LUTERRA-S2-XL

User Manual

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Date	2026-08-15



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About This Document

Purpose

This document describes the product information, installation, and cable connections of the residential single-phase all-in-one system LUTERRA-S2-XL. It also provides frequently asked questions (FAQs) and troubleshooting methods. Read this document carefully before installing and operating the all-in-one system.

Intended Audience

This document is intended for:

- Technical support engineers
- Hardware installation engineers
- Commissioning engineers
- Maintenance engineers

Symbol Conventions

The symbols that may be found in this document 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.

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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

Issue	Date	Description
01	2026-08-15	This issue 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 shall 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:

- Equipment damage 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
- Operation beyond the conditions specified in this document

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- Installation or use in environments that do not comply with international, national, or regional standards
- Installation or use by unqualified personnel
- Failure to follow the operation instructions or safety precautions on the product or in this document
- Unauthorized modifications to the product or software code or removal of the product
- Damage caused during transportation by you or a third party authorized by you
- Storage conditions that do not meet the requirements specified in this document
- Failure to comply with local laws, regulations, or related standards due to the materials and tools prepared by you
- Damage caused by your or a third party's negligence, intentional breach, gross negligence, or improper operations or damage not caused by 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

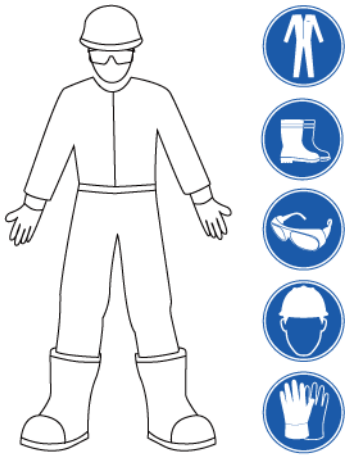
During operations, use dedicated insulated tools to prevent electric shocks or short circuits. The dielectric withstanding voltage level must comply with local laws, regulations, standards, and specifications.

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WARNING

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.
- Do not touch a running fan with your hands, components, screws, tools, or boards. Otherwise, personal injury or equipment damage may occur.
- 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 fully aware 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 fires 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, short circuits, 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.

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WARNING

During the installation of PV strings and the inverter, the positive or negative terminals of PV strings may be short-circuited to ground if the power cables are not properly installed or routed. In this case, an AC or DC short circuit may occur and damage the inverter. The resulting device damage is not covered under any warranty.

CAUTION

Do not route cables near the air intake or exhaust vents of the equipment.

CAUTION

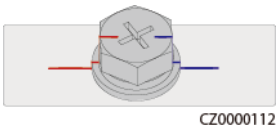
The components (such as power distribution boxes, circuit breakers, and cables) used for electrical connections shall comply with fire resistance and flame retardance standards (such as IEC 60670-1). The materials and structure shall meet fire safety requirements.

General Requirements

- Follow the procedures described in the document for installation, operation, and maintenance. Do not modify, retrofit, or alter the equipment without authorization (including, but not limited to, adding or removing components and cables), and do not change the installation sequence.
- 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.

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Quality inspection personnel confirm that the bolts are tightened and then mark them in red. (The marks must 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 and wait until the equipment is completely powered off before performing operations on 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 "No switching 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 operate 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.

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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 cables are protected from mechanical stress, overheating, and corrosion.
- Ensure that cables are not squeezed, torn, warped, or whitened.
- 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 below 0°C must be stored at room temperature for more than 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.

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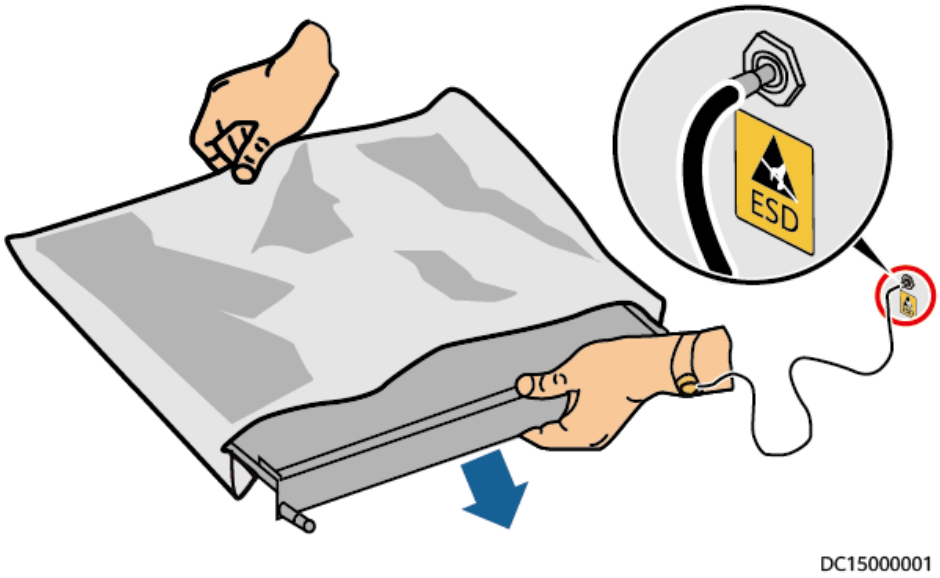
ESD

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



- 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.

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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. Overheating 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

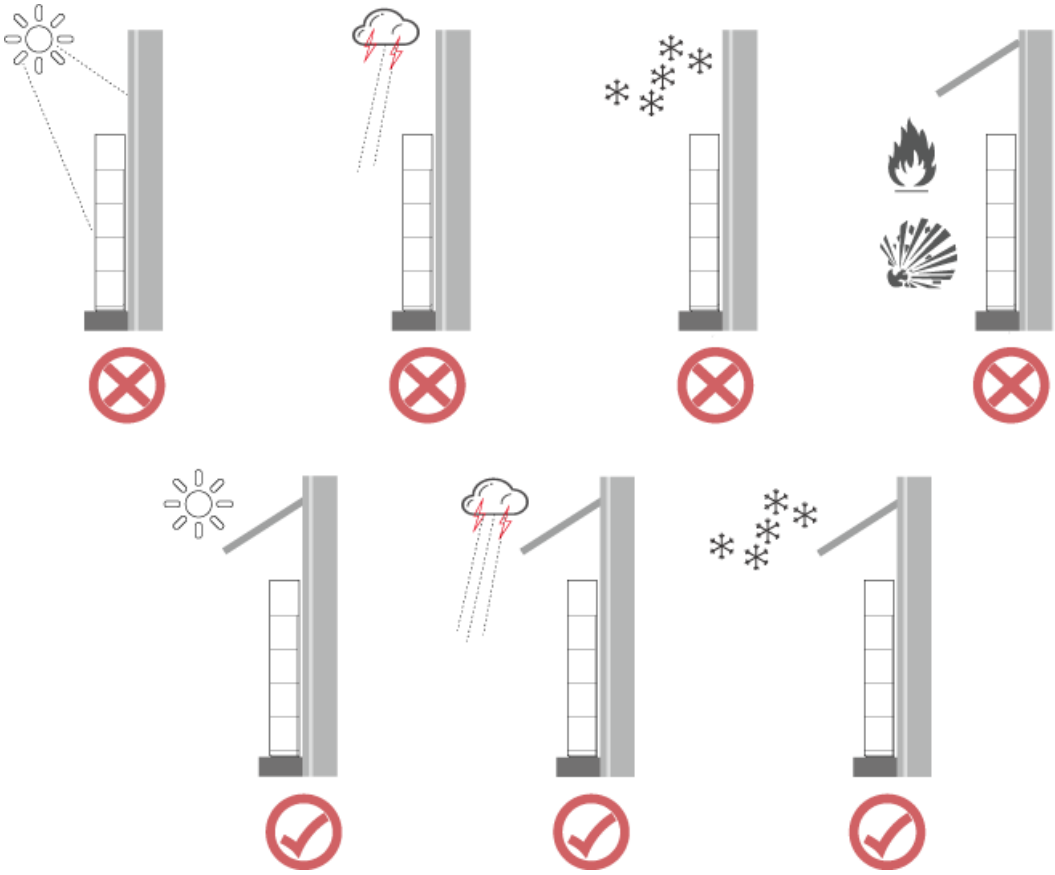
- Store the equipment according to the storage requirements. Equipment damage caused by unqualified storage conditions is not covered under the warranty.
- Keep the installation and operating environments of the equipment within the allowed ranges. Otherwise, its performance and safety will be compromised.
- The operating temperature range provided in the equipment's technical specifications refers to the ambient temperatures in equipment's installation environment.
- 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.

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- 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 (the area shall be greater than or equal to 3 m x 2.5 m).
- 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).
- Before installation, operation, and maintenance, clean up any water, ice, snow, or other foreign objects on the top of the equipment.
- 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.
- 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.
- Do not install the equipment in noise-sensitive areas.
- The structure where the equipment is installed must be fireproof.
- Do not install the equipment on flammable building materials.
- In residential areas, do not install the equipment on a drywall or walls made of similar materials that have a weak sound insulation performance because the equipment generates noise during operation.

Figure 1-3 Installation environment



NOTE

- The operation and service life of the ESS depend on the operating temperature. Install the ESS at a temperature equal to the ambient temperature or in a better environment.
- The operating temperature of the ESS ranges from –25°C to +60°C. If the ESS is installed in a cold environment, it will start the built-in thermal control system to heat the batteries for better performance. The heating process consumes chargeable power, which means that the system energy efficiency decreases temporarily.

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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 a 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

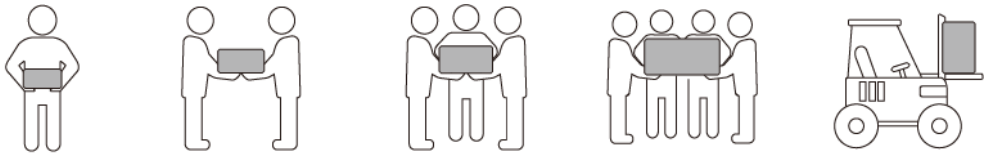
Do not drill holes into the equipment. Doing so may affect the sealing performance and electromagnetic containment of the equipment and damage components or cables inside. Metal shavings from drilling may short-circuit boards inside the equipment.

General Requirements

- Repaint any paint scratches caused during equipment transportation or installation in a timely manner. Equipment with scratches must not 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.



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- 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, roads in good conditions, or airplanes for inverter transportation. Do not transport the equipment by railway. Avoid tilt or jolt during transportation.
- Choose sea or roads in good conditions for energy storage module transportation. Do not transport the equipment by railway or air. Avoid tilt or jolt during transportation.

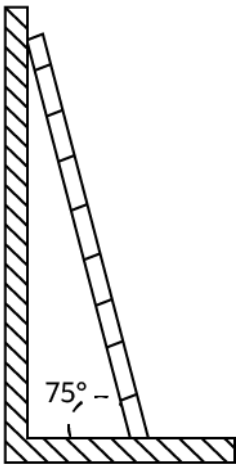
Using Ladders

- 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.



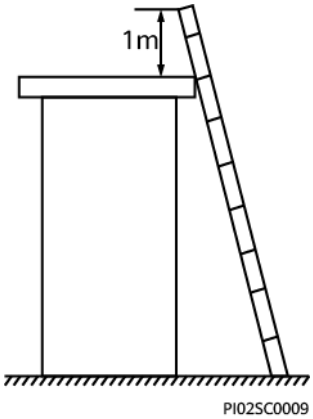
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- When climbing up the ladder, keep your body stable and your center of gravity between the side rails, and do not overreach to the sides.
- When a step ladder is used, ensure that the pull ropes are secured.
- If a single ladder is used, the recommended 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

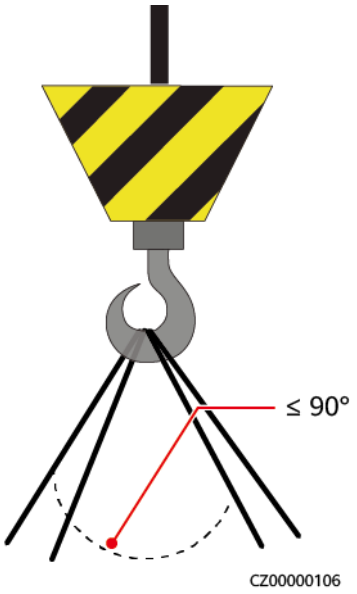
- If a single ladder is used, ensure that the wider end of the ladder is at the bottom, and take protective measures to prevent the ladder from sliding.
- If a single ladder is used, do not climb higher than the fourth rung of the ladder from the top.
- If you use a single ladder to climb up to a platform,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



PI02SC0009

Hoisting

- Only trained and qualified personnel are allowed to perform hoisting operations.
- Install temporary warning signs or fences to isolate the hoisting area.
- Ensure that the foundation where hoisting is performed meets the load-bearing requirements.
- Before hoisting objects, ensure that hoisting tools are firmly secured onto a fixed object or wall that meets the load-bearing requirements.
- During hoisting, do not stand or walk under the crane or the hoisted objects.
- Do not drag steel ropes and hoisting tools or bump the hoisted objects against hard objects during hoisting.
- Ensure that the angle between two hoisting ropes is no more than 90 degrees, as shown in the following figure.



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.

Working at Heights

- Any operations performed 2 m or higher above the ground must 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

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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, scaffold planks, 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 shall be transported by slings, hanging baskets, aerial work platforms, 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.

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 release a large amount of energy, which will 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.

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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 come into contact with leaked liquids or gases in the case of battery leakage or emission of abnormal odor. In such cases, stay away from the battery and contact professionals immediately. Professionals shall 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 H_2. To prevent fire or device corrosion, ensure that flammable gas is properly exhausted.

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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.

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Statement

The Company shall not be liable for any battery damage, personal injury, death, property loss, and/or other consequences caused by the following reasons:

- Force majeure such as earthquakes, floods, volcanic eruptions, debris flows, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, and other extreme weather conditions
- Actions that do not follow instructions in the user manual or direct advice from the Company, including but not limited to the following scenarios:
  - The onsite equipment storage and 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 dropped or incorrectly operated or connected.
  - Batteries are overdischarged due to delayed acceptance or power-on after battery installation.
  - Battery running parameters are incorrectly set.
  - Different types of batteries, for example, batteries of different brands or rated capacities, are used together without prior approval from the Company.
  - Batteries are frequently overdischarged due to improper battery maintenance.
  - Battery use scenarios are changed without prior approval from the Company.
  - Battery maintenance is not performed according to the instructions in the user manual, for example, failing to check battery terminals regularly.
  - Batteries are not transported, stored, or charged according to the instructions in the user manual.
  - Instructions from the Company are not followed during battery relocation or reinstallation.
- The battery warranty period has expired. You are advised not to 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.

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- 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 the batteries cannot be powered on in time, put them in the original packaging and 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 irritating or burning 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 a battery pack, check that its enclosure is not deformed or damaged.
- 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 Product Description

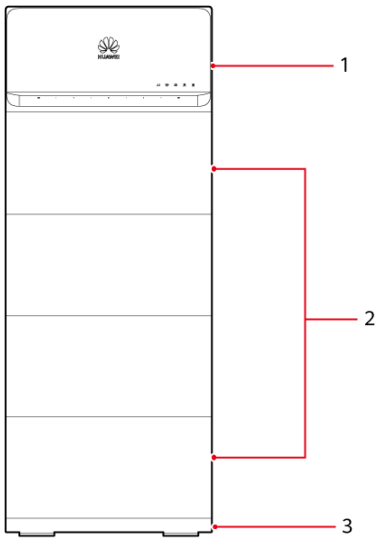
2.1 Overview

The residential single-phase all-in-one system LUTERRA-S2-XL ("all-in-one system" for short) adopts a modular design and consists of an inverter and energy storage modules (also called "batteries").

- Functions:
  - Inverter: single-phase grid-tied PV string inverter. It converts the DC power generated by PV strings into AC power and feeds the power into the power grid.
  - Energy storage module: stores and releases electric energy. It must be used with the inverter and cannot run independently. Each all-in-one system supports a maximum of four stacked energy storage modules.
- Features:
  - Supports module stacking and connection to simplify installation.
  - Supports capacity expansion on demand to flexibly meet different energy demands.

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Figure 2-1 Appearance of the all-in-one system (example: floor-mounted installation)



(1) Inverter	(2) Energy storage modules	(3) Base

Table 2-1 Model number description

Category	Model	Description
All-in-one system	LUTERRA-S2-XL	• LUTERRA: product series identifier. • S2: ESS series identifier. • XL: single-phase series identifier.
Inverter	LUTERRA-3K-6K-XL0	• LUTERRA: product series identifier. • 3K-6K: indicates the range of rated power supported by the product. Software-defined power is supported. The power can be defined as 3 kW, 3.68 kW, 4 kW, 4.6 kW, 5 kW, or 6 kW. • XL0: single-phase series identifier.
	LUTERRA-5K-XL0	• LUTERRA: product series identifier. • 5K: indicates the rated power supported by the product. Software-defined power is not supported. • XL0: single-phase series identifier.
Energy storage module	LUTERRA-5-E2	• LUTERRA: product series identifier. • 5: energy rating, corresponding to the rated energy of 4.9 kWh, respectively. • E2: energy storage module series identifier.

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Inverter

Figure 2-2 Inverter appearance

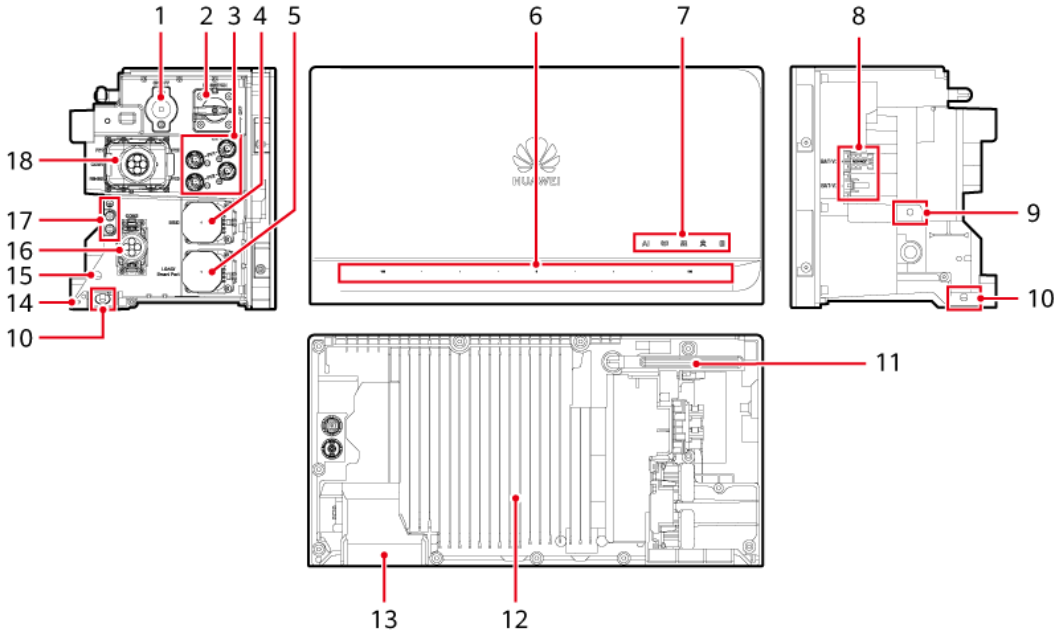


Table 2-2 Inverter appearance description

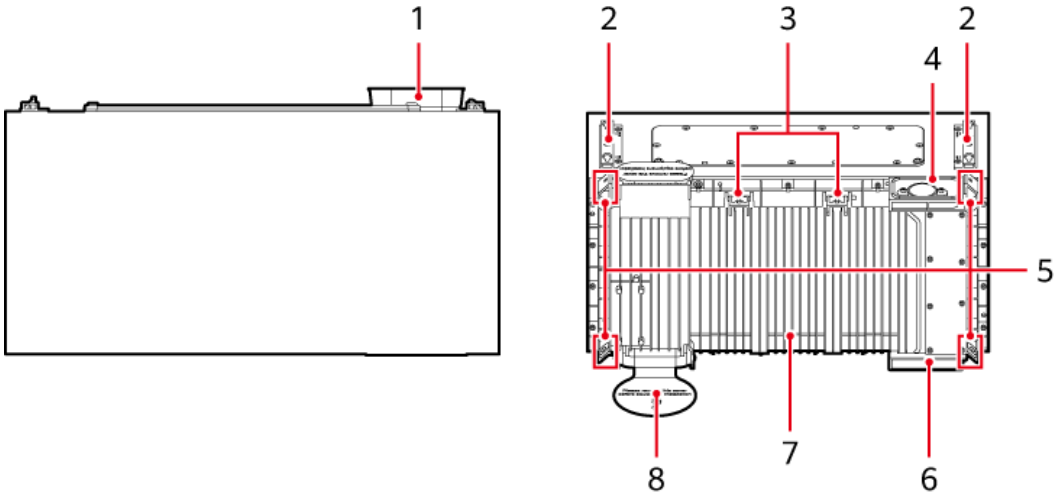
No.	Name	Description
1	ON/OFF button	You can operate the button to start or shut down the equipment or reset passwords. • Start: When there is no AC input or irradiance and batteries have power, press and hold the ON/OFF button for 5s to start the all-in-one system. • Shutdown: Press and hold the ON/OFF button for 5s to shut down the all-in-one system. The loads connected to the backup port of the all-in-one system are powered off. • Password reset: Press and hold the ON/OFF button for 1s for three consecutive times within 10s to reset the WiFi password and app login password.
2	DC switch	Controls the connection between the inverter and the DC input.
3	PV port	Connects the inverter to PV strings through DC input power cables so that DC power generated by the PV strings can be supplied to the inverter.
4	AC grid port	Connects to the power grid to implement on-grid power supply.
5	AC backup port	Connects to important home appliances. In the power grid fails, power is supplied to appliances connected to this port.
6	Battery indicator	Indicates the charge/discharge status and average SOC of the energy storage modules.

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No.	Name	Description
7	Indicator	Indicates the running status of the all-in-one system.
8	BAT/V2X	Reserved.
9, 15	BAT/V2X cable hole	Reserved.
10	Mounting holes for cascading	Holes for securing the inverter to an energy storage module.
11	Antenna	Receives and transmits WiFi signals to implement wireless communication between the equipment and the router.
12	Heat sink	Heat dissipation area of the inverter. Do not block or cover this area with other objects.
13	Port for stacking	Connects and communicates between modules.
14	Binding hole	Hole for binding cables.
16	COM2 port	It can be connected to the RS485 signal port of a power meter, or serve as the signal port for remote shutdown or system shutdown via DI.
17	Protective earthing (PE) point	Connects a PE cable.
18	COM1 port	FE communications port. It is used for cascading all-in-one systems or connecting to the SmartAssistant, Smart Guard, or home router.

Energy Storage Module

Figure 2-3 Energy storage module appearance



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Table 2-3 Energy storage module appearance description

No.	Component	Description
1, 8	Port for stacking (upper)	Connects and communicates between modules.
	Port for stacking (lower)	
2	Quick-connect handle ports	Positions for installing the lifting handles of the energy storage module.
3	Holes for wall mounting	Positions for securing the energy storage module to the wall.
4	Explosion-proof valve	Provides overpressure protection. If the internal pressure of the energy storage module increases due to a fault or abnormality, the explosion-proof valve automatically opens to release the pressure.
5	Mounting holes for cascading	Holes for securing the module.
6	Smoke exhaust duct	If thermal runaway occurs inside a battery due to short circuits, overcharge, high temperature, or mechanical damage, the generated hazardous gases will be quickly exhausted through the smoke exhaust duct. **CAUTION** Do not place the device directly on the floor. Place it on a paper pallet or any other protective pad, or place it on the floor together with the packaging cushioning material. Do not drag the device without bottom protection. Otherwise, large foreign objects may attach to the bottom of the device, compromising the directional smoke exhaust function of the duct.
7	Heat sink	Heat dissipation area of the energy storage module. Do not block or cover this area with other objects.

2.2 Label Description

The following label description is for reference only. The actual labels on the devices may vary.

Table 2-4 Inverter label description

Label	Symbol	Meaning
		Do not remove the DC input connector or AC output connector when the device is running.

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Label	Symbol	Meaning
		Do not touch the device, as the enclosure is hot when the device is running.
		High voltage exists after the device is powered on. Residual voltage still exists after the device is powered off. It takes 5 minutes for the device to discharge to a safe voltage.
		• High voltage may occur after the device is powered on. Only qualified and trained electrical technicians are allowed to install and operate the device. • After the device is powered on, there is a high touch current. Before powering on the device, ensure that the device is properly grounded.
		Before operating the device, carefully read the documentation delivered.
	-	• The device poses high-voltage hazards. • Keep the device away from heat and fire sources, and out of reach of children. • Store and charge batteries in strict accordance with the manual to prevent damage caused by storing the batteries in a low state-of-charge (SOC) for extended periods of time. • It is recommended that the device be installed outdoors under an awning. • When installing the device in a garage, keep it clear of the driving path. You are advised to install the device higher than the vehicle bumper.

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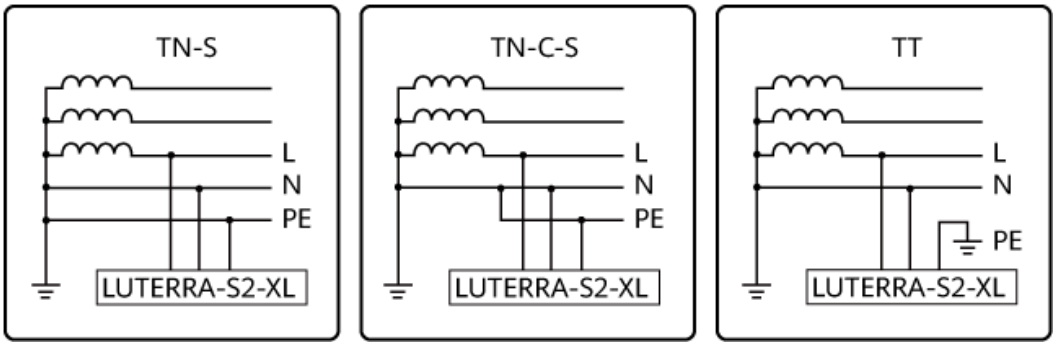
Table 2-5 Energy storage module label description

Label	Symbol	Meaning
		Reminds operators to refer to the documentation provided with the equipment. Losses caused by operations that do not comply with the requirements of site selection, storage, or installation specified in the user manual are not covered under the warranty.
		Note the device installation direction.
		Do not step on the device surface.
		Water spraying is prohibited.
		Open flame and smoking are prohibited.
		Keep the device away from static electricity.
		High voltage may occur after the device is powered on. Only qualified and trained electrical technicians are allowed to install and operate the device.
		Protect batteries from mechanical vibration, falling, collision, punctures, and strong impact. Otherwise, the batteries may be damaged or catch fire.
		Take care when handling corrosive substances.
		Do not touch the device, as the enclosure is hot when the device is running.
		Install the device in a sheltered place or install an awning over it to avoid direct sunlight or rain.

Label	Symbol	Meaning
		The base must be secured to the floor using bolts. Otherwise, the device may tip over, causing personal injury or device damage.
		Recycle batteries in accordance with local laws and regulations. Do not dispose of them at will.
	-	Ensure that multiple people work together to handle the device and be cautious to prevent injury because it is heavy.
	-	Do not use an energy storage module that is dropped or experiences strong impact. Otherwise, safety risks may occur, such as battery cell leakage and electric shock.
	-	For details, see "Inverter label description."

3 Earthing Systems

The LUTERRA-S2-XL supports TN-S, TN-C-S, and TT systems. In the TT power grid, the N-to-PE voltage must be less than 30 V.



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4 Transportation and Storage

4.1 Transportation Requirements

Inverter

For details about the transportation requirements for the inverter, see **1.4 Mechanical Safety**.

Energy Storage Module

- Be cautious to prevent injury when moving heavy objects.



- 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. Do not transport the equipment by railway or air. Avoid tilt or jolt during transportation.

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.

- According to the UN *Recommendations on the Transport of Dangerous Goods: Model Regulations* (also referred to as TDG or UN Orange Book), batteries belong to class 9 dangerous goods and shall pass the related tests required in Part III Subsection 38.3 of the UN *Recommendations on the Transport of Dangerous Goods: Manual of Tests and Criteria*.
- Comply with the latest international and national rules on the transportation and storage of dangerous goods, including but not limited to the *International Maritime Dangerous Goods Code* (IMDG Code), *Agreement*

concerning the International Carriage of Dangerous Goods by Road (ADR), and China's transportation industry standards (JT/T 617) *Regulations concerning road transportation of dangerous goods*, as well as the requirements of the transportation regulatory authorities in the countries of departure, route, and destination. Before transportation and storage, properly pack, label, and mark products according to the local laws, regulations, and standards, and complete related product and packaging tests.

- Transportation and storage service providers must have the qualifications for dangerous goods operations required by local laws, regulations, and standards. Rigid box trucks shall be used for transportation and pickup trucks are prohibited.
- Choose sea or roads in good conditions for transportation. Do not transport the equipment by railway or air. Avoid tilt or jolt during transportation.
- Before transportation, make a compliant and accurate declaration. Ensure that the battery packaging, labels, and markings are intact and there is no abnormal smell, leakage, smoke, or fire. Otherwise, the batteries must not be transported.
- The packing case must be solid and strong. Handle the packages with care and take moisture-proof measures during loading, transportation, and unloading. Do not place the packages on one side or upside down. Bind the packages securely to avoid displacement. Ensure that the dangerous goods labels are visible.
- Exercise caution when moving batteries to prevent bumping and ensure personal safety.
- Unless otherwise specified, dangerous goods must not be mixed with goods containing food, medicine, animal feed, or their additives in the same vehicle or container, and sharp objects are not allowed in the same vehicle or container.
- If the local laws, regulations, and standards allow the mixed transportation of specified different dangerous goods and that of dangerous goods and common goods, the dangerous goods shall be isolated according to the local laws, regulations, and standards. If there is no specific local requirement, refer to the following requirements for isolation when dangerous goods and common goods are in the same vehicle or container:
  - Use a spacer that is as high as the packages.
  - Keep a distance of at least 0.8 m around.
- Store batteries in a separate area away from heat sources. Protect batteries from moisture, water, and rain. Stack batteries according to the labels on the packing case. Do not stack batteries more than the allowed stacking layers. Do not place batteries on one side or upside down.
- 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.

4.2 Device Storage

Inverter

Ensure that the following requirements are met if inverters are not used immediately:

- Do not unpack inverters.
- Maintain a storage temperature between –40°C to +70°C, and humidity between 5%–95% RH.
- Store inverters in a clean and dry place and protect them from dust and moisture.
- You can stack inverters to a maximum of eight layers. To avoid personal injury or device damage, when you stack inverters, exercise caution to prevent them from falling over.
- Check inverters periodically (recommended: once every three months) during storage. In addition, replace the packing materials damaged by insects or rodents in a timely manner.
- If inverters have been stored for two years or longer, they must be checked and tested by professionals before being used.

Energy Storage Module

⚠ 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, it is recommended that the site be equipped with qualified fire fighting facilities, such as fire sand and fire extinguishers.

