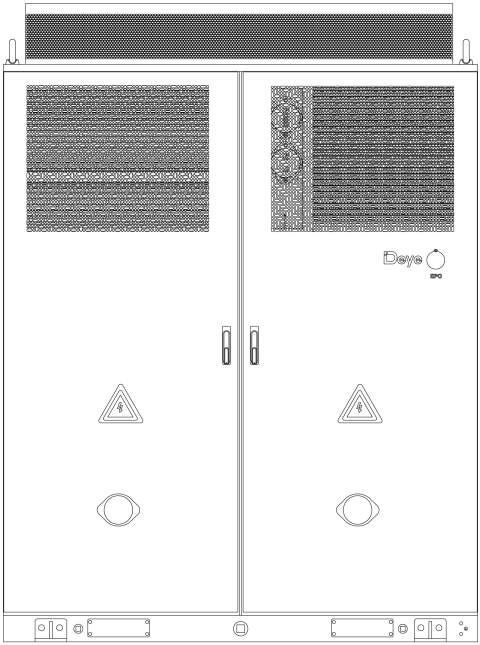
User Manual

Rechargeable Li-ion Battery Storage System
MC-L522-2H2/3



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Preface

This manual provides information on safety, installation, electrical connection, operation, maintenance, and other relevant aspects of the product.

In this manual, the terms “equipment”, “device”, and “product” refer to the product or its components; the terms “manufacturer”, “producer”, and “the Company” refer to NINGBO DEYE ESS TECHNOLOGY CO., LTD. (hereinafter referred to as the “Company”) or its authorized agents.

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The Company assumes no liability for any losses arising outside the scope of the warranty policy.

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NINGBO DEYE ESS TECHNOLOGY CO., LTD. hereby confirms that the products described in this document comply with the fundamental requirements and other relevant provisions of the applicable EU directives.

Vulnerability Reporting & Security Advisories

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Contents

1 Safety 1
1.1 Symbols 1
1.2 Safety Precautions 3
2 Product Introduction 7
2.1 Product Overview 7
2.2 Application Scenarios 7
2.3 Product Appearance 8
2.4 Internal Structure 9
2.4.1 Battery Pack 11
2.4.2 PCS 11
2.4.3 DC PDU 12
2.4.4 AC Combiner Box 13
2.4.5 Thermal Management System (TMS) 13
2.4.6 Fire Suppression System 15
3 Transportation 19
3.1 Safety Precautions 19
3.2 Transportation Modes 20
3.3 Equipment Handling 21
3.3.1 Forklift 22
3.3.2 Hoisting 23
4 Installation 26
4.1 Pre-Installation Preparation 26
4.1.1 Site Requirements 26
4.1.2 Foundation Requirements 30
4.1.3 Tool Requirements 33
4.2 Unpacking 34
4.3 Installation Procedures 37
4.3.1 Install Cabinet Mounting Feet 37
4.3.2 Install the Top Air Outlet Cover 39
4.3.3 Install the Forklift Pocket Cover 40
5 Electrical Connection 41
5.1 Safety Precautions 41
5.2 Access the Cabinet Interior 42
5.2.1 Open the Cabinet Door 42
5.2.2 Remove the Protective Baffle 42

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5.2.3 Prepare the Cable Inlet 43
5.3 Cable Preparation 43
5.3.1 Recommended Cables 43
5.3.2 Terminal Crimping 44
5.4 Equipment Grounding 45
5.5 Connect Auxiliary Power Cables 46
5.6 Connect Signal Cables (Dry Contact) 47
5.7 Connect Communication Cables 48
5.8 Connect Main Power Cables 51
5.9 Post-Connection Procedure 53
5.9.1 Reinstall the Protective Baffle 53
5.9.2 Apply Fire-Proof Mud 53
6 Operation 54
6.1 Check Before Power-On 54
6.2 Power-On 55
6.2.1 Normal Power-On Procedure 57
6.2.2 Black Start Procedure 57
6.3 Power-Off 58
6.3.1 Normal Power-Off Procedure 58
6.3.2 Emergency Power-Off Procedure 58
7 Product Monitoring 59
7.1 Energy Management System 59
7.2 DEYE ESS APP 59
8 Maintenance 60
8.1 Safety Precautions 60
8.2 Maintenance Schedule 61
8.3 Post-Maintenance Requirements 62
8.4 Storage 63
9 Technical Specifications 65
Appendix I Troubleshooting 66
Appendix II Emergency Handling 67

1 Safety

1.1 Symbols

Symbols	Description
	Warning; Electricity
	General Warning
	Warning; Hot surface
5 min	5 min remaining before operation
	Separate collection for waste electrical and electronic equipment is required
	Refer to instruction manual
	Operator's manual
	No chasing
	No open flame; Fire, open ignition source and smoking prohibited
	Do not touch
	Do not step on the equipment
	General symbol for recovery/recyclable
	Warning; Explosive material
+ −	Polarity

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	Class 9 Miscellaneous Dangerous Goods Label for Lithium ion Batteries
	This way up
	Fragile
	Keep away from rain
	Do not roll
	Do not stack
	Center of gravity
	Insert the forklift forks at the position indicated
	No stepping on surface
	Connect an earth terminal to the ground
CE	CE mark of conformity

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1.2 Safety Precautions

This manual uses the following signal words to indicate imminently or potentially hazardous situations. Observe all safety instructions to avoid personal injury, property damage, or equipment malfunction.

Symbols	Description
⚠ **DANGER**	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ **WARNING**	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ **CAUTION**	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTE	Indicates supplementary explanation, clarification, or emphasis on a particular content for better understanding.

Personal safety

⚠ **DANGER**

- Keep the battery storage system out of reach of children and animals.
- Only personnel authorized by the company are permitted to repair or disassemble the system. Unauthorized operations may cause fatal electric shock.

⚠ **WARNING**

- Wiring and electrical connections must be performed by personnel with knowledge of electronics, electrical wiring, and mechanics, and who are familiar with the electrical and mechanical schematics of this equipment.
- In case of electrolyte contact with eyes or skin, flush thoroughly with clean water for at least 10 minutes and seek immediate medical attention.

⚠ **CAUTION**

- Personnel planning to install, operate, or maintain this equipment must:
  - Read, understand and strictly comply with all safety instructions specified in this manual and relevant document.
  - Follow applicable local standards and regulations.
  - Be qualified professionals or trained personnel (as defined in the NOTE below).
- Avoid direct contact with equipment components to prevent scalding caused by high temperatures generated during malfunction.

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NOTE

- Qualified professionals: Personnel familiar with the working principles and structure of the equipment, who have received training or have operation experience, and are fully aware of the sources and risk levels of potential hazards during equipment installation, operation and maintenance.
- Trained personnel: Personnel who have completed technical and safety training, have qualified practical operation experience, are aware of potential hazards to themselves and others during specific operations, and are capable of taking protective measures to minimize those hazards.

Electrical Safety

DANGER

- Dangerous lethal high voltage is present inside the unit. Contact with live terminals and internal charged parts will result in fatal electric shock.

WARNING

- Before any installation, maintenance or inspection work, cut off and isolate all external and internal power sources. Confirm the unit is fully de-energized before operation.
- The battery may retain charge even after power disconnection. Wait for at least 5 minutes and verify zero voltage with a standard professional voltmeter before any operation.
- The battery system must be reliably grounded with a grounding resistance complying with local regulations.
- During all operations, use insulated tools and wear personal protective equipment. Remove all metal accessories such as watches and rings.
- Keep terminals away from exposed wires and metal objects.
- Do not place any tools or metal parts on the battery module or high-voltage control box.
- All adjacent exposed live parts must be fully covered and shielded with insulating materials.
- Connecting batteries of different models is strictly prohibited.

CAUTION

- Ensure correct wiring. Distinguish positive and negative poles strictly to prevent short circuits with external devices.

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- Do not use faulty or incompatible power conversion equipment.
- Verify that battery system parameters are fully compatible with connected equipment.

Mechanical Safety

DANGER

- Installation or operation of the battery system in explosive or high-humidity areas is strictly prohibited.

WARNING

- Do not insert foreign objects into any part of the equipment.
- Set up standard warning signs and safety barriers near the equipment to prevent accidents caused by mis-operation or unauthorized access.

CAUTION

- Route all cables in designated positions. Exposed and irregular cable layout is susceptible to mechanical damage.

NOTE

- Maintain a State of Charge (SOC) above 5% during use. Recharge within 48 hours after full discharge to avoid over-discharging.

Maintenance Safety

DANGER

- Disassembling, modifying, or opening the battery is strictly prohibited.

WARNING

- Fully de-energize the battery unit before equipment relocation or any maintenance work.
- All battery terminals and circuit connectors must be disconnected before maintenance.
- Maintenance shall follow the sequence: equipment de-energization, lockout/tagout to prevent re-energization, zero-voltage verification, residual charge discharge and equipment grounding, and insulation shielding of adjacent live parts.
- Failure to observe warnings, improper installation, or operation by untrained

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personnel will lead to potential safety hazards.

NOTE

- Do not paint any internal or external components of equipment.
- Do not clean batteries with cleaning solvents.
- The battery storage system should be commissioned no later than six months after delivery.

Environmental Safety

DANGER

- Open flames, sparks, and other ignition sources must be kept away from the system at all times.
- Damaged or failed batteries may leak electrolyte and produce hazardous substances such as hydrofluoric acid, which may cause severe chemical burns.

WARNING

- Do not expose the battery to flammable substances, corrosive chemicals, or their vapors.
- Do not submerge the battery in water or expose it to excessive moisture. The ingress protection rating of the equipment is only valid for fully assembled and intact configuration.
- If a battery is damaged or leaking, avoid direct contact with the substance. Contact technical support or a qualified recycling facility immediately for proper handling.

NOTE

- Where this manual does not cover a specific scenario, applicable safety regulations and occupational health standards shall prevail.
- You are obliged to handle waste batteries in compliance with applicable regulations, including removing any personal data from associated devices, and to return them to a designated or authorized recovery point. Used batteries must never be disposed of as household waste.
- Batteries contain important recyclable raw materials such as iron and lithium.

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2 Product Introduction

2.1 Product Overview

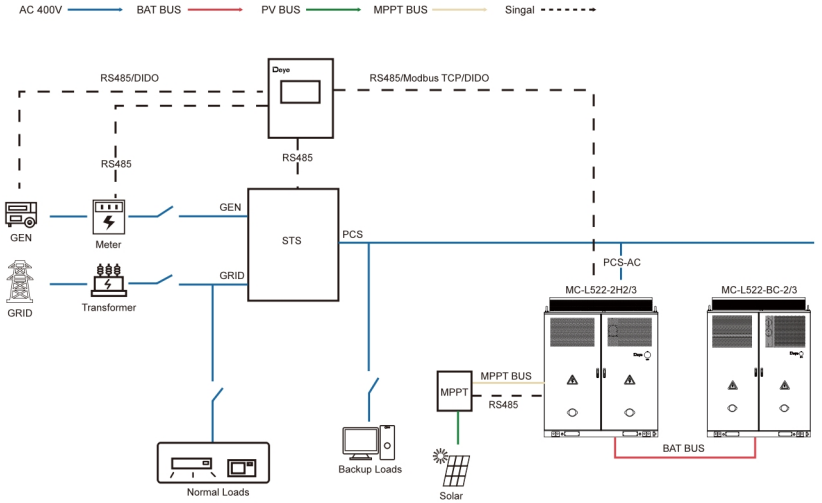
The Rechargeable Li-ion Battery Storage System mainly consists of lithium battery packs, a PCS, an AC combiner box, a DC power distribution unit, a thermal management system, and a fire suppression system.

It plays a significant role in reducing electricity costs, ensuring power reliability, integrating renewable energy, and optimizing energy management.

2.2 Application Scenarios

The battery storage system, when integrated with the MC-L522-2H2/3 and an MPPT/STS cabinet, enables a complete on-grid/off-grid switching system. This architecture supports a full-scenario microgrid application that integrates solar PV, energy storage, the energy management system (EMS), and a diesel generator. For other possible system architectures tailored to specific requirements, please consult your system integrator

A grid-tied application scenario integrating PV, energy storage system, EMS, and diesel generators is shown below.



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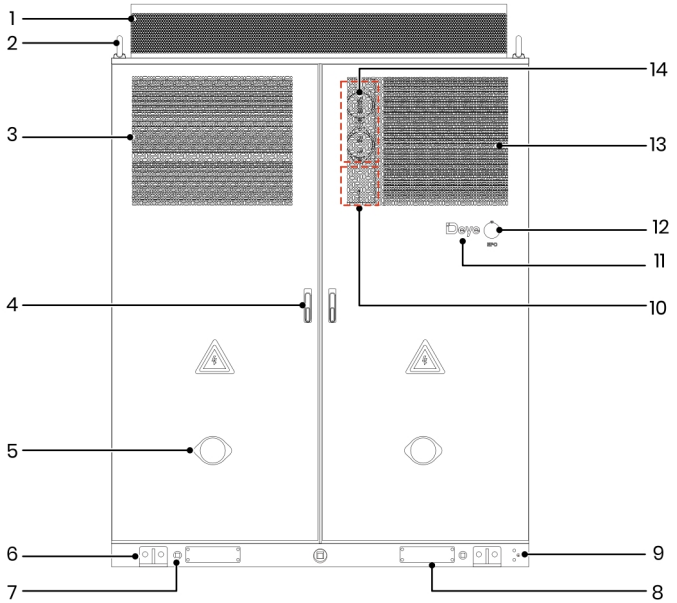
2.3 Product Appearance

Front View



No.	Item	No.	Item
1	Liquid Cooling Unit Air Outlet/PCS Air Outlet/Battery Pack Explosion Relief Vent	8	Forklift Pocket
2	Eye Bolt	9	Protective Earth Terminal
3	Liquid Cooling Unit Air Inlet	10	Audible and Visual Alarm
4	Door Lock	11	Status Indicator*
5	Intake Fan	12	EPO (Emergency Power Off) Button
6	Cabinet Mounting Feet	13	PCS Air Inlet
7	Drain Outlet	14	Exhaust Fan

***Status Indicator**

The status indicator Deye indicates the operating status with different colors.

