

Rechargeable Li-ion Battery System

R6 (NER-PNE-52V126A6K-SXA01)

User Manual



Company Profile

Founded in 1984, CHINT has more than 23,000 employees, which has 8 major professional companies, more than 2000 domestic sales centers and special agencies and more than 50 sales organizations abroad under its jurisdiction. Its industry covers the whole industry chain of "generation, storage, transmission, transformation, distribution and utilization "electrical equipment, and lays out the fields of urban rail transit, energy equipment manufacturing, new energy storage materials, energy Internet, platform of investment and financing and business incubator, etc. The products sell well in more than 90 countries and regions in the world. CHINT is one of the enterprises with the largest production and sales volume in China's industrial electrical equipment industry. Its comprehensive strength ranks in the top ten of the top 500 Chinese private enterprises for many years, and its annual tax amount ranks in the top five of the top 100 Chinese private enterprises for three consecutive years. "CHINT" trademark is recognized as China famous brand, and its four series of products rank among "China Top Brand".

Headquartered in Shanghai, CHINT Energy Storage Division focuses on energy storage technology research and product development. Relying on CHINT's 30-year experience in the whole electrical industry chain and new energy development technology, we strives to create key links in the intelligent energy system, so as to make energy utilization more convenient, stable and efficient.

CHINT Energy Storage Division has an experienced cell and system integration team, advanced cell technology and battery group technology, rich project management experience, fully automated production line and application of MES system, which not only provides a full range of products from battery pack, module and cabinet to container energy storage, but also provides integrated and customized system solutions for household, industrial and commercial use and large-scale energy storage according to customers' requirements. Through a safe, stable and reliable energy storage solution, the functions of peak-shaving and power smoothing, load tracking, peak load and frequency regulation can be realized from the generation end to the user end of the power grid. CHINT Energy Storage Division will significantly improve energy efficiency for both traditional energy optimization and new energy development and application. As a member of CHINT, CHINT Energy Storage Division will rely on the continuous innovation of group resources to create a more secure and sustainable energy environment.

CHINT, make full use of electricity.

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1 Introduction

1.1 Purpose

This manual specifies the functions and specifications of CHINT R6 rechargeable li-ion battery system (hereinafter referred to as battery system), and defines and describes the specific parameters. CHINT reserves the right to amend and update this manual according to the actual situation in different periods.

1.2 Manual description

R6 rechargeable li-ion battery system uses high-energy density and high reliability ternary lithium battery, matching advanced battery management system and integrated development technology, which is a mature household energy storage battery product.

This manual mainly introduces the product features, performance indicators, external interface, operation instructions, installation and maintenance of R6 rechargeable li-ion battery system.

1.3 Applicable people

This manual is applicable to:

- Professionals responsible for the installation, operation and maintenance of the product.
- Users of the product.

1.4 Manual use

➤ Please read this manual carefully before using this product, and keep it in a convenient place for users to find.

➤ The contents of the manual and the pictures, logos and symbols used are all owned by CHINT. Any person who is not an employee of CHINT shall not publicly reproduce all or part of the contents without written authorization.

➤ The contents of the manual will be continuously updated, revised and upgraded. Please refer to the purchased products.

1.5 Symbol use

In order to ensure the personal and property safety of users when using the product and use the product efficiently, the manual provides relevant warning information and explains with symbols.

Warning symbols on product label:



Warning



The battery pack may explode



The voltage of this battery pack is strong enough to cause electric shock



Keep the battery pack away from open flame or ignition sources



The battery pack should not be disposed of with household waste at the end of its working life



Read the manual before installing and operating the battery pack



Wear safety gear when dealing with the battery pack



The battery pack should be disposed of at a proper facility for environmentally safe recycling



This symbol indicates that the product conforms to regulations set out by the CE Directive



This symbol indicates that the product is Class II equipment

Warning information in this manual:



DANGER

Indicates that incorrect operation presents an extreme hazard that could result in death to the personnel, serious damage to the system or even abandonment.



WARNING

Indicates that incorrect operation presents a significant hazard that could result in serious injury or even death to the personnel, or serious damage to the system.



CAUTION

Indicates that incorrect operation presents a possibility of injury to the personnel or damage to the equipment.

NOTE

Indicates information related to device performance or correct operation.

2 Product Presentation

2.1 Introduction to R6 rechargeable li-ion battery system

The product of R6 rechargeable li-ion battery system is composed of R6 battery pack and maintenance control box.

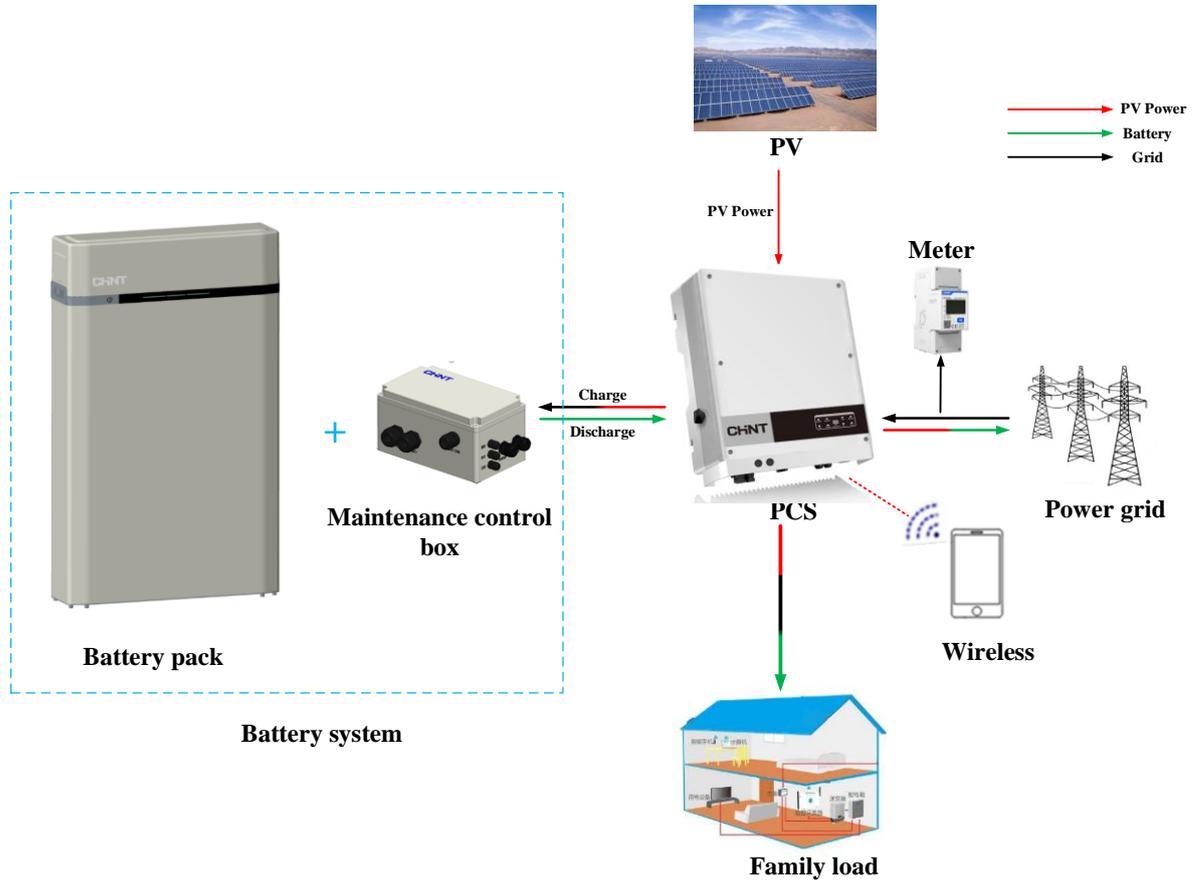


Figure 2-1 System structure diagram

Battery system is designed with system running status indicator lights, and the system provides HVDC power interface and communication interface externally. The system connection block diagram is as follows:

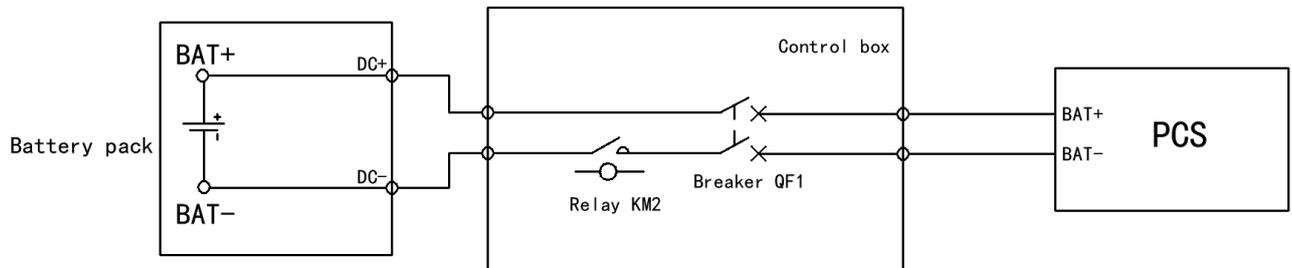


Figure 2-2 System connection power block diagram

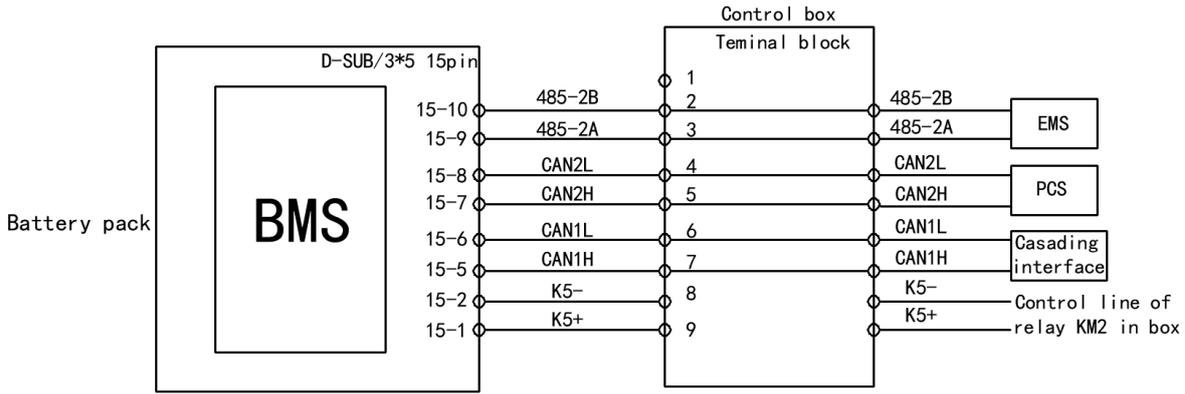


Figure 2-3 System connection communication block diagram

- **Battery pack:** The battery pack is composed of two 2P7S 63Ah ternary modules in series, including: cell, wiring harness, structural parts, battery monitoring unit (BMS) and related electrical components.
- **Maintenance control box:** The maintenance control box is used for the maintenance, breaking and control of battery system, including: copper bar, wire harness and related electrical components.
- **Indicator lights:** used to indicate the running state of the system, as follows:

Table 2-1 system running status

	Indicator lights color	Current state of the system
1	Green	System normal operation
2	Yellow	System temperature is high or low and the system can continue to operate
3	Red	System failure. Need to restart or contact the manufacturer

2.2 Parameters of R6 rechargeable li-ion battery system

Table 2-2 Parameters of R6 rechargeable li-ion battery system

No.	Item	Specification
1	Rated energy	6.5kWh@25°C, at rated power, direct current side, initial nominal capacity
2	Usable Capacity	5.9kWh
3	Model	NER-PNE-52V126A6K-SXA01
4	Nominal voltage	51.8V
5	Operating voltage range	42V-58.8V
6	Rated charge power	1.9kW@25°C
7	Rated discharge power	1.9kW@25°C
8	Standard charging mode	CC-CV, charge current: 37.8A(0.3CC) End voltage/current: 58.8V/6.3A
9	Max. charging and discharging current	70A
10	Max. permissible charging and discharging power	3.2kW

No.	Item	Specification
11	Short-circuit current	5.67kA
12	Allowable operating ambient temperature	0 ℃~40 ℃
13	Storage temperature	-30 ℃~60 ℃
14	Humidity	5%~95%, non-condensing
15	Altitude	<2000m
16	Cycle life	≥4000cycles@25℃, 0.5C/0.5C, 95%DOD, 80%Ret
17	Equalization	Passive equalization
18	Cooling Strategy	Air cooling
19	Battery pack size	445W×115D×734H, unit: mm
20	Battery pack weight	≤52kg
21	Communication mode	CAN, RS485
22	Protection class	II
23	IP code	IP20
24	Pollution degree	II
25	Over-voltage category	II
26	Reference standard	IEC 62619, IEC 62040, IEC61000-6-1, IEC61000-6-3, UN38.8

2.3 Product features

➤ Modular design

The battery system adopts standard modular design, which can be expanded flexibly and easy to maintain and repair.

