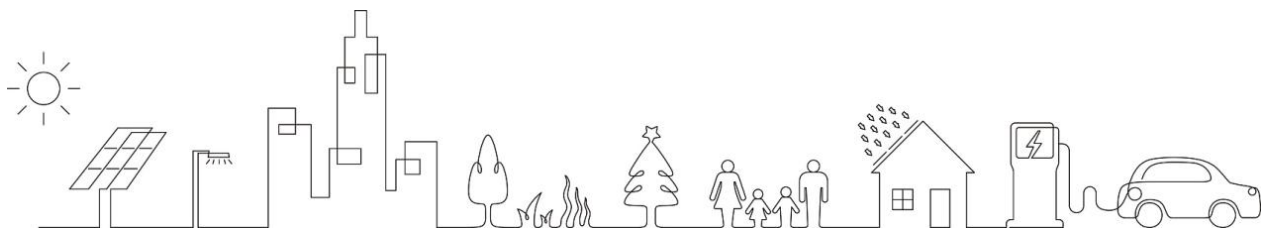
Tensorpack M
Hybrid Energy Storage System
User Manual
(M217-50, M241-50)



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Abbreviation and Definition

Abbreviation	Definition
BMS	Battery Management System
EMS	Energy Management System
EPO	Emergency Power Off
ESS	Energy Storage System
LC	Local Controller
PCS	Power Conversion System
SPD	Surge Protection Device
UPS	Uninterruptible Power Supply

1 About This Document

1.1 Purpose

This document provides the guidelines for the following **Tensorpack M** Hybrid Energy Storage System (also referred to as ESS) models. The content covers product description, installation, and commissioning. Before installing and operating the ESS, read this document carefully to understand the safety information as well as functions and features of the ESS.

- M217-50
- M241-50

1.2 Document Conventions

Statement

In this document, “equipment” refers to the products, software, components, spare parts, or services related to this document; “the company” refers to the manufacturer (producer), seller, or service provider of the equipment; “customer” refers to the entity that transports, stores, installs, operates, or maintains the equipment.

Symbol Conventions

To alert readers or users about the precautions that should be observed during installation, operation, and maintenance to ensure personal and equipment safety, this document uses the following safety symbols:

⚠ DANGER

Indicates a high potential hazard that, if not avoided, will result in death or serious injury.

⚠ WARNING

Indicates a moderate potential hazard that, if not avoided, may result in death or serious injury.

⚠ CAUTION

Indicates a low potential hazard that, if not avoided, may result in minor or moderate injury.

NOTICE

Indicates a potential hazard that, if not avoided, may result in equipment malfunction or property damage.

NOTE

Provides supplementary explanation or key details in the main text. It is not a safety alert and does not contain information related to personal injury, equipment damage, or environmental hazards.

2 Safety Precautions

2.1 Statement

Before installing or operating the equipment, please read all safety instructions carefully. It is mandatory to strictly adhere to all safety precautions, safety markings on the equipment, applicable laws, regulations, standards, and norms.

In this manual, the terms “danger”, “warning”, “caution” and “note” are not limited to all safety matters that should be followed. Customers must also comply with relevant international, national, or regional standards and industry practices. The equipment should be used in an environment that meets the requirements. Incorrect operation can lead to product damage and property loss, and even cause personal injury, for which the company is not liable.

The company is not responsible for any of the following situations or their consequences:

- Equipment damage caused by force majeure such as floods, flash floods, typhoons, earthquakes, tsunamis, lightning, volcanic eruptions, war conflicts, government bans, strikes, etc.;
- Damage caused by transportation by the customer or a third party authorized by the customer;
- Damage caused by failure to comply with the requirements of this manual;
- Installation and operation that do not comply with relevant international, national, or regional standards;
- Failure to observe the safety precautions and operating instructions specified in this manual;
- Failure to follow the safety markings indicated on the equipment;
- Installation and use of the equipment by unqualified personnel;
- Customer-provided non-standard tools that do not meet relevant standards;
- Damage caused by the customer’s intentional acts, gross negligence, operational violations, or reasons not attributable to the company.

2.2 Label Description

Labels on the equipment includes essential information for safely operating the product. It is strictly forbidden to intentionally damage or remove these labels. If the labels become blurred, damaged, or lost, they must be replaced immediately. The machine identification includes:

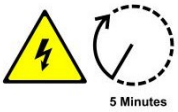
Label	Description
	Indicates high voltage danger; touching may result in an electric shock hazard.
	Advises caution for safety; avoid unnecessary contact to prevent personal injury.
	Indicates that this is a protective ground (PE) and must be securely grounded to ensure personal safety.
	Indicates the presence of lethal high voltage. After disconnecting the equipment from the external power source, wait 5 minutes before touching any internal conductive components.
	Indicates that the manual should be read before performing any operations on the product.

Table 2-1: Label description

2.3 Safety Instructions

2.3.1 General Safety

⚠ DANGER

- Touching the power grid or terminals and contacts connected to the ESS may cause fatal electric shocks.
- There is lethal high voltage inside the product; heed and follow the warning signs on the product.
- Damaged equipment or product malfunctions may cause electric shocks or fires.

2.3.2 Personal Safety

⚠ DANGER

- During equipment operation, unauthorized or incorrect operations can cause fires, electric shocks, or explosions, leading to product damage, property loss, and even personal injuries.
- During work, it is strictly forbidden to wear various conductive objects such as watches and necklaces to avoid electric shock injuries.
- During work, it is mandatory to use regulatory standard specialized insulated tools to avoid electric shock injuries or short circuits.

General Requirements

- If faults that may cause personal injury or equipment damage are discovered during work, stop the operation immediately and, after confirmation by a responsible person, take effective protective measures.
- Before powering on the equipment, ensure it is fully installed and checked by professionals.

- It is forbidden to touch or indirectly contact powered equipment; voltage at the contact points should be measured before touch to ensure there is no risk of electric shock.
- Do not touch operational fans with fingers or tools to prevent personal injury or equipment damage.
- In case of a fire, immediately evacuate the building or equipment area and press the fire alarm or call the fire department.

Personnel Requirements

- Personnel performing electrical operations on this product must have professional training and relevant operation certificates.
- Operators should have a certain level of electronic, electrical wiring, and mechanical expertise, and be fully familiar with the internal electrical principles of the product.
- Operators should be familiar with various safety precautions and relevant standards of their country/region.
- Only qualified professionals or trained personnel are allowed to install, operate, and maintain the equipment.
- Only qualified professionals are allowed to remove safety facilities and service equipment.
- Installation or operation personnel should have the ability to respond to emergencies or unexpected situations that may arise during installation or trial operation.
- Personnel involved in special scenarios such as electrical operations, working at heights, or operating special equipment must have the special operation qualifications required by their local country/region.
- Except for personnel operating the equipment, other individuals should not approach the equipment.

2.3.3 Electrical Safety

⚠ DANGER

- Before making electrical connections, ensure the equipment is undamaged, as damage may cause electric shocks or fires.
- Both the battery side and grid side may produce voltage; always use a standard voltmeter to ensure no voltage before touching.
- Disconnect the power source of the ESS; the battery will not immediately lose power, wait 10 minutes to ensure the equipment is completely de-energized before operating.
- Prevent foreign objects from entering the equipment during work as they may cause short circuits, damage, power supply derating, or personal injuries.

⚠ WARNING

- Ensure the system is reliably grounded before performing electrical installations or connections; otherwise, there may be a risk of electric shock when touching the product.
- Do not damage the grounding conductor.

General Requirements

- Installation, operation, and maintenance must be performed according to the manual's sequence; do not arbitrarily change the installation order, modify or alter the equipment.
- Permission from local electrical authorities is required for grid-connected operation.
- Erect warning signs or set up safety barriers near the equipment, and strictly prohibit non-working personnel from entering.
- Disconnect the equipment itself and the upstream and downstream switches before installing or removing power cables.

- If liquid enters the equipment, immediately turn off the power and do not continue using it.
- Before operating the equipment, carefully check that the tools used meet the requirements and are registered; after the operation, collect them back to prevent them from being left inside the equipment.

Cable Requirements

- Before installing power cables, ensure the cable labels are correct and the cable terminals have been insulated.
- The selection, installation, and routing of cables must comply with local laws, regulations, and standards.
- During the laying of power cables, avoid looping or twisting. If the power cable is found to be too short, replace it; do not make joints or soldering points in the power cable.
- All cables must be securely connected, well-insulated, and of appropriate specifications.

Grounding Requirements

- The equipment grounding impedance should meet local electrical standards.
- The equipment should be permanently connected to protective ground. Before operating the equipment, check the electrical connections to ensure the equipment is reliably grounded.
- Do not operate the equipment without installing a grounding conductor.

2.3.4 Environmental Requirements

⚠ DANGER

It is strictly forbidden to pile flammable and explosive materials around the installation site.

⚠ WARNING

- Install the equipment away from liquids, and strictly prohibit installation under locations such as water pipes and air vents where condensation can occur.
- Do not install under air conditioning vents, ventilation ducts, or windows where leakage is possible to prevent liquids from entering the equipment and causing faults or short circuits.
- The equipment should be installed in a clean, neat, and well-ventilated area; do not pile miscellaneous items within a 2-meter radius.
- Do not install the equipment in environments with radioactive radiation, high salinity, strong vibration or magnetic fields, or where fungi can easily grow.

NOTICE

Avoid opening the maintenance door of the ESS for maintenance and inspection under adverse conditions with air humidity >95% or during rainy and humid weather.

- Moisture intrusion can damage the product. To ensure the normal and safe operation of the system, pay attention to environmental humidity during routine maintenance and inspection.
- The installation site should meet the requirements for equipment ventilation and personnel evacuation.
- Before installing the equipment, ensure the installation surface is solid, free of adverse geological conditions, and meets the load-bearing requirements of the equipment.
- Before maintenance, clean the accumulated water, ice, snow, or other debris on top.
- After installing the equipment, clear empty packaging materials from the area.

2.3.5 Operation and Maintenance Safety

⚠ WARNING

- During routine operation, ensure the equipment cabinet doors are closed and locked, and the keys are removed and kept by a designated person to prevent unauthorized access and accidents.
- Except for necessary checks and maintenance, do not open the cabinet doors to prevent moisture from entering the equipment and causing short circuits and damage.
- Except for personnel operating the equipment, other individuals should not approach the equipment.
- When performing maintenance and repairs, personal protective equipment must be equipped.

NOTICE

- Do not spray any devices inside or outside the equipment.
- Do not clean the equipment with cleaning agents or expose it to corrosive chemicals.

General Requirements

- Personnel operating the equipment must be professionals and trained personnel.
- Ensure that the internal devices and systems of the battery system are completely de-energized.
- Erect clear warning signs at the disconnection points to prevent dangerous accidents caused by misoperation.
- Set up warning signs or safety barriers in the operation area.
- During checks or maintenance, ensure at least two personnel are present.

- Wear protective equipment, including safety goggles, insulated gloves, insulated shoes, and safety helmets, as necessary to ensure the safety of personnel and equipment.
- After operations, lock the maintenance door of the ESS and securely store the keys.

3 Product Description

3.1 Product Overview

The **Tensorpack M Hybrid Energy Storage System (ESS)** is an all-in-one solar-plus-storage solution designed for commercial and industrial applications. It integrates a battery cabinet with a hybrid inverter to support key features including Time-of-Use (TOU) , Demand Charge Management (DCM), PV consumption, capacity expansion, ancillary services, and emergency backup.

As a highly integrated system, Tensorpack M enables efficient solar energy storage and bidirectional energy conversion through coordination between the battery system and the hybrid inverter.

The system comprises the following core components:

- Battery pack
- Hybrid inverter
- High-voltage (HV) control box
- Thermal Management System (TMS)
- Fire Fighting System (FFS)
- Battery Management System (BMS)

Features of Tensorpack M Hybrid ESS

- TOU (Time of Use)

  The LC manages ESS charging or discharging according to tariff structures and load profiles. The system charges during off-peak periods and discharges during peak periods, optimizing electricity cost savings.

