

User Manual

AIR COOLING ENERGY STORAGE SYSTEM

HYX-EF215P2 / HYX-EF215P2-M / HYX-EF215P2-MS



Carefully read this inverter user instructions before using.
Read and save these instructions.



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Preface

Overview

This manual mainly introduces the installation, electrical connection, debugging, and fault handling methods of the HYX-EF215P2, HYX-EF215P2-M, HYX-EF215P2-MS energy storage system product (hereinafter referred to as the energy storage system).

Before installing and using the energy storage system, please read this manual carefully, understand safety information, and be familiar with the functions and characteristics of the energy storage system.

Scope of Application

This manual is intended for the following devices:

- HYX-EF215P2
- HYX-EF215P2-M
- HYX-EF215P2-M

For Readers

This manual is intended for power station operators and electrical technicians with corresponding qualifications.

All installation operations must be carried out by professional technicians and only by professional technicians.

Use of the Manual

Please read the manual carefully before using the product, the content of the manual will be updated and corrected, but it is inevitable that there is a slight discrepancy or error with the actual product.

Users should refer to the actual product purchased and obtain the latest version of the manual by downloading from www.hyxipower.com or through sales channels.

Use for Symbols

In order to ensure the safety of the user's person and property when using the product, relevant information is provided and highlighted using the following symbols.

DANGER

- Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

WARNING

- Indicates a moderate potential hazard that could result in death or serious injury if not avoided.

⚠ CAUTION

- Indicates a low potential hazard which, if not avoided, could result in moderate or minor injury.

ℹ NOTICE

- Indicates a potential risk which, if not known to be avoided, could result in the equipment not functioning properly or in property damage.

1. Safety Precautions

Statement:

Before transporting, storing, installing, operating, using, or/or maintaining the equipment, please read this manual first, strictly follow the instructions in the manual, and follow all safety precautions marked on the equipment and in the manual. In this manual, "equipment" refers to the products, software, components, spare parts, and/or services related to this manual; "Our company" refers to the manufacturer (producer), seller, or/and service provider of the equipment. "You" refers to the entity responsible for transportation, storage, installation, operation, use, and/or maintenance of equipment.

NOTICE

- The "**DANGER**", "**WARNING**", "**CAUTION**", and "**NOTICE**" items in the manual do not represent all safety precautions that should be followed. You are also required to comply with relevant international, national, or regional standards, as well as industry practices. Our 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 it may cause equipment failures, abnormal equipment functions, or component damage, which is not within the scope of equipment quality assurance; Otherwise, our company shall not be liable for compensation for potential personal injury, property damage, etc.
- All operations such as transportation, storage, installation, operation, use, and maintenance shall comply with applicable laws, regulations, standards, and regulatory requirements. Reverse engineering, decompilation, disassembly, adaptation, implantation, or other derivative operations on device software are prohibited. It is not allowed to study the internal implementation logic of the device, obtain the source code of the device software, or infringe intellectual property rights in any way, and the results of any device software performance testing shall not be disclosed.

Our company is not responsible for any of the following situations or their consequences:

- Equipment damage caused by earthquakes, floods, volcanic eruptions, mudslides, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, extreme weather, and force majeure;
- Not operating under the usage conditions specified in this manual;
- The installation and use environment does not comply with relevant international, national or regional standards;
- Not following the operating instructions and safety warnings in the product and documentation;
- Unauthorized disassembly, modification of products or modification of software codes;
- Damage caused by you or your commissioned third-party transportation;
- Damage caused by storage conditions not meeting product documentation requirements;
- The materials and tools you provided do not meet the requirements of local laws, regulations, and relevant standards;

- Damage caused by your or a third party's negligence, intentional, gross negligence, improper operation, or non company reasons.

1.1 Personal Safety

DANGER

- Live operation is strictly prohibited during the installation process. It is prohibited to install or remove cables with electricity. When the cable core comes into contact with the conductor, it may generate an arc, electric spark, or fire explosion, which can cause fire or personal injury.
- When the equipment is electrified, non-standard and incorrect operation may cause fire, electric shock or explosion, resulting in personal injury or property damage.
- It is strictly prohibited to wear conductive objects such as watches, bracelets, bracelets, rings, necklaces, etc. during the homework process to avoid electric shock and burns.
- Special insulation tools must be used during the homework process to avoid electric shock injury or short circuit faults. The insulation withstand voltage level must meet local laws, regulations, standards, and specifications.

WARNING

- Special protective equipment must be used during the work process, such as wearing protective clothing, insulated shoes, goggles, safety helmets, insulated gloves, etc.

Routine Requirements

- Do not disable equipment protection devices and ignore warnings, warnings, and preventive measures in the manual and equipment.
- In the process of equipment operation, if any faults that may cause personal injury or equipment damage are found, the operation should be immediately terminated, reported to the person in charge, and effective protective measures should be taken.
- Do not power on the device until it has been installed or confirmed by a professional.
- It is prohibited to directly contact, use other conductors to contact, or indirectly contact the power supply equipment through damp objects. Before touching any conductor surface or terminal, the voltage at the contact point should be measured to confirm that there is no risk of electric shock.
- When the equipment is running, the shell temperature is high and there is a risk of burns. Please do not touch it.
- It is strictly prohibited for fingers, components, screws, tools, or boards to come into contact with the running fan to avoid injuring hands or damaging equipment.
- In case of fire, evacuate the building or equipment area and press the fire alarm bell, or call the fire alarm hotline. Under any circumstances, it is strictly prohibited to re-enter the burning building or equipment area.

Personnel Requirements

- The personnel responsible for operating the equipment include professionals and trained personnel.

- Professional personnel: Those who are familiar with the principles and structures of equipment, have training or experience in operating equipment, and are able to understand the potential sources and levels of hazards during equipment installation, operation, and maintenance.
- Trained personnel: Personnel who have received appropriate technical and safety training and have necessary experience, can be aware of the potential dangers that may arise when performing a certain operation, and can take measures to minimize the danger to themselves or other personnel.
- The personnel responsible for installing and maintaining equipment must first undergo strict training, master the correct operating methods, understand various safety precautions and relevant standards of the country/region where they are located.
- Only qualified professionals or trained personnel are allowed to install, operate, and maintain equipment.
- Only qualified professionals are allowed to dismantle safety facilities and repair equipment.
- Personnel involved in special scenarios such as electrical operations, high-altitude operations, and special equipment operations must have the special operation qualifications required by the local country/region.
- The operator of medium voltage equipment must hold a high-voltage electrician operation certificate.
- The replacement of equipment or components (including software) must be completed by authorized professionals.
- Except for personnel operating the equipment, please do not approach the equipment.

1.2 Electrical Safety

DANGER

- Before making electrical connections, please ensure that the equipment is not damaged, otherwise it may cause electric shock or fire.
- Irregular and incorrect operations may cause accidents such as fires or electric shocks.
- During the homework process, it is necessary to prevent foreign objects from entering the interior of the equipment, otherwise it may cause equipment short circuit failure or damage, load power reduction or power loss, and personal injury.
- When installing equipment that needs to be grounded, the protective ground wire must be installed first; When dismantling equipment, the protective ground wire must be removed last.
- No cables are allowed to pass through the air inlet and outlet of the equipment.

General Requirements

- Installation, operation, and maintenance must be carried out in accordance with the steps in the manual. Do not modify, add, or change equipment without authorization, and do not change the installation sequence without authorization.
- It is necessary to obtain permission from the power department of the country or region in order to connect to the grid for operation.
- Comply with the safety regulations of the power station, such as implementing the operation ticket and work ticket system.
- Install temporary fences or warning ropes in the work area and hang "No Entry" signs. Non staff are strictly prohibited from entering.
- Before installing or removing power cables, the equipment itself and its front and rear switches

must be disconnected.

- When liquid is found entering the equipment, please immediately turn off the power and prohibit further use.
- Before operating the equipment, it is necessary to carefully check that the tools used meet the requirements and register them in the register; After the operation is completed, retrieve it according to the number to prevent it from being left inside the equipment.
- Before installing the power cable, it is necessary to confirm that the cable label identification is correct and that the cable terminals have been properly insulated.
- When installing equipment, it is necessary to use a torque tool with an appropriate range to tighten the screws. When tightening with a wrench, it is necessary to ensure that the wrench is not skewed and the torque error does not exceed the specified 10%.
- The screws should be fixed using torque tools and double checked with red and blue markings. After confirming the tightening of the screws, the installation personnel shall apply blue markings on the screws; After the inspector confirms tightening, apply a red marking (marking with a line needs to cross the edge of the screw).
- After installation, ensure that all electrical component protective shells, insulation sleeves, and other devices are in place to avoid the risk of electric shock.
- If the device has multiple inputs, all inputs should be disconnected and the device can only be operated after it is completely powered off.
- When maintaining the power supply equipment's downstream power consumption or distribution equipment, it is necessary to disconnect the corresponding output switch of the power supply equipment.
- During equipment maintenance, hang a "No Closing" sign on the up and down switches or circuit breakers, and post a warning sign to prevent accidental connections. The fault must be resolved before power can be restored.
- When conducting fault diagnosis and troubleshooting, if a power outage is required, the following safety measures must be taken: power outage>power verification>installation of grounding wire>hanging of signs and installation of barriers.
- Please regularly check the device connection terminal screws to ensure they are tightened and not loose.
- If the cable is damaged, it must be replaced by professional personnel to avoid risks.
- It is strictly prohibited to artificially alter, damage or obstruct the markings and nameplates on the equipment, and to replace any markings that have become unclear due to long-term use in a timely manner.
- It is prohibited to clean the internal and external electrical components of the equipment with solvents such as water, alcohol, or oil.

WARNING

- The grounding impedance of the equipment should meet the requirements of local electrical standards.
- The equipment should be permanently connected to a protective ground. Before operating the equipment, the electrical connections should be checked to ensure that the equipment is reliably grounded.
- It is prohibited to operate equipment without installing grounding conductors.
- Do not damage the grounding conductor.

⚠ WARNING

- For devices using three core sockets, it is necessary to ensure that the grounding terminal in the three core socket is connected to the protective ground.
- If it is a high contact current device, before connecting to the input power supply, the protective grounding terminal of the device casing must be grounded to prevent the contact current of the device from causing electric shock to the human body.

