

INSTALLATION MANUAL OF ENERGY STORAGE SYSTEM StaX-M29.9/M30/M50



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Please keep this manual safe and strictly follow all safety and operating instructions in this manual. Do not install or operate the system before reading this manual.

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Preface

The StaX-M29.9/M30/M50 energy storage system has been developed by AlphaESS over many years and has been successfully applied in many fields. It is a high-tech product with excellent quality and stable performance that meets today's power supply needs.

This manual is intended to address product installation and usage issues. It provides detailed installation and usage information, including safety instructions, product introduction, installation, and user guidelines.

Symbols

The following symbols may appear in this document. Please note that they represent the following meanings:

Symbol	Description
 CAUTION	Indicates potential risks that may cause system malfunctions or errors if not avoided.
 WARNING	Indicates moderate potential hazards that may lead to system damage or personal injury if not avoided.
 DANGER	Indicates high potential hazards that may result in death or serious injury if not avoided.
 NOTE	Supplementary explanation of key information in the main text. "Explanation" is not a safety warning information and does not involve personal, system, or environmental injury.

Terminology

1. Battery Management System (BMS)

Monitors the operational information of battery cells, battery packs, and system units (such as voltage, current, temperature, and battery protection parameters), and intelligently assesses the state of charge (SOC), state of health (SOH), and total energy output to ensure battery safety.

2. Energy Management System (EMS)

Consists of data collection and monitoring systems and supports automatic power generation control, economic dispatch control, and power system status and safety analysis.

3. Battery Energy Storage System (BESS)

A combination of series- and parallel-connected batteries and the BMS, used to connect the DC side of PCS.

4. Energy Storage System (ESS)

A combination of a battery system and power conversion systems (PCSs) such as StaX-M29.9/M30/M50. An ESS can be used as an independent power source or be directly controlled by a monitoring system.

5. Photovoltaic (PV)

A PV power system is a new type of power generation system that utilizes the photovoltaic effect of semiconductor materials in solar cells to directly convert solar radiation energy into electrical energy.

6. On-Grid System

On-grid systems typically consist of PV strings, PCSs, battery systems, and the power grid. When the electricity generated by the PV strings is sufficient, the excessive electricity can be fed into the grid. When the electricity generated by the PV strings and battery system is insufficient, the grid can supply power to the load.

7. Off-Grid System

Off-grid systems are suitable for areas without a grid or where the grid power is unstable. These systems typically consist of PV strings, energy storage inverters, battery systems, and generators. When the battery has sufficient energy, the load is powered by the PV system and the battery. If the battery energy is insufficient, the generator powers the load while charging the battery system.

Version Information

Version	Date	Content
V01	2026.03.25	New
V02	2026.06.24	Modify in accordance with R&D modification notice
V03	2026.07.15	3.2 Scope of Delivery: Added length specifications for PCS and EMS communication cables 4. System Power-On and Power-Off: Added note that older versions are not equipped with a PCS switch 3.5.5.3 AC Aux Power Connection: Added requirement to connect auxiliary power cable if ambient temperature falls below 0°C 3.5.4.2 Meter Communication Connection: Added instructions for direct meter wiring
V04	2026.08.14	3.2 Scope of Delivery: Revise HV-BOX illustrations; add length specifications for battery power cables contained in the accessory kit. 1.6.4 Space Requirements: Update two illustrations, add requirement: the clearance in front of the inverter shall be no less than 1000 mm. 3.5.4.2 Meter Communication Connection: Add configuration instructions for direct-connected electricity meters. 3.5.5.3 AC Aux Power Connection: Add statement that heating films are powered by auxiliary power supply. 3.5.3 Cover Opening & Removal: Update illustrations and text content; the cover does not need to be disassembled. 3.6.1 Communication Wiring: Add photos of DIP switches. 3.6.2 Electrical Wiring: Update the parallel connection diagram. 3.5.4.2 Meter Communication Connection: Add configuration instructions for household electricity meters.

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1. Introduction

1.1 Personal Safety

1.1.1 General Requirements

1. This manual contains important information regarding product installation, usage, etc. Read it carefully before operation.
2. Keep this manual properly for installation, operation, and maintenance.
3. Strictly follow the instructions in this manual for installation, operation, and maintenance to avoid product damage, personal injury, and property loss.
4. For systems where commissioning is not completed, ensure the system is shut down before the installation personnel leave the site.
5. If a fault occurs in a normally operating system, first refer to the troubleshooting table to eliminate the fault. If the problem is not resolved, contact AlphaESS engineers promptly. Keep the system shut down until you receive a response from AlphaESS engineers.
6. To ensure optimal reliability and meet warranty requirements, the energy storage system must be installed, operated, and maintained according to the instructions in this manual. Our company does not assume any liability for damages resulting from violations of general safety operating requirements or safety standards for the design, production, and use of the product. Product damage caused by such violations is not covered under warranty.
7. Erect clear signage at breakers for PV, batteries, PCS, distribution boxes, etc., to prevent accidents caused by accidental closure.
8. Ensure the system's connection and usage methods comply with relevant regulations to prevent arcs or electric shock accidents.
9. Erect warning signs or set up safety warning tape near the operating area.

1.1.2 Personnel Requirements

1. Operators must hold a professional qualification certificate issued by AlphaESS or authorized by AlphaESS.
2. Operators must be familiar with the product, including its composition and working principles.
3. Operators must be familiar with the product manual and strictly follow it for installation, operation, and maintenance.
4. When performing any product-related work, ensure at least two operators are present. Do not perform maintenance work until the product is powered off.
5. Personnel involved in special scenarios such as electrical operations, working at heights, or operating special equipment must possess the special operation qualifications required by the local country/region.
6. Replacing equipment or components (including software) must be performed by authorized professionals.
7. The system contains high voltage; accidental contact may pose a fatal electric shock hazard. Ensure proper protection is in place when performing live testing.
8. When performing electrical connections, trial runs, or product maintenance, use a multimeter to measure electrical parameters to ensure they meet requirements. Use the multimeter correctly to ensure personnel safety.



During installation, operation, and maintenance, the following installation tools and protective equipment are required.

The installation tools are listed in the following table.

The protective equipment is listed in the following table.

Number	Name	Model/Specification	Unit	Qty
1	Diagonal pliers	/	pcs	1
2	Screwdriver	2/4/6/8mm	pcs	1
3	Cable tie	/	pcs	1
4	Multimeter	DC 1000V	pcs	1
5	Impact drill	/	pcs	1
6	Socket wrench	Socket wrench set	pcs	1
7	Open end wrench	Open end wrench set	pcs	1
8	Socket torque wrench	/	pcs	1
9	PV cable connector tool	/	pcs	1

Number	Name	Number	Name
1	Safety Shoes	4	Safety Goggles
2	Safety Helmet	5	Dust Mask
3	Safety Gloves		

1. 2 Product Safety

- Warning signs contain important information for the safe operation of the product. Ensure that the warning signs are clear and visible and prevent any deliberate damage. If any sign is damaged, it should be replaced immediately.
- The key must be removed from the system after formal operation or maintenance is completed.
- Avoid unnecessary contact with the circuit board to prevent damage to it or other static-sensitive components caused by contact or improper operation.

4. Fire inspections must be conducted regularly on the energy storage system, no less than once per month.
5. During live inspections, pay attention to hazardous warning signs on the equipment and avoid standing near the cabinet door.



During maintenance, all products must be powered off and maintained strictly in accordance with the relevant requirements of this manual.

1. 3 Electrical Safety

1. 3. 1 Grounding Requirements

1. Equipment grounding impedance should meet local electrical standards.
2. When you install the product, install the protective ground wire first. When you disassemble it, remove the protective ground wire in the last step.
3. The system should be permanently grounded. Before you operate on the system, you must check the electrical connections of the system to ensure that it is reliably grounded.
4. It is prohibited to operate the equipment without installing the grounding conductor.
5. Do not damage the grounding conductor.



It is strictly prohibited to install the system before grounding.

1. 3. 2 Cabling Requirements

1. Cable selection, erection, and routing must comply with local laws, regulations, and specifications.

2. During power cable laying, loops and twists are strictly prohibited. If the cable length is insufficient, replace the cable. Making joints or solder points within the power cable is strictly prohibited.
3. All cables must be securely connected, well insulated, and of appropriate specification.
4. Cable trays and cable entry holes must have no sharp edges. Cable entry points through conduits or holes must be protected to prevent cables from being damaged by sharp edges or burrs.
5. Cables used in high-temperature environments may be subject to insulation layer aging and damage. Ensure that the distance between the cable and any surrounding heating devices or heat source areas is at least 30 mm.
6. Similar cables should be bundled together, while different types of cables must be laid at least 30 mm apart. Wrapping or crossing cables is prohibited.
7. All cables used in the product must be securely connected, properly insulated, and meet the applicable specifications.
8. Buried cables need to be reliably fixed using cable supports and cable clamps. Cables in backfilled soil areas must fit tightly to the ground to prevent deformation or damage due to force during backfilling.
9. At very low temperatures, severe impact or vibration may cause the plastic sheath of cables to become brittle and crack. To ensure construction safety, the following requirements must be met:
 - All cables should be laid and installed at temperatures above 0°C. Handle cables gently during transportation, especially during construction in low-temperature environments.
 - If the storage environment temperature of cables is below 0°C, they must be moved to room temperature storage for more than 24 hours before laying.



The system's operating temperature range is -20°C to 50°C.

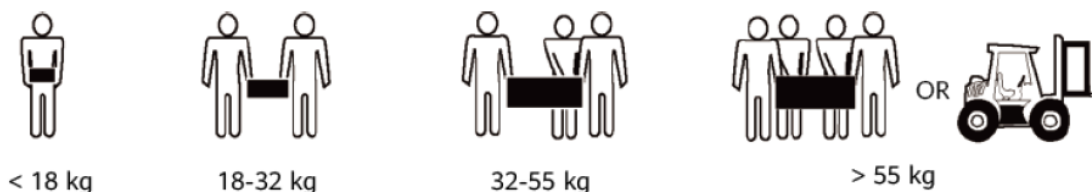
When using the M38314-SNW battery or M38280-SNW battery, the operating temperature of the system should be between 0°C and 50°C.

1. 4 Storage and Transportation

1. 4. 1 Transportation Safety

During transportation, please follow these guidelines:

1. Use the original packaging for transportation. If the original packaging is not available, place the product inside a suitable cardboard box with adequate protection and seal the carton.
2. Handle with care, choose the corresponding handling method according to the weight, and pay attention to safety. Mechanical aids should always be used in preference to lifting by hand.



3. Keep the packaging dry and away from potential sources of damage during transportation.
4. Secure the product during transportation to prevent falling or mechanical impact.

1. 4. 2 Storage Requirements

1. 4. 2. 1 Inverter Storage

If not put into use immediately (stored for more than one month), the following requirements shall be met:

1. Do not open the inverter packaging.
2. The storage temperature shall be controlled within -40°C to 60°C, and the humidity shall be controlled within 5% to 95% RH.
3. The inverter shall be stored in a clean and dry place to prevent corrosion from dust and water vapor.
4. During storage, the inverter shall be inspected periodically. Damaged packaging shall be replaced in a timely manner.
5. Inverters stored for more than two years shall be inspected and tested before being put into use.

1. 4. 2. 2 Battery Storage

If the battery is not put into use immediately (stored for more than one month), the following requirements shall be met:

1. When storing the battery, place it according to the markings on the carton. Do not place the battery upside down.
2. Stack the battery cartons in accordance with the stacking requirements printed on the outer carton.
3. Store the battery out of reach of animals.
4. Store the battery in a place with minimal dust and dirt.
5. Handle the battery with care to avoid damage.
6. The storage environment shall meet the following requirements:
 - a. Ambient temperature: 0°C to 35°C.
 - b. Relative humidity: 0% to 80%.
 - c. Place the battery in a dry, clean, well-ventilated, and dust-free area.
 - d. Store the battery away from corrosive organic solvents and gases.
 - e. Keep the battery away from direct sunlight.
 - f. Place the battery at least 2 meters away from heat sources.

7. Batteries in storage shall be shipped in accordance with the FIFO (first in, first out) inventory control principle.

1. 5 Mechanical Safety

1. 5. 1 Lifting Safety

1. Personnel engaged in lifting operations must receive relevant training and be certified before taking up the post.
2. The foundation for lifting operations must meet the load-bearing requirements for AlphaESS Lifting Tool operation.
3. Temporary warning signs or barriers shall be set up in the lifting area for isolation.
4. During lifting, walking under the boom or the suspended load is strictly prohibited.
5. During lifting, dragging steel wire ropes or lifting gear is prohibited, and impact with hard objects is not allowed.
6. During lifting, ensure that the angle between the two slings does not exceed 90°, as shown in the figure below.



7. During crane lifting, ensure that the center point of the lifting hook is vertically aligned with the battery enclosure.
8. During lifting, the tilt angle of the enclosure shall be less than 5°.
9. The lifting acceleration shall be $\leq 0.5g$, and lifting shall be carried out at a constant speed.
10. The angle between the lifting ropes and the top of the battery shall be $\geq 60^\circ$.

1. 5. 2 Working at Heights Safety

1. When electrical work at heights is possible, use wooden ladders or insulated ladders.
2. Prioritize using platform ladders with guardrails for work at heights; step ladders are prohibited.
3. Before using a ladder, confirm it is intact, its load capacity meets requirements, and overloading is strictly prohibited.
4. The ladder must be placed on a stable surface and must be held by someone during operation.
5. When climbing the ladder, keep your body steady and ensure your center of gravity does not deviate from the edge of the ladder frame to reduce danger and ensure safety.
6. When using an A-frame ladder, the spreader rope must be secure.

1. 6 Environmental Requirements

1. 6. 1 General Requirements

1. Do not place the equipment in an environment containing flammable or explosive gases or smoke, and do not perform any operations in such an environment.
2. Do not store flammable or explosive materials in the equipment area.

3. Do not place the equipment near heat sources or ignition sources, such as fire-works, candles, heaters, or other heat-generating devices. Exposure to heat may cause damage to the equipment or result in fire.
4. The equipment shall be installed in an area away from liquids. Do not install it under water pipes, air outlets, or other locations where condensation is likely to occur. Do not install it under air conditioner outlets, ventilation openings, cable outlet windows in equipment rooms, or other locations prone to water leakage, so as to prevent liquid from entering the equipment and causing malfunction or short circuit.
5. During equipment operation, do not block the ventilation openings or cooling system, and do not cover the equipment with other objects, so as to prevent equipment damage or fire caused by overheating.
6. The storage environment for the equipment shall have appropriate temperature and humidity conditions. The equipment shall be stored in a clean, dry, and well-ventilated area, protected from dust and condensation.
7. Do not install, use, or operate outdoor equipment or cables in severe weather conditions such as lightning, rain, snow, or strong winds above Force 6, including but not limited to moving equipment, operating equipment and cables, plugging or unplugging signal interfaces connected to the outdoors, working at height, outdoor installation, or opening doors.

1. 6. 2 Mounting Environment Requirements

1. StaX-M29.9, Stax-M30, StaX-M50 are suitable for indoor and outdoor installation.
2. Do not install the inverter in a place where people can easily touch it because the inverter's surface will get extremely hot during operation.

3. Do not engage screws into tapped holes using a Hammer Driver, Impact Driver or "Rattle gun". Do not damage screws or threaded holes by tightening with too much torque.
4. Do not mount the system in areas with flammable or explosive materials.
5. Do not install the system in outdoor areas where there may be high salt fog, as corrosion may cause damage there. The overall anti-corrosion grade of the system is C4. Please determine the installation area according to the C4 standard.
6. The system must be mounted in a well-ventilated environment to ensure adequate heat dissipation.
7. Do not mount in a location that will be exposed to direct sunlight. When mounted under direct sunlight, the power of the system may be derated due to additional temperature rise and the longevity of the product will be reduced.
8. Mount the system in a sheltered place or mount an awning over it.
9. The optimal temperature range for the battery to operate is 15 to 30°C.
10. Favour locations that are indoors, under cover, or generally protected from the elements and extreme temperatures (e.g. in a garage).
11. Do not place the system near water sources such as downpipes or sprinklers.
12. If the battery is mounted in the garage, ensure the product is adequately protected from potential mechanical impact.

