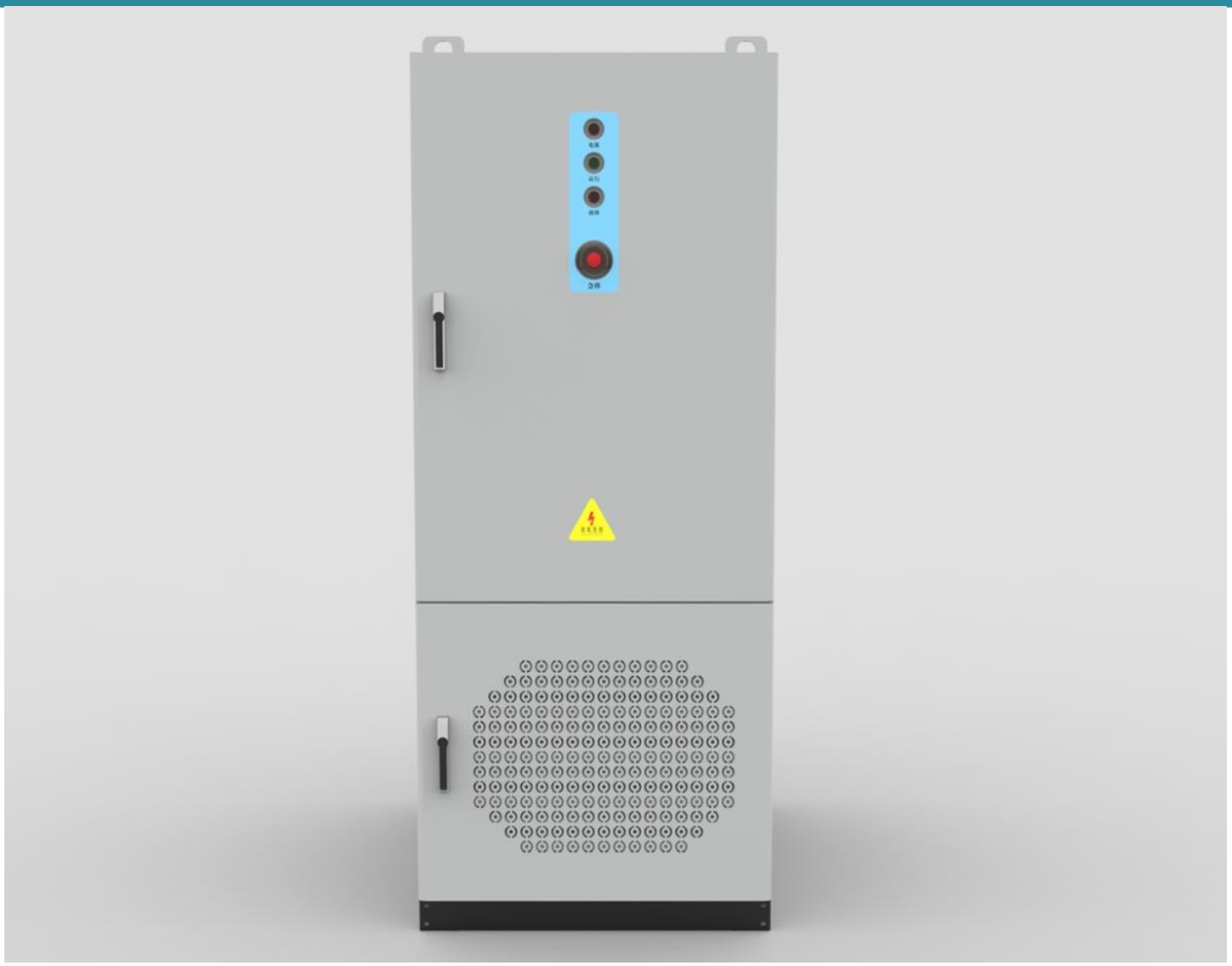
User manual for outdoor energy storage system



Version: V1.1

catalogue

1 Overview 1
1.1 scope of application 1
1.2 brief Introduction of the content 1
1.3 Reading object 1
1.4 symbol description 2
1.5 Manual use 2
1.6 the abbreviated form of a name 3
2 Safety instructions 4
2.1 Electricity safety matters 4
2.2 Personnel requirements 4
2.3 Manual storage 5
2.4 Battery protection 5
2.5 Ground fault protection 5
2.6 live line measurement 5
2.7 Use of measuring equipment 5
2.8 Complete power outage operation 6
2.9 Arc protection 6
2.10 electrostatic protection 7
2.11 LCD parameter setting 7
2.12 Wind, sand and moisture protection 7
2.13 Body warning sign protection 7
2.14 Safety warning mark protection 7
2.15 Transportation and inspection 8
2.16 Installation and trial run 8
2.17 Daily operation and maintenance 8
2.18 Product scrap 9
2.19 Instructions for manual use 9
3 Product description 10
3.1 Basic features 10
3.2 appearance design 10
3.2.1 Mechanical size 10
3.2.2 Appearance introduction 11
3.2.3 ventilation planning 11
3.3 Internal design 12
3.3.1 Internal equipment layout 12
3.3.2 Energy storage converter 13

3.3.5 Emergency shutdown button..... 14
3.3.6 Overview of switch position..... 14
3.3.7 Battery cluster..... 15
3.3.8 Liquid cooling design..... 16
3.3.9 Cable entrance design..... 16
3.3.10 Fire design..... 16
4 Delivery and storage..... 17
4.1 scope of supply..... 17
4.2 Identify energy storage systems..... 17
4.3 Identification to check for transportation integrity..... 17
4.4 memory..... 18
5 Mechanical installation..... 19
5.1 traffic condition..... 19
5.2 Forklift transport..... 19
5.3 Lift transport..... 20
5.4 Foundation construction..... 22
5.4.1 Installation location selection..... 22
5.4.2 Foundation requirements..... 22
5.4.3 Other protective measures..... 23
5.5 Fixed installation..... 23
6 Electrical connection..... 24
6.1 Safety precautions..... 24
6.1.1 general rules..... 24
6.1.2 Five safety laws..... 25
6.2 Wiring parts..... 25
6.2.1 Copper wire access..... 26
6.2.2 Copper wire access..... 26
6.3 Electrical connection preparation..... 27
6.3.1 replacement tool..... 27
6.3.2 Make wiring terminals..... 27
6.3.3 Open the cabinet door..... 28
6.3.4 Disassemble the sealing plate..... 29
6.3.5 Check the cable..... 29
6.3.6 Wiring precautions..... 29
6.4 grounding connection..... 29
6.4.1 brief introduction..... 29
6.4.2 Internal equipment equipotential connection..... 30
6.4.3 External grounding..... 30
6.5 AC cable connection..... 31
6.5.1 Safety precautions..... 31

6.5.2 Terminal steps 31

6.6 Wiring and waterproof treatment 32
6.7 End electrical connection 32
6.8UPS considerations 32
7 Up and down electric operation 33
7.1 Power operation 33
7.2 Electric operation 33

8 Fire instructions 34
8.1 general rules 34
8.2 fire unit 34
9 Troubleshooting 35
9.1 fault message 35
10 Daily operation and maintenance 36
10.1 Safety precautions 36
10.2 Maintenance introduction 36
10.2.1 summary 37
10.2.2 Maintenance cycle 38
10.3 System cleaning 38
10.3.1 summary 38
10.3.2 Cleaning cycle 38
10.3.3 Internal cleaning 39
10.3.4 Clean the interior of the foundation 39
10.3.5 Check the door lock and hinge 39
10.3.6 Seal bar inspection 39
10.3.7 Clean and replace dust cotton 39
11 Appendix 40
11.1 technical parameter 40
11.2 tightening torque 41
11.3 Quality assurance 41
11.4 contact way 42

1 Overview

1.1 scope of application

This product manual applies to the following models of energy storage integrated system: QT-5-52-280-X.

Please keep this product manual properly and ensure that relevant personnel can easily access it.

1.2 brief Introduction of the content

This manual contains the following main contents.

Content	A brief description
Safety instruction	This paper introduces the safety matters that need to be paid attention to in the installation, operation, maintenance and overhaul of the energy storage integrated system.
Product description	This paper introduces the appearance, performance characteristics, composition and internal equipment layout of the energy storage integrated system.
Pay	Delivery, inspection items, etc.
Install	Mechanical transportation, installation and electrical connection methods of energy storage integrated system are introduced.
Turn on / off	Normal maintenance / overhaul, steps to open / close the internal equipment, etc.
LCD operation	Man-machine interface function and use method, etc.
Fire instructions	The main fire-fighting equipment in the energy storage integrated system is introduced.
Troubleshooting	Simple fault finding and troubleshooting methods, etc.
Daily operation guidance	This paper introduces the daily operation precautions and the daily maintenance guidance of the energy storage integrated system.
Other	This paper introduces the technical data, quality assurance terms and contact information of our company.

1.3 Reading object

This manual is applicable to the personnel responsible for the transportation, installation and other operation of the energy storage integrated system. The reader shall, at a minimum, meet the following requirements:

- Should have a certain electronic, electrical wiring and mechanical professional knowledge, familiar with electrical and mechanical schematic diagram.
- Be familiar with the composition and working principle of energy storage integrated system; be familiar with the composition and working principle of energy storage integrated system and its front and rear grade equipment.
- Professional training related to installation and commissioning of electrical equipment.
- It shall have the emergency response capability to dangers or emergencies occurring during installation or trial operation.
- Be familiar with the relevant standards and specifications of the project location country / region.
- Should be familiar with the contents described in this manual.

Only those who meet the above requirements can perform the installation, operation, maintenance and other operations of the energy storage integrated system. Unauthorized personnel shall not perform any operation on the energy storage integrated system, and shall maintain a sufficient safe distance from the system to avoid accidents.

1.4 symbol description

In order to ensure the personal and property safety of the product and the efficient use of the product, the manual provides the relevant safe operation information and highlights it with appropriate symbols. The following lists the symbols used in this manual, please read them carefully.

Danger!

"Dangerous" indicates a high potential danger, and a failure to avoid it would result in death or serious injury.

Warn!

A "Warning" indicates a moderate potential hazard and a failure to avoid conditions that could lead to death or serious injury.

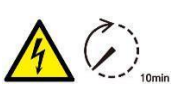
Take care

"Attention" indicates low potential danger and failure to avoid conditions that may lead to moderate or mild injury to a person.

Explain

The "Description" is the additional information in the manual, emphasizing and supplementing the content, and may also provide tips or tips for optimizing the use of the product to help you solve a problem or save your time.

Please always pay attention to the hazard warning signs on the body, including:

Content	A brief description
	This sign indicates that the body contains high pressure and touch may cause electric shock hazard.
	This symbol indicates that the temperature is above the acceptable range. do not contact to avoid human injury.
	Maintenance and overhaul can be carried out after the system is power off for 10 minutes.
	This symbol indicates that the protective ground (PE) end needs to be firmly grounded to secure the operator.

1.5 Manual use

Please read this manual carefully before shipping and installing this product. Please deposit this manual and other information in the product components to ensure it is available to all personnel. Non-

internal personnel of the company shall not publicly reprint all or part of the content without written authorization. In order to continuously improve customer satisfaction, the company's product and product manuals are both

In the process of continuous improvement and upgrading. If your manual is different from the product, it may be caused by the product version upgrade, please refer to the specific product. If any questions still exist, please contact the company.

Explain

The System Manual for the internal electrical equipment of the energy storage integrated system is a random delivery supporting manual. Before the installation and operation of the equipment, please read the manual carefully and perform the operation according to the requirements in the manual.

