VAULT 50 AIO system 30kW 50kWh

Installation Manual

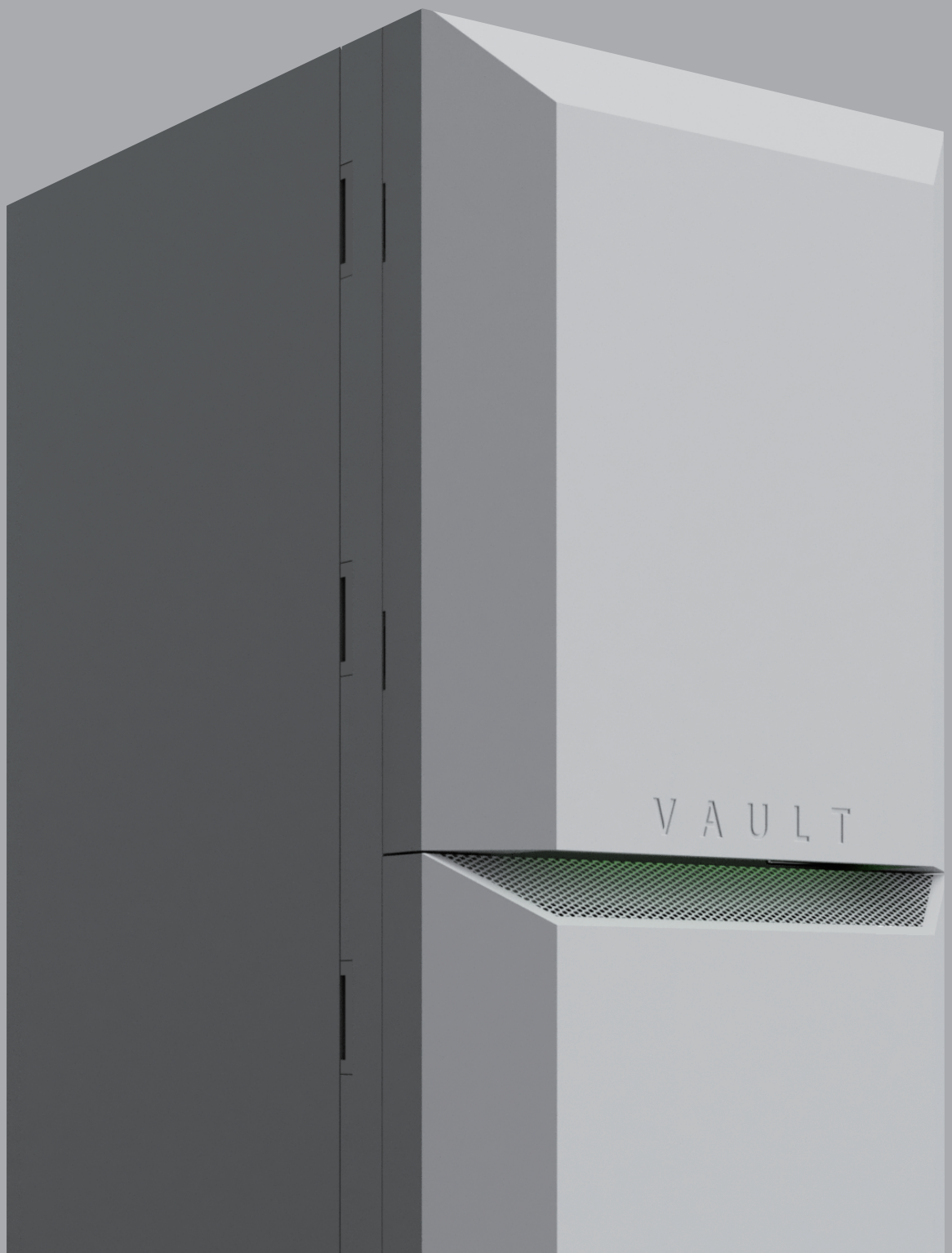


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1 Datasheet

AIO System Specification	
Cabinet Size	L700*W995*H2070mm
Weight(include 10 batteries and inverter)	Around 840kg
IP Rating	IP54
Operating Temperature	-20~60°C
Altitude	<4000m, 2000m derating
Cooling	Intelligent air conditioner
Installation Method	Floor-mounted

Battery Specification	
Cell Chemistry	LiFePO4
Capacity	5.12kWh per battery, max 51.2kWh
Nnominal Voltage	51.2V per battery, max 512V
Max. Charge/Discharge Current	80A
Certification	UN38.3 / IEC62619 / IEC62477 / CE
Life Cycles	6000+

PV Specification	
Max. PV Arry Power	19.2kW + 19.2 kW
Max. PV voltage	850V
PV Start-up Voltage	250V
MPPT Range	200V-800V
PV Input Current	32A+32A

AC Specification [On-grid]	
Rated AC Power	30kVA
Rated Current	43.5A
Rated Grid Voltage Range	400V / 230V
Grid Voltage Range	-20%~15%
Grid Frequency/Range	50Hz(47Hz~52Hz) or 60Hz(57Hz~62Hz)
Total Current Harmonic Distortion THDi	<3%
Power Factor	-1 ~ 1

AC Specification [Off-grid]	
Rated Output Power	30kVA
Max. Output Power	33kVA
Rated Output Current	43.5A
Max. Output Current	48A
Rated Voltage	400V / 230V
Output Voltage Harmonics	<3%(resistive load)
Unbalance	100%
Frequency Range	50/60Hz

2 Precautions

The Vault 50 systems offer many benefits, such as improved efficiency and reduced emissions. It is essential to take certain precautions to ensure safety. Here are some general precautions for using Vault 50 system:

1. Always follow Voltsmile's instructions and guidelines for using and maintaining the battery system.

2. Wear appropriate personal protective equipment, such as insulated gloves and safety glasses, when working with battery systems.

3. Ensure that the battery system is installed correctly and grounded and that all electrical connections are secure.

4. Do not attempt to disassemble or modify the battery system, as this can result in electric shock or other serious injuries.

5. If the battery system is damaged or shows signs of malfunction, such as leaking or swelling, stop using it immediately and seek professional assistance.

6. Avoid exposing the battery system to extreme temperatures or environmental conditions that could cause damage or degradation.

7. Always turn off the power supply before connecting or disconnecting the battery system, and never touch the electrical contacts with bare hands or metal tools.

These precautions ensure that battery systems are used safely and effectively in various applications.

