

iSitePower-M (MAP05A1, MAB05B1)

User Manual

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About This Document

Purpose

This document describes the iSitePower-M system (including the power module MAP05A1 and battery module MAB05B1) in terms of its overview, installation, commissioning, maintenance, and technical specifications.





Intended Audience


This document is intended for:

- Sales engineers
- Hardware installation engineers
- Installation and commissioning engineers
- Technical support engineers
- Maintenance engineers

Symbol Conventions

The symbols that may be found in this guide are defined as follows.

Symbol	Description
 DANGER	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
 WARNING	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
 CAUTION	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
 NOTICE	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.

Symbol	Description
 NOTE	Supplements the important information in the main text. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Change History

Changes between document issues are cumulative. The latest document issue contains all updates made in previous issues.

Issue 06 (2023-04-24)

- Updated [1 Safety Information](#).
- Updated [4.3 System Networking](#).
- Updated [6 Application Scenarios](#).
- Added [7.5 \(Optional\) Installing a 4G Wireless Backhaul Module](#).
- Added [9.2.5 Mains+Genset+ESS](#).
- Added [9.2.6 PV+Mains+Genset+ESS](#).
- Updated [10 Electrical Connections](#).
- Updated [11.2 System Commissioning](#).
- Added [12.6 Battery SOH Check](#).
- Added [12.3 Troubleshooting](#).

Issue 05 (2023-04-19)

- Updated [1 Safety Information](#).
- Added [2 Transportation and Storage](#).
- Added [3 Emergency Handling](#).

Issue 04 (2023-02-16)

- Updated [1 Safety Information](#).
- Updated [4.3 System Networking](#).

Issue 03 (2022-10-28)

- Updated the safety precautions.
- Updated the electrical connections.
- Updated the description of application scenarios.
- Updated the system commissioning.

Issue 02 (2021-12-30)

- Added the label description.

- Added the description of application scenarios.
- Updated the description of battery charge.
- Updated some specifications.

Issue 01 (2021-09-30)

This is the first official release.

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1 Safety Information

Statement

Before transporting, storing, installing, operating, using, and/or maintaining the equipment, read this document, strictly follow the instructions provided herein, and follow all the safety instructions on the equipment and in this document. In this document, "equipment" refers to the products, software, components, spare parts, and/or services related to this document; "the Company" refers to the manufacturer (producer), seller, and/or service provider of the equipment; "you" refers to the entity that transports, stores, installs, operates, uses, and/or maintains the equipment.

The **Danger, Warning, Caution, and Notice** statements described in this document do not cover all the safety precautions. You also need to comply with relevant international, national, or regional standards and industry practices. **The Company shall not be liable for any consequences that may arise due to violations of safety requirements or safety standards concerning the design, production, and usage of the equipment.**

The equipment should be used in an environment that meets the design specifications. Otherwise, the equipment may be faulty, malfunctioning, or damaged, which is not covered under the warranty. The Company shall not be liable for any property loss, personal injury, or even death caused thereby.

Comply with applicable laws, regulations, standards, and specifications during transportation, storage, installation, operation, use, and maintenance.

Do not perform reverse engineering, decompilation, disassembly, adaptation, implantation, or other derivative operations on the equipment software. Do not study the internal implementation logic of the equipment, obtain the source code of the equipment software, violate intellectual property rights, or disclose any of the performance test results of the equipment software.

The Company shall not be liable for any of the following circumstances or their consequences:

- The equipment is damaged due to force majeure such as earthquakes, floods, volcanic eruptions, debris flows, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, and other extreme weather conditions.
- The equipment is operated beyond the conditions specified in this document.

- The equipment is installed or used in environments that do not comply with international, national, or regional standards.
- The equipment is installed or used by unqualified personnel.
- You fail to follow the operation instructions and safety precautions on the product and in the document.
- You remove or modify the product or modify the software code without authorization.
- You or a third party authorized by you cause the equipment damage during transportation.
- The equipment is damaged due to storage conditions that do not meet the requirements specified in the product document.
- You fail to prepare materials and tools that comply with local laws, regulations, and related standards.
- The equipment is damaged due to your or a third party's negligence, intentional breach, gross negligence, or improper operations, or other reasons not related to the Company.

1.1 Personal Safety

 **DANGER**

Ensure that power is off during installation. Do not install or remove a cable with power on. Transient contact between the core of the cable and the conductor will cause electric arcs, sparks, fire, or explosion, which may result in personal injury.

 **DANGER**

Non-standard and improper operations on the energized equipment may cause fire, electric shocks, or explosion, resulting in property damage, personal injury, or even death.

 **DANGER**

Before operations, remove conductive objects such as watches, bracelets, bangles, rings, and necklaces to prevent electric shocks.

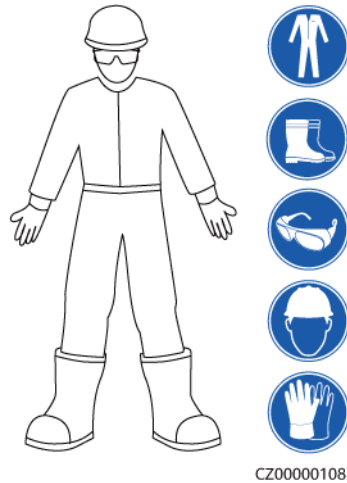
 **DANGER**

During operations, use dedicated insulated tools to prevent electric shocks or short circuits. The dielectric withstanding voltage level must comply with local laws, regulations, standards, and specifications.

⚠ DANGER

During operations, wear personal protective equipment such as protective clothing, insulated shoes, goggles, safety helmets, and insulated gloves.

Figure 1-1 Personal protective equipment



General Requirements

- Do not stop protective devices. Pay attention to the warnings, cautions, and related precautionary measures in this document and on the equipment.
- If there is a likelihood of personal injury or equipment damage during operations, immediately stop, report the case to the supervisor, and take feasible protective measures.
- Do not power on the equipment before it is installed or confirmed by professionals.
- Do not touch the power supply equipment directly or with conductors such as damp objects. Before touching any conductor surface or terminal, measure the voltage at the contact point to ensure that there is no risk of electric shock.
- Do not touch operating equipment because the enclosure is hot.
- In the case of a fire, immediately leave the building or the equipment area and activate the fire alarm or call emergency services. Do not enter the affected building or equipment area under any circumstances.

Personnel Requirements

- Only professionals and trained personnel are allowed to operate the equipment.
 - Professionals: personnel who are familiar with the working principles and structure of the equipment, trained or experienced in equipment operations and are clear of the sources and degree of various potential hazards in equipment installation, operation, maintenance
 - Trained personnel: personnel who are trained in technology and safety, have required experience, are aware of possible hazards on themselves in

certain operations, and are able to take protective measures to minimize the hazards on themselves and other people

- Personnel who plan to install or maintain the equipment must receive adequate training, be able to correctly perform all operations, and understand all necessary safety precautions and local relevant standards.
- Only qualified professionals or trained personnel are allowed to install, operate, and maintain the equipment.
- Only qualified professionals are allowed to remove safety facilities and inspect the equipment.
- Personnel who will perform special tasks such as electrical operations, working at heights, and operations of special equipment must possess the required local qualifications.
- Only authorized professionals are allowed to replace the equipment or components (including software).
- Only personnel who need to work on the equipment are allowed to access the equipment.

1.2 Electrical Safety

 **DANGER**

Before connecting cables, ensure that the equipment is intact. Otherwise, electric shocks or fire may occur.

 **DANGER**

Non-standard and improper operations may result in fire or electric shocks.

 **DANGER**

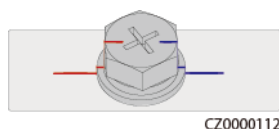
Prevent foreign matter from entering the equipment during operations. Otherwise, equipment damage, load power derating, power failure, or personal injury may occur.

 **WARNING**

For the equipment that needs to be grounded, install the ground cable first when installing the equipment and remove the ground cable last when removing the equipment.

General Requirements

- Follow the procedures described in the document for installation, operation, and maintenance. Do not reconstruct or alter the equipment, add components, or change the installation sequence without permission.
- Obtain approval from the national or local electric utility company before connecting the equipment to the grid.
- Observe the power plant safety regulations, such as the operation and work ticket mechanisms.
- Install temporary fences or warning ropes and hang "No Entry" signs around the operation area to keep unauthorized personnel away from the area.
- Before installing or removing power cables, turn off the switches of the equipment and its upstream and downstream switches.
- If any liquid is detected inside the equipment, disconnect the power supply immediately and do not use the equipment.
- Before performing operations on the equipment, check that all tools meet the requirements and record the tools. After the operations are complete, collect all of the tools to prevent them from being left inside the equipment.
- Before installing power cables, check that cable labels are correct and cable terminals are insulated.
- When installing the equipment, use a torque tool of a proper measurement range to tighten the screws. When using a wrench to tighten the screws, ensure that the wrench does not tilt and the torque error does not exceed 10% of the specified value.
- Ensure that bolts are tightened with a torque tool and marked in red and blue after double-check. Installation personnel mark tightened bolts in blue. Quality inspection personnel confirm that the bolts are tightened and then mark them in red. (The marks should cross the edges of the bolts.)



- After the installation is complete, ensure that protective cases, insulation tubes, and other necessary items for all electrical components are in position to avoid electric shocks.
- If the equipment has multiple inputs, disconnect all the inputs before operating the equipment.
- Before maintaining a downstream electrical or power distribution device, turn off the output switch on the power supply equipment.
- During equipment maintenance, attach "Do not switch on" labels near the upstream and downstream switches or circuit breakers as well as warning signs to prevent accidental connection. The equipment can be powered on only after troubleshooting is complete.
- If fault diagnosis and troubleshooting need to be performed after power-off, take the following safety measures: Disconnect the power supply. Check whether the equipment is live. Install a ground cable. Hang warning signs and set up fences.
- Do not open equipment panels.

- Check equipment connections periodically, ensuring that all screws are securely tightened.
- Only qualified professionals can replace a damaged cable.
- Do not scrawl, damage, or block any labels or nameplates on the equipment. Promptly replace labels that have worn out.
- Do not use solvents such as water, alcohol, or oil to clean electrical components inside or outside of the equipment.

Grounding

- Ensure that the grounding impedance of the equipment complies with local electrical standards.
- Ensure that the equipment is connected permanently to the protective ground. Before operating the equipment, check its electrical connection to ensure that it is reliably grounded.
- Do not work on the equipment in the absence of a properly installed ground conductor.
- Do not damage the ground conductor.
- For the equipment that uses a three-pin socket, ensure that the ground terminal in the socket is connected to the protective ground point.
- If high touch current may occur on the equipment, ground the protective ground terminal on the equipment enclosure before connecting the power supply; otherwise, electric shock as a result of touch current may occur.

Cabling Requirements

- When selecting, installing, and routing cables, follow local safety regulations and rules.
- When routing power cables, ensure that there is no coiling or twisting. Do not join or weld power cables. If necessary, use a longer cable.
- Ensure that all cables are properly connected and insulated, and meet specifications.
- Ensure that the slots and holes for routing cables are free from sharp edges, and that the positions where cables are routed through pipes or cable holes are equipped with cushion materials to prevent the cables from being damaged by sharp edges or burrs.
- Ensure that cables of the same type are bound together neatly and straight and that the cable sheath is intact. When routing cables of different types, ensure that they are away from each other without entanglement and overlapping.
- When cable connection is completed or paused for a short period of time, seal the cable holes with sealing putty immediately to prevent small animals or moisture from entering.
- Secure buried cables using cable supports and cable clips. Ensure that the cables in the backfill area are in close contact with the ground to prevent cable deformation or damage during backfilling.
- If the external conditions (such as the cable layout or ambient temperature) change, verify the cable usage in accordance with the IEC-60364-5-52 or local laws and regulations. For example, check that the current-carrying capacity meets requirements.

- When routing cables, reserve at least 30 mm clearance between the cables and heat-generating components or areas. This prevents deterioration or damage to the cable insulation layer.
- When the temperature is low, violent impact or vibration may damage the plastic cable sheathing. To ensure safety, comply with the following requirements:
 - Cables can be laid or installed only when the temperature is higher than 0°C. Handle cables with caution, especially at a low temperature.
 - Cables stored at subzero temperatures must be stored at room temperature for at least 24 hours before they are laid out.
- Do not perform any improper operations, for example, dropping cables directly from a vehicle. Otherwise, the cable performance may deteriorate due to cable damage, which affects the current-carrying capacity and temperature rise.

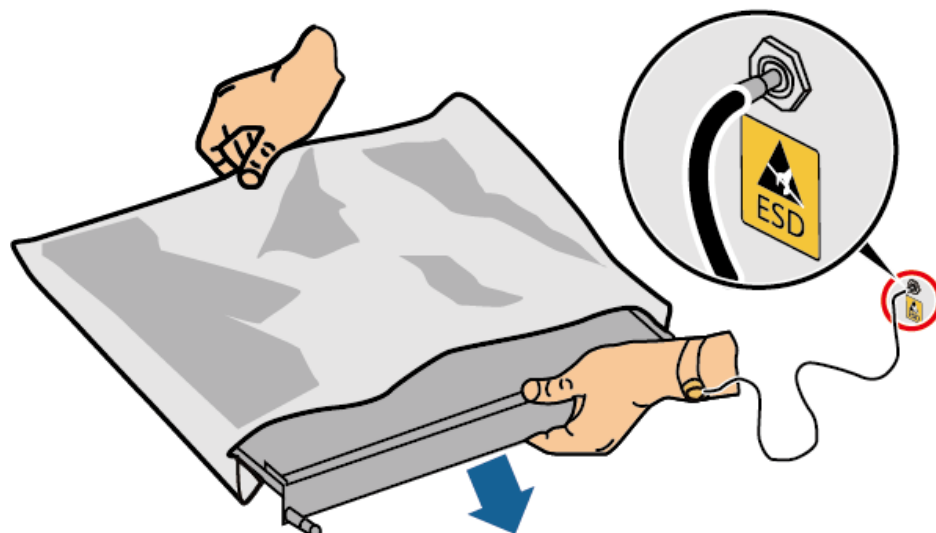
ESD

NOTICE

The static electricity generated by human bodies may damage the electrostatic-sensitive components on boards, for example, the large-scale integrated (LSI) circuits.

- When touching the equipment and handling boards, modules with exposed circuit boards, or application-specific integrated circuits (ASICs), observe ESD protection regulations and wear ESD clothing and ESD gloves or a well-grounded ESD wrist strap.

Figure 1-2 Wearing an ESD wrist strap



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- When holding a board or a module with exposed circuit boards, hold its edge without touching any components. Do not touch the components with bare hands.

- Package boards or modules with ESD packaging materials before storing or transporting them.

1.3 Environment Requirements

 **DANGER**

Do not expose the equipment to flammable or explosive gas or smoke. Do not perform any operation on the equipment in such environments.

 **DANGER**

Do not store any flammable or explosive materials in the equipment area.

 **DANGER**

Do not place the equipment near heat sources or fire sources, such as smoke, candles, heaters, or other heating devices. Overheat may damage the equipment or cause a fire.

 **WARNING**

Install the equipment in an area far away from liquids. Do not install it under areas prone to condensation, such as under water pipes and air exhaust vents, or areas prone to water leakage, such as air conditioner vents, ventilation vents, or feeder windows of the equipment room. Ensure that no liquid enters the equipment to prevent faults or short circuits.

 **WARNING**

To prevent damage or fire due to high temperature, ensure that the ventilation vents or heat dissipation systems are not obstructed or covered by other objects while the equipment is running.

General Requirements

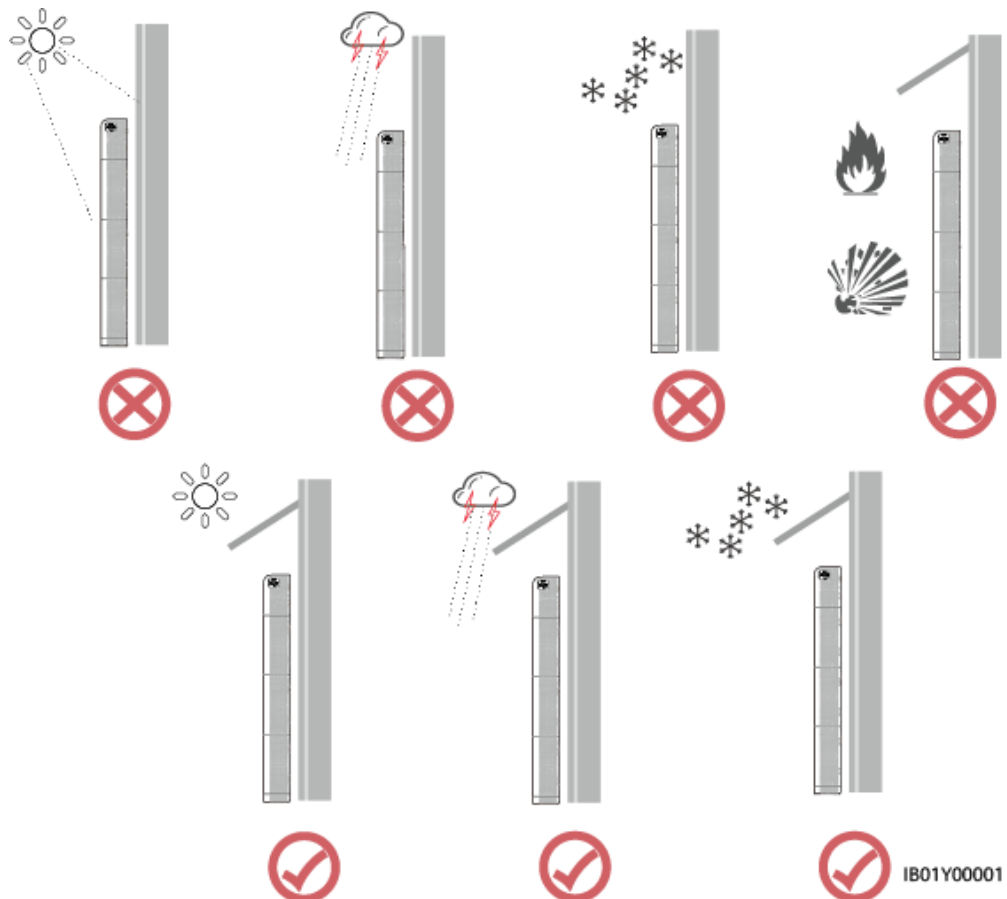
- The installation and usage environment must meet relevant international, national, and local standards for lithium batteries, and are in accordance with the local laws and regulations. The user is obliged to protect the ESS against fire or other hazards.
- Keep the ESS out of the reach of children and away from daily working or living areas, including but not limited to the following areas: studio, bedroom, lounge, living room, music room, kitchen, study, game room, home theater, sunroom, toilet, bathroom, laundry, and attic.

- When installing the ESS in a garage, keep it clear of the drive path. It is recommended that the ESS be mounted on the wall higher than the bumper to prevent collision.
- Do not install the ESS in places that are enclosed, unventilated, without proper fire fighting facilities, or difficult for firefighters to access. Do not place flammable or explosive materials around the ESS. It is recommended that the ESS be mounted on a wall to avoid contact with water.
- Install the ESS in a sheltered place or install an awning over it to avoid direct sunlight or rain.
- For areas prone to natural disasters such as floods, debris flows, earthquakes, and typhoons, take corresponding precautions for installation.
- Do not install the ESS in an easily accessible position because the temperature of the enclosure and heat sink is high when the ESS is running.
- Do not install the ESS on a moving object, such as ship, train, or car.
- Ensure that the equipment is stored in a clean, dry, and well ventilated area with proper temperature and humidity and is protected from dust and condensation.
- Keep the installation and operating environments of the equipment within the allowed ranges. Otherwise, its performance and safety will be compromised.
- Do not install, use, or operate outdoor equipment and cables (including but not limited to moving equipment, operating equipment and cables, inserting connectors to or removing connectors from signal ports connected to outdoor facilities, working at heights, performing outdoor installation, and opening doors) in harsh weather conditions such as lightning, rain, snow, and level 6 or stronger wind.
- Do not install the equipment in an environment with direct sunlight, dust, smoke, volatile or corrosive gases, infrared and other radiations, organic solvents, or salty air.
- Do not install the equipment in an environment with conductive metal or magnetic dust.
- Do not install the equipment in an area conducive to the growth of microorganisms such as fungus or mildew.
- Do not install the equipment in an area with strong vibration, noise, or electromagnetic interference.
- Ensure that the site complies with local laws, regulations, and related standards.
- Ensure that the ground in the installation environment is solid, free from spongy or soft soil, and not prone to subsidence. The site must not be located in a low-lying land prone to water or snow accumulation, and the horizontal level of the site must be above the highest water level of that area in history.
- Do not install the equipment in a position that may be submerged in water.
- If the equipment is installed in a place with abundant vegetation, in addition to routine weeding, harden the ground underneath the equipment using cement or gravel.
- Do not install the equipment outdoors in salt-affected areas because it may be corroded. A salt-affected area refers to the region within 500 m of the coast or prone to sea breeze. Regions prone to sea breeze vary with weather

conditions (such as typhoons and monsoons) or terrains (such as dams and hills).

- When installing the equipment, ensure that the installation surface is solid enough to bear the weight of the equipment.
- After installing the equipment, remove the packing materials such as cartons, foam, plastics, and cable ties from the equipment area.

Figure 1-3 Installation environment



NOTE

- The operation and service life of the battery depend on the operating temperature. Install the battery at a temperature equal to the ambient temperature or in a better environment.
- The operating temperature of the LUNA2000 ranges from -20°C to $+55^{\circ}\text{C}$. If the LUNA2000 is installed in a cold environment, the built-in thermal control system starts to heat the battery to achieve better performance. The heating process consumes rechargeable power, which reduces the system energy efficiency in cold weather.
- If the LUNA2000 is stored in a cold environment (for example, 0°C) before installation, the LUNA2000 needs some time (< 2 h) to heat up before it can be charged. You are advised to place the LUNA2000 in a warm place before installation to facilitate commissioning.
- When the ambient temperature of the LUNA2000 is higher than $+45^{\circ}\text{C}$ or lower than -10°C , the battery charge and discharge power will be derated.

1.4 Mechanical Safety

DANGER

When working at heights, wear a safety helmet and safety harness or waist belt and fasten it to a solid structure. Do not mount it on an insecure moveable object or metal object with sharp edges. Make sure that the hooks will not slide off.

WARNING

Ensure that all necessary tools are ready and inspected by a professional organization. Do not use tools that have signs of scratches or fail to pass the inspection or whose inspection validity period has expired. Ensure that the tools are secure and not overloaded.

WARNING

Do not drill holes into the equipment. Doing so may affect the sealing performance and electromagnetic containment of the equipment and damage components or cables inside. Metal shavings from drilling may short-circuit boards inside the equipment.

General Requirements

- Repaint any paint scratches caused during equipment transportation or installation in a timely manner. Equipment with scratches cannot be exposed for an extended period of time.
- Do not perform operations such as arc welding and cutting on the equipment without evaluation by the Company.
- Do not install other devices on the top of the equipment without evaluation by the Company.
- When performing operations over the top of the equipment, take measures to protect the equipment against damage.
- Use correct tools and operate them in the correct way.

Moving Heavy Objects

- Be cautious to prevent injury when moving heavy objects.



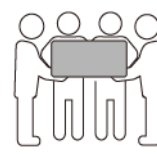
< 18 kg
(< 40 lbs)



18–32 kg
(40–70 lbs)



32–55 kg
(70–121 lbs)



55–68 kg
(121–150 lbs)



> 68 kg
(> 150 lbs)

CZ0000110

- If multiple persons need to move a heavy object together, determine the manpower and work division with consideration of height and other conditions to ensure that the weight is equally distributed.
- If two persons or more move a heavy object together, ensure that the object is lifted and landed simultaneously and moved at a uniform pace under the supervision of one person.
- Wear personal protective gears such as protective gloves and shoes when manually moving the equipment.
- To move an object by hand, approach to the object, squat down, and then lift the object gently and stably by the force of the legs instead of your back. Do not lift it suddenly or turn your body around.
- Do not quickly lift a heavy object above your waist. Place the object on a workbench that is half-waist high or any other appropriate place, adjust the positions of your palms, and then lift it.
- Move a heavy object stably with balanced force at an even and low speed. Put down the object stably and slowly to prevent any collision or drop from scratching the surface of the equipment or damaging the components and cables.
- When moving a heavy object, be aware of the workbench, slope, staircase, and slippery places. When moving a heavy object through a door, ensure that the door is wide enough to move the object and avoid bumping or injury.
- When transferring a heavy object, move your feet instead of turning your waist around. When lifting and transferring a heavy object, ensure that your feet point to the target direction of movement.
- When transporting the equipment using a pallet truck or forklift, ensure that the tynes are properly positioned so that the equipment does not topple. Before moving the equipment, secure it to the pallet truck or forklift using ropes. When moving the equipment, assign dedicated personnel to take care of it.
- Choose sea or roads in good conditions for transportation as transportation by railway or air is not supported. Avoid tilt or jolt during transportation.

Working at Heights

- Any operations performed 2 meters or higher above the ground should be supervised properly.
- Only trained and qualified personnel are allowed to work at heights.
- Do not work at heights when steel pipes are wet or other risky situations exist. After the preceding conditions no longer exist, the safety owner and relevant technical personnel need to check the involved equipment. Operators can begin working only after safety is confirmed.
- Set a restricted area and prominent signs for working at heights to warn away irrelevant personnel.
- Set guard rails and warning signs at the edges and openings of the area involving working at heights to prevent falls.
- Do not pile up scaffolding, springboards, or other objects on the ground under the area involving working at heights. Do not allow people to stay or pass under the area involving working at heights.

- Carry operation machines and tools properly to prevent equipment damage or personal injury caused by falling objects.
- Personnel involving working at heights are not allowed to throw objects from the height to the ground, or vice versa. Objects should be transported by slings, hanging baskets, highline trolleys, or cranes.
- Do not perform operations on the upper and lower layers at the same time. If unavoidable, install a dedicated protective shelter between the upper and lower layers or take other protective measures. Do not pile up tools or materials on the upper layer.
- Dismantle the scaffolding from top down after finishing the job. Do not dismantle the upper and lower layers at the same time. When removing a part, ensure that other parts will not collapse.
- Ensure that personnel working at heights strictly comply with the safety regulations. The Company is not responsible for any accident caused by violation of the safety regulations on working at heights.
- Behave cautiously when working at heights. Do not rest at heights.

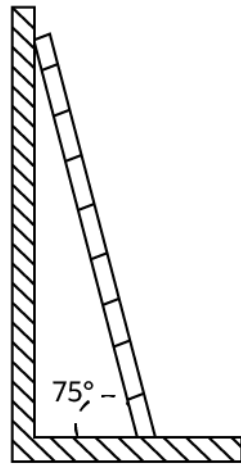
Using Ladders

- Use wooden or insulated ladders when you need to perform live-line working at heights.
- Platform ladders with protective rails are preferred. Single ladders are not recommended.
- Before using a ladder, check that it is intact and confirm its load bearing capacity. Do not overload it.
- Ensure that the ladder is securely positioned and held firm.



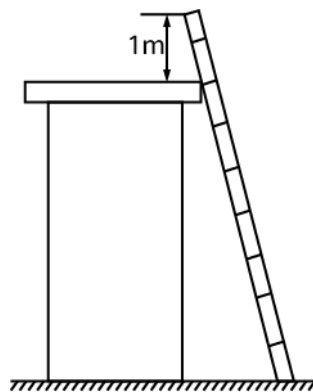
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- When climbing up the ladder, keep your body stable and your center of gravity between the side rails, and do not overreach to the sides.
- When a step ladder is used, ensure that the pull ropes are secured.
- If a single ladder is used, the recommended angle for the ladder against the floor is 75 degrees, as shown in the following figure. A square can be used to measure the angle.



PI02SC0008

- If a single ladder is used, ensure that the wider end of the ladder is at the bottom, and take protective measures to prevent the ladder from sliding.
- If a single ladder is used, do not climb higher than the fourth rung from the top.
- If you use a single ladder to climb up to a platform, ensure that the ladder is at least 1 m higher than the platform.



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Drilling Holes

- Obtain consent from the customer and contractor before drilling holes.
- Wear protective equipment such as safety goggles and protective gloves when drilling holes.
- To avoid short circuits or other risks, do not drill holes into buried pipes or cables.
- When drilling holes, protect the equipment from shavings. After drilling, clean up any shavings.

1.5 Battery Safety

 **DANGER**

Do not connect the positive and negative poles of a battery together. Otherwise, the battery may be short-circuited. Battery short circuits can generate high instantaneous current and releases a large amount of energy, which may cause battery leakage, smoke, flammable gas release, thermal runaway, fire, or explosion. To avoid battery short circuits, do not maintain batteries with power on.

 **DANGER**

Do not expose batteries at high temperatures or around heat sources, such as scorching sunlight, fire sources, transformers, and heaters. Battery overheating may cause leakage, smoke, flammable gas release, thermal runaway, fire, or explosion.

 **DANGER**

Protect batteries from mechanical vibration, falling, collision, punctures, and strong impact. Otherwise, the batteries may be damaged or catch fire.

 **DANGER**

To avoid leakage, smoke, flammable gas release, thermal runaway, fire, or explosion, do not disassemble, alter, or damage batteries, for example, insert foreign objects into batteries, squeeze batteries, or immerse batteries in water or other liquids.

 **DANGER**

Do not touch battery terminals with other metal objects, which may cause heat or electrolyte leakage.

 **DANGER**

There is a risk of fire or explosion if the model of the battery in use or used for replacement is incorrect. Use a battery of the model recommended by the manufacturer.

 **DANGER**

Battery electrolyte is toxic and volatile. Do not get contact with leaked liquids or inhale gases in the case of battery leakage or odor. In such cases, stay away from the battery and contact professionals immediately. Professionals must wear safety goggles, rubber gloves, gas masks, and protective clothing, power off the equipment, remove the battery, and contact technical engineers.

 **DANGER**

A battery is an enclosed system and will not release any gases under normal operations. If a battery is improperly treated, for example, burnt, needle-pricked, squeezed, struck by lightning, overcharged, or subject to other adverse conditions that may cause battery thermal runaway, the battery may be damaged or an abnormal chemical reaction may occur inside the battery, resulting in electrolyte leakage or production of gases such as CO and H₂. To prevent fire or device corrosion, ensure that flammable gas is properly exhausted.

 **DANGER**

The gas generated by a burning battery may irritate your eyes, skin, and throat. Take protective measures promptly.

 **WARNING**

Install batteries in a dry area. Do not install them under areas prone to water leakage, such as air conditioner vents, ventilation vents, feeder windows of the equipment room, or water pipes. Ensure that no liquid enters the equipment to prevent faults or short circuits.

 **WARNING**

Before unpacking, storage, and transportation, ensure that the packing cases are intact and the batteries are correctly placed according to the labels on the packing cases. Do not place a battery upside down or vertically, lay it on one side, or tilt it. Stack the batteries according to the stacking requirements on the packing cases. Ensure that the batteries do not fall or get damaged. Otherwise, they will need to be scrapped.

 **WARNING**

After unpacking batteries, place them in the required direction. Do not place a battery upside down or vertically, lay it on one side, tilt it, or stack it. Ensure that the batteries do not fall or get damaged. Otherwise, they will need to be scrapped.

 **WARNING**

Tighten the screws on copper bars or cables to the torque specified in this document. Periodically confirm whether the screws are tightened, check for rust, corrosion, or other foreign objects, and clean them up if any. Loose screw connections will result in excessive voltage drops and batteries may catch fire when the current is high.

 **WARNING**

After batteries are discharged, charge them in time to avoid damage due to overdischarge.

Statement

The Company shall not be liable for any damage or other consequences to the batteries it provides due to the following reasons:

- Batteries are damaged due to force majeure such as earthquakes, floods, volcanic eruptions, debris flows, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, and other extreme weather conditions.
- Batteries are damaged because the onsite equipment operating environment or external power parameters do not meet the environment requirements for normal operation, for example, the actual operating temperature of batteries is too high or too low, or the power grid is unstable and experiences outages frequently.
- Batteries are damaged, fall, leak, or crack due to improper operations or incorrect connection.
- After being installed and connected to the system, the batteries are not powered on in time due to your reasons, which causes damage to the batteries due to overdischarge.
- Batteries are damaged because they are not accepted in time due to your reasons.
- You set battery operating parameters incorrectly.
- You use batteries of different types together, causing acceleration of capacity attenuation. For example, you use our batteries together with batteries of other vendors or with batteries of different rated capacity.
- You maintain batteries improperly, causing frequent overdischarge; you expand the load capacity without notifying us; or you have not fully charged the batteries for a long time.
- You do not perform battery maintenance based on the operation guide, such as failure to check battery terminals regularly.
- Batteries are damaged because you do not store them in accordance with storage requirements (for example, in an environment that is damp or prone to rain).
- Batteries are not charged as required during storage due to your reasons, resulting in capacity loss or other irreversible damages to the batteries.

- Batteries are damaged due to your or a third party's reasons, for example, relocating or reinstalling the batteries without complying with the Company's requirements.
- You change the battery use scenarios without notifying the Company.
- You connect extra loads to the batteries.
- The battery storage period has exceeded the upper limit.
- The battery warranty period has expired. Do not use a battery whose warranty period has expired, as this poses safety risks.

General Requirements

NOTICE

To ensure battery safety and battery management accuracy, use batteries provided by the Company. The Company is not responsible for any faults of batteries not provided by it.

- Before installing, operating, and maintaining batteries, read the battery manufacturer's instructions and comply with their requirements. The safety precautions specified in this document are highly important and require special attention. For additional safety precautions, see the instructions provided by the battery manufacturer.
- Use batteries within the specified temperature range. When the ambient temperature of the batteries is lower than the allowed range, do not charge the batteries to prevent internal short circuits caused during low-temperature charging.
- Before unpacking batteries, check whether the packaging is intact. Do not use batteries with damaged packaging. If any damage is found, notify the carrier and manufacturer immediately.
- Power on batteries within 24 hours after unpacking. If batteries cannot be powered on in time, place them in a dry indoor environment without corrosive gases. During later maintenance, ensure that the power-off time does not exceed 24 hours.
- Do not use a damaged battery (such as damage caused when a battery is dropped, bumped, bulged, or dented on the enclosure), because the damage may cause electrolyte leakage or flammable gas release. In the case of electrolyte leakage or structural deformation, contact the installer or professional O&M personnel immediately to remove or replace the battery. Do not store the damaged battery near other devices or flammable materials and keep it away from non-professionals.
- Before working on a battery, ensure that there is no irritant or scorched smell around the battery.
- When installing batteries, do not place installation tools, metal parts, or sundries on the batteries. After the installation is complete, clean up the objects on the batteries and the surrounding area.
- If batteries are exposed to water accidentally, do not install them. Instead, transport the batteries to a safe isolation point and dispose of them in a timely manner.

- Before installing battery packs, check whether they are abnormal. A battery pack is deemed abnormal when any of the following symptoms occurs:
 - The enclosure of the battery pack is obviously deformed or damaged.
 - The voltage between the positive and negative electrodes of the battery pack is far below the specified range.
- Check whether the positive and negative battery terminals are grounded unexpectedly. If so, disconnect the battery terminals from the ground.
- Do not perform welding or grinding work around batteries to prevent fire caused by electric sparks or arcs.
- If batteries are left unused for a long period of time, store and charge them according to the battery requirements.
- Do not charge or discharge batteries by using a device that does not comply with local laws and regulations.
- Keep the battery loop disconnected during installation and maintenance.
- Monitor damaged batteries during storage for signs of smoke, flame, electrolyte leakage, or heat.
- If a battery is faulty, its surface temperature may be high. Do not touch the battery to avoid scalds.
- Do not stand on, lean on, or sit on the top of the equipment.
- In backup power scenarios, do not use the batteries for the following situations:
 - Medical devices substantially important to human life
 - Control equipment such as trains and elevators, as this may cause personal injury
 - Computer systems of social and public importance
 - Locations near medical devices
 - Other devices similar to those described above

Short-Circuit Protection

- When installing and maintaining batteries, wrap the exposed cable terminals on the batteries with insulation tape.
- Avoid foreign objects (such as conductive objects, screws, and liquids) from entering a battery, as this may cause short circuits.

Recycling

- Dispose of waste batteries in accordance with local laws and regulations. Do not dispose of batteries as household waste. Improper disposal of batteries may result in environmental pollution or an explosion.
- If a battery leaks or is damaged, contact technical support or a battery recycling company for disposal.
- If batteries are out of service life, contact a battery recycling company for disposal.
- Do not expose waste batteries to high temperatures or direct sunlight.
- Do not place waste batteries in environments with high humidity or corrosive substances.

- Do not use faulty batteries. Contact a battery recycling company to scrap them as soon as possible to avoid environmental pollution.

2 Transportation and Storage

2.1 Transportation Requirements

 **DANGER**

Load or unload batteries with caution. Otherwise, the batteries may be short-circuited or damaged (such as leakage and crack), catch fire, or explode.

 **WARNING**

Do not move a battery by holding its terminals, bolts, or cables. Otherwise, the battery may be damaged.

Keep batteries in the correct direction during transportation. They must not be placed upside down or tilted, and must be protected against falling down, mechanical impact, rains, snows, and falling into water during transportation.

 **WARNING**

Before unpacking, storage, and transportation, ensure that the packing cases are intact and the batteries are correctly placed according to the labels on the packing cases. Do not place a battery upside down or vertically, lay it on one side, or tilt it. Stack the batteries according to the stacking requirements on the packing cases. Ensure that the batteries do not fall or get damaged. Otherwise, they will need to be scrapped.

- Batteries have obtained the certifications of the UN38.3 (UN38.3: section 38.3 of the sixth Revised Edition of the Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria) and SN/T 0370.2-2009 (Part 2: Performance Test of the Rules for the Inspection of Packaging for Exporting Dangerous Goods). The batteries belong to class 9 dangerous goods.

- Batteries can be delivered to the site directly if the road or sea transportation requirements are met.
- Comply with the international regulations on the transport of dangerous goods and meet the requirements of the transportation regulatory authorities in the countries of departure, route, and destination.
- Choose sea or roads in good conditions for transportation. Do not transport batteries by railway or air. Avoid tilt or jolt during transportation.
- Maritime transport must comply with the *International Maritime Dangerous Goods Code* (IMDG Code).
- Road transport must comply with the *Agreement Concerning the International Carriage of Dangerous Goods by Road* (ADR) or JT/T 617.
- Before transportation, check that the battery package is intact and that there is no abnormal odor, leakage, smoke, or sign of burning. Otherwise, the batteries cannot be transported.
- The packing case must be secured for transportation. Handle the case with care during loading and unloading, and take moisture-proof measures during transportation.
- Exercise caution when moving batteries to prevent bumping and ensure personal safety.
- Unless otherwise specified, dangerous goods cannot be mixed with goods containing food, medicine, animal feed, or their additives in the same vehicle or container.
- Unless otherwise specified, when dangerous goods packages are loaded in the same vehicle or container as ordinary goods, they should be separated in either of the following ways:
 - Use a spacer that is as high as the packages.
 - Keep a distance of at least 0.8 m around.
- Before transporting a faulty battery (with scorch, leakage, bulge, or water intrusion), insulate its positive and negative terminals, pack it, and place it in an insulated explosion-proof box as soon as possible. Record information such as the site name, address, time, and fault symptom on the box.
- When transporting faulty batteries, avoid approaching flammable material storage areas, residential areas, or other densely populated places, such as mass transit facilities or elevators.

2.2 Storage Requirements

WARNING

- Ensure that batteries are stored in a dry, clean, and ventilated indoor environment that is free from sources of strong infrared or other radiations, organic solvents, corrosive gases, and conductive metal dust. Do not expose batteries to direct sunlight or rain and keep them far away from sources of heat and ignition.
 - If a battery is faulty (with scorch, leakage, bulge, or water intrusion), move it to a dangerous goods warehouse for separate storage. The distance between the battery and any combustible materials must be at least 3 m. The battery must be scrapped as soon as possible.
 - Place batteries correctly according to the signs on the packing case during storage. Do not place batteries upside down, lay them on one side, or tilt them. Stack batteries in accordance with the stacking requirements on the packing cases.
 - Store batteries in a separate place. Do not store batteries together with other devices. Do not stack batteries too high. If a large number of batteries are stored onsite, the site should be equipped with qualified fire fighting facilities, such as fire sand and fire extinguishers.
-

CAUTION

Batteries should be used soon after being deployed onsite. Batteries that have been stored for an extended period should be charged periodically. Otherwise, they may be damaged.

- The storage environment must comply with local regulations and standards.
- The storage environment must be clean and dry. The product must be protected against rain and water.
- The air must not contain corrosive or flammable gases.
- The storage environment requirements are as follows:
 - Ambient temperature: -10–55°C; recommended storage temperature: 20–30°C
 - Relative humidity: 5% to 80%
- If equipment except battery packs has been stored for more than two years, it must be checked and tested by professionals before use.
- Proof that the product is stored according to the requirements must be available, such as temperature and humidity log data, storage environment photos, and inspection reports.
- Ensure that batteries are delivered based on the "first in, first out" rule.

- Ensure that the storage duration starts from the latest charge time marked on the battery packing case and that the latest charge time is updated after every charge.

3 Emergency Handling

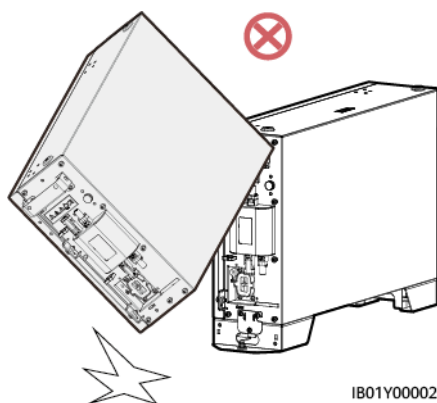
If an accident (including but not limited to the following) occurs on the site, ensure the safety of onsite personnel first and contact the Company's service engineers.

Battery Falling or Strong Impact

 **DANGER**

If a battery is dropped or violently impacted during installation, it may become faulty and cannot be used. Using a faulty battery will cause safety risks such as cell leakage and electric shock.

- If a battery has obvious damage or abnormal odor, smoke, or fire occurs, evacuate the personnel immediately, call emergency services, and contact the professionals. The professionals can use fire extinguishing facilities to extinguish the fire under safety protection.
- If the appearance is not deformed or damaged, and there is no obvious abnormal odor, smoke, or fire, contact the professionals to transfer the battery to an open and safe place, or contact a recycling company for disposal.



Flood

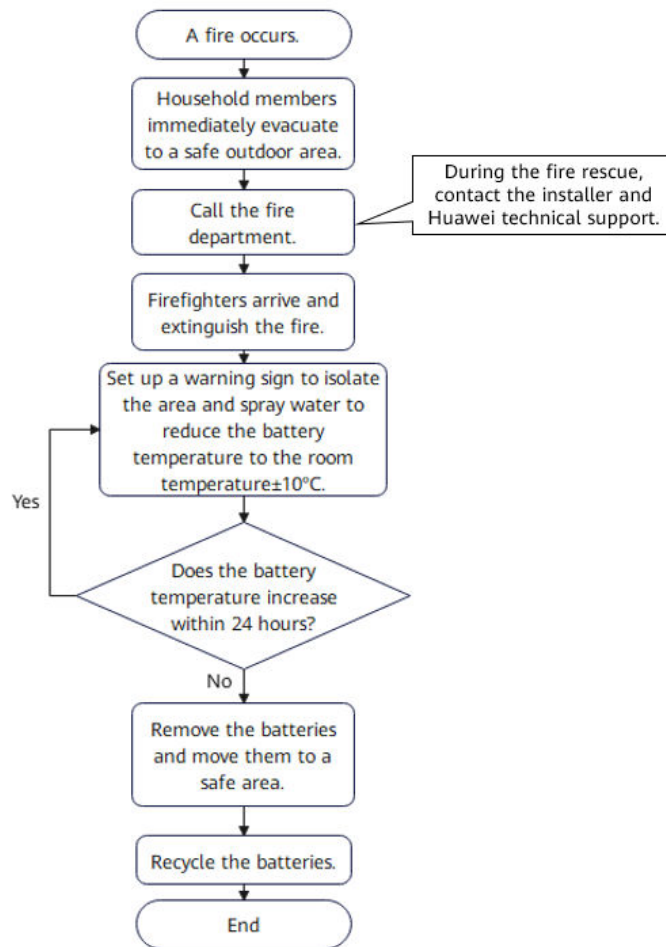
- Power off the system if it is safe to do so.
- If any part of the batteries is submerged in water, do not touch the batteries to avoid electric shock.
- Do not use batteries that have been soaked in water. Contact a battery recycling company for disposal.

Smoke or Fire

 **DANGER**

- In case of smoke or fire, if there is a large amount of smoke in the battery storage room, do not open the door to prevent explosion risks and toxic gas inhalation.
- If a lithium battery catches fire, flammable and toxic gases will be released. Therefore, during the extinguishing process, all firefighters must wear a full set of protective suite, including flame retardant/fireproof clothing, air-purifying respirator or breathing apparatus, firefighter helmet and mask, and insulated shoes.
- A lithium battery fire may last for several hours. After it is extinguished, the fire may be reignited by the heat generated from residual ingredients due to internal cell damage. After an open flame is extinguished, continue spraying water to cool the batteries. Wait until the battery temperature drops to the room temperature $\pm 10^{\circ}\text{C}$ and monitor for 24 hours to ensure that there is no sign of temperature rise before removing the batteries. Move the removed batteries to a safe place (an open and safe outdoor place is recommended), and then place the batteries in the fire sand box or salt water.

If a Huawei ESS emits smoke or catches fire, household members should not dispose of the ESS by themselves. Follow the processes in the flowchart below.



The detailed description is as follows:

1. If batteries emit smoke or catch fires, notify all household members to evacuate immediately.
2. After evacuating to a safe outdoor area (20 m away is recommended), call the fire department immediately. While waiting for the fire rescue, contact the installer and Huawei technical support.
3. Firefighters arrive at the site and extinguish the fire.
4. After the fire is extinguished, set up a warning sign to isolate the area and spray water to reduce the battery temperature to the room temperature $\pm 10^{\circ}\text{C}$. (You can use an infrared thermometer or thermal imager.)
5. Observe the batteries for 24 hours and ensure that there is no sign of temperature rise before removing the batteries. (Only professionals are allowed to remove the batteries.)
6. After removing the batteries, move them to a safe place (an open and safe outdoor place is recommended), place them in the fire sand box or salt water. These operations must be performed by professionals who must take insulation measures, such as wearing insulated gloves, insulated shoes, and personal protective equipment (PPE).

7. After the battery fire is extinguished, if there is no potential risk onsite, the battery must be handled and recycled by professionals in accordance with local laws and regulations.

Electric Shock

DANGER

Before the injured person is separated from the source of electricity, onsite paramedic personnel are not allowed to touch the injured person with their hands to avoid electric shocks.

WARNING

Even if the AC circuit breaker of an inverter is turned off, PV modules and the DC side of the inverter are still energized in the daytime.

For household members, if an electric shock occurs related to a PV device, you are advised to follow the following steps:

- (1) Turn off the AC circuit breaker of the inverter.
- (2) Wear dedicated insulated shoes and insulated gloves, and use insulated tools to separate the injured person from the source of electricity. If no professional equipment is available, you can step on a dry wooden stool or hold insulated tools (such as a long dry wooden stick) to separate the injured person from the source of electricity while ensuring your safety.
- (3) If the injury is serious, call the emergency medical service immediately. Let the injured person lie flat and monitor the person's consciousness, breathing, and heartbeat changes. Personnel who have first aid qualifications or have received first aid training can perform first aid such as artificial respiration and cardiopulmonary resuscitation based on the situation of the injury onsite until the paramedic personnel arrive to send the injured person to the hospital.
- (4) Install warning objects and barricades around the electric shock site to prevent other personnel from getting electric shocks.
- (5) Notify distributors and installers to dispatch professional O&M personnel to rectify the fault.