1.6 the abbreviated form of a name

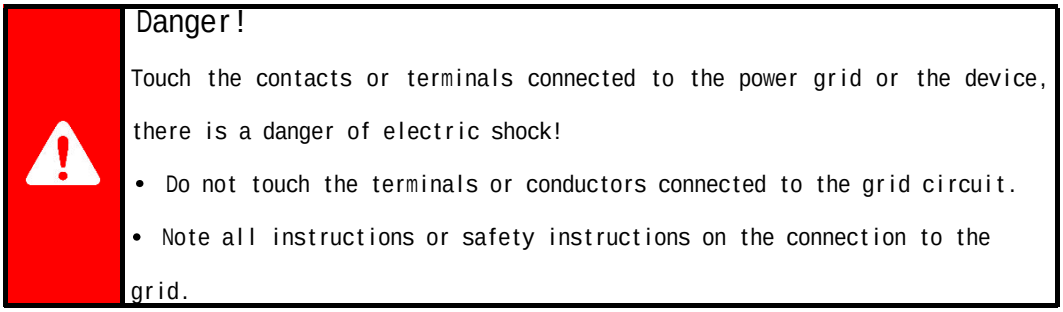
Full name	The abbreviated form of a name
Energy storage integration system	ESS(EnergyStorageSystem)
Energy storage battery system	BSS(BatteryStorageSystem)
Energy storage converter	PCS
Battery cluster	PACK
Temperature-control system	HVAC(HeatingVentilationAirConditioning)
Fire extinguisher system	FSS(FireSuppressionSystem)
Switch capsule	S/G(SwitchGear)
Local controller	LC(LocalController)
Battery management system	BMS(BatteryManagementSystem)
Battery elevator	Rack
EMS controller	EMS(EnergyManagementSystem)

If not specified below, abbreviation is used in place of the above equipment.

2 Safety instructions

The safety instructions of this manual must be strictly observed. In order to avoid possible casualties and property losses during installation or operation, and to effectively extend the service life of the energy storage integrated system, please be sure to read the safety instructions carefully.

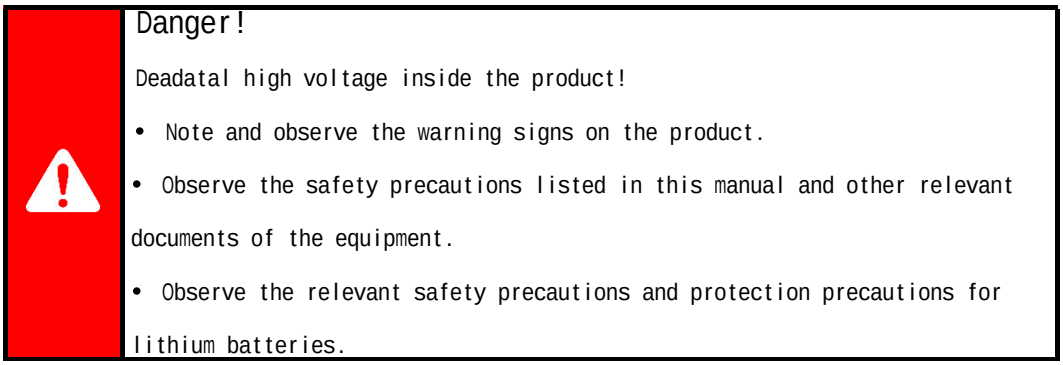
2.1 Electricity safety matters



Danger!

Touch the contacts or terminals connected to the power grid or the device, there is a danger of electric shock!

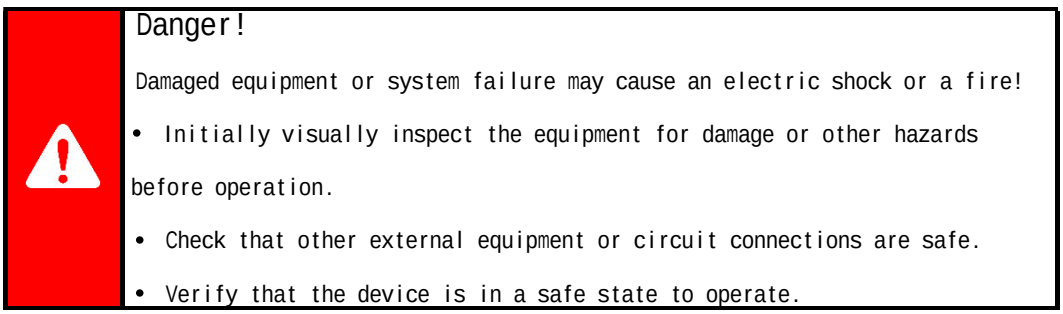
- Do not touch the terminals or conductors connected to the grid circuit.
- Note all instructions or safety instructions on the connection to the grid.



Danger!

Deadatal high voltage inside the product!

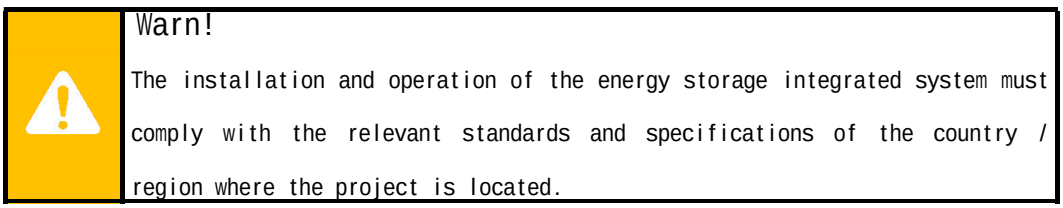
- Note and observe the warning signs on the product.
- Observe the safety precautions listed in this manual and other relevant documents of the equipment.
- Observe the relevant safety precautions and protection precautions for lithium batteries.



Danger!

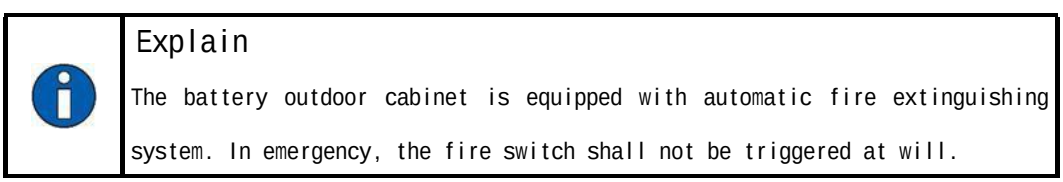
Damaged equipment or system failure may cause an electric shock or a fire!

- Initially visually inspect the equipment for damage or other hazards before operation.
- Check that other external equipment or circuit connections are safe.
- Verify that the device is in a safe state to operate.



Warn!

The installation and operation of the energy storage integrated system must comply with the relevant standards and specifications of the country / region where the project is located.



Explain

The battery outdoor cabinet is equipped with automatic fire extinguishing system. In emergency, the fire switch shall not be triggered at will.

2.2 Personnel requirements

- Only professional electricians or professional qualified personnel can operate the product.
- Operators should be fully familiar with the composition and working principle of the energy storage integrated system.

- Operators shall be fully familiar with the relevant standards and specifications in the project country / region.
- Operators shall be fully familiar with the product manual of outdoor cabinets and internal electrical equipment.

2.3 Manual storage

The product manual is an indispensable part of the product. The manual contains important information on the transportation, installation, overhaul and maintenance of the product. Please read this manual carefully before transportation, installation, repair, maintenance and other operation.

- Please conduct transportation, installation, overhaul and maintenance of the products in strict accordance with the description in this manual, otherwise, equipment damage, casualties and property loss.
- This manual shall be kept properly to ensure ready access for transport, installation and operators.

2.4 Battery protection

Danger!

DC high pressure! Electric shock danger! The battery in the system is connected. If the accidental touch, there will be an electric shock or even life danger.

During the installation, maintenance and overhaul of the equipment, ensure that:

- The energy storage battery has been completely disconnected.
- Establish an clear warning sign at the disconnection to ensure there is no accidental reconnection.

2.5 Ground fault protection

Danger!

When the energy storage integrated system has a grounding failure, the originally inactive part may have a deadly high voltage. If accidentally touch, very dangerous! Before operation, please ensure that the system has no grounding fault, and relevant protective measures should be taken.

2.6 live line measurement

Danger!

There is high voltage in the equipment in the energy storage integrated system, accidental touch may lead to fatal shock hazard, so the live measurement should:

- Do a good job of protection (such as wearing insulating gloves, etc.).
- There must be escorts to ensure personal safety.

2.7 Measurement equipment use

For the energy storage integrated system, relevant electrical measuring equipment is required to ensure that the electrical parameters meet the requirements.

Danger!

- Select high quality measuring equipment whose range and usable conditions

meet the requirements of the site.

• Ensure the correct connection and use of measuring equipment, to avoid arc and other dangers.

• If live measurement, protection should be done (such as wearing insulating gloves, etc.).

2.8 Complete power outage operation

Only perform all operations on the energy storage integrated system if it's equipment and system are completely uncharged.

- Ensure that the outpowered equipment is not accidentally re-powered.
- Use the multimeter to ensure that the equipment is completely dead.
- Implement the necessary grounding.
- Insulate the potentially live parts near the operation part by using an insulating fabric.
- During the whole operation process, ensure the smooth escape passage.
- After the energy storage integrated system is completely out of operation, it must wait at least 20 minutes to operate the energy storage integrated system.
- Ensure that the energy storage integrated system is completely uncharged.

2.9 Arc protection

Danger!

To avoid unnecessary casualties and equipment damage, the product must be strictly following the description in this manual. If operated improperly, it may cause arc danger, and may even cause fire, explosion and other risks. The Company shall not be liable for any arc, fire, explosion and other accidents caused by failing to follow the machine label or the product manual.

The following improper operation may cause arc, fire, explosion and other hazards inside the machine. And always remember, once an accident occurs, it must be dealt with by qualified professionals. For existing accidents, improper operation may cause a wider range of failures or accidents.

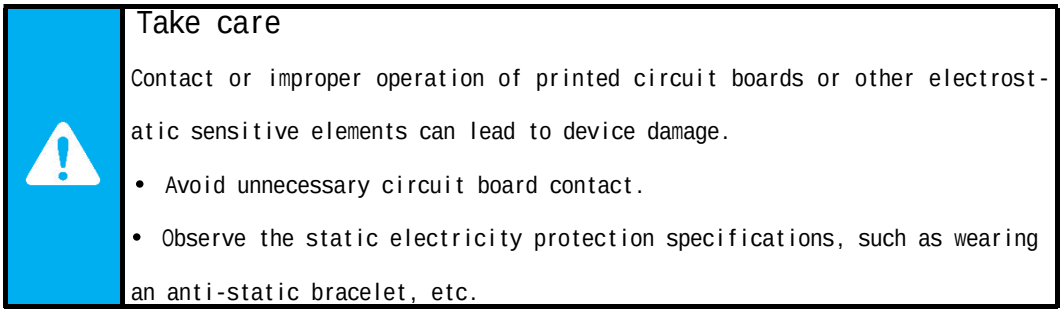
- Electric plug and plug the DC side of each equipment.
- Touch the end of a potentially live cable not insulated.
- Touch potentially wiring copper bars, terminals, or other components inside the machine.
- Power cable connection is loose.
- Screws and other parts accidentally fell into the power module.
- Incorrect operation of untrained unqualified operators, etc.

Before operating the equipment, the arc risk must be assessed in the operating area. If there is an arc risk, you will require:

- Operators must have received the relevant safety training in advance.

- Try to assess the areas where electric shocks may occur.
- Qualified protective clothing must be worn before operating on the possible electric shock area.

