TCL

BlueArk X5

C & I Energy Storage System

User Manual

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Serial Number	Version	Date	Modifications (Retain initial release)	Publisher	Remarks
1	V1.0	2025/11/20	Initial Release	TCL Digital Power	
2					
3					
4					
5					

Note: When modifying content, the file version must be updated simultaneously;

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About This Manual

1) Applicable Product

This product user manual primarily introduces the transportation and storage, mechanical installation, electrical connection, power-up commissioning and power-down decommissioning, troubleshooting, and maintenance methods for the BlueArk X5 Commercial and Industrial Photovoltaic Storage Integrated Unit (hereinafter referred to as the "Photovoltaic Storage Integrated Unit"). This manual is only applicable to the BlueArk X5 Commercial and Industrial Photovoltaic Storage Integrated Unit developed by Guangdong TCL Digital Power Co., Ltd. (hereinafter referred to as "TCL Shenlan").

Product Name: BlueArk X5 Photovoltaic-Storage Integrated Unit.

2) Intended Audience

This manual is intended for personnel involved in the installation, operation, maintenance, and related tasks of this product. Readers should possess relevant electrical and related professional knowledge and qualifications. All installation operations must be performed exclusively by qualified technical personnel. Qualified technical personnel must meet the following requirements:

- Have undergone specialized training and obtained certification
- Have thoroughly read this manual and mastered all relevant safety procedures
- Be familiar with local standards and relevant safety regulations for electrical systems

Note: Operation by non-professionals may result in equipment malfunction or damage.

3) Symbol Usage

To ensure personal and property safety during product use and to promote efficient and correct operation, this manual provides relevant information highlighted with the following symbols. The symbols potentially used in this manual are listed below. Please read them carefully to better utilize this manual.

The following symbols may appear in this document, with their meanings as follows:

DANGER

Indicates a warning of an imminent hazardous situation.

Failure to avoid may result in death or serious personal injury.

WARNING

Indicates a potentially hazardous situation.

Failure to avoid may result in death or serious personal injury.

CAUTION

Indicates a potential hazard.

Failure to avoid may result in moderate or minor personal injury.

NOTE

Used to convey equipment or environmental safety warnings.

Failure to avoid may result in equipment damage, data loss, reduced equipment performance, or other unpredictable consequences.

2 Safety Precautions

2.1 General Safety

Before transporting, storing, installing, operating, using, or maintaining the equipment, read this manual thoroughly. Strictly follow the instructions in this manual and observe all safety precautions indicated on the equipment and in this manual. The "Note," "Caution," "Warning," and "Danger" statements in this manual do not represent all safety precautions that must be followed; they are supplementary to all safety precautions.You must also comply with relevant international, national, or regional standards and industry practices. The company assumes no liability for any consequences arising from violations of general safety operating requirements or breaches of safety standards in the design, production, or use of the equipment. This equipment must be used in environments meeting its design specifications. Failure to do so may cause equipment malfunction, and any resulting abnormal equipment operation or component damage is not covered under the equipment warranty. The company shall not be liable for any personal injury, property damage, or other losses that may occur as a result.Transportation, storage, installation, operation, use, and maintenance of the equipment must comply with local laws, regulations, and codes. The safety precautions in this manual are provided solely as a supplement to local laws, regulations, and codes. The company shall not be liable for any of the following situations or their consequences:

1) Installation and operating environments that do not comply with relevant international, national, or regional standards.
2) Operation outside the conditions specified in this manual.
3) Unauthorized disassembly, modification of the product, or alteration of the software code.
4) Failure to follow the operating instructions and safety warnings in the product and documentation.
5) Damage to equipment caused by abnormal natural events (earthquakes, floods, volcanic eruptions, mudslides, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, extreme weather, force majeure).
6) Damage caused by transportation arranged by you or a third party you authorized.
7) Damage caused by storage conditions that do not meet the requirements specified in the product documentation.
8) Damage to hardware or data caused by negligence, improper operation, or intentional damage by you or a third party.
9) System damage caused by you or a third party, including relocation and installation of the system not in accordance with this manual, as well as damage resulting from adjustments, modifications, or removal of identification marks not in accordance with this manual.
10) Defects, failures, or damages resulting from acts, events, negligence, or accidents beyond the reasonable control of the seller, including power outages or electrical failures, theft, war, riots, civil unrest, terrorism, or intentional or malicious damage.

NOTE

Reverse engineering, decompiling, disassembling, modifying, adapting, implanting, or performing other derivative operations on the equipment software is prohibited. You may not study the internal implementation of the equipment, obtain the source code of the equipment software, or steal intellectual property in any manner. You may not disclose the results of any performance testing of the equipment software.

2.2 Personal Safety

DANGER

- **Never perform live electrical work during installation. Do not install or remove cables while energized. Contact between cable conductors and live parts may cause arcing, sparks, or ignition, potentially leading to fire or personal injury.**
- **Improper or incorrect operations while the equipment is energized may cause fire, electric shock, or explosion, resulting in personal injury or property damage.**
- **During operations, wearing conductive objects such as watches, bracelets, rings, or necklaces is strictly prohibited to prevent electric shock burns.**
- **Specialized insulated tools must be used during operations to prevent electric shock injuries or short circuits. The insulation voltage rating must comply with local laws, regulations, standards, and specifications.**

WARNING

Special protective equipment must be worn during operations, including protective clothing, insulated shoes, safety goggles, hard hats, and insulated gloves.

2.3 Personnel Requirements

Lifting, transportation, installation, wiring, operation, and maintenance of the equipment must be performed by qualified electrical technicians in compliance with local regulations. When operating the equipment, wear protective gear that meets local safety requirements.

Figure 2-1 Personnel Attire Requirements

Operators must meet the following requirements:

1) During installation, operation, and maintenance, wearing conductive objects such as watches, bracelets, rings, or necklaces is strictly prohibited to prevent electric shock injuries.
2) During transportation, transfer, installation, wiring, and maintenance operations, comply with the laws, regulations, and relevant standards of the country or region where the equipment is located.
3) Be familiar with the entire energy storage system's composition and operating principles, and perform operations according to the manual's descriptions.
4) Personnel must have received professional training related to electrical equipment installation and commissioning, possess relevant expertise in electronics, electrical wiring, and mechanical systems, and be proficient in interpreting electrical and mechanical schematics.
5) Possess the ability to respond to emergencies or unexpected situations that may arise during installation or commissioning.

2.4 Electrical Safety

DANGER
• **Before making electrical connections, ensure the equipment is undamaged to prevent electric shock or fire hazards.** • **Non-standard or incorrect operation may cause accidents such as fire or electric shock.** • **During operation, prevent foreign objects from entering the equipment interior, as this may cause short circuits, equipment damage, load power derating or loss of power, and personal injury.**
WARNING
For equipment requiring grounding, the protective grounding wire must be installed first during installation; when removing the equipment, the protective grounding wire must be

removed last.


NOTE

Cables must not pass through the equipment's air inlets or outlets.

2.5 General Requirements

1) Installation, operation, and maintenance must follow the step-by-step procedures outlined in the manual. Do not modify, add components to, or alter the equipment without authorization. Do not change the installation sequence without permission.
2) Permission from the local power authority is required for grid connection operation. Comply with power plant safety regulations, such as implementing work permit and operation ticket systems.
3) Install temporary fencing or warning ropes in the work area and display "No Entry" signs. Non-authorized personnel are strictly prohibited from entering.
4) Before installing or removing power cables, disconnect the equipment itself and its upstream/downstream switches.
5) If liquid is detected inside the equipment, immediately shut off the power supply and cease all use.
6) Before operating equipment, carefully verify that all tools meet requirements and record them in the logbook. After operation, count and retrieve all tools to prevent them from being left inside the equipment.
7) Before installing power cables, verify that cable labels are correctly marked and cable terminals are properly insulated.
8) When installing equipment, use torque tools with appropriate ranges to tighten screws. When using wrenches, ensure they are not angled and that torque value deviations do not exceed 10% of the specified range.
9) After installation, ensure all electrical component protective covers, insulating sleeves, and similar devices are properly in place to prevent electric shock hazards.
10) If the equipment has multiple inputs, disconnect all inputs and wait until the equipment is completely powered down before performing any operations.
11) When servicing downstream electrical or distribution equipment connected to the power supply, disconnect the corresponding output switch of the power supply equipment.
12) During equipment maintenance, hang a "DO NOT CLOSE" sign on the upstream/downstream switches or circuit breakers and post warning signs to prevent accidental reconnection.
13) Power may only be restored after all faults have been resolved. When performing fault diagnosis and troubleshooting requiring power shutdown, the following safety measures

must be completed: Power Off > Verify Voltage > Install Grounding Wire > Hang Warning Signs and Install Barriers.

14) Regularly inspect equipment connection terminal screws to ensure they are tightened and free of looseness. If cables are damaged, they must be replaced by qualified personnel to avoid risks.
15) It is strictly prohibited to alter, damage, or obscure any labels or nameplates on the equipment. Replace any labels that have become illegible due to prolonged use promptly.
16) Do not clean internal or external electrical components with solvents such as water, alcohol, or oil.

2.6 Grounding Requirements

1) Equipment grounding impedance must comply with local electrical standards.
2) The equipment must be permanently connected to a protective ground. Before operating the equipment, inspect its electrical connections to ensure reliable grounding.
3) Do not operate the equipment without a properly installed grounding conductor.
4) Do not damage the grounding conductor.
5) For equipment using a three-prong plug, ensure the grounding terminal in the three-prong plug is connected to the protective earth.
6) For equipment with high contact current, the protective grounding terminal on the equipment chassis must be grounded before connecting the input power supply to prevent electric shock to personnel from contact current.

2.7 Wiring Requirements

1) Cable selection, installation, and routing must comply with local laws, regulations, and standards.
2) During power cord installation, avoid coiling or twisting. If the power cord is insufficient in length, replace it entirely. Do not splice or solder power cords.
3) All cables must be securely connected, well-insulated, and of appropriate specifications.
4) Cable trays and cable entry points must be free of sharp edges. Protective measures must be in place at locations where cables pass through conduits or entry points to prevent damage from sharp edges, burrs, etc.
5) If cables enter the cabinet from the top, they must be bent into a U-shape outside the cabinet before entering.
6) Cables of the same type should be bundled together, appearing straight and neat with no damage to the outer sheath. Cables of different types must be laid at least 30mm apart; intertwining or crossing is prohibited.
7) After completing wiring or when leaving during the wiring process, immediately seal the cable entry points with sealing compound to prevent moisture and small animals from entering.

8) Buried cables must be securely fastened using cable supports and clamps. Cables in backfilled soil areas must be tightly pressed against the ground to prevent deformation or damage from soil compaction forces during backfilling.

9) When external conditions (such as installation methods or ambient temperature) change, verify cable selection by referring to IEC-60364-5-52 or local regulations and standards, including whether the current-carrying capacity meets requirements.

10) Cable use in high-temperature environments may cause insulation aging or damage. Maintain a minimum clearance of 30mm between cables and the periphery of heat-generating components or heat sources.

11) At extremely low temperatures, severe impact or vibration may cause brittle cracking of the cable's plastic outer sheath.

12) To ensure installation safety, adhere to the following requirements: All cables must be installed at temperatures above 0°C. Handle cables with care during transportation, especially in low-temperature environments. If cables are stored below 0°C, they must be acclimated at room temperature for at least 24 hours before installation.

13) Prohibit improper practices such as pushing cables directly off vehicles to prevent damage that could degrade cable performance, affecting current-carrying capacity and temperature rise.

2.8 Anti-static Requirements


NOTE

- **Static electricity generated by the human body can damage electrostatic-sensitive components on circuit boards, such as BMU boards.**
- **Wear anti-static gloves before touching equipment or handling circuit boards.**
- **When handling circuit boards, hold only the edges free of components; do not touch any components with your hands.**
- **Removed boards must be packaged in anti-static materials for storage or transportation.**

2.9 Environmental Requirements


DANGER

- **Strictly prohibit placing equipment in environments containing flammable or explosive gases or fumes. No operations are permitted in such environments.**
- **Storing flammable or explosive materials in the equipment area is strictly prohibited.**
- **Never place equipment near heat sources or open flames, such as fireworks, candles, heaters, or other heat-generating devices. Exposure to heat may cause equipment damage or ignite a fire.**


WARNING

- **Install the equipment in areas away from liquids. Do not install it below locations prone to condensation, such as water pipes or air vents. Do not install it below areas susceptible to water leakage, such as air conditioning vents, ventilation openings, or equipment room cable access windows, to prevent liquid ingress causing equipment failure or short circuits.**
- **During operation, do not obstruct ventilation openings or cooling systems, nor cover the equipment with any objects. This prevents high temperatures from damaging the equipment or causing fires.**

1) Store the equipment in a suitable temperature and humidity environment. Keep it in a clean, dry, and well-ventilated area, and prevent dust and condensation.
2) Installation and operation of the equipment beyond the specified technical parameters are strictly prohibited, as this will compromise performance and safety.
3) Strictly prohibit installing, using, or operating outdoor equipment and cables during severe weather conditions such as thunderstorms, rain, snow, or winds exceeding force 6 (including but not limited to moving equipment, operating equipment and cables, plugging/unplugging outdoor signal interfaces, working at heights, outdoor installation, opening doors, etc.).
4) Installation of equipment in environments with dust, smoke, volatile gases, corrosive gases, infrared radiation, organic solvents, or excessive salt content is strictly prohibited.
5) Installation is strictly prohibited in environments containing conductive metallic dust or ferromagnetic dust.
6) Installation is strictly prohibited in areas prone to microbial growth, including fungi and mold.
7) Strictly prohibit installing equipment in areas subject to strong vibrations, intense noise sources, or strong electromagnetic field interference.
8) Site selection must comply with local laws, regulations, and relevant standards.
9) The installation site must have solid ground free of rubber soil, weak soil, or other adverse geological conditions prone to subsidence. Installation in low-lying areas or flood-prone zones is strictly prohibited. The site's horizontal plane must be elevated above the region's historical highest water level.
10) Installation of equipment in locations susceptible to flooding is strictly prohibited.
11) If equipment is installed in areas with dense vegetation, in addition to routine weed removal, the ground beneath the equipment must be hardened, such as by laying cement or gravel.
12) Before installation, operation, or maintenance, clear any accumulated water, ice, or debris from the top surface before opening doors to prevent foreign objects from entering the equipment.

13) When installing equipment, ensure the mounting surface is sturdy and meets the equipment's load-bearing requirements.

14) All cable access holes must be sealed. Use sealing compound to seal holes with existing cables, and use the equipment's included covers to seal unused holes. The correct sealing compound application standard is shown in the figure below.

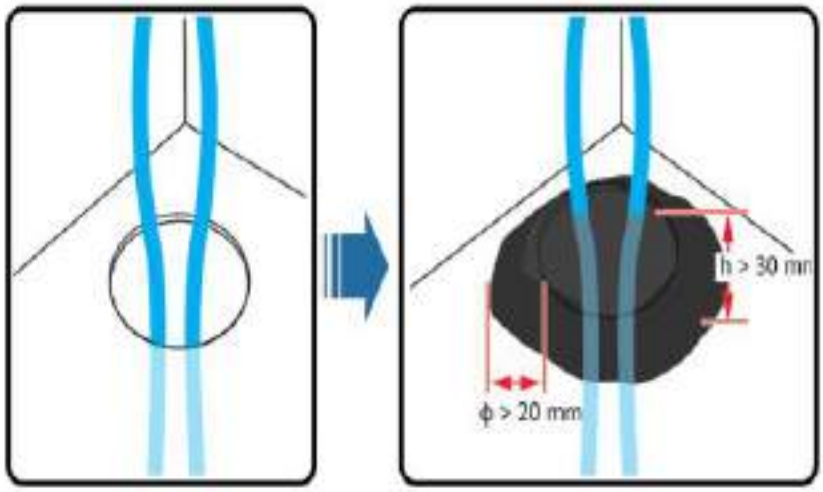


Figure 2-2 Cable Entry Hole Sealing Standard Diagram

2.10 Mechanical Safety

DANGER

When working at heights, wear a safety helmet and secure a safety harness or lanyard to a sturdy structural component. Never attach to moving, unstable objects or sharp-edged metal surfaces to prevent hook slippage and falls.

WARNING

- **Tools must be fully prepared and certified by professional inspection agencies. Do not use tools with damage, failed inspections, or expired certifications. Ensure tools are secure and not overloaded.**
- **Before installing equipment into cabinets, first ensure the cabinets are securely anchored to prevent tilting or collapse due to unstable weight distribution, which could cause injuries to installers or damage to equipment.**
- **When pulling equipment out of the cabinet, exercise caution with items that may be unstable or heavy to avoid crushing or impact injuries.**
- **Drilling holes in equipment is strictly prohibited. Drilling compromises equipment sealing, electromagnetic shielding performance, internal components, and cables. Metal shavings from drilling may enter the equipment and cause circuit board short circuits.**

2.11 Heavy Lifting Safety

1) When moving heavy objects, select appropriate handling tools and sufficient personnel based on the load's weight to ensure safe operation. The company's recommended cargo handling methods are illustrated below:

Figure 2-3: Schematic of Lifting Methods for Different Weight Loads

2) When manually handling equipment, wear protective gloves, safety shoes, and other appropriate safety gear.
3) During equipment handling, avoid scratching surfaces, damaging components, or damaging cables.
4) When using a forklift, position the forks in the center to prevent tipping. Secure the equipment to the forklift with ropes before moving; assign a dedicated supervisor during transport.
5) Handle equipment with care to prevent impacts or drops.
6) For transportation, select sea freight or roads with good conditions. Rail and air transport are not supported. Minimize jolts and tilting during transit.
7) The cabinet tilt angle must comply with the illustrated requirements: $\alpha \leq 3°$ when packaged, and $\alpha \leq 3°$ after unpacking.

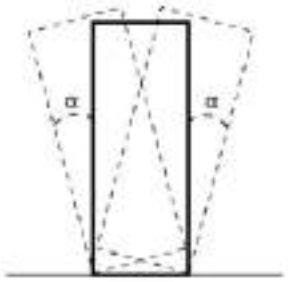


Figure 2-4: Permissible Cabinet Tilt Angle Diagram

2.12 High-Altitude Safety

1) Any work performed at a height exceeding 2 meters above ground level is considered high-altitude work. A supervisor must be present for high-altitude operations.
2) Personnel must undergo relevant training and obtain the appropriate certification before being permitted to perform work at heights.
3) Work at height must cease when steel pipes are wet from rain or other hazardous conditions exist. After such conditions subside, all work equipment must be inspected by the

safety supervisor and relevant technical personnel to confirm safety before resuming operations.

4) Designate restricted zones at high-altitude work sites with clear signage; unauthorized personnel are strictly prohibited from entering.
5) Guardrails and warning signs must be installed at edges and openings to prevent falls through openings.
6) Stacking scaffolding, planks, or other debris directly beneath elevated work zones is strictly prohibited. Ground personnel must not linger or pass directly beneath active elevated work areas.
7) Carry all operational equipment and tools securely to prevent tool falls that could damage equipment or cause personal injury.
8) Workers at height must not throw objects down to the ground, and objects must not be thrown up from the ground. Use hoists, baskets, aerial work platforms, or cranes to transfer objects.
9) Simultaneous work on upper and lower levels should be avoided whenever possible. If unavoidable, dedicated protective sheds or other safeguards must be installed between levels, and tools or materials must not be stored on upper levels.
10) When dismantling scaffolding after project completion, proceed layer by layer from top to bottom. Simultaneous dismantling at multiple levels is strictly prohibited. When removing any section, prevent collapse of adjacent sections.
11) Personnel working at heights must strictly adhere to high-altitude safety regulations. The company shall not be held liable for accidents resulting from violations of these regulations.
12) No horseplay or rest breaks are permitted in elevated work zones.

2.13 Ladder Safety

1) When electrical hazards may be present during elevated operations, wooden ladders or insulated ladders must be used.
2) Platform ladders with guardrails should be prioritized for elevated work; straight ladders are prohibited.
3) Before using a ladder, ensure it is in good condition and meets the required weight capacity. Overloading is strictly prohibited.
4) Ladders must be placed on stable ground, and a spotter must hold the ladder during use.

Figure 2-5 Personnel Ladder Support Diagram

5) When climbing a ladder, maintain body stability and keep your center of gravity aligned

with the ladder frame to minimize risk and ensure safety.

6) When using a stepladder, the pull rope must be securely fastened.

2.14 Lifting Safety

1) Personnel performing hoisting operations must undergo relevant training and be qualified before commencing work.
2) Erect temporary warning signs or barriers to isolate the lifting area.
3) The foundation where lifting operations are conducted must meet the load-bearing requirements for crane operations.
4) Before lifting, ensure lifting tools are securely fastened to fixed objects or walls that meet load-bearing standards.
5) During lifting operations, it is strictly prohibited to walk beneath the crane boom or suspended load.
6) During lifting operations, dragging steel cables or lifting devices is prohibited, and striking with hard objects is strictly forbidden.
7) During lifting, ensure the angle between the two cables does not exceed 90°, as shown in the figure below.

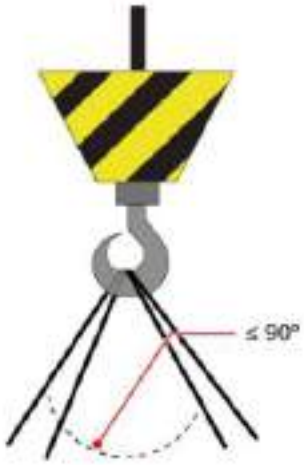


Figure 2-6 Schematic Diagram of Cable Angle for Lifting Operations

2.15 Drilling Safety

1) Obtain approval from the client or contractor before drilling.
2) Wear safety equipment such as goggles and protective gloves when drilling.
3) Avoid pre-installed pipes or cables during drilling to prevent short circuits or other hazards.
4) Cover and protect equipment during drilling to prevent debris from entering the equipment interior. Clean up debris promptly after drilling.

2.16 Equipment Safety

2.16.1 Energy Storage System Safety

DANGER

- **Do not open cabinet doors while the system is operating.**
- **In the event of an energy storage system malfunction, avoid standing near the cabinet door (including within the door's swing range).**

NOTE

The energy storage system must be protected by barriers, fences, or similar measures. Safety warning signs must be erected to isolate the area, preventing unauthorized personnel from entering during operation and causing personal injury or property damage.

1) The installation layout of the energy storage system must comply with local standards for fire separation distances or firewalls, including but not limited to the requirements of GB51048-2014 Design Code for Electrochemical Energy Storage Power Stations and NFPA 855 Standard for the Installation of Stationary Energy Storage Systems.
2) The energy storage system shall undergo regular fire safety inspections at least once per month.
3) During live inspections, pay attention to hazard warning labels on equipment and avoid standing near cabinet doors.
4) After replacing power components or modifying wiring in the energy storage system, manually initiate wiring verification and topology recognition to prevent system malfunctions.
5) Users are advised to provide their own video recording equipment to document detailed processes of installation, operation, and maintenance.

2.16.2 Battery Safety

DANGER

- **Short-circuiting the positive and negative terminals of batteries is strictly prohibited, as it may cause battery short circuits. A battery short circuit generates a large instantaneous current and releases significant energy, potentially leading to battery leakage, smoke emission, release of flammable gases, thermal runaway, fire, or explosion. To prevent battery short circuits, batteries must not be maintained while energized.**
- **Do not expose batteries to high-temperature environments or near heat-generating equipment, such as intense sunlight, open flames, transformers, or heaters. Battery overheating may cause leakage, smoke emission, release of flammable gases, thermal**

runaway, fire, or explosion.

- Strictly prohibit subjecting batteries to mechanical vibration, drops, impacts, punctures by hard objects, or pressure shocks, as these may cause battery damage or fire.
- Never disassemble, modify, or damage the battery (e.g., inserting foreign objects, applying external pressure, submerging in water or other liquids), as this may cause leakage, smoke, release of flammable gases, thermal runaway, fire, or explosion.
- Never allow battery terminals to contact other metal objects, as this may cause overheating or electrolyte leakage.
- Using or replacing batteries with incorrect models may cause fire or explosion hazards. Always use the manufacturer's recommended battery model.
- Battery electrolyte is toxic and volatile. If leakage or unusual odors occur, avoid contact with leaked liquid or gas. Non-professionals must stay clear and immediately contact qualified personnel. Professionals should wear goggles, rubber gloves, respirators, and protective clothing. Promptly power down the device, remove the leaking battery, and contact a technical engineer for handling.
- Batteries are sealed systems that do not release gases under normal operation. However, extreme misuse—such as fire exposure, puncturing, crushing, lightning strikes, overcharging, or other conditions potentially causing thermal runaway—may damage the battery or trigger abnormal chemical reactions inside. This could result in electrolyte leakage or the generation of gases like CO and H_2 . Ensure flammable gas venting systems are operational at the site to prevent combustion or equipment corrosion.
- Gases produced by battery combustion can irritate the eyes, skin, and throat. Take appropriate protective measures.


WARNING

- **Batteries must be installed in areas away from liquids. Installation is strictly prohibited beneath locations prone to water leakage, such as air conditioning vents, ventilation openings, equipment room cable access windows, or water pipes, to prevent liquid ingress causing equipment failure or short circuits.**
- **During battery installation and commissioning, firefighting equipment such as fire sand and carbon dioxide extinguishers must be provided in accordance with construction standards and specifications. Before operational deployment, ensure all firefighting facilities comply with local laws, regulations, and standards.**
- **Before unpacking batteries, during storage and transit, ensure outer packaging remains intact and undamaged. Position batteries correctly according to markings on the packaging. Never place batteries upside down, on their sides, upright, or at an angle. When stacking, comply with the stacking requirements indicated on the outer packaging. Avoid any impact or drops that could damage or render batteries unusable.**
- **After unpacking batteries, position them according to specified orientation. Strictly prohibit upside-down, sideways, vertical, tilted, or stacked placement. Avoid any impact or drops that could damage or render batteries unusable.**
- **Tighten the fastening screws for copper busbars or cables to the torque specified in the documentation. Periodically inspect for proper tightness, rust, corrosion, or foreign objects, and clean thoroughly. Loose connections may cause excessive voltage drop or significant overheating at high currents, potentially destroying the battery.**
- **After discharging, recharge the battery promptly to prevent damage from over-discharge.**

Disclaimer: The Company shall not be liable for damage to batteries supplied by the Company caused **by** the following reasons:

1) Damage caused by earthquakes, floods, volcanic eruptions, mudslides, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, extreme weather, or force majeure events.
2) Direct damage to batteries caused by on-site equipment operating environments or external power parameters failing to meet normal operational requirements, including but not limited to excessively high or low actual operating temperatures, unstable grid conditions, or frequent power outages.
3) Damage, drops, leakage, or rupture of the battery caused by improper operation or failure to connect the battery according to requirements.
4) Damage caused by deep discharge of batteries installed on-site and connected to the system due to delayed power-up on your part.
5) Damage to the battery caused by failure to conduct timely acceptance inspection due to your reasons.

6) Failure to correctly configure battery operational management parameters.
7) Mixed use of batteries provided by our company with other batteries, accelerating capacity degradation, including but not limited to: mixing with batteries of other brands or different capacities.
8) Frequent over-discharge due to improper maintenance, on-site capacity expansion, or prolonged inability to fully charge the battery.
9) Failure to perform proper maintenance on the battery according to the operating manual of the supporting equipment, including but not limited to: failure to periodically check whether the battery terminal screws are tightened.
10) Battery damage caused by failure to store batteries according to storage requirements (e.g., storing in damp or rain-exposed environments).
11) Battery capacity loss or irreversible damage due to prolonged storage caused by delayed charging.
12) Damage to the battery caused by you or a third party, including but not limited to: unauthorized relocation or installation of the battery without following our company's requirements.
13) Changing the battery's usage scenario without notifying the company.
14) Connecting additional loads to the battery without authorization.
15) The battery has exceeded its maximum storage period.
16) The battery has exceeded its warranty period.

2.16.3 General Requirements

DANGER

- **Do not expose the battery to high temperatures or place it near heat-generating equipment such as direct sunlight, open flames, transformers, or heaters. Overheating may cause fire or explosion.**
- **Do not disassemble, modify, or damage the battery (e.g., by inserting foreign objects, immersing in water or other liquids, etc.), as this may cause leakage, overheating, fire, or explosion.**
- **Lithium-ion battery energy storage systems pose a high fire hazard. Before performing any battery operations, fully consider the following safety risks.**
- **Battery electrolyte is flammable, toxic, and volatile.**
- **Battery thermal runaway can produce flammable gases and harmful gases such as CO and HF.**
- **Accumulation of combustible gases from thermal runaway poses deflagration and explosion risks. Energy storage systems must be loaded/unloaded according to local laws, regulations, and industry standards. Rough handling may cause battery short circuits or damage within cabinets, potentially leading to leakage, rupture, explosion, or fire.**

1) Batteries must be stored in a dedicated warehouse within their original packaging. Avoid storing them with other materials, avoid outdoor storage, and avoid stacking batteries too high. The site must be equipped with compliant firefighting facilities, such as fire sand and fire extinguishers.
2) Under normal circumstances, do not remove the battery's outer packaging. If battery recharging is required, it must be performed by qualified personnel following specified procedures. After recharging, the battery must be repackaged.
3) For outdoor scenarios, batteries should be powered within 24 hours after unpacking. If immediate powering is not feasible, store batteries indoors in a dry environment free from corrosive gases.
4) Batteries must be positioned correctly according to the anti-inversion markings or labels on the packaging to prevent long-term storage in an inverted position, which may cause electrolyte leakage.
5) Avoid impact to the batteries.
6) When handling batteries, transport them in the specified orientation. Do not invert or tilt them.
7) Use batteries within the temperature range specified in this manual. Do not charge batteries when the ambient temperature is below the lower operating temperature limit to prevent crystallization caused by low-temperature charging, which may result in internal short circuits.
8) Dispose of used batteries in accordance with local laws and regulations. Do not treat batteries as household waste. Improper battery disposal may cause environmental pollution.
9) Do not use damaged batteries (batteries with dented casings or other damage). Damaged

batteries may release flammable gases. Do not store damaged batteries near undamaged products.

10) Damaged batteries must be stored away from flammable materials. Unauthorized personnel must not approach them.
11) During storage, inspect damaged batteries regularly to ensure no signs of smoke, flames, electrolyte leakage, or overheating.
12) If a battery pack is accidentally exposed to water, do not continue installation. Transport it to a secure isolation point and promptly request replacement parts.
13) Store in a location protected from direct sunlight and rain, ensuring it is dry, well-ventilated, and surrounded by a clean environment free from excessive infrared radiation, organic solvents, or corrosive gases.

2.16.4 Prohibited Applications

In backup power scenarios, batteries must not be used for the following purposes:

1) In medical devices directly related to human life.
2) Control equipment for trains, elevators, etc., where it may cause personal injury.
3) In computer systems of critical social or public importance.
4) For locations near medical equipment.
5) Equipment similar to the above description.

3 Product Introduction

3.1 Product Overview

The BlueArk X5 Commercial & Industrial Photovoltaic Storage System, manufactured by Guangdong TCL Digital Power Co., Ltd., is designed for small and medium-sized commercial and industrial users. It offers a modular design, flexible scalability, safety and reliability, high efficiency, and advanced intelligence.

The system adopts an integrated design, incorporating a battery cluster, hybrid inverter, thermal management system, fire protection system, power distribution system, grounding system, and EMS energy management system.

The BlueArk X5 Commercial & Industrial Photovoltaic-Storage Integrated System represents a new generation of microgrid management systems that integrate photovoltaic power, utility grid power, diesel generator sets, energy storage, and loads. It ensures reliable power supply and energy savings for users while enhancing grid stability and power quality locally. Simultaneously, it reduces the need for grid expansion and minimizes hardware investment in local power supply systems.

The BlueArk X5 commercial and industrial photovoltaic-storage integrated system employs an intelligent EMS energy management system to support multiple core operating modes, adapting to diverse power consumption scenarios. Based on PV generation status, grid tariff policies, and load characteristics, the system automatically selects optimal energy dispatch strategies, achieving dual optimization of economic benefits and power supply reliability.

- **Peak Shaving and Valley Filling Mode:**
  This mode supports either time-segmented or continuous operation. Within designated time periods, the system performs battery charging and discharging operations based on preset upper limits for battery SOC charging, lower limits for discharging, and maximum inverter output power constraints.
- **Self-Generation and Self-Consumption Mode:**
  This mode prioritizes maximizing local consumption of renewable energy, enhancing energy self-sufficiency, and improving economic efficiency. It follows a "load-first" principle with the following energy dispatch priority: Load > Energy Storage > Grid.When solar generation is sufficient, energy is prioritized for load supply, with any surplus charging the storage system before feeding into the grid. When solar generation is insufficient, the storage system discharges to ensure load supply. When storage capacity is insufficient, the grid seamlessly supplements as a backup power source.
- **Grid Priority Mode:**
  This mode operates with the core objective of maximizing grid-connected power generation, adhering to the "feed-in priority" principle. Its energy dispatch priority is: Load > Grid > Energy Storage. When PV generation is sufficient, energy is prioritized for supplying loads and the grid, with any surplus charging the energy storage. When PV generation is insufficient, energy storage discharges to ensure power supply to both loads and the grid.

- **Battery Priority Mode:**
  This mode is an operational strategy centered on maximizing battery runtime and ensuring backup power reliability, adhering to the "storage priority" principle. Its energy dispatch priority is: Battery > Load > Grid. When solar generation is sufficient, energy is prioritized for charging the storage unit, with the remainder supplied to loads and the grid. When solar generation is insufficient, the grid supplies power to charge the storage unit.
- **Strategy Time-of-Use Mode:**
  This mode implements a time-based intelligent energy management strategy, supporting either time-segmented or full-time configuration. During preset periods, the system operates according to user-defined modes (self-generation for self-consumption/grid priority/battery priority). Outside these periods, the system automatically defaults to self-generation for self-consumption mode.
- **Microgrid Mode:**
  The PV system supplies power to loads only until the battery reaches the set State of Charge (SOC) value. In this scenario, the system can automatically activate the diesel generator to supply power to both the battery and loads.

3.2 Model Specifications

This document primarily covers the following product models:

BlueArk X5-50K-100; X5-29.9K-60/100; X5-30K-60/100

Table 3-1 Product Specifications

Model	X5-29.9K-60/100	X5-30K-60/100	X5-50K-100
DC Input			
Maximum PV Input Power [Wp]@STC	59800	60,000	100,000
Maximum Input Voltage [V]	1000		
MPPT Voltage Range [V]	180-850		
Rated Input Voltage [V]	600		
Startup Voltage [V]	200		
Maximum Input Current [A]	4*45	4*45	6*45
Maximum Short-Circuit Current [A]	4*55	4*55	6*55
Number of strings per MPPT input	2		
Battery Parameters			
Battery Type	LiFePO4		
Rated Energy [kWh]	60/100	60/100	100
Battery Voltage Range [V]	168-216/280-360	168-216/280-360	280-360
Maximum Charge/Discharge Current [A]	150		
AC Output (Grid Side)			
Rated Output Power [W]	29,900	30000	50000
Maximum Output Power [VA]	29,900	33000	55000
Rated Output Current [A]	43.3	43.5	72.5
Maximum Output Current [A]	43.3	47.9	79.8
Rated Voltage [V]	3L+N+PE, 380/400		
Rated Frequency/Range [Hz]	50/60		
Power Factor Adjustment Range	-0.8 to 0.8		
Total Harmonic Distortion [THDi]	<3%		

AC Input (Grid-Connected)			
Rated Input Voltage [V]	3L+N+PE, 380/400		
Rated Input Frequency [Hz]	50, 60		
Maximum Input Current [A]	80	80	200
AC Output (Off-Grid Side)			
Maximum Output Power [VA]	29900	33000	55000
Peak Output Power [VA]	29,900	45000, 5s	75000, 5S
Rated Voltage [V]	3L+N+PE, 380/400		
Rated Frequency/Range [Hz]	50/60		
Total Harmonic Distortion [THDV] (Linear Load)	<3%		
AC Input [Generator]			
Maximum Input Power [VA]	138000		
Maximum Input Current [A] @ 230V	200		
Rated Voltage [V]	3L+N+PE, 380/400		
Rated frequency/range [Hz]	50, 60		
Protection			
PV Polarity Reversal Protection	Integrated		
Anti-islanding protection	Integrated		
AC Overcurrent Protection	Integrated		
AC Short-Circuit Protection	Integrated		
AC Overvoltage Protection	Integrated		
DC Switch	Integrated		
DC Surge Protection	Secondary		
AC Surge Protection	Level 2		
Arc-Flash Monitoring	Integrated		
Fast Switch-Off	Optional		
System Parameters			
Communication Method	Ethernet/RS485/4G		
Topology	Transformerless Isolation		
Operating Temperature Range	-30°C to +50°C (Derating at 45°C to 50°C)		
Cooling Method	Air-conditioned (battery)/Intelligent air-cooled (inverter)		
Operating Humidity	0-95% RH, non-condensing		
Maximum Operating Altitude	3000m		

Protection Rating	Battery compartment IP55, IP66 (inverter)
Dimensions	1900*1020*1340mm (H*W*D)
Weight	1.2 T
Warranty [Years]	5

Note: *1. The open-circuit voltage of photovoltaic modules must not exceed 1000V. Exceeding 1000V may damage the hybrid inverter.

3.3 Appearance Introduction

Figure 3-1 BlueArk X5 Appearance Diagram

*The above images are for reference only. Please refer to the actual product received.

Table 3-3 BlueArk X5 Specification Comparison

No.	Name	Serial No.	Name
1	Combustible Gas Exhaust Outlet	5	Combined Inverter
2	Air Conditioner	6	Status Indicator
3	Combustible Gas Exhaust and Intake Vent	7	Emergency Stop Button
4	Electrical Distribution Room	8	Door Lock

Inside the outdoor cabinet door, there is a set of LED lights indicating the main operating status of the machine, including the power indicator "POWER," the operation indicator "RUN," and the fault indicator "FAULT."

Table 3-4 LED Indicator Descriptions

Name	Color	Description
POWER	Green	On: Power output present at Backup port; Off: No power output on the Backup port;
RUN	Green	Solid: System standby, charging, discharging; Off: Operation stopped.

FAULT	Red	Solid: Fault occurred and has not been cleared. Off: No fault; Flashing: An alarm exists in the system, but it does not affect system operation.

Table 3-5 LED Display States and Operational Notes

Color	Description
POWER LED illuminated	Control power supply is powered on
POWER LED lit, RUN LED green	System is operating normally
POWER LED off, RUN LED off, FAULT LED steady on	System fault and system shutdown status
POWER LED steady on, FAULT LED flashing	System alarm present, does not affect system operation
All lights off	Power disconnected

The appearance and dimensions of the outdoor battery cabinet are shown below:

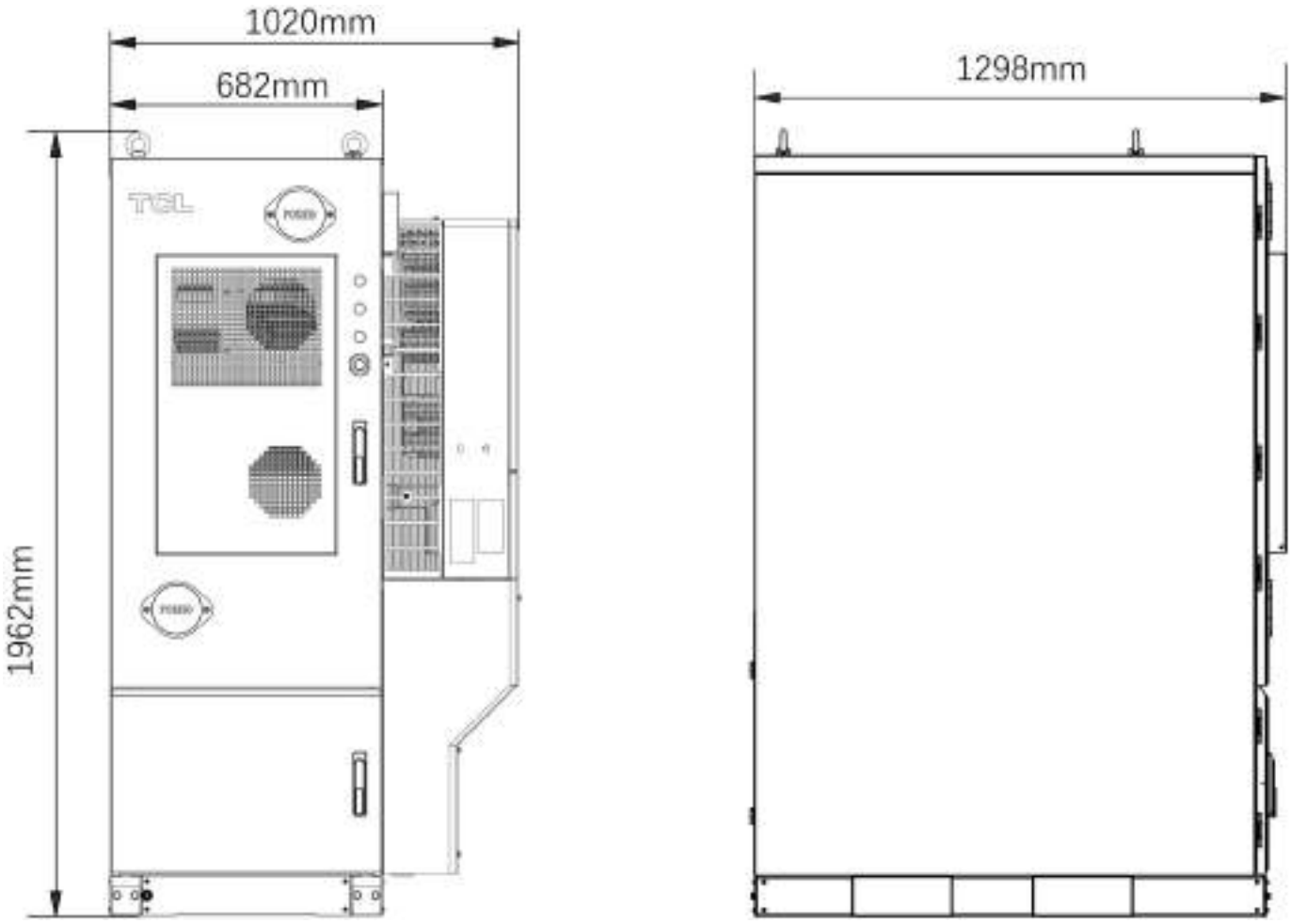


Figure 3-2 Battery Outdoor Cabinet Dimensions

*The above images are for reference only. Please refer to the actual product received.