- DCM (Demand Charge Management)

  By regulating ESS power output based on transformer load at the grid connection point, the system prevents power demand from exceeding the set demand. This maintains consumption within demand levels and improves economic efficiency.

- PV Consumption

  When PV generation exceeds local load demand, excess energy is stored in the ESS batteries to prevent grid feed-in. The LC automatically reduces discharge power when load decreases, ensuring no energy export to the grid.

- Capacity Expansion

  Integrated with charging station monitoring systems, the LC coordinates transformer load, charging power, and ESS operation to maintain total power consumption within the transformer's safe operating capacity.

- Ancillary Services

  Through connectivity with grid operator dispatch platforms, the system enables behind-the-meter services including demand response, peak shaving, and frequency regulation.

3.2 System Architecture

Tensorpack M employs a modular separated architecture consisting of the battery cabinet and hybrid inverter:

- **Battery Cabinet**: Handles energy storage, integrating battery packs, HV control components, air-conditioning units, fire-protection equipment, and the BMS.
- **Hybrid Inverter**: Manages power flow, coordinating between photovoltaic input, grid interaction, and load supply.
- **Interconnection**: Reliable cabinet-to-cabinet linkage via DC power cables and communication wiring.

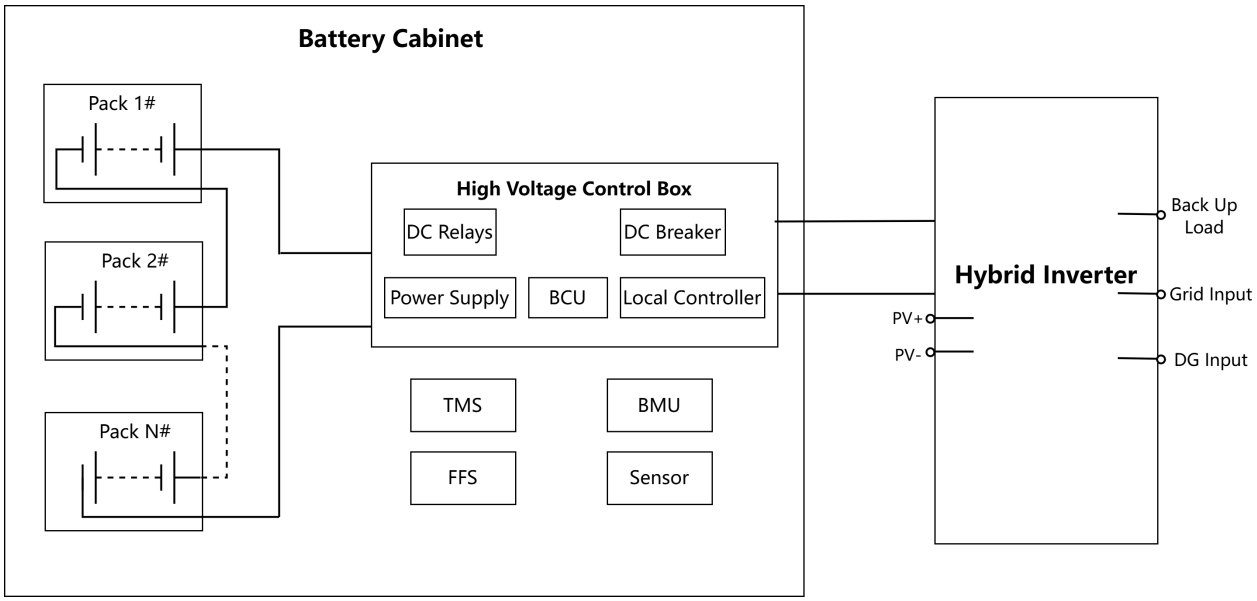


Figure 3-1: System architecture

3.3 Model Description

This document involves the following product model: M217-50, M241-50.

The product model of Tensorpack M is divided into three fields, as shown in Figure 3-2 (using **M217-50** as an example). Table 3-1 provides the description of each field.

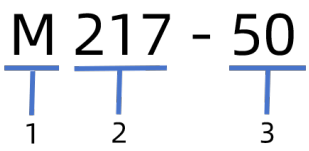


Figure 3-2: Product model

Field	Description	Value Options
1	Serial product	M：Tensorpack M Hybrid ESS
2	Capacity level	217：Rated capacity 217kWh 241：Rated capacity 241kWh
3	Power rating	50：The power rating of the ESS is 50kW

Table 3-1: Model description

3.4 Appearance

Figure 3-3 demonstrates the appearance of the Tensorpack M Hybrid ESS.

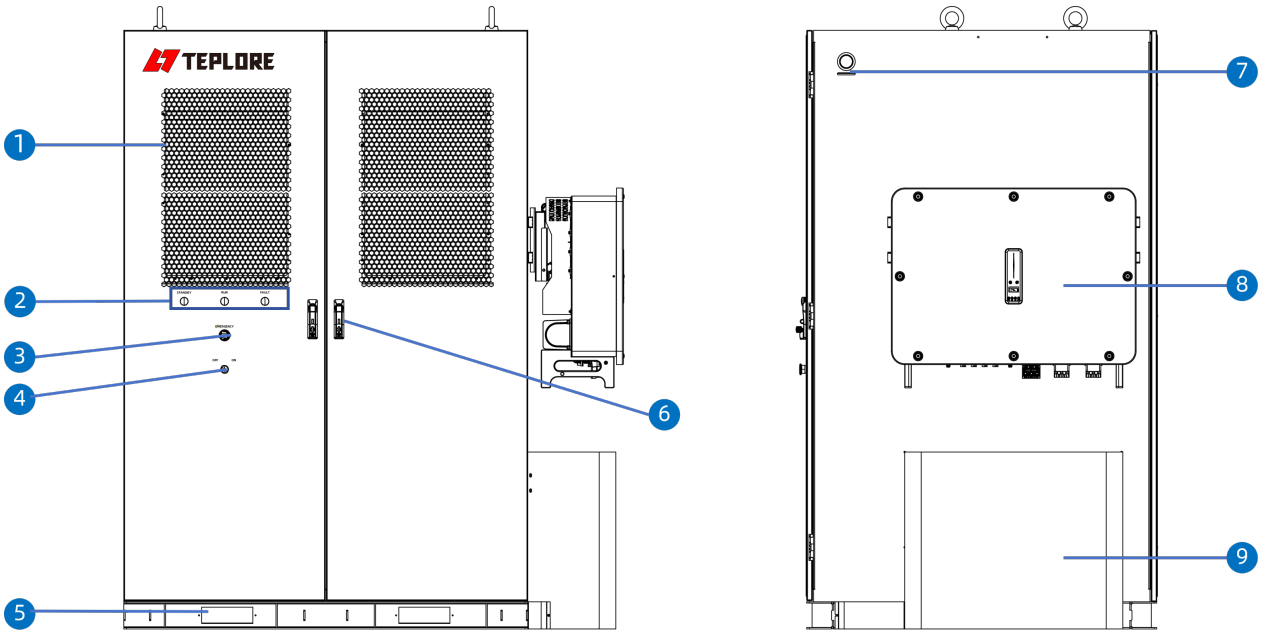


Figure 3-3: Appearance

No.	Component
1	Thermal Management System (TMS)
2	Device Status Indicators*
3	Emergency Switch
4	On-Off Switch (Rotary Type)
5	Forklift Hole
6	Door Lock
7	Pressure Relief Valve
8	Hybrid Inverter
9	Cable Protective Cover

Table 3-2: Appearance description

*Device Status Indicators indicate three statuses: Standby, Run and Fault.

Figure 3-4 demonstrates the external dimensions of the Tensorpack M ESS (Unit:mm).

