

User Manual.

R-SM1672LCB01-EU

2024 1ST EDITION

E-mail: support@renonpower.com

Website: www.renonpower.com



Renon Power Technology Inc.

© Renon Power Technology Inc.
All Rights Reserved. Specifications are subject to change without notice.



Renon Power

We Care The Sustainability

With our own R&D team and automatic production factory, we are dedicated to delivering innovative, reliable, and affordable energy storage solutions to global customers.

At Renon, we believe that sustainable energy is the future. We are passionate about reducing carbon emissions and preserving our planet for future generations. That's why we invest heavily in research and development, leveraging the latest technologies to design and manufacture energy storage systems that are efficient, scalable, and adaptable.

Our products are designed to meet the needs of a wide range of applications, from residential and commercial buildings to industrial facilities and utility-scale projects. Whether you're looking to reduce your energy bills, increase your energy independence, or support your sustainability goals, Renon has the right solution for you.

Our commitment to quality and customer satisfaction is unwavering. We work closely with our clients to understand their unique needs and provide customized solutions that meet or exceed their expectations. We also provide comprehensive technical support, maintenance, and warranty services to ensure that our customers get the most out of their investment.

[JOIN US ON OUR MISSION TO MAKE GREEN POWER WITHIN REACH.](#)

**PROVIDE INNOVATIVE,
RELIABLE, AND
AFFORDABLE ENERGY
STORAGE SOLUTIONS
TO CUSTOMERS
WORLDWIDE.**



Contents

1. Preface	1
1.1. Applicable Products	1
1.2. Applicable Audience	1
1.3. Symbol Definitions	1
2. Definition of terms	1
3. Safety Precautions	2
3.1. General Security	2
3.2. System Safety	2
3.3. Battery Safety	4
3.4. Emergency Treatment	4
3.5. Personnel Requirements	5
3.6. Label Instructions	5
4. Product Presentation	6
4.1. Product Profile	6
4.2. Application Scenarios	6
4.3. Surface	7
4.3.1. Appearance Profile	7
4.3.2. Size	8
4.4. Mode Code	8
4.5. Part Introduction	9
4.5.1. High-voltage Control box	9
4.5.2. Battery Module	10
4.5.3. Fire Extinguisher System	11
4.5.4. Liquid Cooling Units	12
4.5.5. UPS	12
4.5.6. All-in-One Display and Control Unit	13
5. Transportation, Inspection and Storage	14
5.1. Transportation requirements	14
5.2. Check Before Signing	15
5.3. Equipment Storage	15
6. Install	16
6.1. Installation Requirements	16
6.1.1. Installation Environment Requirements	16
6.1.2. Installation Angle Requirements	17
6.1.3. Install the Base Requirements	17
6.1.4. Installation Tool Requirements	17
6.2. Install 10-foot Battery Cabinet Container	18
6.2.1. Handling 10-foot Battery Cabinet Container	18
6.2.2. Install 10-foot Battery Cabinet Container	20
7. Electrical Connection	20
7.1. Safety Precautions	20
7.2. Connect DC lines	21
7.3. Connect To the RS485 Communication Line	21
7.4. Connect the LAN Communication Line	23
7.5. Auxiliary Power Wiring	24
8. Startup Operation Guide	24
9. Shutdown Operation Guide	25
10. System Maintenance	25

10.1. Power Down the battery cabinet	25
10.2. Maintenance Precautions	26
10.3. Maintenance Requirements	26
10.4. Routine Maintenance	26
10.5. Cabinet Maintenance	28
10.5.1. Appearance Damage Repair Measures	28
10.5.2. Door Lock Inspection	28
10.6. Battery Maintenance	29
10.7. The battery cabinet Maintenance	29
10.8. Removal of the Smart System	30
10.9. Scrapped battery cabinet	30
11. Fault Treatment	30
12. Technical Data	30
13. Emergency Treatment	31
14. After-Sale Service	32
15. Quality Assurance Instructions	32
15.1. Quality Warranty Regulations	32
15.2. Exemption Scope of Quality Warranty Liability	32
16. Technical Description and Specification	33
16.1. Introduction of the Main Equipment	33
16.2. Product Parameter	34
16.2.1. Battery cell	34
16.2.2. Battery module	38
16.2.3. Smart Matrix Battery Cluster	39
16.2.4. Battery Management System	40
16.3. Protection System	42
16.3.1. Level Protection Strategy	42
16.3.2. Warning system	44
16.3.3. Firefighting System	45
16.4. Energy Management System(EMS)	46
16.4.1. Cabinet Level EMS	46
Parameters	47
16.5. EMS architecture diagram	47
16.5.1. 50MWh/100MWh EMS architecture diagram	48
16.5.2. 200MWh EMS architecture diagram	48
16.5.3. Station Level EMS & Cloud Platform	49
16.6. 10-foot Battery Cabinet Container parallel operation plan	50
17. Appendices	54
17.1. Primary System Schematic	54
17.2. Communication Schematic	55
17.3. System Communication Details	56
17.4. Auxiliary Power Supply Schematic	57
17.5. Fire protection system alarm diagram	58
17.6. Output Interface Diagram	59
17.7. Infrastructure Diagram	60
17.8. System Layout Diagram	61
17.9. Drawing of Container Bottom Corner Components	62
17.10. Top corner piece drawing of container	63
17.11. Spare parts list	64

1. Preface

This document primarily covers the product information, installation and wiring procedures, configuration and testing guidelines, troubleshooting, and maintenance instructions for the energy storage system. Before installing and using this product, it is imperative to thoroughly read this manual. Doing so will ensure your understanding of the safety information and acquaint you with the features and characteristics of the product.

1.1. Applicable Products

This manual applies to the battery cabinet product. In this manual, unless specifically noted otherwise, the term "Cabinet" refers collectively to the series of products mentioned above.

1.2. 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.

1.3. Symbol Definitions

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

Danger
Indicates a high potential for danger. Failure to avoid this hazard could result in death or serious injury.
Warning
Indicates a moderate potential for danger. Failure to avoid this hazard could result in death or serious injury.
Caution
Indicates a low potential for danger. Failure to avoid this hazard could result in moderate or minor injury.
Note
Indicates an emphasis or supplement to the content. It may also provide tips or tricks for optimizing the use of the product, helping you resolve issues or save time.

2. Definition of terms

NO.	Item	Definition
1	Battery Cell	Cell
2	Battery Pack	Liquid-cooled battery pack
3	Battery Module	Battery system consisting of multiple battery packs and a high-voltage box
5	BMS	Battery Management System
6	BMU	Level-1 BMS, subordinate control unit of the battery management system
7	BCU	Level-2 BMS, main control unit of the battery management system
8	SCU	Level-3 BMS, master control unit of the battery management system
9	PCS	Energy Storage Converter
10	UPS	Uninterruptible Power Supply
11	EMS	Energy Management System

12	SOC	State of Charge
13	Rack	Battery module

3. 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.

3.1. General Security

Note
<ul style="list-style-type: none"> ● Due to product version upgrades or other reasons, the content of this document may be updated periodically. Unless specifically agreed upon, the content of this document does not supersede the safety precautions listed on product labels. All descriptions in this document are provided for guidance only. ● Carefully read this document before installing the equipment to understand the product and relevant precautions. ● All operations on the equipment must be performed by qualified electrical technicians who are familiar with the relevant standards and safety regulations applicable to the project location. ● When performing operations on the equipment, use insulated tools and wear personal protective equipment to ensure personal safety. When handling electronic Instructions, wear anti-static gloves, anti-static wristbands, and anti-static clothing to protect the equipment from electrostatic damage. ● The manufacturer is not responsible for equipment damage or personal injury caused by failing to install, use, or configure the equipment according to this document or the corresponding user manual. For more information on product warranties, please visit the official website.

3.2. System Safety

Danger
<ul style="list-style-type: none"> ● Always adhere to the safety precautions and product warnings listed in this manual, other related documents, and on the product itself. ● Strictly comply with all local laws, regulations, and industry standards when operating the equipment. ● To protect the equipment during transportation, ensure that transport personnel are professionally trained. Record the handling procedures and maintain the balance of the equipment to prevent falls. ● Follow local laws and industry standards during loading and unloading. Rough handling can cause short circuits or damage to the battery packs, potentially leading to electrolyte leakage, fires, or explosions. ● As this is heavy equipment, use appropriate tools and take protective measures during installation and maintenance. Improper handling can result in personal injury or product damage. ● The equipment contains lethal high voltage and poses an electric shock hazard; do not touch it

casually.

- Non-professionals must not open equipment doors or touch internal Instructions s without permission, as this may lead to electric shock.
- Do not operate the equipment if it is damaged or faulty, as this may increase the risk of electric shock and fire.
- When a ground fault alarm is triggered, the equipment may contain lethal high voltage, posing an electric shock hazard.
- Before operating the equipment, ensure that the system is properly grounded and that all necessary safety measures are taken to prevent electric shock.
- Do not open equipment doors or touch any terminals or Instructions s while the equipment is in operation, as this may result in electric shock.
- Before installing, wiring, or maintaining the equipment, ensure that all switches are turned off.
- Do not disassemble or modify any part of the equipment without official authorization from the manufacturer. Damage caused by unauthorized modifications is not covered by the manufacturer's responsibility.

Warning

- Do not strike, pull, drag, or step on the equipment. Avoid piercing the equipment casing with sharp objects and do not place unrelated items inside the equipment.
- When the internal temperature of the equipment exceeds 160°C, there is a risk of battery ignition, which will trigger the automatic fire suppression system.
- The equipment is equipped with an automatic fire suppression system. Do not activate the fire suppression switch unless in an emergency.
- Choose cables that comply with local laws and regulations.
- Ensure that the voltage and frequency at the grid connection point meet the specifications required by the energy storage system.
- It is recommended to add circuit breakers or fuses as protection devices on the AC side of the equipment.
- Do not place the equipment in a high-temperature environment. Ensure that there are no heat sources near the equipment.

Danger

- After installation, ensure that the labels and warning signs on the equipment are clearly visible. Do not obstruct, deface, or damage them.

3.3. Battery Safety

Warning

- The battery contains high voltage. Before operating any equipment within the system, ensure that the equipment is powered off to avoid the risk of electric shock.
- Do not subject the battery to shocks, impacts, pulls, or squeezing, as this may cause damage to the battery or increase the risk of fire.
- When storing the battery pack for an extended period, charge the battery pack regularly to avoid capacity loss or irreversible damage.
- Do not charge or discharge the battery beyond its rated current.
- If the battery or high-voltage control box shows obvious defects, cabinet, damage, or other issues, do not use it. This could pose a personal safety risk.
- Battery current may be affected by factors such as temperature, humidity, weather conditions, which may cause current limiting and affect load capacity.
- If you need to replace the battery, contact the after-sales service center.
- If the battery fails to start, contact the after-sales service center promptly; otherwise, the battery may suffer permanent damage.

3.4. 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.

3.5. Personnel Requirements

Note	
<ul style="list-style-type: none"> • 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. 	

3.6. Label Instructions

	High voltage danger. There is high pressure during the equipment. When operating the equipment, make sure the equipment is powered off.		Potential hazard after equipment operation. When operating, please protect yourself.
	Before operating the equipment, please read the product instructions in detail.		Protect the ground wire connection point.
	Battery recycling: the equipment should not be treated as household waste. Please treat the equipment according to local laws and regulations, or send it back to the equipment manufacturer.		System recycling: the equipment should not be treated as household waste, please treat the equipment according to the local laws and regulations, or send it back to the equipment manufacturer.
	Pay attention to personal protection during installation, operation and maintenance.		Always read the instructions before operating the system.

4. Product Presentation

4.1. Product Profile

The RENON Power Storage Cabinet Smart Matrix Series is a high-capacity, high-efficiency energy storage solution specifically designed for large commercial and industrial applications. This product line features a total storage capacity of 1.67 MWh, providing users with reliable energy management solutions. It excels particularly in addressing fluctuations in power demand, improving energy utilization efficiency, and supporting the integration of renewable energy sources.



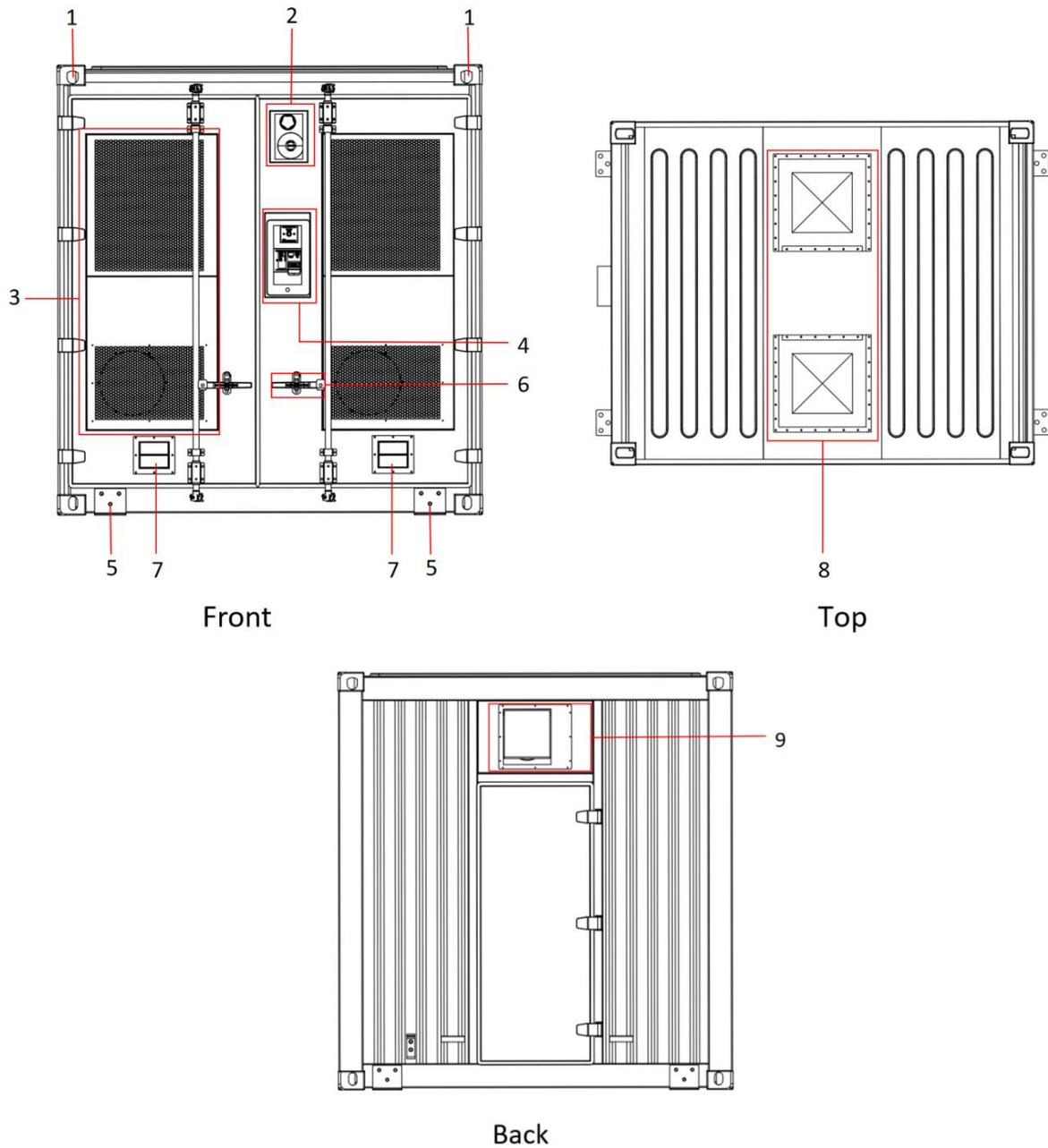
4.2. Application Scenarios

Warning

- This 10-foot Battery Cabinet Container is suitable for industrial and commercial scenarios.
- In the 10-foot Battery Cabinet Container, 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.

