EN

C&I ALL-IN-ONE HYBRID ESS

RENA5000 Series

User Manual

VT0

- P125B261
- P375B783
- P250B522
- P500B1044

RENAC

更新日志

版本	更新记录	更新日期	更新人
VT0	初版	2025.4.29	隆烨洪

Content

Notice

This manual contains important safety instructions, installation, electrical connections, commissioning, and maintenance of the equipment.

Save the manual!

This manual must be stored carefully and be available at all times.

Copyright Declaration

1. About this Manual

1.1 Applicability

Please read the product manual carefully before installation, operation or maintenance. This manual contains important safety instructions and installation instructions that must be followed during installation and maintenance of the equipment.

1.2 Target Group

The instructions in this document can only be performed by qualified persons who must have the following skills:

- Have certain electronic, electrical wiring, and mechanical expertise, and be familiar with electrical and mechanical schematic diagrams.
- Be familiar with the composition and working principle of the integrated hybrid inverter; be familiar with the design and working principle of the integrated hybrid inverter and its front and back level equipment.
- Have received professional training related to electrical equipment installation and commissioning.
- Understand how the product works and how to operate the product.
- Have emergency response capabilities for dangerous or unexpected situations during installation or trial operation.
- Be familiar with the relevant standards and codes of the country where the project is located.
- Understand and follow this manual and all safety information.

1.3 Symbols Used

Symbols used have the following meaning:

 'Danger' indicates a hazard with a high level of risk that, if not avoided, will result in death or serious injury.
 'Warning' indicates a hazard with a medium level of risk that, if not avoided, will result in death or serious injury.
 'Caution' indicates a hazard with a low level of risk that, if not avoided, could result in minor or moderate injury.
 'Notice' indicates a situation that, if not avoided, could result in equipment or property damage or provides tips that are valuable for the optimal operation of your product.

1.4 Designation in the Document

BMS	Battery Management System
DG	Diesel generator
EMS	Energy Management System
HYD INV	Hybrid inverter

MSD	Manual Service Disconnect
PVS	Photovoltaic System
STS	Static Transfer Switch
SPD	Surge Protective Device
SPS	Surge Pre-protection Switch
SOC	State of Charge

2. Safety

2.1 General Safety

The energy storage system should be used in an environment that meets the requirements of the design specifications. Failure to follow proper usage guidelines may result in equipment malfunction, component damage, personal injury, property damage, and other issues. Please note that the energy storage system's quality assurance does not cover any such problems. Installation, operation, and maintenance of equipment should comply with local laws, regulations, and norms. The safety precautions in the manual are intended only as a supplement to local laws, regulations, and norms. The company shall not be liable in the event of any of the following circumstances.

- The installation and use environment exceeds the provisions of relevant international, national and regional standards.
- Does not operate under the conditions of use described in this manual.
- Disassemble, alter the product or modify the software code without authorization.
- Failure to follow the product's operating instructions and safety warnings, and documentation.
- Equipment damage caused by abnormal natural environment (force majeure, such as earthquakes, fires, storms, floods, mudslides, etc.).
- Damage caused by storage conditions not meeting the requirements of the product documentation.
- Damage to the hardware or data of the device due to customer negligence, incorrect operation, or intentional damage.
- System damage due to third-party or customer reasons, including relocation and installation systems that do not meet the requirements of this manual and damage caused by adjustments, alterations, or removal of identifying marks that do not meet the needs of this manual.
- Defects, malfunctions, or damages resulting from acts, events, omissions, or accidents beyond the seller's reasonable control, including power or electrical failures, theft, war, riot, civil commotion, terrorism, intentional or malicious damage, etc.
- The installation and various operations of the integrated hybrid inverter must comply with the relevant standards and regulations of the country/region where the project is located.
- The battery cabinet is equipped with an automatic fire extinguishing system and the fire switch should not be triggered unless it is an emergency.

2.2 Important Safety Instructions

DANGER

The equipment has a high voltage, and irregular operation may cause electric shock or fire, resulting in death, personal injury, or property damage. Please follow the operation sequence and safety precautions given in this manual and other related documents, and standardize the operation:

- Please check that the cable connection is fastened before the device. Inspect the machine for damage, such as holes, dents, or other signs of possible damage inside. Check that the internal parts of the equipment are kept the same, and it is forbidden to change the structure and installation order of the equipment without authorization.
- It is forbidden to clean the electrical parts inside the equipment with water. If you find liquid entering the device, press the emergency stop immediately off and notify the site management.
- It is forbidden to carry out installation, wiring, maintenance, and replacement operations with electricity. Contact should be measured before touching any conductor surface or terminal point voltage, and confirm that the protective ground wire of the equipment or parts to be serviced is reliably grounded to confirm that there is no risk of electric shock.
- Do not approach the equipment except those operating the equipment. The device has not been installed or confirmed by a professional Yes, do not power up the device. When powering up for the first time or operating the main circuit live, at least two personnel must be on site.

WARNING

◆ Battery pack Leakage

If the battery packs leak electrolytes, contact with the leaking liquid or gas should be avoided. The electrolyte is corrosive, and the contact may cause skin irritation and chemical burns. If one is exposed to the leaked substance, do these actions:

- Inhalation: Evacuate the contaminated area, and seek medical help immediately.
- Eye contact: Rinse eyes with flowing water for 15 minutes and seek medical help immediately.
- Skin contact: Wash the affected area thoroughly with soap and water and seek medical help immediately.
- Ingestion: Induce vomiting and seek medical help immediately.

◆ The battery packs and their components should be protected from damage when transporting and handling.

- Do not impact, pull, drag, or step on the battery packs.
- Do not insert unrelated objects into any part of the battery packs.
- Do not throw the battery pack into a fire.
- Do not soak the battery packs in water or seawater.
- Do not be exposed to strong oxidizers.
- Do not short-circuit the battery packs.
- The battery packs cannot be stored at high temperatures (more than 50°C).
- The battery packs cannot be stored directly under the sun.
- The battery packs cannot be stored in a high-humidity environment. Do not use the battery packs if it is defective, or cracked, broken or otherwise damaged, or fails to operate.
- Do not attempt to open, disassemble, repair, tamper with, or modify the battery packs. The battery packs are not user-serviceable.
- Do not use cleaning solvents to clean the battery packs.

CAUTION

◆ Risk of injury due to the weight of the battery pack injuries may result if the battery pack is lifted incorrectly or dropped while being transported or installed.

- Transport and lift the battery pack carefully. Take the weight of the battery pack into account.
- Wear suitable personal protective equipment for all work on the energy storage system.

◆ If the battery has not been installed within 6 months of shipment from the factory, the battery must be recharged until the State of Charge (SOC) is greater than 50% for maintenance.

NOTICE

◆ Firefighting Measures

The battery packs may catch fire when it is put into the fire. In case of a fire, please ensure an ABC or carbon dioxide extinguisher is nearby. Water cannot be used to extinguish the fire. Full protective clothing and self-contained breathing apparatus are for the firefighters to extinguish the fire.

◆ Damage to the energy storage system due to under voltages

If the energy storage system doesn't start at all, please contact Renac after-sales service within 48 hours. Otherwise, the battery could be permanently damaged.

◆ Electrical installation and maintenance must be carried out by competent electricians according to local regulations.

2.3 Explanation of Symbols

Symbols on Label:

Symbol	Explanation
	Do not disconnect or disassemble by untrained personnel.
	Do not short circuit.
	Do not expose the battery to open flame, heat or sparks, as there is a risk of fire or explosion.
	Keep the battery packs away from children.
	Observe the documents Observe all documents supplied with the system.

Symbol	Explanation
	Warning! Metal parts of the batteries are always under voltage. Do not short-circuit the batteries! In case of a short-circuit may flow very high currents and cause burns. By Touching conductive parts can cause cardiac arrhythmia and shock.
	The battery contains corrosive electrolytes. Please avoid contact with the leaked substance.
	WEEE designation Do not dispose of the system together with the household waste but in accordance with the disposal regulations for electronic waste applicable at the installation site.

2.4 Electrical Safety

2.4.1 Wiring Requirements

- Please select the cable that meets the requirements of local laws and regulations. The same type of cables should be tied together, different types of cables should be placed separately, and mutual winding or cross-laying should be prohibited.
- When the wiring is completed or left for a short time during the wiring process, it is necessary to immediately block the cable port and close the cabinet door to avoid the entry of small animals.
- The cables used in the energy storage system must be firmly connected and well insulated, and the specifications must meet the requirements. The position of the cable through the pipe or the wire hole must be protected to avoid the cable being damaged by sharp edges, burrs, etc.
- After the completion of the cable connection, it is necessary to use the cable bracket and the cable clamp to be reliably fixed. The cable in the backfill soil area ensures that it is closely fitted to the ground to prevent deformation or damage caused by the force of the cable when the backfill soil is loaded.
- The use of cables in high-temperature environments may cause aging and damage to the insulation layer and between the cable and the heating device or the periphery of the heat source area.
- In order to ensure the safety of construction, all cables should be installed above 0 °C. When handling cables, especially in low-temperature environments, they should be taken lightly.

2.4.2 Grounding Requirements

- It is prohibited to destroy the grounding conductor. The grounding body of the equipment should be permanently connected to the protective grounding grid. Before operating the equipment, the electrical connection of the equipment should be checked to ensure that the equipment is reliably grounded.
- The grounding impedance of the equipment meets the requirements of national standard IEC62477-1 and local electrical standards.
- It is prohibited to operate the equipment when the grounding conductor is not installed. When installing the equipment that needs to be grounded, the protective ground wire must be installed first; when the equipment is removed, the protective ground wire must be finally released.

- When a ground fault occurs in the integrated hybrid inverter, there may be fatal high voltage in the parts that are not charged originally. Dangerous if accidentally touched! Before operation, please ensure that there is no ground fault in the system, and also take relevant protective measures.

2.4.3 Maintenance Requirements

- Before connecting or removing the cable, the protective switch of the corresponding circuit must be disconnected.
- Use the multimeter of the corresponding voltage level to check whether it is charged to ensure that the device has been completely powered off.
- If there is a charged body nearby, please use an insulation board or insulation belt to block or wrap it.
- After the grounding wire is used to reliably connect the circuit to be repaired with the grounding circuit, the operation and maintenance is carried out.
- When maintaining or overhauling the DC/DC modular system, at least two operators must be on site. The maintenance or overhaul operations can be performed only when the equipment has been safely disconnected and the power conversion system has discharged after 10 minutes.

WARNING

Before connecting the cable, it is necessary to confirm that the line label identification is correct before connecting.
If the device has multiple inputs, all inputs of the device should be disconnected, and the device can be operated after the device is fully powered down.
After the overhaul is completed, the grounding wire between the overhaul circuit and the grounding circuit is disassembled.

2.4.4 Mechanical Safety

- The bottom apron must be removed when forklifting without wooden boxes. Take-off and landing should be taken lightly to avoid impact or vibration.
- In the process of transportation, the center of gravity of the box should fall in the middle of the two forks on the forklift. Prohibit long-distance handling or inversion, tilt.
- When transporting equipment, it may cover the operator's line of sight due to the large volume of the equipment, and it is necessary to arrange auxiliary personnel to assist in the completion.
- In order to ensure the safety of drilling outside the equipment, the appropriate position should be selected before drilling to ensure that it will not cause short circuits and other effects.
- In the process of drilling, the equipment should be blocked to prevent the debris from falling into the equipment, and the debris should be cleaned in time after drilling.
- When handling equipment by hand, it is necessary to prepare for load-bearing, wear protective gloves, wear anti-shoes, and other safety protective equipment.
- Carefully move the device during the equipment handling process to avoid impact or drop. Avoid scratching the surface of the equipment and damaging parts or cables.

2.4.5 Battery Safety

The Company shall not be liable for any damage to the batteries provided by the company due to the following reasons:

- Due to customer reasons, the battery is not charged and accepted in time, resulting in overdue storage, capacity loss, or irreversible damage.
- Due to improper operation or not in accordance with the requirements of the battery caused by the fall of mechanical damage, leakage, rupture, etc.
- The customer or third party did not inform the company to change the battery usage scenario. Including but not limited to self-connecting the battery to an additional load, mixing with other brands of batteries, mixing with batteries with different rated capacities, etc.
- The direct damage to the battery is caused by the operating environment of the field equipment or the external power parameters that cannot meet the requirements of the normal operating environment. Including the actual operating temperature of the battery is too high or too low, the power grid is bad, and the power outage is frequent.
- Customers do not correctly set the battery operation management parameters or improper maintenance, resulting in frequent over-discharge of the battery, customer on-site expansion, or long-term inability to fully charge.
- The customer did not carry out the correct maintenance of the battery according to the operating manual of the supporting equipment, including but not limited to not checking whether the battery terminal screw is tightened regularly.
- The battery was stolen and lost.
- Battery beyond the warranty period.

Battery exception handling measures:

- When electrolyte leakage or abnormal odor occurs, avoid contact with the leaked liquid or gas. Non-professionals, please do not approach; please contact the professionals immediately.
- The electrolyte is corrosive, and contact may cause skin irritation and chemical burns. If you come into contact with the battery electrolyte, you need to immediately clean the contact area with a lot of water and soap and immediately seek medical help.
- After the battery drops (whether with packaging material or not), it is prohibited to continue to use. If the appearance is not obviously deformed or damaged and there is no obvious smell, smoke, or fire, under the premise of ensuring safety, the battery is transferred to an open and safe place for one hour for post-treatment, and contact the company's technical service engineer.
- When the battery has obvious odor, damage, smoke, and fire after falling, the personnel should be evacuated immediately and alerted in time. Professionals use fire protection facilities to extinguish the fire under the condition of ensuring safety.

2.4.6 Maintenance and Replacement

WARNING

When installing, maintaining and overhauling the equipment, make sure that:

- The energy storage battery has been completely disconnected.
- Clear warning signs at the point of disconnection to ensure no accidental reconnection.

- It is forbidden to open the cabinet door in the weather of rain, snow, lightning, dust, fog, and so on.
- Before the parts are taken out of the cabinet, please make sure that the other pieces on the cabinet are not loose.
- During the maintenance of the equipment, insulating materials should be used to cover the live parts nearby.
- Before the fan is powered off and stops rotating, any item is prohibited from contacting the running fan (such as fingers, components, screws, etc.). Please do not power on the device before troubleshooting.
- During the live inspection of the system, attention should be paid to the danger warning signs on the equipment to avoid standing

at the cabinet door.

- Devices other than battery packs must wait for about 15 minutes after powering down to ensure that the device is powerless before operating the machine.
- After the power components of the energy storage system are replaced, or the wiring is changed, manual wiring detection is required to avoid the abnormal completion of the system operation.
- If any battery packs are damaged, they must be replaced with new ones. Please ensure that the voltage of the replacement battery pack is the same as that of the other battery packs.
- After the relevant operations of maintenance and replacement, the cabinet door should be locked in time, and the key should be properly kept.

2.4.7 Arc Protection

WARNING

In order to avoid unnecessary casualties and equipment damage, the product must be operated strictly according to the description in this manual. If the operation is improper, it may cause an arc hazard and may even cause fire, explosion, and other risks. The company will not be liable for accidents such as arcs, fires, explosions, and other accidents caused by failure to follow the signs or product manual.

Improper handling, as described below, may cause arcing, fire, explosion and other hazards inside the machine. In an accident, it must be handled by qualified professionals. If not handled properly, existing accidents may cause a broader range of malfunctions or accidents.

- Plug and unplug the DC side high-voltage cables of each device under power.
- Touch potentially live cable ends that are not insulated.
- Touch copper bars, terminals, or other parts inside the machine that may be live.
- Power cable connections are loose.
- Parts such as screws accidentally dropped into the power module.
- Improper operation by untrained and unqualified operators, etc.

Before working on the equipment, the area of operation must be pre-assessed for arc risk. If there is a risk of arcing:

- Operators must have received relevant safety training in advance.
- Try best to assess the area where shock may occur.
- Wear appropriate protective clothing before working in areas of potential electric shock.

3. Introduction

3.1 Block Diagram

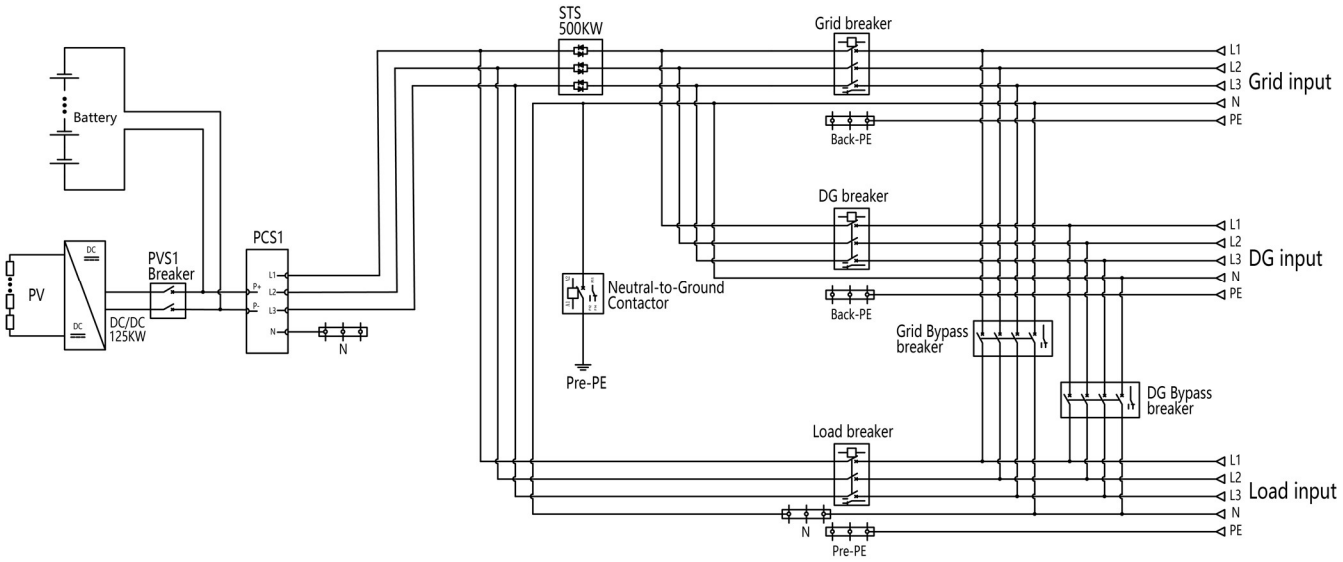


Figure 3-1 Block diagram of the RENA5000-P125B261

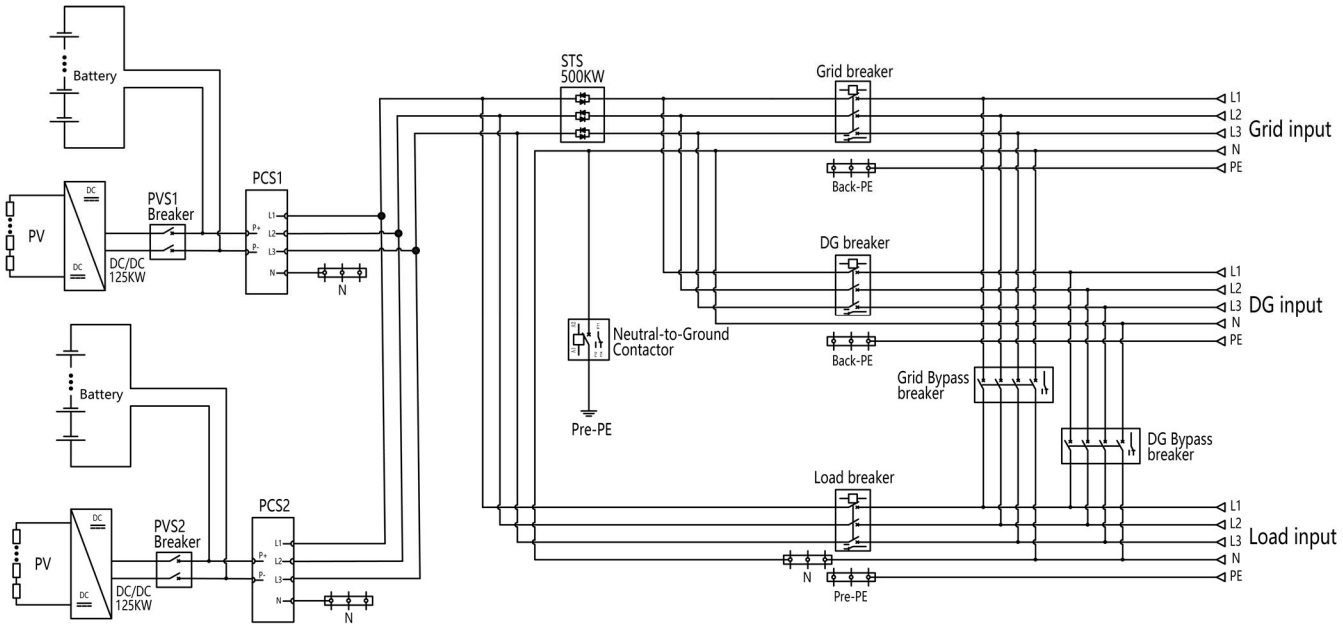


Figure 3-2 Block diagram of the RENA5000-P250B522

3.2 Product Overview

RENA5000 series All-in-one C&I Hybrid ESS integrates battery cabinet, photovoltaic system, energy management monitoring system, power distribution system, environmental control system, and fire control system. It has the characteristics of safety, reliability, rapid deployment, low cost, high energy efficiency, and intelligent management.

