RENON
RENON POWER

User Manual.

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Renon Power Technology Inc.

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

This document primarily covers the product information, installation and wiring procedures, configuration and testing guidelines, troubleshooting, and maintenance instructions.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 ECube 60AP product.In this manual, unless specifically noted otherwise, the term "battery racks" 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. 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.

2.1. General Security

Note
● 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 s, 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.

2.2. System Safety

Danger
● 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 battery rackss, 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 battery racks 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 battery racks 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 battery racks.
- 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 battery racks.
- 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 battery racks are clearly visible. Do not obstruct, deface, or damage them.

2.3. 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.
	There is high temperature on the surface of the equipment, no touch when the equipment is running, otherwise it may cause scald		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.

2.4. Battery Safety

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.

2.5. Personnel Requirements

Note

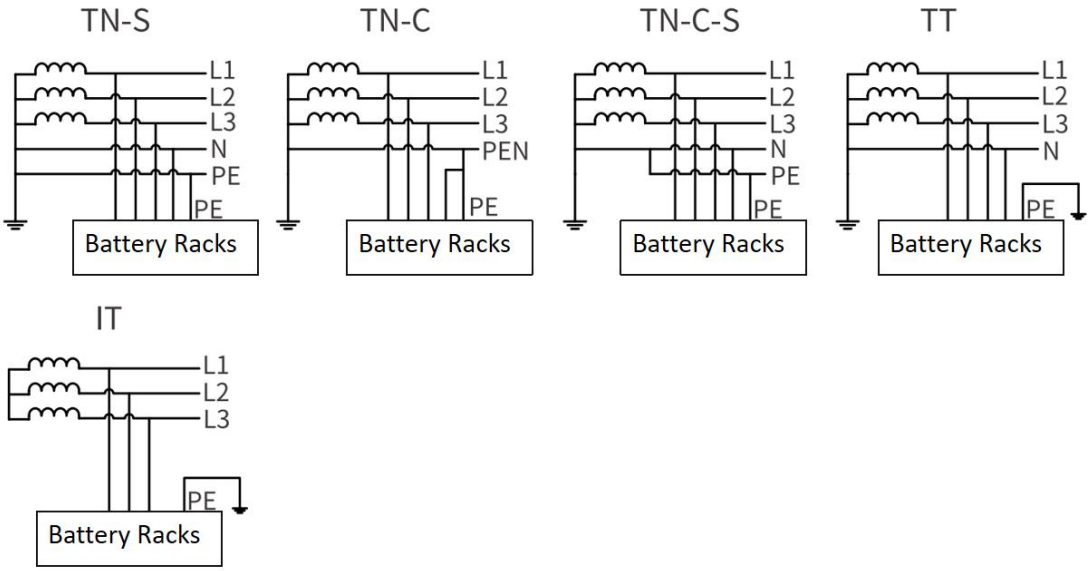
- Personnel responsible for the installation and maintenance of the equipment must undergo rigorous training to understand all safety precautions and master the correct operating procedures.
- Installation, operation, maintenance, and replacement of the equipment or its Instructions s should only be performed by qualified professionals or trained personnel.

3. Product Presentation

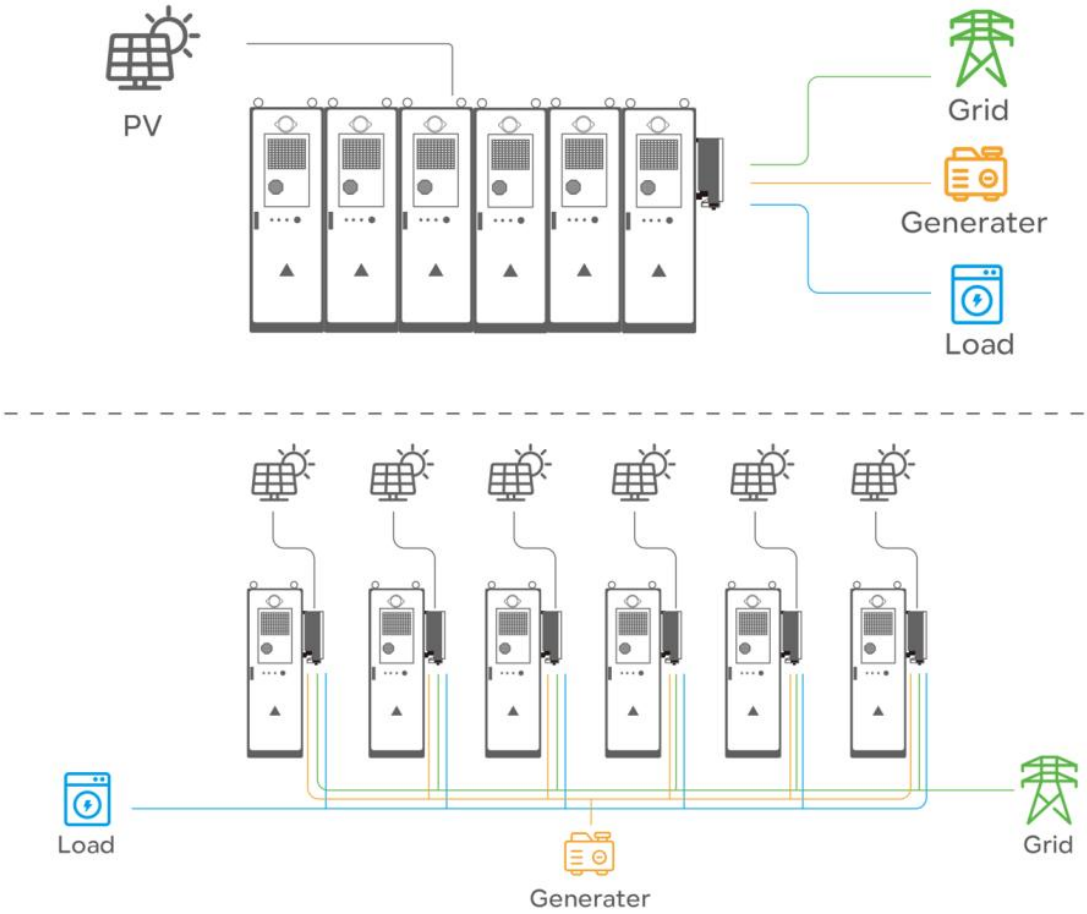
3.1. Product Profile

The battery racks integrates an energy management and storage system to control and optimize the flow of energy. It can supply electricity from the grid to loads, store it in batteries, or feed it back into the grid.

3.1.1. Type of Ground Configuration Supported



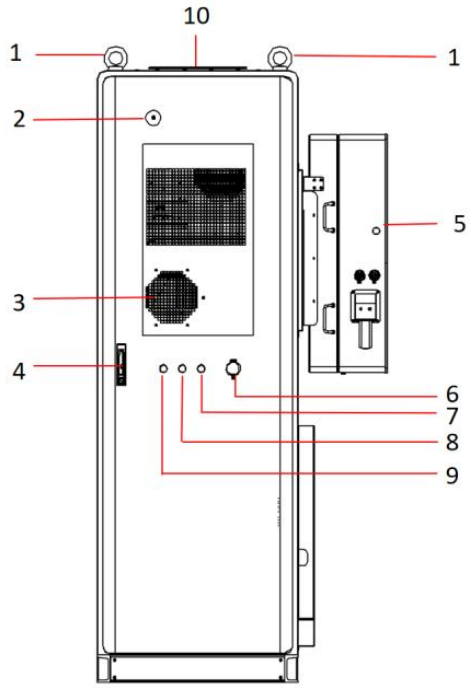
3.2. Application Scenarios



Warning
● This battery racks is suitable for industrial and commercial scenarios. ● In the battery racks, 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. ● Battery current may be affected by factors such as temperature, humidity, and weather conditions, which may cause current limiting and affect the system's load capacity.

3.3. Surface

3.3.1. Appearance Instructions

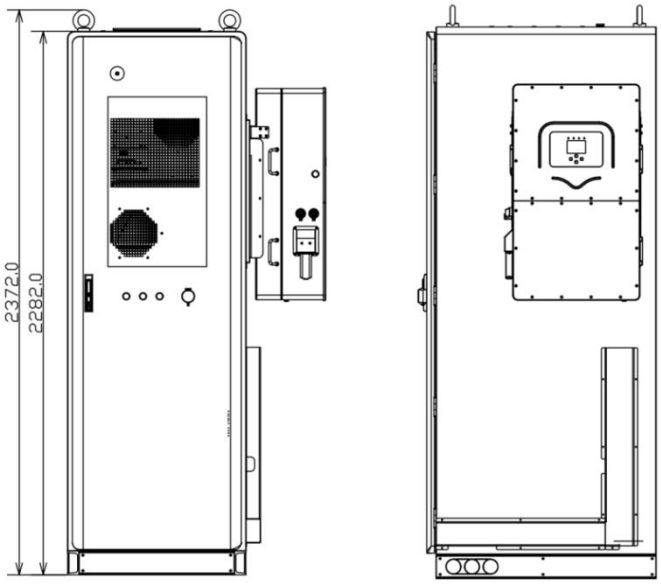


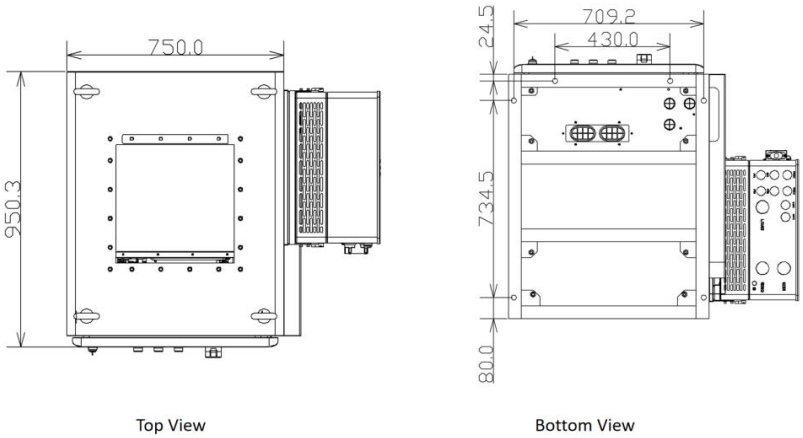
1	Lifting ring
2	WIFI
3	Air conditioner
4	Door lock
5	Three-phase inverter
6	Emergency button
7	Fault light
8	Running light
9	Stop light
10	Venting plate

3.3.2. Indicator Light Description

Indicator lamp status		Description
●	RUN	White light always on = the battery racks works normally
●	FAULT	Yellow light on = battery racks malfunction
●	STOP	battery racks has stopped working

3.3.3. Sizing Specification



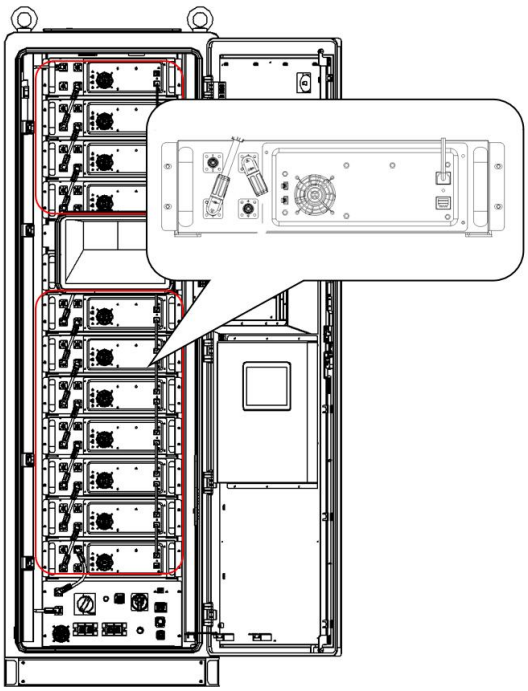


Top View　　Bottom View

3.4. Part Introduction

3.4.1. Battery System

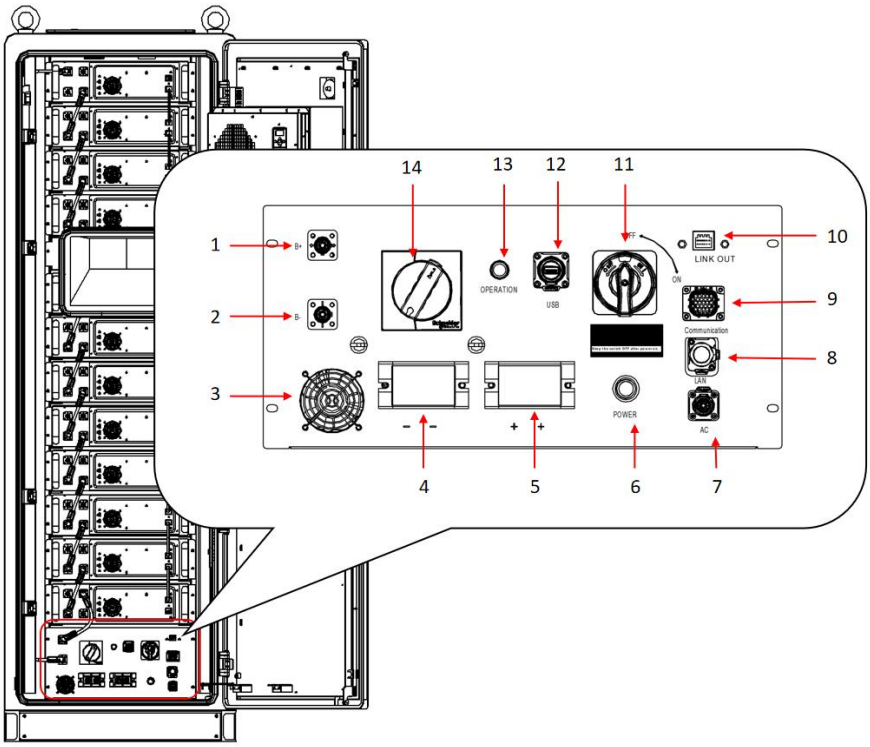
The battery racks contains the battery module and the high-voltage control box. The battery module stores and releases the electric energy; the high voltage control box controls the battery charge and discharge



