

User Manual

Ener Hexon® Smart 103P PV&ESS All-in-one Distributed ESS

YT-DS5T103-PV050-B02



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4					
5					

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When the content is modified, the document version needs to be upgraded simultaneously.

When modification is made too many times, except for retaining the first released content, keep the content of recent several modifications.

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1 Preface

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(4) If the product is damaged or could not be used due to the corresponding operation not carried out according to the requirements in the manual (or the product storage not meeting the requirements in the manual), the product you purchased will not be covered by the warranty; the technical support you mentioned may incur costs.

Note: Before using the product, users need to carefully read and understand all the clauses in the manual.

The images described in this manual are for reference only and subject to the actual product.

About This Manual

(1) Applicable Products

This user manual primarily introduces the transportation and storage, mechanical installation, electrical connection, commissioning and decommissioning, fault handling, and maintenance methods for the Ener Hexon® Smart 103P PV&ESS All-in-one Distributed ESS Cabinet (hereinafter referred to as: PV&ESS All-in-one Cabinet). This manual is applicable only to the PV&ESS All-in-one Smart Distributed ESS Products developed by YOTAI Digital Energy Technology (Shenzhen) Co.,Ltd.(Hereinafter referred to as: Yotai).

The product name is: Ener Hexon® Smart 103P PV&ESS All-in-one Distributed ESS Cabinet, Model: YT-DS5T103-PV050-B02.

(2) Intended Readers

This manual is intended for personnel involved in the installation, operation, maintenance, and other related tasks of this product. Readers should possess certain electrical and related professional knowledge and qualifications. All installation operations must and can only be performed by professional technical personnel. Professional technicians must meet the following requirements:

- Undergo specialized training and receive qualification recognition.
- Read this manual thoroughly and understand the relevant safety matters of operation.
- Be familiar with local standards and safety regulations of the electrical system.

Note: Non-professionals' operation may cause the equipment to malfunction or be damaged.

(3) Symbols Used

To ensure the personal and property safety of users when using the product and to use it more efficiently and correctly, relevant information is provided in the manual, highlighted with the following symbols. The symbols possibly used in this manual are listed below. Please read them carefully to better understand and use this manual.

The following symbols may appear in this manual, and their meanings are as follows.

Symbol	Symbol Meanings
 DANGER	Used to warn of emergency danger situations. If not avoided, this could lead to death or serious personal injury.
 WARNING	Used to warn of potential hazardous situations. If not avoided, this could possibly lead to death or serious personal injury.
 CAUTION	Used to warn of potential hazardous situations. If not avoided, this could lead to moderate or minor personal injury.
 NOTE	Used to convey equipment or environmental safety warning information. If not avoided, this could lead to equipment damage, data loss, reduced equipment performance, or other unforeseeable outcomes.

2 Safety Instructions

2.1 General Safety Precautions

Before transporting, storing, installing, operating, using and maintaining the equipment, please read this manual first, operate strictly in accordance with the contents of the manual, and follow all safety precautions marked on the equipment and in the manual. The "Instructions", "Notes", "Cautions", "Warnings" and "Dangers" in the manual do not represent all safety precautions that should be followed, but only serve as a supplement to all safety precautions. You must also comply with relevant international, national or regional standards, as well as industry practices. The company does not assume any responsibility for any violation of general safety operating 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 failure, and the resulting equipment malfunction or component damage is not within the scope of the equipment quality assurance; otherwise, the company is not responsible for compensation for personal injury, property loss, etc. that may be caused. Local laws, regulations and specifications should be observed when transporting, storing, installing, operating, using and maintaining the equipment. The safety precautions in the manual serve only as a supplement to local laws, regulations and specifications. The company does not assume responsibility for any of the following situations or their consequences:

- 1) Installation and usage environments that do not comply with relevant international, national, or regional standards.
- 2) Operation outside the conditions described in this manual.
- 3) Unauthorized disassembly, alteration of the product, or modification of software codes.
- 4) Operation not in accordance with the product and documentation instructions and safety warnings.
- 5) Equipment damage caused by abnormal natural events (earthquakes, floods, volcanic eruptions, mudslides, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, extreme weather, force majeure).
- 6) Transport damage caused by you or your appointed third party
- 7) Damage due to storage conditions not meeting product documentation requirements.
- 8) Negligence, improper operation, or deliberate damage by you or a third party, resulting in hardware or data damage to the equipment.
- 9) System damage caused by you or a third party, including relocation and installation of systems not in accordance with this manual, and damage caused by unauthorized adjustments, changes, or removal of identification marks.
- 10) Defects, malfunctions, or damage caused by acts, events, negligence, or accidents beyond the seller's reasonable control, including power outages or electrical faults, theft, war, unrest, internal strife, terrorism, intentional or malicious damage, etc.



NOTE

Reverse engineering, decompiling, disassembling, dismantling, adapting, implanting, or other derivative operations on the equipment software are prohibited. It is forbidden to study the internal implementation of the equipment, obtain the equipment software source code, steal intellectual property, etc., and to disclose any performance tests of the equipment software.

2.2 Personal Safety

 DANGER	1) The installation process strictly prohibits operations while energized. Live installation or removal of cables is forbidden. The instant the cable core comes into contact with a conductor, it may generate electric arcs, sparks, or cause ignition and explosion, potentially leading to fires or personal injury.
	2) Fire, electric shock, or explosion can occur during equipment operation due to non-standard or incorrect operation, resulting in personal injury or property loss.
	3) Do not wear conductive objects like watches, bracelets, rings, necklaces during work to avoid electric shock burns.
	4) Use specialized insulated tools during work to avoid electric shock injuries or short circuits. The insulation voltage level must meet local laws, regulations, standards, and specifications.
 WARNING	Use specialized protective equipment, such as protective clothing, insulated shoes, safety goggles, safety helmets, insulated gloves, etc., during work.

2.3 Personnel Requirements

Operations such as lifting and transporting, installation and wiring, and operation and maintenance of the equipment must be carried out by professional electrical technicians who meet local specifications. Operators should wear protective gear that meets local safety requirements.



Fig. 2.3-1 Personnel Dress Requirements

Operators must meet the following requirements:

- 1) Do not wear conductive items like watches, bracelets, rings, necklaces during installation, operation, and maintenance to avoid electric shock burns.
- 2) Comply with the laws, regulations, and relevant standards of the country or region during transportation,

transshipment, installation, wiring, and maintenance.

- 3) Be familiar with the composition and working principles of the entire ESS and operate according to the manual.
- 4) Have received professional training related to the installation and trial operation of electrical equipment, possess certain knowledge in electronics, electrical wiring, and mechanics, and be familiar with electrical and mechanical schematics.
- 5) Have the ability to respond to emergencies or sudden situations that may occur during installation or trial operation

2.4 Electrical Safety

 DANGER	1) Ensure that the equipment is undamaged before making electrical connections, as damage may cause electric shock or fire. 2) Non-standard or incorrect operations may lead to accidents such as fire or electric shock. 3) Prevent foreign objects from entering the equipment during operation, as this may cause short circuits or damage to the equipment, reduction in load supply, power drop, and personal injury.
 DANGER	Equipment requiring grounding must have the protective earth wire installed first during installation; it must be the last to be removed during disassembly.
 NOTE	Do not allow cables to pass through equipment air inlets and outlets.

2.5 General Requirements

- 1) Installation, operation, and maintenance must be carried out according to the steps in the manual. Do not modify, add, or change the equipment without authorization, and do not change the installation order.
- 2) Grid connection operation requires permission from the electrical department of the country or region. Follow power station safety specifications, such as the operation ticket and work ticket systems.
- 3) Set up temporary fences or warning ropes in the work area and hang “No Entry” signs. Non-workers are strictly forbidden from entering.
- 4) Before installing or removing power cables, disconnect the equipment itself and its upstream and downstream switches.
- 5) If liquid enters the equipment, immediately turn off the power and do not continue to use it.
- 6) Before operating the equipment, carefully check that the tools used meet the requirements and are logged; After operation, count and collect the tools to prevent them from being left inside the equipment.
- 7) Before installing power cables, confirm that the cable labels are correct and that the cable terminals have been insulated.
- 8) When installing the equipment, use a torque tool of the appropriate range to tighten the screws. When tightening with a wrench, ensure that the wrench is not skewed, and the torque value deviation does not exceed the specified 10%.
- 9) After installation, ensure that all electrical components, protective covers, insulation tubes, and other devices are in place to avoid the risk of electric shock.

- 10) If the equipment has multiple inputs, disconnect all inputs and wait for the equipment to be completely powered down before operating.
- 11) When maintaining downstream electrical or distribution equipment, disconnect the corresponding output switch of the power supply equipment.
- 12) When maintaining equipment, hang a “Do Not Close” sign on the upstream and downstream switches or circuit breakers and post warning signs to prevent accidental connection.
- 13) Faults must be fully resolved before re-powering. When diagnosing and troubleshooting faults, the following safety measures must be completed if power off is necessary: power off > test for electricity > install grounding wire > hang signs and set up barriers.
- 14) Regularly check the equipment terminal screws, confirm they are tightened and not loose. If cables are damaged, they must be replaced by professional personnel to avoid risks.
- 15) Do not tamper with, damage, or cover up labels and nameplates on the equipment, and timely replace labels that have become unclear due to long-term use.
- 16) Do not use water, alcohol, or oil solvents to clean the internal and external electrical components of the equipment.

2.6 Grounding Requirements

- 1) The equipment grounding impedance should meet local electrical standards.
- 2) Equipment must be permanently connected to the protective ground. Before operating the equipment, check its electrical connections to ensure reliable grounding.
- 3) Do not operate equipment without installing a grounding conductor.
- 4) Do not damage the grounding conductor
- 5) For equipment using three-core sockets, ensure that the ground terminal in the three-core socket is connected to the protective ground.
- 6) If it is a large contact current device, before connecting the input power, the protective ground terminal of the equipment chassis must be grounded first to prevent contact current from causing electric shock to the human body.

2.7 Wiring Requirements

- 1) The selection, installation, and routing of cables must comply with local laws, regulations, and specifications.
- 2) During the laying of power cables, avoid twisting or coiling. If the power cable is not long enough, replace it with a new one; do not make joints or welds in the power cable.
- 3) All cables must be securely connected, well insulated, and of the appropriate specification.
- 4) Cable ducts and through holes should have no sharp edges, and protective measures should be in place where cables pass through to prevent damage by sharp edges or burrs.
- 5) If cables enter the cabinet from the top, they should be bent in a U-shape outside the cabinet before entering.
- 6) Cables of the same type should be bundled together, neatly and without damage to the outer sheath; cables of different types should be laid at least 30mm apart and should not be intertwined or crossed.
- 7) Seal cable entries with sealing putty immediately after wiring or when leaving the wiring process to prevent moisture and small animals from entering.
- 8) Buried cables should be reliably fixed using cable supports and cable clamps, and cables in the backfill soil area should be closely fitted to the ground to prevent deformation or damage during backfilling.
- 9) When external conditions, such as installation methods or environmental temperatures, change, it is necessary

to refer to IEC-60364-5-52 or local regulations and standards to verify cable selection, such as whether the current carrying capacity meets requirements.

- 10) Using cables in high-temperature environments may lead to aging and damage to the insulation layer. The distance between cables and heat-generating devices or heat source areas should be at least 30mm.
- 11) At low temperatures, severe impacts or vibrations can cause the plastic sheath of the cable to become brittle and crack.
- 12) To ensure construction safety, the following requirements should be followed: All cables should be laid and installed at temperatures above 0°C. When handling cables, especially in low-temperature environments, they should be handled gently. If the storage temperature of the cable is below 0°C, the cable must be stored in a room-temperature environment for more than 24 hours before laying.
- 13) Unconventional operations, such as pushing cables directly off a vehicle, are prohibited to avoid damage to the cables, which can lead to decreased performance, affecting current carrying capacity and temperature rise.

2.8 Anti-static Requirements

 NOTE	Human-generated static electricity can damage static-sensitive components on circuit boards, such as BMU boards. 1) Wear anti-static gloves before touching the equipment or handling circuit boards. 2) When holding a circuit board, hold it by the edges without components and avoid touching the components with your hands. 3) Circuit boards that have been removed should be wrapped in anti-static materials for storage or transportation.
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2.9 Environmental Requirements

 DANGER	1) It is strictly forbidden to place the equipment in environments with flammable or explosive gases or smoke, and any operation in such environments is prohibited. 2) Do not store flammable or explosive materials in the vicinity of the equipment. 3) Keep the equipment away from heat sources or fire sources, such as fireworks, candles, heaters, or other heating devices, as this may cause equipment damage or fire.
 WARNING	1) Install the equipment away from liquids and not under locations prone to condensation, such as water pipes or air vents; it should also not be installed under air conditioning vents, ventilation openings, or windows in machine rooms where water leakage is likely, to prevent liquids from entering the equipment and causing faults or short circuits. 2) Do not block the ventilation ports or cooling system of the equipment during operation, and do not cover it with other items, to prevent overheating and fire.

- 1) The storage environment for the equipment should have suitable temperature and humidity, be clean, dry, well-ventilated, and free from dust and condensation.
- 2) Do not install or operate the equipment beyond the specified technical parameters, as this may affect the performance and safety of the equipment.
- 3) Do not install, use, or operate outdoor equipment or cables in severe weather conditions such as thunderstorms,

rain, snow, high winds of level 6 or above (including but not limited to moving equipment, operating equipment and cables, plugging and unplugging outdoor signal interfaces, working at heights, outdoor installations, opening doors, etc.).

- 4) Do not install equipment in environments with dust, smoke, volatile gases, corrosive gases, infrared radiation, organic solvents, or high salt content.
- 5) Do not install equipment in environments with conductive metallic dust or magnetic dust.
- 6) Do not install equipment in areas prone to mold, mildew, or other microorganisms.
- 7) Avoid installing equipment in areas with strong vibrations, loud noise sources, and strong electromagnetic interference.
- 8) The installation site should comply with local laws, regulations, and relevant standards.
- 9) Ensure the installation surface is solid and not composed of materials like rubber soil, weak soil, or prone to sinking; avoid low-lying areas or areas prone to water accumulation; the site's elevation should be above the highest historical water level of the area.
- 10) Never install the equipment in locations susceptible to flooding.
- 11) If the equipment is installed in areas with lush vegetation, in addition to routine weeding, the ground below the equipment should be hardened, such as by laying cement or stones.
- 12) Before installing, operating, or maintaining the equipment, clear any accumulated water, ice, snow, or other debris from the top. Open the door only after ensuring that no debris will fall into the equipment.
- 13) When installing the device, please ensure that the installation surface is firm and meets the load bearing requirements of the equipment.
- 14) All wiring holes need to be sealed. The wiring holes that have been used shall be sealed using sealing mud, and the unused wiring holes shall be sealed using the owner cover of the equipment. The correct sealing method is shown in the figure below.

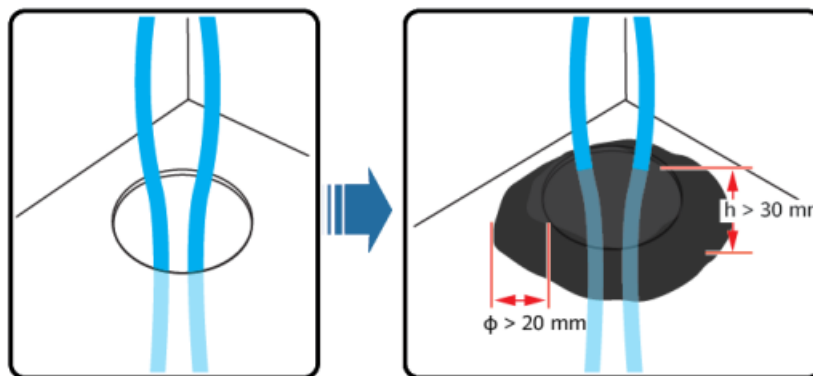


Figure 2.9-1 Standard for Sealing Construction of Wiring Holes

2.10 Mechanical Safety

 DANGER	High-altitude work requires wearing safety helmets, safety belts, or lanyards, securely attached to firm structural components. Do not hang on unstable moving objects or metal with sharp edges to prevent accidents due to hook slippage and falls.
 WARNING	Tools should be complete and professionally inspected for quality. Do not use tools with damage, those that fail inspection, or are beyond their inspection validity. Ensure tools are secure and not overloaded. Before installing the equipment in the cabinet, ensure the cabinet is properly fixed to prevent tilting or collapsing due to an unstable center of gravity, which could injure installers or damage the equipment. When removing equipment from the cabinet, be careful with potentially unstable or heavy equipment inside the cabinet to avoid crushing or impact injuries. Drilling holes in the equipment is strictly prohibited. Drilling can damage the equipment's seal, electromagnetic shielding, internal components, and cables. Metal filings generated from drilling can cause short circuits on circuit boards.

2.11 General Requirements

- 1) Paint scratches that occur during the transportation and installation of equipment must be repaired promptly, and it is strictly forbidden for the scratched areas to remain exposed for an extended period.
- 2) Welding, cutting, or any other operations involving electrical arcs on the equipment are prohibited without the assessment and approval of our company.
- 3) Installation of other equipment on top of the equipment is prohibited without the evaluation and authorization of our company.
- 4) When working in the space above the equipment, additional protection must be added to the top of the equipment to prevent damage to the equipment.
- 5) Please use the correct tools and be familiar with their proper usage.

2.12 Safety in Lifting and Carrying Heavy Objects

- 1) When handling heavy objects, select appropriate handling tools and ensure an adequate number of personnel coordinate their efforts based on the weight of the cargo to ensure safe handling. The recommended methods for handling goods by our company are shown in the diagram below.



Figure 2.12-1 Schematic Diagram of Different Methods for Handling Goods of Varying Weights

- 2) When manually handling equipment, wear protective gloves and anti-crush shoes, and use other safety protective gear as required.
- 3) During the equipment handling process, take precautions to avoid scratching the equipment surface or damaging components and cables.
- 4) When using a forklift for handling, ensure that the forklift forks are positioned in the middle to prevent tipping. Before moving, secure the equipment to the forklift using ropes and assign personnel to oversee the process.
- 5) Exercise caution when moving equipment to prevent collisions or falls.
- 6) Choose sea transport or well-maintained roads for transportation; rail and air transport are not supported. During transportation, minimize vibrations and tilting as much as possible.
- 7) The tilting angle of the equipment cabinet must adhere to the requirements shown in the diagram, with a tilt angle of $\alpha \leq 3^\circ$ when packaged and $\alpha \leq 3^\circ$ after unpacking.

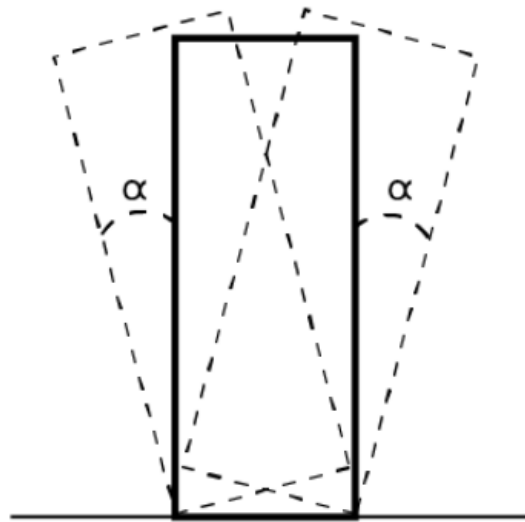


Figure 2.12-2 Schematic Diagram of Allowable Tilting Angles for Equipment Cabinets

2.13 Work-at-Height Safety

- 1) Any operation conducted at a height of more than 2 meters above ground level is considered a high-altitude operation and requires the presence of a safety supervisor.
- 2) Individuals must undergo relevant training and obtain the necessary qualifications before engaging in high-altitude operations.
- 3) High-altitude operations should be halted in the event of rain or other hazardous conditions. After such conditions pass, the safety officer and technical personnel must inspect all operation equipment to ensure safety before resuming work.

- 4) In high-altitude work areas, dangerous prohibited zones must be marked and clearly identified, and access by unauthorized personnel must be strictly prohibited.
- 5) Guardrails and signs must be installed at openings and holes in high-altitude work areas to prevent accidental falls.
- 6) Below the work area in high-altitude operations, it is strictly forbidden to store scaffolding, planks, or other objects. Ground personnel are prohibited from staying or passing directly beneath the high-altitude work area.
- 7) Ensure that tools and equipment are properly secured to prevent damage to equipment or injury to personnel due to falling objects.
- 8) It is strictly prohibited for personnel working at heights to throw objects from a high elevation to the ground or vice versa. Instead, use hoists, baskets, elevated platforms, or cranes for transporting objects.
- 9) Whenever possible, avoid simultaneous operations on upper and lower levels. If unavoidable, dedicated protective shelters or other measures must be implemented between upper and lower levels, and upper levels must strictly avoid stacking tools and materials.
- 10) When dismantling scaffolding upon completion of work, it must be done in a step-by-step manner from top to bottom, and simultaneous dismantling of upper and lower levels must be strictly prohibited to prevent collapse.
- 11) Personnel engaged in high-altitude work must strictly adhere to high-altitude safety regulations, and the company assumes no responsibility for accidents resulting from violations of high-altitude safety operation rules.
- 12) Playfulness and resting are strictly prohibited during high-altitude work.

2.14 Ladder Usage Safety

- 1) When there is a possibility of electrical operations at heights, wooden ladders or insulated ladders should be used.
- 2) Platforms with protective barriers should be prioritized for climbing operations, and single-pole ladders should be prohibited.
- 3) Before using a ladder, ensure that it is in good condition, capable of bearing the weight, and strictly avoid overloading.
- 4) The ladder must be placed on a stable surface, and there must be someone to hold the ladder during use.



Figure 2.14-1 Schematic Diagram of Personnel Assisting on a Ladder

- 5) Maintain a stable posture while climbing, ensuring that your body's center of gravity does not deviate from the ladder edge to reduce the risk and ensure safety.
- 6) Secure the rope firmly when using an extension ladder.

2.15 Hoisting Safety

- 1) Personnel involved in lifting operations must undergo relevant training and be qualified before commencing work.
- 2) The lifting area must be demarcated with temporary warning signs or barriers.
- 3) The foundation for lifting must meet the load-bearing requirements of the crane.
- 4) Before lifting, ensure that lifting tools are securely fixed to a fixed object or wall that meets the weight-bearing standards.
- 5) During lifting, walking beneath the lifting arm or load is strictly prohibited.
- 6) Dragging steel cables or lifting gear and using hard objects to strike are prohibited during lifting.
- 7) During lifting, ensure that the angle between the two cables does not exceed 90° , as shown in the following diagram.

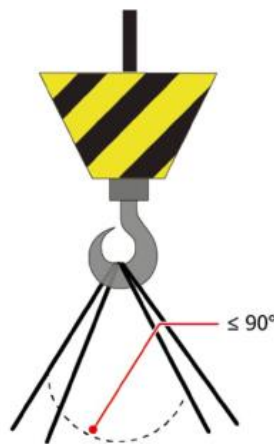


Figure 2.15-1 Schematic Diagram of Cable Angle during Lifting Operations

2.16 Drilling Safety

- 1) Prior approval from the customer or contractor is required before drilling.
- 2) When drilling, wear safety protective equipment such as protective goggles and gloves.
- 3) Avoid pre-embedded pipelines or cables during drilling to prevent short circuits or other hazards.
- 4) During drilling, protect the equipment from debris and promptly clean up after drilling to prevent debris from entering the equipment.

2.17 Equipment Safety

2.17.1 ESS Safety

This product specification is exclusively applicable to the YT-DS5T103-PV050-B02 PV&ESS All-in-One Cabinets developed by YOTAI Digital Energy Technology (Shenzhen) Co., Ltd.

 DANGER	Opening the cabinet doors is prohibited during system operation. Avoid standing near the cabinet doors, including within their opening range, during an ESS fault.
 NOTE	ESS must have protective measures such as fences or walls, along with erected safety warning signs for isolation, to prevent unauthorized personnel from entering during operation and causing personal injury or property damage.

- 1) The installation layout of the ESS must comply with local standards for fire safety distances or firewalls, including but not limited to the "GB51048-2014 Electrochemical Energy Storage Station Design Specification" and the "NFPA 855 Standard for the Installation of Stationary ESS."
- 2) ESS should undergo regular fire safety inspections, at least once a month.
- 3) During live inspections of the system, pay attention to danger warning signs on the equipment and avoid standing at the cabinet doors.
- 4) After replacing power components of the ESS or changing connections, manual initiation of connection testing and topology recognition is required to prevent abnormal system operation.
- 5) It is recommended that users have their own recording devices to document the detailed process of installing, operating, and maintaining the equipment.

2.17.2 Battery Safety

 DANGER	1) Short-circuiting the positive and negative terminals of the battery is strictly prohibited, as it can cause a short circuit. A battery short circuit can instantly generate a large current and release a significant amount of energy, leading to battery leakage, smoking, release of combustible gases, thermal runaway, fire, or explosion. To prevent battery short circuiting, maintenance with the battery charged is not allowed. 2) Do not expose the battery to high-temperature environments or near heating devices such as intense sunlight, fire sources, transformers, heaters, etc. Overheating of the battery can cause leakage, smoking, release of combustible gases, thermal runaway, fire, or explosion. 3) The battery must not be subjected to mechanical vibrations, falls, collisions, puncturing by sharp objects, or pressure impacts, as these could damage the battery or cause fires. 4) Dismantling, modifying, or damaging the battery (such as inserting foreign objects, external pressure, immersion in water or other liquids) is strictly forbidden, to avoid causing battery leakage, smoking, release of combustible gases, thermal runaway, fire, or explosion. 5) Contact of battery terminals with other metal objects is prohibited as it may cause heating or electrolyte leakage. 6) Using or replacing batteries with incorrect models poses a risk of fire or explosion. Please use batteries of the specified model recommended by the manufacturer. 7) Battery electrolyte is toxic and volatile. In case of electrolyte leakage or abnormal
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	odors, avoid contact with the leaked liquid or gases. Non-professionals should not approach and must contact professionals immediately. Professionals should wear protective goggles, rubber gloves, gas masks, protective clothing, etc., turn off the equipment promptly, remove the leaking batteries, and contact a technical engineer for handling. 8) The battery is a sealed system and under normal operating conditions, no gases are released. However, in extreme misuse scenarios such as burning, puncturing, compression, lightning strike, overcharging, or other conditions that might cause thermal runaway, the battery could be damaged or undergo abnormal chemical reactions internally, potentially leading to electrolyte leakage or the production of gases like CO or H₂. Ensure proper venting measures for combustible gases on-site to prevent combustion or equipment corrosion. 9) Gases produced by burning batteries can irritate the eyes, skin, and throat. Take appropriate precautions.
 WARNING	1) Batteries should be installed away from areas prone to liquid intrusion, such as air conditioning vents, ventilation openings, windows in machine rooms, water pipes, etc., to prevent liquids from entering the equipment and causing failures or short circuits. 2) When installing and commissioning batteries, adhere to construction standards and equip with fire safety facilities, such as fire sand, CO₂ fire extinguishers, etc. Before operation, ensure the availability of fire safety facilities compliant with local laws and standards. 3) Before unpacking batteries for storage and transport, ensure that the outer packaging is intact and correctly placed according to the packaging box labels, strictly prohibiting upside-down, sideways, vertical, inclined placement, and stacking in compliance with the stacking requirements on the packaging, to avoid any impacts or falls that could damage or scrap the batteries. 4) After unpacking, place batteries in the specified direction, strictly forbidding upside-down, sideways, vertical, inclined, or stacked placement, to avoid any impacts or falls that could damage or scrap the batteries. 5) Tighten the copper busbars or cable terminal screws as specified in the manual, regularly check for tightness, rust, corrosion, or other foreign objects, and clean them. Otherwise, loose screws can cause excessive connection voltage drop, and high currents can cause excessive heating, burning the battery. 6) After battery discharge, charge the battery promptly to prevent damage due to over-discharge.

Disclaimer: Yotai is not responsible for damage to batteries provided by the company due to the following reasons:

- 1) Battery damage caused by earthquakes, floods, volcanic eruptions, mudslides, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, extreme weather, or force majeure.
- 2) Direct damage to batteries due to on-site equipment operating environments or external electrical parameters not meeting the requirements for normal operation, including but not limited to actual operating temperatures of batteries being too high or too low, unstable electrical grid conditions, frequent power outages, etc.
- 3) Battery damage, falls, leaks, ruptures, etc., due to improper operation or failure to connect the batteries as required.

- 4) Battery damage caused by over-discharge due to failure to power up the batteries promptly after on-site installation and system connection.
- 5) Battery damage due to failure to accept delivery promptly.
- 6) Incorrect setting of battery operation management parameters.
- 7) Mixing batteries provided by the company with other batteries, causing accelerated capacity degradation, including but not limited to: mixing with batteries of other brands or different rated capacities.
- 8) Frequent over-discharge of batteries due to improper maintenance, on-site capacity expansion, or long-term inability to fully charge.
- 9) Failure to properly maintain and care for batteries according to the operating manual of the accompanying equipment, including but not limited to: not regularly checking whether battery terminal screws are tightened.
- 10) Battery damage due to storage not in accordance with requirements (such as storing in humid or rain-prone environments).
- 11) Battery damage due to failure to charge promptly, causing over-storage and resulting in capacity loss or irreversible damage.
- 12) Battery damage caused by you or a third party, including but not limited to: unauthorized relocation or installation of batteries against the company's requirements.
- 13) Changing the battery usage scenario without notifying the company
- 14) Connecting additional loads to the battery on your own.
- 15) Exceeding the maximum storage period of the battery.
- 16) Exceeding the warranty period of the battery.

2.17.3 General Requirements

This product specification is exclusively applicable to the YT-DS5T103-PV050-B02 PV&ESS All-in-One Cabinets developed by YOTAI Digital Energy Technology (Shenzhen) Co., Ltd.

	1) Do not expose batteries to high-temperature environments or near heating devices, such as sunlight, fire sources, transformers, heaters, etc. Overheating of batteries may cause fires or explosions. 2) Dismantling, modifying, or damaging batteries (such as inserting foreign objects, immersing in water or other liquids) is strictly prohibited, to avoid causing battery leakage, overheating, fire, or explosion. 3) Lithium-ion battery ESS have a high fire risk. Consider the following safety risks before working on batteries. 4) Battery electrolyte is flammable, toxic, and volatile. 5) Thermal runaway of batteries can produce combustible gases and harmful gases such as CO and HF. 6) Accumulation of combustible gases produced after thermal runaway of batteries poses a risk of deflagration and explosion. ESS must be installed and unloaded in accordance with the laws and industry standards of the region. Rough handling can cause short circuits or damage to batteries inside the cabinet, potentially leading to battery leakage, rupture, explosion, or fire.
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- 1) Batteries must be stored in a separate warehouse, in their external packaging, to avoid mixing with other materials, open-air storage, and excessive stacking. The site must have fire safety facilities that meet

requirements, such as fire sand, fire extinguishers, etc.

- 2) Do not disassemble the external packaging of batteries under normal circumstances. If recharging of batteries is required, it must be done by professionals according to requirements. After recharging, the batteries should be repackaged.
- 3) After unpacking batteries for outdoor use, it is recommended to power them up within 24 hours. If timely powering up is not possible, store the batteries indoors, in a dry environment free from corrosive gases.
- 4) Batteries should be placed according to the anti-inversion labels or tags on the packaging boxes, to avoid leakage from long-term inverted storage.
- 5) Batteries should be protected from impacts.
- 6) When handling batteries, carry them in the direction required by the battery, prohibiting inversion or tilting.
- 7) Use batteries within the temperature range specified in this manual. When the environmental temperature of the battery is below the lower limit of the working temperature, do not charge to avoid internal short circuits due to crystallization at low temperatures.
- 8) Dispose of waste batteries according to local laws and regulations, and do not treat batteries as household waste. Improper disposal of batteries can lead to environmental pollution.
- 9) Do not use damaged batteries (batteries with dents or other damage to the casing). Damaged batteries may release flammable gases, and should not be stored near undamaged products.
- 10) The storage location for damaged batteries should not contain flammable materials, and non-professionals should not approach.
- 11) During the storage of damaged batteries, monitor them to ensure there are no signs of smoke, flame, electrolyte leakage, or heating.
- 12) If the battery pack is accidentally drenched, do not continue with the installation. Transport it to a safe isolation point and promptly apply for spare part replacement.
- 13) Ensure no direct sunlight or rain exposure, dry and well-ventilated environment, clean surroundings, and absence of excessive infrared radiation, organic solvents, or corrosive gases.

2.17.4 Recharging Requirements

- 1) If it has been more than 6 months since the last charge, the battery needs to be recharged. Failure to recharge as required may affect the battery's performance and lifespan.
- 2) Consult a Yotai service engineer for the production completion time of the battery pack.
- 3) Before installing the battery pack, check for any abnormalities. Abnormalities in the battery pack include significant deformation or damage to the outer shell, total positive to total negative voltage being approximately 0V, or impedance from the positive or negative ears to the ground being less than 50k Ω .

2.17.5 Battery Installation Requirements

- 1) Please use the specified model of the battery. Using non-specified models may result in battery damage.
- 2) Before installing the battery, check that the packaging is intact. Do not use batteries with damaged packaging.
- 3) Batteries should be placed horizontally and secured.
- 4) During the installation of batteries, do not place installation tools or miscellaneous items on the batteries.
- 5) Pay attention to the positive and negative terminals during the installation process, and avoid short-circuiting the battery's terminals.
- 6) During installation, use a torque wrench to ensure terminal connections are tightened and regularly check for looseness.

2.17.6 Battery Short Circuit Protection

 DANGER	Short circuits in batteries can produce a large current instantaneously and release a significant amount of energy, potentially causing personal injury and property loss.
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- 1) When installing or maintaining batteries, use insulating tape to wrap exposed cable terminals on the battery.
- 2) Avoid foreign objects (such as conductive objects, screws, liquids, etc.) entering the battery and causing a short circuit.

2.17.7 Hazard and Toxicity Description

 DANGER	Hazard: Contact of battery terminals with other metals may cause heating or electrolyte leakage. The electrolyte is flammable; if it leaks, immediately move the battery away from the fire. Toxicity: Vapors produced by burning batteries may irritate the eyes, skin, and throat.
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2.17.8 Battery Anomaly Handling Measures

 DANGER	1) In case of electrolyte leakage or abnormal odors, avoid contact with the leaked liquid or gases. Non-professionals should not approach and must contact professionals immediately. Professionals should wear protective goggles, rubber gloves, gas masks, protective clothing, etc., to prevent harm caused by electrolyte spillage. 2) The electrolyte is corrosive and can cause skin irritation and chemical burns upon contact. If contact with battery electrolyte occurs, take the following measures: 3) Inhalation: Evacuate the contaminated area, inhale fresh air immediately, and seek medical help. 4) Eye Contact: Immediately rinse eyes with plenty of water for at least 15 minutes without rubbing, and seek medical help. 5) Skin Contact: Immediately wash the contact area with plenty of water and soap, and seek medical help. 6) Ingestion: Seek medical help immediately.
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2.17.9 In Case of Battery Drop

- 1) After a battery drop (with or without packaging), if there are no obvious deformations or damages and no obvious odors, smoke, or fire, proceed with caution.

- 2) In a warehouse: Evacuate personnel, use mechanical tools by professionals to transport the battery to a safe open space, and contact a Yotai service engineer. Leave the battery stationary for 1 hour and monitor the temperature within $\pm 10^{\circ}\text{C}$ of room temperature before handling.
- 3) At the ESS site: Evacuate personnel, close the ESS door, use mechanical tools by professionals to transport the battery to a safe open space, and contact a Yotai service engineer. Leave the battery stationary for 1 hour before handling.
- 4) If a battery drop results in obvious odors, damage, smoke, or fire, immediately evacuate personnel, contact professionals, report the incident, and extinguish the fire with fire-fighting equipment by professionals ensuring safety.
- 5) After a battery has fallen, it is prohibited to continue use. Please contact our company's service engineer for assessment.

2.17.10 Maintenance and Replacement

- 1) Before removing components from the cabinet, please ensure that other components on the cabinet are not loose or pose safety hazards.
- 2) When performing maintenance on the ESS, there must be two or more personnel present at the site.
- 3) During equipment maintenance, insulated materials should be used to cover nearby energized components.
- 4) Opening the cabinet is prohibited during adverse weather conditions such as rain, snow, lightning, sandstorms, heavy fog, etc.
- 5) Before the fans are powered off or stopped, it is prohibited to touch the running fans with fingers, components, screws, tools, or circuit boards.
- 6) Do not power on the equipment before troubleshooting.
- 7) When conducting live inspections of the system, pay attention to the danger warning signs on the equipment and avoid standing at the energy storage cabinet door.
- 8) After de-energizing equipment other than battery packs, wait for 15 minutes to ensure that the equipment is completely de-energized before performing any operations on the equipment.
- 9) Switches that need to be disconnected for maintenance must have conspicuous labels affixed to them.
- 10) After replacing power components of the ESS or changing connections, manual initiation of connection testing and topology recognition is required to prevent abnormal system operation.
- 11) After completing maintenance and replacement procedures, promptly lock the battery cabinet door and securely store the key.

3 Product Introduction

3.1 Product Overview

The PV&ESS All-in-one Smart Distributed ESS Cabinet (referred to as "PV&ESS All-in-one Cabinet") is a new type of electric energy management system that integrates PV, mains grid power sources, energy storage, and load . It goes beyond simple modular stacking, ensuring reliable and efficient electricity consumption for users while contributing to stable power supply for local public grids and enhancing overall power quality. Additionally, it aids in reducing the need for grid expansion and alleviating hardware investments in local power supply systems.

The product system adopts a modular design, with individual modules for Power Conversion System (PCS), PV (PV) capacity, ESS capacity, energy management system (EMS), fire protection system, air conditioning insulation system, and combustible gas emission system. This modular approach allows each component to operate optimally, leveraging their respective advantages.

- The Power Conversion System (PCS) provides a stable and reliable power source for loads. Using advanced technology, it integrates solar power, grid electricity, and energy storage batteries to supply power to loads.
- PV (PV) technology collects clean solar energy, which is then transmitted to users (loads) through the PCS. In the long term, this provides users with a reliable source of clean energy while also reducing electricity costs.
- ESS batteries provide users with a continuous and reliable power source, particularly in situations requiring uninterrupted power supply. They also help in smoothing peak power demand and reducing overall power consumption.
- The energy management system (EMS), employing advanced smart algorithms, optimizes the sources of electricity for users, enhancing the economic efficiency of power consumption and ensuring reliable power supply.
- The fire protection system ensures the safety of the product itself and can be integrated with the user's fire protection system for a comprehensive fire protection solution.
- The air conditioning insulation system precisely controls battery temperature, extending battery lifespan and enhancing battery power supply.
- The combustible gas emission system releases gases produced during battery charging and discharging outside, reducing gas concentration inside and minimizing the risk of combustion and explosion.

Through a well-designed configuration of Power Conversion System (PCS), PV capacity, and ESS capacity, the system can operate both connected to the grid (leveraging peak and off-peak electricity price differentials) and off-grid (in areas with unreliable or no grid power).