Color	Description
Blue	The system is in standby or discharge mode.
Green	The system is in charge mode.
Yellow	An alarm has been triggered.
Red	A fault has been detected and the system enters the protection mode.

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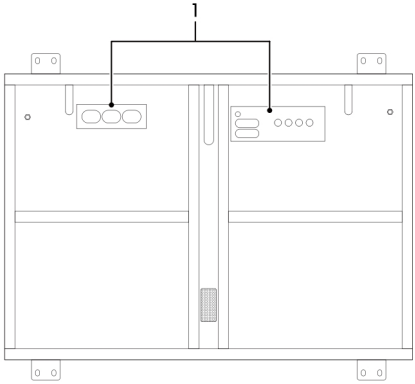
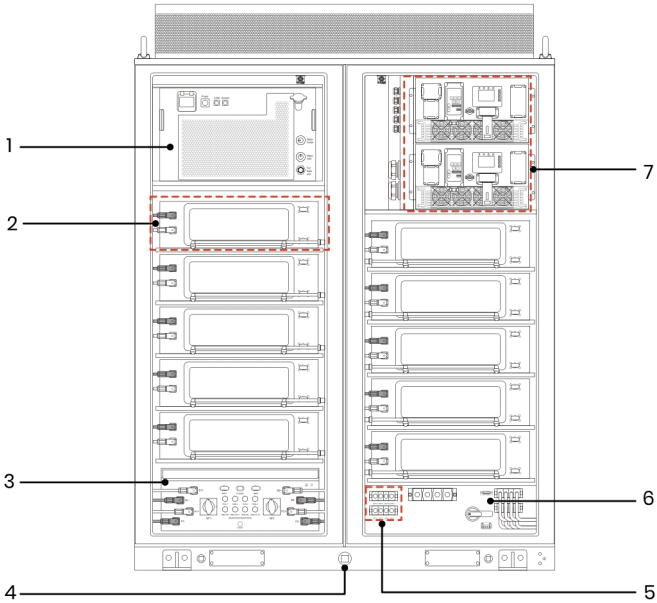
Bottom View



No.	Item
1	Cable Inlet

2.4 Internal Structure

Internal Front View



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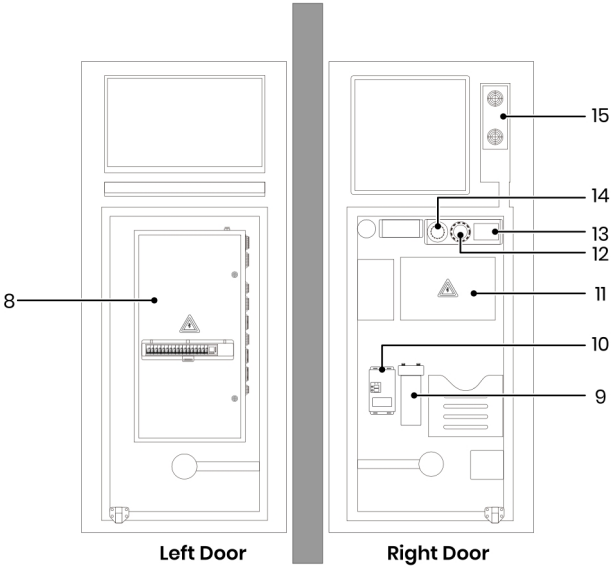

No.	Item	No.	Item
1	Liquid Cooling Unit	9	Aerosol Device
2	Battery Pack ×10	10	Dehumidifier
3	DC PDU (Power Distribution Unit)	11	Lead-Acid Battery
4	Sprinkler System External Connector	12	Smoke Detector
5	DC Parallel Combiner Unit (BAT & MPPT terminals)	13	CO Detector
6	AC Combiner Box	14	Heat Detector
7	PCS (Power Conversion System)	15	Exhaust Fan
8	Control Box	/	/

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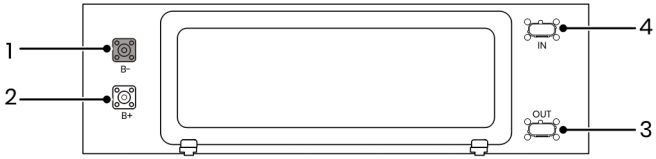
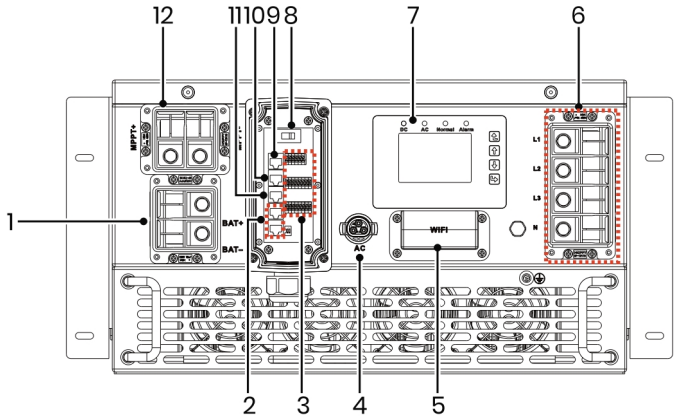
2.4.1 Battery Pack



No.	Item	Description
1	B-	Battery module positive terminal (Black)
2	B+	Battery module negative terminal (Orange)
3	COMMIN	Battery module communication and power output interface.
4	COMMOUT	Battery module communication and power input interface.

2.4.2 PCS



No.	Item	No.	Item
1	Battery Input Port	7	Display Screen*
2	Parallel Port	8	Auxiliary Power Switch
3	Function Port	9	LCD 485 Port
4	Auxiliary Power Port	10	BATBMS Port
5	Interface for logger	11	MPPT CAN Port
6	AC Input/Output Port	12	MPPT Input Port

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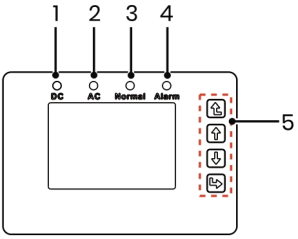
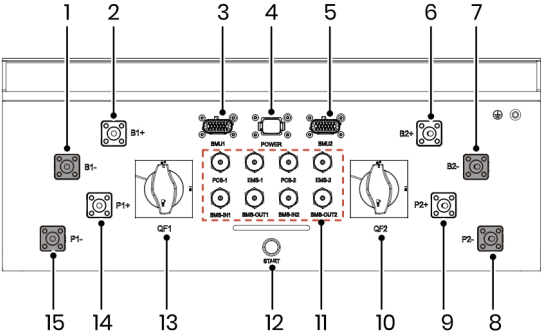
***Display Screen**



No.	Item	Description
1	DC Indicator	Green light steady on when DC power is input.
2	AC Indicator	Green light steady on when AC power is input.
3	Normal Indicator	Green light steady on when the inverter operates normally.
4	Alarm Indicator	Red light steady on when the inverter is faulty.
5	Function Button	/

2.4.3 DC PDU



No.	Item	Description
1	B1-	Negative battery input terminal
2	B1+	Positive battery input terminal
3	BMU1	BMS-BMU communication port
4	POWER	DC24V PDU control power input/output interface
5	BMU2	BMS-BMU communication port
6	B2+	Positive battery input terminal
7	B2-	Negative battery input terminal
8	P2-	Negative PCS input terminal

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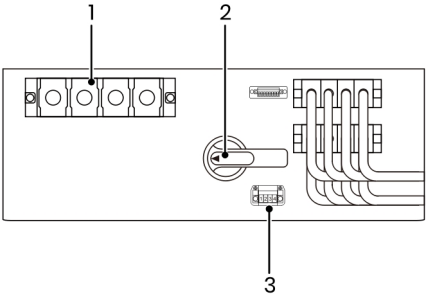
9	P2+	Positive PCS input terminal
10	QF2	BAT MCCB (Molded Case Circuit Breaker)
11	PCS-1/PCS-2	RJ45 port for Battery-PCS closed-loop communication
	EMS-1/EMS-2	BMS-EMS communication port
	BMS-IN1/BMS-OUT1; BMS-IN2/BMS-OUT2	Communication port for parallel connection of multiple DC PDUs
12	START	Press to start up or shut down the DC PDU
13	QF1	BAT MCCB
14	P1+	Positive PCS input terminal
15	P1-	Negative PCS input terminal

2.4.4 AC Combiner Box



No.	Item	Description
1	AC Grid Port	L1/L2/L3/N terminals for AC grid input
2	AC Circuit Breaker	AC main breaker for circuit protection and isolation.
3	AC Auxiliary Power Output Port	Output port for 220V AC auxiliary power

2.4.5 Thermal Management System (TMS)

The thermal management system consists of a liquid cooling system for battery packs, an air cooling system for PCS and dehumidifiers.

The liquid cooling system adopts liquid as the cooling medium to absorb and dissipate heat and realize consistent thermal conditions throughout the system with dehumidifiers preventing condensation from forming inside the cabinet.

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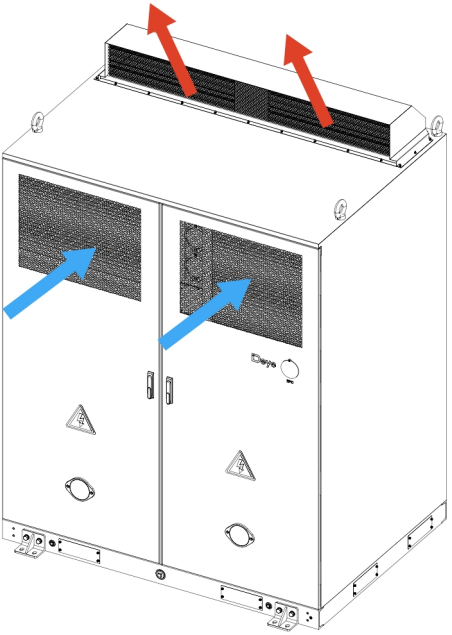
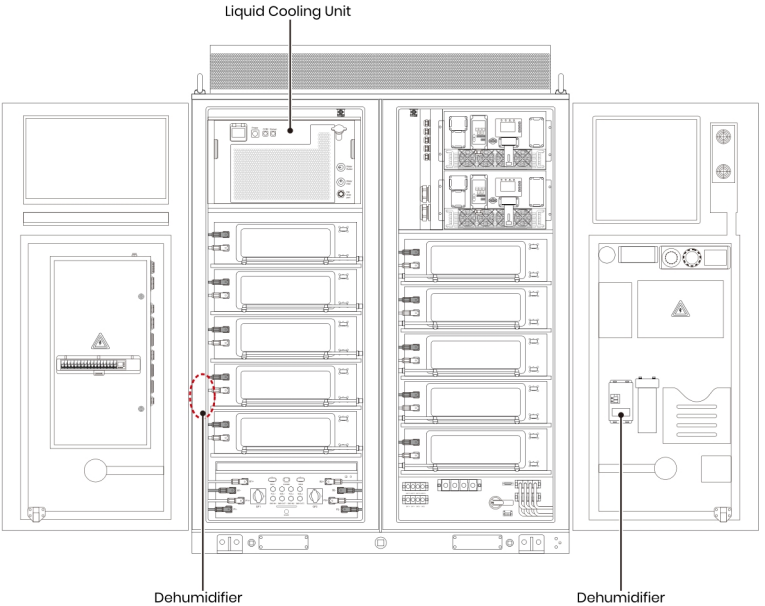
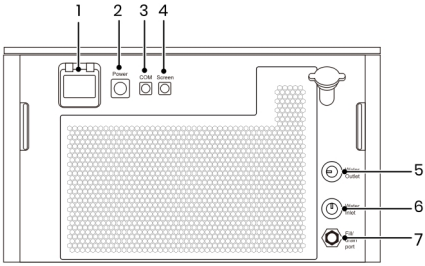
Air Cooling System of PCS



Liquid Cooling System of Battery Packs



Liquid Cooling Unit



No.	Item	Description
1	MCB (Miniature Circuit Breaker)	Manual on/off control for the liquid cooling system
2	POWER	Power supply input (230 V AC, 50/60 Hz)
3	COM	Communication port for connection to the master computer
4	Screen	Port for commissioning
5	Water Outlet	The liquid cooling system's output port for delivering coolant to the battery
6	Water Inlet	A port that the coolant flows through and returns to the liquid cooling system after circulation
7	Fill/Drain Port	Coolant fill and drain port

2.4.6 Fire Suppression System

The fire suppression system consists of a fire alarm system and aerosol fire extinguishing system, an CCR (Combustible Concentration Reduction) system, and a sprinkler system.

Fire Alarm System and Aerosol Fire Extinguishing System

The system is equipped with a heat detector, a smoke detector, and audible/visual alarm devices. Detectors will initiate an alarm signal once abnormal conditions are detected. The alarm signal interlocks with the aerosol fire extinguishing system to perform fire extinguishing.