3.4 Component Overview

This system employs an integrated design, featuring a comprehensive cabinet housing five battery packs, a high-voltage box, BMS system, EMS system, air conditioning system, fire suppression system, and one 50kW hybrid inverter. The front view of the outdoor cabinet door is shown below:

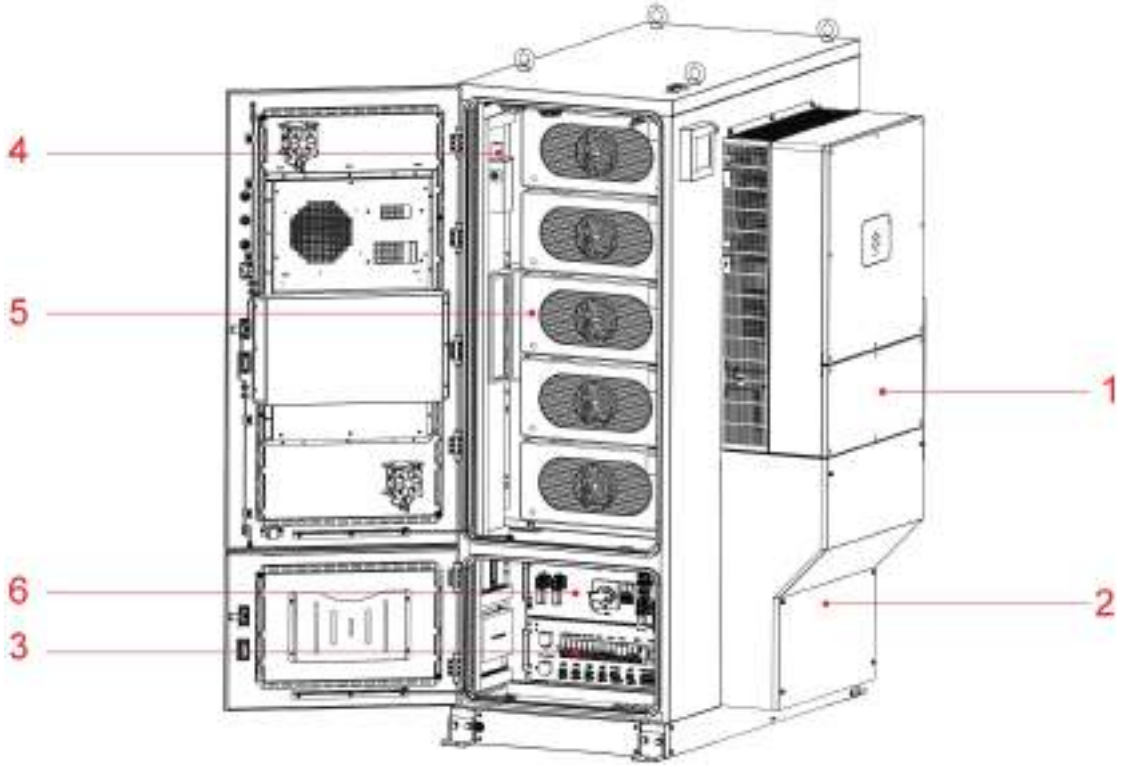


Figure 3-3 Front View with Door Open

*The above image is for reference only. Actual product may vary.

Table 3-6 System Unit Specifications

No.	Name	Serial No.	Name
1	Hybrid Inverter Wiring Area	4	Aerosol Fire Extinguisher
2	Inlet compartment	5	Battery Pack
3	Distribution Box	6	High-voltage box

3.4.1 Battery Cluster

This product utilizes lithium iron phosphate batteries to develop standardized, modular battery cells. These cells are connected in series and paired with high-voltage boxes to form battery clusters. The battery clusters are integrated with a hybrid inverter to create an energy storage system (ESS) product.

1) Cell

The cell adopts a 314Ah lithium iron phosphate (LFP) square aluminum-cased cell with a standard charge/discharge rate of 0.5P. It features high continuous power, long cycle life, extended storage life, and high safety.

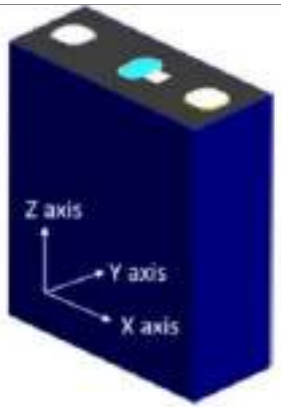


Figure 3-4 Cell Schematic Diagram

Detailed cell parameters are listed in the table below:

Table 3-7 Cell Parameters

Serial No.	Parameter Name	Remarks
1	Battery Type	Lithium Iron Phosphate
2	Nominal Voltage	3.2V
3	Nominal Capacity	314Ah
4	Standard Charging Power	0.5P
5	Maximum Continuous Charging Power	0.5P
6	Standard Discharge Power	0.5P
7	Maximum Continuous Discharge Power	0.5P
8	Voltage Range	2.0-3.65V, cell temperature T ≤ 0°C
		2.5–3.65V, cell temperature T > 0°C
9	Energy Efficiency	≥93%, 0.5P@25 ℃
10	Dimensions (W*D*H)	173.7*71.7*204.6mm
11	Cycle Life	≥8000 cycles, 70% SOH @ 25°C
12	Internal Resistance (1kHz)	0.18 ± 0.05 mΩ
13	Weight	5.6±0.3 kg
14	Storage Temperature Range	-20°C to +60°C
15	Operating temperature range	-20°C to +60°C

2) Battery PACK

The battery pack primarily consists of 20 314Ah cells, 1 fan, 1 BMU, and structural/electrical components for cell mounting. Integrated thermal control ducts are incorporated within the pack. The battery pack has a nominal energy capacity of 20.096kWh.

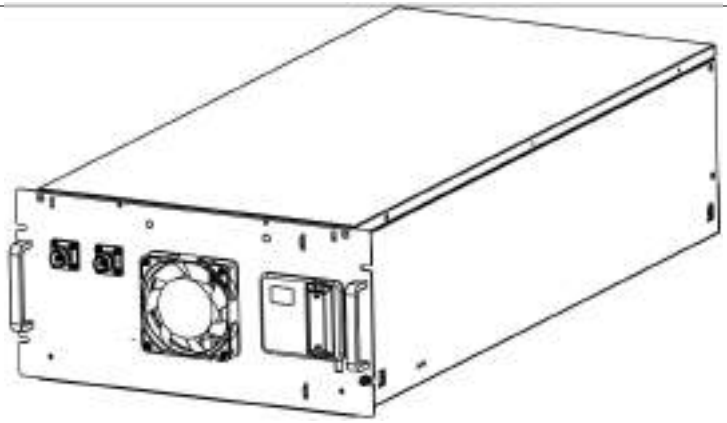


Figure 3-5 Battery Pack Schematic Diagram

Table 3 -8 Battery Pack Parameters

Serial No.	Parameter Name	Description
1	Discharge Rate	≤0.5P, recommended below 0.5P
2	Cell Type	Square aluminum casing LFP
3	Pack Configuration	1P20S
4	Rated Voltage	64.0 Vdc
5	Nominal Capacity	20.096 kWh
6	Voltage Range	56.0 Vdc ~ 73.0 Vdc (Cell: 2.8 ~ 3.65 V)
7	Cooling Method	Air-cooled
8	Weight	150±10 kg
9	Protection Rating	IP20
10	Dimensions (W*D*H)	485*980*235mm

3) High-Voltage Box

The high-voltage box connects the battery strings to the hybrid inverter, providing real-time monitoring of string voltage, temperature, current, and insulation. It also collects signals from auxiliary contacts of contactors and switches. The Battery Cluster Management Unit (BCU) uploads string information to the EMS and PCS. The high-voltage box incorporates protection functions against overcurrent, over/undervoltage, overtemperature, and overcharging/overdischarging.

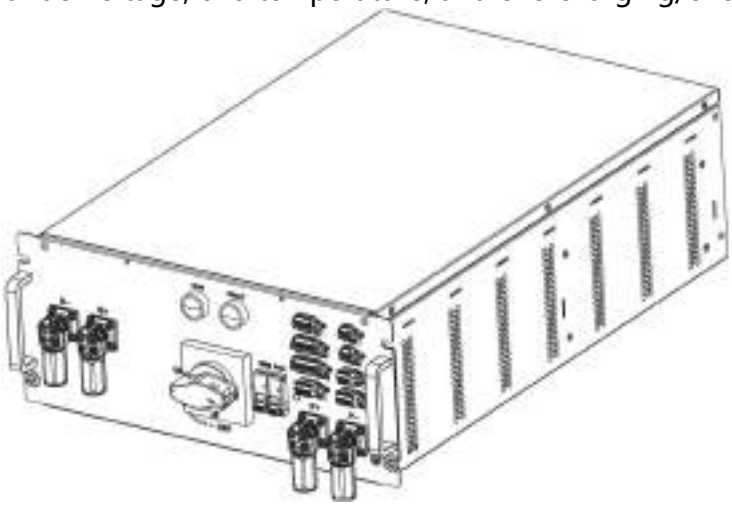


Figure 3-6 High-Voltage Box Schematic

Table 3-9 High-Voltage Box Parameter Table

Serial No.	Parameter Name	Description
1	Dimensions (W*D*H)	485*711.5*200mm
2	Weight	35 kg
3	Allowable Voltage Range	200V to 1000V
4	Allowable Current Range	0A to 200A
5	Permissible Ambient Temperature	-30°C to 55°C (Derating required above 45°C)
6	Permissible relative humidity	95% RH
7	Permissible Altitude	≤3000m
8	Cooling method	Air-cooled

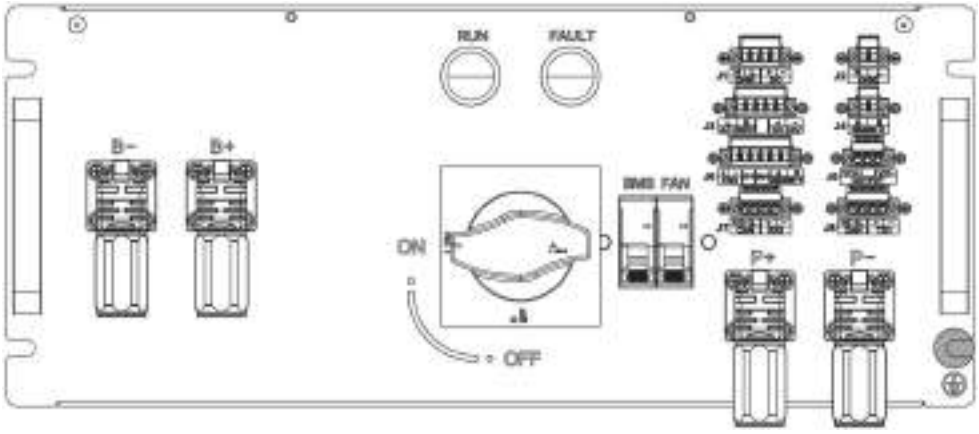


Figure 3-7 Schematic Diagram of High-Voltage Box Front Panel

Table 3-10 High-Voltage Box Component Specifications

Name	Description	Function
B+/B-	Battery Terminal Connector	Connects to the overall positive and negative terminals of the entire battery cluster.
P+/P-	Hybrid inverter terminal connector	Connects to the positive and negative terminals of the hybrid inverter.
RUN	RUN Indicator	Green light illuminates when main contactor is closed
FAULT	Fault Indicator	Three-level alarm and contactor disengagement illuminate red light
J1	PCS Communication and Emergency Stop Interface	CAN1H/L: CAN communication with PCS; DO+/-: Emergency stop signal for PCS
J2	Debug Port	CAN2H/L: Debug port
J3	Power Input	AC230V L/N: Switching power supply AC input; DC24V ±: Main Control Unit (BCU) power supply input.
J4	RS485 Communication	RS485-2A/B: RS485 communication with EMS

J5	BMU Power Supply and Communication	Power supply and communication between the master controller and the next-level BMU
J6	DC24V Output	DC24V power output from high-voltage box: 300W
J7	CAN1H/1L, RX1+/1-	CAN communication and addressing input with master controller BAU
J8	CAN1H/1L, TX1+/1-	CAN communication and addressing output with the next-level master control unit (BCU)

4) BMS - Battery Management System

This product's BMS system is primarily used for real-time monitoring of the battery pack. It can detect individual cell voltage, overall voltage, current, temperature, etc., and continuously assess the battery's operational status. It uploads battery pack status information and alarm signals, and when necessary, disconnects the battery pack circuit output for protection.

Key BMS parameters are detailed in the table below:

Table 3-11 BMS Performance Parameters

No.	Performance Category	Item	Performance Target
1	Basic Requirements	Operating Temperature Range	-30°C to +85°C
2		Storage Temperature Range	-40°C to +85°C
3	Battery Status Monitoring	Cell Voltage Sampling Accuracy	±3mV @ -30°C ~ +85°C
4		Total Voltage Sampling Accuracy	≤0.5% FSR
5		Total voltage detection range	0V to 1500V
6		Current sampling accuracy	≤0.5% FSR
7		Current Detection Range	-500A to 500A (subject to actual conditions)
8		Temperature sampling accuracy	±1°C (-20°C to 65°C)
9		Temperature sampling range	-40°C to 125°C

3.4.2 Hybrid Inverter

The inverter used in this product is a three-phase grid-tied/off-grid energy storage inverter, suitable for energy management in systems such as photovoltaic panels, batteries, loads, and the

power grid.

Electricity generated by photovoltaic panels powers loads, with excess energy stored in batteries. When batteries are fully charged, surplus electricity can be fed into the utility grid.

When PV generation is insufficient to meet user load demands, the battery discharges to the load. If stored battery energy is inadequate, the utility grid supplies power to the load through the system.

Features of this hybrid inverter:

- 4/6 MPPT channels supporting 200% over-modulation;
- AC and DC Type II surge protectors;
- Supports grid-tied and off-grid switching;
- IP66 protection rating, suitable for indoor and outdoor installation;
- Compatible with diesel generators without additional equipment;
- Supports parallel connection of up to 10 units for easy scalability;

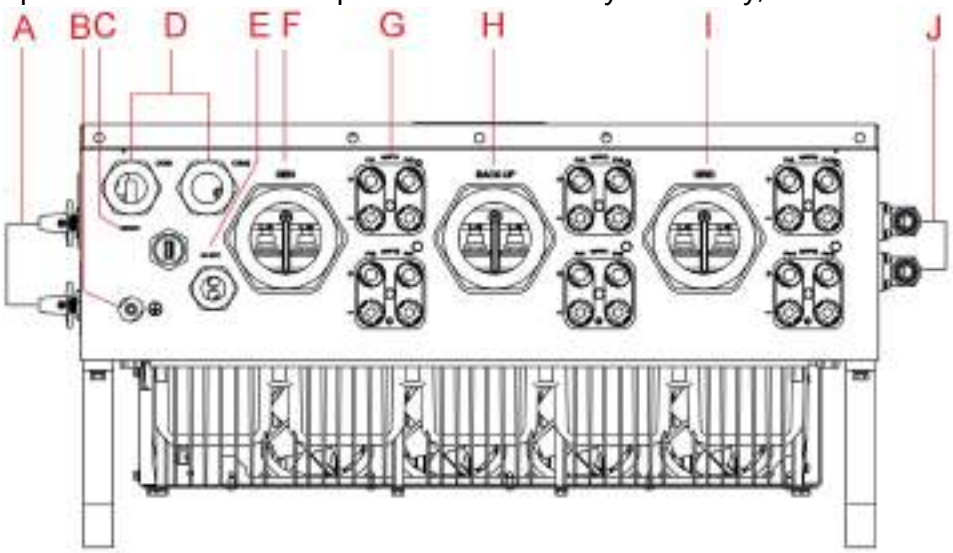


Figure 3-8 Structural Layout

Table 3-12 Hybrid Inverter Component Description

Serial No.	Description	Function
A	DC SWITCH	DC Switch
B	/	Ground Connection
C	4G/WIFI	USB port for 4G (optional)/Wi-Fi communication (standard)
D	COM1, COM2	Communication Ports
E	AC-OUT	220V AC power output connection.
F	GEN	Generator connection
G	MPPT1/2/3/4/5/6	PV Input Connection
H	BACK-UP	Backup Load Port
I	GRID	Grid Port
J	BAT+, BAT-	Battery Port

Important Notes:

The DC switch serves as the connection switch between the PV system and the hybrid inverter. It allows for the safe disconnection of the hybrid inverter from the PV system when necessary. To

ensure operator safety, ensure the DC switch is in the OFF position under the following conditions:

• During installation wiring, the DC switch must be in the OFF position.

• During inspection or maintenance, place the DC switch in the OFF position and wait 30 minutes. Use a multimeter to verify the DC bus voltage inside the unit is below 10V before proceeding with maintenance work.

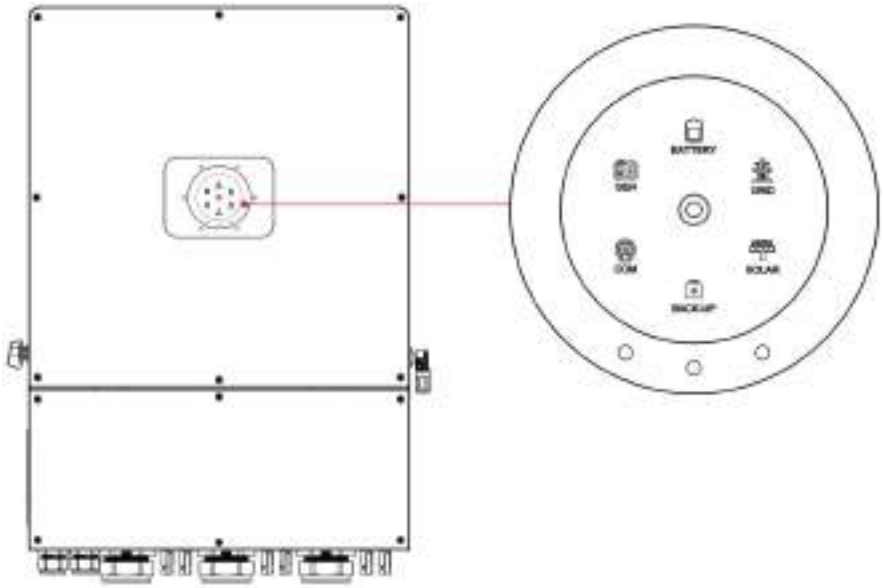


Figure 3-9 Hybrid Inverter Indicator Panel

Table 3-13 LED Indicator Descriptions

LED Indicator	Status	Description
	LED Off	Inverter is off
	Flashing	Inverter is in initial state or standby mode
	Steady	Inverter operating normally
	Flashing	Inverter is upgrading
	Steady	Inverter fault

3.4.3 Fire Suppression System

The product features an aerosol fire suppression system. The battery cabinet is equipped with a combustible gas detection and alarm system, an emergency ventilation system, and a gas fire suppression system. This system constitutes an efficient firefighting solution. It utilizes fire detection devices such as combustible gas detectors, smoke detectors, and temperature sensors for monitoring. Upon detecting anomalies, it sends signals to the monitoring system to trigger fire alerts.

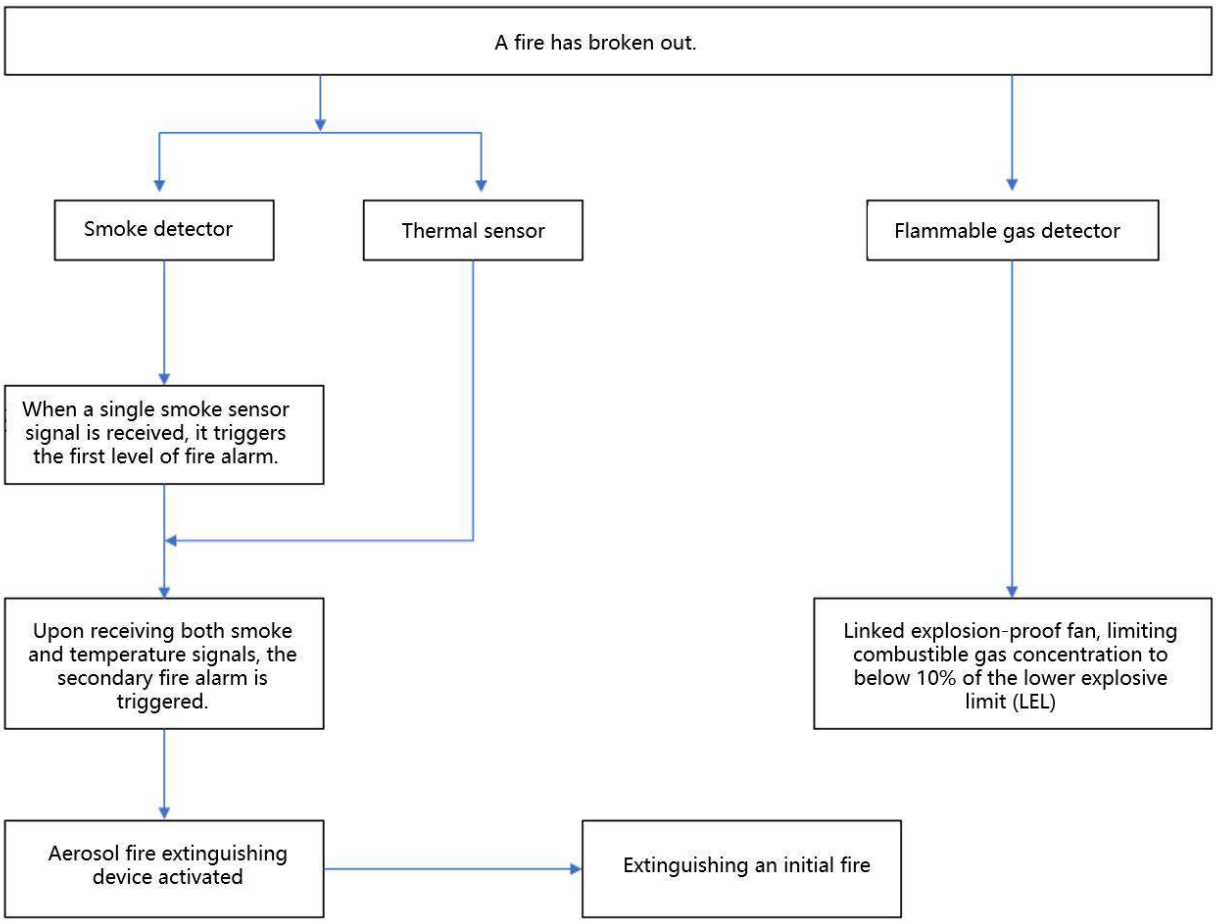


Figure 3-10 Fire Protection System Action Flowchart

1) Aerosol Fire Suppression Device

Figure 3-11 Aerosol Fire Suppression Device

Table 3-14 Aerosol Fire Suppression Device Parameters

Serial No.	Item	Specification
1	Activation Method	Electric Start
2	Electric Igniter Rated Current	1.35A
3	Fire Extinguishing Agent	SFE Agent
4	SFE Weight	100g

5	Fire Extinguishing Type	Class A, Class B, Class C, Class E

2) Temperature Detector

Figure 3-12 Temperature Monitor

Table 3-15 Temperature Monitor Parameter Table

Serial No.	Item	Specification
1	Activation Temperature/Output Characteristics	65°C/Relay Dry Contact Output
2	Supply Voltage	9-33V
3	Operating Temperature/Humidity	-20°C to +90°C / 0% to 95% RH

3) Smoke Detection

Figure 3-13 Smoke Detector

Table 3-16 Smoke Detector Parameter Table

Serial No.	Item	Specification
1	Threshold/Output Characteristics	0.15 dB/m (EN 54-7)/Relay Dry Contact Output
2	Supply Voltage	9-33V
3	Operating Temperature/Humidity	-20°C to +60°C / 0% to 95% RH

4) Flammable Gas Detection

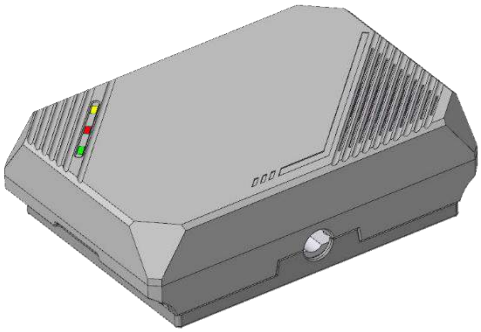


Figure 3-14 Combustible Gas Detector

Table 3-17 Combustible Gas Detector Parameter Table

Serial No.	Item	Specifications
1	Rated Voltage	24V
2	Supply Current	Imax ≤ 80mA, Iavg ≤ 20mA
3	Control Output	Two alarm point outputs (passive switch signals)
4	Data Interface	RS485
5	Communication Protocol	Modbus-RTU
6	Software Support	Compatible control software (MODBUS Debug Assistant 1.0);
7	Operating Environment	Temperature: -20°C to 50°C; Humidity: 15% to 90% RH
8	Sensor Type (Optional)	CO, H_2 , combustible gas LEL, etc.

3.4.4 Air Conditioning

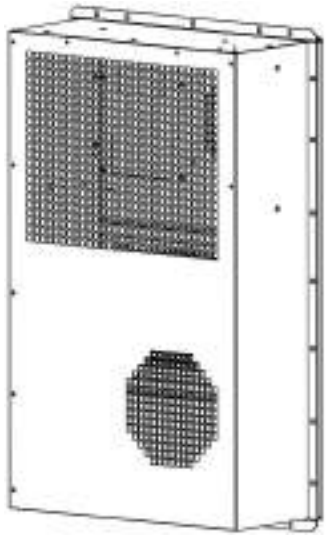


Figure 3-15 Air Conditioning View

Table 3-18 Air Conditioning Parameter Table

Serial No.	Item	Specification
1	Input Voltage	220VAC

2	Frequency	50Hz
3	Cooling Capacity	2kW
4	Cooling Power	0.8 kW
5	Heating capacity	1kW
6	Dimensions/Weight	446*200*746mm (W*D*H)/29kg

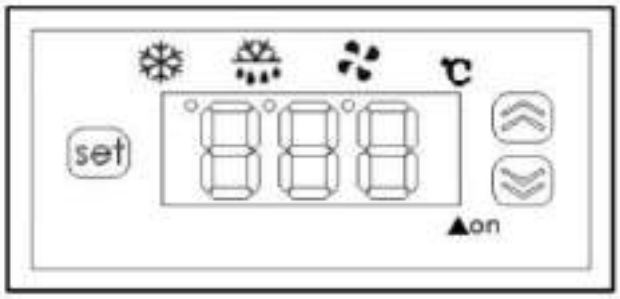


Figure 3-16 Air Conditioner Display Panel View

Table 3-19 Air Conditioner Panel Display Explanation Table

Serial No.	Name	Port, Status	Function
1	Cooling		Indicates the air conditioner is in cooling mode
2	Heating		Indicates the air conditioner is in heating mode
3	Fan		Indicates the air conditioner is in fan mode
4	Confirm button		Confirms function selections and parameter settings
5	Up Arrow Key		Increase values or select the previous record/menu item
6	Down Arrow Key		Decrease value or select next record/menu item

3.4.5 Combustible Gas Exhaust System

The fire safety valve is the actuator of the active venting system. When the battery opens the valve to release combustible gas, the venting module operates to reduce the concentration of combustible gas within the battery compartment.

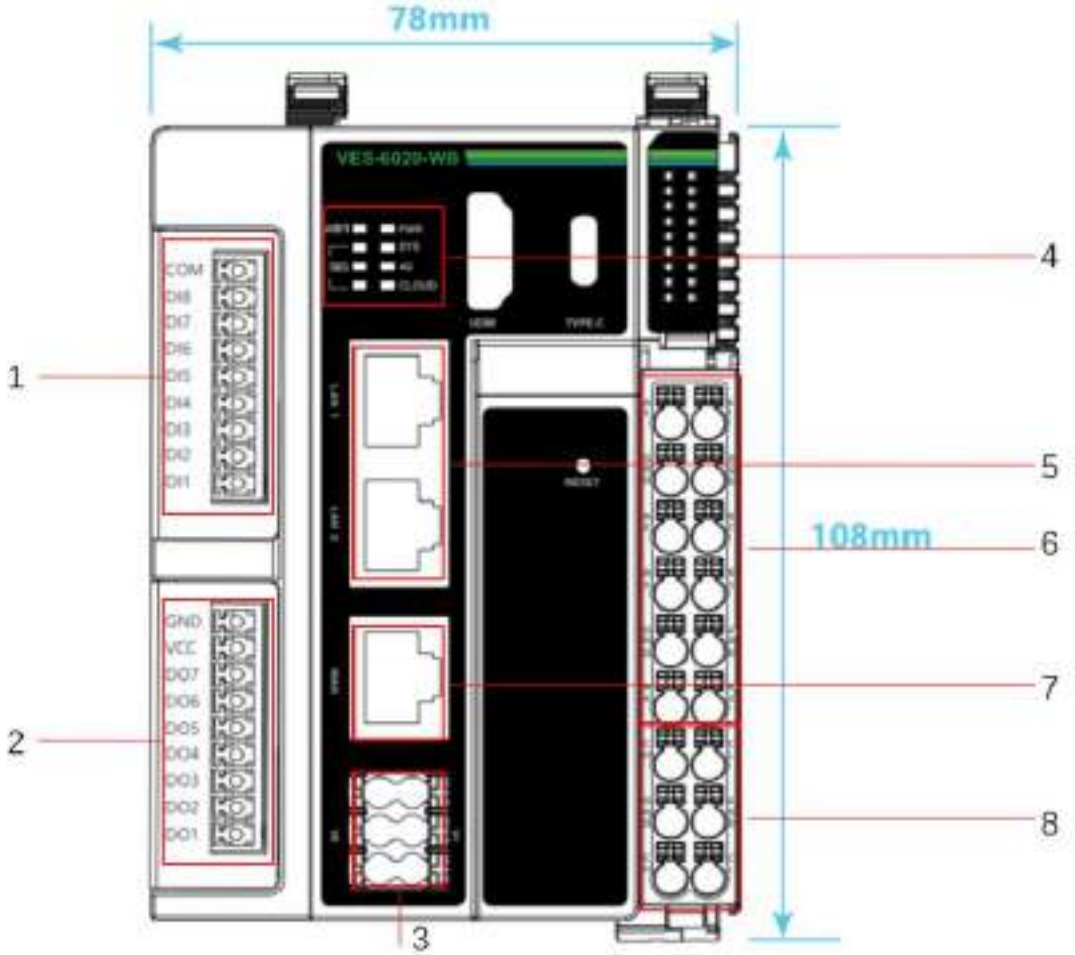
Figure 3-1 7 Fire Safety Valve Appearance

Table 3-20 Fire Safety Valve Parameter Table

Serial No.	Item	Specification	No.	Item	Specification
1	Input Voltage	24VDC	3	Airflow	107 CFM
2	Protection Rating	IP66	4	Operating Temperature	-20~60°C

3.4.6 EMS

The Energy Management System (EMS) serves as the central hub for energy scheduling and management within photovoltaic storage systems. By maintaining real-time communication with the Battery Management System (BMS), hybrid inverters, loop energy meters, manageable load devices, and peripheral equipment (such as air conditioning and fire protection systems), it collects critical data from all communication substations. Through data acquisition, processing, analysis, and internal program logic operations, the EMS ensures the orderly and stable operation of the entire energy storage system.The EMS used in this product features robust data processing capabilities and supports multiple communication protocols for rapid data integration with commercially available BMS and hybrid inverters, eliminating the need for on-site service.

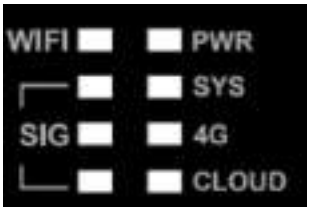


3 -18 EMS Interface

Table 3-21 Fire Safety Valve Parameter Table

Serial No.	Name	No.	Name
1	DI Port	5	LAN1/LAN2
2	DO Port	6	RS485 Interface
3	24V Power Input Port	7	WAN port
4	LED Indicator	8	CAN Interface

Table 3-22 LED Indicators

Name	Port	Function
Indicator 	PWR	Steady: Normal; Off: Abnormal.
	SYS	Flashing: System is running (power-on self-test passed, system is operational); Steady or off: Abnormal.
	WIFI	Wi-Fi has 4 indicator lights: Light 1: Indicates the operational status of the Wi-Fi device. Light 2: Indicates the weakest signal strength. Light 3: Indicates medium signal strength. Light 4: Indicates the strongest signal strength.
	CLOUND	Steady: Uplink connection established Not lit: Uplink disconnected Flashing: Uplink is connecting

3.4.7 Distribution Box

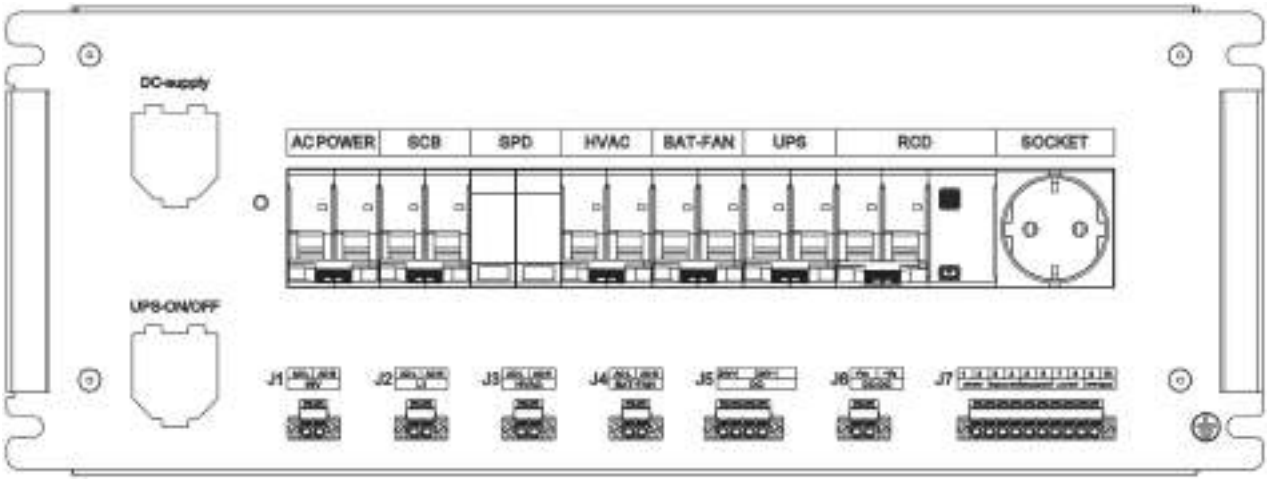


Figure3 -19 Power Distribution Box Schematic

Table 3-23 Power Distribution Box Component Description

Name	Description	Function
DC-supply	DC Power Switch	When the system has no mains power and the UPS is in low-battery mode, activate the DC power switch to supply power to the system when operation is required; note that it should not be enabled during normal operation.
UPS ON/OFF	UPS ON/OFF Button	Turn the UPS on or off
ACPOWER	AC 220V Power Switch	AC 220V Main Control Switch
HVAC	Air Conditioning Power Supply Switch	Air Conditioning Power Control Switch Usage
BAT-FAN	Battery Fan Power Switch	Battery Fan Power Control Switch Usage
UPS	UPS Power Supply Switch	UPS Input Power Control Switch Usage
SCB	Surge Protection Backup Circuit Breaker	Used as backup protection for surge arresters
SPD	Surge Protective Device	Used for AC 220V main control switch surge protection
RCD	Residual Current Device	Used for power control protection at customer site sockets
SOCKET	Socket	Supports AC 220V power requirements for European standards and other countries, with a maximum output current of 10A
J1	AC220V power input	Connects to hybrid inverter AC220V, maximum input current 32A
J2	AC 220V power output	POWER indicator
J3	AC220V power output	Provides AC220V power for air conditioner operation, Maximum output current 10A
J4	AC220V Power Output	Provides AC 220V power for battery fan operation, maximum output current 4A
J5	DC24V Output	Provides DC24V power for system operation, 480W power
J6	DC24V Input	DC24V power input for high-voltage box, 300W power
J7	UPS Feedback Signal Output	UPS Feedback Signals: Battery Mode Signal, Battery Replacement Signal, Battery Not Connected Signal, and Low Battery Signal

3.4.8 Busbar Control Box

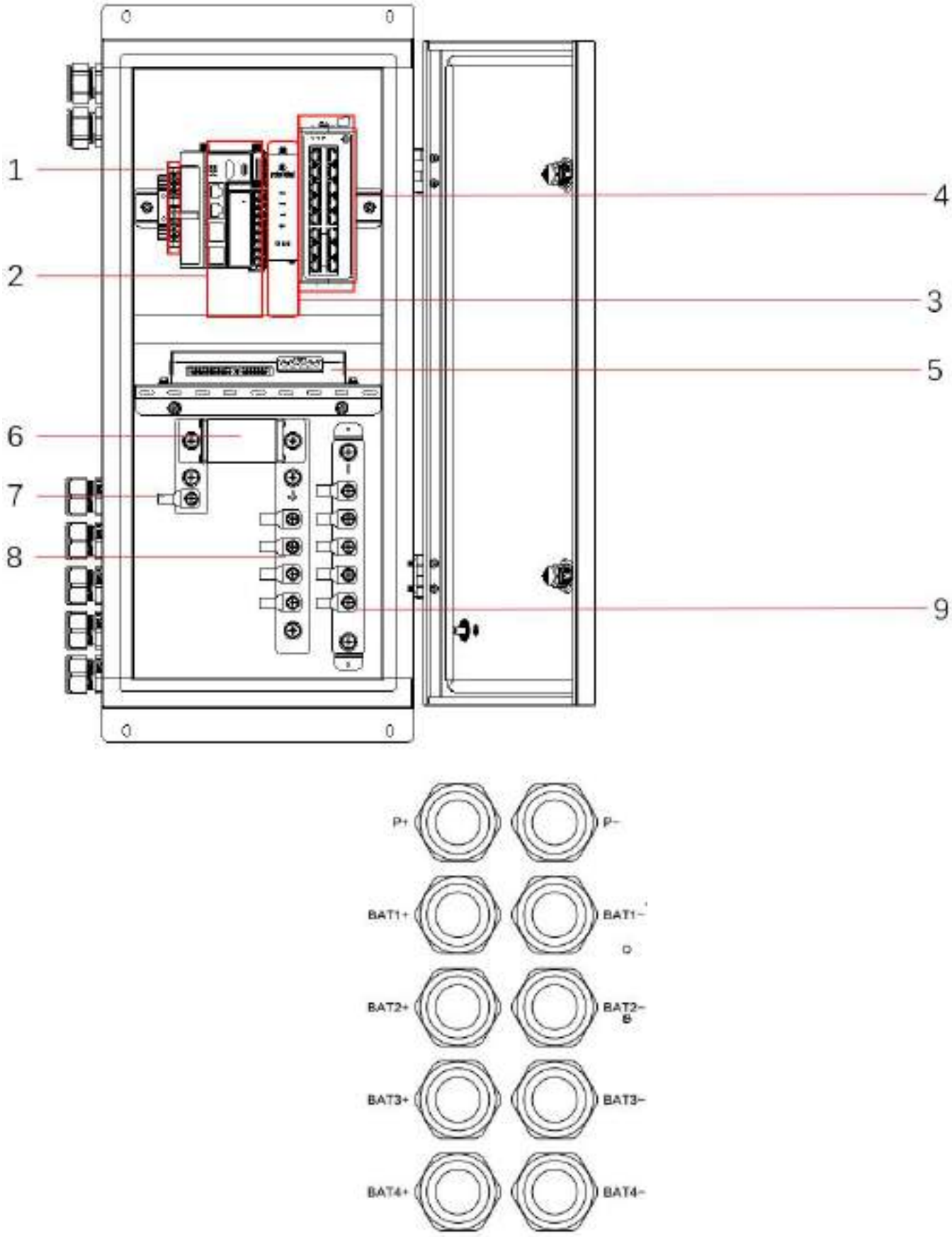


Figure3 -20 Busbar Control Box Schematic

Table 3-24 Busbar Control Box Specifications

Serial Number	Description	Function

1	Terminal Block	DC24V Power Terminal Block
2	EMS	Serves as the station-controlled EMS host for multi-cabinet parallel operation
3	4G Router Module	Serves as the station-controlled EMS host for cloud connectivity via 4G
4	Switch	Used for EMS parallel connection during parallel operation
5	BAU	During battery capacity expansion, the BAU master controller functions as a multi-cluster battery management system
6	Fuse	During battery expansion, fuses protect the busbar circuit
7	P+	During battery expansion, connects to the positive terminal port of the hybrid inverter after busbar connection
8	BAT1/2/3/4+	When expanding the battery capacity, connect the positive terminal of each battery cluster to the B+ positive busbar port.
9	P-/ BAT1/2/3/4-	When expanding the battery capacity, connect the negative terminals of each battery cluster to the B- negative copper busbar port. After busbar connection, connect to the negative terminal port of the hybrid inverter battery.

