



W51100 Lithium-ion Battery for Household Energy Storage

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FOREWORD

Overview

This manual describes the installation, history recording and parameter settings etc. Please keep the manual in safety for more information.





Readers

This document provides technical details regarding the tools and infrastructure used by the following users:

- Sales engineer
- Technical support engineer
- Installation engineer
- Application engineer
- Maintenance engineer

Symbol convention

The following symbols may appear in this article, and they are represented as follows:

Symbol	Indication
 Dangerous	Used as warning in an emergency, if not avoided, it will result in death or serious personal injury.
 Warning	Used as a warning of a middle or low potential hazards, if not avoided, it may cause minor or normal injury.
 Caution	Used as a warning of potential dangers, if ignore this information, it may result in equipment broken, data lost, equipment performance decrease and other unpredictable result.
 INTRO	Represents the supplement information of main text to emphasize or replenish.

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1 OVERVIEW

1.1 Product model

The model of lithium-ion battery (hereafter referred to as battery or PACK) is shown in Figure1-1.

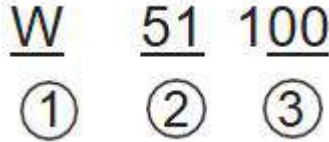


Figure1-1 The explanation of the product model

- ① W represents the wall-mounted Lithium-ion Battery for Household Energy Storage
- ② The nominal voltage is 51.2V
- ③ The rated capacity is 100Ah

1.2 Product profiles

The W51100 Lithium-ion Battery is one of the new energy storage products developed and manufactured for household energy storage. It can be used to support reliable power for various types of devices and solar systems. W51100 is especially suitable for application scene of high power and long cycle life.

The W51100 has a built-in BMS battery management system that can manage and monitor cell information including voltage, current and temperature. What's more, the BMS can balance the charging and discharging of cells to extend cycle life. Multiple batteries can be connected in parallel to increase capacity and power for greater capacity and longer power support requirements.

1.3 Product structure

The appearance of the Lithium-ion battery pack is shown in Figure 1-2. For interface description, please refer to the 2.2 panel description.



Figure 1-2 Product picture

2 ILLUSTRATION

2.1 Interface display

The structure of Lithium-Ion battery pack is as shown in Figure 2-1.

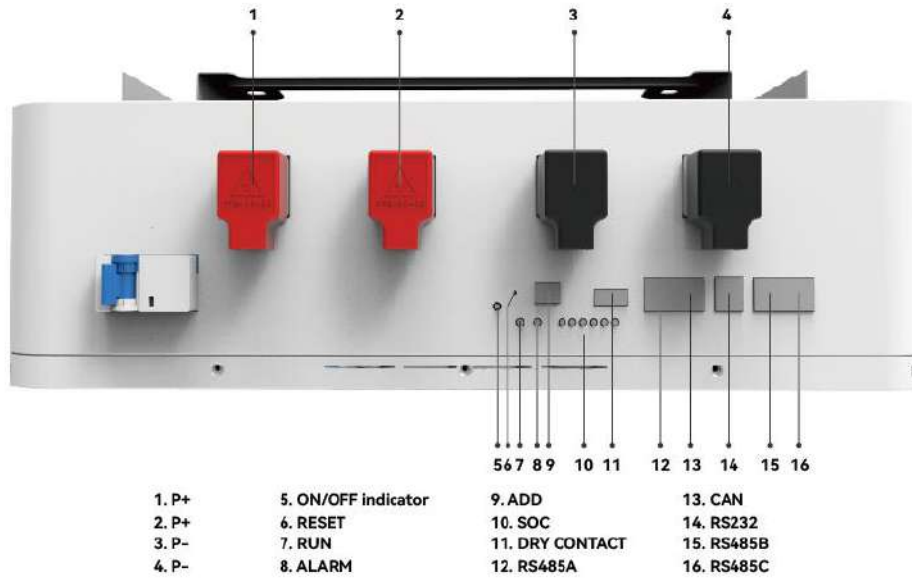


Figure 2-1 Product structure

2.2 Panel description

Battery Output

Using 4 terminal pins, the terminals from left to right are defined as P+, P+, P-, P-, which are connected to the power transmission line for charging and discharging.

SOC

The meaning of SOC indication light is shown in Table2-1.

