BY SOLAX
TRIPLE
POWER

TB-LD51

User Manual

Version 0.0

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About This Manual

Scope of Validity

This manual is an integral part of TB-LD51. It describes the transportation, storage, installation, electrical connection, commissioning, maintenance and troubleshooting of the product. Please read it carefully before operating.

Model Code

TB-LD51

Target Group

The installation and maintenance setting can only be performed by qualified personnel who:

- Are licensed and/or satisfy state and local jurisdiction regulations;
- Have good knowledge of this manual and other related documents.

Conventions

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

Symbol	Description
DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE!	Provides tips for the optimal operation of the product.

Change History

Version 0.0 (2024-12-20)

Initial release

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1 Safety

1.1 General Safety

Before transporting, storing, installing, operating, using and/or maintaining the device, please carefully read and understand the document, and strictly follow the instructions and safety precautions given herein, as well as symbols affixed on the device. The safety instructions herein are only supplements to local laws and regulations.

The operator should not only abide by all safety precautions provided in the document, including but not limited to the “Danger” sign, "Warning" sign, "Caution" sign, and "Notice" sign, but also comply with relevant international, national and local laws, regulations, standards, guidelines and industry rules in the process of transportation, storage, installation, operation, and maintenance. SolaX will not assume any responsibilities for the loss caused by improper operation, or violation of safety standards for design, production and equipment suitability.

SolaX will not be liable for maintenance for possible device failure, device malfunction, or parts damage, nor will the company assume any liability to pay compensation for the possible physical and property damage resulting from the installation environment that does not meet the design requirements.

The device is well designed and tested to meet all applicable state and international safety standards. However, like all electrical and electronic equipment, safety precautions must be observed and followed during the installation of the device to reduce the risk of personal injury and to ensure a safe installation.

SolaX will not assume any responsibilities if any of the following circumstances occur, including but not limited to:

- Device damage due to force majeure, such as earthquake, flooding, thunderstorm, lighting, fire hazard, volcanic eruption, war, typhoon, tornado, etc.
- Device damage due to human causes.
- Device used or operated against local policy or regulations.
- Failure to follow the operation instructions and safety precautions on the product and in this document.
- Installation and use under improper environment or electrical condition.
- Unauthorized modifications to the product or software.
- Device damage caused during transportation by the customer or the third party.
- Battery damage caused by strong vibrations from external factors before, during and after installation.
- Storage conditions that do not meet the requirements specified in this document.
- Use of incompatible inverters or devices.
- Installation and commissioning operated by unauthorized personnel who are not licensed and /or satisfy state and local jurisdiction regulations.

1.2 Battery Safety

DANGER!

- Prohibit the use of SolaX lithium battery in Lead-acid mode. Lead-acid mode not only reduce the lifespan of lithium batteries, but may also cause safety issues under extreme conditions. Any consequences arising from the use of lead-acid mode shall be borne by users themselves, and SolaX will not provide warranty!
- Do not connect the positive and negative poles of a battery together. Otherwise, it may be short-circuited. This will result in an excessive flow of current and large quantities of energy for a short time, and then will cause battery leakage, smoke, the emission of flammable gases, thermal runaway, fire, or even an explosion. Therefore, the battery must be powered off before maintenance.
- If a battery is overheated, it will cause leakage, smoke, release of flammable gases, thermal runaway, fire, or even an explosion. Therefore, please ensure that the installation site shall be well ventilated and kept away from high temperatures.
- Do not dismantle, change, shake, drop, crush, impact, cut, penetrate with a sharp object, or any other ways to damage the battery. Otherwise, it may cause leakage, smoke, emission of flammable gases, thermal runaway, fire, or even an explosion.
- Do not mix different types or makes of the battery. Otherwise, it may cause leakage or rupture, resulting in personal injury or property damage.
- The battery electrolyte is toxic and volatile. Never get in contact with the leaked liquids or inhale gases in the case of the battery leakage or odor, and contact professionals immediately. The professional must wear PPE (including but not limited to safety glasses, safety gloves, gas masks, and protective clothing) before powering off the device, and then contact our company at once after removing the damaged battery.
- Normally, the battery will not release any gases. However, in the following situations: burnt, needle-pricked, squeezed, struck by lightning, overcharged, or subject to other adverse conditions that may cause battery thermal runaway, the battery may be damaged or an abnormal chemical reaction may occur inside the battery, resulting in electrolyte leakage or production of gases. If the battery needs to exhaust flammable gas, safe emission measures must be taken to prevent fire and device corrosion.
- Do not use damaged batteries.

WARNING!

- Please read the document carefully before installation, operation and maintenance.
- Must arrange fire-fighting equipment in advance according to the local laws, regulations, and standards while installing and commissioning the device.
- Please check that there is no damage to the outer packaging before and after unpacking, and in the process of storage and transportation. The battery shall be correctly placed or stacked in accordance with the requirements stipulated on the labels to prevent damaging or scrapping the battery resulting from crushing or falling.

WARNING!

- Must tighten screws securing cables and on the copper bars according to the torque information specified in the document, and check whether they are tightened periodically. For instance, whether there is any rust, corrosion, or any other foreign object on it, and then clean it up if any. Because the loose screw connections may result in excessive voltage drops and large currents, leading to generating a lot of heat and burning the battery.
- The battery should be charged in time after discharge, to prevent battery damage due to overdischarge. If a battery pack is stored for a long time, please periodically recharge it to protect it from damage according to the storage requirements specified in the document.
- Please charge the battery within the specific temperature range because the low temperature may result in a short circuit. Hence, do not charge it when the temperature is below the low limit of the operating temperature.
- Do not use the battery when you find a bulge, or dents on the battery housing, and contact the installer or professional maintenance personnel to dismantle and replace it. The damaged battery must be kept away from other devices and flammable and explosive articles, and do not contact it except for professionals.
- Before operation, ensure that there are no irritating or burning smells around the battery.
- Do not weld or grind near a battery. Because electric sparks or arcs may cause fires.
- Do not step, lead, stand, or sit on the battery.

CAUTION!

- It has the IP40 ingress protection, which allows it to be installed only indoor. Exposure to direct sunlight raises the temperature inside the battery. This temperature rise poses no safety risks, but may impact the battery performance.

NOTICE!

Transportation requirements for battery:

- Relevant qualifications for the transport of dangerous goods must be obtained by the forwarding agent engaged in such businesses, and they must strictly abide by the local regulations for the transport of dangerous goods.
- Please check the battery before transportation. If a battery leaks, smells, or is damaged, do refuse to transport it.
- Please handle gently in the process of loading and unloading, transportation, and moving a battery to prevent bumping, and take effective moisture-proof measures to prevent personal injuries and battery damage.
- Unless otherwise specified, do not transport the batteries, which are classified as dangerous goods, together with food, medicine, or other additives on the same means of transport.

NOTICE!

If the battery leaks electrolyte or any other chemical materials, the electrolyte leakage can lead to toxic gases. Therefore, do not contact with them at all times. In case of accidentally coming into contact with them, please do as follows:

- In case of inhalation: Leave the contaminated area immediately, and seek medical attention at once;
- In case of contact with eyes: Rinse eyes with running water for at least 15 minutes, and seek medical attention;
- In case of contact with skin: Wash the contact area thoroughly with soap, and seek medical attention;
- In case of ingestion: Induce vomiting, and seek medical attention.

If a fire breaks out where the battery is installed, please do as follows:

- In case a battery is charging when the fire breaks out, provided it is safe to do so, press the emergency stop button and unplug the power cable;
- In case a battery is not on fire yet, use a water-based fire extinguisher or a carbon dioxide extinguisher to extinguish the fire;
- In case a battery catches fire, do not try to put it out, and evacuate immediately;
- A battery may catch fire when it is heated above 150°C/302°C. If the battery catches fire, please evacuate immediately since it will generate noxious and poisonous gases.

Recovery of damaged or wasted battery:

- Dispose of the damaged or wasted batteries according to local laws and regulations instead of placing them in the household trash or curbside recycling bins. Otherwise, it may cause environmental pollution or explosions.
- Ensure that the damaged or wasted batteries are not exposed to the following situations: high temperatures, high humidity, direct sunlight, or corrosive environments.
- Contact a battery recycling company to scrap the battery, which leaks electrolytes, or is damaged or expired.
- Please take protective steps to prevent battery short circuits before moving batteries.
- Please keep away from flammable material storage areas, residential areas, and other population centers when transporting and storing the damaged battery.

1.3 Electrical Safety

DANGER!

- Please make sure that the unit is free from any damage before the electrical connection.
- Do not modify, change, or dismantle the device.
- Do not change the power-on and power-off sequences and the installation procedure written in the document, and please properly and correctly operate it.

DANGER!

- Do not power on the device during installation. Otherwise, it may cause a fire, personal injury, or device damage.
- Must remove earrings, rings, bracelets, watches, and any other metal jewelry before operation, to avoid electrical shock, burns, or even death.
- During operation, special insulated tools must be used to avoid electric shock or short circuit failure. The insulated tools' voltage ratings must exceed the system voltage ratings. Please refer to "12 Technical Data" for system information.

WARNING!

- Please wear PPE, such as, protective clothing, insulating shoes, goggles, safety helmets, insulating gloves, etc., when conducting electrical wiring.
- Please check that there is no damage to the outer packaging before unpacking. If damaged, do not use and contact the transporter and manufacturer immediately.
- Do not place installation tools, metal parts and other sundries on the battery while installing. Items on and around it need to be cleaned up in time after finishing installation.
- Do not install the battery in rain, snow, fog and other weather to avoid battery damage.
- If the battery is damaged or accidentally drenched in water, do not install and use it. Please transport it to a safety isolation point and contact the local fire department or professional technicians for scrapping.
- If the battery cables are submerged in water, do not approach, touch or use them.
- Ensure that the positive and negative terminals of the battery are not accidentally grounded. If accidental grounding occurs, disconnect the battery terminals from the ground immediately.
- Do not touch the power supply equipment directly, or through conductors or damp objects.
- Do not touch the parts of the equipment of which warning signs are attached, to avoid personal injury or device damage.

CAUTION!

- Do not power on the device until it has been installed and confirmed by professionals.
- In the event of a fire, evacuate immediately and call the local fire services.

NOTICE!

General requirement:

- Please operate according to the safety code for power station.
- Please make sure that the equipment and its associated switches are off before connecting and disconnecting power cables.
- Please check whether the protective housing and insulating sleeve for an electrical component have been installed correctly after finishing installation, to avoid electric shock.
- Must turn off the output switch of the power supply equipment when maintaining its electrical terminal device and power distribution device.
- If the device is required to be powered off during troubleshooting and diagnosis, please do as the following procedure: power off > electricity testing > connecting grounding cable > hanging warning signs and setting up guardrails.
- Must hang up "Do Not Switch On" warning signs on the relevant switches or circuit breakers before completing maintenance, to prevent power connection. Do not switch on before the fault is solved.
- Do not use water, alcohol, oil, or other solvents when cleaning electrical components inside and outside the device.

Grounding requirement:

- The device's grounding impedance shall meet the requirements of local electrical safety standards.
- The equipment shall be permanently connected to a grounding wire within the building's electrical system. Please check whether the device is reliably grounded before operation. The grounding cable should be removed last while dismantling and maintaining the device.
- Do not start the device if it is not fitted with a grounding conductor.
- All acts against the grounding conductor are prohibited.
- If the device is equipped with a three-pronged socket, make sure that the ground prong is reliably grounded.
- For the device that may generate large contact currents, please make sure that the grounding terminal on the housing has been grounded before powering on, to avoid electric shock.

Cable requirement:

- When deciding the wire diameter, and connecting or wiring cables, follow the local laws, regulations, and codes to ensure safety.
- Before connecting power cables, please make sure that the cable labels are correctly labelled and the cable terminals are well insulated.
- Do not loop and twist cables while conducting electrical wiring. If the length of the power cable is not enough, please replace it instead of joining or welding. Ensure that all the cables of the correct type and size are fully connected and well insulated, and the edges of cable slots and crossing holes are smooth.
- Cables should be kept away from heaters or other heat sources, because a high temperature environment may result in aging and damage to cable insulation.

NOTICE!

Short circuit protection:

- Please use electrical tape to wrap the bare conductor cables to prevent short circuits when installing and maintaining the battery.
- Prevent any object from entering into batteries, which may cause a short circuit.
- Regularly check the screws or copper bars on the device, to ensure that they are fully tightened.

2 Product Overview

2.1 Introduction

The TB-LD51 is an advanced energy storage system, using state-of-the-art technology, and having the characteristics of high reliability and convenient control. Characteristics are shown as follows:

- Premium LiFePO4 cells and high-efficiency processors;
- IP40 Protection Level and Protection Class I for reliable and safe operation;
- User-friendly LCD touchscreen for intuitive and easy interaction;
- Remote fault diagnostics and updates;
- Supports floor, wall and stack mounting;
- Expandable to 16 units in parallel;
- CTP (Cell-to-Pack) design maximizes space and energy density for superior performance.

2.2 Product Appearance

2.2.1 System Introduction

System appearance

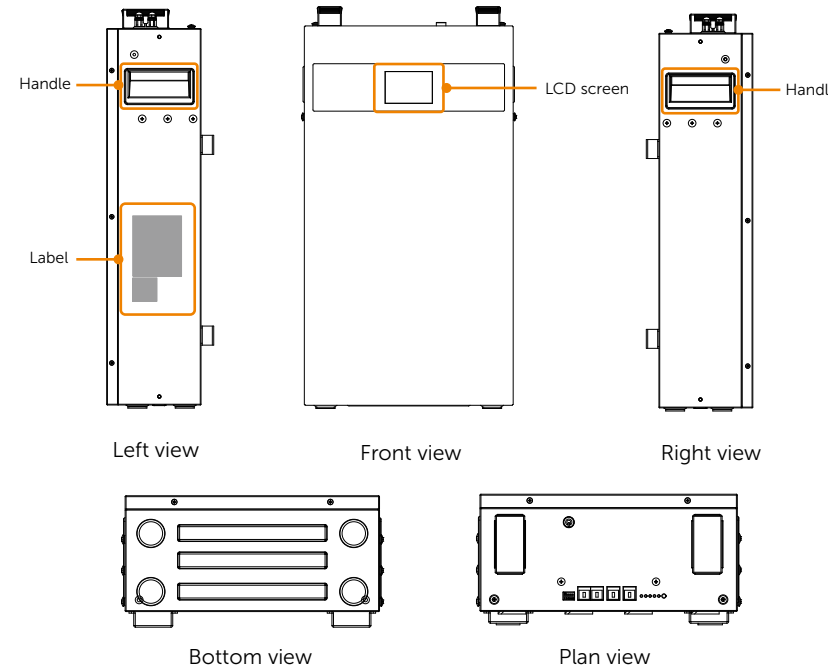


Figure 2-1 Appearance

Table 2-1 Description

Item	Description
Label	Identify the device type, serial number, parameters, certification, etc.. For details, please refer to "2.7 Label".
LCD Screen	Display the information of the battery. For details, please refer to "2.4 LCD screen".
Handle	Lift the battery conveniently.

Weight and dimension

Table 2-2 Weight and dimension

Length (mm)	326.0
Width (mm)	165.4
Height (mm)	625.7
Net weight (kg)	41.5±1

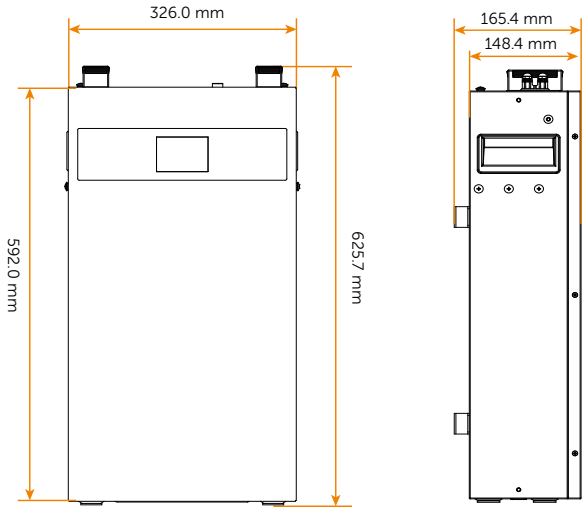


Figure 2-2 Weight and dimension

2.2.2 Parts Introduction

Introduction of electrical area

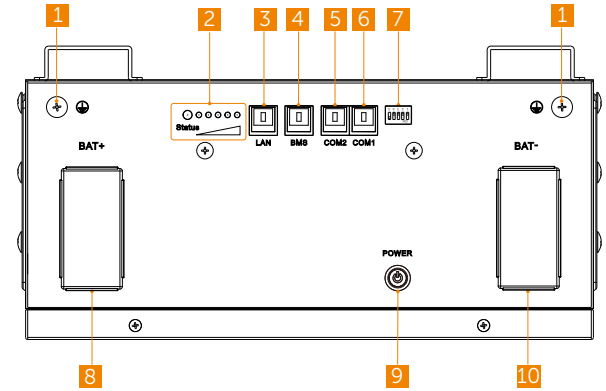


Figure 2-3 Introduction of electrical area

Table 2-3 Introduction of electrical area

NO.	Item	Description
1	Grounding port	To connect to the grounding port of the inverter or the next battery pack.
2	Indicator panel	Show the operating status and remaining capacity of the battery.
3	LAN port	To connect ethernet cable. For details, please refer to "13.2 Device Networking".
4	BMS port	Communication port: to connect to the "BMS" port on the inverter.
5	COM2 port	Communication 2 port: to connect to the "COM 1" port on the next battery pack.
6	COM1 port	Communication 1 port: to connect to the "COM 2" port on the next battery pack.
7	DIP switch	Please refer to "2.6 DIP Switch" for details.
8	BAT + port	Positive power port: to connect to the "BAT+" port of the inverter or the next battery pack.
9	POWER button	To start/shut down system.
10	BAT - port	Negative power port: to connect to the "BAT-" port of the inverter or the next battery pack.

2.3 Indicator Panel

2.3.1 Indicators

The battery pack is equipped with a tri-status status light (red/yellow/green) to show its operating status and five monochrome SOC indicators (yellow) to show the current battery percentage.

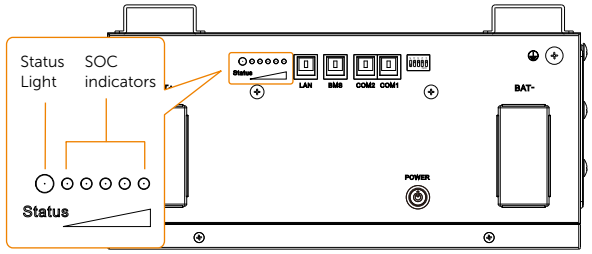


Figure 2-4 Indicators

Status light information

Table 2-4 Status light Information

Status light	Definition
Solid yellow	Self test
Solid green	Standby
Green quick flashing (every 1 second)	Start up
Yellow quick flashing (every 0.8 second)	Black start
Solid yellow	Shut down
Red slow flashing (every 3 second)	Fault

SOC Indicators information while charging

When the charging current is over 1 A, SOC indicators information is shown as follows:

Figure 2-5 SOC Indicators

Table 2-5 SOC Indicators information while charging

SOC value	SOC1	SOC2	SOC3	SOC4	SOC5
SOC≥80%	Flash	Flash	Flash	Flash	Flash
SOC≥60%	Off	Flash	Flash	Flash	Flash
SOC≥40%	Off	Off	Flash	Flash	Flash
SOC≥20%	Off	Off	Off	Flash	Flash
SOC>0%	Off	Off	Off	Off	Flash
SOC=0%	Off	Off	Off	Off	Off

SOC Indicators information while discharging

When the charging current is leass than or equal to 1 A, SOC indicators information is shown as follows:

Figure 2-6 SOC Indicators

Table 2-6 SOC Indicators information while discharging

SOC value	SOC1	SOC2	SOC3	SOC4	SOC5
SOC≥80%	Solid	Solid	Solid	Solid	Solid
SOC≥60%	Off	Solid	Solid	Solid	Solid
SOC≥40%	Off	Off	Solid	Solid	Solid
SOC≥20%	Off	Off	Off	Solid	Solid
SOC>0%	Off	Off	Off	Off	Solid
SOC=0%	Off	Off	Off	Off	Off

2.4 LCD Screen

The device is equipped with a LCD (3.5 inches) screen to show the operating status and remaining capacity of the battery. The screen will turn off 15 seconds after no operation.

NOTICE!

- Here takes the interface of master battery pack in parallel connection status as an example. Interfaces may vary in different operation status, and the actual interface display shall be prevail in that case.

Main menu

The following figure shows the main menu of LCD screen when the battery system is in operation.

Figure 2-7 Main menu

Inputting the password of secondary menu

For more details of technical data, users can input the default password "2014" to enter the secondary menu to check. The password can not be reset by users themselves.

After password verification, there is no need to input the password for 15 minutes. When the screen turns off 15 seconds after no operation, users need to input the password again to enter the secondary menu.