Battery Leakage

 **DANGER**

- The leaked electrolyte is a colorless viscous liquid that may evaporate rapidly and is flammable, turning into white salt residues. The electrolyte has a pungent smell and is corrosive, irritating to eyes and skin. Avoid contact with it.
- When handling chemical leakage incidents, professional maintenance personnel and firefighters must wear necessary protective equipment such as air-purifying respirator and other PPE.

For household members, if battery leakage occurs, you are advised to follow the following steps:

- (1) Stop the ESS immediately and set the battery power control module (DCDC) switch to OFF. Turn off the AC circuit breaker of the inverter and set the inverter DC switch to OFF.
- (2) Indoor installation scenario: Indoor personnel should quickly evacuate, open the doors, windows, and ventilation devices of the room, and turn off indoor fire sources during the evacuation. Outdoor installation scenario: Notify outdoor personnel to stay away from the site and set up a warning sign to isolate the area.
- (3) After evacuating to a safe area, notify professional maintenance personnel or firefighters to handle the emergency.

Avoid contact with electrolytes or released gases. In the case of contact, take the following measures:

- Inhalation: Evacuate from contaminated areas, get fresh air immediately, and seek immediate medical attention.
- Eye contact: Immediately wash your eyes with water for at least 15 minutes, do not rub your eyes, and seek immediate medical attention.
- Skin contact: Wash the affected areas immediately with soap and water and seek immediate medical attention.
- Intake: Seek immediate medical attention.

Conclusion and Follow-Up Procedure

- After a battery fire is extinguished and there is no potential risk onsite, professionals handle and recycle the batteries after wearing insulated gloves, insulated shoes, and other PPE in accordance with local laws and regulations. After an accident occurs, the manufacturer can identify the damage to the device and replace the device according to the corresponding procedure to restore the ESS.
- After a battery fire is extinguished, the fire extinguishing water may pollute the surrounding soil and water source. In this case, notify the related environmental protection department for evaluation and handling.
- If you have any questions about Huawei residential inverters and ESSs, contact the device distributor and installer. You can also contact us through the local service hotline on Huawei official website.

4 Product Description

4.1 Overview

Function

The iSitePower-M system consists of power modules and battery modules. It can store and release electricity based on the status of PV modules, mains, and gensets.

Models

- Model of the power module in the iSitePower-M: iSitePower-M-MAP05A1

Figure 4-1 Model number

iSitePower-M-MAP05A1

Table 4-1 Model description

No.	Meaning	Value
1	Product label	iSitePower-M: hybrid power supply series
2	Version	MA: product version
3	Module type	P: power module
4	Power level	05: 5 kW
5	Design code	A1: module number

- Model of the battery module in the iSitePower-M: iSitePower-M-MAB05B1

Figure 4-2 Model number

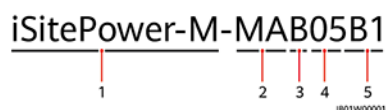
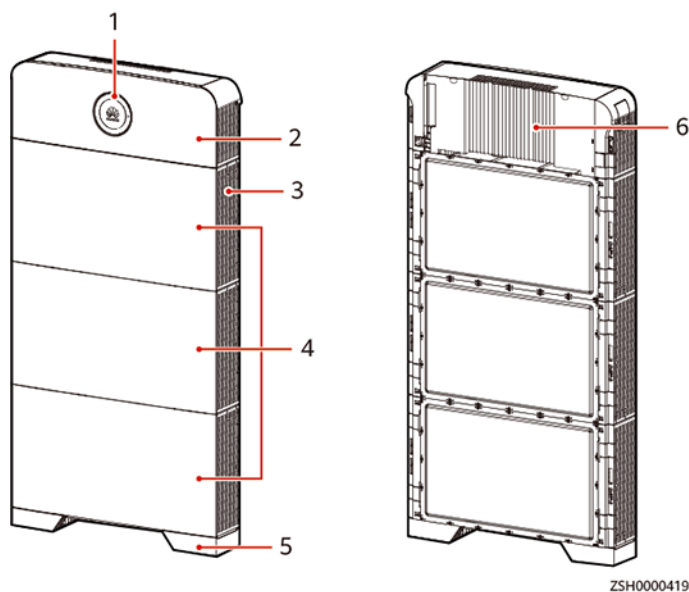


Table 4-2 Model description

No.	Meaning	Value
1	Product label	iSitePower-M: hybrid power supply series
2	Version	MA: product version
3	Module type	B: battery module
4	Power level	05: 5 kWh
5	Design code	B1: module number

4.2 Appearance

Figure 4-3 Appearance



(1) LED indicator

(4) Battery modules

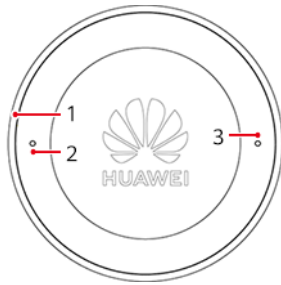
(2) Power module

(5) Base

(3) Decorative cover

(6) Heat sink

Figure 4-4 LED indicators



(1) Annular strip light (2) Running indicator (3) WiFi indicator

Table 4-3 Indicator description

Indicator	Status	Description
Running indicator	Steady on in green	The power system is running properly.
	Off	<ul style="list-style-type: none"> The power system is not running. The power system is faulty. The power system has no input current.
	Steady on in red	The power system is running properly, but an alarm is generated.
WiFi indicator	Off	The WiFi function is abnormal.
	Steady on in green	The WiFi function is normal.
Annular strip light	Steady on in green	Indicates the battery capacity and that the product is discharging. NOTE A part of the strip light dims when every 10% of battery power is consumed.
	Blinking green at an interval of 1.25s	Indicates that the product is being charged.

4.3 System Networking

Networking Scenarios

Figure 4-5 Single system (dashed boxes indicating optional components)

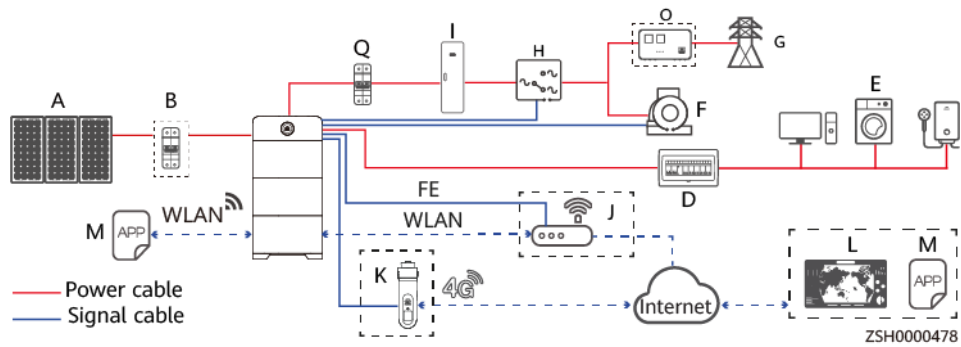


Figure 4-6 Parallel system (dashed boxes indicating optional components)

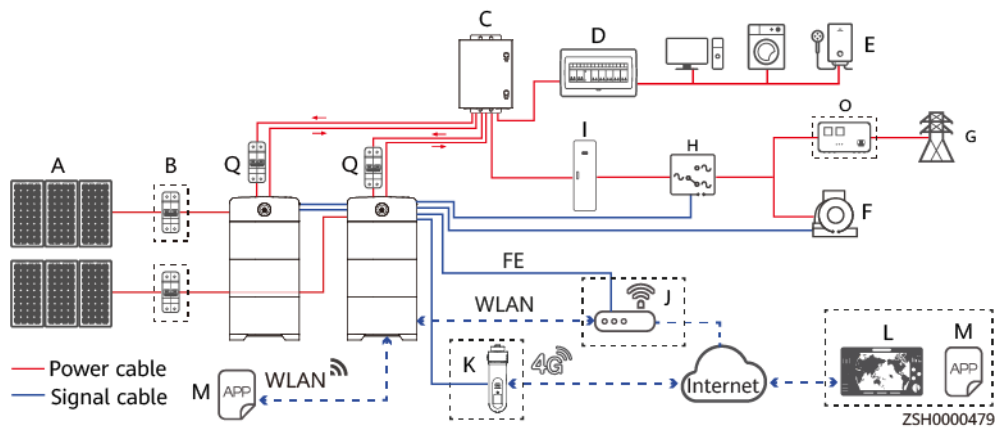


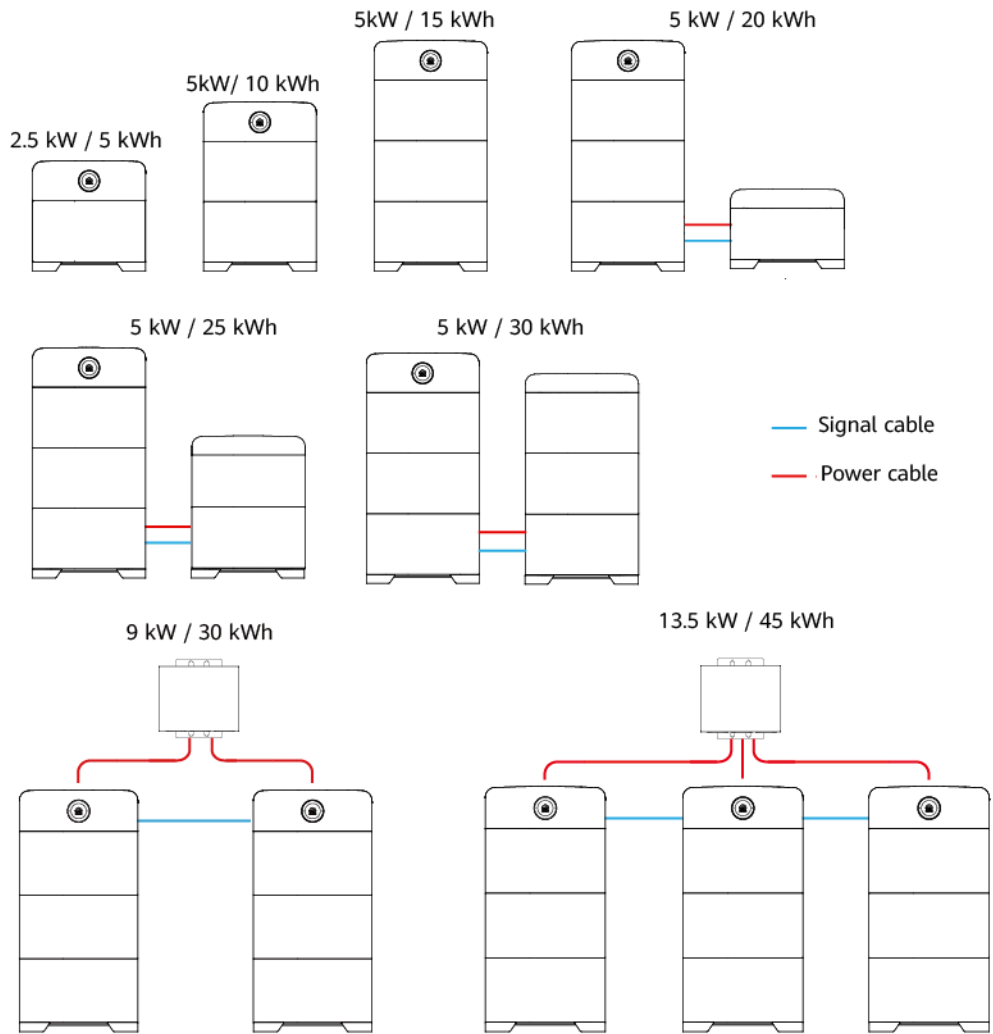
Table 4-4 Application scenarios

Device	PV +ESS	Main s+ESS	PV +Mains +ESS	PV +Genset +ESS	Mains +Genset +ESS	PV+Mains +Genset +ESS
(A) PV string	√	×	√	√	×	√
(B) DC switch	√	×	√	√	×	√
(C) AC parallel box	√	√	√	√	√	√
(D) Power distribution box (PDB)	√	√	√	√	√	√
(E) Load	√	√	√	√	√	√

Device	PV +ESS	Main s+ESS	PV +Mains +ESS	PV +Genset +ESS	Mains +Genset +ESS	PV+Mains +Genset +ESS
(F) Genset	×	×	×	√	√	√
(G) Power grid	×	√	√	×	√	√
(H) ATS	×	×	×	×	√	√
(I) AC power distribution cabinet (PDC)	×	√	√	√	√	√
(J) Router	√	√	√	√	√	√
(K) 4G wireless backhaul module	√	√	√	√	√	√
(L) FusionSolar Smart PV Management System	√	√	√	√	√	√
(M) FusionSolar app	√	√	√	√	√	√
(O) Automatic voltage regulator (AVR)	×	×	×	×	√	√
(Q) AC switch	√	√	√	√	√	√
Note: √ indicates supported and × indicates not supported.						

Capacity Expansion and Power Expansion Supported

Figure 4-7 System configurations



ZSH0000451

 **NOTE**

- **Maximum capacity:** In single-system scenarios, a maximum of six battery modules can be connected. In parallel-system scenarios, a maximum of three power modules can be connected. Each power module can connect to a maximum of three battery modules.
- In parallel-system scenarios, three routes of single-phase output can be combined but they cannot be used as three-phase output.
- In parallel-system scenarios, it is recommended that the number of battery modules on the master and slave products be the same.
- In parallel-system scenarios, if the number of battery modules in the master product is different from that in the slave product (not recommended), for example, two power modules and five battery modules, the power/capacity of battery modules is 9 kW/25 kWh.
- In parallel-system scenarios, if the number of battery modules in the master product is different from that in the slave product (not recommended), the products with larger capacity may fail to fully discharge in heavy load scenarios.
- **One power module and one battery module:** If the product supplies power separately, the load power cannot exceed 2.5 kW. If the load power exceeds 2.5 kW, the product shuts down for 10 seconds and then restarts, which repeats for three times. The product runs with a power limit of 2.8 kW for 1 hour and then stops working.







Table 4-5 Recommended battery configuration





Scenario	Number of Power Modules	Number of Battery Modules	Maximum Output Power	Capacity
Single system	1	1	2.5 kW	5 kWh
		2	5 kW	10 kWh
		3	5 kW	15 kWh
Single system (capacity expansion scenario)		4	5 kW	20 kWh
		5	5 kW	25 kWh
		6	5 kW	30 kWh
Parallel system	2	2	5 kW	10 kWh
		4	9 kW	20 kWh
		6	9 kW	30 kWh
	3	3	7.5 kW	15 kWh
		6	13.5 kW	30 kWh
		9	13.5 kW	45 kWh

4.4 Label Description

Enclosure Labels

Table 4-6 Enclosure label description

Label	Item	Description
	Tiltwatch	The product may tilt, which may cause personal injury or device damage. Secure the product to the ground using screws.
	Burn warning	Do not touch the product because the enclosure is hot when it is running.
	Delayed discharge	High voltage exists after the product is powered on. Residual voltage still exists after the product is powered off. It takes 5 minutes for the product to discharge to the safe voltage.
	Operation	<ul style="list-style-type: none"> High voltage exists after the product is powered on. Only qualified and trained electrical technicians are allowed to install and operate the product. Ground the product before powering it on.
	Refer to documentation	Reminds operators to refer to the documentation of the battery.
	Operation warning	Do not remove the connector when the product is running.

Label	Item	Description
	Grounding label	Indicates the position for connecting the PE cable.
 <p>(1P)PN/ITEM:XXXXXXXXX (32P)MODEL:iSitePower-M MAP05A1 (S)SN:XXXXXXXXXXXXX MADE IN CHINA</p>	Serial number (SN) label	Indicates the product SN.
 <p>MAC:XXXXXXXXXXXXXXXXXX</p>	MAC address label	Indicates the MAC address.
<p>WiFi SSID: iSitePower-M-XXXXXXXXXXXXX PSW: Changeme</p> 	WiFi login QR code	Scan the QR code to connect to the WiFi network of the product and log in to the product to set parameters locally.

 **NOTE**

The labels are for reference only.

5 Components

5.1 Power Module

A power module consists of a power unit and a monitoring unit. The power unit is responsible for energy access and conversion. The monitoring unit is responsible for power signal access and monitoring management of PV, grid power, genset power, and batteries.

Figure 5-1 Power module

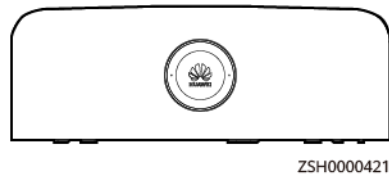
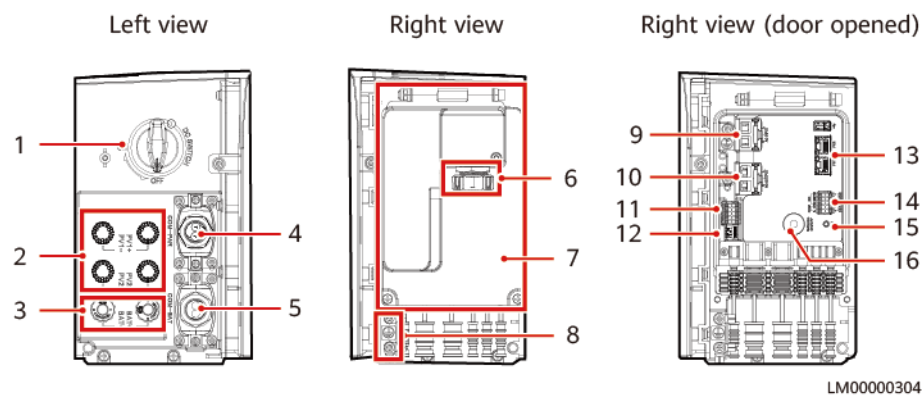


Figure 5-2 Ports on the power module



(1) DC SWITCH (PV switch)

(2) PV input ports

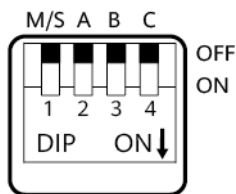
(3) Battery module input ports

(4) COM-PAR (communications port between parallel power modules)

- (5) COM-BAT (communications port between the power module and battery module)
- (6) 4G wireless backhaul module port
- (7) Maintenance compartment door
- (8) Ground point
- (9) AC input ports
- (10) AC output ports
- (11) Reserved ports
- (12) DIP switch
- (13) FE ports (communications ports)
- (14) COM and dry contact ports
- (15) WiFi switch
- (16) Manual ON/OFF switch

DIP Switch

Figure 5-3 DIP switch



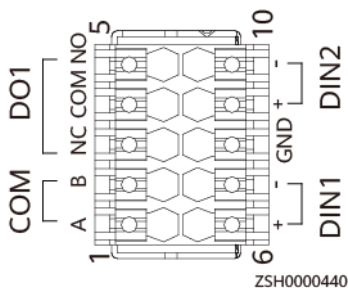
ZSH0000439

Table 5-1 DIP switch description

Parallel Power Module CAN Address	Pin 1 (M/S)	Pin 2 (A)	Pin 3 (B)	Pin 4 (C)	Remarks
1	ON	OFF	OFF	OFF	Master address
2	OFF	ON	OFF	OFF	Slave address
3	OFF	OFF	ON	OFF	Slave address

COM and Dry Contact Ports

Figure 5-4 Wiring terminals



ZSH0000440

Table 5-2 Terminals on the panel

Pin	Signal	Description	Function	
1	-	-	Reserved ports	
2				
3	NC	Dry contact output normally closed (NC) terminal	Connect to a genset and control genset startup and shutdown signals ^[1] .	
4	COM	Dry contact output common terminal		
5	NO	Dry contact output normally open (NO) terminal		
6	DIN1+	Dry contact input DIN 1	<ul style="list-style-type: none"> Connect to an ATS. In the mains+genset scenario, the DIN dry contacts are used to detect mains signals. Connect to an EPO switch to remotely shut down the equipment. 	
7	DIN1-			
9	DIN2+	Dry contact input DIN 2		
10	DIN2-			
8	GND	-		-
<p>Note [1]: For a genset that starts when the dry contact is open, connect the signal cable to ports NC and COM. For a genset that starts when the dry contact is closed, connect the signal cable to ports NO and COM.</p>				

WiFi Switch

The power module has a built-in WiFi module. You can press the WiFi switch to enable or disable WiFi and reset the WiFi password and user login password.

- Enable/Disable WiFi: Hold down the WiFi switch for at least 10s to enable or disable WiFi. The WiFi function is disabled by default.
- Reset the WiFi password and user login password: Press the WiFi switch for three times within 10s and each time lasts for 1s. Wait for more than 1s each time before pressing the switch again. Then the WiFi module is restarted, and the WiFi password and user login password are reset successfully.
- The last six digits of the product WiFi name are the same as the last six digits of the product SN. The default password is **Changeme**.

NOTICE

Password reset will result in system restart, which may interrupt the power supply to loads. Therefore, you are advised not to reset the passwords when power is supplied to loads.

Communications Ports

Table 5-3 Communications port description

Port	Communications Parameter	Communications Protocol	Function
COM-PAR	Baud rate: 1 Mbit/s	CAN	Parallel communications port for power modules
COM-BAT	Baud rate: 250 kbit/s	CAN	Parallel communications port between the battery module and power module
FE	10/100 Mbit/s autonegotiation	FE1: BIN/HTTPS	Parallel control communications ports
		FE2: TCP-Modbus	
NOTE The preceding ports are protected by security mechanisms.			

Table 5-4 COM-PAR pin definitions

Pin	Signal	Description
1	Synchronization signal 1+	Parallel synchronization signals
2	Synchronization signal 1-	
3	Synchronization signal 2+	
6	Synchronization signal 2-	
4	Synchronization signal 3+	
5	Synchronization signal 3-	
7	CANH	Parallel high-speed CAN

Pin	Signal	Description
8	CANL	

Table 5-5 COM-BAT pin definitions

Pin	Signal	Description
1	START+	Manual ON/OFF switch
2	START-	
3, 4, 5, 6	Null	-
7	CANH	CAN bus high level
8	CANL	CAN bus low level

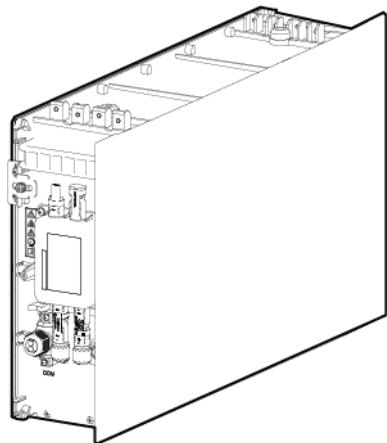
Table 5-6 Pin definitions for the FE port

Pin	Signal	Description
1	TX+	Transmit data over FE.
2	TX-	
3	RX+	Receive data over FE.
6	RX-	
4, 5, 7, 8	Null	-

5.2 Battery Module

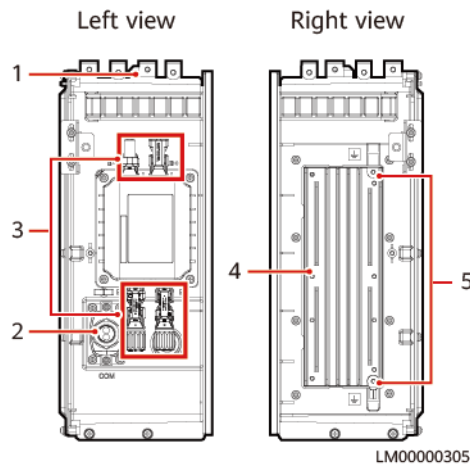
The standard capacity is 5 kWh.

Figure 5-5 Appearance



ZSH0000422

Figure 5-6 Ports on the battery module



- (1) Alignment boss (2) COM port (3) Terminals for battery module cascading
- (4) Heat sink (5) Ground points

Communications Port

Table 5-7 Communication port description

Port	Communications Parameter	Communications Protocol	Description
COM	Baud rate: 250 kbit/s	CAN	Communications port for a battery module
NOTE The preceding port is protected by security mechanisms.			

Table 5-8 COM pin definition

Pin	Signal	Description
1	START+	Manual ON/OFF switch
2	START-	
3	Null	-
4	Null	
5	Null	

Pin	Signal	Description
6	Null	
7	CANH	CAN bus high level
8	CANL	CAN bus low level

5.3 (Optional) AC Parallel Box ACDB220-90-1B

The AC parallel box is used for paralleling of power modules to increase the system power. A maximum of three power modules can be connected in parallel.

Figure 5-7 ACDB220-90-1B

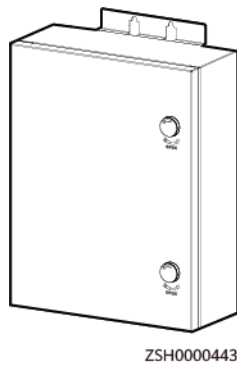
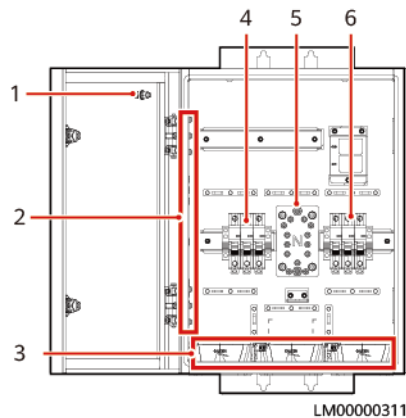


Figure 5-8 ACDB220-90-1B interior



- (1) Ground point on the door
- (2) Ground bar
- (3) Cable bags
- (4) AC input circuit breaker
- (5) N wiring terminal
- (6) AC output circuit breaker

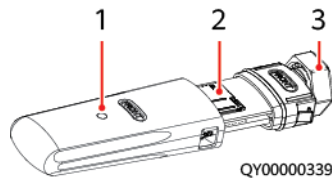
5.4 (Optional) Backhaul Module iIOT-WAC0412

The iIOT-WAC0412 is an IoT outdoor 4G wireless backhaul module. It reports alarms and signals to the FusionSolar Smart PV Management System in wireless communication mode.

NOTICE

- The 4G wireless backhaul module may be disconnected or fail to connect to the network in an enclosed metal environment or in a base station with weak signals.
- Recommended SIM card monthly data package: 500 MB

Figure 5-9 4G wireless backhaul module



(1) Indicator

(2) SIM card installation position

(3) Module installation port

Table 5-9 Indicator status description

Color	Status	Remarks	Description
Green	Steady on	Abnormal	The backhaul module is not running.
	Blinking slowly On for 0.8s and off for 0.064s alternately	Normal	The backhaul module is not registered with the network.
	Blinking slowly On for 2s and off for 0.064s alternately	Normal	The backhaul module is registered with the network.
	Blinking slowly On for 0.6s and off for 0.064s alternately	Normal	The backhaul module is transmitting data.

Color	Status	Remarks	Description
Red	Steady on	Abnormal	The backhaul module is faulty.

Figure 5-10 Port pins (male)

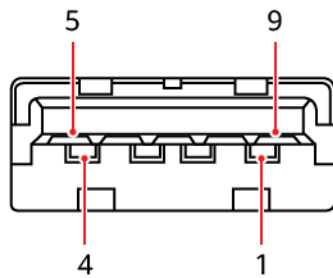


Table 5-10 Port pin definitions

Pin	Signal	Description
1	VBUS	Power supply
2	D-	NC
3	D+	NC
4	GND1	Power ground
5	STDA_RX-	Signal
6	STDA_RX+	Signal
7	GND2	NC
8	STDA_TX-	Signal
9	STDA_TX+	Signal

Table 5-11 Supported frequency bands

Frequency Band	Transmit (Tx)	Receive (Rx)
GSM 850	824 MHz–849 MHz	869 MHz–894 MHz
GSM 900	880 MHz–915 MHz	925 MHz–960 MHz
GSM 1800	1710 MHz–1785 MHz	1805 MHz–1880 MHz
GSM 1900	1850 MHz–1910 MHz	1930 MHz–1990 MHz

6 Application Scenarios

The iSitePower-M is mainly used in houses, apartments, shops, and business outlets. Based on different energy inputs, the application scenarios are classified into six types.

- PV+ESS
- Mains+ESS
- PV+mains+ESS
- PV+genset+ESS
- Mains+genset+ESS
- PV+mains+genset+ESS

NOTICE

- In a parallel system, the battery SOC settings of the master and slave products can be different. When setting the battery SOC, you need to set the master and slave products separately.
 - Optimizers are not supported in any scenario.
 - The time for switching from bypass mode to inverter mode is less than 20 ms.
 - The startup power of the genset cannot exceed three to seven times the rated power of the genset to ensure that the startup power does not exceed the loading power of the equipment. For example, if the rated power of the genset is 1 kW, the startup power cannot exceed 3–7 kW.
-

6.1 PV+ESS

Working Logic

Power supply priority: PV > ESS

1. When the PV power is greater than the load power, the PV system supplies power to the loads and charges the ESSs.
2. When the PV power is less than the load power or there is no PV power, the PV system and the ESSs supply power to the loads. When the ESSs discharge

to the value of **End-of-Discharge SOC for Lithium Batteries(%)**, the loads power off.

- After the ESS discharge ends, the PV system charges the ESSs. When the value of **Available SOC for Lithium Batteries(%)** is reached, the ESSs resume power supply to loads.

Table 6-1 Lithium battery parameters

End-of-Discharge SOC for Lithium Batteries(%)		Available SOC for Lithium Batteries(%)	
Value Range	Default Value	Value Range	Default Value
5–15	5	20–95	20

NOTE

- Lithium battery SOC: lithium battery real-time capacity percentage.
- End-of-Discharge SOC for Lithium Batteries(%)**: In any mode, the ESSs discharge to the value of **End-of-Discharge SOC for Lithium Batteries(%)**, protecting the batteries.
- Available SOC for Lithium Batteries(%)**: When the ESSs have only PV input (no AC input), the ESSs discharge to the value of **End-of-Discharge SOC for Lithium Batteries(%)**. The PV system charges the ESSs until the value of **Available SOC for Lithium Batteries(%)** is reached. Then the ESSs supply power to loads. This prevents unstable power supply when the irradiance is low.

Parameters Settings

Figure 6-1 Setting basic parameters

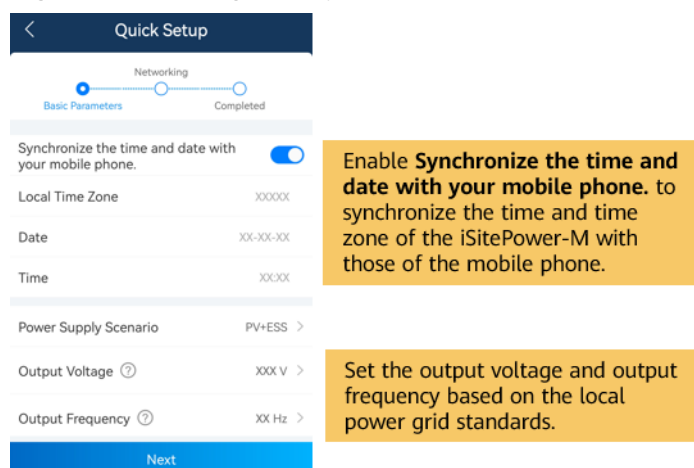
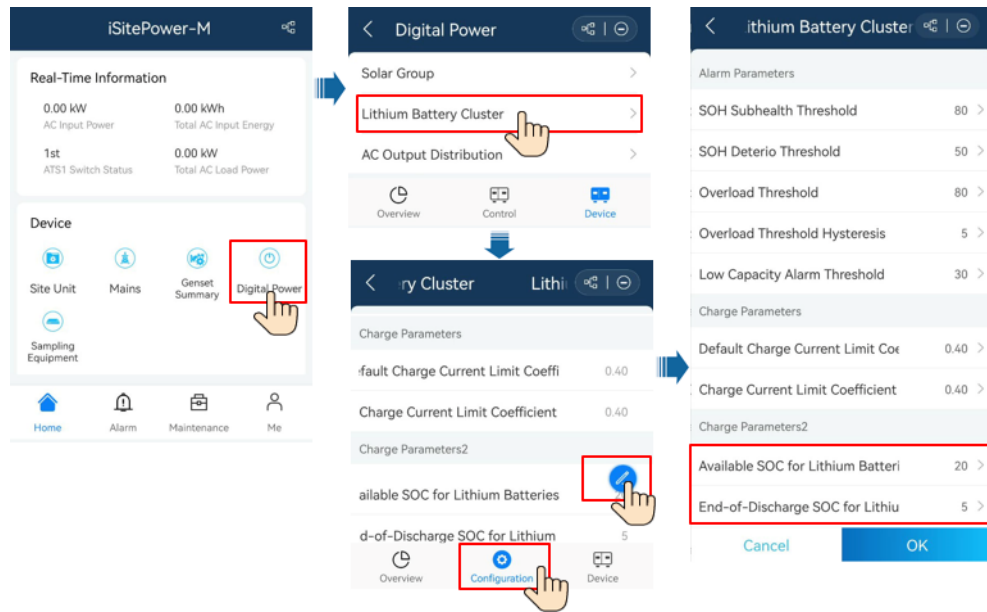


Figure 6-2 Setting lithium battery parameters



Networking Scenarios

Figure 6-3 Single system networking (dashed boxes indicating optional components)

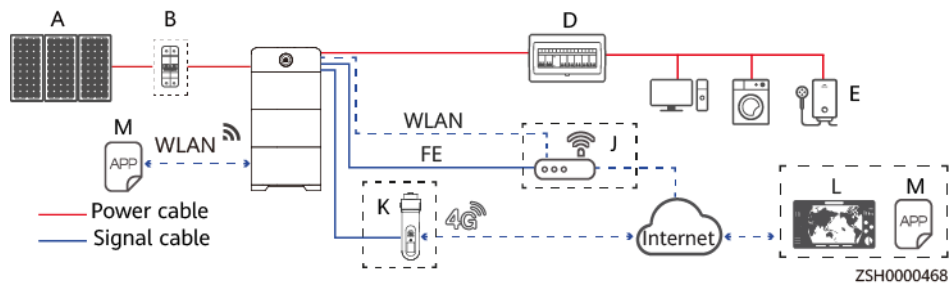
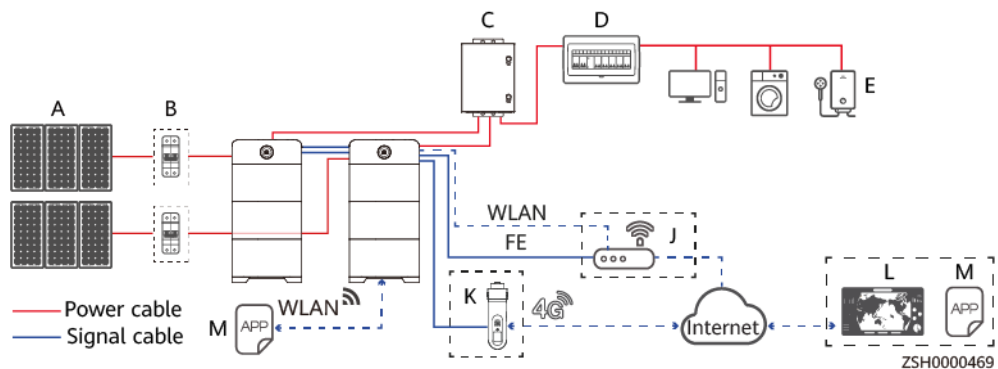


Figure 6-4 Parallel system networking (dashed boxes indicating optional components)



(A) PV string
(B) DC switch

(C) AC parallel box
(D) PDB

(E) Load
(J) Router

(K) 4G wireless backhaul module (L) FusionSolar Smart PV Management System (M) FusionSolar app

6.2 Mains+ESS

Working Logic

Power supply priority: mains > ESS

1. When the mains is available, the mains supplies power to loads and charges the ESSs.
2. When the mains is unavailable and the lithium battery SOC is greater than the value of **End-of-Discharge SOC for Lithium Batteries(%)**, the ESSs supply power to loads until the value of **End-of-Discharge SOC for Lithium Batteries(%)** is reached. When the lithium battery SOC is less than the value of **End-of-Discharge SOC for Lithium Batteries(%)**, the loads power off.
3. When the mains recovers, the mains supplies power to loads and charges the ESSs.

Table 6-2 Lithium battery parameters

End-of-Discharge SOC for Lithium Batteries(%)	
Value Range	Default Value
5-15	5

NOTE

- Lithium battery SOC: lithium battery real-time capacity percentage.
- **End-of-Discharge SOC for Lithium Batteries(%)**: In any mode, the ESSs discharge to the value of **End-of-Discharge SOC for Lithium Batteries(%)**, protecting the batteries.

Parameters Settings

Figure 6-5 Setting basic parameters

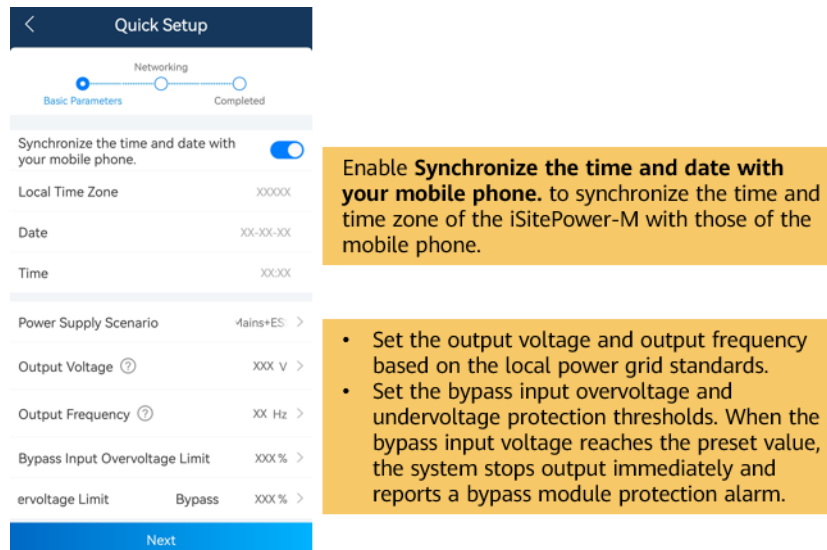
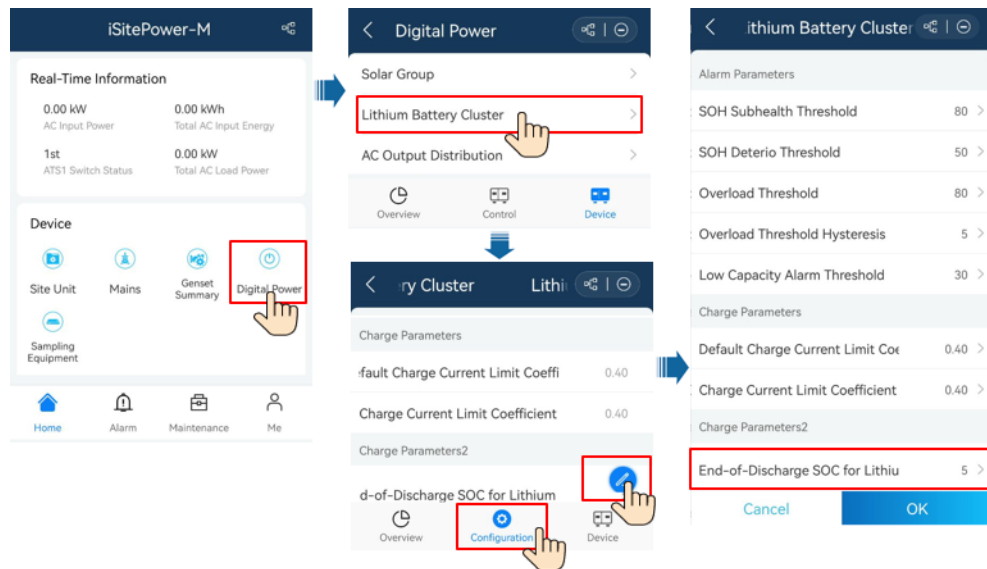


Figure 6-6 Setting lithium battery parameters



Networking Scenarios

Figure 6-7 Single system networking (dashed boxes indicating optional components)

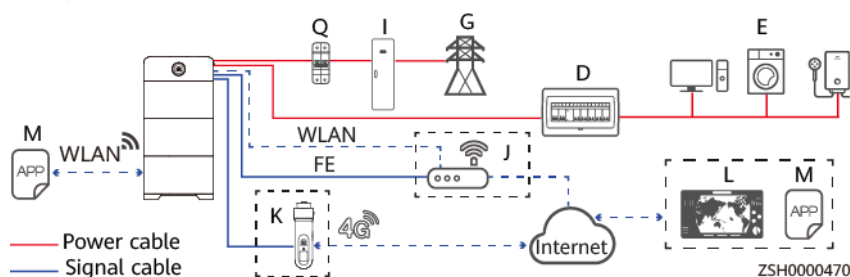
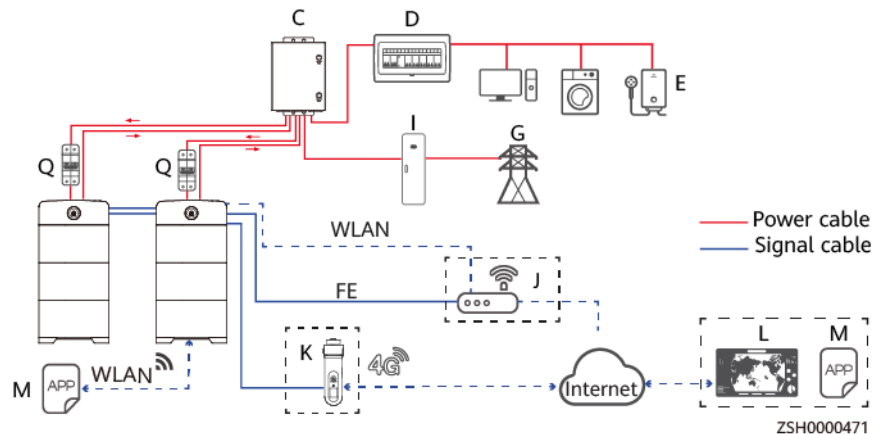


Figure 6-8 Parallel system networking (dashed boxes indicating optional components)



- | | | |
|---------------------------------|--|---------------------|
| (C) AC parallel box | (D) PDB | (E) Load |
| (G) Power grid | (I) AC PDC | (J) Router |
| (K) 4G wireless backhaul module | (L) FusionSolar Smart PV Management System | (M) FusionSolar app |
| (Q) AC switch | | |

6.3 PV+Mains+ESS

Working Logic

1. Maximize PV Consumption:
 - a. When the mains is available:

NOTE

When the ESSs are powered on for the first time and the lithium battery SOC is greater than the value of **Backup Power SOC(%)**, the PV system and ESSs supply power to loads, and the ESSs discharge to the value of **Backup Power SOC(%)**.

- i. The mains supplies power to loads. The PV system charges the ESSs (the ESSs do not supply power to the loads in this case). After the ESSs are fully charged, the mode switches to ii.
 - ii. The PV system and the ESSs supply power to the loads. When the ESSs discharge to the value of **Backup Power SOC(%)**, the mode switches to i.
 - b. When the mains is unavailable:
 - i. When the lithium battery SOC is greater than the value of **End-of-Discharge SOC for Lithium Batteries(%)**, the PV system and ESSs supply power to loads (when the PV power is greater than the load power, the PV system supplies power to the loads and charges the ESSs). When the ESSs discharge to the value of **End-of-Discharge**

- SOC for Lithium Batteries(%)**, the loads power off and the mode switches to ii.
- ii. When the lithium battery SOC is less than or equal to the value of **End-of-Discharge SOC for Lithium Batteries(%)**, the PV system charges the ESSs (the PV system and the ESSs do not supply power to the loads). When the value of **Available SOC for Lithium Batteries(%)** is reached, the mode switches to i.
2. Maximize Power Backup:
 - a. When the mains is available, the mains supplies power to loads, and the mains and PV system charge the ESSs until the ESSs are fully charged.
 - b. When the mains is unavailable:
 - i. When the lithium battery SOC is greater than the value of **End-of-Discharge SOC for Lithium Batteries(%)**, the PV system and ESSs supply power to loads (when the PV power is greater than the load power, the PV system supplies power to the loads and charges the ESSs). When the ESSs discharge to the value of **End-of-Discharge SOC for Lithium Batteries(%)**, the loads power off and the mode switches to ii.
 - ii. When the lithium battery SOC is less than or equal to the value of **End-of-Discharge SOC for Lithium Batteries(%)**, the PV system charges the ESSs (the PV system and the ESSs do not supply power to the loads). When the value of **Available SOC for Lithium Batteries(%)** is reached, the mode switches to i.

Table 6-3 Lithium battery parameters

Operating Mode		Backup Power SOC(%) (Maximize PV Consumption)		End-of-Discharge SOC for Lithium Batteries(%)		Available SOC for Lithium Batteries(%)	
Value Range	Default Value	Value Range	Default Value	Value Range	Default Value	Value Range	Default Value
<ul style="list-style-type: none"> • Maximize PV Consumption • Maximize Power Backup 	Maximize Power Backup	20-50	20	5-15	5	20-95	20

 NOTE

- Lithium battery SOC: lithium battery real-time capacity percentage.
- **Backup Power SOC(%)**: In **Maximize PV Consumption** mode, when the mains is normal, the lithium battery SOC is greater than the value of **Backup Power SOC(%)** to provide backup power.
- **End-of-Discharge SOC for Lithium Batteries(%)**: In any mode, the ESSs discharge to the value of **End-of-Discharge SOC for Lithium Batteries(%)**, protecting the batteries.
- **Available SOC for Lithium Batteries(%)**: When the ESSs have only PV input (no AC input), the ESSs discharge to the value of **End-of-Discharge SOC for Lithium Batteries(%)**. The PV system charges the ESSs until the value of **Available SOC for Lithium Batteries(%)** is reached. Then the ESSs supply power to loads. This prevents unstable power supply when the irradiance is low.