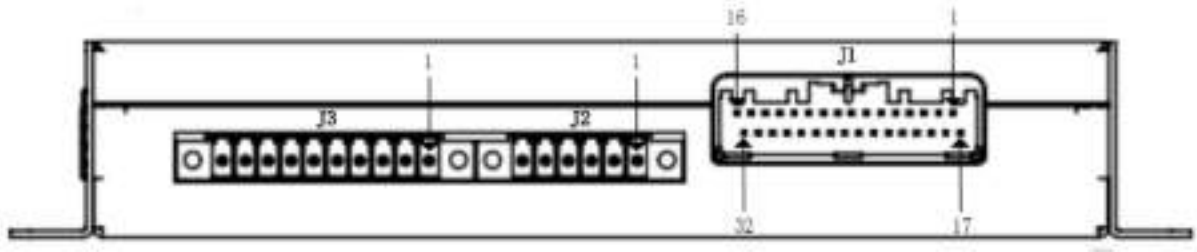


Figure3 -21 BAU Master Control Unit Interface Diagram

Table 3-25 BAU Master Control Interface Specifications

Serial No.	Description	Function
1	J1-1 (DC24V+) J1-7 (DC24V-)	Master Control BAU Power Supply
2	J1-27 / J1-28	Master Control BAU Addressing Output to Main Control BCU
3	J1-14 (CAN1H) J1-13 (CAN1L)	Communication between Master Control BAU and Primary Control BCU
4	J3-1(485A5) J3-2(485B5)	Master Control BAU and EMS Communication

5	J3-5 (CAN2H) J3-6(CAN2L)	Main Control BAU and Hybrid Inverter Communication
6	J3-7 (DRY3+) J3-8(DRY3-)	PCS Shutdown Normally Open Dry Contact

3.4.9 Emergency Stop Switch

Figure 3-22 Emergency Stop Switch

3.5 System Principle

3.5.1 Typical Single-Unit Application Scenarios

The inverter used in this product is a three-phase grid-tied/off-grid energy storage inverter, suitable for energy management in systems such as photovoltaic, battery, load, and grid applications.

This product supports standalone/parallel system operation. The standalone system application diagram is shown below.

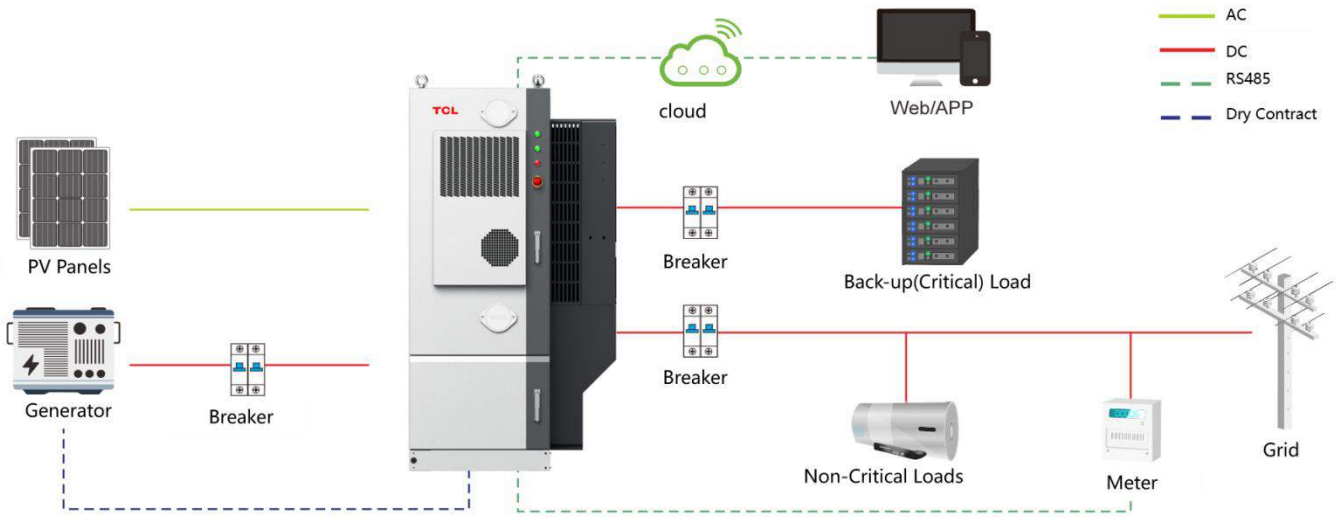


Figure3 -23 Single-Unit System Diagram

3.5.2 Typical Parallel Application Scenarios

This product supports grid-connected operation and off-grid parallel operation, with a maximum of 10 units capable of off-grid parallel operation.

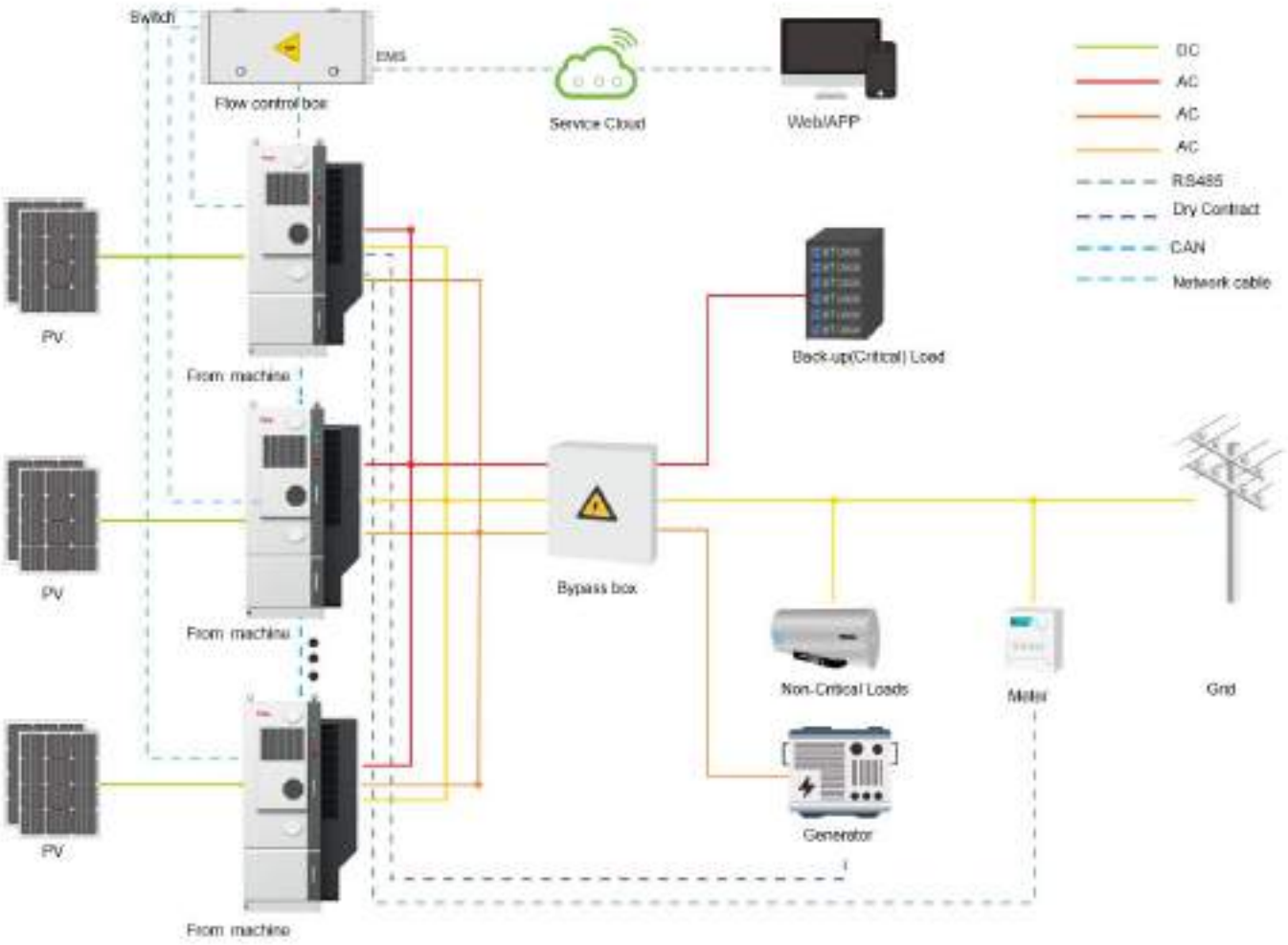
1、 Grid-Connected Operation

When operating in grid-connected mode, configure the appropriate number of units based on the capacity of the upstream transformer and low-voltage distribution equipment.

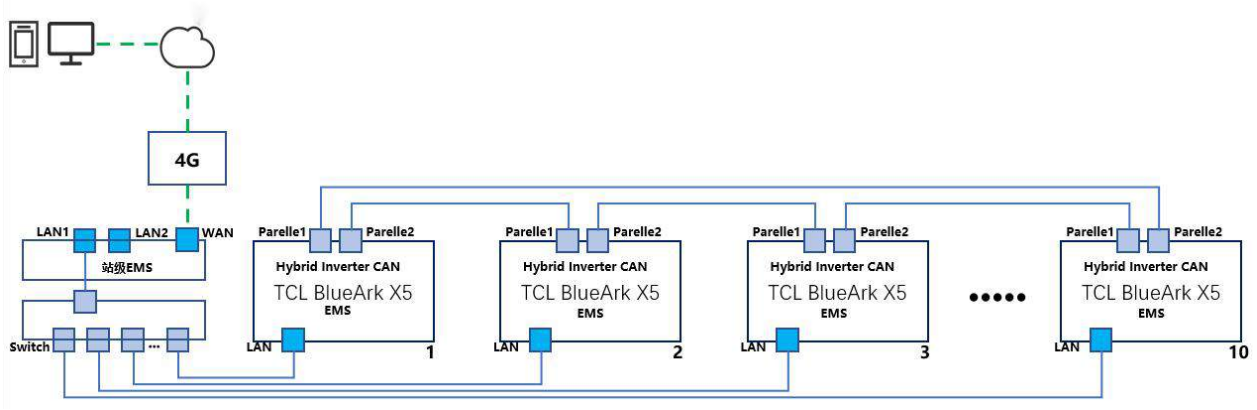
A、 When multiple photovoltaic-storage integrated units are connected to the same transformer, the Backup unit operates without load; customers may configure grid-tie equipment independently.

B、 When multiple photovoltaic-storage integrated units are connected to the same transformer, multiple Backup units operate in parallel under load (refer to parallel operation scheme).

2、 Dedicated parallel cabinets are required for parallel operation, with a maximum of 10 units.



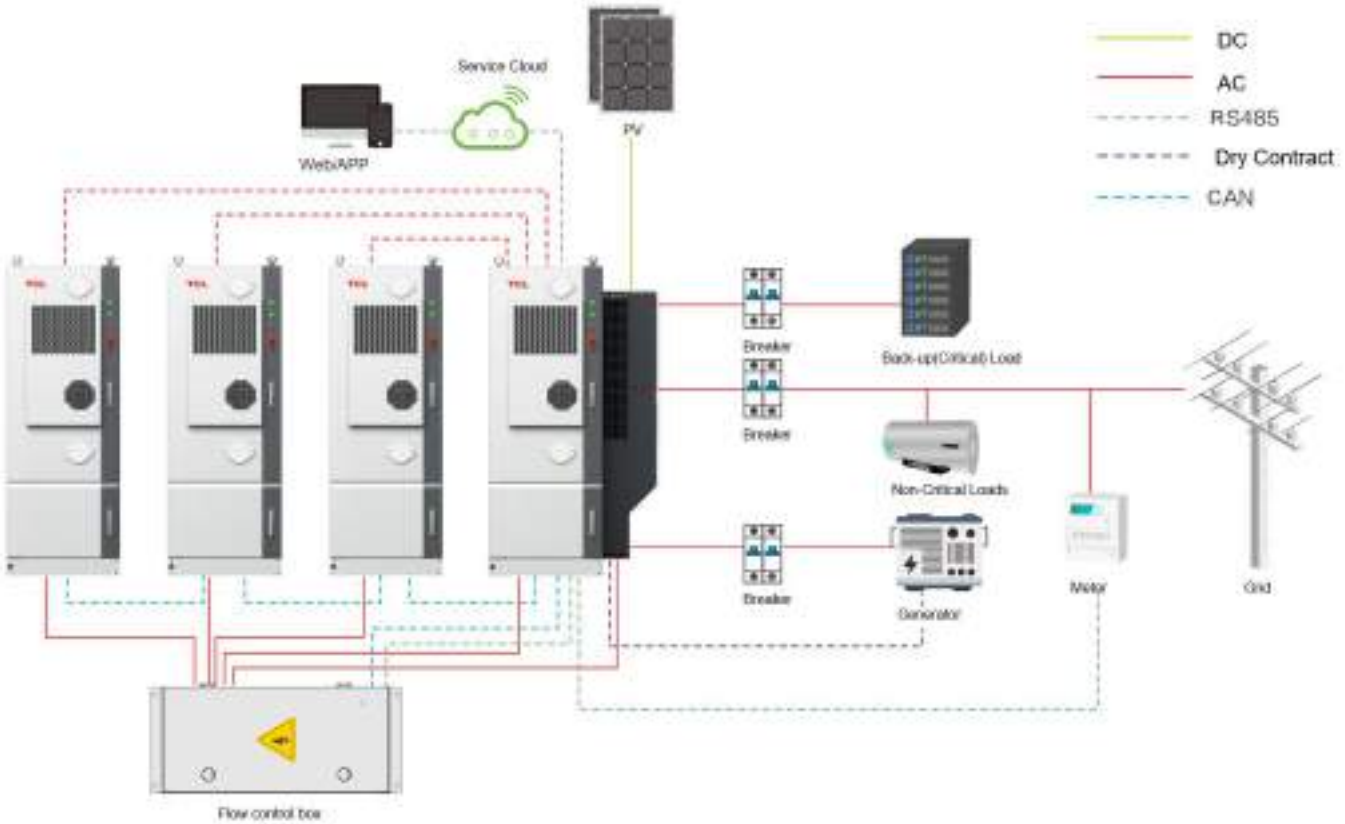
3 -24 Parallel System Schematic Diagram



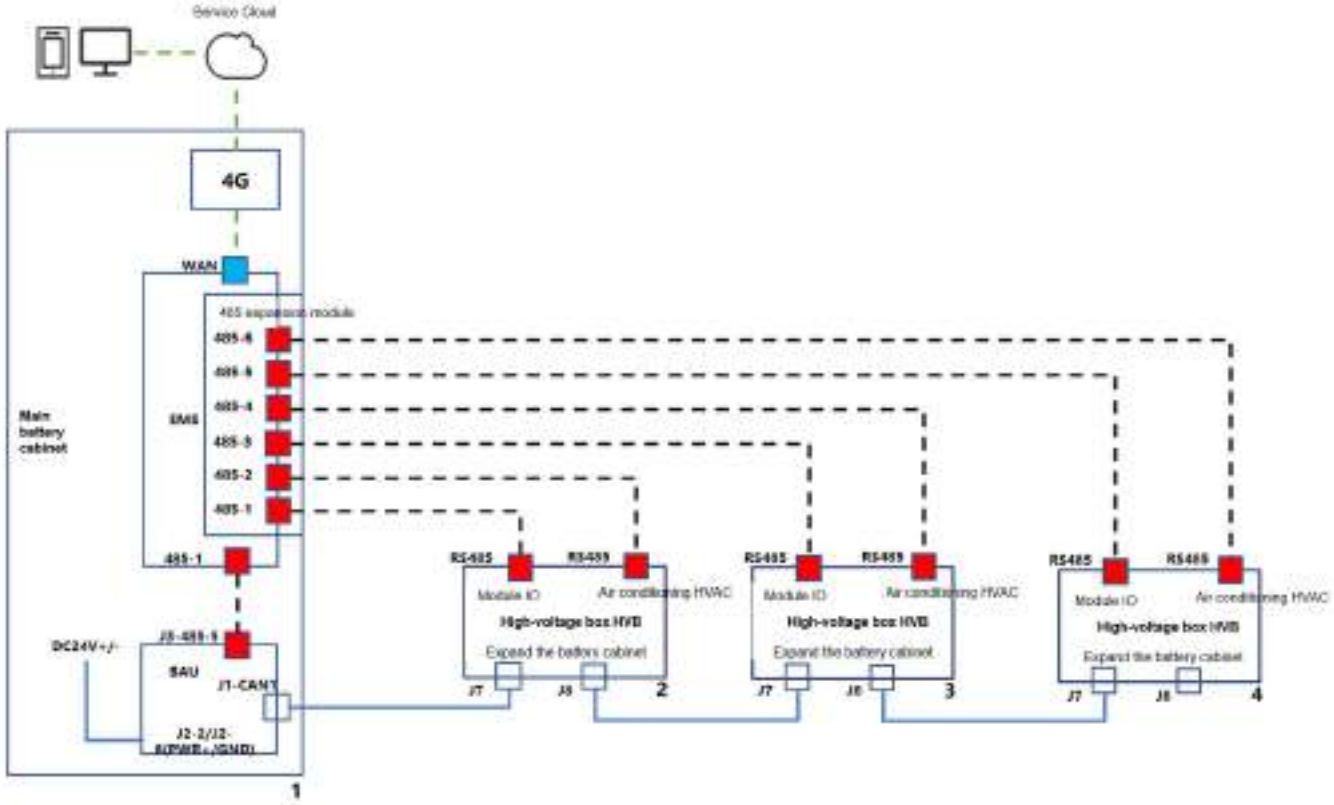
3 -25 Parallel System Communication Network Diagram

3.5.3 Expansion Application Scenarios

This product supports battery capacity expansion through a battery-side parallel configuration to enhance backup power capability, supporting up to 4 parallel battery cabinets.



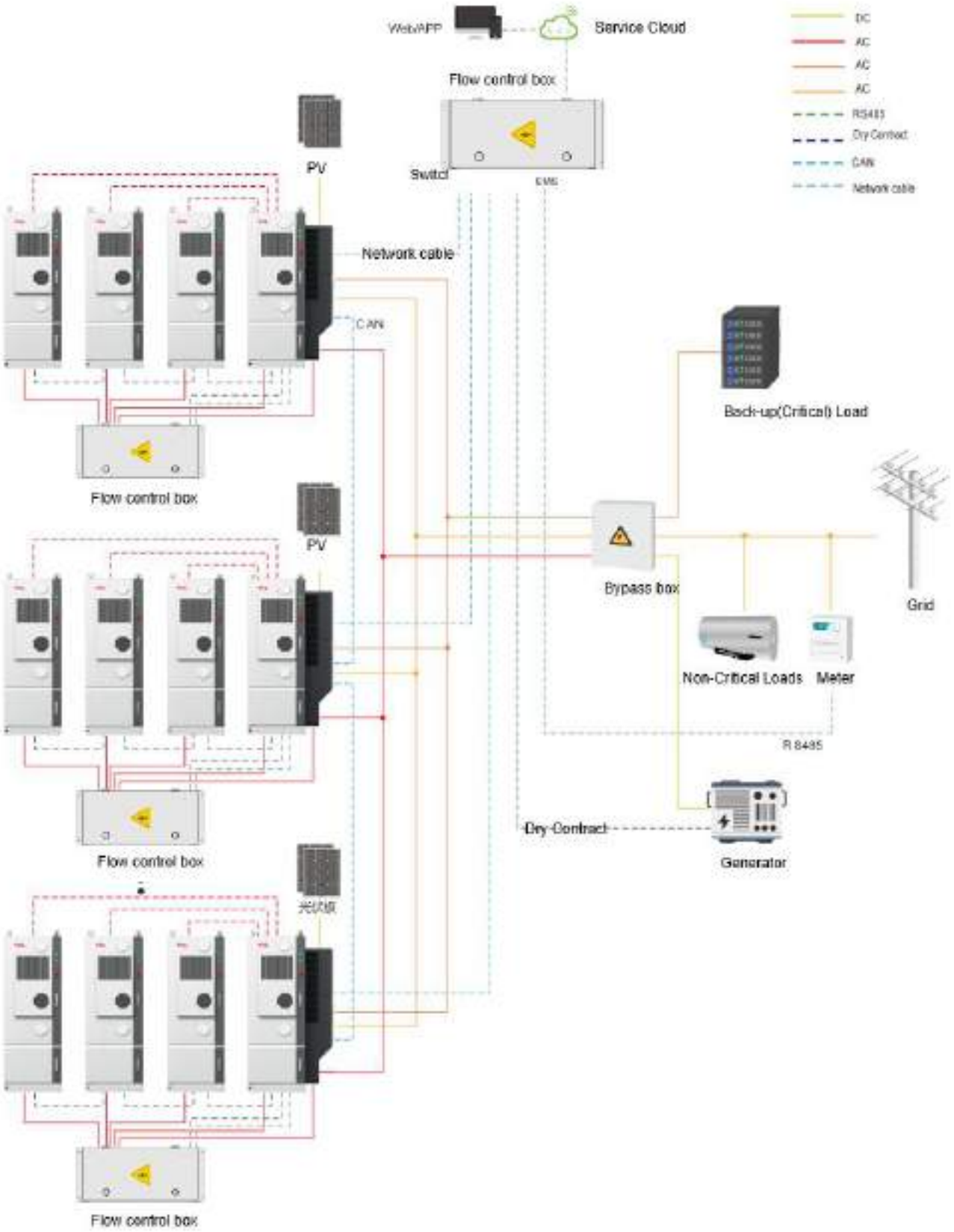
3 -26 Battery Expansion System Schematic Diagram



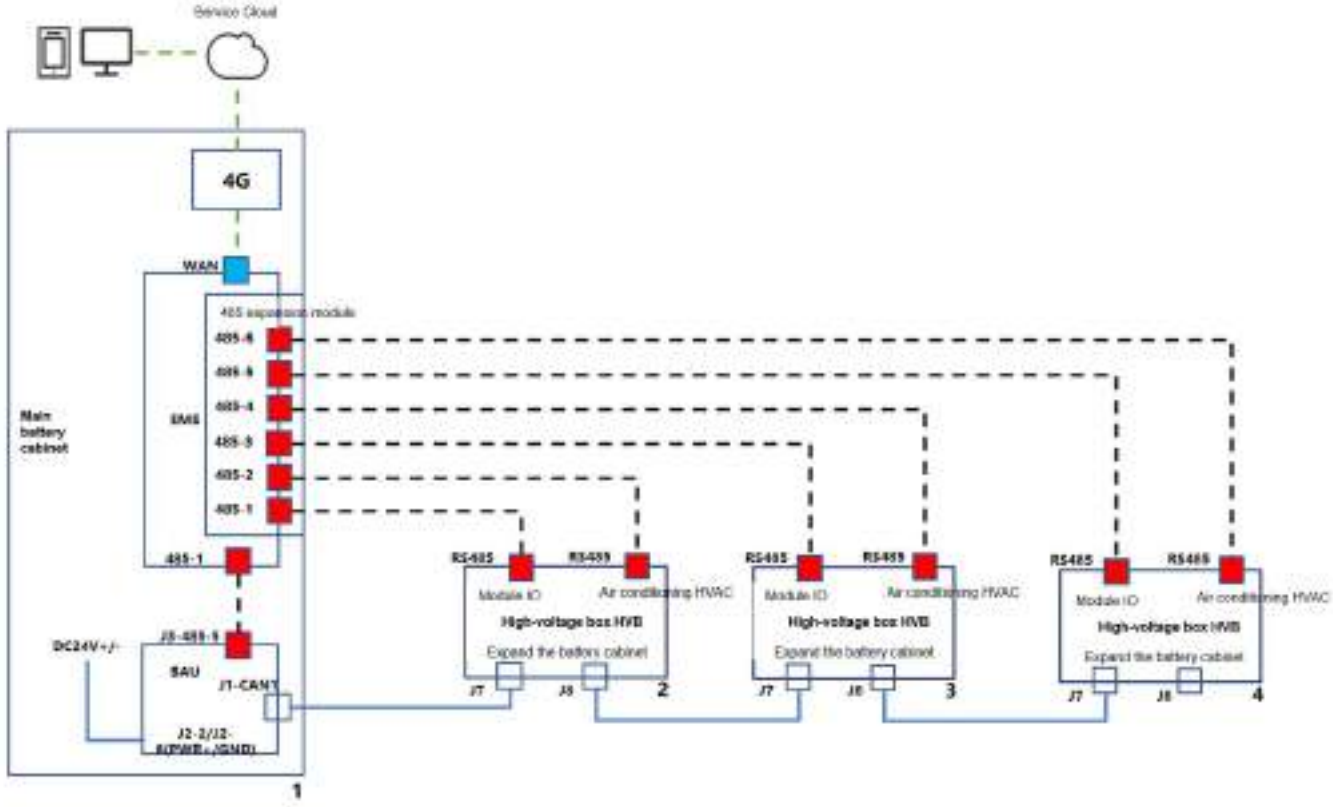
3 -27 Communication Networking Diagram for Expansion Scenarios

3.5.4 Typical On-Site Expansion and Parallel Operation Application Scenarios

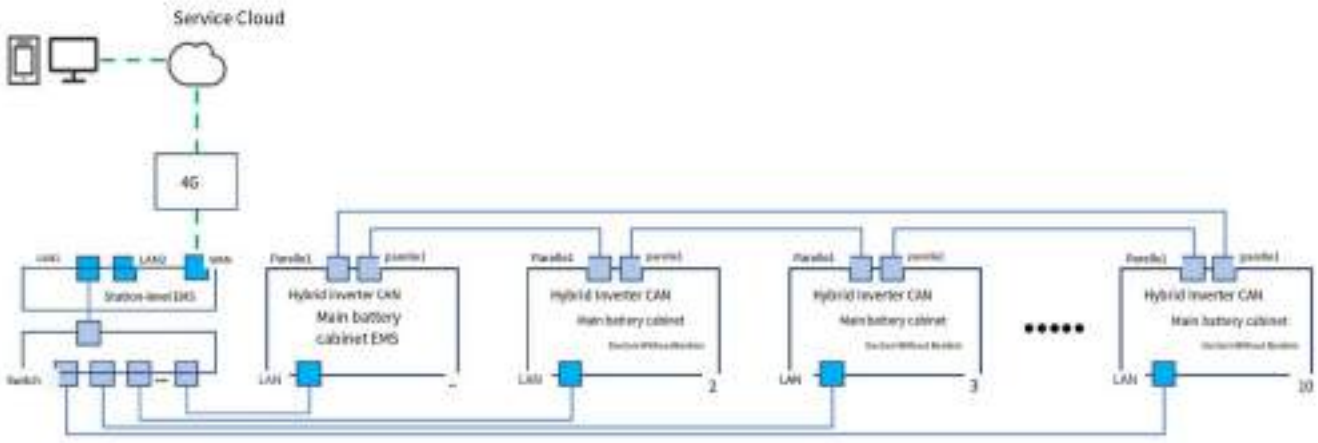
This product supports battery capacity expansion. After parallel connection on the battery side, it enables AC-side parallel operation to enhance power input/output capability.



3 -28 Battery Expansion and Parallel Operation System Schematic



3 -29 Communication Networking Diagram for Single Main Battery Cabinet Expansion



3 -30 Communication Networking Diagram After AC-Side Parallel Operation

4 Product Transportation and Storage Requirements

4.1 Transportation Conditions

All equipment within the outdoor cabinet energy storage system is pre-installed and secured within the system's outdoor cabinet prior to shipment. The entire outdoor cabinet energy storage system must be transported via overhead lifting.


WARNING

- **Throughout loading, unloading, and transportation, strictly adhere to the system outdoor cabinet operation safety regulations of the project's country/region!**
- **All outdoor cabinets and tools used in operations must be properly maintained.**
- **All personnel involved in loading, unloading, and securing operations must receive appropriate training, particularly regarding safety protocols.**


NOTE

Throughout the entire loading, unloading, and transportation process, the mechanical parameters of the outdoor cabinet energy storage system must be kept in mind at all times.

Transporting mobile outdoor cabinets requires meeting the following conditions:

- All doors of the outdoor cabinet energy storage system must be securely locked.
- Select an appropriate crane or lifting equipment based on site conditions. The selected equipment must have sufficient load-bearing capacity, boom length, and swing radius.
- Additional towing equipment may be required for operations such as moving on slopes.
- Clear all existing or potential obstacles during movement, such as trees, cables, etc.
- Transportation should be scheduled during favorable weather conditions whenever possible.
- Warning signs or caution tape must be set up to prevent unauthorized personnel from entering the lifting and transportation area to avoid accidents.

4.2 Forklift Transportation

If the installation site is level, the outdoor cabinet energy storage system can be moved using a forklift. The bottom of the outdoor cabinet energy storage system is equipped with forklift pockets specifically designed for forklift transport. Move the outdoor cabinet energy storage system using the front forklift pockets.

When using forklift transportation, the following requirements must be met:

- The forklift must have sufficient load capacity (minimum 5 tons).

- The fork length must be at least 1200mm. The forks must be inserted into the fork pockets at the bottom of the workstation (refer to the diagram below for fork pocket locations). The insertion depth of the forks into the pockets must match the pocket depth, i.e., 1200mm.
- Transportation, movement, and placement of the system outdoor cabinet should be performed slowly and steadily. Trial transport is recommended.
- The outdoor cabinet energy storage system must only be placed on level ground. The location should have good drainage and be free of any obstacles or bumps. The system outdoor cabinet should be secured using four base corner brackets.

Figure 4-1 Forklift Transport

4.3 Storage Requirements

After delivery is completed, if installation is not performed immediately, store the outdoor cabinet system properly as described in this section.

- To prevent condensation inside the outdoor cabinet energy storage system or waterlogging of the cabinet base during rainy seasons, store the system indoors in a large warehouse or workshop facility.
- If outdoor storage is unavoidable due to site constraints, elevate the outdoor cabinet base. The specific elevation height should be determined based on site conditions such as geology and climate. Additionally, provide heating power to the internal equipment when ambient temperatures are excessively low.
- Storage ambient temperature: -25°C to +50°C; Storage ambient relative humidity: 0% to 95%, non-condensing. Store the outdoor cabinet energy storage system on a dry, level, solid ground surface with sufficient load-bearing capacity and free of any vegetation cover. The

storage ground must be flat, free of standing water, and without any unevenness or undulations.

- Ensure the cabinet doors of the outdoor cabinet energy storage system are securely locked during storage.
- Effective measures must be taken to prevent rainwater, dust, and other contaminants from entering the system. At minimum, the intake and exhaust vents of the outdoor cabinet must be adequately protected.
- Conduct regular inspections. Inspect at least once every two weeks to verify the integrity of the cabinet and all internal equipment.
- Batteries should be used promptly. For long-term storage, perform periodic recharge cycles to prevent battery damage.
- If batteries are stored for more than 3 months, perform a charge-discharge cycle every 3 months. Failure to follow this requirement may impair battery performance and shorten its service life.

5 Site Requirements

5.1 Site Selection Requirements


NOTE

Site selection must comply with GB 51048 Design Code for Electrochemical Energy Storage Power Stations, NFPA 855 Standard for the Installation of Stationary Energy Storage Systems, and local regulations.

The energy storage system is intended for outdoor use only and must be installed outdoors; indoor installation is not supported. General site selection requirements are as follows:

1) The installation location must not be in low-lying areas; the installation level must be higher than the historical highest water level in the region.
2) Distance from airports, landfill sites, riverbanks, or dams must be ≥2000m.
3) Select an open location ensuring no obstacles within 10 meters of the site perimeter.
4) Maintain a minimum distance of 50m from residential areas to prevent noise pollution, keep away from fire sources, and ensure children cannot access the site.
5) The site must have convenient transportation access and reliable fire suppression system equipment.
6) Meet immediate site area requirements while reserving expansion space for full lifecycle needs.
7) Select well-ventilated locations. Do not obstruct ventilation openings or cooling systems during equipment operation to prevent high-temperature fires.
8) Installing energy storage systems in salt-damaged areas may cause corrosion and potential fires. Do not install outdoor energy storage systems in such areas. Salt-damaged areas refer to locations within 2000m of the coastline or regions affected by sea breezes. Sea breeze influence varies based on meteorological conditions (e.g., typhoons, seasonal winds) or topography (e.g., presence of embankments, hills).

Site selection must avoid scenarios not recommended by industry standards and regulations, including but not limited to the following locations, areas, and sites:

1) Areas with strong vibrations, high noise levels, or intense electromagnetic field interference.
2) Locations generating or containing dust, oil fumes, harmful gases, corrosive gases, etc.
3) Locations where corrosive, flammable, or explosive materials are produced or stored.
4) Locations with existing underground facilities.
5) Sites with poor geological conditions such as rubber soil or weak soil layers, prone to water accumulation and subsidence.
6) Earthquake fault zones and seismic zones with design seismic intensity exceeding 9 degrees.
7) Areas directly threatened by mudslides, landslides, quicksand, or sinkholes.
8) Within boundaries of mining subsidence (displacement) zones.
9) Within blasting hazard zones.

10) Areas potentially inundated by dam or levee breaches.
11) Important water source sanitation protection zones.
12) Historical and cultural relic protection zones.
13) Highly populated areas, high-rise buildings, and underground structures.

5.2 Space Requirements

The diagram below shows the minimum space requirements for installation and maintenance. Equipment space requirements must also comply with site selection criteria.

Recommended installation space for a single unit:

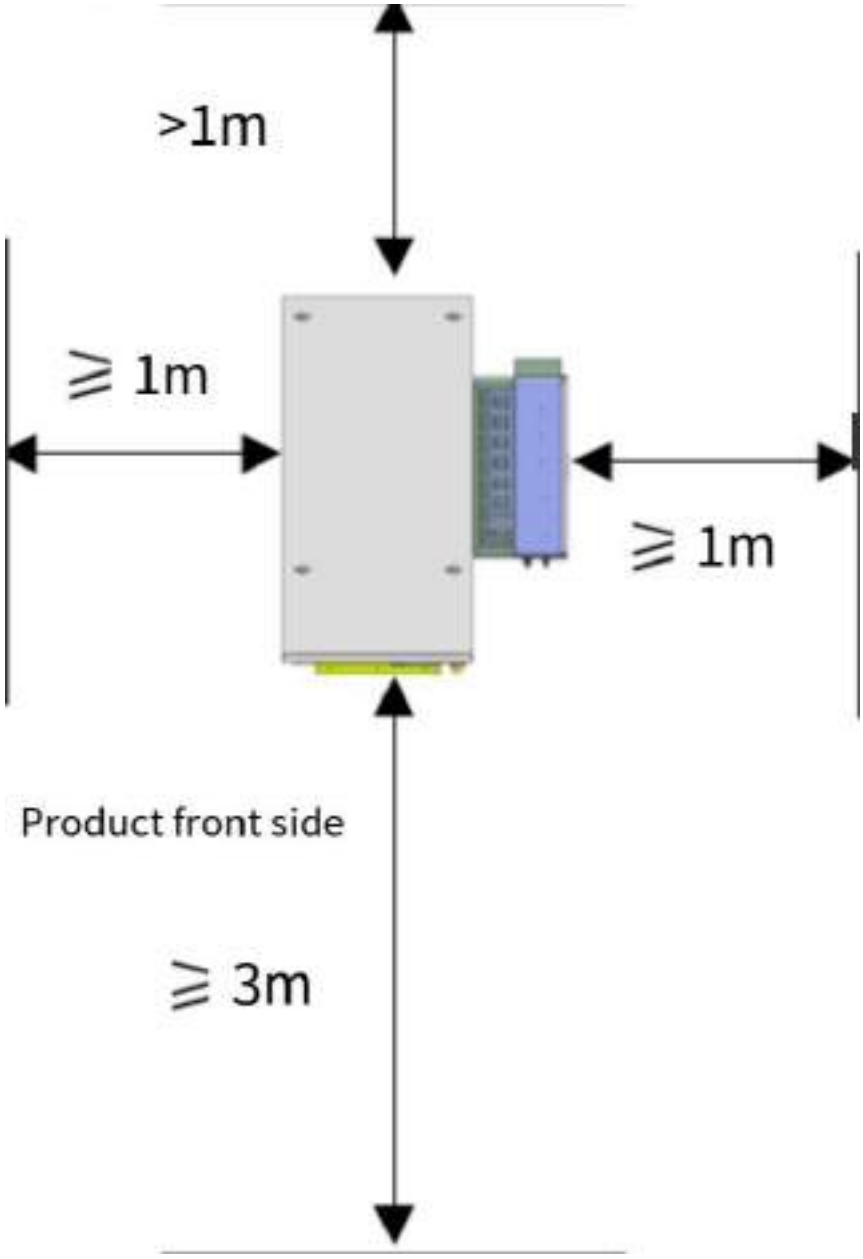


Figure 5-1 Recommended Installation Space for a Single Unit

Recommended installation space for multiple units:

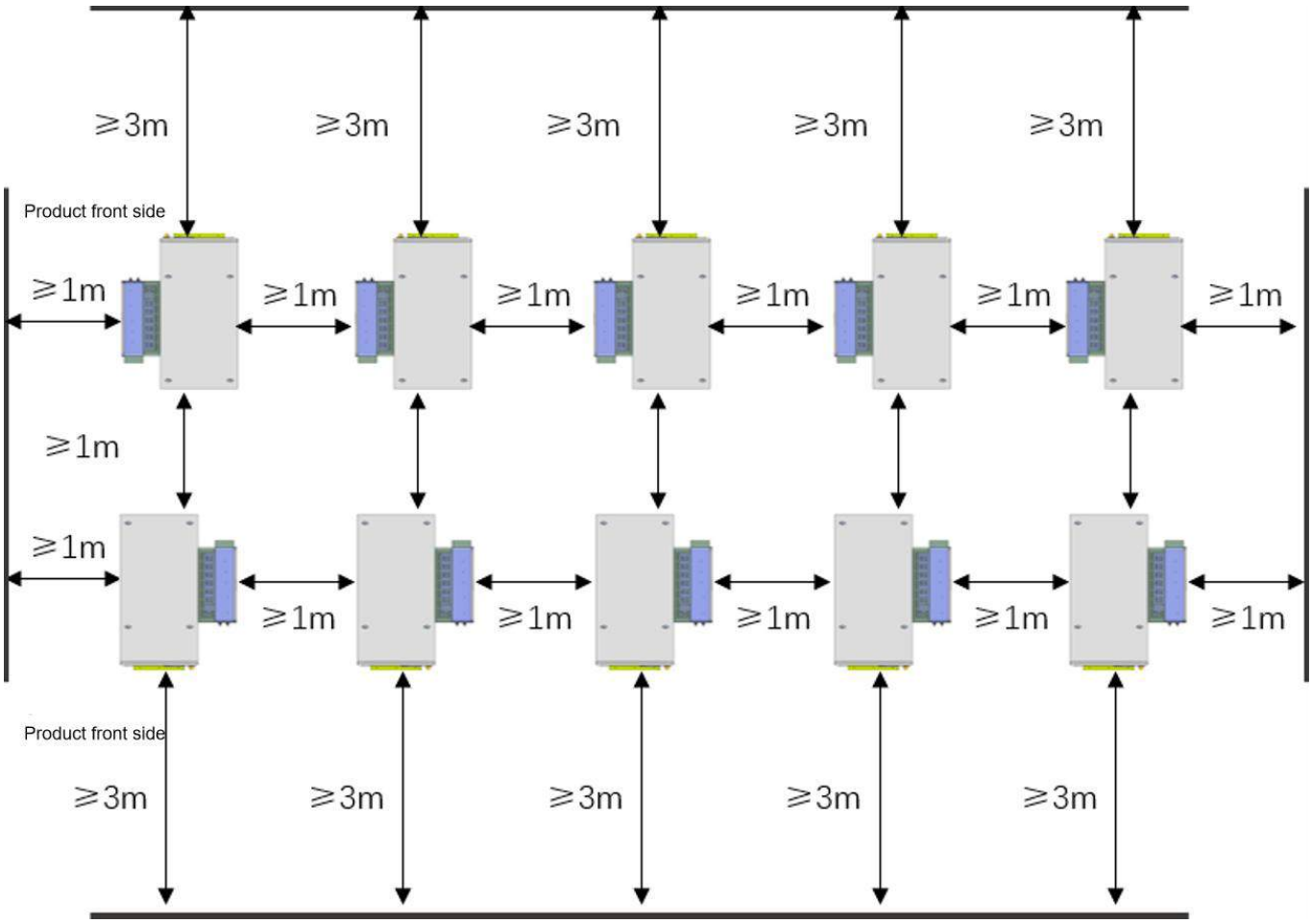


Figure 5-2 Recommended Installation Space for Multiple Systems

Recommended installation space for battery expansion:

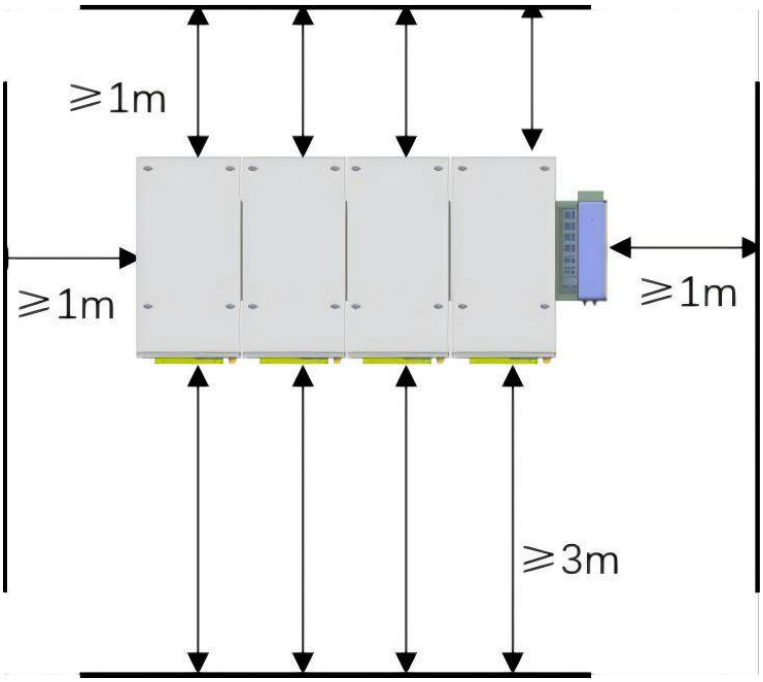


Figure 5-3 Recommended Installation Space for Battery Expansion System

Recommended Installation Space for Battery Expansion with Parallel Operation:

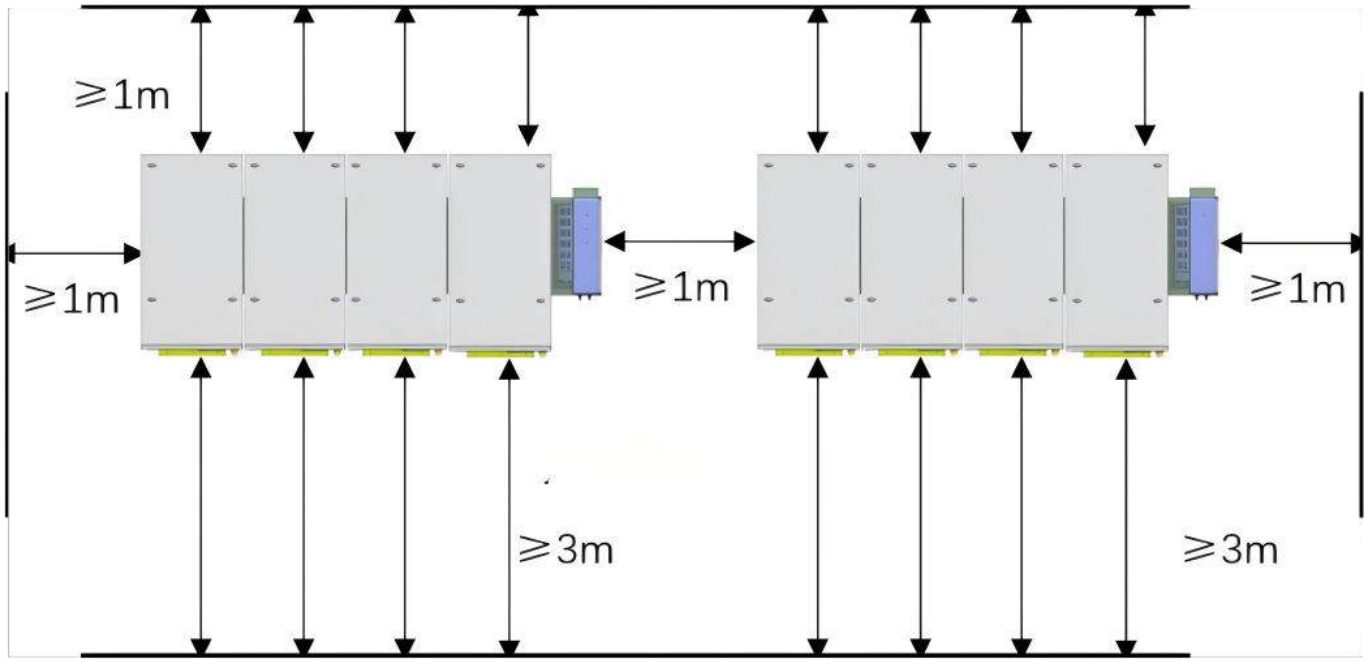


Figure 5-4 Recommended Installation Space for Battery Expansion and Parallel Connection System

5.3 Installation Foundation

When constructing the foundation, the following requirements must be met at a minimum:

1) The bottom of the foundation pit must be compacted and leveled.
2) The foundation must provide sufficient load-bearing capacity for the outdoor cabinet energy storage system.
3) Elevate the outdoor cabinet energy storage system to prevent rainwater from eroding the base and interior components. It is recommended that the foundation be approximately 300mm above the level ground at the installation site.
4) Appropriate drainage measures must be constructed based on local geological conditions.
5) Construct a concrete foundation with sufficient cross-sectional area and height. The foundation height shall be determined by the contractor based on site geology.
6) Cable routing must be considered during foundation construction.
7) Construct a maintenance platform around the foundation to facilitate future maintenance.
8) During foundation construction, reserve sufficient space for AC/DC cable trays based on the location and dimensions of cable entries and exits on the outdoor cabinet, and embed cable conduits in advance.
9) Determine the specifications and quantity of perforated pipes based on cable types and the number of incoming/outgoing lines.

10) Both ends of all embedded conduits shall be temporarily sealed to prevent debris ingress; failure to do so may hinder subsequent wiring.

11) After connecting all cables, seal cable entries, exits, and joints with fire-resistant putty or other suitable materials to prevent rodent intrusion.

12) The foundation diagram is for reference only and shall not be used as final construction drawings. Users must verify the foundation design parameters of the energy storage system based on the installation environment, geological conditions, seismic requirements, and other project-specific factors at the site.

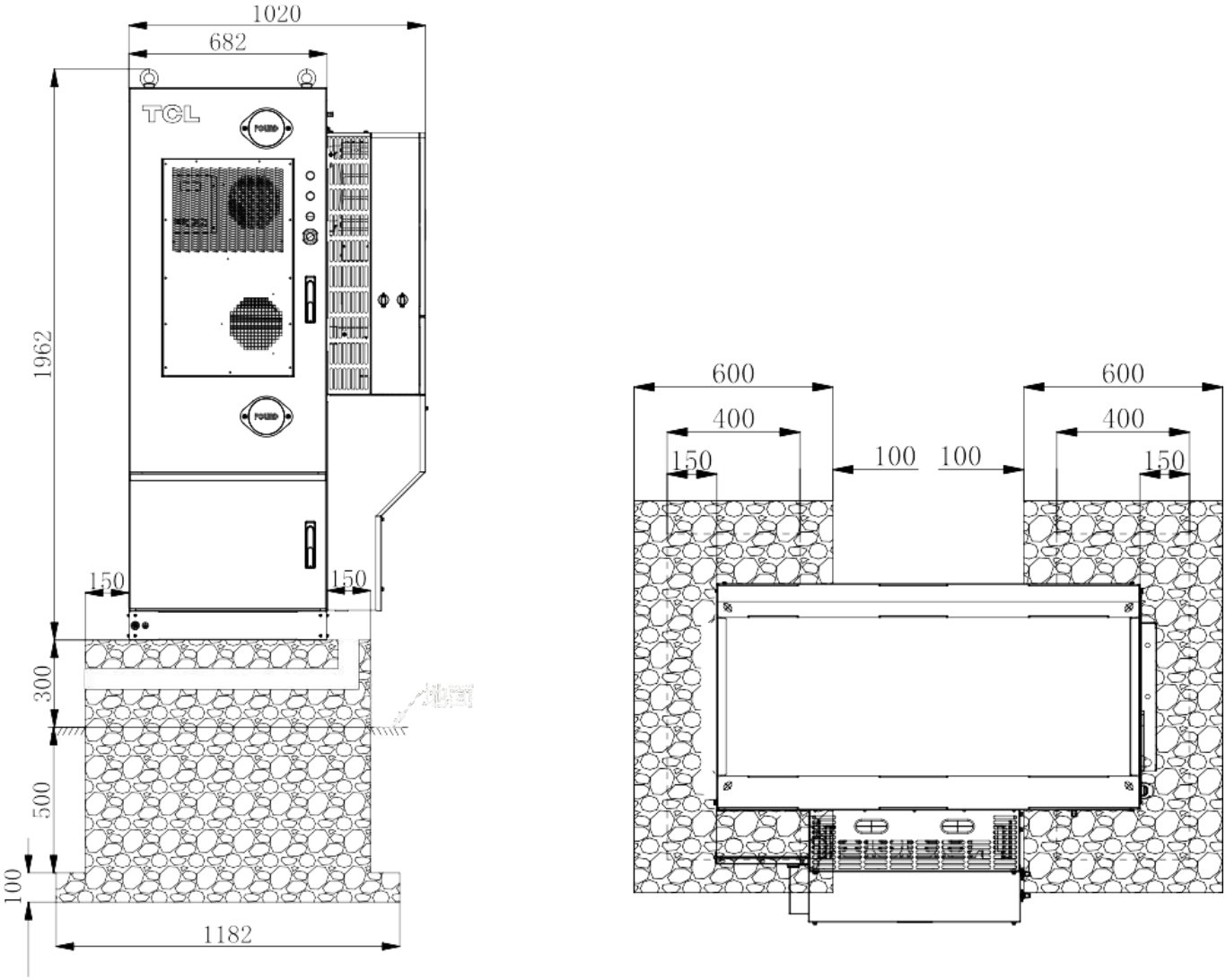


Figure 5-5 Foundation Installation Schematic

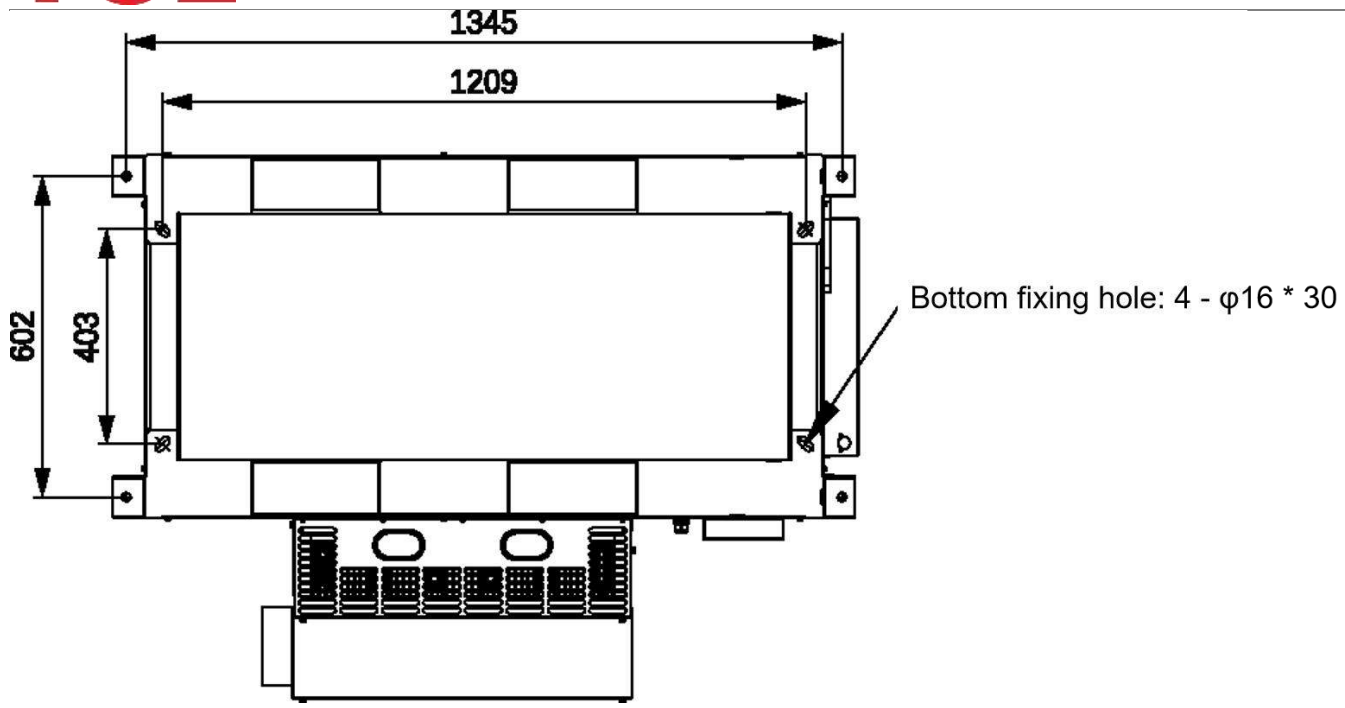


Figure 5-6 Anchor Bolt Fixing Hole Schematic

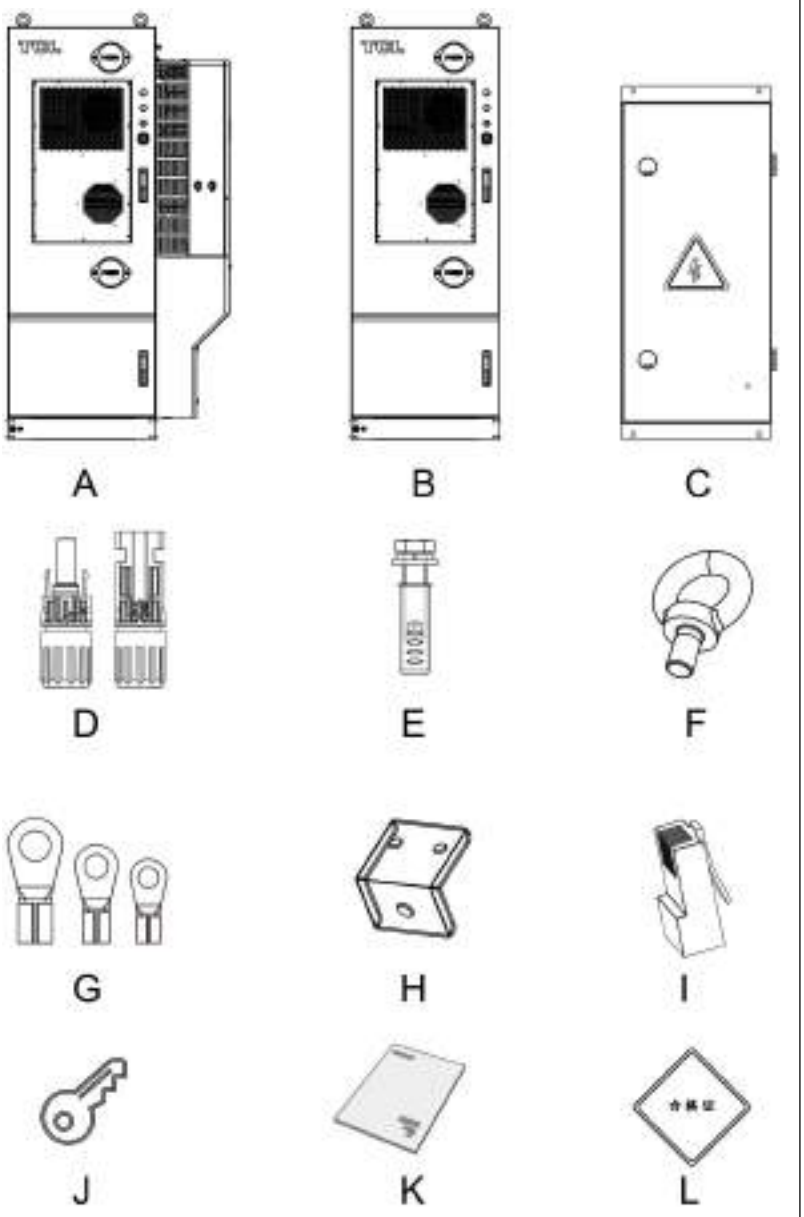
6 Unpacking and Inspection

Important Notes

1) To prevent equipment overturning, secure the equipment-containing box to the forklift with ropes before moving. Handle equipment with care; impacts or drops may cause damage.
2) Once the equipment is positioned, carefully remove the packaging to avoid scratching the equipment. Maintain stability throughout the unpacking process.
3) After opening the packaging, inspect all fasteners and removable components for looseness. If any are loose, immediately notify the carrier and manufacturer.
4) Before unpacking batteries, inspect the packaging for integrity. Do not use batteries with damaged packaging. Notify the carrier and manufacturer immediately if damage is found.
5) If the installation environment is poor, implement dust and condensation prevention measures after unpacking (e.g., using dust covers, plastic film, or spunbond fabric covers) to prevent internal condensation or dust accumulation that could cause corrosion and failure.

6) If any missing or damaged parts are found, please contact after-sales service.

Serial Number	Description		Quantity
A	Main Battery Cabinet		1
B	Expansion Battery Cabinet (as needed)		/
C	Busbar Control Box (as needed)		/
D	PV Connector		12*2
E	M12*8 Expansion Bolt		4
F	Lifting ring		4
G	OT Terminal	RNBS 38-8	5
		RNB70-10	12
		SC50-10	12
H	Eversion Fixing Device		4
I	Crystal Head		6
J	Door Lock Key		2
K	Quick Installation Guide		1
L	Certificate of Conformity		1



7 Installation Equipment

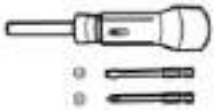
7.1 Cabinet Installation

WARNING
The cabinet assembly is heavy. Before constructing the foundation, thoroughly assess all site conditions (primarily geological and environmental climate factors). Only after this evaluation should foundation design and construction commence.

7.1.1 Tool Preparation

Tools required for equipment installation include installation tools and personal protective equipment, as listed below.

NOTE
Tools used, including socket wrenches, torque wrenches, screwdrivers, etc., must have insulated handles or be insulated tools.

Tool Type	Description	Tool Type	Description
	Impact Drill (Drill bits φ: 14mm, 16mm, 20mm)		Complete Socket Set
	Torque Wrench		Diagonal Cutters
	Wire Strippers		Phillips/Slotted Screwdriver
	Rubber mallet		Utility knife

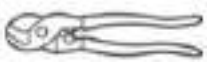
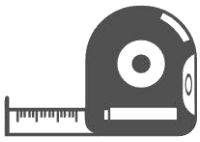
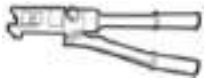
	Wire cutters		Wire Crimping Pliers
	Vacuum cleaner		Multimeter
	Marker pen		Steel Tape Measure
	Spirit level		Hydraulic pliers

Figure 7-1 Schematic Diagram of Common Installation Tools

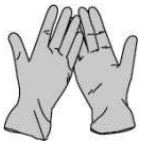
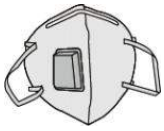
Tool Type	Description	Tool Type	Description
	Insulated gloves, protective gloves		Dust mask
	Safety goggles		Safety Shoes
	Reflective Vest		Safety helmet
	First Aid Kit		

Figure 7-2 Schematic Diagram of Commonly Used Personal Protective Equipment

7.1.2 Unpacking

NOTE

- **This product is packaged in wooden crates;**
- **Use specialized tools such as a pry bar or crowbar when unpacking;**
- **The outer packaging exceeds 2 meters in height. Use a ladder for assistance during unpacking;**
- **Exercise caution regarding equipment and personal safety during unpacking;**
- **Upon unpacking, verify all installation accessories, manuals, drawings, and other documentation.**

7.1.3 Fixed Installation

After confirming the foundation construction meets requirements and is sufficiently dry, sturdy, and level, hoist the system outdoor cabinet to its designated position. Secure the system outdoor cabinet to the foundation using the fastening bolts included in the shipping accessories. The locations requiring securing for the battery system outdoor cabinet are shown in the figure:

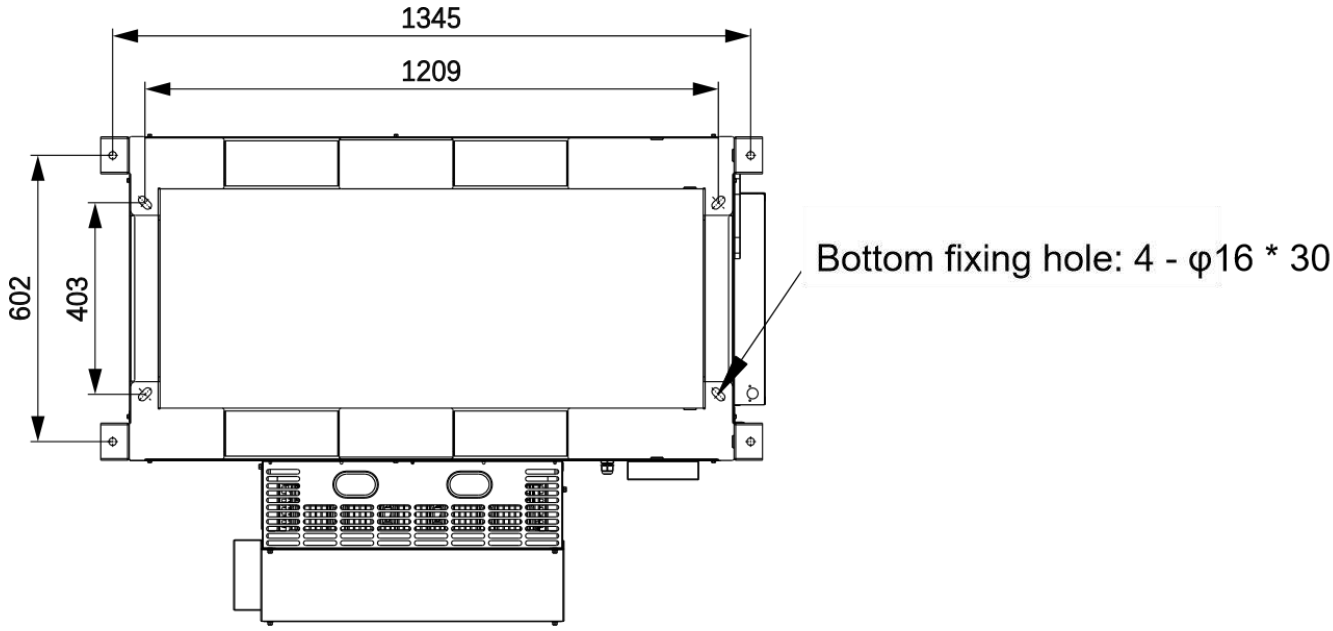


Figure 7-2 Top View of Mounting Locations

8 Cable Connection

8.1 Prepare Cables

The selected cables must meet the following conditions:

1) Possess sufficient current-carrying capacity. Factors affecting conductor current-carrying capacity include but are not limited to:

– Environmental conditions

– Type of conductor insulation material

– Cable installation method

– Cable material and cross-sectional area

2) Cable diameter must be selected based on maximum current-carrying capacity, and sufficient length allowance must be provided.
3) All DC input cables shall be of identical specifications and material.
4) The specifications and material of three-phase AC output cables should be consistent.
5) Flame-retardant cables must be selected.

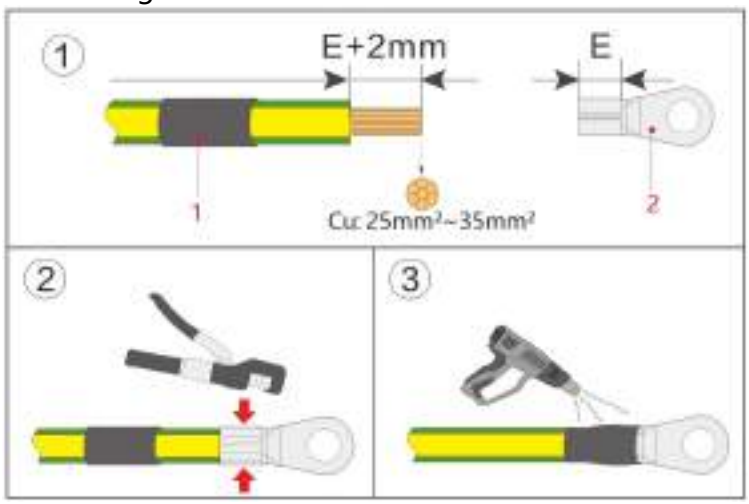
Designation	Recommended Copper Conductor Specifications		Recommended Terminal
	Single Unit	Parallel Connection	
Mains Cable	50mm²/400V	70mm²/400V	RNB70-10/SC50-10 OT/DT
Load Cable	25mm²/400V	50mm²/400V	RNB70-10/SC50-10 OT/DT
Generator Cable	50mm²/400V	70mm²/400V	RNB70-10/SC50-10 OT/DT
AC Side Grounding Cable	25mm²	35mm²	RNBS38-8 OT/DT
Cabinet Grounding	25–35 mm²	25–35 mm²	RNBS38-8 OT/DT
Photovoltaic Cable	4–6 mm²/1000 V	4~6mm²/1000V	MC4 Terminal
Diesel Engine Control Signal Cable	0.5mm²	0.5mm²	
Communication shielded twisted pair cable	0.5mm²	0.5mm²	
Network Cable	CAT 5E Outdoor Shielded Network Cable		Shielded RJ45 Connector

8.2 Cabinet grounding wire connection

WARNING
Do not install fuses, switches, or other devices on the protective grounding conductor.
NOTE
Grounding must comply with local electrical safety regulations.

Use 25mm² to 35mm² copper grounding cable to securely connect the grounding point to the cabinet's grounding point.

Crimp OT/DT terminals to M8, secure OT/DT terminals to the wiring hole using M8 bolts, and apply tightening torque according to the recommended values.



1 Heat-shrink sleeve 2 OT/DT copper terminal

Install external grounding according to actual site conditions and under the guidance of power station personnel. After completing the grounding connection, measure the grounding resistance. The resistance value must not exceed 4Ω. The grounding schematic is shown below:

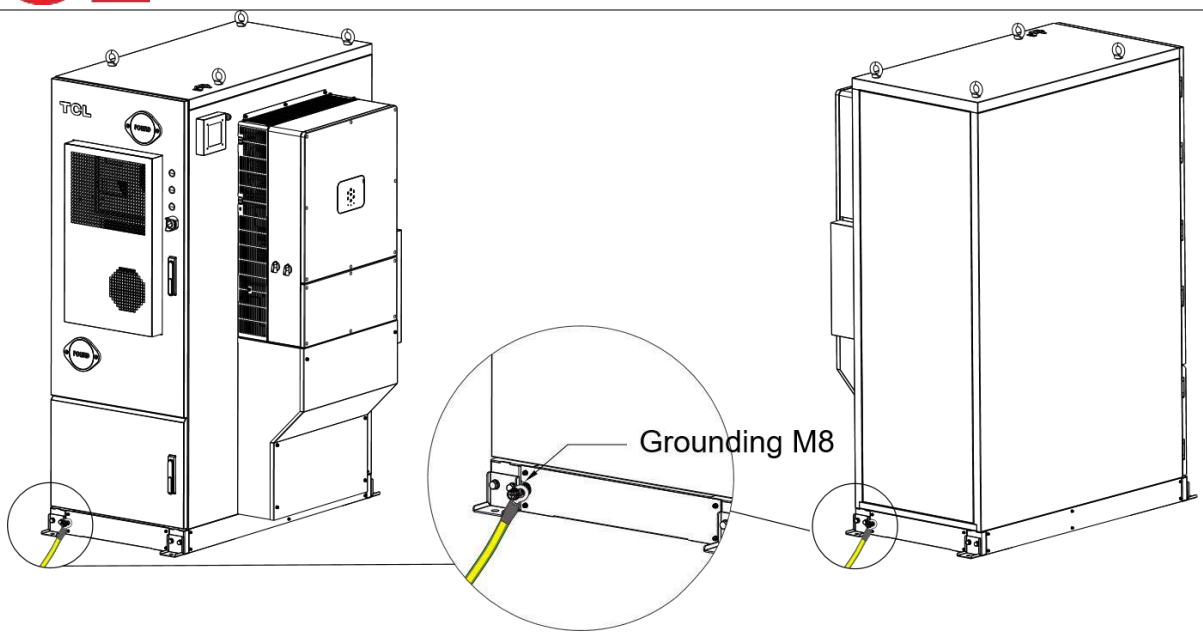


Figure 8-1 Grounding Diagram

8.3 AC Line Connection

8.3.1 Safety Precautions

WARNING
• **Accidental contact with live terminals poses a risk of fatal electric shock!** • **Ensure the hybrid inverter's AC/DC switch is in the off position and that the terminals are de-energized.** • **Connection to the utility grid requires authorization from the relevant authorities and compliance with all applicable grid safety regulations.**
WARNING
• **When connecting to the AC grid, disconnect the upper AC-side circuit breaker and ensure the contact terminals are de-energized.** • **Connection to the grid may only be made after obtaining approval from the utility grid and following all relevant safety instructions.** • **The AC output is not grounded internally within the equipment.** • **DC and AC circuits are isolated from the enclosure. System connection by an installer is required if mandated by applicable national electrical codes.**

8.3.2 Wiring Procedure

AC cable connections include utility port, backup port, and diesel generator port. An external AC

circuit breaker must be connected. Install the circuit breaker to ensure the inverter can safely disconnect from the grid. The inverter's integrated earth leakage current detector monitors external leakage currents in real time. When detected leakage current exceeds the threshold, the inverter will rapidly disconnect from the grid.

Table 8-1 AC Circuit Breaker Specifications

Name	Recommended Specifications	Source
Grid AC Circuit Breaker	200A	User-supplied
Diesel Generator AC Circuit Breaker	200A	User-supplied
Backup Load AC Circuit Breaker	100A	User-supplied

The inverter does not require an external residual current device (RCD) as it incorporates an integrated RCMU. If local regulations mandate an external RCD, both Type A and Type B RCDs are compatible with the inverter. The operating current for the external RCD should be 300 mA.

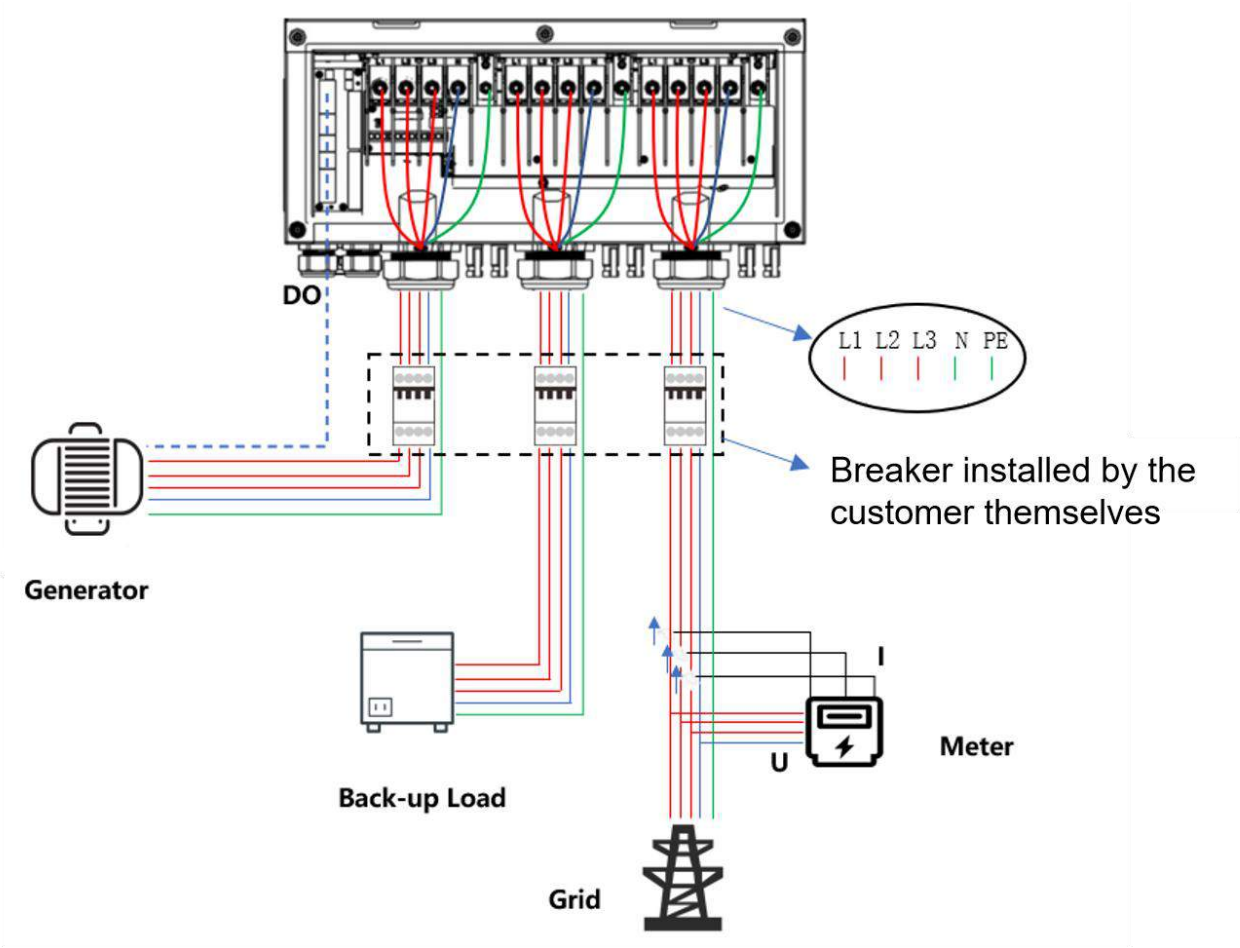


Figure 8-2 Single-unit cable wiring diagram

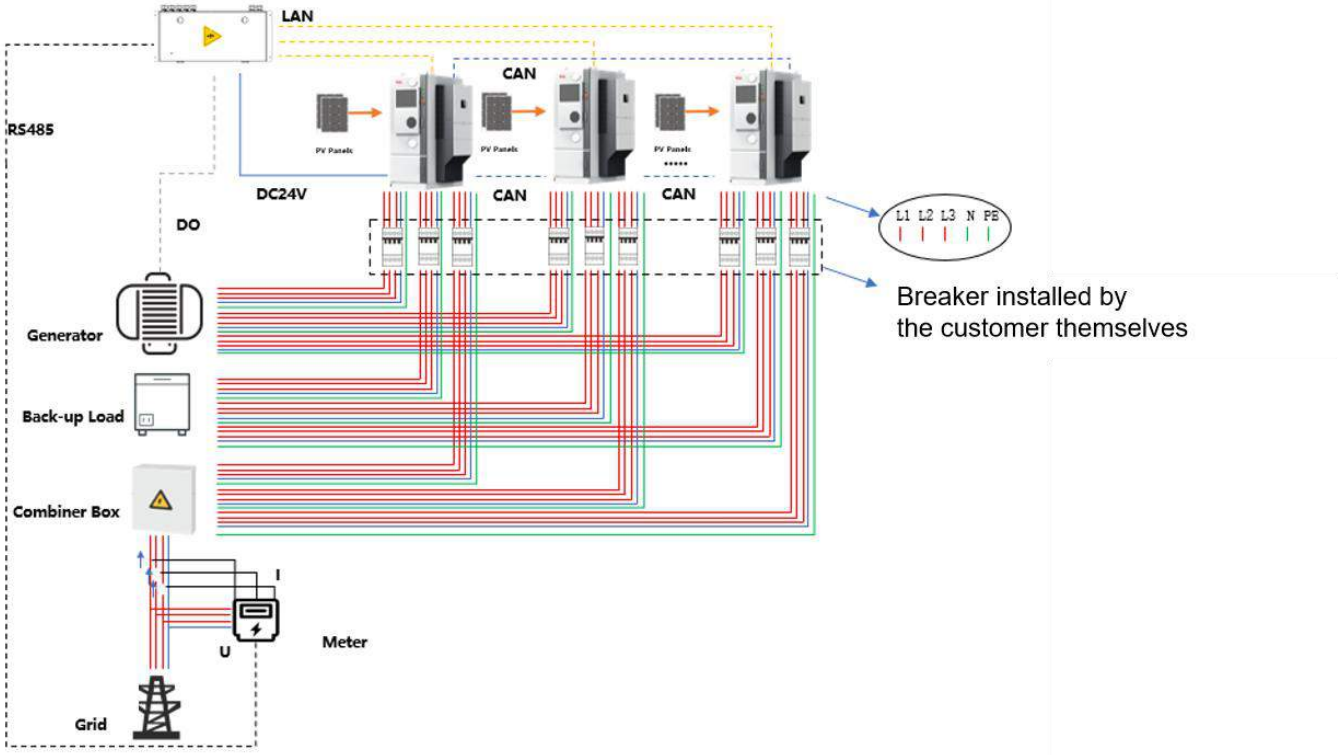


Figure 8-3 Parallel Connection Cable Wiring Diagram

Wiring procedure:

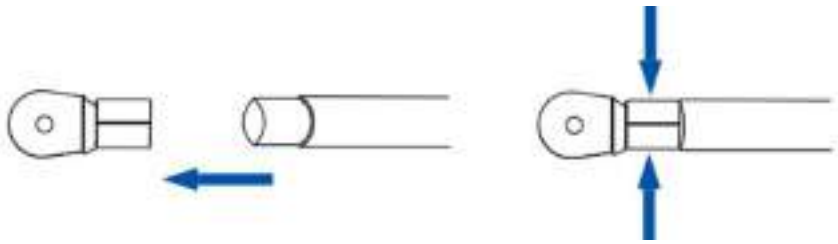
Step 1 Disconnect the upstream AC circuit breaker and use a multimeter to verify the terminals are de-energized.

Step 2 Insert the cable through the cable entry hole into the AC wiring area of the cabinet.

Step 3 Ensure the AC cable connection sequence is correct.

Step 4 Use wire strippers to remove the cable insulation, exposing the copper conductors.

Step 5 Crimp using OT terminals.



Step 6 Secure the grid, generator, and backup cables to the machine's terminals marked L1, L2, L3, and N using RNB70-10/SC50-10 OT/DT connectors. Connect the PE terminal using RNBS38-8 OT/DT connectors. Tightening torque: L1/L2/L3/N : 15 N·m and PE: 8 N·m.

Step 7 After completing the wiring, gently pull the cables to ensure sufficient slack.

Table 8-2 AC Cable Specifications

Description	Recommended Specifications	
	Single Unit	Parallel Operation
AC Cable	50mm²	70mm²

AC Side Grounding Cable	25mm²	35mm²
Diesel Engine Control Signal Cable	0.5mm²	0.5mm²
OT/DT Terminal	L1/L2/L3/N: SC50-10 OT/DT; PE: RNBS38-8 OT/DT	L1/L2/L3/N: RNB70-10; PE: RNBS38-8 OT/DT


NOTE

If the grid connection distance is too long, select AC cables with larger diameters based on actual conditions.

8.4 Photovoltaic Power Generation Connection

8.4.1 Safety Precautions


WARNING

- **Touching live components or DC cables poses a risk of electric shock, which can be life-threatening.**
- **Ensure the PV array is properly insulated from ground before connecting it to the inverter.**
- **When exposed to light, the PV array supplies DC voltage to the equipment. Contact with energized DC cables can cause death or serious injury.**
- **Never touch uninsulated components or cables.**
- **Disconnect the inverter from the power source.**
- **Never disconnect DC connectors under load.**
- **Wear appropriate personal protective equipment during all work.**


NOTE

The MPPT port supports a maximum voltage of 1000V. Do not connect too many PV strings to prevent the maximum open-circuit voltage from exceeding 1000V, which could damage the equipment.

8.4.2 Wiring Procedure

The PV DC connector consists of a positive and a negative connector.

Figure 8-4 Schematic Diagram of PV DC Positive and Negative Connectors

NOTE

- **After unpacking, store the connectors separately to avoid confusion when connecting cables.**
- **Connect the positive terminal connector to the positive terminal of the solar panel and the negative terminal connector to the negative terminal of the solar panel. Ensure they are connected to the correct positions.**

The wiring procedure is as follows:

Step 1 Loosen the locking screws on the positive and negative terminals.

Step 2 Use a 3mm flathead screwdriver to strip approximately 8 to 10mm of insulation from one end of each cable.

Figure 8-5 Photovoltaic DC Cable Stripping Diagram

Step 3 Insert the cable end into the sleeve and assemble the cable end using crimping pliers.