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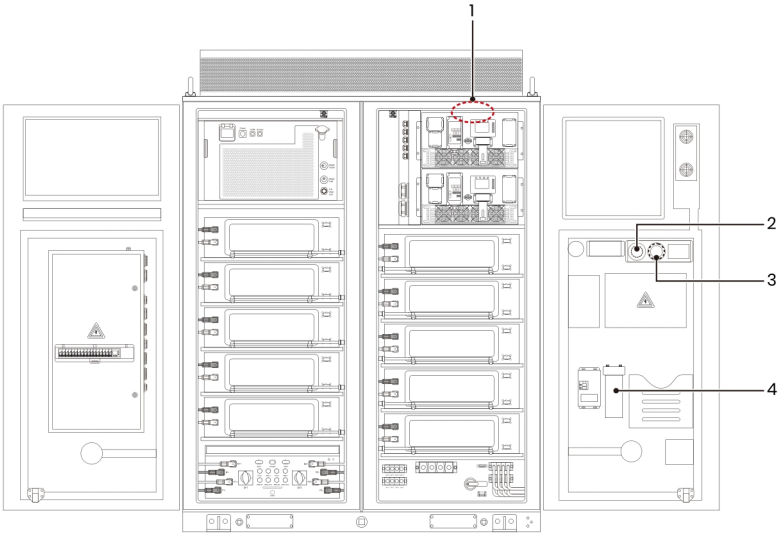
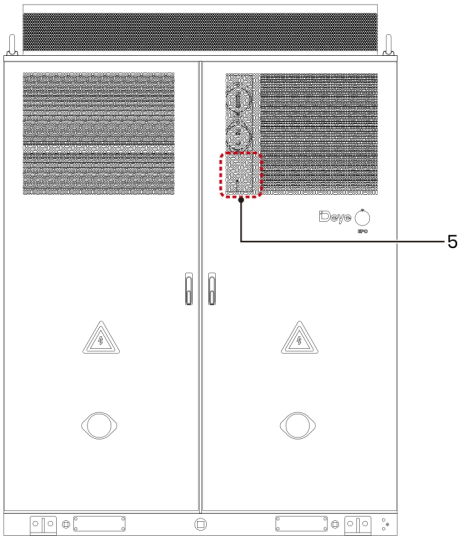
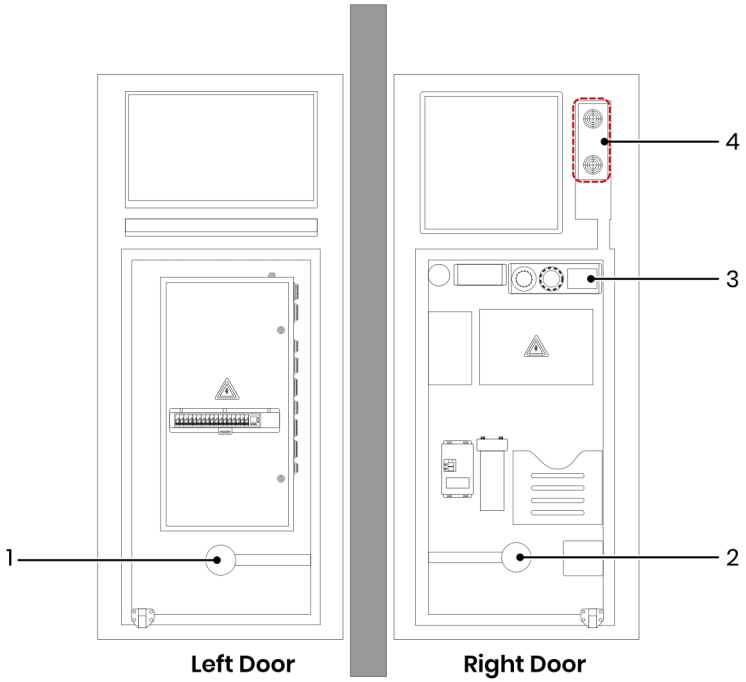




No.	Item	No.	Item
1	Aerosol Device (PCS)	4	Aerosol Device (Battery Compartment)
2	Heat Detector	5	Audible and Visual Alarm
3	Smoke Detector	/	/

CCR System

The system is composed of a CO detector, two intake fans, and two exhaust fans. The detectors detect abnormal conditions and trigger an alarm, then exhaust fans exhaust combustible gases quickly.



No.	Item	No.	Item
1	Intake Fan	3	CO Detector
2	Intake Fan	4	Exhaust Fan ×2

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Sprinkler System

DANGER

- In case of severe fire, evacuate immediately and call the fire department.

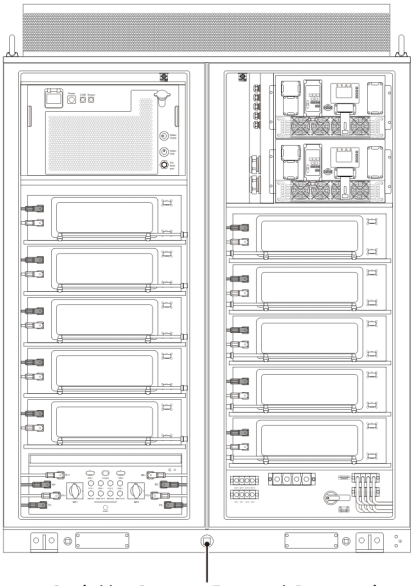
CAUTION

- For safety, the manual master valve on the fire-fighting water pipe should extend at least 3 meters horizontally from the foundation.
- The final layout of fire protection equipment is subject to review and approval by the local authorities.

This sprinkler system serves as the final protective barrier for the energy storage system. It can be activated manually according to on-site requirements.

Extension pipes (provided by the customer) should be installed through the cabinet's **DN40** water inlet. A manual master valve shall be installed on this pipe, positioned at least 3 m away from the cabinet, to serve as the primary manual activation for the entire water supply. For multiple cabinets, a separate control valve shall be installed on the branch pipe to each individual cabinet.

It is recommended that the inlet pressure of the water connection port be not less than 0.16 MPa and the inlet flow rate be not less than 10 L/s.



Sprinkler System External Connection

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3 Transportation

3.1 Safety Precautions

DANGER

- Transportation of end-of-life, damaged or recalled batteries may be prohibited in some regions. Confirm local regulations before transportation; illegal transportation is strictly prohibited.
- It is strictly prohibited to mix dangerous goods with food, medicine, animal feed and their additives in the same vehicle or container, and to transport with sharp objects in the same vehicle or container.
- Transport is strictly prohibited if the equipment shows any abnormalities such as unusual odor, leakage, smoke, or fire before departure.
- When transporting faulty batteries, avoid flammable and explosive material storage areas, residential areas, public transit facilities, elevators and other densely populated places.

WARNING

- Lithium-ion batteries are classified as UN3480, Class 9 Miscellaneous Dangerous Goods. For sea, land and air transportation, they fall under PI965 Section I. Class 9 dangerous goods labels and UN identification labels must be affixed during transportation.
- Comply with all applicable safety rules and regulations of the local country or region during loading, unloading, and transportation.
- Transport and storage service providers must hold valid dangerous goods handling certifications as required by local laws and standards. Undertaking relevant business without proper qualifications is strictly prohibited.
- Before removing the transport protector, inspect the packaging for damage and check whether the impact indicator on the outer packaging has been triggered; if triggered, potential transport damage cannot be ruled out.
- Keep the equipment upright and securely fixed during sea or land transportation. The inclination angle of equipment shall not exceed 15° throughout the transportation process.
- Throughout the transportation process, protect the equipment from severe vibration, impact, and crushing. Avoid exposure to direct sunlight, rain, and moisture. Take appropriate rainproof, moisture-proof, and sun-protection

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measures.

- Smoking is strictly prohibited in transportation, loading and unloading areas.
- Freight personnel are strictly prohibited from opening the outer packaging of the equipment without authorization.
- All loading and unloading operations must be carried out by authorized and trained personnel.

CAUTION

- Handle with care during moving to prevent bumping.
- Transport operators must wear protective gloves and toe-cap safety shoes for personal protection, and pay special attention to avoiding scratches by sharp metal panels and crushing injuries by heavy objects.

NOTE

- Complete compliant and accurate declaration before transportation, and carefully check whether the packaging, labels and markings are intact.
- Do not remove the product transport packaging before arrival at the installation site.

3.2 Transportation Modes

Recommended transportation modes: sea freight and land freight.

Sea freight	▪ Sea transportation shall comply with the requirements of the International Maritime Dangerous Goods Code (IMDG Code). ▪ Obtain Material Safety Data Sheet (MSDS) before sea transportation. ▪ Seal all external gaps of the equipment and affix marks certified by the classification society. ▪ Equip the outer packaging with rainproof canvas covers to avoid paint finish scratches.
Land freight	▪ Land transport shall comply with ADR or JT/T 617 standards, as applicable. ▪ Remove obstacles along the transport route. ▪ Ensure that dangerous goods transport vehicles are equipped with two tested and certified CO_2 fire extinguishers. ▪ Speeding is strictly prohibited. Speed limits: 70 km/h on highways, 40 km/h on urban roads, and 50 km/h when turning. Sudden acceleration and emergency braking are also prohibited. ▪ If the equipment exceeds the weight limit for ordinary roads, obtain an overweight transportation permit from the local authorities.

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	▪ Transport vehicles with twist locks are recommended. If twist locks are unavailable, the product shall be fixed at both the top and bottom with lashing straps to prevent shifting and rollover. ▪ If transportation on sloped roads is necessary, equip the vehicle with additional traction equipment.

3.3 Equipment Handling

DANGER

- This equipment is equipped with integrated lithium batteries. Improper hoisting and handling can cause cell damage, fire, explosion, equipment damage, severe injury or death.

WARNING

- Only certified authorized personnel can operate forklifts and perform hoisting and handling of the equipment. Unauthorized operation is strictly prohibited. All safety procedures and work instructions must be strictly observed. Any equipment damage or personal injury caused by non-compliant operations shall be the responsibility of the relevant personnel.
- Establish warning signs and a restricted area to prevent unauthorized personnel from entering the handling zone.
- Equipment handling operations are prohibited in severe weather such as typhoons, heavy rain, dense fog and thunderstorms.
- Ensure all equipment doors are closed and secured prior to hoisting and forklift handling.
- Personnel are prohibited from standing on the suspended load. Loose or movable items shall not be placed on the load during lifting and handling operations

NOTE

- Refer to the shipping marks or equipment label for exact cabinet weight and dimension parameters.

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3.3.1 Forklift

DANGER

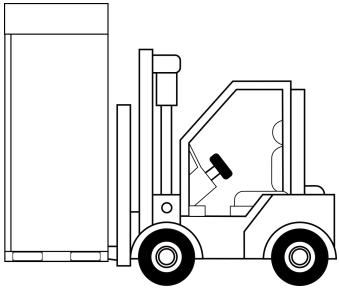
- Unauthorized personnel must maintain a minimum safe distance of 2 m from the forklift and load during operation. Standing or riding on the forklift or cargo is strictly prohibited.
- Overloading and lifting to excessive heights shall be forbidden to avoid risks of forklift instability and overturning.

Forklift Requirements

Item	Requirement
Load capacity	> 5.5 t
Fork length	≥ 2.5 m
Fork width	80–160 mm
Fork thickness	25–70 mm
Lifting height	≥ 2 m (when foundation height ≤ 0.3 m) Increase accordingly when foundation height > 0.3 m

Fork Positioning & Loading:

When lifting heavy or unbalanced loads, observe the center-of-gravity position of the load, and then insert the forks precisely into the reserved forklift pockets located below the "Forklift Fork Insertion" marking on the packaging.



Driving & Steering:

- Forklift driving speed shall not exceed 3 miles per hour (3mph). Sharp turns are strictly prohibited to avoid load shifting and imbalance.
- The forklift operator shall fully inspect the rear area and verify safety before reversing. A dedicated spotter shall be arranged for full-time guidance during reversing within confined spaces.

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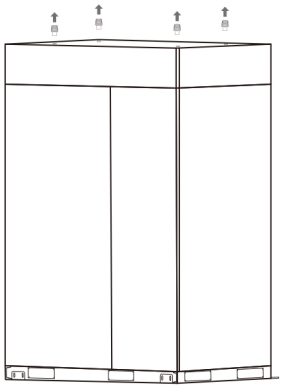
- Operating forklifts on slopes with a gradient ≥5° is strictly prohibited. Slow down and operate carefully when lifting loads on uneven roads.
- Tilting or inverting the cabinet is forbidden throughout the entire handling process. If tilting or inversion is unavoidable under exceptional circumstances, restore the cabinet to an upright position promptly and keep it stationary for 2 hours prior to power-on.

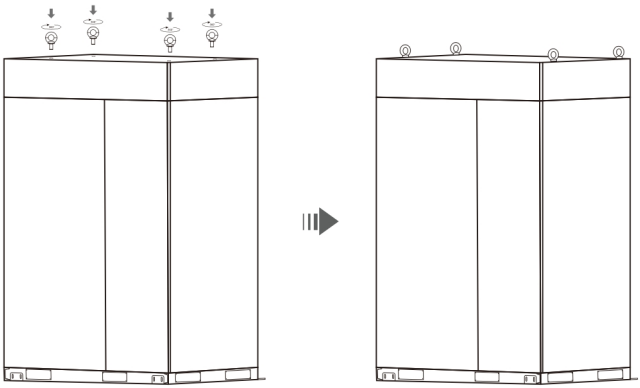
3.3.2 Hoisting

Before hoisting the product, follow the steps below to install the eyebolts.

