

5MWh Liquid-cooled Battery Container User Manual

(REE-ESB-0250-5000-0150)

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1. Preface

1.1. Overview

This manual mainly introduces the 5MWh liquid-cooled battery cabin system produced by REsource Electric Tianjin Ltd. This system integrates batteries, battery modules, BMS, thermal management, power distribution, fire protection and security functions.

This manual detail product-related information, installation instructions, operation and troubleshooting, etc. Before installing and commissioning the equipment, the user must read and understand all instructions contained in this manual and be familiar with the relevant safety symbols.

Readers are required to have certain electrical theory, electrical wiring and professional mechanical knowledge. Please read this manual carefully before installing this product and ensure that relevant personnel can easily obtain and use it.

1.2. Abbreviations

REN	REsource Electric Tianjin Ltd.
AC	alternating current
DC	direct current
PACK	Battery Pack
RACK	Battery cluster
PCS	Energy Storage System Converter
EMS	Energy Management System
BMS	Energy Storage (Battery) Management System
BAMU	Battery Array Management Unit
BCMU	Battery Cluster Management Unit
BMMU	Battery Management Unit
ESS	Energy Storage System
UPS	Uninterruptible Power Supply

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2.Safety Tips

2.1.Symbol Conventions

To ensure the personal and property safety of users during the installation of this product, or to use this product effectively and optimally, this manual provides relevant information and highlights important information with appropriate symbols.

The following is a list of symbols that may be used in this manual to describe hazards to equipment or personnel.




Relevant procedures and practices should be followed. Failure to correctly perform or follow these symbols may result in damage to the equipment or other related equipment, or even personal injury.

Symbol	illustrate
	This symbol indicates a hazard which, if not avoided, will result in a risk of injury.
	This symbol indicates that the machine contains high voltage which may cause electric shock if touched.
	This symbol indicates that the temperature of the part is higher than the acceptable temperature range of the human body. Do not touch it to avoid burns.
	This symbol indicates that the place where it appears is the protective earth (PE) point, which needs to be safely grounded to ensure the safety of the operator.
	This is the correct upright position of the delivery package when transporting or storing.
	Indicates that you should read the operator's manual before continuing.
	Symbol indicating that batteries should be collected separately.
	Indicates that the battery should be disposed of properly.
	Indicates that the cargo is Class 9 dangerous goods and its UN number is 3536.



The container (or container product) is very heavy, so operators are reminded to handle it with care.

Definition of Danger, Warning and Caution symbols:

 Danger
<p>DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.</p>
 warn
<p>WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.</p>
 Notice
<p>CAUTION indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.</p>

For safety reasons, it is the installer's responsibility to familiarize himself with the contents of this manual and all warnings prior to the installation process.

2.1.Safety Instructions

2.1.1.General safety

This chapter explains the safety precautions that need to be paid attention to for the correct use of this product. Before using this product, please read the product manual and correctly understand the relevant information about the safety precautions. Failure to comply with the matters stipulated in the safety precautions may result in death, serious injury, or damage to the equipment.

The "Danger", "Warning", "Caution" and "Notes" in the manual do not represent all the safety matters that should be observed but only serve as a supplement to all safety precautions. You must also comply with relevant international, national or regional standards, as well as industry practices. The company does not assume any responsibility for any violation of safety operation requirements or violation of safety standards for design, production and use of equipment.

This product should be used in an environment that meets the design specifications. Otherwise, it may

cause malfunctions. Functional abnormalities or component damage caused by failure to comply with relevant regulations are not within the scope of product quality assurance.

The company will not assume any legal responsibility for personal safety accidents, property losses, etc. caused by failure to comply with the contents of this manual or illegal operation of the product.

The Company shall not be liable for any of the following circumstances or their consequences:

- Equipment damage caused by force majeure such as earthquake, flood, volcanic eruption, mudslide, lightning strike, fire, war, armed conflict, typhoon, hurricane, tornado, extreme weather, etc.
- Failure to operate the product in accordance with the instructions in the manual may result in product damage.
- The installation and use environment does not comply with relevant international, national or regional standards.
- Unqualified personnel are not allowed to install and use the equipment.
- Failure to follow the operating instructions and safety warnings in the product and documentation.
- Unauthorized disassembly, modification of the product, or modification of the software code.
- Damage caused by you or a third party you entrusted to transport the goods.
- Damage caused by storage conditions not meeting product requirements.
- The materials and tools you bring with you do not meet the requirements of local laws, regulations and relevant standards.
- Damage caused by your or a third party's negligence, intent, gross negligence, improper operation, or reasons not attributable to our company.
- Product damage caused by use beyond the specified range of the product.

General Requirements

 **Danger**

General Safety:

- (1) Do not install, use or operate outdoor equipment and cables (including but not limited to moving equipment, operating equipment and cables, plugging and connecting outdoor signal

interfaces, working at height and outdoor installation) under severe weather conditions such as lightning, rain, snow, strong winds, etc.

- (2) Before touching any conductive surface or terminals, always measure the voltage to ensure that there is no risk of electric shock.
- (3) In case of fire, evacuate the building or equipment area and sound the fire alarm or call the fire department. Do not re-enter a burning building under any circumstances.
- (4) Do not disable any protective devices.
- (5) It is strictly prohibited to artificially change, damage or cover the logos and nameplates on the equipment.
- (6) It is strictly forbidden to work with live power during the installation process.
- (7) Do not use water to clean electrical components inside or outside the cabinet.
- (8) Do not change the structure and installation sequence of the equipment without authorization.
- (9) It is prohibited to reverse engineer, decompile, disassemble, disassemble, adapt, implant or otherwise derive the device software. It is also prohibited to study the internal implementation of the device, obtain the source code of the device software, steal intellectual property or disclose any results of the performance testing of the device software.


Personal safety:

- (1) During equipment operation, if there is a possibility of personal injury or equipment damage, the operation should be stopped immediately, the situation should be reported to the superior, and feasible protective measures should be taken.
- (2) Do not touch live equipment to avoid electric shock and burns.
- (3) Do not energize the device until the installation process is complete or the device has been confirmed by a professional.

 Warn

- (1) During installation, operation and maintenance, do not wear watches, bracelets, arm bracelets, rings, necklaces and other conductive items to avoid electric shock and burns; special protective equipment such as insulating gloves, goggles, protective clothing, safety helmets and safety shoes must be worn.
- (2) Installation, operation and maintenance must be carried out in accordance with the steps and sequence described in the instruction manual.

- (3) Do not ignore any warnings, cautions, or precautions in the manual or on the equipment.
- (4) Replace hazard signs that become difficult to read due to long-term use in a timely manner.
- (5) No unauthorized personnel are allowed to enter during the installation process.
- (6) Tools used should have insulated handles for protection, or insulated tools should be used.
- (7) All wiring holes should be sealed, and holes with wires inside should be sealed with fire-resistant sealant.
- (8) During the installation process, you should select a torque wrench with an appropriate range and tighten the screws according to the torque specified in the instructions.
- (9) Before using a tool, you should understand its correct usage to avoid injury or damage to equipment.

 Notice

- (1) After installation is complete, empty packaging materials such as cartons, foam, plastic, and cable ties should be cleared from the equipment area.
- (2) Paint scratches that occur during equipment transportation and installation must be repaired in a timely manner and should not be exposed to outdoor environments for a long time.
- (3) Before operating the equipment, it should be securely fastened to the floor or other stable object.

2.1.2. Personnel safety

 Warn

- (1) During operation and maintenance with voltage, relevant personal protective equipment (PPE) is required to prevent arc flash injuries. The personal protective equipment listed below is for reference only. Always comply with local and national regulations on personal protective equipment.
 - ① Safety boots – Class S3 (Conforming to BS EN ISO 20345:2011)
 - ② Electrical gloves – low voltage/high voltage gloves (ASTM D120, NFPA 70E)
 - ③ Safety Glasses – Inertia Safety Glasses
 - ④ Helmet – Arc Flash Protection Helmet (Fire Resistant 100cal/cm²)
 - ⑤ Mask – Arc Flash Protection Mask (Fire Resistant 100cal/cm²)

- ⑥ High visibility vest
- ⑦ Rescue pole – insulated pole
- (2) Be thoroughly familiar with the composition and working principle of this product, as well as the relevant standards of the country or region where the project is located.
- (3) Personnel responsible for installing or maintaining the equipment must be fully trained, aware of all necessary safety precautions, and able to perform all operations correctly.
- (4) Only qualified professionals or trained personnel are allowed to install, operate and maintain the equipment.
- (5) Only qualified personnel should remove the safety covers and inspect the equipment.
- (6) Personnel operating the equipment, including operators, trained personnel and professionals, should have special operation qualifications such as high-voltage operation, high-altitude operation and special equipment operation as required by the local country.
- (7) Only qualified or authorized personnel are allowed to replace equipment or parts (including software).

Professionals: Personnel who have received equipment operation training or are experienced and are aware of the sources and extent of various potential hazards in equipment installation, operation and maintenance.

Trained Personnel: Personnel who have received technical training, have the required experience, are aware of the hazards that may occur to themselves during certain operations, and are able to take protective measures to minimize the hazards to themselves and others.

Operator: Operators who may come into contact with the equipment, except for trained personnel and professionals.

2.1.3. Electrical safety



Danger

Lockout/Tagout:

- (1) Always follow lockout/tagout procedures before servicing equipment to ensure individuals are protected from accidents caused by accidental energization and exposure to hazardous energy.
- (2) To prevent personal injury or even death from unintended use, defects, or maintenance-related conditions, or from unauthorized personnel, do not touch any equipment inside the enclosure and keep the enclosure door closed unless you are an authorized employee, wear appropriate clothing and shoes that meet personal protective equipment requirements, and ensure that all equipment is properly grounded.
- (3) Isolate equipment powered by battery compartments and keep areas locked unless authorized personnel can unlock when needed.

Grounding requirements:

- (1) For equipment that must be grounded, install the grounding cable first during installation and remove it last during disassembly.
- (2) Do not damage the ground conductor.
- (3) Do not operate the equipment until a grounding conductor is installed.
- (4) The equipment should be permanently connected to protective earth. Before operating the equipment, check its electrical connections to ensure they are securely connected to earth.
- (5) Equipment grounding requirement is $<4\Omega$.

General requirements:

Before making electrical connections, make sure the device is intact. Otherwise, electric shock or fire may occur.

- (1) All electrical connections must comply with local electrical codes.

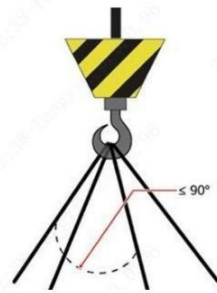
- (2) Before connecting to the grid, a license must be obtained from the local power department.
- (3) Special insulated tools must be used when working with high voltage.
- (4) Do not connect or disconnect the power cable while power is on. Momentary contact between the power cable core wires and conductors can generate arcs or sparks, which may cause fire or personal injury.
- (5) Before connecting or disconnecting the power cord, be sure to turn off the power switch.
- (6) Before connecting the power cord, check that the label on the power cord is correct.
- (7) If the device has multiple inputs, disconnect all inputs and wait until the device is completely powered off before operating the device.
- (8) If parts are damaged, they must be replaced by professionals to avoid risks.
- (9) Cable selection, support and connection, and routing must comply with local laws, regulations, and standards.

2.1.4.Machinery Safety

 Warn

Hoisting:

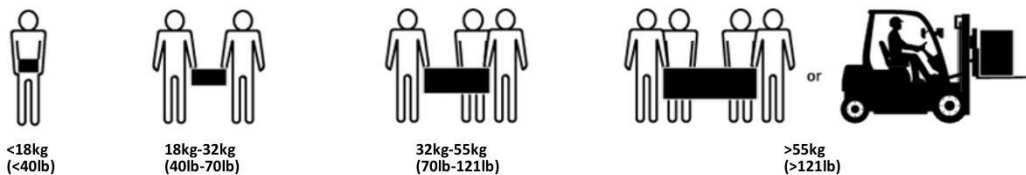
- (1) When lifting heavy objects, do not walk under the boom and the objects being lifted.
- (2) Personnel performing lifting operations need to receive relevant training and pass assessments before they can carry out lifting operations.
- (3) Lifting equipment needs to be checked. Use only undamaged and intact lifting materials.
- (4) Before lifting, make sure the lifting equipment is securely fastened to the load-bearing fixture or wall.
- (5) When hoisting, ensure that the angle between the two ropes is no greater than 90°, as shown in the figure below.



- (6) During the lifting process, the wire rope and sling must not be dragged, nor must they hit hard objects.
- (7) When installing or removing equipment in a cabinet, consider that the cabinet may be top-heavy. Avoid this area during hoisting to prevent crushing injuries.
- (8) When lifting heavy objects, be prepared to lift them to avoid being crushed or sprained.
- (9) Choose a suitable crane or lifting tool according to the site conditions. The lifting tool used should have sufficient load-bearing capacity, boom length and rotation radius. Before moving, secure the equipment to the crane with ropes and ensure that there is someone to supervise the entire process.

 Notice

- (1) When carrying heavy objects by hand, wear protective gloves to avoid injury.
- (2) When moving the device, be sure to avoid scratching the surface of the device and damaging parts and cables.
- (3) The equipment must be moved carefully to avoid damage due to collision, falling, etc.



2.1.5.Product Safety

 Danger

- (1) Do not short-circuit the positive and negative poles of the product. Otherwise, strong current and high temperature may cause personal injury or fire. During the assembly and connection of the battery system, adequate safety protection should be provided to prevent short circuit.

- (2) Do not overcharge or over-discharge the product. Otherwise, it may cause overheating of the battery in the module and fire incidents. During the installation and use of the product, multiple fail-safe protection measures should be implemented to prevent overcharging and over-discharging of hardware and software.
- (3) The positive and negative poles of the product should be connected strictly according to the markings and instructions. Reverse or incorrect connection is not allowed.
- (4) Customers should firmly fix the product on a solid flat surface. The power cables should be securely tied in the right position to avoid arcs and sparks caused by friction.
- (5) Improper electrical connections may cause overheating when using the product.
- (6) The product should be protected from mechanical vibration, collision and pressure shock during use. Otherwise, a short circuit may occur inside the product, resulting in high temperature and fire. The product has potential risks. Appropriate safety measures must be taken during operation and maintenance. Improper operation during safety performance testing may cause the battery in the module to catch fire or explode. Safety performance testing can only be performed by professionals in professional laboratories using appropriate protective equipment. Otherwise, serious personal injury and property damage may occur. Failure to comply with the above precautions may result in different serious incidents.
- (7) The following risks may occur during the use and operation of the product: Operators may be injured by chemicals, electric shock or arc during operation. Although the human body reacts differently to DC and AC, both DC and AC with voltages exceeding 50V can cause serious harm to the human body. Therefore, customers must take a conservative approach during operation to avoid injury from current. The above potential risks must be considered during product operation and personal protective equipment selection to prevent accidental short circuits and the resulting arcs, explosions or thermal runaway.