Parameters Settings

Figure 6-9 Setting basic parameters

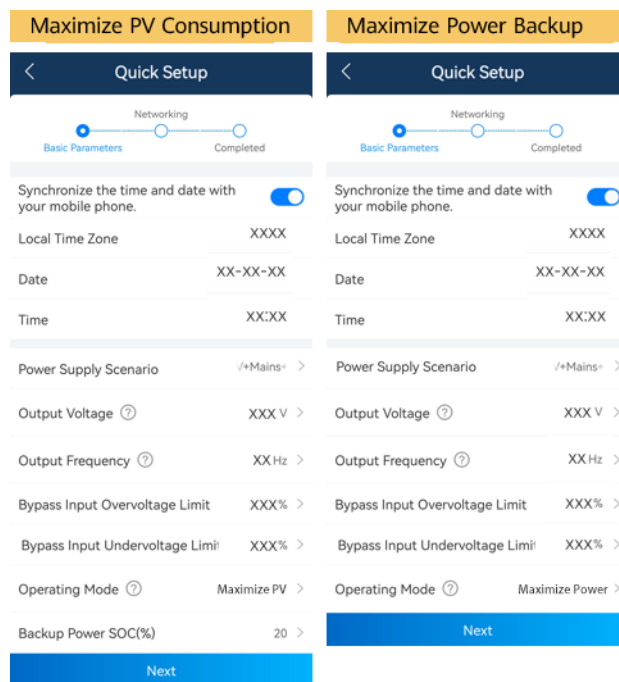
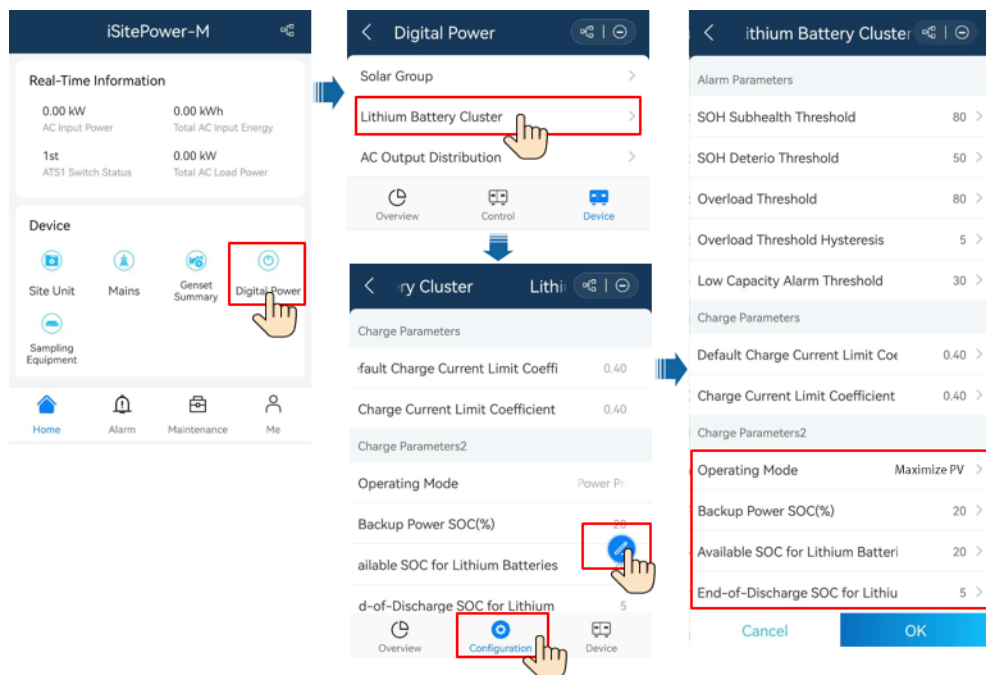


Table 6-4 Basic parameters

Parameter	Description
Output Voltage	Set the output voltage and output frequency based on the local power grid standards.
Output Frequency	
Bypass Input Overvoltage Limit	Set the bypass input overvoltage and undervoltage protection thresholds. When the bypass input voltage reaches the preset value, the system stops output immediately and reports a bypass module protection alarm.
Bypass Input Undervoltage Limit	

Parameter	Description
Operating Mode	<p>Maximize PV Consumption: PV power is preferentially used for loads.</p> <p>Maximize Power Backup: The mains is preferentially used to supply power to loads. At the same time, the mains and PV system charge the ESSs until the ESSs are fully charged.</p>
Backup Power SOC(%)	This parameter is available only when Operating Mode is set to Maximize PV Consumption .

Figure 6-10 Setting lithium battery parameters



Networking Scenarios

Figure 6-11 Single system networking (dashed boxes indicating optional components)

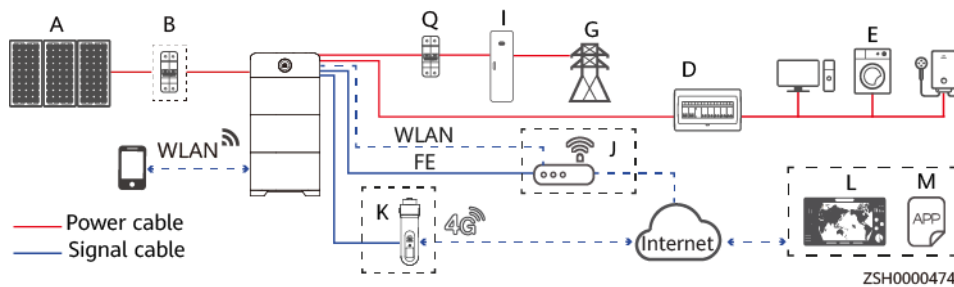
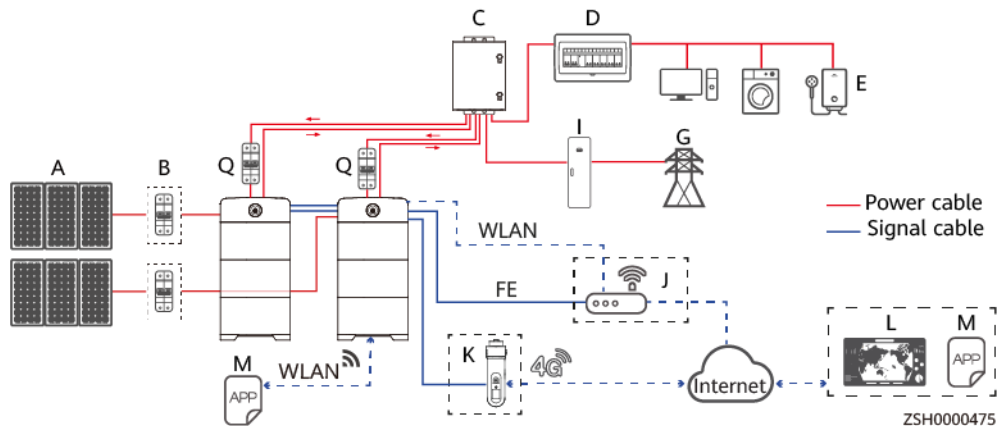


Figure 6-12 Parallel system networking (dashed boxes indicating optional components)



- (A) PV string
- (B) DC switch
- (C) AC parallel box
- (D) PDB
- (E) Load
- (G) Power grid
- (I) AC PDC
- (J) Router
- (K) 4G wireless backhaul module
- (L) FusionSolar Smart PV Management System
- (M) FusionSolar app
- (Q) AC switch

6.4 PV+Genset+ESS

Working Logic

1. The PV system and ESSs supply power to loads. When the lithium battery SOC is less than or equal to the value of **Genset Startup SOC(%)**, the genset starts and the mode switches to 2. If the genset fails to start, after the ESSs discharge to the value of **End-of-Discharge SOC for Lithium Batteries(%)**, the loads power off and the mode switches to 3.
2. The genset supplies power to loads. At the same time, the genset and PV system charge the ESSs until the value of **Genset Shutdown SOC(%)** is reached. The mode switches to 1.
3. The PV system charges the ESSs until the value of **Available SOC for Lithium Batteries(%)** is reached, and the mode switches to 1.

Table 6-5 Lithium battery parameters

Genset Startup SOC(%)		End-of-Discharge SOC for Lithium Batteries(%)		Available SOC for Lithium Batteries(%)		Genset Shutdown SOC(%)	
Value Range	Default Value	Value Range	Default Value	Value Range	Default Value	Value Range	Default Value

Genset Startup SOC(%)		End-of-Discharge SOC for Lithium Batteries(%)		Available SOC for Lithium Batteries(%)		Genset Shutdown SOC(%)	
15-30	15	5-15	5	20-95	20	85-100	90

 NOTE

- Lithium battery SOC: lithium battery real-time capacity percentage.
- **End-of-Discharge SOC for Lithium Batteries(%)**: In any mode, the ESSs discharge to the value of **End-of-Discharge SOC for Lithium Batteries(%)**, protecting the batteries.
- **Available SOC for Lithium Batteries(%)**: When the ESSs have only PV input (no AC input), the ESSs discharge to the value of **End-of-Discharge SOC for Lithium Batteries(%)**. The PV system charges the ESSs until the value of **Available SOC for Lithium Batteries(%)** is reached. Then the ESSs supply power to loads. This prevents unstable power supply when the irradiance is low.
- **Genset Startup SOC(%)**: The ESSs discharge until the lithium battery SOC is less than or equal to the value of **Genset Startup SOC(%)**. Then the genset is started to prevent load power-off.
- **Genset Shutdown SOC(%)**: The ESSs are charged until the value of **Available SOC for Lithium Batteries(%)** is reached. Then the genset is shut down. This reduces the genset runtime.

Parameters Settings

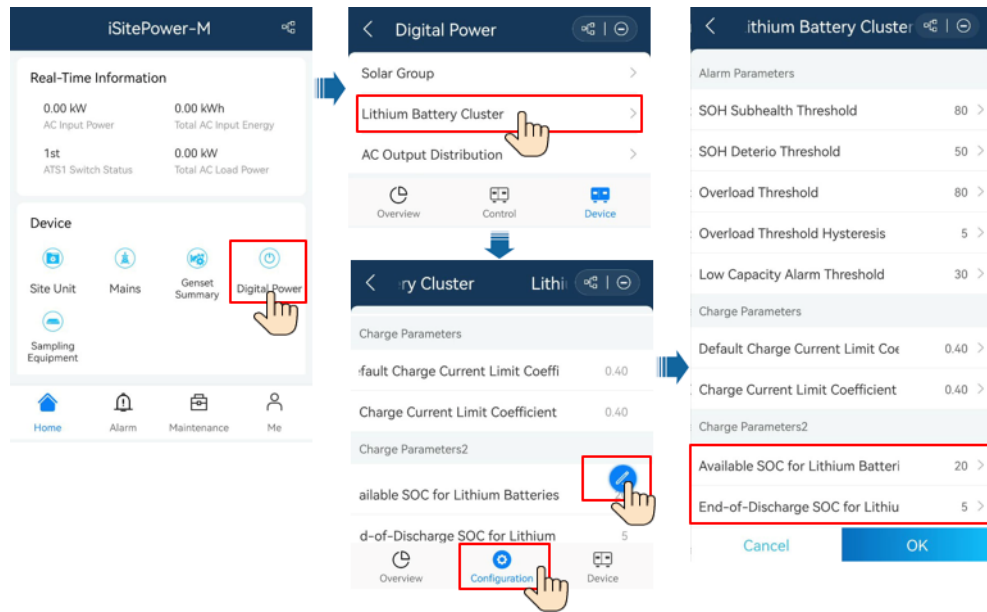
Figure 6-13 Setting basic parameters



Table 6-6 Basic parameters

Parameter	Description
Output Voltage	Set the output voltage and output frequency based on the local power grid standards.
Output Frequency	
Rated Power(kW)	Set the genset power to prevent genset overload and system breakdown when ESSs are charged.
Genset Startup SOC(%)	The value of Genset Startup SOC(%) must be at least 10% greater than the value of End-of-Discharge SOC for Lithium Batteries(%) .
Genset Shutdown SOC(%)	The genset shuts down when the ESSs charge to the value of Genset Shutdown SOC(%) .

Figure 6-14 Setting lithium battery parameters



Networking Scenarios

Figure 6-15 Single system networking (dashed boxes indicating optional components)

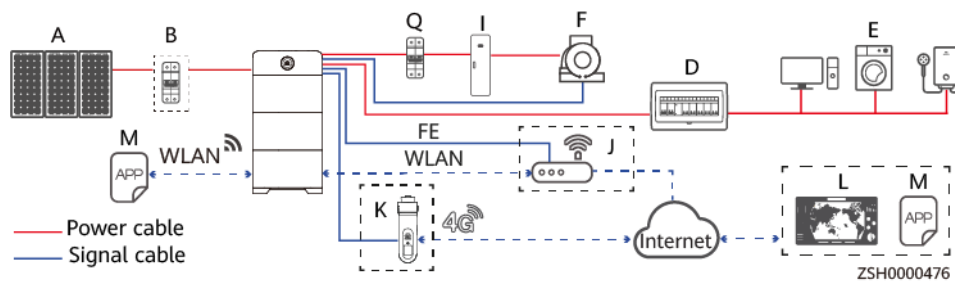
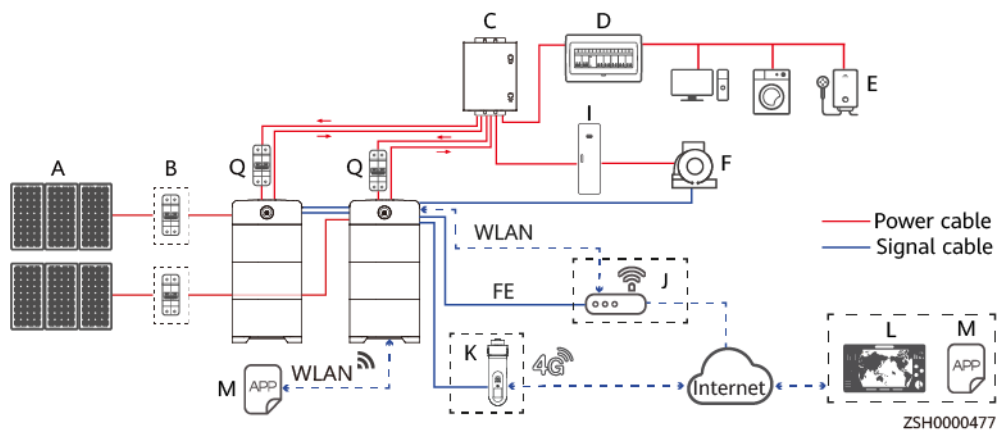


Figure 6-16 Parallel system networking (dashed boxes indicating optional components)



- | | | |
|--|---------------------|---------------------------------|
| (A) PV string | (B) DC switch | (C) AC parallel box |
| (D) PDB | (E) Load | (F) Genset |
| (I) AC PDC | (J) Router | (K) 4G wireless backhaul module |
| (L) FusionSolar Smart PV Management System | (M) FusionSolar app | (Q) AC switch |

6.5 Mains+Genset+ESS

Working Logic

1. When the mains is available, the genset shuts down. The mains supplies power to loads and charges the ESSs.
2. When the mains is unavailable:
 - a. The ESSs supply power to loads. When the lithium battery SOC is less than or equal to the value of **Genset Startup SOC(%)**, the genset starts and the mode switches to b. If the genset fails to start, the ESSs discharge to the value of **End-of-Discharge SOC for Lithium Batteries(%)**, and the loads power off.
 - b. The genset supplies power to loads and charges the ESSs until the value of **Genset Shutdown SOC(%)** is reached. The mode switches to a.

Table 6-7 Lithium battery parameters

Genset Startup SOC(%)		End-of-Discharge SOC for Lithium Batteries(%)		Genset Shutdown SOC(%)	
Value Range	Default Value	Value Range	Default Value	Value Range	Default Value
15–30	15	5–15	5	85–100	90

NOTE

- Lithium battery SOC: lithium battery real-time capacity percentage.
- **End-of-Discharge SOC for Lithium Batteries(%)**: In any mode, the ESSs discharge to the value of **End-of-Discharge SOC for Lithium Batteries(%)**, protecting the batteries.
- **Genset Startup SOC(%)**: The ESSs discharge until the lithium battery SOC is less than or equal to the value of **Genset Startup SOC(%)**. Then the genset is started to prevent load power-off.
- **Genset Shutdown SOC(%)**: The ESSs are charged until the value of **Available SOC for Lithium Batteries(%)** is reached. Then the genset is shut down. This reduces the genset runtime.

Parameters Settings

Figure 6-17 Setting basic parameters

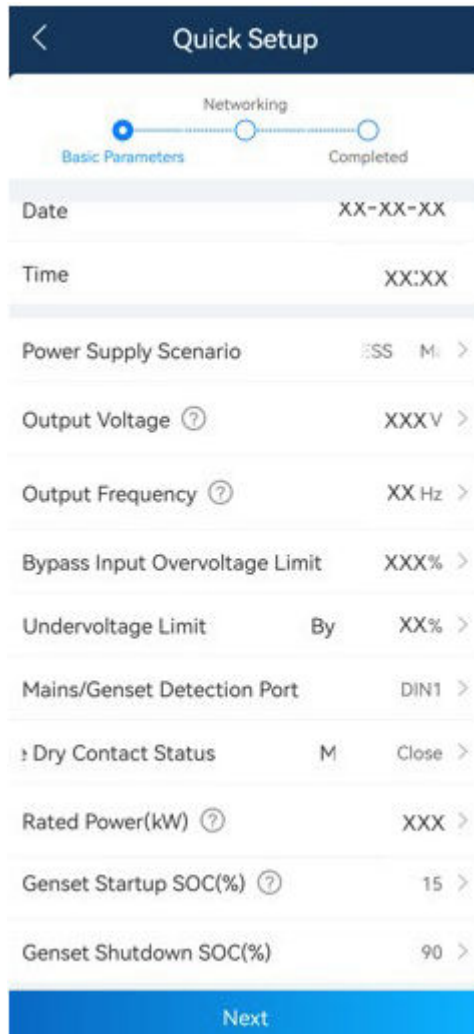
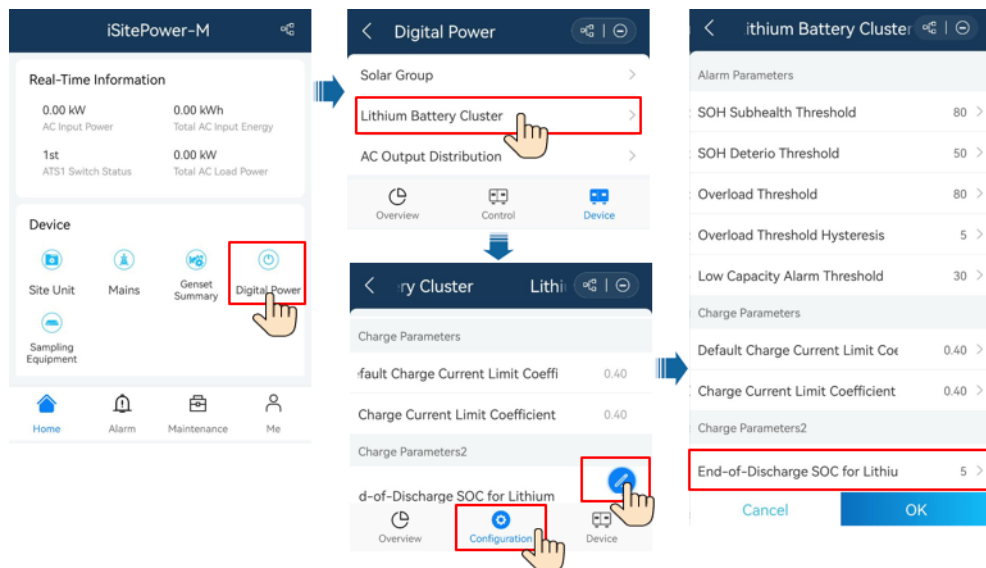


Table 6-8 Basic parameters

Parameter	Description
Output Voltage	Set the output voltage and output frequency based on the local power grid standards.
Output Frequency	
Bypass Input Overvoltage Limit	Set the bypass input overvoltage and undervoltage protection thresholds. When the bypass input voltage reaches the preset value, the system stops output immediately and reports a bypass module protection alarm.
Bypass Input Undervoltage Limit	
Mains/Genset Detection Port	Select a mains/genset detection port.

Parameter	Description
Mains Outage Dry Contact Status	Set the mains outage dry contact status.
Rated Power(kW)	Set the genset output power to prevent genset overload and system breakdown when ESSs are charged.
Genset Startup SOC(%)	The value of Genset Startup SOC(%) must be at least 10% greater than the value of End-of-Discharge SOC for Lithium Batteries(%) .
Genset Shutdown SOC(%)	The genset shuts down when the ESSs charge to the value of Genset Shutdown SOC(%) .

Figure 6-18 Setting lithium battery parameters



Networking Scenarios

NOTE

If an ATS without overvoltage/undervoltage protection is used, the ATS may make misjudgment due to overvoltage/undervoltage of the power grid. To ensure the power supply quality, install an AVR before the ATS.

Figure 6-19 Single system networking (dashed boxes indicating optional components)

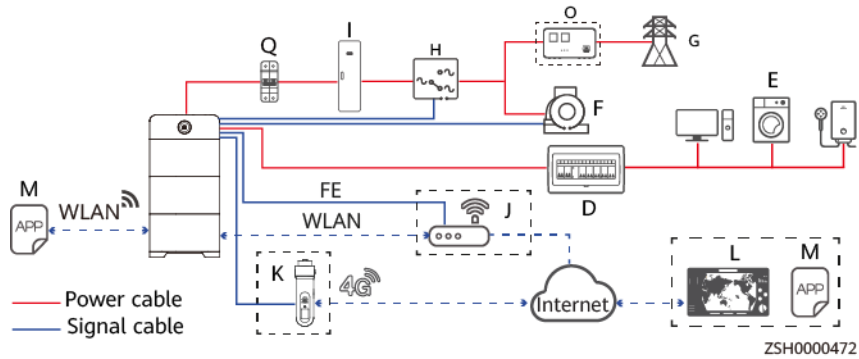
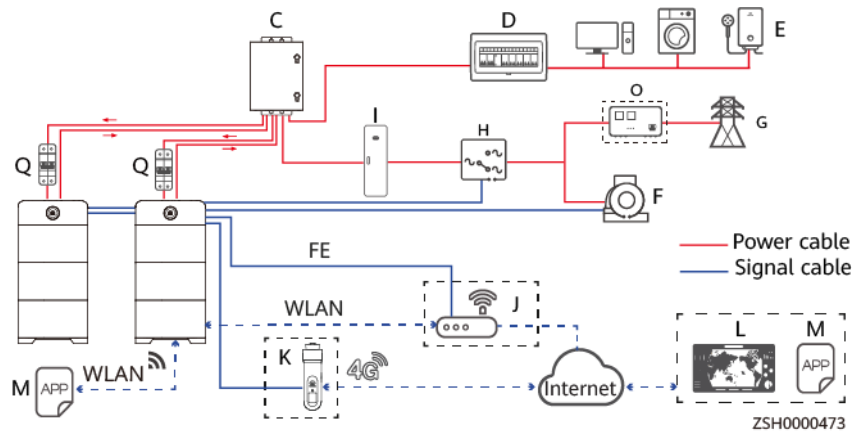


Figure 6-20 Parallel system networking (dashed boxes indicating optional components)



- | | | |
|--|---------------------|---------------------------------|
| (C) AC parallel box | (D) PDB | (E) Load |
| (F) Genset | (G) Power grid | (H) ATS |
| (I) AC PDC | (J) Router | (K) 4G wireless backhaul module |
| (L) FusionSolar Smart PV Management System | (M) FusionSolar app | (O) AVR |
| (Q) AC switch | | |

6.6 PV+Mains+Genset+ESS

Working Logic

1. Maximize PV Consumption:
 - a. When the mains is available:

 NOTE

When the ESSs are powered on for the first time and the lithium battery SOC is greater than the value of **Backup Power SOC(%)**, the PV system and ESSs supply power to loads, and the ESSs discharge to the value of **Backup Power SOC(%)**.

- i. The mains supplies power to loads. The PV system charges the ESSs (the ESSs do not supply power to the loads in this case). After the ESSs are fully charged, the mode switches to ii.
 - ii. The PV system and the ESSs supply power to the loads. When the ESSs discharge to the value of **Backup Power SOC(%)**, the mode switches to i.
- b. When the mains is unavailable:
- i. The PV system and ESSs supply power to loads. When the lithium battery SOC is less than or equal to the value of **Genset Startup SOC(%)**, the genset starts and the mode switches to ii. If the genset fails to start, after the ESSs discharge to the value of **End-of-Discharge SOC for Lithium Batteries(%)**, the loads power off and the mode switches to iii.
 - ii. The genset supplies power to loads. At the same time, the genset and PV system charge the ESSs until the value of **Genset Shutdown SOC(%)** is reached. The mode switches to i.
 - iii. The PV system charges the ESSs (the PV system and the ESSs do not supply power to the loads) until the value of **Available SOC for Lithium Batteries(%)** is reached, and the mode switches to i.
2. Maximize Power Backup:
- a. When the mains is available, the mains supplies power to loads, and the mains and PV system charge the ESSs until the ESSs are fully charged.
 - b. When the mains is unavailable:
 - i. The PV system and ESSs supply power to loads. When the lithium battery SOC is less than or equal to the value of **Genset Startup SOC(%)**, the genset starts and the mode switches to ii. If the genset fails to start, after the ESSs discharge to the value of **End-of-Discharge SOC for Lithium Batteries(%)**, the loads power off and the mode switches to iii.
 - ii. The genset supplies power to loads. At the same time, the genset and PV system charge the ESSs until the value of **Genset Shutdown SOC(%)** is reached. The mode switches to i.
 - iii. The PV system charges the ESSs until the value of **Available SOC for Lithium Batteries(%)** is reached, and the mode switches to i.

Table 6-9 Lithium battery parameters

Operating Mode		Backup Power SOC(%) (Maximize PV Consumption)		Genset Startup SOC(%)		Genset Shutdown SOC(%)		End-of-Discharge SOC for Lithium Batteries(%)		Available SOC for Lithium Batteries(%)	
Value Range	Default Value	Value Range	Default Value	Value Range	Default Value	Value Range	Default Value	Value Range	Default Value	Value Range	Default Value
<ul style="list-style-type: none"> Maximize PV Consumption Maximize Power Backup 	Maximize Power Backup	20–50	20	15–30	15	85–100	90	5–15	5	20–95	20

 **NOTE**

- Lithium battery SOC: lithium battery real-time capacity percentage.
- **Backup Power SOC(%)**: In **Maximize PV Consumption** mode, when the mains is normal, the lithium battery SOC is greater than the value of **Backup Power SOC(%)** to provide backup power.
- **End-of-Discharge SOC for Lithium Batteries(%)**: In any mode, the ESSs discharge to the value of **End-of-Discharge SOC for Lithium Batteries(%)**, protecting the batteries.
- **Available SOC for Lithium Batteries(%)**: When the ESSs have only PV input (no AC input), the ESSs discharge to the value of **End-of-Discharge SOC for Lithium Batteries(%)**. The PV system charges the ESSs until the value of **Available SOC for Lithium Batteries(%)** is reached. Then the ESSs supply power to loads. This prevents unstable power supply when the irradiance is low.
- **Genset Startup SOC(%)**: The ESSs discharge until the lithium battery SOC is less than or equal to the value of **Genset Startup SOC(%)**. Then the genset is started to prevent load power-off.
- **Genset Shutdown SOC(%)**: The ESSs are charged until the value of **Available SOC for Lithium Batteries(%)** is reached. Then the genset is shut down. This reduces the genset runtime.

Parameters Settings

Figure 6-21 Setting basic parameters

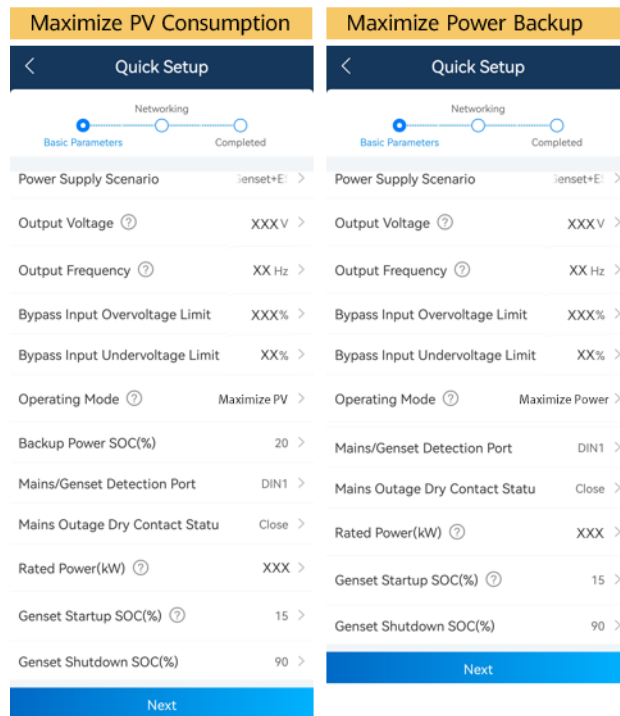
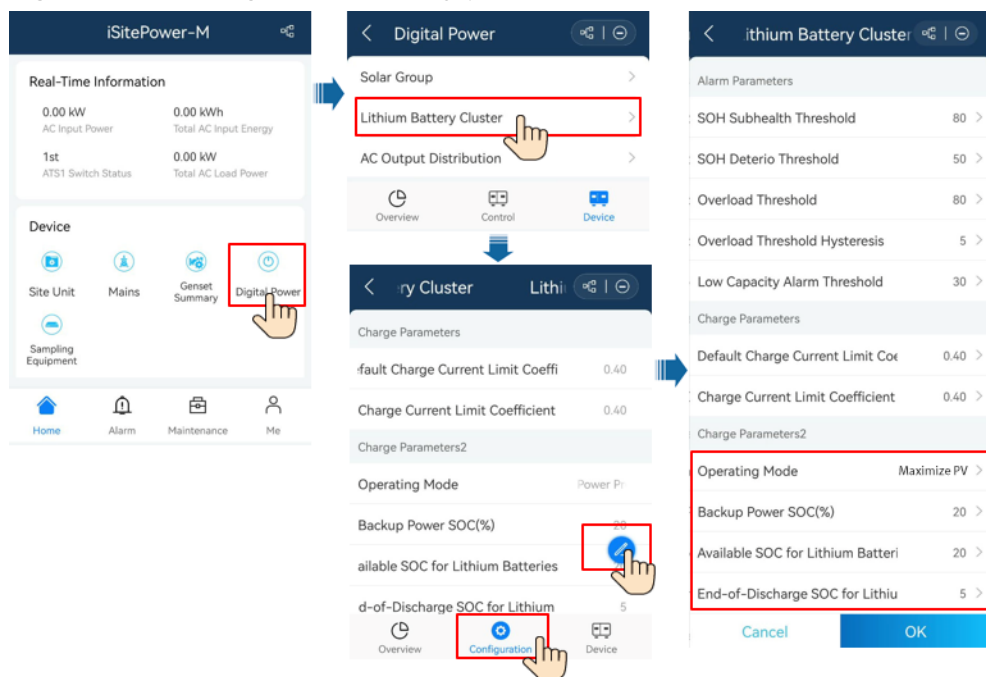


Table 6-10 Basic parameters

Parameter	Description
Output Voltage	Set the output voltage and output frequency based on the local power grid standards.
Output Frequency	
Bypass Input Overvoltage Limit	Set the bypass input overvoltage and undervoltage protection thresholds. When the bypass input voltage reaches the preset value, the system stops output immediately and reports a bypass module protection alarm.
Bypass Input Undervoltage Limit	
Operating Mode	<p>Maximize PV Consumption: PV power is preferentially used for loads.</p> <p>Maximize Power Backup: The mains is preferentially used to supply power to loads. At the same time, the mains and PV system charge the ESSs until the ESSs are fully charged.</p>
Backup Power SOC(%)	This parameter is available only when Operating Mode is set to Maximize PV Consumption .
Mains/Genset Detection Port	Select a mains/genset detection port.
Mains Outage Dry Contact Status	Set the mains outage dry contact status.

Parameter	Description
Rated Power(kW)	Set the genset power to prevent genset overload and system breakdown when ESSs are charged.
Genset Startup SOC(%)	The value of Genset Startup SOC(%) must be at least 10% greater than the value of End-of-Discharge SOC for Lithium Batteries(%) .
Genset Shutdown SOC(%)	The genset shuts down when the ESSs charge to the value of Genset Shutdown SOC(%) .

Figure 6-22 Setting lithium battery parameters



Networking Scenarios

NOTE

If an ATS without overvoltage/undervoltage protection is used, the ATS may make misjudgment due to overvoltage/undervoltage of the power grid. To ensure the power supply quality, install an AVR before the ATS.

Figure 6-23 Single system networking

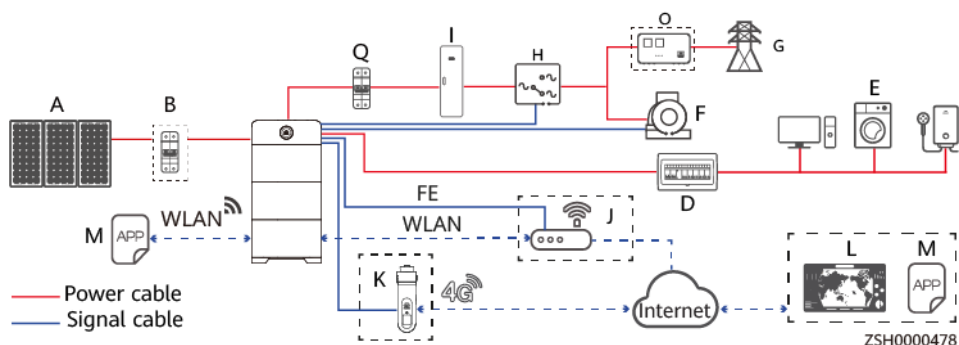
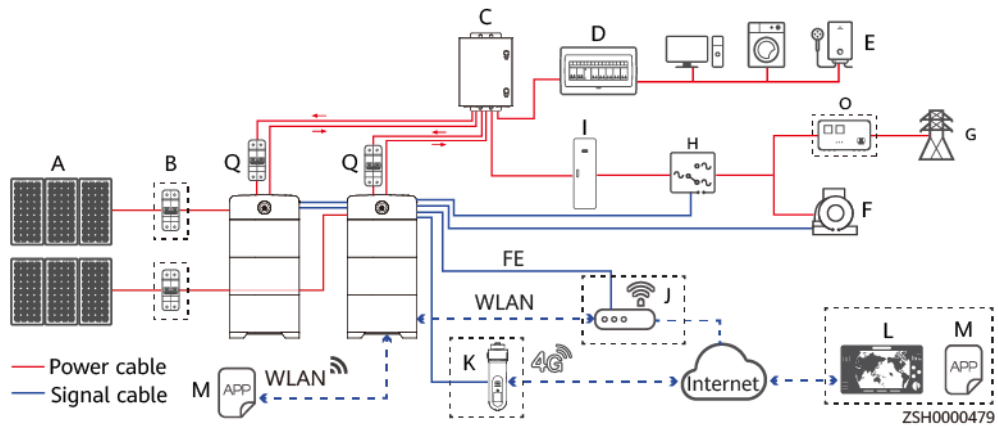


Figure 6-24 Parallel system networking



- | | | |
|---------------------|---------------------------------|--|
| (A) PV string | (B) DC switch | (C) AC parallel box |
| (D) PDB | (E) Load | (F) Genset |
| (G) Power grid | (H) ATS | (I) AC PDC |
| (J) Router | (K) 4G wireless backhaul module | (L) FusionSolar Smart PV Management System |
| (M) FusionSolar app | (O) AVR | (Q) AC switch |

7 System Installation

7.1 Installation Preparations

7.1.1 Checking Before the Installation

Checking Outer Packaging

Before unpacking the product, check the outer packaging for damage, such as holes and cracks, and check the model. If any damage is found or the model is not what you requested, do not unpack the product and contact your vendor as soon as possible.

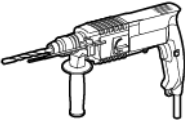


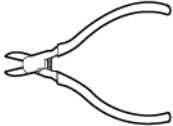
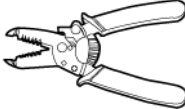
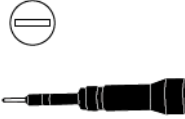




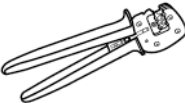

Checking Deliverables





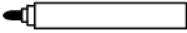
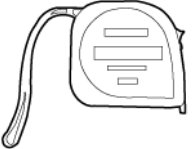

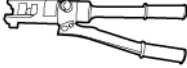





After unpacking the product, check that the deliverables are intact and complete, and free from any obvious damage. If any item is missing or damaged, contact your vendor.



 **NOTE**

For details about the number of deliverables, see the *Packing List* in the packing case.

7.1.2 Tools and Instruments

Type	Tools and Instruments		
Installation			
	Hammer drill	Insulated torque socket wrench (including an extension bar)	Adjustable torque wrench
			
	Diagonal pliers	Wire stripper	Flat-head insulated torque screwdriver
			
Phillips insulated torque screwdriver	Rubber mallet	Utility knife	
			
Cable cutter	Crimping tool, model: PV-CZM-CZM41100 (preferred)/CZM22100	Cord end terminal crimping tool	

Type	Tools and Instruments		
	 Removal tool (model: PV-MS-HZ open-end wrench)	 Cable tie	 Vacuum cleaner
	 Multimeter (DC voltage measurement range ≥ 600 V DC)	 Marker	 Steel measuring tape
	 Level	 Hydraulic pliers	 Heat shrink tubing
	 Heat gun	-	-
PPE	 Insulated gloves	 Protective gloves	 Goggles

Type	Tools and Instruments		
	 Dust mask	 Protective shoes	-

7.1.3 Determining the Installation Position

Installation Angle Requirement

The battery can be floor-mounted and wall-mounted. The installation angle requirement is as follows:

- Do not install the battery at forward tilted, back tilted, side tilted, horizontal, or upside down positions.

Installation Position Requirements

- Install the battery on a solid brick-concrete structure or concrete wall or floor. If other types of walls and floors are used, they must be made of fire-retardant materials and meet the load-bearing requirements of the equipment.
- The bearing capacity of the ground must be greater than or equal to 500 kg/m².

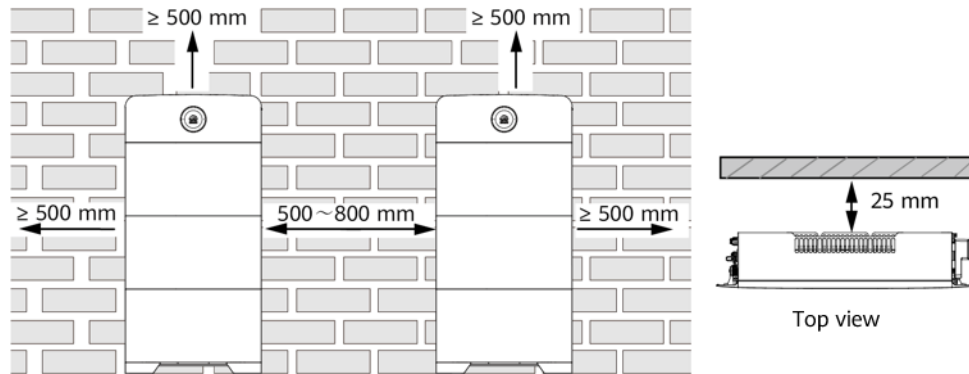
Installation Space Requirements

- During installation, ensure that there is no other devices (except related Huawei devices and awnings) or flammable or explosive materials around the batteries. Reserve adequate space for heat dissipation and safety isolation.
- When the battery is mounted on a wall, do not place any objects under the battery.

Installation Dimensions

Reserve sufficient clearance around the product for installation and heat dissipation.

Figure 7-1 Clearance



7.2 Installing a Mounting Bracket

7.2.1 Ground Mounting

WARNING

The base must be secured to the ground using bolts. Otherwise, the device may tip over, causing personal injury or device damage.

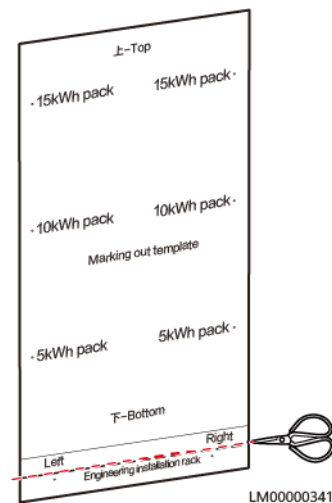
Procedure

NOTE

Two marking-off templates are required for ground mounting. A small marking-off template determines holes on the ground, and a large marking-off template determines holes on the wall.

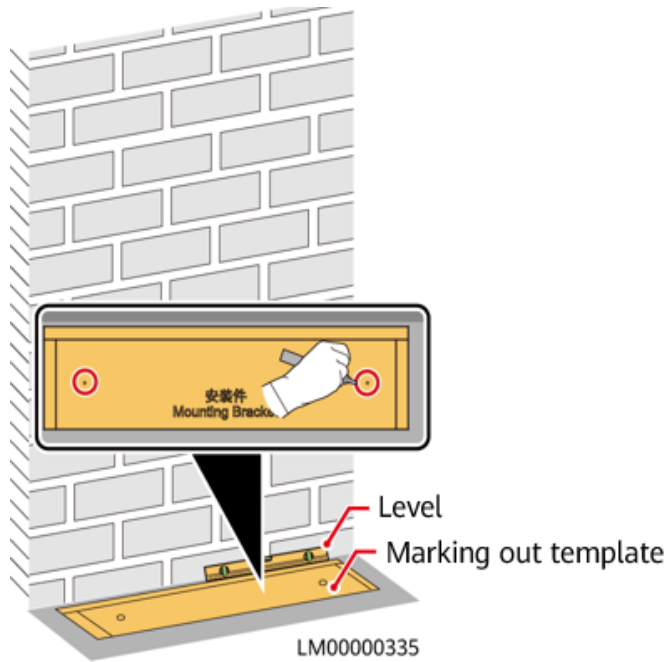
Step 1 Cut the marking-off template along the dotted line.

Figure 7-2 Cutting the marking-off template



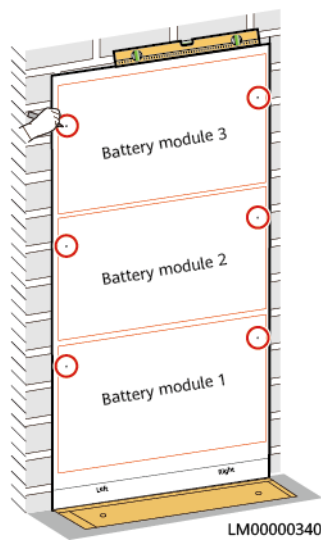
Step 2 Mark mounting holes for the base.

Figure 7-3 Marking mounting holes for the base



Step 3 Mark the mounting holes for battery modules.

Figure 7-4 Marking the mounting holes for battery modules

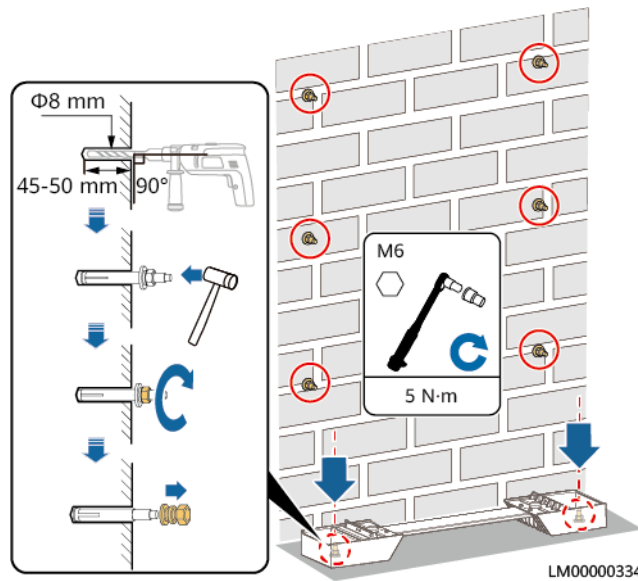


Step 4 Drill holes and install expansion bolts.

⚠ DANGER

When drilling holes, avoid the water pipes and power cables buried in the wall.

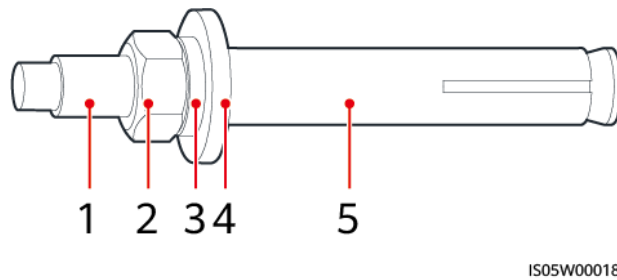
Figure 7-5 Installing expansion bolts



NOTE

Use the M6x60 expansion bolts delivered with the product to secure the mounting base. If the length or quantity of the M6x60 expansion bolts cannot meet the installation requirements, prepare M6 stainless steel expansion bolts by yourself. The expansion bolts delivered with the product are used for solid brick walls and concrete grounds. If other types of walls and grounds are used, ensure that the load bearing capacity requirements (the weight of one battery module is 50 kg) are met and appropriate bolts are selected.

Figure 7-6 M6 expansion bolt structure



- | | | |
|-----------------|----------------------|-------------------|
| (1) Bolt | (2) Nut | (3) Spring washer |
| (4) Flat washer | (5) Expansion sleeve | |

NOTICE

- To prevent dust inhalation or contact with eyes, wear safety goggles and a dust mask when drilling holes.
- Wipe away any dust in or around the holes and measure the hole spacing. If the holes are inaccurately positioned, drill holes again.
- Level the head of the expansion sleeve with the concrete wall or ground after removing the nut, spring washer, and flat washer. Otherwise, the mounting bracket will not be securely installed.
- Loosen the nut, spring washer, and flat washer of the expansion bolt at the bottom.

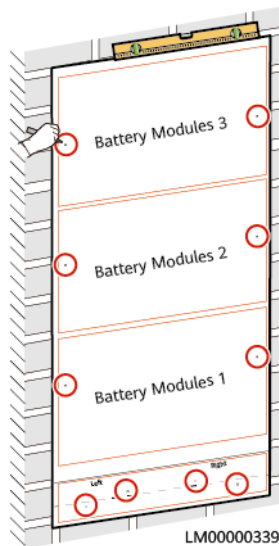
----End

7.2.2 Wall Mounting

Procedure

- Step 1** Mark the mounting holes for the wall-mounting bracket and battery modules.

Figure 7-7 Standard mounting holes



- Step 2** Drill holes and install expansion bolts.

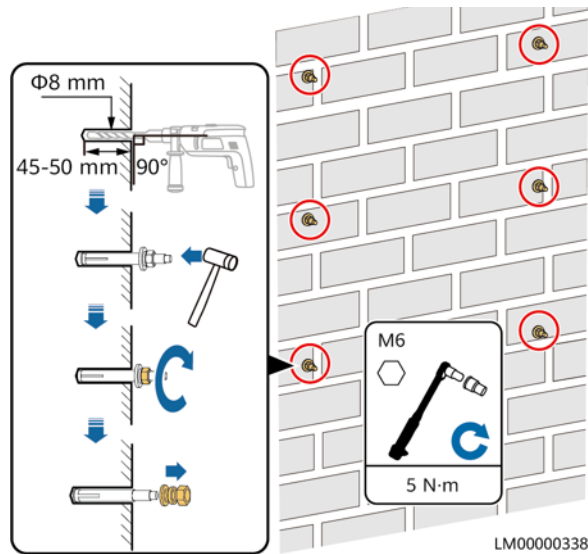
⚠ DANGER

When drilling holes, avoid the water pipes and power cables buried in the wall.

NOTE

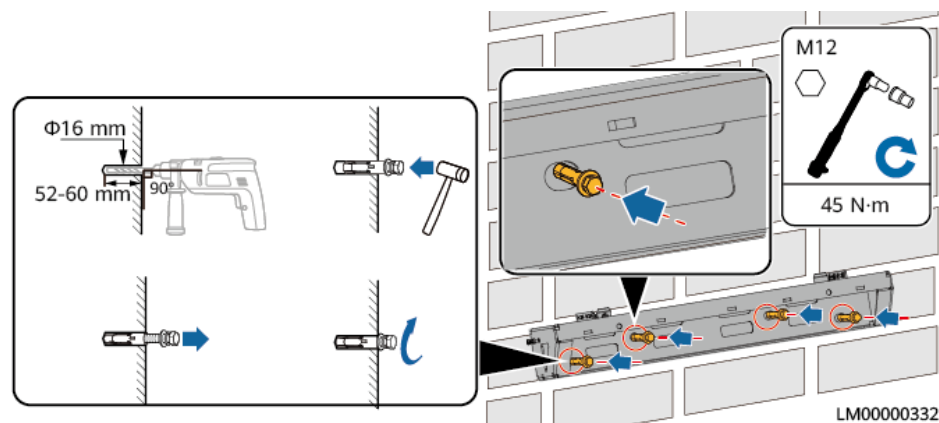
- Use the M12x60 expansion bolts delivered with the product to secure the wall-mounting bracket. If the length or quantity of the expansion bolts cannot meet the installation requirements, prepare M12 stainless steel expansion bolts by yourself.
- Use the M6x60 expansion bolts delivered with the product to secure the modules. If the length or quantity of the expansion bolts cannot meet the installation requirements, prepare M6 stainless steel expansion bolts by yourself.

Figure 7-8 Installing expansion bolts



Step 3 Install a wall-mounting bracket.