2 Precautions

Installation Environment

- Do not install the equipment in a smoky, flammable, or explosive environment.
- Avoid exposing the equipment to direct sunlight, rain, standing water, snow, or dust. It is suggested to install the equipment in a sheltered place. Take preventive measures in operating areas prone to natural disasters such as floods, mudslides, earthquakes, and typhoons.
- Do not install the equipment in an environment with strong electromagnetic interference.
- The temperature and humidity of the installation environment should meet equipment requirements.
- The equipment should be installed in an area that is at least 500m away from corrosion sources that may result in salt damage or acid damage. Corrosion sources include but are not limited to seaside, thermal power plants, chemical plants, smelters, coal plants, rubber plants, and electroplating plants.

Installation Location

- Do not tilt the equipment or place it upside down. Ensure that the equipment is horizontally installed.
- Do not install the equipment in areas easily accessible to children.
- Do not install the equipment in a place with fire hazards or is prone to moisturizing.
- The equipment produces sound when it is operating. Please install the equipment in a place with appropriate distance at which there is no impact to daily work and life.
- Do not install the equipment in a sealed, poorly ventilated location without fire protection measures and inaccessible for firefighters.
- The equipment is hot when it is operating, please ensure good indoor ventilation.
- Do not install the equipment in mobile scenarios such as recreational vehicles, cruise ships, and trains.
- It is recommended to install the equipment in a location where you can easily access, install, operate, and maintain it, and view the indicator status.
- Do not place the equipment in the vehicle passage when installed in a garage to avoid collisions

2 Precautions

CAUTION!

THIS SYSTEM CONTAINS
LITHIUM-ION BATTERY

WARNING:

Installation and maintenance should only be carried out by trained professionals. We do not undertake any consequences or related responsibility because of violation of safety operation or violation of design, production and equipment safety standards.

CAUTION:

1. It is required to charge the battery at least once every six months. For this charge, maintenance ensures the SOC is higher than 90%.
2. The connection of the power connector, grounding point, power cable and screw are suggested to be checked yearly. Ensure there is no loose, broken, or corrosion at the connection point. Check the installation environment, such as dust, water, insect and more.
3. If the battery is stored for a long time, it must charge every six months, and the SOC should be higher than 90%.



In case a battery (normal condition or damaged) needs disposal or needs recycling, it shall follow the local recycling regulation (i.e. Regulation (EC) Number 1013/2006 among European Union) to process and use the best available measures to achieve relevant recycling efficiency.

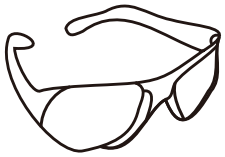
3 Pre-installation inspection:

Check the personal protective gears and installation tools to make sure they are complete; if not, please replace them.

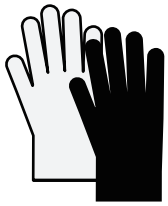
Protective Equipment



Safety hat



Goggles

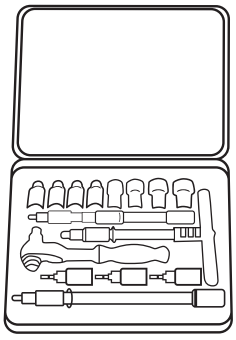


Protective gloves



Insulating shoes

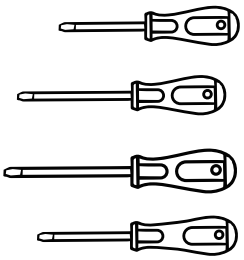
Installation Tool



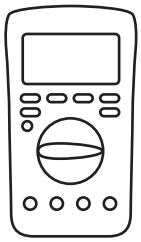
Insulation sleeve set



Torque socket wrench



Insulation screwdriver set



Multimeter

4 Transport and storage

5.1 Transportation

1 Preventive Measures

Failure to follow the shipping and storage instructions outlined in this manual may result in the voiding of the product warranty.

2 Transportation Methods

It can be transported by cars, trains and ships.

5.2 Transportation Requirement

The following conditions must be met when transporting the BESS:

- Ensure that all doors are securely locked.
- Select a suitable crane or lifting device based on site conditions. The lifting equipment must have adequate load-bearing capacity, boom length, and rotation radius..
- If transportation involves a slope, additional traction may be required.
- Remove any existing or potential obstacles along the transportation path, such as tree branches or overhead cables.
- Transport and relocation should only be carried out under favorable weather conditions.
- Set up warning signs or cordon off the lifting area to prevent unauthorized personnel from entering and to avoid accidents.
- When transporting by road, secure the equipment to the vehicle using ropes fixed to the top lifting rings to prevent excessive tilting during transit.

The battery products should be transported after packaging and during the transportation porocess, severe vibration, impact, or extrusion should be prevented to prevent sun and rain. It can be transported using vehicles such as cars, trains, and ships.

Always verify and comply with all applicable local, national, and international regulations before transporting lithium iron phosphate ($LiFePO_4$) batteries.

The transportation of end-of-life, damaged, or recalled batteries may be subject to specific restrictions or prohibitions, depending on the circumstances.

Lithium-ion batteries are classified as hazardous materials under UN3480, Class 9. For transportation by sea, air, or land, they fall under Packaging Instruction 965, Section I.

Class 9 Miscellaneous Dangerous Goods and UN identification labels must be used when transporting lithium-ion batteries classified under Class 9. Always refer to the relevant transportation documentation for detailed requirements.



Class 9 Miscellaneous Dangerous Goods and UN Identification Label

5.3 Storage requirement

- To prevent moisture accumulation during the rainy season, or potential water ingress from rain at the bottom, the BESS should be placed on elevated ground.
- The container base should be raised appropriately based on site-specific conditions. The exact height should be determined with reference to the site's geological and weather characteristics.
- Ensure the system is stored on dry, level, and stable ground with sufficient load-bearing capacity and free from any vegetation.
- Before placing the BESS in storage, confirm that the door is properly locked.
- Storage ambient temperature:-30°C~60°C, recommended storage temperature:-30°C~25°C.

