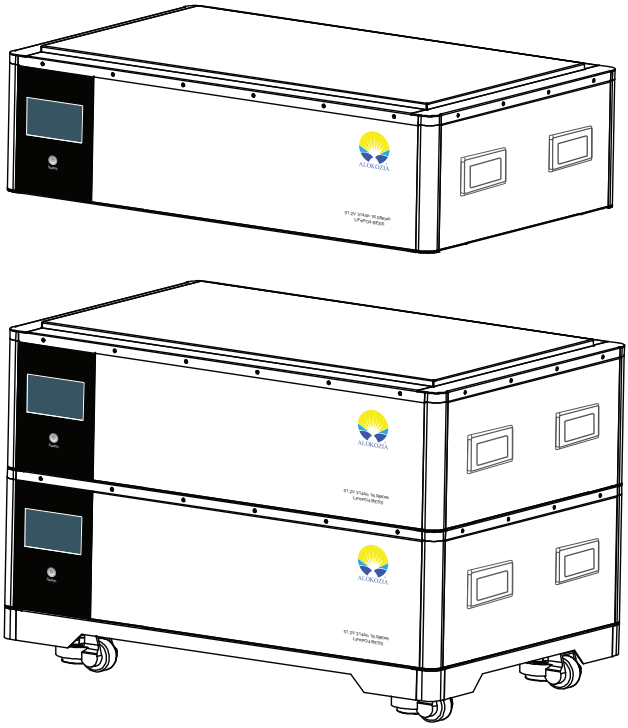
Mobile Stackable BESS LIFEPO4 Batteries

Thin stacked energy storage series



LFP SS-51100/51200/51314

LiFePO4 Battery User Manual

The LFP SS-Series is suitable for home energy storage, industrial and commercial energy storage, off-grid systems and backup power supply scenarios.be seriously injured or killed by electric shock, or the battery pack may be damaged.

This manual introduces the LFP SS51100 / SS51200 / SS51314 Series , please read this manual before installing the battery,and follow the instructions carefully during the installation process. If you have any questions, please contact manufacturer for assistance immediately.

1. Safety Instructions

Reminding

1) Before installing or using the battery, it is important and necessary to read the user manual (in the attachment) carefully. Failure to do so or to follow any instructions or warnings in this document may result in electric shock, serious injury or death, or may damage the battery, potentially rendering it inoperable.
2) If the battery is stored for long time, it is required to charge them every six months, and the SOC should be no less than 90%.
3) The battery needs to be recharged within 12 hours after fully discharged.
4) Do not install the product in an outdoor environment, or an environment beyond the operating temperature or humidity range listed in the manual.
5) Do not expose the cable to the outside.
6) Do not connect power terminal reversely.
7) All battery terminals must be disconnected for maintenance.
8) Please contact the supplier within 24 hours if there is something abnormal.
9) Do not use detergent to clean the battery.
10) Do not expose batteries to flammable or harsh chemicals or vapors.
11) Do not paint any part of the battery, including any internal or external components.
12) Do not connect battery with PV solar wiring directly.
13) The warranty claims are excluded for direct or indirect damage due to items above.
14) Any foreign object is prohibited to insert into any part of 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 your local dealer.
2) Before installation, be sure to cut off the grid power and make sure the battery is in the turned-off mode.
3) Wiring must be correct, do not mistake the positive and negative cables, and ensure no short circuit with the external device.
4) It is forbidden to directly connect the battery with AC power.
5) The battery embedded BMS is designed for 51.2VDC, please do not connect the battery in series.
6) The battery must be grounded and the resistance must be less than 0.1Ω.
7) Please ensure that the electrical parameters of the battery system are compatible with related equipment.
8) Keep the battery away from water and fire.

