Outdoor Energy Storage Cabinet User Manual

PMS-A125K-261L-E

Ver 1.0

Revision History

Date	Revision	Description	Owner
2025-08-29	V1.0	Initial Release	UZ

Contents

1. Preface

1.1 Declaration

This manual details the installation, use, operation, maintenance, troubleshooting, and technical performance of the energy storage cabinet. Users are advised to thoroughly read and understand this manual before installation and to keep it properly for future reference.

Due to equipment iteration upgrades or other reasons, the content of this manual will be updated periodically. Users should refer to the actual purchased product as the standard and may obtain the latest version of the manual through official or sales channels. Unless otherwise agreed, this manual serves only as a usage guide. All statements, information, and recommendations contained herein do not constitute any explicit or implicit warranty. Without the written permission of our company, no organization or individual may excerpt or copy part or all of this manual's content, nor disseminate it in any form.

1.2 Safety Tips

During transportation, storage, installation, operation, and use of the equipment, strict compliance with the manual's content and all safety precautions indicated on the equipment and in the manual is mandatory. Furthermore, relevant international, national, or regional standards must be observed. Any unauthorized operations are prohibited. The precautions in this manual do not encompass all safety requirements. Our company assumes no responsibility for personnel or equipment damage resulting from violations of safety operation requirements or breaches of design, manufacturing, and equipment usage safety standards.

This equipment shall be operated in environments that comply with the design specifications; failure to do so may result in equipment malfunction, abnormal operation, or component damage, which are not covered under the product warranty. The company shall not be held liable for any personal injury, property damage, or other losses that may arise otherwise.

1.3 Safety Precautions

1.3.1 Warning Signs

⚠ *DANGER*

Indicates precautions or instructions which, if improperly executed, may pose a risk to the user's personal safety or cause severe damage.

⚠ *WARNING*

Indicates precautions or instructions which, if improperly executed, may pose a risk to the user's personal safety or cause serious damage.

⚠ *CAUTION*

Indicates precautions or instructions which, if improperly executed, may pose a risk to the user's personal safety or cause minor damage.

1.3.2 Safety Rules

⚠ DANGER

- During equipment installation and replacement, power must be disconnected and proper grounding ensured to prevent electric shock; installation and maintenance must be performed by professional personnel.
- All equipment cables must be securely connected, well insulated, and appropriately sized. Loose, damaged, or undersized cables can cause circuit faults, potentially resulting in severe equipment damage, personal injury, or fire.
- Equipment that has been tipped over must not be installed directly, even if its exterior is undamaged, as internal damage may cause system malfunction or circuit short circuits. It must be inspected by professional personnel and confirmed to be free of damage before installation is permitted.
- If water ingress or residual moisture is detected inside the cabinet during installation, professional personnel must be notified for inspection; otherwise, it may result in safety incidents.
- Improper use and storage of the battery carry risks of explosion and burns; The battery must not be exposed for prolonged periods to high-temperature environments exceeding the limits specified in this manual, as this may lead to fire.

⚠ WARNING

- Any malfunction potentially affecting the equipment's safety performance must be rectified by professional personnel before restarting.
- The product shall be installed by the company's professional technical personnel or authorized professional organizations. Unauthorized installation or modification may cause safety hazards or equipment damage. The company assumes no responsibility for any resulting losses.

1.3.3 Safety Notes

The energy storage cabinet must be operated strictly in accordance with safety measures and relevant operating procedures; any incorrect operation may cause personal injury and equipment damage. Before commencing operation, ensure that operators have thoroughly read this manual to prevent electric shock and burn incidents.

(1) Personnel responsible for the operation and maintenance of the battery system must have undergone specialized training and obtained certification for electrical equipment operation;
(2) Before connecting cables, verify that the cables and their markings correspond to the actual installation situation prior to connection;
(3) The equipment installation site must be equipped with safety protective barriers, proper isolation measures, and appropriate safety signage;
(4) Do not place flammable materials next to the battery system.
(5) Before installing or removing power cables, the corresponding power switches must be turned off.

(5)Before installing or removing power cables, the corresponding power switches must be turned off.
(6) Do not open the equipment cabinet door unauthorized during operation; risk of electric shock.
(7) During operation, specialized tools with insulation must be used.
(8) Conductive items such as watches, bracelets, bangles, and rings are strictly prohibited during operation; do not touch the battery system with wet hands.
(9) Maintenance must comply with operating procedures, including wearing insulating gloves, insulating footwear, and safety glasses; a supervisor must be present during work.
(10) Battery pack maintenance must be conducted by professional personnel; disassembly by non-professionals is strictly prohibited. During use or maintenance operations, any wear or damage to the internal or external wiring of the battery pack is strictly prohibited to prevent hazards.

2. Preface

2.1 Product Overview

2.1.1 Product Description

The PMS-A125K-261L-E is an integrated commercial and industrial energy storage product, incorporating the battery system, inverter system, BMS/EMS, temperature control, and fire protection systems. This product facilitates the storage and discharge of electrical energy and is primarily applied in user-side commercial and industrial energy storage scenarios.

The system integrates the energy storage battery system, PCS module, liquid cooling heat dissipation system, and perfluorohexanone fire protection system, providing customers with a safe, reliable, and efficient commercial and industrial energy storage solution that meets conventional energy storage system requirements including peak-valley arbitrage, demand management, and grid connection applications.

2.1.2 Product Appearance and Dimensions

The outline of the PMS-A125K-261L-E unit is shown in Figure 2-1, with dimensions (unit: mm) of

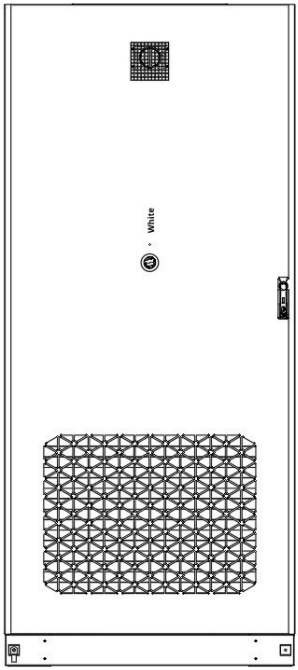


Figure 2- 1 Unit Outline Drawing

2.2 Technical Specifications

Item		Specification Parameters
AC Side Parameters	Rated Power	125 kW
	Output Voltage	400 V / 230 V (-15%~15%)
	Grid Frequency	50 Hz / 60 Hz
	Power Factor	-1~1
	Wiring Method	Three-phase Four-wire + PE
DC Side Parameters	Maximum Output Current	200 A
	Battery Cell Type	LFP 3.2 V/314 Ah
	Rated Capacity	261 kWh
	Depth of Discharge	≤100% DOD (Recommended)
	Voltage Range	650~950 V
	Maximum Current	157 A
	Battery Pack Specifications	166.4 V/314 Ah (1P52S)
	Number of Battery Packs	5 units
System Parameters	Operating Temperature	-30 to 55℃ (Derating above 45℃)
	Relative Humidity	0 to 95%, Non-condensing
	Altitude	3,000 m (Derating above 2,000 m)
	Noise	<70dB@1m
	Communication Methods	LAN, 4G (optional), BT (optional), WiFi (optional)
	Protection Rating	IP55
	Corrosion Resistance Rating	C3, Entire Cabinet Galvanized Steel Plate
	Heat Dissipation Method	Liquid Cooling
	Isolation Method	Non-Isolated
	Fire Protection Method	Pack-level Perfluorohexanone Fire Suppression + Explosion Relief System + Water Fire Protection (Energy Storage Cabinet)
	Third-Party Certification	CB/CE, Transportation
	System Dimensions (L×W×H)	1,400*1,000*2,280 mm
	System Weight	2,330±10 KG

Table 2- 1 Main Technical Parameters

※ Information is subject to change without notice.