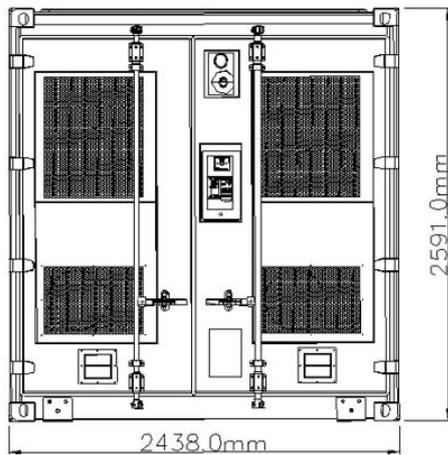
4.3. Surface

4.3.1. Appearance Profile

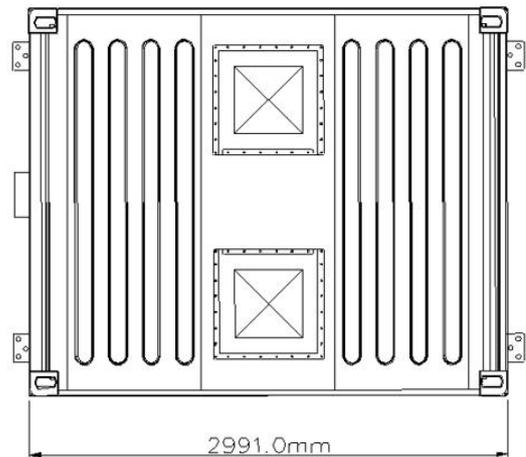


No.	Name	No.	Name
1	Corner Fittings	5	Fixed Position
2	Audio-Visual Alarm	6	Door Latch Lock
3	Liquid Cooling Unit	7	Air Inlet
4	Fire Control Panel	8	Explosion Relief Window
9	Air Outlet		

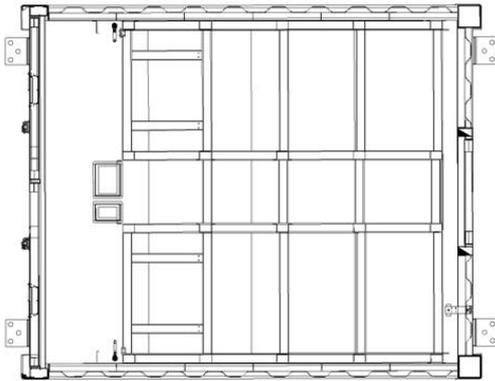
4.3.2. Size



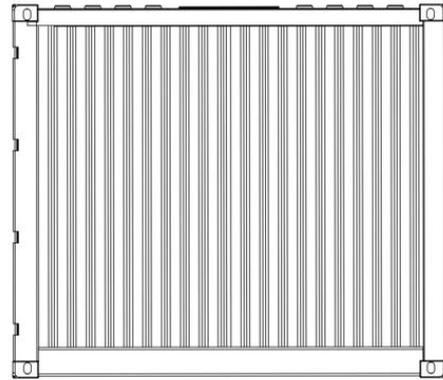
Front View



Top View



Top cross -section View



Side View

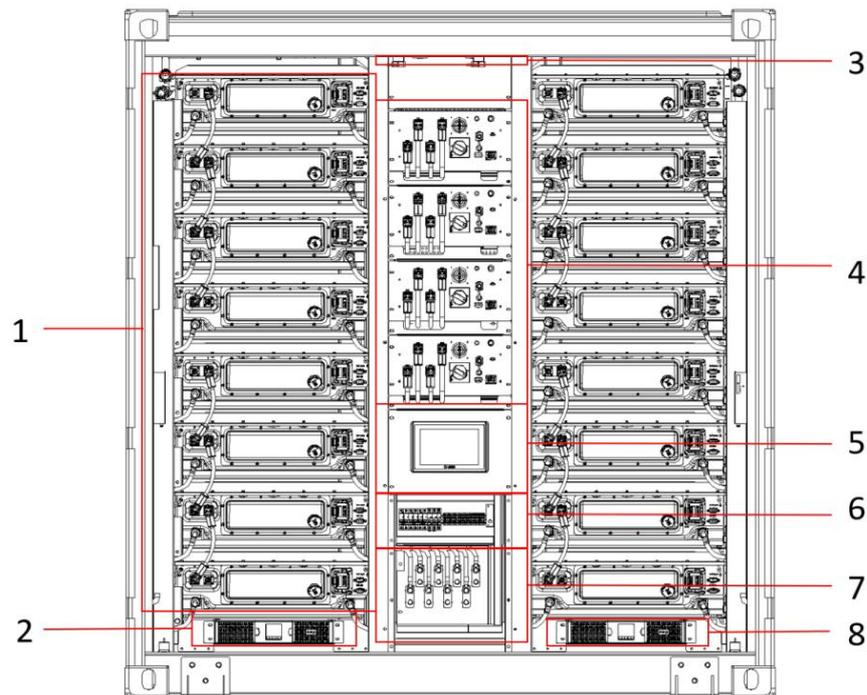
4.4. Mode Code

R- SM 1672LCB01-EU

1 2 3 4 5 6

No.	Meaning	Instructions
1	Brand code	R: RENON Power
2	Series of code	SM: Smart Matrix
3	System capacity	1.672MWh
4	LCB	Individual Battery Cabinet
5	01	Battery Cabinet Serial Number
6	Applicable standards	EU

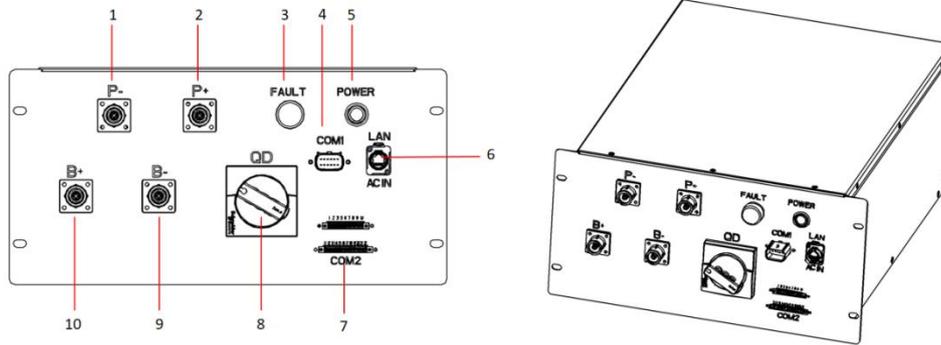
4.5. Part Introduction



No.	Name
1	Battery Module Pack
2	UPS Main Unit
3	Fire Protection Equipment
4	High Voltage Control Box
5	Integrated Display and Control Unit
6	Power Distribution Communication Unit
7	Power Busbar
8	UPS Backup Battery Pack

4.5.1. High-voltage Control box

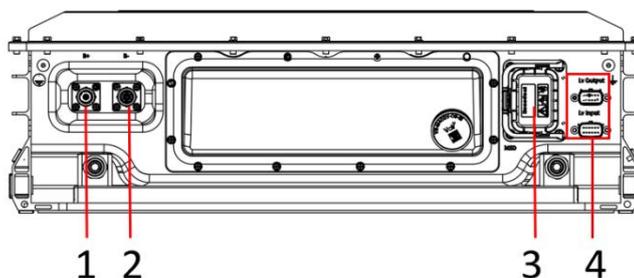
The high-voltage cabinet in a 10-foot Battery Cabinet Container serves several critical functions, including power conversion, protection, control, and monitoring. It converts high voltage from the grid to a suitable level for the 10-foot Battery Cabinet Container, distributes power to different components such as battery packs or inverters, and provides safety mechanisms to protect against overvoltage, short circuits, and other electrical faults.



No.	Name	Instructions
1	P-	
2	P+	
3	Indicator Light	malfunction indicator
i4	Communication 1 Port	Connecting to the Integrated Display and Control Unit on the High-Voltage Box
5	Power	Pushbutton switch
6	Network Port	Connecting to the Integrated Display and Control Unit on the High-Voltage Box
7	Communication 2 Port	Connecting to the Integrated Display and Control Unit on the High-Voltage Box
8	Circuit Breaker	Interrupt Battery External Current
9	B-	Battery Negative
10	B+	Battery Positive

4.5.2. Battery Module

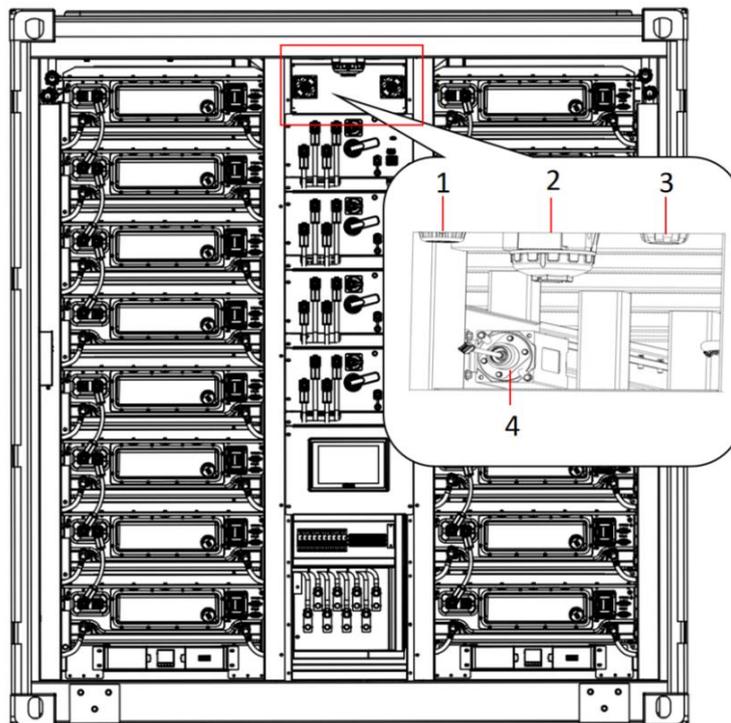
The battery module is a core component of the 10-foot Battery Cabinet Container, consisting of multiple battery cells that can efficiently store electricity from the grid or renewable energy systems. When needed, it can quickly release stored energy to meet peak power demands or supplement insufficient grid power supply. Additionally, the battery module enhances the stability and reliability of the system by smoothing out the intermittent output of renewable energy sources, and it provides backup power in case of power outages.



No.	Name	Instructions
1	Positive Terminal	Battery positive terminal
2	Negative Terminal	Battery negative terminal
3	MSD	Battery maintenance switch disconnect device
4	Communication Interface	Connecting to the Integrated Display and Control Unit on the High-Voltage Box

4.5.3. Fire Extinguisher 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 and emergency start/stop button.



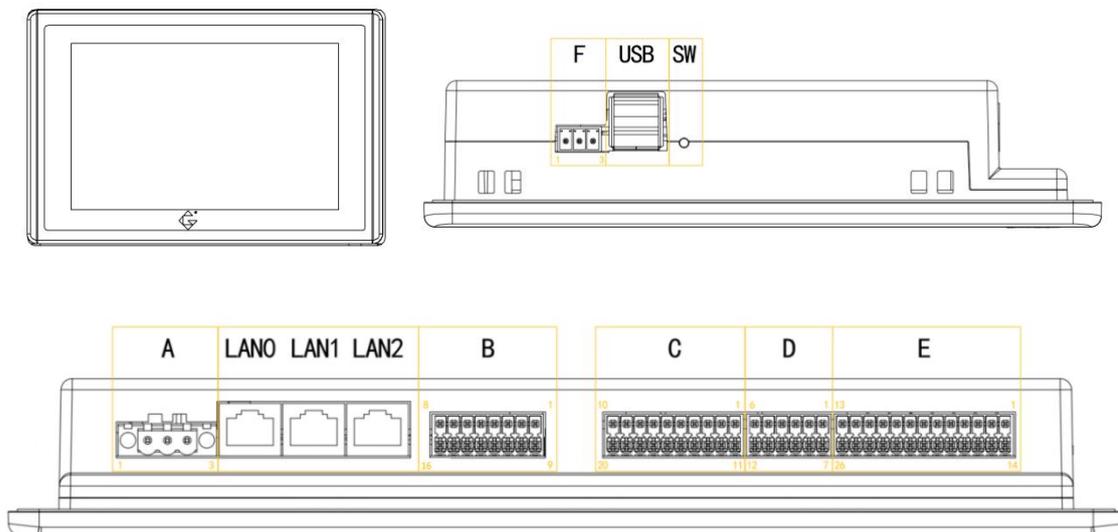
No.	Name	Instructions
1	Smoke Detector	A device that senses smoke, typically as an early warning of a fire. It can be either optical or ionization-based.
2	Flammable Gas Sensor	A sensor designed to detect the presence of flammable gases (H ₂) in the air, often used in industrial and residential settings for safety purposes
3	Temperature Sensor	A device that measures temperature and converts it into an output signal for monitoring or controlling systems.
4	Aerosol Fire Suppression System	A fire suppression system that uses aerosol particles to extinguish fires by interrupting the combustion process. These systems are often used in enclosed spaces where traditional fire suppression methods may not be practical or effective.



No.	Name	Instructions
1	Graphical LCD Display	<ol style="list-style-type: none"> 1. Provides clear information on UPS status and measurements 2. Enhances configuration capabilities
2	Battery Replacement Panel	
3	Intelligent Communication Slot	
4	Output	8 x IEC 10A + 2 x IEC 16A, with power metering
5	Communication Port	USB Port, 1 Serial Port, Dry Contact Output, Remote On/Off, Remote Power Off
6	External Battery Module (EBM) Connector	

4.5.6. All-in-One Display and Control Unit

The Tier-3 BMS is a control management host designed for energy storage battery management systems. It processes real-time battery data uploaded from the ESBCM (Tier-2 BMS) and ESBMM (Tier-1 BMS), performing numerical calculations, performance analysis, alarm handling, and data recording and storage. Additionally, it can achieve coordinated control with the PCS (Power Conversion System) host and the Energy Management System (EMS). Based on output power requirements and the SOC (State of Charge) status of each battery cluster, it optimizes load control strategies to ensure the safe, stable, and efficient operation of the battery system.



Name	Instructions
A	Power Supply
LAN	100M/1000M Ethernet
B	AC Detection
C	RS485 Ports
D	CAN Ports
E	Normally Open Dry Contact Output
F	Internal Debugging
USB	Firmware Upgrade
SW	Auxiliary Fixed Buttons

5. Transportation, Inspection and Storage

5.1. Transportation requirements

(1) Transportation environment requirements

Transport the cell in forms of package by truck, railway, ship or airplane. Severe vibration, impact, crush, exposure to the sun and rain during transportation should be avoided. The SOC of cell should be kept between 30-40%.

(2) Transportation Process Requirements

Danger
Prohibition on Rough Handling

Warning
<ul style="list-style-type: none"> 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 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.

5.2. 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, cabinet, 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.

Delivery list	
10-foot Battery Cabinet Container	1
Fireproof clay	5kg
Expansion screw M16	12
Installation angle piece M16	4
Tubular terminal E6010	6
Tubular terminal E4010	6
Tubular terminal E1010	20

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.

5.3. Equipment Storage

1. If the 10-foot Battery Cabinet Container 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°C
Allowable storage temperature:	10-30°C
Humidity:	less than 90%, 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 needs to be stored for more than 30days, the SOC should be adjusted to 40%±3%the ambient humidity RH<90%, and there should be no condensation. The battery voltage should be tested every 3 months, and the battery module should be fully charged and discharged every 6 months according to the charging and discharging standard.

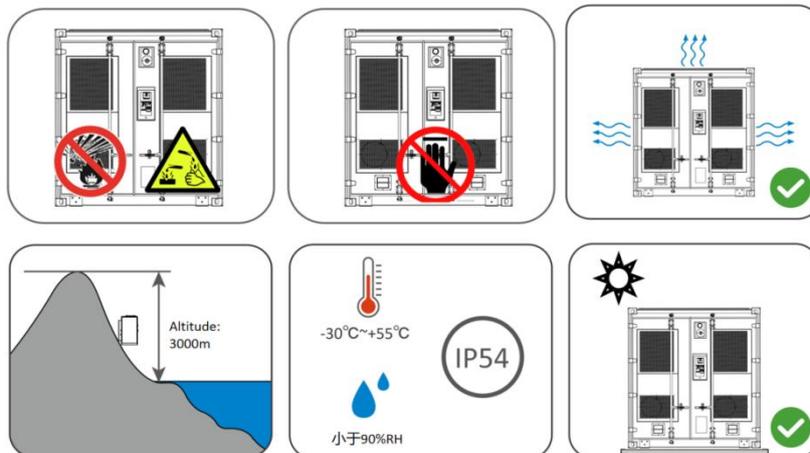
7. The equipment should be stored in a cool place, avoiding direct sunlight.
8. Keep the equipment away from flammable, explosive, corrosive, and other hazardous substances during storage.
9. Ensure that the 10-foot Battery Cabinet Container is not damaged during the storage process.
10. Do not expose the battery to fire, as there is a risk of explosion.

6. Install

6.1. Installation Requirements

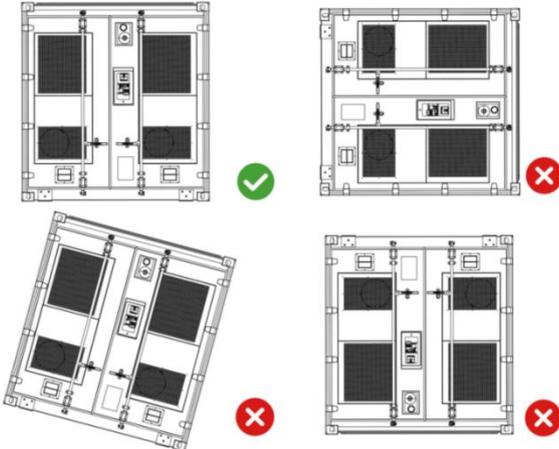
6.1.1. Installation Environment Requirements

- 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 10-foot Battery Cabinet Container 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.



6.1.2. Installation Angle Requirements

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



6.1.3. Install the Base Requirements

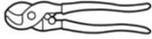
1. The equipment shall be installed on a concrete or other non-combustible surface foundation.
2. Before installation, ensure that the foundation is level, solid, smooth, and dry, with sufficient bearing capacity, and prohibit any depression or inclination.
3. For foundation construction, safe and reliable 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.



6.1.4. Installation Tool Requirements

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 Torque Wrench	 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	

6.2. Install 10-foot Battery Cabinet Container

6.2.1. Handling 10-foot Battery Cabinet Container

Warning

- 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 10-foot Battery Cabinet Container 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.