 Notice

- (1) Do not immerse the product in water.
- (2) Improper use and improper storage of the product may create a risk of fire,

explosion and burns. Do not disassemble, crush, incinerate or heat the product.

- (3) Do not expose the product to fire or high temperature environments that exceed the temperature range specified in this specification for a long time. Otherwise, it may cause a fire. Under any normal use conditions, the battery temperature in the module must not exceed 50°C. If the temperature exceeds 50°C, the product should be turned off and stopped.
- (4) Keep the product out of the reach of children. Do not remove the original packaging before use. Dispose of the old product in a timely manner in accordance with local recycling or waste management regulations.
- (5) The product may not be disassembled, disassembled or repaired in any way without authorization.
- (6) Do not mix products of different strengths, brands and batches.
- (7) Do not expose the product to fire or high temperature conditions exceeding the temperature range specified in this specification for a long period of time.
- (8) If the product emits an odor or becomes hot, deformed, discolored, or exhibits any other abnormality, it must not be used and should be moved to a safe place.
- (9) Improper charging termination may occur during the charging process of the product. If charging is terminated due to exceeding the allowed charging time, charging voltage being too high, or charging current being too large, this phenomenon will be defined as "improper charging termination". When any of the above phenomena occur, it may mean that the battery system is leaking or some parts are malfunctioning. Continuing to charge the product before the root cause is identified and fully resolved may cause the batteries in the module to overheat or catch fire.
- (10) If the electrolyte leaks, protect the skin and eyes from contact with the electrolyte. In case of contact, clean the contact area with plenty of water and consult a doctor for help. No part of the product should be swallowed by any person or animal.
- (11) When the product capacity does not exceed 65% of the nominal capacity, the customer should stop using the product. Otherwise, the company will not be responsible for product parameter differences, quality problems, battery failures and any losses.

3.Product Information

3.1.Equipment parameters

Table 3-1 Equipment parameters

5MWh liquid-cooled battery compartment			
Product Type	Lithium iron phosphate battery system		
Serial number	project	Specification	
1	Configuration	12*(1P104S*4)	
2	Rated power	5.015 MWh	
3	Rated voltage	1331 . 2 VDC	
4	Voltage range	1164 . 8-1497 . 6 V D C	
5	Rated charging power	≤ 2.5 MW	
6	Rated discharge power	≤ 2.5 MW	
7	Auxiliary power supply	400V AC±5% 50Hz /220VAC (important load)	
8	Basic parameters	altitude	≤2000m (derating is required for distances above 2000m)
9		size	6058mm(length)*2438mm(width)*2896mm(heig ht)
10		color	RAL 7035 (default)
11		weight	≤43t
12		IP Rating	IP55 (default)
13		Refrigerati on method	Liquid Cooling
14		Communic ation Protocol	C A N / I E C 6 1850 / I E C 10 4 / T C P / M O D B U S R T U
15		Coolant	50% ethylene glycol aqueous solution

3.2.System Introduction

5 MW h liquid-cooled container system is a high- energy- density integrated system consisting of battery modules , high-voltage boxes , fire - fighting units , temperature control units , and power distribution units .


Table 3-2 Liquid Cooling Container Equipment Components

Serial number	Part Name	Specification	Parameter Description	quantity
1	Battery Module	1P104S	The battery box is composed of 8 1P13S 314Ah lithium iron phosphate modules connected in series. In addition to the battery cells, wiring harnesses and structural parts, each battery box is also equipped with a battery management unit BMU. The PACK is equipped with a fuse, and the battery module protection level is IP67	48
2	High voltage box		The two-in-one high-voltage box is mainly composed of a battery management unit BCU, wiring harness, terminal blocks and related structural parts. Design high-voltage DC power interface, CAN interface, isolation switch, power input interface, etc.	6
3	Power Distribution Unit		Including battery management unit BAU, power switches and wiring terminals of temperature control unit, fire protection unit, communication system, etc.	1
4	Temperature control unit		Including 60kW liquid cooling unit, liquid cooling pipes, coolant, etc.	1
5	Fire Fighting Unit		Aerosol + DN65 water firefighting interface	1

3.2.1. Battery Cell

The energy storage system uses 3.2V 314Ah single battery, which is a lithium iron phosphate system with many advantages such as high safety, long life and low cost.


Table 3 - 3 Battery cell parameters

Serial number	project	Specification	Diagram
1	Cell Type	Lithium iron phosphate 3.2V 314Ah	
2	size	174.7±0.8*207.2±0.8*71.70±0.8mm	
3	weight	(5.56±0.15)kg	
4	Nominal capacity	314Ah	
5	Nominal voltage	3.2V	
6	Nominal energy	1004.8Wh	
7	Energy density	180.7Wh/kg	

3.2.2. Battery Module

The battery module (battery box) measures 2187*790*245mm, and the battery pack management unit is installed on the front panel of the battery box for easy disassembly and maintenance. The battery box contains 104 batteries, which are grouped in series with 8 modules of 1 in parallel and 13 in series, forming 1 in parallel and 104 in series. The battery box has IP67 protection, uses stamped high-strength liquid cooling plates, liquid cooling, PACK-level fire protection, and has a high-strength structure and high safety performance design.

Table 3 - 4 Battery module parameter table

Serial number	project	Specification	Diagram
1	Configuration	1P104S	
2	size	2209±3mm×790±3mm×245±3mm	
3	weight	664±10 kg	
4	Nominal capacity	314Ah	
5	Nominal voltage	332.8V	
6	Nominal energy	104kWh (@25°C±2)	
7	Voltage range	260V~379.6V	
8	IP Rating	IP67	

3.2.3.High voltage box

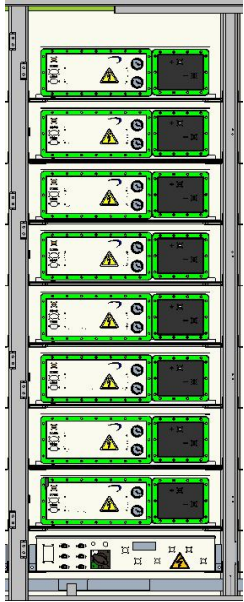
The high-voltage box is mainly composed of an isolating switch, a contactor, a fuse, a Hall sensor, and a pre-charging circuit. The BMS master monitors the cluster voltage, current, insulation, etc., and realizes the on-off control of the battery cluster, the inter-cluster circulation, and the cluster-level protection functions. At the same time, the high-voltage box also has the functions of pre-charging current, relay adhesion detection, battery cluster on-site protection, and overcurrent protection.

3.2.4.Battery Cluster

The battery cluster is mainly composed of the following parts: battery box, high-voltage box, battery rack, liquid cooling pipe, high and low voltage wiring harness, fire protection pipe and other components. There

are 6 rows of battery containers, each with 9 slots. It can accommodate 8 battery modules and 1 two-in-one high-voltage box. The upper four layers are a cluster, and the lower four layers are a cluster. The upper and lower clusters share a high-voltage box. All wire connections and pipes in the liquid cooling container are placed on the front side of the rack for easy installation and maintenance.

Table 3 - 5 Battery cluster parameter table

Serial number	project	Specification	Diagram
1	Configuration	1P416S	 <p>For reference only</p>
2	Number of modules in a single cluster	4 modules in a cluster	
3	Key Components	High voltage box, battery module	
4	High voltage box location	bottom	
5	Nominal capacity	314Ah	
6	Nominal energy	417.996 kWh	
7	Nominal voltage	1331.2V	
8	Voltage range	1164.8~1497.6	
9	Maximum Power	208.95 kW	

3.2.5. Power Distribution Unit

The power distribution unit is used to assist in power distribution and control the power distribution equipment in the system, and plays a role in protecting the normal operation of the entire system. The

power distribution box provides auxiliary power for the following items: battery system, fire extinguishing system, air conditioning/dehumidifier system, liquid cooling unit and other auxiliary power supplies.

It contains three levels of BMS inside. The three-level BMS collects the total voltage, total current, total power and secondary BMS information of the system. It can accurately calculate the battery SOC and cycle times of the battery system in real time, and communicate with PCS and on-site monitoring devices to complete data forwarding and related interactive operations. The three-level BMS stores various events and historical key change data of the battery system locally. The three-level BMS has the function of comprehensively managing the battery system.

3.2.6. Temperature control unit

The liquid cooling unit is a refrigeration product developed for application environments such as energy storage battery heat dissipation. It is suitable for applications where the internal battery of the cabinet generates a large amount of heat and the internal equipment is sensitive to the ambient temperature, ensuring the service life of the equipment in the cabinet. The liquid cooling unit has fault alarm, temperature sensor fault detection, heating overtemperature protection, compressor high-pressure protection, call automatic start function, and start delay function. The liquid cooling unit should have inlet and outlet water temperature detection, inlet and outlet pressure detection, water pump status detection, high-pressure pressure relief function, and low-pressure alarm function.

The primary pipeline adopts stainless steel pipeline equipped with standard sealing pipe clamps, and the secondary and tertiary pipelines adopt standardized quick-plug form. The system flow is optimized and adjusted through a two-stage reducer to ensure the uniformity of the container system flow.

3.2.7. Fire Fighting Unit

3.2.7.1. Fire protection system configuration

The battery liquid cooling container system adopts dual protection of aerosol fire extinguishing system and water fire fighting system. The fire fighting system adopts PACK-level fire fighting + cabin-level fire fighting system for detection and protection.

The battery container PACK is equipped with a safety module, with a single PACK as a protection unit, which can achieve timely fire extinguishing when the PACK is thermally out of control. The cabin is equipped with temperature, smoke detectors and aerosol fire extinguishing devices. If a fire is detected in the cabin, the

aerosol fire extinguishing device will start spraying to extinguish the fire. If the fire cannot be extinguished, water will be poured into the battery cabin through the liquid pipeline through the external water interface to achieve final fire extinguishing.

3.2.7.2. Fire extinguishing flow chart

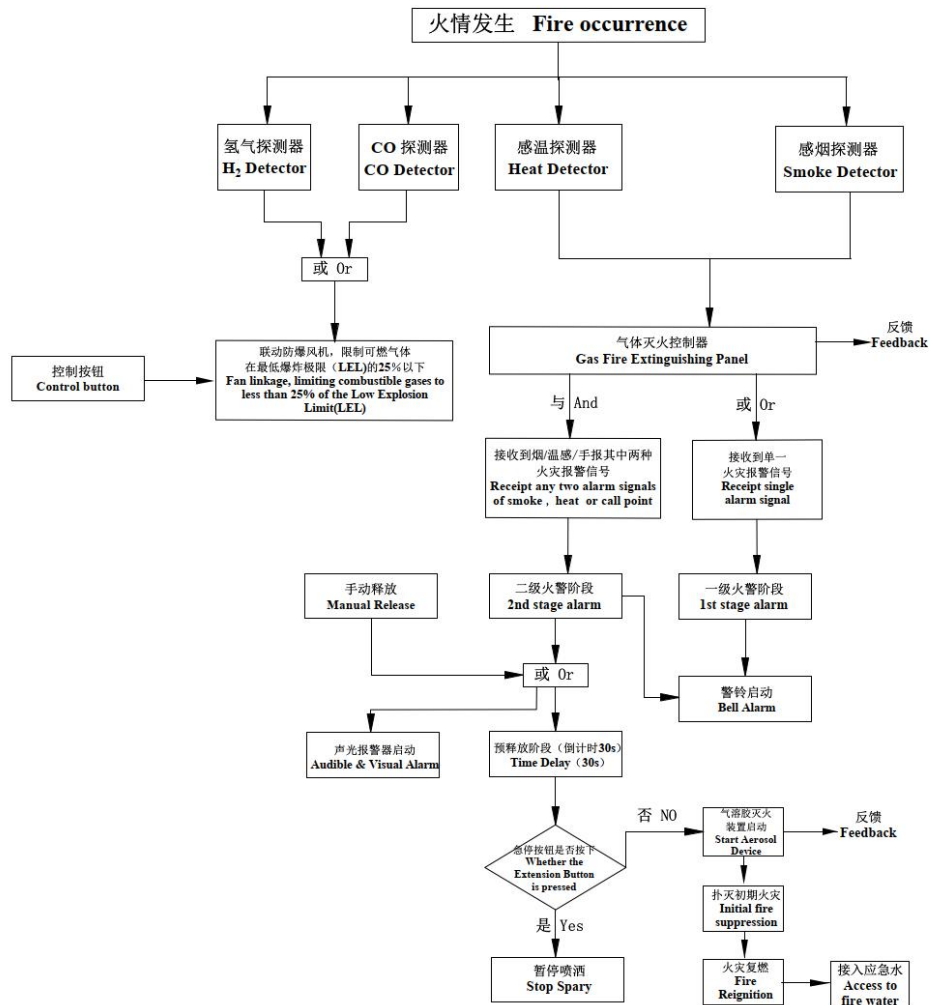


Figure 3-1 Fire extinguishing flow chart

3.2.8.Container cabin layout

The energy storage system adopts an integrated design, integrating energy storage batteries, distribution boxes, liquid cooling units, temperature control systems, fire protection systems, etc. into a 20-foot (6058*2438*2896mm) container. The container has independent power supply systems, temperature control systems, fire protection systems and other automatic control and safety assurance systems. The energy storage system consists of 12 417.996kWh energy storage battery clusters, and the container layout is shown in the figure below.