2.3 Main System Components

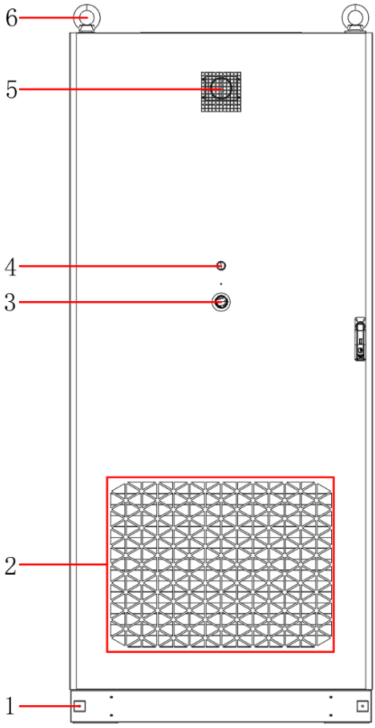


Figure 2- 2 Component Description (External)

No.	Module Description	Configured Quantity	Instructions
1	Cabinet Grounding	4	External Grounding Terminal of the Energy Storage System
2	Cooling Air Inlet	1	Power Distribution Compartment Air Inlet
3	Emergency Stop Switch	1	Energy Storage System Emergency Stop
4	Operation Indicator Light	1	Operating Status Indicator: Red Light Solid On: Abnormal Status Warning Green Light Solid On: Normal Operating Status
5	Audible and Visual Alarm	1	Internal Fault Alarm
6	Lifting Eye	4	Energy Storage System Lifting (Optional Accessory)

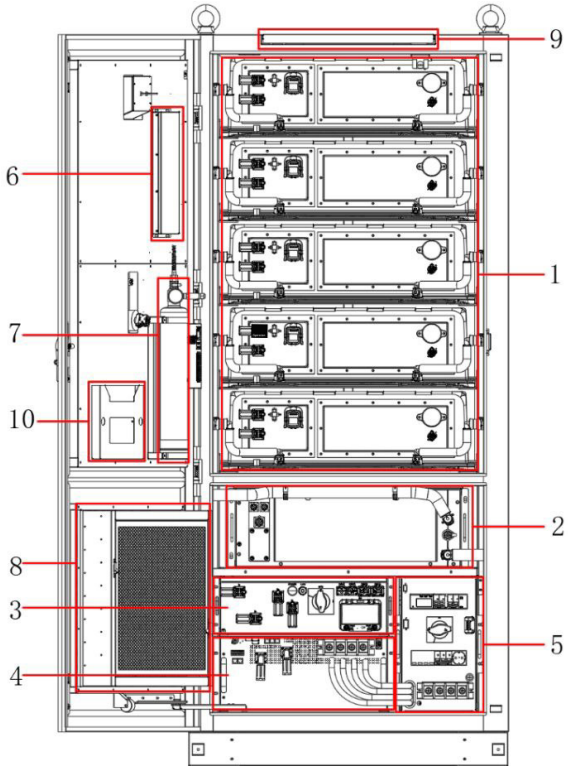


Figure 2- 3 Component Introduction (Internal)

No.	Module Description	Configured Quantity	Instructions
1	Battery Pack	5	The battery pack for storing and outputting electrical energy is composed of 52 battery cells, connection busbars, a sampling harness, and a BMU (Battery Management Unit), among other components.
2	Liquid Cooling Unit	1	Liquid Cooling and Heating Host
3	High Voltage Box	1	Control and Management of the Battery System High-Voltage Power Circuit
4	PCS	1	Energy Storage Converter System
5	Distribution Box	1	Functions of AC Side Overload and Short-Circuit Protection, Lightning Protection, and Energy Metering
6	ECS	1	Integrated Centralized Control Unit of the Energy Storage System
7	Fire Extinguishing Device	1	Stored-Pressure Perfluorohexanone, 3 kg Fire Extinguishing Agent
8	Sound-Absorbing Louvers	1	Sound Insulation and Noise Reduction
9	Smoke Exhaust Fan and Explosion Vent	1	Emergency Smoke Exhaust and Explosion Venting in Case of Battery Thermal Runaway
10	Folder	1	File Placement

Table 2- 3 Description of Main Components (Internal)

2.4 Functional Diagram

2.4.1 System Topology Diagram

The BCS of the Energy Storage Cabinet is a centralized control system; the BCS communicates with the BMU to control the battery side, thereby managing the operation of the battery system. Communicate with the PCS Module for energy management and power dispatch, implementing functions such as peak shaving, valley filling, and demand management. Communicate with dynamic environment monitoring equipment, including fire composite detectors, liquid-cooled main units, and water immersion sensors, to ensure the energy storage system operates safely under suitable environmental conditions. Communicate with the ECS to achieve centralized data processing, cloud data transmission, and reception and execution of cloud-based strategies. The topology of the energy storage system is shown in Figure 2-4.

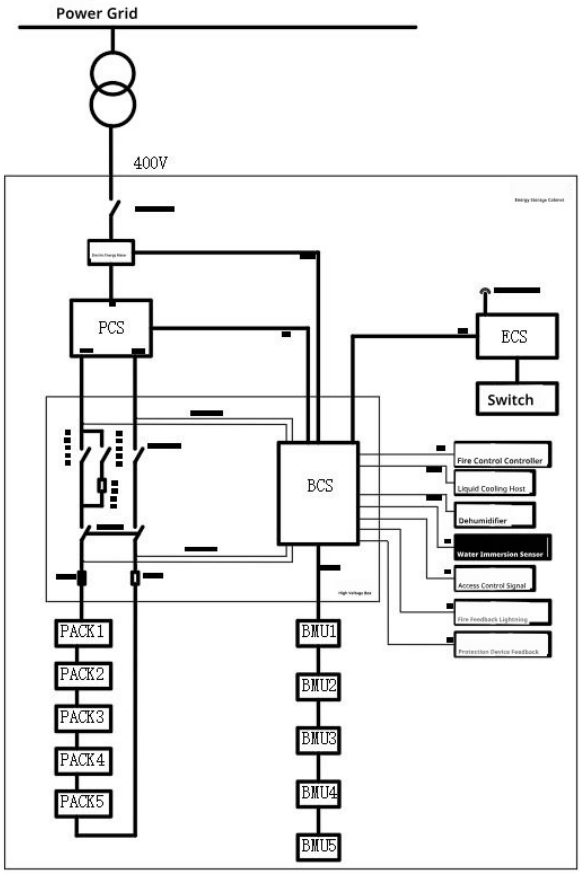


Figure 2- 4 Energy Storage System Topology Diagramc

3. Component Introduction

3.1 Battery Pack

The battery pack, which stores electrical energy and outputs it externally, consists of 52 battery cells, a connection busbar, sampling harness, and BMU (Battery Monitoring Unit). It includes internal voltage and temperature measurement functions for the battery cells.

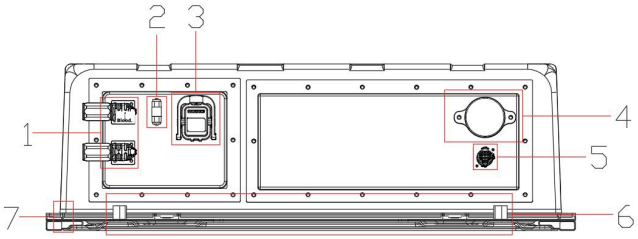


Figure 3-1 Battery Pack Appearance

No.	Name	Configured Quantity	Function Description
1	Power Interface	2	Main Power Input/Output Interface
2	Fire Sprinkler	1	Injects fire extinguishing gas into the PACK through this sprinkler to prevent the spread of thermal runaway
3	Manual Maintenance Switch	1	Provides electrical isolation terminal during PACK maintenance
4	Explosion Vent Valve	1	Releases high-pressure and high-temperature gases generated by battery thermal runaway to prevent excessive internal pressure
5	Communication Interface	1	Communication interface between PACKs or between PACK and BCS
6	Coolant Inlet/Outlet	2	Used for coolant inlet and outlet connections
7	Grounding Terminal	1	For PACK enclosure grounding

Table 3- 1 Battery Pack Panel Description

No.	Technical Specifications	Parameters
1	Battery Cell Nominal Capacity	3.2 V/314 Ah
2	Battery Cell Material	Lithium Iron Phosphate
3	Battery Configuration	1P52S
4	Operating Voltage	145.6 V~187.2 V
5	Rated Voltage	166.4 V
6	Standard Charge and Discharge Current	≤0.5C
7	Nominal Capacity	52.2 kWh
8	Operating Temperature	Charging: 0～60℃; Discharging: -30～60℃
9	Storage Temperature	-20℃～45℃; ≤1 month 0℃～35℃; ≤1 year
10	Dimensions (L×W×H)	1,140*790*247.7 mm
11	Weight	330±3Kg
12	Communication Interface	Daisy Chain
13	Cooling Method	Liquid Cooling

