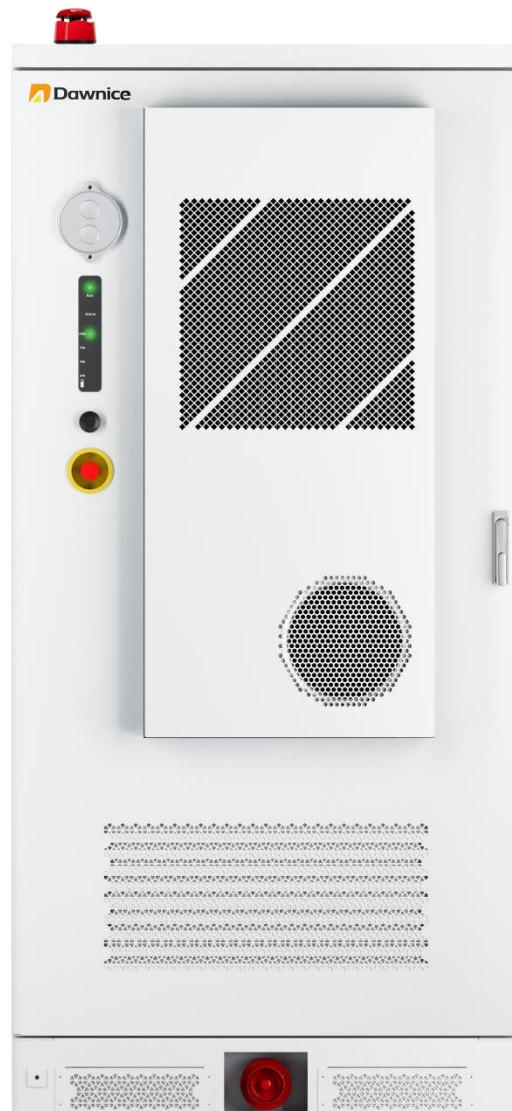




User Manual

Energy Storage System

BS07-265-ES-X

All-in-one energy storage system

Contents

1. Preface	1
1.1 Applicable Products	1
1.2 Applicable personnel	1
1.3 Legal Notice	1
1.4 Other Statements	2
1.5 Revision History	3
2. Safety	4
2.1 Safety Tips	4
2.2 Personal safety	4
2.3 Personnel requirements	4
2.4 Safety warning operation	5
2.5 Electricity safety	5
2.5.1 Electrical safety	5
2.5.2 Static Electricity Safety	5
2.5.3 Battery Pack Notes	5
2.6 Environmental safety	5
2.6.1 Escape route requirements	5
2.6.2 Moisture protection	6
2.7 Machinery Safety	6
2.7.1 General requirements	6
2.7.2 Heavy object handling requirements	6
2.7.3 Forklift and lifting requirements	6
2.8 Live test specifications	6
2.8.1 Live measurement	7
2.8.2 Measuring equipment used	7
2.9 Equipment Security	7
2.10 Product scrapping	7
3. Transportation Requirements	8
3.1 Transportation requirements	8
3.2 Shipping requirements	9
4. Storage requirements	9
4.1 Energy storage system storage (excluding battery pack)	10
4.2 Battery Pack Storage	10
4.3 Storage environment requirements	11
5. Installation site requirements	12
5.1 Site selection requirements	12
5.2 Site selection and flood control requirements:	13
5.3 Foundation requirements	14
5.4 Forklift requirements	14
5.5 Lifting requirements	15
6. Equipment Installation	16
6.1 Pre-installation preparation	16
6.2 Product Installation	18
7. System Solution	20
7.1 System Overview	20
7.2 System Features	20

7.3 System Dimension layout	21
7.3.1 System Dimensions	21
7.3.2 System Connection	22
7.3.3 Component layout	24
7.4 System Configuration	27
7.5 System Parameters	28
8. Battery System	28
8.1 System Configuration Parameters	29
8.2 Battery parameters	30
8.3 Battery Pack Parameters	30
8.4 Battery cluster parameters	30
8.5 High voltage cluster control box parameters	31
8.5.1 Dimensions	31
8.5.2 control Panel	31
9. Power Conversion System (PCS)	32
9.1 PCS Overview	32
9.2 PCS Features	33
9.3 PCS Parameters	33
10. Battery Management System (BMS)	34
10.1 BMS Overview	34
10.2 BMS Features	34
10.3 BMS parameters	35
11. Energy Management System (EMS)	36
11.1 EMS Overview	36
11.2 EMS Features	36
11.3 EMS modules and parameters	37
12. Thermal Management	39
12.1 Cooling System Overview	39
12.2 Battery pack fan	39
12.3 Air conditioning design	40
12.4 Air conditioning parameters	40
13. Fire protection system	41
13.1 Analysis of characteristics of electrochemical energy storage fires	41
13.2 Working principle of fire fighting equipment	41
13.3 Fire extinguishing mechanism	42
13.4 Thermally Actuated Aerosol Fire Extinguishing Device	44
13.5 Temperature Sensor	45
14. Dynamic ring system	47
15. Main equipment list	47

1. Preface

This manual mainly introduces the BS07-265-ES-X energy storage product. BS07-265-ES-X is a lithium iron phosphate battery energy storage product. It is mainly suitable for energy storage system application scenarios. If you have any confusion, please contact your supplier for advice and instructions.

1.1 Applicable Products

This document applies to the following product models:

BS07-265-ES-X

1.2 Applicable personnel

It is only suitable for professionals who are familiar with local regulations and electrical systems, have received professional training, and are familiar with the relevant knowledge of this product. Including but not limited to:

- Technical Support Engineer
- Installation Engineer
- Commissioning Engineer
- Electrical Engineer
- Maintenance Engineer

1.3 Legal Notice

The copyright of this document belongs to our company . No part of this document may be extracted, copied, translated, annotated or reproduced in any form or by any means without the prior written authorization of our company .

All rights are reserved by our company.

Please note that the contents of this manual may be modified without prior notice. If the information changes, no further notice will be given.

1.4 Other Statements

Before transporting, storing, installing, operating, using or/and maintaining the equipment, please read this manual first, operate strictly in accordance with the contents of the manual, and follow the markings on the equipment and all safety precautions in the manual. In this manual, "equipment" refers to the products, software, components, spare parts and/or services related to this manual; "the company" refers to the manufacturer, seller or service provider of the equipment; "you" refers to the entity that transports, stores, installs, operates, uses or/and maintains the equipment.

The "Danger", "Warning" and "Notice" items in the manual do not represent all the safety items that should be observed. You must also comply with relevant international, national or regional standards and 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 equipment should be used in an environment that meets the design specifications. Otherwise, the possible equipment failure, equipment malfunction or component damage is not within the scope of the equipment quality assurance. Otherwise, the company will not be liable for compensation for personal injury, property loss, etc.

All operations including transportation, storage, installation, operation, use and maintenance must comply with applicable laws, regulations, standards and specifications.

It is prohibited to reverse engineer, decompile, disassemble, adapt, implant, etc. the device, study the internal implementation logic of the device, obtain the source code of the device software, infringe intellectual property rights in any way, and disclose the results of any device software performance test.

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

- Equipment damage caused by earthquake, flood, volcanic eruption, mudslide, lightning strike, fire, war, armed conflict, typhoon, hurricane, tornado, extreme weather, or force majeure;
- Not operated within the conditions of use described in this manual;
- The installation and use environment does not comply with relevant international, national or regional standards;
- Unqualified personnel 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 software code;
- Damage caused by you or a third party you entrust to transport;
- Damage caused by storage conditions not meeting the requirements of product documentation;
- 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.

1.5 Revision History

The latest version in the revision log contains the updated contents of all previous document versions.

V1.0.0. 20250611

- **First issue.**

V1.1.0.20250802

- Adjust the layout, replace the picture, and add the corresponding picture in the parameters.
- Added new chapter 6.2 "Product Installation".
- Added new chapter 7.3.2 "System Connection".
- Added new chapter 7.3.3 "Component Layout".

2. Safety

2.1 Safety Tips

Read all safety instructions carefully before carrying out any work and follow them when

handling the battery. Improper handling may result in:

- Injury or death of the operator or third party
- Damage to system hardware

Skills required of qualified personnel:

- Training in electrical system installation and commissioning and hazard handling
- Understanding this manual and other related documents
- Know your local regulations and directives

The following symbols may appear in this manual to highlight information. Their meanings are as follows:



Indicates a hazardous situation which, if not avoided, will result in death or serious injury.



Indicates a possible damage or injury. If not avoided, a low to medium risk situation could result in death, injury, or damage.



Indicates potential equipment damage or environmental safety warnings. Failure to avoid may result in equipment damage, data loss, performance degradation, or other unpredictable consequences.

2.2 Personal safety



It is strictly forbidden to install, maintain, or overhaul the equipment when it is energized ! When maintaining or overhauling the equipment, at least two people must be on site.

2.3 Personnel requirements

- Only professional electricians or personnel with professional qualifications can perform various operations on this product.
- Operators should be fully familiar with the structure and working principle of the entire energy storage system.
- Operators should be fully familiar with this manual.
- Operators should be fully familiar with the relevant standards of the country/region where the project is located.

2.4 Safety warning operation

When installing, performing routine maintenance, or inspecting the battery pack, please follow the following warnings to prevent unrelated personnel from approaching and causing misoperation or accidents:

- Place clear markings on the front, back and switch of the battery pack to prevent accidental closing of the switch.
- Set up warning signs or safety warning tapes near the operating area.
- After maintenance or repair operations are completed, be sure to remove the cabinet door key and keep it properly.

2.5 Electricity safety



It is strictly forbidden to operate with power on during the installation process. It may cause fire or personal injury.

2.5.1 Electrical safety

- Never touch terminals or conductors connected to the mains circuit.
- Observe all instructions or safety documents regarding connection to the power grid and comply with warning signs on the product.
- Observe the safety precautions listed in this manual and other documentation related to this equipment.
- Perform a preliminary visual inspection of the equipment for damage or other hazards before operating.
- Check whether other external devices or circuit connections are secure.
- Make sure the equipment is in a safe state before operating it.

2.5.2 Static Electricity Safety

- Avoid unnecessary contact with the circuit board.
- Observe electrostatic protection regulations, such as wearing an anti-static wrist strap.

2.5.3 Battery Pack Notes

- There is a lethal high voltage between the positive and negative poles of the energy storage battery pack.
- When maintaining the equipment, ensure that the connection between the energy storage inverter and the energy storage battery pack is completely disconnected.

2.6 Environmental safety



It is strictly forbidden to place the device in an inflammable, explosive or smoky environment, otherwise it may cause hazards such as fire or explosion.

2.6.1 Escape route requirements

To ensure that staff can evacuate the scene quickly in the event of an accident, please comply with the following:

- Do not place flammable or explosive items around the battery pack.
- It is strictly prohibited to pile up debris in the escape passage or occupy the escape passage in any form.

2.6.2 Moisture protection

- Do not use the product in an environment that is more humid than specified.

2.7 Machinery Safety



When working at height, you must wear a helmet and other safety equipment, and fasten it to a solid structure to prevent falling accidents. Before installing the equipment, make sure it is fixed well to avoid problems such as tipping over and injuring people or damaging the equipment.

2.7.1 General requirements

- Scratches that occur during transportation and installation must be repaired in a timely manner, and it is strictly forbidden to expose the scratched parts for a long time.
- It is prohibited to perform welding, cutting and other operations on the equipment without permission.
- Proper use of work and the correct use of tools.
- When working at height, wooden ladders or insulated ladders should be used, and straight ladders are prohibited.
- When using a ladder, the ladder must be placed on a stable surface and someone must hold the ladder during operation.

2.7.2 Heavy object handling requirements

- When moving heavy objects, you should be prepared to bear the weight in advance.
- When multiple people are carrying the load, they should be distributed appropriately to ensure that the weight is evenly distributed.
- When carrying heavy objects, you should wear protective gloves, labor protection shoes and other safety gear.

2.7.3 Forklift and lifting requirements

- When using a forklift, make sure the forks are in the middle position before raising the fork arms to prevent tipping.
- Before moving, the equipment needs to be fastened to the forklift with ropes; during moving, it needs to be supervised by a dedicated person.
- Lifting operators need to undergo relevant training and pass the training before they can start work.
- Warning signs must be erected to isolate the lifting area.
- The lifting conditions must meet the operating requirements
- During lifting operations, serious personnel are walking under the operation.
- During hoisting, ensure that the angle of the hoisting cable is less than 90°.

2.8 Live test specifications



There is a fatal high voltage between the positive and negative electrodes of the energy storage battery pack. Two people must be involved to ensure personal safety.