➤ Use high strength and light weight structure design

It can meet the structural reliability requirements of mechanical load-bearing, safety in operation, applicability and durability under changeful operating environment and long-distance transportation.

➤ On -line battery equalization technology and control strategy

The advanced battery equalization control strategy can effectively guarantee the available capacity and service life of rechargeable li-ion battery system.

➤ Wide range of application

It can be compatible with household PV system, improve the spontaneous utilization rate of PV and can also be used in peak shaving, emergency power supply and other scenarios.

➤ High space utilization

With small occupied area and flexible installation, the utilization rate of indoor space can be effectively improved.

➤ Safe and reliable

The product has passed the certification of IEC62619, UN38.3, IEC62040, EN 61000-6-3:2007+A1 and EN

61000-6-1:2007, and has multiple safety protection designs from the battery to the system; the automatic control cooling system can ensure the operation life and reliability of the battery.

➤ Fashion appearance

Fashionable industrial design, and perfect integration with home environment.

2.4 Plan

2.4.1 Battery pack plan

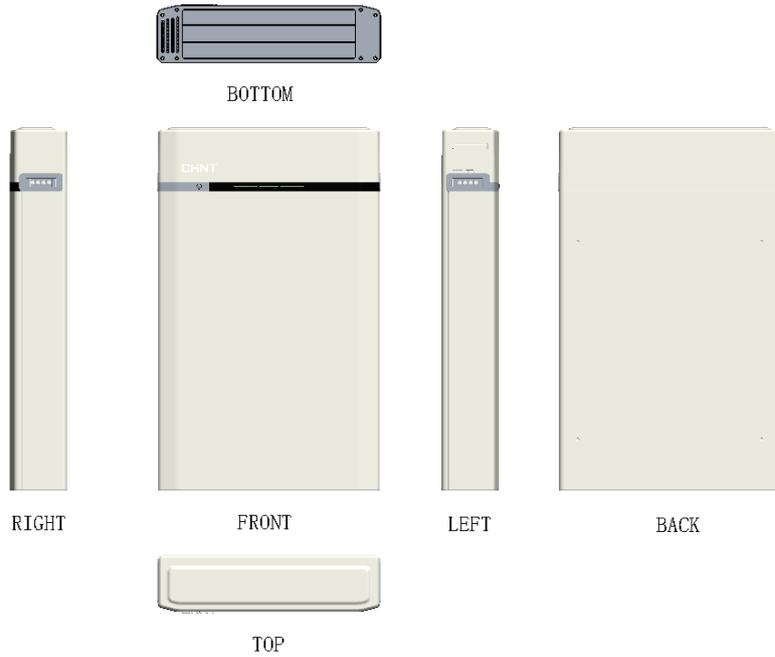


Figure 2-4 Battery pack plan

2.4.2 Maintenance control box plan

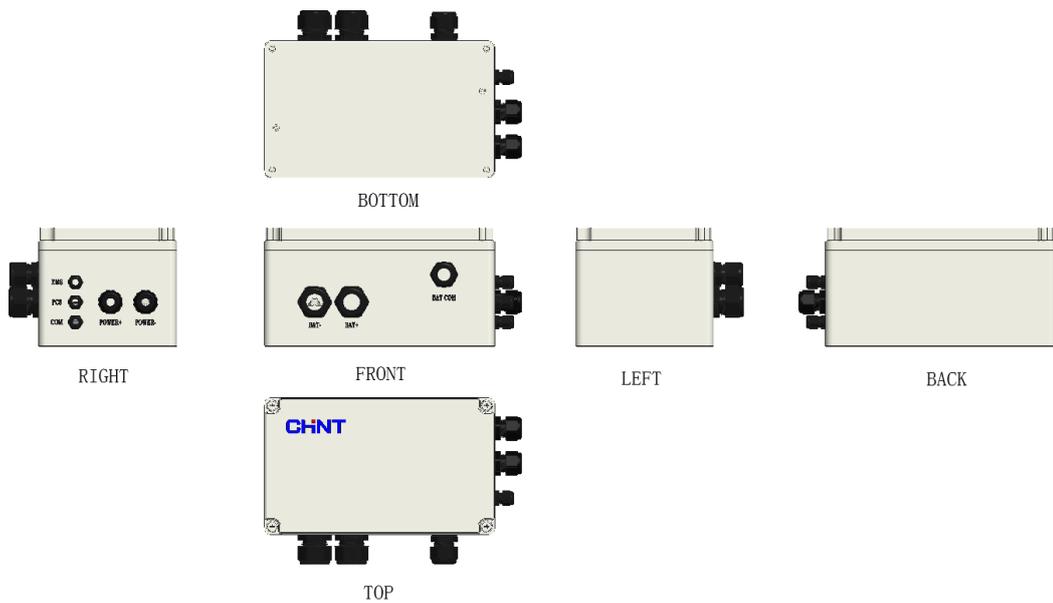


Figure 2-5 Maintenance control box plan

2.5 Interface definition

2.5.1 Definition of battery pack interface

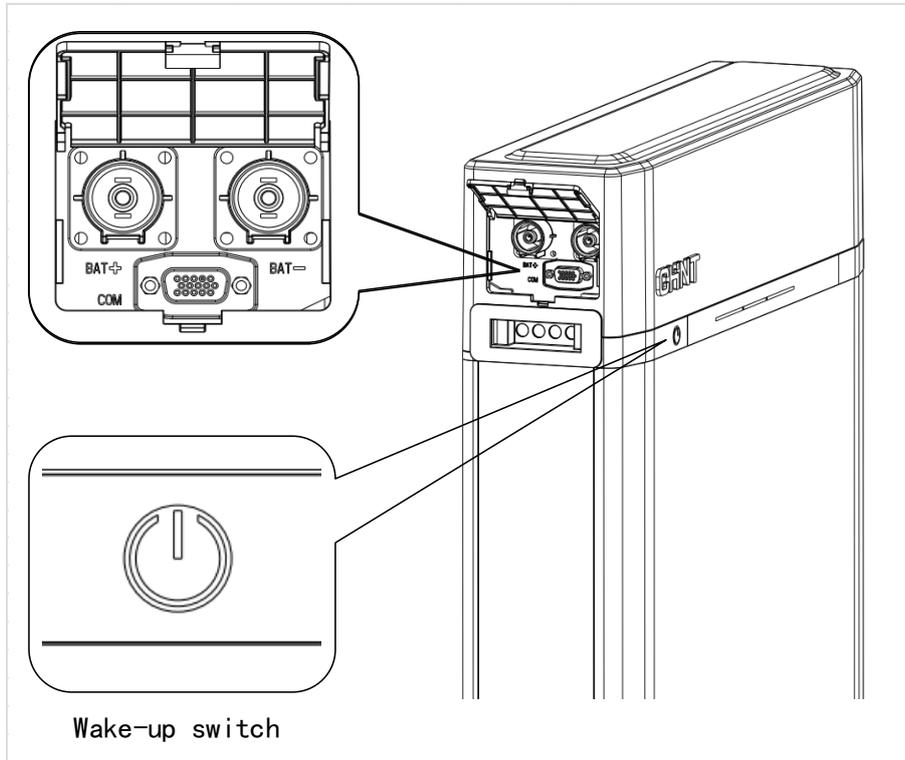


Figure 2-6 Diagram of left interface of battery pack

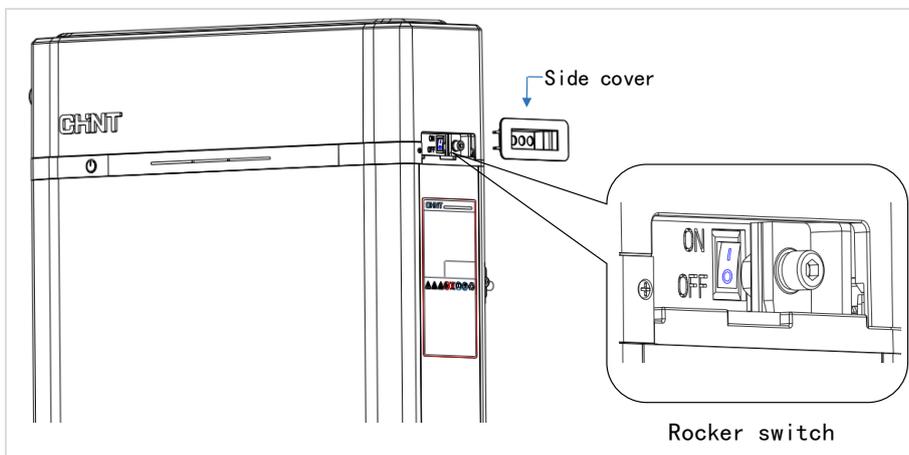


Figure 2-7 Diagram of right interface of battery pack

- BAT+: Battery positive interface.
- BAT-: Battery negative interface.
- COM: External communication interface, responsible for the communication between BMS and PCS, the communication between BMS and EMS, and the debugging of BMS.
- Wake-up switch: Used to open and close the system. Press the wake-up switch on the panel to start up, and press the wake-up switch on the panel for 3 seconds to shut down.

- Rocker switch: Storage and transportation switch. It is necessary to turn off the switch during storage and transportation, and it will be normally on after arriving at the user site.

2.5.2 Definition of maintenance control box interface

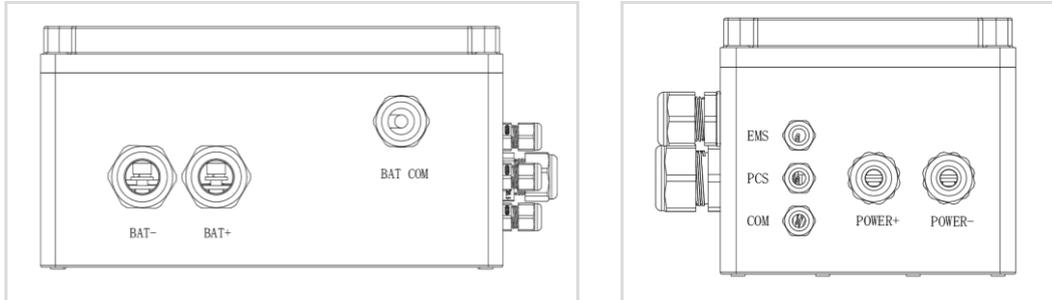


Figure 2-8 Diagram of maintenance control box interface

- BAT+: Interface connecting the positive pole of the battery pack to the maintenance control box.
- BAT-: Interface connecting the negative pole of the battery pack to the maintenance control box.
- BAT COM: Interface connecting communication of the battery pack to the maintenance control box.
- EMS: Interface connecting the maintenance control box to EMS communication.
- PCS: Interface connecting the maintenance control box to PCS communication.
- COM: Interface between the maintenance control box and the battery pack cascading communication.
- POWER+: Power input interface of maintenance control box (positive).
- POWER-: Power output interface of maintenance control box (negative).

3 Precautions for Use

This product is designed and tested in strict accordance with relevant international safety standards. However, for electrical and electronic equipment, the installation, commissioning, operation and maintenance processes must comply with the relevant safety specifications. Improper use or mishandling will harm:

- Life and personal safety of operator or third party.
- This product or other property belonging to the operator or a third party.

In order to reduce the damage of R6 rechargeable li-ion battery system products and other equipment and avoid casualties, the following safety precautions should be strictly followed during operation and maintenance. The precautions in the specific operation process will be explained in detail in the corresponding chapters.

WARNING

All installation operations must be performed only by professional and technical personnel. Professional and technical personnel must:

- With special training.
- Read this manual completely and master the safety matters related to operation.
- Familiar with electrical system safety specifications.

3.1 Product matching

CAUTION

This product must be matched with isolated PCS.