1.2 In using

1) If you need to move or repair the battery system, you must cut off the power supply and turn off the battery completely.
2) It is forbidden to connect the battery with different types of batteries.
3) It is forbidden to connect the battery with a faulty or incompatible inverter.
4) It is forbidden to disassemble the battery (the QC sheet falls off or is damaged);
5) In the event of a fire, only dry powder fire extinguishers can be used, and liquid fire extinguishers are prohibited.
6) Please do not open, repair or disassemble the battery except staffs from manufacturer or authorized by manufacturer. 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

The LFP SS51100/SS51200/SS51314 Series lithium iron phosphate battery is a new energy storage product developed and produced by Senior team, which can provide reliable power support for various equipment and systems.The LFP SS51100/SS51200/SS51314 Series has a built-in BMS battery management system,which can manage and monitor battery voltage, current, temperature and other information.

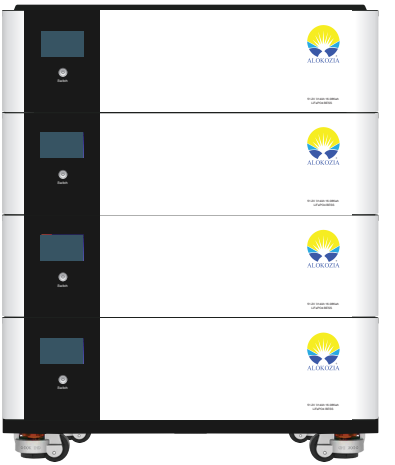
2.1 Product Features

1) Built-in soft start function, when the inverter needs to start from the battery, it can reduce the current impact.
2) Double active protection at BMS level.
3) Automatically set the address when multiple groups are connected.
4) Support wake-up via 5~12V signal of RJ45 port.
5) Support the host controller to upgrade the battery module through CAN or RS485 communication.
6) Enable 95% depth of discharge, which can be used for inverters operating in full compliance with the CAN protocol.
7) The module is non-toxic, non-polluting and environmentally friendly.
8) The cathode material is lithium iron phosphate, which has good safety performance and long cycle life.
9) The battery management system (BMS) has protection functions such as over-discharge, over-charge, over-current, high and low temperature, etc.
10) The system can automatically manage the charging and discharging status and balance the voltage of each cell.
11) Flexible configuration, multiple battery modules can be connected in parallel to expand capacity and power.
12) Adopt self-cooling method to quickly reduce the overall noise of the system.
13) The module has less self-discharge, and can be put on the shelf for up to 6 months without charging. There is no memory effect, and the shallow charge and discharge performance is excellent.

2.2 Product Specifcation

(1) Product appearance and size

Single Battery
(Basic Size)



Stacking Battery
(4 in parallel)

5Kwh Single Battery Module			
L(mm)	W(mm)	H1(mm)	H2(mm)
510	500	210	110

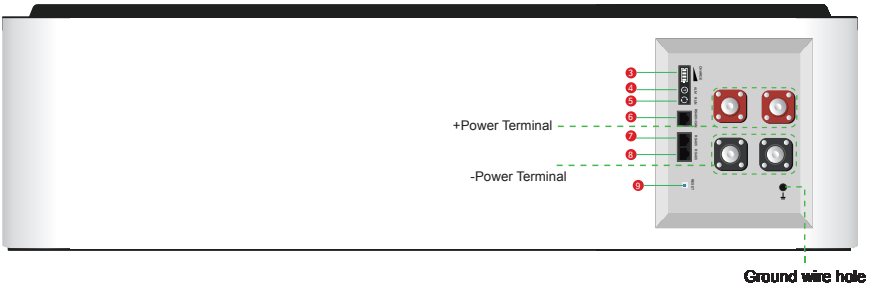
10Kwh Single Battery Module			
L(mm)	W(mm)	H1(mm)	H2(mm)
630	580	170	110

16Kwh Single Battery Module			
L(mm)	W(mm)	H1(mm)	H2(mm)
800	500	210	110

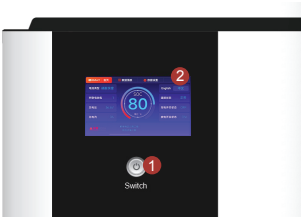
(2) Battery Module Technical Specification