2.8.1 Live measurement

There is high voltage in the device. Accidental contact may result in fatal electric shock. Therefore, when measuring with power on, you should:

- Take protective measures (such as wearing insulating gloves, insulating shoes, etc.).

2.8.2 Measuring equipment used

When performing electrical measurements, connections, or test runs on equipment:

- Select high-quality measuring equipment whose measuring range and usable conditions meet the on-site requirements.
- Ensure that the connection and use of measuring equipment are correct and standardized to avoid dangers such as arcing

2.9 Equipment Security



Protective measures such as fences and walls must be set up around the equipment, and safety warning signs must be erected for isolation to prevent unauthorized personnel from entering and misoperating the equipment during operation, which may cause personal injury or property loss.

➤ The equipment installation layout must meet the installation protection requirements specified in local standards, including but not limited to. 51048-2014 Electrochemical Energy Storage Power Station Design Specifications, NFPA 855 Standard for the Installation of Stationary Energy Storage Systems» specification requirements.

- Before installing, operating, or maintaining the battery, please read the relevant instructions and follow the manufacturer's requirements.
- Please use the battery within the specified ambient temperature range.
- If the battery is accidentally exposed to water, do not continue to install it. Please transport it to a safe place and dispose of it promptly.
- Before installing the battery, check that the battery pack casing is not damaged or deformed.

2.10 Product scrapping



When the product needs to be scrapped and discarded, it cannot be treated as regular waste.

- Our company has priority to recycle scrapped batteries
- For scrapped batteries that are not recycled by our company, please contact local authorized professional recycling agencies or manufacturers for scrap recycling.

Note: This manual cannot cover all possible situations during operation, maintenance, and repair. If you encounter a situation that is not explained in the manual, please give priority to following the relevant local regulations and standards and contact our company in a timely manner.

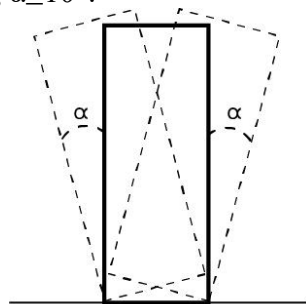
3. Transportation Requirements

3.1 Transportation requirements



During the transportation process, comprehensive personnel safety measures must be taken. The equipment must be handled with care and must not be dragged or thrown on rough surfaces.

- When carrying heavy objects, you should be prepared to bear the weight to avoid being crushed or sprained by the heavy objects.
- When two or more people are lifting heavy objects together, one person should be in charge and they should lift or lower the equipment at the same time and in unison.
- When moving equipment by hand, you should wear protective gloves, work shoes and other safety protection equipment to avoid injury.
- When carrying equipment by hand, first get close to the object, squat down, and use the strength of your straight legs (not your back) to lift the object slowly and steadily. It is strictly forbidden to lift it suddenly or twist your torso.
- When moving or lifting the device, hold the device handle or support the bottom edge of the device instead of the handle of the installed module.
- Do not quickly lift heavy objects above waist height. Place the heavy object on a workbench at half waist height or in a suitable place first, adjust the position of your palms, and then lift it.
- When moving heavy objects, you must use balanced and steady force; the moving speed must be uniform and slow; positioning must be smooth and slow, and any impact or drop that may scratch the surface of the equipment or damage the components and cables of the equipment must be avoided.
- When carrying heavy objects, you should be especially careful on workbenches, slopes, stairs and places where it is easy to slip. When carrying heavy objects over thresholds, make sure the door is wide enough for the equipment to pass through to prevent bumps or scratches on your fingers.
- When transferring heavy objects, you should move your feet instead of twisting your waist. When you need to lift and transfer heavy objects at the same time, you should first point your feet in the direction you want to move them, and then carry them.
- When using a forklift to transport the equipment, the forklift must be in the middle position to prevent it from tipping over. Before moving, please fasten the equipment to the forklift with ropes; during moving, special personnel are required to supervise.
- The placement tilt angle should meet the requirements, the tilt angle with packaging $\alpha \leq 15^\circ$, and the tilt angle after removing the packaging $\alpha \leq 10^\circ$.



- During the process of moving and transporting the air conditioner, the air conditioner must be kept upright and it is prohibited to place it flat or upside down.

3.2 Shipping requirements

- Rough loading and unloading is prohibited, otherwise it may cause battery short circuit, damage (leakage, rupture, etc.), fire or explosion, etc.
- The battery should be transported in the direction required. It is prohibited to invert, tilt, drop, mechanically impact, expose to rain or snow, or drop into water.
- Batteries must be transported separately. For cabinets with installed batteries, it is prohibited to transport them with batteries. If the cabinet needs to be transported or moved, the batteries must be removed first.
- The battery has passed the UN38.3 (UN38.3: Section 38.3 of the sixth Revised Edition of the Recommendations on the Transport of Dangerous Goods: Manual of Tests and Criteria) certification, and this product belongs to the ninth category of dangerous goods.
- Transport service providers must be qualified to transport dangerous goods, and the use of convertibles is strictly prohibited .
- The battery can be directly delivered on site to meet the transportation requirements of cars, ships, etc.
- Comply with international dangerous goods transportation regulations and meet the regulatory requirements of transportation regulatory authorities in the country of departure, transit and destination .
- When transporting, choose sea transportation or roads with good road conditions. Railway and air transportation are not supported. Bumping and tilting should be minimized during transportation .
- Sea transportation complies with the transportation requirements of the International Maritime Dangerous Goods Code .
- Before transportation, the battery packaging must be checked to ensure it is intact and free of odor, leakage, smoke, fire, etc. Otherwise, transportation is prohibited .
- The transport packaging box must be sturdy and should be handled with care and moisture-proof measures during loading, unloading and transportation .

4. Storage requirements



Due to the characteristics of lithium batteries, battery storage requirements should be followed when storing lithium batteries, otherwise permanent battery damage or performance degradation may occur.

- Battery packs should not be stored for long periods of time. Long-term storage of lithium batteries will cause capacity loss. After lithium batteries are stored at the recommended storage temperature for 12 months, the general irreversible capacity loss is 3%~10%.
- Store in a clean and dry place and avoid erosion by dust and water vapor. Do not expose to rain or ground water.
- The ambient air must not contain corrosive or flammable gases.
- Do not store tilted or upside down.
- When equipment other than battery packs is stored for two years or more, it must be inspected and tested by professionals before being put into use.

4.1 Energy storage system storage (excluding battery pack)

- During long-term storage, it is prohibited to remove the packaging.
- Stacking storage is prohibited.
- Storage (long term or temporary) on a flat surface.
- Keep cabinet doors closed.
- Storage environment temperature: $-40^{\circ}\text{C}\sim+60^{\circ}\text{C}$, relative humidity: 5% RH~90% RH.

4.2 Battery Pack Storage

● The battery should be stored indoors, out of direct sunlight or rain, in a dry and well-ventilated place, with a clean environment, free from a large amount of infrared radiation, organic solvents or corrosive gases, metal conductive dust, etc., and away from heat and fire sources.

● If the battery fails (carbonization, leakage, expansion, water ingress, etc.), it must be promptly transferred to a hazardous goods warehouse for separate storage, at least 3m away from surrounding combustible materials, and scrapped as soon as possible.

● When storing batteries, they should be placed correctly according to the packaging box labels. It is strictly prohibited to place them upside down, sideways, or tilted. When stacking, they must comply with the stacking requirements on the outer packaging.

● When storing batteries, please store them separately and avoid mixing them with other equipment or stacking them too high. Firefighting facilities that meet the requirements must be available on site, such as fire sand, fire extinguishers, etc.

● After the battery is powered off, there is static power consumption of the battery internal module and self-discharge loss of the battery itself, which may cause the battery to be damaged due to over-discharge. Avoid storing the battery in a low-power state and recharge the battery in time. If the battery fails to be recharged beyond the expiration date and causes permanent failure, the company will not provide corresponding warranty services. Scenarios that trigger low-power storage of the battery include but are not limited to:

- The battery power cable or signal cable is not connected.
- After the energy storage system is discharged, the battery cannot enter the charging state due to system failure
- Improper configuration of the energy storage system results in the battery being unable to enter the charging state
- The battery cannot be charged due to long-term AC power failure
- The control system, PCS or main circuit components are not closed, causing the battery to be unable to enter the charging state

4.3 Storage environment requirements

- Ambient temperature: -30°C~+50°C (excluding battery pack)
- Ambient temperature: 0~30°C (battery pack); it is recommended that the battery pack be stored in a constant temperature environment of 25°C. Long-term storage beyond this temperature may affect the performance and service life of the battery.
- Relative humidity: 5% RH~90% RH (around 45% RH recommended).
- Dry, ventilated and clean.
- Avoid contact with corrosive organic solvents, gases and other substances.
- Avoid direct sunlight.
- The distance to the heat source must not be less than two meters.
- During storage, the battery must be disconnected from any external connections. If there is an indicator light on the battery pack panel, it should be off.
- If storage period is exceeded, it should be reported promptly.
- When batteries are shipped, the first-in-first-out principle should be followed.
- When transporting batteries, they must be handled with care and it is strictly forbidden to damage the batteries.

5. Installation site requirements

5.1 Site selection requirements

- This system is only suitable for outdoor scenes.
- The installation environment level should be higher than the historical highest water level in the area and at least 300mm above the horizontal ground. The installation location cannot be in a low-lying area.
- There should be no vegetation or flammable plants within 3m of the installation site of the energy storage system or energy storage power station and the surrounding area to prevent wildfires caused by high temperatures in summer from causing fires in the energy storage system.
- The safe distance between the energy storage system and the building should comply with local fire regulations or standards.
- The safe distance between the energy storage system and Class A production buildings is $\geq 12\text{m}$, the safe distance between the energy storage system and Class B production buildings is $\geq 10\text{m}$, the safe distance between the energy storage system and Class C, D, and E production buildings with fire resistance levels of one or two is $\geq 10\text{m}$, the safe distance between the energy storage system and fire resistance level three production buildings is $\geq 12\text{m}$, and the safe distance between the energy storage system and living buildings is $\geq 12\text{m}$. If the exterior walls of the adjacent buildings are non-combustible and have no doors, windows, or exposed burning eaves, the fire separation distance can be reduced by 25% based on the aforementioned safe distance.
- If the above safety distance cannot be met, a firewall must be installed between the battery equipment room, energy storage room or energy storage installation area and Class C, D, and E buildings. Firewalls with a fire resistance of no less than 3h should be installed for safety protection, and the length and height of the firewall should exceed the outer contour of the energy storage system by 1m each. At the same time, the space requirements for equipment transportation, installation, maintenance, etc. need to be considered.
- The energy storage system or energy storage power station must be set up in an environment without the risk of explosion.
- The site has convenient transportation conditions and reliable fire suppression system equipment.

Description 1

- The installation, commissioning and operation phases of the energy storage system should comply with the principle of fire protection first: ≥ 2 gas fire extinguishers should be installed near each unit, such as heptafluoropropane, perfluorohexanone, and carbon dioxide .
- Please reserve a water fire extinguishing system interface at the energy storage system site .
- The site area required in the near term should be sufficient, and room for expansion should be left based on the needs of the entire life cycle .
- Choose a well-ventilated area
- Energy storage systems installed in salt-damaged or polluted areas will be corroded. Please do not install energy storage systems in salt-damaged or polluted areas. Energy storage systems can be used in the following or better environments:
 - Outdoor environment more than 2000m from the coast. It is not recommended to use the energy storage system when the distance is 500m~2000m from the coast (if you need to use it, you must confirm with the dealer or our engineers). The energy storage system cannot be used when the distance is less than 500m from the coast.
 - The distance from heavy pollution sources such as smelters, coal mines, thermal

power plants, etc. is greater than 1500m to 3000m

- The distance from moderate pollution sources such as chemical industry, rubber, electroplating, etc. is more than 1000m to 2000m

- The distance to light pollution sources such as food, leather, heating boilers, slaughterhouses, centralized garbage dumps, and sewage treatment plants is greater than 500m to 1000m.

Note 2

When the safety distance of the selected site cannot meet the requirements of relevant national standards, it is recommended to re-select the site. The site selection should avoid scenarios that are not recommended by industry standards and regulations, including but not limited to the following areas, regions and places:

- Areas with strong vibration, strong noise sources and strong electromagnetic field interference.
- Places where dust, oil smoke, harmful gases, corrosive gases, etc. are generated or present.
- Places where corrosive, flammable, or explosive items are produced or stored.
- Locations with existing underground facilities.
- There are unfavorable geological conditions such as rubbery soil, soft soil layers, and the ground is prone to water accumulation and sinking.
- Below the water reservoir, water landscape, and water intake room.