Table 3- 2 Technical Specifications

3.2 Energy Storage Converter

Energy Storage Converter The primary function is to realize energy conversion and bidirectional flow between the power grid and the battery, to monitor and manage the exchange process, and to support both grid-connected and off-grid operating modes. This product uses the EPCS125-AM-F model PCS, as detailed below:

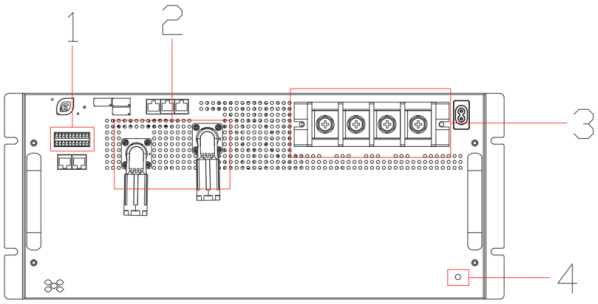


Figure 3- 2 PCS Appearance Diagram

No.	Name	Configured Quantity	Function Description
1	Communication Terminals	1	External Communication Port
2	DC Power Port	2	DC Side Power Wiring Port
3	AC Power Port	1	AC Side Power Wiring Port
4	Grounding Terminal	1	For PCS Enclosure Grounding

Table 3- 3 PCS Panel Description

Item		Parameters
DC Side	Operating Voltage Range (V)	680-950 V
	Number of Input Channels	1
	Maximum Current (A)	203
AC Measurement (Grid-Connected)	Rated Voltage (V)	230 V/400 V
	Voltage Deviation	-15%~+15%
	AC Output Type	(3W+PE) Three-Phase Three-Wire / (3W+N+PE) Three-Phase Four-Wire
	Rated Output Power (kW)	125 kW
	Maximum Current (A)	200
	Rated Grid Frequency (Hz)	50/60
	Power Factor	0.99
	Power Factor Range	1 (Leading) ~ 1 (Lagging)
	Current Distortion Rate	<2% (Rated Power)
	Overload Capacity	110% Continuous
	Maximum Efficiency	98.5%l

AC Measurement (Off-Grid)	Rated Output Voltage	230/400
	AC Voltage Harmonics	<3% (Linear Load)
	Rated Frequency (Hz)	50/60
	Rated Output Power (kW)	125
	Maximum Output Current (A)	200
General Parameters	Dimensions (L×W×H)	785×520×232 mm
	Altitude (m)	Up to 4000 m (Derated Above 2000 m)
	Operating Temperature	-30℃ to 55℃ (Derated Above 45℃)
	Storage Temperature	-45℃～70℃
	Humidity	0% RH to 95% RH, Non-condensing
	Cooling Method	Intelligent Air Cooling
	Protection Rating	IP20
	Communication Interface	CAN/RS485/Ethernet
	Grid Support	L/HVRT, Active and Reactive Power Control

Table 3- 4 PCS Technical Parameters

3.3 High Voltage Box

The High Voltage Box is responsible for DC bus control, DC bus output short-circuit protection, communications with internal and external equipment, and power supply functions.

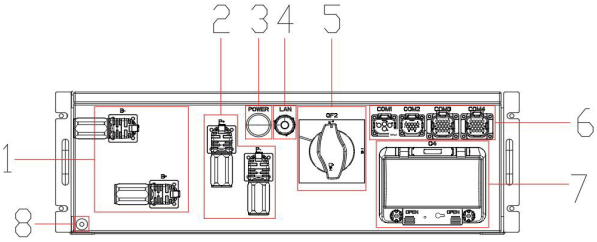


Figure 3- 3 High Voltage Box Appearance Diagram

No.	Name	Configured Quantity	Function Description
1	DC Bus Interface	1	DC Output Bus Positive and Negative Terminals
2	Battery Cluster DC Interface	1	Battery System Positive and Negative Terminals
3	Indicator Light	1	Power-On Status Indicator
4	Network Port	1	BCS External Network Port
5	DC Main Switch	1	DC Input Main Switch
6	External Interfaces	4	Includes AC 220 V Power Input, DC 24V Output, Dry Contact Detection, and Communication Interfaces
7	DC 24V Switch	1	DC 24 V Output Switch
8	Grounding Terminal	1	Used for Grounding the High Voltage Box Enclosure

No.	Technical Specifications	Parameters
1	Rated Voltage	DC 1000
2	Rated Current	250A
3	Dimensions (L×W×H)	785*564*177 mm
4	Weight	35±1 KG

Table 3- 5High Voltage Box Panel Description

Table 3- 6High Voltage Box Parameter Description

3.4 Distribution Box

Distribution Box The primary function is to distribute electrical energy from the grid to various electrical devices, ensuring reasonable and safe power transmission. It also includes AC Side Overload and Short-Circuit Protection, Lightning Protection, and Energy Metering functions.

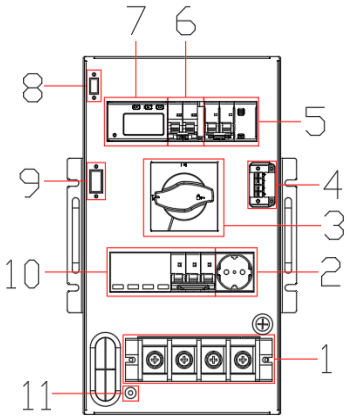


Figure 3- 4 Distribution Box Appearance Diagram

No.	Name	Configured Quantity	Function Description
1	AC Input Interface	1	Grid AC Side Entry Interface
2	Socket	1	Peripheral Equipment Power Supply AV 230 V During Commissioning
3	AC Main Switch	1	Grid AC Input Main Switch
4	AC Power Output Switch	1	Output of AC Power for Use by Other Equipment in the Energy Storage Cabinet
5	Leakage Protection Switch	1	Leakage Protection Circuit Breaker
6	Liquid Cooling Main Unit Switch	1	Liquid Cooling Main Unit AC Input Switch
7	Electric Meter	1	Electric Energy Measurement
8	Communication Interface	1	Electric Meter and BCS Communication Interface
9	Dry Contact Interface	1	Lightning Protection, AC Input Main Switch, and Leakage Protection Switch Dry Contact Interface with BCS
10	AC Lightning Protector and Protective Switch	1	AC Lightning Protection Function
11	Grounding Terminal	1	Used for Distribution Box Enclosure Grounding

Table 3- 7 Distribution Box Panel Description

No.	Technical Specifications	Parameters
1	Rated Voltage (V)	AC380
2	Rated Current (A)	250
3	Dimensions (L×W×H)	400*235*417 mm

Table 3- 8 Distribution Box Parameter Description

3.5 Liquid Cooling Unit

Liquid Cooling Unit Used to regulate the battery pack temperature within the energy storage system, ensuring consistent operation within the appropriate temperature range to maintain the system's optimal operational state, supporting intelligent cooling and heating modes.

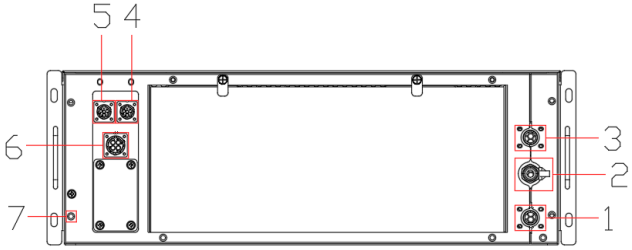


Figure 3- 5 Liquid Cooling Unit Appearance Diagram

No.	Name	Configured Quantity	Function Description
1	Water Outlet	1	Chilled Liquid Outlet Interface
2	Filling/Draining Port	1	Chilled Liquid Filling/Draining Interface
3	Water Inlet	1	Chilled Liquid Inlet Interface
4	Communication Interface	1	External Communication Interface of the Liquid Cooling Unit
5	Debug Interface	1	For Use During Debugging
6	Power Interface	1	AC 220 V Input Interface
7	Grounding Terminal	1	For Grounding the Liquid Cooling Unit Enclosure

Table 3- 9 Liquid Cooling Unit Panel Description

No.	Technical Specifications	Parameters
1	Operating Voltage Range	220 Vac, 50/60 Hz
2	Cooling Capacity	5 kW
3	Heating Capacity	2 kW
4	Cooling Input Power	2.5 kW
5	Operating Ambient Temperature Range	-30℃~55℃
6	Operating Environment Humidity Range	5%~95%
7	Storage Environment Temperature	-40℃~70℃
8	Operating Altitude	≤1,000 m (derating <5% for every additional 1000 m, maximum operating altitude ≤4,000 m)
9	Overall Dimensions (L×W×H)	900×700×245 mm (excluding flange)
10	Coolant	50% Ethylene Glycol Solution

