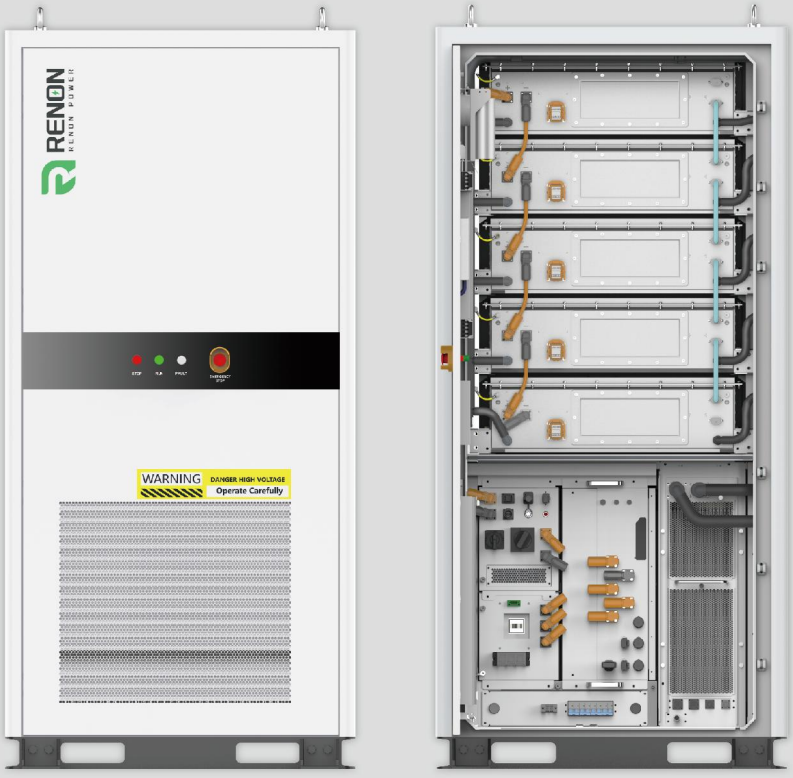
RENON
RENON POWER

User Manual.

R-MP233125A1-US

2024 1ST EDITION



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Contents

PART 01. Preface

This document mainly introduces the RENON Energy Storage Product M Pack series with a capacity of 233kWh, including product introduction, application scenarios, installation and transportation conditions, maintenance methods, and technical data.

1、 Applicable Audience

This manual is intended for professional personnel who are familiar with local regulations and standards, have undergone specialized training, and possess a thorough knowledge of this product, as well as the end-users of the product.

2、 Symbol Definitions

For better use of this manual, the following symbols are used to highlight important information.Please read the symbols and instructions carefully.

Symbols	Instructions
Danger	Indicates a high-level risk hazard that can lead to death or serious injury if not avoided.
Warning	Indicates a medium-level risk hazard that can lead to death or serious injury if not avoided.
Caution	Indicates a low-level risk hazard that can result in minor or moderate injuries if not avoided.
Note	Indicates an emphasis or additional information pertaining to the content. It may also offer tips or best practices for optimizing the use of the battery system, assisting in resolving issues or saving time.

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PART 02. Safety Precautions

The safety precautions information included in this document is always observed when operating the equipment.

Note

The equipment has been designed in strict accordance with the safety regulations and qualified for the test, but as electrical equipment, the relevant safety instructions shall be observed before any operation of the equipment, and any improper operation may lead to serious injury or property loss.

1、General Security

Note

- Due to product version upgrades or other reasons, the content of this document may be updated irregularly, and unless otherwise specifically agreed, no further notice will be given.
- All descriptions in this document are provided for guidance only.
- Before installing the equipment, please read this document carefully to fully understand the battery system and related precautions.
- All operations on the equipment must be carried out by qualified electrical technicians who are familiar with the relevant standards and safety regulations applicable to the project location.
- When operating the equipment, insulated tools should be used, and personal protective equipment must be worn to ensure personal safety. When handling electronic components, anti-static gloves, anti-static wristbands, and anti-static clothing should be worn to prevent electrostatic damage to the equipment.
- The manufacturer is not liable for any equipment damage or personal injury resulting from failure to properly install, use, or configure the equipment according to this document or the corresponding user manual. For more information about product warranties, please visit the official website.

2、System Safety

⚠ Danger

- Must always adhere to the safety precautions and product warnings listed in this manual, other related documents, and on the battery system itself.
- When operating the equipment, strictly comply with all local laws, regulations, and industry standards.

- To ensure the safety of the equipment during transportation, ensure that the transport personnel have received professional training. Additionally, detailed records of handling procedures must be kept, and the equipment must be kept balanced during handling to prevent falls.
- During loading and unloading, follow local laws and industry standards. Rough handling can lead to short circuits or damage to the battery packs, which may result in electrolyte leakage, fires, or explosions.
- This is heavy machinery, and during installation and maintenance, appropriate tools must be used and proper safety measures must be taken. Improper operation can result in personal injury or equipment damage.
- The equipment contains lethal high voltage and poses an electric shock hazard; do not touch it casually.
- Unauthorized personnel must not open the equipment doors or touch internal components without permission, to avoid the risk of electric shock.
- If the equipment is damaged or malfunctioning, do not operate it. Doing so can increase the risk of electric shock and fire.
- Before operating the equipment, ensure that the system is properly grounded and all necessary safety measures are in place to prevent electric shock.
- While the equipment is in operation, do not open the equipment doors or touch any terminals or components, as this can result in electric shock.
- Before installing, wiring, or maintaining the equipment, ensure that all power switches are turned off.
- Do not disassemble or modify any part of the equipment without formal authorization from the manufacturer. Any damage caused by unauthorized modifications will not be covered under the manufacturer's warranty.
- After installation, ensure that the labels and warning signs on the equipment are clearly visible. Do not obstruct, deface, or damage them.
- It is strictly prohibited to store flammable or explosive materials in the equipment area.
- It is strictly prohibited to place the equipment in an environment containing flammable or explosive gases or smoke. Do not perform any operations in such environments.

⚠Warning

- Do not strike, pull, drag, or step on the equipment.
- Do not place unrelated items inside the equipment.
- When the internal temperature of the equipment exceeds 130°C and the smoke concentration reaches 0.15 dB/m, there is a risk of battery ignition, which will automatically trigger the fire suppression system.
- Choose cables that comply with local laws and regulations.
- Do not place the equipment in a high-temperature environment, and ensure that there are

no heat sources near the equipment.

- It is not recommended to use the equipment in seismically active areas or regions with salt mist.
- The equipment should be installed in an area away from liquids. It is strictly prohibited to install the equipment below water pipes, air outlets, or any locations where condensation may occur. It is also strictly prohibited to install the equipment below air conditioner vents, ventilation outlets, or server room cable windows, or any other locations where leaks may occur, to prevent liquids from entering the equipment and causing faults or short circuits.
- When the equipment is in operation, do not block the ventilation ports, cooling system, or cover the equipment with any other items to prevent high temperatures from damaging the equipment or causing a fire.

3、 Battery Safety

⚠ Danger

- It is strictly prohibited to subject the battery to mechanical vibrations, drops, impacts, penetration by sharp objects, or pressure shocks, as these actions may result in battery damage or fire.
- It is strictly prohibited to disassemble, modify, or damage the battery (such as inserting foreign objects, applying external pressure, or immersing it in water or other liquids), as these actions may cause the battery to leak, emit smoke, release flammable gases, experience thermal runaway, catch fire, or explode.
- The battery electrolyte is toxic and volatile. In the event of electrolyte leakage or an unusual odor, avoid contact with the leaked liquid or gas. Non-professionals should not approach the area and should immediately contact a professional for assistance. Professionals should wear safety goggles, rubber gloves, a gas mask, and protective clothing, and promptly de-energize the equipment and remove the leaking battery. They should also contact a technical engineer for further handling.

⚠ Warning

- The battery contains high voltage. Before operating any equipment in the energy storage system, it is essential to ensure that the equipment is completely disconnected to avoid the risk of electric shock.
- It is strictly prohibited to subject the battery to impacts, shocks, pulls, or squeezes, as these actions may result in battery damage or increase the risk of fire.
- When storing the battery pack for an extended period, regular charging should be performed to avoid capacity loss or irreversible damage.
- It is strictly prohibited to exceed the rated current of the battery during charging or discharging operations.

- If the battery or high-voltage control box shows obvious defects, damages, or other issues, do not use it. This may pose a serious risk to personal safety.
- The battery current may be affected by factors such as temperature, humidity, weather conditions, etc., which could result in current limitations and impact the load capacity.
- For battery replacement, please contact a professional after-sales service center.
- If the battery fails to start properly, contact the after-sales service center immediately; otherwise, the battery may suffer permanent damage.

4、 Mechanical Safety

- Tools must be complete and inspected by a professional organization. Do not use tools with damage, those that have failed inspection, or those that have exceeded their inspection validity period. Ensure that tools are secure and not overloaded.
- It is strictly prohibited to drill holes in the equipment. Drilling can compromise the equipment's seal, electromagnetic shielding, internal components, and wiring. Metal shavings produced by drilling can enter the equipment and cause short circuits on the circuit board

5、 Personnel Requirements

⚠ Danger

- It is strictly prohibited to perform live operations during installation. Do not install or remove cables while the equipment is energized.
- During the work process, do not wear conductive objects such as watches, bracelets, necklaces, rings, or other jewelry to avoid electric shock burns.
- During the work process, dedicated insulated tools must be used to prevent electric shock injuries or short-circuit faults. The insulation voltage rating must meet the requirements of local laws, regulations, standards, and codes.
- During the work process, dedicated protective equipment must be used, such as wearing protective clothing, insulated shoes, safety glasses, hard hats, and insulated gloves.

Note

- Personnel responsible for the installation and maintenance of the equipment must undergo rigorous training to understand all safety precautions and master the correct operating procedures.
- Installation, operation, maintenance, and replacement of the equipment or its Instructions s should only be performed by qualified professionals or trained personnel.
  - **Professional Personnel**:Individuals who are familiar with the principles and construction of the equipment, have received training or have experience in operating the equipment, and can clearly identify various potential hazards and their

severity during installation, operation, and maintenance.

- **Trained Personnel**:Individuals who have undergone the necessary technical and safety training and possess the required experience. They are able to recognize the potential dangers associated with specific operations and can take measures to minimize the risks to themselves and others.

PART 03. Product Introduction

1、 Applicable Scope

The energy storage system integrates energy management and storage functions to control and optimize energy flow. It can supply power from the grid to loads, store energy in batteries, or output energy back to the grid.

This manual is specifically applicable to the MPack 233kWh Liquid-Cooling Battery for use in the energy storage industry.

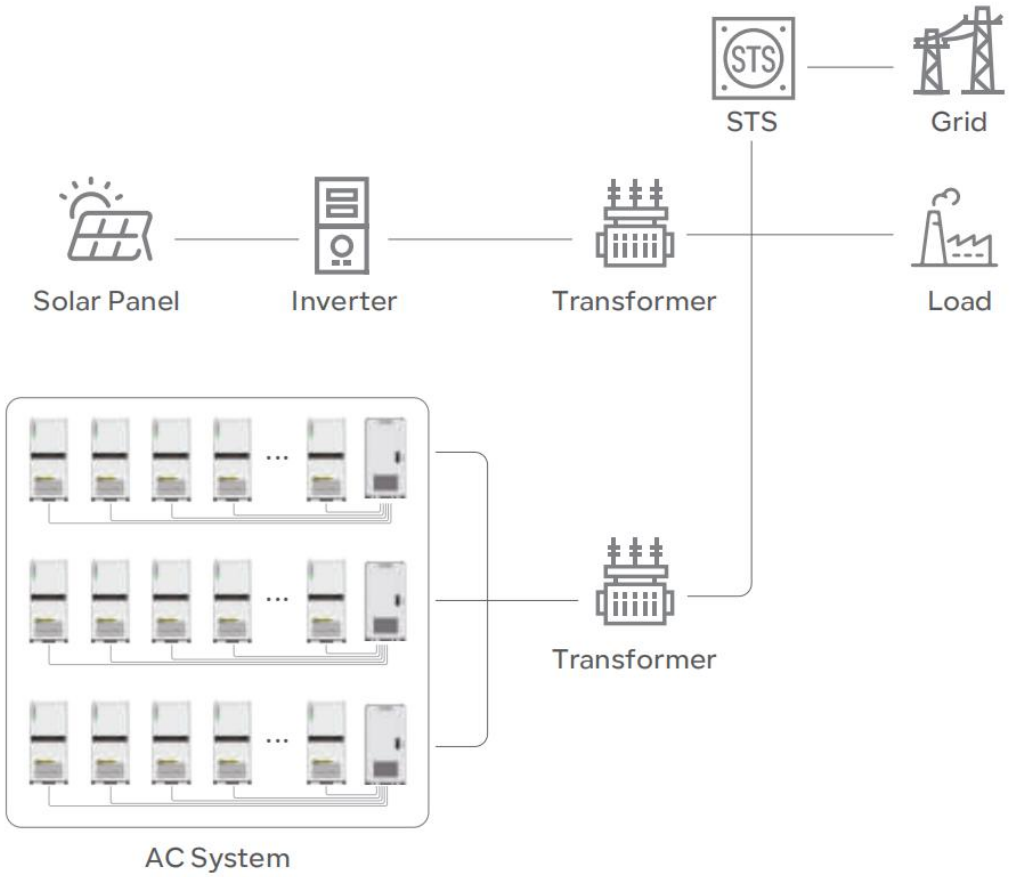
2、 Main Feature

- **Highly Integrated:** Combines an all-in-one design with high power density, requiring minimal space and offering flexible transportation and installation.
- **Safety & Reliability:** Features comprehensive battery monitoring, multi-level fire prevention, top venting design, and proactive AI management to ensure maximum safety and reliability.
- **Efficient & Flexible:** Boasts a modular structure with high-efficiency liquid

cooling, adaptable to extreme environments, maximizing battery life and performance.

- **Intelligent Operation & Maintenance**: Equipped with a full EMS for easy upgrades, big data-managed inspection, proactive handling, and intelligent SOC calibration for optimal performance without downtime.

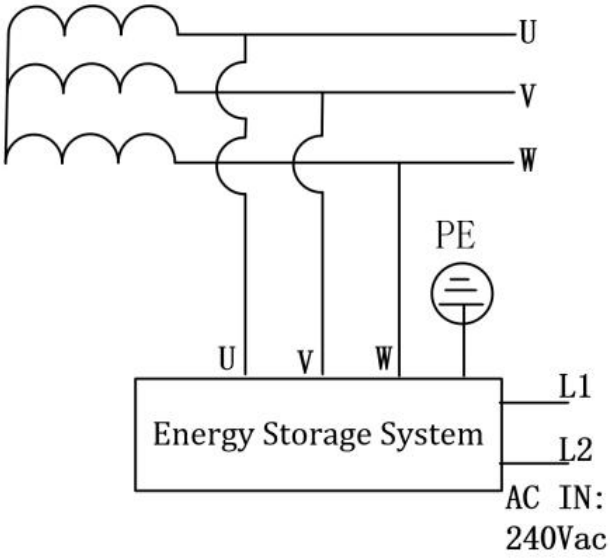
3、 Application Scenarios



⚠Warning

- ✧ This energy storage system is suitable for industrial and commercial scenarios.
- ✧ In the energy storage system, try to avoid using loads with high startup currents, such as high-power pumps, as this may cause the system to fail due to excessive instantaneous power.

4、 Supported Forms of Power Grid

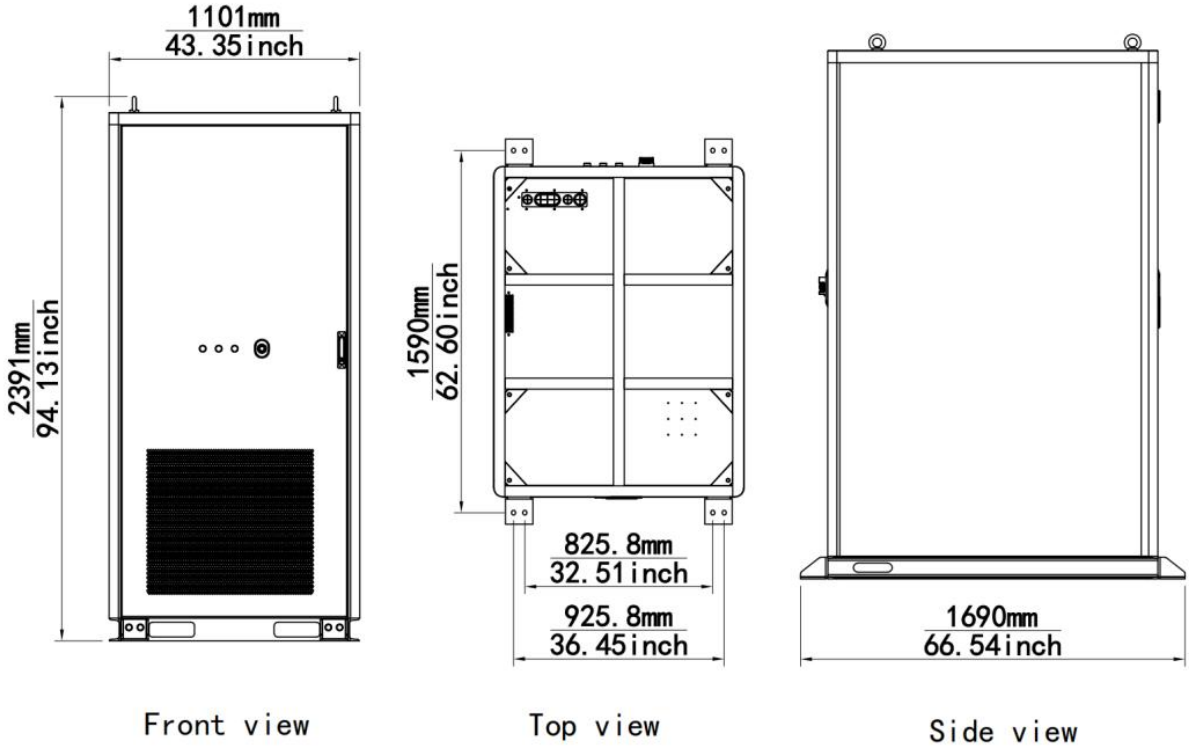


5、 Work Pattern

Timed Mode

In Timed Mode, the system can be configured to set the charging and discharging power levels during specified time periods.Parameters can be set via the touchscreen on the energy storage system or remotely through a web platform or mobile app.

6、 Dimensions



7、 Mode Code

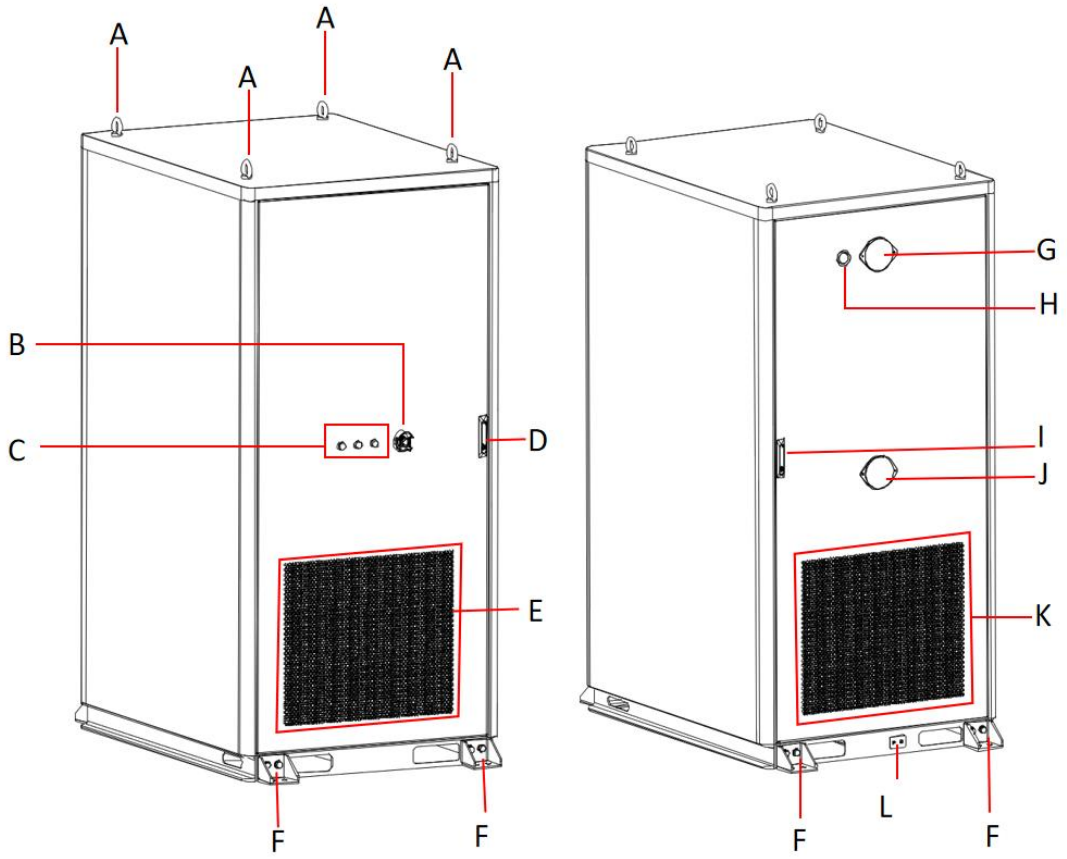
R-MP233125A0-US

1 2 3 4 5 6 7

No.	Meaning	Instructions
1	brand code	R: RENON Power
2	series of code	MP: M Pack
3	system capacity	233kWh
4	output power	125kW
5	AC / DC	A: AC
6	custom type	0: No custom
7	area Identification	US

8、 Surface

(1) Appearance Instructions



No.	Name	Instructions
A	Lifting Ring	Can use lifting rings for hoisting the energy storage system.
B	Emergency Stop	When an emergency occurs in the energy storage system, this button can be used to stop the system from operating.
C	LED indicator	Stop Light、Fault Light、Run Light
D	Front door Lock	Please use a key to unlock the equipment door. When no internal operation is needed, please close and securely lock the equipment door.
E	Air Intake	Introduce external air into the internal part of the energy storage system.
F	Mounting Hole	Fix mounting
G	Exhaust Valve	Allows gases within the system to be released, helping to maintain appropriate internal pressure and preventing overpressure situations.
H	WIFI	Can connect to WiFi to improve wireless communication signal strength.
I	Rear Door Lock	Please use a key to unlock the equipment door. When no internal operation is needed, please close and securely lock the equipment door.
J	Intake Valve	Controls the entry of external gases into the system, ensuring that only the appropriate amount of gas enters the system.
K	Air Outlet	Emit the air that has been heated or circulated from within the energy storage system.
L	Ground Terminal	For Equipment Grounding

(2) LED indicator Description

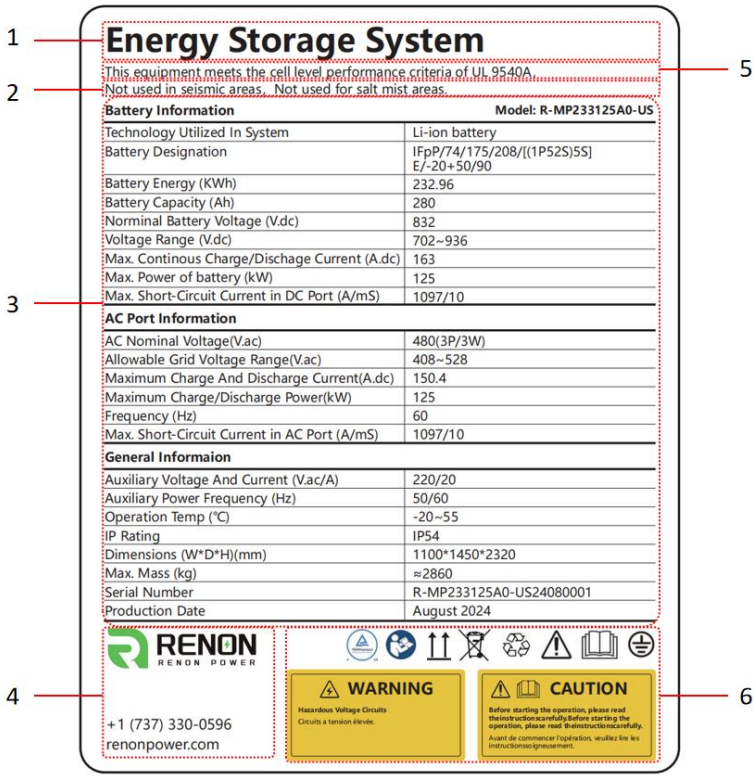
Light Indicator		Description	Instructions
●	RUN	Fast flash: Local upgrade Slow flash: Firmware download or copy from USB	Upon startup, all three lights default to being continuously lit for 5 seconds, after which they display according to the logic set for the indicator lights.
		Solid on: PCS startup Solid off: PCS shutdown	
●	FAULT	Slow flash: Alarm present Solid on: Fault present Solid off: No faults or alarms	
●	STOP	Solid on: PCS shutdown Solid off: PCS startup	

Alarm Fault Source Instructions:

1. PCS, Liquid Cooling, Dehumidifier, Main Unit, Secondary Unit, Battery Equipment
2. Water Ingress, Fire, Lightning Protection, AC Coil Abnormal Status, Emergency Stop Button Pressed, etc., are fault events

(3) Nameplate and Label Instructions

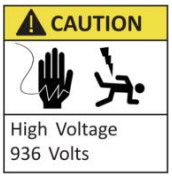
Equipment Nameplate



No.	Instructions
1	Product Type
2	Usage Recommendations
3	Product Technical Specifications
4	Company Trademark and Contact Information
5	Safety Standards for Test Methods of Thermal Runaway Fire Propagation in Battery Energy Storage Systems
6	Product Certification and Safety Markings

The nameplate is for reference only; the actual product shall prevail.