Wiring Requirements

- The selection, installation, and routing of cables must comply with local laws, regulations, and norms.
- During the process of laying the power cord, it is strictly prohibited to wrap or twist it. If the length of the power cord is found to be insufficient, it is necessary to replace the power cord and it is strictly prohibited to make joints or solder joints in the power cord.
- All cables must be firmly connected, have good insulation, and have appropriate specifications.
- Cable trays and wire holes should have no sharp edges, and the positions of cable conduits or wire holes must be protected to avoid damage from sharp edges, burrs, etc.
- If the cable is connected to the cabinet from the top, it needs to be U-bent outside the cabinet before entering the cabinet.
- Similar cables should be tied together, with a straight and neat appearance and no external skin damage; Different types of cables should be laid at least 30mm apart, and intertwining or cross laying is prohibited.
- When the wiring is completed or left during the wiring process, it is necessary to immediately seal the cable mouth with sealing mud to prevent water vapor and small animals from entering.
- Buried cables need to be reliably fixed using cable brackets and cable clamps. The cables in the backfilled soil area must be tightly attached to the ground to prevent deformation or damage caused by stress on the cables during backfilling.
- When the external conditions (such as laying method or ambient temperature) change, reference should be made to IEC-60364-5-52 or local regulations and specifications for cable selection verification, such as whether the current carrying capacity meets the requirements.
- The use of cables in high-temperature environments may cause aging and damage to the insulation layer, and the distance between the cable and the periphery of the heating device or heat source area should be at least 30mm.
- When the temperature is too low, severe impact and vibration may cause brittle cracking of the plastic outer skin of the cable.

📌 NOTICE**To ensure construction safety, the following requirements should be followed:**

- All cables should be laid and installed above 0°C . When handling cables, especially in lowtemperature environments, they should be handled carefully.
- If the storage environment temperature of the cable is below 0°C , the cable must be moved to room temperature for storage for at least 24 hours before laying.
- Prohibit non-standard operations such as directly pushing cables off the vehicle to avoid cable damage that may cause a decrease in cable performance and affect current carrying capacity and temperature rise.

Anti Static Requirements

- The static electricity generated by the human body can damage the static sensitive components on the single board, such as large-scale integrated circuits (LSIs), etc.
- Before touching equipment, such as single boards, modules with exposed circuit boards, or specialized integrated circuit (ASIC) chips, please comply with electrostatic protection regulations, wear anti-static work clothes, anti-static gloves or wristbands, and ensure that the other end of the anti-static wristband is well grounded.
- When holding a single board or a module with an exposed circuit board, it is necessary to hold the edge of the single board or module and do not touch the components with your hands.
- The dismantled boards or modules must be packaged with anti-static packaging materials before they can be stored or transported.

1.3 Environmental Requirements

DANGER

- It is strictly forbidden to place the equipment in an environment with flammable, explosive gases or fumes, and it is forbidden to perform any operation in such an environment.
- It is strictly forbidden to store flammable and explosive materials in the equipment area.
- It is strictly forbidden to place the appliance near a heat or fire source, such as fireworks, candles, heaters or other heat-generating devices, as heat may cause damage to the equipment or cause a fire.
- The equipment should be installed in an area away from liquid, and it is strictly forbidden to install it under the water pipe, air outlet and other places that are prone to condensation;
- It is strictly forbidden to install under the air conditioning port, vent, outlet window of the machine room and other places that are prone to water leakage, so as to prevent liquid from entering the equipment and causing equipment failure or short circuit.
- When the equipment is in operation, do not cover the vents, cooling system or other place to prevent high temperature damage to the equipment or fire.

General Requirements

- The equipment should be stored in a clean, dry, well-ventilated area and protected from dust and condensation.
- It is strictly forbidden to install and operate the equipment beyond the scope specified in the technical indicators, otherwise the performance and safety of the equipment will be affected.
- It is strictly forbidden to install, use and operate outdoor equipment and cables (including but not limited to handling equipment, operating equipment and cables, plugging and unplugging signal interfaces connected to the outdoors, aerial work, outdoor installation, door opening, etc.) in bad weather such as lightning, rain, snow, and strong winds above level 6.
- It is strictly forbidden to install the equipment in an environment with dust, smoke, volatile gases, corrosive gases, infrared and other radiation, organic solvents or high salt content.
- It is strictly forbidden to install the equipment in an environment with metal conductive dust, magnetic conductive dust.
- It is strictly forbidden to install the equipment in areas where microorganisms such as fungi and mold can easily grow.

- It is strictly forbidden to install the equipment in areas of strong vibration, strong noise sources and strong electromagnetic field interference.
- Site selection should comply with local laws and regulations and relevant standards.
- The installation environment has a solid ground, no bad geology such as rubber soil, weak soil or easy sinking, it is strictly forbidden to choose low-lying areas or areas prone to water accumulation, and the site should be higher than the highest historical water level in the area.
- It is strictly forbidden to install the device in a location where water can be submerged.
- If the equipment is installed in a place with lush vegetation, in addition to routine weeding, the ground under the equipment needs to be hardened, such as laying cement, stones, etc.
- During installation, operation, and maintenance, it is necessary to clean up the stagnant water, ice and snow or other debris on the top first, and then open the door to prevent debris from falling into the equipment.
- When installing the device, make sure that the mounting surface is sturdy and meets the load-bearing requirements of the equipment.
- The wiring holes need to be sealed, seal the wiring holes that have been routed with sealing mud, and use the cover that comes with the equipment to seal the wiring holes that have not been routed.
- After installing the equipment, empty packaging materials such as cartons, foam, plastic, cable ties, etc. should be removed from the equipment area.

Site Selection Requirement

The ESS site selection and fire safety must comply with local laws and regulations. Reference standards include but are not limited to the "GB 51048 Design Code for Electrochemical Energy Storage Power Stations", "GB 50016 Code for Fire Protection Design of Buildings" and "NFPA 855 Standard for the Installation of Stationary Energy Storage Systems".

NOTICE

- During the installation, commissioning, and operation of the unit, fire extinguishers must be provided in the vicinity as required by the fire code. The number of extinguishers must exceed two.
- The minimum distance between the unit's exhaust and heating vents, air vents, air conditioning vents, window doors, or heat sources of the building or other installations shall be 4.6 meters.
- In instances where this is unavoidable, such as during installation in areas where rainwater may accumulate, measures should be taken, such as the installation of water barriers or drainage facilities, or the raising of floors.

The installation site should meet the following requirements:

- The horizontal level of the installation site shall be above the highest water level of that area in history and at least 300 mm above the ground. The site must not be located in a low-lying land.
- Additionally, ensure that there is no vegetation planted within three meters of the site and its surroundings to avoid wildfires that could cause the appliance to catch fire in the summer heat.
- For safety reasons, the distance between the appliance and a dwelling should be more than 12 meters, while the distance between the appliance and a school, hospital, or other populated area should be at least 30.5 meters. In the absence of these measures, a firewall must be installed

between the installation and the building.

- The safety distance between the installation and industrial buildings should comply with local fire safety codes and standards.

Table.1 Safe distanc

Item	Safe distance
Safety distances between installations and class A industrial buildings	≥ 12m
Safety distance between installations and class B industrial buildings	≥ 10m
Safety distances between installations and industrial buildings of class C and D meeting the requirements of fire-resistance class I and L.	≥ 10m
Safety distances between installations and industrial buildings meeting the requirements of Class III fire-resistant class.	≥ 12m
Where the external walls of adjacent buildings are made of fire-resistant materials and there are no windows, doors and retractable eaves, the safety distance shall be.	(3-25%*3)m

NOTICE

- If the above safety distances can't be achieved, fire walls between equipment, storeroom, or installation areas and buildings of categories C, D and E must have a 3-hour fire resistance rating. The firewall should measure 1 m taller and thicker than the equipment. Factors such as transportation, installation and maintenance should be considered before construction.
- Keep away from flammable and explosive materials.
- The installation site needs to be equipped with convenient transportation and a reliable fire extinguishing system.
- Please reserve sufficient space for expansion.
- The site should be well ventilated.
- The ESS shall not be installed in salt-affected or polluted areas because this will cause corrosion.

The ESS shall be used in the following or better environments:

- Outdoor environment more than 2000 m away from the coast. You are advised not to use the ESS in an area within 2000 m of the coast. (If you need to use it, confirm with the vendor or the Company's engineers).
- More than 3000 m away from heavy pollution sources such as smelteries, coal mines, and thermal power plants.
- More than 2000 m away from medium pollution sources such as chemical, rubber, and electroplating industries.
- More than 1000 m away from light pollution sources such as packing houses, tanneries, boiler rooms, slaughterhouses, landfill sites, and sewage treatment plants.

Table.2 Installation Spacing Requirements

Item	Safe distance
Distance from coastal area	> 2000m
Distance to heavy pollution sources such as smelters, coal mines, thermal power plants	> 1500m
Distance to moderate pollution sources such as chemical plants, rubber factories and electroplating plants	> 1000m
Distance to light pollution sources such as food processing plants, leather processing plants, heating boiler plants, slaughterhouses, dumping sites and sewage treatment stations	> 500m

NOTICE

- Away from sandy and dusty environments.
- Away from high vibration, strong noise sources or strong electromagnetic interference areas.
- Away from places prone to dust, fumes, noxious gases, corrosive gases, and so on.
- Away from places where corrosive, flammable and explosive materials are stored.
- Away from places where underground facilities have been built.
- Away from areas with poor geology (e.g., rubbery soil, weak soil), and waterlogged ground or ground subsidence.
- Away from underneath reservoirs, water features and water intake chambers.
- Away from earthquake zones and seismic areas with a seismic intensity exceeding 9 degrees.
- Away from areas where natural disasters (e.g., mudslides, landslides, quicksand) may occur and karst caves.
- Do not install the unit within the boundaries of a mining subsidence (impact) area.
- Away from areas where there is a risk of explosion.
- Away from areas that may be flooded if a dike or dam breaks down
- Away from important water protection areas.
- Away from heritage conservation areas.
- Away from population centers, high-rise buildings and underground buildings.
- Away from intersections of main city streets and heavily traveled roads.

Select the installation site following these flood and storm water control requirements:

- The foundation height of large, medium, and small electrochemical energy storage systems must be higher than the highest recorded water level.
- If the installation site cannot meet these requirements, please find another site or take flood control measures according to the situation.
- For energy storage plants next to rivers, lakes, and oceans, the foundation height must be 0.5 meters above the highest historical wave height.
- If large amounts of water flow into or over the foundations, it is recommended that you construct side ditches or drainage channels.

A “Stop” sign is required at the installation site:

- It is recommended that solid walls or fences be constructed around the area of the energy storage device. For fences, they must be lockable and should exceed 2.2 meters in height. Depending on the combination of considerations, firewalls may be constructed instead of partial or complete fences.