1. 6. 3 Mounting Structure Requirements

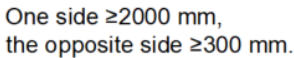
1. The surface to which the Battery System is to be mounted shall be fire-rated where required by local regulations.
2. Out of an abundance of caution, it is recommended that the system be mounted on non-flammable building materials, even when not required by local regulations.

- 4.

1.

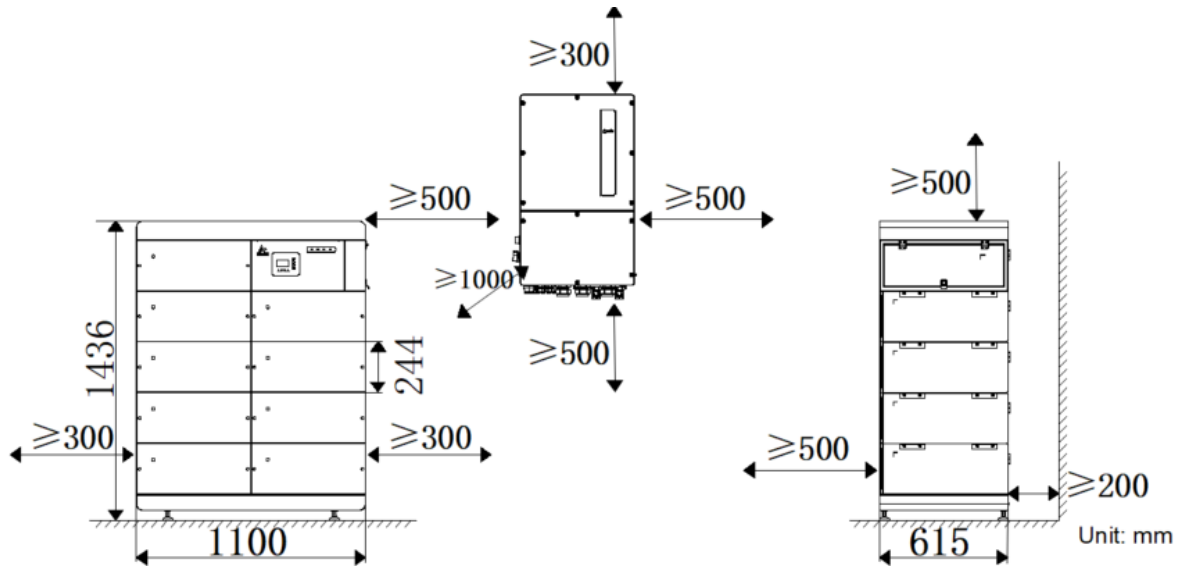
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Sp



Unit: mm

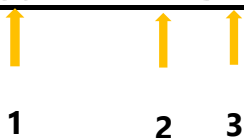
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2. Product Introduction

2.1 Naming Convention

StaX-M50



Location	Name	Explanation
1	StaX	Commercial & Industrial Stacked Energy Storage System
2	M	Module mounting
3	50	Inverter power is available in 29.9kW, 30kW and 50kW.

2.2 Product Features

The Lithium Iron Phosphate (LFP) batteries produced by AlphaESS feature long life and high reliability, meeting the application needs of various energy storage systems.

The system is designed with a highly modular structure, making it easy to assemble, transport, and maintain.

The system uses real-time balancing technology to ensure high consistency between battery modules.

The system is designed with a detachable structure, compact and flexible, facilitating installation and testing, and meeting application requirements in different working environments and types.

Contents

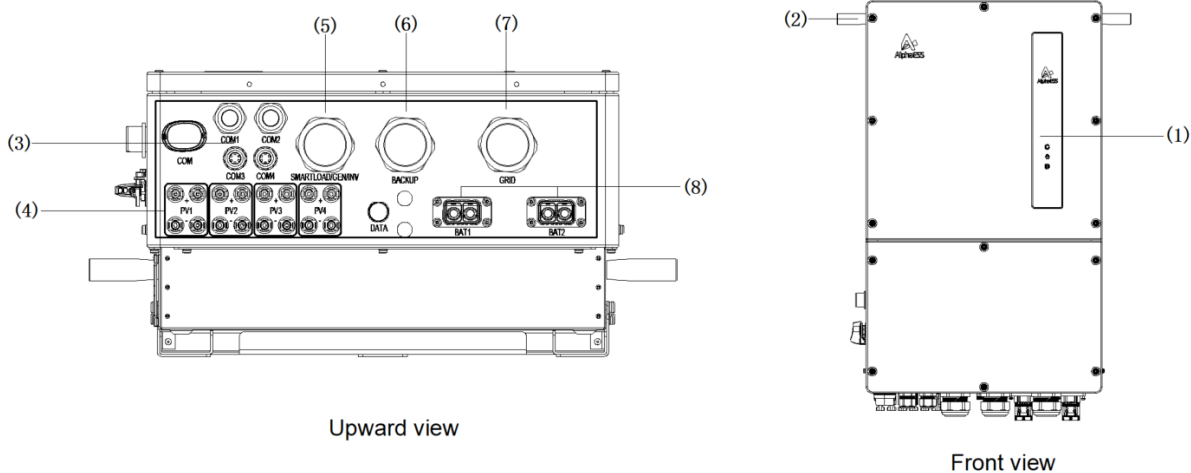
The system features advanced thermal management technology, allowing it to operate within the optimal temperature environment.

The system has local and remote monitoring and control functions.

Through communication between the BMS, PCS, EMS, and monitoring system, the system enables flexible dispatch of the power system.

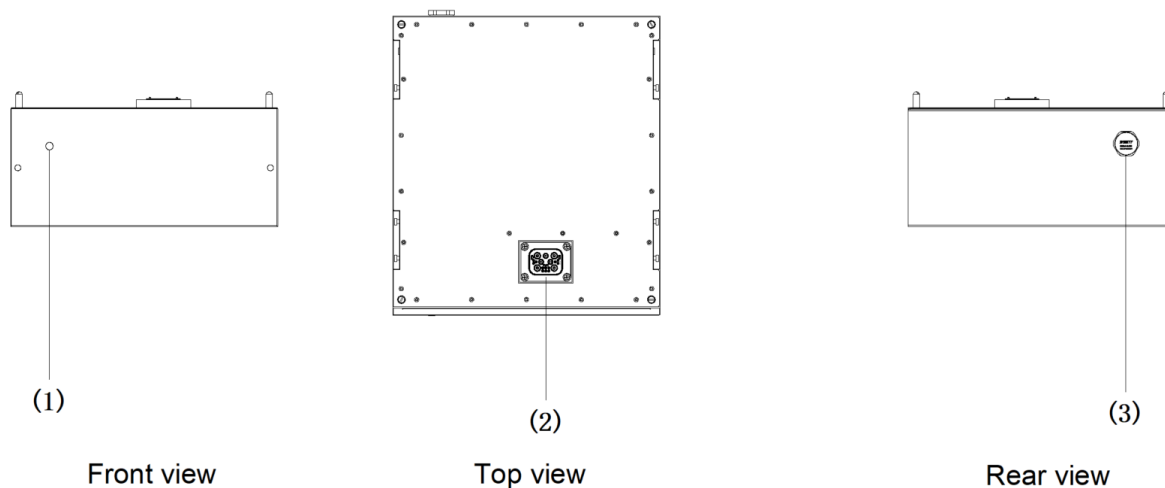
2.3 Product Composition

2.3.1 PCS



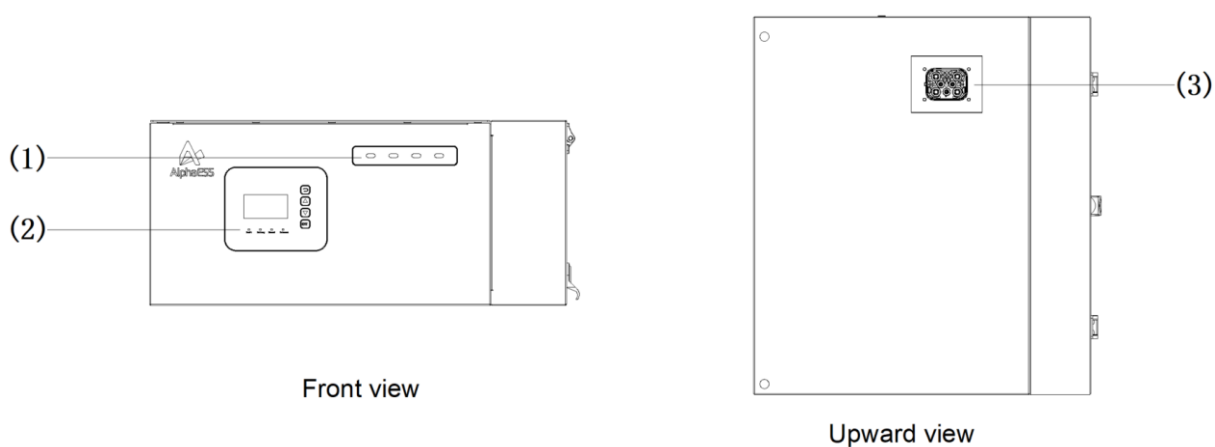
Position	Designation
1	Indicator
2	Handle
3	Communication Port
4	PV Power Port
5	DG Power Port
6	Backup Power Port
7	Grid Power Port
8	Battery Input Port

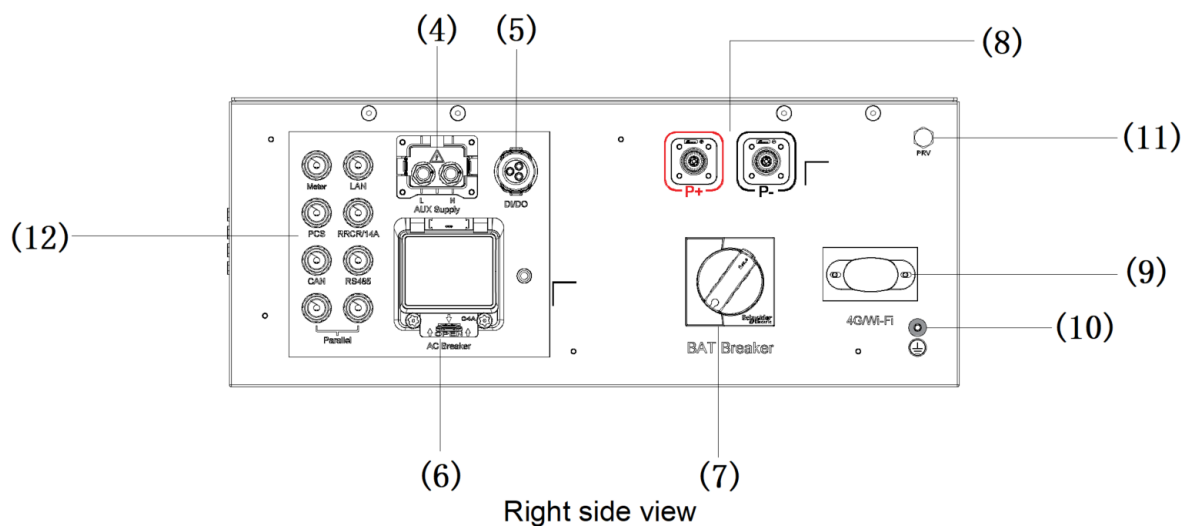
2.3.2 Battery



Position	Designation
1	Indicator
2	Power and Communication Connectors
3	Relief Valve

2.3.3 HV Box

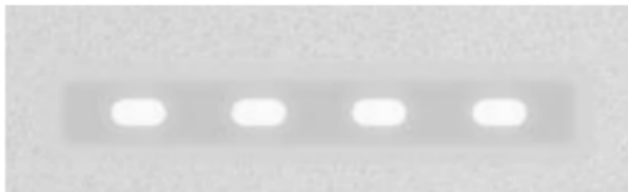




Position	Designation
1	SOC Indicator
2	LCD
3	Power and Communication Connectors
4	AC Auxiliary Power Input
5	DI/DO Interface
6	AC Breaker
7	Battery Breaker
8	Battery DC Output Terminal
9	Wi-Fi Dongle Port (4G Dongle Optional)
10	Relief Valve
11	Grounding Point
12	Communication Port (RJ45)

2. 3. 4 Description of External Indicator Functions

2. 3. 4. 1 Battery Side



Num	Definition	Note
1	$SOC \leq 5\%$	The first cell on the left flashes every 3 seconds
2	$5 < SOC \leq 25\%$	The first cell on the left is on
3	$25 < SOC \leq 50\%$	The first and second cells on the left are on
4	$50 < SOC \leq 75\%$	The first, second and third cells on the left are on
5	$75 < SOC \leq 100\%$	All cells are on

2. 3. 4. 2 PCS Side

  Power  Grid  COM	Light	Status	Description
	 Power	OFF	Inverter shut down
		Flash alternately 3S	Stand by
		Light keeps on .	DC side is active on inverter
		Yellow	PCS warning
		Red	PCS fault
	 Grid	When the system is connected to the grid for operation , the lights remain on constantly. When the system is operating under off-grid state , the light flashes in a cycle of on for 2 seconds and off for 5 seconds . When the system is in standby mode , the light remains on .	
	 COM	ON	EMS-PCS communication ok
		OFF	EMS-PCS communication lost

3. Installation

3.1 Package Inspection

Before unpacking, check whether the packaging shows any obvious signs of damage. If any damage is found, do not unpack the product; verify the system model and contact the dealer as soon as possible.

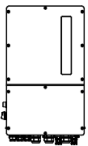
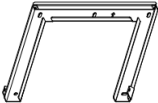
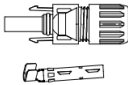
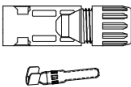
After unpacking, check whether each product is intact. If there is any obvious appearance damage, contact the distributor as soon as possible.

3.2 Scope of Delivery

Check the scope of delivery and inspect components to ensure they are present and undamaged.

Contact your distributor if the packed components are incomplete or damaged.

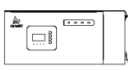
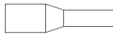
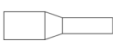
PCS:

 Inverter (X1)	 Handle (X2)	 Wall-mounted panel (X1)	 Expansion bolt (M10*70) (X5)	 PV terminal M29.9/M30(X6) M50(X8)	 PV terminal M29.9/M30(X6) M50(X8)
 OT terminals (R38-8, R14-6-12) (X13)	 RJ45 connector (X11)				

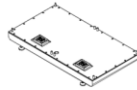
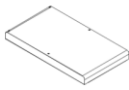
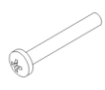
Battery:

 Battery (X1)	 Dowel pin (X4)
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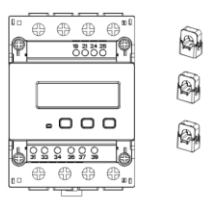
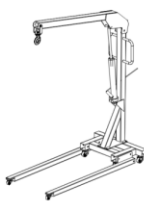
HV Box:

 High-voltage box (X1)	 Empty battery box (X1)	 Quick Installation Guide (X2)	 Battery terminal (X1)	 Battery power cables(5m) (X2)	 EMS-PCS communication cable(5m) (X1)
 Battery handle (X4)	 Communication terminal (X8)	 Terminal E6010 (X2)	 Terminal E0308 (X22)	 Cable Tie (X10)	

Base:

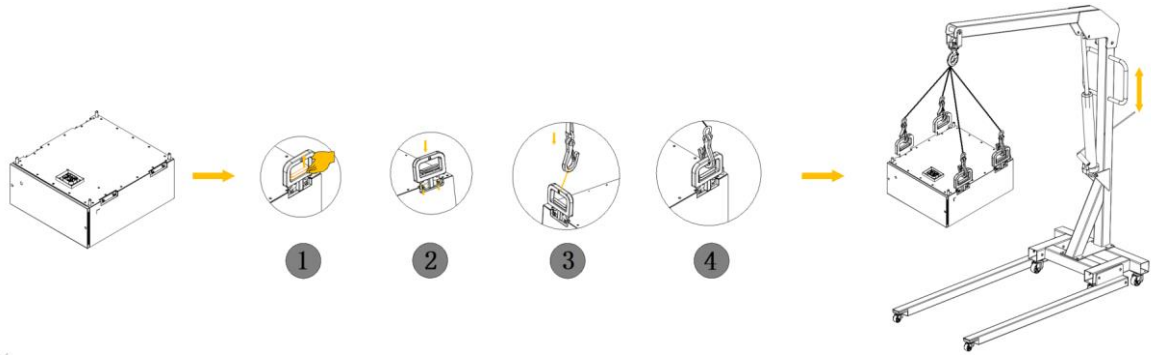
 Base (X1)	 TOP cover (X1)	 Leveling feet (X4)	 Screw M8*90 (X4)	 Hole plug (X4)	 Dowel pin (X8)
---	--	--	--	--	--

