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V0.0





B2 Series

RECHARGEABLE LI-ION BATTERY MODULE USER MANUAL

B2-5.0-LV1 B2-5.0-LV2

Preface

Thank you for choosing SAJ battery. We are pleased to provide you first-class products and exceptiona service

This manual includes information for installation, operation, maintenance, trouble shooting and safety Please follow the instructions of this manual so that we can ensure delivery of our professional guidance and wholehearted service.

Customer-orientation is our forever commitment. We hope this document proves to be of gread assistance in your journey for a cleaner, greener world.

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Guangzhou Saniing Electric Co., Ltc



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SAFETY PRECAUTIONS



1.1 Application Scope

This User Manual describes instructions and detailed procedures for installing, operating, maintaining, and troubleshooting of the following SAJ products:

B2-5.0-LV1; B2-5.0-LV2;

1.2 Safety Instructions





·WARNING indicates a hazardous situation which, if not avoided, can result in death or serious injury or moderate injury.





1.3 Target Group

Only qualified electricians who have read and fully understood all safety regulations in this manual can install, maintain and repair the battery.

PREPARATION

2.1 Safety Instructions

For safety, be sure to read all the safety instructions carefully prior to any works, and please observe the appropriate rules and regulations of the country or region where you installed B2 battery.



/ DANGER

- ·Please keep the power off prior to any operations
- ·Do not use the battery or the battery control unit if it is defective, broken or damaged.
- ·Do not expose the battery to temperatures in excess of 50°C.
- ·Do not subject the battery to any strong force.
- ·Do not place the battery near a heat source, such as direct sunlight, a fireplace.
- ·Keep inflammable and explosive dangerous items or flames away from the battery.
- ·Do not soak the battery in water or expose it to moisture or liquids.
- ·Do not use the battery in vehicles.



/ WARNING

- ·Only qualified personnel who has full knowledge of local safety regulations and local standards on battery can install, maintain, retrieve and process this product.
- ·SAJ electric shall not be liable for any loss or warranty claims arising from any unauthorized change of product which may cause fatal injury to the operator, third party or equipment performance.
- ·For personal and property safety, do not short-circuit the positive (+) and negative (-) electrode terminals.



/ CAUTION

- ·Do not modify or change any components in the battery.
- ·Risk of damage due to improper modification
- ·Use professional tools when operating the products.



- During installation of the B2 low voltage battery, circuit breaker must be disconnected from the battery pack wiring.
- ·The battery can only be used as a set with SAJ's H1 series hybrid solar inverter, otherwise it cannot be used normally.





2.2 Explanations of Symbols

Symbol	Description
<u> </u>	Dangerous electrical voltage This device is directly connected to public grid, thus all work to the battery shall only be carried out by qualified personnel.
	No open flames Do not place or install near flammable or explosive materials.
SSS	Danger of hot surface The components inside the battery will release a lot of heat during operation. Do not touch metal plate housing during operating.
	Attention Install the product out of reach of children
	An error has occurred Please go to Chapter 7 "Troubleshooting" to remedy the error.
	This device shall NOT be disposed of in residential waste
	This battery module shall NOT be disposed of in residential waste
CE	CE Mark Equipment with the CE mark fulfills the basic requirements of the Guideline Governing Low-Voltage and Electro-magnetic Compatibility.
	Recyclable

2.3 Battery Handling

Operate and use the battery properly according to user manual, any attempt to modify battery without the permission from SAJ will void the limit warranty for the battery.

- The battery must be installed at a suitable location with sufficient ventilation
- Do not use the battery if it is defective, damaged or broken.
- Only use the battery with compatible inverter.
- Do not use the battery with other type of battery.
- Make sure the battery is grounded prior to use.
- Do not pull out any cables or open the battery enclosure when the battery is powered on.
- Only use the battery as intended and designed.

2.4 Emergency Situation

Despite of its careful and professional protection design against any hazards, damage of the battery may still possible. If a small amount of battery electrolyte is released due to a serious damage of the outer casing; or if the battery explodes due to not being treated timely after a fire breaks out nearby, and leaks out poisonous gases such as carbon monoxide, carbon dioxide and etc., the following actions are recommended:

- 1) Eye contact: Rinse eyes with a large amount of running water and seek medical advice
- 2) Contact with skin: Wash the contacted area with soap thoroughly and seek medical advice
- 3) Inhalation: If you feel discomfort, dizziness or vomiting, seek medical advice immediately.
- 4) Use a FM-200 or Carbon Dioxide (CO2) fire extinguishers to extinguish the fire if there is a fire in the area where the battery pack is installed. Wear a gas mask and avoid inhaling toxic gases and harmful substances produced by the fire.
 - 5) Use an ABC fire extinguisher, if the fire is not caused by battery and not spread to it yet.



WARNING

If a fire has just occurred, try to disconnect the battery circuit breaker and cut off the power supply first, but only if you can do so without endangering yourself.

· If the battery is on fire, do not attempt to extinguish the fire but evacuate the crowd immediately.

