

# PowerFusion 2.0 Product User Manual

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Taihao Technology (Shenzhen) Power Technology Co., Ltd.



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## Foreword

### Overview






This manual mainly introduces the installation, cable connection, maintenance, etc. of the PowerFusion Commercial and Industrial Integrated Control Cabinet (hereinafter referred to as PowerFusion). Please familiarize yourself with the functions and features of PowerFusion and carefully read the safety information in this manual before installing and using.

### Target Audience

This manual is suitable for distribution installation operators and qualified electrical technicians.

### Symbol Conventions

The following symbols may appear in this document, and their meanings are as follows.

Symbol	Description
	Indicates a high-risk hazard that could lead to death or serious injury if not avoided.
	Indicates a medium risk hazard that could lead to death or serious injury if not avoided.
	Indicates a low risk hazard that could lead to minor or moderate injury if not avoided.
	Used to convey safety warning information regarding equipment or the environment. If not avoided, it may result in equipment damage, data loss, reduced equipment performance, or other unpredictable outcomes. "Notice" does not involve personal injury.
	Supplementary information on key points in the main text. "Explanation" is not a safety warning and does not involve personal, equipment, or environmental injury information.

## Modification Record

The modification record accumulates descriptions of each document update. The latest version of the document includes updates from all previous document versions.

Document Version	Release Date	Formulated / Revised by	Update Description
V1.0	2026-04-20	Yang Baiquan	Initial version released

# 1. Safety Precautions

## Statement

Before transporting, storing, installing, operating or maintaining the equipment, please read this manual carefully, operate strictly according to the contents of the manual, and follow all safety precautions indicated on the equipment and in the manual.

- The items labeled "Danger," "Warning," "Caution," and "Notice" in the manual do not represent all safety matters that should be observed. You must also comply with relevant international, national, or regional standards, as well as industry practices.

- This equipment should be used in an environment that meets the design specifications; otherwise, any equipment failure, abnormal functionality, or component damage that may occur will not be covered by the equipment's quality assurance. Additionally, the company will not be liable for any personal injury or property damage that may arise as a result.

- All operations, including transportation, storage, installation, operation, and maintenance, must comply with applicable laws, regulations, standards, and normative requirements.

- The company shall not be liable for any equipment damage or property loss caused by violations of safety operation requirements or failure to adhere to safety standards for the design, production, and use of the equipment, including but not limited to the following situations:

- Equipment damage caused by natural disasters (such as war, earthquakes, fires, storms, lightning, floods, landslides, etc.);

- Operating outside the conditions specified in this manual;

- The installation and usage environment does not meet relevant international, national, or regional standards;

- Installation and use by unqualified personnel;

- Failure to operate according to the instructions and safety warnings provided in the product and documentation;

- Unauthorized disassembly, modification of the product, or alteration of software code;
- Damage caused by you or a third party you have entrusted for transportation;
- Damage caused by storage conditions not meeting product documentation requirements;
- Your materials and tools do not comply with local laws, regulations, and relevant standards;
- Damage caused by your or a third party's negligence, intentional acts, gross negligence, improper operation, or reasons not attributable to our company.

## 1.1 Personal safety



It is strictly prohibited to operate with power during the installation process. Live installation or removal of cables is forbidden; when the cable core contacts the conductor, it may produce arcs or electric sparks, which can lead to fire or personal injury.



Improper or incorrect operations while the equipment is energized may result in fire, electric shock, or explosion, leading to casualties or property damage.



Wearing watches, bracelets, bangles, rings, necklaces, or other conductive objects during operations is strictly prohibited to avoid electric shock burns.



Special insulated tools must be used during operations to prevent electric shock injuries or short circuit faults; the insulation voltage rating must meet local laws, regulations, standards, and normative requirements.

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Special protective equipment must be used during operations, such as wearing protective clothing, insulated shoes, and using safety goggles, helmets, and insulated gloves.

## General requirements

- Please do not disable the device's protective devices and ignore the warnings, alerts, and precautions in the manual and on the equipment.
- During the operation of the equipment, if any faults are found that may cause personal injury or equipment damage, operations should be immediately terminated, reported to the responsible person, and effective protective measures should be taken.
- Please do not power on the equipment if it has not been fully installed or confirmed by a professional.
- It is prohibited to directly touch, use other conductors to contact, or indirectly contact powered equipment through wet objects. The voltage at the contact point should be measured before touching any conductor surface or terminal to confirm there is no risk of electric shock.
- During the operation of the equipment, the shell temperature is high, posing a burn hazard; please do not touch.
- In case of fire, immediately evacuate the building or equipment area and press the fire alarm bell, or call the fire emergency number. Under no circumstances is it allowed to re-enter a burning building or equipment area.

## Personnel Requirements

- The personnel operating the equipment includes professionals and trained individuals.
  - Professionals: Individuals who are familiar with the principles and structure of the equipment, have training or experience in operating the equipment, and can clearly identify



various potential sources of danger and levels of risk during installation, operation, and maintenance of the equipment.

- Trained individuals: Personnel who have undergone appropriate technical and safety training and possess the necessary experience, who can recognize the dangers that may arise during a specific operation and can take measures to minimize risks to themselves or others.

- The personnel responsible for installing and maintaining equipment must undergo strict training to master the correct operating methods, understand various safety precautions, and be familiar with the relevant standards of the 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 the equipment.

- In special scenarios such as electrical operations, working at heights, and operating special equipment, personnel must have the special operation qualifications required by the local country/region.

- Replacement of equipment or components (including software) must be carried out by authorized professionals.

- Other personnel should not approach the equipment except for those operating it.

## 1.2 Electrical Safety

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Before making electrical connections, ensure that the equipment is undamaged; otherwise, it may cause electric shock or fire.

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Improper or incorrect operations may lead to accidents such as fire or electric shock.

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During operations, foreign objects must be prevented from entering the equipment; otherwise, it may cause short-circuit failures or damage, reduced power supply capacity, or power outages, as well as personal injury.



For equipment that requires grounding, the protective ground wire must be installed first during installation; it must be removed last during disassembly.



The air intake and exhaust of the equipment must not have cables passing through.

## General requirements

- Installation, operation, and maintenance must be carried out according to the steps in the manual. Do not modify, add, or change the equipment without authorization, and do not change the installation sequence without permission.
- Permission from the local power authority is required for grid connection operation.
- Comply with power station safety regulations, such as implementing operation tickets and work ticket systems.
- Install temporary fences or warning ropes in the work area, and hang "No Entry" signs. Unauthorized personnel are strictly prohibited from entering.
- Before installing or removing power cables, the equipment itself and its upstream and downstream switches must be turned off.
- Before operating the equipment, carefully check that the tools used meet the requirements and are registered; after operation, they must be collected according to the count to prevent them from being left inside the equipment.

