



OmniCube-A215-100K/105K

User Manual



This image represents iPotisEdge standardized product. The actual product varies depending on customization.



VIP customization



modular assembly



efficient and flexible



smart and stable



comprehensive after-sales services

Revision History

Revision history depicts the changes that were implemented in the user manual. The most current publication contains all the changes made in the previous versions.

Issue V1.0 (2022-05-11) This version is the first official release.

V2.0 (2024-03-26)	UPDATE	2.2	Storage Requirements
		3	Product
		5	Installation Design
		6	Mechanical Installation
		7	Electrical Connection
		9.4	UPS Maintenance
		Appendix	
V3.0 (2024-05-09)	UPDATE	4	eEMS Operating Instruction
V4.0 (2024-06-09)	UPDATE	4.3	EMS Overview
		4.9	System Settings
		9.5	PCS Maintenance
		9.6	MPPT Maintenance
		9.7	STS Maintenance
		9.8	Air Conditioning System Maintenance
V5.0 (2024-08-01)	UPDATE	3.4	Module Introduction
V6.0 (2024-11-01)	UPDATE	3	Product
		7	Electrical Connection
		8	System Commissioning
V7.0 (2025-03-26)	UPDATE	10	Technical Data

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***Please read this manual carefully before installation and use. The company is not responsible for any losses caused by improper installation or operation.**

Overview

This manual elaborates on the product profile, installation and wiring, configuration commissioning, trouble shooting and system maintenance.

Please read through this manual meticulously to be familiarized with the safety instructions, functionalities and characteristics of the product hereunder to be provided prior to use.

Intended Readers

This manual aims to provide operational and maintenance convenience for professionals and users. Operators of the product must be qualified persons who have demonstrated electrical know-how and knowledge related to power distribution system and operation installations in of electrical equipment. Otherwise, serious personal injury or significant property damage may be caused.

This manual is intended for:

- Marketing engineers
- System engineers
- Commissioning engineers
- End users (Users are prohibited from the operations specified in the manual that must be done by licensed technician.)

Meaning of Symbols

In order to ensure personal and property safety during installation better user experience, this manual highlights the meaning of the industry-standard symbols.

This manual contains the following types of warnings. Please read carefully before installation.

Danger

If the instructions are not followed, death or severe injury may occur.

It indicates high risk.

Warning

If the instructions are not followed, death or severe injury may occur.

It indicates moderate risk.

Caution

If the instructions are not followed, minor or moderate injury may occur.

It indicates low risk.

Instruction

Instruction is complementary to the key information of the manual.

It has nothing to do with personal injury, equipment damage, and environment damage.



Meaning of Warning Signs

	High Voltage		Put away from flammable materials
	Danger		Do not short circuit the battery
	Be careful of fire		Do not install or disassemble by non-professionals
	Hot surface		Install the product out of the reach of children
	After power failure, the components have a delay in discharging. Please wait for 20 minutes until the equipment is discharged completely.		
	Do not throw away this product, and it shall be sent to the designated recycling place.		
	Do not dispose of this product with residential waste.		
	Recyclable		Read the instructions carefully before installation and use
	CE certification		

Definition of Abbreviation

Abbreviation	Full name	Abbreviation	Full name
FPC	Flexible Printed Circuit	SOC	State Of Charge
BMS	Battery Management System	BM	Battery Module
BMU	Battery Management Unit	PCS	Power Conversion System
BOL	Begin Of Life	EOL	End Of Life
Bus- bar	Current Connection Between Cells	OCV	Open Circuit Voltage
CAN	Controller Area Network	S/G	Switch Gear
SOH	State Of Health	DOD	Depth Of Discharge

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1. Safety

1.1 General Safety Rules

Danger

- The ESS is a high-voltage system. Do not install or operate the system in severe weather, such as lightning, rain, snow, and strong wind of level 7 or above.
- Do not perform installation, cable connection, maintenance, replacement of parts while the power is on. Transient contact between a power cable and a conductor may generate electric arcs or sparks, resulting in fire or personal injury.
- Only professional personnel who are familiar with local laws and regulations, electrical systems, professional training, and knowledge about the product are allowed to operate the system.
- If the electrical control cabinet or battery box is found to have obvious defects, damage or missing parts, do not use it and contact after-sales centers without delay.
- Do not remove or modify any part of the battery pack or electrical control cabinet without the official authorization of the company. Battery damage may result in electrolyte leakage. If the electrolyte leaks, do not touch the leaked electrolyte or volatile gas. Please take precautions, and contact the after-sales service centers immediately.
- Do not place batteries near high temperature, high voltage, or heating devices.
- Do not use flooded batteries. Contact your local battery recycler for disposal.
- In case of fire, turn off the power supply of the equipment to ensure safety.

Warning

- In case of inhaling leaked materials, evacuate from the contaminated area and seek immediate medical help.
- In case of eye contact, rinse with water for at least 15 minutes. In case of skin contact, wash the contact area thoroughly with soap and water. In case of accidentally eating dangerous things, induce vomiting and seek medical help immediately.
- If the battery needs to be replaced or stacked, please contact the after-sales service center. Do not disassembly, install or move battery system.
- It is necessary to obtain the permission of the relevant departments of the country in which it is connected to the grid.
- Do not compile or decompile the components or devices of the product, and do not infringe on the intellectual property rights of manufacturer.
- When installing a ground device, ground the cable first and remove the cable last. Grounding equipment must be grounded first when installing, and please remove the ground wire last when removing the equipment.
- Do not dispose of used batteries as common waste to avoid environmental pollution. Contact a battery recycling company for disposal. Please refer to local laws and regulations for details.

Caution

- Store and transport as required to ensure ESS is not damaged during transportation and storage.
- Pay special attention to the weight when hoisting batteries or cabinets.
- Wear gloves when handling batteries.
- Do not hit, pull, drag, or step on the equipment, and do not place irrelevant items in any part of the battery module.
- Transport must be carried out by trained professionals and operations must be documented during the process.
- Ensure that the device is securely placed and not tilted. Tipping the equipment may cause equipment damage or personal injury.
- Make sure there are fire extinguishers readily available such as Novac1230 or FM-200.
- When exposed to high temperatures, the battery is at risk of explosion.
- When installing and maintaining heavy equipment, use proper tools and take protective measures to prevent scratches on the equipment enclosure. If the scratches occur, repair the enclosure in time to prevent rust.
- When performing high voltage operations, use special insulation tools.
- The insulation layer may be ageing or damaged when cables are used in high temperatures. The distance between the cables and the heating device or the heat source must be at least 30 mm.
- Cables of the same type must be bound together and laid at least 30 mm apart from each other. Do not intertwine or cross cables.

1.2 Manual Keeping

This manual is an integral and important part of the product usage as it contains important information on product transportation, installation, repair, and maintenance. Read through this manual before transportation, installation, repair, and maintenance.

- Strictly follow the instructions and precautions described in this manual for the transportation, installation, repair, and maintenance of the product. Otherwise, equipment damage, personal injury or death, and property loss may occur.
- Keep this manual in a safe place to ensure that it is readily available during transportation, installation and operation.

1.3 Battery Protection

Danger

This product contains high voltage! There's a risk of electric shock! The battery in the system will generate high voltage when connected. Accidental touch of the battery might lead to electric shock and even life-threatening injury. When installing, maintaining, and repairing the device, ensure that:

- All energy storage batteries have been completely disconnected and remain powered off for 20 minutes.
- Set up a clear warning sign at the disconnection of the energy storage battery to ensure that it will not be accidentally reconnected.

1.4 Grounding Fault Protection

Danger

- When the ESS is grounded or irregular grounding occurs, deadly high voltages may be present in parts that are not otherwise charged.
- Accidental touching is fatal!
- Before performing this operation, ensure that the system is properly grounded. In addition, take protective measures and properly ground the system according to local standards.

1.5 Live Line Measurement

Danger

ESS has high voltages, and accidental contact may result in a fatal electric shock. The following instructions must be observed when performing live line measurements:

- Take protective measures. (wear insulating gloves and shoes, etc.)
- The staff performing the measurement must be accompanied by at least one technician to ensure personal safety.

1.6 Use of Measuring Equipment

Danger

In order to ensure that the electrical parameters of ESS meet the requirements during electrical connection and trial operation, it is necessary to use relevant electrical measuring equipment.

- The selected measuring equipment should fulfill the field operation requirements in terms of measuring range and working conditions.
- Ensure the correct connection and standardized use of the measuring equipment, so as to circumvent arcs.
- Live measurement should be performed with such protective measures as wearing insulating gloves and shoes. The staff performing the measurement must be accompanied by at least one technician to ensure personal safety.

1.7 Complete Power-off Operation

Warning

Performing operations on the ESS only when all equipment and systems in the ESS are completely unpowered.

- Ensure that the powered-off device will not be powered on accidentally.
- Use a multimeter to ensure that the device is completely powered off.
- Ensure proper grounding.
- During the entire operation process, ensure that the escape ways are clear and unblocked.
- Use insulating material to cover the adjacent parts that may be live.
- Ensure that the ESS has been completely de-energized, and use a multimeter to confirm.
- After the system is completely out of operation, wait for at least 20 minutes before performing operations on the system.

1.8 Arc Protection

Warning

In order to protect the safety of personnel and equipment, it is necessary to strictly follow the instructions described herein this manual when operating the product.

Improper operation may cause arc and even risks such as ignition and explosion.

The following improper operation may cause electric arcing, ignition, explosion etc. Always keep in mind that accidents, if any, must be handled by qualified professionals.

Improper handling for existing accidents may cause worse failures or accidents.

- Plug or unplug the DC high-voltage fuses when the power is on.
- Touch the uninsulated end of a potentially live cable.
- Mistakenly touching potentially wiring bars, terminals, or other parts inside the equipment that may be live.
- The power cable is improperly connected or loose.
- Metal parts such as screws are dropped into the power module.
- Incorrect operation by unqualified operators.

Before operating the equipment, it is necessary to assess whether there is an arc risk in the operating area of the equipment. Potential risks, if any, should addressed by observing the following instructions:

- Operators must have passed safety training and proven qualified.
- Area of potential electric shock should be identified.
- It is necessary to wear the required protective clothing before operating in the area where the electric shock may exist.

1.9 Electrostatic Protection

Warning

Contact with or improper handling of the printed circuit board or other electrostatic-sensitive components may cause equipment damage.

- Avoid unnecessary contact with the circuit board.
- Comply with electrostatic discharge (ESD) prevention regulations, such as wearing an anti-static wrist strap.

1.10 Product Recycling

- The spent ESS or its internal separate equipment cannot be simply disposed of as common waste.
- Some components of the ESS can be recycled or reused while some are environmentally malignant.
- Please contact local authorized recycling agency for proper disposal of the product and its internal components.

1.11 Sand and Moisture Protection

Warning

- Do not open the ESS cabinet door in case of severe weather such as sandstorms, thunderstorms, strong winds, and hail, or when the relative humidity of the surrounding environment is greater than 95%.
- Restore the product to working condition once adverse weather conditions cease.

1.12 Enclosure Warning Sign Protection

Warning

The warning signs on the product and the internal electrical equipment contain important information about safe operation. It is prohibited to vandalize these signs!

- Make sure the warning signs of the system are always legible and clear.
- If warning signs on the ESS enclosure are damaged or blurred, replace them immediately.

1.13 Safety Warning Sign Protection

Warning

During transportation, installation, overhaul, maintenance and other operations of ESS, in order to prevent mistaken operation or accident by unauthorized persons, the following precautions should be observed:

- Place clear warning signs at the switches on the front and rear doors of the ESS to prevent accidental switch-on.
- Set up warning signs or safety warning tape in the vicinity of the operation to ward off unauthorized persons.

1.14 Daily Operation and Maintenance

Warning

During daily operation, it is necessary to ensure that the doors of the ESS cabinet and its internal equipment are closely locked. The keys should be specially kept, so as to prevent unauthorized access to the interior of the ESS, a flooded ESS and animals.

In the meantime, the ESS and its internal equipment should be regularly checked and maintained to realize longer-term, reliable operation.

To carry out relevant operations while the system is energized, insulation protection measures should be taken, and at least two staff members should be present simultaneously.

The ESS is normally installed at places far away from urban area, usually at open countries. Therefore, field rescue facilities should be prepared.

During routine operations and regular maintenance, always pay attention to the followings:

- Do not repair or maintain the ESS in rainy or humid conditions. Moisture may cause system failure.
- Warning signs and nameplates are affixed to all electrical equipment of the system. The nameplate contains important parameters. When performing operations, please keep the nameplate safe and sound.
- Some devices in the system may have heating components, which will continue to heat after the ESS stops. Therefore, anti-scald gloves should be worn when operating such devices.
- The power units and cooling fans in the system may generate noise during operation. When certain faults occur, the noise may get louder. Therefore, noise-proof earplugs should be worn while approaching the ESS.
- All the installation instructions of the fire suppression system (FSS) should be observed and regular maintenance should be conducted to ensure a well-functioning FSS.
- If necessary, appropriate protective equipment, such as goggles, insulating gloves, insulating shoes should be prepared and auxiliary measures should be adopted to ensure the safety of personnel and the equipment.

2. Packing, Transportation & Storage

2.1 Supply List

The ESS has gone through rigorous testing and examination, though. It may still be damaged during shipping. In this sense, meticulous check is necessary before installation. Shipping-induced item damage or loss, if any, should be reported to the forwarding agents and local distributors.

Item	Model/Specification	Unit	Qty	Notes
OmniCube- A215-100K	OmniCube- A215-100K	Set	1	/
Air conditioning water pipe	/	Set	1	/
Door key	/	PCS	6	Two hanging on the door
Display key	/	PCS	2	Slave units are designed to be keyless.
Hexagon head bolt assembly	M8*16	PCS	20	4 Spare parts
Cable tie holder	3M Adhesive back (CL-3_White)	PCS	3	To fix air-conditioning hose
Fuse	5*22 (6A_AC220V)	PCS	3	Spare part
Sealant	Fireproof Mud-High Temperature Fireproof Sealing Mud	kg	3	/
Indicator light	Green	PCS	2	Spare part
Fault indicator light	Red	PCS	1	Spare part
User manual	OmniCube- A215-100K	PCS	1	/
Quick installation manual	OmniCube- A215-100K	PCS	1	/
PACK connection busbar	/	PCS	8	Required for exported products
PCS auxiliary wire	A set of communication adapter cables	PCS	1	/

2.2 Storage Requirements

If the ESS is not for immediate use, it should be placed in the condition where:

- The storage environment should comply with local regulations and standards.
- In case of battery failure (carbonized, leaked, swollen, or flooded battery), such batteries should be placed to the dangerous goods warehouse without delay and kept at a distance of no less than 3 meters away from flammable materials. Disposal of such batteries should be ASAP.
- When storing the battery, place it correctly according to the signs or guides on the packaging. Do not store the battery upside down, sideways or tilted. When stacking up the batteries, follow the instructions on the outer packaging.
- Batteries should be separated from other items while being stacked up, so as to avoid dangerous pile-ups. If a large number of batteries are stored, it is recommended to prepare FSS facilities, such as fire sand and fire extinguishers.
- The ambient air shall not contain corrosive or flammable gases.
- During storage, there must be proof that the product is being stored in accordance with the requirements, such as temperature and humidity logs, storage environment photos and inspection reports.
- The battery must be disconnected from the external connection and the circuit breaker must be disconnected.
- The warehouse keeper shall collect battery storage information every month, regularly report the battery inventory to the planning department, and timely recharge the batteries stored for nearly 15 months ($-10^{\circ}\text{C} \sim 25^{\circ}\text{C}$), 9 months ($25^{\circ}\text{C} \sim 35^{\circ}\text{C}$) or 6 months ($35^{\circ}\text{C} \sim 55^{\circ}\text{C}$).
- Batteries under extended storage need to be inspected and tested by professionals before reuse.
- Stored batteries should be shipped on a first-in, first-out basis.
- Once the battery production testing has been completed, the battery should be charged to at least 50% SOC before storage.

Instruction

Storage Environment Requirements

- Ambient temperature: $-10^{\circ}\text{C} \sim 55^{\circ}\text{C}$, recommended storage temperature: $0^{\circ}\text{C} \sim 30^{\circ}\text{C}$ (6 months).
- Relative humidity: 5%RH $\sim$ 95%RH.
- Store in a dry, ventilated and clean room.
- Avoid contact with corrosive organic solvents or gases.
- Avoid direct sunlight.
- The distance from the heat source shall not be less than two meters, ensuring there are no significant infrared rays.
- No metal conductive dust.

Conditions Defining Extended Storage

- If the battery is deformed, damaged or leaked, it can't be used, regardless of the storage duration.
- The storage time is calculated from the latest charging date marked on the outer package of the battery. After the battery is recharged, update the latest and the next charging dates on the label (the next charge date = the latest charge date + recharge interval).
- The battery can be maximally stored for 3 years or recharged for 3 times, whichever comes earlier shall prevail. Batteries stored for over three years or recharged for over 3 times amount to spent batteries.
- Long-term storage of Li-ion batteries will lead to inevitable capacity loss. After 12 months of storage at the recommended temperature, the maximum irreversible capacity loss is generally 3% per month.
- If customers perform the discharge test according to the specifications, they may find that a battery with less than 100% of its rated capacity fails the test.

Warning

- Check the battery appearance before recharge. Only the qualified battery can be recharged in the next step, and the unqualified battery shall be considered as spent.
- The battery passes the visual inspection if there is no deformation, damage to the casing or leakage.
- If the battery SOC drops to 0% or the system shuts down for protection, the battery must be recharged within 7 days. The company does not provide the corresponding warranty service for the permanent failure of the battery caused by the customer's failure to recharge the battery within the recommended storage period.

2.3 Packing Box Transportation Requirements

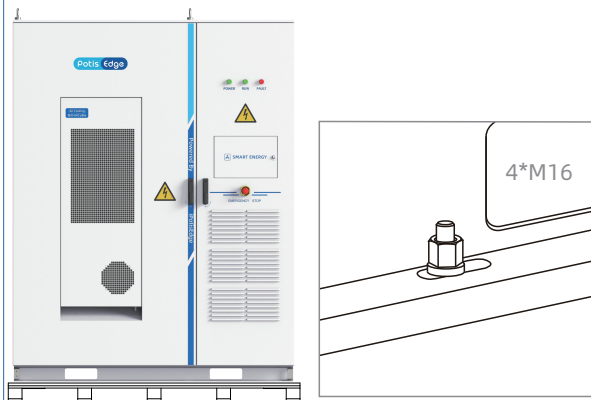
- The product should be packed in boxes before transportation. The battery SOC during transportation should be 30% to 50% or as specified.
- During transportation, it should be protected from severe vibration, shock, extrusion, sunlight, and rain, as well as tilting and being turned upside down.
- During loading and unloading, it should be handled with care. Do not drop, tumble or crush.
- During transportation, high voltages must be disconnected.

2.4 Product Packing

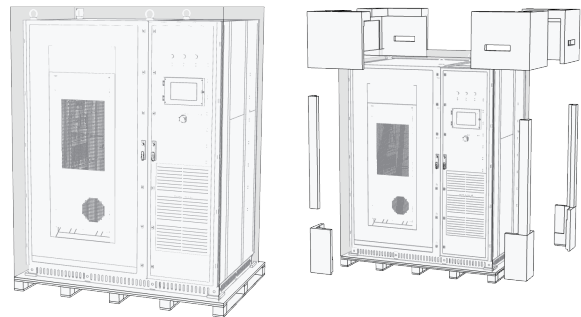
The ESS needs to be packaged as a whole to ensure that it will be immune from any harmful gases, chemical pollution, static electricity, moisture and mechanical damage during handling, transportation and storage.

Instruction

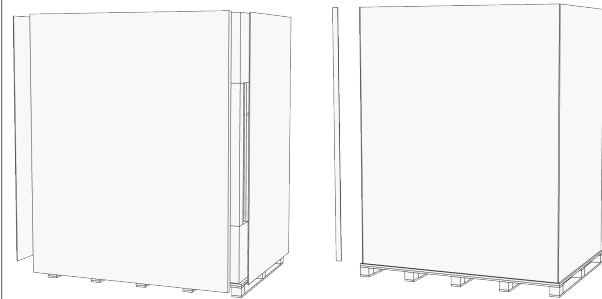
- 01** Place the ESS on the base support of the packing box, aligning the four foot holes of the system with the reserved holes on the base support. Secure the it to the base support using bolts, nuts, and washers.



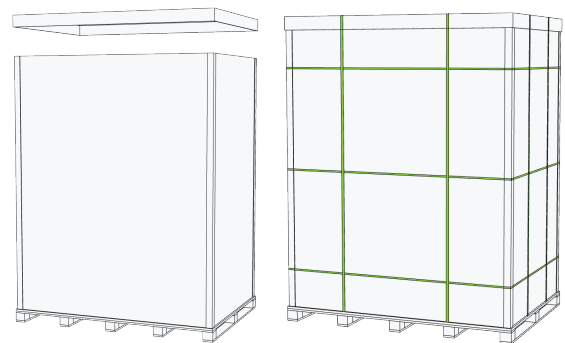
- 02** Cover it with PE bag from top to bottom. Insert EPE pads around the system according to their shapes.



- 03** Wrap the EPE pads with cardboard to prevent them from falling off, seal the box, and place fixing clips around it.



- 04** Close the top cover, attach the shipping label, and use packing straps to tightly secure the box in a cross pattern.

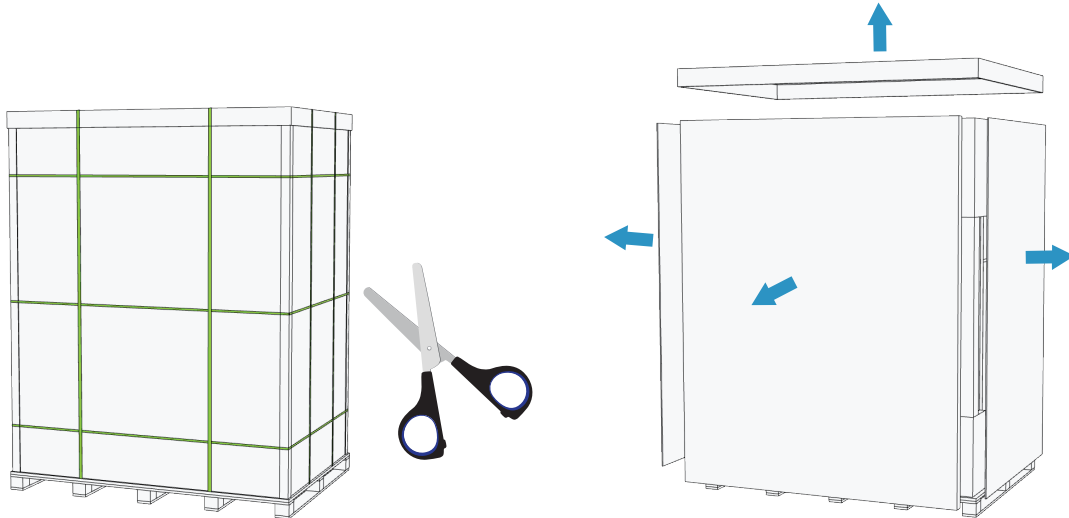


2.5 Product Unpacking

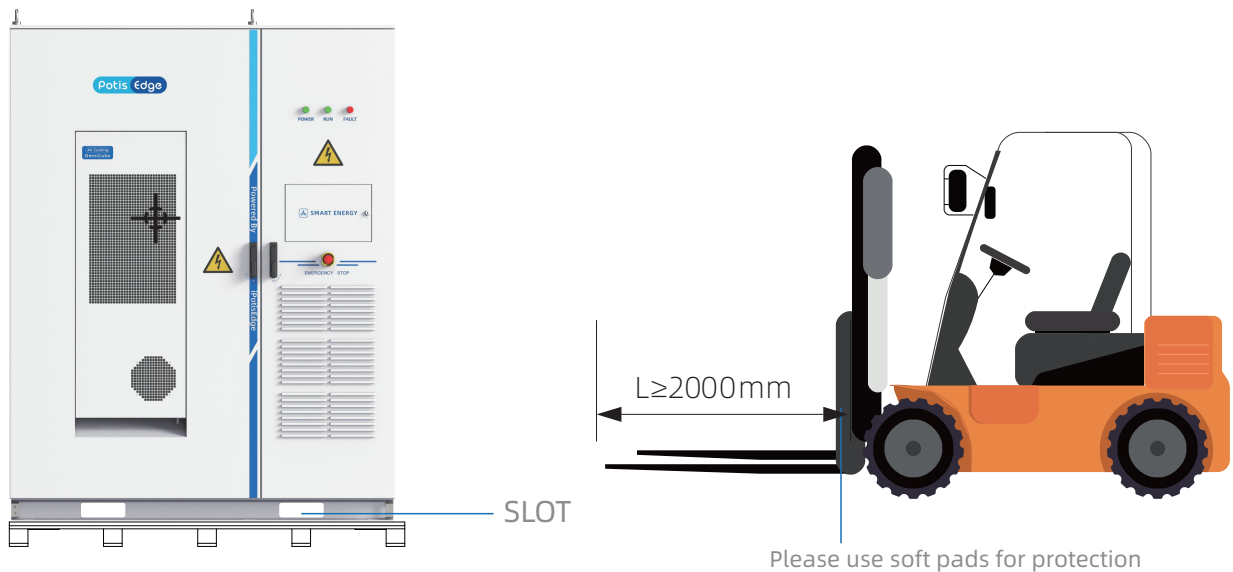
The procedure for unpacking the ESS is as follows:

⚠ Instruction

- 01 Cut the packaging tape with scissors or packing knife, remove the upper cover, fixed sleeves and cardboard box, and then remove the EPE sleeves and PE bags from the system in sequence.



- 02 Use appropriate tools to remove the four bolts that lock the system onto the bottom bracket and use a forklift to take it to the specified location.



⚠ Caution

Please make sure that the use of forklift meets the specifications and that the forks of the forklift can pass through the entire base cabinet slot.

When transporting with a forklift, align the slot according to the center of gravity marked on the packaging box to prevent the ESS from tipping over and causing unnecessary losses.

2.6 Transportation Condition

Warning

Various devices of the ESS have been installed and fixed in the ESS cabinet before leaving the factory. The ESS should be lifted and transported as a whole during transportation.

During the whole process of loading, unloading and transportation, the outdoor operation safety regulations of the country or region where the project is located must be followed.

- Any equipment used in the hoisting process of the system should be maintained.
- All personnel involved in handling and bolting shall be specifically trained, with a particular emphasis on safety training.
- The ESS should be hoisted or transported as a whole.

Caution

During the entire process of loading, unloading and transportation, keep in mind the mechanical parameters of the system.

The transportation system needs to meet the following conditions:

- Each door of the system is locked tightly.
- If the ESS has to pass on slopes, additional traction devices may be required.
- Remove all obstacles that exist or may exist during the movement, such as trees, cables, etc.
- The ESS should be installed under favorable weather conditions.
- Warning signs or warning belts must be set up as required to avoid unauthorized access to the hoisting area.
- Select appropriate lifting tools according to the installation site conditions.
- The selected crane must have sufficient load bearing capacity, boom length and rotation radius.

2.7 Forklifting

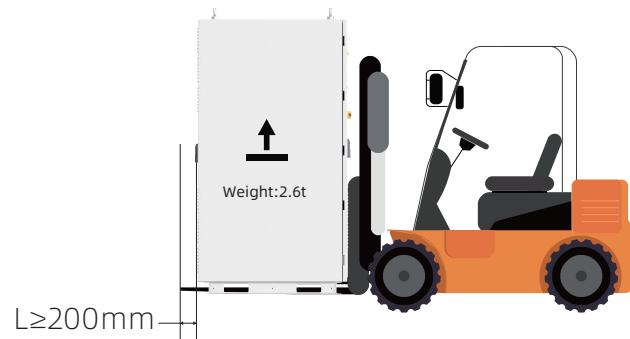
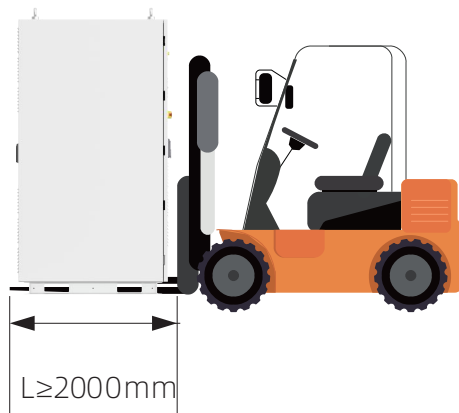
If the installation site is level, the system can be handled using a forklift, and the bottom of the system is equipped with a slot for forklift transportation.

If forklift trucks are used, the following requirements should be met:

- The forklift should have a sufficient carrying capacity (please ensure $\geq 3t$).
- The fork length should be $\geq 2000mm$, with a thickness $\leq 55mm$ and width $\leq 190mm$.
- The fork should be inserted into the slot at the bottom of the workstation (see product description drawing for details on the location of the slot).
- It should be kept slow and steady during the transportation movement and setting down process of the system and battery.
- The system and battery should only be placed on a flat, well-drained surface with adequate support. Do not place them in places prone to flooding.

Caution

- Move the system through the pallet at the bottom of the box.
- When transporting with a forklift, pay attention to the center of gravity (the center of gravity is marked on the outer packaging box).



2.8 Hoisting

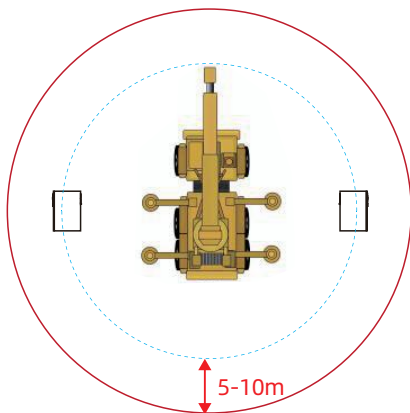
Hoisting Precautions

⚠ Warning

- During the whole process of hoisting the system, the safety operation rules of the crane must be strictly followed.
- No one is allowed to stand within 5m to 10m of the hoisting operation area, especially under the hoisting arm and the hoisting or moving machinery, to avoid potential injuries or fatalities.
- In case of adverse weather conditions, such as heavy rain, fog, strong wind, etc., the hoisting should be stopped immediately, and the site should be protected to prevent unauthorized access.

When hoisting a system, the following requirements must be met:

- The site must be safe when hoisting.
- While hoisting the ESS for installation, professionals should be around to manage the process.
- The sling used should be strong enough to withstand the weight of the system.
- Ensure that all sling connections are secure and that all slings connected to corner pieces are equal in length.
- The length of the sling can be adjusted according to the actual requirements of the installation site.
- The whole hoisting process must ensure that the system is stable and is not skewed.
- Use the four rings of the system to hoist.
- Take all necessary auxiliary measures to ensure safe and successful hoisting of the system.



⚠ Danger

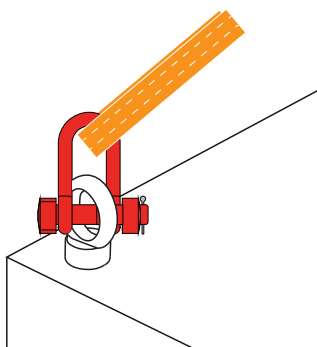
- The blue dotted circle in the crane operation diagram indicates the operating area of the crane.
- No person shall be permitted to stand within the solid red circle while the crane is in operation!

⚠ Warning

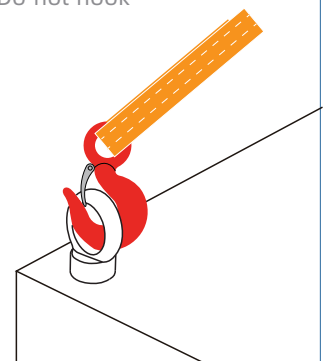
- The system can be lifted using a sling with a hook or U-hook.
- Connect the hoisting device and the system correctly.

⚠ Instruction

The cross pin must be tightened and the safety pin added.



Hook from the inside out. Do not hook from the outside in.



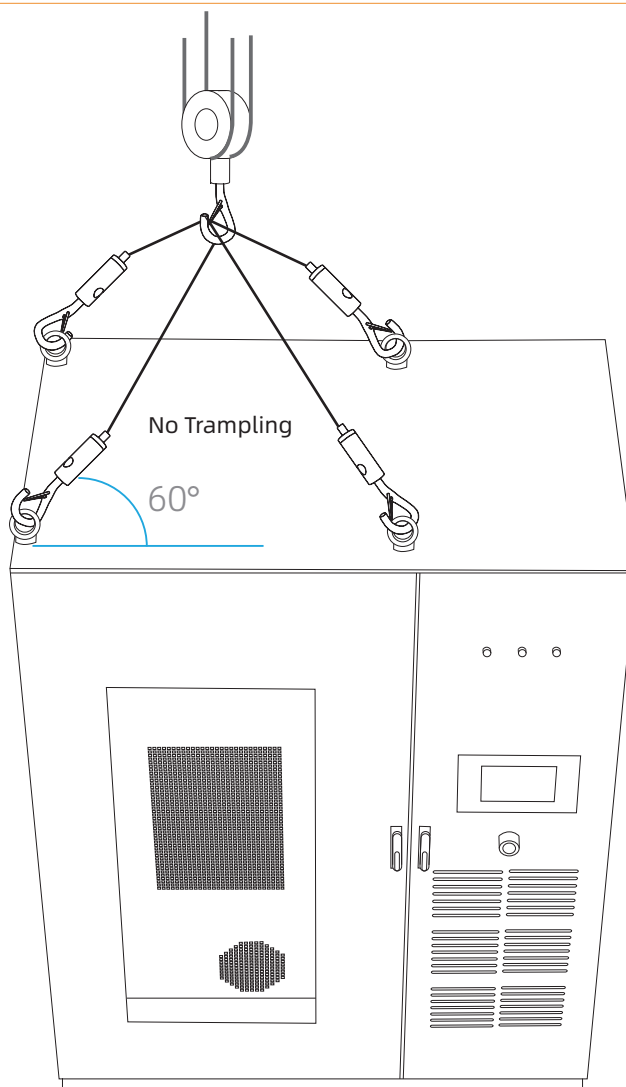
Hoisting Operation

In the process of hoisting the system, each operation link should be carried out according to the following requirements:

- The system shall be hoisted vertically. Do not drag the system on the ground or roof when hoisting. Do not drag or pull the system on any surface.
- When the system is hoisted 300mm off the supporting surface, stop it and check the connection between the slings and the system. Before hoisting the system, ensure the connection is secure.
- After the system is in place, it should be settled gently and landed smoothly. Do not place the system outside the vertical landing place by swinging the slings.
- The site where the system is placed should be solid and leveled, well-drained, and free of obstacles or protrusions.
- On the site, the system shall be fixed by four bottom corner pieces.
- Due to limited site conditions, use non-vertical forces to hoist from the four rings of the system.