Figure 2-8 Inputting the password

After inputting the password correctly, users can enter the secondary menu as follows.

Figure 2-9 Secondary menu

Assigning address (black start)

Figure 2-10 Assigning address (black start)

System upgrading

Figure 2-11 System upgrading

2.5 Black Start

The device can provide black start capacity, meaning that our energy storage inverter and battery can continue to run even if the power grid and photovoltaic panel are out of service.

The startup procedure for black start is as follows:

- Pressing and holding the "POWER" button for 5 seconds, the status light will flash yellow (every 0.8 second) and the SOC indicator will come on yellow according to remaining capacity of the battery.
- Release the "POWER" button.

2.6 DIP Switch

A DIP Switch is actually a set of small manual electronic switches that are designed to be packaged with other circuits. It is currently equipped with the battery pack.

The location of the DIP switch and the factory defaults are shown as below.

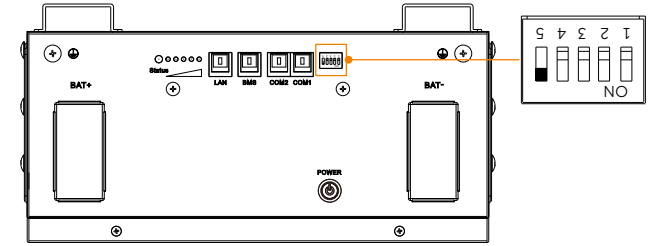


Figure 2-12 DIP switch

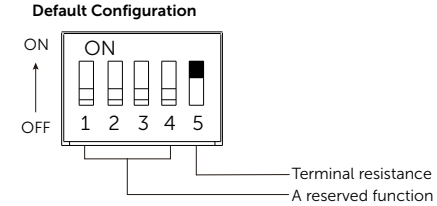


Figure 2-13 Default Configuration

NOTICE!

- In the case of one battery pack, **please confirm that the DIP switch 5 must stay in the ON position**. The DIP switch 5 will be slid to the ON position in the factory settings.
- In the case of parallel connection of two or more battery packs, flip the DIP switch 5 to the "ON" position and flip at least one of the DIP switches 1~4 to the "ON" position of the master battery pack (that connects to the inverter). Do not operate the DIP switches of slave battery pack(s). The DIP switch 5 will be slid to the ON position in the factory settings.
- To adjust the DIP switch, a small flat-head screwdriver should be prepared by the users themselves. **Do not use a pencil**. Graphite from the pencil is conductive and may damage the DIP switch.

2.7 Label

There are some kinds of labels pasted on the battery pack that contain various technique data or detailed information of the battery system. For example, the system performance label, located on the left side of the battery pack, consists of the following parts:

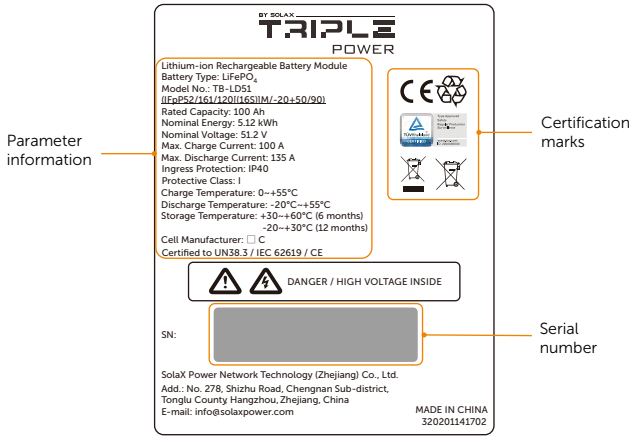


Figure 2-14 System performance label

NOTICE!

- Regarding the SN, 32-base nomenclature is adopted to identify the type, specific features, manufacture date, order serial number, and factory serial number.

32-base nomenclature

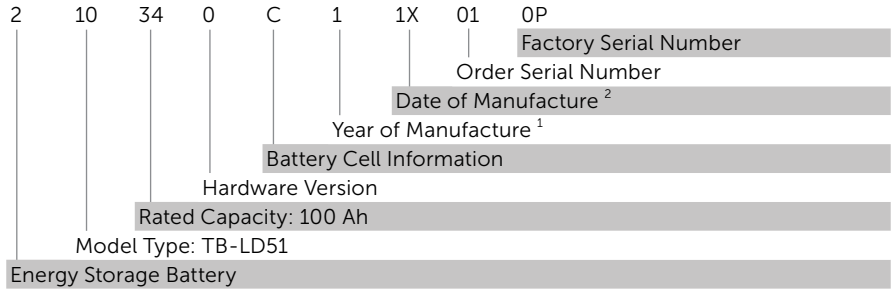


Figure 2-15 Explanation of SN

1 0-2023, 1-2024, 2-2025 ..... A-2033, B-2034 .....
2 The two digits represent the week of when the battery pack was produced. There are totalling 52 weeks in a year, and the first week is represented by the number 00, and the second week is represented by the number 01. Do the rest in the same manner in accordance with the 32-base coding rule.

2.8 Explanation of Symbols and Icons

Table 2-7 Explanation of symbols and icons

Symbol and icon	Description
	CE mark of conformity.
	TUV certification.
	Protective grounding point.
	The battery module may explode. The rechargeable battery can become hot during operation. Avoid touch during operation.
	Danger, electric shock. Do not touch the device after it is powered on. Otherwise, an electric shock may occur.
	Danger. Due to possible risks, do not touch the device after it is powered on.
	Observe enclosed documentation.
	The device cannot be disposed together with the household waste.
	The device cannot be disposed together with the household waste.
	The battery system must be disposed of at a proper facility for environmentally-safe recycling.
	Keep the device away from children.
	Keep the device from open flames or ignition sources.

3 Transportation and Storage

3.1 Transportation Requirements

DANGER!

- When handling equipment, please handle it with care to avoid physical collisions. Do not place the device upside down or immerse it in water, otherwise it may cause damage, causing equipment damage and even fire and explosion accidents.
- Do not disassemble the battery violently. Otherwise, it may lead to battery pack short circuit, damage to the device (leakage, rupture), fire, or explosion.

CAUTION!

- Hold the handles on the device or put your hands underneath the device to move or lift, and do not hold the handles on the parts installed in it.
- Srtictly follow the document to carry or move the battery pack. Ensure that the device is correctly placed. Do not place a battery upside down or vertically, lay it on one side, or tilt it. And keep away from rain and water.

NOTICE!

General requirement

- Please pay attention to the signs on the package and strictly follow the transportation requirements.
- To prevent injury from oversize loads, assess the device you're about to lift before you start lifting.
- If more than 2 people lift a device, reasonably arrange to have a balanced weight distribution.
- Wear personal protective device, such as, safety gloves, safety boots, etc., to prevent injuries when lifting devices with bare hands.
- Know the right body posture to prevent personal injuries when lifting devices, for instance, bend at your knees, not at your waist or back, and do not twist your back.
- To prevent injuries, do not quickly lift the heavy device above the waist.
- To prevent scratches and dents, or damage to components and cables, avoid impact and falling when moving.
- Be aware of workbenches, slopes, steps, and other places where it is easy to slip when moving devices. Ensure that the passageways are smooth, clean, and away from obstacles.
- Relevant qualifications for transport of dangerous goods must be obtained by the forwarding agent engaged in such businesses. Do not transport it in an open trailer.

NOTICE!

- Strictly abide by the international regulations on the transport of dangerous goods, and meet the supervision requirements stipulated by the transport authority of the departure country, transit country, and country of destination, respectively.
- Before transportation, check that the battery package is intact and that there is no abnormal odor, leakage, smoke, or sign of burning. Otherwise, the batteries cannot be transported.
- The packing case must be secured for transportation. Handle the case with care during loading, unloading, and transportation, and take measures to prevent moisture damage to the device during transportation.
- Handle gently when moving the battery pack to prevent bumping and damage to individuals.
- Unless otherwise specified, dangerous goods shall not be mixed with goods containing food, medicine, animal feed, or their additives in the same vehicle or container.
- Before moving a faulty battery pack (with scorch, leakage, bulge, or water intrusion), insulate its positive and negative terminals, pack it, and place it in an insulated explosion-proof box as soon as possible. Record information such as the site name, address, time, and fault symptom on the box.
- Keep away from flammable material storage areas, residential areas, and other population centers (e.g., public transport, elevators) when transporting the faulty battery pack.

3.2 Storage Requirements

DANGER!

- Ensure that batteries are stored in a dry, clean, and ventilated indoor environment that is free from sources of strong infrared or other radiations, organic solvents, corrosive gases, and conductive metal dust. Do not expose batteries to direct sunlight or rain and keep them far away from sources of heat and ignition.
- If a battery is faulty (with scorch, leakage, bulge, or water intrusion), move it to a dangerous goods warehouse for separate storage. And it must be scrapped as soon as possible.
- Store the device according to the caution signs on the packaging to prevent device damage. Do not place a battery upside down or vertically, lay it on one side, or tilt it.
- Store the battery packs in a separate place. Do not store them together with other devices. Do not stack too high. The storage site should be equipped with qualified fire fighting facilities, such as fire sand and fire extinguishers.

CAUTION!

- If a battery pack is stored for a long time, please periodically recharge it to protect from damage.

NOTICE!

General requirement

- Store the device according to the signs on the packaging.
- Do not remove the original packaging material and check the outer packaging material regularly.
- If the rechargeable battery has been stored for more than 1 year, it must be checked and tested by professionals before use.
- The relative humidity should be between 20% and 85% (non-condensing).
- It is recommended to store the battery in a temperature range of -20°C to +60°C.

Table 3-1 Storage temperature and recharge time

Storage temperature	Recharge time
+30°C to +60°C	Every 6 months.
-20°C to +30°C	Every 12 months.

4 Preparation before Installation

4.1 Selection of Installation Location

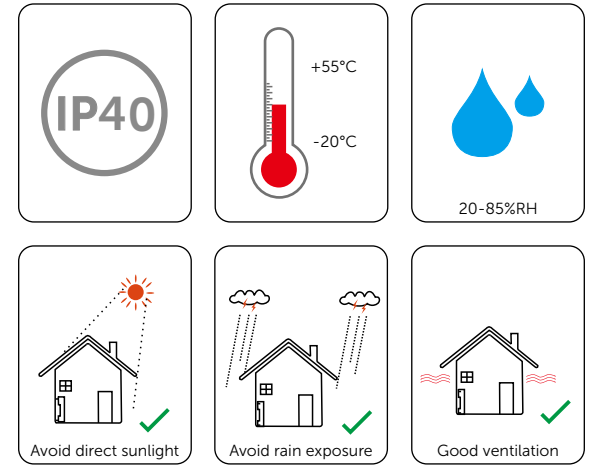
The installation location selected for the rechargeable battery is quite critical in the aspect of the guarantee of machine safety, service life and performance.

- Flaunting an IP40 enclosure, the battery can only be used indoors;
- The installation position shall be convenient for wiring connection, operation and maintenance.

4.1.1 Environment Requirement

Make sure the installation site meets the following conditions:

- Ambient temperature: -20°C~+55°C;
- Humidity: 20~85%RH (non-condensing);
- Avoid direct sunlight and rain exposure;
- Install the rechargeable battery in a well-ventilated environment for heat dissipation;
- Do not install the rechargeable battery in areas with flammable, explosive and corrosive materials, as well as areas near combustibles and antenna.



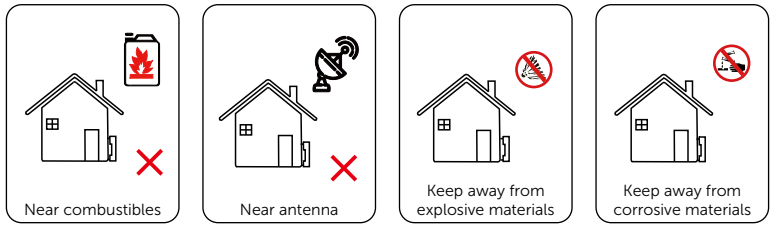


Figure 4-1 Environment requirements

4.1.2 Installation Carrier Requirement

The mounting location must be suitable for the weight and dimensions of the product and the support surface for installation must be made of a non-flammable material. Detailed requirements are shown below:

- The installation floor and wall shall be made of non-combustible materials, such as solid brick, concrete, and the surface shall be level, firm, and flat with a sufficient load-bearing capacity;
- Please ensure that the installation site has a bearing capacity of at least 4 times the weight of the entire battery system. For instance, if the user purchases one battery, the load-bearing capacity ≥ (weight of all battery packs) * 4;
- Please ensure that the thickness of any part of the wall is no less than 100 mm;
- The product must not be installed on the wood wall.

4.1.3 Clearance Requirement

To guarantee proper heat dissipation and ease of disassembly, the minimum space around the rechargeable battery must meet the standards indicated below.

- No matter which mounting is chosen, a distance between 200 and 300 mm wide shall be provided from the wall to the edge of the battery pack.
- No matter which mounting is chosen, a distance between 400 and 600 mm wide shall be provided from the left side edge of a battery pack to the right side edge of the neighbouring battery packs.

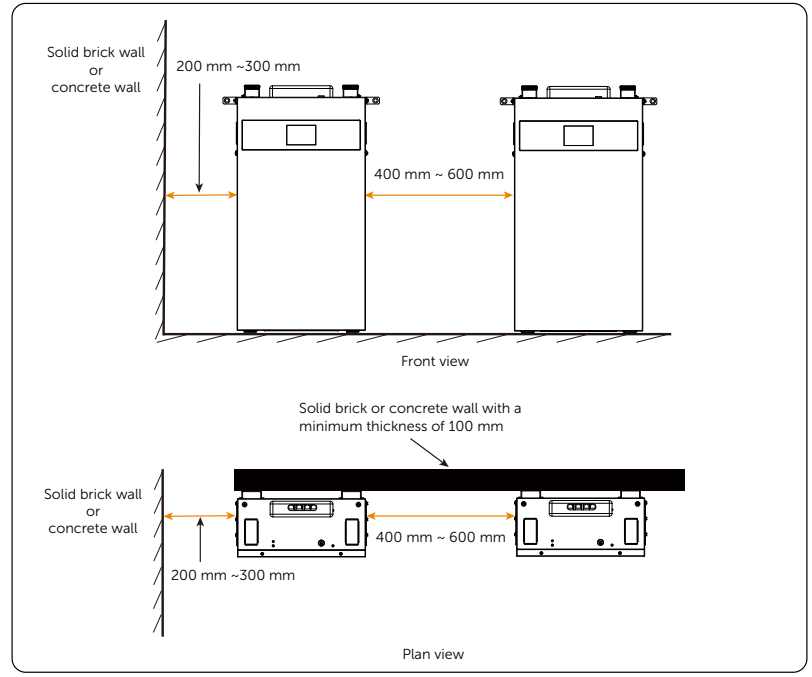


Figure 4-2 Clearance requirement about floor mounting

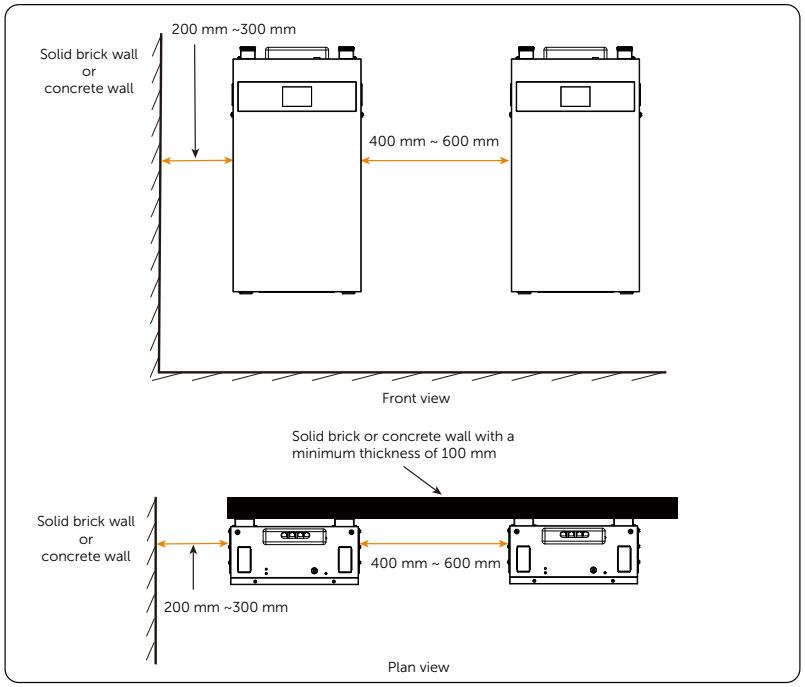


Figure 4-3 Clearance requirement about wall mounting

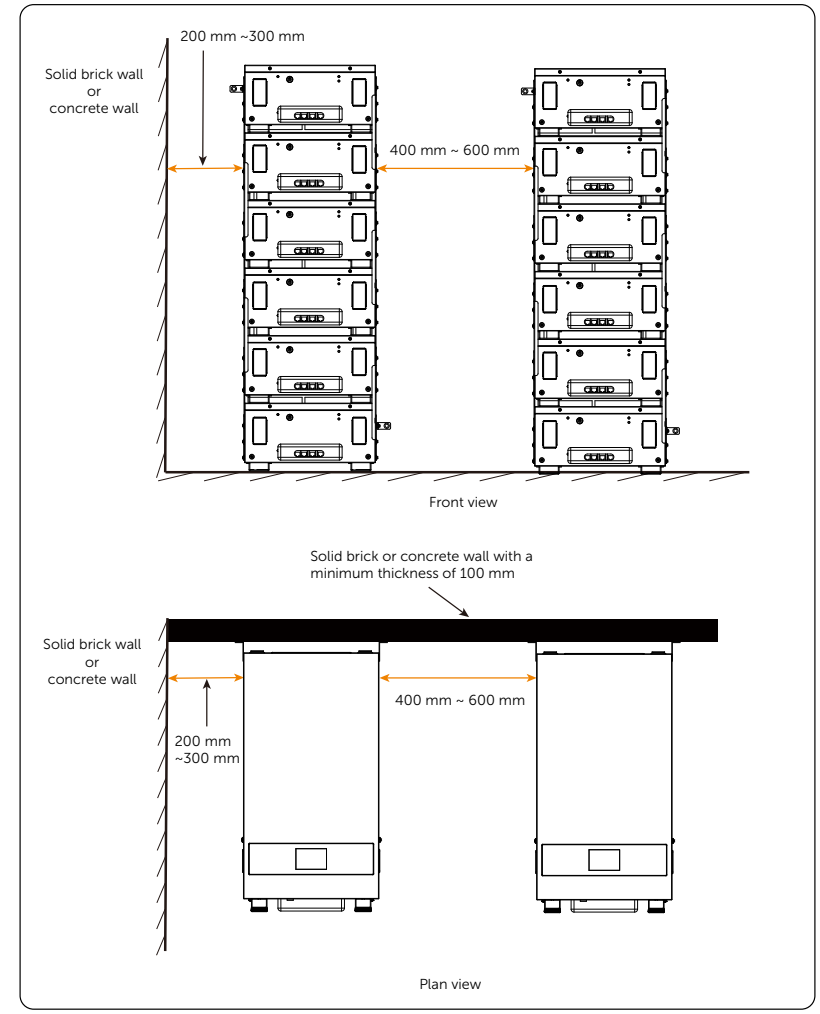
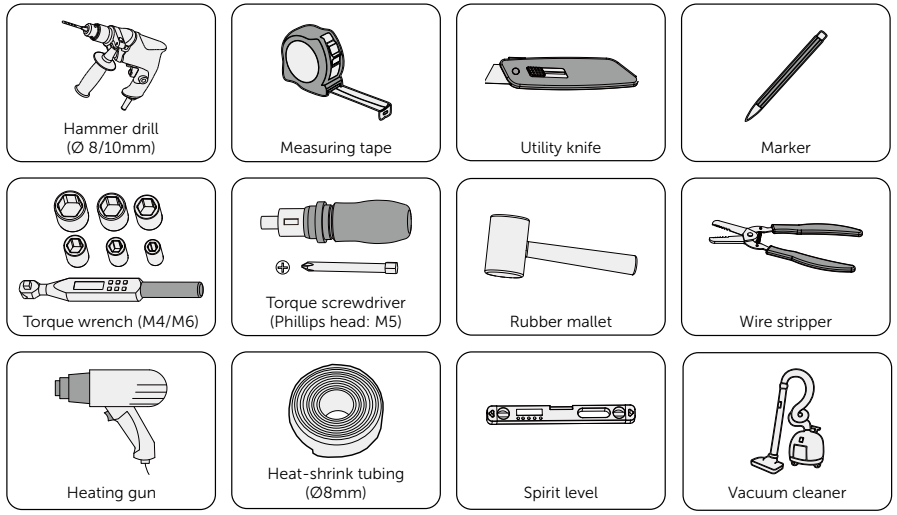


Figure 4-4 Clearance requirement about stack mounting

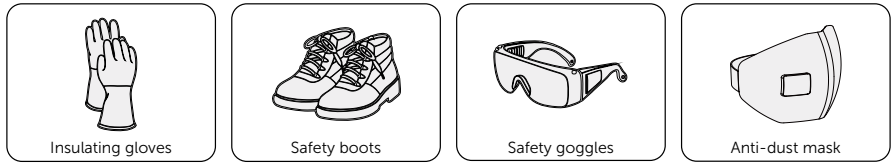
4.2 Tools Requirement

Installation tools include but are not limited to the following recommended ones. If necessary, use other auxiliary tools on site.