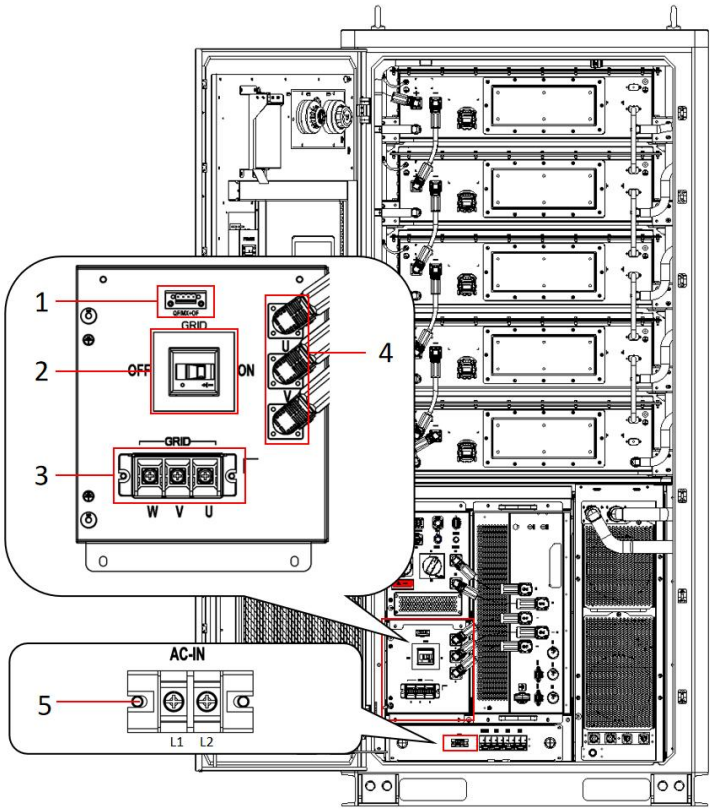
Label

Icon	Name	Meaning
	Electrical Arc Flash Hazard Symbol	Caution is required to avoid the risk of arc flash incidents. Proper personal protective equipment (PPE) and safety procedures must be followed when working in areas where arc flash hazards are present.
	Electrical Hazard Symbol	Indicates that the equipment switch must be disconnected before performing any maintenance to ensure safety.
	View Manual Symbols	Operators are reminded to carefully read the user manual for the energy storage system.
	Electrical Hazard Symbol	Indicates that the power must be turned off before performing any operations to avoid the risk of electric shock.
	High Voltage Hazard Symbol	Indicates the presence of high voltage. Do Not Touch. Caution is required to avoid the risk of severe electric shock.

9、 Part Introduction

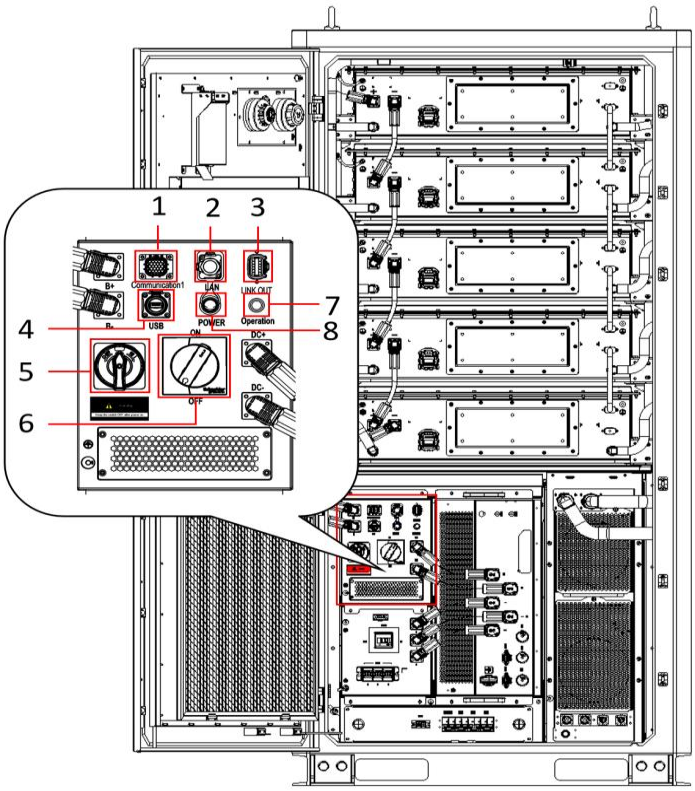
(1) AC Control Box

The AC control box is a key device that connects the energy storage battery to the grid or loads, and it also provides a location for customer wiring. Its core function lies in managing and optimizing the distribution and use of electric power. The device converts direct current (DC) from the storage battery into alternating current (AC) through its built-in inverter, catering to various electrical needs.



No.	Name	Instructions
1	Interface	Display control of AC circuit breaker's coil trip and auxiliary contact monitoring.
2	AC grid-tie switch	Open and close the switch for three-phase AC power.
3	AC terminal block	Used for connecting the system's AC output to the grid or loads.
4	AC 480V Connection Port	AC wiring connection to PCS terminal
5	AC-IN	AC240V; Auxiliary Power Supply Port;

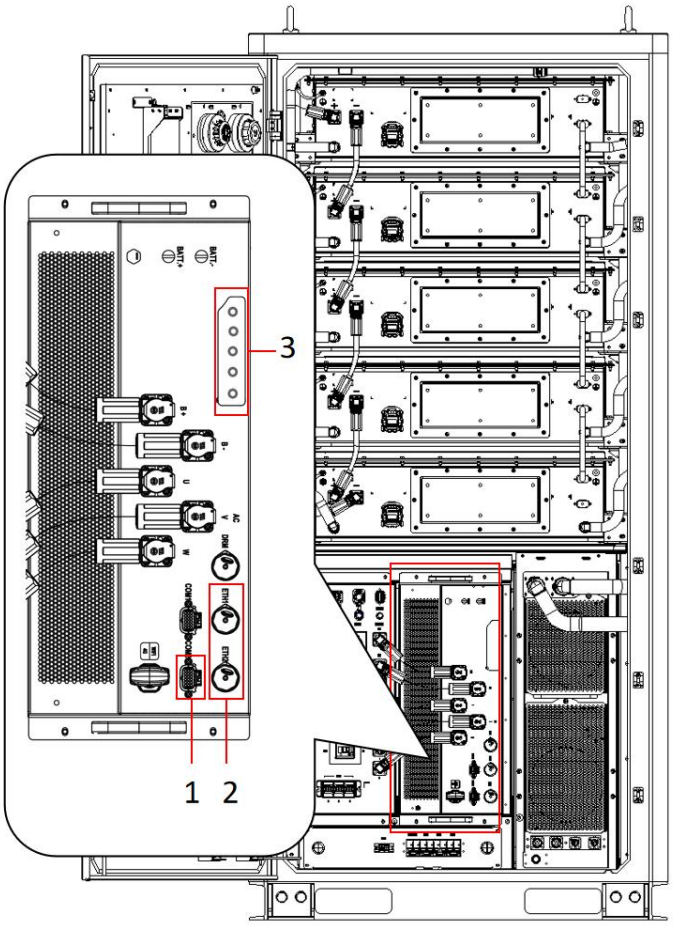
(2) High-voltage box



No.	Name	Instructions
1	Communications Line Interface	Provides DC24V power supply and communicates with peripheral devices.
2	LAN Interface	Connects to the LAN port of the EMS screen for data exchange.
3	The battery module communications Line Interface	Enables communication with the battery module.
4	USB Interface	Reserved for debugging purposes.
5	DC Isolation Switch	Controls the on/off state of the DC power supply.
6	DC Circuit Breaker Switch	Automatically cuts off battery output when abnormal conditions are detected.
7	Operation Indicator Light	Displays the working status of the high-voltage box; green typically indicates normal operation, while red indicates a fault or warning.
8	DER Switch Button	Controls the startup and shutdown of the high-voltage box.

(3) PCS

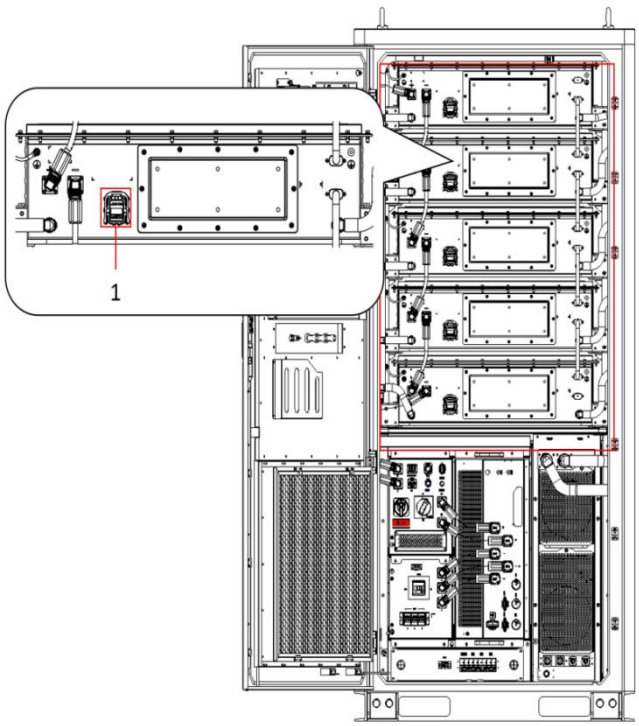
In the energy storage system, the PCS (Power Conversion System) manages and controls the charging and discharging of the batteries. It converts DC (Direct Current) to AC (Alternating Current) or vice versa, facilitating the storage and release of electrical energy.



No.	Name	Instructions
1	COM2 communication Interface	Interface for communication with the BMS (Battery Management System).
2	Ethernet communication Interface	Interface for communication with the EMS (Energy Management System).
3	PCS Status Light	Indicates the operating status of the PCS (Power Conversion System).

(4) Battery System

The battery system contains the battery module and the high-voltage control box. The battery module stores and releases the electric energy; the high voltage control box controls the battery charge and discharge.



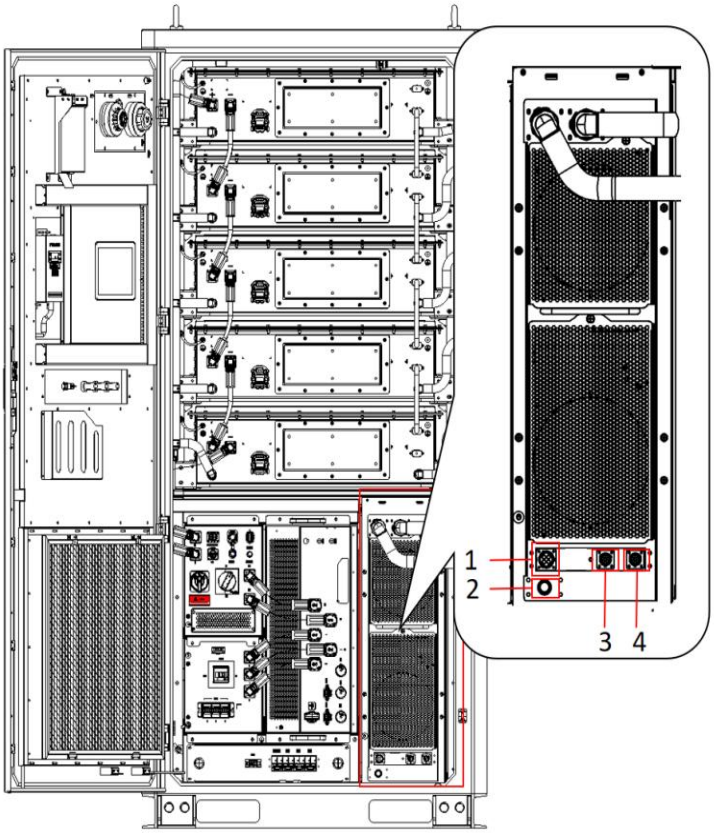
Note

Installation of MSD should be conducted after the fixation of racks and harness.

No.	Name	Instructions
1	MSD	Battery Maintenance Switch Disconnect Device

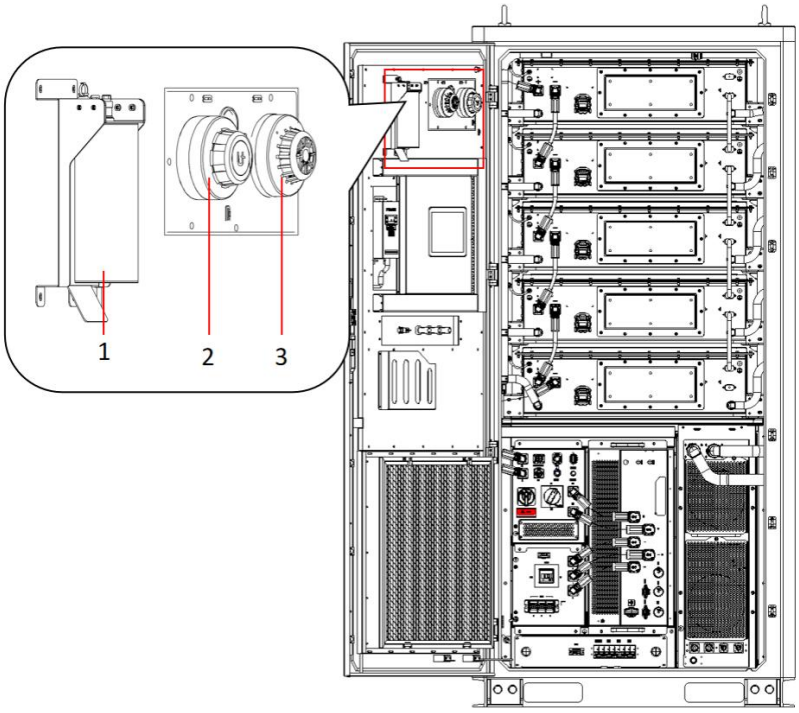
(5) Liquid Cooling System

The liquid cooling system absorbs and transfers the heat generated during the battery's operation through circulating liquid, ensuring that the battery temperature remains within an optimal range, thereby improving the thermal stability of the system and the lifespan of the battery.

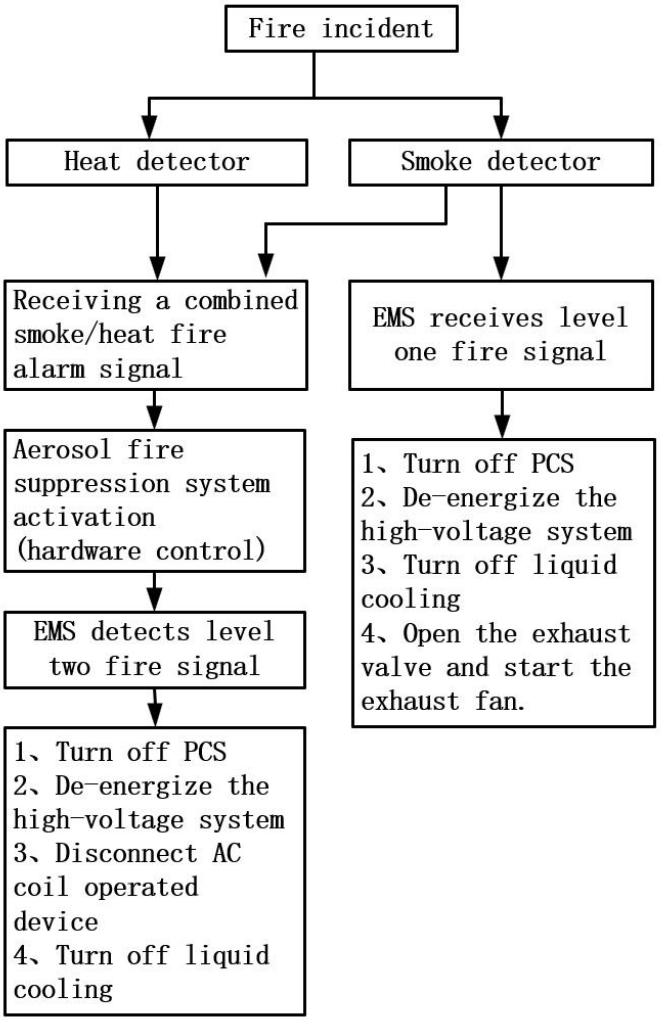


No.	Name	Instructions
1	Power Port	Power supply interface for the liquid cooling system.
2	Filling Port	Port for filling the liquid cooling system with coolant.
3	Debug Port	Device interface for setting parameters of the liquid cooling unit.
4	Communication Port	Communication interface between the EMS and the liquid cooling system; uses RS485 communication cable.

(6) Fire Extinguisher System



No.	Name	Instructions
1	Aerosol Fire Extinguisher	When a fire occurs, the aerosol fire suppression device will be automatically activated or manually triggered. The agent inside the device is ignited at high temperatures, producing a large number of aerosol particles.
2	Smoke detector	Determine whether a fire has occurred by detecting smoke particles in the air.
3	Temperature detector	Determine whether a fire has occurred by detecting changes in environmental temperature.


Fire incident
Heat detector
Smoke detector
Receiving a combined smoke/heat fire alarm signal
EMS receives level one fire signal
Aerosol fire suppression system activation (hardware control)
1、Turn off PCS
2、De-energize the high-voltage system
3、Turn off liquid cooling
4、Open the exhaust valve and start the exhaust fan.
EMS detects level two fire signal
1、Turn off PCS
2、De-energize the high-voltage system
3、Disconnect AC coil operated device
4、Turn off liquid cooling

PART 04. Transportation 、 Inspection and Storage

1、 Transportation requirements

(1) Transportation environment requirements

Trucks and shipping are preferred as means of transport while shelter and sun protection should be guaranteed during transportation.Equipment shall be handled with care in the middle of loading and unloading. Be cautious of throwing, rolling over and heavy pressure.Avoid direct contact with rain, snow and mechanical impacts.

(2) Transportation Process Requirements

⚠ Danger

Prohibition on Rough Handling

⚠Warning

Ensure that the outer packaging box remains intact and undamaged during storage and transportation, and place the packaging box according to the labels on the box; do not invert, lay on its side, stand upright, or place at an angle.

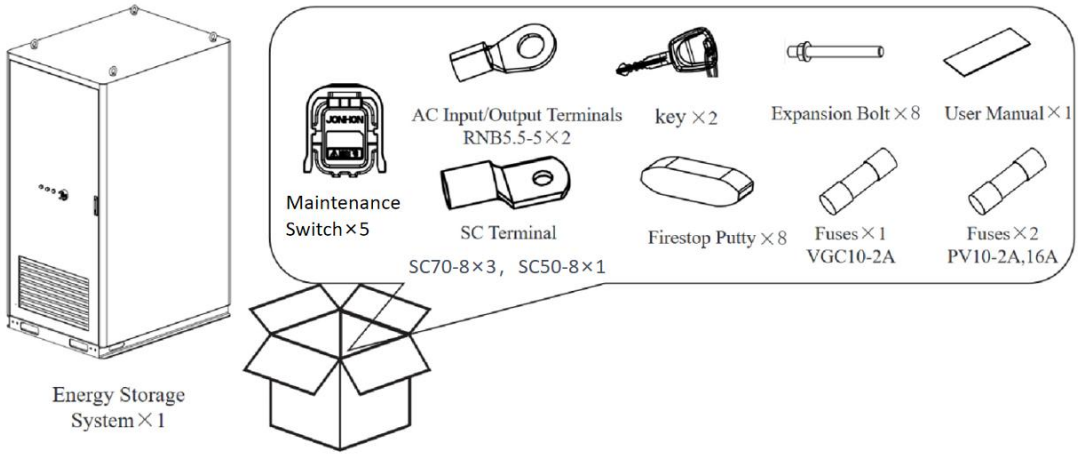
1. Equipment inspection before loading
   - Before loading, the exterior and interior of the transport vehicle should be checked to ensure the internal cleanliness, and the vehicle should be equipped with hooks;
   - Check the outer packaging and label information before loading to ensure the integrity of the outer packaging and the accuracy of the goods information.
2. Equipment loading
   - A forklift that meets the load requirements of the equipment must be used; the forklift must have passed its annual inspection, and it is not allowed to move during lifting operations;
   - The individual weight of the equipment is significant; therefore, the space within the vehicle should be reasonably secured using appropriate cushioning materials and bindings to fix the equipment;
   - After completing the packing operation, a re-inspection should be conducted to confirm that the straps are securely fastened and that protective measures are adequate.

3. Equipment transportation
   - The high speed of the vehicle shall not exceed the speed stipulated by the traffic regulations, and try to avoid bumpy road transportation;
   - Sudden braking and sharp turning are prohibited during the vehicle driving process;
   - Maintain good vehicle condition and frequently check the loading situation. Report and address any issues discovered promptly.
   - For equipment unloading, appropriate unloading tools shall be prepared according to the loading list before unloading.

2、 Check Before Signing

Before signing for the battery system , please check the following contents in detail:

1. Inspect the outer packaging for any signs of damage, such as deformation, punctures, cracks, or any other indications that could potentially damage the equipment inside. If any damage is found, do not open the package and contact your dealer immediately.
2. Inspect to ensure that the equipment model matches the expected model. If there is any discrepancy, contact your dealer.
3. Inspect the type and quantity of delivered items to ensure they are correct. Inspect the appearance of the equipment for any signs of damage. If any damage is found, contact your dealer immediately.



⚠Warning

Please use the wiring terminals shipped in the accessories. If the wiring terminals used do not meet the specifications, the equipment damage caused is not within the responsibility range of the equipment manufacturer.

3、 Equipment Storage

1. If the energy storage system is not immediately, store the following:
2. Ensure that the storage environment is clean, with suitable temperature and humidity, and no condensation.

Storage Conditions:

Average daily average storage temperature:	20℃
Allowable storage temperature:	-20-30℃
Humidity:	less than 95%, no condensation.

3. After long-term storage, the equipment should be inspected and confirmed by professionals before reuse.
4. The equipment should be placed in a box and sealed after adding desiccant.
5. If the equipment is not installed within 3 days after unpacking, it is recommended to put it back into the packaging box.
6. If the battery module is expected to be stored for more than 60 days, the State of Charge (SOC) should be adjusted to 30% to 50%, and a charge-discharge cycle should be performed every three months.
7. Humidity range: 0-95% without condensation. Installation is not allowed if there is moisture condensation.
8. The equipment should be stored in a cool place, avoiding direct sunlight.
9. Keep the equipment away from flammable, explosive, corrosive, and other hazardous substances during storage.
10. Ensure that the energy storage system is not damaged during the storage process.
11. Do not expose the battery to fire, as there is a risk of explosion.
12. There is a fire hazard in the battery system when the ambient temperature is too high.

PART 05. Install

1、Installation Requirements

(1) Installation Environment Requirements

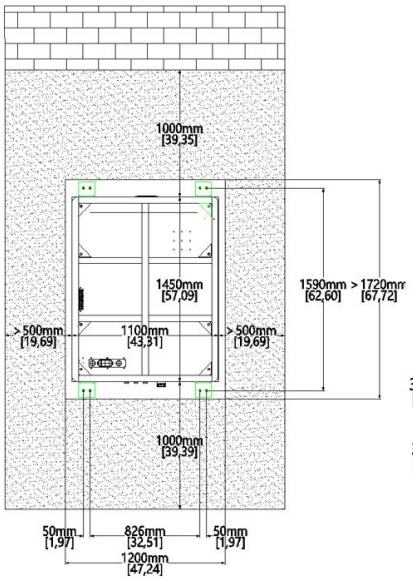
1) Equipment should not be installed in flammable, explosive, corrosive and other environment.
2) When installing equipment, it is essential to place it in a location that is not easily accessible to children to ensure their safety.
3) The installation space shall meet the requirements of equipment ventilation and heat dissipation and the requirements of operation space.
4) The protection level of the equipment meets the outdoor installation, and the installation environment temperature and humidity should be within the suitable range.
5) Equipment can be installed indoors. When installing indoors, it is necessary to comprehensively consider installation density, isolation measures, temperature control, fire safety facilities, grounding requirements, and operational space.
6) Do not place the equipment in a high temperature environment to ensure that there is no heat source near the equipment.
7) The installation height of the equipment should be easy for operation and maintenance, ensure that the equipment indicators, all labels are easy to view, and the terminals are easy to operate.
8) The energy storage system is installed at an altitude of 2,000 m below the highest working altitude.
9) Keep away from the strong magnetic field environment and avoid electromagnetic interference.
10) The equipment is not recommended for installation in seismically active areas or regions prone to salt fog.

