SUNGROW
Clean power for all

User Manual

Battery Energy Storage System (BESS)

PowerKeeper-
ST050/062/075/087/100/112/125/137/150/162/175/187/200/212/225/237/250CF

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About This Manual

This manual mainly describes the product information, mechanical installation, electrical connection, powering on and off procedures, troubleshooting, and maintenance of the BESS. For additional information on other components, you may refer to http://www.sungrowpower.com or the respective component manufacturers' websites.

Applicability

This manual applies to the following product models:

- ST050CF
- ST062CF
- ST075CF
- ST087CF
- ST100CF
- ST112CF
- ST125CF
- ST137CF
- ST150CF
- ST162CF
- ST175CF
- ST187CF
- ST200CF
- ST212CF
- ST225CF
- ST237CF
- ST250CF

They will be referred to as "BESS" hereinafter unless otherwise specified.

Target Group

This manual is intended for professional technicians who are responsible for the installation, operation, and maintenance of the product. The technicians should possess the following qualifications:

- Having received training in electrical system installation, commissioning, and handling of hazards.
- Being familiar with the contents of this manual and other related documentation.
- Having a working knowledge of applicable local laws, regulations, and codes.

How to Use This Manual

Please read this manual carefully before using the product. Keep this manual in a place where it is easily accessible to O&M personnel.

All contents, pictures, marks and symbols in the manual are owned by SUNGROW. No part of this manual may be reproduced by non-internal staff without the prior written authorization of SUNGROW.

Figures are intended for conceptual understanding and may differ from the physical products.

This manual may be updated and revised from time to time, however, there still might be slight deviation from the real product or errors. In such cases, the actual product you have purchased should take precedence. The latest manual is available for download from the website **support.sungrowpower.com**.

Symbols in This Manual

To ensure user safety and protect property, and to improve product usability, this manual provides relevant information highlighted by the following symbols.

The symbols that may be used in this manual are listed below. Please review carefully for better use of this manual.

⚠ DANGER

Indicates high-risk potential hazards that, if not avoided, may lead to death or serious injury.

⚠ WARNING

Indicates moderate-risk potential hazards that, if not avoided, may lead to death or serious injury.

⚠ CAUTION

Indicates low-risk potential hazards that, if not avoided, may lead to minor or moderate injury.

NOTICE

Indicates potential risks that, if not avoided, can lead to device malfunctions or financial losses.

Indicates supplementary information, emphasis on specific points, or tips related to the use of the product that might help to solve your problems or save your time.

Signs on Product

Observe the warning signs on the equipment. Failure to do so may result in equipment damage or safety incidents. The explanations of the signs are as follows:

Sign	Definition
	Danger! No live working!
	High voltage inside! Touching may cause electric shock!
	Heavy object. Lifting may cause back injury. Please use appropriate lifting equipment.
	Explosion hazard.
	Corrosion hazard.
	CE marking. EU/EEA importer.
	UKCA marking.
	Do not dispose of it together with household waste.
	No smoking or open flames.
	A nearby medical facility must be set up.
	In case of eye contact, immediately flush eyes with running water or normal saline and seek medical attention promptly.
	Read the manual before performing any operation on the equipment.
	Wear safety goggles.
	The product is recyclable.

Sign	Definition
	The lithium battery is recyclable.
	The protective earthing (PE) terminal must be connected for reliable grounding to ensure the safety of the operator.

Terms

Abbreviation	Full Name / Meaning
B	
BMU	Battery management unit
BMS	Battery management system
C	
CAN	Controller area network
CMU	Cluster management unit
L	
LFP	Lithium iron phosphate
S	
S/G	Switch gear
SOC	State of charge
SOH	State of health
P	
Pack	Battery module

Contents

1 Safety Instructions

Follow strictly the relevant safety instructions during product installation, commissioning, operation, and maintenance. Improper operation or misuse may result in:

- injury to or death of the operator or a third party.
- damage to the product, or to the property that belongs to the operator or a third party.

⚠ WARNING

- **Do not perform any operation on the product (including but not limited to, handling, installing, powering on, and maintaining the product, performing electrical connection, and working at heights) in harsh weather conditions, such as thunder and lightning, rain, snow, or winds above Beaufort scale 6. SUNGROW shall not be held liable for any damage to the product due to force majeure, such as earthquakes, floods, volcanic eruptions, mudslides, lightning strikes, fires, wars, armed conflicts, typhoons, hurricanes, tornadoes, or other extreme weather conditions.**
- **In case of fire, immediately evacuate the building or product area and call the fire department. Do not go back to the fire area.**
- **Tighten the screws at the specified torques using proper tools when fastening the product and terminals. Otherwise, the product may be damaged. The damage caused therefrom will not be covered by the warranty.**
- **Before using any tools, ensure you are thoroughly familiar with their correct operation to prevent personal injury and equipment damage.**

NOTICE

Perform operations on the product only if you fully understand the contents of this manual and have appropriate tools in hand.

- Safety instructions in this manual serve only as a supplement and do not cover all required safety practices. All work should be carried out considering the actual situation on the site.
- SUNGROW shall not be held liable for any damage caused by violation of general safe operation requirements, safety standards, and the safety instructions specified in this manual.
- Product installation, operation, and maintenance should be conducted in compliance with applicable local laws, regulations, and specifications. Safety instructions in this manual should only be a supplement to the local laws, regulations, and specifications.
- During the product transport, installation, wiring, and maintenance, etc., the materials and tools prepared by users must meet the requirements of applicable local laws and regulations, safety standards, and other relevant specifications. SUNGROW shall not be held liable for any damage to the product caused by the adoption of materials and tools that fail to meet the above-mentioned requirements.
- Operations on the product, including but not limited to, handling, installing, wiring, powering on, maintenance, and use of the product, must not be performed by unqualified personnel. SUNGROW shall not be held liable for any damage to the product resulting from operations done by unqualified personnel.
- Where the transport of the product is arranged by users, SUNGROW shall not be held liable for any damage to the product that is caused by users themselves or the third-party transport service providers designated by the users.
- SUNGROW shall not be held liable for any damage to the product caused by the negligence, intent, fault, improper operation, and other behaviors of users or third-party organizations.
- SUNGROW shall not be held liable for any damage to the product arising from reasons unrelated to SUNGROW.

1.1 Safety Precautions

Before performing any operation, read all safety instructions thoroughly and always observe them while operating or handling the battery. Failure to comply with the precautions described in this section may result in serious personal injury or property damage.

⚠ DANGER

Explosion Hazard

- **Do not subject the battery to strong external impact.**
- **Do not cause mechanical damage to the battery (e.g., by puncturing, deforming, or disassembling it).**
- **Do not heat the battery or dispose of it in a fire.**
- **Do not install the battery in a potentially explosive environment.**
- **Do not immerse the battery in water or other liquids.**

⚠ DANGER

Fire Hazard

- **Do not place the battery near heat sources, such as direct sunlight, fireplaces, uninsulated walls exposed to sun, hot water, or heaters.**
- **Keep ignition sources (e.g., sparks, open flames, and smoking materials) away from the battery.**

⚠ DANGER

Electric Shock Hazard

- **Do not disassemble the battery.**
- **Do not handle the battery with wet hands or tools.**
- **Do not immerse the battery in water or expose it to moisture or liquids.**
- **Keep the battery out of reach of children and animals.**
- **Wear PPE such as protective clothing and gloves to prevent direct contact with DC voltage.**
- **Use insulated tools when working on the battery.**
- **Before working on DC circuits, ensure you are not wearing any metal accessories.**

1.2 Battery Handling

NOTICE

Handle the battery in compliance with local standards and regulations.

SUNGROW shall not be held liable for any battery damage resulting from improper human operation. Always handle the battery with care to prevent damage.

- Use the battery only as intended and designed.
- Install the battery in a suitable location.
- Ensure the battery is properly grounded before using it.

- Do not use the battery if it is defective (e.g., cracked, broken, damaged) or inoperable. Do not use the battery in conjunction with other types of battery.
- Do not pull, drag, or step on the battery.
- Do not leave any foreign debris inside the battery.
- Do not repair or modify the battery. It is not user-serviceable.
- Do not disconnect any cables while the battery is energized.
- Do not damage the protective sleeves of cables, wire harnesses, and connectors.
- Keep the battery away from materials prone to discharge (including electrostatic discharge) during charging, operation, and storage.
- Keep the battery out of reach of infants and children.
- Insulate the exposed terminals of the battery with insulating tape before they are properly disposed of.
- Protect the battery from direct contact with rain, snow, and water. Avoid dropping the battery or subjecting it to mechanical impact during transport.

1.3 Emergencies

1.3.1 Battery Leakage

Abuse, misuse, or damage to the battery may cause an increase in internal pressure. This can lead to electrolyte release. In the event of electrolyte release:

- Do not enter the room under any circumstances.
- Do not contact the released liquid or gases.
- Call local emergency services or the fire department if necessary.

If you are exposed to the released substance, follow the advice below to minimize injury:

- Inhalation: Evacuate the contaminated area and seek immediate medical attention.
- Eye contact: Flush eyes with large amounts of water for at least 15 min and seek immediate medical attention.
- Skin contact: Wash the affected area with large amounts of water for at least 15 min. Remove or soak contaminated clothing with water if possible. Seek immediate medical attention if irritation persists.
- Ingestion: Induce vomiting and seek immediate medical attention.

Blot the affected area with a water-soaked sponge or cloth until medical aid is obtained. These substances can damage the skin and eyes, and in severe cases, may lead to blindness.

1.3.2 Fire

A battery fire might occur despite elaborate design. Similarly, fire or abnormally high temperatures near the battery can cause it to ignite.

Personal Protective Equipment (PPE)

Respirators are not required during normal operation.

In the event of a fire, hazardous fumes may be released, including CO, CO_2, and other hydrocarbons. To comply with the PPE Directive (89/686/EEC), use a full-face self-contained breathing apparatus (SCBA) with full protective gear during firefighting operations.

Fire Suppression

NOTICE

In case of fire, only qualified firefighters equipped with appropriate PPE are permitted to enter the room containing the battery.
Be advised that extinguishing the fire may require a significant amount of time. Smoke indicates the battery is still burning. Considering leaving it to burn out completely. Remain aware that the battery carries a significant risk of re-ignition.

Firefighting procedure:

1. Shut down any connected power system or electronic devices, such as the battery, battery isolator, PV DC isolator, AC isolator, solar main switch, and normal supply main switch.
2. Before entering the hot zone of the incident, ensure the fire is adequately suppressed.
3. If the battery is on fire, extinguish it using fire sand, a CO_2 extinguisher, or other emergency firefighting equipment approved for use by firefighters.
4. If the fire is not originating from the battery and has not spread to it, use an ABC fire extinguisher. Remove the battery and other ignition sources from the fire scene.

1.3.3 Wet Battery

The battery has limited water resistance, but operation with a wet battery is not recommended. If the battery has been submerged in water, please contact the installer or customer service promptly.

1.3.4 Battery Damage

The battery is composed of lithium-ion cells. They are classified as dry cells. If the battery is damaged, only a small amount of electrolyte may leak.

A damaged battery can cause its cells to rapidly self-heat. If you notice smoke emanating from the cell area, treat it as a fire and take corresponding actions as outlined in 1.3.2 Fire.

Damaged batteries are hazardous and must be handled with extreme care. Do not reuse a damaged battery, as it may endanger personal or property safety. If the battery appears damaged:

1. Package it in its original shipping container.
2. Store it in a separate, isolated room (e.g., the installation location).

3. Contact SUNGROW.

⚠ DANGER

A damaged battery can release hazardous substances and a flammable gas mixture. Do not attempt to repair the battery, even if you are a qualified electrician.

2 Product Description

2.1 Product Introduction

Product Model

The product model code is defined as follows:

No.	Description
A	Energy storage product
B	Battery capacity
C	Commercial & industrial flexible application

Typical Application Scenarios

As a crucial part of the PV power generation system, the BESS works in conjunction with the hybrid inverter to store energy and supply it later. The BESS is connected to the hybrid inverter on the DC side via an S/G. Multiple battery stacks are connected in series via CAN communication.

Featuring a stackable, modular design, the BESS offers high deployment flexibility and facilitates convenient installation and O&M, enabling it to adapt to a wide range of application scenarios.