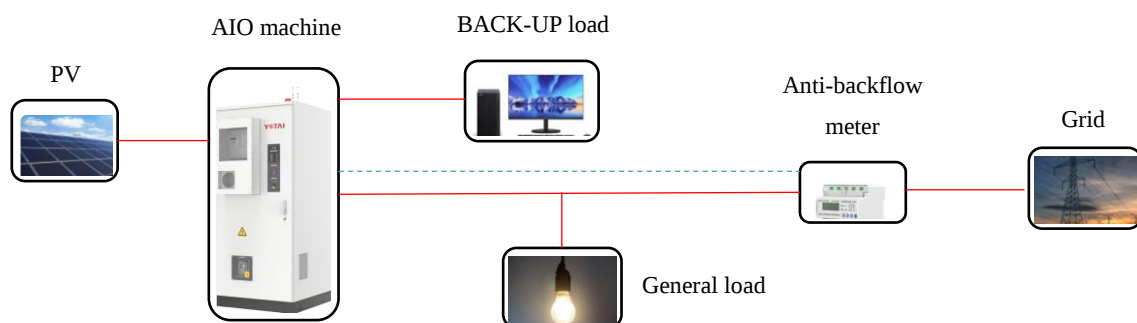


Figure 3.1-1 General Applications

3.2 Model Specification

This document mainly involves the following product models:

TY-DS5T103-PV050-B02

Number description

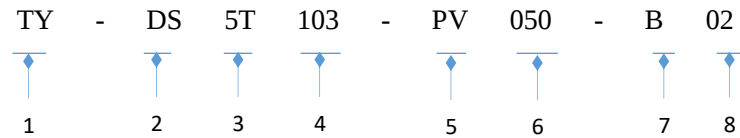


Table 3.2-1 Product Numbering Method Description

S/N	Name	Content
1	Company name: YT	YOTAI Digital Energy Technology (Shenzhen) Co., Ltd.
2	Product type: DS	Industrial and commercial ESS product
3	System topology: 5T	1T: Low-voltage centralized 2T: Distributed type 3T: Intelligent string type 4T: DCDC + string type 5T: Integrated design 6T: High-voltage cascade
4	Battery capacity: 103	Nominal battery capacity: 103kWh
5	PCS composition: PV	Spaces indicate no PCS P represents pure conversion system (PCS) PV represents PV&ESS All-in-one cabinet PVW represents PV&ESS&Wind All-in-one cabinet
6	Power of PCS: 050	Nominal power of PCS: 50kW
7	Design standard: B	A: Chinese standards B: European standards C: American standards
8	Design version number: 02	Design of the second edition

Table 3.2-2 Product Specifications and Parameters

Product Model	YT-DS5T103-PV050-B02
PV Parameters	
Max. input power	50kW
Start-up voltage	200V
PV rated voltage	620Vdc
MPPT operating voltage range	200-850Vdc*1
MPPT Qty	4
Qty. of single MPPT input channels	2
Max. input current (each MPPT)	30A×4
Max. short circuit current (each MPPT)	40A×4
DC-side ESS Parameters	
Nominal capacity	103kWh
Nominal voltage	690Vdc
Battery voltage range	605~777 Vdc
Rated charge/discharge current	75A
Max. charge/discharge current	90A
AC Parameters	
Rated output power	50kW
Rated input power	50kW
Max. output current	75A
Rated voltage (input&output)	3L/N/PE; 400V
Grid-connect/off-grid switch time	<20ms
Grid frequency	50Hz/60Hz
Total voltage harmonic distortion	<3%@rated power & linear load
Mechanical Parameters	
Weight	Net weight 1480kg, gross weight with packaging 1570kg
Outer dimensions	960×1650×2245 (W×D×Hmm)
Packing dimensions	1030×1720×2400 (W×D×Hmm)
Communication mode	RS485, Ethernet, 4G
Environment Parameters	
Operating temperature	-20℃~50℃ (>45℃ derating)
Storage temperature	-20℃~45℃
Relative humidity	5~95%RH, no condensing
Altitude	3000m (>2000m derating)
Protection rating	IP54

Note:

*1. When the open-circuit voltage of the PV module is greater than 850V, the inverter will automatically protect and enter standby mode; when the open-circuit voltage is greater than 1000V, the inverter may be damaged.

3.3 Product Composition

This product is a smart microgrid system that intelligently regulates the distribution of multiple sources and loads.

The overall design is housed in a comprehensive cabinet containing 9 battery packs, a high-voltage tank, BMS, EMS, air conditioning system, fire protection system, and one 50 kW PV&ESS inverter.



Figure 3.3-1 PV&ESS All-in-One Cabinet

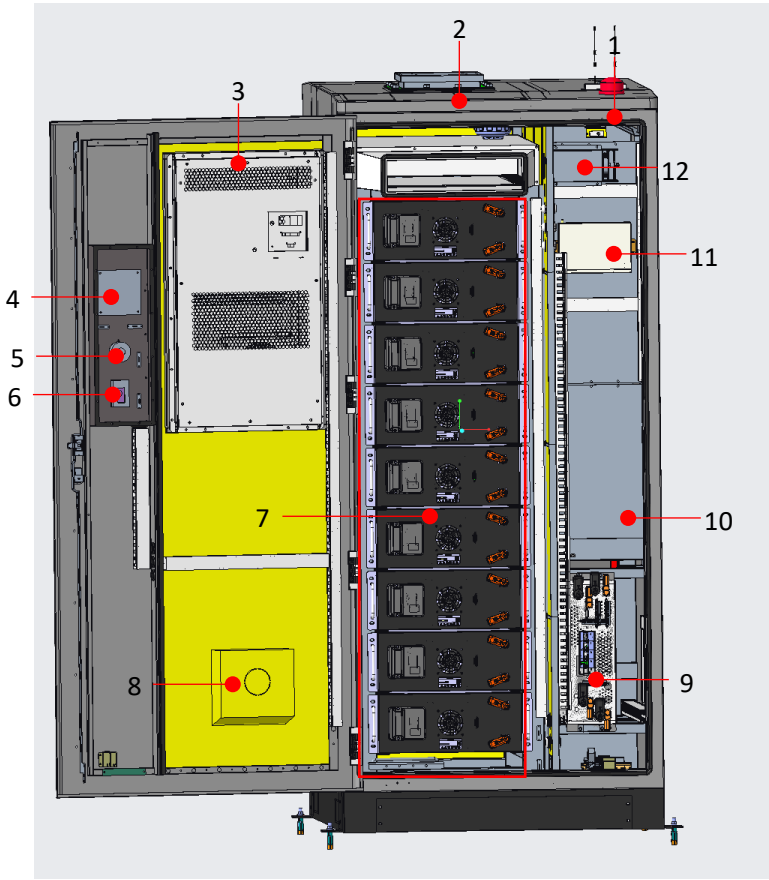


Figure 3.3-2 Interval Layout 1 of PV&ESS All-in-One Cabinet

- | | | |
|-----------------------------|--------------------------|-----------------------------|
| 1. Audible and visual alarm | 5. Emergency stop switch | 9. High-voltage tank |
| 2. Blast relief panel | 6. Fire button | 10. Fire system main engine |
| 3. Air conditioner | 7. Battery (PACK) | 11. EMS |
| 4. Lamp panel | 8. Water fire interface | 12. Paralleling EMS |

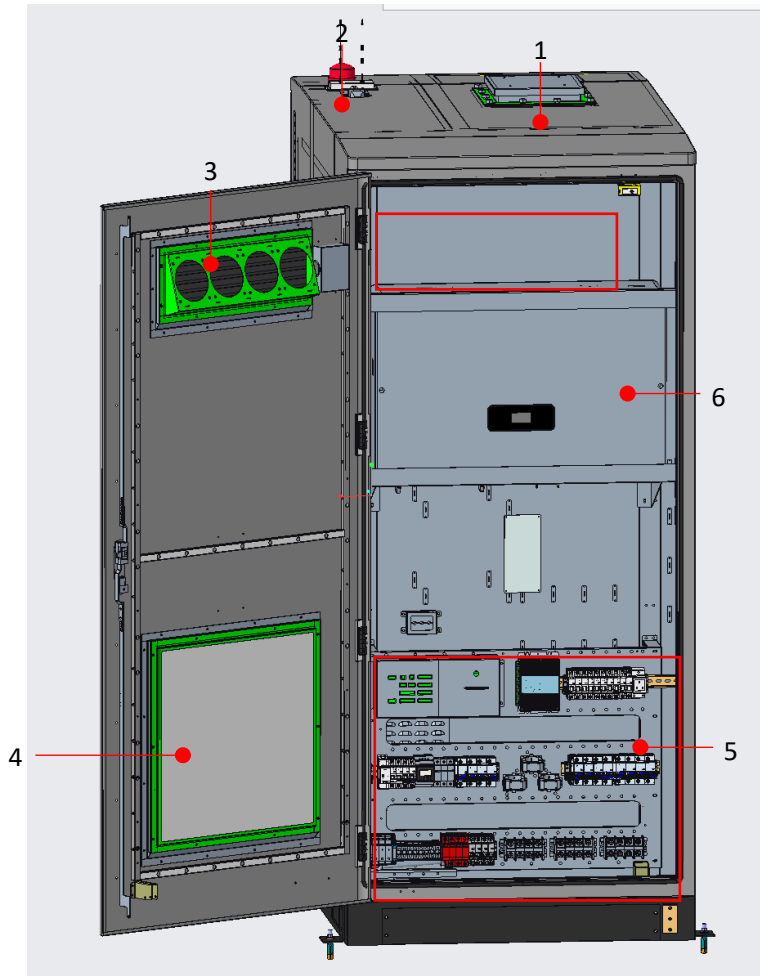


Figure 3.3-3 Interval Layout 2 of PV&ESS All-in-One Cabinet

- | | | |
|-----------------------------|----------------|--------------------------|
| 1. Blast relief panel | 3. Cooling fan | 5. Distribution district |
| 2. Audible and visual alarm | 4. Air inlet | 6. Hybrid inverter |

3.3.1 Battery PACK

Note:

When the battery module needs to be stored for an extended period, charge the battery module to a battery level between 15% and 40%. Perform a standard charging and discharging current cycle at least once a month, and activate with a low current (0.1C) every three months. Environment requirements: temperature 0 °C ~35 °C, relative humidity ≤60%, atmospheric pressure 86kPa~106kPa, placed in a dry, ventilated place, avoiding contact with corrosive substances, away from fire and heat sources.

After packaging, the battery module should be transported to prevent severe vibration, impact, or compression during transportation, and protected against exposure to sunlight and rain. Various transportation methods, such as automobiles, trains, ships, and aircraft, can be used.

The Battery PACK is composed of 24 cells, each with a capacity of 150Ah, along with one fan, one BMU, and structural and electrical components for cell support. The PACK integrates a temperature-controlled air duct, a dedicated channel for combustible gas emission, and other features. The rated capacity of the battery PACK is 11.52 kWh.

Table 3.3.1-1 Detailed Parameters of Battery PACK

S/N	Name	Specification
1	Nominal capacity	11.52kWh
2	Rated voltage	76.8V
3	Maximum charging voltage	86.4V
4	Minimum discharge voltage	67.2V
5	External dimensions	L*W*H (mm) (857.5±2*428±2*176±2)

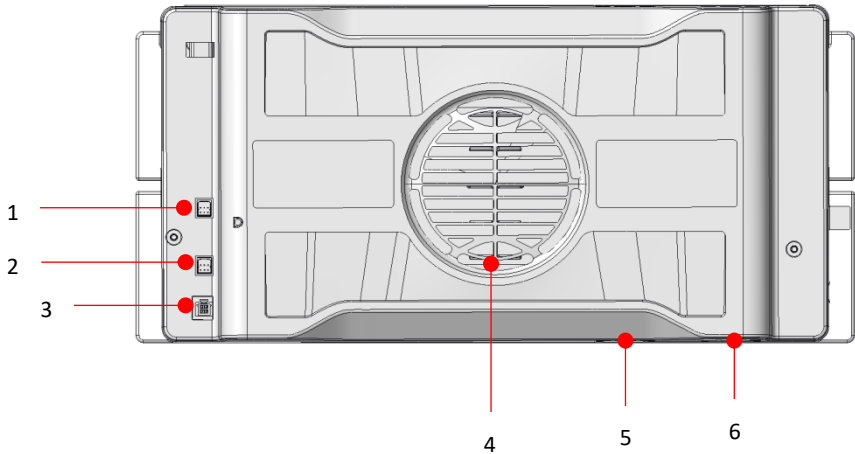


Figure 3.3.1-1 Battery Pack Appearance View

- (1) Daisy Chain J4 Terminal
- (2) Daisy Chain J3 Terminal
- (3) Fan Power Terminal
- (4) Fan
- (5) Battery Output Leads
- (6) Battery Output Leads

Table 3.3.1-2 Battery PACK Pin Definitions

Type	Port	Pin	Function
	J3, J4	2 (J3, J4 Ports, view wire end)	Battery RS485-A, Red Wire
		3	Daisy Chain IP, Blue Wire
		5	Battery RS485-B, Brown Wire
		6	Daisy Chain IM, Black Wire
	Power Terminal	1 (Power Terminal, view wire end)	Fan Power Negative, Black Wire
		2	Fan Power Positive, Red Wire

3.3.2 High-Voltage Tank

The high-voltage tank is the control part of the entire battery pack, responsible for main circuit interruption control and safe management of the charging and discharging processes of the battery clusters to ensure the safe, reliable,

and stable operation of the battery. Its interior mainly consists of pre-charge resistor, fuse, DC contactor, shell, and other components. The specifications of the high-voltage tank are shown in the table below.

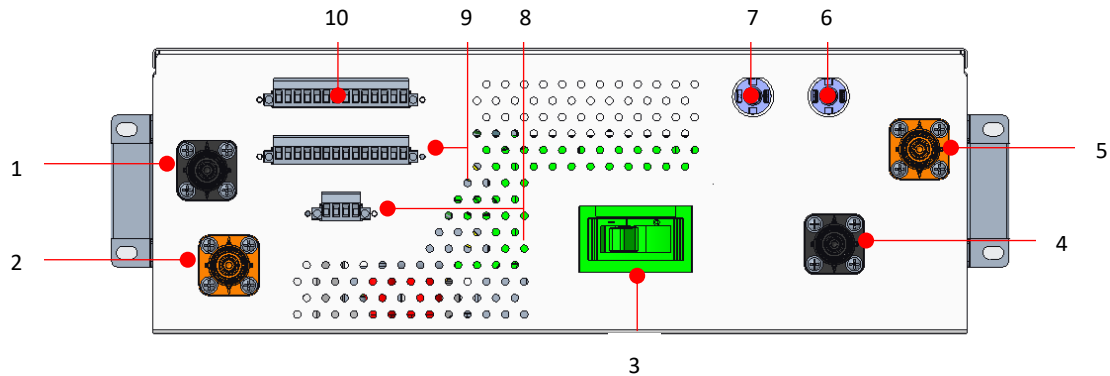


Figure 3.3.2-1 Appearance of High-Voltage Tank

- | | | |
|-------------------------------|-----------------------------------|------------------|
| (1) PCS negative terminal | (5) Battery positive terminal | (9) X4 terminal |
| (2) PCS positive terminal | (6) Black start positive terminal | (10) X1 terminal |
| (3) Main switch | (7) Black start negative terminal | |
| (4) Battery negative terminal | (8) X2 terminal | |

Table 3.3.2-1 High-Voltage Tank Functions

Type	Pin	Function
Battery input	B+	Connect positive terminal of the battery cluster
	B-	Connect negative terminal of the battery cluster
Battery output	P+	Connect PCS positive terminal
	P-	Connect PCS negative terminal
Black start	VIN+	Connect to the black start power module+ (there is a fuse in the VIN end)
	VIN-	Connect to the black start power module- (there is a fuse in the VIN end)
X1 terminal	CANH, CANL	Debugging port
	24V+, 24V-	High-voltage tank power supply
	CAN2H, CAN2L	Connect the master control unit
X2 terminal	RS485A1, RS485B1	Battery cluster RS485 communication
	A2, B2	Reserved
	A3, B3	Reserved
X4 terminal	IP1, IM1	Battery cluster daisy chain head
	IP2, IM2	Battery cluster daisy chain tail

Table 3.3.2-2 High-Voltage Tank Parameters

S/N	Name	Specification
1	Maximum voltage [Vdc]	1000
2	Rated current [A]	100
3	Maximum current [A]	125
4	Communication interface	CAN (connect to the master control unit), RS485-1 battery cluster, daisy chain

3.3.3 BMS - Battery Management System

The BMS system of this product adopts a two-level architecture, mainly used for real-time monitoring of battery packs. It can detect the battery cell voltage, voltage, current, temperature, etc., and judge the operating status of the battery in real time. It can upload battery pack status information and alarm information, and if necessary, cut off the output of the battery pack circuit for protection.

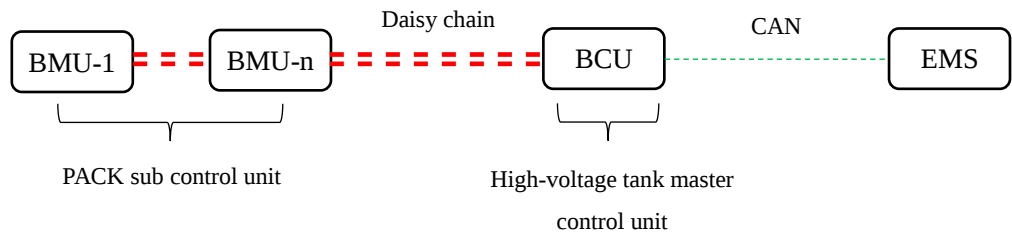


Figure 3.3.3-1 BMS Dual-Level Architecture Diagram

3.3.4 PV&ESS Inverter

The inverter used in this product is a three-phase on/off-grid ESS inverter suitable for energy management in PV, battery, load, and grid systems.

The electricity generated from the PV battery panels is used for load consumption, and excess electricity can be stored in the battery. When the battery is fully charged, surplus electricity can be fed back to the grid.

If the electricity generated by the PV system is insufficient to meet the load demand, the battery will discharge to supply the load. If the energy stored in the battery is insufficient, the grid will supplement the power supply to the load through the system.

Note:
If the inverter needs maintenance, please contact our customer service staff or the corresponding after-sales service staff.
During the operation of the inverter, the temperature of some components may exceed 60 °C. Do not touch the inverter during operation to avoid burns;
When photovoltaic modules are exposed to sunlight, the output wires of the PV module array have high voltage DC, and attention should be paid to it when connecting them.
When connecting the lithium battery wires, please disconnect the battery end circuit breaker or switch first to avoid personal injury caused by high voltage

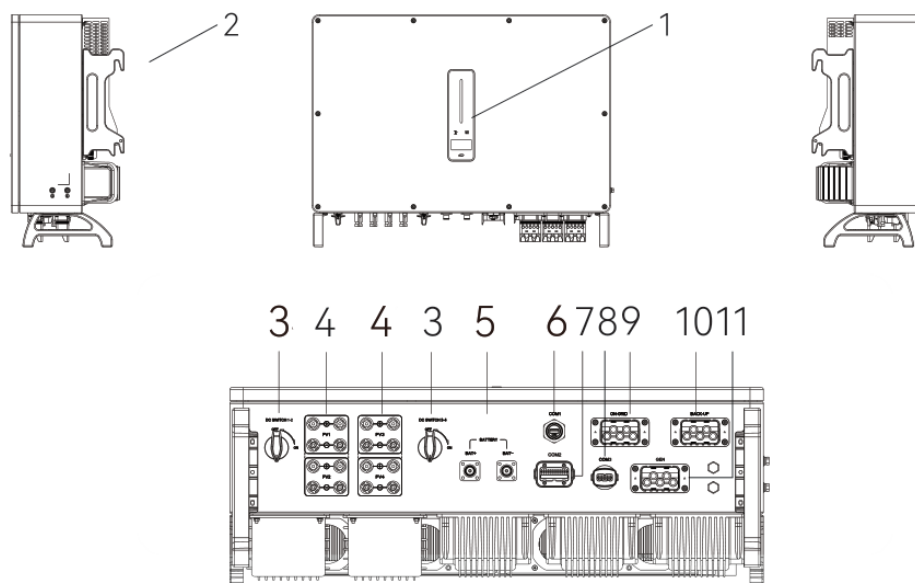


Figure 3.3.4-1 Inverter Appearance

Table 3.3.4-1 Inverter Parameters

S/N	Name	Item	Specification
1	PV access	PV input voltage (V)	135-850/620
		Max. input power of PV (kW)	18.75*4
		Max. input current of PV (A)	40*4
2	Battery access	Input voltage (V)	135-750
		Charge/discharge current (A)	<100
3	Mains input	Voltage (V)	3L/N/PE 220/380V; 230/400V
		Power (kW)	Rated 50 (max. 55)
		Frequency (Hz)	50/60
		Power factor	-0.8~0.8
4	Load output	Voltage (V)	3L/N/PE 220/380V; 230/400V
		Power (kW)	Rated 50
		Frequency (Hz)	50/60
		Power factor	-0.8~0.8
5	Diesel generator access *	Voltage (V)	3L/N/PE 220/380V; 230/400V
		Power (kW)	Rated 50
		Frequency (Hz)	50/60
		Power factor	-0.8~0.8

*The PV&ESS diesel generator model is applicable to this instruction this item.

Table 3.3.4-2 Inverter Functions

S/N	Pin, port	Function
1	Display panel and LED panel	Display the operation information and working status of the inverter
2	Hook	Inverter mounting bracket
3	DC switch	Used for safely disconnecting the DC circuit
4	DC input terminal	PV Access
5	Battery input terminal	Battery access
6	COM1 port	WIFI, LAN and 4G module interfaces
7	COM2 port	Electricity meter, BMS, RS485, DRED, and DO interfaces
8	COM3 port	DO/0-10V AO/4-20mA AO interface
9	Grid-connected output terminal	Used for connecting output cables at the grid connection end
10	Standby-end output terminal	Used for connecting output cables at the standby end
11	Generator input terminal	Generator connector

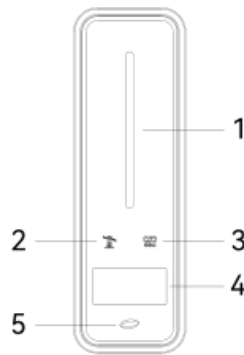


Figure 3.3.4-2 Inverter Display Panel

Table 3.3.4-3 Inverter Functions

S/N	Name	Status		Function
1	Power and alarm indicator light	Off		No power supply
		Blue	Fast flashing	The inverter enters self-check mode
			Slow flashing	The inverter enters wait mode
			Breathing flashing	The inverter is running properly
		Orange	Breathing flashing	Low battery warning, battery level is about to reach SOC protection value
		Red	Normally on	An alarm or fault is detected, and the fault information can be viewed on the display screen
2	Grid indicator light	Off		Power grid loss
		Slow flashing		The inverter detects the power grid, but is not running in grid-connected mode
		Normally on		The inverter operates in grid-connected mode
3	AC indicator light	Green	Normally on	Inverter communication is normal
		Green	Flashing	Inverter AC terminal and EMS or RS485 or CAN-controlled inverter
		Orange	Normally on	Abnormal communication between inverter and smart electricity meter
		Red	Normally on	Abnormal communication between inverter and BMS
4	Display	The display screen is off (enter power-saving mode); press the button to wake up the display screen		
5	Button	Press or press and hold the button to switch between display information and set parameters		

3.3.5 Fire Suppression System

The product provides perfluorohexane and aerosol two fire extinguishing devices. The equipment you purchased is one of them. Please verify which type of fire extinguishing device the equipment is.

Note:
Fire gas spraying can do harm to human health. Whenever fire gas spraying occurs, personnel must stay away from it
Fire sensors are used to detect temperature and smoke, and should be kept away from high temperatures, dense smoke, and other places during maintenance to avoid accidental fire gas spraying
When the fire suppression system is powered off, please maintain it in a timely manner, in case that the fire suppression system fails to work.
If necessary, manually control the fire suppression system to spray fire gas (manual spray switch on the door panel).

3.3.5.1 Perfluorohexane

3.3.5.1.1 Fire Alarm Control Unit

Perfluorohexane agent fire protection, with a fire suppression accuracy at the chamber level (optional PACK-level fire protection);

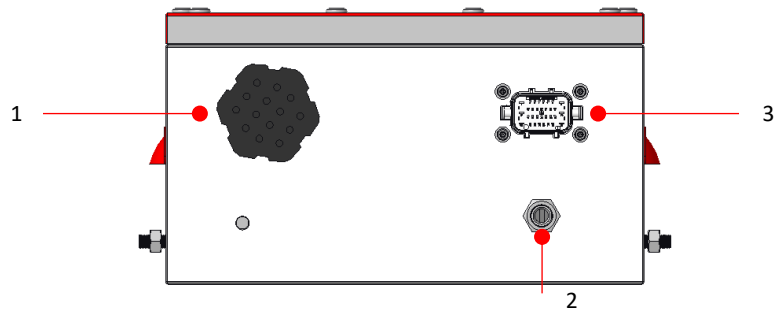


Figure 3.3.5-1 Fire Alarm Control Panel Interface

(1) Moisture-proof air vent

(2) Spray interface

(3) Electrical connection port

Table 3.3.5-1 Fire Alarm Control Unit Function List

S/N	Name	Port		Function
3	Electrical interface	Alarm start switch	5V+ (red line)	5V power supply+
			Green light (green line)	Green indicator light (in sleep mode (powered by battery), low battery capacity)
			Key (white line)	Connect the key (press and hold for 1 second, to perform one-click start)
			Fault (yellow line 1)	Fault indicator light (early warning yellow light flashes, with a cycle of 3s, continuously on for 0.2s)
			Early warning (yellow line 2)	Early warning indicator light (early warning yellow light flashes, with a cycle of 3s, continuously on for 0.2s)
			Red light (red line)	Red indicator light
			5V power supply-	5V power supply-
		CAN	CAN2H (yellow)	Connect EMS
			CAN2L (green)	
		Compound detector	CANH	Connect to the composite detector (cabinet); detect temperature, smoke concentration, and combustible gas concentration
			CANL	
			VCC	
			GND	
			EM-	Start-
			EM+	Start+
		Audible and visual alarm apparatus		
2	Spray interface	Connect the spray pipe		
1	Air vent	Moisture-proofing and ventilating inside the box		

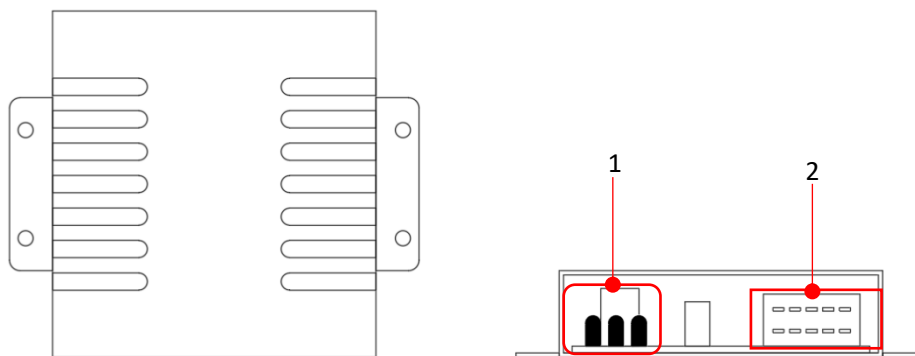


Figure 3.3.5-2 Detector

(1) Indicator lights

(2) Electrical interfaces

Table 3.3.5-2 Detector Functions

S/N	Item	Ports and parameters	Function
1	Indicator lights	Red light	Normally on when an alarm occurs
		Yellow light	Normally on when a fault occurs
		Green light	Normally on during hydrogen preheating, flashing after preheating, with a frequency of 1Hz
2	Electrical ports	1: EM+	The output of the sub-control valve is positive
		2: COUT	Serial encoding output
		3: CIN	Serial encoding input
		4: CANH	CAN high
		5: CANL	CAN low
		6: GND	The output of the sub-control valve is negative
		7: PWR-	Power supply negative
		8: PWR+	Power supply +
		The numbers from left to right in the view is 1, 2,..., 7, 8	

Table 3.3.5-3 Detector Parameters

S/N	Item	Specification
1	Input voltage	24VDC (20V-28V)
2	Rated power	$\leq 0.6W$
3	Gas alarm threshold (hydrogen)	200ppm (electrochemical detection)
4	Smoke alarm threshold	0.12dB/m (infrared photoelectric type)
5	Temperature alarm threshold	77 °C (thermistor NTC)

3.3.5.1.2 Alarm Start Switch

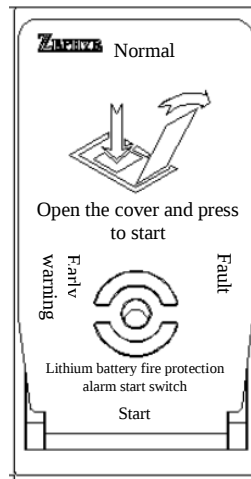


Figure 3.3.5-3 Alarm Start Switch

3.3.5.2 Aerosol Fire Suppression System

3.3.5.2.1 Aerosol Fire Extinguisher

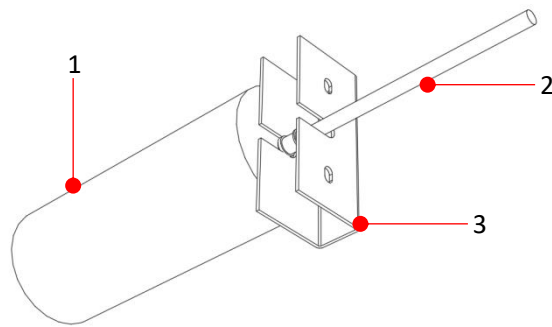


Figure 3.3.5-4 Aerosol Fire Extinguisher

(1) Aerosol

(2) Nozzle

(3) Mounting bracket and control

Table 3.3.5-4 Aerosol Fire Extinguisher Parameters

S/N	Item	Specification
1	Start mode	Electric start
2	Rated current of electric initiator	2A/5ms
3	Name and content of oxidant	Potassium nitrate 59~69%
4	Shelf life	15 years
5	Dimension & weight	Φ76*192mm+180mm; 2.3kg

3.3.5.2.2 Temperature detector



Figure 3.3.5-5 Temperature Detector

Table 3.3.5-5 Temperature Detector

S/N	Item	Specification
1	Operating temperature/output characteristics	50 °C/relay dry contact output
2	Supply voltage	9-33V
3	Operating current	Standby 45μA, alarm 52mA
4	Operating temperature / humidity	-20°C~+50°C/0%~95%RH
5	Dimension & weight	Φ100*42mm; 80g

3.3.5.2.3 Smoke detection



Figure 3.3.5-6 Smoke Detector

Table 3.3.5-6 Smoke Detector Parameters

S/N	Item	Specification
1	Threshold/output characteristics	0.15dB/m (EN 54-7)/relay dry contact output
2	Supply voltage	9-33V
3	Operating current	Standby 30-50μA, alarm 52mA
4	Operating temperature / humidity	-20°C~+60°C/0%~95%RH
5	Dimension & weight	Φ100*42mm; 99g

3.3.5.2.4 Combustible Gas Detector

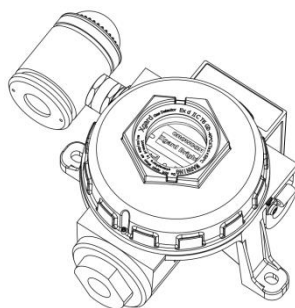


Figure 3.3.5-7 Combustible Gas Detector

Table 3.3.5-7 Combustible Gas Detector

S/N	Item	Specification
1	Supply voltage	10-30V
2	Power consumption	$\leq 3W$
3	Display	High-brightness OLED
4	Alarm output	Relay output: Level 1, Level 2, fault; audible and visual alarm
5	Communication	RS485
6	Sensor type	Electrochemical/Catalytic combustion/PID/Infrared
7	Harmful gas detection	Toxic gas, oxygen, flammable gas
8	Dimension & weight	H156*w166*d111; 1kg

3.3.5.3 Audible and Visual Alarm Apparatus

Perfluorohexane and aerosol share one set of audible and visual alarm apparatus.

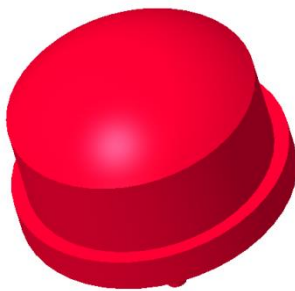


Figure 3.3.5-8 Audible and Visual Alarm Apparatus

Table 3.3.5-8 Audible and Visual Alarm Apparatus Parameters

S/N	Item	Ports and parameters	Function
1	Power supply	Red line	DC power supply +5V
		Black line	DC power supply 0V
2	Audible alarm	Sound pressure level	75dB~95dB (3 meters in front)
3	Light warning	Flash rate	1Hz~1.5Hz
4	Modulation period	1 second~3 seconds	

3.3.6 Air Conditioner

Note:
The air conditioner inlet and outlet should be regularly maintained to prevent the air vent blockage and air conditioner failure.
The air conditioner outlet should be properly guided to prevent the condensate water from floating randomly
There is a risk of water leakage at the contact surface between the air conditioner and the cabinet door. During maintenance, observe the adhesive strip (whether the structural adhesive is damaged)
The air conditioner uses Ac power supply, so please pay attention to the risk of electric shock.

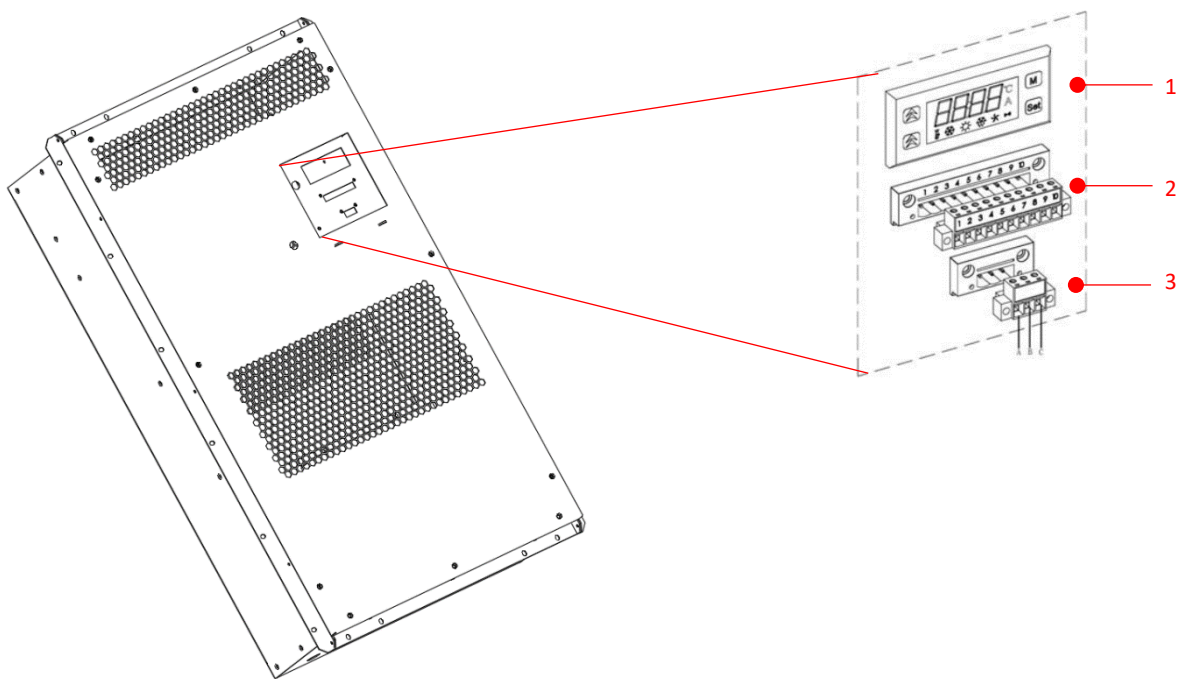


Figure 3.3.6-1 Air Conditioner View

(1) Display panel (2) Signal terminal (3) Power terminal

Table 3.3.6-1 Air Conditioner Parameters

S/N	Item	Specification
1	Input Voltage (VAC)	220
2	Frequency (Hz)	50/60
3	Refrigerating capacity (kW)	2
4	Refrigerating power (kW)	0.87
5	Refrigerating power (kW)	1
6	Overall dimensions / weight	479*200*833mm/38kg

Table 3.3.6-2 Air Conditioner Panel Parameters

S/N	Name	Port, status	Function
1	Display panel		Flashing indicates that the air conditioner is in self-check or temperature setting state.
			Flashing indicates that the air conditioner is about to refrigerate; normally on indicates that the air conditioner is refrigerating.
			Normally on indicates that the air conditioner is heating.
			Normally on indicates that the external fan is running.
			Flashing indicates an alarm has occurred.
2	Signal terminal	1: TR/+	RS485 communication A
		2: TR/-	RS485 communication B
		Others	Reserved
3	Power terminal	L	AC power live wire
		N	AC power neutral line
		PE	AC power grounding wire

3.3.7 Combustible Gas Exhaust Fan

Note:
The air outlet of the exhaust fan should be regularly maintained to avoid blockage and exhaust failure.
There is a risk of water leakage at the contact surface between the exhaust fan and the cabinet. During maintenance, observe the adhesive strip (whether the structural adhesive is damaged)
During routine inspection, press and hold the inspection button for more than 10 seconds and observe the operation of the exhaust fan

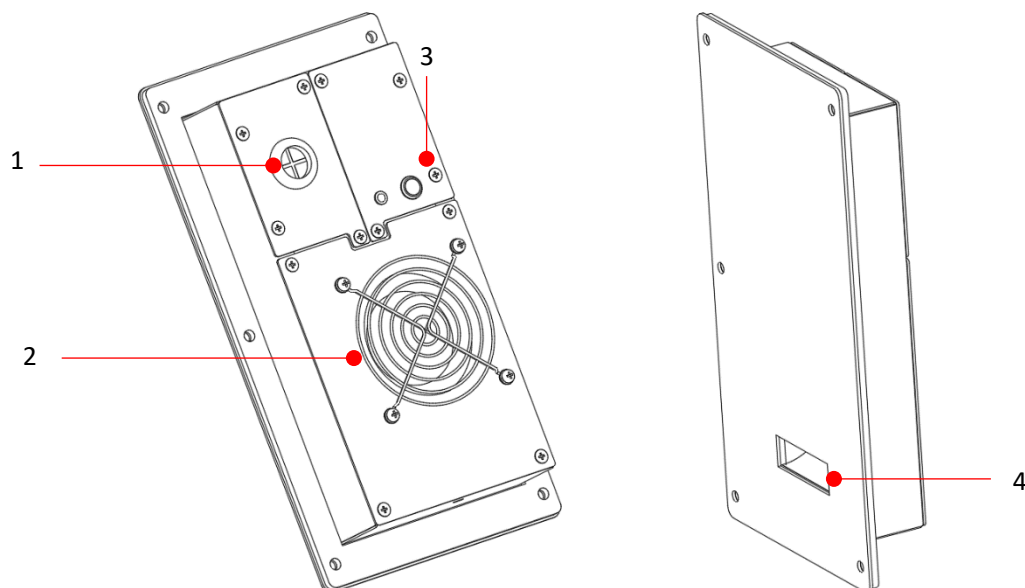


Figure 3.3.7-1 Combustible Gas Exhaust Fan

- | | |
|-------------------------------------|---|
| (1) Incoming and outgoing line hole | (3) Inspection button and indicator light |
| (2) Exhaust fan | (4) Air outlet |