- Before installing power cables, confirm that the cable label identification is correct and that the cable terminals have proper insulation protection.
- When installing equipment, use a torque tool with an appropriate range to tighten the screws. When using a wrench, ensure that the wrench is not misaligned and that the torque value deviation does not exceed the specified 10%.
  - Use a torque tool to secure the bolts and conduct a double-check with red and blue markings. After the installation personnel confirm that the bolts are tightened, apply a blue mark on the bolts; after the inspection personnel confirm the tightening, apply a red mark (the marking line must cross the edge of the bolt).
  - If the device has multiple inputs, all inputs to the device should be disconnected. Only after the device is completely powered off can operations be performed on the device.
  - When maintaining the power supply equipment or distribution equipment at the back end, it is necessary to disconnect the output switch corresponding to the power supply equipment.
  - During equipment maintenance, hang a "No Closing" sign on the up and down switches or circuit breakers, and post warning signs to prevent accidental reconnection. The fault must be resolved before power can be restored.
  - Please regularly check the terminal screws of the equipment to ensure they are tightened and not loose.
  - If the cable is damaged, it must be replaced by a professional to avoid risks.
  - It is strictly prohibited to alter, damage, or obscure the labels and nameplates on the equipment. Timely replacement of labels that have become unclear due to long-term use is required.
  - It is forbidden to clean the internal and external electrical components of the equipment with solvents such as water, alcohol, or oil.

## Grounding Requirements

- The grounding impedance of the equipment should meet local electrical standards.
- The equipment should be permanently connected to a protective ground. Before

operating the equipment, check the electrical connections to ensure the equipment is reliably grounded.

- It is prohibited to operate the equipment without an installed grounding conductor.
- Prohibit the destruction of grounding conductors.

## Wiring Requirements

- The selection, installation, and routing of cables must comply with local laws, regulations, and standards.
- During the installation of power cables, it is strictly forbidden to form loops or twists. If the length of the power cable is insufficient, it must be replaced; making joints or solder points in the power cable is prohibited.
- All cables must be securely connected, well insulated, and of appropriate specifications.
- Cable trays and through-holes should have no sharp edges, and the locations where cables pass through pipes or holes must be protected to prevent damage from sharp edges or burrs.
- Cables of the same type should be bundled together, appearing straight and neat, with no damage to the outer sheath; different types of cables should be laid separately, and interweaving or crossing is prohibited.
- After completing the wiring or if leaving during the wiring process, the cable openings must be immediately sealed with sealing compound to prevent moisture and small animals from entering.
- Buried cables need to be securely fixed using cable supports and clamps, ensuring that the cables in the backfilled soil area are closely adhered to the ground to prevent deformation or damage due to stress during backfilling.
- When external conditions (such as installation methods or environmental temperatures) change, cable selection verification must refer to IEC-60364-5-52 or local laws and regulations to ensure that the current-carrying capacity meets the requirements.

- When the temperature is too low, severe impacts and vibrations may cause the plastic outer sheath of the cable to become brittle and crack. To ensure construction safety, the following requirements must be followed:
  - All cables should be installed at temperatures above 0°C. When handling cables, especially in low-temperature environments, they should be handled with care.
  - If the storage temperature of the cables is below 0°C, the cables must be moved to a room temperature environment and stored for more than 24 hours before being laid out.
- It is prohibited to push cables directly off the vehicle or engage in other improper operations to avoid damage to the cables, which could lead to a decline in performance, affecting current carrying capacity and temperature rise.

### 1.3 Environmental Requirements

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It is strictly forbidden to place equipment in environments with flammable or explosive gases or smoke, and any operations in such environments are prohibited.

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It is strictly forbidden to store flammable or explosive materials in the equipment area.

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It is strictly forbidden to place equipment near heat sources or fire sources, such as fireworks, candles, heaters, or other heating devices, as exposure to heat may cause damage to the equipment or lead to fire.

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Equipment should be installed in areas away from liquids and must not be installed below water pipes, air outlets, or other locations prone to condensation; it is also prohibited to install below air conditioning vents, ventilation openings, or windows in equipment rooms where leakage may occur, to prevent liquids from

entering the equipment and causing malfunctions or short circuits.



During the operation of the equipment, do not block ventilation openings or cooling systems, or cover them with other items, to prevent high temperatures from damaging the equipment or causing a fire.

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## General requirements

- The temperature and humidity environment for equipment storage should be appropriate, stored in a clean, dry, and well-ventilated area, and protected from dust and condensation.
- According to the storage requirements chapter for storage devices, any damage to the equipment caused by failure to meet storage conditions is not covered by the warranty.
- The working temperature range specified in the equipment technical specifications refers to the ambient temperature of the surrounding environment after the equipment is installed.
- It is strictly prohibited to install and operate the equipment outside the range specified in the technical specifications, as this will affect the performance and safety of the equipment.
- It is strictly prohibited to install, use, and operate outdoor equipment and cables (including but not limited to handling equipment, operating equipment and cables, plugging and unplugging signal interfaces connected outdoors, working at heights, outdoor installation, opening doors, etc.) during severe weather conditions such as thunderstorms, rain, snow, and winds above level six.
- It is strictly prohibited to install the equipment in environments with dust, smoke, volatile gases, corrosive gases, infrared radiation, organic solvents, or excessive salinity.
- It is strictly prohibited to install the equipment in environments with conductive metallic dust or ferromagnetic dust.

- It is strictly prohibited to install the equipment in areas prone to the growth of fungi, mold, and other microorganisms.
- It is strictly prohibited to install the equipment in areas with strong vibrations, strong noise sources, and strong electromagnetic interference.
- The site selection should comply with local laws, regulations, and relevant standards.
- The ground of the installation environment should be solid, without rubber soil, weak soil, or other unfavorable geology that is prone to sinking. Low-lying areas that are prone to water accumulation or snow accumulation are strictly prohibited, and the station's horizontal plane should be above the historical highest water level in the area.
- It is strictly prohibited to install the equipment in areas prone to flooding.
- If the equipment is installed in a densely vegetated area, in addition to routine weeding, the ground beneath the equipment needs to be hardened, such as by laying cement or gravel.
- If the equipment is installed in a salt-affected area, it will be subject to corrosion. Please do not install outdoors in salt-affected areas. Salt-affected areas refer to regions within 500 meters of the coast or areas influenced by sea breezes. The areas affected by sea breezes vary depending on meteorological conditions (such as typhoons, seasonal winds) or terrain (such as dikes, hills).
- When installing, operating, or maintaining the equipment, ensure that any accumulated water, ice, or other debris on top is cleared away before opening the door to prevent debris from falling into the equipment.
- When installing the equipment, please ensure that the installation surface is solid and meets the weight-bearing requirements of the equipment.
- All wiring holes must be sealed. Use sealing compound to seal the wiring holes that have been wired, and use the covers provided with the equipment to seal the unwired holes.
- After the equipment is installed, remove any empty packaging materials from the equipment area, such as cardboard boxes, foam, plastic, and zip ties.

## 1.4 Mechanical Safety

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Tools must be fully prepared and inspected by a professional organization. It is prohibited to use tools that are damaged, unqualified, or beyond their inspection validity period. Ensure that tools are secure and not overloaded.

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Before installing the equipment into the cabinet, first ensure that the cabinet is securely fixed to avoid issues such as tilting or collapsing due to an unstable center of gravity, which could injure the installation personnel or damage the equipment.