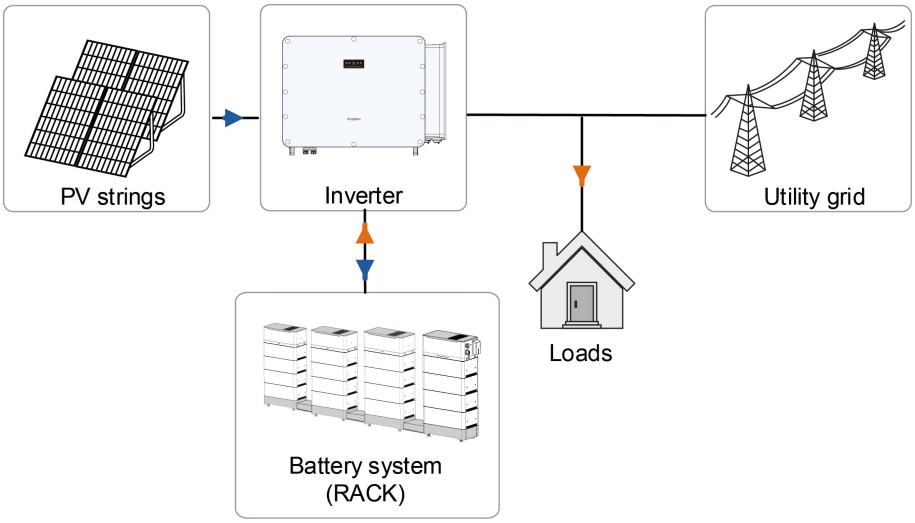
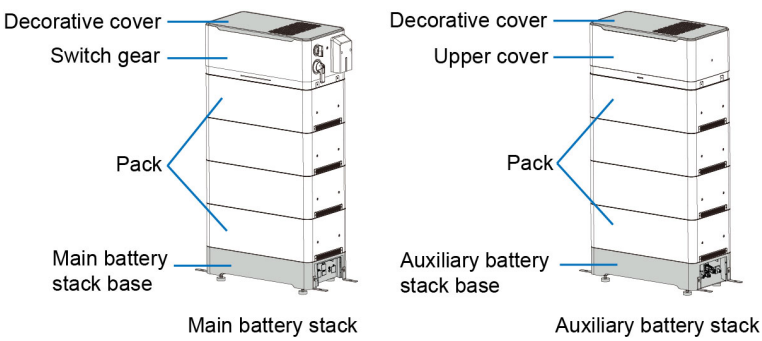


Figure 2-1 Typical Application Scenarios of BESS

*The figure is for reference only and the actual product shall prevail.

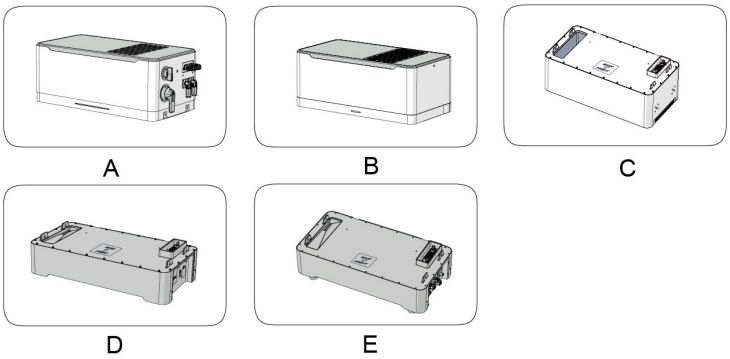
Product Composition

The BESS is primarily composed of the decorative upper cover, S/G for the main battery stack, upper cover for the auxiliary battery stack (if applicable), Pack, main battery stack base, auxiliary battery stack base, and other modules. The system allows 4 to 20 Packs to be connected in series.



*The figure is for reference only and the actual product shall prevail.

Key Components



*The figure is for reference only and the actual product shall prevail.

No.	Name
A	S/G (with a decorative upper cover)
B	Upper cover (with a decorative upper cover)
C	Pack
D	Main battery stack base
E	Auxiliary battery stack base

Table 2-1 BESS Composition

Model	S/G	Upper Cover	Pack	Main Battery Stack Base	Auxiliary Battery Stack Base	Recommended Combination*
ST050CF	1	0	4	1	0	4
ST062CF	1	0	5	1	0	5
ST075CF	1	1	6	1	1	3 + 3
ST087CF	1	1	7	1	1	4 + 3
ST100CF	1	1	8	1	1	4 + 4
ST112CF	1	1	9	1	1	5 + 4
ST125CF	1	1	10	1	1	5 + 5
ST137CF	1	2	11	1	2	4 + 4 + 3
ST150CF	1	2	12	1	2	4 + 4 + 4

Model	S/G	Upper Cover	Pack	Main Battery Stack Base	Auxiliary Battery Stack Base	Recommended Combination*
ST162CF	1	2	13	1	2	5 + 4 + 4
ST175CF	1	2	14	1	2	5 + 5 + 4
ST187CF	1	2	15	1	2	5 + 5 + 5
ST200CF	1	3	16	1	3	4 + 4 + 4 + 4
ST212CF	1	3	17	1	3	5 + 4 + 4 + 4
ST225CF	1	3	18	1	3	5 + 5 + 4 + 4
ST237CF	1	3	19	1	3	5 + 5 + 5 + 4
ST250CF	1	3	20	1	3	5 + 5 + 5 + 5

*For the recommended combination, the first number represents the quantity of Packs in the main battery stack. Numbers from the second onward represent the quantities of Packs in the auxiliary battery stacks. A maximum of five Packs can be stacked for each battery stack.

2.2 Component Introduction

S/G (With Decorative Upper Cover)

The S/G is equipped with a DC circuit breaker and a CMU, etc., and is used for the monitoring, energy transmission, and signal interaction of the BESS.

Table 2-2 S/G Specifications

Specifications	Value
Dimensions (W × H × D)	(800 ± 20) mm × (317 ± 20) mm × (405 ± 20) mm (handles and terminals excluded)

Specifications	Value
Weight	≤ 35 kg

Do not rotate the explosion relief valve on the back.

Upper Cover (With Decorative Upper Cover)

The upper cover is equipped with a fuse and a top controller, etc., and is used for the energy transmission and signal interaction of the battery.

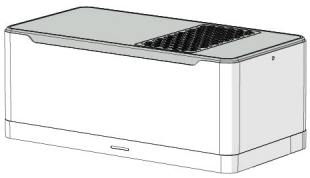


Table 2-3 Upper Cover Specifications

Specifications	Value
Dimensions (W × H × D)	(800 ± 20) mm × (317 ± 20) mm × (405 ± 20) mm (handles and terminals excluded)
Weight	≤ 30 kg

Do not rotate the explosion relief valve on the back.

Pack

The Pack is used for energy storage and supply. A single Pack is composed of cells connected in series. Data such as cell temperature and voltage are collected and then transmitted to the CMU inside the S/G for processing.

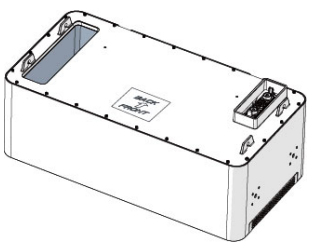


Table 2-4 Pack Specifications

Specifications	Value
Dimensions (W × H × D)	(800 ± 20) mm × (317 ± 20) mm × (405 ± 20) mm (handles and terminals excluded)
Weight	(90 ± 2) kg

Specifications	Value
C-rate	≤ 0.5 P
Cell type	Prismatic cell with aluminum shell, LFP
Configuration (series and parallel)	1P12S
Key components	12 cells and one BMU (1P12S)

*The values are for reference only, please refer to the actual product.

Base

The base contains components such as the power board and bottom controller. The base for the main battery stack houses one or more contactors, while the bases for the auxiliary battery stacks do not house any contactor. The base is used for holding the S/G, the top gear, or the Packs.

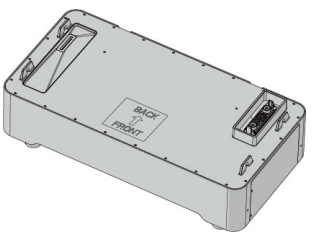
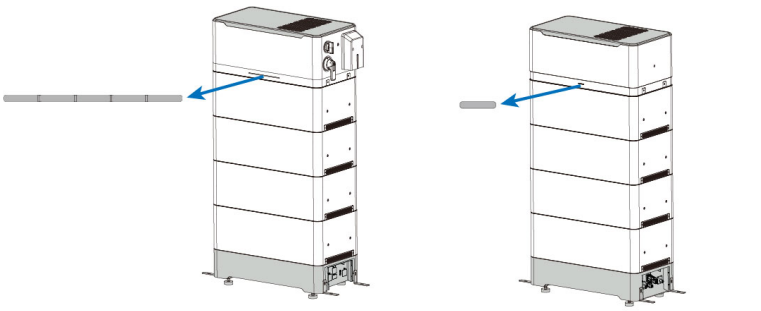


Table 2-5 Base Specifications

Specifications	Value
Dimensions (W × H × D)	(800 ± 20) mm × (170 ± 20) mm × (405 ± 20) mm (handles and terminals excluded)
Weight	≤ 35 kg (main battery stack base) ≤ 33 kg (auxiliary battery stack base)

2.3 LED Indicators

The BESS is equipped with two LED indicators: the SOC indicator and the status indicator.



Main battery stack Auxiliary battery stack

*The figure is for reference only and the actual product shall prevail.

SOC Indicator

The SOC indicator indicates the current SOC of the battery. The indicator is designed with five bars in total, each for 20% SOC.

Table 2-6 SOC Indicator

Indicator	Color	Status	Meaning
	Yellow	Steady on	SOC ≤ 5%
	Blue	Steady on	5% < SOC ≤ 20%
	Blue	Steady on	20% < SOC ≤ 40%
	Blue	Steady on	40% < SOC ≤ 60%
	Blue	Steady on	60% < SOC ≤ 80%
	Blue	Steady on	80% < SOC ≤ 100%

During the charging process of the BESS, the SOC indicator displays a chasing lights effect; during the discharging process, the SOC indicator displays a blinking effect.

Status Indicator

The status indicator indicates the current status of the battery, as shown in the table below:

Table 2-7 Main Battery Stack Status Indicator

Indicator	Color	Status	Meaning
	Blue	Steady on	In normal operation
		Flashing Interval: 1 s	Self-testing
		Flashing	Updating

Indicator	Color	Status	Meaning
		Interval: 0.5 s	
	Red	Steady on	Main battery stack fault
	Gray	In shutdown status	The BESS is powered off and in shutdown status.

Table 2-8 Auxiliary Battery Stack Status Indicator

Indicator	Color	Status	Meaning
	Blue	Steady on	In normal operation
		Flashing Interval: 1 s	Self-testing
		Flashing Interval: 0.5 s	Updating
	Red	Steady on	Auxiliary battery stack fault
	Gray	In shutdown status	The BESS is powered off and in shutdown status.

3 Unpacking and Storage

3.1 Unpacking and Inspection

The product has undergone strict tests and inspections before delivery. However, as it may still get damaged during transportation, please carry out a thorough inspection before signing the delivery receipt.

- Check the packaging for any damage.
- Check the delivered items for quantity and see if the delivery matches the order placed according to the packing list.
- Unpack and inspect the items inside for any damages.

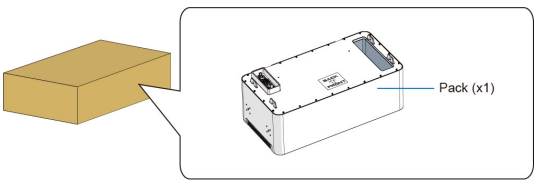


Figure 3-1 Pack Shipping Box

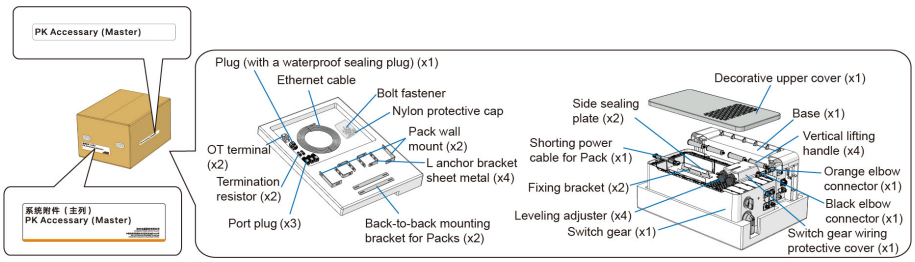


Figure 3-2 Main Battery Stack Accessory Shipping Box

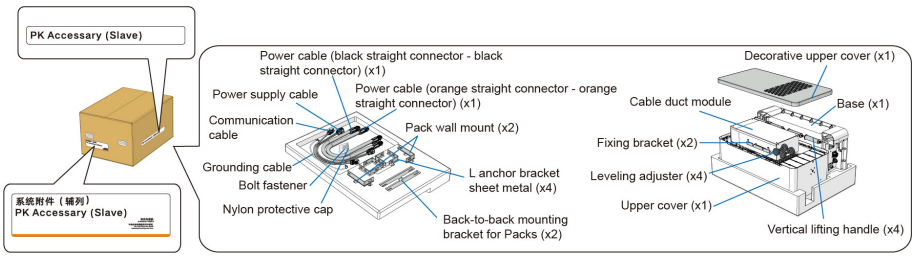


Figure 3-3 Auxiliary Battery Stack Accessory Shipping Box

Figures are for reference only. The actual shipping box you have received may differ.