Warning

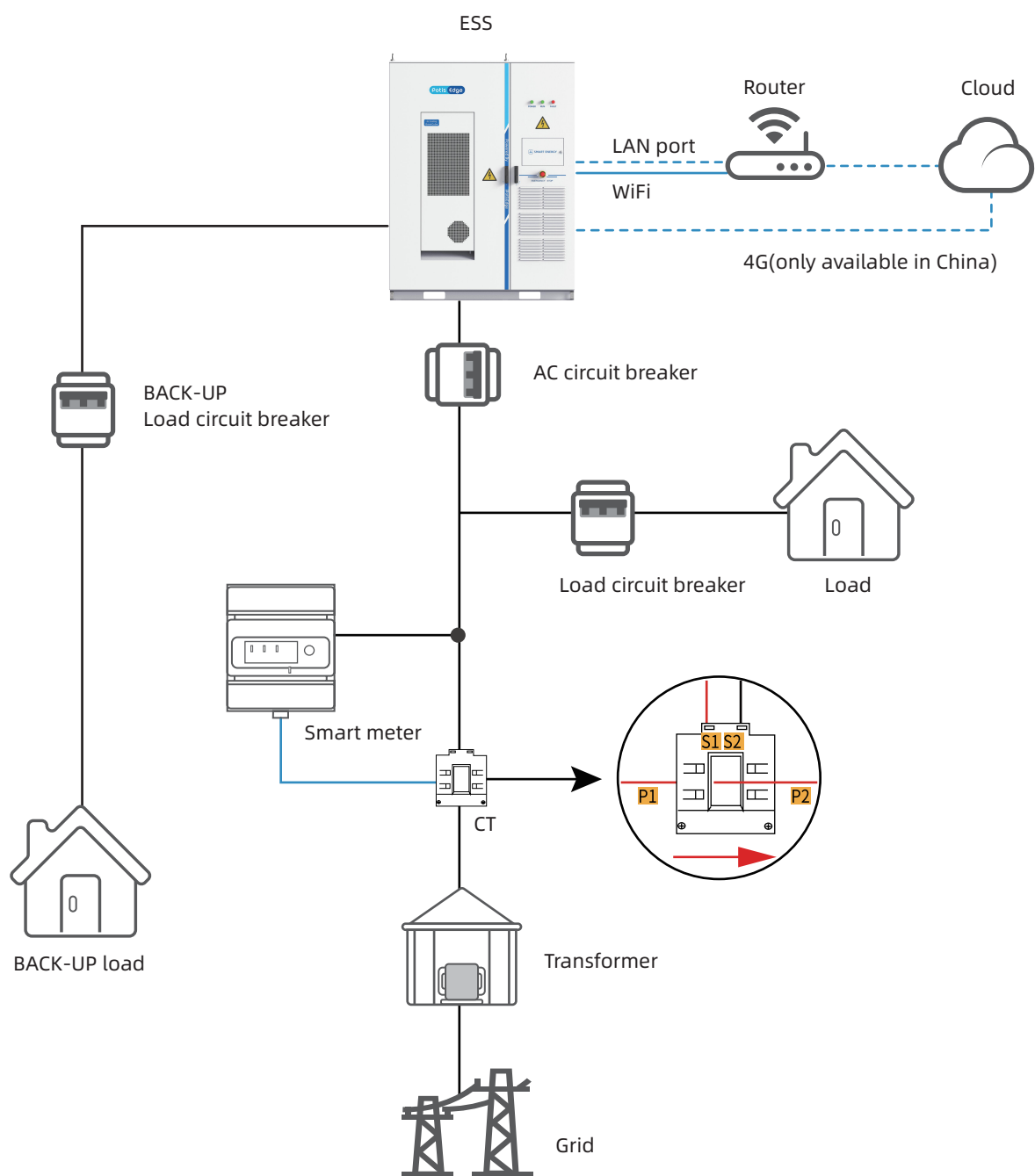
- Do not hoist the system through the bottom slot.
- When hoisting and transporting, all safety operation standards and regulations of the country and region where the project is located must be strictly followed.
- The company does not assume any responsibility for personal injury or property damage caused by violation of relevant requirements or safety regulations.



3. Product

3.1 Use Cases

OmniCube-A215-100K is a cabinet-integrated system, serving the purpose of peak-load shifting for villas, hospitals and factories. It can also act as backup power during emergencies and store surplus power and emit it when the PV-generated electricity is stressed for small off-grid PV factories. With a myriad of functionalities including shifting peak-hour consumption, ensuring overload capacity of transformers, and addressing optimal power flow problem, it is capable of optimizing energy usage for consumers, generating revenues, and contributing to the decarbonization drive. The system can be customized to cater to diverse power system needs or enhance the connectivity of low-voltage networks.



3.2 Functions

OmniCube-A215-100K products may differ slightly in functions as a result of version upgrading. Specific functions are subject to the technical agreement.

Introducing the Functions of the Lightweight EMS

Edge EMS (eEMS) is an edge energy management system integrated with purpose-designed operation system.

Compared with the traditional EMS+BMS, it addresses the difficulties in protecting overlapping and blind spots and accelerates the data acquisition between EMS and BMS through data sharing, thereby improving the real-time protection of the battery system.

The product is ideal for industrial and commercial applications which can act to achieve peak-load shifting, serve as backup power supply, anti-backflow, and manage energy demands.

Equipment access and data acquisition: southbound interface data acquisition through a variety of communication modes (Ethernet, RS485, CAN, DI/O, etc.), including but not limited to: BMS (including cell), PCS, DC/DC, STS, distribution switch, electricity meter, fire suppression system, air conditioning, and safety and protection system.

Data storage and analysis: eEMS can store original data acquired by southbound interface and command data from the northbound interface (data storage period can be set). The stored information includes but is not limited to: remote regulation data, remote control data, telemetry data, remote communication data, alarm information, operation records, incidents, etc. The stored data can be exported to CSV format. Based on cloud + edge combination, it can calculate and analyze the charging and discharging capacity, electricity bills saving, availability, SOH, and display the results on the cloud /APP Kanban interface.

Strategy execution and command distribution: eEMS can calculate and process the collected data based on eEMS's control strategy, and follow the balancing algorithm to generate control commands and distribute them to PCS and DC/DC for execution.

System-level protection: eEMS can protect local ESS by analyzing the acquired data. The cloud EMS supports intelligent inspection and fault diagnosis of the system and analysis and early warning of the system health status. Such cloud + edge integration provides all-round protection for the ESS.

Core Functions

Peak-Load Shifting

Users can set different charging and discharging schedules in different months according to peak-valley prices and electricity consumption behaviors.

In this scenario, flexible configuration needs can be met via mapping out multiple charging and discharging schedules. To illustrate, users can set one schedule to be repeated on a daily basis or in a specific time period, while setting a schedule with a higher priority for holidays or temporary power usage.

After the schedule is made, the system will intelligently measure the priority of each date and time period to control the charge and discharge in a bid to shaving the peak and leveling the load, thus reducing the peak-valley difference of grid.

Demand Management

When the load power exceeds the preset demand power or the maximum demand generated in the current month, eEMS will reduce the charging power of the ESS or will even discharge to offset the excess power demand, thereby reducing the demand charges.

In this scenario, there are two modes: demand following and demand control. End-users can choose the best one according to electricity charges. When PV is configured, the PV-generated surplus power can be fed back to grid by the demand control mode.

Anti-backflow

For the application scenario where energy is not allowed to be fed into the grid, during the charging to store energy, eEMS will prioritize the distribution of PV-generated power to the load if PV panels are equipped. Then eEMS will store the excess energy, if any, in the ESS. When the ESS and load fail to fully consume the energy, the PV-generated power is curtailed to avoid being fed into the grid. During the discharging to emit energy, when the load can not consume the energy released by PV and the ESS, eEMS will curtail PV power generation and reduce discharging power of ESS to ensure the power from PV or ESS will not be fed into the grid.

Off Grid Power Supply

In the off-grid scenario, ESS provides stable voltage and frequency support for the local power grid to ensure stable power supply for regional loads. In this application scenario, AC/DC PV can be added to increase the off-grid power supply duration.

Backup Power Supply

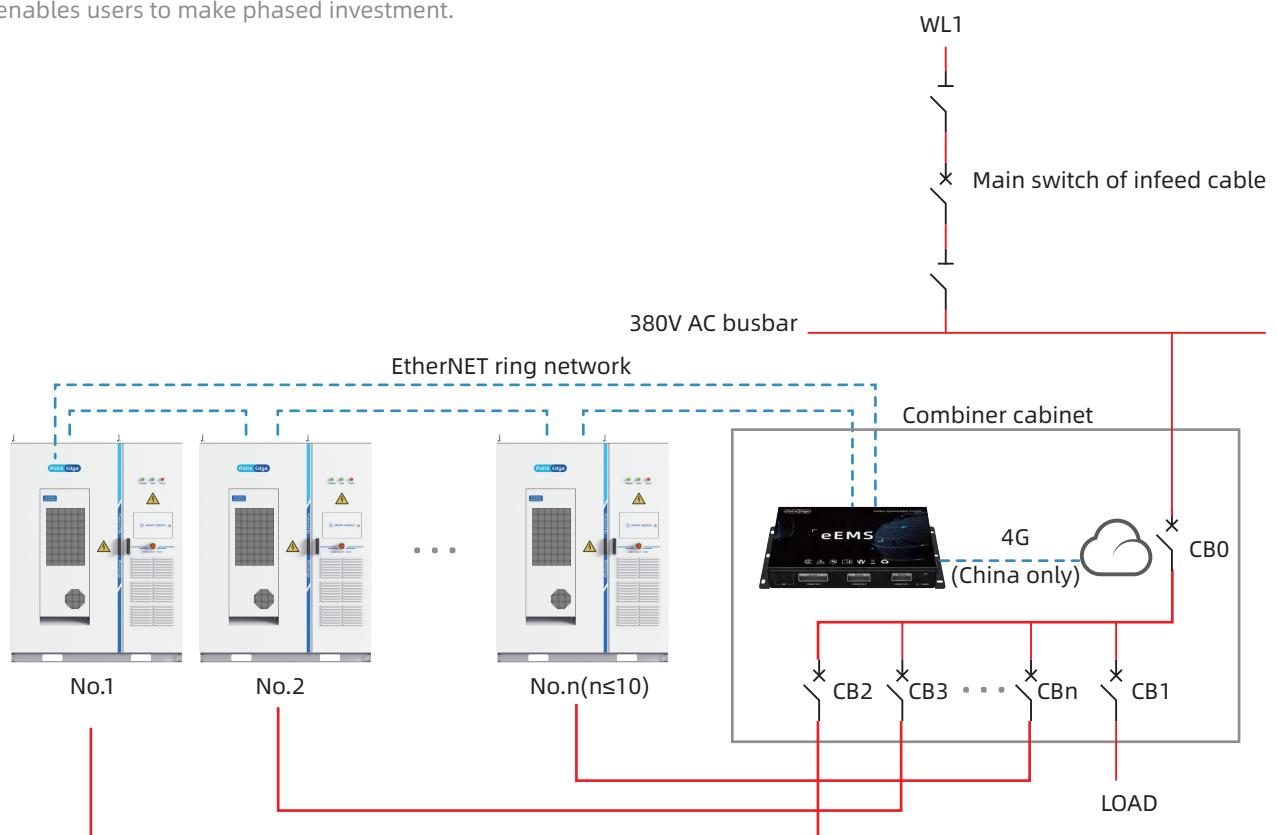
When acting as a backup power supply, ESS can be connected to the grid for peak-load shifting, dynamic expansion, anti-backflow and demand management to generate grid-connected revenues if the power grid functions well. When there are anomalies in the power grid causing power interruption or emergencies, ESS can be switched to off-grid mode to output voltage and frequency to provide reliable power supply for regional loads.

Remote Control

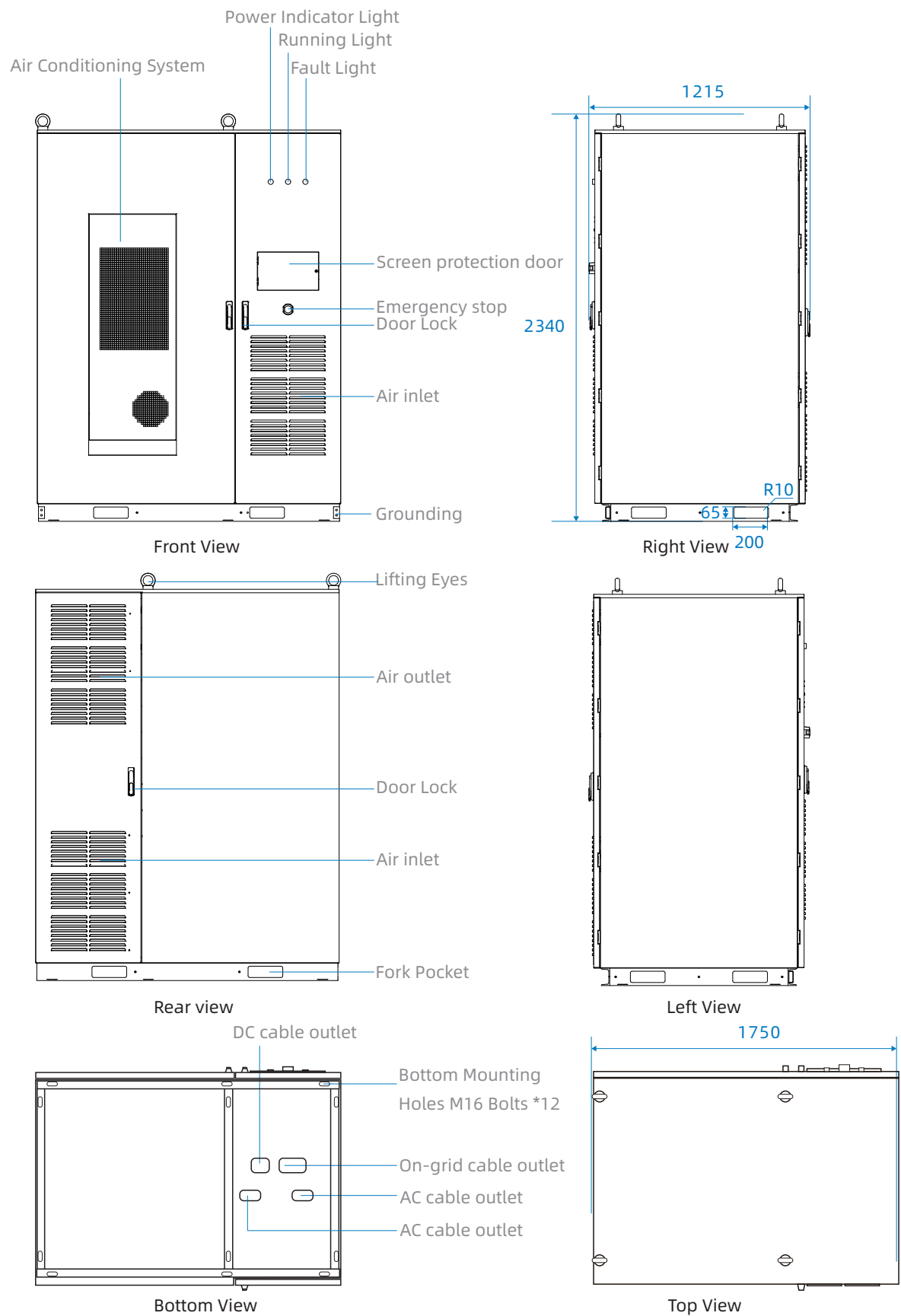
ESS can work in remote mode in ways that run under the control and scheduling of the virtual power plant platform, charge or discharge according to the needs of the large power grid, provide energy or auxiliary services, and are traded in the power market, so as to generate revenues.

Parallel Control

OmniCube-A215-100K(100kW/215kWh) can be scaled to a maximum of 10 battery strings connected in parallel, providing configuration flexibility covering 100kW/215kWh ~ 1MW/2.15MWh for users according to project requirements. This enables users to make phased investment.



3.3 Appearance



Instruction

Indicator light definition

	POWER	☐ Shutdown, Light Off ☐ No low voltage power supply (24V), Light Off ☒ Low voltage supply (24V), Light On
	RUN	☐ Shutdown, Light Off ☐ Battery not on high voltage, Light Off ☒ Battery on high voltage, Light On
	FAULT	☐ Shutdown, Light Off ☐ No fault, Light Off ☒ Fault, Light On
	EMERGENCY STOP	Emergency shutdown switch

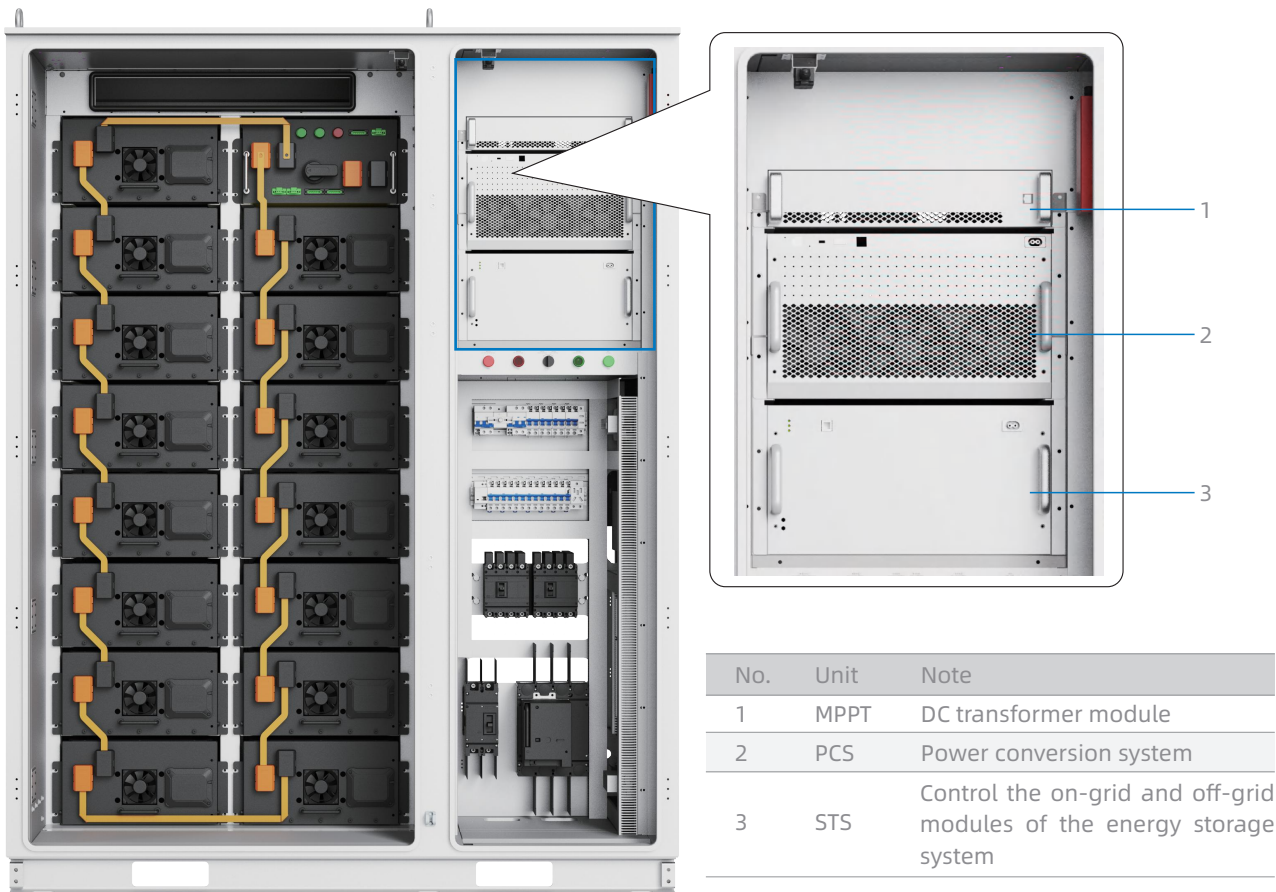
3.4 Module Introduction

3.4.1 Power Conversion System (PCS)

- The PCS in the energy storage system can convert the AC power drawn from the grid into both the DC power for battery charging and the AC power for loads powered by backup batteries.
- In addition, the PCS can also convert the DC power in the battery into AC for load consumption.

Description of off-grid mode applications for PCS with different load characteristics:

- **Purely Resistive Loads:** When the power of purely resistive loads is no more than the rated power of PCS, the PCS can support 100% load capacity. The recommended load capacity is 80%.
- **Purely Inductive Loads:** The power of such purely inductive loads as direct-start motors, water pumps, electric drills, and non-inverter air conditioners which have inrush currents, should equal or be below 15%~20% of PCS rated power.
- **Loads with Inverters:** The power of loads with inverters should be 60% of the rated power of PCS. For mixed loads (e.g., inverter air conditioner + lighting), the power should be no more than 70% of PCS rated power.
- **Special Loads (e.g., high power quality requirements such as Tungsten lamps in theaters and AC charging piles):** It is necessary to add an isolation transformer at the AC output of the PCS. Recommended transformer type: DYn11 to enhance reliability and anti-interference capability.
- **PCS Off-grid Mode Operation:** Power Factor: ≥ 0.8 .
- **Single PCS Module:** Purely Resistive Load: Supports 100% load engagement/removal; recommended at 80%.
- **Multiple PCS Modules in Parallel:** Initial load engagement rate: Suggested $\leq 40\%$. Remaining load: Engage gradually.
- **Special Use Cases:** Confirm detailed design plans and load characteristics with iPotisEdge electrician to configure the appropriate PCS capacity.

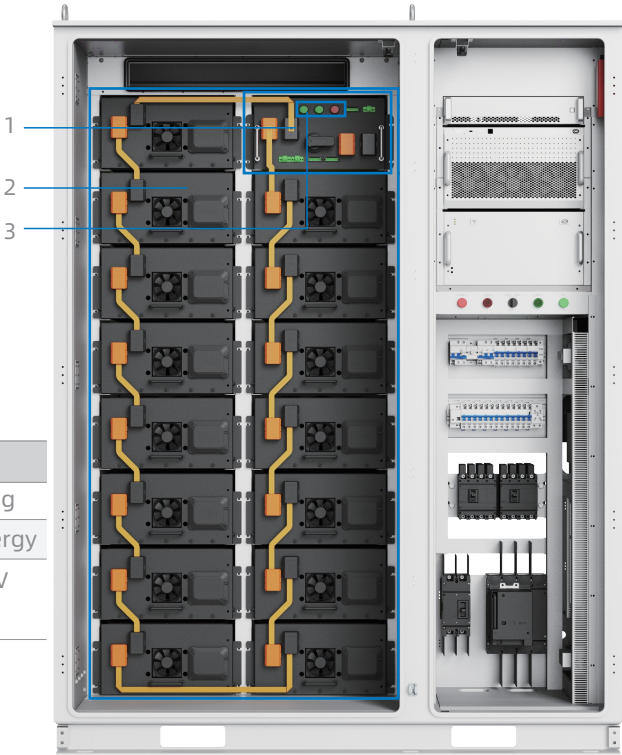


⚠ Instruction					
MPPT Charge Controller Module (Optional) The MPPT charge controller features bidirectional DC-DC conversion, converting the photovoltaic DC input voltage into the most suitable DC power for mobile devices.					
Indicator light definition	Color	Icon	Status		State definition
Power	●	POW	○ Light on ● Flicker	System standby Power on	
Mode	●	MOD	● Light on ● Flicker ● Fast flicker	Standby Charging Discharging	
Grid	/	GRID	/ /	/	
Fault	●	FAULT	● Light on ○ Light off	System fault No fault	

⚠ Instruction					
The module can be configured in the following ways, which can be customized according to user's needs.					
MPPT-1	√	√	√	/	/
MPPT-2	√	√	/	/	/
PCS	√	√	√	√	√
STS	√	/	√	√	/
Graphical representation					

3.4.2 Battery System

The battery system includes a battery module and a HV control box. The battery module stores and releases electrical energy while the HV control box manages charging and discharging.



No.	Unit	Note
1	HV BOX	Controls charging and discharging
2	Battery module	Stores and releases electrical energy
3	HV BOX running indicator	Indicates the running status of HV BOX

⚠ Instruction

HV BOX indicator definition:

Indicator light definition	Color	Icon	Status	State definition
Run		运行 RUN	○ Light off	Power off
			● Light on	Low voltage power on
Standby		待机 STANDBY	○ Light off	Power off
			● Light on	Stand by/High voltage power on
Fault		故障 FAULT	○ Light off	Power off
			● Light on	Fault (First level alarm)

Stacking of battery cluster:	Power	215kWh	114kWh
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Stacking of battery cluster



3.4.3 Air Conditioning System

The air conditioning system can generate cold or hot air to keep the temperature of the energy storage system within an acceptable range.

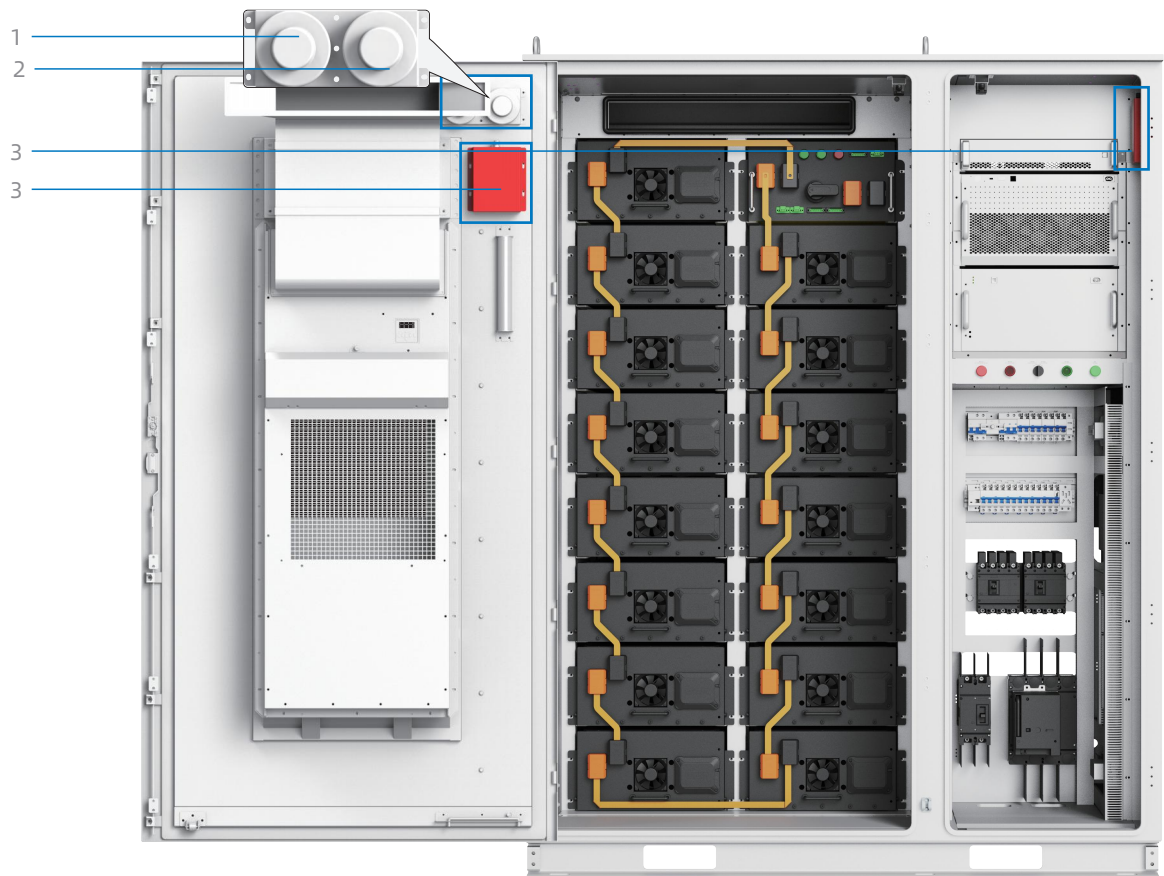


No.	Unit	Note
1	Air conditioning outlet	The cold or hot air generated from the air conditioner enters the energy storage system from the outlet.
2	System inlet	The cold or hot air generated from the air conditioner enters the energy storage system from the inlet to heat or cool the energy storage system.
3	Display and button	• Display: Displays air conditioner parameters and operating status. • Button: Adjusts the air conditioner temperature. • Do not use the display and button shown in the picture to set air conditioner parameters.
4	Air conditioning inlet	The output air enters the air conditioner from the inlet after the cold or hot air enters the energy storage system.

3.4.4 Fire Suppression System

Fire suppression equipment is installed in the battery and electrical compartments. It can be activated and trigger the fire extinguishing device in time to reduce the accidents and loss.

Due to its compact size, the aerosol fire extinguishing device integrated into the system can be stored at normal pressure and operates without the need for a pipe network. It can effectively extinguish flames anywhere within the system. Being non-toxic and eco-friendly, it does not deplete the atmospheric ozone layer.



No.	Unit	Note
1	Smoke sensor	When a fire occurs in the energy storage system, after detecting the smoke, the smoke sensor will output electrical signal to trigger the sound-light alarm so that the personnel can utilize the fire extinguishing device to put out the fire in time.
2	Heat sensor	When a fire occurs in the energy storage system, after detecting the heat, the heat sensor will output electrical signal to trigger the audible-visual alarm so that the personnel can utilize the fire extinguishing device to put out the fire in time.
3	Condensed aerosol fire suppression device	Rapid aerosol fire suppression device: When a fire occurs, after the fire suppression device receives the signal or the open fire ignites the thermal line, the electric initiator or thermal line burns to activate the aerosol generator in the fire suppression device. The aerosol generator decomposes the chemical coolant through the heat released by the REDOX reaction, so that the aerosol generator and the coolant can coordinate to suppress the fire. Synchronously, it will send feedback signals to EMS, notifying personnel to put out the fire.

Composition and Working Logic of Fire Suppression System

System Composition

The fire fighting system consists of detector, fire extinguishing device and other parts. The battery compartment is equipped with a set of detection equipment (smoke and heat sensors) and aerosol fire extinguishing device. The electrical compartment is equipped with an aerosol fire extinguishing unit activated by thermal-sensitive wire.

Work Logic

Battery Compartment: When the smoke or heat sensor sends out an alarm signal, the BMS sends a Level-1 alarm signal and cuts off the DC side power.

When the smoke and heat sensors alarm at the same time, the signal is transmitted to the BMS system, and at the same time the BMS system sends an electrical signal to trigger the aerosol fire extinguishing device in the cabinet, and receives a feedback signal that the aerosol fire extinguishing device is successfully started.

Electric Compartment: When the temperature reaches the trigger value of the thermal-sensitive wire, the thermalsensitive wire starts the aerosol fire extinguishing device and outputs the spray feedback signal to the BMS system.

System Function

- Fire protection: cabinet level.
- Independent fire extinguishing device: condensed aerosol fire extinguishing device at cabinet level.
- Detector type: smoke and heat detectors.
- The fire fighting equipment is capable of transmitting alarm signals from smoke sensor, heat sensor, as well as feedback signals from fire extinguishing device to the (BMS) system through dry contact.

Fire Suppression System Operation

Verify the authenticity of the fire alarm through video surveillance or on-site visual observation. If a fire is confirmed:

- The battery charging and discharging circuit should be cut off immediately and emergency measures should be taken.
- Call local fire department to report the fire.
- After observing the operation of the fire extinguishing device, the fire should be extinguished, otherwise alternative fire extinguishing measures should be taken.
- Even if the fire is extinguished, it still needs to be cooled with water for two hours.
- Observe for more than 12 hours to ensure safety.

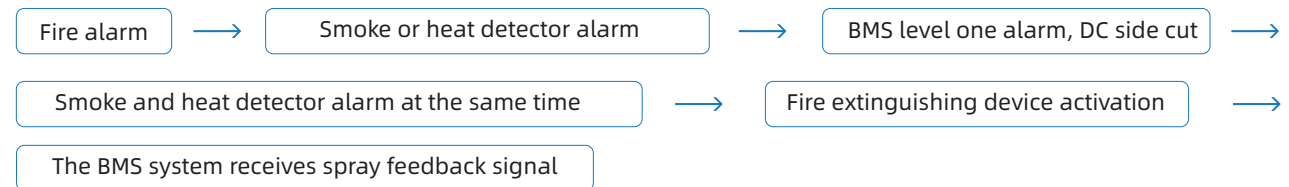
If it is confirmed as false alarm:

- The fire extinguishing system should be powered off immediately to avoid the false triggering of the fire extinguishing device. During the power outage, the smoke and temperature detectors are reset.
- After the system is reset, stay alert and pay attention to whether the smoke or heat alarm signal is issued again.
- If the fire alarm signal is still issued, check the fire detector and its connection line in the corresponding circuit according to the alarm signal.
- Replace the detector if necessary.

Processing flow when a false fault alarm signal is monitored:

- According to the fault message, check whether the connecting wire of the fault alarm circuit is loose, detached or disconnected.
- According to the fault information, check whether the terminal resistance of the corresponding circuit is detached or has poor contact.
- According to the fault information, check whether the value of the terminal resistor of the corresponding circuit has obvious deviation.
- Repair or replace the faulty parts if necessary.

The logic diagram of the battery compartment fire control system is shown as follows:



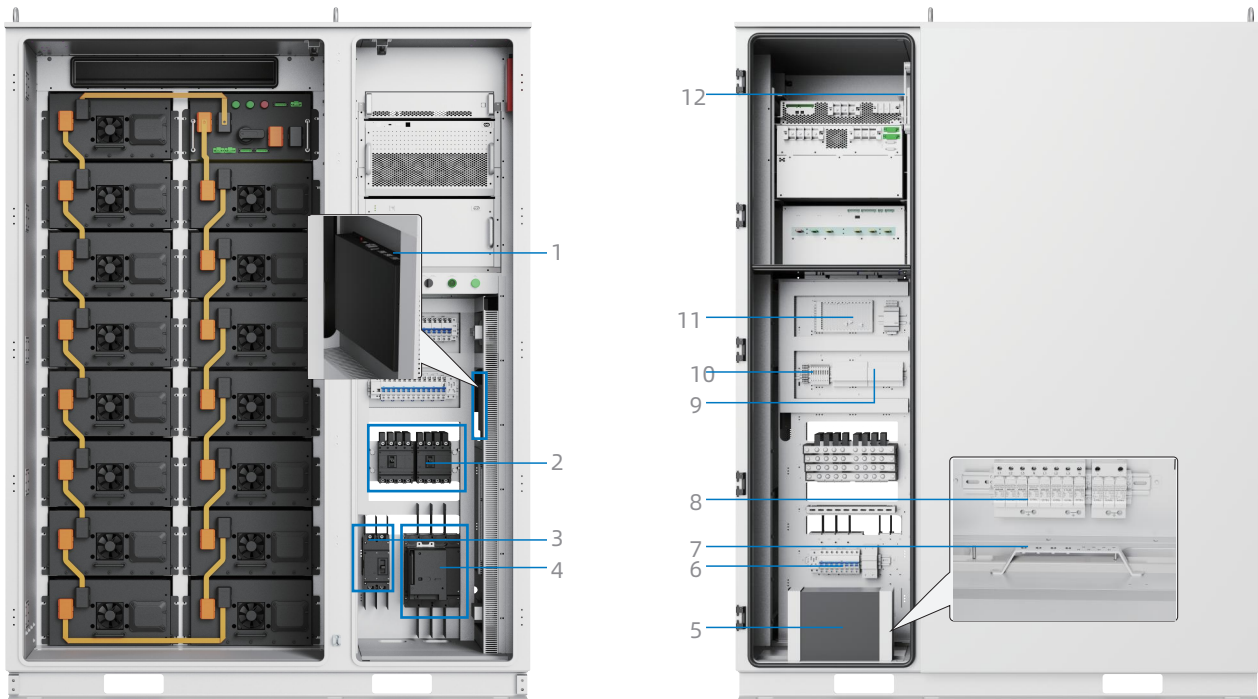
Instruction

Disconnection of Fire Suppression System(FSS)

The FSS will be disconnected simply by any of the following operations:

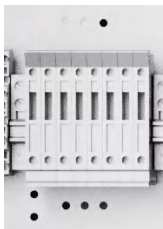
- unscrewing the probe of either heat sensor or smoke sensor.
- disconnecting the trigger wire of the condensed aerosol fire extinguishing agent.
- disconnecting UPS.