3.2 Before installation

NOTE

When receiving the product, you should check whether the product is damaged during transportation. If you find any problem, please contact Zhejiang Chint Electric Co., Ltd.

CAUTION

There is a danger of injury to the misoperation of the product !

- The instructions in the manual must be followed when the energy storage products are moved and placed.
- Improper operation of equipment may result in minor injury, serious injury or contusion.

3.3 In machinery installation

 DANGER

Make sure the inverter is free of any electrical connections before installing the energy storage product.

3.4 In electrical connection

NOTE

All electrical installations must meet local and national electrical standards.

3.5 Repair and replacement

 CAUTION

Avoid unrelated personnel entering the maintenance site !

Temporary warning signs or obstacles must be posted to prevent unrelated personnel from entering the electrical connection or maintenance area during electrical connection and maintenance work.

NOTE

Do not replace the internal components of the product without authorization. The company will not be liable for any quality assurance and joint and several liability for the resulting losses.

NOTE

Contact or poor operation of printed circuit boards or other electrostatic sensitive components can lead to device damage.

- Avoid unnecessary circuit board contact.
- Obey the electrostatic protection specifications and wear anti-static bracelet.

3.6 Other

 WARNING

All safety labels, warning labels and nameplates on energy storage products:

- Must be clearly visible.
- Can not be removed or covered.

4 Installation of R6 Rechargeable Li-ion Battery System

Battery system belongs to dangerous goods, improper operation and use may cause serious consequences such as electric shock, combustion, and explosion and so on. The installation and maintenance of battery system must be operated by professionals, and the relevant safety regulations must be strictly observed in use.

Installation process of R6 rechargeable li-ion battery system:

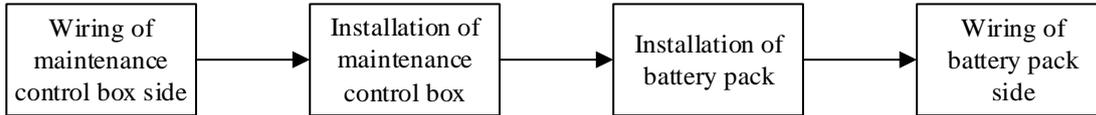


Figure 4-1 Flow chart of battery system installation

NOTE

The manufacturer will not be liable for battery damage and other losses caused by failure to use the battery as required or beyond the prescribed scope.



CAUTION

This product is for indoor use only.

4.1 Installation Prerequisites

4.1.1 Tools

These tools are required to install the battery system.

Table 4-1 List of tools

Hexagon wrench(M4)	Phillips-screw driver	Flat-head screw driver	Torque wrench
Tape measure	Drill (Φ6, Φ10)	Hammer	

4.1.2 Safety gear

Wear the following safety gear when dealing with the battery system, in order to avoid short circuit and personal injury. Installers must meet the relevant requirements of international standards, such as IEC 60364 or the domestic legislation.

Table 4-2 List of safety gear

		
Insulated gloves	Safety goggles	Safety shoes

4.2 Installation of maintenance control box

4.2.1 List of maintenance control box

After unpacking the battery system, please check whether the accessories of the battery system are complete according to the following table. Check whether there is any damage or missing items. If any, please contact the manufacturer.

Table 4-3 List of maintenance control box accessories

			
A	B	C	D
			
E	F		

Table 4-4 Parameters of maintenance control box accessories

Item	Quantity	Description	Area/length (mm)	Specification
A	1	Maintenance control box	250 W×150D×130H	\
B	1	Power cable (POWER+)	1500	EV 25mm ² 1500V
C	1	Power cable (POWER-)	1500	EV 25mm ² 1500V
D	1	Communication harness	1600	\
E	4	Tapping screw	\	M4×30
F	4	Expansion pipe	\	Φ6×30

Cable specifications are shown in the following table:

Table 4-5 Cable specifications table

No.	Type of terminal/terminal blocks	Name of terminal/terminal blocks	Position of terminal/terminal blocks	Number of terminal/terminal blocks	Terminal pin corresponding to cable	Cable voltage	Cable current	Insulation requirement	Cable diameter	Cable color	Cable material	Definition	Remark
1	DB15/3*5	D-SUB connector	Communication COM interface	9	K5+	600V	<1.5A	1000V&≥50 0MΩ	AWG22	Red	Copper	K5+	Teflon
2				8	K5-	600V	<1.5A		AWG22	Black	Copper	K5-	Teflon
3				7	CAN1H	600V	<1.5A		AWG22	Yellow	Copper	CAN1H	Shielded
4				6	CAN1L	600V	<1.5A		AWG22	Green	Copper	CAN1L	twisted pair
5				5	CAN2H	600V	<1.5A		AWG22	Yellow	Copper	CAN2H	Shielded
6				4	CAN2L	600V	<1.5A		AWG22	Green	Copper	CAN2L	twisted pair
7				3	485-2A	600V	<1.5A		AWG22	Yellow	Copper	485-2A	Shielded
8				2	485-2B	600V	<1.5A		AWG22	Green	Copper	485-2B	twisted pair
9	CNTQ-QC 7-48X-200 -35	Connector	BAT+	Battery pack BAT+	DC1000	100A	V	25mm ²	Orange	Copper	DC+	High voltage cable, single core	
10	CNTQ-QC 7-48Y-200 -35	Connector	BAT-	Battery pack BAT-	V	100A		25mm ²	Black	Copper	DC-	High voltage cable, single core	

NOTE

It is recommended that the packaging should not be removed before reaching the installation site.

4.2.2 Installation precautions

- After connecting all the external wiring related to the maintenance control box with the maintenance control box according to the wiring steps, the whole body is fixed on the wall.
- When installing the expansion pipe, drilling is required. The depth of the hole is slightly longer than the length of the expansion pipe (about 3-5mm), which is convenient for firm installation.
- Keep the installation environment well ventilated, avoid installing in places with too high or too low temperature and high humidity, keep away from water, flammable gas or corrosive agent and heat sources, and avoid direct sunlight.
- Avoid using in the environment with dust, volatile gas, corrosive gas or excessive salt. Do not place inflammable and explosive materials around the battery system.
- To minimize damage from accidental fires, fireproof materials should try to be used on the walls, ceilings and

floors of the room where the battery system is located, and portable dry powder fire extinguishers should be provided.

4.2.3 System wiring criterion

The maintenance control box has positive and negative interface of battery, battery communication interface, EMS communication interface, PCS communication interface and cascading interface. All interfaces are built-in. The system wiring is strictly in accordance with the following requirements:

- Power cables shall meet the requirements of 100VDC voltage, 80A continuous current and 25mm² wire diameter.
- All connectors must be safe and reliable to ensure that there are no loosening and virtual contact problems, and the contact resistance is less than 20 mΩ. The connectors must have anti-corrosion, wear-resisting and anti-seismic functions.
- The copper busbar terminals at the end of power cables adopt SC25-6.
- The parameters of bipolar bidirectional DC circuit breaker are rated voltage DC125V and rated current DC100A. Its main function is to maintain and protect overcurrent.
- All connections must meet the requirements of relevant national standards, and strictly prevent various forms of arc discharge.
- It is strictly forbidden to have any form of short circuit in the process of connection.
- Operators are strictly forbidden to operate without wearing protective equipment.
- All connections must be carried out under clear guidance, and any form of conjecture or vague attempt is not allowed.
- The key points of connection is that ensure correct and reliable connection (not loosening), good contact (no contact resistance), no short circuit.
- After the wiring harnesses are connected, they must be measured and confirmed point by point.
- All connection points must ensure no contact with the external box or other parts, no short circuit.
- If there are other uncertain factors, please consult professionals before implementation.

4.2.4 Wiring of maintenance control box

1. Take out the maintenance control box (A) and open the top cover. The internal structure is shown in Figure 4-2. The relay control harness in the control box (A) has been connected (in the bottom right part of the terminal blocks, terminal 8 is connected to K5- black control harness and terminal 9 is connected to K5+ red control harness).

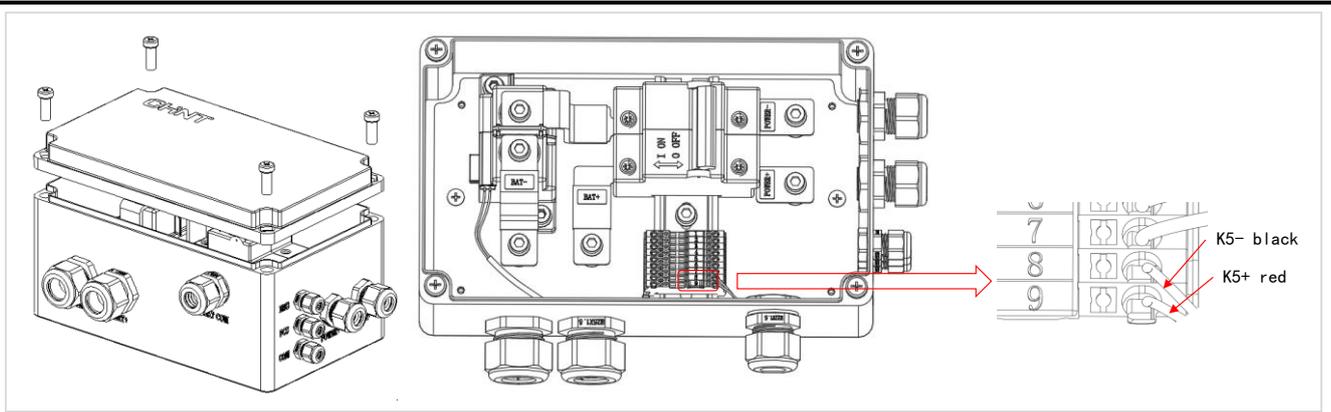


Figure 4-2

2. Connection of communication harnesses

1) Connection of battery communication harness

- Find the battery communication harness (D) in the battery system accessories.
- Take down the cable gland of “BAT COM” interface on the maintenance control box and set it on the battery communication harness (D).
- The battery communication harness (D) is passed through the “BAT COM” interface on the maintenance control box.
- According to the label on the terminal blocks and the wiring diagram of terminal blocks, as shown in Figure 4-3, the battery communication harness (D) is inserted directly from the upper end into the same side of the terminal blocks (the other side is to be related to the battery pack in chapter 4.3.5).
- Move the cable gland on the battery communication harness (D) to the interface and tighten it.

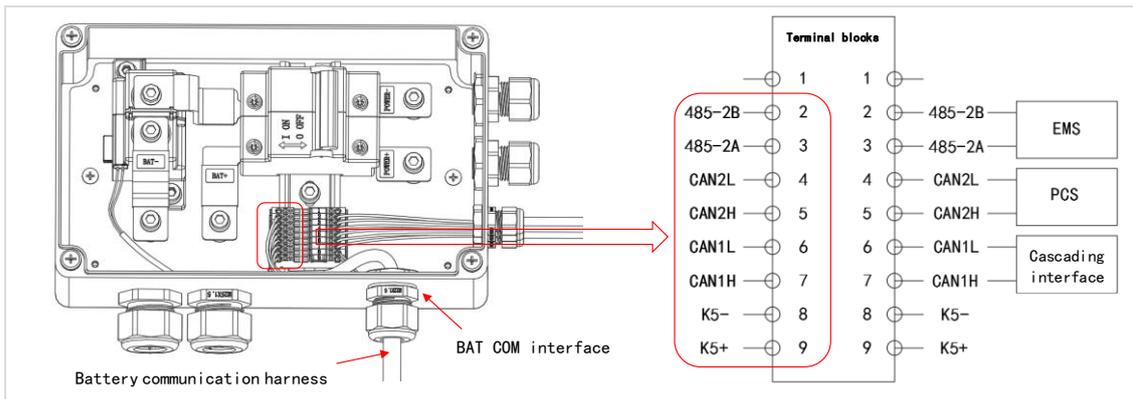


Figure 4-3

2) Connection of communication harness between maintenance control box and PCS

- Take down the cable gland of PCS interface on the maintenance control box (A), and pass the communication harness through the cable gland and the PCS interface in turn.
- As shown in Figure 4-4, the communication harness is connected to the corresponding position of the terminal

blocks.

- Move the gran head on the PCS communication harness to the interface and tighten it.