Contact the transport company or SUNGROW in case of any damages or missing items, and provide relevant photos or the name/quantity of the missing items for better services.

Do not throw away the original packaging box. It is recommended to store the device in its original packaging after it is decommissioned.

NOTICE

- **Inspect the product for any external damages or damages to the structural parts, and check if the packing list matches the order placed. In case of any problem with the above-mentioned inspection items, do not install the device and contact SUNGROW in time.**
- **Exercise caution when using tools for unpacking to avoid damaging the product.**

3.2 Battery Storage

If the battery is not to be installed immediately, store it properly.

- Store the battery in its original packaging that contains desiccant inside.
- Do not expose the battery directly to sunlight or rain.
- Do not store the battery near hazardous substances, flammable, or explosive materials. Protect the battery from mechanical impact, high pressure, strong magnetic fields, and direct sunlight.
- The recommended maximum storage time for a Pack is six months. The absolute maximum storage time must not exceed 12 months. (The storage duration is calculated from the Pack's manufacturing date. The production date can be verified by SUNGROW's sales network (e.g., local retailers) using the Pack's serial number.) Procedure for identifying production date: Each Pack is affixed with a serial number label. This label is typically located on the side or top of the Pack or on its packaging. The production date is encoded within the serial number and can be queried as follows:

EM	134	D	2	21	8	20	0289	D	A
				Year	Month	Day			

- Under ideal conditions, the maximum storage time is 12 months. However, due to uncertainties in warehouse storage conditions (e.g., temperature fluctuations outside the normal range), charge the battery to 40% SOC every six months during storage.
- Handle the battery with care.
- Ambient storage temperature range: -30°C to 50°C. Optimal storage temperature range: -20°C to 50°C (as battery degradation is temperature-dependent).

Long-term storage of the battery is not recommended as it may lead to battery capacity degradation. Even if the battery is stored at the recommended optimal storage temperature, irreversible capacity degradation will still happen during the period of rest, and such degradation will become more severe as the storage time lengthens. Please refer to the technical agreement for the specific amount of degradation.

- The storage relative humidity should be always between 0 and 100% without condensation.
- Do not stack batteries directly without their packaging.
- Packs must not be stored on their side or upside down.
- Regularly inspect the packaging for damage and signs of insect infestation. If any damage is found, replace the product immediately.
- Use the batteries with the longest storage time first to ensure the storage duration does not exceed recommendations.

If the battery is stored for more than one year, it may suffer an irreversible capacity degradation of 5% to 8%.

4 Mechanical Installation

4.1 Installation Precautions

⚠ WARNING

- **Installation and operation of this product must be performed by qualified personnel only.**
- **Installation by unqualified personnel is strictly prohibited. Any improper operation may result in serious personal injury or significant property damage.**
- **During the whole process of mechanical installation, strictly observe the relevant standards and requirements of the project site.**

4.2 Installation Location Selection

- The selection of the product installation site must be based on a comprehensive evaluation of safety, operational efficiency, and long-term reliability to ensure stable system operation and achieve expected performance and service life.
- The BESS features an IP66 protection rating, permitting installation in both indoor and outdoor environments.
- The climate environment and geological conditions, such as stress wave emission and underground water level, should be fully considered when selecting the installation site.
- The installation site should be away from areas where toxic and harmful gases are concentrated, and free from inflammable, explosive, and corrosive materials.
- It is suggested the product be installed in a place away from the residential area. Ensure the distance and noise level meet the local laws and regulations. If the requirements cannot be met due to geographical restrictions, use noise mitigation measures. For details, consult with the designer or SUNGROW.
- Do not install the the product in dusty environments with a large amount of dust, smoke, or floc. These particles may cling to the product's air inlets/outlets or heat sink, thus impairing its heat dissipation performance or getting it damaged.
- Do not install the product in places where corrosive gas or dust may be produced or accumulated, or in places within 30 km of saline-alkaline land or pollution-generating industrial complex such as chemical plants and power plants (chemical gas class: 1C1, solid particle level: 1S2).
- Do not install the product in environments contaminated with halogen or sulfur pollutants.
- There are no underground facilities at the site.

- The product must be installed out of reach of children.

Installation Environment Requirements

- The product should be installed in a dry, well-ventilated place.
- Do not install the product in environments with direct sunlight, standing water, snow accumulation, or excessive dust. To ensure stable operation, it is recommended to install the product in an area with adequate shelter or protection.
- The system operating temperature range is -20°C to 55°C.

  - The BESS may derate if the ambient temperature is excessively high.
  - The BESS charging power may decrease if the ambient temperature is excessively low.

- Relative humidity at the installation site: 0–100%, non-condensing.
- During installation and maintenance, prevent water or foreign objects from entering the Pack connectors. (Outdoor installation and maintenance are prohibited in rainy or dusty conditions.)

Installation Orientation

Install the BESS vertically. Do not install the system upside down, horizontally, or on its side.

Installation Foundation Requirements

- Mount the BESS securely. Based on the installation layout, use either the battery retention strap or the base mounting bracket to prevent the unit from tipping over.
- The mounting surface must not be combustible and must possess fire-resistant properties.
- Ensure the mounting surface is structurally sound and capable of supporting the equipment's weight.
- The flatness of the installation foundation surface shall be ≤ 5 mm. For details, see 4.4 BESS Installation.
- If the installation site is assessed to have no flood risk, the foundation construction work may be omitted.

Installation Clearance Requirements

For effective heat dissipation and ease of maintenance, it is recommended to reserve sufficient space around the equipment during installation. The required clearance around the BESS (using 200 kWh as an example) is shown in the figure below.

NOTICE

The recommended installation space is applicable for scenarios where there are no obstructions above the equipment.

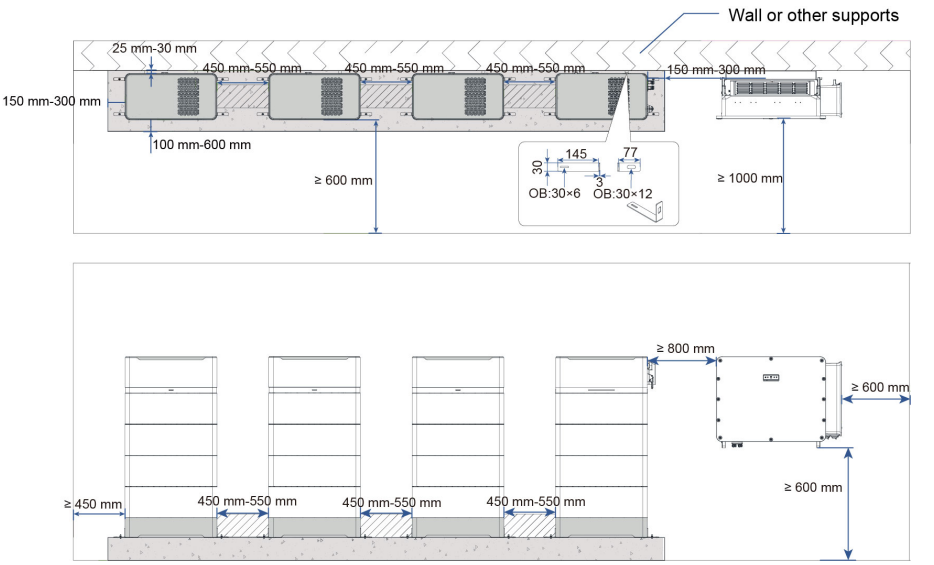


Figure 4-1 Recommended Installation Clearances for One-Row Layout

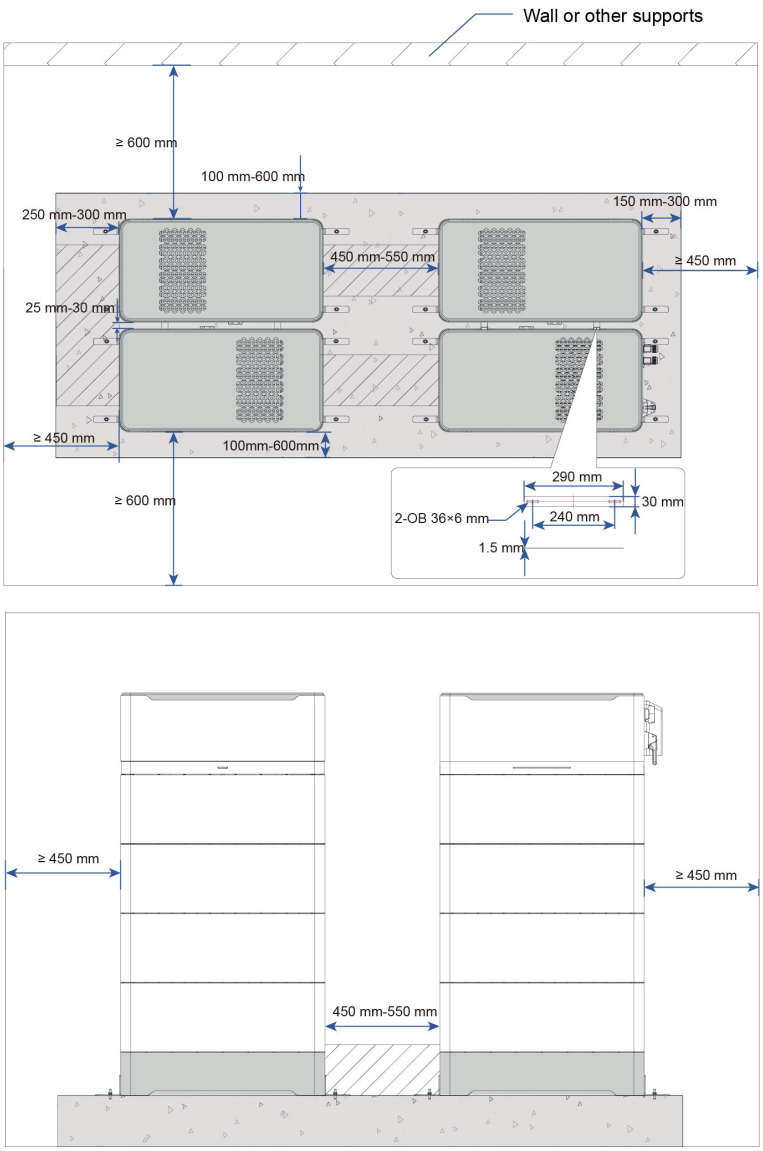


Figure 4-2 Recommended Installation Clearances for U-Shaped Layout

When the BESS is arranged in this layout, the layout of the hybrid inverter should be determined based on actual on-site conditions. It is recommended that the plant design for the BESS refer to this layout, while the hybrid inverter should be installed according to the requirements specified in its respective manual. The installation distance between the BESS and the hybrid inverter shall be ≥ 800 mm.

If the product is installed indoors or where significant obstructions exist in the exhaust air duct, additional ventilation equipment is required to assist with heat dissipation. For long-term stable system operation, the recommended environmental conditions are as follows: The ambient temperature of the BESS shall not exceed 35°C, the ambient temperature of the inverter shall not exceed 40°C, and the ventilation rate shall be ≥ 2200 m^3/h.

NOTICE

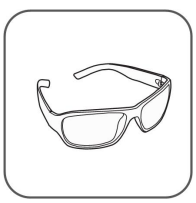
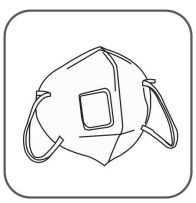
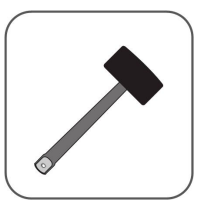
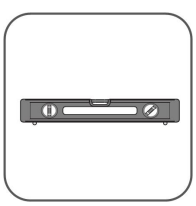
- **If the indoor space is a container, the inner walls must be lined with rock wool of ≥ 50 mm thickness.**
- **For outdoor installations, if the product's sides or top are significantly obstructed by large shaded areas, resulting in a clearly impeded exhaust air path, it shall be treated equivalently to an indoor installation.**

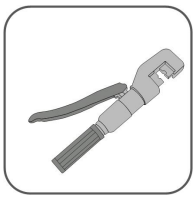
For other layout requirements, contact SUNGROW for corresponding layout guidance.

4.3 Installation Tools and Parts

Installation tools to be used include but are not limited to those listed below. If necessary, use other auxiliary tools at the site.