Potential danger of damaged battery:

Chemical Hazard: Despite of its careful and professional protection design against any hazard results, rupture of battery may still occur due to mechanical damage, internal pressure etc., and may result in a leakage of battery electrolyte. The electrolyte is corrosive and flammable. When there is fire, the toxic gases produced will cause skin and eyes irritation, and discomfort after inhalation. Therefore:

- 1) Do not open damaged batteries;
- 2) Do not damage the battery again (shock, fall, trample, etc.);
- 3) Keep damaged batteries away from water (except to prevent an energy storage system from catching fire);
- 4) Do not expose the damaged battery to the sun to prevent internal heating of the battery.

Electrical hazard: The reason of fire and explosion accidents in lithium batteries is battery explosion. Here are the main factors of battery explosion:

- 1) Short circuit of battery. Short circuit will generate high heat inside battery, resulting in partial electrolyte gasification, which will stretch the battery shell. The temperature reaching ignition point of internal material will lead to explosive combustion.
- 2) Overcharge of battery. Overcharge of battery may precipitate lithium metal. If the shell is broken, it will come into direct contact with the air, resulting in combustion. The electrolyte will be ignited at the same time, resulting in strong flame, rapid expansion of gas and explosion.

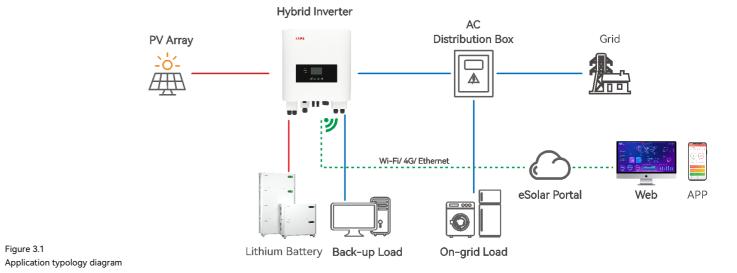


PRODUCT INFORMATION



3.1 Application Typology Diagram

The B2 series low voltage battery is applied to residential photovoltaic storage system. The battery is equipped with a built-in battery management system (BMS), which functions to ensure efficiency of the battery and protect the battery from operating out of its specified limitations. The battery employs modular design for easy installation and wiring.



3.2 Product Model

Figure 3.1

①B2 represents for product name.

②X.X represents rated energy X kWh of battery, for example, 5.0 means 5.0kWh.

③LV means low voltage, 1/2 represents different battery cell manufacturers.



3.3 Dimensions

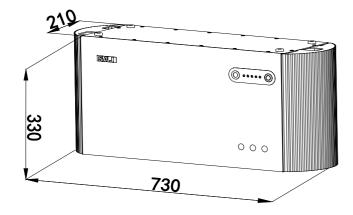


Figure 3.2
Dimensions of battery (unit: mm)

3.4 Components Description

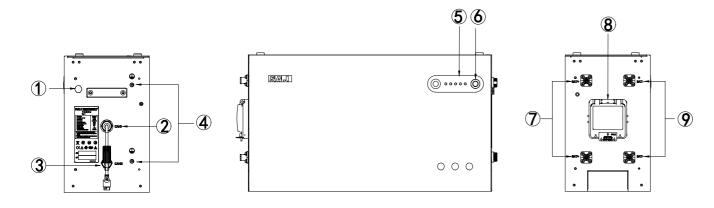


Figure 3.3 Components of battery

Code	Name
1	Breather valve
2	CAN1
3	CAN2
4	Ground
5	Display
6	Main switch
7	BAT+ port
8	Circuit breaker
9	BAT- port

Table 3.1 Battery components description

3.5 Datasheet

Model	B2-5.0-LV1	B2-5.0-LV2	
Electrical parameters			
Total energy capacity [kWh]	5.0	5.0	
Usable capacity [kWh]	4.5	4.5	
Rated voltage [V]	51.2		
Voltage range [V]	44.8 ~ 57	7.6	
Depth of discharge [DOD]	≤ 90%	≤ 90%	
Max. charge current [A]	100	100	
Max. discharge current [A]	100	100	
Parallel	Yes (≤8pcs)		
Battery Designation	IFpP50/160/115[(1P16S)nS]E/-20+45/90, n=number of modules		
Physical parameters			
Battery cell type	LiFePO4		
Communication	CAN		
Operating temperature	Charging: 0 ~ 50°C; Discharging: -10 ~ 50°C		



Model	B2-5.0-LV1	B2-5.0-LV2		
Storage temperature	-20~45°C (≤1 month); (-20~45°C (≤1 month); 0~35°C (≤6 months)		
Cooling method	Natural cor	Natural convection		
Ambient humidity	0 ~ 95% non-c	0 ~ 95% non-condensing		
Operating altitude [m]	≤200	≤2000		
Ingress Protection	IP65	IP65		
Installation type	Wall-mounted or ground	Wall-mounted or ground-mounted installation		
Dimensions [H*W*D][mm]	330*730	330*730*210		
Weight [kg]	45.7	47.5		
Warranty [Year]	5/10	5/10		
Applicable standard	IEC62619(Cell&Pack), EN62477-1, EN61000-6-1/2/3/4, UN38.3			



INSTRUCTIONS FOR INSTALLATION

4.1 Unpacking and Inspection

4.1.1 Checking the Package

Although SAJ's batteries have thoroughly tested and checked before delivery, the battery may suffer damages during transportation. Please check the package for any obvious signs of damage, and if such evidence is present, do not open the package and contact your dealer as soon as possible

4.1.2 Scope of Delivery

Please contact after sales if there are missing or damaged components.

