

BIWATT

PowerNest R2 (PNR-4.5-02)

Sodium-ion Battery

User Manual



Issue 08

Date 2025-10-14

Shenzhen Biwatt Technology Co., Ltd.

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Overview

This document mainly introduces the product introduction, application scenarios, installation and commissioning, system maintenance and technical data of the energy storage system battery module.

Target Group

This document is mainly intended for the following engineers:

- ◆ Marketing Engineer
- ◆ System Engineer
- ◆ Technical Support Engineer
- ◆ Product End User

Change History

A revision record accumulates descriptions of each documentation update. The latest version of the documentation contains updates for all previous versions of the documentation content.

Issue 08 (2025-10-14)

Updated [5.6 Battery parallel connection](#).

Issue 07 (2025-6-25)

Updated [5.6 Battery parallel connection](#).

Updated [6 Trouble Shooting: Functional Issues](#).

Issue 06 (2025-5-21)

Updated [3.5.2 Boot sequence](#).

Issue 05 (2025-5-20)

Updated [5.6 Battery parallel connection](#).

Issue 04 (2025-3-25)

Updated [2.1 Before connecting](#).

Updated [3 Product Introduction](#).

Updated [5.2 Package items](#).

Updated [5.6 Battery parallel connection](#).

Issue 03 (2024-12-17)

Updated [2 Safety Precautions](#).

Updated [3.1 Battery specifications](#).

Updated [4.1 Statement](#).

- Updated [4.2 Personal safety](#).
- Updated [4.7 Storage requirements](#).
- Updated [4.8 Installation environment requirements](#).
- Updated [5.3 Installation location and direction](#).
- Updated [6 Trouble Shooting](#).
- Updated [7 Maintenance and Replacement](#).

Issue 02 (2024-08-26)

- Adjusted [the order of the contents](#).
- Added [6 Trouble shooting](#).
- Updated [Company address](#).

Issue 01 (2024-05-26)

This issue is the first official release.

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1 Symbols

Symbol	Description
 DANGER	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
 WARNING	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
 CAUTION	Indicates a hazard with a low level of risk which, if not avoided, may result in minor or moderate injury.
 NOTICE	Used to convey equipment or environment safety warnings. If not avoided, it may cause equipment damage, data loss, equipment performance degradation or other unpredictable results. "NOTE" does not involve personal injury.
	Caution! Warning! Reminding. Safety related information. Risk of battery system failure or life cycle reduces.
	Do not place near open flame.
	Warning electric shock.
	Label for Waste Electrical and Electronic Equipment (WEEE) Directive (2012/19/EU).
	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
	The certificate label for EMC/CE.

2 Safety Precautions

DANGER

- It is very important and necessary to read the user manual carefully before installing or using the battery. Failure to follow any instructions or warnings in this document may result in electric shock, serious injury, death, or possible damage to the battery and the entire system.
- If the battery is stored in a warehouse for a long time, the battery needs to be charged every 12 months, and the SOC after charged should not be less than 60% each time.
- When the battery is fully discharged, it needs to be recharged within 24 hours.
- Do not leave wires exposed.
- All battery terminals must be disconnected before maintenance.
- Do not use cleaning solvents to clean the battery.
- Do not expose batteries to flammable or irritating chemicals or vapors.

- Do not paint any part of the battery, including any internal or external components.
- Do not connect the battery directly to photovoltaic solar energy.
- Do not insert any foreign objects into any part of the battery.
- Direct or indirect damages caused by the above items are not covered by any warranty claims.

2.1 Before connecting

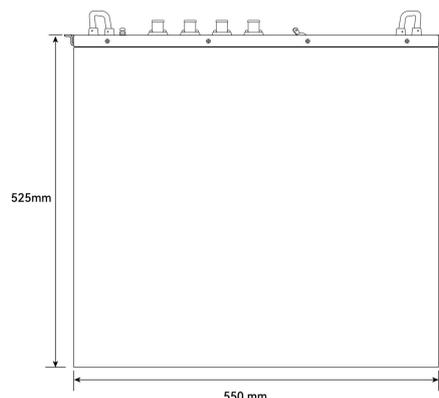
- After unpacking, please check the battery and packing list first. If the battery is damaged or spare parts are missing, please contact the dealer.
- Before installation, be sure to cut off the power supply and ensure that the battery is in off mode.
- The wiring must be correct, positive and negative cables must not be mixed, and ensure that there is no short circuit with external devices.
- Do not connect the battery directly to an AC power source.
- The battery is a 45V low-voltage system, please do not connect the batteries in series.
- Do not connect batteries of different types.
- Before connecting more than two batteries together in parallel, make sure the battery SOC and voltage should be at the same level.
- Please make sure that the electrical parameters of the battery system are compatible with the inverter.
- Keep batteries away from fire or water.

2.2 During operation

- If the battery system needs to be moved or repaired, the power supply must be disconnected first and the battery completely shut down.
- Do not connect batteries of different types.
- Do not operate the battery with a faulty or incompatible inverter.
- In case of fire, only dry powder fire extinguishers can be used, liquid fire extinguishers are prohibited.
- Please do not open, repair or disassemble the battery. We do not assume any consequences or related responsibilities arising from violations of safe operation or violations of design, production and equipment safety standards.