Table 4-1 Tool Description

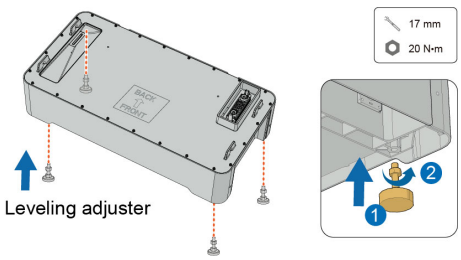
			
Safety goggles	Dust mask	Safety gloves	Safety shoes
			
Utility knife	Marker	Rubber mallet	Measuring tape
			
Level	Hammer drill (φ10)	Torque screwdriver	Torque wrench (16 mm, 17 mm, 35 mm)

		(ST6.3, M4, M5, M6)	
			
Hydraulic plier	Heat gun	M4 Allen wrench	Terminal crimping tool (10 mm^2, cold-pressed terminal)
			
Wire strippers	Crimping tool (4–6 mm^2)	Electric drill (ST6.3, M4, M5, M6)	

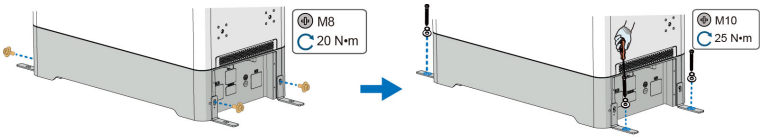
4.4 BESS Installation

Installation should be conducted on a flat surface in an open space.
The BESS installation process is illustrated with ST050CF as an example.

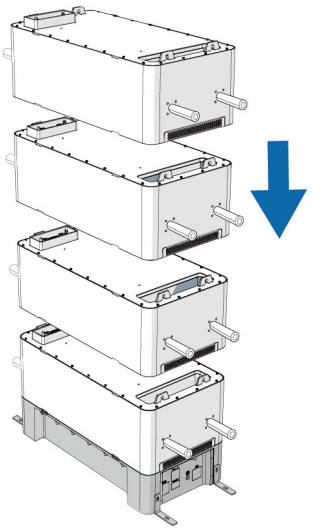
Step 1 Install leveling adjusters to level the base. (If the equipment is installed against a wall, maintain a 25 mm to 30 mm clearance between the base and the wall.)



If the installation site floor already meets the levelness requirement and no adjustment via leveling adjusters is needed, the battery base can be directly placed on the floor and secured using the L anchor bracket sheet metal.



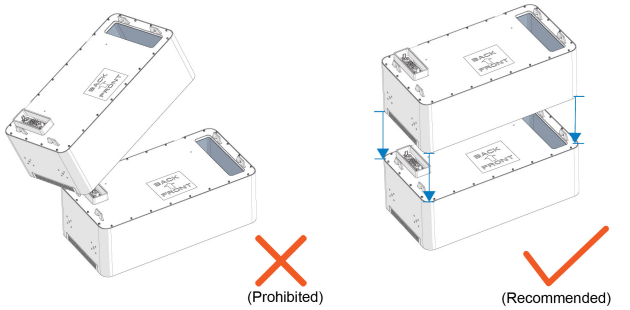
Step 2 Install the vertical lifting handles (two on each side) onto the Packs. Ensure they are fully screwed in. Two persons must work together to carry the Packs and place them onto the base from bottom to top. After installing the Packs, remove the vertical lifting handles and install the nylon protective caps in the handle mounting points.



NOTICE

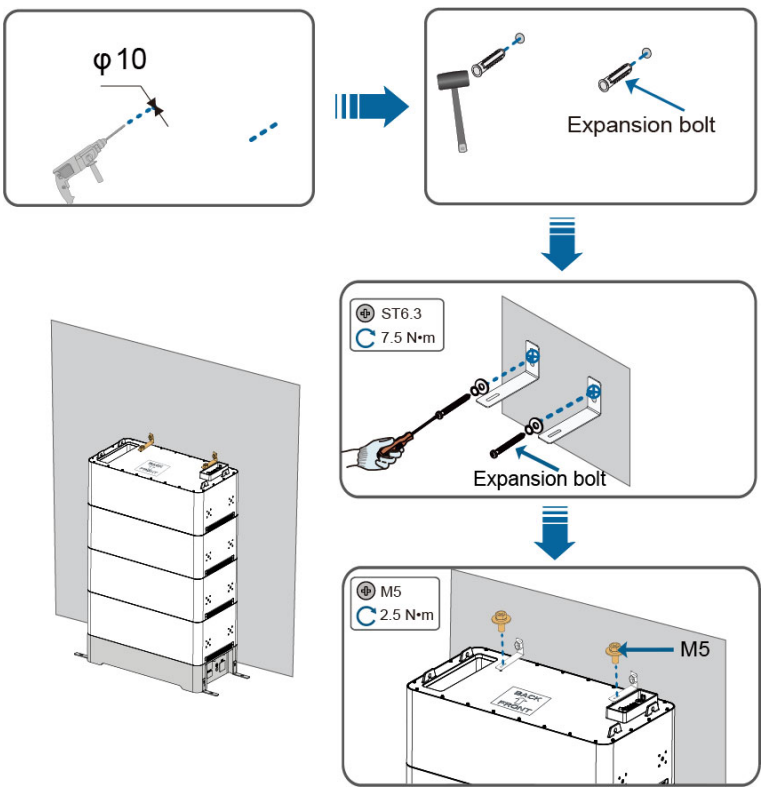
- **Packs can be manually lifted using handles or hoisted using shackles (recommended: US-standard bow shackle, 0.75 tonnes) attached to the four lifting points on the Pack upper cover.**
- **Lift and install Packs with care. Localized paint peeling on the enclosure may occur if the equipment is handled roughly.**
- **Minor gaps between Packs may occur during random stacking, but this does not affect electrical performance. If a more seamless appearance is preferred, try reordering the Packs. If the issue persists, contact SUNGROW or the retailer.**

- Do not tilt the Packs during installation.



- Store the vertical lifting handles properly for future use.

Step 3 Install the Pack wall mount across the topmost Pack to prevent the system from tipping over. (If the equipment is not installed against a wall, skip this step.)

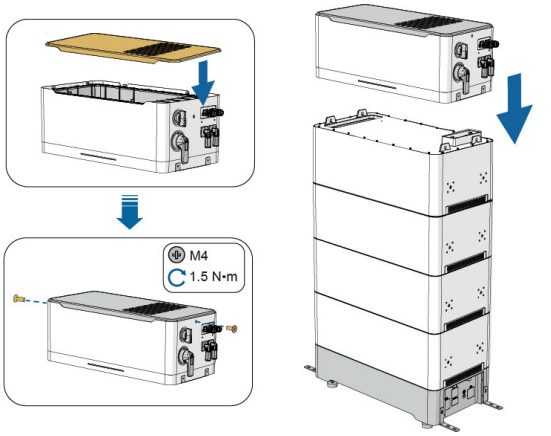


NOTICE

When performing drilling operations, personnel must wear safety goggles and a dust mask to protect against dust exposure to the eyes and respiratory system. Upon completion of work, promptly clean up any residual dust generated by the operation.

If the battery stacks are arranged in a U-shaped layout, back-to-back mounting brackets for Packs must be installed on the topmost Pack.

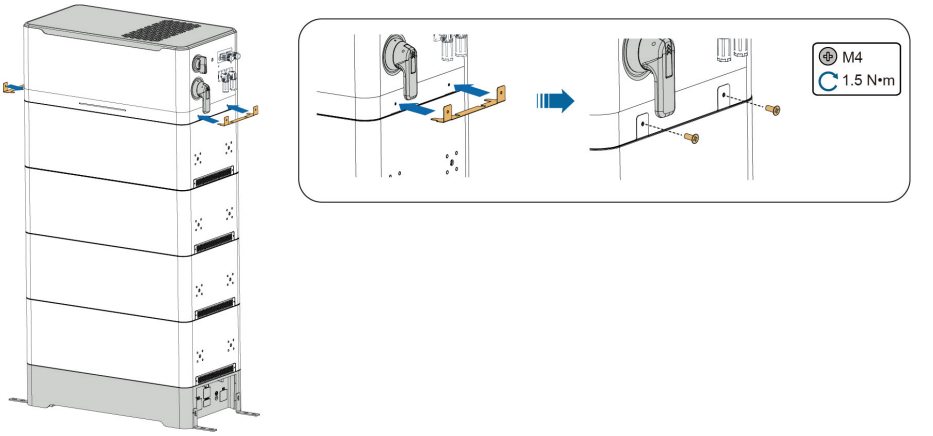
Step 4 Install the decorative upper cover onto the S/G first, then fix the complete S/G assembly onto the Pack.



NOTICE

The main battery stack is equipped with an S/G at the top, while the auxiliary battery stack features an upper cover. An upper cover is required for the auxiliary battery stack. The installation steps remain the same as above.

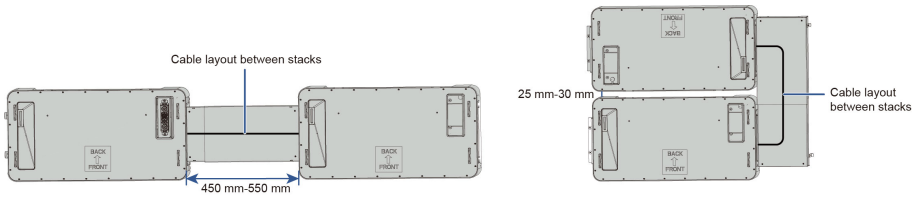
Step 5 Install the fixing bracket to prevent accidental displacement of the S/G, which could cause an arc fault. Insert the bracket into the gap between the S/G and the Pack and fix the bracket using screws.



For auxiliary battery stacks with a upper cover, install the fixing bracket following the same procedure.

Step 6 Install the cable duct and the side sealing plates of the base. (For a BESS configured with a single main battery stack, only the base side sealing plates are necessary.)

If the BESS includes both main and auxiliary battery stacks, the cable duct must be installed between such stacks to protect the cables.