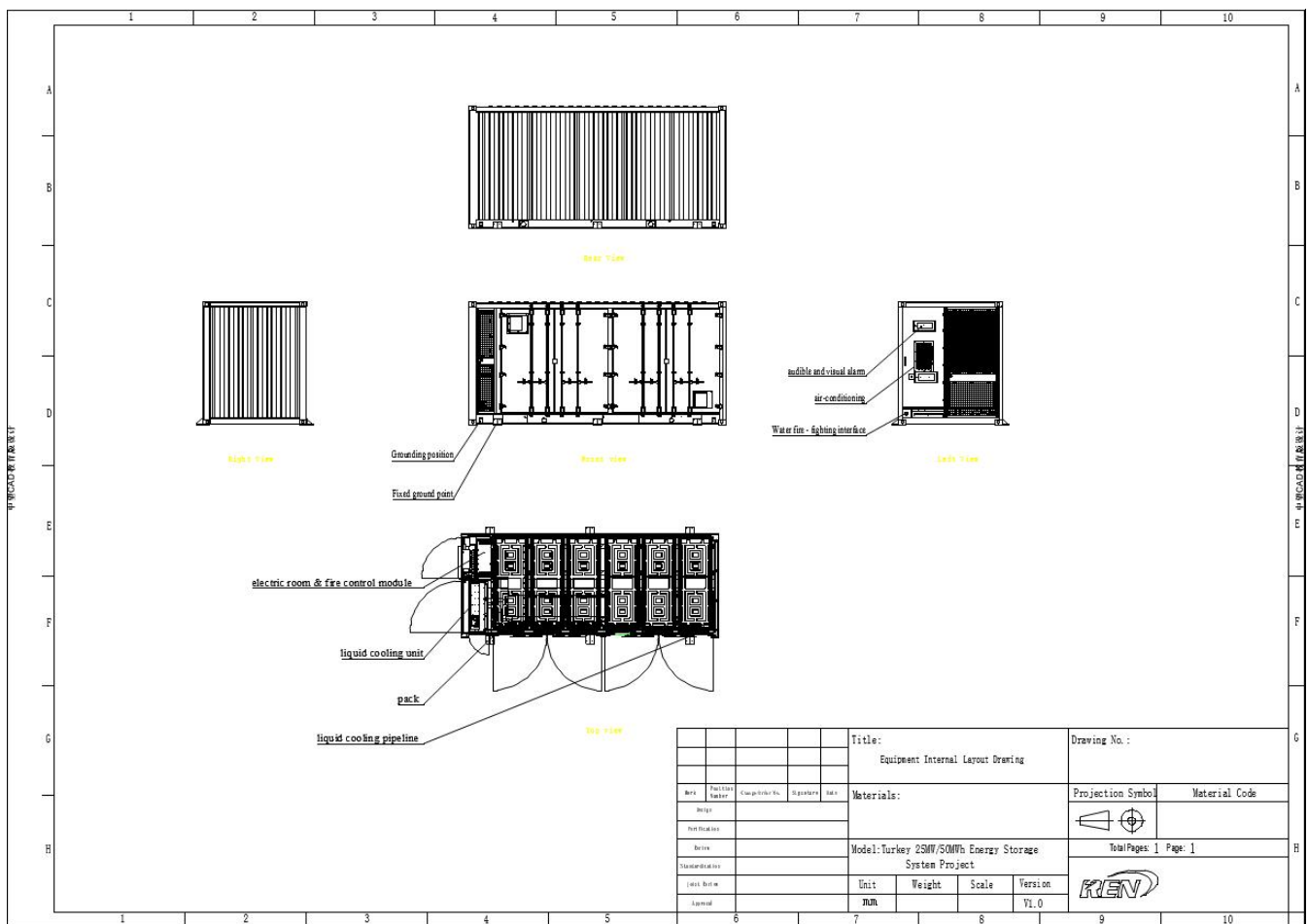


Figure 3-2 Equipment internal layout

4. Packaging, transportation and storage

Notice

Failure to pay attention may result in damage to equipment or property.

4.1. Package

The battery compartment container is an international standard 20-foot ultra-high shipping container, which is sealed with a plastic rain cover before transportation. During the hoisting and transportation process, be careful not to bump it, otherwise it will affect the reliability of the water machine.

4.2. transportation

This product has obtained a transport certificate (UN38.3: Section 38.3 of the sixth revised edition of the Recommendations on the Transport of Dangerous Goods: Manual of Tests and Criteria) and is classified as Class 9 dangerous goods.

4.2.1. Transportation Notes

The product is based on a standard sea container and can be transported by vehicle or ship and delivered directly to the site for installation. The container must be secured for transportation.

Before loading, check whether the packaging is intact and check the cargo information including labels.

Avoid mechanical shock to the container during transportation.

Avoid container inversion, tilting and rolling during transportation.

The loading capacity of the gate hoist should take into account the total weight of the container.

In most cases, the combined weight of the truck and cargo exceeds the limit allowed on ordinary roads. In such cases, an overweight permit from the country or region of transportation may be required.

The stacking capacity of the container is 215,000 kg, and the number of stacking layers of ESS containers is not more than 4 (excluding the bottom container). The battery compartment parameter table is as follows:

Table 4-1 Battery compartment parameters

Length (mm)	Depth (mm)	Height (mm)	Approximate standard weight (kg)	Maximum weight (kg)
6058	2438	2896	42000	43000

4.2.2. Lifting and unloading



Figure 4-1 Schematic diagram of port loading and unloading methods

Hoisting precautions:

1. The hoisting method shown in this figure is for reference only. The lifting equipment used in the actual project, including slings and ropes, should be determined by the lifting company based on the weight and center of gravity of the product. Select a suitable crane or lifting tool based on the site conditions. The lifting tool used should have sufficient load-bearing capacity, boom length and rotation radius.
2. Supported lifting methods: horizontal and vertical lifting using the bottom of the hanger or horizontal and vertical loading and unloading at the port. Tilt is not allowed under any circumstances.
3. The lifting should be slow and steady, and the speed should not be too fast to prevent it from shaking or hitting other objects. The lifting speed should be less than 5m/min.

4. All doors of the container were closed and locked.
5. Make sure all sling connections are secure.
6. When hoisting outdoors, the weather conditions are good and there is no wind. The container should be transported and moved under good weather conditions.
7. Clear the way of any obstacles that exist or may exist, such as tree branches, cables, etc.
8. The container should be lifted vertically. Never drag the container on the ground or on top of the lower container, and do not pull or push it on any surface.
9. Make sure the container is stable and does not tilt during lifting.
10. When the container is in place, place it gently and steadily. It is strictly forbidden to drop it to a place other than a vertical landing point.
11. If the container needs to be transported on a slope, additional traction may be required.
12. Be sure to set up warning signs or warning areas to prevent non-staff from entering the lifting area and avoid accidents.
13. During the design phase, please consult our company to obtain structural drawings.

Lifting requirements:

- The installation of the whole machine must be carried out by personnel with relevant qualifications.
- To avoid the risk of electric shock to personnel, the system must be de-energized before installation.
- Before installation, operators must read the lifting requirements carefully.
- Installers need to take safety precautions according to industry standards, such as wearing protective masks.
- When lifting, the relevant lifting safety regulations should be followed and the lifting equipment should be selected according to the nominal weight on the product nameplate.

Failure to follow these instructions could result in severe personal injury, death, or equipment damage.

During the entire unloading and installation process, adequate safety precautions should be strictly implemented on site, and the installers and project owners shall be responsible for personal injury or property damage caused by violation of the precautions specified in the user manual.

4.2.3.Procedure

Supported lifting methods: Use the horizontal and vertical lifting at the bottom of the hanger or the horizontal and vertical loading and unloading at the port. In any case, tilting is not allowed. (The lifting method is for reference only. The lifting equipment used in the actual project includes slings and ropes, which should be determined by the lifting company based on the weight and center of gravity of the product);

Step 1: Loading and unloading containers at the port;



Figure 4-2 Schematic diagram of container lifting

Step 2: Place the container gently and steadily at the target location, ensuring that the container is correctly connected to the fixed points on the transport vehicle; use a total of 8 corner fittings at the bottom and top to secure the container body to the vehicle with iron chains. One end of the iron chain locks the corner fitting of the container, and the other end is fixed to the frame. A total of 8 iron chains are required.



Figure 4-3 Transportation diagram

Step 3: A rubber pad should be laid between the flatbed truck and the bottom of the cabin to prevent the cabin from sliding during transportation, and the load-bearing surface of the flatbed truck must be flat.

Step 4: After arriving at the destination, assemble the spreader tooling.

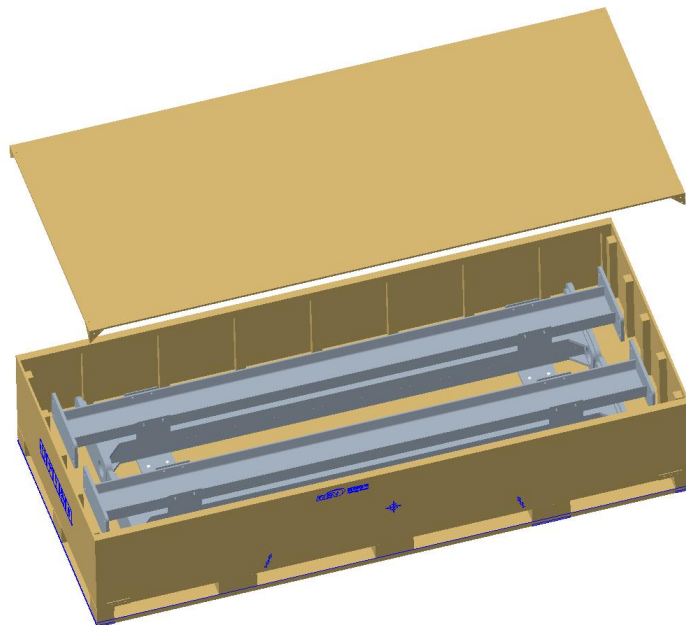


Figure 4-4 Spreader with wooden packaging

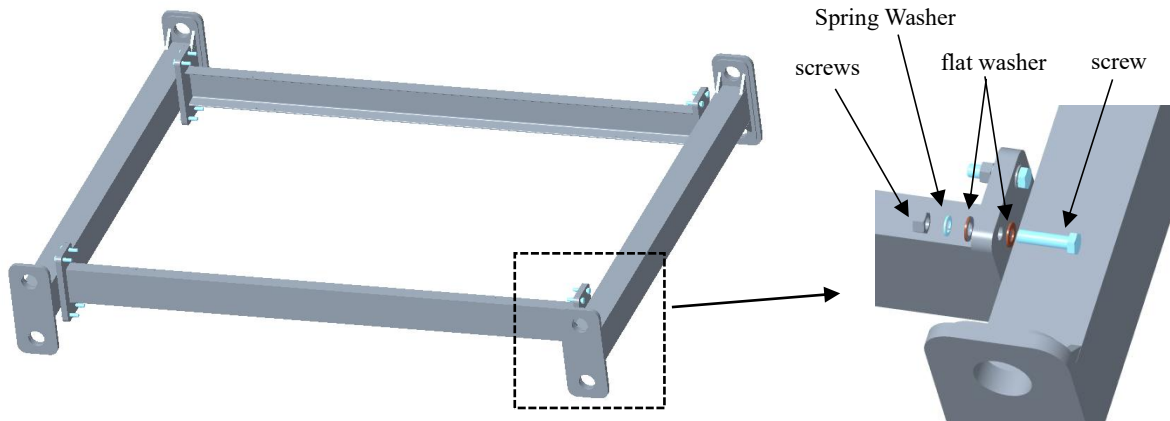


Figure 4 - 5 Assembled hanger and hardware installation (external hexagon cross combination bolt M20×80)

Step 5: Use the lifting equipment to lift the container to the foundation.

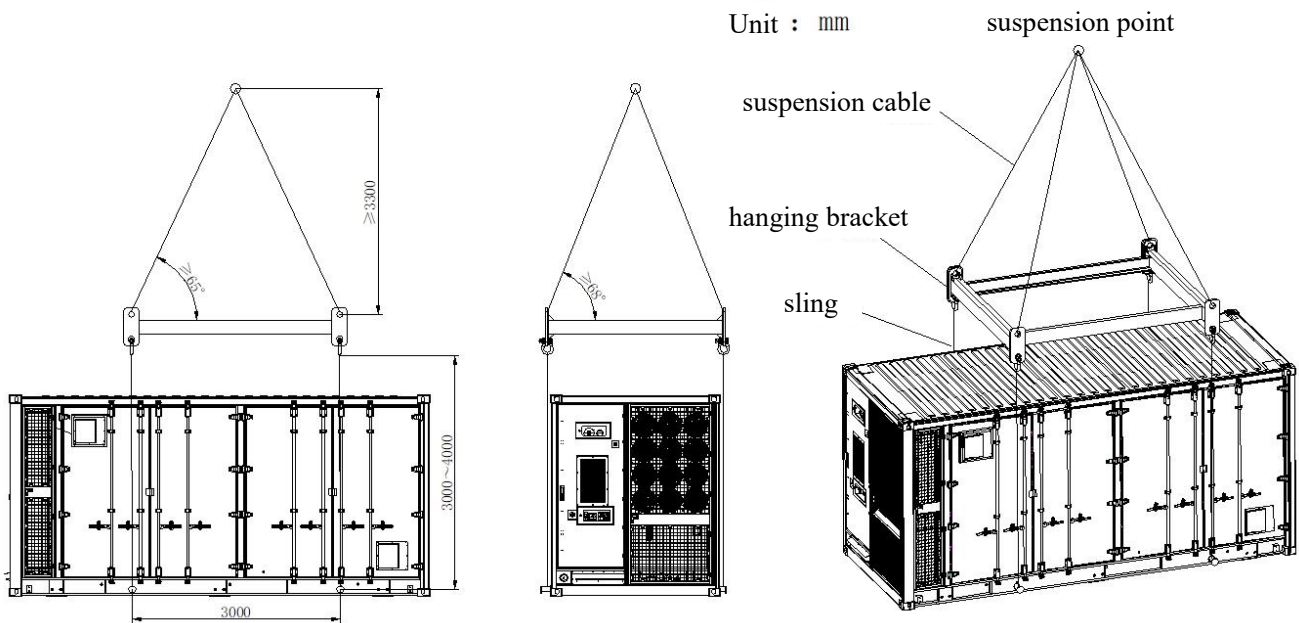


Figure 4-6 Hoisting diagram

Note: When hoisting, it should be done slowly and steadily, and the speed should not be too fast to prevent it from shaking or hitting other objects.

4.2.4. Arrival inspection

The containers have been fully inspected by our quality control staff before shipment and have been securely packed.

However, collision or damage may occur during transportation. After receiving the container, carefully check it according to the shipping list, verify and record the integrity of each item; the above arrival inspection process should be witnessed by our representative on site (or

confirmed in the form of video or pictures) . If there is any abnormality, please contact us in time.

4.2.5.Storage

If not installed or debugged immediately after receipt, the container should be properly stored. The container must be stored on a flat foundation that is strong enough to support the container; it should be stored in a clean and dry place to prevent dust and moisture; the storage temperature should always be kept between -20°C and $+35^{\circ}\text{C}$, and the storage relative humidity should always be less than or equal to 95% , without condensation; be sure to keep the container away from harsh environments such as thermal shock, cold shock or any collision; before storage, make sure that all doors of the container are firmly locked, all air inlets, exhaust ports and cable entrances are properly sealed to prevent animals from entering, and check regularly for visible damage caused by rodents. When installing the container after long-term storage, the cabinet door should be opened for a thorough inspection to ensure that the container is intact, and if necessary, it should be tested by professionals before installation. During storage, relevant records that meet the product storage requirements, such as temperature and humidity record data, storage environment photos and inspection reports, are required. In principle, it is not recommended to store batteries for a long time, and they should be used in a timely manner, because long-term storage of lithium batteries will cause capacity loss. If the product is stored within 6 months , please be sure to perform charging and discharging maintenance (the number of cycles is not less than 1 time). Otherwise, the company will not be responsible for product parameter differences, quality problems, battery failure and any losses .

5.Install

Warn

For safety reasons, all installation processes (including mechanical installation, electrical installation, power on and power off) should always follow the safety instructions in this manual.