3 Product Introduction

3.1 Battery specifications



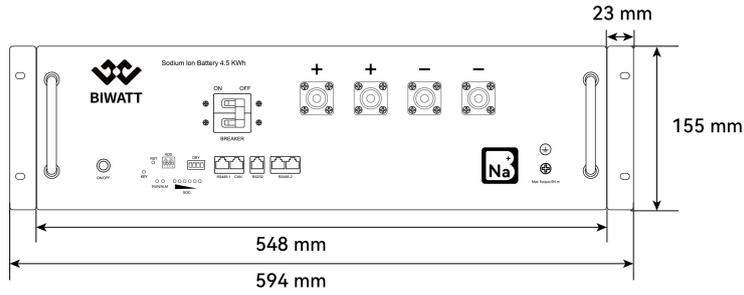


Table 1 Battery parameters

Performances	Battery type		Sodium-ion battery
	Capacity		4.5 kWh
	Cycle life (25±2°C, 0.5C/0.5C, 80%DOD)		5,000
	Charge and discharge current	Maximum continuous charge current	100 A
		Maximum continuous discharge current	100 A
	Rated voltage		45 V
	Operating voltage		33 V ~ 59.5 V
Display		SOC: 17% ~ 100%, LED	
Communicatio	Communication port		RS485 / CAN
General Parameters	Dimensions (W x H x D)		594 x 525 x 155 mm
	Weight		54.5 kg (120.2 lb)
	Recommended depth of discharge		90%
	Installation		Floor stand
	Working temperature		Charge: -20°C ~ +55°C Discharge: -30°C ~ +55°C
	Storage temperature		0°C ~ +35°C
	Max. operating altitude		≤4,000 m (13,123 ft.)
	Installation environment		Interior
	Operating humidity		5% RH ~ 95% RH
	Cooling mode		Natural convection
IP rating of enclosure		IP20	
Certification	CE		EN IEC 61000-6, EN 62619

3.2 Equipment interface instruction

This section describes the interface functions of the upper shell and lower shell in detail. The interface diagram is as follows:

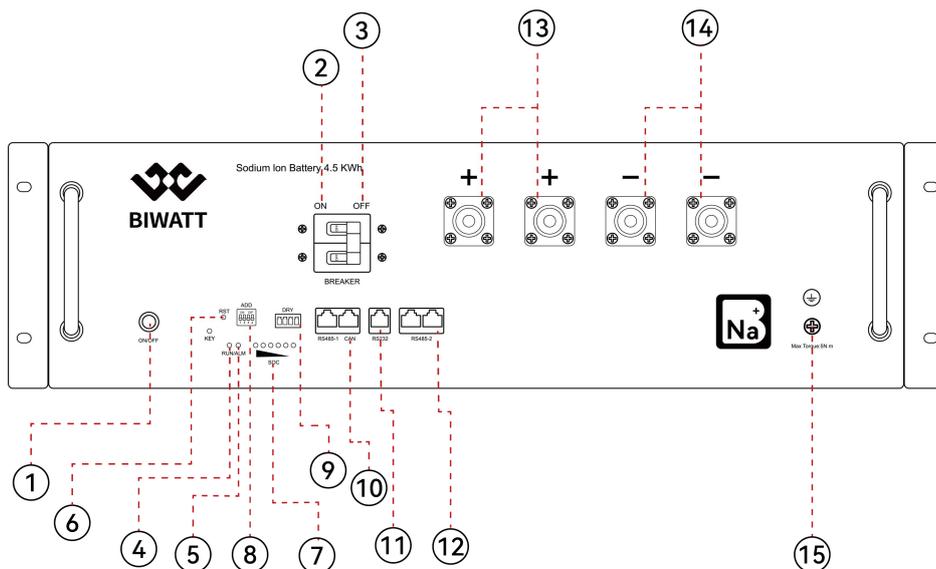


Table 2 Interface function description

No.	Interface function	Description
①	ON/OFF	Power on
②	ON	When the circuit breaker is turned ON, the DC output is turned on
③	OFF	When the circuit breaker is turned OFF, the DC output is turned off
④	RUN	Green LED flashing or lighting to show the battery running status.
⑤	ALM	Red LED flashing to show the battery has alarm; lighting to show the battery is under protection.
⑥	RST	(Reserved)
⑦	SOC	LEDs to show the battery's current capacity
⑧	ADD	Parallel battery address setting
⑨	DRY	Dry Contact
⑩	RS485-1/ CAN	For inverter communication
⑪	RS232	Connect to the host computer software
⑫	RS485-2/ RS485-2	Battery parallel communication port
⑬	"+"	Battery positive terminal
⑭	"-"	Battery negative terminal
⑮	GND	Grounding point

3.3 Indicator light display description

Table 3 Indicator light flashing description

Flashing mode	Bright	Off
Flash 1	0.25S	3.75S
Flash 2	0.5S	0.5S
Flash 3	0.5S	1.5S

Table 4 Battery SOC indicator light description

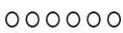
State		Charge						Discharge					
Capacity indicator light		L6	L5	L4	L3	L2	L1	L6	L5	L4	L3	L2	L1
	