3.4.5 Wiring Area



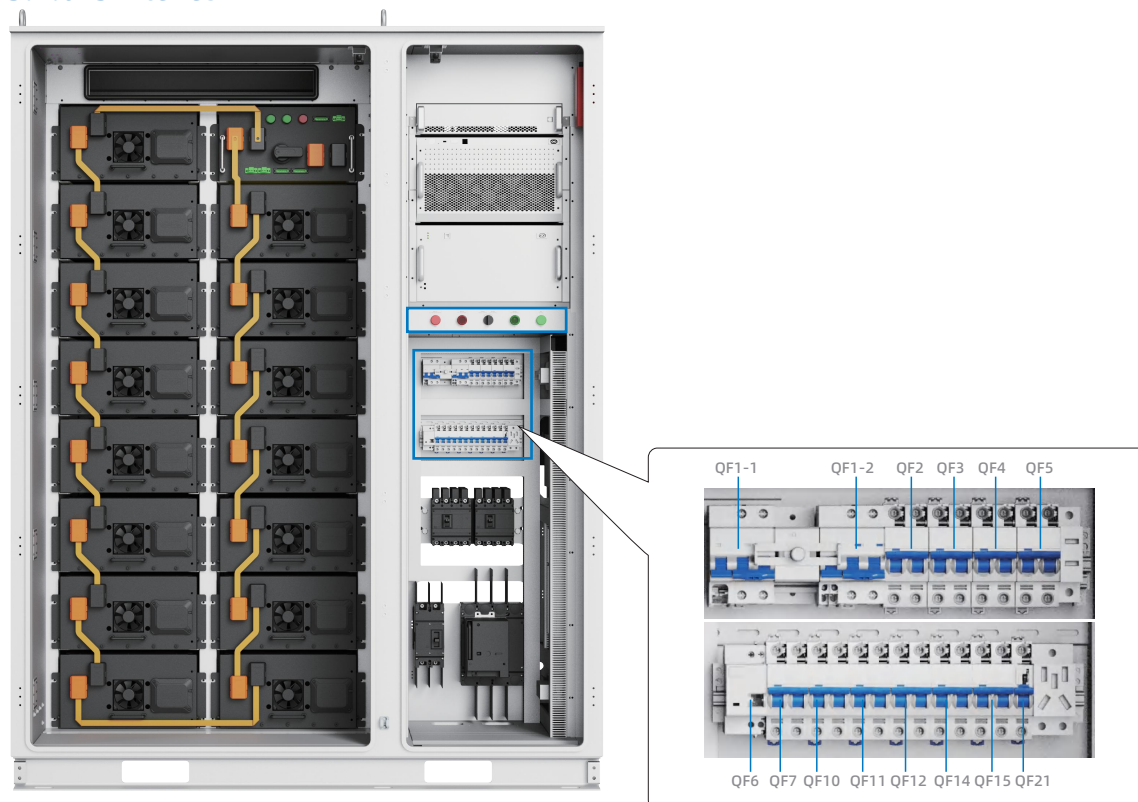
No.	Unit	Note
1	LAN port	Connecting a network cable to the monitoring platform.
2	BACK-UP load AC terminal	Connecting the BACK-UP load AC cable.
3	PV DC terminal	Connecting to the PV DC cable.
4	Grid-connected AC terminals	Connecting three-phase AC cables to the power grid.
5	UPS	Providing emergency backup power.
6	SPD protection	Control the lightning protection switch.
7	Terminal strips	Connecting the ground cables of the grid-connected end, PV end, and BACK-UP end.
8	SPD	Connecting the surge circuit breaker and grounding bar.
9	Meter	Connect the electric meter transformer (CT) to the communication line (BMS-EMS).
10	Fuse Terminal	Connecting the electric meter (kWh1) to the electric meter (kWh2).
11	AC/DC Power Supply	Connecting the switching power circuit breaker to the secondary circuit power supply.
12	DC Busbar	Connecting the battery DC side to the PCS artesian DC side.

Instruction



- The fuse is located inside the terminal. If the fuse is faulty, please open the terminal and replace the corresponding fuse.
- The fuse terminals are labeled with an identification label (FU), which is yellow in color.

3.4.6 Switches



No.	Unit	Note
QF1-1	Main Auxiliary Power Supply	Control whether to emit power to the auxiliary power supplies.
QF1-2	Backup Auxiliary Power Supply	Control whether to charge the backup power.
QF2	UPS Input	Control UPS input.
QF3	Air-conditioner	Control whether to power the air conditioner.
QF4	HV BOX Fan	Control whether to power the fans of the battery HV BOX.
QF5	Electrical Cabinet Fan	Control whether to power the fans of the electrical cabinet.
QF6	Socket	Control whether to power receptacles.
QF7	On-grid	Control the connection between the energy storage system and the power grid.
QF10	UPS Output	Control UPS output.
QF11	AC/DC Power Supply	Control AC/DC Power Supply input.
QF12	BMS Power Supply	Control whether to power the HV BOX BMS.
QF14	PCS/STS Power Supply	Control whether to power PCS/STS.
QF15	24V Power Supply	Control whether 24V power is supplied.
QF21	EMS Power Supply	Control whether EMS power is supplied.

Instruction



- When connected to the grid, the circuit breaker is in a disconnected state and the off grid light is on, provided that the mains electricity is available. The circuit breaker is in a closed state and the grid connection light is on.
- When disconnected from grid, the device is in undervoltage state and the off grid light is on.
- For manual (local) operation, press the on-grid button, the on-grid light will be on, and press the off-grid button, the off-grid will be on.
- For automatic (remote) operation, when BMS controls the KA3 relay to close, the on-grid light is on. When BMS controls the KA2, the off-grid light will be on.

4. eEMS Operating Instructions

⚠ Caution

The parameter values and other specific details in the following pictures are for illustrative purposes only. Please refer to the actual LCD display of the received product.

4.1 System Login

Step 1: Turn on the energy storage system and enter the power on interface for eEMS.

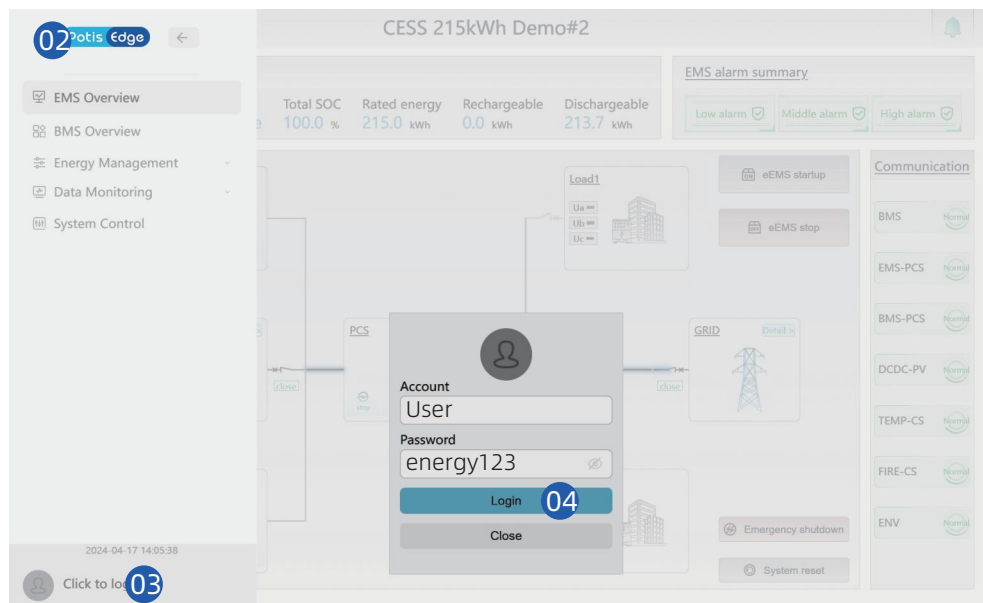
Step 2: Click on the logo in the upper left corner to pop up a menu bar.

Step 3: Click on "Login" in the bottom left corner and a pop-up window will appear.

Step 4: Enter your account password to log in and redirect to the main interface.

⚠ Instruction

01 Please refer to "8 System Testing" for the startup of the energy storage system.



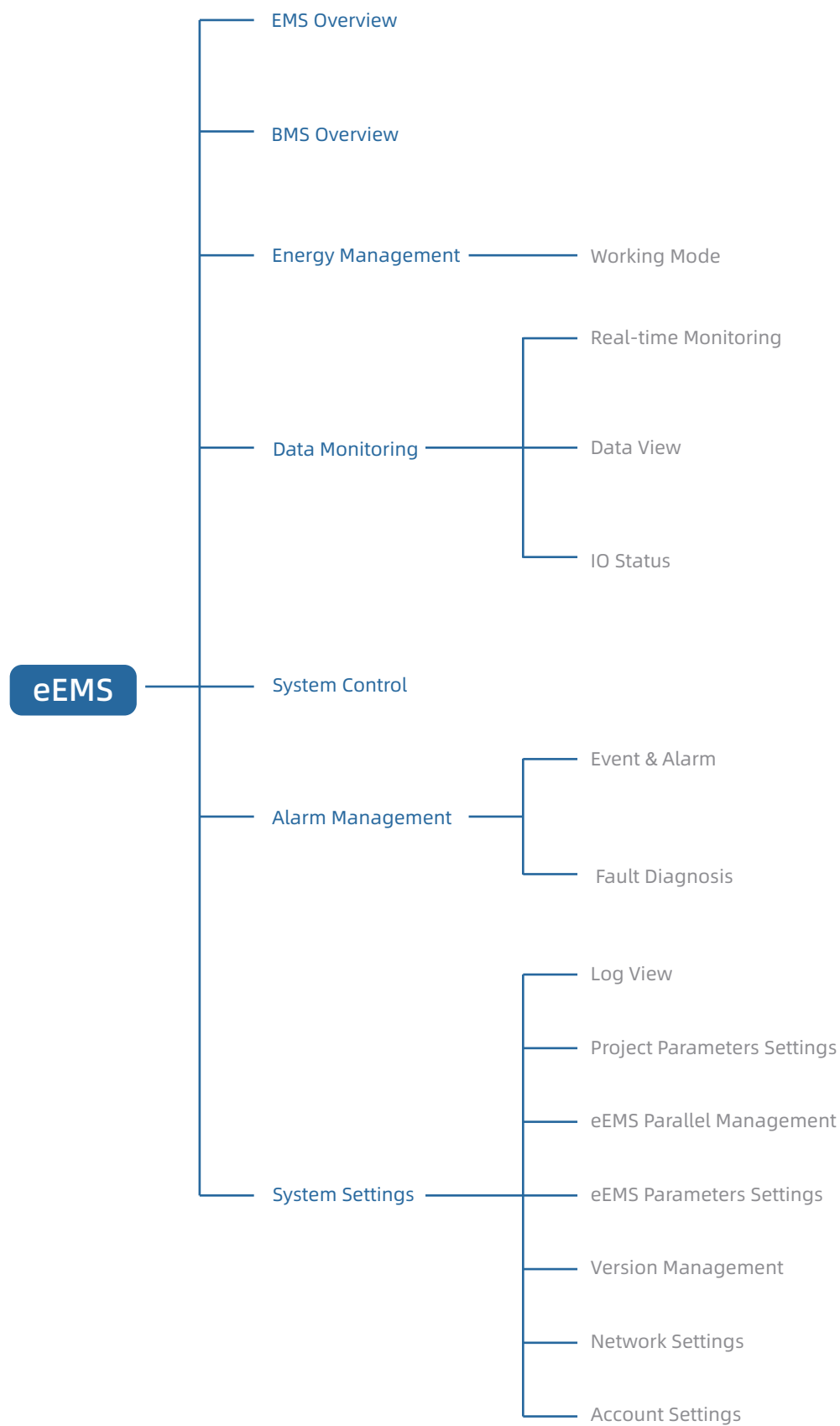
⚠ Caution

- The system has two different types of users: "user" and "anonymous".
- "User" can log in through (default account: User default password: energy123), and "user" can set "anonymous" permissions.
- Anonymous is a visitor mode, which allows users to log in directly without the need for an account.
- This manual demonstrates in the "user" type.

⚠ Instruction

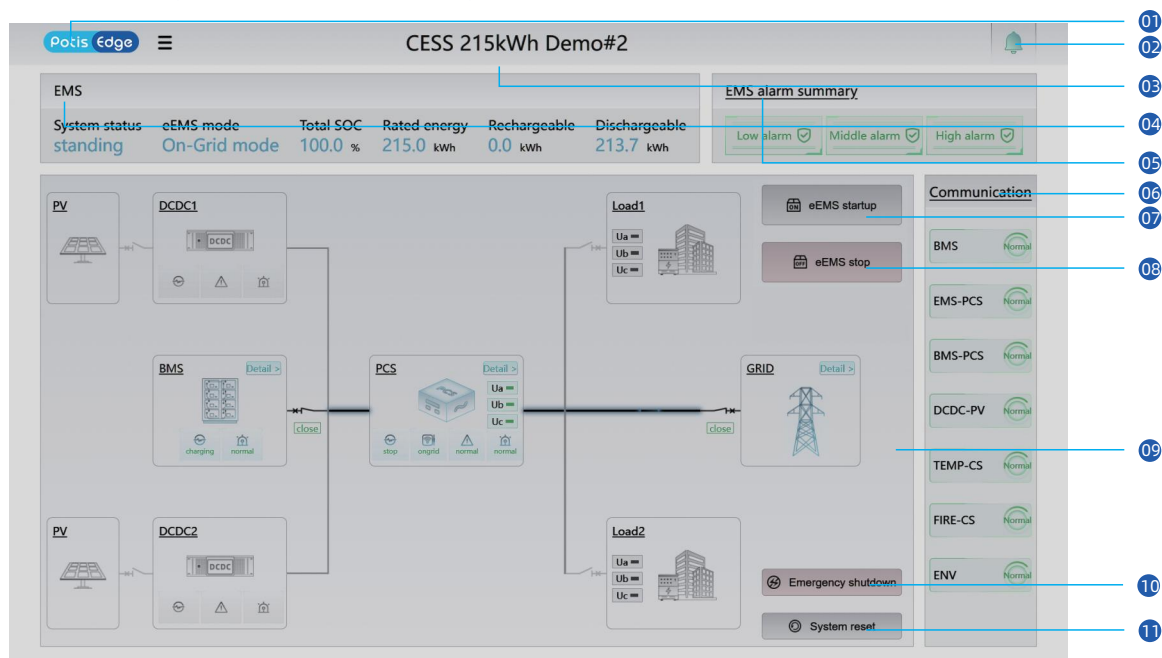
- This manual only introduces the operation method of the touch end. If you need to log in on the web end, please consult relevant professionals.
- If you encounter a malfunction of the touch screen, please log in to the webpage using an Ethernet cable.

4.2 System Logic Map



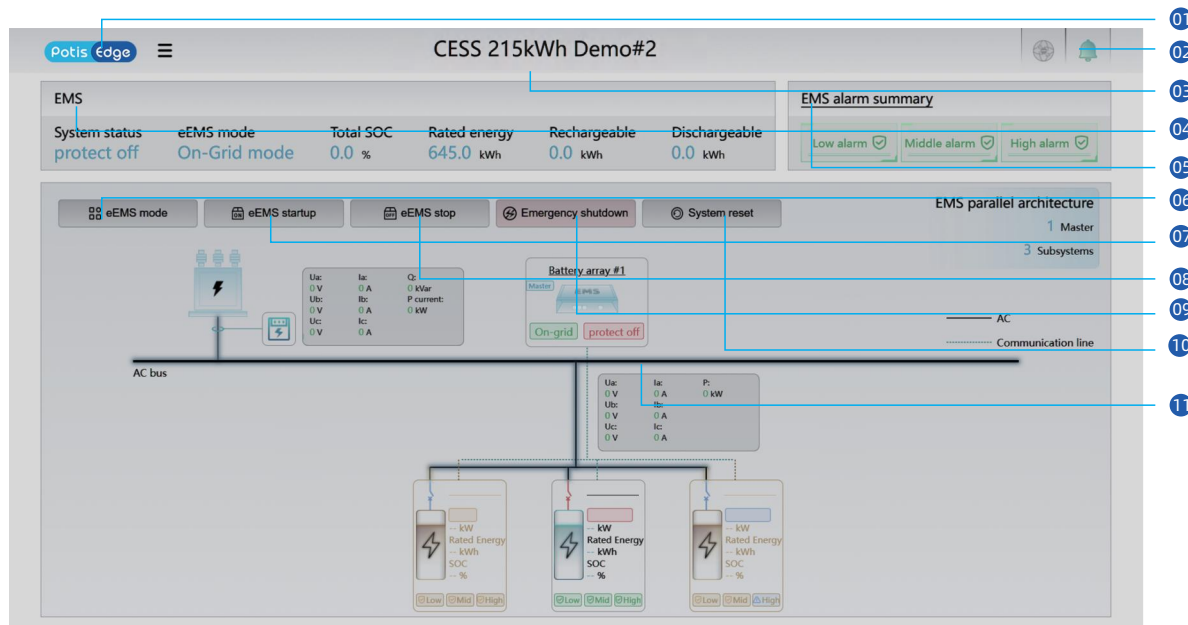
4.3 EMS Overview

4.3.1 Standalone System/ Parallel Subsystem



- 01 Logo and menu bar: Click to open the side menu bar.
- 02 Notice and alarm icon: Click to enter "Event & Alarm" interface.
- 03 Project name: Click the name on any page to go back to the Edge EMS homepage. The text content can be edited in the Project Parameters Settings page.
- 04 EMS status: eEMS working mode(standby, standing, charging, discharging,protection shutdown, stop); Working mode(refers to the CESS working mode, such as on-grid mode, off-grid mode, remote control); Total SOC (ratio of remaining energy to rated energy), rated energy(rated energy of the battery string), rechargeable energy (current rechargeable energy of the battery string), dischargeable energy (current dischargeable energy of the battery string).
- 05 EMS alarm summary: Alarms are divided into "Low alarm/Middle alarm/High alarm"; Green means normal, yellow/orange/red means the presence of low/middle/high alarm, respectively; Click to jump to the alarm interface and display the alarm detail according to the selected alarm level.
- 06 EMS communication status: Click to jump to the battery Real-time Monitoring page. Display the communication status of BMS, EMS-PCS, BMS-PCS, DCDC-PV, TEMP-CS (temperature communication), FIRE-CS (Fire control communication), ENV (Environmental control communication).
- 07 EMS startup: After clicking to start up the EMS system, carry out the second confirmation. Then the system will self-start to enter the standing status, and the CESS can be controlled to realize the energy charging/discharging according to the working mode settings.
- 08 EMS stop: Carry out the second confirmation after clicking. After confirmation, the system enters the shutdown status and stops charging/discharging.
- 09 Schematic diagram of system power energy flow: Power flow between PV, DCDC1/2 (optional), BMS, PCS, load1/2, STS, Grid.(Unconfigured modules are displayed in gray).
- 10 Emergency shutdown: It has the same function as the emergency stop button of the cabinet door. Click the button, and the second confirmation window will pop up on the page. After confirmation, the system will automatically stop, disconnect all relays and breakers, stop system charging/discharging, and stop PV power generation (if there is DCDC). Meanwhile, the system enters the status of fault protection shutdown. It is necessary to carry out the system reset after manual checking and solving of the problems, so as to continue to start up and use it.
- 11 System reset: When there is a serious fault in the system, after manual checking and clearing/recovering the fault, click the "System reset" button to reset and repower the system.

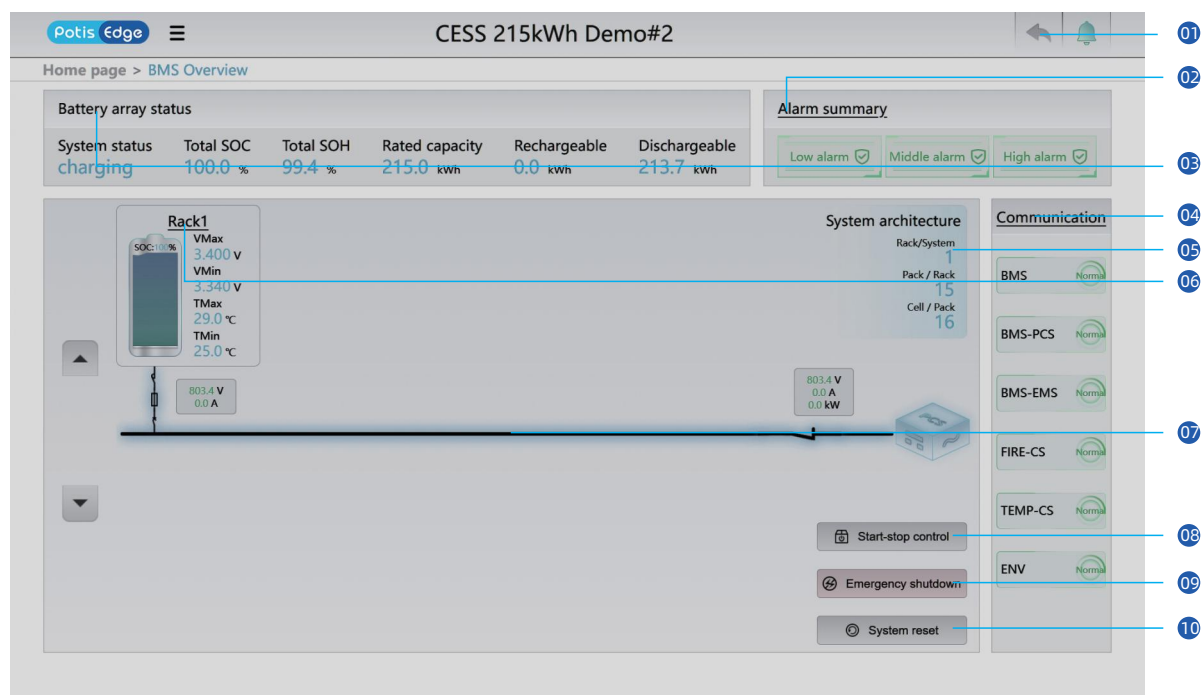
4.3.2 eEMS Master



- 01 **Logo and menu bar:** Click to open the side menu bar.
- 02 **Notice and alarm icon:** Click to enter "Event & Alarm" interface.
- 03 **Project name:** Click the name on any page to go back to the Edge EMS homepage. The text content can be edited in the Project Parameters Settings page.
- 04 **EMS status:** eEMS working mode(standby, standing, charging, discharging,protection shutdown, stop); Working mode(refers to the CESS working mode, such as on-grid mode, off-grid mode, remote control); Total SOC (ratio of remaining energy to rated energy), rated energy(rated energy of the battery string), rechargeable energy (current rechargeable energy of the battery string), dischargeable energy (current dischargeable energy of the battery string).
- 05 **EMS alarm summary:** Alarms are divided into "Low alarm/Middle alarm/High alarm"; Green means normal, yellow/orange/red means the presence of low/middle/high alarm, respectively; Click to jump to the alarm interface and display the alarm detail according to the selected alarm level.
- 06 **Work mode:** Acting on the working mode command,it can manage the operation of the grid, PV and energy storage system. There are three modes available, namely grid-tied operation, off-grid operation and remote control.
- 07 **EMS startup:** After clicking to start up the EMS system, carry out the second confirmation. Then the system will self-start to enter the standing status, and the CESS can be controlled to realize the energy charging/discharging according to the working mode settings.
- 08 **EMS stop:** Carry out the second confirmation after clicking. After confirmation, the system enters the shutdown status and stops charging/discharging.
- 09 **Emergency shutdown:** It has the same function as the emergency stop button of the cabinet door. Click the button, and the second confirmation window will pop up on the page. After confirmation, the system will automatically stop, disconnect all relays and breakers, stop system charging/discharging, and stop PV power generation (if there is DCDC). Meanwhile, the system enters the status of fault protection shutdown. It is necessary to carry out the system reset after manual checking and solving of the problems, so as to continue to start up and use it.
- 10 **System reset:** When there is a serious fault in the system, after manual checking and clearing/recovering the fault, click the "System reset" button to reset and repower the system.
- 11 **Schematic diagram of system power energy flow:** the electric power flow between the eEMS master and the eEMS slave.

4.4 BMS Overview

The BMS overview interface is divided into four major sections, namely battery array status, alarm summary, communication status, and system architecture.



- 01 Return icon: Click to return to the previous level interface.
- 02 Alarm Summary: Click to jump to the "Event & Alarm" page. Same as the EMS overview interface.
- 03 Battery array status: displays the battery dimension information, BMS working mode(charging, discharging, stand-by), total SOC, SOH, rated capacity (total battery energy), rechargeable energy (the energy to which the battery can be charged), dischargeable energy (the energy to which the battery can be discharged).
- 04 Communication status: Click to jump to the "Real-time Monitoring" page. Display the communication status of BMS, BMS-PCS, BMS-EMS, FIRE-CS (fire control communication), TEMP-CS (temperature communication), and ENV (environmental control communication).
- 05 System architecture: The grouping and stringing methods of whole battery system, including the number of battery strings, the number of battery packs in the string, and the number of battery cells in the pack.
- 06 String 1: Overview of the status of each string of the corresponding battery system, click to enter the detailed data monitoring module of battery string.V (total voltage), VMax(maximum cell voltage of battery pack),VMin(minimum cell voltage of battery pack), T (temperature), TMax(maximum cell temperature of battery pack),TMin(minimum cell temperature of battery pack), A(current),kW(power).
- 07 Dynamic effect: The flow direction is consistent with the charging/discharging status, flowing to the battery string when charging, and flowing to the PCS when discharging.
- 08 Start-stop control: Manage the closing and opening of the DC system relays and control the high voltage connection between the battery and PCS.
- 09 Emergency shutdown: BMS emergency shutdown, DC relays open, battery system stops charging/discharging.
- 10 System reset: If serious fault (high level alarm) occurs in BMS, the DC system relays can be re-controlled to close only after the system reset.

4.5 Energy Management

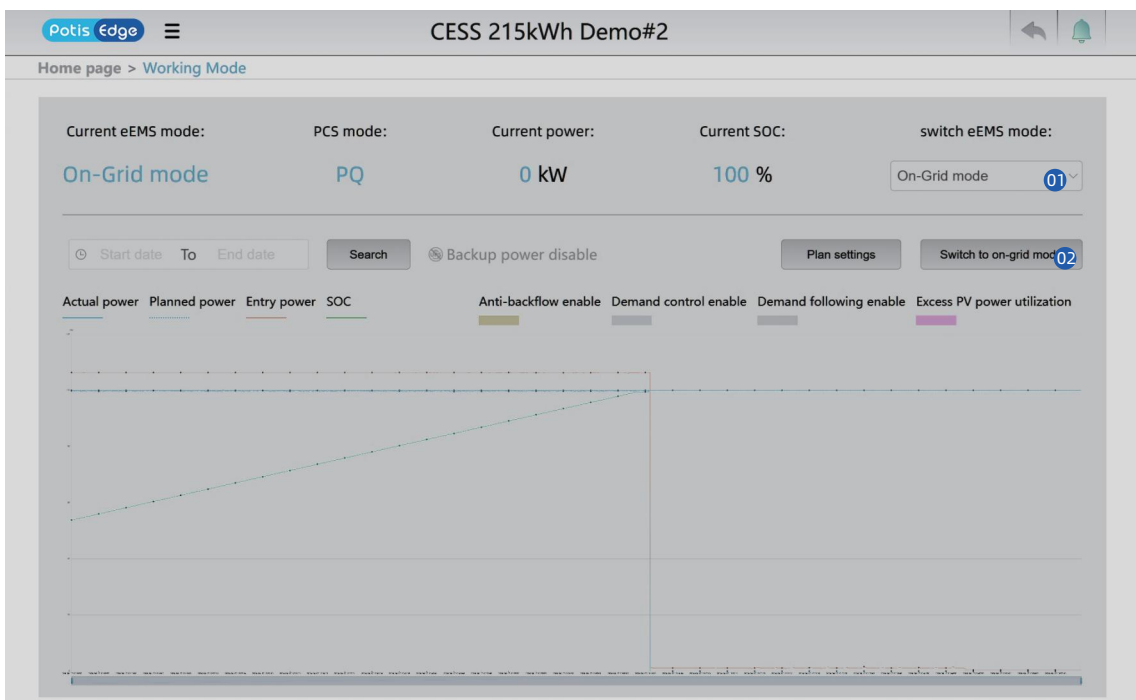
Click "Energy Management" to enter the "Energy Storage Work Mode Management" details page, which has three working modes: on-grid mode, off-grid mode and remote control mode.

⚠ Instruction

Using on-grid mode as an example to introduce the operation method of switching working modes.

Step 1: Click the dropdown arrow on the work mode switch box, select on-grid mode, and the current interface will display grid connected operation status (preview status).

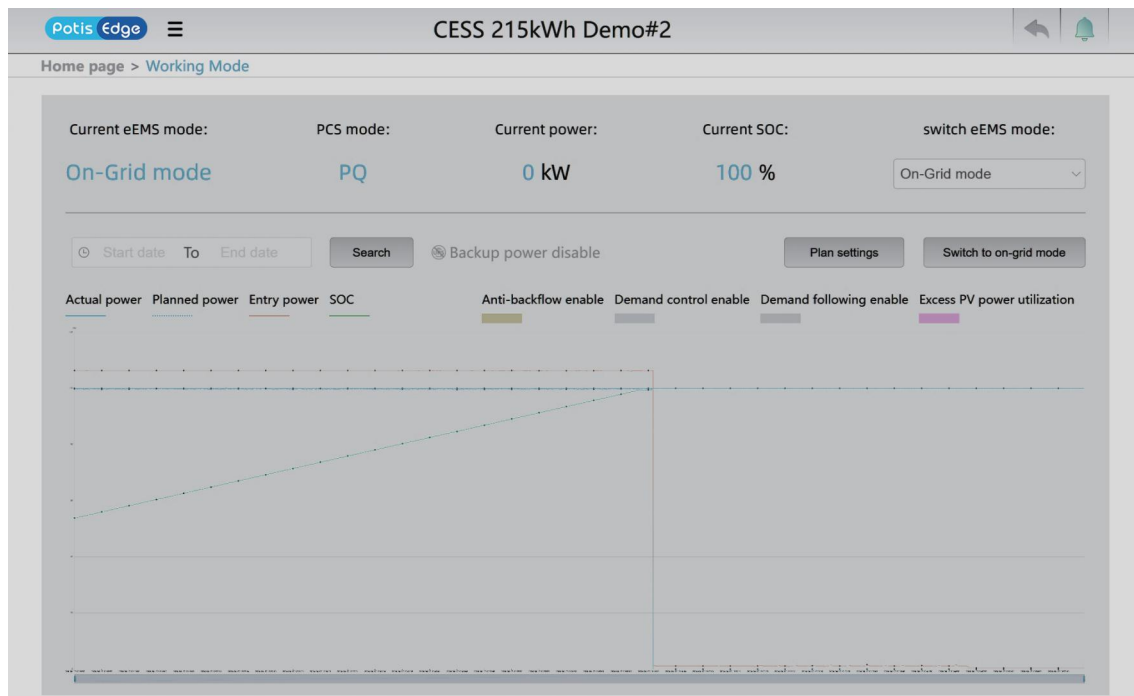
Step 2: Click to switch to on-grid mode, and the switch is successfully finished.



4.5.1 eEMS Mode

On-grid Mode

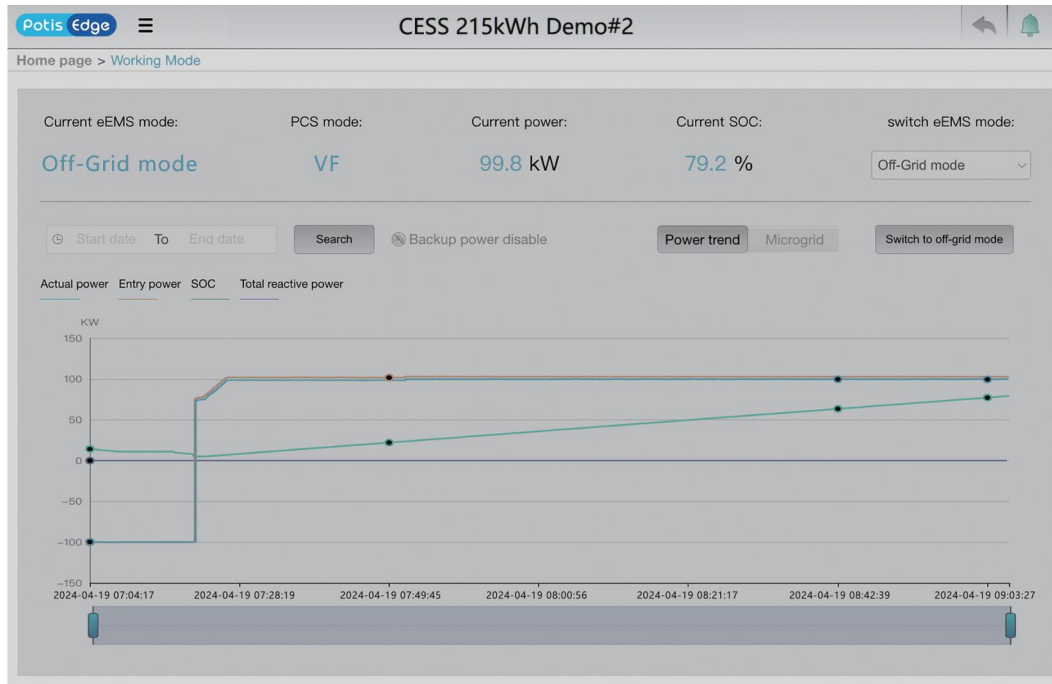
This mode is operated according to the conditions set by the EMS parameters in the system control, including charging/discharging plan, anti-backflow, demand control, demand following, allowable SOC range, backup power switch, PV utilization rate, etc. Set charging/discharging according to the time-of-use power tariffs by means of charging during peak hours while discharging during off-peak hours, so as to save electricity bill.



- Current eEMS mode: On-Grid mode.
- PCS working mode: PQ refers to charging/discharging with constant power.
- Current power: real-time power.
- Current SOC: percentage of total remaining energy.
- On-grid mode power curve: scheduled power (one point every 5 minutes, 48H data of the current day and the next day are provided by default).
- Actual power, input power, (PV power DC, AC Load 1 power, AC Load 2 power---displayed when the corresponding functions are enabled in the eEMS configuration), SOC, backup power SOC (displayed after the backup power function is started).
- Anti-backflow triggering, demand control triggering, demand following triggering, excess PV-generated power utilization (color blocks represent the time segment of triggering).

Off-grid Mode

- There are two modes available, namely automatic off-grid mode and default off-grid mode.
- **Automatic off-grid mode:** This mode can't work without STS. In order to keep a stable output of AC voltage and frequency, in the energy storage system, PCS will automatically adjust the output frequency for the changing loads and EMS will control the PV generated power (for DCDC coupled equipment). The system will initiate the standby mode and terminate power output when the SOC falls out of the preset limits of charging or discharging.
- **Default off-grid mode:** This mode is the factory default configuration and can't be rejigged.



- **Current eEMS mode:** Off-Grid mode.
- **PCS working mode:** VF, voltage source mode.
- **Current power:** real-time power.
- **Current SOC:** percentage of total remaining energy.
- **Manually switch to off-grid mode:** (Off-grid mode is not supported in parallel status.) After user enters the EMS working mode management interface, the current setting of system mode information will be displayed by default. When switching to off-grid mode, the CESS disconnects the on-grid STS/breakers (if the system has the electric operation mechanism of STS and breakers; the user needs to manually switch the upper-level breakers when there is no STS). In this situation, the B ESS will automatically control the charging/discharging power and PV power (when the DC-coupled DCDC equipment has been installed) to maintain stable AC voltage and frequency output. When the SOC does not meet the limit value by charging/discharging setting, the system will enter the standby status and stop the power output.
- **Power trend:** actual power of PCS, input power, (PV power DC, AC Load 1 power, AC Load 2 power---displayed when the corresponding function is enabled in the eEMS configuration), SOC, total reactive power.
- **Microgrid:** (One point per second, 24H data of the current day is provided by default) Phase A voltage, Phase B voltage, Phase C voltage, system frequency (voltage value is available at the left coordinate, system frequency value to see the right coordinate).
- **Backup power function:** enable/disable (displayed according to the settings in the eEMS parameter configuration).
- **PV DC average power (of the year):** the ratio of the total PV power generation to the PV running time in the current year.
- **Average active power of total load (of the year):** total accumulated power consumption of the load/the AC system fault-free running time.

Remote Control

- For a standalone system, under this mode, the system can act on the command from external EMS or virtual power plant, through it has an eEMS of its own.
- For a parallel system, under this mode, the system acts as an eEMS slave, taking scheduling and command from the eEMS master.



- **Current eEMS mode:** Remote control.
- **PCS working mode:** PQ.
- **Current power:** real-time power.
- **Current SOC:** percentage of total remaining energy.
- **Switch eEMS mode:** When eEMS serves as a subsystem, the remote control mode is entered by default, the switching list of working mode is not operable, and the "Switch to remote control mode" button is disabled; In the case of single system, it can be controlled by external EMS system.
- **Power curve:** actual power, planned power, entry power, AC Load 1 power/ AC Load 2 power/PV power DC(display according to the actual configuration of the system), SOC, support time range view.