Figure 7-9 Installing a wall-mounting bracket

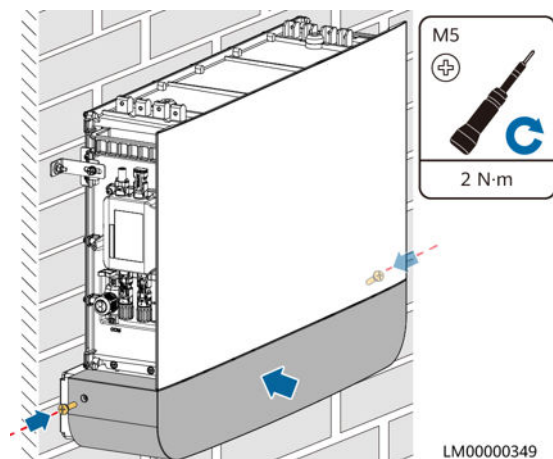


Step 4 Install a wall-mounting bracket cover.

NOTICE

In the wall-mounting scenario, install battery modules before installing the wall-mounting base cover.

Figure 7-10 Installing the cover



----End

7.3 Installing Modules

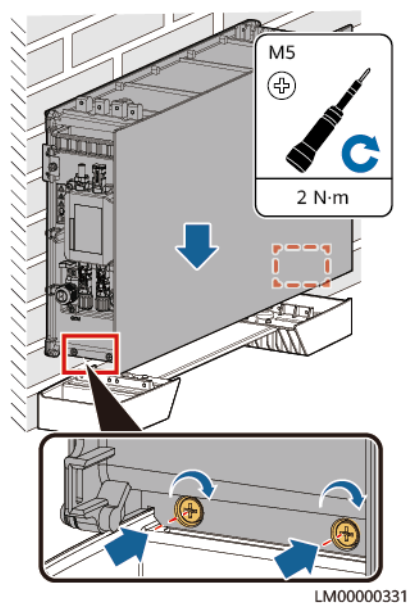
NOTICE

- Two persons are required to move a module.
- Battery modules must be secured to the wall.

Installing Modules

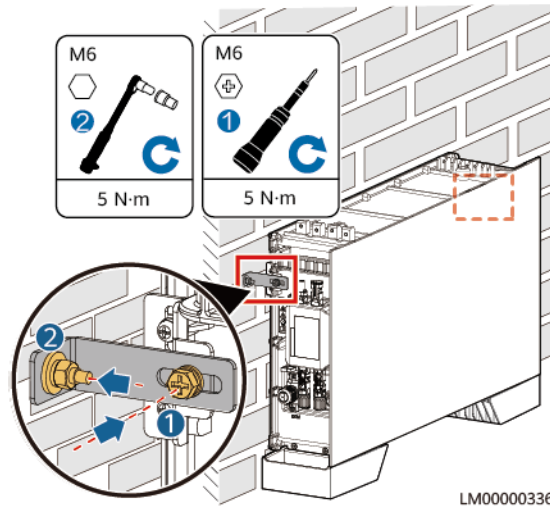
Step 1 Install a battery module on the base.

Figure 7-11 Installing a battery module



Step 2 Secure the battery module to the wall.

Figure 7-12 Securing the battery module



Step 3 Install the remaining battery modules and power module from bottom to top. Each time a module is installed, tighten the screws on the left and right, and then secure it against the wall.

Figure 7-13 Ground mounting completed

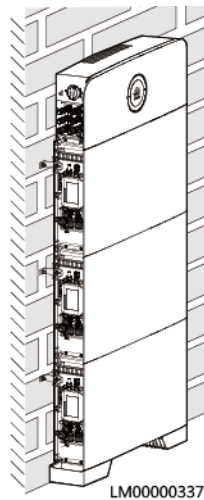
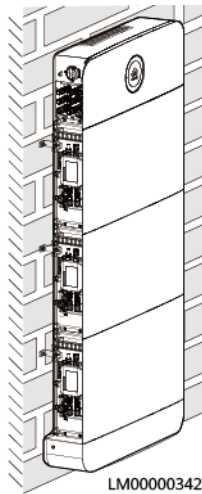


Figure 7-14 Wall mounting completed



----End

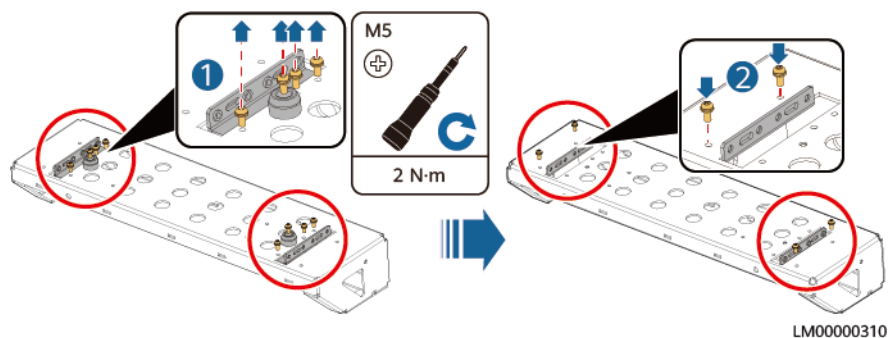
7.4 (Optional) Installing Battery Modules for Capacity Expansion

NOTICE

- A maximum of three battery modules can be installed on a bracket or base. If more than three battery modules are required, add a bracket.
- For details about how to install brackets and modules, see [7.2 Installing a Mounting Bracket](#) and [7.3 Installing Modules](#).

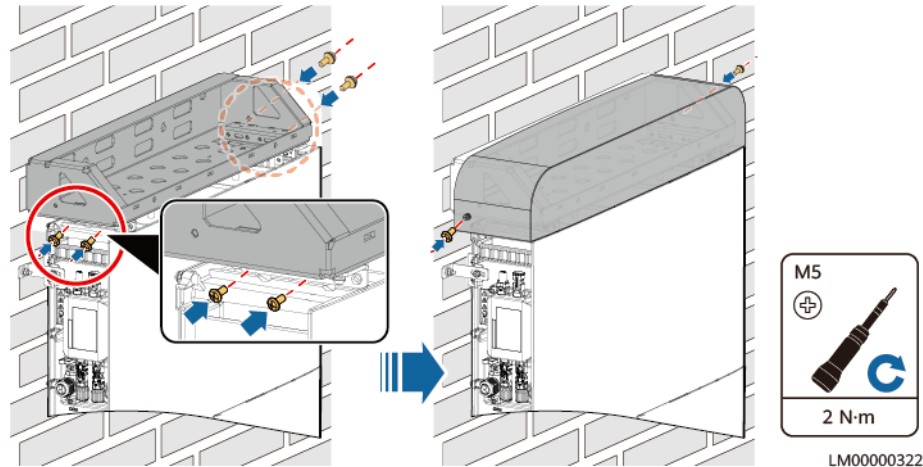
Step 1 Remove the L-shaped plates from the top cover, rotate them by 180 degrees, and install them back on the top cover.

Figure 7-15 Rotating the L-shaped plates on the top cover



Step 2 Install the top cover on the battery module.

Figure 7-16 Installing the top cover



----End

7.5 (Optional) Installing a 4G Wireless Backhaul Module

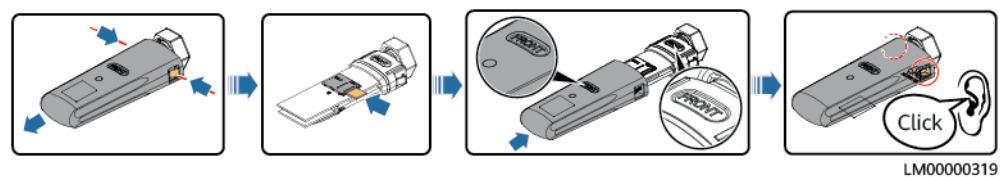
Prerequisites

- A 4G wireless backhaul module is configured.
- A SIM card has been activated.

Procedure

Step 1 Install a SIM card.

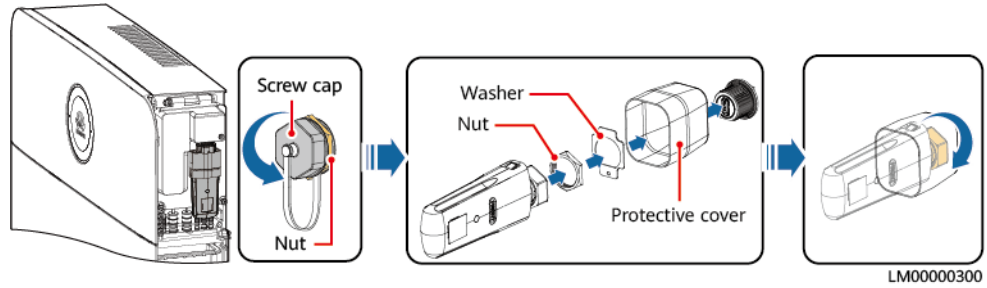
Figure 7-17 Installing a SIM card



NOTE

- Recommended SIM card monthly data package: 500 MB
- When installing a SIM card, determine its installation direction based on the arrow on the card slot.
- Press the SIM card in place to lock it. In this case, the SIM card is correctly installed.
- When removing the SIM card, push it inwards to eject it.
- If you hear two clicks when installing a 4G wireless backhaul module, the module is properly installed. If the module is not properly installed, water may enter it.

Step 2 Install a 4G wireless backhaul module.



NOTE

- When installing the 4G wireless backhaul module, ensure that the clip is in place.
- Ensure that the protective cover is properly installed.

----End

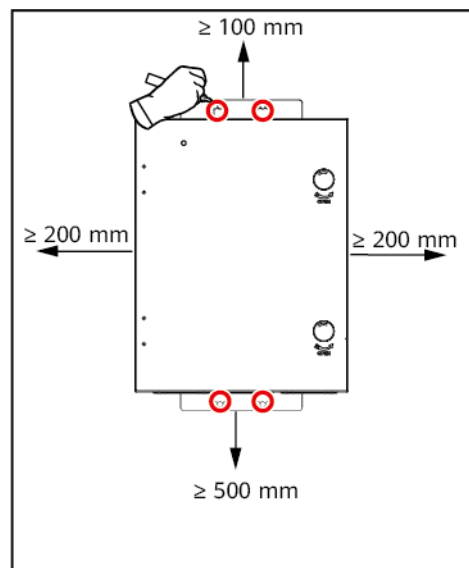
7.6 (Optional) Installing an AC Parallel Box

Prerequisites

In a parallel system, an AC parallel box must be configured.

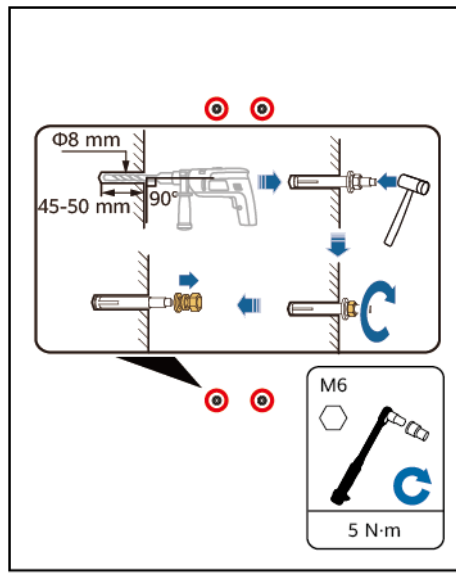
Step 1 Mark mounting holes.

Figure 7-18 Marking mounting holes



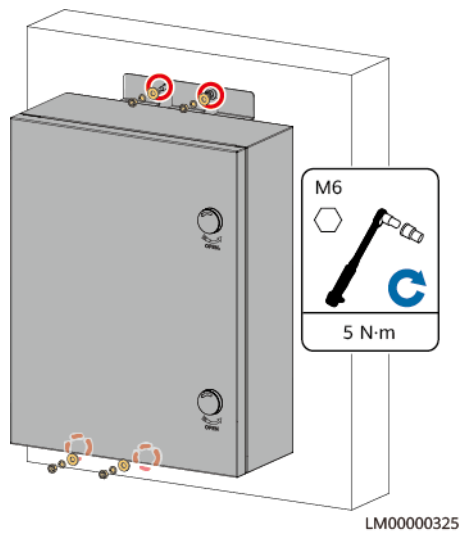
Step 2 Install expansion bolts.

Figure 7-19 Installing expansion bolts



Step 3 Install the AC parallel box on the wall.

Figure 7-20 Installing the AC parallel box



----End

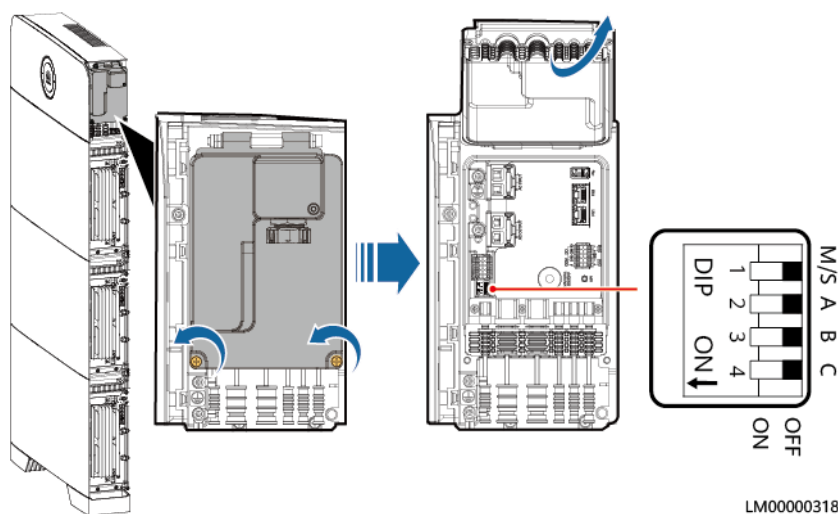
8 Setting Address DIP Switches

NOTICE

- Before installing parallel cables, correctly set the address DIP switches for the master and slave products.
- The address DIP switches take effect only after the devices are restarted. Set the DIP switches when the devices are powered off (AC and DC inputs are disconnected, and the devices are shut down by pressing the black start button).
- Pin 1 (M/S) indicates whether the product is a master or slave. When Pin 1 is set to ON, the product is a master product. Otherwise, the product is a slave product. Pins 2–4 (A–C) indicate the high-speed CAN communication addresses in a parallel system.
- When only one product is used, set Pin 1 to ON.
- The default address is 0 (Pin 1 to Pin 4: OFF).

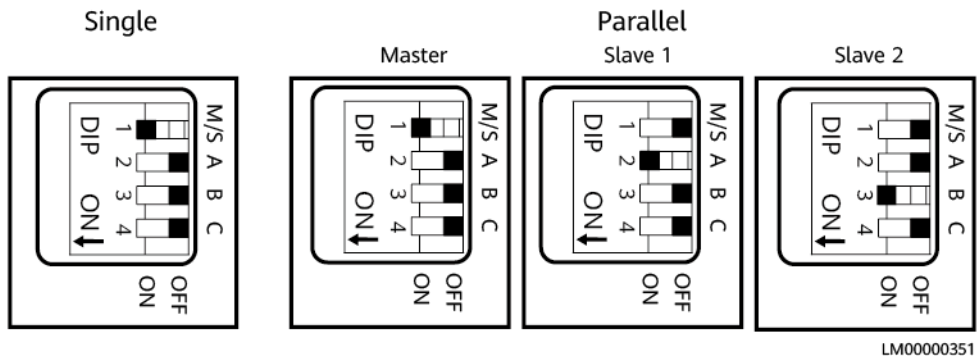
Step 1 Open the power module maintenance compartment.

Figure 8-1 Opening the maintenance compartment



Step 2 Set the address DIP switches.

Figure 8-2 Address DIP switches



LM00000351

----End

9 Preparing Cables

NOTICE

- Do not use aluminum cables to avoid electrochemical corrosion of copper and aluminum.
- Power cables should be able to withstand a temperature of at least 90°C.

NOTE

- The minimum cable cross-sectional area must meet local standards.
- The factors that affect cable selection include the rated current, cable type, routing mode, ambient temperature, and maximum expected line loss.

9.1 Cables Delivered with the Product

Table 9-1 Cables delivered with the product

No.	Cable	Type
1	Power cables	Common outdoor PV cables in the industry
2	Signal cables	Outdoor shielded twisted pair cables
3	PE cables (standard scenario)	Outdoor single-core copper cables

NOTICE

In capacity expansion scenarios, you need to purchase power cables and signal cables for bottom cascading from Huawei.

Table 9-2 (Optional) Cables in capacity expansion scenario

No.	Cable	Type
1	Power cables for bottom cascading	Common outdoor PV cables in the industry
2	Signal cables for bottom cascading	Outdoor shielded twisted pair cables

9.2 Cables Prepared by the Customer

9.2.1 PV+ESS

Table 9-3 Cables in single-system scenarios (including capacity expansion)

No.	One End	Other End	Type	Recommended Specifications
1	PV input port	DC switch (customer side)	Common outdoor PV cable in the industry	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 5.5–9 mm
2	AC output port	PDB (customer side)	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 13.7–16.9 mm
3	Ground point	Site ground bar (customer side)	Outdoor single-core copper cable	Conductor cross-sectional area: 4–6 mm ² (same as the cross-sectional area of the AC input power cable)
4	Ground point	Ground point on the module for capacity expansion	Outdoor single-core copper cable (capacity expansion scenario)	Conductor cross-sectional area: 6 mm ²

Table 9-4 Cables in parallel-system scenarios

No.	One End	Other End	Type	Recommended Specifications
1	PV input port	DC switch (customer side)	Common outdoor PV cable in the industry	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 5.5–9 mm
2	Ground point	Site ground bar (customer side)	Outdoor single-core copper cable	Main PE cable: 4–6 mm ² (same as the cross-sectional area of the AC input power cable)
3	AC parallel box	AC output port	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 13.7–16.9 mm
4	AC parallel box	PDB (customer side)	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 25 mm² Cable outer diameter: 16–26 mm
5	AC parallel box	Site ground bar (customer side)	Outdoor single-core copper cable	<ul style="list-style-type: none"> Conductor cross-sectional area: 25 mm² Cable outer diameter: 8–11 mm

9.2.2 Mains+ESS

Table 9-5 Cables in single-system scenarios (including capacity expansion)

No.	One End	Other End	Type	Recommended Specifications
1	AC output port	PDB (customer side)	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 13.7–16.9 mm
2	AC input port	AC PDC (customer side)	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 13.7–16.9 mm

No.	One End	Other End	Type	Recommended Specifications
3	Ground point	Site ground bar (customer side)	Outdoor single-core copper cable	Conductor cross-sectional area: 4–6 mm ² (same as the cross-sectional area of the AC input power cable)
4	Ground point	Ground point on the module for capacity expansion	Outdoor single-core copper cable (capacity expansion scenario)	Conductor cross-sectional area: 6 mm ²

Table 9-6 Cables in parallel-system scenarios

No.	One End	Other End	Type	Recommended Specifications
1	Ground point	Site ground bar (customer side)	Outdoor single-core copper cable	Main PE cable: 4–6 mm ² (same as the cross-sectional area of the AC input power cable)
2	AC parallel box	AC PDC (customer side)	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 25 mm² Cable outer diameter: 16–26 mm
3	AC parallel box	AC output port	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 13.7–16.9 mm
4	AC parallel box	AC input port	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 13.7–16.9 mm
5	AC parallel box	PDB (customer side)	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 25 mm² Cable outer diameter: 16–26 mm
6	AC parallel box	Site ground bar (customer side)	Outdoor single-core copper cable	<ul style="list-style-type: none"> Conductor cross-sectional area: 25 mm² Cable outer diameter: 8–11 mm

9.2.3 PV+Mains+ESS

Table 9-7 Cables in single-system scenarios (including capacity expansion)

No.	One End	Other End	Type	Recommended Specifications
1	PV input port	DC switch (customer side)	Common outdoor PV cable in the industry	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 5.5–9 mm
2	AC output port	PDB (customer side)	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 13.7–16.9 mm
3	AC input port	AC PDC (customer side)	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 13.7–16.9 mm
4	Ground point	Site ground bar (customer side)	Outdoor single-core copper cable	Conductor cross-sectional area: 4–6 mm ² (same as the cross-sectional area of the AC input power cable)
5	Ground point	Ground point on the module for capacity expansion	Outdoor single-core copper cable (capacity expansion scenario)	Conductor cross-sectional area: 6 mm ²

Table 9-8 Cables in parallel-system scenarios

No.	One End	Other End	Type	Recommended Specifications
1	PV input port	DC switch (customer side)	Common outdoor PV cable in the industry	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 5.5–9 mm
2	Ground point	Site ground bar (customer side)	Outdoor single-core copper cable	Main PE cable: 4–6 mm ² (same as the cross-sectional area of the AC input power cable)

No.	One End	Other End	Type	Recommended Specifications
3	AC parallel box	AC PDC (customer side)	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 25 mm² Cable outer diameter: 16–26 mm
4	AC parallel box	AC output port	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 13.7–16.9 mm
5	AC parallel box	AC input port	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 13.7–16.9 mm
6	AC parallel box	PDB (customer side)	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 25 mm² Cable outer diameter: 16–26 mm
7	AC parallel box	Site ground bar (customer side)	Outdoor single-core copper cable	<ul style="list-style-type: none"> Conductor cross-sectional area: 25 mm² Cable outer diameter: 8–11 mm

9.2.4 PV+Genset+ESS

Table 9-9 Cables in single-system scenarios (including capacity expansion)

No.	One End	Other End	Type	Recommended Specifications
1	PV input port	DC switch (customer side)	Common outdoor PV cable in the industry	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 5.5–9 mm
2	AC output port	PDB (customer side)	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 13.7–16.9 mm
3	AC input port	AC PDC (customer side)	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 13.7–16.9 mm

No.	One End	Other End	Type	Recommended Specifications
4	COM and dry contact ports	Genset control signal	Outdoor shielded twisted pair cable (eight cores)	<ul style="list-style-type: none"> Conductor cross-sectional area: 0.2–1 mm² Cable outer diameter: 6.3–7.5 mm
5	Ground point	Site ground bar (customer side)	Outdoor single-core copper cable	Conductor cross-sectional area: 4–6 mm ² (same as the cross-sectional area of the AC input power cable)
6	Ground point	Ground point on the module for capacity expansion	Outdoor single-core copper cable (capacity expansion scenario)	Conductor cross-sectional area: 6 mm ²

Table 9-10 Cables in parallel-system scenarios

No.	One End	Other End	Type	Recommended Specifications
1	PV input port	DC switch (customer side)	Common outdoor PV cable in the industry	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 5.5–9 mm
2	Ground point	Site ground bar (customer side)	Outdoor single-core copper cable	Main PE cable: 4–6 mm ² (same as the cross-sectional area of the AC input power cable)
3	COM and dry contact ports	Genset control signal	Outdoor shielded twisted pair cable (eight cores)	<ul style="list-style-type: none"> Conductor cross-sectional area: 0.2–1 mm² Cable outer diameter: 6.3–7.5 mm
4	AC parallel box	AC PDC (customer side)	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 25 mm² Cable outer diameter: 16–26 mm
5	AC parallel box	AC output port	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 13.7–16.9 mm

No.	One End	Other End	Type	Recommended Specifications
6	AC parallel box	AC input port	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 13.7–16.9 mm
7	AC parallel box	PDB (customer side)	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 25 mm² Cable outer diameter: 16–26 mm
8	AC parallel box	Site ground bar (customer side)	Outdoor single-core copper cable	<ul style="list-style-type: none"> Conductor cross-sectional area: 25 mm² Cable outer diameter: 8–11 mm

9.2.5 Mains+Genset+ESS

Table 9-11 Cables in single-system scenarios (including capacity expansion)

No.	One End	Other End	Type	Recommended Specifications
1	AC output port	PDB (customer side)	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 13.7–16.9 mm
2	AC input port	AC PDC (customer side)	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 13.7–16.9 mm
3	COM and dry contact ports	Genset control signal/ATS detection signal	Outdoor shielded twisted pair cable (eight cores)	<ul style="list-style-type: none"> Conductor cross-sectional area: 0.2–1 mm² Cable outer diameter: 6.3–7.5 mm
4	Ground point	Site ground bar (customer side)	Outdoor single-core copper cable	Conductor cross-sectional area: 4–6 mm ² (same as the cross-sectional area of the AC input power cable)

No.	One End	Other End	Type	Recommended Specifications
5	Ground point	Ground point on the module for capacity expansion	Outdoor single-core copper cable (capacity expansion scenario)	Conductor cross-sectional area: 6 mm ²

Table 9-12 Cables in parallel-system scenarios

No.	One End	Other End	Type	Recommended Specifications
1	Ground point	Site ground bar (customer side)	Outdoor single-core copper cable	Main PE cable: 4–6 mm ² (same as the cross-sectional area of the AC input power cable)
2	COM and dry contact ports	Genset control signal/ATS detection signal	Outdoor shielded twisted pair cable (eight cores)	<ul style="list-style-type: none"> Conductor cross-sectional area: 0.2–1 mm² Cable outer diameter: 6.3–7.5 mm
3	AC parallel box	AC PDC (customer side)	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 25 mm² Cable outer diameter: 16–26 mm
4	AC parallel box	AC output port	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 13.7–16.9 mm
5	AC parallel box	AC input port	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 13.7–16.9 mm
6	AC parallel box	PDB (customer side)	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 25 mm² Cable outer diameter: 16–26 mm
7	AC parallel box	Site ground bar (customer side)	Outdoor single-core copper cable	<ul style="list-style-type: none"> Conductor cross-sectional area: 25 mm² Cable outer diameter: 8–11 mm

9.2.6 PV+Mains+Genset+ESS

Table 9-13 Cables in single-system scenarios (including capacity expansion)

No.	One End	Other End	Type	Recommended Specifications
1	PV input port	DC switch (customer side)	Common outdoor PV cable in the industry	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 5.5–9 mm
2	AC output port	PDB (customer side)	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 13.7–16.9 mm
3	AC input port	AC PDC (customer side)	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 13.7–16.9 mm
4	COM and dry contact ports	Genset control signal/ATS detection signal	Outdoor shielded twisted pair cable (eight cores)	<ul style="list-style-type: none"> Conductor cross-sectional area: 0.2–1 mm² Cable outer diameter: 6.3–7.5 mm
5	Ground point	Site ground bar (customer side)	Outdoor single-core copper cable	Conductor cross-sectional area: 4–6 mm ² (same as the cross-sectional area of the AC input power cable)
6	Ground point	Ground point on the module for capacity expansion	Outdoor single-core copper cable (capacity expansion scenario)	Conductor cross-sectional area: 6 mm ²

Table 9-14 Cables in parallel-system scenarios

No.	One End	Other End	Type	Recommended Specifications
1	PV input port	DC switch (customer side)	Common outdoor PV cable in the industry	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 5.5–9 mm

No.	One End	Other End	Type	Recommended Specifications
2	Ground point	Site ground bar (customer side)	Outdoor single-core copper cable	Main PE cable: 4–6 mm ² (same as the cross-sectional area of the AC input power cable)
3	COM and dry contact ports	Genset control signal/ATS detection signal	Outdoor shielded twisted pair cable (eight cores)	<ul style="list-style-type: none"> Conductor cross-sectional area: 0.2–1 mm² Cable outer diameter: 6.3–7.5 mm
4	AC parallel box	AC PDC (customer side)	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 25 mm² Cable outer diameter: 16–26 mm
5	AC parallel box	AC output port	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 13.7–16.9 mm
6	AC parallel box	AC input port	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 4–6 mm² Cable outer diameter: 13.7–16.9 mm
7	AC parallel box	PDB (customer side)	Outdoor three-core copper cable (L/N/PE)	<ul style="list-style-type: none"> Conductor cross-sectional area: 25 mm² Cable outer diameter: 16–26 mm
8	AC parallel box	Site ground bar (customer side)	Outdoor single-core copper cable	<ul style="list-style-type: none"> Conductor cross-sectional area: 25 mm² Cable outer diameter: 8–11 mm

10 Electrical Connections

Precautions

 **DANGER**

Before connecting cables, ensure that the DC switch on the battery and all the switches connected to the battery are set to OFF. Otherwise, the high voltage of the battery may result in electric shocks.

 **DANGER**

Note the polarities when installing batteries. Do not connect the positive and negative poles of a battery or battery string together. Otherwise, the battery may be short-circuited.

 **DANGER**

- Do not smoke or have an open flame around batteries.
 - Wear personal protective equipment and use dedicated insulated tools to avoid electric shocks or short circuits.
-

 **WARNING**

- The equipment damage caused by incorrect cable connections is not covered under any warranty.
 - Only certified electricians are allowed to connect cables.
 - Operation personnel must wear proper PPE when connecting cables.
-

 **WARNING**

- Tighten the screws on copper bars or cables to the torque specified in this document. Periodically confirm whether the screws are tightened, check for rust, corrosion, or other foreign objects, and clean them up if any. Loose screw connections will result in excessive voltage drops and batteries may catch fire when the current is high.
 - When installing batteries, do not place installation tools, metal parts, or sundries on the batteries. After the installation is complete, clean up the objects on the batteries and the surrounding area.
-

 **CAUTION**

- Do not connect two or more cables to the positive or negative power port of a battery in parallel.
 - Stay away from the equipment when preparing cables to prevent cable scraps from entering the equipment. Cable scraps may cause sparks and result in personal injury and equipment damage.
-

 **NOTE**

The cable colors shown in the electrical connection diagrams provided in this chapter are for reference only. Select cables in accordance with local cable specifications (green-and-yellow cables are only used for PE).

10.1 PV+ESS

10.1.1 Installing a PE Cable

Precautions

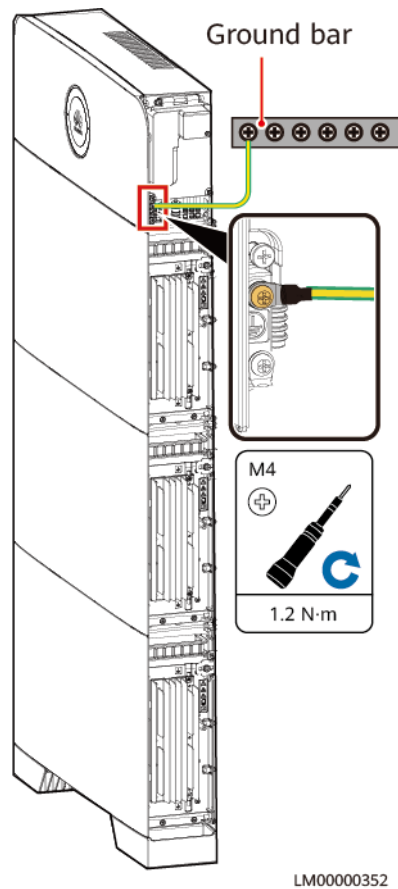
 **DANGER**

Ensure that the PE cable is securely connected. Otherwise, electric shocks may occur.

Procedure

- Step 1** Install a PE cable for the product.

Figure 10-1 Installing a PE cable



----End

10.1.2 Installing Internal Cables

CAUTION

- Do not reversely connect positive and negative battery module power cables.
- Use the power cables delivered with the product. If the number of cables is insufficient or any cable is damaged, contact the vendor to obtain cables. Do not prepare cables by yourself.

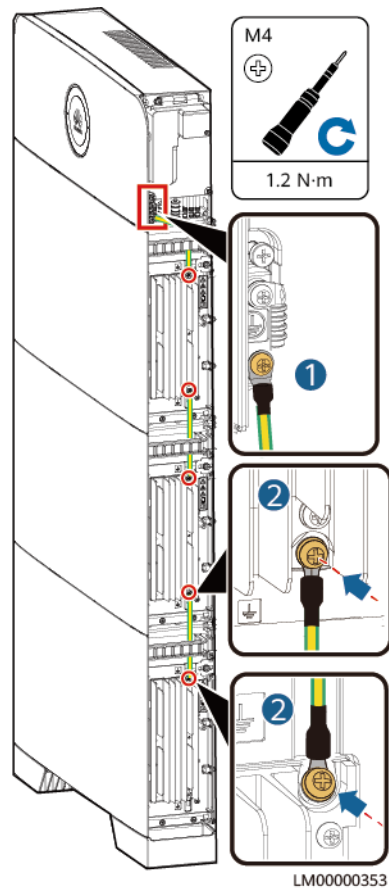
NOTICE

When a communications terminal is connected to a single network cable, a waterproof rubber plug must be installed.

Procedure

- Step 1** Install a PE cable.

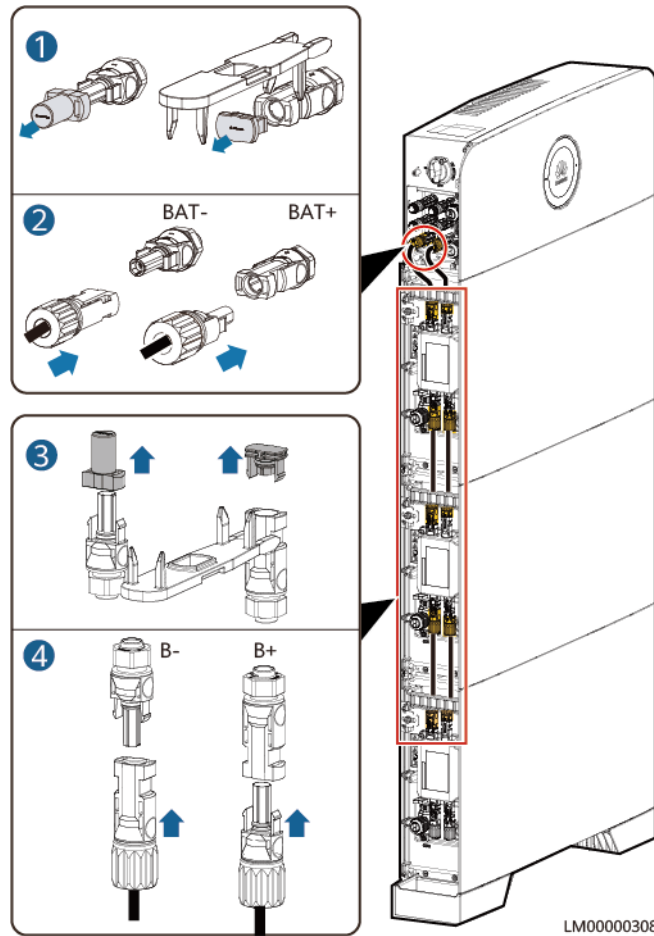
Figure 10-2 Installing a PE cable



Step 2 Install battery module power cables.

1. Use a removal wrench to remove the waterproof glands from the cascading terminals of the battery modules.
2. Install battery module power cables.
3. Use a removal wrench to remove the waterproof glands from the battery terminals on the power module.
4. Install power cables between the battery modules and power module.

Figure 10-3 Installing battery module power cables

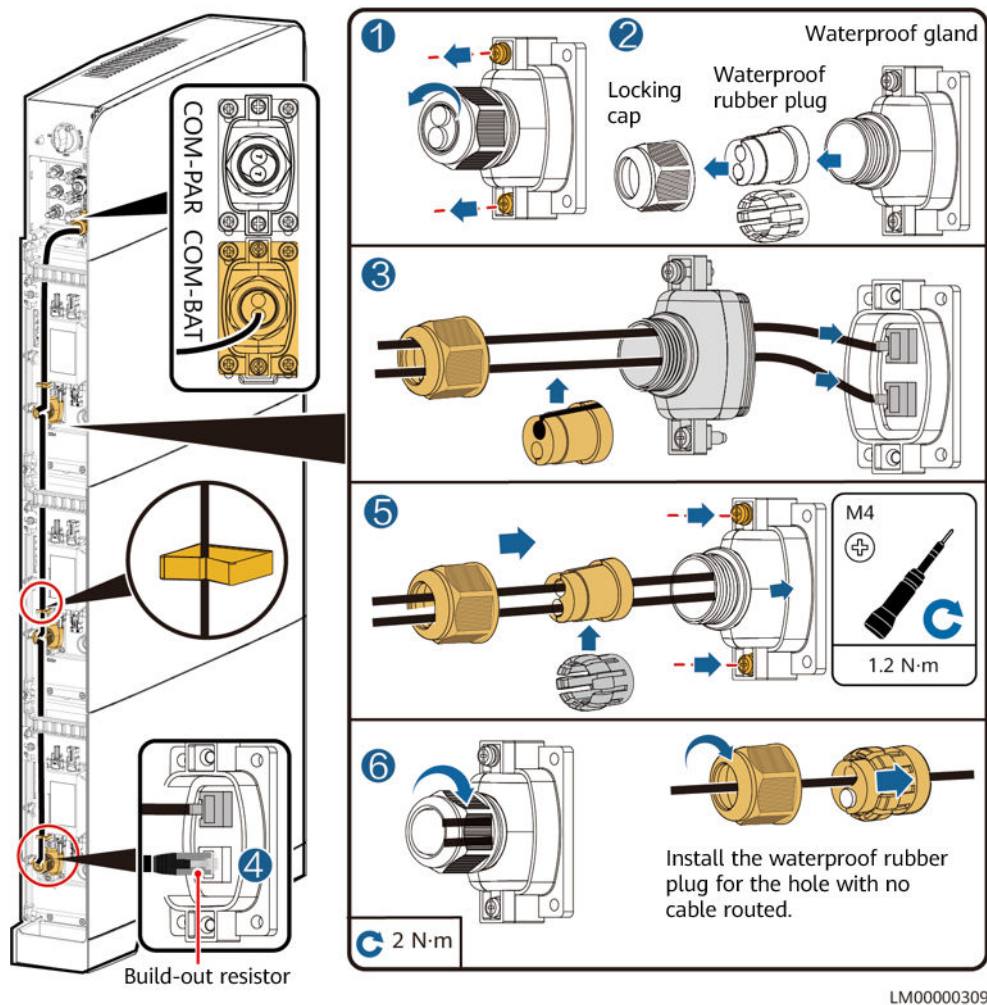


Step 3 Install battery signal cables.

1. Remove the waterproof gland from the communications terminal of a battery module.
2. Remove the locking cap and waterproof rubber plug from the communications terminal housing.
3. Install communications cables for the battery module.
4. Install termination resistors. Otherwise, the communication will be interrupted.
5. Lock the communications terminal waterproof gland and reinstall the waterproof rubber plug.
6. Tighten the locking cap and secure the signal cables using cable clips.

Step 4 Install communications cables for other battery modules in sequence.

Figure 10-4 Installing battery signal cables



NOTICE

When a communications terminal is connected to a single network cable, the waterproof rubber plug must be installed for the hole with no cable routed. Otherwise, the waterproof performance may be affected and the device will be damaged.

----End

10.1.3 Installing PV Input Power Cables

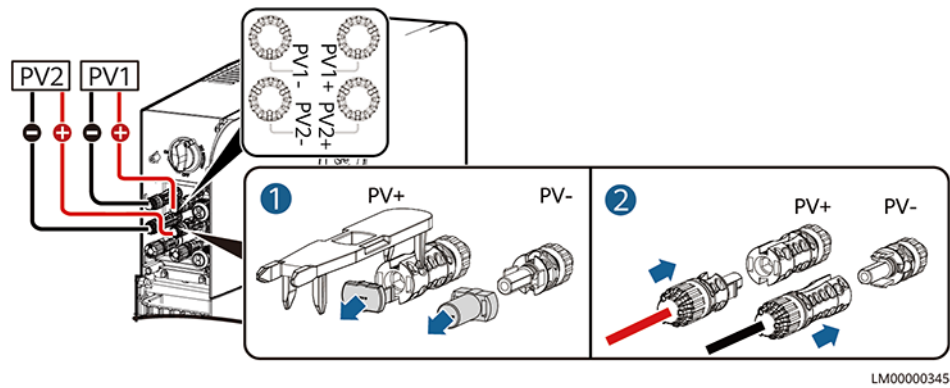
Step 1 Use a removal wrench to remove the waterproof gland from the PV input terminal on the power module.

NOTE

Take out the removal wrench from the decorative cover delivered with the product.

Step 2 Install the PV input power cables.

Figure 10-5 Installing the PV input power cables



----End

10.1.4 Installing an AC Output Power Cable

CAUTION

- The live (L) wire and neutral (N) wire of an AC power cable must be correctly connected.
- The PE wire of an AC power cable must be grounded.
- Do not reversely connect AC output power cables.

NOTICE

A leakage protection device must be configured for the AC output of the iSitePower-M. The leakage current must be 30 mA. You need to configure and install the device by yourself.

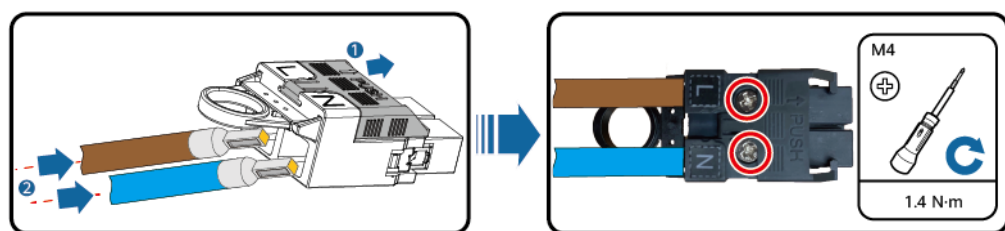
NOTE

In single-system scenarios, connect the other end of the cable to the AC load. In parallel-system scenarios, connect the other end of the cable to the parallel box.

Procedure

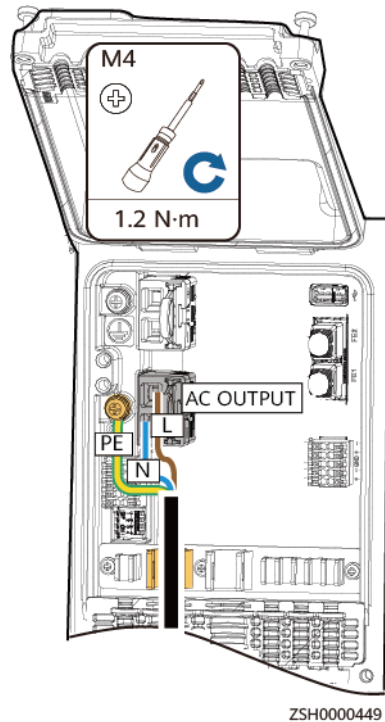
- Step 1** Connect an AC power cable to the terminal connector.

Figure 10-6 Connecting the cable to the terminal connector



Step 2 Install the AC output power cable and secure the cable using cable clips.

Figure 10-7 Installing the AC output power cable

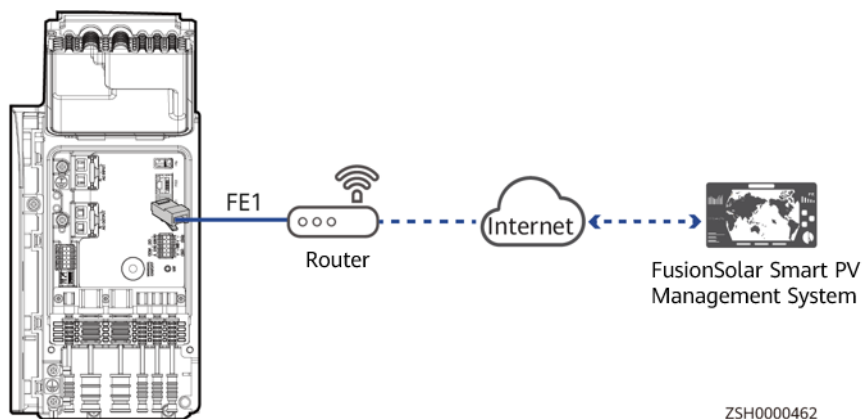


----End

10.1.5 (Optional) Installing a Communications Cable

Step 1 Connect the network cable to the FE1 port of the product.

Figure 10-8 Installing a communications cable



----End

10.2 Mains+ESS

10.2.1 Installing a PE Cable

Precautions

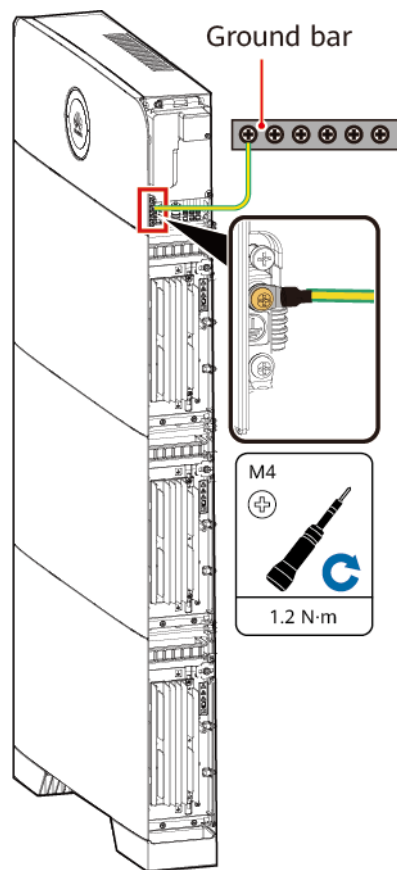


Ensure that the PE cable is securely connected. Otherwise, electric shocks may occur.

Procedure

Step 1 Install a PE cable for the product.

Figure 10-9 Installing a PE cable



----End

10.2.2 Installing Internal Cables

CAUTION

- Do not reversely connect positive and negative battery module power cables.
- Use the power cables delivered with the product. If the number of cables is insufficient or any cable is damaged, contact the vendor to obtain cables. Do not prepare cables by yourself.

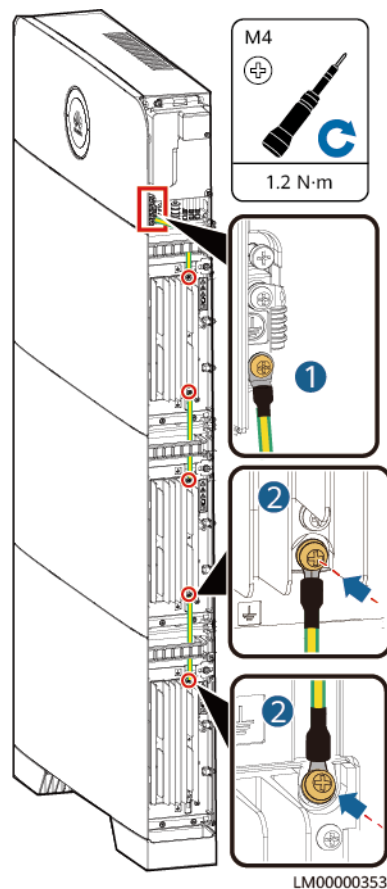
NOTICE

When a communications terminal is connected to a single network cable, a waterproof rubber plug must be installed.

Procedure

Step 1 Install a PE cable.

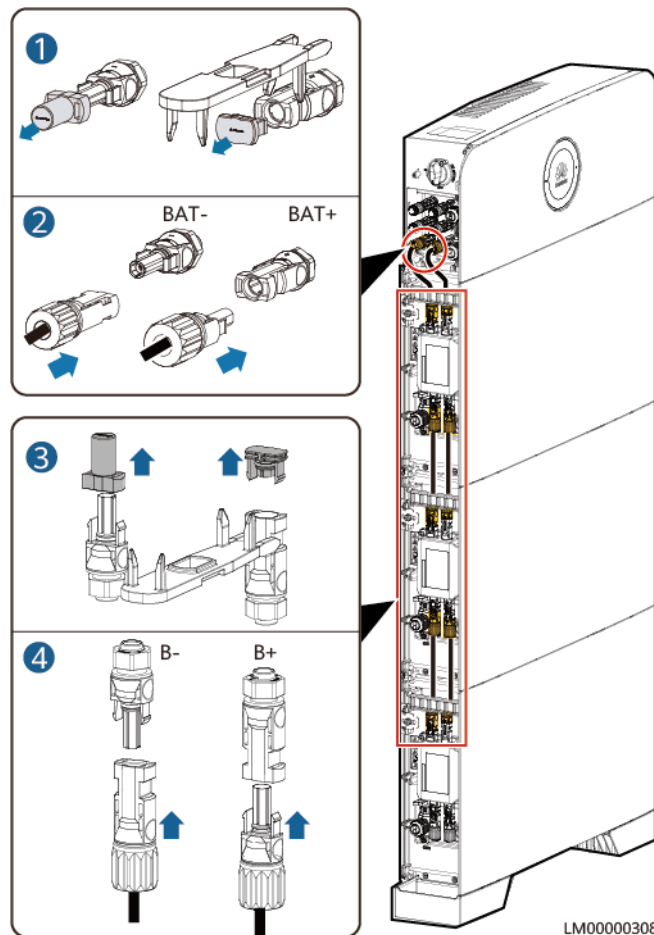
Figure 10-10 Installing a PE cable



Step 2 Install battery module power cables.