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When pulling the equipment out of the cabinet, be cautious of equipment that may be unstable or very heavy inside the cabinet to avoid being crushed or injured.

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Drilling holes on the equipment is strictly prohibited. Drilling can damage the equipment's sealing, electromagnetic shielding performance, internal components, and cables. Metal shavings generated from drilling can cause short circuits on the circuit board.

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### General requirements

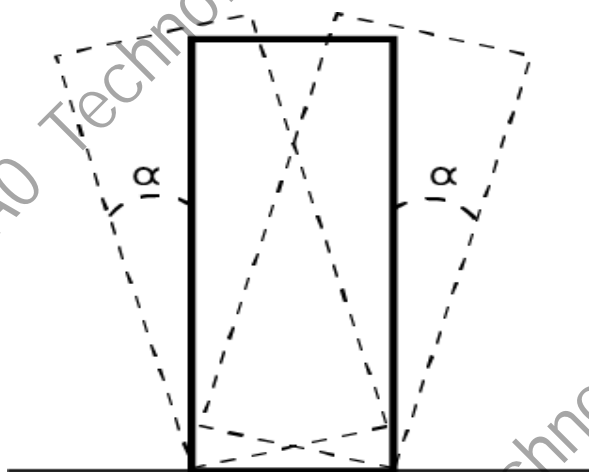
- Any paint scratches that occur during the transportation and installation of the equipment must be repaired promptly, and the scratched areas must not be left exposed for long periods.
- Arc welding, cutting, and other operations on the equipment are prohibited without evaluation by our company.



- Installing other equipment on top of the device is prohibited without evaluation by our company.
- When working in the space above the equipment, protective measures should be taken on top of the equipment to prevent damage.
- Please use the correct tools and master the proper usage methods of the tools.

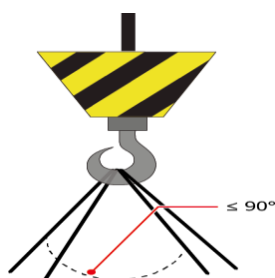
## Loading and Transportation Safety

- When manually handling the equipment, protective gloves and safety shoes should be worn to avoid injury.
- When moving heavy objects, the force must be balanced and steady; the movement speed should be uniform and slow; positioning should be smooth and slow to avoid any impacts or falls that could scratch the surface of the equipment or damage its components and cables.
- When using a forklift for transportation, the forks must be positioned in the middle to prevent tipping. Before moving, secure the equipment to the forklift with ropes; during movement, a dedicated person should supervise.
- During transportation, sea freight or well-maintained roads should be chosen; railway and air transport are not supported. Efforts should be made to minimize bumps and tilting during the transportation process.
- The cabinet's tilt angle should meet the requirements shown in the diagram, with a packaging tilt angle  $\alpha \leq 15^\circ$ , and after removing the packaging, the tilt angle  $\alpha \leq 10^\circ$ .



## Hoisting Safety

- Personnel engaged in hoisting operations must undergo relevant training and can only work after passing the qualification assessment.
- The hoisting area must have temporary warning signs or barriers erected for isolation.
- The foundation for hoisting operations must meet the load-bearing requirements for the crane's operation.
- Before hoisting, ensure that the hoisting tools are securely fixed to a load-bearing standard fixture or wall.
- During hoisting, it is strictly prohibited to walk under the boom or the hoisted object.
- During hoisting, dragging steel cables or lifting devices is prohibited, and hard objects should not be used to strike.
- During the hoisting process, ensure that the angle between the two cables does not exceed 90°, as shown in the figure below.



## 2. Product Introduction

### 2.1 Model Description

PowerFusion-L150



Serial number	Meaning	Description
1	Product Line Name	PowerFusion, Industrial & Commercial Integrated Distribution Control Cabinet
2	Backup Load Rated Capacity	L80: Off-grid load carrying capacity: 80kW (non-impact load) L150: Off-grid load carrying capacity: 150kW (non-impact load) L300: Off-grid load carrying capacity: 300kW (non-impact load)

## 2.2 Functions and Features

### Function

- PowerFusion is a core platform used in industrial and commercial microgrid scenarios that integrates power distribution and control functions, providing a highly integrated solution for the access and intelligent coordinated control of distributed energy sources such as photovoltaics and energy storage within industrial and commercial microgrids.

- PowerFusion series integrated cabinets are suitable for electrical load scenarios with a capacity range of up to 300kW in industrial and commercial applications, supporting a maximum of 4 energy storage inlets, 600kW photovoltaic inlets, grid power inlets, and load feeder connections.

### Features

Simple selection: PowerFusion is standardized and serialized.

- Simple deployment: One-stop delivery on-site, with the core distribution and control systems of the microgrid prefabricated in the factory, eliminating the need for on-site installation and debugging, suitable for outdoor deployment, and does not affect the existing industrial and commercial distribution system.

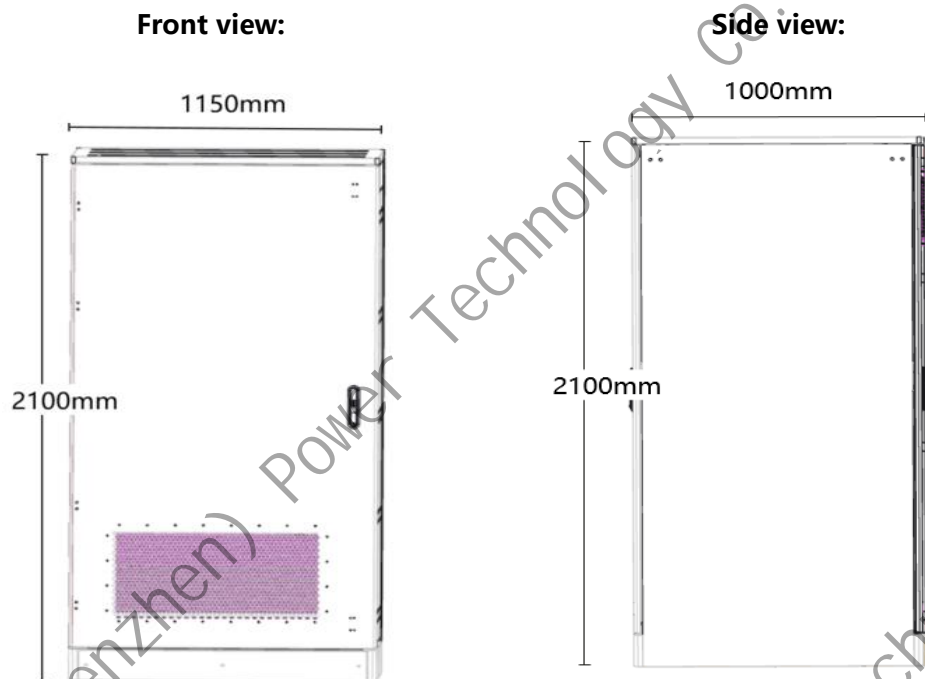
- Simple maintenance: Intelligent photovoltaic cloud supports unified management of energy storage and photovoltaics, with full-chain visibility of the microgrid system and intelligent operation and maintenance.