(2) Installation Angle Requirements

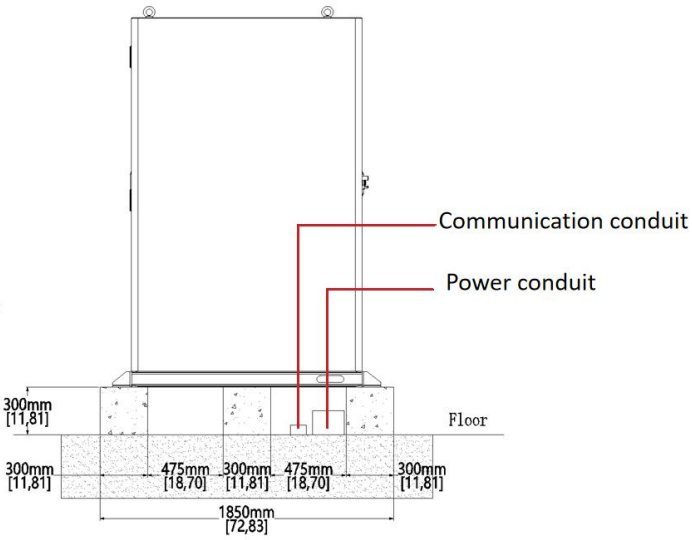
Ensure that the equipment is installed horizontally, not tilted, horizontally or inverted.

(3) Install the Base Requirements

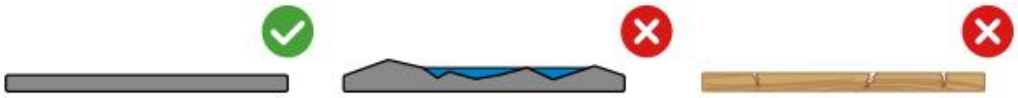
1. The equipment shall be installed on a concrete or other non-combustible surface foundation.
2. Before installation, ensure that the foundation is level, solid, smooth, and dry, with sufficient bearing capacity, and prohibit any depression or inclination.
3. For foundation construction, safe and reliable support measures should be implemented during the excavation of the foundation pit.
4. The foundation should reserve trenches or outlet holes to facilitate the routing of the equipment's wiring.
5. Trench Requirements:
   - The equipment adopts a bottom-entry cable design, and the trench must be designed with dustproof and rodent-proof features to prevent foreign objects from entering.
   - There must be waterproof and moisture-proof designs in the trench to prevent cable aging and short circuits, which could affect the normal operation of the equipment.
   - Due to the thickness of the equipment's cables, the design must adequately reserve space for the cable positions to ensure smooth connections without causing wear.



Recommended:
M16*150 expansion bolts.

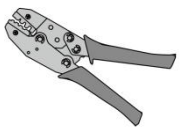
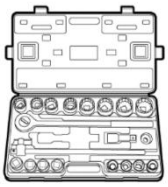
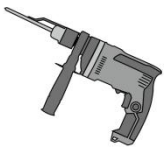


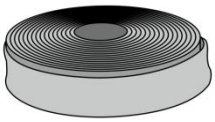
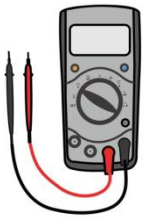
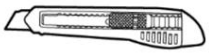
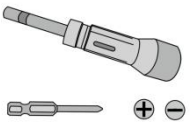
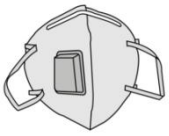
Communication conduit: ≥80*60
Power conduit: ≥200*150



(4) Preparation of Tools and Instruments

When installing, the following installation tools are recommended. If necessary, other auxiliary tools can be used on site.

Type	Tools and Instruments		
Installation Tools	 Crimping Pliers	 Socket TorqueWrench	 Impact Drill
	 Torque Wrench	 Diagonal Cutting Pliers	 Wire Stripping Pliers
	 Hot Air Gun	 Vacuum Cleaner	 Marker Pen

	 Level	 Heat Shrink Tubing	 Cable Ties
	 Multimeter	 Rubber Mallet	 Steel Tape Measure
	 Utility Knife	 Lineman's Pliers	 Torque Screwdriver
PPE	 Goggles	 Safety Shoes	 Safety Gloves
	 Dust Mask	 Insulating Gloves	

2、 Install Energy Storage System

(1) Handling Energy Storage System

⚠Caution

- During transportation, handling, installation, and other operations, all applicable laws, regulations, and standards of the country or region must be met.

- To protect the equipment from damage during transportation, ensure that the transport personnel are professionally trained. Record the steps taken during transportation and maintain balance of the equipment to prevent it from falling.
- Before installation, the energy storage system must be moved to the installation site. During this process, to avoid personal injury or damage to the equipment, please observe the following points:
  1. Allocate appropriate personnel and tools according to the weight of the equipment to prevent it from exceeding the safe carrying capacity of individuals and causing injuries.
  2. Ensure that the equipment remains balanced during movement to prevent it from falling.
  3. Ensure that equipment doors are securely locked during the movement of the equipment.

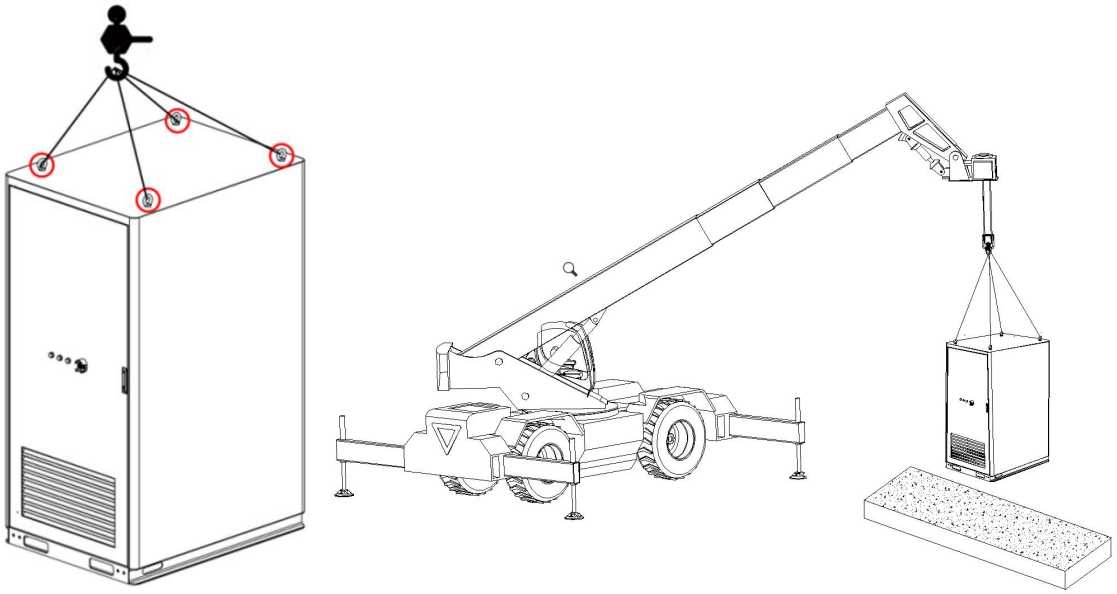
Note

✓ The energy storage system can be transported to the installation location using crane lifting or a forklift.

Crane-lift transportation (optional)

Step 1:Use the sling with the hook or the U-shaped hook to work on the ceiling of the energy storage system.

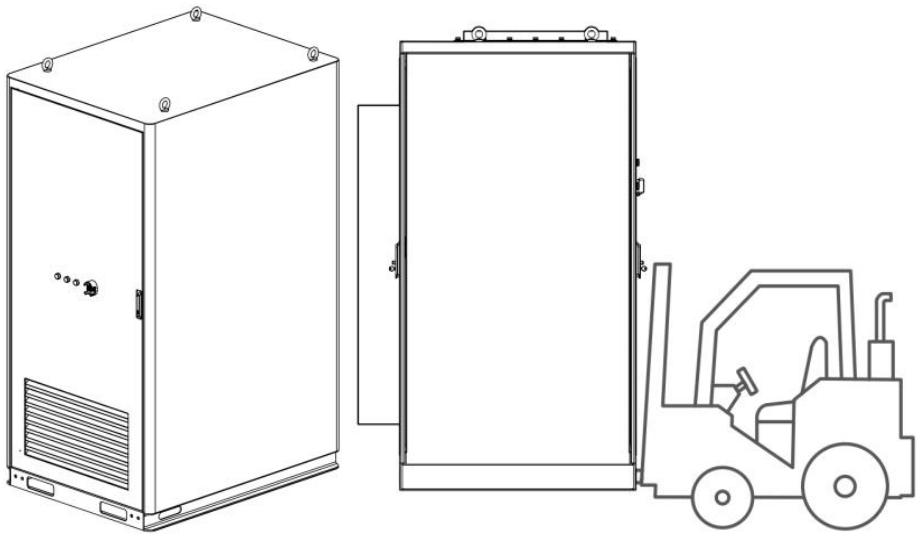
Step 2: Use the lifting device to lift the energy storage system for handling.



Forklift handling equipment (optional)

Step 1: Align the forks of the forklift with the pallet positions of the energy storage system.

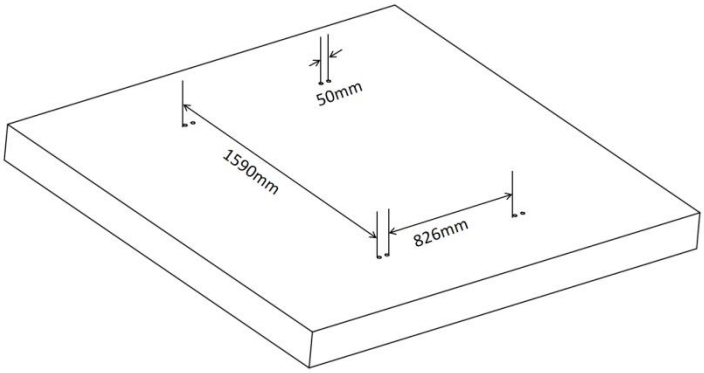
Step 2: Use the forklift to carry the energy storage system and place the center of the equipment at the center of the forklift.

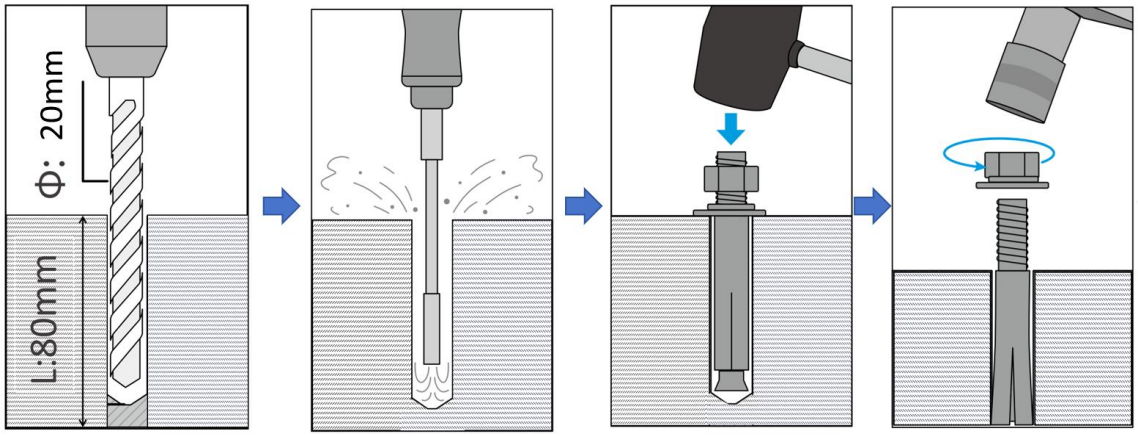


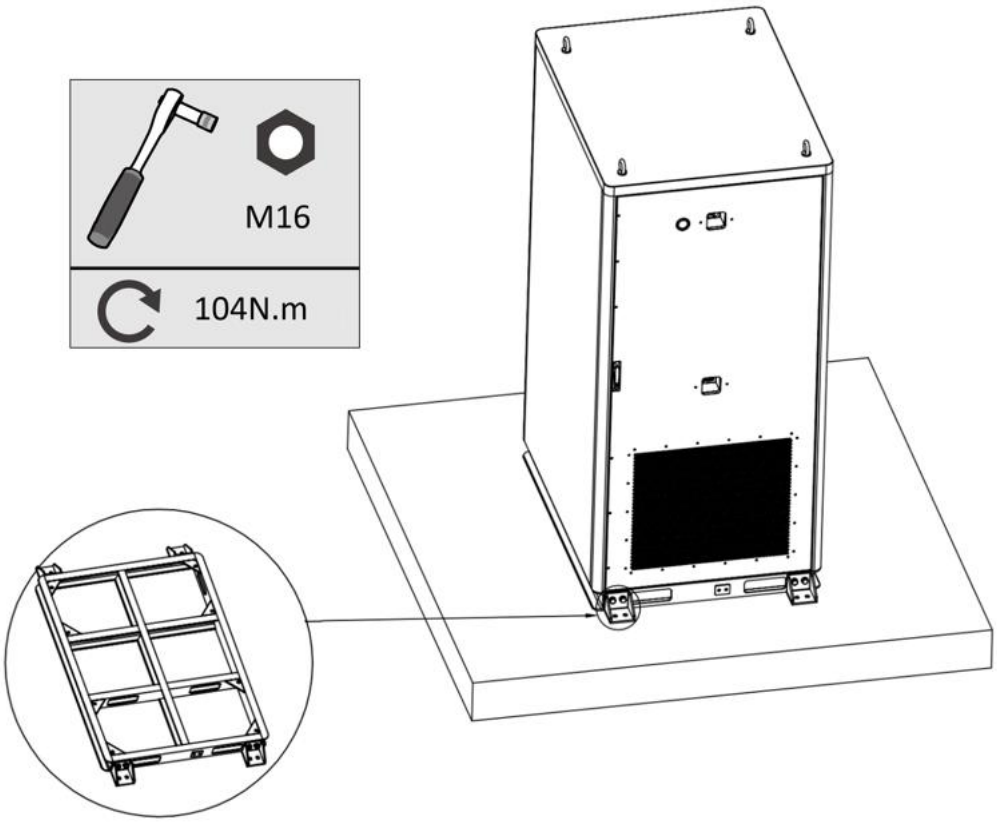
(2) Install Energy Storage System

Note

- ✓ Ensure that the energy storage system is vertically close to the ground without the risk of dumping.
- ✓ Ensure that the energy storage system is firmly installed to prevent dumping and personnel.






M16
104N.m

PART 06. Electrical Connection

1、 Safety Precautions

⚠ Danger

- All operations, cables, and component specifications used during the electrical connection process must comply with local laws and regulations.
- Before performing electrical connections, disconnect the AC switch and battery switch of the energy storage system to ensure that the equipment is powered off. Live work is strictly prohibited, as it can result in electric shock hazards.
- Similar cables should be tied together and arranged separately from different types of cables, without mutual entanglement or crossing arrangements.
- If the cable tension is too high, it may lead to poor wiring. When wiring, reserve a certain length of the cable before connecting it to the wiring terminal of the energy storage system.
- When crimping the terminal, ensure that the cable conductor is in full contact with the terminal, and do not crimp the cable insulation along with the terminal, as this may cause the equipment to fail to operate or lead to damage of the terminal strip of the energy storage system due to unreliable connections after operation.
- Using cables in a high-temperature environment may cause the insulation layer to age and deteriorate. The distance between the cable and the periphery of the heating device or heat source area should be at least 30mm.

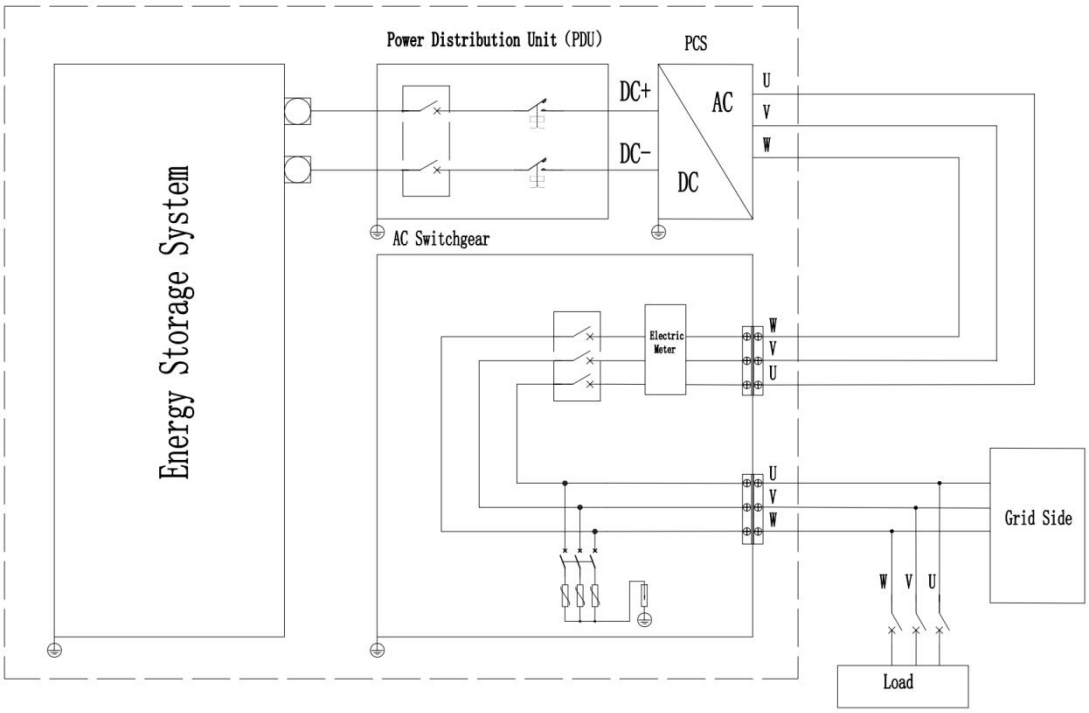
Note

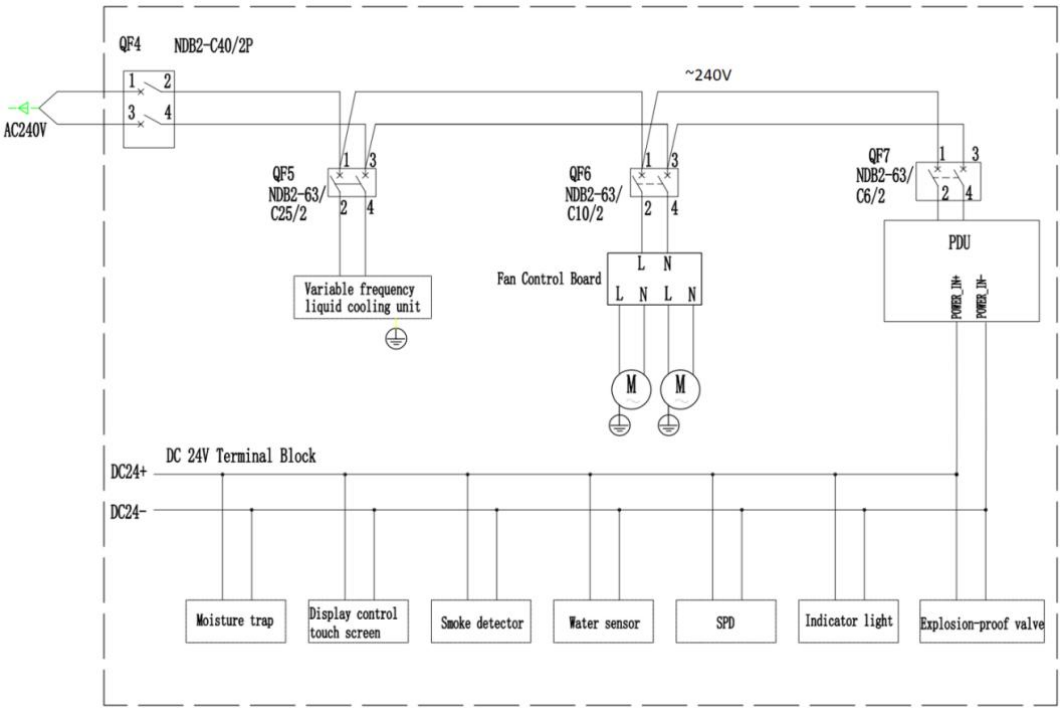
✓ For electrical connections, please wear the required personal protective equipment (PPE), including safety shoes, protective gloves, and insulating gloves.

✓ Only qualified professionals are permitted to perform electrical connections.

✓ The cable colors shown in the drawings of this document are for reference only; the specific cable specifications must comply with local regulations.

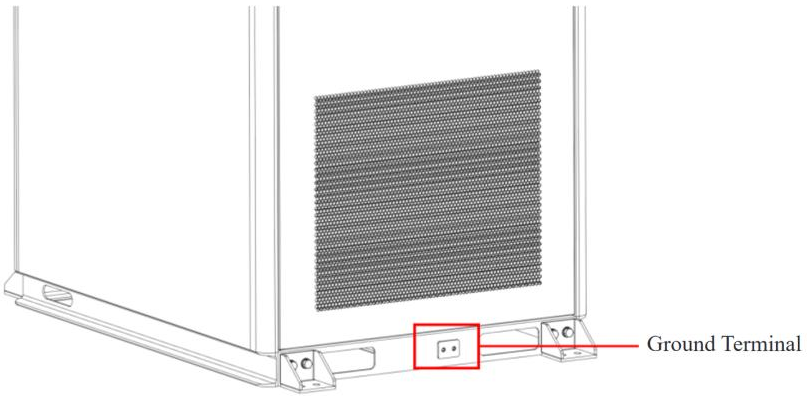
2、 Wire Block Diagram





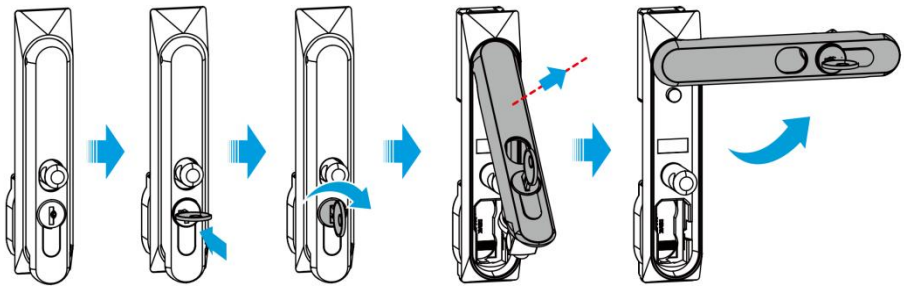
3、 Connect Protected Ground Lines

1) Before operating the equipment, ensure that the system is grounded reliably, and take relevant protective measures. Otherwise, there may be a danger of electric shock.
2) Recommended Wiring Harness: UL1015, Wire Cross-sectional Area ≥ 2AWG.
3) As shown in the figure (equipment contact location diagram)



4、 Equipment door-open

Note
• Please open the equipment door with the key shipped with the machine. • Please keep the key properly after use.



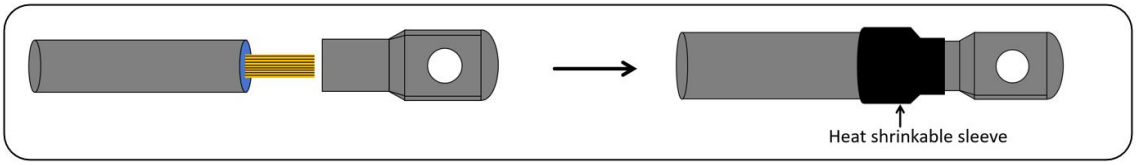
5、 Connect AC lines

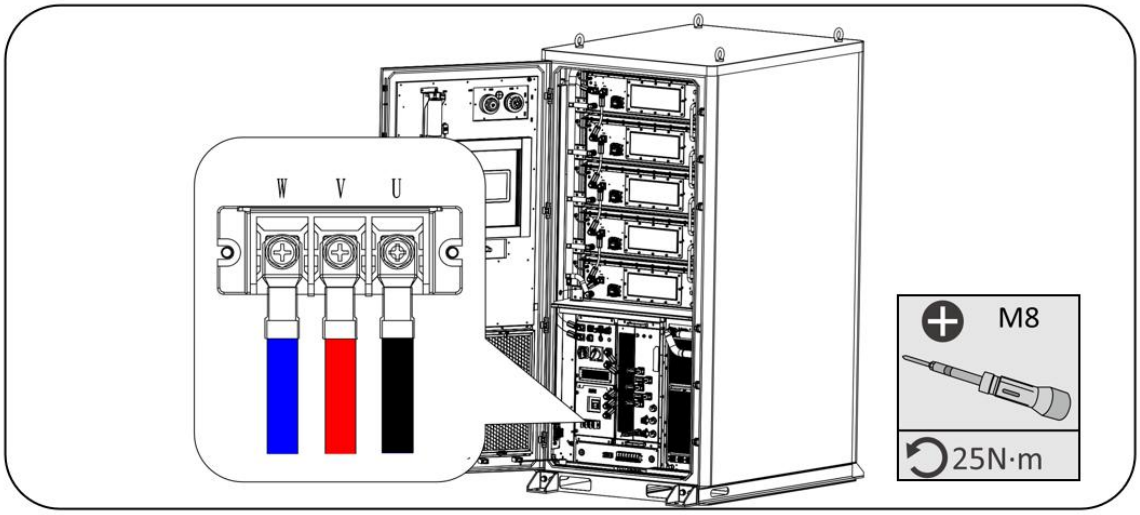
Warning
• When the energy storage system is powered on, the AC port of the load end is charged. If the load is maintained, please ensure that the circuit breaker of the load end is disconnected or the energy storage system is powered on, otherwise it may cause electric shock.