Table2-1 Capacity Indicator Description

●	●	●	●	●	●	Capacity
☒	☒	☒	☒	☒	☒	83~100%
☒	☒	☒	☒	☒	○	66~83%
☒	☒	☒	☒	○	○	50~66%
☒	☒	☒	○	○	○	33~50%
☒	☒	○	○	○	○	16~33%

☒	○	○	○	○	○	○	0~16%
---	---	---	---	---	---	---	-------

INTRO ☒ indicates ON, ○ indicates OFF

ALM

If the battery is in fault or protection mode, the "ALM" light will light up or flash, as shown in Table2-2.

RUN

"RUN" and "ALM" can display the battery status, as shown in Table2-2.

Table2-2 The explanation of "RUN" and "ALM"

Battery Statuses	Normal/Alarm/Protection	ON/OFF	RUN	ALM	Capacity LED						Description	
		●	●	●	●	●	●	●	●	●		
Shut Down	/	Off	Off	Off	Off	Off	Off	Off	Off	Off	Off	All Off
Standby	Normal	Light	Flash 1	Off	According to the capacity indicator						Standby	
	Alarm	Light	Flash 1	Flash 3	According to the capacity indicator						low voltage	
Charge	Normal	Light	Light	Off	According to the capacity indicator						The highest capacity LED flashes (flash 2), ALM does not flash during an overcharge alarm	
	Alarm	Light	Light	Flash 3	(The highest battery indicator LED flashes 2 times)							
	Overcharge protection	Light	Light	Off	Light	Light	Light	Light	Light	Light	Light	If there is no utility, the indicator light turns to the standby state.
	Overtemperature, overcurrent and failure protection	Light	Off	Light	Off	Off	Off	Off	Off	Off	Off	Stop charging
Discharge	Normal	Light	Flash 3	Off	Based on capacity							
	Alarm	Light	Flash 3	Flash 3	Based on capacity							
	Under voltage protection	Light	Off	Off	Off	Off	Off	Off	Off	Off	Off	Stop discharging

	Temperature over-current short circuit reverse connection failure protection	Light	Off	Light	Off	Off	Off	Off	Off	Off	Stop discharging
Failure		Off	Off	Light	Off	Off	Off	Off	Off	Off	Stop charging and discharging

Note: The flashing instructions: ①Flash1 - 0.25s light / 3.75s off; ②Flash2 - 0.5s light / 0.5s off; ③Flash3 - 0.5s light / 1.5s off.

ADD

In parallel, dip switch using:

4-bit dip-switch for setting the battery pack address. The explanation of its dip switches is shown in Table2-3.

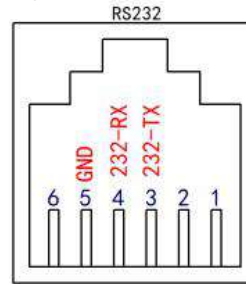
Table2-3 Dip switch address code

Dial Switch				ADD	PACK Definition	Explanation
#1	#2	#3	#4			
OFF	OFF	OFF	OFF	0		Use Alone (as Master Pack)
ON	OFF	OFF	OFF	1	PACK1	Use as SlavePack1
OFF	ON	OFF	OFF	2	PACK2	Use as SlavePack2
ON	ON	OFF	OFF	3	PACK3	Use as SlavePack3
OFF	OFF	ON	OFF	4	PACK4	Use as SlavePack4
ON	OFF	ON	OFF	5	PACK5	Use as SlavePack5
OFF	ON	ON	OFF	6	PACK6	Use as SlavePack6
ON	ON	ON	OFF	7	PACK7	Use as SlavePack7
OFF	OFF	OFF	ON	8	PACK8	Use as SlavePack8
ON	OFF	OFF	ON	9	PACK9	Use as SlavePack9
OFF	ON	OFF	ON	10	PACK10	Use as SlavePack10
ON	ON	OFF	ON	11	PACK11	Use as SlavePack11
OFF	OFF	ON	ON	12	PACK12	Use as SlavePack12
ON	OFF	ON	ON	13	PACK13	Use as SlavePack13
OFF	ON	ON	ON	14	PACK14	Use as SlavePack14
ON	ON	ON	ON	15	PACK15	Use as SlavePack15

RS232 (PC to Battery)

For manufacturer or professional engineer to debug or update software.

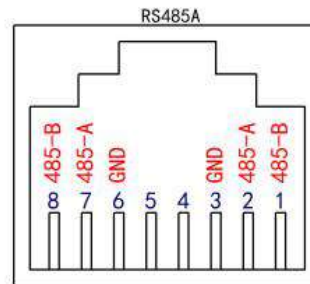
PIN	Definition
1,2,6	NC
3	TX
4	RX
5	GND



RS485A (Inverter to Battery)

RJ45 port follow RS485 protocol, for connection to the inverter.