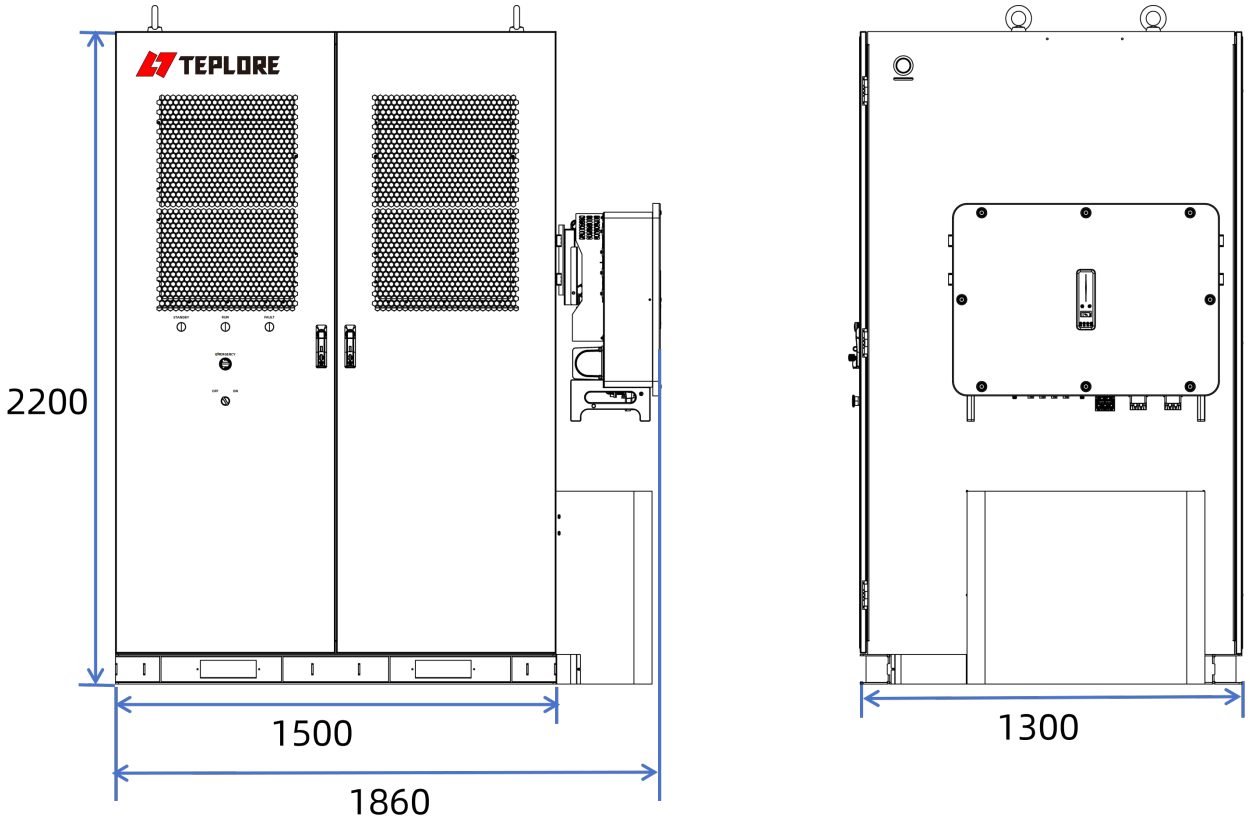


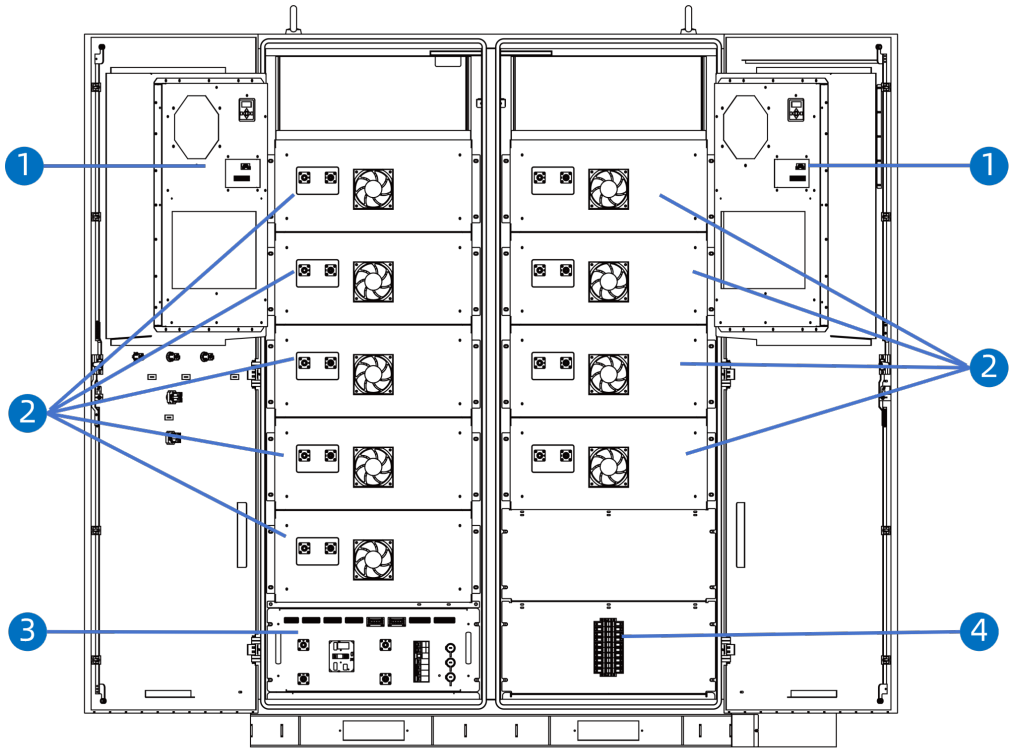
Figure 3-4: Dimensions

3.5 Internal Layout

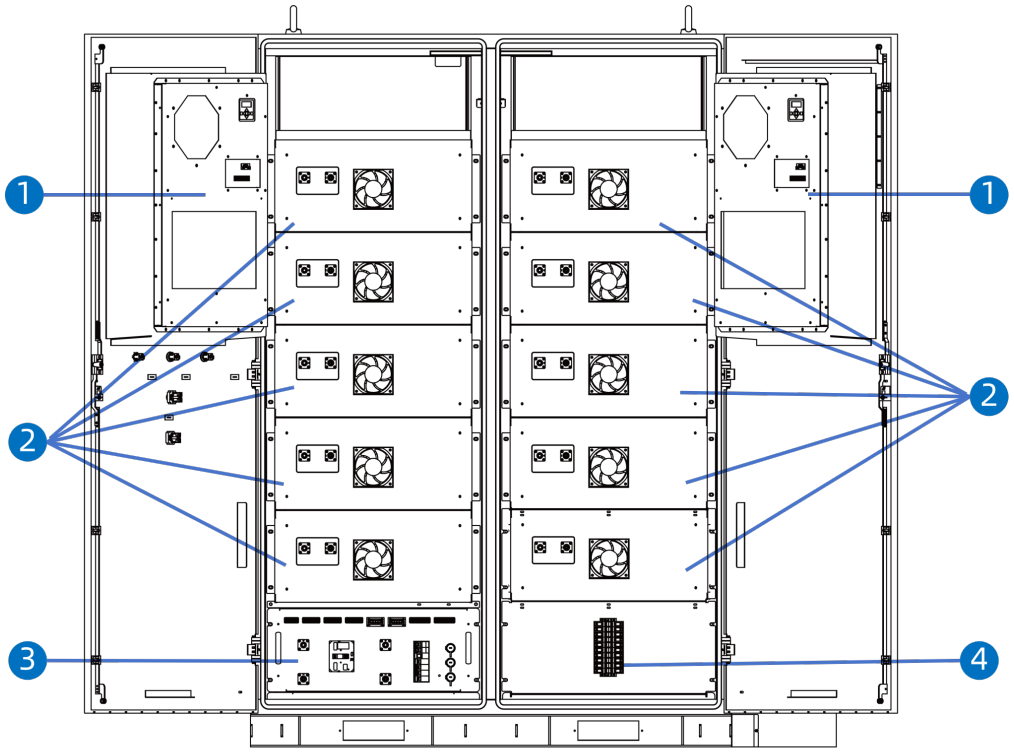
Figure 3-5 shows the internal layout for both M217-50 and M241-50 models, which differ only in the number of battery packs. Refer to the figure and description that correspond to your specific model.

No.	Component
1	TMS
2	Battery Pack
3	HV Control Box
4	Terminal Block

Table 3-3: Component description



M217-50



M241-50

Figure 3-5: Internal layout

3.6 Component Description

3.6.1 Battery Pack

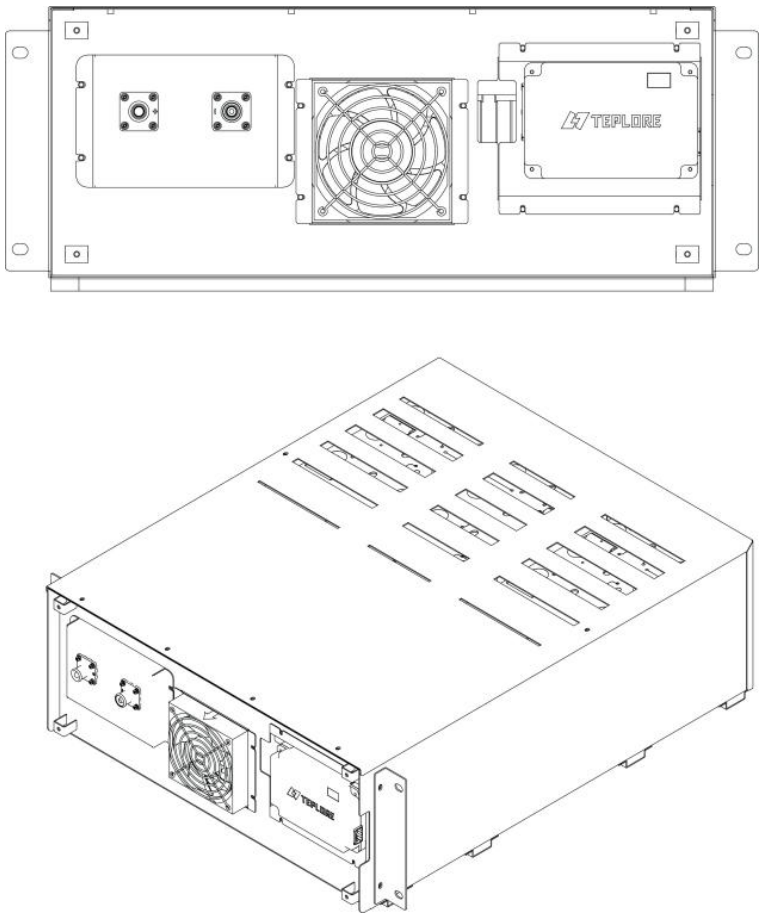


Figure 3-6: Battery pack appearance

Parameter	Specification
Dimension (W × D × H)	666mm x 762mm x 249mm
Weight	170kg
Rated Capacity	24.1kWh
C-Rate	≤0.5P
Configuration	1P24S
Core Components	24S cells，BMU，pack fan

Table 3-4: Battery pack specifications

3.6.2 BMS

The Battery Management System (BMS) is the intelligent core responsible for ensuring the safety, reliability, and optimal performance of the battery pack. This hierarchical system primarily comprises the Battery Management Unit (BMU) and the Battery Control Unit (BCU).

BMU

The BMU is a critical component of the energy storage BMS, ensuring safe operation and extended battery life through precise real-time monitoring of individual cell voltage and temperature.

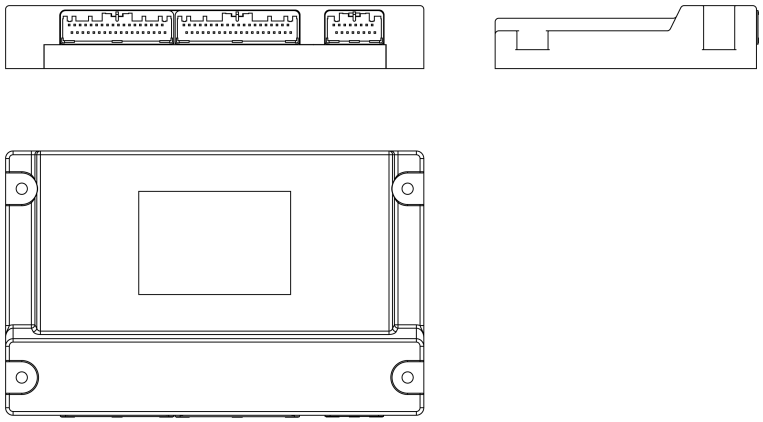


Figure 3-7: BMU appearance

Key Features:

- Accurately monitors individual cell voltage and temperature across multiple battery chemistries.
- Supports passive cell balancing to maintain pack consistency and extend battery life.
- Features robust daisy-chain communication for reliable data transmission to the master controller.
- Built with self-diagnostic capabilities and high-safety design.

BCU

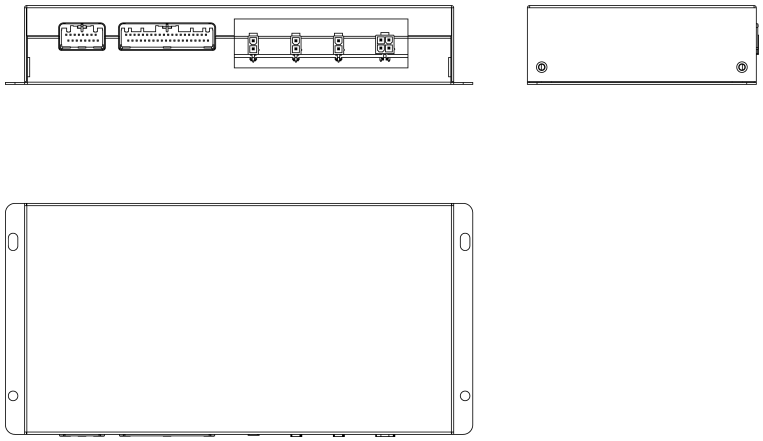


Figure 3-8: BCU Appearance

The BCU is the central control unit of the BMS, managing battery state estimation, charge/discharge, balancing, and safety functions by communicating with BMUs and external systems like PCS and EMS.

Key Features:

- Designed with high reliability and multi-layer safety protection to ensure safe battery operation under all conditions, in compliance with industry standards.
- Provides accurate battery monitoring and dependable SOC indication for efficient system operation and energy management.
- Built to withstand electrically noisy environments in storage systems, ensuring stable communication and signal integrity.
- Supports flexible system expansion and remote configuration updates via standard CAN interface, simplifying deployment and maintenance.

3.6.3 TMS

The Thermal Management System (TMS) consists of industrial air conditioners, water immersion sensors, and door magnets inside the cabinet.

Industrial Air Conditioner

Each side of the front door panel of the system is equipped with an industrial air conditioner. These units provide intelligent temperature control within the system, enabling preheating in extremely cold environments and cooling when the ambient temperature is high. The parameters of the industrial air conditioner are shown in Table 3-5.