Battery Module Package

©			0 0
Battery control unit*1	Side cover*1	Side cover*1	Locking bracket*2
		© 1 □	
M4*10 screw*8	M4*20 screw*4	Grounding cable*1	M6*50 screw*2
Screw fixing seat*2	Flat gasket*2	Power cable*1	Power cable*1





4.2 Installation Requirements

4.2.1 Position and Clearance

This device is cooled by natural convention and suggested an indoor installation or an installation under a sheltered place to prevent the battery from exposure to direct sunlight, rain and snow erosion.

Figure 4.1 Installation location



Please reserve enough clearance around the battery to ensure a good air circulation at the installation area. Because poor air ventilation will affect the working performance of internal electronic components and shorten the service life of the system.

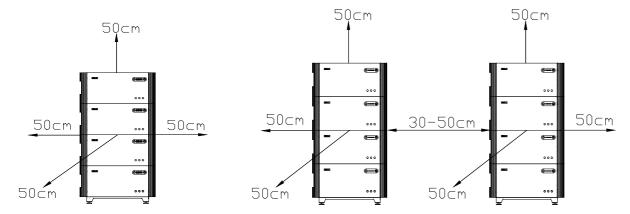


Figure 4.2 Installation space

4.2.2 Mounting Method

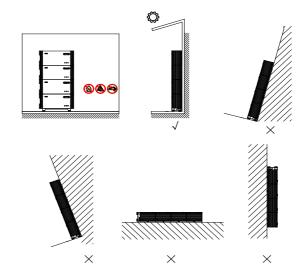


Figure 4.3 Mounting method

- $\textcircled{1} \ \ \textbf{The equipment employs natural convection cooling, and it can be installed indoor or outdoor.}$
- 2 Mount vertically. Never install the battery tilted forwards, sideways, horizontally or upside down.
- ③ When mounting the battery, please consider the solidity of wall for battery, including accessories, make sure the wall has enough strength to hold the screws and bear the weight of products. Please ensure the mounting bracket mounted tightly.

4.2.3 Environment Requirements

- The installation environment must be free of inflammable or explosive materials.
- Install the battery away from heat source.
- Do not install the battery at a place where the temperature changes extremely.
- Keep the battery away from children.
- Do not install the battery at daily working or living arears, including but not limited to the following areas:
 bedroom, lounge, living room, study, toilet, bathroom, theater and attic.



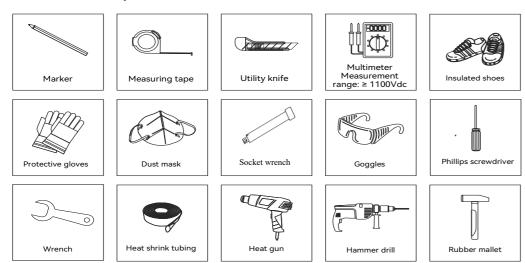
- · When installing the battery at the garage, please keep it away from drive way.
- Keep the battery from water sources such as taps, sewer pipes and sprinklers to prevent water seepage.

Note: When installing outdoors, the height of the battery from the ground should be considered to prevent the battery from soaking in water. The specific height is determined by the site environment.

4.3 Mounting Procedure

4.3.1 Installation Tools

Installation tools include but are not limited to the following recommended ones. Please use other auxiliary tools on site if necessary.



4.3.2 Mounting Procedure

The battery employs either ground mounting or wall mounting.

Ground-Mounted Installation

Before installation, ensure that the ground is flat and there is no inclination.

Step 1: To install the foot cup, you need to screw it down to the base.

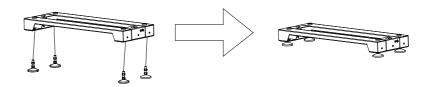


Figure 4.4
Assembling the foot cup

Step 2: Ensure that the base is placed on level ground and kept a distance of 12 to 17mm from the wall. Take out the cardboard from the packaging box of the base, place the cardboard on the base and align the oval holes with the wall-side rubber feet of the base. Move the cardboard against the wall and use a marker to mark on the wall through the locating holes of the cardboard and remove the cardboard when finished.

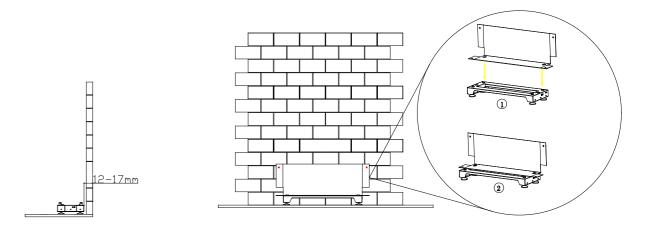


Figure 4.5
Base placement and marking positions

Step 3: Unfold the cardboard, make the two semicircular holes at the bottom of the cardboard overlap the marks on the wall, and mark the wall through the two semicircular holes at the upper part of the cardboard. Repeat this step for hole positions of other battery packs.