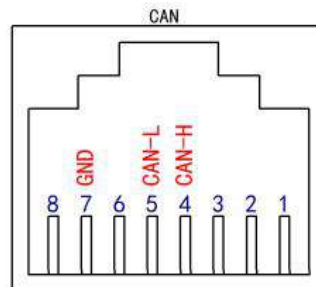
PIN	Definition
1,8	RS485-B
2,7	RS485-A
3,6	GND
4,5	NC



CAN (Inverter to Battery)

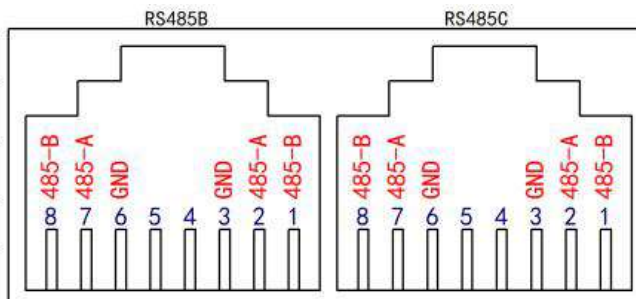
CAN communication terminal: (RJ45 port) following the CAN protocol, for connection to the inverter.

PIN	Definition
1,2,3,6,8	NC
4	CAN-H
5	CAN-L
7	GND



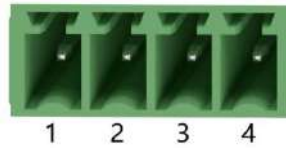
485B & 485C (Battery to Battery)

PIN	Definition
1,2,6	NC
3	TX
4	RX
5	GND



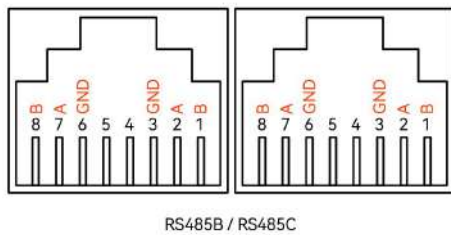
Dry Contact (double channels)

Dry Contact 1---PIN1 to PIN2: Normal Open, Closed during fail-protection;
 Dry Contact 2---PIN3 to PIN4: Normal Open, Closed during low SOC;



Parallel Communication

BMS can be connected in parallel via 485B or 485C. Select one of the interfaces for parallel connection.



RS485B/RS485C	
PIN	Definition
1,8	RS485-B
2,7	RS485-A
3,6	GND
4,5	NC

RESET

Press RESET key for 3-6 seconds, to turn on or turn off the battery pack.

2.3 Menu operation instruction

The LCD display interface is user-friendly, as shown in Figure 2-3. It provides a 320*240 dot matrix graphic display. The LCD is capable of displaying the alarm information in real time and provides the historical alarm records for the user to query, providing a reliable basis for fault diagnosis.

The user can easily browse through the battery parameters via the LCD interface and get instant access to information on the current state of the battery. The interface displays a total of 4 menu buttons, the functions of which are described below.



Figure 2-3 LCD Display

The commonly used button function

The display function of the button as shown in Table2-5.

Table2-4 Button function description

ON/OFF	Turn on or off the BMS. When the button is turned off, the BMS does not work and the battery consumes almost no power.
MENU	If the screen is in sleep mode, press the MENI key to activate the screen.
ENTER	Confirm, Enter
DOWN	Page down
ESC	Return to previous page

Operation procedures

- 1) If the screen is in sleep mode, press Menu once and the LCD screen will light up and then display the welcome screen. If the battery is in off mode, the ON/OFF button must be pressed for the screen to turn on; If the user does not touch any buttons for 5 minutes, the screen will enter sleep mode and the screen will not light up.
- 2) Follow by the prompt and then click once to enter the main menu bar.
- 3) After entering the menu interface, press DOWN once and the information selection arrow on the screen will automatically move down one line. When the last line is reached, press DOWN again and the arrow will return to the first line.
- 4) Go back to the menu bar, click on the ESC button.

3 INSTALLATION GUIDE

3.1 Installation precaution notes

Comply with local laws and regulations

When operating the equipment, make sure to certain to comply with local laws and regulations.

Personnel requirements

Technicians responsible for installation and maintenance must first undergo rigorous training. Only when they have mastered the correct methods of operation and safety can installation, operation and maintenance be carried out.