Table 3.3.7-1 Combustible Gas Exhaust Fan Parameters

S/N	Item	Specification
1	Input voltage (VDC)	24
2	Input current (A)	1.9
3	Exhaust air volume	54CFM
4	Overall dimensions / weight	320*170*19.5mm/2.5kg

Table 3.3.7-2 Combustible Gas Exhaust Fan Functions

S/N	Name	Port	Function
1	Button Indicator lights	Button	Press and hold the inspection button for 10 seconds, and observe the operation of the fan
		Indicator lights	Normally on, power indicator
			Flashing, indicating the system is running normally
2	Fan control board	24V, GND (24VD, GND)	Power input terminal
		+, - (OS+, OS-)	Fan start control signal (switch signal)
		V, G (FB+, FB-)	Fan feedback signal (switch signal)

3.3.8 Cooling fan

3.3.8.1 Fan

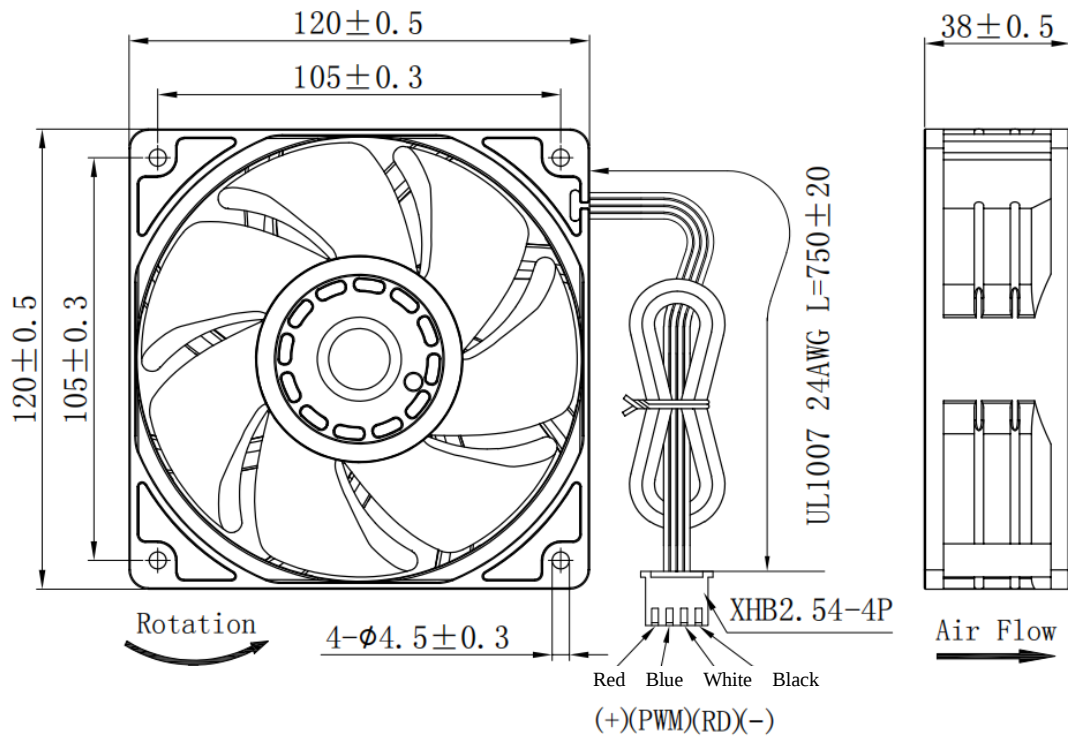


Figure 3.3.8-1 Fan View

Table 3.3.8-1 Fan Parameters

S/N	Item	Specification
1	Input voltage (VDC)	24
2	Input power (W)	17
3	Input current (A)	0.71
4	Outer dimensions	120*120*38mm

3.3.8.2 Fan Control Board

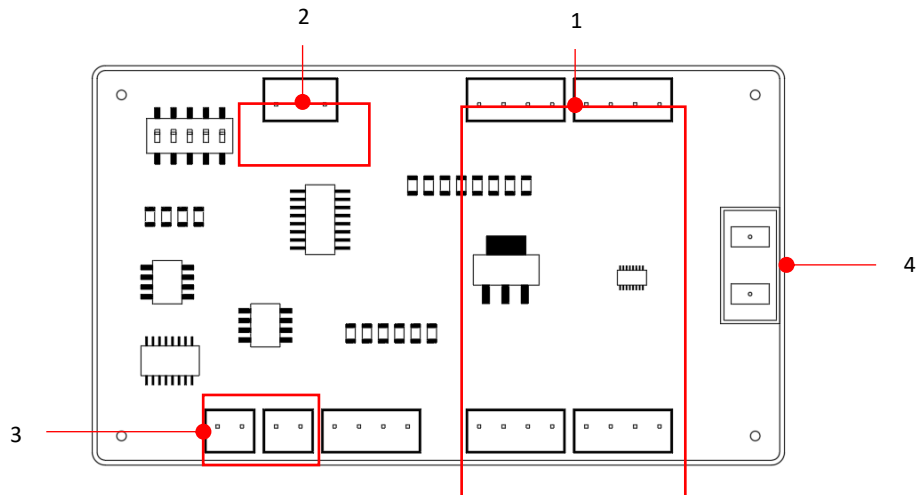


Figure 3.3.8-2 Fan Control Board

- (1) Fan interface (3) RS485 communication interface
 (2) Thermistor interface (4) Power interface

Table 3.3.8-2 Fan Control Board

S/N	Name	Port	Function
1	Fan interface	PWM	PWM wave interface (blue line)
		POW	Power+ (red line)
		FB	Feedback signal (white line)
		GND	Power- (black line)
2	Thermistor interface	TEM1	Connect the thermistor
		COM	Common terminal
		TEM2	Reserved
3	Communication interface	J1-RS485A	Connected the EMS
		J1-RS485B	Connected the EMS
		J2-RS485A	Reserved
		J2-RS485B	Reserved
4	Power interface	12V/24V	Connect 12V/24V power supply+
		GND	Power supply-

3.3.9 EMS

The Energy Management System (EMS) is the energy dispatching and management center of the PV storage system.

Through real-time communication with the BMS (Battery Management System), PV&ESS inverter, circuit energy meter, manageable loads, and peripheral devices (air conditioning, fire protection), it collects critical data from all communication substations. Through data collection, processing, analysis, internal program logic operation, it controls the orderly and robust operation of the ESS. The EMS used in this product possesses powerful data processing capabilities, is compatible with multiple communication protocols, can quickly interface with BMS and PCS available on the market, and supports remote servicing.

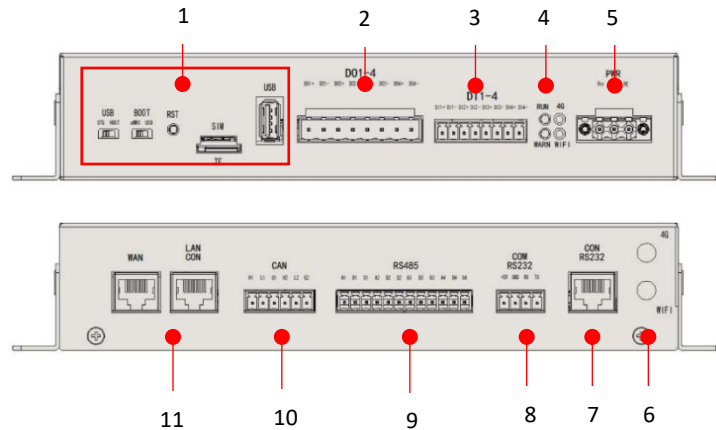


Figure 3.3.9-1 EMS Interfaces

- | | | |
|---------------------|-----------------------|---------------|
| (1) Debugging area | (5) Power interface | (9) RS485 |
| (2) DO interface | (6) Antenna interface | (10) CAN |
| (3) DI interface | (7) RS232 (RJ45) | (11) Ethernet |
| (4) Indicator light | (8) RS232 | |

Table 3.3.9-1 EMS Functions

S/N	Name	Port	Function
1	Debugging area	USB dip	USB debugging
		BOOT dip	EMS startup selection (USB mode, eMMS mode)
		RST	EMS restart
		SIM/TF	SIM/TF card slot
		USB slot	Connect USB
2	DO port	DO1	Reserved
		DO2	Combustible gas exhaust fan start control
		DO3	Black start switch shunt trip
		DO4	Reserved
3	DI port	DI1	Emergency stop switch input (normally closed contact)
		DI2	Auxiliary power switch input (normally closed contact)
		DI3	Black start power switch input (normally closed contact)
		DI4	Fire feedback signal
4	Indicator lights	RUN	Green running indicator light, with an alternating time of 1 second for the module to turn on and off during operation
		WAR.	Alarm indicator light, red when a fault alarm occurs, and off when normal
		4G	An alternating time of 1 second for the 4G running indicator light and green light to turn on and off
		WIFI	An alternating time of 1 second for the WIFI running indicator light and green

			light to turn on and off
5	Power access PWR	1. VCC	DC input positive terminal, 12V/24V
		2. GND	DC input negative terminal, 0V
		3. PE	Grounding is necessary for the reliable operation of the system
6	Antenna interface	4G	Connect 4G antenna
		WIFI	Connect WIFI antenna
7	RS232(RJ45)	RJ45 Interface	Used for debugging
8	RS232	RS232	Used for debugging
9	RS485	A1	Connect the light board and IO module
		B1	
		G1	
		A2	Anti-backflow meter (connected to signal lightning arrester)
		B2	
		G2	
		A3	Connect smart air conditioner
		B3	
		G3	
		A4	Connect PCS
		B4	
		G4	
10	CAN	H1	Connect PCS and BCU (high-voltage tank)
		L1	
		G1	
		H2	Connect the fire alarm control panel
		L2	
		G2	
11	Ethernet	WAN	Connect the station control EMS or external communication (signal lightning protection)
		LAN	Connect lower-level equipment

3.3.10 I/O Hub Module

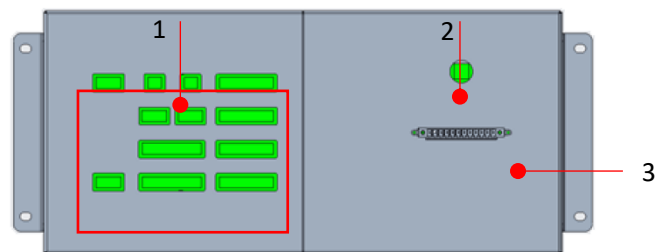


Figure 3.3.10-1 I/O Hub Module

(1) Power module

(2) Observation window

(3) I/O interface

Table 3.3.10-1 Hub Module Functions

S/N	Name	Port	No.	Function
1	Power module	J15, J16 24V+ common terminal	J15:1	Power module power supply positive -20
			J15:2	Power module power supply positive -21
			J15:3	Fan board power supply -24V+
			J15:4	Reserved
			J15:5	EMS power supply -VCC
			J15:6	QF12 shunt trip-C2
			J15:7	QF5 shunt trip-C2
			J15:8	Lamp panel power supply -24V+
			J15:9	Exhaust fan power supply -24V+
			J16:1	Terminal block X1-10
			J16:2	Fire control power supply -24V+
			J16:3	Water flooding power supply VCC-24V+
			J16:4	Reserved
			J16:5	Reserved
			J16:6	Reserved
			J16:7	Reserved
			J16:8	Reserved
			J16:9	Reserved
		J13, J14 Common terminal	J13:1	QF5 feedback signal auxiliary contact -14
			J13:2	SPD1 lightning protection feedback signal contact-COM
			J13:3	QF6 feedback signal auxiliary contact -14
			J13:4	Reserved
			J13:5	QF11 feedback signal auxiliary contact -14
			J13:6	
			J13:7	Water flooding switch feedback signal contact-ON
			J13:8	Access control contact-ON
			J13:9	Reserved
			J14:1	Reserved
			J14:2	Reserved
			J14:3	Reserved
			J14:4	Reserved
			J14:5	Reserved
			J14:6	Reserved
			J14:7	Reserved
			J14:8	Reserved
			J14:9	Reserved
		J3, J4 24V- common terminal	J3:1	Terminal block X1-11
			J3:2	Fire control power supply -24V-
			J3:3	Water flooding power supply GND
			J3:4	Reserved
			J3:5	Reserved
			J3:6	Reserved

			J3:7	Reserved
			J3:8	Reserved
			J3:9	Reserved
			J3:10	Reserved
			J4:1	Power module power supply negative-17
			J4:2	Power module power supply negative-18
			J4:3	Fan board power supply -24V-
			J4:4	Combustible gas exhaust fan -FB-
			J4:5	EMS power supply -GND
			J4:6	EMS module-DO3-
			J4:7	EMS module-DO4-
			J4:8	Lamp panel power supply -24V-
			J4:9	Exhaust fan power supply -24V-
			J4:10	Reserved
		J1, J10	485 extension	J1:485-1A is connected in parallel with J10: A1 and A2
				J1:485-1B is connected in parallel with J10: B1 and B2
		J11, J12	485 extension	J11:485-1A is connected in parallel with J12: A1 and A2
				J11:485-1B is connected in parallel with J12: B1 and B2
		Ground terminal	J2, J9	Eight terminals of J2:1-4 and J9:1-4 are connected in parallel
2	Observation window	Observe the running indicator light of the I/O module		
3	I/O interface	I/O module-1	1: RS485-A	I/O module RS485 communication-A
			2: RS485-B	I/O module RS485 communication-B
			3: DI8	Access control 2 feedback signal contact-C (high level indicates closed door state)
			4: DI7	Water flooding feedback signal contact-COM (high level indicates water flooding alarm)
			5: DI6	Combustible gas fan feedback signal-V (high level indicates fan fault)
			6: DI5	QF6 feedback signal auxiliary contact-11 (high level indicates closed state)
			7: DI4	Reserved
			8: DI3	Reserved
			9: DI2	SPD1 lightning protection feedback signal contact-NC (high level indicates normal lightning arrester)
			10: DI1	QF1 feedback signal auxiliary contact-11 (high level indicates closed state)
			11: COM-	
			12	Reserved

3.3.11 Lamp Panel Display

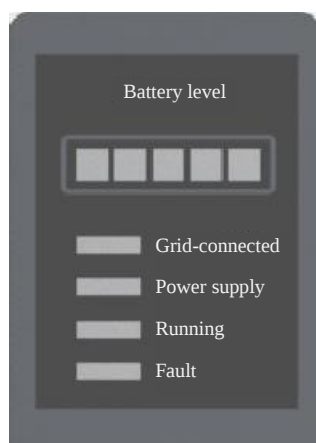


Figure 3.3.11-1 Lamp Panel

Table 3.3.11-1 Lamp Panel Information

S/N	Item	Specification
1	Battery level	1. Cycle to the right indicates charging, and static display indicates battery level percentage 2. Cycle to the left indicates discharging, and static display indicates battery level percentage
2	Grid-connected	Normally on indicates the mains access; flashing indicates discharge to the grid
3	Power supply	Indicates that the system is in standby or running mode
4	Running	Indicates that PCS is in running state
5	Fault	System fault display

Table 3.3.11-2 Lamp Panel Functions

S/N	Name	Port	Function
1	CN3	1:VCC	8V-24V DC power supply positive input
		2:GND	DC power negative pole
		3:NC	NC
		4:RS485-3A	RS485A communication (connected to EMS)
		5:RS485-3B	RS485B communication (connected to EMS)
2	J1	1	Connect a 120Ω matching resistor between terminals 1 and 2
		2	

3.3.12 Emergency Stop Switch

Note:
The emergency stop switch is only used in emergency situations
After the emergency stop switch is pressed, the system enters emergency stop mode and sends an alarm externally

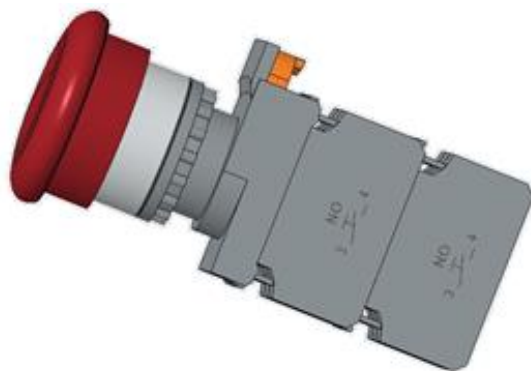


Figure 3.3.12-1 Emergency Stop Switch

Table 3.3.12-1 Emergency Stop Switch Functions

S/N	Name	Port	Function
1	Section 1	11 (normally closed contact)	EMS_DI1+
		12	EMS_DI1-
		13 (normally closed contact)	BCU_DI5+
		14	BCU_DI5-
2	Section 2	11 (normally open contact)	24V+
		12	Mains trip QF5_KA-C1
		13 (normally open contact)	24V+
		14	Diesel generator trip QF6_KA-C1

3.3.13 Power Distribution Area

3.3.13.1 DC Power Supply

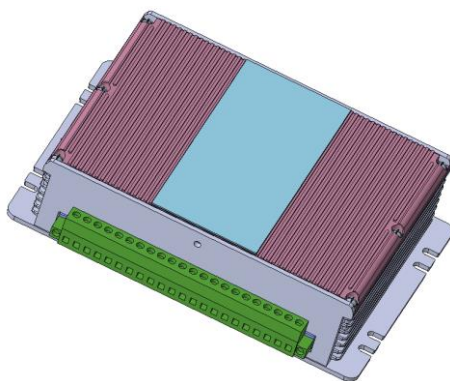


Figure 3.3.13-1 DC Power Supply

Table 3.3.13-1 DC Power Supply Wiring

S/N	Name	Port	Function
1	Input part	1: Vin+	Input power+, connecting the black start+
		2: NC	Reserved
		3: NC	Reserved
		4: Vin-	Input power-, connecting the black start-
		5: NC	Reserved
		6: NC	Reserved
2	Grounding	7: PE	Grounding
3	Output	8: NC	Reserved
		9: NC	Reserved
		10: NC	Reserved
		11: NC	Reserved
		12: NC	Reserved
		13: NC	Reserved
		14: NC	Reserved
		15: NC	Reserved
		16: Trim	Reserved
		17: VO-	I/O module hub J4-1
		18: VO-	I/O module hub J4-2
		19: VO-	Fan control board power interface GND
		20: VO+	I/O module hub J15-1
		21: VO+	I/O module hub J15-2
		22: VO+	Fan control board power interface 12V/24V

3.3.13.2 Electricity Meter

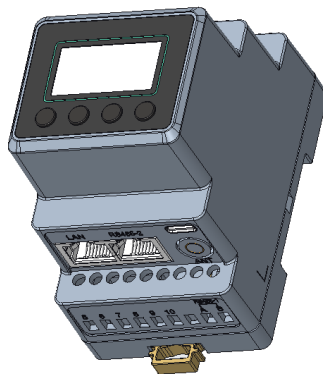


Figure 3.3.13-2 Electricity Meter

Table 3.3.13-2 Mains Electricity Meter Wiring

S/N	Name	Port	Function
1	Mains voltage input	1: L1	Connect the mains input L1 to the QF5 input terminal
		2: L2	Connect the mains input L2 to the QF5 input terminal
		3: L3	Connect the mains input L3 to the QF5 input terminal
		4: N	Connect the mains input N to the QF5 input terminal
2	Mains current input	5: CT1-L1*	Connect CT1-S2
		6: CT1-L1	Connect CT1-S1
		7: CT2-L2*	Connect CT2-S2
		8: CT2-L2	Connect CT2-S1
		9: CT3-L3*	Connect CT3-S2
		10: CT3-L3	Connect CT3-S1
3	Grounding	11: PE	Grounding
4	RS485 communication	A	Connect to the inverter
		B	Connect to the inverter

3.3.14 Water flooding

Note:
Do not drip water on water flooding sensor to avoid false alarms
It should be ensured that the water flooding sensor inlet will not be blocked. If the inlet is blocked, it should be cleaned in time

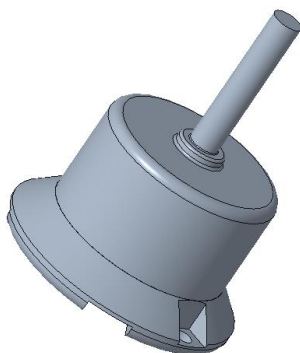


Figure 3.3.14-1 Water Flooding

Table 3.3.14-1 Water Flooding Parameters

S/N	Name	Port	Function
1	Power supply	VCC+ red line	Connect to terminal block XT3-5
		GND black line	Connect to terminal block XT3-6
2	Dry contact output	NC blue line	Normally closed contact
		COM common terminal	Common terminal, connected to terminal block XT3-8
		NO white line	Normally open contact, connected to terminal block XT3-7

3.3.15 Blast Relief Panel

Note:
The vent plate is used for releasing pressure and guiding pressure release in case of battery box failure explosion
Do not step on the vent plate
There should be a sufficient space above the vent plate to release pressure (unobstructed outdoors)
Regularly inspect the connection of the vent plate for any damage to avoid water leakage

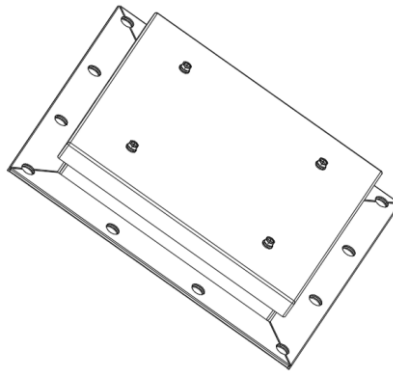


Figure 3.3.15-1 Blast Relief Panel

3.3.16 Air Inlet

Note:
The air intake filter should be cleaned regularly to ensure proper ventilation
When the filter cotton is damaged, it should be replaced in time
In areas with lots of dust, the cleaning frequency should be increased

3.3.17 Air Outlet

Note:
Keep the air outlet open to ensure proper ventilation
There should be sufficient space at the air outlet (at least 400mm away from the air outlet)
In areas with lots of dust, the cleaning frequency should be increased

3.3.18 Fire Water Joint

Note:
The fire water joint is used for soaking and cooling the battery pack by injecting water to it in case of a battery fire accident
Both the inside and outside of the fire water joint should not be blocked with additional items
The fire water joint chamber should be regularly checked for foreign objects entering

Regularly inspect the connection of the fire water joint for any damage to avoid water leakage
Specification: KD65-A

3.4 System Principle

3.4.1 Primary Diagram

The inverter used in this product is a three-phase on/off-grid ESS inverter suitable for energy management in PV, battery, load, and grid systems.

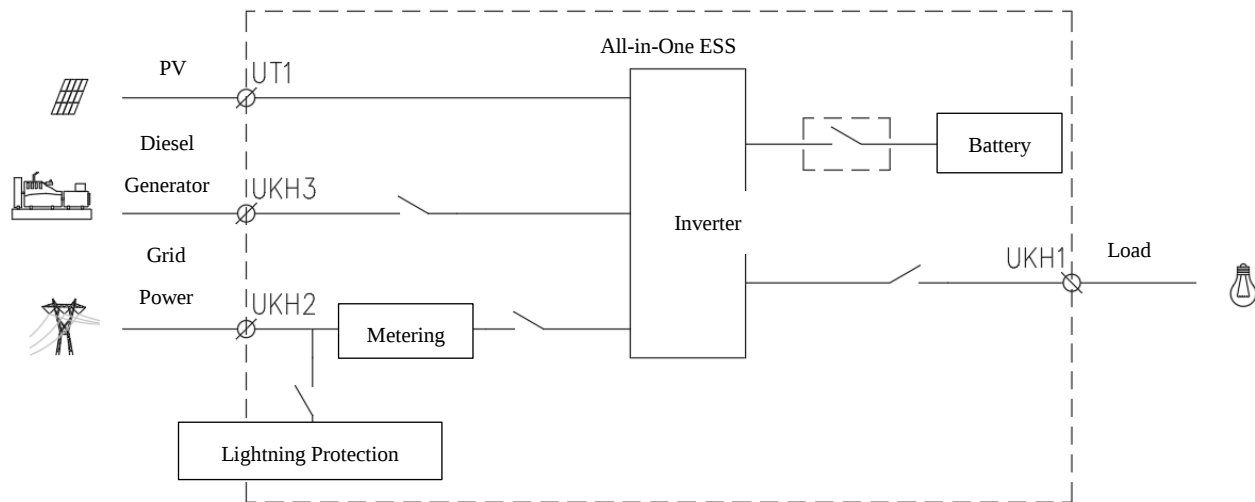


Figure 3.4.1-1 Single-Line Diagram

3.4.2 Air Conditioning System

Note:
The air conditioner inlet and outlet should be regularly maintained to prevent the air vent blockage and air conditioner failure.
The air conditioner outlet should be properly guided to prevent the condensate water from floating randomly
There is a risk of water leakage at the contact surface between the air conditioner and the cabinet door. During maintenance, observe the adhesive strip (whether the structural adhesive is damaged)
The air conditioner uses Ac power supply, so please pay attention to the risk of electric shock.

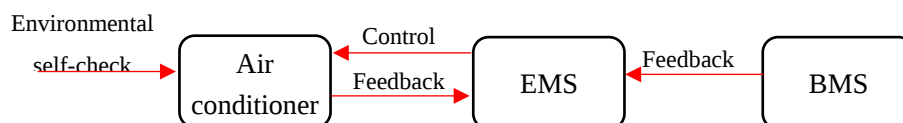


Figure 3.4.2-1 Working Principle of Air Conditioning System

S/N	Working Mode	Working Status	Function
1	Automatic Control	Heating	Set the heating and refrigerating temperature range through the panel or upper computer; dehumidify based on the humidity; the air conditioner uploads the operating status to EMS
		Dehumidification	
		Refrigeration	
2	EMS control	Heating	EMS makes decisions based on BMS feedback on battery temperature and humidity information; the air conditioner uploads the operating status to EMS
		Dehumidification	
		Refrigeration	

3.4.3 Fire Suppression System

Note:
Fire gas spraying can do harm to human health. Whenever fire gas spraying occurs, personnel must stay away from it
Fire sensors are used to detect temperature and smoke, and should be kept away from high temperatures, dense smoke, and other places during maintenance to avoid accidental fire gas spraying
When the fire suppression system is powered off, please maintain it in a timely manner, in case that the fire suppression system fails to work.
If necessary, manually control the fire suppression system to spray fire gas (manual spray switch on the door panel).

3.4.3.1 Perfluorohexane

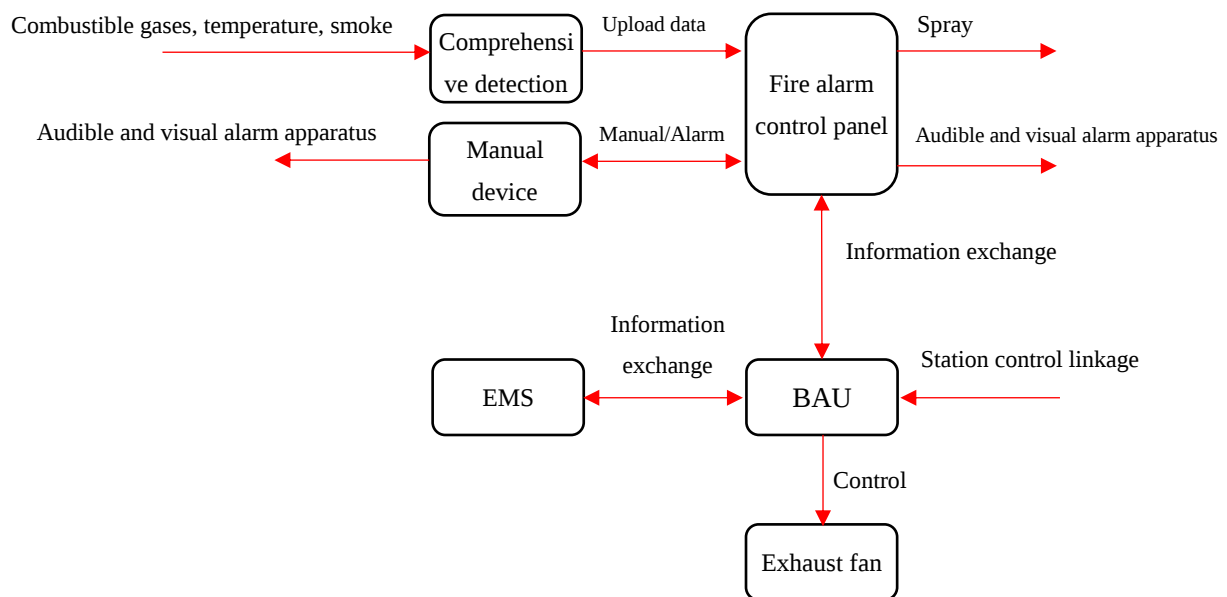


Figure 3.4.3-1 Fire Protection Working Principle

3.4.3.2 Aerosol

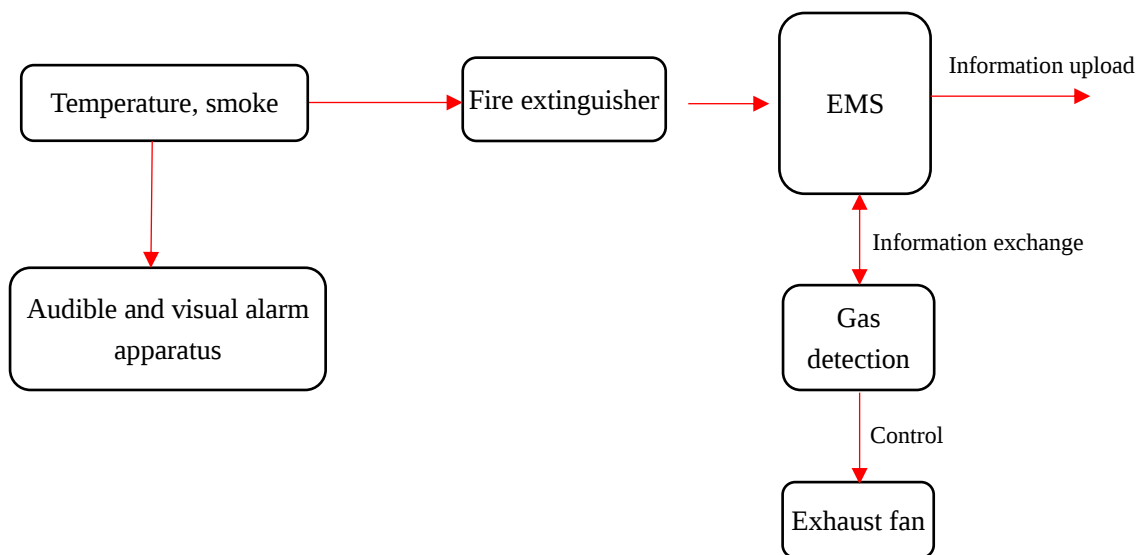


Figure 3.4.3-2 Aerosol Working principle

Table 3.4.3-1 Fire Protection System

S/N	Working Mode	Working Status	Function
1	Fire protection input	Self-detection	Self-detection of fire protection action
		Near-end manual control	Near-end (on door panel) manual control of fire protection action (aerosol does not have this function)
		Fire control linkage	Remote fire control linkage
2	Fire protection output	Spray	Gas spray, audible and visual alarm output
		Audible and visual alarm apparatus	

3.4.4 Dynamic Environment Monitoring

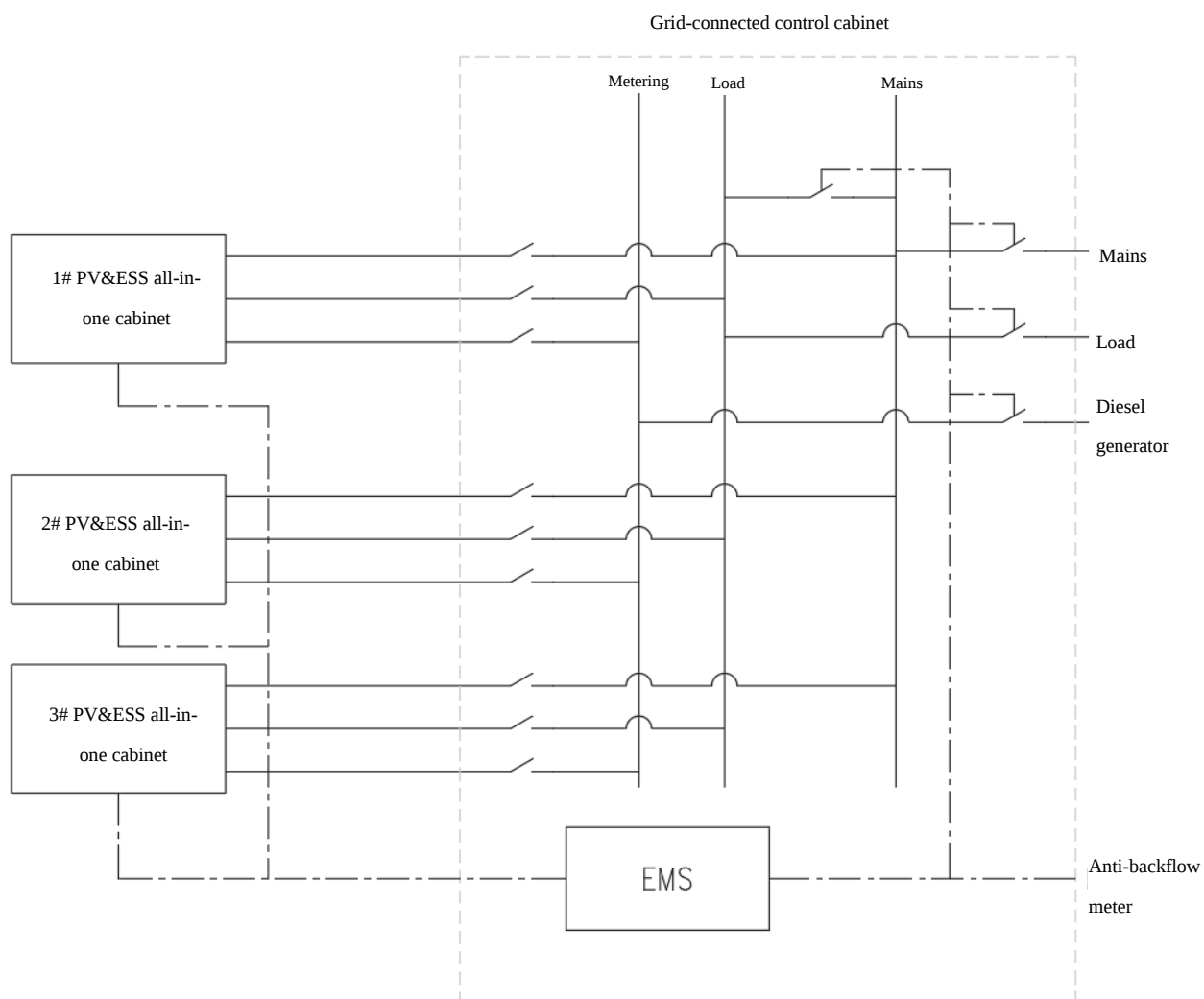


Figure 3.6-1 Parallel Solution

4 Product Transportation and Installation

4.1 Product Transportation and Storage Requirements

This product complies with transportation requirements for vehicles, ships, etc. Transport packaging boxes must be sturdy, comply with national standards, and include labels such as "Handle with Care" and "Moisture Resistant".

Before packaging, ensure that the remaining battery capacity is around 40%-50% and all switches are disconnected, and verify the secure installation of all components. Due to external factors (e.g., temperature, transportation, storage), the specifications of the product are subject to change based on the specific manufacturing date. During transportation, avoid direct exposure to rain, snow, dropping, or mechanical impact.

If leakage or swelling is detected in the batteries, transportation is prohibited. Please contact a battery recycling company for proper disposal.

4.2 Installation Environment Requirements

 NOTE	The site selection must meet the requirements of GB 51048 Design Code for Electrochemical Energy Storage Power Station, NFPA 855 Standard for the Installation of Stationary ESS and local regulations.
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ESS is only suitable for outdoor scenarios and require outdoor deployment; indoor placement is not supported. The site selection criteria are generally as follows:

- 1) The installation location should not be in low-lying areas, and the horizontal plane of the installation should be higher than the historical highest water level in that area.
- 2) The distance from airports, buried waste disposal sites, riverbanks, or dams should be $\geq 2000\text{m}$.
- 3) Choose an open area, ensuring that there are no obstacles within a 10m radius around the site.
- 4) Maintain a distance of at least 50m from residential areas to avoid noise pollution, stay away from sources of ignition, and prohibit children from entering.
- 5) Have convenient transportation conditions and a reliable fire suppression system.
- 6) Meet the immediate space requirements and leave space for expansion based on the needs of the entire lifecycle.
- 7) Select a well-ventilated location, and do not block ventilation openings or heat dissipation systems during equipment operation to prevent overheating and fire.
- 8) Installing ESS in areas prone to salt damage can lead to corrosion and potential fire hazards. Do not install ESS outdoors in areas prone to salt damage. Salt-prone areas refer to regions within 2000m of the coastline or areas influenced by sea winds. The extent of the impact of sea winds varies based on meteorological conditions (such as typhoons, seasonal winds) or topography (presence of embankments, hills).

 NOTE	1) When the safety clearance at the selected site fails to meet the relevant national standards, it is advisable to reconsider the site selection. 2) If no more suitable site is available, it is recommended to install a fire wall with a fire resistance rating of not less than 3 hours according to DBJT 15-81-2022 "Technical Code for Fire Resistance Design of Building Concrete Structures." The thickness of the fire wall should be $\geq 200\text{mm}$, as shown in the table below. Simultaneously, considerations should be given to the requirements of equipment transportation, installation, maintenance, and other spaces. 3) It is recommended to refer to T/CEC 373-2020: The length and height of the fire wall should extend beyond the outline of the prefabricated container by 1 meter each. Also, refer to NFPA 855-2020 "Standard for the Installation of Stationary ESS": When there is an independent fire wall with a 1-hour fire resistance rating, the clearance is allowed to be reduced to 914mm.
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Table 4.2-1 Minimum Values of Wall Thickness and Cover Thickness for Longitudinal Reinforcement

Fire Resistance Limit (min)	Wall Thickness (mm) / Cover Thickness of Longitudinal Reinforcement (mm)			
	u=0.35		u=0.7	
	One-sided Fire Exposure	Two-sided Fire Exposure	One-sided Fire Exposure	Two-sided Fire Exposure
60	140/15	140/15	140/15	140/15
90	140/15	140/15	140/20	170/20
120	150/20	160/20	160/30	220/30
180	180/35	200/40	210/45	270/50

Note: u is the ratio of combined axial pressure to the normal temperature axial bearing capacity at the point where the force is applied to the wall.