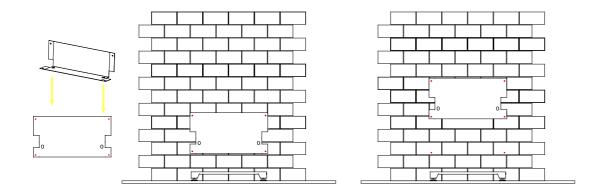


Figure 4.6 Mark positions on the wall by using the cardboard

Step 4: Drill holes at the marks of the wall (8mm in diameter and 55mm in depth). Then drive the screw fixing seats into the holes with a rubber hammer.

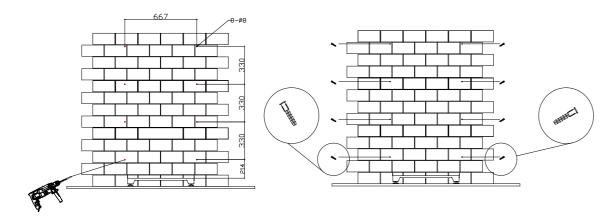


Figure 4.7
Drilling holes and inserting
Screw fixing seats on the wall

Step 5: Put the battery pack on the base, the recessed part at the bottom of the battery pack should be aligned with the base locating rubber pad. After stacking the battery packs, fasten the battery packs together and fix the bottom battery pack on the base with screws (M4*10) and connecting parts. Adjust the fixtures of the

battery pack to fit with the screw fixing seats' holes, tighten the fixtures with screws, and then drive hexagonal head wooden screws through the flat gaskets into the screw fixing seats to fix the battery pack on the wall.

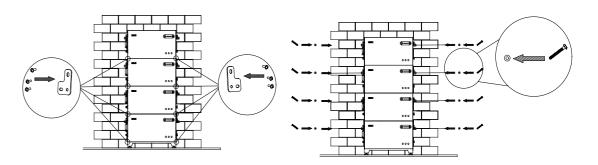


Figure 4.7 Fastening battery packs

Step 8: Remove the locating rubber pad of the topmost battery pack, cover the top coverboard on the top battery pack, align the oval holes of the coverboard with the threaded holes of the battery pack, and fix the board with M4*10 screws.

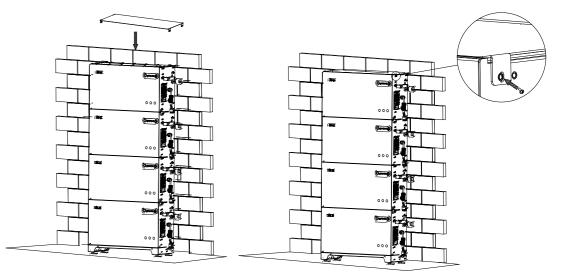


Figure 4.11 Installing the coverboard



Wall-Mounted Installation

Ensure that the wall is capable of mounting screws and supporting the weight of the battery pack before installation. For safety reason, solid wall is recommended for wall-mounted installation, and cavity wall and timber wall are not allowed to install the battery system.

Step 1: Fit the wall bracket onto the wall, and drill holes (ϕ 16, 105mm in depth) with an electric drill aligned with the mounting holes of the bracket. After drilling holes, use a hammer to drive M12*100 bolts through the bracket into the holes and tighten the bolts with a socket wrench (M12, 230mm in depth) to fix the bracket on the wall.

Note: The customer can decide the mounting height of the wall bracket for their convenience. It is recommended to leave no gap between the bracket and wall.

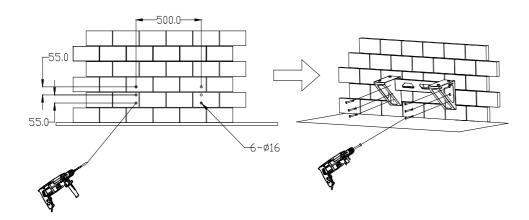


Figure 4.12
Drilling holes and mounting the bracket on the wall

Step 2: Take out the cardboard form the packaging box of the bracket, put the cardboard on the bracket, align the oval holes with the two wall-side locating rubber pad, move the cardboard to lean on the wall and mark on the wall according to the locating holes on the cardboard. Remove the cardboard when finished.

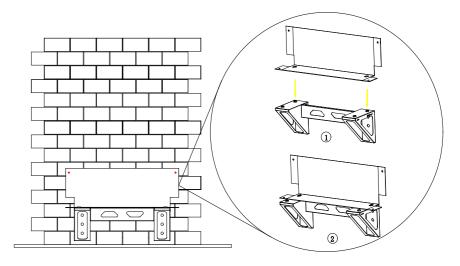
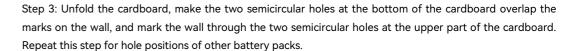


Figure 4.13 Marking hole positions for the first battery pack



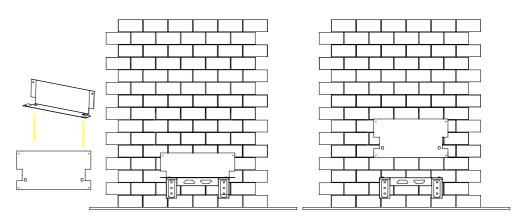


Figure 4.14

Marking hole positions for other battery packs

Step 4: Drill holes at the marks of the wall (8mm in diameter and 55mm in depth). Then drive the screw fixing seats into the holes with a rubber hammer.