Notice : To extend battery lifespan, maintain the storage temperature of the battery module within a range of 0°C and 35 °C

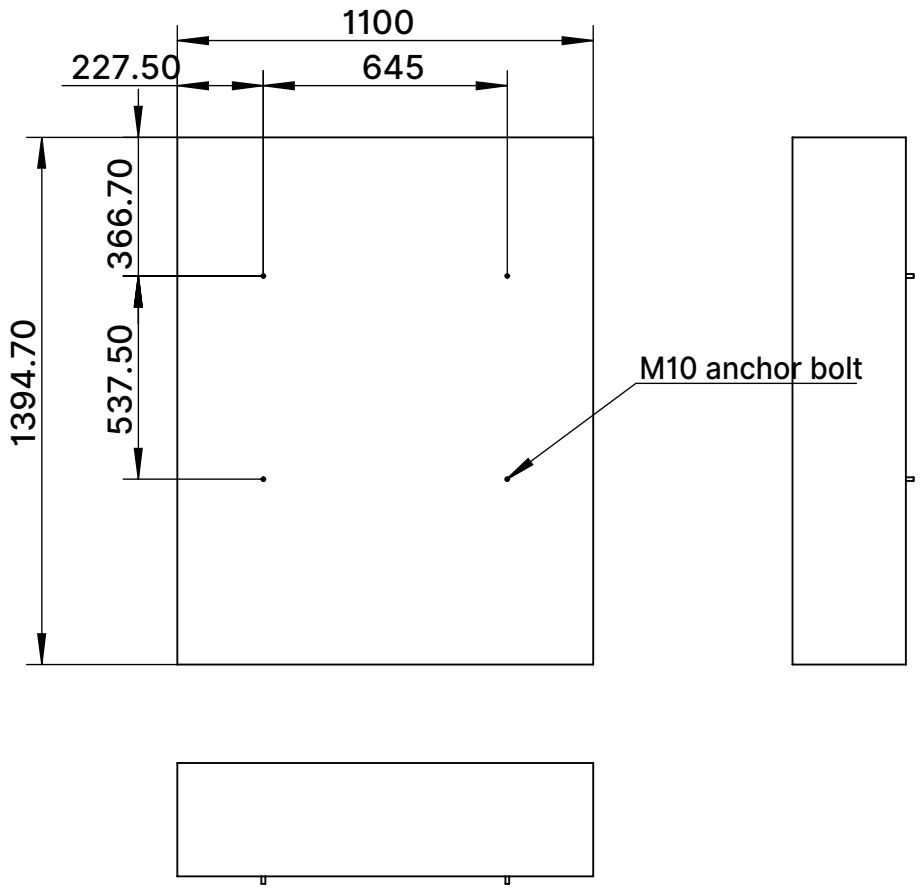
- If the battery energy storage system will remain unused for an extended period, please charge the system to 50% SOC. Once charging is complete, switch off all power switches to minimize system power consumption.
- Ensure that the relative humidity stays between 0% and 95%, with no condensation.
- The air inlets and outlets of the BESS must be properly protected to prevent ingress of rain, dust, and sand. Regularly inspect the equipment for any signs of damage.

5 System installation

5.1 Foundation requirements

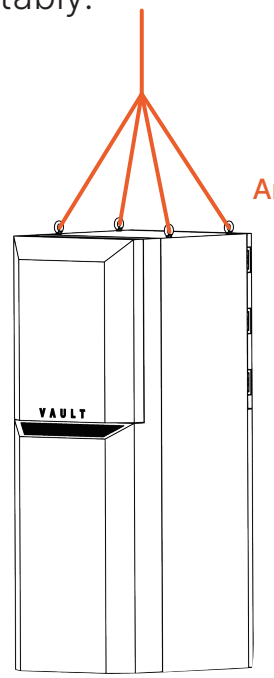
Please refer to the diagram below for the detailed foundation dimensions. The foundation must be level, structurally stable, and capable of supporting the full weight of the system.

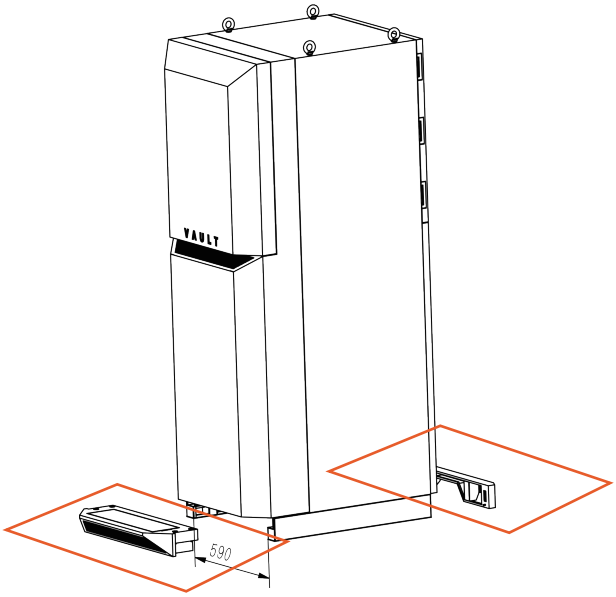
Additionally, four M10 anchor bolts must be pre-embedded in the foundation according to the specified positions shown in the drawing. Ensure precise alignment and spacing of the bolts to facilitate proper installation of the equipment.



5.2 Lifting and lowering the cabinet

- The lifting rope should pass through four rings; The Angle formed by the lifting rope needs to be greater than 60°.
- Lifting rope carrying capacity of 700KG; The lifting operation should be carried out stably.