Site selection should avoid areas not recommended by industry standards and regulations, including but not limited to the following locations, regions, and places:

- 1) Areas with strong vibration, strong noise sources, and strong electromagnetic field interference.
- 2) Places with dust, oil smoke, harmful gases, corrosive gases, etc.
- 3) Places for production or storage of corrosive, flammable, or explosive materials.
- 4) Areas with existing underground facilities.
- 5) Areas with poor geological conditions such as rubber soil, soft soil layers, prone to water accumulation, and sinking ground.
- 6) Areas with seismic faults and earthquake intensities greater than nine degrees.
- 7) Areas directly threatened by mudslides, landslides, quicksand, and sinkholes.
- 8) Within the boundaries of mining subsidence (faulting) zones.
- 9) Within the blast danger zone.
- 10) Areas that may be submerged after dam or dike failure.
- 11) Important sanitary protection zones for water supply sources.
- 12) Historical and cultural heritage protection zones.
- 13) Crowded places, high-rise buildings, and underground structures.

4.3 Installation Space Requirements

To ensure the normal maintenance of equipment inside the cabinet and facilitate the normal movement of tools, it is recommended to reserve sufficient space around the cabinet installation location. The minimum size of the reserved space should not be less than the minimum size shown in the figures below (excluding air conditioner dimension).

- 1) For a single cabinet, reserve a minimum installation spacing of $\geq 1500\text{mm}$ on the side with the door open and $\geq 300\text{mm}$ on the side without the door open. For multiple cabinets with back-to-back installation, the central passage should be $\geq 2000\text{mm}$. Consider the later maintenance of battery packs, and the minimum reserved space should not be less than the minimum size shown in the figures below.
- 2) A maintenance aisle with a net width of $\geq 1000\text{mm}$ should be set around the cabinet or on one side.
- 3) It is recommended to use a fence to isolate and protect the equipment area, with a height of 1.5m.
- 4) The spacing design above only considers installation and operation requirements. The final spacing must meet local fire requirements.

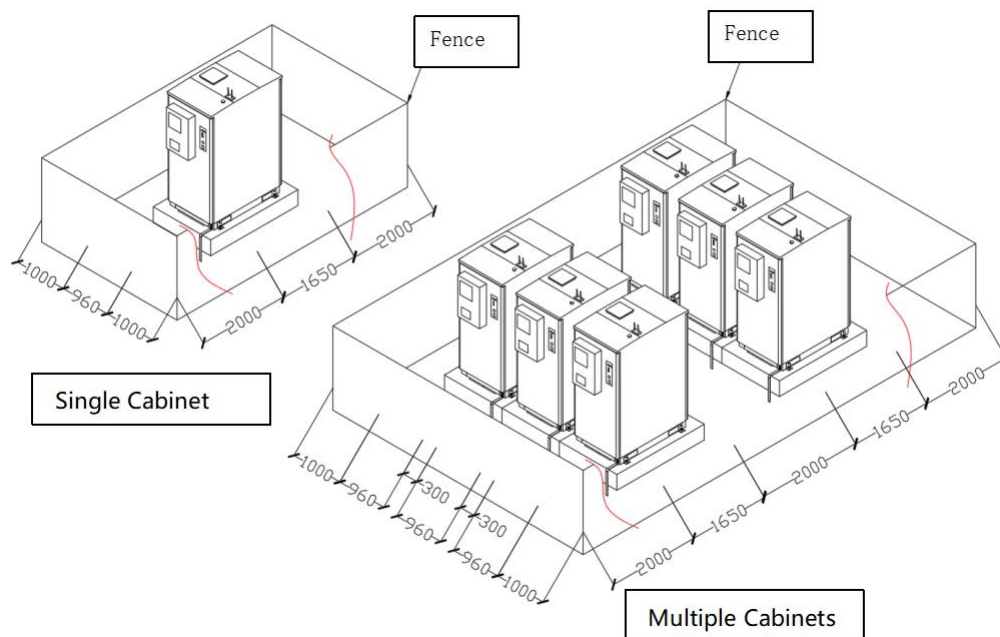


Figure 4.3-1 Installation Space Requirements

4.4 Installation Foundation

The foundation location shall comply with 4.2 Installation Environment Requirements and 4.3 Installation Space Requirements.

The foundation for storage location of the cabinet needs to be prepared by a professional construction team in advance. Sufficient space should be left around it for installation and maintenance. If the power lines run through the bottom cable trench, foundation preparation should be done in advance to meet the requirements of lightning

protection, waterproofing, rodent prevention, and ventilation. The foundation for cabinet installation must be designed and constructed according to certain standards to meet the requirements of mechanical support, cable routing, and later maintenance and inspection. In addition, the foundation for the energy storage battery cabinet should be designed based on the actual terrain while meeting the relevant local standards for power facility construction. The following requirements must be met during foundation construction:

- 1) The soil at the cabinet installation site needs to have a certain degree of compactness. It is recommended that the relative compaction of the soil at the installation site is $\geq 98\%$. If the soil is loose, measures must be taken to ensure the stability of the foundation.
- 2) The bottom of the cabinet foundation pit must be compacted and filled to provide sufficient and effective support for the cabinet.
- 3) The cabinet foundation should be constructed according to the foundation drawing provided by the supplier or the foundation drawing confirmed by our company. The surface tolerance of the foundation should be $\pm 5\text{mm}$.
- 4) Elevate the base of the cabinet to prevent rainwater from eroding the base and interior of the battery cabinet.
- 5) The cross-sectional area and height of the foundation should meet the requirements.
- 6) Drainage measures should be built according to local geological conditions.
- 7) Build a sufficiently sized and high-quality cement foundation. The height of the foundation should be determined by the construction party based on the site geology.
- 8) Consider cable routing during foundation construction.
- 9) Construct a maintenance platform around the foundation for convenient maintenance in the future.
- 10) Based on the location and size of cable entry and exit points inside the cabinet, sufficient space should be reserved for AC/DC cable trays during foundation construction, and cable conduits should be embedded in advance.
- 11) Determine the specifications and quantity of sleeve pipes based on the cable model and the number of incoming and outgoing lines.
- 12) Build a drainage system to prevent the cabinet base or internal equipment from being immersed in water during heavy rainfall or abundant precipitation.
- 13) Both ends of all embedded pipes should be temporarily sealed to prevent impurities from entering; otherwise, it will be inconvenient for later wiring.
- 14) After connecting all cables, seal the cable entry and exit points and joints with fire-resistant mud or other suitable materials to prevent rodents from entering.

Table 4.4-1 Foundation Table

S/N	Item	Requirements
1	Fixed bolt	Embedded part or expansion bolt It is recommended to use M10 threads to fasten the embedded parts, exposing the foundation by 30mm It is recommended to use M10*120 stainless steel bolts for expansion bolts
2	Size	Fixed size of embedded parts or expansion bolts: 1300*1030, see Figure 4.4-1 Equipment Foundation Drawing 1 (Ground without Bearing Capacity) for details, Figure 4.4-2 Equipment Foundation Drawing 2 (Ground with Bearing Capacity)
3	Tool	Use 16mm sleeve or open-end wrench
4	Inlet and outlet holes	For the Inlet and outlet holes, view the base map Figure 4.4-4 Base Map

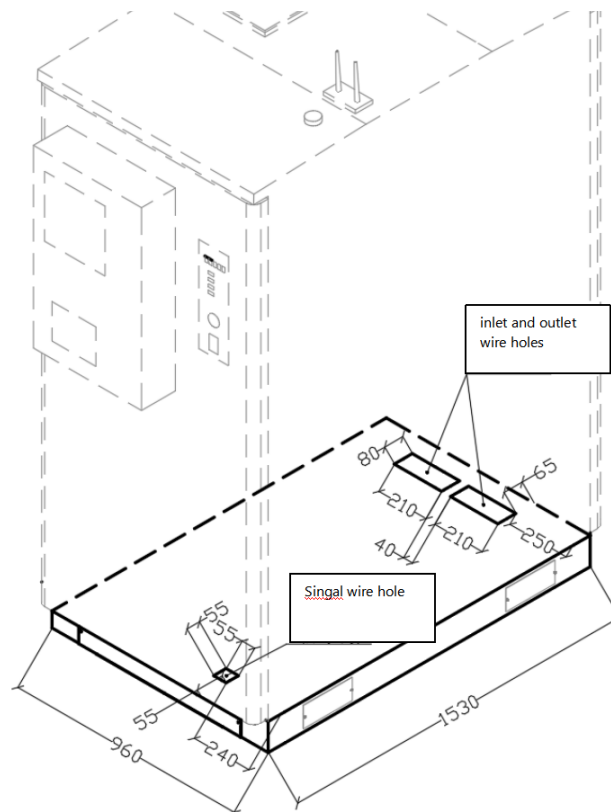


Figure 4.4-4 Base Map

The recommended cabinet installation foundation is shown in the following figure

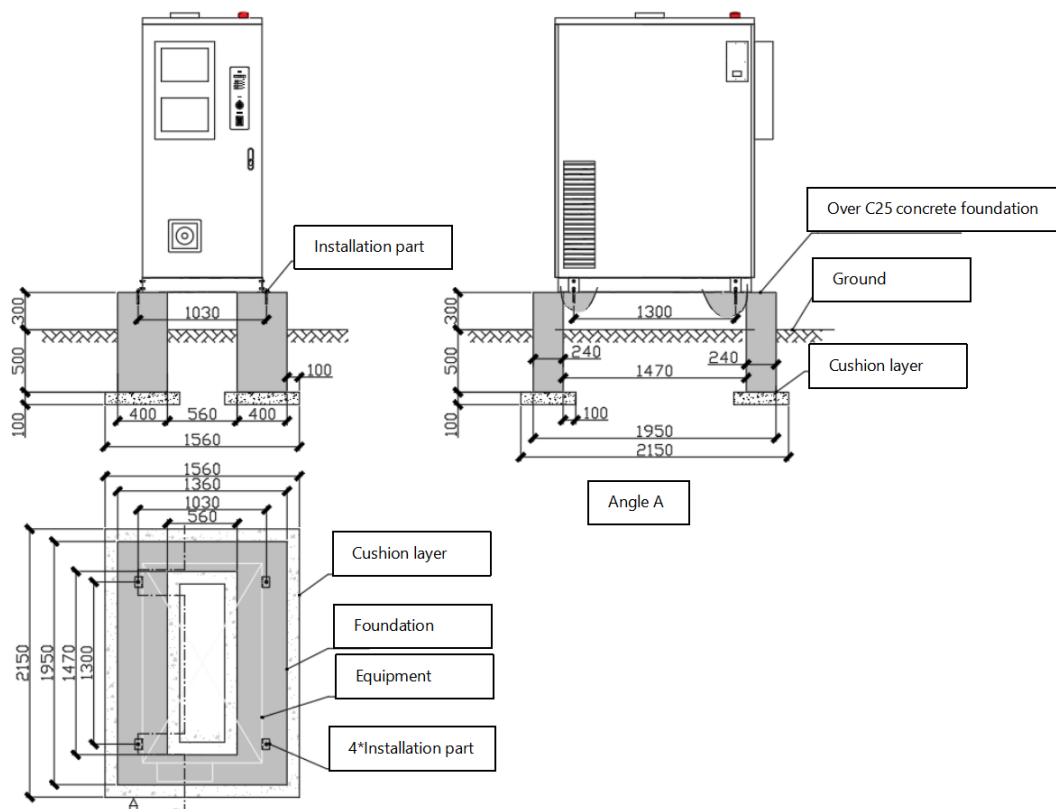


Figure 4.4-5 Equipment Foundation Drawing 1 (Ground without Bearing Capacity)

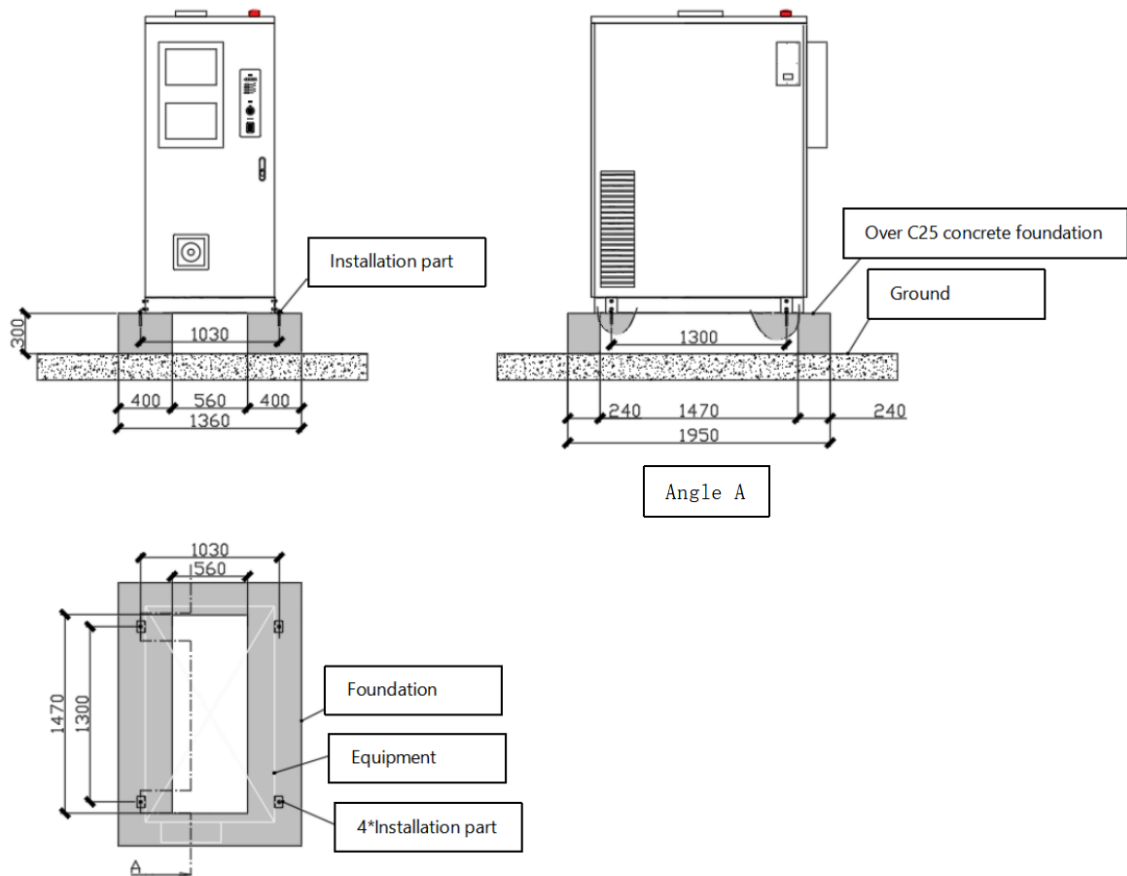


Figure 4.4-6 Equipment Foundation Drawing 2 (Ground with Bearing Capacity)

Foundation Construction Instructions

- 1) The site is compacted and smooth.
- 2) Cement base material C25.
- 3) The cabinet installation should be 300mm above the ground.
- 4) Before cementing, bury wire pipe (4* $\varnothing$ 75mm) with a depth greater than 500mm.
- 5) Pay attention to the position and size of pre-opening holes when cement is poured.
- 6) After the cement pouring, the equipment should be maintained for more than 7 days before installation.

4.5 Cabinet Installation



WARNING

The cabinet is relatively heavy, and before constructing the foundation, the conditions of the installation site (mainly referring to geological conditions and environmental climate conditions, etc.) should be carefully examined. Only on this basis can the design and construction of the foundation be started.

4.5.1 Tool Preparation

Before installing equipment, the tools needed, including installation tools and personal protective tools, must be prepared, as shown below.

 NOTE	The tools used, including socket wrenches, torque wrenches, screwdrivers, and other handles, need to undergo insulation protection treatment or be used with insulated tools.
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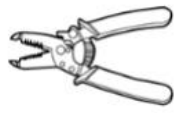
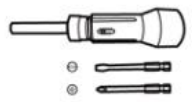
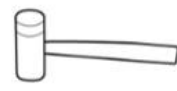
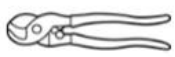
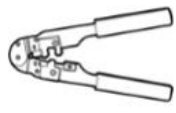
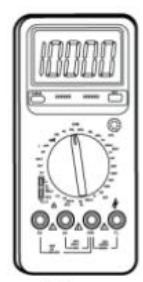
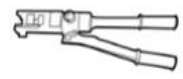
 Impact Drill (Drill Bit: φ14mm, φ16mmφ20mm)	 Complete Set of Socket Wrenches	 Torque Wrench	 Diagonal Pliers
 Wire Stripper	 Cross/Flathead Screwdriver	 Mallet	 Utility Knife
 Wire Cutter	 Waterproof Head Crimping Pliers	 Vacuum Cleaner	 Multimeter DC Voltage Range ≥ 1500V DC
 Marker Pen	 Steel Tape Measure	 Digital or Bubble Level	 Hydraulic Crimping Tool

Figure 4.5.1-1 Common Installation Tools Schematic Diagram



Figure 4.5.1-2 Personal Protective Equipment Schematic Diagram

4.5.2 Installation Environment Inspection

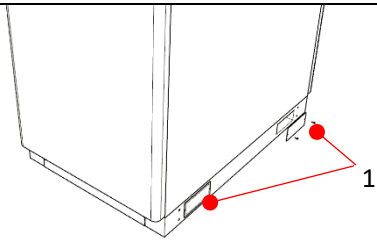
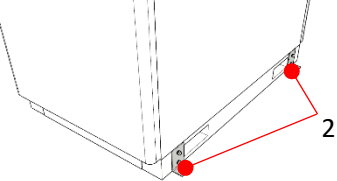
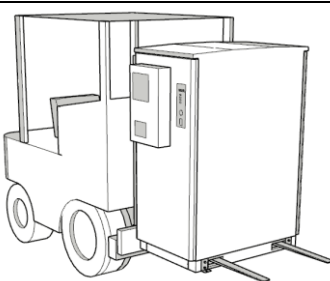
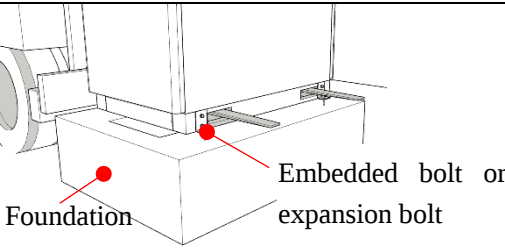
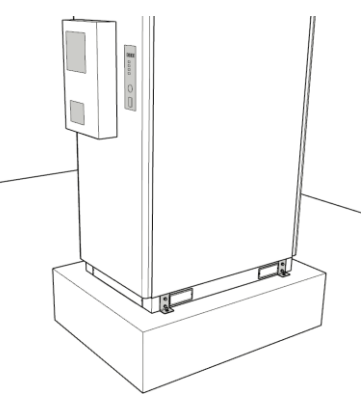
Inspect according to site requirements, and proceed with the installation only if the requirements are met. The company will not be responsible for any losses caused by forced installation that does not meet the requirements.

 NOTE	Marking the Safety Zone: Use red construction markings to circle the safety area. Clear obstacles within the safety zone, and prominently display construction and safety warning signs.
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4.5.3 Unpacking

Note:
The outer packaging of this product is wooden board packaging.
When unpacking, special tools such as claw hammer or crowbar should be used.
The outer packaging size of the product is higher than 2 meters. Please use a ladder to assist when unpacking.
Attention should be paid to equipment and personal safety when unpacking.
When unpacking, check the installation accessories, other manuals, drawings, etc.

4.5.4 Installation

S/N	Working Mode	Function
1		1. Remove the forklift baffles on both sides and keep the baffles and bolts intact.
2		2. Install the surrounding installation feet.
3		3. Forklift handling (forklifts weighing 3 tons or more is recommended)
4		4. The forklift assists in positioning and installation. 5. Tighten the mounting bolts. 6. Install the baffles back.
5		7. Finished drawing

4.6 PV Panel Installation

Note:
At any time, the open circuit voltage of the PV string should not exceed 850V to avoid causing the PCS to enter standby protection mode

This product provides 4 MPPT connections to ensure that the input current of each MPPT is less than 30A
PV cables must be dedicated PV cables
The cable terminals should be crimped with dedicated terminals
One MPPT can connect up to 2 PV strings, ensuring that the PV strings are correctly connected to the positive and negative terminals

Users must hire professionals to install PV panels according to the user manual. During installation, please pay attention to the following:

- 1) When the PV panel is exposed to sunlight, it generates electrical energy and may cause lethal voltage and electric shock.
- 2) This inverter is a multi-power system, and operators must wear appropriate personal protective equipment: safety helmets, insulating lines, gloves, etc.
- 3) Before the operator touches the output cable of the PV panel, they must use measuring equipment to ensure that the cable is voltage-free.
- 4) Installation of PV modules is strictly prohibited in rainy, snowy, and windy weather conditions.
- 5) It is prohibited for one person to carry PV modules. It must be carried by two people, and handled gently to avoid vibration that may cause hidden cracks in the modules.
- 6) Only PV modules of the same size and specification can be connected in series.
- 7) Do not use damaged PV modules.
- 8) Opened battery modules on the construction site should be placed flat with the front side up, with wooden trays and battery board packaging at the bottom. It is strictly forbidden to stand, tilt, or suspend the modules.
- 9) The back of the modules should not be directly exposed to sunlight.
- 10) During construction, it is strictly prohibited to step on the battery panels, and brutal construction practices that may affect the high-quality construction of the power station should be avoided. The design unit should fully consider the reserved channel for module installation and should not blindly pursue installed capacity.
- 11) It is strictly prohibited to crush or strike any part of the PV module with sharp objects.
- 12) Installation tools should not be placed or touched arbitrarily on the PV module.
- 13) Do not touch the metal live parts of the PV module.
- 14) Do not connect the positive and negative terminals of the same PV module connection line.
- 15) It is strictly prohibited to lift the modules using lifting junction boxes or connectors.

Tools and equipment needed for the assembly of PV modules and accessories:

- 1) The fastening parts connecting the PV module support must meet the requirements of national standards, using hot-dip galvanized parts to achieve the purpose of ensuring its service life and anti-corrosion fastening. The number, specifications, models, and varieties of bolts, nuts, flat washers, and spring washers should be complete, with good performance, and meet the design requirements. After each bolt is fastened, the exposed part of the bolt should be 2/3 of the bolt diameter in length.
- 2) Tools: socket wrench, open-end wrench, plum wrench, hex wrench, level, compass, steel tape measure, torque wrench, rope, spirit level, bench, ladder, etc. must meet the needs of engineering construction and quality inspection.

Wiring between modules should meet the following requirements:

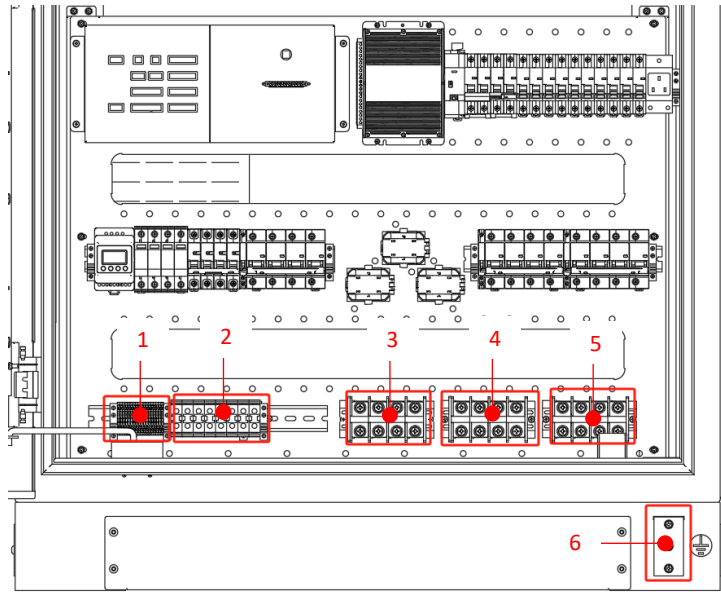
- 1) The number and path of connections between PV modules should meet the design requirements.

- 2) The connection between PV modules should be firm.
- 3) Tin plating should be applied to the junction of external cables and connectors.
- 4) After the connection of PV module, the open-circuit voltage and short-circuit current of the PV module string should be tested.
- 5) The connecting wires between PV modules can be fixed using brackets, and the arrangement should be neat and beautiful.
- 6) The positive and negative poles of the same group of PV modules or PV module strings should not be short-circuited.
- 7) Do not touch the metal live parts of the PV module string.
- 8) It is strictly forbidden to connect PV module string plug connectors in the rain.

5 Electrical Connection

5.1 Electrical Connection

The product integrates the functions of energy storage and PV grid connection for inverters. The product provides mains access ports, load output, diesel generator access, PV DC input ports, grounding wire connections, and communication line connection ports for multiple parallel machines.

S/N	Item	Description
		Power distribution area
1	Signal terminal block	
2	PV access terminal block	
3	Mains access terminal block	
4	Load output terminal block	
5	Diesel generator access terminal block	
6	Cabinet body grounding	

5.2 Grounding Cable Connection

 WARNING	Prohibit the installation of fuses, switches, etc., on the protective ground cable.
 NOTE	Grounding complies with local electrical safety regulations.

The product cabinet is equipped with two grounding points. After the cabinet foundation is installed, install the

grounding lead cable. It is recommended to use 40*4 flat iron lead cable. Connect one end of the cable with an M10 screw, and weld the other end to the grounding angle iron. The grounding angle iron is recommended to be an $\angle 50 \times 5 \times 2500\text{mm}$ hot-dip galvanized grounding iron. Before connecting, drive the grounding iron vertically into the ground. The cabinet requires no less than two grounding points. The grounding schematic diagram is shown below:

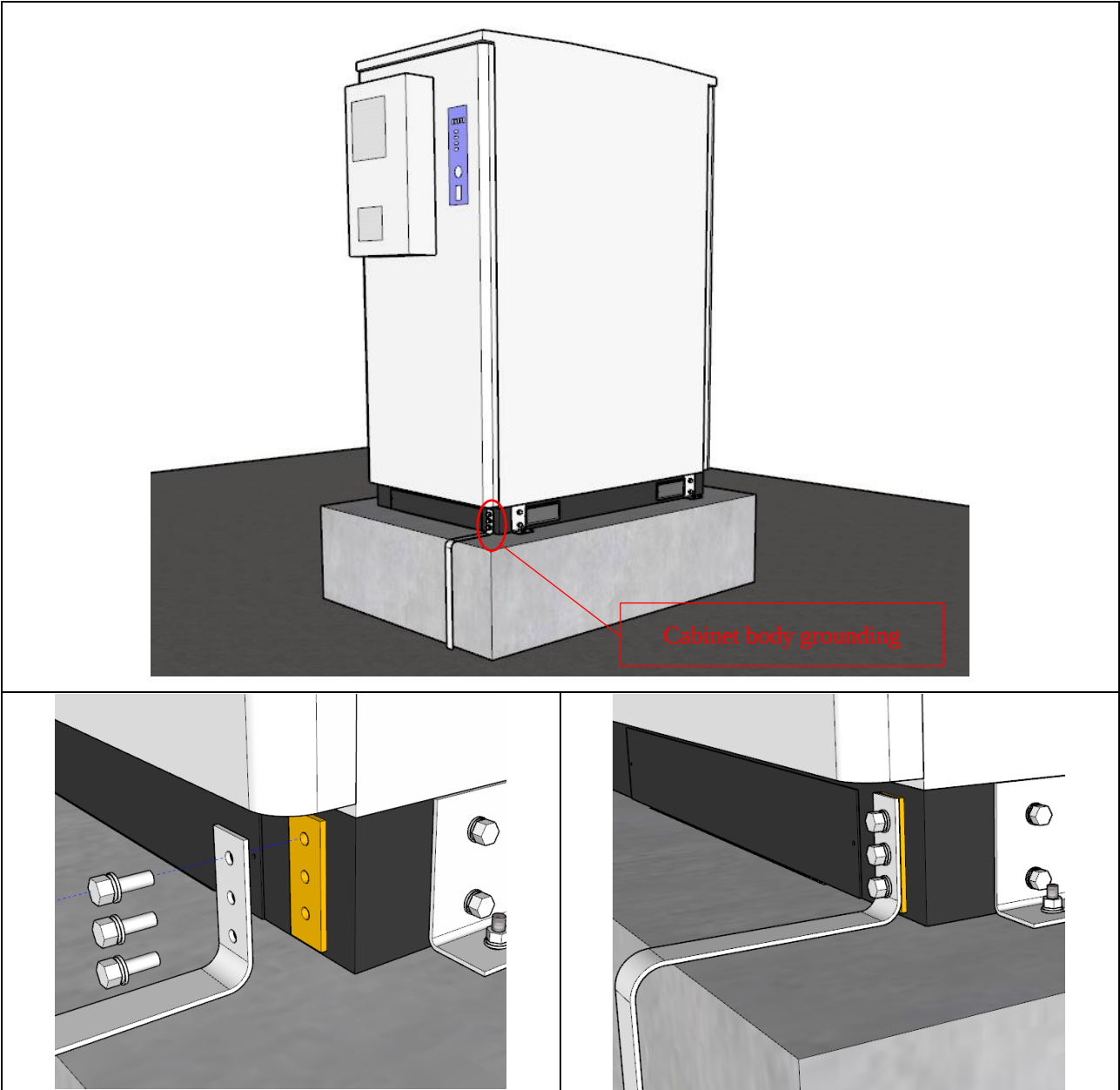


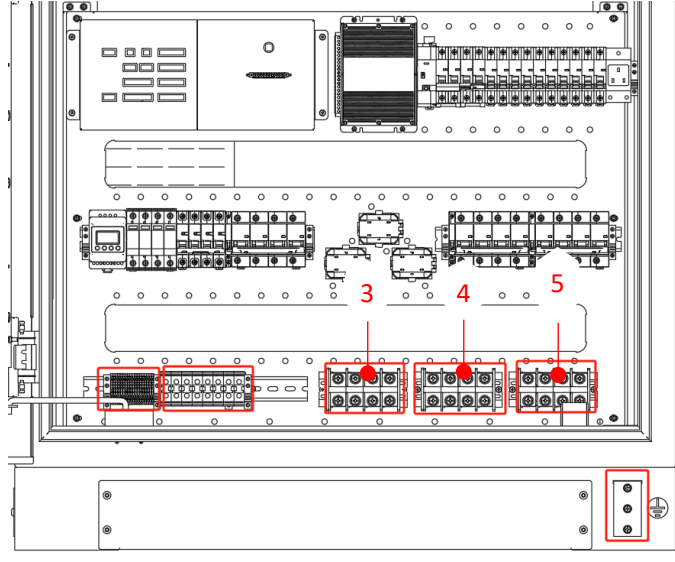
Figure 5.2-1 Grounding Diagram

S/N	Item	Specification	Quantity
1	Fastening bolt	Hexagonal head M10*35 combination bolt	6 pcs
2	Down lead	40*4 galvanized flat iron	Appropriate length
3	Tool	16mm sleeve	1

5.3 AC Cable Connection

 NOTE	1) When connecting AC cables, ensure that the cables are not damaged or broken, and ensure that the N line connection is reliable to avoid damage to AC equipment within the system. 2) After connecting AC cables, ensure that the terminals are fully aligned and in good contact, and the AC input cables are vertical.
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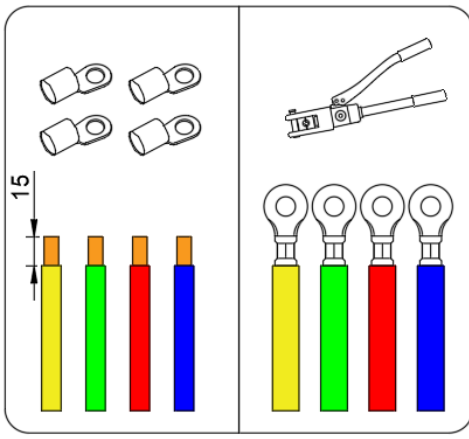
This product offers critical load interfaces to meet the needs of different load uses. Loads can be connected below the QF11 switch. Before wiring, it is important to disconnect the AC circuit breakers QF5 and QF11. The utility power input terminals are located on the right terminal bar of the distribution panel. It is recommended to use 25mm² copper core cables for mains, diesel generator and load lines, or recalculate based on the ambient temperature at the installation site, cable cooling conditions, and cable length. For more details, please refer to the figure below.



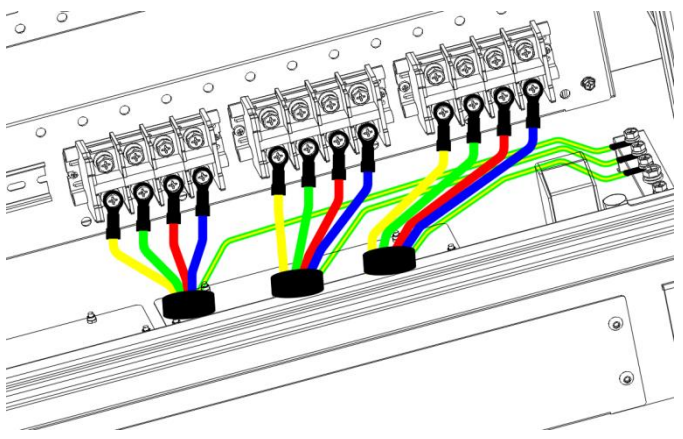
3. Grid power input

4. Load output

5. Diesel generator input (optional)



15



Crimp terminal		Connect the cable	
S/N	Item	Specification	Quantity
1	Cable	Copper cable of 25mm ² or above	On demand
2	Terminal	DT/OT25-8	9

3	Terminal	DT/OT16-8	6
4	Hydraulic pliers	25mm2	1
5	Sleeve	13mm	1

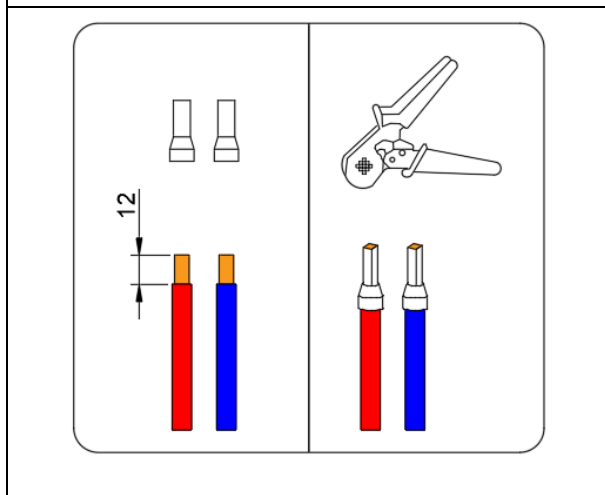
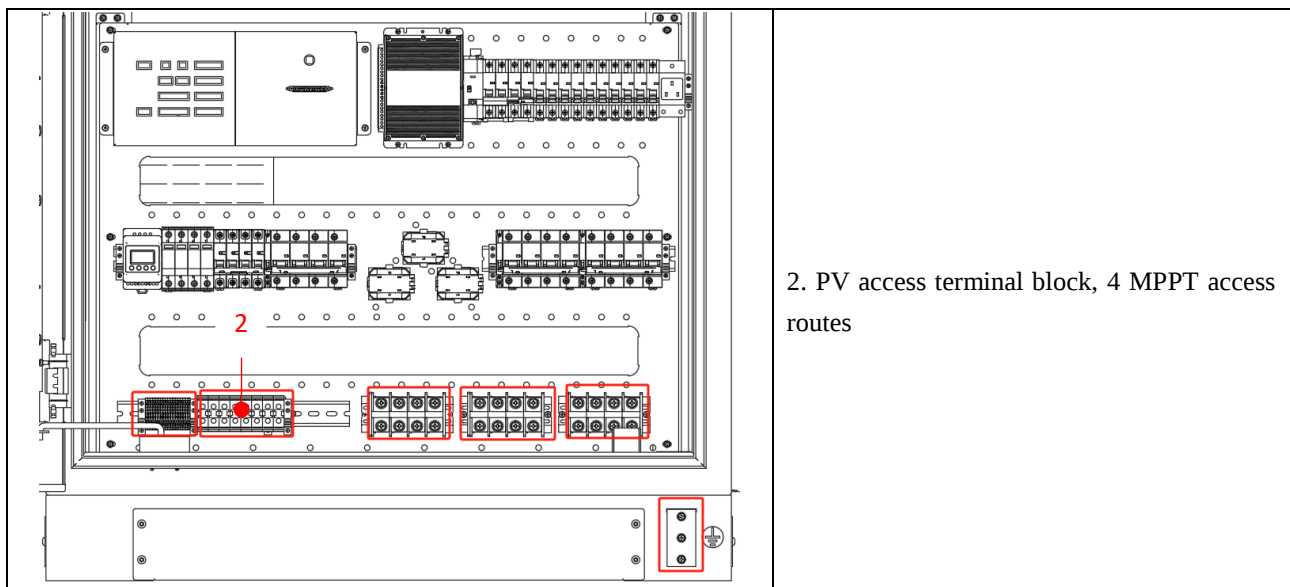
5.4 PV Power Generation Connection

	DANGER	1) Once the PV array is exposed to sunlight, it will generate lethal high voltage. When connecting the inverter to the PV system, ensure good insulation of the PV array. 2) Ensure that the maximum voltage of each PV string is always less than 850V. 3) Since the inverter has independent operation for each input and independent MPPT, the PV string structure for each PV input can be different from the other PV input, including solar panel type, number of cells, tilt angle, azimuth, etc.
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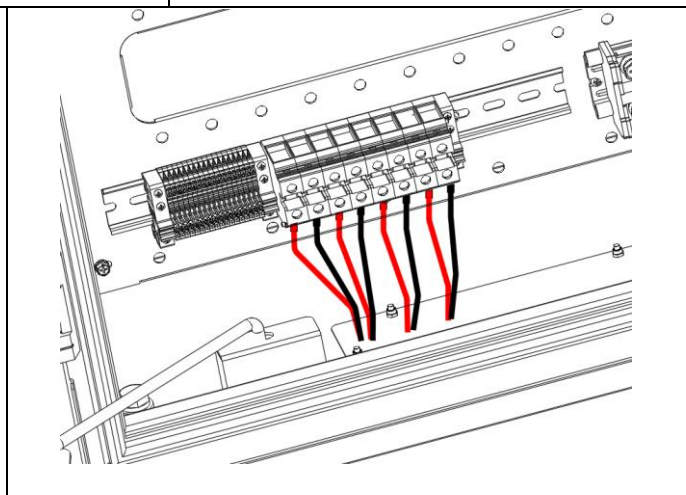
Before PV power generation connection, pay attention to the following points:

- 1) In order to fully utilize the input power of the PV panel, PV strings on the same route should be consistent, including the same model, the same number of panels, the same tilt angle, and the same azimuth.
- 2) Before wiring, disconnect the circuit breaker on the front panel of the DC distribution box.
- 3) Before wiring, do not reverse the positive and negative poles.

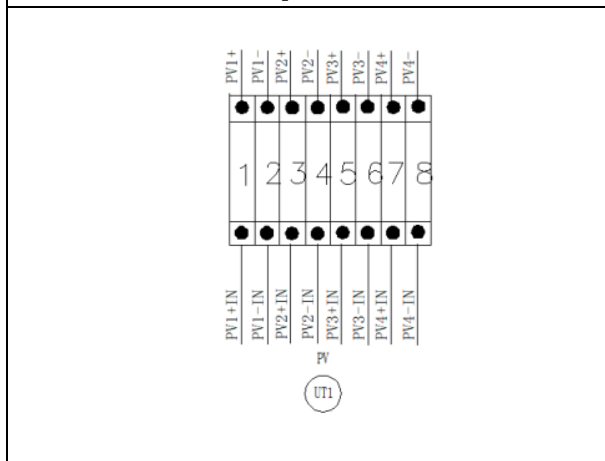
The PV access point of this product is located on the left side of the distribution panel, terminals UT1 1-8. It can provide 4 PV access routes. When wiring, pay attention to the correct order. Before wiring, disconnect the connection between PV modules, disconnect DC circuit breakers QF1-QF4 to avoid electric shock hazards. The PV input line is recommended to use 4-6mm² PV dedicated cables.