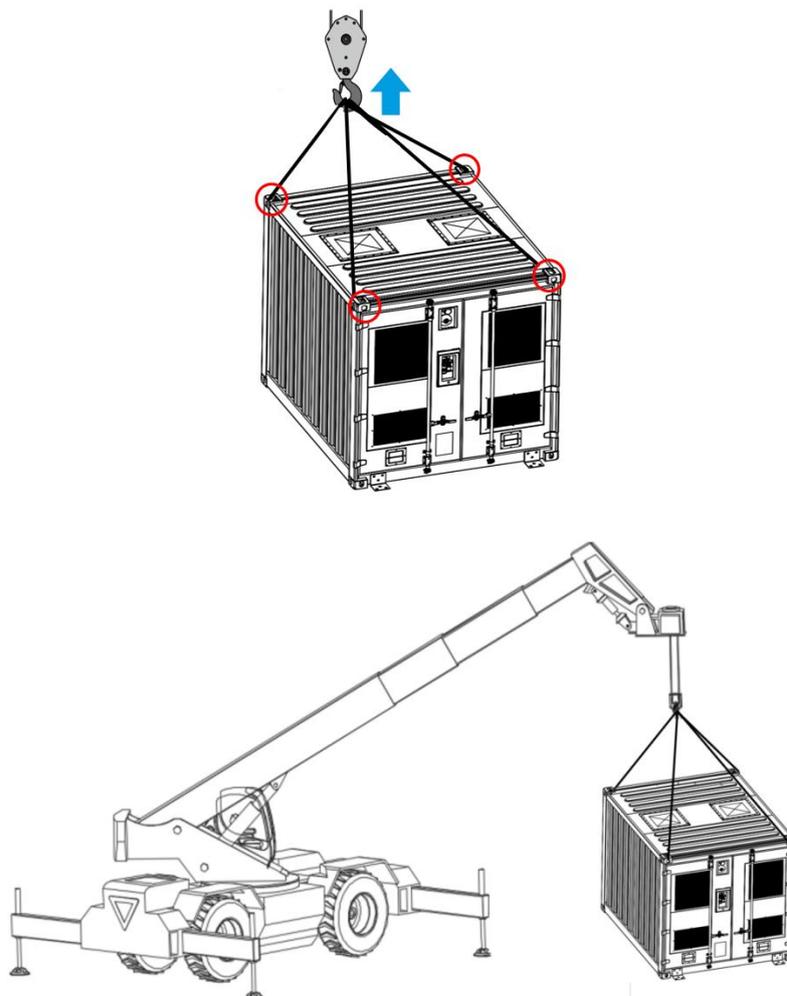
Note

- The 10-foot Battery Cabinet Container can be transported to the installation location using crane lifting or a forklift.

Crane-lift transportation

Step 1: Use the sling with the hook or the U-shaped hook to work on the ceiling of the 10-foot Battery Cabinet Container.

Step 2: Use the lifting device to lift the 10-foot Battery Cabinet Container for handling.



6.2.2. Install 10-foot Battery Cabinet Container

Note

- Ensure that the 10-foot Battery Cabinet Container is vertically close to the ground without the risk of dumping.
- Ensure that the 10-foot Battery Cabinet Container is firmly installed to prevent dumping and personnel.

7. Electrical Connection

7.1. Safety Precautions

Warning

- 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 10-foot Battery Cabinet Container 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 10-foot Battery Cabinet Container.
- 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 10-foot Battery Cabinet Container due to unreliable connections after operation.

Caution

After all electrical cables have been connected, the following operations need to be performed:

- Carefully and thoroughly inspect all connections to ensure there are no missed connections and no loose connections.
- Seal all cable exit holes and gaps around the container using fireproof and waterproof materials.
- Check inside the container to ensure that no tools or equipment have been left inside.

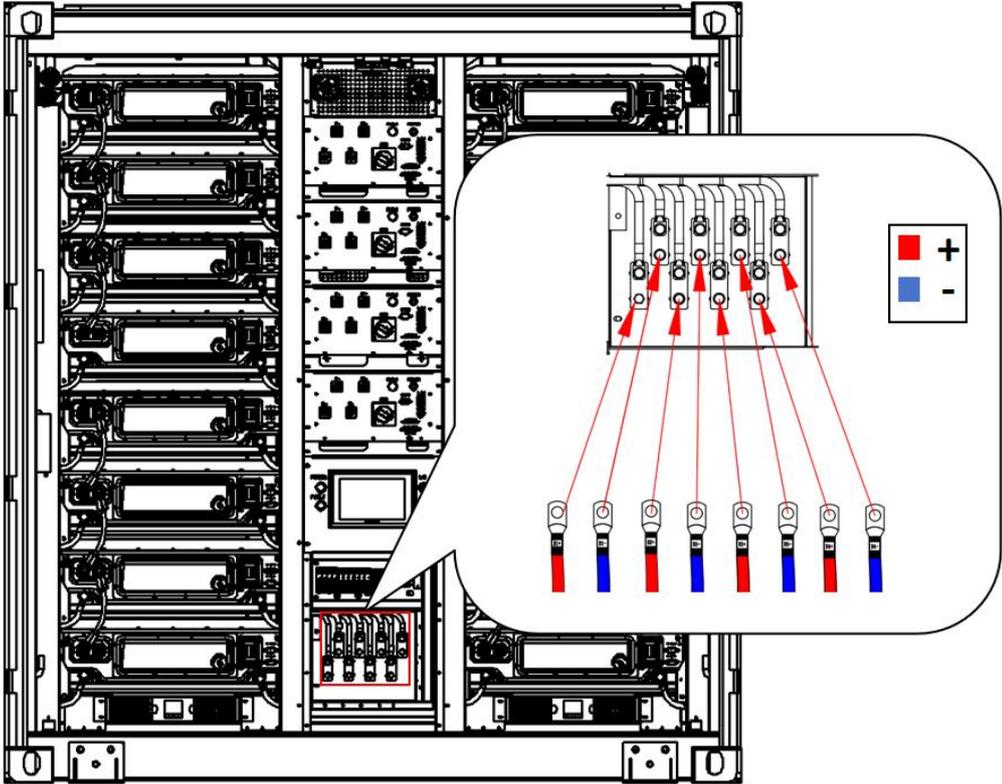
Note

- 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.

7.2. Connect DC lines

Note

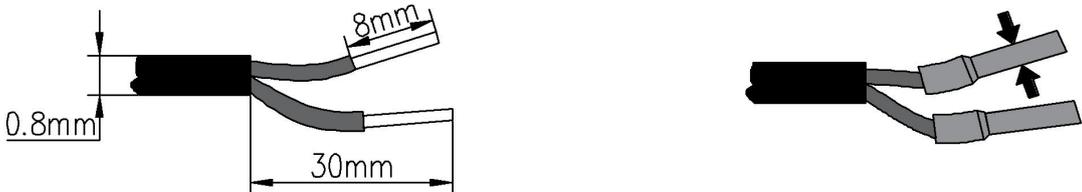
- Terminal: SC70-10
- Cable: 2/0 AWG

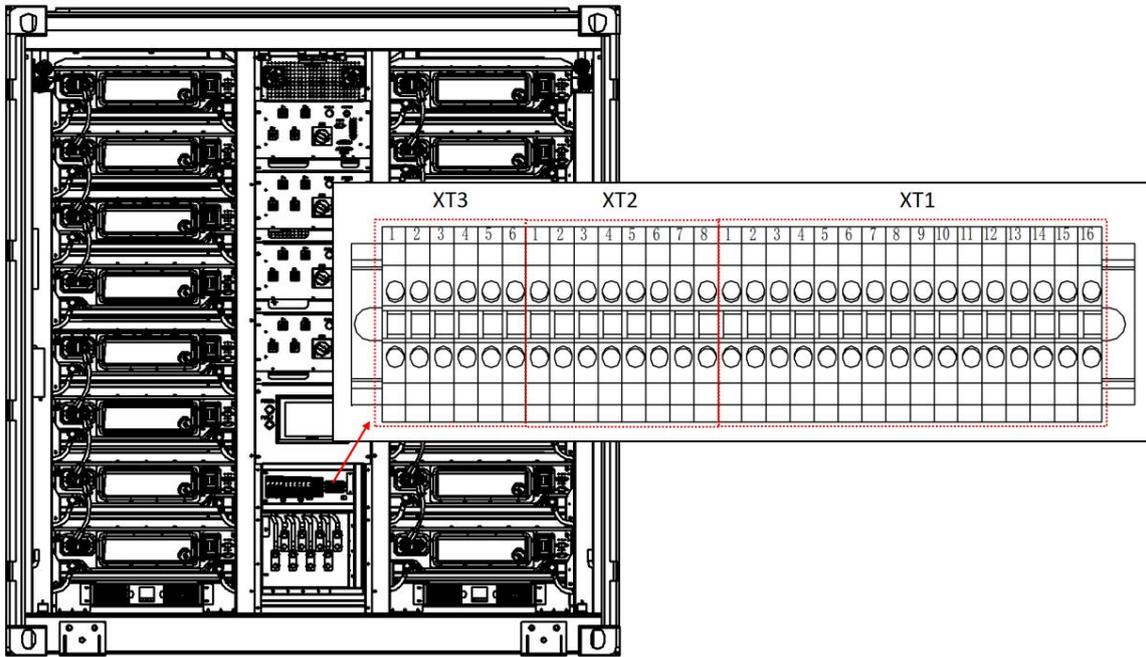


7.3. Connect To the RS485 Communication Line

Note

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





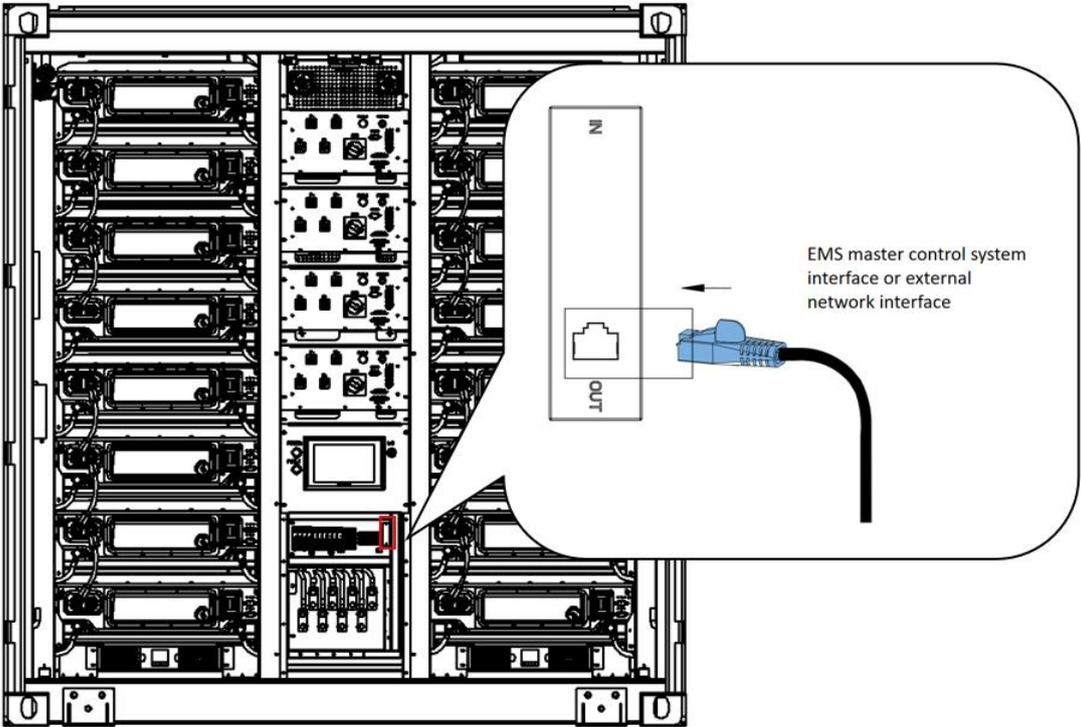
PIN	Signal Name	Function	Remarks
XT1-1	PCS-NO	BA fault output	Connect to PCS fault emergency stop contact point
XT1-2	PCS-COM		
XT1-3	HOT-NO	Thermal runaway state output	Connect to upper-level EMS-IO port
XT1-4	HOT-COM		
XT1-5	PCS-485A	PCS-485 communication	Connect to PCS-485 communication port
XT1-6	PCS-485B		
XT1-7	PCS-CANH	PCS-CAN communication	Connect to PCS-CAN communication port
XT1-8	PCS-CANL		
XT1-9	PCMSM1-NO	BC1 fault output	Connect to PCS branch 1 fault emergency stop contact point
XT1-10	PCMSM1-COM		
XT1-11	PCMSM2-NO	BC2 fault output	Connect to PCS branch 2 fault emergency stop contact point
XT1-12	PCMSM2-COM		
XT1-13	PCMSM3-NO	BC3 fault output	Connect to PCS branch 3 fault emergency stop contact point
XT1-14	PCMSM3-COM		
XT1-15	PCMSM4-NO	BC4 fault output	Connect to PCS branch 4 fault emergency stop contact point
XT1-16	PCMSM4-COM		

7.4. Connect the LAN Communication Line

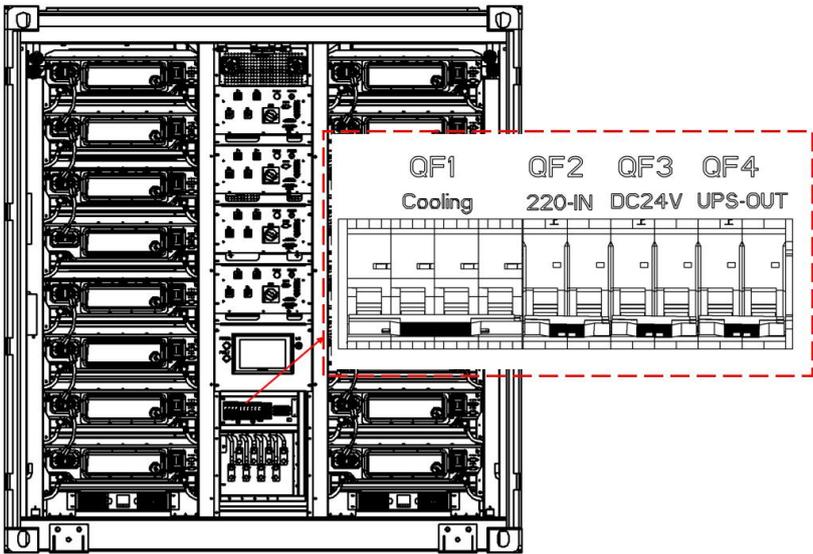
Note

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

Communication Interface between Superior EMS and 10-foot Container

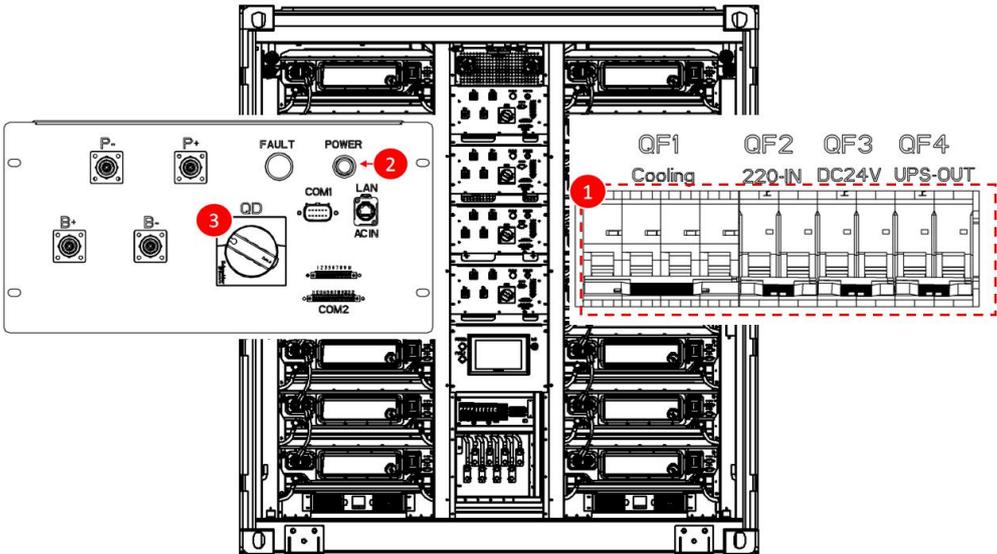


7.5. Auxiliary Power Wiring



Name	Description	Terminal	Function	Remarks
QF1-2	AC U-phase	Tubular terminal E6010	Power supply for liquid cooling unit/EU	EU / AC380V/3P+N / 50Hz / 60Hz
QF1-4	AC V-phase			
QF1-6	AC W-phase			
QF1-8	AC N-phase			
QF2-2	Auxiliary power 220V - L	Tubular terminal E4010	AC 220V auxiliary power input	EU / AC220V / L+N / 50Hz / 60Hz
QF2-4	Auxiliary power 220V-N			

8. Startup Operation Guide

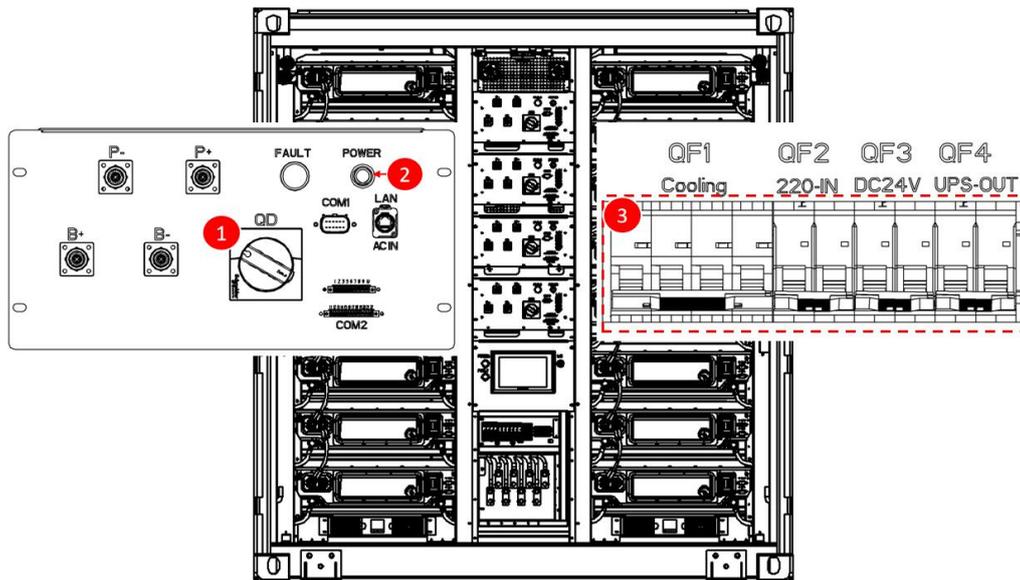


Step:1→2→3

1. Close QF1,2,3,4 in turn.
2. Press the push button switch 'Power', wait for the indicator to light up
3. Rotate the circuit breaker to 'ON'.