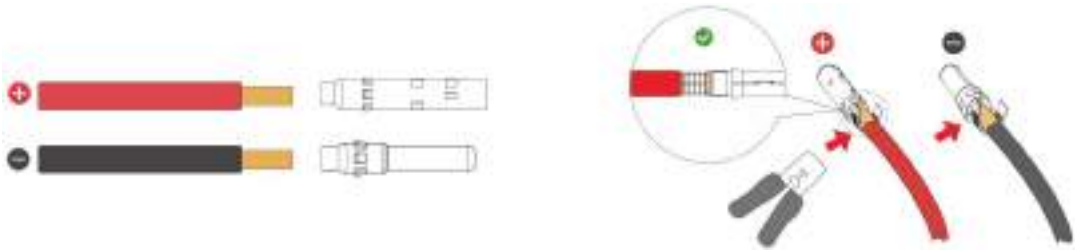


Figure 8-6 Photovoltaic DC Cable Crimp Diagram

Step 4 Insert the assembled cable end into the positive and negative connectors. Gently pull back the latches to ensure a secure connection.

Figure 8-7 Positive and Negative Connector Cable Connection Diagram

Step 5 Tighten the locking screws on the positive and negative cable connectors.

Step 6 Ensure the DC switch on the hybrid inverter is in the OFF position.

Figure 8-8 DC Switch Off Diagram

Step 7 Insert the positive and negative cable connectors into the corresponding positive and negative PV ports on the inverter until you hear a "click" to ensure a secure connection.

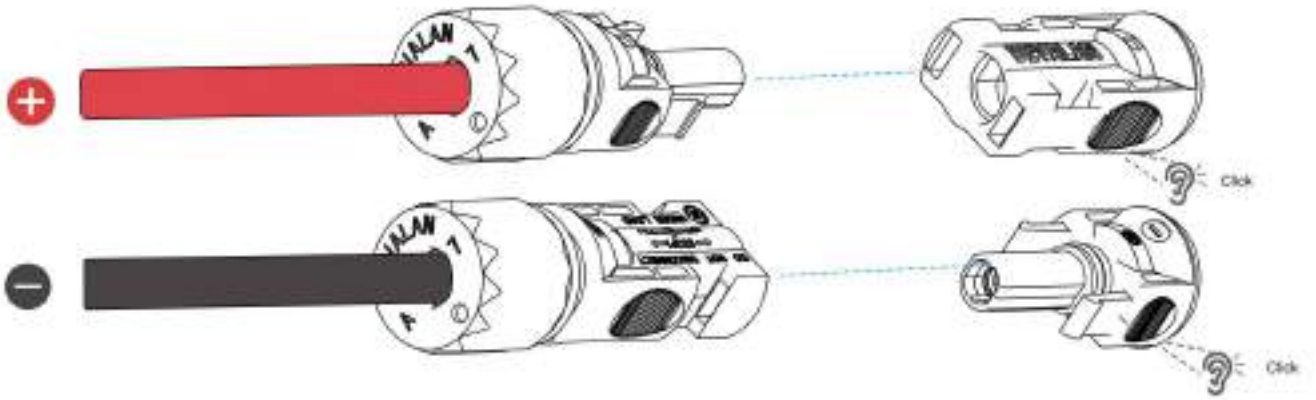


Figure 8-9 Connector to Hybrid Inverter Interface Connection Diagram

Table 8-3 DC Cable Interface Specifications

Description	Recommended Specifications	
	Single Unit	Parallel Operation
Photovoltaic DC Cable	4–6 mm²	4–6 mm²

8.5 Diesel Generator Connection

During single-unit operation, the dry contact DO1 port of the hybrid inverter can be used to

start and stop the diesel generator.

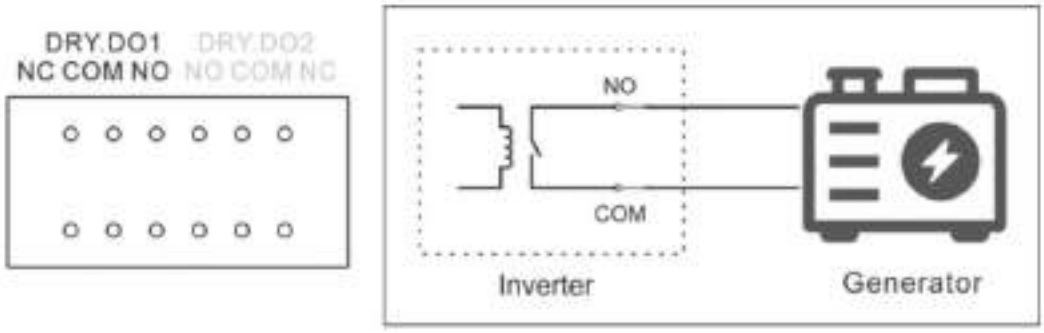


Figure 8-10 Diesel Generator Start Signal

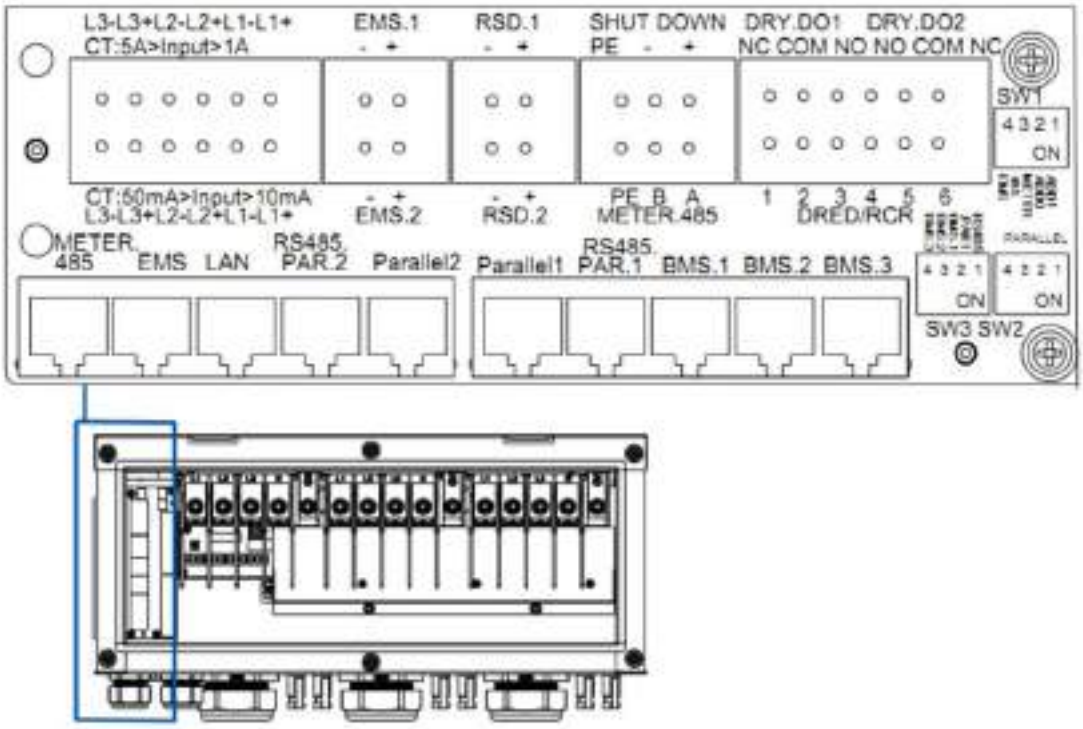


Figure 8-11 Schematic Diagram of Hybrid Inverter Communication Ports

8.6 Anti-Reverse Flow Meter Connection

This product supports integration with the ADL400N-CT backflow prevention meter. Its voltage and current acquisition are shown in the figure below. The RS485 interface must be connected to the EMS's RS485A2/B2 port to enable RS485 communication.

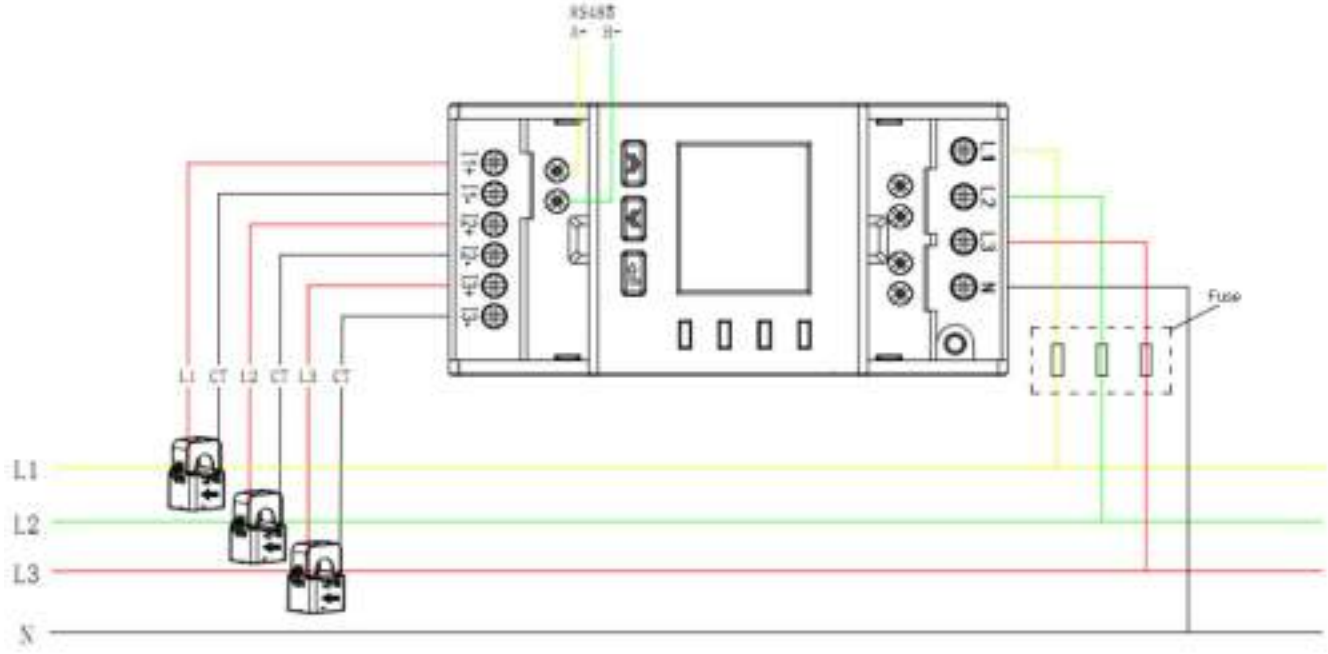


Figure 8-12 ADL400N-CT Three-Phase Four-Wire Connection via Current Transformer

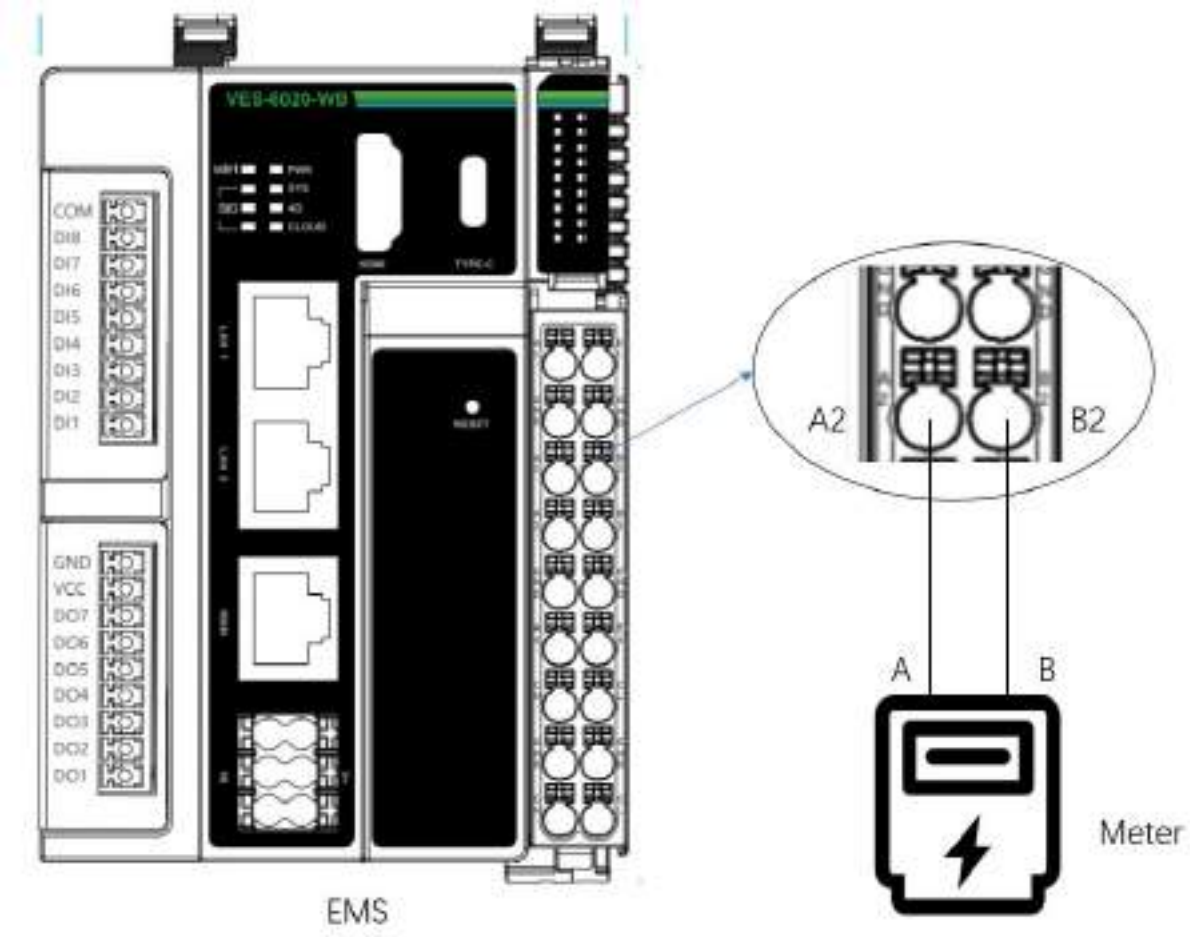


Figure 8-13 EMS RS485A2/B2 Port Diagram

8.7 Parallel Connection

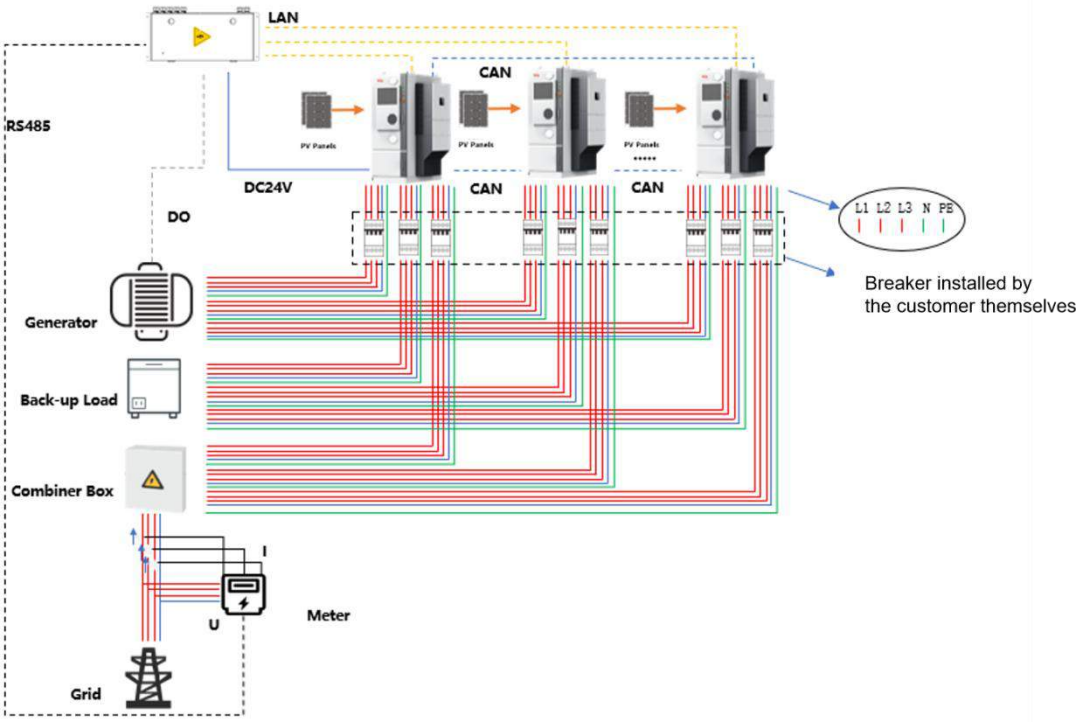


Figure 8-14 Parallel Connection Wiring Diagram

8.7.1 Parallel AC Cable Connection

For detailed AC cable connection methods, refer to Section 8.3 AC Line Connection.

8.7.2 Parallel PV Power Feed-in

For PV power cable connection methods, refer to Section 8.4 PV Power Connection.

8.7.3 Parallel Diesel Generator Connection

For details on diesel generator connection methods, refer to Section 8.5 Diesel Generator Connection.

8.7.4 Parallel Connection of Anti-Reverse Flow Meters

For detailed connection methods of anti-reverse flow meters, refer to Section 8.6 Anti-Reverse Flow Meter Connection. Meter communication must be integrated into the EMS within the busbar control box.

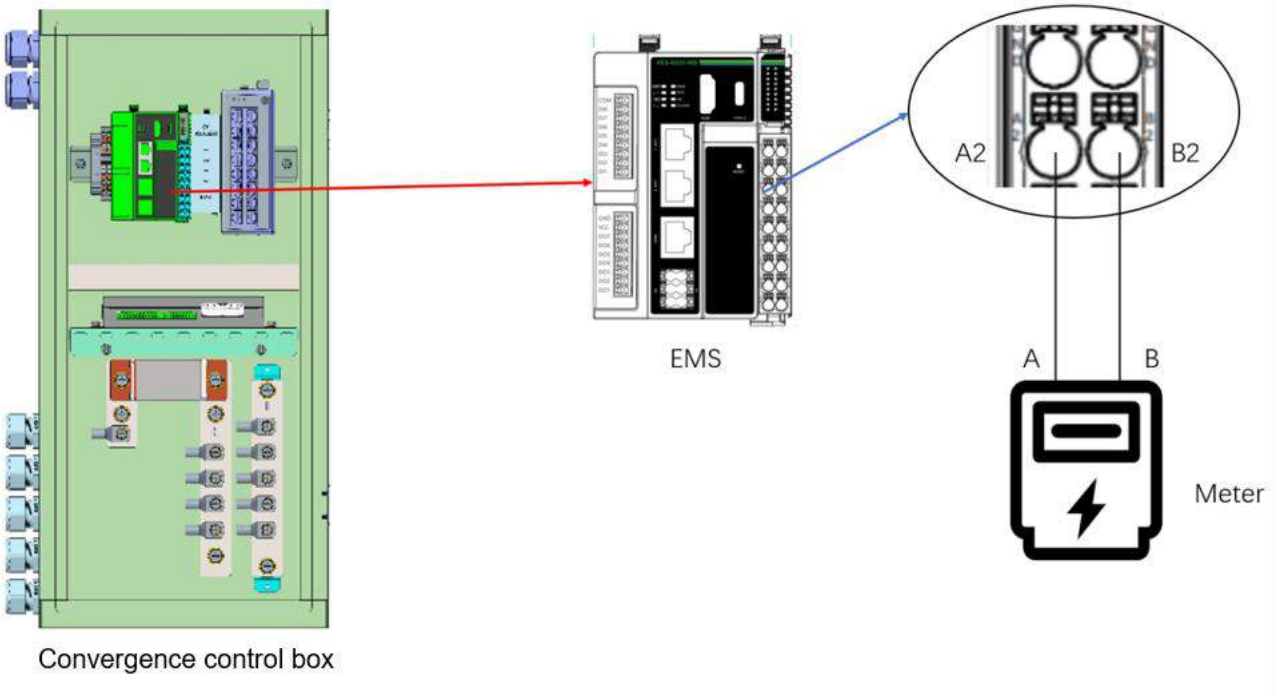


Figure 8-15: RS485 A2/B2 Port Diagram of EMS in Parallel Combiner Box

8.7.5 EMS Parallel Communication Connection

EMS comprises station-level EMS and device-level EMS. The station-level EMS is integrated within the busbar control box, with one device-level EMS assigned to each BlueArk X5 commercial/industrial storage-photovoltaic integrated unit. Station-level equipment includes the station-level EMS and switches. The station-level EMS connects to switches via Ethernet communication, while each device-level EMS connects to switches via Ethernet communication, enabling interactive communication and control functions between station-level and device-level EMS.

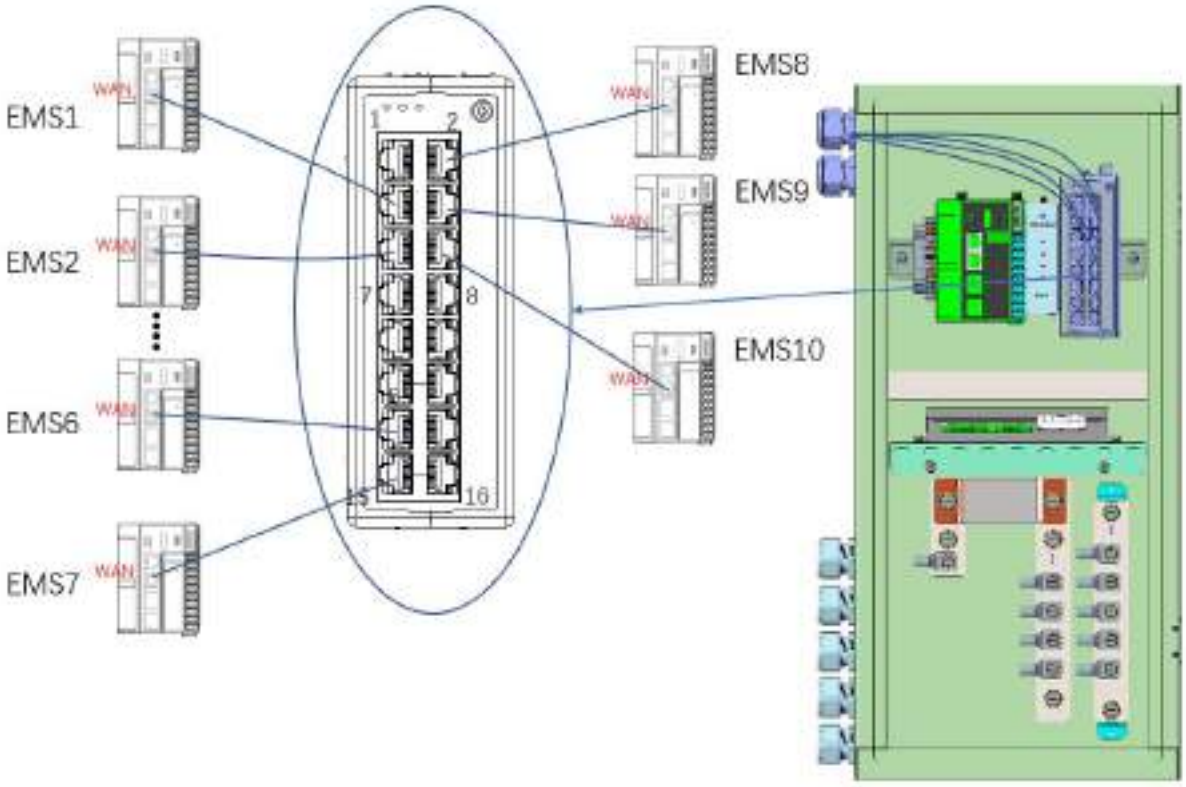


Figure 8-16 Station Control Level EMS and Device Level EMS Networking Wiring Diagram

8.7.6 Hybrid Inverter Parallel Connection Signal Wires

Hybrid inverters are paralleled and connected to a backup load. The Parallel1 and Parallel2 ports of the hybrid inverter facilitate CAN communication between inverters. Each cabinet's hybrid inverter must be connected via RJ45 network cables through Parallel1 and Parallel2 in a daisy-chain configuration to form a ring network.

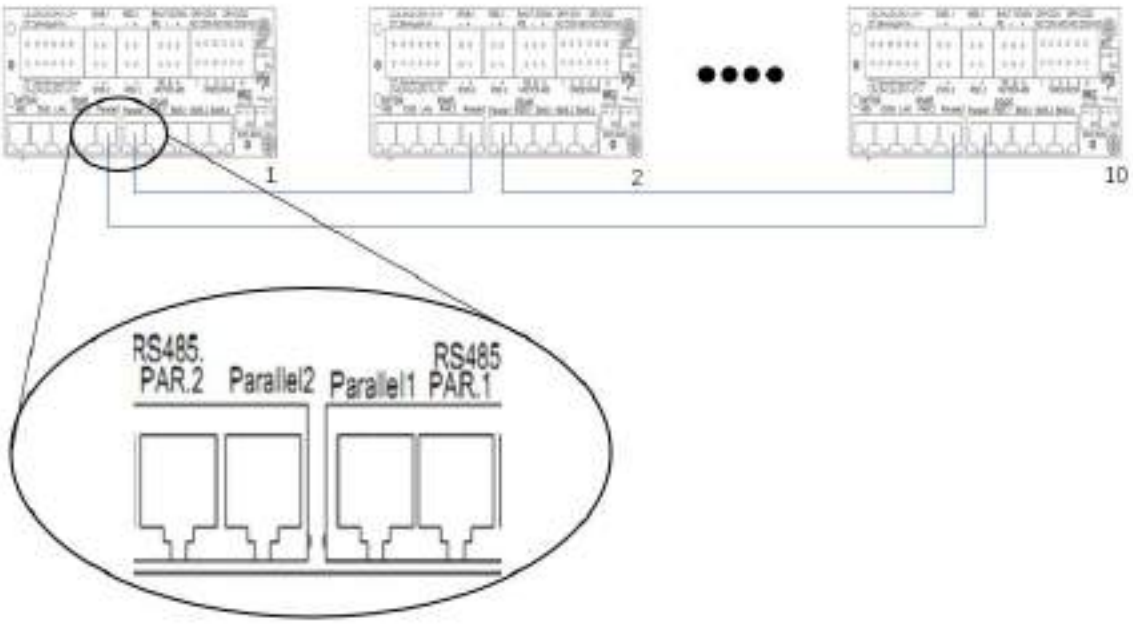


Figure 8-17 Hybrid Inverter Parallel Signal Cable Connection Diagram

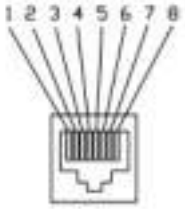
Parelle1/ Parelle2		
1	SYN B	
2	SYN A	
3	SYN B	
4	SYN B	
5	SYN A	
6	SYN A	
7	CANL	
8	CANH	

Figure 8-16 Hybrid Inverter Paralle1/2 Communication Schematic

Note:

Before implementing multi-unit parallel operation, consult our pre-sales or technical engineers to verify the feasibility of the parallel configuration. Forced parallel operation or configurations not meeting our specifications will result in the termination of technical support for the project.

8.8 Battery Cabinet Expansion Scenario Wiring

This product supports on-site battery capacity expansion by parallel connection only on the battery side, enhancing backup power capability. It supports parallel operation of up to 4 battery cabinets.

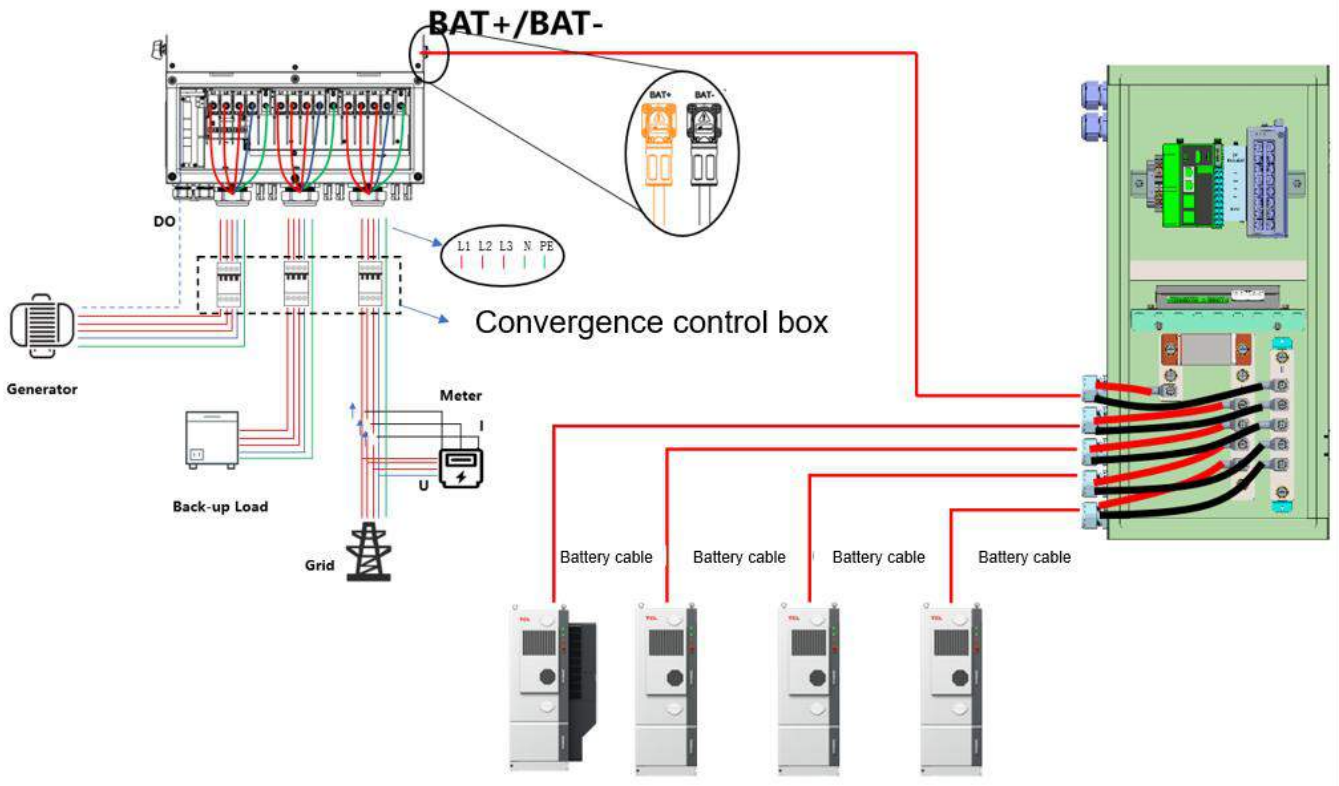


Figure 8-18 Battery Expansion System Wiring Diagram

8.8.1 Expansion AC Cable Connection

Refer to Section 8.3 AC Line Connection for detailed AC cable connection methods.

8.8.2 Photovoltaic Power Generation Connection

For PV power cable connection methods, refer to Section 8.4 PV Power Connection.

8.8.3 Diesel Generator Connection

For diesel generator connection methods, refer to Section 8.5 Diesel Generator Connection.

8.8.4 Backflow Prevention Meter Connection

For details on backflow prevention meter connection, refer to Section 8.6 Backflow Prevention Meter Connection.

8.8.5 Bus Cable Connection

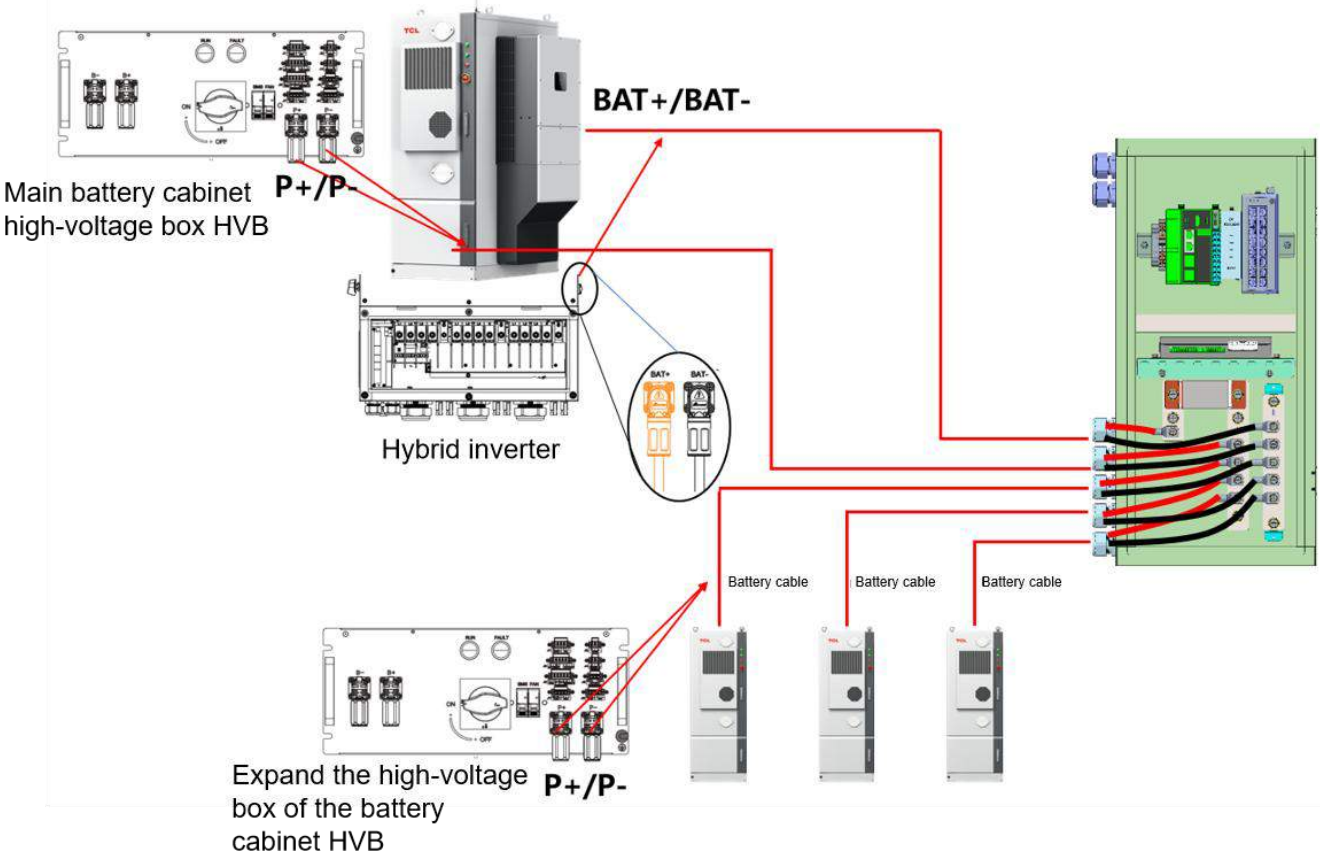


Figure 8-19 Schematic Diagram of Busbar Wiring Between Extended Battery Cabinet and Main Battery Cabinet

1) Safety Precautions

WARNING

- **Touching live components or DC cables poses a risk of electric shock, which can be fatal.**
- **Before connecting the battery bus cables to the inverter, ensure they are properly insulated from ground.**
- **Do not touch uninsulated parts or cables.**
- **Disconnect the inverter from the power source.**
- **Never disconnect DC connectors under load.**
- **Wear appropriate personal protective equipment during all work.**

2) Wiring Procedure

NOTE

- **After unpacking, store the battery bus cables separately to avoid confusion when connecting cables.**
- **Connect the battery bus cables from the expansion battery cabinet to the bus control box.**
- **Connect the battery bus cables from the main battery cabinet to the BAT+/BAT- terminals on the battery side of the hybrid inverter and to the P+/P- terminals in the bus control box. Ensure they are connected to the correct positions.**
- **To minimize the possibility of battery circulating current, the lengths of the battery bus cables for both the main battery cabinet and the expansion battery cabinet must be identical.**

Wiring procedure:

Step 1 Connect the copper terminal ends of the battery bus cables from both the main battery cabinet and the expansion battery cabinet to the busbar control box first, applying torque according to local specifications.

Step 2 Connect the connectors of the main battery cabinet's battery bus cables to the BAT+/BAT- terminals of the hybrid inverter and the P+/P- terminals of the high-voltage box, respectively.

Step 3 Connect the battery bus cable connectors from the expansion battery cabinet to the P+/P- terminals of the high-voltage box.

Table 8-3 Bus Cable Specifications

Description	Recommended Specifications	
	Single Unit	Parallel Operation
Main Battery Cabinet Hybrid Inverter Connection Cable to Busbar Control Box	50mm²	50mm²
Expansion Battery Cabinet High-Voltage Box Connection Cable to Busbar Control Box (1)	35mm²	35mm²
Expansion battery cabinet high-voltage box to busbar control box cable (2 pieces)	35mm²	35mm²
Expansion battery cabinet high-voltage box to busbar control box cable (3 pieces)	35mm²	35mm²

8.8.6 BMS Communication Signal Connection

After expanding the battery cabinet, the BMS communication architecture is changed to a three-tier structure, adding a BAU master controller. It requires CAN communication with the main controller BCU of each battery cabinet and addressing them.

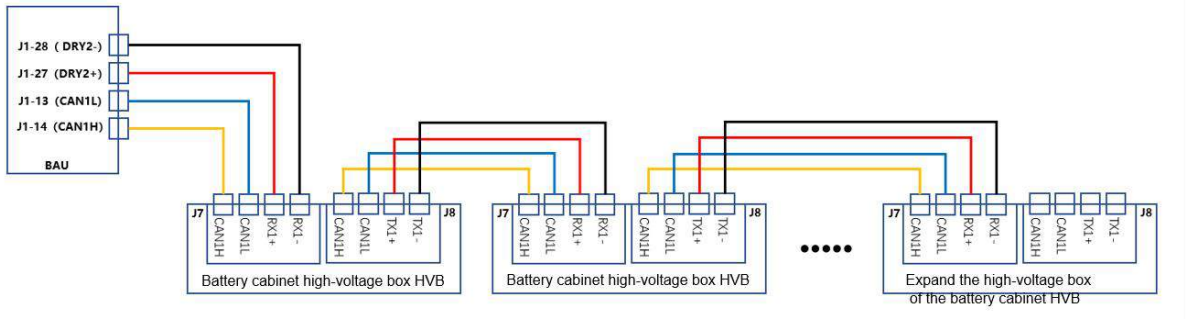


Figure 8-20 BMS Communication Network Diagram

8.8.7 RS485 Communication Signal Connection

After expanding the battery cabinet, the RS485 communication for the IO module ( ), the battery management system ( ), and the air conditioning system from each expanded battery cabinet must be connected to the 485 communication expansion module integrated into the main battery cabinet's EMS.

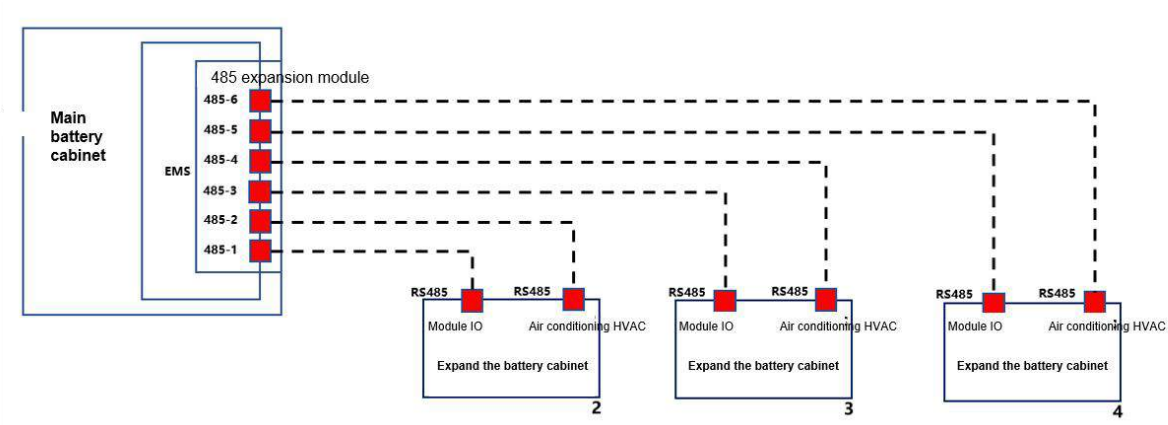


Figure 8-21 RS485 Communication Network Diagram

8.8.8 AC220V Connection

After expanding the battery cabinet, the J1: AC220V power input (current: 32A) must be additionally connected to the AC220V supply, specifically to the backup load side of the hybrid inverter within the main battery cabinet.