1.4 Machinery Safety

- Wear a safety helmet, safety belt or waist rope for aerial work, tie it to a firm and sturdy structural part, and it is strictly forbidden to hang it on a moving unstable object or a metal with sharp edges and corners to prevent the hook from slipping and falling accidents.
- Tools need to be prepared and inspected by professional institutions, it is forbidden to use tools with scars and unqualified inspection or beyond the validity period of the inspection, to ensure that the tools are firm and not overloaded.
- Before the equipment is installed in the cabinet, first make sure that the cabinet has been fixed to avoid the cabinet from tilting and collapsing due to the unstable center of gravity, resulting in the installer being hurt and the equipment being broken.
- When pulling equipment out of the cabinet, be careful to install equipment that may be unstable or heavy in the cabinet to avoid being hurt.
- It is strictly forbidden to drill holes in the equipment. Drilling can compromise the device's tightness, electromagnetic shielding, internal components, and cables, and metal shavings from drilling holes can enter the device and cause a short circuit on the board.

General Requirements

- Paint scratches during transportation and installation of equipment must be repaired in time, and long-term exposure of scratched parts is strictly prohibited.
- Without the company's evaluation, it is forbidden to carry out arc welding, cutting and other operations on the equipment.
- It is forbidden to install other equipment on top of the equipment without the company's evaluation.
- When working in the space above the top of the equipment, protection should be added to the top of the equipment to avoid damage to the equipment.
- Use the right tools and master the correct use of them.

Handling Safety

- When carrying heavy objects, you should be prepared to bear heavy loads to avoid being crushed or sprained by heavy objects.
- When multiple people carry heavy objects at the same time, it is necessary to consider the height and other conditions, and do a reasonable job of personnel matching and division of labor to ensure a balanced weight distribution.
- When two or more people carry heavy loads together, one person should be responsible for directing them to lift or lower the equipment at the same time to ensure a uniform pace.
- When handling equipment by hand, you should wear protective gloves, labor protection shoes and other safety protective equipment to avoid injury.
- When carrying the equipment by hand, first approach the object, squat down, use the force of straightening your legs, do not use the strength of your back, slowly and steadily lift the object, and it is strictly forbidden to suddenly jerk or twist the torso.
- When moving or lifting the device, hold the handle of the device or the bottom edge of the

device, not the handle of the module installed in the device.

- Do not quickly lift heavy objects above waist height, place heavy objects on a half-waist high work table or an appropriate place, adjust the position of your palms, and then lift them.
- The handling of heavy objects must be balanced and steady, the moving speed should be uniform and low, and the position should be stable and slow, so as to avoid any impact or fall and other scratches on the surface of the equipment or damage to the components and cables of the equipment.
- When carrying heavy objects, special care should be taken to work benches, slopes, stairs and some places that are easy to slip, and when carrying heavy objects through thresholds, ensure that the width of the door is sufficient for the equipment to pass through to prevent collisions or abrasions on fingers.
- When conveying heavy objects, you should move your feet instead of twisting your waist.
- When you need to lift and pass heavy objects at the same time, you should point your feet in the direction you want to move before moving.
- When using a forklift for handling, the forklift must be forked in the middle position to prevent tipping over. Before moving, please use a rope to fasten the equipment to the forklift, and when moving, a special person needs to take care of it.
- When transporting, you should choose sea or road with good road conditions, and do not support railway and air transportation. Bumps and tilts should be minimized during transportation.
- The tilt angle of the cabinet is required, the inclination angle of the package is $\alpha \leq 15^\circ$, and the inclination angle is $\alpha \leq 10^\circ$ after removing the package.

Aerial Work Safety

- Operations carried out at a height of more than 2 meters above the ground are classified as aerial work, and guardians must be set up for aerial work.
- You must go through relevant training and obtain relevant qualifications before you can take up your post and work at height.
- If the steel pipe rainwater is not dried or other dangerous situations may occur, the aerial work should be stopped. When the above situation is over, the safety person in charge and relevant technical personnel must check all kinds of operating equipment and confirm the safety before operation.
- At the aerial work site, a dangerous forbidden area should be demarcated, obvious signs should be set up, and irrelevant personnel should be strictly prohibited from entering.
- Guardrails and signs should be set up along the mouths and holes of aerial work to prevent stumbling into the air.
- It is strictly forbidden to stack scaffolding, springboards or other sundries on the ground below the aerial work area. It is strictly forbidden for ground personnel to stay or pass directly below the aerial work area.
- Carry the operating equipment and tools in a suitable place to prevent equipment damage or personal injury caused by falling tools.
- It is strictly forbidden for aerial worker to throw objects from high altitude to the ground, and it is strictly forbidden to throw objects from the ground to high altitude, and slings, hanging baskets, overhead vehicles or cranes should be used to transmit objects.
- The upper and lower layers should be avoided as much as possible to carry out operations at the same time. If it cannot be avoided, a special protective shed or other protective measures must be set up between the upper and lower floors, and it is strictly forbidden to stack tools and materials on the upper floor.

- When the scaffold is dismantled after the completion of the work, it should be carried out in layers from top to bottom, and it is strictly forbidden to disassemble the upper and lower layers at the same time.
- Personnel working at height shall operate in strict accordance with the safety regulations at height, and the company shall not be responsible for accidents caused by violations of the safety regulations at height.
- It is strictly forbidden to laugh and play when working at height, and it is strictly forbidden to rest in the aerial work area.

Ladder Using Safety

- When there may be electricity for operation, a wooden ladder or insulated ladder should be used.
- Priority is given to the use of platform ladders with protective fences for climbing operations, and the use of slotted ladders is prohibited.
- Before using the ladder, please confirm that the ladder is intact, the weight of the ladder meets the requirements, and it is strictly forbidden to use it with excessive weight.
- The ladder must be placed in a stable place, and someone must hold the ladder when working.
- When climbing ladders, keep your body steady and ensure that your center of gravity does not deviate from the edge of the ladder frame to reduce danger and ensure safety.
- When using a herringbone ladder, the drawstring must be secur.

Hoisting Safety

- Personnel who carry out hoisting operations need to undergo relevant training and can only take up their posts after they are qualified.
- The hoisting area needs to be isolated by erecting temporary warning signs or fences.
- The foundation for hoisting operations must meet the load-bearing requirements of crane work.
- Before hoisting, make sure that the hoisting tool is firmly fixed to the fixture or wall that meets the load-bearing standard.
- When hoisting, it is strictly forbidden to walk under the boom and hoisting objects.
- When hoisting, it is forbidden to drag wire ropes and spreaders, and it is forbidden to use hard objects to impact.
- During the hoisting process, ensure that the angle between the two cables is not more than 90°.

Drilling Safety

- Consent should be obtained from the customer and contractor prior to drilling.
- Safety protective equipment such as goggles and protective gloves should be worn when drilling.
- When drilling, avoid buried pipes or lines to avoid short circuits or other hazards.
- When drilling, the equipment should be shielded and protected to prevent debris from falling into the equipment, and debris should be cleaned up in time after drilling.

1.5 Product Safety

1.5.1 Energy Storage System Safety

- When the system is running, it is forbidden to open the cabinet door.
- When the energy storage system fails, please avoid standing at the cabinet door (including the cabinet door opening range).

- After the fire sound and light alarm is triggered, the scene should be evacuated urgently.
- The energy storage system must be equipped with protective measures such as fences and fences, and safety warning signs must be erected for isolation to avoid unauthorized personnel entering during the operation of the equipment, resulting in personal injury or property damage.
- The installation layout of the energy storage system must meet the fire distance or firewall requirements specified by local standards, including but not limited to the NFPA 855 Standard for the Installation of Stationary Energy Storage Systems.
- The energy storage system should be inspected regularly and not less than once a month.
- When the system is live for inspection, you should pay attention to the danger warning signs on the equipment and avoid standing at the cabinet door.
- After the power components of the energy storage system are replaced or the wiring is changed, the wiring detection and topology identification need to be manually started to avoid abnormal system operation.
- It is recommended that users bring their own camera devices to record the detailed process of installation, operation and maintenance of equipment.

1.5.2 Battery Safety

- It is strictly forbidden to short the positive and negative poles of the battery, otherwise it will cause a short circuit in the battery. A short circuit in a battery can instantly generate a large current and release a large amount of energy, causing the battery to leak, smoke, release combustible gases, thermal runaway, fire, or explosion. To avoid short circuits in the battery, live maintenance is not allowed.
- Do not expose the battery to high-temperature environments or around heat-generating equipment, such as high-temperature sunlight, fire sources, transformers, heaters, etc.
- Overheating the battery may cause leakage, smoke, release of flammable gases, thermal runaway, fire, or explosion.
- It is strictly forbidden for the battery to be subjected to mechanical shock, drop, collision, puncture by hard objects and pressure impact, otherwise it may cause damage to the battery or fire.
- It is strictly forbidden to disassemble, modify or destroy the battery (such as inserting foreign objects, extruding by external force, immersing in water or other liquids) to avoid leakage, smoke, release of combustible gas, thermal runaway, fire or explosion of the battery.
- It is strictly forbidden for the battery terminals to come into contact with other metal objects, which may cause heat generation or electrolyte leakage.
- Incorrect battery type used or replaced will cause a risk of fire and explosion. Please use the battery of the standard model recommended by the maker.
- Battery electrolytes are toxic and volatile. When electrolyte leakage occurs or there is an abnormal odor, contact with the leaking liquid or gas should be avoided. Non-professionals should not approach, please contact professionals immediately. Professionals should wear goggles, rubber gloves, gas masks, protective clothing, etc., power off the equipment in time, and take out the leaking battery, and contact the technical engineer for treatment.
- The battery is a closed system and no gas is released under normal operation. If in extreme abuse situations, such as fire, needle prick, crushing, lightning strike, overcharging or other harsh conditions that may cause thermal runaway of the battery, it may lead to battery damage or abnormal chemical reactions inside the battery, resulting in electrolyte leakage or the production of CO, H₂ and other gases, the site should ensure that the flammable gas emission measures are normal to avoid causing combustion or corrosion of the equipment.
- Gases from battery combustion can irritate the eyes, skin, and throat, so please take precautions.