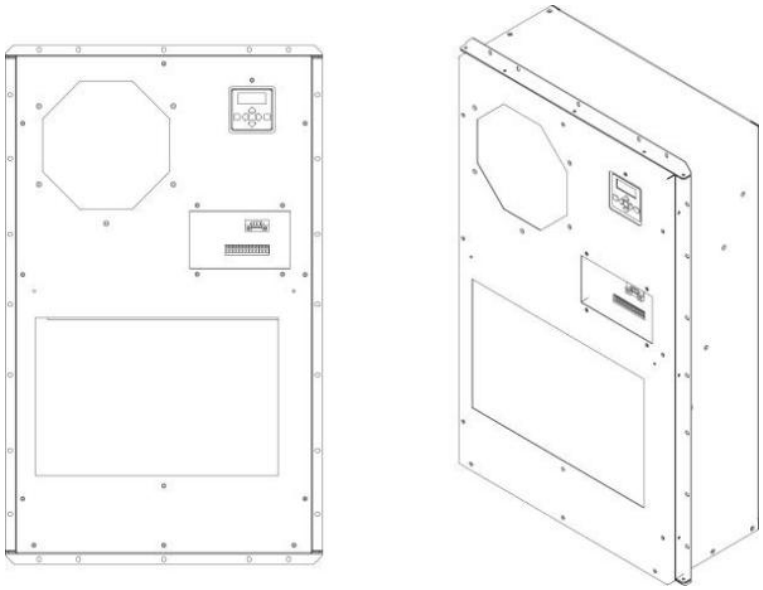


Figure 3-9: Industrial air conditioner appearance

Parameter	Specification
Configuration Quantity	2 Sets
Operating Temperature	-40℃ ~ +55℃
Refrigerant	R134a
Cooling Capacity L35	2000W
Heating Capacity	1000W
Internal Circulation Airflow	650m³/h
Power Supply Range	220V ± 15%, 50/60Hz

Table 3-5: Industrial air conditioner specification

Water Immersion Sensors

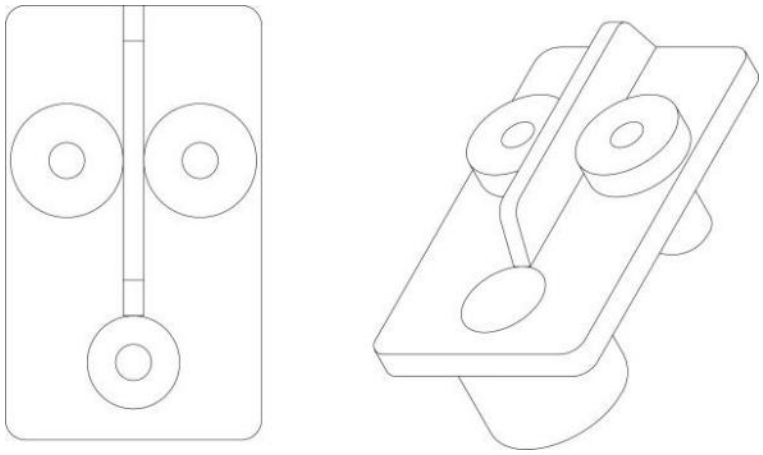


Figure 3-10: Water immersion sensors appearance

Parameter	Specification
Power Supply	24Vdc ± 10%
Operating Current	<15mA in dry state; <50mA in water alarm state
Operating Humidity	0 ~ 100% RH (no condensation)
Alarm Threshold Range	50kΩ ± 10kΩ (hysteresis value ≥5kΩ)

Table 3-6: Water immersion sensors specification

3.6.4 FFS

The Fire Fighting System (FFS) consists of a composite gas sensor, an aerosol unit, and pressure relief valves.

A composite gas sensor (monitoring CO, smoke, temperature, and VOC) is installed at the top of the internal space to detect the internal environment. Upon detection of thermal runaway, the aerosol fire suppression unit is triggered.

One 300g aerosol unit is installed inside the cabinet to provide total flooding fire protection within the enclosed space.

Pressure relief valves are installed on both sides of the cabinet top to maintain internal pressure stability, and prevent potential explosion hazards caused by excessive pressure during thermal runaway events.

Composite Gas Sensor

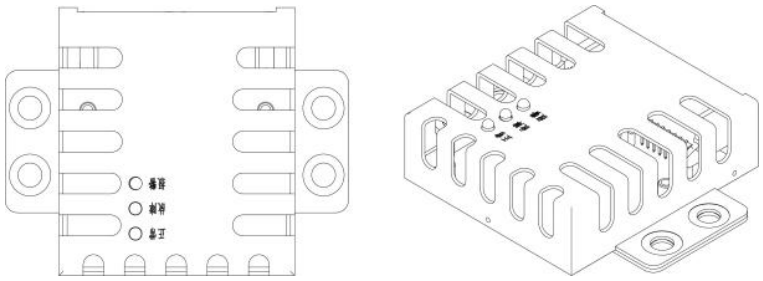


Figure 3-11: Composite gas sensor appearance

Parameter	Specification
Operating Humidity	<95%RH
Operating Pressure	55 ~ 106kPa
Detection Range	Smoke, temperature, carbon monoxide, electrolyte gas
Measurement Range	0 ~ 5000ppm, -40℃ ~ +125℃
Measurement Accuracy	<±10ppm , ±0.5℃
Data Collection Interval	1s

Table 3-7: Composite gas sensor specification

Aerosol

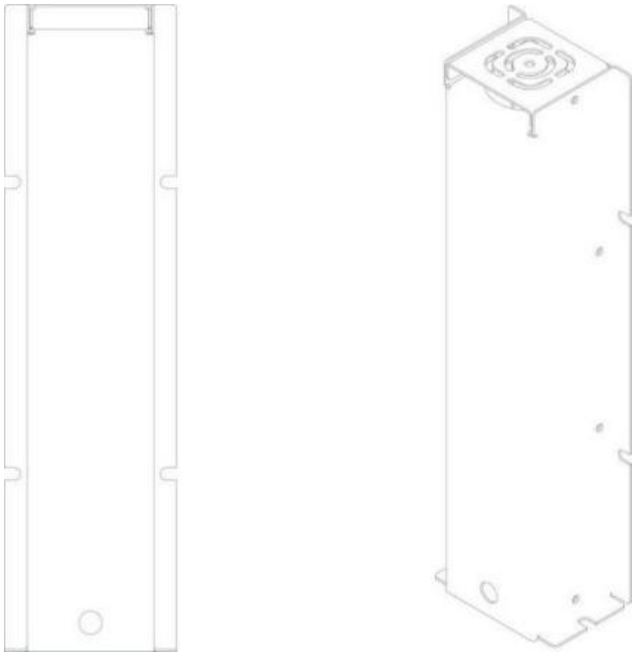


Figure 3-12: Aerosol appearance

Parameter	Specification
Activation Method	Electric start and thermal start
Thermal Start Temperature	≥170℃
Safe Current	≤200mA
Activation Current	≥700mA
Fire Extinguishing Efficiency	100g/m³ ~ 130g/m³
Protection Space	3m³

Table 3-8: Aerosol specification

Pressure Relief Valve

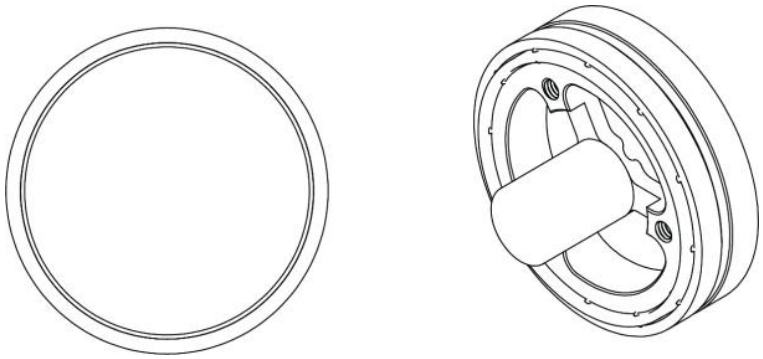


Figure 3-13: Pressure relief valve appearance

Parameter	Specification
IP Rating	IP68
Diaphragm Air Permeability	≥1L/min@1.5kPa
Burst Pressure	4±1kPa
Exhaust Area (maximum opening)	600mm^2
Temperature Resistance	-40℃ ~ +125℃

Table 3-9: Pressure relief valve specification

3.6.5 HV Control Box

The High-Voltage (HV) Control Box integrates a pre-charge circuit, DC contactor, DC circuit breaker, auxiliary power supply, and the System Monitoring Unit (SMU) to manage and protect the HV DC loop.

In the event of a serious system fault, the integrated DC circuit breaker disconnects the circuit to ensure battery system safety and the proper operation of control circuits.

Note: Conditional short-circuit current (Icc) = 6kA

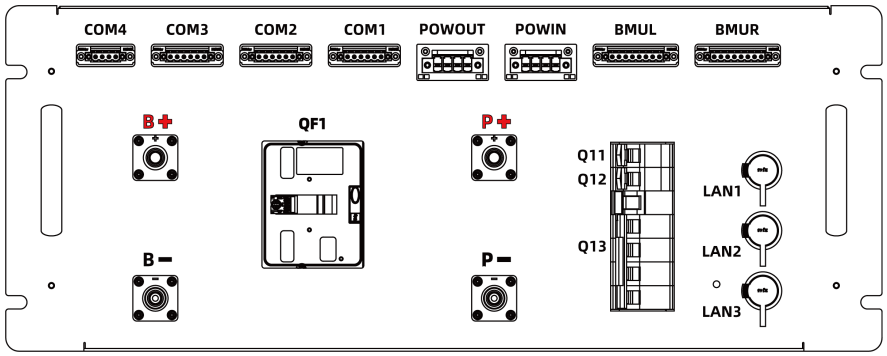


Figure 3-14: HV control box appearance

Terminal	Description
P+	PCS input positive
P-	PCS input negative
B+	Battery side positive
B-	Battery side negative
BMUL	Left BMU communication
BMUR	Right BMU communication
POWIN	Auxiliary circuit power input
POWOUT	Air conditioner power output
COM1	Air conditioner communication
COM2	Fire protection communication
COM3	Signal communication
COM4	Water immersion and door access signal

Table 3-10: Terminal description

3.6.6 Hybrid Inverter

The hybrid inverter (hereinafter referred to as the inverter) is installed at the upper section of the right side panel. To learn more about the inverter, refer to the user manual of the inverter.

4 Transportation and Storage

4.1 Packaging Requirements

Cabinet Packaging Requirements:

- Pallet Securing: The cabinet shall be securely fastened to a wooden pallet using appropriate fasteners to prevent any movement during transportation.
- Main Body Wrapping: The cabinet body shall be tightly wrapped with multiple layers of shrink film to provide protection against water and dust ingress.
- Corner Protection: Foam protective pads shall be installed on all exposed edges and corners to effectively prevent impact damage during handling and transit.

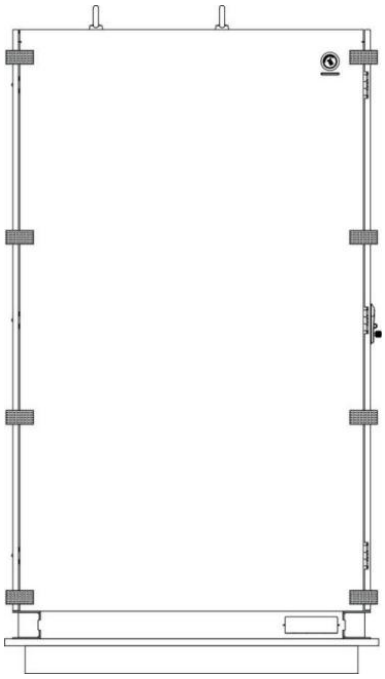


Figure 4-1: Cabinet packaging

4.2 Transportation Requirements

⚠ WARNING

- Any rough handling may cause the equipment to short circuit, damage, leak, crack, catch fire, or explode.
- Before transportation, ensure that the equipment packaging is intact and undamaged, with no unusual smells, leaks, smoke, or fire. If any of these conditions are present, do not transport.

NOTICE

Establish a controlled zone by setting up warning signs or barrier tape around the work area to prevent unauthorized personnel from entering and to ensure safe operations.

General Requirements

- Ensure all cabinet doors are securely locked before moving.
- Select appropriate forklifts or lifting tools based on site conditions. The equipment's load capacity, working radius, and swing radius must meet operational requirements.
- The cabinet tilt angle must not exceed 15° when transported with packaging. The tilt angle must not exceed 10° if the packaging has been removed.