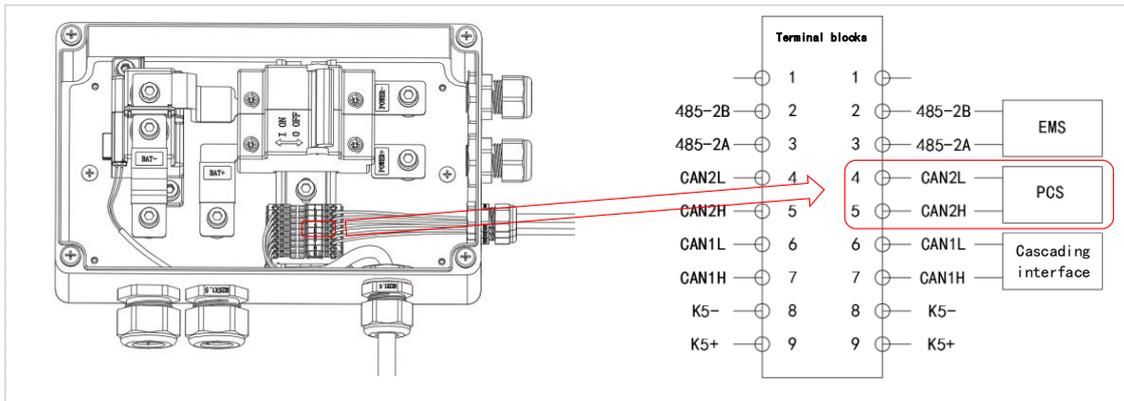


Figure 4-4

3) Connection of communication harnesses between maintenance control box and EMS, battery pack cascade

The connection method of communication harnesses between maintenance control box and EMS, battery pack cascade shall refer to the connection procedure of communication harness between maintenance control box and PCS. As shown in Figure 4-5, the communication harness is connected to the corresponding position of the terminal blocks.

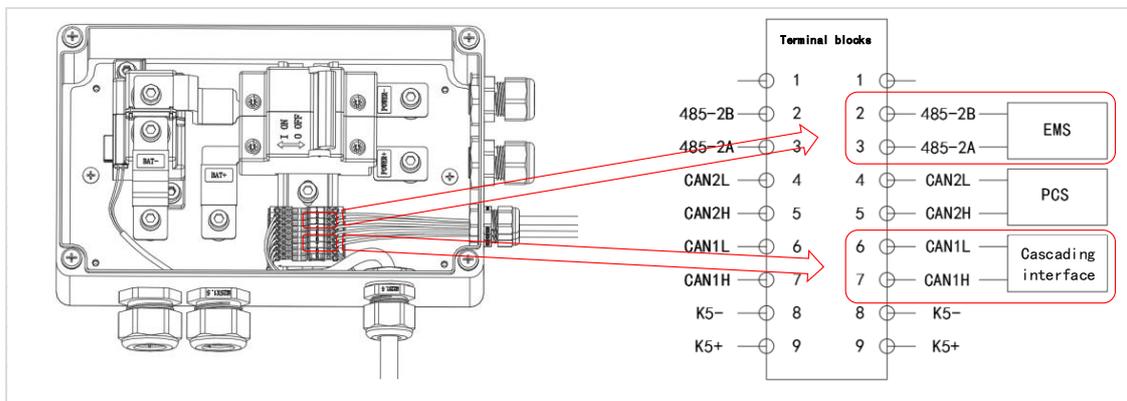


Figure 4-5

NOTE

In this manual, the communication harnesses used between maintenance control box and EMS, PCS, battery pack cascade are all network harnesses.

The external cables of the maintenance control box (except for the cable between the battery pack) are not within the scope of supply.

3. Connection of power harnesses

1) Connection of battery power cables

- Find the orange positive power cable (B) in the battery system accessories.
- Take down the cable gland of “BAT+” interface on the maintenance control box (A) and set it on the orange

positive power cable (B) as shown in Figure 4-6.

- The power cable (B) is passed through the “BAT+” interface.

- Remove the screw on the copper bar corresponding to the “BAT+” interface and fix the copper tube terminal at the end of the power cable (B) to the copper busbar with the screw (the other end of the power cable is connected to the battery pack in chapter 4.3.5).

- Tighten the cable gland at “BAT+” interface.

The connection method of black negative power cable (C) refers to the connection procedure of orange positive power cable (B) (the other end of the power cable is connected to the battery pack in chapter 4.3.5).

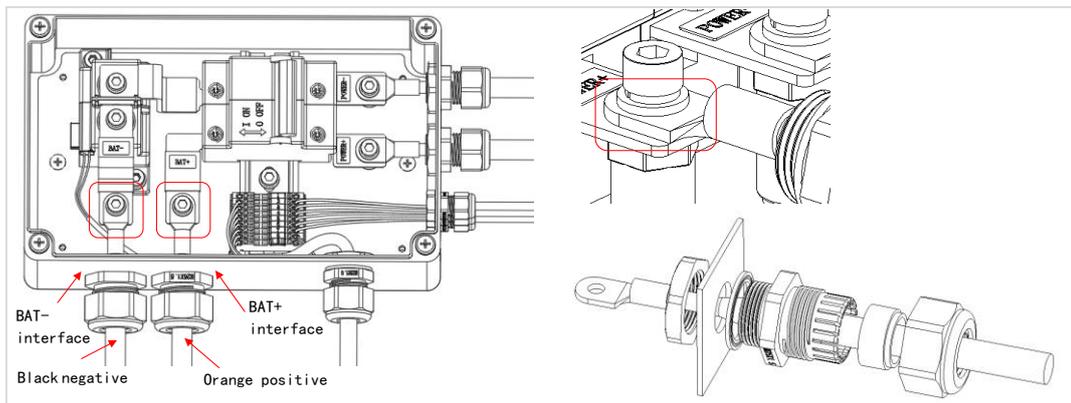


Figure 4-6

2) Connection of power cables between maintenance control box and PCS

- The positive and negative power cables are fixed on the corresponding copper busbar through “POWER” and “POWER-” interfaces respectively, as shown in Figure 4-7.

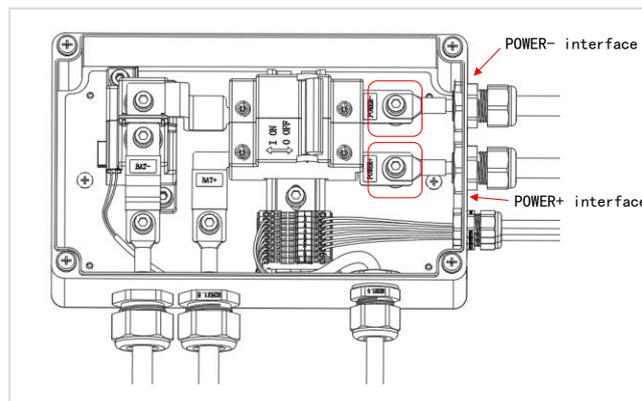


Figure 4-7

NOTE

The power cable between maintenance control box and PCS is not within the scope of supply. Specifications refer to Table 4-3.

4. The complete wiring harness connection diagram of the maintenance control box as shown in Figure 4-8.

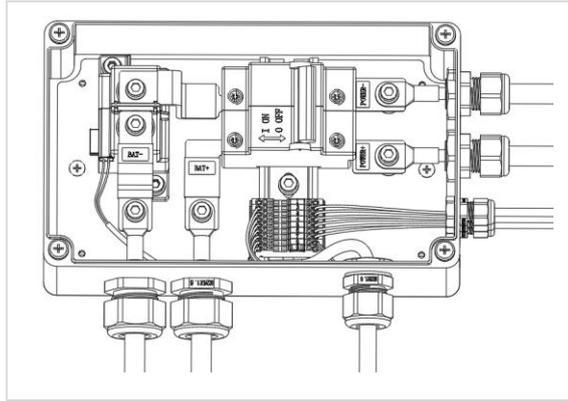


Figure 4-8

4.2.5 Installation way

NOTE

After all the external wirings related to the maintenance control box are connected, the whole body is fixed on the wall. External wiring is not shown in the installation steps of the maintenance control box below.

Install on the wall:

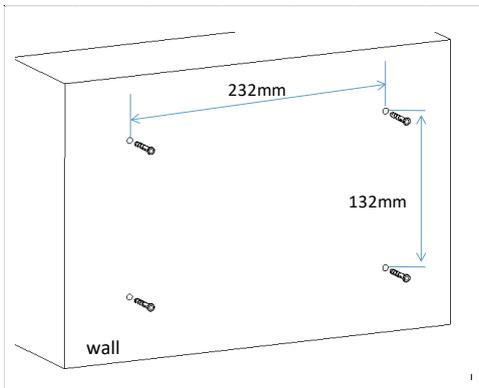


Figure 4-9

1. Drill holes in the wall ($\Phi 6 \times 30\text{mm}$) according to the dimensions shown in Figure 4-9, and insert expansion pipe (F).

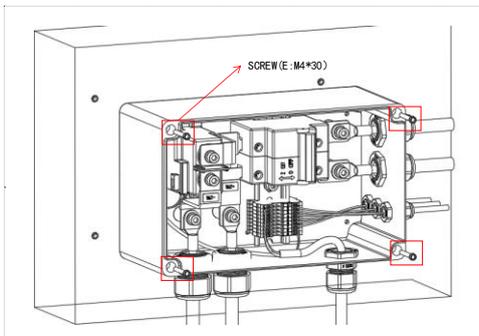


Figure 4-10

2. After the internal wiring of the maintenance control box is connected, it is installed on the wall as a whole. As shown in Figure 4-10, M4×30 tapping screw (E) (a total of 4) is installed in the expansion pipe (F) and tightened.

3. Install and lock the top cover.

4.3 Installation of battery pack

4.3.1 List of battery pack

After unpacking the battery system, please check whether the accessories of the battery system are complete according to the following table. Check whether there is any damage or missing items. If any, please contact the manufacturer.

Table 4-6 List of battery pack accessories

		
G	H	I
		
J	K	L

Table 4-7 Parameters of battery pack accessories

Item	Quantity	Description	Area/length (mm)	Specification
G	1	Battery pack	445W×115D×734H	6.5kWh
H	2	Wall mounting bracket (wall end)	\	\
I	2	Wall mounting bracket (battery pack end)	\	\
J	6	Expansion screw	\	M8×60
K	4	Screw	\	M6×12
L	4	Screw	\	M5×12

NOTE

It is recommended that the packaging should not be removed before reaching the installation site.

4.3.2 Installation precautions

- Please place the battery pack on the horizontal ground to ensure it is placed smoothly without shaking or tilting.
- When the battery pack is installed, make sure that it is fixed reliably without obvious skew, and it is correctly loaded into the corresponding bracket chute.
- When installing the battery pack, the bearing capacity and loading capacity of its installation point should be considered (according to the requirements of architectural drawings).
- Do not cover the ventilation holes on the battery pack with articles, so as not to hinder the heat dissipation of the battery pack, and keep the distance from installation point to the floor more than 5mm (bottom screw support height of battery pack is more than 5mm), resulting in the increase of the internal temperature of the system, affecting the safety and life of the battery.
- Keep the installation environment of battery pack well ventilated, avoid installing in places with too high or too low temperature and high humidity, keep away from water, flammable gas or corrosive agent and heat sources, and avoid direct sunlight. Try to keep the inlet/outlet free of dust.
- Avoid using in the environment with dust, volatile gas, corrosive gas or excessive salt. Do not place inflammable and explosive materials around the battery system.
- In order to reduce the possibility of fire and reduce the resulting damage, fireproof materials should try to be used on the walls, ceilings and floors of the room where the battery system is located, and portable dry powder fire extinguishers should be provided.
- When the battery pack is mounted on the wall, manual handling shall be adopted in the lifting process. The installer must wear anti-smashing shoes and pay attention to at least 2 people for operation. During operation, hold the handle of the battery pack with one hand and the bottom of the battery pack with the other hand, and slowly lift it up. Pay attention to prevent tilting during lifting and operate safely.
- The installed walls must be load-bearing walls. The bearing capacity of the installation wall or ground shall be no less than four times of the actual weight of the battery pack (no less than 200kgf), and the battery pack shall not be tipped when the wall hanging is tilted 5 degrees forward and back.
- The installation location shall meet the requirements as shown in Figure 4-11, so as to install in the early stage, later maintenance and repair etc.