Note 3

- If it is unavoidable to set it up in a place where water may accumulate, water retaining and drainage facilities or measures to raise the ground should be installed.
- Cable trenches should not be used as drainage channels, and openings for cable routing (such as holes where cables pass through partition walls and floor slabs) should be fire-blocked.
- Earthquake faults and seismic zones with a fortification intensity higher than nine degrees.
- Areas with direct hazards such as mud-rock flow, landslide, quicksand, and caves.
- Within the boundaries of the mining subsidence (dislocation) zone.
- Within the explosion hazard area.
- An area that may be flooded if a dam or dike fails.
- Important water supply source sanitary protection area.
- Historical and cultural relics protection area.
- Crowded places, high-rise buildings, and underground buildings.
- Intersections and busy traffic sections of urban main roads.

5.2 Site selection and flood control requirements:

- The design elevation of the station site of a large-scale electrochemical energy storage system (power $\geq 100\text{MW}$) should be higher than the flood water level with a frequency of 1% or the highest historical waterlogging water level.
- The design elevation of the station site for medium and small electrochemical energy storage systems (power $<100\text{MW}$) should be higher than the flood water level with a frequency of 2% or the highest historical waterlogging water level.
- When the design elevation of the station site cannot meet the above requirements, another site should be selected, or different flood and waterlogging prevention measures should be taken according to different situations.
- For energy storage power stations along rivers, lakes, seas and other places affected by wind and waves, the elevation of flood control facilities should take into account the wind and wave height with a frequency of 2% and a safety overheight of 0.5m.

- When a large amount of water flows into or passes through the base from the periphery of the base, it is advisable to set up side ditches or drainage (interception) ditches to carry out surface drainage in an organized manner.

Anti-intrusion fence:

It is recommended to use a solid wall or fence to isolate and protect the energy storage equipment area. The fence should have a door lock and the fence height should be greater than 2.2 meters. Firewalls can replace part or all of the walls, and the designer can make comprehensive considerations.

5.3 Foundation requirements

Foundation design requirements:

- The energy storage system must be installed on concrete or other non-combustible surfaces. The installation surface must be level, firm, flat, and have sufficient bearing capacity. No dents or tilts are allowed.
- The equipment foundation is calculated and configured based on the load-bearing capacity of a single piece of equipment of 3000kg. If the foundation load-bearing capacity is not met, it needs to be reviewed.
- The bottom of the foundation pit of the equipment foundation must be compacted and filled.
- It is strictly forbidden to disturb the foundation of the equipment by water after excavation. If it is disturbed by water, excavation should be continued and replacement should be carried out.
- The horizontal error between the equipment foundation and the contact surface of the cabinet is $\leq 3\text{mm}$.
- The foundation must be higher than the local historical highest water level and at least 300mm above the horizontal ground.
- Drainage facilities should be constructed in accordance with local geology and municipal drainage requirements to ensure that no water accumulates at the foundation of the equipment. The foundation construction should meet the drainage requirements of the local maximum historical rainfall, and the discharged water needs to be treated in accordance with local laws and regulations.
- When constructing the equipment foundation, it is necessary to consider the cable outlet of the energy storage system and reserve trenches or cable entry holes.
- The reserved holes in the equipment foundation and the cable inlet holes at the bottom of the equipment should be sealed.
- Users must verify the basic design parameters of the energy storage system based on the project site's installation environment, geology, and earthquake resistance requirements.

5.4 Forklift requirements

- It is prohibited to move the energy storage system after the battery pack wiring harness is installed.
- If a forklift is used to install the cabinet, the forklift's load-bearing capacity must be $\geq 3\text{t}$.
- If a forklift is used for battery pack installation and maintenance, the forklift's load-bearing capacity must be $\geq 1\text{t}$.
- The recommended fork and knife length is 1300mm~1500mm, width is 80mm~160mm, and thickness is 25mm~80mm.
- Forklift lifting height requirements: when the foundation height is $\leq 0.3\text{m}$, the lifting height is $\geq 2\text{m}$; when the foundation height is $> 0.3\text{m}$, the lifting height is increased accordingly.

5.5 Lifting requirements

Personnel performing lifting operations must undergo relevant training and be qualified before they can take up their posts.

- Temporary warning signs or fences must be erected in the lifting area to isolate it.
- The foundation for lifting operations must meet the load-bearing requirements of the crane.
- Before lifting, ensure that the crane and lifting rope meet the load-bearing requirements.
- Before lifting, ensure that the lifting tools are firmly fixed to a fixed object or wall that meets the load-bearing standards.
- During hoisting, it is strictly forbidden to walk under the boom or the hoisted object.
- During lifting, it is prohibited to drag the wire rope or lifting equipment, and it is prohibited to use hard objects to hit.
- During the lifting process, ensure that the angle between the two cables is no greater than 90° .
- When installing or removing the hanging equipment, do not drag on the cabinet to avoid scratching the cabinet.
- It is prohibited to lift or move the energy storage system after installing the battery pack.

Hoisting precautions:

Before lifting:

- The crane's lifting capacity is $\geq 3t$ and its working radius is $\geq 2m$. If the on-site working conditions do not meet the requirements, a professional person should be consulted for evaluation.
- Personnel performing lifting operations must undergo relevant training and be qualified before they can take up their posts.
- Lifting tools must be inspected and complete before they can be used.
- Ensure that the lifting tools are firmly fixed to a load-bearing fixture or wall.
- When used outdoors, it is recommended to hoist the device in clear and windless weather.
- Confirm that the crane and steel cable meet the requirements before lifting.
- The doors of the equipment are all closed and locked.
- Ensure that the connection of the steel cable is safe and reliable.
- It is recommended to adopt the lifting order from left to right or from right to left to ensure smooth lifting.

When hoisting:

- It is strictly forbidden for unauthorized personnel to enter the lifting area, and it is strictly forbidden to stand under the boom.
- Ensure that the crane is in a suitable position and do not lift over long distances.
- Keep it stable, with the diagonal inclination of the cabinet $\leq 5^\circ$.
- Ensure that the angle between the two cables is $\leq 90^\circ$.
- Lifting equipment should be lifted and lowered gently, and the cabinet should be lowered slowly and steadily to avoid impact on internal equipment.
- When the cabinet is in contact with the base, remove the lifting cable after the base is evenly stressed.
- It is prohibited to drag wire ropes and slings, and equipment collision is prohibited.
- The subsequent cabinets can be hoisted only after the cabinet that is hoisted first is fixed.

6. Equipment Installation

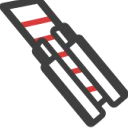
6.1 Pre-installation preparation

Tools:

- The tools shown in the pictures are for reference only. Please refer to the actual objects.
- Due to different on-site conditions, this tool list does not fully list the tools that may be used.

On-site installers and users are requested to prepare unlisted tools based on actual conditions.

Installation Tools:

			
Slotted insulated screwdriver	Phillips insulated screwdriver	Wire strippers	Diagonal pliers
			
Wire cutters	Utility knife	wrench	Rubber hammer
			
Hand drill	Impact drill	Cutting Machine	tape measure
			
Level	Vernier caliper	Steel Ruler	brush

 Cable Ties	 multimeter	 Heat Gun	 Vacuum cleaner
 Lifting cable	 Insulation ladder	 Forklift	 crane

Diagram Installation Tool Diagram

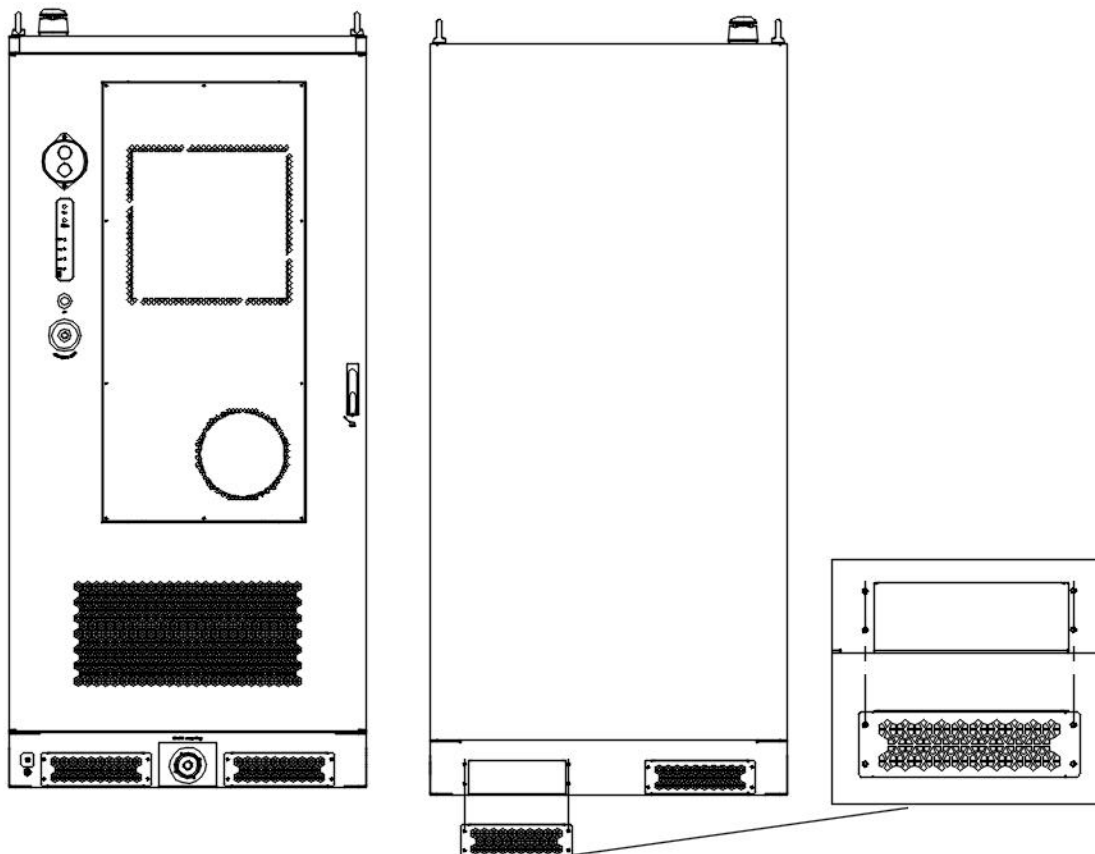
Personal protection tools:

 Insulating gloves	 Protective gloves	 Reflective vest	 seat belt
 Insulated shoes	 helmet	 Goggles	 Protective masks

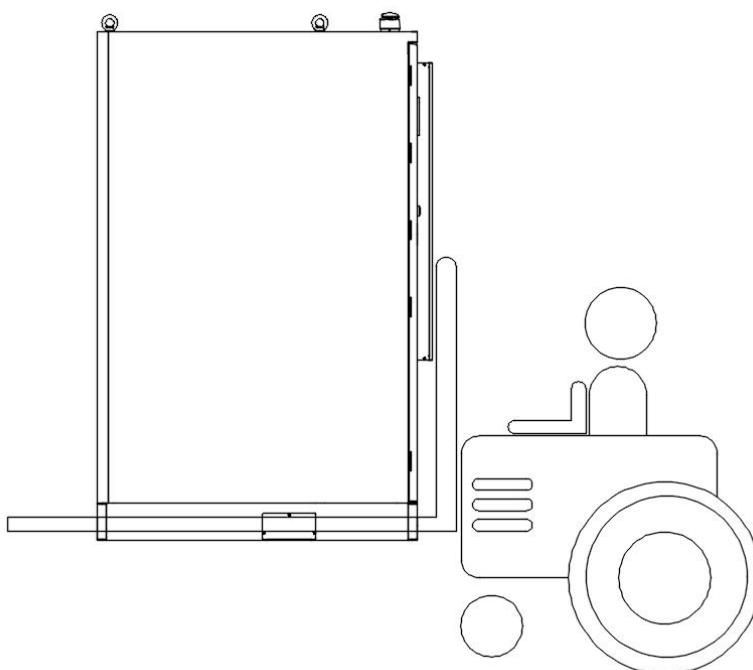
Icon protection tool map

6.2 Product Installation

- Step 1: Open the cabinet door and take out the items and accessories inside.
- Step 2: Confirm that the movable parts in the cabinet are securely fixed
- Step 3: Close and lock the cabinet door
- Step 4: Remove the bottom panel