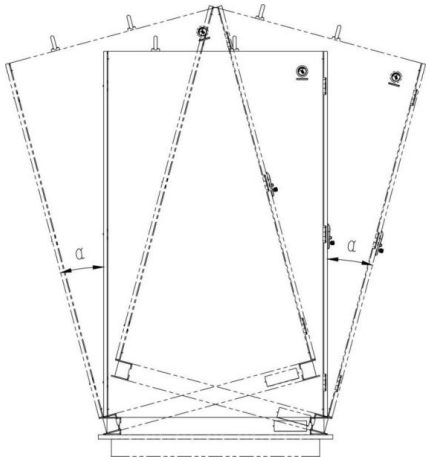


Figure 4-2: Cabinet tilt angle

- Clear all obstacles (such as trees, cables) from the transport path.
- Use necessary traction devices when operating on slopes or challenging terrain.
- Conduct transportation only under favorable weather conditions. Operations are strictly prohibited during adverse weather.
- The carrier must be qualified for hazardous materials transport. The use of open-top vehicles is strictly prohibited.
- Sea or road transport (with good road conditions) is preferred; rail and air transport are not supported. All activities must comply with international dangerous goods transportation regulations.
- Transporting the battery pack separately is strictly prohibited, and the battery system must not be disassembled at any time during transportation.

4.3 Storage Requirements

During storage, maintain relevant proof that meets product storage requirements, including temperature and humidity log data, storage environment photos, and inspection reports.

Environment Requirements

- Store in an elevated, dry, and clean area, away from rain, standing water, and vegetation.
- The ground must be level, solid, and have sufficient load-bearing capacity.
- The storage environment temperature should be between -30℃ and +60℃, and relative humidity should be maintained at 5% RH to 95% RH.
- Do not store in environments containing corrosive or flammable gases.
- Ensure all cabinet doors are securely locked before storage.
- The packaging must not be tilted or inverted.

Battery System Management

- Long-term storage of the battery system is not recommended. If necessary, the total storage duration must not exceed six months.

- For equipment stored for more than six months, perform a charge-discharge cycle prior to storage to adjust and maintain the system SOC at 30% - 40%.
- Before installation, visually inspect equipment that has been in long-term storage. After power-up and start-up, conduct comprehensive functional and safety tests by qualified personnel.

5 Site Requirements

5.1 Location Requirements

When choosing a suitable location for installing the equipment, consider the characteristics of the climatic environment and geological conditions to ensure the system operates normally under different conditions.

- The surrounding environment should be dry and well-ventilated to maintain normal operation.
- Stay away from areas concentrated with toxic and harmful gases to avoid equipment corrosion.
- Keep away from flammable, explosive, and corrosive materials to ensure safe operation.

5.2 Space Requirements

Sufficient space around the equipment is required to ensure effective heat dissipation and facilitate maintenance. The following figure shows the minimum clearance requirements (Unit:mm).

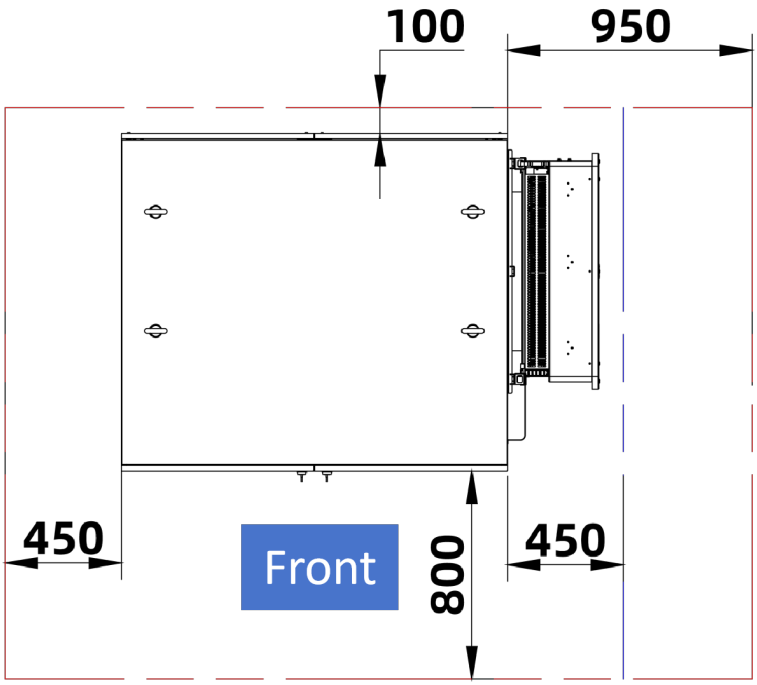


Figure 5-1: Space Requirement

5.3 Foundation Requirements

Before starting foundation construction, conduct thorough research on various conditions of the equipment installation site, including geological conditions and environmental climate factors. The rationality of foundation construction determines the stability of the equipment, the smooth opening and closing of doors, and the smooth operation thereafter. To prevent significant issues or troubles during equipment placement and maintenance, design and construct the foundation according to corresponding standards to meet the requirements for equipment support, cable routing, and future maintenance.

The foundation construction should at least meet the following requirements:

- The bottom of the foundation pit must be compacted and leveled.
- The foundation should provide sufficient bearing support to handle the equipment's weight.
- To avoid rainwater erosion of the cabinet base and interior, it is recommended to elevate the cabinet, making the foundation 200mm above the highest historical water level of the installation site's ground.
- Take appropriate drainage measures based on local geological conditions.

5.4 Forklift Requirements

During system installation or maintenance, if a forklift is required to move cabinets or battery pack, the following requirements must be strictly observed.

Forklift Selection Requirements

- Use a forklift with a rated capacity of at least 3.5 tons.
- Ensure the forks meet the following dimensions:
  - Length: 1500mm - 1800mm
  - Width: 80mm - 160mm
  - Thickness: 25mm - 50mm

Handling and Operation Requirements

- Forklift operations are permitted only on level, firm, and obstacle-free surfaces.
- Move and lower the equipment slowly and steadily to ensure safety.
- Insert the forks into the designated fork holes at the bottom of the cabinet. Moving through other locations is strictly prohibited.
- After installation, seal the fork holes with the provided cover plates.

5.5 Hoisting Requirement

When hoisting equipment, strictly follow the requirements below to ensure safe, stable, and efficient operations.

Personnel and Site Safety

- Assign a certified signal person to direct the entire hoisting operation. All personnel involved must be trained and hold valid operating certifications.
- Establish an exclusion zone of 5 m to 10 m around the hoisting area. Never allow anyone to stand under the crane boom or directly beneath the suspended load.
- Perform hoisting only in clear, windless weather. Do not hoist during heavy rain, dense fog, or high winds.

Hoisting Equipment and Rope Inspection

- Crane hoisting capacity ≥ 5 t, working radius ≥ 3 m. Ensure both the crane and hoisting ropes comply with applicable safety standards.
- Hoisting ropes must be undamaged, securely attached, and have a rated load capacity no less than the total weight of the equipment.
- Securely fasten the hoisting tool to load-bearing fixtures or walls to ensure stability.

Hoisting Operation Procedures

- Position the crane as close as possible to the load to avoid long-distance lifts. Maintain the cabinet's diagonal tilt angle at ≤5° throughout the lift.
- Lift and lower the cabinet slowly and smoothly. Do not start or stop abruptly, as this may damage internal components.
- Once the cabinet contacts the base, wait until it is fully and evenly seated before removing the hoisting ropes.
- Do not drag hoisting ropes or tools on the ground or against equipment surfaces to prevent collisions or damage.
- Secure the first hoisted cabinet in place before proceeding with subsequent units.
- Keep the angle between the two hoisting ropes at ≤90°.

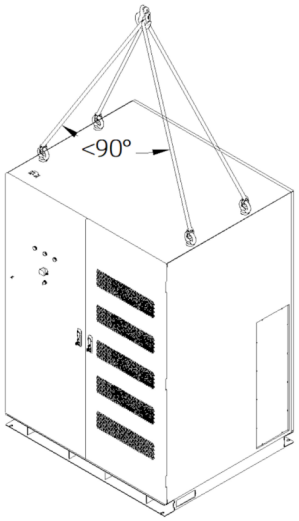
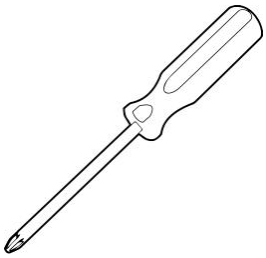
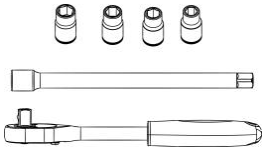
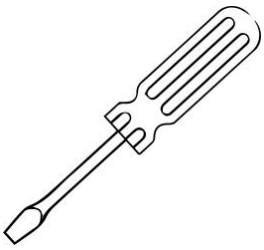
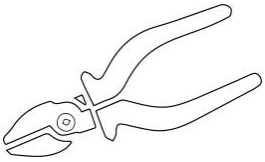
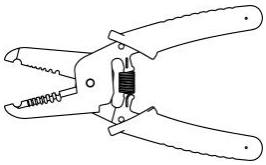
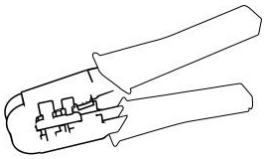
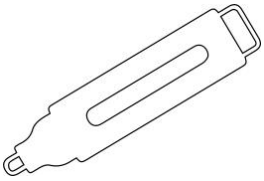
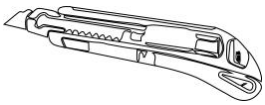
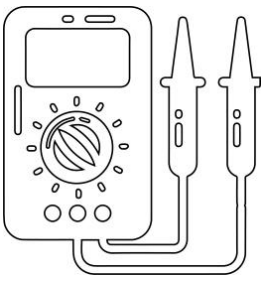
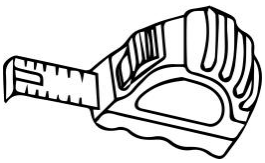
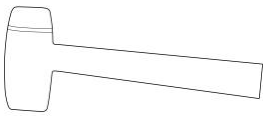
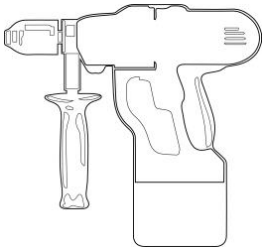
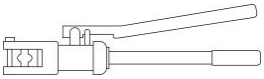
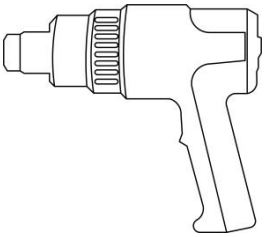


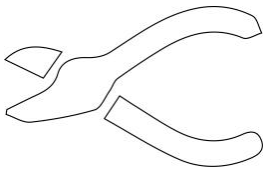
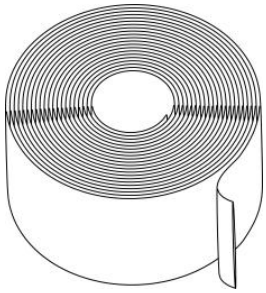
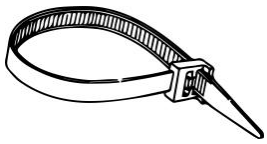
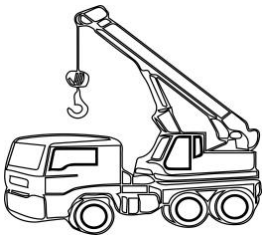
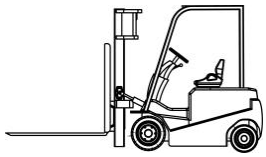
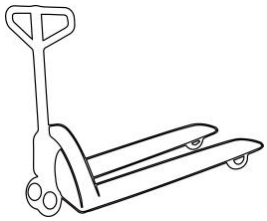
Figure 5-2: Hoisting Reference

6 Installation

6.1 Tools

This section only lists the tools required for system installation.

			
Insulated Phillips Torque Screwdriver	Socket Wrench	Insulated Flathead Torque Screwdriver	Diagonal Pliers
			
Wire Stripper	RJ45 Crimping Tool	Marker	Utility Knife
			
Leveling Ruler	Vacuum Cleaner	Multimeter	Tape Measure
			
Rubber Mallet	Impact Drill	Hydraulic Crimping Tool	Heat Gun

			
Wire Cutter	Impact Drill Bits	Heat Shrink Tubing	Cable Ties
			
Ladder	Crane	Electric Forklift	Manual Forklift

Due to varying on-site conditions, this tool list may not include all the tools that may be needed. Installers should prepare any additional tools based on the actual conditions at the site.