One-Row Layout U-Shaped Layout

Figure 4-3 Cable Duct Installation

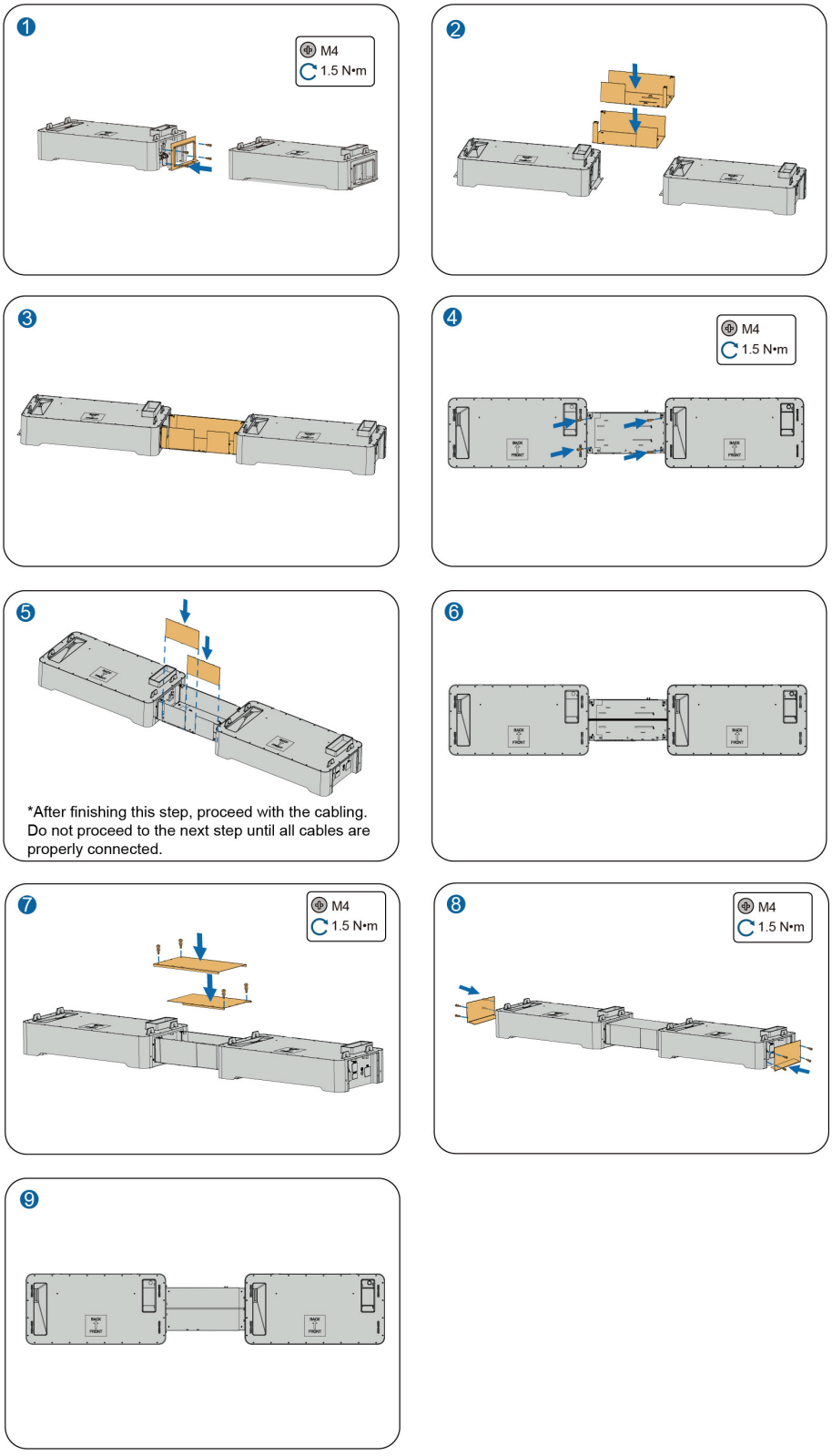


Figure 4-4 One-Row Layout

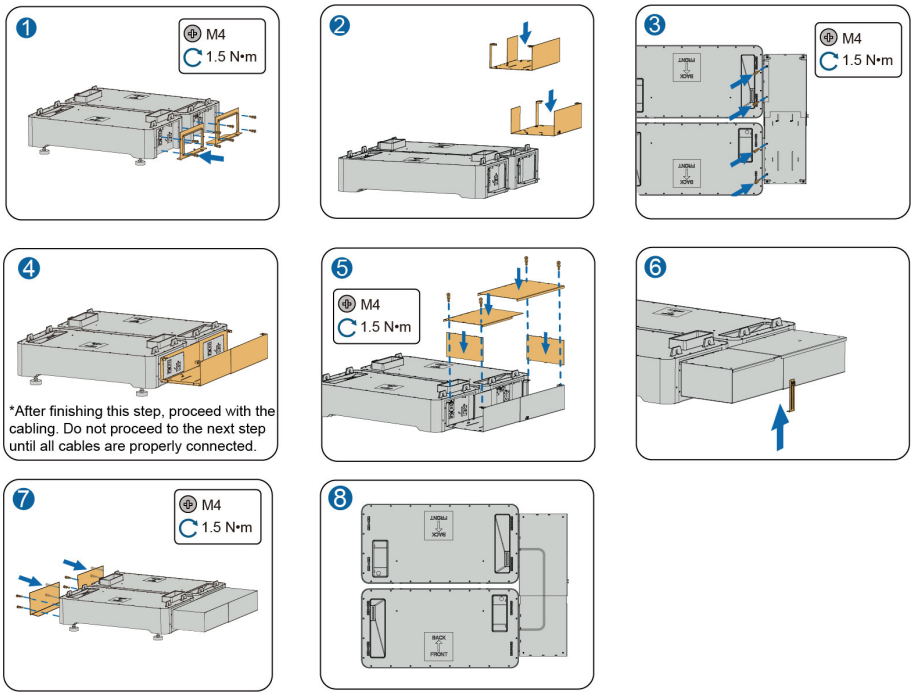


Figure 4-5 U-Shaped Layout

--End

5 Electrical Connection

5.1 Safety Precautions

⚠ DANGER

- **Operators must wear personal protective equipment (PPE) when performing electrical connections.**
- **Verify that the DC cables are voltage-free using a measuring device before touching them.**
- **Ensure the BESS is undamaged and all cables are voltage free before performing any electrical work.**
- **Any improper operation, such as short circuits or non-compliant installation, may cause severe burns or even a fire.**

⚠ WARNING

Improper wiring may damage the device, and such damage will not be covered by the warranty.

- **All electrical connections must be performed only by qualified technicians.**
- **Ensure all cables used in the system are securely connected, well-insulated, and of the correct specifications.**

NOTICE

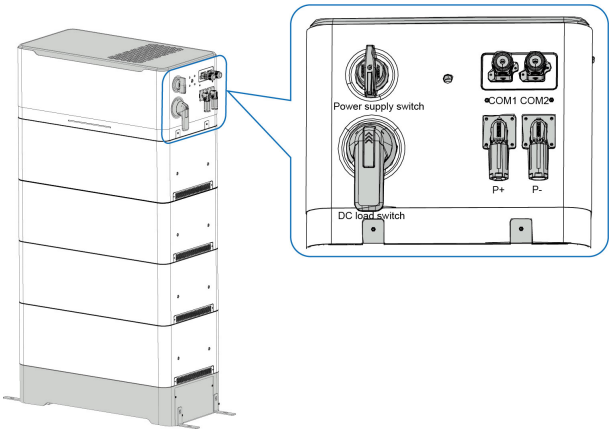
All electrical connections must comply with the local and national/regional electrical standards.

- **Cables selected by the user must comply with local laws and regulations.**
- **All spare terminals must be covered with waterproof caps to maintain the product's ingress protection rating.**
- **When laying out communication cables, keep them separate from power cables. Do not run cables near sources of strong electromagnetic interference.**
- **The cable colors in the figures in this manual are for reference only. Please select cables according to local cable standards.**

5.2 Terminal Description

S/G Terminals

The location and appearance of the electrical terminals on the S/G are shown in the figure below:

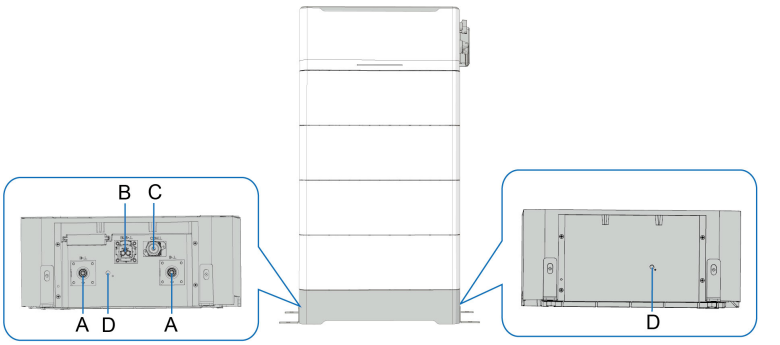


*The figure is for reference only and the actual product shall prevail.

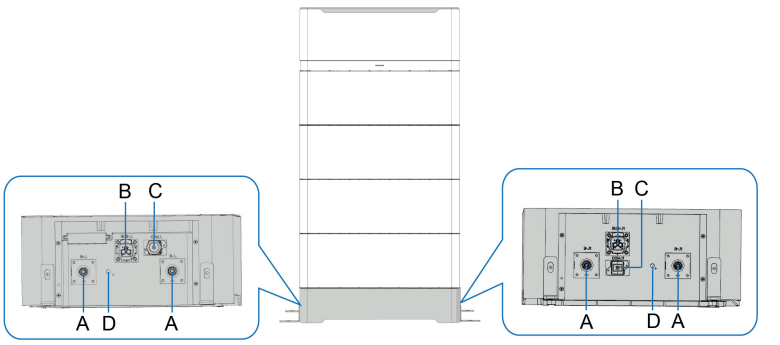
Name	Marking	Description
Connectors for battery connection	P+ P-	P+: Connects to the positive terminal of the hybrid inverter. For the terminal details, see relevant inverter manuals. P-: Connects to the negative terminal of the hybrid inverter. For the terminal details, see relevant inverter manuals.
Communication ports	COM1 COM2	Two ports are available. COM1 is for connection to the termination resistor and COM2 is for connection to the hybrid inverter.
DC load switch	/	Controls the power output of the BESS.
Auxiliary power switch	/	Power switch for the auxiliary devices of the BESS.

Base Terminals

The location and appearance of the terminals on the base are shown in the figure below:



Master battery stack



Auxiliary battery stack

*The figure is for reference only and the actual product shall prevail.

No.	Name	Marking	Description
A	Main circuit connection terminals	B_L / B_R B-_L / B-_R	Power connection terminals between pieces of equipment connected in series.
B	Power supply terminals	BUS+_L / BUS+_R	Provides auxiliary power between equipment via interconnection cables.
C	Communication ports	COM_L / COM_R	Used for communication connections between equipment.
D	PE terminals	⏚	Used for reliable grounding of the BESS.

5.3 Electrical Connection Overview

The electrical wiring diagram of the BESS (using ST200CF as an example) is shown below:

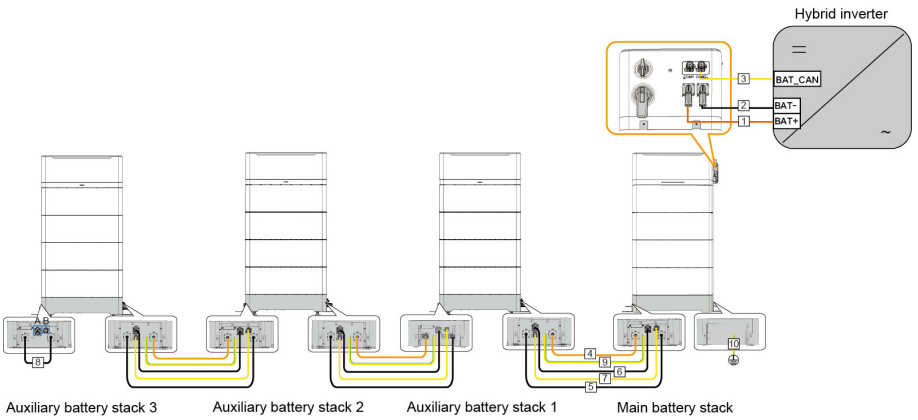


Figure 5-1 Electrical Wiring of BESS

Table 5-1 Cable Requirements

No.	Name	Marking	Recommended Specifications*	Remarks
1	Main power cable (positive)	P+	70 mm^2	Connection distance: ≤ 40 m
2	Main power cable (negative)	P-	70 mm^2	Connection distance: ≤ 40 m
3	External CAN communication cable	COM1	/	Termination resistor for connection (included in the accessory shipping box)
		COM2	Ethernet cable (CAT5e or higher shielded cables)	Connection distance: ≤ 40 m The shipment accessories include a 3 m Ethernet cable. (The communication cable shall be cut to length according to the actual on-site requirement.)
4	Stack power cable (positive)	B_R / B_L	70 mm^2	Quick-connect cable**

No.	Name	Marking	Recommended Specifications*	Remarks
5	Stack power cable (negative)	B-_R / B-_L	70 mm^2	Quick-connect cable**
6	Auxiliary power cable***	BUS+_R / BUS+_L	4 mm^2	Quick-connect cable**
7	CAN communication cable***	COM_R / COM_L	Ethernet cable	Quick-connect cable**
8	Stack negative jumper cable	B_L / B-_L	70 mm^2	Quick-connect cable**
9	Grounding cable	⏚	35 mm^2	Included in the shipment accessories
10				Prepare by the customer

*The aforementioned cable conductors utilize homogeneous copper, and the design is based on overhead installation.

**A quick-connect cable refers to a pre-assembled cable that can be plugged directly into its corresponding port. It is included in the product accessories and requires no on-site fabrication. The customer shall prepare cables (items 1, 2, and 3) for connecting the BESS to the hybrid inverter as well as the main battery stack grounding cable (item 10).

***If the auxiliary equipment power port and the CAN communication port are not connected to their respective cables (labeled Port A and Port B as shown in the figure), insert the plug with a waterproof sealing plug from the main battery stack accessory shipping box into Port A. For Port B, install the port plugs and termination resistors provided in the same shipping box (for installation details, please refer to 5.6.1 Install Communication Connector and Termination Resistor).