- Architectural safety: The control system and distribution system are designed with separate compartments, with insulation coordination inside the cabinet, electrical protection, and circuit connections that comply with IEC60364 and GB/T7251.

- Active safety: coordinated scheduling of light storage and visual management.
- Cooling method: Active cooling by air conditioning.

## 2.3 Product appearance

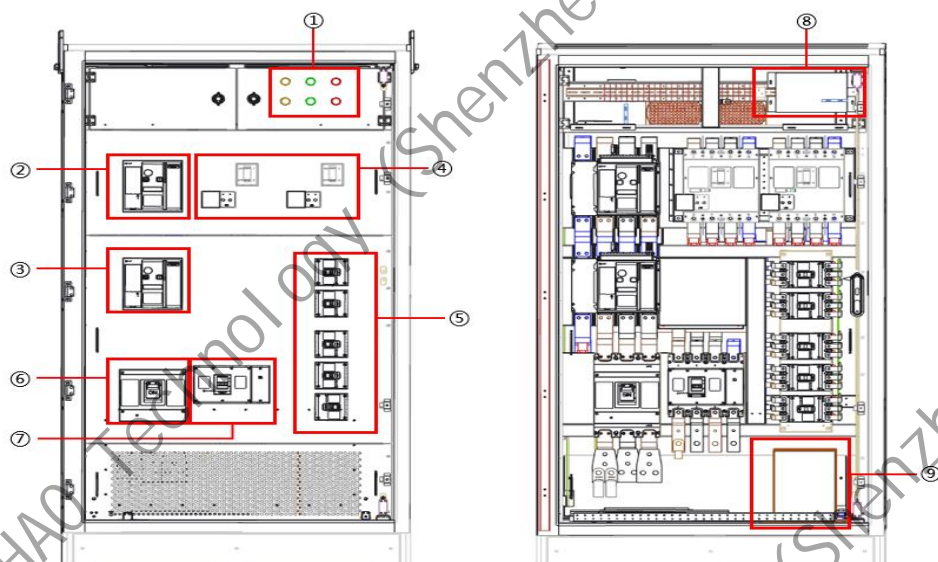
Appearance size diagram of L300 (as an example)

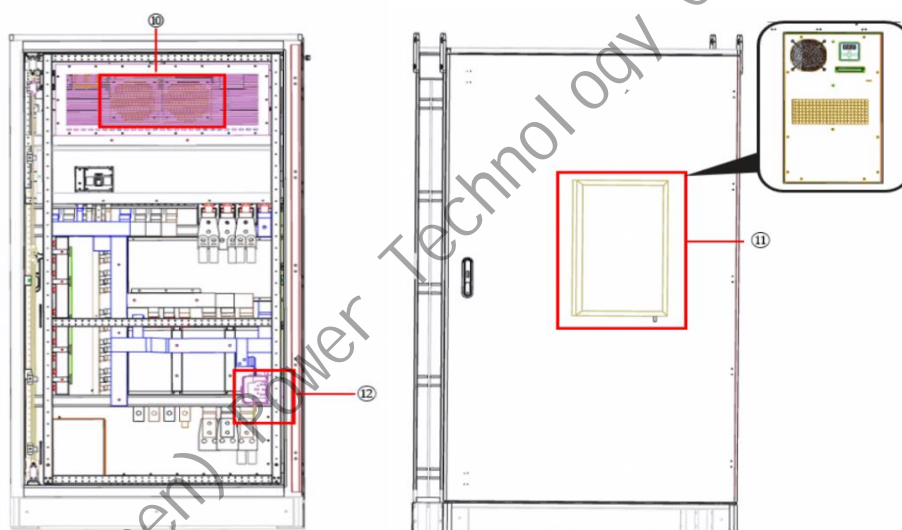


## 2.4 Product composition

Figure 2 -2 Component location

Front



**Back****Component location description**

Serial number	Name	Standard/Optional	Description
1	Power Indicator Light	Standard	
2	AC Input Protection Switch	Standard	
3	Bypass Switch	Standard	
4	Grid-Connected and Off-Grid Quick Switch	Standard	
5	Energy Storage Input Switch	Standard	
6	Photovoltaic Input Switch	Standard	
7	Load Switch	Standard	
8	SmartMGC5000	Standard	Industrial and Commercial Light Storage Microgrid Controller
9	UPS and Battery	Standard	
10	Cabinet Cooling Fan	Optional	
11	Industrial Air Conditioner	Optional	Suitable for Low Temperature and High Temperature Areas
12	N Ground Contactor	Optional	Configured According to the Power Distribution System
13	Intelligent Power Sensor	Optional	Optional HW self-developed electric meter
14	Oil machine incoming line switch	Optional	Compatible with parallel operation of fuel storage, configured for three-party EMS scenarios
15	EMS	Optional	

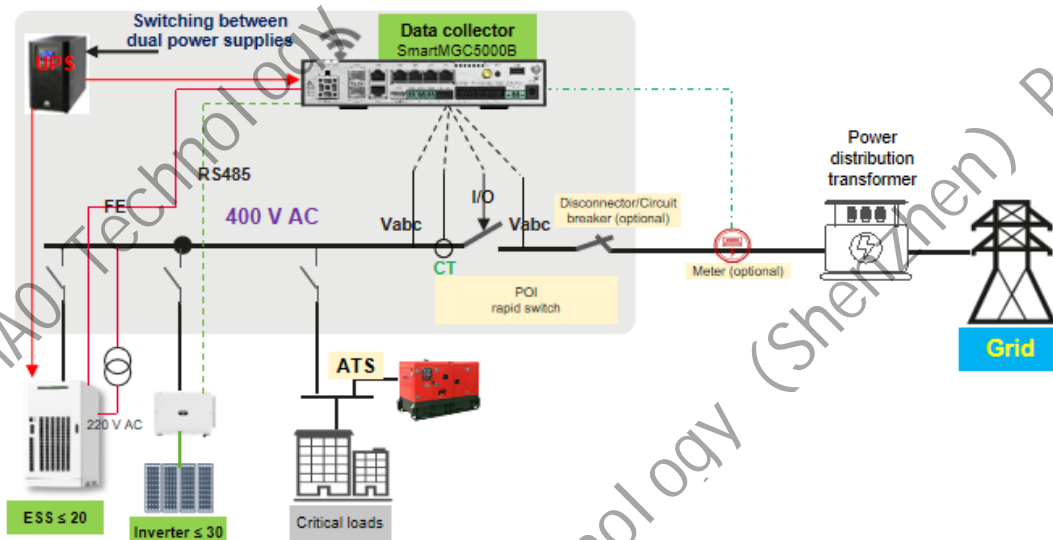
## 2.5 typical application scenarios

The PowerFusion series is suitable for seamless/quick switching scenarios in commercial and industrial solar-storage microgrids.

- General characteristics of application scenarios:

Scenarios where the municipal power supply frequently experiences outages, with low requirements for grid-connected power generation scheduling control, and where power fluctuations are acceptable.