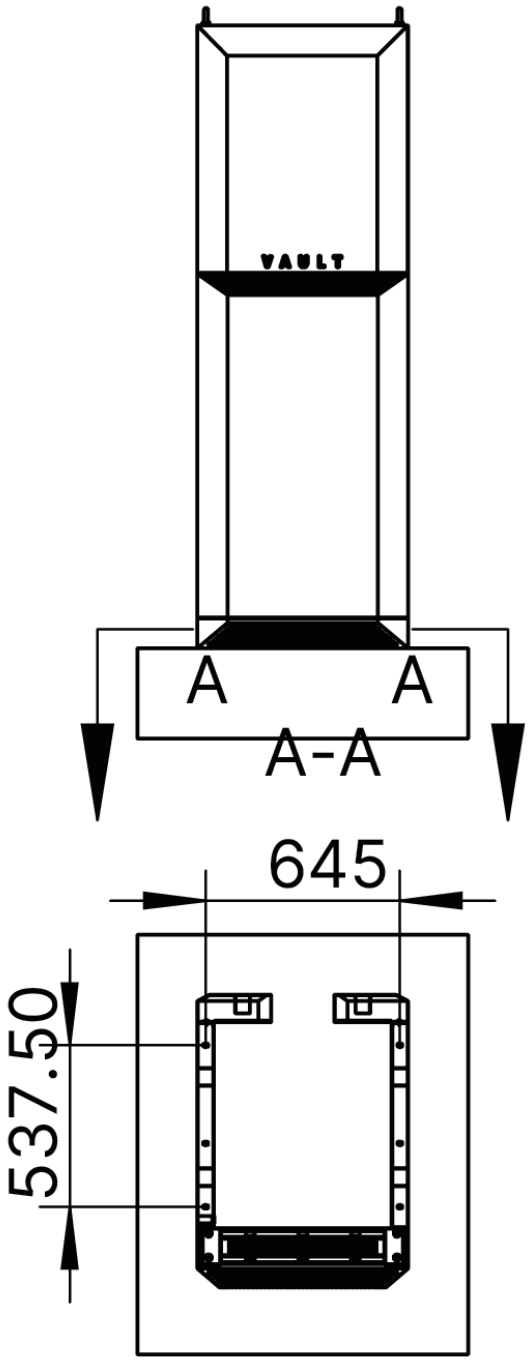


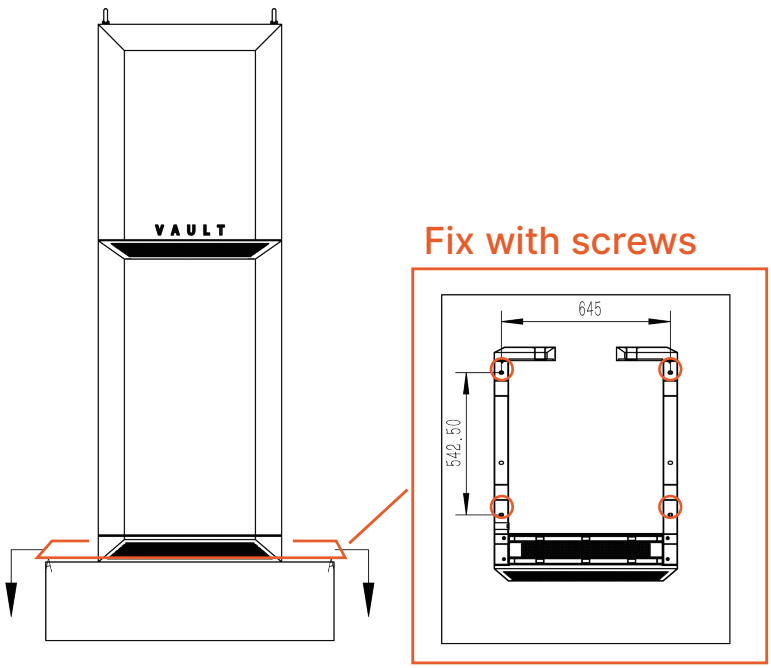


- Before using a forklift, remove the front and rear bottom covers of the cabinet.
- The forklift shall meet the gear length ≥ 930mm.
- The width of the cabinet base is 590 mm. Please ensure the forklift forks are properly adjusted to match the base width before lifting.
- The forklift shall move slowly and operate steadily.

5.3 Cabinet placement and fixing

- When placing the cabinet onto the foundation, make sure to leave sufficient clearance on all sides (front, rear, left, and right) as specified in the diagram to ensure proper ventilation, maintenance access, and safety.
- Once positioned, align the mounting holes at the base of the cabinet with the four pre-embedded M10 anchor bolts on the foundation. Secure the cabinet firmly using appropriate nuts and washers.