5.1.Prepare

Table 5-1 List of recommended installation tools

Serial number	name	picture	Function
1	multimeter		For measuring resistance, voltage and current.
2	Insulating gloves		Used to prevent electric shock.
3	Digital torque wrench		Used to measure torque value.
4	screwdriver		Used to connect shielded twisted pair cables.
5	Network cable pliers		Used for crimping network cables.
6	Wire strippers		Used to strip shielded twisted pair cables.
7	Crimping pliers		For crimping shielded twisted pair cables.
8	Manual hydraulic crimping pliers		For crimping auxiliary power cables.
9	Electric hydraulic crimping pliers		For crimping DC cables.



10	Level		Used to measure the height difference between ground points.
11	Ratchet wrench		For tightening and loosening nuts and bolts
Note: The above tool pictures are for reference only.			

Table 5-2 Recommended external cables

Serial number	name	interface	Quantity (pieces)	Specification	Function
1	External power cable	Behind the PC baffle on the side of the container	12	Copper wire, 150 mm ² ~240 mm ² , cable outer diameter 25 mm ~45 mm , cable current carrying capacity ≥360A	Connect PCS to battery container
2	Auxiliary power cable	XT0 terminal block in the power distribution cabinet behind the cable gland	1	Copper wire, 3L/N, 4*25 mm ² , cable outer diameter 15 mm ~30 mm , cable current carrying capacity ≥80A	External auxiliary power supply
3	External communication cable	XT10 terminal block for BEMU distribution cabinet	1	Control dry contact cable: 2*1.0~1.5 mm ² , cable outer diameter 5 mm~14mm	Connecting PCS and BEMU
		XT11 terminal block of BEMU	1	CAN communication cable: 2 * 1.0~1.5 mm ² shielded	Connecting PCS and BEMU

		distribution cabinet		twisted pair cable and the outer diameter 5mm~14mm	
		Network port 1 of the switch in the power distribution cabinet	1	Network cable: Category 5e shielded network cable	Connecting BAMU and EMS
4	Ground connection	Container shell bottom	2	Connection via M12 bolts 50mm*4mm ground flat steel	Container grounding

5.2.Mechanical Installation

5.2.1.Site requirements

The selection of a container installation site requires careful consideration of various environmental conditions, including but not limited to the following factors: geological conditions, groundwater level , wind speed, snow volume and flood history.

- (1) Ideally, the air surrounding the installation site should be clean, non-aggressive, and unobstructed to airflow.
- (2) The installation site must be away from vegetation or anything that may obstruct airflow.
- (3) The site should be away from concentrated areas of toxic, flammable, explosive, corrosive and harmful gases and substances.
- (4) Make sure the installation site is far enough away from residential areas or set up a fence to prevent unauthorized access.

5.2.2. Requirements for foundation facilities

The container foundation must be designed by a professional civil engineer, comply with local standards, and the construction process should strictly follow the design specifications. The following factors should be considered during the design and construction stages:

- (1) The bearing layer of the foundation should consist of solid soil. If the foundation bearing layer consists of weak soil, it should be replaced with graded sand. The replaced soil layers must be compacted in layers.
- (2) The foundation should be appropriately elevated to prevent rainwater from eroding the foundation, base and interior of the ESS container.
- (3) Design and implement appropriate drainage systems.
- (4) The cross-sectional area and height of the foundation must meet the relevant requirements.
- (5) The horizontal error between the stress points of the four corner pieces at the bottom of the container is $\leq 2\text{mm}$, and the horizontal error between any two stress points at other locations is $\leq 5\text{mm}$. Before lifting, the foundation stress points must be checked for flatness to ensure that the overall flatness of all stress points is within the tolerance requirements. Please keep records. It is recommended to use a level or transparent water pipe to check the height before dropping the container.
- (6) Consider cabling and related work during foundation construction.
- (7) Ensure that all cables are sealed with fire retardant sealant or suitable material at cable entries, exits and connectors.
- (8) The road or pavement around the container needs to be smooth to allow forklifts to pass.
- (9) Determine the distance between the bottom of the container and the ground based on a flood survey.

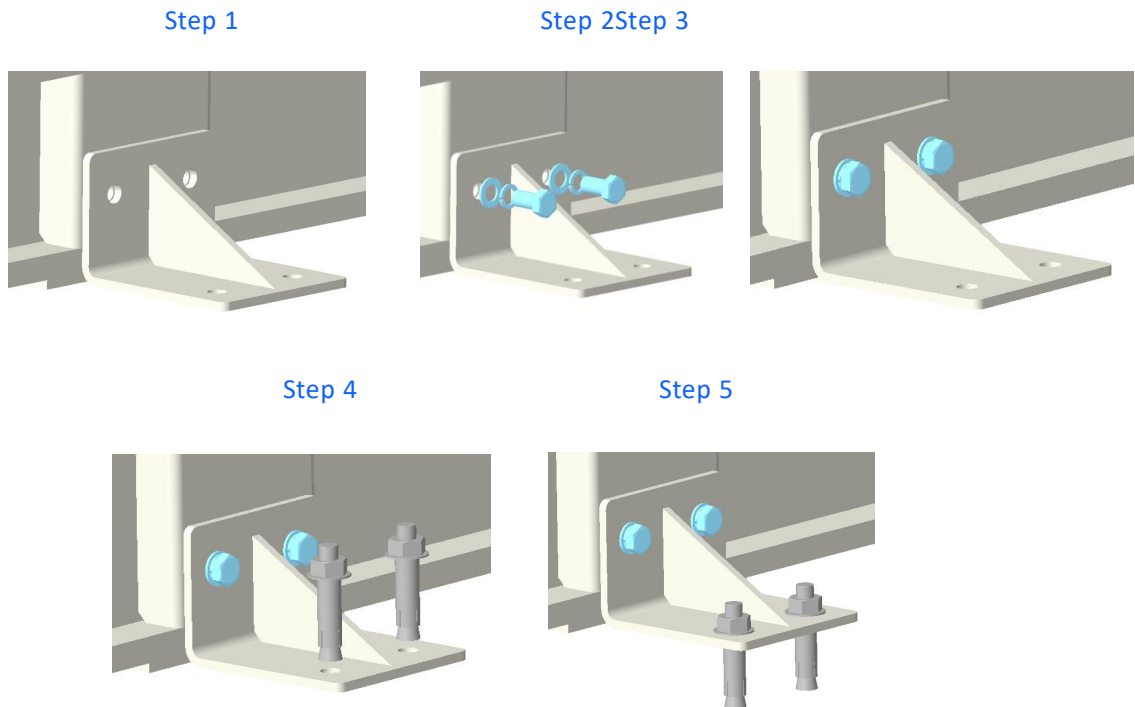
5.2.2.1.Fixed parts installation

Use fixings to secure the fixing points on the bottom of the ESS container to the foundation. There are three fixing points on the left and right sides of the container as shown below.

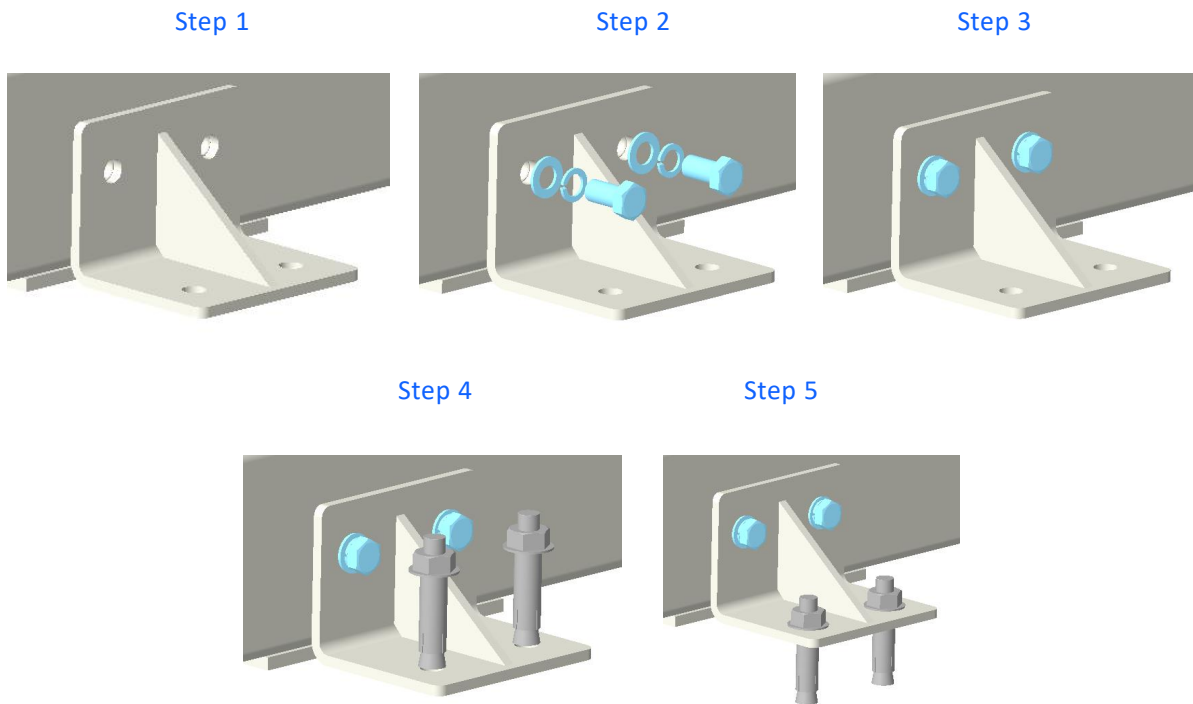


Figure 5-1 ESS container fixing points

The steps for fixing the container front fixings are as follows.



The grounding side of the container rear fixings is shorter than the front fixings (note the difference). The rear fixing steps are as follows.



Notice:

- (1) The mounting hardware for fixing the fixing parts to the container is a combination of M20×40 hexagonal bolts, spring washers and flat washers.
- (2) Before installation, clean the threaded holes and bolts, and apply an appropriate amount of molybdenum disulfide lubricant on the bolts to prevent locking.
- (3) The grounding terminal is an expansion bolt M20×120, which needs to be prepared by yourself.

5.2.3. Protection requirements

Electrical safety devices should be installed in a way that prevents access by unqualified persons. To prevent access, it is recommended to use a fence, screen, wall or barrier not less than 2.1 meters high. The fence should be locked and posted with "Authorized Users Only" or similar signs.

NOTE: If the installation location is located within a property that already contains a perimeter fence to prevent unauthorized public access, additional fencing may not be required.

5.2.4.Product size

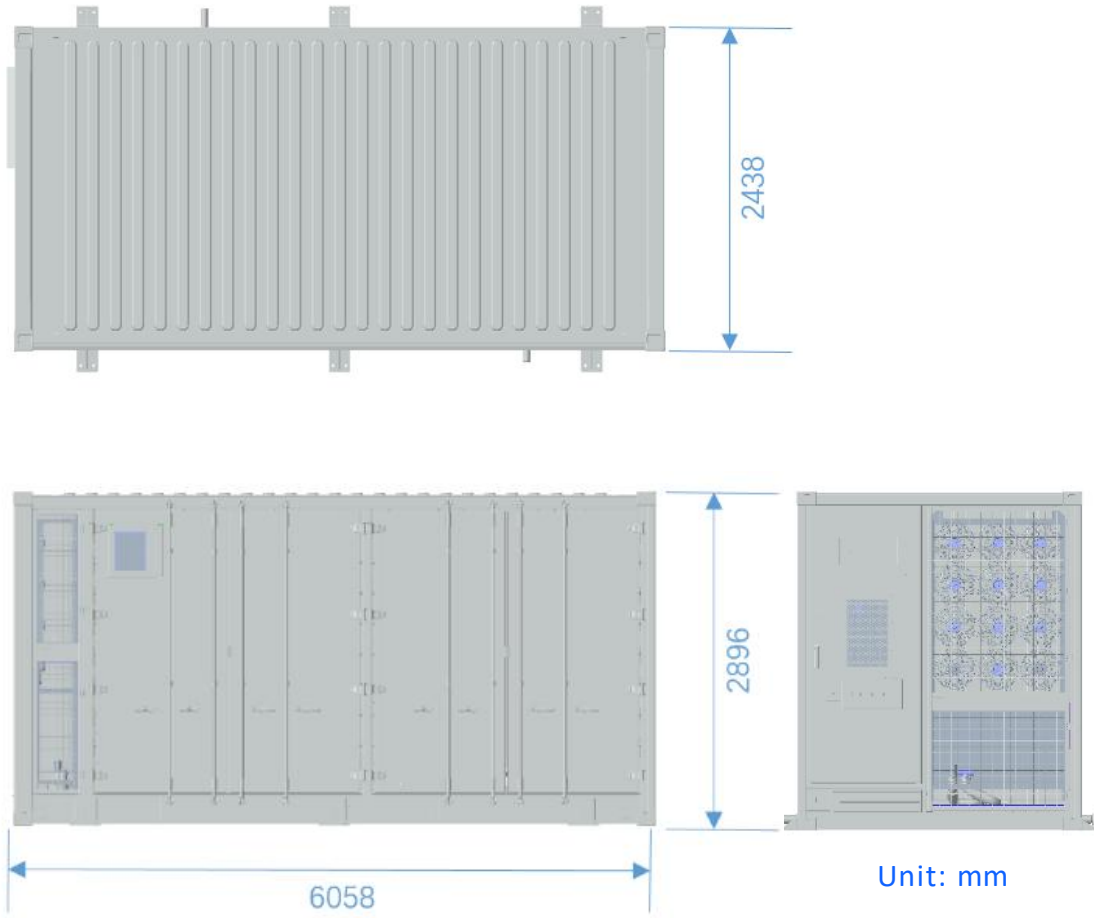


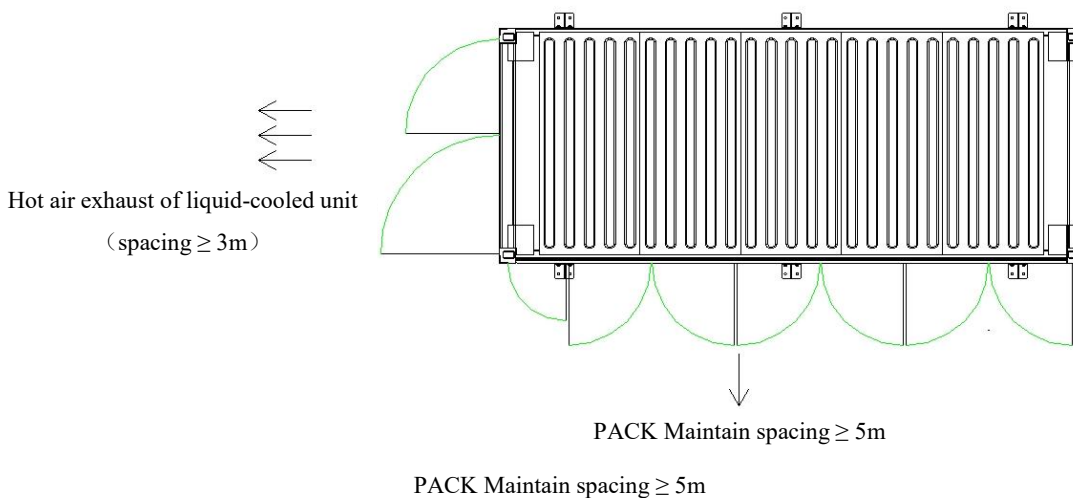
Figure 5-2 ESS container dimensions

5.2.5. Minimum clearance

⚠ Caution/Attention

- When designing the clearances on the sides of the container, local fire protection requirements and user convenience should be considered .
- To optimize space utilization without compromising functionality, two containers can be placed back to back .
- when designing the edges on each side of each container .