1. Take 4 eye bolts from the accessory kit (refer to section ***4.2 Unpacking***).
2. Remove the four pre-installed silicone masking plugs. .



3. Insert eye bolts into the holes and rotate the them clockwise until they are firmly secured.



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Follow the requirements and precautions when hoisting the ESS cabinet:

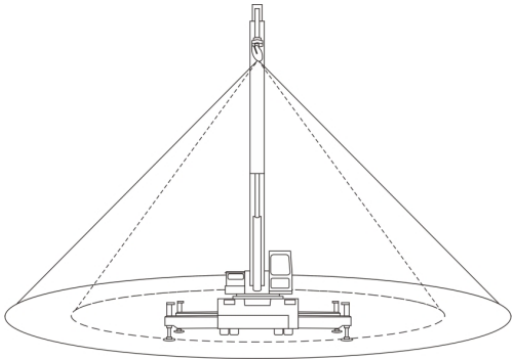
Hoisting Requirements

The crane capacity shall be calculated and evaluated by a professional hoisting company before operation to meet the following requirements.

Item	Requirement
Crane lifting capacity	> 5.5 t
Working radius	≥ 2 m

DANGER

- Do not perform lifting operations in limited visibility conditions.
- No personnel are allowed within the fall zone of the moving suspended load. No one shall stand under the crane boom, directly beneath the load or within the crane operating radius.



- Ensure lifting tools are correctly and securely connected to the equipment, and verify slings at equipment corner fittings are of equal length. Improper connection may result in product damage, serious injury, or death.
- Use only approved and certified lifting equipment.
- Hoisting shall be performed only by qualified personnel.

WARNING

- Before hoisting, inspect the crane, slings, and other rigging equipment to confirm that their load ratings meet the product's weight requirements.
- Position the crane appropriately; long-distance hoisting is strictly prohibited.
- A designated signal person must direct the entire hoisting operation to ensure coordinated movement.
- Keep the equipment stable and level during hoisting. Do not swing the crane to avoid sudden drops or impacts on the equipment.

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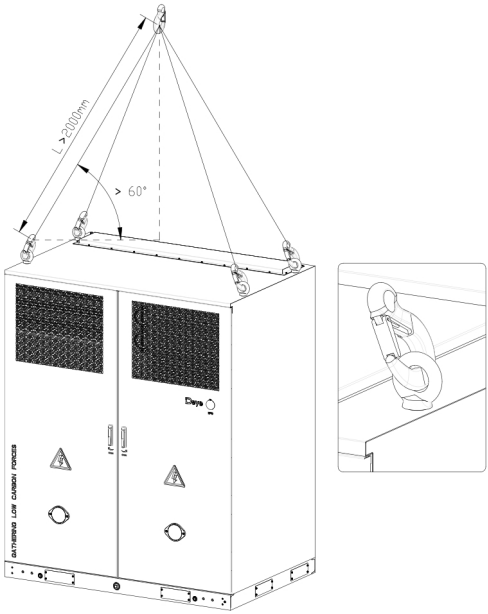
CAUTION

- Adjust sling lengths as required by site conditions to maintain hoisting balance.
- Hoist gently and lower the equipment slowly and smoothly into position. Avoid any impact or collision.
- Use vertical hoisting only. Do not drag the equipment on any surface during lifting, or when attaching or detaching lifting tools, to prevent scratches.
- It is recommended to hoist the equipment while keeping it horizontally stable to ensure a smooth operation.
- Ensure the angle between the lifting sling and the horizontal plane complies with the requirements as specified in the figure below.



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4 Installation

DANGER

- Do not expose the equipment to, or operate it in, flammable or explosive gases, smoke, or any corrosive environment. Otherwise, it may cause fire, explosion or equipment damage.
- Do not expose the equipment to flammable or explosive gases, smoke, or any explosive environments, and do not operate the equipment in such environments. Otherwise, it may cause serious safety accidents such as fire, explosion, or equipment damage.
- There is a risk of static overload during the entire installation process, which may cause damage to building structures. Be sure to verify the site bearing capacity and anti-static measures in advance.

CAUTION

- Only qualified or trained personnel, who have mastered all necessary safety precautions and relevant applicable regulations, are permitted to install the equipment.
- Keep the equipment out of the reach of children and away from daily working or living areas.

WARNING

- The installation and usage environment must comply with relevant international and local laws and regulations. The user is obligated to protect the ESS against fire and other hazards.
- Product assembly must be carried out in strict accordance with the design scheme, process requirements, relevant regulations and national standards; unauthorized changes to assembly procedures are strictly prohibited.

4.1 Pre-Installation Preparation

4.1.1 Site Requirements

DANGER

- Do not install the equipment in low-lying areas where it may become submerged. The installation level must be at least 300 mm above the highest historical water level in the area. Do not install in any position that could be submerged in water.

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WARNING

- Install the equipment in an outdoor area far from liquids. Do not install it under areas prone to condensation (e.g., under water pipes, air exhaust vents) or water leakage (e.g., air conditioner vents, ventilation vents, equipment room feeder windows). Liquid ingress may cause equipment faults, short circuits, fires, or electric shock.
- To prevent high-temperature damage or fire, ensure that the equipment's ventilation vents and heat dissipation systems are not obstructed or covered by other objects during operation. Poor heat dissipation can lead to equipment overheating, fire, or explosion.
- To protect the equipment from wildfires caused by high summer temperatures, ensure there are no vegetation or flammable plants within 3 meters of the equipment. Wildfires can spread to the equipment, causing explosions or fires.
- For safety purposes, the distance between the equipment and residential buildings must be more than 12m, and the distance between the equipment and densely populated buildings (such as schools, hospitals) must be more than 30.5m. If this safety distance cannot be met, a firewall must be built between the equipment and the building to prevent fire or explosion hazards from affecting people.
- Outdoor storage systems must be at least 10 feet away from boundaries, public roads, buildings, flammable materials, hazardous materials, high piles, and other non-grid-related hazards to reduce the risk of fire, explosion, or collision-induced accidents.
- The ESS area shall be enclosed by lockable solid walls or fences with height over 2.2m; fire walls can serve as partial or full enclosure substitutes.
- The distance between the battery cabinet's exhaust device and the air intakes of heating, ventilation, and air conditioning systems, windows, doors, discharge platforms, and fire sources of other buildings or facilities must be more than 4.6m to prevent the spread of harmful gases or fire.
- Do not install the equipment in places without proper fire-fighting facilities or where firefighters cannot easily access. In the event of a fire, lack of fire protection or accessibility will lead to the rapid spread of fire, resulting in serious injury or death.
- Do not install the equipment in an easily accessible location. The enclosure and heat sink of the ESS reach high temperatures during operation, which may cause severe burns.
- Do not install the equipment in the following locations (including but not limited to):

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- Areas subject to severe vibration (such as ships, trains, or cars), intense noise, or strong electromagnetic interference;
- Locations with dust, oil fumes, harmful gases, corrosive gases, and other pollutants;
- Spaces where corrosive, flammable, or explosive substances are stored;
- Areas with existing underground facilities;
- Ground with poor geological conditions, such as mucky soil and soft soil layers, which is prone to water accumulation and subsidence;
- Spaces underneath reservoirs, water features, and water intake structures;
- Seismic fault zones and regions with a seismic fortification intensity exceeding Grade 9.
- Zones directly threatened by mudslides, landslides, quicksand, karst caves, and other geological disasters.
- Areas within the scope of mining subsidence and ground displacement.
- Regions inside blasting hazard zones.
- Areas vulnerable to inundation caused by dam or dike failure.
- Sanitary protection zones for key domestic water sources.
- Protected zones of historical relics and cultural heritage sites.
- Crowded public areas, high-rise buildings, and underground structures.
- Urban road intersections and major traffic arteries.

- During the installation, commissioning, and operation of the equipment, ensure that each unit is equipped with no less than 2 fire extinguishers nearby. Insufficient fire-fighting equipment may result in uncontrollable fires, leading to death or serious injury.

CAUTION

- Do not install the equipment in areas conducive to the growth of microorganisms (such as fungi or mildew). Microbial growth may damage the equipment's surface or internal components, leading to malfunctions and potential minor injuries during maintenance.
- Do not install the equipment in salt-damaged or polluted areas. Corrosion caused by these environments may damage the equipment, leading to malfunctions and minor injuries during handling or maintenance. The equipment must be installed in locations that meet the following criteria:

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Condition	Required Distance	Examples
Distance from coast	More than 2000 m	/
Distance from pollution sources	Heavy pollution sources: ≥1500 m	Smelters, coal mines, thermal power plants
	Moderate pollution sources: ≥1000 m	Chemical, rubber, electroplating
	Mild pollution sources: ≥500 m	Food, leather, heating boilers, slaughter houses, centralized garbage dumps, sewage treatment stations

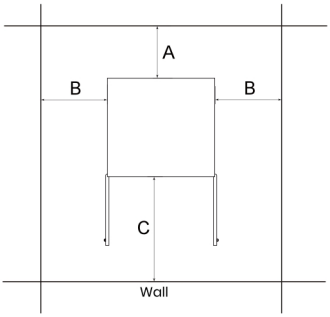
NOTE

- The safe distance between the equipment and production buildings shall comply with local fire codes or standards.
- Install the equipment in a clean, dry, and well-ventilated area with appropriate temperature, humidity, and altitude. For detailed parameters, refer to ***Chapter 9Technical Specifications***.
- Reserve sufficient space for expansion according to the whole-life cycle needs of the energy storage system.

Recommended Clearance

The following clearance requirements must be reserved before installation.

Single MC-L522-2H2/3:



Item	Distance (mm)
A	≥1000
B	≥1000
C	≥2200

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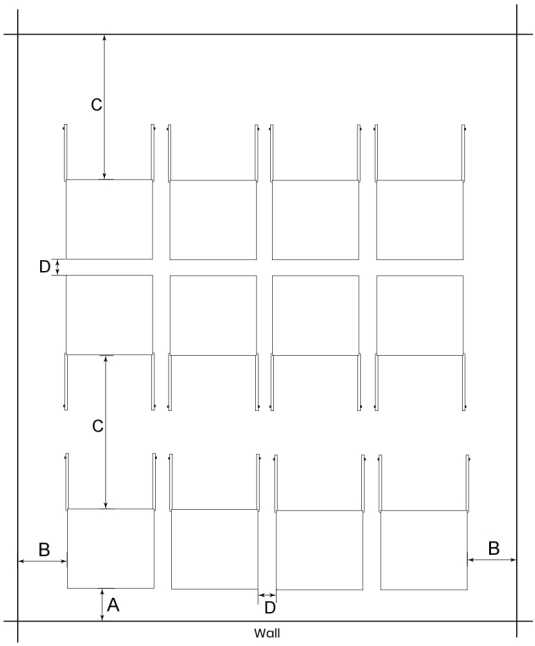
Multiple MC-L522-2H2/3 in parallel:



Item	Distance (mm)
A	≥1000
B	≥1000
C	≥2200
D	≥20

4.1.2 Foundation Requirements

An inadequately designed foundation can cause installation difficulties, compromise equipment operation, and undermine overall system performance. Therefore, the foundation for the energy storage system must be carefully designed and constructed in strict compliance with applicable industry and local standards to ensure proper mechanical support, cable routing, and future maintenance access.

At a minimum, the following requirements shall be met.

Requirement	Description
General Requirements	
Surface material	Install cabinets on concrete or other non- combustible surfaces.
Surface condition	The surface must be level, stable, flat, and free of depressions

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	or tilts, with sufficient load- bearing capacity.
Load capacity	The foundation must support the total weight of the equipment. If the bearing capacity is insufficient, re- verification is required.
Floor Edge Extension	300 mm beyond the cabinet fixing parts on each side, with a minimum of 150 mm.
Foundation Construction Requirements	
Concrete grade & thickness	Default C30, unless otherwise specified
Bedding layer	300 mm thick, C15 concrete below the slab
Reinforcing steel bars	HRB400 (Grade III), 12 mm diameter at 150 mm spacing
Corrosion protection	Apply standard anti- corrosion measures to steel bars after rust removal.
Bearing stratum	Undisturbed soil, bearing capacity ⩾ 100 kPa
Construction & Excavation Requirements	
Foundation pit bottom	Thoroughly compacted and leveled
Excavation safety	Ensure proper safety measures for excavation support.
Water prevention after excavation	The pit must not be soaked. If water intrusion occurs, further excavation and replacement filling are required.
Surface leveling tolerance	Levelness error between foundation and cabinet contact surface ≤ 3 mm.
Height & Drainage Requirements	
Height above ground	≥ 300 mm above ground level, higher than local historical highest water level
Drainage system	Drainage facilities should be based on local geology and municipal requirements to prevent water accumulation at the foundation. The system must accommodate the local historical maximum rainfall. Discharged water must comply with local environmental regulations.
Cable Management & Sealing	
Cable inlets/ trenches	Reserve cable inlets/trenches as required
Sealing	All reserved cable inlet holes shall be fully sealed post-installation.
Cable Trench Requirements (for bottom cable entry)	
Dust & Rodent Protection	Prevent foreign objects from entering the equipment.