No.	Project	Parameters	Remarks
1	Configuration	1P16S	
2	Rated Energy	5.12kWh（100Ah）	
3	Rated Voltage	51.2V	
4	Allowable voltage range	40V~57.6V	For cell 2.5V~3.6V
6	Rated charge/discharge power	1P	
7	Storage Temperature	-30℃~60℃	
8	Battery cooling method	Forced air cooling	

No.	Project	Parameters	Remarks
9	Fire Fighting	Aerosols	
10	Dimension	132mm*620mm*439.8mm	
11	Weight	46.5kg	
12	Battery operating temperature	-20~55℃for discharge 0~55℃for charge	

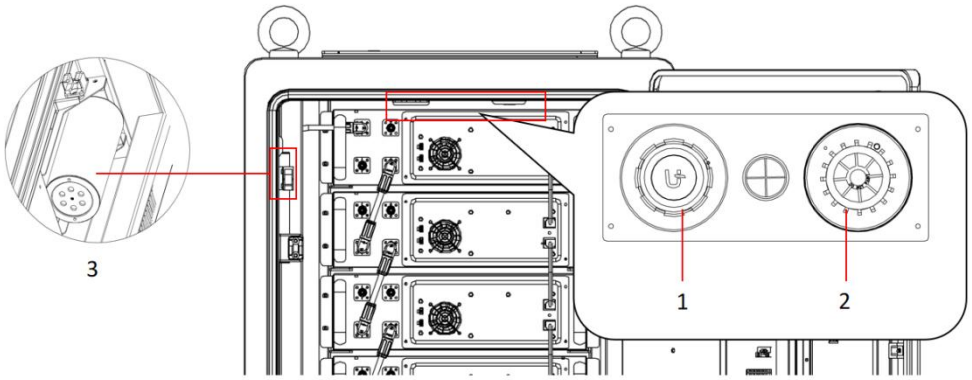
3.4.2. Master Control Module



No.	Project	Remarks
1	B+	Battery positive
2	B-	Battery positive
3	FAN	
4	-	
5	+	
6	Power	Button switch
7	AC	
8	LAN	
9	Communication	
10	LINK OUT	
11	DC Isolator Switch	
12	USB	
13	Indicator light	Show the main control box working status
14	Circuit Breaker	

3.4.3. Fire Extinguisher System

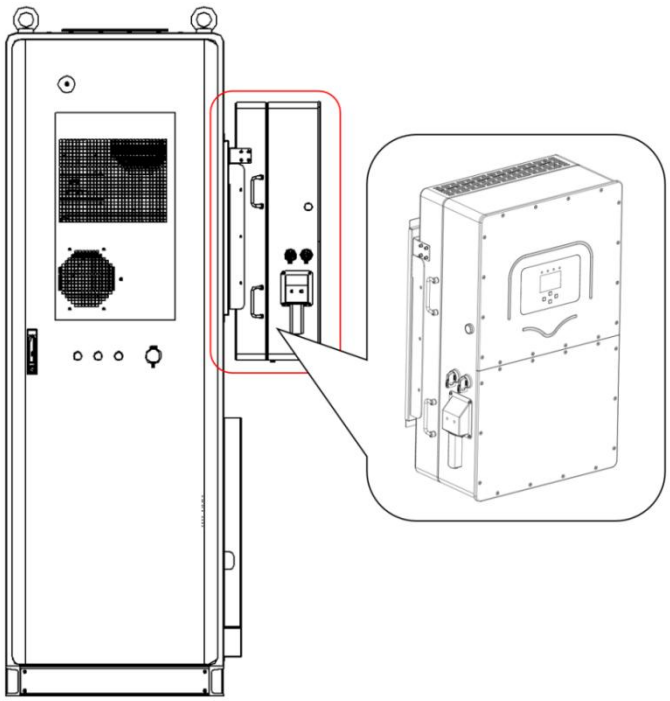
This firefighting system uses aerosol as fire extinguishing agent. It is mainly equipped with a fire extinguishing controller, smoke detector, temperature detector.



No.	Project	Remarks
1	Smoke Detector	Used for Smoke Concentration Detection
2	Heat Detector	Used for Temperature Detection
3	Aerosol Fire Extinguisher	

3.4.4. Three-phase inverter(Optional)

In the battery racks, the inverter (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. The inverter also monitors and regulates voltage and current levels to ensure the safe and efficient operation of the system.



See detailed inverter parameters in Section 10.2. Inverter Parameters（Optional）

4. Transportation, Inspection, and Storage

4.1. Transportation Requirements

4.1.1. Transportation Process Requirements

1) Battery racks 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) Battery racks loading
   - Need to use the forklift that meets the load of the battery racks, the forklift passes the annual inspection, and the forklift is not allowed to move during the lifting operation;
   - The battery racks monomer weight is large, the space in the car should be reasonably fixed with the corresponding filling material and binding to bind the battery racks;
   - After completing the packing operation, it shall be reinspected to confirm whether the strap is fixed and protected is secure.

3) Battery racks 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;
   - Keep the vehicle in good condition, check the delivery situation of the vehicle frequently, and give feedback to solve the problems found in time.
   - For battery racks unloading, appropriate unloading tools shall be prepared according to the loading list before unloading.

4.2. Check Before Signing

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

1) Check the outer package for damage, such as deformation, opening, cracks or other signs of possible damage to the equipment inside the packing box. In case of damage, do not open the package and contact us.
2) If an inverter is configured, please check whether the inverter model is correct.If there is any discrepancy, do not open the package and contact contact us.
3) Check whether the type and quantity of the deliverable are correct, and whether the appearance is damaged. For any damage, please contact us.

4.3. Equipment Storage

If the battery racks is not immediately, store the following:

1) Ensure a clean storage environment, a suitable temperature and humidity range, and no condensation.
2) After long-term storage, it should be checked and confirmed by professional personnel before further use.
3) The equipment shall be packed in boxes and sealed after desiccant in the box.

4) If the installation is not conducted within 3 days after unpacking, it is recommended to put the equipment in the box.
5) Store the cell in a clean, dry, and well-ventilated location with ambient temperature between -30℃~60℃, better between-10℃ and 40℃. In addition, relative humidity of 10%RH ~90%RH. Keep away from corrosive materials and magnetic field, fire and heat sources. Do not upside down, crush and press. If battery is not in use, total storage time is not recommended for more than 3 months.
6) The equipment shall be stored in a shade to avoid direct sunlight.
7) Equipment storage should be far away from flammable, explosive, corrosive and other items.
8) Ensure that the battery racks is not damaged during transportation and storage.
9) Do not put the battery into the fire, otherwise there is a risk of explosion.
10) The battery system has a risk of fire when the ambient temperature is too high.

5. Install

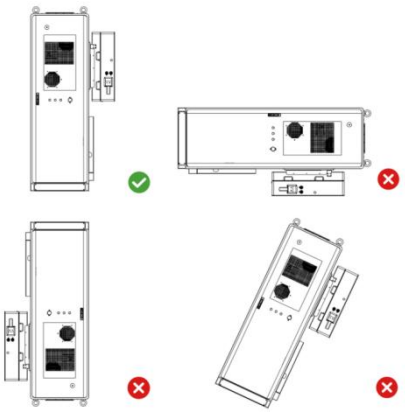
5.1. Installation Requirements

5.1.1. Installation Environment Requirements

1) The battery racks should not be installed in flammable, explosive, corrosive and other environment.
2) The battery racks should be installed in a place that is not easily accessible to children.
3) The installation space shall meet the requirements of battery racks ventilation and heat dissipation and the requirements of operation space.
4) The protection level of the battery racks meets the outdoor installation, and the installation environment temperature and humidity should be within the suitable range.
5) Do not place the battery racks in a high temperature environment to ensure that there is no heat source near the battery racks.
6) The installation height of the battery racks should be easy for operation and maintenance, ensure that the battery racks indicators, all labels are easy to view, and the terminals are easy to operate.
7) The battery racks is installed at an altitude of 2,000 m below the highest working altitude.
8) Keep away from the strong magnetic field environment and avoid electromagnetic interference.

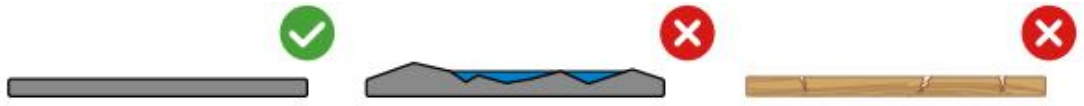
5.1.2. Installation Angle Requirements

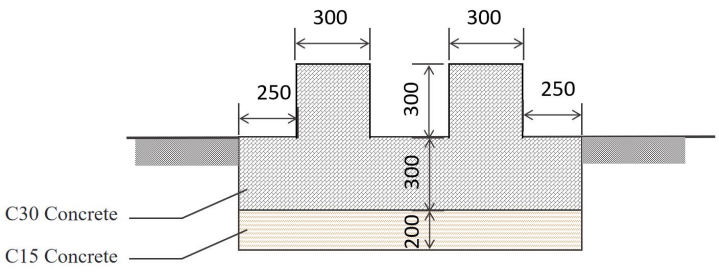
Ensure that the battery racks is installed horizontally, not tilted, horizontally or inverted.



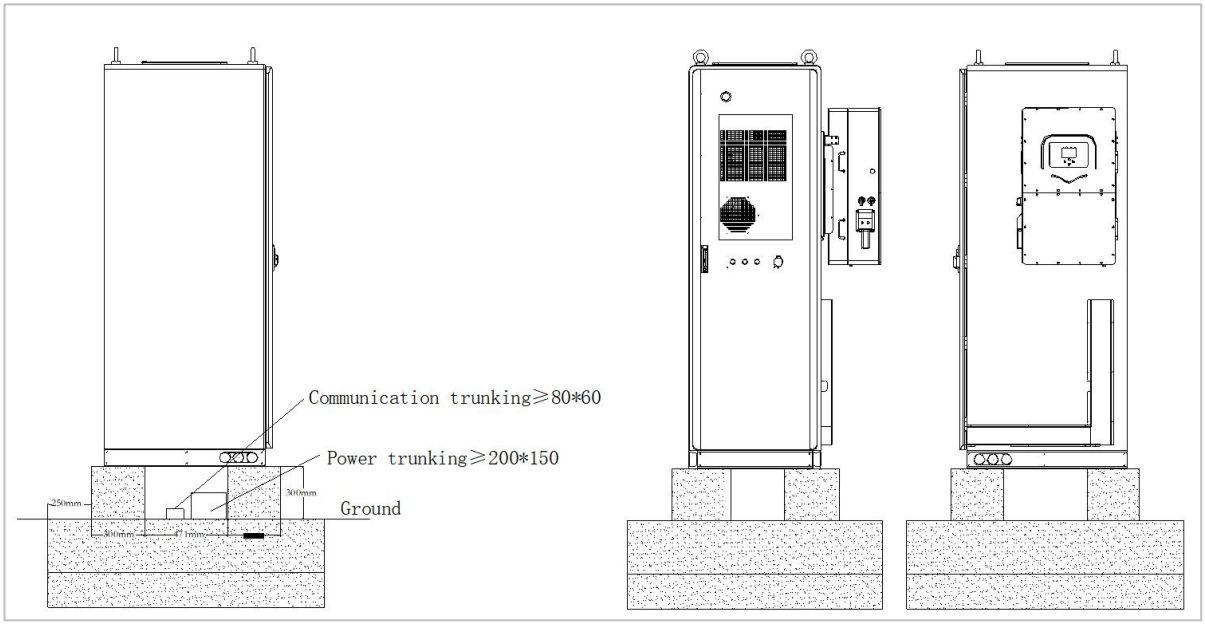
5.1.3. Install the Base Requirements

- Floor board thickness 200mm, concrete strength class C15.
- The floor thickness is 300mm，concrete strength class C30.
- Each side protrudes 250mm from the edge of the battery racks.
- Ditch requirements:
  1) The battery racks adopts the bottom entry line, and the trench must be dust and rodent designed to prevent the foreign body from entering.
  2) There must be waterproof and moisture-proof design in the trench to prevent cable aging and short circuit and affect the normal operation of the battery racks.
  3) Due to the thick cable of the battery racks, the position of the cable should be fully reserved in the design to ensure the smooth connection of the cable without wear.