Installation tools



Personal protective tools



4.3 Additionally Required Materials

The following is a recommended list of equipment required for installation of the battery system.

Table 4-1 Additionally required materials

No.	Required material		Type	Conductor cross-section
1	PE cable		Conventional yellow and green cable	16 mm^2
2	Ethernet cable		CAT-5	/
3	Ethernet cable connector		RJ45	/

5 Unpacking and Inspection

5.1 Unpacking

- The rechargeable battery undergoes 100% testing and inspection before shipping from the manufacturing facility. However, transport damage may still occur. Before unpacking the rechargeable battery, please verify that the model and outer packing materials for damage, such as holes and cracks.
- Unpack a battery pack according to the following figure. If there are other cartons, the unpacking procedure can also be referred to the following figure.

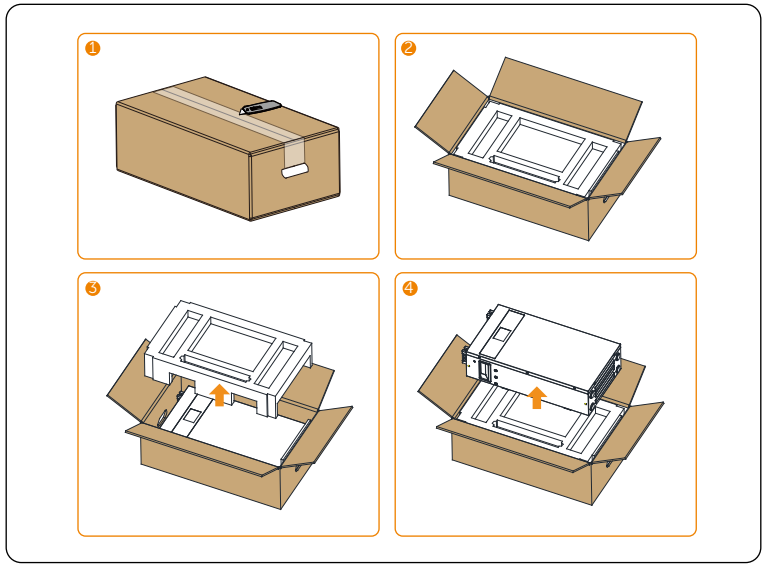
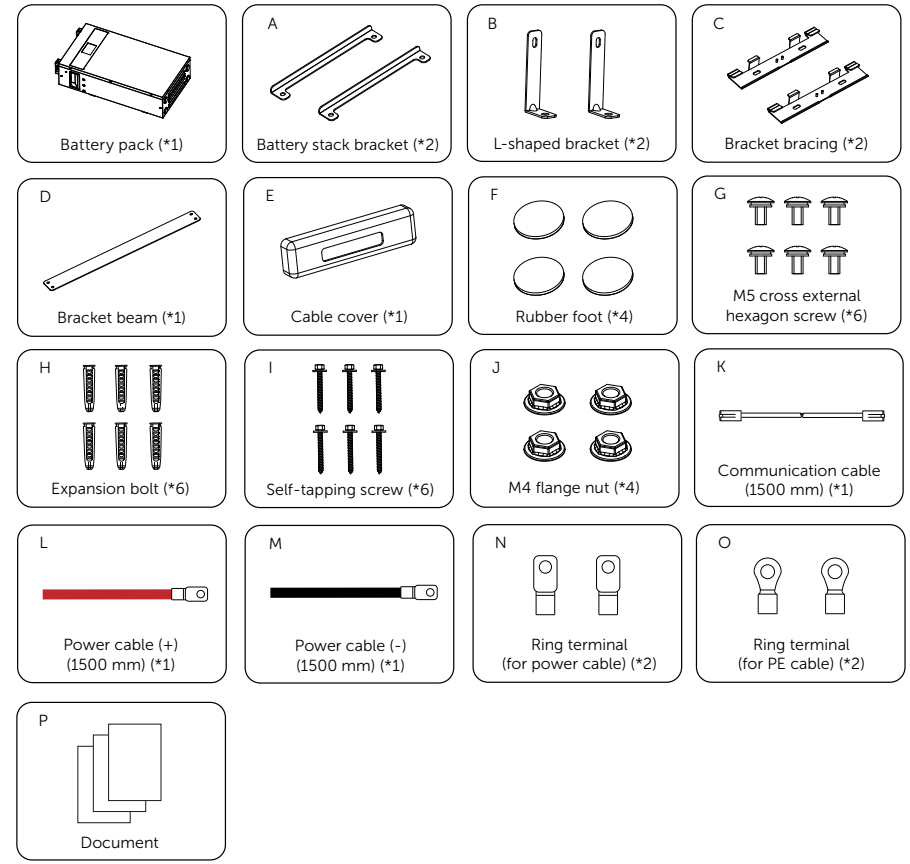


Figure 5-1 Unpacking the battery pack

- Be careful when dealing with all package materials which may be reused for storage and relocation of the rechargeable battery in the future.
- Upon opening the package, check whether the appearance of the rechargeable battery is damaged or lack of accessories. If any damage is found or any parts are missing, contact your dealer immediately.

5.2 Scope of Delivery



6 Mechanical Installation

WARNING!

- Only the qualified personnel can perform the mechanical installation following the local standards and requirements.
- Check the existing power cables or other piping in the wall to prevent electric shock or other damage.
- Use insulated tools and wear personal protective device (PPE) during installation and maintenance.

CAUTION!

- Pay attention to the weight of the device at all times during transportation and installation, as improper lifting or dropping of the device may cause personal injury. Due to the battery pack's weight of 41.5±1 kg, it is suggested to arrange for 2 people to move or lift it.

NOTICE!

- Please ensure that the occupied floor area's bearing capacity for the device is over four times the total weight.
- Please ensure that the thickness of any part of the wall is less than 100 mm;
- The product must not be installed on the wood wall.
- The following steps take one (1) battery pack as an example.

6.1 Installation Options

There are three options: floor mounting, wall mounting or stack mounting.

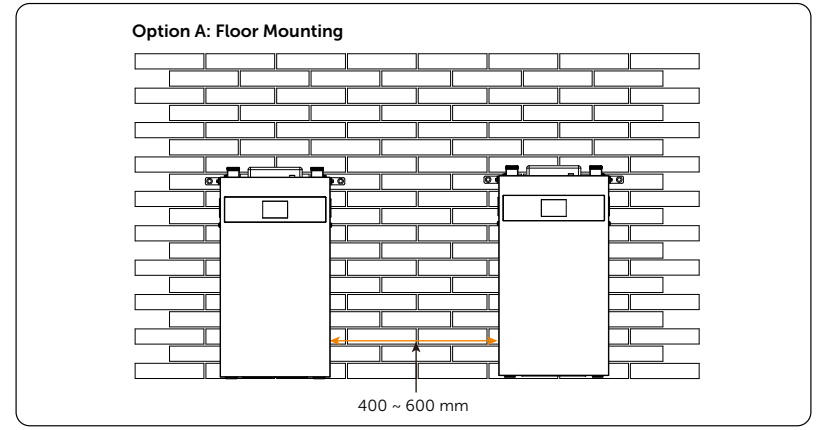


Figure 6-1 Floor mounting

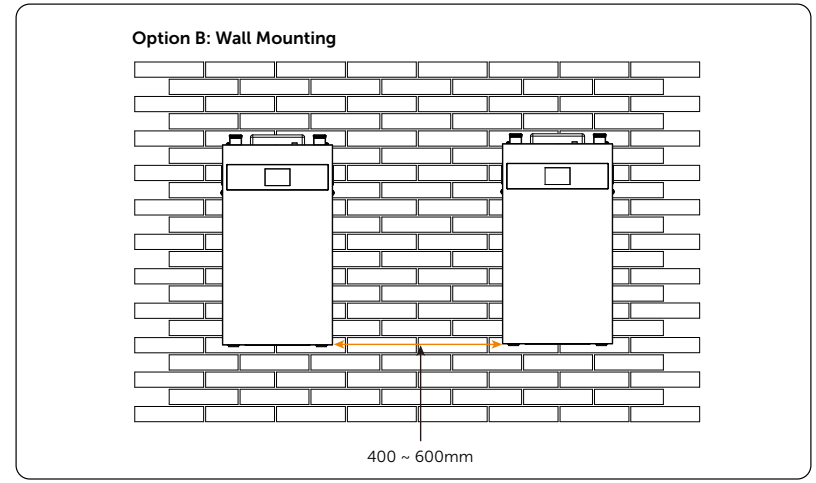


Figure 6-2 Wall mounting

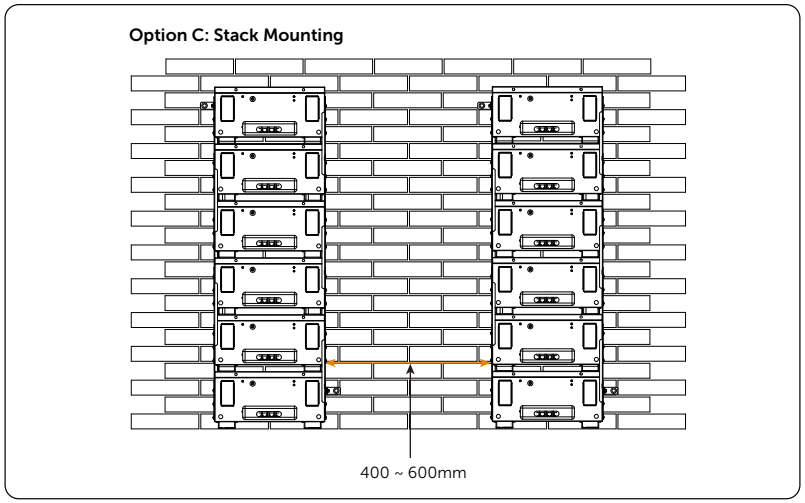


Figure 6-3 Stack mounting

6.2 Installation Procedure of One Battery Pack

Floor mounting

Step 1: Secure the cable cover (Part E).

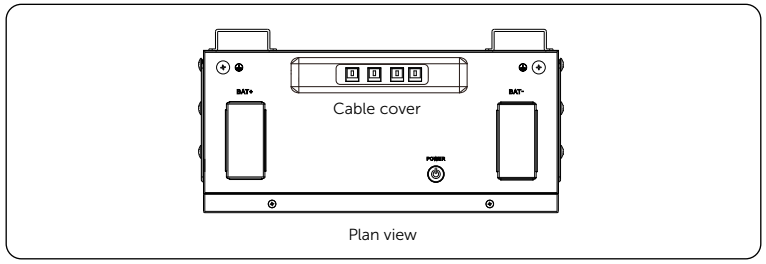


Figure 6-4 Securing cable cover

Step 2: Stick the rubber foot (Part F) (× 4 pcs) to the bottom of the battery pack.

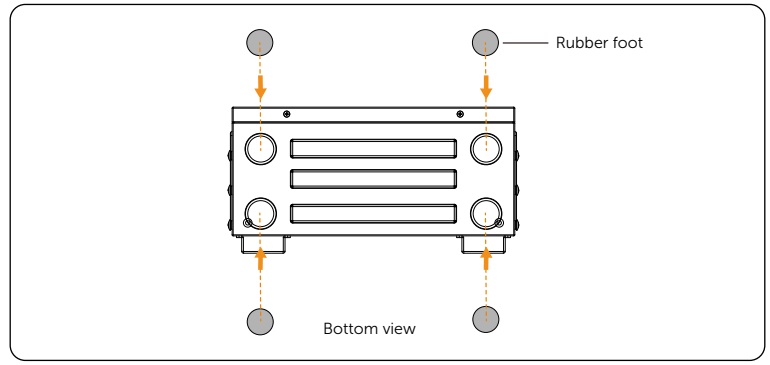


Figure 6-5 Sticking rubber feet

Step 3: Secure the L-shaped bracket (Part B) (2 pcs) to the battery pack with M5 screw (Part G) (× 2 pcs), but do not tighten fully.

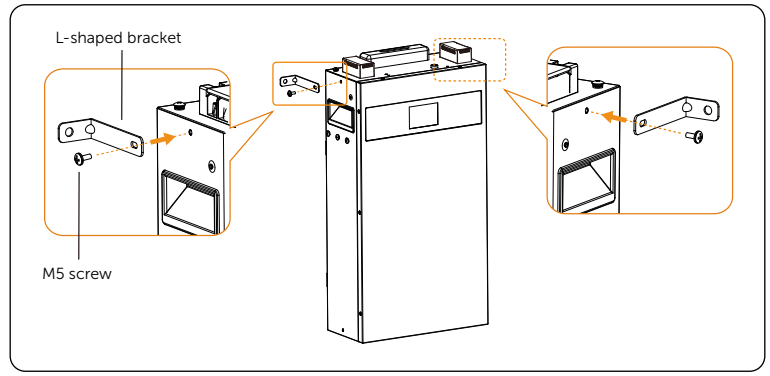


Figure 6-6 Securing L-shaped brackets

Step 4: Locate the battery pack against the wall.

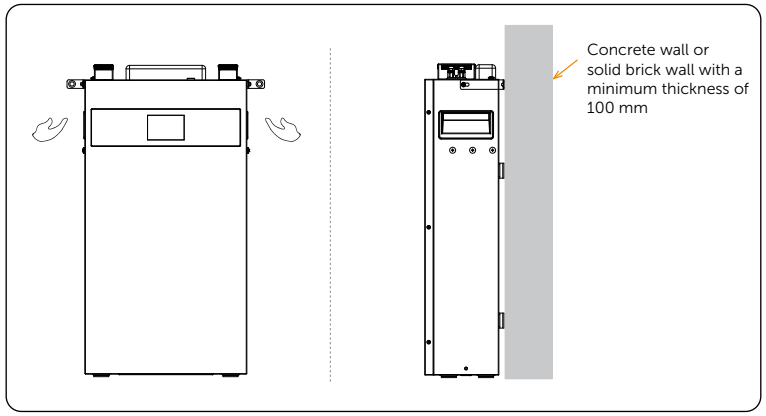


Figure 6-7 Locating the battery pack against the wall

NOTICE!

- At least two persons are required to lift the battery pack.

Step 5: Draw a circle along the inner ring with one on each side of the L-shaped bracket. Then gently move the battery pack aside.

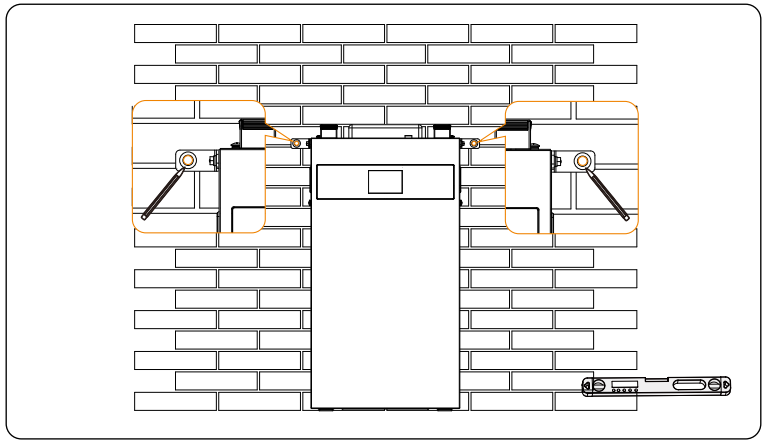


Figure 6-8 Drawing circles

Step 6: Drill two holes at a depth of more than 60 mm in the concrete wall or solid brick wall by using a Drill (Ø 8 and 10 mm).

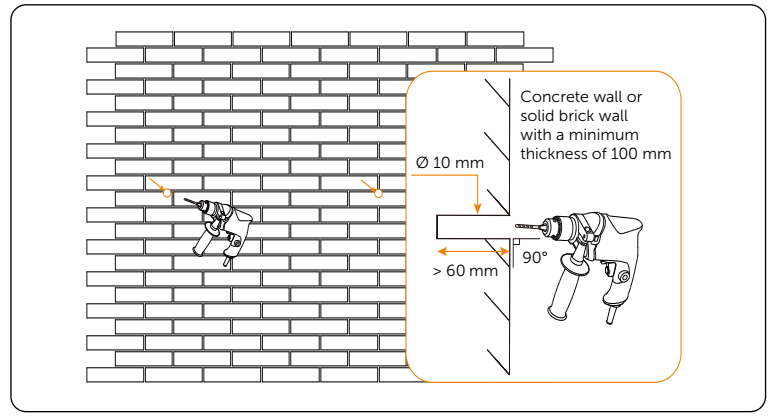


Figure 6-9 Drilling holes

NOTICE!

- To prevent angled holes from being drilled, it is suggested to use a Ø 8 mm Drill to drill holes first, and then change to a Ø 10 mm Drill.
- Please clean the dust on the wall and foundation timely after drilling.

Step 7: Insert the expansion bolt (Part H) (x 2 pcs) into the holes drilled previously.

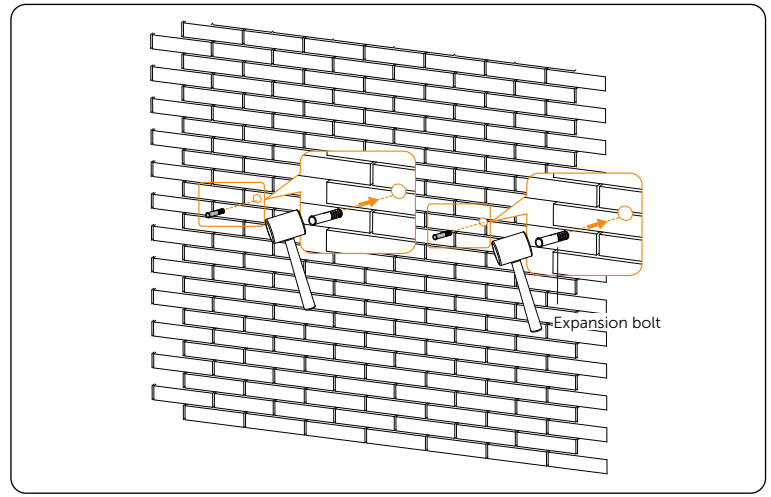


Figure 6-10 Inserting expansion bolts

Step 8: Gently move the battery pack against the wall, and align the holes drilled previously.

Correctly insert and tighten the self-tapping screw (Part I) (× 2 pcs) to secure the L-shaped bracket on both sides to the wall (Tightening torque: 6-8 N·m).

Fully tighten M5 screw (× 2 pcs) on both sides (Tightening torque: 2.2-2.5 N·m).

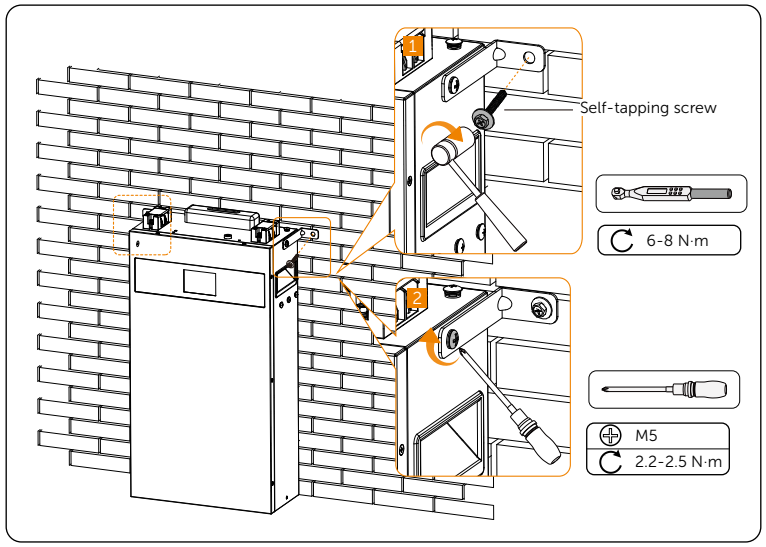


Figure 6-11 Tightening self-tapping screws and M5 screws

Step 9: Finish floor mounting.