Other accessories:

 Meter+CT	 Lifting tool	 Series cable (3m/5m/10m)	 4G dongle
---	---	--	--

3. 3 AlphaESS Lifting Tool

You may install the battery either by lifting it with AlphaESS Lifting Tool or without using AlphaESS Lifting Tool. If AlphaESS Lifting Tool is used for installation, follow the steps below:

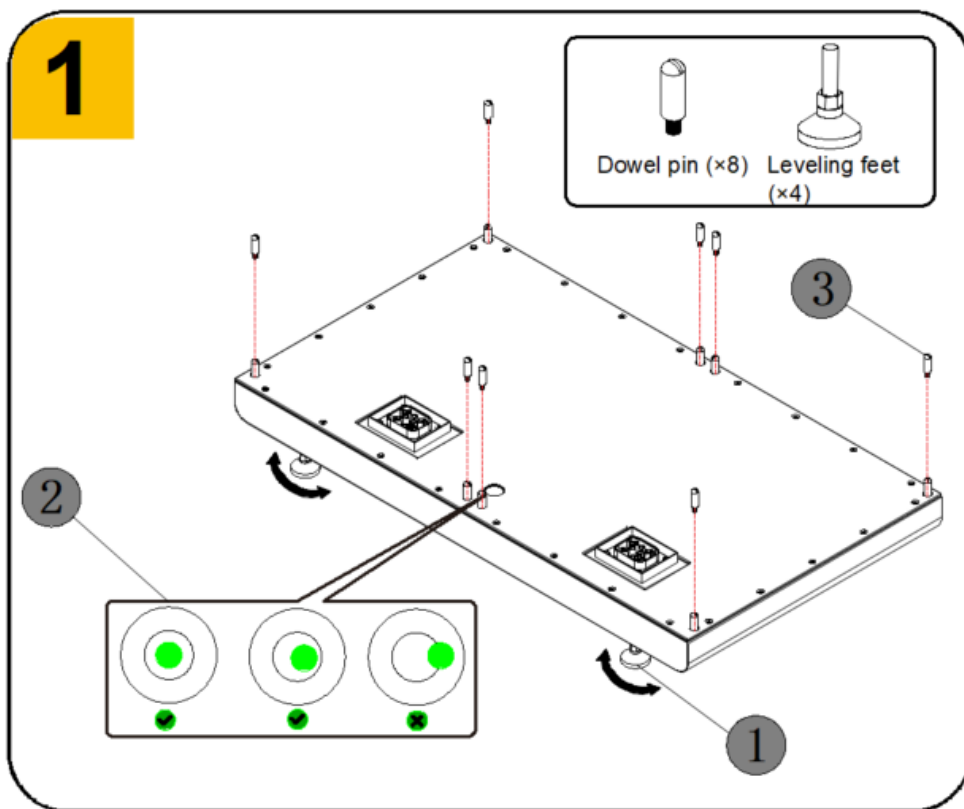


3. 4 Product Installation

3. 4. 1 Base Installation

Remove the base from the carton and transport it to the installation site and ensure that the installation site meets the requirements in Section 1.6.

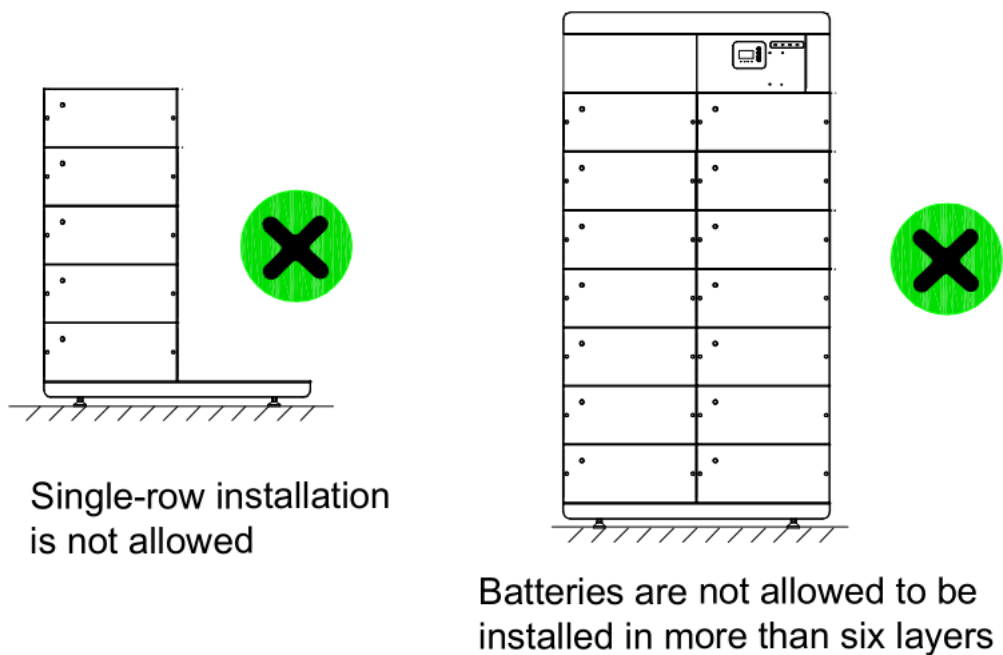
1. Install four leveling feet onto the battery base one by one and tighten them fully.
2. Level the base according to the spirit level
3. After leveling is completed, Install four dowel pins on the base.



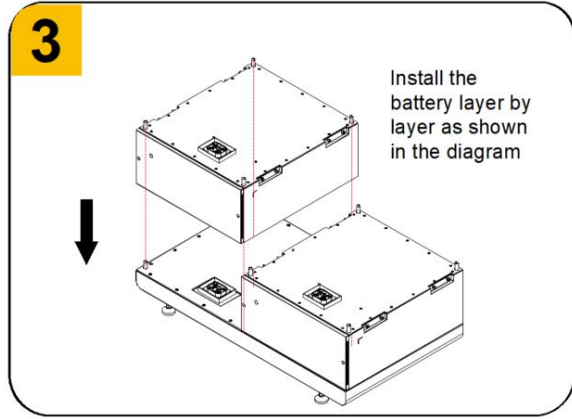
3. 4. 2 Battery Installation

Notice:

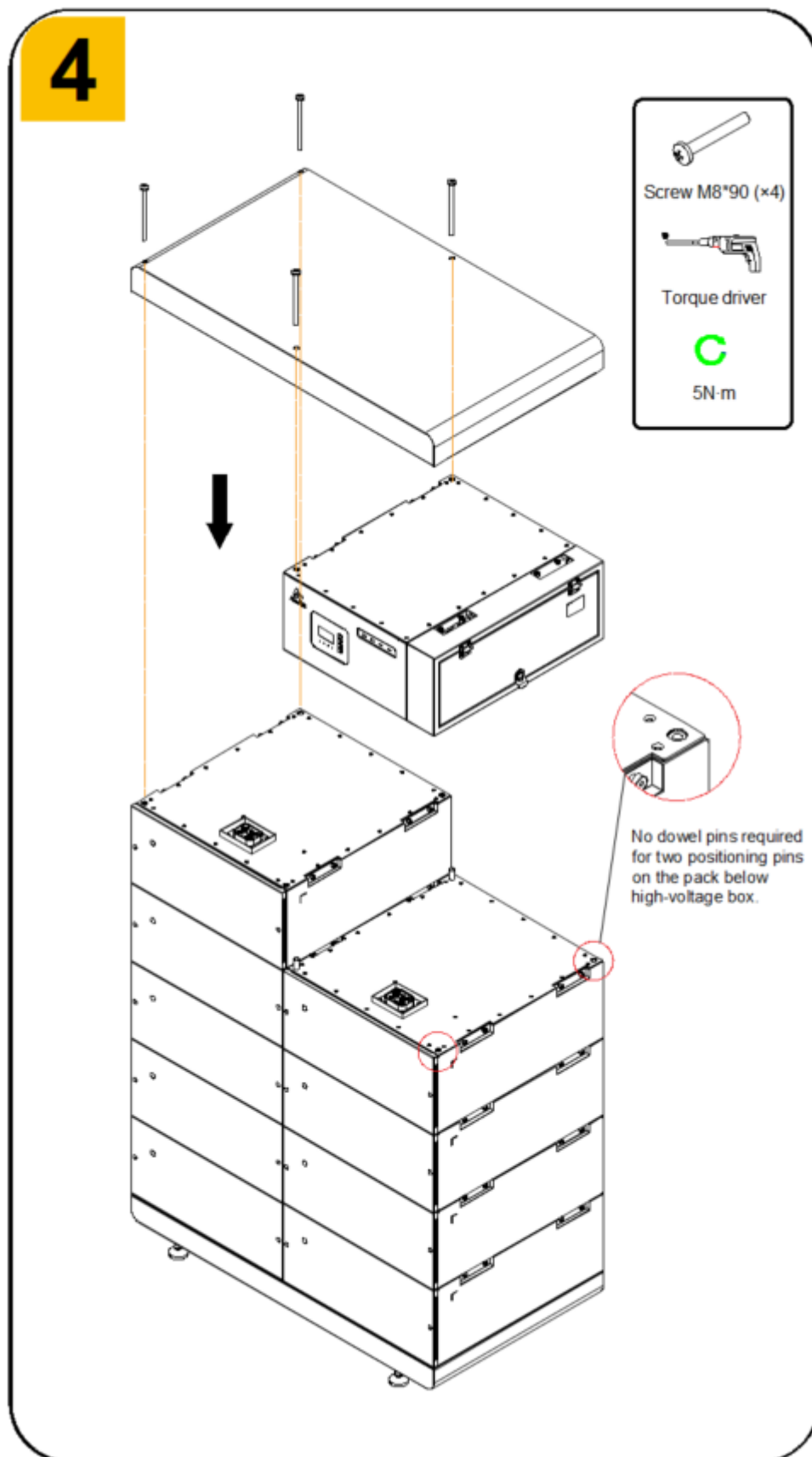
The batteries shall be installed row by row; single-column installation is not allowed. Each base can accommodate a maximum of 12 battery modules and 1 high-voltage box. Installation of more than 12 battery modules is not allowed.



1. Open the packaging of the high-voltage box and take out the four handles from the accessories of the high-voltage box.
2. Use the handles to remove the battery from the carton, and remove the protective cap from the battery blind-mate connector. At this point, you may choose to install the battery using lifting tools or manually carry and install it.
3. Move the battery onto the base. After one battery is installed, take out the positioning post from the battery accessory pack and install it on the battery.

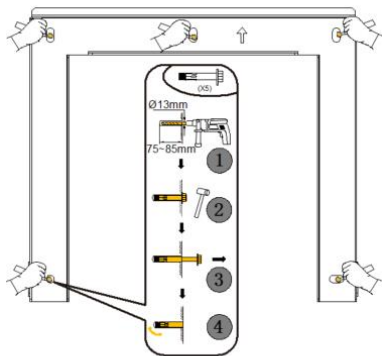


4. Install the high-voltage box on the top. (The high-voltage box shall be installed on the right side of the battery). And no dowel pins required for two positioning pins on the pack below high-voltage box.
5. Install the cover plate on the top, then take out the screws from the top cover accessory pack and fasten them onto the top cover.



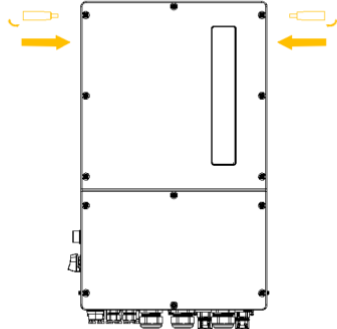
3. 4. 3 PCS Installation

1



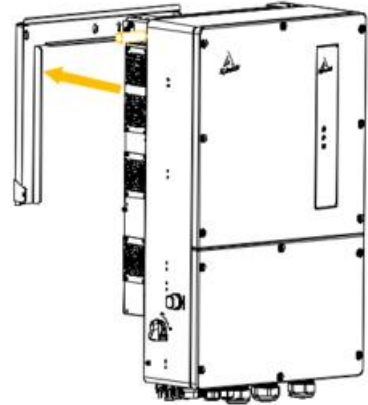
Drill holes for the mounting screws based on the hole diameter of the mounting bracket using a precision drill
Select the mounting height of the bracket and mark the mounting holes.

2



Fix the handle and use them to lift the inverter.

3



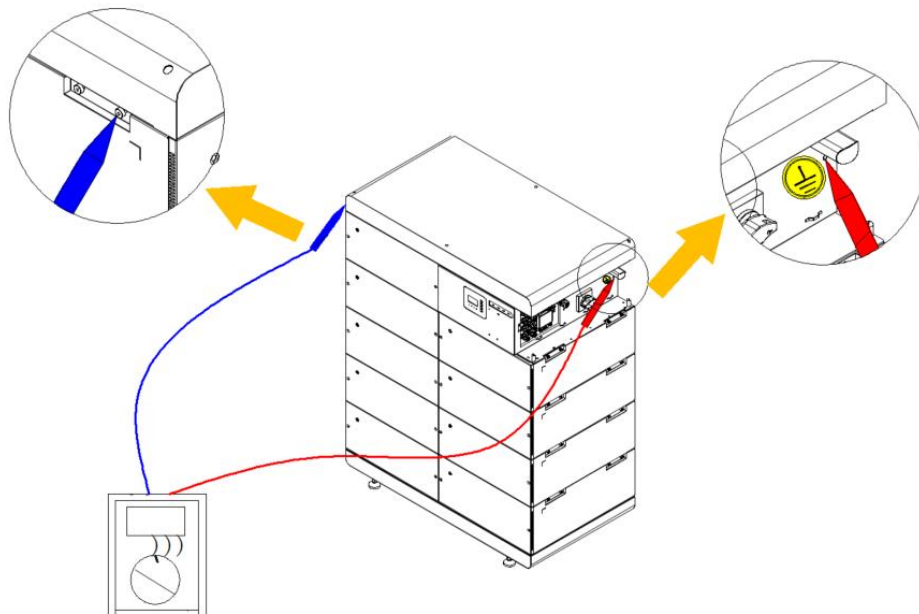
Lift up the inverter (be careful to avoid body strain) , and align the back bracket on the inverter with the convex section of the mounting bracket . Hang the inverter on the mounting bracket and make sure the inverter is secure . Install vertically ($\pm 5^\circ$) or tilted backward ($\leq 15^\circ$).
Don't mount inverter on the tilted forward wall.
Don't mount inverter on the horizontal.

1. Install the inverter on a wall or structure capable of bearing its weight.
2. The inverter must be installed vertically, with a maximum tilt angle of $\pm 5^\circ$. Exceeding this angle may result in reduced output power.
3. To avoid overheating, ensure that the airflow around the inverter is not obstructed. Refer to Section 1.6.4 for installation clearance requirements.
4. Select the installation height of the bracket and mark the positions of the mounting holes. For brick walls, the hole positions shall match the expansion bolts.

5. Lift the inverter, align the bracket on the back of the inverter with the raised surface of the mounting bracket, hang the inverter on the mounting bracket, and ensure that it is securely fastened.

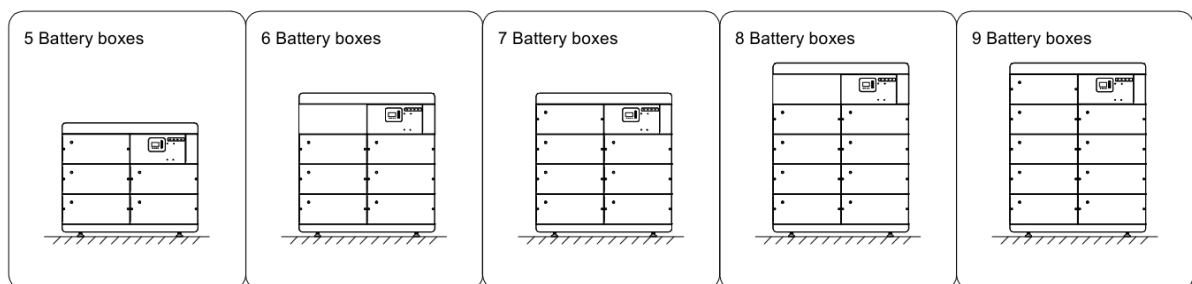
3. 4. 4 Continuity Test

After assembly, use the continuity function of a multimeter to test the connection between the high-voltage box and the last active battery, and ensure good continuity.