Considering the project's requirements and the product's characteristics, we recommend the following configuration of the RENA5000 system. When there is sufficient sunlight, the photovoltaic system mainly supplies power to the load and stores the excess energy in the battery during the day. When there is insufficient sunlight, the system supplies power to the loads by discharging the batteries. The system also provides backup power when the utility grid fails. When the utility grid fails and no energy is in the BESS, the diesel generator will begin to support load operation and support load operation and charge the batteries. See the entire system diagram. The intelligent Photovoltaic System (DC/DC) PVS-125K is mounted outside the RENA5000 unit, and all other components are integrated and mounted inside the unit for plug-and-play operation at the project site.

Model name: RENA5000-P125B261

- Capacity of battery: 261kWh / 522kWh / 783kWh / 1044kWh
- Rated Power of PV Smart Controller: 125kW / 250kW / 375kW / 500kW
- Product series

3.3 Appearance Introduction

3.3.1 Appearance and Dimensions

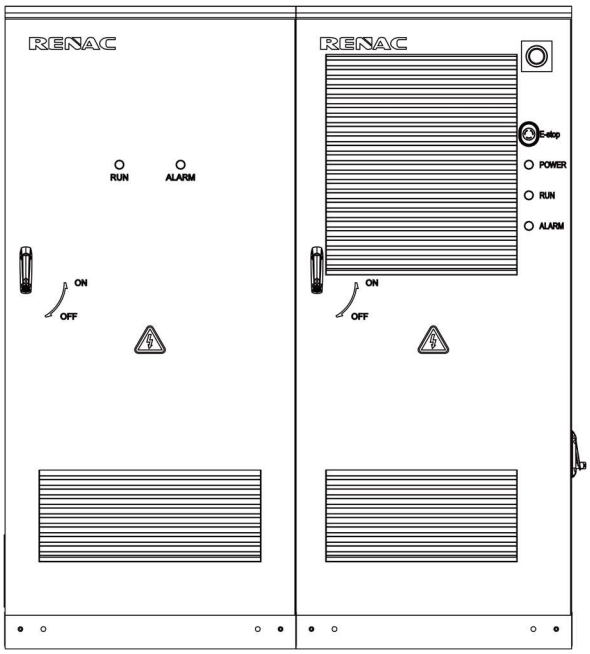


Figure 3-3 Appearance of the RENA5000-P125B261

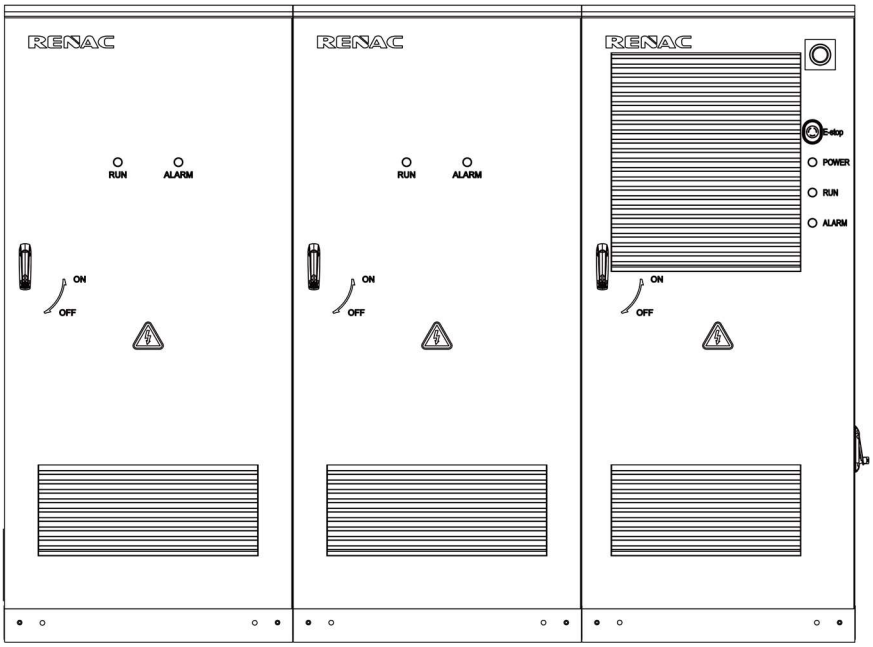


Figure 3-4 Appearance of the RENA5000-P250B522

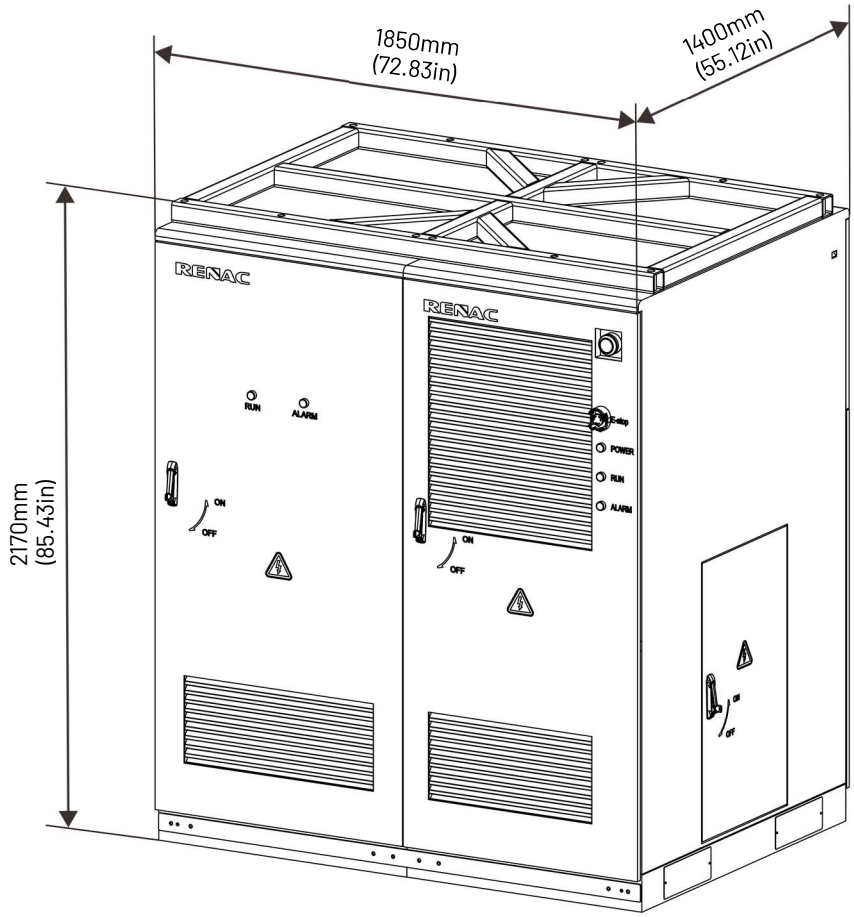


Figure 3-5 Dimensions of the RENA5000-P125B261

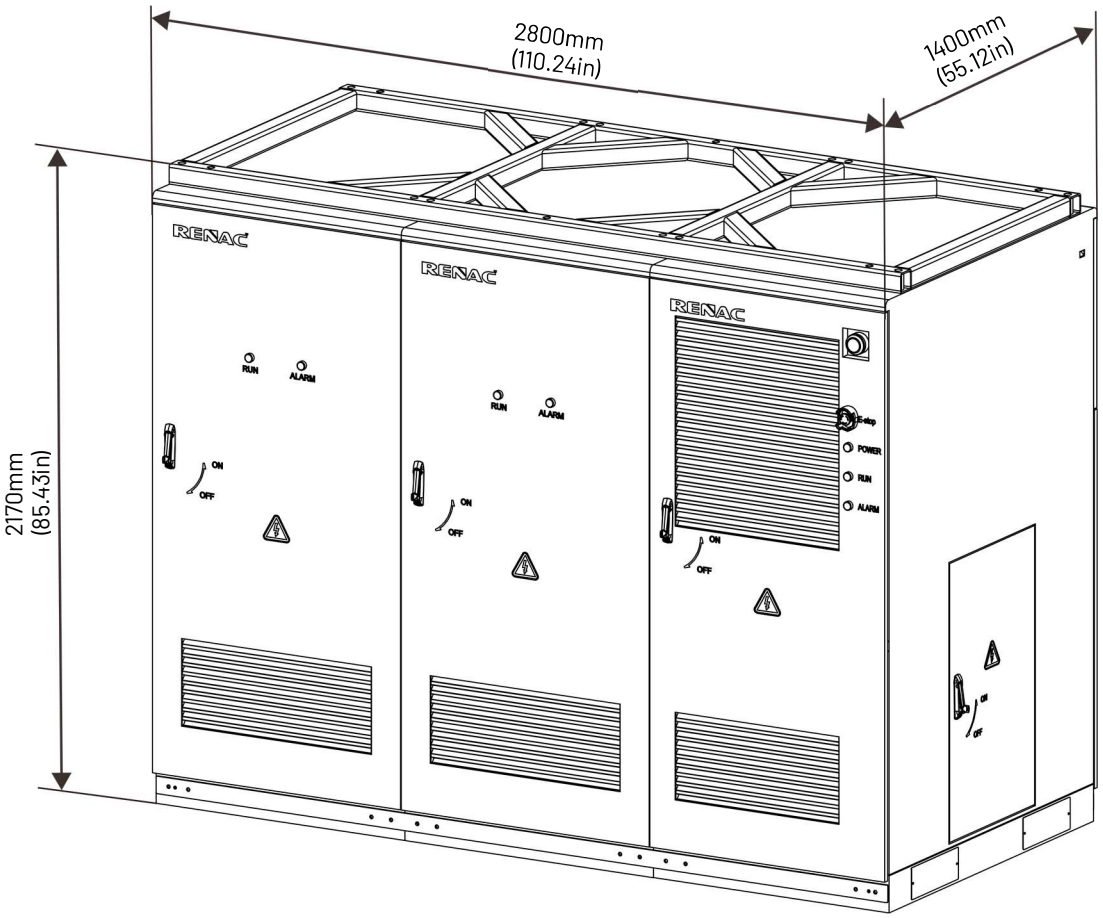


Figure 3-6 Dimensions of the RENA5000-P250B522

3.3.2 Product Characteristic

System productization, integrated energy storage battery, PCS, STS, energy management monitoring system, power distribution system, environmental control system, fire control, etc., to fully control the system operation status and risk.

According to the system capacity requirements of microgrid and other scenarios, the hybrid inverter and the battery packs power can be selected, and the typical configuration is 125kWh / 250kWh / 375kWh / 500kWh, corresponding to different battery systems for.

IP54 protection level is the response to general types of outdoor weather.

The door-mounted embedded integrated air conditioner does not occupy the cabinet space, improves the available space of the outdoor cabinet, and the top structure has a better waterproof effect.

The local control screen can realize diversified functions such as system operation monitoring, energy management strategy formulation, and remote equipment upgrade.

3.4 Application Scenarios

1. Standalone version:

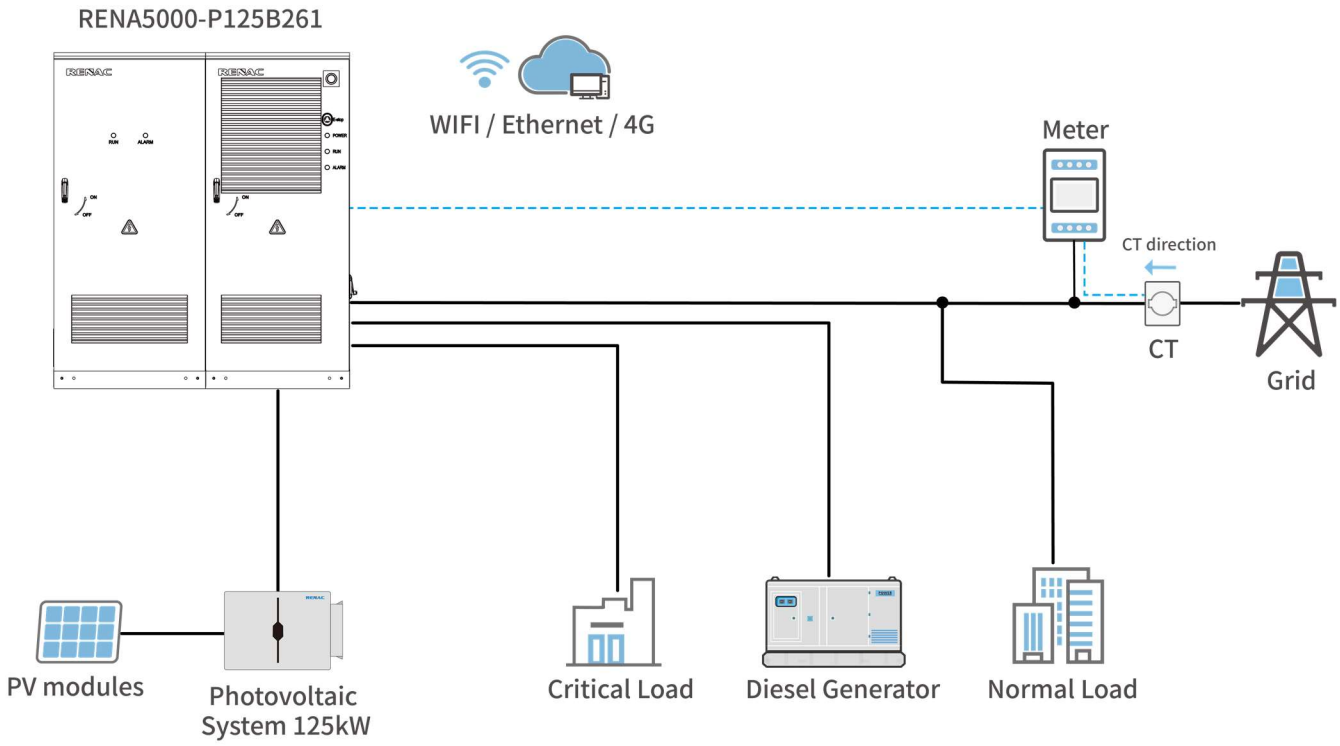


Figure 3-7

2. Parallel version:

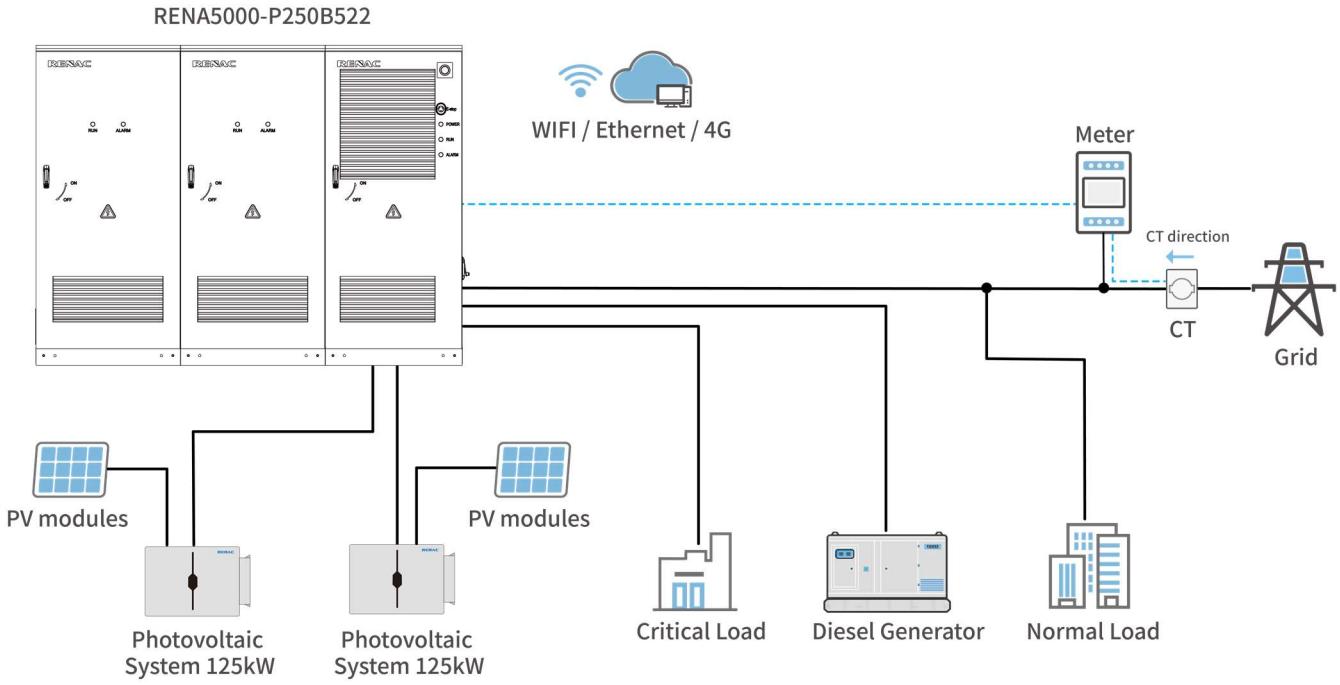


Figure 3-8

3.5 Technical Data

ESS Model	RENA5000-P125B261	RENA5000-P250B522	RENA5000-P375B783	RENA5000-P500B1044
PV Input				
Max. Recommended PV Power [Wp]	187500	375000	562500	750000
Max. PV Power for Single MPPT [Wp]	20000			
Max. PV Input Voltage [V]	730			
MPPT Voltage Range [V]	180 ~ 600			
Rated PV Input Voltage [V]	550			
Start-up Voltage [V]	200			
No. of MPP Trackers	10	10*2	10*3	10*4
No. of Input Strings per Tracker	2			
Max. PV Input Current per MPPT [A]	40			
Max. Short-circuit Current per MPPT [A]	50			
AC Input				
Max. AC Input Power [kVA]	250	500	750	800
Max. AC Input Current [A]	362	724	1086	1160
Rated AC Voltage [V]	3 / N / PE, 400			
Grid Frequency [Hz]	50			
AC Output				
Max. AC Apparent Power [kVA]	138	276	414	552
Rated AC Power [kW]	125	250	375	500
Max. AC Current [A]	208	416	624	832
Rated AC Voltage [V]	3 / N / PE, 400			
Grid Frequency [Hz]	50			
Adjustable Power Factor [cosφ]	-1 ~ +1			
Output THDi (@Rated Output)	< 3%			
Charging and Discharging Switch Time [ms]	< 100			
Battery				
Battery Technology	LiFePO4			
Nominal Capacity [Ah]	314			
Battery Configuration	1P260S * 1	1P260S * 2	1P260S * 3	1P260S * 4
Nominal Energy [kWh]	261	522	783	1044
Nominal Voltage [V]	832			
Voltage Range [V]	728 ~ 949			
Max. Continuous Charging / Discharging Current [A]	157 / 157	314 / 314	471 / 471	628 / 628
Depth of Discharge	95%			
Cycle Life	6000 @90% DOD / 25℃ / 0.5C			
Backup Output				
Rated Power [kW]	125	250	375	500