3.6 Fire Protection System

3.6.1 Composition of the Fire Protection System

The fire protection system employs a triple protection strategy comprising active explosion venting, agent-based extinguishing, and water fire protection, featuring PACK-level and battery compartment-level extinguishing mechanisms, and consists of four components:

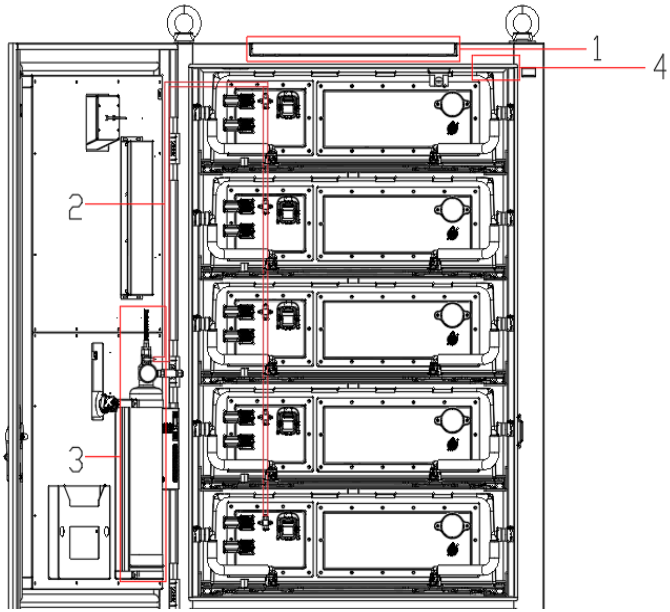


Figure 3- 6 Schematic Diagram of Fire Protection System Components

No.	Name	Configured Quantity	Function Description
1	Active Explosion Venting Device	1	Release of High-Pressure, High-Temperature Gas to Prevent Combustion Explosion
2	Fire Detection Pipeline	1	Used for Storage and Transport of Agent
3	Agent Bottle	1	Perfluorohexanone Agent, Dosage 3 kg
4	Water Fire Protection Pipeline Interface	1	Water Fire Protection Inlet, Equipped with Glass Globe Fire Sprinkler

3.6.2 Operating Principle

This product employs a three-level fire protection system as follows:

Level One Active Detection, Early Warning, and Suppression: The composite detector can monitor multiple parameters including CO, VOC (flammable gases), smoke, and temperature. When these parameters reach preset thresholds, an alarm is triggered, activating the perfluorohexanone extinguishing system and notifying the ECS of the fire event. The ECS controls the local audible and visual alarms and initiates system energy storage shutdown, simultaneously opening the top explosion relief vent to coordinate with the smoke exhaust fan for smoke expulsion, thereby reducing smoke and gas concentration and temperature, and mitigating fire and deflagration risks.

This product employs a three-level fire protection system as follows:
Level One Active Detection, Early Warning, and Suppression: The composite detector can monitor multiple parameters including CO, VOC (flammable gases), smoke, and temperature. When these parameters reach preset thresholds, an alarm is triggered, activating the perfluorohexanone extinguishing system and notifying the ECS of the fire event. The ECS controls the local audible and visual alarms and initiates system energy storage shutdown, simultaneously opening the top explosion relief vent to coordinate with the smoke exhaust fan for smoke expulsion, thereby reducing smoke and gas concentration and temperature, and mitigating fire and deflagration risks.

3.7 Combiner Cabinet (Optional)

The energy storage cabinet supports parallel connection of multiple cabinets and can be optionally used with a combiner cabinet. One combiner cabinet can accommodate up to four parallel-connected energy storage cabinets. The primary role of the combiner cabinet is line distribution and connection, providing a centralized connection point, along with overload and short circuit protection on the main circuit.

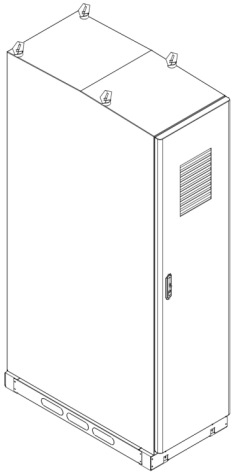


Figure 3- 7 Combiner Cabinet Outline Diagram

No.	Technical Specifications	Parameters
1	Rated Voltage (V)	AC380
2	Output Power (kW)	525
3	Output Current (A)	800
4	Dimensions (L×W×H)	1,200*600*2,280 mm
5	Weight (kg)	220

4. Storage and Transportation

4.1 Transportation Requirements

⚠ DANGER

Violent handling during installation or removal is prohibited, as it may cause internal battery short circuit, damage (leakage, rupture, etc.), fire, or explosion within the cabinet body.

⚠ WARNING

- Handling during transportation shall comply with the orientation requirements specified on the packaging; inversion, tilting, dropping, mechanical impact, exposure to rain or snow, and immersion in water are strictly prohibited.
- Transportation and warehousing service providers must hold hazardous materials operation qualifications in accordance with the applicable laws and standards of their locality. Transportation shall be conducted using rigid box trucks; the use of open-top vehicles is strictly prohibited.
- Transportation shall be conducted via sea or roads with good conditions; rail and air transport are not supported. Vibrations and tilting should be minimized during transportation.
- Before transportation, compliant and accurate declarations must be made. Packaging and label markings shall be inspected to ensure they are complete and undamaged, with no signs of odor, leakage, smoke, or fire; otherwise, transportation is forbidden.
- During handling and transportation, care must be taken to handle items gently. Side placement and inversion are prohibited. Moisture-proof measures must be implemented. Packaging should be securely tied to prevent displacement, with hazardous material labels facing outward.

4.2 Forklift Operation Requirements

- The forklift used must have adequate load capacity (at least 5 tons);
- Forklift forks may be inserted from all sides of the cabinet body. The forks should be inserted to the full depth of the cabinet body. Forklift schematic diagrams are illustrated in Figures 4-1, 4-2, and 4-3;
- During lifting, lowering, and movement, operations must be conducted slowly and steadily.
- During forklift loading, it is recommended to tie a safety rope around the cabinet body and connect it to the forklift crossbeam;
- It is recommended to prioritize side forklift handling for the Energy Storage Cabinet, as illustrated in Figure 4-1.

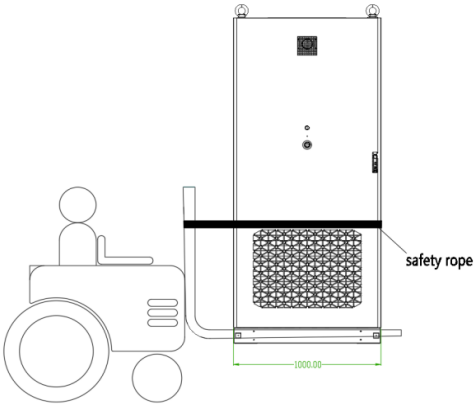


Figure 4-1 Schematic of Energy Storage Cabinet side forklift handling (forklift insertion is only permitted from the battery compartment side).

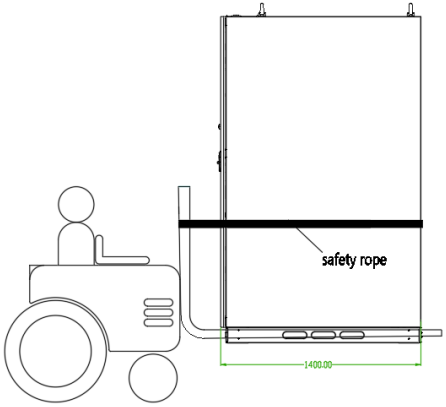


Figure 4-2 Schematic of Energy Storage Cabinet front/rear forklift handling.

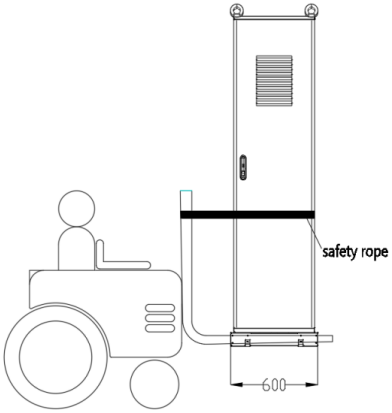


Figure 4-3 Schematic of Combiner Cabinet side forklift handling.