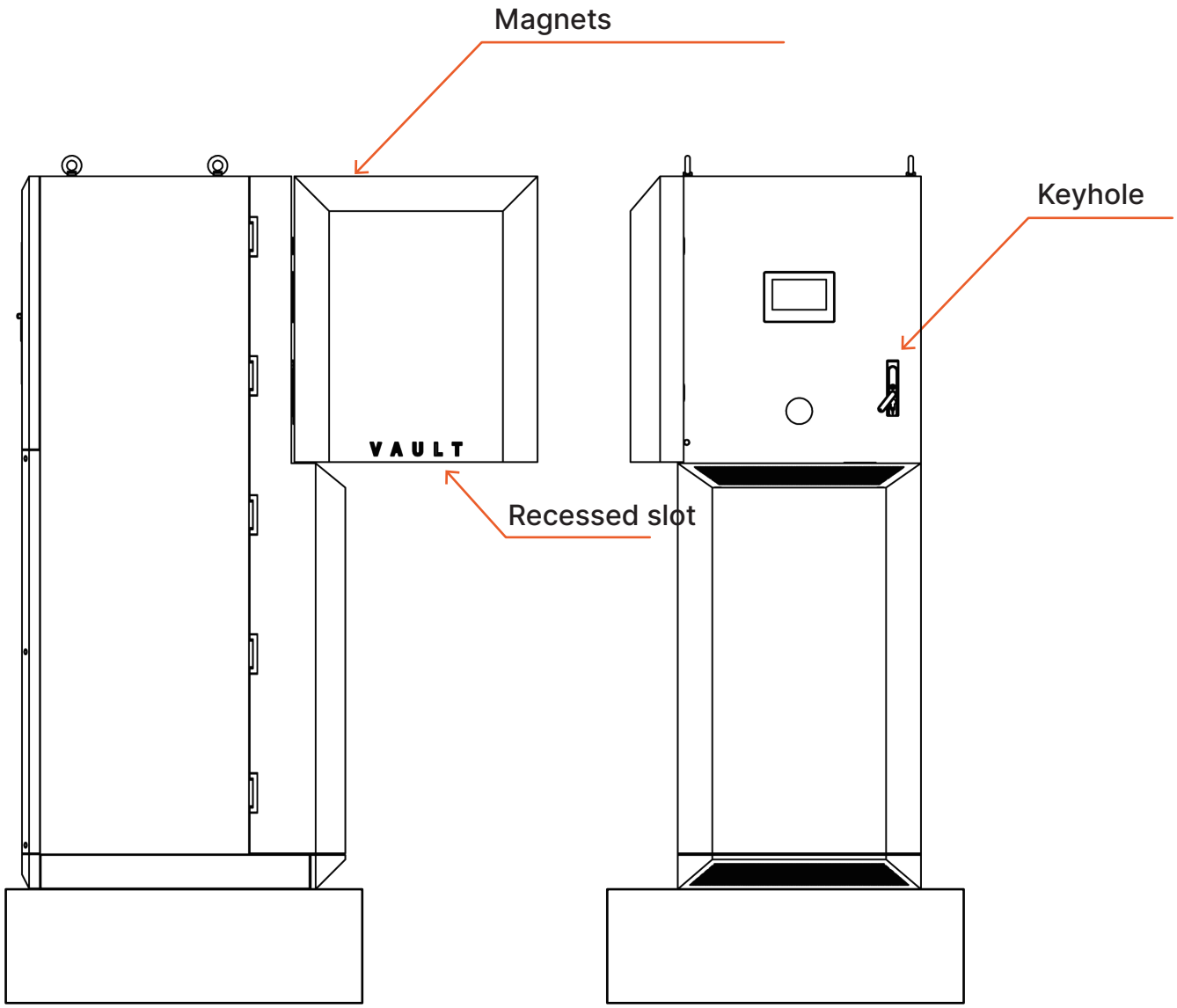




5.4 Cabinet door operation

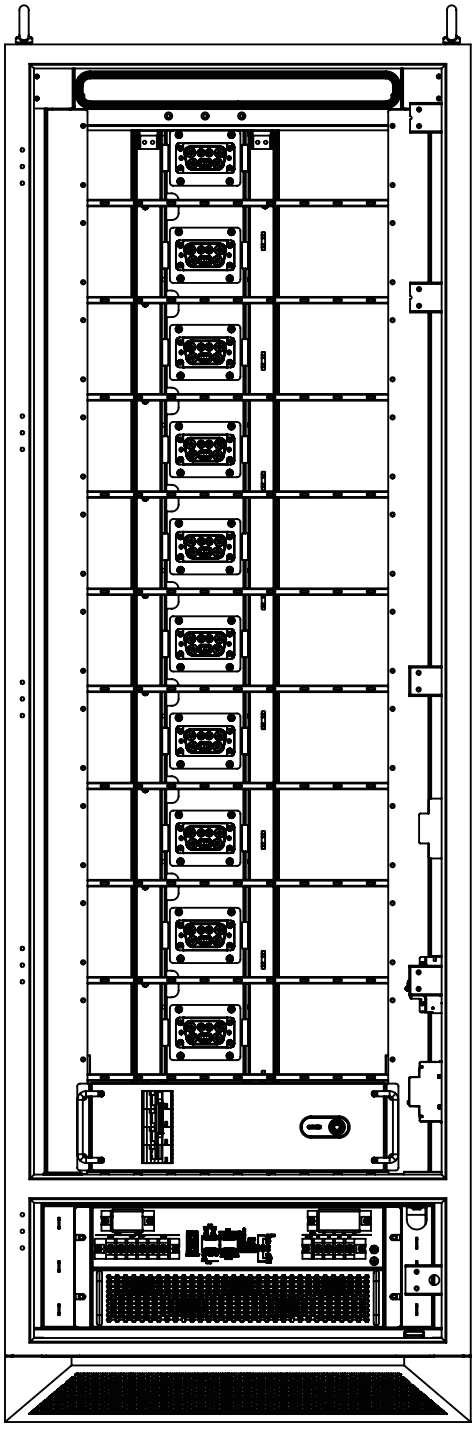
The cabinet features a two-layer door design:

- First Layer: The outer door is held closed by magnets. To open it, pull from the recessed slot at the bottom of the door.
- Second Layer: Open the cover located at the handle area to reveal the keyhole. Insert the key and turn the handle to the right to unlock and open the inner door.



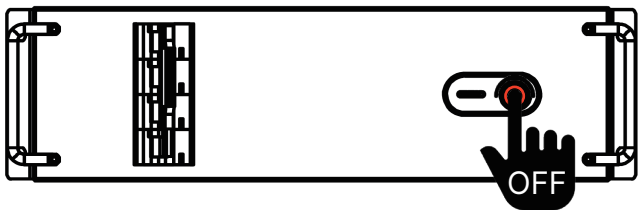
5.5 Inverter installation

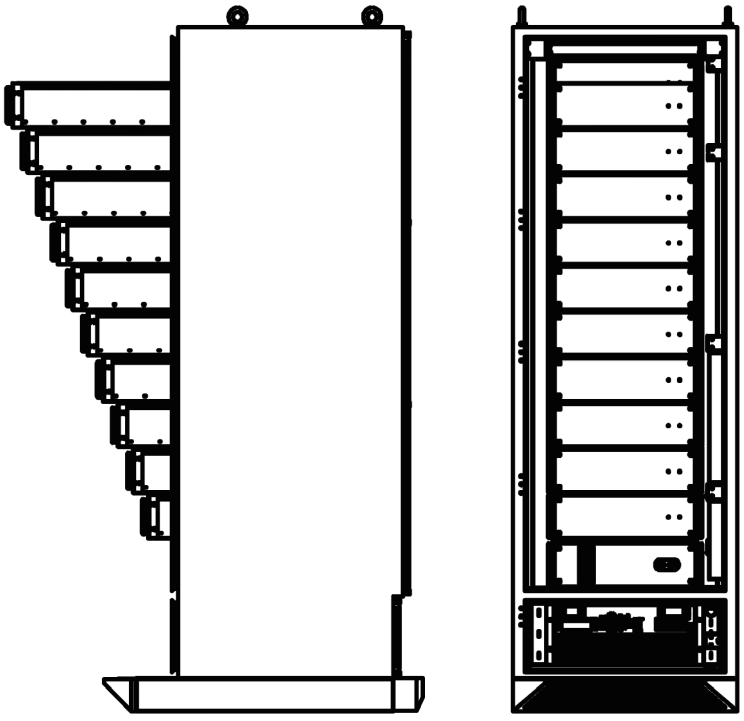
The inverter and battery controller of the Vault 50 system have been pre-installed at the factory. Before connecting power, please ensure that both the inverter and battery controller are powered off.