Reinforcing Steel Recommendation：12@150

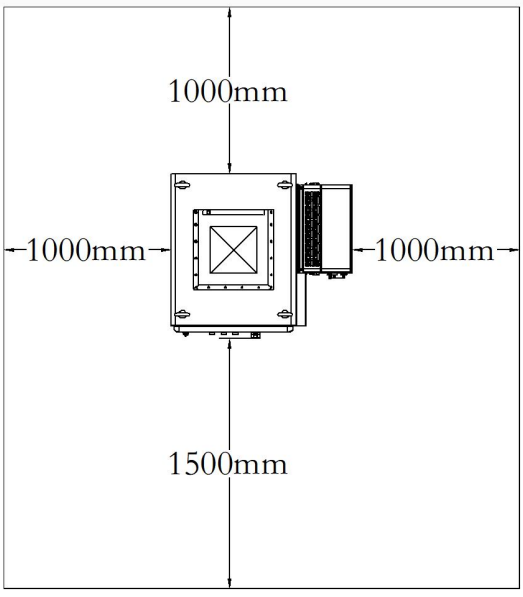


5.1.4. Installation Tool Requirements

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

5.2. Install

5.2.1. Installation Space Requirements



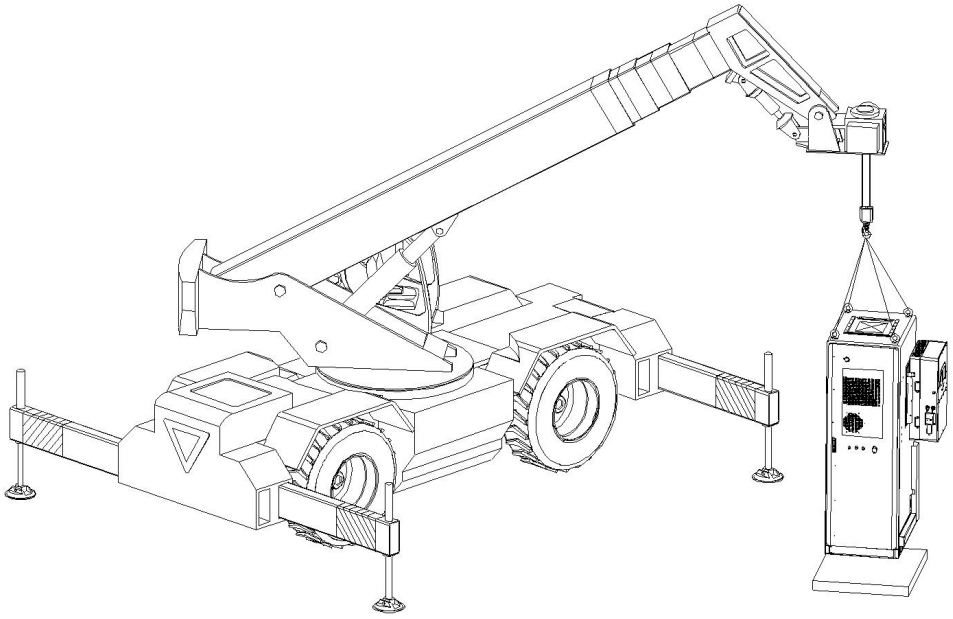
5.2.2. Moving the Battery Racks

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

Crane-lift transportation (optional)

Step 1: Use the sling with the hook or the U-shaped hook to work on the ceiling of the battery racks.

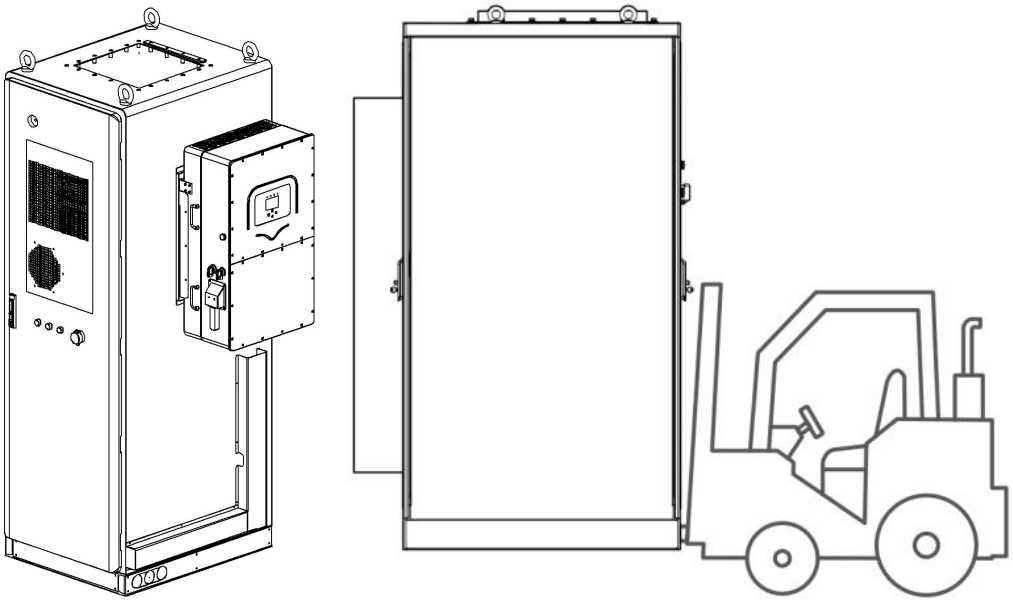
Step 2: Use the lifting device to lift the battery racks for handling.



Forklift handling battery racks (optional)

Step 1: Remove the front baffle of the battery racks.

Step 2: Use the forklift to carry the battery racks and place the center of the battery racks at the center of the forklift.



The battery racks should be moved to the designated position by means of forklift transfer or lifting, and the lifting ear should be re-checked and painted up if necessary.

5.2.3. Install the Battery Racks

Note
● Ensure that the battery racks is vertically close to the ground without the risk of dumping. ● Ensure that the battery racks is firmly installed to prevent dumping and personnel.

6. Electrical Connection

6.1. Safety Precautions

Danger
● Before making electrical connections, disconnect the AC switch and battery switch of the battery racks to ensure that the device is powered off. Do not operate under power, as this can lead to electric shock or other dangers. ● Similar cables should be bundled together and separated from different types of cables; do not allow them to tangle or cross each other. ● If the tension on the cables is too high, it may cause poor connections. When wiring, leave some extra length before connecting the cables to the connection terminals of the energy storage system. ● When crimping terminal connectors, ensure that the conductor part of the cable makes full contact with the terminal connector. Do not crimp the cable insulation along with the terminal connector, as this can prevent the device from operating properly or cause overheating due to unreliable connections, leading to damage to the terminal strips of the energy storage system.

Note
● For electrical connection, please wear safety shoes, protective gloves, insulating gloves and other personal protective battery racks as required. ● Only professionals are allowed to perform electrical connections. ● The cable color in the drawing of this paper is for reference only, and the specific cable specifications should meet the local regulations.

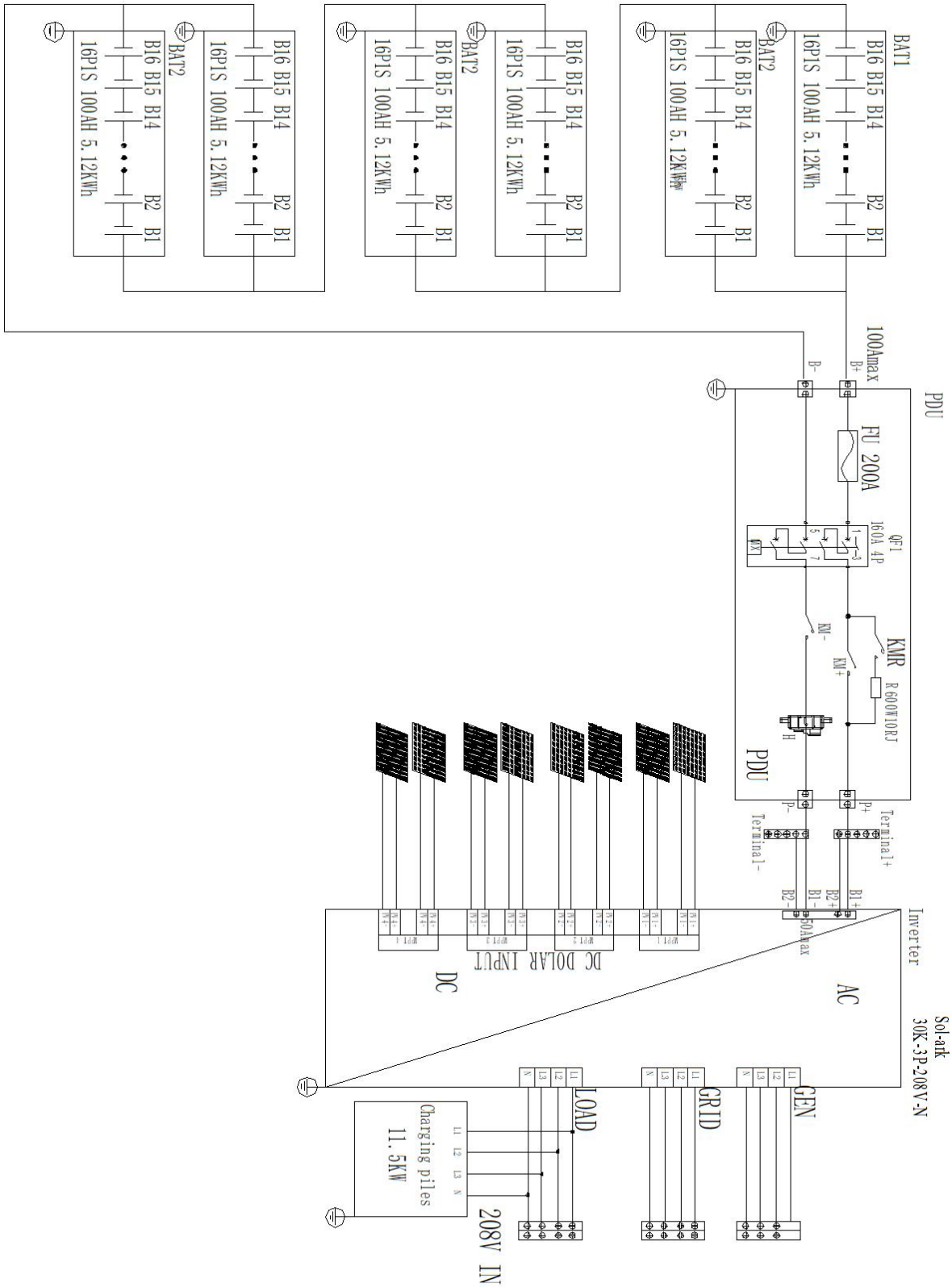
6.2. Cable Requirements

Wiring Location	Rated Voltage/Current	Terminal Specifications	Cable Model	Remarks
Main Control Box Wiring Area	DC:1000V/160A	SC25-8	UL4AWG	User-supplied
AC Auxiliary Power Source Wiring Area	US/5kW/AC120V+15%/60Hz US/5kW/AC277V+15%/60Hz	RV3.5-5	UL12AWG	User-supplied
LAN Wiring Area	/	/	RJ45	User-supplied