4.5.2 Set Charging/Discharging Plan

Click "Set Charging/Discharging Plan" to enter the details page.

Users can set different charging/discharging plans in different months according to the electricity prices of peak and off-peak hours. The charging/discharging plans can be configured with multiple sets of schemes. Users can set a hybrid of schemes to be repeated every day or within a specific time period, and set higher priority plans for legal holidays, temporary power consumption arrangements, etc. The system will intelligently judge the priority of plans for each date and time period to meet the user's flexible configuration requirements.

Potis Edge

CESS 215kWh Demo#2

Home page > Energy Management

Charging/Discharging plan:

Modify Plan

Current plan: 22

Color tag:

ESS power range: -100kW ~ 100kW

Add

Edit

Delete

ESS working plan

Preview future plan

Start time	End time	ESS power set (kW)	Config
00:10:00	07:15:00	90	Edit Delete
			+Add

Click "Preview future plan" to view all the charging/discharging plans that have been set; The color tags set by the charging/discharging plans display whether there are charging/discharging tasks on the month date table.

Potis Edge

CESS 215kWh Demo#2

Home page > Energy Management

Plan preview

Back to last page

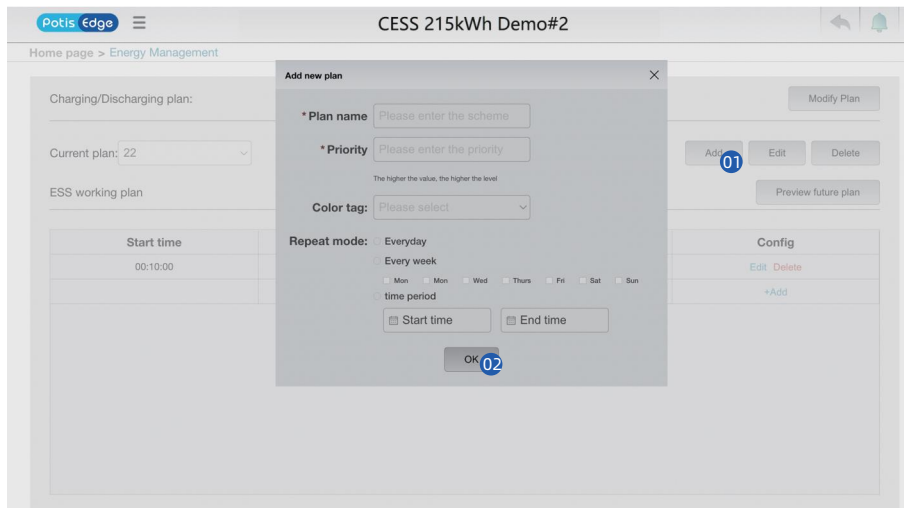
Month / Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
January																															
February																															
March																															
April																															
May																															
June																															
July																															
August																															
September																															
October																															
November																															
December																															

Instruction

1. Add new charging/discharging plan

Step 1: Click Add and a new scheme window will pop up.

Step 2: Fill in the name of the new plan and set the priority (the plan implementation priority, the larger the number, the higher the priority). When the time periods conflict, the plan with the higher priority will be implemented first. Set a color tag for easier identification of the plan. You can also select and set repeated implementation plans by day or week. Click "Confirm" to save the new plan.



The screenshot shows the 'Add new plan' dialog box in the Potis Edge interface. The dialog box has the following fields and options:

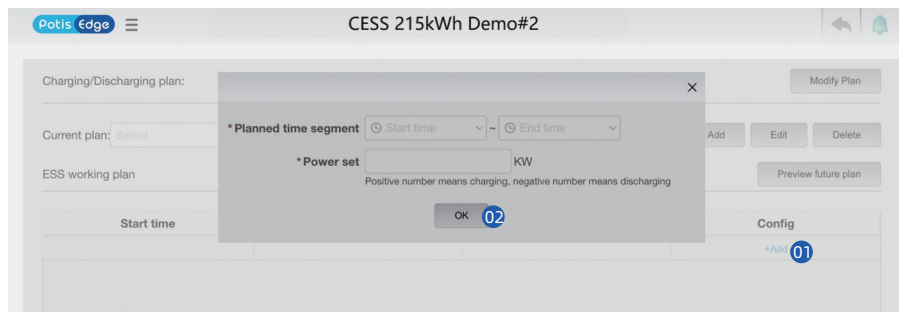
- * Plan name:** A text input field with the placeholder 'Please enter the scheme'.
- * Priority:** A text input field with the placeholder 'Please enter the priority'. Below it, a note states: 'The higher the value, the higher the level'.
- Color tag:** A dropdown menu with the placeholder 'Please select'.
- Repeat mode:** Radio buttons for 'Everyday' and 'Every week'. Below 'Every week' are checkboxes for days of the week: Mon, Mon, Wed, Thurs, Fri, Sat, Sun.
- time period:** Two input fields for 'Start time' and 'End time'.
- Buttons:** 'OK' (labeled 02) and 'Cancel'.

The background interface shows the 'Charging/Discharging plan' section with a 'Current plan' dropdown set to '22' and a 'Modify Plan' button (labeled 01).

2. Add new planned time segment

Step 1: Click Add and a window will pop up for adding a new planned time period. Set the output power(positive for charging, negative for discharging).

Step 2: After completing the form, click "confirm".



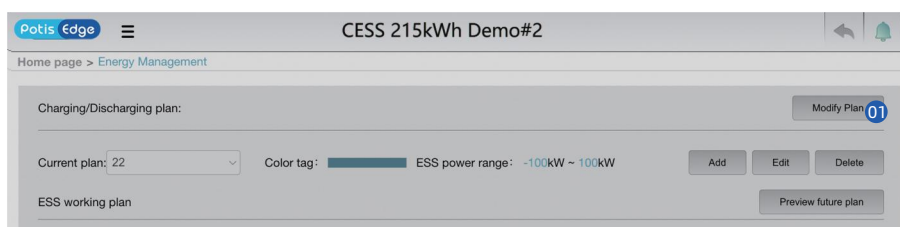
The screenshot shows the 'Planned time segment' dialog box in the Potis Edge interface. The dialog box has the following fields and options:

- * Planned time segment:** Two dropdown menus for 'Start time' and 'End time'.
- * Power set:** A text input field with the placeholder 'KW'. Below it, a note states: 'Positive number means charging, negative number means discharging'.
- Buttons:** 'OK' (labeled 02) and 'Cancel'.

The background interface shows the 'Charging/Discharging plan' section with a 'Current plan' dropdown set to 'Select' and an 'Add' button (labeled 01).

3. Complete the charging/discharging plan setting

Click "Modify Plan" to confirm the effect.



The screenshot shows the 'Modify Plan' button in the Potis Edge interface. The button is labeled 'Modify Plan' (labeled 01) and is located in the top right corner of the 'Charging/Discharging plan' section. The background interface shows the 'Current plan' dropdown set to '22' and the 'ESS power range' set to '-10kW ~ 10kW'.

4.6 Data Monitoring

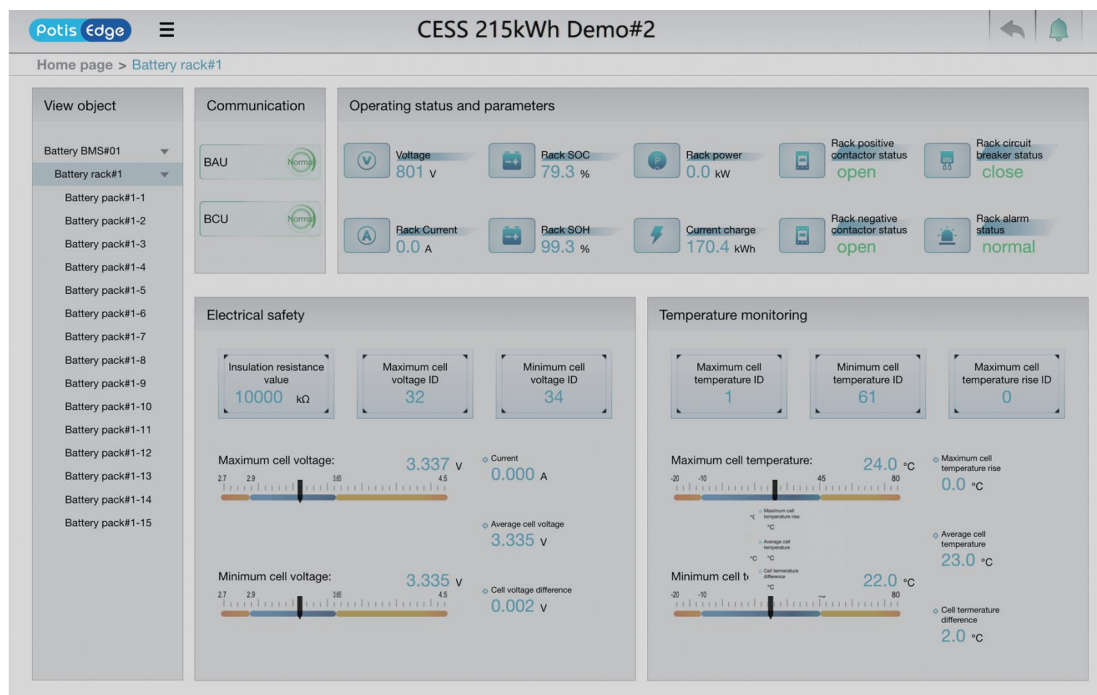
Click "Data Monitoring" to view real-time monitoring, data view, and IO Status.

4.6.1 Real-time Monitoring

Real time monitoring includes five modules, namely viewing object, communication status, operating status and parameters, electrical safety, and temperature monitoring. Users can view detailed information about each battery cluster and battery pack.

Battery Rack

- Display monitoring data of battery packs and individual cells of the battery array: Click on different levels to view the monitoring data of the respective level.
- **Battery string information:** Click the Real-Time Monitoring menu to enter the operation interface of string 1 by default, which is divided into four areas: "Communication", "Operation status and parameters", "Electrical safety" and "Temperature monitoring". Click the data to enter the data detail page. The "View object" area on the left can switch battery string.
- **Communication:** Display the real-time communication status of the battery string.
- **Operating status and parameters:** Display the main parameters and switch status of the battery string.
- **Electrical safety:** Display the insulation resistance value, the extreme and average value of cell voltage, the cell voltage difference, the corresponding cell ID and other parameters of the battery string.
- **Temperature monitoring:** Display the extreme and average value of cell temperature, the temperature difference, the corresponding cell ID and other parameters of the battery string.



Battery Pack

Click the drop-down arrow behind the battery string to display all battery packs in the string. Click on a battery pack to enter the parameter interface of the pack, which is divided into "Operating status", "Electrical safety", and "Temperature monitoring" areas.

- **Operating status:** Display the real-time current and the positive/negative terminal temperature of the battery pack.
- **Electrical safety:** Display the voltage of each cell, cell voltage statistics, the balance status of the battery pack and other information. Different colors of the bar chart indicate different status of voltage sensors. Click to view the historical data curve.
- **Temperature monitoring:** Display the cell temperature, cell temperature statistics and other information according to the actual configuration. Different colors of the bar chart indicate different status of heat sensors. Click to view the historical data curve.

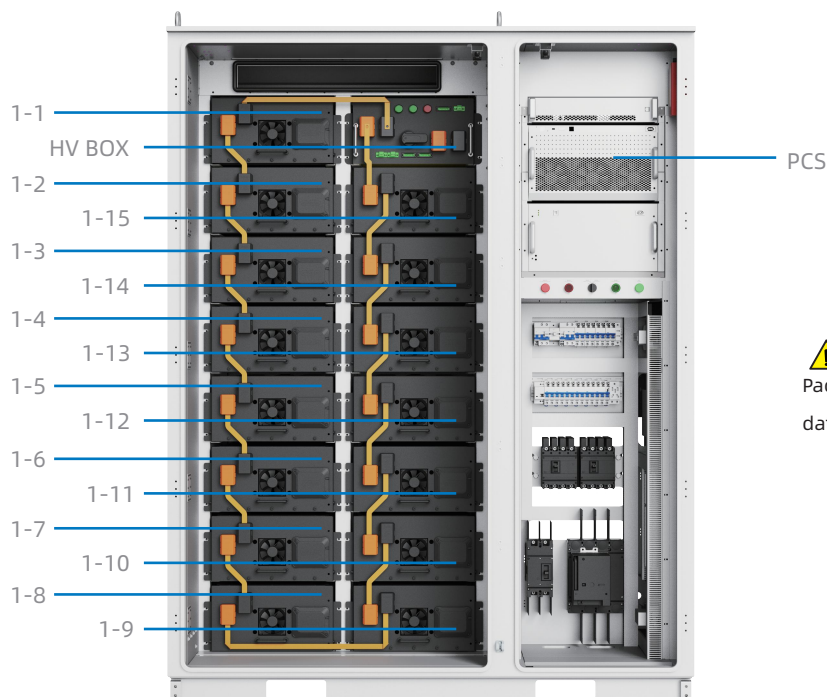


Electrical safety and temperature monitoring can be tabularly displayed.



⚠ Instruction

Numbering Rule



⚠ Caution
Packs should be placed based on the data of electrical components.

Battery numbering rule: 1-1

Battery numbers increase from left to upper right.
Number of pack group (a string means a group).

4.6.2 Data View

- Data view function enables users to view real-time, historical data.
- Data can be filtered by the objects they belong to or can be viewed according to the key name and key description.
- It supports "%" wildcard view.

Potis Edge CESS 215kWh Demo#2

Home page > Data View

Data filtering

Key name Description Tag Search Reset

List of data

Key name	Description	Real-time data	Unit	Last update time	Operation
A4_ePM1_CT	ePM-Grid Current Transformation Ratio CT	40		2024-04-17 14:10:33	Detail
A4_ePM1_DI	ePM-Grid DI Status	0		2024-04-17 14:10:33	Detail
A4_ePM1_EP	ePM-Grid Combined Total Active Energy	76394.797	kWh	2024-04-17 14:10:33	Detail
A4_ePM1_Epf	ePM-Grid Forward Active Energy	41117.602	kWh	2024-04-17 14:10:33	Detail
A4_ePM1_Epr	ePM-Grid Reverse Active Energy	35277.199	kWh	2024-04-17 14:10:33	Detail
A4_ePM1_Eqf	ePM-Grid Forward Reactive Energy	41.2	kvarh	2024-04-17 14:10:33	Detail
A4_ePM1_Eqr	ePM-Grid Reverse Reactive Energy	5619.6	kvarh	2024-04-17 14:10:33	Detail
A4_ePM1_Ia	ePM-Grid Phase A Current	4	A	2024-04-17 14:10:33	Detail
A4_ePM1_Ib	ePM-Grid Phase B Current	2.8	A	2024-04-17 14:10:33	Detail
A4_ePM1_Ic	ePM-Grid Phase C Current	2.8	A	2024-04-17 14:10:33	Detail

Total 3873 10/page 1 2 3 4 5 6 ... 388 Go to 1

4.6.3 IO Status

IO status monitoring enables users to view current status of some BESS key IO signals for assisting in judging and checking system faults. Click Detail to view the historical change curves of signals.

Potis Edge

CESS 215kWh Demo#2

Home page > IO Status

IO monitor

Name	Purpose	Description	Real-time data	Current status	Last update time	Operation
IO_DI10_val	/	DI10 value	0	open	2024-04-17 14:11:15	Detail
IO_DI11_val	Electrical Compart...	DI11 value	1	close	2024-04-17 14:11:15	Detail
IO_DI12_val	/	DI12 value	0	open	2024-04-17 14:11:15	Detail
IO_DI1_val	Emergency Stop Sig...	DI1 value	1	close	2024-04-17 14:11:15	Detail
IO_DI2_val	Container Thresho...	DI2 value	1	close	2024-04-17 14:11:15	Detail
IO_DI3_val	Auxiliary Power Mai...	DI3 value	1	close	2024-04-17 14:11:15	Detail
IO_DI4_val	Air Conditioning Fa...	DI4 value	0	open	2024-04-17 14:11:15	Detail
IO_DI5_val	/	DI5 value	0	open	2024-04-17 14:11:15	Detail
IO_DI6_val	/	DI6 value	0	open	2024-04-17 14:11:15	Detail
IO_DI7_val	Grid-side Breaker F...	DI7 value	1	close	2024-04-17 14:11:15	Detail

Number of test points: 24

Total 24

30

<1>

Go to 1

Instruction

Data queries and IO monitoring both support data export, as described below:

Click on the details in the data list to view detailed information. Automatic data refresh is supported (this can be turned off by clicking the button), allowing users to view real-time voltage values, maximum values, and the time of occurrence for the current battery cluster/pack. Users can query data within a specific time period, or use the "Today," "This Week," and "This Month" options to quickly filter results. Additionally, users can drag the control below to query data for the most recent period and export the data as an image or Excel file as needed.

Potis Edge

CESS 215kWh Demo#2

Home page > IO Status

IO monitor

Name	Purpose	Description	Real-time data	Current status	Last update time	Operation
IO_DI10_val	/	DI10 value	0	open	2024-04-17 14:11:20	Detail
IO_DI11_val	Electrical Compart...	DI11 value	1	close	2024-04-17 14:11:20	Detail
IO_DI12_val	/	DI12 value	0	open	2024-04-17 14:11:20	Detail
IO_DI1_val	Emergency Stop Sig...	DI1 value	1	close	2024-04-17 14:11:20	Detail
IO_DI2_val	Container Thresho...	DI2 value	1	close	2024-04-17 14:11:20	Detail
IO_DI3_val	Auxiliary Power Mai...	DI3 value	1	close	2024-04-17 14:11:20	Detail
IO_DI4_val	Air Conditioning Fa...	DI4 value	0	open	2024-04-17 14:11:20	Detail
IO_DI5_val	/	DI5 value	0	open	2024-04-17 14:11:20	Detail
IO_DI6_val	/	DI6 value	0	open	2024-04-17 14:11:20	Detail
IO_DI7_val	Grid-side Breaker F...	DI7 value	1	close	2024-04-17 14:11:20	Detail

Number of test point

DI10 value

Real-time value: 0

Auto update: ☒

Please select...

 ~

Please select...

Search

Today

This week

This month

Maximum value:

0

Time:

2024-04-17 14:11:19 709

Minimum value:

0

Time:

2024-04-17 14:11:19 709

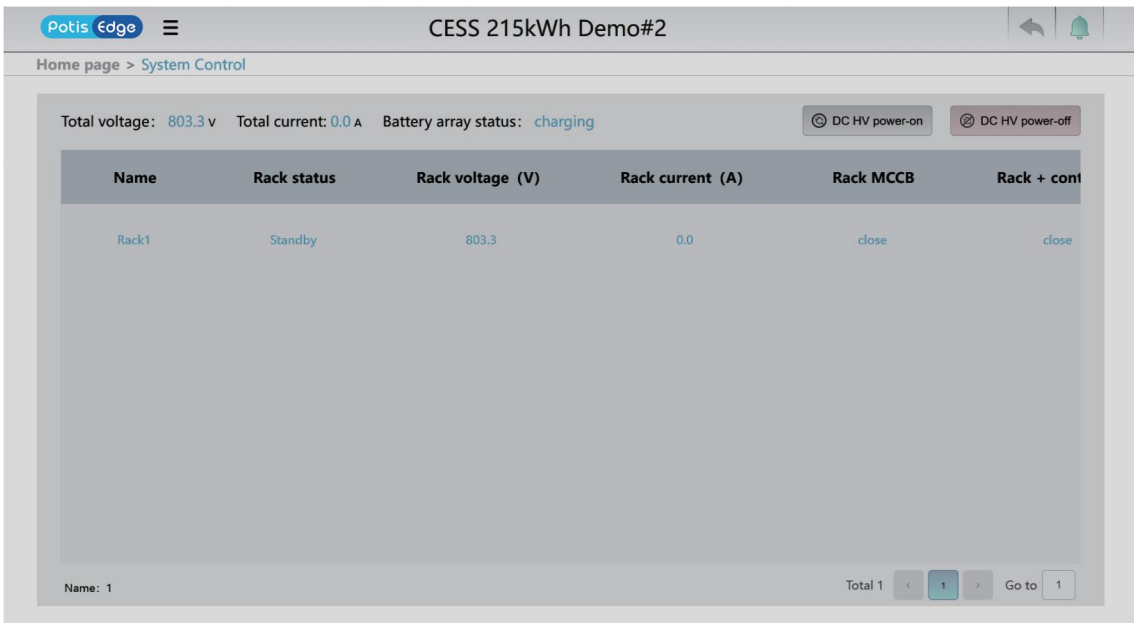
Export image

Export Excel

4.7 System Control

The system control interface mainly controls the power on and power off of the system and display some related data (total voltage, total current, battery array status).

- Before connecting to high voltage, ensure that the system has no high alarms and is in standby status. Click "DC HV power-on" at the top right and confirm. The system will then connect to DC HV, with the default status of the battery array set to "charging." The charging/discharging power of the system can be set through the external EMS.
- Before powering off, reset the PCS power and shut down the PCS. Once the total current of the battery array is 0, click "DC HV power-off" at the top right and confirm. The system will then power off and enter "power off" status. After powering off, click "System reset" on the system overview interface before powering on again to change the battery array status to "standby."



Instruction

- Enabled only in stand-alone BMS status.
- when using the Edge EMS function, the eEMS startup and eEMS stop buttons on the homepage have integrated the BMS system power on and power off operations. Users do not need to operate the functions on this page separately.

4.8 Alarm Management

Click on "Alarm Management" to view event & alarm and fault diagnosis.

4.8.1 Event & Alarm

- Event & alarm function is used to view existing and historical alarm and alarm reset. Event & alarm can be viewed by alarm name, alarm level or alarm time range.
- If the fault still exists, the alarm will still be triggered after reset.
- The event & alarm levels are divided into "event", "low alarm", "middle alarm" and "high alarm".
- "Event" includes the record of parameter value change and the reset record of high alarm.



Alarm filter

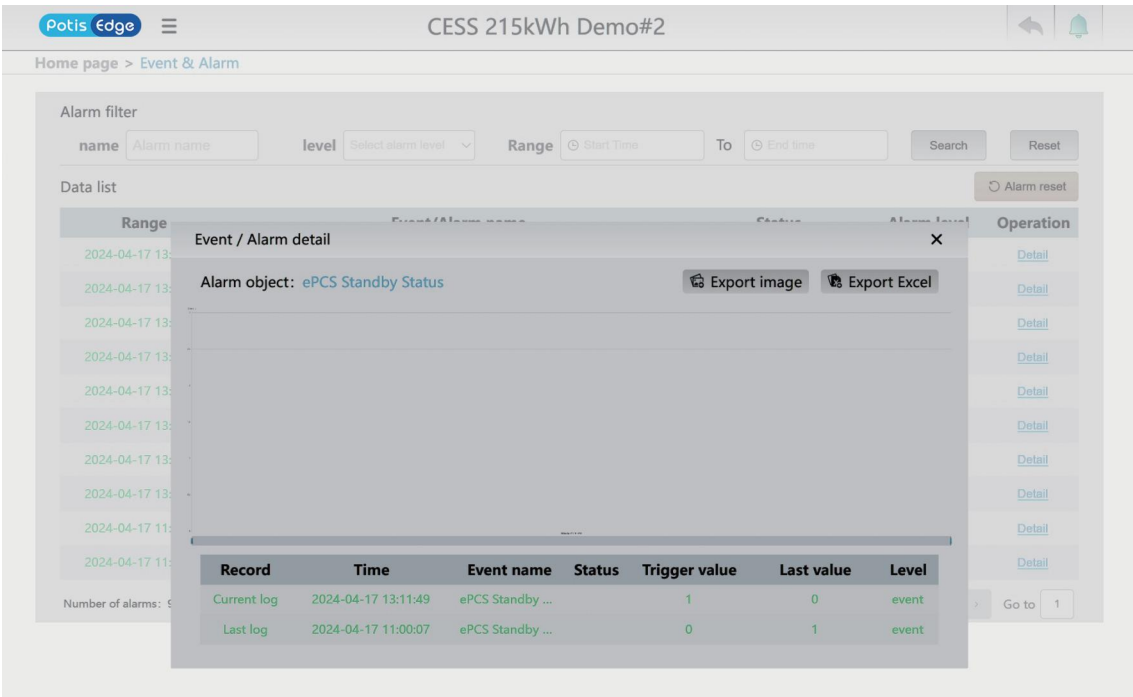
name level Range To Search Reset

Data list Alarm reset

Range	Event/Alarm name	Status	Alarm level	Operation
2024-04-17 13:11:49	ePCS Standby Status		event	Detail
2024-04-17 13:11:49	ePCS Operation Status	stop	event	Detail
2024-04-17 13:11:47	DO2 value	open	event	Detail
2024-04-17 13:11:39	ems running state	standing	event	Detail
2024-04-17 13:11:37	Rack 1 state	Standby	event	Detail
2024-04-17 13:11:33	Array 1 full charge action	full	event	Detail
2024-04-17 13:11:33	PCS 1 BAU state	no charge	event	Detail
2024-04-17 13:11:33	Array 1 charge&discharge state	no charge	event	Detail
2024-04-17 11:00:07	ePCS Operation Status	run	event	Detail
2024-04-17 11:00:07	ePCS Standby Status		event	Detail

Number of alarms: 985244 Total 985244 10/page < 1 2 3 4 5 6 ... 98525 > Go to 1

Click "Detail" to view the historical record of this event & alarm and support export to a picture or Excel file.



Alarm filter

name level Range To Search Reset

Data list Alarm reset

Event / Alarm detail

Alarm object: ePCS Standby Status

[Export image](#) [Export Excel](#)

Record	Time	Event name	Status	Trigger value	Last value	Level
Current log	2024-04-17 13:11:49	ePCS Standby ...		1	0	event
Last log	2024-04-17 11:00:07	ePCS Standby ...		0	1	event

Number of alarms: 985244 Total 985244 10/page < 1 2 3 4 5 6 ... 98525 > Go to 1

4.8.2 Fault Diagnosis

- Fault diagnosis can compare data from the same or similar dimensions to analyze the cause of faults.
- Users can independently choose to create and modify diagnostic projects based on the operating parameters they care about.
- Data and screenshots can be exported for further analysis.

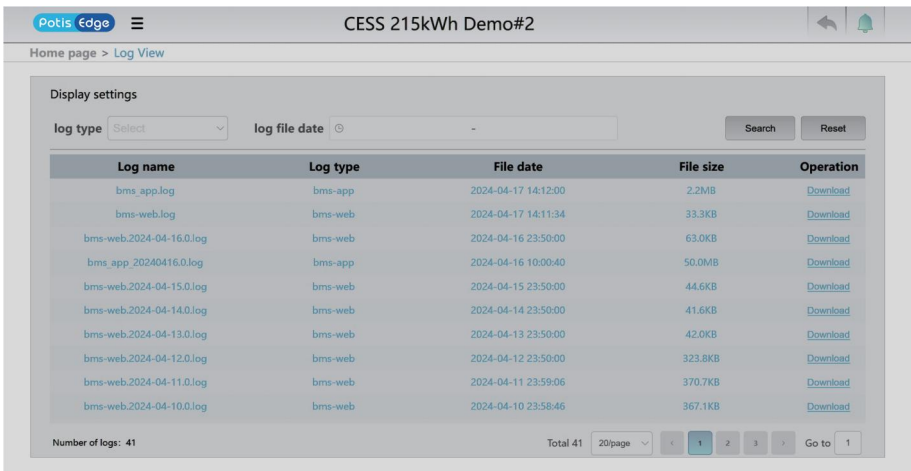


4.9 System Settings

Click on "System Settings" to view log view, project parameter settings, eEMS parameter settings, software version management, network settings, and account settings.

4.9.1 Log View

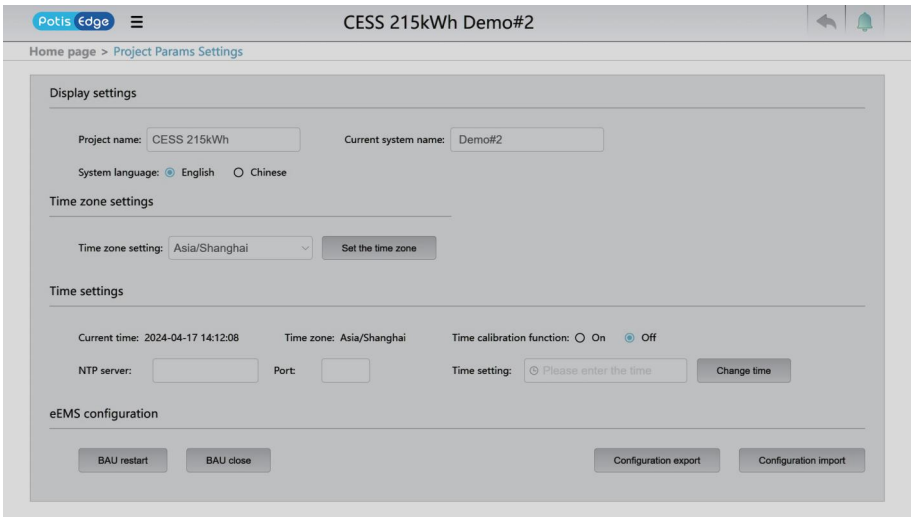
The log view allows you to set the viewing range according to log type and date. It supports downloading log files, which can then be sent to after-sales technicians for fault diagnosis and inspection.



Log name	Log type	File date	File size	Operation
bms_app.log	bms-app	2024-04-17 14:12:00	2.2MB	Download
bms-web.log	bms-web	2024-04-17 14:11:34	33.3KB	Download
bms-web.2024-04-16.0.log	bms-web	2024-04-16 23:50:00	63.0KB	Download
bms_app_20240416.0.log	bms-app	2024-04-16 10:00:40	50.0MB	Download
bms-web.2024-04-15.0.log	bms-web	2024-04-15 23:50:00	44.6KB	Download
bms-web.2024-04-14.0.log	bms-web	2024-04-14 23:50:00	41.6KB	Download
bms-web.2024-04-13.0.log	bms-web	2024-04-13 23:50:00	42.0KB	Download
bms-web.2024-04-12.0.log	bms-web	2024-04-12 23:50:00	323.8KB	Download
bms-web.2024-04-11.0.log	bms-web	2024-04-11 23:59:06	370.7KB	Download
bms-web.2024-04-10.0.log	bms-web	2024-04-10 23:58:46	367.1KB	Download

4.9.2 Project Parameters Settings

- Display settings: The project name and current system name can be modified, and the system language supports switching between Chinese and English.
- Time zone setting: Select the local time zone and click "Effective Time Zone" to confirm.
- Time setting: To enable the proofreading function, you need to configure the clock source IP and port number, otherwise the proofreading time function cannot be enabled.
- BAU restart controls the top-level main control system to restart (shut down and restart).
- BAU shutdown control top-level master shutdown.
- Configuration export: Export a series of configuration information such as system configuration parameters to a configuration file, which can be imported on other devices without the need for separate configuration.
- Configuration import: supports importing configuration files and setting/updating system parameter configuration parameters.



Project name: CESS 215kWh Current system name: Demo#2

System language: ☒ English ☐ Chinese

Time zone setting: Asia/Shanghai Set the time zone

Time settings

Current time: 2024-04-17 14:12:08 Time zone: Asia/Shanghai Time calibration function: ☐ On ☒ Off

NTP server: Port: Time setting: Please enter the time Change time

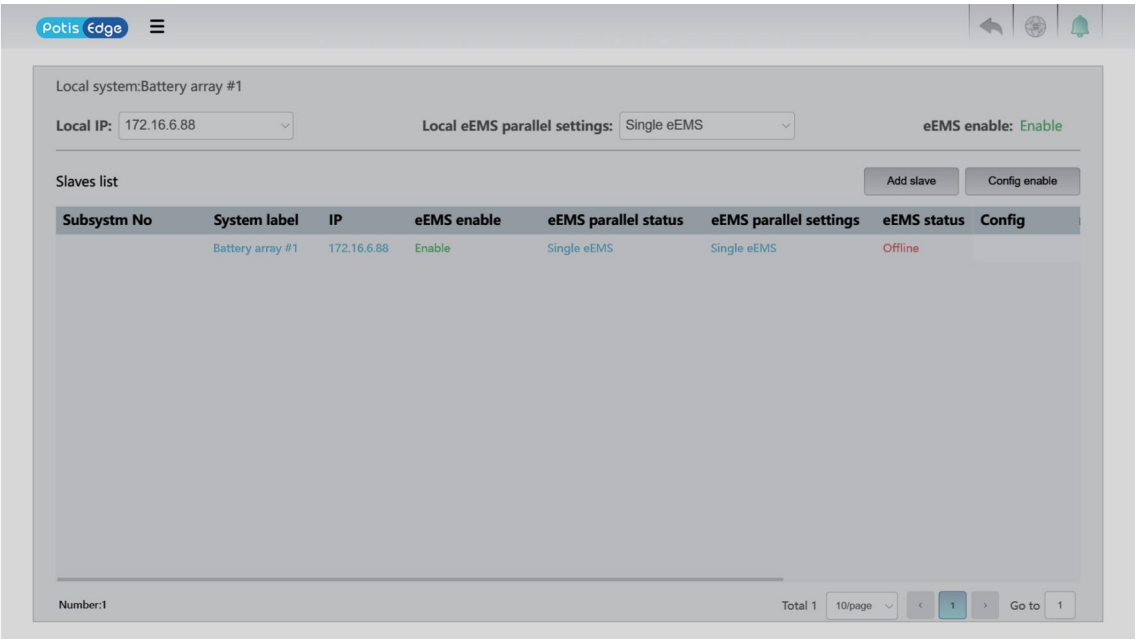
eEMS configuration

BAU restart BAU close Configuration export Configuration import

4.9.3 eEMS Parallel Management

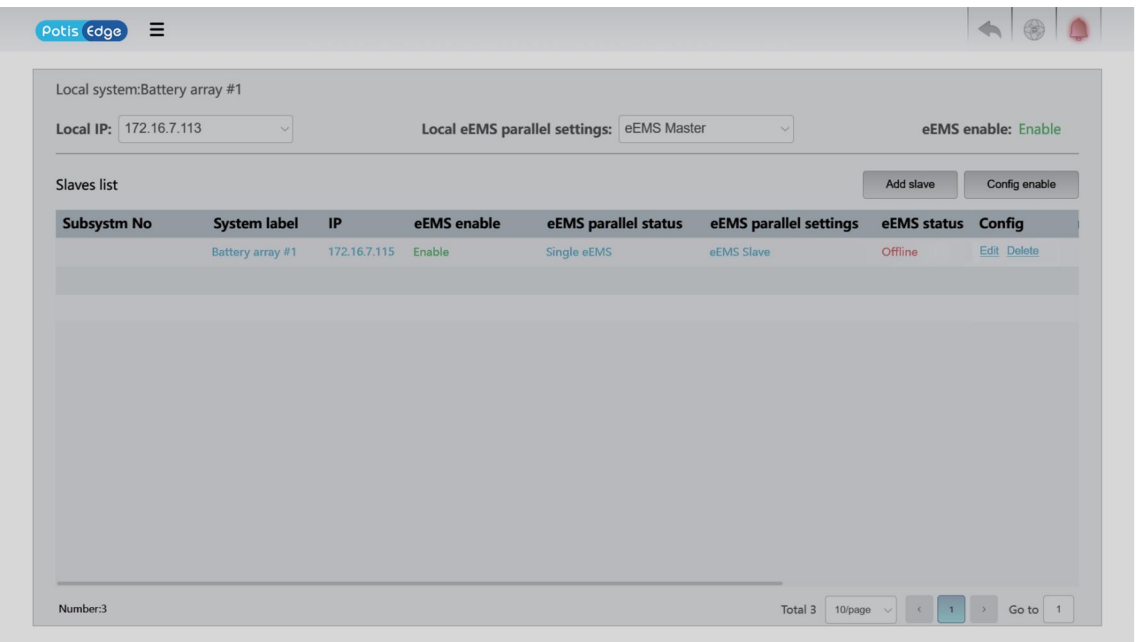
For the parallel management page, please refer to the picture shown below.