5.6 Battery installation

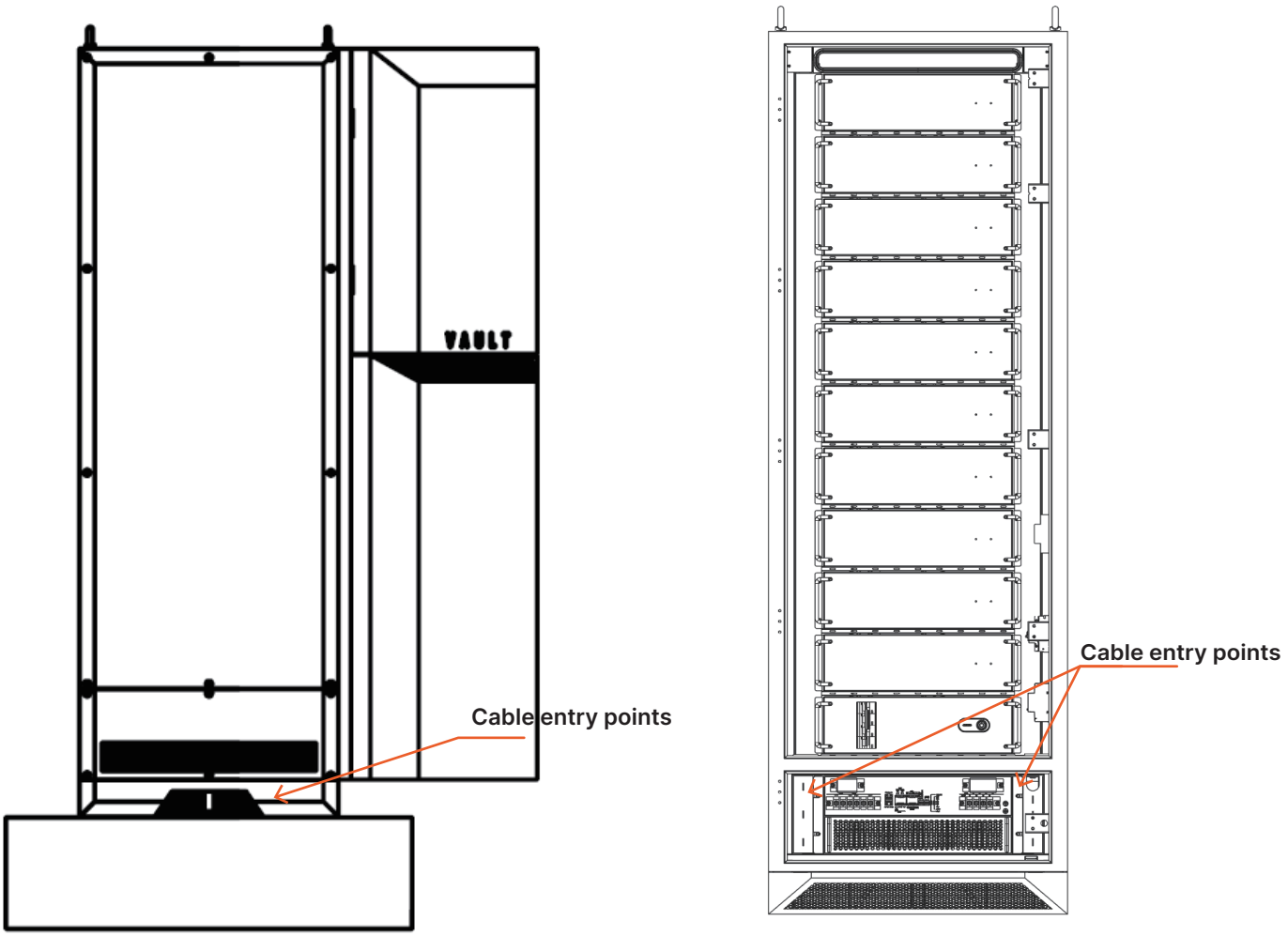
Before installing the batteries, make sure the battery controller is turned off. Then, insert the battery modules from bottom to top in sequence and secure each module with screws.





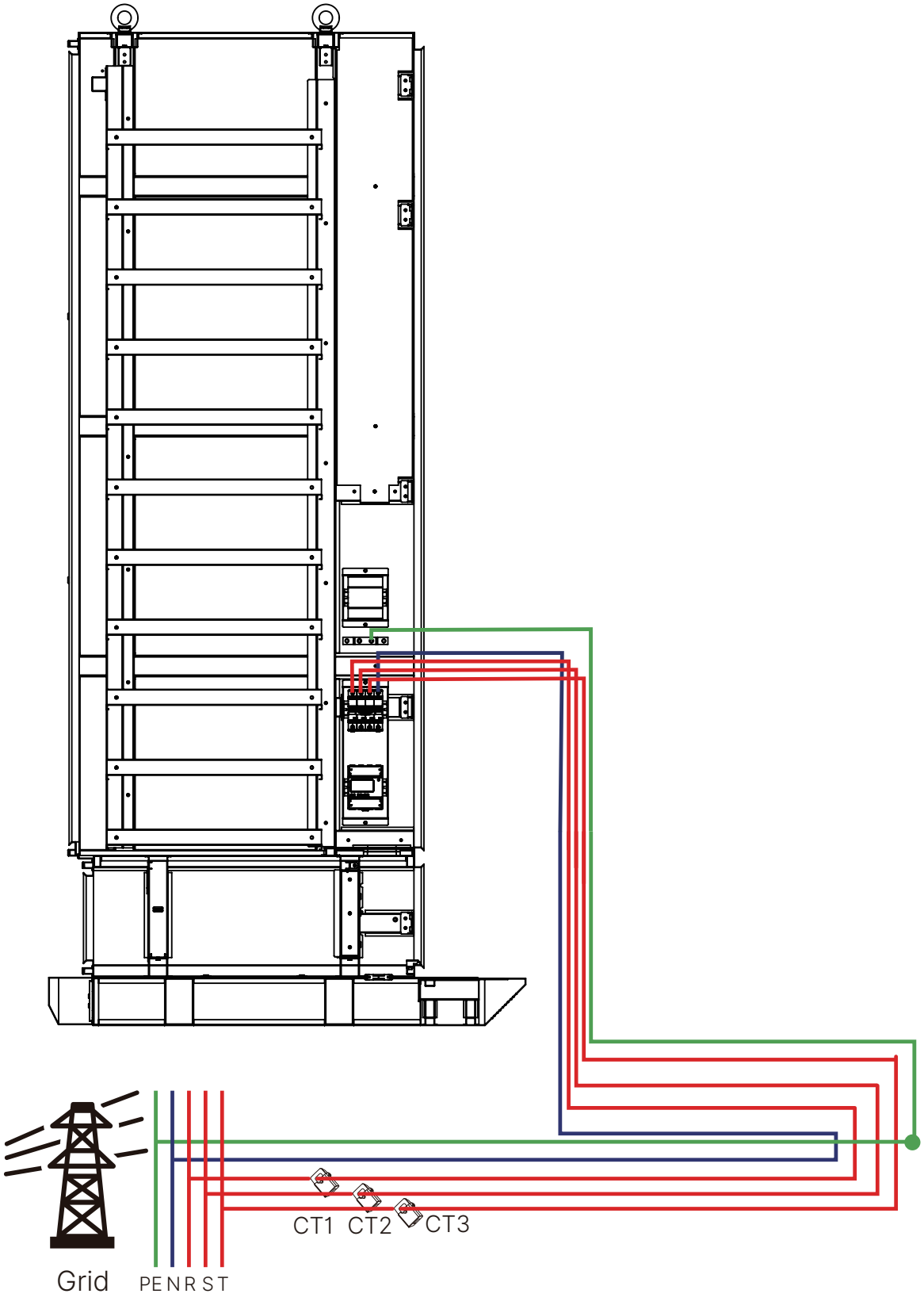
5.7 Wiring path overview

The diagram below shows the internal cable routing layout. Please refer to this diagram to ensure correct and safe installation of power cables.