ESS Model	RENA5000-P125B261	RENA5000-P250B522	RENA5000-P375B783	RENA5000-P500B1044
Rated Voltage [V]	3 / N / PE, 400			
Rated Frequency [Hz]	50			
Rated Current [A]	181	362	543	724
Output THDv (@Linear Load)	< 3%			
Automatic Switch Time [ms]	< 20			
Overload Capability	1.1 times rated long term, 1.2 times rated not less than 1 minute.			
Generator Input				
Max. Power [kW]	125	250	375	500
Rated Current [A]	181	362	543	724
Rated Voltage [V]	3 / N / PE, 400			
Rated Frequency [Hz]	50			
General Data				
Dimensions (W * H * D) [mm]	1850 * 2100 * 1400	2800 * 2100 * 1400	6058 * 2591 * 2438	6058 * 2591 * 2438
Weight [kg]	3000	5500	9500	12000
Ambient Temperature Range [℃]	-20 ~ +50			
Relative Humidity	0 ~ 95%			
Operation Altitude [m]	≤ 2000			
Topology	Transformerless			
Cooling	Fan + Liquid (Battery)			
Fire Protection	Aerosol			
Communication	CAN, RS485, USB Update, WiFi, 4G, Ethernet			
Ingress Protection	IP54			

3.6 Components Introduction

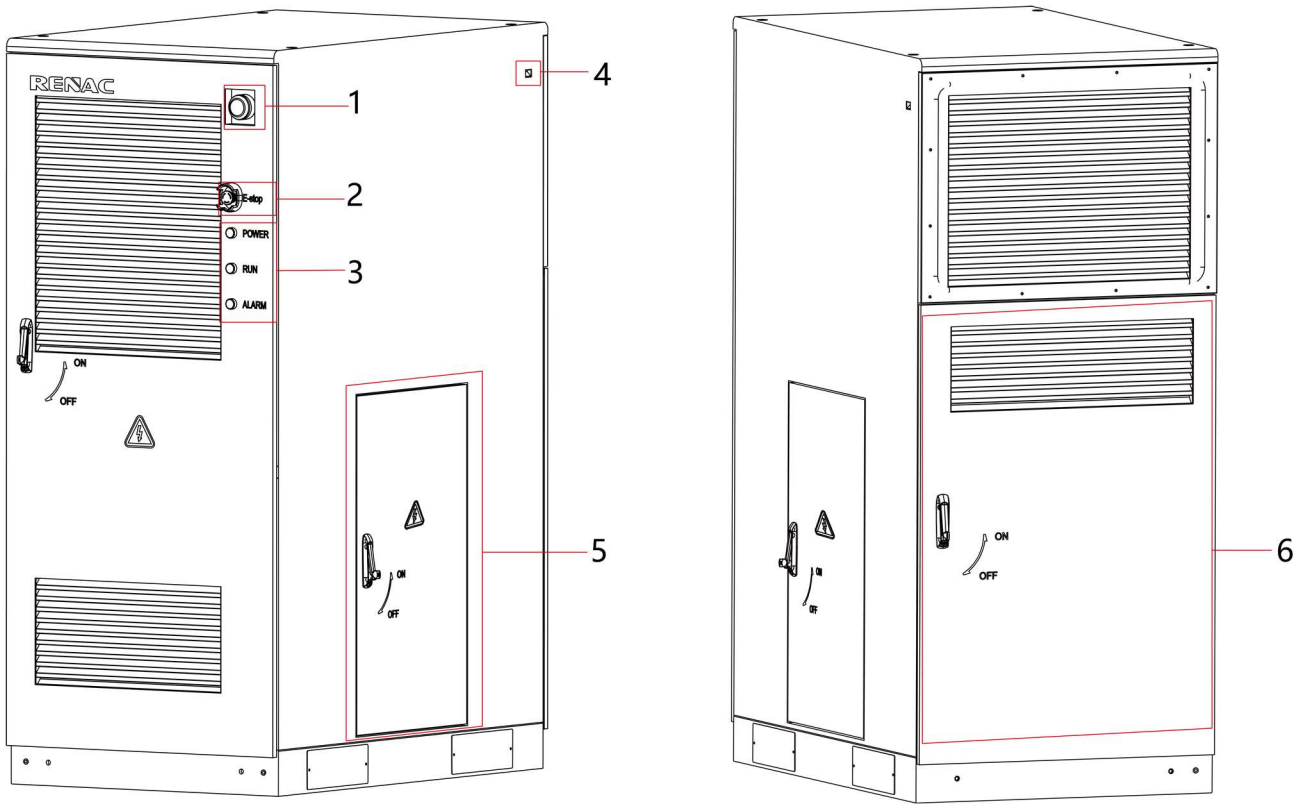


Figure 3-9 Components of the RENA5000 AC Cabinet (close the door)

No.	Model	Description	Quantity
1	Audible-visual alarm	Used to alter you when the abnormal conditions occur, such as temperature, smoke.	1
2	Emergency stop	This button can be used to stop the system from running when an emergency occurs.	1
3	Signal light	Power, run and alarm light displays.	3
4	Antenna hole	Used to thread WIFI antenna.	1
5	Maintenance access	Used to repair wiring and control boards.	1
6	Back door	Used to install and wire equipment in the back.	1

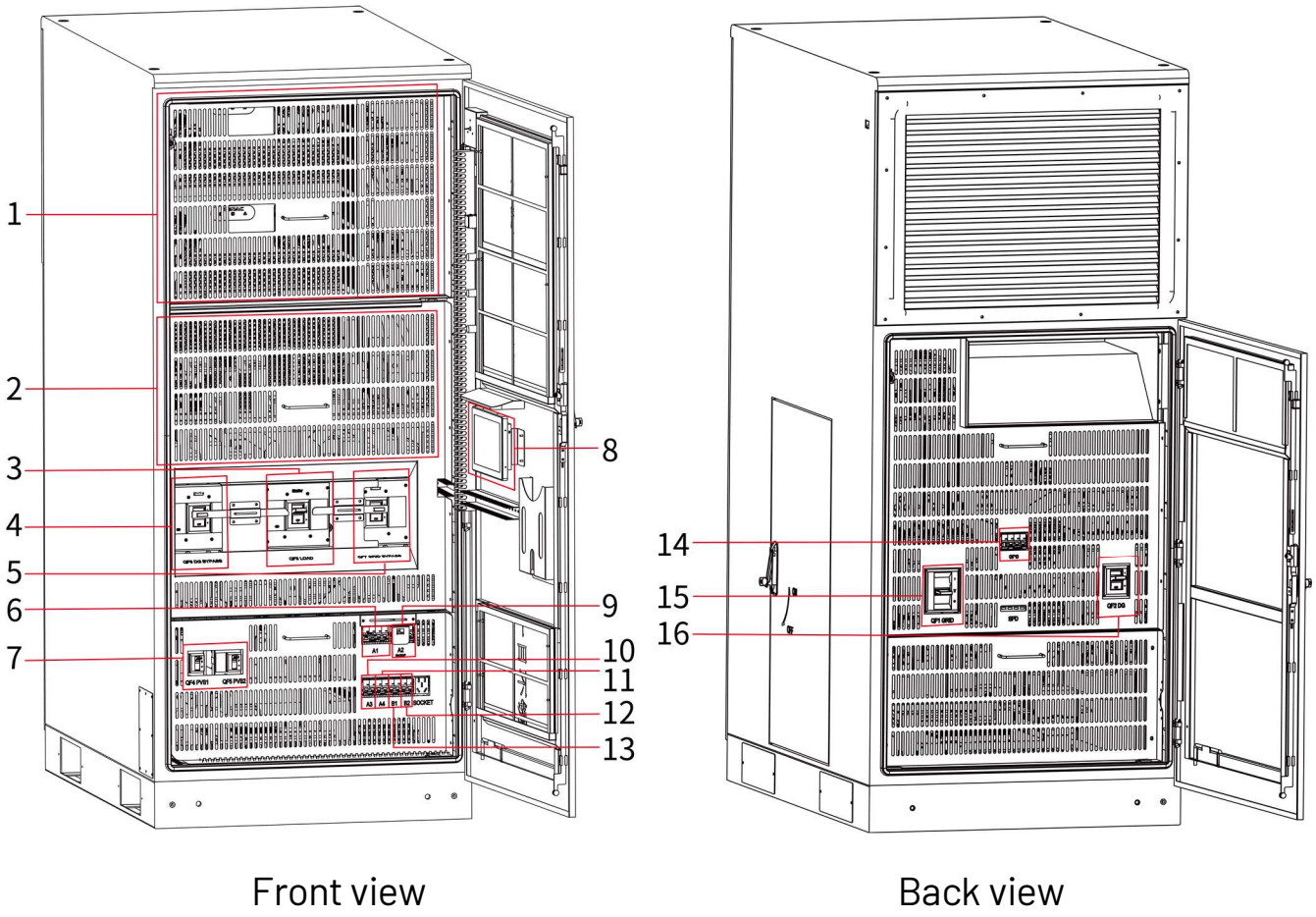


Figure 3-10 Components of the RENA5000 AC Cabinet (open the door)

No.	Model	Description	Quantity
1	PCS	Area to place PCSs. The RENA5000-P125B261 requires one, and the RENA5000-P250B522 requires two.	1 / 2
2	STS	Area to place STS.	1
3	QF3	Load breaker	1
4	QF6	DG bypass breaker	1
5	QF7	Grid bypass breaker	1
6	A1	Load-Side secondary power tap breaker	1
7	QF4 / QF5	PVS breaker. The RENA5000-P125B261 requires one, and the RENA5000-P250B522 requires two.	1 / 2
8	LED screen	The EMS operator interface.	1
9	A2	Grid-Side secondary power tap breaker	1
10	A3	AC electrical cabinet breaker	1
11	A4	Switch disconnect power supply breaker	1
12	B1	Battery cabinet 1# power supply breaker	1
13	B2	Battery cabinet 2# power supply breaker	1
14	SPS	Protection against indirect lightning and direct lightning effects or other transient overvoltage surges.	1

No.	Model	Description	Quantity
15	QF1	Grid breaker	1
16	QF2	DG breaker	1

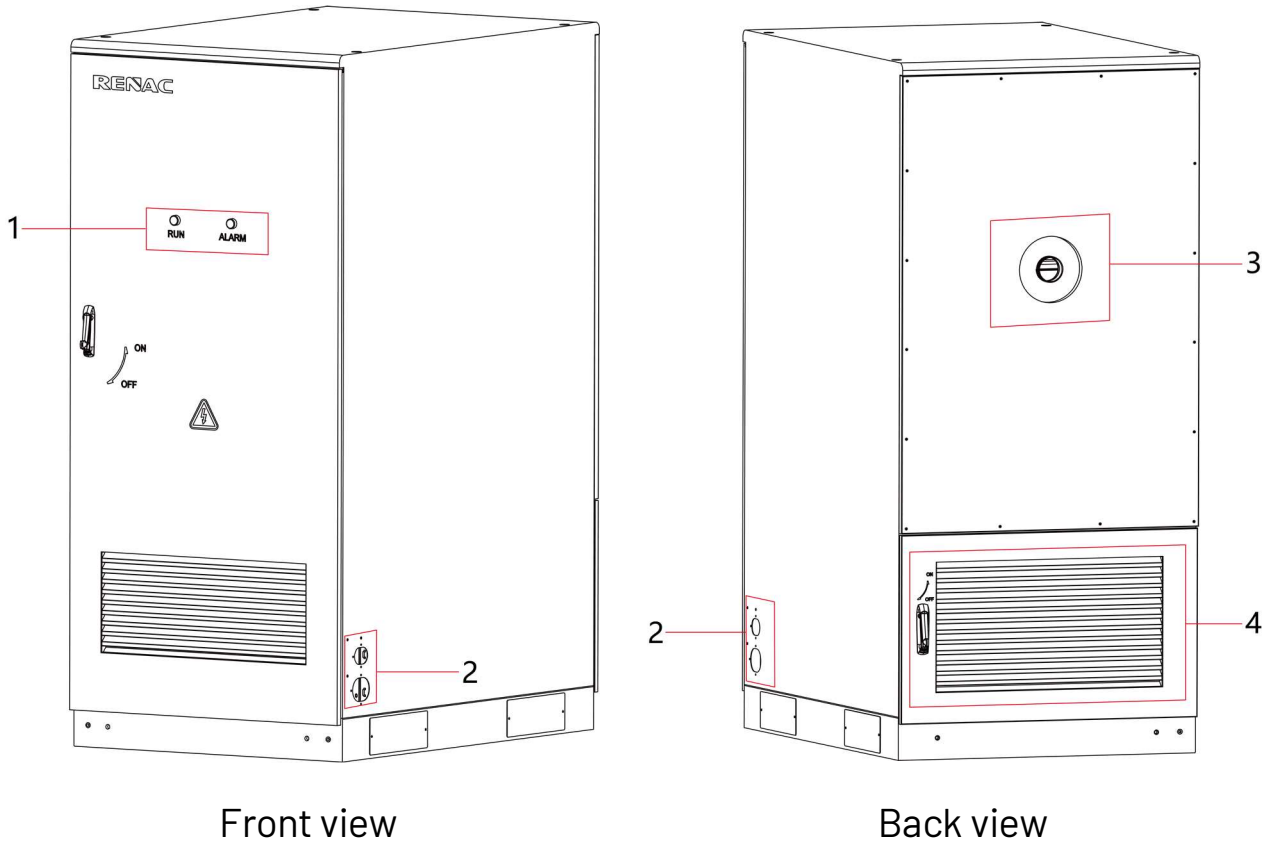


Figure 3-11 Components of the RENA5000 DC Cabinet (close the door)

No.	Model	Description	Quantity
1	Signal light	Run and alarm light displays.	2
2	Junction port	For wiring between DC and AC cabinets.	1
3	Fire hose coupling	For conjunction with a fire-fast connection for easy access to a fire hose.	1
4	Back door	For installation and wiring of equipment in the back.	1

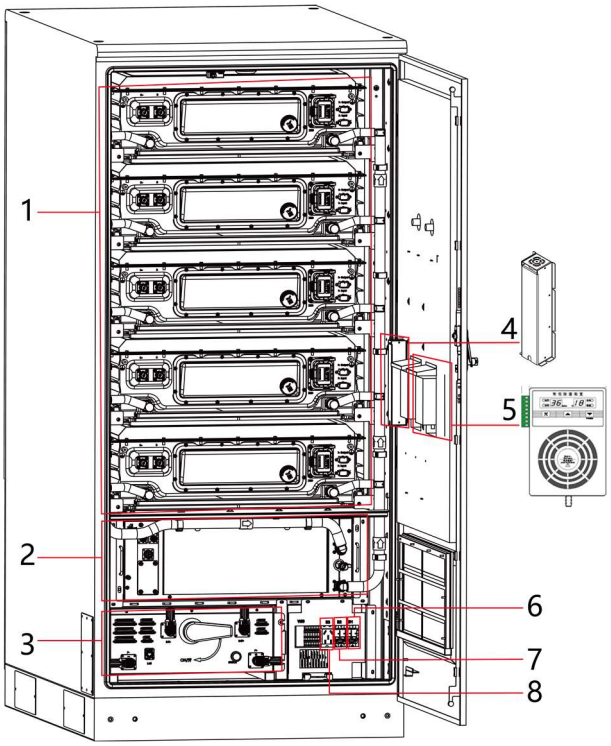


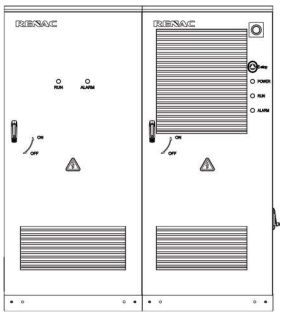
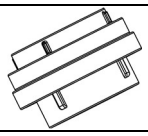
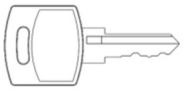
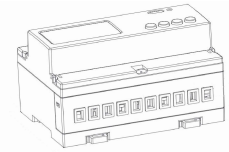
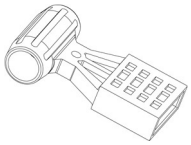
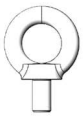
Figure 3-12 Components of the RENA5000 DC Cabinet (open the door)

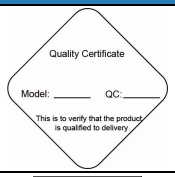
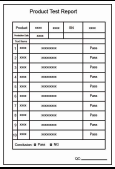
No.	Model	Description	Quantity
1	Battery pack	Used to store and release power.	5
2	Liquid-cooled units	Used to maintain the battery system temperature within a suitable range.	1
3	PDU	To collect current and voltage information on battery pack, and control the charge and discharge of battery pack.	1
4	Fire-fighting system	When a fire or other emergency occurs, it can suppress the fire, protect the system and personal safety. When the temperature inside the outdoor cabinet reaches 170℃, the fire detector tube will rupture automatically, and the Aerosol fire-fighting device can be released to the inside of the outdoor cabinet to extinguish the fire.	1
5	Dehumidification system	Remove moist air from confined spaces.	2
6	B1	Auxiliary power main circuit breaker	1
7	B2	Liquid cooler breaker	1
8	B3	Socket	1

4. Unpacking and Storage

4.1 Unpacking

Before opening the package, please check whether the packing box is complete and whether there is any damage, soaked in water; if the package is incomplete or obviously damaged, please contact the supplier. If the package is complete, please open the box to check whether the contents are complete against the material list or as shown in the figure below; if there is any omission or damage, please contact the supplier.

No.	Appearance	Model	Quantity
1		RENA5000-P125B261	1
2		Firefighting water inlet	1
3		Manual service disconnect	5
4		Key	6
5		Smart meter	1
6		Circuit breaker switch handle	1
7		Lifting components	4
8		User manual	1

No.	Appearance	Model	Quantity
9		Quality Certificate	1
10		Factory report	1

* The above packaging is the smallest unit, and the exact quantity varies depending on the model purchased.

4.2 Storage Environment

If it isn't installed immediately after the delivery work is successfully completed, please properly store the RENA5000 according to the description in this section.

- In order to prevent condensation inside the RENA5000, or if the bottom of the house is soaked by rainwater in the rainy season, the RENA5000 should be stored in an indoor environment, such as a large warehouse or in the workshop.
- If the battery packs are going to be kept for more than 30 days, adjust SOC to 40%-60% and dis-/charge them once every six months. Continuous storage is not recommended for more than 3 months.
- If it must be stored outdoors due to on-site conditions, the RENA5000 must be raised. The specific elevation height should be reasonably determined according to the site's geological and meteorological conditions. If the ambient temperature is too low, heating should be provided for the internal equipment of the RENA5000.
- Storage environment temperature: -30°C~60°C (less than one month); recommended long-term storage temperature: 20°C~30°C; storage relative humidity: 10~90%, non-condensing. The storage ground must be flat, free of water, no bumps or undulations.
- Effective measures must be taken to prevent rainwater, sand, and dust from intruding into the RENA5000. At least the air inlet and outlet of the RENA5000 must be effectively protected.
- It is strictly forbidden to put the batteries into fire. Otherwise it might be exploded. It also might cause a fire to the Battery pack when the ambient temperature exceeds 150°C.
- Inspect at least once every half month to check whether the cabinet and internal equipment are in good condition.