- The battery should be installed in an area far away from liquid, and it is strictly forbidden to install it under the air conditioning port, vent, outlet window of the computer room, water pipe and other water-prone locations to prevent liquid from entering the equipment and causing equipment failure or short circuit.
- When the battery is installed and commissioned, it must be equipped with fire-fighting facilities in accordance with the requirements of the construction standards and specifications, such as fire-fighting sand, carbon dioxide fire extinguishers, etc. Before putting into operation, it is necessary to ensure that the fire protection facilities are in place to meet the requirements of local laws, regulations and codes.
- Before the battery is dismantled and packaged, when stored and transferred, ensure that the outer packaging box is intact and undamaged, and place it correctly according to the identification of the packaging box.
- After the battery is unpacked and placed in the required direction, it is strictly forbidden to put it upside down, sideways, vertically, tilted and stacked to avoid any damage to the battery caused by impact or drop.
- Tighten the fastening screws of the copper bar or cable according to the torque specified in the text, regularly check whether they are tightened, whether there are rust, corrosion or other foreign objects, and deal with them cleanly, otherwise the virtual connection of the screws will lead to excessive connection voltage drop, and even burn the battery when the current is large.
- After the battery is discharged, the battery should be charged in time, otherwise the battery may be damaged due to over discharge.

CAUTION

The company is not responsible for damage and other results of the battery provided by the company due to the following reasons:

- Battery damage caused by earthquakes, floods, volcanic eruptions, mudslides, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, extreme weather, force majeure;
- Direct damage to the battery caused by the operating environment of the field equipment or the external power parameters that cannot meet the environmental requirements of normal operation, including but not limited to the actual operating temperature of the battery is too high or too low, the power grid is unstable and the power outage is frequent, etc.;
- Battery damage, dropping, leakage, rupture, etc. caused by improper operation or failure to connect the battery as required;
- The battery is installed on site and connected to the system, and the battery is damaged due to over-discharge due to your failure to power on in time;
- The battery is damaged due to your failure to accept the acceptance in time;
- You have not set the battery operation management parameters correctly;
- You mix the batteries provided by the Company with other batteries to accelerate the capacity decay, including but not limited to: mixing with other brands of batteries, mixing with batteries with different rated capacities, etc.;
- Your improper maintenance causes the battery to be frequently over discharged, your onsite expansion or long-term inability to fully charge, etc.;

⚠ CAUTION

- You have not carried out proper maintenance of the battery in accordance with the
- operation manual of the supporting equipment, including but not limited to: failing to
- regularly check whether the battery terminal screws are tightened, etc.;
- The battery is damaged due to your failure to store it in accordance with the storage
- requirements (such as in a humid, rain-prone environment, etc.);
- Failure to charge the battery in time due to your reasons, resulting in overdue storage of the battery, loss of capacity or irreversible damage to the battery, etc.;
- Battery damage caused by you or a third party, including but not limited to: relocation and installation of the battery without authorization as required by the company;
- Change the battery usage scenario by yourself without the company's evaluation.
- You connect the battery with an additional load by yourself;
- The battery has exceeded the maximum storage period;
- The battery is out of warranty.

Short Circuit Protection

- When installing and maintaining the battery, it is necessary to wrap the exposed cable terminals on the battery with insulating tape.
- Avoid foreign objects (such as conductive objects, screws, liquids, etc.) from entering the battery and causing short circuits.

Leakage handling

- Electrolyte spillage will cause potential harm to the equipment, and the spilled electrolyte will corrode metal objects and PCB, resulting in damage to PCB.
- Electrolytes are corrosive and may cause skin irritation and chemical burns on contact.
- If you come into contact with the battery electrolyte, you need to take the following measures.
- Inhalation: Evacuate contaminated areas, inhale fresh air immediately, and seek medical help immediately. Immediately rinse your eyes with plenty of water for at least 15 minutes, do not rub, and seek medical help immediately.
- Skin contact: Wash the contact area immediately with plenty of water and soap and seek medical help immediately.
- Intake: Seek medical help immediately.

Recycling

- Please dispose of used batteries in accordance with local laws and regulations, and do not dispose of batteries as household waste. Improper disposal of the battery may result in environmental contamination or explosion.
- If the battery leaks or is damaged, please contact technical support or a battery recycling company for disposal.
- When a battery is out of service life and unusable, contact a battery recycling company for scrapping.
- Avoid exposing used batteries to high temperatures or direct sunlight.
- Avoid exposing used batteries to high humidity or corrosive environments.

2. Product Overview

2.1 Product Description

This article mainly involves the following product models:

- HYX-EF215P2
- HYX-EF215P2-M
- HYX-EF215P2-MS

Identification	Meaning	Description
HYX	HYXiPOWER	Company Name
EF	Air-cooled energy storage system	System Type Description
215	215kWh	System rated capacity
P2	2h system/ 0.5C rate	2h system/ 0.5C rate
M	MPPT Function	Built-in MPPT module
S	STS Function	Built-in STS module
MS	MPPT & STS Function	Built-in MPPT & STS module

2.2 Product Overview

HYX-EF215P2, HYX-EF215P2-M, HYX-EF215P2-MS series energy storage outdoor cabinet is an all-in-one battery energy storage system. It is built around a 100kW power platform and equipped with a 215kWh air-cooled battery.

The equipment is safe and reliable, and is suitable for scenarios such as industrial and commercial areas with large peak-valley electricity price differences, backup power demand in application scenarios, photovoltaic storage scenarios, and demand control. The equipment integrates EMS, HVAC and fire protection, UPS, etc. to ensure system safety and stable power supply.

2.2.1 Technical Parameters

Product model	HYX-EF215P2	HYX-EF215P2-M	HYX-EF215P2-MS
Battery Side			
Battery Type	LiFePO4		
Cell Capacity	280Ah		
Battery Configuration	1P240S		
Operating Voltage Range	672-864V		
Nominal Capacity	215kWh		
Calendar Life	6,000 / 70%EOL (25±2°C, 0.5P)		
AC Side			
Nominal Power	100kW		
Nominal Current	145A		
Operating Voltage Range	AC 400V±3% Vac		
AC Connection Method	3P+N+PE		
Nominal AC Grid Frequency	50 / 60Hz (-2.5 to +2.5Hz)		
PV Side			
Nominal Input Voltage	/	300 - 650V	300 - 650V
Number of MPPT	/	2	2
Nominal Input Power	/	50kW*2	50kW*2
Nominal Current Per MPPT	/	138A	138A

STS Side			
Off-grid Switching Time	/	/	≤ 20ms
General Data			
System Parallel Units	8	3	/
Operating Temperature Range	-20 to 50° C		
Operating Humidity Range	0 - 95%RH		
Noise	≤ 75dB		
Dimensions (W*H*D)	1730*2200*1170mm		
Weight	3,500kg		
Protection Degree	IP54		
Cooling Method	Air Cooling		
Fire Protection Method	Aerosol Fire Suppressio		
Max. Operating Altitude	≤ 2,000m		
Networking Mode	WIFI / LAN		

2.2.2 Product Advantages

Safe & Reliable

- A⁺ grade cells with automotive-grade standards
- 24/7 Battery Monitoring

Flexible & Scalable

- Supports up to 3 parallel units (HYX-EF215P2-M / HYX-EF215P2-MS)
- Supports up to 8 parallel units (HYX-EF215P2)

Convenient and Flexible

- Support multiple installation methods
- Built-in EMS, remote O&M
- Plug-and-play, flexible, easy installation

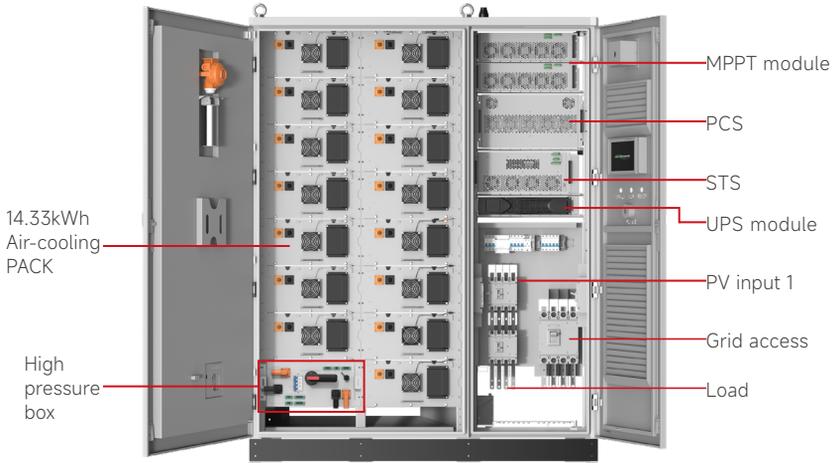
2.2.3 Application Areas

It is suitable for industrial and commercial scenarios in areas with large peak-valley electricity price differences, and supports functions such as peak shaving and valley filling, demand control, and emergency power backup.

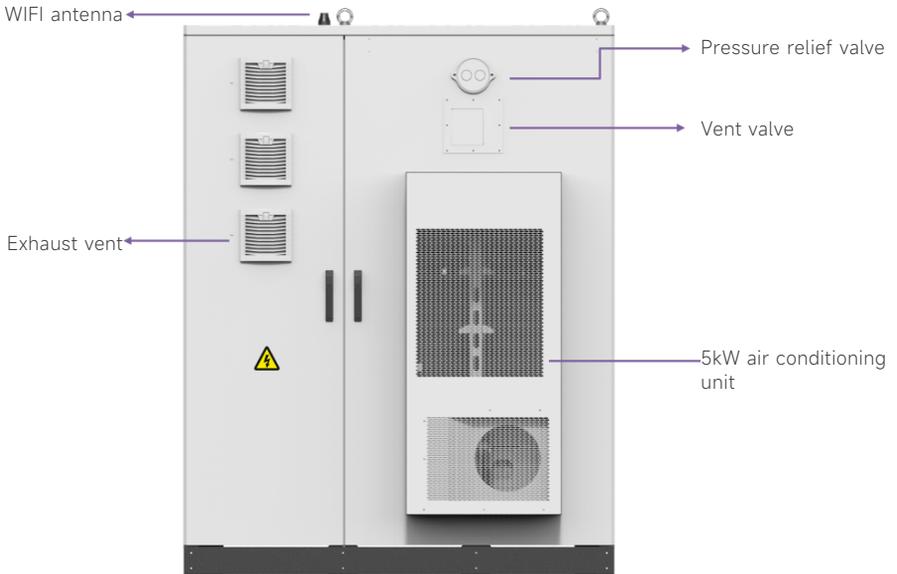
2.3 Appearance



2.4 Components Introduction

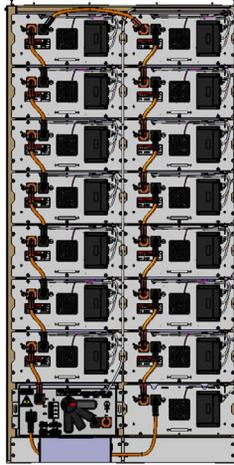


Front parts introduction



Back parts introduction

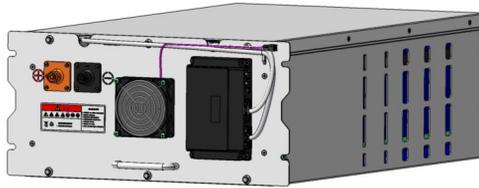
2.4.1 Main Specifications of Battery Cluster:



Main specifications of battery cluster			
No.	Item	Specifications	Remark
1	Nominal voltage	768V DC	Cell voltage 3.2V
2	Operating voltage range	672-864V DC	Recommended single cell voltage range 2.8-3.6V
3	Nominal capacity	280Ah	0.5C, 25°C single cell voltage 2.5V-3.6V
4	Nominal power	215kWh	
5	Series-parallel configuration	1P240S	15 battery packs in series
6	Rated charging current	140A	
7	Peak charging current	170A	Lasts 60 seconds
8	Rated discharge current	140A	
9	Peak discharge current	170A	Lasts 60 seconds
10	Operating temperature	Charging: 0-55°C Discharging: -25-55°C	
11	Storage temperature	-30-60°C	
12	Operating humidity	5%-95%RH	
13	Apply Altitude	≤ 2000m	
14	size	W1048±5*D831±3*H2031±5mm	Rack depth 777±3mm
15	weight	2000±100Kg	
16	IP protection rating	IP20	

17	Cooling method	Forced air cooling	
18	Auxiliary power supply	85-264V AC, 47-63Hz	Control box
19	Communication Protocol	CAN	
20	Baud rate	250Kbps	
21	Shipping SOC	30% SOC	
22	Noise Level	≤ 70dB	
23	Battery Cluster Standard Requirements	GB/T 36276, UN38.3, UL1973, UL9540A	

2.4.2 Battery PACK



Battery PACK main specifications

No.	Item	Specifications	Remark
1	Nominal voltage	51.2V	Single cell voltage 3.2V
2	Operating voltage range	40-58.4V DC	Single cell voltage range 2.5-3.65V
3	Nominal capacity	280Ah	0.5C,25°C
4	Nominal power	14.336kWh	0.5C,25°C
5	Series-parallel configuration	1P16S	2 battery modules in series
6	Charge current	140A	
7	Peak charging current	170A	Lasts 60 seconds
8	Rated discharge current	140A	
9	Peak discharge current	170A	Lasts 60 seconds
10	Operating temperature	Charging: 0-55°C Discharging: -25-55°C	Lasts 60 seconds
11	Storage temperature	-30-60°C	
12	Operating humidity	5%-95%	
13	Apply Altitude	≤ 2000m	

14	Size	L798±3*W498±1*H227±2mm	=440mm without hangers
15	Weight	116±5kg	
16	Cooling method	Forced air cooling	
17	Shipping SOC	30%SOC	
18	Battery plug box standard requirements	GB/T 36276, UN38.3, UL1973,	

2.4.3 MPPT Main Specifications:

Parameter table of 50kW DCDC bidirectional converter	
Product Name	DC/DC Bidirectional Converter
BAT side DC voltage (V)	Voltage range 300-900V, full load 310V-900V
High voltage side battery voltage (V)	Voltage range 300-900V, full load 500V-900V
Rated power (KW)	50kW
Peak power (KW)	55kW (10min)
Low voltage side rated current (A)	161A
Rated current on high voltage side (A)	100A
Voltage measurement accuracy	1%
Current measurement accuracy	1%
Current ripple effective value	≤ 2%
Highest efficiency	≥ 99%
Charge to discharge transition time	< 20ms
MPPT function	have
MPPT number	1st Road
Working Mode	Constant voltage on low voltage side, constant current on low voltage side, constant power on low voltage side, constant voltage on high voltage side, constant current on high voltage side.

2.4.4 PCS Main Specifications



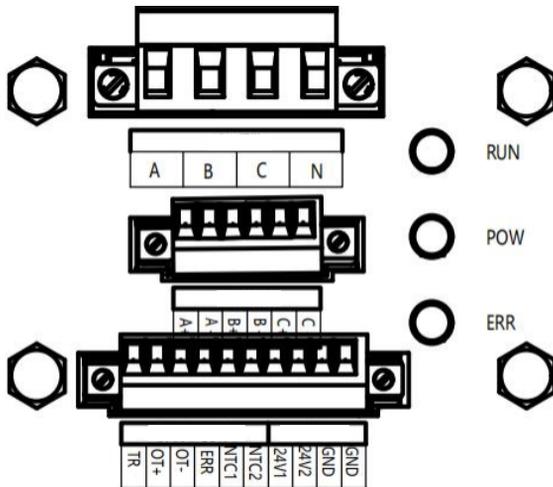
100kW PCS module technical parameters		
Product Name	DC side parameters	
Number of routes	1	
DC voltage range	DC630V-900V	Fully loaded
DC maximum current	190A	
Rated DC power	100kW	
Voltage stabilization accuracy	≤ ±2%	
Steady flow accuracy	≤ ±5%	
Voltage limiting characteristics	have	
Current limiting characteristics	have	
Rated output power	100kW	
Overload capacity	1.1 times long term, 1.2 times 1 minute	≤ 35°C
Rated voltage	AC 400V	
Rated output current	145A	
Communication access method	Three-phase four-wire	
Isolation method	Non-isolated	
Grid voltage range	340V-460V	
Grid frequency range	50Hz/60Hz±2.5Hz	
Current total harmonics	≤ 3% (full load)	
Power Factor	-0.99~+0.99	
DC component of current	≤ 0.5%	
Charge and discharge conversion time	<100ms	
Maximum conversion efficiency	≥ 98%	
Allowable ambient temperature	-25°C ~60°C	>45°C need to reduce frequency
Allowable relative humidity	≤ 95%	No condensation
Noise	≤ 75dB	
Protection level	IP20	
Altitude	3000m	> 2000 meters, frequency reduction is required
Size	Model 14: W480mm×H260mm×D720mm Model 24: W480mm×H260mm×D659mm	Outline
Weight	70KG	

Cooling method	Forced air cooling	
Multi-module networking mode	DC side separate - AC side parallel	
Emergency stop function	The module's IO receives the emergency stop switch command	
Human-computer interaction	The module does not have an LCD screen and requires an external 7-inch configuration screen	
BMS communication interface	CAN	
EMS Communication Interface	Network port/485	
Communication with the screen	Network port	

2.4.5 STS One-time Specification

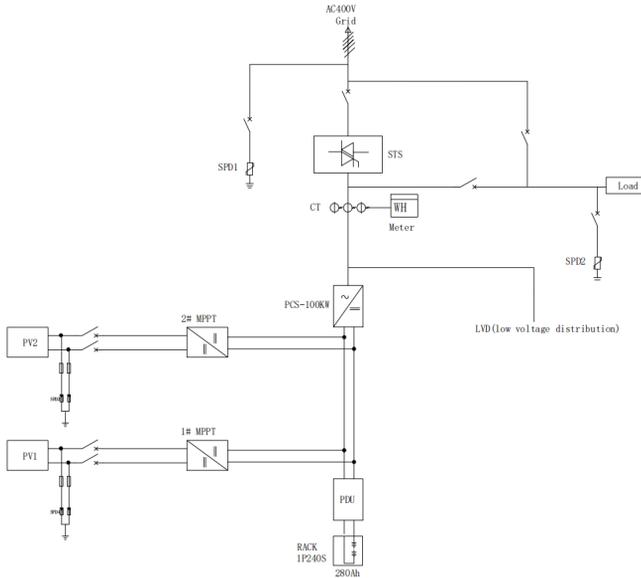
STS transfer switch technical parameters	
Rated voltage	0.4kV
Voltage range	-15%~+15%
Rated current	433/288
Rated Power	300/200kVA
Rated frequency	50Hz/60Hz
On-grid and off-grid switching time	≤ 20ms
Protection level	IP20
size	440*370*200mm
weight	15KG
Primary interface	Grid side interface: A/B/C;

STS Secondary Circuit Interface



Voltage sampling	Significance	Remark
A	Voltage sampling A phase sampling line	AC400V
B	Voltage sampling B phase sampling line	AC400V
C	Voltage sampling C phase sampling line	AC400V
N	Voltage sampling N-phase sampling line	Note that an external grid N line is required
Current sampling	Significance	Remark
A+	A phase current sampling line	The CT ratio is 500A:1A and needs to be short-circuited when not in use.
A-		
B+	B phase current sampling line	
B-		
C+	C phase current sampling line	
C-		
Signal and temperature switches	Significance	Remark
TR	Trigger signal	TR and GND are 0V to turn on the thyristor, 15-24V to turn off the thyristor
OT+	Temperature switch (normally closed)	80 degree protection
OT-		
ERR	Fault light indication	The voltage between ERR and GND is 15-24V, and the fault indicator is lit.
NTC1	Radiator temperature value 1, 5V 50% duty cycle frequency signal	
NTC2	Radiator temperature value 2, 5V 50% duty cycle frequency signal	
Powered by	Significance	Remark
24V1	The first power supply	It can be used for AC and DC dual power supply, with a required power of 100W.
24V2	Second power supply (optional)	
GND	Power supply GND	
GND	Power supply GND	
Indicator Lights	Significance	Remark
RUN	Running indicator light	TR signal is low, it lights up, high, it turns off
POW	Power indicator	24V power supply lights up normally
ERR	Fault indicator light	ERR trigger

2.5 Equipment Electrical Schematics



2.6 Temperature Characteristics

Battery charge and discharge temperature: -20°C to $+55^{\circ}\text{C}$ (discharge)/ 0°C to $+45^{\circ}\text{C}$ (charging)

Safe storage environment temperature: -20°C to $+60^{\circ}\text{C}$

Recommended storage temperature: $25\pm 5^{\circ}\text{C}$

Recommended working environment temperature: 0°C to $+40^{\circ}\text{C}$

2.7 Test Data

The battery system can detect the battery operating status (voltage, current, temperature, SOC/SOH/SOP estimation, etc.), based on the current status of the battery.

The actual performance of the state and electrical components is used to regulate battery charging and discharging and energy storage.

2.8 Circuit Protection

The battery system has high-voltage sampling and circuit breaker, Fuse and other safety device status check functions. When a battery fails, the system will report It also limits the charge and discharge current or power, delays the disconnection of the contactor, and protects the safety of the power system.

2.9 Security Protection

The energy storage cabinet is equipped with multifunctional detectors such as smoke, combustible gas, and water immersion, as well as a perfluorohexanone fire extinguishing system , which can detect safety hazards in the cabinet in real time and prevent fire safety accidents such as accidental battery fires.

2.10 Product Usage

As an independent system connected to the grid, it works according to the EMS system setting function and reactive power value requirements. Dynamically adjust the charge and discharge parameters according to the EMS setting data and execute the corresponding charge and discharge process.