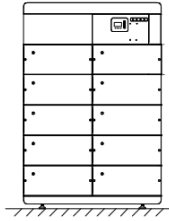


3. 4. 5 Other Battery Installation Layouts

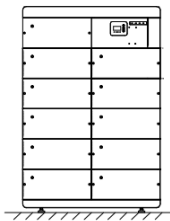
If two bases are used, an inter-cluster cable harness shall be ordered separately. This harness is available in 3 m and 5 m options. The detailed layout and wiring are shown below:



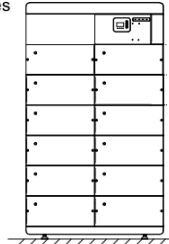
10 Battery boxes



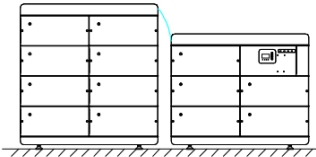
11 Battery boxes



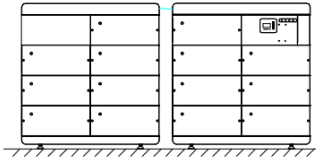
12 Battery boxes



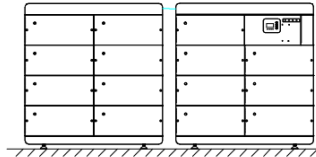
13 Battery boxes



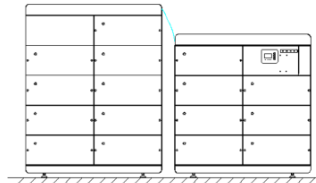
14 Battery boxes



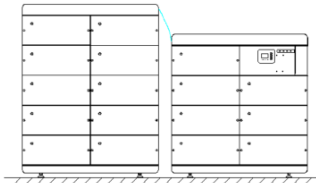
15 Battery boxes



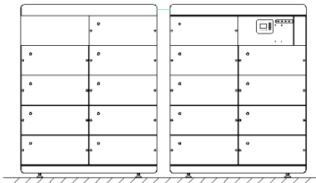
16 Battery boxes

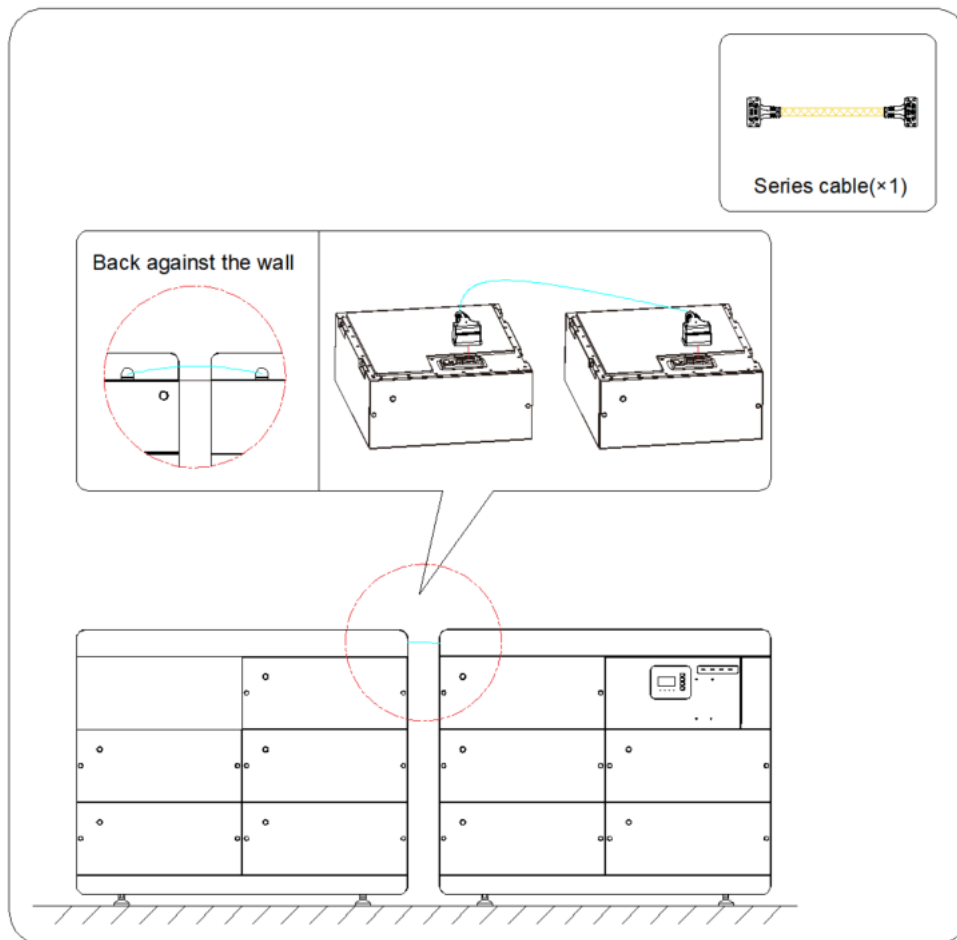


17 Battery boxes



18 Battery boxes





3. 5 Electrical Connections

3. 5. 1 Cable Requirements

No.	Cable	Type	Source
1	PV power cable	Standard PV cable (recommended type: H1Z2Z2-K)4 ~ 6 mm ²	Purchased by the installer
2	AC power (Grid)	Flexible cable 50mm ²	Purchased by the installer
3	AC power (Backup)	Flexible cable 20-25 mm ²	Purchased by the installer
4	Auxiliary Power Wiring	It is recommended to use 10AWG/6mm ² cable with a cable overcurrent of $\geq 35\text{A}$ and an outer diameter of $\leq 5.2\text{mm}$	Purchased by the installer
5	PE cable (High-voltage box)	recommend:35mm ²	Purchased by the installer
6	PE cable (Base)	recommend:35mm ²	Purchased by the installer
7	PE cable (Inverter)	recommend:35mm ²	Purchased by the installer
8	DI/DO	Recommend using three four core wires with a diameter of 24AWG/0.2mm ² ~22AWG/0.5mm ²	Purchased by the installer

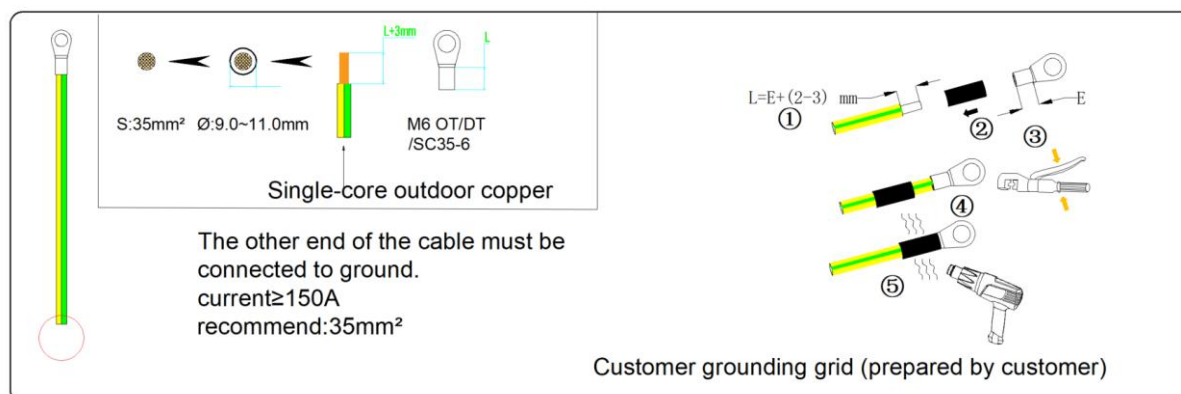
3.5.2 System Grounding



Electric Shock Hazard

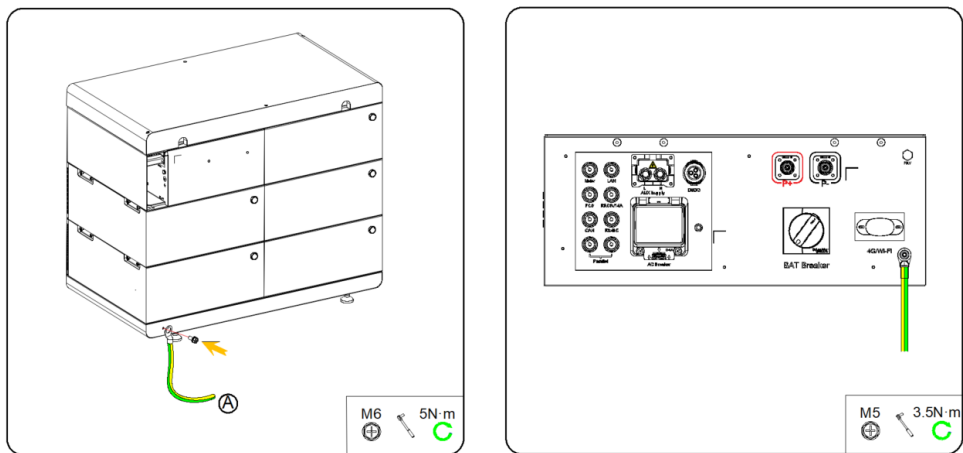
Before doing electrical connection, please ensure the PV switch & all AC and BAT circuit breakers in the energy storage system are switched OFF and cannot be accidentally or unintentionally reactivated.

The high-voltage box, base and inverter of the energy storage system are all equipped with grounding terminals. For on-site installation, either the high-voltage box or the base shall be grounded, and the inverter must be grounded.



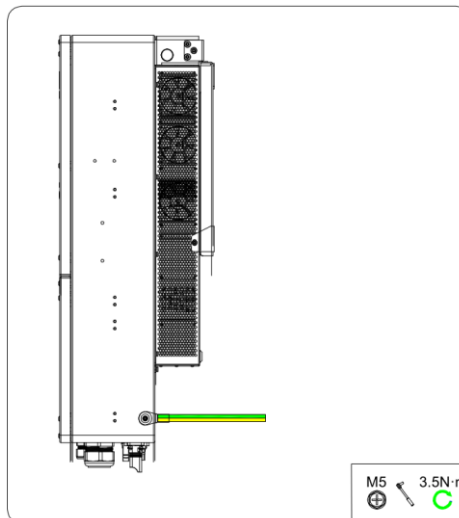
On the battery side, prepare an M6 OT terminal, strip the insulation from the grounding cable, insert the stripped conductor into the barrel of the OT terminal, and crimp it using a crimping tool.

Use a screwdriver with a tightening torque of 5 N·m to connect the grounding terminal to the battery.

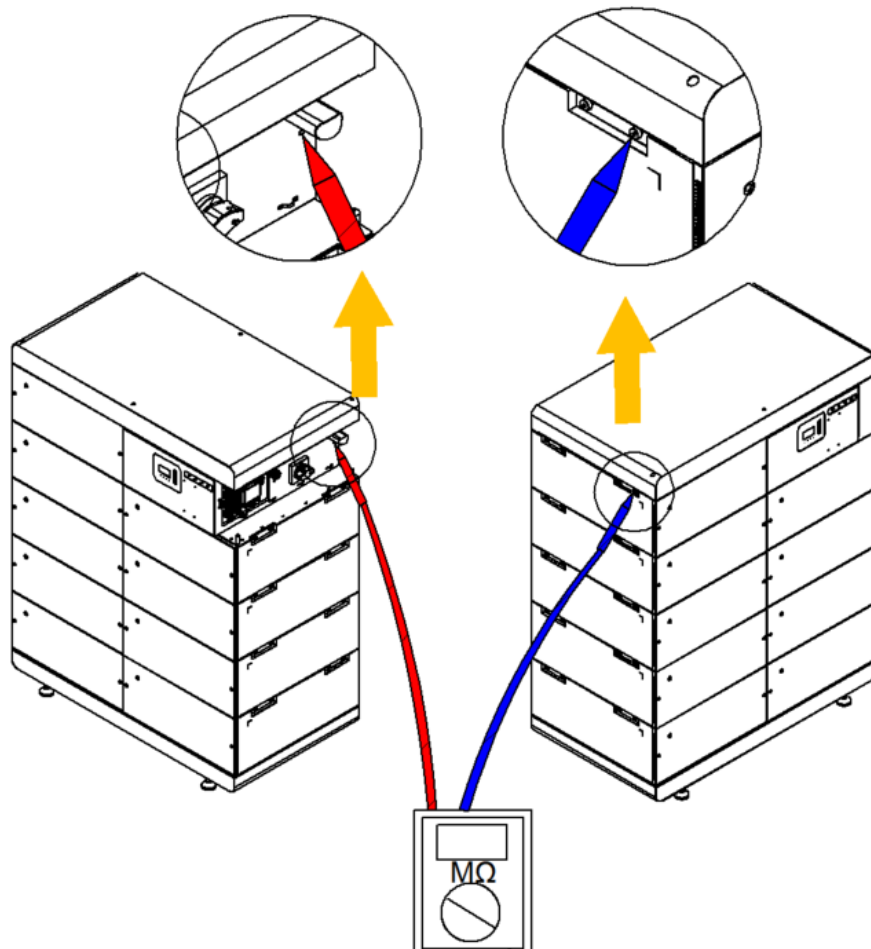


On the inverter side, prepare an M5 OT terminal, strip the insulation from the grounding cable, insert the stripped conductor into the barrel of the OT terminal, and crimp it using a crimping tool.

Use a screwdriver with a tightening torque of 3.5 N·m to connect the grounding terminal to the inverter.



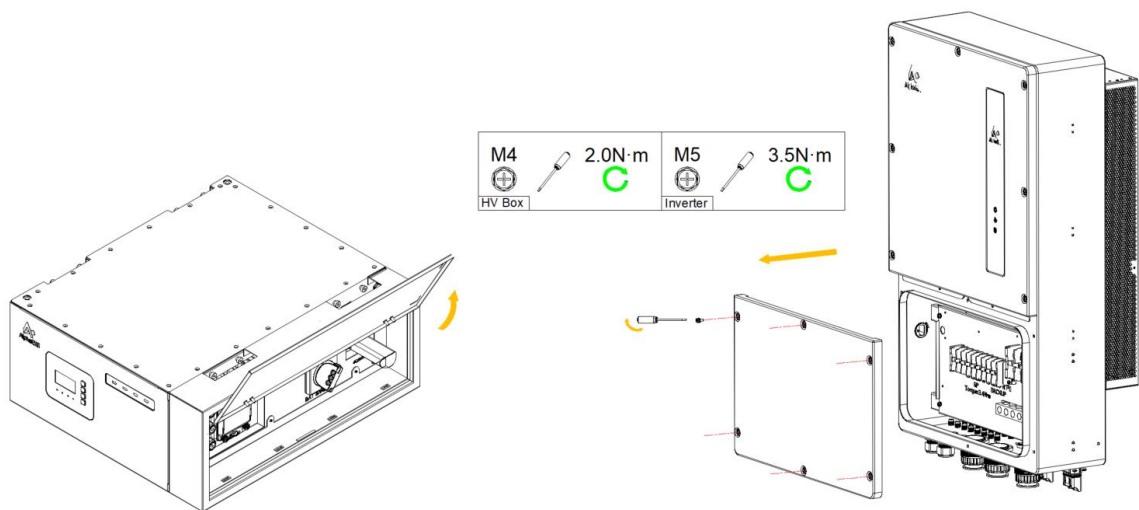
After grounding is completed, the battery grounding shall be checked. Use the positive and negative probes of a multimeter to contact the corresponding positions on the battery and verify whether grounding has been completed successfully.



3. 5. 3 Cover Opening & Removal

Flip open the high-voltage cabinet cover.