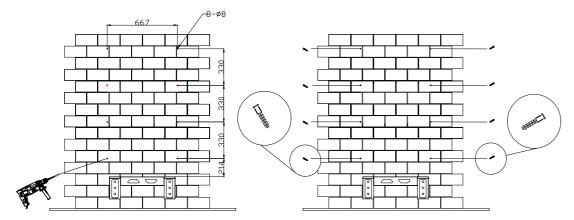


Figure 4.17
Drilling holes and inserting screw fixing seats on the wall

Step 5: Put the battery pack on the base, the recessed part at the bottom of battery pack should be aligned with the locating rubber pad. After stacking the battery packs, fasten the battery packs together and fix the bottom battery pack on the bracket with screws (M4*10) and connecting parts. Adjust the fixtures of the battery packs to fit with the screw fixing seats' holes and tighten the fixtures with screws. Drive hexagonal head wooden screws through the flat gaskets into screw fixing seats to fix the battery pack on the wall.

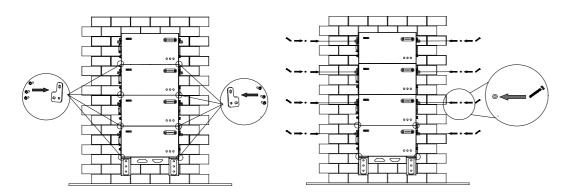


Figure 4.19 Installing the coverboard

Step 8: Remove the locating rubber pad of the topmost battery pack, put the coverboard on the top battery pack, align the oval holes of the cover board with the threaded holes of the battery pack, and fix the coverboard with M4*10 screws.

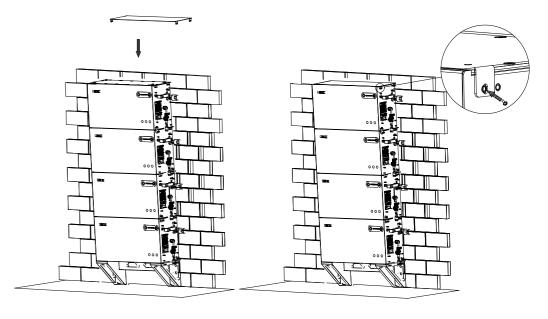


Figure 4.18
Fastening battery packs

ELECTRICAL CONNECTION



5.1 Additional Grounding Cable

Electrical connection must only be operated by professional technicians. Before connection, necessary protective equipment must be employed by technicians, including insulating gloves, insulating shoes and safety helmet.



Connect this additional grounding cable before other electrical connection.

Note: The additional cable and OT/DT terminal should be prepared by user themselves.

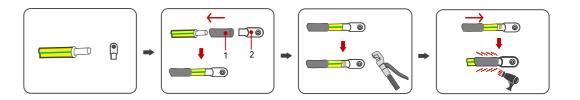


Figure 5.1 Preparing additional grounding cable

1. Heat shrink tubing 2. OT/DT terminal



Remove the screw of grounding port and secure the additional grounding cable. Connect the grounding ports of the two adjacent battery packs with a grounding wire. The grounding port at the bottom of the upper battery pack is connected to the grounding port on the top of the lower battery pack, and the client's grounding wire to the grounding port at the bottom of the downmost battery pack. Connect the grounding cables as the following diagram.

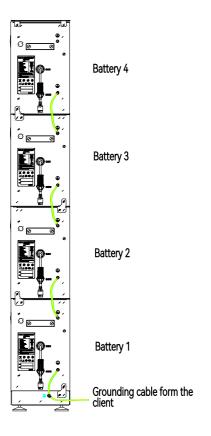


Figure 5.2 Connecting the additional grounding cable

5.2 Connecting Battery Communication Cable

One stack of battery packs:

Step 1: Connect CAN2 of the upper batteries to CAN1 of the lower batteries.

Step 2: Insert a RJ45 plug to the CAN2 port of the downmost battery.

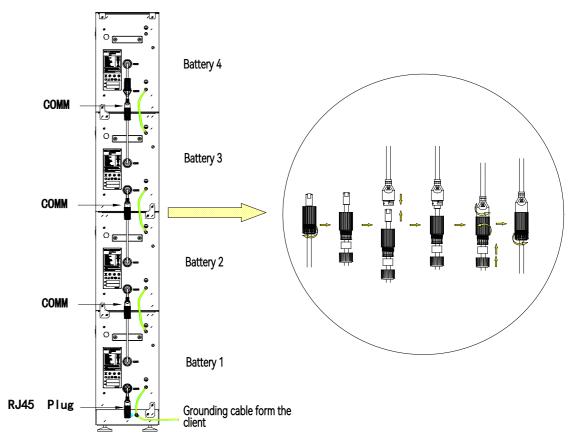


Figure 5.3
Wiring of communication cable for one stack of battery packs



Two stacks of battery packs:

Step 1: Connect CAN2 of the upper batteries to CAN1 of the lower batteries.