Parameters	Data Sheet		
Energy	5.12Kwh	10.24Kwh	16.078Kwh
Nominal Voltage	51.2V	51.2V	51.2V
Nominal Capacity	100Ah	200Ah	314Ah
Dimension	510*500*210mm	630*580*170mm	800*500*210mm
Net Weight	About 55Kg	About 86Kg	About 116Kg
Overcharge Protection Voltage	58.4V	58.4V	58.4V
Over-discharge Protection Voltage	43.2V	43.2V	43.2V
Recommened Charging Current	50A	100A	100A
Max Charging Current	105A	205A	205A
Recommended Discharging Current	50A	100A	100A
Max Discharging Current	105A	205A	205A
Max Loaded Power	5Kwh	10Kwh	16Kwh
Peak charging / Discharging current	250A@500ms (Single Battery)		
Communication	RS485/CAN/UART		
Depth of Discharge	95%		
Nos of Cells	LFP16S	LFP16S	LFP16S
Working Temperature	0°C~45°C Charge		
	-10°C~45°C Discharge		
The Shelf Temperature	-20°C~50°C		
Humidity	5~95%(RH)		
Certificates	UN38.3 / MSDS		
Design Life Cycle	10+Years (25°C/77°F)		
Cycles	≥6000 at 25°C		≥12000 at 25°C
Optional Features	Option(Bluetooth / Wifi / Heating / Safe) Module		

2.3 Equipment interface instruction



1. Function Switch
   a).ON: starting
   b).OFF: Power off for storage or transportation



2. Upgraded touch screen LED

   a).Select the inverter protocol from the LED screen and directly select the matching inverter.
   b).Monitor the battery/cell voltage/capacity/temperature, current/cycle count, etc. on the screen.

3. Battery Indicator
   green LED show the current capacity of the battery

LED Working Status Indication

State	RUN	ALM	SOC Indication LEDs				Instructions·
			L4	L3	L2	L1	
	●	●	●	●	●	●	
Power Off	OFF	OFF	OFF	OFF	OFF	OFF	Power Off/Sleep
Standby	Flash1	OFF	Indication by SOC				Standby
	Flash1	Flash3					Secondary protection has been triggered. Connect the host computer to check the fault information and take appropriate ineasures.
Charge	ON	OFF	Indication by SOC (The top SOC Led Flash 2)				Normal charge
	ON	Flash3					Over-charge alarm,please unplug the charger
	ON	OFF	ON	ON	ON	ON	Overcharge protection, If the charger is unplugged, the indicator turns to standby state
Discharge	Flash3	OFF	Indication by SOC				Normal discharge
	Flash3	Flash3					Over-discharge protection, please charge the battery
	OFF	OFF	OFF	OFF	OFF	OFF	Enter under voltage sleep state,please charge the battery
Fault	OFF	ON	OFF	OFF	OFF	OFF	The system is in temperature, over-current, short circuit protection, etc., can not charge and discharge, need to check the cause

✱ Caution: Other status exception, Please consult your seller.

LED Flash Instructions

Flash mode	ON	OFF
Flash 1	0.25S	3.75S
Flash 2	0.5S	0.5S
Flash 3	0.5S	1.5S

Description of Battery Capacity Indicator

State		Charge				Discharge				Standby State			
Capacity indicator light		L4	L3	L2	L1	L4	L3	L2	L1	L4	L3	L2	L1
		●	●	●	●	●	●	●	●	●	●	●	●
electricity (%)	0% ~ 25%	OFF	OFF	OFF	Flash2	OFF	OFF	OFF	ON	OFF	OFF	OFF	ON
	25% ~ 50%	OFF	OFF	Flash2	ON	OFF	OFF	ON	ON	OFF	OFF	ON	ON
	50% ~ 75%	OFF	Flash2	ON	ON	OFF	ON	ON	ON	OFF	ON	ON	ON
	75% ~ 100%	Flash2	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON	ON

4 ALM

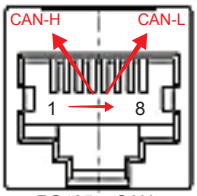
Red LED flashing indicates battery alarm; (On: The battery is protected)