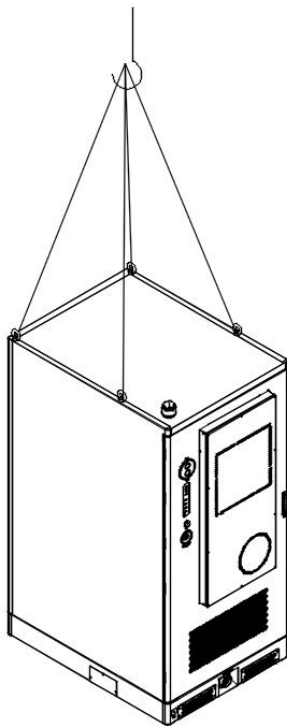


- Step 5: Use a forklift ^① (or hoist ^②) to move the battery cabinet

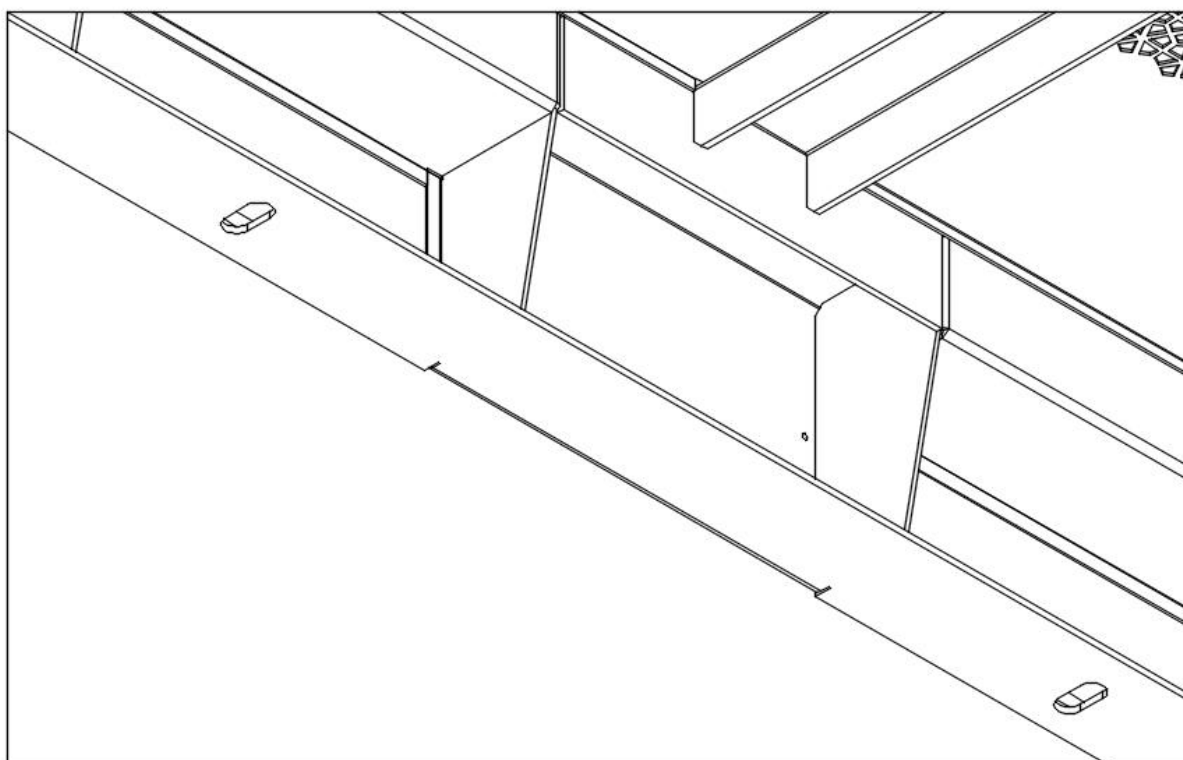


Note ^① : When operating a forklift, it is only allowed to be operated from the front and back. Lifting from the side may cause the center of gravity to shift and cause tipping, resulting in personal injury and equipment damage.

Note ^② : During hoisting operations, ensure that the angle between every two cables is no greater than 90°, otherwise a hoisting accident may occur, causing personal injury and equipment damage.



➤ Step 6: Secure the battery cabinet with bolts



7. System Solution

7.1 System Overview

265kwh energy storage system (hereinafter referred to as the system) is mainly composed of a lithium iron phosphate battery system, PCS, refrigeration, fire protection system, etc. It is configured in an integrated cabinet and can be applied to a variety of usage scenarios. The built-in battery management system (BMS) and energy management system (EMS) effectively prevent overcharging and over-discharging, and have short circuit protection, overvoltage protection, overcurrent protection , real-time monitoring, advanced control and other functions.

This system is connected to the public grid at a voltage level of 400 volts (the actual access plan is subject to the communicated design plan). The energy storage system is mainly used for energy storage or to adapt to peak shaving and valley filling and dynamic capacity expansion needs, thereby improving the economy and stability of customers' electricity use.

7.2 System Features

The energy storage system adopts an outdoor cabinet design, which is easy to install, transport, maintain and expand. The system is composed of lithium iron phosphate battery units with high energy density, low cost and high safety, connected in a certain series-parallel manner, and equipped with an advanced battery management system. It is flexible, reliable and easy to expand and upgrade; in addition, it also has the following functions:

- Comprehensive, multi-level battery warning and protection strategy, high safety
- Equipped with complete communication, monitoring, management and control functions, it can run stably for a long time
- The cabinet is equipped with an intelligent temperature control system, the internal equipment working environment is less affected by the external environment, and the system can be used in a wide range of areas
- Automatic fire alarm and automatic fire extinguishing system is installed in the cabinet

7.3 System Dimension layout

7.3.1 System Dimensions

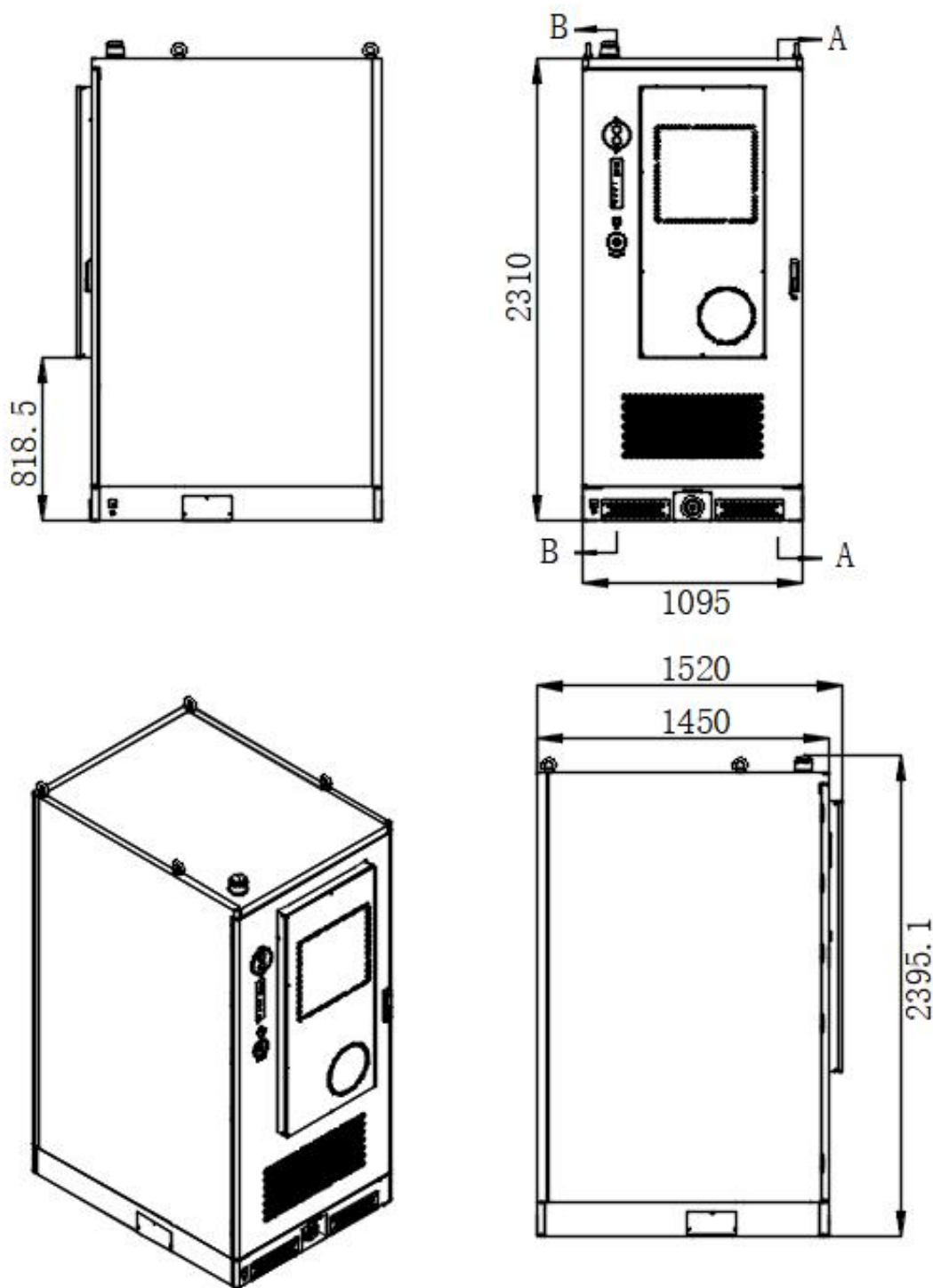
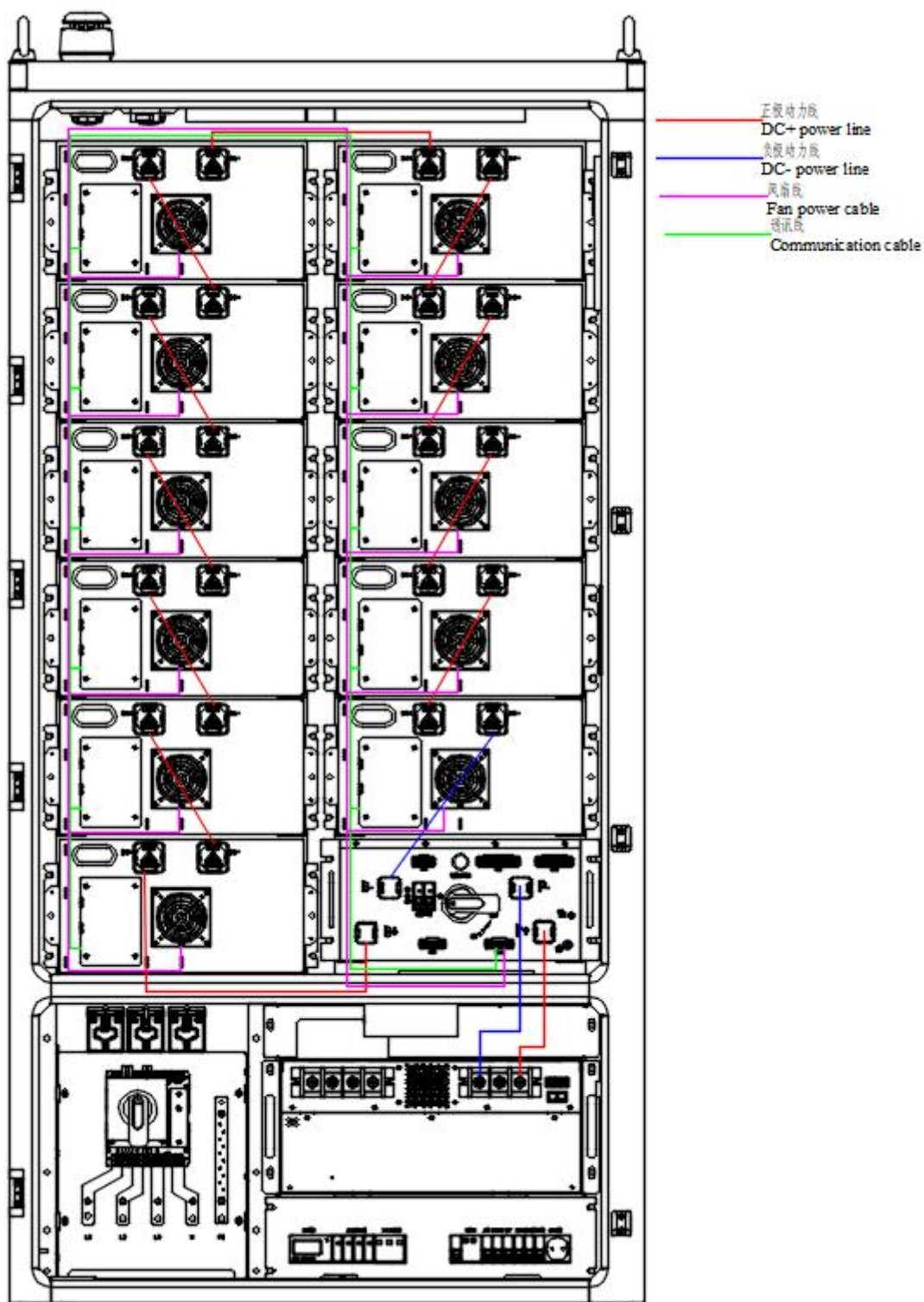