The opening area of each door should be considered to determine the minimum clearance between the container wall and the near-end equipment or internal road, as shown in the figure below. The clearance on the side of the liquid cooling unit is $\geq 3\text{m}$, the clearance for PACK maintenance is $\geq 5\text{m}$, and the clearance on the back of the container or between two containers back to back is $\geq 650\text{mm}$.



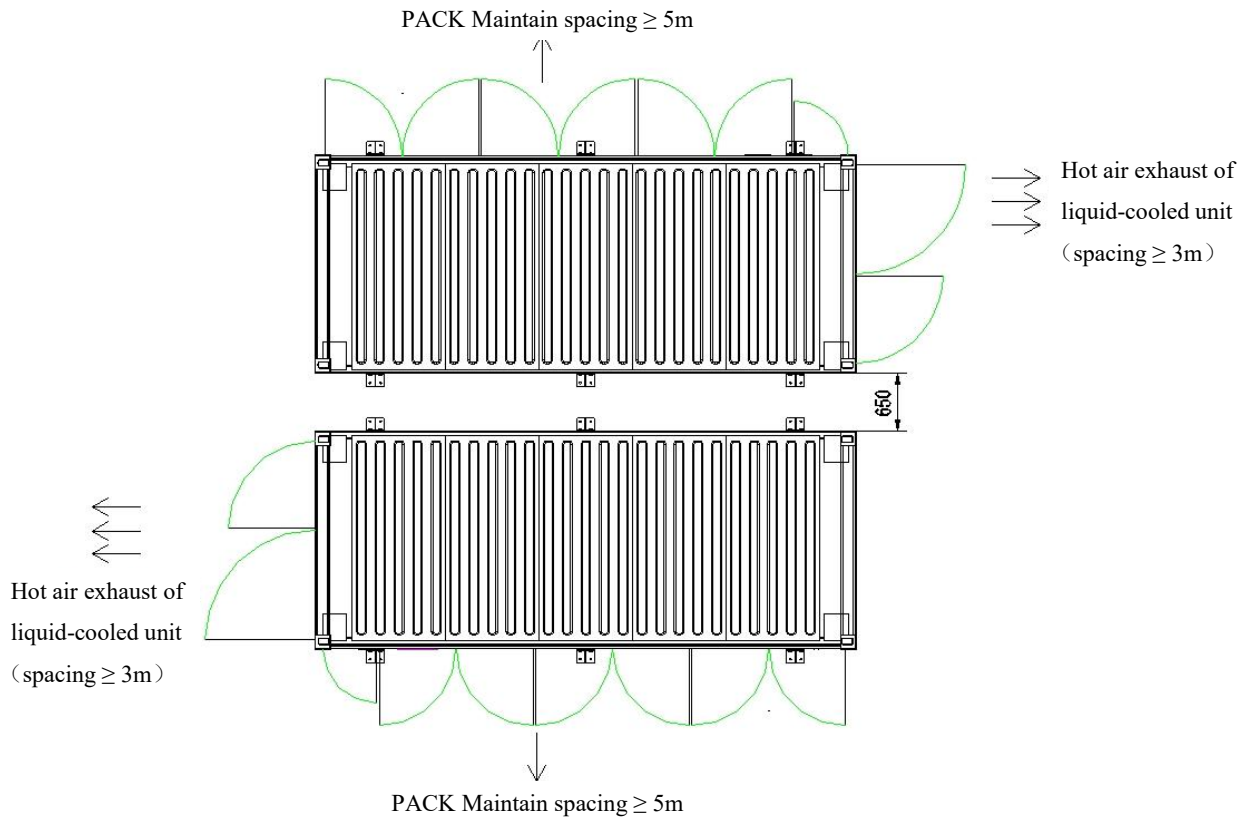


Figure 5 - 3 Gap spacing

5.2.6. Fire water connection

 **Warning/Reminder**

- used for this container is an open system, which means that once the water supply is available, the sprinklers as well as the fire hose will immediately spray water on the battery.
- Therefore, unless there is a fire, it is prohibited to connect the fire protection system to any water supply.
- In the event of a fire, only professional firefighters can connect the fire water system to the fire water supply.
- During installation, commissioning and operation, the fire protection system must not be connected to any external water supply.

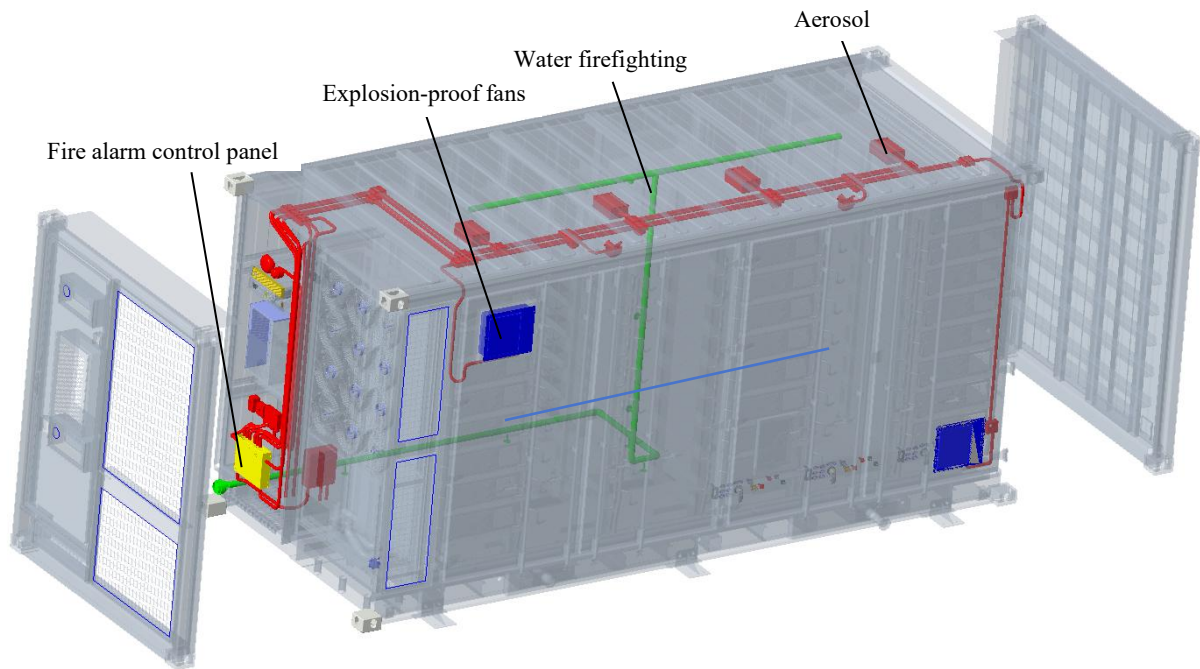


Figure 5-4 Schematic diagram of fire protection system

The container's fire water supply and necessary response procedures should be designed in accordance with the fire department's fire protection protocols or guidelines before installation, rather than waiting for an emergency to occur.

A water pipe inlet is arranged on the side of the container, and the water pipe extending from the inlet to the top of the container is provided with nozzles at different positions.

The DN65 connector is specially designed for connecting outdoor water sources for fire fighting. Please remove the cap before connecting. After correctly inserting, rotate to ensure a reliable connection. The installation steps for the sprinkler system connection are as follows.

- (1) Remove the cover of the DN65 connector.
- (2) Connect the external fire protection pipe to the fitting.
- (3) Twist to tighten.

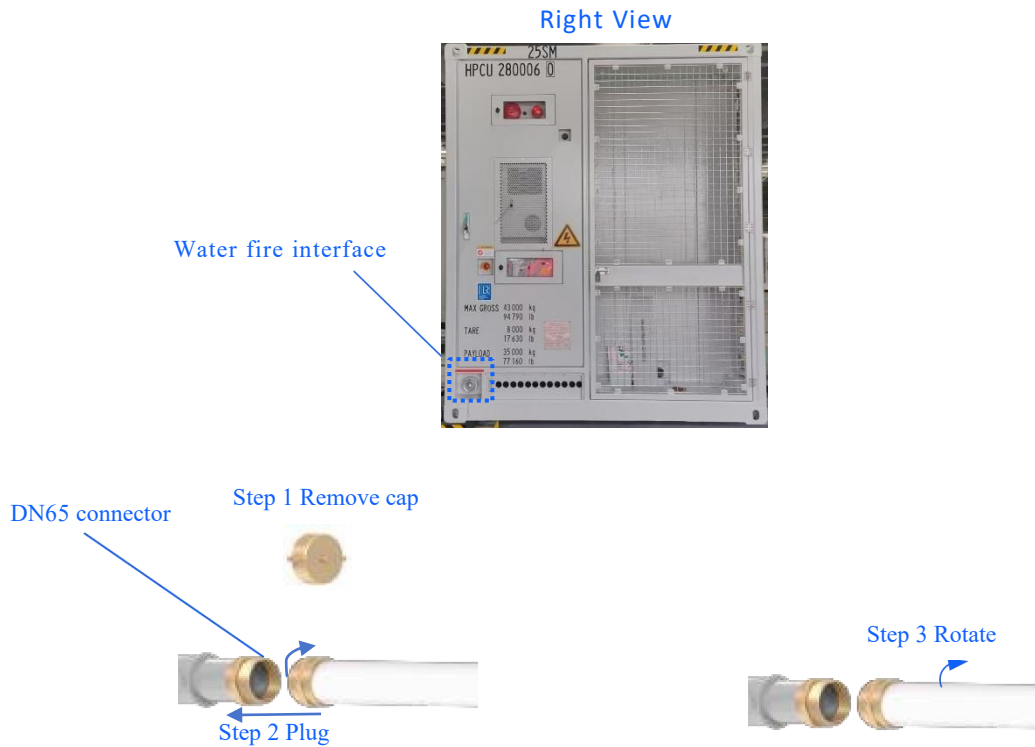


Figure 5-5 Water fire connection point installation

If required, a water supply must be provided from the outside as directed by the fire department and should only be used in the event of a fire on the equipment. The design is to accommodate a direct connection from a fire hose. The connection for the fire hose should match the connection point on the container.

Water pressure and flow rate requirements: The specified water pressure is 1.5 bar and the flow rate at the container inlet is 2~3m/s.

5.3.Electrical Installation

5.3.1.Electrical Principle

In the energy storage system, the on and off of each cluster circuit is controlled by the DC contactor in the high-voltage box, which is controlled by the BCMU (battery cluster management unit). The BCMU communicates with the BMMU (battery module management unit) in a daisy chain manner.

In the high-voltage box, the main circuit loop is protected against overcurrent by a fuse, pre-charging is achieved through a pre-charging circuit, and electrical isolation is achieved through an isolating switch.

In each battery module (1P104S), the BMMU monitors the battery status through 56 temperature sampling points and 104 voltage sampling points.

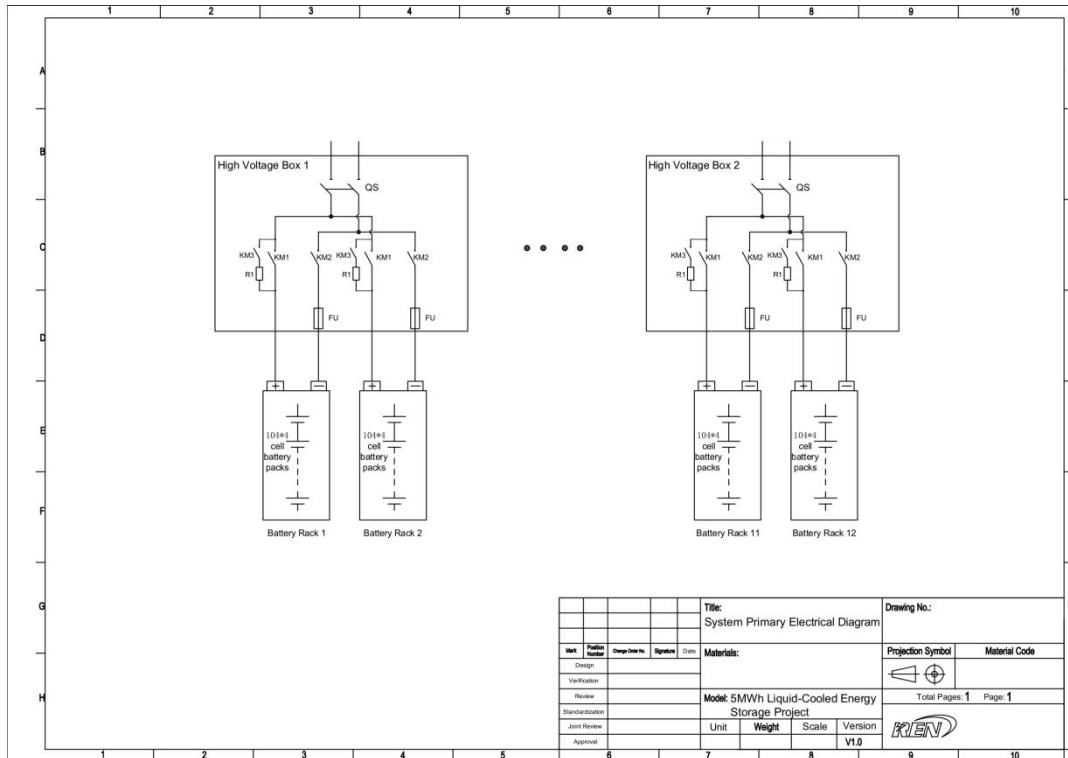


Figure 5-6 Energy storage system electrical primary diagram

5.3.2.DC connection

The connection between the energy storage system container and external equipment includes DC power cable connection, AC auxiliary power cable connection, and communication cable connection.

5.3.2.1.Power connection

The external power cables are connected to the energy storage system through wiring terminals, and 6 wiring terminals are installed in the container.

For recommended cable specifications, please refer to Table 5-2 Recommended external cables.



Figure 5-7 Schematic diagram of power cable interface



Figure 5 - 8 Schematic diagram of the wiring of the busbar



Figure 5-9 Schematic diagram of the appearance of the junction compartment of the confluence part

The specific installation steps are as follows:

- (1) Remove the PC baffle on the container.