5 RUN

Green LED light shows battery running status

6 RS485 + CAN

For Connecting with inverter and slave battery



RS485 + CAN

RS485 and CAN Communication Port Difinition			
RJ45 PIN	Definition Description	RJ45 PIN	Definition Desc
1	RS485-B1	5	CAN-L
2	RS485-A1	6	ISO-GND
3	ISO-GND	7	TX
4	CAN-H	8	RX

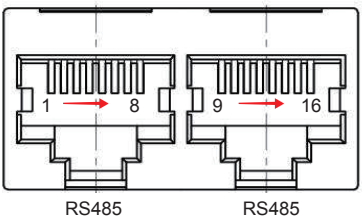
7 RS485 Battery Pack Parallel Function

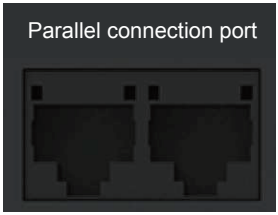
8 RS485 Battery Pack Parallel Function

Parallel Communication Port

a).Under parallel status，communication address 0001 is Master battery pack，rest communication position are slave battery .And slave battery could communication with master battery pack through RS458 port. master battery pack will collect all slave battery data.

b). When parallel status, only master battery pack communicate with PC upper computer as remote monitoring, uploading datas, displaying status & any other info of all battery packs.





RS485 Parallel Communication Port Definition			
RJ45-PIN	Definition Description	RJ45-PIN	Definition Description
1、8	RS485-B	9、16	RS485-B
2、7	RS485-A	10、15	RS485-A
3、6	ISO-GND	11、14	ISO-GND
4、5	TBD	12、13	TBD

9 **Reset Button Description**

(1) When the BMS is in sleep state, press the button and release it. The protection board is activated, and the LED indicator turns on for 0.5 seconds from "RUN".

(2) When the BMS is in the active state, press the button (3~6S) and release it, the protection board will be hibernated, and the LED indicator will turn on for 0.5 seconds from the lowest power indicator.

(3) When the BMS is in the active state, press the key (6-10S) and release it, the protection board is reset, and all the LED lights are extinguished at the same time.

(4) When the BMS is in the active state, press the button three times within 5S, and the BMS can be automatically coded again.

※ Additional Notes

1. Buzzer logic

a) When a fault occurs, 0.25S is emitted every 1S.
b) When protection, sound 0.25S every 2S (except overvoltage protection, 3S sound 0.25S when undervoltage)
c) When an alarm is generated, the alarm is generated every 3S for 0.25S (except for an overvoltage alarm)
d) When the heat is out of control, sound 1S every 2S
The buzzer function can be enabled or disabled by the host computer, but is disabled by factory default.

2. Parameter configuration description

Save/Load configuration: Users can save the configuration and load through the host computer for the factory-configured or set parameters:

3.Sleep and wake up

3.1 Sleep

If any of the following conditions are met, the system enters sleep mode:
a) over-charge protection is not removed within 30 seconds.
b) Press the button(3~6S)and release the button.
c) At the same time,no communication,no protection.no balance, no current, and the duration reaches the sleep delay time.
Before entering sleep mode,ensure that no extreme voltage is connected to the input terminal. Otherwise, the sleep mode cannot be entered.

3.2 Wake up

If any of the following conditions are met, the system exits the sleep mode and enters the normal running mode:
a) Plug in charger/load.
b) Press the button and release the button.
c) With 485, CAN communication activation.
Note: After the single or overall over-discharge protection, it enters sleep mode, wakes up periodically every 4 hours and starts charging and discharging MOS. If it can be charged, it will exit the resting state and enter normal charging.

4. Communication instructions

4.1 External communication

RJ45 single network port integrates RS485, UART, CAN functions, BMS can communicate with the host computer through RJ45 port, so that the host computer can monitor various information of the battery, including battery voltage, current, temperature,status and battery production information, the default baud rate is 9600bps

4.2 Inner communication

RJ45 dual network port has the function of RS485, through which internal communication between BMS can be carried out to achieve automatic coding of BMS, the baud rate is 115200bps.

5.Inverter communication

The protection board supports the inverter protocols of RS485 and CAN communication interaces. The engineering mode of the uppel computer can be selected.