Battery Capacity (%)   SOC	0~17%	Off	Off	Off	Off	Off	Flash2	Off	Off	Off	Off	Off	.
	18~33%	Off	Off	Off	Off	Flash2	.	Off	Off	Off	Off	.	.
	34~50%	Off	Off	Off	Flash2	.	.	Off	Off	Off	.	.	.
	51~66%	Off	Off	Flash2	.	.	.	Off	Off	.	.	.	.
	67~83%	Off	Flash2	.	.	.	.	Off	.	.	.	.	.
	84~100%	Flash2	.	.	.	.	.	.	.	.	.	.	.
Running lights		.						Flash (Flash 3)					

Table 5 Battery LED status

State	Normal/ Warning/ Protection	ON/OFF	RUN	ALM	Battery indicator LED						Illustrate
		.	.	.	L6	L5	L4	L3	L2	L1	
Shutdown	Power off	Off	Off	Off	Off	Off	Off	Off	Off	Off	
Standby	Normal	.	Flash 1	Off	According to the power indicator						Standby mode
	Alerts	.	Flash 1	Flash 3	According to the power indicator						Module low voltage
Charge	Normal	.	.	Off	According to the power indicator						The highest power LED flashes(flash 2). Overcharge alarm ALM does not flash.
	Alerts	.	.	Flash 3	(The maximum power indicator LED flashes 2 times)						
	Overcharge protection	.	.	Off	.	.	.	.	.	.	If there is no mains power, the indicator light is in standby mode.
	Over-temperature, over-current, failure protection	.	Off	.	Off	Off	Off	Off	Off	Off	Stop charging
Discharge	Normal	.	Flash 3	Off	According to the power indicator						
	Alerts	.	Flash 3	Flash 3	According to the power indicator						
	Under-voltage protection	.	Off	Off	Off	Off	Off	Off	Off	Off	Stop discharge
	Over-temperature over current, short circuit, Reverse	.	Off	.	Off	Off	Off	Off	Off	Off	Stop discharge

	connection failure protection										
Invalidation		Off	Off	•	Off	Off	Off	Off	Off	Off	Stop charging and discharging

3.4 Connectors

RS232 communication port definition:

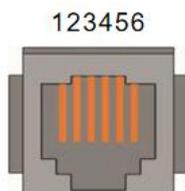


Table 6 RS232 interface definition

Interface	Definition	
Communication port definition	PIN 1	NC (empty)
	PIN 2	NC (empty)
	PIN 3	TX protection board sends data (computer receives data pin)
	PIN 4	RX protection board receives data (computer sends data)
	PIN 5	Ground
	PIN 6	NC (empty)

CAN/RS485-1 communication interface definition:

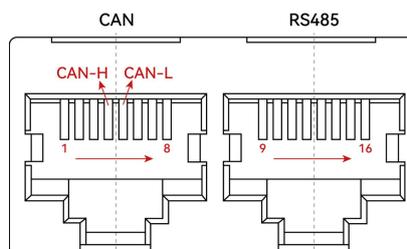


Table 7 CAN/RS485-1 interface definition

Interface	Definition		Definition			
Communication port definition	Section A CAN interface	PIN 1	NC (empty)	Section B RS-485-1 interface	PIN 9	RS485-B1
		PIN 2	GND		PIN 10	RS485-A1
		PIN 3	NC (empty)		PIN 11	GND
		PIN 4	CAN-H		PIN 12	NC (empty)
		PIN 5	CAN-L		PIN 13	NC (empty)
		PIN 6	NC (empty)		PIN 14	GND
		PIN 7	NC (empty)		PIN 15	RS485-A1
		PIN 8	NC (empty)		PIN 16	RS485-B1

RS485-2 communication port definition :

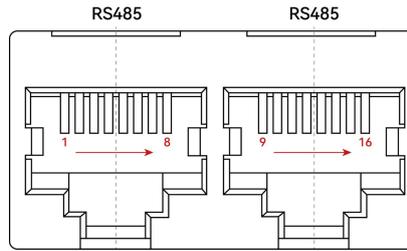


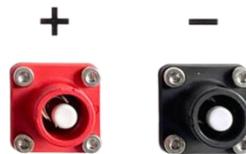
Table 7 RS485-2 interface definition

Interface	Definition			Definition				
Communication port definition	Section A	PIN	1	RS485-B	Section B	PIN	9	RS485-B
		PIN	2	RS485-A		PIN	10	RS485-A
		PIN	3	GND		PIN	11	GND
	RS485-2 interface	PIN	4	NC (empty)	RS485-2 interface	PIN	12	NC (empty)
		PIN	5	NC (empty)		PIN	13	NC (empty)
		PIN	6	GND		PIN	14	GND
		PIN	7	RS485-A		PIN	15	RS485-A
			PIN	8	RS485-B	PIN	16	RS485-B

3.4.1 Battery connector

Battery Connector:

- (1) By connecting the positive (+) and negative (-) terminals of the battery to the inverter.
- (2) Connect batteries of the same brand in parallel via the positive (+) and negative (-) terminals of the batteries.

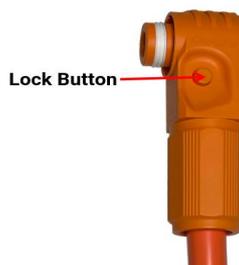


Battery terminal

Power cable terminals:

There are two pair of terminals with same function, one connects to equipment, the other one paralleling to other battery module for capacity expanding.