Warning
• When wiring, the AC line perfectly matches the "U", "V", "W",ports of the AC terminal. If the cable is not connected correctly, the equipment may be damaged. • Make sure that the core is fully connected to the terminal hole and not exposed. • Ensure that the cable connection is fastened, otherwise the equipment operation may damage the equipment. • Ensure that all switches of the equipment are disconnected.

Steps:

1. Open the front panel of the wiring area.
2. Mark the appropriate length in the bottom cable entry area.
3. Strip the AC cable to the appropriate length.
4. Crimp the AC terminal onto the AC cable.
5. Route the AC cable through the cable entry area and connect it to the terminals on the energy storage system.
6. Step 6: Close the cover of the wiring area.



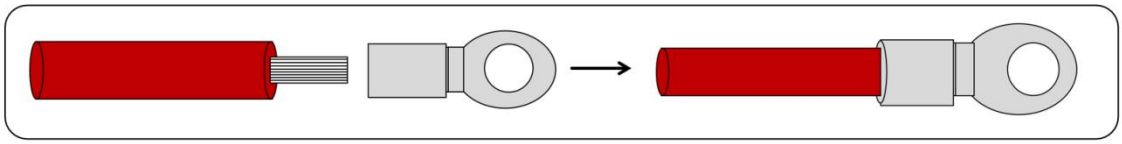


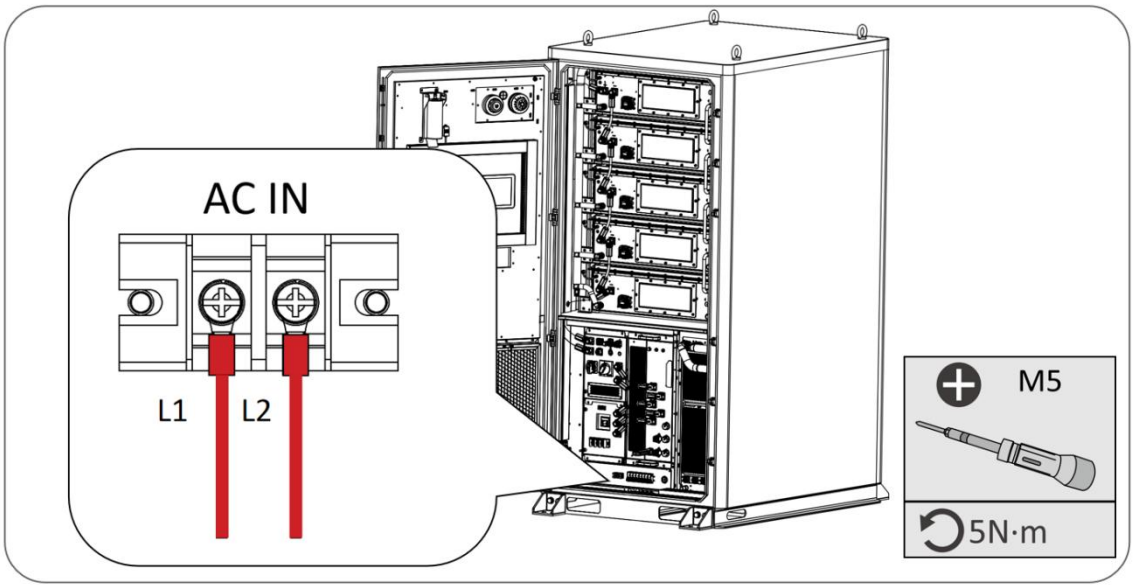
Cable and Terminal Recommendations:

No.	Name	Specification
1	AC wire	U/V/W:UL1015 * 2/0
2	Connection terminal	SC70-8

6、 Connect the auxiliary power source lines

Note
• Auxiliary AC power supply: 240Vac, 50/60Hz

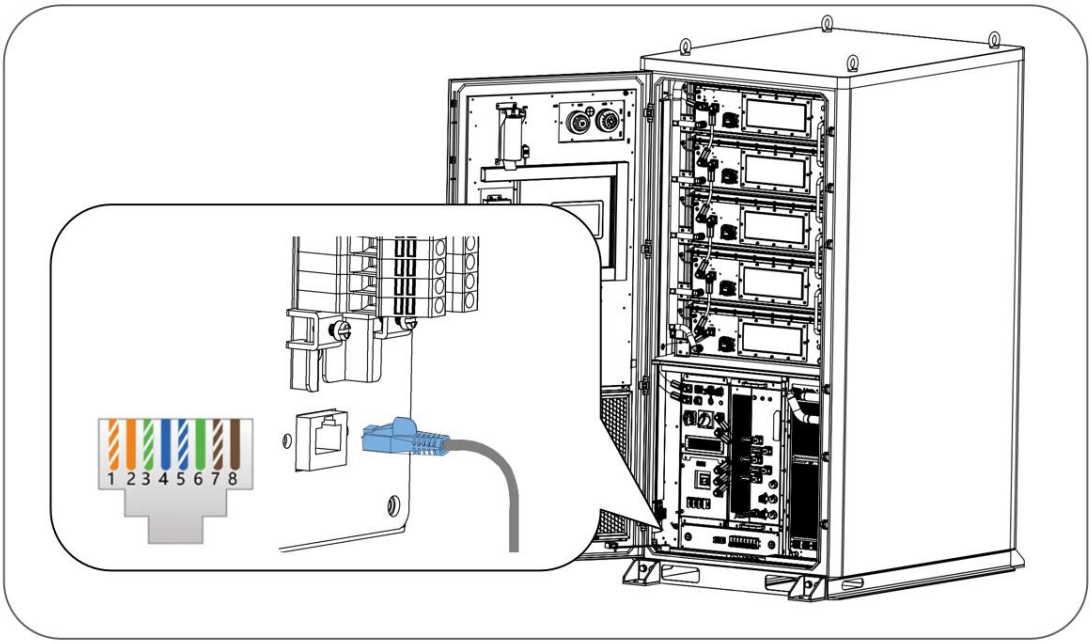




No.	Name	Specification
1	AC Auxiliary Power Cable	UL1015 * 12AWG
2	Connection terminal	RNB 5.5-5

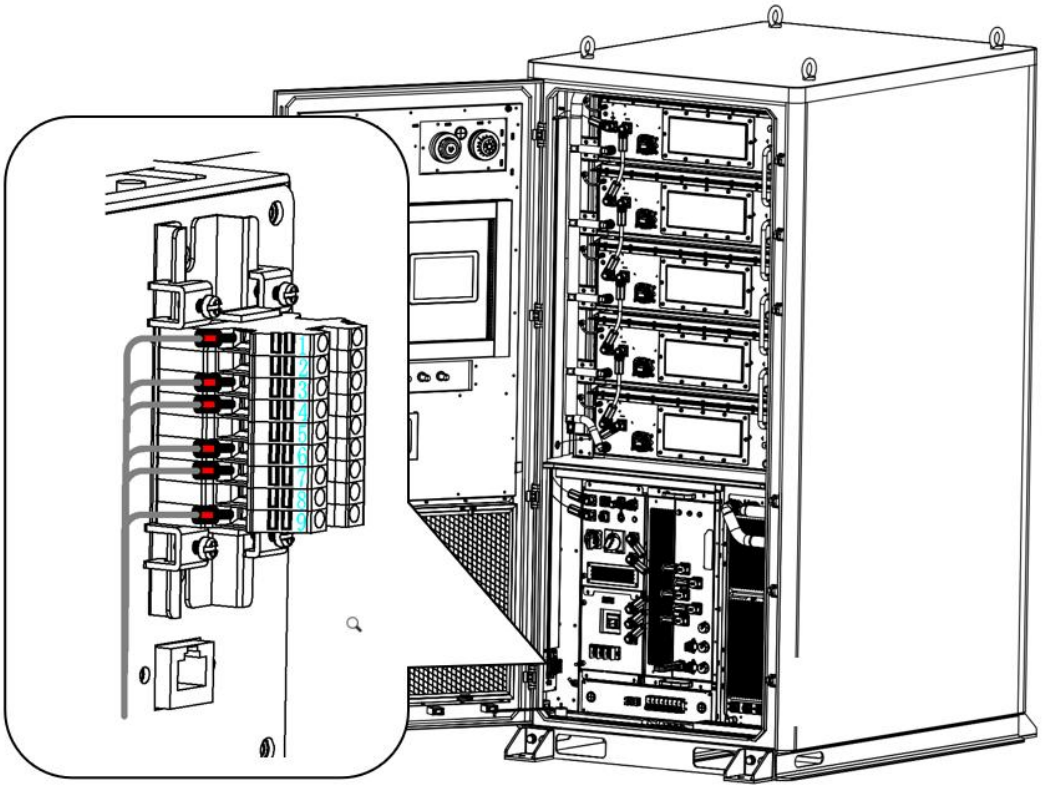
7、 Connect the LAN Communication Line

Note
• When connecting the LAN communication line, the cable routing path should avoid interference sources, power lines, etc., to avoid affecting the signal reception.



8、 Connect To the RS485 Communication Line

Note
• RS485 communication cable please use Two-Core Shielded Cable. • The recommendation is to use 20AWG.



PART 07. Test Operation of Equipment

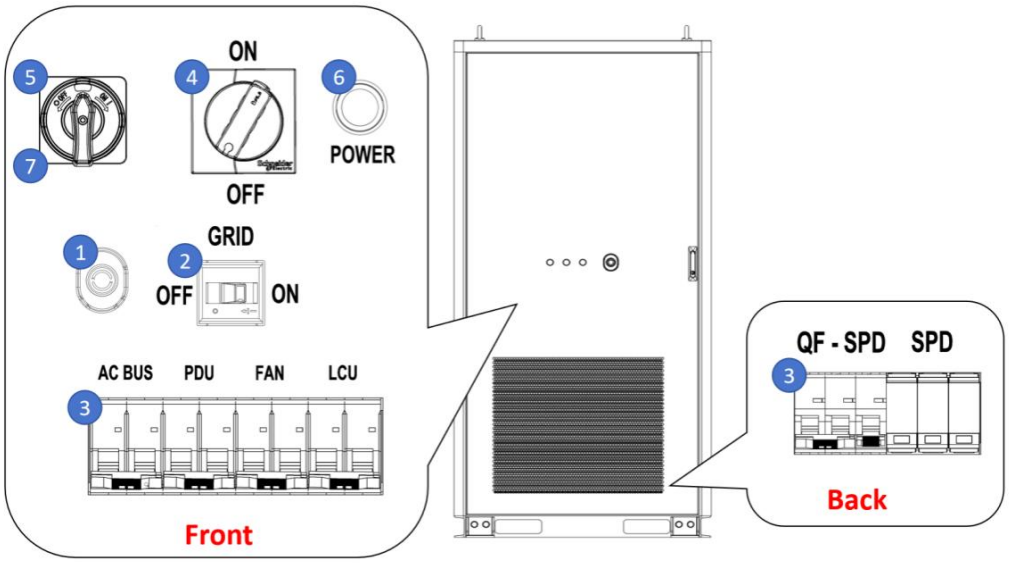
1、 Check Before Charging

No.	Check items
1	The equipment is securely installed in a location that facilitates operation and maintenance, with adequate space for ventilation and heat dissipation, and in a clean and tidy environment.
2	The protective earth wire, grid-connected AC line, auxiliary power line, load line, and communication line are correctly and securely connected.
3	Cables are tied and routed according to requirements, distributed reasonably, and free from damage.
4	AC switch, and DC power supply switch are all turned off.
5	The voltage and frequency at the grid connection point of the energy storage system meet the grid connection requirements.

2、 Power on the equipment

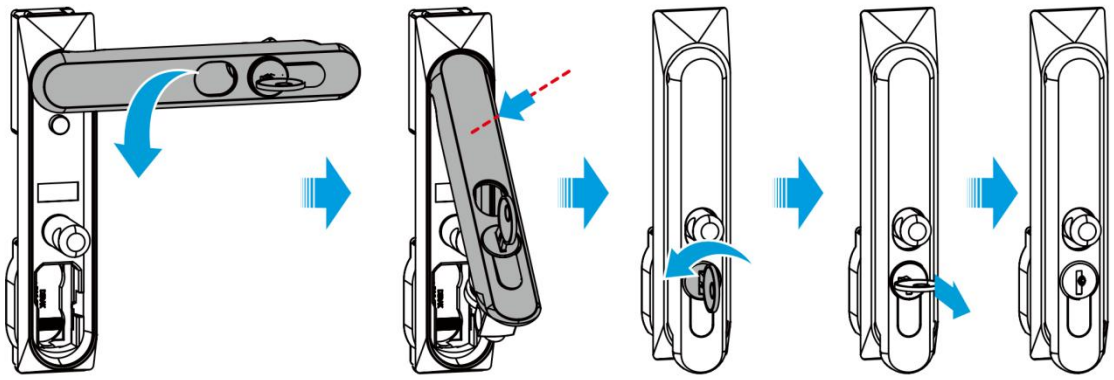
Power-Up Steps：

1. Verify the emergency stop button. If it is engaged, turn it to release.
2. Switch off the AC circuit breaker.
3. Turn on the AC auxiliary power circuit breakers (both front and rear of the equipment).
4. Switch the DC circuit breaker to the ON position.
5. Move the DC isolation switch to the ON position.
6. Press the high-voltage equipment power switch.
7. Return the DC isolation switch to the OFF position.
8. Power-up is complete; monitor all indicator lights and verify the status using the display.



3、 Equipment door-close

Note
• After the energy storage system is powered on, if there is no abnormal situation and fault alarm, please close the equipment door. • Close the equipment door and keep the key properly.



PART 08. Energy Management System(EMS)

Each equipment has a High-end integrated display and control system.

(1) High-Performance Data Processing

Efficient processor and NPU for fast response to demand-side instructions, enabling local and cloud data monitoring, storage, and computation.

(2) Advanced Graphics and AI

Integrated 2.3 TOPS NPU, extendable to 8-26 TOPS AI card, supporting 4kP30 and 1080p60 video decoding.

(3) High-Brightness Touch Display

10.1" LCD with LED backlight, wide operating temperatures, flat surface, and thin profile. Optional anti-reflective treatment and brightness up to 1200 nits. Standard brightness of 500 cd/m2. Wide viewing angles (85°/85°/85°/85°), multi-touch PCAP touchscreen with USB interface.

(4) Robust and Durable Design

IP65 protection and operating temperature range of -20 ° C to 65°C, suitable for harsh industrial environments.

(5) Smart Local Control Modes

Built-in modes like self-use, peak shaving, PV priority, grid priority, backup, and battery modes. Local smart monitoring, data curve generation, parameter settings, firmware updates, maintenance reports, and log recording for convenient after-sales service.

(6) Flexible Cloud Connectivity

Supports multiple interfaces including LAN, Wifi, and LTE for versatile cloud platform connections.

PART 09. System Maintenance

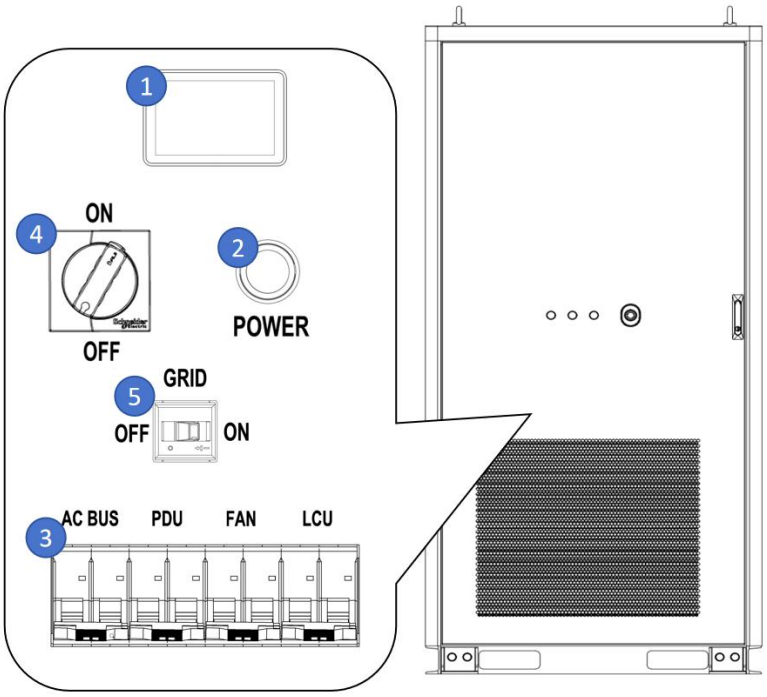
1、 Power Down the Equipment

Danger

- When operating and maintaining the energy storage system, please charge down the energy storage system. The live operation equipment may cause damage to the energy storage system or the risk of electric shock.
- After the energy storage system is powered off, it takes some time for the internal Instructions s to discharge. Please wait until the equipment is fully discharged according to the required labeling time requirement.
- In case of emergency, please use the emergency stop switch to power on the equipment.

Power-Down Steps:

1. Step 1: Use the display to shut down the system (do not power off while high-power loads are active).
2. Step 2: Press the high-voltage equipment power switch to turn it off.
3. Step 3: Turn off the AC auxiliary power breakers located at both the front and back of the equipment.
4. Step 4: Rotate the black DC breaker knob to the OFF position.
5. Step 5: Open the AC circuit breaker to disconnect it.



2、 Energy Storage Battery System Maintenance

(1) Basic Safety Measures

Regular inspection to ensure the function of fire fighting equipment, maintenance personnel should be equipped with safety protective equipment, such as safety helmet, insulation gloves, insulation shoes, etc., equipped with tools should have insulation protection, to avoid causing battery short circuit during maintenance.

(2) Maintenance Principle

On the premise of not affecting the normal operation of the overall energy storage system and the safety of personnel and equipment, the abnormal operation state of the energy storage battery and appearance equipment is found, and the battery of the energy storage power station is in a good state by optimizing the operating environment, battery balancing and replacement.

3、 Maintenance Tool

⚠Caution

- Should be equipped with necessary tools, can be used to remove the battery module of the system, other corresponding equipment, should be equipped with appropriate battery maintenance equipment, appropriate manual lift.
- Basic voltage, current, resistance and other parameters should be equipped.

(1) Maintenance Test

Basic status detection

Battery level	Basic status monitoring
Battery system	System voltage, system current, system communication status, system charging /discharge status, system SOH, maximum available capacity, maximum available energy system
Battery cluster	Cluster voltage, cluster current, cluster communication status, cluster charging /discharge status, cluster SOC, cluster SOH, cluster maximum available capacity, cluster maximum available energy, and cluster residual capacity

Battery level	Basic status monitoring
Battery module	Module voltage, module temperature, module communication status, module SOC, module SOH, module maximum available capacity, module maximum available energy, and module residual capacity
Battery monomer	Monomer voltage, monomer temperature, monomer SOC, monomer SOH, monomer residual capacity, battery maintenance state

4、 Fire System Maintenance

(1) Quarterly Inspection

A comprehensive inspection of the gas fire extinguishing system shall be conducted quarterly and shall comply with the following provisions:

- Fire extinguishing agent storage equipment, supports and hanger are fixed without loosening.
- Check if the smoke detector and temperature sensor indicator lights are flashing normally.

(2) Annual Inspection

- Once a year, a simulated gas discharge test should be conducted in the protected area in accordance with local regulations.

5、 Liquid Cooling Maintenance

- In case of liquid leakage inside the electric equipment, please stop the machine in time and contact RENON for maintenance.
- Inspect the water cooling pipes during annual maintenance. If any damage is found, replace them immediately.
- Coolant replacement should be performed by contacting professional after-sales personnel.

6、 Electrical Compartment Maintenance

Check the situation of the main loop contact, erase the old grease on the dynamic contact, check whether the contact has no damage, whether the spring force changes significantly, and whether there is any abnormal coating oxidation phenomenon caused by the high temperature, if the above situation, should be handled in time;

- Check the load situation of the main inlet line and the main branch outlet line and record

it;

- Check whether the circuit breaker terminal and bus connection point is overheating or bad contact phenomenon;
- Check the working condition of the instrument equipment and indicator lights of each inlet and outlet circuit;
- Check whether the Instructions s and connecting lines in the equipment are abnormal;
- Check the fasteners of each part, if loose, should be tightened in time;
- Before maintenance, the relevant procedures of power failure should be handled in advance, the starting and ending time of power failure should be notified in advance, and the tools required for maintenance should be prepared;
- After power failure, to ensure that the electrical compartment is not charged;
- When switching operation, wear insulation boots, insulation gloves, and special supervision;
- Before the maintenance of the electrical compartment, check whether there are tools left in the electrical compartment.
- Regular use of local discharge instrument for live detection.

7、 Maintenance of Equipment Body

- Check whether the box installation of the battery equipment is complete, whether there is corrosion, slanting, local deformation, vibration and condensation phenomenon;
- Check whether all the box body grounding is normal;
- Check whether the shell is complete, whether the connection is loose, whether the shell is broken site;
- Check whether the surrounding environment of the box is clean, whether there is water, water leakage on the top and other objects that interfere with the safe operation;
- Check the ash accumulation of the ventilation filter screen, if the ash accumulation is serious, it should be cleaned in time.It is recommended to clean and maintain the system every six months; the specific maintenance cycle may vary depending on usage.
- Regularly use a thermal imaging camera to inspect the equipment.
- After the equipment is put into operation, do not touch the box;
- In severe weather, special inspection should be carried out. In strong wind, check whether the lead is swinging violently and whether the arc is sufficient. There should be no debris at the top cover of the box; on snow days, the contacts should not melt or discharge immediately; on fog days, the parts have spark discharge, etc.

8、 Removal of the Smart System

Warning
• Ensure that the energy storage system has been powered off. • Wear personal protective equipment when operating the energy storage system.

Step 1: Open the equipment door

Step 2: Disconnect all the electrical connections of the energy storage system, including: AC line, communication line, and protective ground wire.

Step 3: Properly preserve the energy storage system. If the subsequent energy storage system needs to be put into use, ensure that the storage conditions meet the requirements.

9、 Scrapped Energy Storage System

If the energy storage system cannot be used and needs to be scrapped, please dispose the energy storage system according to the electrical waste treatment requirements of the regulations where the energy storage system is located. The energy storage system should not be treated as household waste.

10、 Operational Requirements

(1) Personnel Requirements

- All personnel shall be familiar with the operation and maintenance of high and low voltage electrical equipment, and shall have at least two years of practical experience in the operation and maintenance of electrical equipment.
- Maintenance personnel must have the maintenance knowledge of lithium ion battery of electrochemical energy storage power station and the relevant professional knowledge of energy storage power station.
- Relevant staff shall conduct corresponding operations in strict accordance with relevant systems. On the basis of safety measures, use special tools, spare parts, maintenance devices or software to test, test, maintain and replace batteries or related devices, and record the corresponding operations in time.
- Full-time safety officer must be appointed to be responsible for the safety supervision of the operation and maintenance projects.

(2) Regular Requirements

Maintain the content	Maintenance method	Maintenance cycle
System appearance	Check the inlet / outlet for foreign matter, dust, clean appearance and running light.	1 time / half a year ~1 time / a year
Meter display	Check whether the voltage and electrical intensity values are within the normal range.	1 time / half a year ~1 time / a year
Electrical connection	Check whether the electrical connection is loose, and whether the cable appearance is damaged and leaky copper phenomenon.	1 time / half a year ~1 time / a year
Fire extinguisher System	1. Check if the wiring is loose or abnormal.. 2. Check if the fire suppression device is obstructed.	1 time / half a year ~1 time / a year
PCS Test	Charge and discharge test, off-grid operation test, initialization test, system shutdown test,remote test.	After the first installation or repair, depending on the demand
Main control box Test	Battery cluster split switch and battery cluster closing test.	After the first installation or repair, depending on the demand

The above maintenance cycles are only recommended values and can be adjusted according to actual planning.

PART 10. Fault Treatment

Please troubleshooting according to the following methods. If the troubleshooting method cannot help you, please contact the after-sales service center.

When contacting the after-sales service center, please collect the following information to easily solve the problem quickly.

1) Energy storage system information, such as serial number, software version, equipment installation time, fault occurrence time, fault occurrence frequency, etc.
2) Energy storage system installation environment, such as: weather conditions, installation environment recommendation can provide photos, videos and other documents to assist the analysis of problems.

1、 Power grid situation.