Protocol type	Protocol abbreviation	Protocol type	Protocol abbreviation
RS485 Protocol	SUNSYNK	CAN Protocol	SUNSYNK
RS485 Protocol	DEYE	CAN Protocol	GOODWE
RS485 Protocol	SOROTEC	CAN Protocol	DEYE
RS485 Protocol	SACOLAR	CAN Protocol	XMT
RS485 Protocol	GROWATT	CAN Protocol	SOLARK
RS485 Protocol	SOFAR	CAN Protocol	PYLON
RS485 Protocol	VOLTRONICPOWER	CAN Protocol	MEGAREVO
RS485 Protocol	SRNE	CAN Protocol	SOROTEC
RS485 Protocol	STUDER	CAN Protocol	SRNE
RS485 Protocol	VOLTRONIC	CAN Protocol	SOLIS
RS485 Protocol	SOLAX	CAN Protocol	LUXPOWERTEK
RS485 Protocol	LTW	CAN Protocol	SACOLAR
RS485 Protocol	PV3500	CAN Protocol	GROWAT
RS485 Protocol	(BAYKEE)	CAN Protocol	SOFAR
RS485 Protocol	LOCAL	CAN Protocol	MUST
RS485 Protocol	GOODWE	CAN Protocol	VICTRONENERGY
		CAN Protocol	SMA
		CAN Protocol	AISWEI
		CAN Protocol	STUDER

2.4 BMS Basic Function

Protection And Alarm	Management And Monitor
Charge / Discharge End	Cells Balance
Charge Over Voltage	Intelligent Charge Model
Discharge Under Voltage	Charge / Discharge Current Limit
Charge / Discharge Over Current	Capacity Retention Calculate
High / Low Temperature(cell/BMS)	Administrator Monitor
Short Circuit	Operation Record
	Power Cable Reverse
	Soft Start of Inverter

2.5.Bluetooth instructions

The Bluetooth communication mobile phone APP system mainly connects the special Bluetooth device through the Bluetooth function of the mobile phone, and the Bluetooth device communicates with the BMS, so that the user can detect the BMS information directly through the mobile phone and carry out the functions of reading, managing, querying and managing.Thus replacing the special BMS equipment and software.

2.51.Bluetooth communication function

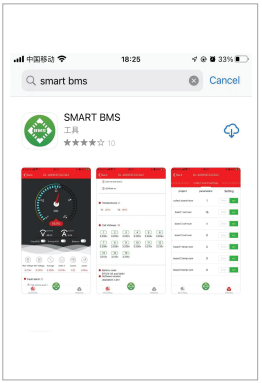
Bluetooth communication mobile phone APP system includes real-time data reading, protection parameters, core characteristics, acquisitionboard settings, temperature protection, system settings and query functions.The main functions of the system are:

(1) Parameter reading: alarm fault information, number of temperature, number of battery strings.
(2) Protection parameters: monomer over voltage protection monomer under voltage protection, overall over voltage protection,over all under voltage protection, differential pressure protection,charging over current protection, discharge over current protection.
(3) Core characteristics: battery type, rated capacity, monomer reference voltage,dormant waiting time,SOC setting, balanced opening voltage, voltage deviation for balancing.
(4) Acquisition board setting: number of monitoring board,number of monitoring board l unit, number of monitoring board 2unit, number of monitoring board 3 unit, number of monitoring board l unit temperature, number of monitoring board 2 unit temperature, number of monitoring board 3 unit temperature.
(5) Temperature protection: charging high temperature protection, charging low temperature protection, discharge high temperature protection, discharge low temperature protection,temperature difference protection, power tube temperature protection.
(6) System settings: charging switch, discharge switch, restart system,restore factory settings, current to zero, reset password.

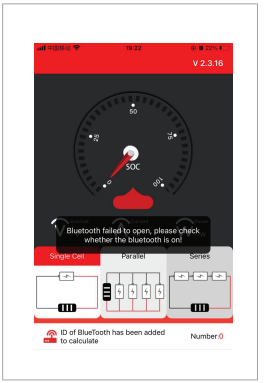
2.52.System characteristics

(1) Alarm prompt: alarm fault view, alarm prompt automatic elimination after fault release.
(2) Bluetooth: When the user opens the software, if the user does not turn on the Bluetooth function, then automatically prompt to turn on the phone Bluetooth, unplug or sleep automatically disconnect Bluetooth connection.