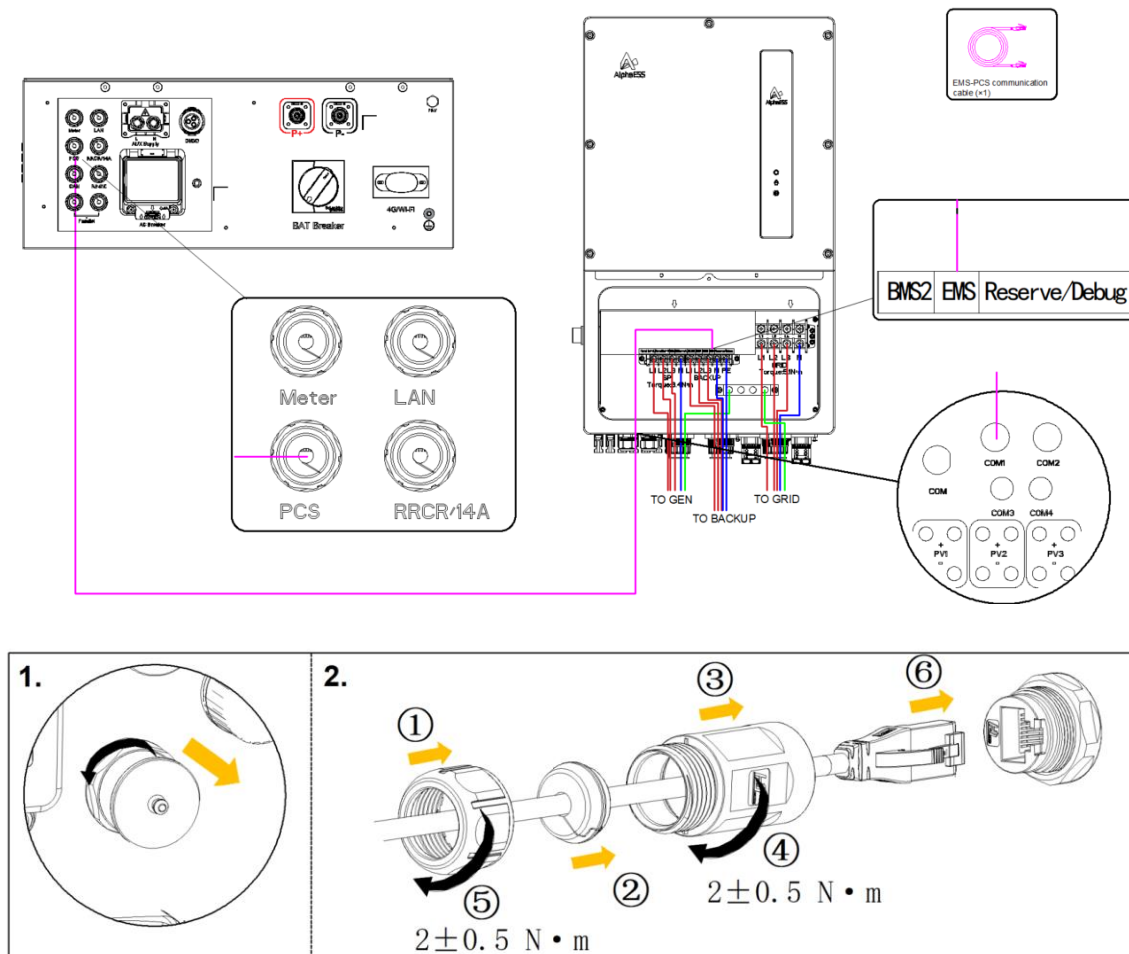
Remove the side cover plate of the inverter.



3.5.4 Communication Connection

3.5.4.1 EMS and PCS Communication Connection

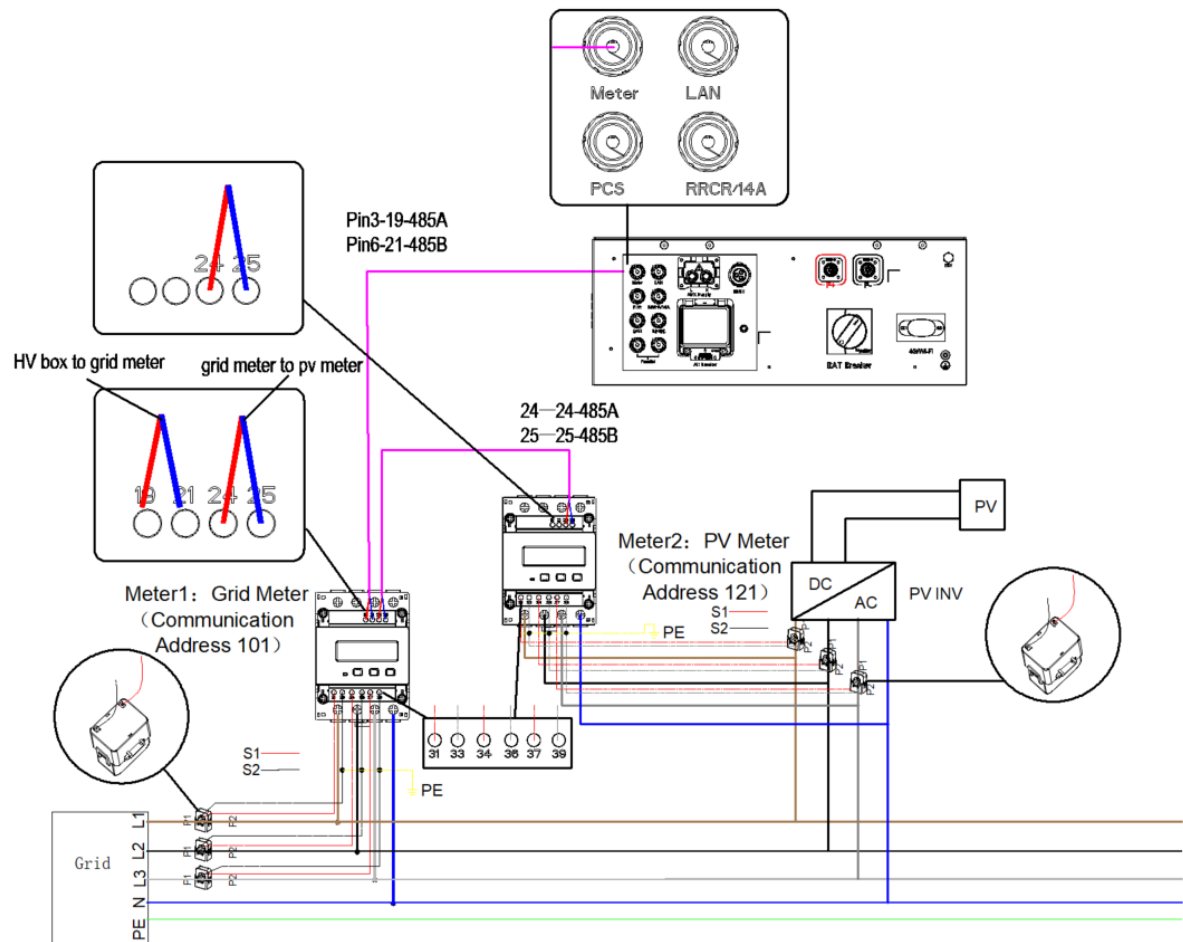
Take out the Ethernet cable from the high-voltage box. Insert one end of the cable through the waterproof terminal into the "PCS" communication terminal of the high-voltage box, and connect the other end through the waterproof terminal of the inverter to the "EMS" terminal of the inverter.



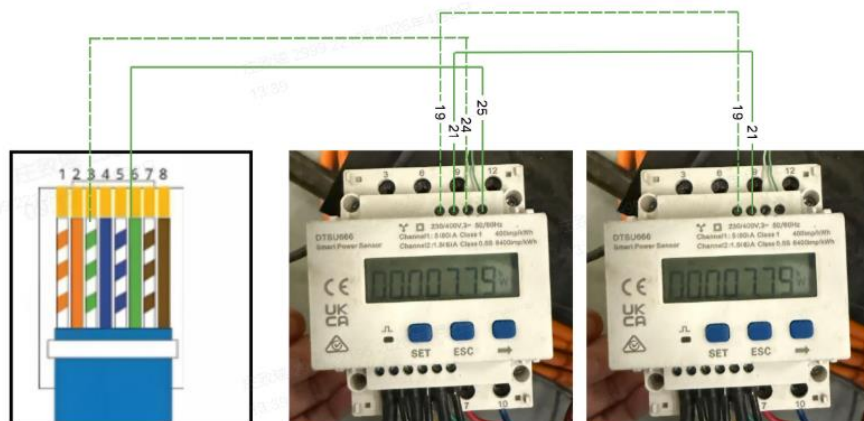
3.5.4.2 Meter Communication Connection

1. Connect the grid phases L1/L2/L3/N to terminals 1/4/7/10 of the meter respectively.

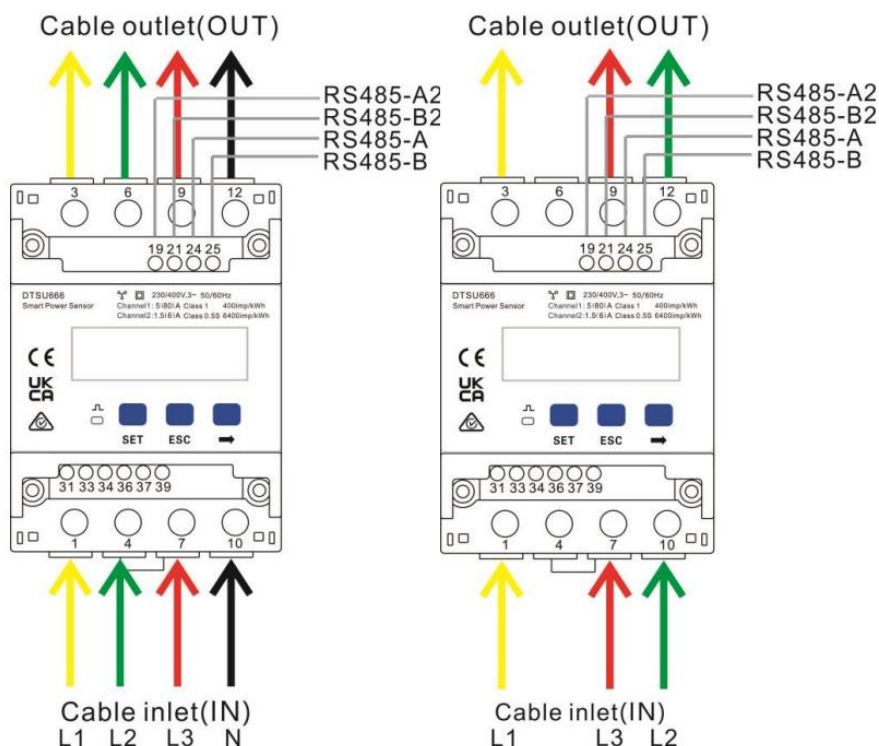
2. Pass grid phase L1 through the meter CT from the P1 side to the P2 side. Connect the CT secondary terminal S1 to meter terminal 31, and connect CT secondary terminal S2 to meter terminal 33.
3. Pass grid phase L2 through the meter CT from the P1 side to the P2 side. Connect the CT secondary terminal S1 to meter terminal 34, and connect CT secondary terminal S2 to meter terminal 36.
4. Pass grid phase L3 through the meter CT from the P1 side to the P2 side. Connect the CT secondary terminal S1 to meter terminal 37, and connect CT secondary terminal S2 to meter terminal 39.
5. According to the actual distance to the meter installation location, the customer shall prepare the meter communication cable. Connect one end of the Ethernet cable to the "Meter" port in the high-voltage box according to the procedure in Section 3.5.6. At the other end, connect the green/white wire of the Ethernet cable to communication terminal "24" of the meter, and connect the green wire to terminal "25".



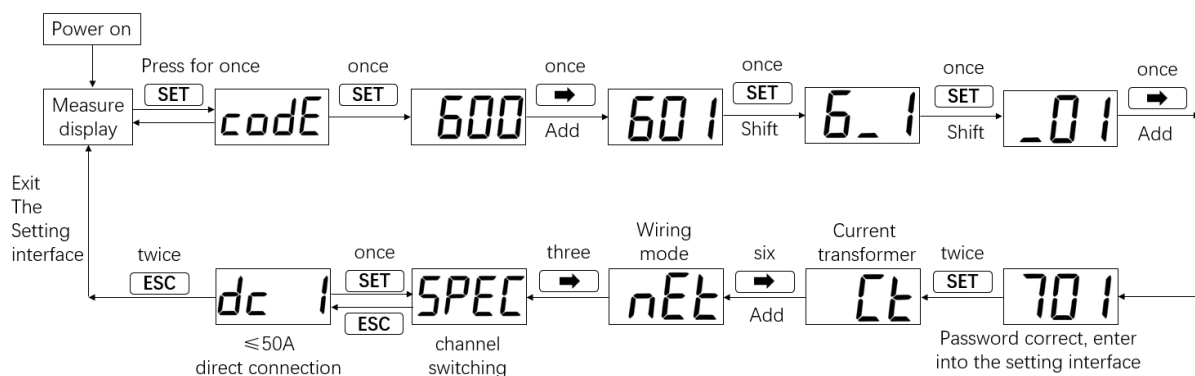
6. If a PV meter is used, the two meters shall be connected in series, that is, terminal "19" of the PV meter shall be connected to terminal "19" of the grid meter, and terminal "21" of the PV meter shall be connected to terminal "21" of the grid meter.



7. If the direct-connection method is used, ensure the current is less than 50 A. The installation procedure is as follows.



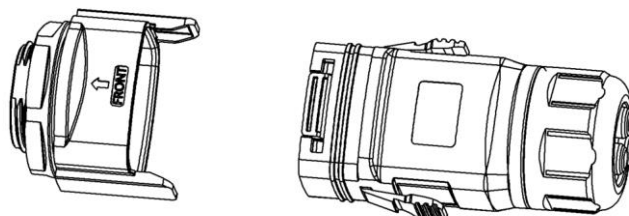
If adopting the direct-connection method, you also need to modify the access mode on the electric meter by following the operations shown in the figure below.



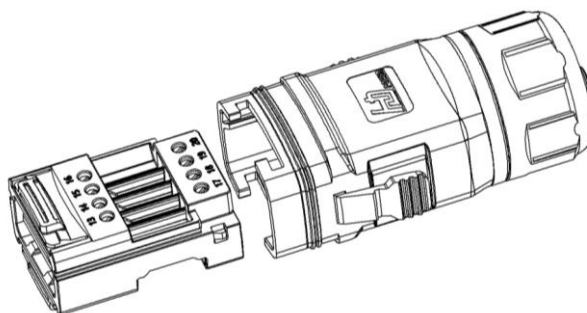
8. DTSU666 meter with 6 CT access is supported. Attention: these CTs have narrow measuring ranges and are not allowed for parallel connection.

3. 5. 4. 3 **DI/DO Communication Connection**

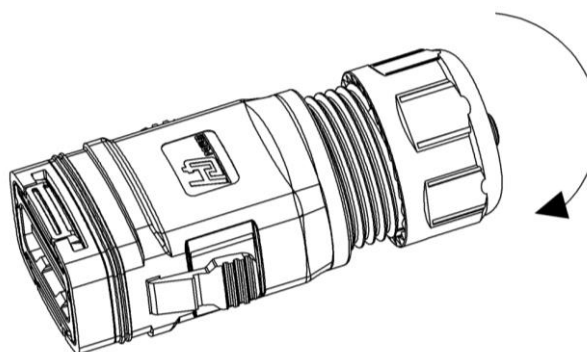
1. Press the handles on both sides of the DI/DO port of the high-voltage box, and remove the connector from the high-voltage box.
2. As shown in the figure, pull out the wiring terminal.



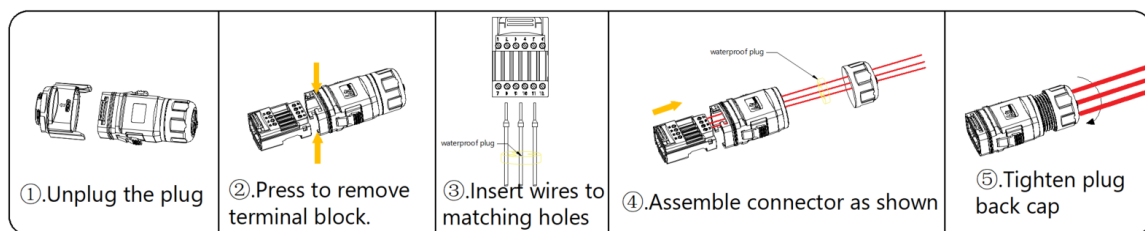
3. Loosen the wiring terminal, remove the waterproof terminal, and pass the cable through the terminal.
4. Connect the cable harness to the terminal.