Step 2: Connect the CAN2 ports of the downmost battery packs of the two stacks with a communication cable.

The two sides of the cable should be tightened up for water proofness.

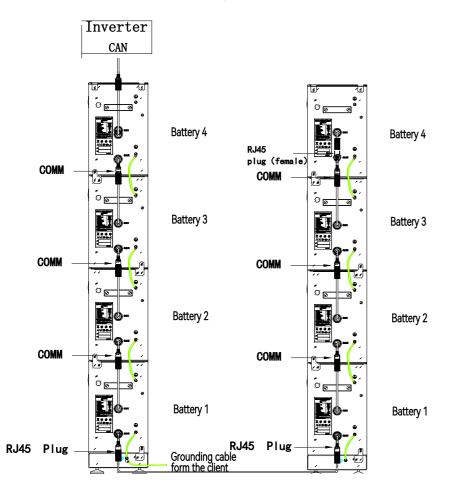


Figure 5.4 Wiring of communication cable for two stacks of battery packs

Detailed connection methods:

Step 1: Before connecting the communication cable, unscrew the nut of CAN1 cable from the screw shell, and extend the RJ45 plug of CAN1 cable from the screw shell.

Step 2: Insert the RJ45 plug of CAN1 cable into the RJ45 socket of CAN2 cable. Then tighten the screw shell of CAN1 cable and the RJ45 socket of CAN2 cable to ensure that the sealant ring of CAN2 cable is clamped by the screw shell, and avoid extruding the sealant ring due to the screw shell being overtightened.

Step 3: Tighten the nut of CAN1 cable with the screw shell. Ensure that the rubber plug seals the outlet hole of the nut and the screw shell.

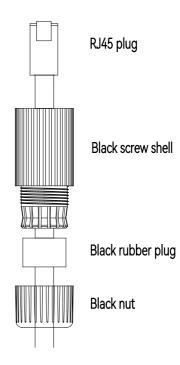


Figure 5.5 RJ45 plug (male) of CAN1 cable



5.3 Connecting Battery Power Cable



- Power off the battery system before connecting the power cable to avoid voltage danger
- The electrical connection of B2 series low voltage battery system must be operated by qualified technicians in accordance with local and national power grid standards and regulations.

One stack of battery packs:

Step 1: After the battery packs are stacked, connect the B+ ports of the two adjacent battery packs with the B+ power cable, and connect the B+ port at the bottom of the upper battery pack to the B+ port on the top of the lower battery pack.

Step 2: Connect the B-ports of the two adjacent battery packs with the B-power cable, and connect the Bport on the bottom of the upper battery pack to the B- port on the top of the lower battery pack.

Step 3: Follow steps 1~2 to connect all battery packs.

Step 4: The B+ port on the top of the top battery pack is connected to the positive battery input of the inverter, and the B- port is connected to the negative battery input of the inverter

Step 5: Cover the B+/B- ports near the bottom of the downmost battery with dust caps.

Two stacks of battery packs:

Step 1 to Step 4: Refer to the steps of one stack of battery packs

Step 5: Use power cable to connect the B+ port of the downmost battery pack of the right stack with that of the right stack. Use power cable to connect the B- port of the downmost battery pack of the right stack with that of the right stack. For the top battery pack of the stack that has not been connected to the inverter, cover the B+/B- port with dust caps

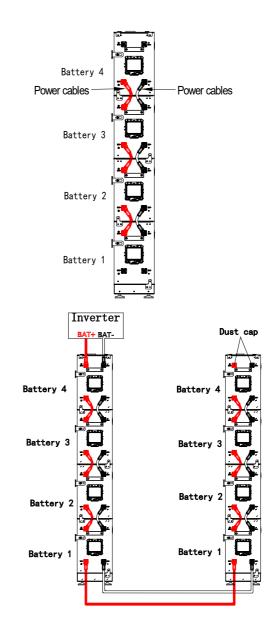


Figure 5.6 Connecting battery power cables



5.4 Connecting Battery to Inverter

Please follow the following diagram to connect battery and inverter.

One stack of battery packs:

Power cable: Connect the B+/B- port of the top battery pack with the B+/B- port of the inverter respectively with power cable.

Communication cable: Connect the CAN1 port of the top battery pack with the CAN port of the inverter with communication cable.

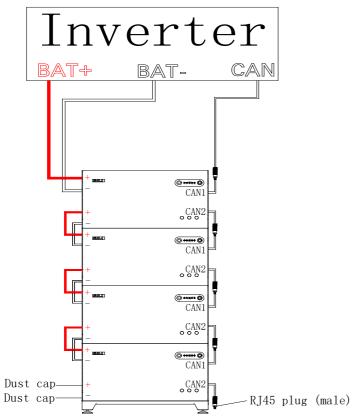


Figure 5.7
Connecting battery system (one stack) to inverter

Two stacks of battery packs:

Power cable: Connect the B+ port of the top battery pack from the left stack with the B+ port of the inverter.