Content	Maintenance method	Actions
Smoke sensor abnormality	Detecting smoke	Stop PCS, battery low voltage, liquid cooling shutdown
Aerosol abnormality	After aerosol release	Stop PCS, disconnect AC circuit breaker, battery low voltage, liquid cooling shutdown
Water immersion abnormality	Detecting water	Stop PCS, disconnect AC circuit breaker, battery low voltage, liquid cooling shutdown
AC circuit breaker status off	AC circuit breaker off	Stop PCS, disconnect AC circuit breaker
Emergency stop button state	Emergency stop button pressed	Stop PCS, disconnect AC circuit breaker, battery low voltage, liquid cooling shutdown
Lightning arrester abnormality	After being struck by large current	Stop PCS, disconnect AC circuit breaker, battery low voltage, liquid cooling shutdown

Content	Maintenance method	Actions
Host disconnection	1. Line connection not good 2. IP address problem	Stop PCS, disconnect AC circuit breaker, liquid cooling shutdown
Sub-host disconnection	1. Line connection not good 2. IP address problem	Stop PCS, disconnect AC circuit breaker, liquid cooling shutdown
Battery total information disconnection	1. Line connection not good 2. IP address problem	Stop PCS, disconnect AC circuit breaker, liquid cooling shutdown
Liquid cooling unit disconnection	1.Line connection not good	Stop PCS, disconnect AC circuit breaker
Dehumidifier disconnection	1.Line connection not good	Stop PCS, liquid cooling shutdown
PCS disconnection	1.Line connection not good 2.IP address problem	Disconnect AC circuit breaker, battery low voltage

PART 11. Technical Data

1、 Energy Storage System parameter

Technical Specifications	R-MP233125A0-US
Battery Energy Storage	
Cell Type	LFP 3.2V/280Ah
Module Combination	1P52S
System Combination(Modules)	5 in series
Capacity(kWh)	233
Nominal Voltage(V)	832
Operation Voltage Range(Vdc)	761-923
Discharge Depth	90%DoD
Thermal Management Mode	Liquid Cooling
Thermal Control Management	Aerosol Extinguishing
AC Output	
Rated AC Output Power(kW)	125
MAX.AC Output Power(kVA)	137.5
Rated Output Voltage (Vac)	480 /3P3W
Output Voltage Range(Vac)	-15%~+10%(settable)
Rated Grid Frequency(Hz)	60(settable)
MAX.Output Current(A)	165.4
Adjustable Power Factor	>0.99
THDi	<3%
System Characteristic	
Communication Interface	RS485,Wi-Fi,LTE,LAN
Certifications	IEC 62619,EN 61000-6-1/2/3/4 EN 62019-1/2,UL1973,UL9540A UL9540,UN38.3
General Parameters	
Dimensions(W*D*H)	1100*1450*2330mm/43*57*91.3in
Total Weight	≈2860kg
Noise Level @1m	≈75dB(A)/Average Value of Front and Rear Inlets

IP Rating	IP54
Operating Temperature	-20℃ to 55℃
Operating Humidity(RH)	0 to 95%
Storage Conditions	-20℃ to 30℃ Up to 95% RH,non-condensing State of Energy(SoE):50% initial

2、 Battery Cell Parameter

No.	Projects	Parameters	Remarks
1	Cell Type	Lithium Iron Phosphate (LFP)	
2	Cell Nominal Capacity	280Ah	25℃±2℃/0.50
3	Nominal voltage	3.2V	
4	Nominal energy	896Wh	25℃
5	Operating Voltage	2.5Vto 3.65V	0℃~55℃
		2.0Vto 3.65V	-30C~0℃
6	Standard discharge current	140A	25℃±2℃
7	Maximum continuous discharge current	280A	25℃±2℃
8	Peak discharge current	560A	@60S,SOC≥20%
9	Standard charging current	140A	25℃±2℃
10	Maximum continuous charging current	280A	25℃±2℃
11	Peak charging current	560A	@60S,SOC≤80%
12	Operating temperature	0~55℃	Charging
		-30~55℃	Discharge
13	Storage temperature	-30~60℃	

No.	Projects	Parameters	Remarks
14	Battery weight	5.34kg±0.3kg	
15	Energy Density	≥165Wh/Kg	
		≥350Wh/L	
16	Battery internal resistance	≤0.45mΩ	25℃,50%SOC
17	Standard charging mode	Under the condition of ambient temperature (25±2)℃,constant current and then constant voltage are used for charging.The constant current is 0.511(A),the constant voltage is 3.65V,and the charging is terminated when the current drops to 0.0511(A)during the constant voltage process and left for 1 hour	

PART 12. Emergency Handling Plan

1、 Fire

Step 1: Evacuate the site personnel to the safe area, delimit the safety isolation area, and call the alarm number according to the scene situation.

Step 2: To ensure personal safety, perform the following operations conditionally:

(1) If the wiring harness smoke and fires, use carbon dioxide or dry powder fire extinguisher to put out the fire.

(2) If the energy storage battery catches fire, use high pressure water gun to put out the fire at a distance.

(3) If smoke inhalation occurs accidentally, please transfer it as soon as possible and seek medical attention.

Step 3: Notify the system manufacturer to get further processing opinions.

If the fire is caused by abnormal charging and discharge, be sure to turn off the power supply at the first time, and then perform the fire extinguishing action.

2、 Water Logging

Step 1: No matter whether the system is powered on or not, evacuate the site personnel to a safe area and draw a safety isolation area.

Step 2: Notify the system supplier and repair it after the water is removed.

Step 3: Do not start the system before the system manufacturer gives the system safety judgment result.

PART 13. Quality Assurance Instructions

1、 Quality Warranty Regulations

- During the quality warranty period, RENON shall provide the quality warranty service by RENON for the faults caused by the quality defect of the battery system.
- RENON provides paid services for products beyond the quality warranty period.
- Any fault that is not responsible for RENON is not within the responsibility of the quality warranty.
- During the quality warranty period, the ownership of the faulty parts replaced by RENON for free shall belong to RENON.

2、 Exemption Scope of Quality Warranty Liability

RENON does not provide a quality warranty service for:

- Various faults caused by not operating, maintaining, and repairing products according to the correct methods provided in this manual.
- The battery system has been subjected to excessive water immersion, impact, or other forms of damage beyond what it can withstand.
- Without the authorization of RENON after-sales service department and service station, the company shall refit, install, assemble and adjust the battery system.
- When a fault occurs in the battery system, any damage caused by the customer handling the fault without prior authorization from RENON's after-sales department or service station.
- Quality problems caused by not using the pure parts provided by our company.
- Damage caused by the use of the charging equipment that does not meet the national standards or the non-standard charging operation.
- Due to force majeure such as earthquake, typhoon, flood, chemical pollution, lightning strike, hail, sand, flying rocks, fire, political disaster, or
- Damage caused by force majeure events such as earthquakes, typhoons, floods, chemical pollution, lightning strikes, hail, mud and sand, flying stones, fires, political disasters, or intentional human damage, as well as secondary compensation claims based on these damages, are exempt from liability for both

parties.

RENON reserves the right to the final interpretation of this specification within the limits of the law, and retains the right to modify this specification. Any changes will not be subject to further notice.

PART 14. Emergency Treatment

Warning
If the battery leaks electrolyte, avoid contact with the leaked liquid or gas. Electrolyte is corrosive and can cause skin irritation and chemical burns. If contact occurs, follow these steps: • Inhalation: Move away from the contaminated area and seek medical assistance immediately. • Eye Contact: Rinse eyes with water for at least 15 minutes and seek medical assistance immediately. • Skin Contact: Wash the affected area thoroughly with soap and water and seek medical assistance immediately. • Ingestion: Induce vomiting and seek immediate medical attention.

Warning
• A burning battery may release toxic and harmful gases. • In the event of a fire, immediately call the fire department and notify firefighters, providing them with relevant product information. • If safe to do so, disconnect the power supply to the equipment by turning off the upstream and downstream switches. • Do not use ABC dry powder extinguishers to extinguish the fire. Firefighters must wear protective suits and self-contained breathing apparatus.

PART 15. After-Sale Service

RENON Energy provides customers with a full range of technical support and after-sales service.Users can get service through our company's service phone.

Free warranty service life, please refer to the contract.

The following conditions are not covered by our free warranty service:

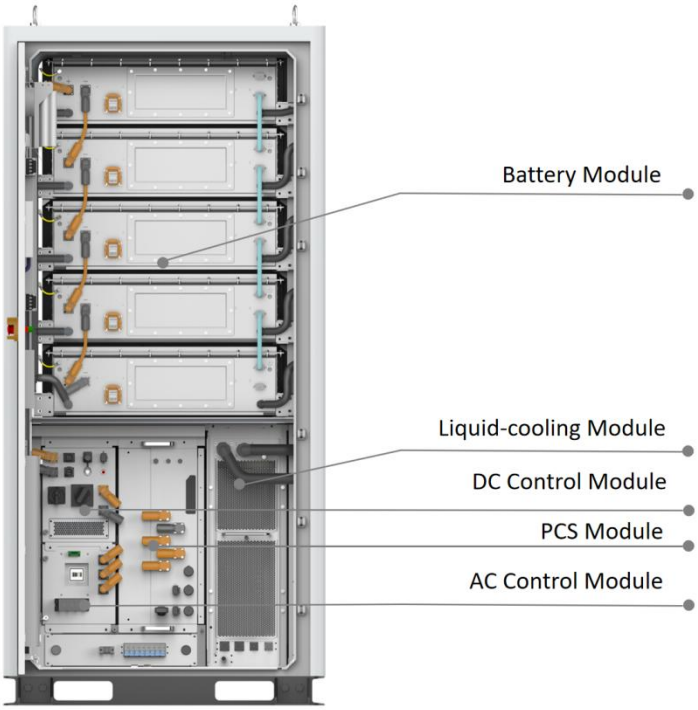
- Failure to follow the user manual, resulting in system damage or malfunctions caused thereby.
- Not following relevant electrical safety standards for wiring and power supply, or damage and malfunctions caused by poor on-site conditions.
- Unauthorized modifications by the user, resulting in system damage or malfunctions caused thereby.
- Due to irresistible natural factors such as typhoon, earthquake, flood, fire or harsh environment (high temperature, low temperature, high humidity, acid rain, etc.),System damage or caused failure.
- After a fault occurs, if the user does not maintain the initial fault state and fails to promptly notify the manufacturer, instead handling the issue themselves, leading to an inability to accurately determine the cause of the fault.

PART 16. Technical Agreement

1、 Introduction of the Main Equipment

AC-MPack energy capacity is 125kW/233kWh, and its main configurations are: 1 set of PCS with rated power of 125kW(EU), 1 set of high voltage control management system, 1 set of liquid cooling control management system, 1 set of aerosol fire protection system, 1 set of PACK aerosol fire fighting system,1 set of 233kWh battery system (DC voltage 761.8-923V), 1 set of battery management system (BMS), and 1 set of communication management system.

AC-MPack energy system adopts modular unit design with AC 400V output, which can be directly AC side parallel expansion. The appearance of each energy system is consistent and uniform in style, and the modular design reduces the risk caused by product failure and allows flexible configuration of capacity. With compatible outdoor design and IP54 protection level, it can be installed directly outdoors to save users' deployment cost.



The whole machine is delivered to meet the requirements of rapid, phased and distributed deployment; comprehensive monitoring and management system for battery, grid and environment provides fault warning, status monitoring and maintenance reminder.

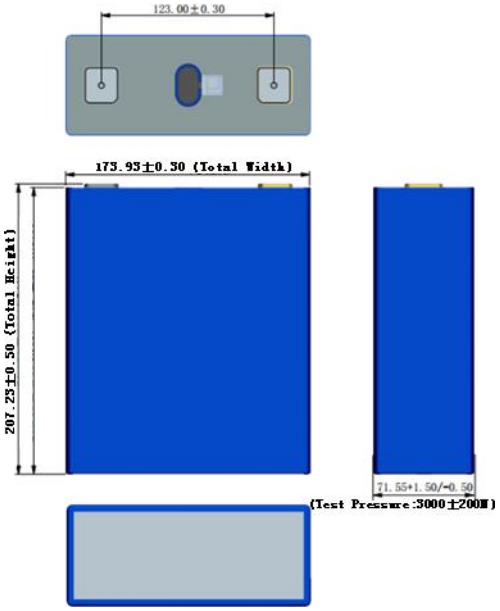
No.	Projects	Parameters	Remarks
1	Product Model	AC-MPack	
2	Cell Type	LFP 3.2V/280AH	
3	Battery PACK configuration	233kWh	
4	Battery voltage range	761~923V	
5	AC rated power	125kW	
6	AC maximum power	137.5kVA	
7	THD (rated power)	<3%	
8	Rated grid voltage	480V,3P3W	
9	Grid voltage range	-15%~+10% (settable)	
10	Maximum AC current	164.5A	
11	Power factor	>0.99	
12	Rated grid frequency	60Hz	
13	Charge/discharge multiplier	≤0.5C	
14	Discharge depth	90% DODs	
15	Number of cycles	>8000 times	(80% DOD)

No.	Projects	Parameters	Remarks
16	Charge and discharge switching time	<100ms	
17	Communication Interface	CAN, RS485, Wi-Fi, LTE	
18	System protection level	IP54	
19	Operating temperature	-20℃ ~ 55℃	Above 40℃ reduction
20	Working humidity	0%RH ~ 95%RH non-condensing	
21	Noise	<75db	
22	System size (W*D*H)	1100mm*1450mm*2350mm	
23	Altitude	≤2000m	
24	Thermal management methods	Air-cooled (PCS) + Liquid-cooled (battery)	
25	Total weight	≈3100kg	

2、 Product Parameter

(3) Battery cell

Cell parameter



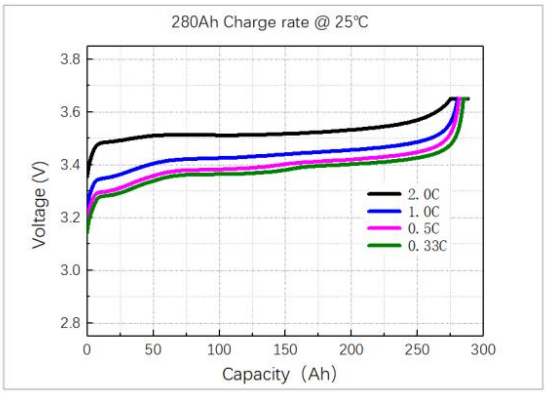
The standard 280Ah Lithium Iron Phosphate (LFP) square aluminum shell cell is manufactured by a fully automated production line. This cell performs excellently in continuous power, high cycle life, high storage life and high safety. The table 1 shows cell's basic parameter:

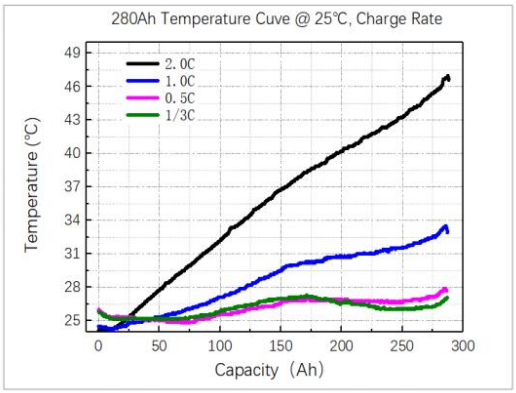
No.	Projects	Parameters	Remarks
1	Cell Type	Lithium Iron Phosphate (LFP)	
2	Cell Capacity	≥280Ah	25℃±2℃/0.5C
3	Nominal voltage	3.22V	
4	Nominal energy	896Wh	25℃
5	Operating Voltage	2.5V to 3.65V	0℃~55℃
		2.0V to 3.65V	-30℃~0℃
6	Standard discharge current	140A	25℃±2℃
7	Maximum continuous discharge current	280A	25℃±2℃
8	Peak discharge current	560A	@60S,SOC≥20%
9	Standard charging	140A	25℃±2℃

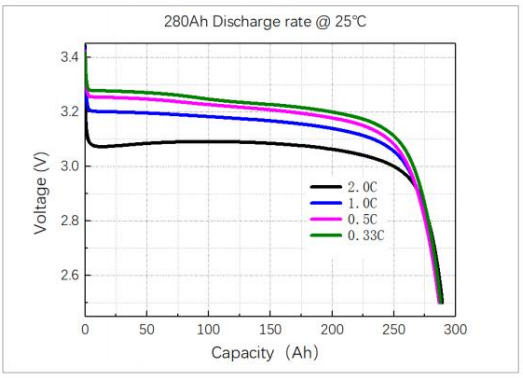
No.	Projects	Parameters	Remarks
	current		
10	Maximum continuous charging current	280A	25℃±2℃
11	Peak charging current	560A	@60S,SOC≤80%
12	Operating temperature	0~55℃	Charging
		-30~55℃	Discharge
13	Storage temperature	-30~60℃	
14	Anode Materials	LiFeO4	
15	Battery weight	5.34kg±0.3kg	
16	Energy Density	≥165Wh/Kg	
		≥350Wh/L	
17	Battery internal resistance	≤0.45mΩ	25℃,50%SOC
18	Standard charging mode	Under the condition of ambient temperature (25±2)℃, constant current and then constant voltage are used for charging. The constant current is 0.5I1(A), the constant voltage is 3.65V, and the charging is terminated when the current drops to 0.05I1(A) during the constant voltage process and left for 1 hour.	

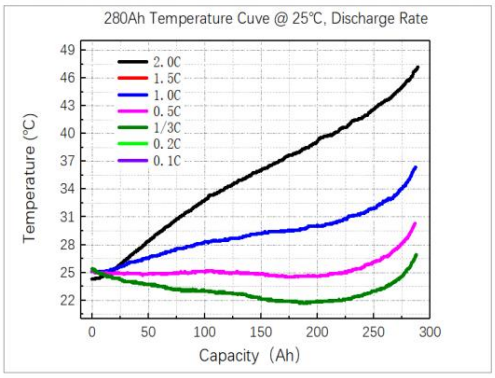
Cell capacity curve

Test conditions: ambient temperature 25℃, charge to 3.65V at different C-rate of 0.33C\0.5C\1.0C\2.0C, leave for 60 minutes and discharge at 1 C-rate power.





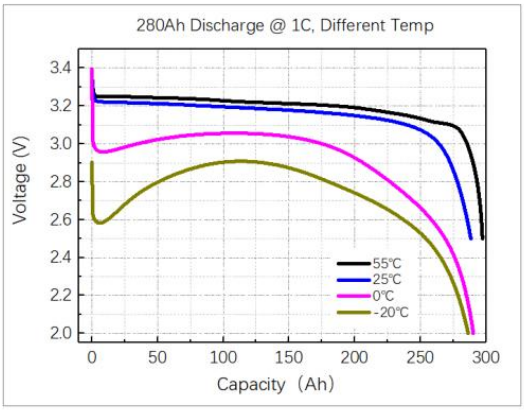


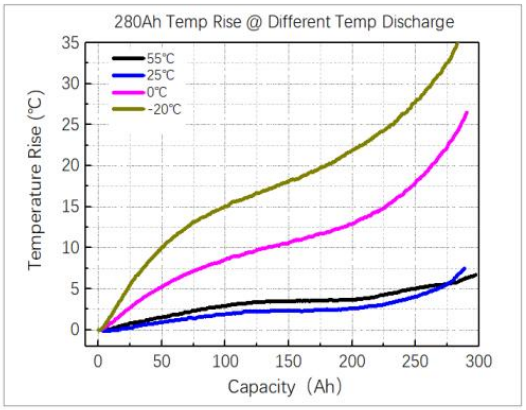


Conclusion: Ambient temperature 25°C, discharge at 1 C-rate power, cell capacity ≥ 280Ah, nominal energy ≥ 896Wh.

Cell ambient temperature curve

Test conditions: ambient temperature (-20°C, 0°C, 25°C, 55°C), discharged to 2.0V at 1 C-rate.

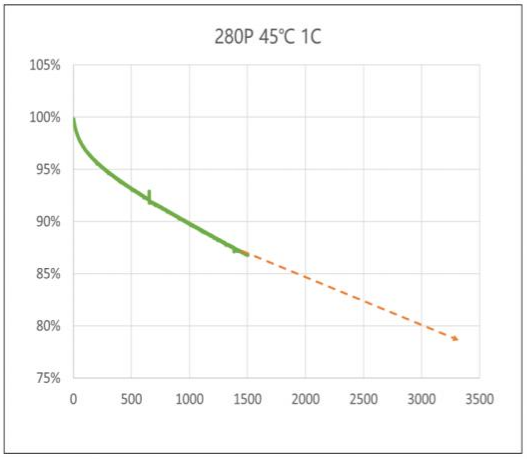


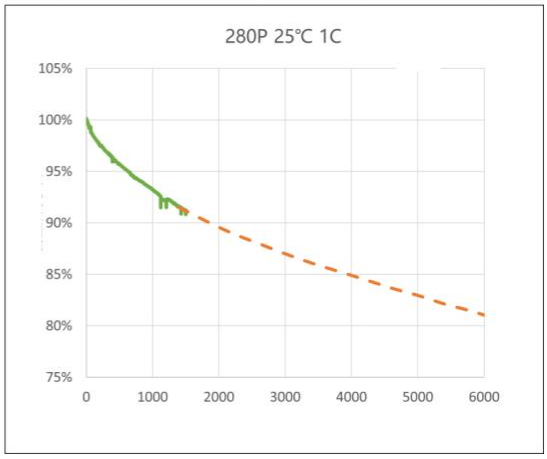


Conclusion: The ambient temperature of 25°C is the ideal operating temperature for battery cells. Above 25°C, the potential risk of thermal runaway increases; below 25°C, capacity utilisation decreases rapidly and temperature rise increases.

Cell cycle life curve

Test conditions: ambient temperature (25°C, 45°C), cyclic charge/discharge at 1 C-rate in the voltage range [2.5V, 3.65V] (corresponding to 100% DOD).

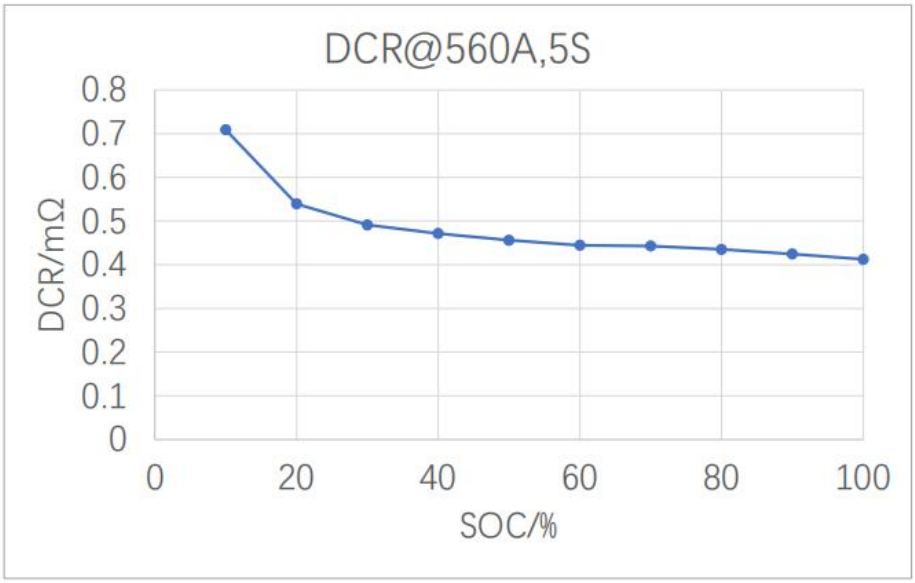




Conclusion: Ambient temperature 25°C, discharge at 1C-rate, usable capacity ≥ 80% after 6000 cycles of the cell. Ambient temperature 45°C, discharge at 1 C-rate, usable capacity ≥ 80% after 3000 cycles of the cell. The rise of ambient temperature will lead to a significant decrease in the number of cycles of cell.

Cell DC internal resistance

Test conditions: Ambient temperature (25°C, 45°C) with a pulse current of 560A for 5S to test the DC internal resistance at different SOC states.



Conclusion: The internal resistance to flow is 0.45mΩ at 25℃ ambient temperature and 50% SOC. The resistance affects the heat generation in practice.