- Standalone System



- Parallel Management

eEMS Master



eEMS Slave

Potis Edge

Local system: Battery array #1

Local IP: 172.16.6.88

Local eEMS parallel settings: eEMS Slave

*Subsystem No: Select

eEMS enable: Enable

Slaves list

Add slave

Config enable

Subsystem No	System label	IP	eEMS enable	eEMS parallel status	eEMS parallel settings	eEMS status	Config
	Battery array #1	172.16.6.88	Enable	Single eEMS	eEMS Slave	Offline	

Number: 1

Total 110/page1Go to 1

Instruction

- User is granted the read-only access in terms of the function shown in the page by default in a bid to avoiding runtime errors caused by unauthorized changes in parameters.
- If the user needs more accesses than the read-only access, please reach out to the manufacturer for technical supports. In this process, the user shall bear the loss, if any, caused by the failure to follow through the manufacturer's guide.

4.9.4 eEMS Parameters Settings

On-grid mode

The screenshot displays the 'On-grid mode' configuration page in the eEMS system. The page title is 'CESS 215kWh Demo#2'. The 'On-grid mode' tab is selected, with 'Off-grid mode' and 'Remote control mode' also visible. A 'Config enable' button is in the top right. The 'On-grid setting' section includes: 'Allowable SOC range' with 'Discharge cut-off SOC' set to 10% and 'Charge cut-off SOC' set to 100%; 'Charge/discharge plan' with a 'Plan settings' button; 'Anti-backflow and demand control' with 'Control mode' set to 'Fixed max demand c'; 'Fixed max demand function' with 'Enable' selected; 'Demand meter' set to 'ePM-Grid'; 'Fixed max demand setting' at 120 kW, 'Fixed demand protection threshold' at 0 kW, and 'Calculation time for active power' at 15 s; 'Backup power' with 'Backup power function' set to 'Enable' and 'SOC threshold for backup on' at 30; and 'DC PV settings (only for max config type)' with 'Max allowable SOC for PV charge' set to 'Select' and 'Allow PV excess power supply to loads always' set to 'No'.

- **Allowable SOC range:** Support SOC discharging/charging depth setting; Limit the battery charging/discharging threshold by percentage.
- **Charging/Discharging plan settings:** See 4.5.2 for details.
- **Anti-backflow and demand control:** Control mode selection(Anti-backflow only, Fixed maximum demand only, Anti-backflow + fixed maximum demand, Anti-backflow + demand following, Demand control + excess energy back to grid).
- **Backup power:** enable/disable, SOC threshold for backup on.
- **DC PV settings:** (Only available for maximum configuration type.) Choose the maximum allowable SOC for photovoltaic charging, and whether to allow excess PV electricity to supply power to the load at all times.

Instruction

Anti-backflow and demand control

- **Anti-backflow only (A):** anti-backflow meter selection (total entry meter in cabinet, total entry meter of busbar panel, user's LV entry meter), anti-backflow protection threshold, anti-backflow dead band.
- **Fixed maximum demand only (B):** demand meter selection (total entry meter in cabinet, total entry meter of busbar panel, user's LV entry meter), fixed maximum demand setting, fixed demand protection threshold, calculation time for active power smoothing.
- **Anti-backflow + fixed maximum demand:** combined the functions above A + B.
- **Anti-backflow + demand following:** the above A + demand following. demand meter selection (total entry meter in cabinet, total entry meter of busbar panel, user's LV entry meter), calculation time for active power smoothing, initial time of demand cycle (Nth day of each month), initial power of demand cycle, protection threshold of demand following, target power of current demand following.
- **Demand control + excess energy back to grid:** the above demand control + excess energy fed to grid (maximum demand control threshold, maximum on-grid power threshold).

Off-grid mode

Potis Edge CESS 215kWh Demo#2

Home page > eEMS Params Settings

On-grid mode Off-grid mode Remote control mode

On-grid setting Config enable

Allowable SOC range

Discharge cut-off SOC: 10 % Charge cut-off SOC: 100 %

Other settings

SOC threshold for system power on: 20 % Remaining usage time alarm value: 24 kW Calculation time for active power smoothing: 15 s

DC PV settings (only for PV DCDC type)

Max allowable SOC for PV charge: Select %

- Allowable SOC range: Support SOC discharging/charging depth setting; Limit the battery charging/discharging threshold by percentage.
- Other settings: SOC threshold for system power on, alarm value of usage time of remaining energy, calculation time for active power smoothing.
- DC PV settings (only available for type configured with PV DCDC): maximum allowable SOC for PV charging.

Remote control mode

Allowable SOC range: Support SOC discharging/charging depth setting; Limit the battery charging/discharging threshold by percentage.

Potis Edge CESS 215kWh Demo#2

Home page > eEMS Params Settings

On-grid mode Off-grid mode Remote control mode

On-grid setting Config enable

Allowable SOC range

Discharge cut-off SOC: 10 % Charge cut-off SOC: 100 %

4.9.5 Version Management

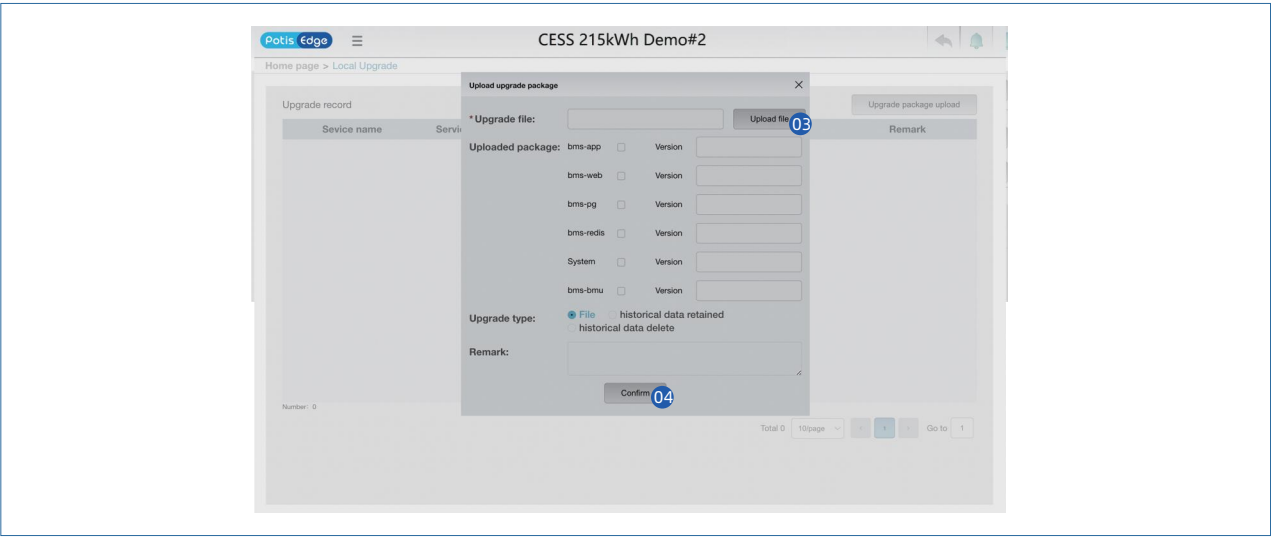
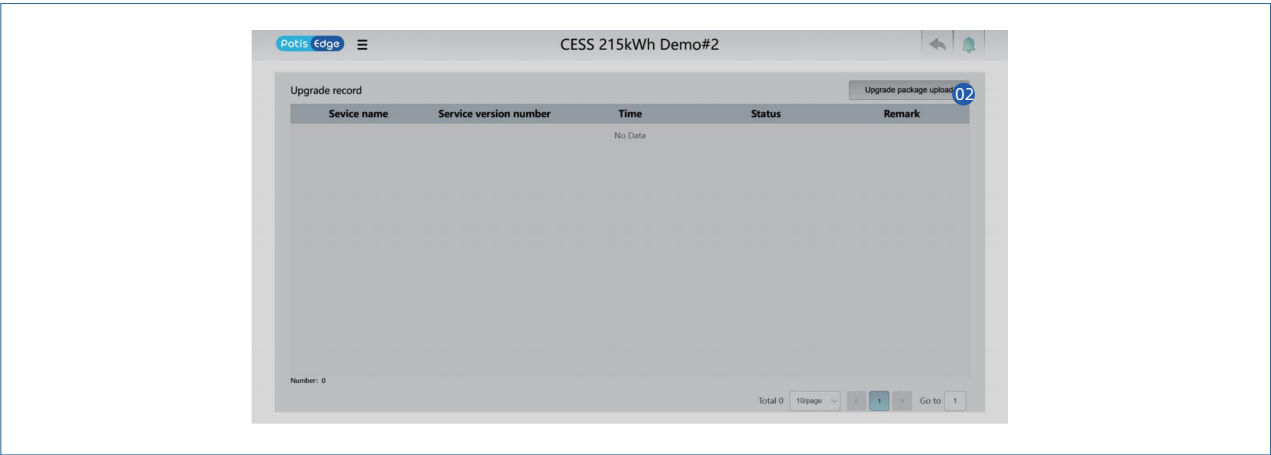
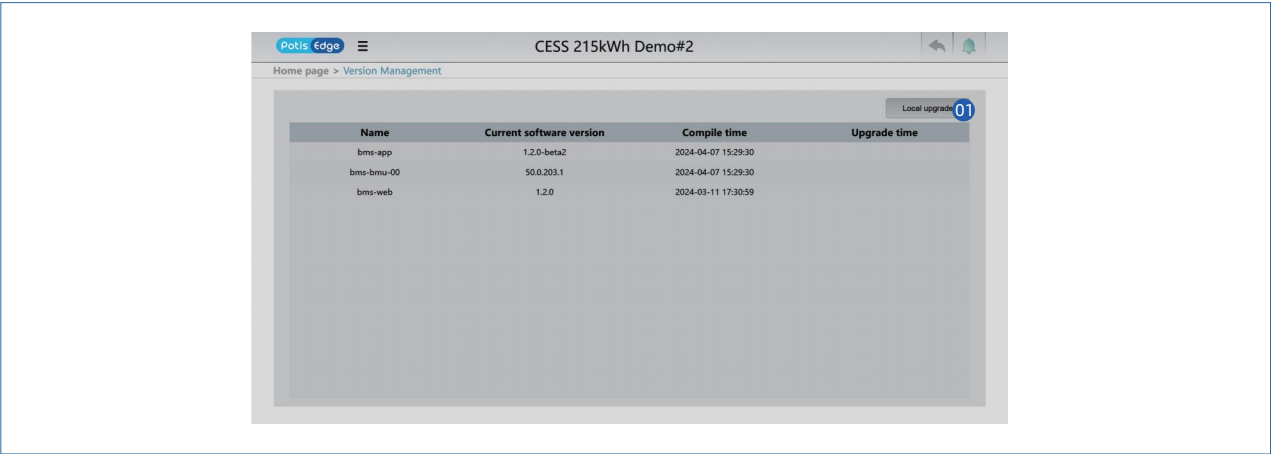
Software upgrade supports local file import to upgrade the software version.

Step 1: Click "Local Upgrade" to jump to the next level page.

Step 2: Click on the upgrade package upload and a pop-up window will appear.

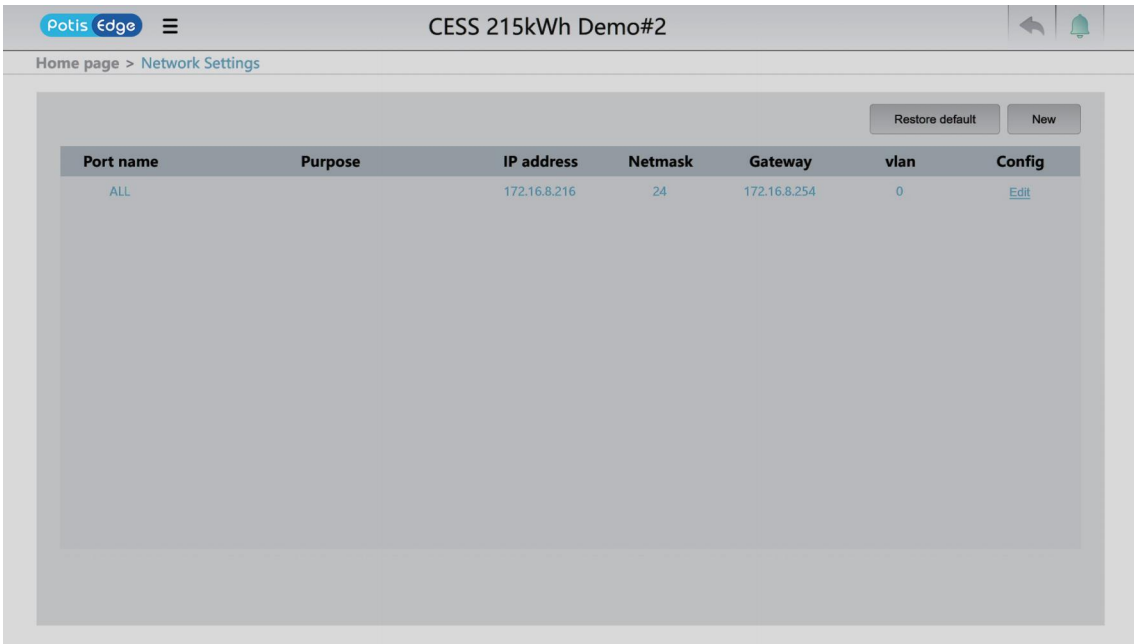
Step 3: Click to upload the file, and after uploading, determine the software version type and version number contained in the file.

Step 4: Click confirm and an upgrade record will be generated. You can check whether the upgrade is completed and successful in the status bar.



4.9.6 Network Settings

Network Settings is the settings to the local LAN connection.



4.9.7 Account Settings

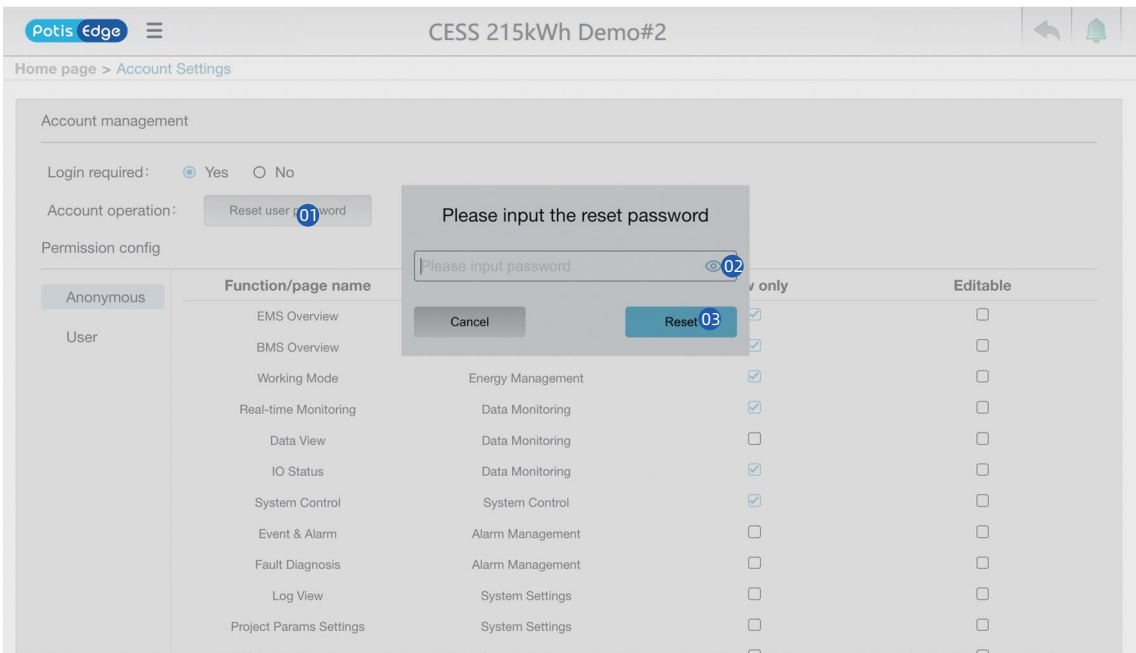
Step 1: clicking the "Reset user password" button, a new password setting box will pop up.

Step 2: When entering the new password, please click on the icon on the right to display the entered password to prevent errors.

Step 3: Click reset to complete the modifications.

Instruction

- For the security of your account, please set your password as a combination of English numbers with 6 or more digits.
- If you forget your password, please contact after-sales or relevant technical personnel.



5. Installation Design

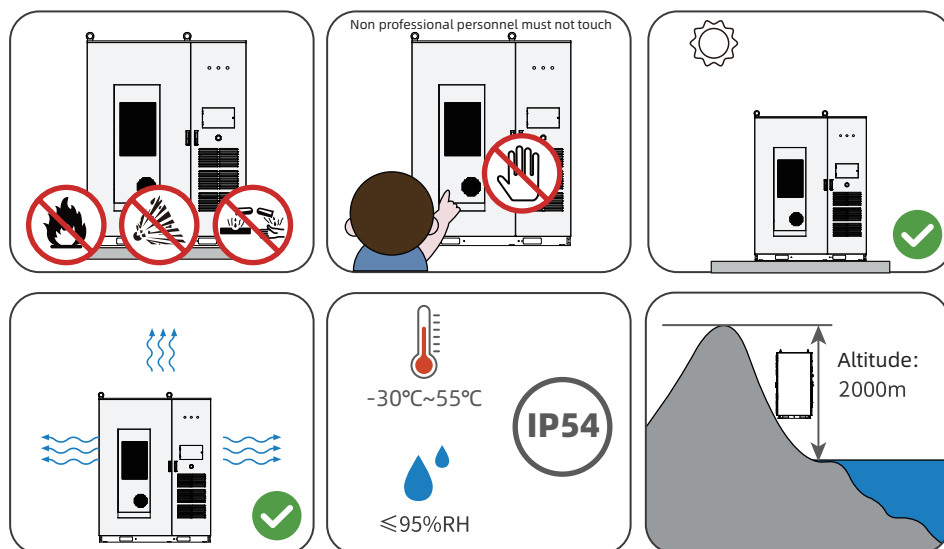
5.1 Install Location

Basic Requirements

- OmniCube-A215-100K is rated to IP54, making it suitable for outdoor installation. However, as an electronic device, it must not be placed in environments with high humidity for extended periods.
- Due to the noise generated during operation, it is recommended to install it away from residential areas.
- Additionally, ensure that there are no corrosive or flammable gases around the installation location.

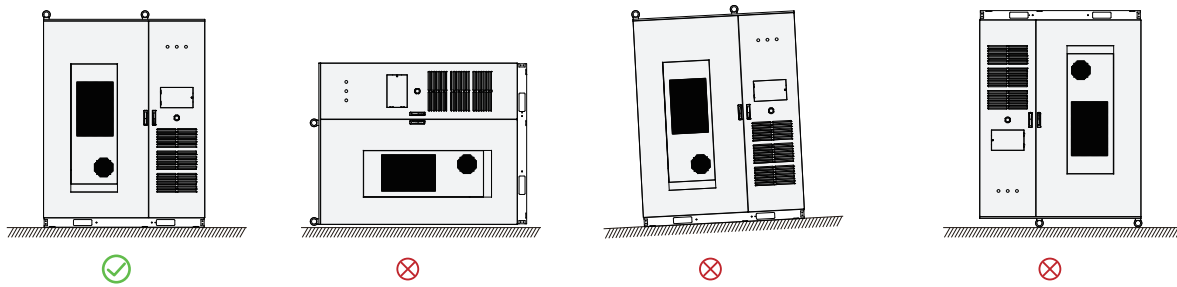
Installation Environment Requirements

- The system must be installed on ground with sufficient bearing capacity and flatness. If the ground does not provide adequate support and flatness, other means (such as creating a foundation) must be used to ensure stability.
- Reserve enough space for opening doors when installing the ESS.
- Do not place anything above the system.
- Do not place in areas containing corrosive gases or liquids.
- Do not install in areas accessible to children.
- Do not place flammable, explosive, or corrosive materials around the device.
- The installation and maintenance of the system must be operated by professional and technical personnel, and the relevant safety regulations must be strictly followed during use. Non-professionals are not allowed to install, maintain and abuse the system beyond the scope.
- Avoid installing in areas with high temperature and salt spray, as it may shorten the service life or cause internal short circuits. (If there is a need, please contact relevant personnel)
- Avoid exposure to sunlight, rain or humidity.
- Avoid installation near high temperature heat source or low temperature cold source environment (-20~45°C environment is preferable).
- Avoid installation in strong interference environment.
- Avoid installing in areas prone to water accumulation.



Installation Angle Requirements

Ensure that the equipment is installed horizontally. Do not tilt or invert the equipment or rotate it sideways.



Installation foundation and space requirements

- The installation foundation is stable and has adequate load-bearing capacity.
- Reserve sufficient space between the ESS and the surrounding walls to ensure normal heat dissipation and facilitate later maintenance and repair of the ESS.
- The installation position should ensure easy observation of the indicator lights.

5.2 Installation Environment

The ESS can be installed outdoors and needs to meet the following requirements.

5.2.1 Foundation Requirements

The overall weight of the system is heavy. Before making the foundation, it is necessary to examine the conditions of the installation site (mainly geological, environmental and climate conditions) in detail. Only on this basis can the design and construction of the foundation begin.

Caution

Do not install in a working environment with metal-conductive dust.

Installation Condition

Operating Temperature	-30 ~ 55°C
Storage Temperature	-30 ~ 50°C
Relative Humidity	0 ~ 95%RH, non-condensing
Operating Altitude	≤2000m
Perpendicularity	No vibration and vertical inclination does not exceed 5°
Pollution Level	Level II
Field Environment	The surrounding environment is dry, well ventilated, and away from flammable and explosive areas.
Soil Requirement	The soil at the installation site must have a certain degree of compactness.
	It is recommended that the relative density of the soil in the installation site be at least 98%.
	If the soil is loose, take measures to ensure that the foundation is stable.

Foundation Flatness Requirements

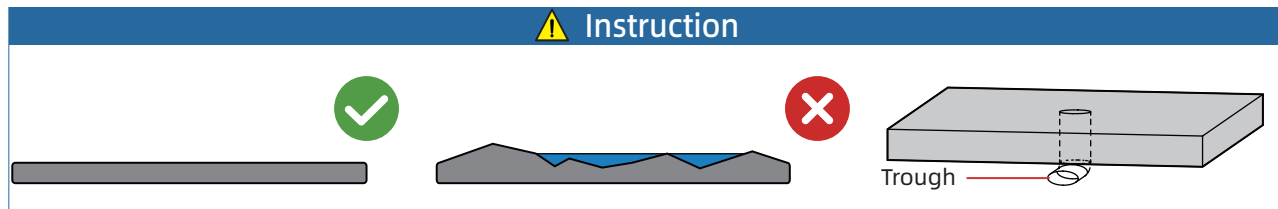
Item	Allowable Deviation (mm)	
	Per meter	Total length
Unflatness	1.0	5.0
Levelness	1.0	5.0
Nonparallelism	-	5.0

Construction Requirement

Unreasonable foundation construction plan will bring difficulties to the placement, door opening and closing, and later operation of the ESS. Therefore, the installation foundation of the system must be designed and constructed in accordance with certain standards in advance to meet the requirements for mechanical support, cable routing, and later maintenance.

The following requirements should be met during foundation construction:

- The foundation pit bottom must be tamped and filled.
- The foundation is sufficient to provide effective load-bearing support for the system.
- Elevate the system to prevent rainwater from eroding its base and interior. It is recommended that the foundation be about 300 mm higher than the installation site level.
- Drainage measures should be constructed according to local geological conditions.
- Build a concrete foundation with sufficient cross-sectional area and height. The height of the foundation is determined by the construction party according to the site geological realities.
- Cable routing should be considered when constructing the foundation. Dirt excavated during foundation construction should be cleaned immediately so as not to affect the subsequent hoisting of the system.
- The maintenance platform is built around the foundation to facilitate later maintenance.
- According to the location and size of the input and output cables of the ESS, enough space should be reserved for the AC/DC cable trough during the foundation construction, and the cable conduit should be embedded in advance.
- Specifications and quantity of the cable conduit based on the cable type and the number of input and output cables should be predetermined.
- Both ends of all embedded pipes are temporarily sealed to prevent impurities. ensuring convenient wiring later.
- After all cables are connected, cable inlets and outlets and connectors are sealed with fire-resistant mud or other suitable material to prevent the entry of rodents as well as flying insects.
- The ground unit is embedded according to the relevant standards of the country/region where the project is located.



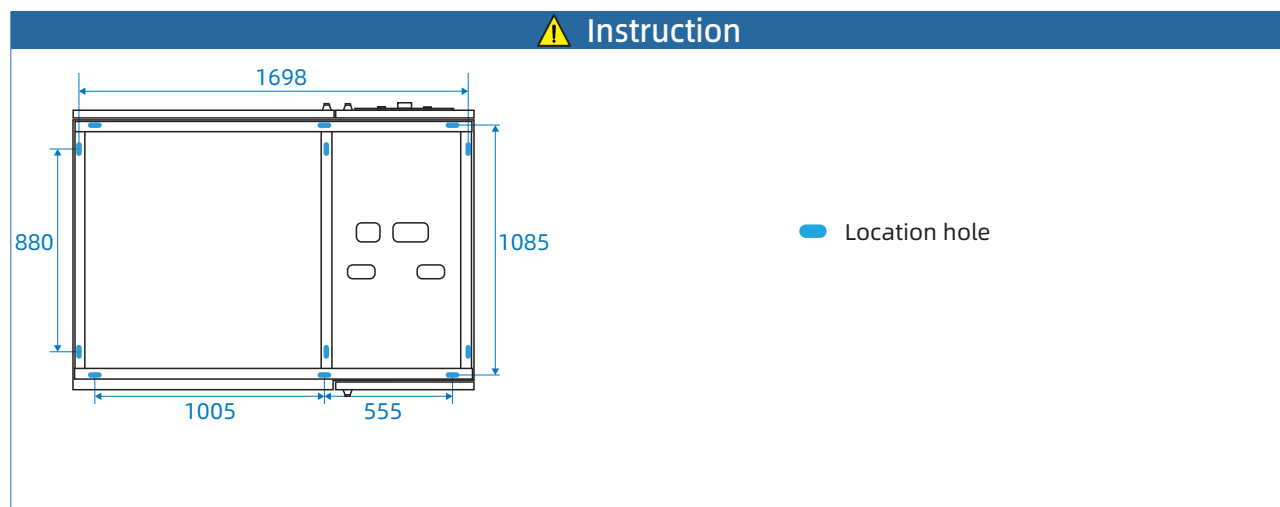
5.2.2 Cable Duct Requirements

- Since the infeed cables enter into the equipment from bottom, the cable trenches must be designed with dustproof and rat-proof features to prevent foreign matters.
- The cable trenches must be waterproof and moisture-proof to prevent short circuit of aging cables, which may affect the normal operation of devices.
- Due to the thickness of the cables, ample space must be reserved for cables when designing the cable trenches to ensure smooth connection and avoid wear.

When building the foundation, cable trenches should be preset according to the overall design of the power station and the cable access mode at the bottom of ESS.

Holes must be opened in the foundation. The holes must be the same size as the location holes on the base of ESS so that ESS is firmly connected to the foundation.

The base of ESS is equipped with 12 18mm x 58mm location kidney-shaped holes. Please use M16 bolts to secure the base to the foundation.

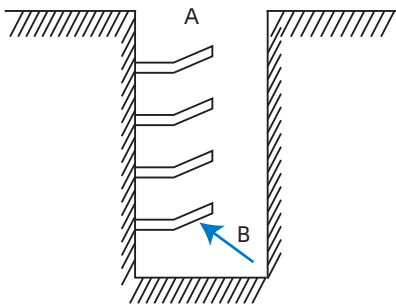


5.2.3 Cable Trench Design

- The cable inlet and outlet holes of ESS are located at the bottom of the system. It is recommended that cables connecting to external devices be routed through cable troughs for easy installation and maintenance. When installing cable troughs, secure the ground screws or U-channels to the ESS. When installing steel brackets, the ESS must be directly fixed to the brackets.
- Cable troughs are generally designed and constructed by the construction party in accordance with relevant standards with full consideration of the weight and size of the equipment.
- Good electrical connections are required between the cable troughs and between the cable and the grounding electrodes.

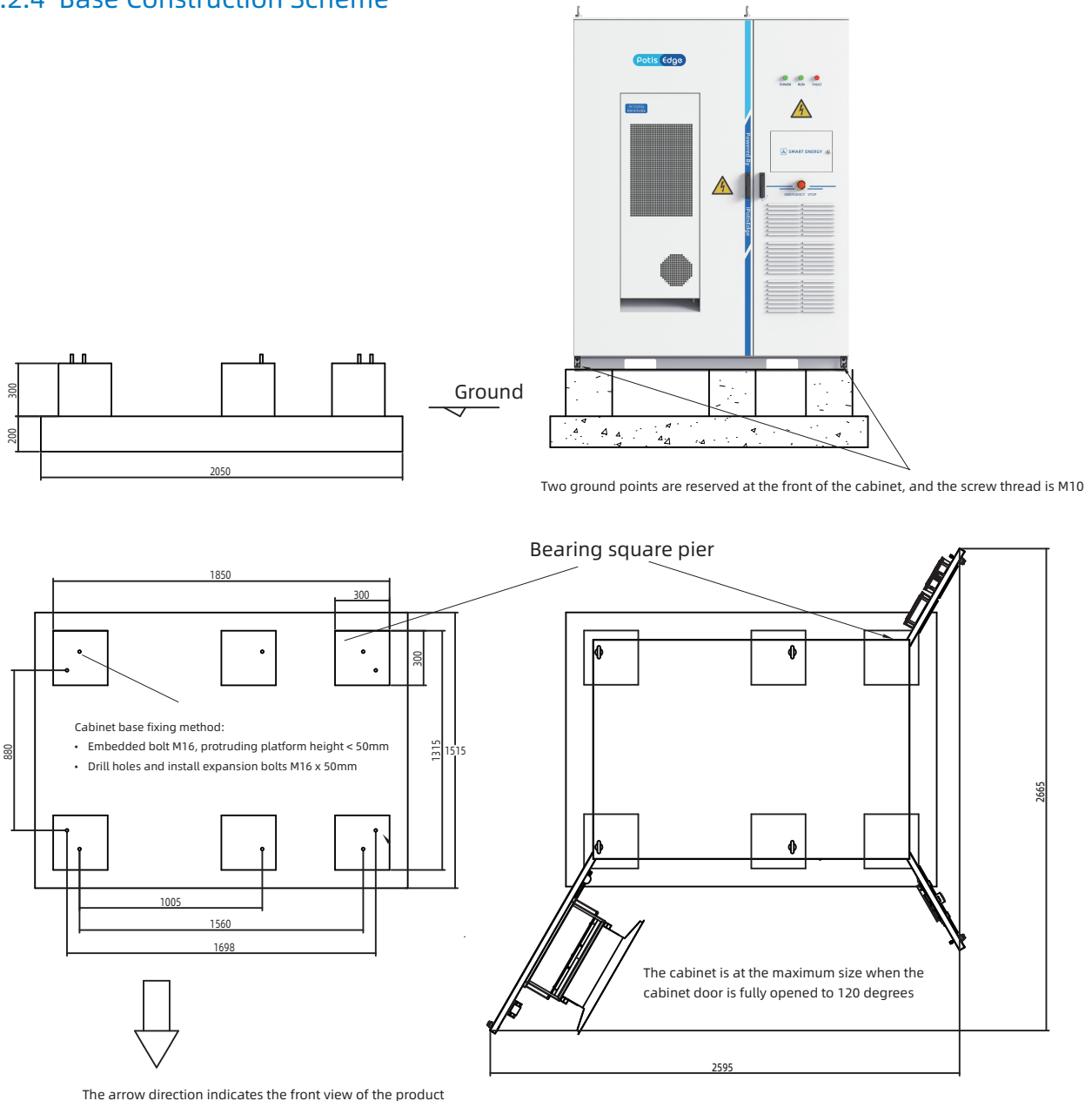
The following figure shows the section of cable troughs. Users can determine the number of cable brackets based on specific needs. The communication cables, control cables, and power cables must be laid separately. The DC circuit and AC circuit must be laid separately. This is conducive to installation and maintenance, and mitigate the interference caused by the power circuit to the communication and control signal lines.

 **Instruction**



Serial number	Name
A	Cable tray
B	Cable bracket

5.2.4 Base Construction Scheme



⚠ Instruction

1. The concrete foundation should be horizontal, with a flat surface, and can evenly bear the weight of the battery cabinet. The foundation for one single cabinet should be able to bear a load greater than 3 tons.
2. The inner wall of the groove and the foundation platform are sealed with M10 mortar with a thickness of 10, and the surface is flat.
3. The bottom of the base should be slightly inclined to the drainage tank to avoid water accumulation. Cable supports or cable troughs can be set up according to the actual situation.
4. Use $\Phi 10$ round steel or 30x4 flat steel to lead the grounding points to the top of the high and low voltage foundation from both sides. The grounding resistance must meet the requirements of the local electric power department.
5. This diagram illustrates the positioning of the energy storage cabinets and is for reference only. The specific foundation measurements should be comprehensively evaluated based on the actual situation of the project.

5.2.5 Space Requirement

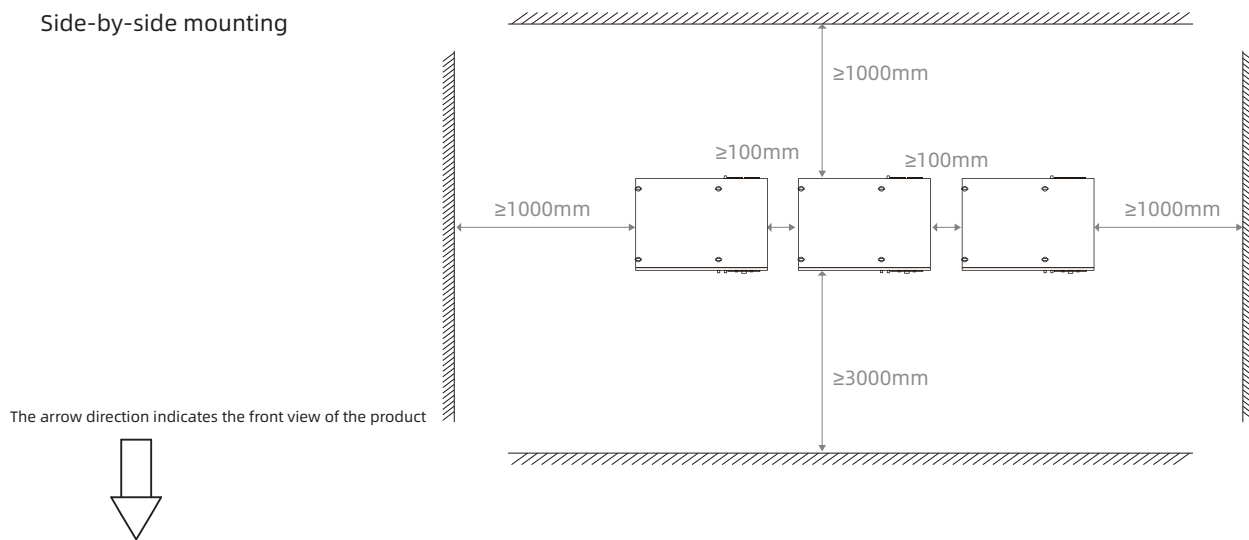
When installing an ESS, an appropriate and sufficient distance must be kept from walls and other equipment to meet the requirements of the narrowest maintenance channel, fire exit, and ventilation. This section depicts the minimum space requirements for a non-containerized ESS. It is recommended to select a possibly larger space to ensure reliable and efficient operation of the ESS.