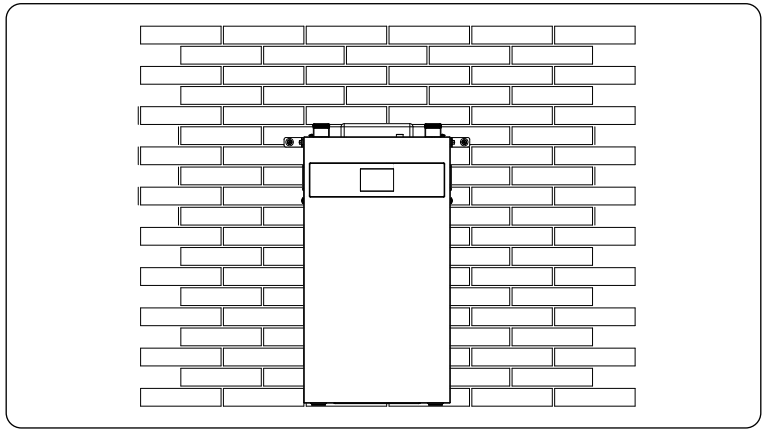


Figure 6-12 Finishing floor mounting

Wall mounting

Step 1: Secure the cable cover (Part E).

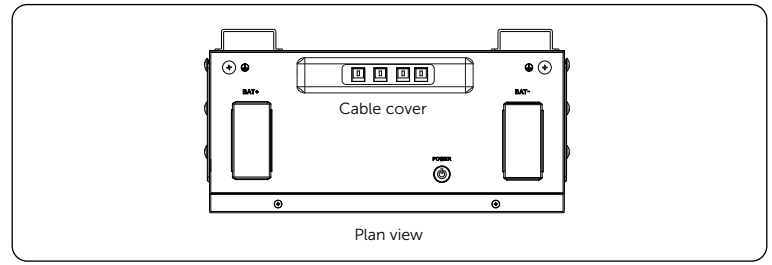


Figure 6-13 Securing cable cover

Step 2: Stick the rubber foot (Part F) (× 4 pcs) to the bottom of the battery pack.

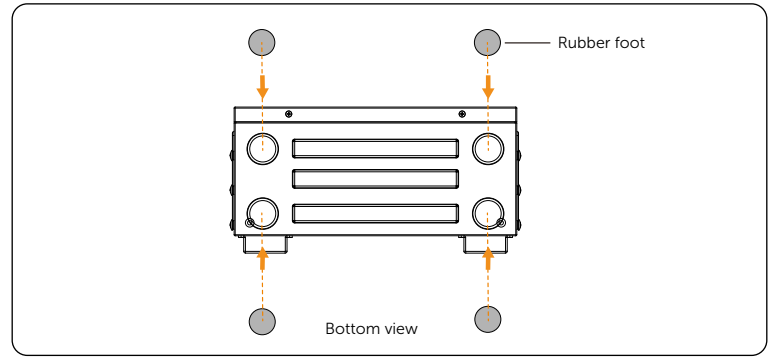


Figure 6-14 Sticking rubber foot

Step 3: Assemble the wall bracket by inserting and tightening M4 flange nut (Part J) (4 pcs) to secure the bracket bracing (Part C) (2 pcs) and bracket beam (Part D) (Tightening torque: 1.3-1.5 N·m).

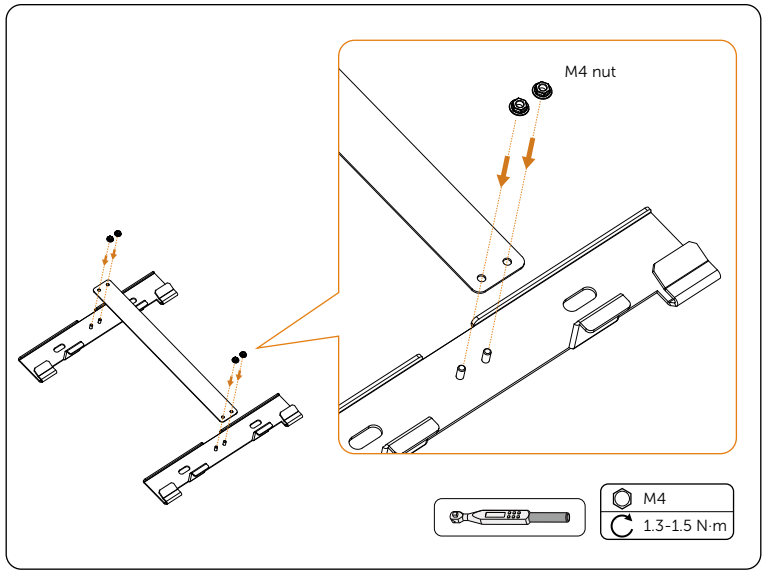


Figure 6-15 Assembling the wall bracket

Step 4: Draw a circle along the inner ring on the wall bracket, with a total of 4 circles.

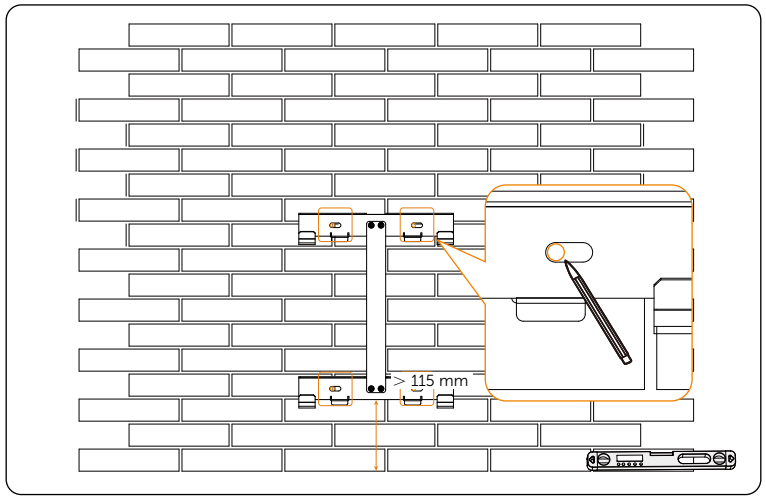


Figure 6-16 Drawing circles

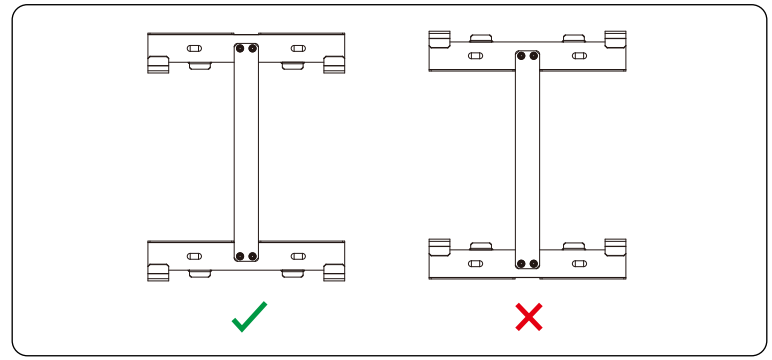


Figure 6-17 Direction of securing the wall bracket

Step 5: Remove the wall bracket, and then drill four holes at the depth of more than 60 mm in the concrete wall or solid brick wall by using a Drill (Ø 8 and 10 mm).

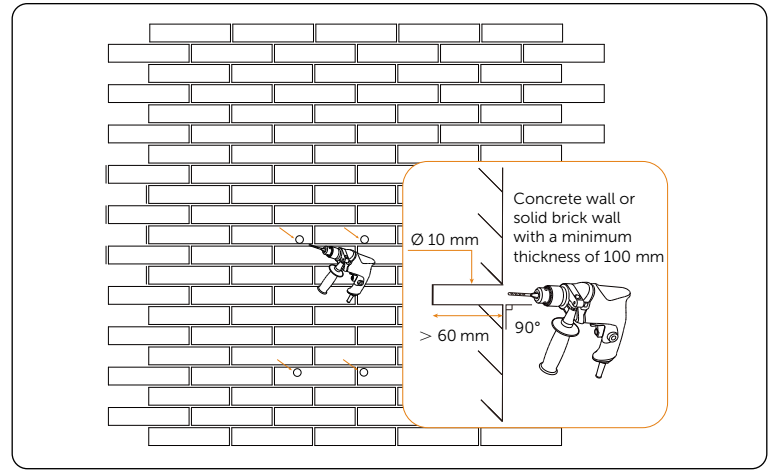


Figure 6-18 Drilling holes

NOTICE!

- To prevent angled holes from being drilled, it is suggested to use a Ø 8 mm Drill to drill holes first, and then change to a Ø 10 mm Drill.
- Please clean the dust on the wall and foundation timely after drilling.

Step 6: Insert the expansion bolt (Part H) (× 4 pcs) with a rubber hammer into the holes drilled previously on the wall.

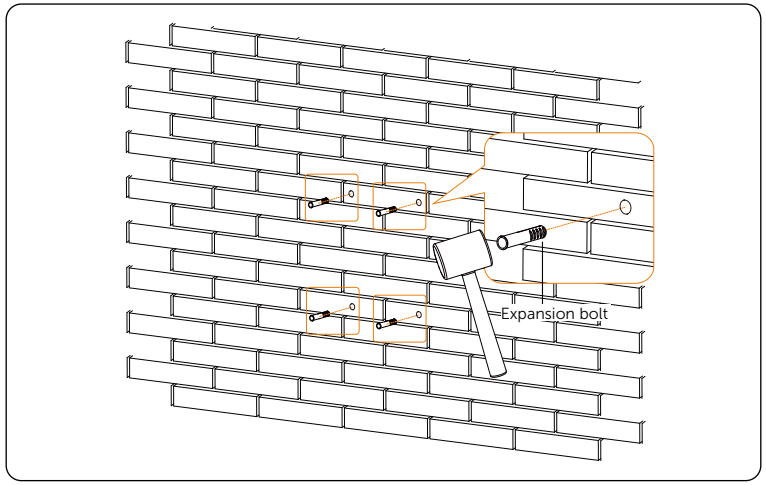


Figure 6-19 Inserting expansion bolts

Step 7: Align holes of the wall bracket with holes drilled previously.

Correctly insert and tighten self-tapping screw (Part I) (× 4 pcs) to secure the wall bracket (Tightening torque: 6-8 N·m).

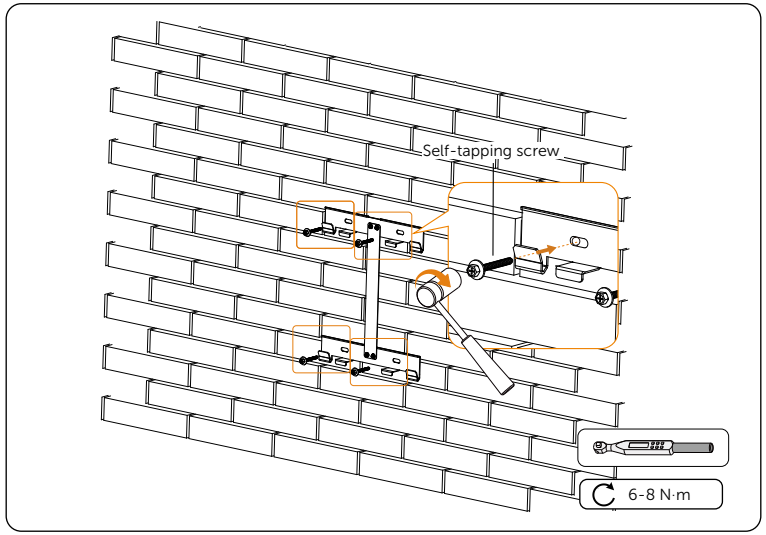


Figure 6-20 Tightening self-tapping screws

Step 8: Lift the battery pack and hang it on the wall bracket.

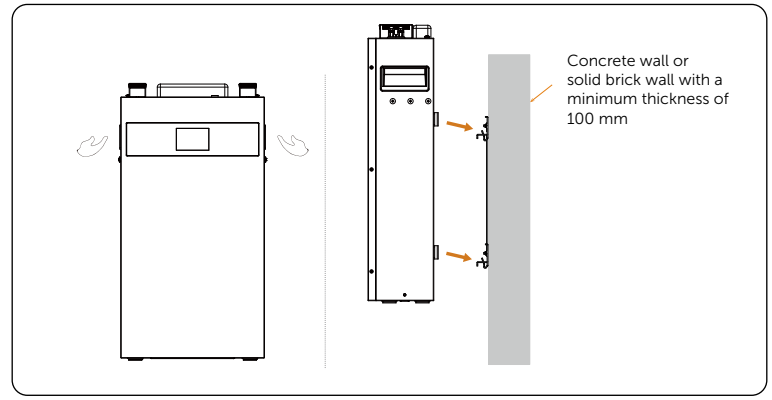


Figure 6-21 Hanging the battery pack on the wall bracket

NOTICE!

- At least two persons are required to lift the battery pack.

Step 9: Finish wall mounting.

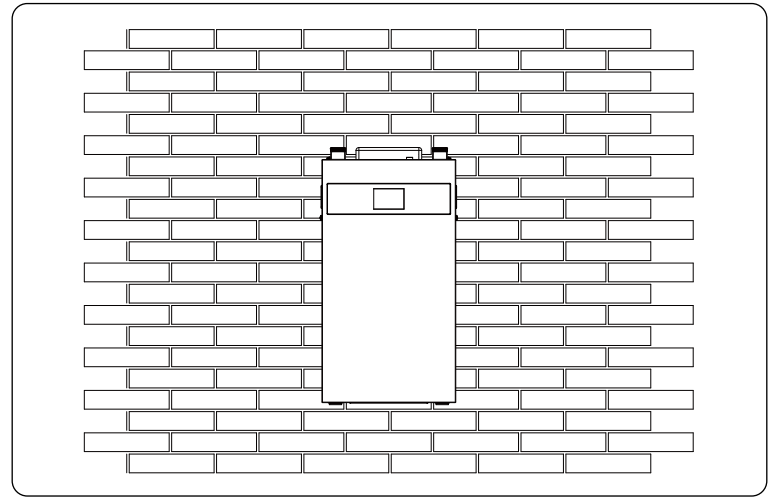


Figure 6-22 Finishing wall mounting

Stack mounting

Step 1: Secure the cable cover (Part E).

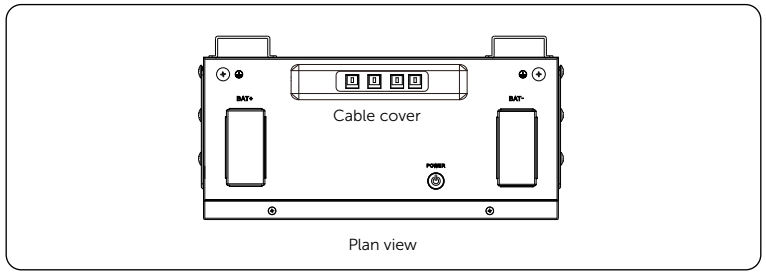


Figure 6-23 Securing cable cover

Step 2: Stick the rubber foot (Part F) (× 4 pcs) to the rear side of the battery pack.

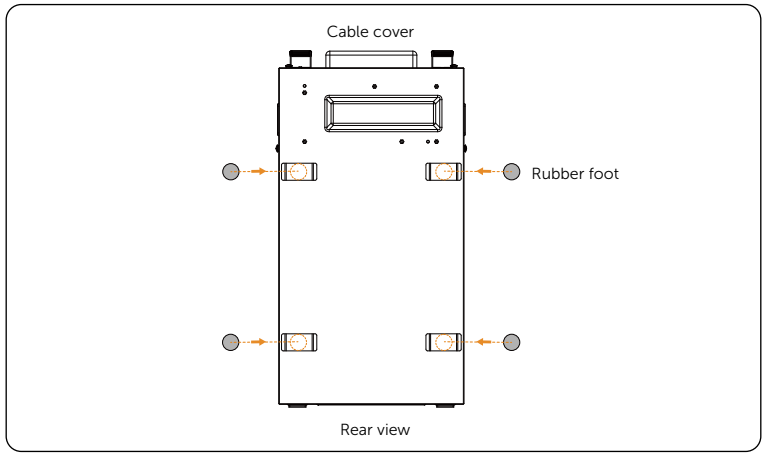


Figure 6-24 Sticking rubber feet

Step 3: Place the battery pack face up flat on the ground.

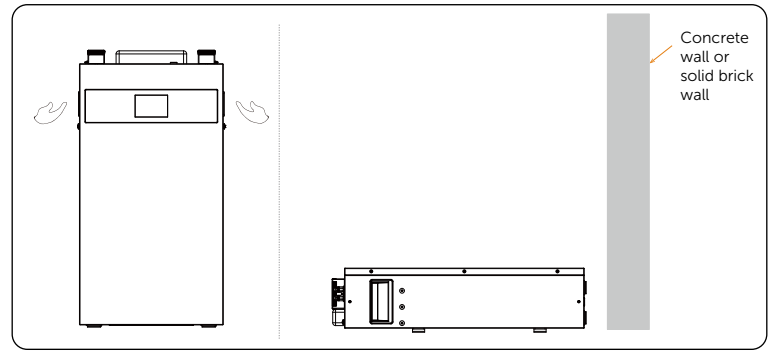


Figure 6-25 Placing the battery pack flat

Step 4: Finish stack mounting.

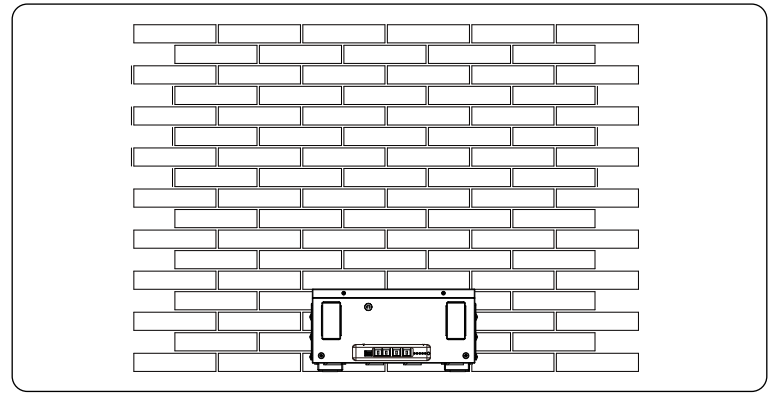


Figure 6-26 Finishing stack mounting

6.3 Installation Procedure of Two or More Battery Packs

NOTICE!

- Up to 16 battery packs can be installed together in the case of capacity expansion.
- Regarding the installation distance between two or more battery packs, please refer to "4.1.3 Clearance Requirement".

Floor mounting

Regarding to the specific installation steps, please refer to "6.2 Installation Procedure of One Battery Pack".

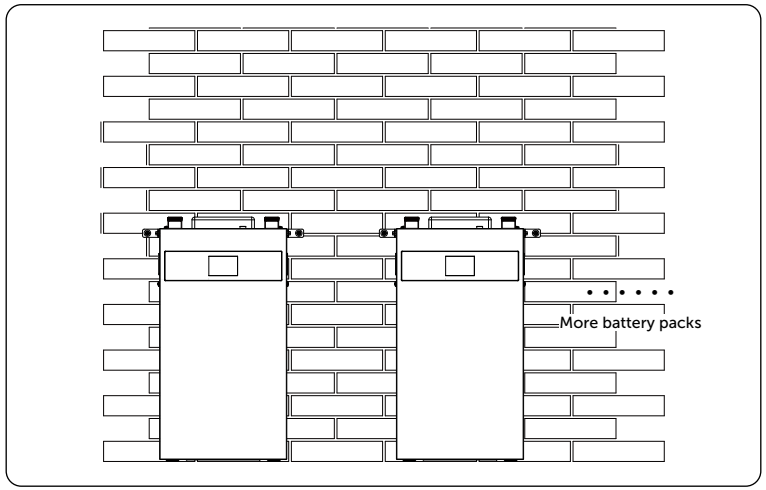


Figure 6-27 Finishing floor mounting

Wall mounting

Regarding to the specific installation steps, please refer to "6.2 Installation Procedure of One Battery Pack".

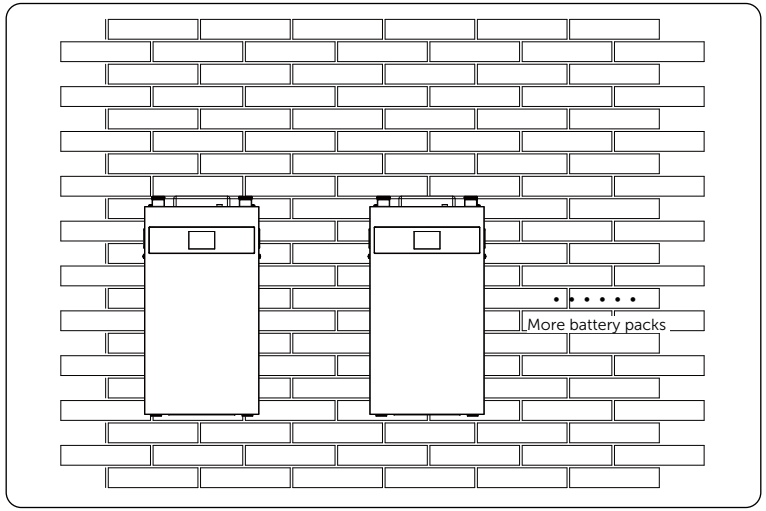


Figure 6-28 Finishing wall mounting

Stack mounting

NOTICE!