6.3. Wire Block Diagram

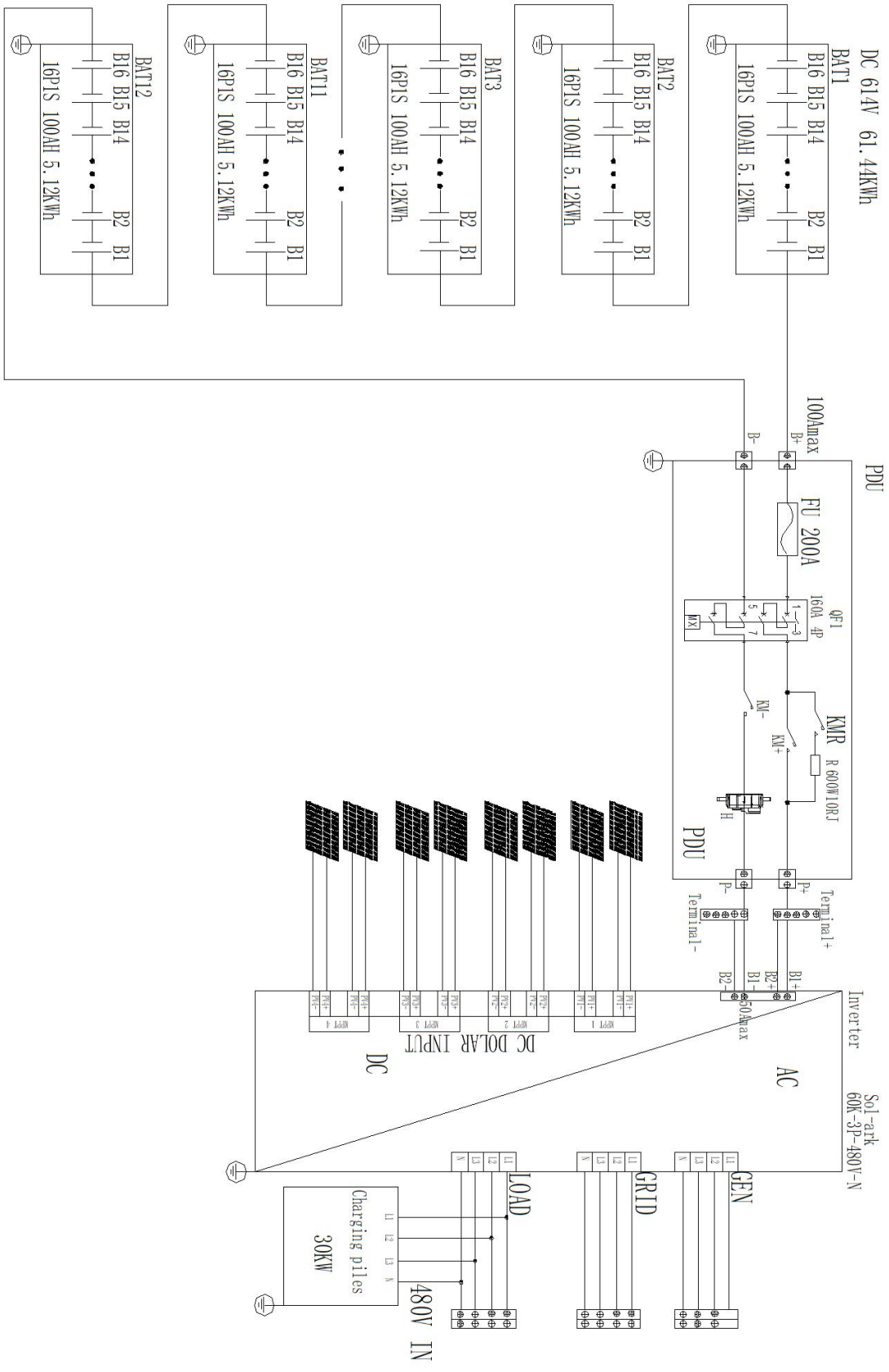
6.3.1. Sol-Ark 30K-3P-208V

Optional 1 307V 200Ah 61kWh matching Solark 30K inverter



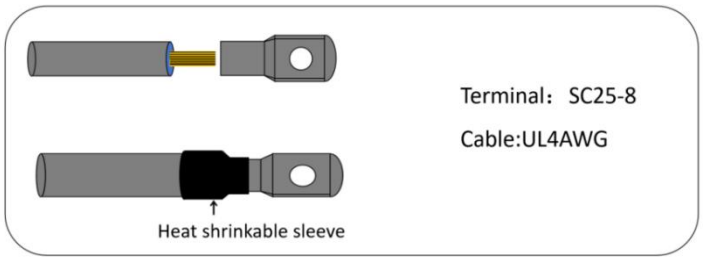
6.3.2. Sol-Ark 60K-3P-480V

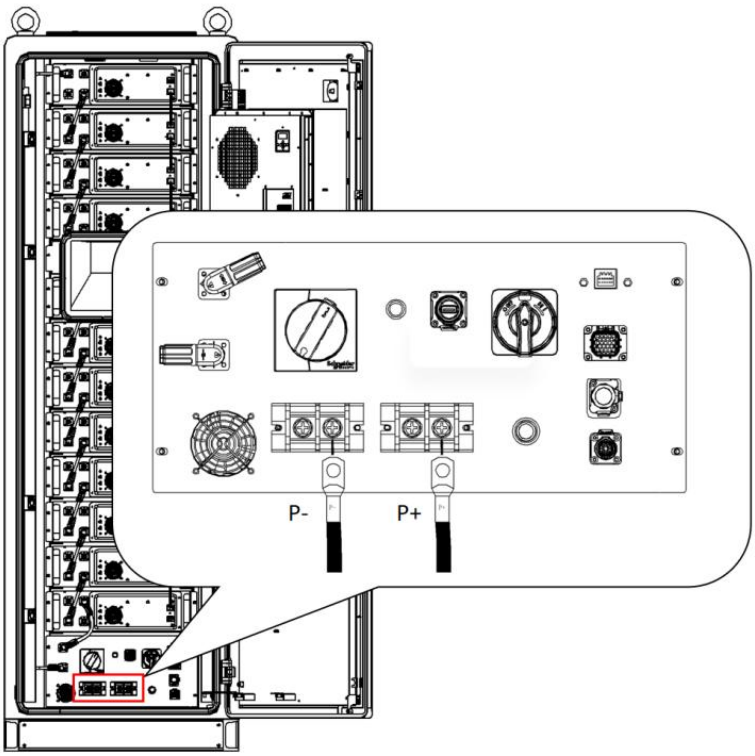
Optional 2: 614V 100Ah 61kWh matching Solark 60K inverter



6.4. Electrical Connection Diagram Description

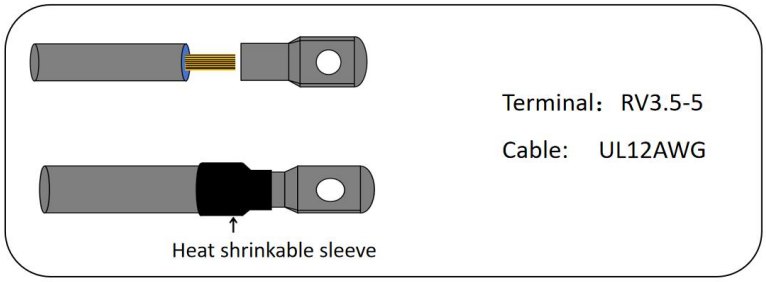
6.4.1. Connecting the Three-phase inverter

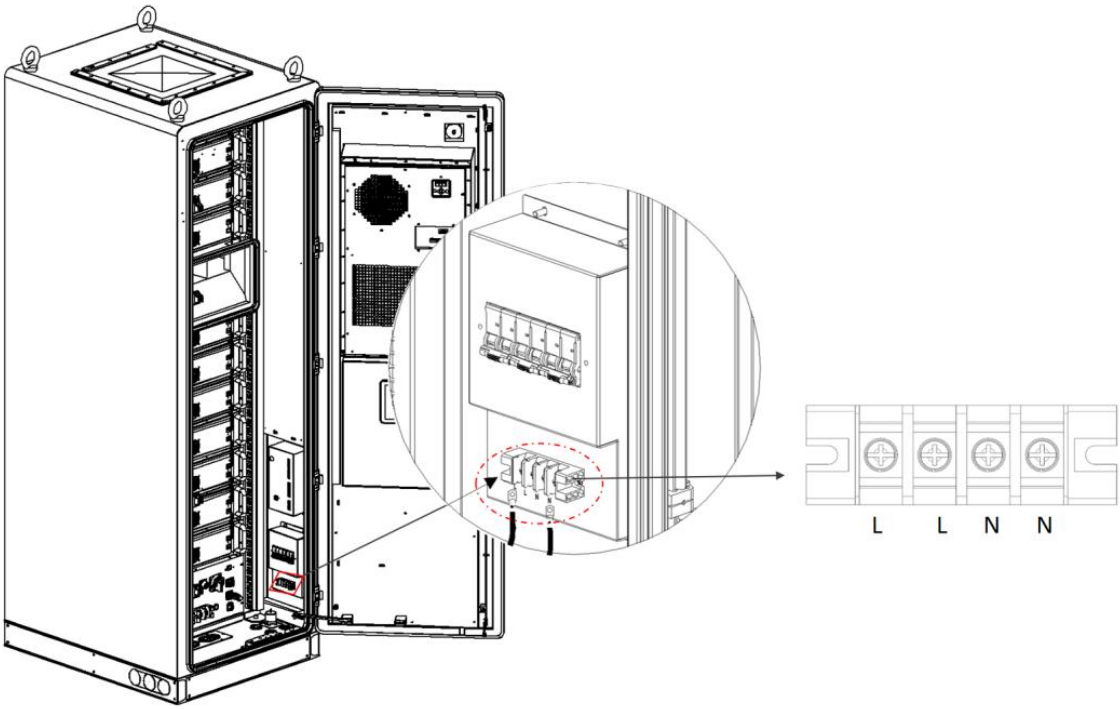




Connecting the P+ and P- Terminals to the DC Side of the Three-Phase Inverter.

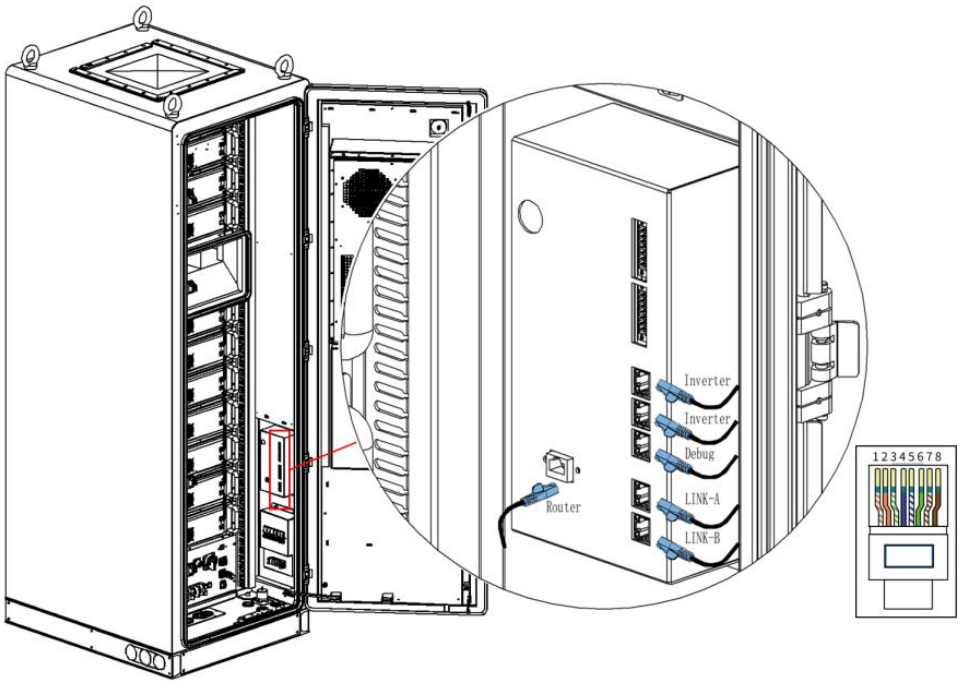
6.4.2. Connecting the AC Auxiliary Power Source





Warning
● When wiring, the AC line perfectly matches the "L", "N", ports of the AC terminal. If the cable is not connected correctly, the battery racks 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 battery racks operation may damage the battery racks.

6.4.3. Connect LAN Communication Cable



7. Test Operation of battery racks

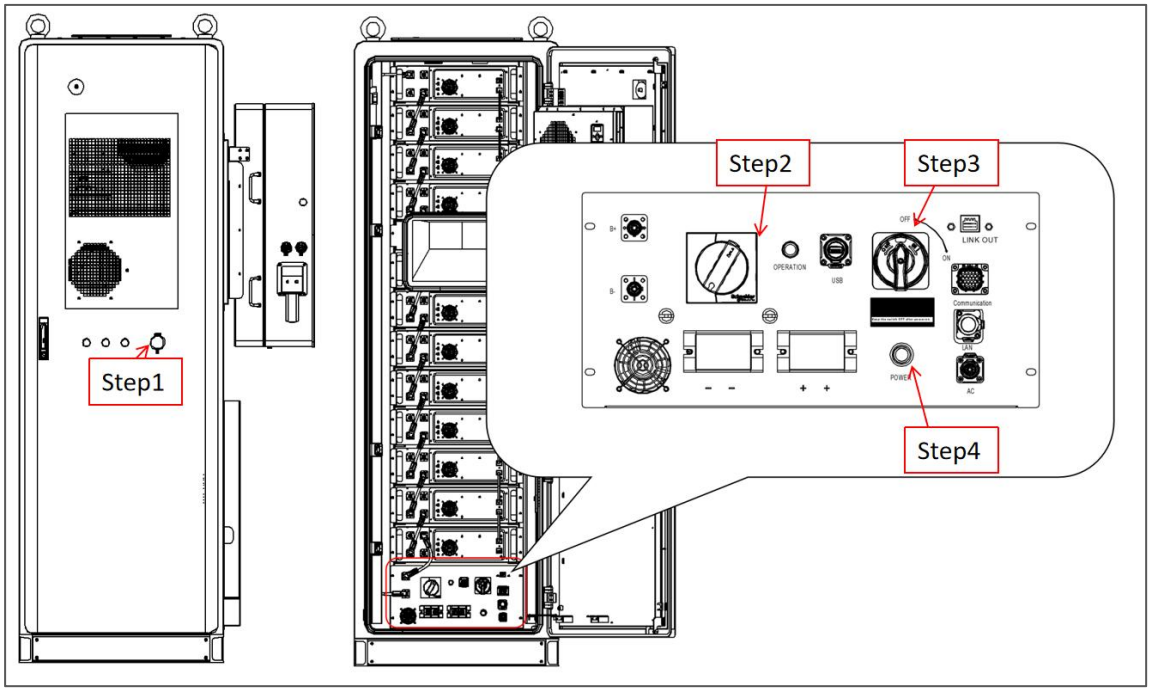
7.1. Check Before Charging

No.	Check items
1	The battery racks is installed firmly installed, the installation position is convenient for operation and maintenance, the installation space is convenient for ventilation and heat dissipation, and the installation environment is clean and tidy.
2	Protect the ground line, grid-connected AC line, load line and communication line are correctly and firmly connected.
3	Cable binding meets the wiring requirements, reasonable distribution and no damage.
4	Battery cluster switch, AC switch and DC power switch have been disconnected.
5	The voltage and frequency of the grid-connected access point of the battery racks meet the grid-connected requirements.

7.2. Power on the equipment

Steps:

1. Check the emergency knob.
2. Check the position of the circuit breaker and rotate it to the closed position.
3. Rotate the SA switch to the ON position.
4. Press the SB switch button



7.3. Power on the battery racks

Note
● After the battery racks is powered on, if there is no abnormal situation and fault alarm, please close the battery racks door. ● Close the battery racks door and keep the key properly.