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CAUTION

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

- The storage environment must comply with local regulations and standards.
- Store the product in a dry, clean, and ventilated place and protect it from dust and moisture. 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°C to +55°C; recommended storage temperature: around 25°C
  - Relative humidity: 5%–95% RH
- If the storage period has expired, the product 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.

4.3 Battery Charge

Battery Acceptance Inspection

A battery charge label must be attached to the battery packing case. The latest charge time must be marked on the charge label.

Battery Charge Requirements

1. AC mains input voltage requirements on the charging facilities: single-phase voltage: 220 V/230 V/240 V, ±10%; three-phase voltage: 380 V/400 V, ±10%.
2. The warehouse keeper shall collect battery storage information every month and periodically report the battery inventory information to the planning department to ensure that batteries are charged in a timely manner.
3. After the battery production test is complete and before the batteries are stored, the batteries must be charged to at least 50% SOC.

Conditions for Determining Long-term Storage

Do not store batteries for extended periods of time. The deep discharge during storage may damage batteries. If you have to store batteries, observe the following storage requirements.

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Table 4-1 Lithium battery charge intervals

Required Storage Temperature	Actual Storage Temperature	Charge Interval	Remarks
–10°C < T ≤ +55°C	T ≤ –10°C	Charge not allowed	Not reaching the time for charge: Use the batteries as soon as possible. Reaching the time for charge: Charge the batteries.
	–10°C < T ≤ 30°C	15 months	
	30°C < T ≤ 40°C	9 months	
	40°C < T ≤ 55°C	6 months	
	T > 55°C	Charge 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 marked on the charge label attached to the battery packing case. If a battery is qualified after charging, update the latest charge time on the charge label.
3. Batteries can be charged for a maximum of three times during storage. Dispose of batteries if the maximum charge times are exceeded.
4. Long-term storage of lithium batteries will cause capacity loss. The longer the storage duration, the greater the capacity loss. Batteries may fail the discharge acceptance tests when their capacity after storage is less than 100% of the rated capacity.

Inspection Before Charge

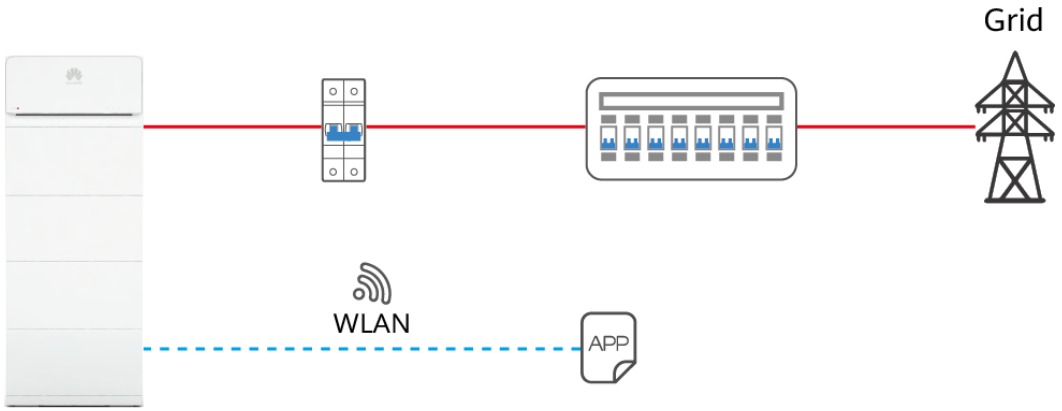
1. Before charging a battery, you need to check its appearance. Charge the qualified battery or dispose of the unqualified one.
2. If any of the following symptoms occurs, the battery is unqualified.
   - Deformation
   - Shell damage
   - Leakage

Battery Charging Cable Connection

Connect cables by referring to **7 Electrical Connections**.

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Figure 4-1 Cable connection diagram



Charge Procedure

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.
- If the battery SOC is 0%, the battery cannot be activated by holding down the ON/OFF button. The battery can be started only after both the DC and AC power supplies of the inverter are connected.
- It is recommended that a battery be charged to 50% SOC. If a lithium battery is stored for extended periods of 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%.

Step 1 Connect cables correctly. For details, see **7 Electrical Connections**.

Step 2 Turn on the AC switch between the all-in-one system and the power grid.

Step 3 Observe the running status indicator of the all-in-one system and check that the AC indicator is blinking white slowly.

Step 4 On the plant home screen of the all-in-one system, tap **Monitoring** and then tap the corresponding all-in-one system name to access the home screen of the single system.

Step 5 In **Maintenance**, choose **Battery maintenance** > **Forcible charge/discharge**, set **Working Mode** to **Maintenance charge**, and enable **Maintenance charge**. The battery starts charging and then stops charging when the target SOC is reached.

Step 6 Check that the battery indicator stops flowing or the status displayed on the app is **Charging completed**.

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Step 7 After the charging is complete, power off the system (for details, see **10.1 Powering Off the System**). If other batteries need to be charged, repeat the preceding steps.

----End

5 Installation Preparations

5.1 Unpacking and Checking

Step 1 Check the outer packaging of the device.

Before unpacking the device, check whether the outer packaging is damaged (such as holes and cracks) and check the device model. If the packaging is abnormal or the model is not what you ordered, do not unpack the device and contact your vendor as soon as possible.

Step 2 Unpack and check the device.

Check whether the device exterior is in good condition and free of collision marks or scratches. If any damage is found, contact your vendor immediately.

⚠ CAUTION

- Unpacking time: To prevent the device from being exposed to dust, moisture, or temperature differences, which may increase the risk of surface scratches or moisture damage, you are advised to unpack the device within 24 hours before installation.
- Unpacking: Place the device package with the front side facing upwards. Carefully remove the outer packaging. Keep the device stable during unpacking. Power on the device within 24 hours after unpacking. Otherwise, repack the device and place it in a dry indoor environment without corrosive gases.
- Safe placement: After unpacking, place the device on the original paper pallet or a dedicated protective pad. Do not place the device directly on the floor. If the device needs to be placed on the floor temporarily, use the original packaging cushioning material underneath for isolation.
- Device transportation: Do not drag the device without bottom protection.
- Energy storage module protection: For energy storage modules, ensure that the smoke exhaust duct at the bottom of the device is not blocked by foreign objects to prevent affecting the directional smoke exhaust function of the duct.

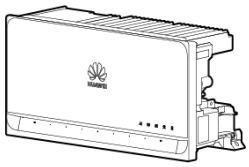
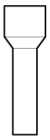
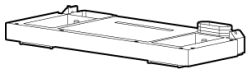
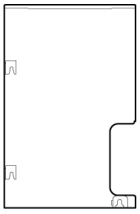
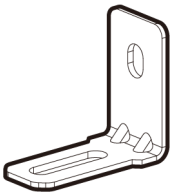
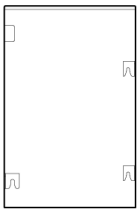
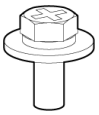
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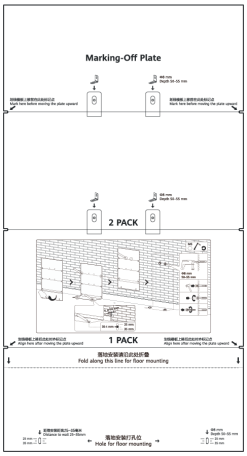
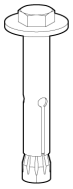
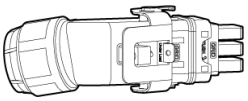
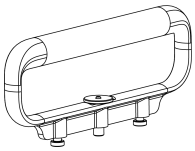
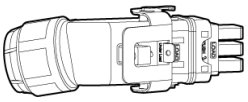
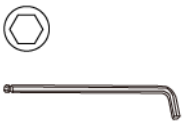
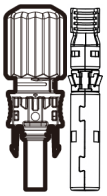
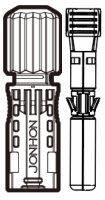
5.2 Checking the Inverter and Accessories

After unpacking, check that the items inside the packing case are intact, complete, and free from any obvious damage. If any item is missing or damaged, contact your vendor immediately. When checking the items inside the packing case, do not place them on a rough, uneven, or sharp surface to avoid damage that could affect subsequent installation.

Table 5-1 Inverter and accessories

No.	Component	Description	No.	Component	Description
1		Inverter: 1	10		Cord end terminals for AC power cables: 6
2		Base: 1	11		Cord end terminals for signal cables: 15
3		Left decorative cover: 1	12		Folded mounting brackets for the energy storage module: 2 (Used to secure the energy storage module to a wall.)
4		Right decorative cover: 1	13		M6x16 mm screws: 4

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No.	Component	Description	No.	Component	Description
5		Marking-off template: 1 (Used to mark hole positions.)	14		M6x50 mm expansion bolts: 4 **NOTE** The expansion bolts delivered with the product are mainly used for a solid brick-concrete wall. If you choose to install the inverter on another type of wall, ensure that the wall meets the load-bearing requirements of the inverter and select appropriate bolts.
6		Grid AC connector (GRID): 1	15		Lifting handles for the energy storage module: 2
7		Backup AC connector (LOAD): 1	16		Hex key: 1
8		Positive DC connectors: 3 Positive metal terminals: 3	17		Quick guide: 1 (three sheets) Compliance manual: 1 Delivery inspection report and packing list: 1 Product label: 1 Cable label: 1 CE-DOC label: 1
9		Negative DC connectors: 3 Negative metal terminals: 3	18		Cable ties: 2

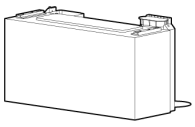
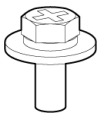
5.3 Checking the Energy Storage Module and Accessories

After unpacking, check that the items inside the packing case are intact, complete, and free from any obvious damage. If any item is missing or damaged, contact your vendor immediately. When checking the items inside the packing case, do not place them on a rough, uneven, or sharp surface to avoid damage that could affect subsequent installation.

⚠ CAUTION

- Take out the energy storage module from the packing case by holding its lifting handles. Comply with the requirements in **Moving Heavy Objects** when handling the module.
- Do not place the device directly on the floor. Place it on a paper pallet or any other protective item, or place it on the floor together with the packaging cushioning material. Do not drag the device without bottom protection. Otherwise, large foreign objects may attach to the bottom of the device, compromising the directional smoke exhaust function of the duct.

Table 5-2 Energy storage module and accessories

Component	Description
	Energy storage module: 1
	M6x16 mm screws: 2
	Delivery inspection report and packing list: 1 Compliance manual: 1

5.4 Checking the Mounting Rack and Accessories (Wall Mounting)

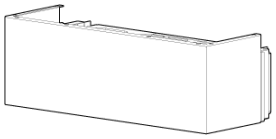
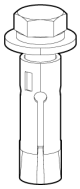
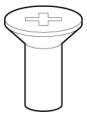
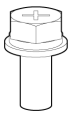
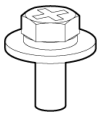
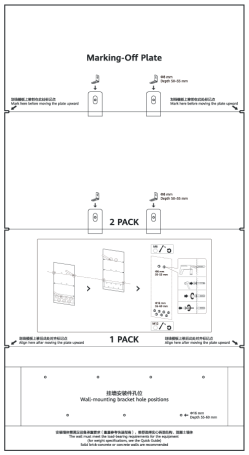
The mounting rack is used only for wall mounting. If you choose to install the device on a floor, skip this section.

After unpacking, check that the items inside the packing case are intact, complete, and free from any obvious damage. If any item is missing or damaged, contact

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your vendor immediately. When checking the items inside the packing case, do not place them on a rough, uneven, or sharp surface to avoid damage that could affect subsequent installation.

Table 5-3 Mounting rack and accessories (wall mounting)

Component	Description
	Mounting rack: 1
	M12x60 mm expansion bolts: 7
	M4x10 mm screws: 8
	M8x20 mm screws: 2
	M6x16 mm screws: 2
	Marking-off template: 1 (Used to mark hole positions.)

5.5 Preparing Tools

Before the installation, prepare the tools and instruments listed in the following table.

Table 5-4 Hardware installation tools

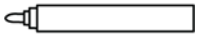
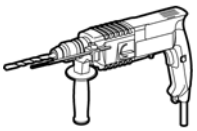
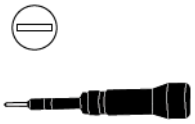
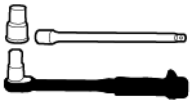
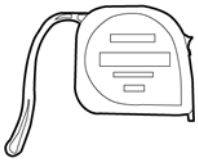
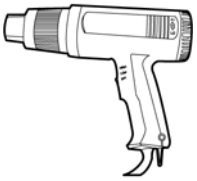
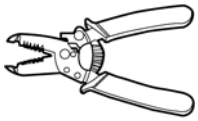
 Digital level or bubble level	 Marker	 Hammer drill	 Hammer drill bit
 Rubber mallet	 Adjustable wrench	 Flat-head insulated torque screwdriver (M10)	 Phillips insulated torque screwdriver (M3/M4/M6)
 Insulated torque socket wrench (including an extension rod) (M6/M8/M12)	-	-	-

Table 5-5 Cable preparation tools

 Steel measuring tape	 Heat-shrink tubing	 Heat gun	 Wire stripper

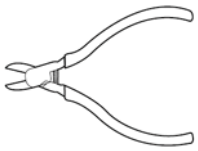
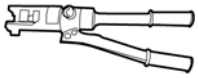
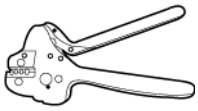
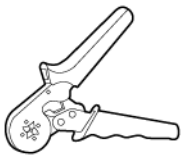
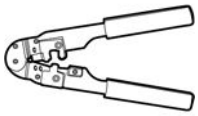
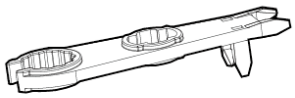
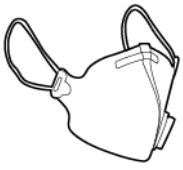
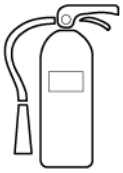
 Cable cutter	 Diagonal pliers	 Multimeter DC voltage measurement range ≥ 600 V DC	 Network cable tester
 Hydraulic pliers Used to crimp OT terminals when preparing PE cables.	 Crimping tool Model: H4TC0003 Used to crimp positive and negative metal terminals when preparing DC power cables.	 Cord end terminal crimping tool Used to crimp cord end terminals when preparing AC power cables and signal cables.	 RJ45 crimping tool Used to crimp RJ45 connectors when preparing network cables.
 Cable tie	 Spanner Model: H4TW0001	-	-

Table 5-6 Personal protective equipment (PPE)

 Safety helmet	 Goggles	 Dust mask	 Insulated shoes

 Insulated gloves	 Protective gloves	 Reflective vest	 Fire extinguisher

5.6 Preparing Cables

The following figure shows an example of the cable types and specifications for a single all-in-one system in the on/off-grid scenario. Select cables based on the scenario and device configuration.

Figure 5-1 Wiring diagram for the all-in-one system (for reference only)

1 x LUTERRA-S2-XL + Meter

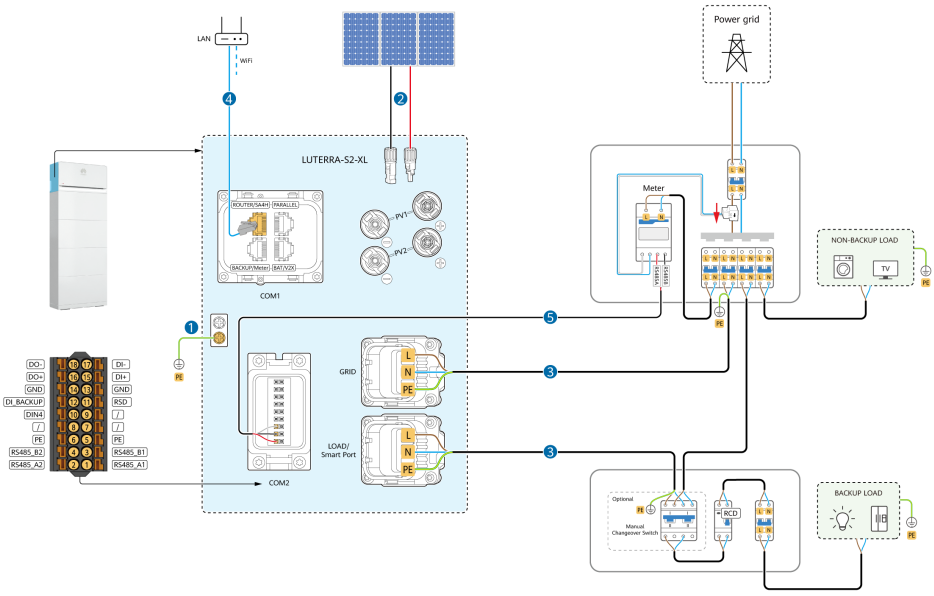


Table 5-7 Cable description

No.	Cable	Type	Recommended Specifications	How to Obtain
1	PE cable	Single-core outdoor copper cable with M6 OT terminals	Conductor cross-sectional area: • 3 kW/3.68 kW/4 kW: 6 mm² • 4.6 kW/5 kW/6 kW: 10 mm²	Prepared by the customer

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No.	Cable	Type	Recommended Specifications	How to Obtain
2	DC input power cable	Common outdoor PV cable in the industry	• Conductor cross-sectional area: 4–6 mm² • Cable outer diameter: 5.5–9 mm	Prepared by the customer
3	AC output power cable [a]	Three-core outdoor copper cable (L, N, and PE)	Conductor cross-sectional area: • Grid: – 3 kW/3.68 kW/4 kW: 6 mm² – 4.6 kW/5 kW/6 kW: 10 mm² • Backup: – 3 kW/3.68 kW/4 kW: 4 mm² – 4.6 kW/5 kW/6 kW: 6 mm² Cable outer diameter: 10–21 mm	Prepared by the customer
4	COM1 signal cable	CAT 5E or higher shielded network cable with RJ45 connectors	Cable outer diameter: 4–8 mm If a connector with an extended boot are used, the distance from the top of the connector to the end of the boot shall be less than or equal to 70 mm.	Prepared by the customer

No.	Cable	Type	Recommended Specifications	How to Obtain
5	COM2 signal cable	Multi-core outdoor shielded twisted pair cable	• Conductor cross-sectional area: 0.2–1 mm^2 • Cable outer diameter: 4–8 mm • Recommended cable length: The cable length is related to the baud rate. A higher baud rate indicates a shorter stable communication distance and a shorter cable length required. To ensure communication stability, you are advised to select the cable length based on the following criteria: – If the baud rate is 9600 bit/s, the recommended cable length is less than or equal to 500 m. – If the baud rate is 115200 bit/s, the recommended cable length is less than or equal to 50 m. If the baud rate is unknown, you are advised to prepare cables that are 50 m or shorter to ensure compatibility with different baud rates and prevent communication exceptions.	Prepared by the customer

Note [a]: The minimum cross-sectional area of the cable shall be selected based on the rated value of the AC fuse.

Select AC output power cables based on the scenario:

- On-grid scenario: Configure only the AC output power cable for the grid port.
- On/off-grid scenario (all-in-one system backup): Configure AC output power cables for both the grid port and backup port.
- On/off-grid scenario (Smart Guard backup): Configure only the AC output power cable for the grid port. For details about the cable specifications, see **Port Connection Restrictions of the Smart Guard**.

NOTE

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

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5.7 Preparing Switches

The following figure shows an example of the types and specifications of switches to be prepared for a single all-in-one system in the on/off-grid scenario. Select switches based on the scenario and device configuration.

Figure 5-2 Electrical diagram (example)

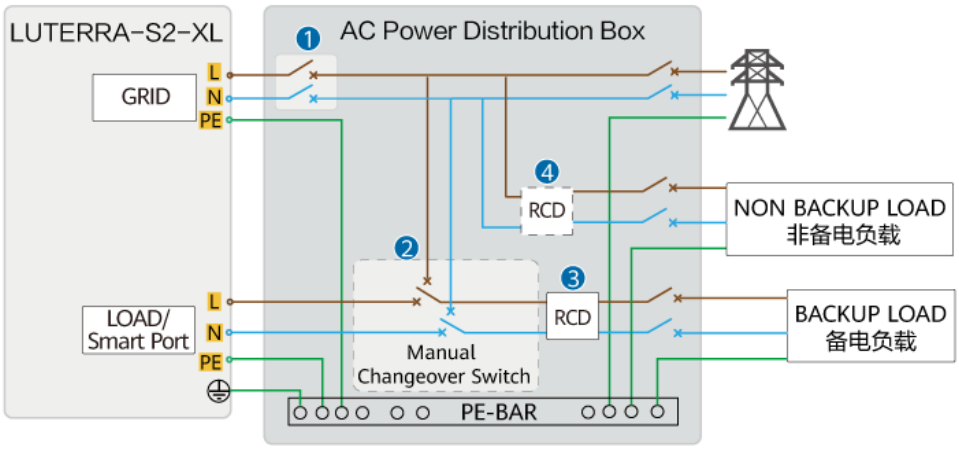


Table 5-8 Switch description

No.	Switch Type	Function	Recommended Specifications		How to Obtain
			3 kW/3.68 kW/4 kW	4.6 kW/5 kW/6 kW	
❶	AC switch	To ensure that the inverter can be safely disconnected from the power grid when an exception occurs, connect an AC switch to the AC grid port of the inverter.	40 A	50 A	Prepared by the customer
❷	(Optional) Manual changeover switch	If a manual dual source changeover switch is installed for the backup port, the switch must have the mechanical interlock function. During normal operation, the backup loads are powered by the all-in-one system. If an exception occurs, you can manually operate the switch to switch the backup loads to the power grid.	25 A	40 A	Prepared by the customer

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No.	Switch Type	Function	Recommended Specifications		How to Obtain
			3 kW/3.68 kW/4 kW	4.6 kW/5 kW/6 kW	
③④	Residual current device (RCD)	An RCD must be installed for backup loads. During off-grid operation, the main circuit breaker does not provide protection. Electric leakage on the loads may result in electric shocks.	Rated residual operating current: 100 mA		Prepared by the customer

NOTE

Select switches based on the scenario:

- On/off-grid scenario (all-in-one system backup): The grid port must be connected to the AC switch, and the backup port must be connected to the manual changeover switch.
- On/off-grid scenario (Smart Guard backup): For details about the switch specifications, see **Port Connection Restrictions of the Smart Guard**.
- On-grid scenario: Only the grid port needs to be connected to the AC switch. It is recommended that the specifications of the AC switch be the same as those of the manual changeover switch.

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6 Installation

6.1 Installation Requirements

Installation Position Requirements

- Install the ESS 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.
- For wall-mounted installation, in addition to the preceding requirements, the wall must be capable of bearing four times the weight of the equipment and the tightening torque of expansion bolts must reach 45 N·m.

Installation Clearance Requirements

- During installation, ensure that there is no other equipment (except related Huawei equipment and awnings) or flammable or explosive materials around the all-in-one system. Reserve sufficient space for heat dissipation and safety isolation. If the installation clearance is insufficient, power derating may occur.
- 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.
- Do not place any objects under the all-in-one system if it is wall-mounted.

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Figure 6-1 Installation clearance (floor-mounted installation)

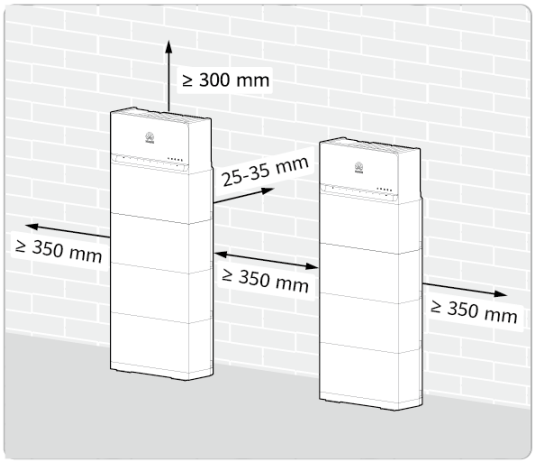
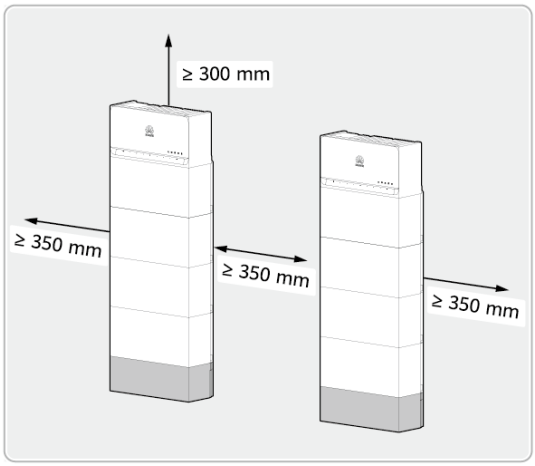


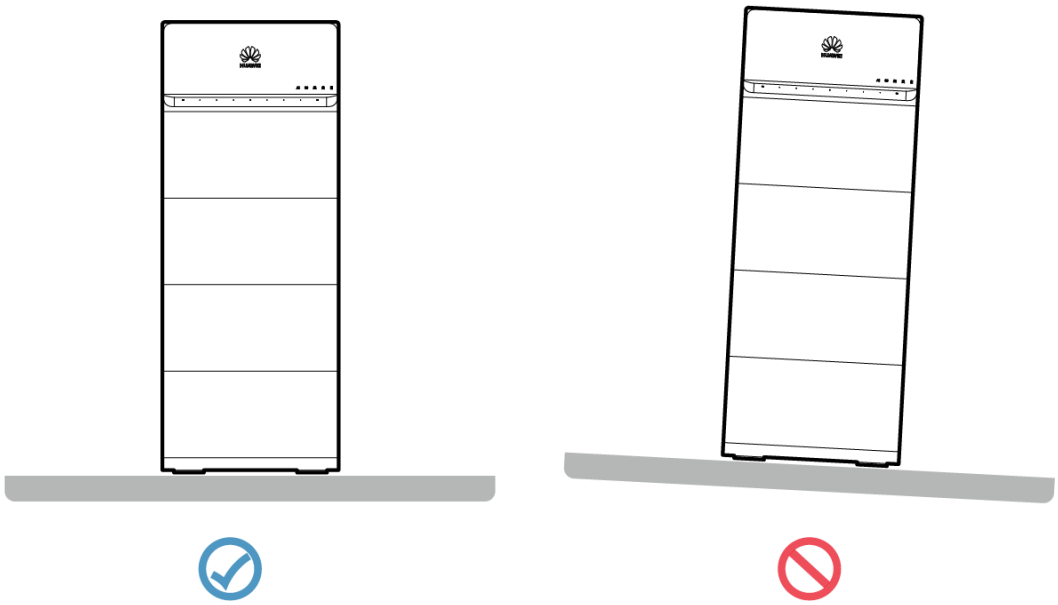
Figure 6-2 Installation clearance (wall-mounted installation)



Installation Angle Requirements

Do not install the all-in-one system at forward tilted, back tilted, side tilted, horizontal, or upside down positions.

Figure 6-3 Installation angle



6.2 Floor-Mounted Installation

This section describes how to install the equipment on the floor. Strictly follow the procedure to ensure secure installation and personal safety.

Procedure

DANGER

Avoid drilling holes into any water pipes or power cables buried in the wall or under the floor.

CAUTION

When installing the equipment, ensure that the installation surface is flat and solid enough and meets the load-bearing requirements of the equipment. Do not overadjust a leveling nut for the floor-mount base. Ensure that the slotted head of the leveling nut is not lower than the threaded hole. If the screw-in depth is insufficient, the screw threads may be damaged due to overstress as the energy storage module is heavy.

NOTICE

- To avoid inhaling dust and to prevent dust from falling into your eyes, wear safety goggles and a dust mask when drilling holes.
- Clean up dust in and around the holes, and measure the spacing. If the holes are inaccurately positioned, drill the holes again in correct positions.

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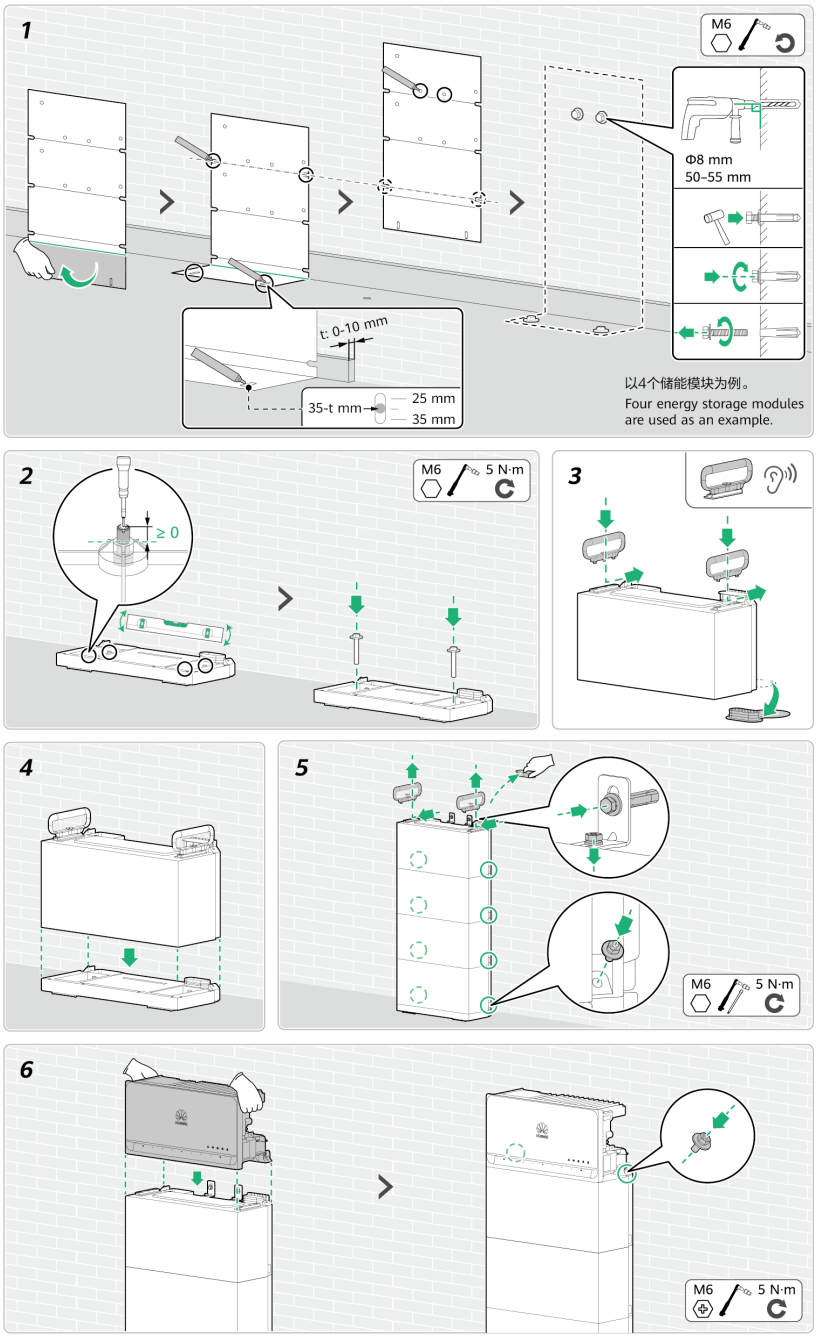
NOTE

Expansion bolts are delivered with the product. If the length or number of the bolts do not meet installation requirements, prepare stainless steel expansion bolts by yourself. The expansion bolts delivered with the product are used for solid brick-concrete walls and concrete floors. If other types of walls and floors are used, ensure that the load-bearing requirements are met and appropriate bolts are selected.