5. Installations

5.1 Installation Environment

- The level of the installation location should be above the highest historical water level in the area. The distance to airports, buried waste disposal sites, river banks, or dams should be greater than 2km.
- Select a well-ventilated area. Do not block the ventilation openings and heat dissipation system while the equipment is in operation to prevent fire from high temperatures.
- Installation space is sufficient to ensure that the surrounding equipment will not be affected by the heat generated by the product; the installation location ensures sufficient space for external wiring, easy access to transport, and reliable fire suppression system equipment.
- Keep the installation location away from sources of ignition, and do not place flammable or explosive materials around the equipment.
- If the equipment is installed in a place with lush vegetation, in addition to routine weeding, the ground below the equipment needs to be hardened to prevent weeds from growing.

- Do not install the energy storage system outdoors in salt-affected areas to prevent equipment corrosion and fire. Salt-affected areas are defined as areas within 2km of the coast or affected by sea breezes.
- The energy storage system must be equipped with protective measures such as fences and walls, and safety warning signs must be erected for isolation to avoid the entry of unauthorized personnel during the operation of the equipment, which may lead to personal injury or property damage.
- The equipment is installed in the area away from the liquid; should not be installed in the water pipe, air outlet, and other easy-to-produce condensation below the location; should not be installed in the air conditioning port, vents, machine room outlet windows, and other easy to leak below the area, to prevent the liquid from entering the internal caused by the short circuit of the equipment.

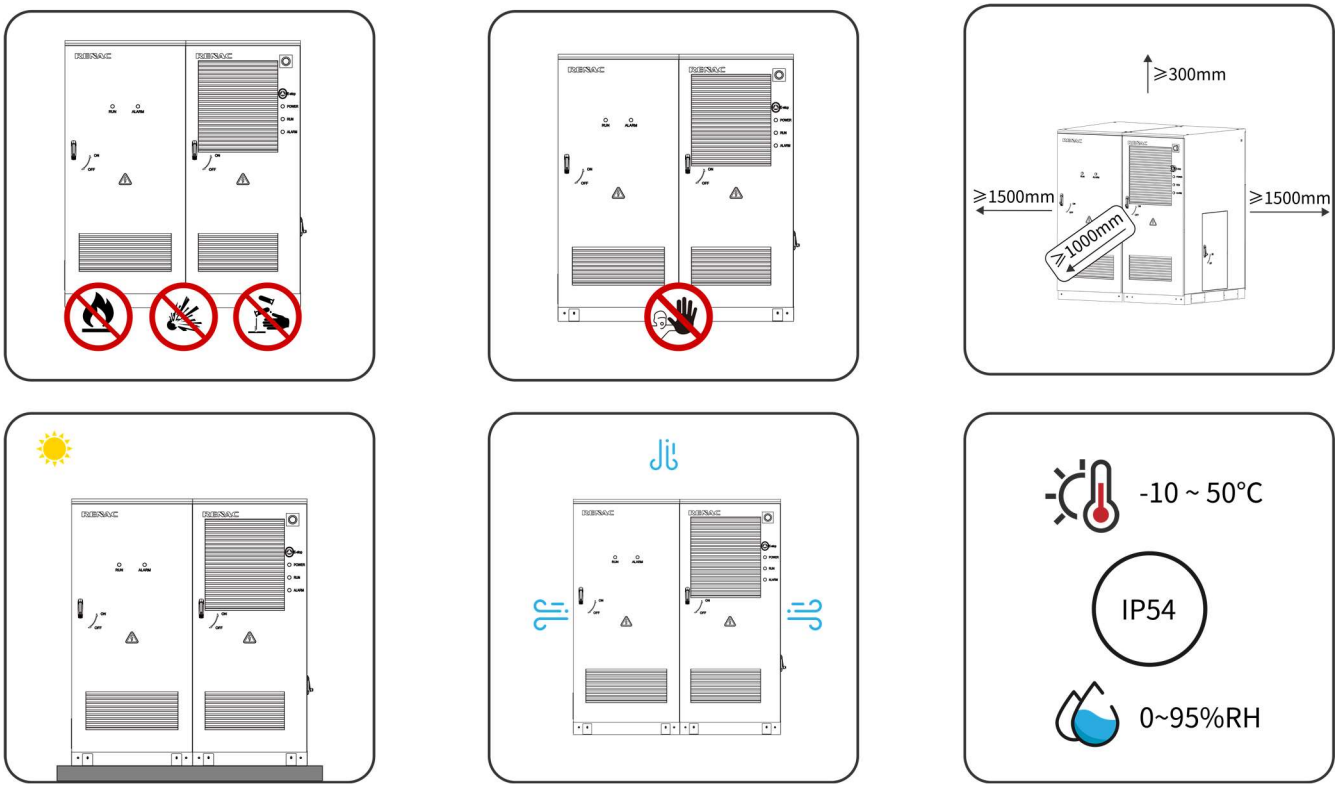


Figure 5-1

At least the following requirements should be met when constructing the foundation:

- The bottom of the foundation pit for building the foundation must be compacted and filled.
- The foundation should be sufficient to provide adequate load-bearing support for the energy storage system.
- Elevate the energy storage system to prevent rainwater from eroding the base and interior. It is suggested that the foundation should be about 300mm higher than the horizontal ground of the installation site.
- It is necessary to construct corresponding drainage measures in combination with local geological conditions.
- Construct concrete foundations of sufficient cross-sectional area and height. The construction party shall determine the foundation height according to the site geology.
- Cable routing should be considered when constructing the foundation.
- The maintenance platform should be built around the foundation to provide convenience for later maintenance.
- Both ends of all pre-buried pipes are temporarily sealed to prevent impurities from entering; otherwise, it will be inconvenient to route later.

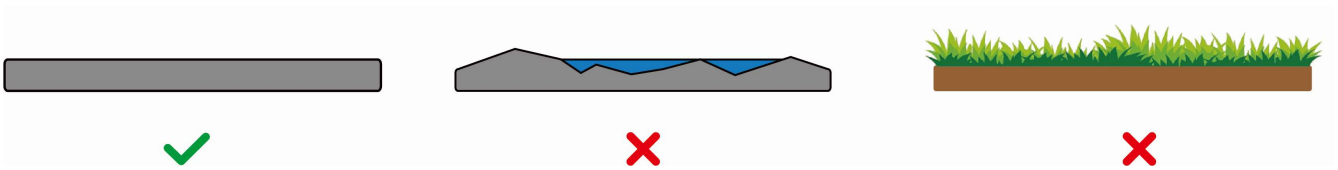


Figure 5-2

Foundation requirements:

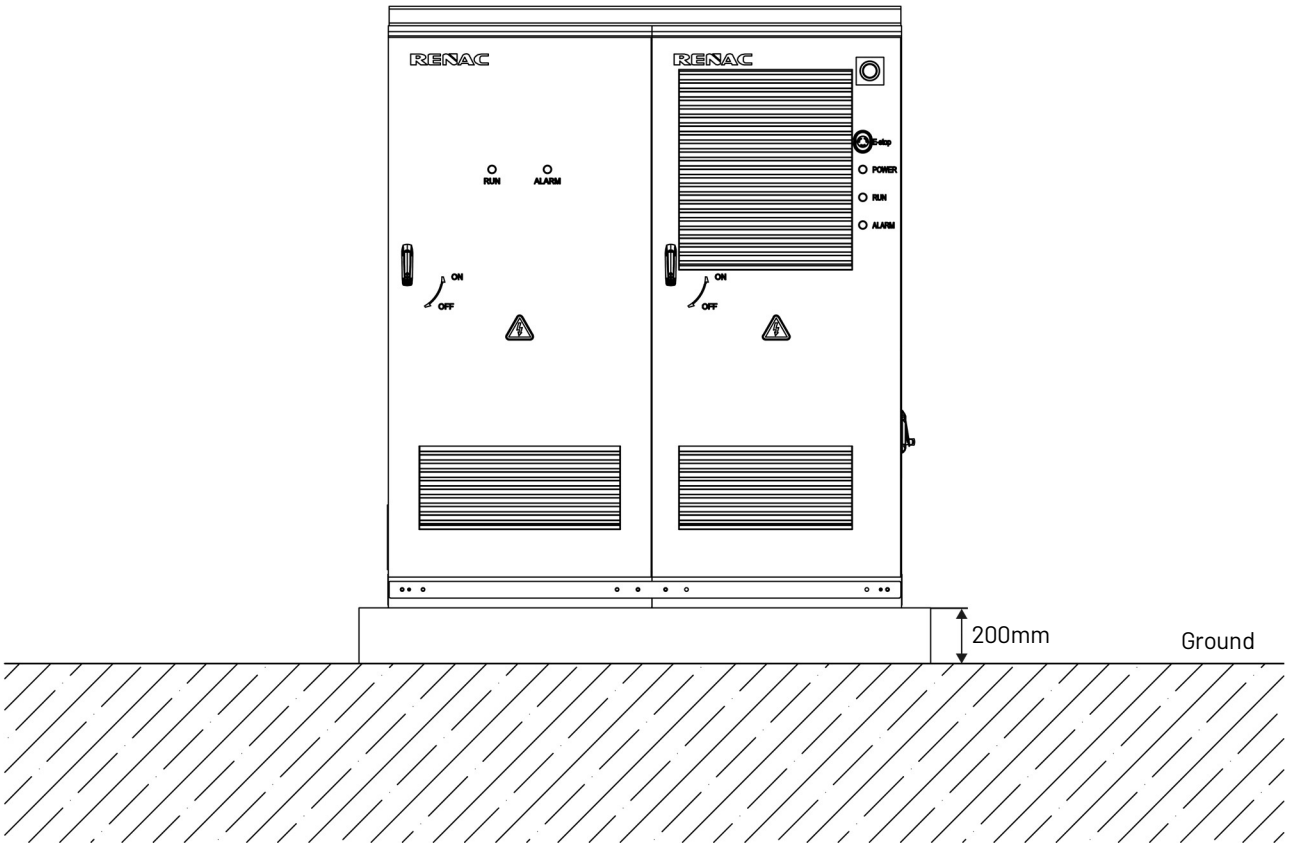


Figure 5-3 Front view of foundation

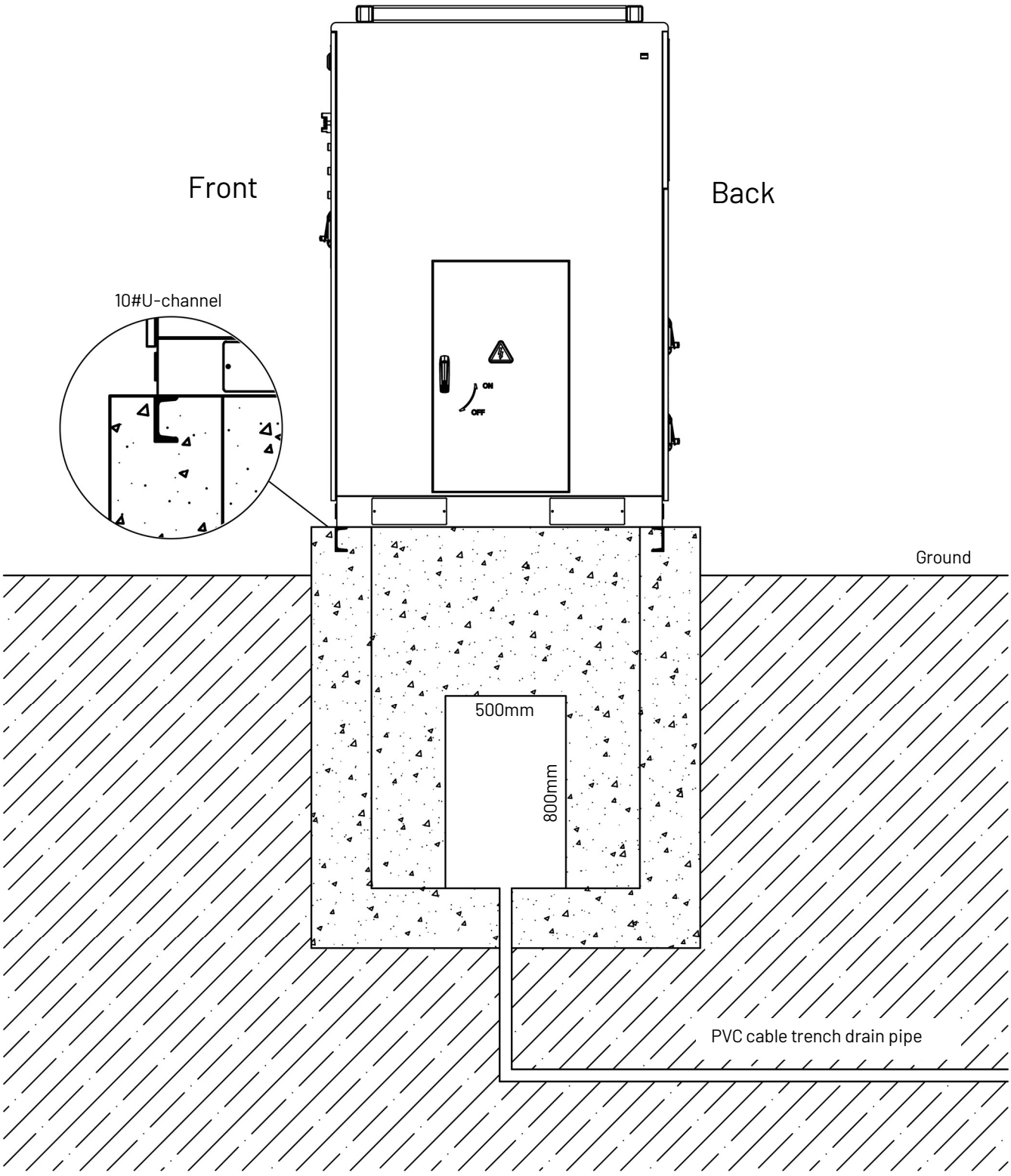


Figure 5-4 Front view of foundation

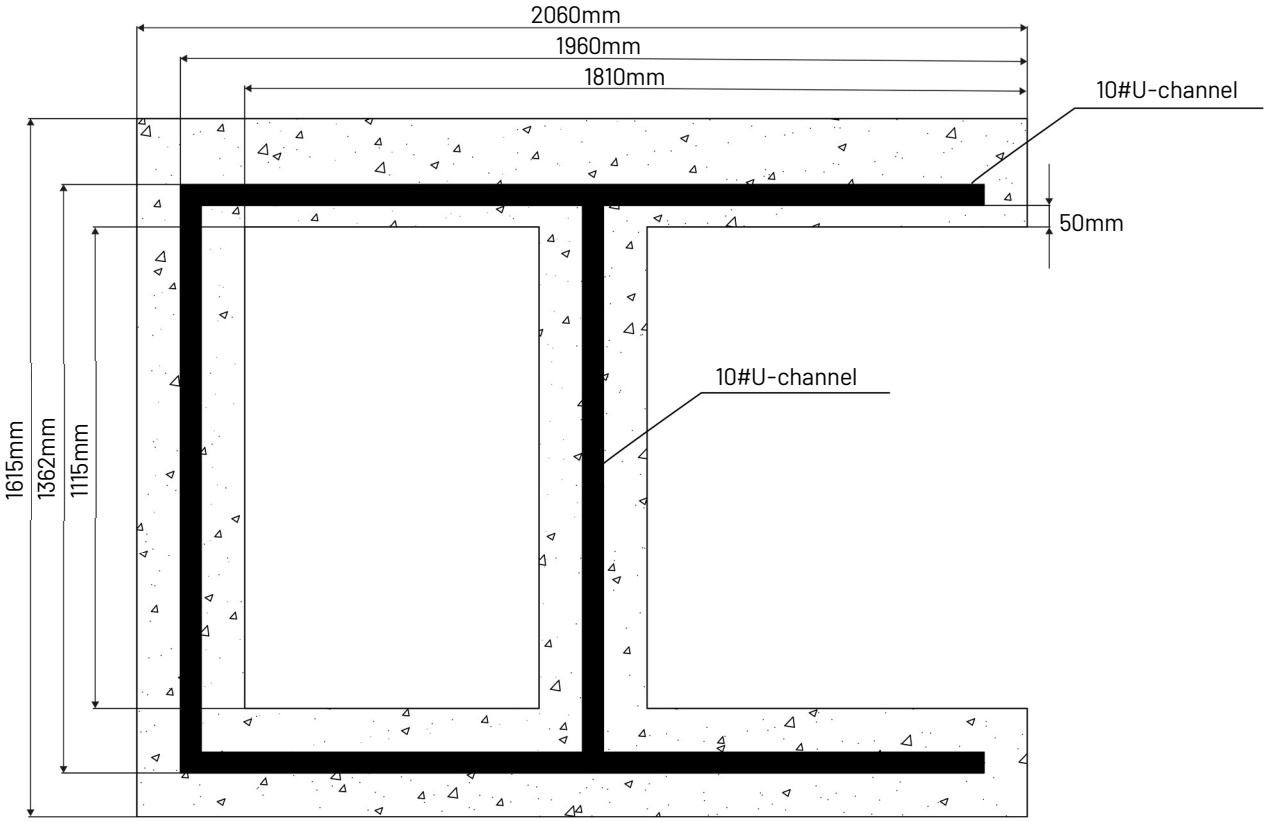


Figure 5-5 Top view of foundation

CAUTION

This foundation scheme is for recommended use only, and a construction scheme will need to be specified according to site conditions.

5.2 Product handling

Forklift transport:

- When using a forklift to transport, ensure that the forklift has sufficient load capacity, and note that the center of gravity of the equipment should fall between the legs of the forklift to prevent personal injury and equipment damage.
- With one battery cabinet transfer, forklift truck loading capacity needs to be ≥7t. With two battery cabinets transfer, forklift truck loading capacity needs to be ≥10t.
- Recommended forklift arm length > 2.1m, 489mm < forklift arm spacing < 989mm, forklift arm thickness < 100mm

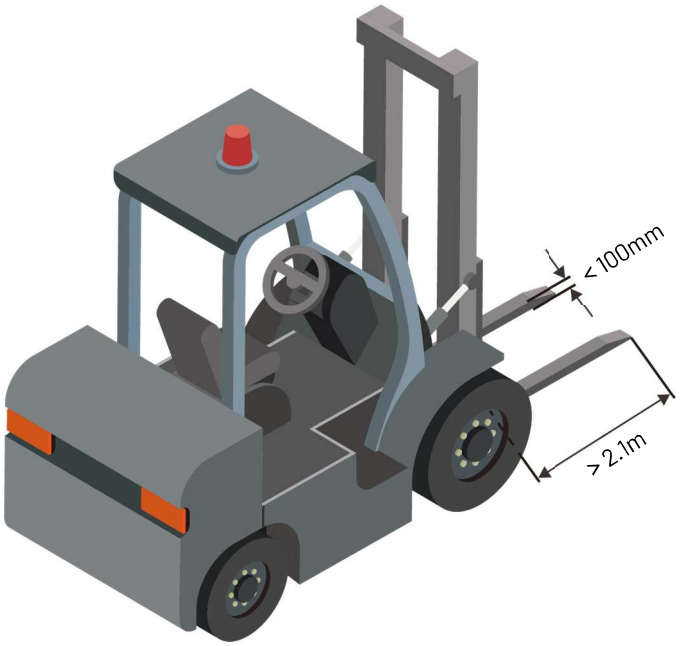


Figure 5-6 Recommended forklift arm sizes

- Transportation, moving and setting down of the RENA5000 should be slow and steady.
- When using a forklift truck to transport equipment, it is important that it is operated by a professional operator.