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



3.5 Button functions

3.5.1 ON/OFF

When the ON/OFF switch is pressed, the battery is turned on. When the ON/OFF switch is pressed again, the switch pops up and the battery is turned off.

3.5.2 Boot sequence

First press the ON/OFF switch, then verify that the RUN indicator (green LED) begins flashing in Flash 1 mode (0.25s on / 3.75s off). Once confirmed, turn the circuit breaker to the ON position to activate DC output.

3.5.3 Shutdown sequence

Turn the circuit breaker to OFF, then press the ON/OFF switch to power off the entire device.

3.6 Electrical wiring

DANGER

Before making electrical connections, make sure the "ON/OFF" of the energy storage and all switches connected to the energy storage are in the "OFF" state, all indicator lights are off. Otherwise, the high voltage stored in the energy may cause electric shock.

WARNING

- Equipment damage caused by incorrect wiring is not covered by the equipment warranty.
- Electrical connection operations must be performed by professional electrical technicians.
- Operators must wear personal protective equipment when making electrical connections.

4 Battery Safety

4.1 Statement

The company is not responsible for any equipment malfunction or component damage, personal safety accidents, property losses, etc. caused by the following reasons:

- The battery is not charged in 12 months due to customer reasons, resulting in over-discharge of the battery and causing damage.
- Battery damage, falling, leakage, etc. caused by improper operation or failure to connect the battery as required.
- The user did not set the battery operation management parameters correctly.
- The customer or third party changes the battery usage scenario without informing the company, such as connecting additional loads to the battery, mixing the battery provided by the company with other batteries, including but not limited to: mixing with other brands of batteries, mixing with batteries of different rated capacities, etc.
- Direct damage to the battery due to the on-site equipment operating environment or external power parameters not meeting the normal operating environment requirements, including the actual operating temperature of the battery being too high or too low, and the power grid being unstable and causing frequent power outages.
- Improper customer maintenance results in frequent over-discharge of the battery, on-site capacity expansion by the customer, or long-term inability to fully charge the

battery.

- The customer did not properly maintain the battery according to the operating manual of the supporting equipment, including but not limited to:
 - 1) Failure to regularly check whether the battery terminals are locked.
 - 2) Batteries that have exceeded their warranty period.

4.2 Personal safety

During equipment operation, appropriate personal protective equipment should be worn. If a fault that may cause personal injury or equipment damage is found, the operation should be stopped immediately, reported to the person in charge, and effective protective measures should be taken. Before using tools, please master the correct use of tools to avoid injury and damage to equipment.

- When the device is running, the casing temperature is high and there is a risk of burns, so do not touch it.
- To ensure personal safety and normal use, reliable grounding should be carried out before use.
- When a battery fails, the temperature may exceed the burn threshold of touchable surfaces and contact should be avoided.
- Do not open or damage the battery, the released electrolyte is harmful to the skin and eyes and contact should be avoided.
- Do not place extraneous objects on top of the device or insert them into any part of the device.
- Do not place flammable objects around the device.
- It is strictly forbidden to place the battery in fire to avoid explosion and endanger personal safety.
- Do not place the battery module in water or other liquids.
- Never short-circuit the battery terminals, a short-circuited battery may cause a burn.
- Batteries may cause danger of electric shock and large short-circuit current. When using batteries, pay attention to the following precautions.
 - 1) Remove metal objects such as watches and rings.
 - 2) Use tools with insulated handles.
 - 3) Wear rubber gloves and boots.
 - 4) Do not place tools or metal parts on top of the battery.
 - 5) Disconnect the charging power source before connecting or disconnecting the battery terminals.
 - 6) Determine if the battery is accidentally grounded (the positive or negative battery line falls to the ground), and if so, remove the power source from the ground .
 - 7) Do not use water or detergent to clean the electrical components inside and outside the cabinet.
 - 8) Do not stand, lean or sit on the device.
 - 9) Do not damage the modules of the device.

4.3 Battery installation requirements

Before installing the battery, check whether the packaging is intact. Batteries with damaged packaging cannot be used.

- During battery installation, pay attention to the positive and negative poles and do not short-circuit the positive and negative poles of the battery.
- During installation, use a torque wrench to ensure that the screws are tightened and

not loose, and check them regularly.

- After installing the equipment, empty packaging materials such as cartons, foam, plastic, cable ties, etc. Should be removed from the equipment area.

4.4 Hazard and toxicity statements

DANGER

- Danger: Battery terminals contacting other metals may cause heating or electrolyte leakage. The electrolyte is flammable. If the electrolyte leaks, the battery should be removed from the fire immediately.
- Toxicity: Vapors from burning batteries may irritate eyes, skin, and throat.

4.5 Emergency measures for battery abnormality

DANGER

- When electrolyte leakage or abnormal odor occurs, avoid contact with leaking liquid or gas. Non-professionals should not approach, please contact professionals immediately. Professionals should wear goggles, rubber gloves, gas masks, protective clothing, etc. to prevent the harm caused by electrolyte overflow.
- The electrolyte is corrosive and contact may cause skin irritation and chemical burns. If you come into contact with battery electrolyte, you will need to take the following actions.
- Inhalation: Evacuate the contaminated area, breathe fresh air immediately and seek medical help immediately.
- Eye contact: Immediately flush eyes with plenty of water for at least 15 minutes without rubbing and seek medical help immediately.
- Skin Contact: Wash exposed area immediately with plenty of water and soap and seek medical help. Ingestion: Seek medical help immediately.