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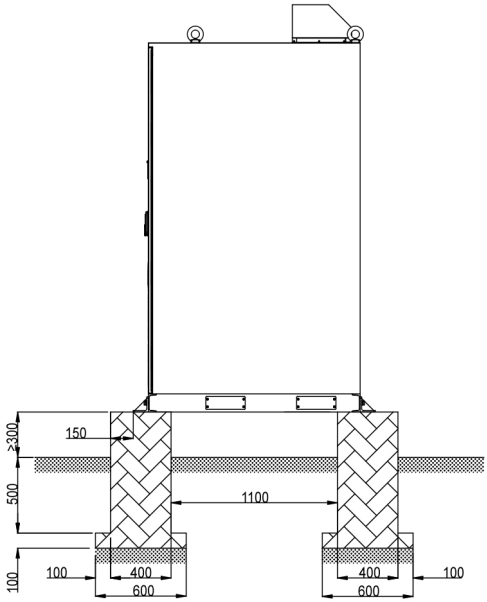
Waterproof & Moisture Protection	Protect cables from aging and short circuits that could affect normal operation.
Cable cross-section & bending radius	Trench design must accommodate the required cable cross-sectional area and provide sufficient bending radius.

The recommended foundation construction details are provided below and may be adjusted based on actual site conditions.



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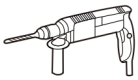
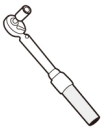
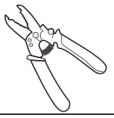
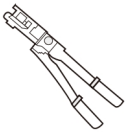
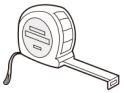
4.1.3 Tool Requirements

Recommended installation tools are listed below and the pictures are for reference only.

Tools			
			
Hammer drill	Phillips insulated torque screwdriver	Flat-head insulated torque screwdriver	Insulated torque socket wrench
			
Diagonal pliers	Wire stripper	Cable cutter	Ferrule crimping pliers
			
Hydraulic pliers	Needle-nose pliers	Marker	Utility knife
			
Steel tape measure	Spirit Level	Multimeter	Heat shrink tubing
Heat gun	Cable tie	Insulated ladder	Forklift
Crane			

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Personal Protective Equipment			
Insulated gloves	Protective gloves	Safety goggles	Dust mask
Insulated shoes	Safety helmet	Protective suit	

4.2 Unpacking

WARNING

- If the installation environment is not conducive to equipment protection, take measures to prevent internal battery failure caused by condensation or dust corrosion (e.g., cover with woven cloth or dust cover).
- During component handling and storage, collision and scratch are strictly prohibited. Keep parts dry and rust-free to avoid damage and part failure.

CAUTION

- If possible, do not remove the transport packaging until the equipment arrives at the installation site.
- After preparing the equipment for installation, unpack it carefully to avoid scratching the equipment.
- Keep the equipment stable during unpacking.

NOTE

- Keep the packaging material for future transportation or long-term storage.
- All components must be thoroughly cleaned before assembly to remove burrs, flash edges, oxide layers, rust, sand particles, dust and stains, ensuring a clean and impurity-free surface.

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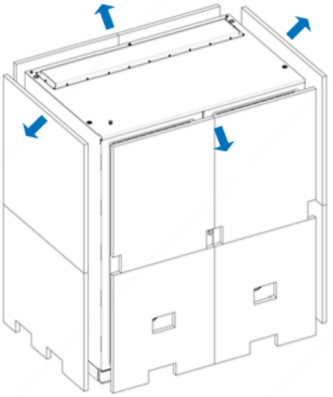
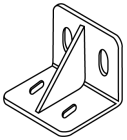
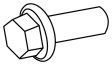
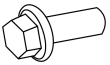
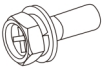
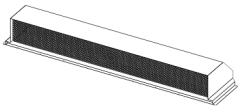
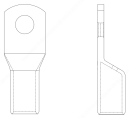
Unpack and inspect the equipment immediately upon receipt. If the unit is damaged or missing accessories are found, contact the local distributor or the after-sales service department



Packing List

			
M30 Eye bolts ×4 pcs	Cabinet Mounting Feet ×4 pcs	M16×150 Expansion Bolt ×8 pcs	Forklift Pocket Cover ×8 pcs
			
Fire-poof Mud ×1 bag (2 kg)	M16×40 Hex Head Bolt Assembly ×8 pcs	M10×35 Hex Head Bolt Assembly ×4 pcs	M6×16 Hex Head Bolt Assembly ×32 pcs
			
Top Air Outlet Cover ×1 pc	SC185-12 Copper Lug ×4 pcs		

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Recommended Torque

Nominal thread diameter (mm)	T N·m	0.5T N·m	1.8T N·m	2.4T N·m
M1	0.0195	0.0098	0.035	0.047
(M1.1)	0.027	0.0135	0.049	0.065
M1.2	0.037	0.0185	0.066	0.088
(M1.4)	0.058	0.029	0.104	0.14
M1.6	0.086	0.043	0.156	0.205
(M1.8)	0.0128	0.064	0.23	0.305
M2	0.176	0.088	0.315	0.42
(M2.2)	0.23	0.116	0.41	0.55
M2.5	0.36	0.18	0.65	0.86
M3	0.63	0.315	1.14	1.5
(M3.5)	1.0	0.5	1.8	2.4
M4	1.5	0.76	2.7	3.6
(M4.5)	2.15	1.08	3.9	5.2
M5	3.0	1.5	5.4	7.2
M6	5.2	2.6	9.2	12.2
(M7)	8.4	4.2	15.0	20.0
M8	12.5	6.2	22.0	29.5
M10	24.5	12.5	44	59
M12	42	21.0	76	100
M14	68	34	122	166
M16	106	53	190	255
(M18)	146	73	270	350
M20	204	102	370	490
(M22)	282	140	500	670
M24	360	180	650	860
(M27)	520	260	940	1240

NOTE

- Strictly adhere to the specified torque values to prevent over-tightening or under-tightening.
- The torque value is for reference only for standard bolts during normal assembly; adjust appropriately for special working conditions (high vibration/harsh environment).
- Use a calibrated torque wrench for installation to ensure torque accuracy.

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4.3 Installation Procedures

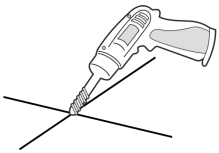
4.3.1 Install Cabinet Mounting Feet

NOTE

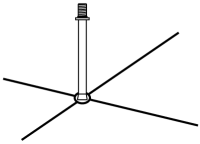
- Due to variations in drilling accuracy and bit material, it is recommended to use a drill bit with a diameter ranging from Φ20.5 to Φ21.

To secure the cabinet to the ground, install the four cabinet mounting feet:

1. Position the cabinet at the installation site.
2. Attach the mounting feet to the cabinet using the M16×40 hex bolts. Do not tighten the bolts.
3. Mark hole positions on the ground using a marker.
4. Remove the M16×40 hex bolts and mounting feet. Then, drill holes (102–105 mm deep) using a hammer drill.



5. Insert the 8 pieces of M16×150 expansion bolts (without nuts and washers) into the drilled holes and tap the expansion sleeves until they are fully seated.



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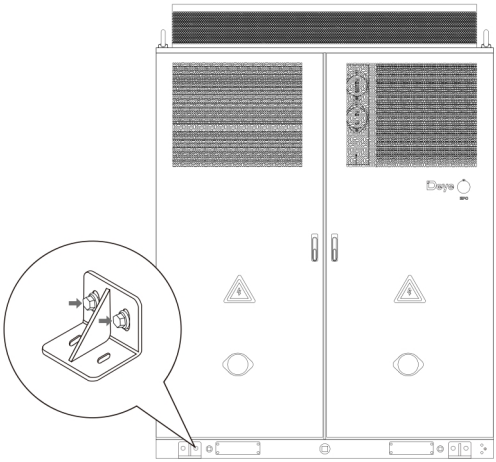
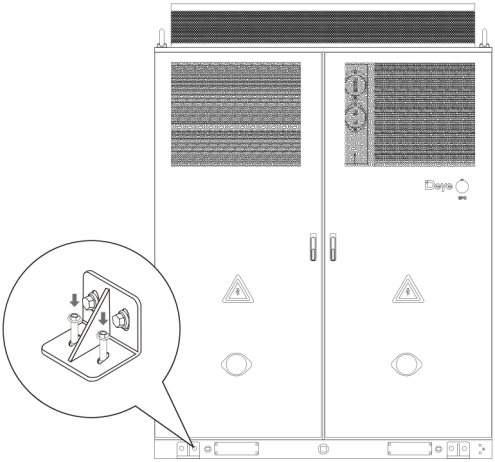
6. Slide the mounting feet over the expansion bolt studs. Then, secure mounting feet to the cabinet with M16×40 hex bolts.

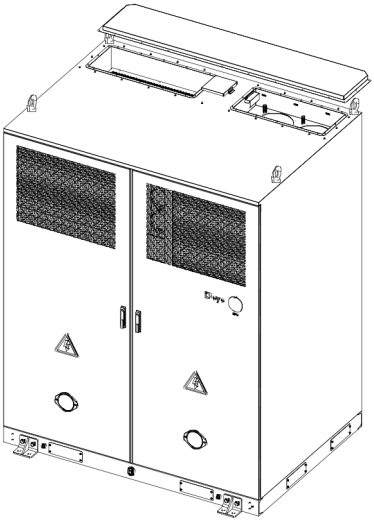


7. Place the washers and nuts onto the studs, then tighten the expansion bolt nuts to secure the cabinet to the ground (Recommended torque: 140 N·m).

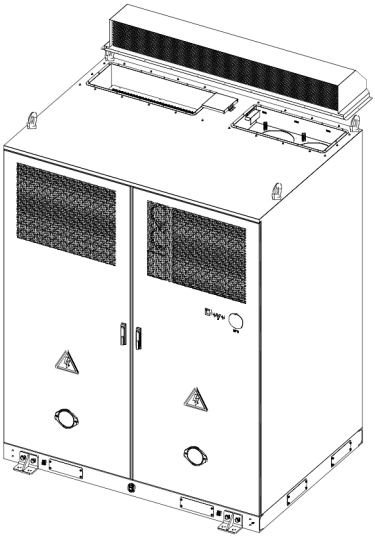


4.3.2 Install the Top Air Outlet Cover

1. Remove the top air outlet baffle by unscrewing the M5 bolts. Keep the bolts for further installation.



2. Install the top air outlet cover onto the outlet opening and secure it with the M5 bolts. Tighten to a torque of 4.5 N·m.



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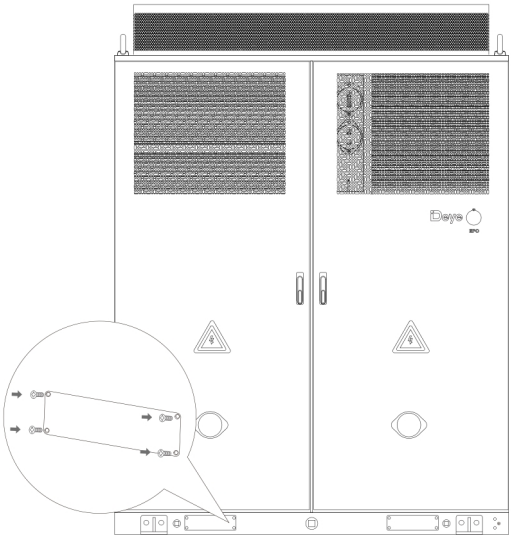
4.3.3 Install the Forklift Pocket Cover

WARNING

- Do not install the forklift pocket covers until the cabinet is fully secured in its final location and the installation site has been verified to meet all requirements in this manual and all applicable local safety regulations.

Secure the 8 forklift pocket covers to the forklift pockets at the bottom edge of the cabinet using 32 M6×16 bolts (4 per cover). Tighten the bolts to a torque of 6 N·m.



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5 Electrical Connection

5.1 Safety Precautions

DANGER

- All electrical connections must be performed only when the equipment is completely de-energized and isolated from all power sources.
- Do not expose the equipment to flammable or explosive gases, smoke, or any explosive environments.
- Always wear appropriate PPE and use only dedicated insulated tools when working on energized circuits to prevent electric shock, personal injury, or equipment damage.

WARNING

- Only qualified electrical professionals can perform the electrical connection.
- The product can only be used in situations equipped with overvoltage protection devices.
- Do not perform electrical connections during sandstorms or when the relative humidity of the surrounding environment is greater than 90%.
- Do not contact live parts directly without protection.
- Before cable connection, ensure that there is no voltage on the AC side and DC side.
- Ensure correct polarity during wiring: connect positive (+) to positive (+) and negative (-) to negative (-).
- Before connecting cables, check that the polarity of all input cables is correct. Do not pull wires and cables forcibly during electrical installation; otherwise, the insulation performance may be affected. Ensure all cables have sufficient bending space and take necessary auxiliary measures to reduce cable stress.
- Keep the equipment clear of the cable preparation area. Cable scraps entering the equipment can cause sparks, resulting in personal injury or equipment damage.
- All grounding connections must be completed and verified before connecting any high-voltage circuits.

NOTE

- This system must be used in conjunction with compatible hybrid inverter models. It needs to establish communication with the inverter to activate the lithium battery mode, ensuring optimal battery performance.

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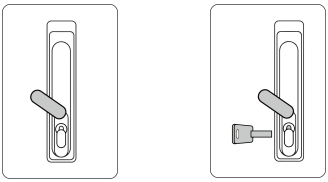
- After cable connection, carefully verify that all connections are correct and secure.
- When connecting to inverters or operating in parallel mode, please use the cables provided in the packing list. If other cables must be used under special circumstances, ensure they comply with relevant standards.