NOTICE

- Before installing an energy storage module, clean the ports on the base. Ensure that the ports are dry and free from dust and foreign objects. Otherwise, the equipment may be damaged.
- Before tightening the screws on both sides of devices on each layer, ensure that the front panels of the modules are aligned with each other. You are advised to use a ruler to align the surfaces of the modules. If the modules are not aligned with each other, the aesthetics or combination may be affected.

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Step 1 Mark hole positions and drill holes.

1. Place the marking-off template on the flat floor, flush against the wall or baseboard.
2. Fold the marking-off template as instructed and mark the mounting hole positions for the base on the floor. (The distance between the base and the wall must be 25–35 mm.)
   a. If there is no baseboard, place the marking-off template against the wall, and mark the mounting hole positions for the base at a distance of 25–35 mm.

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b. If the thickness (t) of the baseboard is 0–10 mm, place the marking-off template against the baseboard, and mark the mounting hole positions for the base at a distance of (35 – t) mm from the baseboard.

3. Mark the mounting hole positions for the energy storage modules on the wall in sequence.

   If more than two energy storage modules need to be installed, mark the alignment points, move the marking-off template upwards to align it with the marked alignment points, and then mark the mounting hole positions for the energy storage module on the top layer.

4. Use a hammer drill to drill holes vertically at the marked positions. The hole diameter is 8 mm.
5. Clean up dust inside and around the holes to ensure that the expansion bolts can be securely fastened.
6. Insert M6x50 mm expansion bolts into the holes, and use a rubber mallet to hammer the expansion bolts until the washers are in close contact with the floor.
7. Rotate the threaded rods of the expansion bolts clockwise to secure the bolts.
8. Remove the threaded rods counterclockwise, remove the washers, and place them aside.

Step 2 Install the base.

1. Place the base and align the mounting holes on the base with the expansion bolts.
2. Check whether the base is level using a level. If necessary, rotate the leveling nuts to adjust the levelness of the base.
3. Insert the washers and threaded rods into the expansion sleeves, and tighten the expansion bolts to secure the base.

Step 3 Install the lifting handles for an energy storage module and remove the lower dust cover from the energy storage module.

Step 4 Stack the energy storage module over the base.

Step 5 Install energy storage modules.

1. At the mounting holes for cascading, use M6x16 mm screws to secure the energy storage module to the base.
2. Remove the lifting handles from the energy storage module and remove the upper dust cover.
3. If multiple energy storage modules need to be cascaded, after installing one module, tighten the screws between the modules, and then install the next module.

⚠ CAUTION

Energy storage modules are heavy. For personal safety, if more than three energy storage modules need to be installed, use a hoisting tool that meets safety requirements and ensure that the operations are performed by professionals.

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4. Secure the top energy storage module to the wall to enhance the stability of stacking and prevent the module from falling due to external forces or vibrations.
   a. Pre-secure the folded mounting brackets for the energy storage module to the wall using M6x50 mm expansion bolts, as described in **Step 1**.
   b. Pre-secure the other end of the folded mounting brackets to the energy storage module using M6x16 mm screws.
   c. Adjust the position of the energy storage module to ensure that the screws for module cascading and the folded mounting brackets secured to the wall are not under tension. Then tighten the expansion bolts and screws.

Step 6 Install the inverter.

Stack the inverter over the top energy storage module. Secure the inverter to the energy storage module using M6x16 mm screws.

----End

6.3 Wall-Mounted Installation

This section describes how to install the equipment on a wall. Strictly follow the procedure to ensure secure installation and personal safety.

Procedure

DANGER

Avoid drilling holes into any water pipes or power cables buried in the wall or under the floor.

NOTICE

- To avoid inhaling dust and to prevent dust from falling into your eyes, wear safety goggles and a dust mask when drilling holes.
- Clean up dust in and around the holes, and measure the spacing. If the holes are inaccurately positioned, drill the holes again in correct positions.

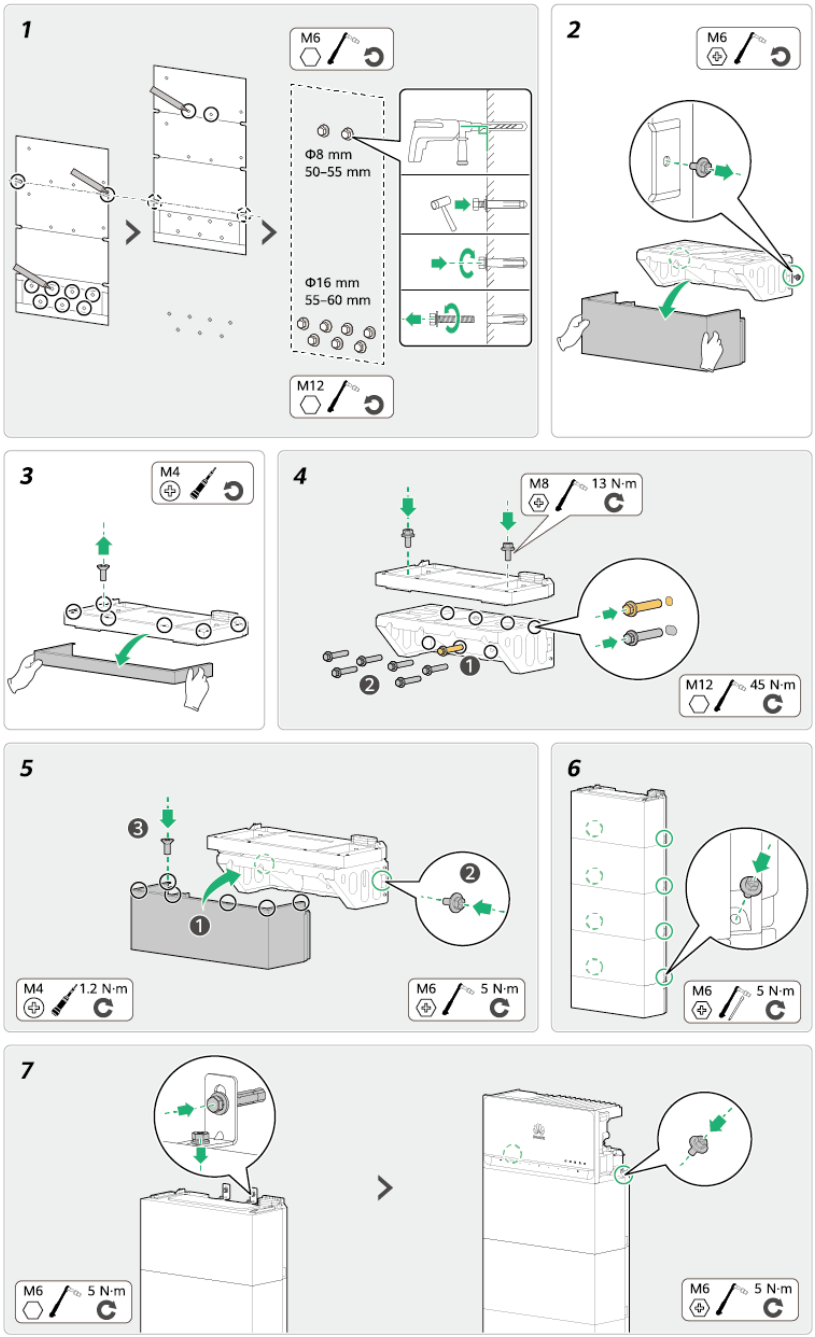
NOTE

Expansion bolts are delivered with the product. If the length or number of the bolts do not meet installation requirements, prepare stainless steel expansion bolts by yourself. The expansion bolts delivered with the product are used for solid brick-concrete walls and concrete floors. If other types of walls and floors are used, ensure that the load-bearing requirements are met and appropriate bolts are selected.

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NOTICE

- Before installing an energy storage module, clean the ports on the base. Ensure that the ports are dry and free from dust and foreign objects. Otherwise, the equipment may be damaged.
- Before tightening the screws on both sides of devices on each layer, ensure that the front panels of the modules are aligned with each other. You are advised to use a ruler to align the surfaces of the modules. If the modules are not aligned with each other, the aesthetics or combination may be affected.



Step 1 Mark hole positions and drill holes.

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1. Mark the mounting hole positions for the mounting rack and energy storage modules on the wall based on the marking-off template.

   If more than two energy storage modules need to be installed, mark the alignment points, move the marking-off template upwards to align it with the marked alignment points, and then mark the mounting hole positions for the energy storage module on the top layer.
2. Use a hammer drill to drill holes vertically at the marked positions.

   Mounting holes for the mounting rack: 16 mm diameter, 55–60 mm depth

   Other holes: 8 mm diameter, 50–55 mm depth
3. Clean up dust inside and around the holes to ensure that the expansion bolts can be securely fastened.
4. Place the M12x60 mm expansion bolts into the mounting holes on the mounting rack.
5. Rotate the threaded rods of the expansion bolts clockwise to secure the bolts.
6. Remove the threaded rods counterclockwise, remove the washers, and place them aside.

Step 2 Remove the decorative covers from the mounting rack.

Step 3 Remove the decorative covers from the base.

Step 4 Install the mounting rack.

1. Place the mounting rack and align the mounting holes on the mounting rack with the expansion bolts.
2. Insert the washers and threaded rods into the expansion sleeves, and use a torque wrench to tighten the expansion bolts to secure the mounting rack.
3. Place the base on the mounting rack, align the mounting holes, and secure the base to the mounting rack using M8x20 mm screws.

Step 5 Install the decorative covers for the mounting rack.

Reinstall the decorative covers for the mounting rack using eight M4x10 mm screws and two M6x16 mm screws (one on the left and one on the right).

Step 6 Install energy storage modules.

1. Install the lifting handles for an energy storage module.
2. Remove the lower dust cover from the energy storage module and stack it over the base.
3. At the mounting holes for cascading, use M6x16 mm screws to secure the energy storage module to the base.
4. Remove the lifting handles from the energy storage module and remove the upper dust cover.
5. If multiple energy storage modules need to be cascaded, after installing one module, tighten the screws between the modules, and then install the next module.

CAUTION

Energy storage modules are heavy. For personal safety, if more than three energy storage modules need to be installed, use a hoisting tool that meets safety requirements and ensure that the operations are performed by professionals.

Step 7 Install the inverter.

1. Secure the top energy storage module to the wall to enhance the stability of stacking and prevent the module from falling due to external forces or vibrations.
   a. Pre-secure the folded mounting brackets for the energy storage module to the wall using M6x50 mm expansion bolts, as described in **Step 1**.
   b. Pre-secure the other end of the folded mounting brackets to the energy storage module using M6x16 mm screws.
   c. Adjust the position of the energy storage module to ensure that the screws for module cascading and the folded mounting brackets secured to the wall are not under tension. Then tighten the expansion bolts and screws.
2. Stack the inverter over the top energy storage module. Secure the inverter to the energy storage module using M6x16 mm screws.

----End

7 Electrical Connections

7.1 Precautions

DANGER

When exposed to sunlight, the PV arrays supply DC voltage to the inverter. Before connecting cables, ensure that all **DC SWITCH** on the inverter are OFF. Otherwise, the high voltage of the inverter may result in electric shocks.

DANGER

- The site must be equipped with qualified fire fighting facilities, such as fire sand and carbon dioxide fire extinguishers.
- 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 beyond the warranty scope.
- Only certified electricians can perform electrical terminations.
- Operation personnel must wear PPE when connecting cables.
- Before connecting cables to ports, leave enough slack to reduce the tension on the cables and prevent poor cable connections.

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CAUTION

- 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 section are for reference only. Select cables in accordance with local cable specifications (green-and-yellow cables are only used for protective earthing).

7.2 Connecting a PE Cable

Connect a PE cable first when installing the equipment. The all-in-one system must be grounded through the PE point on the inverter.

WARNING

- Ensure that the PE cable is securely connected. Otherwise, electric shocks may occur.
- Do not connect the neutral wire to the enclosure as a PE cable. Otherwise, electric shocks may occur.

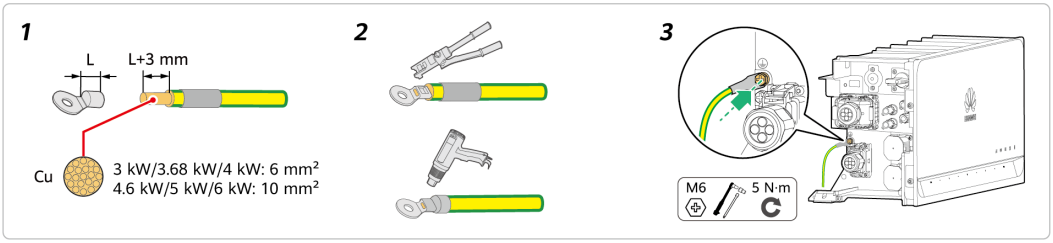
Procedure

NOTICE

- Avoid damaging the conductor when stripping the cable. Ensure that the core wire is intact.
- The cavity formed after the conductor crimp strip of the OT terminal is crimped must wrap the core wire completely. The core wire must make close contact with the OT terminal.
- Wrap the wire crimping area with heat shrink tubing or insulation tape. The heat shrink tubing is used as an example.
- To avoid burns or equipment damage, wear protective gloves and goggles when using a heat gun.
- It is recommended that silicone grease or paint be applied around the ground terminal after the PE cable is connected.

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Figure 7-1 Connecting a PE cable



7.3 Connecting DC Power Cables

DANGER

- Before connecting the DC input power cables, ensure that the DC voltage is within the safe range (lower than 60 V DC) and that the **DC SWITCH** on the inverter is **OFF**. Otherwise, the high voltage may result in electric shocks.
- When the all-in-one system is operating, do not perform maintenance or operations on the DC input power cables, such as connecting or disconnecting a PV string or a PV module in the PV string. Otherwise, electric shocks may occur.

WARNING

Ensure that the following conditions are met. Otherwise, the inverter may be damaged or even a fire may occur.

- The DC input voltage of the inverter must not exceed the maximum input voltage under any circumstance.
- The polarities of electrical connections must be correct on the DC input side. The positive and negative terminals of a PV string must be connected to corresponding positive and negative DC input terminals of the inverter.
- If a DC input power cable is connected in reverse polarity, do not immediately operate on the **DC SWITCH** or positive and negative connectors. Wait until the night when solar irradiance declines and the PV string current drops to below 0.01 A. Then set the **DC SWITCH** to **OFF**, remove the positive and negative connectors, and correct the polarities of the DC input power cable.
- During the installation of PV strings and the all-in-one system, the positive or negative terminals of PV strings may be short-circuited to the ground if the power cables are not properly installed or routed. In this case, an AC or DC short circuit may occur and damage the equipment. The resulting device damage is not covered by the product warranty.
- If no PV string connects to a DC input terminal, do not remove the waterproof cap from the DC input terminal. Otherwise, the IP rating of the inverter will decrease.

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NOTICE

- If the PV string is not configured with optimizers, use a multimeter to measure the DC voltage. The multimeter must have a DC voltage range of at least 600 V. If the voltage is a negative value, the DC input polarity is incorrect and needs correction. If the voltage is greater than 600 V, too many PV modules are configured to the same string. Remove some PV modules.
- If the PV string is configured with optimizers, check the cable polarity by referring to **SUN2000-600W-PA0 User Manual**.

Procedure

⚠ CAUTION

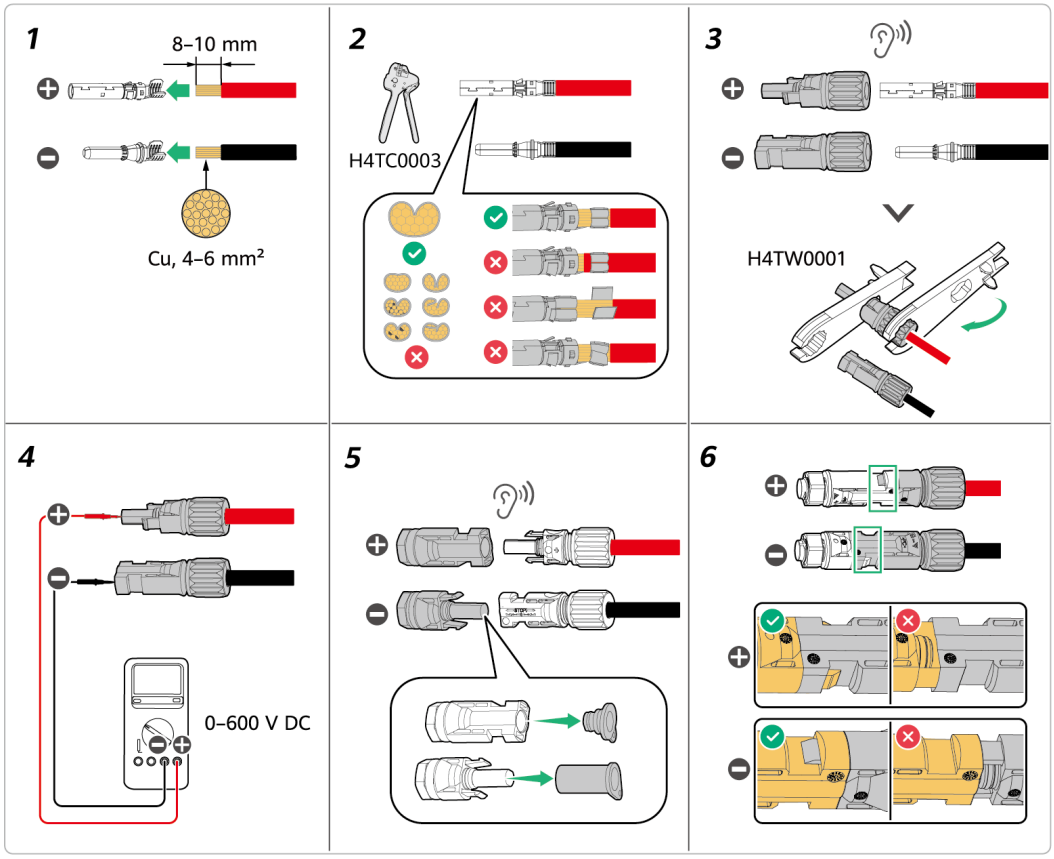
Use the positive and negative metal terminals and DC connectors delivered with the product. Using incompatible positive and negative metal terminals and DC connectors may result in serious consequences. The resulting device damage is not covered by the product warranty.

NOTICE

- The output of the PV string connected to the inverter cannot be grounded. Ensure that the PV module output is well insulated to ground.
- Keep the DC input PV+ cable and PV– cable close to each other.
- Cables with high rigidity, such as armored cables, are not recommended as DC input power cables, because poor contact may be caused by the bending of the cables.
- Before assembling DC connectors, label the cable polarities correctly to ensure correct cable connections.
- After crimping the positive and negative metal terminals, try to pull the DC input power cables back to check that they are securely connected.
- Insert the crimped metal terminals of the positive and negative power cables into the appropriate positive and negative connectors. Then pull the DC input power cables back to ensure that they are connected securely.
- After the positive and negative connectors snap into place, try to pull the DC input power cables back to check that they are connected securely.
- When installing DC input power cables, leave at least 50 mm of slack. The axial tension on PV connectors must not exceed 80 N. Radial stress or torque must not be generated on PV connectors.

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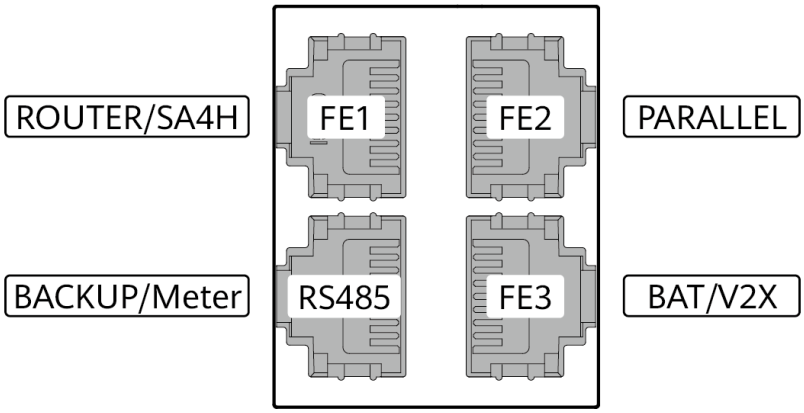
Figure 7-2 Connecting DC power cables



7.4 Connecting Signal Cables (COM1)

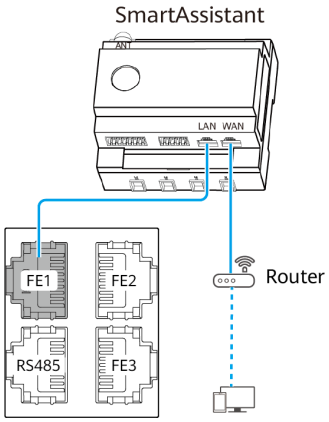
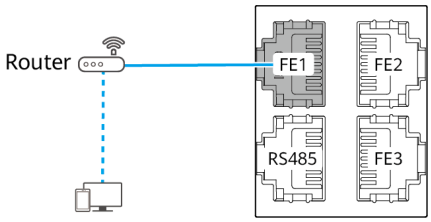
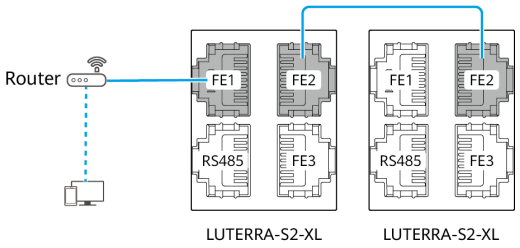
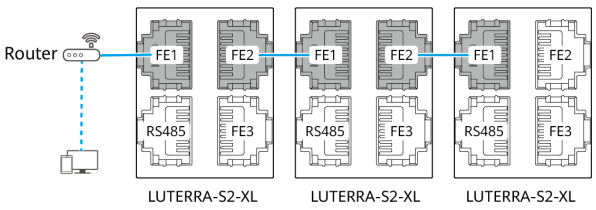
COM1 port description

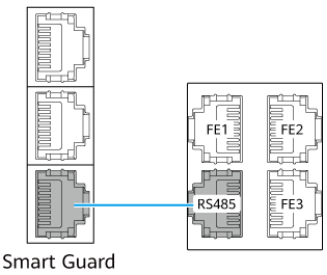
Figure 7-3 COM1 port



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Table 7-1 COM1 port description

Port (Silk Screen)	Function		Wiring
FE1	SA4H	Connects to the SmartAssistant.	Connect to the LAN port of the SmartAssistant. 
	ROUTER	Connects to the home router.	
	NOTE If multiple all-in-one systems need to operate in parallel, you can also use this port for parallel connection.		
FE2	PARALLEL	If multiple all-in-one systems need to operate in parallel, use this port for parallel connection.	Two parallel systems are used as an example:  Three parallel systems are used as an example: 

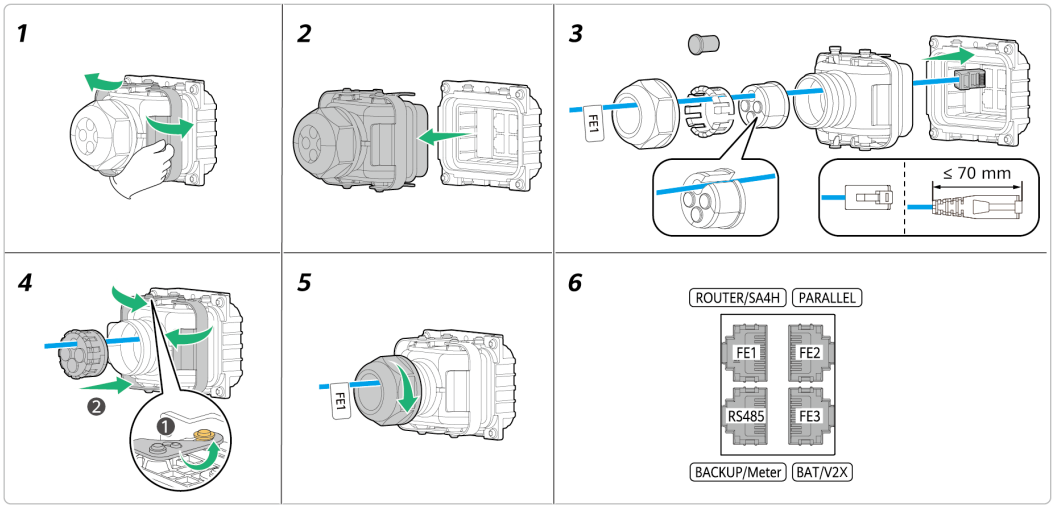
Port (Silk Screen)	Function		Wiring
RS485	BACKUP/ Meter	Backup feedback port.	It is recommended that this port be used for connecting to the SmartGuard-63A-S1. 
FE3	BAT/V2X	Reserved.	-

Procedure

CAUTION

- When laying out a signal cable, separate it from power cables and keep it away from strong interference sources to prevent communication interruption.
- Do not remove the rubber plugs from unused cable holes. If a rubber plug is removed, install a cable at the hole promptly to prevent the IP rating of the device from being affected.

Figure 7-4 Connecting signal cables (COM1)



7.5 Connecting Signal Cables (COM2)

COM2 port description

Figure 7-5 COM2 port

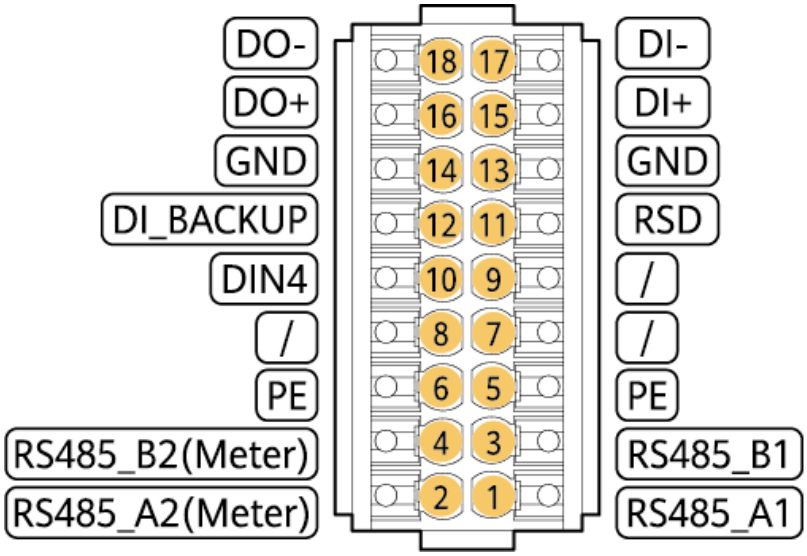


Table 7-2 COM2 port description

Pin	Definition	Function	Description	Pin	Definition	Function	Description
1	RS485_A1	RS485A, RS485 differential signal+	Used for connecting to the RS485 signal port of the SmartAssistant or Smart Guard. **NOTE** • It is recommended that the COM1 port be used for connecting to the SmartGuard-63A-S1 and SmartAssistant. • The SmartGuard-63A-S0 needs to be connected through this port.	2	RS485_A2 (Meter)	RS485A, RS485 differential signal+	Connecting to the RS485 signal port of a power meter
3	RS485_B1	RS485B, RS485 differential signal–		4	RS485_B2 (Meter)	RS485B, RS485 differential signal–	
5	PE	Shield layer grounding	-	6	PE	Shield layer grounding	-
7	/	Reserved	-	8	/	Reserved	-
9	/	Reserved	-	10	DIN4	Digital input signal 4+	Connecting to the dry contact for power grid scheduling

Pin	Definition	Function	Description	Pin	Definition	Function	Description
11	RSD	Rapid shutdown	Connects to the DI signal port for rapid shutdown.	12	DI_BACKUP	Digital input signal 6+	Used as the feedback signal port for the Smart Guard
13	GND	GND of RSD	-	14	GND	GND of DI_BACKUP	-
15	DI+	Reserved	-	16	DO+	Reserved	-
17	DI-	Reserved	-	18	DO-	Reserved	-

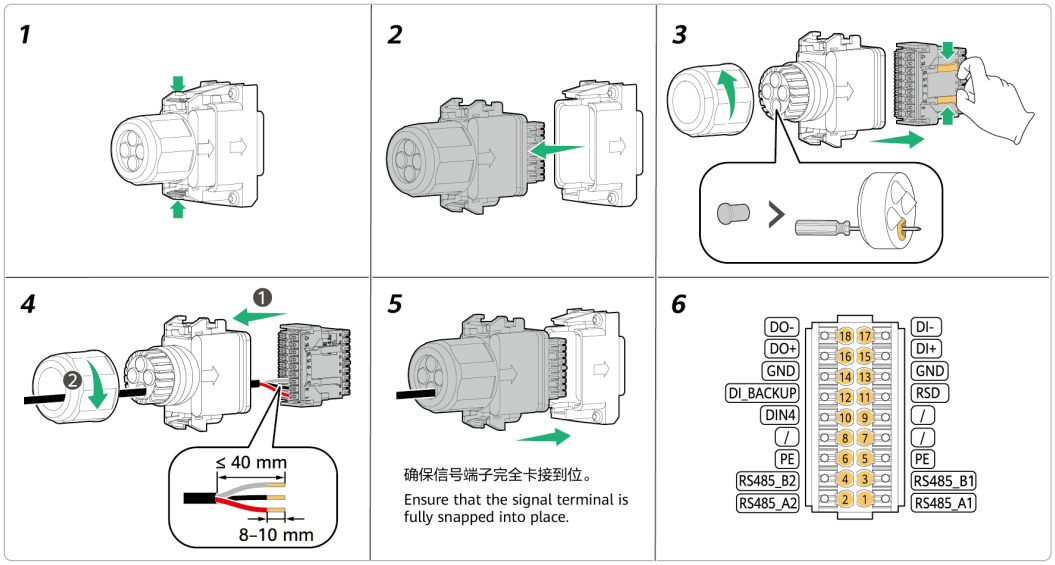
Procedure

⚠ CAUTION

- The signal cable must be a multi-core outdoor shielded twisted pair cable, and the shield layers at both ends of the cable must be properly grounded (you are advised to select the nearest ground point).
- When laying out a signal cable, separate it from power cables and keep it away from strong interference sources to prevent communication interruption.
- Ensure that the signal cable jacket is inside the connector and surplus core wires are cut off flush with the edge of the cable jacket. Insert the exposed core wires completely into the holes. Ensure that the cable is connected securely.
- Do not remove the rubber plugs from unused cable holes. If a rubber plug is removed, install a cable at the hole promptly to prevent the IP rating of the device from being affected.

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Figure 7-6 Connecting signal cables (COM2)



7.6 Connecting AC Power Cables

An AC switch shall be installed on the AC side of the all-in-one system. To ensure that the all-in-one system can be safely disconnected from the power grid when an exception occurs, select a proper overcurrent protection device in compliance with local power distribution regulations.