5. Insert the wiring terminal back into the connector.
6. Tighten the waterproof terminal clockwise.



7. Insert the connector back into the high-voltage box.

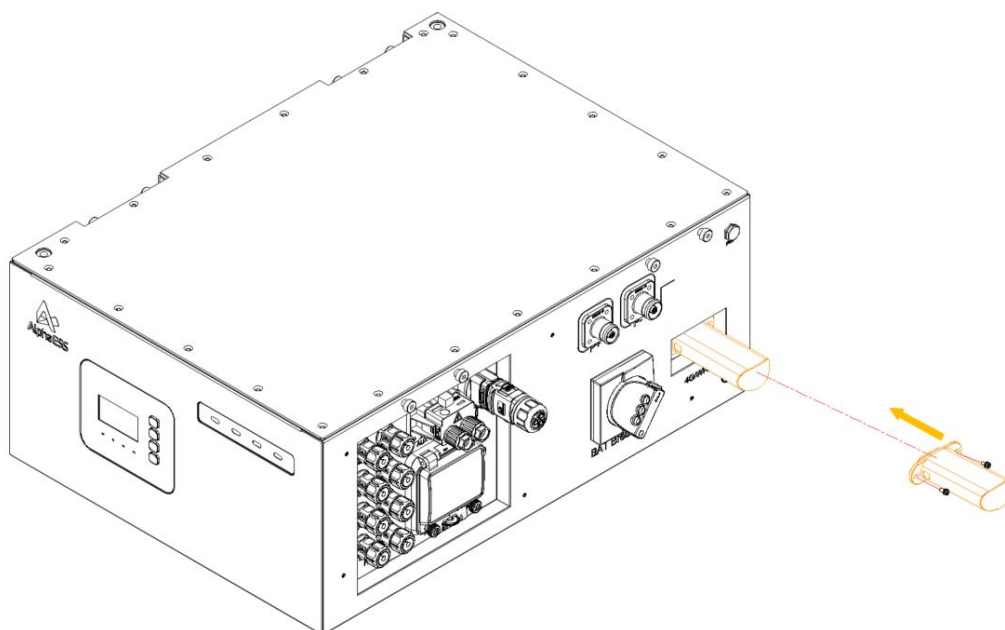


3. 5. 4. 4 **4G Dongle Connection**

1. Remove the right-side cover plate of the high-voltage box.
2. Check whether the Wi-Fi dongle is properly installed.

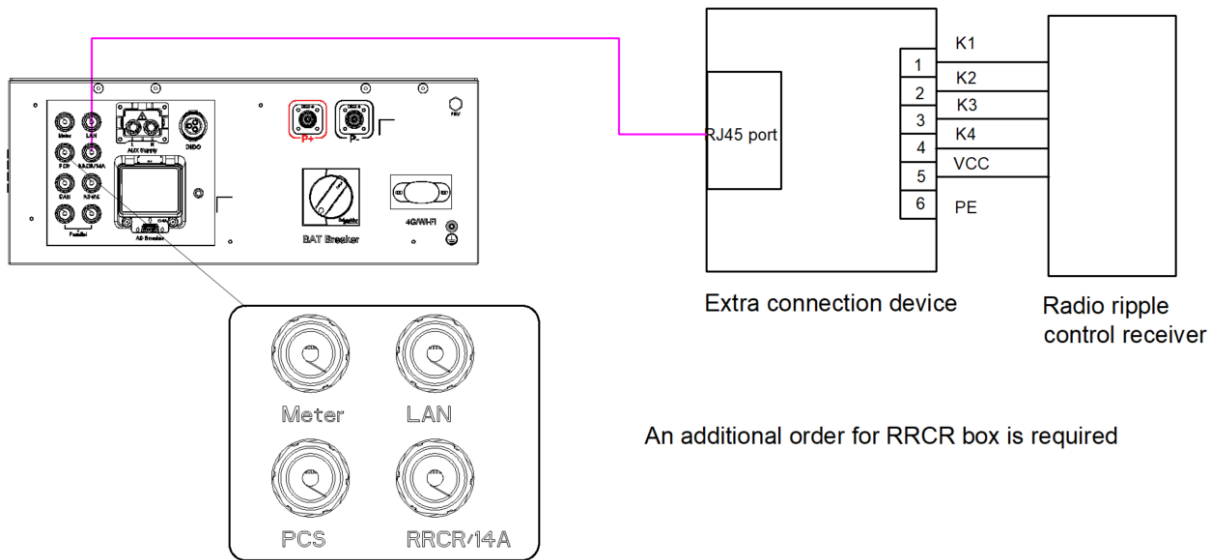
If a 4G dongle is required, it shall be ordered separately and used to replace the Wi-Fi dongle.

Note that AlphaESS always recommends a LAN cable connection over the use of a Wi-Fi dongle.



3. 5. 4. 5 **RRCR/14a Connection**

If there is an RRCR/14a requirement, complete the wiring as shown in the diagram.



3. 5. 5 Power connection

3. 5. 5. 1 PV Connection



Before connecting inverter, please make sure the PV array open circuit voltage is within the limit of the inverter.



Before connection , please make sure the polarity of the output voltage of PV array matches the " DC+ "and"DC- "symbols .



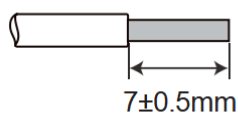
Please use approved DC cable for PV system .Make sure the photovoltaic cables have no voltage before wiring

A DC-PV1 switch , complied toAS60947 .3 :2018 , within the inverter, is used as isolating device . Please check below ratings .

DC switch brand	SVRU(TIANJIN) ELECTRICAL EQUIPMENT CO. LTD
Model	GHX6-55P/8P1100- 45-2-O-F
PV category	DC-PV2
Ue	1100V
Ie	45A
Ui	1500V
Uimp	8000V
Icw	1500A
Icm	2000A
I (make)/Ic(break)	180A
Complied standard	AS 60947 .3: 2018 , ASINZS IEC 60947 . 1 :2015

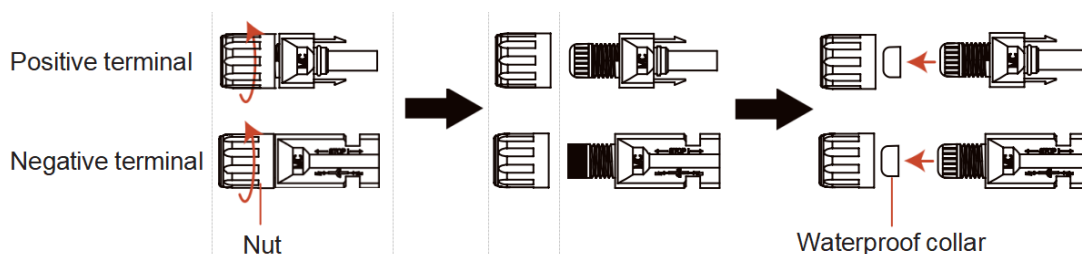
Contents

1. Select a suitable DC cable and strip the wires out by 7 ± 0.5 mm . Please refer to the table below for specific specifications;

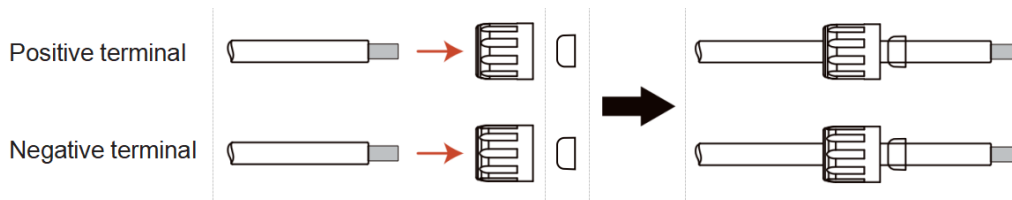


Cable type	Cross section (mm ²)	
	Range	Recommended value
Industry generic PV cable	4.0 ~ 6.0 (12 ~ 10AWG)	4.0 (12AWG)

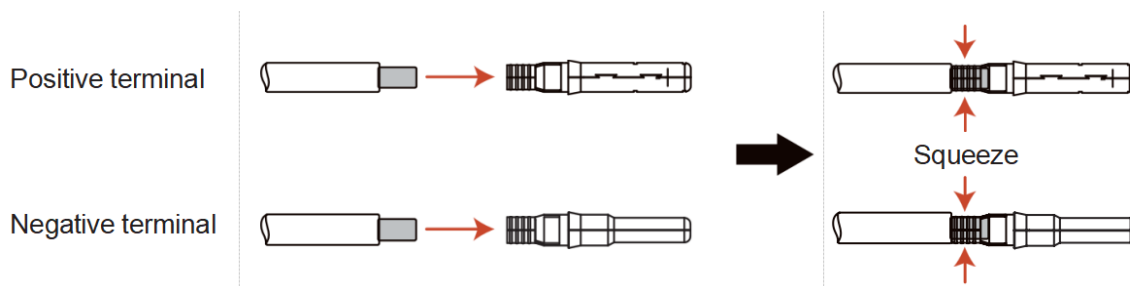
2. Take the DC terminal out of the accessory bag , turn the screw cap to disassemble it , and take out the waterproof rubber ring;



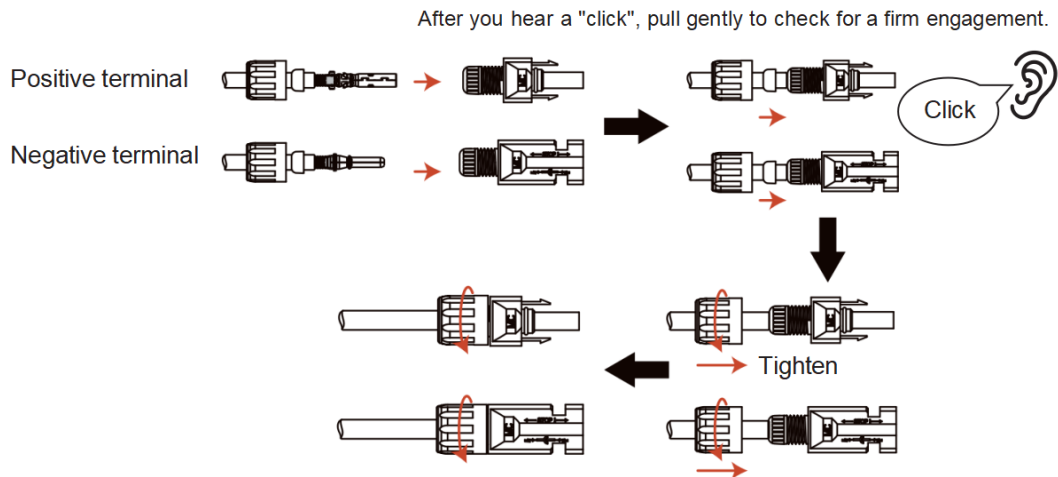
3. Pass the stripped DC cable through the nut and waterproof rubber ring;



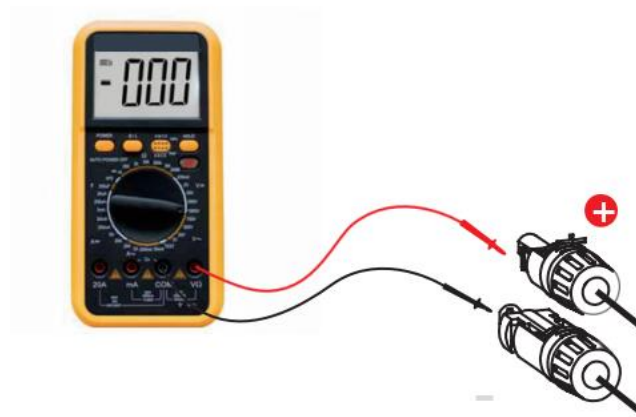
4. Connect the wire part of the DC cable to the metal DC terminal and crimp it with a special DC terminal crimping tool;



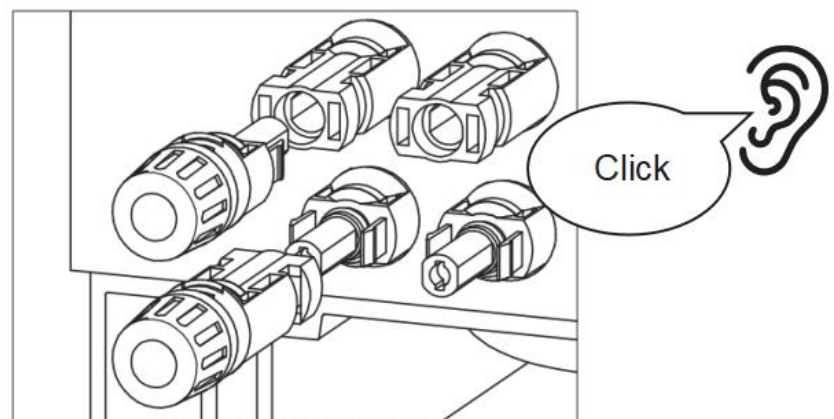
5. Insert the crimped DC cable into the DC terminal firmly, then insert the waterproof rubber ring into the DC terminal and tighten the nut;



6. Measure PV voltage of DC input with multimeter, verify DC input cable polarity;



7. Connect the wired DC terminal to the inverter as shown in the figure , and a slight "click" is heard to prove the connection is correct;





CAUTION:

If DC inputs are accidentally reversely connected or inverter is faulty or not working properly, it is NOT allowed to turn off the DC switch. Otherwise it may cause DC arc and damage the inverter or even lead to a fire disaster. The correct actions are:

* Use a clip-on ammeter to measure the DC string current.

* If it is above 0.5A, please wait for the solar irradiance reduces until the current decreases to below 0.5A.

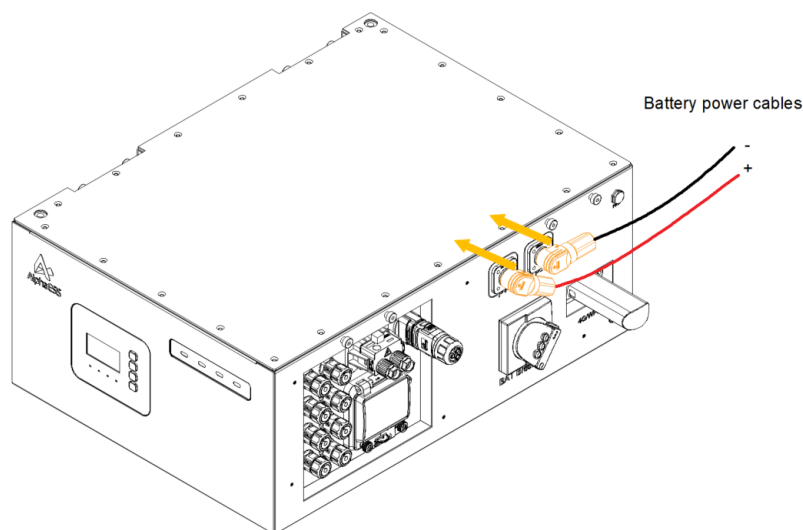
* Only after the current is below 0.5A, you are allowed to turn off the DC switches and disconnect the PV strings.

* In order to completely eliminate the possibility of failure, please disconnect the PV strings after turning off the DC switch to avoid secondary failures due to continuous PV energy on the next day.

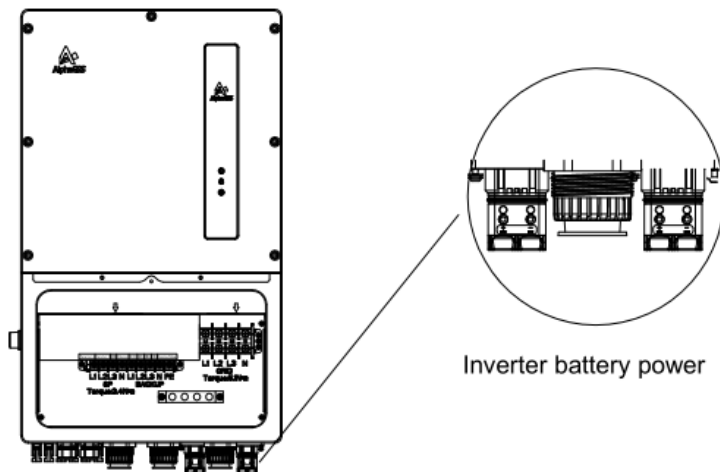
Please note that any damages due to wrong operations are not covered in the device warranty.