Name	Status	Explanation
Power Indicator Light	On	High-voltage box power supply is normal
Fault Indicator Light	On	There is a system failure, including hardware failures, internal communication failures, battery failures, etc.

9. Shutdown Operation Guide



Step:1→2→3

1. Rotate the circuit breaker to 'OFF'.
2. Press the pushbutton switch 'Power'.
3. Disconnect QF1, 2, 3 and 4 in turn.

Warning

After the 10-foot Battery Cabinet Container is disconnected, it takes some time for the internal components to discharge, please wait for 10 minutes until the device is fully discharged.

10. System Maintenance

10.1. Power Down the battery cabinet

Danger

- Ensure that the battery cabinet is de-energised during operation and maintenance of the battery cabinet. Operating the battery cabinet with electricity may result in damage to the battery cabinet or risk of electric shock.
- When emergency, please use an emergency stop switch to make an emergency call for the battery cabinet.

10.2. Maintenance Precautions

- Do not open the outdoor cabinet for maintenance during rainy, humid, or windy weather. If damage occurs due to unavoidable circumstances, Renon Power assumes no responsibility.
- To reduce the risk of electric shock, do not perform any maintenance or inspection operations outside of those specified in this manual.

10.3. Maintenance Requirements

1. Personnel must hold professional certificates and have undergone qualified professional training before starting work.
2. Adhere to relevant safety precautions, use necessary tools, and wear personal protective battery cabinet.
3. Do not wear jewelry, watches, or other metal accessories.
4. Under no circumstances should both hands touch the high-voltage positive and negative terminals of the energy storage system simultaneously.
5. Before maintaining the battery energy storage system, disconnect all high-voltage and low-voltage switches.
6. During cleaning operations, do not wash directly with water. Use a vacuum cleaner if necessary.
7. When plugging or unplugging cables, operate according to standards; do not use excessive force.
8. After maintenance, promptly clean up tools and materials, and check for any metal objects left inside or on top of the battery cabinet.
9. If you have any questions about operating or maintaining the battery cabinet, contact Renon's after-sales service center. Do not operate without authorization.

10.4. Routine Maintenance

Project List	Inspection Method	Maintenance Cycle
System Status and Cleanliness	<p>Check the following items. Correct any issues immediately:</p> <ul style="list-style-type: none"> • Check if the outdoor cabinet and internal battery cabinet are damaged or deformed. • Check for abnormal noises during operation. • Check if the internal temperature is too high. • Check if the internal humidity and dust levels are within normal range. Clean if necessary. • Check if the intake and exhaust vents are blocked. 	Every two years
Warning Signs	Check if warning signs and labels are clearly visible and undamaged. Replace if necessary.	
Cable Shield Grounding	Check if the cable shield is in good contact with the insulating sleeve and if the grounding copper strip is securely fixed.	

Corrosion	Check for oxidation or rust inside the outdoor cabinet.	
-----------	---	--

Project List	Inspection Method	Maintenance Cycle
Cabinet Exterior	<p>Check the following items. Correct any issues immediately:</p> <ul style="list-style-type: none"> ● Check if there are flammable objects on the top of the outdoor cabinet. ● Check if the welding points between the outdoor cabinet and the base steel plate are secure and free of rust. ● Check if the cabinet shell is damaged, chipped, or oxidized. ● Check if the door lock operates smoothly. ● Check if the seals are properly fixed. 	Annually
Cabinet Interior	Check for foreign objects, dust, dirt, and condensation inside the energy storage integrated system.	
Intake and Exhaust Vents	Check the temperature and dust level of the heat sink. Clean with a vacuum cleaner if necessary.	
Wiring and Cable Layout	<p>Ensure the energy storage integrated system is completely powered off before inspection. Correct any issues immediately:</p> <ul style="list-style-type: none"> ● Check if the cable layout is standard and if there are any short circuits. ● Check if all cable entry and exit holes are sealed. ● Check for water ingress inside the cabinet. ● Check if power cable connections are loose and retighten according to the specified torque. ● Check for damage to power and control cables, especially for cuts on surfaces in contact with metal. ● Check if the insulation wrapping of power cable terminals has fallen off. 	

Fans	Check the fan operation: <ul style="list-style-type: none"> ● Check if the fans are blocked. ● Check for abnormal noise during operation. 	
Screws	Check for dropped screws inside the outdoor cabinet.	

Project List	Inspection Method	Maintenance Cycle
<ul style="list-style-type: none"> ● Functions 	<ul style="list-style-type: none"> ● Check the emergency stop button function: ● Simulate a shutdown. ● Check if the warning signs and labels on the body and other battery cabinet are clear and undamaged. Replace if necessary. 	Every six months
Internal Component Inspection	Check the cleanliness of circuit boards and components: <ul style="list-style-type: none"> ● Check the temperature and dust level of the heat sink. Clean with a vacuum cleaner if necessary. ● Clean or replace air filters if necessary. ● Ensure the intake vents are unobstructed. 	
Intake and Exhaust Vents	Check the temperature and dust level of the heat sink. Clean with a vacuum cleaner if necessary.	

- The maintenance cycles provided in this section are recommendations. Actual maintenance cycles should be determined based on the specific installation environment.
- Factors such as plant size, location, and site conditions can affect maintenance cycles. If the operating environment is dusty or sandy, it may be necessary to shorten the maintenance cycle and increase the frequency of maintenance.

10.5. Cabinet Maintenance

10.5.1. Appearance Damage Repair Measures

Note
Check if the protective paint on the cabinet shell has peeled off or chipped. Repair if necessary.

10.5.2. Door Lock Inspection

Check if the door locks of the energy storage integrated system are functioning normally and in good condition. Lubricate the lock holes if necessary.

10.6. Battery Maintenance

Project List	Inspection Method	Maintenance Cycle
Battery Cluster Status and Cleanliness	Check the following items. Correct any issues immediately: <ul style="list-style-type: none"> ● Check if the battery cluster and internal battery cabinet are damaged or deformed. ● Check for abnormal noises during operation. ● Check if the internal temperature is too high. ● Check if the internal humidity and dust levels are within normal range. Clean if necessary. 	Every two years
Warning Signs	Check if warning signs and labels are clearly visible and undamaged. Replace if necessary.	
Wiring and Cables	Check the connections between the switch box (if present) and battery modules, and between battery modules.	
Corrosion	Check for oxidation or rust inside the battery cluster.	

10.7. The battery cabinet Maintenance

1. Before using the system for the first time after long-term storage, fully charge the system at least once to restore the battery performance to its best state.
2. Regularly check if the high-voltage cables and connection strips are loose, if the contacts are good, and if the terminal surfaces are severely rusted or oxidized.
3. Regularly check if the cables are loose, aged, damaged, or broken, and if the insulation is good.
4. Regularly check for any pungent odors inside the battery cabinet and for any burning smells at high-voltage connection points.
5. Regularly check if the status and alarm indicator lights of the battery energy storage system are intact and functioning properly.
6. Regularly check if the emergency stop switch is effective to ensure rapid system shutdown in emergencies.
7. Regularly check the fire extinguishing device to ensure it is in good condition and within the validity period.
8. Do not connect different types of battery modules in series or parallel.

10.8. Removal of the Smart System

Warning

- Ensure that the battery cabinet has been powered off.
- Wear personal protective equipment when operating the battery cabinet.

Step 1: Open the battery cabinet door

Step 2: Disconnect all the electrical connections of the battery cabinet, including: AC line, communication line, and protective ground wire.

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

10.9. Scrapped battery cabinet

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

11. Fault Treatment

If you encounter energy storage system system failure, professional personnel can not be eliminated, please contact the after-sales service personnel in a timely manner.

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

- 1) 10-foot Battery Cabinet Container information, such as serial number, software version, equipment installation time, fault occurrence time, fault occurrence frequency, etc.
- 2) 10-foot Battery Cabinet Container installation environment, such as: weather conditions, installation environment recommendation can provide photos, videos and other documents to assist the analysis of problems.

12. Technical Data

No.	Projects	Parameters	Remarks
1	Product Model	R-SM1672LCB01-EU	
2	Cell Type	LFP 3.2V/314Ah	
3	Module Configuration	1P104S	
4	String Configuration	1P416S	
5	Number of Strings	4	
6	Capacity (kWh)	1672	
7	Nominal Voltage(V)	1331.2	
8	Operation Voltage Range(Vdc)	1218.88~1476.8	
9	Discharge Depth	90% DoD	
10	Number of cycles	>8000 times	(80% DOD)

No.	Projects	Parameters	Remarks
11	Thermal Management Mode	Liquid-cooling	
12	Thermal Control Management	Aerosol Extinguishing	
13	Rated Output Power(kW)	840	
14	Max. Output Power(kW)	860	
15	Certifications	IEC62619, IEC62477, EN61000-6-2/4, UL9540A, UL9540, UN3536, UL1973	
16	Battery System Dimensions(W*D*H)	2991*2438*2591mm 117.8*96*102in	
17	Battery System Total Weight	~15000kg / 33069lb	
18	IP Rating	IP54	
19	Operation Temperature	-30°C to 55°C (De-rating over 45°C)	
20	Operation Humidity(Rh)	≤90%, No condensation	
21	Operation Altitude	3000m	
22	Storage Conditions	10°C to 30°C, Up to 90% RH, non-condensing, State of Energy (SoE): 50% initial	

13. Emergency Treatment

Warning
<p>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:</p> <ul style="list-style-type: none"> ● 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
<ul style="list-style-type: none"> ● 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.

14. After-Sale Service

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

Renon Power provides a three-year free warranty service, and other warranty requirements are subject to the terms of the contract.

15. Quality Assurance Instructions

15.1. 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.

15.2. 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.

16. Technical Description and Specification

16.1. Introduction of the Main Equipment



The Smart Matrix has an energy capacity of 1.67 MWh. Its main configuration includes: one 1.67MWh battery system (DC voltage 1218.88~1476.8V), primarily composed of four battery clusters, each with a capacity of 418 kWh. Additionally, it includes two sets of liquid cooling control management system, a set of aerosol fire suppression system, a set of battery management system (BMS), and a set of communication management system.

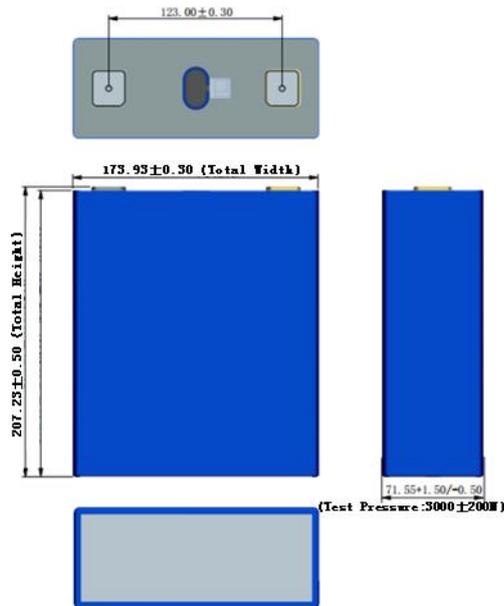
The Smart Matrix energy system employs a modular unit design, allowing for direct parallel expansion on the DC side. Each energy system has a consistent and unified appearance and style. The modular design reduces the risk caused by product failure and allows for flexible capacity configuration. The system features a compatible outdoor design with an IP54 protection rating, enabling direct outdoor installation, which helps reduce user deployment costs.

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.

16.2. Product Parameter

16.2.1. Battery cell

16.2.1.1. Cell parameter



The standard 314Ah 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.

Cell's basic parameter

No.	Projects	Parameters	Remarks
1	Cell Type	Lithium Iron Phosphate (LFP)	
2	Nominal Capacity	314Ah	$25^{\circ}\text{C} \pm 2^{\circ}\text{C} / 0.5\text{C}$
3	Nominal Voltage	3.2V	
4	Nominal Energy	1004.8Wh	25°C
5	Operating Voltage	2.5~3.65V	$T > 0^{\circ}\text{C}$
		2.0~3.65V	$T \leq 0^{\circ}\text{C}$
6	Working Temperature	Charge: $0^{\circ}\text{C} \sim 55^{\circ}\text{C}$ Discharge: $-20^{\circ}\text{C} \sim 60^{\circ}\text{C}$	
7	Dimension	Thickness: $71.7 \pm 0.8\text{mm}$ Width: $174.0 \pm 0.8\text{mm}$ Shoulder Height: $204.4 \pm 0.8\text{mm}$ Total Height: $206.8 \pm 0.8\text{mm}$	
8	Peak discharge current	560A	@60S, SOC $\geq 20\%$

No.	Projects	Parameters	Remarks
9	Dimension	Thickness: 71.7±0.8mm Width: 174.0±0.8mm Shoulder Height: 204.4±0.8mm Total Height: 206.8±0.8mm	
10	Cathode Material	Lithium-iron phosphate	
11	Cell Weight	5.78±0.2kg	
12	Energy Efficiency	≥94.0%	25±2°C, 0.5P
13	Energy Density	174Wh/kg 394Wh/L	
14	IMP	0.17±0.05mΩ	40%SOC
15	Shipping capacity	125.6±3Ah	40%SOC
16	Cycle Life	≥8,000cycles	The temperature is maintained at 25±2°C, cycle test by the standard charge and discharge method under 300±20Kgf preload, Fading to 70% of standard capacity.

16.2.1.2. Electrical Performance

No.	Item	Electrical Performance Test	Standard
1	Initial discharge energy	1) Test temperature: 25±2°C. 2) Pretreat the cell with standard charge and discharge mode. 3) Charge the cell with a power at 0.5P to 3.65V. Rest 10min. 4) Discharge the cell with a power at 0.5P to 2.5V. Rest 10min. 5) The value of the discharge energy is taken as the initial discharge energy.	Initial discharge energy ≥ 1004.8 Wh
2	High temperature charge-discharge performance	1) Initial discharge the cell in standard discharging mode. 2) Leave the cell at 45±2°C for 5h. 3) Charge with a power at 0.5P to 3.65V and	Charge energy ≥ 1004.8Wh Discharge energy ≥ 1004.8Wh

		record charge energy (Wh), rest 10 min. 4) Discharge with a power at 0.5P to 2.5V and record discharge energy (Wh), rest 10min.	
3	Low temperature charge-discharge performance	1) Initial discharge of the cell in standard discharging mode. 2) Leave the cell at 5±2°C for 20h. 3) Charge with a power at 0.5P to 3.65V and record charge energy(Wh), rest 10 min. 4) Discharge with a power at 0.5P to 2.5V and record discharge energy (Wh), rest 10 min.	Charge energy ≥703.36Wh Discharge energy ≥ 703.36Wh
4	Cycle Life	1) Test temperature:25±2°C. 2) Preload force:300±20kgf. 3) Charge with a power at 0.5P(W) to 3.65V,then stand by 30min. 4) Discharge with a power at 0.5P(W) to 2.5V, then standby 30min.	Cycle number≥8,000 times
5	Self-Discharge	Within three months of cell shipping. Test temperature:25±3°C ,40%SOC storage	≤3%/month

16.2.1.3. Safety

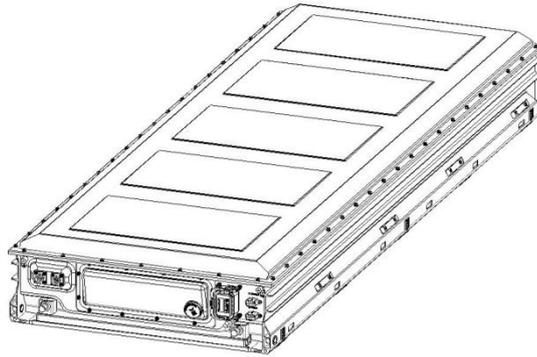
No.	Item	Electrical Performance Test	Standard
1	Drop	1) Fully charge the cell in standard charging mode. 2) Terminal of cell faces down and free fall from1.5m height to cement floor. 3) Observe for 1h.	No fire or explosion or smoking
2	Over-Charge	1) Test temperature: 25±2°C. 2) Fully charge the cell in standard charging mode. 3) Charge with current at 0.5C for 1hor voltage at 5.475V.. 4) Observe for 1h.	No fire or explosion
3	Over-Discharge	1) Test temperature:25±2°C. 2) Fully discharge the cell in standard discharging mode..	No fire or explosion or leakage or smoking