⚠ WARNING

- If no cable is connected to an AC input terminal, do not remove the waterproof cap from the terminal. Otherwise, the IP rating of the device will decrease.
- Do not connect loads between the all-in-one system and an AC switch that directly connects to the all-in-one system. Otherwise, the switch may trip by mistake.
- If an AC switch is used with specifications beyond local standards, regulations, or the Company's recommendations, the switch may fail to turn off in a timely manner in case of exceptions, causing serious faults.

⚠ CAUTION

Each all-in-one system shall be equipped with an AC output switch. Multiple all-in-one systems shall not connect to the same AC switch.

The inverter is installed with an integrated residual current monitoring unit. When the inverter detects that residual current exceeds the permitted value, it disconnects from the power grid quickly.

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NOTICE

- If the external AC switch provides the leakage protection function, the rated residual operating current must be 100 mA.
- If multiple all-in-one systems are connected to the master leakage protection device through their external AC switches, the rated residual operating current of the device must be greater than or equal to the number of all-in-one systems x 100 mA.
- The AC switch cannot be a knife switch.
- The PE point at the AC output port is used only as a PE equipotential bonding point, and cannot substitute for the PE point on the enclosure.
- Keep the AC output power cable and the PE cable close to each other.

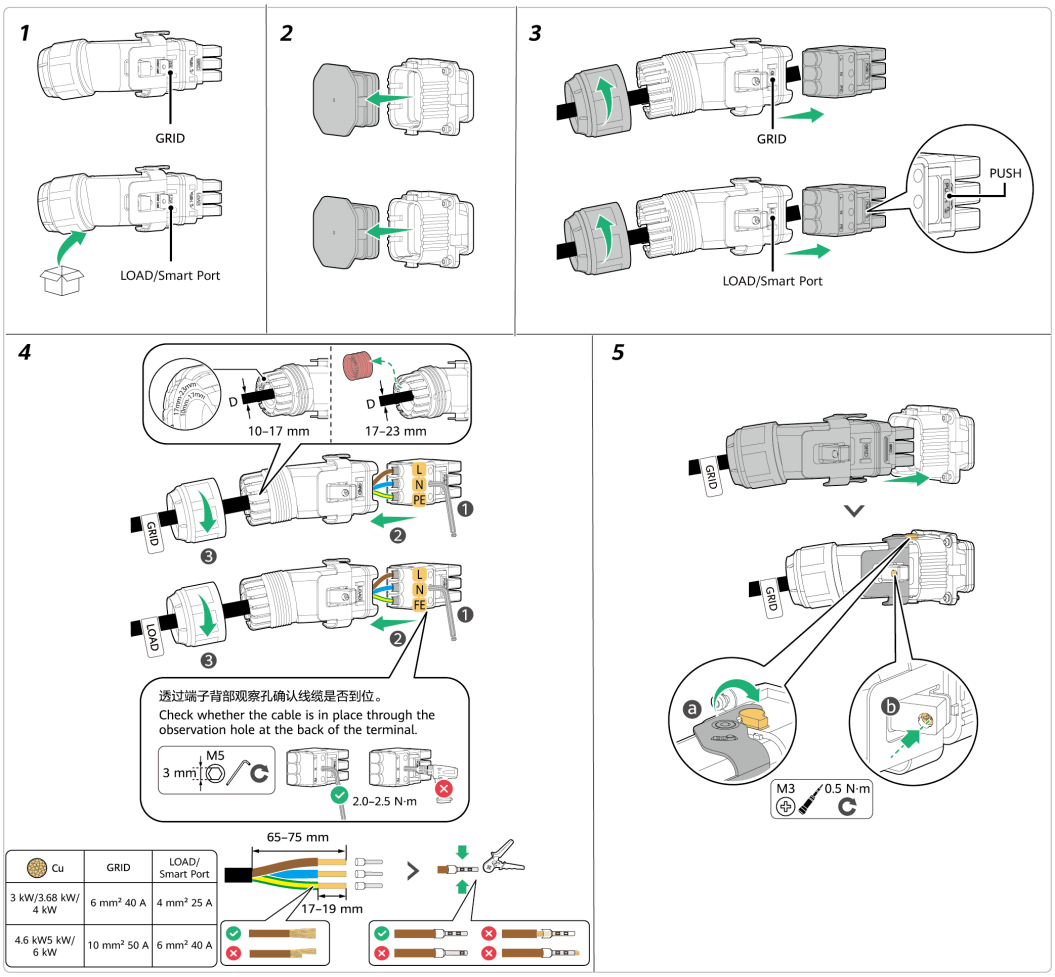
Procedure

NOTICE

- Ensure that the cable jacket is inside the connector.
- Insert the exposed core wires completely into the holes.
- Connect the AC output power cable securely. Otherwise, the device may fail to operate properly or the AC connector may be damaged.
- Ensure that the cable is not twisted.
- Strip the insulation layers of the AC output power cable by the recommended length (17–19 mm), crimp the conductors using the provided cord end terminals, ensure that the cord end terminals are completely inserted into the conductor insertion points, and secure the conductors. Otherwise, the device may fail to run properly or be damaged during operation. Check whether the cable is in position through the observation hole at the back of the connector.
- The cable colors shown in the figure are for reference only. Select an appropriate cable according to the local standards.

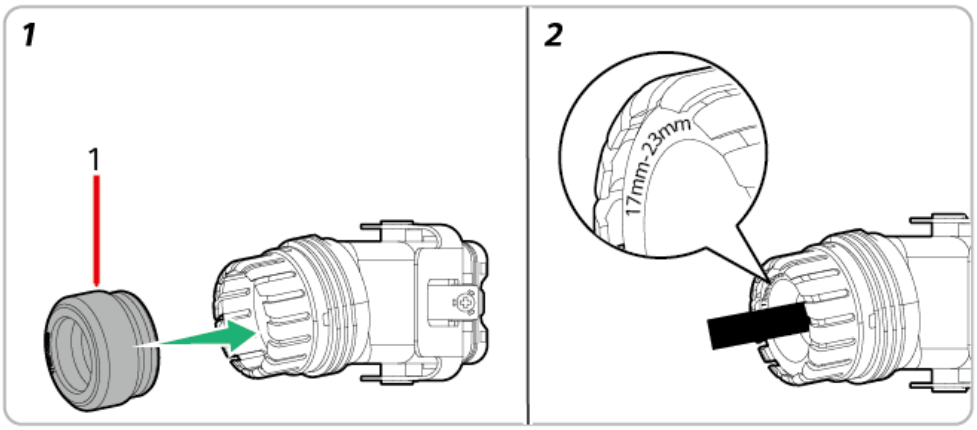
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Figure 7-7 Connecting AC power cables



If the large rubber plug is removed during cable preparation, reinstall it at the connector in the correct direction.

Figure 7-8 Installation direction of the large rubber plug



(1) Large rubber plug

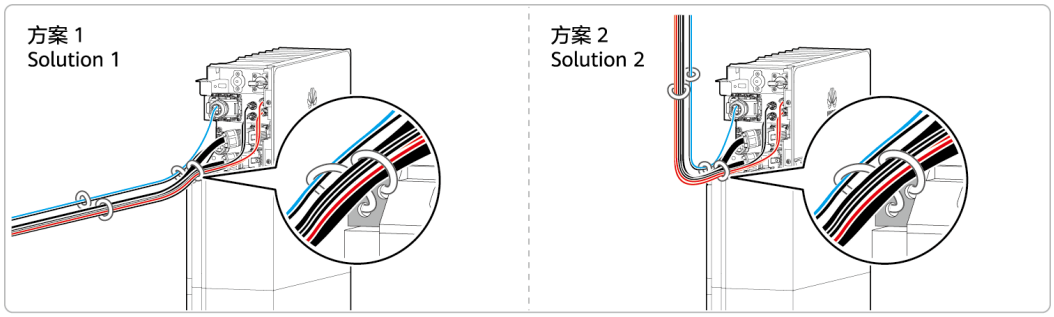
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7.7 Binding Cables

Cabling Requirements

- Bind and secure cables at the binding hole of the inverter, and then route the cables out through the cable outlet on the decorative cover.
- Cables must not be stretched or pulled tight. Otherwise, the wiring ports on the inverter may loosen due to the tension.
- When routing cables, ensure that the lowest point of the first cable bend is lower than the binding point. This prevents rainwater from flowing into the device along the cables, which could cause short circuits or device damage.
- When routing signal cables and power cables in parallel, bind them separately and keep a distance of at least 5 cm between them.

Figure 7-9 Cable binding scheme



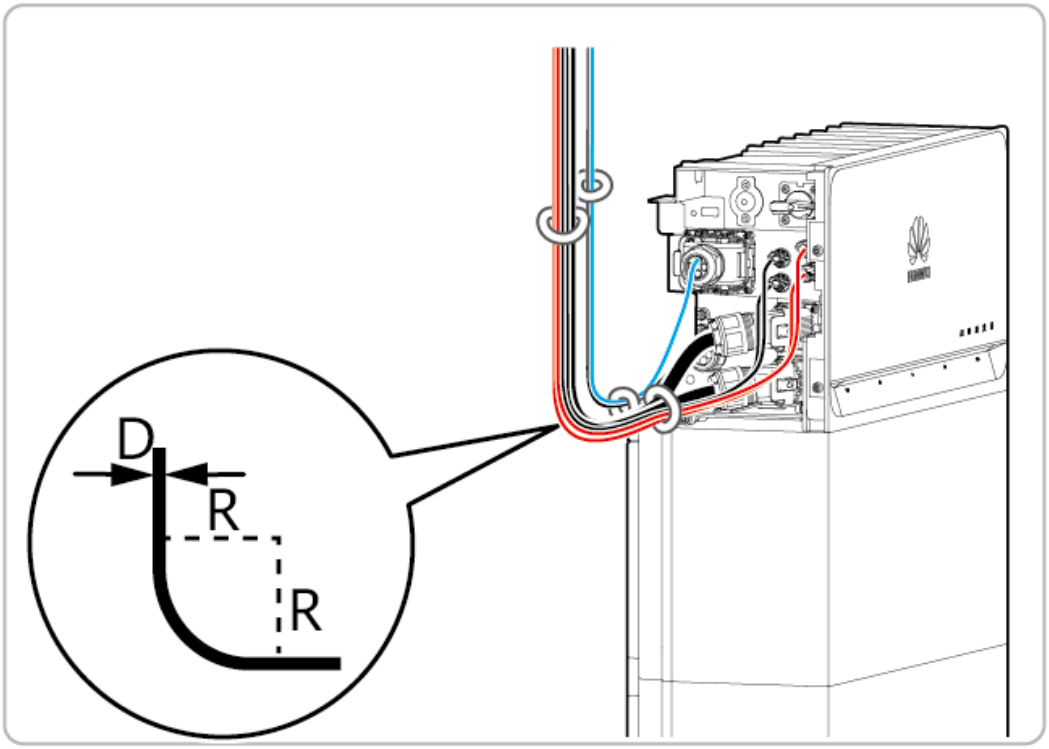
Bending Radius Requirements

The bending radius of cables must meet the following requirements:

- The bending radius (R) of a PE cable, DC power cable, or signal cable must be at least three times the outer diameter (D) of the cable.
- The bending radius (R) of an AC power cable must be at least five times the outer diameter (D) of the cable.

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Figure 7-10 Cable bending radius



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8 System Configuration and Wiring

This chapter describes the device configurations, electrical diagrams, and wiring diagrams in the on-grid and on/off-grid scenarios.

Scenario	Description	Configuration	Description
On/off-grid	Grid available, backup required	**All-in-one system only (both the grid port and backup port connected)**	• The all-in-one system can be connected to smart switches only. If devices such as heat pumps, heating rods, and chargers need to be connected, the SmartAssistant must be configured. • The all-in-one system supports only standalone backup. If multiple all-in-one systems need to be connected in parallel for backup, the Smart Guard must be configured.
		All-in-one system (both the grid port and backup port connected) + SmartAssistant	
		All-in-one system (only the grid port connected) + Smart Guard	
On-grid	Grid available, backup not required	**All-in-one system only (only the grid port connected)** **All-in-one system (only the grid port connected) + SmartAssistant**	-

8.1 Configuration and Wiring in the On/Off-Grid Scenario (Grid Available, Backup Supported)

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8.1.1 Backup Power Solution and Influencing Factors

In the on/off-grid scenario, the backup power solution is affected by the number and off-grid output power of all-in-one systems, number, charge power, and discharge power of energy storage modules, and number and types of loads.

You can choose the all-in-one system backup or Smart Guard backup. **Table 8-1** describes the configurations and instructions of different backup power solutions.

Table 8-2 lists the rated off-grid output power of a single all-in-one system.

NOTE

If multiple all-in-one systems need to be connected in parallel, the Smart Guard must be configured.

Table 8-1 Backup power solution configurations and instructions

Backup Power Solution	Configuration	Description
All-in-one system backup	• Solution 1: **All-in-one system only**	A maximum of one all-in-one system is supported.
	• Solution 2: **All-in-one system + SmartAssistant**	
Smart Guard backup	**All-in-one system + Smart Guard**	A maximum of two all-in-one systems can be connected to the Smart Guard.

Table 8-2 Off-grid rated output power

Model	LUTERRA-3K-XL0	LUTERRA-3.68K-XL0	LUTERRA-4K-XL0	LUTERRA-4.6K-XL0	LUTERRA-5K-XL0	LUTERRA-6K-XL0
Off-Grid Rated Output Power	3000 VA	3680 VA	4000 VA	4600 VA	5000 VA	6000 VA

Table 8-3 Rated discharge power of a single energy storage module

Model of Energy Storage Module	Rated Discharge Power
LUTERRA-5-E2	3 kW

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When there is no irradiance, the backup output power of the all-in-one system is provided by energy storage modules and is limited by the off-grid rated output power. For example:

- If the LUTERRA-3K-XL0 is configured with one LUTERRA-5-E2 energy storage module, the backup output power is 3 kW. If the LUTERRA-3K-XL0 is configured with two to four LUTERRA-5-E2 energy storage modules, the backup output power is also 3 kW.
- If the LUTERRA-4K-XL0 is configured with one LUTERRA-5-E2 energy storage module, the backup output power is 3 kW. If the LUTERRA-4K-XL0 is configured with two to four LUTERRA-5-E2 energy storage modules, the backup output power is 4 kW.

When there is irradiance, the backup output power of the all-in-one system is the sum of the power provided by the energy storage module and the PV power, and is limited by the off-grid rated output power. For example:

- If the LUTERRA-4K-XL0 is configured with one LUTERRA-5-E2 energy storage module and the PV power is 1 kW, the backup output power is 4 kW.

The number of loads that can operate in off-grid mode is calculated based on the total load power. In off-grid mode, the continuous operating power, peak current, and duration of all loads must not exceed the off-grid output capability of the all-in-one system.

NOTICE

- High-power devices such as heat pumps and chargers are not recommended as backup loads.
- Professional special equipment (such as elevators and medical devices) must not be used as backup loads.

The load features listed in **Table 8-4** affect the stable operation of the off-grid system. To ensure that loads can start and run properly in off-grid mode, do not power on or start the following typical devices at the same time, or reduce the number of typical devices connected to the backup port. Especially, the startup current of motor loads (such as air conditioners) may be 5 to 6 times the current during stable operation. You can obtain and check the specific data from the manuals provided with the devices to ensure that the system can withstand the startup current and steady-state current of the loads in off-grid mode.

Table 8-4 Residential load features

Typical Load	Load Feature	Impact on the System
Air conditioner, electric saw, and water pump	High startup current	The loads require a high startup current when it starts running, which may exceed the maximum output current of the all-in-one system. In this case, the loads may fail to start even if the rated power is within the off-grid output range.

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Typical Load	Load Feature	Impact on the System
Washing machine, soy milk maker, rice cooker, and electric oven	Dynamic power fluctuation	The operating power of the loads fluctuates greatly with the operating status. When multiple devices are operating at the same time, the power superposition effect may cause unstable system voltage.
Electric stove and hair dryer	Harmonic interference during power consumption	When the loads are operating, current harmonics are generated, which may cause system voltage distortion and interfere with the normal operation of other sensitive devices in the system.
Laptop charger, water purifier, and projector	High transient current during startup	The loads contain switch-mode power supplies. At the moment of power-on, the internal energy storage components (such as capacitors) generate a large transient current due to fast charging.

8.1.2 All-in-One System Only (Both the Grid Port and Backup Port Connected)

8.1.2.1 Device Configuration

The main devices in this configuration include the all-in-one system, optimizer, and meter.

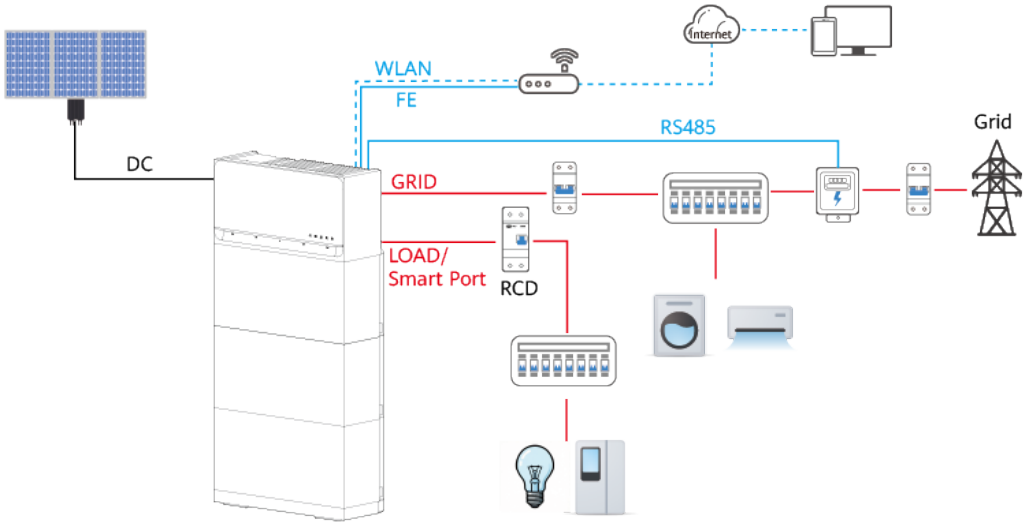
Table 8-5 Device configuration

Product Type	Model
All-in-one system	LUTERRA-S2-XL
(Optional) Optimizer	SUN2000-600W-PA0
Meter	SmartPS-100A-S0: YDS70-C16, DDSU666-H, DDSU71, DDSU1079-CT

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Product Type	Model
Note: The measurement data of the meter mentioned in this document is used only for grid connection point control and cannot be used as the basis for electricity billing. Electricity billing is subject to the metering by the power grid company.	

Figure 8-1 Device connection diagram (on/off-grid scenario, all-in-one system only)



8.1.2.2 Electrical Diagram

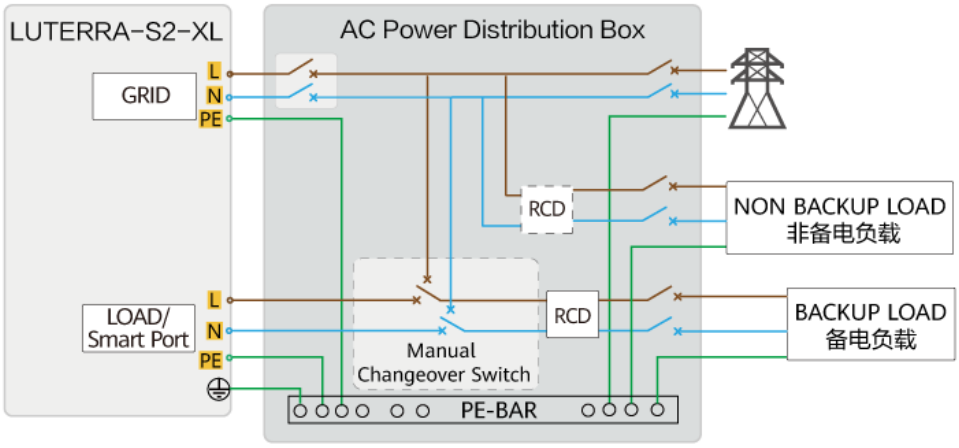
DANGER

- An RCD must be installed for backup loads. During off-grid operation, the main RCD does not provide protection. Electric leakage on the loads may result in electric shocks. Its rated residual operating current must be greater than or equal to 100 mA.
- A main circuit breaker with the leakage protection function must be installed. Its rated residual operating current must be greater than or equal to 100 mA. You do not need to install an RCD for non-backup loads.

NOTE

- The neutral wire must be securely connected to prevent load damage caused by neutral wire disconnection.
- In some countries, the system must disconnect from the neutral wire of the grid when it is off-grid. Do not short-circuit the neutral wire of the backup port and the neutral wire of the grid outside the all-in-one system. In addition, **Off-grid neutral wire connection** must be set to **Open**.

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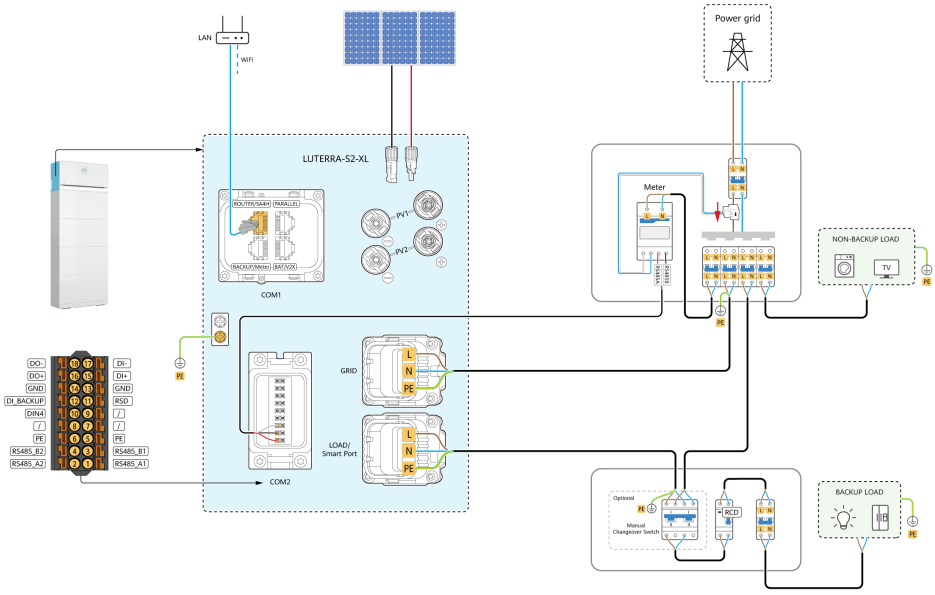
8.1.2.3 Wiring Diagram

This section describes the cable connections for the all-in-one system and different types of meters in the on/off-grid scenario. A maximum of one all-in-one system can be connected.

No.	Diagram	Number of All-in-One Systems	Measuring Energy Data at the Grid Connection Point
1	1 x LUTERRA-S2-XL + Meter	1	Meter

Figure 8-2 1 x LUTERRA-S2-XL + Meter

1 x LUTERRA-S2-XL + Meter



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8.1.3 All-in-One System (Both the Grid Port and Backup Port Connected) + SmartAssistant

8.1.3.1 Device Configuration

The main devices in this configuration include the all-in-one system, optimizer, and SmartAssistant. You can configure the external CT for the SmartAssistant or the external meter based on the current at the grid connection point.

Table 8-6 Device configuration

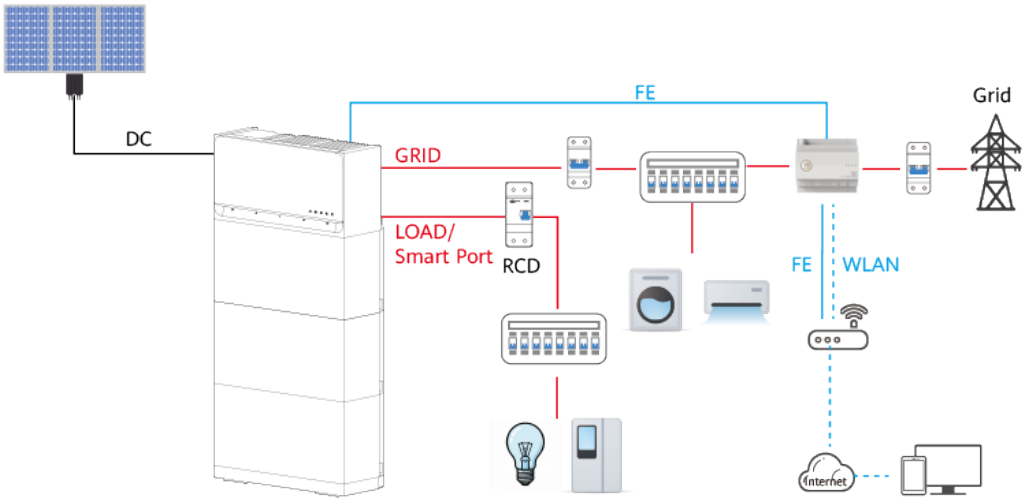
Product Type	Model
All-in-one system	LUTERRA-S2-XL
(Optional) Optimizer	SUN2000-600W-PA0
SmartAssistant	SA4H-A02, SA4H-A03
(Optional) External CT for the SmartAssistant	SmartPS2000-100-24-A
(Optional) External meter	SmartPS-100A-S0: YDS70-C16, DDSU666-H, DDSU71, DDSU1079-CT
Note: If the SA4H-A02 is used, the software version must be upgraded to SmartHEMS V100R026C10 or later.	

Select the SmartAssistant, external CT for the SmartAssistant, or external meter to measure the energy data at the grid connection point based on the current at the grid connection point.

Current at the Grid Connection Point	Measuring Energy Data at the Grid Connection Point
≤ 63 A	SmartAssistant
> 63 A	External CT for the SmartAssistant or external meter

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Figure 8-3 Device connection diagram (on/off-grid scenario, all-in-one system + SmartAssistant)



8.1.3.2 Electrical Diagram

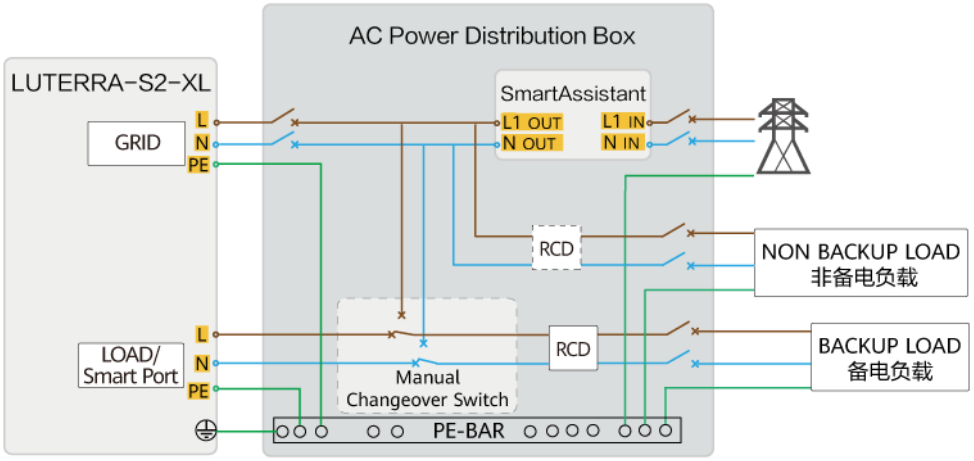
DANGER

- An RCD must be installed for backup loads. During off-grid operation, the main RCD does not provide protection. Electric leakage on the loads may result in electric shocks. Its rated residual operating current must be greater than or equal to 100 mA.
- A main circuit breaker with the leakage protection function must be installed. Its rated residual operating current must be greater than or equal to 100 mA. You do not need to install an RCD for non-backup loads.

NOTE

- The neutral wire must be securely connected to prevent load damage caused by neutral wire disconnection.
- In some countries, the system must disconnect from the neutral wire of the grid when it is off-grid. Do not short-circuit the neutral wire of the backup port and the neutral wire of the grid outside the all-in-one system. In addition, **Off-grid neutral wire connection** must be set to **Open**.

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8.1.3.3 Wiring Diagrams

This section describes the cable connections for the all-in-one system and SmartAssistant in the on/off-grid scenario. A maximum of one all-in-one system can be connected.

No.	Diagram	Number of All-in-One Systems	Measuring Energy Data at the Grid Connection Point
1	**1 x LUTERRA-S2-XL + SmartAssistant (built-in CT)**	1	SmartAssistant
2	**1 x LUTERRA-S2-XL + SmartAssistant (external CT)**	1	External CT for the SmartAssistant

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Figure 8-4 1 x LUTERRA-S2-XL + SmartAssistant (built-in CT)

1 x LUTERRA-S2-XL + SmartAssistant

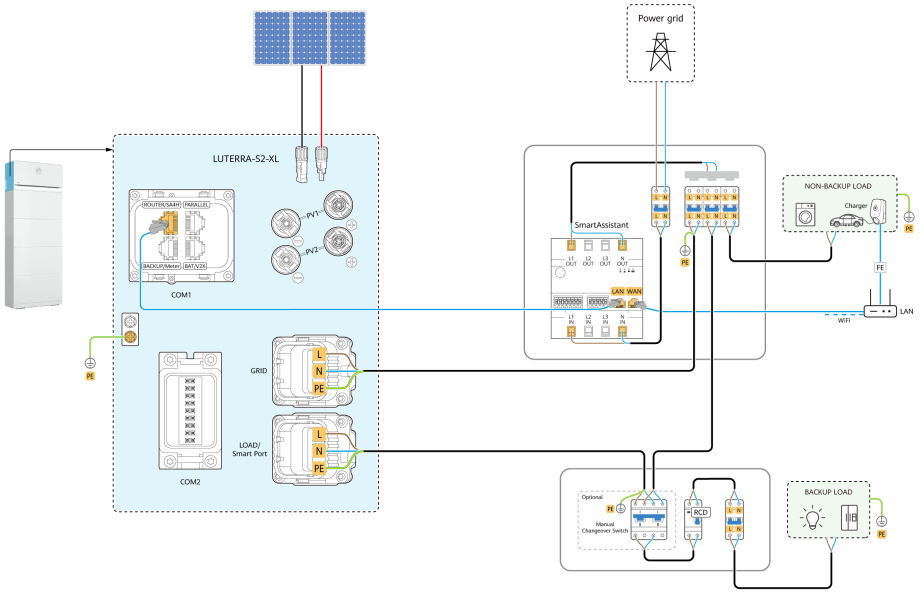
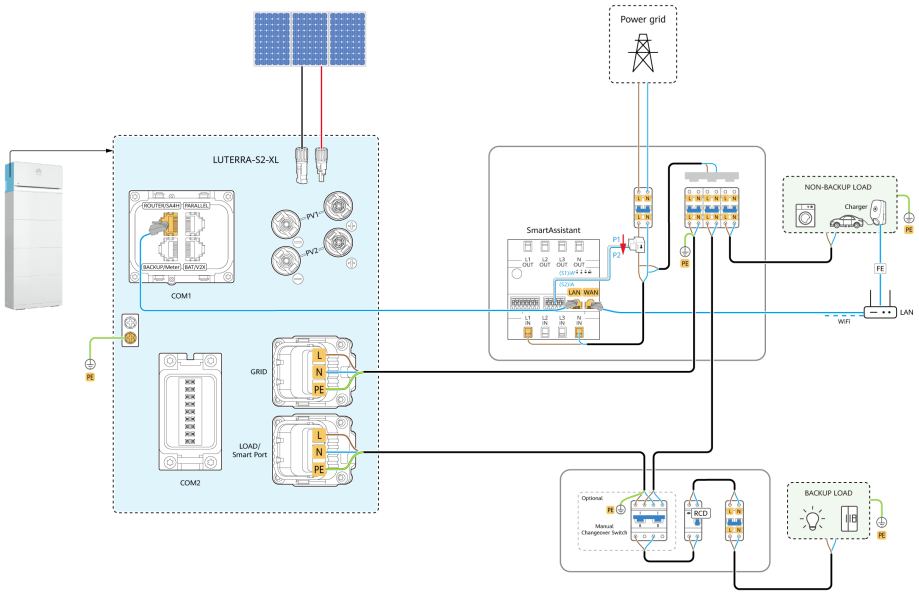


Figure 8-5 1 x LUTERRA-S2-XL + SmartAssistant (external CT)

1 x LUTERRA-S2-XL + SmartAssistant

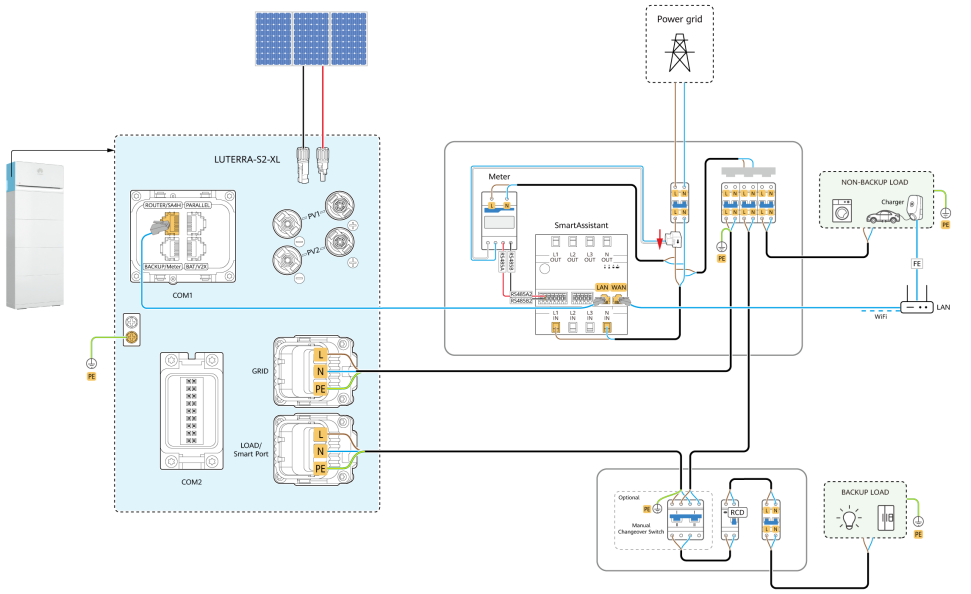


Wiring diagram with the external meter used to measure energy data at the grid connection point

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Figure 8-6 shows the wiring diagram with the external meter used to measure energy data at the grid connection point.