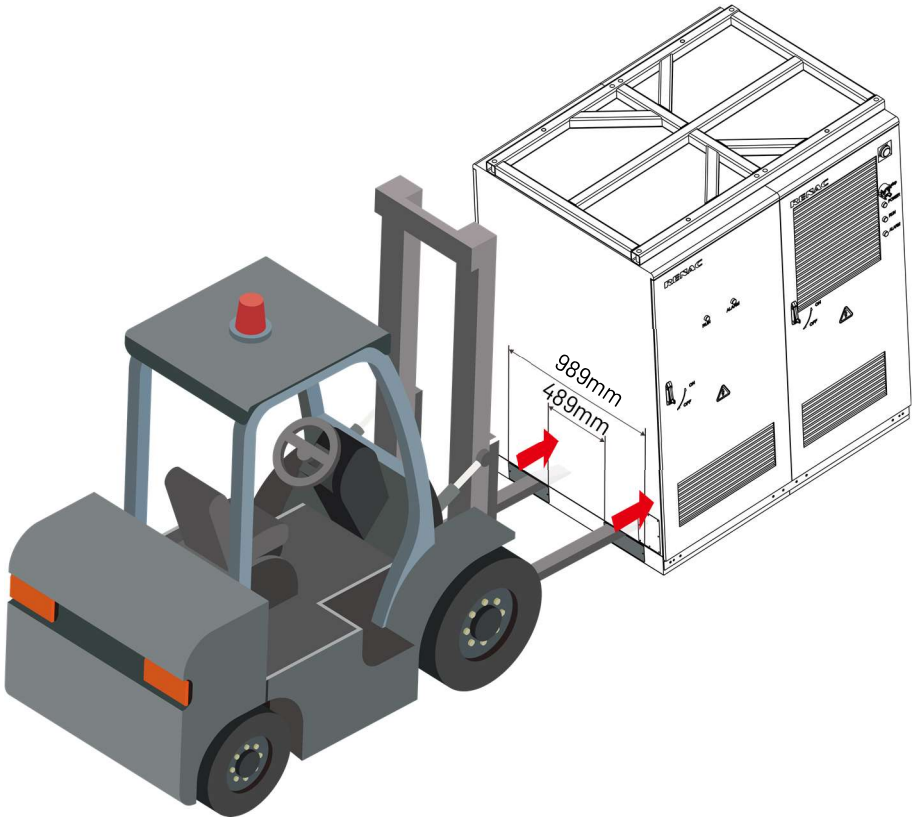


Figure 5-7

WARNING

Forklift transport only from that side of the battery cabinet (pictured).

Lifting transport:

- When using lifting equipment to transport, ensure that the energy storage system is lifted into the air using a sling with a hook or U-hook.
- One battery cabinet: the load-bearing capacity of the lifting equipment shall be ≥10t; Two battery cabinets: the load-bearing capacity of the lifting equipment shall be ≥15t.
- The entire lifting process should be carried out slowly; pay attention to observing the balance state of the box, and do not move too fast.
- During the entire lifting process, no one is allowed to stand underneath the energy storage system or the crane.

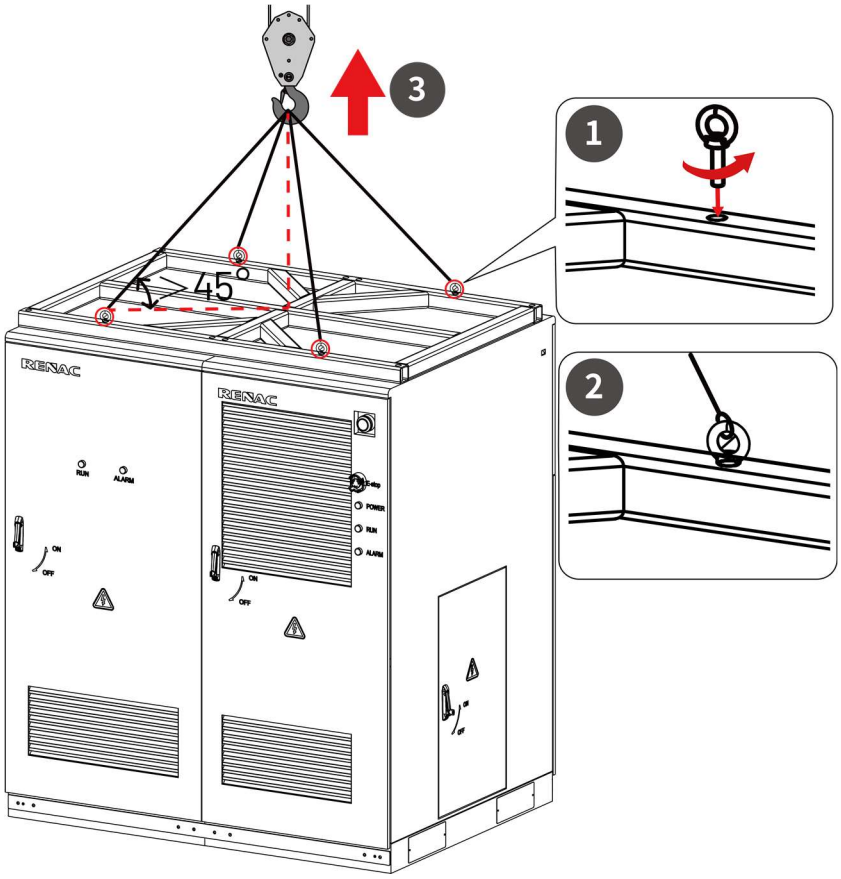
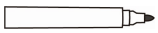
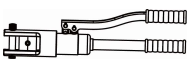
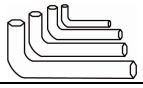
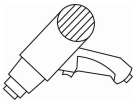
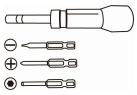
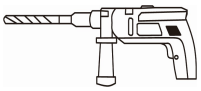
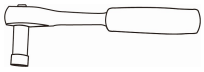
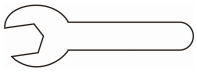


Figure 5-8

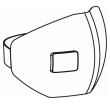
5.3 Preparation for Installation

(1) Installation tools:

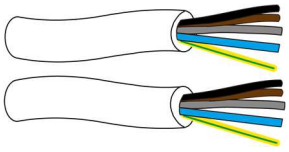
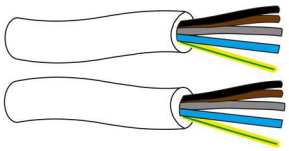
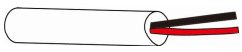
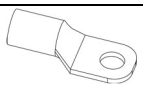
No.	Tool	Model	No.	Tool	Model
1		Spirit level	7		Marker
2		Wire stripper	8		Rubber hammer
3		Hydraulic pliers	9		Hex key

No.	Tool	Model	No.	Tool	Model
4		Heat gun	10		Torque screwdriver
5		Hammer drill	11		Multimeter
6		Socket spanner	12		Spanner

(2) Protective tools:

No.	Tool	Model	No.	Tool	Model
1		Dust mask	4		Insulated shoes
2		Goggles	5		Safety helmet
3		Insulated gloves			

(3) Cables and other tools:

No.	Tool	Model	Description
1		2*(5*240 mm^2)	Grid input
2		2*(5*240 mm^2)	Diesel generators input
3		5*240 mm^2	Loads input
5		RVSP 2*0.5 mm^2	Meter communication
6		Deutsch Terminal (240 mm^2)	Wiring connector

5.4 Mechanical Installation

Transport the equipment to the designated location by forklift or crane.

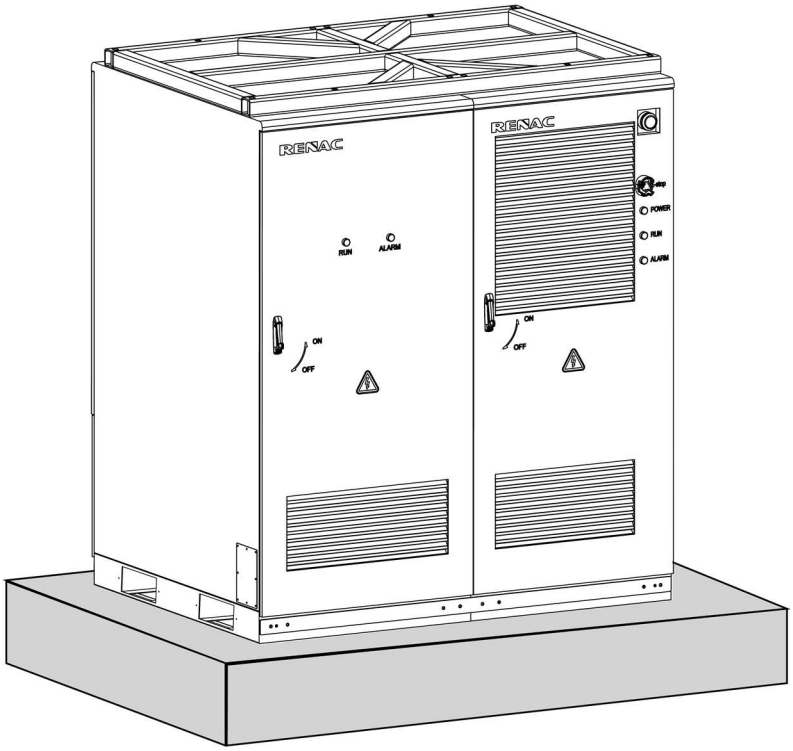


Figure 5-9

Install the two anti-rodent panels on the battery cabinet.

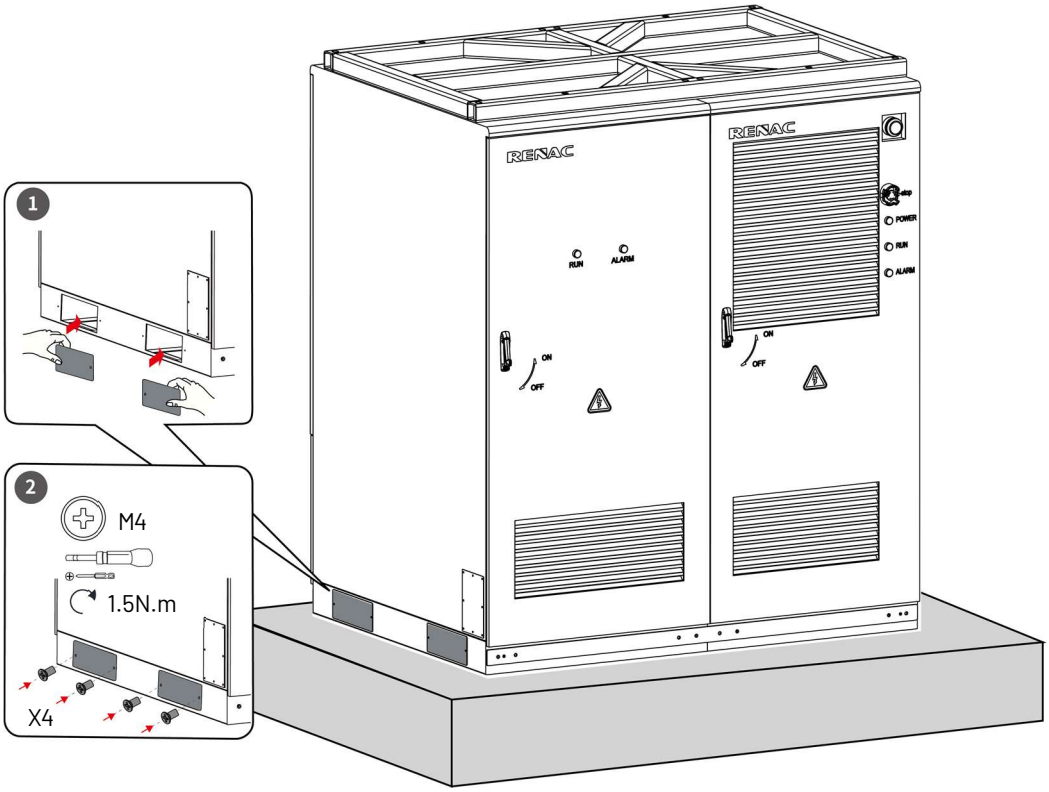


Figure 5-10

5.5 Electrical Connection

DANGER

Danger of high voltage! Danger of electric shock!

- Do not touch live parts!
- Please ensure that the AC and DC sides are not charged before installation.

Do not place the energy storage system on the surface of combustible materials.

WARNING

When performing an electrical installation, refer to the following recommendations for electrical installation:

- Check that all switches in the equipment are disconnected before wiring. Ensure that the equipment is not energized.
- Disconnect the grid switch before wiring and ensure the cable is not energized.
- To determine the correct phase sequence of the cable, you can add yellow, green, red, and black different colors of insulation sheath or marking to distinguish to prevent the phase sequence error.
- Cable terminals and copper row connections need to be compressed; screws should be selected to the right length so as not to affect the insulation and tightening.
- Lay communication and power cables as separately as possible, making sure that the cable insulation is not damaged during the laying process.
- The grounding cable must be reliably connected to the grounding copper row, and the cross-sectional area of the cable must meet the design requirements.
- All AC cables should be connected to the appropriate phase sequence after entering the device through the access holes on the bottom.
- After the wiring is completed, use fireproof mud to seal the leaks to prevent external insects and rodents from entering and damaging the equipment or cables.
- During electrical connection, bolts must be tightened strictly according to the torque described in this manual. Failure to observe the torque requirements may result in fire at the connection!

NOTICE

During the whole process of electrical connection, as well as all other operations on equipment such as integrated hybrid inverter, the following five safety rules must be observed:

Ensure that disconnection of the energy storage system does not accidentally energize it;

Disconnect all external connections to the integrated hybrid inverter and the device's internal power supply.

Ensure that the energy storage system is completely de-energized when using a multimeter.

Make the necessary grounding.

Insulate and cover potentially live parts adjacent to the operating part with insulating cloth.

5.5.1 Grounding connection

WARNING

The equipment needs to be reliably grounded, with at least two grounding points, distributed diagonally.

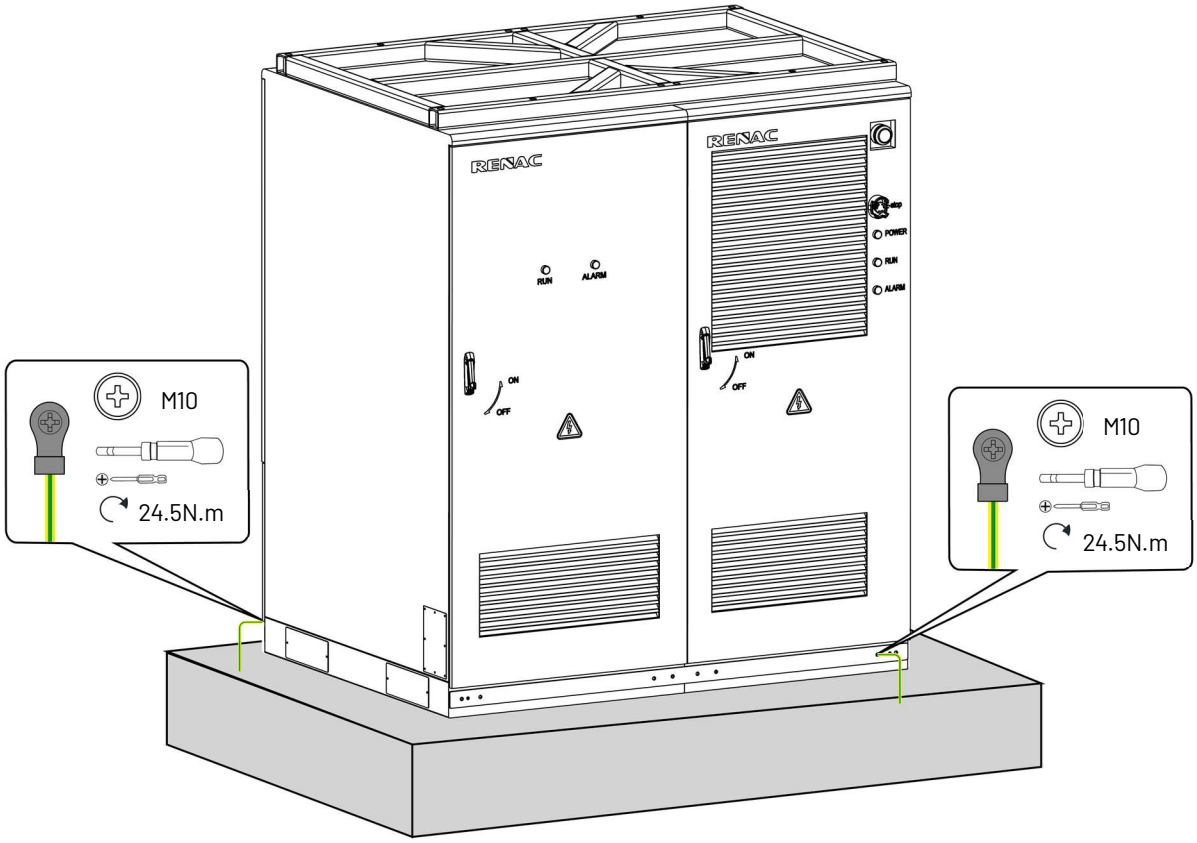


Figure 5-11

5.5.2 Electrical connection

1. Open the cabinet door before the electrical wiring. All cabinet doors open the same way.

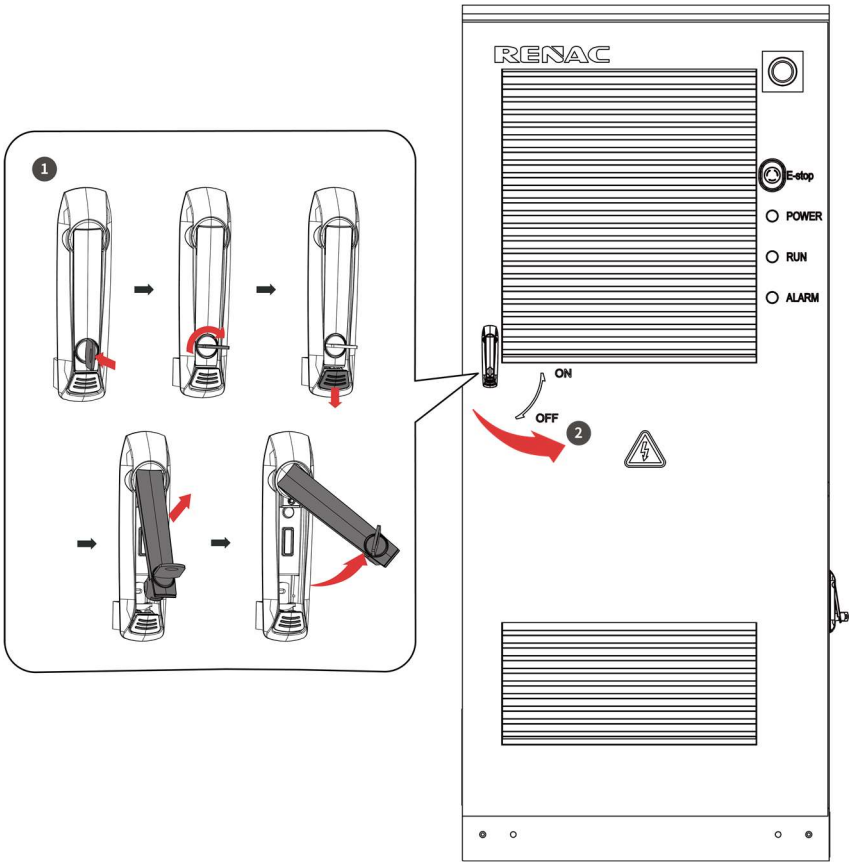


Figure 5-12

> **NOTICE**
>
> Please keep the key in a safe place after use.