In order to maximize the efficiency of the equipment, achieve the best possible operating results and ensure maximum service life, please pay careful attention to the correct installation and use requirements.

Personal safety

- Insulated tools and gloves should be used and worn at all times - Watches, bracelets, rings and other metal items should be removed during installation.
- Avoid falls or collisions during installation.
- Do not remove any battery components. Battery maintenance should be carried out by a qualified technician
- All operations should be carried out and supervised by an experienced engineer who can take preventive measures against potential battery hazards.

Field and environment

- **Site requirements**

- 1) Cleanness**

Lithium-ion battery packs cannot be placed in or near garbage disposals, or accidentally dropped or placed in smaller disposal units, as their interaction with metals is likely to cause short circuits and endanger the system and personal safety.

- 2) Fire protection**

It is forbidden to store flammable, explosive and other dangerous goods where the battery pack is installed, and it should be equipped with effective fire-fighting equipment (e.g. CO2 fire extinguishers).

- 3) Ventilation and heat dissipation**

To facilitate operation and maintenance of the battery, a minimum of 30~50cm should be left around the battery, with approximately 50cm left for the upper space. The installation space should be fitted with an exhaust fan to ensure good ventilation.

4) Installation requirements

Installation should be carried out as shown in Figure 3-1 to avoid possible hazards. Place the Lithium-ion battery on the ground and avoid tilting or uneven surfaces. Avoid exposure to sunlight, rain or wet surfaces. Avoid exposure to sunlight, rain or wet surfaces.

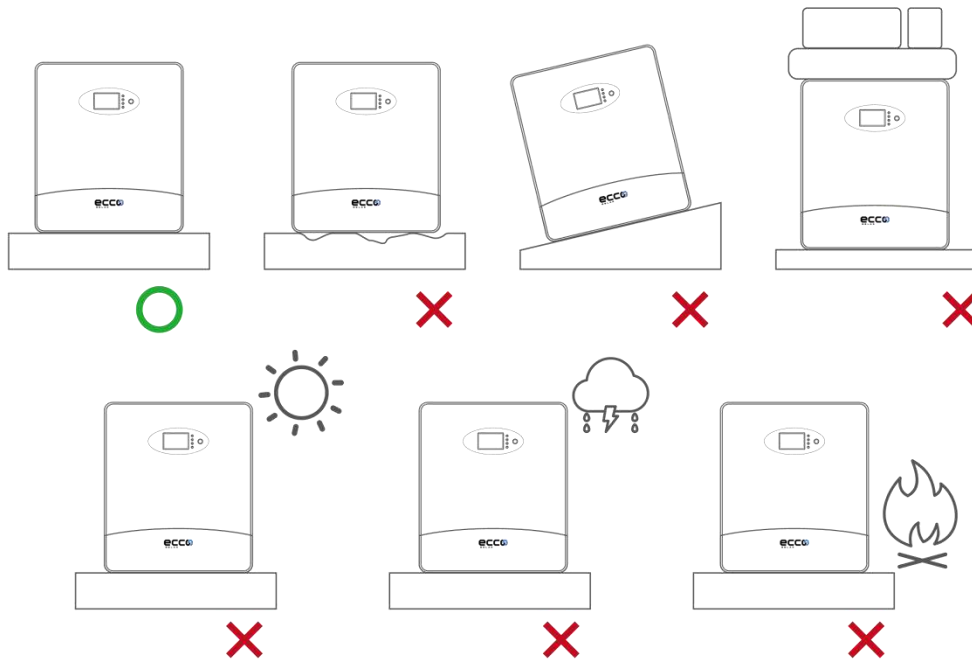


Figure3-1 Requirements for installation scenarios

● Environmental requirements

Ambient temperature: -10~40°C.

Relative humidity level: 0~95%RH, no condensation. Cooling method: air cooler.

Verticality: no vibration and the vertical tilt does not exceed 5°.

Pollution level: Level 2.

Recommended operating temperature: 20~25°C, humidity level control within 50%.

Caution

- Do not install in an environment with metallic conductive dust.
- Do not install anything containing corrosive gases.
- Do not place anything in the areas where dust is concentrated.
- Do not place anything on top of the lithium-ion battery.
- Do not allow people to sit on the battery.

Power check

Before installation, make sure that the load capacity of the supply wire meets the requirements of the new equipment. Check that the voltage and frequency of the power supply matches the nameplate on the equipment and that the current carrying capacity has not decreased due to ageing of the wire.