Figure 8-6 1 x LUTERRA-S2-XL + SmartAssistant (external meter)



8.1.4 All-in-One System (Only the Grid Port Connected) + Smart Guard

8.1.4.1 Device Configuration

The main devices in this configuration include the all-in-one system, optimizer, and Smart Guard. You can configure the external meter or the external CT for the SmartAssistant based on the current at the grid connection point.

Table 8-7 Device configuration

Product Type	Model
All-in-one system	LUTERRA-S2-XL
(Optional) Optimizer	SUN2000-600W-PA0
Smart Guard	SmartGuard-63A-S0, SmartGuard-63A-S1
(Optional) External meter	SmartPS-100A-S0: YDS70-C16, DDSU666-H, DDSU71, DDSU1079-CT
(Optional) External CT for the SmartAssistant	SmartPS2000-100-24-A

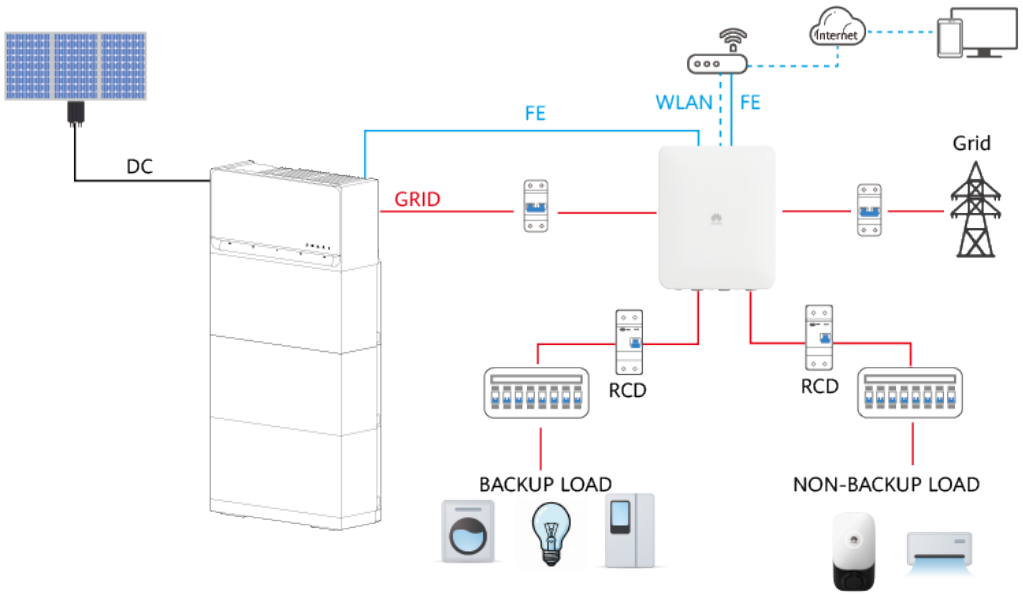
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Product Type	Model
Note: If the SmartGuard-63A-S0 is used, the software versions must be upgraded to SmartHEMS V100R026C10 or later and BackupBoxA V100R023C10SPC10 or later.	

Select the SmartAssistant, external CT for the SmartAssistant, or external meter to measure the energy data at the grid connection point based on the current at the grid connection point.

Current at the Grid Connection Point	Measuring Energy Data at the Grid Connection Point
≤ 63 A	SmartAssistant
> 63 A	External CT for the SmartAssistant or external meter

Figure 8-7 Device connection diagram (on/off-grid scenario, all-in-one system + Smart Guard)



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8.1.4.2 Electrical Diagram

DANGER

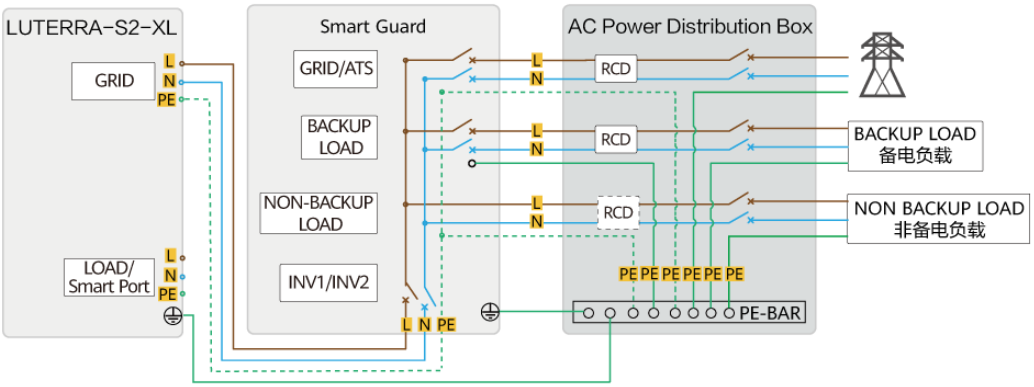
- An RCD must be installed for backup loads. During off-grid operation, the main RCD does not provide protection. Electric leakage on the loads may result in electric shocks. The rated residual operating current must be greater than or equal to the number of inverters multiplied by 100 mA.
- A main circuit breaker with the leakage protection function must be installed. Its rated residual operating current must be greater than or equal to the number of inverters multiplied by 100 mA. You do not need to install an RCD for non-backup loads.

NOTICE

In the configuration with the all-in-one system and Smart Guard, the backup port of the all-in-one system must be left vacant and not be connected to any device.

NOTE

- The neutral wire must be securely connected to prevent load damage caused by neutral wire disconnection.
- In some countries, the system must disconnect from the neutral wire of the grid when it is off-grid. Do not short-circuit the neutral wire of the backup load, neutral wire of the grid, neutral wire of the non-backup load, and neutral wire of the all-in-one system outside the Smart Guard.



8.1.4.3 Wiring Diagrams

This section describes the cable connections for different numbers of all-in-one systems and the Smart Guard in the on/off-grid scenario. A maximum of two all-in-one systems can be connected in parallel.

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No.	Diagram	Number of All-in-One Systems	Measuring Energy Data at the Grid Connection Point	Description
1	1 x LUTERRA-S2-XL + Smart Guard S1 (all loads connected)	1	SmartAssistant	All loads are connected to the Smart Guard. Some of loads are connected to the backup load port, while others are connected to the non-backup load port.
2	2 x LUTERRA-S2-XL + Smart Guard S1 (all loads connected)	2		
3	1 x LUTERRA-S2-XL + Smart Guard S1 (some of loads connected, external CT)	1	External CT for the SmartAssistant	Some of loads are connected to the Smart Guard.
4	2 x LUTERRA-S2-XL + Smart Guard S1 (some of loads connected, external CT)	2		
5	1 x LUTERRA-S2-XL + Smart Guard S1 (some of loads connected, external meter)	1	External meter	
6	2 x LUTERRA-S2-XL + Smart Guard S1 (some of loads connected, external meter)	2		

Port Connection Restrictions of the Smart Guard

A maximum of two all-in-one systems can be connected to the Smart Guard, one through the INV1 port and the other through the INV2 port.

The following tables list the required ports, circuit breakers, and cables for connecting all-in-one systems to the Smart Guard.

Table 8-8 Connecting one all-in-one system to the Smart Guard

Power of One All-in-One System	Connected Port	Cable Specifications	External AC Switch
3 kW/3.68 kW/4 kW/4.6 kW/5 kW/6 kW	INV2	6 mm²	Not required

Table 8-9 Connecting two all-in-one systems to the Smart Guard

Power Combination of Two All-in-One Systems	Connected Port	Number of All-in-One Systems	Cable Specifications	External AC Switch
Any power combination of two all-in-one systems is supported. For example: • 3 kW + 4 kW • 5 kW + 6 kW	INV2	1	6 mm²	Not required
	INV1	1	• 3 kW/3.68 kW/4 kW: 4 mm² • 4.6 kW/5 kW/6 kW: 6 mm²	Required, 1 • 3 kW/3.68 kW/4 kW: 25 A • 4.6 kW/5 kW/6 kW: 40 A

Figure 8-8 1 x LUTERRA-S2-XL + Smart Guard S1 (all loads connected)

1 x LUTERRA-S2-XL + Smart Guard S1

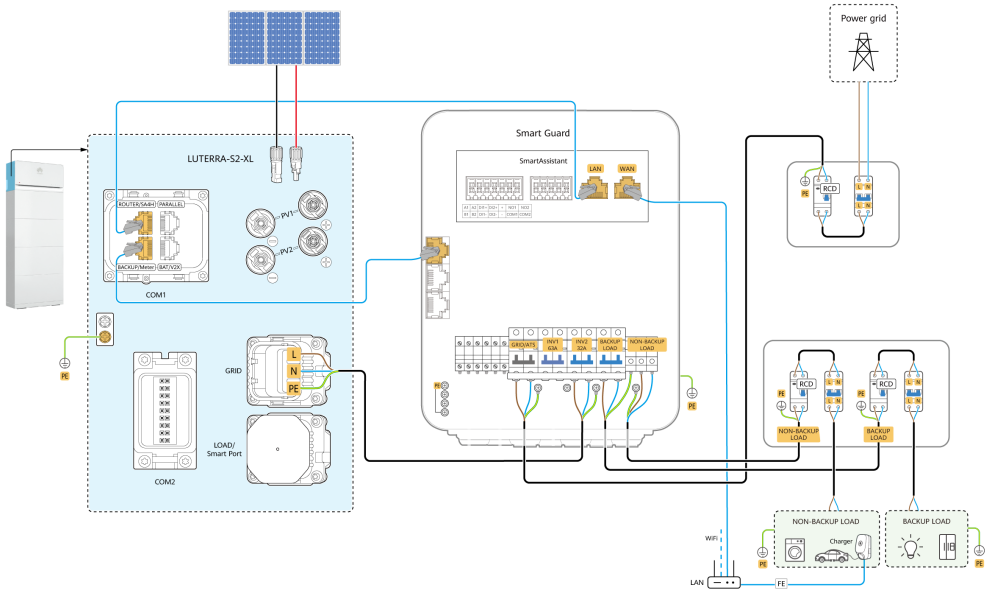


Figure 8-9 2 x LUTERRA-S2-XL + Smart Guard S1 (all loads connected)

2 x LUTERRA-S2-XL + Smart Guard S1

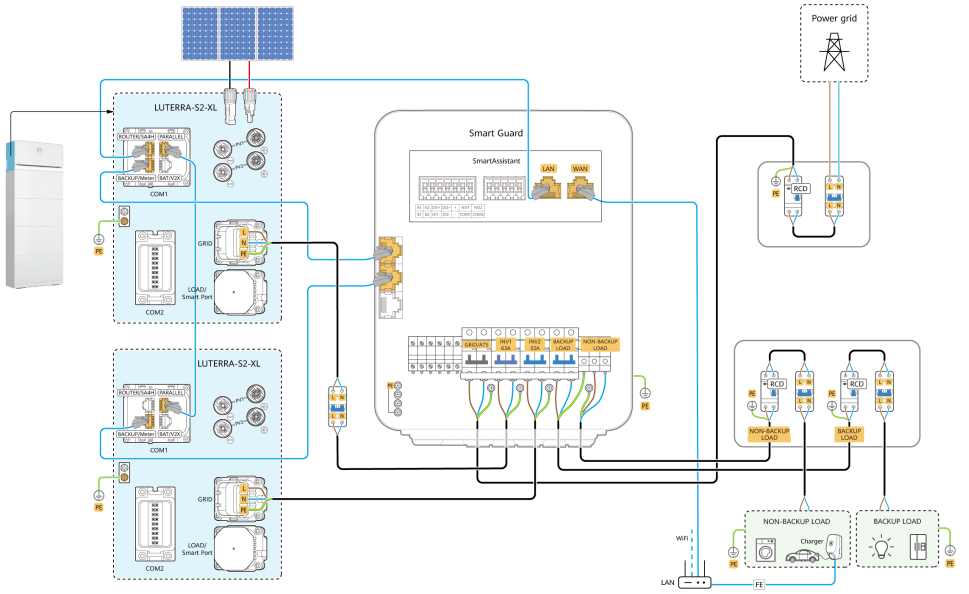
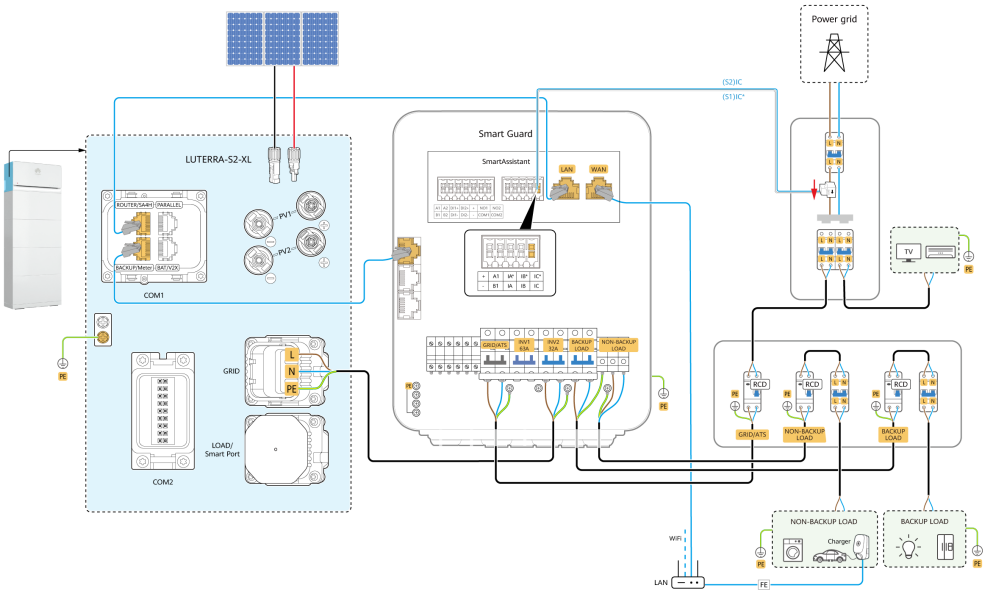


Figure 8-10 1 x LUTERRA-S2-XL + Smart Guard S1 (some of loads connected, external CT)

1 x LUTERRA-S2-XL + Smart Guard S1



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Figure 8-11 2 x LUTERRA-S2-XL + Smart Guard S1 (some of loads connected, external CT)

2 x LUTERRA-S2-XL + Smart Guard S1

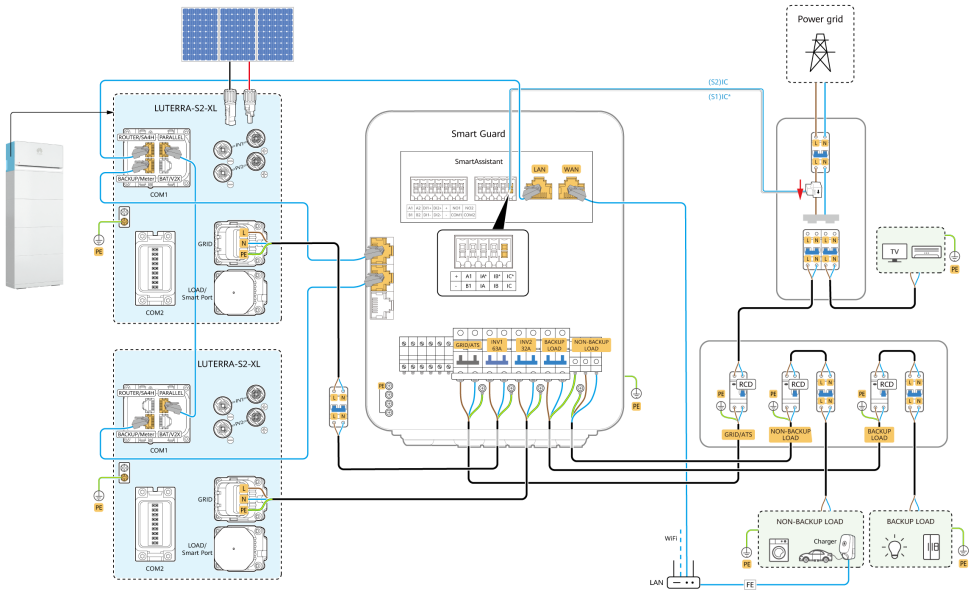
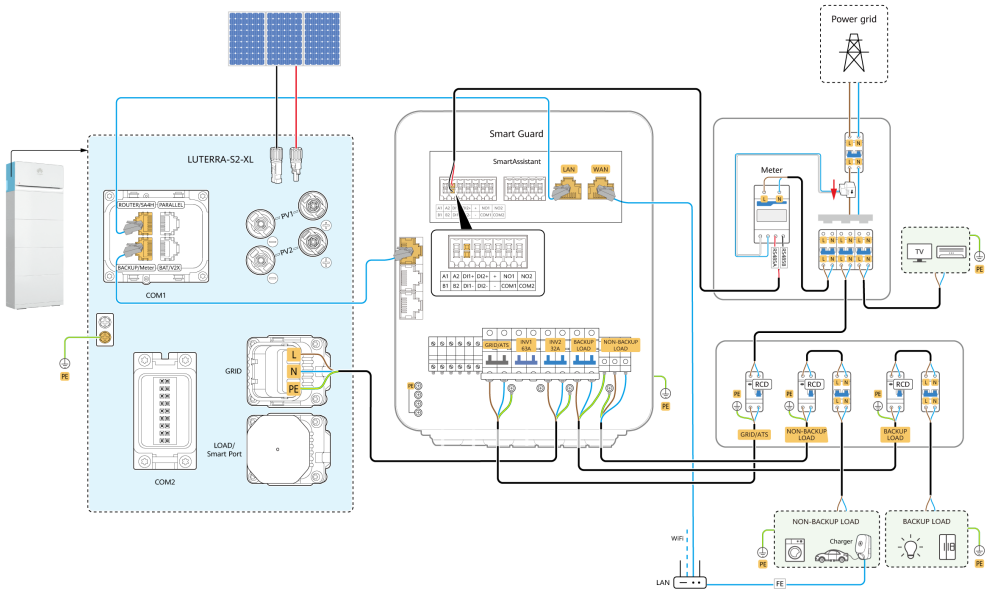


Figure 8-12 1 x LUTERRA-S2-XL + Smart Guard S1 (some of loads connected, external meter)

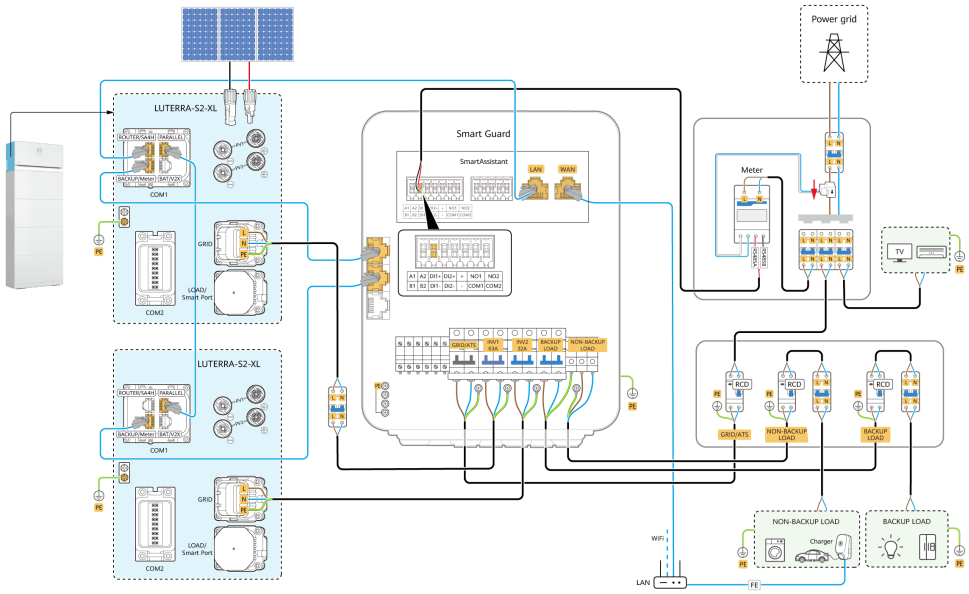
1 x LUTERRA-S2-XL + Smart Guard S1



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Figure 8-13 2 x LUTERRA-S2-XL + Smart Guard S1 (some of loads connected, external meter)

2 x LUTERRA-S2-XL + Smart Guard S1



Wiring diagram with the SmartGuard-63A-S0

For details about the wiring diagrams for the all-in-one system and SmartGuard-63A-S0, see **Figure 8-14** and **Figure 8-15**.

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Figure 8-14 1 x LUTERRA-S2-XL + Smart Guard S0 (all loads connected)

1 x LUTERRA-S2-XL + Smart Guard S0

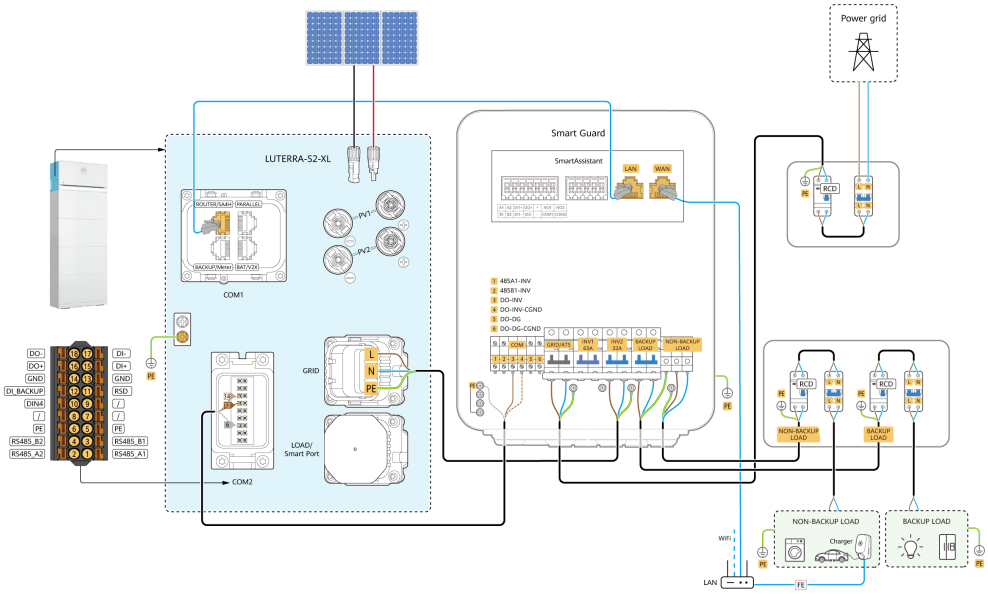
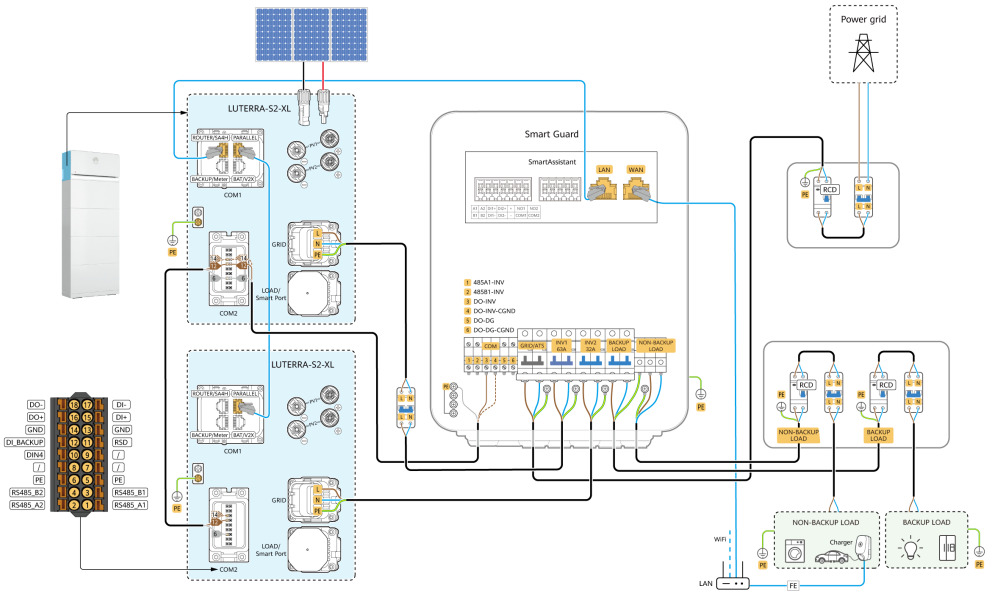


Figure 8-15 2 x LUTERRA-S2-XL + Smart Guard S0 (all loads connected)

2 x LUTERRA-S2-XL + Smart Guard S0



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8.2 Configuration and Wiring in the On-Grid Scenario (Grid Available, Backup Not Required)

In the on-grid scenario, only these two configuration modes are supported: all-in-one system and all-in-one system + SmartAssistant. The following sections describe the device configurations, electrical diagrams, and wiring diagrams in the two modes.

8.2.1 All-in-One System Only (Only the Grid Port Connected)

8.2.1.1 Device Configuration

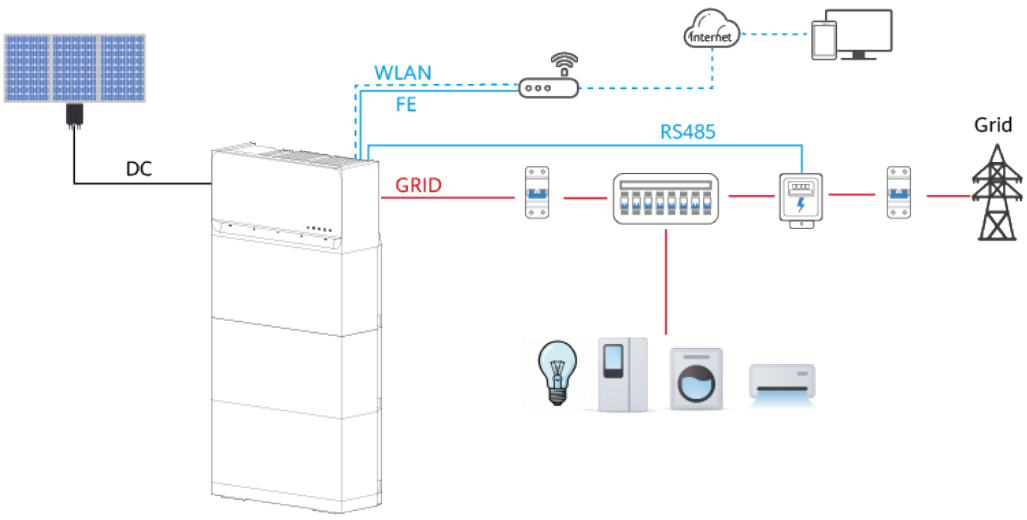
The main devices in this configuration include the all-in-one system, optimizer, and meter.

Table 8-10 Device configuration

Product Type	Model
All-in-one system	LUTERRA-S2-XL
(Optional) Optimizer	SUN2000-600W-PA0
Meter	SmartPS-100A-S0: YDS70-C16, DDSU666-H, DDSU71, DDSU1079-CT
Note: The measurement data of the meter mentioned in this document is used only for grid connection point control and cannot be used as the basis for electricity billing. Electricity billing is subject to the metering by the power grid company.	

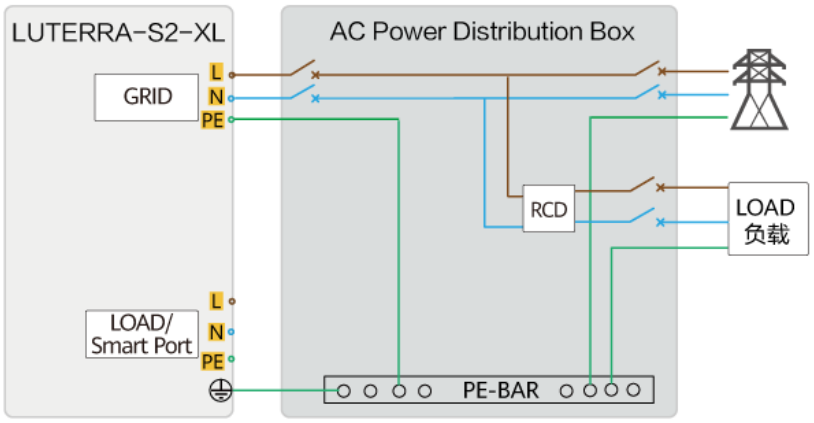
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Figure 8-16 Device connection diagram (on-grid scenario, all-in-one system only)



8.2.1.2 Electrical Diagram

In the on-grid scenario, only the grid port of the all-in-one system is connected to the power grid. The following figure shows the electrical diagram.