Connect to the lower end of the transformer to monitor the transformer load in real time. When the transformer exceeds the capacity, the system will collect data and send an EMS. The system controls the output power that exceeds the capacity to reduce the excess capacity cost.

2.11 System Communication

The system has a built-in EMS system to comprehensively manage and maintain the BMS, PCS, power environment, fire protection, air conditioning, and safety monitoring equipment of the entire machine. The protocol is open and can be quickly connected to a third-party power station operation system .

2.12 Transportation and storage

Transportation

Applicable to trucks and ships. During transportation, the products should be covered with awnings, sun-proof, and loaded and unloaded in a civilized manner. The packaging boxes containing the products can be transported by any means of transportation. During loading and unloading, the batteries should be handled with care and prevented from being dropped, rolled, or pressed. Direct rain and snow and mechanical impact should be avoided during transportation.

Storage

The system should be stored in a dry warehouse and should not be exposed to the sun or rain. No harmful gases, flammable or explosive products are allowed in the warehouse. and corrosive chemicals, avoid mechanical shock, heavy pressure and strong magnetic field, avoid direct sunlight, and keep at least 2000mm away from heat sources. The packaging box should be at least 200mm above the ground and at least 500mm away from the wall, window or air inlet.

Under the specified conditions, the product must be recharged to 50% SOC at least once within 6 months after leaving the factory, and the capacity must be recharged every 12 months. quantity verification test and re-inspection.

3. Installation

3.1 Installation Principles

The energy storage system is a high-voltage energy storage device and is a dangerous item. Improper operation and use by non-professionals may cause serious consequences such as electric shock, combustion, and explosion. The installation and maintenance of the battery system must be performed by professional technicians or trained designated personnel. Relevant safety regulations must be strictly observed.

3.2 Installation Notes

The energy storage system is a whole and must not be disassembled during transportation or installation. Failures caused by unauthorized modifications are not covered by the warranty.

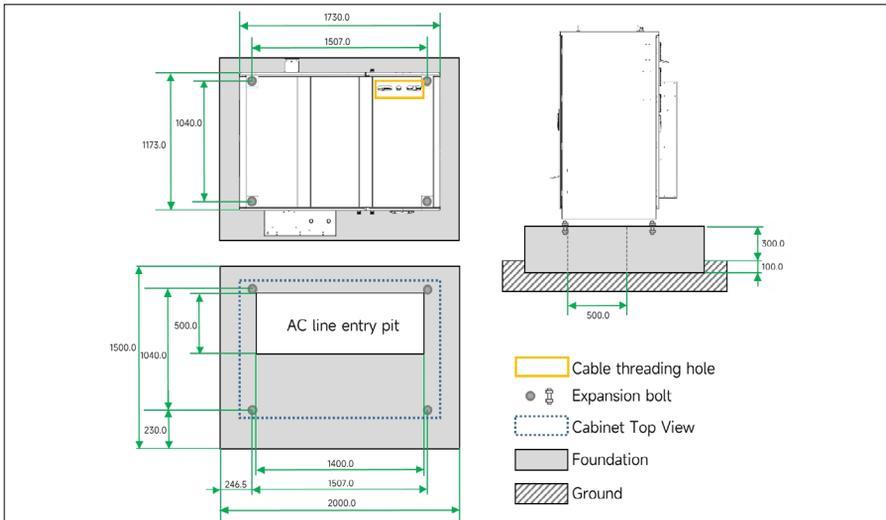
CAUTION

- Do not install in bad weather such as rain, dust, etc.
- Do not insert foreign objects into any part of the energy storage cabinet.
- Do not expose the energy storage cabinet or its components to direct flames.
- Do not install the energy storage cabinet near heating equipment.
- Do not immerse the device or its components in water or other liquids.
- Please place the energy storage system on a level surface and ensure that it is placed stably without shaking or tilting.
- Do not use detergent to clean the cabinet, and do not expose it to flammable or irritating chemicals or vapors.

WARNING

- During installation, operation and maintenance, it is strictly forbidden to wear watches, bracelets and other conductive objects to avoid electric shock and burns.
- Do not attempt to open, disassemble, repair, tamper with, or modify the energy storage cabinet while it is installed.
- Do not use parts or accessories not authorized by Huayuxin Technology.
- Specific details shall be subject to the tools and equipment used in actual operation.
- The installation of the battery system should take into account the load-bearing capacity of the installation ground and floor.

3.3 Foundation Requirements



Requirements for foundation design solution:

- The concrete strength of this project is C30, the steel reinforcement is HRB400 grade, and the thickness of the protective layer of concrete is 40 mm.
- This design of independent foundation bearing layer bearing capacity characteristic value is not less than 100KPa, the base should fall to the old soil layer, such as the case of loose miscellaneous fill should be dug out and use 3:7 gray soil refill, the refill thickness is not less than 500mm, compaction coefficient is not less than 0.94, gray soil bedding top elevation should be counted from the base of the bottom of the vegetative concrete bedding layer: the base of the 100mm thick C15 vegetative concrete bedding layer, each side of the wide out of the base of 100mm each, the foundation reinforcement anchorage length $35d$ (d for the diameter of steel bar) corner foundation pre-embedded lightning grounding, grounding length details of electrical drawings. 100mm thick C15 plain concrete bedding under the foundation, each side wide out of the foundation 100mm, foundation steel anchorage length $35d$ (d for the diameter of steel bars) corner of the foundation pre-embedded lightning protection grounding, grounding length details of the electrical drawings.
- The ESS must be installed on concrete or other non-combustible surfaces. Ensure that the installation surface is horizontal, secure, flat, and has sufficient load-bearing capacity. Subsidence or slope is not allowed.
- The foundation shall sustain the total weight of the equipment. If the load-bearing capacity of the foundation does not meet the requirement, a review is required.
- The bottom of the excavated foundation must be compacted and flat.
- After the foundation is excavated, prevent water from entering the foundation. If water enters the foundation, excavate and refill the affected parts.
- The level tolerance between the foundation and the contact surface of the cabinet must be less than or equal to 3 mm.
- The foundation must be above the highest water level of the local area in history and at least 300 mm above the ground.
- Construct drainage facilities based on the local geological conditions and municipal drainage

requirements to ensure that no water will accumulate at the equipment foundation. The foundation construction must meet the local drainage requirements for the maximum historical rainfall. The drained water must be disposed of in accordance with local laws and regulations.

- Reserve trenches or cable inlets for the ESS during foundation construction.
- The reserved holes on the foundation and the cable inlets at the bottom of the equipment shall be sealed.
- The foundation drawings shall not be used as the final construction drawings and are for reference only. For details, contact the product manager of the Company to obtain the foundation drawings. The design specifications of the ESS foundation shall be reviewed based on the installation environment, ground bearing capacity, geological features, and seismic resistant requirements of the project site.

Clearance Requirements

NOTICE

- The following figures show the minimum clearance requirements for installation and O&M.
- The equipment clearances must also meet the site selection requirements.

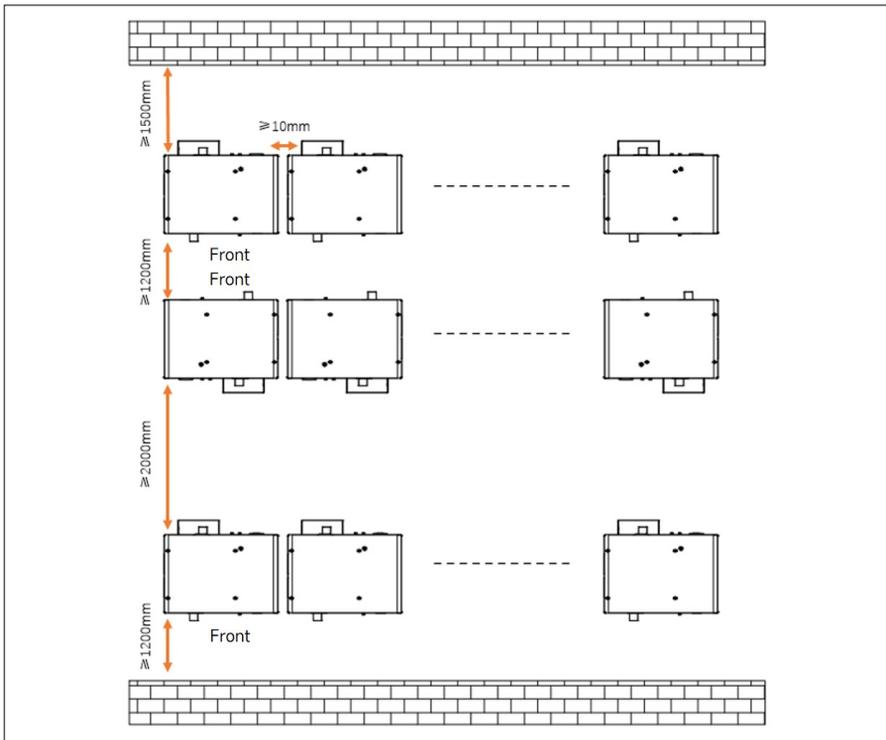


Fig2a. Clearance requirement

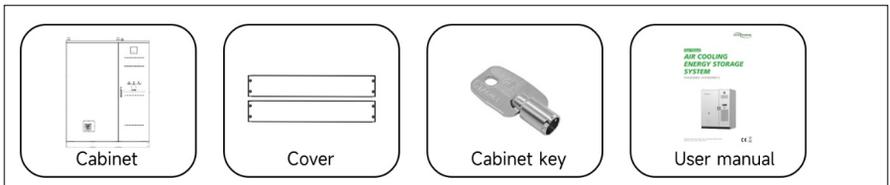
3.4 Installation Preparation

3.4.1 Prepare common tools

- The tool pictures are for reference only.
- The tool tables may not list out some tools required onsite. Onsite installation personnel and the customer need to prepare the tools based on the site requirements.