If in doubt, please consult your local power supply Consultation Department.

- Ground wire
To avoid electric shock, the ground wire needs to be reliably connected.
- DC output voltage and load
Rated output voltage is 51.2V; the output power cannot exceed 6KW.

 **Caution**

When installing the Lithium-ion Battery Pack, the user should check the Lithium-ion Battery Pack in advance to ensure that the contacts and connectors are securely in place to avoid an open circuit or short circuit fault. When installing the Lithium-ion Battery Pack, do not reverse the polarity or connect it incorrectly to avoid short circuit. Do not connect the terminals without safety or insulation protection to avoid the risk of electric shock.

3.2 Installation preparation

3.2.1 Unpacking and inspection





Lithium-ion batteries and accessories are packed in cardboard or wooden boxes. Take care when unpacking. Check the battery and accessories against the packing list to ensure that they are complete and that nothing has been damaged in transit.

If the equipment or accessories have been damaged in transit or are incomplete or incompatible, the equipment, accessories and purchase orders should be recorded and the local branch or office contacted immediately.

3.2.2 Installation tools

For possible commonly used tools, as shown in Table 3-1~3-4, the field technician will increase or decrease the amount according to the construction.

Table3-1 General purpose tools

The appearance of the tools, parameters, and names			
Adjustable wrench	Phillips screwdriver	Slotted screwdriver	Socket wrench
			




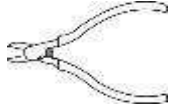
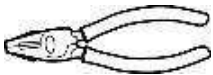
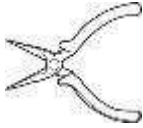



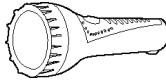


Torque wrench	Open-end wrench	Double offset ring spanner	Diagonal cutting pliers
			
Wire cutters	Needle-nosed pliers	Marking pen	Working gloves
			
Ladder (2m)	Flashlight	Tape measure	Impact drill
			

Table3-2 Tools for delivery and unpacking

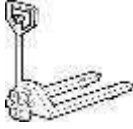

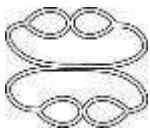
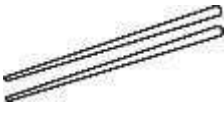
The appearance of the tools, parameters, and names			
Manual forklifts	Electric forklift	Sling (weight≥400 kg)	Leverage (weight≥400kg)
			

Table3-3 Electrical installation tools

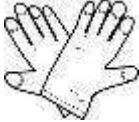
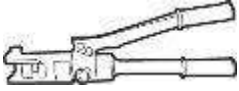
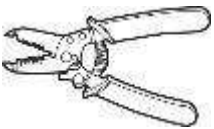
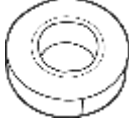
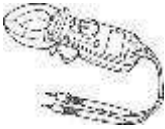
The appearance of the tools, parameters, and names			
Insulated gloves	Power cable crimping pliers	Wire stripping pliers	Electrical tape
			