4.6 Fire emergency measures

DANGER

- If a fire occurs, the system should be powered off while ensuring safety.
- Use carbon dioxide, FM-200 or ABC dry powder fire extinguisher to put out the fire.
- Firefighters need to avoid contact with high-voltage components while fighting a fire, as this may result in the risk of electric shock.
- When the battery temperature is too high, it may cause deformation, damage, electrolyte overflow, and leakage of toxic gases. Wear respiratory protection equipment and stay away from it to avoid skin irritation and chemical burns.

4.7 Storage requirements

NOTICE

- During storage, you need to keep records according to the product storage requirements in this manual, such as temperature, humidity, storage environment, etc.
- The storage environment must meet local regulations and standards. If the storage period is extended, it must be inspected and tested by professionals before it can be put into use. When storing batteries, they should be placed correctly according to

- the packaging box labels and should not be placed upside down or on their sides.
- When stacking battery packaging boxes, they must comply with the stacking requirements on the outer packaging.
 - When transporting batteries, they must be handled with care and it is strictly forbidden to damage the batteries.
 - Storage environment requirements:
 - 1) Recommended storage temperature: 0°C ~ 35°C.
 - 2) Relative humidity: 5%RH ~ 95%RH.
 - 3) Store in a dry, clean, ventilated place and avoid dust and water vapor. Do not expose to rain or ground water.
 - 4) Avoid contact with corrosive organic solvents, gases and other substances.
 - 5) Avoid direct sunlight.

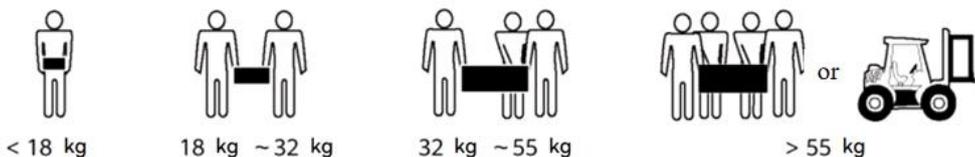
4.8 Installation environment requirements

The installation and use environment must comply with local laws and regulations and relevant international, national and regional standards for battery products.

- The installation location should be out of reach of children and away from daily work and living areas, including but not limited to the following areas: studio, bedroom, lounge, living room, music room, kitchen, study, game room, home theater sun room, bathroom, shower room, laundry room installation, away from the direction of vehicle travel, it is recommended to install the energy storage higher than the vehicle bumper to avoid accidental collision.
- When installing in a basement, ventilation must be maintained. Do not place flammable or explosive items around the device. It is recommended to place it away from stagnant water.
- Install the device in a dry and well-ventilated environment and fix it on a solid and flat support surface.
- Please choose a sheltered installation location or build an awning to avoid direct sunlight or rain.
- The environment around the installation location is clean, without a large amount of infrared radiation, organic solvents and corrosive gases, etc.
- For areas prone to natural disasters such as floods, mudslides, earthquakes, and typhoons, installations require appropriate preventive measures.
- The installation location should be kept away from fire and heat sources. Do not place flammable or explosive items around the device.
- Avoid water accumulation at the installation location, and keep away from water sources such as faucets, sewer pipes, sprinklers, etc. to prevent water from entering.
- When the device is running, the temperature of the chassis and heat sink will be relatively high. Do not install it in a place where it is easily touched.
- It is prohibited to place the device in an environment with flammable or explosive gas or smoke, and it is prohibited to perform any operation in such an environment.
- It is prohibited to install in mobile scenarios such as ships, trains, and cars.
- Energy storage devices installed in salt-damaged areas will be corroded. Do not install them outdoors in salt-damaged areas. Salt-damaged areas refer to areas within 500m from the coast or affected by sea breezes. The areas affected by sea breezes vary depending on meteorological conditions (such as typhoons, seasonal winds) or terrain (dams, hills).

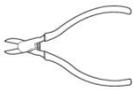
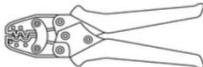
4.9 Carrying heavy objects safely

When carrying heavy objects, you should be prepared to bear the weight to avoid being crushed or sprained by the heavy objects. When carrying equipment by hand, you should wear protective gloves to avoid injury.