5.2 Access the Cabinet Interior

5.2.1 Open the Cabinet Door

1. Slide the protective cover upward to expose the keyhole.
2. Insert the door key into the keyhole and turn it clockwise to release the handle.
3. Rotate the door handle in the indicated direction to unlock and open the door.

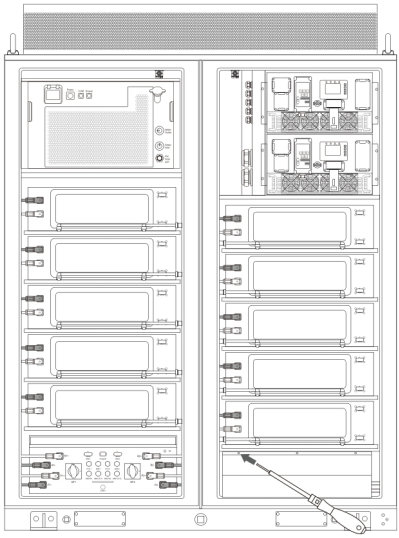


NOTE

- After the electrical connection is complete, lock the door and keep the key.

5.2.2 Remove the Protective Baffle

To access the terminals and interfaces on the AC combiner box and DC parallel combiner unit, the protective baffle must be removed. Unscrew the screws using a screwdriver and then remove the protective baffle.



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5.2.3 Prepare the Cable Inlet

NOTE

- Select the appropriate cable inlet according to your cable routing plan to ensure neat cable management.

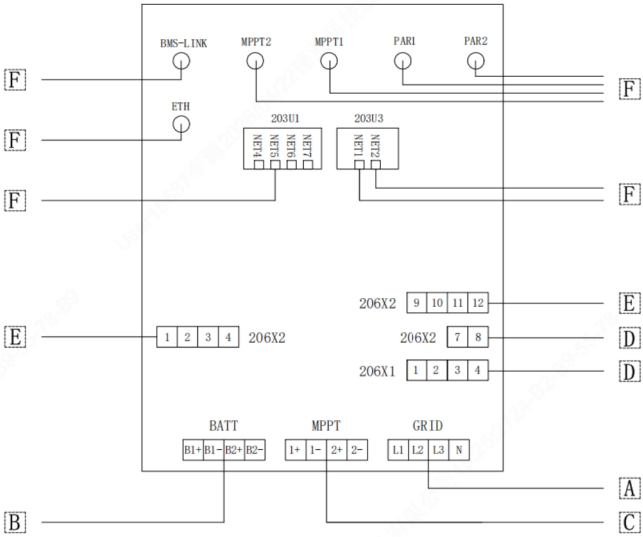
Before cable connection, prepare the cable inlet as follows.

1. Open the cabinet door and locate the oval or pagoda rubber grommet.
2. Cut a slit in the grommet using a utility knife and then clean all debris.

5.3 Cable Preparation

5.3.1 Recommended Cables

External interface topology diagram



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Item	Description	Recommended Cable (mm^2)	Terminal
A	AC power connection cable	150-185	SC 185-12
B	DC parallel power cable	50-70	SC 70-12
C	MPPT DC power cable	70-95	SC 95-12
D	PCS AC auxiliary power supply cable & UPS DC 24V output cable	1.5-2.5	ENY 2510
E	DO output & RS485 communication cable	0.75 - 1.5 (STP)	ENY 1010
F	Communication network cable	CAT6 FTP	/
/	Grounding flat steel	150 – 200	/
	Grounding cable	70 – 90	M10 OT/DT

NOTE

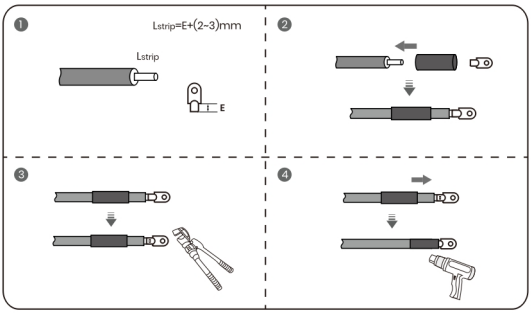
- Choose either the grounding flat steel or the grounding cable for equipment grounding.
- All specifications listed above are recommendations and may be adjusted to suit on-site conditions.

5.3.2 Terminal Crimping

Crimp SC Terminals

For connecting with AC grid/battery cabinets/MPPT/STS cabinets, crimp the terminal as follows:

1. Strip the cable insulation to the length 2-3mm longer than the terminal barrel length.
2. Slide the heat shrink tubing onto the cable, and insert the core wire fully to the bottom of the terminal barrel.
3. Crimp the terminal firmly with a matching hydraulic crimping tool.
2. Move the heat shrink tubing over the terminal barrel and apply a heat gun until it tightly seals and insulates the joint.



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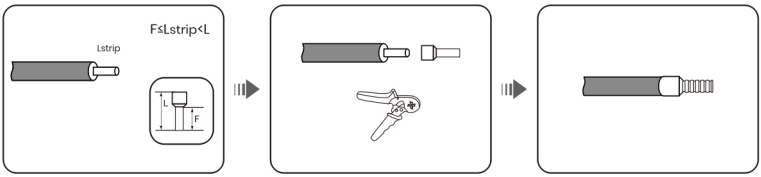
Crimp cord-end terminals

1. Strip cable insulation to the specified stripping length Lstrip (F≤Lstrip<L).
2. Insert the core wire fully to the ferrule barrel.
3. Crimp the terminal securely with ferrule crimping pliers.



5.4 Equipment Grounding

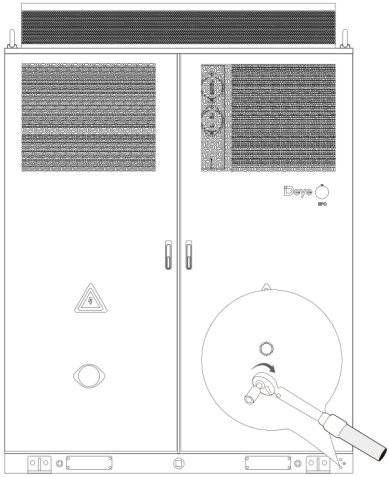
WARNING

- Ensure the equipment is reliably grounded to prevent electric shock.

CAUTION

- After completing the grounding connection, grounding resistance must be measured and must comply with applicable national/local standards and regulations.

1. Ensure the cabinet and external power supply are fully de-energized.
2. Verify the PE terminal marking on the cabinet is intact and legible.
3. Remove the screws on the protective earth terminal of the cabinet with a screwdriver.



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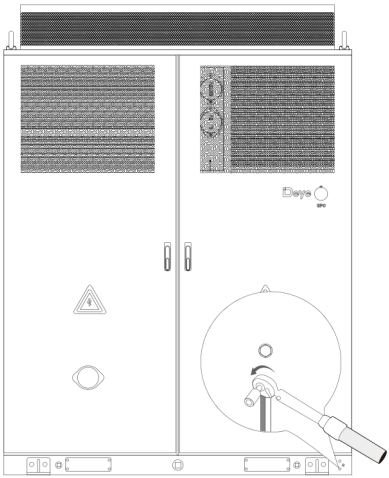
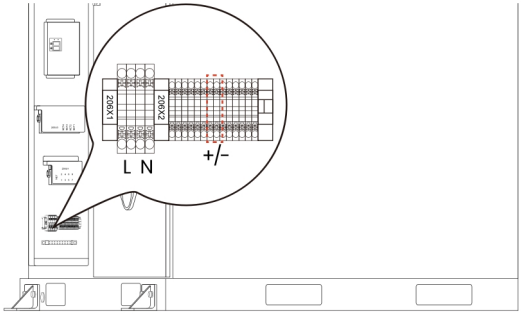
4. Connect the grounding flat steel (**150 - 200 mm²**) or the M10 OT/DT terminal of the grounding cable (**70 - 90 mm²**) to the protective earth terminal on the cabinet with the included M10×35 hex head bolts (Recommended torque: 25 N·m).



5.5 Connect Auxiliary Power Cables

1. Ensure the cabinet and the auxiliary power source are fully de-energized.
2. Open the cabinet door to locate the auxiliary power interface.
3. Verify all the terminal markings are intact and legible.
4. Connect the AC 220V L1/N lines and DC 24V positive and negative power cables to the corresponding terminals specified below.



Three-quarter View (Left Door Open)

Terminal Block	Position	Description	Recommended Cable
206X1	1/3	PCS AC 220V L Input	Cable specification: 1.5-2.5 mm²
	2/4	PCS AC 220V N Input	

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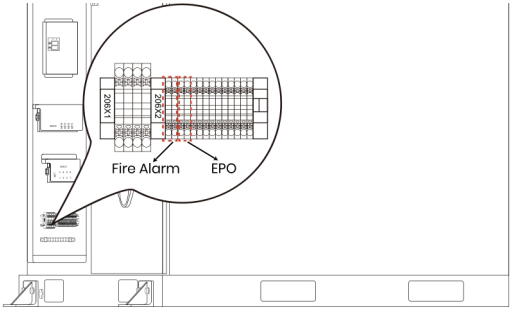
206X2	7	UPS DC 24V Positive Output	Terminal: ENY 2510
	8	UPS DC 24V Negative Output	

5.6 Connect Signal Cables (Dry Contact)

For integration with external fire alarm and emergency systems, this cabinet provides passive dry contact interfaces.

1. Ensure the cabinet and all connected external equipment are fully de-energized.
2. Open the cabinet door to locate the dry contact interface.
3. Verify all the terminal markings are intact and legible.
4. Connect the external fire system signal cable and EPO signal cable to the designated terminals as shown below.



Three-quarter View (Left Door Open)

Terminal Block	Position	Description	Recommended Cable
206X2	1	Fire alarm NO	Cable specification: 0.75 - 1.5 mm^2 (STP) Terminal: ENY 1010
	2	Fire alarm NC	
	3	System emergency fault NO	
	4	System emergency fault NC	

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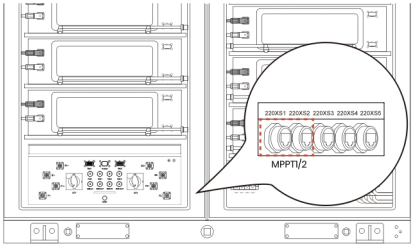
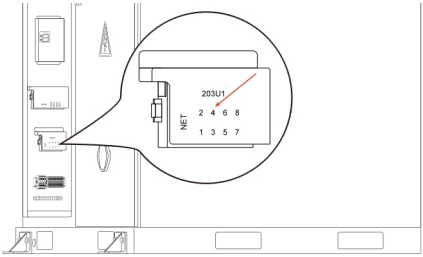
5.7 Connect Communication Cables

This cabinet provides multiple communication ports for connecting to external devices (MPPT cabinets, battery cabinets, EMS cabinets, etc.). Connect communication cables according to the following steps:

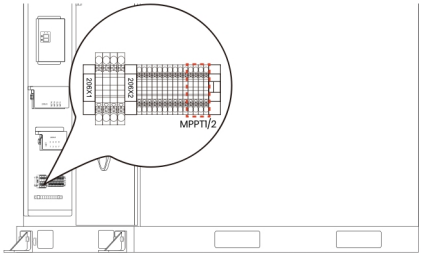
1. Ensure the cabinet and all connected external equipment are fully de-energized.
2. Open the cabinet door to locate the communication ports.
3. Verify all the terminal markings are intact and legible.
4. Connect one end of the communication cable to the external equipment; the other end to the designated communication ports as shown below.