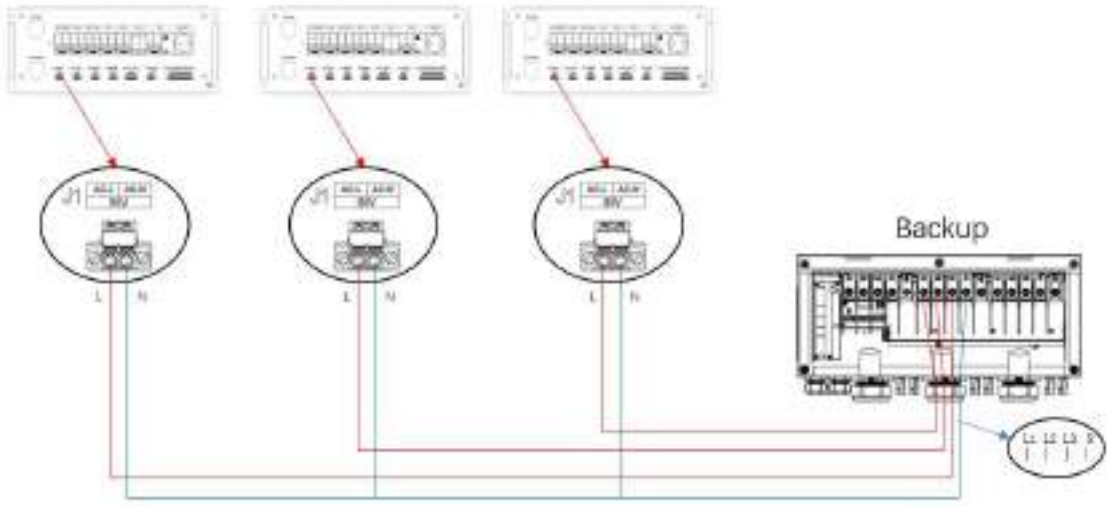


Figure 8-22 AC220V Input Power Connection Diagram

Note: Before implementing parallel expansion, consult our pre-sales or technical engineers to verify feasibility. Forced expansion or non-compliant modifications will void our technical support for the project.

8.9 Expansion Parallel Connection Scenario Wiring

This product supports on-site battery capacity expansion. It enables parallel connection not only on the battery side (enhancing backup power capacity, supporting mixed use of new and old battery cabinets, and allowing up to 4 battery cabinets to be connected in parallel) but also on the AC side, thereby increasing power input/output
capability.

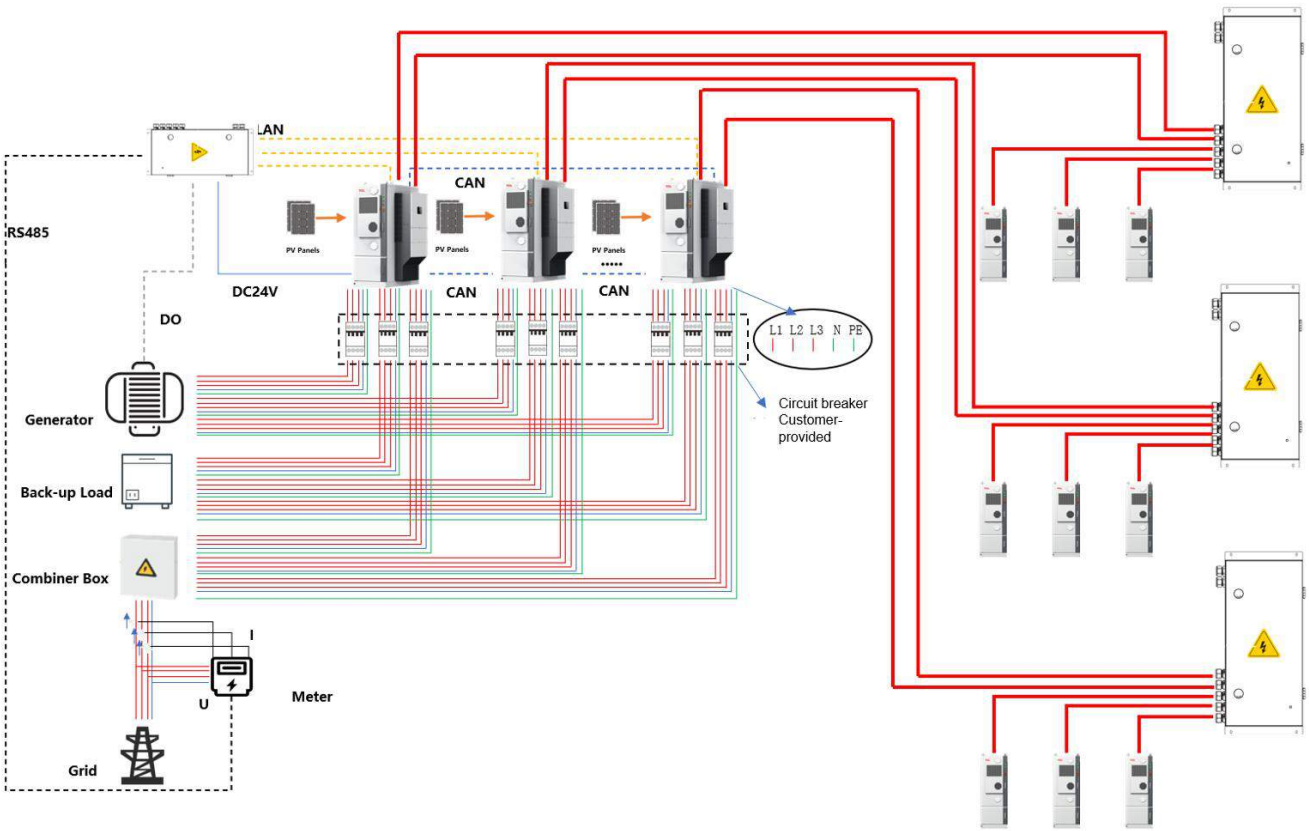


Figure 8-23 AC Wiring Diagram for Expansion and Parallel Operation

8.9.1 Expansion and Parallel Operation AC Cable Connection

For detailed AC cable connection methods during expansion, refer to Section 8.3 AC Line Connection.

8.9.2 Photovoltaic Power Generation Connection

For PV power cable connection methods, refer to Section 8.4 PV Power Connection.

8.9.3 Diesel Generator Connection

For diesel generator connection methods, refer to Section 8.5 Diesel Generator Connection.

8.9.4 Backflow Prevention Meter Connection

For details on backflow prevention meter connection, refer to Section 8.7.4 Parallel Operation Backflow Prevention Meter Connection.

8.9.5 Bus Cable Connection

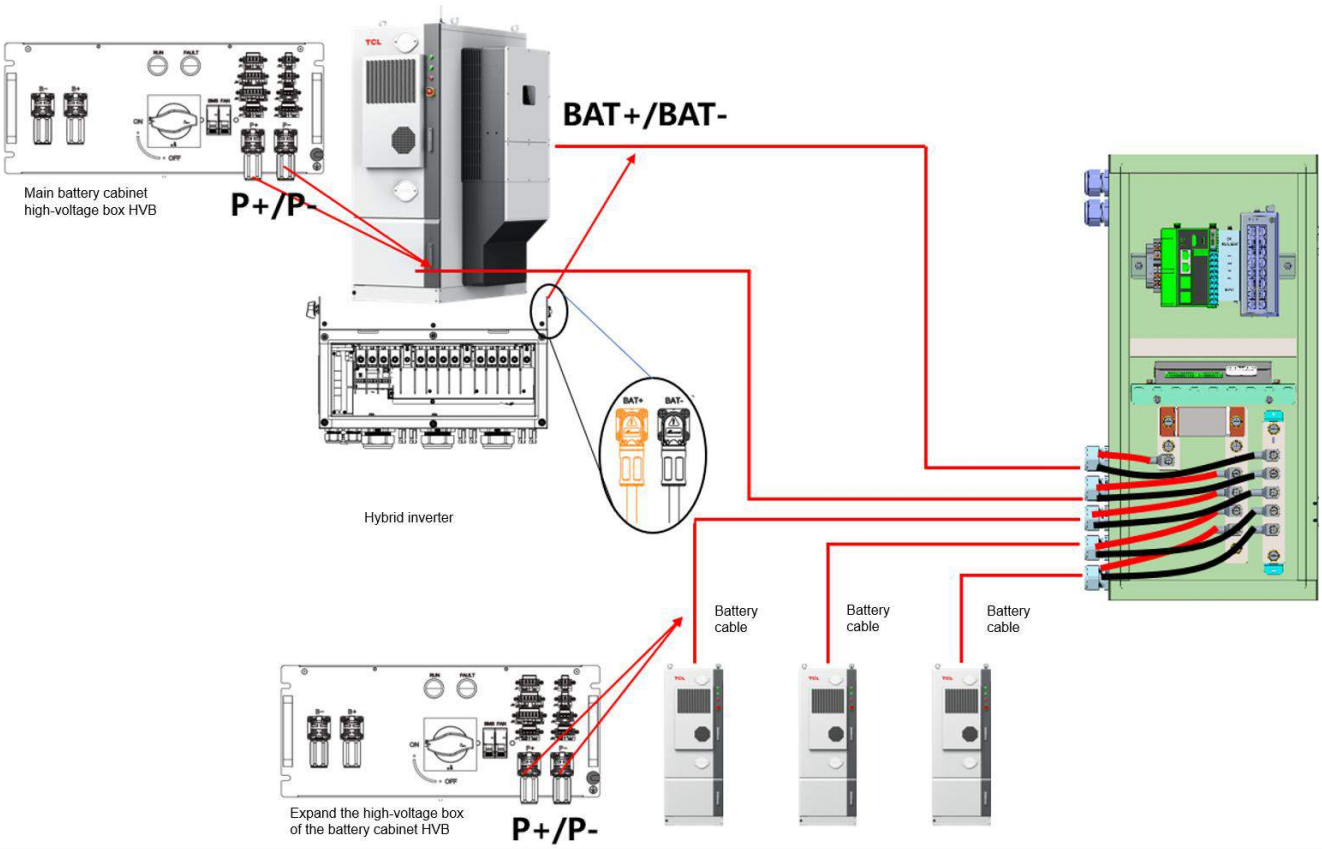


Figure 8-24 Schematic Diagram of Busbar Wiring Between Extended Battery Cabinet and Main

1) Safety Precautions


WARNING

- **Touching live components or DC cables poses a risk of electric shock, which can be fatal.**
- **Ensure the battery bus cable is properly insulated to ground before connecting it to the inverter.**
- **Do not touch uninsulated parts or cables.**
- **Disconnect the inverter from the power source.**
- **Never disconnect DC connectors under load.**
- **Wear appropriate personal protective equipment during all work.**

2) Wiring Procedure


NOTE

- **After unpacking, store the battery bus cables separately to avoid confusion when connecting cables.**
- **Connect the battery bus cables from the expansion battery cabinet to the bus control box.**
- **Connect the battery bus cables from the main battery cabinet to the BAT+/BAT- terminals on the battery side of the hybrid inverter and to the P+/P- terminals in the bus control box. Ensure they are connected to the correct positions.**
- **To minimize the possibility of battery loop currents, the lengths of the battery bus cables for both the main battery cabinet and the expansion battery cabinet must be identical.**

Wiring procedure:

Step 1 Connect the copper terminal ends of the battery bus cables from both the main battery cabinet and the expansion battery cabinet to the busbar control box first, applying torque according to local specifications.

Step 2 Connect the connectors of the main battery cabinet's battery bus cables to the BAT+/BAT- terminals of the hybrid inverter and the P+/P- terminals of the high-voltage box, respectively.

Step 3 Connect the battery bus cable connectors from the expansion battery cabinet to the

P+/P- terminals of the high-voltage box.

Table 8-3 Bus Cable Specifications

Description	Recommended Specifications	
	Single Unit	Parallel Operation
Main Battery Cabinet Hybrid Inverter Connection Cable to Busbar Control Box	50mm²	50mm²
Expansion Battery Cabinet High-Voltage Box Connection Cable to Busbar Control Cabinet (1)	35mm²	35mm²
Expansion battery cabinet high-voltage box to busbar control box cable (2 pieces)	35mm²	35mm²
Expansion battery cabinet high-voltage box to busbar control box cable (3 pieces)	35mm²	35mm²

8.9.6 BMS Communication Signal Connection

After expanding the battery cabinet, the BMS communication architecture is changed to a three-tier structure, adding a BAU master controller. It requires CAN communication with the main controller BCU of each battery cabinet and addressing them.

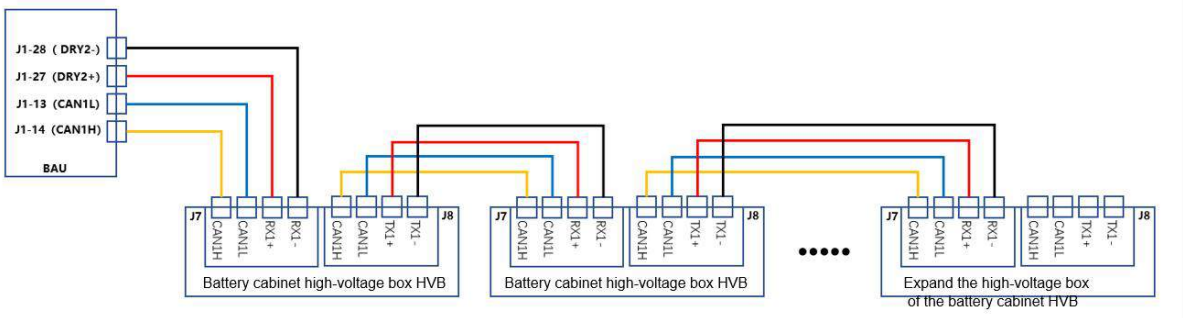


Figure 8-25 BMS Communication Network Diagram

8.9.7 RS485 Communication Signal Connection

After expanding the battery cabinet, the RS485 communication for the IO module and the air conditioning system of each expanded battery cabinet must be connected to the 485 communication expansion module integrated into the EMS of the main battery cabinet.

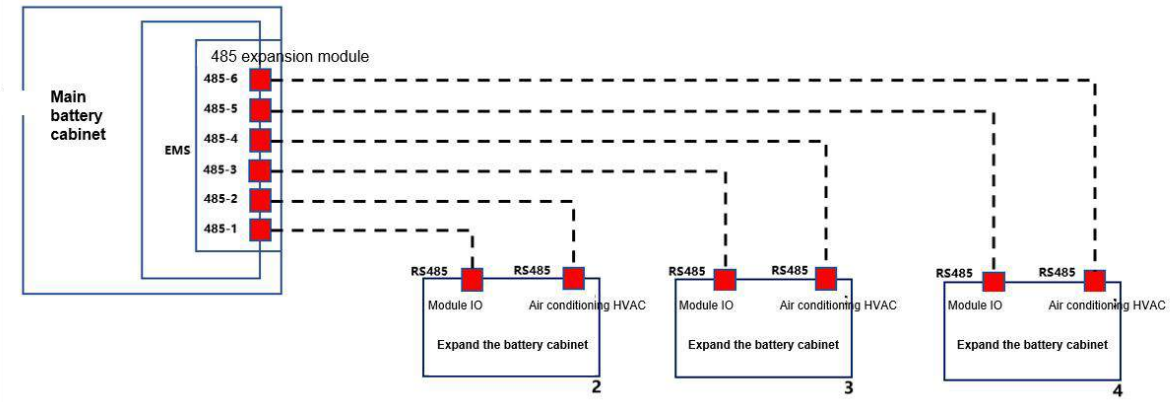


Figure 8-26 RS485 Communication Network Diagram

8.9.8 AC220V Connection

After expanding the battery cabinets, the J1: AC220V power input (current: 32A) must be additionally connected to the AC220V supply, specifically to the backup load side of the hybrid inverter in the main battery cabinet.

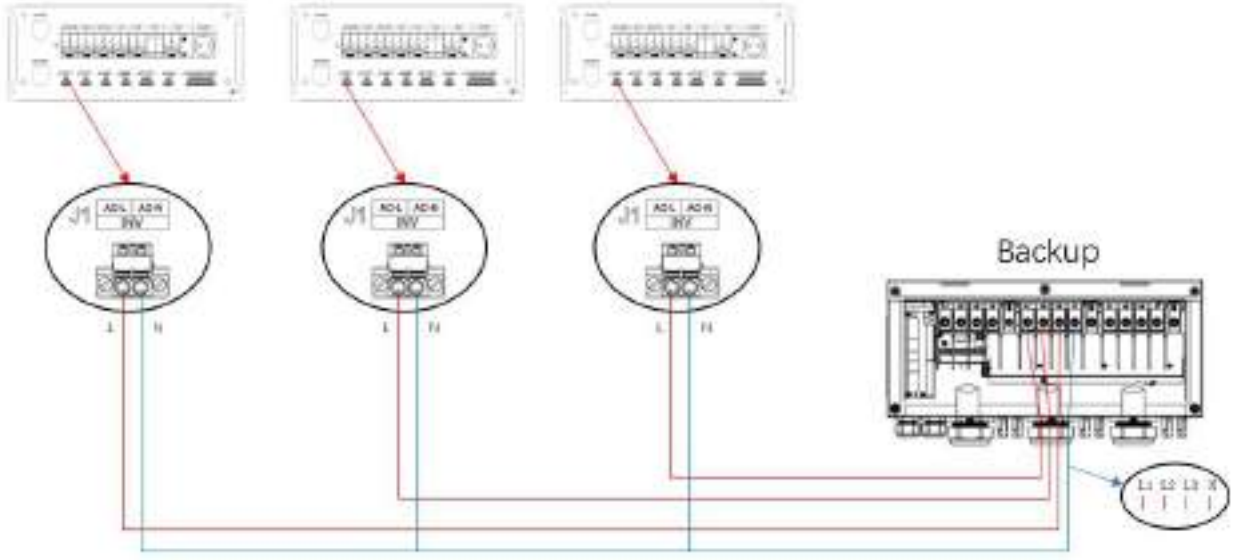


Figure 8-27 AC220V Input Power Connection Diagram

8.9.9 EMS Parallel Communication Connection

EMS comprises Station Control Level EMS and Device Level EMS. Station Control Level EMS is integrated within the busbar control cabinet, with one Device Level EMS assigned to each BlueArk X5 commercial/industrial storage photovoltaic storage integrated unit. Station control layer equipment includes Station Control Level EMS and switches. Station Control Level EMS connects to switches via Ethernet communication, while each Device Level EMS connects to switches via Ethernet communication, enabling interactive communication and control functions between Station Control Level EMS and Device Level EMS.

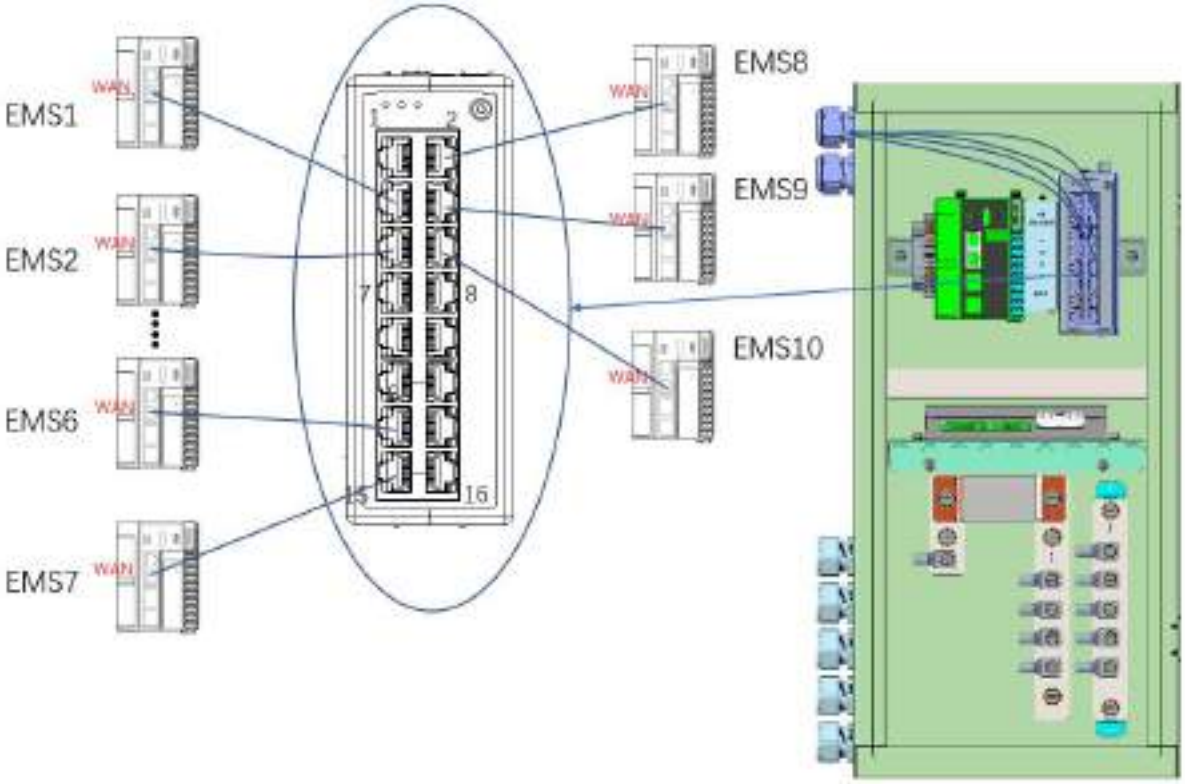


Figure 8 -28 Station Control Level EMS and Device Level EMS Networking Diagram

Note:

Before implementing expansion and parallel operation scenarios, please consult our pre-sales or technical engineers to verify the feasibility of the solution. If expansion and parallel operation is forced or does not comply with our requirements, we will not provide technical support for the project.

8.10 Sealing Cable Entry Holes

All cable access holes must be sealed. Use sealing compound to seal holes with installed cables, and use the device's original covers to seal unused holes. The correct sealing compound application standard is shown in the figure below.

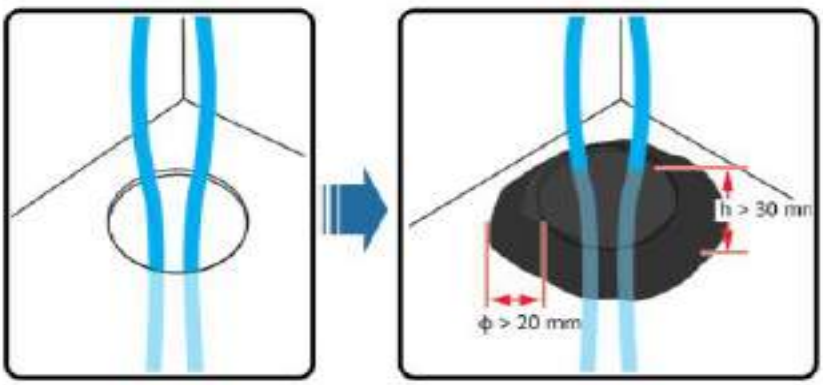


Figure 8-29 Sealant Application Diagram

9 System Power-Up

9.1 Pre-Power-Up Inspection


WARNING

- **The energy storage system may only be put into operation after confirmation by qualified personnel.**
- **For energy storage systems that have been idle for extended periods, a comprehensive and meticulous inspection of the equipment must be conducted before powering on to ensure all specifications meet requirements.**

1) Verify correct wiring connections.
2) Internal protective covers are securely installed.
3) The emergency stop button is in the released position.
4) Verify that there are no ground faults.
5) Use a multimeter to verify that AC and DC side voltages meet startup conditions and pose no overvoltage hazard.
6) Verify that no tools or components are left inside the equipment.
7) The energy storage system may only be put into operation after confirmation by qualified personnel.
8) For energy storage systems with extended downtime, conduct a thorough inspection of the equipment before powering on. Only proceed with power-up after confirming all parameters meet requirements.

9.2 System Power-Up


WARNING

If a circuit breaker trips during power-up, pause closing other circuit breakers and immediately inspect the downstream load of the tripped circuit breaker for short circuits.

Step 1: Power-up Preparation.

1) Complete power and communication wiring between battery cabinets and between battery cabinets and grid-tie cabinets;
2) Battery Bay: Rotate the DC circuit breaker handle in the high-voltage cabinet to the "ON" position;
3) Inverter Bay: Rotate the hybrid inverter DC switch handle to "ON".

Step 2: Power Up Auxiliary Distribution System

1) Close the auxiliary power switch AC POWER (main distribution switch) and the surge protection switch SCB (distribution switch surge protection);

2) Close the HVAC power supply switch to complete air conditioning power-up;

3) Close the BAT-FAN power supply switch to complete battery pack fan power-up;

4) Close the UPS power supply switch ( ) and press and hold the UPS-ONOFF switch for at least one second until the high-voltage cabinet indicator lights up ( ) and the water immersion indicator lights up. BMS, fire protection, and control power supply power-up complete;

Step 3: Operate the control platform to start the control system.

10 Power Off and Shutdown

10.1 Scheduled Shutdown

Step 1 Power-Down Preparation: Shut down the control system via the operating control platform and disconnect the battery contactor (in special circumstances, press the cabinet emergency stop button to halt operation).

Step 2: Outdoor Cabinet Power-Down.

1) Disconnect the BAT-FAN power supply switch to complete fan power-off for the battery pack;
2) Disconnect the HVAC power switch to complete air conditioning shutdown;
3) Disconnect the auxiliary power switch AC POWER (main distribution switch);
4) Rotate the hybrid inverter DC switch handle to "OFF";
5) Rotate the DC circuit breaker handle of the high-voltage cabinet to "OFF";
6) Disconnect the UPS power supply switch and press and hold the UPS-ON/OFF switch until the UPS indicator light turns off, completing the shutdown of the BMS, fire protection, and control power supplies;

10.2 Unplanned (Emergency) Shutdown

In case of an emergency, contact local fire department professionals.

11 Cloud Platform Usage

11.1 Software Overview

11.1.1 Overview

The Energy Management System Cloud Platform, developed by Guangdong TCL Digital Power Co., Ltd., supports multi-role usage including equipment manufacturers, channel partners, distributors, and installers. It provides comprehensive data overview capabilities to manage power stations, equipment, and individual unit data.The platform supports device firmware management and upgrades, allowing users to view upgrade logs and handle related service requests. Through the Service Center, users can address end-user inquiries, manage device shipments, and perform account administration. It aims to deliver efficient and convenient energy management solutions for all user types.

11.1.2 Features

Data Overview: Users can view real-time aggregate power plant data, equipment data under each power plant, and detailed information for each device, enabling comprehensive control over energy management.

Power Plant Management: Supports centralized management of power plants and their subordinate equipment. Users can easily monitor plant operations and promptly adjust and optimize performance.

Device Management: Users can monitor real-time device operational status, health metrics, and other critical parameters to ensure optimal performance, thereby enhancing overall energy management efficiency.

Firmware Management & Updates: The platform offers centralized firmware management. Manufacturers can upload firmware for remote updates, while users can review update logs to ensure devices maintain peak performance.

Service Support: Through the platform's service portal, users can quickly address end-user inquiries, process equipment dispatch and after-sales service requests, ensuring customers receive timely and effective assistance whenever issues arise.

Account Management: Administrators can create and manage sub-administrators, channel users, distributors, and installer accounts, enabling flexible role management and permission control.

11.1.3 Target Audience

Equipment Manufacturers (Admin): Administrators can create and manage sub-administrators, channel users, distributors, and installer accounts; view all power plants and equipment; and manage firmware versions and remote upgrades.

Channel Partner (distributor): Manage power plants, equipment, and accounts; support creation of installers.

Channel: Manage power plants, devices, and accounts; support creation of installers.

Installer: Monitor activated devices and manage accounts.

11.1.4 Security

The software features high performance and high concurrency while ensuring information security and confidentiality.

11.2 Operating Environment

This software runs in a web browser. Minimum supported browser versions:

- Chrome 123 - 126
- Firefox 115, 125 - 128
- Safari (iOS) 15.6 - 17.5
- Safari (Desktop) 17.4 - 17.5
- Microsoft Edge 124 - 126

11.3 How to Use

11.3.1 URL Retrieval

Contact TCL Digital Power Field Application Engineer (FAE) to obtain the vendor's email address. After activating your account via email, you will receive a dedicated URL.

11.3.2 Cloud Platform Feature Overview

A. Login.

B. Overview.

C. Power plant management and equipment monitoring.

D. Individual device monitoring, data collection, and configuration.

E. Operations and Maintenance (Manage firmware, support remote device upgrades, and view upgrade logs).

F. Service Center (user support and equipment database).

G. Account management.

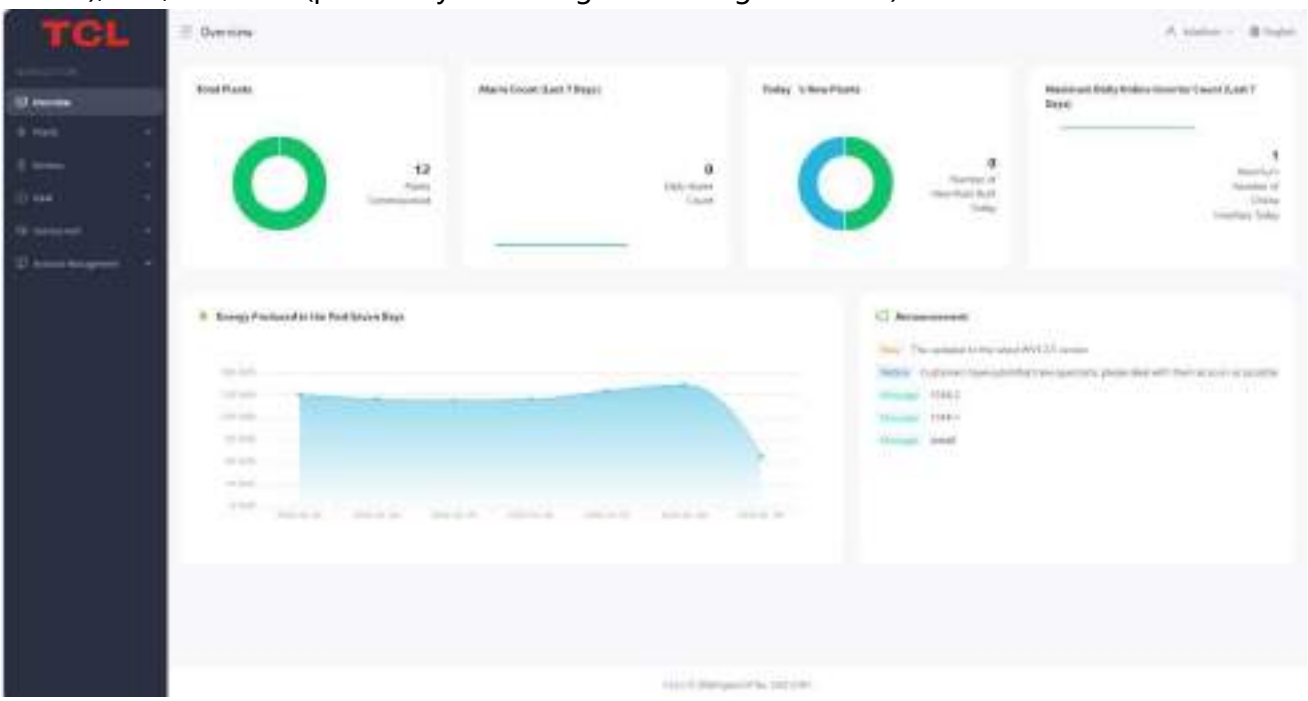
1) Login

Contact Guangdong TCL Digital Power Co., Ltd. → Provide the device manufacturer's email address → Guangdong TCL Digital Power Co., Ltd. sends an email → The device manufacturer activates the account and sets a password via email → Receive the dedicated cloud platform URL.

2) Overview

1. View total power stations and alarm counts over the past 7 days, newly added stations on the current day, and device online status over the past 7 days.

2. Different statistical dimensions based on equipment type: e.g., BMS (7-day charge/discharge statistics), INV, and EMS (past 7 days' discharge and charge statistics).

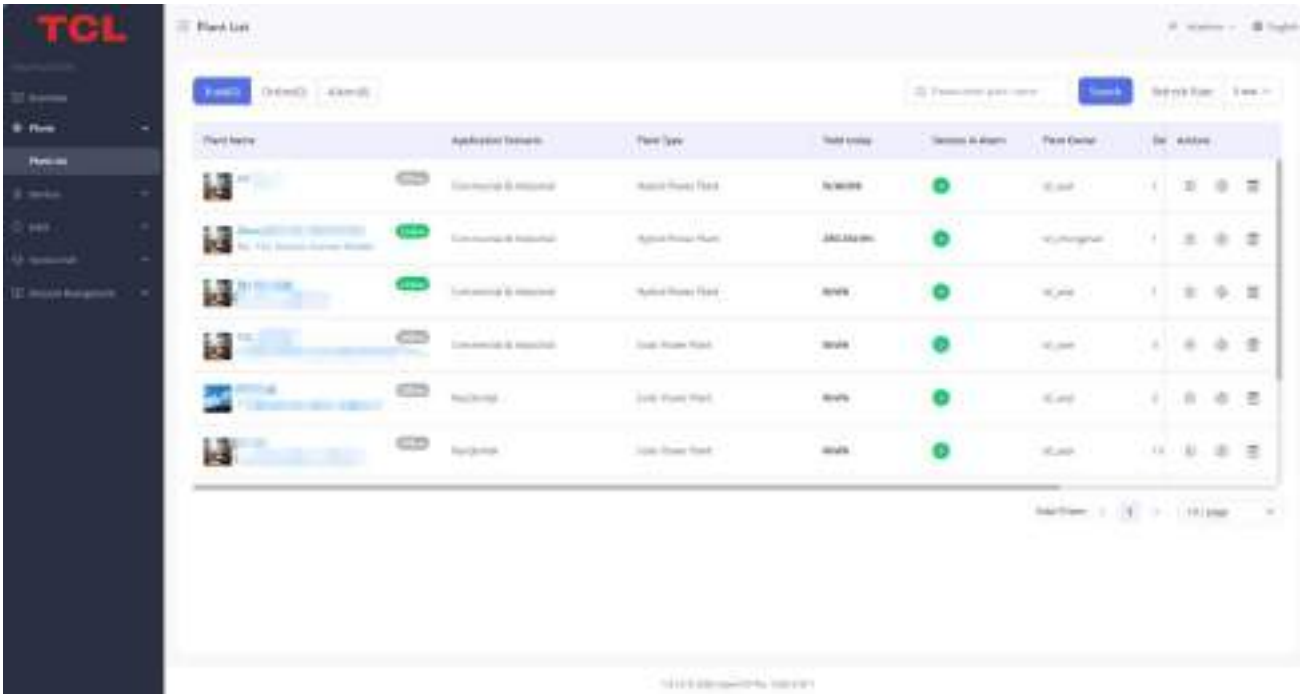


3) Power Station

1) View the user's power stations.
2) Supports adding new power stations.
3) Click a power station name to view its details.

4) Supports unlinking power stations and unlinking devices.

5) Supports deleting power stations.



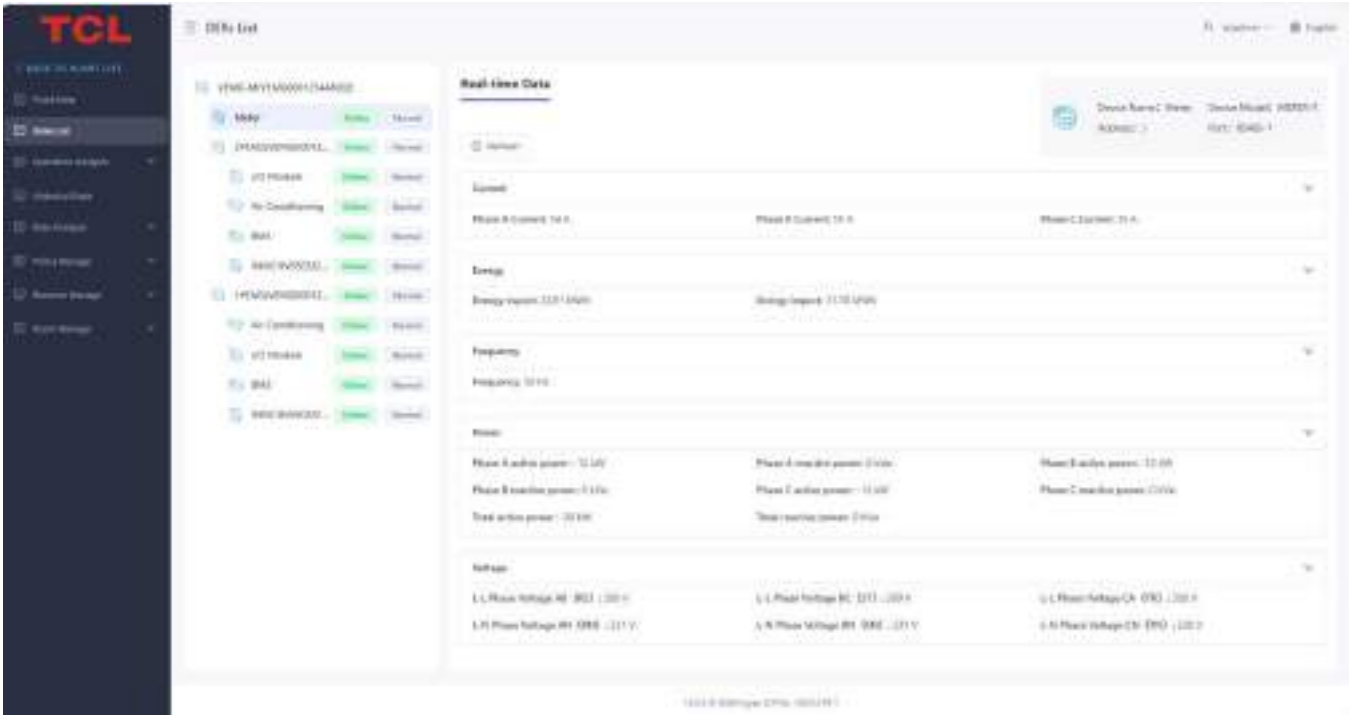
C&I Power Plant Details

1，Plant Overview：

View daily/monthly energy generation, revenue & performance reports, and alarm monitoring.

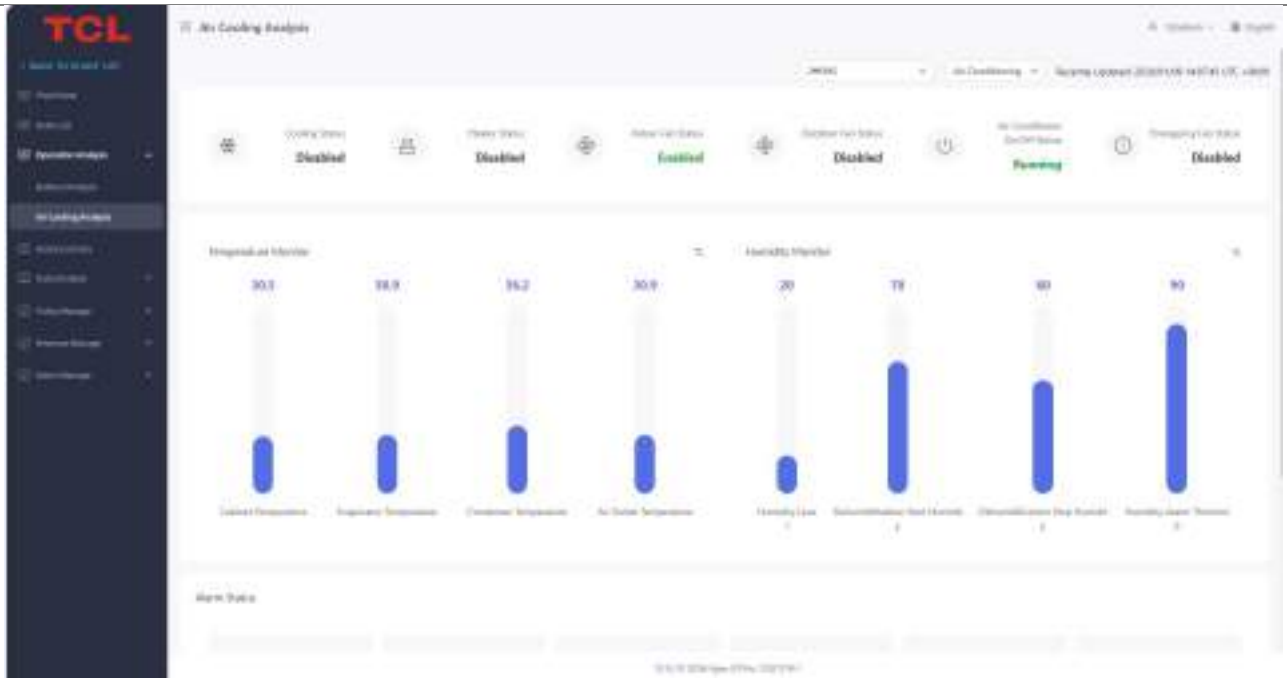
4) Device List

View device status and data bound to the plant



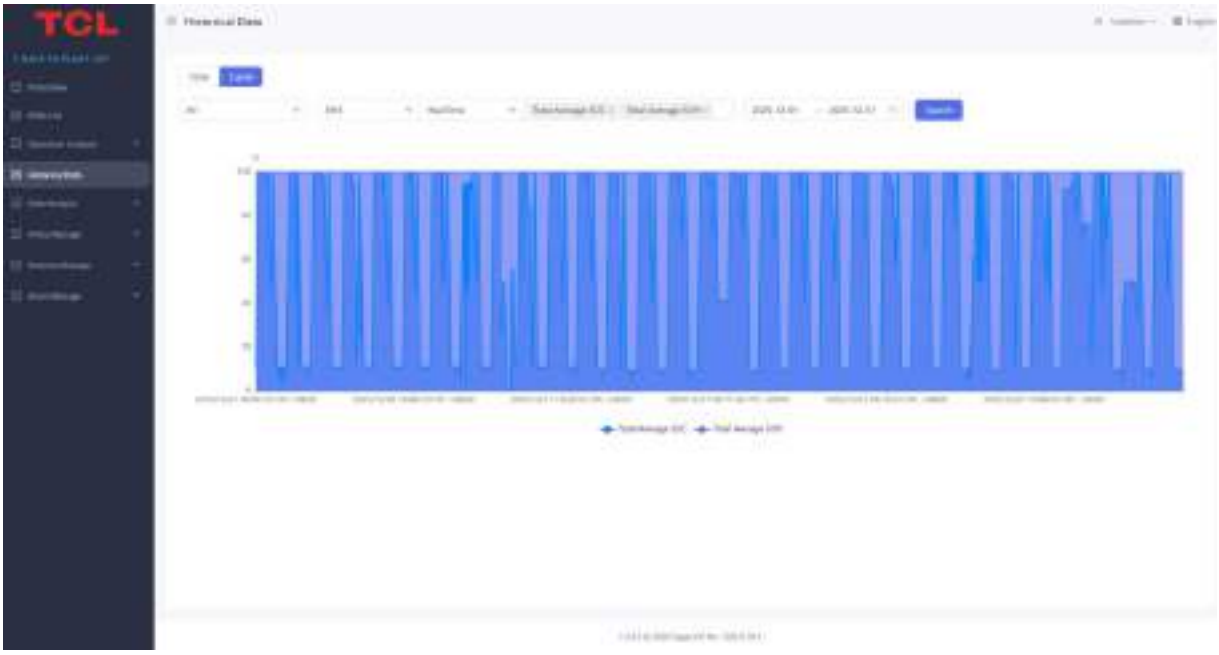
5) Operation Analysis:

Battery analysis: charge/discharge energy, SOC, SOH, temperature , HVAC analysis: operating status, ambient temperature, alarm status



6) Historical Data

Manually select devices to view historical data in tables or curves.