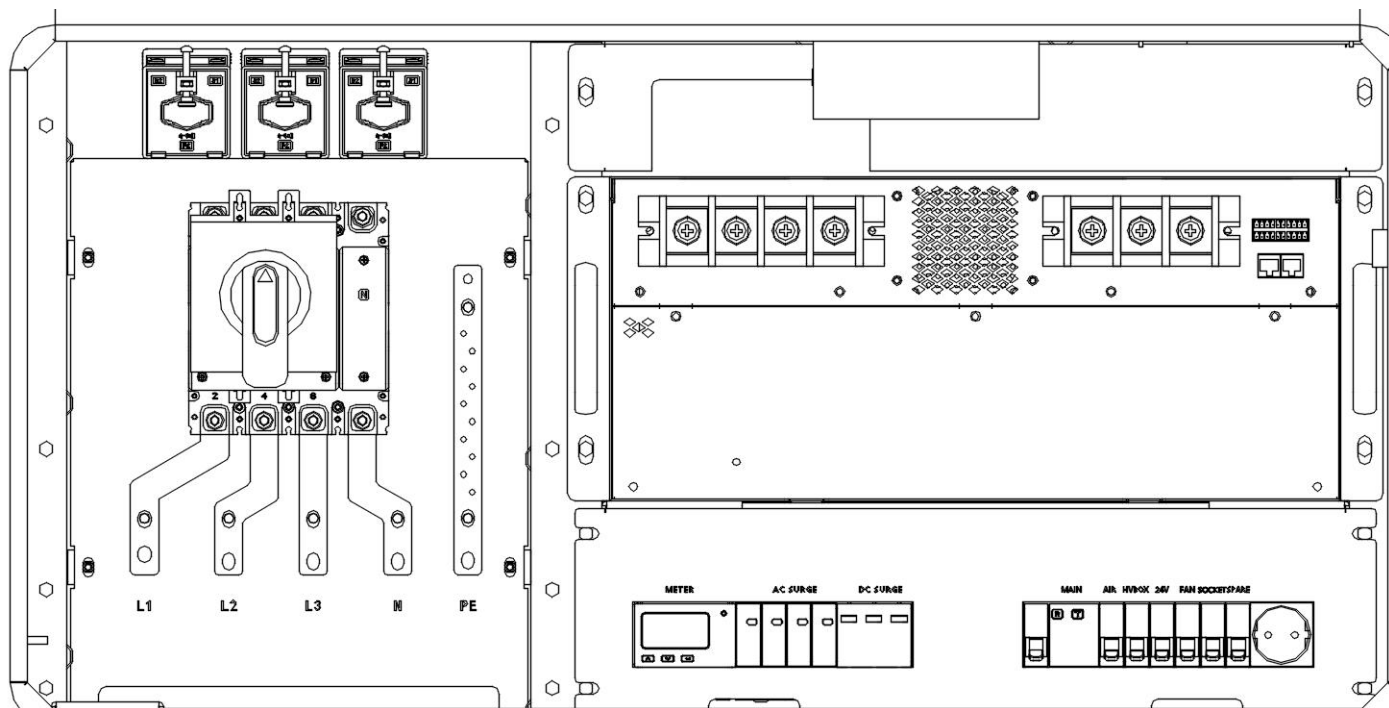
Figure System Dimensions

7.3.2 System Connection

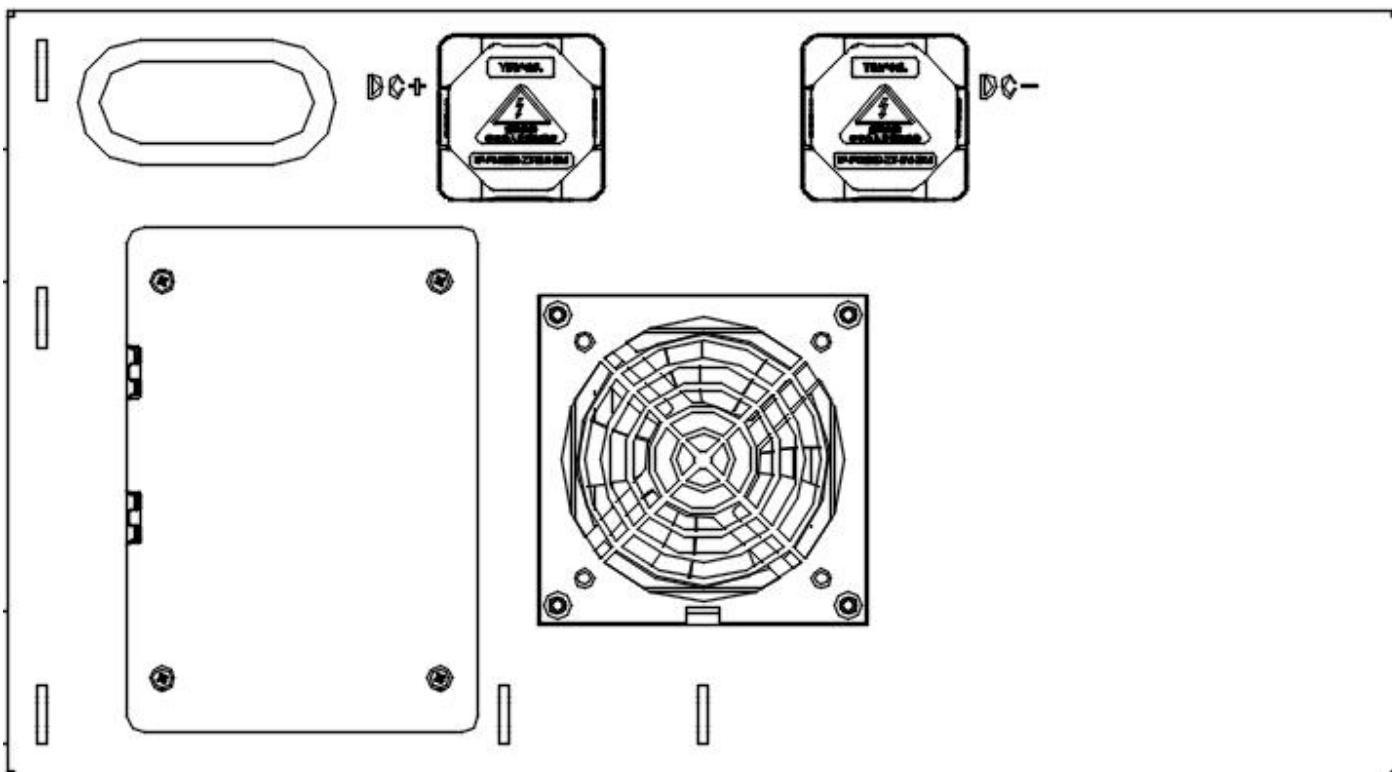
Wiring harness connection diagram:



Electrical warehouse layout diagram:

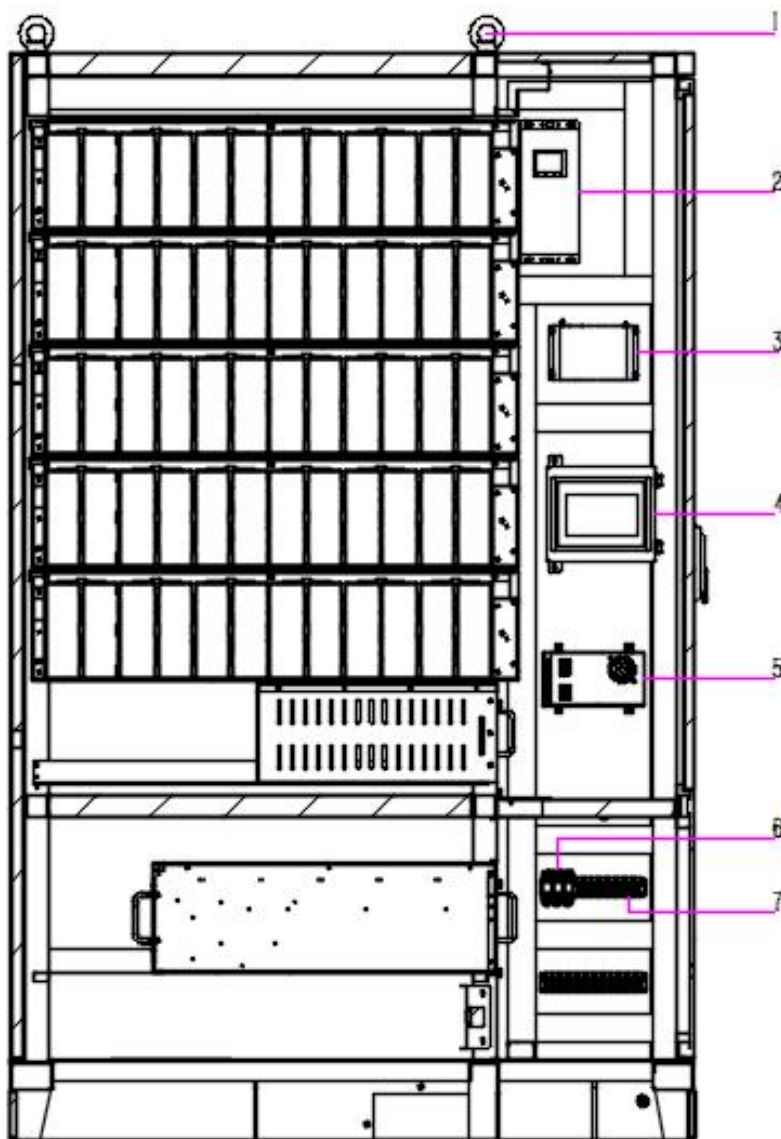


Plug-in box layout diagram:



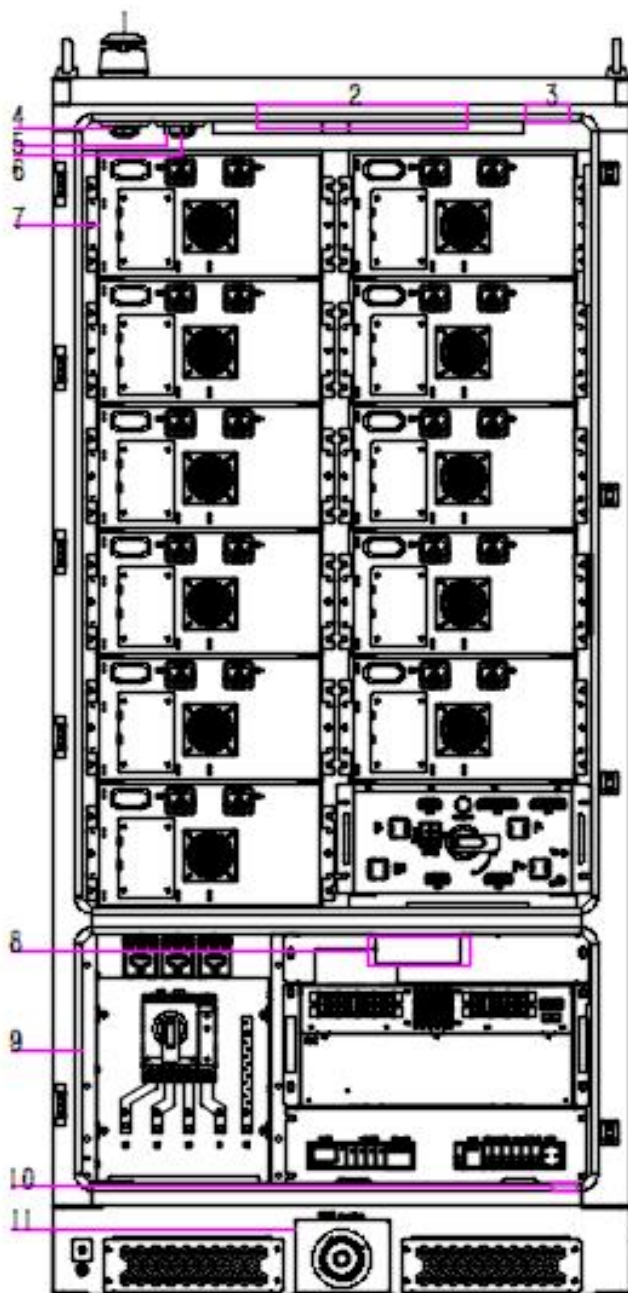
7.3.3 Component layout

Component Introduction



Serial number	Name	Description
1	Cabinet Lifting Hole	Connection point for lifting slings
2	Dehumidifier	Temperature & humidity monitoring and control
3	HMI	EMS data display interface
4	EMS	Energy Management System
5	Switching Power Supply	AC/DC conversion power supply
6	Relay	Electrical control relay
7	Terminal Blocks	Wire connection terminals