6.2 Pre-Installation Check

- Upon receiving the equipment, check the delivered items against the enclosed packing list to ensure all items are complete.
- Verify that the actual received cabinet matches the ordered model.
- Remove the packaging, ensuring the stability of the equipment while removing the bolts from the wooden pallet.
- If the installation environment is poor, take dustproof and anti-condensation measures after removing the packaging, such as using dust covers, plastic film, or cloth.
- Carefully inspect the product and internal equipment to ensure there is no damage.

- If a custom steel frame is required on-site, confirm that the steel frame has been installed in place and verify the placement direction of the equipment.

6.3 Installing the Battery Cabinet

Prerequisites

- According to the guidelines in Location Requirements, Space Requirements and Foundation Requirements, choose the suitable installation location.
- Prepare four M16×50 fasteners.

Procedure

1. Use a forklift or crane to move the equipment to the chosen installation location, ensuring the base mounting holes align with the drilled holes.
2. Secure the equipment at all four bottom corners with M16 fasteners as shown in Figure 6-1.

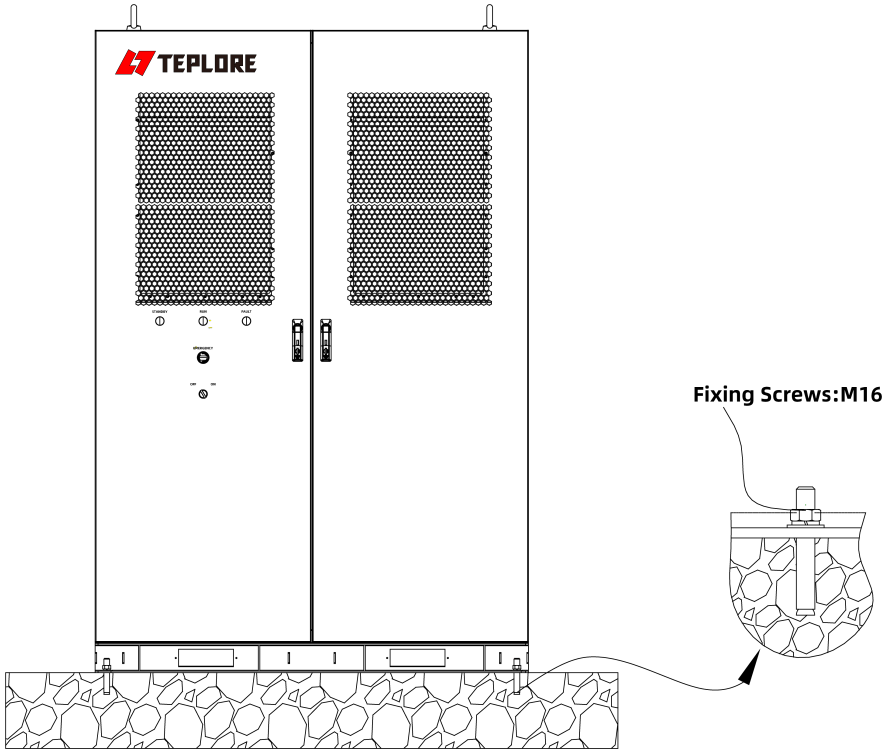


Figure 6-1: Screw the cabinet

6.4 Installing the Inverter

The battery cabinet and hybrid inverter arrive unassembled. After installing the cabinet, mount the inverter onto the right side panel of the cabinet.

Prerequisites

Installing the Battery Cabinet

Procedure

Four mounting holes for the inverter are provided on the right side panel of the cabinet, as shown in Figure 6-2.

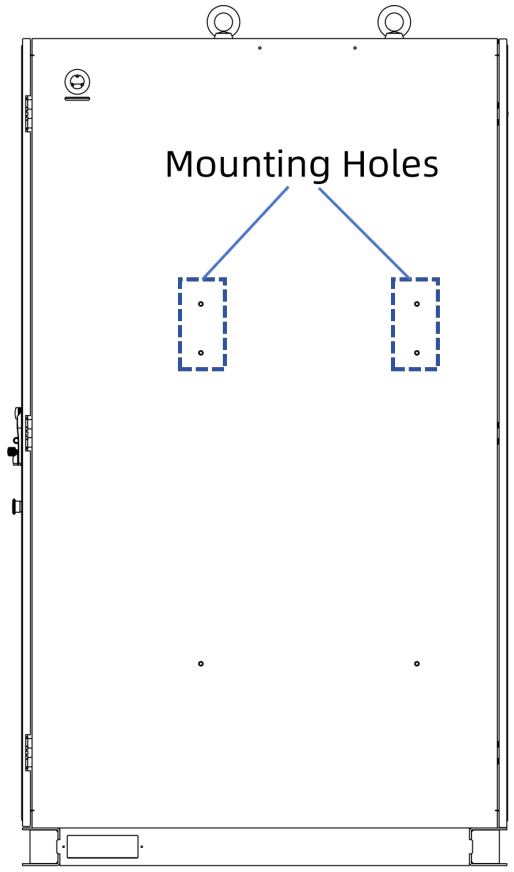


Figure 6-2: Mounting holes of the inverter

Figure 6-3 display the installation sequence of the three components: auxiliary bracket, inverter bracket, and inverter.

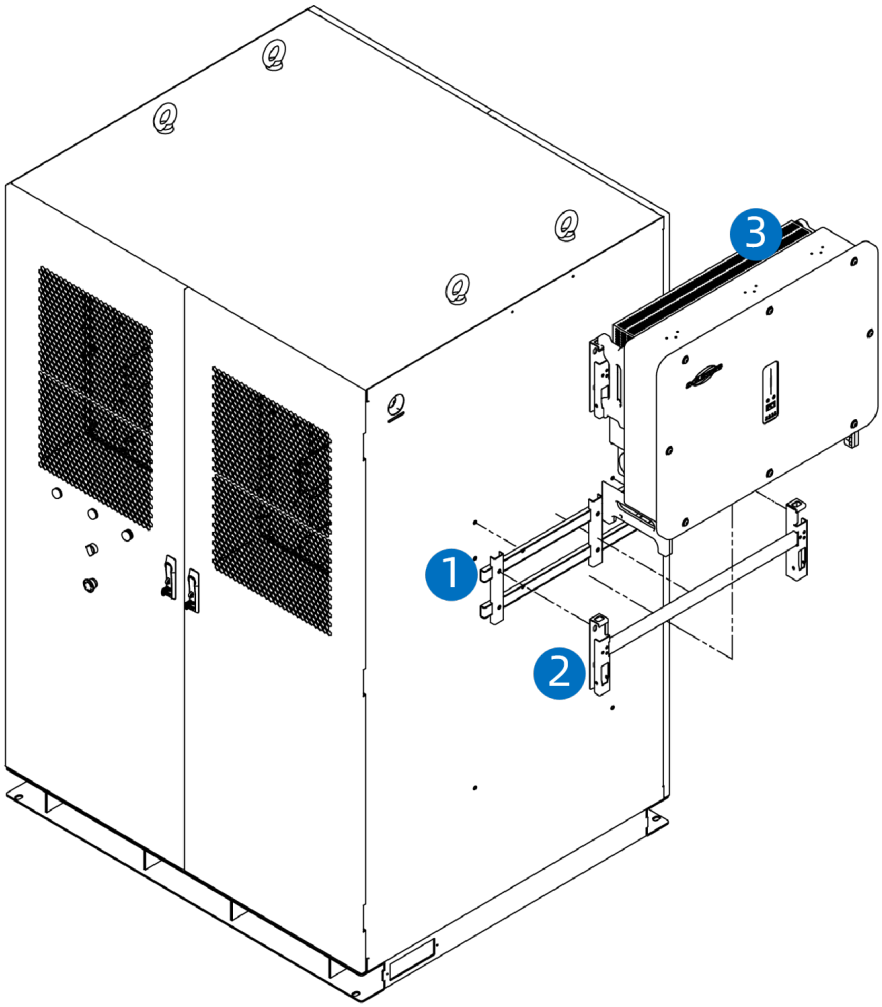


Figure 6-3: Install the inverter

1. Align the auxiliary bracket with the holes on the cabinet as shown in Figure 6-2 and secure the auxiliary bracket to the cabinet with M10 screws.
2. Secure the inverter bracket to the auxiliary bracket with M10 bolts.
3. Lift the inverter, and hang the back rail on the fixed bracket carefully.
4. Secure the inverter to the inverter bracket with M6 screws.

NOTE

For details of installing the inverter, refer to the “Mounting the Inverter” section in the user manual of the inverter.

6.5 Follow-up Procedure

1. Open the cabinet door and check all internal components for looseness or deformation, and inspect communication cables for secure connections.
2. Refer to the Electrical Connections chapter for electricity connections.

7 Electrical Connections

The electrical connection for the ESS consists of the following parts:

- Grounding of the battery cabinet.
- External connection through the inverter.
- Connection between the battery cabinet and the inverter.

NOTE

This chapter uses M217-50 as an example for guidance. Procedures for M241-50 are the same.

7.1 Grounding the Battery Cabinet

Prerequisites

- Recommended cable: cross-sectional area ≥50 mm^2
- M10 fastener and compatible terminal

Procedure

1. Ground the enclosure of the cabinet according to on-site installation requirements.
2. Ground the grounding copper bar inside the cabinet.
   a. Route the external grounding cable through the bottom entry port of the cabinet.
   b. Crimp a terminal to the grounding cable.
   c. Connect the grounding terminal to the grounding bar with the M10 fastener as shown in Figure 7-1.

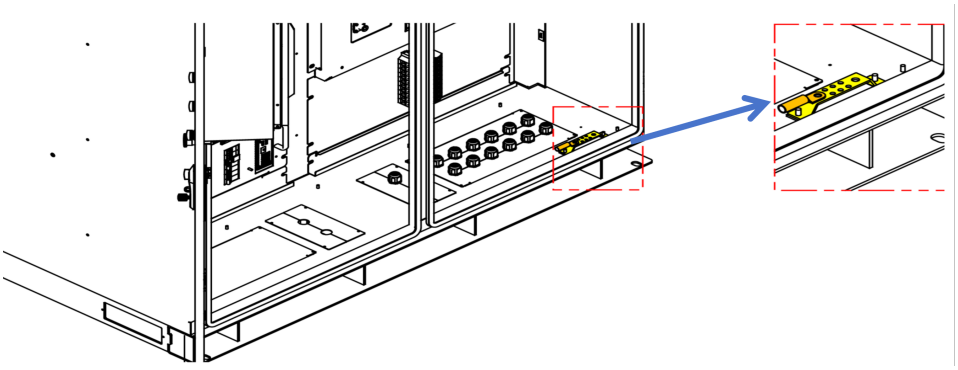


Figure 7-1: Grounding connection

7.2 Connecting Externally via the Inverter

Following are the steps for the external wiring of the Tensorpack M ESS through the inverter. For detailed procedures, refer to the corresponding sections (listed under **Reference**) in the inverter user manual.

1. Connecting the inverter to the external power supply.

   Reference: The instructions of **On-grid AC side** in section" AC Connection"
2. Connecting the inverter to the on-site PV string through terminal PV1~PV4.

   Reference: Section "PV String Connection"
3. Connecting the inverter to the external meter through the **Meter** port in **COM2**.

   Reference: Section "Communication Connection".

7.3 Interconnecting the Battery Cabinet and Inverter

Cable Requirements

All cables are supplied with the product and can be identified by the cable labels at both ends for correct terminal connection.

You must route all interconnecting cables through the cable entry at the cabinet bottom as indicated by the red box in Figure 7-2.