5 Installation and Operation

5.1 Preparation of tools

		
Diagonal pliers	Crimping pliers	Screwdriver
		
Safety gloves	Safety shoes	Goggles

Notes

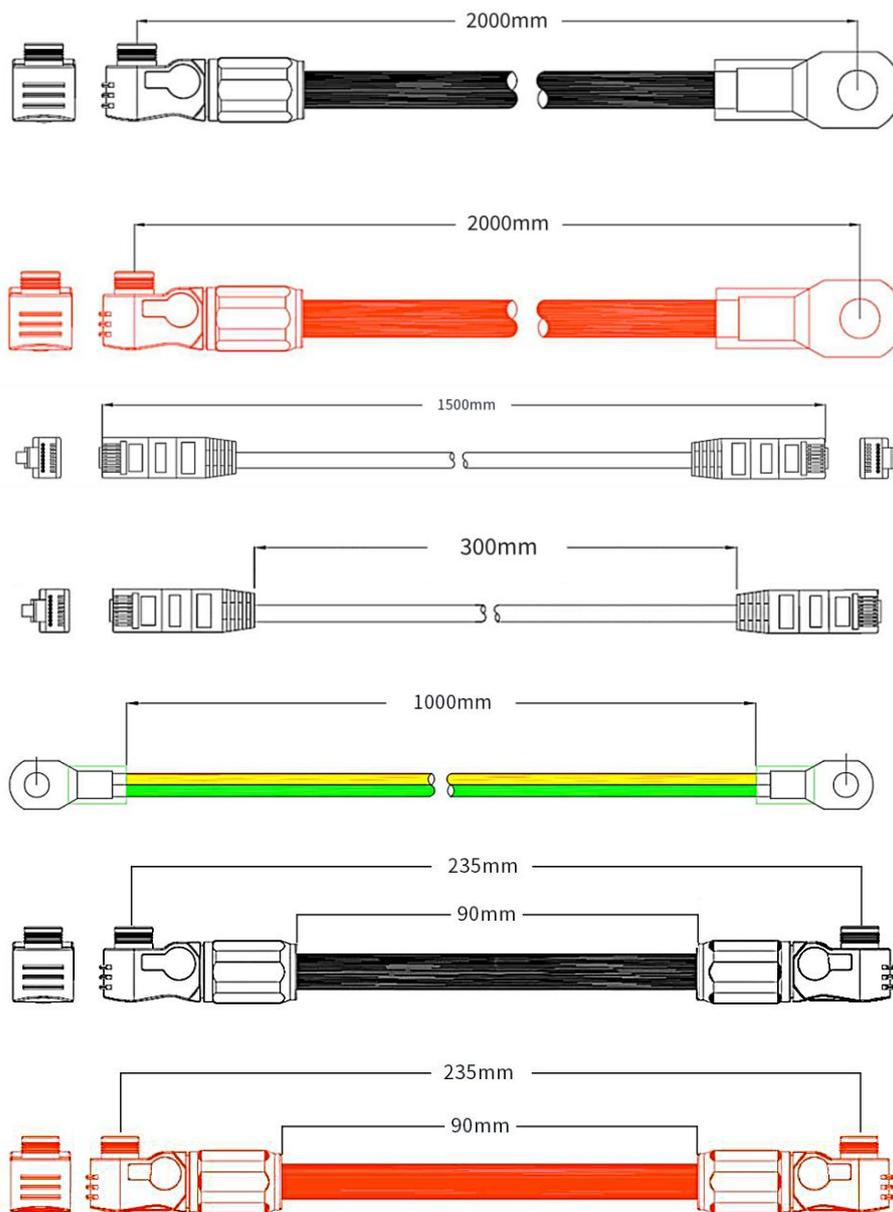
- Use properly insulated tools to prevent accidental electric shock or short circuit.
- If insulated tools are not available, cover the exposed surfaces of metal tools, except for their tips, with electrical tape.

5.2 Package items

Please check the packaging thoroughly upon receipt. If any items are missing or if there is any damage to the packaging or the unit itself when unpacking, please contact us immediately.

No.	Picture	Object	Quantity	Description
1		Battery Pack	1 pcs	4.5 kWh
2		Power Cables	2 pcs	35mm ² (2AWG) Length: 2,000 mm
3		CAN Bus Cable	1 pcs	Connect the battery to the inverter's CAN bus port Length: 1,500 mm
4		Parallel Communication Cable	1 pcs	Communication port for connecting batteries Length: 300 mm

5		Grounding Cable	1 pcs	12AWG Length: 1,000 mm
6		Parallel Power Cables	2 pcs	Connect battery to battery 35mm ² (2AWG) Length: 235 mm
7		Indoor Easy Racks	4 pcs	Length: 157 mm
8		Parallel Power Cables (Optional)	2 pcs	Connect battery to battery (wall mount) 35mm ² (2AWG) Length: 1,000 mm



5.3 Installation location and direction

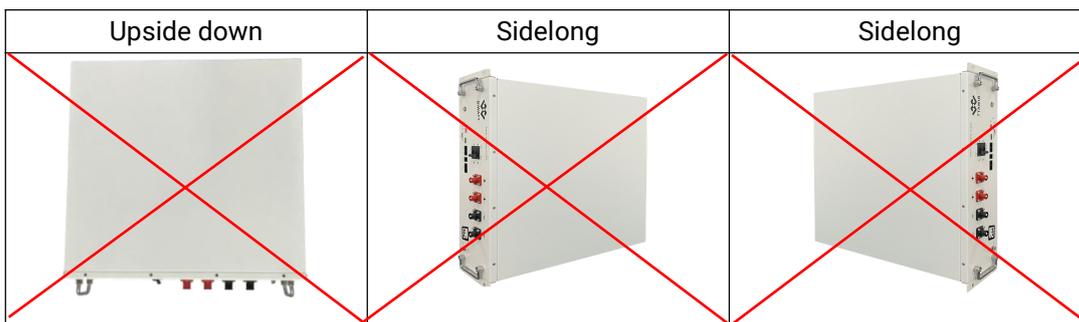
Make sure the installation location meets the following conditions:

- The installation site must be suitable for the size and weight of the battery.
- It must be mounted on a solid surface to support the weight of the battery.
- The area is completely waterproof.
- There are no flammable or explosive materials nearby.
- Ambient temperature is in the range of -20°C to 55°C.
- This area has minimal dust and dirt.
- Install so as not to tilt forward or sideways.
- The temperature and humidity are maintained at a constant level.
- The distance from heat source is more than 2 meters.
- The distance from air outlet of inverter is more than 0.5 meters.
- The Minimum clearance to battery module(rack) is more than 0.5 mm.