1. Use a removal wrench to remove the waterproof glands from the cascading terminals of the battery modules.
2. Install battery module power cables.
3. Use a removal wrench to remove the waterproof glands from the battery terminals on the power module.
4. Install power cables between the battery modules and power module.

Figure 10-11 Installing battery module power cables

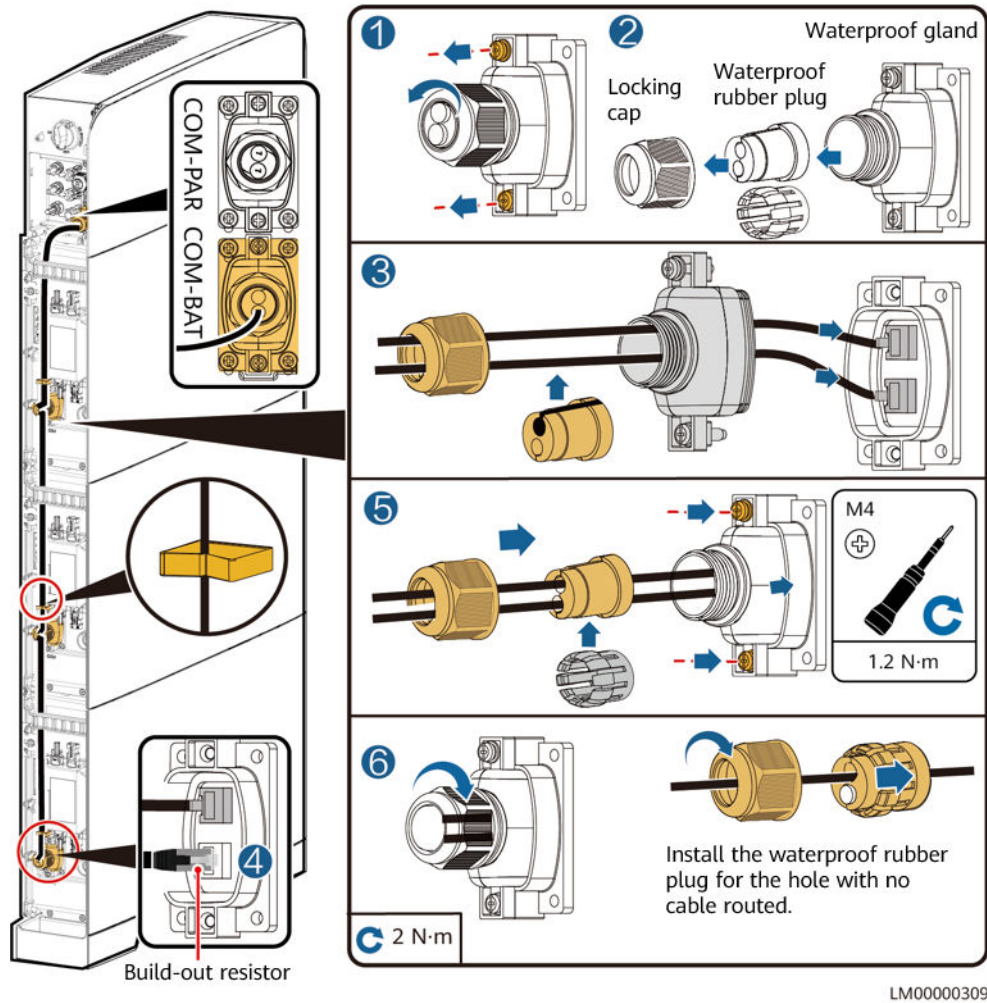


Step 3 Install battery signal cables.

1. Remove the waterproof gland from the communications terminal of a battery module.
2. Remove the locking cap and waterproof rubber plug from the communications terminal housing.
3. Install communications cables for the battery module.
4. Install termination resistors. Otherwise, the communication will be interrupted.
5. Lock the communications terminal waterproof gland and reinstall the waterproof rubber plug.
6. Tighten the locking cap and secure the signal cables using cable clips.

Step 4 Install communications cables for other battery modules in sequence.

Figure 10-12 Installing battery signal cables



NOTICE

When a communications terminal is connected to a single network cable, the waterproof rubber plug must be installed for the hole with no cable routed. Otherwise, the waterproof performance may be affected and the device will be damaged.

----End

10.2.3 Installing an AC Output Power Cable

CAUTION

- The live (L) wire and neutral (N) wire of an AC power cable must be correctly connected.
- The PE wire of an AC power cable must be grounded.
- Do not reversely connect AC output power cables.

NOTICE

A leakage protection device must be configured for the AC output of the iSitePower-M. The leakage current must be 30 mA. You need to configure and install the device by yourself.

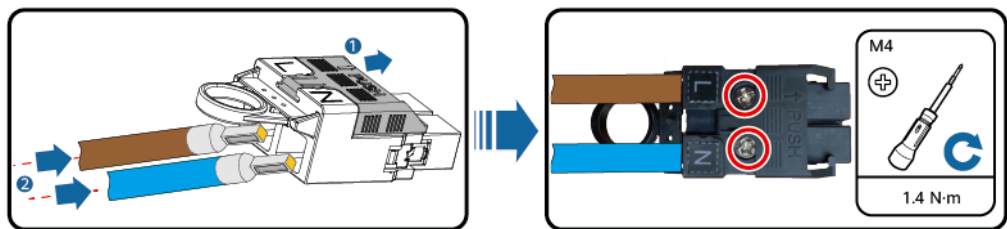
NOTE

In single-system scenarios, connect the other end of the cable to the AC load. In parallel-system scenarios, connect the other end of the cable to the parallel box.

Procedure

Step 1 Connect an AC power cable to the terminal connector.

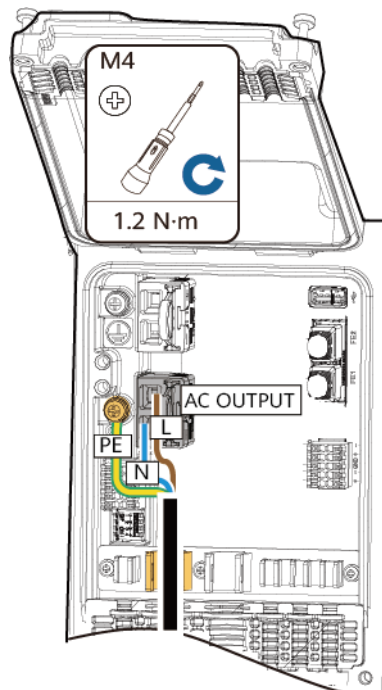
Figure 10-13 Connecting the cable to the terminal connector



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Step 2 Install the AC output power cable and secure the cable using cable clips.

Figure 10-14 Installing the AC output power cable



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----End

10.2.4 Installing an AC Input Power Cable

DANGER

- A surge protective device (SPD) must be configured for the AC input of the iSitePower-M. You need to configure and install the device by yourself.
- Before installing an AC input power cable, ensure that the AC input switch is turned off and a prominent label indicating "Do not operate" is set.
- AC switches (with a capacity of 40 A) must be installed for phases L and N of the iSitePower-M AC input. The AC switches are delivered with the iSitePower-M. Do not use a Type D circuit breaker because it cannot effectively protect products.
- No leakage protection device is required for the AC input of the iSitePower-M. If a leakage protection device is configured, it is recommended that the leakage current be greater than or equal to $100 \text{ mA} \times n$, where n is the number of power modules.

CAUTION

- The live (L) wire and neutral (N) wire of an AC power cable must be correctly connected.
- The PE wire of an AC power cable must be grounded.
- Do not reversely connect AC input power cables.

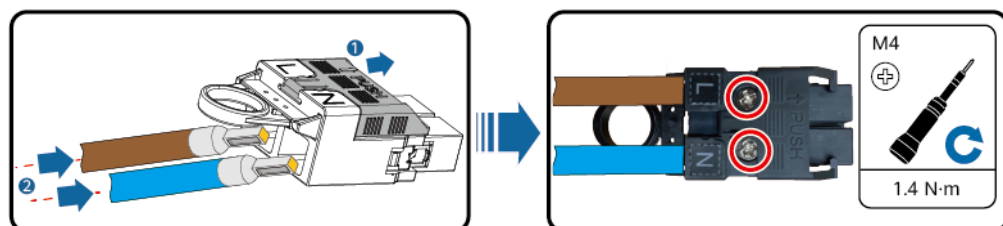
NOTE

In single-system scenarios, connect the other end of the cable to an AC PDC. In parallel-system scenarios, connect the other end of the cable by referring to section "(Optional) Installing Parallel Cables."

Procedure

Step 1 Connect an AC power cable to the terminal connector.

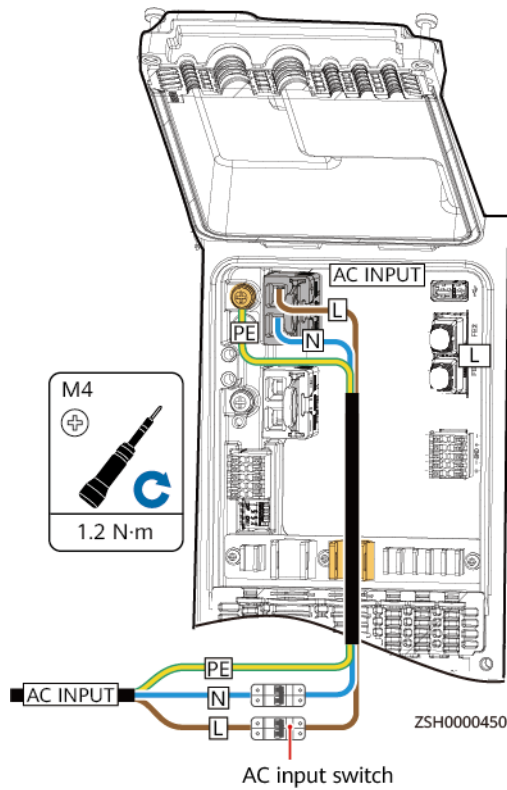
Figure 10-15 Connecting the cable to the terminal connector



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Step 2 Install the AC input power cable and secure the cable using cable clips.

Figure 10-16 Installing an AC input power cable

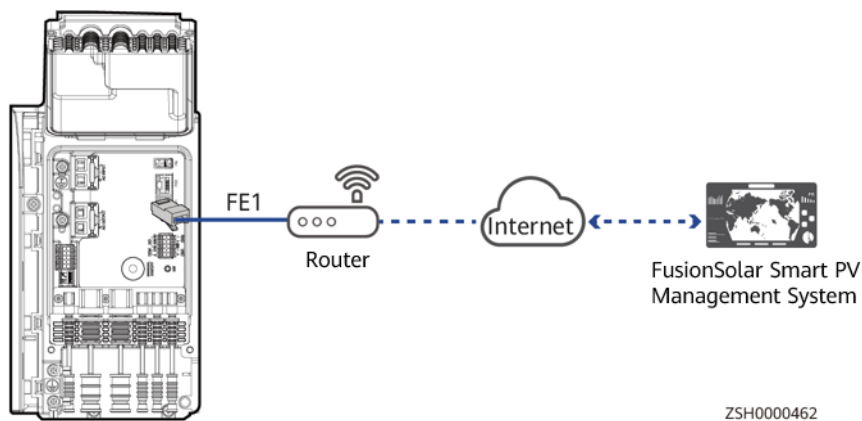


----End

10.2.5 (Optional) Installing a Communications Cable

Step 1 Connect the network cable to the FE1 port of the product.

Figure 10-17 Installing a communications cable



----End

10.3 PV+Mains+ESS

10.3.1 Installing a PE Cable

Precautions

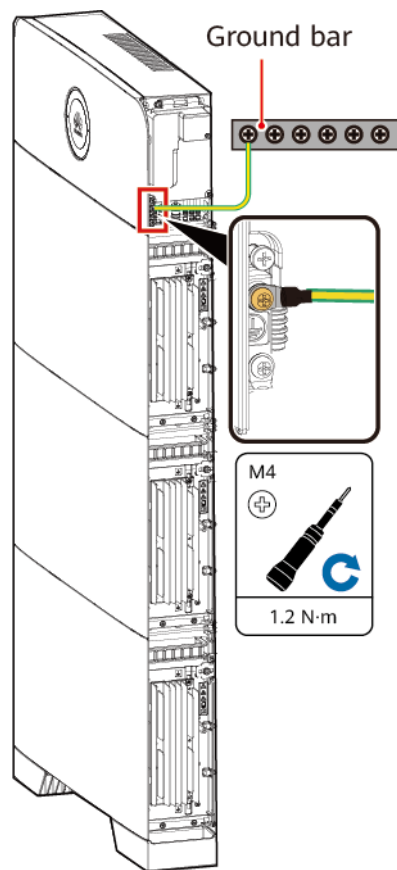


Ensure that the PE cable is securely connected. Otherwise, electric shocks may occur.

Procedure

Step 1 Install a PE cable for the product.

Figure 10-18 Installing a PE cable



----End

10.3.2 Installing Internal Cables

CAUTION

- Do not reversely connect positive and negative battery module power cables.
- Use the power cables delivered with the product. If the number of cables is insufficient or any cable is damaged, contact the vendor to obtain cables. Do not prepare cables by yourself.

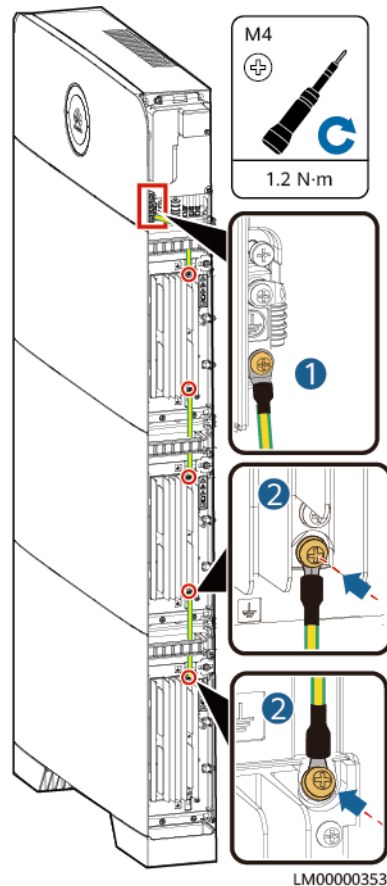
NOTICE

When a communications terminal is connected to a single network cable, a waterproof rubber plug must be installed.

Procedure

Step 1 Install a PE cable.

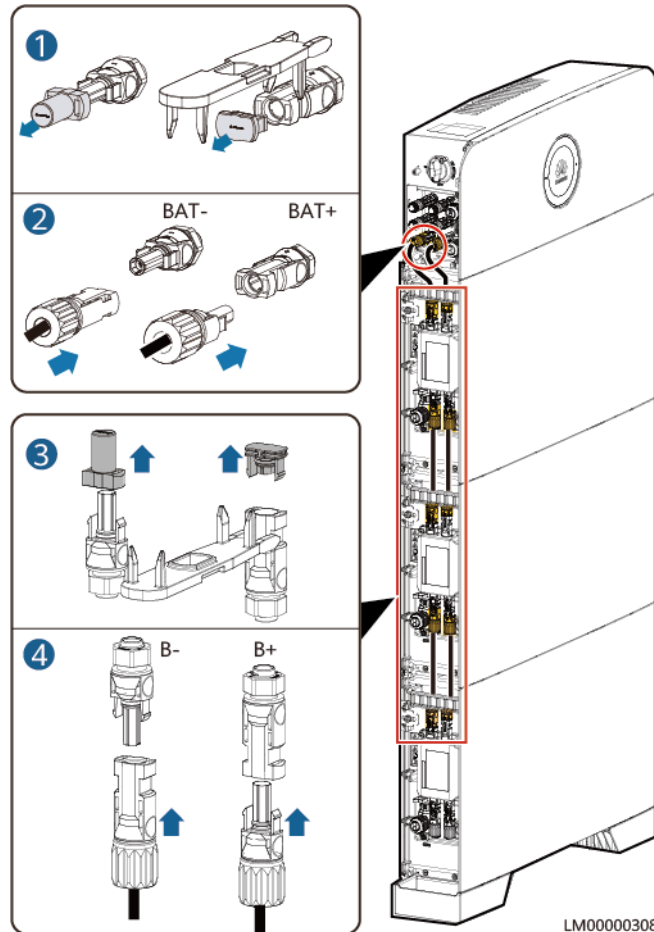
Figure 10-19 Installing a PE cable



Step 2 Install battery module power cables.

1. Use a removal wrench to remove the waterproof glands from the cascading terminals of the battery modules.
2. Install battery module power cables.
3. Use a removal wrench to remove the waterproof glands from the battery terminals on the power module.
4. Install power cables between the battery modules and power module.

Figure 10-20 Installing battery module power cables

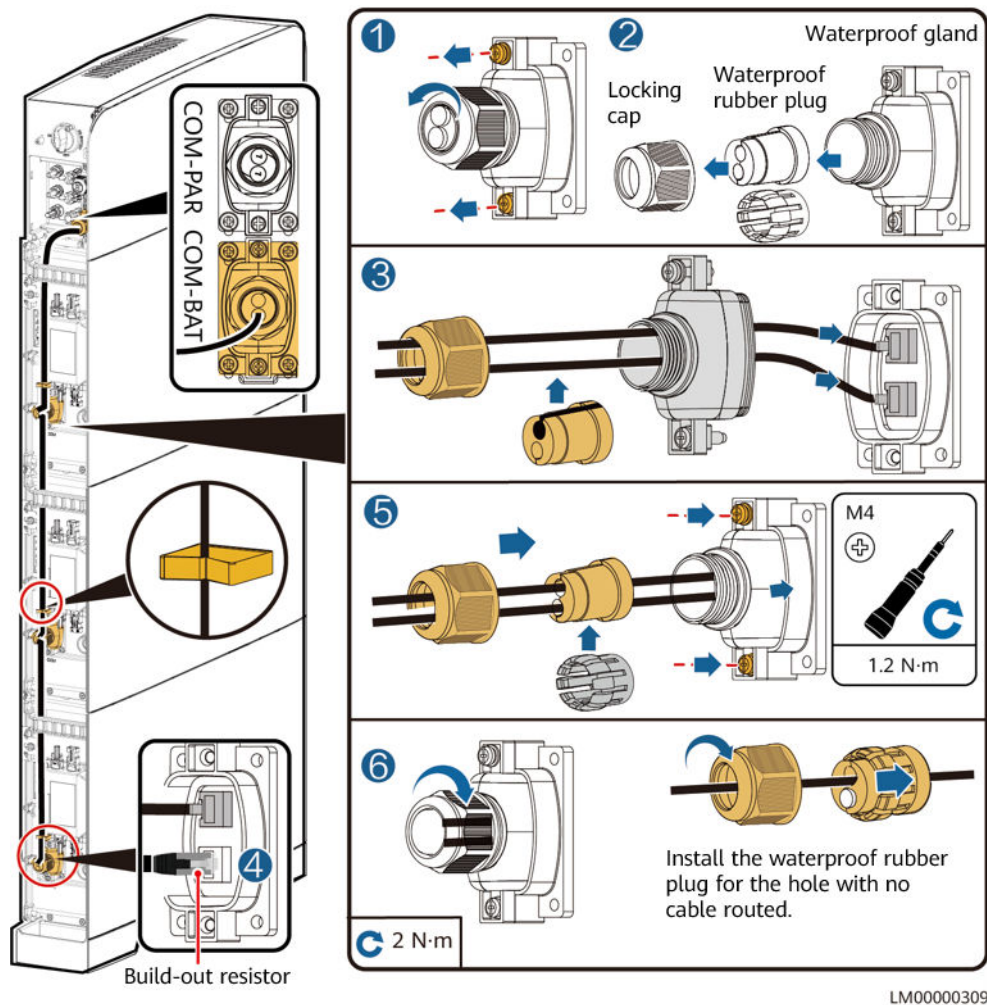


Step 3 Install battery signal cables.

1. Remove the waterproof gland from the communications terminal of a battery module.
2. Remove the locking cap and waterproof rubber plug from the communications terminal housing.
3. Install communications cables for the battery module.
4. Install termination resistors. Otherwise, the communication will be interrupted.
5. Lock the communications terminal waterproof gland and reinstall the waterproof rubber plug.
6. Tighten the locking cap and secure the signal cables using cable clips.

Step 4 Install communications cables for other battery modules in sequence.

Figure 10-21 Installing battery signal cables



NOTICE

When a communications terminal is connected to a single network cable, the waterproof rubber plug must be installed for the hole with no cable routed. Otherwise, the waterproof performance may be affected and the device will be damaged.

----End

10.3.3 Installing PV Input Power Cables

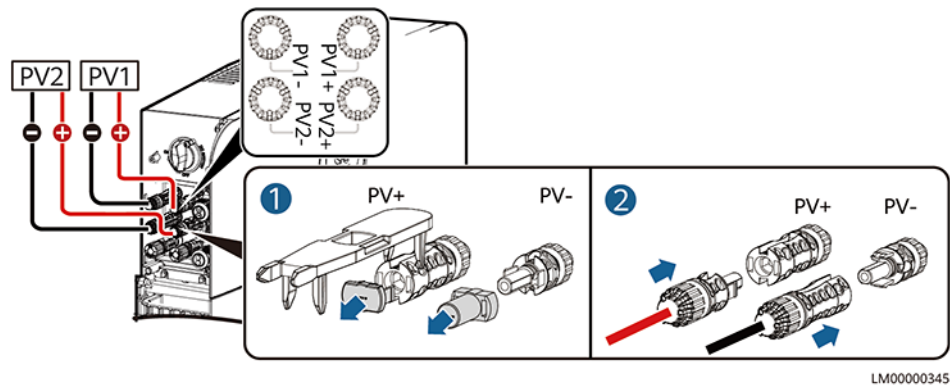
Step 1 Use a removal wrench to remove the waterproof gland from the PV input terminal on the power module.

NOTE

Take out the removal wrench from the decorative cover delivered with the product.

Step 2 Install the PV input power cables.

Figure 10-22 Installing the PV input power cables



----End

10.3.4 Installing an AC Output Power Cable

CAUTION

- The live (L) wire and neutral (N) wire of an AC power cable must be correctly connected.
- The PE wire of an AC power cable must be grounded.
- Do not reversely connect AC output power cables.

NOTICE

A leakage protection device must be configured for the AC output of the iSitePower-M. The leakage current must be 30 mA. You need to configure and install the device by yourself.

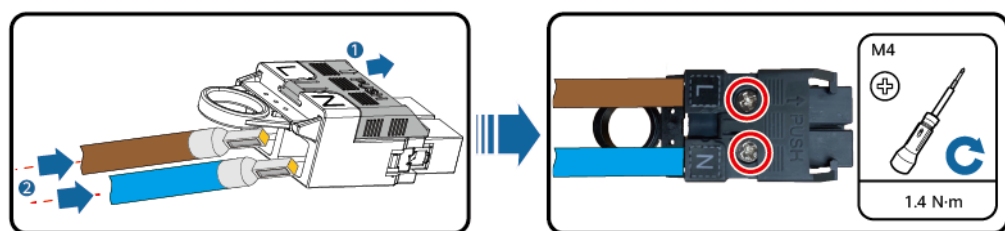
NOTE

In single-system scenarios, connect the other end of the cable to the AC load. In parallel-system scenarios, connect the other end of the cable to the parallel box.

Procedure

Step 1 Connect an AC power cable to the terminal connector.

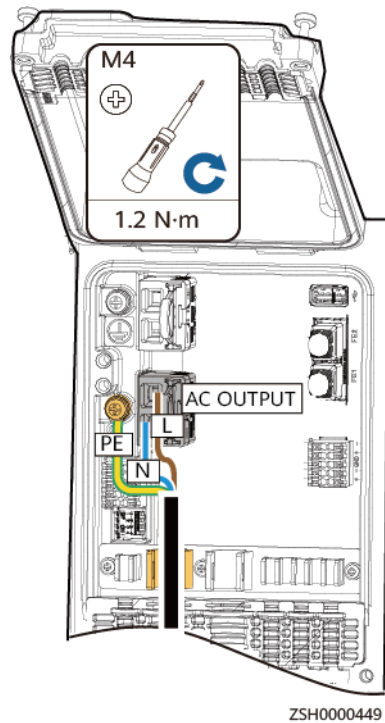
Figure 10-23 Connecting the cable to the terminal connector



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Step 2 Install the AC output power cable and secure the cable using cable clips.

Figure 10-24 Installing the AC output power cable



----End

10.3.5 Installing an AC Input Power Cable

⚠ DANGER

- A surge protective device (SPD) must be configured for the AC input of the iSitePower-M. You need to configure and install the device by yourself.
- Before installing an AC input power cable, ensure that the AC input switch is turned off and a prominent label indicating "Do not operate" is set.
- AC switches (with a capacity of 40 A) must be installed for phases L and N of the iSitePower-M AC input. The AC switches are delivered with the iSitePower-M. Do not use a Type D circuit breaker because it cannot effectively protect products.
- No leakage protection device is required for the AC input of the iSitePower-M. If a leakage protection device is configured, it is recommended that the leakage current be greater than or equal to $100 \text{ mA} \times n$, where n is the number of power modules.

CAUTION

- The live (L) wire and neutral (N) wire of an AC power cable must be correctly connected.
- The PE wire of an AC power cable must be grounded.
- Do not reversely connect AC input power cables.

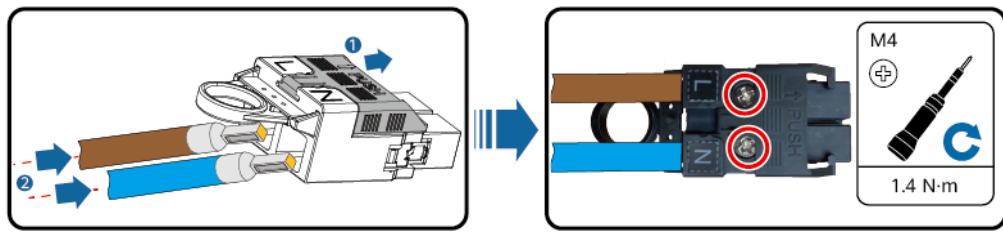
NOTE

In single-system scenarios, connect the other end of the cable to an AC PDC. In parallel-system scenarios, connect the other end of the cable by referring to section "(Optional) Installing Parallel Cables."

Procedure

Step 1 Connect an AC power cable to the terminal connector.

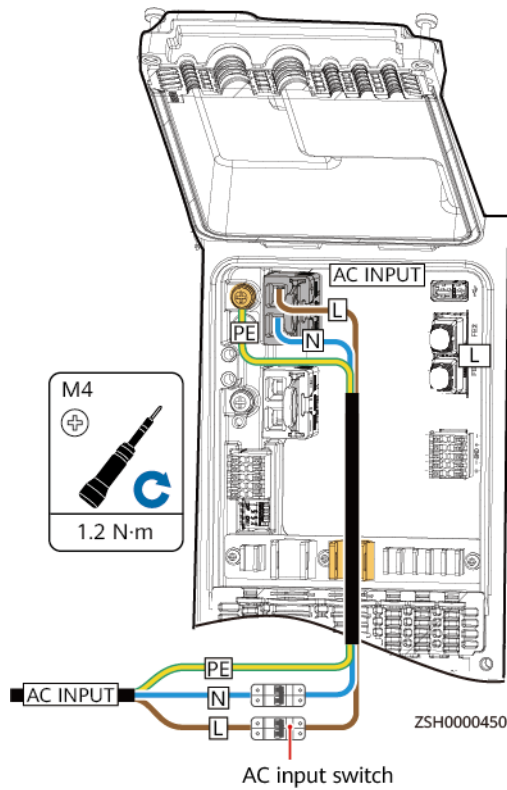
Figure 10-25 Connecting the cable to the terminal connector



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Step 2 Install the AC input power cable and secure the cable using cable clips.

Figure 10-26 Installing an AC input power cable

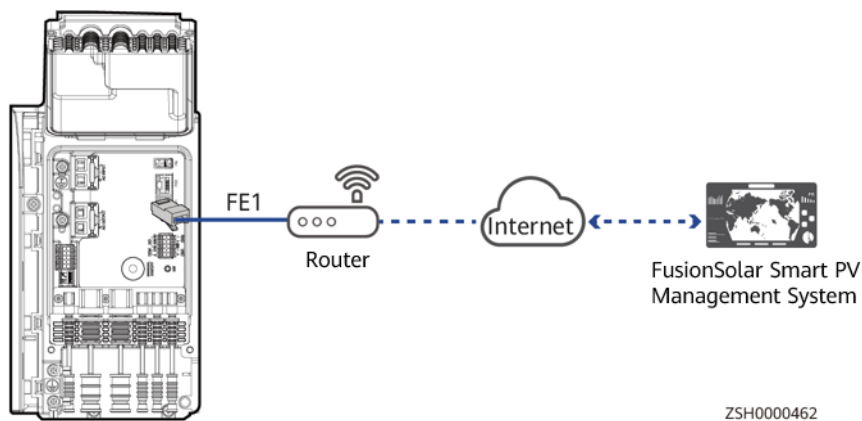


----End

10.3.6 (Optional) Installing a Communications Cable

Step 1 Connect the network cable to the FE1 port of the product.

Figure 10-27 Installing a communications cable



----End

10.4 PV+Genset+ESS

10.4.1 Installing a PE Cable

Precautions

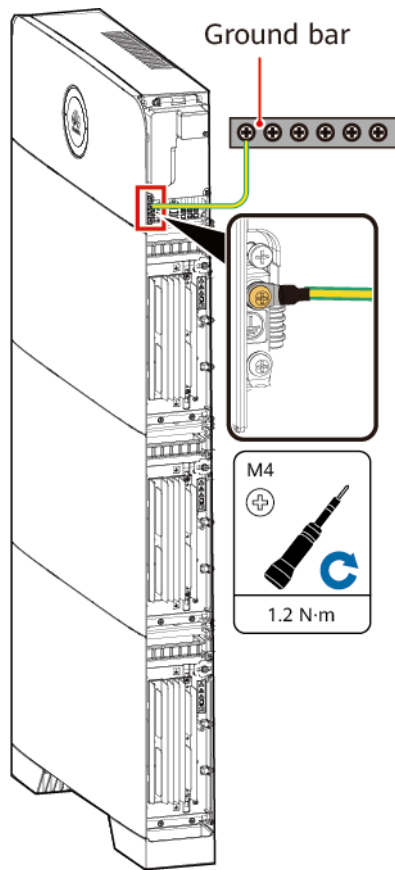


Ensure that the PE cable is securely connected. Otherwise, electric shocks may occur.

Procedure

Step 1 Install a PE cable for the product.

Figure 10-28 Installing a PE cable



----End

10.4.2 Installing Internal Cables

CAUTION

- Do not reversely connect positive and negative battery module power cables.
- Use the power cables delivered with the product. If the number of cables is insufficient or any cable is damaged, contact the vendor to obtain cables. Do not prepare cables by yourself.

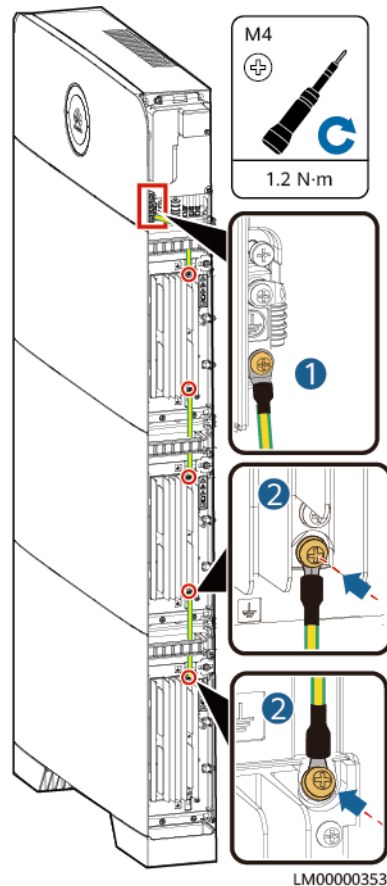
NOTICE

When a communications terminal is connected to a single network cable, a waterproof rubber plug must be installed.

Procedure

Step 1 Install a PE cable.

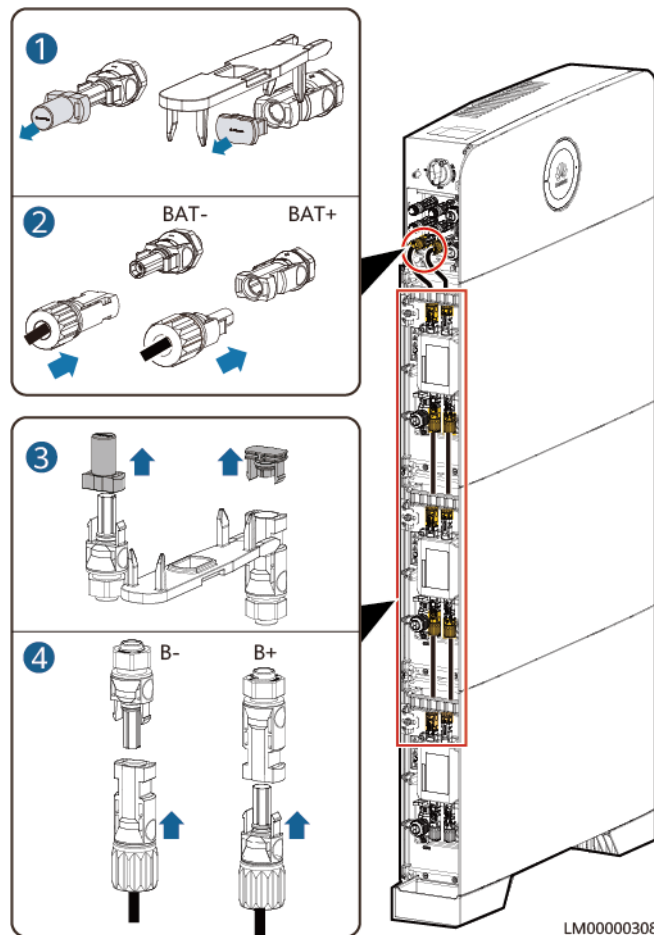
Figure 10-29 Installing a PE cable



Step 2 Install battery module power cables.

1. Use a removal wrench to remove the waterproof glands from the cascading terminals of the battery modules.
2. Install battery module power cables.
3. Use a removal wrench to remove the waterproof glands from the battery terminals on the power module.
4. Install power cables between the battery modules and power module.

Figure 10-30 Installing battery module power cables

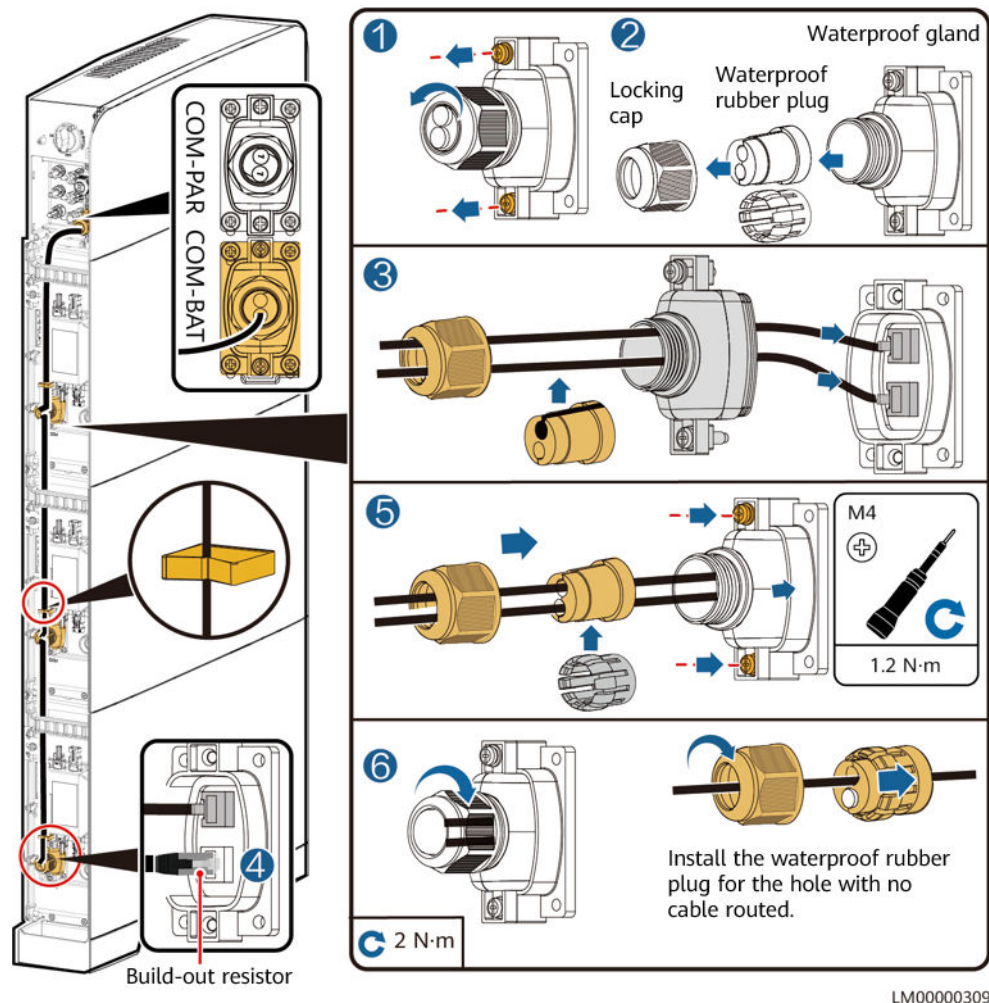


Step 3 Install battery signal cables.

1. Remove the waterproof gland from the communications terminal of a battery module.
2. Remove the locking cap and waterproof rubber plug from the communications terminal housing.
3. Install communications cables for the battery module.
4. Install termination resistors. Otherwise, the communication will be interrupted.
5. Lock the communications terminal waterproof gland and reinstall the waterproof rubber plug.
6. Tighten the locking cap and secure the signal cables using cable clips.

Step 4 Install communications cables for other battery modules in sequence.

Figure 10-31 Installing battery signal cables



NOTICE

When a communications terminal is connected to a single network cable, the waterproof rubber plug must be installed for the hole with no cable routed. Otherwise, the waterproof performance may be affected and the device will be damaged.

----End

10.4.3 Installing PV Input Power Cables

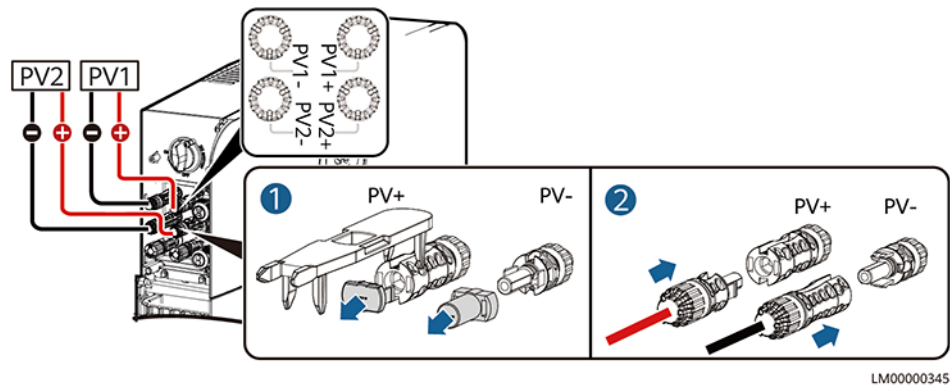
Step 1 Use a removal wrench to remove the waterproof gland from the PV input terminal on the power module.

NOTE

Take out the removal wrench from the decorative cover delivered with the product.

Step 2 Install the PV input power cables.

Figure 10-32 Installing the PV input power cables



----End

10.4.4 Installing an AC Output Power Cable

CAUTION

- The live (L) wire and neutral (N) wire of an AC power cable must be correctly connected.
- The PE wire of an AC power cable must be grounded.
- Do not reversely connect AC output power cables.

NOTICE

A leakage protection device must be configured for the AC output of the iSitePower-M. The leakage current must be 30 mA. You need to configure and install the device by yourself.

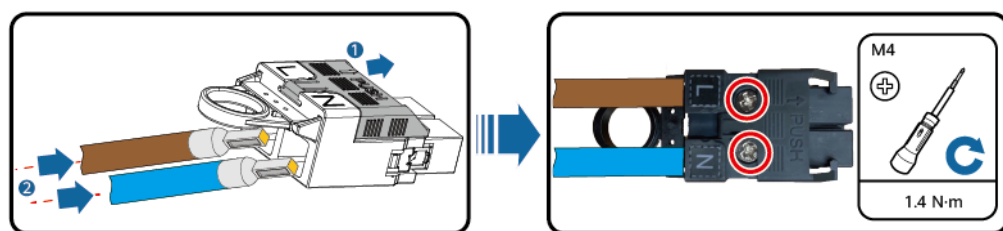
NOTE

In single-system scenarios, connect the other end of the cable to the AC load. In parallel-system scenarios, connect the other end of the cable to the parallel box.

Procedure

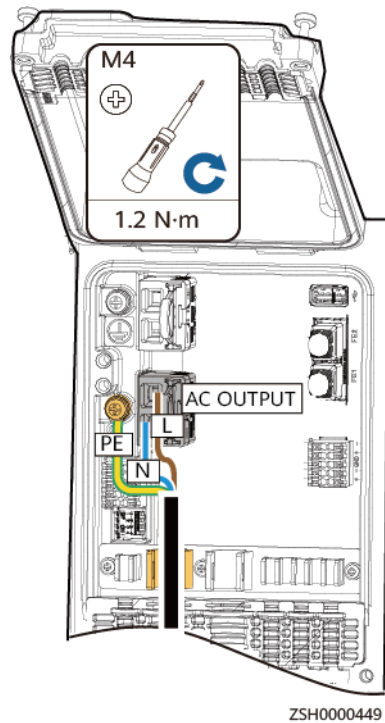
Step 1 Connect an AC power cable to the terminal connector.

Figure 10-33 Connecting the cable to the terminal connector



Step 2 Install the AC output power cable and secure the cable using cable clips.

Figure 10-34 Installing the AC output power cable



----End

10.4.5 Installing an AC Input Power Cable

⚠ DANGER

- A surge protective device (SPD) must be configured for the AC input of the iSitePower-M. You need to configure and install the device by yourself.
- Before installing an AC input power cable, ensure that the AC input switch is turned off and a prominent label indicating "Do not operate" is set.
- AC switches (with a capacity of 40 A) must be installed for phases L and N of the iSitePower-M AC input. The AC switches are delivered with the iSitePower-M. Do not use a Type D circuit breaker because it cannot effectively protect products.
- No leakage protection device is required for the AC input of the iSitePower-M. If a leakage protection device is configured, it is recommended that the leakage current be greater than or equal to $100 \text{ mA} \times n$, where n is the number of power modules.

CAUTION

- The live (L) wire and neutral (N) wire of an AC power cable must be correctly connected.
- The PE wire of an AC power cable must be grounded.
- Do not reversely connect AC input power cables.

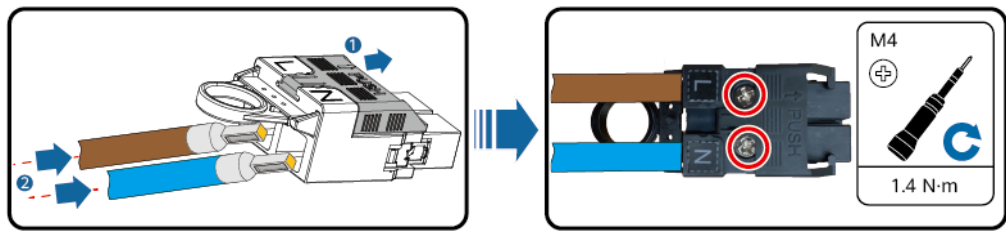
NOTE

In single-system scenarios, connect the other end of the cable to an AC PDC. In parallel-system scenarios, connect the other end of the cable by referring to section "(Optional) Installing Parallel Cables."

Procedure

Step 1 Connect an AC power cable to the terminal connector.

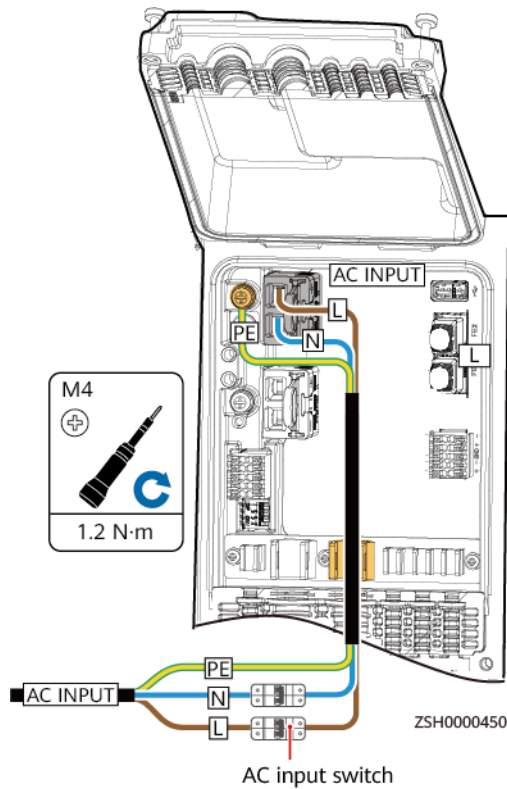
Figure 10-35 Connecting the cable to the terminal connector



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Step 2 Install the AC input power cable and secure the cable using cable clips.

Figure 10-36 Installing an AC input power cable



----End

10.4.6 Installing Genset Control Cables

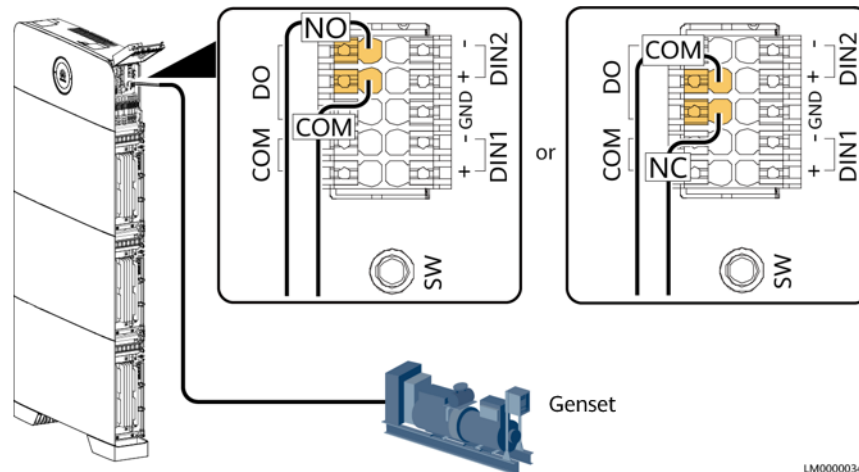
NOTICE

For a genset that starts when the dry contact is open, connect the signal cable to ports NC and COM. For a genset that starts when the dry contact is closed, connect the signal cable to ports NO and COM.