During grid-connected operation, an economic operation strategy is executed; when the power grid experiences an outage or significant disturbance, the solar-storage system automatically disconnects the grid connection switch and switches to off-grid operation, ensuring continuous power supply to critical loads; when the municipal power supply returns to a stable range, the solar-storage system seamlessly reconnects to the grid and resumes grid-connected operation strategy. During grid-connected operation, it supports backup power SOC settings (reserve power for off-grid emergency supply). When the solar-storage power is insufficient, it automatically switches to the diesel generator branch through the load-side ATS (customer-owned) to continue supplying power to the load. The solar-storage system and diesel generator are decoupled through ATS.



**Networking Scenario**

## Operating Mode Description:

### ● Mode 1: Grid-connected, low SOC

Operating Method: Self-consumption/TOU, prioritizing backup power and preventing reverse flow;

Control Logic:

Real-time SOC < off-grid backup SOC, photovoltaic priority charges the energy storage, with any shortfall supplemented by the grid (optional).

### ● Mode 2: Grid-connected, high SOC

Operating Method: Self-consumption/TOU, prioritizing backup power and preventing reverse flow;

Control Logic:

Grid-connected charging cutoff SOC > real-time SOC > off-grid backup SOC, operating according to grid-connected control mode.

### ● Mode 3: Transition from grid-connected to off-grid

Operating Method: Transition from grid-connected to off-grid, switching time < 20ms;

Control Logic:

The power grid is down, and the SmartMGC5 controls the off-grid switch to trip.

### ● Mode 4: Off-grid, high SOC

Operating mode: Off-grid operation, coordinated control of solar and storage;

Control Logic:

SOC ≥ off-grid discharge cutoff SOC, solar and storage supply power to the load.

### ● Mode 5: Off-grid, low SOC, solar and storage shut down, generator (manual/automatic) starts;

- (Note: The generator's automatic start requires optional EMS and generator incoming line switch)

Operating mode: Start the generator, solar and storage shut down;

Control Logic:



SOC approaches the off-grid discharge cutoff SOC, EMS starts the generator to take over the microgrid, data collection controls the solar and storage shut down.

### ● **Mode 6: Transition from off-grid to grid-connected**

Operating mode: SmartMGC detects the grid power, synchronously connects to the grid (shuts down the generator), and starts solar and storage:

Control Logic:

The power grid is restored, and the microgrid system is connected to the grid simultaneously, controlling the on/off switch for grid connection and disconnection, with the load switched to power supply from the grid.

## **2.6 Notes**

- Choose the appropriate series of PowerFusion models based on load capacity and the number of energy storage units;
  - The product's temperature control system defaults to a fan, and air conditioning cooling can be selected based on the usage environment (fan/air conditioning as an option);
  - The oil machine circuit input and EMS are optional;
  - The oil machine connects to the microgrid system, with EMS controlling the start and stop of the oil machine, allowing for seamless switching in and out;
- Choose the appropriate cable to connect to the system based on the local power grid standard (TN-S, TN-C, TN-C-S).

## **3. Transportation and Storage**

### **3.1 Transportation Requirements**

- Select suitable transportation tools based on the equipment's dimensions and weight (please refer to the specifications).
  - The equipment should be placed horizontally during transportation.
  - Prevent collisions or scratches during the transportation of equipment.



- Road transportation requirements: Conduct a road survey before transporting equipment to identify obstacles along the vehicle's route for loading equipment, ensuring that the transportation route can be safely traversed by vehicles. Survey information includes: road conditions, height restrictions, actual height, width restrictions, actual width, weight limits, restricted time periods, and obstacle conditions, etc.
- Waterway transportation requirements: The waterway must meet the requirements for the hull to navigate at full load.

## 3.2 Storage requirements

- Keep cabinet doors tightly closed.

The temperature and humidity of the storage environment should be appropriate.

Temperature and humidity requirements:

Storage temperature: -40 to 70°C

Relative humidity: 5 to 95% RH

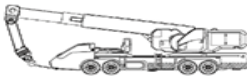


Store in a clean, dry place, and prevent erosion from dust and moisture.

## 4. Tool Preparation



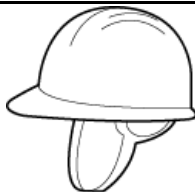





- The illustrated tools are for reference only; please refer to the actual items.
- Due to varying on-site conditions, this tool list may not fully enumerate all the tools that may be needed. Please have the on-site installation personnel and users prepare any unlisted tools based on the actual situation.

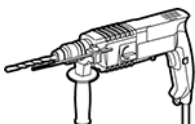
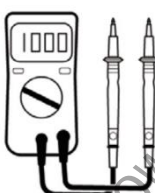

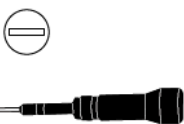





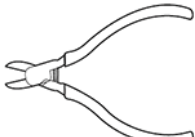
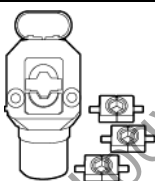
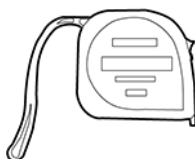
### 4.1 Tools for Handling

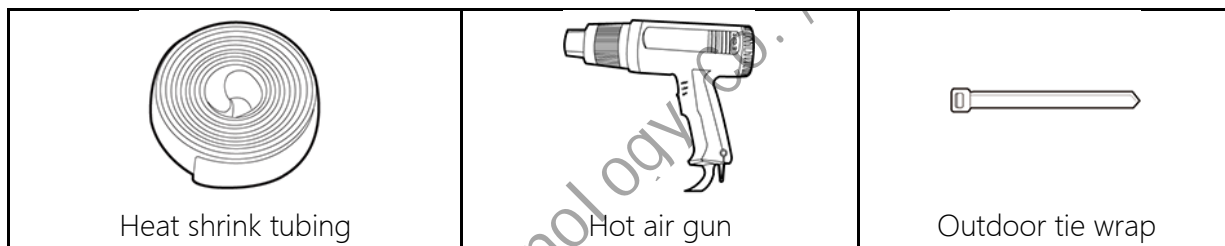
 <p>Cranes Lifting capacity <math>\geq 3t</math>; Working radius <math>\geq 2m</math></p>	 <p>Hoisting rope and hook</p>	 <p>Step ladder</p>
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## 4.2 Safety Protection Tools

		
Insulated gloves	Protective gloves	Safety helmet
		
Reflective vest	Protective goggles	Insulated shoes

## 4.3 Installation tools

		
Impact drill	Multimeter	Rubber hammer
		
Flat insulated torque screwdriver	Cross insulated torque screwdriver	Insulated Torque Socket Wrench (including extended sockets)
		
Tool knife	Wire stripper	Marker pen
		
Diagonal pliers	Separable hydraulic pliers	Steel tape measure



## 5. Installation equipment

### 5.1 Select Installation Location

#### Site Requirements

The equipment is suitable for general outdoor scenarios. The site requirements are as follows:

- The installation location must not be in low-lying areas, and the site's horizontal plane should be higher than the historical highest water level in the area.
- The soil condition should be good, with a solid ground. Poor geological conditions such as rubber soil and weak soil layers should be avoided, and areas prone to water accumulation and subsidence should not be selected.
- Well-ventilated areas.
- Away from strong vibration, strong noise sources, and areas with strong electromagnetic interference.
- Avoid locations with existing underground facilities as much as possible.
- The equipment has a corrosion resistance level of C3 and can be used in Class C or better environments, but not in Class D or E environments.
- Should be away from places that generate dust, oil smoke, harmful gases, and from production or storage sites of corrosive, flammable, or explosive materials.
- The distance from airports, landfill sites, riverbanks, coastlines, or dams should not be less than 500 meters.
- Operating temperature requirements:  $-20^{\circ}\text{C}$  to  $55^{\circ}\text{C}$ . When the ambient temperature exceeds  $55^{\circ}\text{C}$ , please choose a shaded installation location or build a sunshade to ensure reliable



shading.