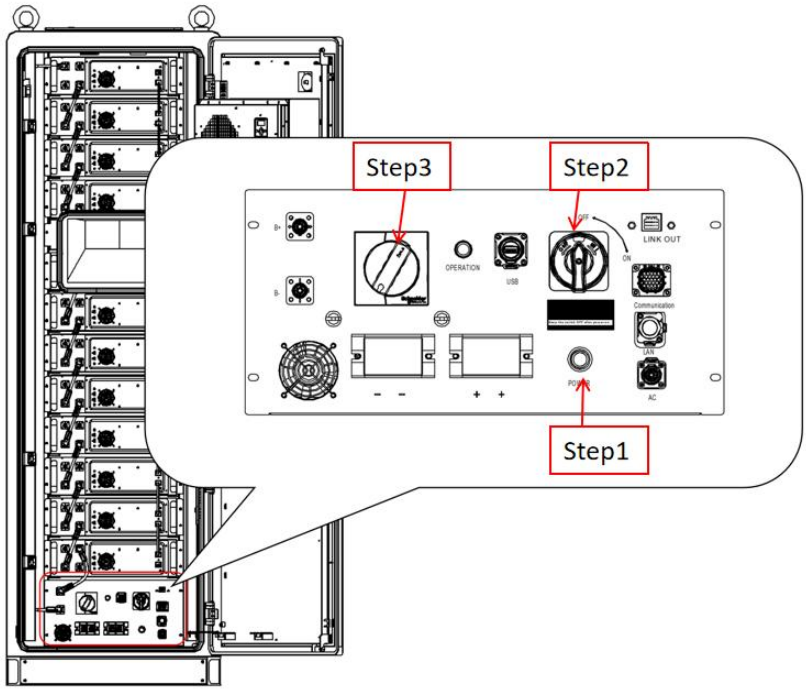
8. System Maintenance

8.1. Power Down the battery racks

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. ● After the battery racks is disconnected, the internal component is discharged for a certain time. Please wait until the battery racks is required to be completely discharged according to the required label time. ● When emergency, please use an emergency stop switch to make an emergency call for the battery racks.

Step:

1. Press the switch button.
2. Rotate the DC isolator switch to the OFF position.
3. Rotate the circuit breaker to the open position.



8.2. 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.

8.3. 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 racks.
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 racks.
9. If you have any questions about operating or maintaining the battery racks, contact Renon's after-sales service center. Do not operate without authorization.

8.4. Routine Maintenance

Project List	Inspection Method	Maintenance Cycle
System Status and Cleanliness	Check the following items. Correct any issues immediately: ● Check if the outdoor cabinet and internal battery racks 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	Check the following items. Correct any issues immediately: ● 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	Ensure the energy storage integrated system is completely powered off before inspection. Correct any issues immediately: ● 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: ● 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
Functions	Check the emergency stop button function: ● Simulate a shutdown. ● Check if the warning signs and labels on the body and other battery racks are clear and undamaged. Replace if necessary.	Every six months
Internal Component Inspection	Check the cleanliness of circuit boards and components: ● 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.

8.5. Cabinet Maintenance

8.5.1. Appearance Damage Repair Measures

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

8.5.2. 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.

8.6. Battery Maintenance

Project List	Inspection Method	Maintenance Cycle
Battery Cluster Status and Cleanliness	Check the following items. Correct any issues immediately: ● Check if the battery cluster and internal battery racks are damaged or deformed. ● Check for abnormal noises during operation. ● Check if the internal temperature is too high.	Every two years

	● Check if the internal humidity and dust levels are within normal range. Clean if necessary.	
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.	

8.7. The Battery Racks 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.

8.8. Removal of the battery racks

Warning
● Ensure that the battery racks has been powered off. ● Wear personal protective the battery racks when operating the battery racks.

Step 1: Open the battery racks door

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

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

8.9. Scrapped Battery Racks

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

9. 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, the battery racks 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.

10. Technical Data

10.1. Battery Cell Parameter

Battery Energy Storage	Optional 1*	Optional 2**
Model number	R-EC060030A1-US	R-EC060060A1-US
Cell Chemistry	LiFePO4	LiFePO4
Module Energy (kWh)	5.12	5.12
Module Nominal Voltage (V)	51.2	51.2
System Combination	2P96S	1P192S
System Nominal Voltage (V)	307.2	614.4
System Nominal Power（kW）	30	60
System Operating Voltage (V)	259.2-345.6	518.4-691.2
System Battery Energy (kWh)	61.44	61.44
Charge/Discharge Current (A)	100	100
PV Input	**Optional 1***	**Optional 2****
Max. Power(kW)	45	90
Max. Voltage(V)	550	1100
Start-up Voltage(V)	80	200
Rated Voltage(V)	360	730
MPPT Voltage Range(V)	80-520	200-1000
Number of MPPT	4	4
Max. PV Input Current(A)	40/40/40/40	40/40/40/40
Charging System（Optional）		
Charging Type	Charging Mode 3 Case c, level 2	
Outlet options	AC Type 1 (SAEJ1772)	
Input/Output Current rating(A)	32 / 48 / 80	
Input/Output Power rating(kW)	7.7 / 11.5 / 19.2@240VAC	
Input/output voltage(VAC)	208~240	

Input Frequency(Hz)	50/60	
Cable Length	16 feet, Optional: 25 feet	
Distribution Systems	Single phase, split-phase	
Connector Type	L1 + L2 + PE	
Certifications	UL2594, UL2231-1, UL2231-2, UL1998 UL991FCC Part 15 Class B, ENERGY STAR	
AC Output（EPS）	**Optional 1***	**Optional 2****
Max. Output Power(kW)	33	66
Peak Output Power, Time(kVA,s)	45, 7s	120, 7s
Rated Voltage(V)	120/208	277/480
THDv(@Rated Power)	<3%	<3%
Switch Time(ms)	<10	<10
AC Output（On-Grid）	**Optional 1***	**Optional 2****
Rated Output Power(kW)	30	60
Max. Output Power(kVA)	33	66
Max. Output Current(A)	91.6	79.4
Rated Voltage(V)	120/208	277/480
Rated Frequency(Hz)	50/60	50/60
THDi(@Rated Power)	<3%	<3%
Power Factor	0.8 leading~0.8 lagging	
General Parameters		
Dimension (W*D*H)	750*950*2280mm / 29.5*37.4*89.7in	
Weight Approximate	1050kg / 2314.8lb	
Working Temperature	-20~55°C	
Communication Interface	CAN, RS485, Wi-Fi, LTE	
Humidity	5%~85%RH	
Altitude	≤2000m	
IP Rating	IP55	
Storage Temperature	-20~35°C	
Recommend Depth of Discharge	90%	
Cycle Life	>8000 cycles	
Warranty	3 years free, paid from the 4th to the 15th year	
Certification	UL1973, UL9540A, UN38.3, IEC62619 UL 1741-2021 (incl UL1741SB), CSA C22.2, No 107.1-16 IEEE 1547-2018 & 1547a-2020 & 1547.1-2020 (SRD V2.0), UL1699B	

*Optional 1：Suitable for“Sol-Ark 30K-3P-208V” inverter models

**Optional 2：Suitable for “Sol-Ark 60K-3P-480V” inverter models

10.2. Inverter Parameters（Optional）

10.2.1.Sol-Ark 30K-3P-208V

No.	Item	Parameter
1	Model	Sol-Ark 30K-3P-208V
Input Data (PV)		
2	Max. Allowed PV Power (STC)	39kW
3	MPPT Voltage Range	170-500V
4	Startup Voltage	150V
5	Max. Input Voltage	500V
6	Max PV Power Delivered to Battery & AC Outputs	30kW
7	Max DC Current per MPPT (Self Limiting)	36A
8	Number of MPPT	4
9	Max Solar Strings Per MPPT	2
10	Max AC Coupled Input into the GEN terminal (Micro / String Inverters)	54kW w/ no PVDC 30kVA w/ 39kW PVDC
Output Data (AC)		
11	Connections	120V / 208V Three Phase
12	Continuous AC Power with PV	30,000W 83.4A (208V)
13	Continuous AC Power from Batteries	30,000W 83.4A (208V)
14	Surge AC Power | 7 sec	45,000VA /125A (208V)
15	Parallel Stacking	Yes-Up to 12
16	Frequency	60/50Hz
17	Continuous AC Power with Grid or	72,000W 200A L-L (208V) 36,000W 200A L-N (120V)
19	CEC Efficiency	96.5% (Peak 97.5%)
20	Idle Consumption Typical-No Load	60W
21	Sell Back Power Modes	Limited to Household/Fully Grid-Tied
22	Design (DC to AC)	Transformerless DC
23	Response Time (Grid-Tied to Off-Grid)	5ms
24	Power Factor	+/-0.8 - 1.0
Battery Input Data (DC)		
25	Type/Number of Inputs	Li-Ion /2 Inputs
26	Nominal DC Input	> 300V
27	Capacity	50-9900Ah
28	Voltage Range	150V-500V

29	Continuous Battery Charging Output	100A (50A per Input)
30	Charging Curve	3-Stage w/ Equalization
31	Grid to Battery Charging Efficiency	96.0%
32	Communication to Lithium Battery*	Can Bus&RS485
	*ONLY works with Li-Batteries under Closed-Loop Communications	

10.2.2. Sol-Ark 60K-3P-480V

No.	Item	Parameter
1	Model	Sol-Ark 60K-3P-480V
Input Data (PV)		
2	Max. Allowed PV Power (STC)	78kW
3	MPPT Voltage Range	150-850V
4	Startup Voltage	180V
5	Max. Input Voltage 1	1,000V
6	Max. operating input current per MPPT	36A
7	Max. short circuit current per MPPT	55A
8	No. of MPP Trackers	4
9	No. of PV Strings per MPPT	2
10	Max. AC Coupled Input	60kW
Output Data (AC)		
11	Nominal AC Voltage (3Φ)	480V
12	Grid Frequency	50 / 60Hz
13	Real Power, max continuous (3Φ)	60kW
14	Max. Output Current	72.3A
15	Peak Apparent Power (10s, off-grid, 3Φ)	90kVA
16	Max. Grid Passthrough Current(10min)	200A
17	Continuous Grid Passthrough Current	180A
18	Power Factor Output Range	+/- 0.8 adjustable
19	Backup Transfer Time	5ms (adjustable)
20	CEC Efficiency	96.5%
21	Max Efficiency	97.5%
Battery Input Data (DC)		
22	Battery Input Terminal Rating	50A
23	Nominal DC Voltage	≥ 600V
24	Operating Voltage Range	160 - 800V
25	Battery Capacity Range	50 ~9900Ah
26	Max. Battery Charge / Discharge Current	100A (50A per input)
27	Charge Controller Type	3-Stage with Equalization

28	Grid to Battery Charging Efficiency	2 Wire Start - Integrated
29	BMS Communication	CAN Bus & RS485

11. Emergency Handling Plan

11.1. 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.

11.2. 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.

12. Technical Description and Specification

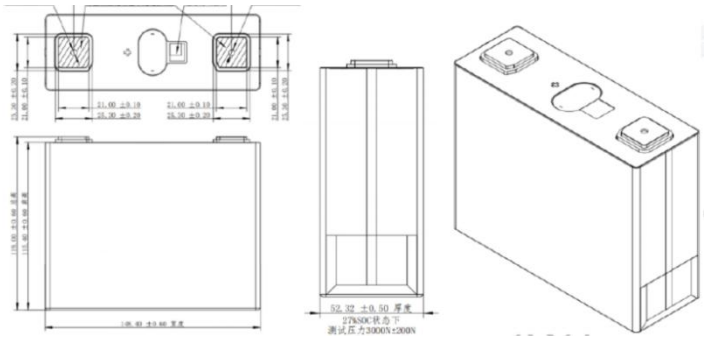
12.1. Introduction of the Main Equipment

The ECube 60AP product has an energy capacity of 60kWh. Its main configuration includes: 12 set of battery packs, 1set of main control box, 1 set of 2kW air conditioner, and 1 set of fire protection system, 1 set of battery management system (BMS), and 1 set of communication management system.

No.	Projects	Optional 1	Optional 2
1	Cell Type	LFP 3.2V/100Ah	
2	Module specifications	51.2V 100Ah	
3	Module Configuration	1P16S	
4	Number of Module	12	
5	System Energy (kWh)	61.44	
6.	System Nominal Voltage(V)	307.2	614.4
7	System Operation Voltage Range(Vdc)	281.25~340.8	562.5~681.6
8	Discharge Depth	90% DoD	
9	Number of cycles	>8000 times	
10	Thermal Management Mode	air-conditioning	
11	Thermal Control Management	Aerosol Extinguishing	
12	Rated Output Power(kW)	30	60
13	Charge/Discharge Current (A)	100	100
14	Battery System Dimensions(W*D*H)	750*950*2280mm	
15	Battery System Total Weight	1050kg	
16	IP Rating	IP55	
17	Operation Temperature	-30°C to 55°C (De-rating over 45°C)	
18	Operation Humidity(Rh）	≤95%, No condensation	

12.1.1.Battery cell

12.1.1.1. Cell parameter



The standard 100Ah 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	Nominal Capacity	100Ah	25℃±2℃/0.5C
3	Nominal Voltage	3.2V	
4	Nominal Energy	320Wh	25℃
5	Operating Voltage	2.5~3.65V	T>0°C
		2.0~3.65V	T≤0°C
6.	Working Temperature	Charge： 0℃~60℃ Discharge：-20℃~60	
7	Dimension	Thickness: 52.32±0.5mm Width: 148.40±0.6mm Total Height:119.00±0.6mm	
8	Peak Discharge current	300A	25℃，50%SOC,30S
9	Cathode Material	Lithium-iron phosphate	
10	Cell Weight	1.93±0.1kg	
11	Energy Efficiency	≥94.0%	25±2℃，0.5P
12	Energy Density	165Wh/kg	
13	IMP	≤0.4mΩ	
14	Shipping capacity	27±1Ah	27%SOC
15	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,Fadingto70%of standard capacity.