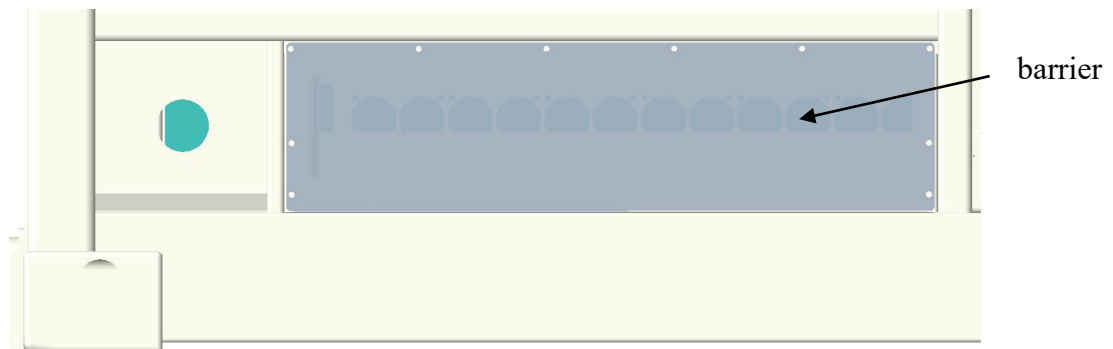


Figure 5-10 Removing the baffle

(2) Install the cable support bracket.

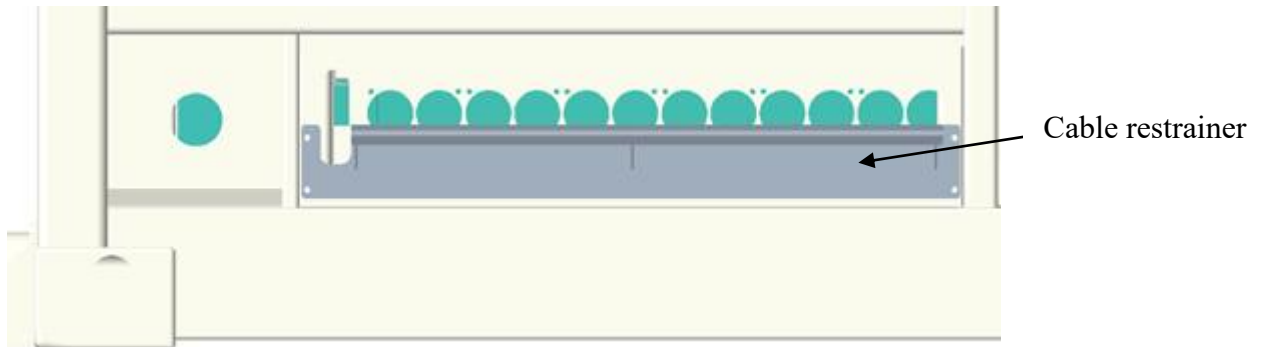


Figure 5-11 Installing the cable support bracket

(3) Select the appropriate cable specification according to the connector specification, strip the appropriate cable insulation, then install the O-type insulation crimping terminal on the cable, and finally use the electric hydraulic crimping tool to crimp. The O-type insulation terminal is required to have a $H \geq 13\text{mm}$ and a $W \leq 42\text{mm}$.

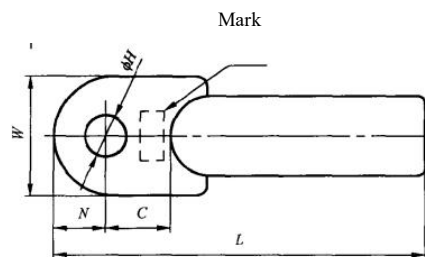


Figure 5-12 Schematic diagram of O-type insulated terminal

(4) Insert the crimped cable into the socket assembly until it is fully seated. Make sure the crimp terminal hole is roughly aligned with the hole on the socket. Then, insert the M12 screw assembly into the socket hole. Tighten the M12 screw with the internal nut from a direction perpendicular to the axis of the socket. Tighten to a torque of $25\sim 30\text{N} \cdot \text{M}$.

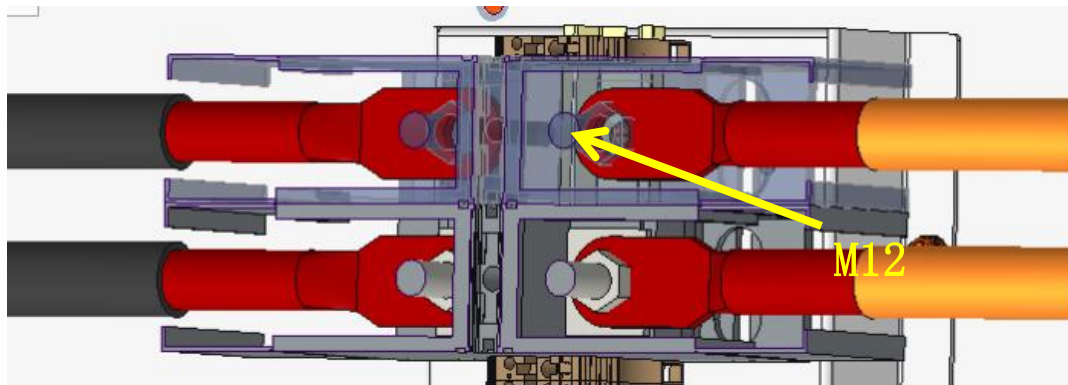
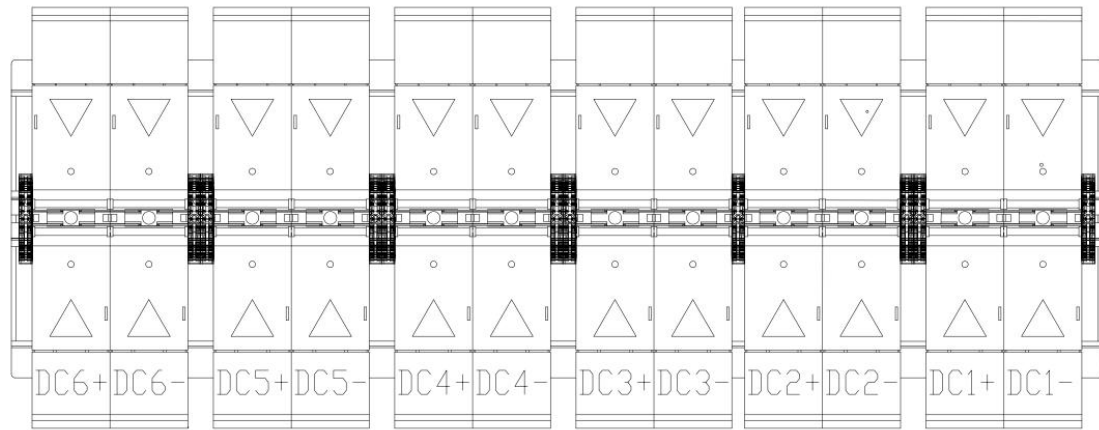


Figure 5-13 Schematic diagram of power cable installation

The power cable installation is completed as shown in the following figure:

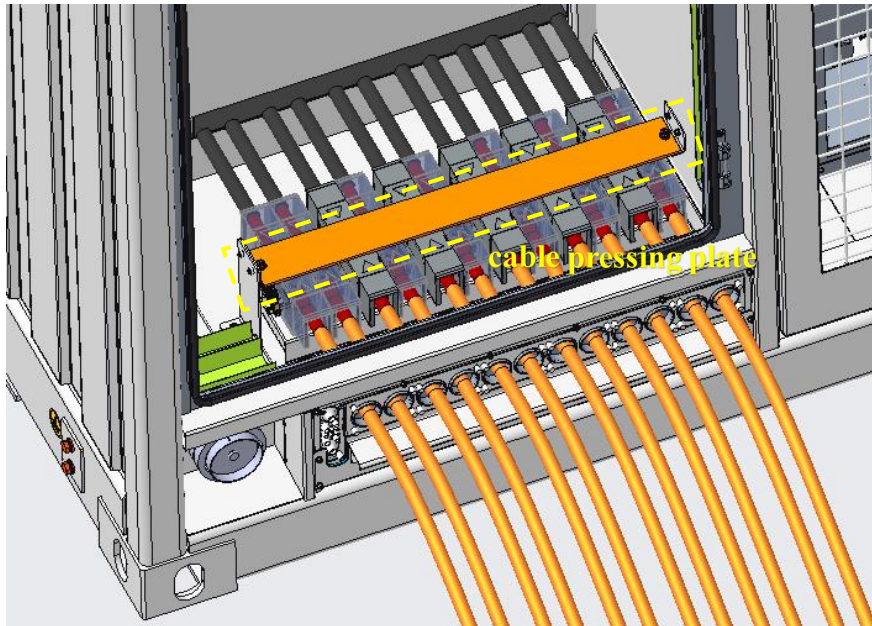


Figure 5-14 Schematic diagram of power cable installation completion

Note: Remove the pressure plate first, and then install the pressure plate after installing the wires.

(5) After connecting the cables, install the weather shield over the cables.

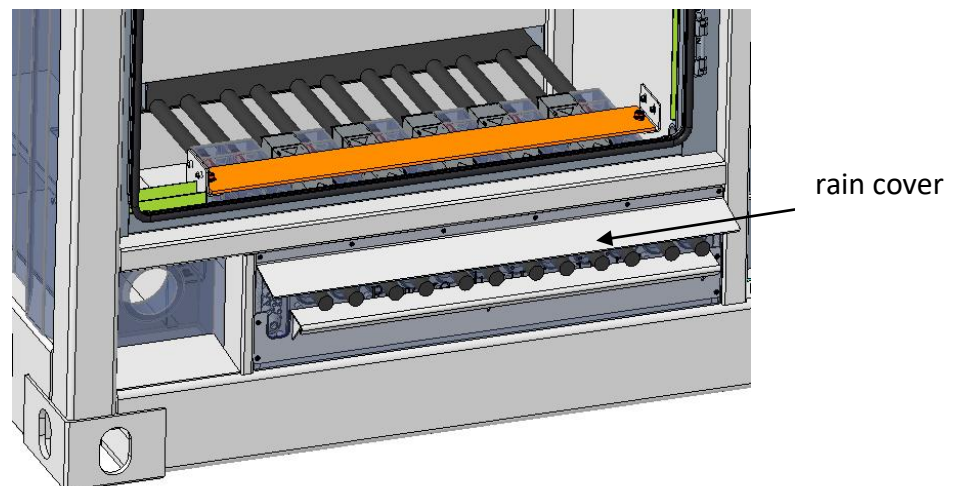


Figure 5-15 Schematic diagram of rain shield installation completion

5.3.2.2. Ground connection

ESS containers are equipped with four grounding connection points to achieve effective grounding (at least two diagonal grounding points should be connected). Flat steel or cables can be used to complete the grounding of ESS containers. The cross-section of the flat steel or cable used for grounding should be calculated according to the standards set by the local competent authority (usually IEC standards).



Figure 5-16 ESS container grounding point

The grounding flat steel or cable can be connected to the grounding point through M12x25 bolts or directly welded. If welding is used, the welding area needs to be treated with anti-corrosion.

NOTE: The grounding flat bar comes with protective tape. Before making any cable connections, always remove the protective tape and clean all contact surfaces in the connection area.

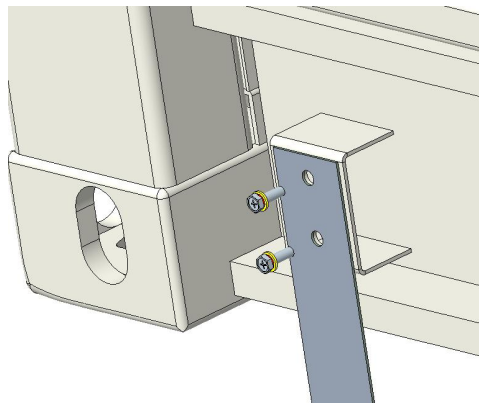


Figure 5-17 Schematic diagram of grounding flat steel installation

5.3.2.3.Auxiliary power connection

three -phase power supply. The cable enters the energy storage container through the cable gland plate, connects to the reserved high current terminal at the bottom, and then connects to the circuit breaker QF1.

For recommended cable specifications, please refer to Table 5-2 Recommended external cables.

The external power supply provides power to various subsystems, including the thermal management system, backup sockets, panel indicators, lighting system, fire protection system, BCMU and UPS. If the external power supply is disconnected, it will automatically switch to the UPS power supply.

The steps for making and installing the auxiliary power cable are as follows:

Note: Wire color is not a special requirement, please determine according to your needs.

Step 1: Select the appropriate cable and strip a certain length of cable sheath



Figure 5 - 18 Strip a certain length of cable sheath

Step 2: Install O-type insulated terminal 25-M8



Figure 5-19 Installing O - type insulation terminal

Step 3: Crimp with tool



Figure 5 - 20 crimp terminal

Step 4: Insert the cable into the corresponding 15~30mm hole (as shown in the figure) of the cable gland plate, pay attention to the sealing of the cable, and connect the cable to the battery container.

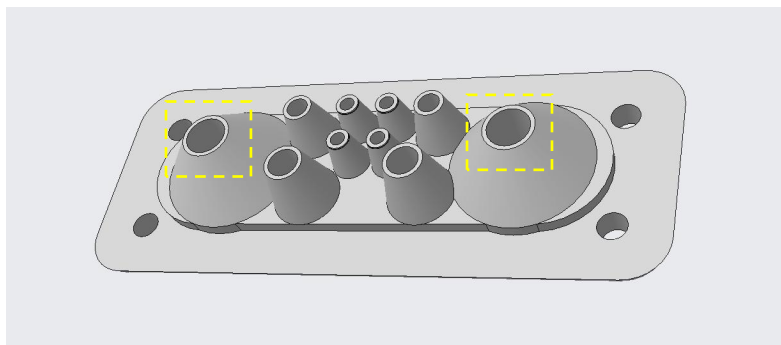


Figure 5-21 Cable gland interface diagram

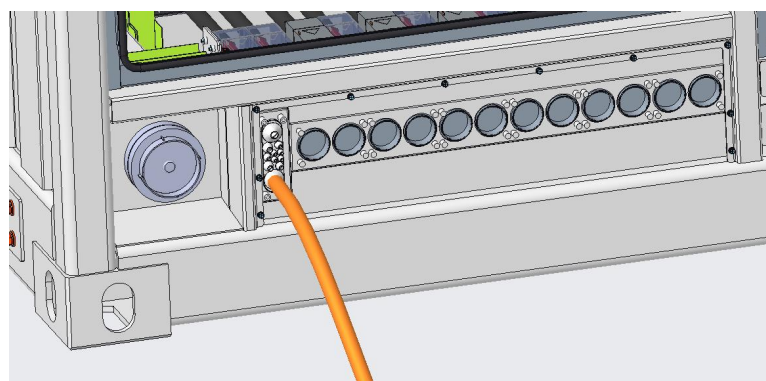


Figure 5-22 Accessing the container through the cable gland

Note: If there is a gap after the cable passes through the sealing plate, please seal it with sealant.

Step 5: Connect the cables to the XT0 terminal blocks in the power distribution cabinet through the aluminum cable duct on the inner wall of the container.