5.8 Grid wiring diagram

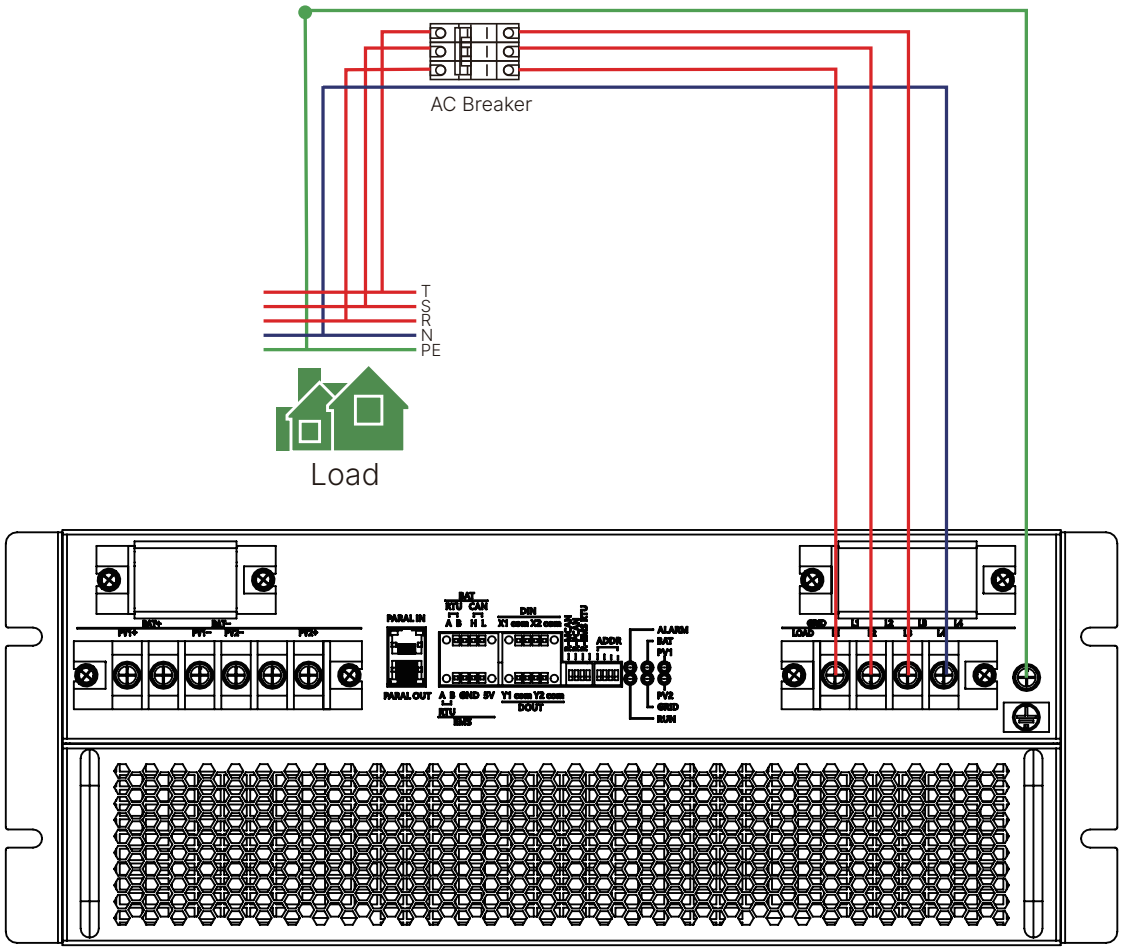
The grid wiring inside the cabinet has been pre-connected to the inverter. During installation, simply connect the external grid cables to the designated area on the right side of the cabinet and follow the instructions below to complete the connection.



AC Breaker for grid : 240A AC breaker

5.9 Load wiring diagram-1

Connect the load to the ‘LOAD’ area of the inverter.



L wire N wire PE wire

AC Breaker for load : 240A AC breaker

6 Operation after system installation

After completing all electrical connections, carefully inspect all wiring to ensure correctness and safety. Additionally, perform the following checks:

- Ensure that all air inlets and outlets are free from obstructions.
- Seal any gaps around the cable entry points to prevent dust or moisture ingress.

Warning!

- If the cabinet is not properly sealed, moisture may enter the enclosure.
- Poor sealing may also allow rodents to access the interior.
- Lock the cabinet door, remove the key, and keep it secure.
- When closing the door, make sure the sealing strip lies flat and is not folded or curled.

Battery connection

- When installing equipment involving hazardous voltages, comply with all applicable regulations and local electrical safety standards.
- Always use tools and personal protective equipment (PPE) in accordance with safety guidelines.
- All wiring and connections must be performed under clear, authorized instructions. Improvisation or unclear procedures are strictly prohibited.
- Use only tools with proper insulated coatings to ensure electrical safety.

Before power on

- The BESS must be inspected by qualified professionals and approved by the local power authority before being put into operation.
- For systems that have been idle for an extended period, perform a thorough inspection before powering on to ensure all indicators are functioning normally.
- Please check following items before power on:
  - Check whether the wiring is correct.
  - Check whether the emergency stop button is released.
  - Check and confirm that there is no ground fault.
  - Check and make sure there are no left tools or parts inside the equipment.
  - Check all air intakes and outlets for blockage.

7 Inspection, cleaning and maintenance

7.1 Basic Information

- The battery is not fully charged. It is recommended to complete the installation within 3months after the arrival of goods.
- Do not disassemble any battery in the battery product, do not dissect the battery;
  After the battery is over discharge, charge the battery within 48 hours. Battery products canalso be charged in parallel.
- After the battery products are connected in parallel, the chargeronly needs to connect the output port of any product battery.
- Do not attempt to open or remove the battery! The battery contains no internalrepairable parts.
- Before cleaning and maintaining the battery, disconnect all load and charging devices.