Connect the B- port of the top battery pack from the right stack with the B- port of the inverter.

Communication cable: Connect the CAN1 port of the top battery pack with the CAN port of the inverter with communication cable.

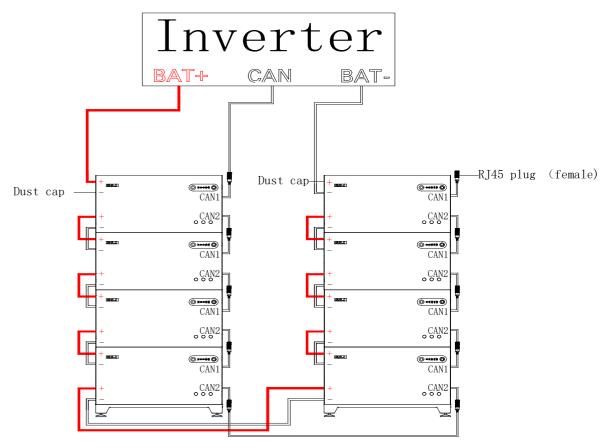


Figure 5.8
Connecting battery system (two stacks) to inverter



5.5 Pinout Description of RJ45

- The communication cable is one end crimped, this crimped end is for battery side connection. The
 other end is for inverter side connection. Customer should crimp the other end of communication
 cable by themselves.
- 2) The pinout of RJ45 is detailed in the table below.
- 3) Confirm that the DC switch is OFF during installation to avoid short circuit caused by wrong operation during battery wiring.
- 4) Please use the battery cable in original package.

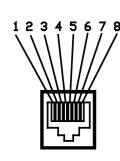




Figure 5.9 Pinout of RJ45

Code	Color	Name
1	/	Blank
2	/	Blank
3	/	Blank
4	Black	CAN-H
5	Red	CAN-L
6	/	Blank
7	Yellow	RS485-A
8	Green	RS485-B

Table 5.1 Pinout description of RJ45

5.6 Installation of Side Covers

Install the side covers on both sides of the battery module and secure the covers with screws (M4*20) on the battery module.

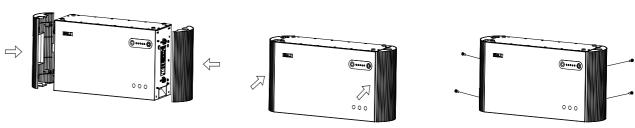


Figure 5.10 Installation of side covers

COMMISSIONING

6.1 Start Up and Shut Down

6.1.1 Start Up

Step 1: Turn on the circuit breaker

Step 2: Press and hold the main switch for 2-3s, until the display is on

After the wiring is completed, refer to the inverter manual for system commissioning and operation.

6.1.2 Shut Down

Step 1: Press and hold the main switch for 2~3s, until the display is off

Step 2: Turn off the circuit breaker

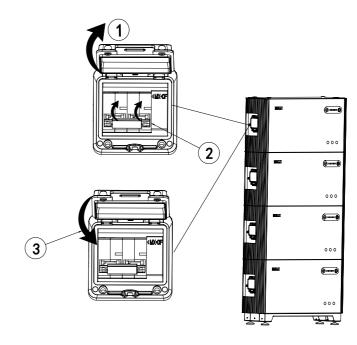
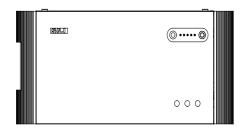


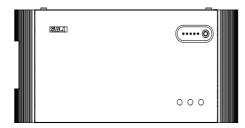
Figure 6.1 Circuit breaker of battery





6.2 Introduction of Display





B2-5.0-LV1

B2-5.0-LV2

Figure 6.2 Display on the battery

Note: The B2-5.0-LV1 series battery and the B2-5.0-LV2 series battery looks the same except the display. The display of B2-5.0-LV1 series battery has a nonluminous decorative green ring () on the left while the display of B2-5.0-LV2 series battery does not.

Display	Status		Description
		Steady on	The battery is in normal state
0 ···· 0	Green	Breathing Mode	The battery is in the initialization or waiting state
0	Red	Steady on	An error occurs
	Breathing Mode		Software is upgrading in the battery
0 ····· ©	OFF		Power off
	Red Steady on		SOC<5%
0 ····· 0	Yellow Steady on		5% SOC < 15%
0 ···· •	Green	Steady on	15%≤SOC<25%

Display	Status		Description
0	Green	Steady on	25% SOC < 50%
0	Green	Steady on	50% SOC < 75%
O ····· •	Green	Steady on	75% SOC < 95%
0 ···· •	Green	Steady on	SOC≥95%

Note: One breathing cycle is 6 seconds.

Table 6.1 Interface description

6.3 Commissioning

For eSolar APP downloading and detailed system commissioning information, please refer to the inverter manual. Please select SAJ for battery brand during commissioning.



Figure 6.3 Selecting the battery brand

Note: Turn on the circuit breaker and main switch before any operation.