- Up to 6 battery packs can be stacked in one tower.

Here takes stacking 6 battery packs in one tower as an example. Please do as follows.

Step 1: Secure the cable cover (Part E).

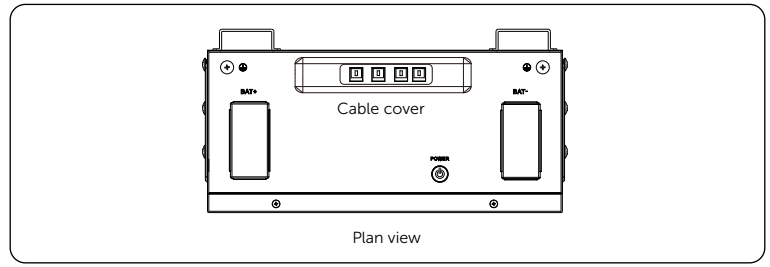


Figure 6-29 Securing cable cover

Step 2: Stick the rubber foot (Part F) (× 4 pcs) to the rear side of the battery pack.

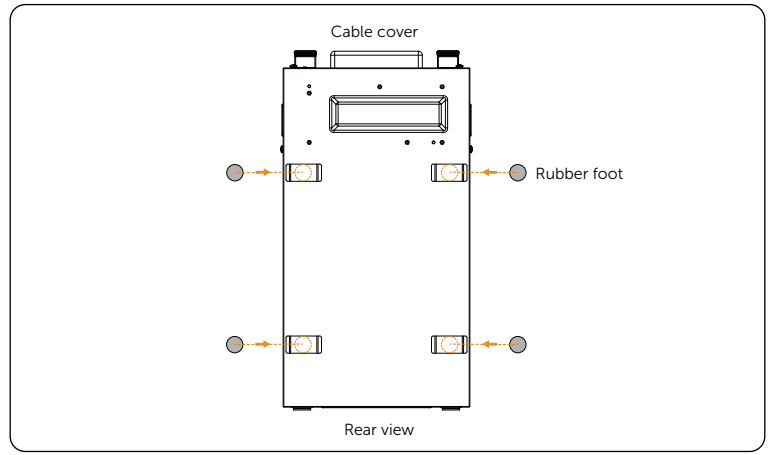


Figure 6-30 Sticking rubber feet

Step 3: Place the bottom battery pack face up flat on the ground.

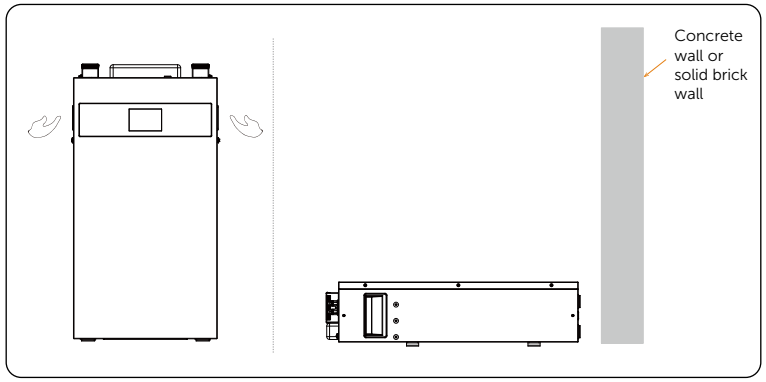


Figure 6-31 Placing the battery pack flat

Step 4: Secure the L-shaped bracket (Part B) (× 1 pc) on the right side of the bottom battery pack with M5 screw (Part G) (× 1 pc), but do not tighten fully. Draw a circle along the inner ring of the L-shaped bracket.

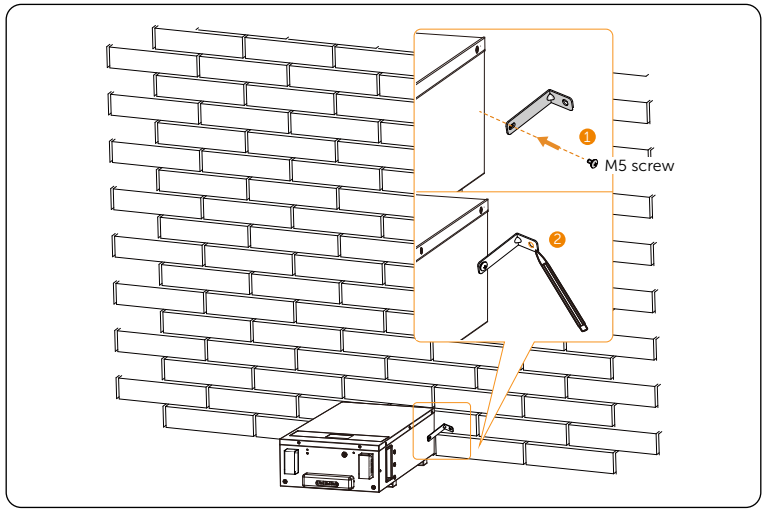


Figure 6-32 Drawing a circle

NOTICE!

- To prevent angled holes from being drilled, it is suggested to use a Ø 8 mm Drill to drill holes first, and then change to a Ø 10 mm Drill.
- Please clean the dust on the wall and foundation timely after drilling.

Step 5: Gently move the bottom battery pack aside. Then drill a hole at a depth of more than 60 mm in the concrete wall or solid brick wall by using a Drill (Ø 8 and 10 mm).

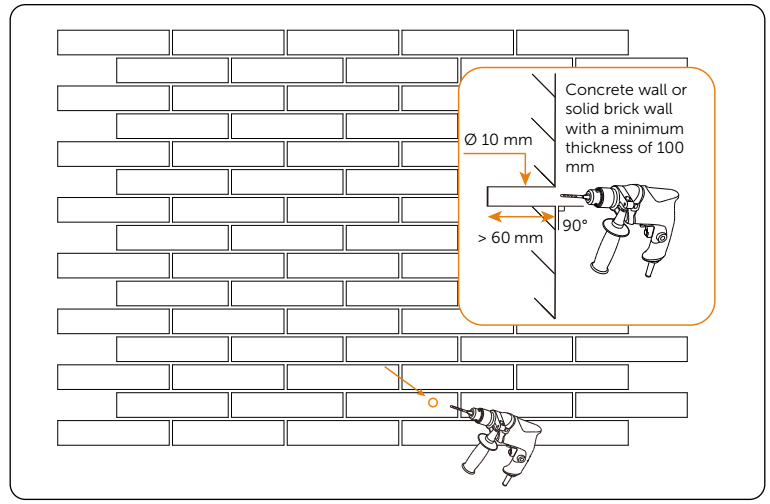


Figure 6-33 Drilling a hole

Step 6: Insert the expansion bolt (Part H) (× 1 pc) with a rubber hammer into the hole drilled previously on the wall.

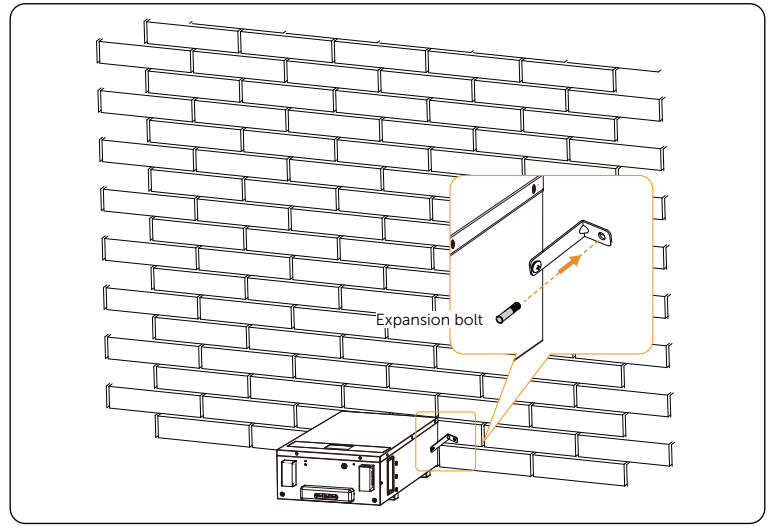


Figure 6-34 Inserting the expansion bolt

Step 7: Tighten M5 screw fully.
Insert and tighten self-tapping screw (Part I) (× 1 pc) to secure the L-shaped bracket (Tightening torque: 6-8 N·m).

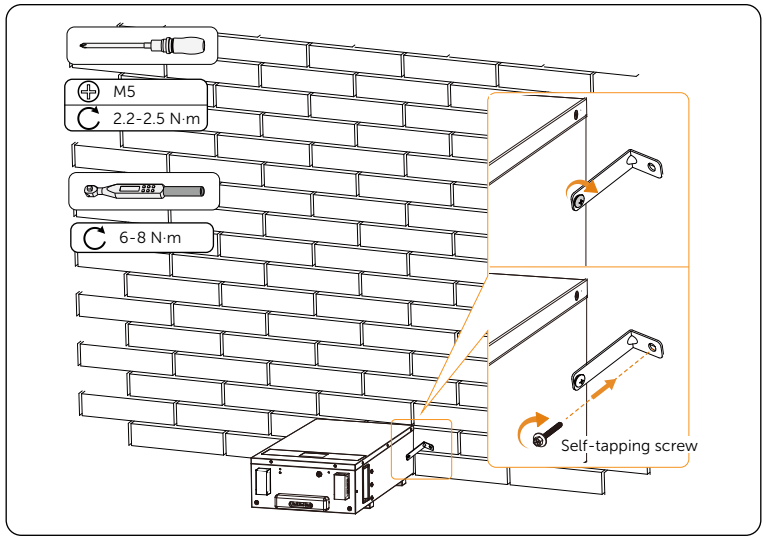


Figure 6-35 Tightening screws

Step 8: Insert and tighten M5 screw (× 8 pcs) to secure the battery stack bracket (Part A) (× 4 pcs) on the right side of the battery packs (Tightening torque: 2.2-2.5 N·m).

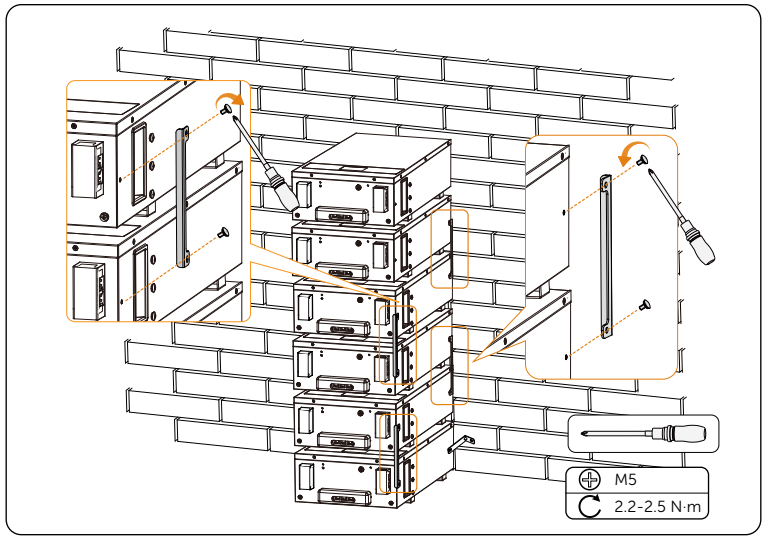


Figure 6-36 Securing stack bracket

Step 9: Insert and tighten M5 screw (× 8 pcs) to secure the battery stack bracket (× 4 pcs) on the left side of the battery packs (Tightening torque: 2.2-2.5 N·m).

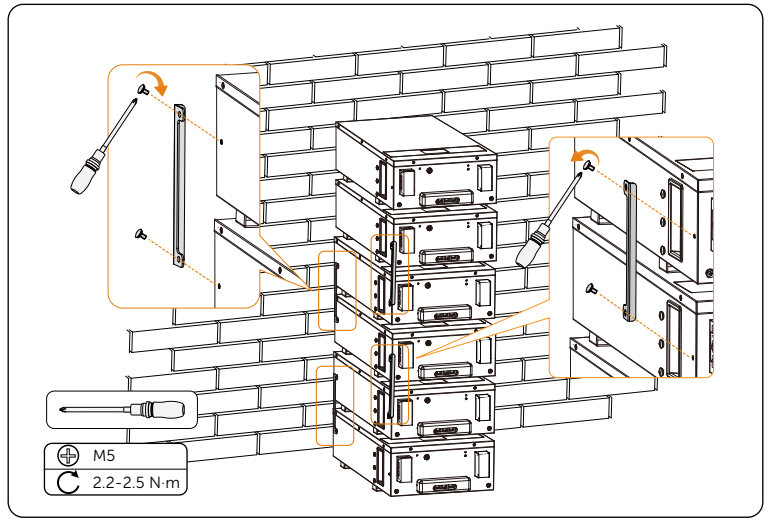


Figure 6-37 Securing stack bracket

Step 10: Secure the L-shaped bracket (× 1 pc) on the left side of the top battery pack with M5 screw (× 1 pc), but do not tighten fully.
Draw a circle along the inner ring of the L-shaped bracket.

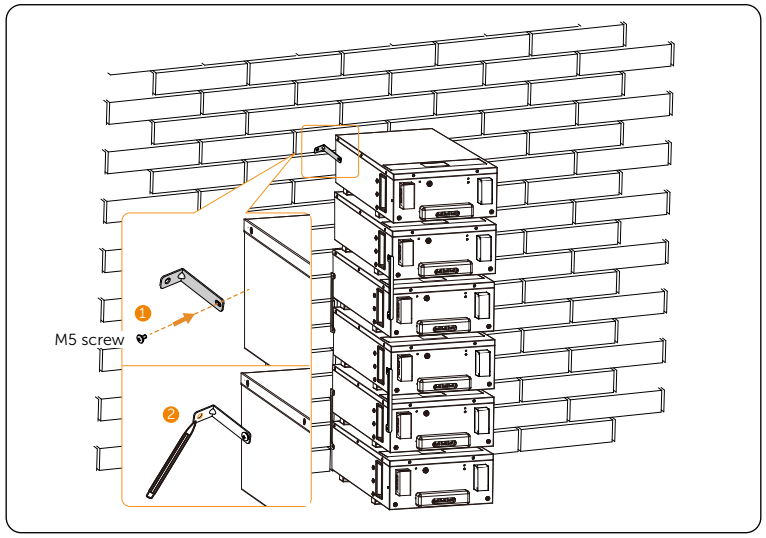


Figure 6-38 Drawing a circle

Step 11: Gently move the top battery pack aside. Then drill a hole at a depth of more than 60 mm in the concrete wall or solid brick wall by using a Drill (Ø 8 and 10 mm).

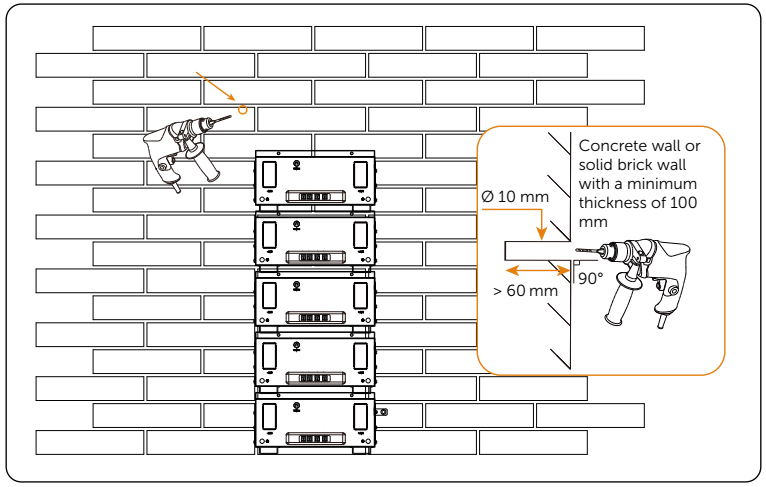


Figure 6-39 Drilling a hole

Step 12: Secure the L-shaped bracket (x 1 pc) and stack bracket (x 2 pcs) with M5 screw (x 4 pcs), but do not fully tighten.

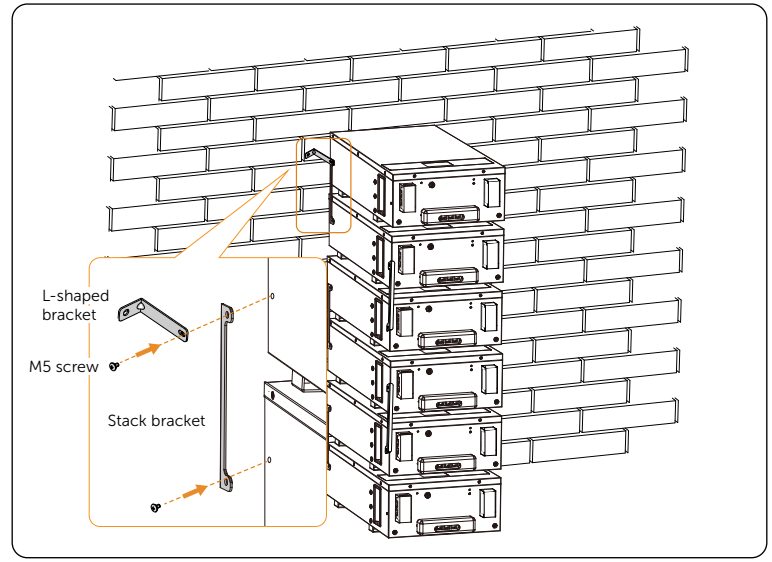


Figure 6-40 Securing brackets

Step 13: Insert the expansion bolt (Part H) (x 1 pc) with a rubber hammer into the hole drilled previously on the wall.
Insert and tighten self-tapping screw (Part I) (x 1 pc) to secure the L-shaped bracket (Tightening torque: 6-8 N·m).
Tighten M5 screw fully.

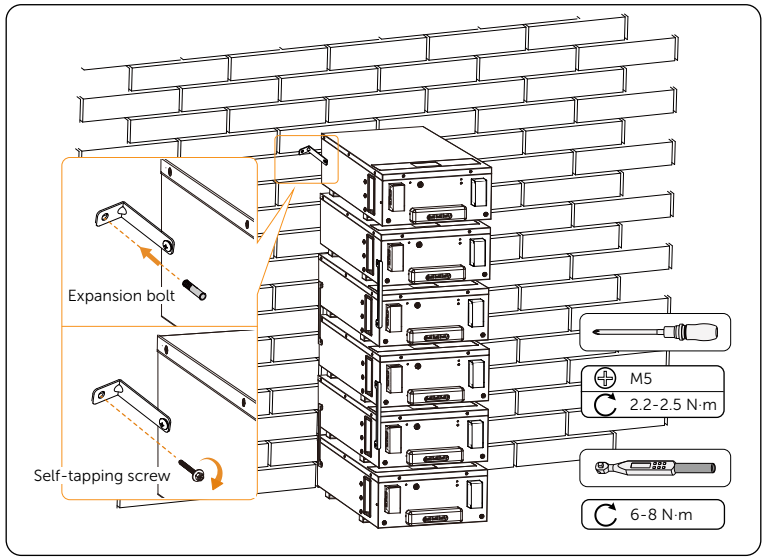


Figure 6-41 Tightening screws

Step 14: Finish stack mounting.

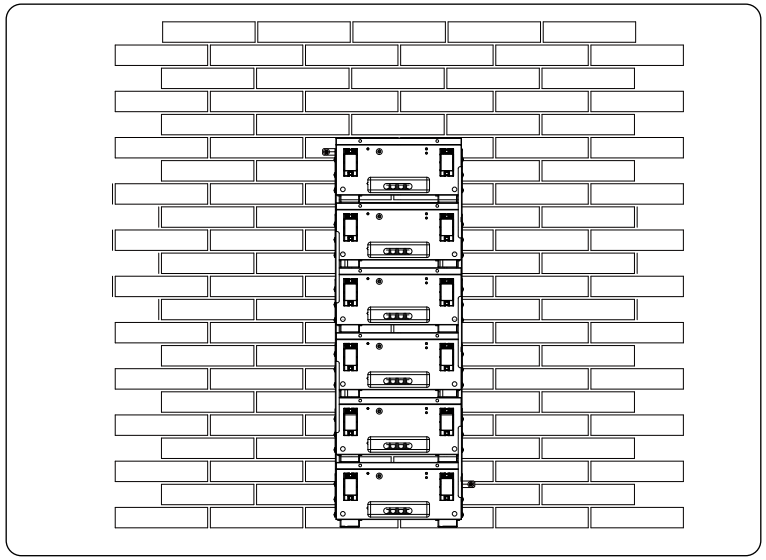


Figure 6-42 Finishing stack mounting

7 Electrical Wiring

CAUTION!

- It's important to give the cables a health check before connection.

DANGER!

- Failure to follow these instructions can result in death or serious injury.
- Make sure that the battery and inverter is shut down before wiring.