3.5.5.2 Battery Power Connection

1. Take out the battery power cable from the accessory pack of the high-voltage box.
2. Insert the end of the cable harness with terminals into the BAT+ and BAT- ports of the high-voltage box.

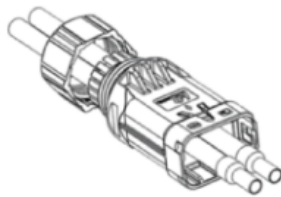


3. Remove the soft silicone protection from the other end of the cable harness, and route it through the waterproof terminal of the inverter to connect it to BAT+ and BAT-.



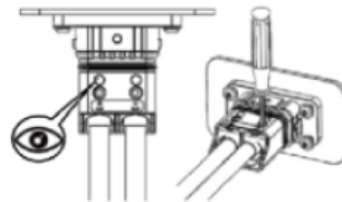
1

Thread the stripped wire into the lock nut and the main body in turn (the flexible wire needs to be riveted to the insulated terminal) .



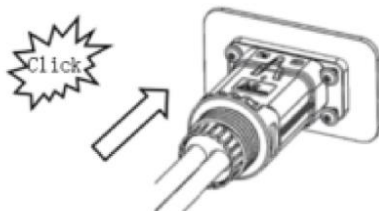
2

Insert the cable into the rubber core according to the line sequence , observe the perspective hole , the cable is in place , and the torque of the crimping screwdriver is $4 \pm 0.1 \text{ N} \cdot \text{M}$.



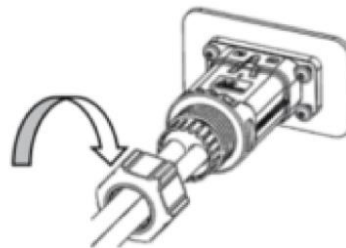
3

Insert the main body into the rubber core and hear the "click" sound.

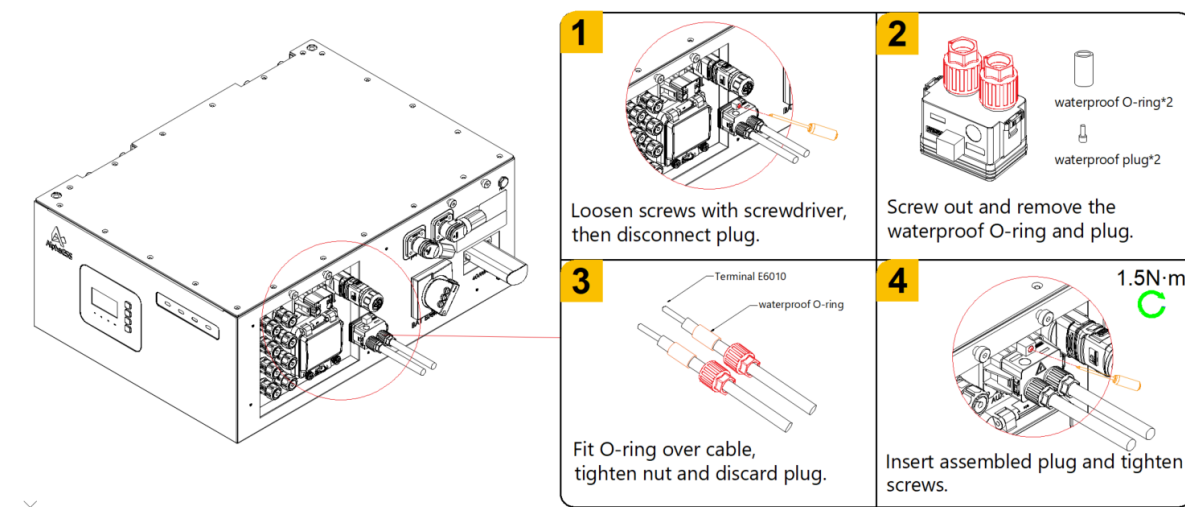


4

Tighten the nut with an open-ended wrench(torque $10.0 \pm 0.1 \text{ N} \cdot \text{m}$) .



3. 5. 5. 3 AC Aux Power Connection



When installing 5 to 9 batteries, use 4mm² power cables. When installing 10 to 18 batteries, use 6mm² power cables.

Wire harness requirements: 12AWG (4mm²) ~ 10AWG (6mm²), with insulation outer diameter of 3.8mm ~ 5.2mm.

Heating strips are supplied by the auxiliary power system. Connection of the auxiliary power supply is mandatory whenever the heating strip is enabled.

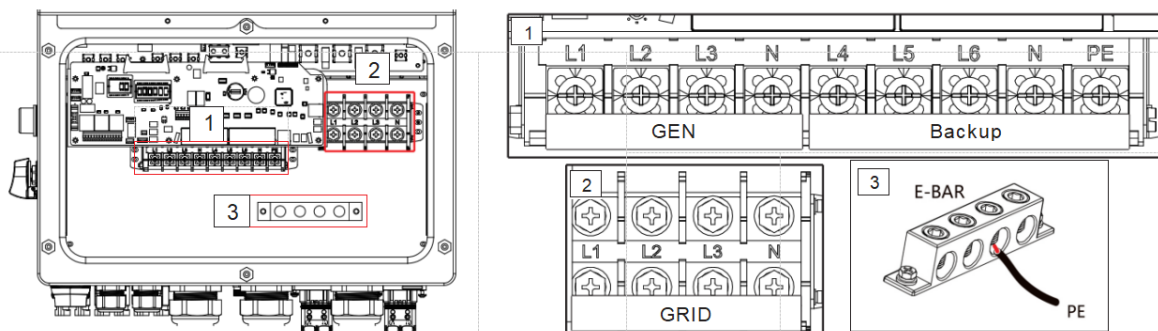
If the ambient temperature may drop below 0°C, the auxiliary power cable must be connected; otherwise, keep the auxiliary power switch OFF when the AC auxiliary power supply is not connected.

3. 5. 5. 4 Grid&Backup&DG Connection

DANGER

! Before installing the AC cables , be sure that the OCPDs (breakers) are turned off. Use a multimeter to verify that the AC voltages are 0Vac before proceeding.

There are three sets of AC output terminals and the installation steps for both are the same . The maximum temperature for connecting AC and battery terminals is 85°C.



Model	Gen port	Backup port	Grid port	Earth Bar
Wire Size	3AWG/4AWG	3AWG/4AWG	0AWG/ 1AWG	2 AWG
Torque	28.2 N . m			20.3 N . m
Cable	20-25 mm2	20-25 mm2	50mm2	33 mm2

1. Bring the AC cables for the backup loads panel (backup) and the main service panel (grid) into the inverter wire box . The backup loads panel should not be electrically connected to the main service panel.
2. Strip 13mm from the ends of each cable . Crimp the R-type connectors onto the ends .
3. Remove the terminal bolts , insert them into the connectors , then use a torque wrench to tighten the bolts down .
4. Please refer to the terminal labels to connect the AC wires to the correct terminals . Cable Gland are recommended torque for installation is 7-7.5 N.m . In order to ensure waterproof effect , the operator regularly checks whether the installation is tight.



NOTE:

Now, with the different batches , the inverter after delivery will be subject to the following screen printing sign , compared with the old version , the function of the corresponding terminal will not change , and the way of connecting the cable will not change and we add the torque data sign for helping installation on site .(In this manual , some diagram contents use the old version sign , but corresponding installation should be based on your machine) .

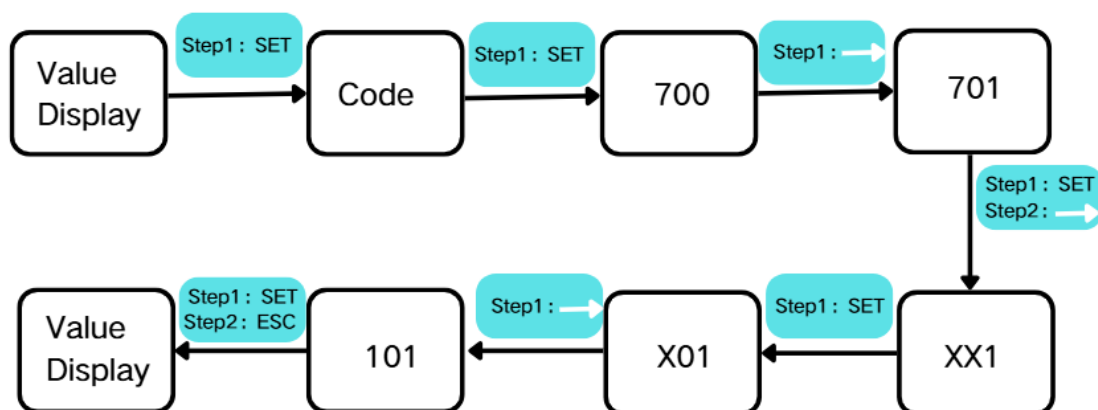
Requirements for the inverter backup port and Gen port:

1. Resistive load & RCD load: single phase Resistive load cannot exceed 100% inverter rated single phase power, the RCD load cannot exceed 60% inverter rated power.
2. Motor load: customer should be careful about the impulse power when start the load , ensure the impulse power cannot exceed the overload curve power and time restriction .
3. RLC load: total power of load cannot exceed inverter rated power, the instantaneous peak current (peak impulse current) during load switching shall not exceed twice the rated current of the inverter, and the minimum power factor shall not be lower than 0.8.
4. Mixed Load: Excluding the RLC load , the motor load and RCD load should be reduced proportionally.
5. Isolation transformer: If starting with a transformer, it is necessary to pay attention to the inrush current not exceeding twice the rated current and the inrush power not exceeding the overload curve limit requirements; otherwise , a soft start function needs to be added to the transformer.

3. 5. 6 Meter Settings

The default meter address is the utility grid meter address. If a PV inverter is added on the Grid side, an additional meter shall be installed, and its address shall be set to 121.

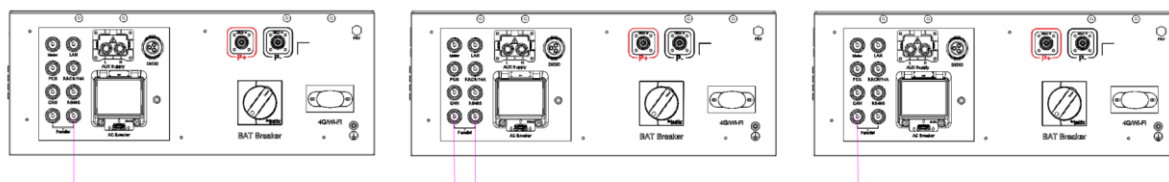
The steps for setting the communication address of the meter are as follows:



3. 6 Parallel Connection Wiring

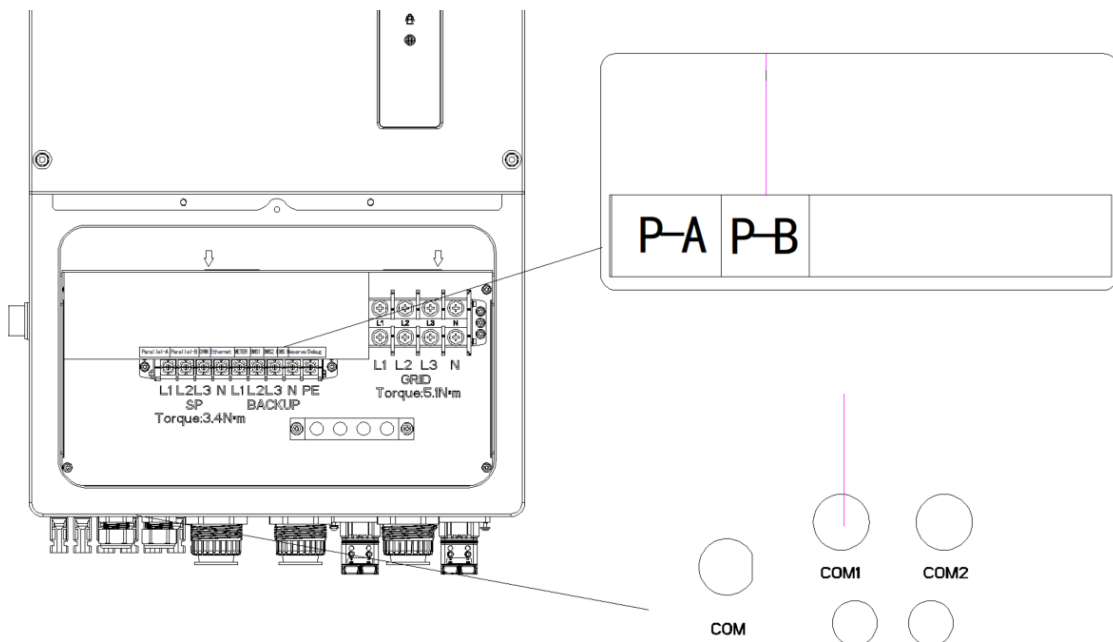
3. 6. 1 Communication Wiring

1. Parallel harness accessory packs are sold separately; one extra pack is needed per additional paralleled unit.
2. Take out the Ethernet cable from the parallel connection harness accessory pack. Connect one end of the cable to the "Parallel" port of one high-voltage box, and connect the other end to the "Parallel" port of the high-voltage box of another system, and so on.

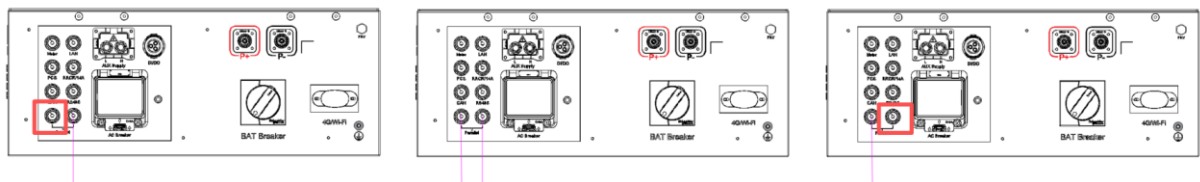


3. Take out the other Ethernet cable from the parallel connection harness accessory pack. Connect one end through the "COM" waterproof terminal at the bottom of

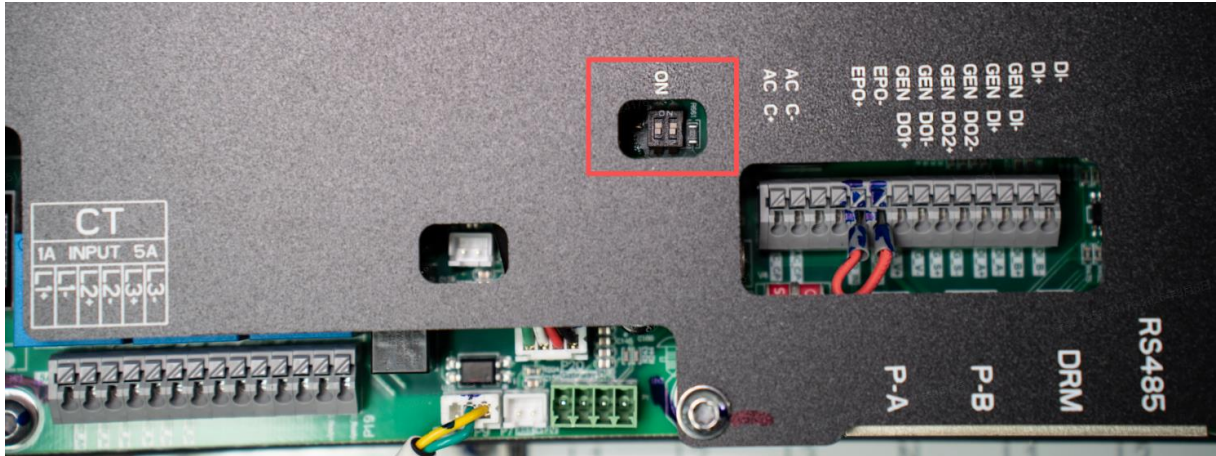
one inverter to "P-A" or "P-B" of that inverter, and connect the other end to "P-A" or "P-B" of the inverter in another system, and so on.



4. Take out the terminal resistors from the parallel connection harness pack, and insert them respectively into the unused "Parallel" ports of the first high-voltage box and the last high-voltage box in the parallel system.