(4) Battery module

External view of the battery module

The battery module consists of a single battery cell, connecting copper strips,

collection harness (FPC board), BMU, aerosols, fuses, fire-fighting water injection pipes, associated electrical and structural components.The battery module grouping method is 1P52S, 52 280Ah cells are connected in series, and the nominal voltage is 166.4V. The appearance effect diagram is as follows：

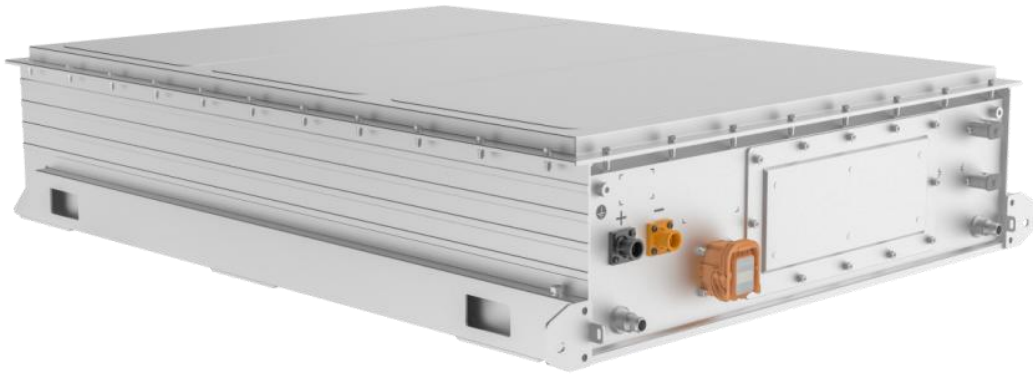
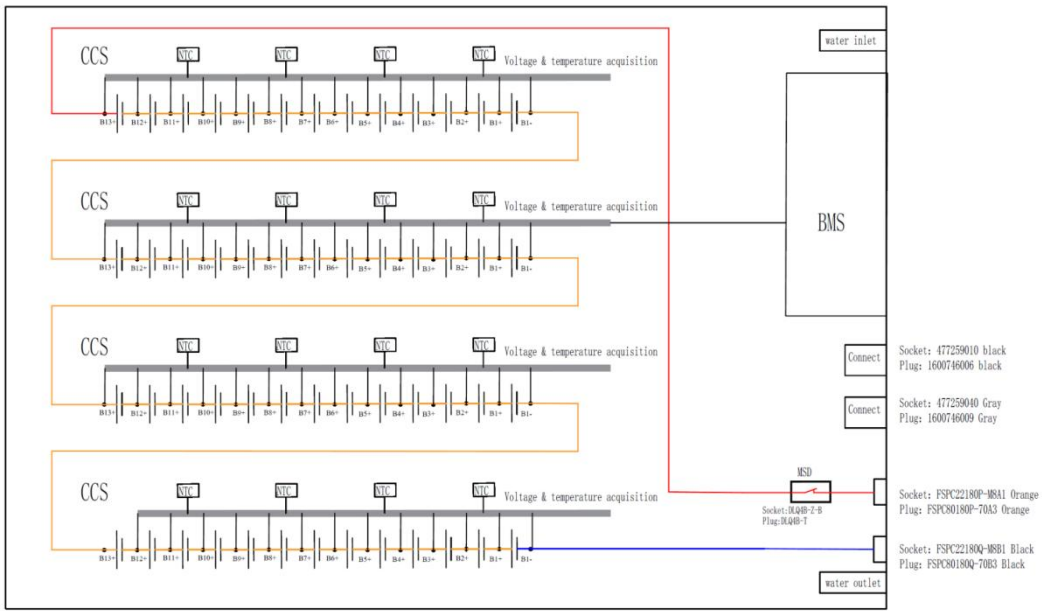


Table of battery module parameters

No.	Project	Parameters	Remarks
1	Grouping method	1P52S	
2	Module capacity	280AH	
3	Nominal voltage	DC 166.4V	
4	Nominal energy	46.6kWh	25℃
5	Operating voltage	140.4V ~ 184.6V	
6	Nominal charge/discharge rate	0.5C	
7	Operating temperature	-30℃~55℃	
8	BMS communication	CAN	
9	Battery cooling method	Liquid-cooled	
10	Fire Fighting	Aerosols	
11	Dimension	810mm*1150mm*240mm	
12	Weight	350kg	

Battery module electrical schematic

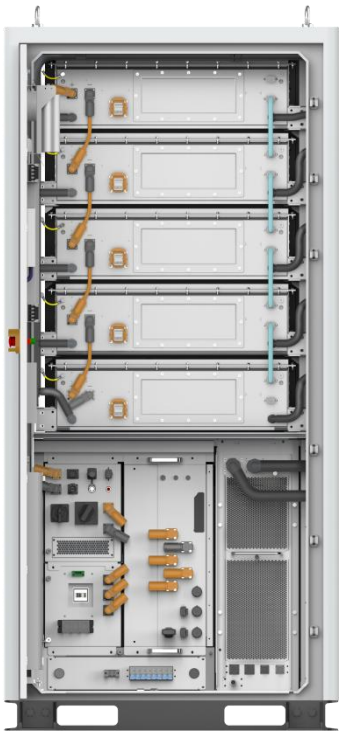


Liquid cooled battery module 1P52S 166.4V280AH

(5) AC-MPack Battery Cluster

AC-MPack battery cluster view

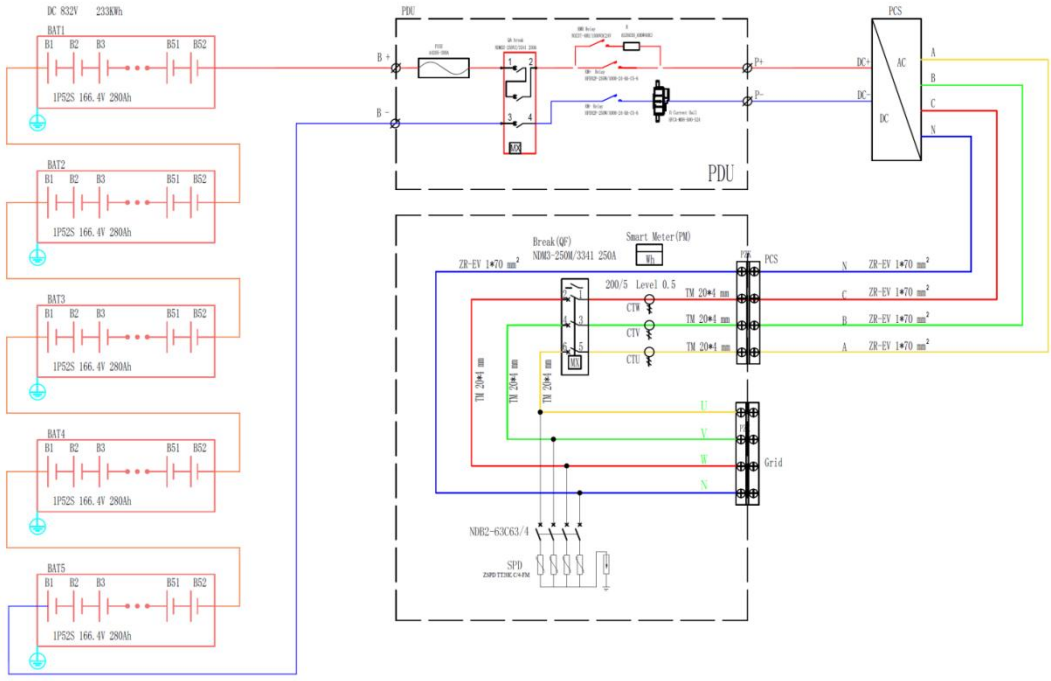
The AC-MPack battery cluster is of frame construction and the battery modules are bolted in place.The battery cluster consists of 5 battery modules, connected in series with each other and grouped in 1P260S.The battery modules are arranged sequentially from top to bottom in the battery cabinet and are connected via a special connector on the front panel. The nominal voltage is 832V and its appearance is shown in the following figure：



AC-MPack battery cluster parameter sheet

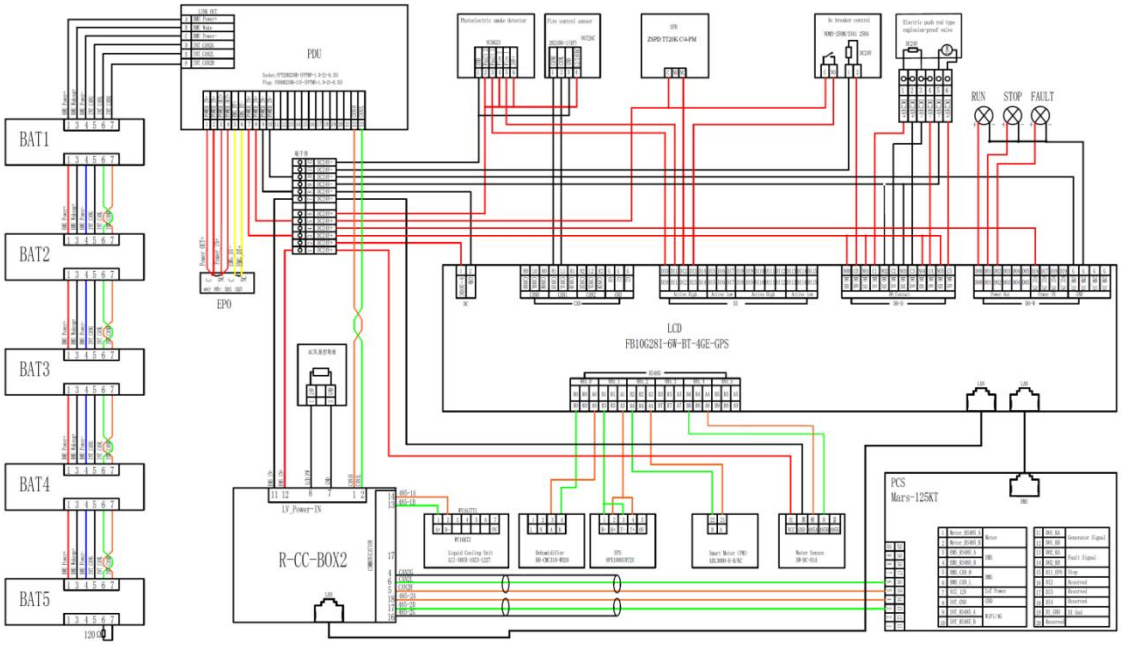
No.	Project	Parameters	Remarks
1	Grouping method	1P260S	
2	Module capacity	280AH	
3	Nominal voltage	DC 832V	
4	Nominal energy	233kWh	25℃
5	Operating voltage	761V ~ 923V	
6	Nominal charge/discharge rate	0.5C	
7	Operating temperature	-20℃~55℃	
8	BMS communication	CAN	
9	Battery cooling method	Liquid-cooled	
10	Fire Fighting	Aerosols	
12	Demension	1100mm*1450mm*2350mm	Tentative
13	Weight	2950kg	Tentative

AC-MPack battery cluster electrical schematic



(6) Battery Management System

The BMS system of this project adopts the battery & converter cooperative control technology. Each battery management unit BMU collects the voltage and temperature parameters of the battery cells in the battery box to the BCS (battery & converter cooperative control unit) through the CAN bus communication cable. Combined with other collected data (including a series of parameters such as ambient temperature, cabinet temperature, gas parameters, and battery status) and scheduling instructions, the BCS takes equalization measures for the battery and performs coordinated power control for the converter PCS. Its system topology is shown in the following graphic.



The BMS system of this project shortens the decision-making chain of battery protection and power control, ensuring that the system is simple, stable and reliable. Implement the following functions:

Combined with the battery box dynamic loop monitoring system, it can realize all-round temperature management of the energy storage system, formulate a reasonable temperature management strategy, ensure the allowable temperature range of the battery operation, improve the temperature consistency of the battery system, reduce the operating power consumption of the temperature control system, and improve the storage capacity. energy system efficiency.

Combined with the energy storage fire control system, dynamic ring monitoring system, and electrical protection mechanism, it integrates battery information, dynamic ring information in the battery box, and fire protection system detection information to realize all-round fire early warning, protection and linkage of the energy storage system, providing high reliability. To ensure effective fire safety, to achieve effective prevention, early detection, effective isolation and protection.

The integrated design with PCS greatly reduces the action sequence, action delay and the possibility of partial fault protection failure of the protection unit in the energy storage system, and designs the hierarchical action and linkage mechanism of protection.

No.	Item	parameter	Remark
1	BMS Model	BMU-56	
2	Battery voltage detection range	0 ~ 5V	
3	Battery voltage detection accuracy	±5mV	
4	Battery voltage detection cycle	≤100ms	
5	Current detection range	±300A	
6	Current detection accuracy	≤±1%	
7	Current detection cycle	≤50ms	
8	Temperature detection range	-40 ~ 125℃	
9	Temperature detection accuracy	±2℃	
10	temperature detection cycle	≤1s	
11	Balance current	≥50mA	
12	SOE calculation accuracy	≤5%	
13	SOE calculation update error	≤1s	
14	SOC estimation accuracy	≤3%	
15	SOH estimation accuracy	≤5%	
16	record	≥100000	

The energy storage battery management system (BMS) is mainly used for real-time monitoring of the battery pack, which can detect the voltage, voltage, current, temperature, etc. of the battery cells, and judge the running status of the battery in real time, upload the battery pack status information and alarm information, etc. , if necessary, cut off the output of the battery circuit for protection.

a. Battery Management System (BMS) function

1) Analog measurement function: It can measure the voltage and temperature of the single cell in real time, and measure the voltage and current of the battery pack terminal. Ensure the safe, reliable and stable operation of the battery, ensure the service life of the single battery, and meet the requirements for the optimization and control of the operation of the single battery and battery module.

2) Calculation: BMS online SOC diagnosis, estimate the state of charge of the battery, charge and discharge energy value (Wh), maximum charging current, maximum discharge current and other state parameters, and has the function of

power-down retention, and has the ability to upload the energy management system. Function. On the basis of real-time data acquisition, a multi-mode segmentation processing method is used to establish an expert mathematical analysis and diagnosis model, and the remaining power SOC of each battery is measured online. At the same time, the SOC prediction is intelligently corrected according to the discharge current of the battery and the ambient temperature, etc., and the remaining capacity and reliable use time of the battery more in line with the changing load are given.

3) Status parameter information upload function: BMS has internal information collection and interaction functions, and can upload battery cell and battery overall information to the energy management system and energy storage converter.

4) Fault diagnosis function: BMS can detect the running state of the battery, and can display and send relevant alarm signals to Energy management systems and energy storage converters.

5) Electrical protection function of battery: BMS has electrical protection functions such as battery overvoltage protection, undervoltage protection, overcurrent protection, short circuit protection, overtemperature protection, leakage protection, etc. Ground isolation to ensure the safe and reliable operation of the system.

6) Thermal management function: Strictly monitor the operating temperature of the battery pack. If the temperature is higher or lower than the protection value, a thermal management start signal will be output, and the system is equipped with a liquid cooling device to adjust the temperature; if the temperature reaches the set dangerous value, The battery management system automatically links with the system protection mechanism to cut off the battery circuit in time to ensure system safety.

7) Self-diagnosis and fault-tolerant function: The battery management system adopts advanced self-fault-diagnosis and fault-tolerant technology, and has self-test function for the software and hardware of the module itself. Even if the internal fault or even the device is damaged, it will not affect the safety of battery operation. There will be no failure of the energy storage system due to the failure of the battery management system, or even damage to the battery or a vicious accident.

8) The BMS has the function of self-diagnosis, which can self-diagnose faults such as interruption of communication between the BMS and the outside world, abnormal communication within the BMS, and abnormal acquisition of analog quantities, and can report it to the local monitoring system.

9) Balancing function: Adopting a high-efficiency balancing control strategy, the balancing current is not less than 100mA to ensure high consistency between batteries.

10) Operation parameter setting function: Various parameters of BMS operation can be modified remotely or locally in the BMS or energy storage station monitoring system, and some parameter modifications require password confirmation.

11) Local operating state display function: BMS can display various operating states of the battery system locally, such as system state, analog information, alarm and protection information, etc.

12) Event and log data recording function: BMS can store a certain amount of events and log data of the battery system locally ≥ 100,000.

13) The operation interface of the BMS system is divided into two categories of personnel. The operator and the installer have their own authority and password settings.

b. Features of BMS system

The energy block AC-MPack changes the DC confluence to the AC confluence, the battery multi-stage series-parallel management is changed to single-stage series management (that is, the single-cluster battery), and the DC side of the battery cluster is not connected in parallel. Therefore, the BMS does not need to balance the voltage between the battery clusters, and the BMS control architecture is simplified, which shortens its control and protection response time compared with the traditional BMS architecture.

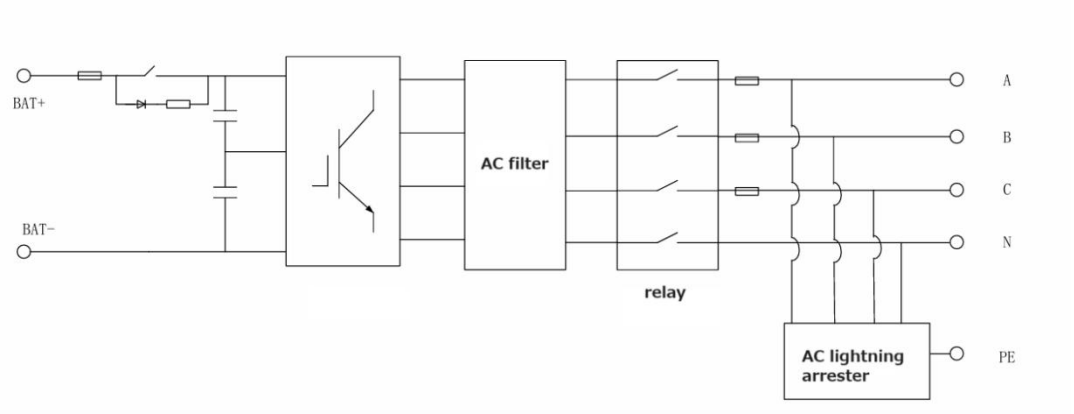
(7) Energy Storage Converter PCS

The energy storage converter (PCS) can control the charging and discharging process of the battery and perform AC-DC conversion. PCS is composed of DC/AC bidirectional converter, control unit, etc. The PCS controller receives the control command of the energy management system through communication, and controls the converter to charge or discharge the battery according to the symbol and size of the power command, so as to realize active power to the power grid. Power and reactive power regulation. The PCS controller communicates with the BMU through the CAN interface to obtain the status

information of the battery pack, which can realize the protective charging and discharging of the battery and ensure the safe operation of the battery.

No.	Item	Parameter
1	Model	Mars-125KT
DC Side Parameters		
2	Maximum DC Voltage	1500V
3	DC Maximum Current	195A
4	DC Voltage Range	720~1300V
AC Side Parameters		
5	AC Rated Power	125kW
6	AC Maximum power	137.5kVA
7	AC Maximum Current	165.4A
8	Rated Grid Voltage	480V
9	Grid Voltage Range	-15%~10% (Can be set)
10	Rated Grid Frequency	60Hz
11	THD (rated power)	< 3%
12	Power factor	>0.988
System parameters		
13	Topology	Non-isolated
14	IP rating	NEMA type 4X
15	Operation temperature	-35°C~60°C/-31°F~140°F
16	Relative humidity	0~100% (No-condensing)
18	Cooling type	Intelligent air cooling
19	Dimensions (W×H×D)	600x295x900mm/23.6x11.6x35.4in
20	Altitude	3000m/9843ft(>2000m/6562ft derating)
21	Communication interface	RS485, Ethernet, CAN, Bluetooth
22	Installation	Rack-mounted
23	Display	LED

Basic functions of the energy storage converter

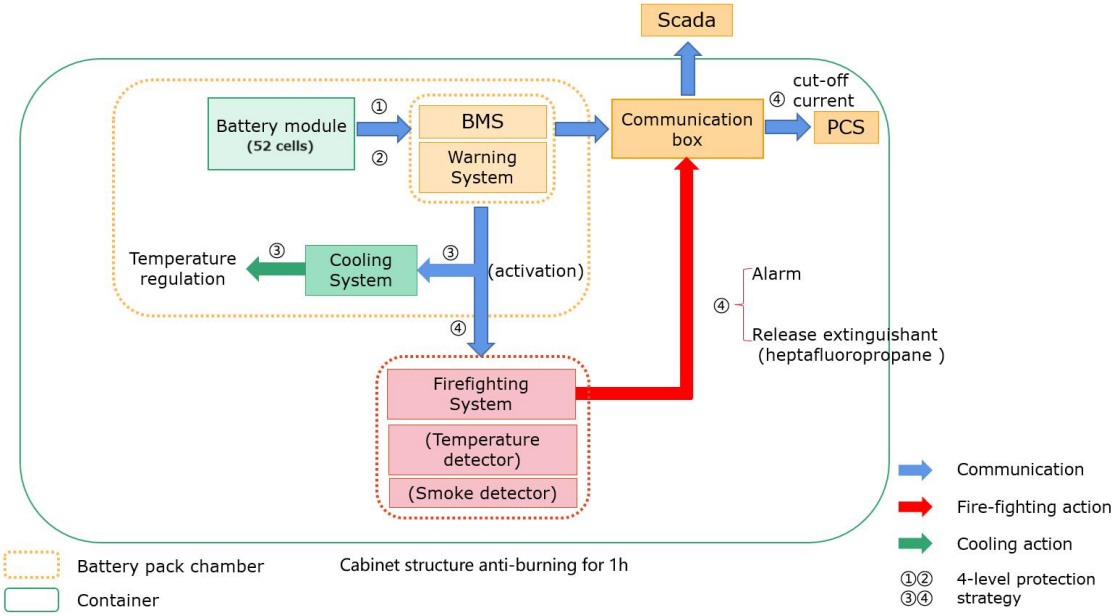


The PCS device can automatically synchronize with the grid, and the PCS device has a primary frequency regulation function. The necessary current limiting measures are taken at any stage of charging and discharging according to the needs of the battery to avoid damage to the battery.

3、 Protection System

(8) Level Protection Strategy

Renon power energy storage system focuses on safety and protection. A holistic protection system, communicating with BMS and EMS provided by buyer, consists of three sub-systems: warning system, cooling system and firefighting system. The topology diagram of whole protection system is shown below Figure



The system considers natural decay, abnormal charging and discharging, early internal short circuits and thermal runaway etc. based on 4-level protection strategy from single cell to the whole BESS. The strategy is shown briefly in Figure below.

Protection Level	Condition	Treatment Measures
Level 1	1. Abnormal cell voltage 2. Abnormal cell temperature 3. Cell voltage imbalance	1. Generate alarm information 2. Performance discreteness analysis
Level 2	1. Micro short circuit in cell 2. Cell voltage drops slowlly	1. Generate alarm information 2. Limit power
Level 3	1. Overtemperature up to limited value	1. Generate alarm information 2. Stop PCS running 3. Start protection status
Level 4	1. Smoke concentration triggers the smoke detector 2, Indoor temperature triggers the temperature detector	1. Generate alarm information 2. Firefighting system Alarm(light and sound) 3. Release extinguishant (heptafluoropropane)

The first-level protection refers to the fire protection system from the early aging of the battery cell to intervene in the early warning. When the performance of a single cell suddenly changes, named with inconsistency with other cells' performances, it is possible of early failure on the cell. BMS receives signals and releases alarms to the operator. Cell performance discreteness analysis starts at this stage to find deterioration or risk, to reduce the possibility of fire.

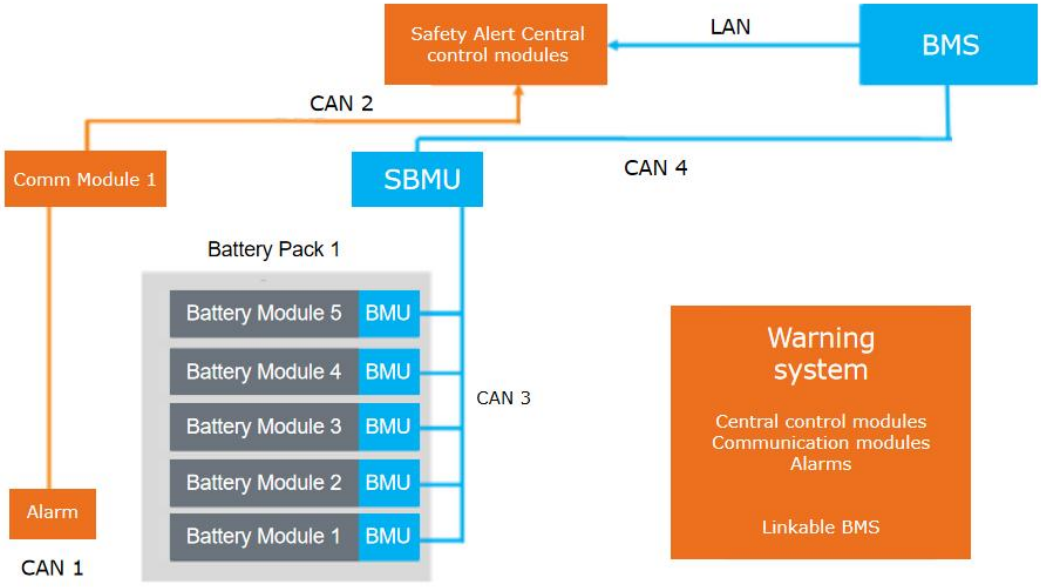
The second-level protection can restrict the charge and discharge power of abnormal battery cells to avoid causing rapid thermal runaway. When a single cell has an internal micro-short circuit, the performance of the cell will decrease. Also, the terminal voltage will slowly drop even without load, that self-discharge. The temperature is thus abnormal due to excessive self-discharge. The risk of thermal runaway exists if the battery continues to charge and discharge at a large current at the time. The secondary system will remove risk of thermal runaway by limiting the charge and discharge power of the abnormal battery cell.

The third-level protection is related to current cut-off and cooling adjustment. It is necessary to cool down and cut off the current of PCS to stop running when over-temperature occurs. Especially in the extreme situation of short-circuit leading to over-temperature. Short circuit generates a certain amount of heat and it is a time for BESS in a critical state of thermal runaway. Spontaneous combustion occurs within a few minutes with the absence of external intervention at this stage. Therefore, to avoid fire caused by severe heat production, the third-level protection ensures cutting the external circuit off and cooling down by adjusting the air-conditioning system.

The fourth-level protection strategy triggers the firefighting system. When the smoke detector and temperature detector detect the fire signal at the same time, the detector will feed back to the gas fire extinguishing controller, and start the acousto-optic alarm. 30 seconds after alarming, the firefighting system releases extinguishant into such protection area as the battery pack chamber in the 233kWh for fire extinction.