7.1 PE Connection

A PE cable should be connected between the master battery pack and inverter and between adjacent battery packs, the steps for making PE connection are shown as follows:

Step 1: Users can cut the PE cable into appropriate length based on the actual installation distance. And then strip the cable jacket about 12 to 15 mm from the end.

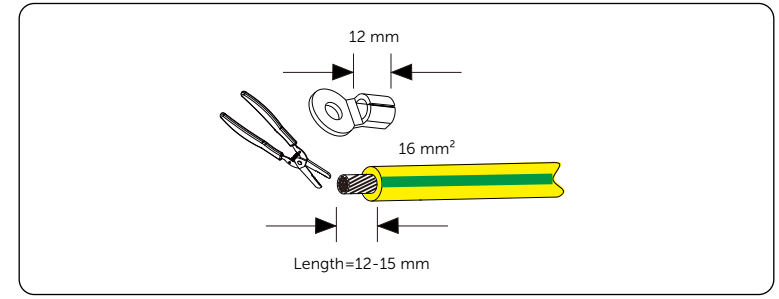


Figure 7-1 Striping cable jacket

NOTICE!

- It's necessary to use controlled motion to strip the insulation down the wire, to prevent damage to the wires.
- Make sure that the insulation layer has been stripped to a sufficient length so that the center conductor is fully exposed without any damage or nicks. In addition, make sure that no extra insulation remains beyond the connector once it's crimped on.

Step 2: Cut the heat-shrink tubing (Ø 8 mm) to about 28 to 30 mm length, carefully slide it onto the end of the cable, and then carefully slip the wires all the way into the ring terminal (for PE cable) (Part O) (2 pcs).

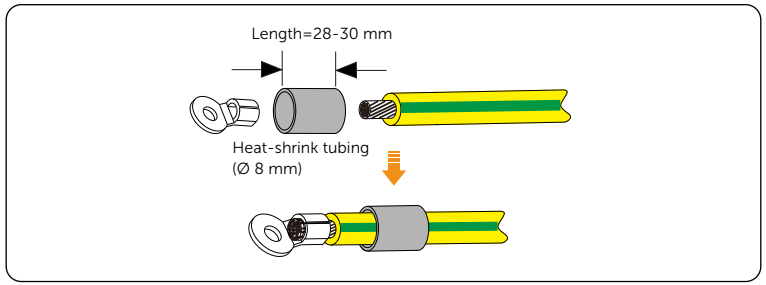


Figure 7-2 Cutting heat-shrink tubing

Step 3: Crimp the terminal, and heat the heat-shrink tubing after it wraps the end of terminal.

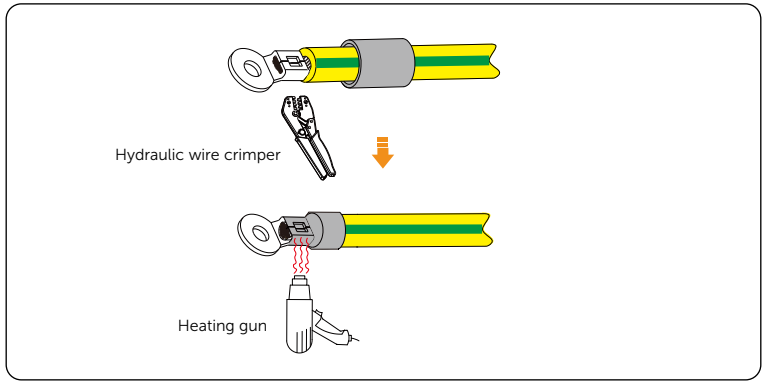


Figure 7-3 Crimping and heating

NOTICE!

- Do not place the conductor insulation into the terminal.
- Do not damage the conductor insulation while crimping.
- Move the heat gun back and forth slowly to distribute the heat evenly across the surface of heat shrink tubing.

Step 4: Unscrew the M5 screw, connect the assembled PE cable to the grounding port of the battery pack, and then tighten M5 screw. (Tightening torque: 2.2-2.5 N·m). There are two grounding ports (a and b), and users can choose one of them to connect PE cable.

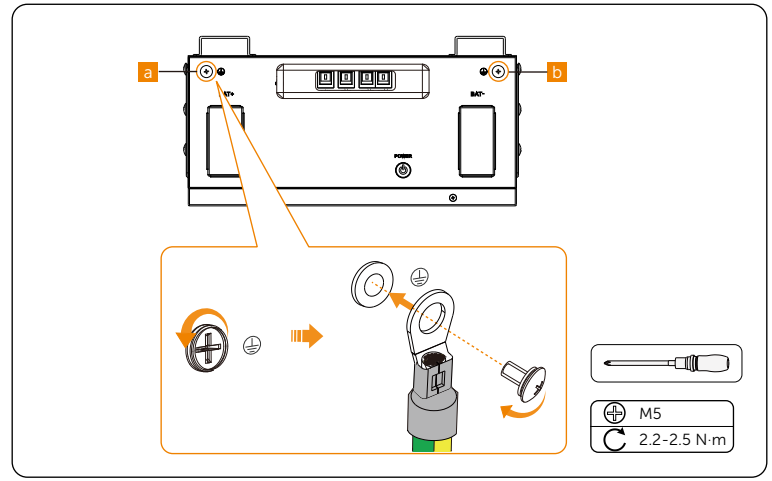


Figure 7-4 Connecting PE cable

Step 5: Connect PE cable between the master battery pack and inverter (Tightening torque: 2.2-2.5 N·m).

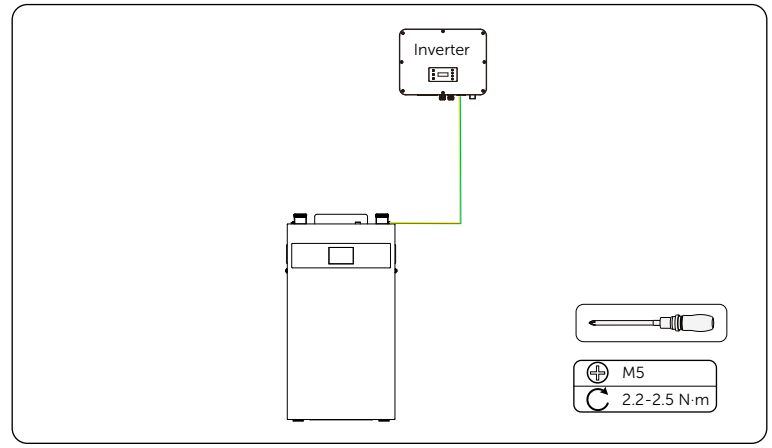


Figure 7-5 PE connection between the master battery pack and inverter

Step 6: If there are two or more battery packs, connect PE cable between adjacent battery packs (Tightening torque: 2.2-2.5 N·m).

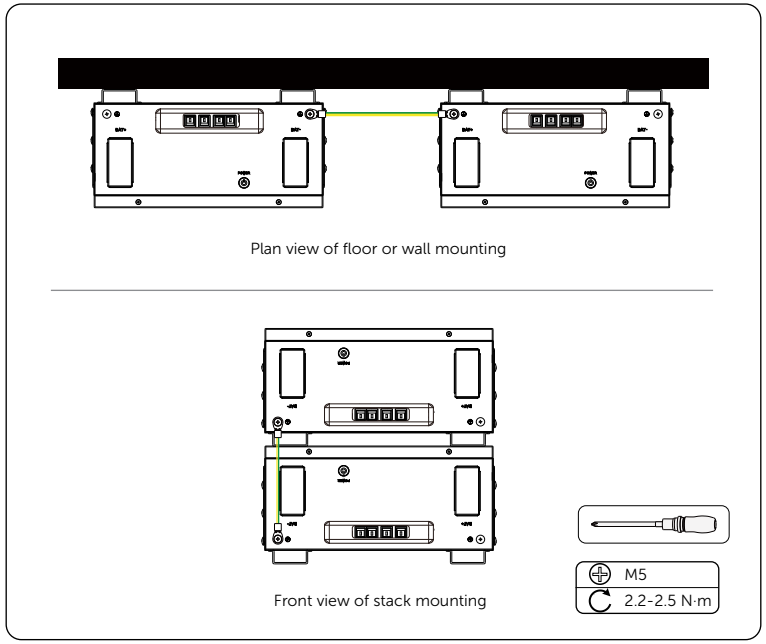


Figure 7-6 PE connection between adjacent battery packs

7.2 Ring Terminal Installation

Ring terminals are connectors for power cables. They are designed to connect the end of a power cable to a circuit point. To connect the power cable to the circuit point on the inverter, a ring terminal is required to be fit over the power cable.

A ring terminal has been installed at one end of power cables (Part L and M), and users need to install the ring terminal (for power cable) (Part N) on the other end of power cables.

NOTICE!

- The end of cables that will be connected to inverters are bare upon delivery with the battery, and need external connector for connecting inverters.
- The ring terminals are delivered with the accessories kit.

Step 1: Users can cut the power cable into appropriate length based on the actual installation distance. And then strip the cable jacket about 10 mm from the end.

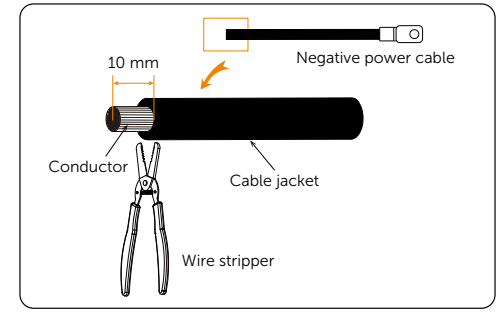


Figure 7-7 Stripping power cable

NOTICE!

- DO NOT damage the conductor while sliding the jacket off the power cable end.

Step 2: Cut the heat-shrinking tubing (Ø 8 mm) to about 15-20 mm long, slide it onto the end of the cable, and then lip the cable all the way into the ring terminal.

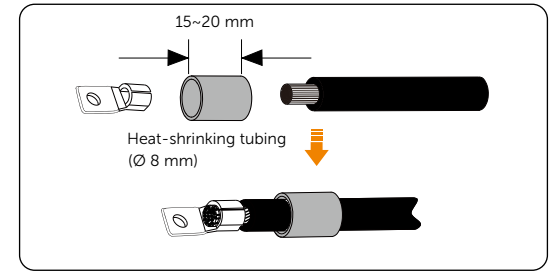


Figure 7-8 Cutting heat-shrinking tubing

Step 3: Crimp the terminal, and heat the heat-shrink tubing after it wraps the end of terminal.

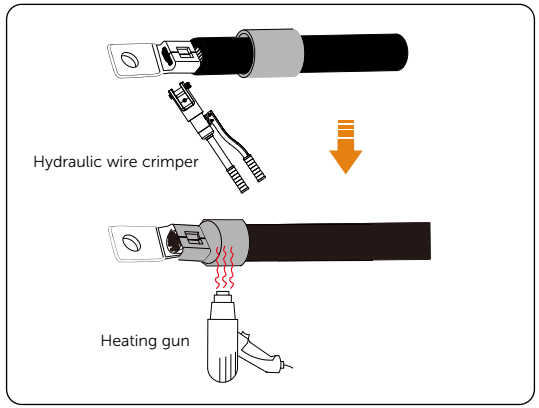


Figure 7-9 Crimping and heating terminal

NOTICE!

- Properly place the ring terminal into the hydraulic wire crimper.

Step 4: Make the positive power cable according to above steps.

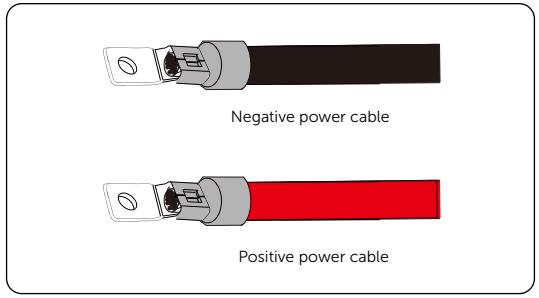


Figure 7-10 Making the positive cable

7.3 Communication Cable

Communication cable (Part K) is applicable for "BMS", "COM 1" and "COM 2" ports.

WARNING!

- Do not cut off the communication cable.

The pin assignment of "BMS", "COM 1" and "COM 2" ports is shown as follows:

Table 7-1 "BMS" port in assignment

PIN	1	2	3	4	5	6	7	8
BMS	RS485B	RS485A	GND	CAN-H	CAN-L	/	MASTER-IN	/

Table 7-2 "COM 1" port in assignment

PIN	1	2	3	4	5	6	7	8
COM1	Up out	GND	Wake up	CAN-H	CAN-L	Up in	/	GND

Table 7-3 "COM 2" port in assignment

PIN	1	2	3	4	5	6	7	8
COM2	Next in	GND	Wake up	CAN-H	CAN-L	Next out	/	GND

The wire sequence of one terminal connecting to the inverter is the same as the wire sequence of the other terminal, connecting to the battery pack.

The wire sequence is shown as follows:

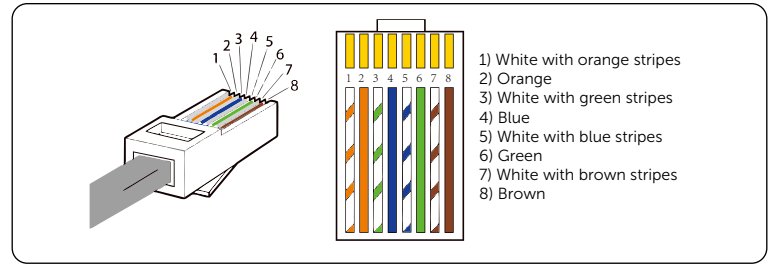


Figure 7-11 Wire sequence

7.4 Cable Connection

WARNING!

- Only the qualified personnel can perform the wiring.
- Follow this manual to wire connection. The device damage caused by incorrect cabling is not in the scope of warranty.
- Ensure that PE cable is connected correctly and securely before connecting other cables, otherwise it will cause personal injury or property damage.
- Use insulated tools and wear individual protective tools when connecting cables.

7.4.1 Cable Connection of One Battery Pack

Wiring of one battery pack (floor and wall mounting)

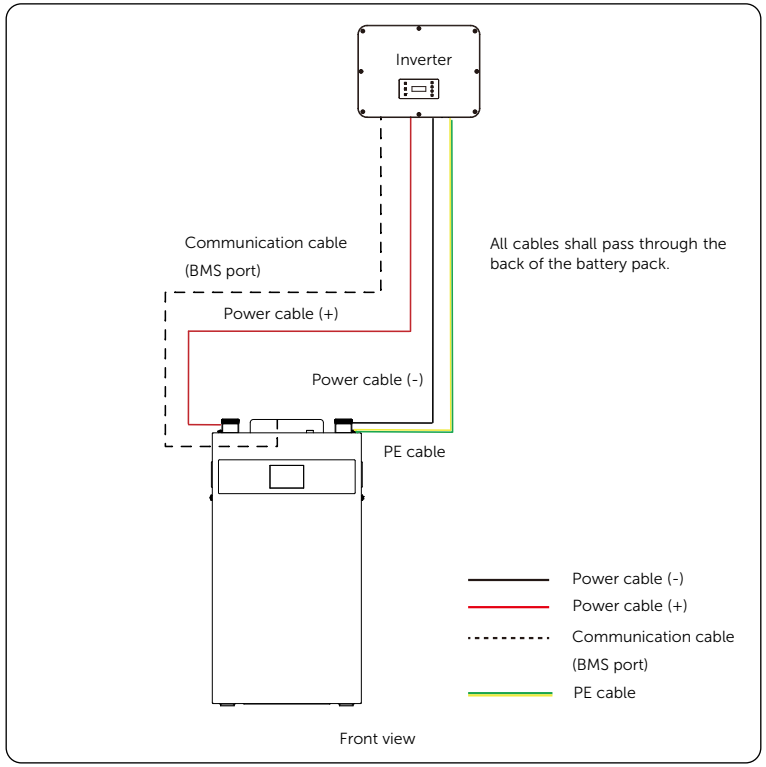


Figure 7-12 Wiring diagram (floor and wall mounting)

Table 7-4 Cable information

Cable		Length	Description
PE cable		/	"⏚" port of battery pack → "⏚" port of inverter or the next battery pack. Please refer to "4.3 Additionally Required Materials" for details.
Power cable (+)		1500 mm	"BAT+" port of battery pack → "BAT+" port of inverter or the next battery pack
Power cable (-)		1500 mm	"BAT-" port of battery pack → "BAT-" port of inverter or the next battery pack
Communication cable		1500 mm	"BMS" port of battery pack → "BMS" port of inverter "COM1/2" port of battery pack → "COM1/2" port of battery pack

Step 1: Press the top and bottom sides of the "BAT -" cover to remove it.
Unscrew M6 screw and insert negative power cable.
Insert and tighten M6 screw to secure negative power cable (Tightening torque: 5±0.5 N·m).
Press the cover to reinstall it (A clicking sound will be heard).

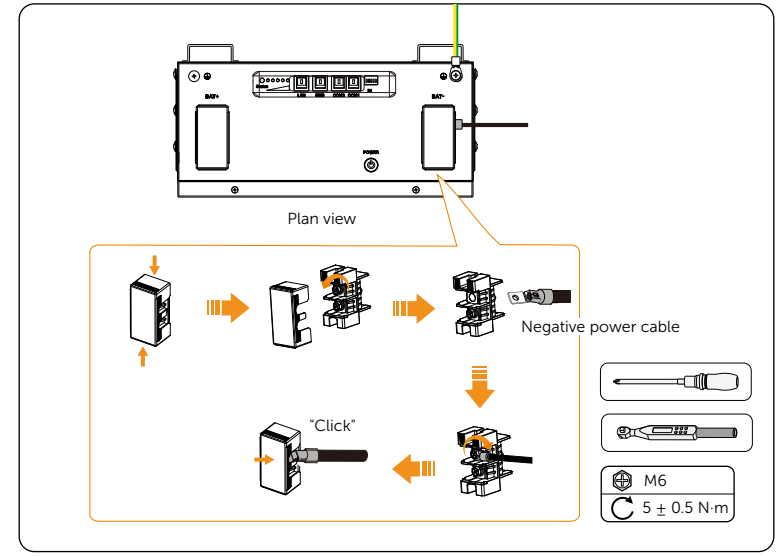


Figure 7-13 Connecting negative power cable

Step 2: Press the top and bottom sides of the "BAT +" cover to remove it.
Unscrew M6 screw and insert positive power cable.
Insert and tighten M6 screw to secure positive power cable (Tightening torque: 5±0.5 N·m).

Press the cover to reinstall it (A clicking sound will be heard).

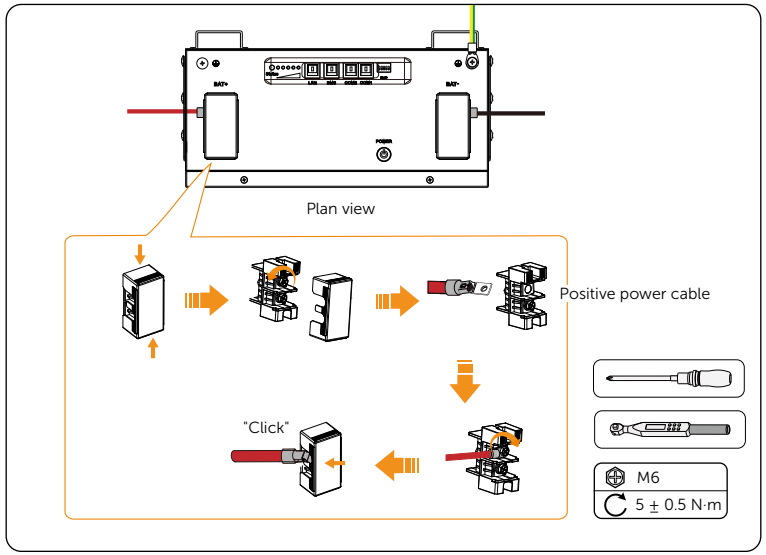


Figure 7-14 Connecting positive power cable

Step 3: Remove the cable cover (Part E) and waterproof cap on the "BMS" port.

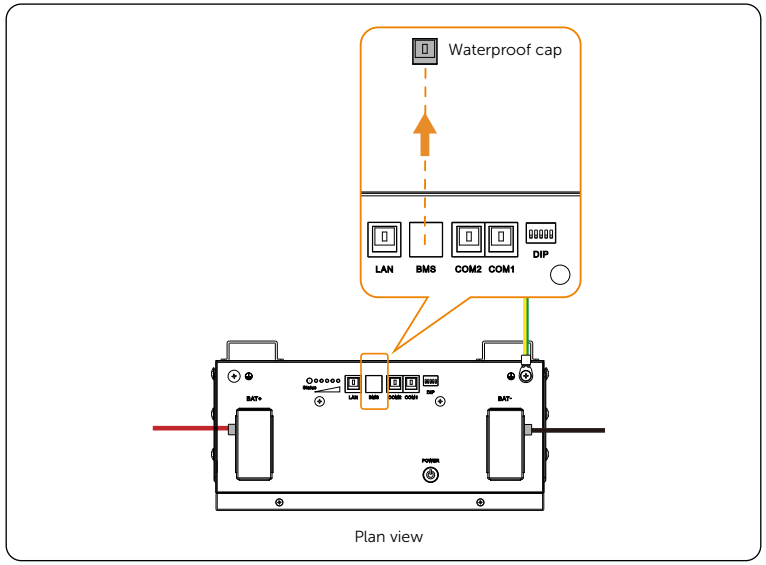


Figure 7-15 Removing waterproof cap

Step 4: Thread one end of the communication cable into the hole on the cable cover, and connect it to the "BMS" port.