Crimp terminal

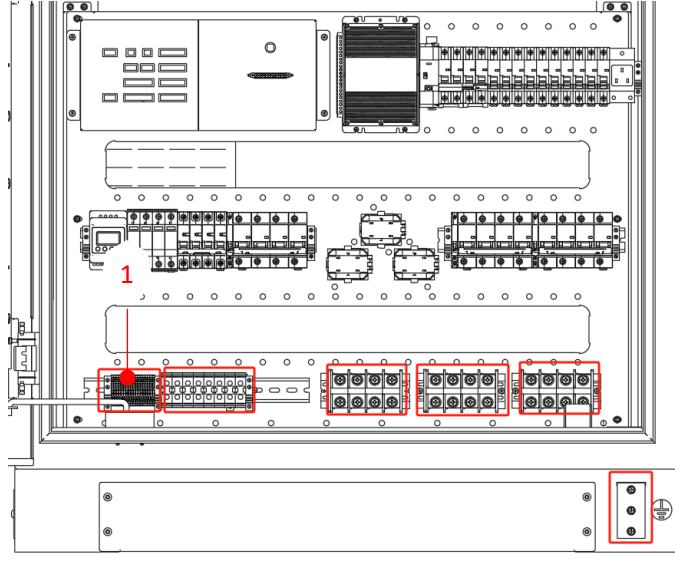
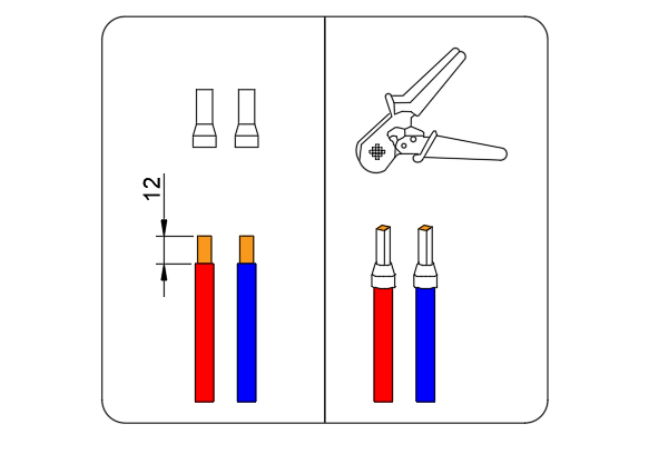
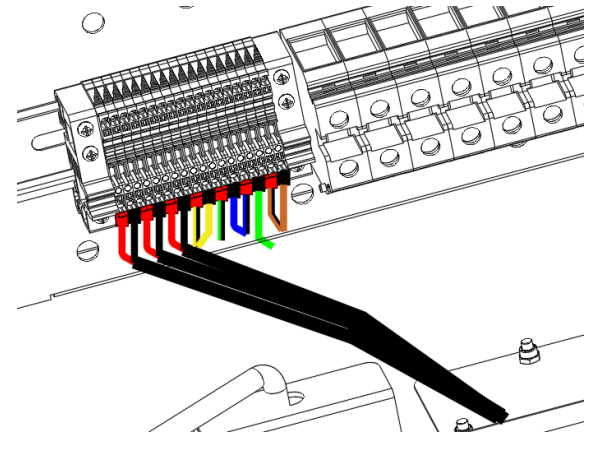
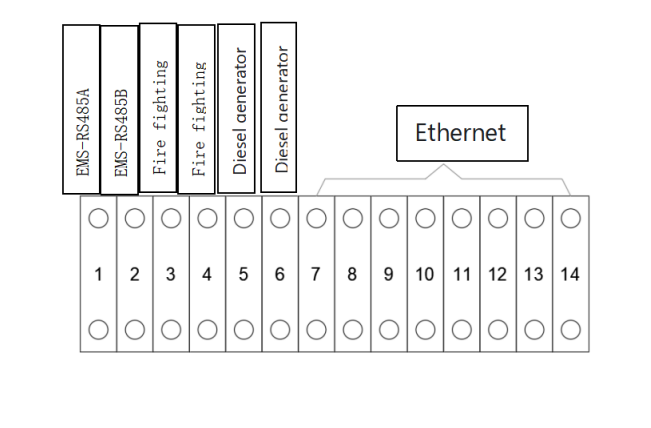


Connect the cable



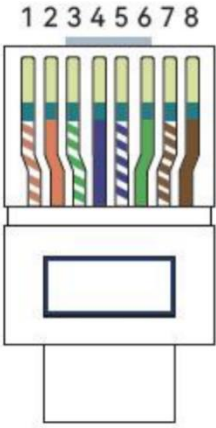
S/N	Item	Specification	Quantity
1	Cable	Copper cable of 4-6mm ² or above	On demand
2	Tube terminal	E6012	4 red and black respectively
3	Tube terminal crimping pliers	25mm ²	1
4	Cross screwdriver	D6	1

5.5 Communication access

		1. Communication terminal block	
		Crimp terminal	
		Connect the cable	
			
S/N	Item	Specification	Quantity
1	Cable	Shielded twisted pair communication wire	On demand
2	Tube terminal	E0510	On demand
3	Tube terminal crimping pliers	25mm2	1
4	Slotted screwdriver	D3	1

5.6 Multi-Unit Parallel Connection

When multiple units are connected in parallel, each cabinet's PCS needs to be connected in series through RS485 communication, and the EMS needs to be connected in series through Ethernet communication. Connect the PCS's RS485 communication to the PCS's communication terminal block PARA interface, and connect the EMS's Ethernet communication using an RJ45 network cable to the lower end of the lightning protection port in the electrical compartment of the PV&ESS All-in-One Cabinet.

	No.	Color	Meter Side	Battery Side
	1	Orange & White	/	RS485_A3
	2	Orange	/	RS485_B3
	3	Green & White	RS485_B2	/
	4	Blue	/	CANH_B
	5	Blue & White	/	CANL_B
	6	Green	RS485_A2	/
	7	Brown & White	RS485_B2	/
	8	Brown	RS485_A2	/

Note:

Before multiple units are used in parallel, please consult our pre-sales or technical engineers in detail to see if the parallel plan is feasible; if parallel unit connection is forced or the parallel connection does not meet our company's requirements, our company will not provide technical services for this project.

6 System Power On

6.1 Pre-power-on Check

 WARNING	1) The ESS can only be put into operation after professional confirmation. 2) For ESS with long downtime, a comprehensive and detailed check of the equipment must be carried out before power-on to ensure that all indicators meet the requirements.
--	--

- 1) Check if the wiring is correct.
- 2) Ensure that the internal protective cover of the equipment is securely installed.
- 3) The emergency shutdown button is in the released state.
- 4) Check to ensure no ground faults.
- 5) Use a multimeter to check if the AC and DC side voltages meet the startup conditions and there is no overvoltage danger.
- 6) Check to ensure no tools or parts are left inside the equipment.
- 7) The ESS can only be put into operation after professional confirmation.
- 8) For ESS with long downtime, a comprehensive and detailed check of the equipment must be carried out before power-on to ensure that all indicators meet the requirements.

6.2 ESS Power On

 WARNING	If there is a tripping phenomenon of the circuit breaker during the power-on process, pause to close other circuit breakers. Immediately check whether the downstream load of the tripped circuit breaker has a short circuit.
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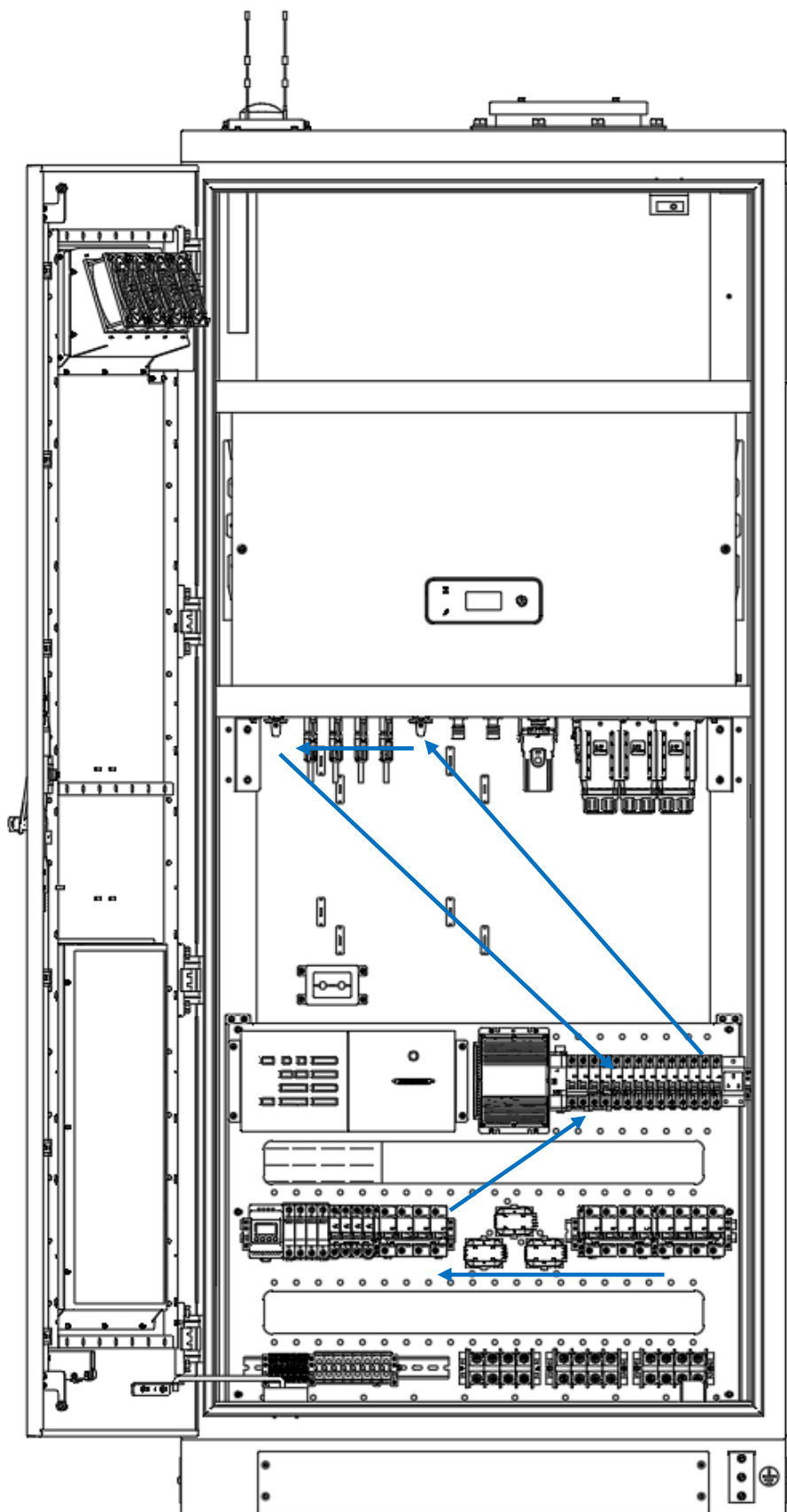
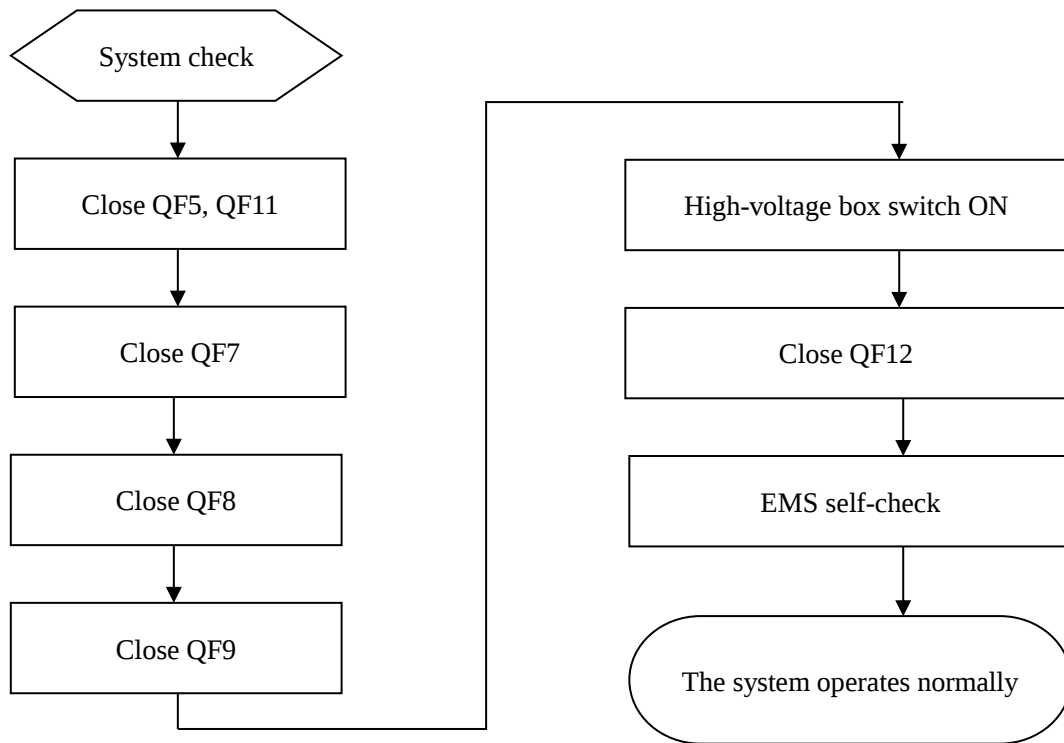


Figure 6.2-1 Switch Closing Sequence

- 1) Check and confirm that the AC lightning arrester is normal, and the AC lightning arrester circuit breaker is closed.

- 2) Close the mains power switch QF5 (or diesel generator QF6).
- 3) Close the main load switch QF11.
- 4) Close the auxiliary power supply switch QF7.
- 5) Close the air conditioning power supply switch QF8.
- 6) Close the fan power supply switch QF9.
- 7) Turn the handle of the DC circuit breaker in the high-voltage box to ON, and close the circuit breaker.
- 8) Close the 24V switch power supply switch QF12.
- 9) Control the system to start through EMS (upper computer) operation, and after EMS self-check is completed, the system starts normally.



6.3 PV System Power On

- 1) Check and confirm that the DC lightning arrester is normal, and the DC lightning arrester fuse is closed.
- 2) Check and confirm whether each PV DC line is connected, and whether the MC4 terminals are inserted properly.
- 3) Check and confirm whether the positive and negative poles of each PV DC line are wired correctly.
- 4) Turn the DC switch of the inverter to ON position.

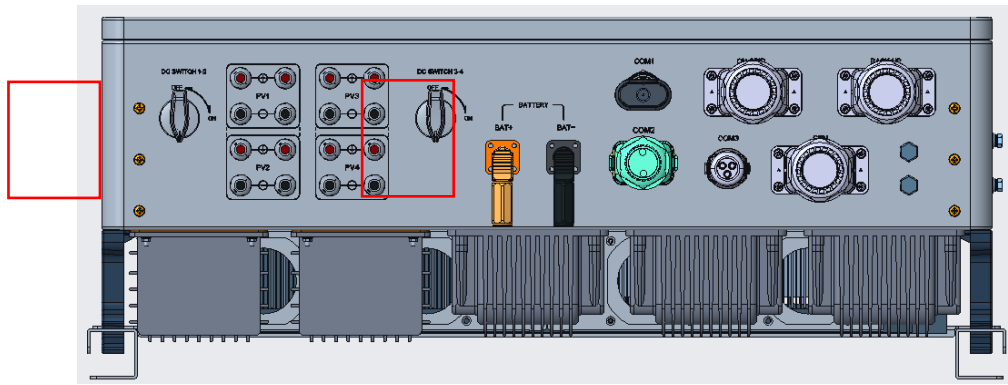


Figure 6.3 1 Inverter DC Switch

6.4 PV System Power Down

- 1) Stop the load first;
- 2) Stop on the cloud platform; (as shown in the figure below)
- 3) Disconnect QF12-QF9-QF8-QF7-QF11-QF5-PV switch in order (Figure 6.3 1 Inverter DC Switch)

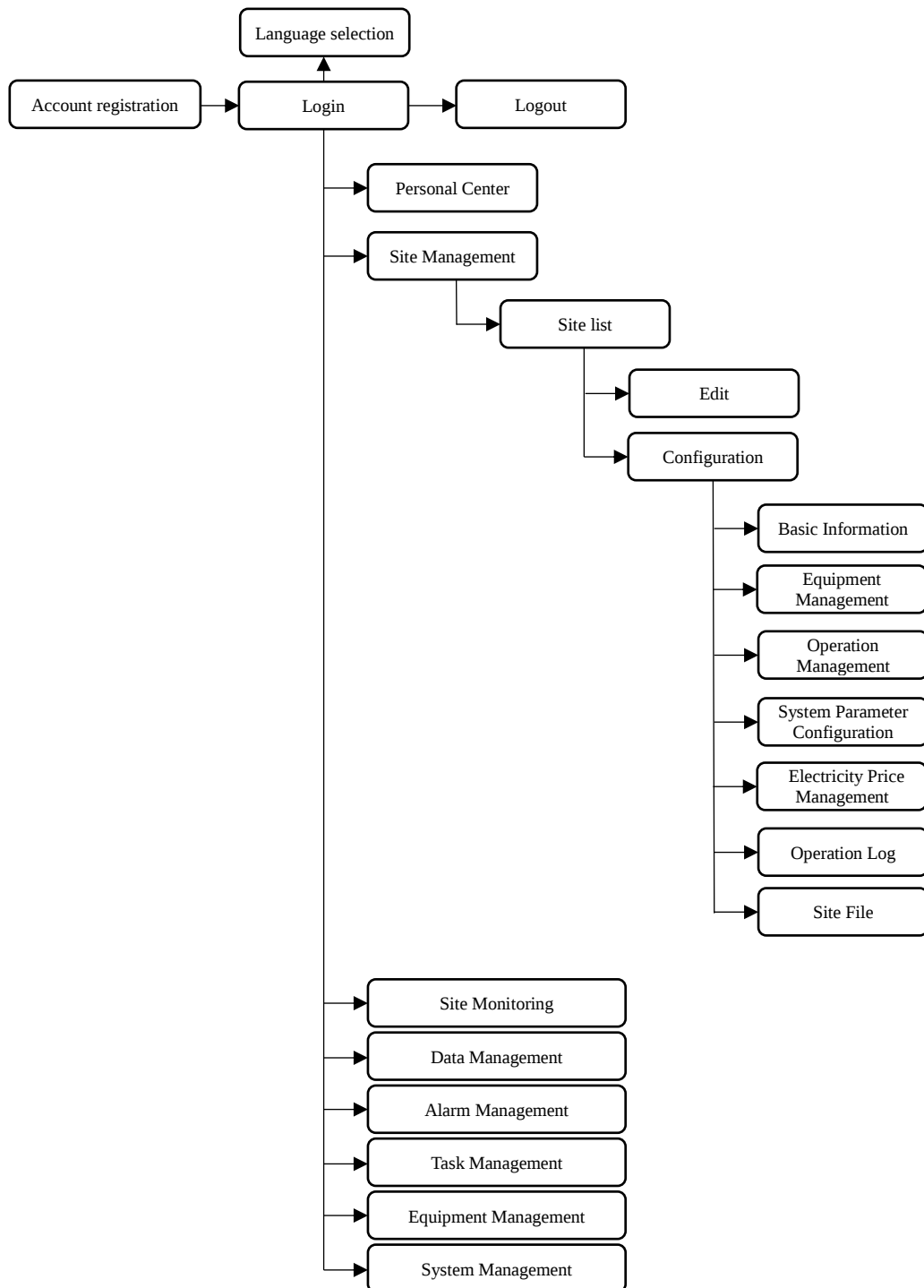


If it is not possible to shut down through the cloud platform, follow the steps below

- 1) Stop the load first;
- 2) Disconnect QF5-QF11-PV switch (Figure 6.3 1 Inverter DC Switch)-QF12-QF9-QF8-QF7 in order.

7 Usage of Cloud Platform

This product supports cloud platform-based operation and maintenance management, which is built upon digital energy technologies such as the Internet of Things (IoT), big data analysis, and cloud computing. It establishes a cloud-edge collaborative system that enables device perception, intelligent diagnostics, and coordinated control. This facilitates remote monitoring and unattended operation of C&I ESS stations, providing users with efficient and secure smart operation and maintenance services.



7.1 User Login

(1) Account Information

Please contact your installer or our company's service personnel to obtain an account.

(2) Login

The login address for the energy management cloud platform can be obtained from the relevant C&I ESS service personnel. Enter your account and password on the login page, then click "Login" to access the platform.

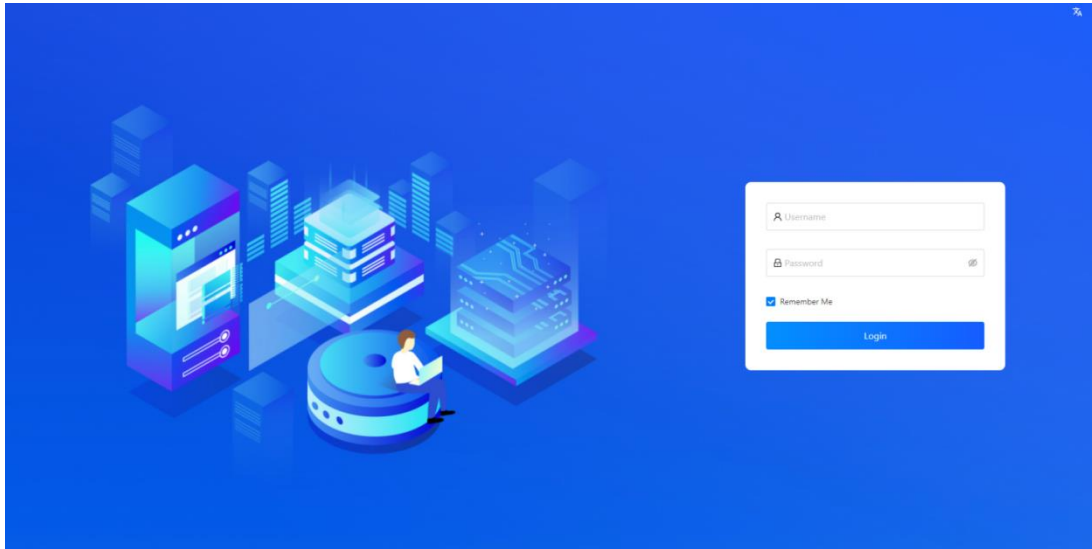


Figure 7.1-1 Cloud Platform Login Display Interface

(3) Multi-Language Switching

Language switching can be done at the top right corner of the login page.

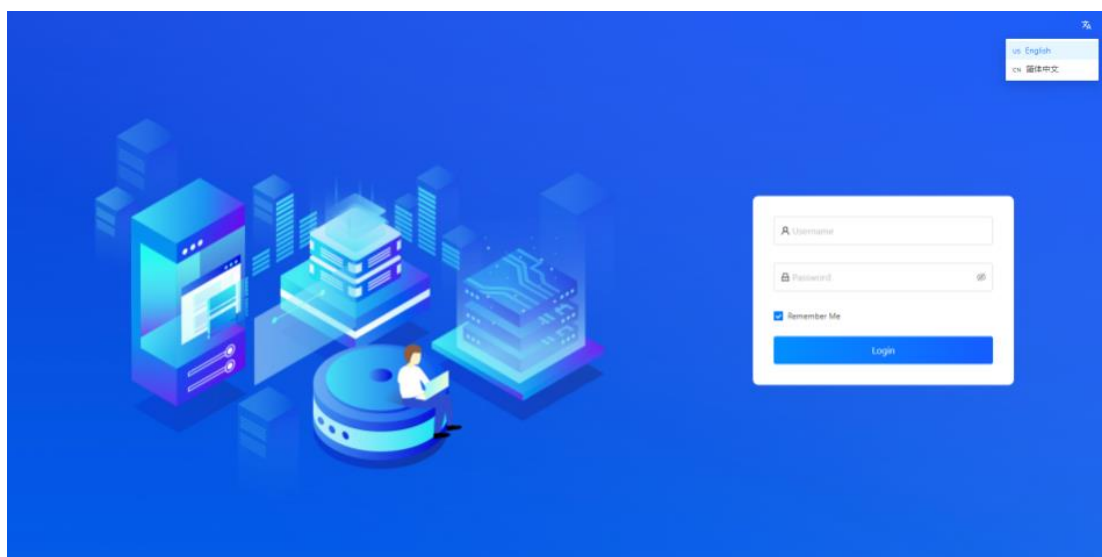


Figure 7.1-2 Cloud Platform Language Switching Display Interface

(4) Logout

Access the management platform - click on the profile icon at the top right corner, then click the "Logout" button to exit the system.

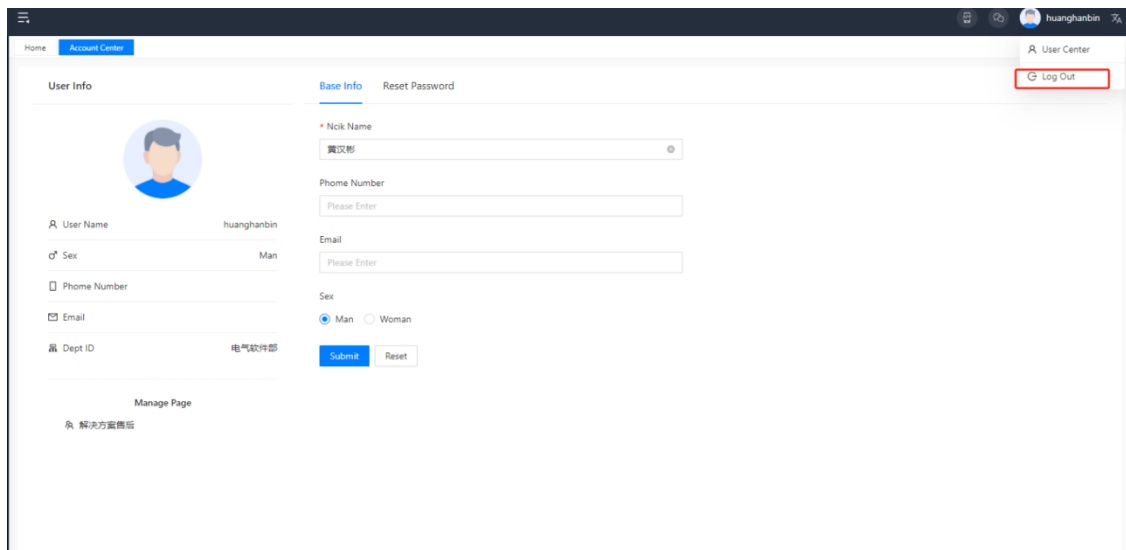


Figure 7.1-3 Cloud Platform Logout Display Interface

(5) Login Account Viewing and Password Reset

Access the management platform - click on the profile icon at the top right corner, then click on "Personal Center" to enter the basic information page. Here, you can modify your avatar, nickname, mobile number, user email, gender, and other basic information, as shown in the figure below:

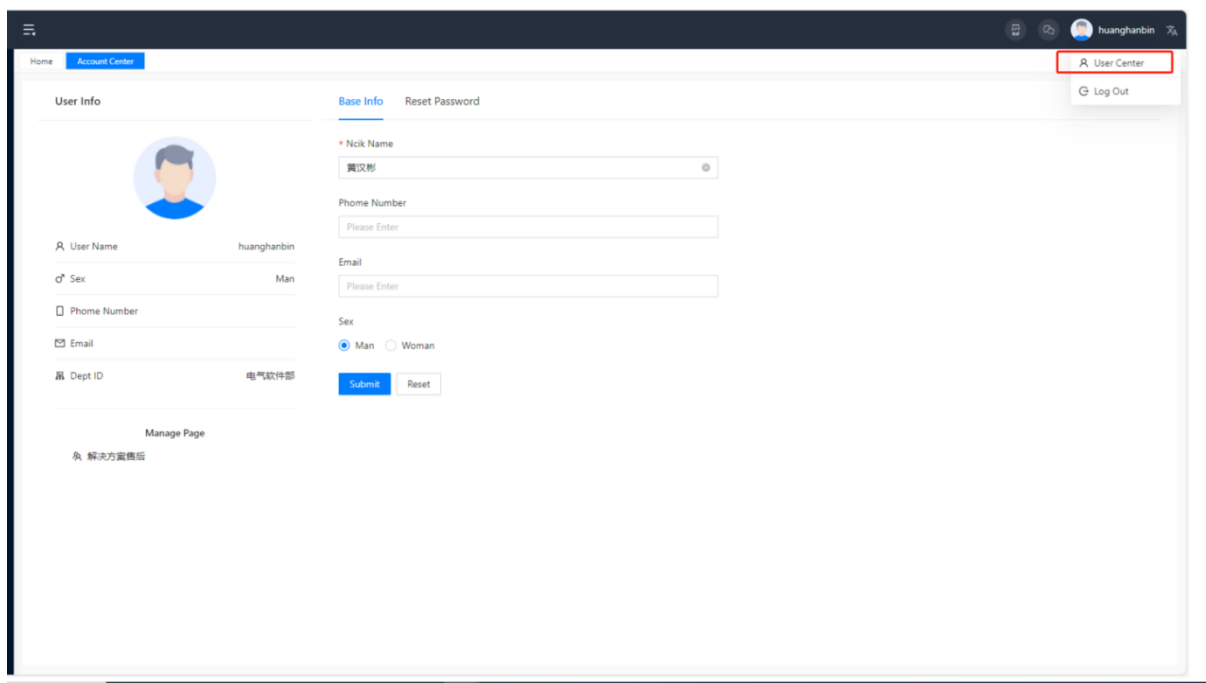


Figure 7.1-4 Cloud Platform Personal Center Display Interface

Access the management platform - click on the profile icon at the top right corner, then click on "Personal Center" to enter the password reset page, where you can change your password information.

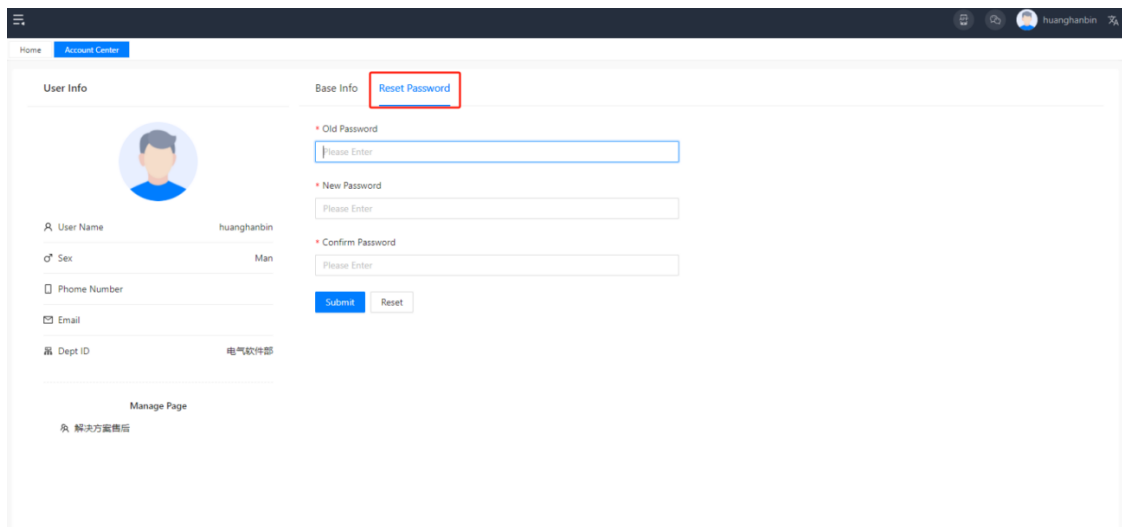


Figure 7.1-5 Cloud Platform Password Modification Display Interface

7.2 Site Management

Owners can filter their owned site lists using conditions and view the main information of the sites, edit basic site information, configure operating parameters, and check site operation logs, etc.

(1) Site List

Query Conditions: Site name, creation time, region.

List Display: Site name, site code, site type, creation time, delivery time, site location, construction status, installer, operator, last operation time.

Site Operations: Edit (edit basic site information), Site Configuration (site operating parameter configuration).

No.	Site Name	Site Status	Site Code	Site Type	Creator	Creation Time	Installation Status	Delivery T...	Installer	Operate
1	深圳盐田储能项目	Alarm	150098	ESS Site	胡振林	2024-10-12 16:04:44	Processing		储能售后	Edit Delete Site Configuration ☆
2	欧标测试	Alarm	150096	-	吴德博	2024-10-12 09:05:16	Processing		充电桩-广东、海南	Edit Delete Site Configuration ☆
3	湖北荆门海晏储能站	Alarm	150093	-	王栋	2024-10-10 09:39:04	Processing		储能售后	Edit Delete Site Configuration ☆
4	天锐益-益达实业 0.3MW	Normal	150085	ESS Site	羊昌远	2024-10-03 14:32:58	Completed	10/11/2024	储能售后	Edit Delete Site Configuration ☆
5	天锐益-益达实业 0.4MW	Normal	150084	ESS Site	羊昌远	2024-10-03 14:31:33	Completed	10/06/2024	储能售后	Edit Delete Site Configuration ☆
6	天锐益-益达实业 0.5MW	Normal	150083	ESS Site	羊昌远	2024-10-03 14:16:22	Completed	10/06/2024	储能售后	Edit Delete Site Configuration ☆
7	广东惠州-东莞大埔木业 0.3MW	Normal	150082	ESS Site	周双银	2024-10-02 13:44:22	Completed	10/10/2024	储能售后	Edit Delete Site Configuration ☆
8	中建科工无锡固废建设项目	Normal	150081	ESS Site	朱忠炎	2024-09-30 11:13:56	Completed	10/01/2024	储能售后	Edit Delete Site Configuration ☆
9	四川雅里坪水厂	Alarm	150080	ESS Site	杨胜峰	2024-09-29 17:31:09	Processing		储能售后	Edit Delete Site Configuration ☆

Figure 7.2-1 Cloud Platform Site List Display Interface

(2) Edit Site

Click the "Edit" button in the operation bar of the site list, and a pop-up window will appear where you can set basic information such as utility voltage level, transformer capacity, site location, PV capacity, ESS capacity, and charging pile rated total power. You can also upload site photos and logos for display.

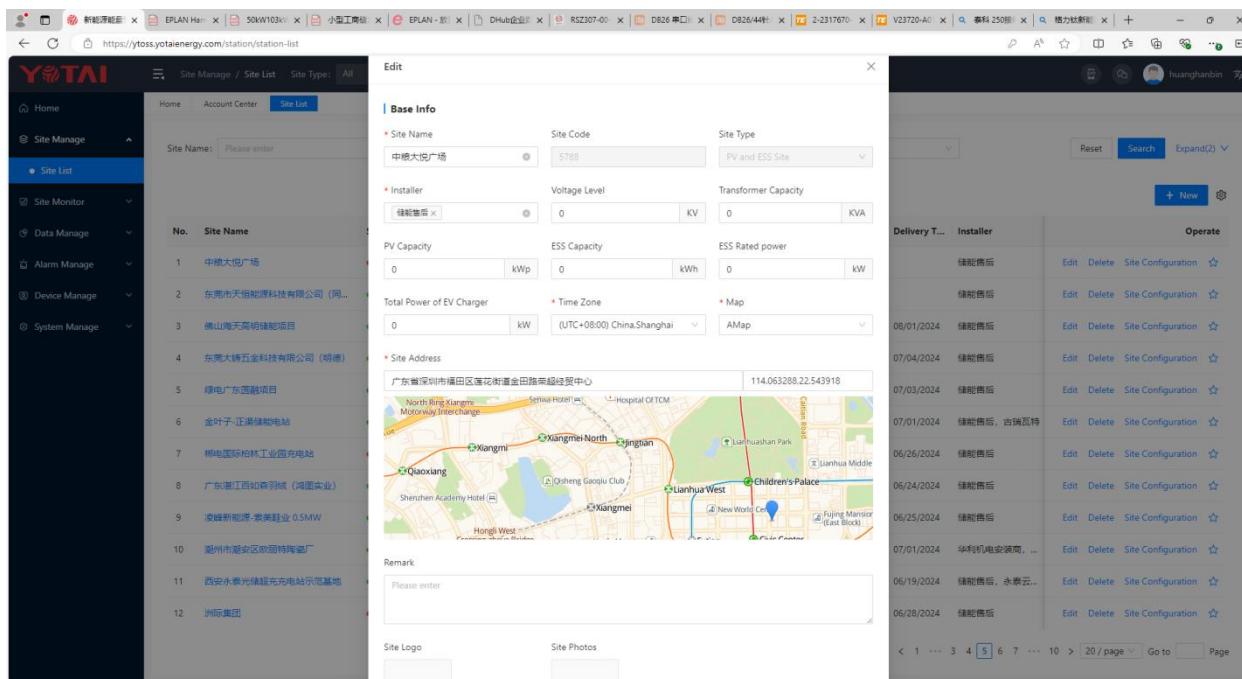


Figure 7.2-2 Cloud Platform Edit Site Display Interface

(3) Site Configuration

Click the "Site Configuration" button in the site list to jump to the "Site Configuration" page, which includes five sub-pages: "Basic Information," "Device Management," "Operation Management," "Electricity Price Management," and "Configuration Log." This layout allows users to easily modify statistical collection points during site operation and adjust the rules for revenue generation according to their needs.

(4) Basic Information

On this page, you can view the delivery status, status information, and basic information of the current site, which helps to understand the overview of the site's information.