⚠ Caution

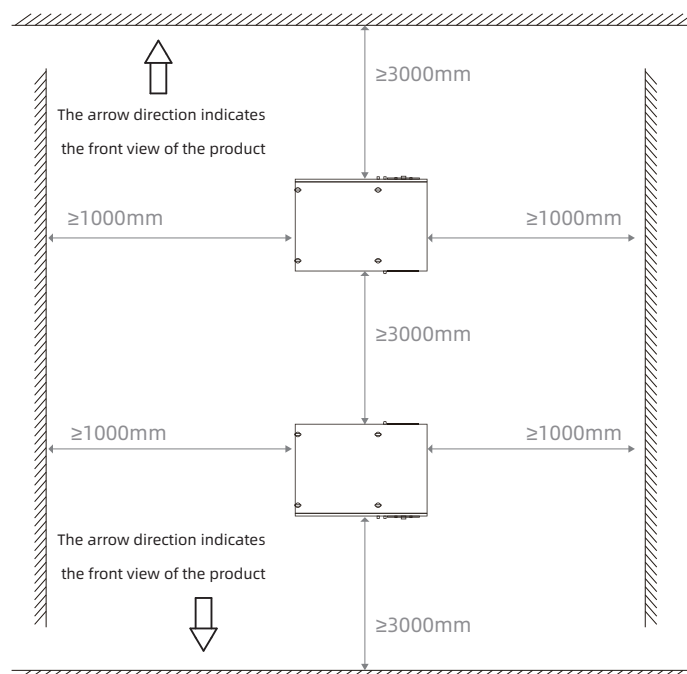
The values of space described hereinabove are the recommended minimum distance of the maintenance platform around the ESS. When installing ventilation and dust removal devices, one shall design the appropriate distance for easy maintenance and repair.

If multiple ESSs are combined, the spacing is recommended as shown in the following figure.

Side-by-side mounting



Back-to-back mounting



5.2.6 Ventilation Requirements

ESS will produce large amounts of heat during operation. When the equipment overheats, its electrical performance will be negatively affected, or it will even be damaged. When deciding the installation environment, one must take into account the release of the heat to ensure the normal and efficient operation of the equipment.

To meet the ventilation requirements of ESS, the installation environment must fit the following conditions:

Ventilation Environment

- The ESS should be installed in a location with good ventilation and ample airflow.
- The air inlet should ensure a sufficient flow of fresh air.
- Both the air inlet and outlet should be cleaned regularly to prevent blockage by sand.

Ventilation Equipment

In order to ensure the efficient and reliable operation of the equipment, the ambient temperature must be controlled within the reasonable range. Therefore, ventilation must be ensured.

- When ESS is exposed to direct sunlight, its internal temperature will rise rapidly, wreaking havoc on charging and discharging capacity. It is recommended to install an ESS in the shade or with sun-shading systems.
- The direction of the air outlet of ESS shall be determined according to local wind direction.

The schematic diagram of the heat dissipation airduct of ESS is shown as follows.



5.2.7 Other Requirements

- With an IP54 protection rating, the ESS is suitable for outdoor installation. Considering EMC requirements and noise levels, ESS units should be installed in industrial environments or outdoors.
- After completing cable connections, ensure that the waterproof terminals on cable inlet and outlet holes are tightened. Use fireproofing mud to seal the bottom clearance.
- If there are vacant waterproof terminals, use appropriate plugs to meet water and dust resistance requirements.

Caution

The ESS should avoid direct sunlight. Otherwise, high temperature will degrade the charge and discharge of the ESS.

6. Mechanical Installation

6.1 Checking Before Installation

Caution

- Do not perform any mechanical operation in or on the top of the PCS that is irrelevant to installation.
- During installation, the internal and ambient conditions of PCS shall be clean.

Instruction

The AC side of the ESS should be close to the external full-bridge transformer to minimize the length of the three-phase cable connecting the AC side of the ESS to the external full-bridge transformer.

In addition to using U-channels to fix the ESS, anchor screws can also be utilized to fix the ESS on the pre-built solid foundation. In this case, holes need to be opened in advance on the foundation, whose size must meet the requirements of the location holes at the bottom of the ESS.

It is suggested that the ESS be finally fixed on the U-channel. Before the ESS is finally fixed, it is necessary to:

- Ensure that the layout of cable trenches meet the requirements for installing the ESS.
- Ensure that the U-channel installation and holecutting meet the installation requirements of the ESS.

6.2 Fixing the ESS

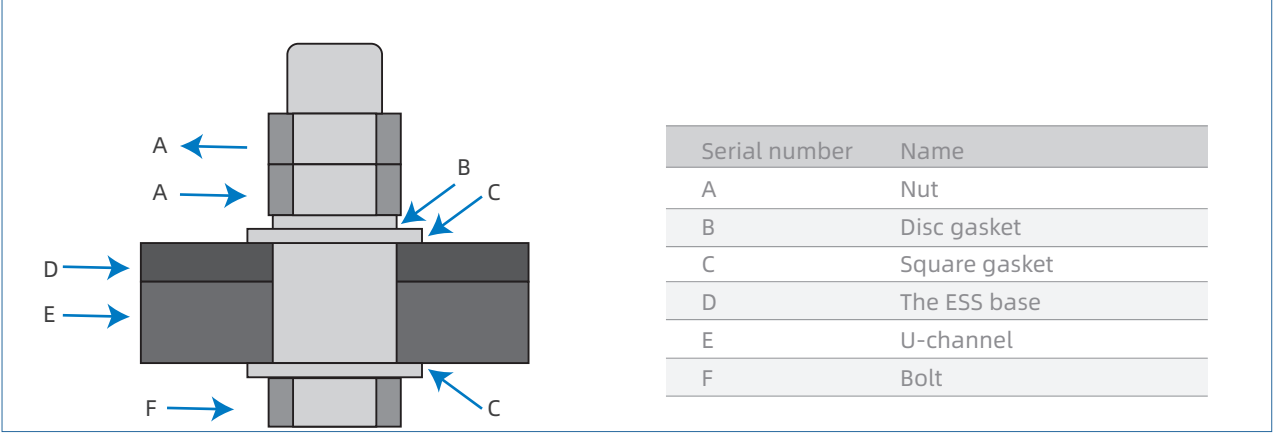
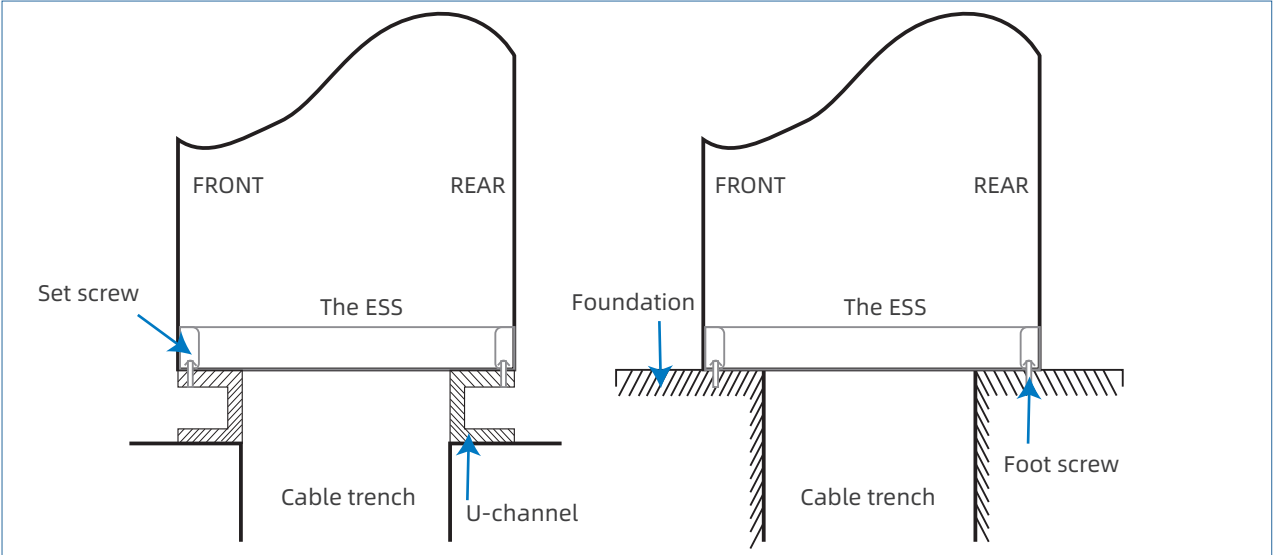
⚠ Caution

- Ensure that the ESS is vertically pressed to the ground without tip-over risk.
- Ensure that the ESS is securely installed to prevent the system from falling on workers below the structure.

Step 1: Select appropriate tools to transport the ESS to the installation position and align it with the mounting holes.

Step 2: Secure the ESS to the U-channel or foundation through the kidney-shaped hole holes in the base by using M16 bolts.

Step 3: Install the four baffles on the left, right, front, and rear sides of the ESS base, after which the ESS installation is complete.



7. Electrical Connection

7.1 Safety Instructions

To ensure the safety of personnel and equipment during the electrical connection process, it is important to follow all safety instructions in this manual, especially in this chapter, and comply with the safety regulations of the country or region where the installation is located.

Danger

Danger: High voltage!

Danger: Electric shock!

- Do not touch live parts!
- Before installation, ensure that the AC and DC sides are not powered on.
- Since the temperature of some parts of PCS is high, do not place PCS with flammable or explosive items.

Danger

During the entire electrical connection process, as well as all other operations performed on equipment including the ESSs, the following five safety rules must be observed:

- Disconnect all external connections to the ESSs and to the device's internal power supply.
- Ensure that the disconnect points are not accidentally powered on.
- Use a multimeter to ensure that the device is completely powered off.
- Perform the necessary grounding.
- Cover the parts that may be live near the operating part with an insulating fabric.

Warning

- All electrical connections must meet the electrical connection standards of the country or region in which the project is located.
- PCS can only be connected to the power grid when it is licensed by the local power supply company and installed by qualified technicians.

Warning

- Only professional electricians or personnel with professional qualifications can make electrical connections to this product.
- Please strictly follow the cable connection labels on the device.

Warning

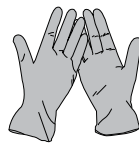
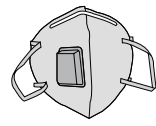
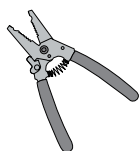
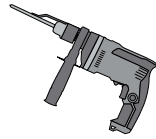
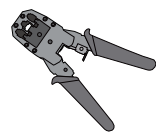
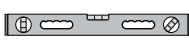
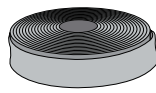
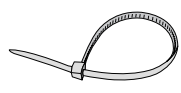
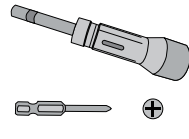
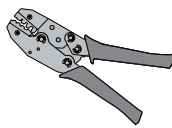
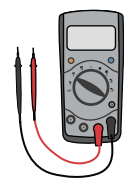
Wear protective earplugs when approaching the device during operation.

Warning

- Incorrect wiring sequence may cause fire and combustion. Pay attention to the connection sequence of the wiring components.
- Before electrical wiring, clean the terminals first. Do not touch the terminals directly after cleaning.
- Check for any cable damage. If any cable is damaged, replace it with a new one of the same specifications.
- Check whether cable connections are secure. Ensure that all terminals are firmly tightened.
- When connecting, ensure that the connector is tight. If the connection is not sufficient or the oxidation of the contact surface will also cause excessive heat, which may lead to fire.
- The screw length should be appropriate, with the screw slightly protruding from the mounting hole. A screw that is too long may affect the device's insulation performance or even cause a short circuit.
- After the installation is complete, check whether some heat shrink tubes are clipped at the connection between the copper nose and the copper bar. If the tubes are clipped, remove them in time. Otherwise, the device may be in poor contact or even be damaged.

7.2 Installation Tools

Please use the following installation tools during installation.

				
Goggles	Safety Shoes	Insulated Gloves	Dust Mask	Safety Helmet
				
Diagonal Pliers	Wire Stripper	Percussion Drill	Heat Gun	Crystal Crimping Pliers
				
Marker Pen	Level	Heat Shrink Tube	Rubber Hammer	Vacuum Cleaner
				
Cable Tie	Torque Screwdriver	Crimping Pliers	Torque Wrench	Multimeter
				
Hoisting Ring	Scissors			

7.3 Preparation Before Electrical Connection

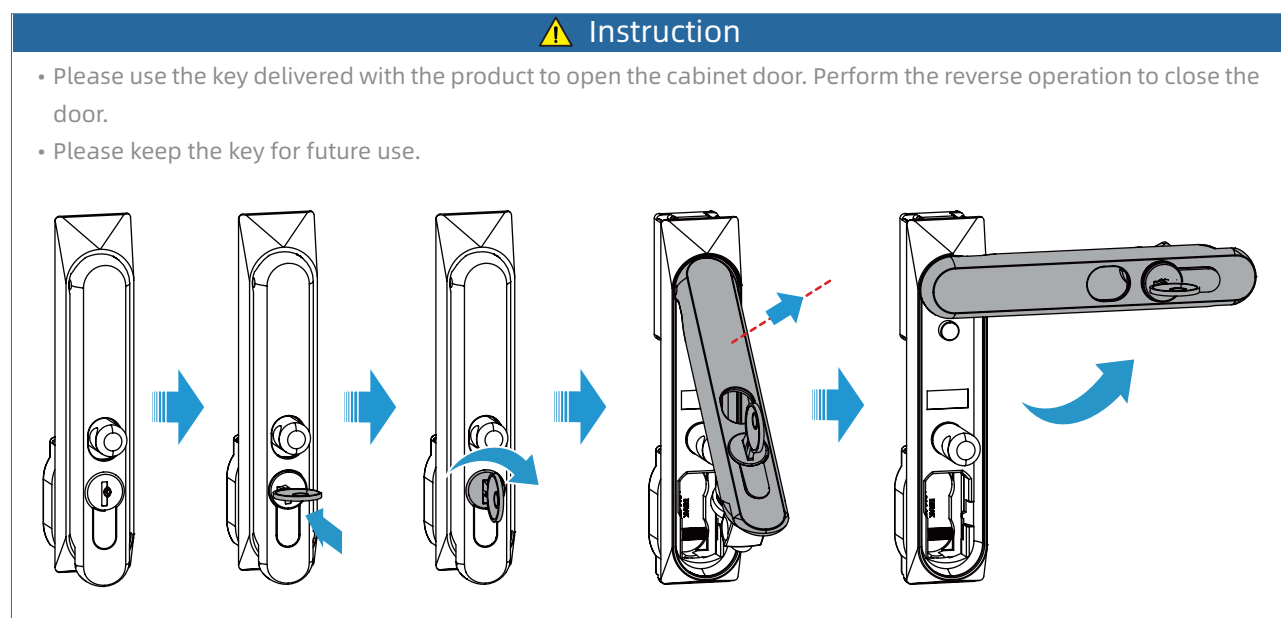
Remove Protective Film

Before delivery, the inlet and outlet of the system are coated with protective film. Remove these protective films before starting the system.

When the system is running, ensure that the water outlet of the air conditioner is not blocked and the water is flowing smoothly.

Open the Door

The user needs to open the cabinet door of the ESS before wiring. The opening and closing of cabinet doors require the use of cabinet door keys. The opening steps are shown in the following diagram:



Check the Connecting Cables

⚠ Warning

Before conducting all electrical wiring, it is necessary to conduct insulation and intactness checks on all connecting cables. Poor insulating performance, partially exposed wires, or other damaged wires pose significant safety hazards and must be replaced immediately.

Wire Terminals

Warning

- Before wiring, ensure that the polarity of the DC side cable is correct and the phase sequence of the AC side cable is consistent.
- During electrical installation, do not forcefully pull cables or wires to avoid damaging their insulation performance.
- All cables and wires should have adequate bending space to ensure proper installation and functionality.
- Take necessary auxiliary measures to reduce the stress borne by cables or wires.
- After each wiring operation is completed, it is necessary to carefully check to ensure that the wiring is correct and firm.

Warning

- Incorrect wiring sequence may cause fire and combustion. Please pay attention to the connection sequence of the wiring components.
- When connecting, ensure that the connectors are securely fastened. If the connection is insufficient or the contact surface oxidizes, it can cause excessive heat, which may lead to fire and combustion.

Instruction

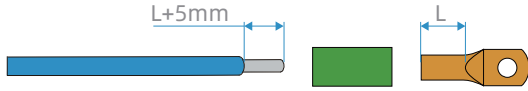
- Before conducting electrical wiring, please clean the wiring terminals and do not touch them directly with your hands after cleaning.
- Please strictly follow the description in this section before connecting the cables.

Make terminals

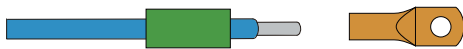
⚠ Instruction

If a multi-core cable is used, add a cable protection finger cover at the fork to prevent the outer insulation from cracking.

- 01
 - Remove the insulation sheath at the end of the cable.
 - The length of the insulation sheath at the end of the cable should be the depth of the cable nose pressure hole, plus about 5mm.

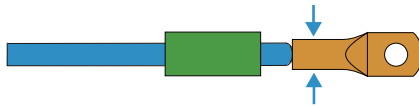


- 02 Select a heat shrink tube that meets the cable size and is about 2 cm longer than the copper nose crimping tube.

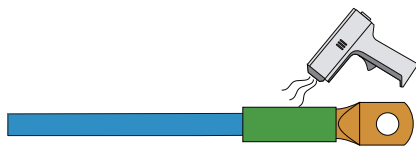


- 03 Crimping wire cooper nose

- Place the exposed copper core part of the stripped wire end into the wire crimping hole of the wiring copper lug.
- Use the terminal crimping machine to crimp the wiring lug tightly.
- Crimp more than twice.



- 04
 - Put the heat shrink tube over the wiring copper lug to completely cover the crimping hole.
 - Use a hot hair dryer to tighten the heat shrink tube.

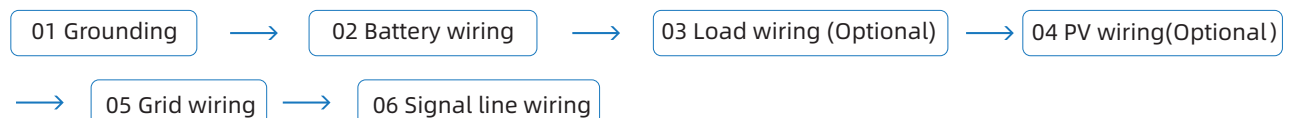


Cable Specification

Cable specifications should be configured according to the specific system capacity, routing method, and design specifications. The following specifications are for reference.

The circuit breaker at the following rated current	The cable specifications should not be smaller	Maximum terminal width for the circuit breaker	Reference ranges for the copper terminals	Notes
250A	ZC-YJV22-0.6/1kV-4x95+1x50	23mm	A/B/C/N:JGC95-8	When buried in the ground
			PE:DT-50/JG50-8/SC50-8	
	ZC-YJV22-0.6/1kV-4x70+1x35		A/B/C/N:DT-70/JG70-8/SC70-8	When not buried in the ground
			PE:DT-35/JG35-8/SC35-8	

Electrical Connection Sequence

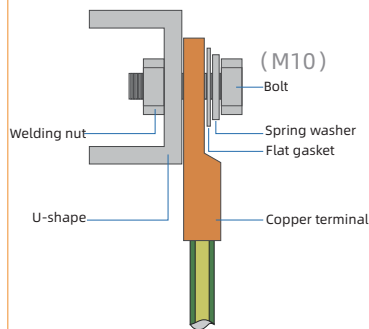


7.4 Grounding

⚠ Instruction

- There are two grounding methods: using grounding flat steel welding for fixation (recommended) and using grounding cables for fixation.
- Please bring your own protective grounding flat steel (hot-dip galvanized flat steel).

⚠ Warning

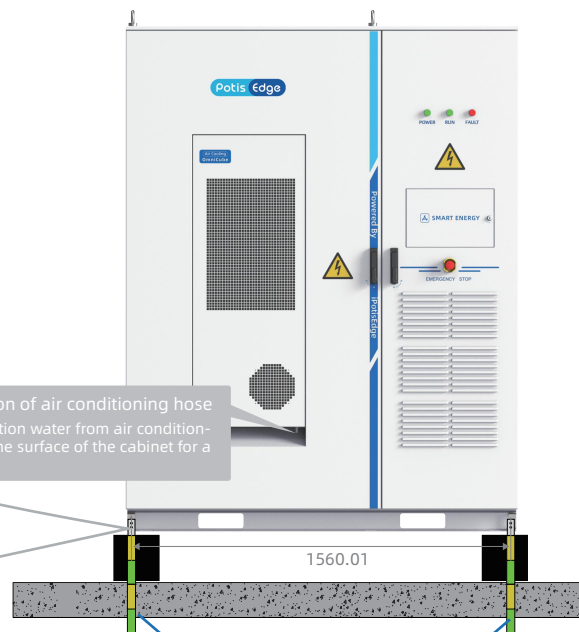


- The grounding connection between the equipment and the grounding electrode must be reliable.
- Measure the grounding resistance after grounding, and the grounding resistance should not exceed $4\ \Omega$.
- Regardless of whether the grounding part is welded or fixed with screws, please apply rust prevention treatment after completion.
- In sandy and rocky soils with high soil resistivity, in order to meet the requirements of low grounding resistance, a grounding grid composed of multiple grounding bodies in parallel is often used.
- Large photovoltaic power stations require a large amount of steel materials and a large grounding area. It is often difficult to achieve the specified grounding resistance. Efforts can be made to reduce the soil resistivity near the grounding body, thereby achieving the goal of reducing grounding resistance.

The following illustration is for reference only. Specific wiring depends on actual situation.



Installation position of air conditioning hose
⚠ Avoid condensation water from air conditioning staying on the surface of the cabinet for a long time.



Ensure at least two groundings are connected

7.5 Battery Wiring

Instruction

- If the cable connection between the batteries inside the ESS is complete, skip to the next step.
- If some parts are not connected, please refer to the figure to complete the cable connection.
- When performing installation operations, please ensure that all switches are in the disconnected state and wear insulated gloves, otherwise it may cause personal injury or equipment damage.
- Please ensure to install the PACK copper bars in the order of 01 to 08, as shown in the figure.



Installation sequence: 01 → 02 → 03 → 04 → 05 → 06 → 07 → 08

 Unconnected components

7.6 Load Wiring (Optional)

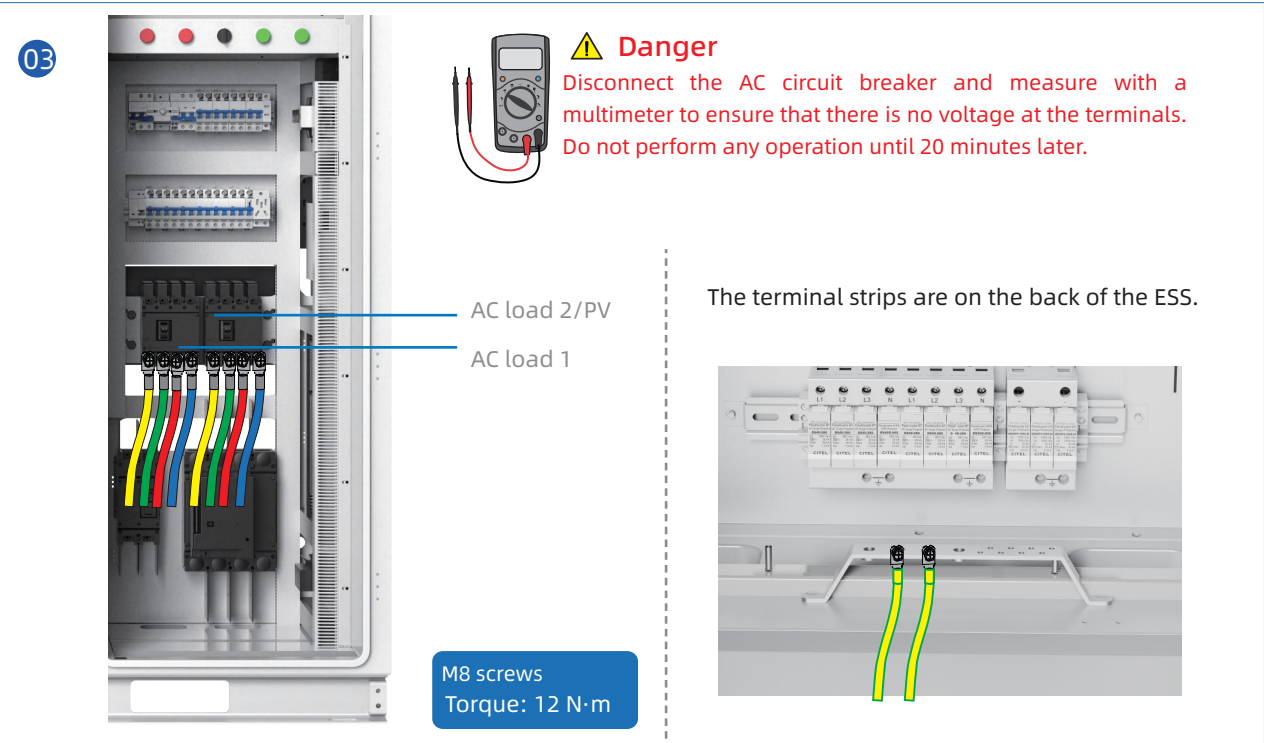
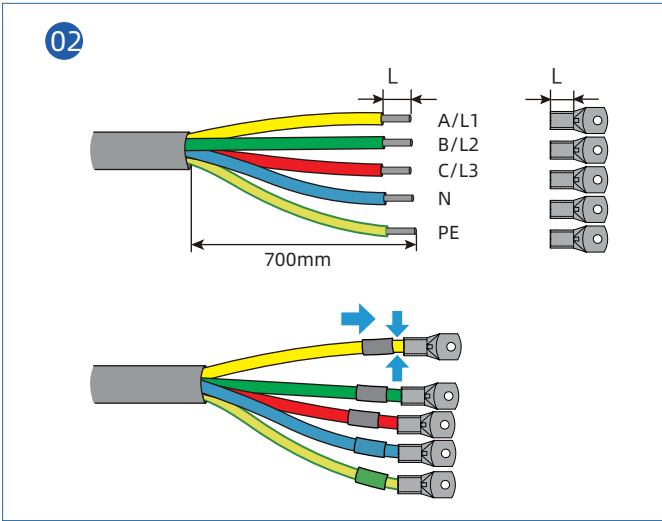
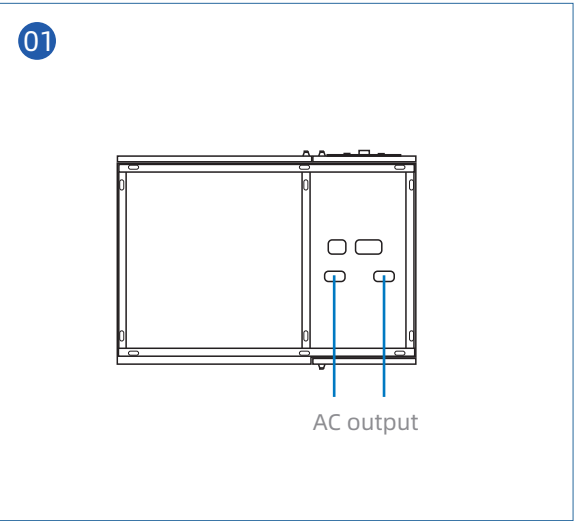
⚠ Danger

- Ensure that the AC/DC switch of the PCS is disconnected and that the wiring terminals are not charged.
- When connecting the AC power grid, disconnect the upstream AC circuit breaker and ensure that the contact terminals have no voltage.
- Connection to the grid is only possible if approved by the utility grid and all relevant safety instructions are followed.
- The AC output must be properly grounded inside the device.
- The DC and AC circuits are isolated from the housing. If required by the relevant national electrical code, a professional should be assigned to connect the system.

Step 1: Route the cable through the bottom wiring area.

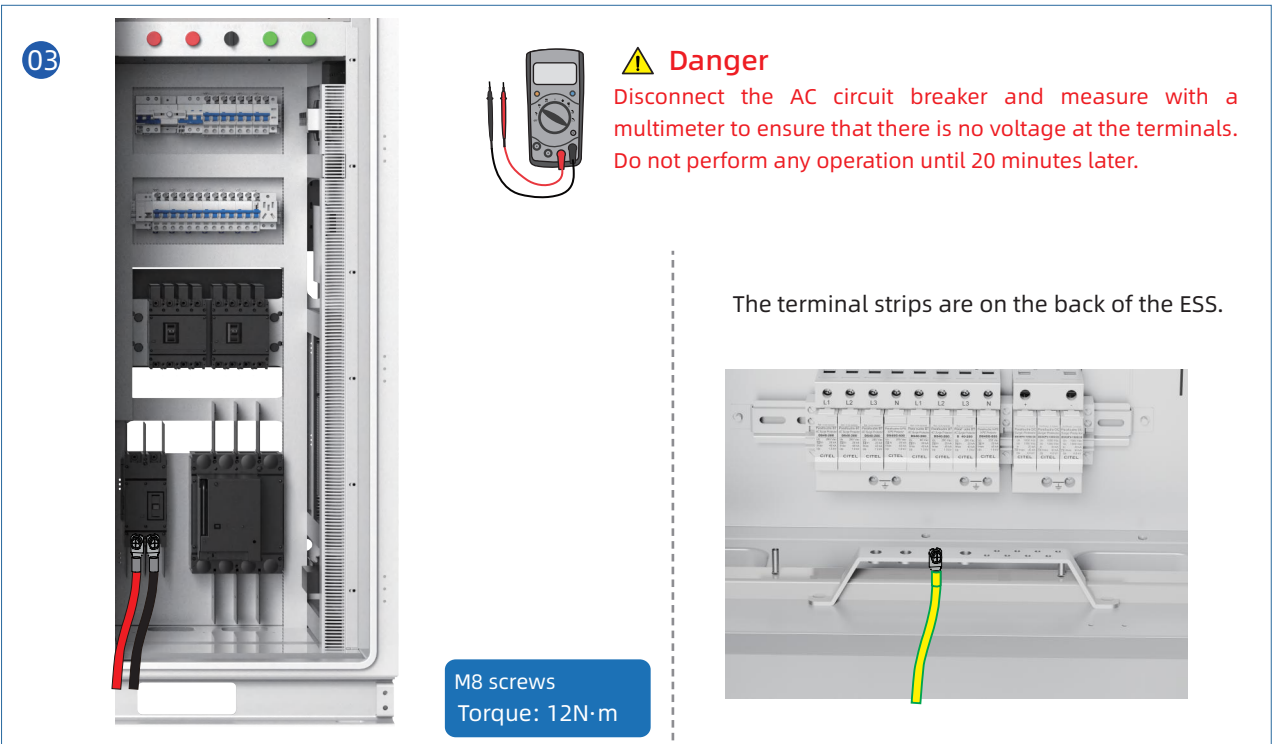
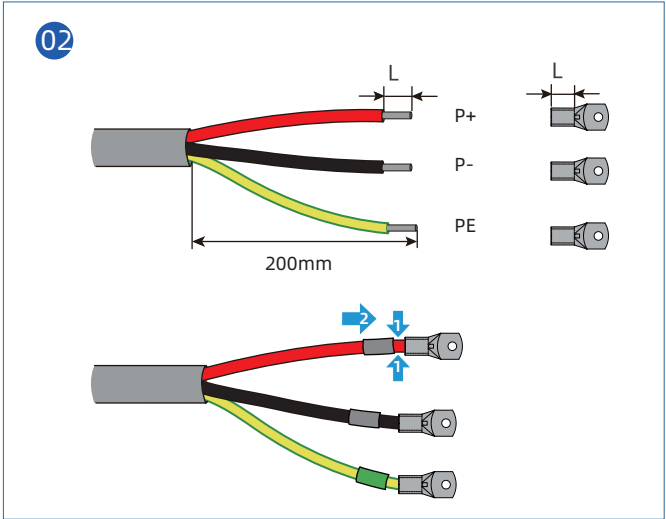
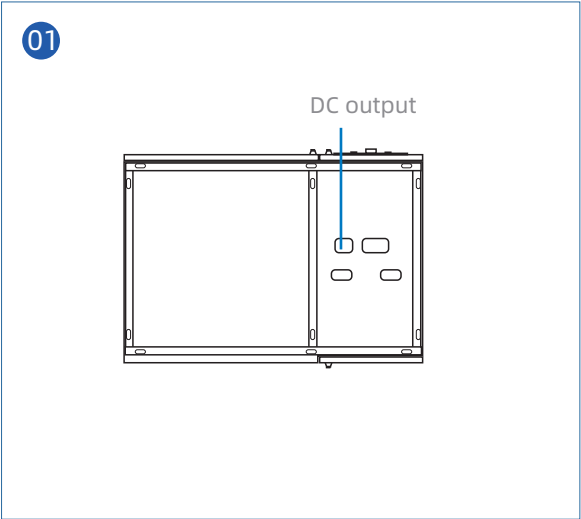
Step 2: Strip out the appropriate length and crimp the AC wire terminals to the AC cables.

Step 3: Connect the AC cables to the corresponding terminals on the ESS.



7.7 PV Wiring(Optional)

- Step 1: Route the cable through the bottom wiring area.
- Step 2: Strip out the appropriate length and crimp the DC wire terminals to the DC cable.
- Step 3: Connect the DC cables to the corresponding terminals on the ESS.



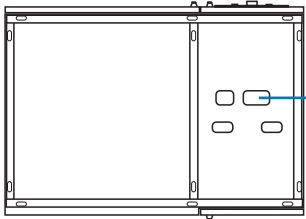
7.8 On-grid Connection

Step 1: Route the cable through the bottom wiring area.

Step 2: Strip out the appropriate length and crimp the AC wire terminals to the AC cable.

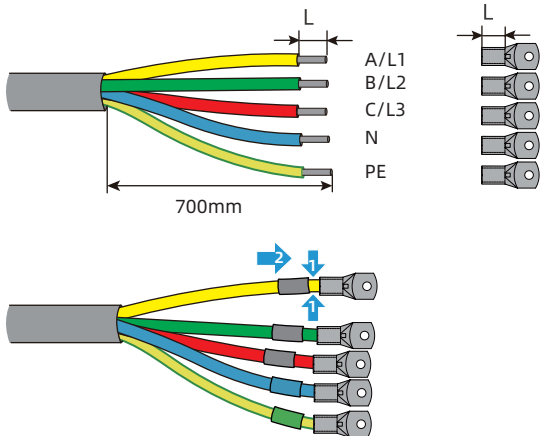
Step 3: Connect the AC cables to the corresponding terminals on the ESS.

01

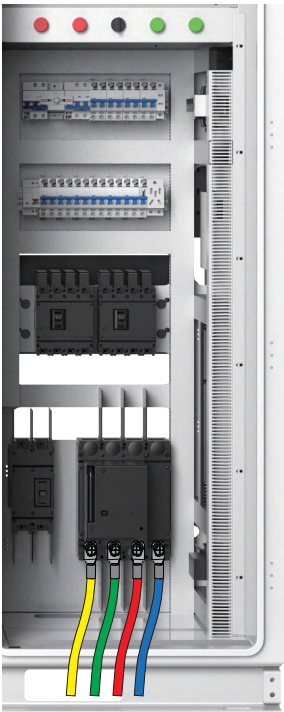


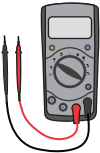
AC output
(On-grid output)

02



03





⚠ Danger

Disconnect the AC circuit breaker and measure with a multimeter to ensure that there is no voltage at the terminals. Do not perform any operation until 20 minutes later.

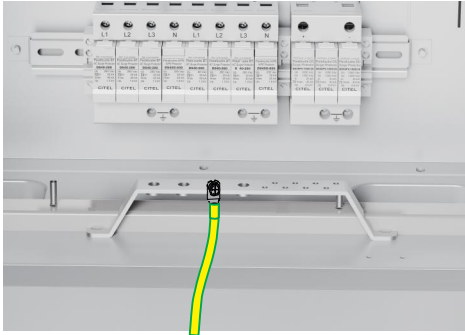
Directly connect to the grid if local utility grid requirement is met.



Grid

M10 screws
Torque: 20 N·m

The terminal strips are on the back of the ESS.