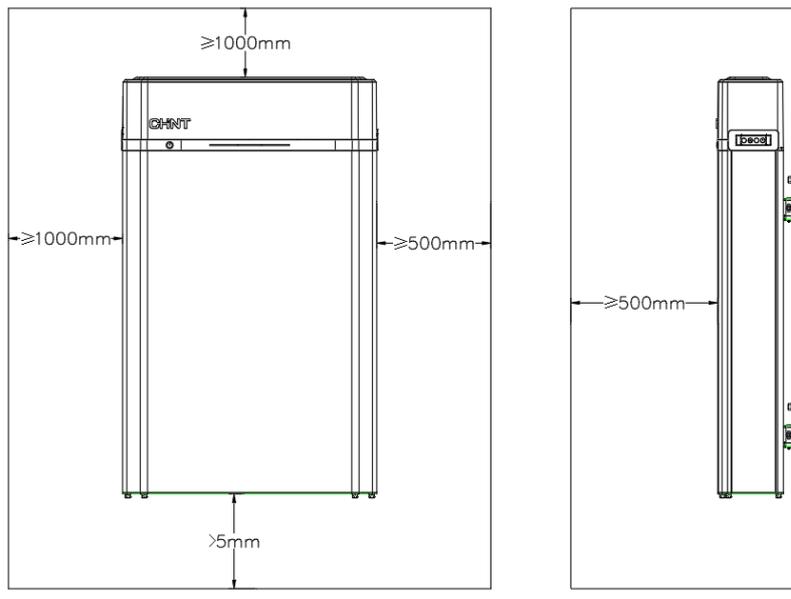


Figure 4-11 Diagram of installation position

4.3.3 System wiring criterion

The battery pack has battery positive and negative electrodes and communication interface. All interfaces of the battery pack are built in. Since the system works in a high-voltage and high-current working environment, the basic requirements for the safety and reliability of the connection are as follows:

- Power cables shall meet the requirements of 100VDC voltage, 80A continuous current and 25mm² wire diameter.
- All connectors must be safe and reliable to ensure that there are no loosening and virtual contact problems, and the contact resistance is less than 20 mΩ. The connectors must have anti-corrosion, wear-resisting and anti-seismic functions.
- All connections must meet the requirements of relevant national standards, and strictly prevent various forms of arc discharge.
- The connection of internal battery, temperature, voltage and current inductors need to be safe and reliable to prevent loosening, aging and extrusion. It is strictly forbidden to expose any metal on the induction harnesses;
- Strictly prevent any form of short circuit in the connection process.
- Operators are strictly forbidden to operate without wearing protective equipment.
- All connections must be carried out under clear guidance, and any form of conjecture or vague attempt is not allowed.
- The key points of connection ensure correct and reliable connection (not loosening), good contact (no contact resistance), no short circuit.

- After the connection is completed, it must be measured and confirmed point by point.
- All connection points must ensure no contact with the external box or other parts, no short circuit.
- If there are other uncertain factors, please consult professionals before implementation.

4.3.4 Installation way

NOTE

Pay attention to the length of the cable between the battery pack and the maintenance control box, and estimate the proper location of the battery pack according to the cable length.

There are two effective installation methods, which can be selected by customers:

[1] Place the battery pack on the horizontal ground to ensure it is placed smoothly without shaking or tilting.

1. After drilling, The wall mounting bracket (H, 1 in total) is fixed to the wall with M8×60 expansion screws (J, 3 in all) (Unit: mm).

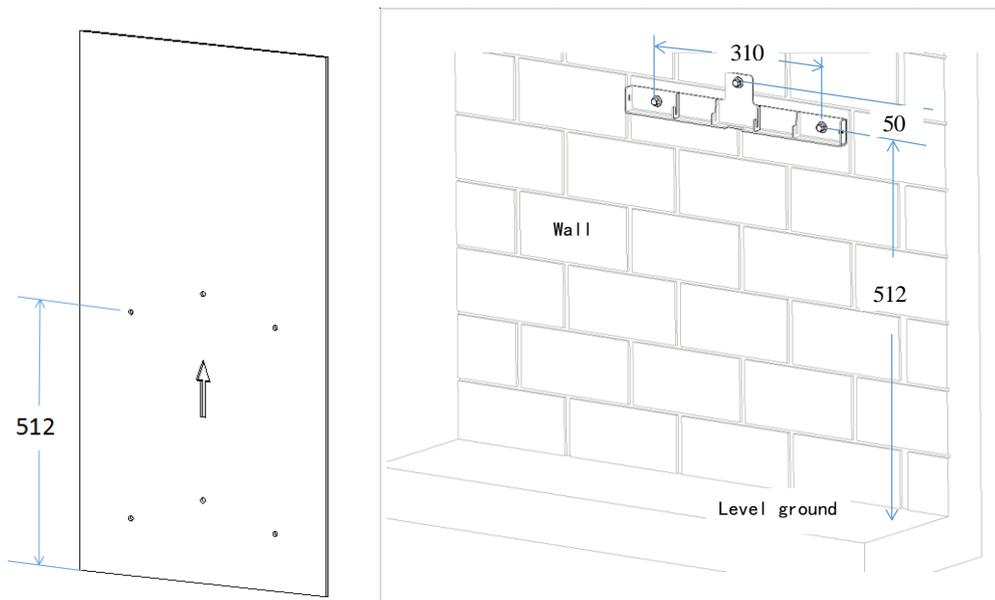


Figure 4-12

NOTE

The inner cardboard of the packaging material is used as a wall drilling positioning plate, and the bottom of the positioning plate contacts the horizontal ground. Pay attention to the direction of the hole on the positioning plate.

Pay attention to the installation direction of wall mounting bracket installed the wall.

2. The wall mounting bracket (I, 1 in total) is fixed to battery pack (G) with M6×12 screws (K, 2 in all), and the torque is 8N.m.

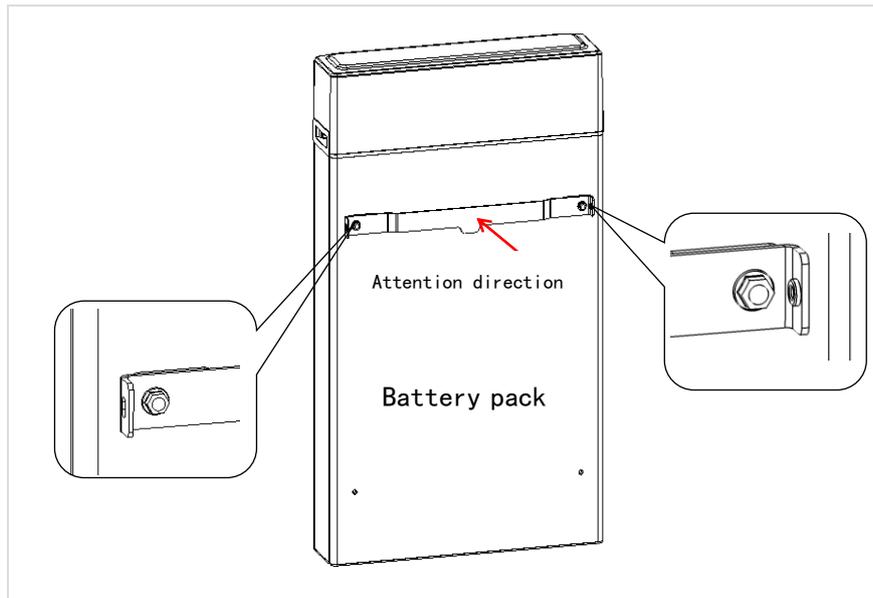


Figure 4-13

CAUTION

Pay attention to the installation direction of wall mounting bracket on battery pack and match it with wall mounting bracket installed the wall.

In the process of installation and movement, pay attention to handling gently to avoid personal injury to operators.

3. The battery pack (G) assembled in step 2 is clamped into the wall mounting bracket (H) fixed to the wall in step 1, as shown in Figure 4-14:

- (1) The bottom of the battery pack (G) is slightly higher than the ground and mounted on the wall.
- (2) The battery pack (G) is clamped down into the chute.

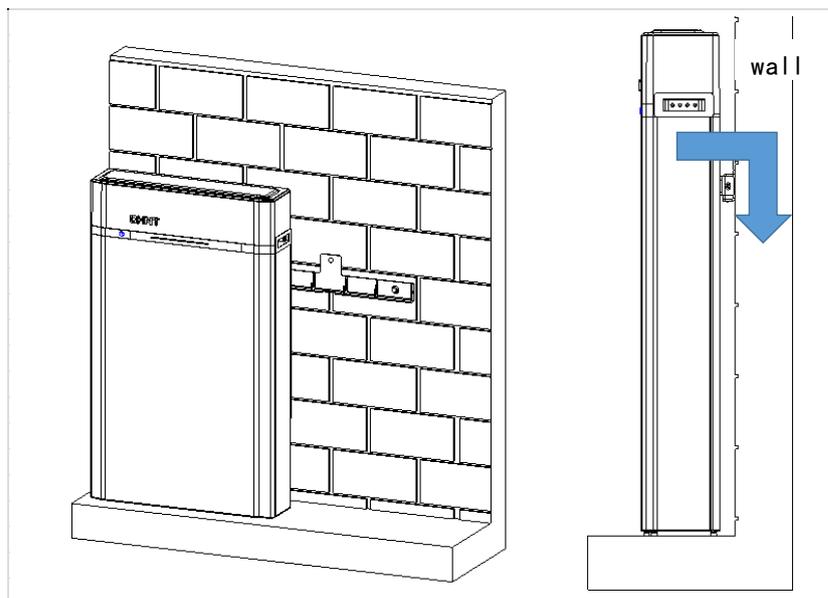


Figure 4-14

NOTE

The arrows indicate the direction and order in which the battery packs are installed in Figure 4-14.

4. Tighten M5×12 screws (L) on both sides as shown in Figure 4-15:

(1) The battery pack (G) is slightly adjusted to the left, so that the concave-convex structure in the middle of the wall mounting bracket (H, I) is completely clamped.

(2) Tighten M5×12 screws on both sides (L, 2 in total, 5N.m).

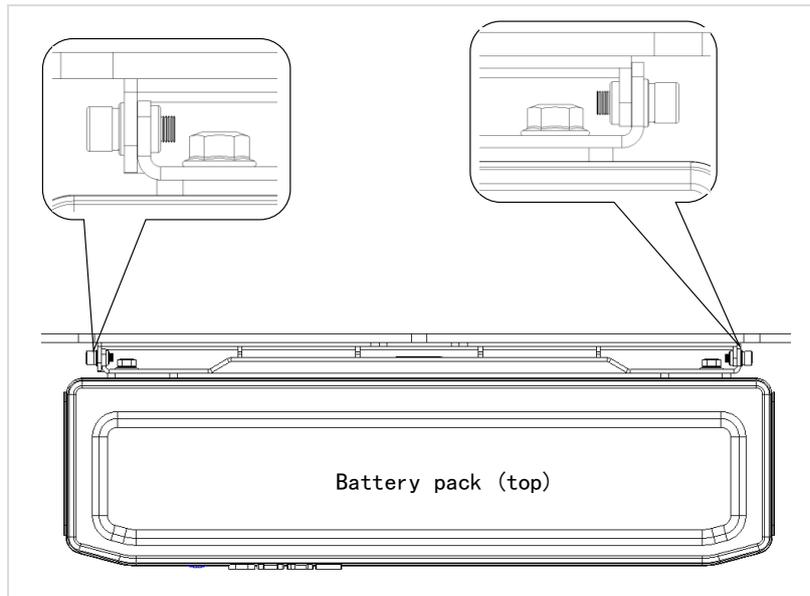


Figure 4-15

[2] Hang the battery pack (G) on the wall and install it as shown in the figure below. Please note that the bearing capacity and loading capacity of the wall mounting point should be considered (according to the requirements of architectural drawings).

Steps are as follows:

1. After drilling, The wall mounting brackets (H, 2 in total) are fixed to the wall with M8×60 expansion screws (J, 6 in all) (Unit: mm).