Procedure

Step 1 Install genset control signal cables.

Figure 10-37 Installing genset control signal cables

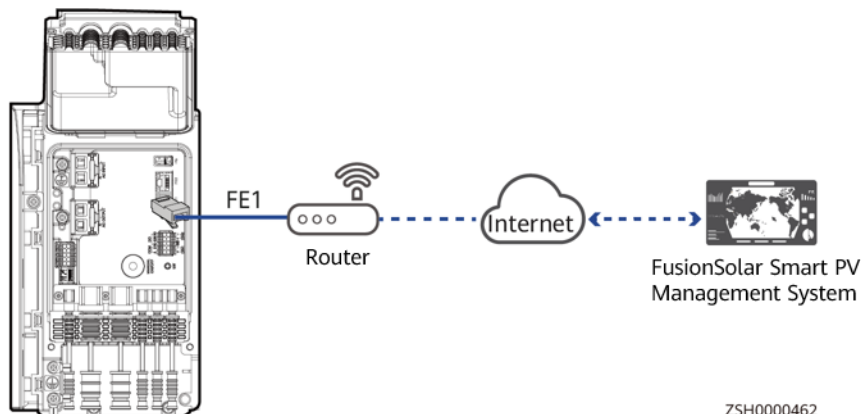


----End

10.4.7 (Optional) Installing a Communications Cable

Step 1 Connect the network cable to the FE1 port of the product.

Figure 10-38 Installing a communications cable



----End

10.5 Mains+Genset+ESS

10.5.1 Installing Ground Cables

Precautions

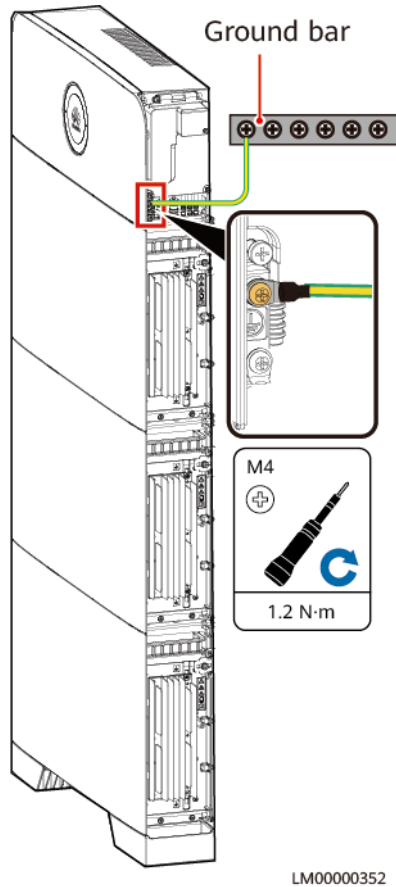
⚠ DANGER

Ensure that the ground cable is securely connected. Otherwise, electric shocks may occur.

Procedure

Step 1 Install ground cables.

Figure 10-39 Installing ground cables



----End

10.5.2 Installing the Internal Cable

CAUTION

- Do not reversely connect positive and negative battery module power cables.
- Use the power cables delivered with the product. If the number of cables is insufficient or any cable is damaged, contact the dealer to obtain cables. Do not prepare cables by yourself.

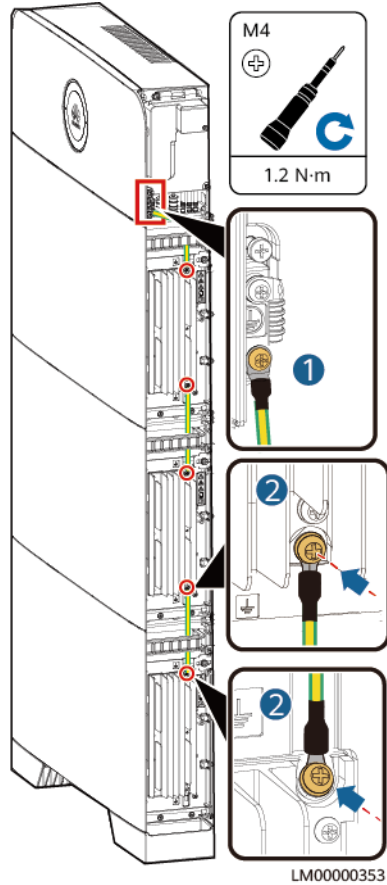
NOTICE

When a communications terminal is connected to a single network cable, a waterproof rubber plug must be installed.

Procedure

Step 1 Install ground cables.

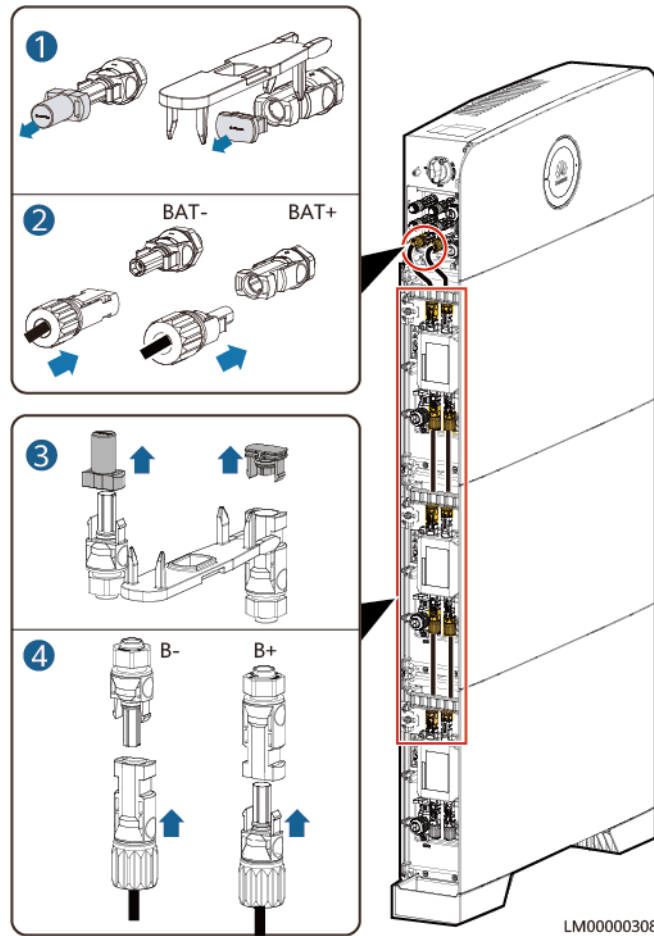
Figure 10-40 Installing ground cables



Step 2 Installing battery module power cables.

1. Use a wrench to remove the waterproof glands from the cascading terminals of the battery modules.
2. Install battery module power cables.
3. Use a removal wrench to remove the waterproof glands from the battery terminals on the power module.
4. Install power cables between the battery modules and power module.

Figure 10-41 Installing battery module power cables

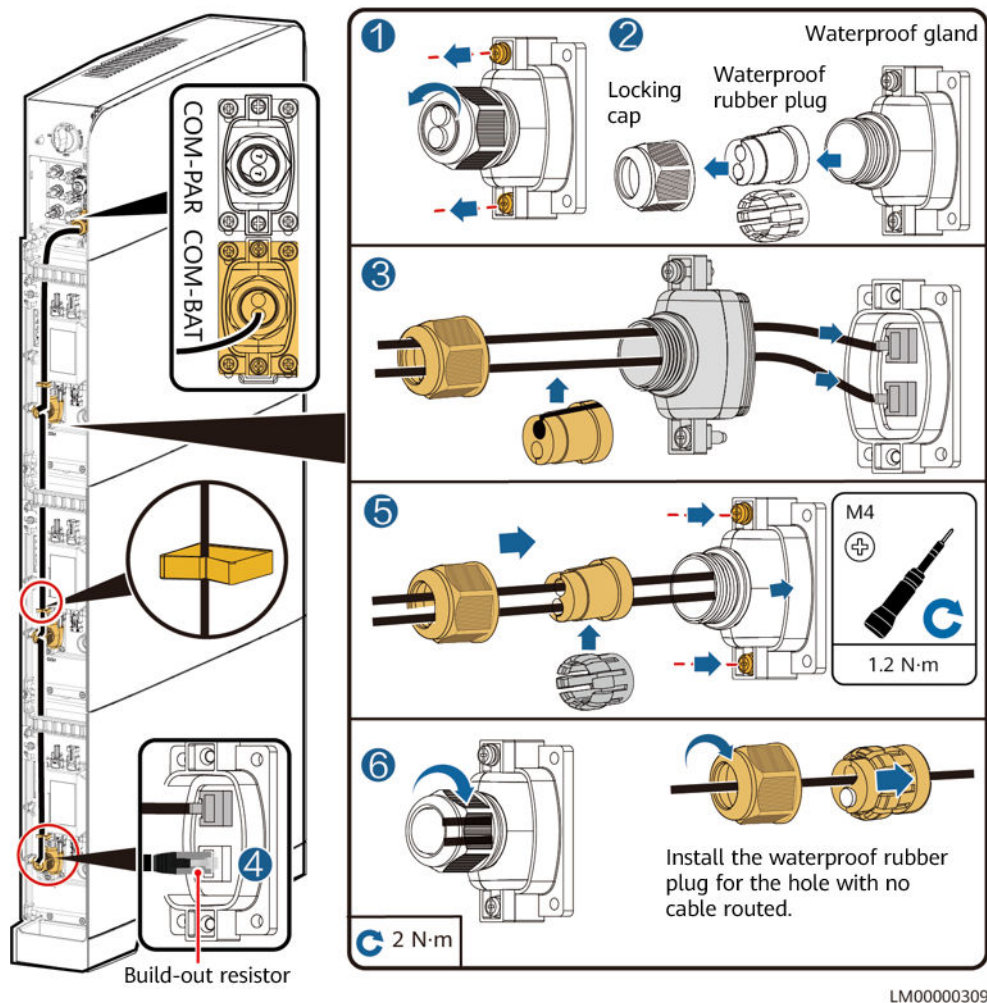


Step 3 Install battery signal cables.

1. Remove the waterproof gland from the communications terminal of a battery module.
2. Remove the locking cap and waterproof rubber plug from the communications terminal housing.
3. Install communications cables for the battery module.
4. Install termination resistors. Otherwise, the communication will be interrupted.
5. Lock the communications terminal waterproof gland and reinstall the waterproof rubber plug.
6. Tighten the locking cap and secure the signal cables using cable clips.

Step 4 Install communications cables for other battery modules in sequence.

Figure 10-42 Installing battery signal cables



NOTICE

When a communications terminal is connected to a single network cable, the waterproof rubber plug must be installed for the hole with no cable routed. Otherwise, the waterproof performance may be affected and the device will be damaged.

----End

10.5.3 Installing an AC Output Power Cable

CAUTION

- The live (L) wire and neutral (N) wire of an AC power cable must be correctly connected.
- The PE wire of an AC power cable must be grounded.
- Do not reversely connect AC output power cables.

NOTICE

A leakage protection device must be configured for the AC output of the iSitePower-M. The leakage current must be 30 mA. You need to configure and install the device by yourself.

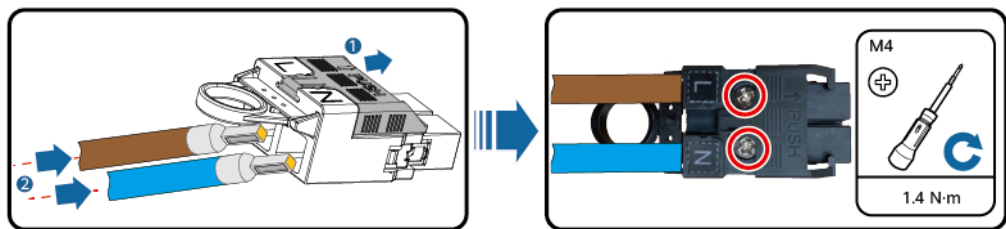
NOTE

In single-system scenarios, connect the other end of the cable to the AC load. In parallel-system scenarios, connect the other end of the cable to the parallel box.

Procedure

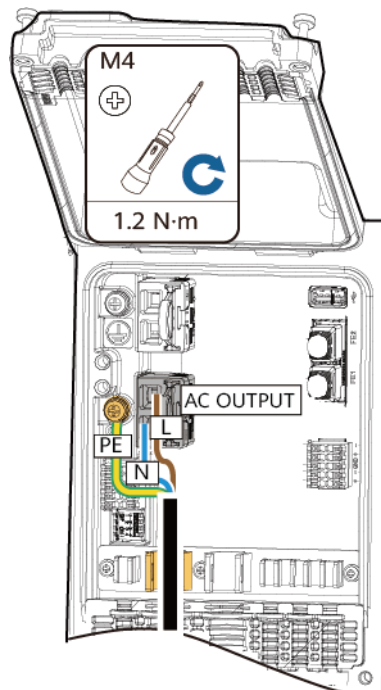
Step 1 Connect an AC power cable to the terminal connector.

Figure 10-43 Connecting the cable to the terminal connector



Step 2 Install the AC output power cable and secure the cable using cable clips.

Figure 10-44 Installing the AC output power cable



----End

10.5.4 Installing an AC Input Power Cable

DANGER

- A surge protective device (SPD) must be configured for the AC input of the iSitePower-M. You need to configure and install the device by yourself.
- Before installing an AC input power cable, ensure that the AC input switch is turned off and a prominent label indicating "Do not operate" is set.
- AC switches (with a capacity of 40 A) must be installed for phases L and N of the iSitePower-M AC input. The AC switches are delivered with the iSitePower-M. Do not use a Type D circuit breaker because it cannot effectively protect products.
- No leakage protection device is required for the AC input of the iSitePower-M. If a leakage protection device is configured, it is recommended that the leakage current be greater than or equal to $100 \text{ mA} \times n$, where n is the number of power modules.

CAUTION

- The live (L) wire and neutral (N) wire of an AC power cable must be correctly connected.
- The PE wire of an AC power cable must be grounded.
- Do not reversely connect AC input power cables.

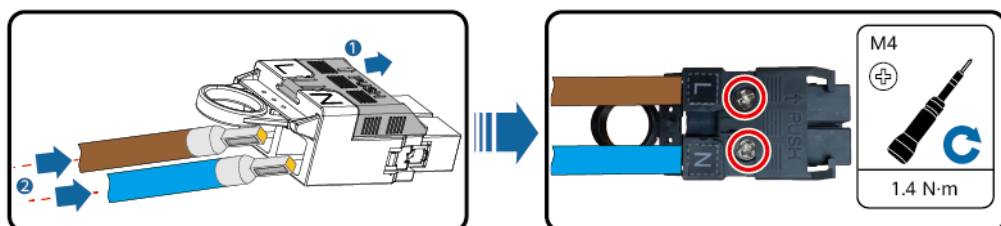
NOTE

In single-system scenarios, connect the other end of the cable to an AC PDC. In parallel-system scenarios, connect the other end of the cable by referring to section "(Optional) Installing Parallel Cables."

Procedure

Step 1 Connect an AC power cable to the terminal connector.

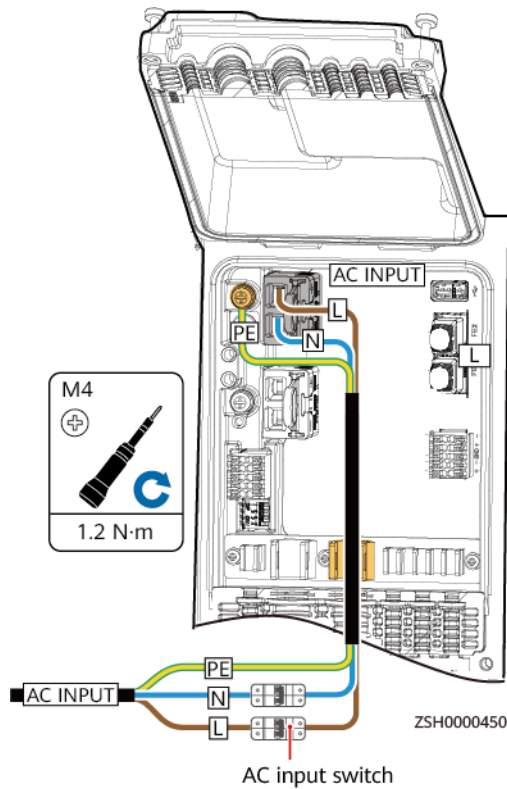
Figure 10-45 Connecting the cable to the terminal connector



ZZX0000021

Step 2 Install the AC input power cable and secure the cable using cable clips.

Figure 10-46 Installing an AC input power cable



----End

10.5.5 Installing Genset Control Cables

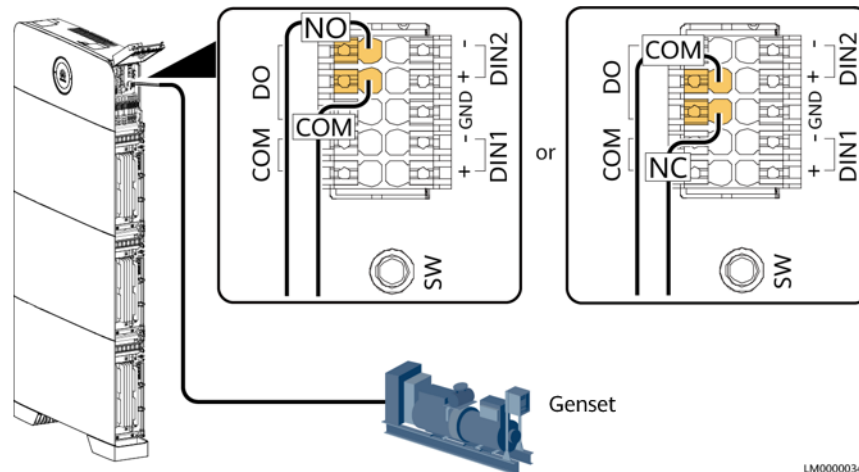
NOTICE

For a genset that starts when the dry contact is open, connect the signal cable to ports NC and COM. For a genset that starts when the dry contact is closed, connect the signal cable to ports NO and COM.

Procedure

Step 1 Install genset control signal cables.

Figure 10-47 Installing genset control signal cables



----End

10.5.6 Installing the Grid Detection Cable of the ATS

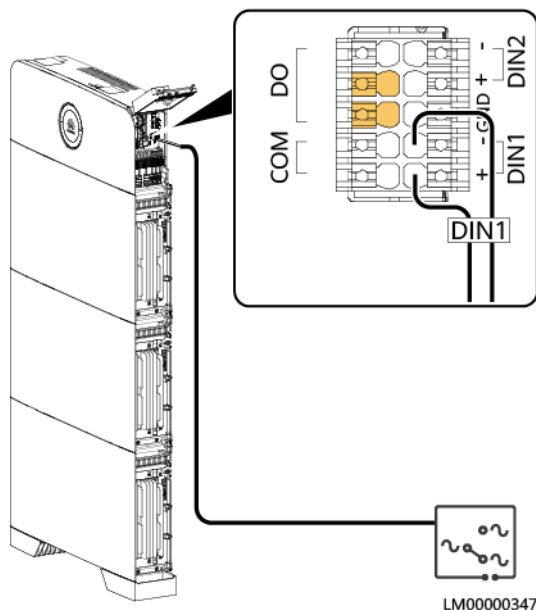
NOTICE

In the genset-grid scenario, the automatic transfer switch (ATS) must support the grid detection function. Connect the grid detection cable of the ATS to the dry contact port DIN1/port DIN2.

Procedure

- Step 1** Install the grid detection cable of the ATS.

Figure 10-48 Install the grid detection cable of the ATS

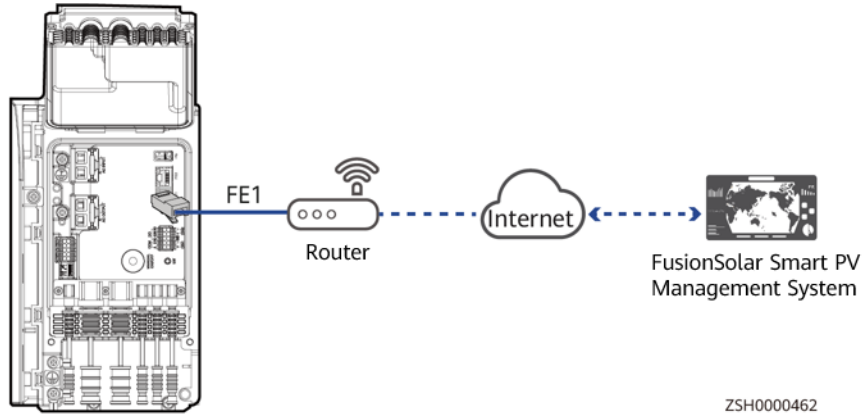


----End

10.5.7 (Optional) Installing a Communications Cable

Step 1 Connect the network cable to the FE1 port of the product.

Figure 10-49 Installing a communications cable



----End

10.6 PV+Mains+Genset+ESS

10.6.1 Installing Ground Cables

Precautions

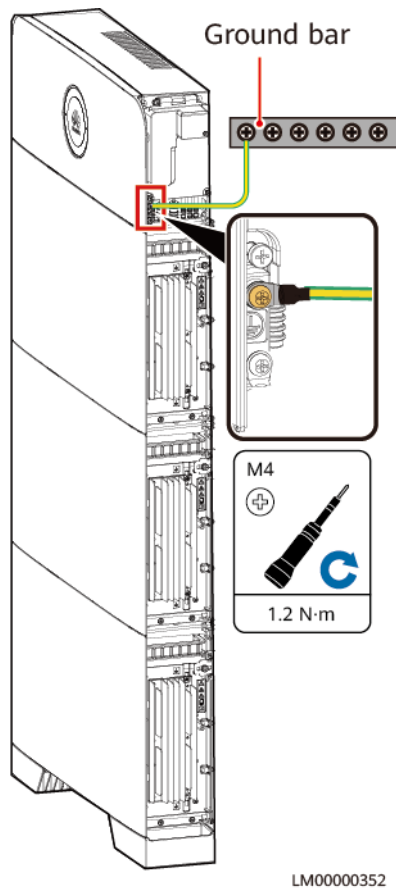
⚠ DANGER

Ensure that the ground cable is securely connected. Otherwise, electric shocks may occur.

Procedure

Step 1 Install ground cables.

Figure 10-50 Installing ground cables



----End

10.6.2 Installing the Internal Cable

CAUTION

- Do not reversely connect positive and negative battery module power cables.
- Use the power cables delivered with the product. If the number of cables is insufficient or any cable is damaged, contact the dealer to obtain cables. Do not prepare cables by yourself.

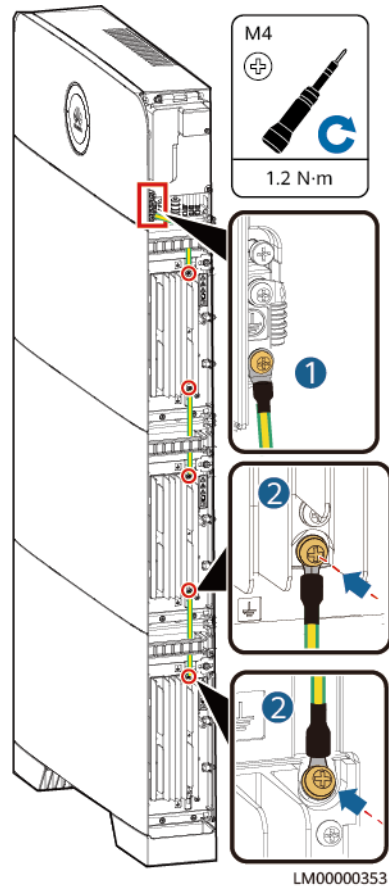
NOTICE

When a communications terminal is connected to a single network cable, a waterproof rubber plug must be installed.

Procedure

- Step 1** Install ground cables.

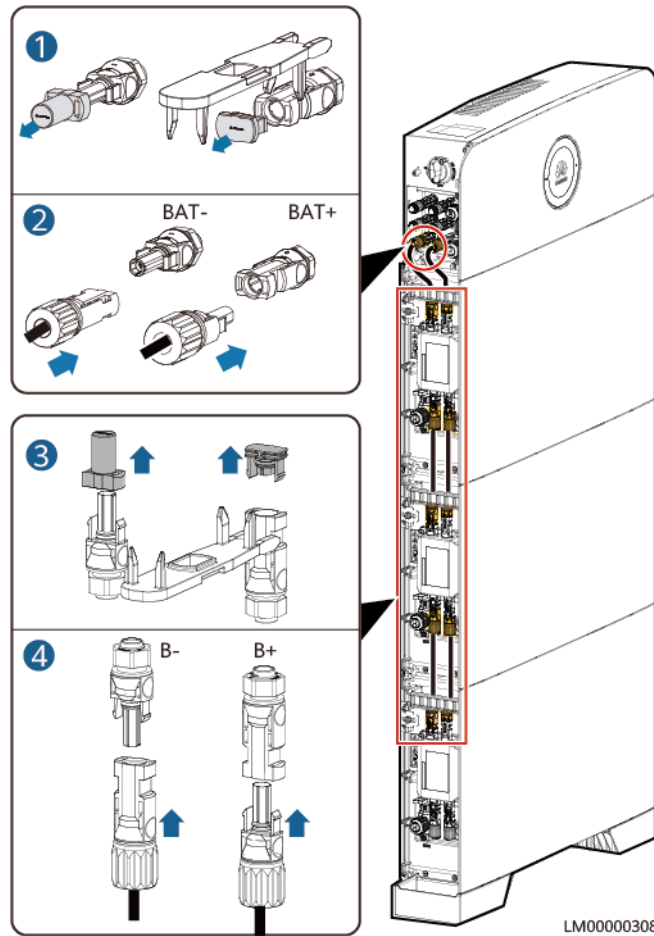
Figure 10-51 Installing ground cables



Step 2 Installing battery module power cables.

1. Use a wrench to remove the waterproof glands from the cascading terminals of the battery modules.
2. Install battery module power cables.
3. Use a removal wrench to remove the waterproof glands from the battery terminals on the power module.
4. Install power cables between the battery modules and power module.

Figure 10-52 Installing battery module power cables

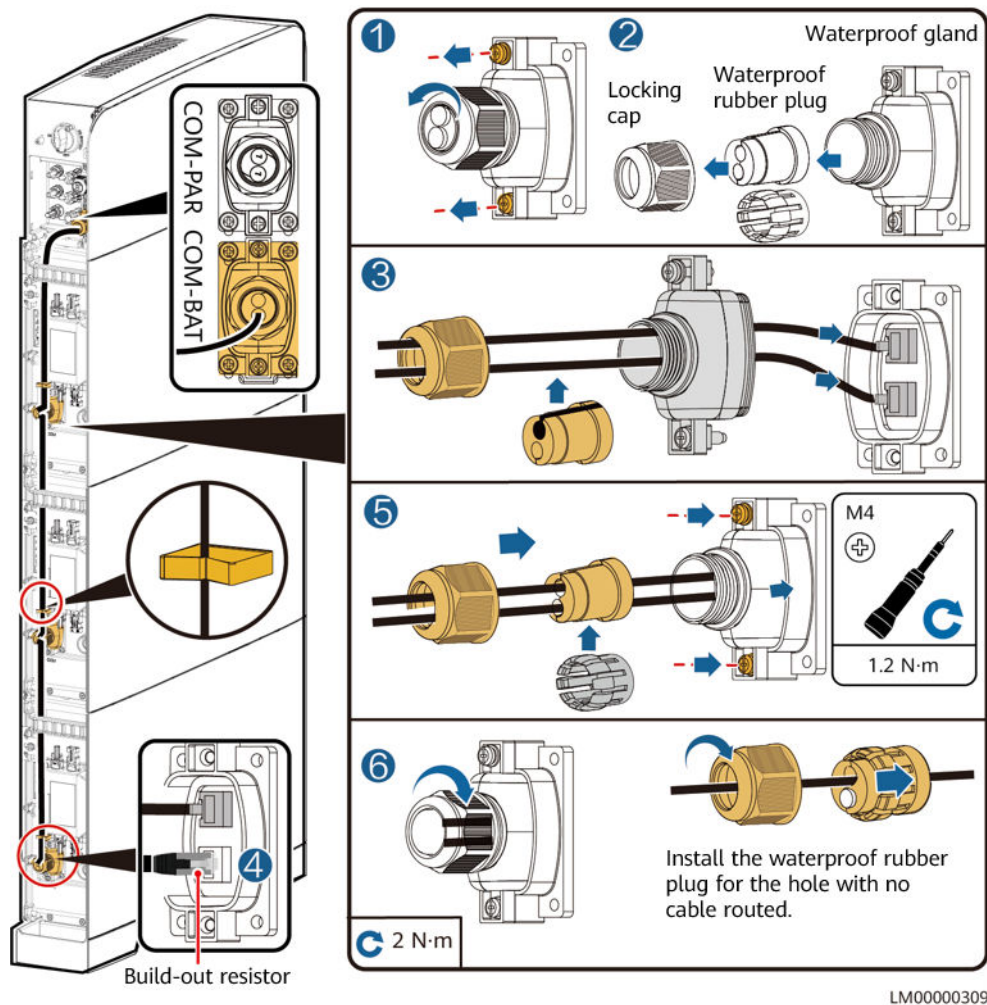


Step 3 Install battery signal cables.

1. Remove the waterproof gland from the communications terminal of a battery module.
2. Remove the locking cap and waterproof rubber plug from the communications terminal housing.
3. Install communications cables for the battery module.
4. Install termination resistors. Otherwise, the communication will be interrupted.
5. Lock the communications terminal waterproof gland and reinstall the waterproof rubber plug.
6. Tighten the locking cap and secure the signal cables using cable clips.

Step 4 Install communications cables for other battery modules in sequence.

Figure 10-53 Installing battery signal cables



NOTICE

When a communications terminal is connected to a single network cable, the waterproof rubber plug must be installed for the hole with no cable routed. Otherwise, the waterproof performance may be affected and the device will be damaged.

----End

10.6.3 Installing PV Input Power Cables

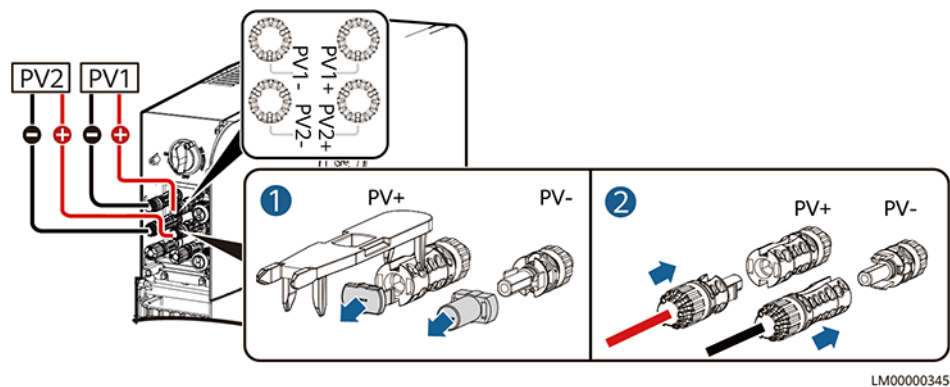
Step 1 Use a removal wrench to remove the waterproof gland from the PV input terminal on the power module.

NOTE

Take out the removal wrench from the decorative cover delivered with the product.

Step 2 Install the PV input power cables.

Figure 10-54 Installing the PV input power cables



----End

10.6.4 Installing an AC Output Power Cable

CAUTION

- The live (L) wire and neutral (N) wire of an AC power cable must be correctly connected.
- The PE wire of an AC power cable must be grounded.
- Do not reversely connect AC output power cables.

NOTICE

A leakage protection device must be configured for the AC output of the iSitePower-M. The leakage current must be 30 mA. You need to configure and install the device by yourself.

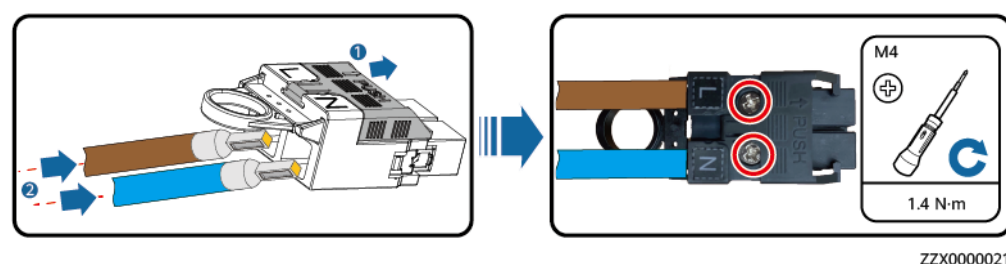
NOTE

In single-system scenarios, connect the other end of the cable to the AC load. In parallel-system scenarios, connect the other end of the cable to the parallel box.

Procedure

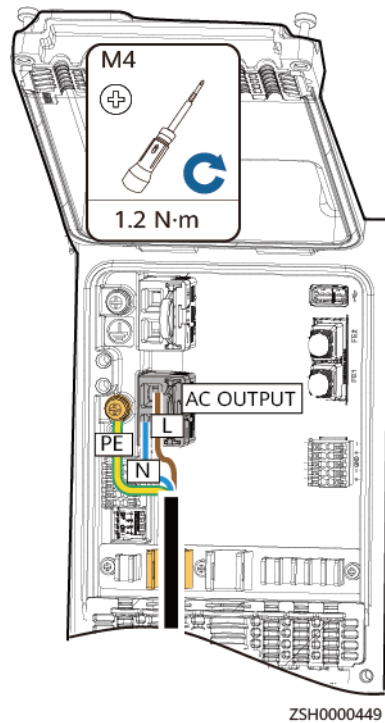
Step 1 Connect an AC power cable to the terminal connector.

Figure 10-55 Connecting the cable to the terminal connector



Step 2 Install the AC output power cable and secure the cable using cable clips.

Figure 10-56 Installing the AC output power cable



----End

10.6.5 Installing an AC Input Power Cable

⚠ DANGER

- A surge protective device (SPD) must be configured for the AC input of the iSitePower-M. You need to configure and install the device by yourself.
- Before installing an AC input power cable, ensure that the AC input switch is turned off and a prominent label indicating "Do not operate" is set.
- AC switches (with a capacity of 40 A) must be installed for phases L and N of the iSitePower-M AC input. The AC switches are delivered with the iSitePower-M. Do not use a Type D circuit breaker because it cannot effectively protect products.
- No leakage protection device is required for the AC input of the iSitePower-M. If a leakage protection device is configured, it is recommended that the leakage current be greater than or equal to $100 \text{ mA} \times n$, where n is the number of power modules.

CAUTION

- The live (L) wire and neutral (N) wire of an AC power cable must be correctly connected.
- The PE wire of an AC power cable must be grounded.
- Do not reversely connect AC input power cables.

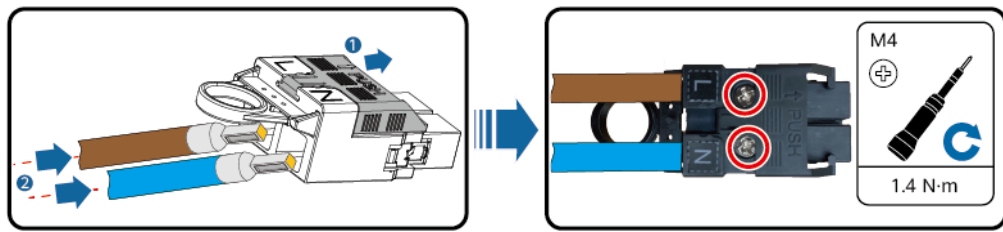
NOTE

In single-system scenarios, connect the other end of the cable to an AC PDC. In parallel-system scenarios, connect the other end of the cable by referring to section "(Optional) Installing Parallel Cables."

Procedure

Step 1 Connect an AC power cable to the terminal connector.

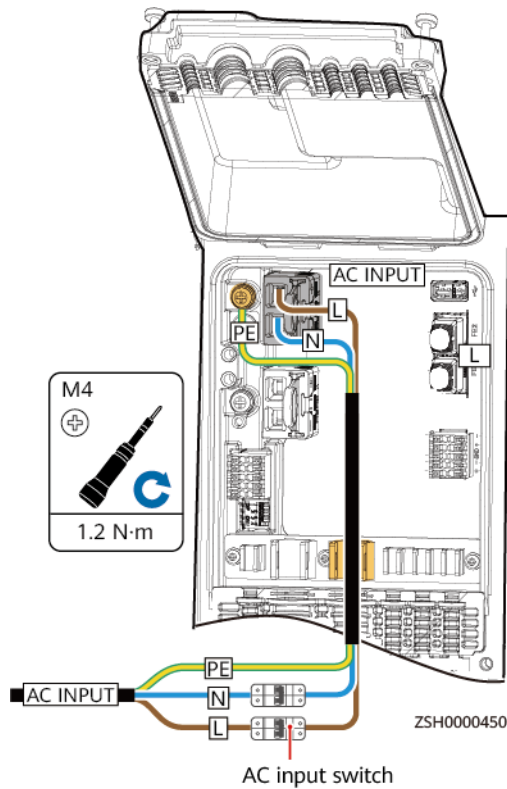
Figure 10-57 Connecting the cable to the terminal connector



ZZX0000021

Step 2 Install the AC input power cable and secure the cable using cable clips.

Figure 10-58 Installing an AC input power cable



----End

10.6.6 Installing Genset Control Cables

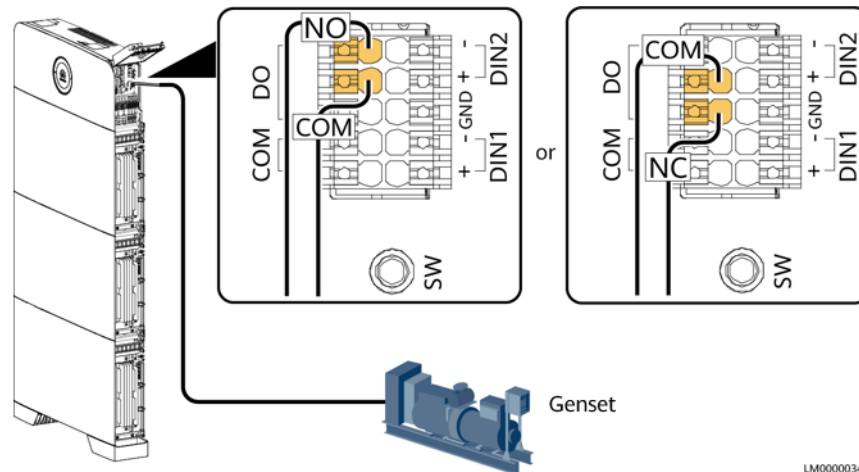
NOTICE

For a genset that starts when the dry contact is open, connect the signal cable to ports NC and COM. For a genset that starts when the dry contact is closed, connect the signal cable to ports NO and COM.

Procedure

Step 1 Install genset control signal cables.

Figure 10-59 Installing genset control signal cables



----End

10.6.7 Installing the Grid Detection Cable of the ATS

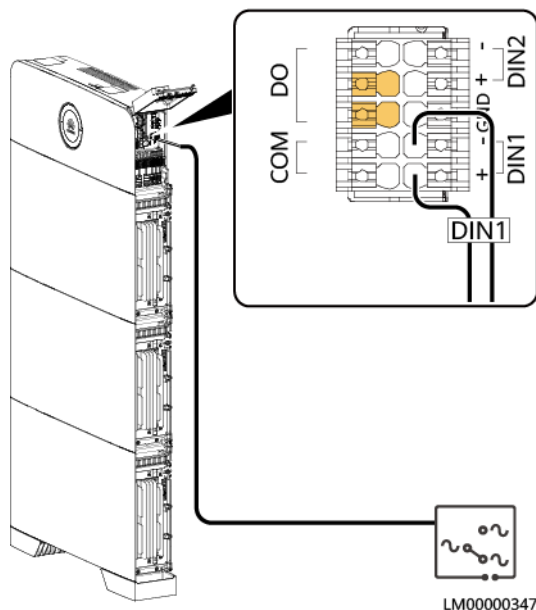
NOTICE

In the genset-grid scenario, the automatic transfer switch (ATS) must support the grid detection function. Connect the grid detection cable of the ATS to the dry contact port DIN1/port DIN2.

Procedure

- Step 1** Install the grid detection cable of the ATS.

Figure 10-60 Install the grid detection cable of the ATS

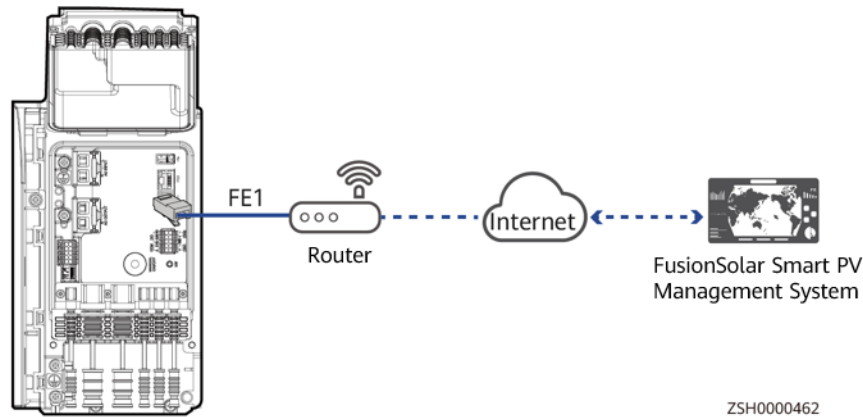


----End

10.6.8 (Optional) Installing a Communications Cable

Step 1 Connect the network cable to the FE1 port of the product.

Figure 10-61 Installing a communications cable



----End

10.7 (Optional) Installing Parallel Cables

10.7.1 Installing a PE Cable for the AC Parallel Box

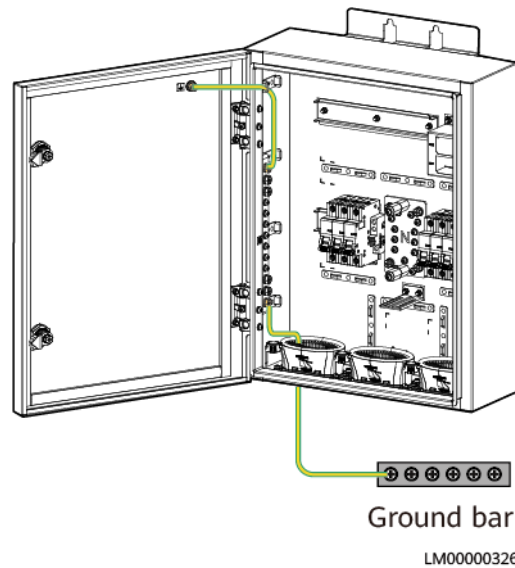
⚠ DANGER

Ensure that the PE cable is securely connected. Otherwise, electric shocks may occur.

Procedure

Step 1 Install a PE cable.

Figure 10-62 Installing a PE cable



----End

10.7.2 Installing Input Power Cables for the AC Parallel Box

⚠ DANGER

- A surge protective device (SPD) must be configured for the AC input of the iSitePower-M. You need to configure and install the device by yourself.
- Before installing an AC input power cable, ensure that the AC input switch is turned off and a prominent label indicating "Do not operate" is set.
- AC switches (with a capacity of 40 A) must be installed for phases L and N of the iSitePower-M AC input. The AC switches are delivered with the iSitePower-M. Do not use a Type D circuit breaker because it cannot effectively protect products.
- No leakage protection device is required for the AC input of the iSitePower-M. If a leakage protection device is configured, it is recommended that the leakage current be greater than or equal to $100 \text{ mA} \times n$, where n is the number of power modules.

⚠ CAUTION

- The live (L) wire and neutral (N) wire of an AC power cable must be correctly connected.
- The PE wire of an AC power cable must be grounded.
- Do not reversely connect AC input power cables.

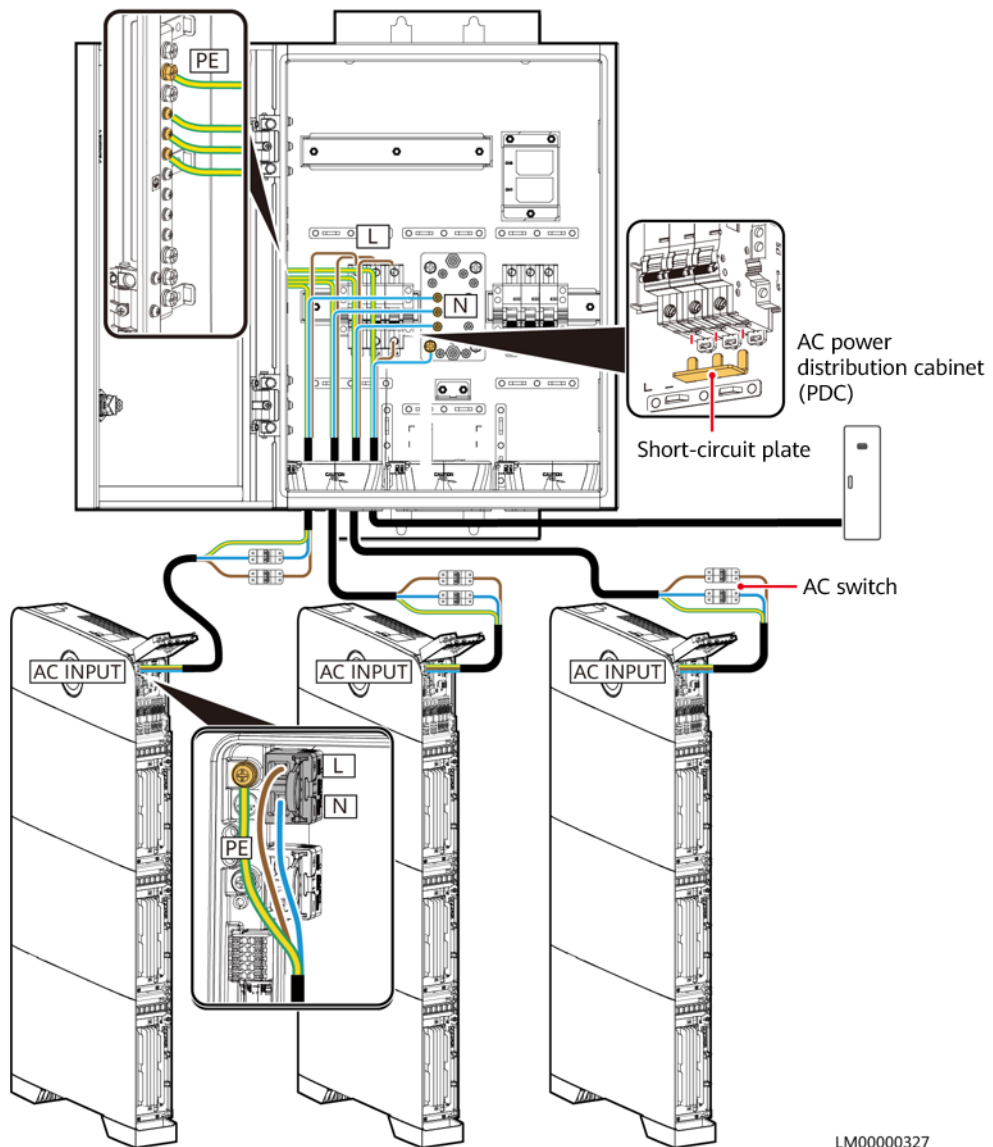
 NOTE

- Install short-circuit plates for AC input circuit breakers.
- The three cables from the AC input circuit breaker to the power modules must be of the same length.

Procedure

Step 1 Install AC input power cables for the parallel box.