2.10 electrostatic protection



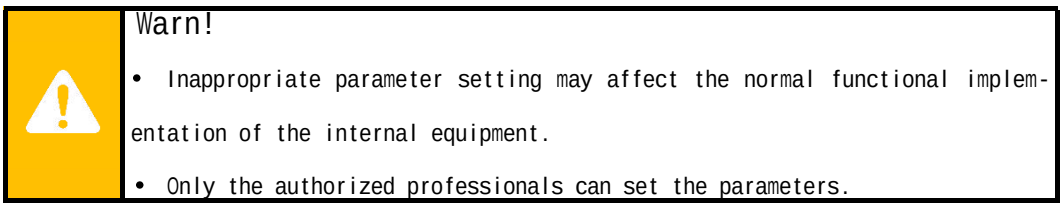
Take care

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

- Avoid unnecessary circuit board contact.
- Observe the static electricity protection specifications, such as wearing an anti-static bracelet, etc.

2.11 LCD parameter setting

The setting parameters of the liquid crystal are closely related to the operation of the energy storage integrated system and its internal equipment. These parameters must be modified after reliable analysis of the health of the system.



Warn!

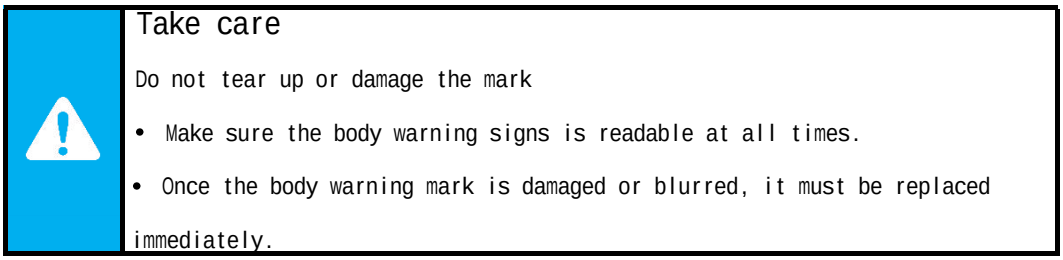
- Inappropriate parameter setting may affect the normal functional implementation of the internal equipment.
- Only the authorized professionals can set the parameters.

2.12 Wind, sand and moisture protection

In case of sandstorm, thunderstorm, gale, hail and other bad weather, or when the relative humidity of the surrounding environment is greater than 95%, do not open the cabinet door of the energy storage integrated system cabinet.

2.13 Body warning sign protection

The warning signs on the body of the product and the internal electrical equipment contain important information for the safe operation of it and the internal equipment. No artificial tearing or damage!



Take care

Do not tear up or damage the mark

- Make sure the body warning signs is readable at all times.
- Once the body warning mark is damaged or blurred, it must be replaced immediately.

2.14 Safety warning mark protection

During the on-site transportation, installation, overhaul, maintenance and other operations of the outdoor cabinet of the energy storage integrated system, in order to prevent the misoperation or accidents of irrelevant personnel from approaching, please follow the following precautions:

? Eye-catching warning signs should be placed at the front and rear switches of the outdoor cabinet of the energy storage integrated system

to prevent accidents caused by accidental closing.

? Set up warning signs or safety warning belts near the field operation area.

2.15 Transportation and inspection

Incorrect mode of transportation may cause equipment damage or personnel casualties. Transportation or mobile energy storage outdoor cabinets shall be strictly in accordance with the operating procedures of transportation equipment.

Warn!

Only intact energy storage outdoor cabinets can be installed and used!

After receiving the energy storage outdoor cabinet, we should first check whether the received equipment is complete according to the delivery list, and check whether there is any damage during the transportation process. If any damage is found, please contact the carrier or dealer immediately, and please provide a photo of the damage area to provide you with the fastest and best service.

2.16 Installation and trial run

The installation and operation environment of the outdoor cabinet is outdoor, and its installation position and foundation must meet the requirements. In addition, the whole process of electrical connection must be strictly in accordance with the procedures.

Warn!

The outdoor cabinet can only be put into operation after being installed and confirmed by professional personnel and approved by the local power department. Close all power distribution circuit breakers before the equipment runs. Do not disconnect during the machine operation.

Take care

Before the trial operation of the outdoor cabinet, the installation must be checked comprehensively and carefully again.

- Check the installation.
- Check to confirm that no tools or parts are left inside the equipment.
- Check the system parameters.

2.17 Daily operation and maintenance

During daily operation, ensure that the energy storage integrated system and the internal equipment cabinet doors are closed and locked, and the keys have been pulled out and sent to special personnel for proper safekeeping. In order to avoid unauthorized personnel into the accident, or internal equipment by rain, move

Invasion, etc. At the same time, the outdoor cabinets and internal equipment should be inspected and maintained regularly to ensure the long-term and reliable operation of the energy storage integrated system.

Warn!

If the equipment is live, please protect the insulation and ensure that at least two staff members are at the site at the same time. The power station where the outdoor cabinet is located is usually located in the field environment deviated from the urban area, and the corresponding field rescue facilities should be prepared for implementation when needed.

During routine operation and maintenance, always pay attention to the following:

? Avoid the maintenance and maintenance of the equipment in the outdoor cabinet under rainy or wet weather conditions. The intrusion of moisture may damage the electrical equipment.

? All the electrical equipment in the outdoor cabinet is affixed with a nameplate. The nameplate contains the important parameter information of the equipment, and attention should be paid to the protection when performing various operations on it.

? Some devices in the outdoor cabinet may have heating devices, and when the equipment stops working, such devices will still have a high temperature. Wear scald protection gloves when operating such devices.

? The power units and cooling fans in the energy storage integrated system may produce some noise during the operation process, and when some equipment faults occur, the noise will be greater. It is recommended to wear noise-proof earplugs near the outdoor cabinet.

? Observe all the installation requirements of the fire extinguishing system.

? If necessary, provide appropriate protective equipment, such as goggles, insulating gloves, insulated shoes, etc., and use all necessary auxiliary measures to ensure the safety of personnel and equipment.

2.18 Product scrap

When the energy storage integrated system or internal equipment needs to be discarded, it should not be treated as conventional waste. Some components of the internal machine can be recycled and reused, while some components can also bring pollution to the environment. Please contact the local authorized professional recycling agency to properly handle the products and internal components.

2.19 Instructions for manual use

Explain

- For easy reading of this manual, a large number of pictures are configured in the manual. The picture is explanatory only. For details of the product, please refer to the actual product received.
- Please keep this manual and other relevant documents near the equipment. For installation, operation, maintenance, and maintenance of ready access.
- All descriptions in this manual are standard for energy storage integrated systems. If users have special needs, please explain to our staff when ordering. We will do our best to meet your needs. Specific details of the product, please refer to the actual product you have received.
- This manual may not cover all possible situations during installation, operation, maintenance, overhaul, etc. If it is not explained in the manual, please contact us in time.

3 Product description

3.1 Basic features

This energy storage integrated system is mainly used in industrial and commercial scenarios. The energy storage integrated system is composed of a converter, energy storage battery, distribution box, liquid cooling and fire fighting equipment. The outdoor cabinet of the energy storage integrated system is IP65, which can be installed outdoors. The system application diagram is shown in the figure below.

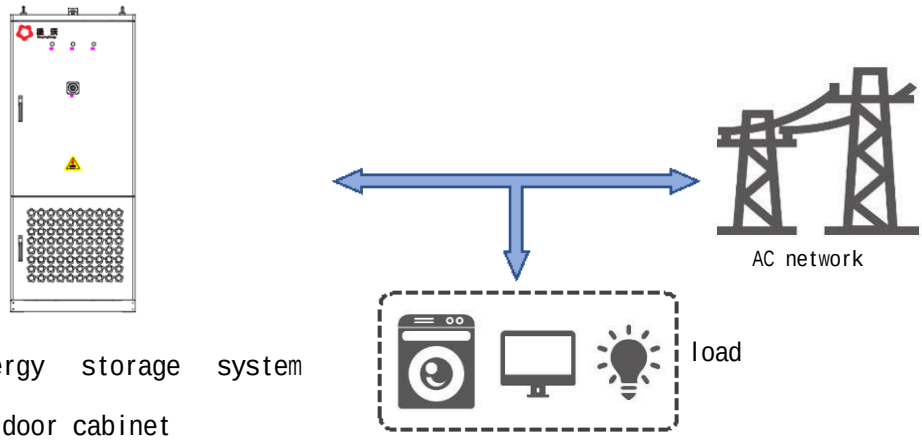
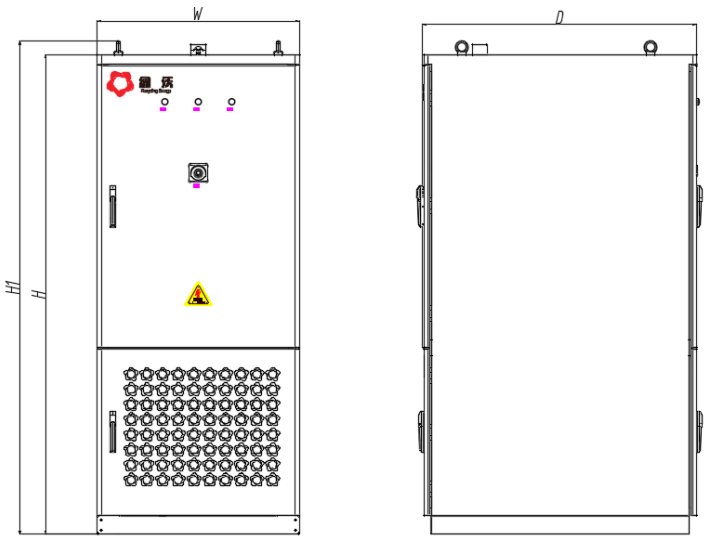


Figure Figure 3-1 A typical application system diagram

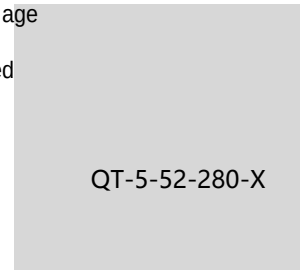
3.2 appearance design

3.2.1 Mechanical size



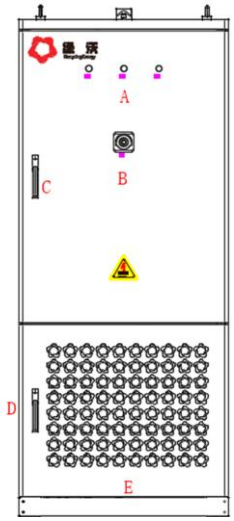
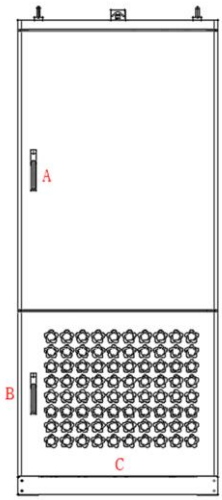
a. front elevation -b. Side view Figure 3-2 Dimensions of energy storage integrated outdoor cabinet

Name	Product model	Size: WD (D1) H	Net weight

Energy storage integrated cabinet		QT-5-52-280-X	965×1300×2288(2355)mm 2500kg

3.2.2 Appearance introduction

Outdoor cabinet of energy storage system:

View	Explain
	Front outline A: pilot lamp B: scram button C: Battery compartment door lock D: Electrical hatch lock E: Electrical cabin inlet window
	Back view A: Battery compartment door lock B: Electrical cabin lock C: Electrical cabin exhaust window

3.2.3 ventilation planning

The electrical compartment of the outdoor cabinet of the energy storage integrated system adopts bidirectional ventilation design. A high-power exhaust fan is installed on the back door of the electrical compartment. When the fan is opened when the system is running, the circulation ventilation is formed through the front and rear inlet exhaust Windows, which is conducive to the heat dissipation of the power devices in the electrical compartment.