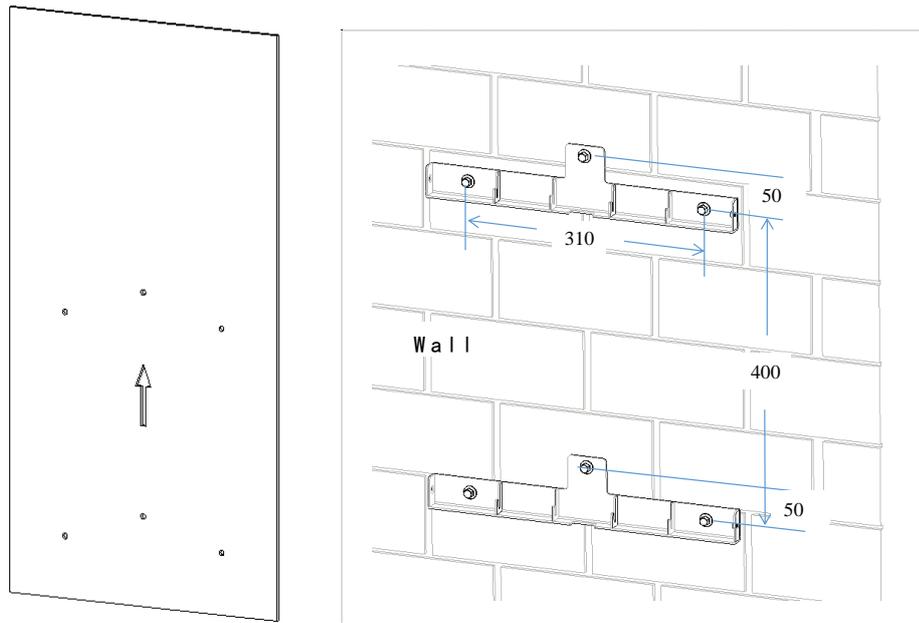


Figure 4-16

NOTE

The inner cardboard of the packaging material is used as a wall drilling positioning plate. Please keep the positioning plate horizontal when drilling. Pay attention to the direction of the hole on the positioning plate.

Pay attention to the installation direction of wall mounting bracket installed the wall.

2.The wall mounting brackets (I, 2 in total) is fixed to battery pack (G) with M6×12 screws (K, 4 in all), and the torque is 8N.m.

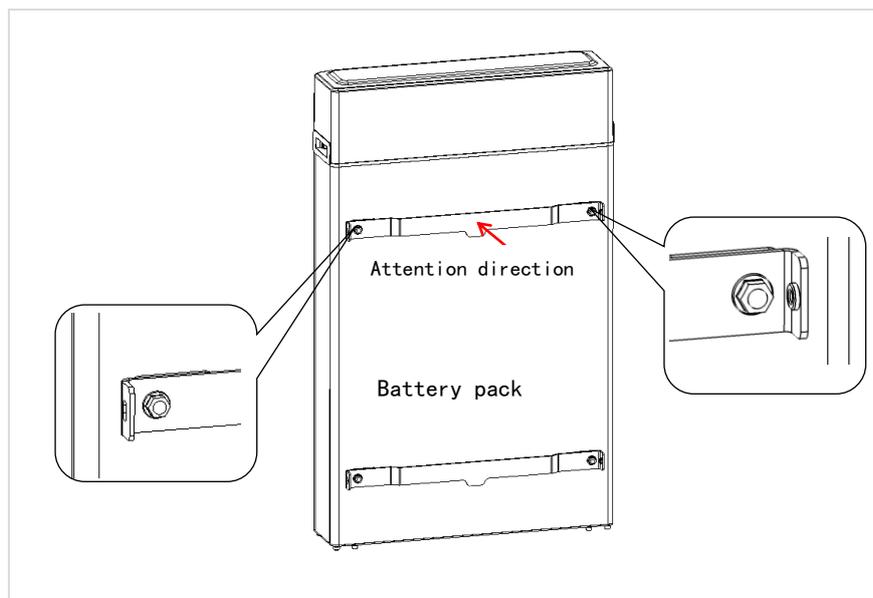


Figure 4-17

CAUTION

Pay attention to the installation direction of wall mounting bracket on battery pack and match them with wall mounting bracket installed the wall.

In the process of installation and movement, pay attention to handling gently to avoid personal injury to operators.

3. The battery pack (G) assembled in step 2 is clamped into the wall mounting bracket (H) fixed to the wall in step 1, as shown in Figure 4-18:

- (1) The battery pack (G) is mounted on the wall.
- (2) The battery pack (G) is clamped down into the chute.

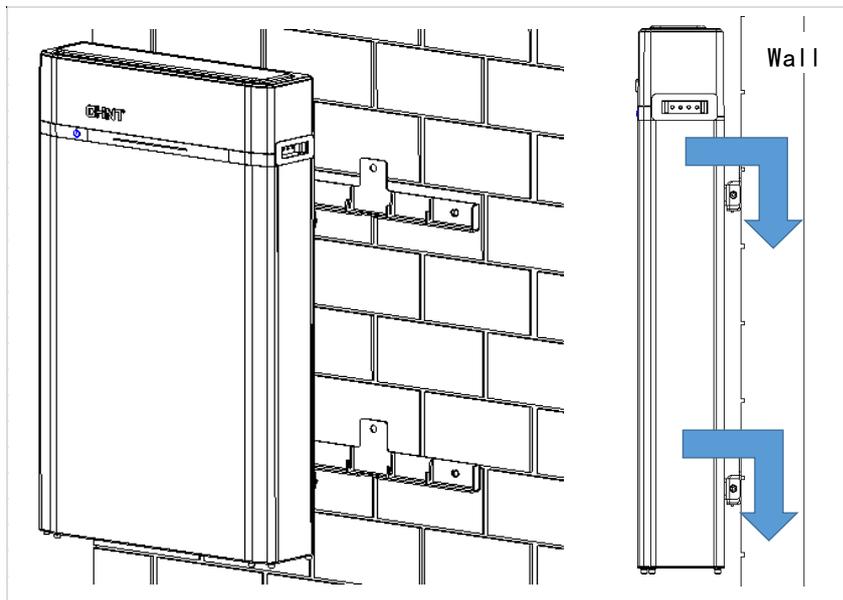


Figure 4-18

NOTE

The arrows indicate the direction and order in which the battery packs are installed in Figure 4-18.

4. Tighten M5×12 screws (L) on both sides as shown:

(1) The battery pack is slightly adjusted to the left, so that the concave-convex structure in the middle of the bracket is completely clamped.

(2) Tighten M5×12 screws on both sides (L, 2 in total, 5N.m).

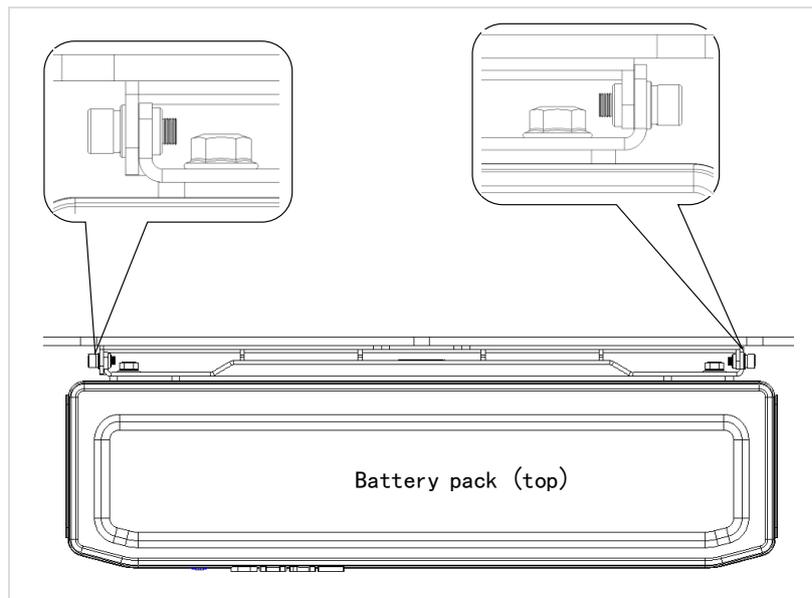


Figure 4-19

4.3.5 Wiring of battery pack

⚠ CAUTION

Make sure the device is powered off.

NOTE

To facilitate installation, follow the steps in the diagram to connect the cables.

1. Connection of battery communication harness

- Find the battery communication harness (D) that has been connected to the “BAT COM” interface of the maintenance control box.

- Insert the other side of the battery communication harness (D) into the “COM” interface of the battery pack (G).

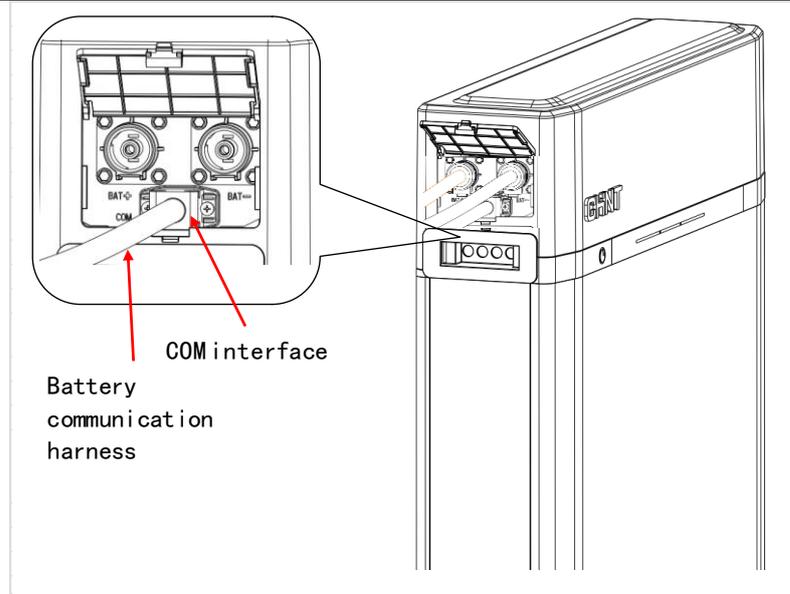


Figure 4-20

2. Connection of battery power cables

- Find the power cables that have been connected to the “BAT+” and “BAT-” interface of the maintenance control box.
- Connect the connector (X key) of orange positive power cable (B) to the “BAT+” interface of the battery pack. Connect the connector (Y key) of the black negative power cable (C) to the “BAT-” interface of the battery pack.
- Press in the black buckle and hear the click.

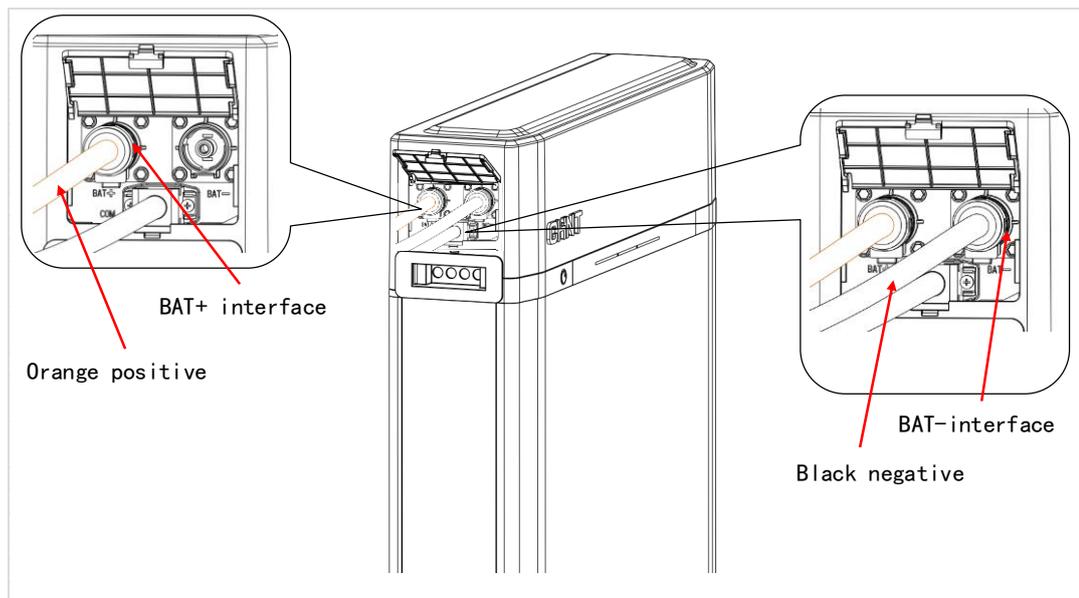


Figure 4-21

**CAUTION**

The polarity of the battery power cables must be carefully identified. Do not connect the polarity incorrectly.