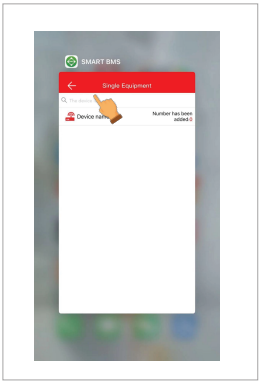
a) Go to the mobile app store and search and download "Smart BMS".



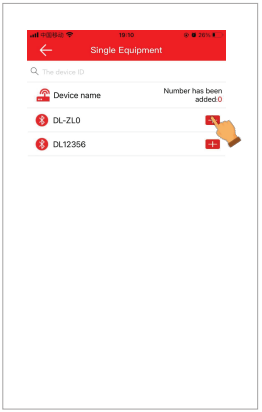
b) Open the downloaded" Smart BMS" APP and Connect.



c) Opt Out of the App.

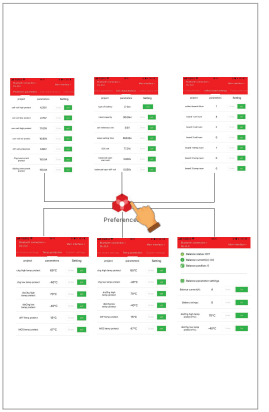


d) Go back to the phone's desktop and re-enter the "SMART BMS" APP. Wait a few second suntil the phone automatically displays "connected" and clicks on the device.



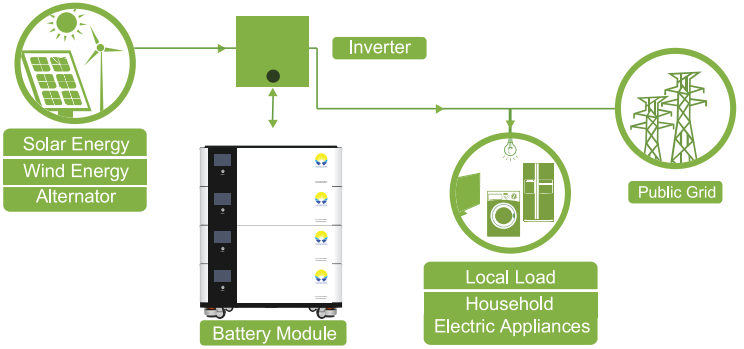
e) Go to the Bluetooth APP And read the data in real time.

f) Enter parameter settings,you can set the parameters.(Password 123456)



3.Safe handling Guide of LiFePO4 Battery

3.1 Schematic Diagram of Solution

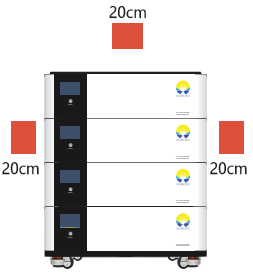


3.2 Consider the following points before selecting where to install:

a).Please install the battery away from fire source or inflammable and explosive materials.

b).The ambient temperature should be between 0°C and 45°C to ensure optimal operation.

c).Make sure to keep the distance from other objects as shown in the right figure to ensure sufficient heat dissipation and sufficient space for moving and installing cables



d).Use properly insulated tools to prevent accidental electric shock or short circuits.If insulated tools are not available, cover the entire exposed metal surfaces ofthe available tools, except their tips, with electrical tape.

4. Installation and Operation

4.1 Package Items (Unpack and check the packing list)

① Battery pack * 1

② 4*M8 Screw and Shield Cover ; Two Cables (1 * BLACK ; 1 * RED)
1 * RS485 Communication Line

4*M8 Screw
and Shield Cover
(Installed on terminal)

2*AWG4 Cables
For parallel connection of battery
(BLACK " - " / RED " + ")

Communication Connection Line
RJ45 for RS485/CAN

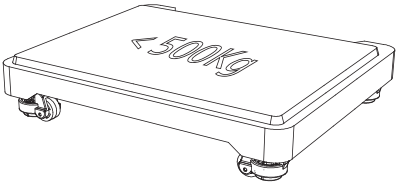
③ Could be customization per require：battery cable、communication cable、parallel cable、grounding cable.