4.3 Requirements for Lifting Operations (lifting rings are optional).

4.3.1 Preparations before Lifting

① Crane Preparation:

The total weight of the Energy Storage Cabinet is approximately 2.7 tons. Please select the crane lifting capacity based on the total equipment weight and site conditions. Recommended capacity: 5 to 8 tons.

② Tool Preparation:

Wire rope, hooks, M24 lifting rings, hex key wrench (19 mm across flats), etc.

③ Using an Allen wrench, unscrew the four plugs at the lifting ring installation points on the top of the energy storage cabinet, as shown in Figure 4-4: The same procedure applies to the combiner cabinet.

④ Screw the M24 lifting rings into the lifting ring installation points on the top of the energy storage cabinet. Ensure the lifting rings are fully tightened and not loose, as shown in Figure 4-5: The same procedure applies to the combiner cabinet.

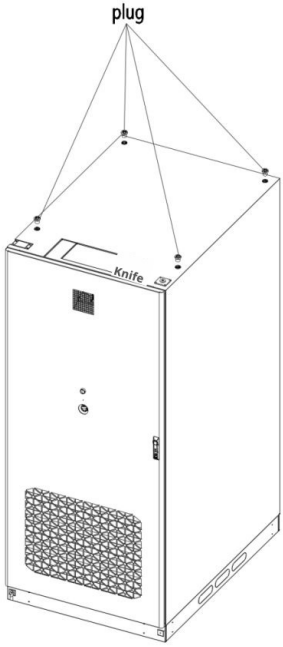


Figure 4- 4Energy Storage Cabinet Plug Removal Diagram

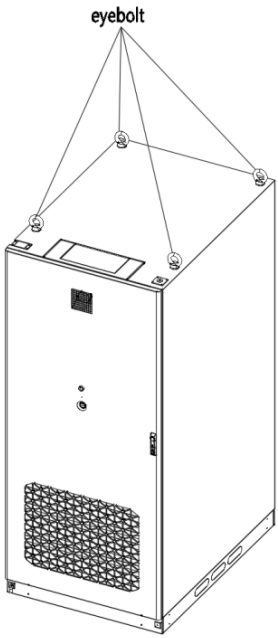


Figure 4- 5 Energy Storage Cabinet Lifting Ring Installation Diagram

4.3.2 Lifting Procedures

①The lifting process must strictly follow the lifting diagram. For details, refer to Figure 4-6;
②The lifting must be carried out vertically; dragging on the ground is prohibited;
③ After the cabinet body is lifted approximately 300 mm off the ground, pause movement and inspect the lifting equipment connections. Only proceed with lifting once the connections are confirmed secure;
④ The entire lifting process should be conducted slowly, with close attention to the cabinet body's balance. Excessive movement speed is prohibited;
⑤ Standing beneath the cabinet body or crane during the entire lifting process is strictly prohibited;
⑥ The same procedures apply to the combiner cabinet;

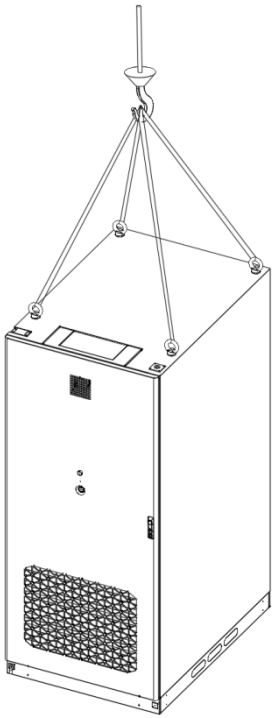


Figure 4- 6Energy Storage Cabinet Lifting Diagram

4.4 Storage Requirements

The energy storage cabinet is recommended to be stored indoors, away from direct sunlight and rain, in a dry, well-ventilated environment. The surrounding area must be clean, free of significant infrared or other radiation, organic solvents, corrosive gases, and conductive metallic dust, and kept away from heat and fire sources.

⚠ CAUTION

- When storing the energy storage cabinet, it must be placed correctly according to the markings on the packaging box. Placement upside down, sideways, or at an incline is strictly prohibited.
- During storage, the energy storage cabinet must be disconnected from all external connections, and its indicator lights should be turned off.
- Storage Environment Requirements:

No.	Item	Parameters
1	Average Daily Storage Temperature	≤30°C
2	Permissible Storage Temperature	Short-term Storage Temperature Range (within 1 month): -20°C ~ 45°C Long-term Storage Temperature: 0°C ~ 35°C
3	Storage Humidity	≤95%, non-condensing

Table 4-1 Storage Environment Requirements

5. Equipment Installation and Operation

5.1 Precautions before Installation

⚠ CAUTION

- To prevent equipment overturning, secure the box containing the equipment to the forklift with ropes before moving. Handle the equipment carefully; impacts or drops may cause damage.
- When removing the outer packaging, please implement protective measures for work at height. Once the equipment is positioned, carefully remove the packaging to avoid damaging the equipment. Ensure the equipment remains stable during the packaging removal process.
- If the installation environment is unfavorable, after removing the packaging, apply dustproof and anti-condensation measures (such as using dust covers, plastic films, or fabric coverings) to prevent internal battery condensation or dust buildup that could cause corrosion and failure.

5.2 Preparations before Installation

5.2.1 Installation Environment Requirements

The energy storage system installation environment shall comply with the following requirements:

Project Content	Environmental Requirements
Installation Site Requirements	Indoor or outdoor locations that are spacious and well-ventilated
	Necessary fireproofing, waterproofing, and rodent-proofing treatments
	The ground on which the Cabinet Body is placed must have a flatness deviation ≤ 5 mm/m, preferably a concrete hardened surface (Strength ≥ C30) or Steel Structure Platform, with a uniformly distributed load capacity ≥ 2,000 kg/m².
Foundation Requirements	The installation surface must be flat and dry; installation is prohibited on soft soil, filled areas, or low-lying sites prone to water accumulation.
	The placement ground must have a flatness deviation ≤ 5 mm/m, preferably a concrete hardened surface (Strength ≥ C30) or Steel Structure Platform, with a uniformly distributed load capacity ≥ 2,000 kg/m².
Space Requirements	Adequate space must be maintained at the front, back, both sides, and above the equipment to allow for ventilation and maintenance.
Ambient Temperature	-20 to 45℃
Relative Humidity	≤95%, no condensation
Altitude	≤2,000m

Table 5- 1 Installation Environment Requirements

5.2.2 Installation Site Requirements

The energy storage equipment shall be installed on concrete or other non-combustible surfaces. The installation surface must be level, stable, flat, and have sufficient load-bearing capacity. Depressions or tilting are strictly prohibited.

When constructing the foundation, the equipment's cable outlet requirements must be considered. Cable trenches or other outlet openings shall be reserved. Since the equipment features bottom cable outlets, cables must be routed through the trench. Therefore, an on-site trench must be pre-installed. The following requirements apply to the trench: it must be equipped with necessary waterproof and moisture-proof designs to prevent cable aging and short circuits, which could affect the normal operation of the energy storage equipment.

Due to the high power of the equipment, thicker cables are required; therefore, the trench design must fully consider the cable cross-sectional area.

The customer may determine the number of cable brackets as needed; the brackets must fully account for the weight and dimensions of the equipment.

When laying cables, communication cables, power cables, and current cables must be segregated. DC and AC circuits must be laid separately, with a minimum spacing of 300 mm between different cables.

The installation site should have a dry climate, adequate ventilation, and be situated away from Class A factories or flammable and explosive areas.

The foundation soil must possess sufficient compaction. It is recommended that the relative compaction of the installation site soil exceeds 98%. If the soil is loose, appropriate measures must be implemented to ensure foundation stability.

The spatial requirements for the energy storage cabinet installation are illustrated below: a distance of 1.5 meters between the rear of the cabinet and the isolation barrier, 2 meters between the front of the cabinet and the isolation barrier, and 1 meter on each side between the cabinet and the isolation barrier. Specific installation distances shall comply with applicable local design and installation codes.