There is a black buckle at the positive and negative connectors of the battery power cables. Do not press it when installing. After installation, be sure to press the black buckle in to prevent the power cable joint from loosening and affecting normal use.

5 System Operating Instructions

5.1 Inspection before start-up

5.1.1 Confirmation of cable connection

- Before formal power-on, check the connecting cables of the whole system to ensure that the cable connection is reliable, no aging fracture and insulation damage, etc.
- Check whether the positive and negative poles of power cables of battery pack and maintenance control box are connected correctly.
- Check whether all communication cables and connection terminals are tightly and reliably connected.

5.2 System boot-up

5.2.1 Battery system boot-up

1. Close the DC circuit breaker in the maintenance control box first.

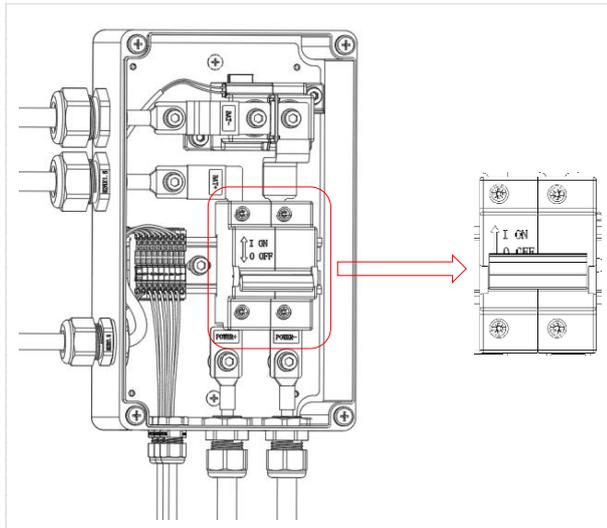


Figure 5-1

2. Start the rocker switch of the battery pack (First pry off the side cover with a flat screwdriver, then turn the rocker switch to the “ON” position).

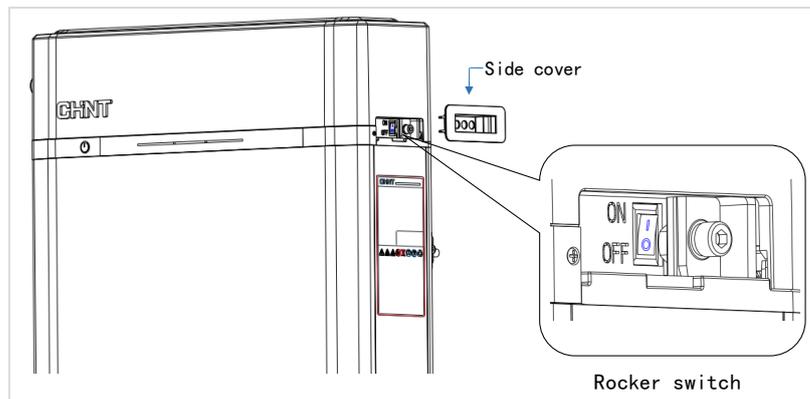


Figure 5-2

NOTE

The side cover is a buckle structure, please do not dismantle it violently.

3.Start the wake-up switch on the front panel of the battery pack. Note that press the switch for about 1s.

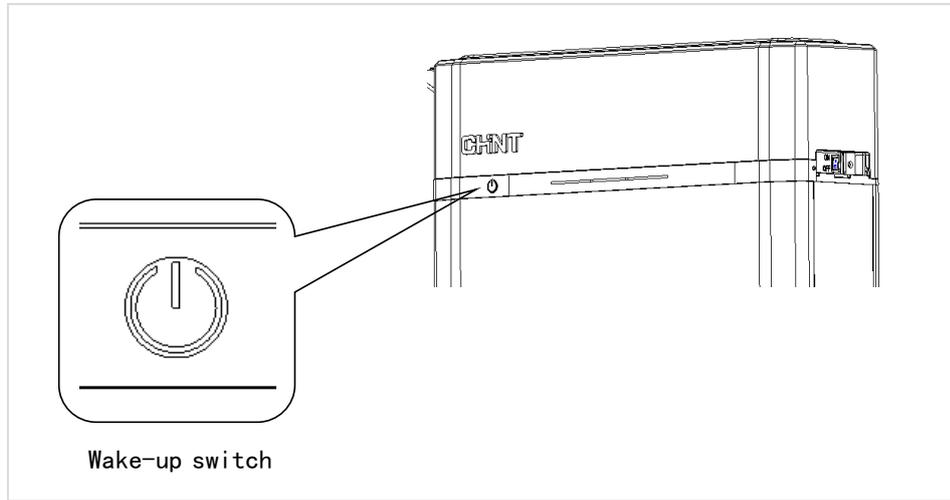


Figure 5-3

The status of the battery pack running indicator lights at this moment:

Table 5-1

System state	Running indicator lights
Starting up	Green lights flash



Figure 5-4

! WARNING

Before starting the rocker switch and wake-up switch of the battery pack, make sure that the previous power circuit of the battery pack is on (such as the switches of PCS, DC circuit breaker of maintenance control box, and distribution box are closed).

! CAUTION

If the light on and light off of the indicator lights is inconsistent with the above list, it means that the system is not started normally. Shut down first and press the wake-up switch again until the lights flashes green.

If repeated operations fail to start up normally for many times, please contact the manufacturer for system troubleshooting.

5.2.2 High-voltage power of battery system

After starting up the battery system, the system detection will be carried out automatically, and the high-voltage power will be automatically completed after passing the detection. The status of indicator lights after power on is as follows:

Table 5-2

System state	Running indicator lights
High-voltage power	Green lights on



Figure 5-5

! CAUTION

If the light on and light off of the indicator lights is inconsistent with the above list, it means that the system is not powered on normally, and repeat the start-up step.

If repeated operations fail to power on normally for many times, please contact the manufacturer for system troubleshooting.

5.2.3 Battery system charge

After the battery system is powered on at high voltage, when the battery is charging, the state of the indicator lights is as follows:

Table 5-3

System state	Running indicator lights
Charging	The green lights up one by one according to the SOC value



Figure 5-6

5.2.4 Battery system discharge

After the battery system is powered on at high voltage, when the battery is discharging, the state of the indicator lights is as follows:

Table 5-4

System state	Running indicator lights
Discharging	The green lights off one by one according to the SOC value



Figure 5-7

5.3 System shutdown

The system shutdown steps are as follows:

1. Make sure the battery is not charging or discharging before shutting down the system.
2. Press the wake-up switch on the panel of the battery pack for 3s, and the system will shut down normally.

When the power is off, the status of the indicator light is as follows:

Table 5-5

System state	Running indicator lights
Power off	Lights off



Figure 5-8

! WARNING

Before shutting down the rocker switch and wake-up switch of the battery pack, make sure that the previous power circuit of the battery pack is on (such as the switches of PCS, DC circuit breaker of maintenance control box and distribution box are closed).

! CAUTION

If the light on and light off of the indicator lights is inconsistent with the above list, it means that the system is not shut down normally, and repeat the shutdown step.

If repeated operations fail to shut down normally for many times, please contact the manufacturer for system troubleshooting.

If the battery system needs to be transported or laid up for a long time, it is necessary to turn off the wake-up switch on the front panel before turning off the rocker switch.

6 System Maintenance Instructions

6.1 Battery system maintenance

6.1.1 Maintenance precautions

- In order to maintain and repair the system safely and effectively, the maintenance personnel must be qualified through professional training before taking up their posts. When performing maintenance work, staff members must abide by the relevant knowledge of safety prevention and use necessary tools and protective equipment.
- When operating and maintaining the system, please do not wear metal jewelry such as gold and silver jewelry and watches.
- Use insulating tools, and wear insulating gloves and insulating shoes for maintenance.
- After the maintenance work, clean the tools and materials in time, and do not put the metal items on the inside or top of the equipment.
- When connecting and disassembling the system cables, please disconnect all high-voltage and low-voltage switches.
- If system operation and maintenance personnel have any questions about the operation and maintenance of equipment, please contact the manufacturer for consultation. Do not operate without authorization.
- Customers are obliged to make a reasonable maintenance plan, such as regular dust removal, regular charging and discharging etc., to ensure the normal use of the product.
- Scrapped products shall be immediately recycled and disposed by the designated qualified manufacturer. It is strictly prohibited to discard them casually, which may lead to safety accidents or serious environmental pollution.

6.1.2 Equipment maintenance

- Ambient temperature: the optimum ambient temperature is $25\pm 5^{\circ}\text{C}$.
- Charging and discharging current: avoid charging and discharging the battery pack at a high rate. The charge and discharge current of a single battery pack should not exceed 70A.
- Lay aside for a long time: when the battery system is not used for a long time, it should be charged every 3 months to make the SOC reach 30%~50%.
- Regular dust removal: clean the system regularly (recommended once a year), especially pay attention to the air inlet and outlet of the fan, and use a vacuum cleaner to clean when necessary to ensure the free flow of air in the battery pack. The power supply must be cut off before dust removal, and water washing is strictly prohibited.

- Periodically check whether the connecting terminals of the cables are loose, whether the surfaces of the terminals are seriously rusted or oxidized, and whether the contacts are good.
- Periodically check whether the cables are aged, damaged and whether the insulations are good.
- Periodically check whether the system status and the indicator lights are in good condition and whether the functions are normal.
- It is forbidden to use in series or in parallel with other types of battery products.

6.1.3 Battery system function maintenance

- Random system test: the manufacturer will send personnel or authorized partners to the site to conduct a comprehensive test on the battery system from time to time to determine whether the system function is normal and whether the battery status is normal.
- System upgrade: the manufacturer will update the battery system software from time to time to ensure the system is more secure and reliable. If the user finds that the battery power supply time is greatly shortened or the system fails frequently, please contact the manufacturer in time for system diagnosis and maintenance by the manufacturer's professionals.

6.2 Accident disposal

The battery system should take correct and effective measures to deal with the abnormalities and accidents in time to avoid further damage and loss:

1) Overheating

Normally, when the battery is overheating, the cooling system will automatically dissipate heat, so that the temperature of the battery system can cool down to the optimum operating temperature range. When the temperature of the battery system exceeds the safe use limit, the management system will give a warning and needs to stop using immediately. In this case, the use of batteries should be stopped immediately and relevant technical personnel should be notified for a comprehensive inspection.

2) Electric leakage

In the process of using, if electric leakage is found in the battery system, you must immediately evacuate the personnel, and notify the relevant technical personnel to deal with the scene. It is strictly prohibited to operate while the battery has problems or continue to be used by force.

3) Over-discharge

When the battery system runs out of power and the total voltage or single voltage is too low, the management system will give a warning. At this time, the discharge of the battery should be stopped immediately and the battery

should be charged. At this time it is strictly prohibited to continue discharging the battery by force, otherwise it will damage the battery performance and may lead to permanent damage of the battery in serious cases, so it cannot be used any more.

4) Short circuit

When a short circuit occurs in the battery system, the personnel must be evacuated immediately, the relevant power supply and electrical equipment should be cut off (if possible), the connection between the battery and the system should be disconnected immediately, and the relevant technical personnel should be notified to repair and troubleshoot on the spot. Shortened battery system must be fully tested by the manufacturer before deciding whether it can continue to be used after partial maintenance.

5) Combustion

In case of a combustion accident in the battery system, the personnel must be evacuated immediately, and a security cordon must be set up. Irrelevant personnel shall not be allowed to approach the battery system (because there may be an explosion danger). Special fire extinguishers should be used to extinguish the fire by professionals. After the fire extinguishing is completed, the personnel wearing the necessary protective equipment shall first cut off the power supply connection harness, and the battery system shall apply resistance to fully discharge (voltage to zero volts) before removing the battery pack for subsequent operation analysis.

6) Collisions of battery system

When the battery system is impacted, deformed or punctured by foreign bodies, disconnect the power connection of the battery immediately and inform the professionals to deal with it on the spot. If it is necessary to remove the battery, the battery should be fully discharged by the personnel wearing necessary protective equipment before disassembly.

7) Insulation

All power supply connections in the battery system must ensure that there are adequate insulation protection measures to ensure that the positive and negative poles of the battery will not contact the outer box under any circumstances, resulting in power leakage and short circuit. It is absolutely necessary to ensure that the positive and negative poles of the battery system will not be short-circuit directly at any time, otherwise major safety and electric shock accidents may occur.