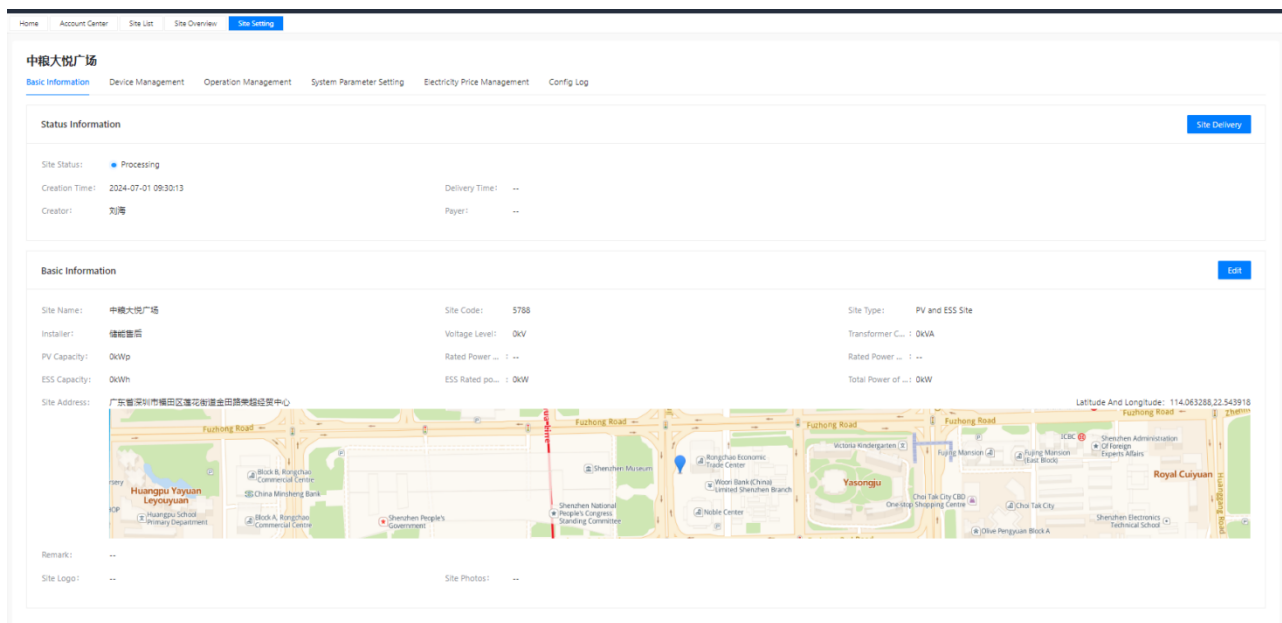


Figure 7.2-3 Cloud Platform Site Information Display Interface

(5) Device Management

This page displays all device information for the site, allowing for convenient monitoring of device operation information and viewing of related configuration information.

Query Conditions: Product type, device name, device serial number, addition time, communication status.

List Display: Device name, device code, device serial number, product model, product type, associated site, addition time, online time, communication status.

Click on the device name to display the device details page, where you can view real-time data, historical information, alarm information, and sub-module data of the selected device. The displayed page is consistent with the device management feature introduction.

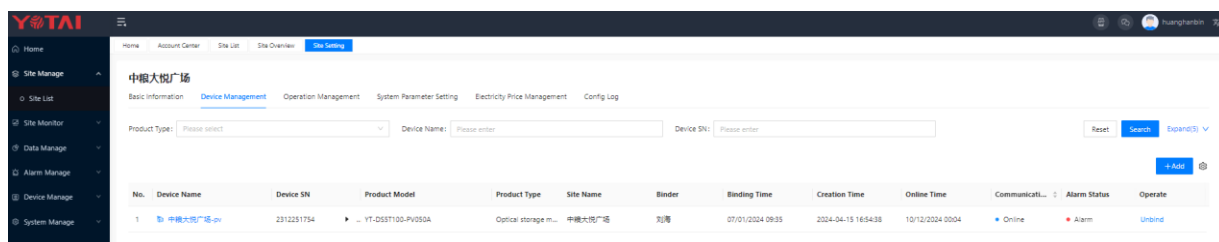


Figure 7.2-4 Cloud Platform Site Device Management Display Interface

(6) Operation Management

Monitoring Settings: Users can view the configuration of the site's data collection points on this page. This configuration affects the summary data display on the site overview page, and improper configuration can impact data accuracy.

Utility Monitoring: Configure the site's utility electricity consumption and real-time power data source.

Other Loads: Configure the site's load electricity consumption and real-time power data source.

PV Monitoring: Configure the site's PV electricity generation.

ESS Monitoring: Configure the site's ESS charge volume, discharge volume, and real-time power data source.

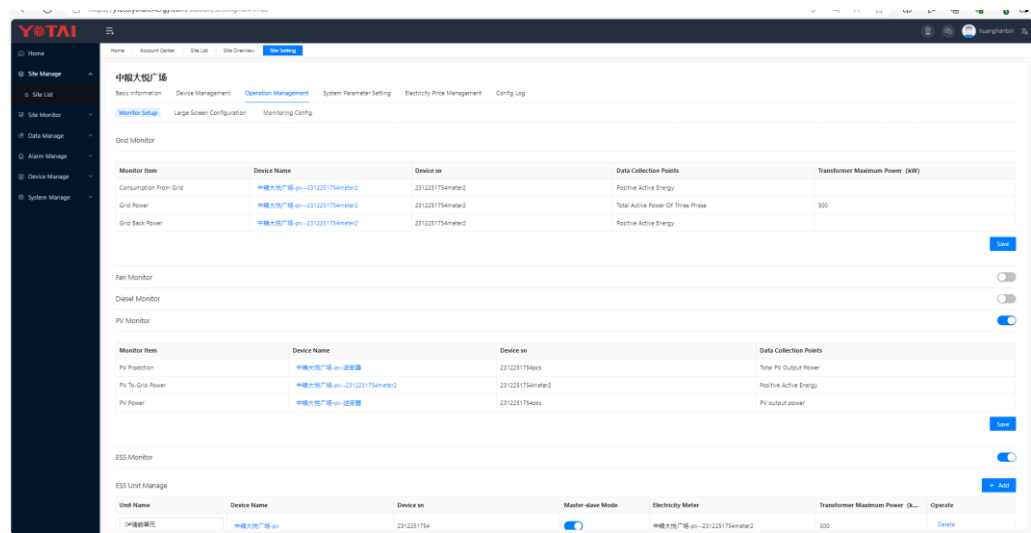


Figure 7.2-5 Cloud Platform Site Operation Management Display Interface

(7) Operation Parameter Setting

The storage duration of historical data can be set. Users can select the storage duration as required.

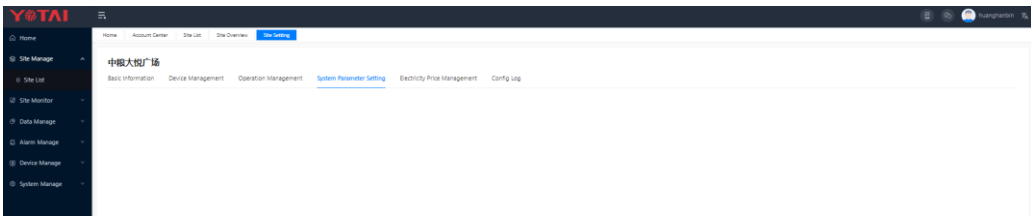


Figure 7.2-6 Cloud Platform Site Running Parameter Setting Page

(8) Electricity Price Management

Utility Electricity Price Settings: Users can flexibly create multiple electricity price rules according to the charging standards of the power supply bureau. Each rule can configure multiple effective dates, setting a uniform peak, flat, and valley electricity price for these date ranges, and can set the peak, flat, and valley time periods within the date range, with up to ten segments.

Rule Name: Define the name of the electricity price rule, ensuring no date conflicts between different rules.

Effective Date: Select the effective date for the electricity price, and you can add multiple non-consecutive time periods. There should be no overlapping dates between different rules.

Power Factor Assessment: The standard for power factor assessment by the power authority for industrial electricity

use.

Basic Electricity Fee Type: Demand electricity fee (charged based on maximum demand), capacity electricity fee (charged based on maximum capacity).

Peak spike, Peak, Flat, and Valley Electricity Prices: Enter the peak spike, peak, flat, and valley time period electricity prices corresponding to the region.

Time Period: Set the corresponding peak spike, peak, flat, and valley time periods according to the regional electricity price periods.

PV Grid Connection Electricity Pricing Settings: Users can create multiple electricity pricing rules flexibly based on the charging standards of the power supply bureau. Each rule can be configured with multiple effective dates, setting a grid connection electricity price for specific time periods within these date ranges, with a maximum of ten segments that can be set.

Rule Name: Define the name of the electricity price rule, ensuring no date conflicts between different rules.

Effective Date: Select the effective date for the electricity price, and you can add multiple non-consecutive time periods. There should be no overlapping dates between different rules.

Grid Connection Electricity Price: Enter the peak spike, peak, flat, and valley period electricity prices corresponding to the region.

Time Periods: Set the corresponding periods based on the regional electricity pricing periods.

Add New Electricity Price Example

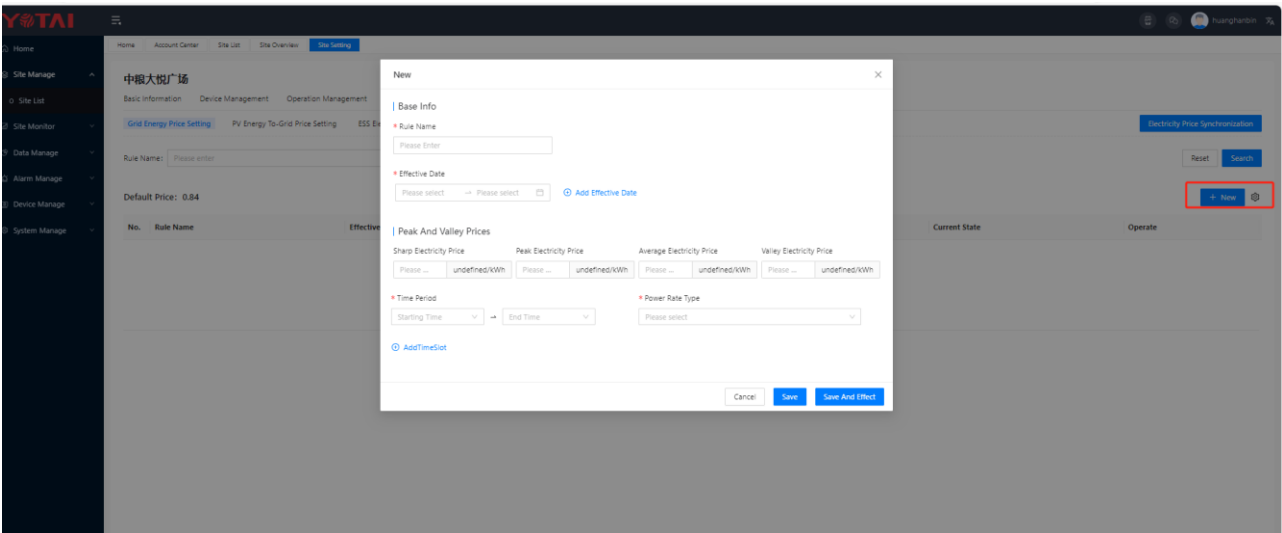
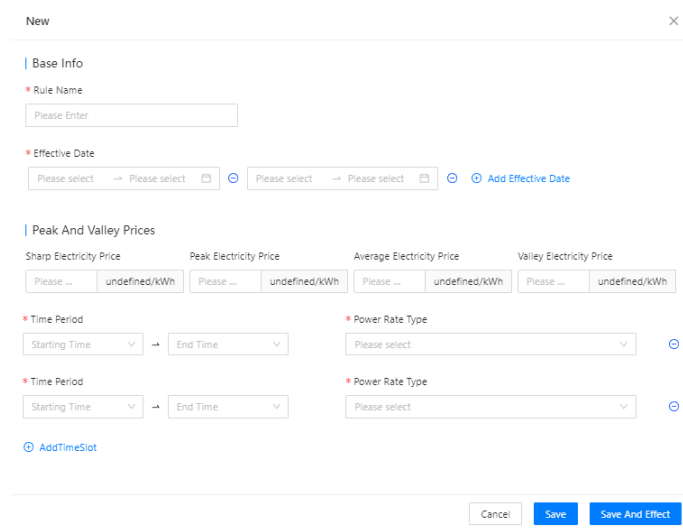


Figure 7.2-7 Cloud Platform Site Electricity Price Management Display Interface

Click on "View Details" in the list to view the configured electricity price details.



New

Base Info

* Rule Name
Please Enter

* Effective Date
Please select → Please select → Please select → Please select → Add Effective Date

Peak And Valley Prices

Sharp Electricity Price Peak Electricity Price Average Electricity Price Valley Electricity Price

Please ... undefined/kWh Please ... undefined/kWh Please ... undefined/kWh Please ... undefined/kWh

* Time Period
Starting Time → End Time

* Power Rate Type
Please select

* Time Period
Starting Time → End Time

* Power Rate Type
Please select

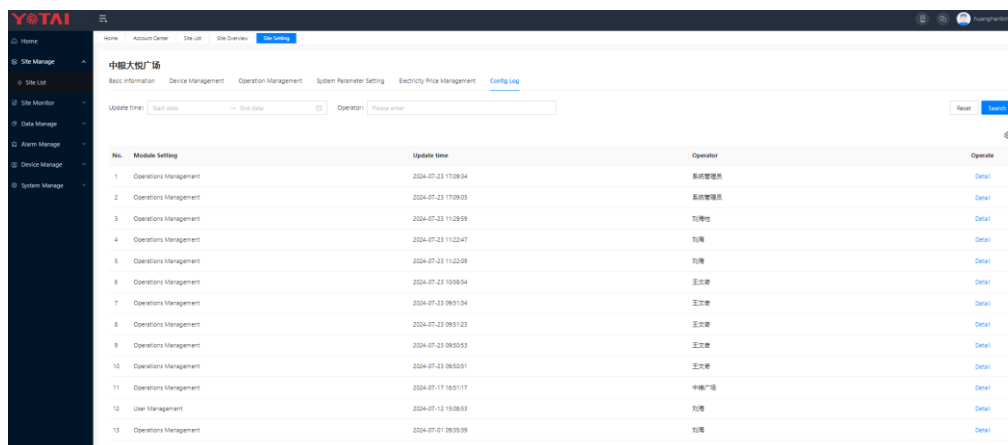
AddTimeSlot

Cancel Save Save And Effect

Figure 7.2-8 Cloud Platform Site Electricity Price Details Display Interface

(9) Configuration Log

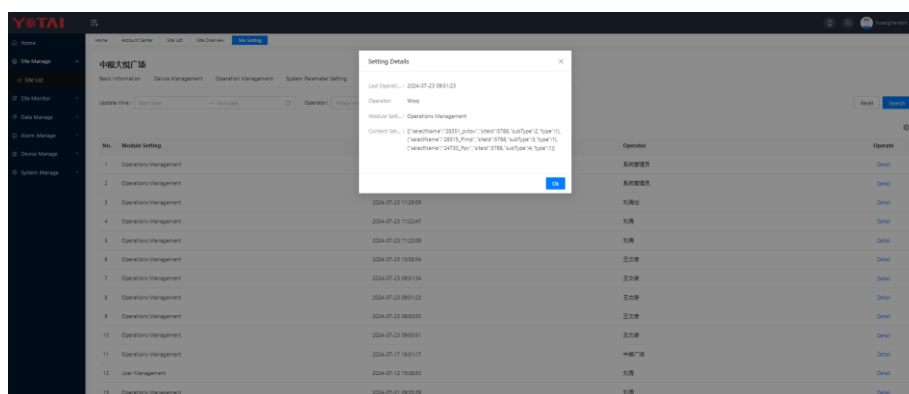
This page displays the historical data of user settings for the site, recording all operation records, including site permission configurations, electricity price configurations, site information modifications, etc., facilitating the daily maintenance and traceability of operations by maintenance personnel.



No.	Module Setting	Update time	Operator	Operate
1	Operations Management	2024-07-23 13:08:34	系统管理员	Detail
2	Operations Management	2024-07-23 13:09:05	系统管理员	Detail
3	Operations Management	2024-07-23 13:09:59	刘博性	Detail
4	Operations Management	2024-07-23 13:22:47	刘博	Detail
5	Operations Management	2024-07-23 13:22:09	刘博	Detail
6	Operations Management	2024-07-23 13:08:54	王次豪	Detail
7	Operations Management	2024-07-23 09:51:54	王次豪	Detail
8	Operations Management	2024-07-23 09:51:23	王次豪	Detail
9	Operations Management	2024-07-23 09:50:53	王次豪	Detail
10	Operations Management	2024-07-23 09:50:51	王次豪	Detail
11	Operations Management	2024-07-17 16:51:17	中微广福	Detail
12	User Management	2024-07-12 15:06:53	刘博	Detail
13	Operations Management	2024-07-01 09:35:39	刘博	Detail

Figure 7.2-9 Cloud Platform Site Configuration Log Display Interface

Click "View Details" to see the detailed logs and parameters, which are helpful for analysis and comparison.



No.	Module Setting	Update time	Operator	Operate
1	Operations Management	2024-07-23 13:08:34	系统管理员	Detail
2	Operations Management	2024-07-23 13:09:05	系统管理员	Detail
3	Operations Management	2024-07-23 13:09:59	刘博性	Detail
4	Operations Management	2024-07-23 13:22:47	刘博	Detail
5	Operations Management	2024-07-23 13:22:09	刘博	Detail
6	Operations Management	2024-07-23 13:08:54	王次豪	Detail
7	Operations Management	2024-07-23 09:51:54	王次豪	Detail
8	Operations Management	2024-07-23 09:51:23	王次豪	Detail
9	Operations Management	2024-07-23 09:50:53	王次豪	Detail
10	Operations Management	2024-07-23 09:50:51	王次豪	Detail
11	Operations Management	2024-07-17 16:51:17	中微广福	Detail
12	User Management	2024-07-12 15:06:53	刘博	Detail
13	Operations Management	2024-07-01 09:35:39	刘博	Detail

Setting Details

Last Operate: 2024-07-23 09:51:23

Operator: 王次豪

Module Set: Operations Management

Content Set: [{"name": "2024-07-23 09:51:23", "value": "2024-07-23 09:51:23", "type": "1"}, {"name": "2024-07-23 09:51:23", "value": "2024-07-23 09:51:23", "type": "1"}, {"name": "2024-07-23 09:51:23", "value": "2024-07-23 09:51:23", "type": "1"}]

OK

Figure 7.2-10 Cloud Platform Site Log Parameters Display Interface

7.3 Site Monitoring

(1) Site Overview

On the current page, users can get a comprehensive view of the site's basic information, main module information, emission reduction statistics, real-time energy flow diagram, multi-dimensional revenue statistics, real-time power, and cumulative electricity statistics based on time periods. This provides a holistic, intuitive, and real-time overview of the site's energy status and equipment operation, facilitating users to keep track of the overall site operation and corresponding revenue information in real time.

Table 7.3-1 Site Display Information Statistics Table

Function	Description
Basic Information	Site name, geographical location, site status, total PV capacity, total energy storage capacity, delivery time, site image.
Site Operation Data Display	Key operational parameter information for energy storage batteries, ESS, utility power, and load operation data.
Energy Flow Diagram	Displays the energy flow direction of the current power station's utility power, energy storage, and load, as well as real-time operating power, energy storage SOC (State of Charge), and equipment operation status.
Revenue Display	Presents the energy storage revenue, energy storage charging electricity fee, and energy storage discharging income according to daily, monthly, annual, and cumulative dimensions.
Emission Reduction Statistics	The amount of energy storage discharging is equivalent to energy saving and emission reduction, reducing the waste of electrical energy resources, which is equivalent to reducing CO ₂ emissions from the combustion of fossil fuels, akin to planting trees for the Earth.
Real-time Power Display	Displays the real-time operating power of the site's utility power, ESS, and other loads, with the ability to query past power curve data by selecting a date.
Electricity Statistics Data	Information on electricity data for utility power consumption, energy storage charging volume, energy storage discharging volume, and other load electricity usage, with the capability to query historical daily, monthly, and annual electricity data by selecting a date.

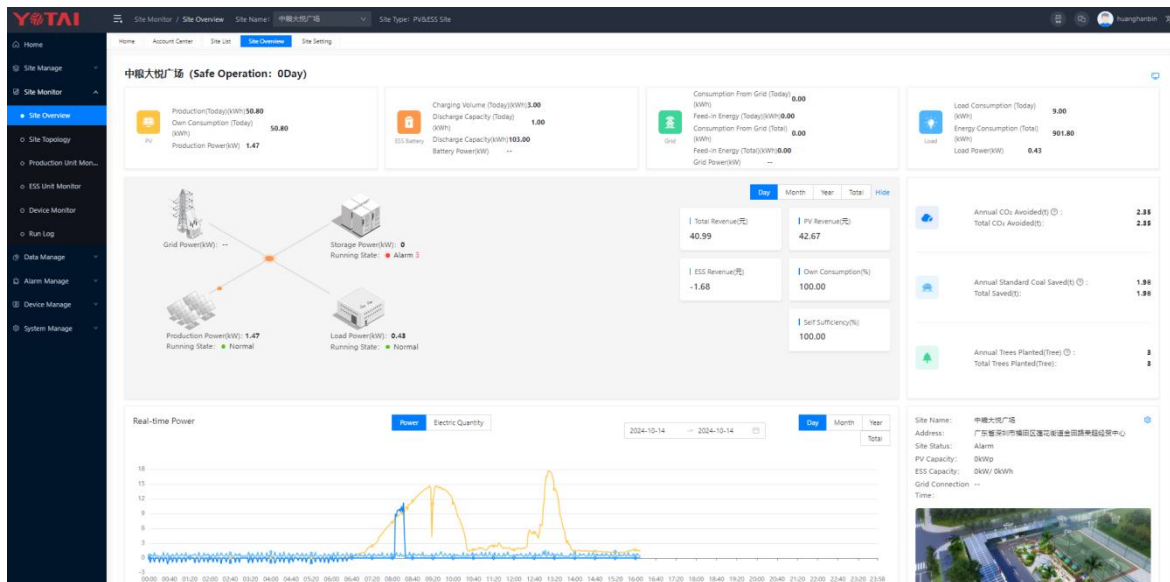


Figure 7.3-1 Cloud Platform Site Overview Display Interface

(2) Power Generation Unit Monitoring

On the current page, users can view the statistics of site-level photovoltaic power generation, including the number of generating units, the number of ungenerated units, the number of power generation groups, the proportion of self-use and other information.

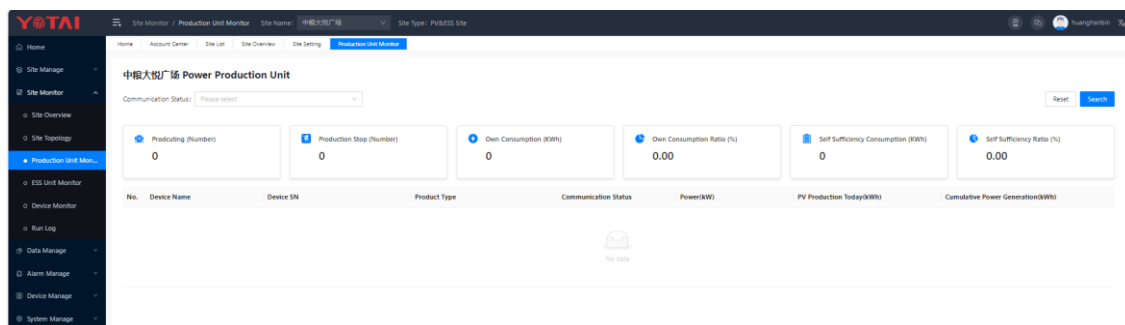


Figure 7.3-2 Cloud Platform Power Generation Unit Display Page

(3) Energy Unit Monitoring

1) Single Energy Storage Unit Monitoring

On the current page, users can view the statistical information of the site-level energy storage unit, including rated capacity, today's system charging, today's system discharging, cumulative charging, cumulative discharging, daily revenue, and cumulative revenue information.

Users can also switch between tables to view the overview data of different energy storage cabinets.

The physical structure diagram of the equipment and the operating status of each component: liquid cooling units, dehumidifiers, cabinet doors, EMS, battery stacks, battery modules, cells, and PCS operating status. By clicking "More," users can view detailed information of the corresponding energy storage device's sub-devices.

The daily operating power curve of the energy storage unit, with positive values indicating discharging and negative values indicating charging. Users can select historical dates to query the charging and discharging power curve of that day.

The charging and discharging trends of the energy storage unit, allowing users to query the daily charging and discharging volumes and the monthly charging and discharging volumes of that year based on monthly/year dimensions.

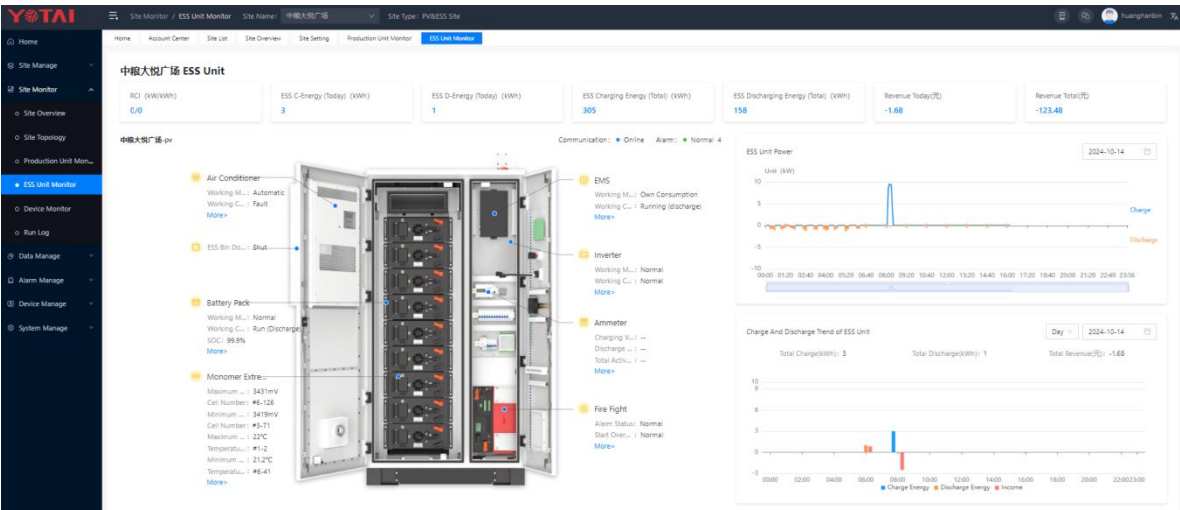


Figure 7.3-3 Cloud Platform Single Energy Storage Unit Display Interface

2) Parallel Energy Storage Unit Monitoring

When the energy storage equipment at a site communicates using a parallel configuration, all energy storage cabinet information of the current parallel system is summarized and displayed, and the information of individual energy storage cabinets is also supported.

Displays operational data such as the rated capacity of the energy storage unit, today's system charging, today's system discharging, cumulative charging, cumulative discharging, daily revenue, and cumulative revenue. Shows the current group's master and group information, and when the number of master and slave devices is more than two, users can view the main information of the current device, such as SOC, SOH, current voltage, current current, and current power, by switching left and right arrows. Displays the overall power and charging and discharging trends of the current parallel group's energy storage unit.

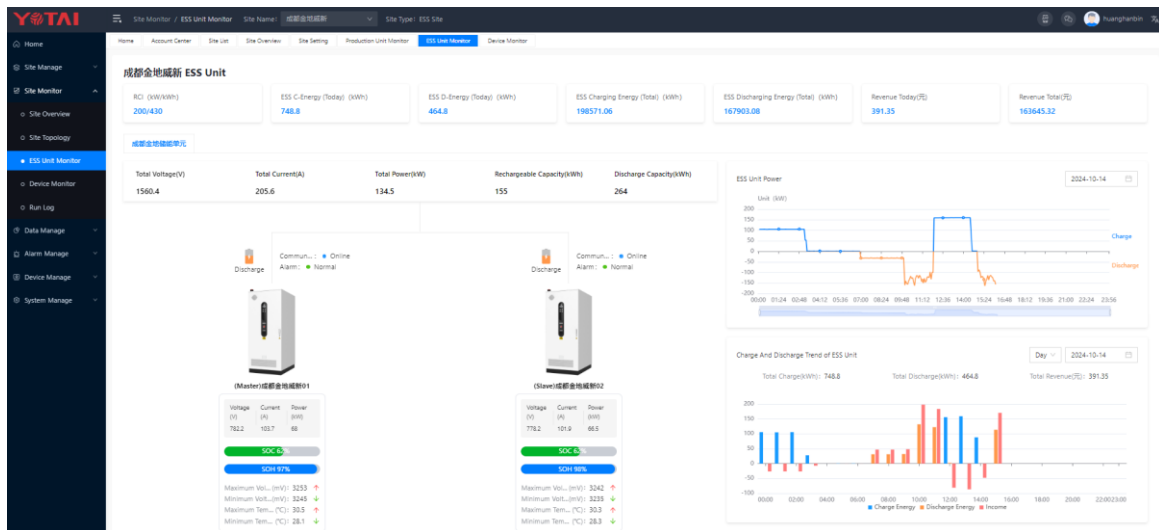


Figure 7.3-4 Cloud Platform Parallel Energy Storage Unit Display Interface One

When a user clicks on the icon of a master or slave device, it switches to the device overview page of the clicked device. Clicking the arrow allows switching between the information of each device. When the return button is clicked on the overview page, it returns to the master-slave topology page. The overall power and charging and discharging trends of the current parallel group are displayed on the right side. The overall power and charging and discharging trends of the current parallel group are displayed on the right side.

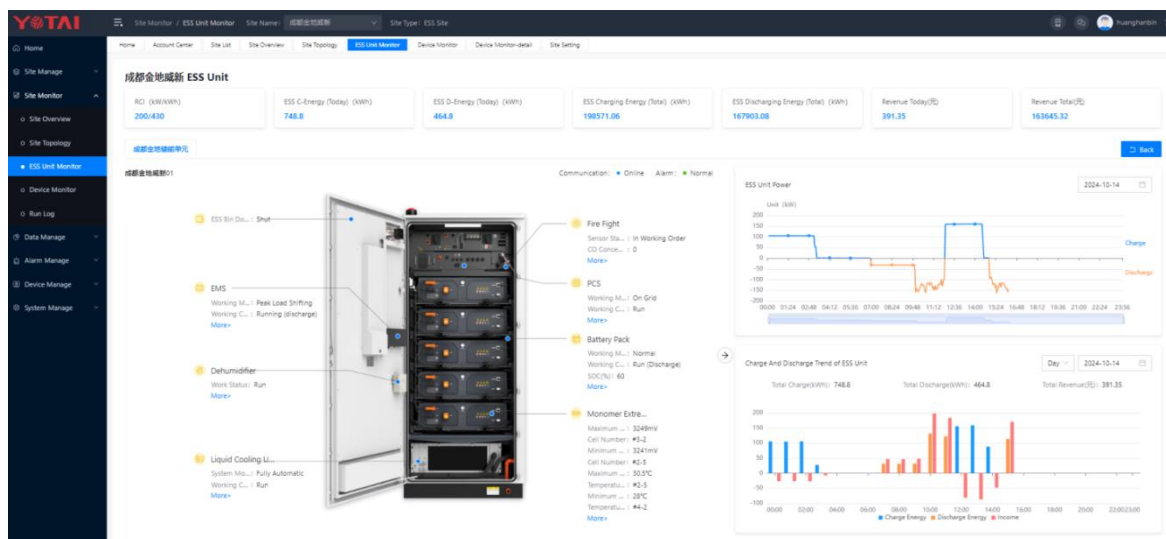


Figure 7.3-5 Cloud Platform Parallel Energy Storage Unit Display Interface Two

(4) Equipment Monitoring

Commercial and industrial energy storage site equipment is comprehensively monitored in three categories: EMS, energy storage inverters, and other devices.

EMS: Displays basic equipment information, associated site, communication status, alarm status, and system mode.

Energy Storage Inverter: Displays basic equipment information, associated site communication status, alarm status, operating status, rated power, and current power.

Other Devices: Displays basic equipment information, associated site communication status, and alarm status.

By clicking the equipment name, users can jump to the equipment detail page to view real-time data of the selected equipment, with the refresh rate determined by the equipment reporting frequency.

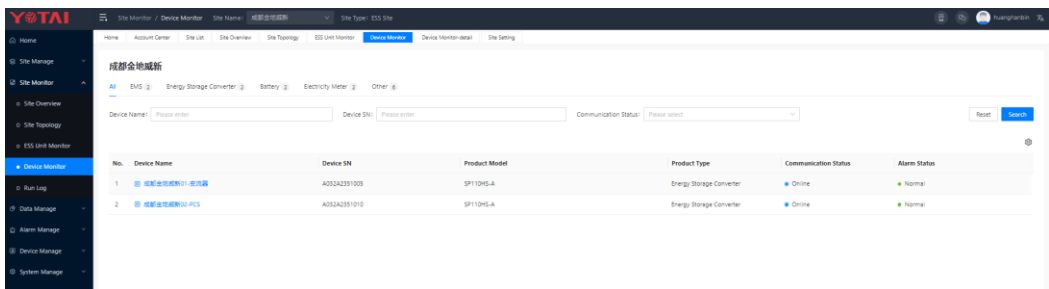


Figure 7.3-6 Cloud Platform Equipment Monitoring Display Interface

The real-time data display of EMS and other devices is similar to the equipment details.

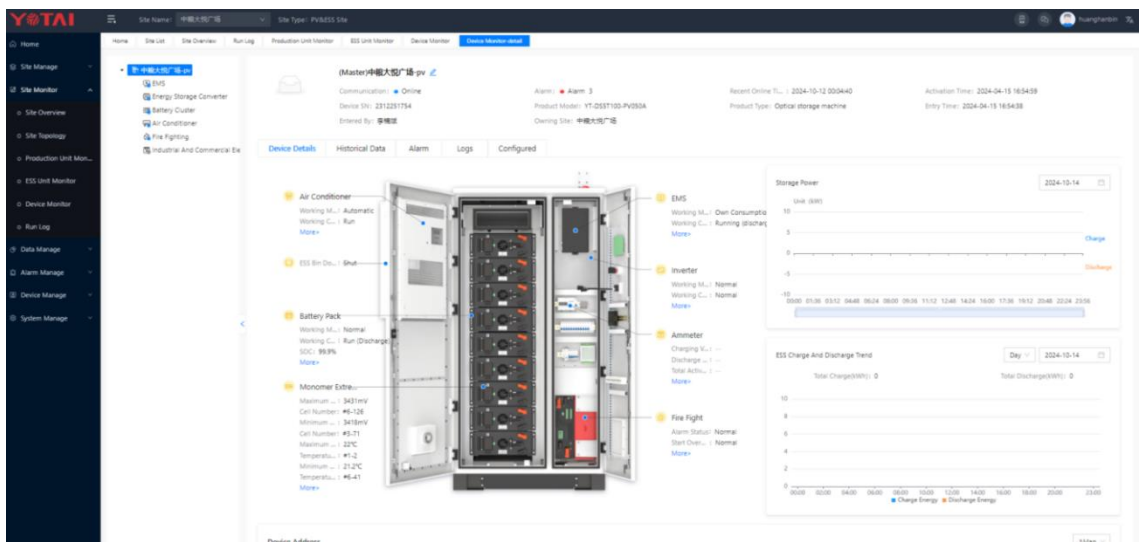


Figure 7.3-7 Cloud Platform EMS Monitoring Display Interface

(5) Operation Log

During the operation of the equipment, when some states of the equipment change, the system records the time of the equipment state change, the previous and new values for easy traceability of the equipment operation state. Instructions issued to the equipment are also recorded in the logs for easy traceability of the issuance records.

No.	Time	Device Name	Device SN	Log Name	Log Type	Operating User	Operate
1	2024-10-13 20:00:56 (23 hours ago)	中微大视广场-EMS	YT2312201754	Set The Calibration Time	Device Downlink		Detail
2	2024-10-12 20:00:53 (1 day ago)	中微大视广场-EMS	YT2312201754	Set The Calibration Time	Device Downlink		Detail
3	2024-10-11 20:00:50 (2 days ago)	中微大视广场-EMS	YT2312201754	Set The Calibration Time	Device Downlink		Detail
4	2024-10-10 20:00:49 (3 days ago)	中微大视广场-EMS	YT2312201754	Set The Calibration Time	Device Downlink		Detail
5	2024-10-09 20:00:53 (4 days ago)	中微大视广场-EMS	YT2312201754	Set The Calibration Time	Device Downlink		Detail
6	2024-10-08 20:00:52 (5 days ago)	中微大视广场-EMS	YT2312201754	Set The Calibration Time	Device Downlink		Detail
7	2024-10-08 08:37:44 (6 days ago)	中微大视广场-EMS	YT2312201754	System Working State Control	Device Downlink	李博源	Detail

Figure 7.3-8 Cloud Platform Operation Log Display Interface One

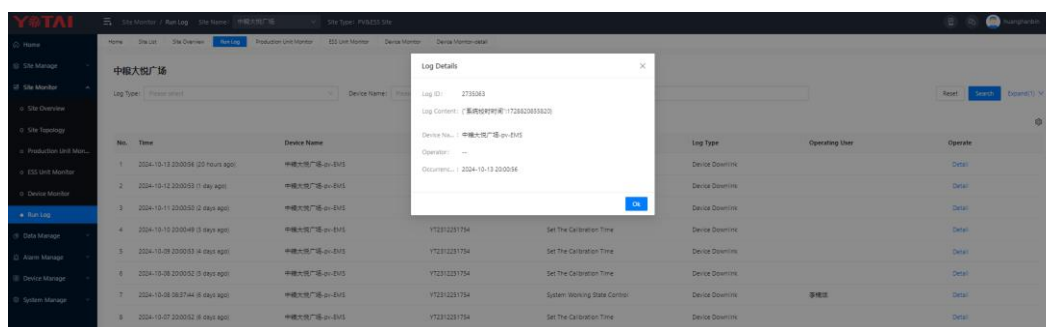


Figure 7.3-9 Cloud Platform Operation Log Display Interface Two

(6) Data Management

1) Data Report

Users can select any site and classify and summarize the operational data, revenue, and electricity costs of all devices under the site. Supports site reports, utility reports, energy storage reports, and other load reports. The statistical dimensions support daily (hourly data statistics), monthly (daily data statistics), annual (monthly data statistics), and lifecycle (annual data statistics). The relevant reports support the export function.

2) Site Report:

Statistics on utility power consumption, utility electricity costs, energy storage charging volume, energy storage discharging volume, energy storage charging costs, energy storage discharging costs, energy storage revenue (energy storage discharging income - energy storage charging costs), other load power consumption, and other load electricity costs.

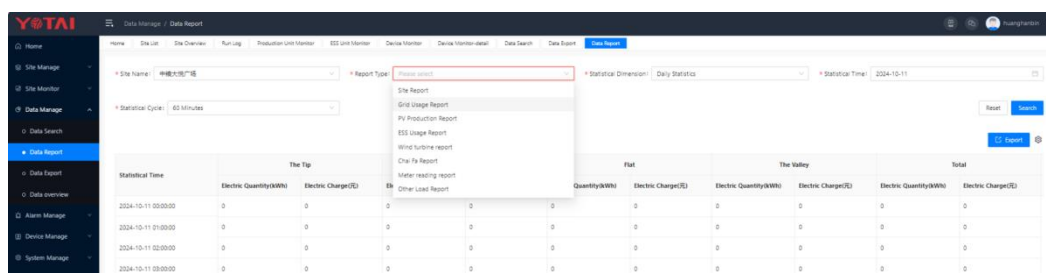


Figure 7.3-10 Cloud Platform Site Report Display Interface

3) Utility Electricity Report:

Statistics on utility electricity consumption and electricity costs during peak spike, peak, flat, and valley periods; total power consumption and total electricity costs.