3.3 Internal design

3.3.1 Internal equipment layout

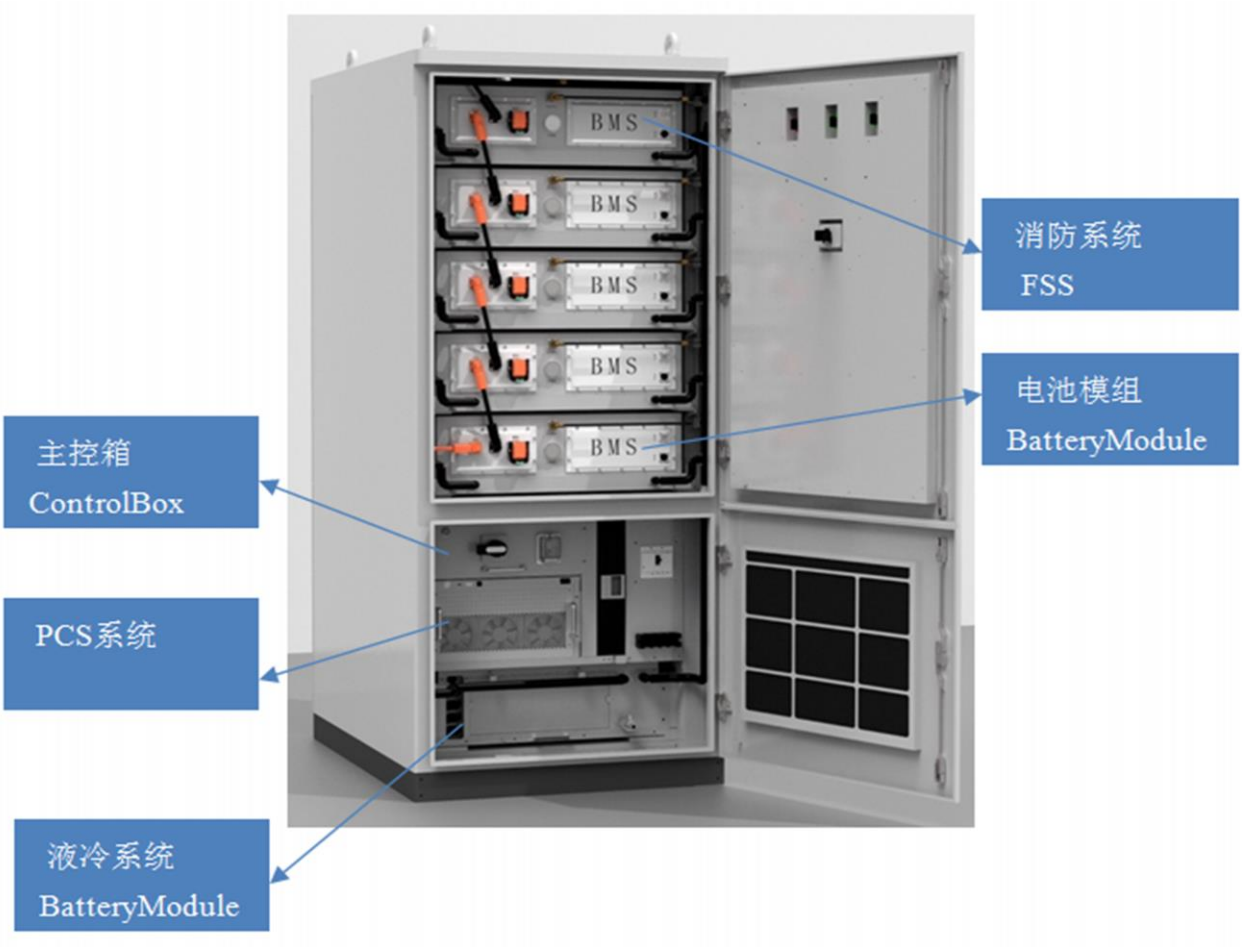


Figure 3-4 Internal Equipment Layout

Outdoor cabinet unit	Equipment composition
Battery cabin	Battery
	Fire extinguisher system
Electrical cabin	Main control box
	PCS system
	Liquid cooling system

3.3.2 Energy storage converter

The energy storage converter adopts the advanced digital control technology, which optimizes the control function and improves the reliability of the system. Suitable for the charge and discharge situations of various batteries. Module structure design, convenient installation and maintenance. The main functions are shown as follows:

- 4G wireless communication;
- Energy storage mode and timing charge and discharge mode;
- LVRT / HVRT and reactive power compensation;
- AC and DC dual-input redundant power supply mode to ensure the reliability of the control power supply;
- Membrane capacitor design, long service life;
- Modular design, convenient for maintenance from the front end;

3.3.3LED indicator light

In the front door of the battery compartment of the energy storage integrated outdoor cabinet, there are three LED lights showing the main operating state of the machine, namely the power indicator "power", the operation indicator "run" and the fault indicator "fault".

Table 3-1 LED indicator

Name	Pigment	Explain
Source	Red	Power supply of the control circuit
Hitch	Red	Fationed and has not been eliminated. If the fault is eliminated, the side indicator light will automatically extinguish.
Move	Green	Normal operation

Table 3-2 Display status and operation instructions of each LED

Display status			explain	
Source	Move	Hitch		
			The Power Supply light is on	Control the power status of power supply
			The Power Supply	The system is in its normal operation

	light is on The Run light lights on	condition
	The Power Supply light is on The "fault" lamp is on	System failure, and the system shutd-own state
	All extinguished	Disconnect the power status

3.3.5 Emergency shutdown button

Emergency stop button is used to disconnect the PCS from DC and AC side in case of fault or emergency.

Warn	Electric shock danger! Emergency stop button to turn off converter only in crisis! Emergency stop button may cause damage to PCS. If the emergency stop button is pressed under load, the PCS related components will bear greater stress. If used frequently, it is easy to cause device damage.

When the emergency stop button is pressed, the PCS and DC and AC side connection are immediately disconnected, and the button itself will be locked. To restart the PCS, the emergency stop switch must be rotated clockwise and the lock state released. Restart the PCS through the LCD screen again.

3.3. Overview of switch position

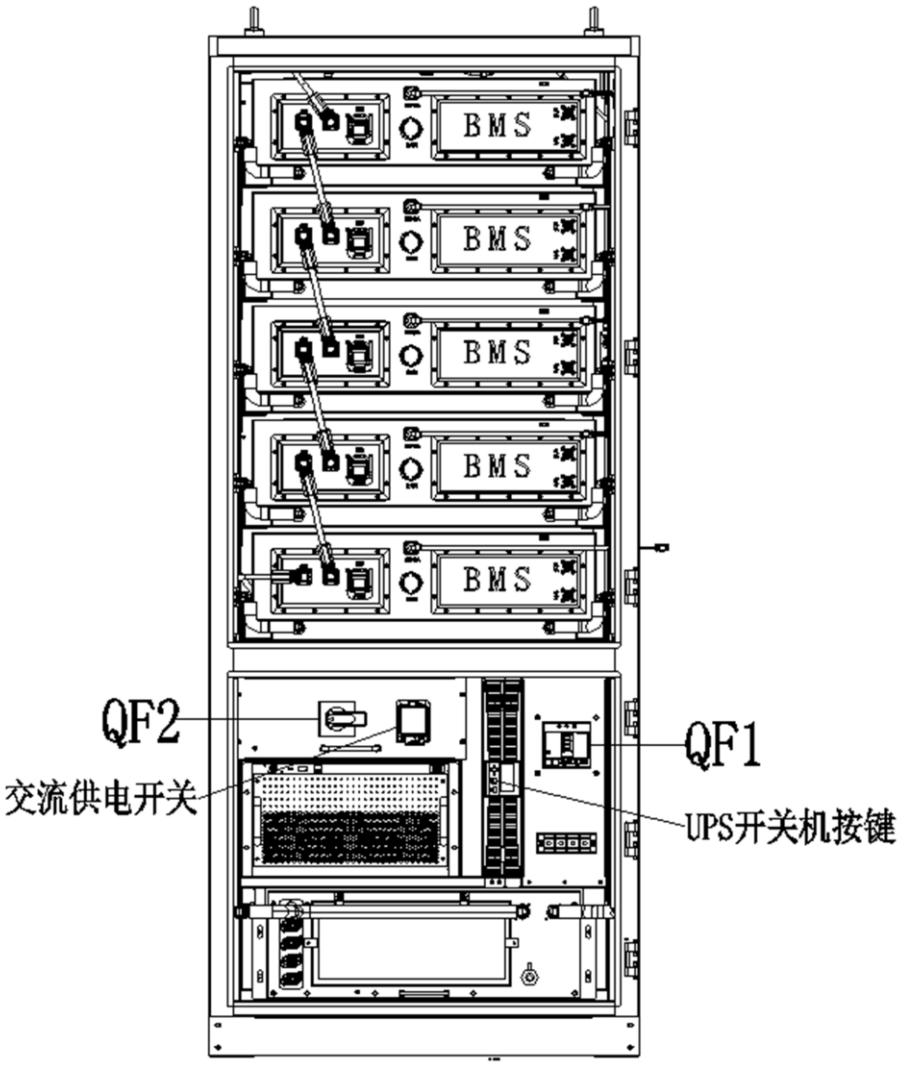


Figure 3-5 Overview of the operation switch position

Table 3-3 Definition of switch symbols

Label	Explain
QF1	a-c circuit breaker
QF2	DC circuit breaker

3.3.7 Battery cluster

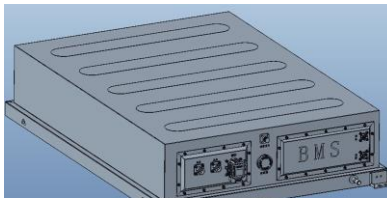
The following is a typical use of the system architecture for lithium iron batteries. Based on lithium iron cells, standardized and unitary battery modules are developed. The battery modules are connected in series and equipped with switch boxes and distribution boxes to form high-voltage battery clusters. The battery cluster is connected to the supporting energy storage converter (PCS) to form the power energy storage system product (ESS) to complete the storage and release of electric energy.

Table 3-4 Cell parameters

The cell	The parameter name	parameter values
	Rated capacity	280Ah
	Rated voltage	3.2V
	Voltage range	2.0~3.65V
	Energy density	≥160Wh/kg
	Size	71×173×207mm

The lithium iron battery module is mainly composed of battery cells through series and parallel connection, and has the functions of voltage and temperature collection and balance control for each battery cell. It adopts the special chip design for battery management to report and collect data.

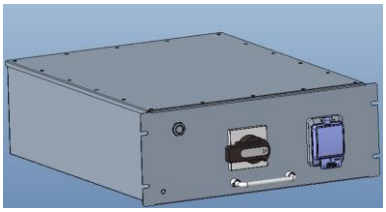
Table 3-5 Parameters of the lithium iron battery

Iron lithium battery	The parameter name	parameter values
	Rated capacity	280Ah
	Rated energy	43kWh
	Cell type	Square, aluminum shell, LFP
	Compound mode	1P48S
	Weight	330±10kg
	Size	810×1160×241mm

The main control box contains the fuse, relay and battery cluster management unit (BCMU), mainly for the monitoring of the whole battery

cluster.

Table 3-6 Main control box parameters

Switch capsule	The parameter name	parameter values
	Size	619×476×185mm
	Weight	30kg
	Rated current	250A
	Rated voltage	1000V
	Voltage sampling range	0V~1500V

3.3. Liquid cooling design

The liquid cooling unit with a heat exchanger is a temperature control product developed for the cabinet. It is suitable for the cabinet to emit a large amount of heat and needs to be completely isolated from the outdoor environment.

3.3.9 Cable entrance design

For easy cable connection on the site, all cables between the equipment inside the outdoor cabinet are connected prior to delivery. The cable connecting the outdoor cabinet and the external equipment can enter the interior from the bottom cable entrance of the outdoor cabinet.

3.3.10 Fire design

Fire protection device is installed in the energy storage integrated outdoor cabinet. In a fire or other emergency, the fire protection system starts when the temperature reaches the set point, and the fire extinguishing agent is released to suppress the fire.