- Class C environment: Outdoor offshore environment, outdoor environment more than 500m away from the ocean, 1500m to 3000m away from heavy pollution sources such as smelting plants, coal mines, and thermal power plants, 1000m to 2000m away from moderate pollution sources such as chemical, rubber, and electroplating industries, and 500m to 1000m away from light pollution sources such as food, leather, heating boilers, slaughterhouses, centralized garbage dumps, and sewage treatment plants.
- Class D environment: Outdoor nearshore environment, outdoor environment less than 500m from the coastline or marine environment, less than 1500m from heavy pollution sources such as smelting plants, coal mines, and thermal power plants, less than 1000m from moderate pollution sources such as chemical, rubber, and electroplating industries, and less than 500m from light pollution sources such as food, leather, heating boilers, slaughterhouses, centralized garbage dumps, and sewage treatment plants.
- Class E environment: Special environments, such as underground, underwater, or seabed, and special environments like wells.

### Foundation requirements for installation

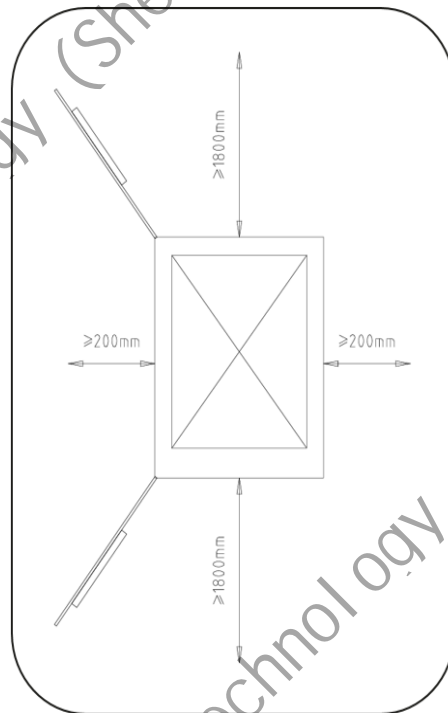
The foundation requirements should be based on the descriptions in the construction site design drawings. Please contact our company's product manager to obtain the drawings.

#### Installation space requirements

The L80 cabinet adopts a front-opening door design, and the maintenance distance in front of the cabinet should not be less than 1400mm;

The L150 and L300 cabinets adopt a front and rear opening door design, and the maintenance distance in front and behind the cabinet should not be less than 1800mm;

A space of no less than 200mm should be reserved on the side of the cabinet for heat dissipation and safety distance;



## 5.2 Installation Inspection

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### Notice

To avoid tipping over the equipment, please secure the box containing the equipment to the forklift with ropes before moving. Handle the equipment with care, as impacts or falls may cause damage.

Once the equipment is in place, carefully remove the packaging to avoid scratching the equipment. Keep the equipment stable during the unpacking process.

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### Check the Outer Packaging

Before opening the outer packaging of the equipment, please check for any visible damage, such as holes, cracks, or other signs of potential internal damage, and verify the equipment model. If there are any abnormalities in the packaging or discrepancies in the equipment model, do not open it and contact your dealer as soon as possible.

### Check the Delivered Items



After opening the outer packaging of the equipment, please check that all delivered items are complete and that there is no obvious external damage. If any items are missing or damaged, please contact your dealer.

For the quantity of delivered items included with the box, please refer to the "Packing List" inside the packaging box.

## 5.3 Installing PowerFusion

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Warning

When handling with a forklift, it is prohibited to lift from the front to prevent the cabinet from tipping due to imbalance, which could cause personal injury or equipment damage.

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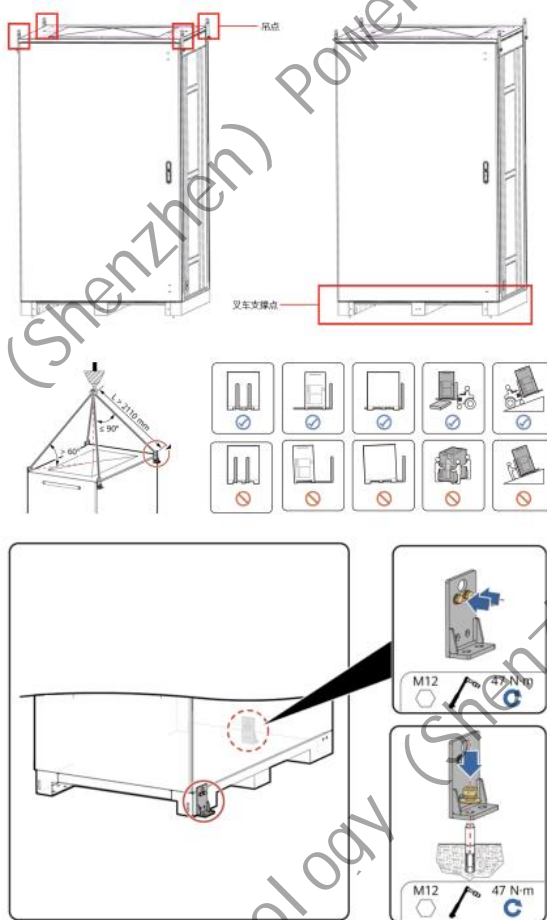


Caution

Either hoisting and handling or forklift handling is acceptable.

- The cabinet foundation must be higher than the local historical highest water level and at least 300mm above the horizontal ground, and the integrated cabinet should be placed in the center of the foundation.
- The cabinet's cable entry and exit are designed for downward entry and exit. The outdoor installed recommended cables are introduced into the cabinet for wiring using a cable trench installation method.
- For equipment that requires grounding, the protective ground wire must be installed first during installation; when removing the equipment, the protective ground wire must be removed last.
- When the cabinet is unstable, leveling shims can be used to level it before securing.
  - Please ensure that the base connection piece is installed correctly as shown in the diagram, and fasten it with screws to prevent the cabinet from being affected by extreme situations such as earthquakes.

Dumping damage.



## 6. Link cable

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Before connecting the cables, please ensure that the PowerFusion integrated cabinet is powered off, as this may pose a risk of electric shock.

On-site fire-fighting facilities that meet the requirements must be provided, such as fire sand, carbon dioxide extinguishers, etc.

Please use specialized protective equipment and dedicated insulating tools to avoid electric shock injuries or short circuit failures.

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Damage to the equipment caused by incorrect wiring is not covered by the equipment warranty.