2. Remove the bottom two front and rear grilles of the AC cabinet for ease of wiring.

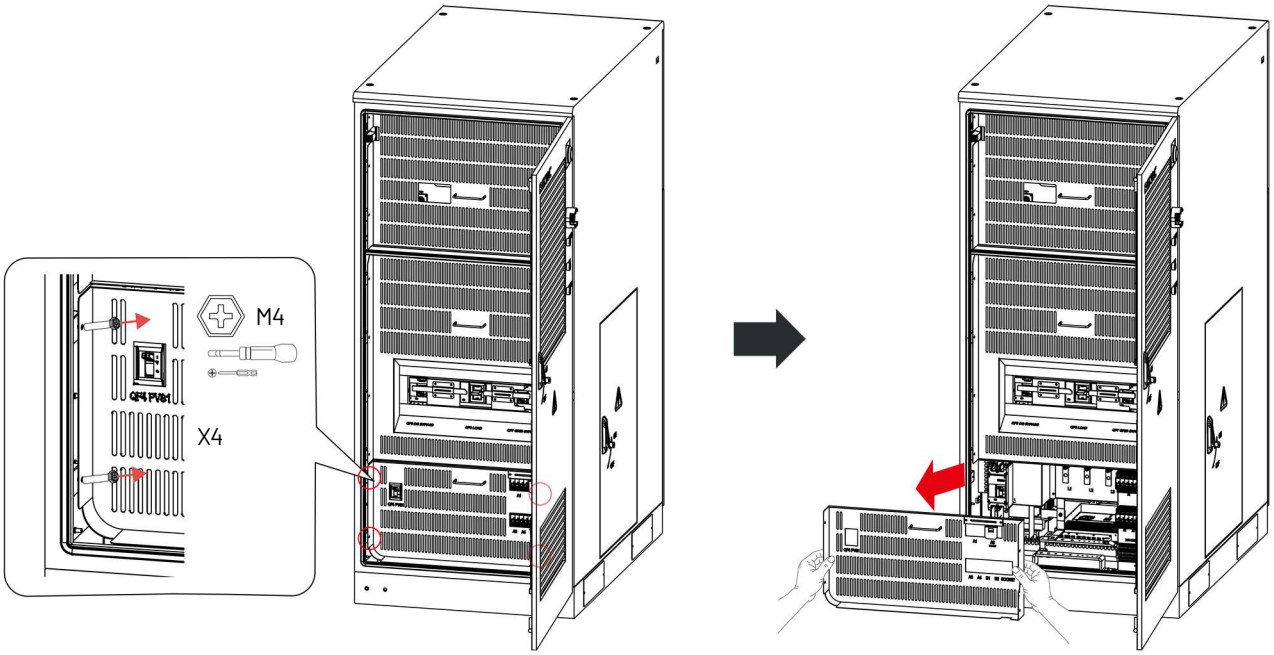
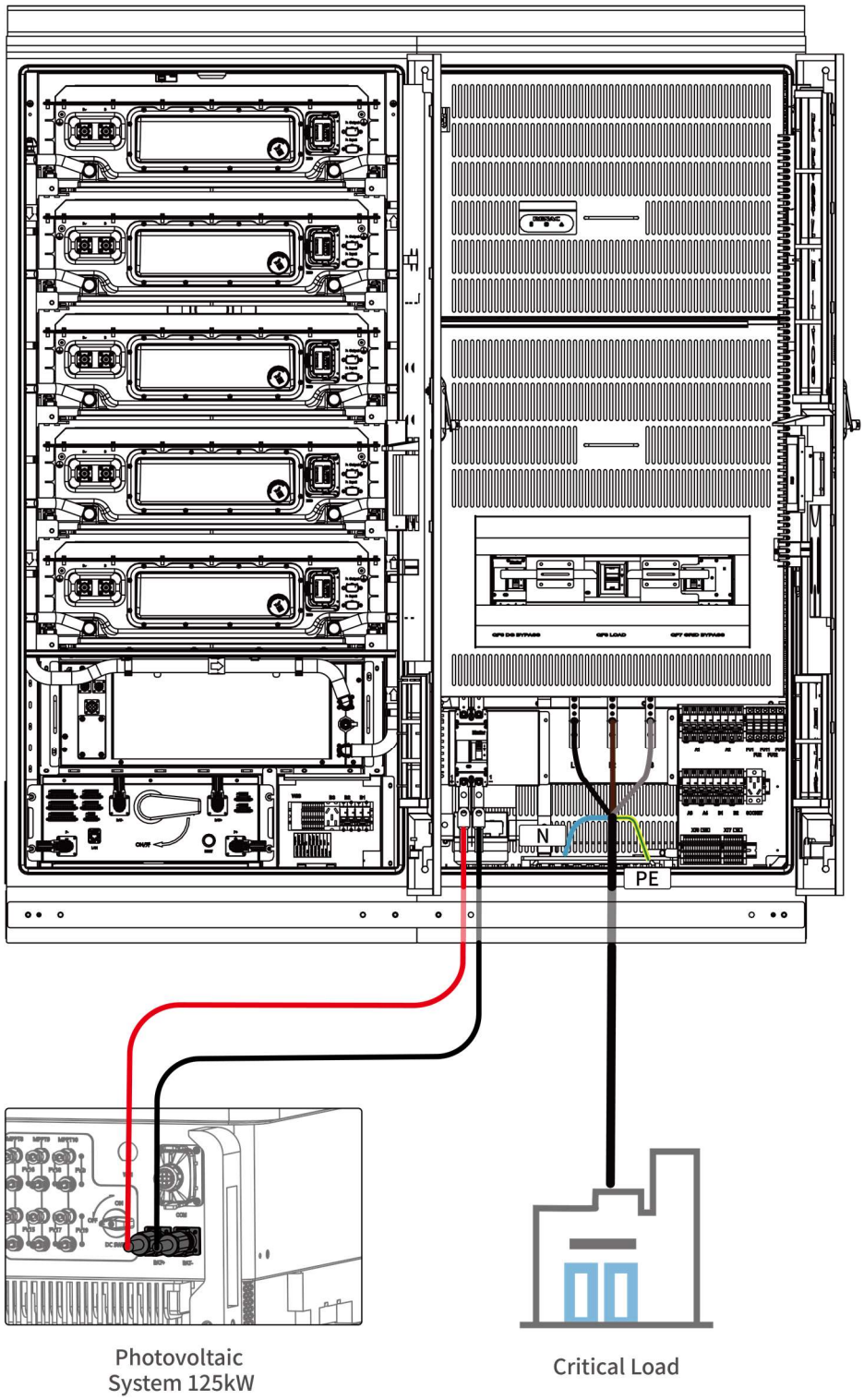


Figure 5-13

NOTICE

The steps for removing the front and back grilles are the same, the picture above shows the front as an example.

3. Make connections for PVS, load, grid, oiler, and meter communications according to the following illustrations.



Front view of RENA5000-P125B261

Figure 5-14

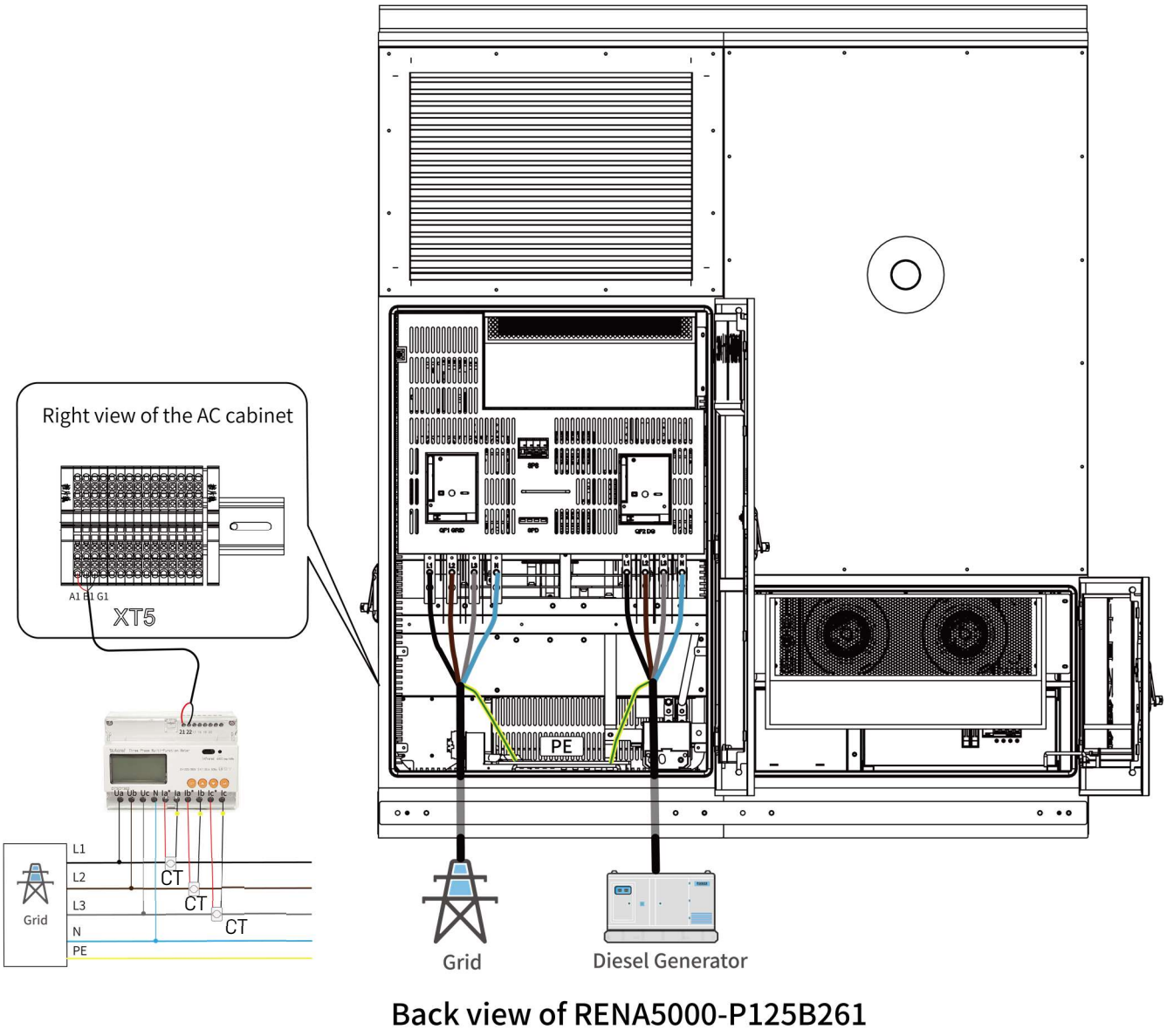


Figure 5-15

CT is not standard and has to be purchased by the customer. Recommended models are shown in the table below:

Model	Ratio (A)	Overall Dimensions (W * H * D) (mm)	Perforation Dimensions (a * e) (mm)	Accuracy class
Acre AKH-0.66/K-30x20	250 / 5	90 * 114 * 40	22*32	0.5
Acre AKH-0.66/K-60x40	350 / 5	114 * 140 * 36	42*62	0.5
Acre AKH-0.66/K-60x40	500 / 5	114 * 140 * 36	42*62	0.5
Acre AKH-0.66/K-80x40	1000 / 5	122 * 161 * 40	42*82	0.5
Acre AKH-0.66/K-100x40	2500 / 5	144 * 194 * 52	42*102	0.5

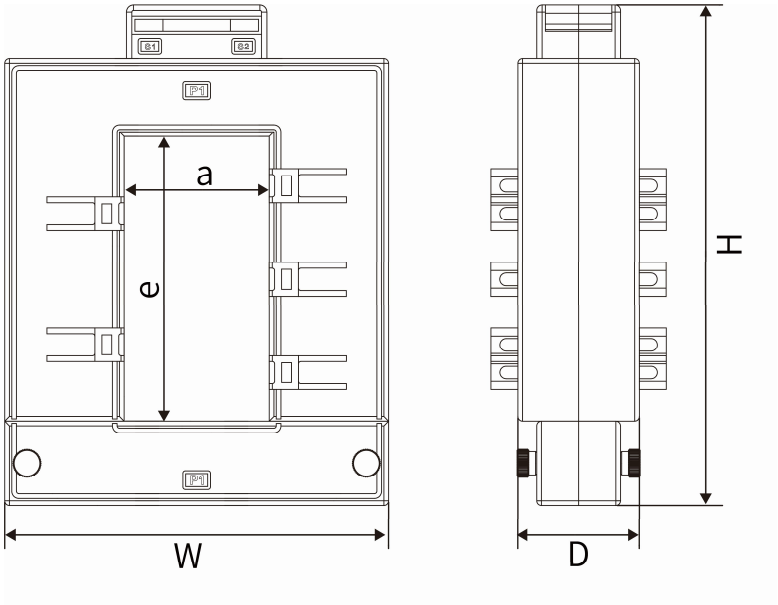


Figure 5-16

4. Install MSD on every battery pack.

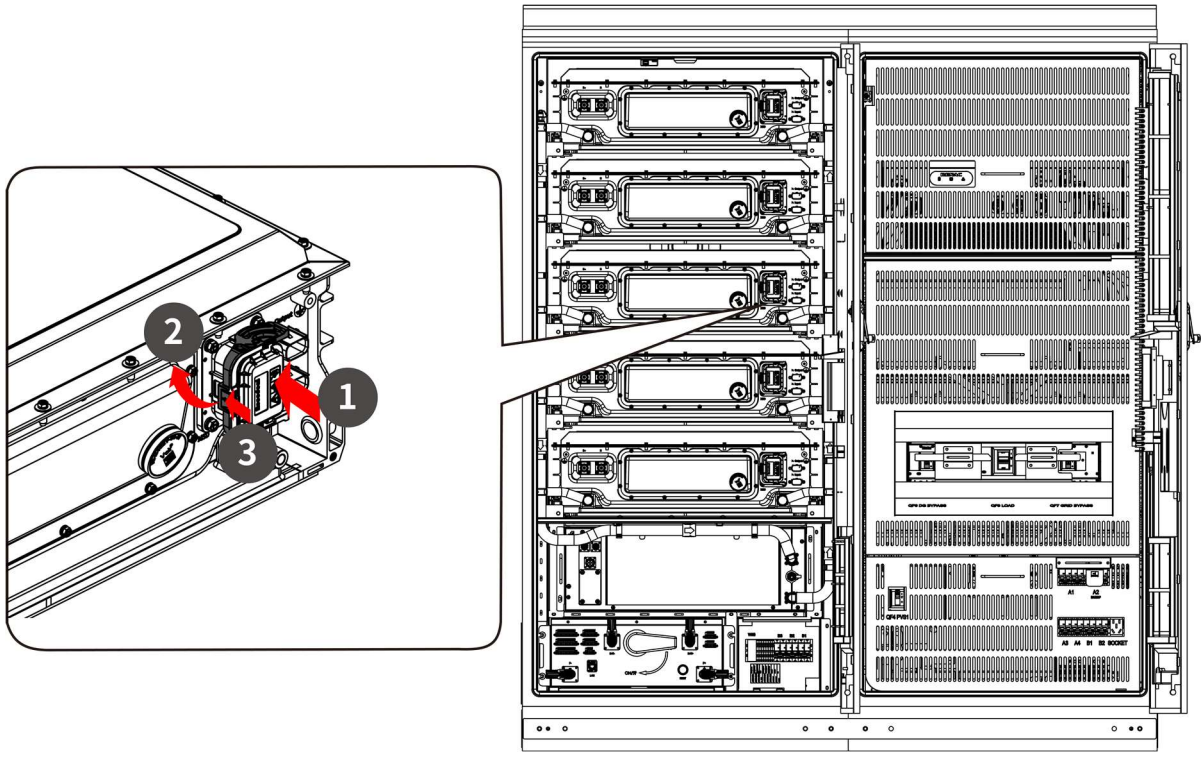


Figure 5-17

WARNING

Ensure that the QS of the PDU is in the "OFF" position before wiring.

6. Commissioning

6.1 Indicator Status

Cabinet	Indicator	Status	Description
AC cabinet		ON	The power indicator light will turn yellow when the system is connected to electricity.
		ON	The run indicator light will turn green when the system is operating normally.
		ON	The alarm indicator light will turn red when the system has faults. (Check EMS for specific fault information.)
DC cabinet		ON	The BMS goes up to high voltage normally.
		ON	BMS failures. (Check EMS for specific fault information.)

6.2 Check before Powering On

Before powering on the RENA5000, please make sure that the product has been installed following the specifications, and carry out a comprehensive and detailed inspection of the system to ensure that all indicators are in line with the requirements before powering on the system.

(1) Exterior Inspection:

- The RENA5000 is in good condition, with no damage, no rust, and no paint loss. If there is any paint loss, please carry out a paint refinishing operation.
- The RENA5000 labels are clearly visible, and damaged labels should be replaced promptly.

(2) Ground check:

- Box with a grounding point and grounded firmly, the box grounding conductor is reliably connected to the box grounding copper row.

(3) Cable check:

- The cable protection is well-wrapped with no visible damage.
- The terminals are made following specifications and are connected firmly and reliably.
- Each cable is clearly labeled at both ends. The alignment meets the principle of separation of strong and weak power, leaving a margin at the turn, and shall not be strained.
- Cable mounting bolts have been tightened, and cable pulling without loosening, and cable crossing hole blocking has been completed.

(4) Copper row check:

- There is no obvious crack or deformation of the copper rows, the screws are tight at the lap joints, the scribe marking is not misplaced, and there is no debris on the copper rows.

(5) Component check

- The breakers are all in the open position.

6.3 Power On

1. RENA5000-P125B261 power-on procedure:

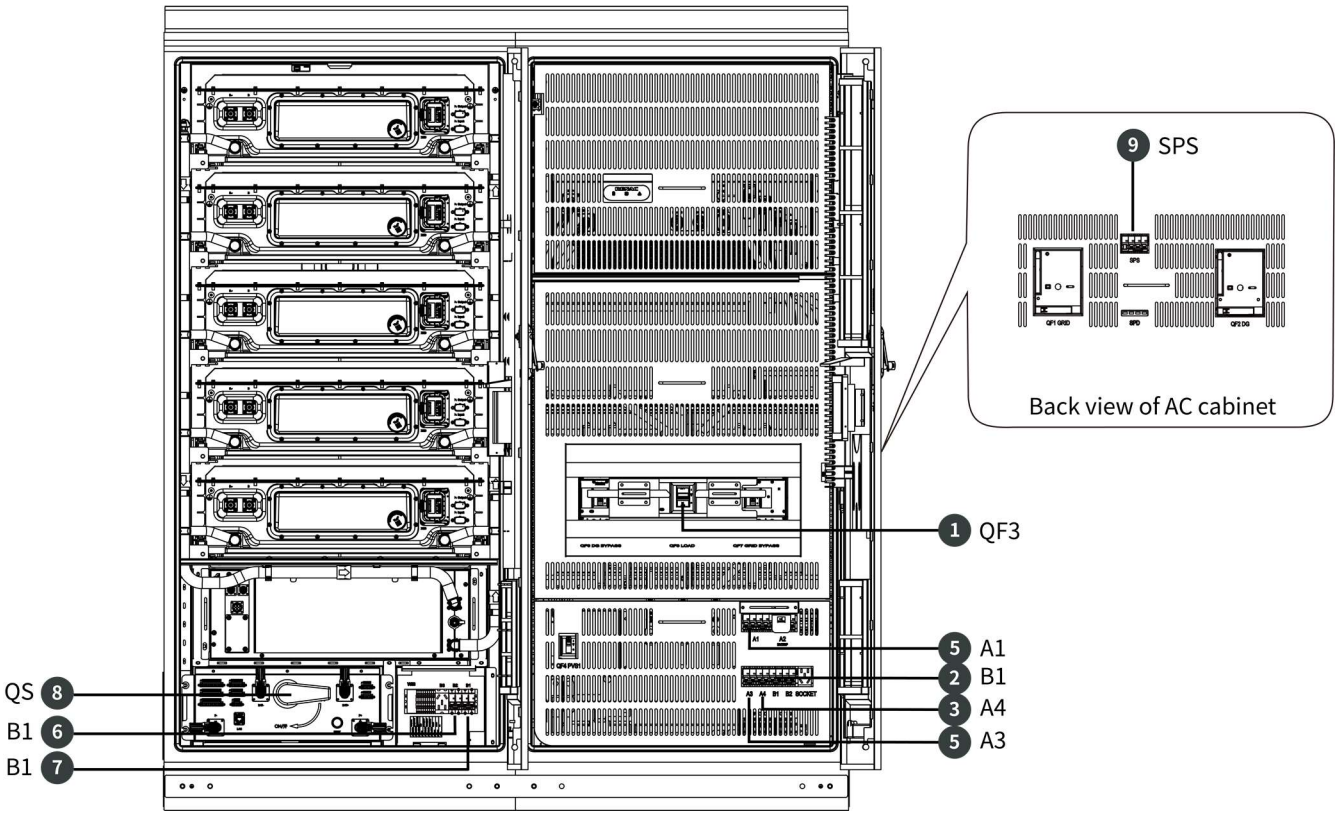


Figure 6-1

WARNING

Users must first switch on the lightning protection breaker (SPS).