(9) Warning system

Each standard 233kWh is configured with a set of warning system including three modules: alarms, communication modules and central control modules. The system and the battery management system(BMS) operate simultaneously. The warning system topology is shown in the following Figure:



Warning system consists of early warning modules which assembly into battery module. The warning modules monitor the temperature, smoke, combustible gas, carbon monoxide and other data of cells in real time. It circulates quantitative detection and analysis intelligently, then uploads the data to the communication module through CAN bus. Communication modules upload related data to the central control module via CAN bus. Then the control modules collects and analyses data of the environmental change characteristic values of 233kWh cabinet. The centralized control modules can also communicate with the BMS.

(10) Firefighting System

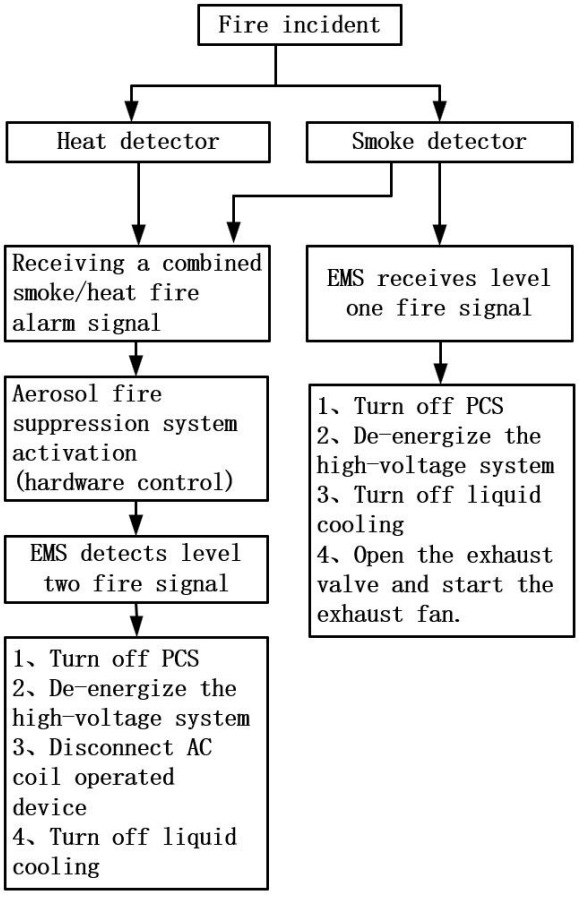
This firefighting system uses aerosol as fire extinguishing agent. It is mainly equipped with a fire extinguishing controller, smoke detector, temperature detector,

alarm bell, sound and light alarms, gas release door light, and emergency start/stop button.

When the smoke and temperature detectors detect fire signals at the same time and feed it back to the fire extinguishing controller, the alarm bell and sound and light alarm are triggered together. 30 seconds after alarming, the firefighting device releases extinguishing agent, aerosol, to protection zone(e.g. battery pack chamber of 233kWh) for fire extinction. At the same time, the gas release door light.

If the alarms fail during a fire, the emergency start/stop button should be pressed manually to release extinguishing agent. This button also can work to stop releasing while false alarm occurs.

Following Figure demonstrates the working flow of firefighting system for reference.



Control mode

There are three control modes for operation.

(1) Automatic control mode.

In this mode, when only one detector signals, the controller just signals sound and light alarm for abnormal light to notify the occurrence of abnormal situations.

The firefighting device would not be triggered. However, when two detectors signal at the same time, sound and light alarms will be ordered to sound an emergency of fire.

(2) Electrical manual control mode.

In the manual state, the firefighting device is only started by pressing manually the emergency star/stop button when two detectors ensure fire occurs.

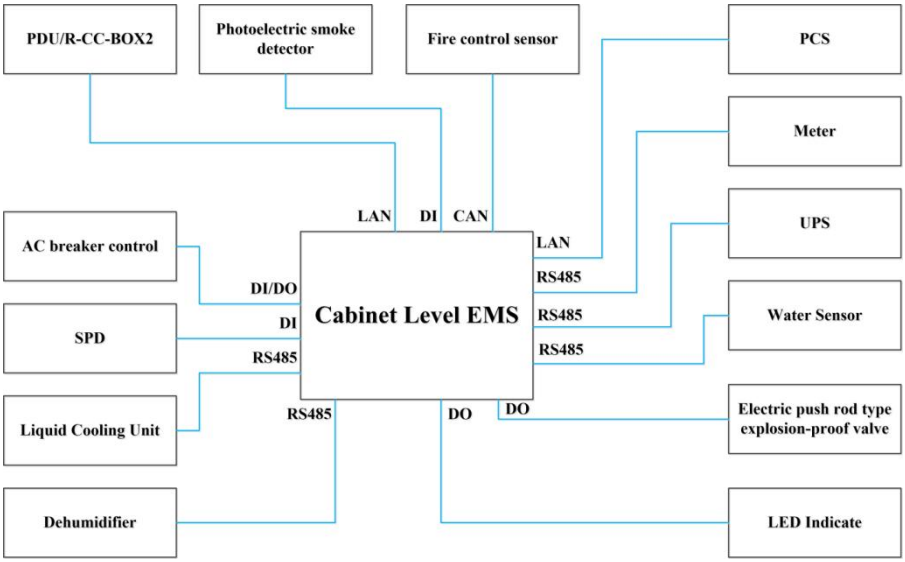
(3) Mechanical emergency manual control mode.

Extremely, if faults occur in the controller leading to no working in the alarms when in combustion, the firefighting device is manually started through the mechanical emergency start/stop button to out fire.

4、 Energy Management System(EMS)

(11) Cabinet Level EMS

Each cabinet has a High-end integrated display and control system.



(1) High-Performance Data Processing MCU

Equipped with a powerful processor and ample memory, ensuring fast response to demand-side instructions and efficient data processing.

(2) Independent Smart Local Control

Built-in modes such as self-use, peak shaving, PV priority, grid priority, backup, and battery modes provide convenient local operation. Supports local intelligent monitoring, data curve generation, parameter settings, firmware updates, maintenance report generation, and log recording for simplified after-sales service.

(3) Advanced Graphics and AI Capabilities

Featuring advanced graphics processing and AI capabilities, offering robust

performance for enhanced device intelligence.

(4) Flexible Cloud Connectivity

Supports multiple interfaces including LAN, WiFi, and LTE for versatile cloud platform connections based on customer needs.

(5) High-Brightness Full-View Touch Display

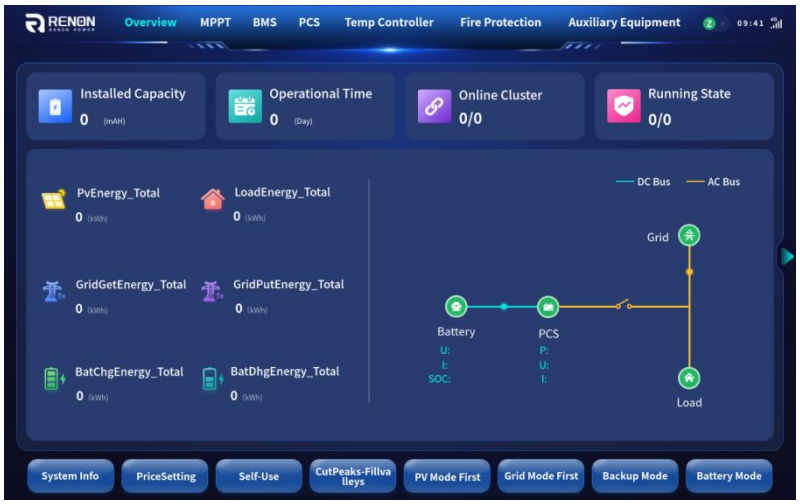
1280*800 resolution, 45cd/m2 brightness, full viewing angle, and three-point capacitive touch screen, allowing easy viewing of system data and settings both indoors and outdoors.

(6) Comprehensive Communication & Control Interfaces

Includes CAN, RS485, RS232, Type-C, USB3.0, LAN, TF card slot, Nano SIM, HDMI, and RTC interfaces, enabling connection to various external devices and sensors for centralized management and control.

(7) Robust and Durable Design

IP65 protection and operating temperature range of -20 ° C to 70°C, making it suitable for harsh industrial environments.



Parameters

Item	Parameter
CPU	RK3568 4xA53@2.0GHz
Memory	RAM: 4GB, EMMC: 64GB, EEPROM:64KB, SSD: 1T(Optional)
GPU	Mail-G52
NPU	Support 1 Tops computing power
OS	Ubuntu 20.04
Brightness	450cd/m2
Resolution	1280*800

Angle	Full viewing Angle
Touch	3 points capacitive screen
Communication interface	3* CAN, 6* RS485, 1*RS232, 1*Type-C, 1* USB3.0, 4*1000Mbps, Lan, 1* TF card, 1* Nano SIM card, 1* HDMI, 1* RTC
Control interface	12* DO, 16* DI, 2* NTC, 1* Buzzer
Wireless communication	Wifi/BT, 4G, GPS
IP grade	IP65
Operating temperature	-20°C~70°C

(12) Array Level EMS

(1) High-Performance Data Processing

Efficient processor and NPU for fast response to demand-side instructions, enabling local and cloud data monitoring, storage, and computation.

(2) Advanced Graphics and AI

Integrated 2.3 TOPS NPU, extendable to 8-26 TOPS AI card, supporting 4kP30 and 1080p60 video decoding.

(3) High-Brightness Touch Display

10.1" LCD with LED backlight, wide operating temperatures, flat surface, and thin profile. Optional anti-reflective treatment and brightness up to 1200 nits. Standard brightness of 500 cd/m2. Wide viewing angles (85°/85°/85°/85°), multi-touch PCAP touchscreen with USB interface.

(4) Robust and Durable Design

IP67 protection and operating temperature range of -20 ° C to 65°C, suitable for harsh industrial environments.

(5) Smart Local Control Modes

Built-in modes like self-use, peak shaving, PV priority, grid priority, backup, and battery modes. Local smart monitoring, data curve generation, parameter settings, firmware updates, maintenance reports, and log recording for convenient after-sales service.

(6) Flexible Cloud Connectivity

Supports multiple interfaces including LAN, Wifi, and LTE for versatile cloud platform connections.

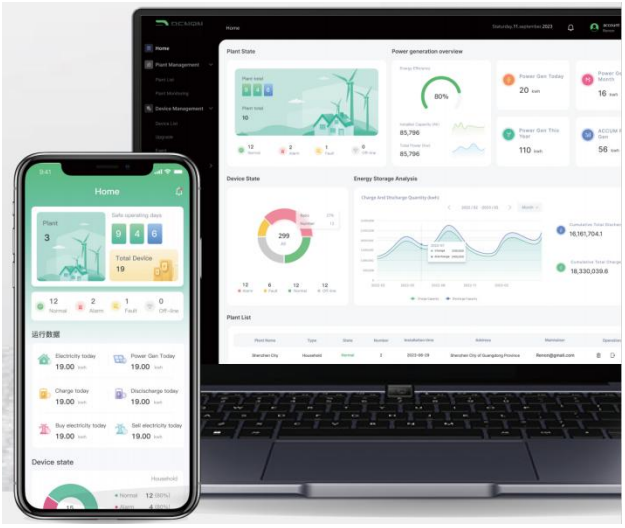
(7) Comprehensive Communication Interfaces

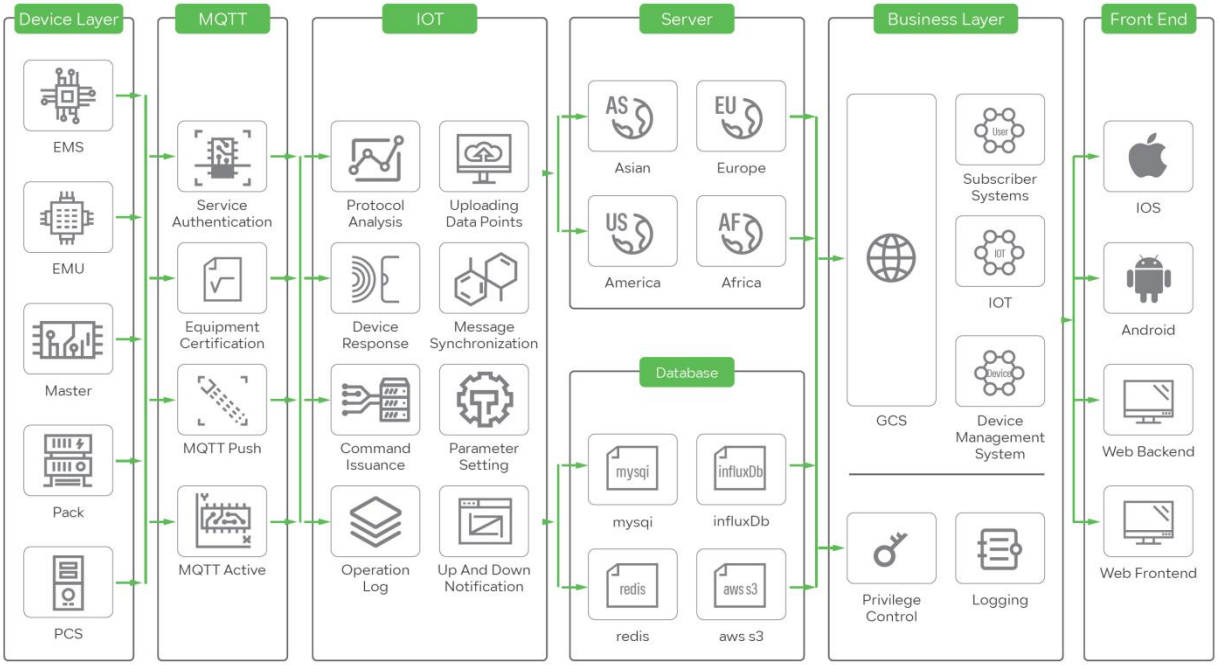
Includes HDMI, GbE LAN, GbE Fiber, USB, RS232, RS485, CAN FD, SATA, SD, and 8-channel mic array for connecting various external devices and sensors.

Parameters

NXP i.MX 8M PLUS 4xA53@1.8GHz	10.1" LCD wide screen panel with LED backlight delivers a long service life
4kP30,1080p60 HEVC, H.264, VP9, VP8 decoding	Supports wide operating temperatures: -20°C~65°C
1080p60 H.265, H.264 encoding	True flat surface-contemporary pro flat design
1xHDMI2.0, 5xGbE LAN, 1xGbE Fiber	Wide viewing angles support portrait and landscape modes: 85°/85°/85°/85°.
USB3.0.USB2.0.RS232.RS485.CAN FD.SATA.SD	Thin profile enclosure eliminates need for additional casing or metalwork
8 Channels Mic Array	Multi-touch PCAP touchscreen with USB interface
Support AI card/5G/4G/GPS/ Wi-Fi 5/Wi-Fi 6/BT	IP rating for water and dust protection: Front IP67
Support TPM, TCM	Optional anti-reflective surface treatment empowers sunlight readability (customized solution)
Linux and Android	Increase panel brightness to 1200 nits using an option enhancement (customized solution)
Wifi/4G	Capacitive screen
Embeded Device On, Device On. Comm Bridge	Input/Output: HDMI *l, Type A USB *l
	Brightness: 500 cd/m2

(13) Station Level EMS & Cloud Platform





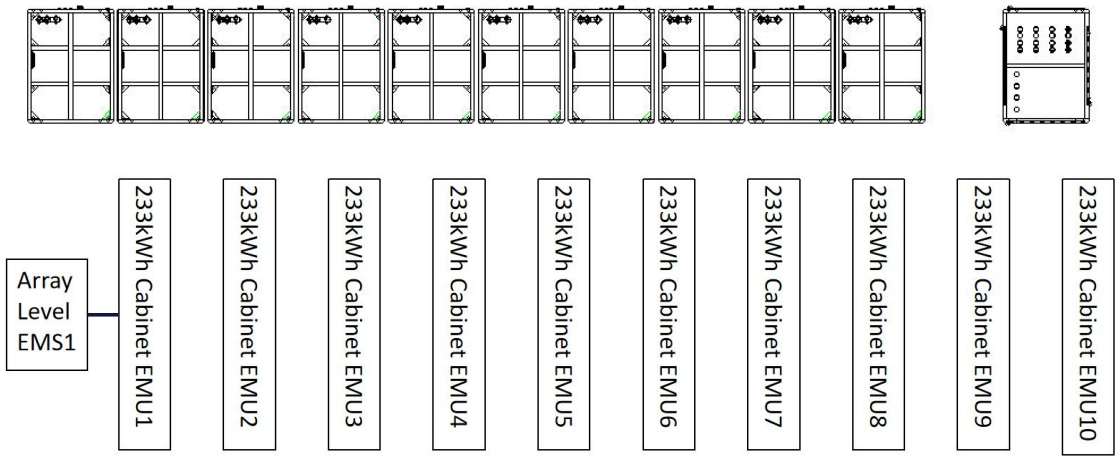
Station level EMS is a high performance local server, working together with Renon cloud platform, Renon Smart is a comprehensive device management and monitoring solution for national agents, secondary agents, installers and users. Comprehensive system for managing large-scale power station and commercial and industrial energy storage systems.

1. Instant Clarity with Remote Data Monitoring and Analysis
2. Remote data monitoring, automatic curve generation, and big data analysis management make the product operation status clear at a glance.
3. Enhanced Security with Distributed Architecture and Data Encryption
4. Distributed architecture deployment and data security encryption ensure that cloud data is more secure and reliable.
5. Seamless Connections with Intelligent Mall and Trial Applications

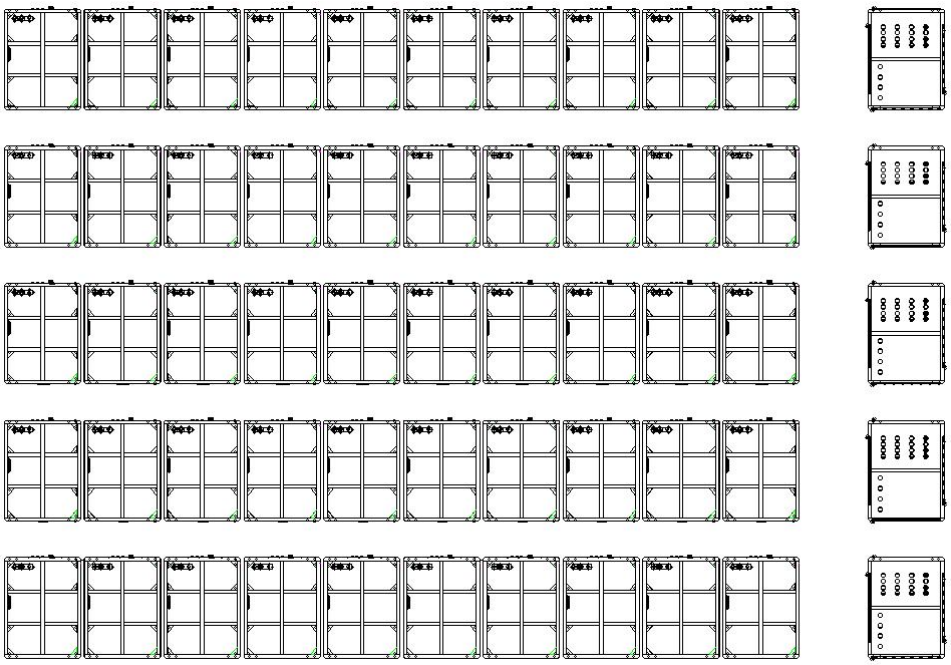
6. Intelligent mall application and new product trial application enable users to contact source manufacturers directly, making product promotion faster and more accurate.
7. Boost Customer Satisfaction with Remote Firmware Upgrades
8. Remote firmware upgrading and intelligent operation and maintenance report generation effectively improve customer satisfaction.
9. Optimized Channel Construction with a Six-Level Distribution System
10. The six-level distribution system, from the brand owner to end-users, is more conducive to robust product channel construction.

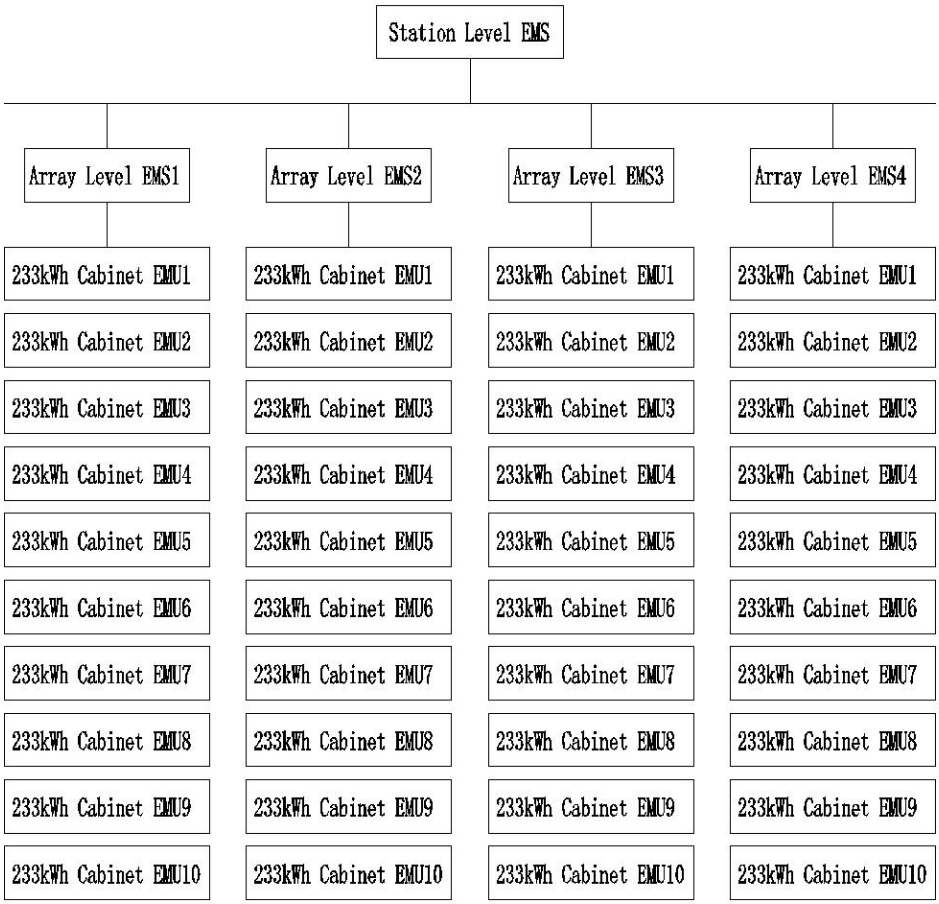
5、 system parallel operation plan

Specification 1	Capacity: 2.33MWh, output power: 1.25MW
	Configuration Description: 233kWh 10 units



Specification 2	Capacity: 11.65MWh, output power: 6.25MW
	Configuration Description: 233kWh 10 units, 5 columns in total

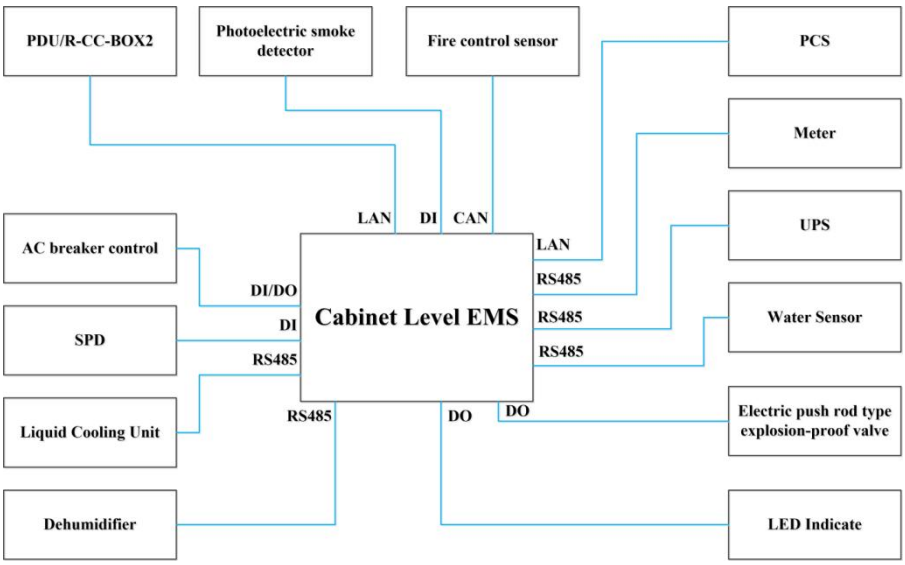




6、 Energy Management System(EMS)

(1) Cabinet Level EMS

Each cabinet has a High-end integrated display and control system.



(1) High-Performance Data Processing MCU

Equipped with a powerful processor and ample memory, ensuring fast response to demand-side instructions and efficient data processing.

(2) Independent Smart Local Control

Built-in modes such as self-use, peak shaving, PV priority, grid priority, backup, and battery modes provide convenient local operation. Supports local intelligent monitoring, data curve generation, parameter settings, firmware updates, maintenance report generation, and log recording for simplified after-sales service.

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Featuring advanced graphics processing and AI capabilities, offering robust performance for enhanced device intelligence.

(4) Flexible Cloud Connectivity

Supports multiple interfaces including LAN, WiFi, and LTE for versatile cloud platform connections based on customer needs.