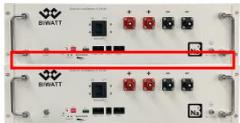
⚠ WARNING

If the ambient temperature exceeds the operating temperature range, the battery pack will stop working to protect itself. The optimal operating temperature range for the battery pack is -20°C to 55°C. Frequent exposure to harsh temperatures may reduce the performance and life of the battery pack.

NOT allowed:

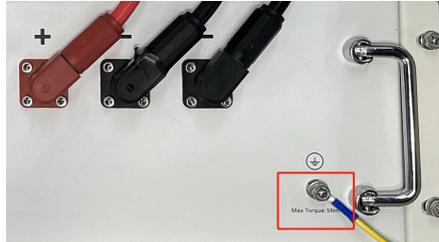


Recommended:

A		<p>Caution:</p> <p>Do not stack modules together directly.</p> <div style="text-align: right;">  </div>
B		<p>Caution:</p> <p>Make sure there is holder for more than 54.5 kg weight at bottom of each module.</p> <p>Installed only rely on two handles is NOT allowed.</p> <div style="text-align: right;">  </div> <div style="text-align: center; margin-top: 10px;">  </div>

5.4 Grounding

Grounding cables shall be 12AWG or higher yellow-green cables. After connection, the resistance from battery grounding point to Ground connection point of room or installed place shall smaller than 0.1Ω.

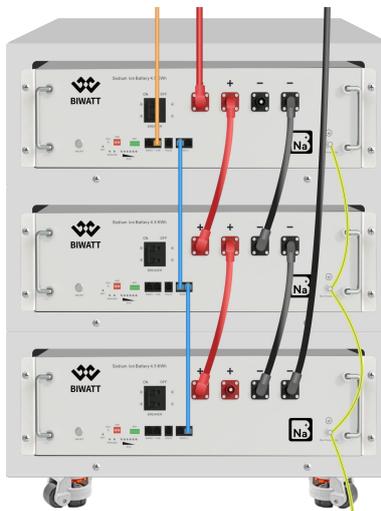


- (1) Based on metal directly touch between the module's surface and rack's surface. If using painted rack, the corresponding place shall remove the painting.
- (2) Install a grounding cable to the grounding point of the modules.

5.5 Put into cabinet or rack

Put battery modules into cabinet and connect the cables:

- (1) Put the battery into the cabinet.
- (2) Drive the 4 pcs screws.
- (3) Connect the cables between battery modules.
- (4) Connect the cables to inverter.



5.6 Battery parallel connection

When batteries need to be used in parallel, the maximum connection is 15 batteries. When PACK is used in parallel, the address can be set by the DIP switch on the BMS to distinguish different PACKs. Avoid setting the same address. For the definition of the BMS DIP switch, refer to the table below. In parallel mode, the default DIP address is 1 for the master.



Address	DIP switch position			
	1	2	3	4
1	ON	OFF	OFF	OFF
2	OFF	ON	OFF	OFF
3	ON	ON	OFF	OFF
4	OFF	OFF	ON	OFF
5	ON	OFF	ON	OFF
6	OFF	ON	ON	OFF
7	ON	ON	ON	OFF
8	OFF	OFF	OFF	ON
9	ON	OFF	OFF	ON
10	OFF	ON	OFF	ON
11	ON	ON	OFF	ON
12	OFF	OFF	ON	ON
13	ON	OFF	ON	ON
14	OFF	ON	ON	ON
15	ON	ON	ON	ON

Note:

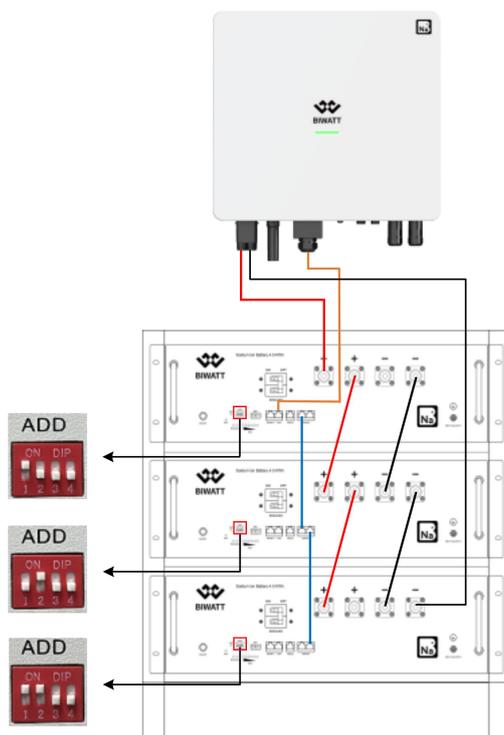
- If the inverter brand factory does not have CAN bus/RS485 port, just plug and play.
- If you connect other hybrid inverters, please make sure to consult technical support of the relevant inverter brand before connecting.
- Before connecting more than two batteries together in parallel, make sure the battery SOC and voltage should be at the same level.
- As the number of parallel batteries increases, the charging current per battery pack decreases and the charging time increases as the capacity increases.