Communicate with MPPT cabinets





Three-quarter View (Left Door Open)



Three-quarter View (Left Door Open)

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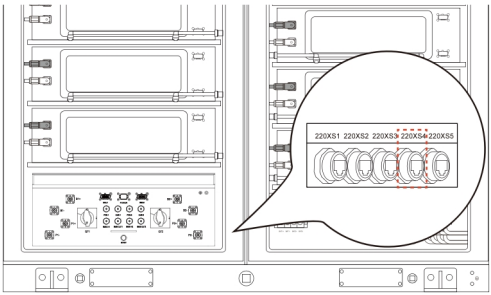
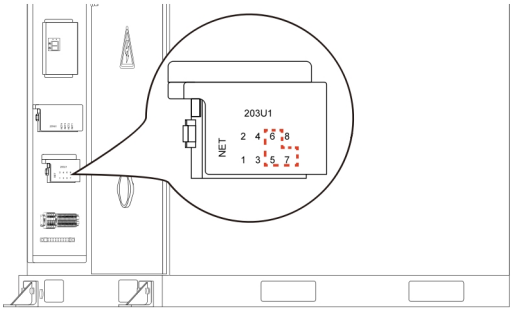
Terminal Block	Position	Description	Recommended Cable
206X2	9&10	MPPT1 RS485-A/B	Cable specification: 0.75 - 1.5 mm^2 (STP) Terminal: ENY 1010
	10&11	MPPT2 RS485-A/B	
203U1	NET4	MS-MPPT400-2 COMM CAN	CAT6 FTP
Communication Port	220XS1	MPPT1 CAN	
	220XS2	MPPT2 CAN	

Communicate with battery cabinets





Three-quarter View (Left Door Open)

Terminal Block	Position	Description	Recommended Cable
Communication port	220XS4	BMS CAN	CAT6 FTP
203U1	NET5	First battery cabinet CAN	
	NET6	Second battery cabinet CAN	
	NET7	Third battery cabinet CAN	

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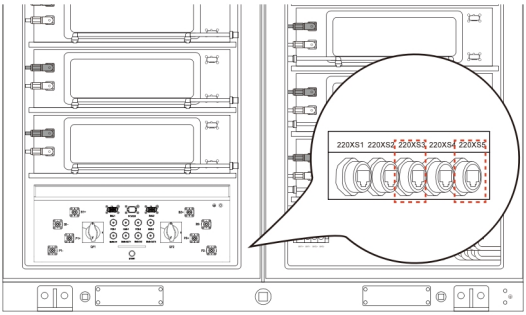
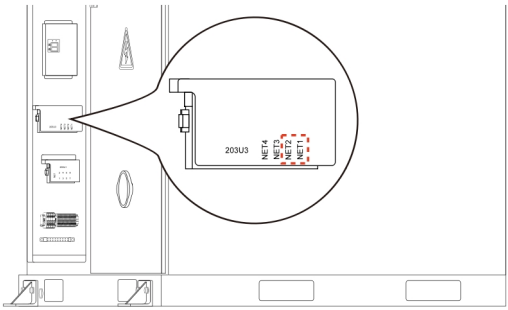
Communicate with STS cabinets



Terminal Block	Position	Description	Recommended Cable
Communication Port	220XS3	PAR2 CAN	CAT6 FTP
	220XS5	PAR1 CAN	

Communicate with the EMS cabinet



Three-quarter View (Left Door Open)

Terminal Block	Position	Description	Recommended Cable
203U3	NET1/NET2	EMS1000 CAN	CAT6 FTP

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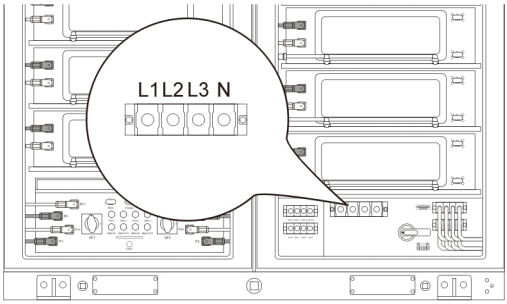
5.8 Connect Main Power Cables

1. Turn off the mains power supply and ensure the cabinet is de-energized.
2. Open the cabinet door to locate the AC grid/MPPT/battery cabinet terminals on the AC combiner box and DC parallel combiner unit.
3. Verify all the terminal markings are intact and legible.
4. Connect the power cables according to your system configuration:
   - **AC grid**: Connect the L1, L2, L3, and N lines from the grid to the cabinet grid terminals using M12 bolts.
   - **MPPT cabinet:** Connect the positive and negative DC cables from the MPPT cabinet to the MPPT terminals using M10 bolts.

     Battery cabinet: Connect the positive and negative DC cables from the battery cabinet to the BAT terminals using M10 bolts.

Connect AC grid power cables



Port	Description	Recommended Cable	Terminal
L1/L2/L3/N	Grid Input	150-185 mm^2	SC 185-12 (included)

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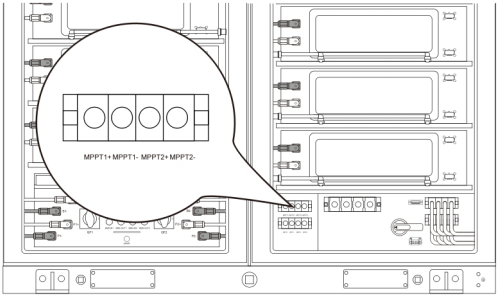
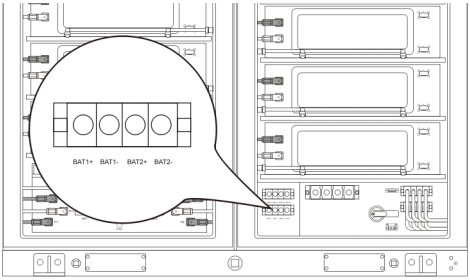
Connect MPPT power cables



Port	Description	Recommended Cable	Terminal
MPPT1+/MPPT1-	MPPT1 Input	70-95 mm^2	SC 95-12
MPPT2+/MPPT2-	MPPT2 Input		

Connect battery cabinet power cables



Port	Description	Recommended Cable	Terminal
BAT1+/BAT1-	BAT1 Input	50-70 mm^2	SC 70-12
BAT2+/BAT2-	BAT2 Input		

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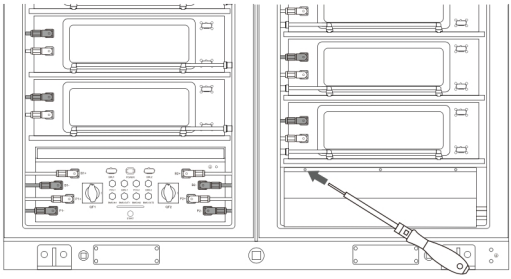
5.9 Post-Connection Procedure

5.9.1 Reinstall the Protective Baffle

After all wiring is complete, reinstall the protective baffle in the power distribution area to protect live components and ensure safe operation.

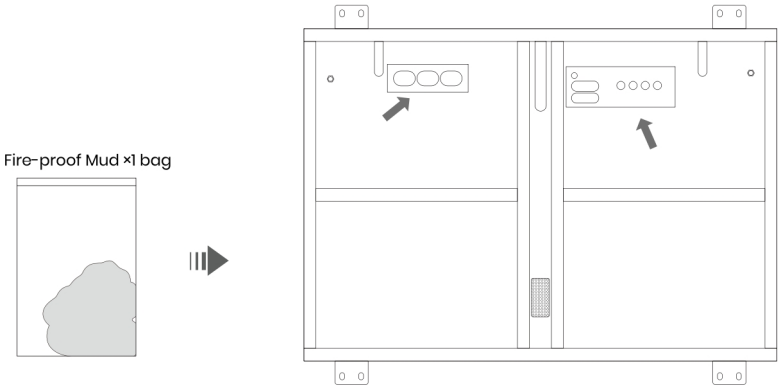


5.9.2 Apply Fire-Proof Mud

CAUTION

- The fire-proof mud must be applied where cables pass through the cabinet bottom.
- Before applying the fire-proof mud, pull the cables slightly by hand to ensure secure connections.

After completing the wiring, use the fire-proof mud to seal the bottom cable inlet. Only the holes through which cables are routed need to be sealed.



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6 Operation

6.1 Check Before Power-On

No.	Item	Criteria
1	Equipment Appearance	● Equipment is intact, no rust or paint flake-off; Repair damaged paint if any. ● Device labels are clear. Replace damaged labels if any. ● Door lock of each cabinet functions properly.
2	Cabinet Installation	● Installation site and foundation meets design requirements. ● Cabinet is level and secured by mounting feet. ● Clearance around the cabinet meets requirements.
3	Cabinet Grounding	● Cabinet grounded correctly with the ground cable securely connected to the cabinet PE terminal.
4	Switch/circuit breaker	● All circuit breakers are in the "OFF" position. ● All disconnectors are in correct position.
5	Cable	● Cables are intact with sheathings wrapped properly. ● Cable specifications meet the requirements and terminals are prepared as required. ● Cables are connected in designated positions ● Labels at both ends of cables are clear. ● Cables are routed with adequate slack at bending points to avoid mechanical stress. ● Cables are routed neatly without twists or crossovers in the cabinets.
6	Cable Inlet Sealing	● Cable inlets are sealed using cable cover or fire-proof mud.
7	Ventilation/Heat Dissipation	● Fans and cooling vents are unobstructed. ● Air conditioner functions properly.

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6.2 Power-On

DANGER

- Wear insulated gloves and use insulated tools. Failure to do so will result in electric shock, short circuit, or death.
- Monitor the system during power-on. If any fault is detected, power off the system immediately, rectify the fault, then resume operation.

WARNING

- If the batteries become fully discharged or over-discharged during installation or commissioning, charge them immediately.
- If the installed system remains unused for 6 months or longer, it must be inspected and tested by qualified personnel before being put back into operation.
- If any circuit breaker inside the system trips, inspect the corresponding load side for faults.
- Only restore the circuit breaker after confirming no short circuit or other abnormality exists, to prevent fault escalation and potential hazards.

CAUTION

- Remove all desiccants from the ESS before initial power-on and long-term operation, and dispose of them in accordance with local waste regulations.
- Clear the equipment working area, and strictly prohibit unrelated personnel and animals from entering the operation range.
- Keep foreign objects, especially metal debris, away from the battery pack to avoid short circuit risks.

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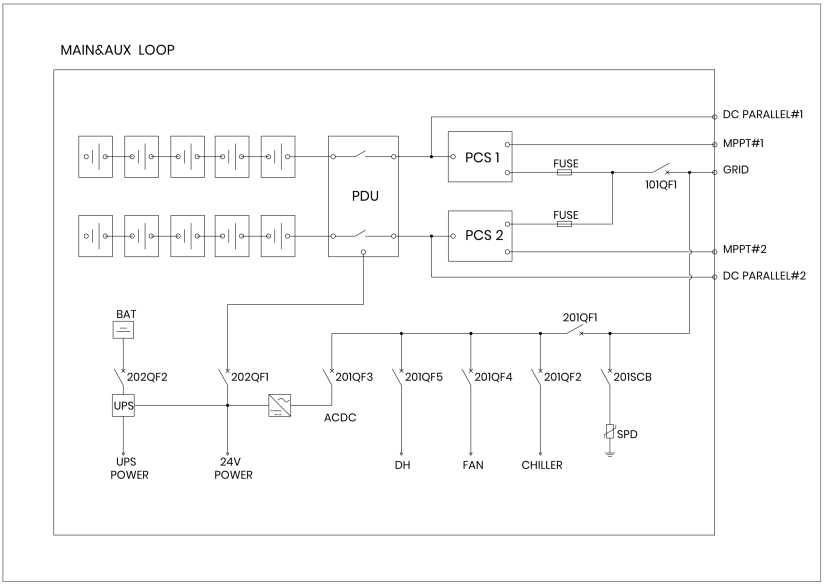
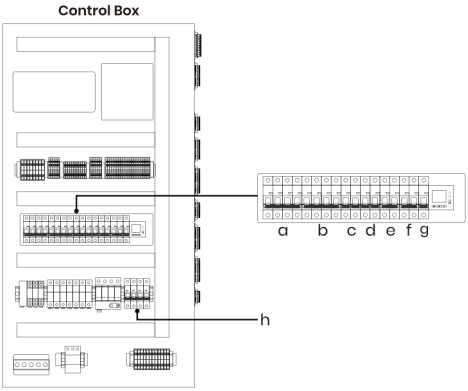
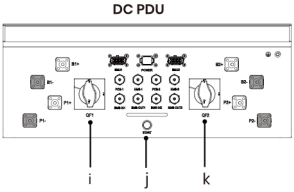
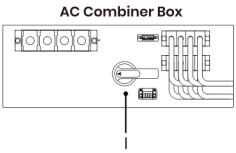
Single-Line Diagram of Main Power and Auxiliary Control Loops:









No.	Item	No.	Item
a	201QF1	g	202QF2
b	201QF2	h	201SCB1
c	201QF3	i	QF1 (DC PDU)
d	201QF4	j	START Button (DC PDU)
e	201QF5	k	QF2 (DC PDU)
f	202QF1	l	AC circuit breaker (AC Combiner Box)

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6.2.1 Normal Power-On Procedure

1. Perform the safety check and ensure all the cables are connected correctly and securely.
2. Close the **201SCB1** AC auxiliary power surge circuit breaker to confirm the lightning protection circuit is properly engaged.
3. Measure the line-side voltage of the 201QF1 AC auxiliary power circuit breaker with a multimeter. After confirming the voltage is within the normal range, close the **201QF1** main AC auxiliary power circuit breaker.
4. Close **201QF3** AC/DC module switch and **202QF2** lead-acid battery power switch.
5. Sequentially close the AC auxiliary power switches: **201QF2** (Liquid cooling), **201QF4** (Fan), and **201QF5** (Dehumidifier).
6. Press the **START** button on the DC PDU. Verify that the PDU and battery packs are correctly powered and communicating.
7. Close the **QF1** and **QF2** DC breakers on the DC PDU. Confirm 24 V DC at 202QF1 line side via multimeter, then close the **202QF1** DC auxiliary power switch.
8. Close the **AC circuit breaker** on the AC combiner box. Confirm the main circuit voltage and current are normal, and the energy storage cabinet power-up procedure is complete.
9. Once the system is powered on, log into Deye EMS to monitor the system. Refer to **Chapter 7 Product Monitoring** for detailed information.

6.2.2 Black Start Procedure

1. Perform the safety check and ensure all the cables are connected correctly and securely.
2. Close the 201SCB1 AC auxiliary power surge circuit breaker to confirm the lightning protection circuit is properly engaged.
3. Close the **QF1** and **QF2** DC breakers and then press the **START** button on the DC PDU. Verify that the PDU and battery packs are correctly powered and communicating.
4. Confirm 24 V DC at 202QF1 line side via multimeter, then close the **202QF1** DC auxiliary power switch.
5. Close **202QF2** lead-acid battery power switch.
6. Verify that the PCS is powered on via Deye EMS.
7. Close the **AC circuit breaker** on the AC combiner box. Then close the **201QF1** main AC auxiliary power circuit breaker.
8. Close **201QF3** AC/DC module switch. Then, close the following breakers in sequence: **201QF2**, **201QF4**, and **201QF5**.
9. Once the system is powered on, log into Deye EMS to monitor the system. Refer to **Chapter 7 Product Monitoring** for detailed information.