8.2.1.3 Wiring Diagrams

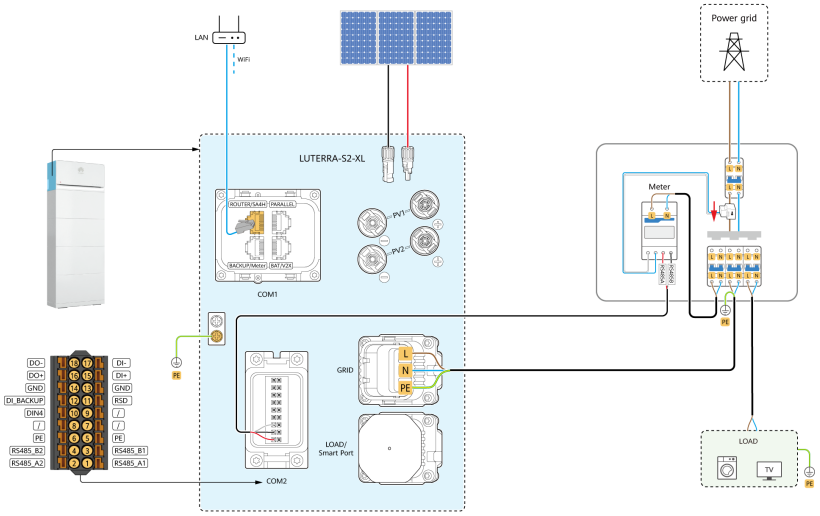
This section describes the cable connections for different numbers of all-in-one systems and a meter in the on-grid scenario. A maximum of three all-in-one systems can be connected in parallel.

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No.	Diagram	Number of All-in-One Systems	Measuring Energy Data at the Grid Connection Point	Description
1	1 x LUTERRA-S2-XL + Meter	1	Meter	Connect the meter to the all-in-one system connected to the router.
2	2 x LUTERRA-S2-XL + Meter	2		
3	3 x LUTERRA-S2-XL + Meter	3		

Figure 8-17 1 x LUTERRA-S2-XL + Meter

1 x LUTERRA-S2-XL + Meter



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Figure 8-18 2 x LUTERRA-S2-XL + Meter

2 x LUTERRA-S2-XL + Meter

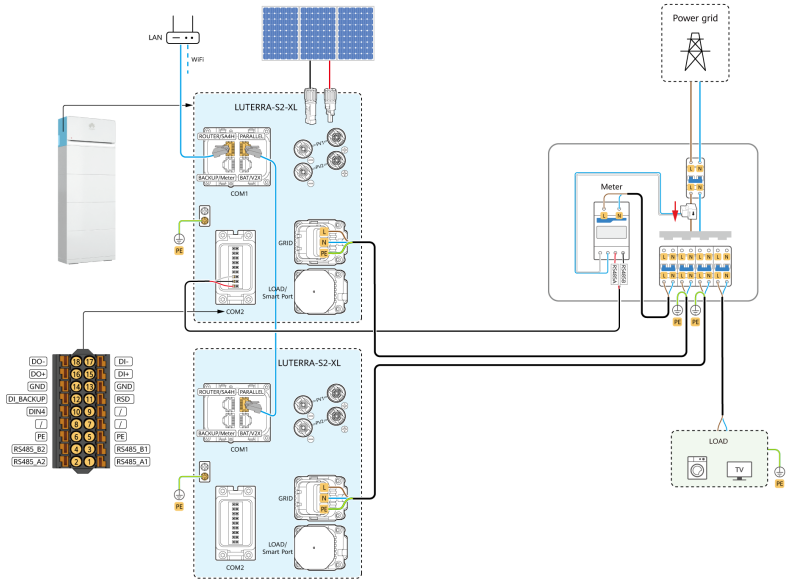
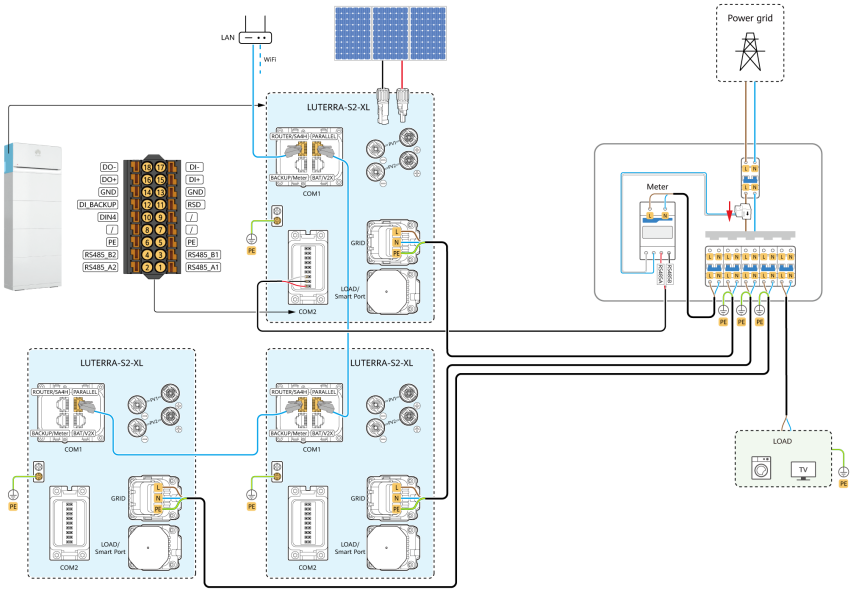


Figure 8-19 3 x LUTERRA-S2-XL + Meter

3 x LUTERRA-S2-XL + Meter



8.2.2 All-in-One System (Only the Grid Port Connected) + SmartAssistant

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8.2.2.1 Device Configuration

The main devices in this configuration include the all-in-one system, optimizer, and SmartAssistant. You can configure the external CT for the SmartAssistant or the external meter based on the current at the grid connection point.

Table 8-11 Device configuration

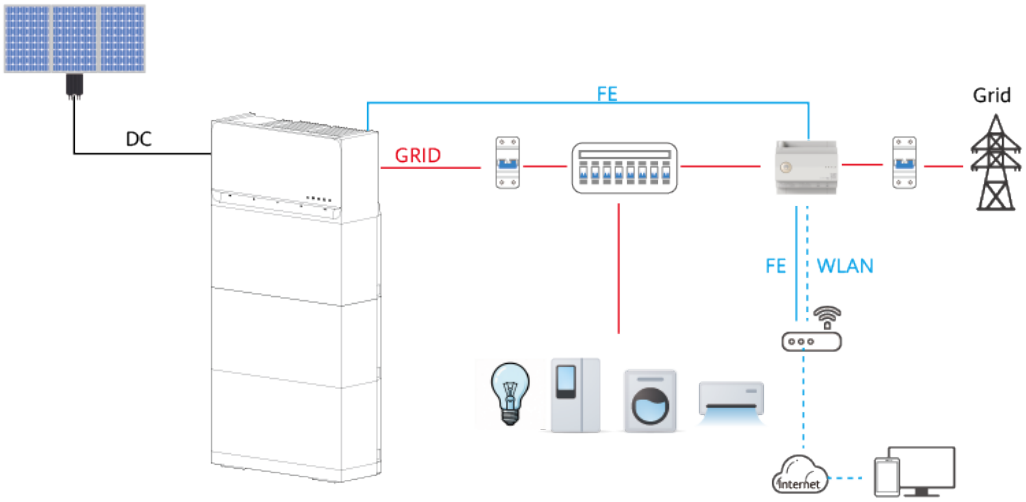
Product Type	Model
All-in-one system	LUTERRA-S2-XL
(Optional) Optimizer	SUN2000-600W-PA0
SmartAssistant	SA4H-A02, SA4H-A03
(Optional) External CT for the SmartAssistant	SmartPS2000-100-24-A
(Optional) External meter	SmartPS-100A-S0: YDS70-C16, DDSU666-H, DDSU71, DDSU1079-CT
Note: If the SA4H-A02 is used, the software version must be upgraded to SmartHEMS V100R026C10 or later.	

Select the SmartAssistant, external CT for the SmartAssistant, or external meter to measure the energy data at the grid connection point based on the current at the grid connection point.

Current at the Grid Connection Point	Measuring Energy Data at the Grid Connection Point
≤ 63 A	SmartAssistant
> 63 A	External CT for the SmartAssistant or external meter

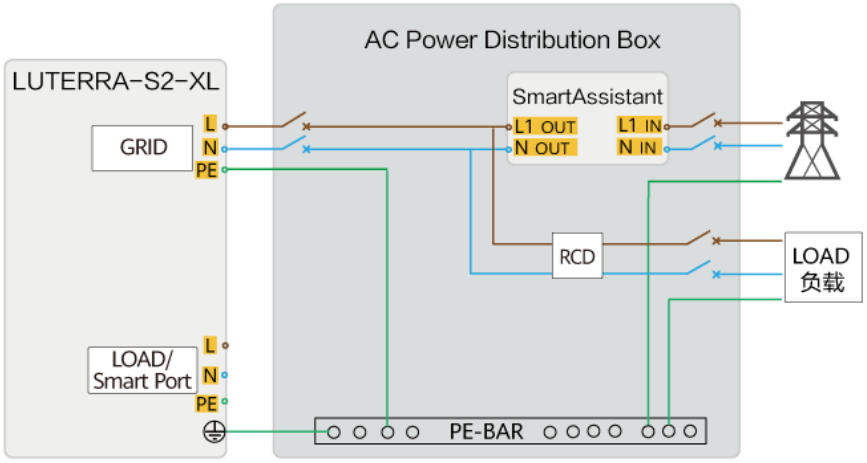
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Figure 8-20 Device connection diagram (on-grid scenario, all-in-one system + SmartAssistant)



8.2.2.2 Electrical Diagram

In the on-grid scenario, only the grid port of the all-in-one system is connected to the power grid. The following figure shows the electrical diagram.



8.2.2.3 Wiring Diagrams

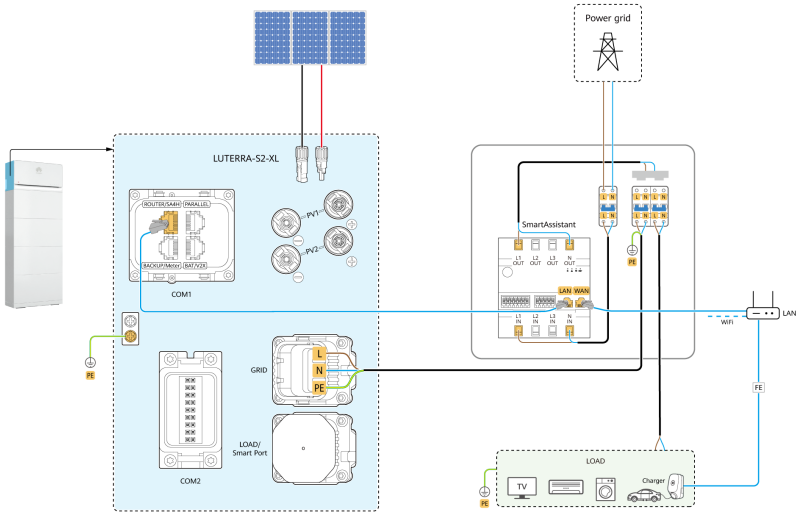
This section describes the cable connections for different numbers of all-in-one systems and the SmartAssistant in the on-grid scenario. A maximum of three all-in-one systems can be connected in parallel.

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No.	Diagram	Number of All-in-One Systems	Measuring Energy Data at the Grid Connection Point
1	1 x LUTERRA-S2-XL + SmartAssistant (built-in CT)	1	SmartAssistant
2	2 x LUTERRA-S2-XL + SmartAssistant (built-in CT)	2	
3	3 x LUTERRA-S2-XL + SmartAssistant (built-in CT)	3	
4	1 x LUTERRA-S2-XL + SmartAssistant (external CT)	1	External CT for the SmartAssistant
5	2 x LUTERRA-S2-XL + SmartAssistant (external CT)	2	
6	3 x LUTERRA-S2-XL + SmartAssistant (external CT)	3	

Figure 8-21 1 x LUTERRA-S2-XL + SmartAssistant (built-in CT)

1 x LUTERRA-S2-XL + SmartAssistant



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Figure 8-22 2 x LUTERRA-S2-XL + SmartAssistant (built-in CT)

2 x LUTERRA-S2-XL + SmartAssistant

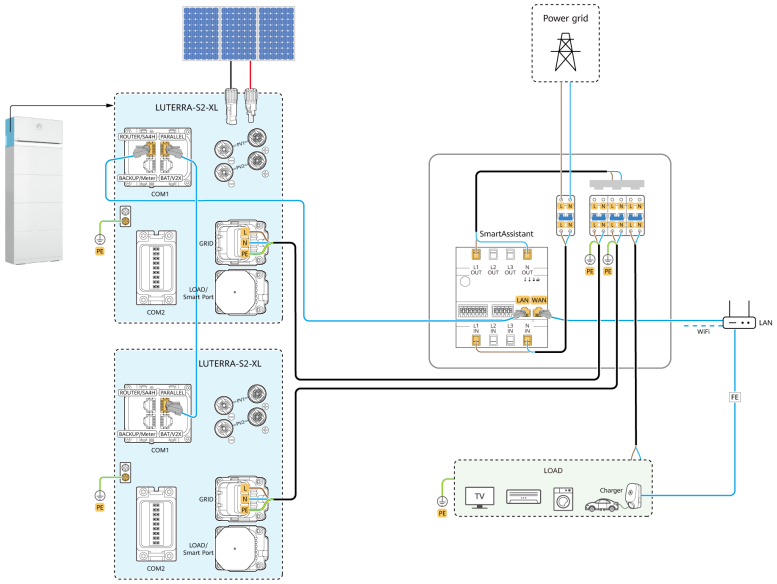
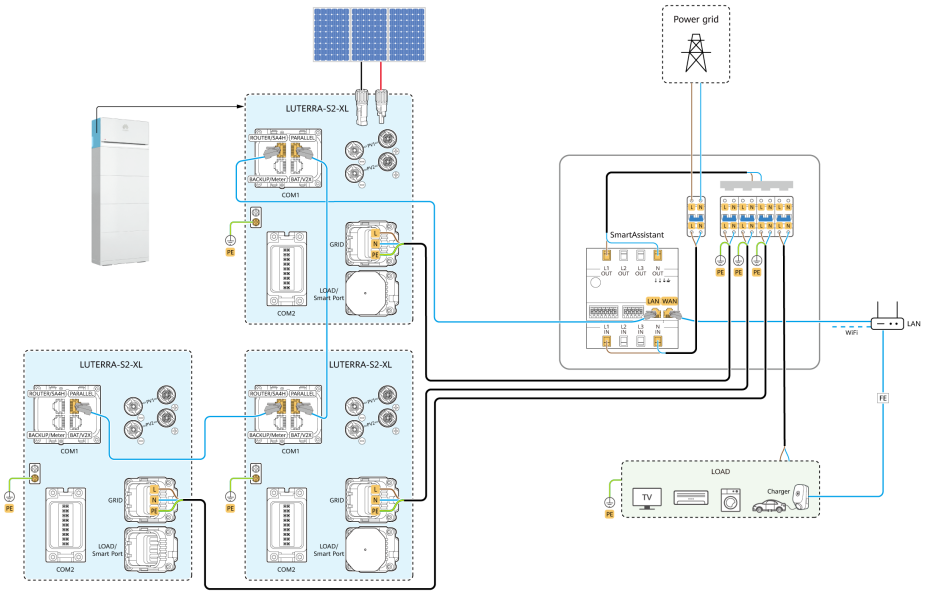


Figure 8-23 3 x LUTERRA-S2-XL + SmartAssistant (built-in CT)

3 x LUTERRA-S2-XL + SmartAssistant



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Figure 8-24 1 x LUTERRA-S2-XL + SmartAssistant (external CT)

1 x LUTERRA-S2-XL + SmartAssistant

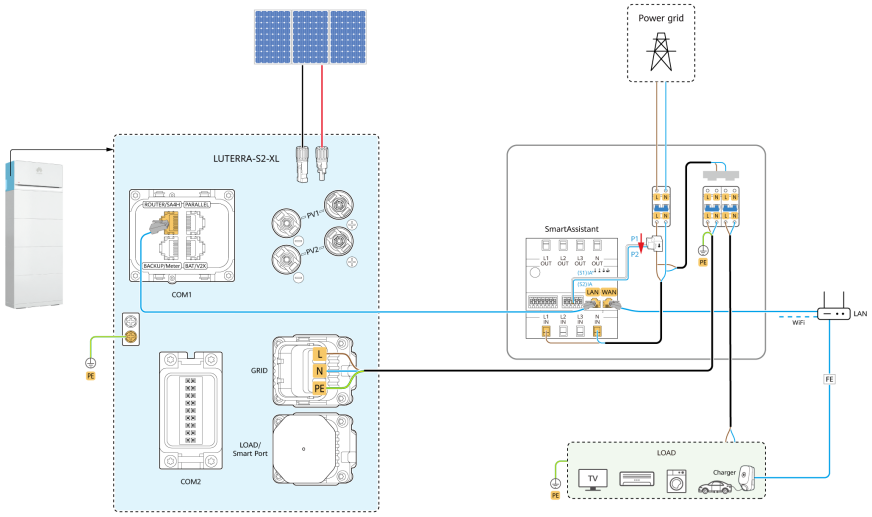
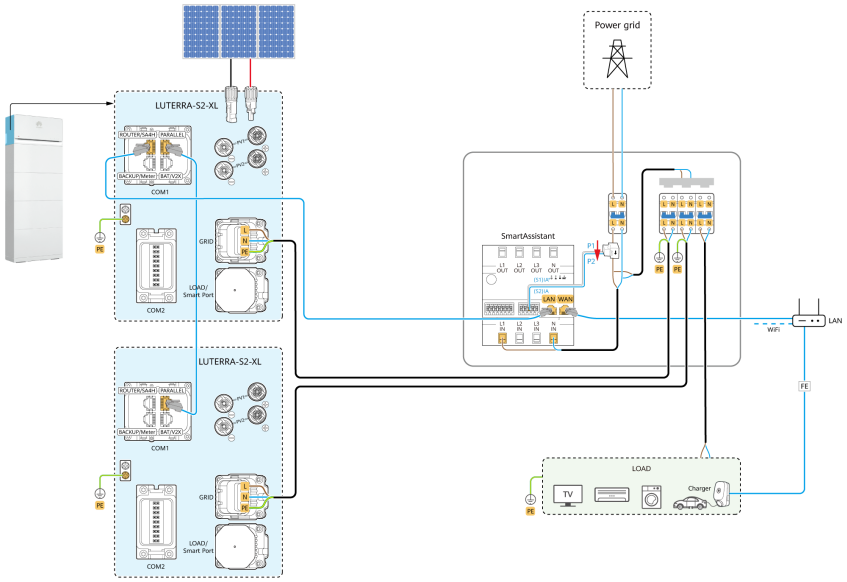


Figure 8-25 2 x LUTERRA-S2-XL + SmartAssistant (external CT)

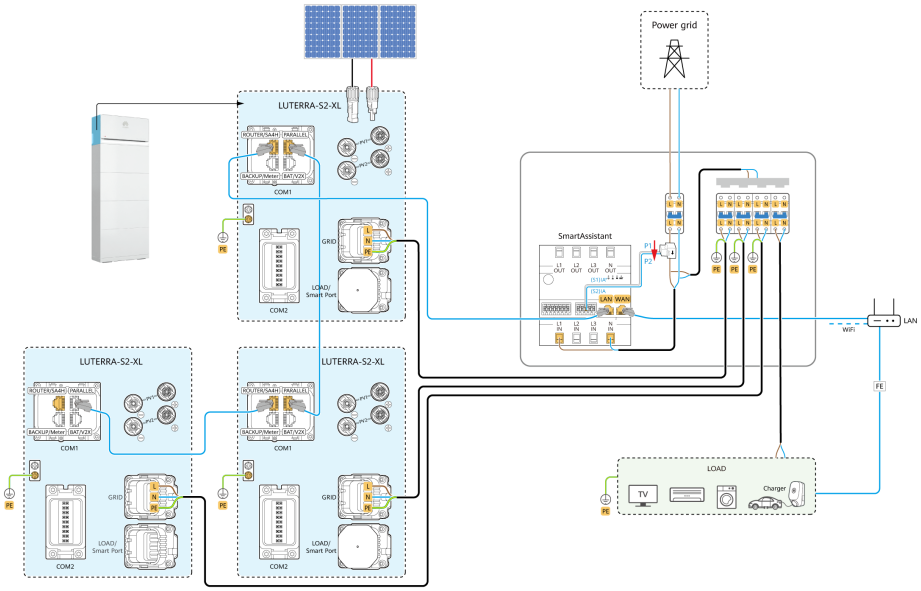
2 x LUTERRA-S2-XL + SmartAssistant



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Figure 8-26 3 x LUTERRA-S2-XL + SmartAssistant (external CT)

3 x LUTERRA-S2-XL + SmartAssistant

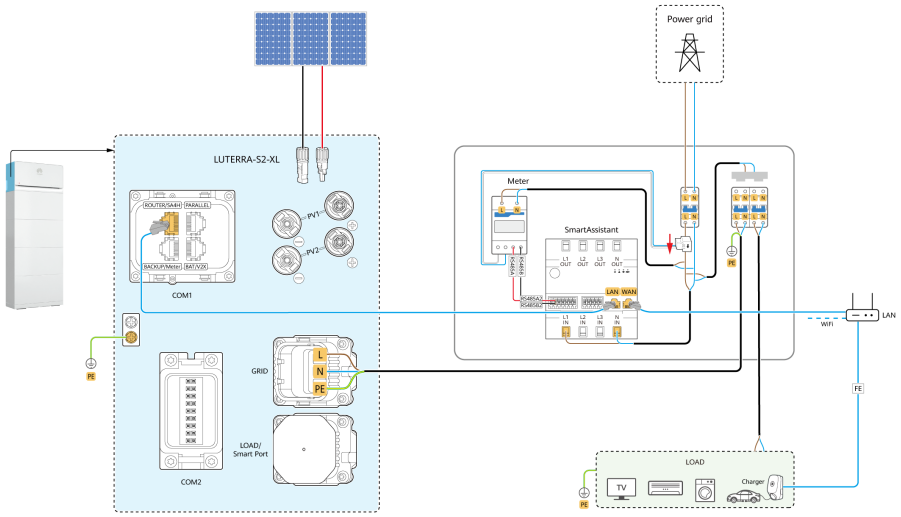


Wiring diagram with the external meter used to measure energy data at the grid connection point

Figure 8-27 shows the wiring diagram with the external meter used to measure energy data at the grid connection point, using one all-in-one system as an example.

Figure 8-27 1 x LUTERRA-S2-XL + SmartAssistant (external meter)

1 x LUTERRA-S2-XL + SmartAssistant



8.3 (Optional) Gateway Configuration and Wiring

- Application Scenario

  If a home device is far away from the router or blocked by a wall, you can connect the device to a gateway to expand the network coverage and enhance the signal quality.

  In addition, after a home device is connected to the router through a gateway, you only need to reconfigure the gateway even if the router is replaced or the router password is changed, facilitating network maintenance.

- Model and Quantity

  Supported gateway model: AX3V. A maximum of two gateways can be used.

- Signal range

  The distance between a gateway and the connected device cannot exceed 15 meters, and a maximum of one brick wall is allowed in between. If this range is exceeded, the signal may be severely attenuated or the connection may fail.

  Ensure that the WLAN signals are stable enough for wireless networking. Otherwise, the devices may fail to connect to the WLAN or frequently go offline.

- Supported devices

  The all-in-one system, SmartAssistant, and Smart Guard can be connected to a gateway, as shown in **Table 8-12**.

  Figure 8-28 and **Figure 8-29** use the all-in-one system and gateway as an example to illustrate the connections.

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Table 8-12 Devices that can be connected to a gateway

Product Type	Model
All-in-one system	LUTERRA-S2-XL
SmartAssistant	SA4H-A02, SA4H-A03
Smart Guard	SmartGuard-63A-S0, SmartGuard-63A-S1
Note: If the SmartGuard-63A-S0 is used, the software versions must be upgraded to SmartHEMS V100R026C10 or later and BackupBoxA V100R023C10SPC10 or later.	

Figure 8-28 Wired connection between the gateway and the router

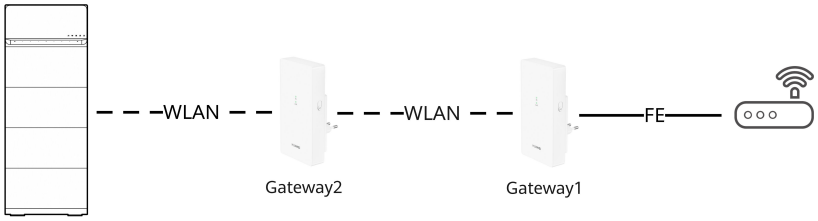
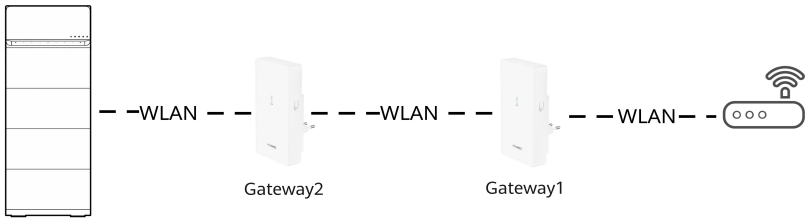


Figure 8-29 Wireless connection between the gateway and the router

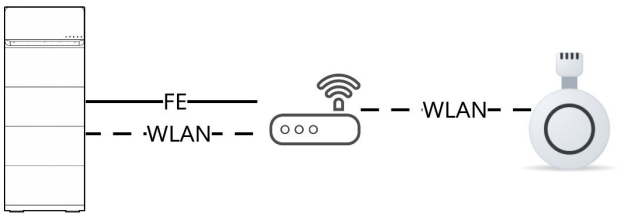


8.4 (Optional) P1 Converter Configuration and Wiring

In on-grid and on/off-grid scenarios, the all-in-one system can reuse the existing smart meter (P1 meter for short) that can be connected to the P1 converter.

The P1 meter and the all-in-one system are connected to the same router. The P1 converter transmits the energy data at the grid connection point measured by the P1 meter to the all-in-one system.

Figure 8-30 Connecting to the P1 converter



P1 converter that has passed the compatibility test: HomeWizard HWE-P1.

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Table 8-13 P1 converter that has passed the compatibility test

Vendor	Model	DSMR Protocol Version
HomeWizard	HWE-P1	5.0 or later
Note: To ensure normal communication between the P1 converter and the all-in-one system, the smart meter connected to the P1 converter must support DSMR 5.0 or later.		

NOTE

Due to the data update time limit of the P1 converter, if the system requires 2s backflow prevention, this converter cannot be used.

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9 Power-On

9.1 Check Before Power-On

No.	Check Item	Expected Result
1	Equipment installation	The equipment is installed correctly and securely.
2	Switch	• The DC SWITCH on the equipment is OFF. • All switches connected to the equipment are OFF.
3	Operating voltage	Use a multimeter to measure the grid voltage and ensure that the voltage is within the operating voltage range of the equipment. If the voltage exceeds the range, check the circuits.
4	Cable connection	• The PE cable is reliably grounded. • The AC power cables, DC power cables, and communications cables are correctly and securely connected.
5	Cable binding	Cables are bound in accordance with the cabling requirements, distributed properly, and free from damage. Cable ties are evenly distributed and no sharp edge exists.
6	Port sealing	• Duct covers are retained for unused ports. • Unused cable holes are sealed with rubber plugs. • Cable holes through which cables have been routed are sealed.
7	Installation environment	• The installation position facilitates operation and maintenance, and the installation space facilitates ventilation and heat dissipation. • The installation environment is clean and tidy without foreign objects. Idle packing materials, such as cartons, foam, plastics, and cable ties, have been removed from the equipment area.

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9.2 Powering On the System

WARNING

Wear PPE and use dedicated insulated tools to avoid electric shocks or short circuits.

CAUTION

Power on batteries within 24 hours after unpacking. If the batteries cannot be powered on in time, put them in the original packaging and place them in a dry indoor environment without corrosive gases. During later maintenance, ensure that the power-off time does not exceed 24 hours.

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.

When powering on the equipment for the first time after installation, you can use either of the following methods:

- Method 1: Power-on in on-grid mode. This method is used when the power grid supplies power properly.
- Method 2: Power-on in off-grid mode. This method is used during commissioning when the power grid is disconnected in the on/off-grid scenario.

NOTE

In the following scenarios, you must choose power-on in on-grid mode for the first power-on and commissioning of the plant. Otherwise, the devices cannot be detected during commissioning because they lack stable power supply or cannot be powered on.

- Optimizers are configured for all PV modules.
- The on/off-grid scenario is involved and an external power meter is configured.
- Smart devices (such as chargers) are connected to the non-backup port of the Smart Guard or outside the Smart Guard.

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9.2.1 Power-On in On-Grid Mode

Table 9-1 Power-on in on-grid mode

Procedure		Indicator Status	System Status
1	(Perform this step only if the Smart Guard is connected.) Turn on the switches between the Smart Guard and the power grid, all-in-one system, backup loads, and non-backup loads. **CAUTION** Do not operate the bypass switch and ensure that it is OFF.	-	-
2	Use a multimeter to check that the AC voltage in the power distribution box is within the allowed range and that cables are correctly connected.	-	-
3	Turn on the AC switch between the all-in-one system and the power grid.	The indicator blinks white slowly.	AC connected but not in operation
4	Set the DC SWITCH of the inverter to ON. **NOTE** Turn on the DC switch (if any) between the PV strings and the all-in-one system.	The indicator blinks white slowly.	DC connected but not in operation
5	In the backup scenario, after checking that the residential load circuit is not short-circuited, turn on the backup load switch.	-	-

NOTE

During system initialization, the indicator blinks.

9.2.2 Power-On in Off-Grid Mode

On/Off-Grid Scenario (All-in-One System + Smart Guard)

CAUTION

- In the on/off-grid scenario, power-on in off-grid mode is supported only when the Smart Guard is configured.
- The power and current of backup loads cannot exceed the maximum off-grid power and current of the system. You are advised to shut down high-power loads and unnecessary loads connected to the backup load port.