No.	Item	Electrical Performance Test	Standard
		3) Discharge with current at 0.5C for 1h to 0V. 4) Observe for 1h.	
4	Short Circuits	1) Test temperature: $25 \pm 2^{\circ}\text{C}$. 2) Fully charge the cell in standard charging mode. 3) Adjust the resistance of the test device for the central position of the connection between the short-circuit test device and the positive electrode of a cell to $[0.8, 1.0] \text{ m}\Omega$, and adjust the connection between the short-circuit test device and the positive electrode of a cell until the contact resistance of the positive electrode is less than or equal to $0.1 \text{ m}\Omega$; Adjust the connection between the short-circuit test device and the negative electrode of the cell until the contact resistance of the negative electrode is less than or equal to $0.1 \text{ m}\Omega$. 4) External short circuit cell for 10 min. 5) Observe for 1h.	No fire or explosion
5	Squeeze	1) Fully charge the cell in standard charging mode. 2) Squeeze direction: perpendicular to the direction of the cell plate, or the same direction that the cell is most likely to be crushed in vehicle; Dimension of Squeeze plate: semi-cylinder with a radius of 75mm, the length (L) of the semi-cylinder is greater than the size of the extruded cell; speed: 5mm/s; terminal condition: force reaches 50kN then hold for 10 min. 3) Observe for 1h.	No fire or explosion or leakage or smoking
6	Thermal Runaway	1) Test method follows GB/T36276-A.2.19.	No fire or explosion

16.2.2. Battery module

16.2.2.1. External view of the battery module

The battery module consists of individual battery cells, connecting copper bars, collection harnesses (FPC board), BMU, aerosol, fuses, fire injection pipes, and related electrical and structural components. The combination method of the battery module is 1P104S, which means 104 cells of 314Ah are connected in series, with a nominal voltage of 332.8V. The appearance rendering is as follows:



16.2.2.2. Table of battery module parameters

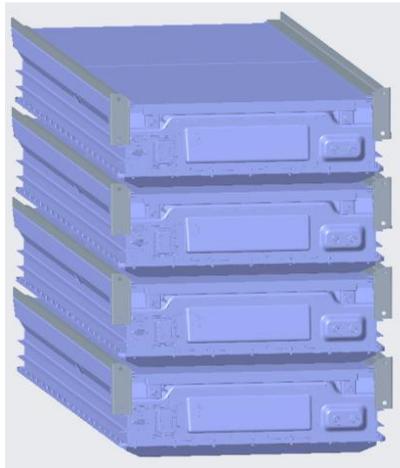
No.	Project	Parameters	Remarks
1	Configuration	1P104S	
2	Rated Energy	104.499kWh (314Ah)	
3	Rated Voltage	332.8V	
4	Allowable voltage range	260V~379.6V	For cell 2.5V~3.65V
5	Dimension	2150.5±5×779±2×250±2mm	
6	Mass	690±5kg	
7	Rated charge power	0.5P	According to current map
8	Rated discharge power	0.5P	
9	Short overload charging current	314A	60S
10	Short overload charging current	314A	60S
11	Battery operating temperature	-30~60°C for discharge /0~55°C for charge	
12	IP level	IP67	
13	Insulation standard	≥1000Ω/V	Test voltage

			2500Vdc
14	Resistant to high voltage	4500VDC,leakage current \leq 5mA, no breakdown or flashover	
15	Cooling and heating type	Liquid cooling/heating	
16	Fire fighting	Hot Aerosol	

16.2.3.Smart Matrix Battery Cluster

16.2.3.1. Smart Matrix battery cluster view

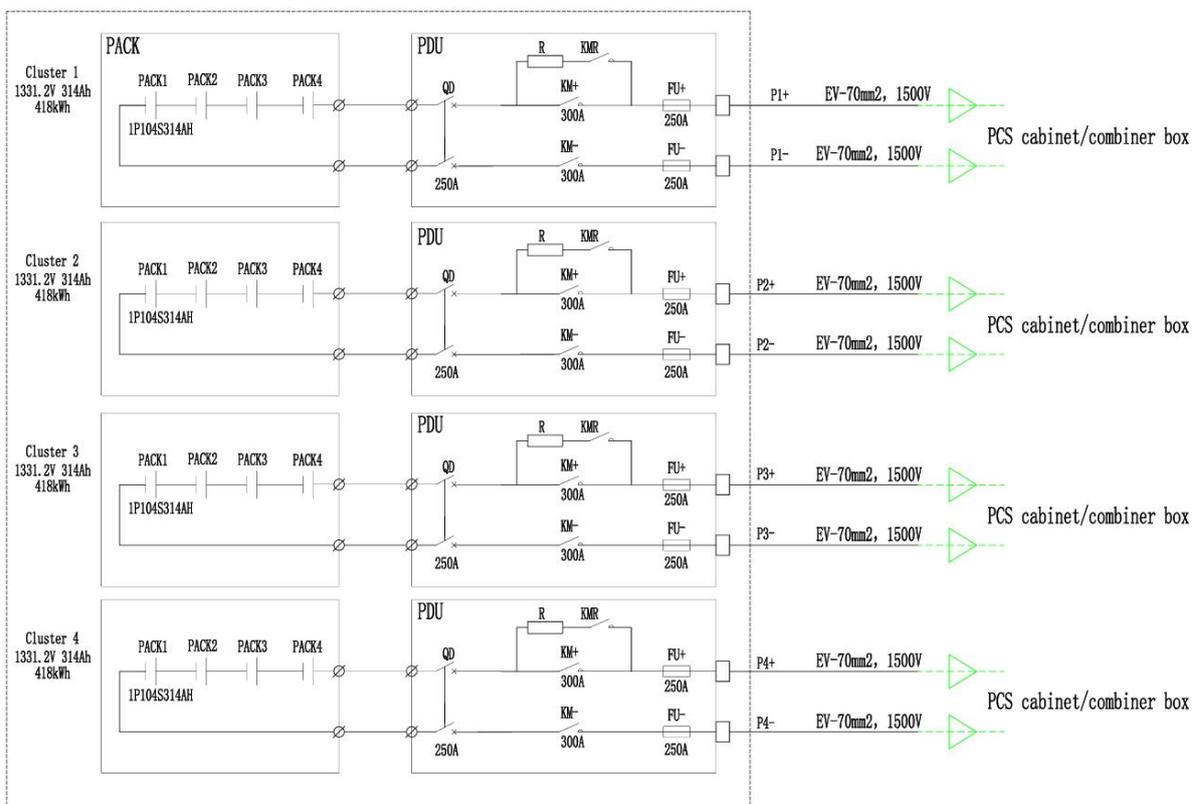
Smart Matrix consists of four battery clusters, each with a frame construction where the battery modules are bolted in place. Each battery cluster is composed of 4 battery modules, connected in series in a 1P416S configuration. The battery modules are arranged sequentially from top to bottom in the battery cabinet and are connected via a special connector on the front panel. The nominal voltage is 1331.2V, and its appearance is shown in the following figure:



16.2.3.2. Smart Matrix battery cluster parameter sheet

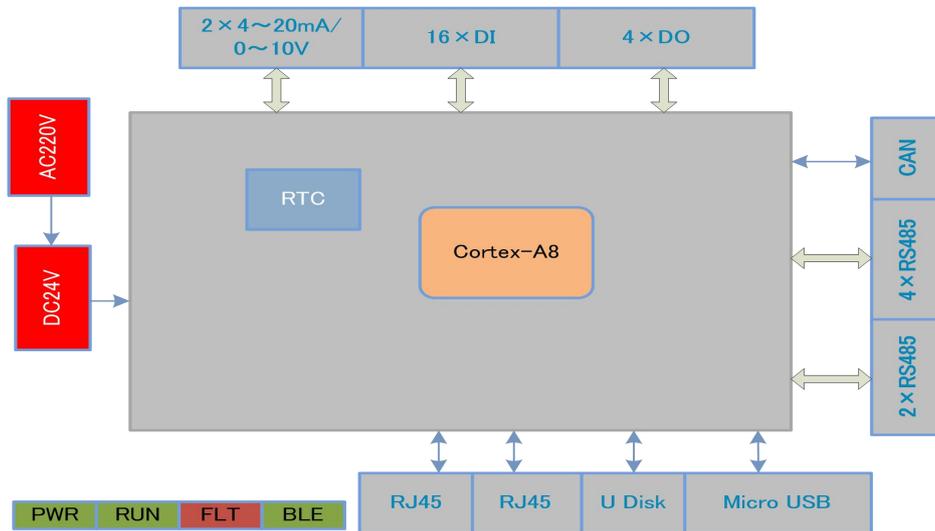
No.	Project	Parameters	Remarks
1	Grouping method	1P416S	
2	Module capacity	314Ah	
3	Nominal voltage	DC 1331.2V	
4	Nominal energy	418kWh	25°C
5	Operating voltage	1218.88V~1476.8V	
6	Nominal charge/discharge rate	0.5C	
7	Operating temperature	-20°C~55°C	
8	BMS communication	CAN	

No.	Project	Parameters	Remarks
9	Battery cooling method	Liquid-cooled	
10	Fire Fighting	Aerosol Extinguishing	
12	Dimension	L2150.5±5*W779±2*H1034.5±2mm	Tentative



16.2.4. Battery Management System

Battery cluster (RACK) is the basic unit of large-scale electric energy storage, and its components include: battery PACK for storing energy, battery management system for weak current monitoring and control (BMS), switch box for strong current monitoring and control, and battery rack for structural load-bearing. Among them, BMS adopts three-level management architecture design, and the overall control and communication block diagram of the system is shown in the following figure:



(1) **Battery Management Unit (BMU)**: built-in in PACK, with voltage and temperature sampling, passive equalization and other functions, it adopts software-free design, through differential UART Daisy chain to achieve communication and control functions.

(2) **Battery cluster management Unit (CMU)**: built into the switch box, it has the functions of SOC calculation, BMU control, and main power circuit on-off control.

(3) **Battery System management Unit (SMU)**: built-in in the DC distribution cabinet, with environmental monitoring (optional), control of the CMU, control of the main power circuit on-off functions.

The specific function description of BMS at all levels is shown in the following table.

BMS Hierarchy	Functional classification	Specific Features
BMU	Battery status Acquisition	Cell voltage acquisition
		Temperature acquisition
	Energy Management	Passive equalization
	Thermal management	Fan drive
	Information management	Communication with CMU
CMU	Battery status acquisition	Current acquisition
		Total voltage acquisition
		Insulation resistance acquisition
	Battery status estimation	SOC estimates
		SOH estimates
	Troubleshooting	Battery system fault diagnosis
		BMS system fault diagnosis
	Energy Management	Charge control management
		Discharge control Management
		Passive balanced control management
Thermal Management	Battery cooling control management	

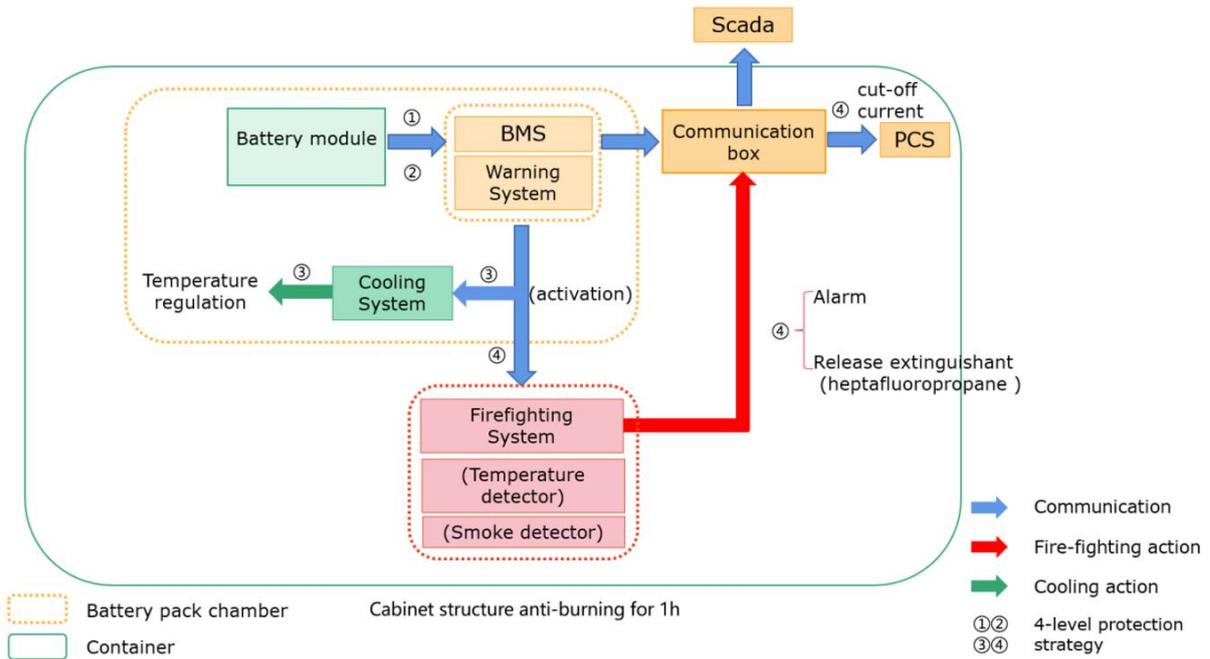
	Information Management	Software upgrades
		Communicate with BMU and SMU
SMU	Energy Management	RACK on-off management
	Information Management	Communication with PCS and CMU
		Logging
		Fault recording

No.	Item	parameter
1	BMS Model	BMU-52
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 ° C
9	Temperature detection accuracy	±2 °C
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

16.3. Protection System

16.3.1. Level Protection Strategy

Renon power 10-foot Battery Cabinet Container 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	<ol style="list-style-type: none"> 1. Abnormal cell voltage 2. Abnormal cell temperature 3. Cell voltage imbalance 	<ol style="list-style-type: none"> 1. Generate alarm information 2. Performance discreteness analysis
Level 2	<ol style="list-style-type: none"> 1. Micro short circuit in cell 2. Cell voltage drops slowly 	<ol style="list-style-type: none"> 1. Generate alarm information 2. Limit power
Level 3	<ol style="list-style-type: none"> 1. Overtemperature up to limited value 	<ol style="list-style-type: none"> 1. Generate alarm information 2. Stop PCS running 3. Start protection status
Level 4	<ol style="list-style-type: none"> 1. Smoke concentration triggers the smoke detector 2. Indoor temperature triggers the temperature detector 	<ol style="list-style-type: none"> 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.

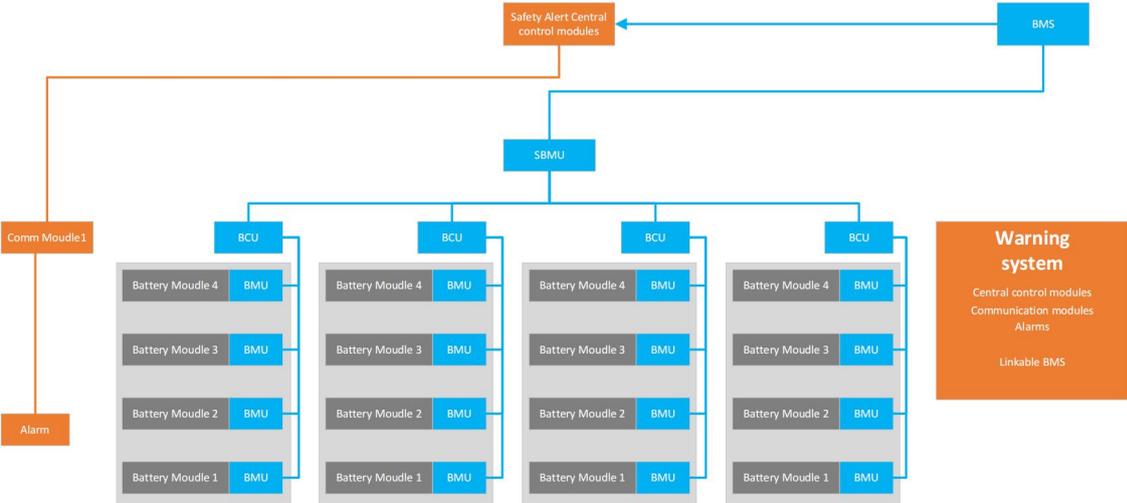
The second-level protection can restrict the charge and discharge power of abnormal battery cells to avoid causing rapid thermal runaway. When a single cell has an internal micro-short circuit, the performance of the cell will decrease. Also, the terminal voltage will slowly drop even without load, that 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 BESS 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 1.67MWh for fire extinction.

16.3.2.Warning system

Each standard 1.67MWh 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, combustibile 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 1.67MWh cabinet. The centralized control modules can also communicate with the BMS.