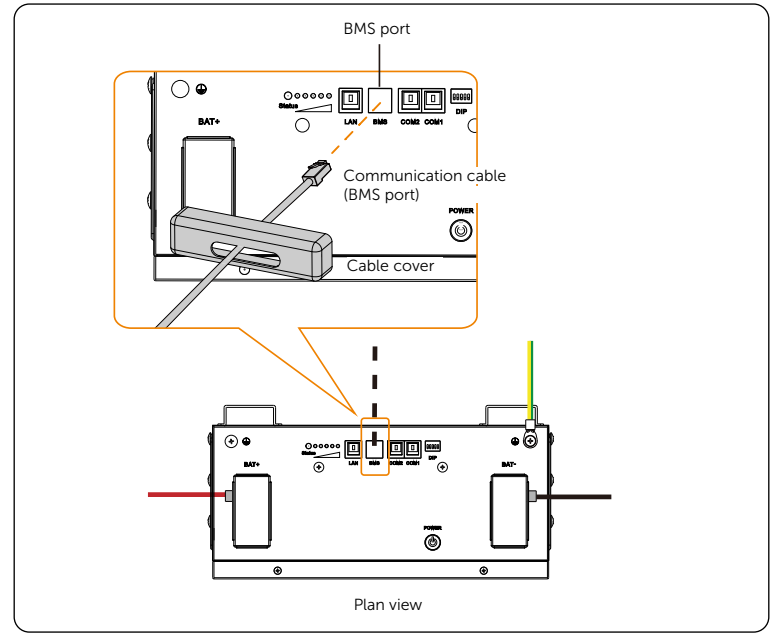


Figure 7-16 Connecting communication cable

Step 5: Secure the cable cover.

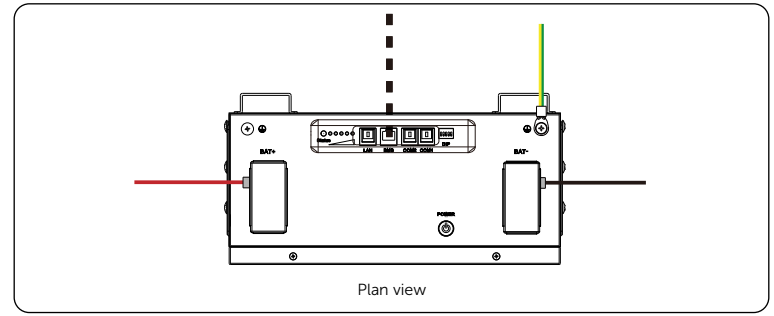


Figure 7-17 Securing the cable cover

Wiring of one battery pack (stack mounting)

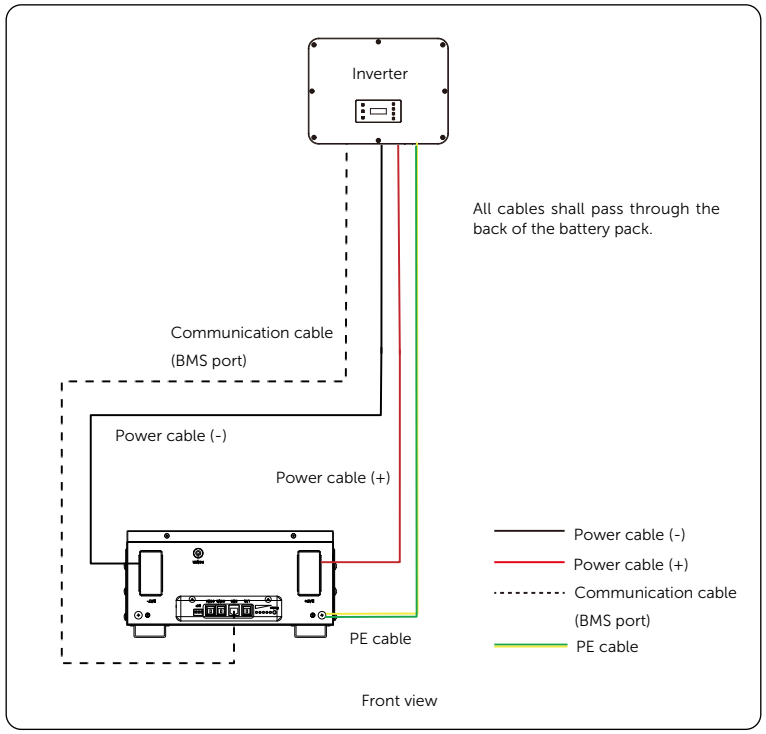


Figure 7-18 Wiring diagram (stack mounting)

Table 7-5 Cable information

Cable		Length	Description
PE cable		/	"⏚" port of battery pack → "⏚" port of inverter or the next battery pack. Please refer to "4.3 Additionally Required Materials" for details.
Power cable (+)		1500 mm	"BAT+" port of battery pack → "BAT+" port of inverter or the next battery pack
Power cable (-)		1500 mm	"BAT-" port of battery pack → "BAT-" port of inverter or the next battery pack
Communication cable		1500 mm	"BMS" port of battery pack → "BMS" port of inverter "COM1/2" port of battery pack → "COM1/2" port of battery pack

NOTICE!

- Wiring procedure of stack mounting is the same as floor and wall mounting. For details, please refer to "Wiring of one battery pack (floor and wall mounting)".

7.4.2 Cable Connection of Two or More Battery Packs

Wiring of two or more battery packs (floor and wall mounting)

NOTICE!

- Here takes the cable connection of two battery packs as an example. If there are more battery packs need to be installed, connect negative, positive and communication cables between adjacent battery packs according to below steps.

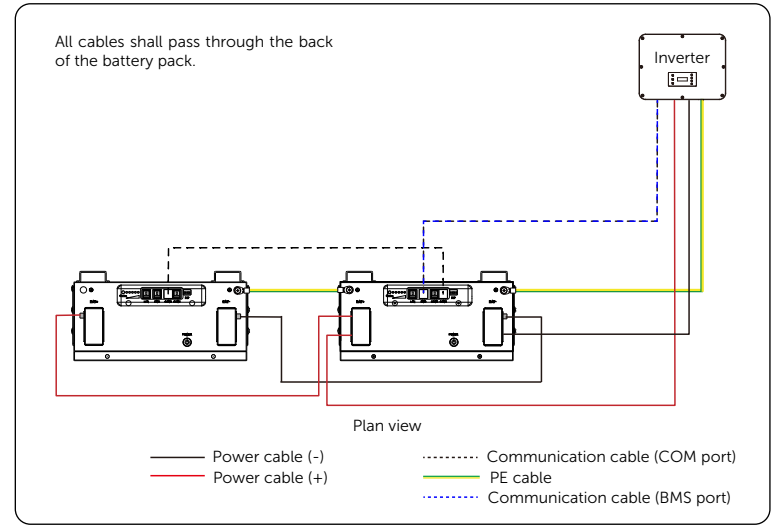


Figure 7-19 Wiring diagram (floor and wall mounting)

Table 7-6 Cable information

Cable	Length	Description
PE cable	/	"⏚" port of battery pack → "⏚" port of inverter or the next battery pack. Please refer to "4.3 Additionally Required Materials" for details.
Power cable (+)	1500 mm	"BAT+" port of battery pack → "BAT+" port of inverter or the next battery pack
Power cable (-)	1500 mm	"BAT-" port of battery pack → "BAT-" port of inverter or the next battery pack
Communication cable	1500 mm	"BMS" port of battery pack → "BMS" port of inverter "COM1/2" port of battery pack → "COM1/2" port of battery pack

Step 1: Press the top and bottom sides of the "BAT -" cover to remove it.
Unscrew M6 screw and insert negative power cable.
Insert and tighten M6 screw to secure negative power cable (Tightening torque: 5±0.5 N·m).
Press the cover to reinstall it (A clicking sound will be heard).

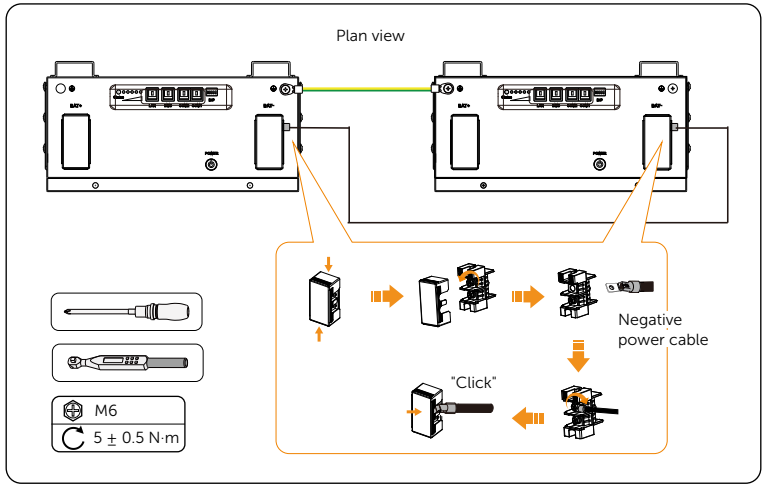


Figure 7-20 Connecting negative power cable

Step 2: Press the top and bottom sides of the "BAT +" cover to remove it.
Unscrew M6 screw and insert positive power cable.
Insert and tighten M6 screw to secure positive power cable (Tightening torque: 5±0.5 N·m).
Press the cover to reinstall it (A clicking sound will be heard).

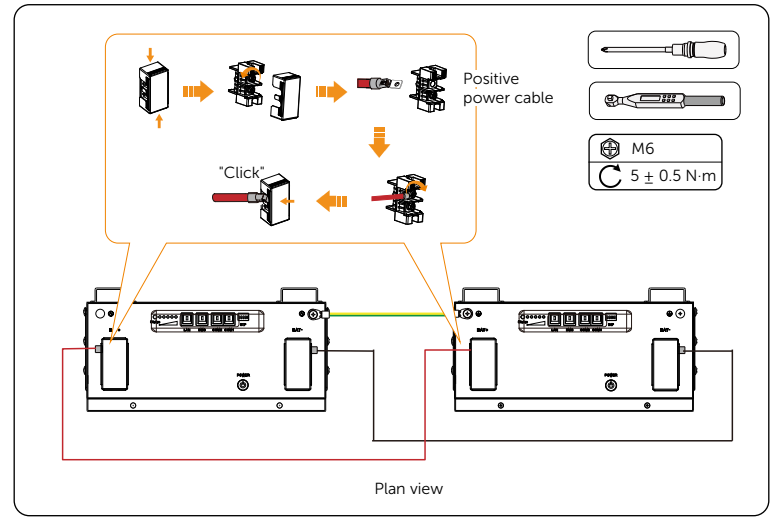


Figure 7-21 Connecting positive power cable

NOTICE!

- Regarding the power cable connection between the master battery pack (that connects to the inverter) and inverter, please refer to Step 1 and Step 2.

Step 3: Remove the cable cover (Part E) and waterproof caps on the "COM 2" port of the left battery pack and the "COM 1" port of the right battery pack.

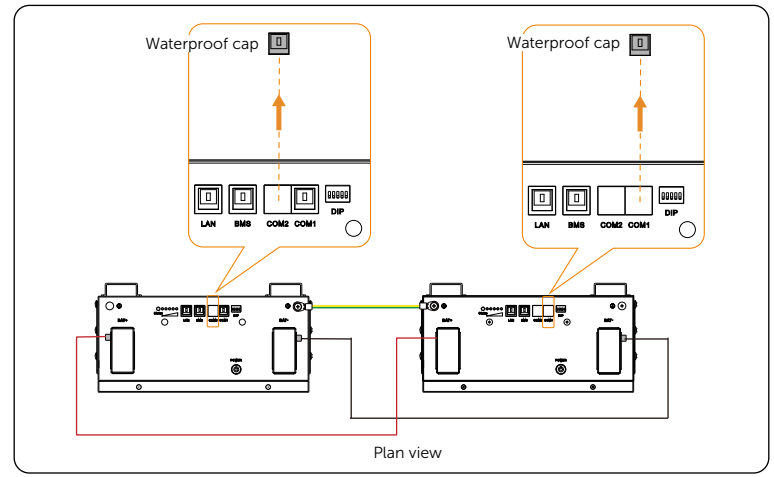


Figure 7-22 Removing waterproof caps

Step 4: To the left battery pack, thread one end of the communication cable into the hole on the cable cover, and connect it to the "COM 2" port.

To the right battery pack, thread the other end of the communication cable into the hole on the cable cover, and connect it to the "COM 1" port.

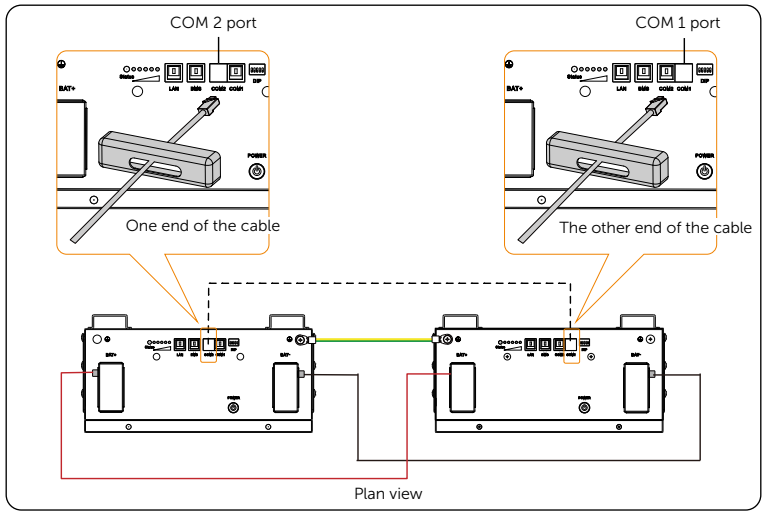


Figure 7-23 Connecting communication cable

Step 5: To the master battery pack that connects to the inverter, remove the waterproof cap on the "BMS" port. And thread one end of the communication cable into the hole on the cable cover, and connect it to the "BMS" port.

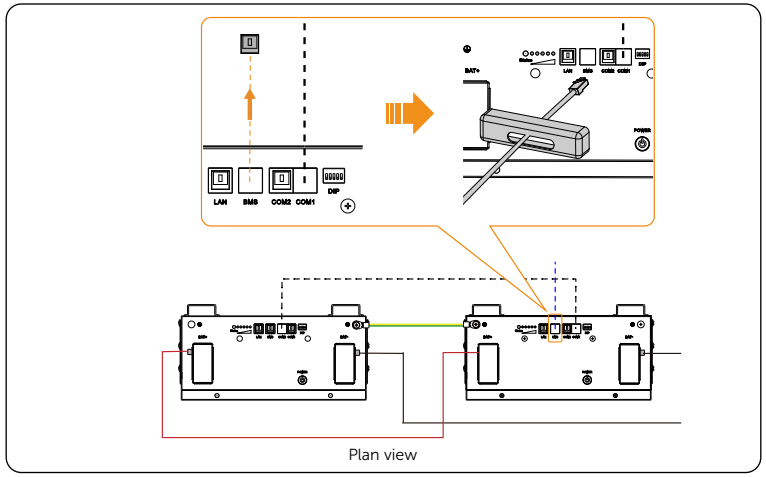


Figure 7-24 Connecting communication cable

Step 6: Secure all cable covers.

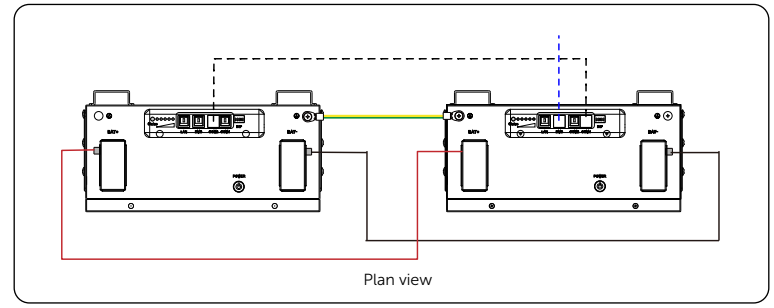


Figure 7-25 Securing cable covers

Wiring of two or more battery packs (stack mounting)

NOTICE!

- Up to six battery packs can be stacked in one tower.
- Here takes the cable connection of six battery packs in one tower as an example.

WARNING!

- **Please confirm that the DIP switches 1~4 must stay in the "OFF" position before wiring, otherwise it will cause personal injury**. The DIP switches 1~4 will be slid to the "OFF" position and the DIP switch 5 will be slid to the "ON" position in the factory settings. For more details about the DIP switch, please refer to "2.6 DIP Switch".

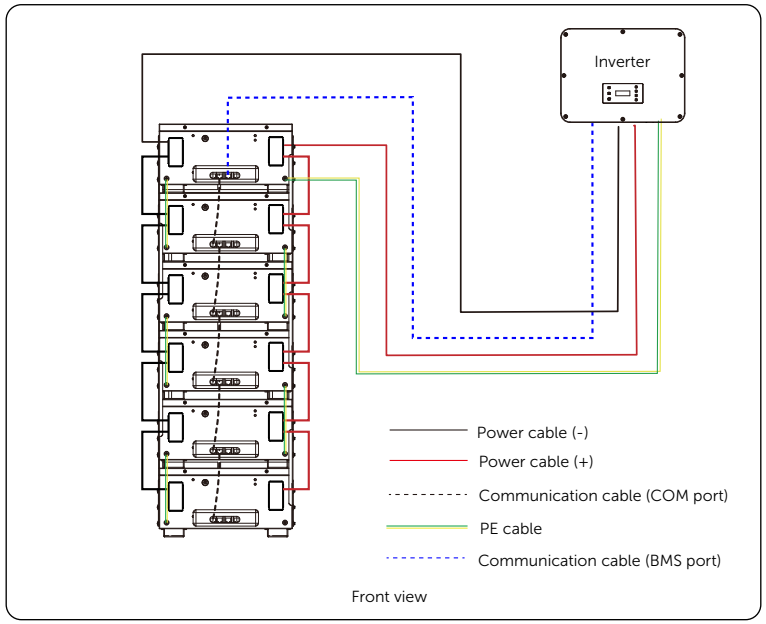


Figure 7-26 Wiring diagram (stack mounting)

Table 7-7 Cable information

Cable		Length	Description
PE cable		/	"⏚" port of battery pack → "⏚" port of inverter or the next battery pack. Please refer to "4.3 Additionally Required Materials" for details.
Power cable (+)		1500 mm	"BAT+" port of battery pack → "BAT+" port of inverter or the next battery pack
Power cable (-)		1500 mm	"BAT-" port of battery pack → "BAT-" port of inverter or the next battery pack
Communication cable		1500 mm	"BMS" port of battery pack → "BMS" port of inverter "COM1/2" port of battery pack → "COM1/2" port of battery pack

Step 1: To the lower battery pack, press the top and bottom sides of the "BAT -" cover to remove it.
Unscrew the upper M6 screw and insert one end of negative power cable.
Insert and tighten M6 screw to secure negative power cable (Tightening torque: 5±0.5 N·m).

Step 2: To the upper battery pack (except for the top battery pack), press the top and bottom sides of the "BAT -" cover to remove it.
Unscrew the lower M6 screw and insert another end of negative power cable.
Insert and tighten M6 screw to secure negative power cable (Tightening torque: 5±0.5 N·m).

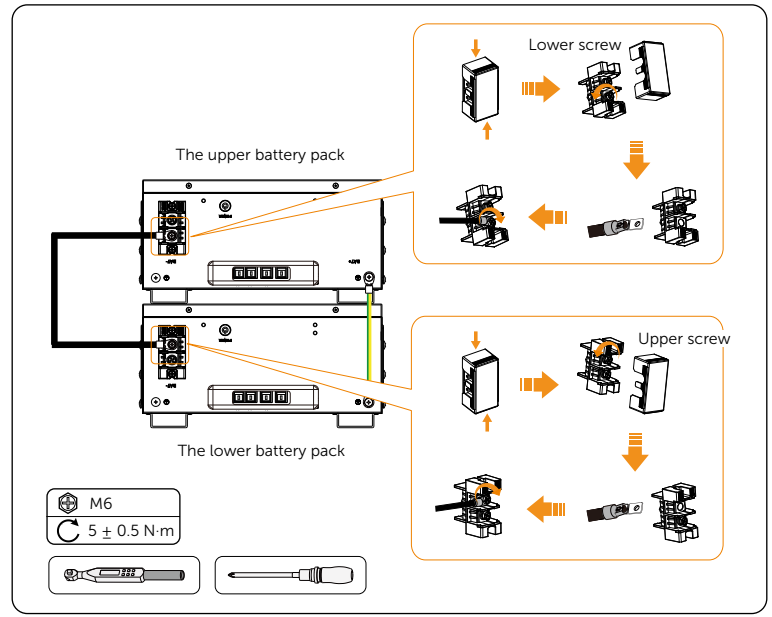


Figure 7-27 Connecting negative power cable

Step 3: Connect positive power cable between adjacent battery packs according to Step 1 - Step 2.