Component Introduction



Serial number	Name	Description
1	Alarm buzzer	Audible fault alarm indicator
2	Illumination light	Cabinet interior lighting
3	Gas detector	Flammable gas detection and alarm
4	Temperature detector	Temperature detector
5	Door sensor + light control	Door position sensing with automatic lighting control interlock
6	Smoke detection	smoke detection
7	Battery pack	Energy storage
8	Electric blinds	Heat exchange system
9	Electrical Compartment	Power connection/system power supply
10	Water Ingress Sensor	Detecting water accumulation in the battery cabinet
11	Fire protection interface	Fire extinguishing interface



Fire hose inside the cabinet

7.4 System Configuration

Serial number	Name	Quantity	Unit	Description
1	Outdoor Cabinets	1	Pcs	Rated 265.267kWh energy storage part
2	Battery Pack	11	Pcs	1P24S, single pack energy 24.1152kWh
3	High voltage cluster control box	1	Pcs	200A HV BOX
4	Energy Storage Converter	1	set	125kW (AC/DC)
5	Energy Management System	1	set	EMS
6	Industrial air conditioning	1	set	Total cooling capacity 5kW (subject to actual operation)
7	Fire protection system	1	set	Aerosol + water firefighting
8	Lighting system	1	set	Cabinet lighting
9	Dehumidification system	1	set	Dehumidification in cabinet
10	Waste heat recovery device	1	set	Adjusting the battery compartment temperature in low temperature environments

Table system configuration

The energy storage system configuration includes:

Battery cabinet: battery box installation location (and related control components)

Lithium battery: 3.2V/ 314 Ah lithium iron phosphate batteries are connected in series to form a battery cluster

Energy storage converter: current conversion unit, converting AC and DC power

Battery Management System: BMS is for secondary batteries, improving battery utilization and preventing overcharging and over-discharging of batteries. It can complete functions such as charge and discharge control of energy storage systems and battery SOC information monitoring according to instructions.

Energy Management System: EMS controls the standby, operation and stop of charging and discharging equipment, protection equipment and battery packs in the energy storage system. It realizes the visualization and intelligence of the whole station through the LAN series connection.

Industrial air conditioning: Controls the operating temperature of the system, provides a good working environment for the energy storage system, and extends the service life of the system.

Fire protection system: Detect and suppress incipient fire protection problems caused by thermal runaway and other reasons.

Lighting system: basic lighting function, providing functions such as operation and maintenance inside the cabinet when there is insufficient light.

Dehumidification system: adjusts the humidity inside the cabinet to ensure that the cabinet is in a dry environment.

Waste heat recovery device : When operating in a low temperature environment, the heat generated by PCS can be reasonably utilized.

7.5 System Parameters

Model	BS07-265-ES-X
Battery Information	
Battery Type	LiFePO ₄
Configuration	1P264S
Battery rated voltage	844.8VDC
Battery voltage range	739.2~950.4VDC
Battery rated energy	265.267 kWh
Maximum charge and discharge rate	0.5C
Battery cycle life	≥8000 cycles (@25°C, 0.5C, 90%DOD, 70%EOL)
AC (On-grid)	
Rated voltage	400V
Rated voltage range	± 15%
Rated frequency	50/60Hz
Wiring method	3W+N+PE
Rated Power	125kW
Maximum Power	138kW
Maximum current	200A
Power Factor	0.99/-1 ∞ 1
Current distortion rate	<2% (rated power)
DC component	<0.5%
Overload capacity	110%
Maximum efficiency	99%
General parameters	
Dimensions (W*D*H)	1095*1520*2395mm (including hoisting)
Weight	2800kg
Operating temperature	-30°C~55°C (>45°C derating)
Relative humidity	5%~90% (non- condensing)
IP rating	IP54
Noise	75dB (distance less than 1m)
Altitude	≤2000
Cooling method	Intelligent air cooling
Fire Fighting	Aerosol + water firefighting
Communication	MODBUS TCP/RTU

Table system parameters

8. Battery System

The total energy of this system is **265.267 kWh**. It is composed of a single **3.2V/ 314Ah** lithium iron phosphate battery in a **1P24S** combination to form a battery pack. **11** battery packs are connected in series to form the DC side of the system; the rated voltage of the DC side is **844.8 V**, and its rated charge and discharge rate is **0.5C**.

8.1 System Configuration Parameters

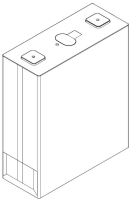
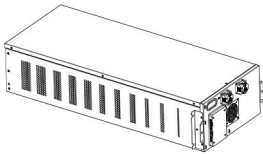
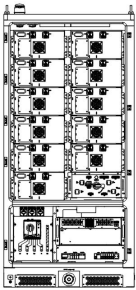
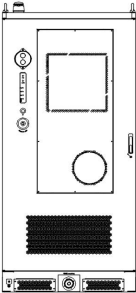
Serial number	Description	unit	Rated voltage	Rated capacity	Rated energy	Quantity
1	Battery		3.2V	314Ah	82896Wh	264
2	Battery Pack		76.8V	314Ah	24115.2Wh	11
3	Battery Cluster		844.8V	314Ah	265267Wh	1
4	Battery System		844.8V	314Ah	265267Wh	1

Table DC side configuration parameters

8.2 Battery parameters

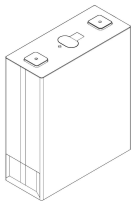
Unit	Model / Description	314Ah
	Chemical system	LFP/C
	Rated capacity (Ah)	314
	Charge and discharge rate	≤0.5C/0.5C
	Energy density (Wh/kg)	≥174
	Application Areas	BEV/ESS
	Dimensions (length * width * height mm)	174.0*71.7*204.4±0.8
	National Standard Certification	GB/T 36276-2018

Table cell parameters

8.3 Battery Pack Parameters

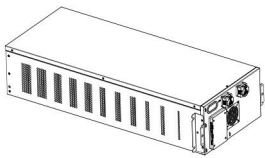
Unit	Model / Description	HZEB-HCT-24
	Cell Type	LFP314Ah
	Rated charge and discharge rate	0.5C
	Maximum charging rate	0.5C
	Maximum discharge rate	0.5C
	Monomer combination	1P24S
	Nominal capacity	314Ah
	Nominal energy	24.1152kWh
	Nominal voltage	76.8V
	Operating voltage range	67.2 ~ 86.4V
	Operating temperature range	Discharge: -10 °C ~55 °C;
		Charging: 0 °C ~55 °C

Table Battery Pack Parameters

8.4 Battery cluster parameters

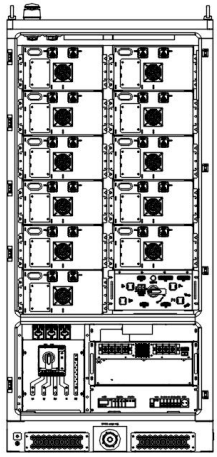
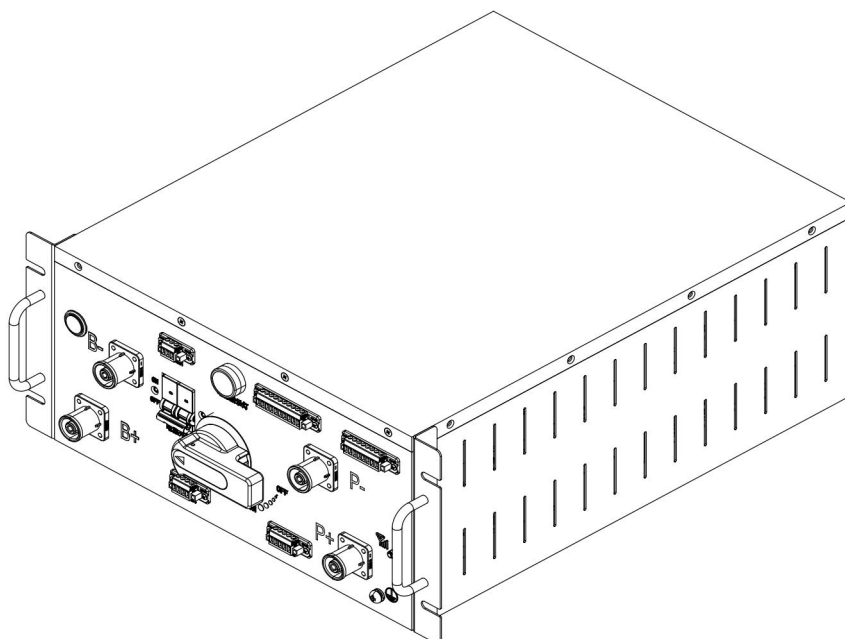
Unit	Model/Description	HZEB-HCT-125CS-265
	Cell Type	LFP
	Maximum charging rate	≤0.5 C
	Rated charge and discharge rate	0.5C
	Maximum discharge rate	≤0.5 C
	System combination	1P264S
	Nominal capacity	314Ah
	Nominal energy	265.267 kWh
	Nominal voltage	844.8V
	Operating voltage range	739.2~950.4VDC
	Operating temperature range	Discharge: -10 °C ~55°C;
		Charging: 0°C~55°C

Table Battery Cluster Parameters

8.5 High voltage cluster control box parameters

8.5.1 Dimensions



Appearance of cluster control box

8.5.2 control Panel

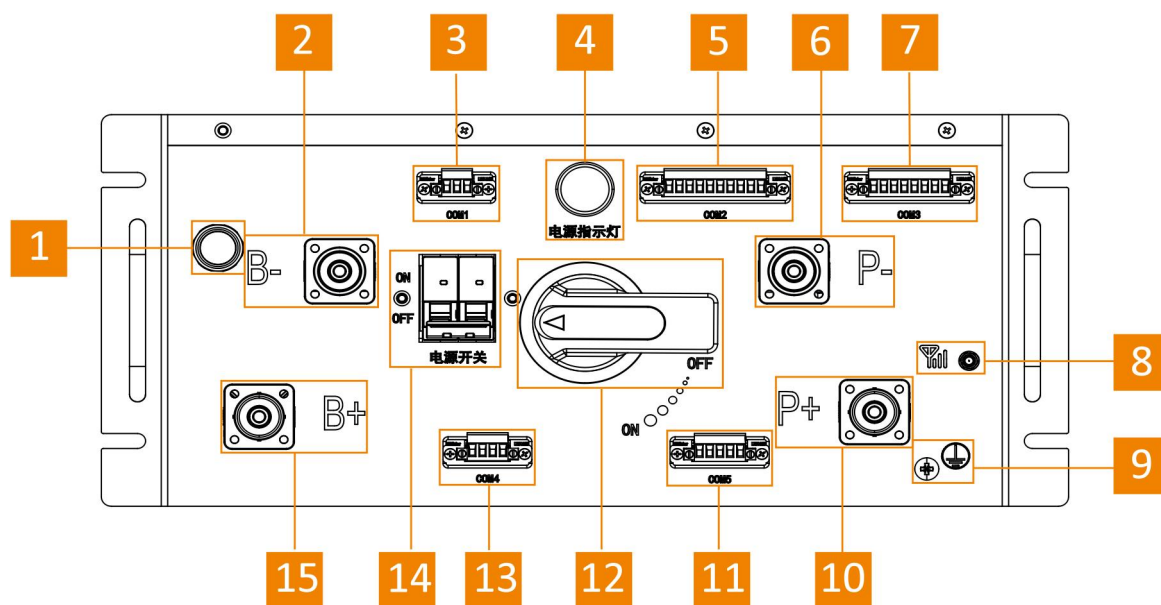


Figure Control Panel

Serial number	Name	Description
1	Wake-up switch	BMS wake-up switch
2	Battery cluster negative connector	Battery pack total negative connection location
3	COM1	220V/50Hz power input
4	Power indicator	Battery cluster operation indicator light
5	COM2	PCS equipment communication terminal
6	PCS main negative connector	PCS DC side negative connection location
7	COM3	Dry contact communication terminal
8	Antenna interface	WiFi/4G antenna connection interface
9	Grounding point	High voltage box grounding point
10	PCS main positive connector	PCS command process positive connection location
11	COM5	BMU communication terminal
12	Circuit breaker manual operation	DC-side power disconnect switch
13	COM4	EMS equipment communication terminal
14	Power switch	220V power switch
15	Battery cluster main positive connector	Connection position for battery pack main positive

9. Power Conversion System (PCS)

9.1 PCS Overview

The Power Conversion System (PCS) is a key device in the electrochemical energy storage system, which connects the battery system and the power grid (and/or load) to achieve bidirectional conversion of electric energy. It can not only control the charging and discharging process of the battery and perform AC/DC conversion, but also directly supply power to AC loads without a power grid.