4 Delivery and storage

4.1 scope of supply

Table 4-1 Scope of supply of energy storage integrated outdoor cabinet

Order number	Name	Quantity	Explain
A	Energy storage and integrated outdoor cabinet	1	
B	D	1	Include the product manual, warranty card, quality inspection report and qualification certificate
C	Door key	2	
D	Dust cotton	10	For regular replacement of dust cotton at the window in the electrical cabin
E	Base sealing plate	2	After the overall construction, it is used to seal the bottom forklift hole
F	Bolt	8	Cross sink head screw M6X16
G			
H			

4.2 Identify energy storage systems

The user can identify the device through the nameplate. The information contained in the nameplate includes: equipment model, serial number, main technical parameters and origin.

Warn!

The nameplate contains important parameter information related to the equipment, including protection in transportation, installation, maintenance, overhaul and other operations. Never destroy or dismantle it!

4.3 Identification to check for transportation integrity

The energy storage integrated system has been carefully checked and firmly packed by the staff of the company before leaving the factory. Still, it is possible that equipment can collide or even damage during transportation. After receiving the equipment, the integrity and integrity of the transportation should be checked first. At least, the following items should be carefully checked:

- Check whether all the shipping components are complete against the "Scope of supply".
- Confirm that the energy storage integrated system and internal

equipment models received are consistent with your previous ordered model.

- Carefully check the energy storage integrated system and each internal equipment to see for any damage during transport-ation. During the inspection, if any problems or questions are found, please contact the carrier or our company immediately.

Warn!

Only the complete and no damage of the integrated energy storage system, can be installed and trial run! Make sure that before the installation starts:

- The energy storage integrated system itself is intact and without any damage.
- All the equipment in the energy storage integrated system is intact and without any damage.

4.4 memory

If not installed immediately after delivery, properly keep the energy storage integrated outdoor cabinet as described in this section.

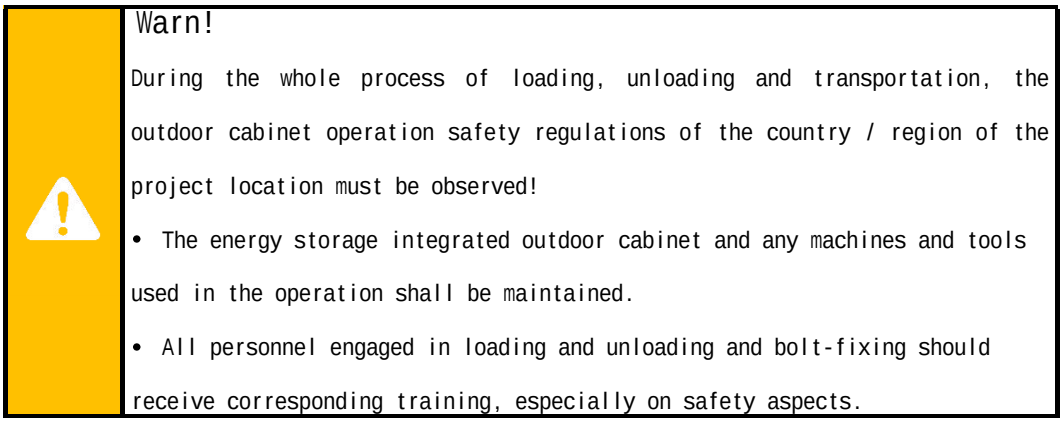
- In order to prevent condensation inside the energy storage integrated outdoor cabinet, or to be soaked by rain at the bottom of the room in the rainy season, the energy storage integrated outdoor cabinet should be stored in an indoor environment, such as a large warehouse or workshop building.
- If the storage must be stored outdoors due to the site conditions, the base of the energy storage integrated outdoor cabinet must be raised, and the specific elevation height should be reasonably determined according to the site geology, weather and other conditions. At the same time, heating should also be provided for the internal equipment of the energy storage integrated outdoor cabinet when the ambient temperature is too low.
- Storage environment temperature: -30c~ + 50c; Relative humidity of storage environment: 0~95%, no condensation.

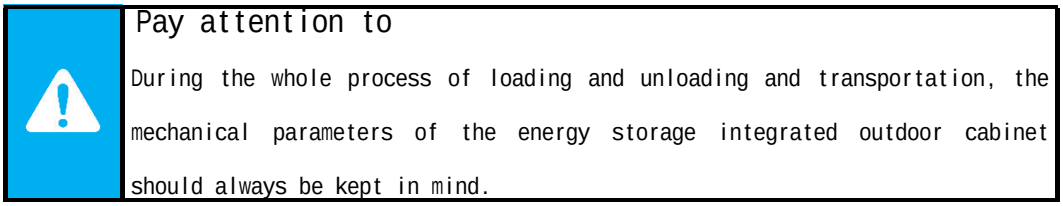
  The energy storage integrated outdoor cabinet is stored on a dry, flat, solid ground with sufficient carrying capacity and without any vegetation cover. The storage ground must be flat, not water, not convex or undulating.
- When storing, the door of the energy storage integrated outdoor cabinet should be locked.
- Effective measures must be taken to prevent rainwater and dust from entering the energy storage integrated outdoor cabinet. At least, the air inlet and outlet of the energy storage integrated outdoor cabinet must be effectively protected.
- Regular inspection. At least once every half months to check whether the cabinet and internal equipment are in good condition.

5 Mechanical installation

5.1 traffic condition

All kinds of equipment in the energy storage integrated outdoor cabinet have been installed and fixed in the outdoor cabinet before leaving the factory. During transportation, the energy storage integrated outdoor cabinet can be hoisted and transported overall.





Transportation of mobile energy storage integrated outdoor cabinet shall meet the following conditions:

- The doors of the energy storage integrated outdoor cabinet are locked.
- Select the appropriate crane or lifting tool according to the site conditions. The selected tool must have sufficient load-bearing capacity, arm length and radius of rotation.
- If movement is required, etc., additional traction devices may be required.
- Remove all obstacles that exist or may exist during the movement, such as trees, cables, etc.
- The energy storage integrated outdoor cabinet should be transported and moved under better weather conditions.
- Be sure to set up warning signs or warning belt to avoid non-staff entering the lifting transportation area to avoid accidents.

5.2 Forklift transport

If the installation site is flat, the forklift truck can be used to move the energy storage integrated outdoor cabinet. The bottom of the energy storage integrated outdoor cabinet is equipped with a fork hole specially used for forklift transportation. If the forklift transport method is used, the following requirements shall be met:

- The forklift shall be equipped with sufficient carrying capacity (at least 5 tons).
- The length of the pin shall be at least 1100mm.
  The pins should be inserted into the forks at the bottom of the outdoor cabinet (see the figure below for the location of the forks).
- Transportation, movement and lowering of energy storage integrated outdoor cabinets should be slow and stable. It is recommended to try the shipping.
- Only the energy storage integrated outdoor cabinet can be placed in a smooth place. The place shall be well drained without any obstacles or bulging.

A≥1100mm

承载能力不小于 5t

Warn!

- Move the energy storage integrated outdoor cabinet through the bottom front fork pocket.
- Under no circumstances can the energy storage integrated outdoor cabinet be moved by inserting a pin other than the fork hole.

Explain

Before delivery, the socket of the energy storage integrated outdoor cabinet is exposed. It is suggested that the socket be seal with the attachment after the site installation.

5.3 Lift transport

Warn!

- In the whole process of lifting the energy storage integrated outdoor cabinet, the operation should be conducted in strict accordance with the safety operation procedures of the crane.
- No standing person within 5m~10m in the operation area. Especially under the lifting arm and under the lifting or moving machine are strictly prohibited to avoid casualties.
- In case of bad weather conditions, such as heavy rain, heavy fog, strong wind, etc., the lifting work should be stopped.

When lifting the energy storage integrated outdoor cabinet, at least the following requirements shall be met:

- The site safety must be ensured when lifting.
- During the lifting and installation operation, professional personnel shall command the whole process.
- The strength of the sling used shall be able to withstand the weight of the energy storage integrated outdoor cabinet.
- Only the sling can be used to lift the undisassembled energy storage integrated outdoor cabinet.
- The length of the sling can be appropriately adjusted according to the actual requirements of the site.
- In the whole lifting process, we must ensure that the energy storage integrated outdoor cabinet is stable and not biased.
- Take all necessary auxiliary measures to ensure the safety and smooth lifting of the energy storage integrated outdoor cabinet.

Figure 5-1 Lifting drawing of sling

The following figure shows the crane operation diagram during the lifting process of the energy storage integrated outdoor cabinet. In the figure, the dotted line circle of the inner layer indicates the operating range of the crane. When the crane works, it is forbidden to stand in the outer solid line circle!

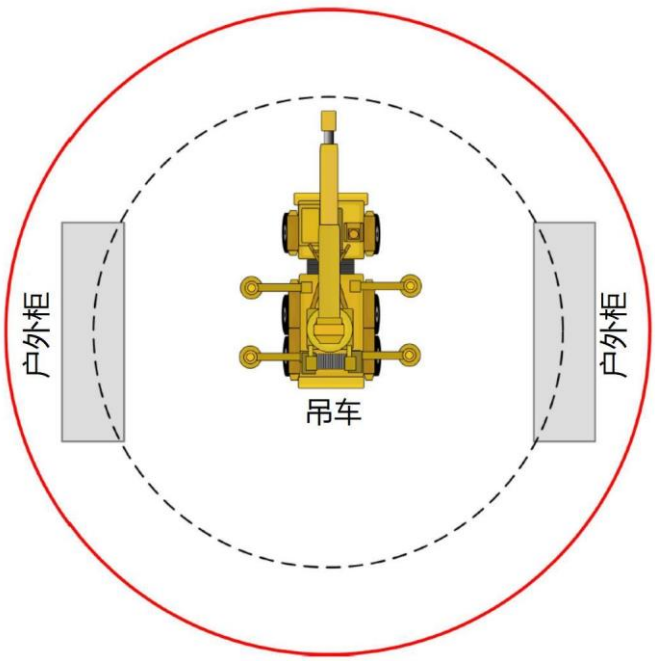


Figure 5-2 Schematic diagram of the crane operation

5.4 Foundation construction

5.4.1 Installation location selection

When selecting the installation site, follow at least the following principles:

- The climatic environment and geological conditions (such as stress wave emission and groundwater level) of the installation site of the energy storage integrated system should be fully considered.
- The surrounding environment is dry and well ventilated, far away from flammable and explosive areas.
- The soil at the installation site needs to have some compaction. The relative compactness of the site soil is 98%. If the soil is loose, please take measures to ensure that the foundation is stable.

5.4.2 Foundation requirements

Warn!

The energy storage integrated system is heavy on a whole. Before building the foundation, the conditions of the installation site (mainly geological conditions and environmental conditions and climatic conditions, etc.) should be investigated in detail. Only on this basis can the design and construction of the foundation be started.

Unreasonable foundation construction scheme will bring great difficulties or troubles to the placement, opening and closing of doors and later operation of energy storage integrated system. Therefore, the installation foundation of energy storage integrated system must be designed and constructed in accordance with certain standards in advance to meet the requirements of mechanical support, cable routing, later maintenance and maintenance, etc.

The foundation shall meet at least the following requirements:

- The bottom of the foundation pit for building the foundation must be compacted and filled in.
- The foundation should be sufficient to provide effective load-bearing support for the energy storage integrated system.
- Raise the energy storage system to prevent rainwater from eroding the base and interior of the energy storage system. The foundation is recommended to be about 300mm above the installation site.
- Corresponding drainage measures should be built in combination with the local geological conditions.
- Build a cement foundation with sufficient cross-sectional area and height. The height of the foundation is determined by the construction party according to the site geology.