Figure 10-63 Installing AC input power cables for the parallel box



LM00000327

----End

10.7.3 Installing Output Power Cables for the AC Parallel Box

CAUTION

- The live (L) wire and neutral (N) wire of an AC power cable must be correctly connected.
 - The PE wire of an AC power cable must be grounded.
 - Do not reversely connect AC output power cables.
-

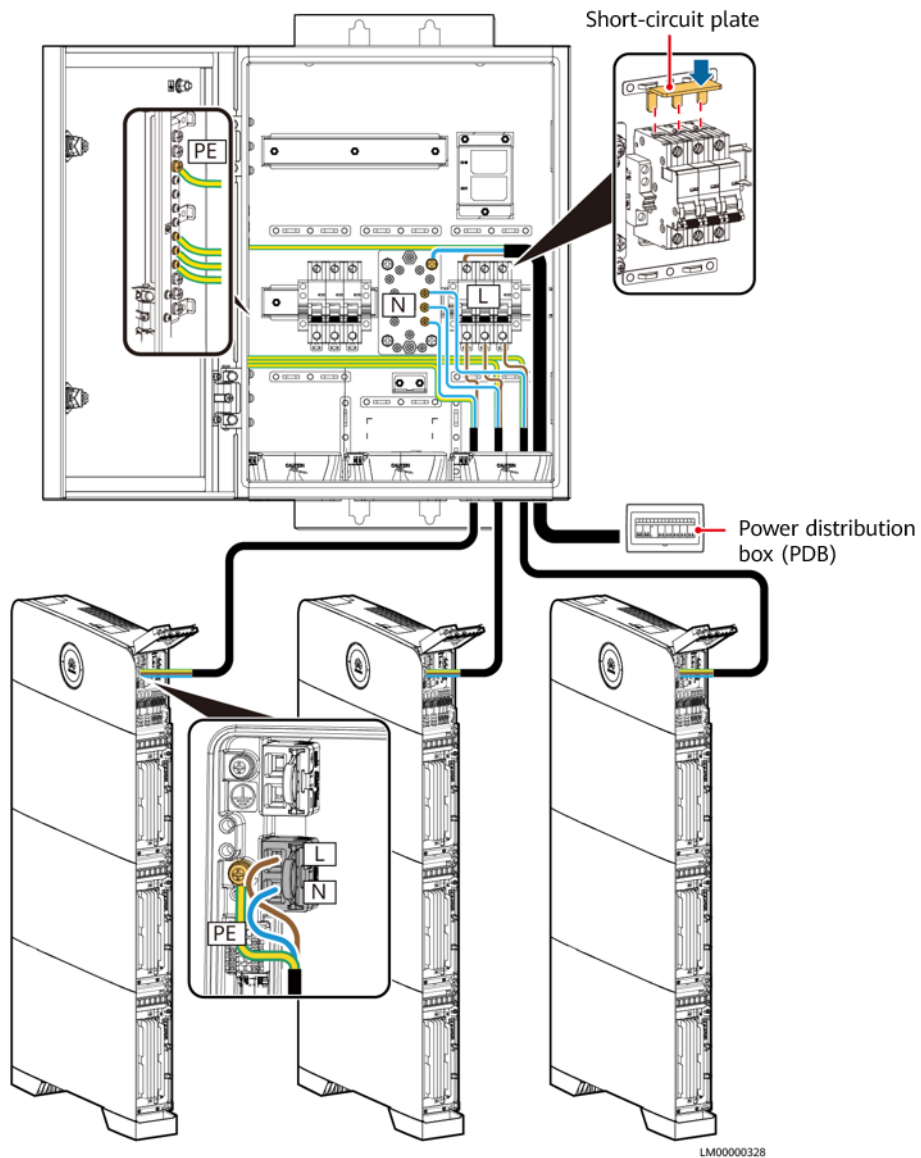
NOTICE

- Install short-circuit plates for AC output circuit breakers.
 - The three cables from the AC output circuit breaker to the power modules must be of the same length.
-

Procedure

- Step 1** Install AC output power cables for the parallel box.

Figure 10-64 Installing AC output power cables for the parallel box



----End

10.7.4 Installing Parallel Communications Cables

NOTICE

- Before installing parallel cables, set the same output parameters for the master and slave products, and then correctly set the address DIP switches for the master and slave products.
- The address DIP switches take effect only after the devices are restarted. Set the DIP switches when the devices are powered off (AC and DC inputs are disconnected, and the devices are shut down by pressing the black start button).
- When installing parallel power communications cables, install termination resistors at the first and last modules. The termination resistors are delivered with the product.
- The length of a single communications cable cannot exceed 3 m.
- A parallel power communications cable is installed in the same way as a battery module communications cable.

Procedure

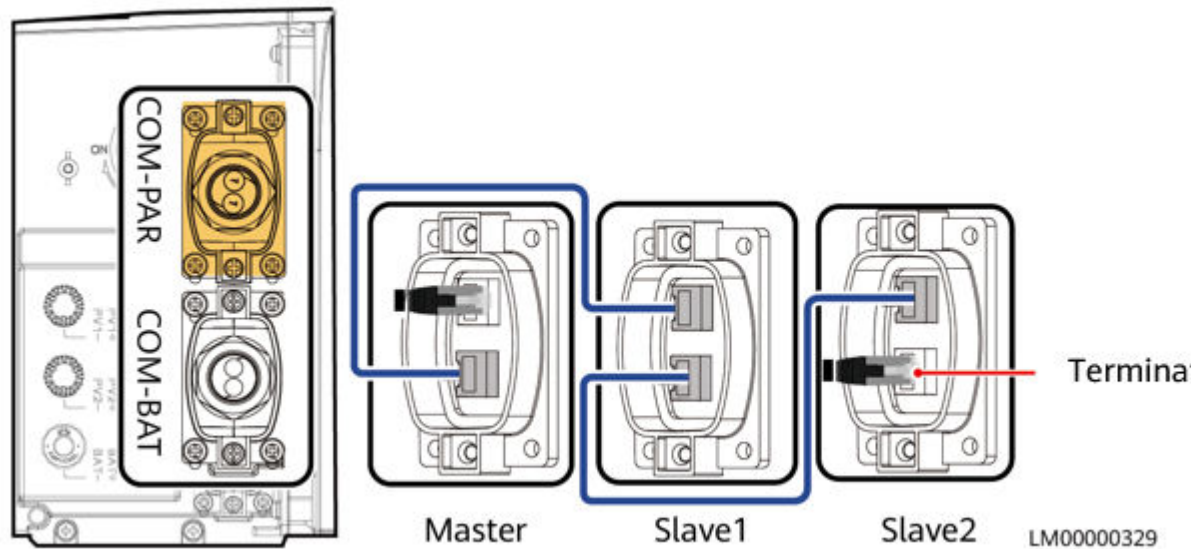
Step 1 Power on the iSitePower-M systems and set the same output parameters for the master and slave products.

Step 2 Power off the iSitePower-M systems and set address DIP switches for the master and slave products.

Scenario		DIP Switch	Pin 1 (M/S)	Pin 2 (A)	Pin 3 (B)	Pin 4 (C)
Parallel products	Master	1	ON	OFF	OFF	OFF
	Slave1	2	OFF	ON	OFF	OFF
	Slave2	3	OFF	OFF	ON	OFF

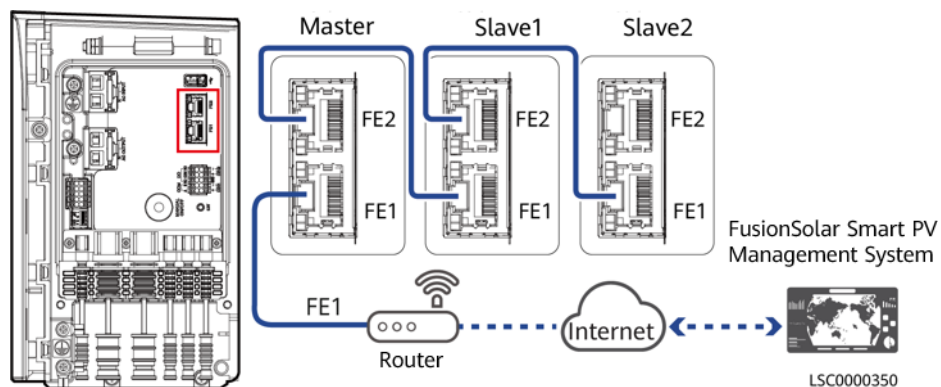
Step 3 Install parallel power communications cables.

Figure 10-65 Installing power communications cables



Step 4 Install parallel monitoring communications cables.

Figure 10-66 Installing monitoring communications cables



----End

10.8 (Optional) Installing Cables in Capacity Expansion Scenarios

NOTICE

- In capacity expansion scenarios, bottom cascading cables must be routed from the rear of the product.
- Cables outside the device must be routed through cable pipes.

10.8.1 Installing a PE Cable

Precautions

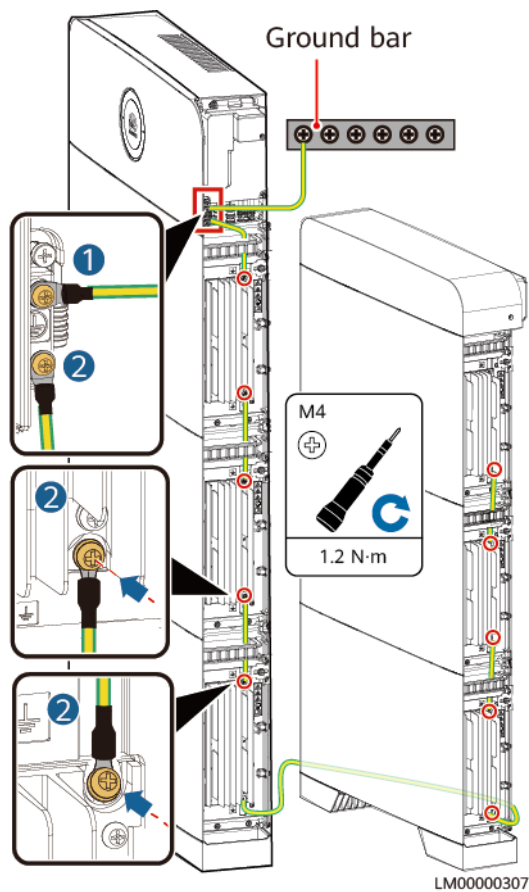


Ensure that the PE cable is securely connected. Otherwise, electric shocks may occur.

Procedure

Step 1 Install a PE cable.

Figure 10-67 Installing a PE cable



----End

10.8.2 Installing Internal Cables

 **CAUTION**

- Do not reversely connect positive and negative battery module power cables.
 - Use the power cables delivered with the product. If the number of cables is insufficient or any cable is damaged, contact the vendor to obtain cables. Do not prepare cables by yourself.
-

NOTICE

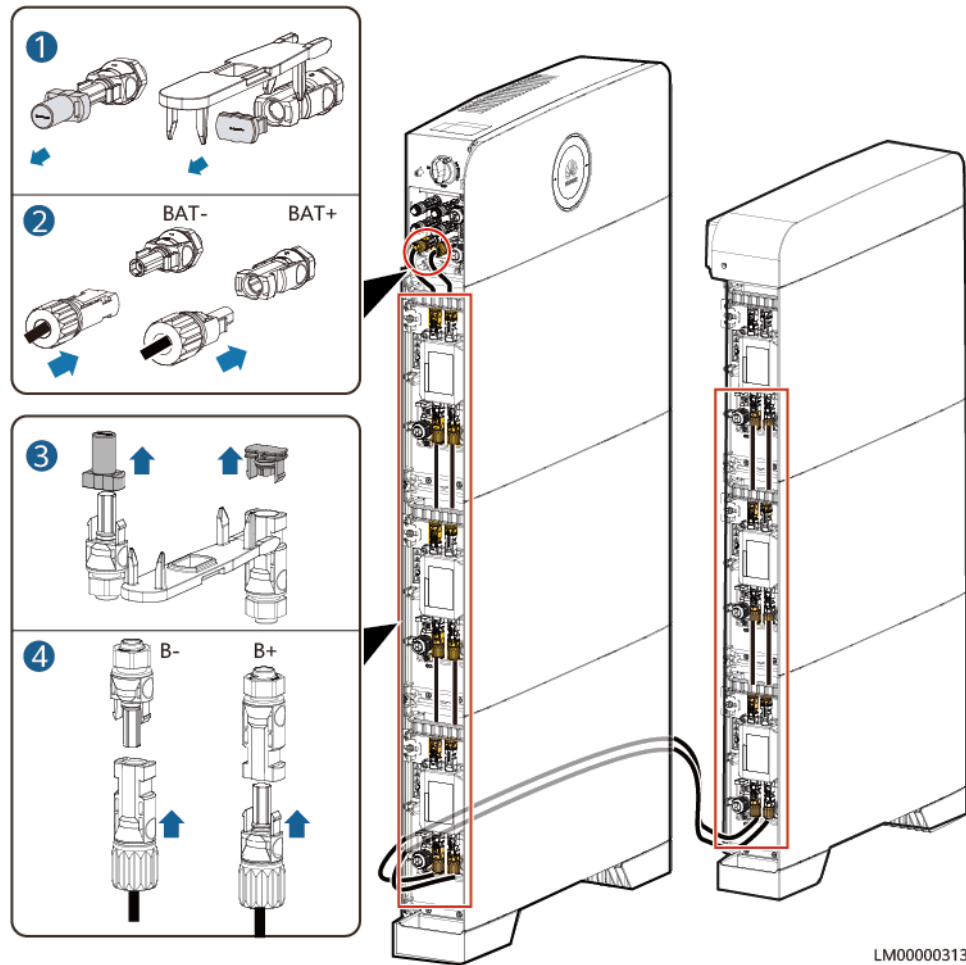
When a communications terminal is connected to a single network cable, a waterproof rubber plug must be installed.

Procedure

Step 1 Install battery module power cables.

1. Use a removal wrench to remove the waterproof glands from the cascading terminals of the battery modules.
2. Install battery module power cables.
3. Use a removal wrench to remove the waterproof glands from the battery terminals on the power module.
4. Install power cables between the battery modules and power module.

Figure 10-68 Installing battery module power cables

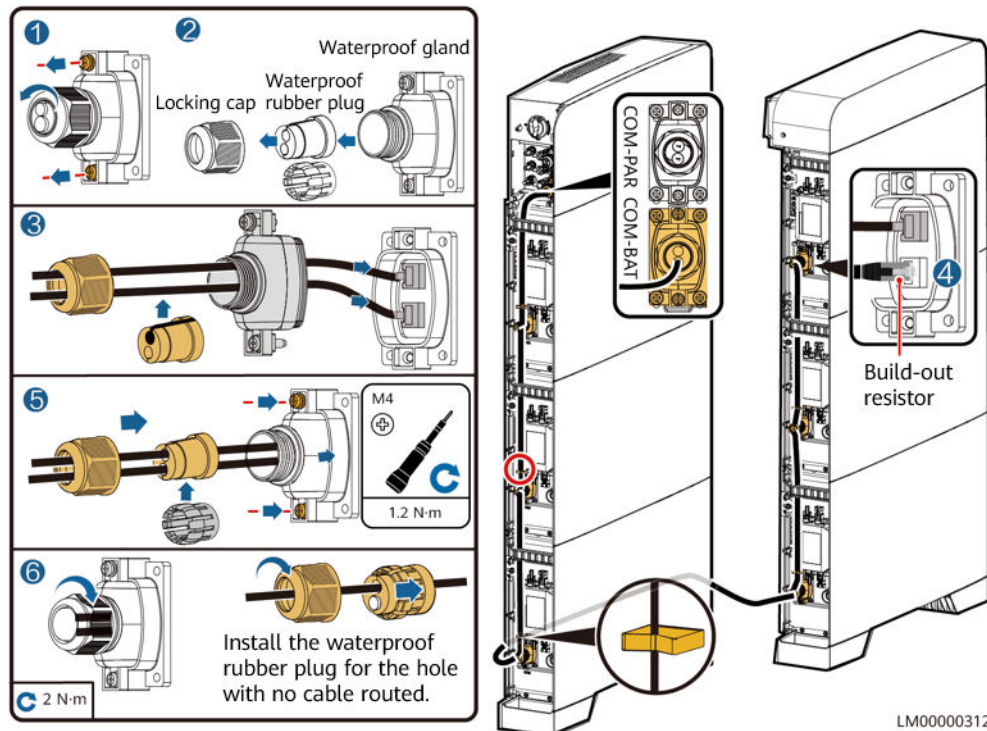


Step 2 Install battery signal cables.

1. Remove the waterproof gland from the communications terminal of a battery module.
2. Remove the locking cap and waterproof rubber plug from the communications terminal housing.
3. Install communications cables for the battery module.
4. Install termination resistors. Otherwise, the communication will be interrupted.
5. Lock the communications terminal waterproof gland and reinstall the waterproof rubber plug.
6. Tighten the locking cap and secure the signal cables using cable clips.

Step 3 Install communications cables for other battery modules in sequence.

Figure 10-69 Installing battery signal cables



NOTICE

When a communications terminal is connected to a single network cable, the waterproof rubber plug must be installed for the hole with no cable routed. Otherwise, the waterproof performance may be affected and the device will be damaged.

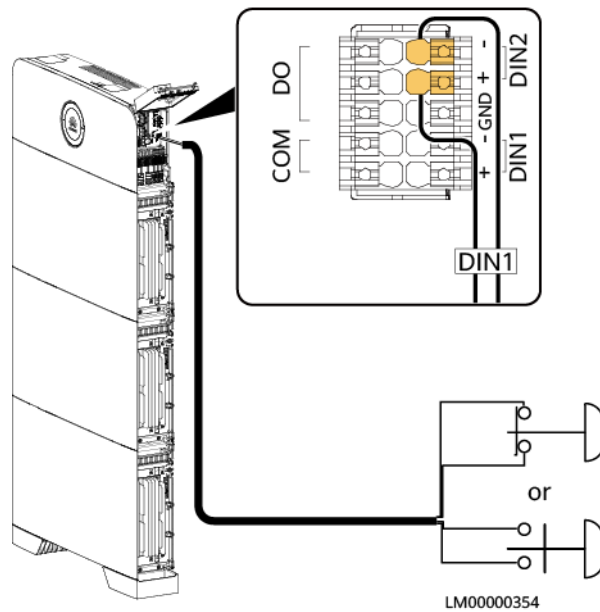
----End

10.9 (Optional) Connecting a Remote EPO Cable

NOTICE

- The EPO switch can be connected to the device and can be associated with DIN1/DIN2 through software configuration. By default, the EPO switch is closed.
- Press and hold the EPO switch for 3s to shut down the entire system (including the genset).
- The connection position of the EPO switch must be different from the mains detection position of the ATS.
- Prepare the EPO switch and cable before installation. The recommended cable size is 22 AWG.
- Equip the EPO switch with a protective cover to prevent misoperations, and protect the cable with a protective tube.

Figure 10-70 Connecting a remote EPO cable



10.10 Installation Verification

10.10.1 Verifying the Installation

Table 10-1 Check items and acceptance criteria

No.	Check Item	Expected Result
1	Product installation	The installation is correct and reliable.
2	Cable routing	Cables are routed properly as required by the customer.
3	Cable bonding	Cable ties are evenly distributed and no burr exists.
4	Grounding	Power cables, signal cables, and PE cables are correctly and securely connected.
5	Switches	The DC SWITCH and all switches connected to the product are OFF.
6	Short circuit at AC input and output ports	The live (L) wire and neutral (N) wire of an AC power cable are correctly connected.
7	Unused terminals and ports	Unused terminals and ports are locked by waterproof glands.
8	Removal wrench	The removal wrench is placed in the original position in the decorative cover.

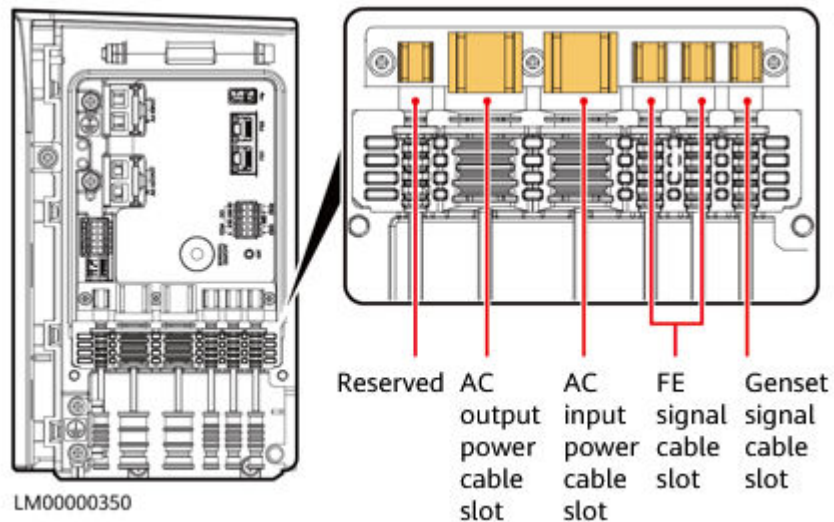
No.	Check Item	Expected Result
9	Installation environment	The installation space is proper, and the installation environment is clean and tidy.

10.10.2 Arranging Cables

NOTICE

Check that the cables are correctly connected. Then fasten the cables to the corresponding cable slots.

Figure 10-71 Cable hole distribution

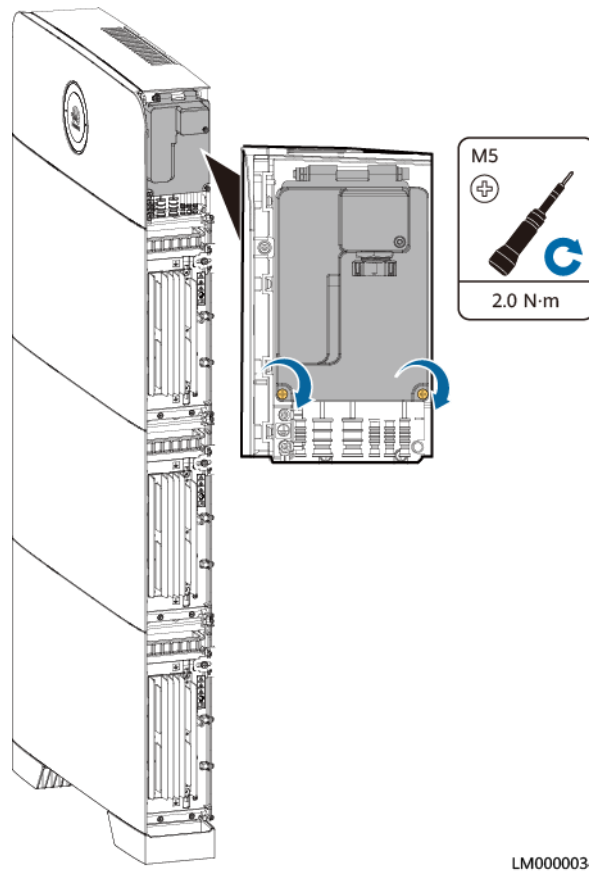


10.10.3 Subsequent Operations

Procedure

Step 1 Close the maintenance compartment door.

Figure 10-72 Closing the maintenance compartment door



Step 2 To facilitate cabling, cut the decorative cover based on the actual situation.

Figure 10-73 Cutting the left decorative cover

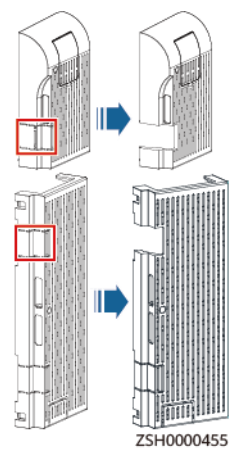
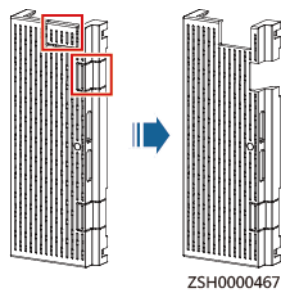


Figure 10-74 Cutting the right decorative cover

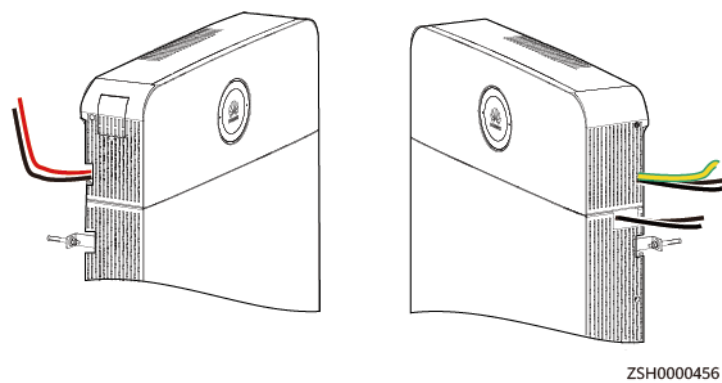


Step 3 Route the cables out of the cable holes.

NOTICE

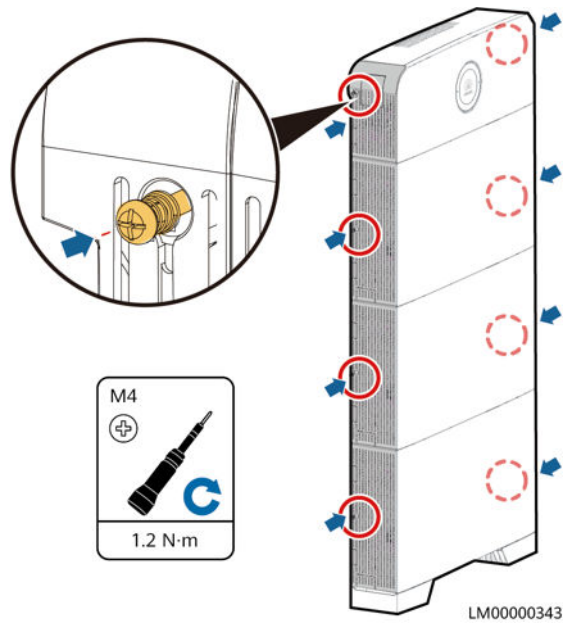
The outlet positions shown in the figure are for reference only. Select an appropriate cable outlet based on the actual cable thickness.

Figure 10-75 Cable routes



Step 4 Tighten the screws.

Figure 10-76 Securing the decorative covers



----End

11 System Commissioning

DANGER

- Wear personal protective equipment and use dedicated insulated tools to avoid electric shocks or short circuits.
-

CAUTION

- During the power-on procedure, power off the batteries immediately if any fault is detected. Rectify the fault before proceeding with the procedure.
 - After batteries are used for system commissioning or batteries have discharged, charge the batteries in time. Otherwise, batteries may be damaged due to overdischarge.
 - Battery overdischarge and damage may occur if batteries with low SOC are stored. Batteries should be recharged in a timely manner.
-

NOTICE

Before the equipment is put into operation for the first time, ensure that the parameters are set correctly by professional personnel. Incorrect parameter settings may result in noncompliance with local grid connection requirements and affect the normal operations of the equipment.

11.1 System Power-On

NOTICE

- The product must be powered on within 24 hours after being unpacked. During maintenance, the power-off time cannot exceed 24 hours.
- If an alarm is generated on the app before the system is powered on, you need to manually clear the alarm on the app.
- Before upgrading the ESS, ensure that no short circuit occurs on load cables. A short circuit may damage the ESS.
- If there is no AC input or PV input, you need to manually start the system by pressing the manual ON/OFF switch.
- In a parallel system, after cables are connected, disconnect loads first. Start all slave products and then the master product. After all products are started, log in to the master product to set parameters.
- When the output voltage system is adjusted, the equipment is powered off and then restarted. No manual operation is required.
- If there is no AC input, the product will be powered off during the upgrade. Therefore, you are advised to upgrade the product when AC input is available.

Procedure

- Step 1** Turn on the corresponding switches based on the scenario.
- If there is PV input, hold down the manual ON/OFF switch for 5s, and turn on the DC SWITCH.
 - If there is no PV or AC input, hold down the manual ON/OFF switch for 5s.
- Step 2** Set the AC input circuit breaker of the iSitePower-M to ON.
- Step 3** After the initial installation and power-on, observe the LED indicator to check the running status.
- End

11.2 System Commissioning

11.2.1 Installing the App

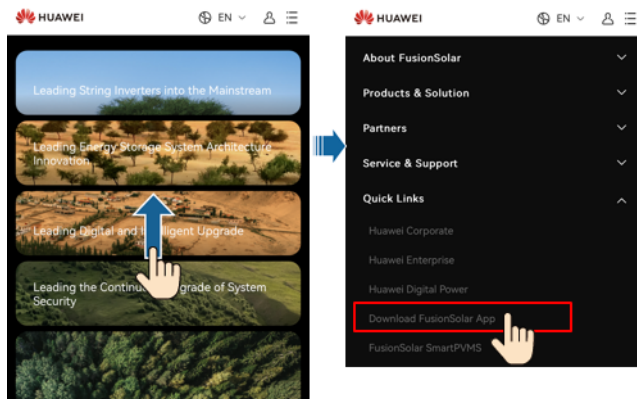
Prerequisites

A mobile phone running Android 8.0 or later is available.

Downloading and Installing the FusionSolar App

- Method 1: Access <https://solar.huawei.com> using the mobile phone browser and download the latest installation package.

Figure 11-1 Downloading the app



- Method 2: Search for **FusionSolar** on Huawei AppGallery and download the latest installation package.
- Method 3: Scan the QR code and download the latest installation package.

Figure 11-2 QR code



11.2.2 Setup Wizard

Prerequisites

For details about how to register an installer account, create a plant, and create an owner account, see *FusionSolar App Quick Guide (iSitePower-M)*. You can scan the QR code to obtain the quick guide.

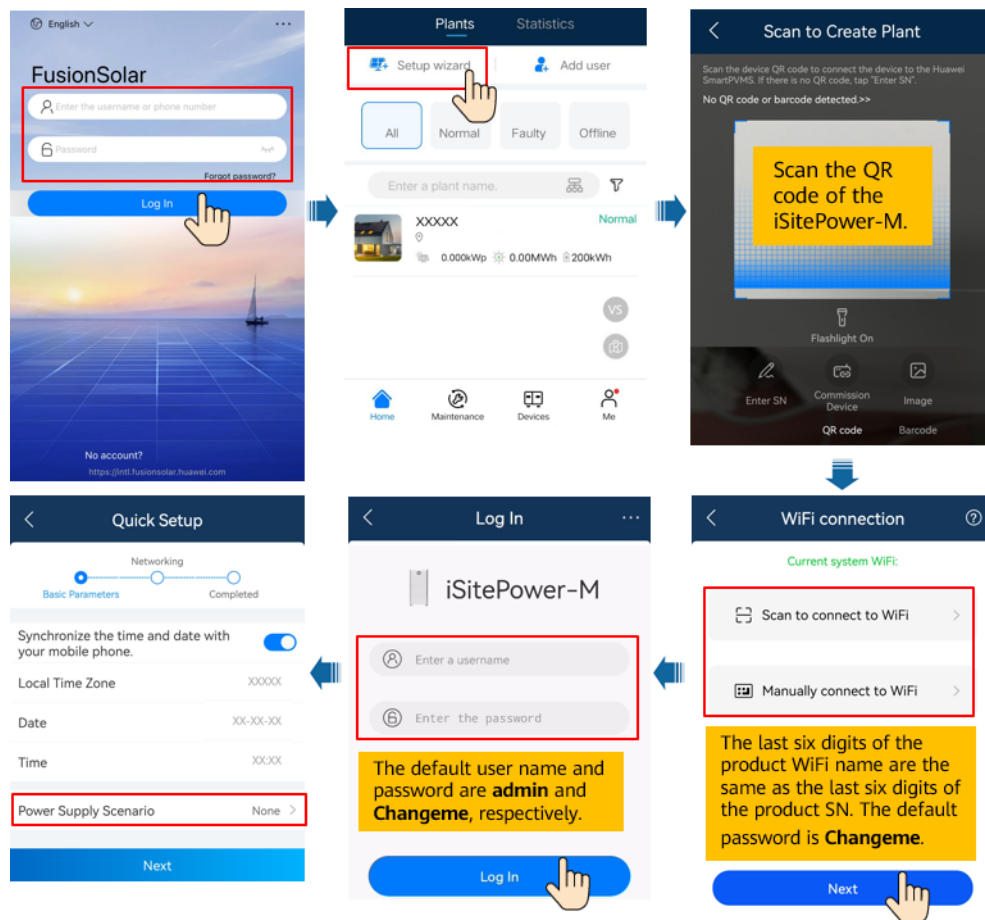
Figure 11-3 QR code



Quick Setup

- Step 1** Log in to the FusionSolar app as an installer, tap **Setup wizard** on the **Home** screen, scan the QR code on the device, and follow the instructions to connect to the device. The parameters vary according to the scenario. For details, see [6 Application Scenarios](#).

Figure 11-4 Connecting to the device



NOTE

- The **Quick Setup** screen is displayed upon the first login.
- Use the initial password to log in for the first time and change the password as prompted. To ensure account security, protect the password by changing it periodically, and keep it secure. Your password might be stolen or cracked if it is left unchanged for extended periods. If a password is lost, devices cannot be accessed. In these cases, the Company shall not be liable for any loss.
- If the login screen is not displayed after you scan the QR code, check whether your phone is correctly connected to the device WLAN. If not, manually select and connect to the WLAN, and tap **Next**.
- In a parallel system, perform quick setup on the master product.

Step 2 Configure communications networking parameters and the management system domain name based on site requirements.

NOTE

- In parallel system scenarios, set communication networking parameters and the management system domain name on the master system.
- (Optional) If the connection mode is set to FE, choose **Maintenance > Network Configuration > Local Area Connection** to configure router parameters after the quick settings are complete.

Figure 11-5 Configuring communications networking parameters and the management system domain name

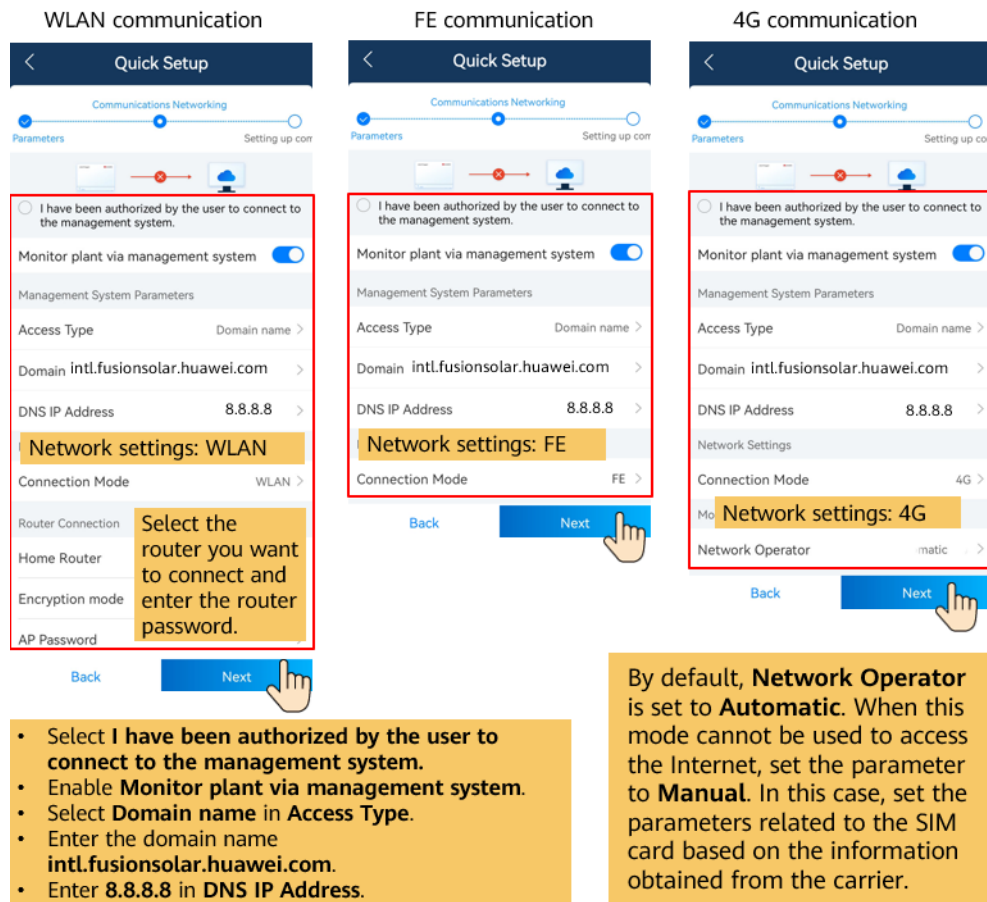
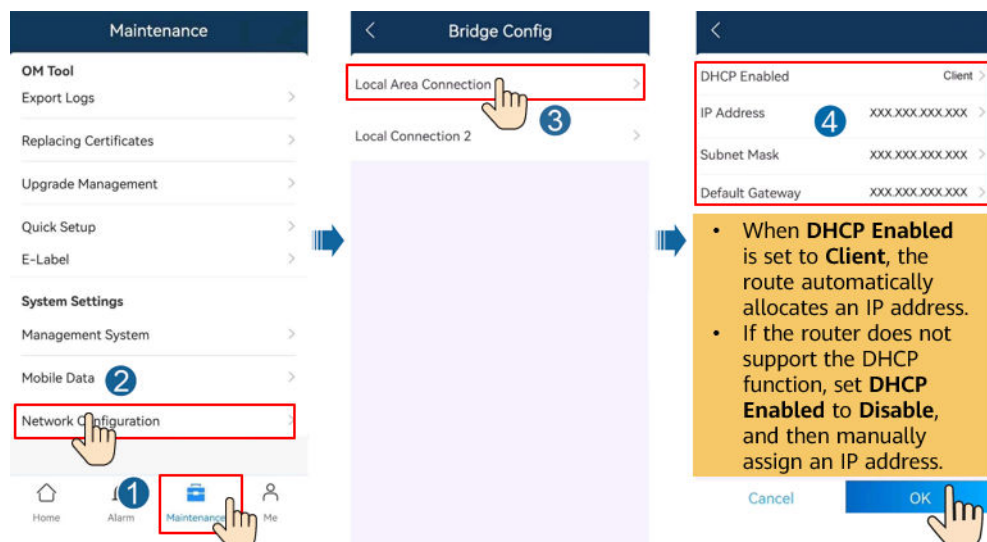
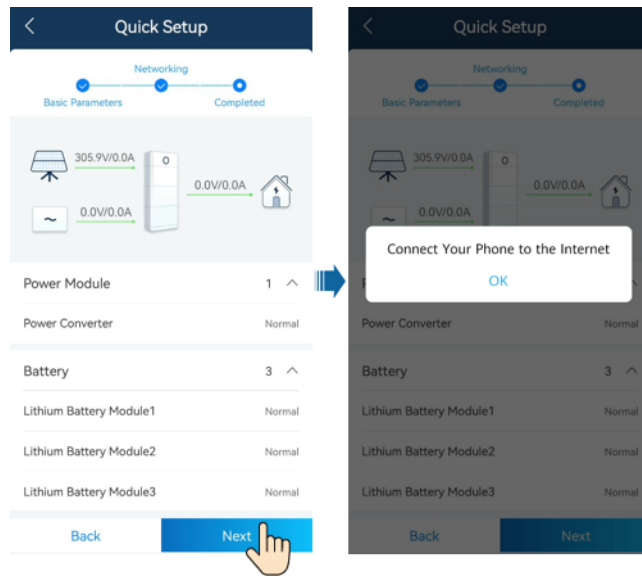


Figure 11-6 (Optional) Router parameter settings for FE communication



Step 3 Ensure that the devices in the device list are consistent with the connected devices.

Figure 11-7 Device connection status



Step 4 Connect the device to the plant.

Figure 11-8 (Optional) Connecting to a new plant

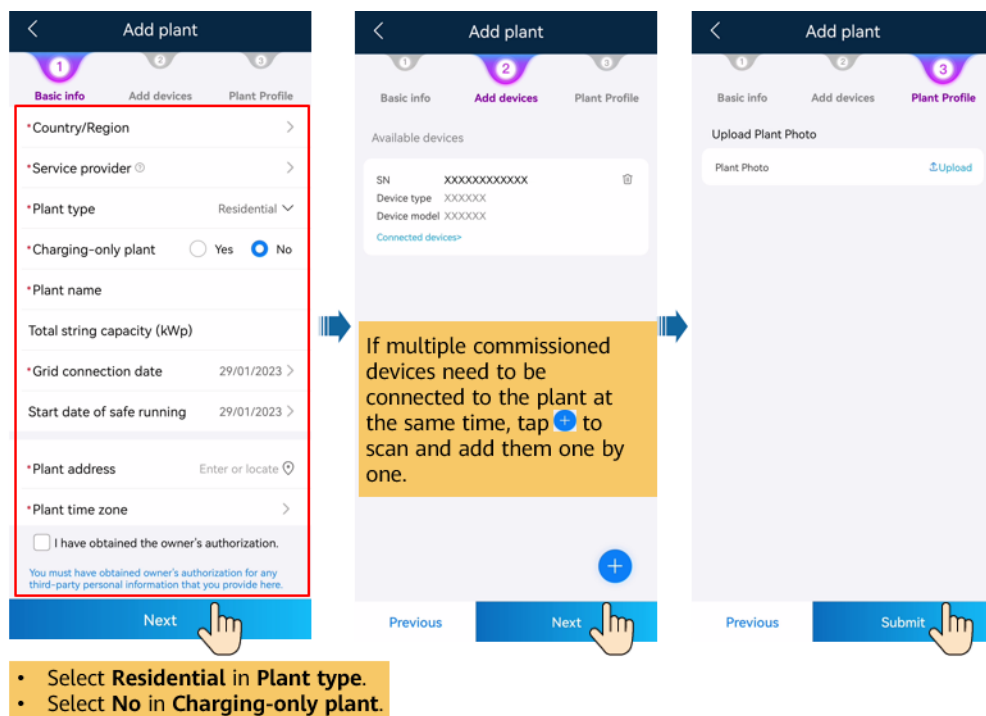
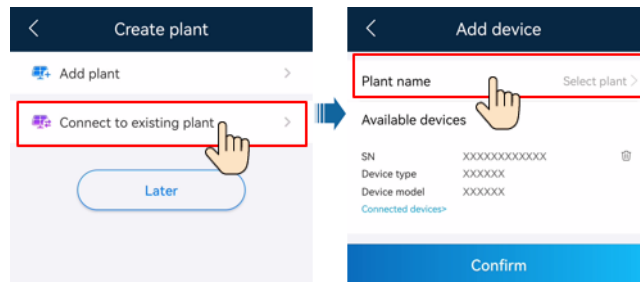


Figure 11-9 (Optional) Connecting to an existing plant



----End

12 System Maintenance

 **DANGER**

- Wear personal protective equipment and use dedicated insulated tools to avoid electric shocks or short circuits.
 - Do not smoke or have an open flame around batteries.
 - Do not use wet cloth to clean exposed copper bars or other conductive parts.
 - Do not use water or any solvent to clean batteries.
-

 **WARNING**

- Do not maintain batteries with power on. To power off the batteries before performing operations such as checking and tightening screw torques, explain the risks to the customer, obtain the customer's written consent, and take effective preventive measures.
 - After batteries are discharged, charge them in time to avoid damage due to overdischarge.
 - Before moving or reconnecting the equipment, disconnect the mains and batteries and wait for five minutes until the equipment powers off. Before maintaining the equipment, check that no hazardous voltages remain in the DC bus or components to be maintained by using a multimeter.
-

 **CAUTION**

- Do not connect two or more cables to the positive or negative power port of a battery in parallel.
 - Stay away from the equipment when preparing cables to prevent cable scraps from entering the equipment. Cable scraps may cause sparks and result in personal injury and equipment damage.
-

12.1 System Power-Off

Precautions

- After the system powers off, the remaining electricity and heat may still cause electric shocks and burns. Therefore, wear protective gloves 5 minutes after the system is powered off before performing any operation. Maintain the product after all indicators are off.
- When an iSitePower system is running, turning off the DC SWITCH of the product cannot completely power off the system. In this case, do not perform maintenance operations on the product.
- When the iSitePower system is running, there is no AC input and the AC input power cable is energized. Therefore, do not maintain the iSitePower system.

Powering Off the System

Step 1 Set the AC input circuit breaker of the iSitePower-M to OFF.

Step 2 Set the DC SWITCH on the power module to OFF.

Step 3 Hold down the manual ON/OFF switch for 5s to shut down the battery module.

----End

12.2 Routine Maintenance

To ensure that the system operates properly for a long term, you are advised to perform routine maintenance as described in this section.

 **CAUTION**

Power off the system before cleaning the system, connecting cables, and checking grounding reliability.

Table 12-1 Maintenance checklist

Check Item	Check Method	Maintenance Interval
System cleanliness	Check periodically that the heat sinks are free from obstacles and dust.	Once every 6 to 12 months

Check Item	Check Method	Maintenance Interval
System running status	<ul style="list-style-type: none"> • Check that the product is not damaged or deformed. • Check that the product does not generate abnormal sound when it is operating. • Check that the parameters are correctly set when the system is running. 	Once every 6 months
Electrical connections	<ul style="list-style-type: none"> • Check that cables are secured. • Check that the cables are intact, especially that the parts touching the metallic surface are not scratched. • Check that the unused PV input terminals, communications terminals, and waterproof glands are locked. 	6 months after the first commissioning and once every 6 to 12 months after that
Grounding reliability	Check that PE cables are securely connected.	6 months after the first commissioning and once every 6 to 12 months after that

12.3 Troubleshooting

Alarm severities are defined as follows:

- Major: The system shuts down or some functions are abnormal due to a fault.
- Minor: Some components of the system are faulty but the system can still operate.
- Warning: The system works properly. The output power decreases or some authorization functions fail due to external factors.

Table 12-2 Common alarms and troubleshooting measures

Module	Alarm Name	Alarm Severity	Causes	Suggestion
Controller	SMU Fault	Major	The internal hardware of the monitoring module is faulty, and sampling is abnormal.	Contact technical support to determine the alarm cause.

Module	Alarm Name	Alarm Severity	Causes	Suggestion
Mains	Mains Failure	Minor	A mains outage occurs.	<ol style="list-style-type: none"> 1. Check the AC voltage and current, and rectify the power grid fault. 2. Contact technical support to determine the alarm cause.
Mains	AC Overvoltage	Minor	<ol style="list-style-type: none"> 1. AC overvoltage occurs. 2. The alarm threshold is improperly set. 	<ol style="list-style-type: none"> 1. If the alarm occurs accidentally, the power grid may be abnormal temporarily. The system automatically recovers after detecting that the power grid becomes normal. 2. If the alarm occurs frequently, check whether the power grid voltage is within the acceptable range. If yes, change the overvoltage alarm threshold on the mobile app or management system. <ul style="list-style-type: none"> • FusionSolar app (local commissioning): Home > Mains > Configuration > Phase Overvoltage Alarm Threshold • Management system: Navigate to the device and choose Mains > Configuration > Basic Parameters > Phase Overvoltage Threshold. 3. Check whether the peak voltage of the power grid is too high. If the fault occurs frequently and persists for a long time, contact the local power operator.

Module	Alarm Name	Alarm Severity	Causes	Suggestion
Mains	AC Undervoltage	Minor	<ol style="list-style-type: none"> 1. AC undervoltage occurs. 2. The alarm threshold is improperly set. 	<ol style="list-style-type: none"> 1. If the alarm occurs accidentally, the power grid may be abnormal temporarily. The system automatically recovers after detecting that the power grid becomes normal. 2. If the alarm occurs frequently, check whether the power grid voltage is within the acceptable range. If yes, change the undervoltage alarm threshold on the mobile app or management system. <ul style="list-style-type: none"> • FusionSolar app (local commissioning): Home > Mains > Configuration > Phase Undervoltage Alarm Threshold • Management system: Navigate to the device and choose Mains > Configuration > Basic Parameters > Phase Undervoltage Threshold. 3. If the fault persists for a long time, check whether the cable connection between the AC switch and the AC port on the device is normal.