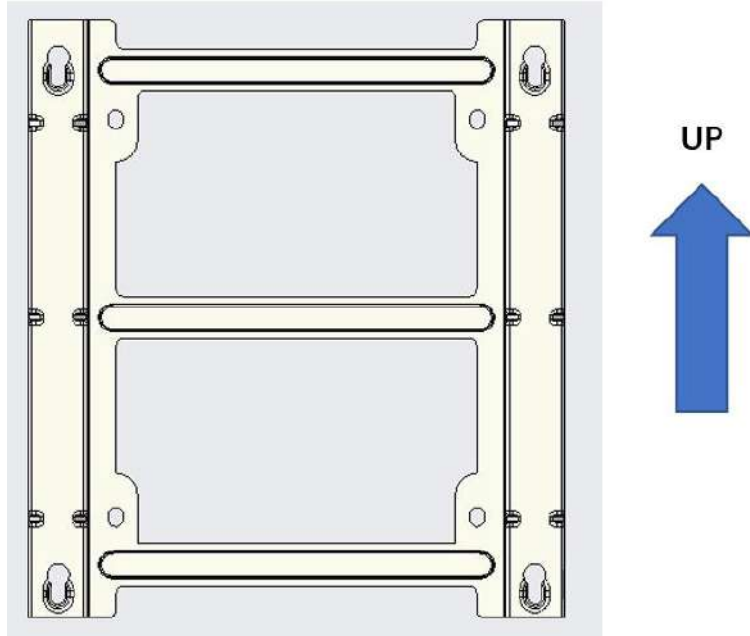
Table3-4 Measuring tools

The appearance of the tools, parameters, and names			
Clamp ammeters			
			

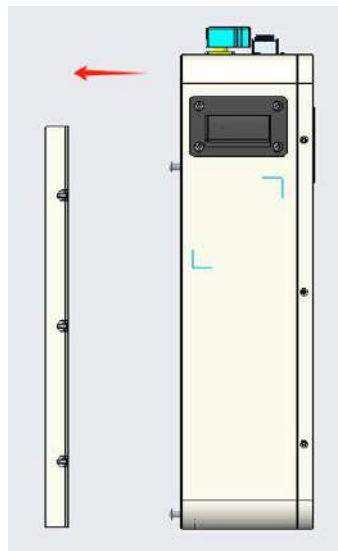
3.3 Installation method

3.3.1 Wall-mounted

- ① Place a bracket on the wall where you want to install the wall-mounted battery as shown below, then punch holes in the center of the 4 bracket holes, install the expansion bolts and use screws to fix the bracket to the wall.
- ② Install the battery box on the bracket as shown below.