④ The base of the battery pack shall be ordered according to the actual needs. The base is an independent packaging part.

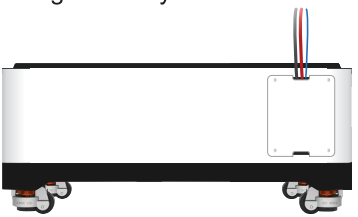
a).The base can stack up to 3 set of LFP-SS51314-16Kwh battery packs

b).The maximum load is 500kg, please do not overload

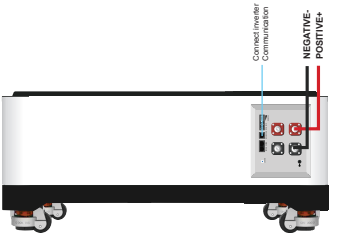
c).When the knob is red, the base can be fixed at the specified position



4.2 Single Battery Connection

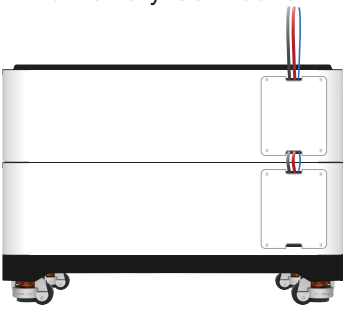


16.08KWH Battery
(LFP-SS51314*1)

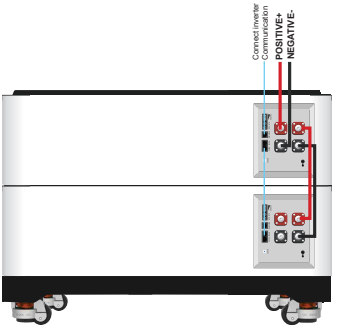


Schematic Diagram of Connection and Use Of Single Battery

4.3 Two Battery Connection



32.16Kwh Battery
(LFP-SS51314*2)

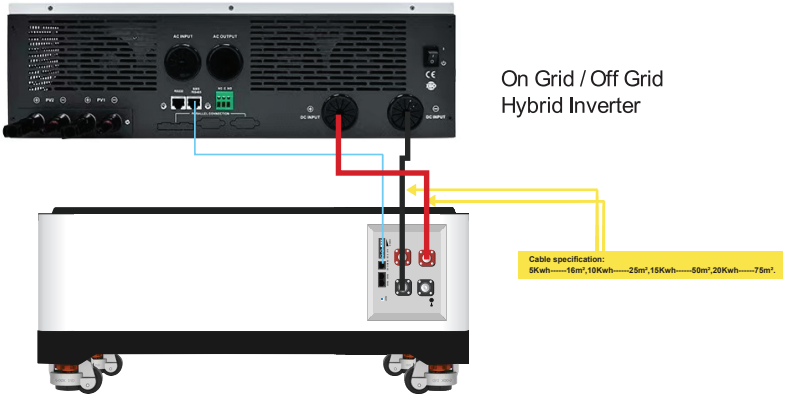


Schematic Diagram of Connection and Use Of Two Battery

※ The positive and negative bus bars are non-standard accessories, and the length and load current are customized according to the demand.

Before the parallel connection of the battery pack, please fully charge the single battery or ensure the voltage between the batteries is consistent to achieve the optimal performance of the battery.

4.4 Connected to Inverter



Connect the positive and negative cables of the battery to the positive and negative ports of the DC input of the inverter, and connect the communication line to the BMS/RS485 port on the inverter to complete the connection between the battery and the inverter.

5. Switch ON / OFF

a).Switch on: press On/Off button to switch on the battery, then the battery will do self-inspection before enable output.The LED will show the soc.
b).Switch off: press and hold On/Off button for 3 seconds, the battery will shut down directly.

Please refer to "2.3" of this manual for the description of communication port and LED indication.