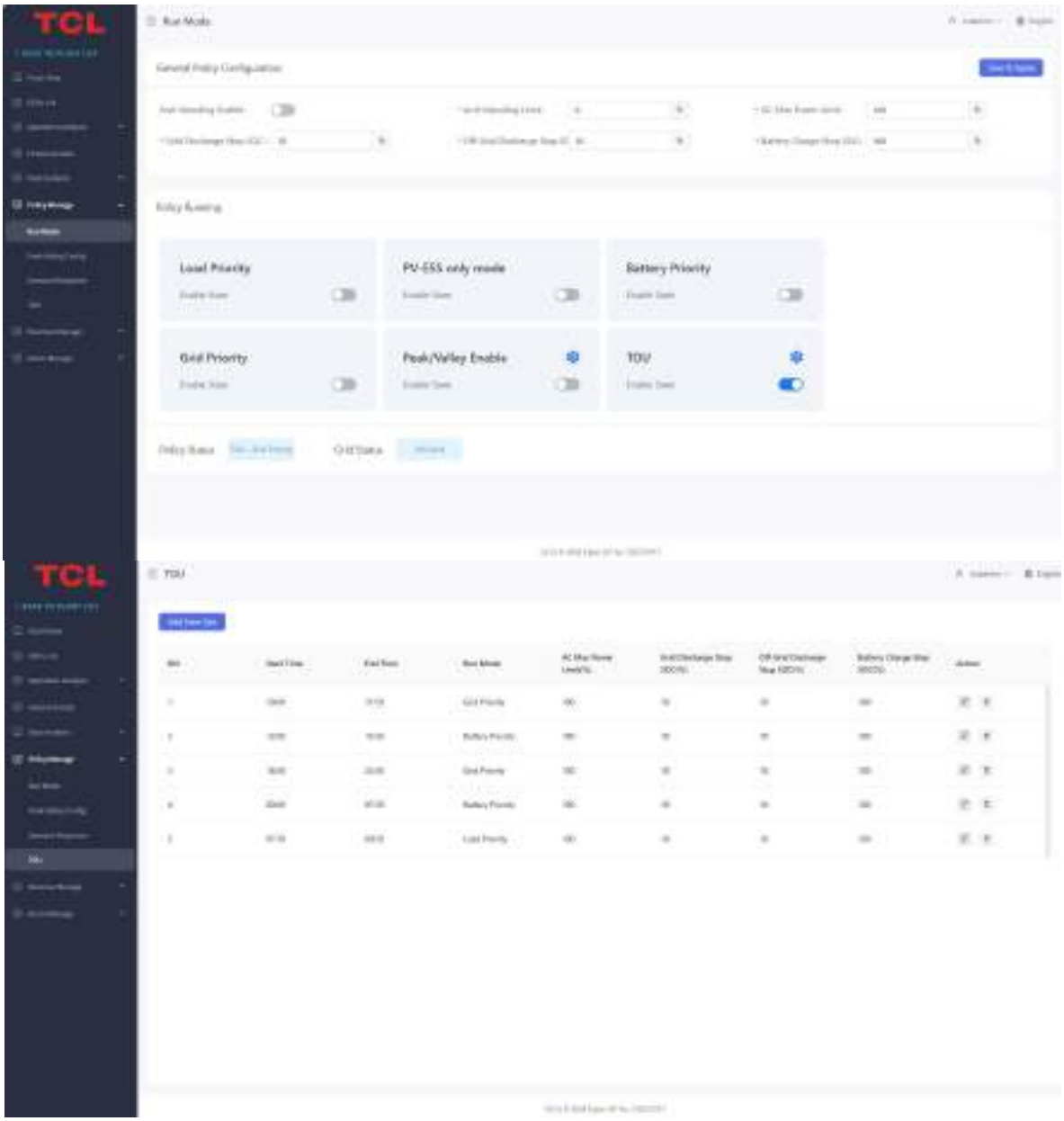


7) Data Analysis

View power curves, energy curves, and system efficiency data, including:
PV power, AC power, load power, grid power, battery charge/discharge power.

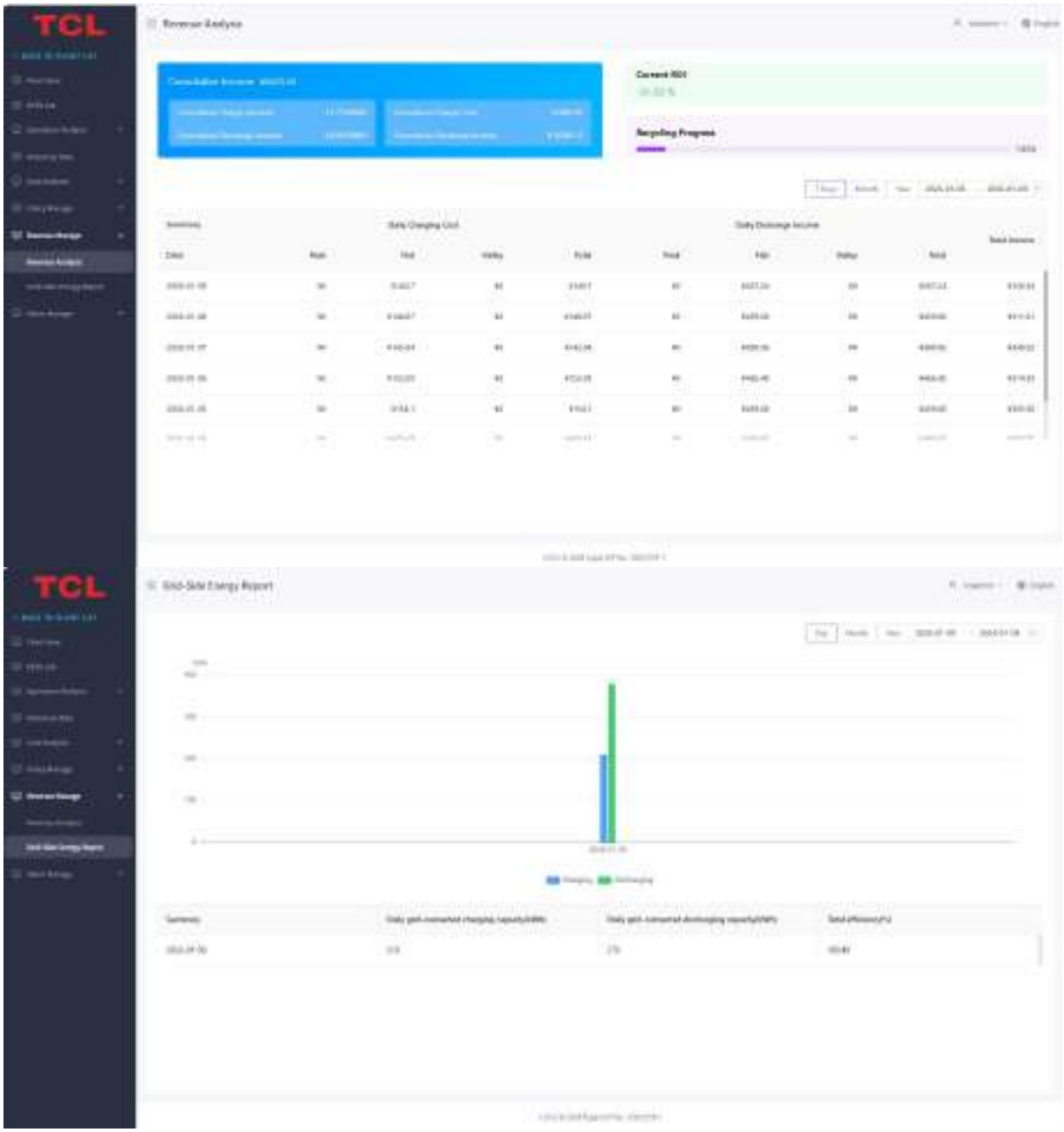
11.3.3 Strategy Management

Support manual anti-backflow control and other operational strategies, including:Self-consumption，PV-only with storage，Battery priority，Grid priority，Peak shaving & valley filling，TOU mode



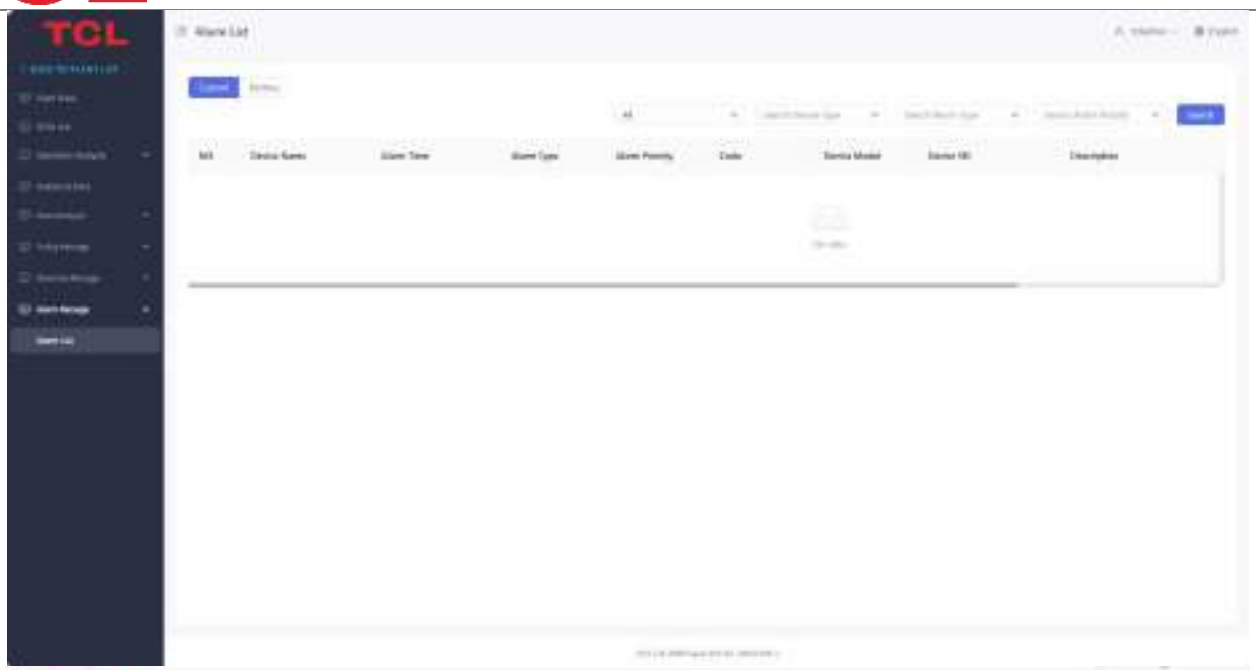
11.3.4 Revenue Management

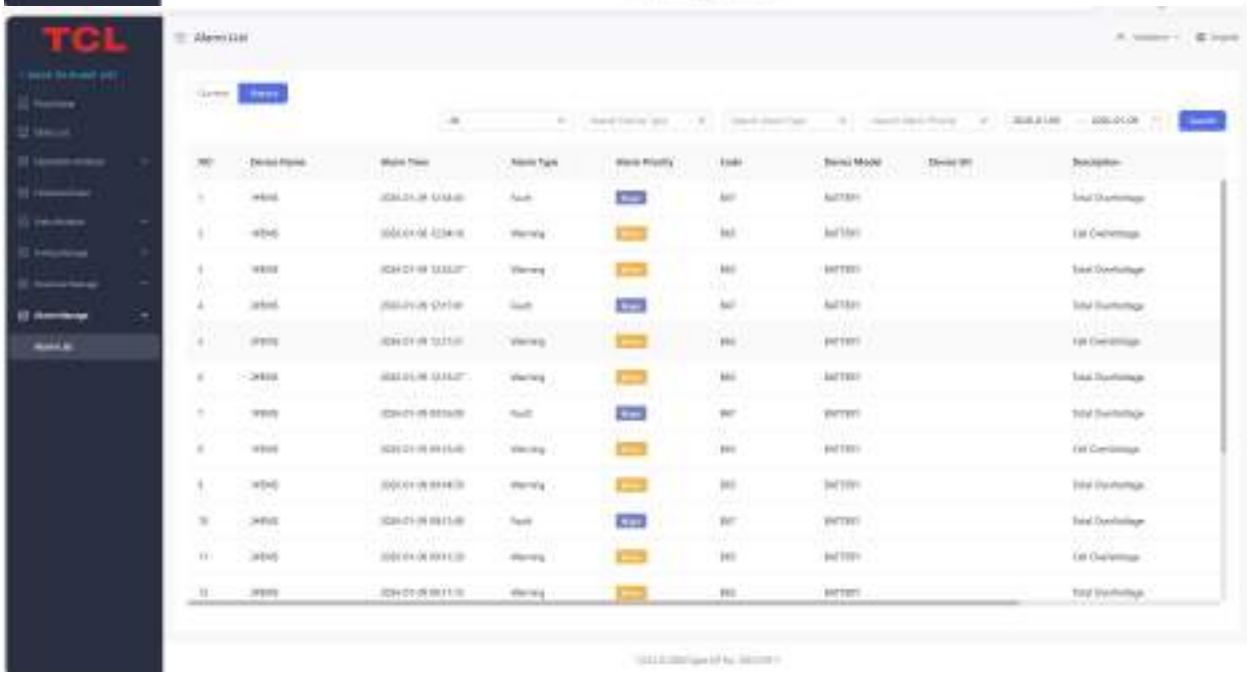
Includes revenue analysis and grid-side energy reports. Revenue is calculated based on electricity purchase/sale under different strategies. Grid-side reports show daily, monthly, and yearly charge/discharge data.



11.3.5 Alarm Management

Includes alarm dashboard and alarm list.Dashboard: total alarms, daily alarms, critical alarms, average processing time, with 7-day/month/year trend curves， Alarm list: view current and historical alarms with filtering by device, alarm type, and and severity

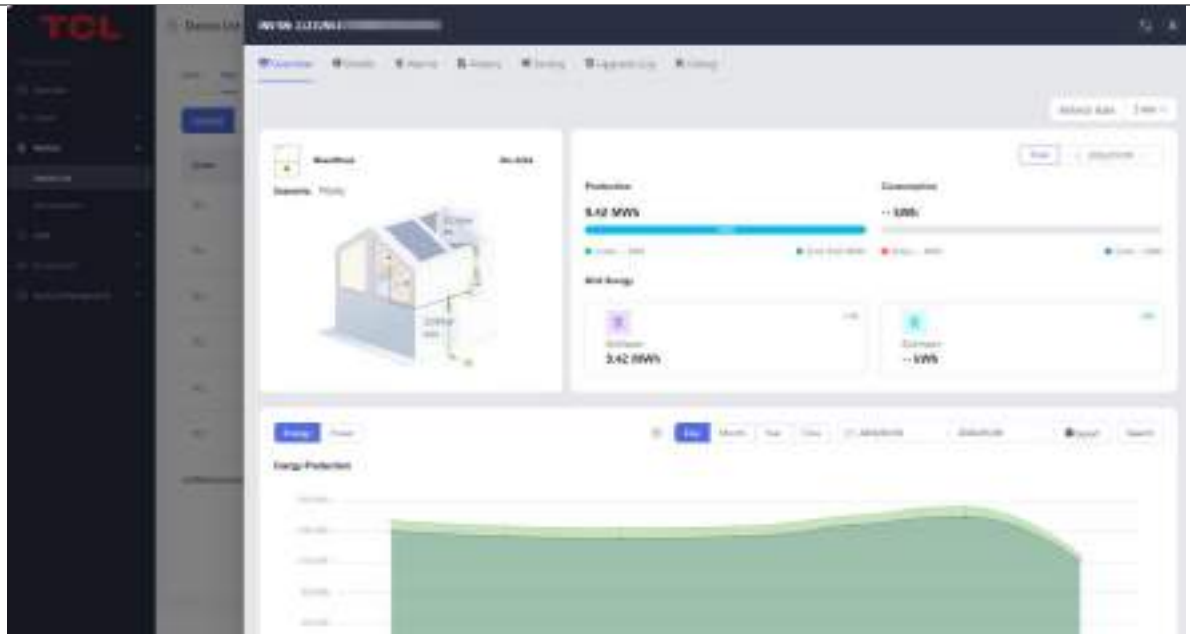




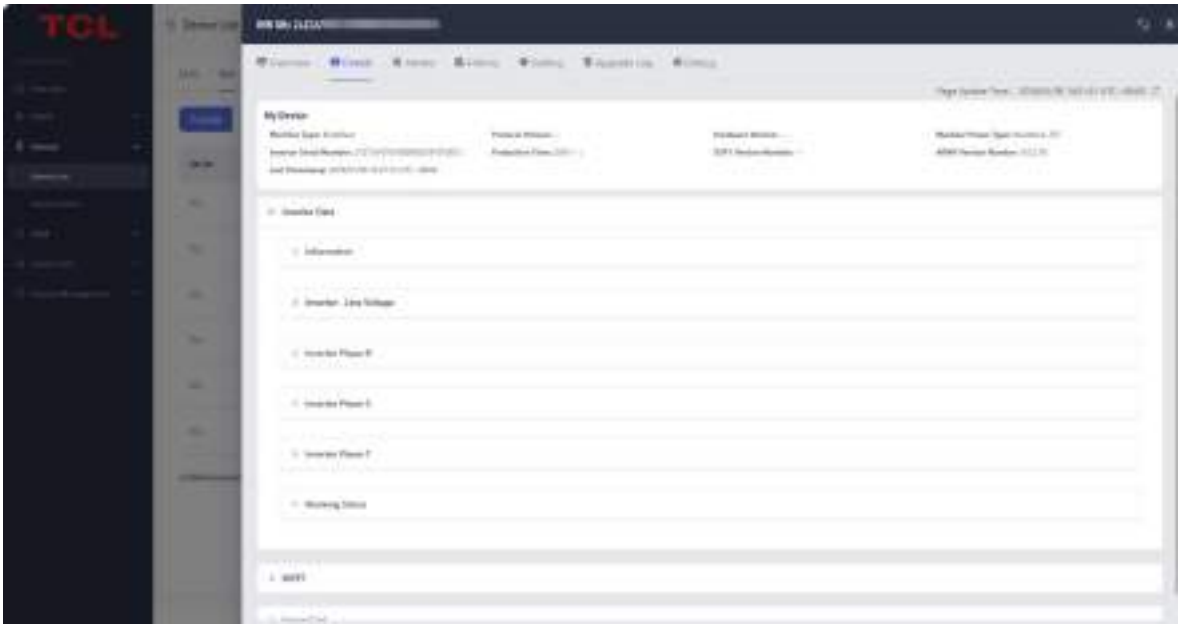
11.3.6 Device Monitoring Details

1）Monitor operating status and energy data

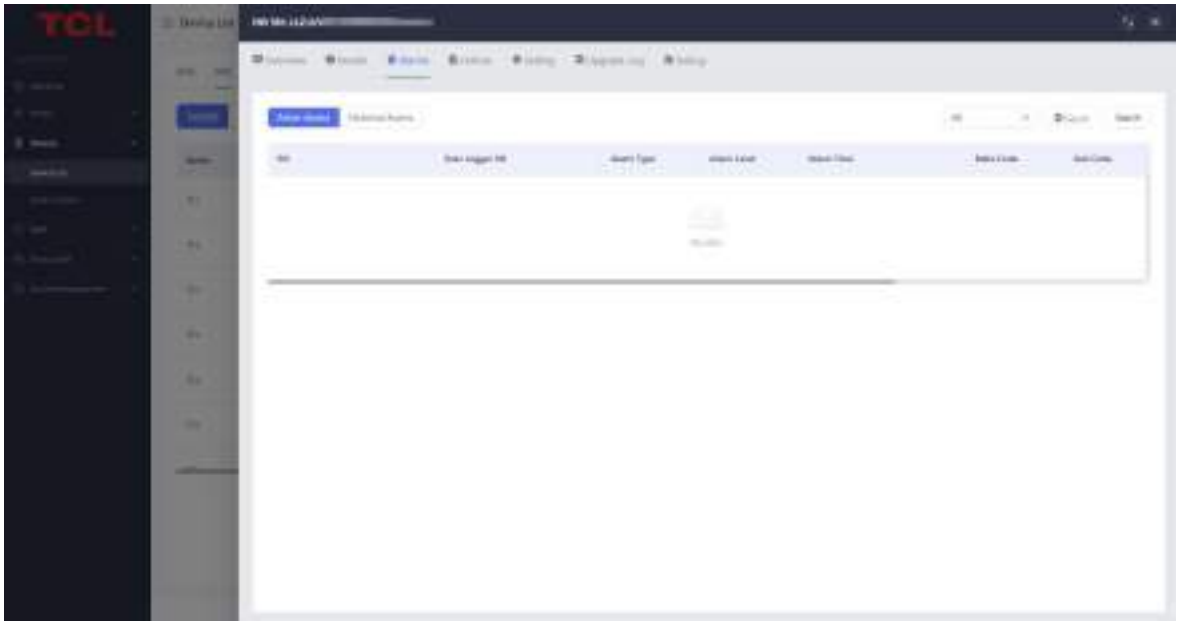
INV



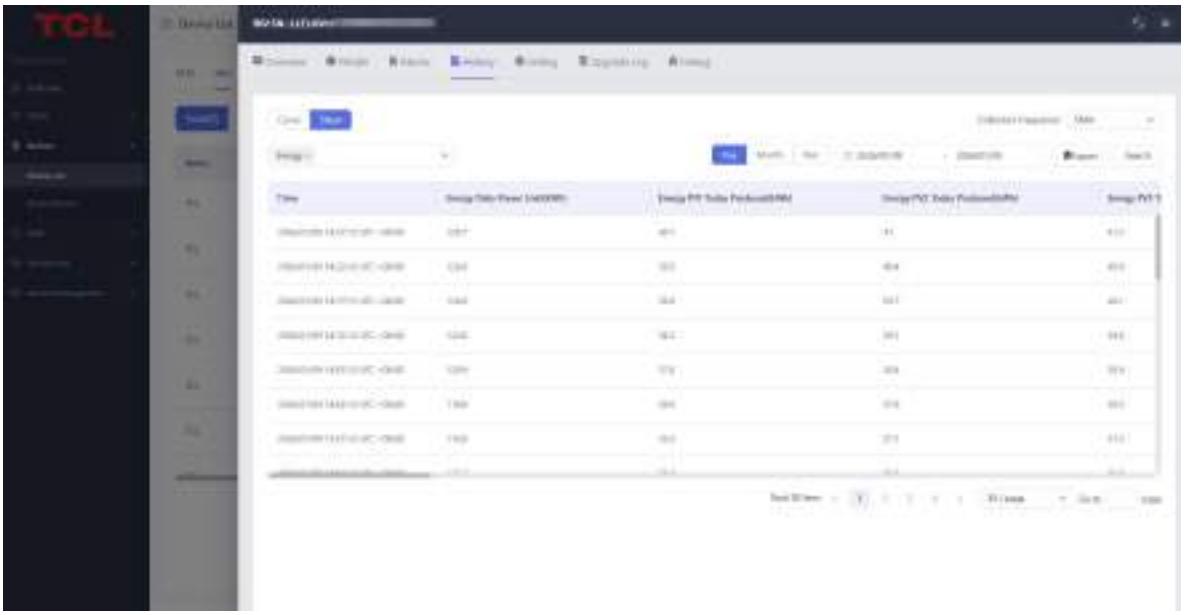
2) View basic device information



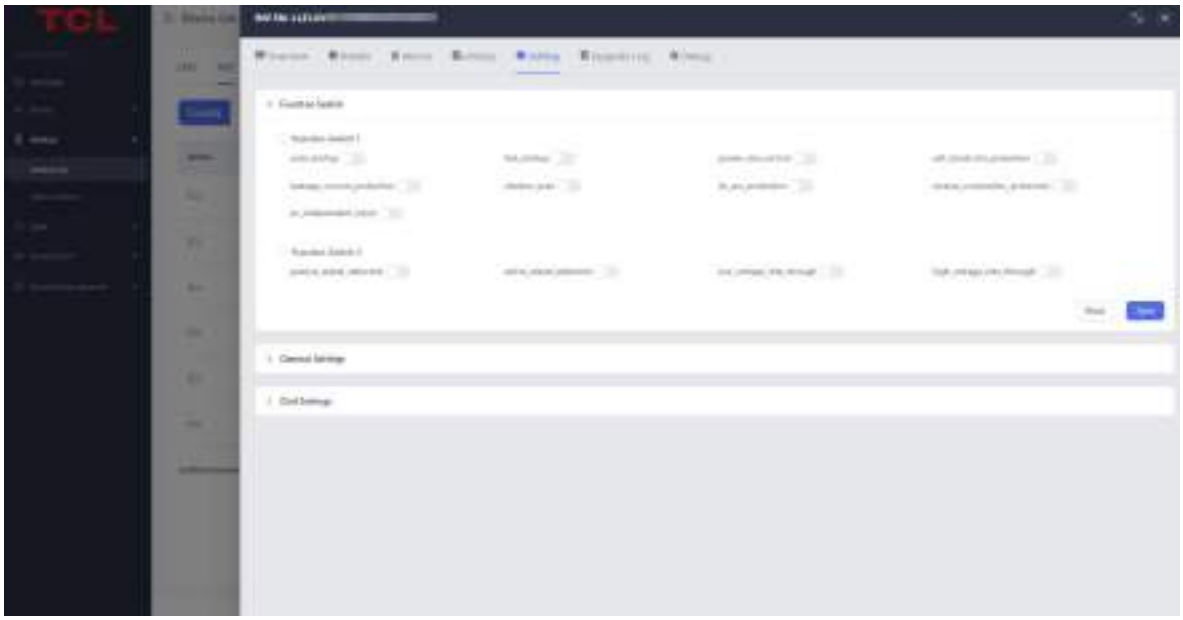
3) Monitor alarm information



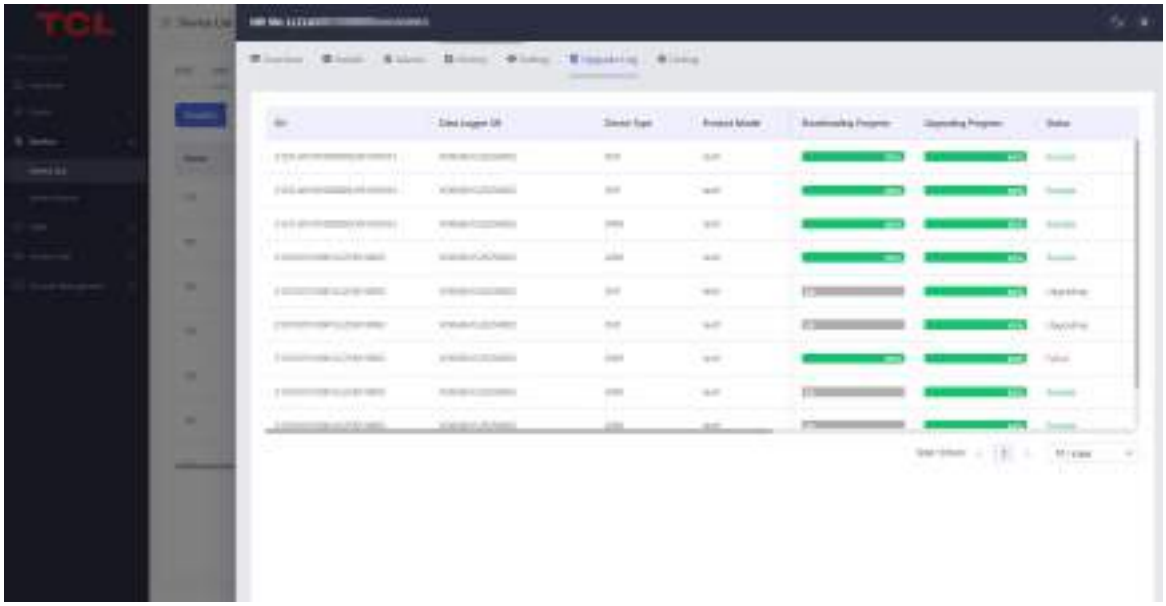
4) View historical data (curve and table formats supported)



5) Send control commands

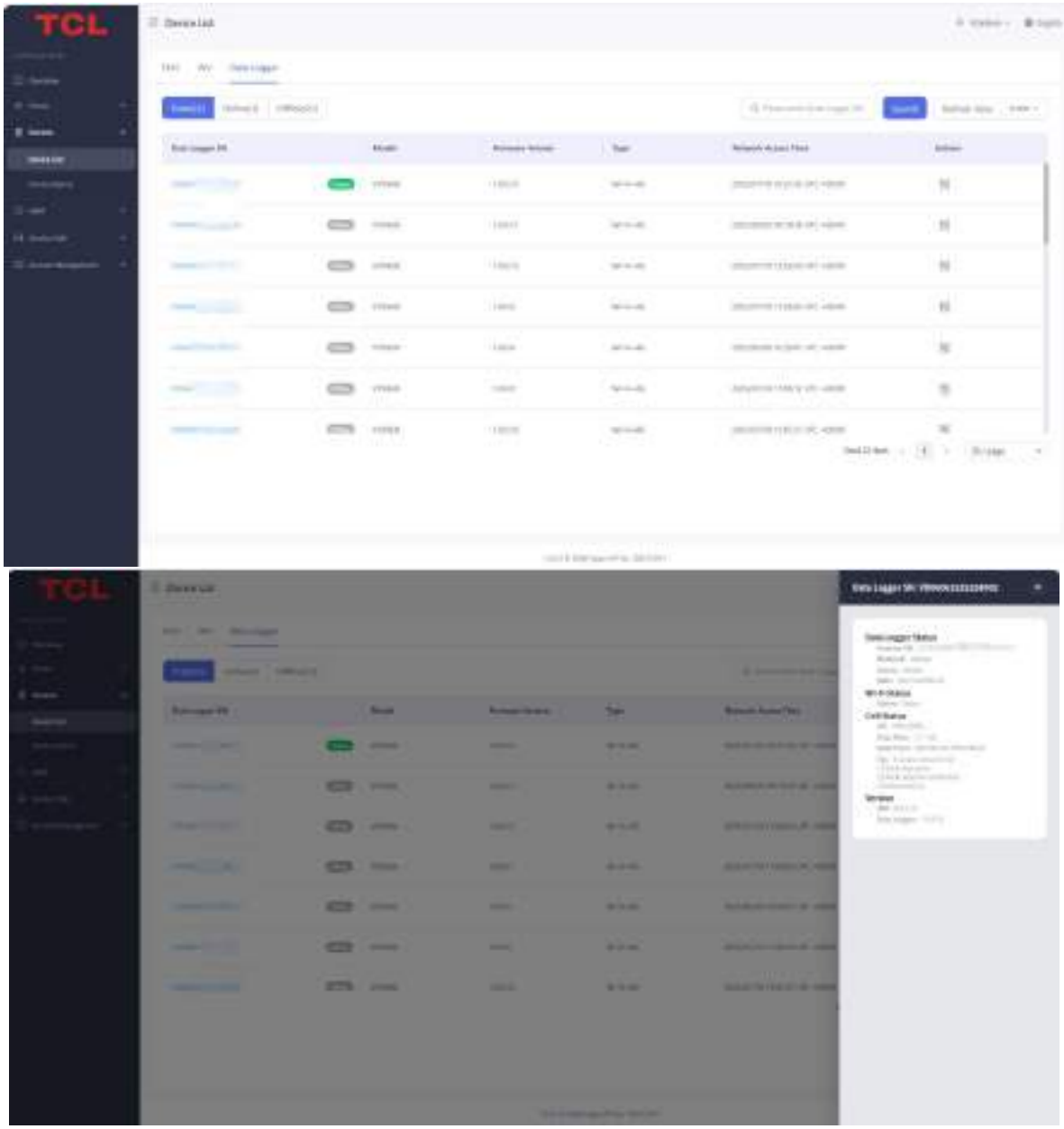


6) View firmware upgrade logs



11.3.7 Data Logger Details

View detailed operating status of the data logger



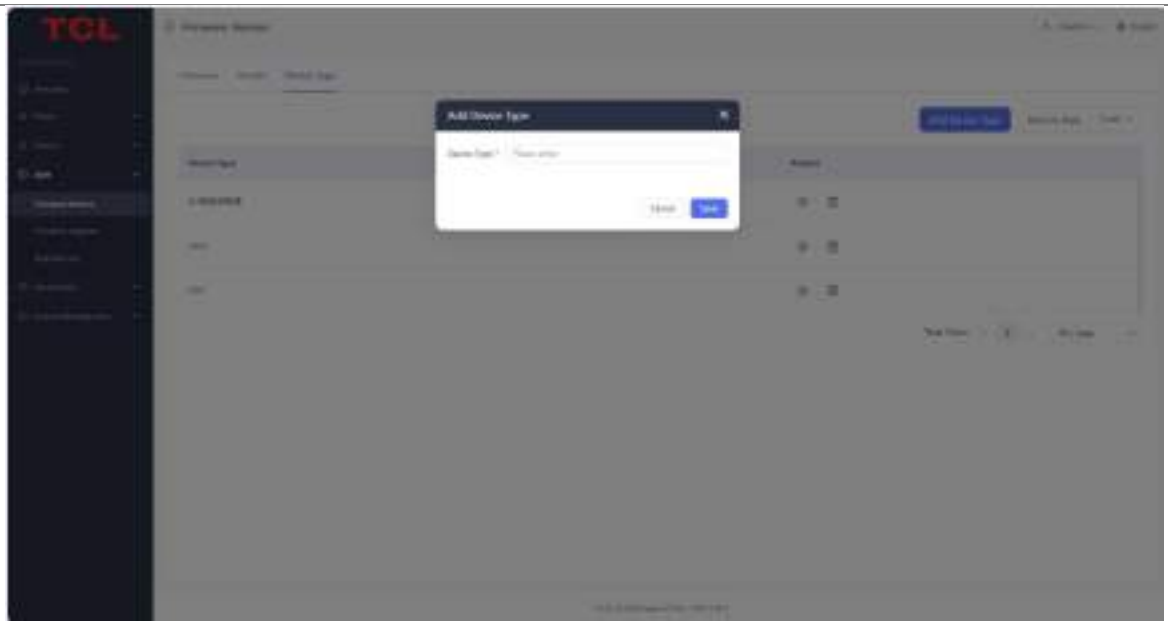
11.3.8 O&M

Firmware Version Management

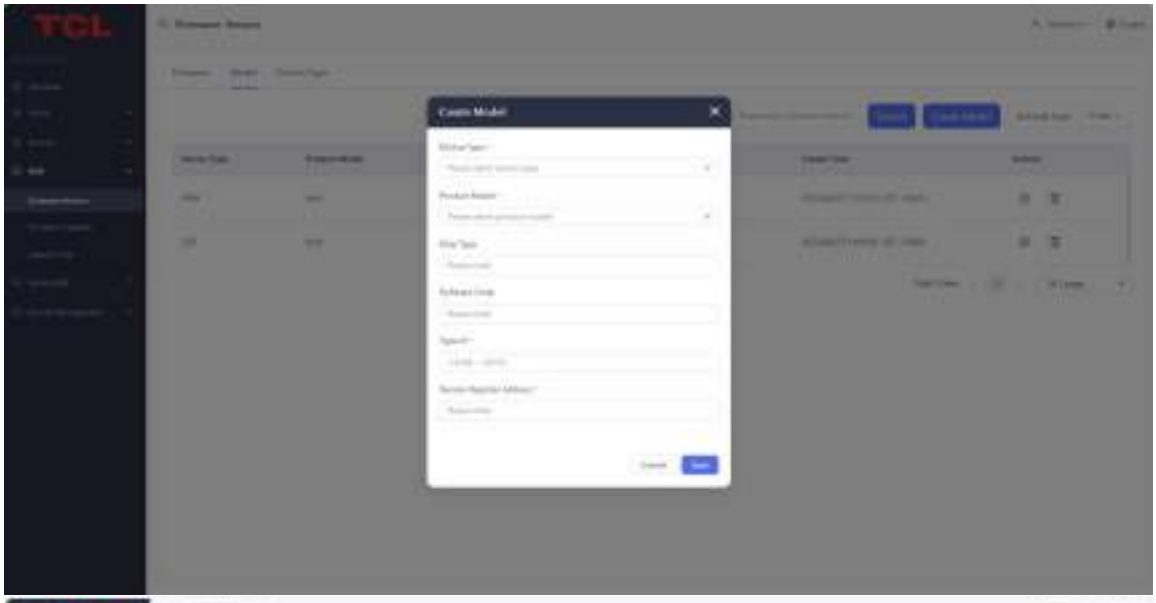
1) Users can manage device firmware versions and perform remote upgrades or Bluetooth upgrades via App.