12.1.1.2. Electrical Performance Test

No.	Item	Electrical Performance Test	Standard
1	Initial discharge energy	1) Test temperature:25±2℃. 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≥320Wh
2	High temperature charge-discharge performance	1) Initial discharge the cell in standard discharging mode. 2) Leave the cell at 55±2℃ for 5h. 3) Discharge with a power at 0.5P to 2.5V and record discharge energy (Wh)	Charge energy ≥320Wh Discharge energy ≥ 320Wh
3	Low temperature charge-discharge performance	1) Initial discharge of the cell in standard discharging mode. 2) Leave the cell at -20±2℃ for 24h. 3) Discharge with a power at 0.5P to 2.5V and record discharge energy (Wh)	Discharge energy ≥ 224Wh
4	Cycle Life	1) Test temperature:25±2℃. 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℃,27%SOC storage	≤3%/month

12.1.1.3. 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℃. 2) Fully charge the cell in standard charging mode.	No fire or explosion

No.	Item	Electrical Performance Test	Standard
		3) Charge with current at 1C for 1hor voltage at 5.475V.. 4) Observe for 1h.	
3	Over-Discharge	1) Test temperature:25±2℃. 2) Fully discharge the cell in standard discharging mode.. 3) Discharge with current at 1C for 90 mins to 0V. 4) Observe for 1h.	No fire or explosion or leakage or smoking
4	Short Circuits	1) Test temperature:25±2℃. 2) Fully charge the cell in standard charging mode . 3) External short circuit cell 10 mins,circuit no larger resistance of external than 5mΩ 4) Observe cell for 1h.	No fire or explosion
5	Crush	1) Fully charge the cell in standard charging mode. 2) Crush direction:perpendicular to the direction of the cell monomer plate, or the same direction that the cell monomers most likely to be crushed in vehicle:Form of crush plate: semi-cylinder with a radius of 75mm, the length (L) of the semi-cylinder is greater than the size of speed:the extruded cell monomer.(5+1)mm/s; terminal condition: voltage reaches 0V or the deformation reaches30% or force reaches (13 +0.78) kN, 3) Hold for 10 minutes. 4) Observe cell for1h.	No fire or explosion or leakage or smoking
6	Thermal Runaway	1) Test method follows GB/T36276-A.2.19.	No fire or explosion

12.1.1.4. Transportation

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 25-35%.

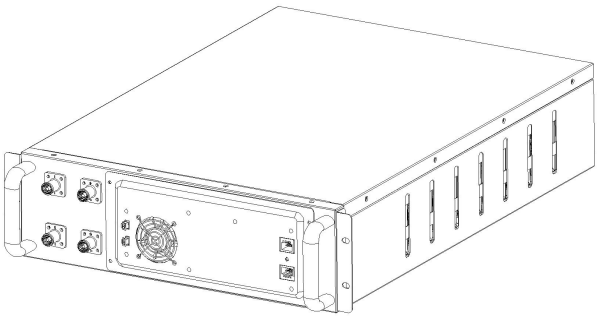
12.1.1.5. Storage

Store the cell in a clean, dry, and well-ventilated location with ambient temperature between -30℃~60℃, better between-10℃ and 40℃. In addition, relative humidity of 10%RH ~90%RH. Keep away from corrosive materials and magnetic field, fire and heat sources. Do not upside down, crush and press. If battery is not in use, total storage time is not recommended for more than 3 months.

12.1.2.Battery module

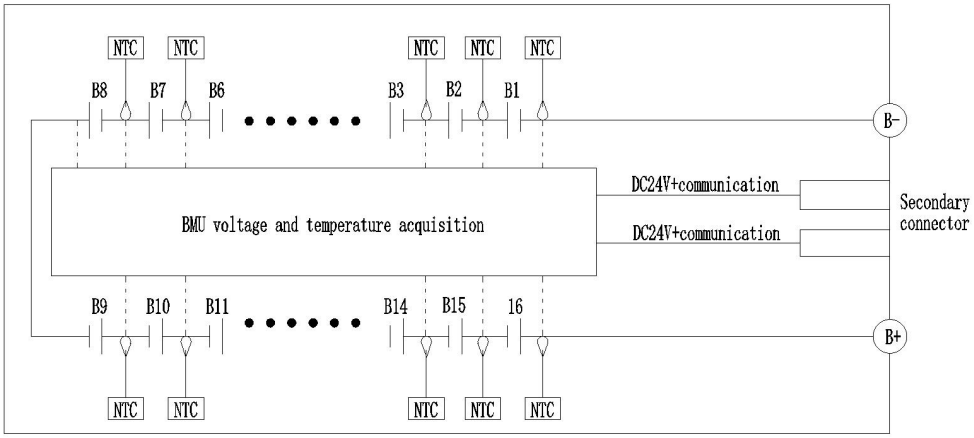
12.1.2.1. External view of the battery module

The battery module consists of individual battery cells, connecting copper bars, BMU, fuses and related electrical and structural components. The combination method of the battery module is 1P116S, which means 16cells of 100Ah are connected in series, with a nominal voltage of 51.2V. The appearance rendering is as follows:



12.1.2.2. Table of battery module parameters

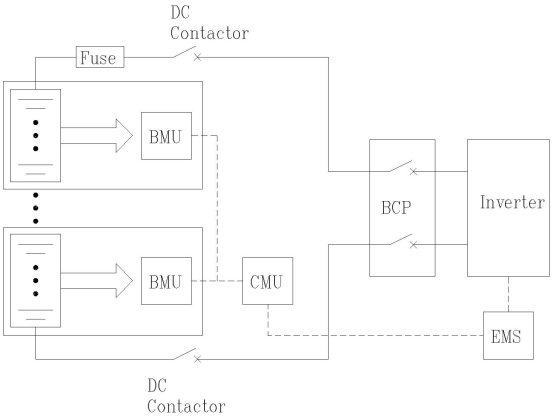
No.	Project	Parameters	Remarks
1.	Configuration	1P16S	
2.	Rated Energy	5.12kWh（100Ah）	
3.	Rated Voltage	51.2V	
4.	Allowable voltage range	40V~57.6V	For cell 2.5V~3.6V
5.	Dimension	132mm*620mm*439.8mm	
6.	Mass	46.2kg	
7.	Rated charge power	1.0P	According to current map
8.	Rated discharge power	1.0P	
9.	Battery operating temperature	-30~60℃for discharge 0~55℃for charge	



Electrical schematic diagram of battery module

12.1.3. 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,control of the main power circuit on-off functions.

(3) 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

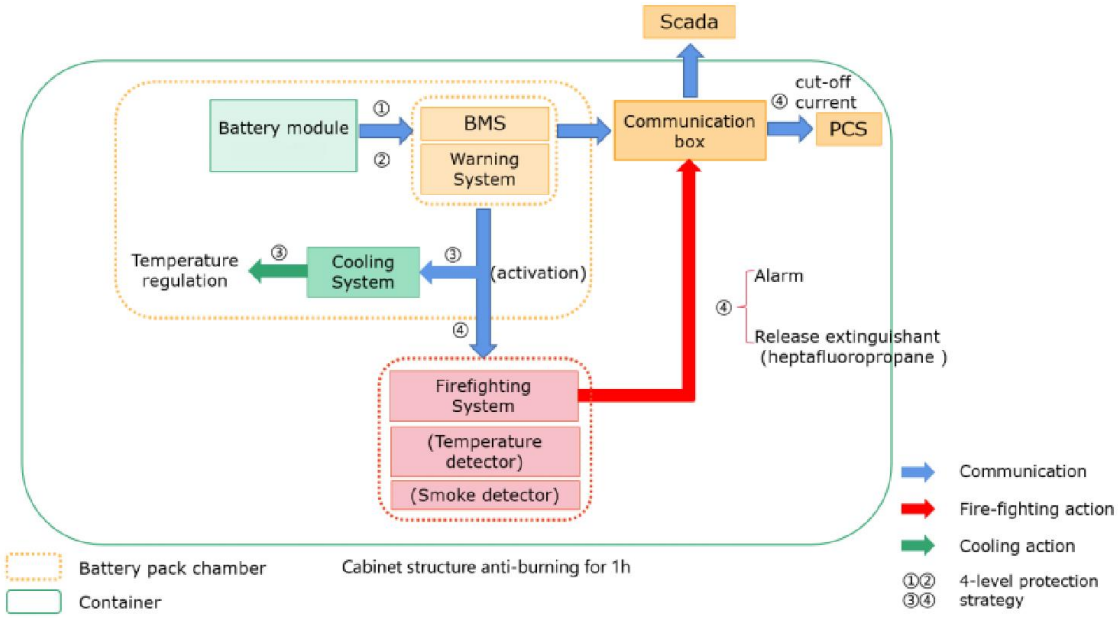
	Information management	Communication with CMU
CMU	Battery status acquisition	Current acquisition
		Total voltage acquisition
		Insulation resistance acquisition
	Battery status estimation	SOC estimates
		SOH estimates
	Troubleshooting	Battery system fault diagnosis
		BMS system fault diagnosis
	Energy Management	Charge control management
		Discharge control Management
		Passive balanced control management
	Thermal Management	Battery cooling control management
	Information Management	Software upgrades
		Communicate with BMU
	Information Management	Communication with PCS and EMS
		Fault recording

No.	Item	parameter
1	BMS Model	BMU-16
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 ℃
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

12.2. Protection System

12.2.1.Level Protection Strategy

Renon power ECube 60AP 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 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 19 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

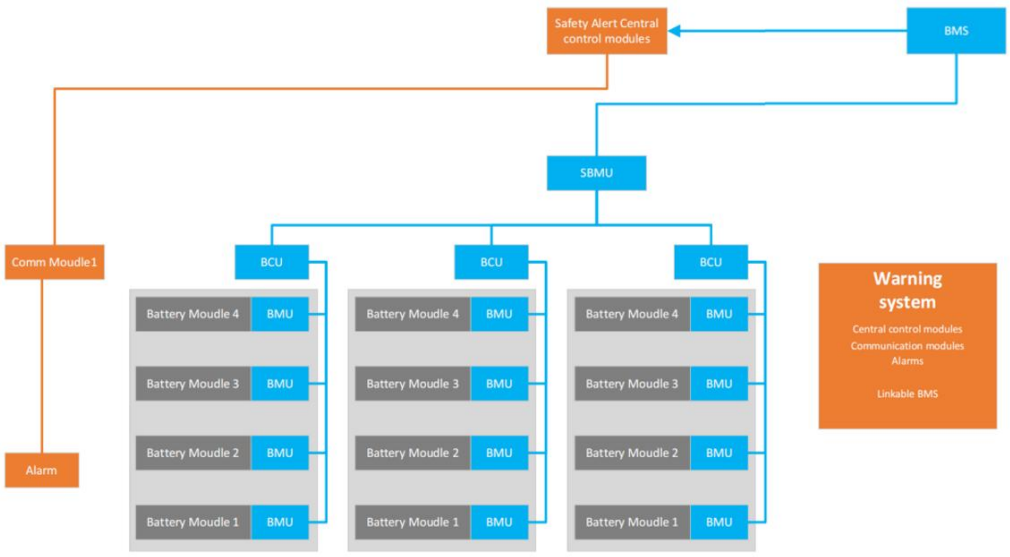
the cell will decrease. Also, the terminal voltage will slowly drop even without load, that self-discharge. The temperature is thus abnormal due to excessive self-discharge. The risk of thermal runaway exists if the battery continues to charge and discharge at a large current at the time. The secondary 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 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 ECube 60AP for fire extinction.

12.2.2.Warning system

Each standard ECube 60AP 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 ECube 60AP. The centralized control modules can also communicate with the BMS.