Only qualified professional electrical technicians are allowed to perform operations related to electrical connections.

When performing electrical connections, operators must be equipped with personal protective equipment.

To prevent poor cable connections due to excessive pulling force, it is recommended to leave some slack in the cable before connecting it to the corresponding port.



When making cables, be sure to stay away from the equipment to avoid cable debris accidentally entering the equipment, which could cause sparks and result in personal injury and equipment damage.

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All cable colors in the electrical connection diagrams in this chapter are for reference only; the selection of cables should comply with local cable standards

## 6.1 Wiring Scheme and Cable Preparation

This chapter only reflects the wiring scheme for commercial PowerFusion cables; please refer to the corresponding chapter descriptions for specific connection operations.

### Cable Specifications

Serial number	Cable Description	Cable Type	Starting Point	Ending Point	Source
1	City Power Incoming Line	4/5-Core Outdoor Copper Core Cable / Aluminum Alloy Cable	External Power Side Output Terminal	Internal Power Connection Terminal	User Provided
2	Energy Storage PCS Incoming Line	4/5-Core Outdoor Copper Core Cable / Aluminum Alloy Cable	External ESS AC Output Terminal	Energy storage terminal inside the cabinet	User Provided
3	Photovoltaic inverter incoming line	4/5-Core Outdoor Copper Core Cable / Aluminum Alloy Cable	AC output terminal of the inverter outside the cabinet	Wiring terminal of the inverter inside the cabinet	User Provided
4	Load feeder	4/5-Core Outdoor Copper Core Cable / Aluminum Alloy Cable	Main bus outside the cabinet	Load wiring terminal inside the cabinet	User Provided
5	Working grounding wire	Single-core outdoor copper core cable	N/PEN inside the cabinet	Grounding electrode outside the cabinet	User Provided
6	Grounding wire	Single-core outdoor copper core cable	P E N / P E bus in the cabinet	Grounding electrode outside the cabinet	User Provided
7	Data acquisition to energy storage	Category 6 shielded network cable	SmartMGC	ESS	User Provided
8	Data acquisition to inverter	RS485 shielded cable	SmartMGC	I NV	User Provided

Note a: When multiple cables are laid in parallel for the energy storage PCS input line and the photovoltaic inverter input line, the number of cables in parallel must be configured according to the specific models of the PCS and inverter.

Note b: The cable type is selected based on the grounding method of the low-voltage system, supporting TN-S, TN-C, and TN-C-S grounding methods.

Cable and terminal correspondence table (applicable to L80-L150-L300 cabinet types)

Cable Specification	240mm <sup>2</sup>	185mm <sup>2</sup>	150mm <sup>2</sup>	120mm <sup>2</sup>	95mm <sup>2</sup>	70mm <sup>2</sup>	50mm <sup>2</sup>	35mm <sup>2</sup>
DT terminal	DT16	DT16	DT12	DT12	DT10	DT10	DT8	DT8



## 6.2 Connect the ground wire

### PowerFusion integrated cabinet protection grounding

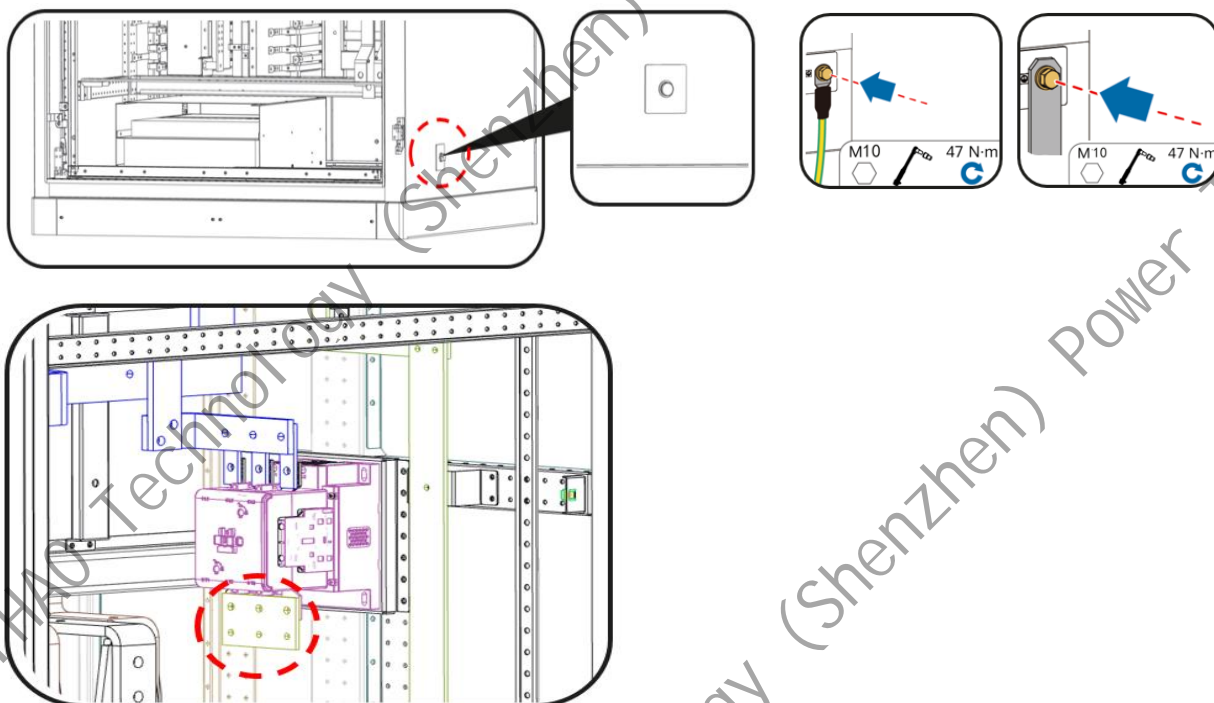


Outdoor copper core/copper-clad aluminum/aluminum alloy cable/galvanized flat steel (to be provided by the user).

步骤 1 Make the cable and connect the protective ground wire.

步骤 2 If the system and off-grid switch is 4 P and is equipped with an N line grounding switch, the grounding cable (recommended cross-sectional area not less than the load side N line) should be connected to the output terminal of the N line grounding switch and connected to the external grounding electrode. (If the system and off-grid switch is 3 P and there is no N line grounding switch, this step can be ignored).

Connect the PowerFusion cabinet ground wire



**N grounding copper busbar (4P system)**

## 6.3 Connect to the mains power supply

Support 1 Access to the mains power supply.

Each terminal block supports a maximum of 2 cables connected in parallel.

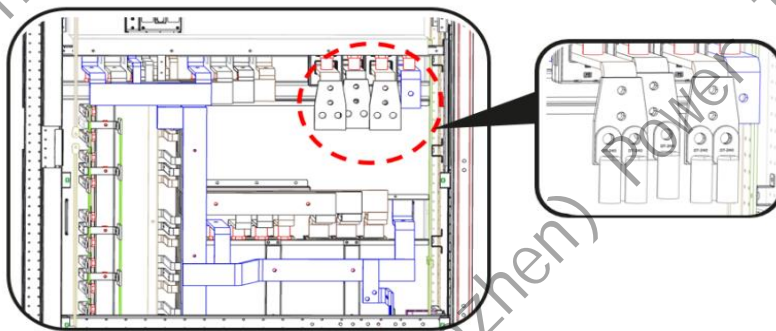
The connection method for each cable is the same; this document uses one line as an example to describe the connection method.