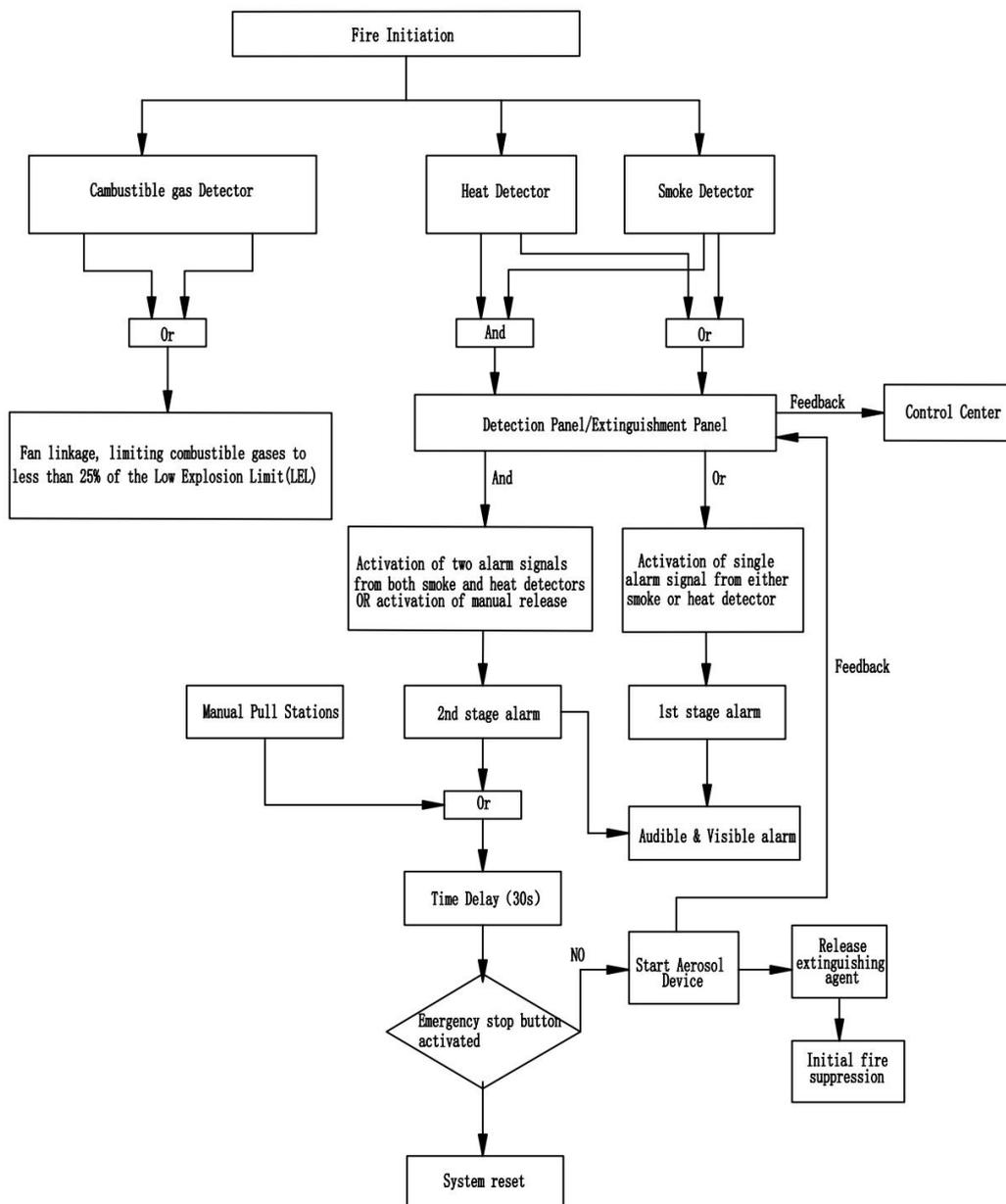
16.3.3. Firefighting System

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 1.67MWh) 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 start/stop button when two detectors ensure fire occurs.

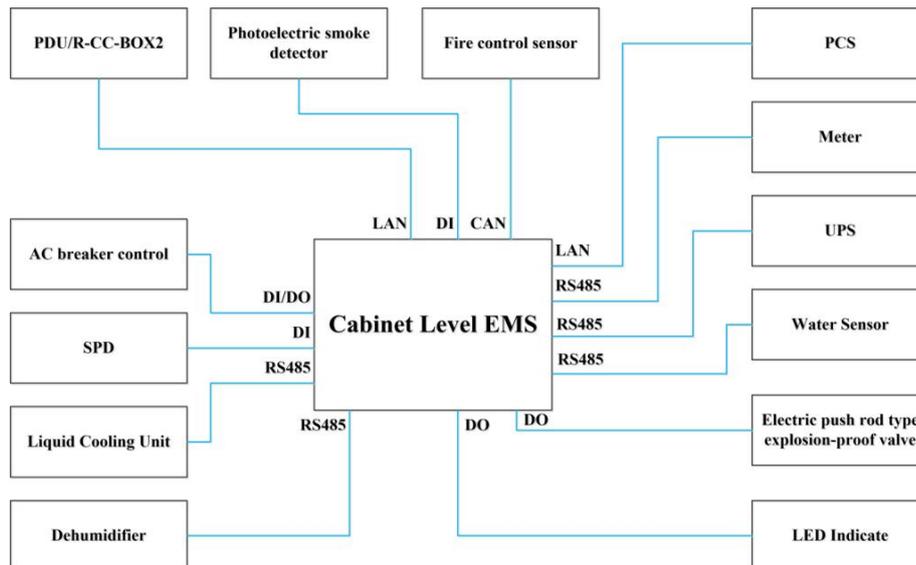
(3) Mechanical emergency manual control mode.

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.

16.4. Energy Management System(EMS)

16.4.1. 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.

(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

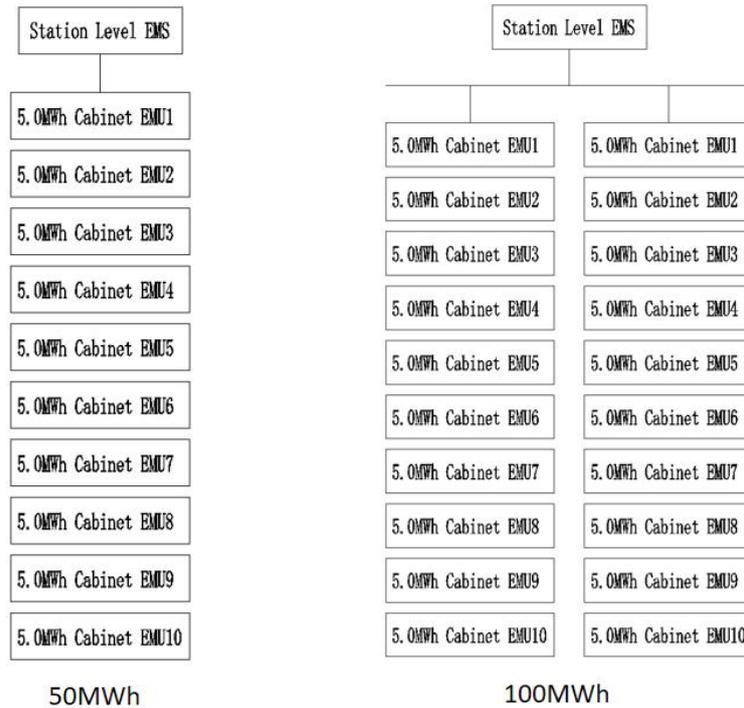
IP65 protection and operating temperature range of -20 ° C to 70°C, making it suitable for harsh industrial environments.

Parameters

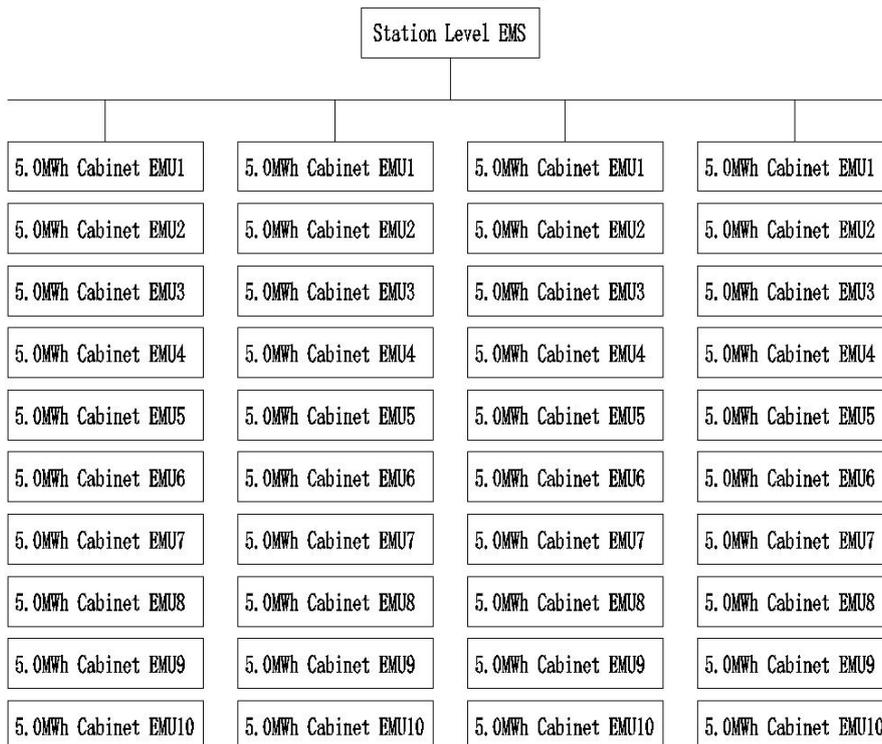
Item	Parameter
CPU	Intel G7400
Memory	RAM: 8GB
GPU	Intel® UHD Graphics 770
NPU	Support 1 Tops computing power
OS	Ubuntu 22.04
Brightness	450cd/m2
Resolution	1920 x 1080
Angle	89°/89°/89°/89°
Touch	Projected Capacitive
Communication interface	4*LAN,4*485,4*USB,2*CAN,1*HDMI
Control interface	8DI,8DO
Operating temperature	-20°C~60°C

16.5. EMS architecture diagram

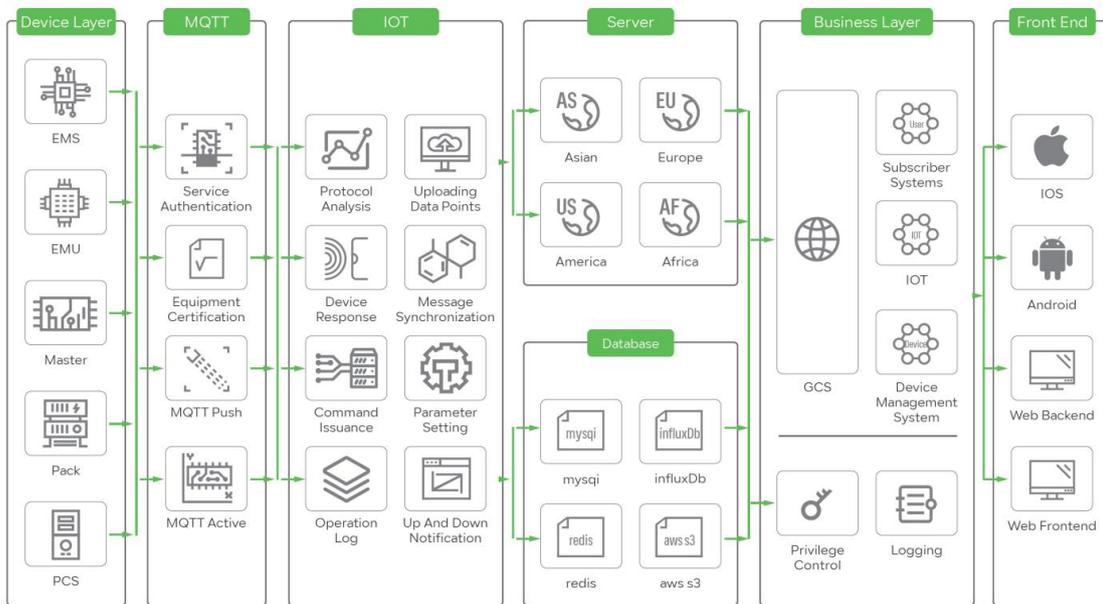
16.5.1. 50MWh/100MWh EMS architecture diagram



16.5.2. 200MWh EMS architecture diagram



16.5.3. Station Level EMS & Cloud Platform



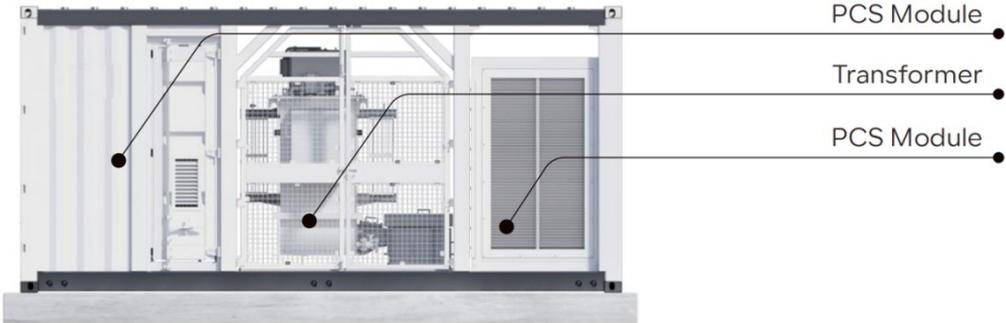
Station level EMS is a high performance local server, working together with Renon cloud platform, Renon Smart is a comprehensive device management and monitoring solution for national agents, secondary agents, installers and users. Comprehensive system for managing large-scale power station and commercial and industrial 10-foot Battery Cabinet Containers.



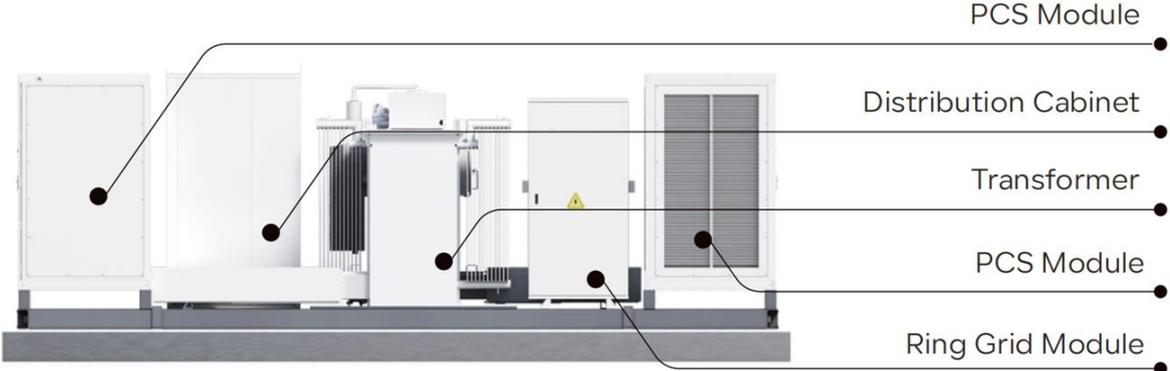
- 1) Instant Clarity with Remote Data Monitoring and Analysis
- 2) Remote data monitoring, automatic curve generation, and big data analysis management make the product operation status clear at a glance.
- 3) Enhanced Security with Distributed Architecture and Data Encryption

- 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.

16.6. 10-foot Battery Cabinet Container parallel operation plan

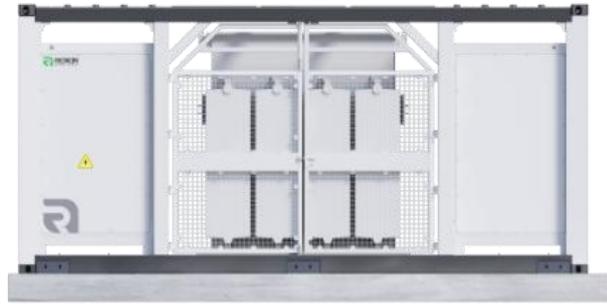


For 10ft/20ft

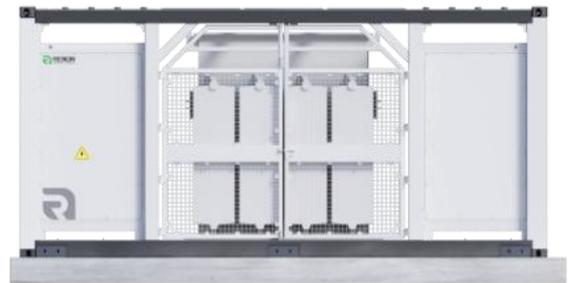


For 30ft

Specification 1:	Capacity :1.67MWh, output power 0.84MW
	DC side specification:10 feet 1 piece
	AC side specification:20 foot high cabinet



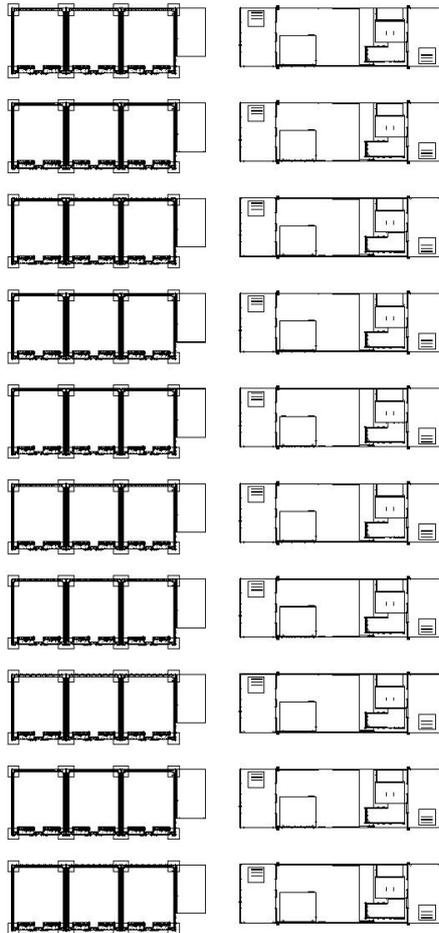
Specification 2	Capacity :3.44MWh, output power 1.67MW
	DC side specification:10 feet 2 sets
	AC side specification: 20 foot high cabinet