The PCS is mainly composed of a DC/AC bidirectional converter and a control unit. The PCS controller receives background control instructions through communication, and controls the converter to charge or discharge the battery according to the sign and size of the power instruction, thereby adjusting the active power and reactive power of the power grid. At the same time, the PCS controller can also communicate with the BMS through the CAN interface to obtain battery pack status information to achieve protective charging and discharging of the battery and ensure safe battery operation.

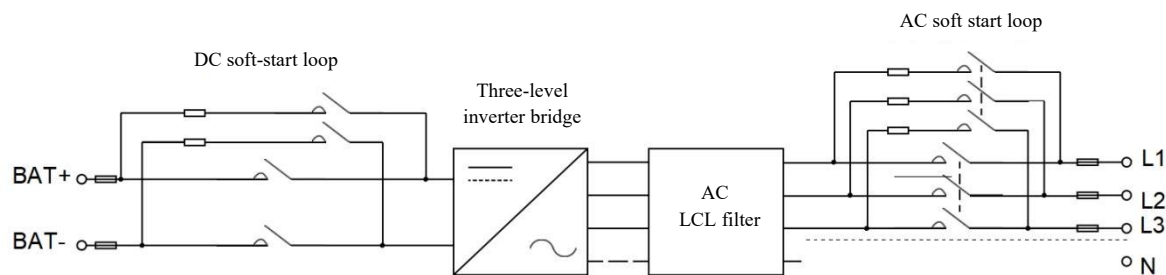


Figure PCS electrical principle

9.2 PCS Features

- Complete fault protection function
- Charge and discharge conversion time $\leq 20\text{ms}$
- The highest conversion efficiency is 99 %
- Compatible with three-phase three-wire/four-wire system
- Supports PCS modular plug-in and plug-out for quick maintenance

9.3 PCS Parameters

Specifications	EPCS125-AM
DC side	
Operating voltage range	615V-950V/650V-950V
Rated voltage range	$\pm 15\%$
Rated frequency	50/60Hz
Wiring method	3W+N+PE
Rated Power	125 kW
Maximum Power	138 kW
Maximum current	200A
Power Factor	0.99/-1 ~ 1
Current distortion rate	$< 2\%$ (rated power)
DC component	$< 0.5\%$
Overload capacity	110%
Maximum efficiency	99%
General parameters	
Dimensions (width*height*depth)	520*232*725
Weight	69kg
Altitude	4000m (>2000m derating)
Operating temperature	5%RH-95%RH, non-condensing
Cooling method	Intelligent air cooling
Protection level	IP20
Communication	CAN/RS485/ Ethernet

Table PCS parameters

10. Battery Management System (BMS)

10.1 BMS Overview

The battery management system is a real-time monitoring system composed of electronic circuit equipment. It effectively monitors battery voltage, battery current, battery cluster insulation status, electrical SOC, battery module and single cell status (voltage, current, temperature, SOC, etc.), safely manages the charging and discharging process of the battery cluster, alarms and performs emergency protection for possible faults, and safely and optimally controls the operation of battery modules and battery clusters to ensure safe, reliable and stable operation of the battery.

10.2 BMS Features

- General control + master control + slave control
- Level 3 BAU and EMS integration
- Daisy chain communication is stable and reliable
- Advanced parallel SOP management and circulation control
- Support Wi-Fi/Bluetooth/4G communication to stay online
- Automatic address allocation
- Remote monitoring, early warning/alarm/diagnosis/positioning, OTA air program upgrade

10.3 BMS parameters

Project		Main parameters
Operating temperature		-40 °C ~85 °C
Operating humidity		5~95%
Cell voltage detection accuracy		± 5mV
Box temperature detection accuracy		±1°C
Balance control		Support, maximum 100mA
High voltage detection accuracy		± 0.5% or 0.5V
Current detection accuracy		± 0.5%FSR
Insulation detection accuracy		+10% or 10KQ
SOC estimation accuracy		<5%
System power supply		Voltage range 6~36V (typical value 12V, 24V)
Power consumption	Run	200mA@12V
	Shutdown	100uA@12V
Acquisition unit	High voltage detection	6 channels, BAT+/HV1/HV2/HV3/HV4; PACK- (total negative adhesion detection)
	Current Sensing	Shunt, support (measurement period <250mS); HALL, Support single range 5VHALL; shunt is preferred
	Insulation testing	Support (battery pack B+/B-, range 0-6MQ), Measurement accuracy: 10% or 10 KΩ
	Temperature detection	5 channels (temperature sensing model default NTC103), measurement accuracy ± 1C
Data storage	Onboard storage	128MB SLC NAND FLASH
RTC		Time synchronization function, can accept IRIG-B (DC) code time synchronization or network time synchronization

Table BMS parameters

11. Energy Management System (EMS)

11.1 EMS Overview

As the core unit of energy management of the energy storage system, EMS has functions such as power station data collection and monitoring, energy dispatching and control, fault detection and safety protection, etc., which improves the efficiency and economy of energy storage operation and ensures the safe, reliable and stable operation of the power station.

11.2 EMS Features

- Seamless connection between EMS and BMS
- Level 3 BAU and EMS integration
- Support energy management strategies based on time periods and loads
- Support OTA of the whole station system software
- Support energy data analysis and forecasting
- Can independently implement equipment management and various energy management strategies
- Remote monitoring and more complex energy management strategies can be achieved through the cloud platform

11.3 EMS modules and parameters



Figure EMS module

EMS parameters:

Project	Main parameters		
Operating temperature	-25 ~ +70°C		
Operating humidity	5% ~ 95%		
Operating voltage	DC9~36V (typical value 24V)		
Rated Power	≤ 10W		
Processor	64-bit Arm processor/Cortex-A35 dual-core + Cortex-M4 core security processor		
Memory	DDR3 512MB		
Memory	eMMC 4GB		
Watchdog	Onboard independent hardware watchdog		
Functional classification	Hardware interface/peripherals	Quantity	Description
Local communication function	Ethernet	2 channels	100Mbps
	USB	1 channel	Host
	CAN	4 channels	Isolating CAN Communication
	RS485	6 channels	Isolated RS485 communication
	IsoSPI	2 channels	Isolated daisy chain communications
Wireless communication function	4G	1 channel	China (mainland), Global 4G optional
	Bluetooth	1 channel	Bluetooth 4.0
	SIM card	1 channel	Nano SIM (12.3mm*8.8mm), need ejector to open the card slot

Signal acquisition function	ADC analog detection	2 channels	0-20mA, 0-15V, accuracy $\leq 1.5\%$, sampling rate $\geq 200\text{SPS}$
	NTC temperature detection	4 channels	$\pm 1^\circ\text{C}$ (-25~65°C), others $\pm 2^\circ\text{C}$
	HDI high level detection	6 channels	Optocoupler isolation, high level detection (active signal detection)
	LDI low level detection	4 channels	Optocoupler isolation, low level detection (passive signal detection)
	SWDI dry contact detection	6 channels	Optocoupler isolation, dry contact signal detection (passive signal detection)
Control output function	SWDO dry contact drive output	8 channels	4 mechanical relays , 2 solid-state relays , 2 optocoupler transistors
	HDO high side driver output	4 channels	High side output
	LDO low side driver output	4 channels	Low side output
	ADDR	1 channel	Addressed output (default output low level)
	LED Indicator	4 channels	4G status indication, power status indication, other 2- way programmable control
Data storage	EMMC	128GB	Onboard EMMC, 128GB
Touch the button	RECOVERY	/	Hidden button, need to be pressed by ejector pin, press to select USB burning function

Table EMS parameters

12. Thermal Management

12.1 Cooling System Overview

The energy storage cabinet is equipped with an air conditioning cooling system and a cooling duct, and the temperature inside the energy storage cabinet is regulated with the cooperation of the battery pack cooling fan. The air conditioning system is connected to the master control through the RS485 communication protocol. In addition to realizing the linkage between the air conditioning and the fire protection system, the air conditioning start-up cooling point, cooling deviation, start-up control point, heating deviation, battery cell temperature start-up cooling point, battery cell temperature start-up control point and other parameters can be set. It has the function of manually starting the air conditioning operation and controlling the air conditioning according to the battery cell temperature.

12.2 Battery pack fan

Each battery pack has 1 fan for heat dissipation. The air volume of 1 fan is 500 CFM. The fan is powered by 24VDC. The single power consumption is ≤ 65 W and the startup power consumption is ≤ 70 W.

The cooling fan of the battery box is based on the battery cluster as a unit, and can be independently controlled by the battery management main control unit to start and stop by cluster. The battery management system can control the start and stop of the fan according to the collected battery cell temperature . By default, when the BMS detects that the temperature of the single cell is higher than 30 degrees, the fan in the corresponding battery cluster is started, and when the temperature of the entire battery cluster is lower than 25 degrees, the fan is turned off.

Battery box fan control strategy:

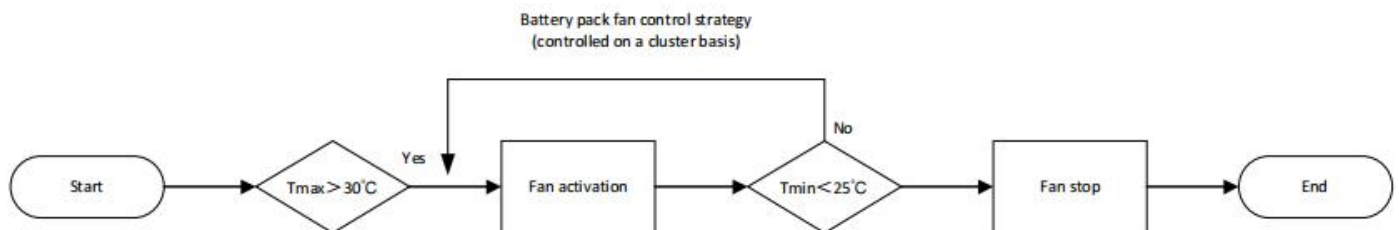


Figure 1. Fan control strategy

12.3 Air conditioning design

Energy storage air conditioner is an industrial air conditioner designed for energy storage system. It adopts integrated structure and large air volume design to provide safe, reliable, efficient and energy-saving precision temperature control solution for energy storage system. Energy storage air conditioner can choose cooling and heating type to meet the application requirements of different environments.

Air conditioning control strategy:

(Control strategy values can be adjusted according to customer needs)

12.4 Air conditioning parameters

Project	Technical Parameters
Rated voltage	AC 230V
Rated Power	2.4/3.3kW
Rated current	11.3/15.1A
Rated cooling capacity	5.0kW
Heating power	3.0kW
Maximum operating current	17.6A
Internal fan air volume	1500m ³ /h
External fan air volume	2000m ³ /h
Temperature control range	20~50°C
Operating ambient temperature	-40~50°C
Refrigerant	R134a
Noise	72dB (distance 1m, average value)
Installation	Wall Mount
Protection level	Internal and external IP55
Dimensions	670 × 296 × 1 400mm
Net weight	About 105kg

Table Industrial Air Conditioning Parameters

13. Fire protection system

13.1 Analysis of characteristics of electrochemical energy storage fires

- Fire classification: Fires in lithium battery energy storage systems are mainly Class B, Class C, and Class E fires;
- Fire characteristics: In lithium battery energy storage systems, thermal runaway fires are jet-type flames;
- Experiments have shown that lithium iron phosphate batteries have a certain possibility of catching fire after thermal runaway, and will produce a large amount of flammable gas with an explosion risk. This is because electrochemical energy storage batteries contain many active chemical substances. In a fire accident, the electrolyte decomposes due to heat, and various substances react violently to release a large amount of toxic and harmful gases (CO, HF, SO₂, HCl, etc.), flammable gases (CO, H₂, CH₄, C₂H₄, C₃H₆, alkanes, etc.) and heat. On the one hand, it endangers the lives of on-site rescue workers and trapped people, and on the other hand, it is also very easy to cause secondary disasters, causing poisoning and explosion injuries.
- Energy storage power stations store a large amount of load electricity, contain a large number of batteries and module groups, and have high current and voltage and large capacity. Once a failure occurs, it is very easy to cause thermal runaway of the battery cells, a chain reaction, and large-scale concentrated release of energy, thus causing large-scale violent combustion and explosion accidents. In addition, each module of the energy storage power station carries high voltage electricity. After an accident, the remaining parts still have residual electricity, which is easy to cause leakage and explosion. Firefighters face risks such as electric shock during the handling process.