6.Trouble Shooting

Problem determination based on
(1) Whether the battery can be turned on or not.
(2) If battery is turned on, check the red light is off, flashing or lighting.
(3) If the red light is off, check whether the battery can be charged / discharged or not.

Possible conditions:
(1) Battery cannot turn on, switch ON and press the metal SW the lights are all no lighting or flashing.

(1.1) Capacity too low, or module over discharged.

solution: use a charge or inverter to provide 57.6-58.4V voltage.

a.If battery can start, then keep charge the module and use monitor tools to check the battery log.

b.If battery terminal voltage is ≤43.2 Vdc, please use ≤0.05C to slowly charge the module to avoid affect to SOH.

c.If battery terminal voltage is ＞43.2 Vdc, it can use ≤0.5C to charge.

d.If battery cannot start, turn off battery and repair.

(2) The battery can turn on, but red light is lighting, and can not charge or discharge. If the red light is lighting, that means system is abnormal, please check values as following.

(2.1)Temperature: Above 50 ℃ or under -10 ℃, the battery could not work.
Solution: to move battery to the normal operating temperature range between 0℃ and 45℃.

(2.2)Current: If current exceeds 250A, battery protection will turn on.
Solution: Check whether current is too large or not, if it is, change the settings on power supply side.

(2.3)High Voltage: If charging voltage above 58.4V, battery protection will turn on.
Solution: Check whether voltage is too high or not, if it is, to change the settings on power supply side. And discharge the module.

(2.4) Low Voltage: When the battery discharges to 43.2V or less, battery protection will turn on.
Solution: Charge the battery till the red light turns off.

(2.5) Cell voltage high. The module voltage is lower than 44.8 V, SOC LED does not all on. When discharge the module protection disappear.
Solution: keep charge the module by 57.6-58.4V or keep the system cycle. The BMS can balance the cell during cycling.

(3) Unable to charge and discharge with red LED on. The temperature is 0~50 degree. Use charger to charge, not possible. Use load to discharge, not possible.

(3.1) Under permanent protection. The single cell voltage has been higher than 3.7 or lower than 2.5 or temperature higher than 55 degree.
Solution: Switch off the module and contact your local distributor for repair.

(3.2) Fuse broken.
Solution: Switch off the module and contact your local distributor for repair.

(4) Buzzer rings.

(4.1) Reverse connection of cables.

Solution: Power off all battery and inverters. Disconnect breaker. Check the cable connection and disconnect all power cables. Check the power port damaged or not.Then try turn on the single module, without any cable connected. If no alarm, then it is reverse connection of cables. Switch off the module and contact your local distributor.

(4.2) MOSFAIL.

Solution: Power off all battery and inverters. Disconnect breaker. Check the cable connection and disconnect all power cables. Check the power port damaged or not. then try turn on the single module, without any cable connected. If still buzzer rings. Then it is mosfail. Switch off the module and contact your local distributor.

(5) After switch On, the module turns on directly

(5.1) BMS failure.

Solution: Switch off the module and contact your local distributor.

Excluding the points above, if the faulty is still cannot be located, turn off battery and repair.

7. Emergency Situations

(1) Leaking Batteries

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.

(1.1) Inhalation: Evacuate the contaminated area and seek medical attention.

(1.2) Contact with eyes: Rinse eyes with flowing water for 15 minutes and seek medical attention.

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

(1.4) Ingestion: Induce vomiting and seek medical attention.

(2) Fire

NO WATER! Only dry powder fire or carbon dioxide extinguisher can be used; if possible, move the battery pack to a safe area before it catches fire.

(3) Wet Batteries

If the battery pack is wet or submerged in water, do not let people access it, and then contact dealer for technical support. Cut off all power switch on inverter side.

(4) Damaged Batteries

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

8.Remarks

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.

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 90%

(2) Every year after installation. The connection of power connector, grounding point, power cable and screw are suggested to be checked. Make sure there is no loose, no broken, no corrosion at connection point. Check the installation environment such as dust, water, insect etc.

(3) If the battery is stored for long time, it is required to charge them every six months, and the SOC should be higher than 90%

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