3.4.2 Packing list



No.	Description	Quantity
1	HYX-EF215P-M(MS) includes modules such as MPPT, PCS, UPS, and STS (optional).	1
2	Cover	2
3	Key for cabinet	2
4	User manual	1

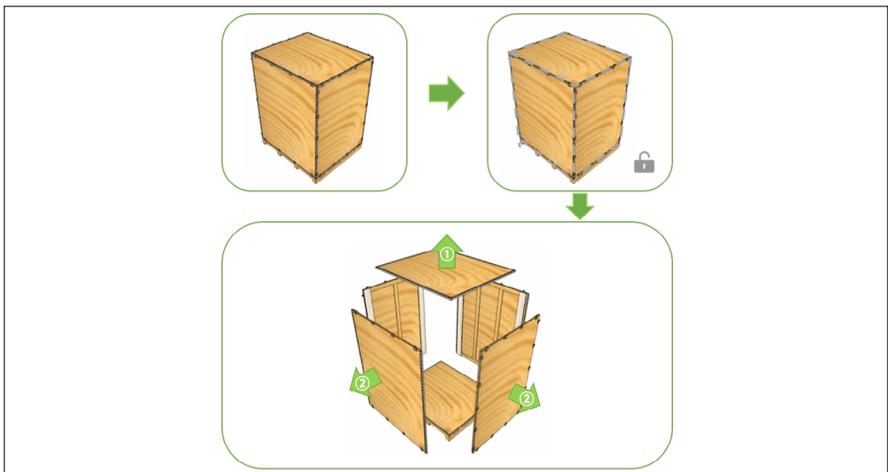
Recommended Cables

Required Material	Type	Conductor Cross-section	Recommended Type
Power AC cable	5-core copper cable *The conductor cross-section of the copper cables connected to the distribution box (4 copper cables in total) is 95mm ² , and the copper cables connected to earth are 50mm ² .	95mm ² *4+50mm ² *1	UL10269-3/0A 6783/0.127TS
DC side cable	5-core copper cable *The conductor cross-section of the copper cables connected to the distribution box (total of 5 copper cables) is 70mm ² .	70mm ² *5	UL10269-2/0A 5292/0.127TS
PV side cable	External connection of two 50mm ² cables	50mm ² *2	UL10269-1/0A 4214/0.127TS

3.4.3 Unpacking and Acceptance

The unit is 100% tested and inspected prior to shipment from the manufacturing facility. However, damage may still occur during transportation. Before unpacking the rechargeable battery, check the model number and the outer packaging material for damage such as holes and cracks.

Since the height of the cabinet is more than 2 meters, take necessary precautions when disassembling the outer packaging so that you can work at a high place. See the following diagram for disassembly procedures.



Torque Check

NOTICE

- Prohibition of energized operation: Workers must wait until the energy storage system has cooled down before carrying out further maintenance.
- The residual voltage on the DC side must be confirmed with a multimeter <60V DC.
- Workers are required to wear insulated gloves, safety helmets, goggles and reflective undershirts.
- Risk of over-torque: exceeding the standard value by 10% may lead to thread slippage.
- Tools with corrosion-resistant coatings are recommended for screws close to the battery module.
- During O&M operations, isolate the perimeter to ensure a safe working environment.

Purpose:

To ensure that the screws of the internal components of the energy storage cabinet (e.g. electrical connection points, structural supports, heat dissipation modules) maintain the torque values specified by the manufacturer to prevent loosening due to vibration and temperature differences, and to avoid the risk of poor contact, overheating or structural instability.

Tools Preparation:

- Digital torque wrench (accuracy within $\pm 3\%$).
- Sockets matching screw specifications (e.g. ISO 4.8 grade M6/M8/M10, etc.)
- Insulated gloves & safety goggles & helmet & reflective undershirt, etc.
- Maintenance Record Sheet.

Procedure

1. Security preparation
 - Disconnect and padlock the energy storage system (follow LOTO procedure).
 - Allow cabinet temperature to cool below 40° C (verify via temperature sensor).
2. Locate critical screws (refer to Figure1. O&M Screw position diagram)
 - Electrical connection: copper busbar, circuit breaker terminals, fuse holders.
 - Mechanical structures: bracket fixation, pack fixation, module fixation.
3. Torque inspection
 - If the screw turns more than 5°, it is considered to be loose (need to retighten).
 - Set the torque wrench to the calibrated value (refer to Table 1. Torque Reference).
 - With the socket perpendicular to the plane of the screw, slowly apply force until the wrench clicks.

4. Anomaly handling

- Loose screws: Remove, inspect threads, apply fresh thread-locker, and re-tighten using the step torque method (50% → 80% → 100% of rated torque).
- Corroded/deformed screws: Replace immediately with equivalent stainless steel screws

Table 1. Torque reference

No.	Position	Thread Diameter	Standard Torque (N·m)	Review Period
1	Pack Fixation (include high voltage box)	M6	5.5	6 month
2	Module fixation (MPPT, PCS, STS, UPS)	M6	5.5	6 month
3	Electrical connection (PV side)	M8	13.5	3 month
4	Electrical connection (Grid side)	M10	24	3 month
5	Electrical connection (Load side)	M8	13.5	3 month

Torque Check Position:



Figure 1. Screw position diagram

For Pack Fixation:

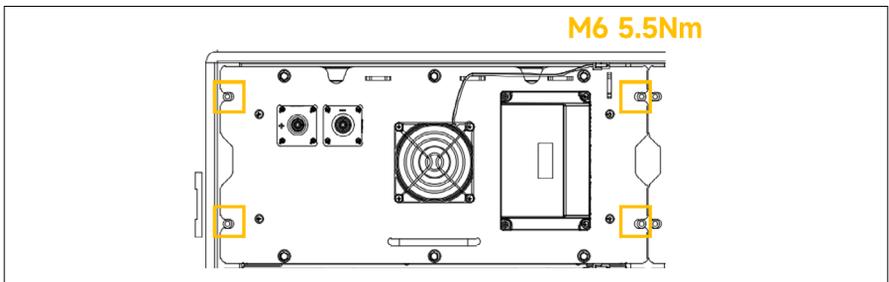


Figure 2. Screw position - pack

For Module fixation (MPPT, PCS, STS, UPS):

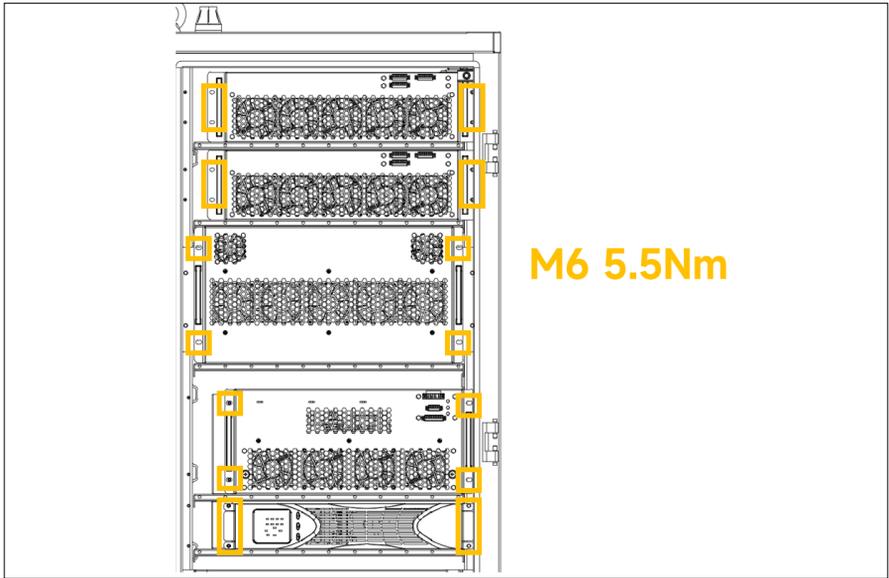


Figure 3. Screw position - module

For Electrical Connection (PV side):

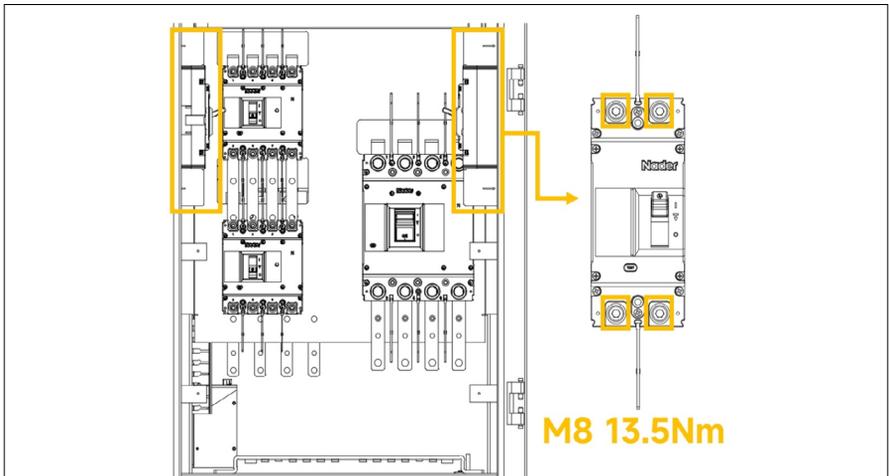


Figure 4. PV side - copper terminal connection

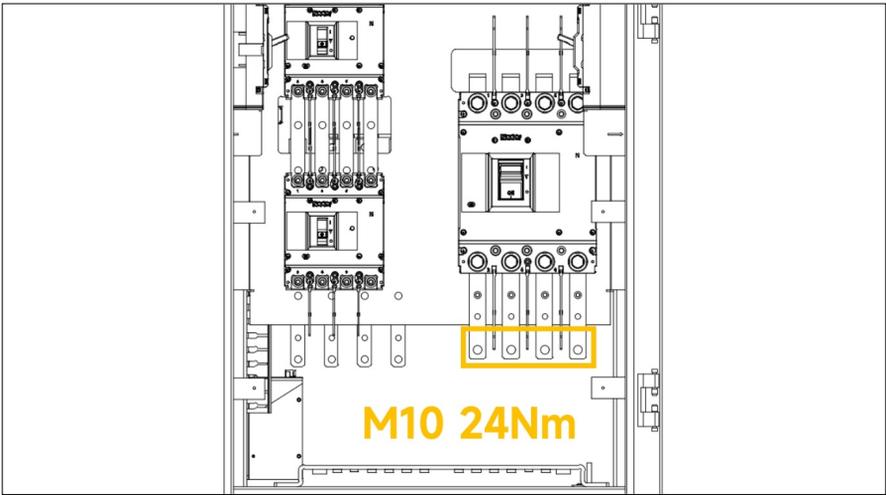
For Electrical Connection (Grid side):

Figure 5. grid side - copper busbar terminal connection

For Electrical connection (Load side):

That the copper busbar for load side connection is on the back side of the distribution zone.