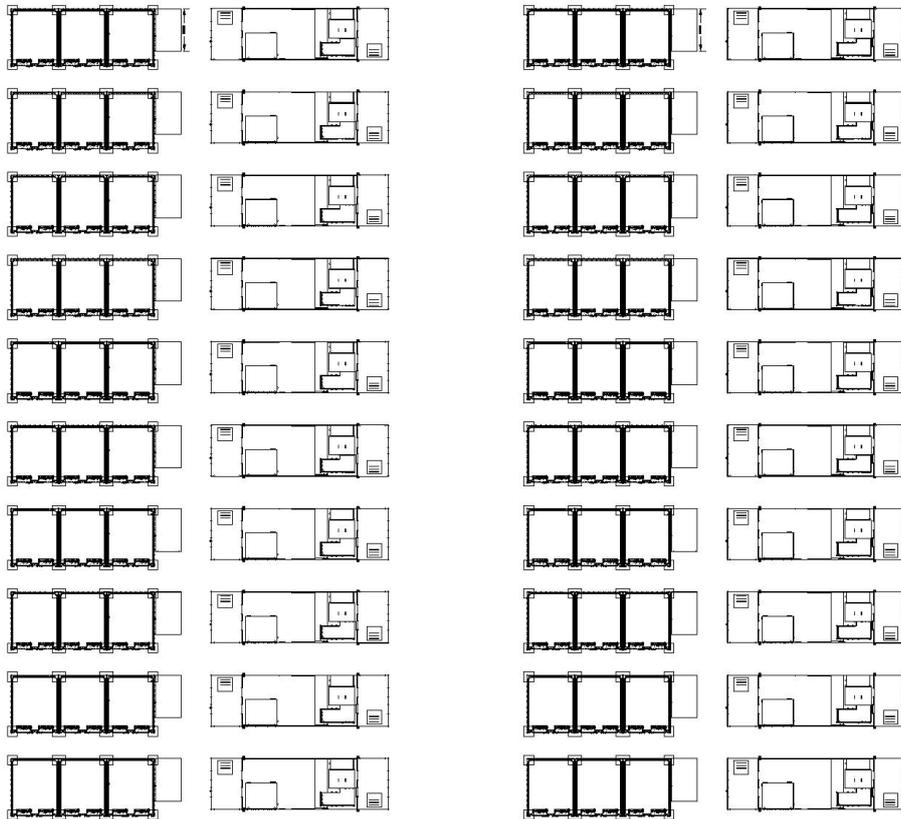
Specification 3	Capacity: 5.0MWh, output power: 2.5MW
	DC side specification: 10 feet 3 sets
	AC side specification: 20 foot high cabinet



Specification 4	Capacity: 50MWh, output power 25MW
	DC side specification: 10 feet, 3 pieces * 10 sets
	AC side specification: 1 x 10 set 20 foot high cabinet



Specification 5	Capacity: 100MWh, output power 50MW
	DC side specifications: 10 feet * 3 sets, 20 sets
	AC side specifications: 20 sets of 20 foot high cabinets

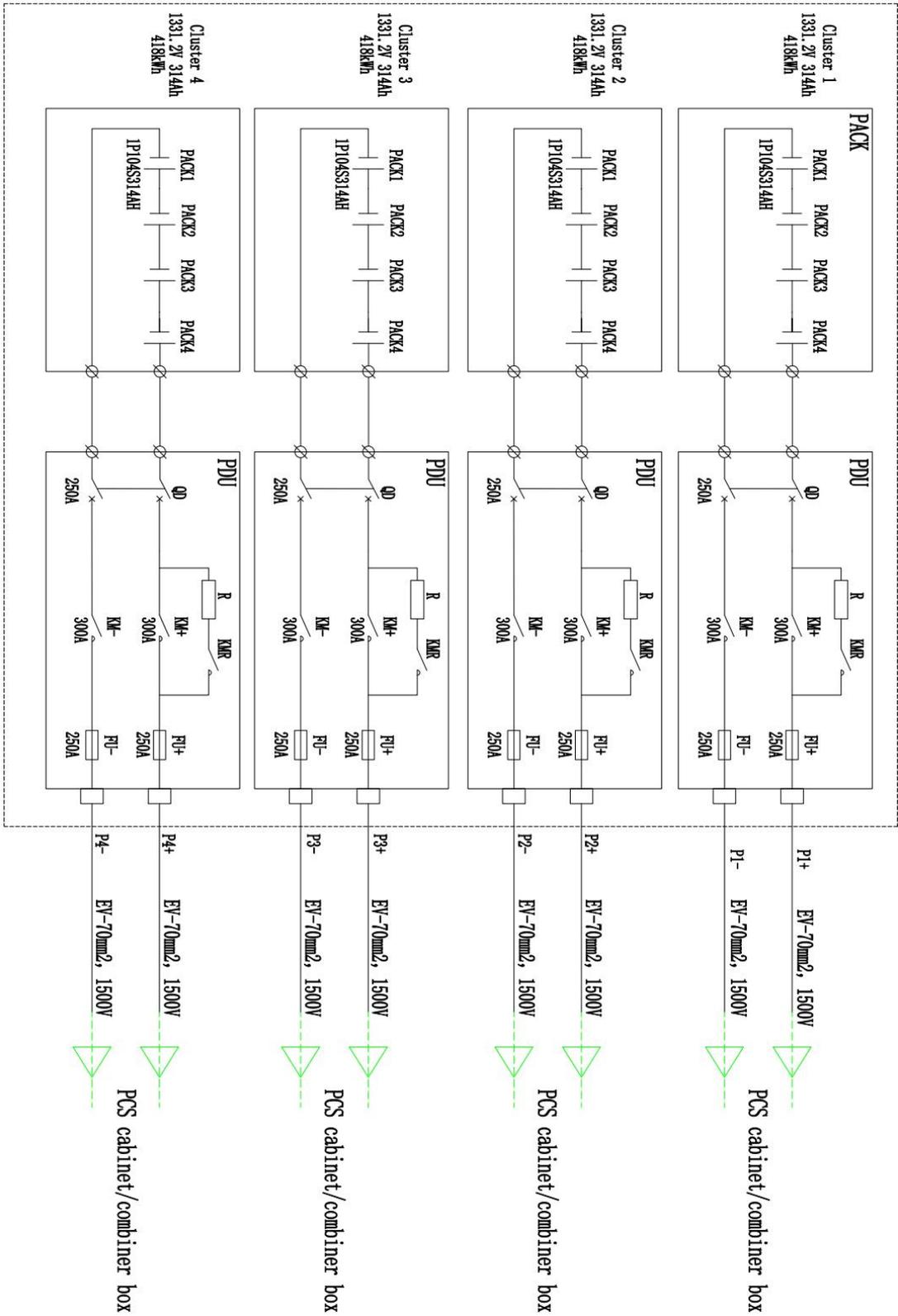


Specification 6	Capacity: 200MWh, output power 100MW
	DC side specifications: 10 feet * 3 sets, 40 sets
	AC side specifications: 40 sets of 20 foot high cabinets