NOTICE

When installing the quick-connect cables between battery stacks, note the following:

- **During the installation of the communication connector, a "click" sound will indicate that the connector is fully seated. Gently pull the DC cable backward to check whether it is securely fastened.**
- **After installing the auxiliary power cable, press the green connector position assurance (CPA) to the locked position. To disconnect, first pull out the green CPA. Then, press button "1" and button "2" in sequence to release the cable.**
- **After installing the stack positive and negative power cables, push the green locking slider inward to secure the connection. To unlock, use a small tool (such as a screwdriver) to depress the front of the green locking slider while sliding it outward. Once released, press the button on the connector to pull out the cable.**

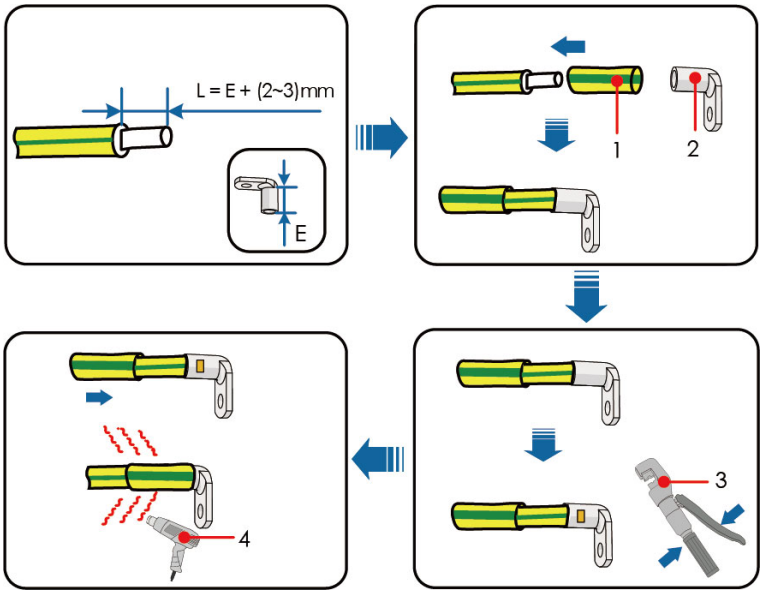
5.4 Grounding

NOTICE

- **Grounding must be completed by strictly following the applicable local standards and regulations.**
- **Before grounding, clean the surface and threads of the grounding point to avoid compromising the grounding performance.**

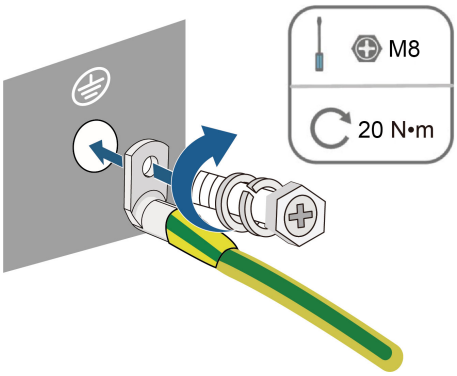
The grounding cable should be prepared separately by the customer.

1. Crimp OT/DT terminals onto the exposed wires.



No.	Name	No.	Name
1	Heat shrink tubing	3	Hydraulic pliers
2	OT/DT terminal	4	Heat gun

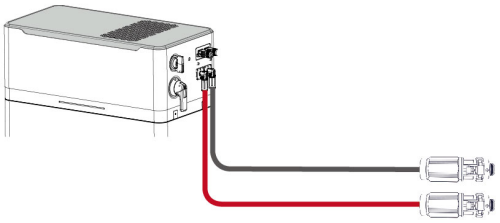
2. Remove the screw from the PE terminal. Position the cable, fit the screw back, and fasten the cable using a screwdriver.



Apply silicone or painting to the PE terminal for corrosion protection.

5.5 DC-Side Connection

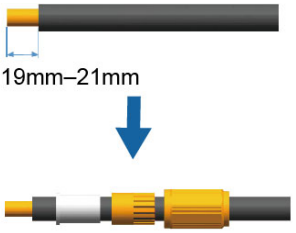
Connect one end of the DC cables to the BESS and the other end to the inverter, as shown in the figure below:



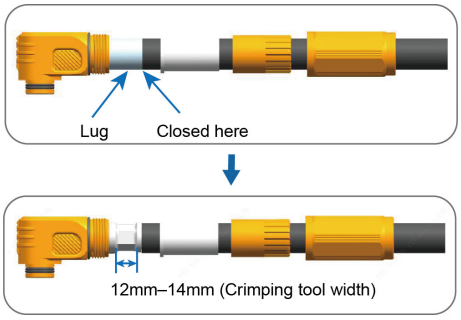
Battery side Inverter side

Assemble Battery-Side DC Cable Terminals

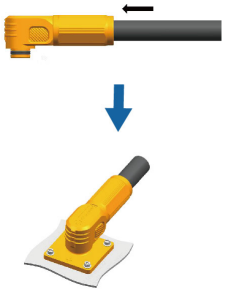
1. Strip the cable sheath and slide the nut and the ferrule onto the cable.



2. Insert the conductor into the cable lug and crimp it. Crimp the lug as shown in the figure below. Ensure a slight bell-shaped flare at the cable barrel end to prevent cable damage.



3. Push the ferrule and nut towards the plug and tighten them. The recommended tightening torque for the nut is 1.5 to 2.0 N·m. Then, insert the plug directly into the socket. An audible "click" indicates successful installation.



4. Gently pull back the DC cable to ensure a secure connection.

Remove DC Cable Terminals

DANGER

Do not insert or remove DC cable terminals live.

Press the button and pull the plug outward.

5.6 Communication Connection

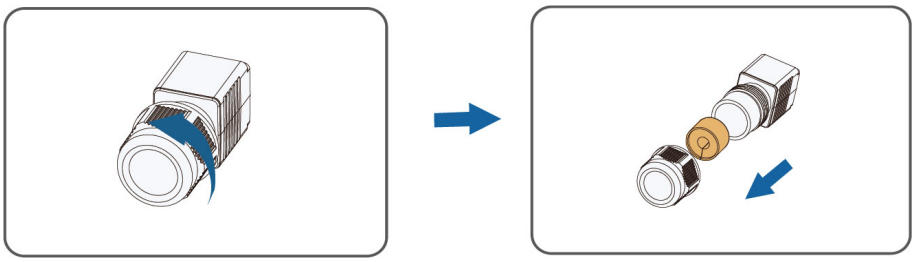
5.6.1 Install Communication Connector and Termination Resistor

Connect one end of the communication cable to the BESS and the other end to the inverter, as shown in the figure below:

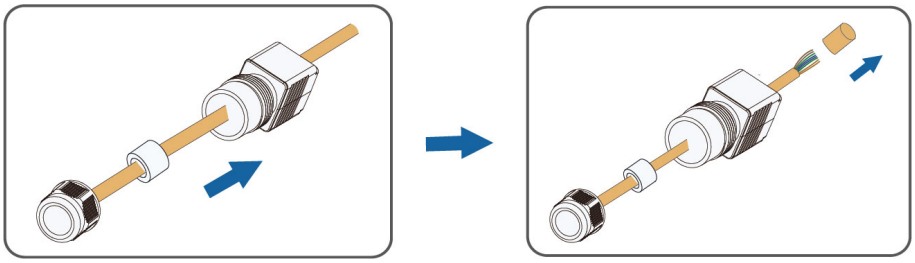
Battery side Inverter side

Assemble Battery-Side Communication Cable Connector

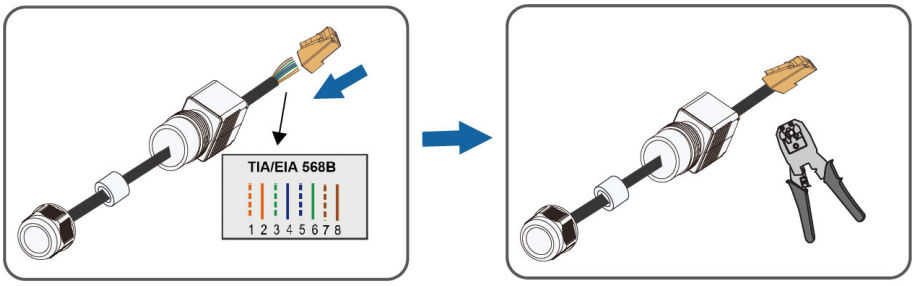
1. Unscrew the lock nut from the communication connector and remove the rubber washer inside.



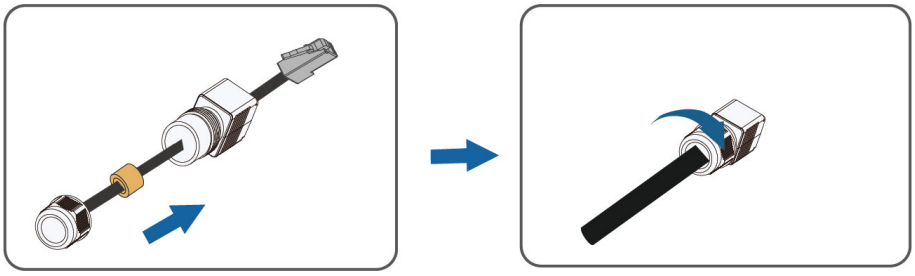
2. Pass the communication cable through the communication connector. Strip approximately 10 mm – 15 mm of the outer sheath and insulation from one end of the cable.



3. Terminate the cable with an RJ45 connector and crimp it using an RJ45 crimping tool.

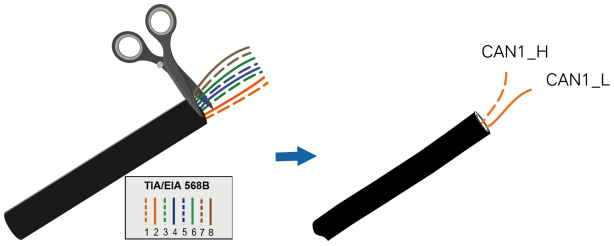


4. Put the rubber washer back and tighten the lock nut.

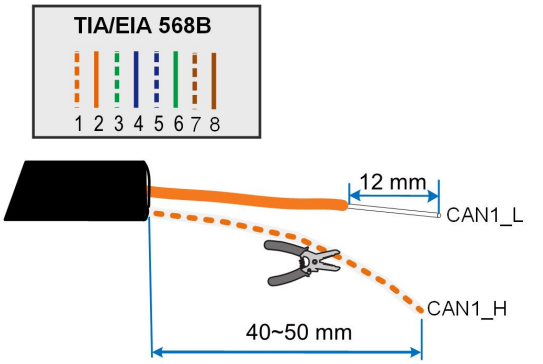


Assemble Inverter-Side Communication Cable Terminal

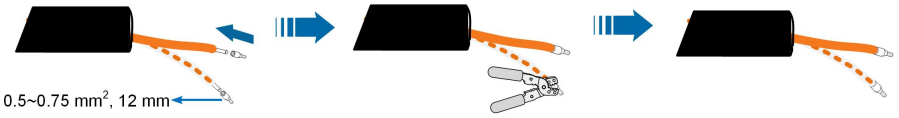
1. Strip the insulation from the other end of the communication cable. Retain the signal wires CAN1_H (orange-white) and CAN1_L (orange) and cut off the other signal wires.



2. Strip approximately 12 mm of insulation from the ends of the retained signal wires.



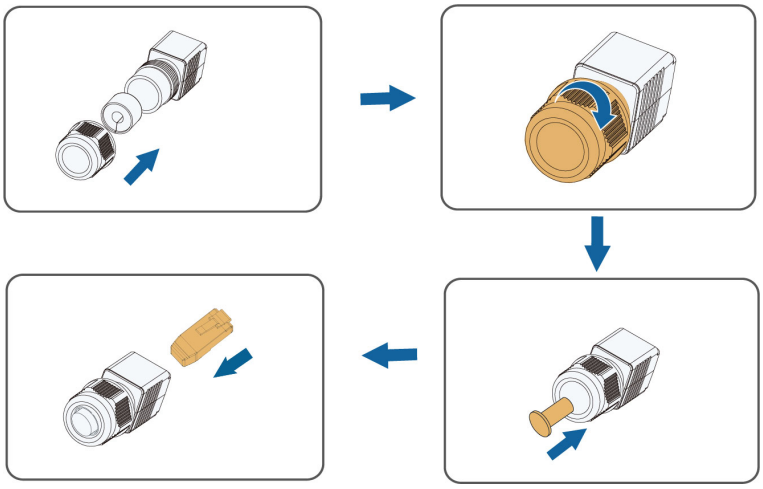
3. Insert the stripped wires into the corresponding cold-pressed terminals and crimp them using a wire crimper.



Install Termination Resistor

To enhance the communication quality of the BESS, connect the termination resistor to COM1 port on the S/G. The installation process is illustrated below.

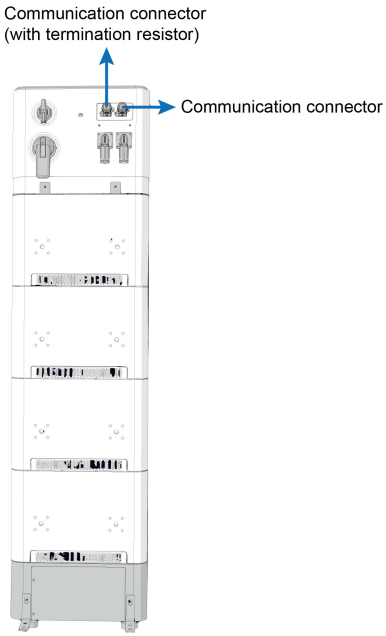
Insert the termination resistor into the communication connector.