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6.3 Power-Off

6.3.1 Normal Power-Off Procedure

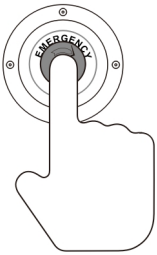
1. Send the shutdown command via Deye EMS to stop the system and PCS. Confirm the web interface indicates shutdown status and the PCS display shows OFF.
2. Press the **START** button, and open the **QF1** and **QF2** on the DC PDU. Then, open the **AC circuit breaker** on the AC combiner box.
3. Open the following breakers in sequence: **201QF2**, **201QF4**, **201QF5**, **202QF1** and **201QF3**.
4. Open the **201QF1** main AC auxiliary power circuit breaker and **201SCB1** switch.
5. Open **202QF2** to cut off the power circuit of the 24 V DC UPS and lead-acid backup battery.

6.3.2 Emergency Power-Off Procedure

DANGER

- Do not use the EPO to stop the ESS during normal operation or when no emergency condition exists.
- Only after confirming that the fault has been completely cleared can you start the system again.

In an emergency, press EPO button to shut down the system immediately.



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7 Product Monitoring

7.1 Energy Management System

The energy storage system can be monitored via the MS-EMS Energy Management System (EMS), which is the core control unit for energy storage systems, responsible for overall operation monitoring, energy dispatch, safety protection, and data analysis.

For detailed operation and configuration instructions, please refer to the EMS user manual. Scan the QR code below and enter the keyword "EMS" to obtain the manual.

7.2 DEYE ESS APP

Follow the steps below to add the equipment to your station on the Deye ESS App:

1. Scan the QR code to download the app.
2. Ensure your equipment is connected to network via 4G or an Ethernet cable.
3. Log in to the Deye ESS Energy Management System (EMS), click "**Create Station**" → "**Create QR Code**" to generate the QR code. Ensure "**Cloud Mode**" is set to 4G mode or Ethernet mode according to your actual conditions.
4. Open the Deye ESS App and scan the QR code to add the equipment.

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8 Maintenance

8.1 Safety Precautions

DANGER

- Fully de-energize the equipment before any maintenance work.
- Maintenance shall be performed or supervised by qualified professional personnel.
- Wear personal protective equipment (PPE) and use dedicated insulated tools to avoid electric shocks or short circuits.
- Do not smoke or have open flames in the vicinity of the equipment.
- Do not wear jewelry, watches or other metallic accessories during maintenance.
- All battery terminals must be disconnected for maintenance.
- It is forbidden to dismantle, dissect or open the battery; no serviceable parts are contained inside the battery.
- Electrolyte released from a damaged battery is harmful to skin and eyes and may be toxic; do not touch it.

WARNING

- Residual voltage may remain in the high-voltage circuit even after power is disconnected. Wait for at least 5 minutes and verify zero voltage with a standard professional voltmeter before any operation.
- Maintenance shall follow the sequence: equipment de-energization, lockout/tagout to prevent re-energization, zero-voltage verification, residual charge discharge and equipment grounding, and insulation shielding of adjacent live parts.
- Install a lockout device on the switch and attach a warning tag to indicate that the switch must not be operated.
- Improper decommissioning may cause damage to equipment. Ensure the product is decommissioned in accordance with relevant provisions before maintenance.
- Do not clean the equipment with water or any solvent.

CAUTION

- Before maintenance, set up warning signs or safety barriers to prevent unauthorized access.
- Use an electroscope of the proper voltage level to verify the equipment is completely de-energized.

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- Before maintenance or repair, securely connect the circuit to be serviced to the main grounding system. Remove the grounding connection upon completion.
- Ensure that the air inlets and outlets are not blocked. Remove any debris around the vents to guarantee proper heat dissipation.
- Insert and remove cables in accordance with regulations; violent or forced operations are prohibited.
- Clean tools and materials promptly after maintenance, and check for any metallic objects left inside or on top of the product.
- Contact the customer service center for any operation and maintenance queries; unauthorized operation is prohibited.
- A full inspection and test shall be performed upon completion of maintenance before the equipment is powered on again.
- If fluid has accumulated inside the cabinet, open the drain outlets at the front bottom using a hex screwdriver. Collect all fluid and dispose of it properly.

8.2 Maintenance Schedule

NOTE

- Perform maintenance as required by site conditions.
- In sandstorm-prone areas, clean the air conditioner filter after each sandstorm with a high-pressure water gun.
- The CO detector is recommended to be zeroed annually and calibrated every 2 years. Remote and on-site zeroing are available.
- Contact the supplier within 24 hours if any abnormality occurs to the battery.

Maintenance Item	Description	Frequency
Environment & Safety	Check that temperature and humidity inside/outside the equipment are within reasonable ranges.	1 day
	Ensure no flammable or explosive materials around the equipment.	1 day
	Check that warning labels are legible and intact.	1 day
	Check heat dissipation modules and vents for blockage; clean with a vacuum cleaner if necessary.	12 months
	Check if the fire-proof mud is with good adhesion and foundation intact and smooth	12 months
Appearance & Structure	Check that status indicators are in normal condition.	1 day
	Ensure no foreign objects wrap or cover the equipment enclosure.	1 day

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	Check the equipment for paint peeling/ rust, door lock damage and blocked vents.	3 months
	Verify normal function of EPO button and equipment shutdown switches.	3 months
	Check internal screws for loss and rust.	12 months
Internal Components	Battery packs: Check batteries work in proper temperature/humidity with normal voltage and current.	3 months
	Thermal management system: Check cooling system operates normally, clean radiators/fans, and confirm over- temperature protection works.	3 months
	Power distribution unit: Verify normal operation, with no alarms, abnormal voltage or temperature, and that all connections are secure.	3 months
	Power distribution area: Check that all connections are tight and free of corrosion or overheating; clean internal dust to maintain proper heat dissipation	3 months
	UPS: Check that connections are secure and input/output parameters are normal.	3 months
	Fire protection and water immersion components: Verify that smoke and heat detectors are working normally, and perform a water drip test to confirm the water immersion sensor triggers an alarm correctly.	6 months
Electrical Connections	Check all cables for loose connection, damage and water ingress.	3 months
	Reliable grounding and equipotential bonding	12 months
System	Check the system operates without alarm information via EMS or Deye Cloud.	1 day

8.3 Post-Maintenance Requirements

After completing maintenance operations, follows the steps below to restore the site and archive the maintenance records:

Step	Operation
1. Cleaning & Restoration	Remove all temporary measures (e.g., grounding and warning signs) and wiring is restored to original condition. Prevent foreign objects from being left behind or personnel from inadvertently entering.

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2. Power-up & Verification	Restore system power step by step per the power-up procedure. Verify that the system has no alarms and operating parameters are normal.
3. Recording & Archiving	Create traceable maintenance records, including the time, personnel and equipment status, and archive the records.

8.4 Storage

NOTE

- For long-term storage, keep the original packaging and check it regularly.

WARNING

- Keep the product far away from high-temperature heat sources, open flames, flammable and explosive areas, and all ignition sources, and do not expose it to direct sunlight or rain.
- During storage, ensure the product is completely disconnected from external equipment, with all operation indicators off.
- Store the product in a dry, clean, well-ventilated indoor area on flat, solid ground, away from strong infrared radiation, organic solvents, corrosive gases, and conductive metal dust.
- Handle with care. Dropping, collision, overturning, side placement, or tilting are strictly prohibited. Do not stack or roll the product improperly.
- Strictly comply with the storage requirements of the warning signs and other information on the packaging to avoid device damage.
- The storage area must be equipped with qualified fire-fighting facilities, including fire sand and special fire extinguishers.
- If the equipment is stored for more than 8 months, it must be tested by qualified personnel before installation and supplementary charging is required.

Storage Requirements

- **Storage Temperature**: -30℃ ~ 60℃
- **Humidity**: 0% ~ 95% RH, non-condensing;
- **Altitude**: ≤3000 m

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Long-Term Storage:

- Replace desiccants with the same specifications and quantity regularly.
- Check the outer packaging every 3 months, and replace damaged packaging immediately.
- Storage duration is calculated from the latest charge date marked on the packaging. If the allowable storage period is exceeded, report to the person in charge immediately.
- Maintain temperature and humidity per the storage requirements.

Since the batteries have been installed in the cabinet in the factory, the following **battery storage requirements** should also be aided:

1. This equipment is shipped with a default SOC of 30%. For long-term battery storage, keep the SOC at a sufficiently high level to avoid low-SOC storage, complete at least one charge-discharge cycle every 6 months, and calibrate the SOC to an appropriate storage level after charging. Storing at a low SOC is strictly prohibited to prevent battery damage from over-discharge.
2. Check the battery voltage monthly if stored for more than 6 months. Storage can be continued if the voltage is higher than 51.2V; charge immediately in accordance with the specified charging strategy if the voltage is lower than 51.2V.
3. To reduce self-discharge losses during extended storage, disconnect one terminal of the positive power cable from the high-voltage box. This action cuts off the internal 12V auxiliary power supply and minimizes battery depletion.
4. Long-term storage of lithium batteries will cause capacity attenuation, so overdue storage shall be avoided as much as possible. If the allowable storage period is exceeded, contact the qualified personnel for inspection and maintenance. Do not attempt to start or operate the equipment without prior inspection.

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9 Technical Specifications

Model	MC-L522-2H2/3
System Parameter	
Operating Temperature (℃)	-30 - 55
Storage Temperature (℃)	-30 - 60
Humidity	0% – 95% RH (Non-Condensing)
Type of Cooling	Liquid Cooling
Fire Suppression	Aerosol, Water
Ingress Protection	IP54
Anticorrosion Grade	≥C4
Altitude	≤3000m
Communication	RS485, Modbus TCP, DIDO
Weight (Kg)	≤5500
Dimension (W x D x H, mm)	2000 x 1400 x 2440
DC Parameter	
Battery	$LiFePO_4$
Nominal Capacity	314Ah
Nominal Energy	522.496 kWh
Nominal DC Voltage	832Vd.c.
DC Voltage Range	715 – 936 Vd.c.
Charge and Discharge Rate	0.5P
AC Parameter	
Nominal AC Voltage	380/400V 3L + N +PE
Rated Frequency	50/60 Hz
Rated Power	250 kW
Maximum Power	250 kW
Power Factor	-1 - +1

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Appendix I Troubleshooting

If any fault occurs, contact the service center or service engineers for help.

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Appendix II Emergency Handling

DANGER

- In the event of natural disasters (earthquake, typhoon, flood, wildfire, etc.): Prioritize personnel safety, cut off power and stop the ESS immediately.
- Do NOT operate damaged equipment without professional inspection and qualified testing after the disaster.
- Keep away from waterlogged or fire-damaged units and contact our service engineers for professional handling.

WARNING

- When the air intake/exhaust system is operating, do NOT face the exhaust vents under any circumstance.
- Refer to the user manual/product manual for product information. Do NOT open the cabinet door if internal safety cannot be guaranteed.

➢ **Fire/Explosion Hazards**

- Do not open the door. Evacuate immediately to at least 50 meters away from the site and call the fire department.
- Wear respiratory protection. Disconnect the upstream power supply only when safe.
- Isolate the accident area only when safe to keep unauthorized personnel away.
- Post-incident maintenance must be performed by professionals or our after-sales engineers.

➢ **Electric Shock**

- Ensure personal safety, then disconnect the power supply immediately to avoid secondary electric shock.
- Use an insulated object to separate the victim from the power source and perform first aid such as cardiopulmonary resuscitation (CPR).
- Call the emergency medical number immediately to obtain professional medical treatment.
- Protect the accident scene for investigation and evidence preservation.
- Contact professionals to conduct a comprehensive inspection of the ESS. The system may only be put back into use after repair or replacement and passing qualified testing.

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- **Chemical Hazards**
  - In case of electrolyte leakage, evacuate personnel from the affected area and notify the relevant personnel immediately. Professionals shall conduct safe collection and proper disposal of leaked substances.
  - Toxic gases may be released during battery combustion or damage; evacuate personnel to a safe area immediately. If personnel are exposed or injured, call the emergency medical number for professional treatment. Respiratory protection, protective clothing and other safety equipment must be worn during hazard handling.

- **Mechanical Injury**
  - In the event of equipment tipping, battery pack dropping or component detachment, disconnect power and stop ESS operation immediately.
  - In case of personnel injury, administer first aid (hemostasis, bandaging, etc.) and call the emergency medical number immediately.
  - If obvious odor, damage, smoke or fire is detected, evacuate personnel immediately, call the fire department, and allow professionals to handle firefighting and subsequent treatment.
  - If any abnormalities are observed, professionals shall use move the battery pack to an open, safe area, let it stand for 1 hour while monitoring temperature, and contact the engineers.
  - Contact professionals to repair or replace damaged components. The system may only be returned to service after passing inspection and testing.

- **Natural Disasters**
  - In the event of natural disasters including earthquake, typhoon, flood, wildfire, etc., disconnect the power supply and stop ESS operation immediately.
  - If the ESS is submerged or flooded, do not touch the equipment and keep clear of the waterlogged area.
  - Do not use water-soaked batteries under any circumstances. Contact a qualified battery recycling service for proper disposal and scrapping.
  - Before a wildfire approaches, establish a firebreak around the ESS and prepare adequate fire-fighting equipment such as fire extinguishers, fire sand, fire hoses, etc.
  - After the disaster, contact professionals to fully inspect the support structure, electrical connections, etc. The system may only be reused after repair/replacement and qualified testing.

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