YOTAI

☰

Data Manage / Data Report

Home

Site List

Site Overview

Run Log

Production Unit Monitor

ESS Unit Monitor

Device Monitor

Device Monitor-detail

Data Search

Data Report

Data Search

Site Name: 申耀光伏厂

Report Type: ESS usage Report

ESS Unit: All

Statistical Dimension: Daily Statistics

Statistical Time: 2024-10-11

Statistical Cycle: 60 Minutes

Reset

Search

Order First

Total First

Report

Statistical Time	ESS Charging						ESS Discharge									
	The Tip		Peak		Flat		The Valley		Total		The Tip		Peak		Flat	
	Electric Quant...	Fees(元)	Electric Quant...	Fees(元)	Electric Quant...	Fees(元)	Electric Quant...	Fees(元)	Electric Quant...	Fees(元)	Electric Quant...	Income(元)	Electric Quant...	Income(元)	Electric Quant...	Income(元)
2024-10-11 00:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2024-10-11 01:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2024-10-11 02:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2024-10-11 03:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2024-10-11 04:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2024-10-11 05:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2024-10-11 06:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2024-10-11 07:00:00	0	0	0	0	1	0.84	0	0	1	0.84	0	0	0	0	0	0
2024-10-11 08:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2024-10-11 09:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2024-10-11 10:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2024-10-11 11:00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Figure 7.3-11 Cloud Platform Utility Report Display Interface

4) Energy Storage Report:

Statistics on the charging volume and costs during the peak spike, peak, flat, and valley periods of energy storage, as well as the total charging volume and costs.

Statistics on the discharging volume and income during the peak spike, peak, flat, and valley periods of energy storage, as well as the total discharging volume and income.

Statistics on the total revenue of energy storage (total discharging income - total charging costs).

永泰数据

数据管理 / 数据报表

站点管理

站点监测

数据管理

数据报表

数据查询

告警管理

设备管理

系统管理

储能充电

设备名称: 小松光伏电站(平山沙湾站)

报表类型: 储能报表

所选设备: 全部

统计维度: 按日统计

统计时间: 2024-02-01

重置

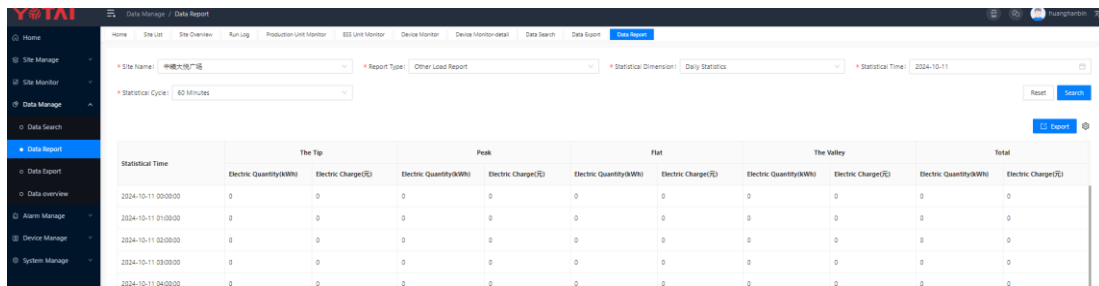
导出

统计时间	储能充电											
	尖		峰		平		谷		总		尖	
	电量(kWh)	费用(元)	电量(kWh)	费用(元)	电量(kWh)	费用(元)	电量(kWh)	费用(元)	电量(kWh)	费用(元)	电量(kWh)	收入(元)
2024-02-01 00:00:00	0	0	0	0	0	0	8.4	1.95	8.4	1.95	0	0
2024-02-01 00:10:00	0	0	0	0	0	0	9.6	3.01	9.6	3.01	0	0
2024-02-01 00:20:00	0	0	0	0	0	0	9.2	3.11	9.2	3.11	0	0
2024-02-01 00:30:00	0	0	0	0	0	0	16	4.68	16	4.68	0	0
2024-02-01 00:40:00	0	0	0	0	0	0	16.4	5.36	16.4	5.36	0	0
2024-02-01 00:50:00	0	0	0	0	0	0	17.2	5.94	17.2	5.94	0	0
2024-02-01 01:00:00	0	0	0	0	0	0	17.2	5.74	17.2	5.74	0	0
2024-02-01 01:10:00	0	0	0	0	0	0	16.8	5.46	16.8	5.46	0	0

Figure 7.3-12 Cloud Platform Energy Storage Report Display Interface

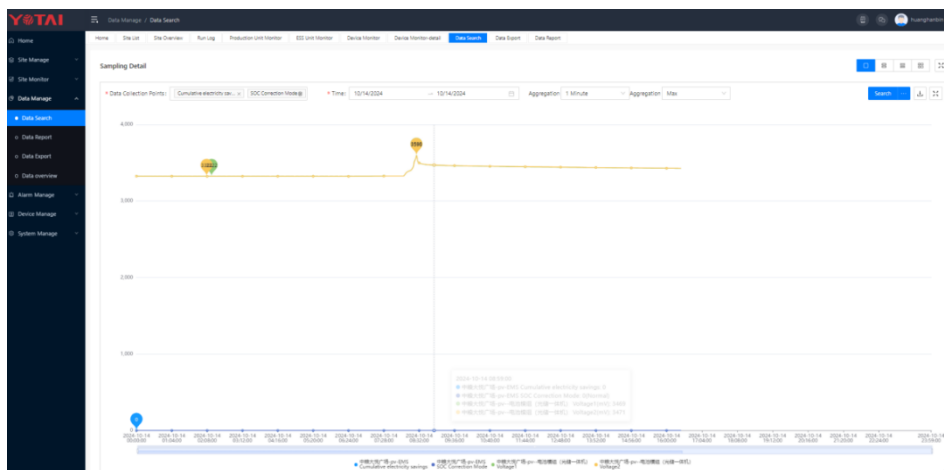
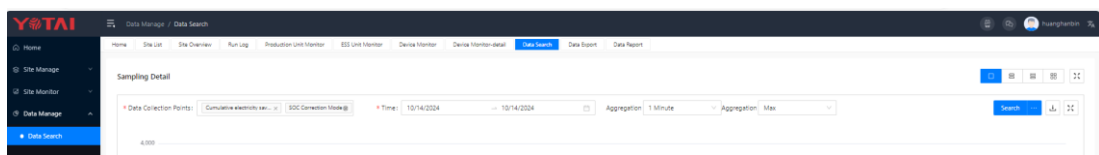
5) Other Load Report:

Calculate the electricity consumption and electricity cost of other loads during the four time periods (peak-shift, peak, flat, and valley), as well as the total electricity consumption and total electricity cost.



6) Data Query

After selecting a site, users can query the historical trend data of a specific data collection point under the site and support the export of the query results.



7.4 Alarm Management

(1) Current Alarms

Users can query real-time alarm information for a specific site or all sites through alarm levels, alarm statuses, and other query conditions, providing users with timely and comprehensive equipment alarm information to help users discover and solve problems in a timely manner, ensuring the reliability and stability of the equipment.

Alarm levels are divided into urgent, important, minor, and informational, and alarm statuses are divided into alarms in progress and alarms resolved.

Alarms in progress are displayed in current alarms, and after the alarm is resolved, they are transferred to historical alarms at 24:00 on the same day.



Figure 7.4-1 Cloud Platform Current Alarm Display Interface

Clicking on the alarm information pops up a window displaying detailed alarm information.

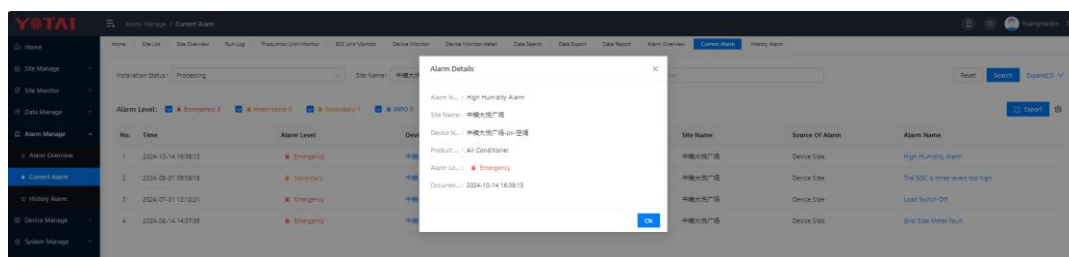


Figure 7.4-2 Cloud Platform Alarm Information Display Interface

(2) Historical Alarms

Alarm records are saved and traced back, providing users with comprehensive and convenient historical alarm management services, helping users review past alarm situations and better control various alarm issues throughout the equipment lifecycle.

Displays all cleared alarms, with clearance types divided into automatic recovery and manual clearance.

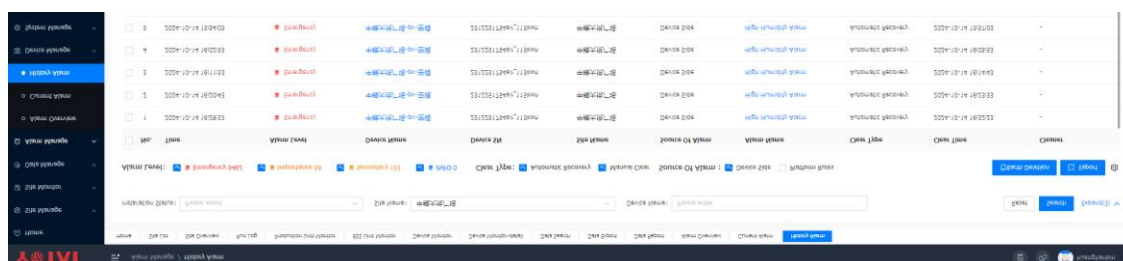


Figure 7.4-3 Cloud Platform Historical Alarm Display Interface

Clicking on the alarm information pops up a window displaying detailed alarm information.

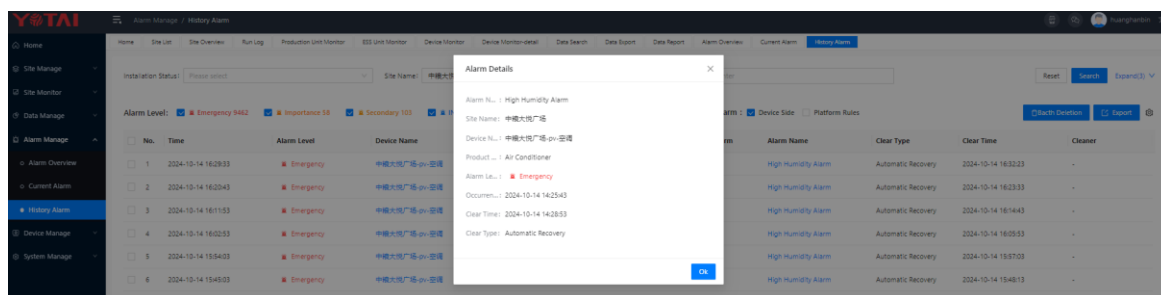


Figure 7.4-4 Cloud Platform Historical Alarm Information Display Interface

7.5 Equipment Management

(1) Device List

Users can search for device in their owned sites through site name, product type, device name, device serial number, communication status, and other query conditions, making it convenient for users to view device operation status and lifecycle.

No.	Device Name	Device SN	Product Model	Product Type	Site Name	Creation Time	Online Time	Communication S.	Alarm Status	Operate
1	宽拉号成 (后山区后山) 01...	013101000000012406120007	YT-0570150-PVWSDA(Wind Wood Storage)	Scenic firewood storage	宽拉号成后山区后山	2024-09-28 16:52:00	10/09/2024 20:03	Online	Alarm	
2	宽拉号成 (后山区后山) 01...	0131010000000012406300...	YT-0570150-PVWSDA(Wind Wood Storage)	Scenic firewood storage	宽拉号成后山区后山	2024-09-27 12:23:56	10/12/2024 00:31	Online	Alarm	
3	宽拉号成 (后山区后山) 01...	0131010000000012406300...	YT-0570150-PVWSDA(Wind Wood Storage)	Scenic firewood storage	宽拉号成后山区后山	2024-09-27 13:18:09	10/12/2024 00:30	Online	Alarm	
4	宽拉号成 (后山区后山) 01...	0131010000000012406300...	YT-0570150-PVWSDA(Wind Wood Storage)	Scenic firewood storage	宽拉号成后山区后山	2024-09-27 16:33:13	10/09/2024 20:03	Online	Alarm	

Figure 7.5-1 Cloud Platform Device List Display Interface

(2) Device Details

After clicking on the device name, users can enter the device details page, which is dedicated to real-time monitoring, control, and management of various device units in the energy storage main device. Through this module, users can easily monitor device operation status, implement remote control, conduct data analysis, and monitor devices.

The device details include five modules: device Details, Historical Data, Alarms, Logs, and Configuration. Among them, Historical Data, Alarms, and Logs are common modules, and all device details have these module functions.

(3) Historical Data:

Users can query the historical data generated by the device and its sub-devices, and can also select different data points for different sub-devices for query, supporting the export of data query results.

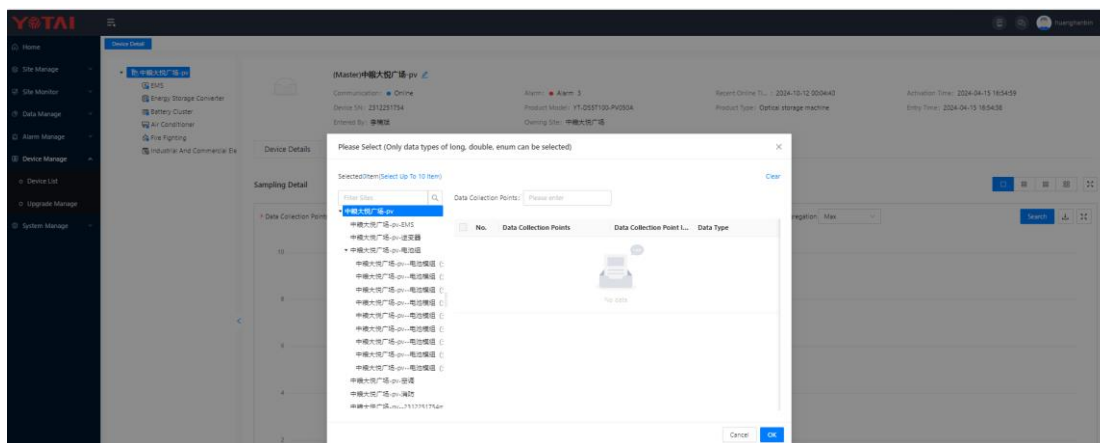


Figure 7.5-2 Cloud Platform Historical Data Display Interface One

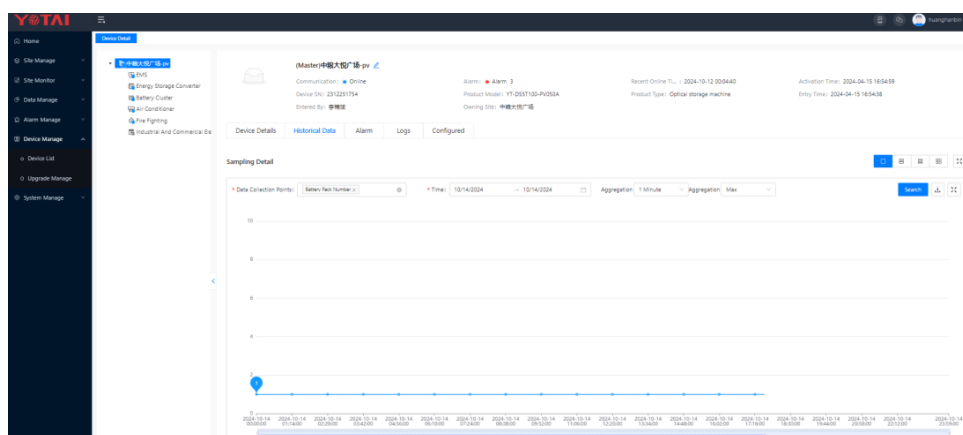


Figure 7.5-3 Cloud Platform Historical Data Display Interface Two

(4) Alarms:

By real-time monitoring, various alarm methods, four alarm levels, and alarm details, users are provided with timely and comprehensive device alarm information to help users discover and solve problems in a timely manner, ensuring the reliability and stability of the device.

Alarm levels are divided into critical, urgent, minor, and informational;

Alarms in progress are displayed in current alarms, and after the alarm is resolved, they are transferred to historical alarms at 24:00 on the same day;

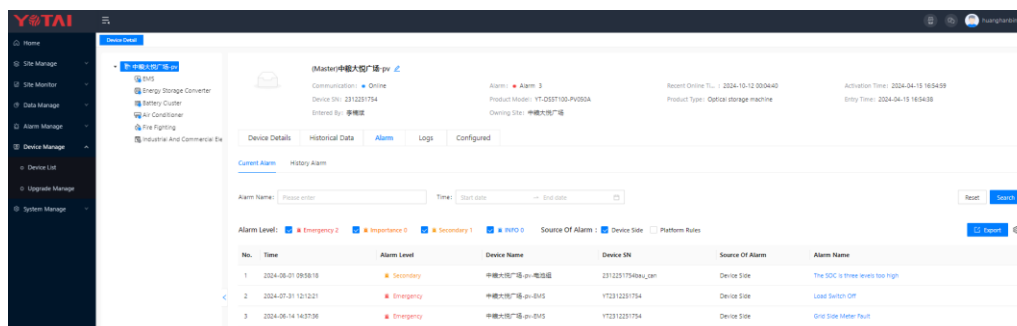


Figure 7.5-4 Cloud Platform Device Alarm Display Interface

Clicking on the alarm information will display detailed alarm information in a pop-up window.

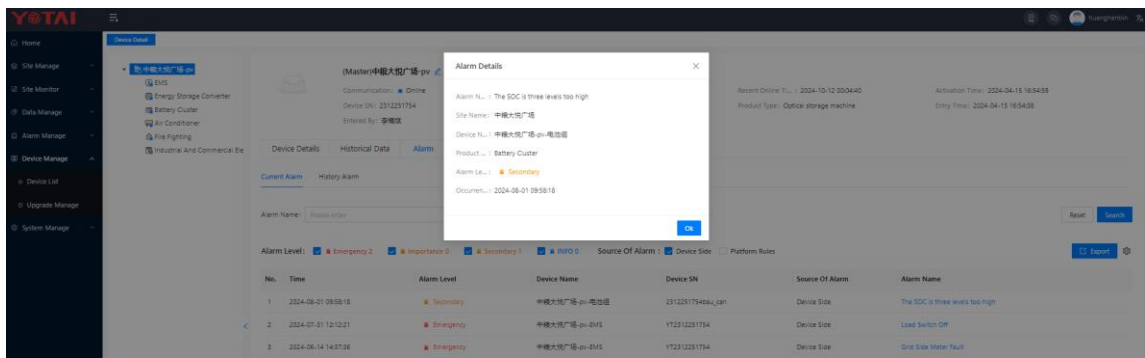


Figure 7.5-5 Cloud Platform Device Alarm Information Display Interface

(5) Logs:

During the operation of the equipment, when some states of the equipment change, the system records the time of the equipment state change, the previous and new values for easy traceability of the equipment operation state. Instructions issued to the equipment are also recorded in the logs for easy traceability of the issuance records.

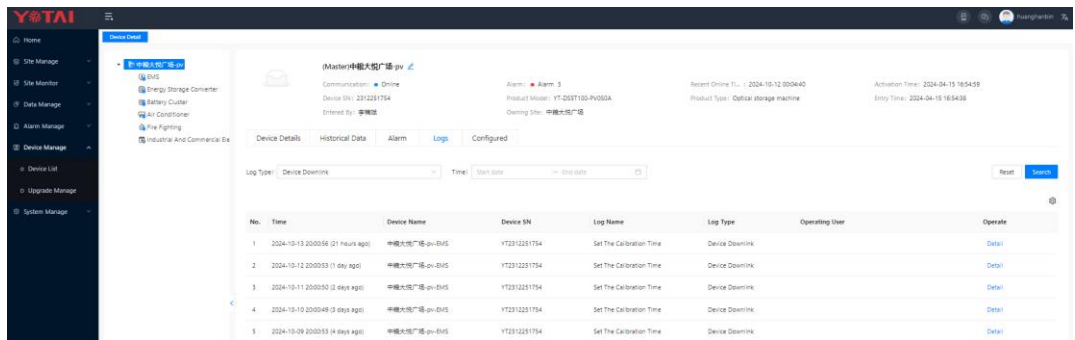


Figure 7.5-6 Cloud Platform Operation Log Display Interface

Click "View Details" to see the specific content of the logs.

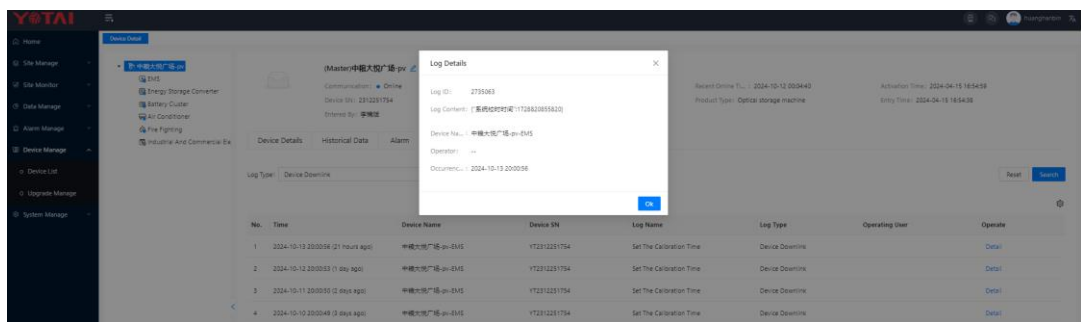


Figure 7.5-7 Cloud Platform Operation Log Content Display Interface

(6) PV&ESS All-in-One Cabinet

Device Details:

Displays the basic information and operational status of the cabinet.

Shows the physical structure diagram of the device and the operational status of each component: cabinet door, EMS, battery pack, individual cell information, inverter, air conditioning's main operational information. By clicking "More" users can view detailed information of the corresponding energy storage device's sub-device.

Displays the operational power of the energy storage unit, with positive values indicating discharging and negative values indicating charging. Users can select historical dates to query the charging and discharging power curve of that day.

On the left side of the device details, a device tree is displayed, showing the list of devices and their sub-devices, which can be clicked to switch and view different devices.

Displays the electrical primary diagram.

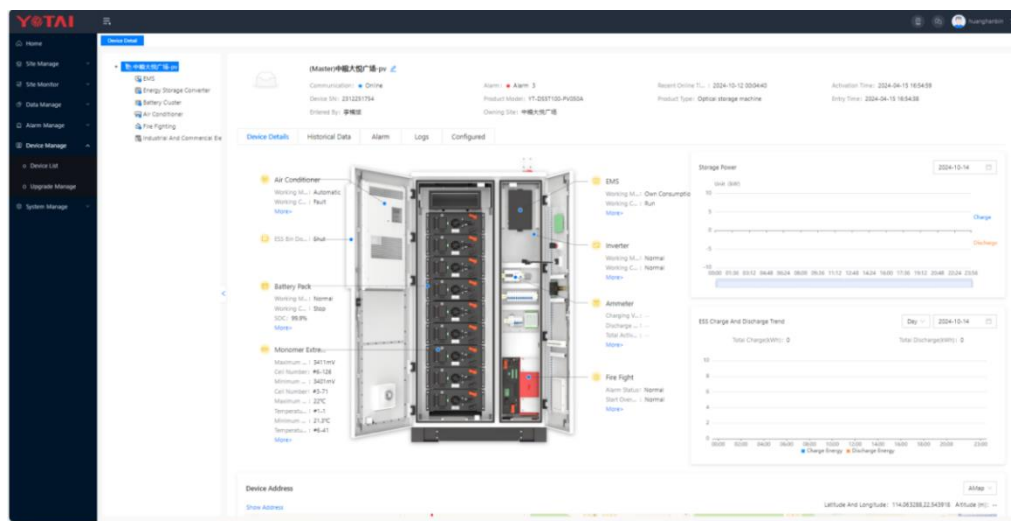


Figure 7.5-8 Cloud Platform Display Interface for PV&ESS All-in-One Cabinet

(7) ESS EMS

1) Device Details - Operational Data

Displays the basic information, status information, system charging cost statistics, system discharging revenue statistics, and emission reduction information of the EMS.

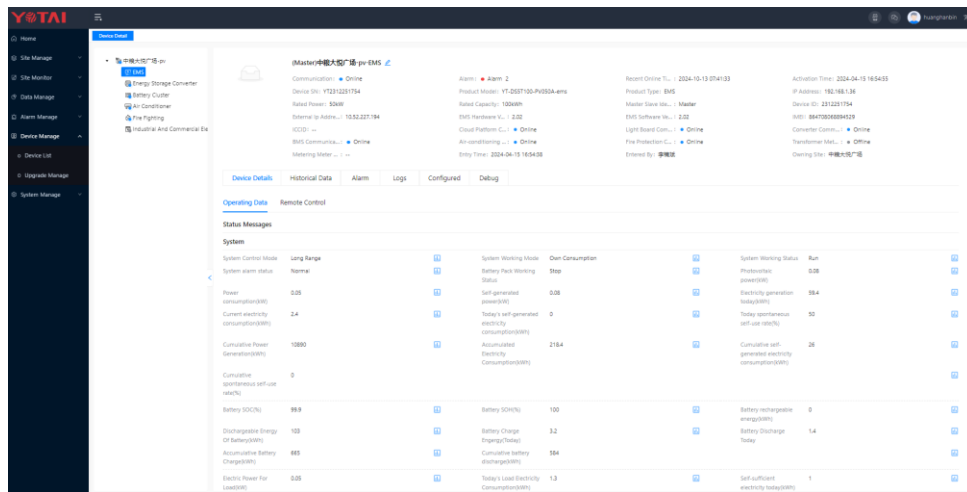


Figure 7.5-9 Cloud Platform EMS Information Display Interface

By clicking next to the data collection point, users can view the historical data trend of that data point, and can select a historical time period to view the trend within that period.

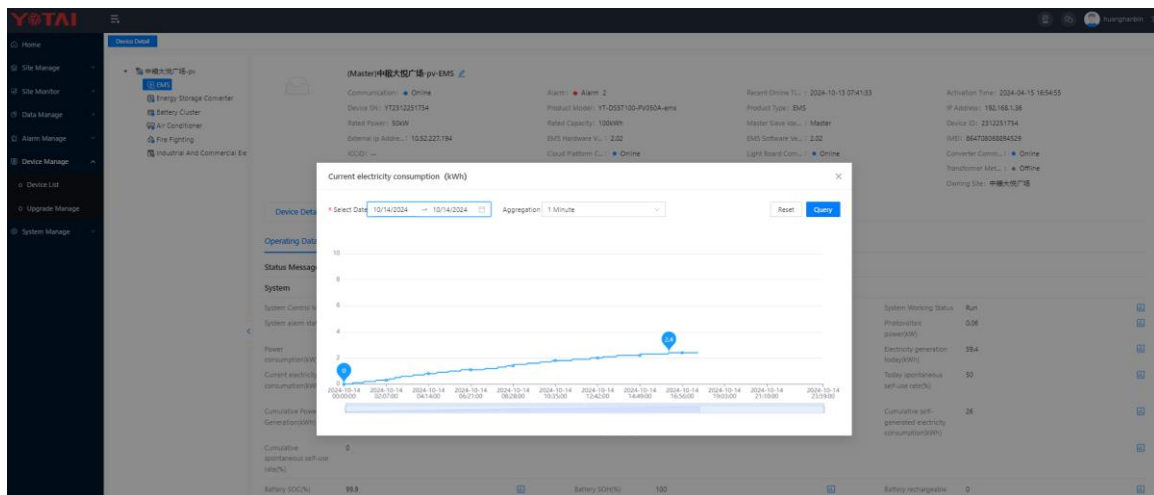


Figure 7.5-10 Cloud Platform Historical Data Display Interface

2) Device Details - Remote Control:

For detailed explanations of control commands, please refer to Appendix B.2.

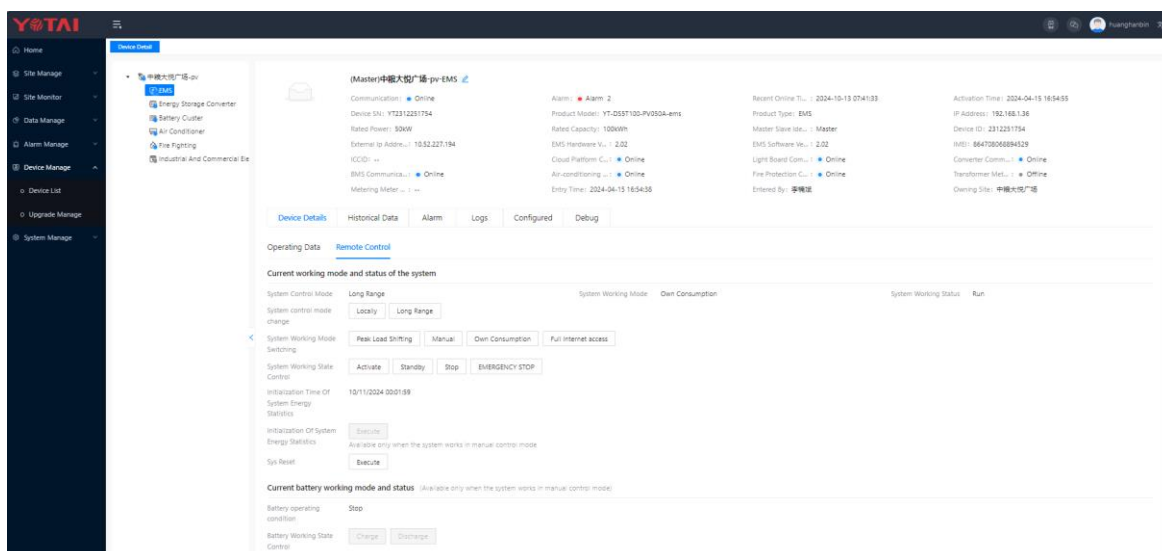


Figure 7.5-11 Cloud Platform Remote Control Display Interface

3) Configuration - Energy Management

Peak-Shaving Mode Settings: Users can set up to ten time periods for charging and discharging cycles, modes, and power, as well as the highest and lowest SOC throughout the entire mode process.

Manual Mode Settings: Set the maximum manual charging power and maximum discharging power.

Peak spike, Peak, Flat, and Valley Time Settings: Issue four electricity prices for peak spike, peak, flat, and valley periods to the device, and set up to ten time periods for peak spike, peak, flat, and valley modes for the device.

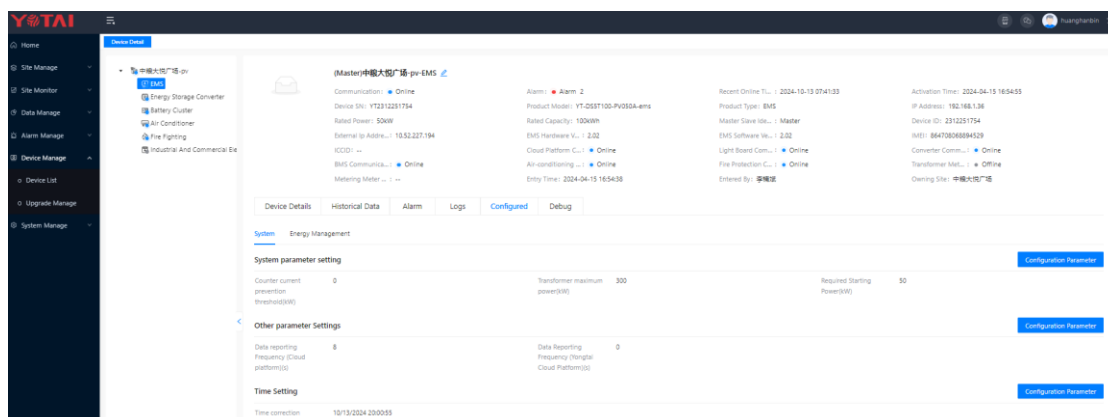


Figure 7.5-12 Cloud Platform Energy Management Settings Display Interface

(8) PV&ESS Inverter

Device Details display the basic information, status information, AC side information, DC side information, temperature information, and version information of the inverter.

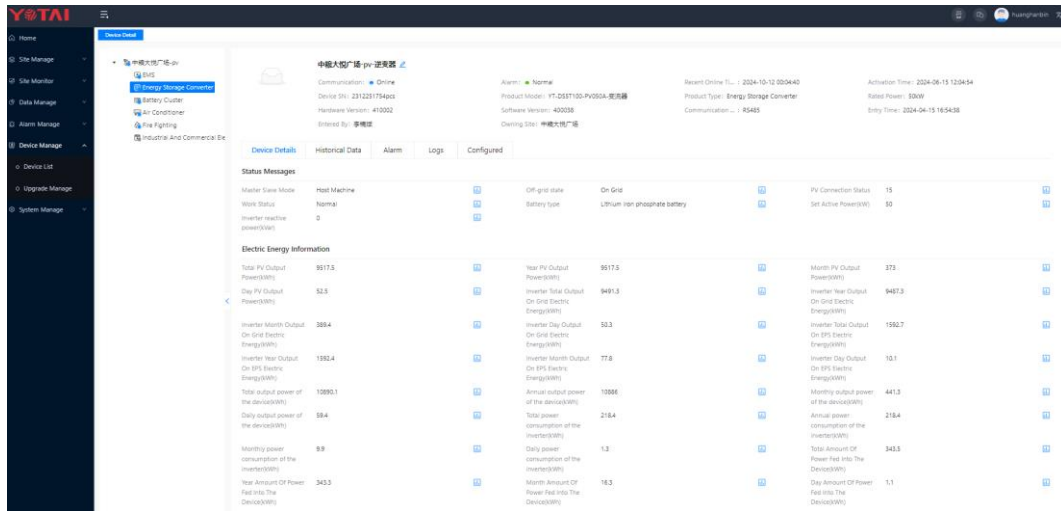


Figure 7.5-13 Cloud Platform Display Interface for Solar Storage Inverter

(9) Energy Storage Battery Pack

Device Details display the battery pack's status information (telemetry), individual cell extreme values, status information (remote signals), status information (fans), and individual cell extreme values.

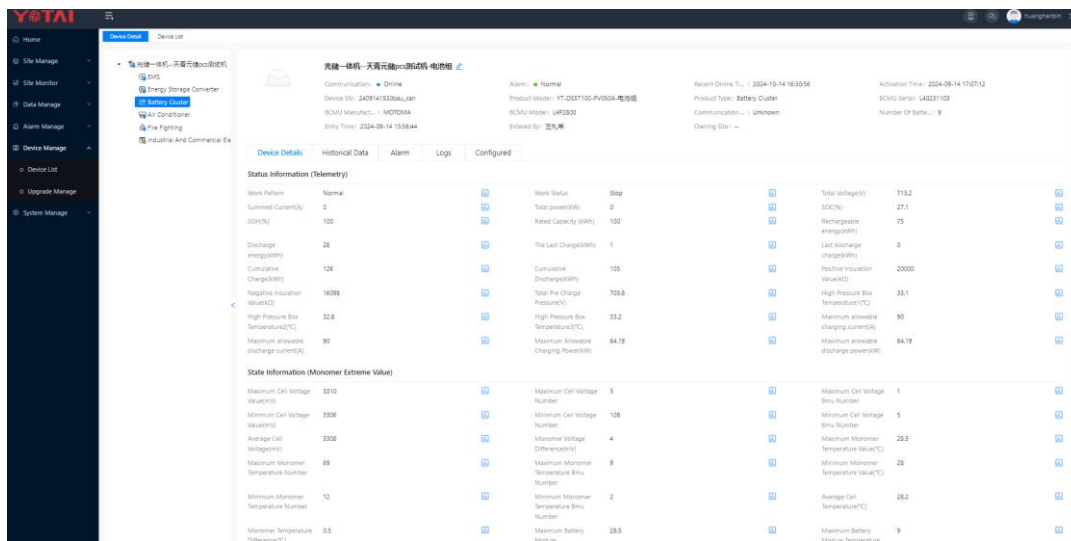


Figure 7.5-14 Cloud Platform Energy Storage Battery Pack Display Interface

(10) Energy Storage Air Conditioner

Device Details display the operational status information of the energy storage air conditioner when it is running.

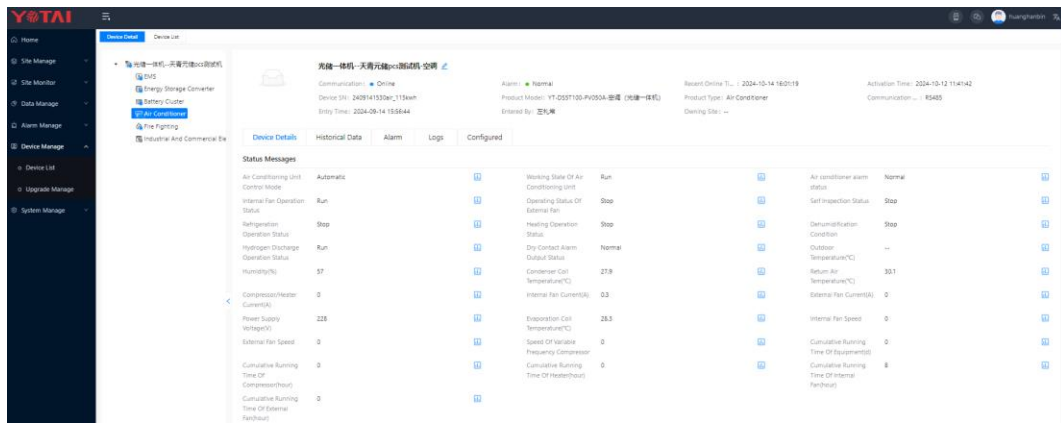


Figure 7.5-15 Cloud Platform Air Conditioner Information Display Interface

(11) ESS Firefighting

Displays the main status information of the air-cooling firefighting system.

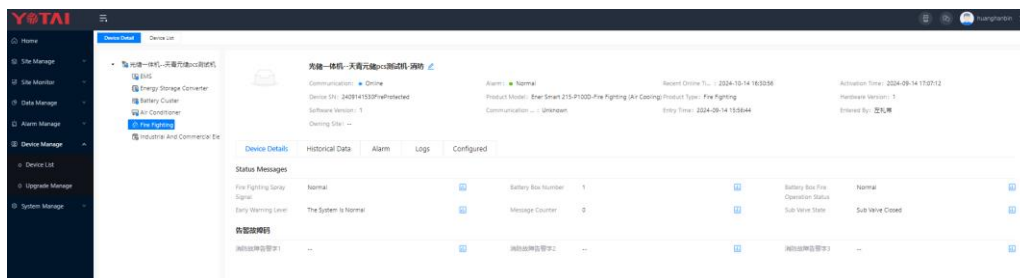


Figure 7.5-16 Cloud Platform Firefighting Information Display Interface

(12) Grid-side Meter

Device details Show real-time data of meter operation: three-phase current, three-phase voltage, three-phase active power, three-phase reactive power, three-phase apparent power, three-phase cumulative power, frequency, and three-phase power factor.