Module	Alarm Name	Alarm Severity	Causes	Suggestion
Mains	AC Overfrequency	Major	<ol style="list-style-type: none"> 1. AC overfrequency occurs. 2. The alarm threshold is improperly set. 	<ol style="list-style-type: none"> 1. If the alarm occurs accidentally, the power grid may be abnormal temporarily. The inverter automatically recovers after detecting that the power grid becomes normal. 2. If the alarm occurs frequently, check whether the power grid frequency is within the allowed range. If yes, change the power grid overfrequency protection threshold on the mobile app or management system. <ul style="list-style-type: none"> • FusionSolar app (local commissioning): Home > Mains > Configuration > AC Overfrequency Alarm Threshold • Management system: Navigate to the device and choose Mains > Configuration > Basic Parameters > AC Overfrequency Alarm Threshold.

Module	Alarm Name	Alarm Severity	Causes	Suggestion
Mains	AC Underfrequency	Major	<ol style="list-style-type: none"> 1. AC underfrequency occurs. 2. The alarm threshold is improperly set. 	<ol style="list-style-type: none"> 1. If the alarm occurs accidentally, the power grid may be abnormal temporarily. The inverter automatically recovers after detecting that the power grid becomes normal. 2. If the alarm occurs frequently, check whether the power grid frequency is within the allowed range. If yes, change the power grid overfrequency protection threshold on the mobile app or management system. <ul style="list-style-type: none"> • FusionSolar app (local commissioning): Home > Mains > Configuration > AC Overfrequency Alarm Threshold • Management system: Navigate to the device and choose Mains > Configuration > Basic Parameters > AC Overfrequency Alarm Threshold.
iSitePower-M	Communication Failure	Major	The iSitePower-Ms involved in the parallel system fail to communicate.	<ol style="list-style-type: none"> 1. Check whether the communications cables to the parallel iSitePower-Ms are disconnected or loose. 2. Check whether the address DIP switches for the master and slave products are set correctly.

Module	Alarm Name	Alarm Severity	Causes	Suggestion
Genset	AC Output Undervoltage	Minor	1. The genset is faulty.	<ol style="list-style-type: none"> 1. If the alarm occurs accidentally, the genset may be abnormal temporarily. The system automatically recovers after detecting that the genset becomes normal. 2. If the alarm occurs frequently, check whether the genset output voltage is within the allowed range. If not, contact the genset supplier. If yes, change the output undervoltage threshold on the mobile app or management system. <ul style="list-style-type: none"> • FusionSolar app (local commissioning): Home > Genset Summary > Device > Genset1 > Configuration > Output Undervoltage Threshold • Management system: Navigate to the device and choose Genset Summary > Genset[1] > Configuration > Alarm Parameters > Output Undervoltage Threshold. 3. If the fault persists for a long time, check whether the output power cable is properly connected to the genset AC output switch. 4. 4. Maintain the genset. If the fault persists, contact technical support.

Module	Alarm Name	Alarm Severity	Causes	Suggestion
Genset	AC Output Overvoltage	Minor	The genset is faulty.	<ol style="list-style-type: none"> If the alarm occurs accidentally, the genset may be abnormal temporarily. The system automatically recovers after detecting that the genset becomes normal. If the alarm occurs frequently, check whether the genset output voltage is within the allowed range. If not, contact the genset supplier. If yes, change the output overvoltage threshold on the mobile app or management system. <ul style="list-style-type: none"> FusionSolar app (local commissioning): Home > Genset Summary > Device > Genset1 > Configuration > Output Overvoltage Threshold Management system: Navigate to the device and choose Genset Summary > Genset[1] > Configuration > Alarm Parameters > Output Overvoltage Threshold. Check whether the peak output voltage of the genset is too high. If the fault occurs frequently and persists for a long time, contact the genset supplier. If the fault persists, contact technical support.
Site Unit	Charge Abnormal	Critical	<ol style="list-style-type: none"> The mains is abnormal. The battery is faulty. The power supply circuit is abnormal. 	<ol style="list-style-type: none"> Check whether the AC power supply is normal. If not, rectify the power grid fault. Contact technical support to determine the alarm cause.

Module	Alarm Name	Alarm Severity	Causes	Suggestion
Lithium Battery	Lithium Battery Communication Failure	Minor	<ol style="list-style-type: none"> 1. The device is faulty. 2. The communications cable is disconnected from the device. 	<ol style="list-style-type: none"> 1. Check whether the communications cable is disconnected from the device or loose. 2. Contact technical support to determine the alarm cause.
Lithium Battery	Board Hardware Fault	Major	The board hardware is faulty.	Contact technical support to determine the alarm cause.
Lithium Battery	<ul style="list-style-type: none"> • Battery Cell 1 Fault • Battery Cell 2 Fault • Battery Cell 3 Fault • Battery Cell 4 Fault • Battery Cell 5 Fault • Battery Cell 6 Fault • Battery Cell 7 Fault • Battery Cell 8 Fault • Battery Cell 9 Fault • Battery Cell 10 Fault • Battery Cell 11 Fault • Battery Cell 12 Fault • Battery Cell 13 Fault • Battery Cell 14 Fault • Battery Cell 15 Fault • Battery Cell 16 Fault 	Major	The battery cell is faulty.	Contact technical support to determine the alarm cause.

Module	Alarm Name	Alarm Severity	Causes	Suggestion
Lithium Battery	Upgrade Failed	Major	<ol style="list-style-type: none"> 1. A communication failure occurs during the update. 2. The battery is faulty. 	<ol style="list-style-type: none"> 1. Perform the update again. 2. If the update fails several times, contact technical support.
Lithium Battery	Discharge Overcurrent Protection	Minor	The battery is faulty.	<ol style="list-style-type: none"> 1. Power off and power on the device, and check whether the alarm is cleared. 2. Contact technical support.
Lithium Battery	Charge Overcurrent Protection	Minor	The battery is faulty.	<ol style="list-style-type: none"> 1. Power off and power on the device, and check whether the alarm is cleared. 2. Contact technical support.
Lithium Battery	Low Temperature	Minor	<ol style="list-style-type: none"> 1. The battery voltage is too low. 2. The device is faulty. 	<ol style="list-style-type: none"> 1. Check whether the ambient temperature is too low. 2. Power off and power on the device, and check whether the alarm is cleared. 3. Contact technical support.
Lithium Battery	Charge Low Temperature Protection	Minor	<ol style="list-style-type: none"> 1. The battery temperature is too low. 2. The device is faulty. 	<ol style="list-style-type: none"> 1. Check whether the ambient temperature is too low. 2. Power off and power on the device, and check whether the alarm is cleared. 3. Contact technical support.
Lithium Battery	Discharge Low Temperature Protection	Minor	<ol style="list-style-type: none"> 1. The battery temperature is too low. 2. The device is faulty. 	<ol style="list-style-type: none"> 1. Check whether the ambient temperature is too low. 2. Power off and power on the device, and check whether the alarm is cleared. 3. Contact technical support.
Lithium Battery	End of Lifecycle	Major	The battery pack has been used for a long time and is approaching the end of its lifecycle.	The battery has reached the end of its lifespan. Contact the local recycling agency to dispose of it in compliance with local laws and regulations as well as applicable standards.

Module	Alarm Name	Alarm Severity	Causes	Suggestion
Lithium Battery	High Temperature Protection	Minor	<ol style="list-style-type: none"> 1. The installation position of the battery is not ventilated. 2. The battery temperature is too high. 3. The device is faulty. 	<ol style="list-style-type: none"> 1. Check whether the heat dissipation of the battery pack is normal. 2. Reset the BMU device and then check whether the alarm is cleared. 3. Contact technical support to determine the alarm cause.
Lithium Battery	Battery High Temperature	Minor	<ol style="list-style-type: none"> 1. The installation position of the battery is not ventilated. 2. The battery temperature is too high. 3. The device is faulty. 	<ol style="list-style-type: none"> 1. Check whether the heat dissipation of the battery pack is normal. 2. Reset the BMU device and then check whether the alarm is cleared. 3. Contact technical support to determine the alarm cause.
Lithium Battery	Charge Overvoltage	Warning	<ol style="list-style-type: none"> 1. The battery voltage exceeds the upper threshold. 2. The device is faulty. 	This message is informational only and no action is required. The alarm is automatically cleared when the lithium battery is discharging.
Lithium Battery	Overdischarge	Warning	<ol style="list-style-type: none"> 1. The battery voltage is below the lower threshold. 2. The device is faulty. 	This message is informational only and no action is required.
Lithium Battery	Heavy Load Warning	Warning	<ol style="list-style-type: none"> 1. The system is overloaded. 2. The battery is faulty. 	<ol style="list-style-type: none"> 1. Reduce the system load. 2. Contact technical support to determine the alarm cause.
Lithium Battery	Charge Overcurrent	Warning	The battery is faulty.	This message is informational only and no action is required.

Module	Alarm Name	Alarm Severity	Causes	Suggestion
Power Converter	PV Module Protected	Minor	PV module protection, input overvoltage/ undervoltage protection, bus overvoltage/ undervoltage protection, PV low irradiance, or internal overtemperature occurs.	<ol style="list-style-type: none"> For input overvoltage/ undervoltage protection: Check whether the PV input voltage is within the normal MPPT voltage range using the mobile app, management system, or a multimeter. <ul style="list-style-type: none"> FusionSolar app (local commissioning): Home > Sampling Equipment > Power Converter > PV Input Voltage(V) Management system: Navigate to the device and choose Power Converter > Details > PV Input Voltage. For PV low irradiance: Generally, a low irradiance alarm is likely to be generated in the early morning or at dusk. The alarm can be manually cleared on the mobile app or automatically cleared after the system runs for 30 minutes (at most) under normal irradiance. For internal overtemperature: If the internal temperature of the power module exceeds the protection threshold, check whether the ambient temperature is too high or whether the heat sink is blocked. Disconnect loads, let the system run for a period of time, and check whether the alarm is automatically cleared. If the alarm persists, contact technical support.

Module	Alarm Name	Alarm Severity	Causes	Suggestion
Power Converter	PV Module Fault	Major	A PV module fault, relay fault, PV self-check fault, insulation fault, or AFCI fault occurs.	<ol style="list-style-type: none"> 1. Relay fault: The relay is damaged, the power supply to the relay is abnormal, or the relay control signal is abnormal. Power off and then power on the system (disconnect the input and loads, and black start the battery). Check whether the alarm is cleared. 2. PV self-check fault: Disconnect the PV input and reconnect it. Check whether the alarm is cleared. 3. Insulation fault: Check whether PV modules, DC cables, and connectors are damaged, whether the insulation layer deteriorates, and whether the ambient humidity is high. 4. Contact technical support to determine the alarm cause.
Power Converter	PV Module Abnormal Shutdown	Major	The PV side of the power module shuts down unexpectedly.	<ol style="list-style-type: none"> 1. Power off and then power on the system and check whether the alarm is cleared. 2. Contact technical support to determine the alarm cause.
Power Converter	PV Reversely Connected	Major	The input power cable on the PV side of the power module is in reverse polarity.	<ol style="list-style-type: none"> 1. Check whether the positive and negative terminals of the PV module are correctly connected to the PV input ports on the power module. If not, connect the cables in correct polarity. 2. Power off and then power on the system and check whether the alarm is cleared. 3. Contact technical support.

Module	Alarm Name	Alarm Severity	Causes	Suggestion
Power Converter	Bypass Module Fault	Major	The bypass module of the power module is faulty, or the module address is abnormal.	<ol style="list-style-type: none"> 1. Check cable connections (communications and output power cables): Check whether the parallel CAN cable is loose, damaged, or correctly connected. Check whether the AC output power cable is correctly connected. Reconnect the AC power supply and check whether the alarm is cleared. 2. 2.Module address abnormal: Check whether the DIP switch settings are correct. 3. Contact technical support to determine the alarm cause.

Module	Alarm Name	Alarm Severity	Causes	Suggestion
Power Converter	Bypass Module Protected	Minor	Bypass module protection, input overvoltage/ undervoltage protection, abnormal input frequency, fast input power failure, or bypass overload occurs.	<ol style="list-style-type: none"> For input overvoltage/ undervoltage protection: Check whether the mains input experiences overvoltage or undervoltage using the mobile phone app, management system, or a multimeter. <ul style="list-style-type: none"> FusionSolar app (local commissioning): Home > Mains > Overview > AC Voltage Management system: Navigate to the device and choose Mains > Details > AC Voltage. For abnormal input frequency: Check whether the frequency settings on the mobile app meet the local requirements. <ul style="list-style-type: none"> FusionSolar app (local commissioning): Home > Mains > Overview > AC Frequency Management system: Navigate to the device and choose Mains > Details > AC Frequency. For fast input power failure: Check whether AC input is present on the mobile app. If not, supply the AC power and check whether the alarm is cleared. <ul style="list-style-type: none"> FusionSolar app (local commissioning): Home > Mains > Overview > Mains Status Management system: Navigate to the device and choose Mains > Details > Mains Status. For bypass overload: Check whether the maximum AC load power (for example, the transient power when the air conditioner is turned on) exceeds the threshold. Run the system within the

Module	Alarm Name	Alarm Severity	Causes	Suggestion
				<p>allowed load range for a period of time and check whether the alarm is cleared.</p> <p>5. Power off and then power on the system and check whether the alarm is cleared.</p> <p>6. Contact technical support.</p>
Power Converter	Address Conflict	Major	There are duplicate bypass module addresses.	Check whether there are duplicate bypass module addresses.

Module	Alarm Name	Alarm Severity	Causes	Suggestion
Power Converter	Inverter Module Fault	Major	Inverter module fault, overvoltage/ undervoltage fault, output short circuit lockout, lockout due to overload exceeding the time limit, output relay fault, INV self-check fault, internal overtemperature and lockout, output open circuit, inverter zero-crossing signal loss, RCD detection circuit fault, or RCD leakage current fault occurs.	<ol style="list-style-type: none"> 1. Check whether the system works in bypass mode and the load power is within the allowed range. If yes, check other troubleshooting suggestions. 2. For undervoltage: Check whether the PV input voltage is within the normal MPPT voltage range on the mobile app or management system. If not, adjust the input power. <ul style="list-style-type: none"> • FusionSolar app (local commissioning): Home > Sampling Equipment > Power Converter > PV Input Voltage(V) • Management system: Navigate to the device and choose Power Converter > Details > PV Input Voltage. 3. For output short-circuit lockout: Check whether the load or output cable is short-circuited. If yes, rectify the fault and clear the alarm on the mobile app. 4. For lockout due to overload exceeding the time limit: Check whether the AC output has been overloaded for an extended period of time. If yes, reduce the load power to the allowed range, let the system run for a period of time, and check whether the alarm is cleared. <ul style="list-style-type: none"> • FusionSolar app (local commissioning): Home > Digital Power > Device > AC Output Distribution > Active Power • Management system: Navigate to the device and choose AC Output Distribution > Details > Active Power. 5. For internal overtemperature: If the internal temperature exceeds the protection threshold, check

Module	Alarm Name	Alarm Severity	Causes	Suggestion
				<p>whether the ambient temperature is too high or whether the heat sink is blocked. Disconnect loads, let the system run for a period of time, and check whether the alarm is automatically cleared.</p> <p>6. For RCD detection circuit fault: Clear the alarm on the mobile app and check whether the alarm is generated again. If yes, power off and restart the system. Check whether the detection circuit can recover automatically after power-off. If the fault persists, contact technical support.</p> <p>7. For output relay fault: When the output relay is damaged, the power supply to the relay is abnormal, or the relay control signal is abnormal, power off and then power on the system, and check whether the alarm is cleared.</p> <p>8. For INV self-check fault: Power off and then power on the system and check whether the alarm is cleared.</p> <p>9. For RCD leakage current fault: Check whether any AC input and output cables (including cables to the loads) of the system have leakage current and whether the cables are deteriorated or damaged.</p> <p>10. Power off and then power on the system and check whether the alarm is cleared.</p> <p>11. Contact technical support.</p>

Module	Alarm Name	Alarm Severity	Causes	Suggestion
Power Converter	Inverter Module Protected	Minor	Inverter module protection, output short circuit, overload exceeding the time limit, output overvoltage/ undervoltage protection, parallel CAN communication failure, module current equalization failure, utility-frequency synchronization cable fault, carrier synchronization cable fault, phase-lock failure, or INV_BPS cable fault occurs.	<ol style="list-style-type: none"> 1. Check whether the system works in bypass mode and the load power is within the allowed range. If yes, check other troubleshooting suggestions. 2. For output overvoltage/ undervoltage protection: When there is no mains power, check whether the output voltage of the inversion unit is within the allowed range of the system using the mobile app, management system, or a multimeter. If not, power off and then power on the system, and check whether the alarm is cleared. <ul style="list-style-type: none"> • FusionSolar app (local commissioning): Home > Digital Power > Device > AC Output Distribution > AC Voltage • Management system: Navigate to the device and choose AC Output Distribution > Details > AC Voltage. 3. For output short circuit: Check whether any load or output cables are short-circuited. If yes, after the fault is rectified, the alarm is automatically cleared. 4. For overload exceeding the time limit: Check whether the AC output has been overloaded for an extended period of time. If yes, reduce the load power to the allowed range, let the system run for a period of time, and check whether the alarm is cleared. <ul style="list-style-type: none"> • FusionSolar app (local commissioning): Home > Digital Power > Device > AC Output Distribution > Active Power • Management system: Navigate to the device and

Module	Alarm Name	Alarm Severity	Causes	Suggestion
				<p>choose AC Output Distribution > Details > Active Power.</p> <ol style="list-style-type: none"> 5. For abnormal parallel CAN communication (an alarm is generated when the utility frequency synchronization cable, carrier synchronization cable, or INV_BPS cable is abnormal): Check whether the parallel CAN cable is securely and correctly connected and whether build-out resistors are connected. 6. For abnormal module current equalization: Check whether the output power of each power module is the same on the mobile app (Check whether a parallel CAN communication abnormal alarm, utility frequency synchronization cable abnormal alarm, or carrier synchronization cable abnormal alarm is generated). 7. Power off and then power on the system and check whether the alarm is cleared. 8. Contact technical support.
Power Converter	Overtemperature	Major	The temperature in the module is too high.	<ol style="list-style-type: none"> 1. If the internal temperature of the power module exceeds the protection threshold, check whether the ambient temperature is too high or whether the heat sink is blocked. Disconnect loads, let the system run for a period of time, and check whether the alarm is automatically cleared. 2. Power off and then power on the system and check whether the alarm is cleared. 3. Contact technical support.

Module	Alarm Name	Alarm Severity	Causes	Suggestion
Power Converter	Hardware Fault	Major	The EEPROM in the power module is faulty, DSP2 redundancy protection is triggered, or the PFC function is faulty.	<ol style="list-style-type: none"> 1. Power off and then power on the system and check whether the alarm is cleared. 2. Contact technical support to determine the alarm cause.
Lithium Battery Cluster	All Li Batt Communication Failure	Major	<ol style="list-style-type: none"> 1. The communication between the lithium batteries and the monitoring module is abnormal. 2. All lithium batteries are disconnected. 	<ol style="list-style-type: none"> 1. Lithium battery replacement is involved: This alarm is reported after all lithium batteries are removed. To clear the alarm, choose Home > Digital Power > Device > Lithium Battery Cluster > Control > Delete Communication Failed Lithium Battery. 2. Lithium battery replacement is not involved: <ul style="list-style-type: none"> • Check whether the communications cable is loose. • If the system cannot identify the connected lithium batteries, contact technical support.
Lithium Battery Cluster	BMU Missing	Major	The number of connected lithium batteries is different from the previously recorded number.	<ol style="list-style-type: none"> 1. Lithium battery replacement is involved: After lithium batteries are removed and the system is restarted, this alarm is generated. To clear the alarm, choose Home > Digital Power > Device > Lithium Battery Cluster > Control > Delete BMU Missing Alarm. 2. Lithium battery replacement is not involved: <ul style="list-style-type: none"> • Check whether the communications cable is loose. • If the system cannot identify the connected lithium batteries, contact technical support.

Module	Alarm Name	Alarm Severity	Causes	Suggestion
Lithium Battery Cluster	Low Battery Capacity	Warning	The battery capacity is lower than the capacity alarm threshold.	Check whether the mains or PV system can normally charge the battery.
Lithium Battery Cluster	Over Load Alarm	Critical	The system is overloaded.	Reduce the load, or contact the installer to expand the capacity based on the system networking .

12.4 Battery Storage and Charge

Battery Acceptance Inspection

A battery charge label must be put on the battery packing case to indicate the latest charge time.

Battery Storage Requirements

1. Place batteries according to the signs on the packing case during storage. Do not put batteries upside down or sidelong.
2. Stack battery packing cases in compliance with the stacking requirements on the outer package.
3. Handle batteries with caution to avoid damage.
4. The storage environment requirements are as follows:
 - Ambient temperature: -10°C to $+55^{\circ}\text{C}$; recommended storage temperature: 20°C – 30°C
 - Relative humidity: 5% to 80% RH
 - Dry, clean, and well-ventilated
 - Away from corrosive organic solvents and gases
 - Away from direct sunlight
 - At least 2 meters away from heat sources
5. Before storing batteries, disconnect them from external devices.
6. AC mains input voltage at the charge position: single-phase power grid, 200/208/220/230/240 V AC
7. The warehouse keeper should collect battery storage information every month and periodically report the battery inventory information to the planning department. The batteries that have been stored for nearly 15 months (at -10°C to $+25^{\circ}\text{C}$), 9 months (at 25°C – 35°C), or 6 months (at 35°C – 55°C) should be charged in a timely manner.
8. Batteries should be delivered based on the "first in, first out" rule.
9. After the battery production test is complete and before the batteries are stored, the batteries must be charged to at least 50% of the SOC.

Conditions for Judging Overdue Storage

It is recommended that batteries not be stored for a long period. They should be used soon after being deployed onsite. The batteries should be stored according to the following requirements.

Table 12-3 Lithium battery charge interval

Required Storage Temperature	Actual Storage Temperature	Charge Interval	Remarks
-10°C < T ≤ +55°C	T ≤ -10°C	Not allowed	Not reaching the time for recharge: Use the batteries as soon as possible.
	-10°C < T ≤ +25°C	15 months	
	25°C < T ≤ 35°C	9 months	
	35°C < T ≤ 55°C	6 months	Reaching the time for charge: Charge the batteries. The total storage duration should not exceed the warranty period.
	T > 55°C	Not allowed	

1. Dispose of deformed, damaged, or leaking batteries directly irrespective of how long they have been stored.
2. The storage duration starts from the latest charge time labeled on the battery package. If a battery is qualified after being charged, update the latest charge time on the label (Next charge time = Latest charge time + Charge interval).
3. The maximum storage period is three years, during which batteries can be charged for a maximum of three times. For example, a battery can be charged every 8 months for three times or every 12 months for three times. Dispose of batteries if the maximum storage period or charge times are exceeded.
4. If a lithium battery is stored for a long time, capacity loss may occur. After a lithium battery is stored for 12 months at the recommended storage temperature, the irreversible capacity loss rate is 3%–10%. Batteries may fail the discharge acceptance tests when their capacity after storage is less than 100% of the rated capacity.

Inspection Before Charge

1. Before charging a battery, you need to check its appearance. Charge the qualified battery or dispose of the unqualified one.
2. The appearance is qualified if it is free from the following symptoms:
 - Deformation
 - Shell damage

- Leakage

Installing Modules and Cables for Battery Charge

WARNING

Use standard cables provided by Huawei to connect power modules and battery modules. Do not use non-standard cables (such as extension cables and interconnection cables). If BAT+ and BAT- cables are reversely connected, the device will be damaged.

Step 1 Install a power module and battery module by referring to [7.3 Installing Modules](#).

Step 2 Install battery charge cables by referring to [10 Electrical Connections](#).

Step 3 Verify the installation by referring to [10.10 Installation Verification](#).

----End

Battery Power-On and Commissioning

NOTICE

- Ensure that the charge process is supervised to prevent any abnormality.
 - If a battery experiences an abnormality such as bulging or smoking, stop charging immediately and dispose of it.
 - Ensure that only trained professionals perform charge operations.
 - When the lithium battery SOC is less than or equal to the value of **End-of-Discharge SOC for Lithium Batteries(%)**, the product cannot be activated by holding down the manual ON/OFF switch. It can be started only after the PV power and AC power are connected.
 - It is recommended that a battery be charged to 50% SOC during charge. Long-term storage will cause capacity loss. After lithium batteries are stored at the recommended storage temperature for 12 months, the irreversible capacity loss is 3% to 10%.
-

Prerequisites

Power cables and signal cables are connected correctly.

Procedure

Step 1 Turn on the corresponding switches based on the scenario.

- If there is PV input, hold down the manual ON/OFF switch for 5s, and turn on the DC SWITCH.
- If there is no PV input, hold down the manual ON/OFF switch for 5s.

- Step 2** Set the AC input switch to ON.
- Step 3** Observe the annular strip light. If all green lights are steady on, battery charging is complete.
- Step 4** After the charging is complete, turn off the AC input circuit breaker of the iSitePower-M and then the DC SWITCH. Hold down the manual ON/OFF switch for 5s to shut down the battery module. If other batteries need to be charged, repeat the preceding steps.
- End

12.5 Storage with Low SOC

After the product is powered off, static power consumption and self-discharge loss may occur in internal modules. Therefore, charge batteries in a timely manner and do not store the product in low SOC. Otherwise, the product may be damaged due to overdischarge, and battery modules need to be replaced.

Storage in low SOC may occur in the following scenarios:

- The DC SWITCH on the power control module is OFF.
- The power cables or signal cables are not connected.
- The batteries cannot be charged due to a system fault after discharge.
- The batteries cannot be charged due to incorrect configurations in the system.
- The batteries cannot be charged due to no PV input and long-term mains failure.

Regardless of scenarios, the batteries must be charged within the longest interval corresponding to the SOC when the batteries are powered off. If the batteries are not charged within the specified interval, they may be damaged due to overdischarge.

Power-Off SOC Before Storage	Maximum Charge Interval
SOC > 5%	30 days
0% ≤ SOC < 5%	7 days

NOTE

When the battery SOC decreases to 0%, charge the batteries within seven days. Permanent battery faults caused by delayed charge due to customer reasons are beyond the warranty scope.

12.6 Battery SOH Check

- To ensure safe and reliable operation, the system checks and calibrates the state of health (SOH) of batteries. If the SOH is low, safety risks may exist. In this case, the ESS stops working and generates an alarm. During battery operation, if the SOH calculation conditions are met, the SOH is calibrated

naturally. If the SOH calculation conditions are not met, the SOH value may be inaccurate. In this case, force SOH calibration is required to accurately calculate the SOH value.

- Natural SOH calibration: When batteries are fully charged during normal operation and discharge to about 5% to 10% SOC and the batteries are not charged during the discharge, the SOH value is calculated during this process, which is equivalent to a natural calibration.
- Force SOH calibration: In normal operation, force SOH calibration is performed one year after the last SOH calibration (natural or force calibration). It is also performed one month after the last SOH calibration (natural or force calibration) near the end of the battery service life.

Impact of SOH Calibration

- Natural SOH calibration: Natural calibration occurs when batteries are running properly and does not affect the operating status of the ESS.
- Force SOH calibration: During force SOH calibration, the batteries are charged to 100% SOC, and then immediately discharge until the SOC reaches 0%. Charging is not allowed during discharging. To ensure accurate calculation, the discharging process needs to be completed within 24 hours. In this case, you can increase the load power to shorten the calibration time. If the discharge time limit is exceeded, the calibration will fail. After the failure, the calibration will be started again 48 hours later. Force SOH calibration is performed on a single battery pack. Only one battery pack can be calibrated at a time in single-system scenarios. Multiple battery packs can be calibrated at the same time in parallel-system scenarios. During force SOH calibration, the working mode of the ESS will be changed.

NOTE

In the PV+ESS scenario, the ESS may stop working after the lithium battery calibration is complete. The PV system charges the ESS until the value of **Available SOC for Lithium Batteries(%)** is reached, and then the ESS works again.

13 FAQs

13.1 How Do I Upgrade the Device Software Version?

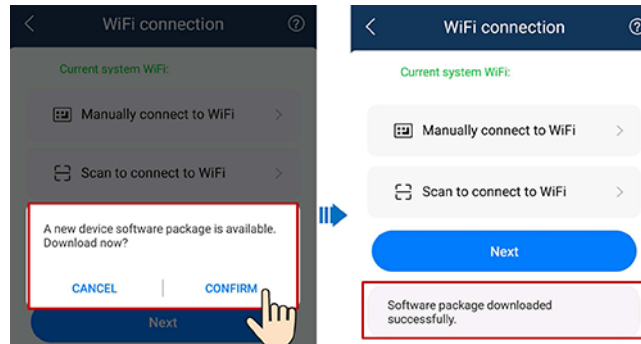
NOTICE

- Before upgrading the ESS, check load cable connections to ensure that there is no short circuit. Load short circuits may damage the system.
- Before the upgrade in a parallel system, check whether an iSitePower-M communication failure or lithium battery communication failure alarm is generated. If yes, clear the alarm according to the alarm handling suggestions and then perform the upgrade.
- If the app is closed during the upgrade, the upgrade task will be interrupted.
- After the upgrade is complete, the device automatically restarts, which may cause a power failure to loads.
- In the scenario with one power module and one battery module, connect the iSitePower-M to the grid before upgrade. Otherwise, the upgrade will fail. If the upgrade fails, connect to the grid and perform the upgrade again.

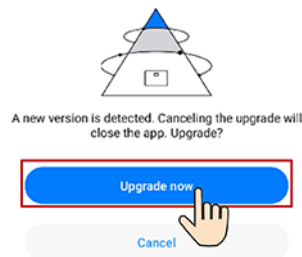
Scenario 1: Automatic Upgrade

1. Download software packages.

After a user opens the app, if the system detects that a new software version is available, a dialog box is displayed, prompting the user to download the upgrade package. To download the upgrade package, connect your phone to the public WLAN or mobile network with Internet connection.

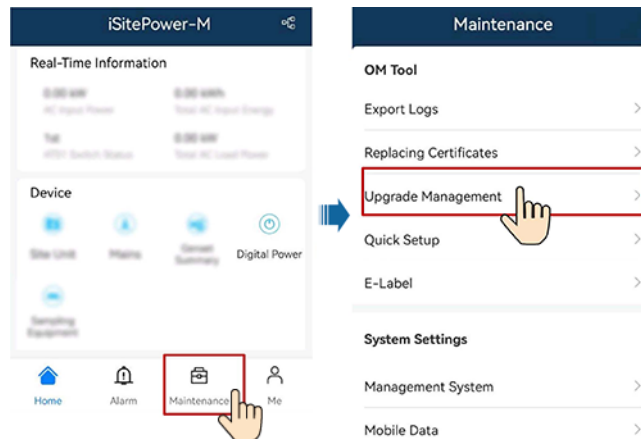


2. Log in to the local commissioning screen to perform the upgrade.



Scenario 2: Manual Upgrade

1. Log in to the app as the **admin** user and tap **Maintenance > Upgrade Management** to upgrade the device.



13.2 Tools for Preparing PV Cables

Use dedicated tools to prepare PV cables. Crimping tool model: PV-CZM-41100; open-end wrench model: PV-MS-HZ

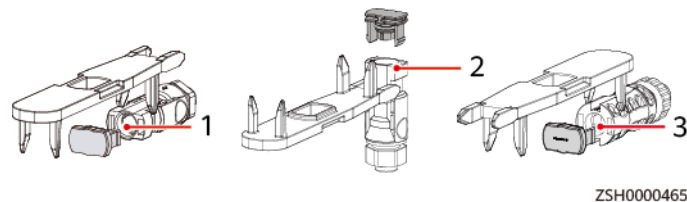
13.3 Special Cables

The power cables, power connectors, and communications cables are customized to be waterproof and moisture-proof. If they are lost or damaged, contact your installer for replacement. Do not purchase or replace them by yourself.

13.4 Removing Power Terminals

There are three methods of using the cable removal tool. Select a proper method based on the actual situation.

Figure 13-1 Usage of the removal tool



(1) Battery module input port (2) Battery cascading port (3) PV input port

13.5 Power-On

Do not touch the manual ON/OFF switch during the installation. Otherwise, electric shocks may occur.

13.6 SOC Changes

How does the charging mode changes when the SOC is turning from 99% to 100%?

When the SOC is greater than 99%, the battery switches to float charging mode and the charge current decreases gradually until the SOC reaches 100%.

13.7 Checking Cable Connections When the Product Fails to Be Upgraded

If the product fails to be upgraded, check the cable connections. Ensure that the cables are correctly connected and perform the upgrade again.

13.8 WiFi QR Code Scanning

Scan the QR code on the device to connect to the WiFi. If the connection fails, contact your installer.

13.9 Querying the Battery Capacity in Parallel-System Scenarios

Query the total system capacity on the app.

13.10 Problem Handling

If you have any questions, contact your vendor or Huawei technical support.

13.11 Resetting Passwords

- Enable/Disable WiFi: Hold down the WiFi switch for at least 10s to enable or disable WiFi. The WiFi function is disabled by default.
- Reset the WiFi password and user login password: Press the WiFi switch for three consecutive times within 10s. Wait for more than 1s each time and press the switch again to reset the WiFi password and user login password.
- Password reset will result in system restart, which may interrupt the power supply to loads. Therefore, you are advised not to reset the passwords when power is supplied to loads.

A Technical Specifications

A.1 ESS

Table A-1 Environmental specifications

Item	Specifications
Operating temperature	0–45°C (When the ambient temperature is low, the battery module charging must be derated. When the ambient temperature is 0°C to 5°C and 5°C to 10°C, battery modules can be charged at 0.05C and 0.1C, respectively.)
Transportation temperature	–40°C to +60°C
Storage temperature	–40°C to +60°C
Relative humidity	5%–95% RH
Altitude	0–4000 m. (When the altitude ranges from 2000 m to 4000 m, high temperature derating applies and the operating temperature decreases by 1°C for each additional 200 m.)
Noise level	≤ 40 dBA at 1 m at 30°C ambient temperature
IP rating	IP66
Operating environment	Class C environment
Other requirements	<ul style="list-style-type: none">• There should be no conductive dust, corrosive gas, or explosion hazard.• Dust, corrosive substances, pests, molds, and other indicators should be controlled in accordance with Class 4.1 requirements in ETSI EN 300 019-1-4 (V2.2.1).

Table A-2 Electrical specifications

Item		Specifications
AC input	Input voltage	200/208/220/230/240 V AC
	Frequency	50/60 Hz
	Input current	Maximum current: 30 A
	Input capacity	6 kVA
PV input	Open-circuit voltage	85–435 V DC
	MPPT voltage	90–420 V DC
	Number of MPPT circuits	1
	MPPT capacity	5.5 kWp
	PV branch	2
	Maximum input current for one string	15 A
	Maximum short-circuit current for one string	18 A
AC output ^[1]	Output voltage	200/208/220/230/240 V AC, default value: 220 V AC
	Output frequency	50/60 Hz, default value: 50 Hz
	Output power	Maximum: 6 kVA/5 kW
	Output current	Maximum current: 30 A
	Power factor	0.8
Battery module capacity ^[2]		5 kWh/battery module. A maximum of six battery modules can be connected to a power module.
Bypass input frequency		6 kW
Overload capability		<ul style="list-style-type: none"> ● 102% ≤ Load ≤ 125%: 30s ● 125% < Load ≤ 150%: 10s ● > 150%: short circuit, 0.3s
Surge protection	AC input	Differential mode: 3 kA (8/20 μs), common mode: 5 kA (8/20 μs), criterion C
	PV input	Common mode: 10 kA, 8/20 μs, criterion C

Item		Specifications
		<p>Note [1]: The output voltage and frequency must be the same as those of the local power grid.</p> <p>Note [2]: Test conditions: 100% depth of discharge (DOD), 0.2C rate charge & discharge at 25°C, upon delivery</p>

Table A-3 EMC specifications

Item		Specifications
Electromagnetic interference (EMI)	Conducted emission (CE)	IEC 62920/CISPR 11/EN 62040-2 AC port: Class B; PV port: Class A; signal port: Class B; FE port: Class B
	Radiated emission (RE)	IEC 62920/CISPR 11/EN 62040-2 Class B
	Harmonic current	IEC 61000-3-12 AC power port: The current of each phase is greater than 16 A.
	Voltage fluctuation and flicker	IEC 61000-3-12 AC power port: $P_{st} \leq 1.0$, $P_{1t} \leq 0.65$, $dc \leq 3\%$, $d_{max} \leq 4\%$. The time when the value of $d(t)$ exceeds 3% is less than or equal to 200 ms.
Electromagnetic susceptibility (EMS)	Electrostatic discharge (ESD)	IEC 61000-4-2 Enclosure port: 6 kV (level B) contact discharge, 8 kV (level B) air discharge
	Electrical fast transient (EFT)	IEC 61000-4-4 AC power port: 2 kV, DC power port: 2 kV, signal port: 1 kV (criterion B)
	Radiated susceptibility (RS)	IEC 61000-4-3 Enclosure port: The test frequency range is 80 MHz to 6 GHz, 80% AM (1 kHz) modulation is used, and the test level is 10 V/m.
	Conducted susceptibility (CS)	IEC 61000-4-6 0.15–80 MHz: 10 V, 80% AM (1 kHz) modulation

Item	Specifications	
	Surge susceptibility	IEC 61000-4-5 <ul style="list-style-type: none"> ● AC power port: horizontal 6 kV (line to line), 1.2/50 μs, 2 ohms, criterion B; vertical 6 kV (two lines to ground), 1.2/50 μs, 2 ohms, criterion B ● Signal port (CAN, FE): differential mode: 1.5 kV (D.1), 10/700 μs, 15 ohms + 25 ohms, criterion B; common mode: 4 kV (C.3), 10/700 μs, 15 ohms + 25 ohms/line, criterion B; differential mode: 1 kV (D.1), 1.2/50 μs, 42 ohms, criterion B; common mode: 2 kV (C.3), 1.2/50 μs, 2 ohms + 40 ohms x n/line, criterion B ● DI&DO, RS485: differential mode: 4 kV (line to line), 10/700 μs, 15 ohms + 25 ohms/line, criterion B; common mode: 4 kV (two or multiple lines to ground), 10/700 μs, 15 ohms + 25 ohms/line, criterion B; differential mode: 1 kV (line to line), 1.2/50 μs, 2 ohms + 40 ohms, criterion B; common mode: 2 kV (two or multiple lines to ground), 1.2/50 μs, 2 ohms +40 ohms x n/line, criterion B ● PV port: differential mode: 2 kV (line to line), 1.2/50 μs, 2 ohms, criterion B; common mode: 4 kV (single line to ground), 1.2/50 μs, 12 ohms, criterion B
	Voltage dip	IEC 61000-4-11 <ul style="list-style-type: none"> ● Voltage interruption (> 95% decrease) for 10 ms: performance grade B ● Voltage interruption (> 95% decrease) for 20 ms: performance grade B ● Voltage dip (> 30% decrease) for 500 ms: performance grade C ● Voltage interruption (> 95% decrease) for 5000 ms: performance grade C

A.2 Power Module

Table A-4 System specifications

Item	Specifications
Dimensions (H x W x D)	246 mmx 700 mm x 152 mm

Item	Specifications
Weight	≈ 17 kg
Mounting mode	Ground-mounted and wall-mounted

A.3 Battery Module

Table A-5 System specifications

Item	Specifications
Dimensions (H x W x D)	390 mm x 700 mm x 158 mm
Weight	≈ 50 kg
Mounting mode	Ground-mounted and wall-mounted

A.4 AC Parallel Box

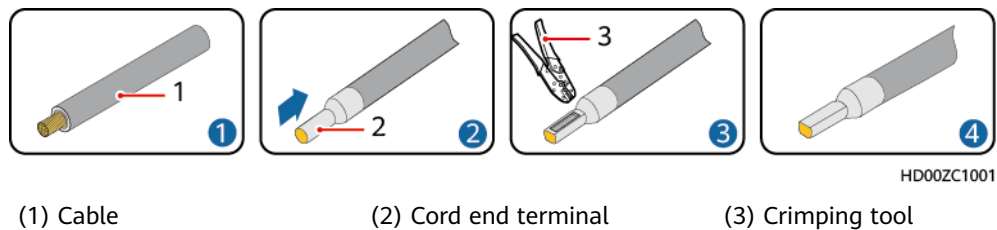
Table A-6 Specifications

Item	Specifications
Dimensions (H x W x D)	450 mm x 350 mm x 150 mm
Weight	12 kg
Input voltage	200/208/220/230/240 V AC, default value: 220 V AC
Input current	Maximum current: 90 A
Output voltage	200/208/220/230/240 V AC, default value: 220 V AC
Output current	Maximum current: 90 A
Cabling mode	Routed in and out from the bottom
Mounting mode	Mounted on a wall or pole (optional)
IP rating	IP55

B Preparing Cables and Terminals

B.1 Preparing a Cord End Terminal

Figure B-1 Preparing a cord end terminal

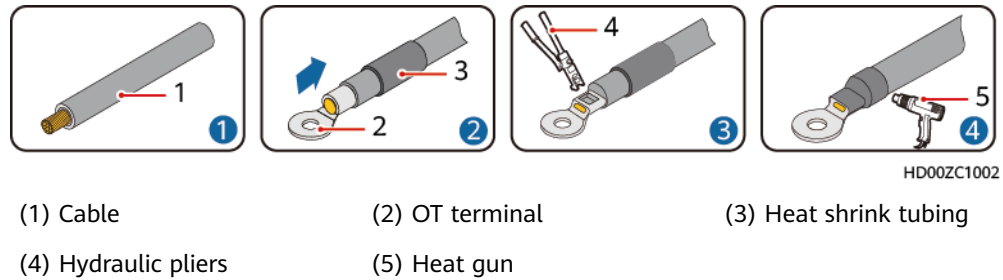


B.2 Preparing an OT Terminal

NOTICE

- Avoid scratching the core wire when stripping a cable.
- The cavity formed after the conductor crimp strip of the OT terminal is crimped must wrap the core wires completely. The core wires must contact the OT terminal closely.
- Wrap the wire crimping area with heat shrink tubing or insulation tape. The heat shrink tubing is used as an example.
- When using a heat gun, protect the equipment from being scorched.

Figure B-2 Preparing an OT terminal



B.3 Preparing a PV Input Power Cable

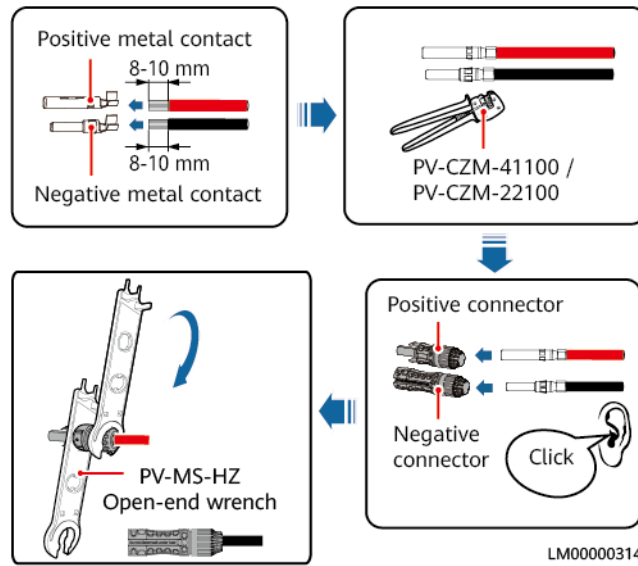
CAUTION

- Use the delivered Staubli MC4 EVO2 positive and negative metal terminals and connectors. Using incompatible positive and negative metal terminals and connectors may result in serious consequences. The caused device damage is not covered under any warranty or service agreement.
- Use professional tools to prepare cables.

NOTICE

- Cables with high rigidity, such as armored cables, are not recommended.
- Before assembling connectors, label the cable polarities correctly to ensure correct cable connections.
- A PV-CZM-41100 crimping tool is recommended.
- Use the wrench shown in the figure to tighten the locking nut. When the wrench slips during the tightening, it indicates that the locking nut has been tightened.
- After crimping the positive and negative metal terminals, pull the PV input power cables to ensure that they are connected securely.
- Insert the crimped metal terminals of the positive and negative power cables into the appropriate positive and negative connectors. Then pull the PV input power cables to ensure that they are connected securely.

Figure B-3 Preparing a PV input power cable



B.4 Stripping Length

Figure B-4 Stripping length

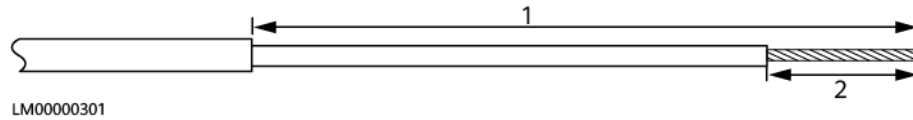


Table B-1 Definition of the cable stripping length (standard scenario)

No.	One End	Other End	1	2
1	PV input port	DC switch (customer side)	N/A	8-10 mm
2	AC input port	AC PDC (customer side)	100 mm	PE wire: 7 mm L/N wire: 17 mm
3	AC output port	PDB (customer side)	75 mm	PE wire: 7 mm L/N wire: 17 mm
4	Ground point	Site ground bar (customer side)	N/A	7 mm

Table B-2 Definition of the stripping length of cables for a parallel box (parallel system scenario)

No	One End	Other End	1	2
1	AC parallel box	AC PDC (customer side)	L wire: 120 mm N wire: 120 mm PE wire: 140 mm	L wire: 16 mm N wire: 14 mm PE wire: 14 mm
2	AC parallel box	AC input port	L wire: 410 mm N wire: 340 mm PE wire: 240 mm	L wire: 12 mm N wire: 7 mm PE wire: 7 mm
3	AC parallel box	AC output port	L wire: 115 mm N wire: 220 mm PE wire: 370 mm	L wire: 12 mm N wire: 7 mm PE wire: 7 mm
4	AC parallel box	PDB (customer side)	L wire: 300 mm N wire: 325 mm PE wire: 580 mm	L wire: 16 mm N wire: 14 mm PE wire: 14 mm
5	AC parallel box	Site ground bar (customer side)	N/A	14 mm

C Contact Information

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

Table C-1 Customer service contact information

Region	Country/Region	Email	Tel
Europe	France	eu_inverter_support@huawei.com	0080033888888
	Germany		
	Spain		
	Italy		
	United Kingdom		
	Netherlands		
	Others		
Asia Pacific	Australia	eu_inverter_support@huawei.com	1800046639
	Türkiye	eu_inverter_support@huawei.com	-
	Malaysia	apsupport@huawei.com	0080021686868/1800220036
	Thailand		(+66) 26542662 (charged at local call rates)
			1800290055 (free in Thailand)
	China	solarservice@huawei.com	400-822-9999
	Others	apsupport@huawei.com	0060-3-21686868

Region	Country/Region	Email	Tel
Japan	Japan	solarsupportjp@huawei.com	0120258367
India	India	indiaenterprise_TAC@huawei.com	1800 103 8009
South Korea	South Korea	koreainverter@huawei.com	-
North America	United States	eu_inverter_support@huawei.com	1-877-948-2934
	Canada	eu_inverter_support@huawei.com	1-855-482-9343
Latin America	Mexico	la_inverter_support@huawei.com	018007703456/0052-442-4288288
	Argentina		0-8009993456
	Brazil		0-8005953456
	Chile		800201866 (only available on fixed-line)
	Others		0052-442-4288288
Middle East and Africa	Egypt	eu_inverter_support@huawei.com	08002229000/0020235353900
	United Arab Emirates		08002229000
	South Africa		0800222900
	Saudi Arabia		8001161177
	Pakistan		0092512800019
	Morocco		0800009900
	Others		0020235353900