7.2 Maintenance item and period

Maintenance of equipment

Every half a year to once a year

Item	Check method
Safety function	• Check whether the shutdown key on the touchscreen and the emergency stop button work normally. • Simulate shutdown.
Internal components inspection	• Check the temperature of the radiator and the amount of dustaccumulated.Clean heat-dissipation modules with a vacuumcleaner if necessary. Notice: It is necessary to check ventilation of the air inlet. Otherwisefault may occur due to overheating if the module cannot be cooledeffectively.
Device maintenance	• Carry out regular inspection for corrosion of all metal components • Check the running parameters(especially voltage and insulation).

Maintenance (Once a year)

Item	Check method
Outside the BESS	Check the following items, and correct immediately those failing to meet relevant requirements: • Check whether there are flammable objects on the top of the BESS. • Check whether there is any damage, flaking paint or sign of oxidization on the enclosure. • Check whether the lock of the cabinet door can be unlocked flexibly. • Check whether the sealing strip is fixed properly.

Inside the BESS	Check whether there are foreign objects, dust, dirt, and condensed water inside the BESS.
Air inlet and outlet	Check the temperature of the radiator and the amount of dust accumulated. Clean heat-dissipation modules with a vacuum cleaner if necessary.
Wiring and cable layout	Completely power off the devices inside the ESS before checking. For any non-conformances found during inspection, correct them immediately. • Check whether the cable layout is normal and whether there is a short circuit. For any non-conformances found during inspection, correct them immediately. • Check whether all cable entry is well sealed. • Check whether there is water seepage inside the BESS. • Check whether the power cables are loose, and fasten them again by the torque specified previously. • Check whether the power cables and control cables are damaged, especially if the surface contacting the metal surface is cut. • Check whether the insulation tapes on the power cable terminals fall off.
Ground connection and equipotential connection	• Check whether the ground connection is correct and the grounding resistance shall be no more than 0.4 Ω. • Check whether the equipotential connection inside the integrated BESS is correct.
Screw	Check whether internal screws fall off.

Every two years

Item	Check method
System status and cleaning	Check the following items, and correct immediately those failing to meet the relevant requirements: • Check whether there is any damage or deformation of th container and internal devices. • Check if there is abnormal noise during operation of internal devices. • Check whether the temperature in the container is excessively high. • Check whether the humidity and the amount of dust inside the container are within the normal range. Clean the equipment if necessary. • Check whether the air inlet and outlet of the BESS are blocked.
Warning marks	Check whether the warning labels and marks are clearly visible and free of stains and damage. Replace them if necessary.

Surge protection device and fuse	Check whether the SPD and fuse are properly fastened.
Corrosion	Check whether there is oxidation or rust inside the container.

7.3 Battery maintenance

Below is the recommended maintenance cycle. The actual maintenance cycle should be adjusted according to the specific installation environment of this product. In sandy or dusty environments, it is necessary to shorten the maintenance cycle and increase the frequency of maintenance.

Once every six months

Inspection item	Inspection method
Ambient temperature and humidity inspection	• Check whether the temperature in the ambient temperature record is within the operating range. • Check whether the humidity in the ambient humidity record is within the operating range.
Corrosion	Check whether there is oxidation or rust inside the container.
Function inspection	• Check the operating status of the DC contactor: Send the Start/Stop command in the power-off status and check whether the system works properly. • Measure whether the output voltage is within the range in the specification. • Check whether the current, voltage and temperature in the operation record of the battery cluster are within the operating ranges.

Once a year

Inspection item	Inspection method
Switchgear and battery module	Please check the following items and take corrective action immediately if you find any non-conformity: • Check the top of the battery cluster for combustibles. • Check whether battery clusters are fixed on the baseplate and corroded. • Check the box for damage, peeling paint, oxidation, etc. • Check the battery cluster for foreign bodies, dust, dirt, and condensate.
Wire and cable layout	• The inspection must not be carried out until all internal devices of the battery cluster are powered off! In case of nonconformity found in inspection, take corrective actions immediately: • Check the cable layout for short circuit and compliance with the specifications. If case of any abnormality, take corrective actions immediately.

	• Check whether all wire inlets and outlets of the battery cluster are sealed properly. • Check the battery cluster for internal seepage of water. • Check whether the power cables and copper busbars are loose, and tighten them according to the aforesaid torque. • Check the power cable and communication cable for damage, especially cut marks on the surface exposed to the metal surface.
Grounding	Check whether the grounding is correct. The grounding resistance should not be greater than 4Ω.
Fan	• Check the fan for faults (e. g. locked rotor and stalling). • Check the fan for abnormal noise during operation.
Screw	Check whether screws inside the battery cluster fall off or are rusted.

Once every two years

Inspection item	Inspection method
Battery cluster status and cleanliness	Check the following items. In case of nonconformity, take corrective actions immediately: • Check the battery cluster and internal devices for damage or deformation. • Check the internal devices for abnormal noise during operation. • Check whether the temperature inside the battery cluster is too high. • Check whether the internal humidity and dust of the battery cluster are within the normal ranges. If necessary, clean the battery cluster. • Check whether the air inlet and outlet of the battery cluster are blocked.
Warning sign	Check whether the warning sign and label are legible and dirty. If necessary, replace them.
Wire and cable	Check whether the switch gear and battery module are connected correctly and whether the battery modules are also connected correctly.
Corrosion	Check the battery cluster for internal oxidation or rust.

To ensure safe and efficient system maintenance, all personnel must thoroughly read and strictly adhere to the following safety requirements:

1. Maintenance personnel must hold a valid electrician certificate issued by the Safety Supervision Bureau and must be professionally trained before starting work.
2. Follow all safety protocols, use appropriate tools, and wear personal protective equipment (PPE) at all times.
3. Do not wear metal accessories such as jewelry or watches during maintenance.
4. Never touch both the positive and negative high-voltage terminals of the energy storage system simultaneously under any circumstances.
5. Before performing maintenance, ensure that all high-voltage and low-voltage switches are turned off.
6. Do not wash the equipment with water. Use a vacuum cleaner for cleaning if needed.
7. Insert and remove cables in accordance with proper procedures. Forceful or improper handling is strictly prohibited.
8. After maintenance is complete, promptly remove all tools and materials, and check thoroughly to ensure no metal objects are left inside or on top of the equipment.
9. If you have any questions regarding the operation or maintenance of this product, please contact the Besst Customer Service Center. Do not perform unauthorized operations.


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ENERGY