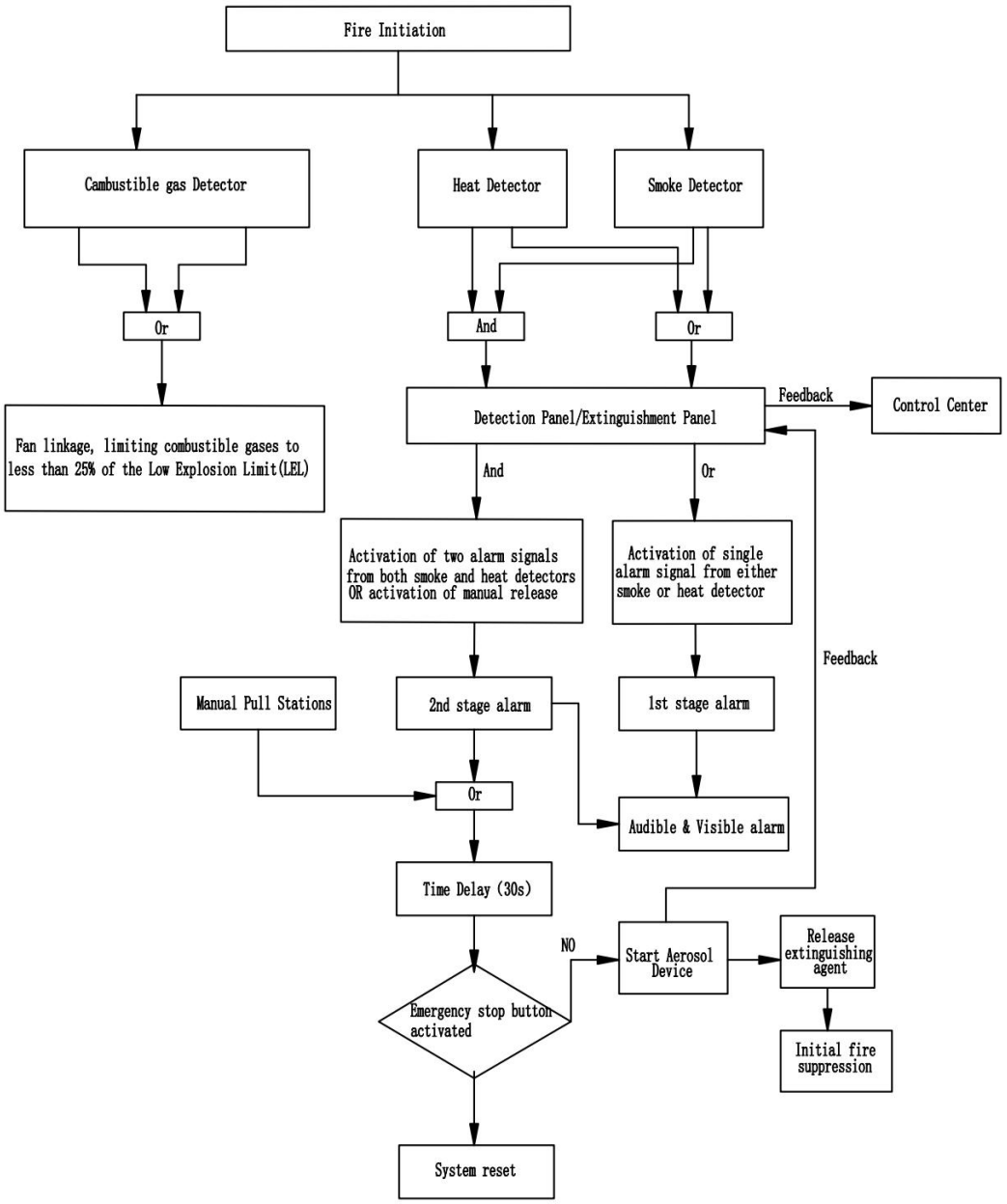
12.2.3.Firefighting System

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 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.

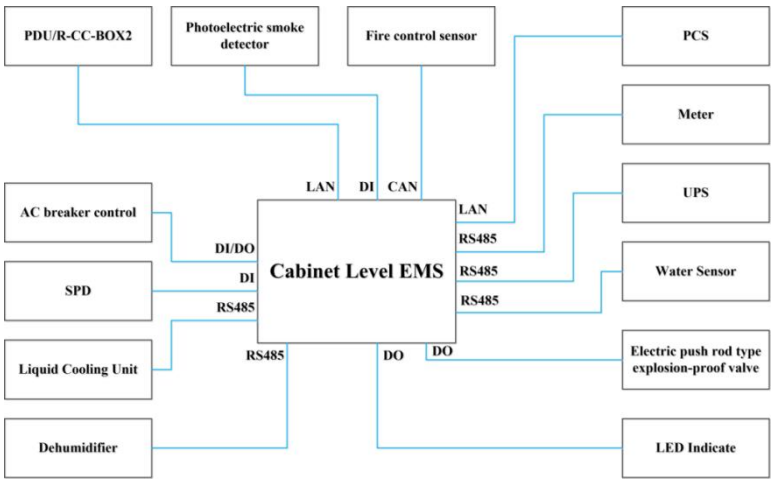
(3) Mechanical emergency manual control mode.

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.

12.3. Energy Management System(EMS)

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

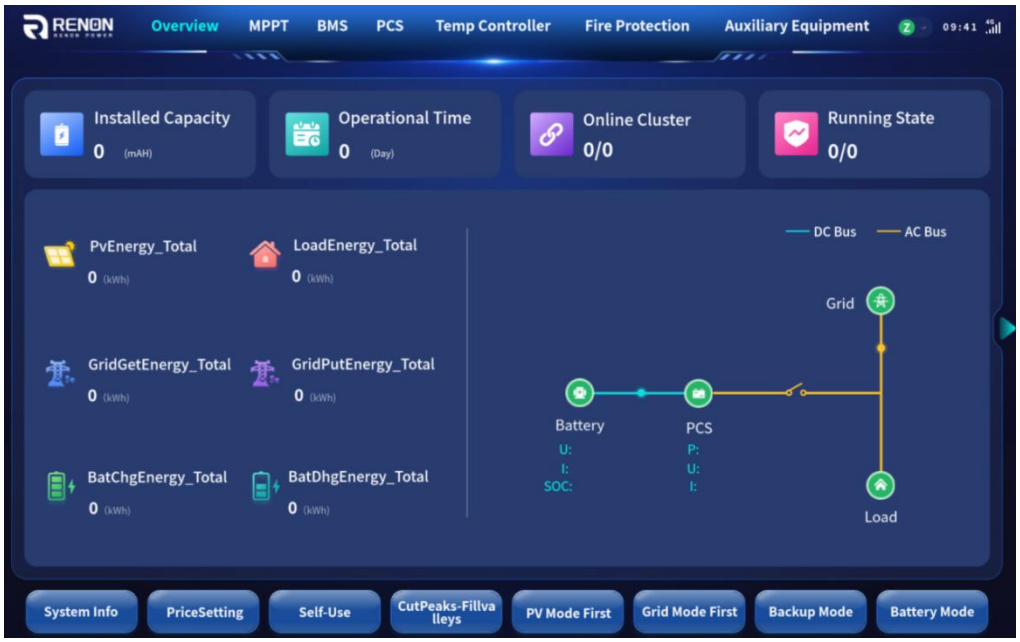
1280*800 resolution, 45cd/m2 brightness, full viewing angle, and three-point capacitive touch screen, allowing easy viewing of system data and settings both indoors and outdoors.

(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.

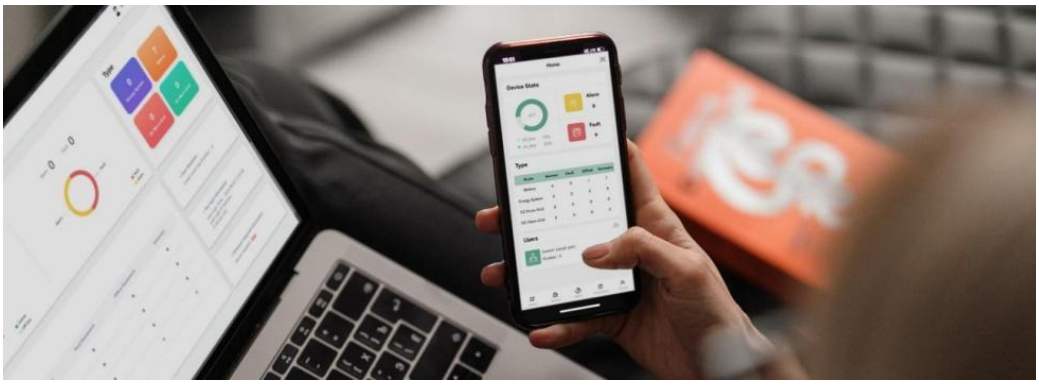


Parameters

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

12.4. EMS architecture diagram

Station Level EMS & Cloud Platform



13. Quality Assurance Instructions

13.1. 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.

13.2. Exemption Scope of Quality Warranty Liability

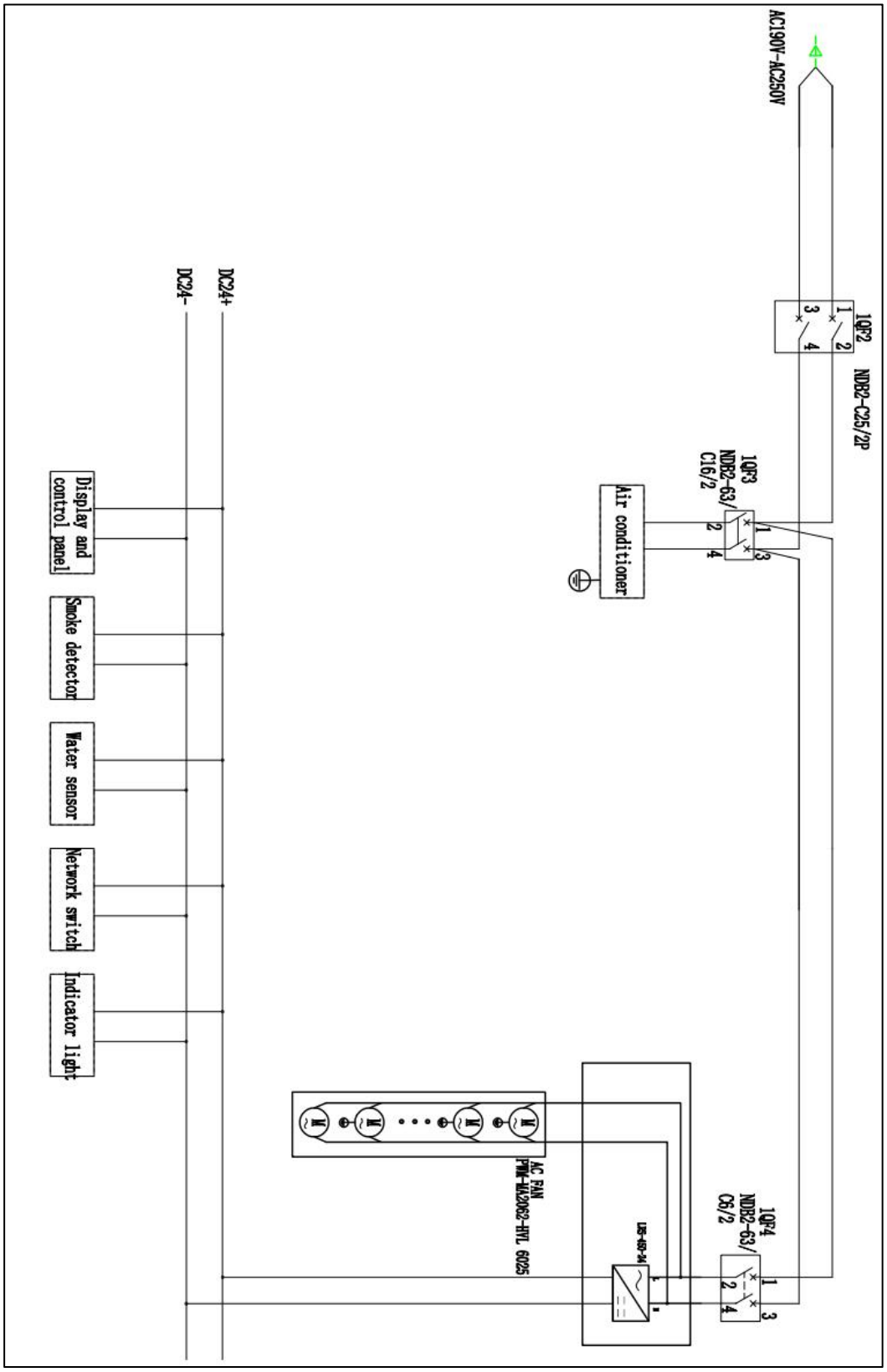
RENON does not provide a quality warranty service for:

- Various faults caused by not using, maintaining, and repairing the products according to the provisions of this manual.
- The product has been subjected to excessive water immersion, impact, or other forms of damage exceeding its capacity to withstand.
- Without the authorization of RENON's after-sales service department and service station, the company carries out modifications, installation, assembly, and adjustments to the battery system.
- Any damage caused when a customer handles a fault in the battery system without prior authorization from RENON's after-sales department or service station.
- Quality issues arising from not using genuine parts provided by our company.
- Damage caused by using charging equipment that does not meet national standards or by non-standard charging operations.
- Damage caused by force majeure events such as earthquakes, typhoons, floods, chemical pollution, lightning strikes, hail, sandstorms, flying debris, fires, political disasters, and secondary compensation claims based on these damages.