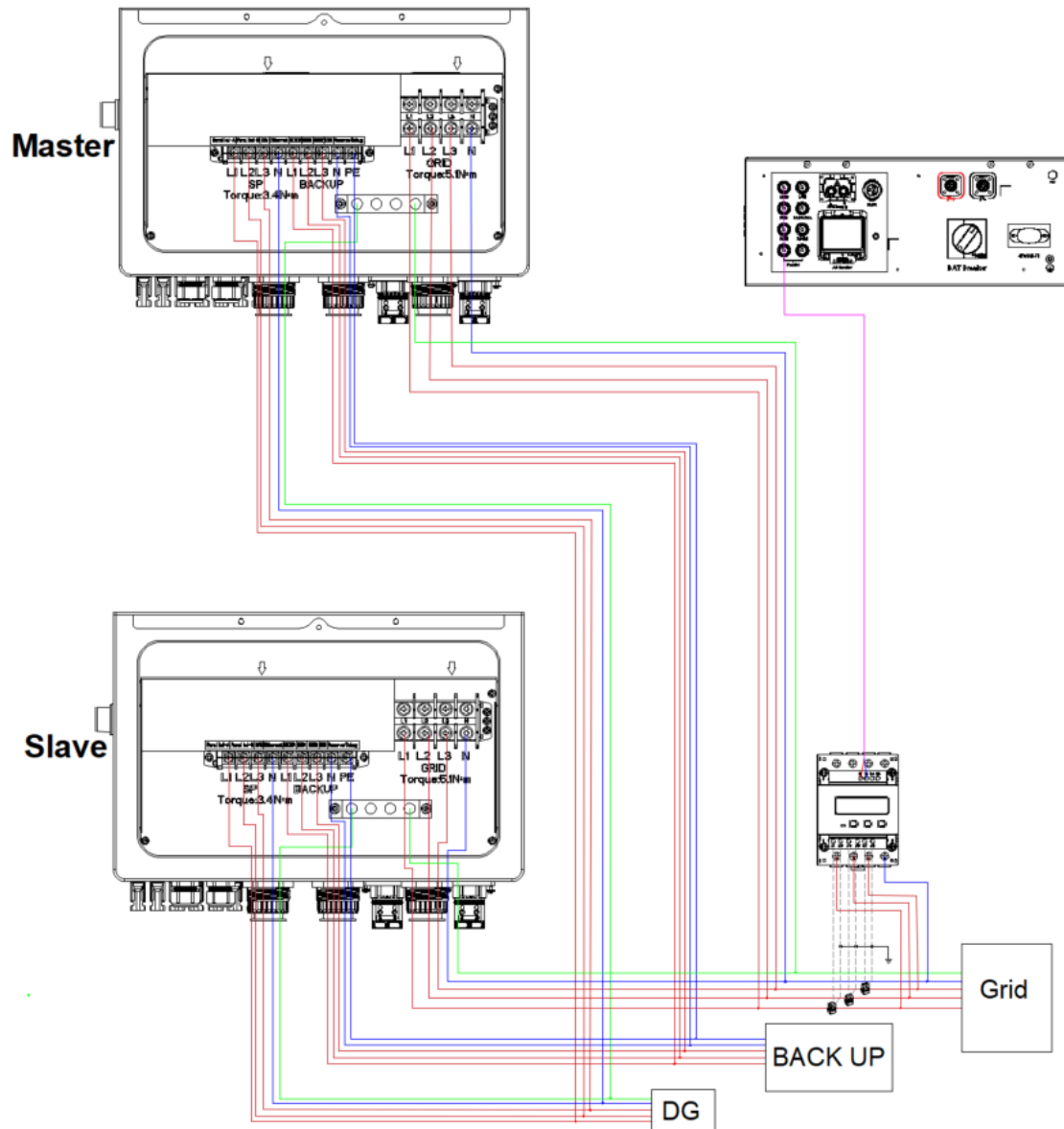
5. Finally, set both DIP switches 1 and 2 on the inverters of the master unit and the last slave unit to ON; leave all other devices untouched.



3. 6. 2 Electrical Wiring

The parallel electrical wiring is as follows:

Equalize the lengths of all branch cables leading to junction points to reduce internal circulating current, optimize control precision and prolong PCS service life.

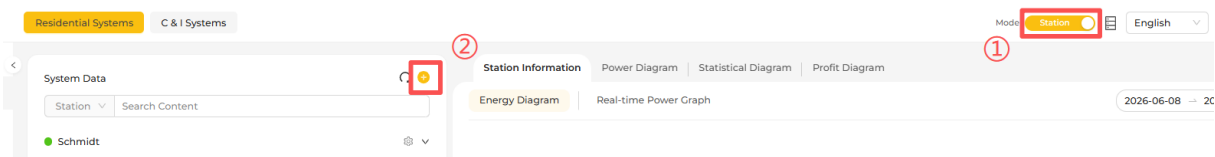


3.6.3 Commissioning

Cloud Platform Commissioning

1. After completing parallel wiring and power-on, connect the system to the cloud, then add the parallel system via the mobile APP.
2. Add a new parallel station on the cloud platform as shown in the figure.

Contents



- Enter the information of the parallel station and click Save. The system will automatically complete parallel networking.

×

Add

* Station Name

Please enter the power station name

* Host SN

Please enter

* checkCode

Please enter

* Follower SN

Please enter

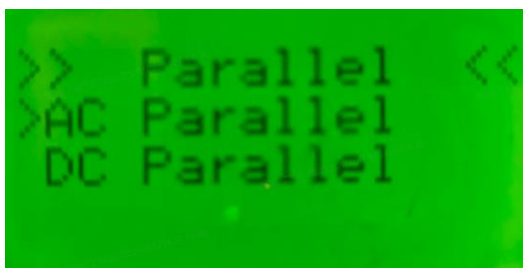
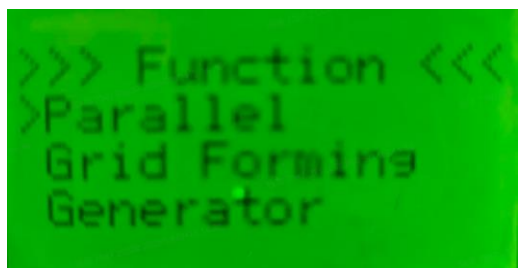
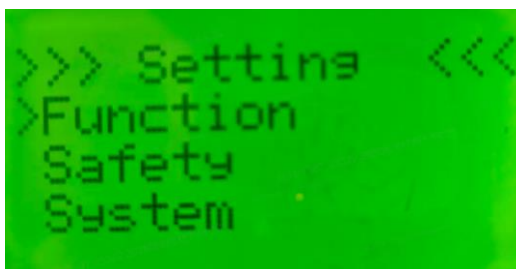
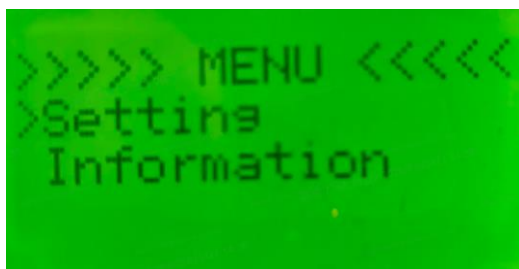
* checkCode

Please enter

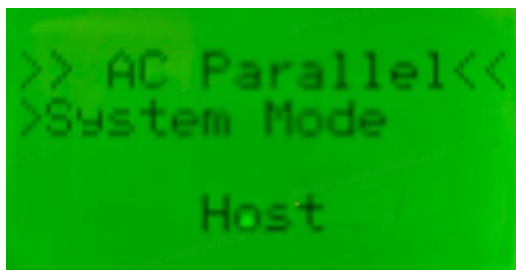
Save

On-site Commissioning

On the LCD of the high voltage box, go to Setting > Function > Parallel > AC Parallel, then set the system mode, total parallel units and parallel ID.

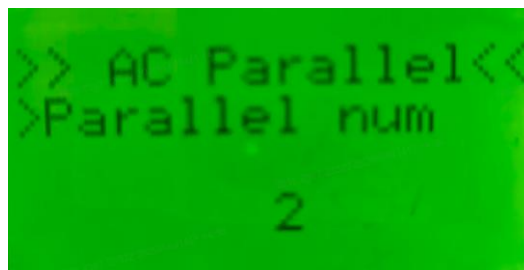


For the master unit: set System Mode to Host. Parallel num refers to the total number of parallel units in the station.



```
>> AC Parallel<<
>System Mode

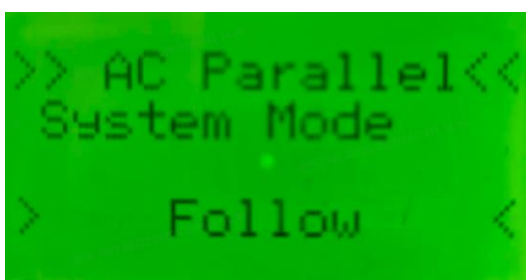
      Host
```



```
>> AC Parallel<<
>Parallel num

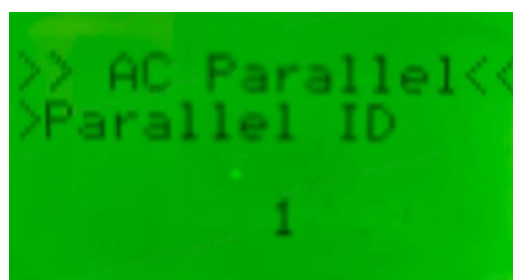
      2
```

For slave units: set System Mode to Follow. Slave Parallel ID starts from 1.



```
>> AC Parallel<<
>System Mode

>      Follow      <
```



```
>> AC Parallel<<
>Parallel ID

      1
```

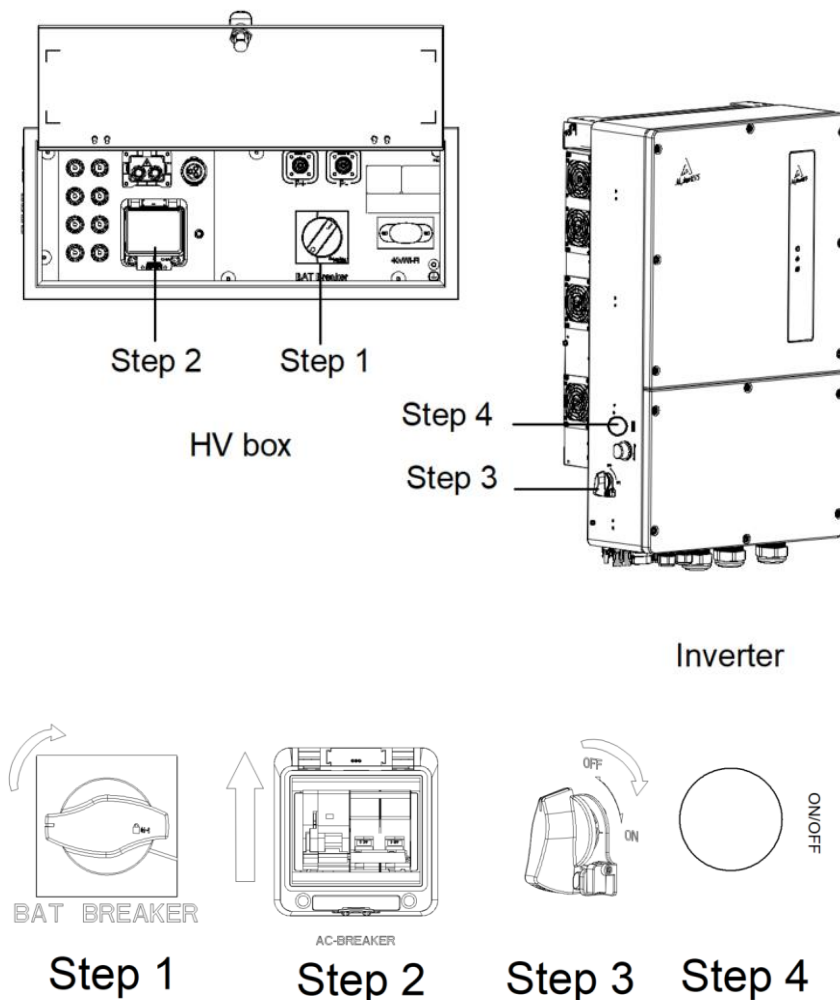
4. System Power-On and Power-Off

4.1 System Power-On



- Before powering on the energy storage system, please ensure the PV switch & all AC and BAT circuit breakers in the system are switched OFF and cannot be reactivated.
- Never power on the energy storage system without the correct and reliable installation and electrical connection.

Complete power-on according to the following steps.



1. Turn on the BAT BREAKER on the high-voltage box
2. Turn on the AC BREAKER.
3. Switch on the PV SWITCH on the inverter
4. Press the ON/OFF button

Note: In historical versions, the inverter does not have an ON/OFF button, so Step 4 may be skipped.

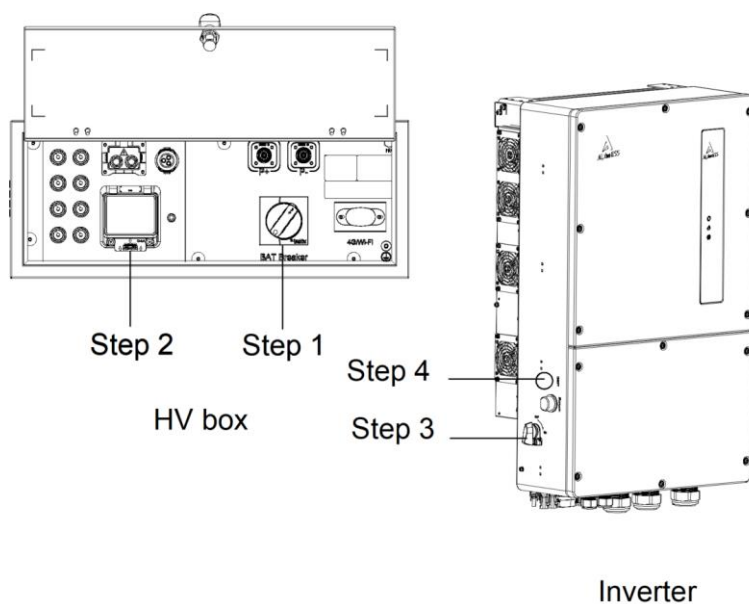
After the system DC side is powered up, switch on the AC side breaker at the user end.

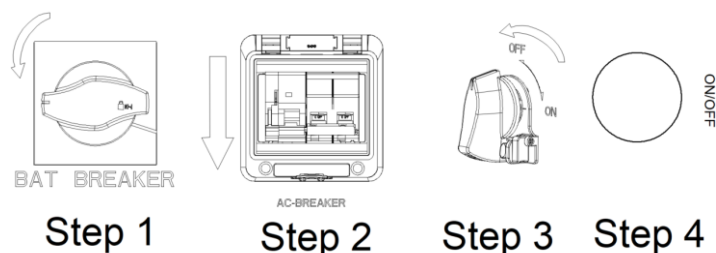
4. 2 System Power-Off



- After the energy storage system is powered off, the remaining electricity and heat may still cause electric shocks and body burns. Please put on protective gloves and operate the product 5 minutes after the system is powered off.

Prior to system shutdown, switch off the user's AC side breaker first, then perform power-down in accordance with the steps below.





1. Turn off the BAT BREAKER on the high-voltage box
2. Turn off the AC BREAKER.
3. Switch off the PV SWITCH on the inverter
4. Press the ON/OFF button

Note: In historical versions, the inverter does not have an ON/OFF button, so Step 4 may be skipped.

CAUTION

If DC inputs are accidentally reversely connected or inverter is faulty or not working properly, it is NOT allowed to turn off the DC switch. Otherwise it may cause DC arc and damage the inverter or even lead to a fire disaster.

The correct actions are:

- *Use a clip-on ammeter to measure the DC string current.
- *If it is above 0.5A, please wait for the solar irradiance reduces until the current decreases to below 0.5A.
- *Only after the current is below 0.5A, you are allowed to turn off the DC switches and disconnect the PV strings.
- * In order to completely eliminate the possibility of failure, please disconnect the PV strings after turning off the DC switch to avoid secondary failures due to continuous PV energy on the next day.

Please note that any damages due to wrong operations are not covered in the device warranty.

5. Technical Contact

If you have any technical issues with our products, please contact us. The contact information can be found on the front page of this manual. To help us quickly resolve your issue, please provide the following information:

- A. System configuration
- B. Product serial number
- C. Software version number
- D. Fault information
- E. Photovoltaic module information