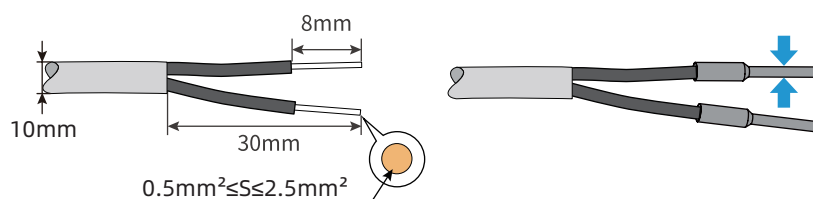


7.9 Connecting RS485 Cables to the Master Cabinet

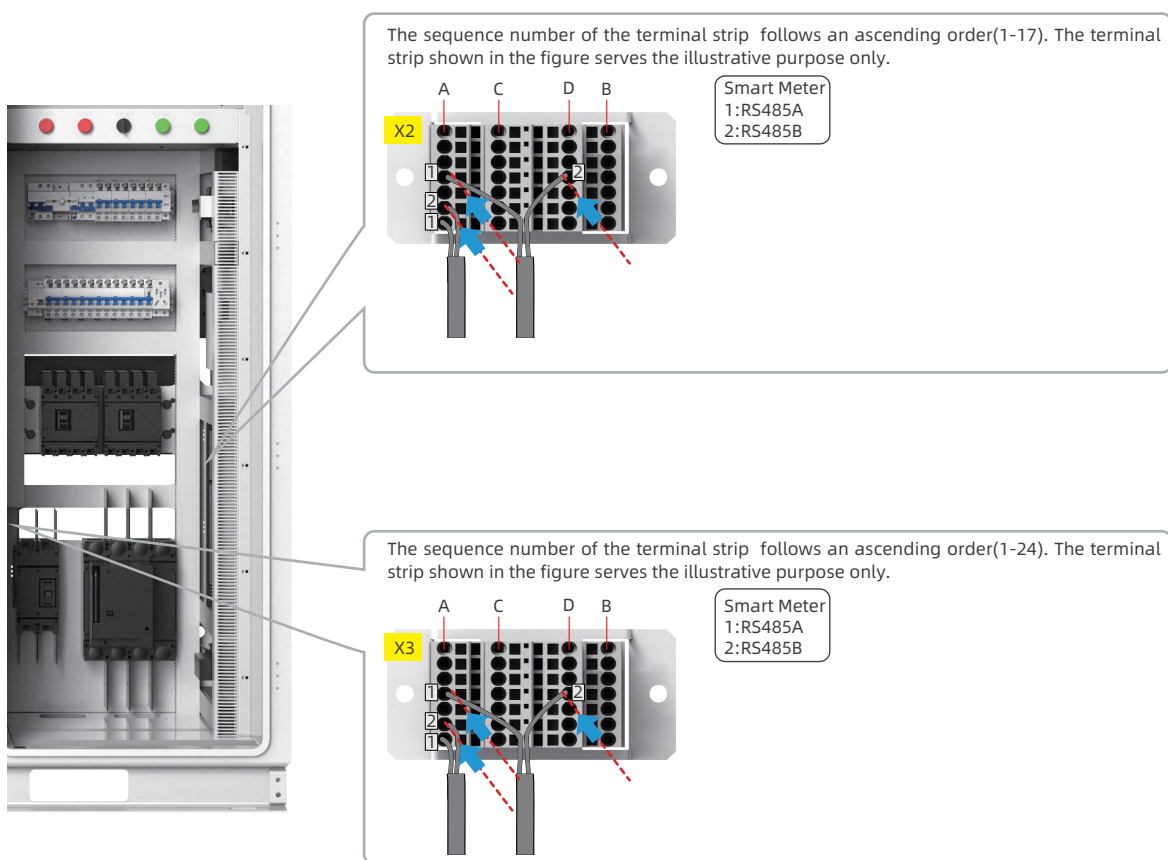
⚠ Caution

- RS485 communication cable is used to connect the smart meter and transmit the circuit information collected by the meter to the energy storage system.
- Use shielded twisted pair for RS485 communications.

01



02



- ⚠ In a parallel-connected system, the smart meter RS485A can be connected to X3:16B/X3:16C/X3:16D, and RS485B can be connected to X3:17B/X3:17C/X3:17D in the master cabinet.
The strategy meter RS485A can be connected to X3:13A, and RS485B can be connected to X3:13C.
- ⚠ In the system with a single cabinet, the smart meter RS485A can be connected to X3:19B/X3:19C/X3:19D, and RS485B can be connected to X3:20B/X3:20C/X3:20D.
The strategy meter RS485A can be connected to X2:22A, and RS485B can be connected to X2:22C.

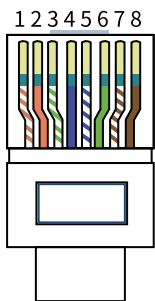
7.10 Installing the Signal Cables

⚠ Caution

- The ESS can be connected to the monitoring platform through the LAN communication cable.
- You can view the equipment information, configure the parameters and set the system operation mode through the remote monitoring platform.
- When connecting the LAN communication cable, the cable routing should avoid interference sources, such as power lines, to prevent signal reception issues.

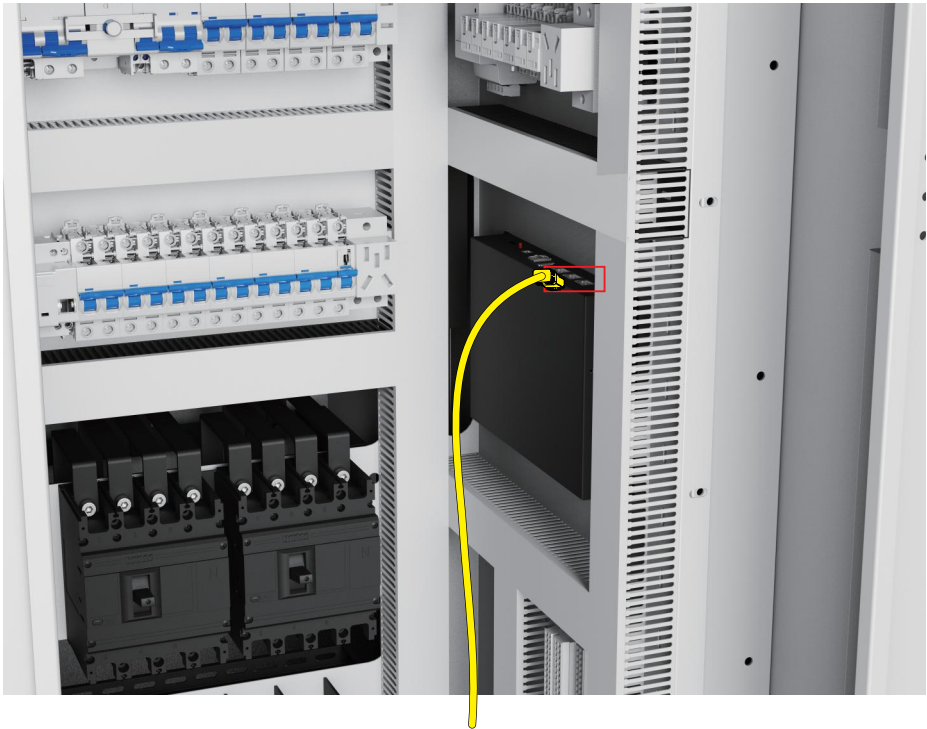
⚠ Instruction

- 01 Signal cables are conventional network cables (CAT 5E outdoor shielded network cables), which can should be prepared by users themselves.



No.	Color
1	Orange white
2	Orange
3	Green white
4	Blue
5	Blue white
6	Green
7	Brown white
8	Brown

- 02 Inset the signal cable into any port and ensure shield protection.



7.11 Wiring and Waterproofing

- When the equipment requires upward cabling, use overhead cabling. If underground cabling is required, the cables should be routed through concealed groove. The principle of electrical connection is safe, reliable and standardized.
- Cable joints are not allowed in the middle of the cable.
- When high-voltage cables and low-voltage cables are arranged side by side, the distance between them should be greater than 200 mm, and the distance between high-voltage cables should be greater than twice the diameter of the high-voltage cables to ensure adequate heat dissipation.
- According to the cable inlet and outlet holes of the system, cables must be laid in the space below the system and routed to each device through the cable inlet and outlet holes at the bottom. Select proper cables based on the requirements of the devices in the system.
- The terminals, contacts and other unnecessary exposed parts of the line should be adequately insulated.
- After confirming that all wiring is correct and firm, use bricks or fireproof mud to seal the gaps between the cable access holes on the side of the system. In addition, take waterproof measures to the system installation base.
- When strong current and weak current are laid in the same channel, take the necessary shielding measures.

7.12 Completion of Electrical Connection

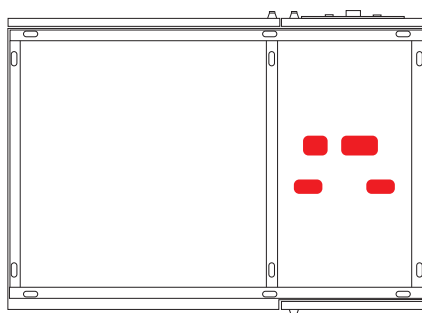
⚠ Caution

- Check the connection of all cables. Make sure all connections are properly secured and tight.
- Effectively protect the cable inlet and outlet holes of the system. For example, use fireproof mud to seal the gaps between cables.
- If waterproof terminals are used for sealing, check whether the terminals are secured. Empty terminals must be sealed.
- Put all the shields together firmly.
- Waterproof measures should be taken for the foundation at the bottom of the outer cabinet.

⚠ Warning

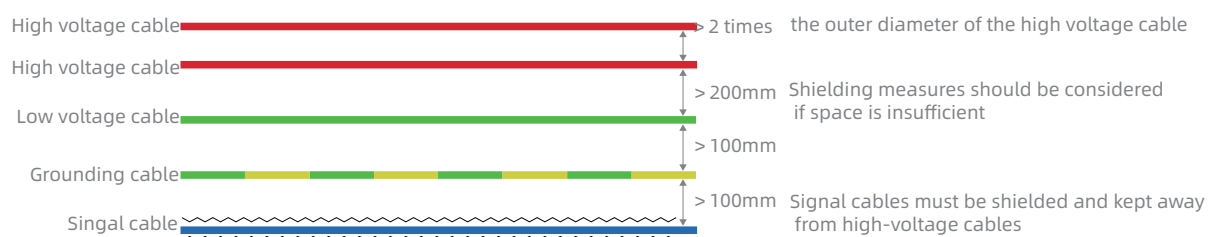
If not properly sealed, the equipment is prone to moisture and rodents.

⚠ Instruction



Fire-resistant mud

After all wiring harnesses are connected, block the outlet with fire-resistant mud.



7.13 Installation Checklist

After the ESS is fully installed, its mechanical installation and electrical connections should be meticulously checked. At least two staff members are required to carry out the check according to the items listed in the table below. Records shall be made during the check. Once nonconformity is found with the national and industrial standards or specifications, it shall be corrected immediately.

Mechanical Installation Check

- ☐ The ESS has no deformation or damage.
- ☐ The bottom of the ESS is fixed and the brackets are stable.
- ☐ There is ample space around the ESS.
- ☐ The ambient conditions of the ESS include temperature, humidity, and ventilation meet requirements.
- ☐ Cooling air flows steadily.
- ☐ Seal protection of the cabinet enclosure is complete and reliable.

Electrical Installation Check

- ☐ The ESS is firmly grounded.
- ☐ The grid voltage matches the rated output voltage of the ESS unit.
- ☐ The phase sequence of the grid is consistent, and the tightening torque meets the requirements.
- ☐ The DC input is correctly connected to the positive and negative anodes, and the tightening torque meets requirements.
- ☐ Communication cabling is correct, and a certain distance from other cables is kept.
- ☐ The cable number is correct, clear and easy to distinguish.
- ☐ The insulation shield is complete and reliable, and the warning labels are clear and firm.

Other Check

- ☐ All unused cables are tightened with insulation cable ties.
- ☐ There are no tools, parts, conductive dust generated by drilling, or other foreign matters left in the cabinet.
- ☐ There is no condensation or frosting inside the cabinet.

8. System Commissioning

8.1 Power-on Check

No.	Check item
1	The equipment is securely installed with an installation position easy for O&M. The installation space is well-ventilated, easy for heat dissipation, clean and tidy.
2	The ground protective cable, on-grid AC cable, load cable, and communication cable must be properly and securely connected.
3	Cables must be bundled in accordance with cable routing requirements, properly distributed, and free from damage.
4	The battery cluster switch, AC switch, and DC power switch are disconnected.
5	The voltage and frequency of the on-grid access point of the ESS meet the grid connection requirements.

8.2 System Power-on

Step1: Use multimeter to check whether the input voltage of the on-grid MCCB meets requirements (AC380V). If yes, go to the next step.

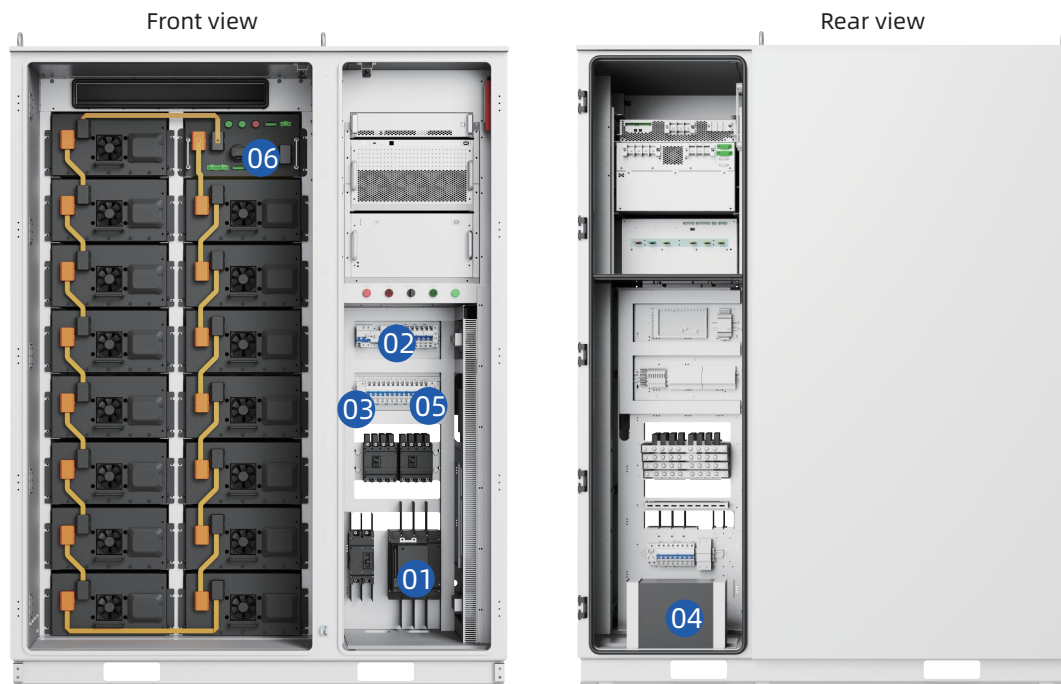
Step2: Turn on QF1-1, QF2 to QF6.

Step3: Turn on QF7. (If there is no on-grid demand, please go directly to the next step)

Step4: Turn on the UPS.

Step5: Turn on QF10 to QF12, QF14 to QF15, QF21.

Step6: Open the HV BOX. Turn the handle on the switch box to "ON".



Power-on step: ① → ② → ③ → ④ → ⑤ → ⑥

⚠ Instruction

- If the UPS is under voltage and no voltage is detected in the QF1-1 auxiliary power supply, manually switch to the
- QF1-2, and the mains supplies power to the UPS.
- After the UPS is charged, normal operation is possible if the auxiliary power switches from QF1-2 to QF1-1.

⚠ Caution

Under the off-grid mode, the system is put at risk of failing to start up when the battery runs out of juice and the operating temperature is below -20°C.

8.3 System Power-off

Danger

- When operating and maintaining the ESS, power off the system. Otherwise, the system may be damaged or electric shocks may occur.
- After the system is powered off, it takes some time for the internal components to discharge. Please wait until the devices are fully discharged according to the required time label.
- In case of emergency, use the emergency stop switch to power off the device.

Power-off step: 01 → 02 → 03 → 04 → 05

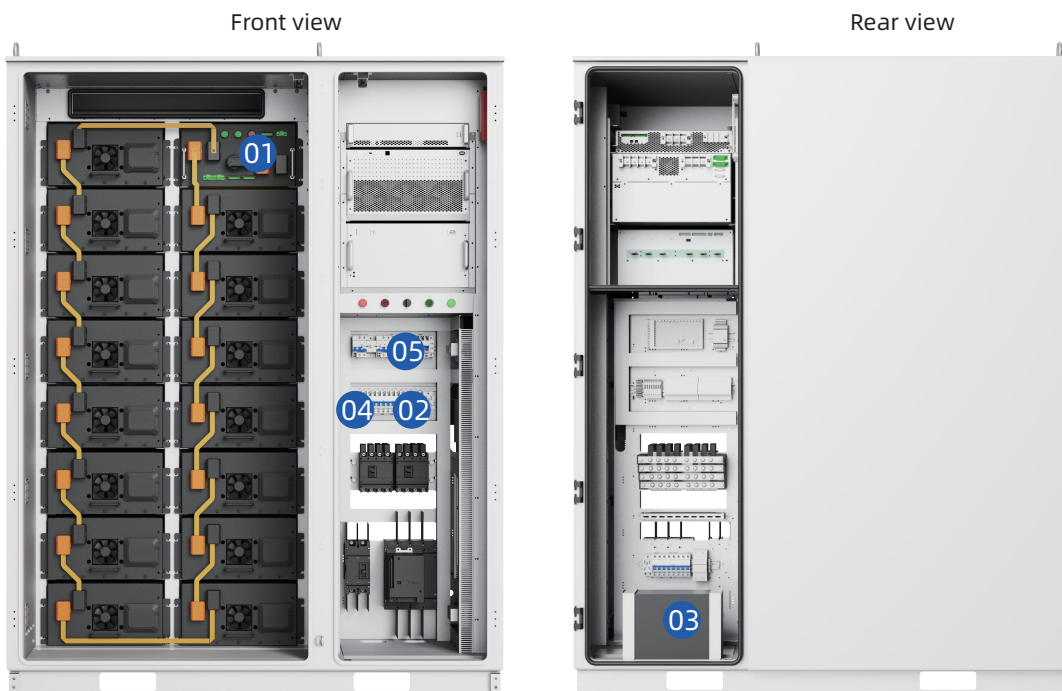
Step1: Disconnect the HV BOX, and turn the handle on the switch box to "OFF".

Step2: Turn off QF10 to QF12, QF14 to QF15, QF21.

Step3: Turn off the UPS.

Step4: Turn off QF7. (If there is no on-grid demand, please go directly to the next step)

Step5: Turn off QF1-1, QF2 to QF6.

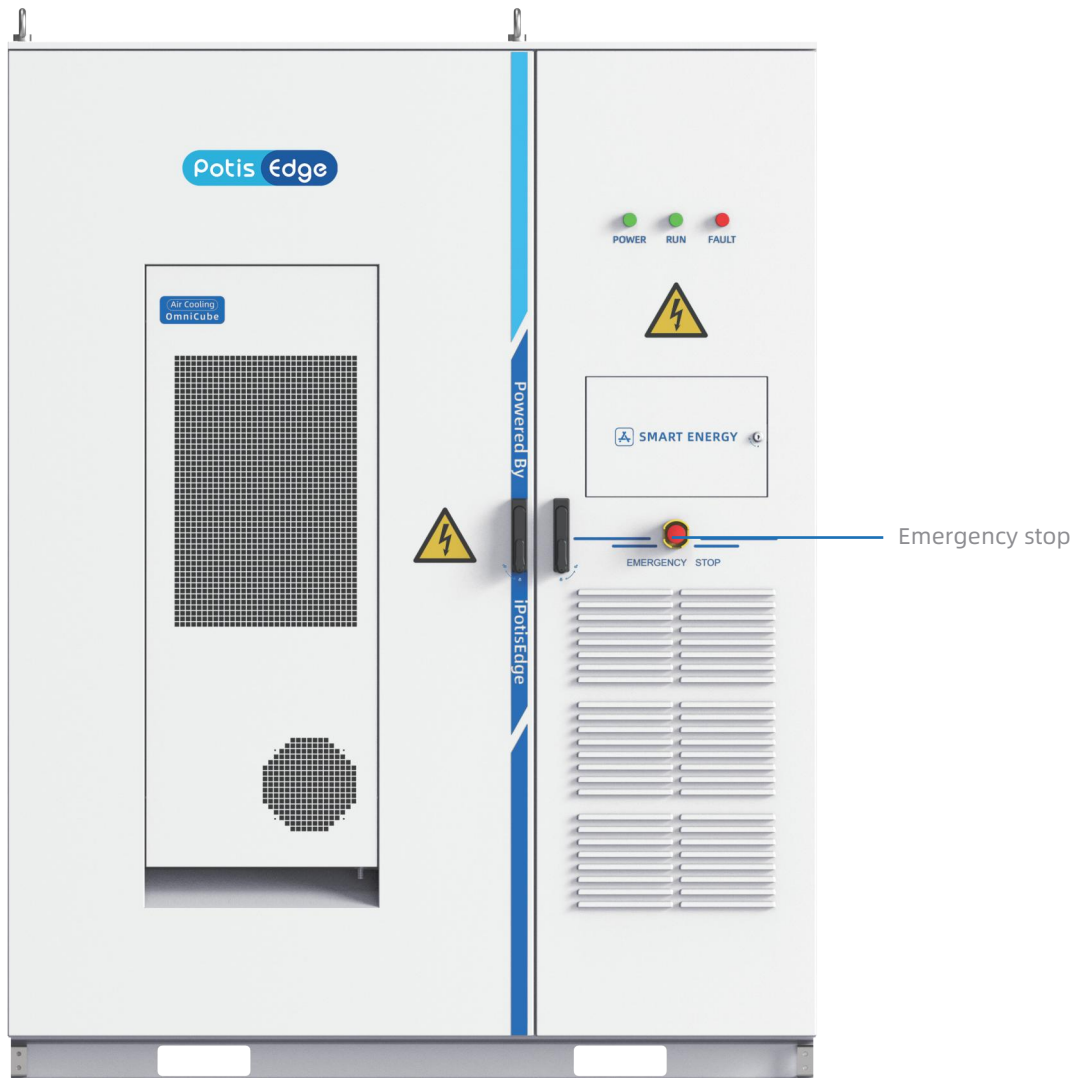


8.4 Unscheduled Power-off (Emergency Stop)

Instruction

In the event of an emergency, personnel must evacuate ASAP and contact professional(s).

Power off the machine by pushing the emergency stop button on the front door.



9. Maintenance

9.1 Maintenance Precautions

Scope of Application

This section is applicable to the operation and maintenance(O&M) of the ESS.

This section includes the basic requirements of system O&M management, station, personnel , service, safety management, emergency response, and the records, evaluation and improvement of O&M.

Basic Requirement

- The ESS O&M must comply with national laws, regulations and standards.
- The ESS O&M must have a sound management system and safety norms.
- The ESS O&M must be undertaken by responsible person(s) with specific work process and duties. Operating procedures of O&M must be formulated.

Equipment Requirements

- The equipment infrastructure must be complete and meet the relevant national or industry standards. The use, maintenance and management of the equipment must be undertaken by specialized personnel.
- O&M personnel must conduct weekly, monthly, quarterly and annual inspections of the system in accordance with the inspection mechanism.
- The internal environment of the equipment must be kept clean and tidy, and the surface of the charging equipment is clean and tidy, free of rust and stains.
- The electrical facilities in the equipment should be free of flammable and explosive materials, pollution and corrosive media.

Personnel Requirements

General Requirements

- The system must be operated and maintained by a specialized person, with at least two individuals responsible for the O&M at each station.
- O&M personnel must have been trained regarding safe production and O&M skills.
- O&M personnel must operate in accordance with the operation process and O&M requirements.
- O&M personnel must be responsible for the work they are engaged in, fulfill their service commitments, and use professional and industry-standardized language.

Job Responsibility Requirements

- O&M personnel are responsible for the operation and maintenance of all facilities including monitoring the operation status of all facilities, dealing with the failure of all facilities and maintaining the key components of the facilities.
- O&M personnel are responsible for the safety of equipment operation including improving the safety system of equipment, carrying out periodic safety inspections and supervising and reporting the safety situation of equipment.

Job Skill Requirements

- O&M personnel must master the working principle of the ESS, common troubleshooting, maintenance, emergency handling and work safety.
- O&M personnel must understand the relevant rules and regulations of national production safety, master the knowledge of electricity safety and emergency response.

Service Requirements

Status Monitoring

- O&M personnel must always monitor the operation status of power station energy storage facilities, formulate preventive measures in advance for possible problems, and deal with existing problems in a timely manner.
- O&M personnel must conduct data analysis on a weekly, monthly, quarterly and annual basis, and formulate preventive maintenance plans according to the analysis results.

Periodic Inspection and Maintenance

- O&M personnel must inspect, repair and maintain the equipment on a weekly, monthly, quarterly and annual basis to ensure the performance and life of the facility.
- The weekly, monthly, quarterly and annual inspection records of the equipment must be compiled and publicized every month.
- If the weekly, monthly, quarterly and annual inspection of the equipment will affect the operation of the power station, the operation and maintenance personnel must issue a notice in advance and share it in the work group.

Spare Parts and Tools Management

- O&M personnel must manage spare parts and tools of the equipment, and be familiar with the inventory and use of spare parts.
- The process of purchasing and receiving equipment spare parts must be recorded.

Danger

Before maintenance, perform the following operations:

- Disconnect the DC isolation switch on the PCS, and ensure that the battery is disconnected from the PCS.
- Disconnect the circuit breaker in the HV BOX and the connection between the HV BOX and the battery box. The ESS is disconnected.
- Ensure that the ESS is well grounded. After disconnecting the system from all DC and AC power sources, wait at least 20 minutes before checking with a multimeter.
- Ensure that all power supplies are disconnected and in a safe state before performing maintenance.
- **Always keep in mind that even if the system is not running, there is still a dangerous voltage inside the system.**

9.2 Periodic Maintenance

Warning

- In order to ensure the optimal operation of all devices in the system, it is necessary to maintain them regularly.
- The maintenance periods specified in this section are for reference only. The actual maintenance period should be determined based on the actual environment. If the system operates in a harsh environment, such as a desert area, the corresponding maintenance period should be shortened. In particular, internal and external cleaning, corrosion prevention and rust prevention work should be more frequent.
- If the system is installed in a desert area, it is recommended to carefully inspect the inside and outside of the ESS after sandstorms, and thoroughly clean it.
- Wait until the internal devices of the system are completely powered off before starting the inspection work! During the inspection, if any nonconformities are found, please correct them immediately.

Safety Management

Organization And Personnel

- Interms of the O&M system, safety management organization must be found, with full-time or part-time safety officers to examine the whole O&M process.
- O&M personnel must abide by the safety operation specifications, operate in a fixed area, and strictly restrain form the operation of mechanical and electrical equipment unrelated to O&M.
- O&M personnel must wear working clothes, insulating shoes and protective equipment in accordance with the requirements.
- O&M personnel must deal with or report safety risks found during inspection or investigation in time.

Equipment

- O&M personnel must ensure the electrical safety of the equipment.
- O&M personnel must replace the faulty equipment in time. Do not use the faulty equipment for operation.
- Cut off power supply before equipment maintenance.
- Safety management personnel in the weekly, monthly, quarterly and annual inspection process must check a variety of safety signs. If any safety sign is found deformed, damaged or faded, repair or replace it promptly.

Irregular Inspection

Safety management personnel must conduct irregular inspections of the equipment, correct wrong operations, and promptly deal with or report any safety hazards that have been found.

Fire Safety

- Fire safety management must comply with relevant laws, regulations and standards.
- Fire fighting facilities must comply with laws, regulations and standards. Fire fighting facilities must be complete and effective, with obvious and clear signs.
- Fire safety inspection must be carried out every month, and the fire fighting facilities shall be maintained by specialized personnel. The fire fighting and monitoring system must be in optimal condition.
- Fire training and emergency drills must be conducted twice a year, and safety management personnel must master fire-fighting knowledge and be familiar with the location, performance and use of fire equipment.
- All emergency exit channels must be kept open, and personnel can be evacuated promptly and effectively in case of fire.

Tool Management

The O&M team of the power station is equipped with the necessary tools for daily work, including safety protection and maintenance tools, to ensure that the inspection, maintenance and overhaul work is carried out properly.

Tools list	Maintenance tools		
Safety Helmet	Kit	Multimeter	Insulation resistance tester/megohm meter
Dust mask	Screwdriver	Electroscope	Electrician's knife
Insulated gloves	Electrician's pliers	Infrared thermometer	Electrical insulating tape
Protective gloves	Wrench	Digital hygograph	Flashlight
Insulated shoes	Needle nose pliers	High voltage electroscope	Climbing truck
			Charge and discharge meter

Record

- O&M personnel must record service processes, including the records of troubleshooting, periodic inspection and maintenance, and spare parts replacement.
- Original data of O&M services must be retained. Records shall be timely, accurate, authentic and complete.
- All paper records must be converted to electronic files and the original paper records shall be kept for at least 3 years. The retention period of electronic records shall not be less than 5 years.

Everyday

Routine Inspection	Check if there are any fault alarms on the home page of the system.
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Every Month

Filter Cotton	01. Check the filter cotton for foreign objects and blockage. 02. If the operating environment of the ESS is relatively harsh, such as in desert areas, the corresponding maintenance cycle is once a month; 03. If the ESS operates in a conventional area, such as a plain area, the corresponding maintenance cycle can be once every three months.
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Anti-insect nets	Conditions of anti-insect nets shall be cross-checked as the nets could be flawed due to environmental factors. The nets must be repaired once found broken and must be cleaned once dropped insects are found, so as to ensure the service life, which will be otherwise impacted by the decomposed bugs.
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Every Three Months

Energy Storage System Inspection	01. Observe the appearance of the ESS for damage, deformation or rust. 02. Check whether there is abnormal sound when the ESS is running. 03. Observe various parameters during operation through battery array unit. 04. Use the thermal imager to detect the heat condition of the system. 05. Check whether the electrolyte leaks out of the battery box. 06. Check whether the ventilation, ambient temperature, humidity, and dust meet the requirements.
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Duct Cleaning	01. Check the air duct for dust. 02. Check whether there is abnormal vibration when the fan is running. 03. Use tools to clean.
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Fire Protection Section	Conduct a visual inspection to evaluate the operational status of detectors and aerosol fire extinguishing devices.
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Check the Appearance and Structure of Batteries	01. Visually test whether the shell is clean. If there are stains, wipe clean and keep ventilated and dry. 02. Visually detect whether there is leakage or deformation of the shell. If yes, replace timely. 03. Refer to the record and measure whether the ambient temperature is normal.
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Voltage, Internal Resistance (Conductance) Measurement	Voltage measurement: Use a multimeter or DC voltmeter to measure the battery terminal voltage and the total voltage of the battery pack, record and judge. Internal resistance (conductance) measurement: Use an internal resistance meter (or conductance meter) to measure the internal resistance (conductance) of a battery cell and compare it with each other. If there are individual batteries with high internal resistance, focus on checking the following: 01. Whether the battery runs correctly. 02. Whether the battery voltage and temperature are within the specified range. 03. Whether the battery has been overcharged or undercharged for a long time. 04. Whether the operation exceeds the recommended service life by the manufacturer.
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Check The Battery Connection	Ensure that all connection parts of batteries are secured, bolts are not loose, or joints are overheated.
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Every Six Months

Safety Function	01. Check the emergency stop button and the LCD stop function. 02. Simulate power-off. 03. Check the warning label and other equipment identifier. If it is blurred or damaged, replace it in time.
Air Conditioning Section	01. Check whether the power cable and communication cable of the air conditioner are normal. 02. Check whether the air conditioner runs normally, and whether the temperature difference between the inlet and outlet inside and outside the cabinet is obvious when the refrigeration system starts. 03. Check whether the fan and compressor work normally when the system is running, and if there is obvious, abnormal sound or vibration. 04. Check the mechanical structure for damage and deformation. 05. Check whether the air conditioner's internal and external circulation inlet and outlet and the cabinet's outer protective cover's inlet and outlet screen are blocked. 06. Check whether the cooling of the air conditioner is normal and whether the internal temperature of the system meets the requirements.
Device Maintenance	01. Routine inspection of the corrosion of all metal components. 02. Contactor annual inspection (auxiliary switch and micro switch) to ensure that the mechanical operation is good. 03. Check operating parameters (especially voltage and insulation, etc.). 04. Check whether all circuit breakers are invalid. 05. Check whether the circuit breaker or load switch is damaged. 06. Check the cleanliness of the circuit board and components. 07. Check the heat sink temperature and dust. If necessary, use a vacuum cleaner to clean the heat dissipation module or replace the filter.
Circuit Connection	01. Check all electrical connections for loose or poor contact. 02. Check whether the skin touching the cable and metal surface is damaged or scratched. 03. Check whether the insulation wrapping tape of all wiring terminals is off. 04. Check whether the screws are overheating. 05. Check whether the color of the copper bar and screws is faded.
Door Lock, Hinge Inspection	01. After the cleaning work, check whether the locks, hinges, etc. of the energy storage integrated system can be used normally and are in good condition. 02. If necessary, properly lubricate the door locks and hinges.
Seal Inspection	The seal in good condition is an important guarantee to effectively prevent water seepage inside the system. Check carefully. If damaged, please replace it immediately.
Fan	01. Check the running status of the fan module. 02. Check whether the fan is blocked. Check for any abnormal noise during operation.

Every Twelve Months

Fire Protection Section	Check if the system is functioning properly. (Attention: Disconnect the circuit between the detector and the aerosol fire extinguishing device before testing!) 01. Check if the detector sends an alarm signal when detecting smoke and temperature signals. 02. Check if there is a 24V start signal on the circuit between the detector and the aerosol fire extinguishing devices when the level 2 alarm is reached.
Grounding the Cable Shield Layer	Check whether the cable shielding layer is in good contact with the insulation tube. Check whether the ground copper bar is fixed properly.
Lightning Protection Equipment And Fuse	Check whether the surge protection device and fuse are properly secured.
Cabinet Exterior	01. Check whether screws fall off inside the ESS. 02. Check whether there is oxidation or rust inside the ESS. 03. Check whether the security door, main door and battery hatch of the ESS can be opened normally. 04. Check whether the internal and external environment of the ESS is clean, tidy, and free of debris. 05. Check whether the ESS is corroded or falls off. 06. Check whether the ESS is properly grounded. 07. Check whether the safety warning label on the ESS is removed. 08. Check whether the battery cabinet and control cabinet in the container are firmly fixed. 09. Check whether the cable is sealed at the inlet and outlet of the device. 10. Check the open trench of the cable to prevent damage to the cable. Ensure that the support is properly grounded and the heat dissipation in the trench is good.
Cabinet Interior	01. Check whether there are foreign objects, dust, dirt and condensate inside the system. 02. Check the inlet and outlet of the system. Check the heat sink temperature and dust. 03. If necessary, use a vacuum cleaner to clean the cooling module, etc.
Wiring And Cable Layout	01. Check whether the cable layout is standard and short circuit exists. If there is an anomaly, correct it immediately. 02. Check whether all inlet and outlet cable holes of the system are properly sealed. 03. Check whether there is water seepage inside the system. 04. Check whether the power cable connection is loose and tighten it according to the previously specified torque. 05. Check the power cable and control cable for damage, especially if the skin in contact with the metal surface has traces of cuts. 06. Check whether the insulation wrapping tape of the wiring terminal of the power cable is off. 07. Check whether the ground connection is correct and the grounding resistance must be no greater than 4 Ω. 08. Check whether the equal potential connection inside the system is correct.

System Cleaning

Cleaning around and inside the ESS is an important part of maintenance. Environmental factors such as temperature, humidity, dust, and internal device vibrations can cause dust to accumulate inside the system. This can block the air inlet and outlet or enter internal devices, potentially leading to failures, shortening the service life of the equipment, or reducing power generation.