2. RENA5000-P250B522 power-on procedure:

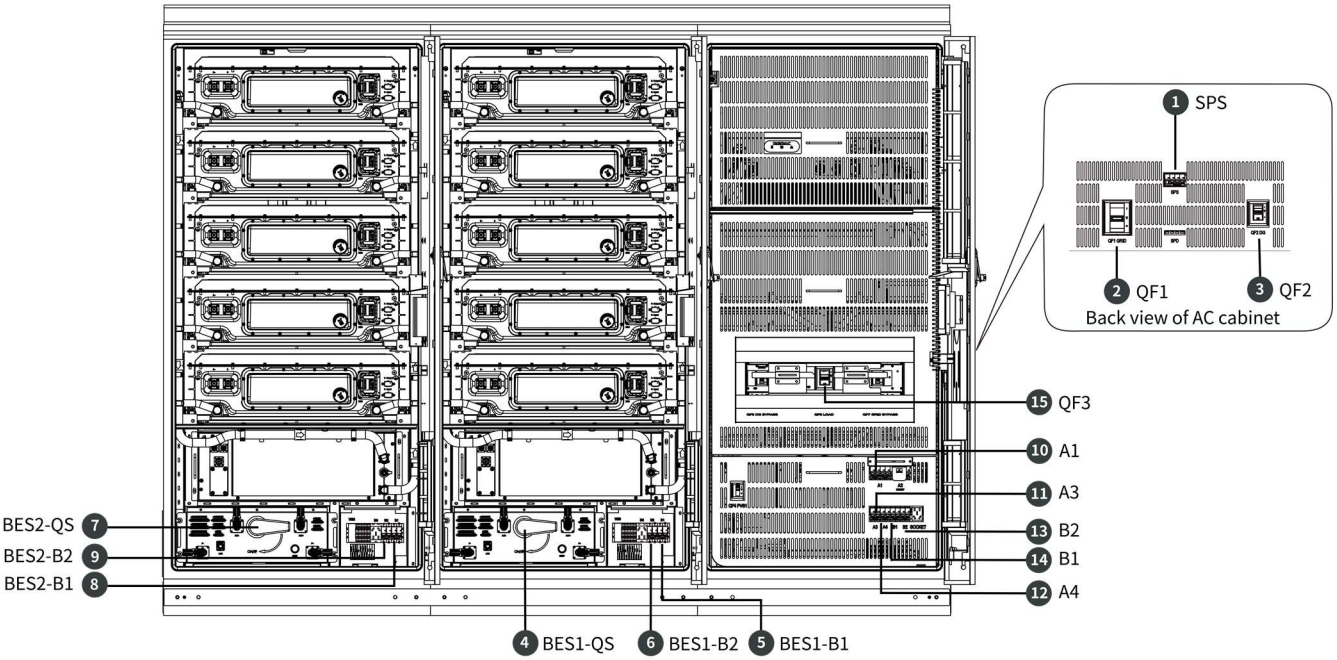


Figure 6-2

6.4 Power Off

1. RENA5000-P125B261 power-off procedure:

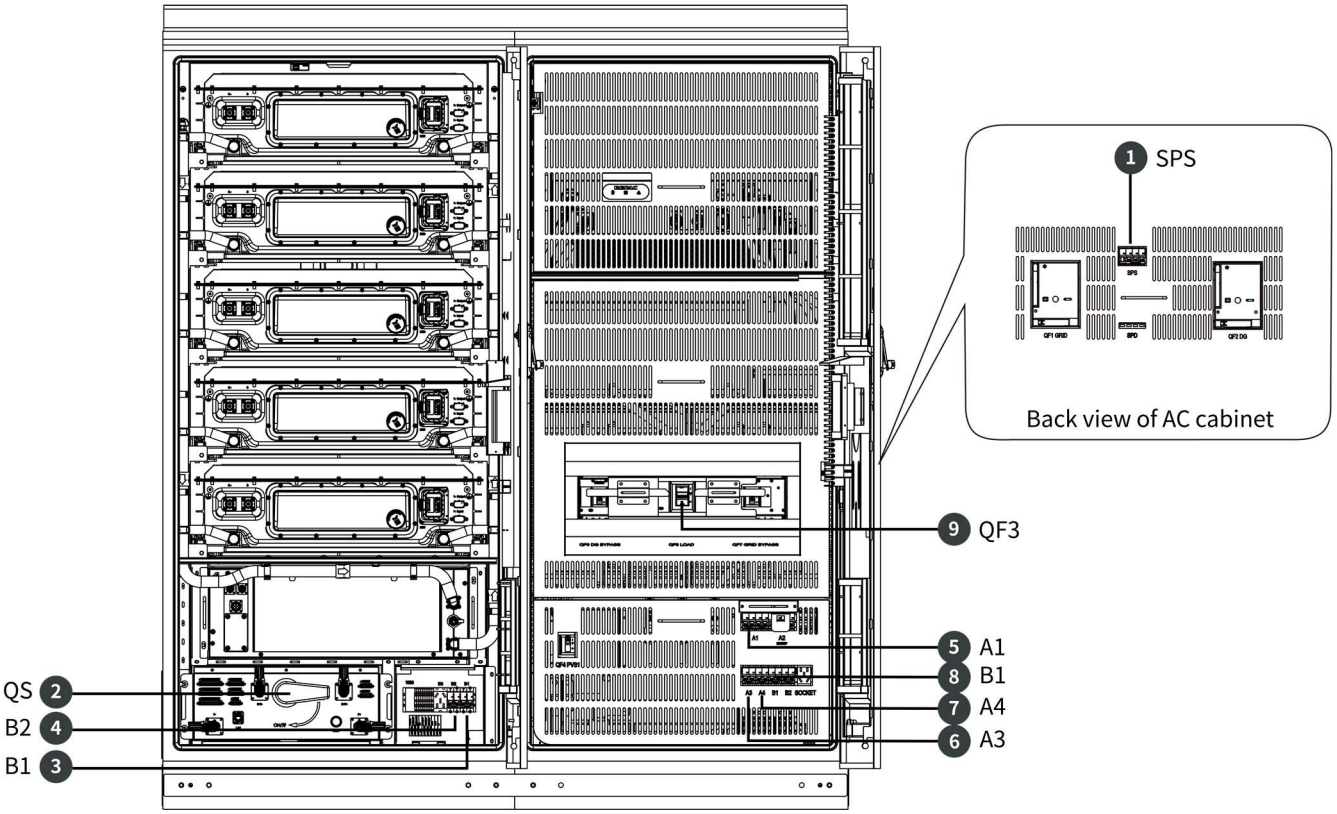


Figure 6-3

2. RENA5000-P250B522 power-off procedure:

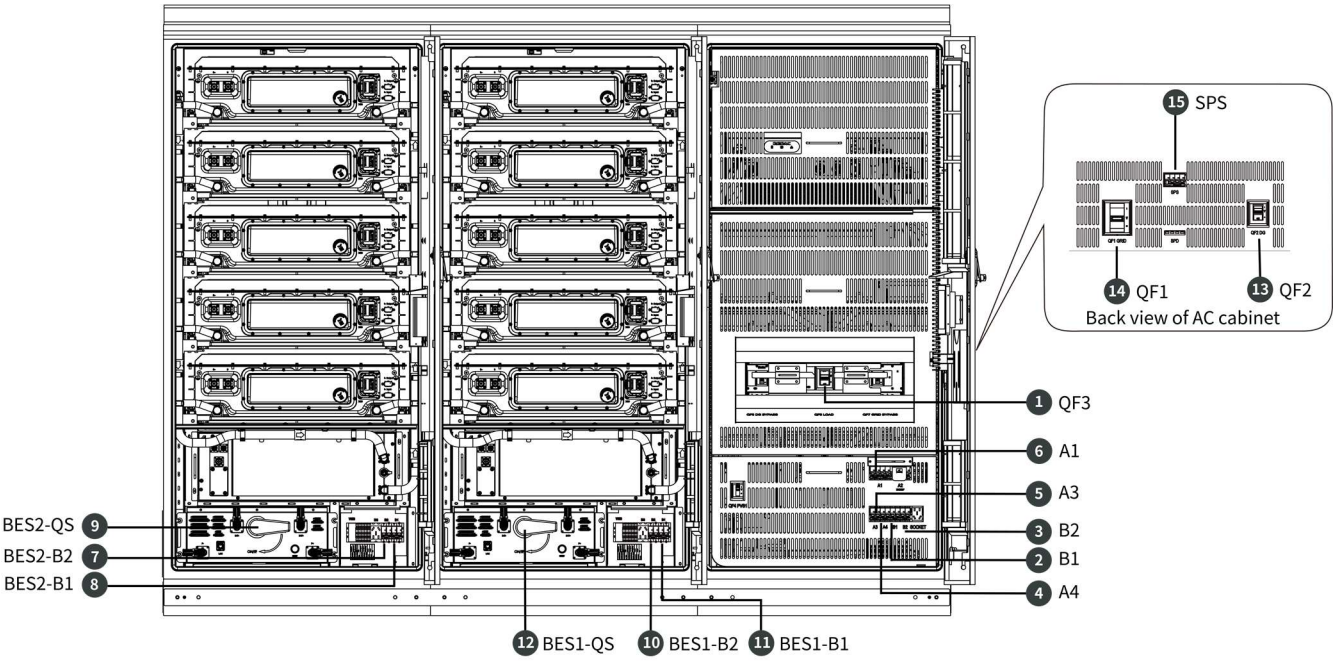


Figure 6-4

6.5 Emergency Shut Down

When there is a malfunction of the product or a critical situation that requires emergency shutdown, you can perform the following emergency shutdown operations:

1) Press the emergency shutdown button "Emergency stop".
2) Reset the Emergency stop button after determining that the fault or hazard is cleared.

7. Operation and Handling

This chapter mainly introduces the EMS operation screen. Users can execute various operation commands through the small computer in the AC cabinet, conveniently browse the DC, AC, and system operation-related parameters and data, and obtain the current equipment status and real-time alarm information in a timely manner, which provides a reliable basis for troubleshooting. In addition, the small computer can also display the system software version information and upgrade the software of each component through the U disk.

7.1 Introduction of Menu Interface

1. There are seven submenus in the menu that can be selected for relevant setting operations.

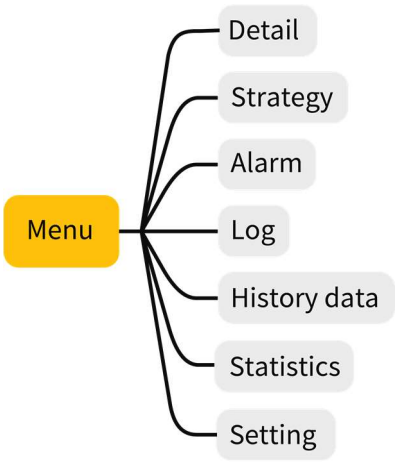


Figure 7-1

Open the EMS energy management system, the home page can display energy information and fault information. Click 'Enter System' in the upper left corner to set up the system.

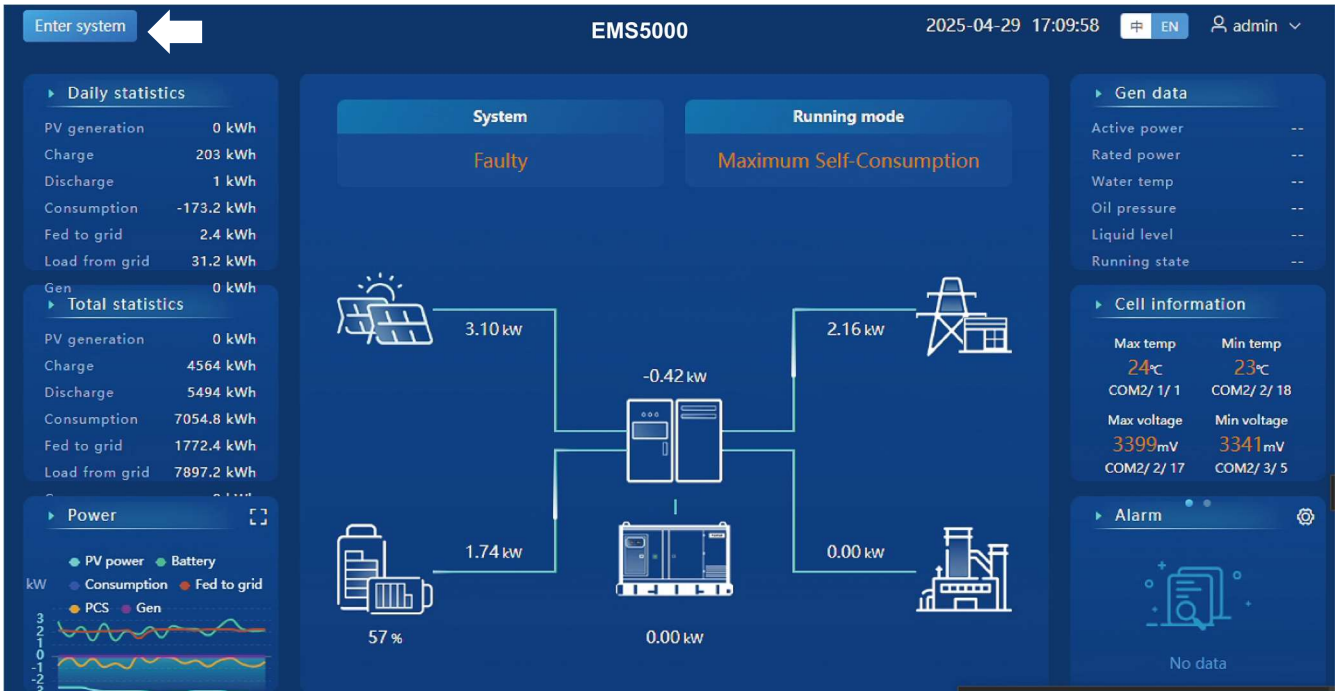


Figure 7-2

(1) Detail: Displays the operating status of the system and the charging/discharging graph of the day. There are six data that can be displayed: PCS data, PVS data, BMS data, STS data, meter data, and I/O data.

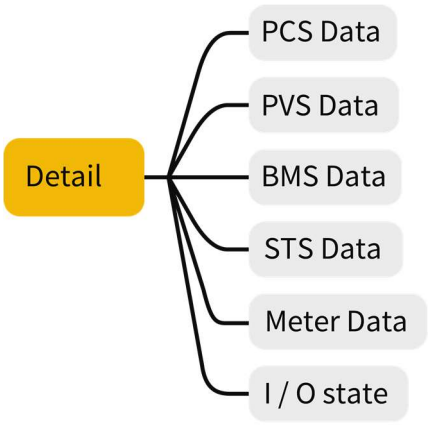


Figure 7-3

Figure 7-4

(2) Strategy management: The RENA5000 has three strategies for meeting the various needs of the user: manual mode, auto mode, and agency mode.

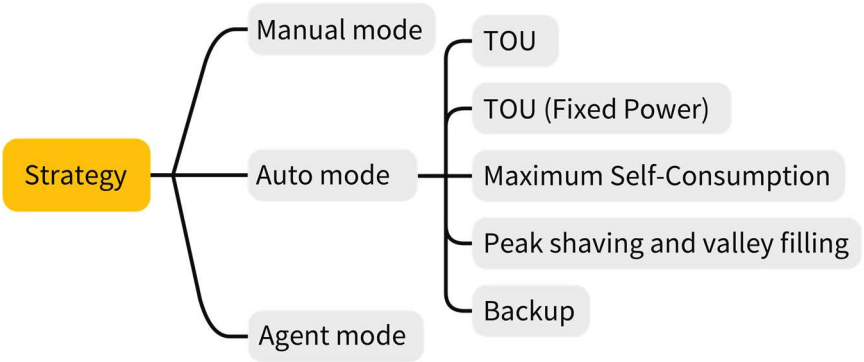


Figure 7-5

Manual mode: Users can set the output power manually in this mode. This mode is only used for post-installation debugging.

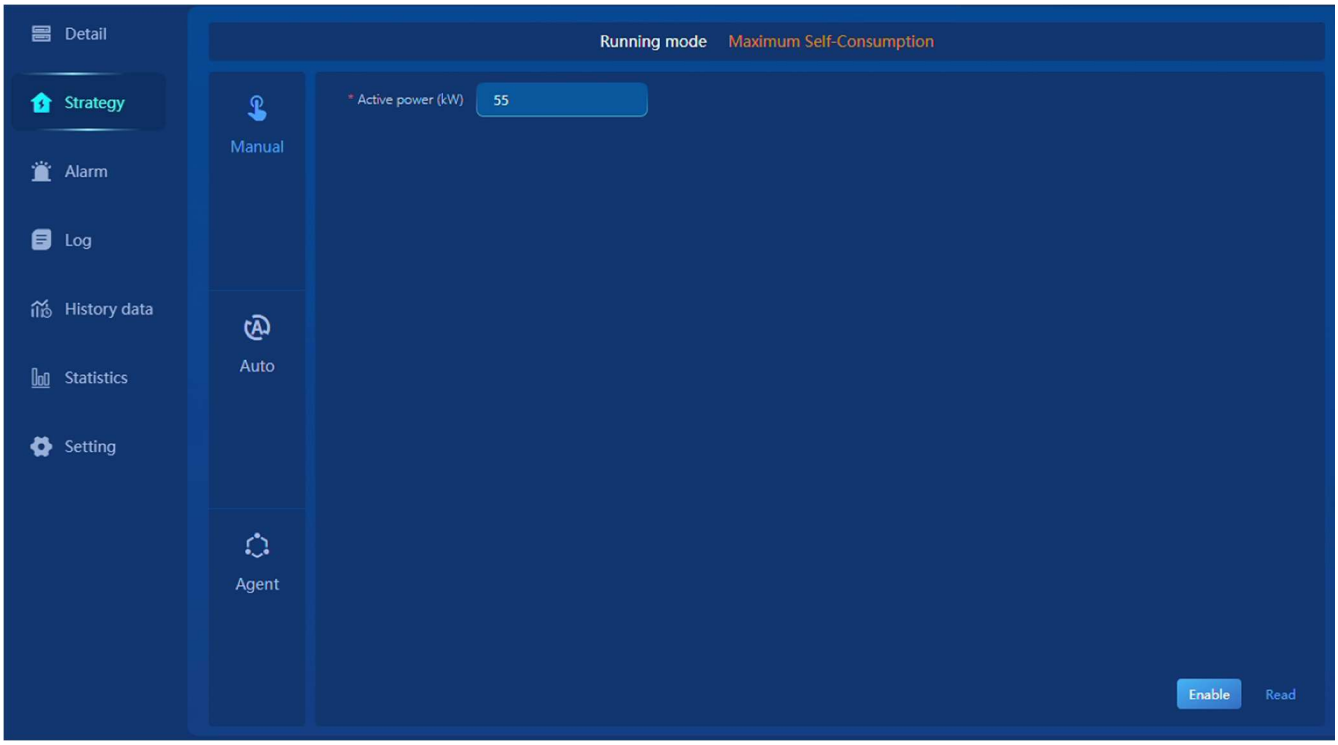


Figure 7-6

Auto mode: This mode allows you to set five different modes: TOU mode, TOU (fixed power), Maximum Self-Consumption mode, Peak shaving and valley filling mode, and Backup mode.