Outdoor copper core/copper-clad aluminum/aluminum alloy cables (to be provided by the user).

**Step 1: Based on the cable selection, choose the cable entry hole and connect the mains power supply cable to the network switch.**

**Step 2: Seal the bottom cable entry hole with fireproof mud.**

Figure6-1 City power supply input



## 6.4 Connect the energy storage PCS input



Supports up to 6 energy storage PCS input connection.

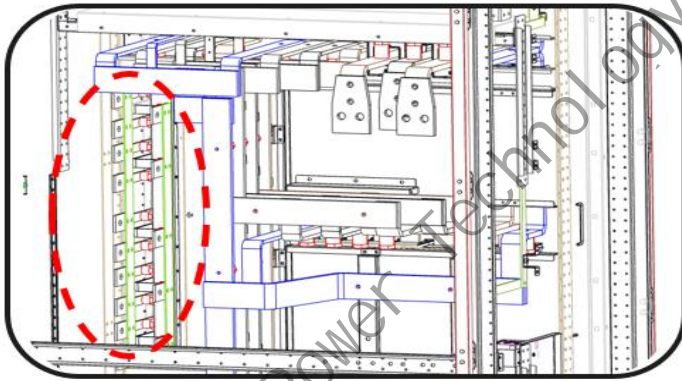
Each terminal block supports a maximum of 2 cables connected in parallel.

Outdoor copper core/copper-clad aluminum/aluminum alloy cables (to be provided by the user).

**Step 3: According to the cable selection, choose the wiring hole and connect the energy storage PCS input cable to the energy storage MCCB.**

**Step 4: Seal the bottom wiring hole with fireproof mud.**

Figure6 -2 PCS input



## 6.5 Connect the photovoltaic system input



Supports one photovoltaic total input connection.

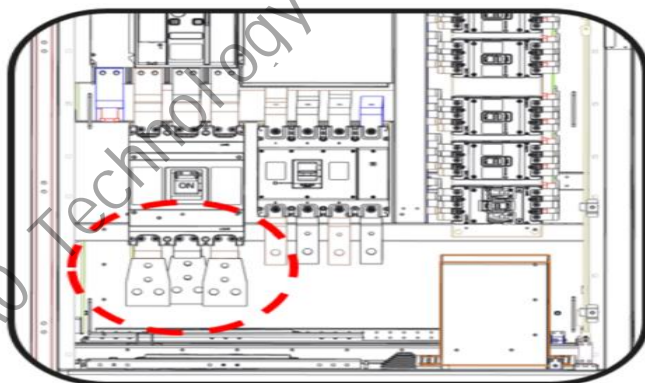
Each terminal block supports a maximum of 2 cables connected in parallel.

Outdoor copper core/copper-clad aluminum/aluminum alloy cables (to be provided by the user).

**Step 1: According to the cable selection, choose the wiring hole and connect the photovoltaic total input or photovoltaic smart controller input cable to the switch.**

**Step 2: Seal the bottom cable entry hole with fireproof mud.**

Figure 6-3 Photovoltaic Incoming Line



## 6.6 Connection of Load Feed Line



Support 1 Access of electrical load feed line.

Each terminal block supports a maximum of 2 cables connected in parallel.

Outdoor copper core/copper-clad aluminum/aluminum alloy cables (to be provided by the user).

Step 1: Select the cable entry hole based on cable selection, and connect the photovoltaic main incoming line or the photovoltaic smart controller incoming cable to the load switch.

Step 2: Seal the bottom cable entry hole with fireproof mud.

Figure 6 -4 Load Incoming Line



## 7. Power On/Off Operation

### 7.1 Power On Operation

Power on and off should follow the order of "power side first, then load side / load side first, then power side." Before powering on, check insulation and equipment integrity.

- Before the first power-on, use a multimeter to check that the external power sources (including but not limited to mains electricity, generators, energy storage, and photovoltaic power sources) are all in a powered-off state. Live operations are prohibited;
- The cables are reliably connected and secured;
- Check the switches in the cabinet to ensure all switches are in the off position;
- Turn on the lightning protection switch in the secondary warehouse;
- Close the mains power switch (connect to external mains power);

- Close the auxiliary power switch in the secondary warehouse (the backup switch does not need to be closed);

- Close the energy storage switch;
- Close the photovoltaic incoming line switch;
- Power on the energy storage system;
- Check if the power indicator light is functioning normally;

(If the indicator light is normal, power on successfully)

- Close the load switch;
- Use a multimeter to check if the power supply voltage is normal;
- After powering on, close the cabinet door.

## 7.2 Power down operation

- After opening the cabinet door, listen and check if the power supply equipment is normal.

After confirming there are no abnormalities, follow the steps below to perform the power down operation.

- Open the load switch;
- Open the energy storage switch;
- Open the photovoltaic incoming line switch;
- Open the mains switch;
- Secondary warehouse auxiliary power switch tripped;
- Check the switches in the cabinet to ensure all switches are in the off position;
- Check whether all power indicator lights are off.
- If maintenance is required, use professional tools such as a multimeter or voltage tester to check whether the cabinet is completely powered off.
- Power down completed.

## 8. Equipment Maintenance

### 8.1 Routine Maintenance

To ensure that the integrated control cabinet operates well for a long time, it is recommended to perform routine maintenance as described in this section.

#### Prerequisites

**Danger**

Please use specialized protective equipment and dedicated insulating tools to avoid electric shock injuries or short circuit failures.

**Warning**

Before performing maintenance work, please power down the equipment to operate on it.

**Caution**

When performing maintenance such as system cleaning, electrical connections, and grounding reliability, execute the system power down operation.

If it is necessary to open the cabinet door in rainy or snowy weather, take protective measures to prevent rain or snow from entering the cabinet. If it is not possible to prevent rain or snow from entering the cabinet, do not open it during rainy or snowy weather.

#### Maintenance Form

Serial number	Check Content	Check Method	Maintenance Cycle
1	System Operating Status and Cleanliness	Check whether the equipment and internal components are damaged or deformed.	Once per quarter
		Check if the warning labels are clear; if not, please replace them in a timely manner.	
		Check the appearance of the	

		equipment for corrosion, paint peeling, etc.; if there is any, please touch up the peeling areas.	
2	Cable Connection	Check whether the connection cables of the equipment are loose. If they are loose, please tighten them.	Once every 6 months after the first debugging, and then once every 2 years.
		Check if the cables are damaged.	
3	UPS Cooling fan	Check if there is dust accumulation at the air intake and exhaust ports, and clean with tools if necessary.	Once every six months to a year.
4	Cleaning of air conditioning/fan intake and exhaust ports in the cabinet	Check if there is dust accumulation at the air intake and exhaust ports, and clean with tools if necessary.	Once every six months to a year.