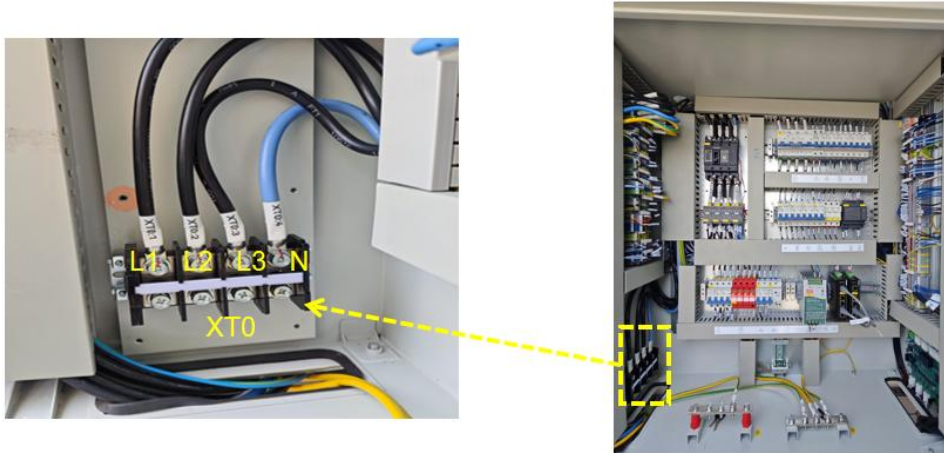


Figure 5-23 XT0 terminal layout

Step 6: Open the cover of the auxiliary power XT0 terminal, connect the auxiliary power cable, and secure it with M8 bolts. The tightening torque of the M8 bolts is 4.5Nm.

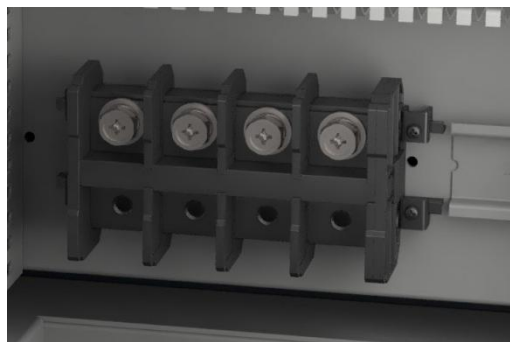


Figure 5-24 Opening the terminal cover

Step 7: Cover the auxiliary power supply XT1 terminal block

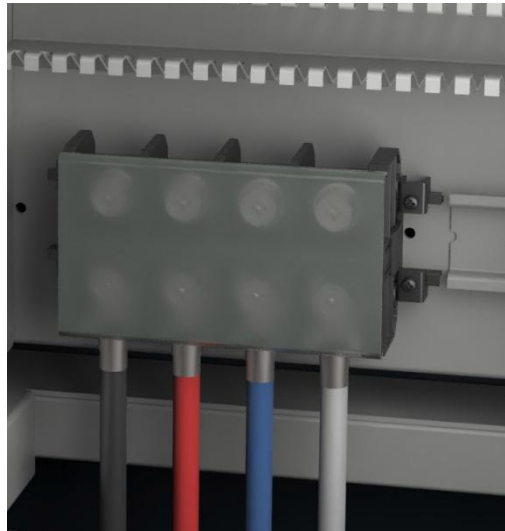


Figure 5 - 25 Schematic diagram of completed wiring

 Notice

To ensure the reliability of the system, the auxiliary power supply of each container should be separated, and it is prohibited to connect the auxiliary power supply in daisy chain (hand in hand) mode.

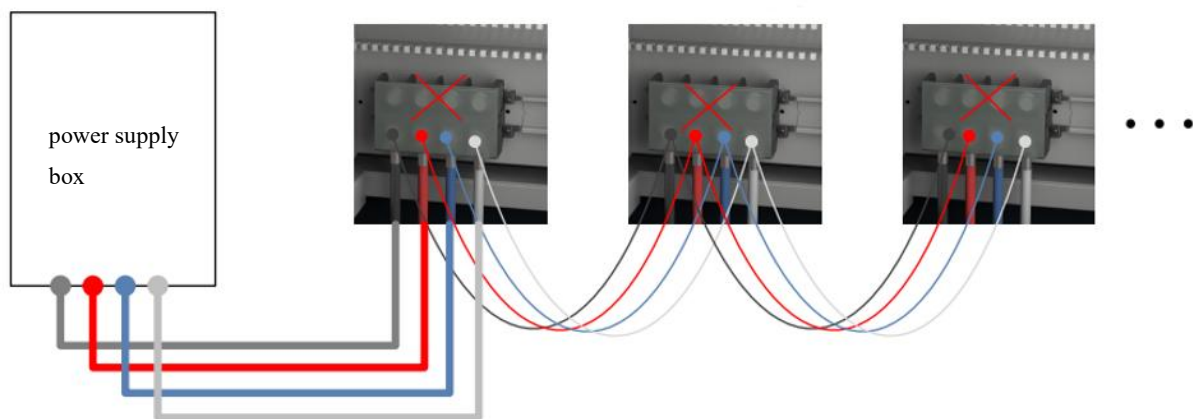


Figure 5-26 Daisy chain connection prohibited

5.3.2.4. Communication circuit connection

External communication cables include network cables, CAN communication cables, and control dry contact cables. The network cables must be terminated according to the T568B wiring standard. The cables

enter the energy storage container through the cable control entrance and are connected to the right wiring terminal of the power distribution cabinet.

For cable specification recommendations, refer to Table 5-2 Recommended external cables.

The BAMU (Battery Array Management Unit) communicates with the BMMU, BCMU, thermal management system, and fire protection system internally, and with the PCS and EMS externally. The BAMU communicates with the EMS via Ethernet. The network port 1 of the two switches in the power distribution cabinet is reserved for external EMS communication network ports.

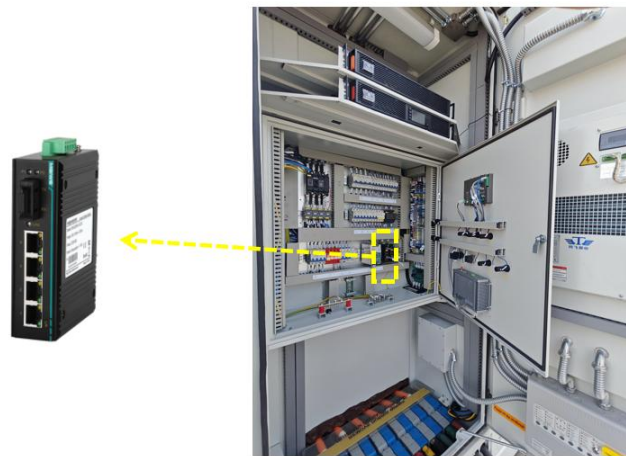


Figure 5-27 Switch layout

The manufacturing steps of network cables are as follows:

Note: Network cables must be terminated according to T568B wiring standards.

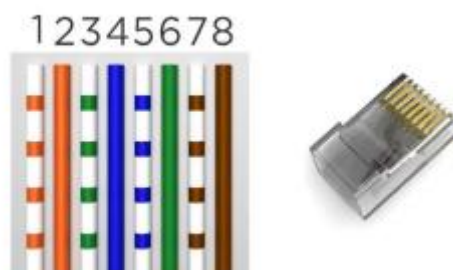


Figure 5-28 T568B standard wiring diagram

Step 1: Strip appropriate insulation (13mm~16mm)



Figure 5-29 Stripping the appropriate insulation

Step 2: Install the network cable crystal head



Figure 5-30 Installing the crystal head

Step 3: Use network cable pliers to crimp the crystal head



Figure 5 - 31 crimping crystal connector

BAMU and PCS communicate via CAN and dry contacts. The wiring locations are shown in the figure below.

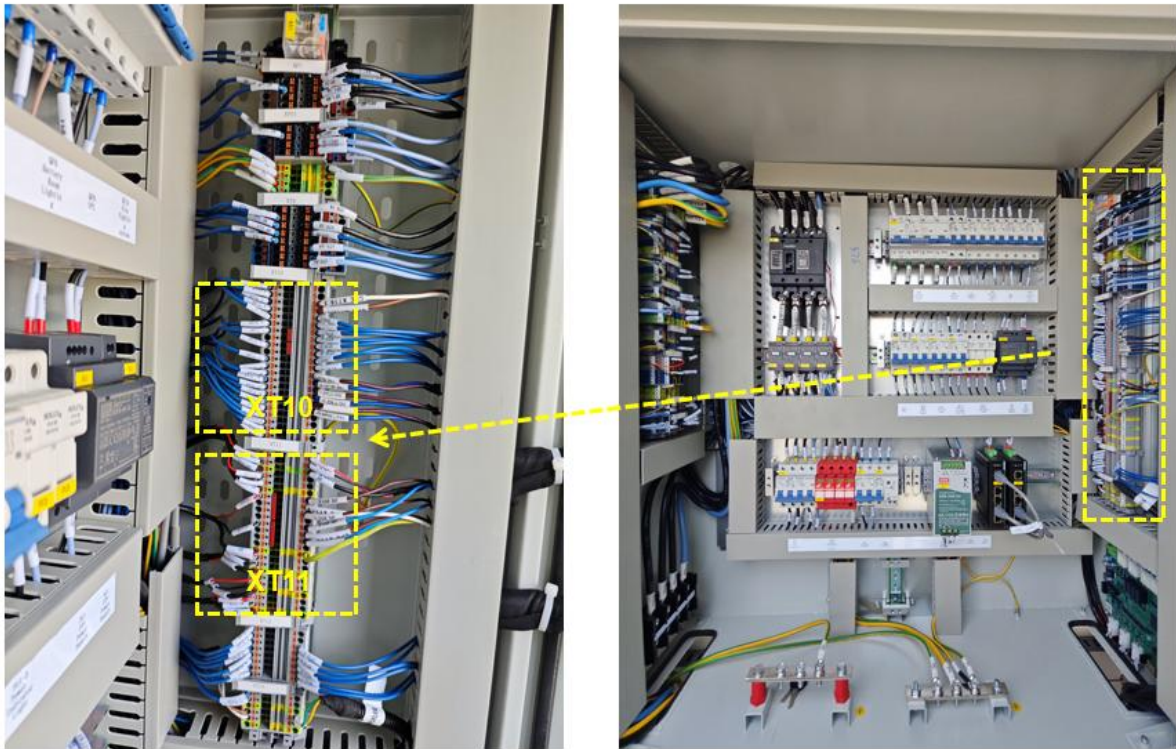


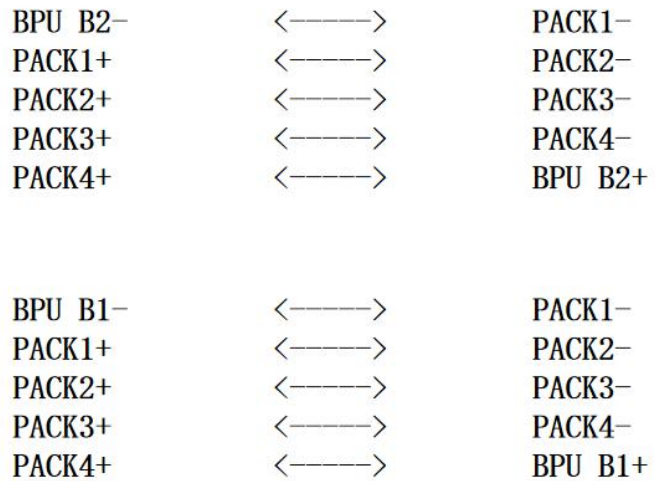
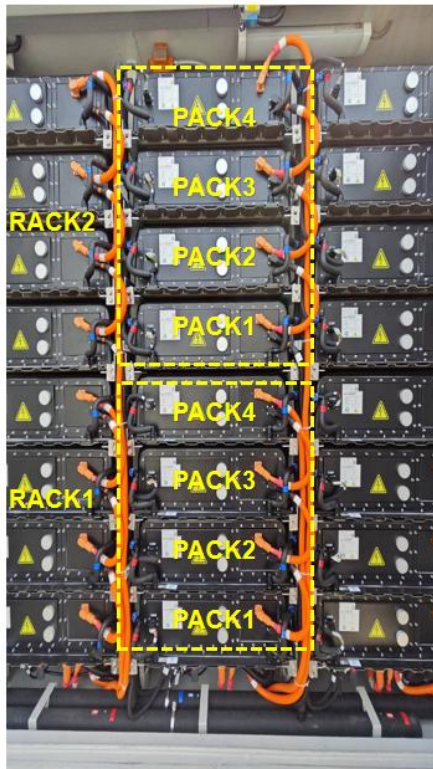
Figure 5 - 32 XT10, XT11 terminal block layout

Table 5-3 XT10 , XT11 terminal block definition

S/N	Items	Point
1	PCS dry contact	XT10:19 - Dry Node+ XT10:20 - Dry Node-
2	PCS communication	XT11:15 - CANH XT11:16 - CANL

5.3.2.5. Battery Connection

The wiring harness in the cluster has been disassembled before transportation. After receiving the goods, please connect the wires as shown in the figure below.



Physical connection confirmation: According to the wiring diagram in the document, check whether the power line connection between the high-voltage box (B1-, B1+, B2-, B2+) and each PACK (PACK1-, PACK1+, PACK2-, PACK2+, PACK3-, PACK3+, PACK4-, PACK4+) is correct, and confirm whether the plug is fully inserted into the corresponding socket and the buckle is firmly locked.

Looseness check: After ensuring that the power is off and insulation protection is in place, gently shake the connection between the power line plug and the socket to feel whether there is any looseness. If there is any looseness, re-plug and ensure the connection is firm.

6.Run and debug

Danger

Only qualified professionals are allowed to work on the equipment.

Make sure the equipment is well grounded.