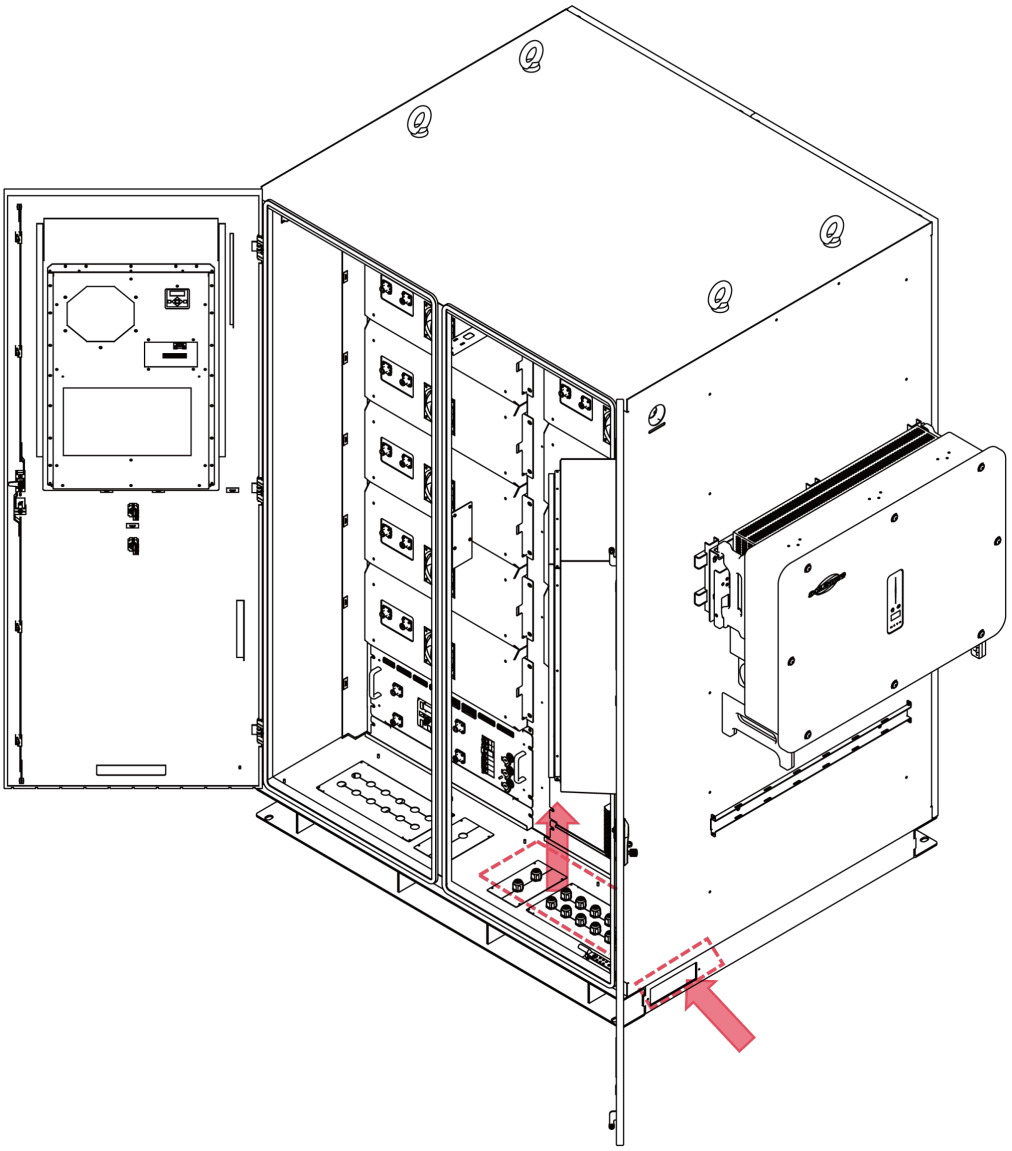


Figure 7-2: Cable routing

Connection Reference

All connection terminals are located as shown in Figure 7-3.

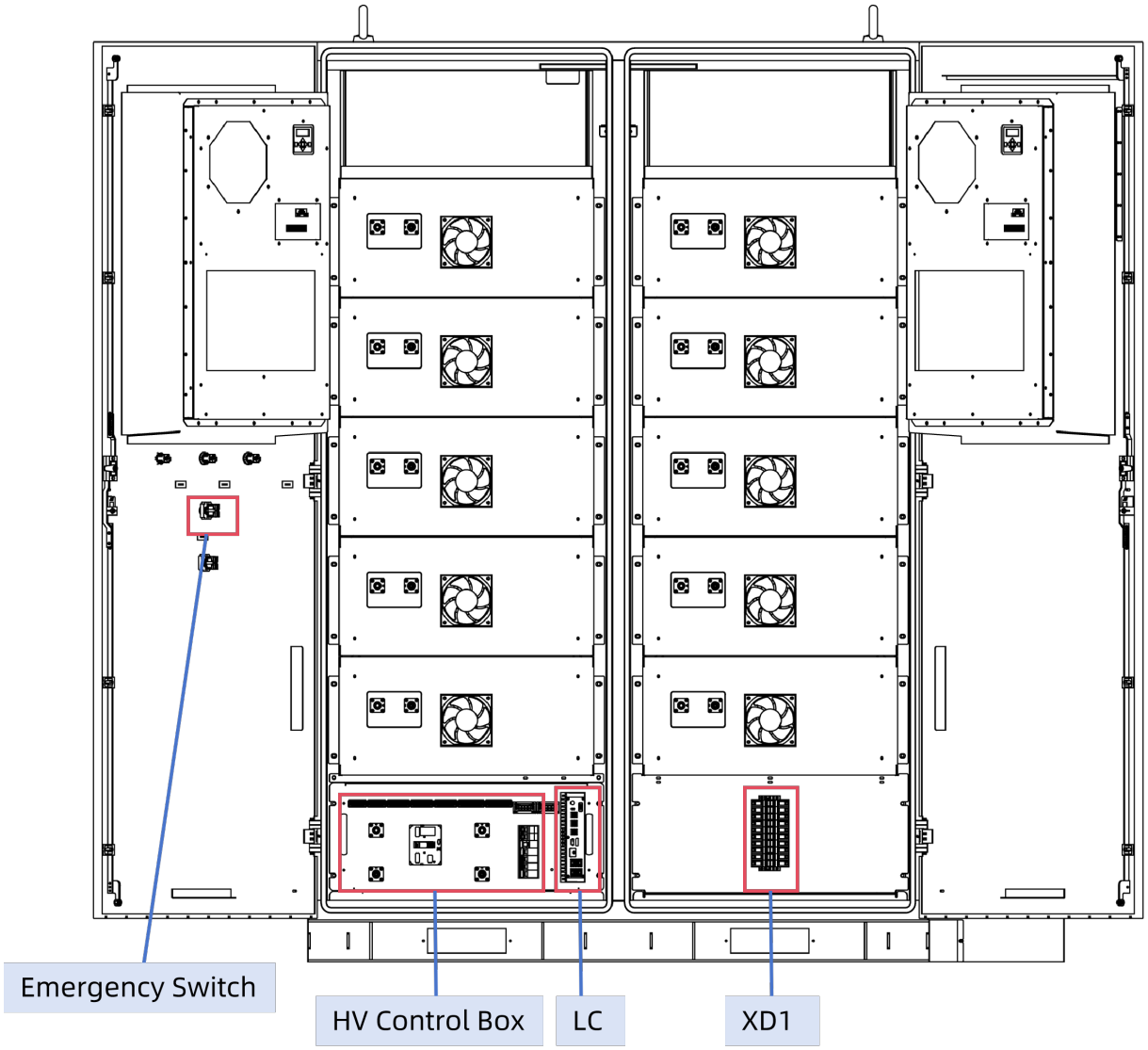


Figure 7-3: Positions of terminals

The interconnection between the battery cabinet and inverter contains the following parts.

- DC circuit connection
- Back-up output connection
- Communication connection.

Table 7-1 specifies all cable connections between the battery cabinet and inverter. The table columns are defined as follows:

- **Component**: Specifies the component of the the battery cabinet or inverter where the terminal to be connected is located.

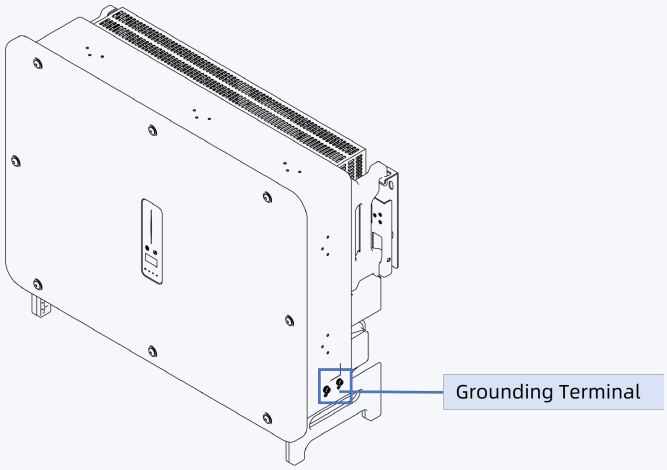
- **Terminal**: Specifies the terminal to be connected. You can locate the specific terminal by label on the corresponding component.
- **Cable Label**: Specifies the identifier on the corresponding end of the cable to be inserted into this terminal.

Battery Cabinet			**Inverter**		
Component	**Terminal**	**Cable Label**	**Component**	**Terminal**	**Cable Label**
DC circuit connection					
HV Control Box	P+	RACK:P+	BAT	BAT+	Battery+
	P-	RACK:P-		BAT-	Battery-
Back-up output connection					
XD1	1	XD1:1	BACK-UP	L1	BACK-UP:L1
	3	XD1:3		L2	BACK-UP:L2
	5	XD1:5		L3	BACK-UP:L3
	7	XD1:7		N	BACK-UP:N
	9	XD1:9		PE	BACK-UP:PE
Communication connection					
Emergency Switch (ES)	1	ES:1	COM2	15	COM2:15
	2	ES:2		16	COM2:16
LC	LAN1	LC:LAN1	R2MD	LAN	R2MD:LAN
Grounding connection					
PE	PE	PE	PE	PE	PE

Table 7-1: Connection between the inverter and battery cabinet

NOTICE

- To ensure the AC auxiliary power of the battery cabinet operates correctly, you must complete the back-up output connection.
- The cables, ES:1 and ES:2, have already be connected to the battery cabinet.
- Before you connect R2MD:LAN and LC:LAN2, you should connect the R2MD communication module to the COM1 port of the inverter(referring to “Communication Module Connection” in the inverter user manual).
- The grounding connection between the battery cabinet and the inverter shall be made as follows:
  - The battery cabinet grounding terminal is located at the grounding bar inside the cabinet, as shown in Figure 7-1 (referring to Grounding the Battery Cabinet).
  - The inverter grounding terminal is located at the lower right side of the inverter, as shown in the following figure (connecting to either grounding terminal).



NOTE

For details about the electrical connections of the inverter, refer to the inverter user manual.

7.4 Installing the Cable Protective Cover

After completing electrical connections, install the cable protective cover on the right side panel of the cabinet. Two mounting holes are shown in Figure 7-4.

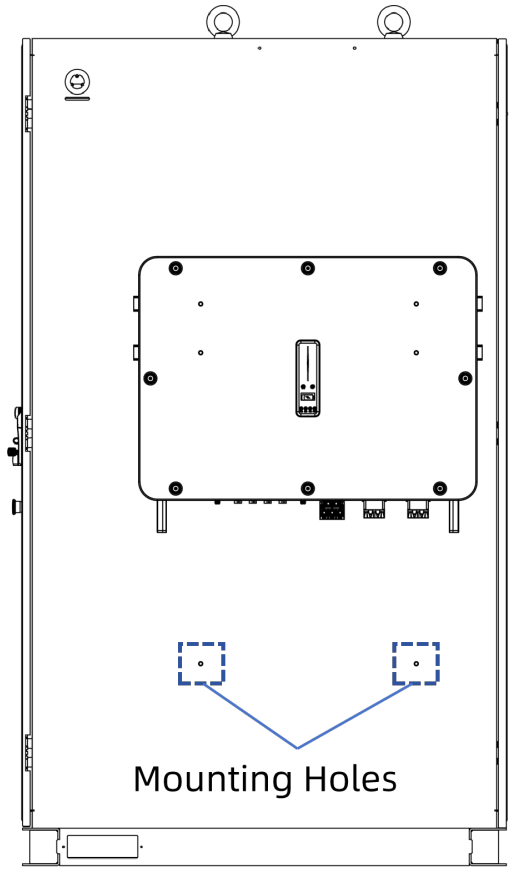


Figure 7-4: Mount holes of the cover

Figure 7-5 display the installation sequence of the three components: mounting bracket, cable protective cover and cable entry cover.