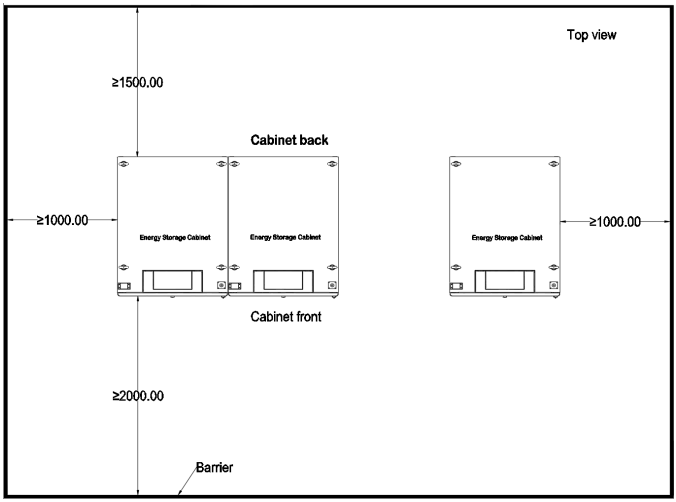


Figure 5- 1 Space Requirements for Energy Storage Cabinet Installation Site

5.2.3 Equipment Ventilation Requirements

Operation of the energy storage equipment generates substantial heat. Excessive equipment temperature can lead to deterioration of the electrical parameters of the energy storage equipment and may cause damage. To ensure adequate heat dissipation, the installation environment must meet the following requirements:

① Equipment shall be installed in a well-ventilated environment.

② The air inlet must guarantee an adequate supply of fresh air.

③ It is recommended that the equipment's ventilation system be separated from other ventilation systems in the control room.

If overheating of the equipment is detected, verify that the ventilation openings are unobstructed and properly ventilated.

The integrated energy storage battery cabinet utilizes a front air intake and rear air exhaust design; the locations of the air inlet and outlet are illustrated in the figure below.

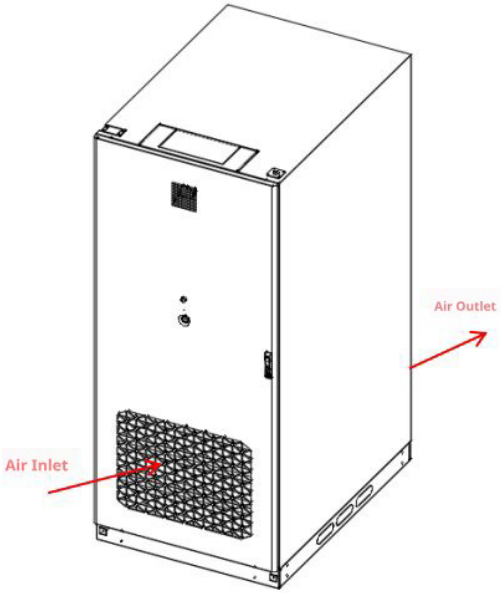
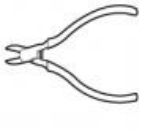
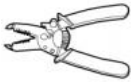
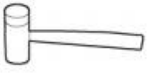
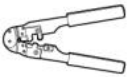


Figure 5- 2 Illustration of Equipment Air Inlet and Outlet

5.2.4 Installation Tools Description

Prior to equipment installation, prepare the following tools:

- The tools shown are for reference only; please refer to the actual items.
- Due to varying onsite conditions, this tool list does not fully enumerate all tools that may be required. Installation personnel and users should prepare additional tools as necessary according to actual conditions.

Installation Tools			
 Insulated Phillips torque screwdriver	 Insulated torque socket wrench (including extension bar) Socket specifications: 7 mm to 19 mm Socket depth ≥ 32 mm Socket interface matched to torque wrench Torque range: 1.2 N·m to 45 N·m	 Flat blade insulated torque screwdriver	 Diagonal cutting pliers
 Wire stripper	 Wire cutter	 Rubber mallet	 Utility knife
 RJ45 crimping pliers	 Hydraulic pliers	 Needle-nose pliers	 Marker pen
 Steel tape measure	 Spirit level	 Multimeter DC voltage range ≥ 1500 V	 Impact drill
 Impact drill bit Φ16 mm	 Heat shrink tubing	 Hot air gun	 Cable tie
 Insulating ladder (height ≥ 1.7 m)	 Lifting rope length ≥2110 mm×4	 Vacuum cleaner	 Powered forklift (forklift load capacity ≥ 3 t) Recommended fork length ≥ 1,800 mm Width 230 mm~300 mm Thickness 25 mm~80 mm)
 Crane (lifting capacity ≥ 3 t; working radius ≥ 2 m)	-	-	-

Protective equipment			
 Insulating gloves	 Protective gloves	 Protective goggles	 Dust mask
 Insulating shoes	 Reflective Vest	 Safety Helmet	 Safety Belt

Table 5- 2 Description of Installation Tools

5.3 Installation Procedure

Step 1: After placing the energy storage cabinet in the designated location, secure the cabinet body base using M12 bolts, as shown in Figures 5-3 and 5-4 below:

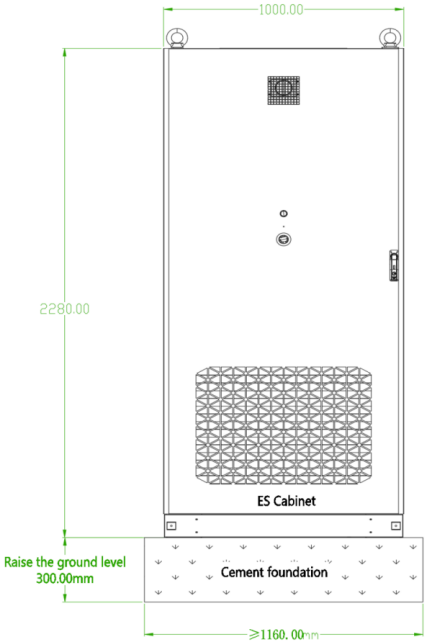


Figure 5- 3 Energy Storage Cabinet Fixing Diagram

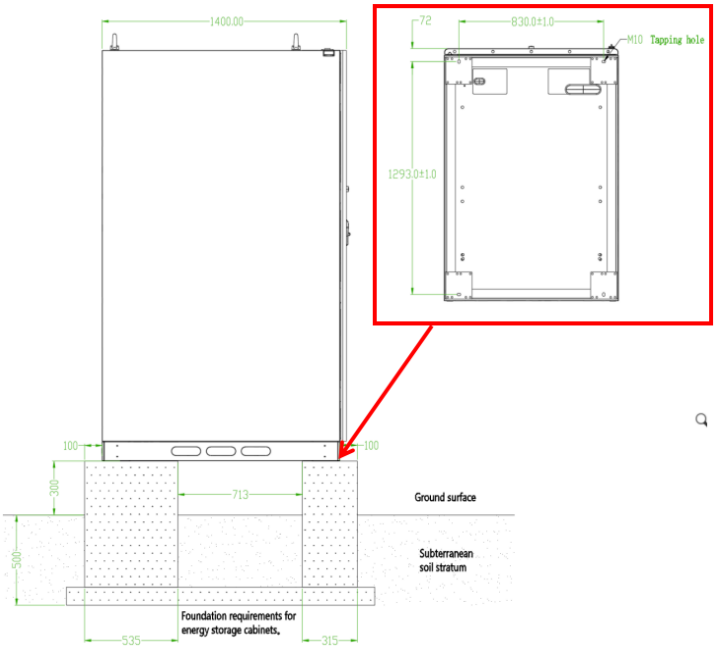


Figure 5- 4 Base Fixing Diagram

Note: If a combiner cabinet is present, after placing it in the designated location, secure the cabinet body base using M12 bolts, as shown in Figures 5-5 and 5-6 below:

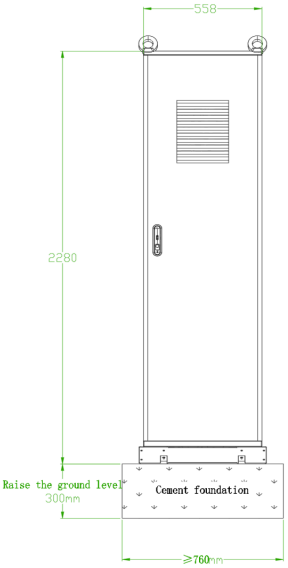


Figure 5- 5 Combiner Cabinet Fixing Diagram

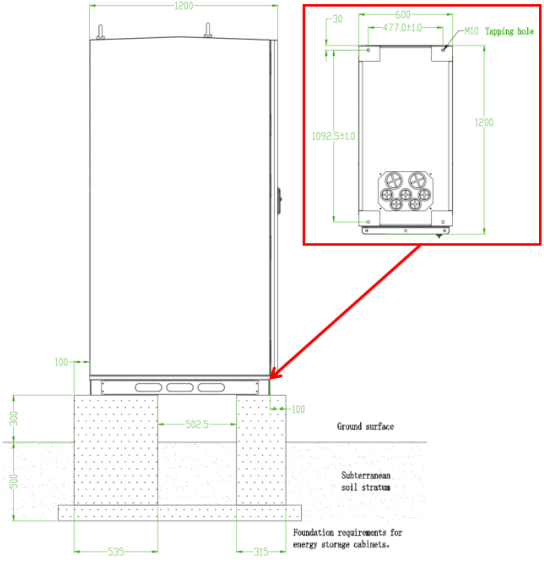


Figure 5- 6 Combiner Cabinet Base Fixing Diagram

Step 2: Cabinet Grounding

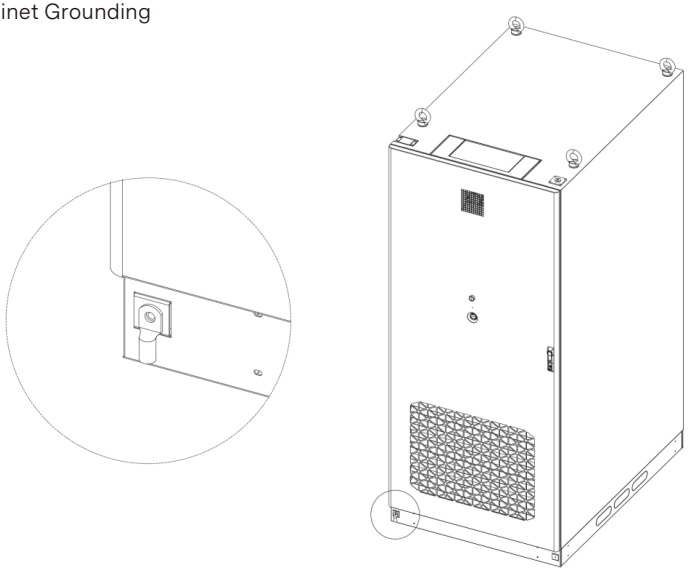


Figure 5- 7 Grounding Location Diagram

Note: If the grounding copper busbar inside the cabinet is already properly grounded, grounding at this point is not required. Refer to the following for specific wiring harness specifications, and consult the cabinet cable selection table.

Step 3: Internal Cabinet Wiring

The A/B/C three-phase, N line, and PE line are shown in the figure. Wiring should be performed according to the schematic in Figure 5-8. The tightening torque for each phase sequence is listed in Table 5-1.

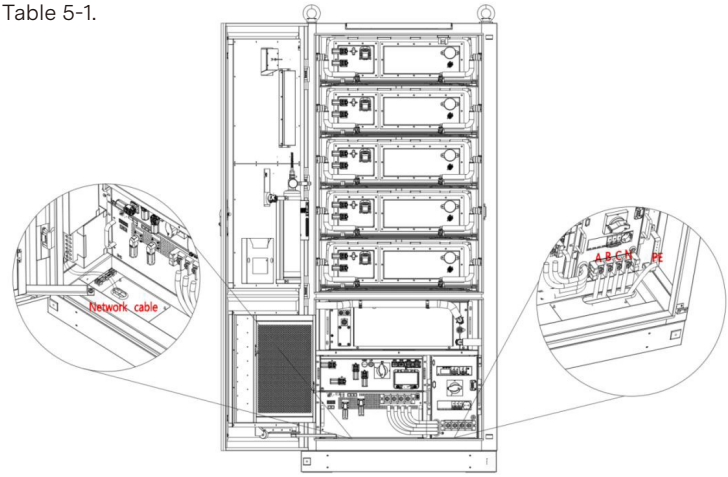


Figure 5- 8 Schematic Diagram of Internal Wiring for the Energy Storage Cabinet

Step 4: After completing the grid wiring, install the sealing plates around the equipment base.

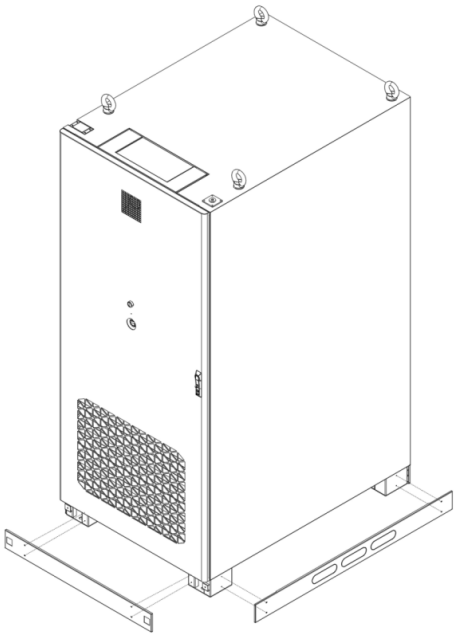


Figure 5- 9 Sealing Plate Installation

Step 3: Internal Cabinet Wiring

The A/B/C three-phase, N line, and PE line are shown in the figure. Wiring should be performed according to the schematic in Figure 5-8. The tightening torque for each phase sequence is listed in Table 5-1.

Phase Sequence	Thread Specification	Torque Requirement (NM)
N	M4	1.5
	M6	5
	M8	15
PE	M4	1.5
	M6	5
	M8	15
A/B/C	M10	25
	M12	45
	M14	70

Table 5- 3 Locking Torque Requirements for Each Phase Sequence

Note: If a Combiner Cabinet is present, the wiring locations are shown in Figure 5-10 below. User grid connection point cables must be connected to the copper bars A, B, and C above the circuit breaker and N, PE below it. Cables from the Energy Storage Cabinet to the Combiner Cabinet must be connected to the copper bars A, B, C, N, and PE below the circuit breaker. The locking torque for each phase sequence is specified in Table 5-4.

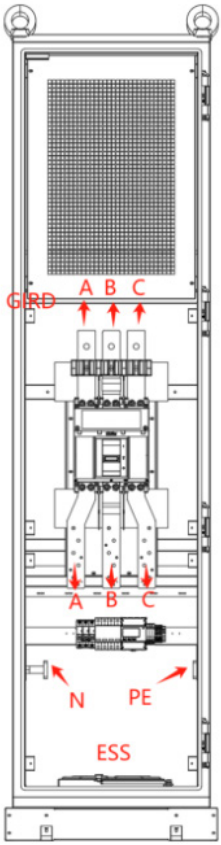


Figure 5- 10 Combiner Cabinet Internal Wiring Diagram

Phase Sequence	Thread Specification	Torque Requirement (NM)
N	M8	15
	M10	25
PE	M8	15
	M10	25
A/B/C	M10	25
	M12	45
	M14	70

Table 5- 4Locking Torque Requirements for Each Phase Sequence

Note: On-site, select appropriate distribution cables according to the number of Energy Storage Cabinets; refer to the table below:

No.	Number of Cabinets in Parallel	Cable Specifications (Copper Cable Recommended)	Remarks
1	1 Main Cabinet	3*95mm²+50mm² (N) +50mm²(PE)	No Combiner Cabinet
2	1 Main Cabinet + 1 Slave Cabinet	2*(3*95mm²+50mm²(N) +50mm²(PE))	1 Combiner Cabinet
3	1 Main Cabinet + 2 Slave Cabinets	3*(3*95mm²+50mm²(N) +50mm²(PE))	1 Combiner Cabinet
4	1 Main Cabinet + 3 Slave Cabinets	4*(3*95mm²+50mm²(N) +50mm²(PE))	1 Combiner Cabinet
5	1 Main Cabinet + 4 Slave Cabinets	5*(3*95mm²+50mm²(N) +50mm²(PE))	2 Combiner Cabinets
6	1 Main Cabinet + 5 Slave Cabinets	6*(3*95mm²+50mm²(N) +50mm²(PE))	2 Combiner Cabinets
7	1 Main Cabinet + 6 Slave Cabinets	7*(3*95mm²+50mm²(N) +50mm²(PE))	2 Combiner Cabinets
8	1 Main Cabinet + 7 Slave Cabinets	8*(3*95mm²+50mm²(N) +50mm²(PE))	2 Combiner Cabinets