5.6.2 Connect Communications Terminal

1. Remove the waterproof plugs from the COM1 and COM2 ports on the battery.

2. Insert the termination resistor and the communication cable into the COM1 and COM2 ports of the communication terminal respectively.

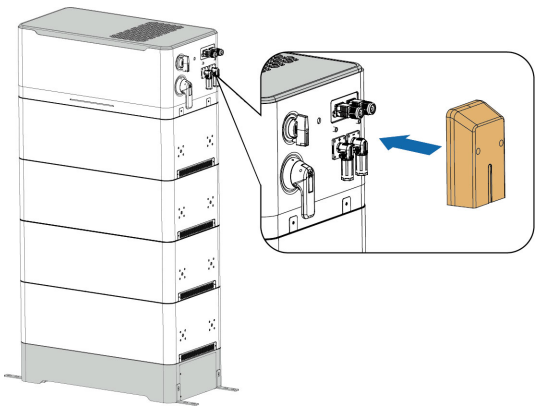


The termination resistor must be installed, otherwise the battery communication cannot be enabled.

3. Connect the other end of the communication cable to the communication port on the inverter.

5.7 Install Switch Gear Protective Cover

After connecting the cables of the switch gear, install the protective cover to protect them.



6 Powering On and Off

6.1 Powering On

⚠ WARNING

- **The BESS can only be put into operation after confirmation by a professional and approved by the local power department.**

⚠ WARNING

- **For a long-idle BESS, perform a thorough inspection before powering on. Power on the BESS only after verifying all specifications meet requirements.**

6.1.1 Checks Before Powering On

Before powering on the system, check the following items:

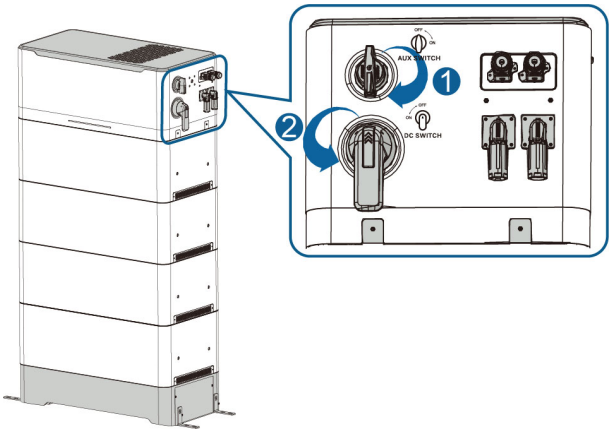
- Check whether the BESS installation is complete.
- Check whether the exterior of the BESS is intact.
- Check whether all cables, both between BESSs and between the BESS and the inverter, are correctly connected to avoid incorrect connection or reverse polarity.

6.1.2 Powering On Procedure

Prerequisite

Inspect the equipment thoroughly before powering it on. The equipment can only be powered on after all the inspection items are confirmed to meet the requirements.

Step 1 Turn the auxiliary power switch on the right side of the S/G to the “ON” position. If no faults are reported, turn the main circuit load switch to the “ON” position. The BESS will now enter a self-check state, indicated by a blinking blue status LED. When the indicator light changes to steady blue, it indicates that the BESS is powered on and operating normally.



⚠ WARNING

If a short circuit occurs during the powering on and commissioning process, immediately disconnect the power cable between the S/G and the inverter and inspect the cable connection of the BESS to locate and eliminate the short circuit fault point. Then, repeat Step 1 of the powering on procedure to check if any fault persists in the BESS (indicated by a red LED). Retrieve the fault information via iSolarCloud to facilitate system repair by SUNGROW.

--End

6.2 Powering Off

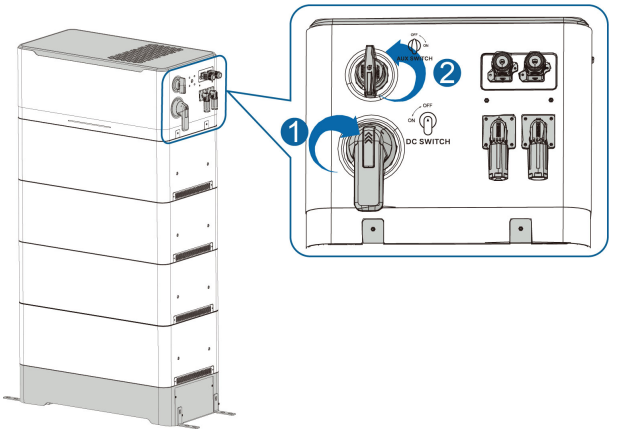
6.2.1 Planned Powering Off

Planned powering off refers to an interruption to the equipment operation that is scheduled in advance for overhaul, test, or maintenance.

⚠ WARNING

To power off and shut down the equipment, first ensure the BESS is not in a charging or discharging state.

Step 1 Turn the main circuit load switch on the right side of the S/G to the “OFF” position. Then, turn the auxiliary power switch to the “OFF” position. The equipment is then shut down.



--End

If the equipment requires powering off for maintenance, ensure that Tag-Out and Lock-Out (TOLO) procedures are implemented on both the load switch and the auxiliary power switch to prevent accidental powering on, which could lead to a safety incident.

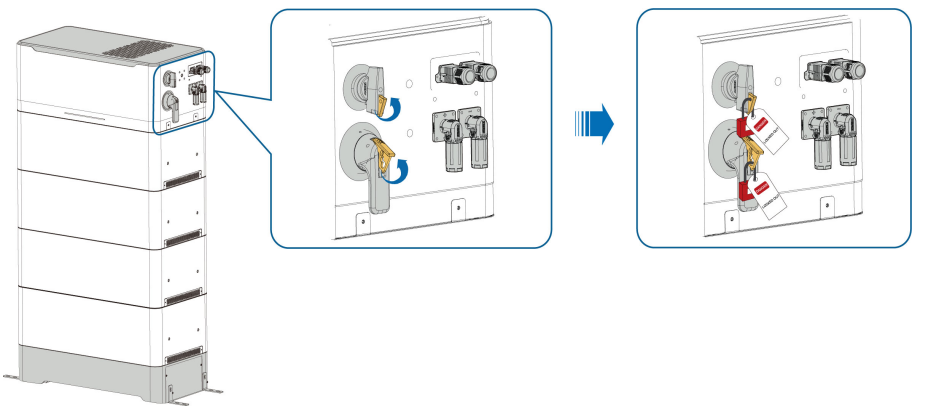


Figure 6-1 TOLO

6.2.2 Unplanned (Emergency) Shutdown

- Fire incident:
  Contact local fire department professionals.
- Unplanned outage (shutdown due to faults):
  Contact SUNGROW.

7 Viewing of Battery Information

Battery system monitoring is achieved via inverter monitoring. To view battery information, first complete the power plant creation process in iSolarCloud. The specific battery information can then be viewed via iSolarCloud. For the power plant creation and battery information viewing, please refer to the iSolarCloud manual accessible by scanning the QR code below:

8 Energy Storage Safety System

8.1 General

NOTICE

When on-site personnel or the monitoring software receives an alarm or fault signal from a BESS, qualified professionals must conduct an on-site investigation under safe conditions before performing a local reset.

8.2 Introduction to Energy Storage Safety System

The BESS's safety system is installed inside the enclosure. An independent safety system is installed per Rack. The safety module within each Pack can operate independently. The composition and configuration are shown in the table below.

Table 8-1 Energy Storage Safety System Composition and Configuration

System	Device	Minimum Installation Unit	Quantity of Devices in Minimum Installation Unit
Safety system	Safety module	Pack	1

8.3 Safety System Composition

The safety module functions as the core execution unit in the safety system. The system integrates four primary components: the thermal actuator, generator, feedback element, and enclosure. Each Pack is equipped with an independent safety module. Operational logic: Upon detecting that the temperature inside the BESS container reaches 185°C ± 10°C, the thermal actuator will trigger the safety module. This activates the system to produce the fire extinguishing agent, which is then discharged through preset nozzles on the enclosure directly into the corresponding Pack to provide protection.

NOTICE

The safety module is triggered by high temperature (185°C ± 10°C). Avoid direct contact of high-temperature mediums with the safety module to prevent accidental activation of the thermal initiator.

The safety module and the BMU are interlocked through DI dry contact signals. When the thermal actuator detects the threshold temperature of the BESS container, it will activate the generator. Once the fire extinguishing agent is released, the feedback element sends a release signal to the local controller (LC). The control logic of the safety system is shown below:

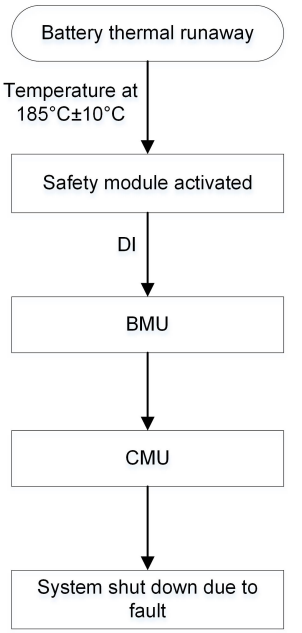


Figure 8-1 Control Logic of Safety System

9 Troubleshooting and Maintenance

9.1 Troubleshooting

When a fault occurs to the BESS, you can view the fault information on the iSolarCloud App. If the inverter is equipped with an LCD display, you may check the fault information on the screen. The fault codes and corresponding troubleshooting methods of the BESS are listed in the table below:

Fault Type	Fault Code	Solution
Battery fault	703, 711, 712, 715, 717	1. Generally this fault clears within 20 min. 2. If the fault occurs frequently and continuously, switch off the battery and contact the installer or manufacturer to check for inverter damage. 3. If the problem persists for an extended period, contact the installer or the manufacturer. If the SOC is below 3%, switch off the battery immediately to avoid damage caused by battery overdischarge.
	707, 733	1. Check for heat sources near the battery and verify the ambient temperature is within limits. The operating temperature range for charging is 0°C to 55°C and for discharging is -20°C to 55°C. Check whether the ambient or battery temperature exceeds this range. If the battery is near a heat source, poorly ventilated, or ambient temperature is excessively high, improve the installation environment. 2. If the problem persists for an extended period, contact the installer or the manufacturer. If the SOC is below 3%, switch off the battery immediately to avoid damage caused by battery overdischarge.
	708, 734	1. The operational temperature range for charging is 0°C to 55°C and for discharging is -20°C to 55°C. Check whether the ambient or battery temperature is below this range. If

Fault Type	Fault Code	Solution
		the ambient temperature is excessively low, improve the installation environment. 2. If the fault persists for an extended period, contact the installer or the manufacturer. If the SOC is below 3%, switch off the battery immediately to avoid damage caused by battery overdischarge.
	714	1. Check whether the communication cable between the inverter and the battery is correctly and securely connected. 2. If the fault persists, replace the communication cable. 3. If the problem persists for an extended period, contact the installer or the manufacturer. If the SOC is below 3%, switch off the battery immediately to avoid damage caused by battery overdischarge.
	732	1. Contact the installer or manufacturer to upgrade the hybrid inverter, Logger, and battery software to the latest versions. 2. If the problem persists for an extended period, contact the installer or the manufacturer.
	735, 736, 737	1. Generally the battery recovers automatically. 2. If the fault persists, switch off the battery, wait for five minutes, and restart it. 3. If the problem persists for an extended period, contact the installer or the manufacturer. If the SOC is below 3%, switch off the battery immediately to avoid damage caused by battery overdischarge.
	739	1. Switch off the battery, wait for five minutes, and restart it. 2. If the fault persists for an extended period, contact the installer or the manufacturer. If the SOC is below 3%, switch off the battery immediately to avoid damage caused by battery overdischarge.

Fault Type	Fault Code	Solution
	740	1. Check whether there is incorrect or loose battery connection in the client stacks. 2. Switch off the battery, wait for five minutes, and restart it. 3. If the fault persists for an extended period, contact the installer or the manufacturer. If the SOC is below 3%, switch off the battery immediately to avoid damage caused by battery overdischarge.
	741	1. Contact the installer or manufacturer to upgrade the hybrid inverter, Logger, and battery software to the latest versions. 2. If the fault persists, check whether the system configuration is correct (SUNGROW single-phase hybrid inverter used with the BESS consisting of two to six Packs; SUNGROW three-phase hybrid inverter used with the BESS consisting of three to eight Packs). 3. If the problem persists for an extended period, contact the installer or the manufacturer. If the SOC is below 3%, switch off the battery immediately to avoid damage caused by battery overdischarge.
	742	1. Check whether the power cables are connected in inverse or have poor contact. 2. If the problem persists for an extended period, contact the installer or the manufacturer. If the SOC is below 3%, switch off the battery immediately to avoid damage caused by battery overdischarge.
	743, 744, 745	1. Generally the battery recovers automatically. 2. If the fault persists, upgrade the battery software. 3. If the problem persists for an extended period, contact the installer or the manufacturer. If the SOC is below 3%, switch off the battery immediately to avoid damage caused by battery overdischarge.