- Cable wiring shall be taken into account for the foundation.
- The maintenance platform is built around the foundation, bringing convenience to the later maintenance.
- According to the location and size of the cable entrance and outlet of the energy storage integrated outdoor cabinet, enough space should be reserved for the cable slot during the foundation construction, and the cable catheter should be embedded in advance.
- Determine the specification and quantity of the perforating pipe according to the cable model and the number of incoming and outgoing lines.

- Both ends of all embedded pipes are temporarily sealed to prevent impurity entry; otherwise, later wiring is inconvenient.
- After connecting all cables, the cable entrances and exits and joints are sealed with refractory mud or other suitable material to prevent rodent entry.

Explain

The grounding unit is embedded according to the relevant standards in the country / region of the project.

5.4.3 Other protective measures

Pay attention to

A drainage system shall be built on the installation site to avoid the bottom of the energy storage integrated outdoor cabinet or the equipment in the cabinet from being soaked in the season of abundant rain or heavy precipitation.

Pay attention to

Do not plant trees in close proximity around the installation site. To prevent the wind from blowing down branches or leaves to block the energy storage integrated outdoor cabinet door or air inlet.

5.5 Fixed installation

After confirming that the foundation construction meets the requirements and is dry, solid and smooth enough, the energy storage integrated outdoor cabinet is hoisted to the predetermined position. Use the fastening bolts to fix the energy storage integrated outdoor cabinet to the foundation.

6 Electrical connection

6.1 Safety precautions

.1.1 General Provisions

Danger!

High pressure danger! Electric shock danger!

- Never touch the live parts!
- Please ensure that the AC / DC side is not charged before installation.
- Do not place the energy storage integrated system on the flammable surface.

Danger!

When the energy storage integrated system has a grounding failure, the originally inactive part may have a deadly high voltage. If accidentally touch, very dangerous! Before operation, please ensure that the system has no grounding fault, and relevant protective measures should be taken.

Warn!

- All electrical connections must comply with the relevant standards and specifications of the project location country / region.
- The energy storage integrated system can be connected to the grid side only when approved by the local power supply company and installed by professional technicians.

Warn!

Only professional electricians or professional qualified personnel can electrically connect to the product. Please perform the wiring operation strictly according to the wiring identification within the equipment.

Warn!

Before wiring, the AC / DC side of the energy storage integrated system should be disconnected.

Warn!

The entry of wind, sand and moisture may damage the electrical equipment in the energy storage integrated system, or affect the operation performance of the equipment!

- In the sandstorm season, or when the relative humidity in the surrounding environment is greater than 95%, the electrical connection work should be avoided.
- When there is no sand and the weather is clear and dry, start the connection work.

Warn!

Failure to comply with the torque requirements may cause a fire at the connection! During the electrical connection, the bolts must be fastened in strict accordance with the torque described in this manual.

Warn!

Only a qualified electrical engineer can perform the work related to the electrical connection. Please follow the requirements given in the safety instructions in this manual 2. The Company shall not be liable for any casualties or property losses caused by the neglect of these safety instructions.

Warn!

When conducting cable laying, ensure electrical insulation and EMC specifications shall be observed, and power cables, power supply and communication cables shall be laid in layers. And when necessary, provide protection and support for the cable to reduce the stress of the cable.

Warn!

Please perform the wiring operation strictly according to the wiring identification within the equipment.

Pay attention to

- The installation design of the energy storage integrated system must comply with the relevant standards or specifications of the country / region where the project is located.
- If the energy storage integrated system or system failure is not installed in accordance with the relevant electrical standards or specifications in the location of this installation, it will not be included in the warranty.

.1.2 Five safety rules

The whole process of electrical connection and all other operations on equipment such as energy storage integrated systems are subject to the following five safety rules:

- Disconnect all external connections to the energy storage integrated system and to the internal power supply of the equipment.
- Ensure that the breaks are not accidentally re-powered on.
- Use the multimeter to ensure that the equipment is completely dead.
- Implement the necessary grounding.
- Insulate the potentially live parts near the operation part with insulating material cloth.

6.2 Wiring parts

Warn!

Incorrect wiring sequence may lead to fire burning. Note the connection sequence of the wiring components. When connecting, ensure that the connection is fastened. If the connection is not sufficient or the contact surface oxidation will also cause excessive heat, which may lead to fire.

Pay attention to

- The length of the screw should be appropriate, and the installation hole can be slightly exposed. Too long may affect the insulation performance of the equipment and even cause short circuit.
- After the installation, check the connection between the wiring copper nose and the copper row, and whether some heat-shrink sleeve is clamped. If clamped, it should be removed in time, otherwise it may lead to poor contact or even damage the equipment.

Explain

	Before electrical wiring, it is recommended to clean the terminal first, and do not touch it directly after cleaning.

The fixed screws and other parts used in the power cable wiring of the energy storage integrated system have been uniformly packaged in special packaging bags when delivered. Connect the cables strictly by following the description in this section.

. 2.1 Copper wire access

If the copper cable is selected, the connection sequence of the wiring components is shown in the figure below.

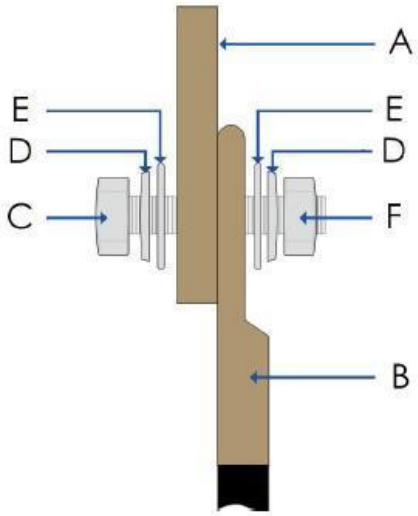


Figure 6-1 Connection sequence of the copper terminals

A	B	C	D	E	F
Copper row	Copper terminal	Nut bolt	Die-shaped gasket	Flat gasket	Nut

.2.2 Copper wire access

If the aluminum cable is selected, the copper-aluminum transition terminal should be used, and the connection sequence of the wiring parts is shown in the following figure.

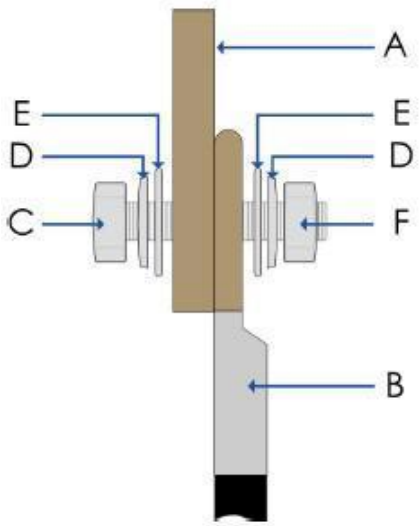


Fig. 6-2 Connecting sequence of copper-aluminum transition terminal

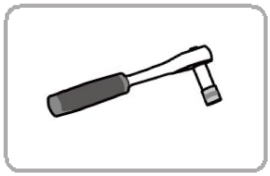
A	B	C	D	E	F
Copper row	Copper terminal	Nut bolt	Die-shaped gasket	Flat gasket	Nut

6.3 Electrical connection preparation

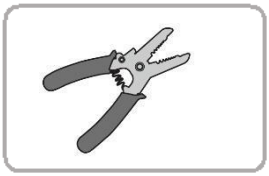
Prior to delivery, the cable connection between the internal equipment of the energy storage integrated system has been completed.

.3.1 Installation tools

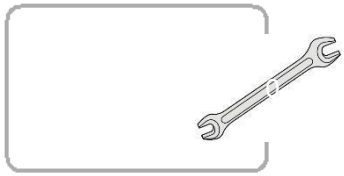
At least, the following tools and parts shall be prepared before installation:



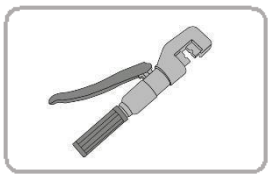
tension wrench



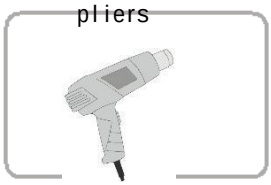
connection cover cutting pliers



spanner

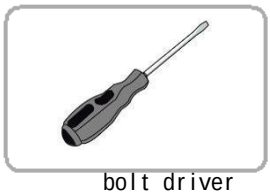


The terminal presses the machine



Hot hair dryer

multimeter

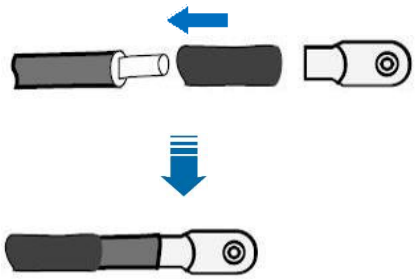


bolt driver

.3.2 Make the wiring terminals

Follow the steps shown below to make the wiring terminals.

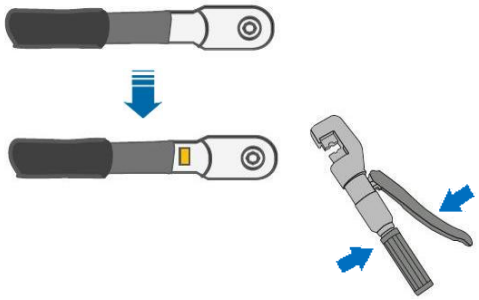
Step 1 Peel off the insulation skin at the end of the cable. The length of the insulation skin at the end of the cable should be the depth of the wiring copper nose pressing wire hole plus about 5mm.



Step 2 Press the wiring copper nose.

1. Place the exposed copper core part of the peeled wire into the pressing hole of the wiring copper nose.

2. Use the terminal press to press the wiring copper nose. The number shall be more than two.

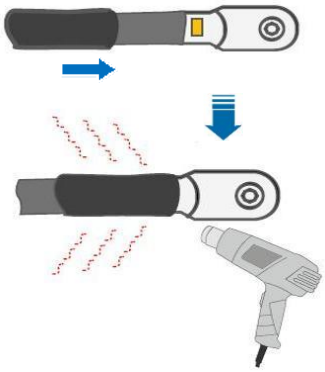


Step 3. Install the heat-shrink sleeve.

1. Select the heat shrink sleeve in line with the cable size, the length should be about 2cm beyond the wiring copper nose pressure pipe.

2. Cover the heat shrink sleeve on the wiring copper nose to the pressing hole completely covering the wiring copper nose.

3. Compact the heat-shrink sleeve with a hot hair dryer.

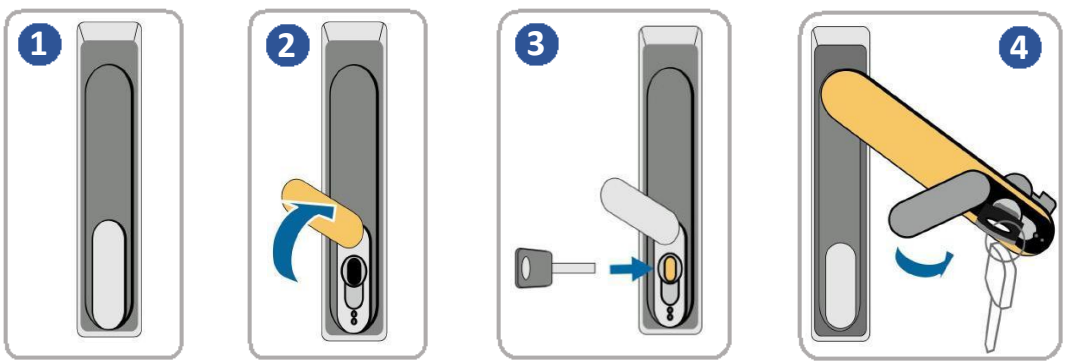


--finish

	Explain If a multi-core cable is used, it is recommended to add the cable protection finger sleeve at the fork to prevent the external insulation skin from cracking.

.3.3 Open the cabinet door

Open the door before the cable connection.