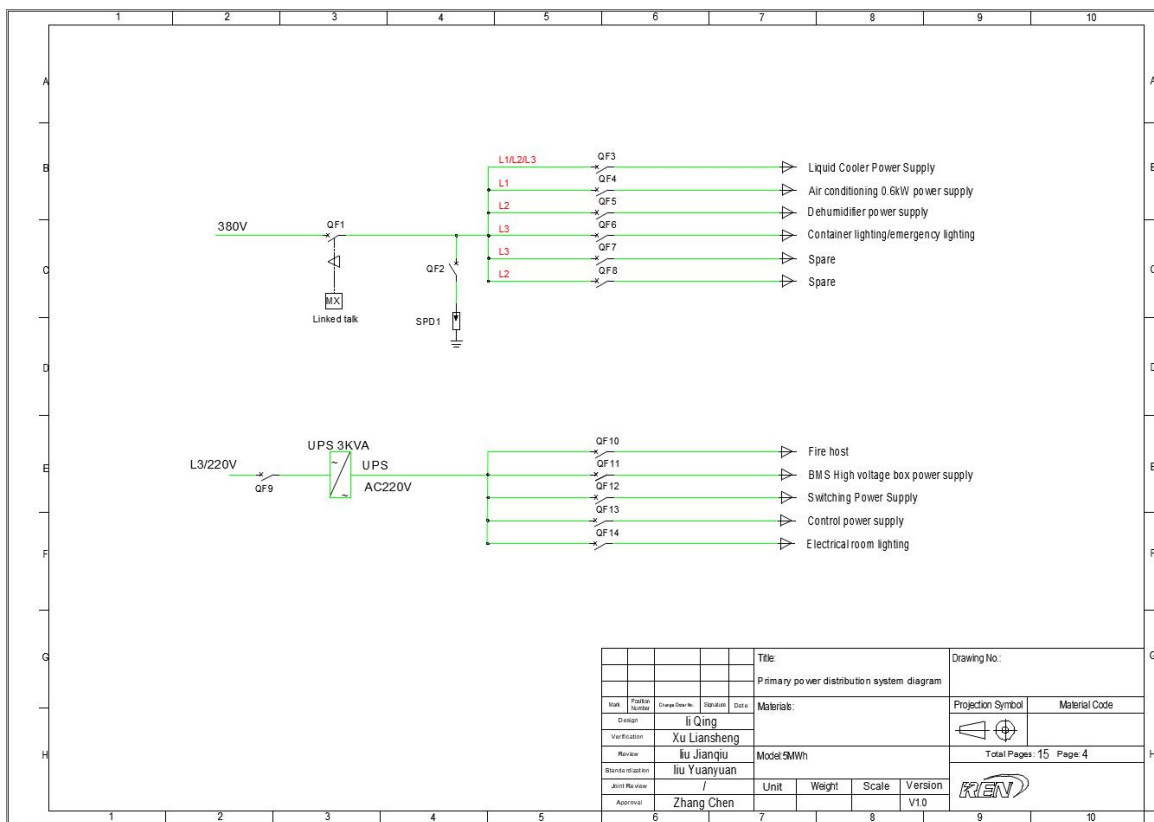


Figure 6-1 Electrical primary diagram of power distribution system

6.1. Check before power on

Table 6-1 Power - on inspection items

Serial number	Inspection items	Completion
1	Check whether there is condensation on the energy storage system and components (water film or water droplets on the surface). If so, the dehumidifier in the cabinet must be turned on for dehumidification and the fan must be turned on for ventilation until the phenomenon disappears. Check the pipe connections to ensure that there is no leakage.	<input type="checkbox"/>
2	Check that all cables are securely connected and not damaged, and that all screws are securely in place.	<input type="checkbox"/>
3	Check that the polarity of the AC and DC side connections is correct and that the voltage meets the requirements.	
4	The wiring terminals are intact and undamaged and have been insulated.	<input type="checkbox"/>
5	There are no foreign objects such as wire ends and metal filings inside or outside the energy storage system that may cause short circuits in signal lines and power lines.	<input type="checkbox"/>
6	Check that the circuit breakers are in the off position.	<input type="checkbox"/>
7	Make sure all circuit breakers are in the OFF position.	<input type="checkbox"/>

6.2. Power on the device

6.2.1. AC circuit power on

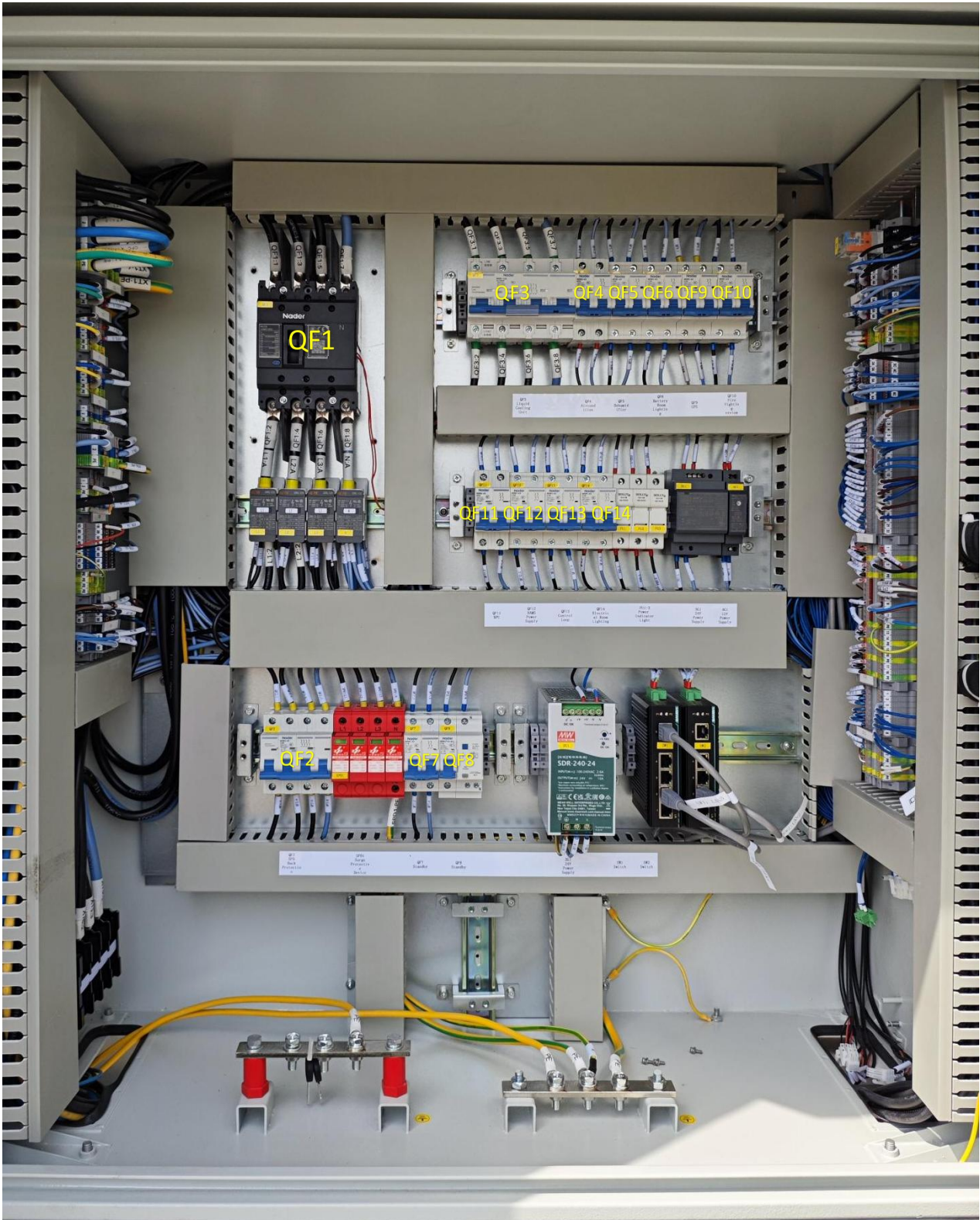


Figure 6-2 Distribution box circuit breaker layout

- Main distribution power supply: Close the QF1 circuit breaker
- Lightning protection circuit: Close the QF2 circuit breaker
- Liquid cooling unit power supply: Close the QF3 circuit breaker
- Air conditioner, dehumidifier power supply: Close QF4, QF5 circuit breakers
- Container lighting power supply: Close the QF6 circuit breaker
- Backup socket power supply: Close QF7 and QF8 circuit breakers
- UPS power supply: Close the QF9 circuit breaker
- Fire host power supply: Close the QF10 circuit breaker
- High voltage box power supply: Close the QF11 circuit breaker
- Switching power supply: Close the QF12 circuit breaker
- Control power supply: Close the QF13 circuit breaker
- Electrical room lighting power supply: Close the QF14 circuit breaker

Note: 1. If the UPS does not start automatically, long press the power button on the UPS to turn it on.

2. The power-on power is not allowed to exceed 0.5P. Our company is not responsible for any damage to the equipment caused by power overload.

6.2.2.DC circuit power on

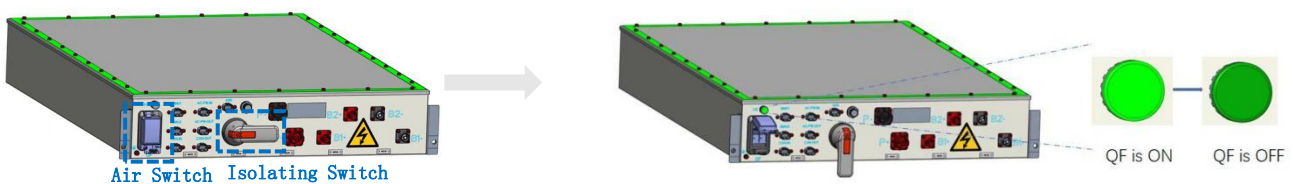


Figure 6-3 High voltage box power-on indicator light prompt

- Close the air switches on the 6 high-voltage boxes in sequence, and the indicator lights will change from dark to bright, as shown in the figure.
- Turn the isolating switch handles on the 6 high-voltage boxes in sequence to the position shown in the figure.

6.3.Device shutdown

Before shutting down the device, make sure that the PCS side is shut down.

6.3.1.DC link shutdown



Figure 6 - 4 Schematic diagram of the high-voltage box handle status corresponding to the DC circuit shutdown

- Turn the isolating switch handles on the 6 high-voltage boxes in sequence to the position shown in the figure.
- Disconnect the air switches on the 6 high-voltage boxes one by one, and the indicator light will turn from bright to dark, as shown in the figure.

6.3.2.Power distribution circuit shutdown

- Electrical room lighting power supply: turn off QF14 circuit breaker
- Control power supply: Turn off QF13 circuit breaker
- Switching power supply: Turn off QF12 circuit breaker
- High voltage box power supply: turn off QF11 circuit breaker
- Fire host power supply: turn off the QF10 circuit breaker
- UPS power supply: turn off QF9 circuit breaker
- Backup socket power supply: Turn off QF7 and QF8 circuit breakers
- Container lighting power supply: turn off the QF6 circuit breaker
- Air conditioner, dehumidifier power supply: turn off QF4, QF5 circuit breakers
- Liquid cooling unit power supply: turn off QF3 circuit breaker
- Lightning protection circuit: Close QF2 circuit breaker
- Main distribution power supply: Turn off QF1 circuit breaker

7.Care and maintenance

7.1.Precautions

In order to safely and effectively perform system maintenance and upkeep, maintenance personnel must undergo professional training and be qualified before taking up their posts. When performing maintenance and upkeep work, the staff must comply with relevant safety precautions and use necessary tools and protective equipment.

(1) When operating and maintaining the system, please do not wear metal accessories such as gold or silver jewelry and watches.

(2) During maintenance, please use insulating tools, and wear insulating gloves and insulating shoes.

(3) After maintenance, please clean up tools and materials promptly and do not place metal objects inside or on top of the equipment.

(4) When connecting or removing system cables, please disconnect all high-voltage and low-voltage switches. After the power is disconnected, a warning sign must be hung at the disconnection point to prevent someone from powering on during maintenance.

(5) If the system operation and maintenance personnel have any questions about the operation and maintenance of the equipment, please contact REsource Electric consultation and do not operate without authorization.

(6) When opening the doors for maintenance, the two middle doors cannot be opened at the same time. The following figure is **an incorrect example** .



Figure 7-1 Error demonstration

(6) When powered on, the PACK package is prohibited from plugging or unplugging the power plug under load.

7.2. Equipment maintenance

The main maintenance items and requirements of the system are shown in the table below. For the maintenance requirements of other components, please refer to the user manual of each component.

Table 7-1 Main system maintenance items and requirements

Serial number	Maintenance Project	Require	Recommended maintenance cycle
1	Energy Storage System	1) Clean the energy storage system thoroughly. Pay special attention to cleaning the air inlet and outlet. Use a vacuum cleaner if necessary to ensure that air can flow freely in the cabinet. The power supply must be turned off before dust removal, and water flushing is strictly prohibited.	The cycle is no longer than 3 months (for areas with heavy dust, regular dust removal is required every 1-4 weeks)
		2) Check and tighten the connecting bolts of various parts of the energy storage system.	The cycle is no more than 6 months
		3) Regularly check whether the cables are aging or damaged, and whether the insulation is good. If any problems are found, they should be dealt with	The cycle is no more than 6 months
		4) When the battery system is not used for a long time, make sure that the main power circuit is powered off, and only the liquid cooling, dehumidification, and air conditioning are turned on for the auxiliary power circuit. Other functions	The cycle is no more than 3 months
2	Battery Management System	1) Regularly read and save the data of the battery management system.	The cycle is no more than 3 months
3	Water cooling unit	1) Regularly check and replenish the coolant of the water-cooled unit.	The cycle is no more than 6 months
		2) Clean the water-cooling unit filter regularly.	The cycle is no more than 3 months
4	Fire Fighting	Regularly check whether the smoke and temperature detectors in the container are working properly.	The cycle is no more than 6 months
5	container	Check regularly to see if the box has corrosion, leakage, rust, etc.	The cycle is no more than 6 months

6	ups	Regularly charge for more than 10 hours.	The cycle is no more than 3 months
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8. Accident handling

When an abnormal situation or accident occurs in the container, correct and effective measures should be taken in a timely manner to deal with it.

1. Fire: When a fire occurs in a container, the surrounding personnel must be evacuated immediately. At the same time, no one is allowed to approach the accident scene within a safe range. Professional firefighters will handle the fire.

2. Short circuit: When a short circuit occurs in the container, the surrounding personnel should be evacuated immediately, the power supply of related equipment should be cut off, the connection between the battery module and the system should be disconnected, and the technicians should be notified to go to the site to troubleshoot the fault. The battery module after the short circuit is prohibited from use.

3. Abnormal insulation withstand voltage: If the insulation withstand voltage performance of the container is found to be abnormal during use, the power should be cut off immediately and the technical staff should be notified to handle it on site. The container can be used only after the fault is eliminated.

4. Overheating: When the battery module is overheated and cannot be cooled to the target temperature within the specified time, the BMS will give a warning, and the user should stop using the module immediately and notify the technician to conduct a comprehensive inspection. The module can only be used again after the fault is eliminated.

5. Other accidents: If other accidents occur and the battery module needs to be removed for maintenance and inspection, it should be operated by professionals.

9. Disclaimer

REsource Electric Tianjin Ltd. provides customers with a full range of technical support and after-sales services.

The following situations are not within the scope of our company's warranty service:

- (1) Failure to follow the manual may result in system damage or malfunction.
- (2) Failure to follow relevant electrical safety regulations for wiring and power supply, or damage or malfunction caused by poor on-site environment.
- (3) System damage or failure caused by irresistible natural factors such as typhoons, earthquakes, floods, fires, or adverse environments (high temperature, low temperature, high humidity, etc.).
- (4) After a fault occurs, the user does not maintain the initial fault status and does not promptly notify the manufacturer, but handles the problem on his own, resulting in an inability to make a realistic assessment of the cause of the fault.