(5) High-Brightness Full-View Touch Display

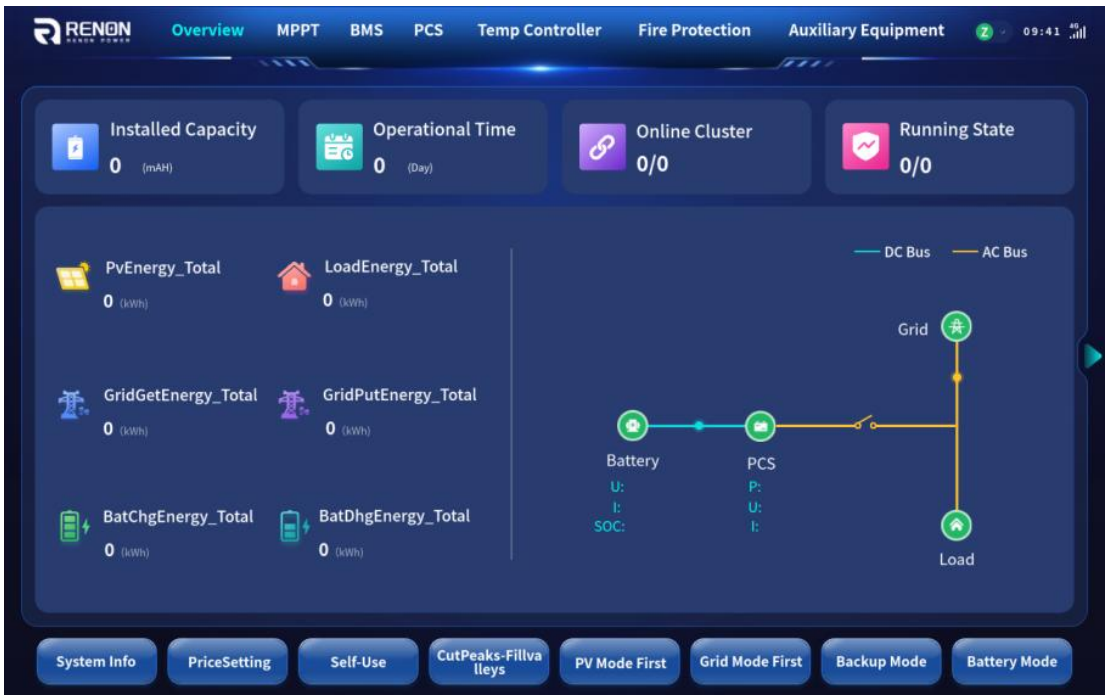
1280*800 resolution, 45cd/m2 brightness, full viewing angle, and three-point capacitive touch screen, allowing easy viewing of system data and settings both indoors and outdoors.

(6) Comprehensive Communication & Control Interfaces

Includes CAN, RS485, RS232, Type-C, USB3.0, LAN, TF card slot, Nano SIM, HDMI, and RTC interfaces, enabling connection to various external devices and sensors for centralized management and control.

(7) Robust and Durable Design

IP65 protection and operating temperature range of -20 ° C to 70°C, making it suitable for harsh industrial environments.



Parameters

Item	Parameter
CPU	RK3568 4xA53@2.0GHz
Memory	RAM: 4GB, EMMC: 64GB, EEPROM:64KB, SSD: 1T(Optional)
GPU	Mail-G52
NPU	Support 1 Tops computing power
OS	Ubuntu 20.04
Brightness	450cd/m2
Resolution	1280*800
Angle	Full viewing Angle
Touch	3 points capacitive screen
Communication interface	3* CAN, 6* RS485, 1*RS232, 1*Type-C, 1* USB3.0, 4*1000Mbps, Lan, 1* TF card, 1* Nano SIM card, 1* HDMI, 1* RTC
Control interface	12* DO, 16* DI, 2* NTC, 1* Buzzer
Wireless communication	Wifi/BT, 4G, GPS
IP grade	IP65
Operating temperature	-20°C~70°C

(2) Array Level EMS

Each array has a array level EMS, installed in the controller cabinet, used to connect with cloud platform.

(1) High-Performance Data Processing

Efficient processor and NPU for fast response to demand-side instructions, enabling local and cloud data monitoring, storage, and computation.

(2) Advanced Graphics and AI

Integrated 2.3 TOPS NPU, extendable to 8-26 TOPS AI card, supporting 4kP30 and 1080p60 video decoding.

(3) High-Brightness Touch Display

10.1" LCD with LED backlight, wide operating temperatures, flat surface, and thin profile. Optional anti-reflective treatment and brightness up to 1200 nits. Standard brightness of 500 cd/m2. Wide viewing angles (85°/85°/85°/85°), multi-touch PCAP touchscreen with USB interface.

(4) Robust and Durable Design

IP67 protection and operating temperature range of -20 ° C to 65°C, suitable for harsh industrial environments.

(5) Smart Local Control Modes

Built-in modes like self-use, peak shaving, PV priority, grid priority, backup, and battery modes. Local smart monitoring, data curve generation, parameter settings, firmware updates, maintenance reports, and log recording for convenient after-sales service.

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Supports multiple interfaces including LAN, Wifi, and LTE for versatile cloud platform connections.

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USB3.0.USB2.0.RS232.RS485.CAN FD.SATA.SD	Thin profile enclosure eliminates need for additional casing or metalwork
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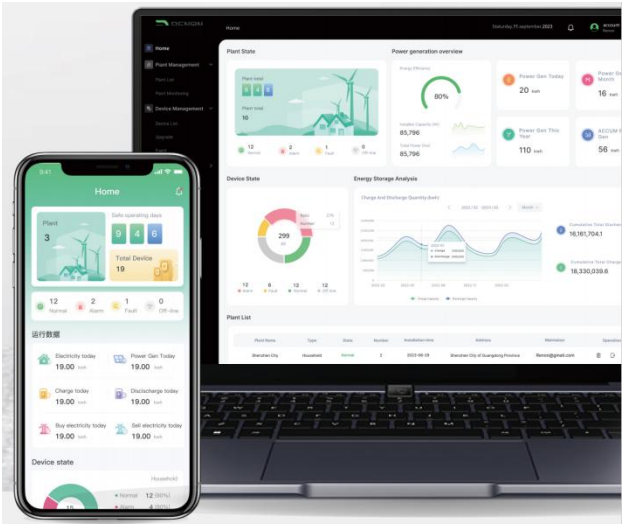
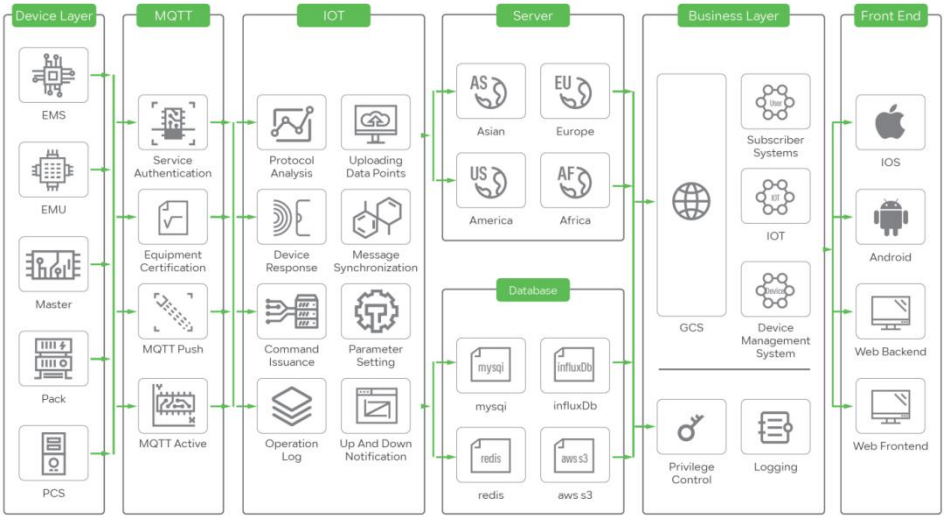
Linux and Android	Increase panel brightness to 1200 nits using an option enhancement (customized solution)
Wifi/4G	Capacitive screen
Embeded Device On, Device On. Comm Bridge	Input/Output: HDMI *I, Type A USB *I

(3) Station Level EMS & Cloud Platform





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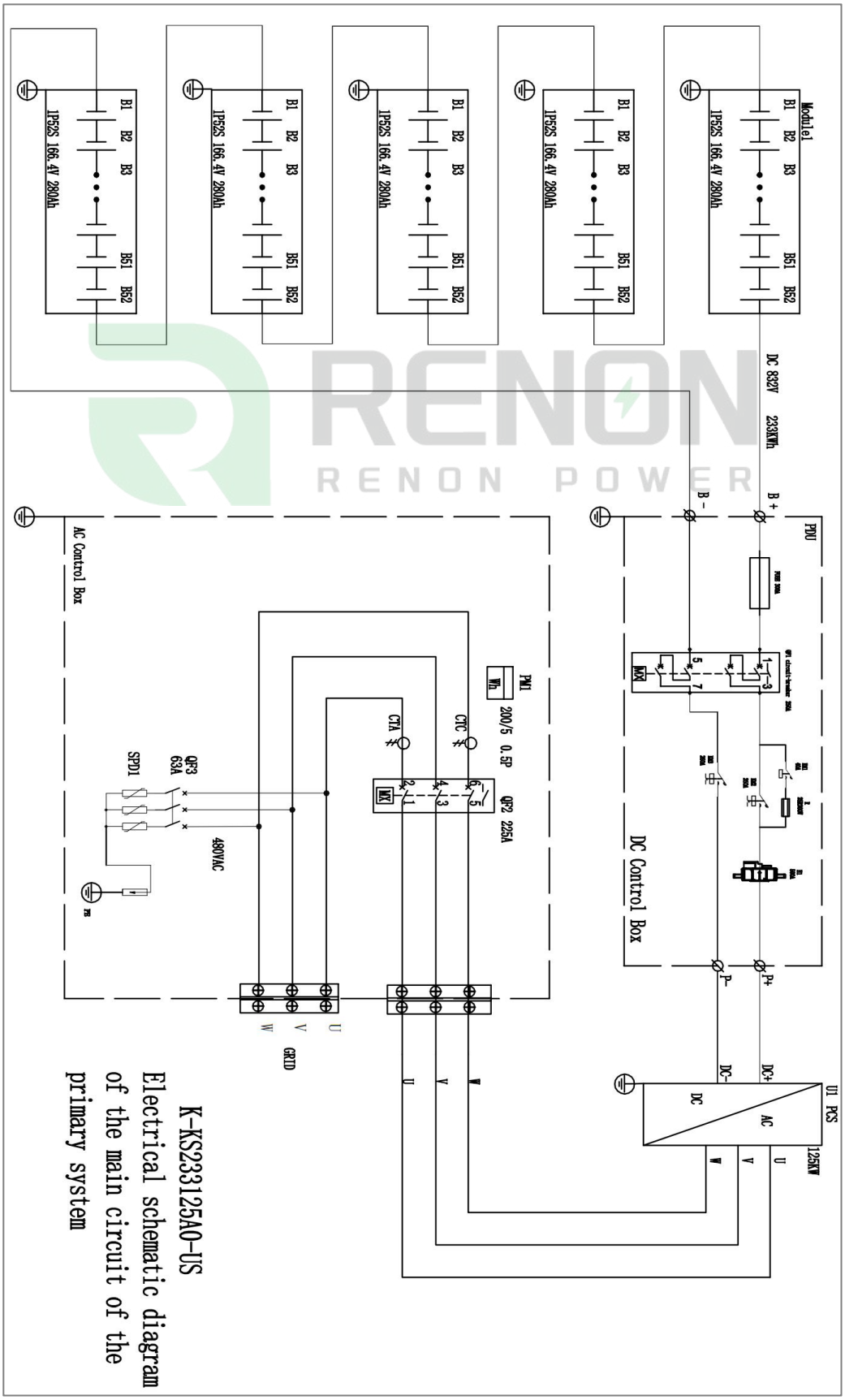
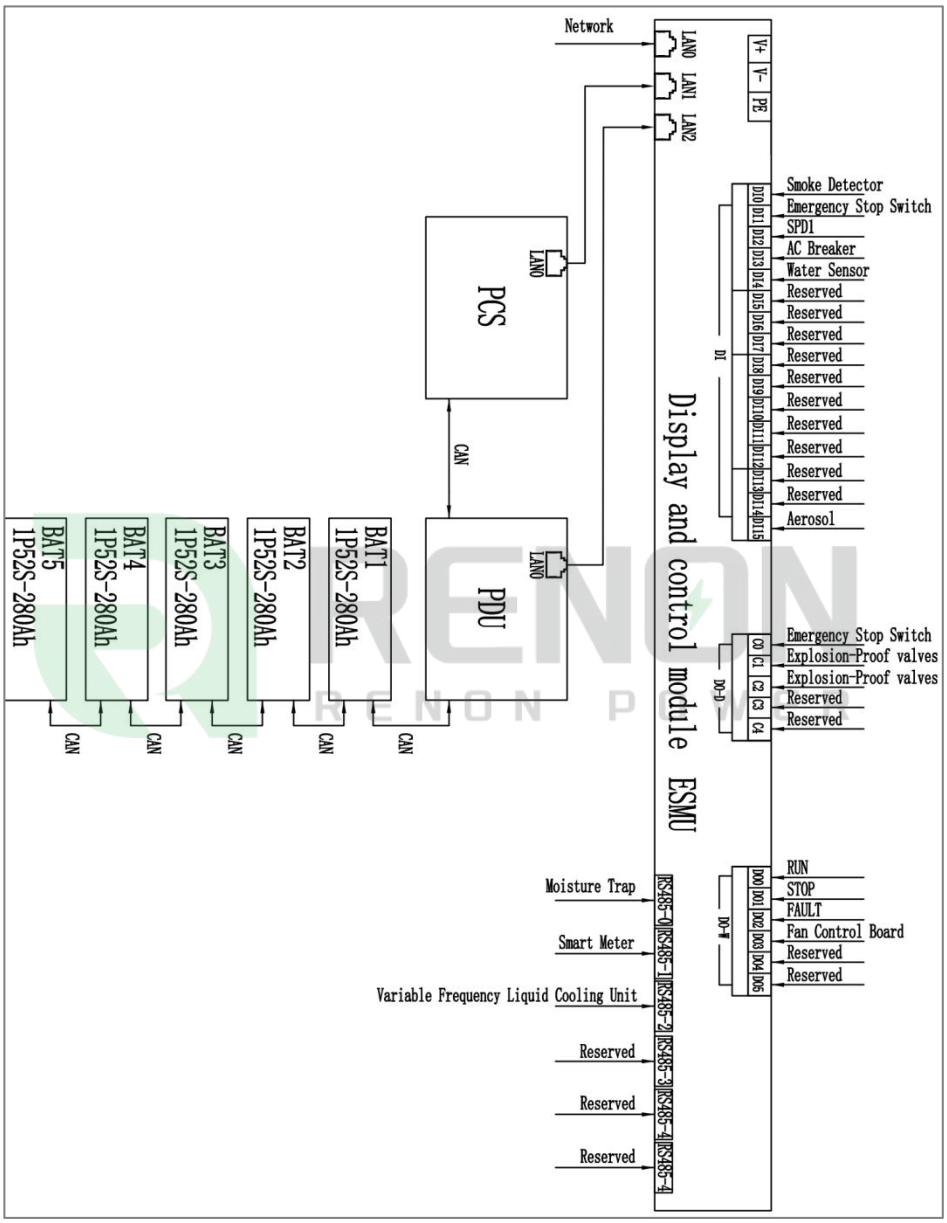
10. The six-level distribution system, from the brand owner to end-users, is more conducive to robust product channel construction.

PART 17. Appendices

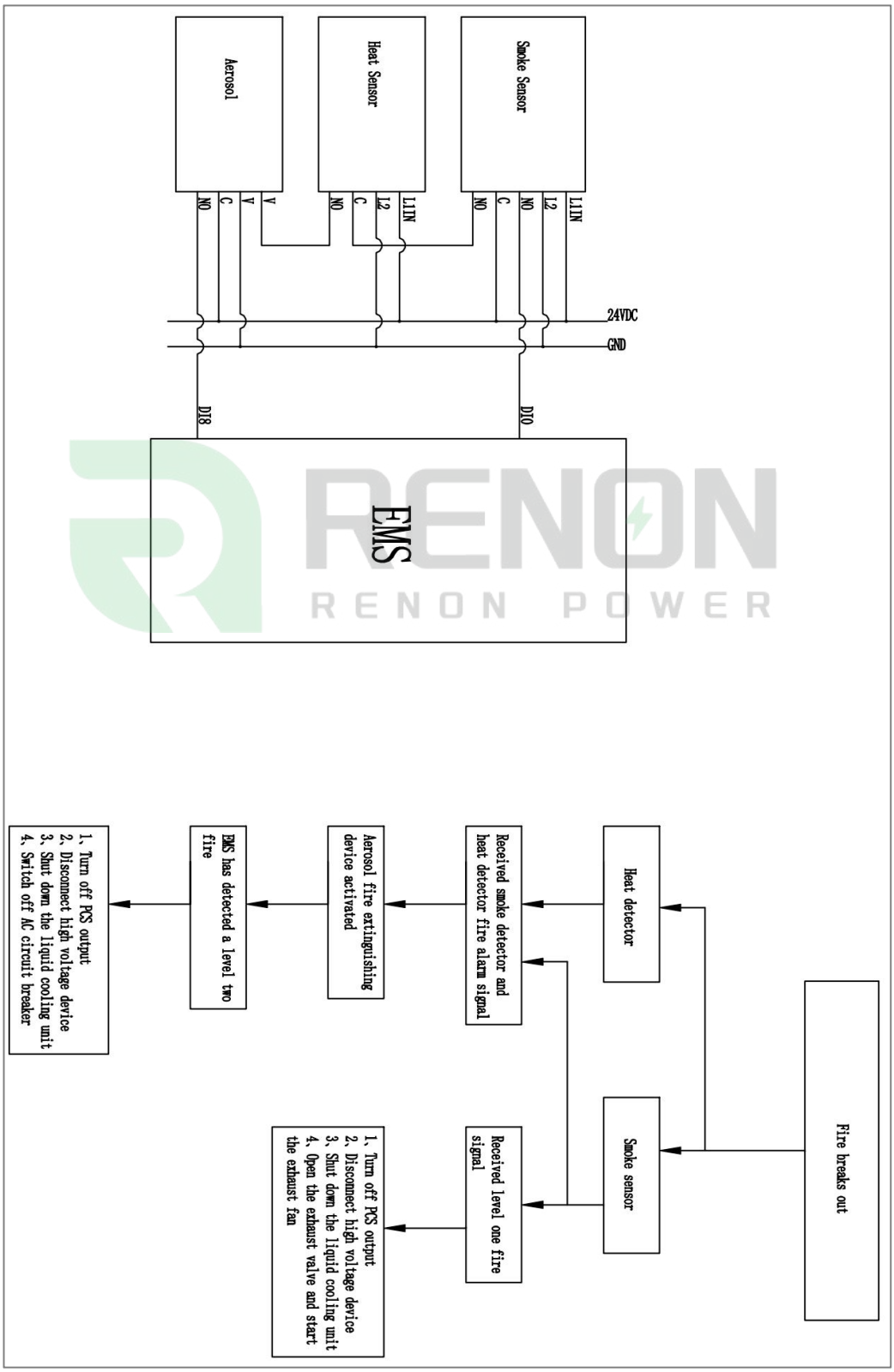
1、 Primary System Schematic



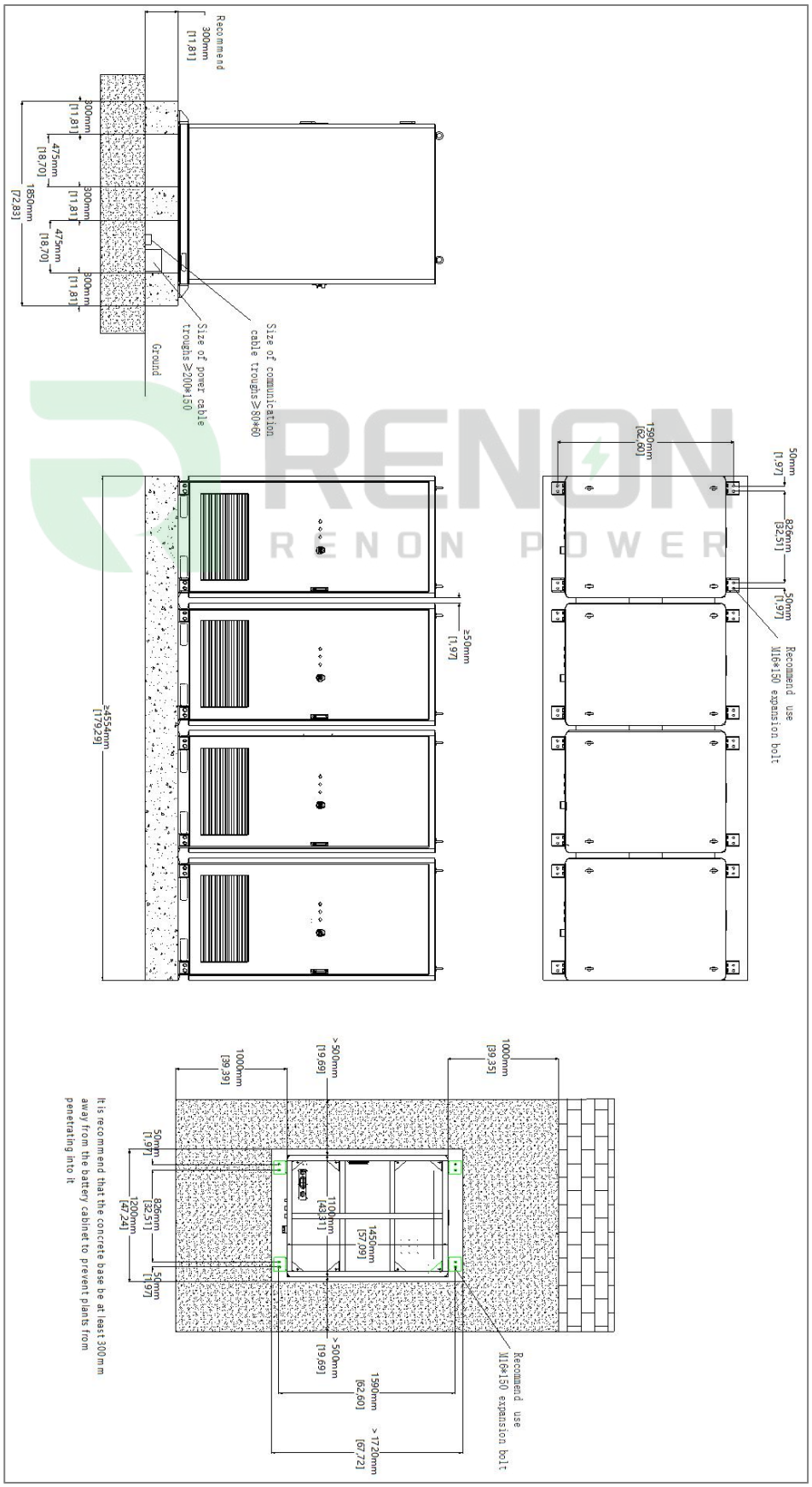
2、 Communication Schematic



3、 Fire Protection Schematic Diagram



4、 Infrastructure Diagram



5、 233kWh spare parts list

233kWh spare parts list						
No.	Material Code	Name	Specification Model	Other Description	Unit	Quantity
1	275.005.001.0002	DC power supply	HV350-15DB24LV	Input :DC200～1500V Output：DC24 350W	PCS	1
2	113.600.00.0045	AC power supply	LRS-450-24 Input :180~264VAC Output：DC24V	Input :180~264VAC Output：DC24 450W	PCS	1
3	263.001.001.0010	Relay	HFE82P-250W/1500-24-HA-C5-6	1500VDC_250A_coil 24VDC_Non polarized with normally open auxiliary touch	PCS	2
4	298.003.000.0002	Hall sensor	HFCA-M08/500-S24	500A_24VDC_CN Communication-Accuracy ＜ 0.5% Baud Rate 250K	PCS	1
5	113.900.00.0033	Fuse	A4305-300A	1000VDC300A with a breaking capacity of 50KA	PCS	1
6	264.003.001.0006	Relay	NDZ3T-40H/1500VDC24V	1500VDC_40A_Coil 24VDC	PCS	2
7	243.003.000.0013	Fuse	PV10-2A1000VDCgPV	2A_1000VDC_10KA section_10x38	PCS	4
8	243.003.000.0012	Fuse	PV10-16A1000VDCgPV	16A_1000VDC10KA section_10x38	PCS	2
9	113.103.00.0296	AC fan	A2259-HBL	150～250VAC_0.27A_850/770CFM	PCS	2
10	108.700.00.0009	Indicator light	AD11-22/21-7GZRN，24V red		PCS	1
11	108.700.00.0010	Indicator light	AD11-22/21-7GZGN，24V green		PCS	1
12	108.700.00.0013	Indicator light	AD11-22/21-7GZGY，24V yellow		PCS	1
13	108.700.00.0018	Emergency stop button	ZB4BS844_Schneider	Ø 40 Red Mushroom Head _ Installation Diameter 22.5mm _ Schneider	PCS	1

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