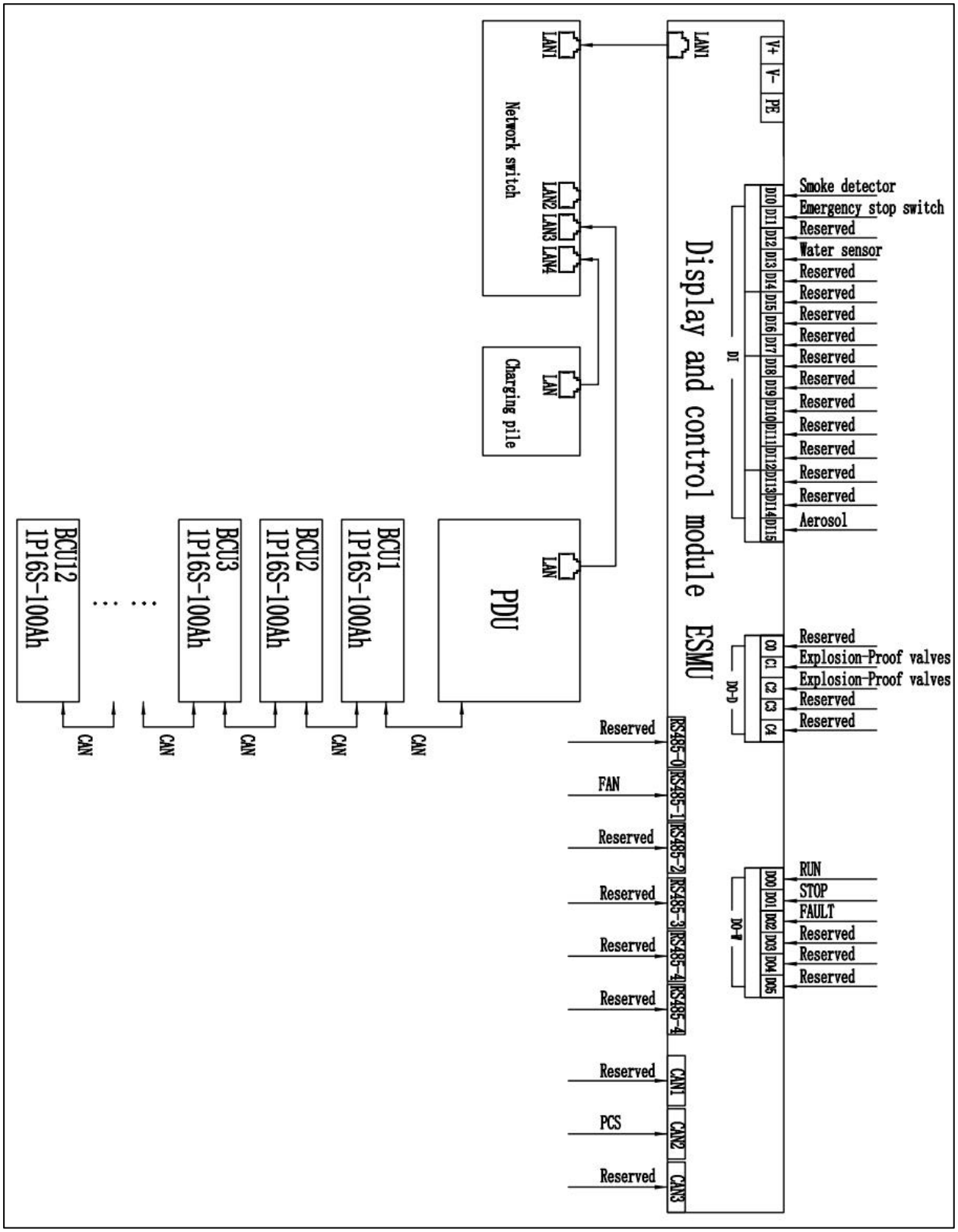
RENON reserves the right to the final interpretation of this specification within the limits of the law, and retains the right to modify this specification. Any changes will not be subject to further notice.

14. Appendix

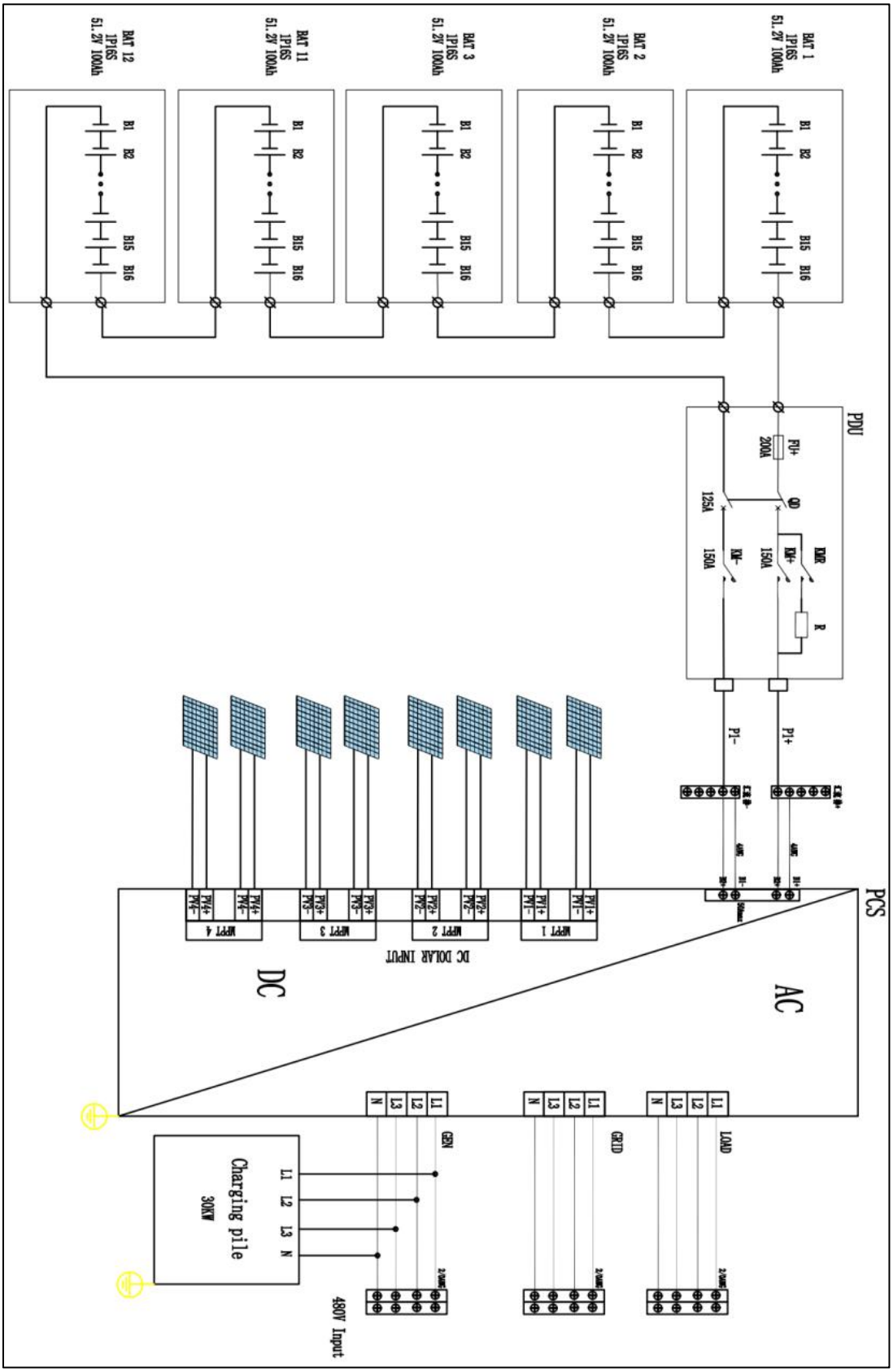
14.1. Auxiliary power supply schematic



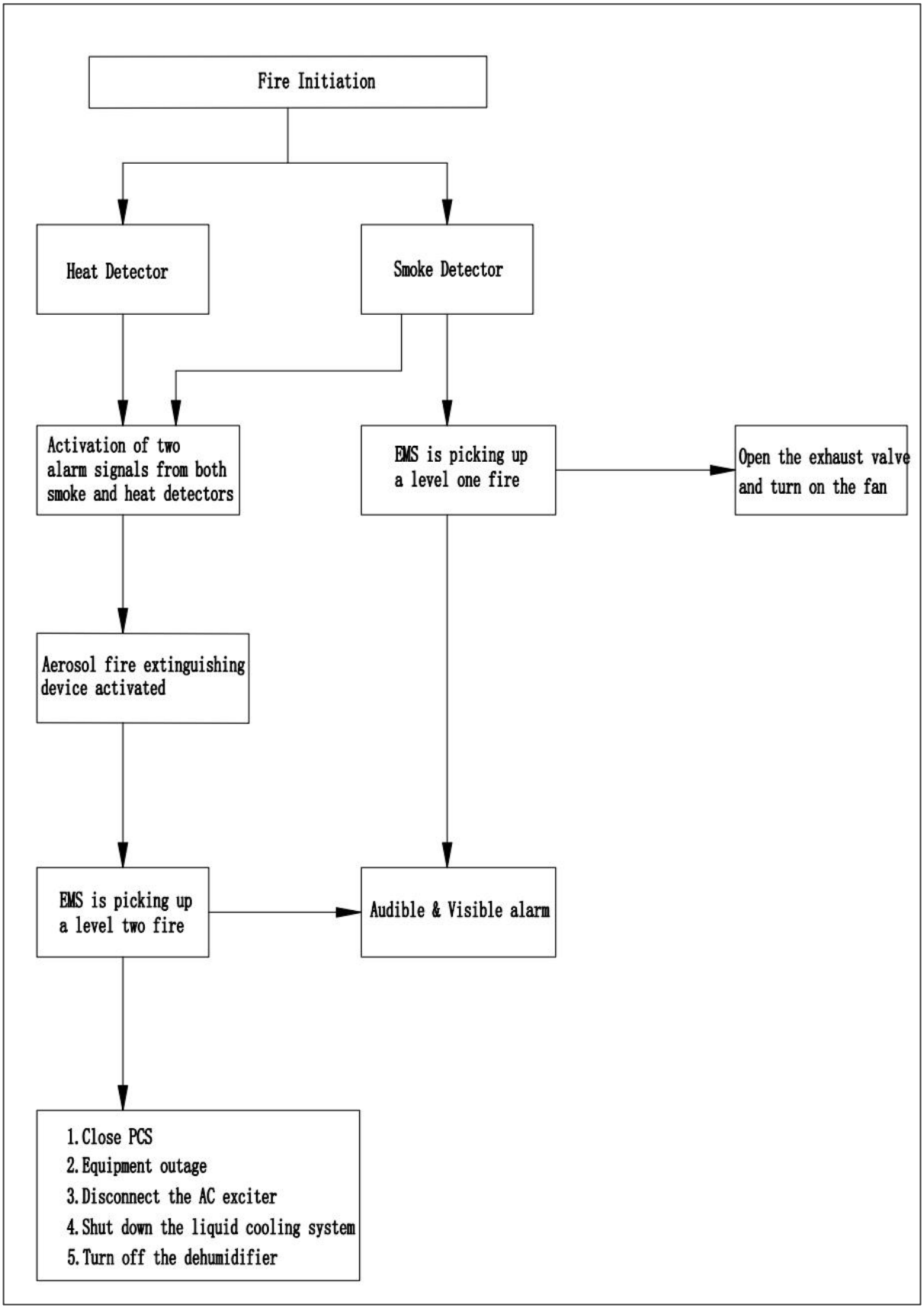
14.2. Communications schematic



14.3. System schematic

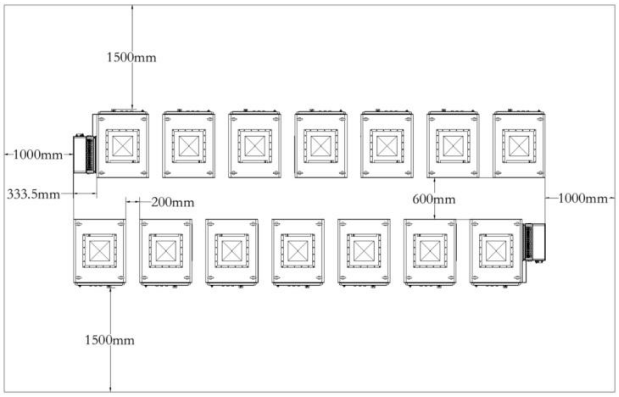


14.4. Firefighting schematics

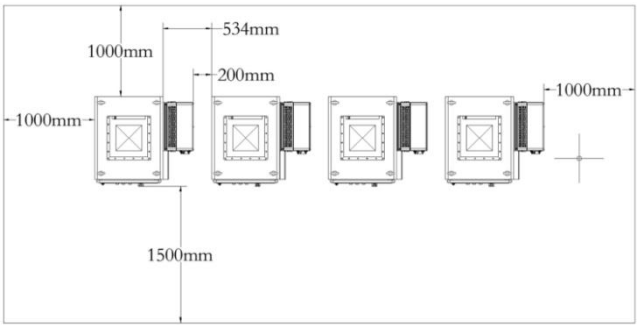


14.5. Space requirements for four combination installations

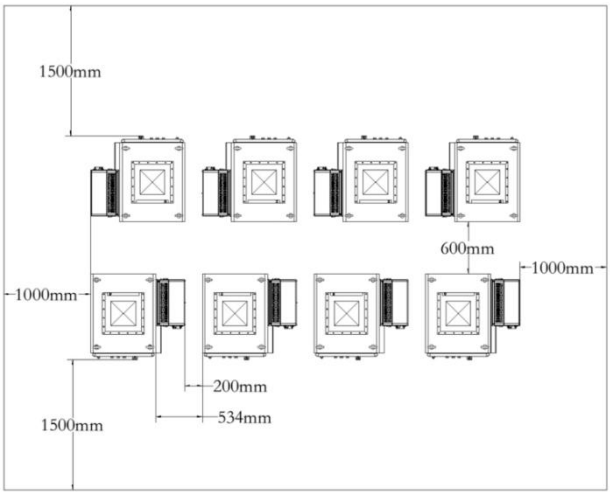
（1）



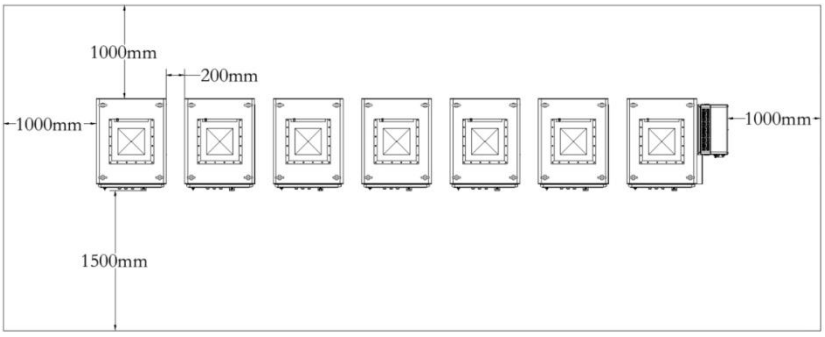
（2）



（3）



（4）



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