13.2 Working principle of fire fighting equipment

- Only the smoke sensor is triggered, the sound and light alarm starts working, and the cluster aerosol device does not start
- Only the temperature sensor is triggered, the sound and light alarm starts working, and the cluster aerosol device does not start
- The smoke sensor is triggered, the temperature sensor is triggered, the sound and light alarm starts working, the cluster aerosol is triggered to spray, and the EMS issues the air conditioner shutdown command and the PCS shutdown command

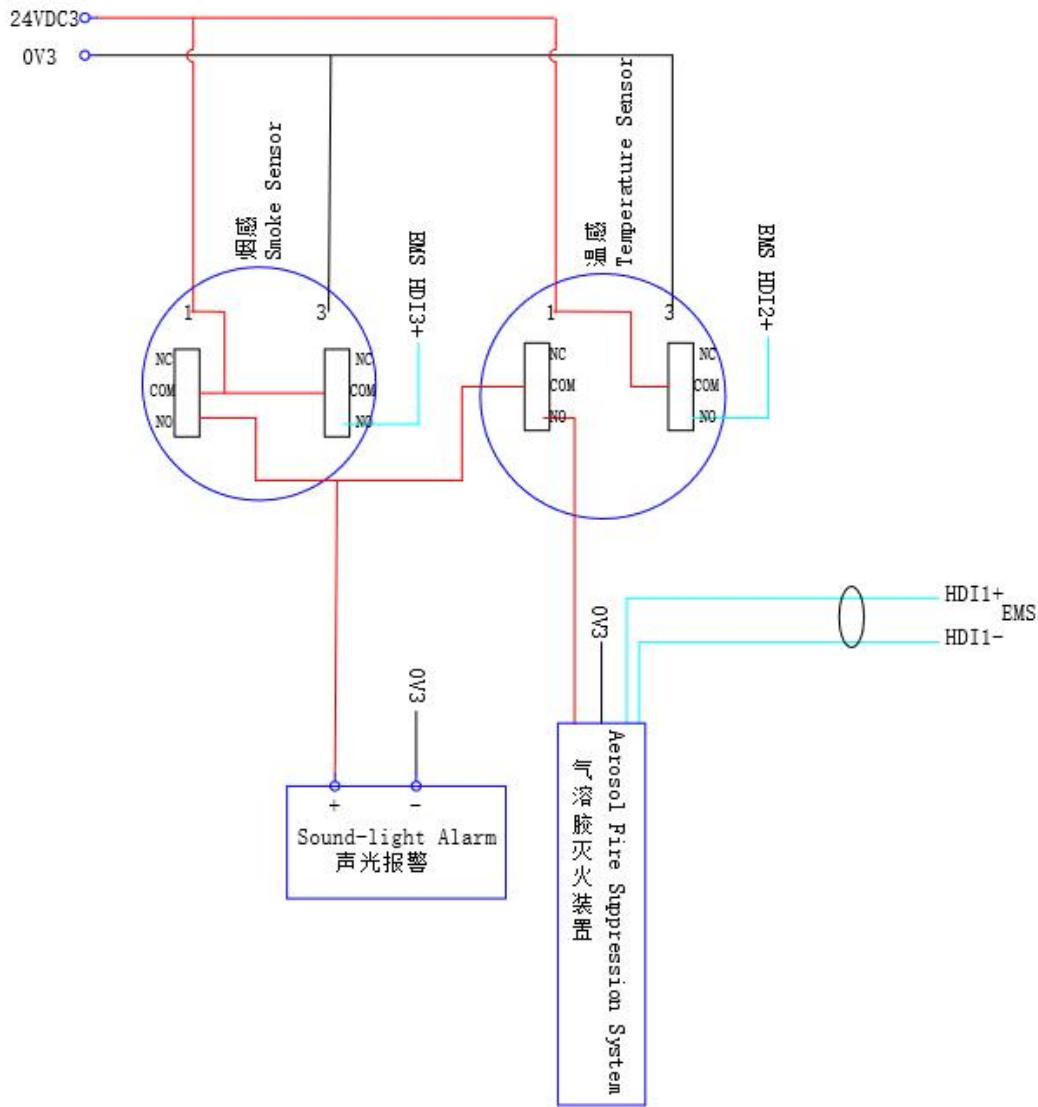


Figure 1. Working principle of fire protection system

13.3 Fire extinguishing mechanism

The fire suppression effect of thermal aerosol is mainly reflected in the following aspects:

The fire extinguishing mechanisms of general fire extinguishing agents mainly include isolation, asphyxiation, cooling, and chemical inhibition. Different fire extinguishing agents have different fire extinguishing mechanisms. The fire extinguishing mechanism of thermal aerosols is mainly reflected in two aspects: on the one hand, the cooling effect of endothermic decomposition, and on the other hand, the chemical inhibition of gas phase and solid phase, which work together. In addition, the gas phase component in the aerosol fire extinguishing agent product also plays a certain auxiliary role.

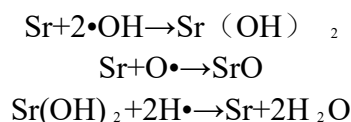
1) Cooling and fire extinguishing effect of endothermic decomposition

The cooling effect of hot aerosol fire extinguishing agents mainly relies on the endothermic decomposition of metal oxides and carbonates. The amount of heat released by any fire in a short

period of time is limited. If the solid particles in the aerosol can absorb part of the heat released by the fire source in a short period of time, the temperature of the flame will be reduced, and the heat radiated to the combustion surface and used to crack the already vaporized combustible molecules into free radicals will be reduced, and the combustion reaction will be suppressed to a certain extent.

2) Gas phase chemical inhibition

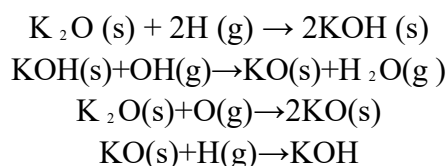
Under the action of heat, the gasified metal ions such as Sr, K, Mg or cations that have lost electrons decomposed by the hot aerosol fire extinguishing agent exist in the form of steam, and undergo multiple chain reactions with the active groups $H\cdot$, $\cdot OH$ and $O\cdot$ in the combustion. The following takes Sr as an example:



This process is repeated many times, and the active groups in combustion are consumed in large quantities, the concentration continues to decrease, and combustion is suppressed.

3) Solid phase chemical inhibition

The solid particles in the hot aerosol fire extinguishing agent can adsorb the chain reaction intermediates $\cdot OH$, $H\cdot$ and $O\cdot$, and catalyze them to reconstitute stable molecules, thereby interrupting the branch chain reaction of the combustion process. Take K as an example below:



In the above-mentioned fire extinguishing effect, several fire extinguishing mechanisms interact and work synergistically, but the gas transmission effect and the heat absorption and cooling effect of metal oxides or carbonates only play auxiliary effects, and the main fire extinguishing effect still relies on the chemical inhibition of gas and solid phases.

13.4 Thermally Actuated Aerosol Fire Extinguishing Device

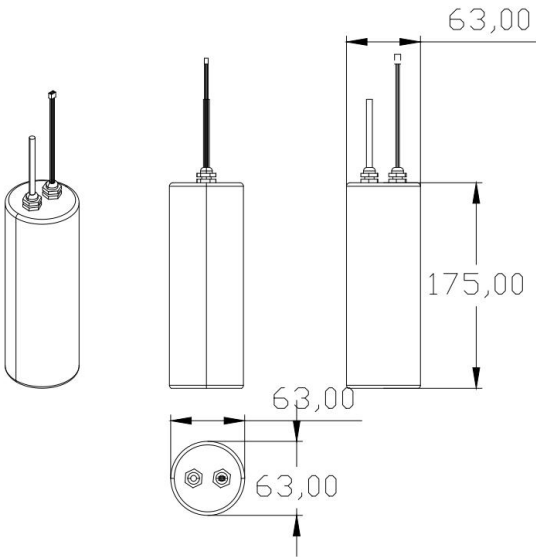


Figure Schematic diagram of thermal aerosol

Technical Parameters

QRR0.3GS	Content	Technical Parameters
	Startup method	Electric start or hot start
	Feedback signal	Passive switch signal
	Protecting space	5m³
	Validity	1 0 years
	Size	Φ 63 × 144 mm
	Usage Environment	-50 °C ~+90 °C
	Implementation Standards	UL2775/EN15276/AS4487/XF499.1

Thermal Aerosol Technical Parameters

13.5 Temperature Sensor

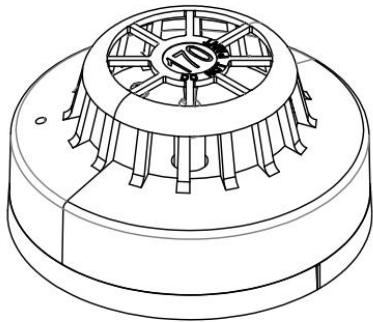


Figure Schematic diagram of temperature sensor

Technical Parameters

DC-9103E	Content	Technical Parameters
	Output voltage	9 to 33 V
	Quiescent Current	24V: 45 μA
	Alarm voltage	6 V to 28 V
	Alarm voltage	24V: 52mA
	Storage temperature	-30 °C to +80 °C
	Operating temperature	CS/CR: -20°C to +80°C
	Ambient humidity	0-95%RH non-condensing
	IP Rating	IP54
	Implementation Standards	CPR, LPCB, VdS, VNIIPO, SBSC, FG, BOMBA
	Size	Diameter 100 mm x height 42 mm (with base 50 mm)

Table temperature sensor technical parameters

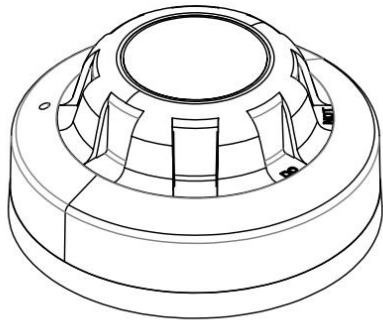


Figure Schematic diagram of smoke sensor

Technical Parameters

DC-9102E	Content	Technical Parameters
	Output voltage	9 to 33V
	Quiescent Current	30 - 50 μ A at 24 V
	Alarm voltage	6 V to 28 V
	Alarm current	52 mA at 24 V
	Alarm LED light current	4 mA
	Operating temperature	-20°C~+ 60 °C
	Ambient humidity	0-95%RH non-condensing
	IP Rating	IP23D
	Implementation Standards	EN 54-7, LPCB, VdS, DIBt, BOSEC, FG, CPR and SBSC
	Size	Diameter 100 mm x height 42 mm (with base 50 mm)

Table Smoke Sensor Technical Parameters

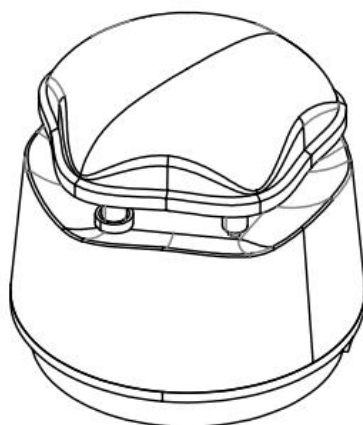


Figure Schematic diagram of sound and light alarm device

Technical Parameters

AW-D316	Content	Technical Parameters
	Operating voltage	9 ~30V DC
	IP Rating	Type A/IP 45 Std Base
	Operating temperature	-20 °C ~+ 70 °C
	Sound decibel	High, Medium (-10 d B(A)) Low (-20 d B(A))
	Implementation Standards	EN 54-3

Technical parameters of sound and light alarm device

14. Dynamic ring system

Access control: The cloud can be used to obtain information about whether the outdoor cabinet door is closed to avoid property loss

Water immersion: The water inflow (water accumulation) status of the outdoor cabinet can be obtained via the cloud, enabling early warning and handling to prevent system damage caused by immersion.

Emergency stop: Emergency brake switch, quickly stop the system operation when system control fails to avoid damage caused by energy loss control

15. Main equipment list

Serial number	Name	Content	Quantity	Unit	Remark
1	Outdoor cabinet	Protection grade IP54	1	Pcs	
2	Battery Pack	1P24S; 24.1152kWh	11	Pcs	314Ah battery cell
3	High voltage cluster control box	200A	1	Pcs	
4	BMS System	HZ-YD-P720	1	Set	
5	EMS System	HZ-YD-G720	1	Set	
6	HMI Display	TPC7051Ki	1	Pcs	Optional
7	Converter	EPCS-125-AM	1	Pcs	
8	Industrial air conditioning	Cooling capacity 5kW	1	Pcs	
9	Fire protection system	Fire suppression equipment	1	Set	
10	Dynamic ring system	System dynamic ring device	1	Set	
11	Wiring Harness	System internal wiring harness	1	Set	
12	Appendix	System internal accessories	1	Set	



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※ The product information and parameters are subject to change without prior notice