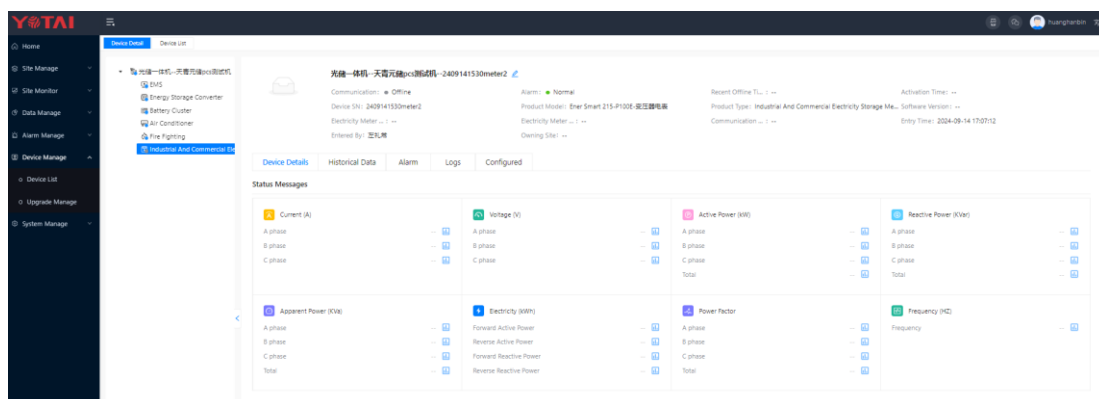


Figure 7.5-17 Cloud platform Electricity Meter Information Display Page

7.6 Upgrade Management

Users can select the product to be upgraded through upgrade tasks, product types, and product models.

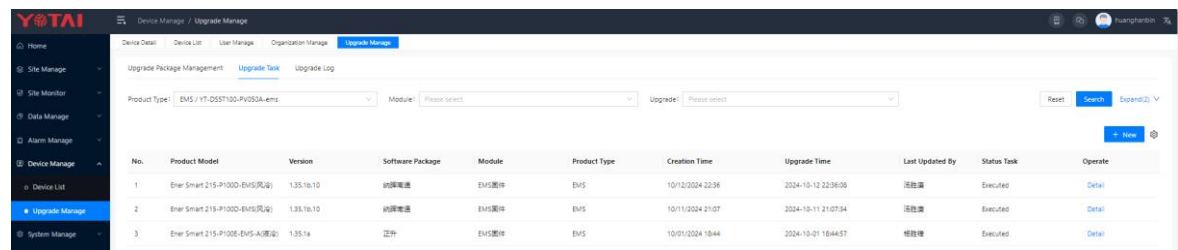


Figure 7.6-1 Upgrade Management Display Interface

8 System Maintenance and Storage

8.1 Pre-Maintenance Notices

 WARNING	1) Do not open the battery cabinet for maintenance in rainy, damp, or windy weather. If unavoidable, any resulting damages will not be the responsibility of this company. 2) Avoid opening the cabinet door during rainy, snowy, or foggy conditions with high humidity. After closing the cabinet door, ensure that the sealing strip around the door is not curled. 3) To minimize the risk of electric shock, refrain from performing any maintenance or repair operations beyond those specified in this manual. If necessary, contact Yotai customer service personnel for maintenance and repairs. 4) *Failure to maintain the equipment on time may result in equipment function reduction, and equipment damage, etc.; the battery capacity will decrease; 5) *Excessive dust accumulation at the air vent can result in poor heat dissipation efficiency, equipment heat dissipation failure, equipment power reduction or direct damage to the equipment
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8.2 Maintenance Conducted Every Two Years

Table 8.2-1 Maintenance Conducted Every Two Years

S/N	Item List	Inspection Method
1	System Status and Cleaning	Please inspect the following items, and promptly rectify any discrepancies found: 1) Examine the battery cabinet and internal devices for damage or deformation. 2) Check for abnormal noises during the operation of internal devices. 3) Monitor whether the temperature inside the battery cabinet exceeds acceptable levels. 4) Verify that the humidity and grime levels inside the battery cabinet are within normal ranges. If necessary, cleaning is required. 5) Ensure that the air inlet and outlet of the battery cabinet are not obstructed.
2	Warning Signs	Examine warning signs and labels for clarity and absence of damage. Replace if necessary.
3	Grounding of Cable Shielding	Inspect the proper contact between the cable shielding layer and insulation sleeves; confirm the secure fixation of the grounding copper bus.
4	Lightning Protection Devices and Fuses	Verify the secure fastening of lightning protection devices and fuses.
5	Corrosion Status	Examine the internal conditions of outdoor cabinets for oxidation or rust.

8.3 Maintenance Conducted Every Year

Table 8.3-1 Maintenance Conducted Every Year

S/N	Item List	Inspection Method
1	External Inspection of the Cabinet	Please inspect the following items, and promptly rectify any discrepancies found: 1) Check for flammable objects on top of the battery cabinet. 2) Inspect the welding points between the battery cabinet and the foundation steel plate for stability and signs of rust. 3) Examine the battery cabinet casing for damages, peeling paint, oxidation, or any other issues. 4) Verify the flexibility of cabinet door locks and hinges. 5) Ensure that seals are securely in place.
2	Internal Inspection of the Cabinet	Check the interior of the ESS cabinet for foreign objects, dust, dirt, and condensation.
3	Inlet and Outlet Vents	Check air conditioner temperature and dust accumulation. If necessary, use a vacuum cleaner to clean the air conditioner.
4	Wiring and Cable Layout	The inspection should commence only after completely disconnecting power to the internal devices of the ESS cabinet. If discrepancies are found during inspection, rectify them immediately: 1) Check if the cable layout is compliant and free from short circuits. Correct any anomalies promptly. 2) Verify the proper sealing of all cable entry and exit points on the battery cabinet. 3) Check for water leakage inside the battery cabinet. 4) Inspect power cable connections for looseness and tighten according to specified torque. 5) Examine power and control cables for damage, especially any signs of cuts where they contact metal surfaces. 6) Ensure that insulation wrapping on power cable connection terminals is intact.
5	Grounding and Equipotential Bonding	1) Verify the correctness of grounding connections, and the grounding resistance should not exceed 4Ω . 2) Check the correctness of equipotential bonding inside the ESS cabinet.
6	Fan	1) Check the operational status of the fans. 2) Ensure that the fans are not obstructed. 3) Examine for any abnormal noise during fan operation.
7	Screws	Check for the presence of dropped screws or any other issues inside the battery cabinet.

8.4 Maintenance Conducted Every Six Months to One Year

Table 8.4-1 Maintenance Conducted Every Six Months to One Year

S/N	Item List	Inspection Method
1	Safety Functions	1) Verify the emergency shutdown button's stopping functionality. 2) Simulate a shutdown. 3) Inspect the device for warning signs and other labels. If any are found to be blurred or damaged, replace them promptly.
2	Internal Component Inspection	1) Inspect the cleanliness of circuit boards and components. 2) Check the air conditioning temperature and dust accumulation. If necessary, use a vacuum cleaner to clean the air conditioning modules. 3) If needed, replace the air filter. Caution! Ensure proper ventilation of the air conditioning intake. Otherwise, if the air conditioning cannot effectively cool, it may malfunction due to overheating.
3	Device Maintenance	1) Perform routine checks for corrosion on all metal components (every six months). 2) Conduct annual inspections of relays (auxiliary switches and micro-switches) to ensure their mechanical operation is sound. 3) Check operational parameters, especially voltage and insulation parameters.

9 Alarm & Fault Reference

9.1 EMS Alarms/Faults

The following is the EMS alarm/fault list.

Table 9.1-1 EMS Alarm/Fault List

S/N	Alarm Name	Fault Cause	Handling Suggestion
1	BMS Communication Disconnected	1. The BMS is not powered on. 2. The communication cable harness is loose.	1. Check whether the power supply to the BMS is normal. 2. Check whether the wiring harness is loose and damaged.
2	The PCS Communication Disconnected	1. The PCS is not powered on. 2. The communication cable harness is loose.	1. Check whether the power supply of the PCS is normal; 2. Check whether the wiring harness is loose and damaged.
3	Meter Communication Disconnected	1. The meter is not powered on. 2. The communication cable harness is loose.	1. Check whether the power supply of the meter is normal; 2. Check whether the wiring harness is loose and damaged.
4	Fire Signal Alarm	1. There is smoke or partial overheat in the battery cabinet. 2. The battery cabinet is on fire.	1. Remotely monitor the device for 30 minutes and check whether other anomalies exist, such as abnormal temperature, battery voltage, battery temperature, and hydrogen concentration. If yes, shut down the remote system. During remote monitoring, do not go near the battery cabinet and do not open the cabinet door. 2. If there is no abnormality in the remote monitoring, arrange security trained personnel to go to the site and observe the situation at a safe distance for 30 minutes. If there is smoke or fire, please shut down the remote system, stay away from the scene as soon as possible, and call the fire alarm phone. 3. If the remote monitoring and on-site observation are not abnormal, open the battery cabinet door and observe whether the perfluoroacetone is sprayed. If yes, contact the service hotline. If not, there is a problem with the perfluoroacetone module and the module needs to be replaced.
5	Electrical Emergency Stop Signal Alarm	The emergency stop button of the battery cabinet door is pressed or damaged.	1. Manually press the emergency stop button to reset. 2. Replace the emergency stop button if the emergency stop button is damaged.
6	BMS Emergency Stop Signal Alarm	1. A level-one alarm is generated for the battery.	1. Check whether the battery cabinet is abnormal and remotely monitor whether a Level 1 alarm is generated

		2. The emergency stop button is pressed or damaged.	on the BMS. 2. Reset the emergency stop button or replace the emergency stop button.
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9.2 BMS Alarms/Faults

The following is the BMS alarm/fault list.

Table 9.2-1 BMS Alarm/Fault List

S/N	Alarm Name	Fault Cause	Handling Suggestion
1	Pack Fan Fault	1. Insufficient power supply. 2. Fan damage or obstruction by foreign objects.	1. Check if the 220V power supply to the fan is reliably connected. 2. Inspect the fan blades for damage, clear any foreign objects around the fan, investigate abnormal power supply, and reinstall the fan if necessary.
2	BMU Hardware Fault	BMU damage	1.Restart the BMU by power cycling. 2. Reinsert and reconnect the BMU. 3. If the issue persists, replace the BMU.
3	BCMU Hardware Fault	BCMU damage	1.Restart the BCMU by power cycling. 2. Reinsert and reconnect the BCMU. 3. If the issue persists, replace the BCMU.
4	Contactor Adhesion Failure	1. Contactor damage. 2. Incorrect wiring of contactor feedback contacts.	1. Replace the contactor. 2. Correct the wiring.
5	BMU Communication Fault	Communication line connector loose.	Replace the communication harness.
6	Current Sensor Fault	1. Shunt sampling line loose. 2. Shunt damage or reverse connection. 3. Collection module damage.	1. Securely fix the shunt sampling signal line; 2. Measure the shunt's normal operation and signal output. If the issue persists, replace the shunt; 3. Replace the BCMU
7	NTC Fault	Abnormal sampling	Restart/disassemble/replace the BMU
8	Emergency Stop Signal Alarm	The emergency stop button of the battery cabinet door is pressed or damaged.	1. Manually press the emergency stop button to reset. 2. Replace the emergency stop button if the emergency stop button is damaged.
9	Water Flooding Alarm	Battery cabinet is flooded, or water immersion sensor is damaged.	1. Check if there is water accumulation inside the battery cabinet. If yes, drain the water thoroughly. 2. Confirm the integrity of the water immersion sensor inside the battery cabinet. If damaged, replace the faulty device; if not, manually clear the alarm.
10	Fire Signal Alarm	Smoke, local overheating, or fire in the battery cabinet.	1. Remotely monitor the device for 30 minutes and check whether other anomalies exist, such as abnormal

			temperature, battery voltage, battery temperature, and combustible gas concentration). If yes, shut down the remote system. During remote monitoring, do not go near the battery cabinet and do not open the cabinet door. 2. If there is no abnormality in the remote monitoring, arrange security trained personnel to go to the site and observe the situation at a safe distance for 30 minutes. If there is smoke or fire, please shut down the remote system, stay away from the scene as soon as possible, and call the fire alarm phone. 3. If the remote monitoring and on-site observation are not abnormal, open the battery cabinet door and observe whether the perfluoroacetone is sprayed. If yes, contact the service hotline. If not, there is a problem with the perfluoroacetone module and the module needs to be replaced.
11	AC Lightning Arrester Fault	AC Lightning Arrester Fault	1. Check if the AC lightning arrester signal line connection is loose. 2. Check if the AC lightning arrester indicator changes color. 3. Replace the AC lightning arrester.
12	Total Voltage Overvoltage Third/Second/First-level Alarm	Battery total voltage exceeds the third/second/first-level alarm threshold.	Idle for more than 30 minutes or discharge until normal.
13	Total Voltage Undervoltage Third/Second/First-level alarm	Battery total voltage is below the third/second/first-level alarm threshold.	Idle for more than 30 minutes or charge until normal.
14	Cell Overvoltage Third/Second/First-level Alarm	Battery single cell voltage exceeds the third/second/first-level alarm threshold.	Idle for more than 30 minutes or discharge until normal.
15	Cell Undervoltage Third/Second/First-level Alarm	Battery single cell voltage is below the third/second/first-level alarm threshold.	Idle for more than 30 minutes or charge until normal.
16	Discharge Current Is Too Large Third/Second/First-level Alarm	Dispatch power is too high.	Issue reasonable dispatch power.
17	Charging Current Is Too Large Third/Second/First-level Alarm	Dispatch power is too high.	Issue reasonable dispatch power.

18	Discharge Battery Overtemperature Third/Second/First- level Alarm	1. Radiator fan connector loose. 2. Radiator fan malfunction. 3. Air conditioning refrigerant failure. 4. Air conditioning refrigeration system not started.	1. Replug the fan connector. 2. Supply power to the fan separately, check if the fan is normal. 3. Replace the coolant. 4. Check the refrigeration system.
19	Discharge Battery Undertemperature Third/Second/First- level Alarm	Air conditioning heating system not started.	Check the heating system.
20	Charge Battery Overtemperature Third/Second/First- level Alarm	1. Radiator fan connector loose. 2. Radiator fan malfunction. 3. Air conditioning refrigerant failure. 4. Air conditioning refrigeration system not started.	1. Replug the fan connector. 2. Supply power to the fan separately, check if the fan is normal. 3. Replace the coolant. 4. Check the refrigeration system.
21	Charge Battery Undertemperature Third/Second/First- level Alarm	Air conditioning heating system not started.	Check the heating system.
22	Insulation Resistance Value Is Too Low Third/Second/First- level Alarm	1. Moisture/dust accumulation. 2. Ground short circuit. 3. Poor contact of power line.	1. Remove moisture and dust. 2. Use instruments to measure the system's insulation to ground. 3. Check if the power line contact is secure.
23	High Voltage Box Connector Temperature Is Too High Third/second/first- level Alarm	Fan malfunction in the sub-control box, abnormal 220V power supply.	Check if the fan power supply is normal or replace the fan.
24	Cell Voltage Difference Third/Second/First- level Alarm	Voltage difference between battery clusters exceeds 30V.	Single-cluster charge and discharge to equalize the cluster total voltage.
25	Cell Temperature Difference Third/Second/First- level Alarm	1. Radiator fan connector loose. 2. Radiator fan malfunction.	1. Replug the fan connector. 2. Supply power to the fan separately, check if the fan is normal. 3. Replace the coolant.

		3. Air conditioning refrigerant failure. 4. Air conditioning refrigeration system not started.	4. Check the refrigeration system.
26	SOC is too low Third/Second/First-level Alarm	Battery SOC is below third/second/first-level alarm threshold.	Idle for more than 30 minutes or charge until normal.

9.3 PCS Alarms/Faults

Please refer to the PCS User Manual for the alarm/fault list to handle the faults.

9.4 Air Conditioner Alarms/Faults

The following is Air Conditioner alarm/fault list.

Table 9.4-1 Air Conditioner Alarm/Fault List

S/N	Alarm Name	Fault Cause	Handling Suggestion
1	Return Air Temperature Sensor Fault Alarm	1. Return air temperature sensor wiring is loose. 2. Sensor is damaged, open-circuited, or short-circuited.	1. Please choose an appropriate time to shut down the system and take necessary safety precautions. 2. Check if the connections are loose. 3. Replace the return air temperature sensor.
2	Return Air Humidity sensor Fault Alarm	1. Return air humidity sensor wiring is loose. 2. Sensor is damaged, open-circuited, or short-circuited.	1. Please choose an appropriate time to shut down the system and take necessary safety precautions. 2. Check if the connections are loose. 3. Replace the return air temperature sensor.
3	Supply Air Temperature Sensor Fault Alarm	1. Supply air temperature sensor wiring is loose. 2. Sensor is damaged, open-circuited, or short-circuited.	1. Please choose an appropriate time to shut down the system and take necessary safety precautions. 2. Check if the connections are loose. 3. Replace the return air temperature sensor.
4	High Temperature Alarm	After the unit has been running continuously for 10 minutes, the return air temperature is higher than the high-temperature alarm setpoint.	1. Review the air conditioning parameter "high-temperature alarm point" to ensure it is set correctly. 2. If the parameters are set correctly, check for other relevant alarms for the air conditioner and perform maintenance according to the corresponding repair suggestions. If there are no other relevant alarms, shut down the air conditioner and contact the service hotline.
5	Low Temperature Alarm	After the unit has been running continuously for 10 minutes, the return air temperature is lower than the high-temperature alarm	1. Review the air conditioning parameter "low-temperature alarm point" to ensure it is set correctly. 2. If the parameters are set correctly, check for

		setpoint.	other relevant alarms for the air conditioner and perform maintenance according to the corresponding repair suggestions. If there are no other relevant alarms, shut down the air conditioner and contact the service hotline.
6	High-humidity Alarm	After the unit has been running continuously for 10 minutes, the return air humidity is higher than the high-humidity alarm setpoint.	1. Review the air conditioning parameter "high-humidity alarm point" to ensure it is set correctly. 2. If the parameters are set correctly, check for other relevant alarms for the air conditioner and perform maintenance according to the corresponding repair suggestions. If there are no other relevant alarms, shut down the air conditioner and contact the service hotline.
7	Low-humidity Alarm	After the unit has been running continuously for 10 minutes, the return air humidity is lower than the low-humidity alarm setpoint.	1. Review the air conditioning parameter "low-humidity alarm point" to ensure it is set correctly. 2. If the parameters are set correctly, check for other relevant alarms for the air conditioner and perform maintenance according to the corresponding repair suggestions. If there are no other relevant alarms, shut down the air conditioner and contact the service hotline.
8	High-voltage Alarm	1. High-voltage switch is open. 2. High-voltage wiring is loose.	1. Check if all system valves are fully open. 2. Check if the condenser is dirty or blocked; if so, clean the condenser. 3. Verify if the condenser fan is operating properly. 4. Inspect if the high-voltage connections are securely connected.
9	High-voltage Lockout Alarm	1. High-voltage alarm or high condensation temperature alarm occurs three times within 1 hour. 2. High-voltage alarm or high condensation temperature alarm persists for 10 minutes without resolution.	1. Check if all system valves are fully open. 2. Check if the condenser is dirty or blocked; if so, clean the condenser. 3. Verify if the condenser fan is operating properly. 4. Inspect if the high-voltage connections are securely connected.
10	Low-voltage Alarm	1. Low-voltage switch is open. 2. Low-voltage wiring is loose.	1. Check if all system valves are fully open. 2. Check if the refrigerant level is sufficient or if there is a leakage in the system. 3. Verify if the low-voltage connections are securely connected.
11	Low-voltage Lockout Alarm	1. Low-voltage alarm or low evaporation temperature alarm occurs three times within 1 hour. 2. Low-voltage alarm or low evaporation temperature alarm persists for 10 minutes without	1. Check if all system valves are fully open. 2. Check if the refrigerant level is sufficient or if there is a leakage in the system. 3. Verify if the low-voltage connections are securely connected.

		resolution.	
12	Condensation Temperature Sensor Fault Alarm	1. Wiring is unstable or incorrect. 2. Sensor is damaged, open-circuited, or short-circuited.	1. Please choose an appropriate time to shut down the system and take necessary safety precautions. 2. Check if the connections are loose. 3. Replace the condenser temperature sensor.
13	Evaporation Temperature Sensor Fault Alarm	1. Evaporator temperature sensor wiring is loose. 2. Sensor is damaged, open-circuited, or short-circuited.	1. Please choose an appropriate time to shut down the system and take necessary safety precautions. 2. Check if the connections are loose. 3. Replace the evaporator temperature sensor.
14	Condensation High-Temperature Alarm	Condensation temperature is higher than the high condensation temperature alarm setpoint.	Please check for other relevant alarms for the air conditioner, and perform maintenance according to the corresponding repair suggestions. If there are no other relevant alarms, shut down the air conditioner and contact the service hotline.
15	Evaporation low-Temperature Alarm	Evaporation temperature is lower than the low evaporation temperature alarm setpoint.	Please check for other relevant alarms for the air conditioner, and perform maintenance according to the corresponding repair suggestions. If there are no other relevant alarms, shut down the air conditioner and contact the service hotline.

10 Appendix

A. How to Touch Up Paint

A.1 Prerequisites

In outdoor, unobstructed conditions, it is strictly forbidden to touch up paint in harsh weather such as rain, snow, strong winds, sandstorms, etc.

A.2 Paint Touch-Up Instructions

The device's appearance should be kept intact. If there is paint peeling, touch up immediately.

Table 1 Paint Touch-up Instructions

Degree of damage to paint surface	Tools and Materials	Operation Steps	Description
Shallow scratches (with the steel plate substrate unexposed)	Spray paint or paint, brush (for small area touch-ups), fine sandpaper, anhydrous ethanol, cotton cloth, spray gun (for large area touch-ups);	Refer to B.3 steps 1+2+4+5 for operation.	The topcoat (acrylic paint) color should reference the color chart provided at the time of shipment, including the Pantone number indicated on the chart. For minor scratches and small stains or rust, it is recommended to use hand spray paint or brush. For major scratches and large areas of stains or rust, use an oil paint spray gun for application. The paint film should be as thin and even as possible, avoiding a droplet-like appearance and maintaining a smooth surface. After touch-up, subsequent operations can be carried out approximately 30 minutes after allowing the paint surface to settle.
Stains and rust that cannot be wiped off			
Deep scratches (primer damaged, exposing the steel substrate)	Spray paint or paint, zinc-rich primer, brush (for small area touch-ups), fine sandpaper, anhydrous ethanol, cotton cloth, spray gun (for large area touch-ups).	Refer to B.3 steps 1+2+4+5 for operation.	
Damage to logos and patterns	For damaged logos and patterns, provide the logo's dimensions and color codes. Seek a local advertising spray supplier to develop a repair plan based on logo size, color, and the extent of damage, and then execute the repair.		
Impact dents	If the impact area is smaller than 100mm ² and the depth is less than 3mm, use unsaturated polyester resin putty (Poly-Putty base) (atomic gray) to fill the area. After filling, follow the procedure for repairing deep scratches. If the impact area is larger than 100mm ² or the depth is greater than 3mm, seek a local supplier to provide a customized repair plan based on the specific situation.		

A.3 Operation Steps

Step 1: Gently sand the damaged area with fine sandpaper to remove dirt or rust.

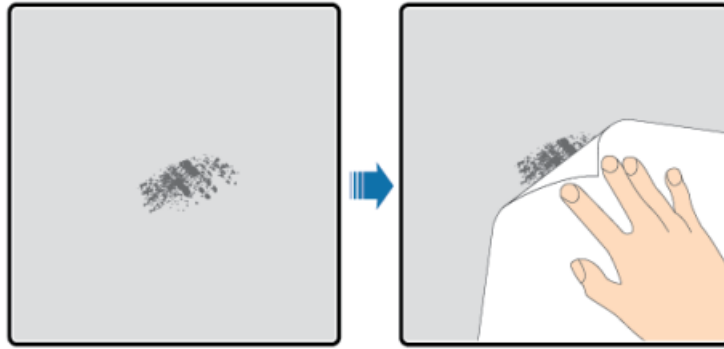


Figure 4: Sanding the Damaged Coating with Fine Sandpaper

Step 2: Dampen a cotton cloth with anhydrous ethanol, wipe the sanded or repair area to remove surface dirt and dust, then dry with a clean cotton cloth.



Figure 5: Treating the Damaged Coating with Anhydrous Ethanol

Step 3: Use a brush or spray gun to apply zinc-rich primer to the damaged coating.

 NOTE	1) If the repair area has exposed the substrate, apply epoxy zinc-rich primer first until the paint is dry and the substrate is not exposed, then apply acrylic topcoat. 2) Choose epoxy zinc-rich primer or acrylic topcoat based on the color of the device surface coating.
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Step 4: Depending on the degree of paint damage, choose one of the methods-self-spraying, brushing, or using a spray gun—to evenly touch up the damaged coating until no traces of damage are visible.

 NOTE	1) Pay attention to keeping the painted film as thin and even as possible, without forming droplets, to maintain a smooth surface. 2) For device with different colored patterns, before touching up, cover other colored areas with tape and white paper to avoid contamination of other colored areas during the touch-up process.
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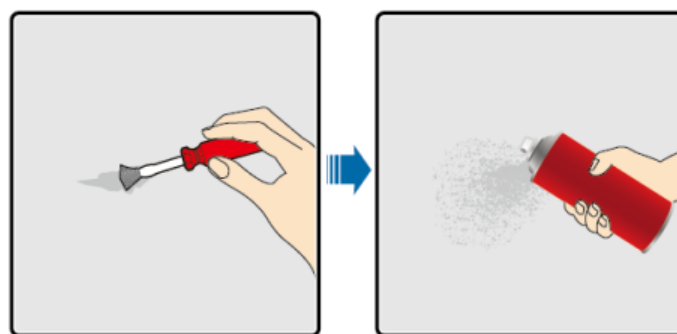


Figure 6: Touching up the Damaged Coating on the Equipment

Step 5: After painting, let it sit for about 30 minutes, then observe whether the repaired area meets the requirements.

 NOTE	1) The repaired area should match the color of the surrounding areas, with a color difference (ΔE) of ≤ 3 when measured with a colorimeter. If a colorimeter is not available, ensure there is no obvious edge between the repainted area and its surrounding areas. The paint should not have protrusions, scratches, peeling, or cracks. 2) If using spray paint, it is recommended to apply three coats and then observe if it meets the requirements. If not, repeat the spray painting until the requirements are met.
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B EMS System Parameter Description

B.1 Data Monitoring Information

1) System Parameter Description

System-Related Parameters

Parameter	Unit	Description	Calculation Formula	Remarks
Today's System Charging Amount	kWh	The cumulative charging amount of the ESS from 0:00 today to the current time	At 00:00:00 every day, the charging amount for today is initialized to the default value of 0 kWh, and the cumulative charging amount of today's ESS begins (including the working loss of auxiliary power supply of the ESS).	
Today's Discharging Amount	kWh	The cumulative discharging amount of the ESS from 0:00 today to the current time	At 00:00:00 every day, the discharging amount for today is initialized to the default value of 0 kWh, and the cumulative charging amount of today's ESS begins (including the working loss of auxiliary power supply of the	

			ESS).	
Cumulative Charging Amount	kWh	The total cumulative charging amount of the ESS since the last energy statistics initialization	From the operation of the last "Energy Statistics Initialization" (the timestamp next to the operation button in the upper computer software can be viewed), up to the current total cumulative charging amount of the ESS.	
Cumulative Discharging Amount	kWh	The total cumulative discharging amount of the ESS since the last energy statistics initialization	From the operation of the last "Energy Statistics Initialization" (the timestamp next to the operation button in the upper computer software can be viewed) up to the current total cumulative discharging amount of the ESS.	
Chargeable Energy	kWh	The remaining chargeable energy of the ESS up to the current time		
Dischargeable Energy	kWh	The remaining dischargeable energy of the ESS up to the current time		
System Charging Amount	kWh	The charging amount of the ESS within the statistical period.	Day: The daily charging amount of the ESS; Month: The total daily charging amount within a month; Year: The total monthly charging amount within a year;	
System Discharging Amount	kWh	The discharging amount of the ESS within the statistical period.	Day: The daily discharging amount of the ESS; Month: The total daily discharging amount within a month; Year: The total monthly discharging amount within a year;	
First Charging Amount	kWh	The cumulative charging amount of the system at the current time during the 1st charge of the day.	The cumulative charging amount of the system during the 1st charge of the day, with a default starting value of 0 kWh each day, which will not accumulate after the 1st charge stops.	
First discharging amount	kWh	The cumulative discharging amount of the system at the current time during the 1st charge of the day.	The cumulative discharging amount of the system during the 1st discharging of the day, with a default starting value of 0 kWh each day, which will not	

			accumulate after the 1st charge stops.	
Second Charging Amount	kWh	The cumulative charging amount of the system at the current time during the 2nd charge of the day.	The cumulative charging amount of the system at the current time during the 2nd charge of the day, starting from the launch of the 2nd charge with a default starting value of 0 kWh, which will not accumulate after the 2nd charge stops.	
Second Discharging Amount	kWh	The cumulative discharging amount of the system at the current time during the 2nd discharge of the day.	The cumulative discharging amount of the system at the current time during the 2nd discharge of the day, starting from the launch of the 2nd discharge with a default starting value of 0 kWh, which will not accumulate after the 2nd discharge stops.	
Total Active Power of the System	kW	The total active power of charging or discharging operation of the system at the current time.	The total active power of the system's charging or discharging operation at the current time (the sum of the three-phase active power on the AC side).	Discharging is positive, and charging is negative.
Total Reactive Power of the System	kvar	The total reactive power of charging or discharging operation of the system at the current time.	The total reactive power of the system's charging or discharging operation at the current time (the sum of the three-phase reactive power on the AC side).	Discharging is positive, and charging is negative.
Total Apparent Power of the System	kVA	The total apparent power of charging or discharging operation of the system at the current time.	The total reactive power of charging or discharging operation of the system at the current moment (the sum of the three-phase apparent power on the AC side).	
System Set Active Power	kW	The value of active power set by the system for current charging or discharging.		Charging is a negative value, and discharging is a positive value.
System Set Reactive Power	var	The value of reactive power set by the system for current charging or discharging.		Charging is a negative value, and discharging is a positive value.

Charging/Discharging Power	kW	The active power of the ESS at the current moment for charging or discharging.	The active power of the ESS (on the AC side) at the current moment for charging or discharging.	Discharging is positive, and charging is negative.
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2) Battery-related Parameters

Battery-Related Parameters

Parameter	Unit	Description	Calculation Formula	Remarks
Today's Charging Amount	kWh	The cumulative charging amount of the energy storage battery from 0:00 today to the current time	At 00:00:00 every day, today's charging amount is initialized to the default value of 0 kWh, and the cumulative charging amount of today's energy storage battery begins.	
Today's Discharging Amount	kWh	The cumulative discharging amount of the energy storage battery from 0:00 today to the current time.	At 00:00:00 every day, today's discharging amount is initialized to the default value of 0 kWh, and the cumulative discharging amount of today's energy storage battery begins.	
Dischargeable Energy	kWh	The current remaining dischargeable energy of the energy storage battery.		
Chargeable Energy	kWh	The current remaining chargeable energy of the energy storage battery.		
Energy Storage Battery Power	kW	The active power of the energy storage battery at the current moment for charging or discharging.	The active power of the energy storage battery at the current moment for charging or discharging.	Discharging is positive, and charging is negative.
Battery SOC	%	The current capacity value of the energy storage battery at this moment.	Readings calculated and uploaded by the system BMS.	
Battery SOH	%	The health status value of the energy storage battery at this moment.	Readings calculated and uploaded by the system BMS.	
Total Battery Voltage	V	The current total voltage value of the energy storage battery.		
Total Battery Current	A	The current total current value of the energy storage battery.		
Total Battery Power	kW	The current total power value of the energy storage battery.		
Highest	mV	The current highest single cell		

Single Cell Voltage		voltage value of the energy storage battery.		
Lowest Single Cell Voltage	mV	The current lowest single cell voltage value of the energy storage battery.		
Average Single Cell Voltage	mV	The current average single cell voltage value of the energy storage battery.		
Single Cell Voltage Difference	mV	The current largest single cell voltage difference of the energy storage battery.	"Highest Single Cell Voltage" - "Lowest Single Cell Voltage" of the energy storage battery.	
Highest Single Cell Temperature	°C	The current highest single cell temperature value of the energy storage battery.		
Lowest Single Cell Temperature	°C	The current lowest single cell temperature value of the energy storage battery.		
Average Single Cell Temperature	°C	The current average single cell temperature value of the energy storage battery.		
Single Cell Temperature Difference	°C	The current largest single cell temperature difference of the energy storage battery.	"Highest Single Cell Temperature" - "Lowest Single Cell Temperature" of the energy storage battery.	

3) Load and Other Parameters

Load and Other Related Parameters

Parameter	Unit	Description	Calculation Formula	Remarks
Load Active Power	kW	The current active power value of the system load.		
Today's Load Electricity Consumption	kWh	The cumulative electricity consumption of the load of the ESS up to today (accumulated from 00:00:00 each day).		
Cumulative Load Electricity Consumption	kWh	The total accumulated electricity consumption of the system load since the last system energy statistics initialization.	Starting from the last "System Energy Statistics Initialization" operation (next to the corresponding operation button in the upper computer software, where the corresponding timestamp can be viewed), up to the current total accumulated electricity consumption of the ESS load.	
Load Electricity Consumption	kWh	The current electricity consumption power of the ESS load.		

Power				
Grid-Side Electricity Meter Active Power	kW	The current active power value read from the grid-side electricity meter.		
Grid-Side Electricity Meter Current Forward Total Active Energy	kWh	The current total active electricity consumption read from the grid-side electricity meter.		
Grid-Side Electricity Meter Current Reverse Total Active Energy	kWh	The current total reverse feed-in active energy read from the grid-side electricity meter.		

B.2 Configuration Parameter Information

1) System Configuration Parameter Description

System Parameter Configuration Description

Name	Description	Remarks
Anti-reverse Flow Threshold	Sets the power threshold to activate the anti-reverse flow of the energy storage equipment. If the minimum power consumption on the grid side is less than this threshold, the ESS will reduce its discharging power output according to the preset strategy until the discharging power output is 0 kW.	
Transformer Maximum Load (kW)	The maximum active power load of the grid-side transformer	
Demand Start-up Power (kW)	Sets the minimum demand power for starting the ESS.	
Data Reporting Frequency (Cloud Platform)	Sets the interval for the ESS to report data to the user's cloud platform, in seconds (s), with the interval settable between 1s to 30s.	
Data Reporting Frequency (Yotai Cloud Platform)	Sets the interval for the ESS to report data to the Yotai cloud platform, in seconds (s), with the interval settable between 1s to 30s.	
Time for Calibration	Sets the calibration of the system time for the ESS, supporting reading the current system time and writing the calibration system time.	

2) Energy Management Parameter Configuration

Peak-Shaving and Valley Filling Mode Parameter Configuration Description

Name	Description	Remarks
Highest SOC (%)	Sets the maximum capacity allowed for charging in peak-shaving mode; charging stops when this capacity is reached.	
Lowest SOC (%)	Sets the minimum capacity allowed for charging in peak-shaving mode; discharging stops when this capacity is reached.	
Charging/Discharging Power Mode	Sets the mode of value selection for system charging/discharging power: Maximum power: charging/discharging at the maximum power allowed by the current equipment; Fixed power: charging/discharging at a set fixed power.	
Time Period Settings	Sets the daily working time periods for peak-shaving mode, the start and end times of each period, and the charging/discharging mode and corresponding power; time periods are in the 24-hour hh:mm format.	

Standby Power Mode Parameter Settings Description

Name	Description	Remarks
Charging Power (kW)	Sets the maximum charging power allowed by the system in standby power mode;	
Discharging Power (kW)	Sets the maximum discharging power allowed by the system in standby power mode;	
Highest SOC (%)	Sets the maximum capacity allowed for charging in standby power mode; charging stops when this capacity is reached.	
Lowest SOC (%)	Sets the minimum capacity allowed for charging in standby power mode; discharging stops when this capacity is reached.	

Manual Mode Parameter Settings Description

Name	Description	Remarks
Charging Power Setting (kW)	Sets the current charging power of the system in manual mode;	
Discharging Power Setting (kW)	Sets the current discharging power of the system in standby power mode;	

Electricity Price Parameter Settings Description for Peak Spike, Peak, Flat and Valley Time Periods

Name	Description	Remarks
Electricity Price Setting (kW)	Set the electricity price, with four types available: "Peak Spike Price," "Peak Price," "Flat Price," and "Valley Price."	
Feed-in Electricity Price Setting (kW)	Set the feed-in electricity price, with four types available: "Peak Spike Price," "Peak Price," "Flat Price," and "Valley Price."	
Time Period Settings	Set the types of peak and valley electricity prices for each period of the day and whether they are enabled; it's possible to set the start and end times for each period, as well as the corresponding type of electricity price; periods are in the 24-hour hh:mm format.	

ESS Working Modes and Parameters Description

Working Mode	Mode Description
Peak Shaving Mode	The ESS operates within the preset daily peak shaving periods, according to preset charging and discharging modes and power levels. Up to 10 time periods can be set daily in the 24-hour hh: mm format. Each period can have a start and end times, charging/discharging modes, and corresponding power levels set;
Standby Power Mode	In standby power mode, the system will charge at a set power level when the lowest SOC is reached and discharge at a set power level when the highest SOC is reached, all within the preset range of highest and lowest SOC.
Manual Mode	In manual mode, the ESS will charge or discharge according to the manually set charging and discharging power levels, independent of peak shaving or standby power mode settings.

3) ESS Control Functions Description

Energy Storage Operation Control Functions Description

Operation Item	Description	Remarks
System Control Mode Switch	Set the operation of the current control mode of the ESS, supporting the choice between "Local" or "Remote" modes. Select "Remote" to set the ESS to be controlled by a remote cloud or mobile APP; it can be operated through the cloud or mobile APP.	The ESS defaults to remote mode when shipped from the factory, and it can be selected and configured through the upper computer software.
System Working Mode Switch	Set the operation of the current working mode of the ESS, supporting three modes: "Peak Shaving and Valley Filling," "Standby Power," and "Manual Control." Select "Peak Shaving and Valley Filling" mode, the system operates according to the preset charging and discharging modes and power during the peak shaving periods set in the energy management. Select "Standby Power" mode, and the system will operate according to the standby power mode parameters preset in energy management.	
System Working State Switch	Set the operation of the current working state of the ESS, supporting four states: "Start," "Standby," "Stop," and "Emergency Stop." Select the "Start" button to activate the ESS and run according to the preset working mode. Select the "Standby" button, the ESS will stop charging/discharging and enter the "Standby" state, PCS shuts down, and BMS main contactor is closed. Select the "Stop" button, the ESS will stop charging/discharging and enter the "Stop" state, PCS	

	shuts down, and BMS main contactor is disconnected. Select the "Emergency Stop" button, the ESS will stop charging/discharging and immediately send out emergency stop control commands to each function module of the ESS through communication, immediately stop charging/discharging, output emergency stop DO dry node signals, and enter the "Emergency Stop" state.	
System Energy Statistics Initialization	Set the operation to reset the energy statistics of the ESS to 0, which will clear all the data of the previous energy statistics. After initialization, energy statistics will start again; this operation only resets the internal energy statistics data of the ESS and cannot initialize the readings of the grid side and inverter side energy meters. The energy statistics of the ESS record the current readings of the electricity meter as the starting data and begin counting the energy operated by the ESS thereafter.	
System Reset	Set the operation to reset the ESS, which will eliminate faults and reset the PCS according to the preset sequence.	After the system reset, it will enter a stop working state.