8) Other accidents

When the rechargeable li-ion battery system needs to be repaired or removed due to other accidents, the battery cable should be disconnected first to ensure that the personnel do not get electric shock. In the case that the battery will not be short-circuited, remove the battery pack to ensure that the battery pack will not be damaged in collision,

fall, inversion and other circumstances. If this happens, please refer to the above provisions for handling.

6.3 Trouble shooting, alarm handling and countermeasures

When the battery system has the following troubles or alarms, please deal with them according to the following table:

Table 6-1 Battery system trouble or alarm phenomenon and corresponding solutions

No.	Failure or alarm	Possible failure cause	Solution
1	The indicator lights of the battery pack are not on	1.The battery capacity is 0%.	Charge
		2.When the battery power is too low, it enters the self-power-off mode.	Restart the rocker switch on the left side of the battery pack to charge. If the battery pack is not charged after two repeated operations, the battery pack will not power up again. Please contact the battery system manufacturer.
		3. Indicator lights are bad.	Please contact the manufacturer to change the indicator lights.
2	The indicator lights of battery pack are red	1.Communication with PCS failed.	Reconnect the communication harness.
		2. System failure.	Restart.
3	The indicator lights of battery pack are yellow	1.High battery system temperature.	The system is in normal operation and needs no attention.
		2.Low battery system temperature.	
		3.Large temperature difference within the battery system.	

6.4 Safety precautions



WARNING

The battery has potential hazards, so proper protective measures must be taken during operation and maintenance.

Improper operation may result in serious personal injury and property loss.

It is necessary to use the right tools and wear protective equipment to operate the battery.

Battery maintenance must be performed by personnel with battery expertise and safety training.

The battery system needs to be charged to more than 30% SOC immediately after full discharge.

Failure to comply with the above warnings may have serious consequences.

7 Packaging, Unpacking, Transportation, Storage and Matters Needing Attention

7.1 Packaging, unpacking, transportation and storage

7.1.1 Packaging

a) Packaging scheme: One 6kWh rechargeable li-ion battery system product and one maintenance control box are placed in one box. The whole system is packaged to ensure that the product is free from any harmful gases, chemical pollution, static electricity, moisture and mechanical damage during handling, transportation and storage. The outer packing of the product uses corrugated carton and the inner part uses pearl cotton as cushioning protection, which can reduce the vibration during transportation, etc.

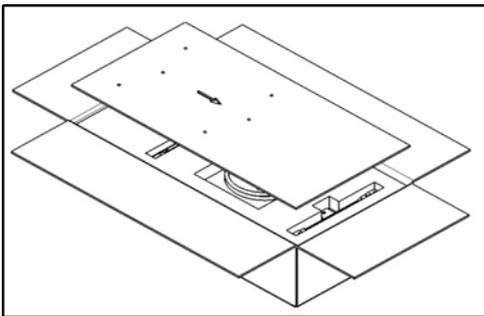
b) Label on package: According to the standard requirements of GB/T 191-2008 packaging labeling, the signs on the outer packing box includes “Handle With Care”, “Up”, “Rain Proof”, “Sunscreen”, “Center of gravity”, “Stack Limit”, “No Turning Over” and “Class 9 Dangerous Goods”.

c) Information on the package includes: name, model, date of production, quantity, address, zip code, executive standard number, net weight and gross weight.

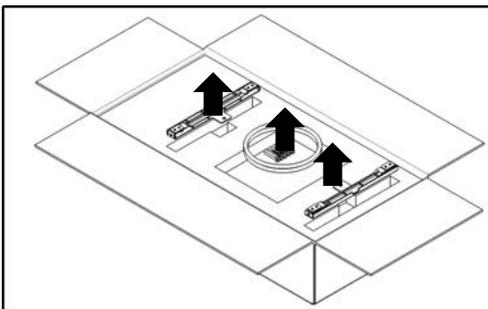
d) Accompanying documents in the packing box include: packing list, product qualification certificate, product user manual and factory inspection report.

7.1.2 Unpacking

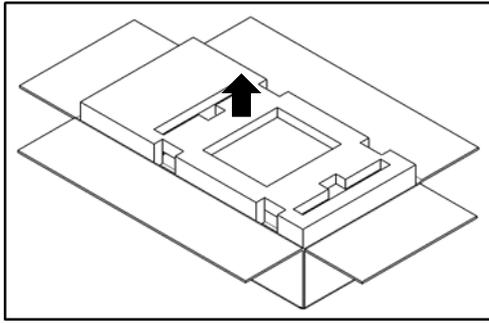
Take out the product according to the following steps:



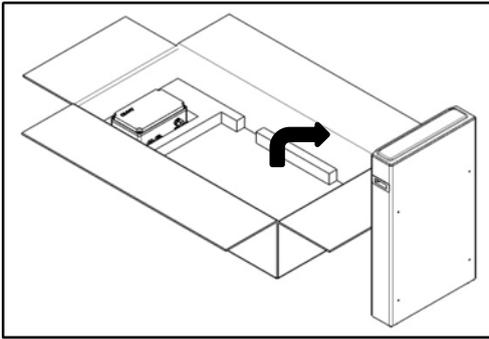
1. Cut off the packing tape and open the carton.
2. Remove cardboard for installation.



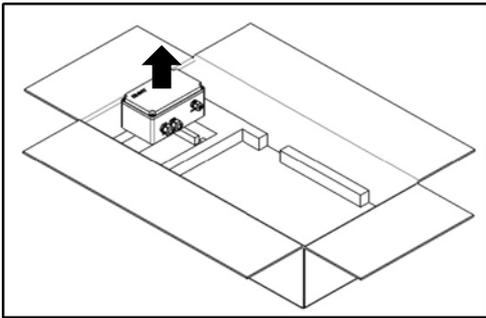
3. Remove wall mounting brackets, fasteners, cables and User Manual, and check for any missing.



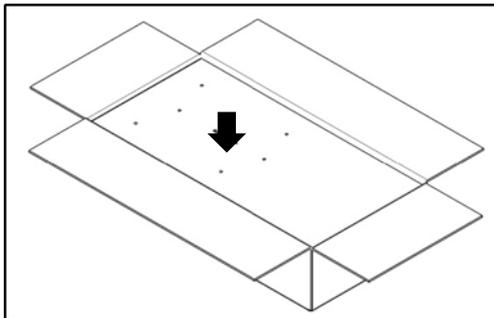
4. Remove EPE foam.



5. Take the battery system out the carton, and place it upright. Check the battery system for damage.



6. Take out the maintenance control box.



7. Put the EPE foam board and cardboard back. Please keep the carton for future storage or transportation.

Figure 7-1 Diagram of unpacking process

Note:

- ① Do not step on the battery system, otherwise it may damage the battery module or equipment.
- ② Do not touch terminals of the battery system, otherwise it may lead to serious electric shock events.
- ③ Observe the unpacking environment and location, and confirm that the unpacking place is indoors and the ground is dry and dust-free (do not unpack in the rain; if water or water traces are found on the outer package, please do not unpack and contact the manufacturer for treatment in time).
- ④ If the battery is damaged when unpacking please take photos and inform the manufacturer.

- ⑤ Do not shake or shock the battery severely when unpacking.

7.1.3 Transportation

a) The product is packed in a box and then transported. During the transportation, the charge state of the battery is 30%~50% or meets the specified requirements.

b) Avoid violent vibration, impact, extrusion and mechanical impact during transportation, prevent direct attack of sunshine, rain and snow, and do not invert.

c) In the process of loading and unloading, loading and unloading in a civilized manner, lifting and releasing gently, strictly prevent throwing, tumbling and pressure.

7.1.4 Storage

a) The charge state of the product should be no less than 30%, the storage environment temperature is - 30 ~60°C and the relative humidity is 5%~95%.

b) Do not store the product upside down, and avoid mechanical impact and pressure.

c) The product should not be exposed to direct sunlight, avoid contact with corrosive media and keep away from fire and heat sources during storage. The system should be stored in a dry warehouse and not exposed to sunshine or rain. Harmful gases, inflammable and explosive products and corrosive chemicals are not allowed in the warehouse. Avoid mechanical impact, heavy pressure and strong magnetic field effects, as well as direct sunlight. The distance from the heat source shall be no less than 2m. The packing box shall be at least 20cm above the ground and at least 50cm from the window.

d) Under these conditions, the products with a storage period of more than 3 months shall be subjected to a supplementary power supply; the products with a storage period of more than 6 months shall be subjected to full-charge and full-discharge test; the products with a storage period of more than 1 year shall be notified to the manufacturer for re-inspection before use.

7.2 Safety precautions

The installation and maintenance of battery system must be operated by professional technicians. The use of battery system must strictly abide by relevant safety regulations. Non-professional and improper operation may cause serious consequences such as electric shock, combustion and explosion. It is strictly forbidden for non-professionals to install, repair the battery system and abuse beyond the scope.

7.2.1 Moisture-proof and water-proof

The battery system is an energy storage device, including many control circuits and single cells. Liquid entering

the battery system may lead to short circuit, leakage, and corrosion of single cells, electronic circuits and connectors. Therefore, it is necessary to ensure that the battery system will not be immersed in various liquids and moist air will not enter the battery system.

7.2.2 Environmental insulation

The battery system must work within the optimal operating temperature range, which can greatly extend the service life of the battery and improve the safety performance of the battery. The temperature limit should fully meet the various definitions in the specification. The space where the battery system is installed shall be kept ventilated and insulated and shall not be exposed to direct sunlight.

7.2.3 Insulation

All power supply connections in the battery system must ensure that there are adequate insulation protection measures to ensure that the positive and negative poles of the battery will not contact the outer box under any circumstances, resulting in power leakage and short circuit. It is absolutely necessary to ensure that the positive and negative poles of the battery system will not be short-circuit directly at any time, otherwise major safety and electric shock accidents may occur.

7.2.4 Unimpeded air channel

In the process of high current charging and discharging, the battery will generate certain heat. The thermal management system of the battery pack adopts the form of fan exhaust to dissipate heat. Therefore, in the process of installation of the battery pack, it is necessary to fully consider the unimpeded intake and outlet of the battery pack and the air volume meets the design requirements, so as to ensure the heat dissipation effect of the battery pack. Otherwise it may seriously damage the performance of the battery, cause the battery not to work, and even cause the thermal runaway accident of the battery.

8 After-sales Service

Zhejiang Chint Electrics Co., Ltd. provides customers with all-round technical support and after-sales service.

Users can access to service through our service telephone:

Service Tel: 021-67777777-889828

The free warranty period refers to the contract.

The following situations are not covered by our free warranty service:

- (1) System damage or malfunction caused by failure to follow the instructions.
- (2) Damage or malfunction caused by failure to wiring and power supply in accordance with relevant electrical safety specifications or poor site environment.
- (3) System damage or malfunction caused by users' private modification.
- (4) System damage or malfunction caused by irresistible natural factors such as typhoon, earthquake, flood, fire, or severe environment (high temperature, low temperature, high humidity, acid rain, etc.).
- (5) The user fails to maintain the initial failure state after the failure occurs, fails to notify the manufacturer in time and handles it by oneself, which fails to make practical fault identification for the cause of the failure.

Notice

Dear _____customer/company,

Thank you for purchasing and using our products!

This product is a technical product, you need to strictly follow the operation instructions in the User Manual, and ensure carefully reading and understanding the User Manual before operating the product.

If the operation instructions shown in the User Manual are violated, serious consequences such as product damage, out of control, smoking and fire may occur.

Thanks for your supporting!

Zhejiang Chint Electrics Co., Ltd.

Date: _____

Notice Receipt

Zhejiang Chint Electrics Co., Ltd.,

Hello!

I have carefully read and understood the operation content of User Manual of R6 Rechargeable li-ion battery system, and will operate in strict accordance with the content of User Manual. If there is any abnormal situation, I will contact your company at the first time and protect the site.

As shown in the notice, I will actively cooperate, use the product correctly, and ensure the stable operation of the product.

Thank you!

Signature: _____

Date: _____



Zhejiang CHINT Electrics Co.,LTD.

Add: NO.3255 Sixian Road,Songjiang District, Shanghai, China

Tell: + 86 - 21 - 6777 7777 - 889828

Http: //www.chint.com

V1.0