Order number	Explain
1	Lock state
2	Move the cover up above the locking hole
3	Insert the door key and rotate clockwise
4	Rotate the handle clockwise to the position shown in the drawing to open the front door

.3.4 Remove the sealing plate

Before the cable connection, remove the sealing plate in the wiring area at the bottom of the battery outdoor cabinet.

.3.5 Check the cables

Warn!

Check to ensure integrity and insulation before electrical cables. If there are damaged cables, please replace them in time. Poor insulation or damaged cables may cause hazards.

The wiring work between the internal equipment of the energy storage integrated system has been completed before leaving the factory. User needs:

- Check the connection cable for damage, replace the same cable immediately.
- Check that the cable connection is fastened in place. Ensure that all the terminals are fastened.

.3. Wiring precautions

Warn!

- Before wiring, check the polarity of all input cables to ensure that each input polarity or phase order is correct.
- During electrical installation, do not pull cables or wires to damage their insulation performance.
- All cables and wires shall have a certain bending space.
- Take the necessary auxiliary measures to reduce the stress of the cable or wire.
- After each step of wiring operation, carefully check to ensure that the wiring is correct and firm.

6.4 grounding connection

.4.1 Introduction

Warn!

The grounding connection must comply with the grounding standards and specifications of the country / region where the project is located.

Warn!

Ground wire must be well grounded!otherwise:

- Potential fatal shock when fault occurs!
- Lightning may damage the equipment!
- The device may not function properly!

Pay attention to

During the grounding period, please note that:

- The ground connection between the equipment and the ground electrode must be reliably fixed.
- Measure the grounding resistance after grounding, and the grounding

	resistance shall not be greater than 0.1 Ω.

.4.2 Equipotential connection of internal equipment

Before leaving the factory, the wiring of the main electrical equipment to the grounding terminal in the energy storage integrated outdoor cabinet has been completed. The connection between the energy storage outdoor cabinet and the earth shall be completed on site, and the following operations shall be performed:

- The effectiveness of each internal ground connection is ensured by measuring the conductivity of each equipment ground end to the total ground copper row.
- The shielding layer and protective layer of each cable should also be grounded in the outdoor cabinet.

.4.3 External grounding

Warn!

Connect the cables strictly in accordance with the wiring identification inside the equipment.

Before delivery, the grounding of the internal equipment of the energy storage integrated outdoor cabinet has been completed. The following below shows the location of the external junction.

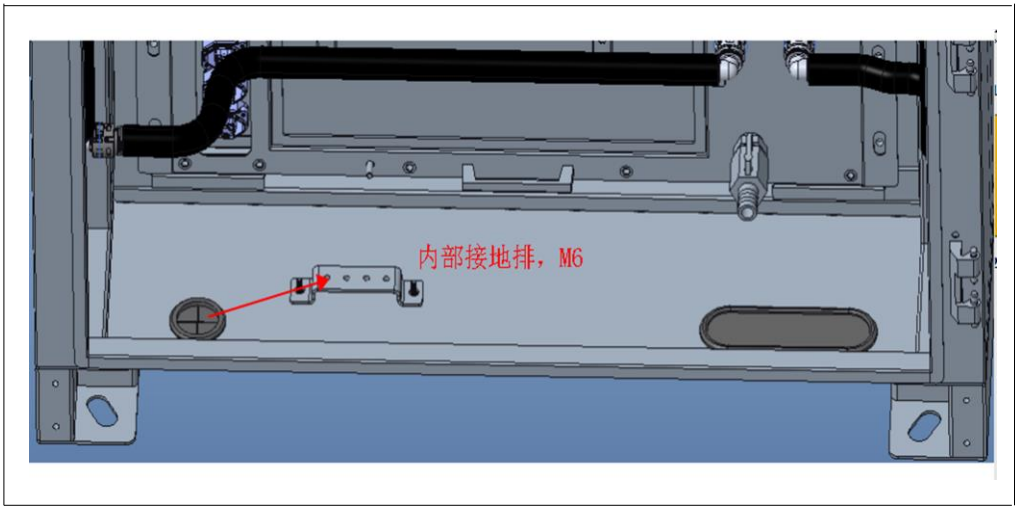


Figure 6-3 Location of external contact location

Please install the external grounding according to the actual situation of the project site and follow the instructions of the power station staff. The grounding resistance shall be measured after the grounding connection.

Explain

The grounding resistance value shall also refer to the relevant standards of the country / region where the project is located.

Warn!

During the grounding connection, please contact the relevant staff in time. If the installation is not complied with the installation specifications, or

	installed or refit without permission, it may lead to safety accidents or equipment damage.

6.5 AC cable connection

. 5.1 Safety precautions

Warn!

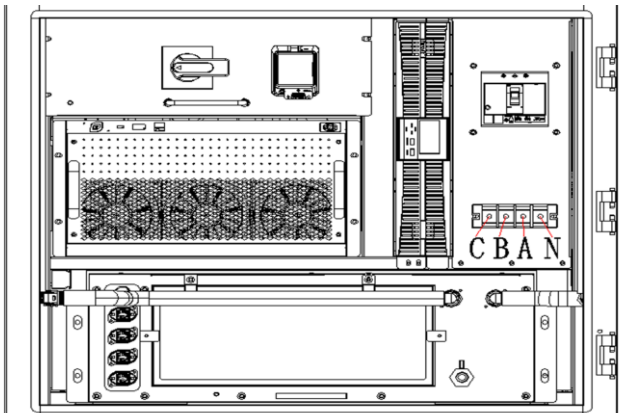
Accidental touch of the electric terminal can cause a fatal electric shock hazard!

- Ensure that the AC / DC switch of the energy storage converter is disconnected and that the terminal is not charged.
- When connecting to the grid, it must be allowed by the relevant department, and all safety instructions related to the grid must be observed.

.5.2 Wiring steps

Step 1 Disconnect the superior AC circuit breaker and measure it with the multimeter to ensure that the terminal has no voltage. Step 2 Push the cable from the bottom inlet hole to the outdoor cabinet.

Step 3 Ensure the AC cable is in is correctly.



Step 4: Crimp in with the terminal. Refer to "6.4.2 Manufacturing wiring terminals"

Step 5 connection.

1. Select the appropriate screws.
2. Press the wiring copper nose on the AC wiring copper row, and refer to the connection sequence of "6.3.1, copper wire access" and "6.3.2 aluminum wire access".
3. Tighten the screws with a screwdriver or a wrench. For the tightening moment, see the attachment table. Step 6 To confirm the firm wiring.

Pay attention to

The length of wiring screw should be appropriate, slightly exposed the copper row installation hole can be exposed, too long may affect the insulation performance or even short circuit. Check whether the connection between the copper nose and the copper row is caught. If the clip is caught, it should be removed immediately, otherwise it may lead to poor contact or even heat damage.

6.6 Wiring and waterproof treatment

According to the design of the entry and exit holes of the energy storage integrated outdoor cabinet, the cables shall be laid at the bottom trough of the outdoor cabinet, and the equipment shall be introduced by the entry and exit holes at the bottom of the cabinet. At the same time, the appropriate cables should be selected as required. Ensure electrical insulation and follow EMC specifications, and power cables and communication cables should be laid in layers. And when necessary, provide protection and support for the cable to reduce the stress of the cable. After that all wiring is correct and firm. The gap between the cable entry and exit holes at the bottom of the energy storage integrated outdoor cabinet should be blocked with fireproof mud. At the same time, the installation foundation of the energy storage outdoor cabinet should be waterproof.

6.7 End electrical connection

Warn!

After the electrical connection, check the connection of all cables. Ensure that all connections are correct and fastened.

After all electrical connections have been completed, the wiring should be thoroughly checked.

- Protect the energy storage outdoor cabinets effectively, such as in the cable gap, using fire mud plugging. If a waterproof terminal is used to seal, check that the waterproof terminal is fastened. For the vacant terminals, they should be sealed.
- Recall all the protective net covers firmly.
- The foundation at the bottom of the energy storage integrated outdoor cabinet should be made with waterproof treatment.

6.8UPS considerations

A set of UPS (uninterrupted power supply) equipment is equipped in the outdoor cabinet of energy storage integrated system. refer to the UPS manual for specific operation. During the operation of the system, the relevant operation and processing shall be handled according to the attached user manual.

The energy storage system must be charged for 3 to 6 months, which will lead to damage to the UPS.

7 Up and down electric operation

7.1 Power operation

For the position of each circuit breaker, please refer to the " 3.3.6 Switch Position Overview".

Step 1 Connect the primary main loop, measure the voltage and frequency to meet the system requirements, and proceed to the next operation. Step 2 Close the AC main circuit breaker QF 1.

Step 3 Press the UPS "Power button" to start up the UPS. At this time, the liquid cooling machine, fan, fire power is completed. Step 4 switch the QF 2 handle to the ON position on the main control box.

--finish

From this point, the system can be powered up to check the operation touch screen to check whether the system is normal.

7.2 Electric operation

Step 1 switch the QF 2 handle to the OFF position on the main control box.

Step 2 Press UPS "Power button", UPS shut down. At this time, the liquid cooling machine, fans, fire-fighting equipment under the power. Step 3 Disconnect the AC main circuit breaker QF 1.

--finish

8 Fire instructions

8.1 general rules

Please comply with the fire regulations and regulations of the country / region. Regular inspection and maintenance of the fire-fighting equipment, Ensure that all the functional indicators are normal.

8.2 fire unit

The design scope of this system is equipped with one set of pump group perfluorohexone fire extinguishing device for each battery cabinet.

1、 At the top of each battery cabinet, a 3 KG pump group perfluorohexone fire extinguishing device is installed, which is used to collect the thermal runaway data of each pack and agent spraying in the battery cabinet.

2、 Each PACK is equipped with a 07A composite detector (co, temperature, voc, smoke) to detect the internal thermal runaway data of the battery and upload the data to the perfluorohexone fire extinguishing device.

3、 One 07A composite detector (co, temperature, voc, smoke) is installed on the top of each battery cabinet to detect the thermal runaway data inside the battery cabinet and upload the data to the perfluorohexone fire extinguishing device.

4、 A single row of box valve, space nozzle and several pipelines are installed on the top of each battery cabinet to spray the fire extinguishing agent into the battery cabinet space for fire extinguishing.

5、 Each PACK is equipped with one perfluorohexone integrated nozzle and several lines for a single pack after thermal runaway, spraying the fire extinguishing agent to a single pack for fire extinguishing.

9 Troubleshooting

9.1 fault message

Table 11-1 Fault information

Hitch	Process mode
Emergency shut down	a. Immediately shut down the fault system and disconnect its external power grid; b. Check whether the emergency stop button is pressed; c. Check whether the feedback connection connection of the emergency stop button is abnormal;
The AC circuit breaker is disconnected	a. Immediately shut down the fault system and disconnect its external power grid; b. Check whether the circuit breaker QF 1 is disconnected; c. Check whether the connection of circuit breaker QF 1 is abnormal;
Lightning protection device failure	a. Immediately shut down the fault system and disconnect its external power grid; b. Check whether the lightning protector is faulty; c. Check whether the lightning protector auxiliary contact connection is disconnected;
The environment is too warm	a. Immediately shut down the fault system and disconnect its external power grid; b. Check whether the air conditioning system is faulty and whether the system is overloaded; c. Check whether the ambient temperature is too high;
A CMU communication failure	a. Check whether the communication line is loose;
CMU report an emergency	a. Check the specific fault through the CMU information interface; b. Find the manual troubleshooting method;
A PCS communication failure	a. Check whether the communication line is loose; b. If this is not resolved, please contact HGTESLA.
PCS report an emergency	a. Check the specific fault through the PCS information interface; b. Find the manual troubleshooting method;
SOC high alarm	a. Check the system battery SOC value;
SOC low alarm	a. Check the system battery SOC value;

10 Daily operation and maintenance

10.1 Safety precautions

Warn!