 CAUTION

When multiple battery modules are connected in parallel, the total discharge current to the inverter must not exceed 200 A. The inverter power cable is designed for a rated current of 200 A.

If the total system power connected to the inverter exceeds 10 kW or the total current exceeds 200 A, a busbar (current distribution bar) must be used to connect the batteries to the inverter safely.

Battery wiring diagram



5.7 Power on

Make sure the circuit breaker for each battery is in the off position and the inverter power is also off.

- (1) Press the power button on each battery to turn it on.
- (2) Switch the circuit breaker to the ON position.
- (3) Turn on the inverter.

5.8 Power off

- (1) Turn off the inverter.
- (2) Once the inverter's indicator light is off, switch each battery's circuit breaker to the OFF position.
- (3) Press the power button on each battery to turn it off.

6 Trouble Shooting

● Communication issues

Problem: Unable to communication with inverter

Possible causes and solutions:

- a) The CANH or CANL pin is not connected.
Solution: Ensure the battery's CANH and CANL pins are correctly connected to the inverter's CANH and CANL pins.
- b) The BMS DIP switch is set to the same address as another unit.
Solution: Refer to **5.6 Battery parallel connection** DIP switch to properly set the battery address.

● Functional Issues

Problem: Battery operation and indicator light status.

- 1) Battery does not turn on:
Symptom: All lights are off or flashing.
Possible Causes and Solutions:
 - c) Capacity is too low, or the module is over-discharged.
Solution: Use a charger to provide 0-60V. If the battery starts, continue charging the module. If the battery does not start, turn it off and contact repair services.
- 2) Battery turns on, but red light is on, and it cannot charge or discharge.
Symptom: Red light indicates an abnormal system.
Possible Causes and Solutions:
 - d) Temperature: If the temperature is above 60°C or below -20°C, the battery cannot charge. If above 60°C or below -30°C, the battery cannot discharge.
Solution: Wait until the temperature returns to the operating range before attempting to use the battery.
 - e) Current: If the current exceeds 100A, battery protection activates.
Solution: Reduce the current by adjusting the power supply settings.
 - f) High Voltage: If the charging voltage exceeds 59.25V, battery protection activates.
Solution: Reduce the voltage by adjusting the power supply settings and discharge the module.
 - g) Low Voltage: If the battery discharges to 30V or less, battery protection activates.
Solution: Charge the battery until the L1 SOC green light flashes twice.
- 3) Unable to charge or discharge with the red LED on (Temperature: -20°C~55°C):
Symptom: Charging and discharging are not possible.
Possible Causes and Solutions:
 - h) Permanent Protection Activated: A single cell's voltage is above 3.98V, below 2.0V, or the temperature exceeds 65°C.
Solution: Switch off the module and contact your local distributor.

7 Maintenance and Replacement



Before operation and maintenance, please turn off the power of the battery system. Otherwise, the equipment may be damaged or electric shock may occur. Therefore, before any maintenance work, the equipment must be powered off and the safety precautions listed in this manual and other related documents must be strictly followed. Please maintain the equipment only after you are familiar with and understand the contents of this manual and have appropriate tools and test equipment.

- It is required to charge the battery at least once every 12 months, for this charge maintenance make sure the SOC is charged to higher than 60%.
- 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. Make sure it is suitable for IP20 battery system.
- Please do not add new battery modules to an existing system. It is not recommended to mix new and old batteries.
- Before performing maintenance work, please power off the device first, then follow the instructions on the delayed discharge label and wait for the corresponding time to ensure that the device is powered off before operating the device.
- During the maintenance process, please try to prevent irrelevant personnel from entering the maintenance site, and temporary warning signs or fences must be

erected for isolation.

- If the device fails, please contact your dealer in time.
- The equipment can be powered on again only after the fault has been resolved. Otherwise, the fault may expand or the equipment may be damaged.
- Unauthorized persons are not allowed to open the cover without authorization, otherwise there will be a risk of electric shock, and the resulting failure is not covered by the warranty.
- Operators and maintenance personnel and professional technicians should receive adequate training on safe use and equipment maintenance, and should operate with adequate preventive measures and personal protective equipment.
- When it is necessary to move or rewire, the power input must be cut off, and maintenance can be started after waiting for 5 minutes for the energy inside the machine to be discharged and confirming with a multimeter that there is no dangerous voltage on the DC bus and the parts to be repaired inside the machine.
- Battery servicing should be performed or supervised by personnel familiar with batteries and the precautions required.
- When replacing batteries, replace with batteries or battery packs of the same type.
- After the maintenance operation is completed, check immediately to ensure that no tools or other parts are left in the equipment.
- If the device is not used for a long time, the battery needs to be stored and recharged according to this manual.