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Table 9-2 Procedure for power-on in off-grid mode (all-in-one system + Smart Guard)

Procedure		Indicator Status	System Status
1	Turn on the switches in the Smart Guard. **CAUTION** • Do not operate the bypass switch and ensure that it is OFF. • If the all-in-one system is used with the Smart Guard, ensure that the GRID port of the all-in-one system is connected to the inverter port of the Smart Guard and no cable is connected to the LOAD port of the all-in-one system. • If an AC switch is installed between the GRID port of the all-in-one system and the Smart Guard, turn on the switch.	-	-
2	Use a multimeter to check that the AC voltage in the power distribution box is within the allowed range and that cables are correctly connected.	-	-
3	Ensure that the AC switch between the Smart Guard and the power grid is OFF.	The  indicator is off.	AC not powered on
4	Set the DC SWITCH of the inverter to ON. **NOTE** Turn on the DC switch (if any) between the PV strings and the inverter.	The  indicator blinks white slowly.	DC in operation
5	On the plant home screen of the all-in-one system, tap **Monitoring** and then tap the corresponding all-in-one system name to access the home screen of the single system. Choose **Settings** > **Grid parameters** and set the grid code for the inverter. Then, choose **Settings** > **Feature parameters** and set **Backup box** to **Smart Guard**.	The  indicator blinks white fast. The SmartAssistant running indicator on the Smart Guard is steady green.	All-in-one system in off-grid output state
6	Check that the power of residential backup loads does not exceed the off-grid operating power of the all-in-one system and that the current of the backup loads does not exceed the maximum off-grid operating current of the system.	-	-
7	After checking that the residential load circuit is not short-circuited, turn on the residential backup load switch.	-	-

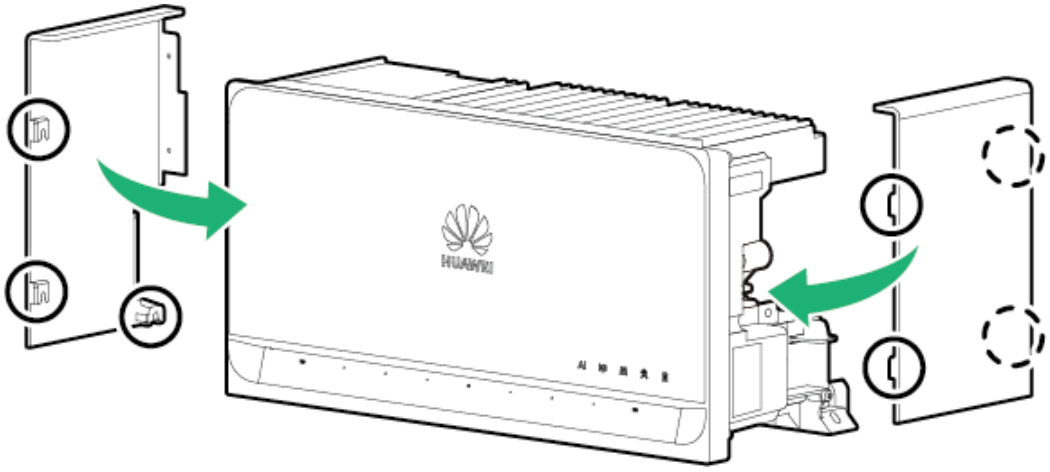
NOTE

During system initialization, the indicator blinks.

9.3 Installing Decorative Covers

WARNING

Wear PPE and use dedicated insulated tools to avoid electric shocks or short circuits.



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10 Maintenance

10.1 Powering Off the System

Before cleaning the system, connecting cables, and checking grounding reliability, power off the system to prevent electric shocks.

WARNING

- Wear PPE and use dedicated insulated tools to avoid electric shocks or short circuits.
- After the equipment is powered off, the remaining electricity and heat may still cause electric shocks and burns. Wait for at least 5 minutes and wear insulated gloves before performing any operations on the equipment.

Method 1: Powering Off Using the App

Procedure		Indicator Status	System Status
1	On the plant home screen of the all-in-one system, tap **Monitoring** and then tap the corresponding all-in-one system name to access the home screen of the single system. Choose **Maintenance** > **Power On/Off** and send a shutdown command. **CAUTION** The loads connected to the backup port are still running properly.	The indicator blinks white slowly.	AC connected but not in operation
		The indicator blinks white slowly.	DC connected but not in operation
		The indicator is off.	Hibernating
2	Turn off the AC switch between the all-in-one system and the power grid.	The indicator is off.	AC not powered on

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Procedure		Indicator Status	System Status
3	Set the DC SWITCH of the inverter to OFF. **NOTE** Turn off the DC switch (if any) between the PV strings and the all-in-one system.	The indicator is off.	DC not powered on
4	Turn off the backup load switch. (if any)	-	-

Method 2: Powering Off Using the ON/OFF Button

Procedure		Indicator Status	System Status
1	Press and hold the ON/OFF button on the left side of the inverter for 5s.	The indicator blinks white slowly.	AC connected but not in operation
		The indicator blinks white slowly.	DC connected but not in operation
		The indicator is off.	Hibernating
2	Set the DC SWITCH of the inverter to OFF. **NOTE** Turn off the DC switch (if any) between the PV strings and the all-in-one system.	The indicator is off.	DC not powered on
3	Turn off the AC switch between the all-in-one system and the power grid.	The indicator is off.	AC not powered on
4	Turn off the backup load switch. (if any)	-	-

10.2 Routine Maintenance

To ensure that the all-in-one system can operate properly for a long term, you are advised to perform routine maintenance on it as described in this section.

Prerequisites

Power off the system according to **10.1 Powering Off the System** before cleaning the system, connecting cables, and checking grounding reliability.

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Maintenance checklist

Table 10-1 Maintenance checklist

Check Item	Check Method	Maintenance Interval
System cleanliness	Check periodically whether at the heat sinks are free from obstacles and dust.	Once every 6 to 12 months
Cleanness of air intake and exhaust vents	Periodically check whether there is dust or foreign objects at the air intake and exhaust vents.	Once every 6 to 12 months (or once every 3 to 6 months based on the actual dust conditions in the environment)
System running status	• Check whether the inverter is damaged or deformed. • Check whether the inverter generates abnormal sounds during operation. • Check whether all inverter parameters are correctly set during operation.	Once every 6 months
Electrical connections	• Check whether cables are securely connected. • Check whether cables are damaged or cracked, especially whether the cable sheath that contacts a metal surface is damaged.	6 months after the first commissioning and once every 6 to 12 months after that
Grounding reliability	Check whether ground cables are securely connected.	6 months after the first commissioning and once every 6 to 12 months after that
Sealing	Check whether all terminals and ports are properly sealed.	Once 12 months
Battery maintenance	If batteries have not been used or charged for a long time, charge them periodically to prolong their service life.	For details about the charging requirements, see section "Battery Charge."
Firmware version upgrade	On the app, choose **Maintenance** > **Upgrade device** and check whether the firmware has been updated to the latest version.	Perform an upgrade when a new version is available. Before the upgrade, ensure that the equipment is running properly and record the current version.

10.3 Replacing Components

10.3.1 Replacing an Antenna

Operation Requirements

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

Procedure

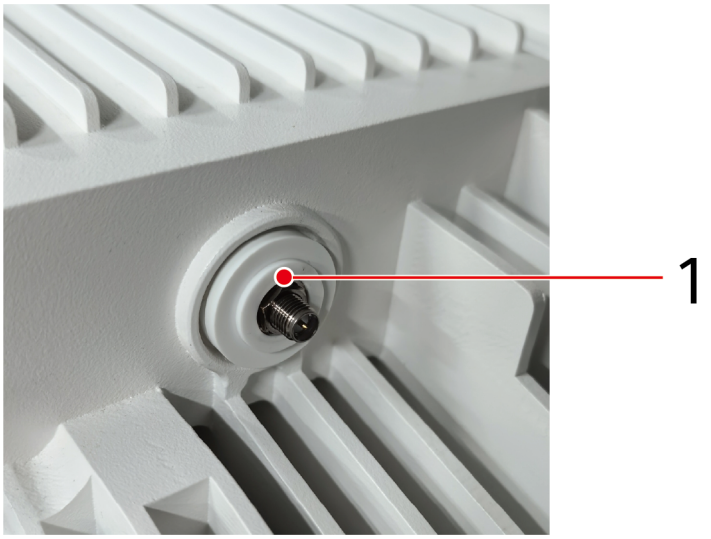
Step 1 Remove the faulty antenna.

1. Power off the system. For details, see **10.1 Powering Off the System**.

   WARNING

   After the system powers off, the remaining electricity and heat may still cause electric shocks and burns. After the system is powered off for 5 minutes and all indicators on the inverter are off, wear PPE such as insulated gloves, and use an electroprobe to check that there is no voltage before performing subsequent operations.

2. Use a wrench with an open end of 13 mm to rotate the nut and remove the faulty antenna. Take off the old round rubber pad (position 1 in the figure).



Step 2 Install a new antenna.

Install the new round rubber pad and antenna in sequence. After partially tightening the nut for several turns, use a wrench with an open end of 13 mm to rotate the nut to secure the antenna (1 N·m).

Step 3 Power on the system. For details, see **9.2 Powering On the System**.

Step 4 If the WiFi alarm is cleared, the antenna is successfully replaced.

----End

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10.3.2 Replacing an Inverter

Operation Requirements

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

Procedure

Step 1 Remove the faulty inverter.

1. Power off the system. For details, see **10.1 Powering Off the System**.

   WARNING

   After the system powers off, the remaining electricity and heat may still cause electric shocks and burns. After the system is powered off for 5 minutes and all indicators on the inverter are off, wear PPE such as insulated gloves, and use an electroprobe to check that there is no voltage before performing subsequent operations.

2. Label the connected cables to facilitate future identification and prevent device exceptions caused by incorrect connections.
3. Remove all cables from the inverter, such as the signal cables, DC power cables, AC power cables, and PE cable.

   WARNING

   During the removal phase, the PE cable must be removed last.

4. Remove the screws from the faulty inverter, and then slowly remove the inverter.

Step 2 Pack the faulty inverter.

- If the original packaging is available, put the inverter inside it and then seal it using adhesive tape.
- If the original packaging is unavailable, put the inverter inside a suitable hard cardboard box and seal it properly.

Step 3 Install a new inverter and connect the cables.

Step 4 Power on the system. For details, see **9.2 Powering On the System**.

Step 5 Perform commissioning again and add the new inverter to the plant where the old inverter was located.

Step 6 Implement device replacement.

1. Log in to the remote app and select the target plant on the home screen.
2. On the **Device** screen, tap the device to be replaced.
3. Choose **::** > **Device replacement** in the upper right corner.

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4. On the **Device replacement** screen, tap  to scan the QR code of the new device or enter its SN.
5. Tap **Replace**.

Step 7 Scrap the faulty inverter.

If the inverter reaches the end of its service life, dispose of it according to local regulations for the disposal of electrical equipment.

----End

10.3.3 Replacing an Energy Storage Module

Operation Requirements

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

Procedure

Step 1 Remove the faulty energy storage module.

1. Power off the system. For details, see **10.1 Powering Off the System**.

> **WARNING**
>
> After the system powers off, the remaining electricity and heat may still cause electric shocks and burns. After the system is powered off for 5 minutes and all indicators on the inverter are off, wear PPE such as insulated gloves, and use an electroprobe to check that there is no voltage before performing subsequent operations.

2. Label the connected cables to facilitate future identification and prevent device exceptions caused by incorrect connections.
3. Remove all cables from the inverter, such as the signal cables, DC power cables, AC power cables, and PE cable.

> **WARNING**
>
> During the removal phase, the PE cable must be removed last.

4. Remove the screws from the inverter, and then slowly remove the inverter.
5. Remove the folded mounting brackets and screws from the energy storage module. Then, slowly lift the energy storage module by holding its lifting handles. Remove the module after ensuring that it is completely separated from the energy storage module under it. Repeat these operations until the faulty energy storage module is removed.

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> **CAUTION**
>
> Energy storage modules are heavy. For personal safety, if there are more than three energy storage modules, use a hoisting tool that meets safety requirements and ensure that the operations are performed by professionals.

Step 2 Delete the offline module.

1. Reinstall the removed inverter and the functional energy storage modules. For details, see **6.2 Floor-Mounted Installation**.
2. Power on the system. For details, see **9.2 Powering On the System**.
3. On the plant home screen of the all-in-one system, tap **Monitoring** and then tap the corresponding all-in-one system name to access the home screen of the single system. Choose **Maintenance** > **Power On/Off**, send a startup command, and wait for the inverter to run.
4. Delete the offline module.

   On the plant home screen of the all-in-one system, tap **Monitoring** and then tap the corresponding all-in-one system name to access the home screen of the single system. Choose **Maintenance** > **Battery maintenance** > **Battery pack management** and delete the offline faulty energy storage module.

Step 3 Install a new energy storage module.

1. Power off the system. For details, see **10.1 Powering Off the System**.
2. Remove the inverter and install a new energy storage module. For details, see **6.2 Floor-Mounted Installation**.

> **CAUTION**
>
> Energy storage modules are heavy. For personal safety, if there are more than three energy storage modules, use a hoisting tool that meets safety requirements and ensure that the operations are performed by professionals.

3. Install the inverter. For details, see **6.2 Floor-Mounted Installation**.

Step 4 Power on the system. For details, see **9.2 Powering On the System**.

Step 5 Reconnect to the app for device commissioning. Choose **Maintenance** > **Battery maintenance** > **Battery pack management** for the all-in-one system, check whether the new energy storage module is online.

Step 6 Recycle the faulty energy storage module.

- 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.

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- 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.

----End

10.4 Charge Requirements for Batteries in Low SOC

After batteries are 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 batteries in low SOC. Otherwise, the batteries may be damaged due to overdischarge and energy storage modules need to be replaced.

Storing the batteries in low SOC may occur in the following scenarios:

- 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 not covered by the warranty.
- When the battery SOC is low due to self-discharge loss or extended periods of storage without being charged, the system forcibly charges the batteries to prevent damage from overdischarge. Additionally, in situations where the PV power is insufficient, the system will draw power from the grid regardless of the **Charge from AC** threshold.

10.5 Battery Health Check

To ensure safe and reliable operation of the ESS, the system checks the state of health (SOH) of batteries for calibration. SOH refers to the ratio of the maximum battery charge to its rated capacity. If the SOH value decreases to a lower threshold, safety risks may occur. To ensure safe power consumption, the ESS will stop working and generate an alarm. SOH calculation is performed on a complete session of battery charge and discharge. During this process, if the conditions are met, the system naturally calculates the SOH. If the calculation conditions are not

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met for a long time, the system performs the automatic SOH check. You can also manually check the SOH to improve the check success rate and shorten the check duration.

Natural Check

Trigger condition: During normal operation, after a complete battery charge and discharge session, the SOH check will be performed once. The check does not require manual operations and is triggered when conditions are met.

For example, in the **Maximum self-consumption** mode, when the PV power is greater than the load power, the batteries are fully charged to 100% SOC by the surplus PV power. When the PV power is insufficient and the batteries discharge to less than 5% SOC, the SOH is checked once.

Impact during the battery SOH check: A natural check is performed during the normal operation of batteries and therefore does not affect the operating status of the ESS.

Automatic Check

Trigger conditions: During normal operation, if the conditions for a natural check are not met, automatic check will be performed one year after the last SOH check. It is also performed three months after the last SOH check near the end of the battery service life (the SOH is between 55% and 65%).

Impacts during the battery health check:

- Only one energy storage module under each inverter can be checked at a time. If there are multiple energy storage modules under an inverter, they will be checked in sequence.
- During an automatic check, a complete charge and discharge session shall be performed on the energy storage modules. During this period, the system running status may not be as expected. During the discharge, the energy storage module under check cannot be charged. During the charge, all energy storage modules cannot discharge. During the check, the end-of-charge SOC, end-of-discharge SOC, and backup power SOC may exceed the preset values. The battery SOC may decrease to 0%, and the power backup capability and grid peak shaving capability of the system may decrease. During this process, if the power grid fails, power supply to loads may be interrupted. During the check, the SOC values of energy storage modules may fluctuate greatly. After the check is complete, the SOC values will gradually restore to the normal state.
- To ensure accurate calculation, the charging session must be completed within 24 hours. If the charging session exceeds the time limit, the check will fail and an automatic check will be performed 48 hours later. To improve the check success rate and reduce the check duration, you are advised to enable the grid charging function.
- During the automatic check, the working mode of the ESS may be changed. For details, see the following table.

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Table 10-2 Impact of the automatic check (ESS working mode of TOU)

Current Charging/ Discharging Status	Impact of Automatic Check During Charging	Impact of Automatic Check During Discharging
Charging	The ESS working mode is not affected. Batteries are charged at the maximum power.	The ESS working mode is not affected. Only the energy storage modules under check cannot be charged.
Discharging; non-charging and non-discharging	Battery discharging stops. The energy storage module under check is charged based on the power of the single energy storage module.	

Table 10-3 Impact of the automatic check (ESS working mode of maximum self-consumption)

Current Charging/ Discharging Status	Impact of Automatic Check During Charging	Impact of Automatic Check During Discharging
The PV power is greater than the load power and battery charge power, and the surplus PV power is fed to the grid.	The ESS working mode is not affected. Batteries are charged at the maximum power.	The ESS working mode is not affected. Only the energy storage modules under check cannot be charged.
The PV power is greater than the load power, and batteries are charged.	The energy storage module under check is charged based on the power of the single energy storage module. The load may need to purchase power from the power grid.	
The PV power is less than the load power, and batteries discharge.	Battery discharging stops. The energy storage module under check is charged based on the power of the single energy storage module. The load consumes more power from the power grid.	

Table 10-4 Impact of the automatic check (ESS working mode of fully fed to the grid)

Current Charging/ Discharging Status	Impact of Automatic Check During Charging	Impact of Automatic Check During Discharging
The PV power is greater than the power limit at the grid connection point, and batteries are charged.	The energy storage module under check is charged based on the power of the single energy storage module. The feed-in power decreases.	The ESS working mode is not affected. Only the energy storage modules under check cannot be charged.

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Current Charging/ Discharging Status	Impact of Automatic Check During Charging	Impact of Automatic Check During Discharging
The PV power is less than the power limit at the grid connection point, and batteries discharge.	Battery discharging stops. The energy storage module under check is charged based on the power of the single energy storage module. The feed-in power decreases.	

- The **Battery Health Check** status of the ESS can be **Pending** or **In auto detection**.

NOTE

- Choose **Monitoring** from the main menu of the management system. In the navigation pane, select the all-in-one system. In the **ESS** area of the **Details** tab page, view the **Battery Health Check** status of a single battery pack in different phases: **Pending**, **Requesting...**, **Detecting**, or **Completed**.
- When the grid power fails, automatic check exits during off-grid switching. If the SOC is lower than the backup power SOC during switching, backup power may be insufficient.
- During the automatic battery health check, the Energy Management Assistant, peak shaving, and third-party ESS scheduling functions are affected.
- During the automatic check, if the load power is low, the irradiance is weak, or the temperature is too low for a long time, the check may fail. If the check fails, the system does not save the check process data. The check restarts after the conditions are met.
- During the automatic battery health check, the system does not respond to third-party ESS scheduling.

Manual Check

Application scenarios:

- If the automatic check fails and an alarm about battery health check timed out is generated, tap **Manual Check** to manually trigger the check.
- If there are a large number of energy storage modules, the automatic check may take a long time. To complete the check quickly, tap **Manual Check** to trigger the check.
- The automatic check may fail due to load, irradiance, or temperature factors. In this case, you can tap **Manual Check** to manually trigger the check.

Navigation path:

- Local app: On the plant home screen of the all-in-one system, tap **Monitoring** and then tap the corresponding all-in-one system name to access the home screen of the single system. On the home screen of the single system, choose **Maintenance** > **Battery maintenance** > **Battery Health Check** and tap **Manual Check**.
- Remote app: In the selected plant, tap **Device**, tap the all-in-one system card, and tap **Manual Check** on the details screen to start the check.
- Management system: Choose **Monitoring** from the main menu of the management system. In the navigation pane, select the all-in-one system. On the **Details** tab page, click **Manual Battery Health Check**.

Impacts during the battery health check:

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- During manual check, the original charge and discharge behavior is changed, and the ESS is automatically charged and discharged. During discharging, all energy storage modules can only discharge power. The battery discharge has priority over PV power supply. In this case, the inverter power is limited, affecting the energy yield. During charging, the ESS is charged at the maximum power. To ensure sufficient charging and discharging capabilities, the ESS can be charged from the grid. In this case, the disabling of **Charge from AC** becomes invalid.
- The **Battery Health Check** status of the ESS can be **Pending**, **In manual detection**, **Completed**, or **Detection failed**.

NOTE

- Choose **Monitoring** from the main menu of the management system. In the navigation pane, select the all-in-one system. In the **ESS** area of the **Details** tab page, view the **Battery Health Check** status of a single battery pack in different phases: **Pending**, **Requesting...**, **Detecting**, or **Completed**.
- To avoid check failure, start **Manual Check** when the battery SOC is greater than or equal to 10%.
- You can tap **Manual Check** or **Stop test** to start or stop the manual check only when the ESS is running properly in an on-grid scenario.
- When **Battery Health Check** is displayed as **Completed** or **Detection failed**, **Battery Health Check** is automatically restored to **Pending** if the device is powered off or restarted.
- You are advised to start **Manual Check** when the energy consumption is high. Otherwise, the check may fail.
- In the charging check phase, the ESS cannot discharge. If there is no PV power, the inverter cannot switch to the off-grid mode when the power grid fails.
- Do not perform update, I-V curve scanning, optimizer search, disconnection detection, or log download during the check.

10.6 SOC Correction

If the ESS is powered on for the first time, powered on after long-term storage, or in standby mode for a long time, the SOC precision may deviate. You are advised to perform the following operations to correct the SOC precision.

It is recommended that the batteries be charged until the SOC reaches 100% or discharged until the SOC is less than 10% at least once every two weeks.

10.7 Battery Troubleshooting

NOTE

In this section, the battery power control module refers to the inverter, and the battery pack and battery expansion module refer to the energy storage module.

Alarm severities are defined as follows:

- Major: The ESS shuts down or some of its functions are abnormal due to a fault.
- Minor: Some components of the ESS are faulty but the ESS can still work.

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Table 10-5 Common alarms and troubleshooting measures

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3007	Battery expansion module cable disconnected	Major	1. The power cable to the battery expansion module is disconnected. 2. A battery expansion module is faulty.	1. Issue a shutdown command on the app, turn off the inverter AC output switch and inverter DC input switch, and wait for 5 minutes. 2-1. If the number of battery expansion modules in the rack is 1, turn on the inverter AC output switch and inverter DC input switch, and issue a startup command on the app. If the alarm persists, contact your vendor or technical support. 2-2. If the number of battery expansion modules in the rack is greater than 1, record the SN, initial physical position, and whether a fault is reported of each battery expansion module in the rack. Then connect the battery expansion modules to the inverter module one by one, turn on the inverter AC output switch and inverter DC input switch, and issue a startup command on the app. 2-2-1. If all the modules work abnormally, replace the inverter module. 2-2-2. If some battery expansion modules work abnormally, replace the abnormal modules. 2-2-3. If all battery expansion modules work properly, the connector of a battery expansion module is faulty. In this case, exchange the lowest battery expansion module that has not reported a fault with the one at the bottom. 2-2-4. If the alarm persists, contact your vendor or technical support.

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Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3008	Battery expansion module overtemperature	Minor	1. The installation position of the battery expansion module is not well ventilated. 2. The ambient temperature is excessively high. 3. A battery expansion module is faulty.	1. Check whether the [Battery-CabinetNo battery expansion module-SlotNo] is properly ventilated and whether the ambient temperature exceeds the upper threshold. 2. If the ventilation is poor or the ambient temperature is too high, improve the installation environment. 3. If the alarm persists after the ventilation and ambient temperature become normal, contact your vendor or technical support.
3009	Battery expansion module low temperature	Minor	1. The ambient temperature is excessively low. 2. A battery expansion module is faulty.	1. Check whether the ambient temperature of the [Battery-CabinetNo battery expansion module-SlotNo] is below the lower threshold. 2. If the ambient temperature is too low, improve the installation environment. 3. If the alarm persists after the ambient temperature becomes normal, contact your vendor or technical support.

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Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3010	Battery expansion module short circuit	Major	1. A battery expansion module is short-circuited. 2. A battery expansion module is faulty.	1. Issue a shutdown command on the app, turn off the inverter AC output switch and inverter DC input switch, and wait for 5 minutes. 2-1. If the number of battery expansion modules in the rack is 1, turn on the inverter AC output switch and inverter DC input switch, and issue a startup command on the app. If the alarm persists, contact your vendor or technical support. 2-2. If the number of battery expansion modules in the rack is greater than 1, connect the battery expansion modules to the inverter module one by one, turn on the inverter AC output switch and inverter DC input switch, and issue a startup command on the app. 2-2-1. If all the modules work abnormally, replace the inverter module. 2-2-2. If some battery expansion modules work abnormally, replace the abnormal modules. 2-2-3. If the alarm persists, contact your vendor or technical support.

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Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3013	Abnormal Battery Expansion Module Communication	Major	1. The communications cable to the battery expansion module is disconnected. 2. The battery expansion module is abnormal.	1. Issue a shutdown command on the app, turn off the inverter AC output switch and inverter DC input switch, and wait for 5 minutes. 2-1. If the number of battery expansion modules in the rack is 1, turn on the inverter AC output switch and inverter DC input switch, and issue a startup command on the app. If the alarm persists, contact your vendor or technical support. 2-2. If the number of battery expansion modules in the rack is greater than 1, record the SN, initial physical position, and whether a fault is reported of each battery expansion module in the rack. Then connect the battery expansion modules to the inverter module one by one, turn on the inverter AC output switch and inverter DC input switch, and issue a startup command on the app. 2-2-1. If all the modules work abnormally, replace the inverter module. 2-2-2. If some battery expansion modules work abnormally, replace the abnormal modules. 2-2-3. If all battery expansion modules work properly, the connector of a battery expansion module is faulty. In this case, exchange the lowest battery expansion module that has not reported a fault with the one at the bottom. 2-2-4. If the alarm persists, contact your vendor or technical support.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3049	Inconsistent Battery Power Control Module Versions	Warning	1. The versions of the power control modules in the parallel system are inconsistent. 2. The update failed.	1. The version of the power control modules in [Battery-CabinetNo] is inconsistent with that of other power control modules in the parallel system and needs to be updated. 2. If the update failed multiple times, contact your vendor or technical support.
3050	Inconsistent ESS Versions	Warning	1. The versions of the battery packs are inconsistent. 2. The update failed.	1. The versions of the battery packs are inconsistent. Perform an update again. 2. If the update failed multiple times, contact your vendor or technical support.
3051	ESS Version Mismatch	Major	1. The version of the inverter modules is incompatible with that of the battery packs, which affects the normal operation. 2. The update failed.	1. The version of the inverter modules is incompatible with that of the battery packs. Perform the update again. 2. If the update failed multiple times, contact your vendor or technical support.
3061	Battery Pack Lifespan Reached	Major	The battery pack has reached its lifespan.	[Battery-CabinetNo battery expansion module-SlotNo] has reached the end of life. Contact a local recycling agency to dispose of it in compliance with local laws and regulations as well as applicable standards.

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Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3066	Abnormal EN Signal on Battery Expansion Module	Warning	1. The EN cable of the battery expansion module is connected to an incorrect port. 2. The battery expansion module is abnormal.	1. Issue a shutdown command on the app, turn off the inverter AC output switch, inverter DC input switch, and battery DC switch, and wait for 5 minutes. 2. Arrange the cables and check whether the communications cable between the [Battery-CabinetNo Battery expansion module-SlotNo] and another battery expansion module or the power control module is correctly connected. If not, correct the connection. 3-1. If the number of battery expansion modules in the rack is 1, turn on the battery DC switch, inverter AC output switch, and inverter DC input switch, and issue a startup command on the app. If the alarm persists, contact your vendor or technical support. 3-2. If the number of battery expansion modules in the rack is greater than 1, connect the battery expansion modules to the power control module one by one, turn on the battery DC switch, inverter AC output switch, and inverter DC input switch, and issue a startup command on the app. 3-2-1. If all the modules work abnormally, replace the power control module. 3-2-2. If some battery expansion modules work abnormally, replace the abnormal modules. 3-2-3. If the alarm persists, contact your vendor or technical support.
3070	ESS Health Check Timeout	Warning	The ESS has not received a health check for a long time.	Perform a battery health check manually.

Alarm ID	Alarm Name	Severity	Possible Cause	Suggestion
3071	Battery Expansion Module Locked	Major	A battery expansion module is faulty.	Contact your vendor or technical support.
3072	Abnormal Battery Expansion Module	Major	A battery expansion module is faulty.	1. Issue a shutdown command on the app, turn off the inverter AC output switch and inverter DC input switch, and wait for 5 minutes. 2. Turn on the inverter AC output switch and inverter DC input switch. 3. Issue a startup command on the app. 4. If the alarm persists, contact your vendor or technical support.

10.8 Resetting Passwords by Operating the ON/OFF Button

You can reset the WiFi password and local app login password by operating the ON/OFF button on the all-in-one system.

Operation	Press the ON/OFF button on the all-in-one system for 1s for three consecutive times within 10s.
Symptom	• If the , , and indicators blink red fast, the password resetting has started. • If the , , and indicators are white or off, the passwords have been reset.
Result	After the resetting is successful: • Scan the QR code on the side of the all-in-one system to connect to the WiFi network. The WiFi connection password has been reset to the initial password. Change the password promptly. • Log in to the app locally to change the login password.

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11 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.

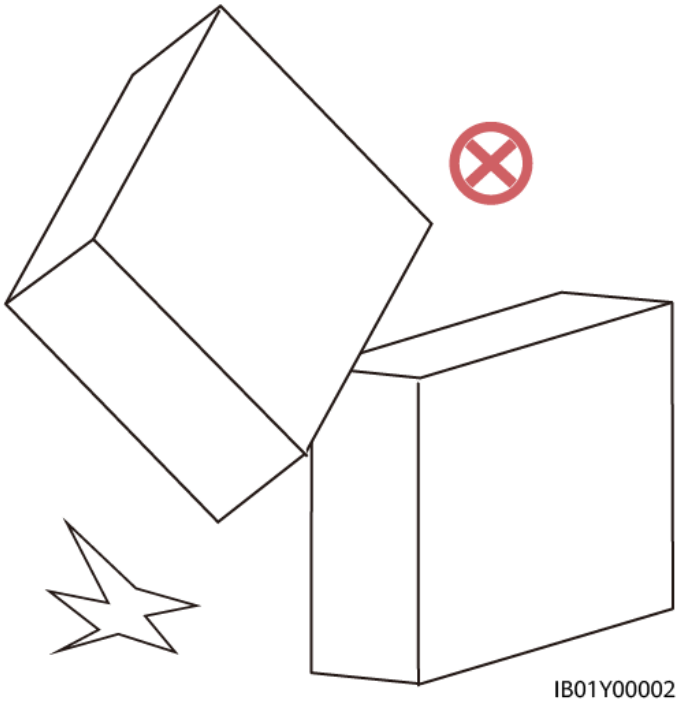
Battery Falling or Strong Impact

DANGER

If a battery is dropped or violently impacted during installation, it may become faulty and must not 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 shall 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.

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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.