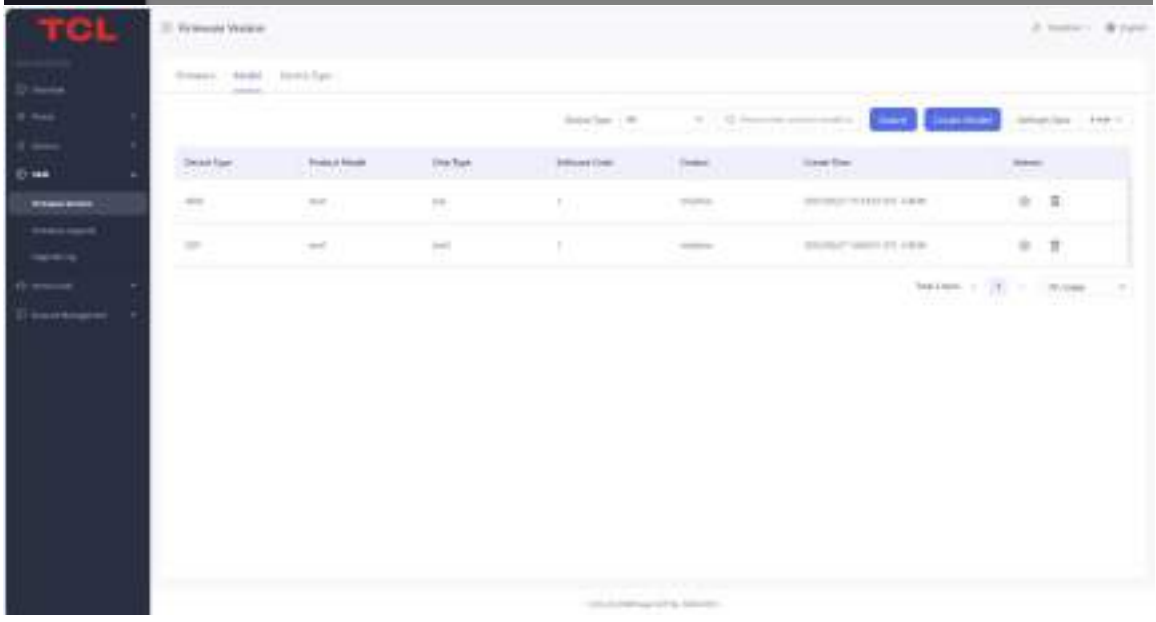
2) Steps:

01 Add device type → Enter device type name → Save

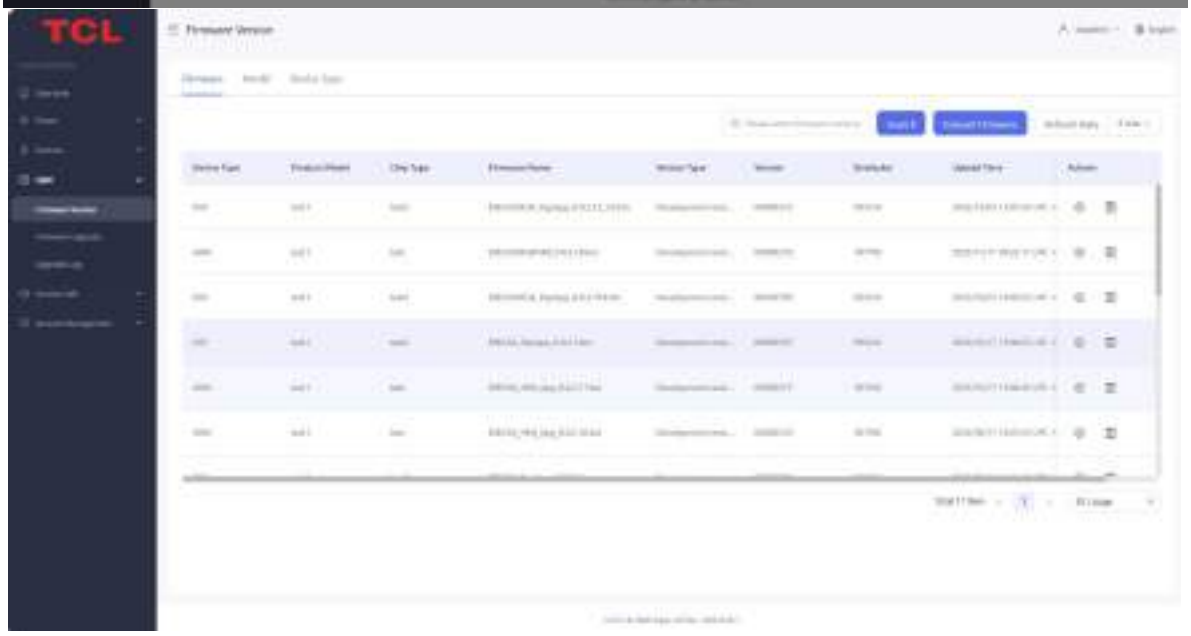


02，Create model → Fill in model information → Save



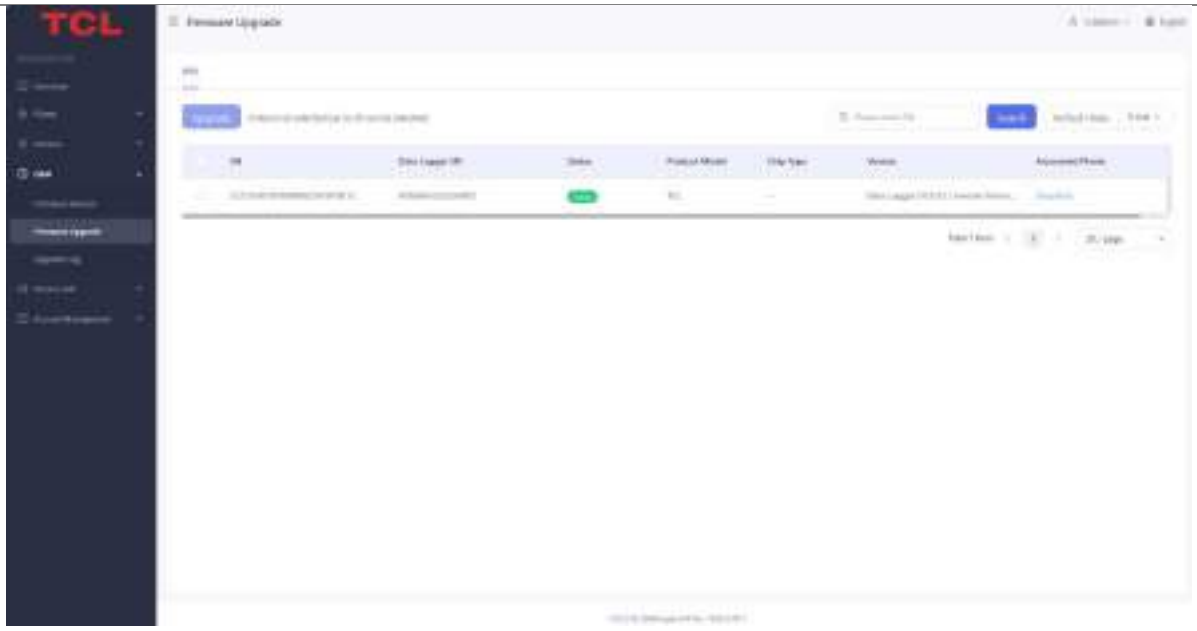


03，Upload firmware (optionally assign to specific channel users) → Save



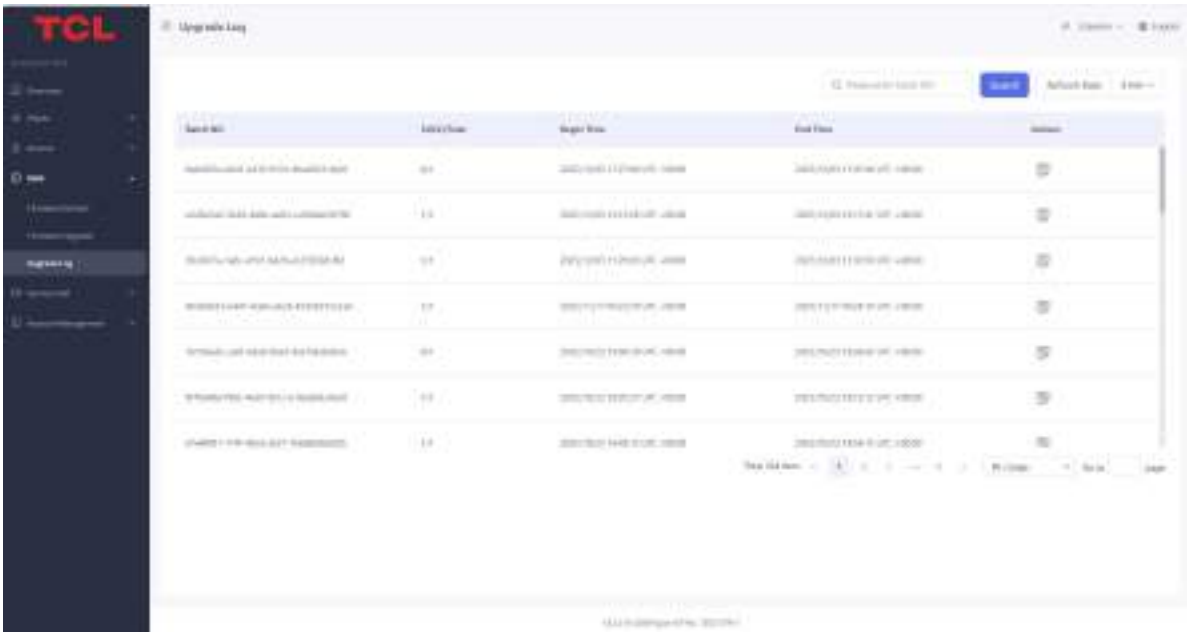
11.3.9 Firmware Upgrade

Perform remote firmware upgrades by selecting target devices and initiating the upgrade.



11.3.10 Upgrade Logs

View firmware upgrade logs.



11.3.11 Service Center

1，User Q&A

End-user device issues are displayed here and responded to by the device manufacturer.

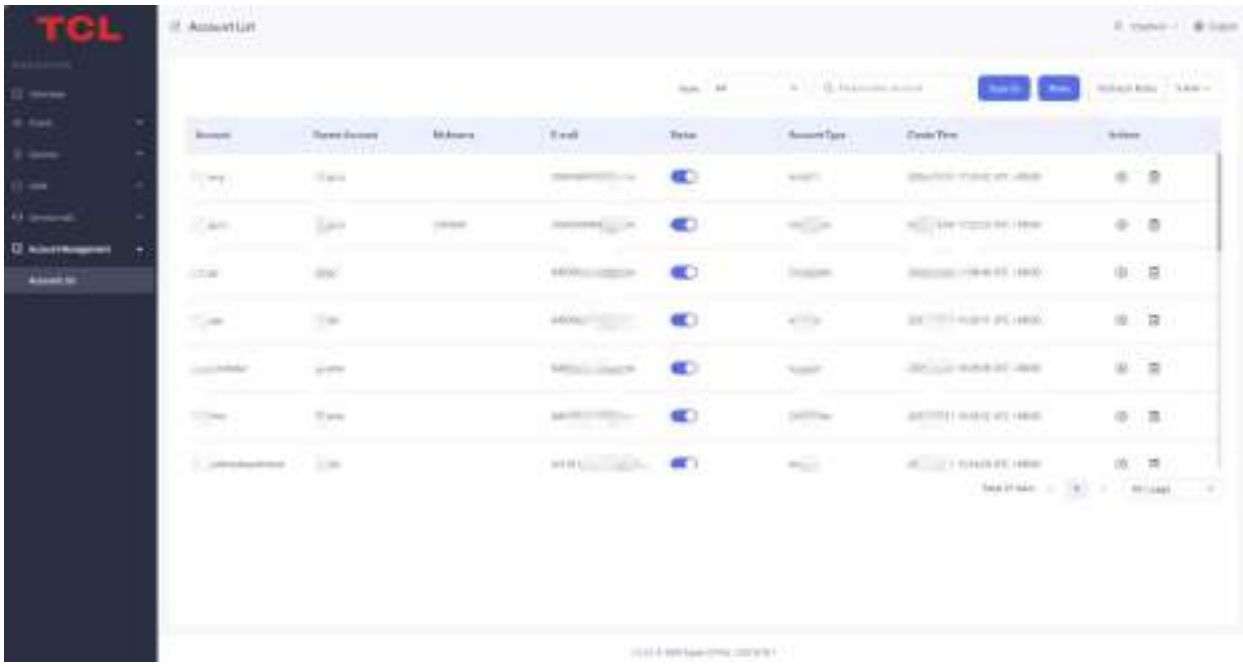
2， Account Management

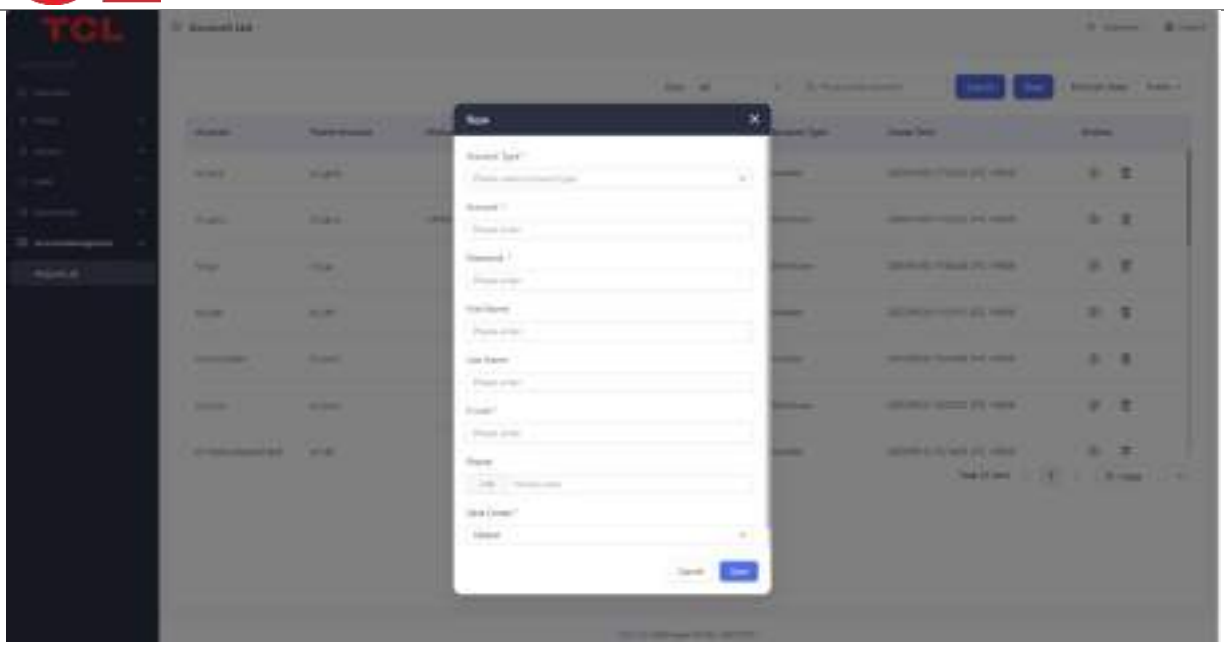
01，Device manufacturers can create Sub Admin, Channel, and Distributor accounts

02，Channel users can create Sub Channel and Installer accounts

03，Distributor users can create Sub Distributor and Installer accounts

Note: Devices activated and power plants bound via sub-accounts will appear in the Power Plant List and Device List.





12 Alarm/Fault Reference

12.1 EMS Alarms/Faults

The following is the EMS alarm/fault list.

Table 12-1 EMS Alarm/Fault List

Serial No.	Alarm Name	Fault Cause	Recommended Actions
1	BMS Communication Loss	1. BMS is not powered on. 2. Communication wiring harness is loose.	1. Verify BMS power supply is normal; 2. Inspect whether the connection harness is loose or damaged;
2	Hunyu communication lost connection	1. Mixed reverse not powered. 2. Communication wiring harness is loose.	1. Verify normal power supply to the mixer; 2. Inspect whether the connection harness is loose or damaged;
3	Communication loss with the meter	1. Meter is not powered. 2. Communication wiring harness is loose.	1. Verify normal power supply to the meter; 2. Inspect whether the connection harness is loose or damaged;
4	Fire alarm signal	1. Smoke or localized overheating inside the battery cabinet. 2. Battery cabinet has ignited.	1. Continuously monitor remotely for 30 minutes for other abnormalities (e.g., abnormal temperature, battery voltage, battery temperature, hydrogen concentration). If detected, shut down the system remotely. During remote monitoring, do not approach the battery cabinet or open its doors. 2. If no other abnormalities are detected during remote monitoring, dispatch safety-trained personnel to the site. They must observe from a safe distance for 30 minutes. If smoke or fire is observed, remotely shut down the system. On-site personnel must evacuate immediately and call the fire department. 3. Only if both remote monitoring and on-site observation show no abnormalities may the battery cabinet door be opened to check for aerosol

			discharge. If discharge is observed, contact the service hotline. If no discharge is observed, the aerosol module is faulty and must be replaced.
5	Electrical Emergency Stop Signal Alarm	The battery cabinet door emergency stop button has been pressed or is damaged.	1. If manually pressed, reset the emergency stop button. 2. If the emergency stop button is damaged, replace it.
6	BMS Emergency Stop Signal Alarm	1. A Level 1 alarm has occurred in the battery system. 2. The emergency stop button has been pressed or is damaged.	1. Inspect the battery cabinet for abnormalities and check the remote BMS monitoring system for Level 1 alarm notifications; 2. Reset the emergency stop button or replace it.

12.2 BMS Alarms/Faults

The following is the BMS alarm/fault list.

Table 12-2 BMS Alarm/Fault List

No.	Alarm Name	Fault Cause	Recommended Action
1	Pack Fan Failure	1. Insufficient power supply. 2. Fan damage or foreign object obstruction.	1. Verify reliable connection of the DC24V power supply to the fan. 2. Inspect fan blades for damage, remove obstructions around the fan, troubleshoot power supply issues, then reinstall the fan.
2	BMU Hardware Failure	BMU damage	1. Power cycle the BMU by removing and reinserting it. 2. Reinsert the BMU. 3. If the above steps fail to resolve the issue, replace the BMU.
3	BCMU Hardware Failure	BCMU damage	1. Power cycle the BCMU by removing and reinserting it. 2. Reinsert the BCMU. 3. If the above steps fail to resolve the issue, replace the BCMU.
4	Contactor Sticking Failure	1. Contactor damage 2. Incorrect wiring of	1. Replace the contactor. 2. Correct wiring.

		contactor feedback contacts	
5	BMU Communication Failure	Loose communication cable connector	Replace communication harness
6	Current sensor failure	1. Shunt sampling cable loose 2. Shunt damaged or reversed 3. Data acquisition module damaged	1. Securely reattach the shunt sampling signal line; 2. Verify shunt functionality and signal output; replace shunt if issues persist; 3. Replace the BCMU
7	NTC fault	Abnormal Sampling	Restart/Reinstall/Replace BMU
8	Total Voltage Overvoltage Level 3/ Level 2/1 Alarm	Battery total voltage exceeds Level 3/2/1 alarm threshold	Let it rest for over 30 minutes or discharge until it returns to normal;
9	Total Voltage Undervoltage Level 3/2/1 Alarm	Battery total voltage is below the Level 3/2/1 alarm threshold	Leave undisturbed for over 30 minutes or charge until restored to normal;
10	Cell Overvoltage Level 3/2/1 Alarm	Cell voltage exceeds Level 3/2/1 alarm threshold	Leave for over 30 minutes or discharge until restored to normal;
11	Cell Undervoltage Level 3/2/1 Alarm	Cell voltage falls below the Level 3/2/1 alarm threshold	Leave undisturbed for over 30 minutes or charge until restored to normal;
12	Excessive Discharge Current - Level 3/2/1 Alarm	Excessive Dispatch Power	Issue a reasonable dispatch power
13	Excessive charging current Level 3/2/1 alarm	Excessive dispatch power	Issue appropriate dispatch power
14	Discharging battery overheating Level 3/2/1 alarm	1. Loose cooling fan connector 2. Cooling fan malfunction 3. Air conditioning coolant failure	1. Reinsert the fan connector plug. 2. Power the fan separately to check if it operates normally. 3. Replace the coolant. 4. Inspect the refrigeration system.

		4. Air conditioning refrigeration system not activated.	
15	Battery discharge low temperature level 3/2/1 alarm	Air conditioning heating system not activated	Check heating system.
16	Charging Battery Over-Temperature Level 3/2/1 Alarm	1. Loose cooling fan connector 2. Cooling fan malfunction 3. Air conditioning coolant failure 4. Air conditioning refrigeration system not activated.	1. Reinsert the fan connector plug. 2. Power the fan independently to verify proper operation. 3. Replace the coolant. 4. Inspect the refrigeration system.
17	Rechargeable battery low temperature level 3/2/1 alarm	Air Conditioning Heating System Not Activated	Check heating system.
18	Insulation Resistance Too Low Level 3/2/1 Alarm	1. Moisture/excessive dust 2. Ground short circuit present 3. Poor contact in power lines	1. Remove moisture and dust. 2. Measure system-to-ground insulation using an instrument. 3. Inspect power lines for secure and reliable connections.
19	High-voltage box connector temperature Excessive Temperature Level 3/2/1 Level alarm	Fan failure in sub-control box, abnormal power supply.	Check if fan power supply is normal or replace fan.
20	Single-unit pressure differential Level 3/2/1 alarm	Pressure differential between battery clusters exceeds 30V	Perform single-cluster charge/discharge to equalize total cluster voltage
21	Single-cell temperature difference alarm (Level 3/2/1)	1. Loose cooling fan connector 2. Cooling fan malfunction 3. Air conditioner coolant failure 4. Air conditioner refrigeration system not	1. Reinsert the fan connector plug. 2. Provide separate power to the fan and check if it operates normally. 3. Replace the coolant. 4. Inspect the refrigeration system.

		activated.	
22	SOC Low Level 3/2/1 alarm	Battery SOC below Level 3/2/1 alarm threshold	After 30 minutes of inactivity or charging until restored to normal;

12.3 Hybrid Inverter Alarms/Faults

The following is the hybrid inverter alarm/fault list.

Table 12-3 Hybrid Inverter Alarm/Fault List

Error Code	Error Message	Cause	Troubleshooting Action
1	Main relay failure	Live conductor grounded on the grid side. Grid voltage is too low. Inverter relay circuit fault.	Measure whether the voltage between the ground wire and neutral wire exceeds 10V. Measure whether the grid voltage is too low.
2	Main EEPROM error	Internal EEPROM fault in the inverter.	Turn off the AC/DC switch for 5 minutes, then restart the inverter. Check if the firmware has been upgraded to the correct version.
3	Main Temperature Too High Error	Inverter temperature is too high.	Check if the inverter's heat dissipation channels are blocked. Check if the inverter is installed in direct sunlight. Verify that the installation environment provides adequate ventilation.
4	Main temperature too low error	Inverter temperature is too low.	Check if the ambient temperature around the inverter installation location is too low.
5	Communication Interrupted M<->S	Internal communication interruption in the inverter.	Turn off the AC and DC switches for 5 minutes, then restart the inverter.
6	GFCI device failure	Inverter GFCI device failure.	After turning off the AC and DC switches for 5 minutes, restart the inverter.
7	DCI device fault	Inverter DCI device failure.	Turn off AC and DC switches for 5 minutes, then restart the inverter.
8	Current Sensor Failure	Inverter current sensor fault.	After turning off the AC and DC switches for 5 minutes, restart the inverter. Check whether the positive and negative terminals of the series MC4 connectors are reversed.

9	Phase 1 voltage too high	Grid voltage exceeds inverter safety specifications.	Check whether the grid voltage is too high. Check whether the inverter AC output cables are securely connected and whether the grid connection cables are too thin. Verify that the inverter grid compatibility is correctly selected in the application.
10	Phase 1 voltage is too low	Grid voltage is below the range permitted by the inverter's safety specifications.	Check if the grid voltage is too low. Check that the inverter AC output cables are securely connected. Verify that the grid compatibility settings for the inverter are correctly selected in the App.
11	Phase 2 voltage is too high	Grid voltage exceeds the range permitted by the inverter's safety specifications.	Check if the grid voltage is too high. Verify that the inverter's AC output cables are securely connected and that the grid connection cables are not undersized. Verify that the grid compatibility mode for the inverter is correctly selected in the App.
12	Phase 2 voltage is too low	Grid voltage is below the range permitted by the inverter's safety specifications.	Check if the grid voltage is too low. Check that the inverter AC output cables are securely connected. Verify that the grid compatibility setting for the inverter in the application is correctly selected.
13	Phase 3 voltage is too high	Grid voltage exceeds inverter safety specifications.	Check whether the grid voltage is too high. Check whether the inverter AC output cables are securely connected and whether the grid connection cables are too thin. Verify that the grid compatibility setting for the inverter in the App is selected correctly.
14	Phase 3 voltage is too low	Grid voltage is below the range permitted by the inverter's safety specifications.	Check if the grid voltage is too low. Check whether the inverter AC output cables are securely connected. Verify that the grid compatibility setting for the inverter in the application has been selected correctly.

15	Grid voltage too high for 10 minutes	Grid voltage exceeds inverter safety specifications.	Check whether the grid voltage is too high. Check whether the inverter's AC output cables are securely connected and whether the grid connection cables are too thin. Verify that the grid compatibility mode for the inverter is correctly selected in the App.
16	Off-grid output voltage is too low	System temperature is too high, causing the battery to reduce load output.	Check if the ambient temperature is too high. Check if the inverter's cooling channels are blocked. Verify the inverter is not installed in direct sunlight.
17	Off-grid output short circuit	External wiring short circuit on the off-grid side.	Check the external cable connections on the off-grid side.
18	Mains Frequency Too High	Grid frequency exceeds the upper limit specified by the local grid.	Verify that the inverter's grid compatibility is correctly selected in the App. After disconnecting the AC and DC switches, wait 5 minutes, then restart the inverter.
19	Main grid frequency too low	Grid frequency is below the lower limit specified by the local grid.	Check whether the grid compatibility settings for the inverter in the app are correct. After disconnecting the AC and DC switches, wait 5 minutes, then restart the inverter.
20	BAT Input Mode Error	Actual battery connections are not in parallel.	Check that all battery connections are secure. Verify that the battery input mode is set to parallel mode.
21	Phase 1 DC Voltage Too High	The DC component in AC L1 output exceeds the limit range.	Turn off the AC/DC switch for 5 minutes, then restart the inverter.
22	Phase 2 DC Voltage Too High	The DC component in the AC L2 output exceeds the limit range.	After turning off the AC/DC switch for 5 minutes, restart the inverter.
23	Phase 3 DC voltage too high	The DC component in the AC L3 output exceeds the limit range.	After turning off the AC/DC switch for 5 minutes, restart the inverter.
24	No Grid Fault on Host	The inverter cannot detect grid voltage.	Verify if the grid power is disconnected. Check if the grid connection box switch

			has tripped. Verify that the inverter AC cables are securely connected.
25	DC reverse connection error	Reverse polarity exists on the PV side or battery side.	Check whether the negative and positive cables on the PV side and battery side are connected correctly.
26	Parallel Device CAN Communication Error	Parallel CAN communication has failed.	Check the cable connections for parallel CAN communication.
27	GFCI Error	A ground leakage current fault has been detected in the power station system.	Turn off the AC and DC switches and wait for 5 minutes. Check that the ground wire at the AC output terminal is securely fastened and that the AC wiring is correct. Inspect AC and DC cables for damage or water ingress, and verify that solar panels are not submerged.
28	Phase 1 DCI High	DC component in AC L1 output exceeds limit range.	Turn off the AC/DC switch for 5 minutes, then restart the inverter.
29	Phase 2 DCI High	DC component in AC L2 output exceeds limit range.	After turning off the AC/DC switch for 5 minutes, restart the inverter.
30	Phase 3 DCI High	DC component in AC L3 output exceeds limit range.	After turning off the AC/DC switch for 5 minutes, restart the inverter.
31	ISO Error	The insulation resistance between the string and ground is below the set value.	Turn off the AC and DC switches and wait for 5 minutes. Check that the grounding wire at the AC output terminal is secure and that the AC wiring is correct. Inspect AC and DC cables for damage or water ingress, and verify that solar panels are not submerged.
32	Bus voltage imbalance	Uneven distribution of three-phase voltages.	Turn off the AC/DC switch for 5 minutes, then restart the inverter.
33	Main bus voltage too high	DC input voltage exceeds the inverter's permissible input limit.	Check the number of panels in each string and calculate whether the open-circuit voltage of the series-connected battery bank exceeds the inverter's maximum input voltage. If the above items are normal, turn off the AC/DC switch for 5 minutes, then restart

			the inverter.
34	Main bus voltage too low	The inverter's bus voltage is too low.	After turning off the AC/DC switch for 5 minutes, restart the inverter.
35	Main Grid Phase Error	Grid phase error.	Measure whether the voltage between the three phases of the grid power supply is normal.
36	Main PV Voltage Too High	Inverter DC input voltage is too high.	Check the number of panels per string and calculate whether the open-circuit voltage of the series-connected panels exceeds the inverter's maximum input voltage. If the above items are normal, turn off the AC/DC switch for 5 minutes, then restart the inverter.
37	Host Islanding Fault	Grid power loss has caused islanding.	Confirm whether the grid power supply is interrupted. Check if the grid connection box switch has tripped and ensure the inverter AC cables are securely connected. Turn off the AC switch and reconnect to the grid.
38	Main HW bus voltage too high	The DC input voltage exceeds the inverter's permissible input voltage limit.	Check the number of panels in each string and calculate whether the open-circuit voltage of the series-connected panels exceeds the inverter's maximum input voltage. If the above items are normal, turn off the AC/DC switch for 5 minutes, then restart the inverter.
39	Main HW PV Current Too High	Positive and negative terminals of the series string are reversed. Internal damage to the inverter.	Check whether the positive and negative terminals of the series strings are reversed. If all the above items are normal, turn off the AC/DC switch for 5 minutes, then restart the inverter.
40	Host self-test failed	Abnormal inverter startup self-test.	Contact technical support for further assistance.
41	Main hardware drive current too high	Grid-side output current exceeds inverter limit.	Turn off the AC and DC switches and check that the AC cables are securely connected. If the above items are normal, turn off the AC/DC switches for 5 minutes, then restart the inverter.

42	Main AC SPD fault	Abnormal condition in the AC surge protection circuit.	Contact technical support for further assistance.
43	Main DC SPD Fault	DC surge protection circuit anomaly.	Please contact technical support for further assistance.
44	Abnormal voltage on the north side of the main grid	A live conductor has grounded on the grid side.	Measure whether the voltage between the ground wire and neutral wire exceeds 10V. If it exceeds 10V, a live conductor has grounded.
45	Main Fan 1 Failure	Fan 1 blade is jammed or damaged.	Check if the external fan (if present) is operating normally. Turn off AC and DC switches, wait 5 minutes, then restart the inverter.
46	Main Fan 2 Failure	Fan 2 blade stuck or damaged.	Check if the external fan (if present) is operating normally. Turn off the AC and DC switches, wait 5 minutes, then restart the inverter.
47	Main Fan 3 Failure	Fan 3 blades jammed or damaged.	Check if the external fan (if present) is operating normally. Turn off the AC and DC switches, wait 5 minutes, then restart the inverter.
48	Main Fan 4 Failure	Fan 4 blades jammed or damaged.	Check if the external fan (if present) is operating normally. Turn off the AC and DC switches, wait 5 minutes, then restart the inverter.
49	Communication between main controller and electricity meter interrupted	Communication between the inverter and the electricity meter is abnormal.	Verify that the electricity meter is functioning properly. Check whether the communication cable connection between the inverter and the electricity meter is secure. Verify that the communication parameters between the inverter and the meter are correctly configured, including the address, baud rate, etc.
50	Communication loss between M and S	Internal communication interruption in the inverter.	Turn off the AC/DC switch for 5 minutes, then restart the inverter.
51	Communication between the inverter and the electricity meter has been	Communication between the inverter and the electricity meter is abnormal.	Verify that the meter is functioning properly. Check whether the communication cable connection between the inverter and the meter is secure.

	interrupted.		Verify that the communication parameters between the inverter and the meter are correctly configured, including address, baud rate, etc.
52	HMI EEPROM error	Internal EEPROM failure in the inverter.	Turn off the AC/DC switch for 5 minutes, then restart the inverter. Check if the firmware has been upgraded to the correct version.
53	Human-machine interface real-time clock error	RTC error.	Please contact technical support for further assistance.
54	BMS Device Error	Battery anomaly.	Please contact technical support for further assistance.
55	BMS connection lost.	BMS did not start normally.	Check if the BMS startup button is activated.
56	CT device error	CT device error	Please contact technical support for further assistance.
57	AFCI Communication Interruption Error	AFCI board communication interrupted.	Please contact technical support for further assistance.
67	Emergency Stop	The emergency stop button has been pressed.	Reset the emergency stop button.
69	Fire Lockout Fault	A fire alarm has been triggered, including smoke, water immersion, or aerosol alarms.	Inspect the cabinet for smoke, water ingress, or abnormal conditions. If the cabinet is operating normally, manually clear the alarm in the application.
81	Communication Interrupted D<->C	Internal communication within the inverter has been interrupted.	Turn off the AC/DC switch for 5 minutes, then restart the inverter.
83	Main Arc Device Error	Arc device error.	Contact technical support for further assistance.
84	Main PV Mode Error	PV mode selection error.	Check if the inverter string mode is set correctly.
85	Permission Expired	Permissions have expired.	Contact technical support for further assistance.
86	DRM0 Error	DRM0 Error	Please contact technical support for further assistance.
87	Main Arc Error	DC arcing is caused by DC short circuits or poor terminal connections.	Check each terminal for proper contact and verify insulation between the positive and negative PV terminals and ground. If the above items are normal, turn off the

			AC and DC switches, wait 5 minutes, then restart the inverter.
88	Main Switch PV Current Too High	Reversed polarity of series-connected positive and negative terminals. Internal damage to the inverter.	Check whether the positive and negative terminals of the series connection are reversed. If the above items are normal, turn off the AC and DC switches, wait 5 minutes, then restart the inverter.
89	Battery voltage is too high	Battery voltage exceeds the inverter's maximum voltage rating.	Please contact technical support for further assistance.
90	Battery Current Too High	Battery charge is too low or load is too high, preventing battery output.	Reduce off-grid load. Charge the battery or stop using it.
91	Battery charging voltage too high	Battery charging voltage is too high.	Do not disconnect the battery during charging. Restart the battery and inverter.
92	Battery overload	Battery capacity is too low or load is too high, preventing battery output.	Reduce off-grid load. Charge the battery or stop using it.
93	Battery Soft Connect Timeout	Battery precharge bus fault.	Contact technical support for further assistance.
94	Output overload	The load connected to the off-grid side exceeds the maximum output power of H2.	Reduce the off-grid load.
95	Battery Open Circuit	The inverter cannot detect battery voltage.	Check if the battery circuit breaker is tripped. Check that the battery power cables are securely connected.
96	Battery discharge voltage is too low	Low voltage detected during battery discharge.	Do not turn off the battery during discharge.
97	BMS internal communication error	Communication anomaly between the battery high-voltage box and the battery pack. The last battery pack is not connected to the resistor plug, preventing the high-voltage box from identifying	Check that the communication cable is properly connected. Verify that the last battery pack is equipped with a resistor plug. Verify the communication network is functioning properly.

		the number of battery packs.	
98	Battery sequence error	Battery pack communication anomaly.	Check if the communication cable is connected correctly. Check if the last battery pack has a resistor plug installed. Verify the communication network is functioning properly.
99	Overcurrent Protection During Discharge	Discharge current exceeds the set threshold.	Wait for the fault to clear automatically or restart the inverter.
100	Charging Overcurrent Protection	Charging current exceeds the set threshold.	Wait for the fault to clear automatically or restart the inverter.
101	Module Undervoltage Protection	Total voltage is below the set threshold.	Force battery charging.
102	Module Overvoltage Protection	Total voltage exceeds the set threshold.	Wait for fault to clear automatically or restart the inverter.
103	Single-Cell Undervoltage Protection	Battery voltage is below the set maximum value.	Force battery charging.
104	Single-cell overvoltage protection	Battery voltage exceeds the set maximum value.	Wait for the fault to clear automatically or restart the inverter.
105	BMS Hardware Failure	Single voltage detection module failure. Temperature monitoring module failure. Current detection module failure.	After turning off the AC/DC switch for 5 minutes, restart the inverter.
106	Charging temperature too low protection	Battery charging temperature below 0°C.	Wait for the battery to warm up until the fault is resolved.
107	Charging Temperature Too High Protection	Battery temperature is too high.	Please wait until the battery cools to normal temperature before continuing use.
108	Discharge Temperature Too	Battery temperature is too low; relay disconnected to	Wait for the battery to warm up until the fault is resolved.

	Low Protection	stop discharge.	
109	Over-Temperature Discharge Protection	Battery temperature is too high.	Wait for the battery to cool until the fault is resolved.
110	BMS Relay Fault	Negative or positive relay stuck. Negative or positive relay cannot close.	Turn off the AC/DC switch for 5 minutes, then restart the inverter.
111	Precharge error	Precharge relay damaged. Precharge circuit blocked. BMS damaged.	After turning off the AC/DC switch for 5 minutes, restart the inverter.
112	BMS insulation error	The battery pack may have a leakage issue.	Contact technical support for further assistance.
113	BMS Supplier Incompatibility	The battery pack is not compatible with the BMS used in the high-voltage box.	Please contact technical support for further assistance.
114	Battery cell supplier incompatibility	The battery cell manufacturers within the battery pack are inconsistent.	Please contact technical support for further assistance.
115	Battery cell incompatibility	Inconsistent cell charge levels within the battery pack.	Please contact technical support for further assistance.
116	Battery pack model is incompatible	Battery pack models do not match.	Please contact technical support for further assistance.
117	Circuit breaker is open	Battery circuit breaker is not closed. Auxiliary contact of the battery circuit breaker is abnormal.	Turn off the battery circuit breaker.
118	Excessive temperature differential	Temperature monitoring module malfunction.	Turn off the AC/DC switch for 5 minutes, then restart the inverter.
119	Excessive voltage difference (Class II)	Loose sampling cable.	Turn off the AC/DC switch for 5 minutes, then restart the inverter.

120	Excessive voltage difference (Class I)	Loose sampling line.	Turn off the AC/DC switch for 5 minutes, then restart the inverter.
121	BMS over-temperature protection	Ambient temperature too high. Battery overload.	Check if the battery's ambient temperature is too high. If the temperature is normal, let the battery rest for 30 minutes before restarting.
122	Short-circuit protection	A short circuit has occurred between the positive and negative terminals of the battery.	Check whether the battery cables are connected correctly.
123	Total voltage mismatch	Contact a technician for troubleshooting.	Contact technical support for further assistance.
124	System locked	Please contact a technician for troubleshooting.	Contact technical support for further assistance.
125	Fuse Protection Error	Please contact a technician for troubleshooting.	Contact technical support for further assistance.
126	Battery Port Voltage Abnormal Protection	The voltage at the battery charging port is too high.	Check whether the positive and negative battery cables are connected to the correct ports.

12.4 Air Conditioning Alarms/Faults

The following is a list of air conditioning alarms/faults.

Table 12-4 Air Conditioning Alarm/Fault List

Fault Type	Possible Causes	Troubleshooting
Temperature Sensor Failure	Poor sensor connection	Check sensor wiring connections and reconnect
	Sensor damage	Replace the sensor
High Temperature Alarm	Condenser or evaporator clogged with dirt	Clean the condenser
	Insufficient cooling capacity	Consult a professional
	Inappropriate temperature setting	Measure the temperature and reset the high-temperature threshold
System high-pressure alarm	Condenser or evaporator clogged with dirt	Clean the condenser
	Outdoor circulation fan	Replace outdoor circulation fan

	malfunction	
	Condenser temperature sensor false alarm	Replace condenser temperature sensor
Evaporator freeze	Internal circulation airflow obstructed	Check for obstructions and remove them
	Internal circulation fan failure	Service/replace interior circulation fan
	Refrigeration system fails to shut off	Check if cooling fails to stop despite meeting shutdown conditions. If so, notify the manufacturer for handling
	Evaporator temperature sensor false alarm	Replace evaporator temperature sensor
Compressor not running	No cooling required	Check if cooling is required
	In 3-minute interval protection	Check if in protection mode
	Poor compressor wire connection	Check sensor wiring connections and reconnect
	Compressor protection switch or motor damaged	Check compressor protection switch for integrity; replace if damaged. If motor is damaged, replace compressor
Internal circulation fan not operating	Internal circulation fan malfunction	Replace the interior circulation fan
	Poor connection of the internal circulation fan wiring	Check sensor wiring connections and reconnect
	Fan is jammed	Check for foreign objects obstructing the fan
External circulation fan not operating	External circulation fan malfunction	Replace the external circulation fan
	Conditions for activation not met	Check if the activation conditions are met
	Poor connection of internal circulation fan wiring	Inspect external circulation fan wiring connections and reconnect
	Fan is jammed	Check for foreign objects obstructing the fan
Abnormal fan noise	Damaged fan blades or bearing friction	Replace the fan
	Fan blades interfering with other materials	Inspect and re-secure
Heater not operating	Heater malfunction	Replace heater
	Heater wire connection is loose	Check heater wiring connections and reconnect
	Conditions for activation not met	Check if activation conditions are met

13 Daily Maintenance

Product Components	Maintenance items	Standard	Maintenance Frequency	Power Off Required
Cabinet	Visual Inspection: Rust Door Locks Ventilation openings	No significant coating peeling or scratches. No significant paint fading or rust. Door locks are undamaged. Ventilation openings free of dust accumulation. No insects, rodents, snakes, or other animals.	Quarter	No
Air Conditioning	Visual inspection: Appearance Rust Fan Filter	No visible damage. No noticeable paint fading or rust. Screws are not loose or missing. Fan rotates normally with no abnormal noise. Filter surface is clean and unobstructed.	Quarterly	No
EMS	Check indicator light status	Indicator light normal	Quarter	No
Combined Control Box	Visual Inspection: Inspect appearance Rust Foreign objects inside the box	No significant coating peeling or scratches. No significant paint fading or rust. Control box is clean and free of foreign objects.	Quarter	No
Label	Visual inspection:	Clearly visible, free of stains or damage.	Quarter	No
Air Conditioning External Fan	Clean the external fan filter.	Filter surface is clean and free of blockages.	Every 6 months	Yes
Battery Compartment	Charge the battery.	If the system is not used for an extended period, charge the battery to no less than 50% SOC	Every 6 months	Yes

Battery box	Visual inspection: Visual inspection Rust Fan Front panel vents	No obvious damage. No noticeable paint fading or rust. Screws are not loose or missing. Fan rotates normally without abnormal noise. Front panel vent surface is clean and unobstructed.	Annually	Yes
Grounding and equipotential bonding points	Grounding wire Internal equipotential bonding	Grounding resistance must not exceed 4Ω. Correct equipotential bonding within the cabinet	Annually	Yes
Safety functions	Emergency button	Verify emergency button functions properly	Annually	Yes

14 Appendix

14.1 Recycling and Disposal

This equipment must not be disposed of as household waste.

Equipment that has reached the end of its useful life does not need to be returned to the dealer; instead, it must be disposed of at an approved recycling facility in your area.

14.2 Warranty

Please refer to the product warranty terms and conditions of Guangdong TCL Digital Power Co., Ltd.

14.3 Contact Support

Service Hotline: For TCL Shenlan support phone numbers, please contact your sales manager for details in your region.

Headquarters: Guangdong TCL Digital Power Co., Ltd.

Address: Building F5, TCL International E-City, Xili Subdistrict, Nanshan District, Shenzhen, Guangdong Province, China

Email: mailto:service.db@tcl.com

Official Website: /