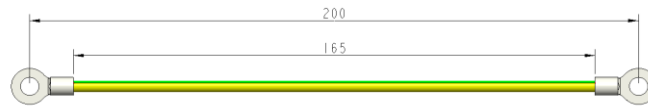
Rate parallel mode, Connect the two positive output terminals of the battery together, the two negative terminals together, and finally to the device.

9.2 Package items for battery module package of PS5120ES:

Two power cables and one communication cable for each battery package:

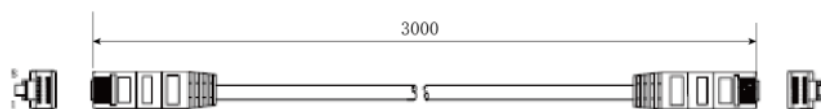


Grounding cable:



For battery system connects to inverter:

Two long power cables (current capacity 120A) and one communication cable for each energy storage system:



Note:

These three long cables are NOT in battery package, they are option for selection. If there is anything missed please contact dealer.

Installation Condition

Make sure that the installation location meets the following conditions:

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

CAUTION

If the ambient temperature is outside the operating range, the battery pack stops operating to protect itself. The optimal temperature range for the battery pack to operate is 0°C to 50°C. Frequent exposure to harsh temperatures may deteriorate the performance and life of the battery pack.

Installation Procedure

Power On

Double check all the power cable and communication cable.

(1) Switch power on

Switch on all the battery modules and the green LED light below will be on:



(2) Parallel connection mode

Note: Only the Host can communicate with the inverter

(3) Parallel connection mode

A. The two modules are in parallel

Normal parallel mode

Parallel parameter:

Charge Voltage : 56.5V

Max Charge current : 100A

Max Discharge current : 100A

Rate parallel mode

Parallel parameter:

Charge Voltage : 56.5V

Max Charge current : 100A

Max Discharge current : 200A



NOTE: If all the battery LED lights on, and then off, which means the battery system is good and working.

Rate parallel mode, Connect the two positive output terminals of the battery together, the two negative terminals together, and finally to the device.

B. The four modules are in parallel
Normal parallel mode

Parallel parameter:

Charge Voltage : 56.5V

Max Charge current : 100A

Max Discharge current : 100A

Rate parallel mode

Parallel parameter:

Charge Voltage : 56.5V

Max Charge current : 200A

Max Discharge current : 200A



NOTE: If all the battery LED lights on, and then off, which means the battery system is good and working.

Rate parallel mode connect the two positive output terminals of the battery together, the two negative terminals together, and finally to the device

10. Safety Regulations

10.1 Safe handling of lithium batteries Guide

Explanation of symbol for PS5120E

LFP Battery	
Model:	PS5120E
Nominal Voltage:	51.2V
Charge Voltage:	57.6V
Cut Off Voltage:	44.8V
Rated Capacity:	100Ah/5.12KWh
IFpP29/176/208/[16S1P]M/-20+40/95 FUJI Electronics (Shenzhen) Co.,Ltd.	
	  
PS5120EF01000001	

 **DANGER**
HIGH VOLTAGE INSIDE

*Do not disconnect,disassemble or repair by yourself.

*Do not drop. deform,impact,cut or spearing with a sharp object.

*Do not place near open flame or incinerate.

*Do not sit or put heavy things on battery.

*Keep away from moisture or liquid.

*Keep out of reach of children,animals or insects.

Emergency Situations

*If leaking,fire,wet or damaged,switch off the breaker and go away from the battery.

*Do not touch the leaking liquid.Do not use water,sand or dry power extinguisher is usable

Explanation of symbol for PS5120ES

LFP Battery	
Model:	PS5120ES
Nominal Voltage:	51.2V
Charge Voltage:	57.6V
Cut Off Voltage:	44.8V
Rated Capacity:	100Ah/5.12KWh
IFpP29/176/208/[16S1P]M/-20+40/95 FUJI Electronics (Shenzhen) Co.,Ltd.	
	  
PS5120ESG01000001	

 **DANGER**
HIGH VOLTAGE INSIDE

*Do not disconnect,disassemble or repair by yourself.

*Do not drop. deform,impact,cut or spearing with a sharp object.

*Do not place near open flame or incinerate.

*Do not sit or put heavy things on battery.

*Keep away from moisture or liquid.

*Keep out of reach of children,animals or insects.

Emergency Situations

*If leaking,fire,wet or damaged,switch off the breaker and go away from the battery.

*Do not touch the leaking liquid.Do not use water,sand or dry power extinguisher is usable

Tools

The following tools are required to install the battery pack



Screw Driver

NOTE

Use properly 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.

Safety protection

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

Insulated gloves



Safety goggles



Safety shoes



10.2 Warning

1. Please read the manual and battery specification carefully before commissioning the system.
2. Please use the batteries in a normal environment, charge temperature is 0°C ~45°C, discharge temperature -20°C~60°C and the relative humidity is 65%±20%.
3. During their use, the batteries should be kept away from heat sources and high voltages, children should not be allowed to play with them, and they should not be knocked violently.
4. If the battery is to be used in other devices, please consult with the supplier about the degree of perfection of its protective function, Do not make arbitrary decisions to use battery in other devices.

5. The manufacturer will not replace the battery free of charge even in the warranty period if the problem with the battery results from misuse rather than bad quality.

6. If the battery is to be used in other devices, please consult with the supplier about the degree of perfection of its protective function. You should at least have a clear knowledge of such issues as the heavy current, fast charging and special application of the battery.

10.3 Against risk

1. There are a protective mechanism and a protective circuit inside the battery, which helps prevent danger. Improper disassembly of the battery can damage the protective function of the battery and therefore causes the battery to heat, smoke, deform or even burn.

2. Do not short circuit the positive and negative poles of the battery with metal and do not store or move the batteries together with metal sheets either. If the battery is short circuited, a heavy current will run through the battery, which will damage it and cause it to heat, smoke, deform and even burn.

3. The installation must be carried out in accordance with safety specifications to avoid personal and property losses.

10.4 Dangerous mode

Customer acknowledges there are in the process of operation and use battery potential dangers:

1. The operator during operation may be limited by chemical damage, electric shock or electric arc. Higher than 50V/DC voltage is damage serious, the harm of human body so the customer must to be conservative in the operation to avoid the current damage.

2. Chemical risks from the electrolyte in the battery.

3. In battery operation and selecting personal protective equipment, the customer must consider more than the potential risks, to prevent accidental short circuit, electric arc, explosion or thermal runaway.