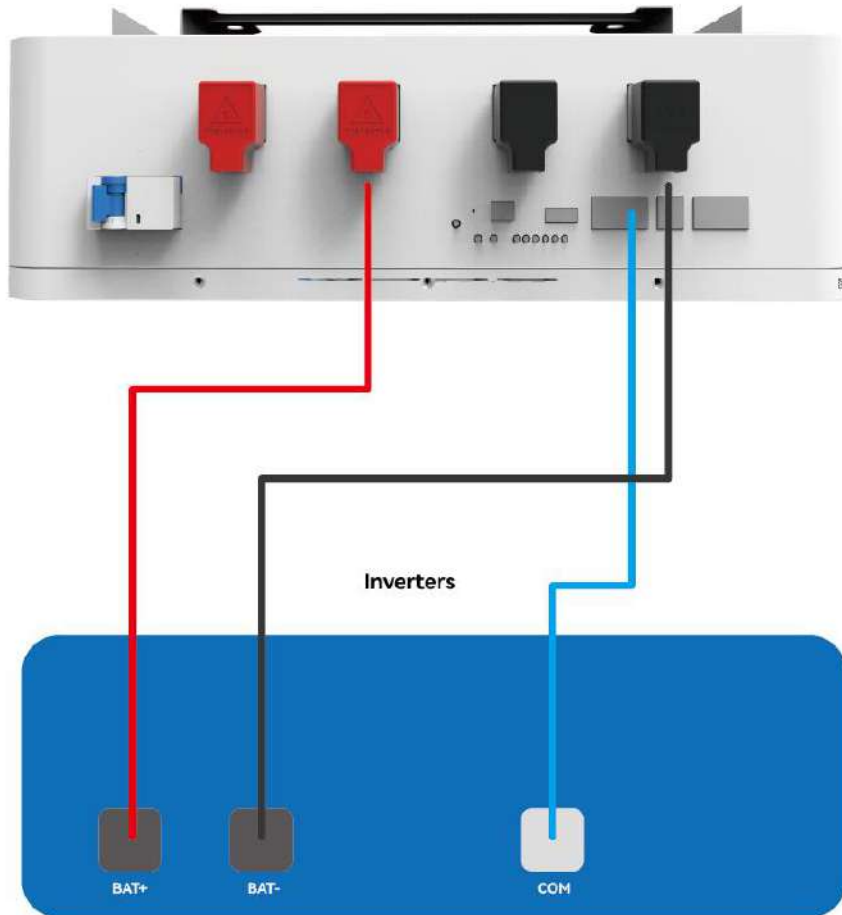


Fix the bracket to the wall with M10 screws

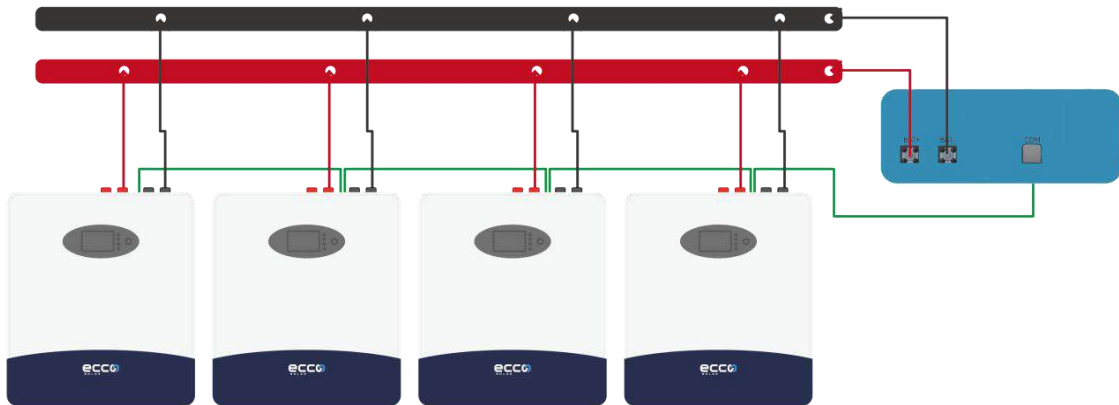


Simply hang the PACK battery on the bracket

3.3.2 Single battery to inverter wiring method



3.3.3 Parallel Connection



RED: Battery Positive; BLACK: Battery Negative; GREEN: Communication line

Refer to the above diagram for connection method: W51100				
Inverter	Battery series connection	Minimum number of batteries connected in parallel	Maximum number of parallel batteries	notes
5kW	NOT ALLOWED	2 pcs	4 pcs	It is recommended to add a circuit breaker between the busbar and the inverter to ensure overall system safety.
8kW		3 pcs	6 pcs	
12kW		4 pcs	8 pcs	

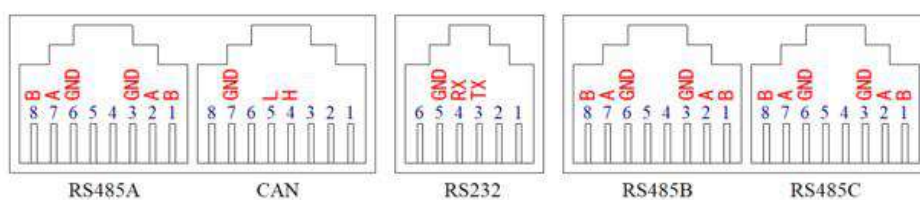
Suggestion:

1. The peak load power is less than 5KW, the average power is about 3KW, and the standby power does not exceed 1 hour. It can be used alone.
2. If the peak load power and average power are both more than 5KW and the standby time exceeds 1 hour or more, please use them in parallel according to the recommended number in the table.

1) Actual photo



2) Pin definition



4 MAINTENANCE

To ensure that the lithium-ion battery pack achieves the longest possible service life, the service technician should carry out regular inspections and maintenance.

Maintenance records should be complete and routine so that subsequent verification of the battery pack's management parameters can be tracked.

4.1 Electrical maintenance

For maintenance of the electrical parts, refer to Table4-1.

Table 4-1 Table of contents for maintenance

Items	The checking Points	Methods	Repair conditions	Repair solution
Electrical	Check if the Output of the voltage is normal	Multimeter	Battery voltage out of range set	See the following problem-solving solution
Fault inspection	Check if lights are normal	Visual inspection	Alarm	
Cable	Insulation, Terminal	Visual inspection	<ul style="list-style-type: none"> ● Insulation cracks, aging ● Exfoliated, corrosion of the terminals 	<ul style="list-style-type: none"> ● Replace the cable ● Replace the terminal block

4.2 Battery maintenance

Maintenance of the battery may refer to Table4-2.

Table 4-2 Contents of battery maintenance

Frequency	Items	Solutions
Monthly	Operating environment	Keep away from heat sources and avoid direct sunlight.
	Visual inspection	If there is any breakage, leakage or deformation, isolate the problematic battery pack, take a photograph and replace the battery.
Quarterly	Visual inspection	Use a cotton cloth to clean the appearance. Be careful when cleaning as the voltage is high.
	Connection status	<ul style="list-style-type: none"> ● Check each terminal, check the screw if it's loose and tighten it again. ● If the cable is soft or hot, check the cause.
Every 6 months	Measure and record the	<ul style="list-style-type: none"> ● At the final stage of charging, record the voltage and check that the positive and negative voltages of the battery are the same. If not,

	voltage	<p>the relevant connection cable should be checked and repaired.</p> <ul style="list-style-type: none"> ● Check the charging and discharging data at least once every six months.
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INTRO: The charging and discharging status of the final stage can be indicated by the capacity light. Please refer to 2.2 for the definition of capacity lights.