During the normal operation of the equipment, regular inspection and cleaning should be carried out to ensure that the internal equipment is in a better operating environment.

Cleaning Cycle

The cleaning cycle of the system should be reasonably determined according to its operating environment, such as climatic conditions, to ensure that the external and internal cleaning conditions of the system are good.

If the operating environment is harsh, such as a desert area, shorten the maintenance period.

Internal Cleaning of ESS

Do not use a broom to clean the dust inside the system. Otherwise, dust may be raised. If necessary, use a vacuum cleaner to absorb dust.

Internal Cleaning of Foundation

Enter the inside of the foundation regularly to check the cleanliness of the foundation. Use a vacuum cleaner if necessary.

Warning

- Air intake ventilation must be checked. Otherwise, modules will be problematic due to overheating.
- The preceding routine maintenance periods are recommended only. The actual maintenance period is determined based on the specific installation environment. Power station scale, location, site environment and other factors will affect the product maintenance cycle.
- If the operating environment is windy or dusty, it is necessary to shorten the maintenance period and increase the frequency of maintenance.

9.3 Battery Maintenance

9.3.1 Regular Maintenance and Period

The following is the recommended maintenance period. The actual maintenance period should be adjusted based on the specific installation environment.

Factors such as station size, installation location and site environment will affect the maintenance cycle of the product. If the operating environment is windy or dusty, shorten the period but increase the frequency of maintenance.

Caution

- When the voltage of an individual cell is less than 2.5V, please contact the manufacturer for replacement. Capacity loss caused by continued use of the abovementioned undervoltage cells is not covered by the warranty.
- When the voltage of an individual cell is less than 2V, please stop using it and contact the corresponding manufacturer for recycling.

Every 6-12 Months

Ambient temperature and humidity check	• Check the ambient temperature record to see whether the temperature is within the operating range. • Check the ambient humidity record and check whether the humidity is within the operating range.
Functional check	• Check the operation status of the DC contactor: in the case of shutdown, send the ON/OFF command to check whether the operation is normal. • Measure whether the 24 V output voltage is within the specified range. • Check the battery pack running record, current, voltage, and temperature are within the range of use.

Every year

Switchgear (if any) and battery module box	Check the following items and correct them immediately if they do not meet the requirements: • Check for any flammable objects on the top of the battery pack. • Check whether the fixed point of the battery pack and the foundation steel plate is firm and whether there is rust. • Check whether the box is damaged, paint off, or oxidized. • Check the battery pack for foreign objects, dust, dirt, and condensate.
Wiring and cable layout	Wait until the battery pack is completely power-off before start checking! During the inspection, if any nonconformities are found, please correct them immediately. • Check whether the cable layout is standard and short circuit exists. If there is an anomaly, correct it immediately. • Check that all inlet and outlet holes of the battery pack are properly sealed. • Check whether there is water seepage inside the battery pack. • Check whether the power cable and copper bar are loose, and tighten the cables according to the specified torque. • Check power cables and communication cables for damage, especially the skin in contact with the metal surface for marks of cuts.
Ground connection	Check whether the grounding connection is correct. The grounding resistance must be no larger than 4 Ω.
Fan	• Check whether the fan is faulty, for example, blocked or stalled. • Check whether abnormal noise exists when the fan is running.
Screws	Check whether screws are dropped or corroded inside the battery pack.

Every two years

Battery string status and cleaning	Check the following items and correct them immediately if they do not meet the requirements: • Check whether battery packs and internal devices are damaged or deformed. • Check whether there is abnormal noise during the running of internal devices. • Check whether the temperature in the battery pack is too high. • Check whether the internal humidity and gray level of the battery pack are within the normal range. If necessary, clean the battery pack. • Check whether the air inlet and air outlet of the battery pack are blocked.
Warning sign	Check that warning signs, labels, etc. are clearly visible and free from defacement. Replace if necessary.
Wiring and cable	Check the switch box (if any) and battery modules, and whether the battery modules are properly connected.
Corrosion condition	Check whether the battery pack is oxidized or corroded.

9.3.2 Maintenance Precautions

For the safe and effective maintenance of the system, please read this manual carefully and comply with the following safety requirements:

- The personnel must be licensed trained electrician approved by the local administration of work safety.
- Do not wear metal jewelry or watches.
- Do not touch the high-voltage positive and negative poles of the ESS with both hands under any circumstance.
- Disconnect all high and low voltage switches before maintaining the battery ESS.
- When cleaning, do not use water to clean directly. Use a vacuum cleaner if necessary.
- Do not use force when inserting or removing a cable.
- After the maintenance is complete, clean up tools and materials and check whether metal objects are left inside or on the top of the device.
- If there is any question about the operation and maintenance of the equipment, please contact the company. Unauthorized operation is strictly prohibited.

9.3.3 Equipment Maintenance

- Operating temperature: 0°C ~ 45°C. During charging and discharging, the temperature should be maintained at 15 °C ~ 30°C, with a typical value of 25°C.
- Do not charge or discharge packs at a unreasonably fast C-rate. The constant charge and discharge current of a single PACK should not exceed the rated current.
- If the BESS is left unused for a long time, charge and discharge the system every six months, so that the system SOC reaches 50%. After charging, the SOC must be consistent.
- If the system is used for the first time after a long-term storage, fully charge it at least once to restore the battery's performance to the best state.
- Regularly check whether the air duct of the heat dissipation system is blocked; clean the system regularly; pay special attention to cleaning the fan inlet and outlet, and use a vacuum cleaner if necessary to ensure that the air can circulate freely in the ESS. Power supply must be cut off before dust removal. Do not rinse dust with water.
- Periodically check whether the bolts fastening the high-voltage cables and connection bars of the BESS are loose and in good contact with each other, and whether the terminals are severely corroded or oxidized.
- Check Pack's positive and negative high voltage protective covers regularly for aging, breakage, and missing.
- Periodically check whether the cables are loose, aged, damaged, or broken, and whether the cables are properly insulated.
- Regularly check whether there is any irritating odor in the ESS and whether there is a burning odor in the high-voltage connection area.
- Periodically check and monitor whether the voltage and temperature data of the upper electrical device are normal, and whether the alarm bar contains abnormal alarms.
- Periodically check whether the status of the BESS and the alarm indicator are in good condition and the function is normal.
- Periodically check whether the emergency stop switch of the BESS is effective to ensure that the system can be stopped quickly in an emergency.
- Check the fire protection system regularly, whether it is in good condition, whether it is within the validity period.
- Do not connect different types of battery modules either in series or in parallel.
- PACK A and PACK B cannot be replaced with each other.

Warning

- Batteries are potentially dangerous and appropriate protective measures must be taken during O&M!
- Improper operation may result in serious personal injury and property damage!
- Batteries must be operated with the correct tools and protective equipment.
- Battery maintenance must be performed by someone with battery expertise and safety training.

9.3.4 Battery Recycling

The company is not responsible for battery recycling. Please dispose of spent batteries according to local laws and regulations. Please do not dispose of batteries as domestic waste. Improper disposal of the battery may cause pollution or explosion.

If there is no local recycling agency, customers are advised to contact the nearest national recycling agency for disposal.

Warning

- If battery leakage or damage occurs, please contact the technical support or the battery recycling company for disposal.
- When the battery is out of its service life, please contact the battery recycling company for disposal.
- Avoid exposing the worn-out batteries to high temperatures or direct sunlight.
- Avoid exposing the worn-out batteries to high humidity or corrosive environments.
- Secondary use of faulty batteries is prohibited, and battery recycling companies should be contacted ASAP to avoid pollution.

Recovery process

Step 1: Contact the nearest recycling agency.

Step 2: The recycling agency assesses the cost of recycling.

Step 3: Recycling agencies carry out recycling in two ways:

- On-site recycling: The recycling agencies can visit your sites to recycle the batteries, but the price shall be assessed according to the actual situation such as distance/transportation cost.
- Centralized recycling: You can collect all the lithium batteries to be recycled in one place for the recycling agency to handle.

9.4 UPS Maintenance

9.4.1 Battery Maintenance

Batteries are an important part of a UPS system. Battery life depends on the ambient temperature and the number of discharges. High temperature or deep discharge will reduce the lifespan of batteries.

- The standard built-in batteries are sealed maintenance-free lead-acid batteries.
- Batteries should be used with the ambient temperature between 15 and 25°C.
- If the UPS is left unused for a long time, it is recommended to charge it every 3 months.
- Under normal use, batteries are charged and discharged every 4 to 6 months, and charge starts when batteries are fully discharged. When used in high temperature areas, batteries are charged and discharged every 2 months, and the charging time of the standard UPS shall not be less than 10 hours.
- Batteries should not be replaced individually. Follow the battery supplier's instructions when replacing it.
- Under normal circumstances, the battery life is 3 to 5 years. If batteries are found to be in poor condition, they must be replaced. The battery replacement must be operated by professionals.

Caution

- Shut down the UPS before replacing the battery.
- Remove metal items such as rings and watches before replacing the battery.
- Use a screwdriver with an insulated handle and do not place tools or other metal objects on the battery.
- Do not short or reverse connect the positive and negative of the battery.

9.4.2 Check on the Functionalities of UPS

Routine check on the functionalities of UPS should be included in each O&M. The check items are as follows:

- **Check the working state of UPS:** UPS is expected to run under the mains mode provided the mains is normal. If the mains goes down, UPS should be at the battery mode. Please be noted that there is no fault display under both modes.
- **Check the mode switch:** In the analogue off-grid mode done by disconnecting the mains power, the UPS should be able to switch to the battery mode and work normally under the mode. Following this step is the resumption of on-grid mode, under which the UPS should be able to function normally.
- **Check the indicator display:** Check whether the indicator display conforms to the actual working mode. For a malfunctioned UPS, shut it down for check and troubleshooting. If this doesn't work, please contact the after-sales service team.

9.5 PCS Maintenance

9.5.1 Daily Maintenance

Due to the influence of ambient temperature, humidity, dust and vibration, the components inside the PCS will age, which may cause potential faults or reduced service life. Therefore, it is necessary to carry out daily and regular maintenance on the PCS.

Danger

- Since the input and output of the PCS are strong electricity, necessary safety precautions must be taken before maintenance begins.
- Before maintenance, ensure that both the DC and AC power supplies are disconnected.
- Since there is an energy storage capacitor in the PCS, after powering off the PCS, wait for more than 10 minutes to confirm that the PCS is in a no-power state prior to performing maintenance.
- To avoid unexpected hazards, maintenance personnel must wear insulating and protective equipment during maintenance.
- Before maintenance, strictly follow the operation procedures prescribed herein this manual.
- Only qualified trained personnel can maintain the PCS.
- After the power supply is disconnected, hang a warning sign at the disconnection point to prevent anyone from powering on the equipment during maintenance.

Caution

- Pay attention to cleaning and corrosion prevention, and shorten the maintenance interval in harsh environmental conditions.
- More frequent maintenance may be required depending on site conditions.
- If the DC power distribution components are vulnerable to adverse environmental conditions, shorten the maintenance interval.
- Periodic appearance check is recommended to determine whether maintenance is necessary.
- When the product is left unused for a long time (more than 6 months), please contact our after-sales engineers if you need to reuse it.

9.5.2 Daily Check Items

No.	Item List
1	It is necessary to monitor the input and output voltage and current and the operation state of the PCS in real time, and specially-assigned person(s) should be tasked with the monitoring at a fixed point. If the PCS or voltage and current is found to be abnormal in operation, timely maintenance is required.
2	Check whether the PCS makes abnormal noise.
3	Check whether there is extraneous odor in the PCS.
4	Observe the readings of the internal temperature of the PCS and check whether the temperature is within the normal range.

9.5.3 Regular Check Items

Regular check on the basis of every three months aims at examining the items that daily maintenance may accidentally fail to include.

No.	Item List
1	Check whether the PCS is damaged or rusted.
2	Check whether the internal temperature of the PCS is within normal range by temperature measuring instrument.
3	Check whether the ventilation, ambient temperature, humidity, and dust adjacent to the PCS meet requirements.
4	Check whether the insulating layers of cables are aged or damaged. If the such conditions are found, reinsulate or replace the cables.
4	Check whether the wiring bolts are aged or burnt, and shake them with hand to examine whether they are tightened.

9.6 MPPT Charge Controller Maintenance

Item	
Working Environment Requirement	The working environment of the equipment must fulfill specific working conditions: • Allowed ambient temperature: -25°C to 55°C. Reduce output when ambient temperature is above 45°C. • Allowed relative humidity: 0~95% (non-condensing). • Maximum allowed altitude: when the altitude exceeds 2000m, the output needs to be decreased.  The recommended working temperature of MPPT module is 20~45°C for the purpose of the best operating condition of MPPT module. Overtemperature or undertemperature will shorten the service life.
Check Electrical and Fixed Parts Connection	After the equipment is put into operation, it is necessary to check the electrical and fixed parts connection of the equipment regularly. Please check every three months and make a record after each check. • Grounding connection of ESS. • Electrical connection of DC input. • Electrical connection of DC output. • Connection of communication cables. • DC switch, fan. • Read the fault message displayed on the upper computer.
Clean-keeping	• Before the equipment is put into operation, remove the dust and sundries from the terminals and mesh. • After the equipment is put into operation, clean the dust inside the equipment regularly and check whether the ventilation and exhaust facilities in the equipment are normal. The cleaning should be conducted every three months. • After the equipment is put into operation, the dust of the MPPT fan and the anti-bug net on the air outlet should be cleaned every three months.  The dust accumulating at the fan will lead the air duct to be blocked, and the MPPT module will consequently shut down at excessive temperature, which severely disrupts the normal operation of the MPPT module. Please do make sure regular cleaning will be performed.

9.7 STS Maintenance

9.7.1 Precautions Before Maintenance

 Danger

- STS is operated with strong electricity. For safety concerns, maintenance personnel should not touch any live terminal of the equipment during operation, and should ensure that the ground terminal of the equipment is reliably grounded.
- Due to the capacitance in the STS busbar, the repair and maintenance must be carried out after 15 minutes of power disconnection.
- After the power is disconnected, set a warning sign at the disconnection point to prevent anyone from powering on the equipment during maintenance.
- To avoid accidents, maintenance personnel should wear insulating equipment during maintenance.
- Only qualified trained personnel are required to perform maintenance on STS.

9.7.2 Contents and Frequency of Routine Maintenance

Everyday	
Routine Check	• The input, output voltage, current and operation state of STS should be monitored in real time to observe whether they are within the normal range. • Examine whether STS emits strange sound or odor while running. • Read the internal temperature of STS to observe whether it falls within the normal range.
Every Month	
State Check	• Check the appearance of STS for damage and rust. • Check whether the air inlet and outlet are well-functioning. • Check whether the ambient humidity, temperature, dust, and ventilation conditions of the device meet requirements.
Every Three Months	
Cable Check	• Check whether cables and terminals are damaged. • Check whether the cables of main circuitry, grounding cables, and communication cables are reliably wired. • Check whether the wiring bolts are aged or burnt, and shake them with hand to examine whether they are tightened.



9.8 Air Conditioning System Maintenance

In order to ensure the normal operation of the air conditioner, please send warnings regarding regular maintenance of the air conditioner such as "All maintenance work must be carried out by qualified professionals" and "Before maintenance, please disconnect power supply and the signal cable of the air conditioner and connect them when the maintenance is finished".

Every Six Months	
Condenser	Check the cleaning condition of the condenser and clean it with compressed air.
Every Year	
Wiring	Visual check for looseness.
Fan	Flip the fan to check whether the rotation is well and whether there is abnormal noise.

9.9 Common Faults and Treatments

After the ESS starts to run, if it fails to work properly, do not determine that the system is faulty. See the table to identify possible causes. At the same time, pay attention to checking whether it is caused by the external environment, such as temperature or humidity that does not meet the requirements or overload.

If the following troubleshooting is not helpful, please arrange a qualified professional to repair the ESS.

This section contains only some simple troubleshooting procedures.

If the diagnosis is unclear, or the information obtained is insufficient to solve the problem, please contact the after-sales service.

• ESS Faults and Measures

No.	Failure	Possible Failure Reason	Troubleshooting Scheme
01	WiFi fault	WiFi module damage	Replace WiFi module
		Poor contact wiring	Re-plug or replace
02	Battery and PCS communication fault	Improperly connected	Check wiring connections
		BMS failure	Change BMS
		RJ45 damage	Replace RJ45 of the same brand
		PCS abnormal	Change PCS
03	Discharge overcurrent protection	Large discharge current of the system	Reduce power
04	Charge overcurrent protection	Large charge current of the system	Reduce power
05	Discharge high temperature protection	High environment temperature	Stop discharge, and decrease the environment temperature
		Single cell temperature abnormal	Single cell temperature abnormal
		Large charging and discharging current	Stop discharge
06	Low temperature discharge protection	Low environment temperature	Stop discharge
07	Charging high temperature protection	High environment temperature	Stop charge, and decrease the environment temperature
		Single cell temperature abnormal	Stop discharge
		Large charging and discharging current	Lower charge current
08	Charge low temperature protection	Low environment temperature	Stop charge
09	High battery voltage	Overvoltage	Stop charge
10	Low total voltage protection	Battery over-discharge	Stop the discharge and charge immediately
11	Unit high voltage protection	Cell overvoltage	Stop charge
12	Cell low voltage protection	Battery over-discharge	Stop the discharge and charge immediately
13	Relay bonding	Relay fault	Change relay
14	NTC abnormal	NTC breakdown Chang	Change NTC
15	Insulation monitoring	Battery pack leak	Break the air, contact customer service
16	DC fuse	Check whether the DC fuse and auxiliary contact cables are disconnected	Immediately shut down the faulty system, disconnect its external power supply, and replace the DC fuse
17	RUN indicator off	High voltage relay broken	Check and replace the relay
		BMU fault	Replace
		Indicator light broken	Replace indicator light
18	Power indicator off	Poor contact wiring	Check and replace the relay
		BMU fault	Replace
		Indicator light broken	Replace indicator light

No.	Failure	Possible Failure Reason	Troubleshooting Scheme
19	External circulation fan not run	Air conditioner input power abnormal, for example, overvoltage or undervoltage.	Check the unit display to determine whether an alarm exists in the air conditioner unit and correct it
		Air conditioner in standby state	The air conditioner is powered on and enters the automatic control logic after 30 seconds of stand-by
		Fan stuck	Check whether any matter is stuck in the fan
		Loose terminal	Check whether the fan docking terminal is loose
		Compressor not started	The external fan starts only after the compressor starts
20	AC O/V	A/B/C phase voltage overvoltage	Contact after-sales
21	AC U/V	A/B/C phase voltage undervoltage	Contact after-sales
22	PCS phase inversion	Incorrect wiring sequence	The phase sequence of the AC power grid is incorrect. Adjust the line sequence
23	STS AC O/F	Grid overfrequency	The frequency of the grid occurrence is higher than the set range, and the inverter will automatically restart after the fault is recovered
24	STS AC U/F	Grid underfrequency	The frequency of the grid occurrence is below the set range, and the inverter will automatically restart after the fault is recovered
25	Grid circuit breaker abnormal	Circuit breaker damaged	Replace the circuit breaker
26	Isolated island	Energy storage inverter isolated island	Energy storage inverter isolated island mode
27	PCS high temperature	High internal temperature Radiator overheating	Power off the system. Power on the system again when the temperature falls down
28	CAN fault	CAN communication fault	Check PCS communication cable
29	DC O/V	DC bus overvoltage	Modify the PCS battery voltage protection threshold
30	DC U/V	DC bus undervoltage	Modify the PCS battery voltage protection threshold
31	AC relay failed to turn off	AC relay short circuit	Check the AC relay short circuit
32	PCS output voltage A/N	Output voltage abnormality	Check and remove high power loads
33	PCS overload	Excessive load power	Remove high power loads
34	PCS soft starting failure	PCS soft starting failure	Contact the after-sales
35	HV BOX DC contactor failed to turn off	DC circuit breaker damaged	Replace the DC circuit breaker
36	Battery output overloaded	Battery output overcurrent	Remove the high power loads on the DC side
37	BMS internal communication failure	Cable connection abnormal	Check the cable connection

- Air Conditioning Faults and Measures

Common Faults and Recovery Measures

No.	Failure	Possible Failure Reason	Troubleshooting Scheme
01	Internal circulating fan not start	Low return air temperature, the system enters the energy saving mode	Whether the stop point of the inner fan is set as the cooling point in the operation setting, the inner fan will not stop
		Main power failure	Check whether the rated voltage of the input AC power phase is faulty or exceeds the 220V±15% range
		Fan stuck	Check whether any foreign matter is stuck in the fan
		Loose terminal	Check whether the fan docking terminal is loose
02	Fan works but the control function does not work	Relay no operation	Check whether the relay is faulty
			Check the relay coil for AC voltage. If there is voltage, replace the control board
03	Fan abnormal noise	Fan bearing wear	Replace fan
		Fan blade scratches other objects	Check whether any cables interfere with the fan blades

Controller Failure

No.	Failure	Possible Failure Reason	Troubleshooting Scheme
	Fan abnormal noise	Fan bearing wear	Replace fan
		Fan blade scratches other objects	Check whether any cables interfere with the fan blades

Refrigeration System Failure

No.	Failure	Possible Failure Reason	Troubleshooting Scheme
01	Compressor fault	Power off (standby)	Check the main power switch, and check whether the operation displays the screen boot
		Loose circuit connection	Fasten the circuit joint
		Compressor motor burned out	Check the motor. If any defect is found, replace immediately
02	Compressor not working	No cooling requirement	Check the compressor output status on the temperature display in the cabinet and operation interface
		Shutdown delay	The compressor has a minimum down-time under normal conditions, and if the temperature rises again to the start point during this period, the compressor will still delay the start
		Compressor built-in temperature protection	Check whether the relay contact has 220 V AC
		High pressure switch off	The reference exhaust pressure is too high
03	High exhaust pressure	Condenser dirty or blocked	Clean condenser
		Condenser fan not work	Check the fault of the fan
04	High compressor noise	The refrigerant is flooding back into the compressor	Check suction overheat
		Bearing wear due to lubricating oil loss	Replace compressor
		Compressor or pipe support loose	Fasten clamp
		Connecting rod, valve or other rotating gear broken	Replace compressor
05	Compressor cycles intermittently	Sensor failure	Check for sensor fault alarm
		Insufficient refrigerant in the system	Check for leaks, repair leaks or add refrigerant
06	Compressor protector stops or cycles	High exhaust pressure	Check whether the condenser filter is dirty or blocked and the condenser fan or fan motor is blocked or not

9.10 Replacement of Electrical and Electronic Components

- When replacing the electronic and electrical components for the system, please be sure to use the same manufacturer's component products of the same model. You can obtain the component model by the identification of the system or the identification of the product itself. If it is not possible, please contact the company.
- If it is necessary to replace a product of another manufacturer or a different model of the same manufacturer at the site, it must be analyzed and confirmed by the company in advance. Otherwise, the company shall not be liable for any injuries or property damage that may be caused.
- Replace electronic components strictly in accordance with this section. The company shall not be responsible for any loss caused by failure to operate in accordance with this section.
- Only qualified personnel are allowed to perform the operations described in this section.

9.11 Fire Extinguishing Equipment Maintenance

- Please comply with the fire codes and regulations of the local country/region. Regularly inspect and maintain the fire equipment to ensure the normal function.
- The system utilizes a new type of fire extinguishing device with a tube body made of special molecular material containing a clean extinguishing agent. When the surface of the tube is heated, the tube ruptures and forms a natural nozzle to release the extinguishing agent, thus suppressing the fire.
- The surface of the tube is very sensitive to heat. When heated, the device reacts quickly to release the extinguishing agent, which can suppress the fire in time.

Danger

Risk of suffocation! A large amount of gas will be generated when the equipment automatically extinguishes the fire. Do not approach the system during the fire extinguishing process.

9.12 Paint Touch-up

Check the ESS for any appearance damage:

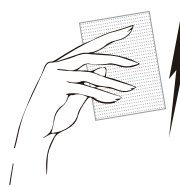
Surface dirt caused by water stains can be cleaned.

- Use a rag (or other scrubbing tool) with water to scrub the dirty part of the surface.
- If water does not remove the stain, it is recommended to scrub with 97% alcohol until the surface has an acceptable level of cleanliness (also try to use a non-corrosive detergent commonly used locally).

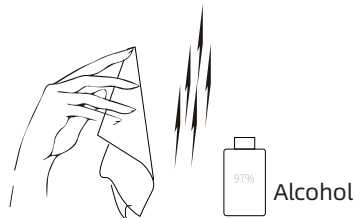
⚠ Instruction

The surface marks for damaged topcoat could not be cleaned.

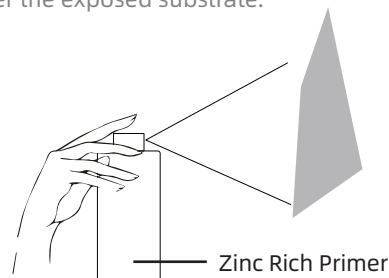
- 01 Use sandpaper to polish the surface paint on the furred or scratched parts, so that the surface is smooth.



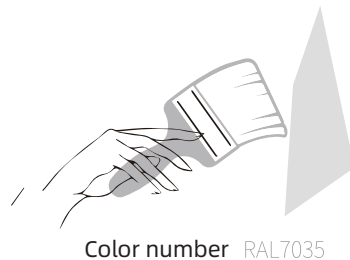
- 02 Use a rag with water or 97% alcohol to scrub the damaged area to remove surface stains.



- 03 After the surface is dry, spray zinc-rich primer on the exposed parts of the substrate for protection. Spraying should completely cover the exposed substrate.



- 04 After the surface is dry, use a soft brush to replenish the paint scratches, and keep the paint brush as uniform as possible.



Color number RAL7035

⚠ Warning

- Check whether the protective paint sprayed on the shell of the system is peeling off. If yes, repair it promptly.
- This product requires periodic maintenance. It is recommended that the entire exterior of the system be resprayed with special protective paint every 5 years.

9.13 Accident Handling

The emergency plan shall be under the unified command of the O&M center, and the personnel shall be responsible for the implementation. The emergency measures in the emergency plan shall be implemented by the O&M personnel to ensure the effectiveness of the emergency measures. The emergency plan should be carried out every six months to train and drill all the personnel. Any problems found in the practice should be tackled.

Correct and effective measures should be taken in time to troubleshoot abnormalities and accidents in the system to eliminate further damage and expansion of losses:

Overheating

When the temperature of the battery pack exceeds the upper limit of safe use, the management system will send a warning and ask to stop using it immediately. In this case, users should stop using it immediately and notify the relevant technical personnel to carry out a comprehensive inspection and troubleshooting before continuing to use it.

Electrical leakage

If battery leakage occurs, evacuate the relevant personnel immediately and notify the technicians to handle the emergency on site. Resuming using the device after troubleshooting. Do not use a system with abnormality. Do not continue operation when there is a failure. In this case, stop using it immediately and inform the relevant technical personnel to conduct a comprehensive inspection, and then continue to use it after troubleshooting. Do not use a system with abnormality.

Short Circuit

- If the machine is short-circuited for various reasons, immediately evacuate the relevant personnel, cut off the power supply and the equipment (if possible), disconnect the battery from the equipment, and notify the technical personnel for repair and troubleshooting.
- The equipment and devices that have been severely short-circuited must be comprehensively tested by the manufacturer before deciding whether they can continue to be used.

Collision

For various reasons, if the equipment is impacted, deformed or pierced by foreign bodies, the power cable of the equipment should be disconnected immediately. Notify professional technicians to be present for handling. In case of special circumstances, wear necessary protective equipment before disassembly.

Fire

Step 1: Evacuate the site personnel to a safe area, delimit a safe isolation area, and dial the emergency phone number according to the situation on the site.

Step 2: Under the condition of ensuring personal safety, carry out the following operations if conditions permit:

- If the wiring harness smokes and catches fire, use a carbon dioxide or dry powder fire extinguisher to extinguish the fire.
- If the energy storage battery is on fire, use a high-pressure water gun at a distance to extinguish the fire.
- If smoke is inhaled, evacuate and seek medical attention as soon as possible.

Step 3: Inform the equipment manufacturer to obtain further treatment advice.

Flooding

Step 1: Whether the equipment is powered on or not, evacuate the site personnel to a safe area and delimit a isolation area for safety concern.

Step 2: Inform the equipment supplier to carry out maintenance after the water has faded.

Step 3: Do not start the system before the system manufacturer gives the system safety judgment result.

Server Breakdown

When a server breaks down, O&M personnel must immediately check whether the device is running safely and contact the maintenance engineers of the server manufacturer to confirm the recovery time. If the server cannot be recovered within one hour, report to the person in charge for confirmation.

System Power-off

When the power supply system of the power station is powered off, the O&M personnel of the power station must go to the site ASAP to turn off the power supply switch of the equipment and press the PCS emergency stop button. At the same time, they must contact the person in charge of electricity to confirm the cause of power failure, the time of power recovery and report to the leader. After power is resumed, they must resume power supply according to the process and confirm the normal operation of the equipment.

Personal Electric Shock

In case of electric shock, under the premise of ensuring their own safety, O&M personnel must cut off the power supply of the facility at the first time, check the injuries of the electrocuted personnel, call the emergency number, and give first aid to the electrocuted personnel. The movement and first aid of the electrocuted personnel must be carried out in strict accordance with relevant regulations to avoid secondary injury.

Other Accidents

When repairing or removing the equipment due to other accidents, disconnect the battery circuit first to avoid electrocution. Do not disassembly until you ensure that no short-circuit will occur. Check that no secondary damage will arise from collision, fall, inversion or other situations.

Danger

- If you find any problem that may affect the battery or equipment, please contact the after-sales personnel. Do not disassemble it without permission.
- If you find that the copper wire inside the conductive wire is exposed, do not touch it. High voltage is dangerous. Please contact the after-sales personnel. Do not disassemble it without permission.
- In case of other emergencies, please contact the after-sales personnel at the first time, operate under the guidance of after-sales personnel, or wait for the after-sales personnel to operate on site..

10. Technical Data

The specific information is subject to the project configuration parameters.

System

Product Model			
Model name	OmniCube-A215-100K-S-E	OmniCube-A215-100K-E	OmniCube-A215-100K-D-E
	OmniCube-A215-105K-S-E	OmniCube-A215-105K-E	OmniCube-A215-105K-D-E
DC Parameters			
Cell chemistry	LFP	LFP	LFP
Rated energy	215.04kWh	215.04kWh	215.04kWh
Rated voltage	768V	768V	768V
Rated capacity	280Ah	280Ah	280Ah
DC voltage range	600 ~ 876V	600 ~ 876V	600 ~ 876V
Rated current	140A	140A	140A
AC Parameters			
Rated power	100kW/105kW	100kW/105kW	100kW/105kW
Rated grid voltage	400V	400V	400V
Grid voltage range	380~460V	380~460V	380~460V
Rated frequency	50Hz	50Hz	50Hz
Power factor	-0.99 (leading) ~ 0.99 (lagging)	-0.99 (leading) ~ 0.99 (lagging)	-0.99 (leading) ~ 0.99 (lagging)
Phase	3P3L/3P4L	3P3L/3P4L	3P3L/3P4L
On-grid/off-grid	On-grid/off-grid	off-grid	off-grid
AC Parameters (Off-grid)			
AC off-grid voltage	400V	400V	400V
AC off-grid frequency	50Hz	50Hz	50Hz
AC voltage range	±3%	±3%	±3%
Off-grid output voltage distortion rate	< 3% (Linear load)	< 3% (Linear load)	< 3% (Linear load)
PV Parameters (Optional)			
Max. current	/	/	100A
Rated power	/	/	50kW
Open circuit voltage	/	/	900V
MPPT range	/	/	0 ~ 900V [1]
General Parameters			
Dimensions (WxDxH)	1750*1215*2340mm	1750*1215*2340mm	1750*1215*2340mm
Weight	2.8±0.1t	2.8±0.1t	2.8±0.1t
Altitude	≤ 2000m	≤ 2000m	≤ 2000m
Operating temperature range	-30°C ~ 55°C	-30°C ~ 55°C	-30°C ~ 55°C
Relative humidity	0 ~ 95%RH	0 ~ 95%RH	0 ~ 95%RH
IP rating	IP54	IP54	IP54
Protection level	I	I	I
Cooling system	Smart air cooled	Smart air cooled	Smart air cooled

[1] The MPPT voltage range in the parameter table is based on the hardware's inherent performance, while the recommended voltage range for the actual connected photovoltaic panels is 0-652V.

Instruction

Interpretation of the product model name

OmniCube-A215-105K-DS-E

PCS module

STS module

MPPT module

Product Model			
Model name	OmniCube-A215-105K-M-E	OmniCube-A215-100K-DS-E OmniCube-A215-105K-DS-E	OmniCube-A215-105K-MS-E
DC Parameters			
Cell chemistry	LFP	LFP	LFP
Rated energy	215.04kWh	215.04kWh	215.04kWh
Rated voltage	768V	768V	768V
Rated capacity	280Ah	280Ah	280Ah
DC voltage range	600 ~ 876V	600 ~ 876V	600 ~ 876V
Rated current	140A	140A	140A
AC Parameters			
Rated power	105kW	100kW/105kW	105kW
Rated grid voltage	400V	400V	400V
Grid voltage range	380~460V	380~460V	380~460V
Rated frequency	50Hz	50Hz	50Hz
Power factor	-0.99 (leading) ~ 0.99 (lagging)	-0.99 (leading) ~ 0.99 (lagging)	-0.99 (leading) ~ 0.99 (lagging)
Phase	3P3L/3P4L	3P3L/3P4L	3P3L/3P4L
On-grid/off-grid	off-grid	On-grid/off-grid	On-grid/off-grid
AC Parameters (Off-grid)			
AC off-grid voltage	400V	400V	400V
AC off-grid frequency	50Hz	50Hz	50Hz
AC voltage range	±3%	±3%	±3%
Off-grid output voltage distortion rate	< 3% (Linear load)	< 3% (Linear load)	< 3% (Linear load)
PV Parameters (Optional)			
Max. current	100A/MPPT*2	100A	100A/MPPT*2
Rated power	50kW/MPPT*2	50kW	50kW/MPPT*2
Open circuit voltage	900V	900V	900V
MPPT range	300~652V	0~900V [1]	300~652V
General Parameters			
Dimensions (WxDxH)	1750*1215*2340mm	1750*1215*2340mm	1750*1215*2340mm
Weight	2.8±0.1t	2.8±0.1t	2.8±0.1t
Altitude	≤ 2000m	≤ 2000m	≤ 2000m
Operating temperature range	-30°C ~ 55°C	-30°C ~ 55°C	-30°C ~ 55°C
Relative humidity	0 ~ 95%RH	0 ~ 95%RH	0 ~ 95%RH
IP rating	IP54	IP54	IP54
Protection level	I	I	I
Cooling system	Smart air cooled	Smart air cooled	Smart air cooled

[1]The MPPT voltage range in the parameter table is based on the hardware's inherent performance, while the recommended voltage range for the actual connected photovoltaic panels is **0-652V**.



11. After-sales services

The company provides customers with a full range of technical supports and after-sales services.

Please refer to the contract for the free warranty service period.

The following conditions are not within the scope of the free warranty service provided by the company:

- Damage to the system or consequent failure due to operation not in accordance with the instruction manual.
- Damage or malfunction caused by wiring and power supply not in accordance with the relevant electrical safety regulations, or due to poor site environment.
- Damage to the system or malfunction caused by the user's private remodeling.
- Damage of failure caused by force majeure such as typhoon, earthquake, flood, fire, or harsh environment (high temperature, low temperature, high humidity, acid rain, etc.).
- Failure of the user to maintain the initial state of device malfunction, and failure to notify the manufacturer in a timely manner and deal with the problem on their own, making it hard to identify the cause of the failure.

Should you have any questions about this product, please contact us. In order to provide you with faster and better service, please provide the following information:

(1) Equipment Model	(2) Serial number (S/N)	(3) Fault code/name
(4) Description of failure	(5) Equipment installation address	(6) Contact information





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