TRANSPORTATION & STORAGE



7.1 Transportation

Lithium batteries are dangerous goods. Passed the test of UN38.3, this product meets the transportation requirements for dangerous goods for lithium batteries. After the installation of the battery on site, the original packaging (contains the lithium battery identification) should be kept. When the battery needs to be returned to the factory for repair, please pack the battery with the original packaging to reduce unnecessary trouble.

Take care of the product during transportation and storage and keep less than 4 cartons of battery in one stack.

7.2 Storage

After purchasing the battery, please store it with following instructions:

- ① Please store it in a dry and ventilated environment, keep it away from heat sources.
- ② Please keep it in an environment with a temperature of $-20\,^{\circ}$ C to $45\,^{\circ}$ C, and the humidity less than 95% RH (storage time less than 1 month).
- $^{\circ}$ For long-term storage (storage time less than 6 months), please put it in an environment with a temperature of 0 $^{\circ}$ C to 35 $^{\circ}$ C and the humidity less than 95% RH.
- The battery should be stored in accordance with the storage requirements mentioned above, and the battery should be installed within 6 months since delivered from the factory and used with compatible inverters.



'The battery remains 50% power when it is delivered from the factory.

·The longer the battery is stored, lower the SOC. When the battery remaining voltage fails to reach the startup voltage requirement, the battery may be damaged.

·Judgment condition: Close the battery breaker switch and press the main switch. At this time, if the LED light is solid green, it is running normal. If the LED light is red or off, the battery is in fault.

The battery cannot be disposed of as household refuse. When the service life of the battery reaches to the limit, it is not required to return it to the dealer or SAJ, but it must be recycled to the special waste lithium battery recycling station in the area.

TROUBLESHOOTING & WARRANTY

Troubleshooting

Code	Error Name	Common Cause	Remedy
97	BMS internal communication error	Communication error between battery control unit and battery module Did not install RJ45 plug, therefore battery control unit counted the number of battery modules connected mistakenly	1. Check if communication cable is connected properly 2. Check if RJ45 plug is installed
98	Battery module sequence error	1. Cable connection is wrong 2. Did not install RJ45 plug 3. Communication cable connection is wrong	1. Connect the cable correctly 2. Check if the RJ45 plug is installed 3. Check if the communication cable is working
99	Discharge overcurrent protection	Discharging current exceeds the set limit	Wait until the error is clear or restart
100	Charge overcurrent protection	Charging current exceeds the set limit	Wait until the error is clear or restart
101	Total voltage low protection	Total voltage is lower than the set limit	Force charging the battery
102	Total voltage high protection	Total voltage is higher than the set limit	Wait until the error is clear or restart
103	Single battery module voltage low protection	Single battery module voltage is lower than the set limit	Force charging the battery
104	Single battery module voltage high protection	Single battery module voltage is higher than the set limit	Wait until the error is clear or restart
105	BMS hardware error	Single battery module voltage sensor error Temperature sensor error Current sensor error	1. Check if battery temperature and voltage sensor cable is in poor contact 2. Check if current sensor cable is in poor contact 3. Replace BMS
106	Charging temperature low protection	Battery charging at <0℃	Wait until battery temperature increased and the error is clear



Code	Error Name	Common Cause	Remedy
107	Charging temperature high protection	Battery temperature too high	Wait until battery temperature decreased and the error is clear
108	Discharging temperature low protection	Battery temperature too low, disconnect relay to stop discharging	Wait until battery temperature increased and the error is clear
109	Discharging temperature high protection	Battery temperature too high	Wait until battery temperature decreased and the error is clear
110	Relay error	Cathode or anode relay is adhesive Cathode or anode relay is unable to close	Replace relay
		Pre-charge relay damaged	Replace pre-charge relay
111	Pre-charge error	Pre-charge resistor open-circuit BMS damaged	Replace pre-charge resistor Replace BMS
112	Insulation error	Battery module has electricity leakage	Contact battery supplier
113	BMS supplier incompatibility	BMS of battery module and battery control unit are incompatible	Check if the model of battery module and battery control unit are compatible
114	Battery cell supplier impartibility	Supplier of battery module and battery cell are incompatible	Check if the model of battery module is correct
115	Battery cell	Battery cells are	Check if the model of
116	incompatibility Voltage inconsistency	incompatible Battery module voltage are inconsistent	Check if the model of battery module is correct
117	Circuit breaker is open	Circuit breaker is open Circuit breaker auxiliary contact error	Replace circuit breaker
118	Temperature difference is too wide	Temperature sensor error Battery life span	Check if temperature sensor cable is in poor contact
119	Voltage difference is too wide(Class II)	Sensor cable is loose Battery life span	Check if voltage sensor cable is in poor contact Replace BMS

Code	Error Name	Common Cause	Remedy
120	Voltage difference is too wide (Class I)	1. Sensor cable is loose	Check if voltage sensor cable is in poor contact Replace BMS
121	BMS over temperature protect	Ambient temperature is high Overload	Check if ambient temperature is high Check if overloaded
122	Short circuit protect	P+ and P- short circuit	Check if the cable connected correctly

Warranty

Please go to SAJ website for warranty conditions and terms https://www.saj-electric.com/