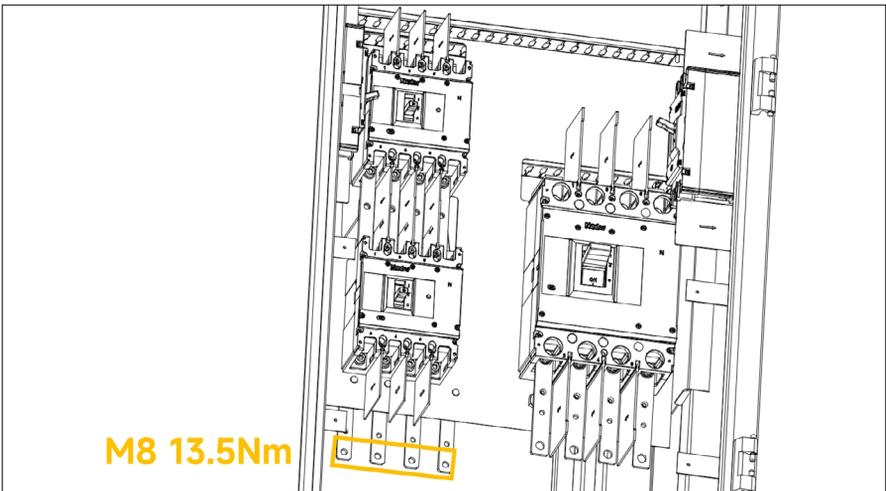


Figure 6. load side - copper busbar terminal connection

4.Power on the system

CAUTION

- To ensure the long-term safe and reliable operation of your energy storage system, please read and follow the following instructions carefully.
- battery damage and other losses caused by failure to use in accordance with the specified requirements or use beyond the specified range , Huayuxin Technology will not be responsible.

4.1 Check Before Power On

- Before officially turning on the power, check the connecting cables of the entire energy storage system to ensure that there are no signs of aging, breakage, or insulation damage .
- Check that the cable connections are secure and consistent with the design.
- Check that the AC power connection is correct.
- Check whether all communication cables and connection terminals are tight and reliable.
- Check that all switches in the cabinet are in the OFF position.
- Check the cabinet for any construction debris.
- Before powering on, use a multimeter to check whether the AC line phase voltage and frequency are within the normal range (400V (-20%- + 15%); 50Hz/60Hz±2.5Hz).
- Use a phase sequence meter to check whether the phase sequence is correct.

5.Equipment Operation Control

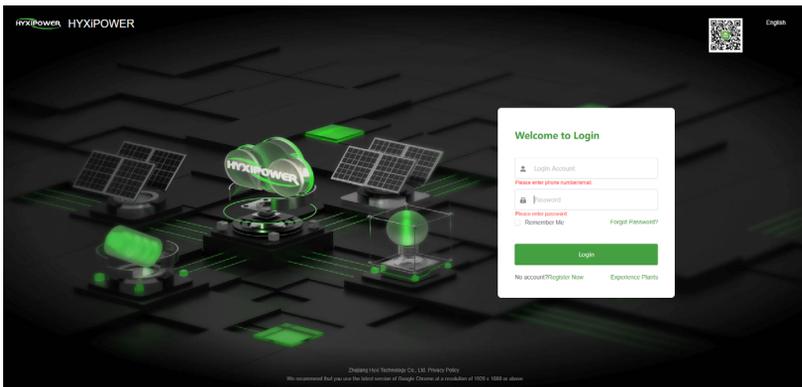
The control of the energy storage system is mainly carried out through the EMS local system, which mainly includes the following functions:

Site Management-EMS: Energy storage system, grid load, energy management, dynamic environment management, historical records, alarm management, energy consumption statistics, battery cluster management, single cell information, etc.

5.1 Login to The Energy Management System

Method 1:

Access the machine EMS IP address and , log in using the login name and password.



Method 2:

Scan the QR code through the APP to add industrial and commercial energy storage cabinet equipment. After scanning and adding, register on the HYXIPOWER Smart Energy Platform.

Log in to the official website: <https://www.hyxcloud.com/#/login>, enter your username and password, go to the device monitoring page, find the corresponding EMS, and click to visit.

EMS Name	EMS Number	Status	Plant Name	Operating Power	Daily Battery Charging C...	Daily Battery Discharge...	Control
储能电站-K01T	504000127704	Normal	工业储能电站	-51.16kW	25.4 kWh	219 kWh	
储能电站-Y0	504000127731	Offline	工业储能电站	--	0 kWh	0 kWh	

5.2 EMS System Main Interface

After successful login, you will enter the main interface of the system, which is divided into three areas. The left side of the interface shows the basic information of the site and the status of peripherals. The middle is the main display area, which shows the electrical topology of the entire site. The bottom shows the operation time of the entire power station, the cumulative charge and

discharge time, and the cumulative charge and discharge efficiency. The right side of the interface shows the charge and discharge status of a single cabinet, as well as real-time power, alarm pop-up boxes , etc.

In the upper right corner, you can enter the system to configure policies, query alarm history records, and configure the overall system.

6.System Power-off

6.1 Power-off Operation

Primary circuit power off:

PCS is in standby mode, battery high voltage box is closed, PCS AC switch and high voltage are disconnected. The DC switch of the box is turned off, and the system is powered off

When there is charge and discharge current in the main circuit of the battery system, the system will not be able to power off. 5A When Can perform power-off operation.

Secondary circuit power off:

After the primary circuit of the energy storage system is powered off, disconnect all circuit breakers in the cabinet, and finally disconnect the auxiliary Power switch and UPS Power switch, primary circuit indicator light is in red state.

If the system still cannot shut down normally after 5 attempts, please contact the manufacturer to troubleshoot the system.

7. Warranty

- The warranty for all equipment shall be in accordance with the contract requirements and the business agreement between the two parties.
- During the warranty period, the supplier shall arrange professionals to carry out necessary testing and maintenance on the equipment in accordance with the contract requirements.

8. Remark

In order to protect the legitimate rights and interests of both parties and avoid unnecessary losses, product failure or damage caused by the following reasons will not be covered by the warranty Free services:

- Your device is out of warranty;
- Equipment damage caused by incorrect installation and use not in accordance with the instructions;
- Your device has been repaired by unauthorized repair personnel;
- Your device uses non-standard or unpublished software or other non-standard expansion components that are not certified by our company, as well as damage caused by other force majeure reasons such as natural disasters.
- In order to protect your rights and interests, Huayuxin will provide high-quality after-sales service. You are welcome to supervise our work . And provide treasure your opinion. The above commitment is only for this product !

Maintenance and system precautions: To ensure the continuous and normal operation of the system, regular maintenance and care of the system is required:

- Regularly check whether the connecting wires are aging and whether the cable connection points are tight and safe;
- Before opening the cabinet for maintenance, the secondary circuit power supply should be completely disconnected, and the grid-connected cabinet circuit breaker, isolation switch and each high The pressure box isolation switch is turned off and the system is idle for 5 minutes or more before maintenance. Be careful not to damage system components and electrical components;
- After system maintenance, a trial run should be carried out before re-operation to ensure reliable operation of the system after maintenance;
- When the product fails to work, refer to the appendix for preliminary problem location and handling;
- If the problem still cannot be solved, please contact our engineers as soon as possible and do not disassemble the parts for illegal maintenance.

9. Appendix

9.1 Common Fault Information and Some Solutions

Fault name	Possible cause of failure	Treatment measures	Remark
The system is not functioning properly Work	<ol style="list-style-type: none"> 1. The secondary circuit of the system is not powered 2. The circuit breaker of some equipment is not closed 3. Other reasons 	<ol style="list-style-type: none"> 1. Check if the monitoring power supply indicator light is on. 2. Refer to the monitoring electrical diagram to see if there is any equipment circuit breaker that is not closed. 3. If it still does not work properly, please contact the manufacturer for after-sales service. 	After troubleshooting, you can restart the
System, single Pressure shutdown protection	<ol style="list-style-type: none"> 1. System, single cell voltage is higher than the protection value. 2. The battery sampling harness is broken or the sampling.Plugin connection is unreliable. 3. BMU working abnormally. 	Reinstall the BMU. Sampler power supply plug, Check the system battery voltage, if the battery is damaged Please replace damaged batteries.	After troubleshooting, refer to "Man-Machine Manual Grid-connected operation, execution completed After that the system can be run again.
System, single unit lack Pressure shutdown protection	<ol style="list-style-type: none"> 1. System, single cell voltage is lower than protection value. 2. Battery sampling harness short wire or sampling.Plugin connection is unreliable 3. BMU works once 4. Other reasons 	Re-plug BMU Sampler power supply plug, Check the system battery voltage, if the battery is damaged Please replace damaged batteries.	/
Charge and discharge over temperature stop Machine protection	<ol style="list-style-type: none"> 1. The system temperature is higher than the protection value. 2. The temperature sampling harness is broken or the sampling Plugin connection is unreliable 3. BMU is not working properly 4. Other reasons 	Re-plug BMU Sampler power supply plug, Check whether the air conditioner is operating normally.	/
Charge and discharge stop due to under temperature Machine protection	<ol style="list-style-type: none"> 1. The system temperature is lower than the protection value 2. The temperature sampling harness is broken or the sampling. Plugin connection is unreliable. 3. BMU is not working properly 4. Other reasons 	If it is abnormal, please contact the manufacturer's after-sales service.	/

Charge and discharge overcurrent stop Machine protection	The system charge and discharge current is higher than the protection value	Check if the PCS is working properly. Please contact the manufacturer for after-sales service.	/	
System insulation failure	1. Insulation detection failure 2. System leakage	Use remote background to shut down PCS, BMS Electrical appliances and contact the manufacturer's after-sales service	/	
BCU and BMU Communication failure	1. BMS system is not powered 2. The corresponding CAN communication line is loose	Check whether the BMS system is powered normally. View the corresponding BCU and BMU communication plug-ins Is it loose or the wiring harness is damaged.	After troubleshooting, you can restart the	
BCU and BAU Communication failure	1. BMS system is not powered 2. The corresponding CAN communication line is loose			
BMS and PCS Communication failure	1. BMS system is not powered 2. PCS system is not powered 3. The corresponding communication network cable is loose	Check whether the power supply of the entire energy storage system is normal, check whether the corresponding BAU and PCS communication plug-ins are loose, and whether the wiring harness is damaged.		
Air conditioner and BMS communication failure	1. The energy storage system is not powered on 2. The corresponding communication line is loose	Check whether the entire energy storage system is powered normally and whether the wiring harness is damaged.		
SOC display abnormal	1. SOC Not calibrated 2. SOC Error Accumulation	Perform a complete charge and discharge cycle on the system		/

9.2 Contact Information

If you have any questions about this product, please contact us.

In order to provide you with faster and better after-sales service, we need your assistance in providing the following information.

- Equipment model: _____

- Serial number of the device: _____

- Fault code / name: _____

- A brief description of the fault phenomenon: _____

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The manual is subject to change without notice while the product is being improved.



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