Fault Type	Fault Code	Solution
	746	1. Contact the installer or manufacturer to upgrade the hybrid inverter, Logger, and battery software to the latest versions. 2. If the fault persists, contact the installer to change the stacking order of the Packs and re-install the battery. 3. If the problem persists for an extended period, contact the installer or the manufacturer. If the SOC is below 3%, switch off the battery immediately to avoid damage caused by battery overdischarge.
	747	1. Switch off the battery, wait for five minutes, and restart it. 2. If the fault persists, upgrade the battery software. 3. If the fault persists for an extended period, contact the installer or the manufacturer. If the SOC is below 3%, switch off the battery immediately to avoid damage caused by battery overdischarge.
	750, 751	Contact the installer or manufacturer.
	833	1. Contact the installer or manufacturer to upgrade the hybrid inverter, Logger, and battery software to the latest versions. 2. If the fault persists, check whether the system configuration is correct (SUNGROW single-phase hybrid inverter used with the BESS consisting of two to six Packs; SUNGROW three-phase hybrid inverter used with the BESS consisting of three to eight Packs). 3. If the fault persists, contact the installer to change the stacking order of the Packs and re-install the battery. 4. If the problem persists for an extended period, contact the installer or the manufacturer. If the SOC is below 3%, switch off the battery immediately to avoid damage caused by battery overdischarge.
	908	Contact the installer or manufacturer.

Fault Type	Fault Code	Solution
Battery alarm	932, 939, 964	1. Generally the battery recovers automatically. 2. If the problem persists for an extended period, contact the installer or the manufacturer. If the SOC is below 3%, switch off the battery immediately to avoid damage caused by battery overdischarge.
	937, 941, 942	1. Generally the battery recovers automatically. 2. If the fault persists, update the battery software. 3. If the problem persists for an extended period, contact the installer or the manufacturer. If the SOC is below 3%, switch off the battery immediately to avoid damage caused by battery overdischarge.
	933	1. Check for heat sources near the battery and verify the ambient temperature is within limits. The operating temperature range for charging is 0°C to 55°C and for discharging is -20°C to 55°C. Check whether the ambient or battery temperature exceeds this range. If the battery is near a heat source, poorly ventilated, or ambient temperature is excessively high, improve the installation environment. 2. If the fault persists for an extended period, contact the installer or the manufacturer. If the SOC is below 3%, switch off the battery immediately to avoid damage caused by battery overdischarge.
	934	1. The operating temperature range for charging is 0°C to 55°C and for discharging is -20°C to 55°C. Check whether the ambient or battery temperature exceeds this range. If the battery is near a heat source, poorly ventilated, or ambient temperature is excessively high, improve the installation environment. 2. If the problem persists for an extended period, contact the installer or the

Fault Type	Fault Code	Solution
		manufacturer. If the SOC is below 3%, switch off the battery immediately to avoid damage caused by battery overdischarge.
	935	1. Generally the battery recovers automatically. 2. If the fault persists, switch off the battery, wait for five minutes, and restart it. 3. If the fault persists for an extended period, contact the installer or the manufacturer. If the SOC is below 3%, switch off the battery immediately to avoid damage caused by battery overdischarge.
	968, 969, 970, 971, 972, 973	1. Generally the battery recovers automatically. 2. If the problem persists for an extended period, contact the installer or the manufacturer. If the SOC is below 3%, switch off the battery immediately to avoid damage caused by battery overdischarge.

9.2 Routine Maintenance

It is recommended that the BESS undergo a maintenance inspection every six months. The actual maintenance activities should be adapted to the overall installation environment.

The maintenance intervals are subject to factors like plant size, location, and on-site environment. For equipment working in sandy or dusty environments, it is necessary to shorten the maintenance intervals.

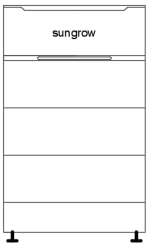
Maintenance Details	Inspection Method
S/G and Pack	Inspect the following items. Take corrective actions immediately for items that fail the inspection: • Check whether there are flammable materials near the Packs. • If the equipment is installed against a wall, check whether the fixing points between the Packs and the wall are secure and free from corrosion. • Check the S/G and the Packs for damage, paint loss, oxidation, etc.

Maintenance Details	Inspection Method
Pack status and cleanliness	Inspect the following items. Take corrective actions immediately for items that fail the inspection: • Check the Packs and internal components for damage or deformation. • Check for any abnormal noise from the internal devices during the equipment operation. • Check for excessively high internal temperature of the Packs. • Check whether the humidity and the dust levels inside the Packs are in the normal range. Clean the Packs if necessary.
Warning signs	Check whether the warning signs and marks are clean and legible. Clean them if necessary.
Cables	Check whether the cables between the S/G and the inverter are correctly and securely connected.
Cable connection and layout	Do not perform any inspection unless all components in the system are powered off. Take corrective actions immediately for items that fail the inspection during the inspection process. • Check whether the cable connections comply with relevant standards and show signs of short circuits. Take corrective actions immediately for anything abnormal condition. • Check for water ingress into the Packs. • Check cable connection points for looseness. If loose, retighten to the specified torque.
Corrosion status	Check the equipment exterior for damage, paint loss, oxidation, etc.
Grounding	Check whether the system is correctly grounded.
Functional inspection	Check whether the current, voltage, and temperature of the Packs are within the normal range.

10 Appendix

10.1 Technical Specifications

Product Model	ST050–250CF
Pack	**STC12.5**
Cell type	LFP 3.2 V
Rated capacity	12.48 kWh
Depth of discharge (DOD)	0% to 100%
Rated voltage range	32.4 V – 43.8 V
Rated C-rate	0.5 P
Weight (per stack)	≤ 90 kg
Dimensions (W × H × D)	800 mm × 270 mm × 405 mm
System Specifications	
Auxiliary power supply	Internal power supply
Installation method	Floor-mounted
Noise level	≤ 60 dB (A) at 1 m, 25°C
Operating temperature range	Charge: 0°C – 55°C / -20°C to 55°C (optional) Discharge: -20°C to 55°C
Storage temperature range	-30°C to 50°C
Operating humidity range	0% to 100% RH, non-condensing
Max. altitude	3000 m
IP rating	IP66
Corrosion protection class	C5

Product Model	ST050–250CF		
Cooling method	Forced air cooling		
Compliance & Safety			
Certification standards	IEC / EN 62619, IEC / EN 63056, UN 38.3; IEC / EN62477-1, IEC / EN 62040, IEC / EN 61000-6-1 / 6-3; VDE 2510-50; IEC / EN 62933-5-2, UL 9540A		
Fire suppression system	Aerosol and explosion relief valve		
EMC class	Class B		
Protective class	Class I		
Overvoltage category	II		
Basic Configuration Options			
			
Number of Packs	3 PCS*	4 PCS	5 PCS
Stack capacity**	37.4 kWh	49.9 kWh	62.4 kWh
Stack weight	340 kg	430 kg	520 kg
Stack dimensions (W × H × D)	800 mm × 1297 mm × 405 mm	800 mm × 1567 mm × 405 mm	800 mm × 1837 mm × 405 mm
Typical System Configurations*			
ST050CF 49.9 kWh		*1	
ST062CF 62.4 kWh			*1
ST075CF 74.9 kWh	*2		
ST100CF 99.8 kWh		*2	

Product Model	ST050–250CF	
ST150CF 149.8 kWh	*3	
ST200CF 199.7 kWh	*4	
ST250CF 249.6 kWh		*4

*A single unit consisting of three Packs cannot operate independently. The minimum system capacity is 49.9 kWh.

**The optional long-duration battery combiner box supports 2–4 Racks connected in parallel and enables system expansion up to 1000 kWh / 8 h.

***Black start is supported when the battery capacity assigned to the hybrid inverter is 100 kWh or above. When the battery capacity assigned to the hybrid inverter is below 100 kWh, PV input is required for startup. The power backup or off-grid function is supported when the battery capacity assigned to the hybrid inverter is 100 kWh or above.

- "Pre-assembled Packs (50 kWh)" consists of four pre-assembled Packs for integrated delivery and installation.
- Specifications are subject to change without prior notice. Please refer to the actual product nameplate for the most up-to-date information.

10.2 FAQs

10.2.1 Battery Not Charging

1. Please wait five to 10 min for data refresh of the iSolarCloud App.

2. If the problem persists, check the system for fault and take countermeasures according to the fault code.

3. If the problem still persists, try charging the battery by enabling force mode. If the battery can be charged now, contact the hybrid inverter installer or manufacturer.

4. Check whether the current battery SOC is the same as the set SOC lower limit of the inverter. If the battery SOC reaches or falls below the SOC lower limit, the battery cannot discharge. Set the value to 5–50 as needed.

5. If the problem still persists, check whether the ambient temperature is near or below 0°C. Switch off the battery when the temperature is below 0°C, and restart and charge it when the temperature exceeds 5°C.

6. Check whether there is a heat source near the battery and whether the ambient temperature exceeds 55°C. Switch off the battery when the ambient temperature exceeds 55°C, and restart and discharge it when the temperature is below 40°C.

7. If the problem still persists, contact the installer or manufacturer. Switch off the battery immediately if the SOC is below 3%.

10.2.2 Battery Not Discharging

1. Please wait five to 10 min for data refresh of the iSolarCloud App.

2. If the problem persists, check the system for fault and take countermeasures according to the fault code.

3. If the problem still persists, try discharging the battery by enabling force mode. If the battery can discharge now, contact the installer or manufacturer.

4. Check whether the current battery SOC is the same as the set SOC lower limit of the inverter. If the battery SOC reaches or falls below the SOC lower limit, the battery cannot discharge. Set the value to 5–50 as needed.

5. Check whether there is a heat source near the battery and whether the ambient temperature exceeds 55°C. Switch off the battery when the ambient temperature exceeds 55°C, and restart and discharge it when the temperature is below 40°C.

6. If the problem still persists, contact the installer or manufacturer. Switch off the battery immediately if the SOC is below 3%.

10.2.3 SOC Jump

1. Occasional SOC jumps may occur if the battery has not been fully charged for an extended period. A full charge cycle is recommended to calibrate the SOC and restore normal operation.

2. In case the SOC jump issue occurs frequently, contact the installer or manufacturer.

10.2.4 Battery Updates

1. If software updates are required, contact the installer or the manufacturer.

2. During software update, ensure that the software for the inverter, Logger, and the battery is upgraded simultaneously to prevent software version mismatch issues.

3. If any abnormal condition occurs during or after updates, contact the installer or the manufacturer immediately.

10.3 Quality Assurance

When product faults occur during the warranty period, SUNGROW will provide free service or replace the product with a new one.

The software security update period for this product aligns with the warranty period. During the warranty, security patches or updates will be provided if any vulnerabilities or compatibility issues are identified.

Evidence

During the warranty period, the customer shall provide the product purchase invoice and date. In addition, the trademark on the product shall be undamaged and legible. Otherwise, SUNGROW has the right to refuse to honor the quality guarantee.

Conditions

- After replacement, unqualified products shall be processed by SUNGROW.
- The customer shall give SUNGROW a reasonable period to repair the faulty device.

Exclusion of Liability

In the following circumstances, SUNGROW has the right to refuse to honor the quality guarantee:

- The free warranty period for the whole machine/components has expired.
- The device is damaged during transport.
- The device is incorrectly installed, refitted, or used.
- The device operates in harsh conditions beyond those described in this manual.
- The fault or damage is caused by installation, repairs, modification, or disassembly performed by a service provider or personnel not from SUNGROW.
- The fault or damage is caused by the use of non-standard or non-SUNGROW components or software.
- The installation and use range are beyond stipulations of relevant international standards.
- The damage is caused by unexpected natural factors.

For faulty products in any of above cases, if the customer requests maintenance, paid maintenance service may be provided based on the judgment of SUNGROW.

Product data such as product dimensions are subject to change without prior notice. The latest documentation from SUNGROW should take precedence in case of any deviation.

10.4 Contact Information

In case of questions about this product, please contact us. We need the following information to provide you the best assistance:

- Model of the device
- Serial number of the device
- Fault code/name
- Brief description of the problem

For detailed contact information, please visit: **https://en.SUNGROWpower.com/contactUS**

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Sungrow Power Supply Co., Ltd.

www.sungrowpower.com

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