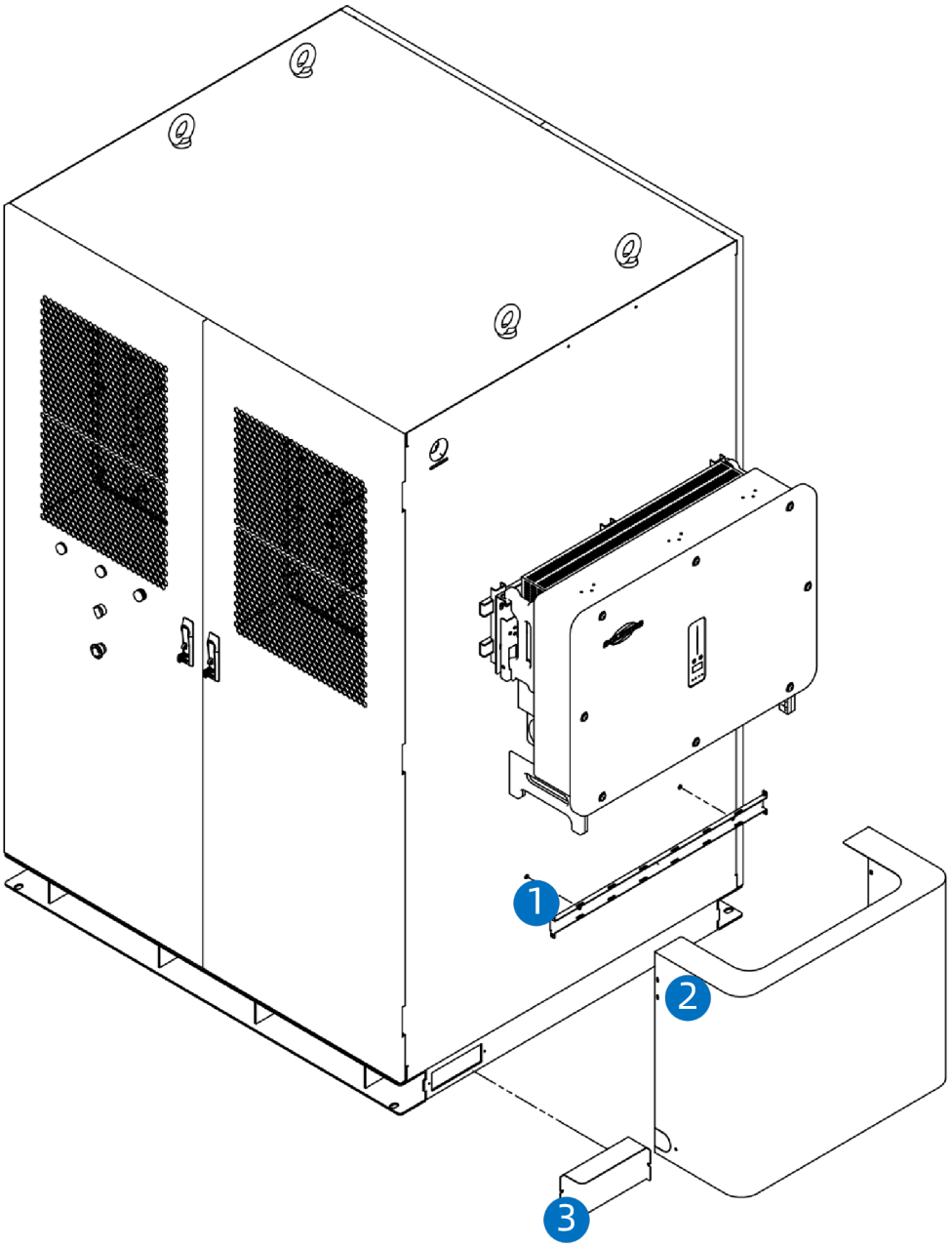


Figure 7-5: Install the cable protective cover

1. Align the mounting bracket with the holes on the cabinet as shown in Figure 7-4 and secure the bracket to the cabinet with M10 screws.
2. Secure the cable protective cover to the bracket with M5 screws.
3. Secure the cable entry cover with M5 screws to cover the bottom cable entry.

8 System Power-On and Power-Off

When you perform the first commissioning, you must:

- Install the Cloud monitoring App (IntegHub) with latest version.

- Contact Teplore to obtain an App account.
- After logging into IntegHub for the first time, change the default password immediately.

8.1 Powering On the ESS

Prerequisites

- Complete all checks before power-on.
- Make sure that the external distribution circuit breaker is closed.

Procedure

Figure 8-1 displays circuit breakers on the HV control box and indicates the direction to close these circuit breakers.

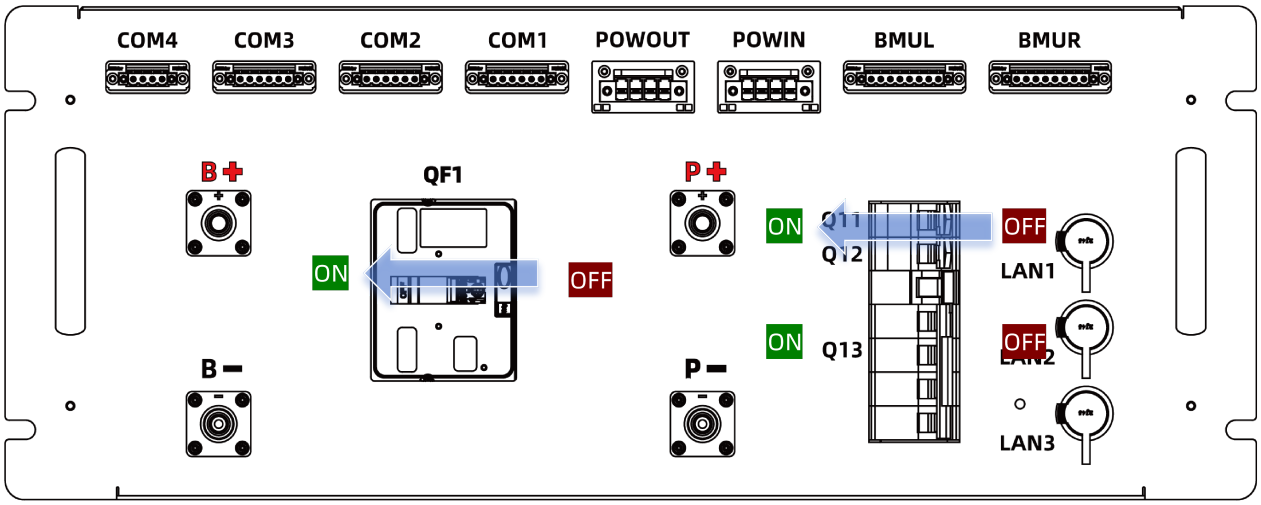


Figure 8-1: Circuit breakers on HV control box

According to the actual requirement, you can choose the on-grid startup or off-grid startup mode.

- **On-Grid Startup**
  1. Open the battery cabinet doors.
  2. Close the DC circuit breaker **QF1**.
  3. Close the AC auxiliary power circuit breaker **Q11**.
  4. Close the air conditioner power circuit breaker **Q12**.
  5. Close the battery cabinet doors and rotate the On-Off switch on the cabinet door to the "**ON**" position.
  6. On the inverter , rotate the DC switches to the "**ON**" position.
- **Off-Grid Startup**
  1. Open the battery cabinet doors.
  2. Close the DC circuit breaker **QF1**.
  3. Close the DC auxiliary power circuit breaker **Q13.**
  4. Rotate the On-Off switch on the cabinet door to the "**ON**" position.
  5. Wait until confirm that the inverter starts successfully and the backup output is normal.
  6. Close the AC auxiliary power circuit breaker **Q11**.
  7. Close the air conditioner power circuit breaker **Q12**.
  8. Turn off the DC auxiliary power circuit breaker **Q13.**

9. Close the battery cabinet doors.
10. On the inverter, rotate the DC switches to the “**ON**” position.

NOTE

For details about the back-up loads, refer to the “Back-up/Off-grid Statement” section in the inverter user manual.

8.2 Powering Off the ESS

Procedure

Figure 8-2 displays circuit breakers on the HV control box and indicates the direction to turn off these circuit breakers.

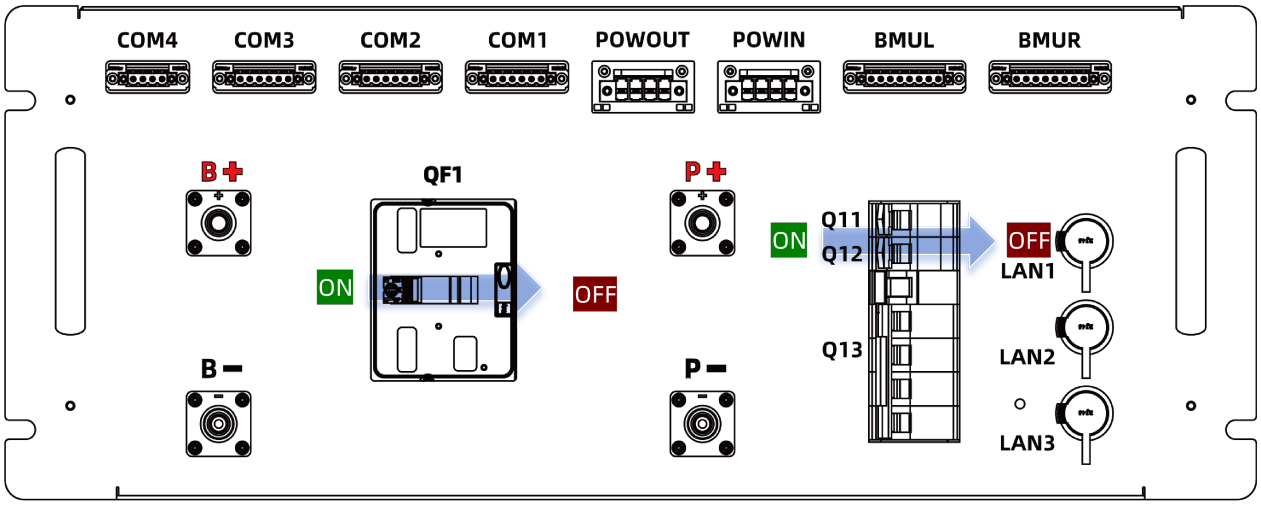


Figure 8-2: Circuit breakers on HV control box

On-Grid /Off-Grid Shutdown

1. Shut down the inverter through the IntegHub App or the button on the display first.
2. Rotate the On-Off switch on the battery cabinet door to the “**OFF**” position.
3. Open the battery cabinet doors.
4. Turn off the air conditioner power circuit breaker **Q12**.
5. Turn off the AC auxiliary power circuit breaker **Q11**.
6. Turn off the DC circuit breaker **QF1**.

7. Close the battery cabinet doors.
8. On the inverter , rotate the DC switch to the “**OFF**” position.

9 Contact Information

If you have any questions about this product, please contact us.

Technical Support Email: support@teplore.com

To enable faster and more efficient service, we kindly request your assistance in providing the following information:

- Project name
- Product model
- Serial number
- Brief description of the issue