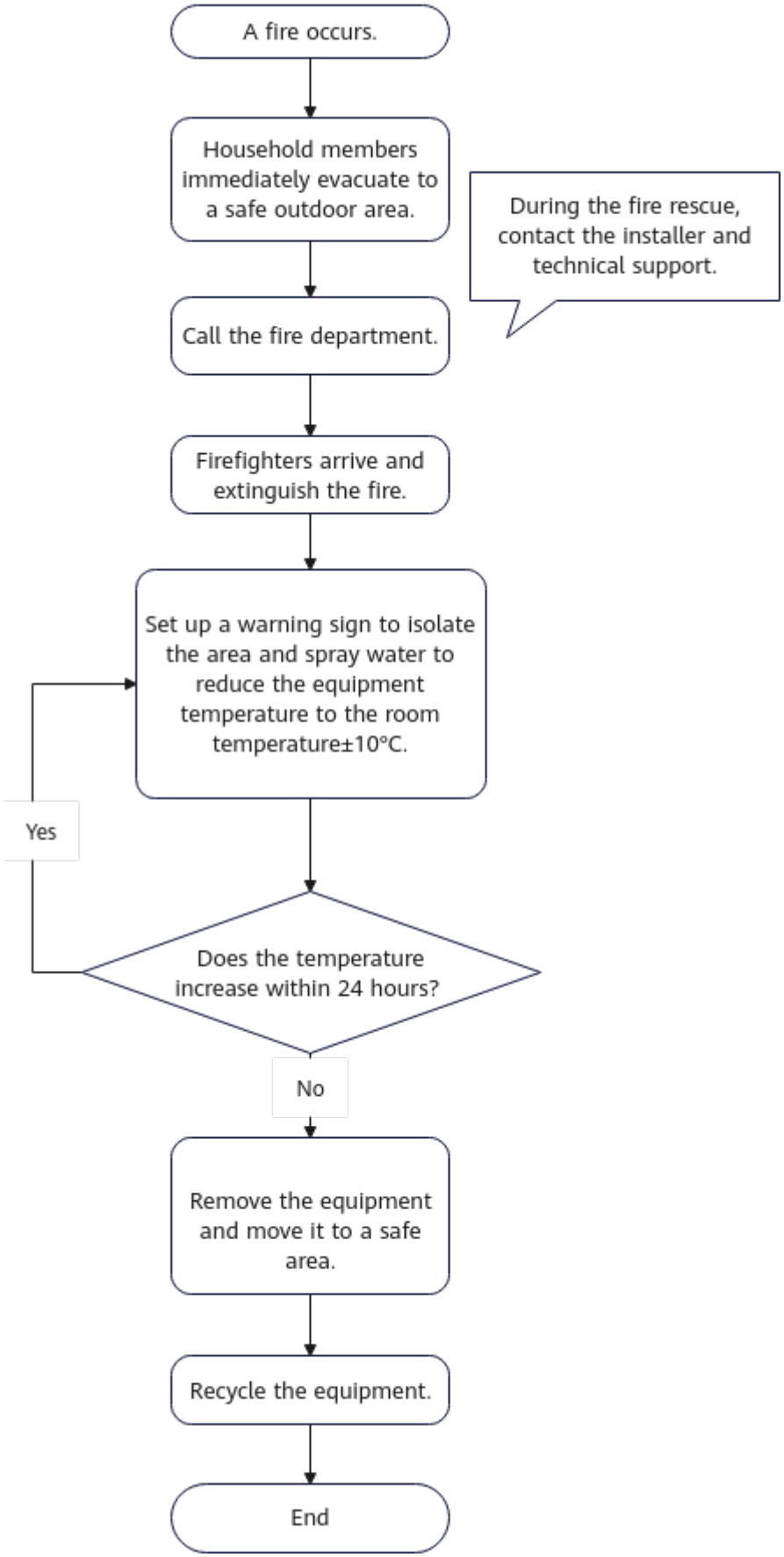
Smoke or Fire

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±10°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.

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If the equipment emits smoke or catches fire, household members should not dispose of it by themselves. Follow the following steps:


A fire occurs.
Household members immediately evacuate to a safe outdoor area.
During the fire rescue, contact the installer and technical support.
Call the fire department.
Firefighters arrive and extinguish the fire.
Set up a warning sign to isolate the area and spray water to reduce the equipment temperature to the room temperature±10°C.
Yes
Does the temperature increase within 24 hours?
No
Remove the equipment and move it to a safe area.
Recycle the equipment.
End

The detailed description is as follows:

(1) If the equipment emit smoke or catch fire, 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 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 equipment temperature to the room temperature±10°C. (You can use an infrared thermometer or thermal imager.)

(5) Observe the equipment for 24 hours and remove it after ensuring that there is no sign of temperature rise. (Only professionals are allowed to remove the equipment.)

(6) After removing the equipment, move it to a safe place (an open and safe outdoor place is recommended), place it 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 fire is extinguished, if there is no potential risk onsite, the equipment shall 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.

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(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 shock.

(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 the required PPE such as air-purifying respirator.

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

(1) Stop the all-in-one system immediately: Press and hold the ON/OFF button on the left side of the inverter for 5s, turn the DC SWITCH of the inverter to OFF, and turn off the AC switch between the all-in-one system and the power grid.

(2) Indoor installation scenario: Indoor personnel shall 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 fire is extinguished and there is no potential risk onsite, professionals handle and recycle the equipment after wearing insulated gloves, insulated

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shoes, and other PPE in accordance with local laws and regulations. After an accident occurs, the manufacturer can identify the damage to the equipment and replace it according to the corresponding procedure to restore the system.

- After a fire is extinguished, the firewater 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 equipment such as residential PV systems, contact the equipment distributor and installer. You can also contact us through the local service hotline on the official website.

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12 Technical Specifications

12.1 Inverter Technical Specifications

Efficiency

Item	LUTERRA-3K-XL0	LUTERRA-3.68K-XL0	LUTERRA-4K-XL0	LUTERRA-4.6K-XL0	LUTERRA-5K-XL0	LUTERRA-6K-XL0
Maximum efficiency	98.6%	98.6%	98.6%	98.6%	98.6%	98.6%
European efficiency	97.5%	97.8%	97.9%	98.1%	98.2%	98.3%

DC Input

Item	LUTERRA-3K-XL0	LUTERRA-3.68K-XL0	LUTERRA-4K-XL0	LUTERRA-4.6K-XL0	LUTERRA-5K-XL0	LUTERRA-6K-XL0
Maximum input DC power	6000 W	7360 W	8000 W	9200 W	10,000 W	12,000 W
Maximum input voltage[a]	600 V DC					
Maximum input current (per MPPT)	18 A at 25°C (subject to the product nameplate)					

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Item	LUTERRA-3K-XL0	LUTERRA-3.68K-XL0	LUTERRA-4K-XL0	LUTERRA-4.6K-XL0	LUTERRA-5K-XL0	LUTERRA-6K-XL0
Maximum short-circuit current (per MPPT)	24 A (subject to the product nameplate)					
Minimum startup voltage	35 V DC					
MPPT voltage range	30–560 V DC					
Rated input voltage	360 V DC					
Number of inputs	2					
Number of MPPTs	2					
Maximum battery input voltage	600 V DC					
Battery voltage range	350–560 V DC					
Maximum battery current	18.3 A					
Battery type	Li-ion					
Note a: The maximum input voltage is the maximum DC input voltage that the inverter can withstand. If the input voltage exceeds this value, the inverter may be damaged.						

On-Grid Input

Item	LUTERRA-3K-XL0	LUTERRA-3.68K-XL0	LUTERRA-4K-XL0	LUTERRA-4.6K-XL0	LUTERRA-5K-XL0	LUTERRA-6K-XL0
Maximum charge power of grid	3000 W	3680 W	4000 W	4600 W	5000 W	6000 W

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On-Grid Output

Item	LUTERRA-3K-XL0	LUTERRA-3.68K-XL0	LUTERRA-4K-XL0	LUTERRA-4.6K-XL0	LUTERRA-5K-XL0	LUTERRA-6K-XL0
Rated output power	3000 W	3680 W	4000 W	4600 W	5000 W	6000 W
Maximum apparent power	3300 VA	3680 VA	4400 VA	5000 VA	5500 VA/ 5000 VA[a]	6600 VA
Maximum active power (cosϕ = 1)	3300 W	3680 W	4400 W	5000 W	5500 W/5000 W[a]	6600 W
Rated output voltage	220 V/230 V/240 V					
Rated output current	13.6 A/220 V 13.0 A/230 V 12.5 A/240 V	16 A/230 V 15.3 A/240 V	18.2 A/220 V 17.4 A/230 V 16.7 A/240 V	20.9 A/220 V 20 A/230 V 19.2 A/240 V	22.7 A/220 V 21.7 A/230 V 21 A/240 V	27.3 A/220 V 26.1 A/230 V 25 A/240 V
Maximum output current	15 A	16 A	20 A	23 A	25 A	30 A
Power factor	–0.8 leading to +0.8 lagging					
Output DC component (DCI)	≤ 0.5% of the rated output		≤ 0.25% of the rated output			
Maximum total harmonic distortion (rated power)	< 2% (rated conditions)					
Note a: Overload is not supported by the LUTERRA-5K-XL0 model that does not support software-defined power. The maximum apparent power is 5000 VA, and the maximum active power (cosϕ = 1) is 5000 W.						

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Off-Grid Output

Item	LUTERRA-3K-XL0	LUTERRA-3.68K-XL0	LUTERRA-4K-XL0	LUTERRA-4.6K-XL0	LUTERRA-5K-XL0	LUTERRA-6K-XL0
Rated apparent power	3000 VA	3680 VA	4000 VA	4600 VA	5000 VA	6000 VA
Overload time	≤ 110% load: long-term operation 110%–150% load: 5 minutes 150%–200% load: 10 seconds					

Protection

Item	LUTERRA-3K-XL0	LUTERRA-3.68K-XL0	LUTERRA-4K-XL0	LUTERRA-4.6K-XL0	LUTERRA-5K-XL0	LUTERRA-6K-XL0
Overvoltage category	DC II/AC III					
Input DC switch	Supported					
Anti-islanding protection	Supported					
Output overcurrent protection	Supported					
Input reverse polarity protection	Supported					
PV string fault detection	Supported					
DC surge protection	Supported					
AC surge protection	Supported					
Insulation resistance detection	Supported					

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Item	LUTERRA-3K-XL0	LUTERRA-3.68K-XL0	LUTERRA-4K-XL0	LUTERRA-4.6K-XL0	LUTERRA-5K-XL0	LUTERRA-6K-XL0
Arc-fault circuit interrupter (AFCI)	Supported					
Residual current monitoring unit (RCMU)	Supported					

Display and Communication

Item	LUTERRA-3K-XL0	LUTERRA-3.68K-XL0	LUTERRA-4K-XL0	LUTERRA-4.6K-XL0	LUTERRA-5K-XL0	LUTERRA-6K-XL0
Display	LED Indicators					
RS485 communication	Supported					
WLAN-FE	Supported					
Built-in WLAN	Supported					

General Specifications

Item	LUTERRA-3K-XL0	LUTERRA-3.68K-XL0	LUTERRA-4K-XL0	LUTERRA-4.6K-XL0	LUTERRA-5K-XL0	LUTERRA-6K-XL0
Dimensions (W x H x D)	590 mm × 300 mm × 255 mm					
Net weight	≈ 21 kg					
Noise	≤ 29 dB (typical working conditions)					
Operating temperature	–25°C to +60°C					
Relative humidity	0%–100% RH					
Cooling mode	Natural cooling					

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Item	LUTERRA-3 K-XL0	LUTERRA-3 .68K-XL0	LUTERRA-4 K-XL0	LUTERRA-4 .6K-XL0	LUTERRA-5 K-XL0	LUTERRA-6 K-XL0
Maximum operating altitude	4000 m (derated when the altitude is greater than 2000 m)					
Storage temperature	–40°C to +70°C					
IP rating	IP66					
Topology	Transformerless					

Wireless Communication Specifications

Item	Inverter Built-in WiFi
Frequency	2400–2483.5 MHz
Protocols and standards	802.11b/g/n/ax
Bandwidth	≤ 40 MHz
Maximum transmit power	≤ 20 dBm EIRP

12.2 Energy Storage Module Technical Specifications

Table 12-1 Energy storage module technical specifications

Performance	
Energy storage module	LUTERRA-5-E2
Rated energy[a]	4.9 kWh
Rated charge power	2.5 kW
Rated discharge power	3 kW
Discharge overload capacity	5 kW (10s) & 3.6 kW (15 min)
Rated voltage (single-phase)	380 V
Operating voltage range (single-phase)	350–560 V
General Specifications	
Energy storage module dimensions (W x H x D)	590 mm × 290 mm × 255 mm
Energy storage module weight	≈ 46 kg

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Installation mode	Floor-mounted (standard), wall-mounted (optional)
Operating temperature	–25°C to +60°C
Maximum operating altitude	4000 m
Operating relative humidity	5%–95%
Cooling mode	Natural convection
IP rating	IP66 (system level)
Cell	LiFePO4

Note a:

- 4.9 kWh is the initial capacity (designed) of an energy storage module. The actual capacity is affected by the external environment (such as temperature, transportation, and storage).
- Capacity expansion is supported. A maximum of four energy storage modules can be installed.

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13 Grid Codes

NOTE

The grid codes are subject to change. The listed codes are for reference only.

Grid Code	Description	LUTERRA-3K-XL0	LUTERRA-3.68K-XL0	LUTERRA-4K-XL0	LUTERRA-4.6K-XL0	LUTERRA-5K-XL0 (Supports Software-Defined Rated Power)	LUTERRA-6K-XL0	LUTERRA-5K-XL0 (Does Not Support Software-Defined Power)
VDE-AR-N-4105	Germany low-voltage power grid	Supported	Supported	Supported	Supported	Not supported	Not supported	Not supported
UTE C 15-712-1(A)	Mainland France 230 V power grid	Supported	Supported	Supported	Supported	Supported	Supported	Supported
UTE C 15-712-1(B)	French island 230 V power grid	Supported	Supported	Supported	Supported	Supported	Supported	Supported
UTE C 15-712-1(C)	French island 230 V power grid	Supported	Supported	Supported	Supported	Supported	Supported	Supported

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Grid Code	Description	LUTERRA-3K-XL0	LUTERRA-3.68K-XL0	LUTERRA-4K-XL0	LUTERRA-4.6K-XL0	LUTERRA-5K-XL0 (Supports Software-Defined Rated Power)	LUTERRA-6K-XL0	LUTERRA-5K-XL0 (Does Not Support Software-Defined Power)
CEI0-21	Italy power grid	Supported	Supported	Supported	Supported	Supported	Supported	Supported
RD1699/661	Spain low-voltage power grid	Supported	Supported	Supported	Supported	Supported	Supported	Supported
C10/11	Belgium power grid	Supported	Supported	Supported	Supported	Supported	Supported	Supported
IEC61727	India IEC 61727 low-voltage grid-connection (50 Hz)	Supported	Supported	Supported	Supported	Supported	Supported	Supported
TAI-PEA	Thailand grid-connection standard	Supported	Supported	Supported	Supported	Supported	Supported	Supported
TAI-MEA	Thailand grid-connection standard	Supported	Supported	Supported	Supported	Supported	Supported	Supported
IEC61727-60Hz	IEC 61727 low-voltage grid-connection (60 Hz)	Supported	Supported	Supported	Supported	Supported	Supported	Supported

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Grid Code	Description	LUTERRA-3K-XL0	LUTERRA-3.68K-XL0	LUTERRA-4K-XL0	LUTERRA-4.6K-XL0	LUTERRA-5K-XL0 (Supports Software-Defined Rated Power)	LUTERRA-6K-XL0	LUTERRA-5K-XL0 (Does Not Support Software-Defined Power)
EN50549-LV	Ireland new standard power grid	Supported	Supported	Supported	Supported	Supported	Supported	Supported
AUSTRIA	Austria power grid	Supported	Supported	Not supported	Not supported	Not supported	Not supported	Not supported
G99-TYPEA-LV	UK G99 power grid	Not supported	Not supported	Supported	Supported	Supported	Supported	Supported
NTS	Spain power grid	Supported	Supported	Supported	Supported	Supported	Supported	Supported
EN50549-SE	Sweden power grid	Supported	Supported	Supported	Supported	Supported	Supported	Supported
EN50549-PL	Poland power grid	Supported	Supported	Supported	Supported	Supported	Supported	Supported
Island-Grid	Off-grid	Supported	Supported	Supported	Supported	Supported	Supported	Supported
SWITZERLAND-NA/EEA:2020-LV230	Switzerland (new standard in 2020)	Supported	Supported	Supported	Supported	Supported	Supported	Supported
IRELAND-EN50549-LV230	Ireland low-voltage power grid	Supported	Supported	Supported	Supported	Supported	Supported	Supported

Grid Code	Description	LUTERRA-3K-XL0	LUTERRA-3.68K-XL0	LUTERRA-4K-XL0	LUTERRA-4.6K-XL0	LUTERRA-5K-XL0 (Supports Software-Defined Rated Power)	LUTERRA-6K-XL0	LUTERRA-5K-XL0 (Does Not Support Software-Defined Power)
AUSTRALIA-AS4777_A-LV230	Australia power grid	Supported	Supported	Supported	Supported	Supported	Supported	Supported
AUSTRALIA-AS4777_B-LV230	Australia power grid	Supported	Supported	Supported	Supported	Supported	Supported	Supported
AUSTRALIA-AS4777_C-LV230	Australia power grid	Supported	Supported	Supported	Supported	Supported	Supported	Supported
AUSTRALIA-AS4777_NZ-LV230	Australia power grid	Supported	Supported	Supported	Supported	Supported	Supported	Supported
N/A	Default grid code	Supported	Supported	Supported	Supported	Supported	Supported	Supported
CZECH-EN50549-LV230	Czech Republic power grid	Supported	Supported	Supported	Supported	Supported	Supported	Supported
FINLAND-EN50549-LV230	Finland power grid	Supported	Supported	Supported	Supported	Supported	Supported	Supported
FRANCE-EN50549-230	France FD C11-519-11	Supported	Supported	Supported	Supported	Supported	Supported	Supported

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Grid Code	Description	LUTERRA-3K-XL0	LUTERRA-3.68K-XL0	LUTERRA-4K-XL0	LUTERRA-4.6K-XL0	LUTERRA-5K-XL0 (Supports Software-Defined Rated Power)	LUTERRA-6K-XL0	LUTERRA-5K-XL0 (Does Not Support Software-Defined Power)
G99/NI-TYPEA-230	Northern Ireland G99 EREC G99/NI	Not supported	Not supported	Supported	Supported	Supported	Supported	Supported
Philippines-PDC	Philippines PDC	Supported	Supported	Supported	Supported	Supported	Supported	Supported

14 Rapid Shutdown

The rapid shutdown function is supported only when optimizers are configured for all PV modules connected to the all-in-one system.

When the PV system output is disconnected or the all-in-one system shuts down, the optimizers reduce the PV string output voltage to below 30 V within 30s to ensure personal safety.

Method 1: Turning Off the AC Switch

- Prerequisite: **Off-grid mode** has been disabled. (On the plant home screen of the all-in-one system, choose **Settings** > **Backup power parameters** and disable **Off-grid mode**.)
- Triggering method: After **Off-grid mode** is disabled, turn off the AC switch between the all-in-one system and the power grid to trigger rapid shutdown (disconnect the voltages of all PV strings connected to the all-in-one system under the AC switch).

Method 2: DI-based Rapid Shutdown

- Prerequisite: The **DI rapid shutdown** function has been set. (On the plant home screen of the all-in-one system, tap **Monitoring** and then tap the corresponding all-in-one system name to access the home screen of the single system. Choose **Settings** > **Feature parameters** > **Running protection** and set **Dry contact function** to **DI rapid shutdown**.)
- Triggering method: After the **DI rapid shutdown** function is set, connect the RSD and GND pins of the COM2 port on the all-in-one system to the rapid shutdown switch (the distance between the rapid shutdown switch and the all-in-one system must be less than or equal to 10 m). The rapid shutdown switch is on by default. When the switch is off, rapid shutdown is triggered.

Method 3: AFCI Triggering

- Prerequisite: **AFCI** has been enabled. (On the plant home screen of the all-in-one system, tap **Monitoring** and then tap the corresponding all-in-one system name to access the home screen of the single system. Choose **Settings** > **Feature parameters** > **Running protection** and enable **AFCI**.)

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- Triggering method: After **AFCI** is enabled, the all-in-one system automatically implements arc fault detection, and triggers rapid shutdown when AFCI lockout protection is activated.

15 System Shutdown via DI

Application Scenario

If no optimizer is configured for PV modules, you can use the function of system shutdown via DI.

Implementation

Step 1 Set the function of system shutdown via DI.

Connect the local app to a single all-in-one system, choose **Settings** > **Feature parameters** > **Running protection**, and set **Dry contact function** to **Shut down system via DI**.

Step 2 Connect the RSD and GND pins of the COM2 port on the all-in-one system to the local normally closed switch.

- Switch ON: The system is running properly.
- Switch OFF: System shutdown is triggered. The all-in-one system will shut down within 5 seconds.

----End

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16 Contact Information

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

https://digitalpower.huawei.com

Path: **About Us** > **Contact Us** > **Global Service Hotlines**

To ensure faster and better services, we kindly request your assistance in providing the following information:

- Model
- Serial number (SN)
- Software version
- Alarm ID or name
- Brief description of the fault symptom

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NOTE

EU Representative Information: Huawei Technologies Hungary Kft.
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Email: hungary.reception@huawei.com

17 Digital Power Customer Service

https://digitalpower.huawei.com/robotchat/

18 Reference

18.1 Indicator Description

Table 18-1 All-in-one system status indicator

Indicator	Status	Description
 Smart scheduling status indicator	Steady white	AI effective
	Off	AI ineffective
 Communication status indicator	Steady white	Normal FE communication
	Blinking white slowly (on for 1s and off for 1s)	Wireless communication, good signal quality
	Blinking white fast (on for 0.2s and off for 0.2s)	Mobile phone connected locally
	Off	There is no communication. Check the power supply and network connection.
	Blinking red slowly (on for 1s and off for 1s)	Wireless communication, poor signal quality
	Steady red	Faulty
 DC status indicator	Steady white	DC in operation
	Blinking white slowly (on for 1s and off for 1s)	DC connected but not in operation
	Off	DC not powered on
	Blinking red slowly (on for 1s and off for 1s)	There is a DC environmental alarm, such as **High String Input Voltage**, **String Reverse Connection**, or **Low Insulation Resistance**.

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Indicator	Status	Description
	Steady red	The device hardware or system is faulty.
 AC status indicator	Steady white	All-in-one system operating in on-grid mode
	Blinking white slowly (on for 1s and off for 1s)	AC connected but not in operation
	Blinking white fast (on for 0.2s and off for 0.2s)	All-in-one system operating in off-grid mode
	Off	AC not powered on
	Blinking red slowly (on for 1s and off for 1s)	There is an AC environmental alarm, such as **Grid Undervoltage**, **Grid Overvoltage**, **Grid Overfrequency**, or **Grid Underfrequency**.
	Steady red	The device hardware or system is faulty.
 Energy storage module status indicator	Steady white	Battery in operation
	Blinking white slowly (on for 1s and off for 1s)	Battery connected but not in operation
	Off	Hibernating
	Blinking red slowly (on for 1s and off for 1s)	The battery environment is abnormal. Check whether an alarm is generated.
	Steady red	An energy storage module is faulty and needs to be replaced.
If the ,  and  indicators are steady red at the same time, the inverter hardware is faulty and needs to be replaced.		

Table 18-2 Battery indicator

Status	Description
White light flow: from both sides toward the center	The energy storage modules are being charged.
White light flow: from the center toward both sides	The energy storage modules are discharging.
Steady white	The energy storage modules are in non-charge/discharge state. The average SOC (%) is displayed. For example, if the white light accounts for 50% of the entire light strip, the current SOC is about 50%.
Blinking white slowly (on for 1s and off for 1s)	The energy storage modules have reached the lower discharge limit and stop discharging.

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19 Certificate Management and Maintenance

19.1 Initial Certificate Risk Disclaimer

Huawei's initial certificates are mandatory identity credentials for Huawei devices before delivery. The disclaimer statements for using the certificates are as follows:

1. Huawei's initial certificates are used only to establish initial security channels for devices to access the customer network during deployment.
2. Initial certificates have a validity period. The validity period of Huawei's root certificates expires in 2041 and 2099, respectively, and the validity period of identity certificates expires earlier than that of root certificates.
3. After devices access the customer network, the management responsibilities of the devices and digital certificates are transferred to the customer. Huawei recommends that the customer replace the initial certificates used by devices on the live network with customer's own certificates, and use certificates with a short validity period and periodically replace the certificates in accordance with industry best practices. This helps mitigate the risk of private key leakage of digital certificates and prevent service interruption caused by certificate expiration.

For details about the rights and responsibilities related to initial certificates, see **Rights and Responsibilities of Initial Digital Certificates on Huawei Devices**.

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19.2 Application Scenarios of Initial Certificates

Table 19-1 Certificate list

Usage	Name on App	Name on Management System	Scenario	Replacement Guide
Management system communication certificate	Modbus-TCP NMS	Modbus-TCP NMS	Authenticates the validity of the all-in-one system when the all-in-one system connects to and communicates with the management system through Modbus-TCP.	**19.3 Replacing a Certificate on the App** **19.4 Replacing a Certificate on the Management System**
App communication certificate	Local O&M Service	Local O&M Service	Authenticates the validity of the all-in-one system when the mobile app connects to and communicates with the all-in-one system through Modbus-TCP.	
Third-party EMS/VPP communication certificate	Third-Party Management System Certificate	Management system 1 (third-party)	Authenticates the validity of a third-party management system for communication through Modbus-TCP. **NOTICE** For communication with a third-party management system through Modbus-TCP, import the certificate from the third-party vendor.	
P1 communication certificate	P1 Communication Certificate	P1 Converter	Authenticates the validity of the P1 converter when the all-in-one system connects to and communicates with the P1 converter through HTTPS.	

19.3 Replacing a Certificate on the App

Initial certificates are used only for commissioning and are not for commercial use. Replace the initial certificates with new ones to improve communication security. To prevent security risks caused by expired certificates, you are advised to periodically update certificates.

Prerequisites

You have applied for a new certificate from the CA and have obtained the new certificate files. **Table 19-2** lists the certificate requirements.

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Table 19-2 Certificate requirements

Parameter	Requirement
Certificate signature algorithm	Use industry-leading security algorithms, such as sha256WithRSAEncryption or sha256ECDSA.
Key length	• For keys encrypted using RSA, the recommended length is 3072 bits or longer. • For keys encrypted using ECDSA, the length can be 256 or 384 bits. **NOTE** RSA keys shorter than 2048 bits or ECDSA keys shorter than 256 bits are insecure. For security purposes, ensure that the private key of the ER certificate is an RSA key of 3072 bits or longer or an ECDSA key of 256 bits or longer.
Certificate storage format	Certificates in .crt or .cer format are supported. The certificate in .cer format must be encoded using Base64. The file in .pem format is the private key file of a certificate.
Private key file format	PKCS#8 format.
Password complexity of the private key file	Contain 8 to 64 characters, including at least two types of the following: • Uppercase letters • Lowercase letters • Digits • Special characters (excluding <>;+&/|%(),`$)

Procedure

1. Log in to the app using an installer account and use the app to locally scan the QR code to connect to the all-in-one system.
2. On the plant home screen of the all-in-one system, tap **Monitoring** and then tap the corresponding all-in-one system name to access the home screen of the single system.
3. Choose **Maintenance** > **Certificate management**, select the certificate to be replaced, upload the corresponding certificates (root certificate, customer certificate, and key file), and enter the key password to replace the certificate.
4. After the replacement is complete, tap **Replace current certificate**.

19.4 Replacing a Certificate on the Management System

Initial certificates are used only for commissioning and are not for commercial use. Replace the initial certificates with new ones to improve communication security. To prevent security risks caused by expired certificates, you are advised to periodically update certificates.

Prerequisites

You have applied for a new certificate from the CA and have obtained the new certificate files.

Table 19-3 Certificate requirements

Parameter	Requirement
Certificate signature algorithm	Use industry-leading security algorithms, such as sha256WithRSAEncryption or sha256ECDSA.
Key length	• For keys encrypted using RSA, the recommended length is 3072 bits or longer. • For keys encrypted using ECDSA, the length can be 256 or 384 bits. **NOTE** RSA keys shorter than 2048 bits or ECDSA keys shorter than 256 bits are insecure. For security purposes, ensure that the private key of the ER certificate is an RSA key of 3072 bits or longer or an ECDSA key of 256 bits or longer.
Certificate storage format	Certificates in .crt or .cer format are supported. The certificate in .cer format must be encoded using Base64. The file in .pem format is the private key file of a certificate.
Private key file format	PKCS#8 format.
Password complexity of the private key file	Contain 8 to 64 characters, including at least two types of the following: • Uppercase letters • Lowercase letters • Digits • Special characters (excluding <>;+&/|%(),`$)

Method 1: Updating a Certificate Online on the Management System

1. Log in to the management system using an installer account.
2. Choose **Plants** > **Device** > **Device Certificate Management**.
3. Create an identity certificate template.
   a. Choose **Identity Certificate Template** and click **Create**.
   b. Set certificate application template parameters as required.

Table 19-4 Key parameters

Parameter	Description
CA Connection Mode	Select **Proxy**. **NOTE** Apply for Replacement Online: Connect to the CA server through the CA proxy to apply for a certificate for the device and replace the device certificate.
CA Server Name	Select a CA server.
Key Type	Set this parameter according to **Table 19-3**.
Key Length	
Common Name (CN)	Set this parameter as planned, for example, to **Device ESN**.

c. Click **OK**.

4. Update the identity certificate.
   a. Choose **Task Center** and click **Replacing Identity Certificate**.
   b. On the page for replacing the identity certificate, select **Apply for Replacement Online** and click **Start**.
5. Set related parameters as prompted and replace the certificate.

Method 2: Updating a Certificate Offline on the Management System

1. Log in to the management system as an installer.
2. Choose **Plants** > **Device** > **Device Certificate Management**.
3. Create an identity certificate template.
   a. Choose **Identity Certificate Template** and click **Create**.
   b. Set certificate application template parameters as required.

Table 19-5 Key parameters

Parameter	Description
CA Connection Mode	Select **Offline**.
Key Type	Set this parameter according to **Table 19-3**.
Key Length	
Common Name (CN)	Set this parameter as planned, for example, to **Device ESN**.

c. Click **OK**.

4. Obtain the CSR file and apply for a certificate.

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a. Choose **Task Center** and click **Replacing Identity Certificate**.
b. On the page for replacing the identity certificate, select **Replace by CSR File** and click **Start**.
c. Configure the identity certificate information and click **Apply for CSR Replacement**.

Table 19-6 Key parameters

Parameter	Description
Application Type	Select the type of the certificate to be updated.
Device Scope	Select the device for which the identity certificate needs to be updated.
Identity Certificate Template	Select the created identity certificate template.

d. After the CSR file is generated, download and use the CSR file to apply for and obtain a new certificate and related certificate files from the CA.

5. Upload and update the identity certificate. You need to upload and update the certificate as prompted.

NOTE

If you have exited the process of replacement by CSR file, go to the task list on the **Task Center** page, locate the target task, and click the edit button in the **Operation** column to re-enter the process of replacement by CSR file.

20 Acronyms and Abbreviations

A	
AC	alternating current
AFCI	arc-fault circuit interrupter
D	
DC	direct current
M	
MPPT	maximum power point tracking
P	
PE	protective earthing
PV	photovoltaic
R	
RCMU	residual current monitoring unit
RH	relative humidity
S	
SN	serial number
SOC	state of charge
SOH	state of health

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