- TOU mode: Users can set different time periods for charging or discharging the system and set the maximum charging and discharging power values.

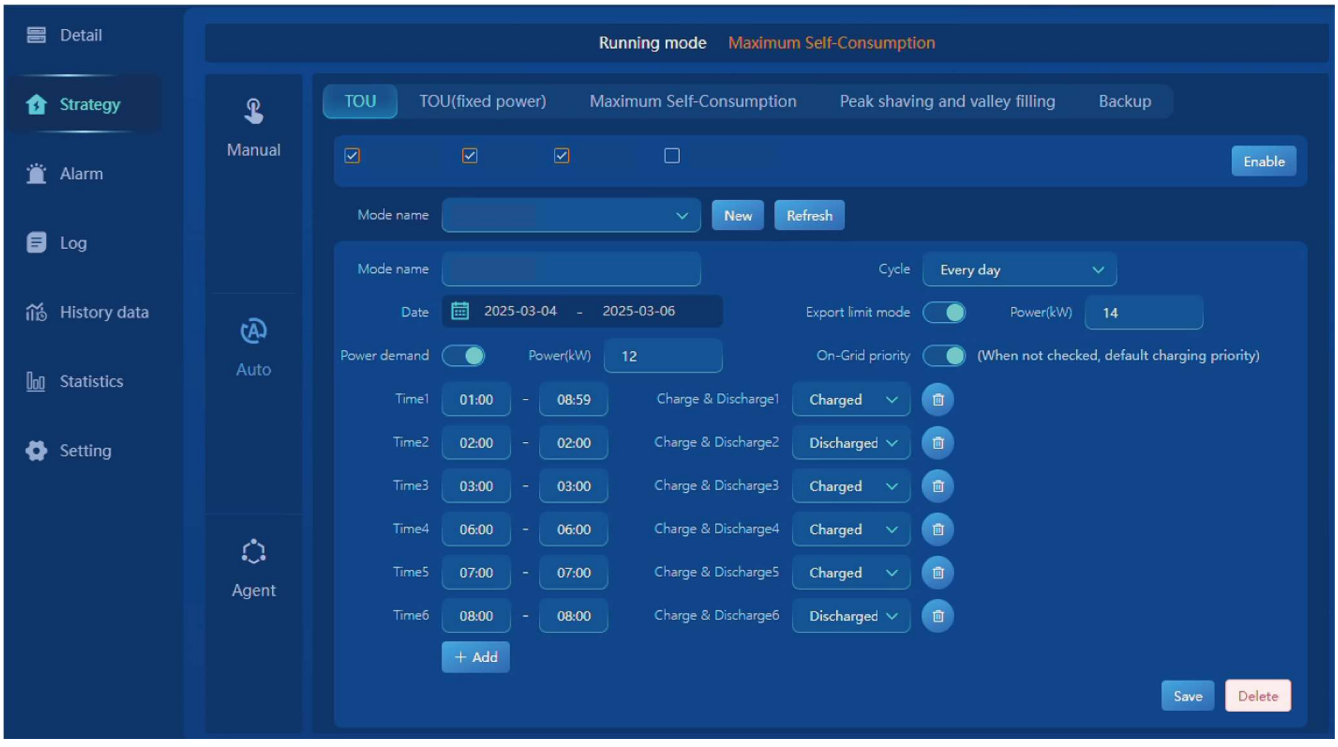


Figure 7-7

Charge/ discharge window	Charging priority	Injecting priority
Discharge	The energy storage system is discharged. PV power priority: Load -> Battery -> Grid Load consumption priority: PV power -> Battery -> Grid	Energy storage systems can be discharged. PV power priority: Load -> Grid -> Battery Load consumption priority: PV power -> Battery -> Grid
Charge	The energy storage system is charged only. PV power priority: Battery -> Load -> Grid Load consumption priority: PV power -> Grid	The energy storage system is charged only. PV power priority: Battery -> Load -> Grid Load consumption priority: PV power -> Grid
Neither	The energy storage system cannot be discharged, and charged from the grid. PV power priority: Load -> Battery -> Grid Load consumption priority: PV power -> Grid	The energy storage system cannot be discharged, and charged from the grid. PV power priority: Load -> Grid -> Battery Load consumption priority: PV power -> Grid

- TOU mode (fixed power): This model is suitable for areas with large tariff differences and where there is no metered access. Users can set different charging and discharging time periods and set fixed charging and discharging power values. For example, charging during low tariff hours and discharging during high tariff hours.

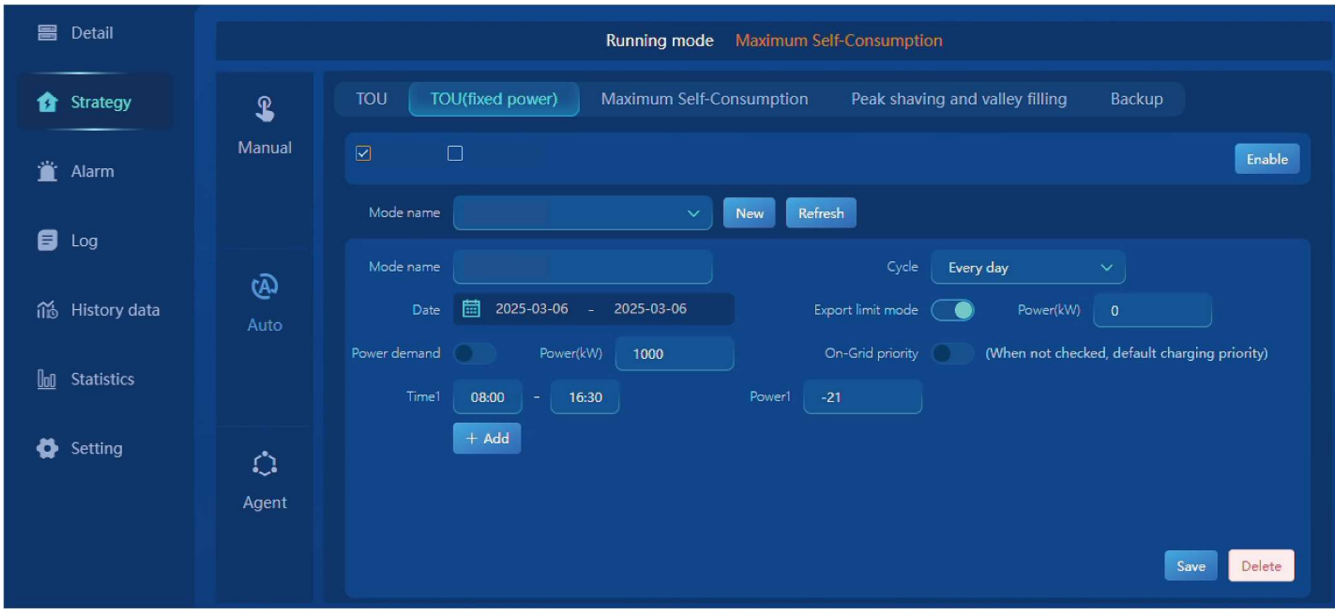


Figure 7-8

- Maximum Self-Consumption mode: This mode is applicable to the areas with low subsidies and high electricity prices. The PV power is prioritized for use by the load, the excess PV power is charged to the energy storage, and if the energy storage is full or fully charged, the excess PV power is fed into the grid. The grid cannot charge the storage, but it can supply power to the load.

  PV power priority: Load -> Battery -> Grid

  Load consumption priority: PV power -> Battery -> Grid

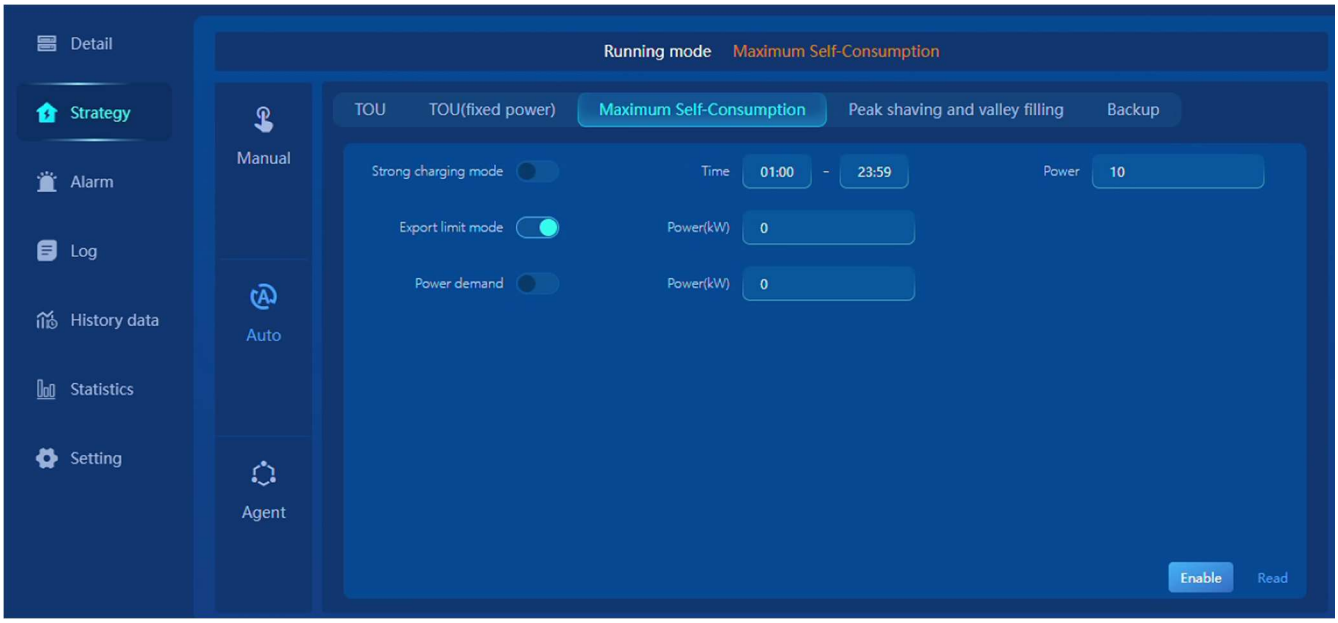


Figure 7-9

- Peak shaving and valley filling mode: This mode applies to the area where the grid system needs to balance the load. In this mode, the energy storage system ensures that the battery is charged during the valley period and discharged during the peak period. When the setting reaches a certain SOC value, the system starts to force charging for a set period of time.

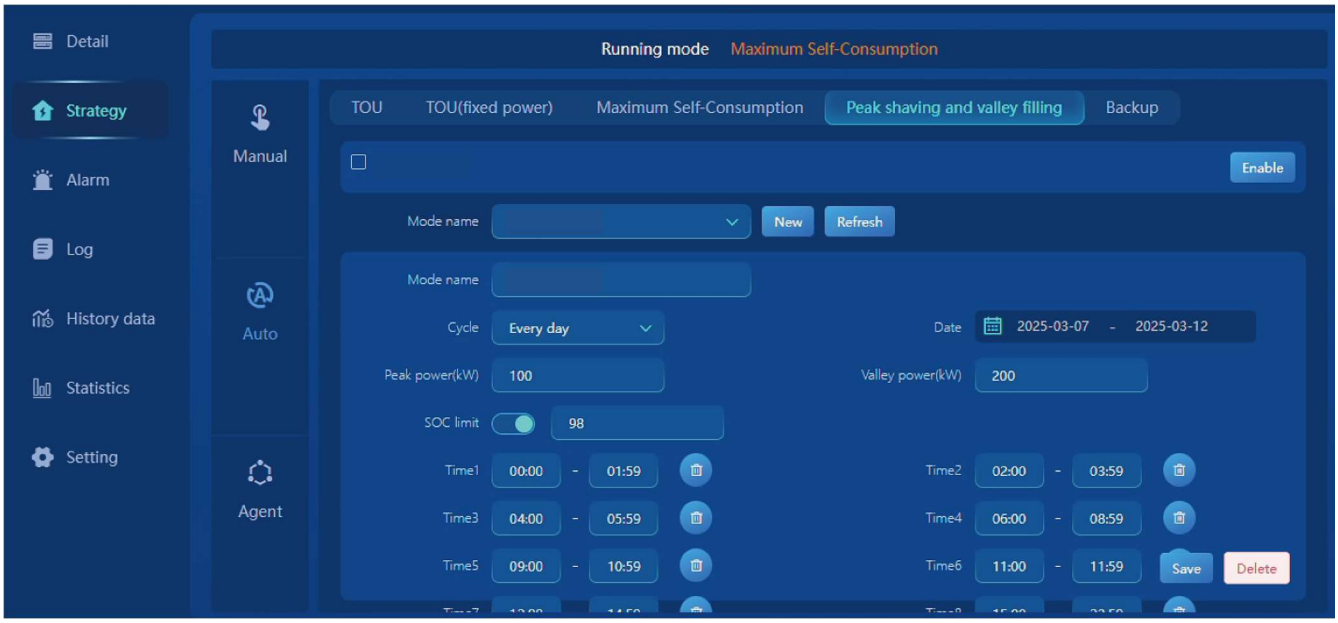


Figure 7-10

- Backup mode: It is suitable for areas with frequent power outages. When the grid is off, the battery is used as backup power to supply load. Under this mode, when the grid is on, the battery will be in a charging state during charge time and will not be discharged. When the grid is off, the battery will be discharged to supply load. The energy storage system will connect to the grid automatically when the grid restores.

  PV power priority: Battery -> Load -> Grid

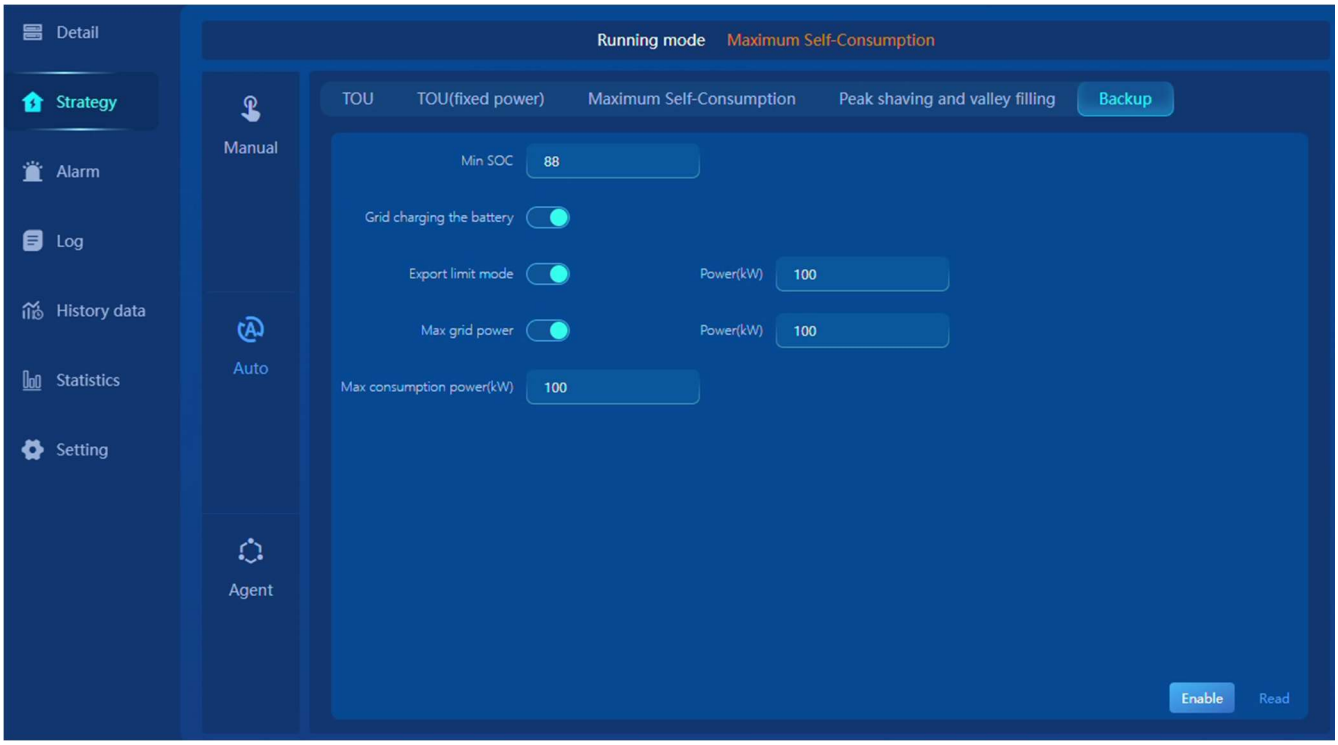


Figure 7-11

- Agent mode: In this mode, a third party manages the energy storage system on behalf of the customer.

8. Routine Maintenance and Warranty

WARNING

There is a deadly high voltage inside the cabinet equipment of the integrated hybrid inverter, and there is a risk of fatal electric shock if accidentally touched.

The energy storage system must be switched off before maintenance, wait 10 minutes, and then open the cabinet door. It is important to ensure that the unit is fully energized internally before carrying out maintenance.

Only qualified and authorized personnel can perform maintenance and other operations.

8.1 Routine Maintenance

There are a number of potential problems that can occur during system operation due to ambient temperature, humidity, dust, vibration, and aging of the inverter's internal components. In order to enable the energy storage system to operate in a long-term and stable manner, it is necessary to arrange for regular inspections by maintenance personnel, according to Table 9-1, so as to identify and deal with problems in a timely manner. Quarterly maintenance is recommended for systems installed in sandy, dusty, salt-fogged, or heavy industrial parks, and semi-annual maintenance is recommended for energy storage systems in areas with favorable climatic conditions.

8.2 Warranty

As long as the product is in the warranty period, where the quality of the product itself leads to failure, Renac Power Technology Co., Ltd. allows customers to carry out free repair or replacement products. Users shall reserve a reasonable response time for the Company's repairs, and the Company shall handle the replacement. Users must present proof of purchase of the product and ensure that the product logo is visible. Otherwise, the Division reserves the right not to warranty.

8.3 Firefighting Instructions

In the event of a fire in the energy storage system, the following measures are recommended for on-site personnel:

- In the event of a fire, evacuate the building or equipment area and press the fire alarm, call the fire alarm immediately, notify professional firefighters, and provide them with relevant product information (battery pack type, system capacity, etc.).
- In any case, re-entry into the area of the burning building or equipment, opening of the energy storage system door, and the approach of uninvolved persons are prohibited.
- After calling the fire alarm, on-site personnel remotely power down the system under conditions that will ensure their safety.
- Wait for professional firefighters to confirm that the fire is extinguished, and then let them handle the situation. It is forbidden to open the door of the energy storage system privately.

8.4 Disclaimer

In the following cases, we have the right not to carry out the warranty but can still provide paid repair services.

The product is out of warranty.

Users cannot provide proof of purchase of the product.

Damage caused during transport, loading, and unloading.

Damage caused by incorrect installation, modification, or dismantling by unauthorized personnel.

Damage caused by operation under abnormal conditions of use or environment.

Failure or damage to the machine caused by the use of non-Renac parts or software.

Failure or damage caused by fire, earthquake, flood, and other irresistible factors.

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