4.3 Problem-solving solutions

1) Problems mainly include:

- ① Whether the battery can be turned on or not;
- ② If the battery is turned on, check whether the red light is off, flashing or lighting;
- ③ If the red light can be not turned on, check whether the battery can be charged/discharged or not;

2) Preliminary solution:

- ① The battery cannot be turned on, the lights are all off or flashing. If the external battery switch is ON, the RUN light is flashing, and the external power supply voltage is 48V or more, and the battery still does not to turn on, please contact us.
- ② The battery can be turned on, but the red light is lighting, and it cannot be charged or discharged. If the red light is lighting, that means the system is abnormal, please check the battery parameters:
 - a. Temperature: Above 50℃ or below -10℃, the battery could not work. Solution: to move battery to the normal operating temperature range between -10℃ and 50℃.
 - b. Current: If the current is higher than 200A, battery protection will be turned on. Solution: Check if the current is too high. If it is too high, check that the electrical equipment and cables are intact.
 - c. High voltage: If the charging voltage is above 58.4V, battery protection will be turned on. Solution: You are using the wrong charger and should replace it.
 - d. Low voltage: The battery protection will be turned on when the battery is discharged to 43.2V or less. Solution: Charge the battery with a current not exceeding 50A.

If other than the four points above, the fault still cannot be located, turn off the battery and repair it.

3) The battery cannot be charged or discharged

- ① Can not be charged: Disconnect the power cables, measure voltage on power side, if the voltage is 53~54V, restart the battery, connect the power cable and try again, If it still doesn't work, disconnect the battery and contact us.

② Can not be discharge: Disconnect the power cables and measure voltage on battery side, if it is below 43.2V, please charge the battery; if voltage is above 48V and still cannot discharge, please turn off the battery and contact us.

5 SPECIFICATION

5.1 Technical specifications

Technical data for a single battery is shown in table 5-1.

Table 5-1 technical data

Item	Specification
Model	W51100
Rated Capacity	100 Ah
Nominal Voltage	51.2 V
Discharge Ending Voltage	43.2±0.5 V
Charging Limited Voltage	56.8±0.5 V
Float Charge Voltage	55.2±0.5 V
Maximum Charging Current	100 A
Maximum Continue Discharging Current	150 A
Peak Current	150 A less than 60 seconds
Weight	Approx. 43 Kg
Display	With display screen
Protocol	Can / Modbus
Parallel Connection	Parallel connection is optional (up to 15P)
Dimensions (W*D*H) mm	460*500*140mm
Design life	More than 15 years
Cycle Life	More than 5000 cycles at 80% DOD.
IP Class	IP 54
Operating Temperature	Charging: 0~45°C; Discharging: -10~55°C; Storage: -20~60°C

5.2 The main performance index of battery

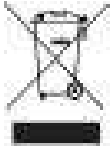
For the Lithium-ion battery of the 51.2V series battery, the electrical performance is shown in Table 5-3.

Table 5-3 Multiple group parallel discharge technology parameters

Items for test	Testing methods	Requirements
0.1C discharge performance	When the battery is fully charged, the 0.1C current is discharged to the cut-off voltage of 43.2V and the discharge time is recorded.	Discharge time \geq 600min
0.5C discharge performance	When the battery is fully charged, the 0.5C current is discharged to the cut-off voltage of 43.2V and the discharge time is recorded.	Discharge time \geq 115min
High temperature performance	After charging the battery pack for 4 hours in the standard $(60 \pm 2) ^\circ\text{C}$ high-temperature box and then discharging to 43.2V at 0.1C, record the discharge time.	Discharge time \geq 600min
Low temperature performance $(-10 ^\circ\text{C})$	After charging, the battery pack is put in the low temperature box of $(-10 \pm 2) ^\circ\text{C}$ for 6 hours, then discharged to 43.2V at 0.2C at this temperature, record the discharging time.	Discharge time \geq 180min
Low temperature performance $(-20 ^\circ\text{C})$	After charging, the battery pack is allowed to stand for 6 hours at $(-20 \pm 2) ^\circ\text{C}$, then discharged to 43.2V at 0.2C at this temperature. Record discharge time.	Discharge time \geq 120min

6 ENVIRONMENT PROTECTION

6.1 Recycle



This symbol indicates that the product cannot be classified with other wastes. To prevent potentially hazardous substances from being disposed of in a way that endangers the environment and human health, please refer to the classification of waste recycling to promote the sustainable use of material resources.



To recycle used equipment, please use the recycling system or contact the manufacturer or seller of the product, or the local authority responsible for managing the product.