Table 5- 5 Parallel Cabinet Cable Selection Reference Table

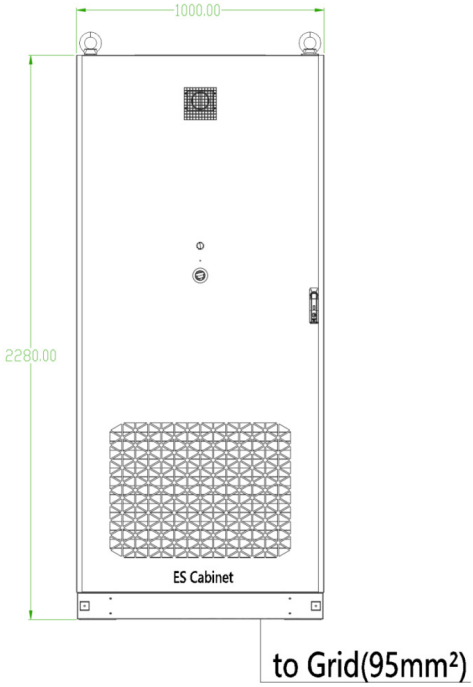


Figure 5- 11 Single Energy Storage Cabinet Connection Diagram

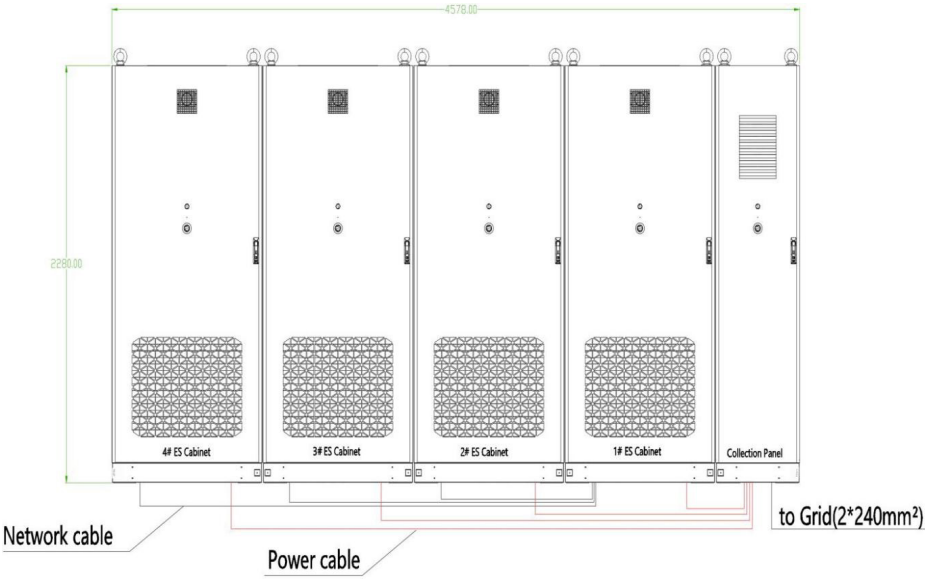


Figure 5- 12 Multiple Energy Storage Cabinets Connection Diagram

DANGER

- Smoking and open flames are prohibited near the Energy Storage Cabinet.
- The site must be equipped with compliant fire-fighting equipment such as fire sand, carbon dioxide extinguishers, and water-based fire-fighting materials.
- Please use dedicated protective equipment and insulated tools to prevent electric shock injuries or short-circuit faults.

CAUTION

- When connecting the energy storage cabinet, ensure terminal connections are tight and cables are undamaged.
- All cable colors in the electrical connection diagrams in this chapter are for reference only. Cable selection must comply with local cable standards (yellow-green bi-color cables may only be used for protective grounding).

5.4 Commissioning

5.4.1 Pre-Power-On Inspection

No.	Inspection Items	Acceptance Criteria
1	Equipment Appearance	● The equipment appearance must be intact, without damage, rust, or paint peeling. If paint peeling occurs, repainting must be performed. ● Equipment labels are clearly visible; damaged labels must be replaced promptly.
2	Cable Appearance	● The cable protective sheath is intact without visible damage. ● The conduit and cable flexible hoses are intact.
3	Cable Connections	● Cable connection points conform to the design. ● Terminal fabrication meets standards; connections are secure and reliable. ● Both ends of each cable have clear and unambiguous labels, consistently oriented.
4	Cable Routing	● Routing complies with the principle of separating high- and low-voltage cables. ● Cable ends are cut cleanly with no exposed burrs or sharp edges. ● Appropriate slack is maintained at bends as required; cables must not be taut. ● Wiring is straight and smooth, with no cable crossings inside the cabinet.
5	Cabinet Grounding	The grounding conductor is reliably connected to the cabinet grounding terminal.
6	Sealing of Cable Passage Holes	The cable passage holes have been sealed.
7	Switch	All switches are in the off (open) position.

Table 5- 6 Pre-Power-On Inspection Items

5.4.2 Power-On Operation Procedure

1. Pre-Power-On Inspection

⚠ DANGER

- Check for any leakage on the pack baseplate inside the battery compartment, leakage at the liquid cooling pipeline connections to the pack inlet/outlet, or leakage at the liquid cooling pipeline connections to the liquid cooling unit inlet/outlet. If leakage is detected at any of the above locations, please contact the manufacturer's after-sales service and do not proceed with the power-on operation.
- Please wear insulating gloves and use insulated tools to prevent electric shock or short circuit hazards.

⚠ CAUTION

- The AC power input terminals (A, B, C, N, PE) must be properly connected and securely fastened.
- Before powering on, ensure that the power cables from the PACK to the High Voltage Box (B+, B-) are properly connected.
- Monitor the system continuously during the power-on process; if any abnormal conditions are detected, immediately power down the Energy Storage System, identify the cause, and only proceed with powering on after the issue is resolved.
- If the circuit breaker inside the Energy Storage System trips, first inspect the corresponding load side, confirm there is no short circuit or fault, and then perform the closing operation to prevent fault escalation and safety risks.

2. Power-On Operation Steps

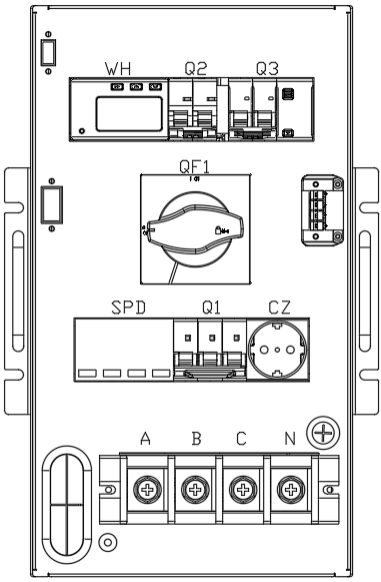


Figure 5- 13 Distribution Box Diagram

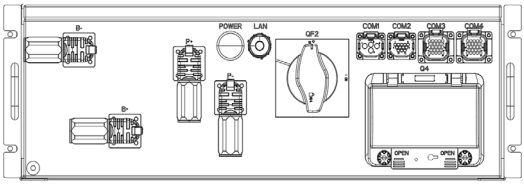


Figure 5- 14 High Voltage Box Diagram

Step 1:

Before the first power-on, parameter confirmation must be performed using the host computer:

1. Close the Q4 switch in the high voltage box and verify that the POWER indicator light is on; after confirmation, start the local host computer and read the BCS configuration information (specifically refer to Appendix 1, section 2.2.2: Parameter Configuration). Compare the retrieved information with the configuration table provided by our sales department to ensure consistency. If discrepancies are found, please contact our technical support.
2. Once the information is confirmed to be correct, customized information configuration (cabinet number, local communication) can be performed.

Step 2:
Before closing the AC circuit breaker QF1 in the distribution box, use a multimeter set to resistance (ohm) mode to check that the three-phase lines A, B, and C at the distribution box input terminals are not incorrectly shorted to each other; verify that none of the three-phase lines A, B, or C are shorted to the ground or neutral lines; confirm that the phase sequence of A, B, and C matches the external wiring phase sequence; and ensure the ground and neutral lines are properly connected.

Step 3:
Close the main circuit breaker and the lightning protection switch of the Combiner Cabinet (if applicable).

Step 4:
Close the AC main circuit breaker QF1 in the High Voltage Box and the DC main circuit breaker QF2 in the Distribution Box; the power meter will activate and the display screen will illuminate. The PCS connection indicator will also light up (flashing or red at this stage).

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