There is fatal high voltage inside the cabinet of energy storage integrated system, and there is a danger of fatal electric shock. After shutdown, please wait at least 10 minutes before opening the cabinet door. Before performing maintenance work, ensure that the equipment is completely completely charged.

Warn!

Only qualified and authorized personnel can perform maintenance and other operations on the energy storage integrated system. During the maintenance work, do not leave the screws, washers and other metal parts in the energy storage integrated system, otherwise it may damage the equipment!

Warn!

The entry of wind, sand and moisture may damage the electrical equipment in the energy storage integrated system, or affect the operation performance of the equipment!

- During the sandstorm season, or when the relative humidity in the surrounding environment is greater than 95%, do not open the cabinet door of the energy storage integrated system equipment.
- The maintenance work can be started when there is no sand and the weather is clear and dry.

Warn!

If only the AC and DC switches are disconnected, the cable connection terminal inside the AC and DC cabinet of the energy storage integrated system will still be live! To avoid the danger of electric shock, before maintenance and maintenance:

- Disconnect each AC / DC side switch,
- Disconnect the front and rear open circuit switches of the energy storage integrated system.

10.2 Maintenance introduction

10.2.1 summary

The energy storage integrated system has IP65 protection level, suitable for outdoor use. However, the harsh environment or long-term operation will still cause the aging of the energy storage integrated system or the damage of the internal equipment. Regular maintenance and inspection of the energy storage integrated system, and the replacement of the aging and damaged parts will effectively extend their service life, and improve the performance of the internal equipment.

Explain

Irregular inspection is necessary, especially when the overall performance of the system is poor.

10.2.2 Maintenance cycle

In order to ensure the good operation of all the equipment in the outdoor cabinet of the energy storage integrated system, it shall be maintained regularly. The respective maintenance periods presented in this section are the reference values. The actual maintenance cycle shall be reasonably determined according to the actual environmental conditions of the project site. If the operating environment of the outdoor cabinet is relatively bad, such as a desert area, the corresponding maintenance period should be shortened. Especially the internal and external cleaning, corrosion and rust prevention work, should be more frequent. If the system is installed in a desert area, it is recommended that the inside and outside of the energy storage integrated outdoor cabinet should be carefully checked and thoroughly cleaned after each sandstorm.

Warn!

It is necessary to regularly check whether the air conditioning system and fan in the energy storage integrated outdoor cabinet are running normally, and observe whether there is friction sound in the operation. If there is, it may be caused by dust entry. It is necessary to stop the energy storage integrated outdoor cabinet and remove the dust. After the energy storage integrated outdoor cabinet is completely powered off, it needs to wait for at least 10 minutes, so that the internal capacitance can be discharged. Before removing dust, please use the multimeter to confirm that the machine is completely uncharged, so as to avoid electric shock.

Warn!

Some maintenance work require the removal of the net cover inside the machine to be performed. After all maintenance work, all removed maintenance covers must be restored to the original state. Ensure that all of the screws are fastened in place.

Warn!

During routine maintenance and inspection of energy storage integrated outdoor cabinet and internal equipment, once non-conformance are found, please correct them immediately.

Table 10-1 Maintenance (bibiennial)

List of projects	Check the method
System status and cleaning	Check the following items, if not met, please correct immediately: • Check whether the energy storage integrated outdoor cabinet and its internal equipment are damaged or deformed. • Check whether there is any abnormal noise in the internal equipment during the operation process. • Check whether the temperature in the outdoor cabinet machine is too high. • Check whether the internal humidity and gray scale of the energy storage integrated outdoor cabinet are within the normal range. Clean it up, if necessary. • Check whether the air inlet and air outlet of the outdoor cabinet are blocked.
Warning logo	Check whether the warning signs and labels are clearly visible and not defiled. Replace them if necessary.
Cable shielding layer is grounded	Check whether the cable shielding layer and the insulation casing contact well; whether the grounding copper row is fixed in place.
Lightning protection device	Check whether the lightning protection equipment is well placed and fastened.
Corrosion	Check whether there is oxidation or corrosion inside the energy storage integrated outdoor cabinet.

Table 10-2 Maintenance Work (Annual)

List of projects	Check the method
Outside the cabinet	Check the following items, if not met, please correct immediately: • Check whether there are flammable objects on the top of the energy storage integrated outdoor cabinet.

	• Check whether the welding point of the energy storage integrated outdoor cabinet and the foundation steel plate is firm and whether there is corrosion. • Check whether the energy storage integrated outdoor cabinet shell is damaged, paint drop, oxidation and other conditions. • Check whether the cabinet door lock can be opened flexibly. • Check whether the seal strips are well fixed.
Inside the cabinet	Check for foreign matter, dust, dirt and condensate inside the energy storage integrated outdoor cabinet.
Into, outlet	Check whether the inlet and outlet are blocked by dust or debris.
Wiring and cable arrangement	• Check whether the cable arrangement is standard, whether there is a short circuit and other conditions. If there is abnormal, it should be corrected immediately. • Check whether all the inlet and outlet line holes of the energy storage integrated outdoor cabinet are well sealed. • Check for water seepage inside the energy storage integrated outdoor cabinet, • Check whether the power cable connection is loose, and tighten it again according to the previously specified torque. • Check the power cables and control cables for no damage, especially the skin in contact with the metal surface

	Whether there are marks of cuts.
Ground and equip-otential connect-ions	• Check whether the grounding connection is correct, and the grounding resistance value should not be greater than 4 Ω. • Check whether the equipotential connection inside the energy storage integrated outdoor cabinet is correct.
Electric fan	• View the running status of the fan. • Check if the fan is blocked. • Check for any abnormal noise of the fan in operation.
Nut bolt	Check whether there is a screw falling inside the energy storage integrated outdoor cabinet.

Table 10-3 Maintenance (semannual to annual)

List of projects	Check the method
Safety function	• Check the emergency stop button and the stop function of the LCD. • Simulation shutdown. • Check the body warning mark and other equipment identif-ication, if blurred or damaged, please replace in time.
Internal component inspection	• Check the cleaning of the circuit board and the compone-nts. • If necessary, please replace the air filter screen. Pay attention to! The ventilation of the air intake port must be checked. Otherwise, if the module cannot be effect-ively cooled, it will fail due to overheating.
Device maintenance	• Routine inspection of the corrosion of all metal elements (every six months). • Annual inspection of the contactor (auxiliary switch and micro-switch) to ensure that its machinery runs well. • Check the operating parameters (especially the voltage and insulation, etc.).

Explain

The table only contains the recommended product routine maintenance cycles. The actual maintenance cycle shall be reasonably determined by combining with the specific installation environment of the product.

The scale, location of the plant, and the site environment and other factors will affect the maintenance cycle of the product. If the operating environ-ment is wind-sandy or the dust is thick, it is necessary to shorten the maintenance cycle and increase the maintenance frequency.

10.3 System cleaning

10.3.1 summary

Cleaning around and inside the energy storage integrated outdoor cabinet is an important part of the maintenance work. Due to the influence of the temperature, humidity, dust and vibration of the internal equipment in the environment of the energy storage integrated outdoor cabinet, dust will accumulate inside, block the inlet and outlet or enter the internal equipment, which will lead to the potent-ial failure of the internal equipment, shorten the service life of the

equipment or reduce the power generation. During the normal operation of the equipment, regular inspection and cleaning should be carried out to ensure that the internal equipment is in a relatively good operating environment to a certain extent.

10.3.2 Cleaning cycle

The cleaning cycle of the energy storage integrated outdoor cabinet should be reasonably determined in combination with its operating environment, such as climate conditions, so as to ensure the good external and internal cleaning condition of the outdoor cabinet. If the operating environment is relatively harsh, such as a desert area, the maintenance period should be shortened.

10.3.3 Internal cleaning

For the internal dust of the energy storage integrated system, it is not recommended to clean it directly with a broom, otherwise it is easy to cause ash lifting. It is recommended to use a vacuum cleaner to absorb the dust.

10.3.4 Clean the interior of the foundation

Users should enter into the foundation interior regularly to check the cleaning condition in the foundation. If necessary, please use a vacuum cleaner to clean it up.

10.3.5 Check the door lock and hinge

After the cleaning work, check whether the door locks and hinges of the energy storage integrated system can be used normally and whether they are in good condition. If necessary, the door lock holes and hinges should be properly lubricated.

10.3. Seal bar inspection

The sealing strip in good condition is an important guarantee to effectively prevent water seepage inside the energy storage integrated outdoor cabinet. It should be carefully checked. If there is any damage, please replace it immediately.

10.3.7 Clean and replace dust cotton

Dust proof cotton is shipped with the cabinet, it is recommended to replace every six months; dustproof cotton should be cleaned once a month in ordinary use environment, in harsh desert, dust and catkins to avoid wind duct blockage, machine overheating, machine failure, fire and other dangerous situations.

11 Appendix

11.1 technical parameter

Model	QT-5-52-280-100
Battery parameters	
Battery type	Lithium iron phosphate
Battery module	43kWh，330kg
Number of battery modules	5
Rated power	215kWh
Rated voltage	768V
Voltage range	672V~864V
Charge and discharge rate	≤0.5C
Grid-connected parameters	
Power rating	107.5kW
Maximum output current	159A
Rated power grid voltage	3/N/PE ,230/400Vac
Rated power grid frequency	50Hz/60Hz
Power grid frequency range	45~55Hz/55~65Hz
Current total harmonic distortion	<3% (@ Rated power)
Direct component	＜0.5%In
Power factor	> 0.99 (@ Rated power)
Load parameters (optional function)	
Output rating	107.5kW
Maximum output current	160A
Rated output voltage	3/N/PE ,230/400Vac
Rated output frequency	50Hz/60Hz
Voltage total harmonic distortion	<3% (@ Linear load)
With an unbalanced load capacity	100%
General parameters	
Levels of protection	IP65
Fire extinguisher system	Possess
Working temperature	-25~+60℃
Relative humidity	0~95%, with no condensation
PCS cooling-down method	Intelligent air cooling
Battery cooling method	Liqukd cooling
The highest altitude	5000m (> 3000m required)
Communication interface	RS485、CAN
Protocol	Modbus , IEC104
Weight	2500kg
Size (width, depth and height)	965×1300×2290mm

11.2 tightening torque

In order to prevent the wiring copper nose from loosening, causing poor contact, or increased contact resistance causing fever or even fire, the following torque requirements shall be met when tightening the screws of the wiring copper nose:

Nut bolt	Torsion (N.m)
M3	0.7-1
M4	1.8-2.4
M5	4.-4.8
M6	6.5-8
M8	18-23
M10	34-40
M12	60-70
M16	119-140

11.3 Quality assurance

If the products fail during the warranty period, the company will repair or replace the new products free of charge.

evidence

During the warranty period, the customer to show the invoice and date of the purchase. At the same time, the trademark on the product should be clearly visible, otherwise we have the right not to give quality assurance.

condition

- The replaced unqualified products shall be handled by the company
- The customer shall reserve reasonable time to repair the faulty equipment

The Company has the right not to conduct quality assurance in the following cases:

- The whole machine and parts have exceeded the free warranty period
- Transportation damage
- Incorrect installation, modification, or use
- Run in very harsh conditions beyond those stated in this manual
- Machine failure or damage caused by the installation, repair, changing or disassembly of non-company service organization or personnel
- Beyond the scope of installation and use specified in the relevant international standards
- Damage caused by an abnormal natural environment

Product failure caused by the above situation, the customer requires maintenance service. After the judgment of the service organization of the company, it can provide paid maintenance services.

11.4 contact way

If you have any questions about this product, please contact us. In order to provide you with a faster and better service, we need your assistance to provide the following information:

- unit type
- Device serial number
- Fault code / name
- Simple description of the fault phenomenon