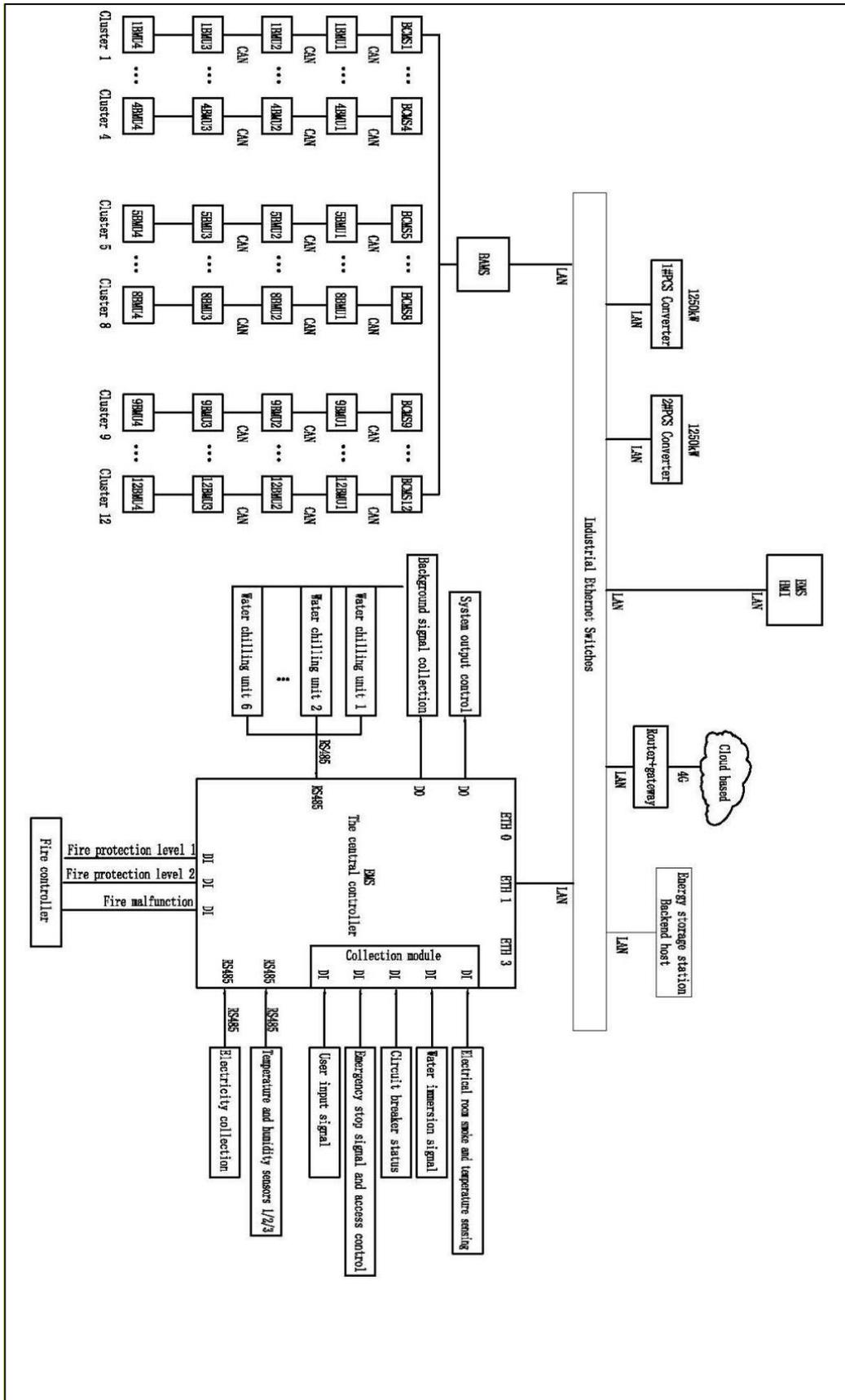


17. Appendices

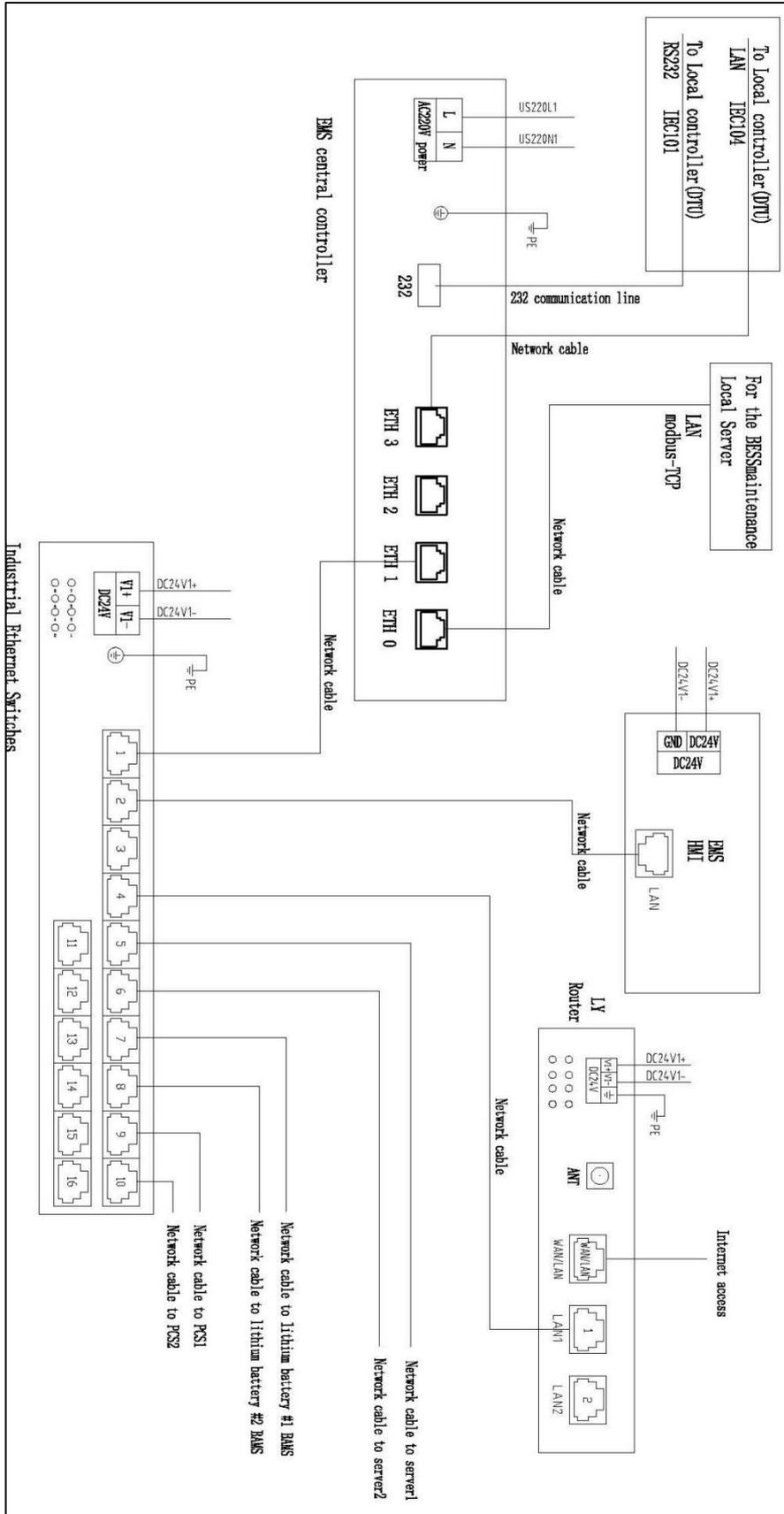
17.1. Primary System Schematic



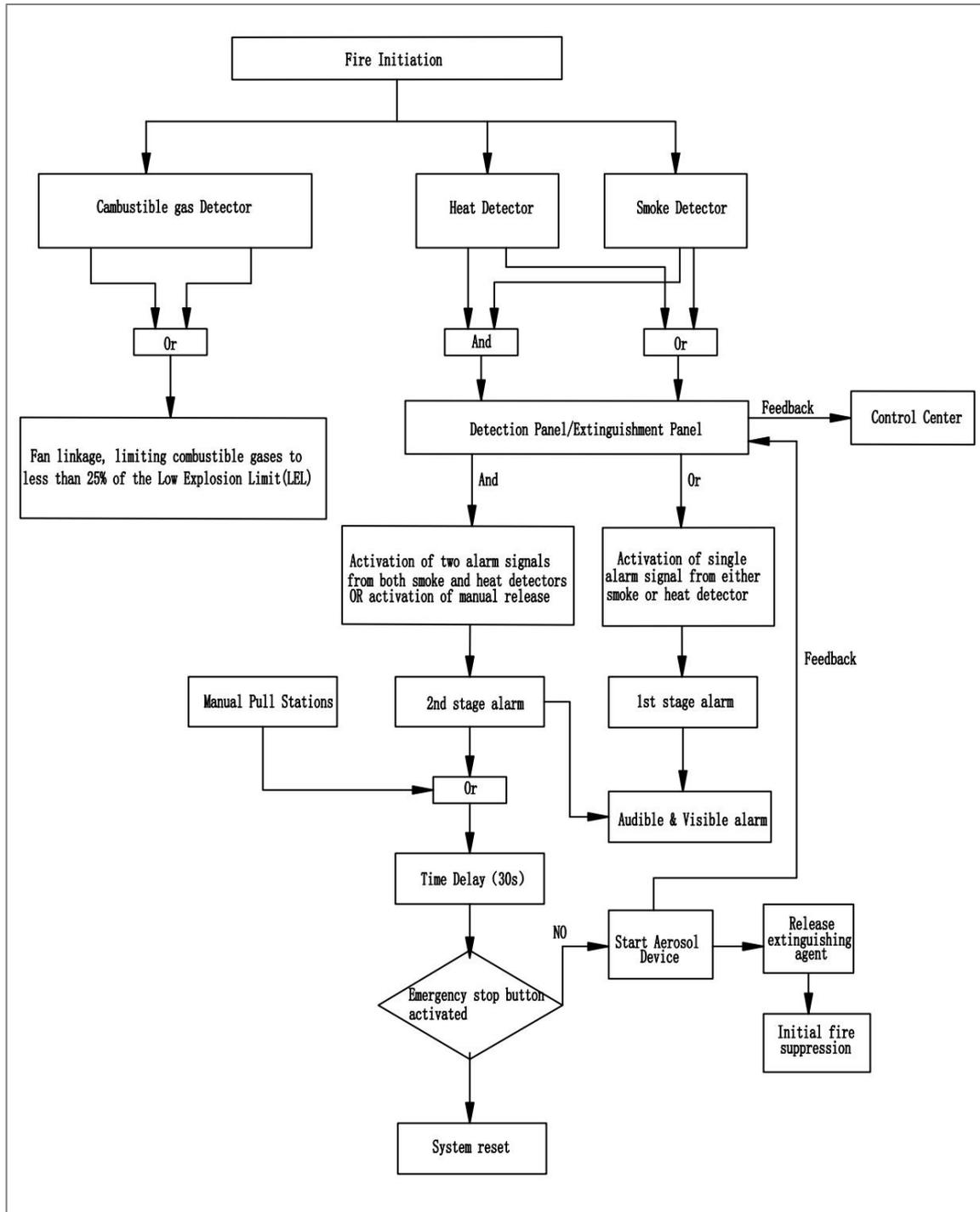
17.2. Communication Schematic



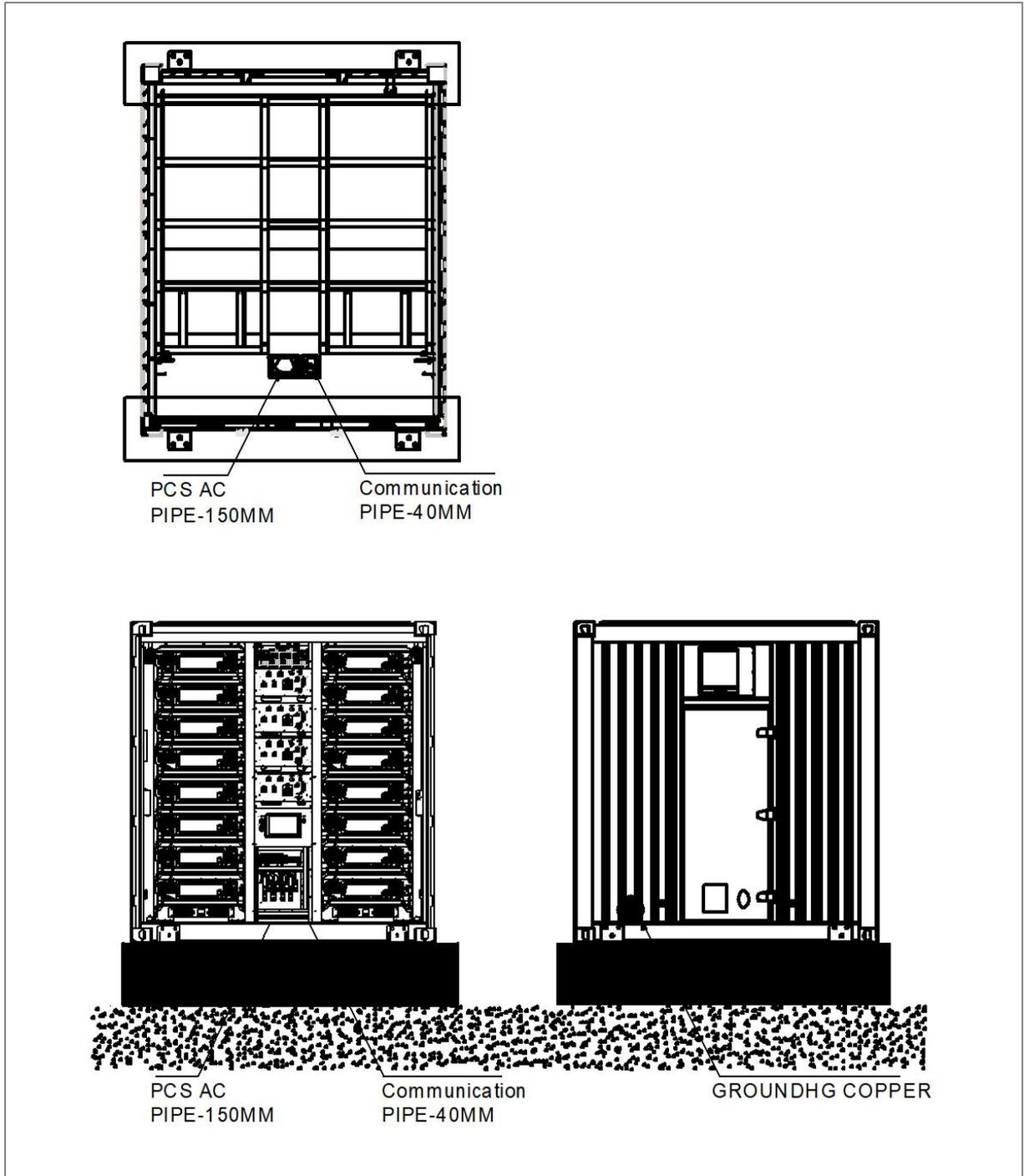
17.3. System Communication Details



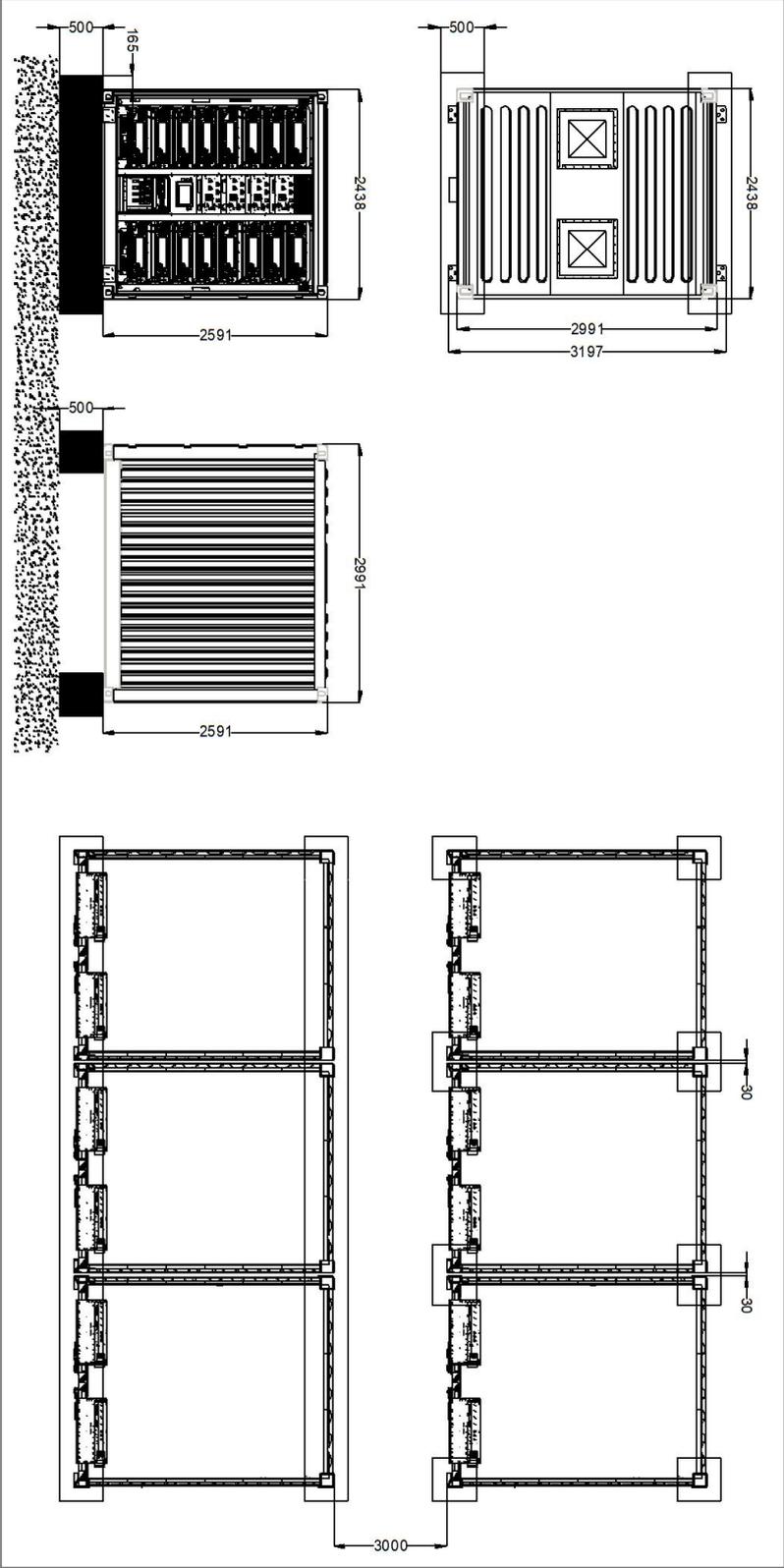
17.5. Fire protection system alarm diagram



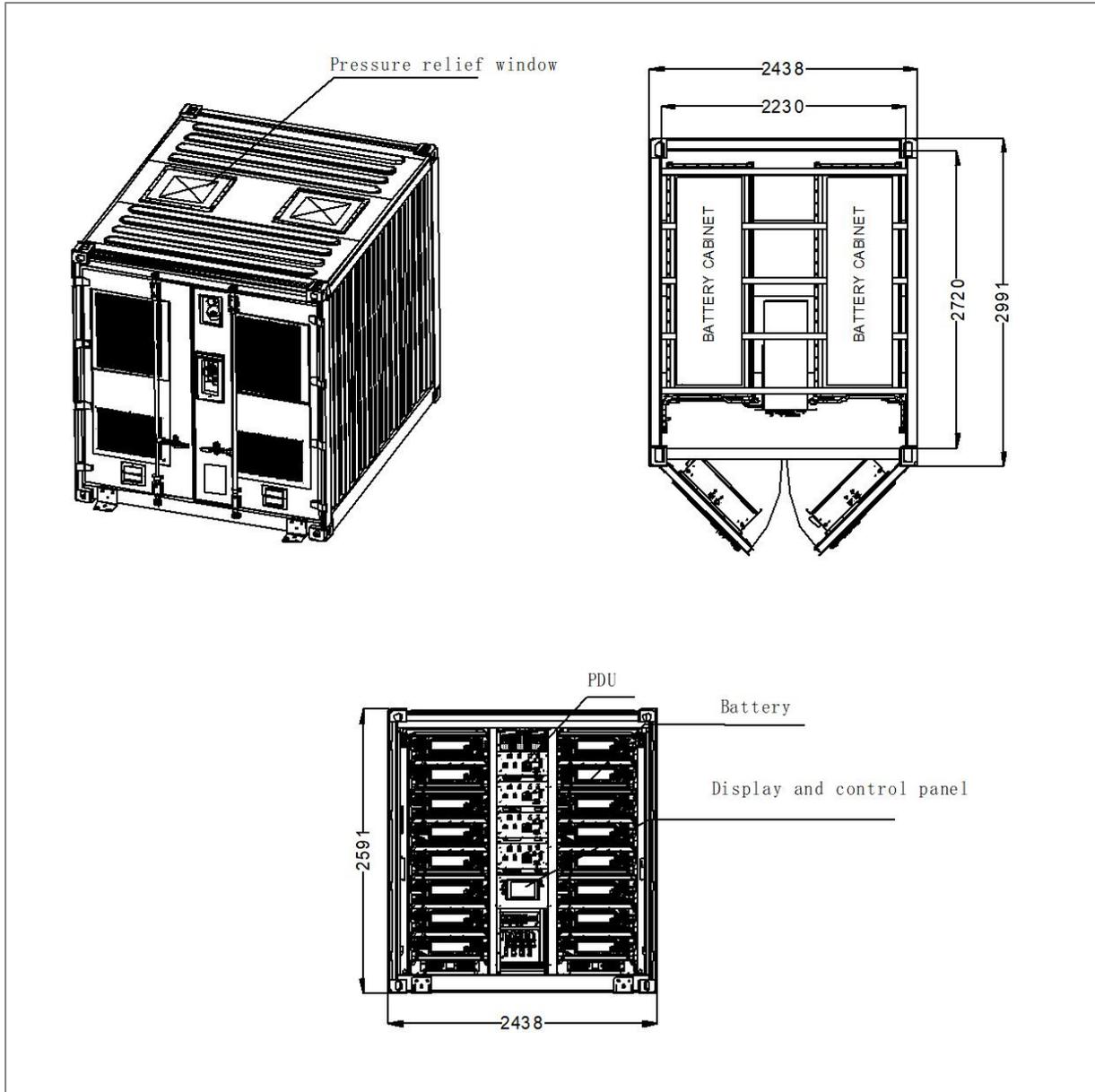
17.6. Output Interface Diagram



17.7. Infrastructure Diagram

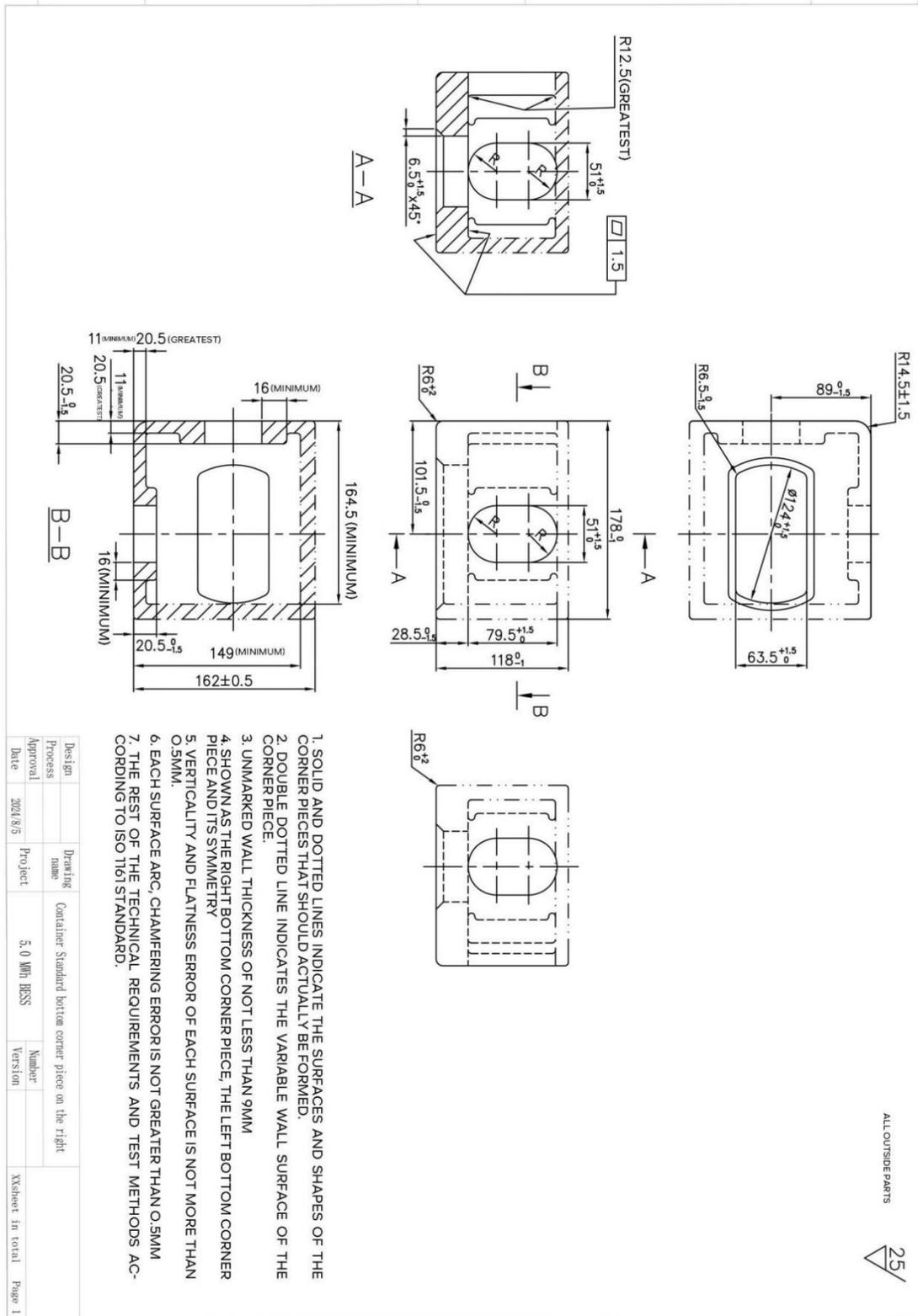


17.8. System Layout Diagram



17.9. Drawing of Container Bottom Corner Components

All rights reserved. Unauthorized dissemination is strictly prohibited



ALL OUTSIDE PARTS

25

Design	Process	Approval	Date	Drawing name	Project	5.0 Wp/ BSS	Number	Version	XXsheet in total	Page 1
			2024/8/5	Container bottom corner piece on the right						

17.11. Spare parts list

1.67MWh 10 foot container spare parts list						
No.	Material Code	Name	Specification Model	Other Description	Unit	Quantity
1	275.005.001.0002	DC power supply	HV350-15IDB24LV	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	HFEE82P-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	NNDZ3T-40H/1500VDC24V	1500VDC_40A_Coil 24VDC	PCS	2
7	243.003.000.0013	Fuse	PV10-2A1000VDC_gPV	2A_1000VDC_10KA section_10x38	PCS	4
8	243.003.000.0012	Fuse	PV10-16A1000VDC_gPV	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	ZB4BSS844_Schneider	Ø 40 Red Mushroom Head_Installation Diameter 22.5mm Schneider	PCS	1

Renon Power Technology Inc.

5900 Balcones Drive Suite 100, Austin, TX 78731 USA

Renon Power Solutions Sp.z o.o.

ul. ELBLĄSKA 1, 93-459, ŁÓDŹ, POLAND

Renon Power Technology B.V.

Rietbaan 10, 2908 LP Capelle aan den IJssel

Renon Power 株式会社

東京都中央区日本橋箱崎町20-5 VORT箱崎5F



Whatsapp



Linkedin



Website