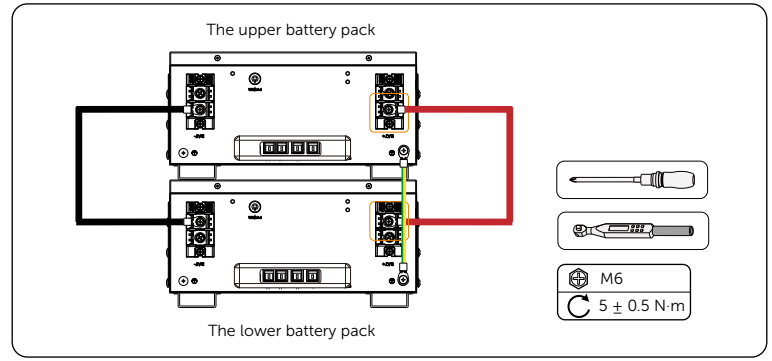


Figure 7-28 Connecting positive power cable

NOTICE!

- Regarding the power cable connection between the master battery pack (that connects to the inverter) and inverter, please refer to Step 1 and Step 2.

Step 4: Remove the cable covers (Part E) and waterproof caps on the "COM 2" port of the upper battery pack and the "COM 1" port of the lower battery pack.

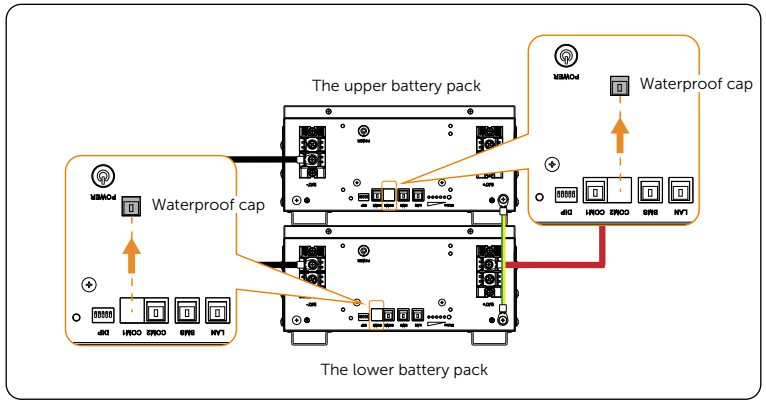


Figure 7-29 Removing waterproof caps

Step 5: To the lower battery pack, thread one end of the communication cable into the hole on the cable cover (Part E), and connect it to the "COM 1" port.

To the upper battery pack, thread the other end of the communication cable into the hole on the cable cover, and connect it to the "COM 2".

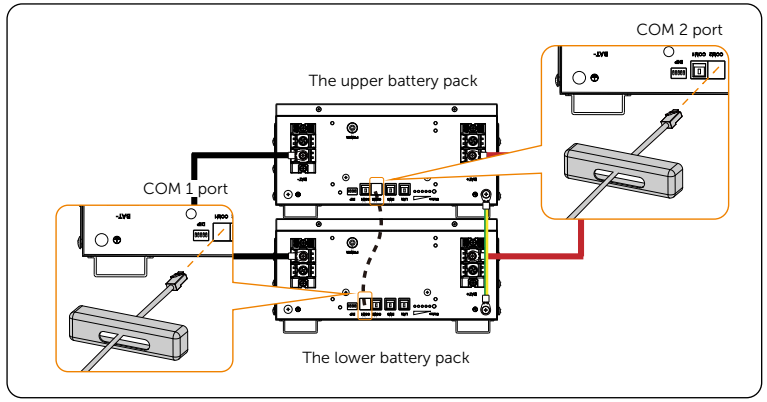


Figure 7-30 Connecting communication cable

NOTICE!

- If there are more battery packs need to be installed, connect negative, positive and communication cables between adjacent battery packs according to above steps.

Step 6: To the master battery pack that connects to the inverter, remove the waterproof cap on the "BMS" port. And thread one end of the communication cable into the hole on the cable cover, and connect it to the "BMS" port.

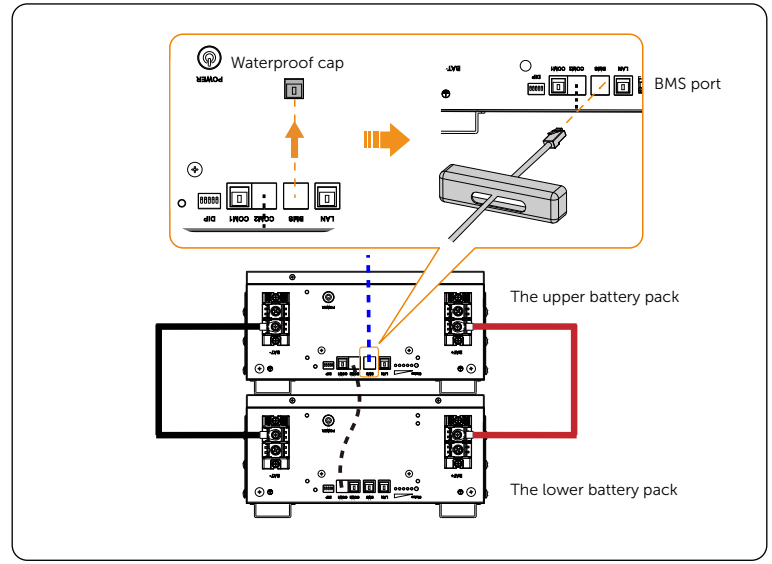


Figure 7-31 Connecting communication cable

Step 7: Reinstall cable covers.

Press down on covers of "BAT -" and "BAT +"port of all battery packs to reinstall them (A clicking sound will be heard).

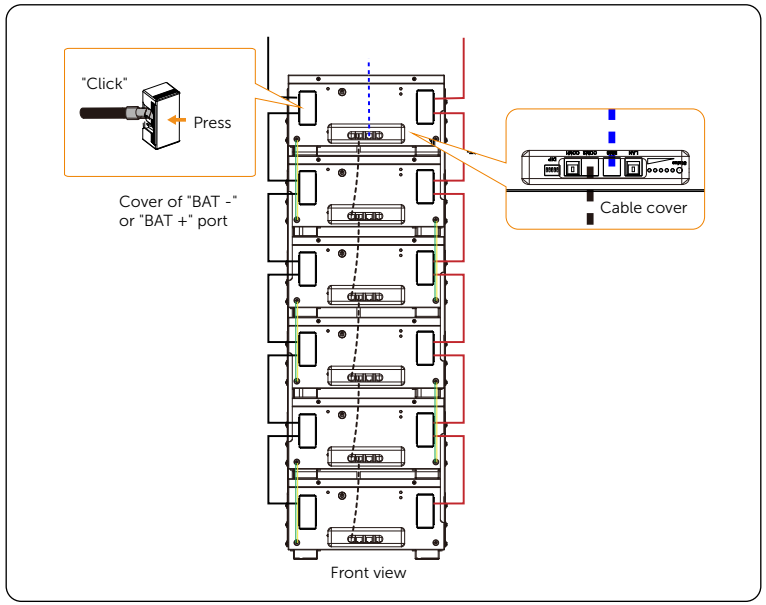


Figure 7-32 Securing covers

8 System Commissioning

DANGER!

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

8.1 Checking before Power-on

- Check whether the device is installed correctly and securely;
- Make sure that the "POWER" button is OFF;
- All cables are connected correctly and securely;
- All unconnected port are covered;
- The installation space is proper, and the installation environment is clean and tidy.

8.2 Power-on/Power-off the System

Power-on

Step 1: Regarding the first start, press and hold the "POWER" button on the battery pack that connects to the inverter for 5 seconds until the LED lights appear.
Regarding the second start, press the "POWER" button on the battery pack that connects to the inverter for less than 3 seconds until the LED lights appear.

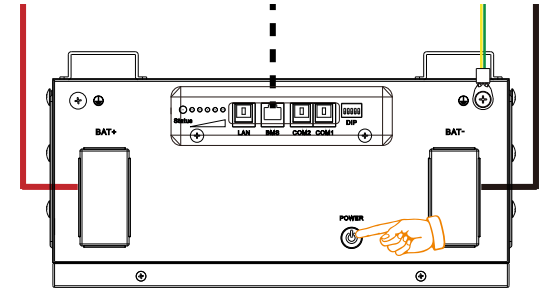


Figure 8-1 Power-on/power-off the system

Power-off

Step 1: Press and hold the "POWER" button on the battery pack that connects to the inverter until the LED lights go out.

DANGER!

- Ensure the inverter is shut down before powering off the battery.
- After the battery pack powers off, there will still be the remaining electricity and heat which may cause electric shocks and body burns. Please wear personal protective equipment (PPE) and begin servicing the battery five minutes after power off.

NOTICE!

- A system problem may be encountered while pressing the button frequently. The user may need to wait at least 10 seconds and then try again.

NOTICE!

- **Regarding the first start, after pressing and holding the "POWER" button on the battery pack that connects to the inverter for 5 seconds, the battery system will assign each battery pack in a communication loop a unique address (battery number).** In the meantime, the SOC power indicators will remain on **solid yellow** based on the battery packs' actual battery capacity. After 5 seconds, the status light will **flash yellow**, and at the same time, release the button. In the meantime, the unique address (battery number) will be assigned. The status light will turn to **flash green** or **solid green** after finishing the address assignment. Then the user can press the button to shut down the system.
- **Regarding the second start, after pressing the "POWER" button on the battery pack that connects to the inverter for less than 3 seconds**, the status light remains on **solid yellow** and then turns to **solid green**. In the meantime, the SOC power indicators remain on **solid yellow** based on the battery packs' actual battery capacity. At this point, release the button.
- **In the event that the user wishes to increase or reduce the battery packs,** the system must be turned off. After completing the capacity expansion or reduction, press and hold the "POWER" button for more than 5 seconds to reassign each battery pack in communication loop a unique address.
- **In the event that the inverter purchased by the user is one of the models specified in *PYLON CANBUS Protocol*,** the user must continuously press the "POWER" button 3 times within 10 seconds to power on the battery. After a successful power-on,
  a. If the battery is running properly, it will be charging all the time.
  b. If there is any fault, the battery will power off first and then automatically power on again after such a fault has been resolved.
- A system problem may be encountered while pressing the button frequently. The user may need to wait at least 10 seconds and then try again.

9 Operation on SolaX App and Web

9.1 Introduction of SolaXCloud

SolaxCloud is an intelligent management platform for home energy, which integrates energy efficiency monitoring, device management, data security communication and other integrated capabilities. While managing your home energy device, it helps you optimize the efficiency of electricity consumption and improve the revenue of power generation.

NOTICE!

- Users can scan the SN code on the performance label to check more device information. If the scan fails, they can manually input the SN number for checking.

9.2 Operation Guide on SolaXCloud App

9.2.1 Downloading and Installing App

Method 1: Scan the QR code below to download the App.

The QR codes are also available on the login page of our official website (www.solaxcloud.com), and the installation guide of the dongle.

Figure 9-1 QR code

Method 2: Search for **SolaXCloud** in Apple Store App or Google Play, and then download the App.

9.2.2 Operation on the SolaXCloud App

For instructions on the related operations, see the online documents on the SolaXCloud App.

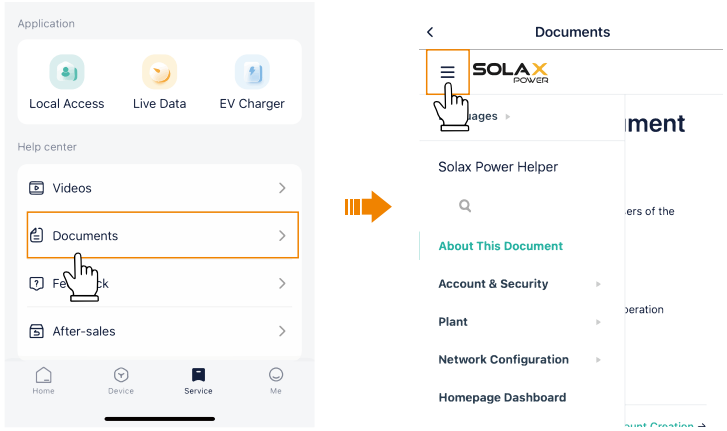


Figure 9-2 Online help on SolaXCloud

NOTICE!

- The screen shots in this chapter correspond to the SolaXCloud App V6.2.0, which might change with version update and should be subject to the actual situations.

9.3 Operations on SolaXCloud Web Page

Open a browser and enter www.solaxcloud.com to complete registration, login, add site and other related operations according to the guide.

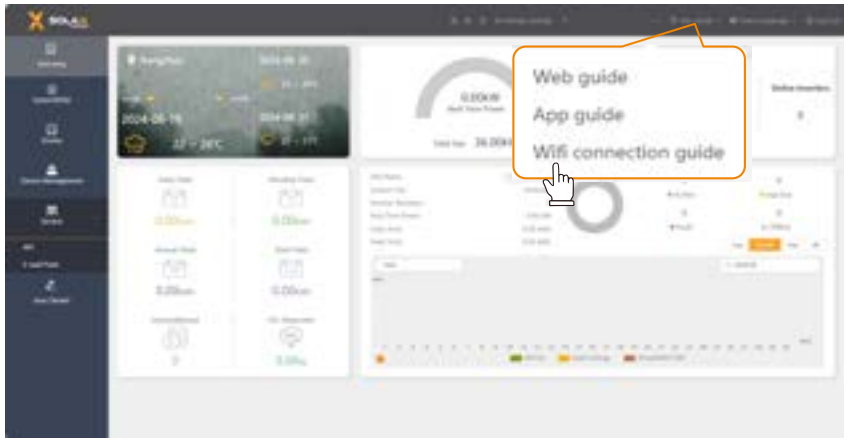


Figure 9-3 Guide on web page

10 Troubleshooting and Maintenance

10.1 Maintenance

Regular maintenance is required for the device. More frequent maintenance service is needed in the worse work environment. Please make records of the maintenance.

WARNING!

- Only qualified person can perform the maintenance for the device.
- Wear PPE before conducting maintenance.

CAUTION!

- The system must be powered off before conducting maintenance works, for instance, system cleaning, electrical connections, PE cable checks.

10.2 Troubleshooting

This section lists the possible problems with the device, and provides information and procedures for identifying and resolving them. In case of any errors, users can:

- Check for the warnings or error messages through the inverter; or
- Contact the company's after-sales personnel to solve it.

For further assistance, contact SolaX Customer Service. Please provide the model and SN of the device, and be prepared to describe the system installation details.

Table 10-1 Troubleshooting information

Fault	Description	Diagnosis & Solution
BMS_CELL_ OVER_FAULT	Battery cell overvoltage fault	Battery (cell) overvoltage: • Restart the BMS. • Contact the after-sales personnel of our company.

Fault	Description	Diagnosis & Solution
BMS_CELL_LOW_FAULT	Battery cell undervoltage fault	Battery (cell) undervoltage: • Make sure that the inverter is connected to the grid and that there is successful communication between the battery and inverter to ensure that the battery is charged. • Contact the after-sales personnel of our company.
BMS_CELL_DIFF_FAULT	The pressure difference between cells in the battery is too large.	The pressure difference between cells in the battery is too large: • Restart the BMS. • Contact the after-sales personnel of our company.
BMS_HVB_OVER_FAULT	Total voltage overvoltage fault	Total voltage overvoltage: • Restart the BMS. • Contact the after-sales personnel of our company.
BMS_HVB_LOW_FAULT	Total voltage undervoltage fault	Total voltage undervoltage: • Make sure that the inverter is connected to the grid and that there is successful communication between the battery and inverter to ensure that the battery is charged. • Contact the after-sales personnel of our company.
BMS_TEMP_OVER_FAULT	High temperature of the BMS	The temperature of the BMS is too high: • Cool down the BMS to normal temperature, and then restart it. • Contact the after-sales personnel of our company.
BMS_TEMP_LOW_FAULT	Low temperature of the BMS	The temperature of the BMS is too low: • Warm up the BMS to normal temperature, and then restart it. • Contact the after-sales personnel of our company.
BMS_SELF_CHECK_FAULT	Self-check fault of the BMS	Self-test fault of the BMS: • Restart the BMS. • Contact the after-sales personnel of our company.

Fault	Description	Diagnosis & Solution
BMS_PRECHG_FAIL_FAULT	BMS precharge failure fault	External short circuit of the BMS: • Check the external connection and restart the BMS. • Contact the after-sales personnel of our company.
BMS_TEMP_SAMPLE_FAULT	Temperature sampling anomaly	Temperature sampling anomaly: • Restart the BMS. • Contact the after-sales personnel of our company.
BMS_SYS_FAULT	Slave control of abnormal current exists in the system	Slave control of abnormal current exists in the system: • Restart the BMS. • Contact the after-sales personnel of our company.
BMS_DSG_OVER_FAULT	Overcurrent discharging of BMS	Discharge overcurrent of BMS: • Restart the BMS. • Contact the after-sales personnel of our company.
BMS_CHG_OVER_FAULT	Overcurrent charging of BMS	Overcurrent charging of BMS: • Restart the BMS. • Contact the after-sales personnel of our company.
BMS_AFE_COM_FAULT	AFE communication fault	AFE communication loss: • Contact the after-sales personnel of our company.
BMS_MID_COM_FAULT	The communication between the master and slave is abnormal.	The communication between the master and slave is abnormal: • Restart the BMS. • Contact the after-sales personnel of our company.
BMS_VOLT_SENSOR_FAULT	Voltage sensor fault	Voltage sampling fault of the BMS: • Restart the BMS. • Contact the after-sales personnel of our company.
BMS_ID_REPEAT_FAULT	The slave controller with the same number exists in the system.	The slave controller with the same number exists in the system: • Restart "Black Start". • Contact the after-sales personnel of our company.

Fault	Description	Diagnosis & Solution
BMS_CURR_ SENSOR_FAULT	Current sensor fault	Current sampling fault of the BMS: • Restart the BMS. • Contact the after-sales personnel of our company.
BMS_LINE_ FAULT	The power cablen is not properly plugged in.	Improper connection of the power cable: • Rewire the power cables. • Contact the after-sales personnel of our company.
BMS_FLASH_ FAULT	Flash fault	Flash fault: • Contact the after-sales personnel of our company.
BMS_AFE_ PROTECT_FAULT	AFE self-protection failure	AFE self-protection failure: • Contact the after-sales personnel of our company.
BMS_CHG_REQ_ FAULT	Charging request not responded	Inverter does not respond the charging request. • Restart the BMS or the inverter. • Contact the after-sales personnel of our company.
MOS_ OVERTEMP_ FAULT	High temperature of MOS	The temperature of the MOS is too high: • Cool down the MOS to normal temperature, and then restart it. • Contact the after-sales personnel of our company.

11 Decommissioning

11.1 Disassembly of Cables

DANGER!

- Before unplugging the cables, ensure that your hands are dry and free from moisture. This will help prevent electrical shock and ensure a secure grip on the plug.
- When disassembling the battery, strictly follow the steps as below.
- Ensure the inverter is shut down before decommissioning the battery.

WARNING!

- Only the qualified personnel can perform disassembly of cables.
- To avoid electric shocks, use insulated tools and wear individual protective tools when disassembly of cables.
- Ensure the inverter has been shut down before disassembling cables.

Step 1: Press the "POWER" button to shut down the system before unplugging.

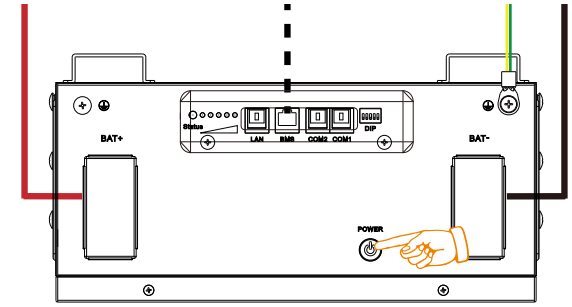


Figure 11-1 Pressing the "POWER" button

Step 2: Press the top and bottom sides of the "BAT -" cover to remove it.
Unscrew M6 screw and unplug negative power cable.
Secure M6 screw again and press the cover to reinstall it (A clicking sound will be heard) (Tightening torque: 5±0.5 N·m).

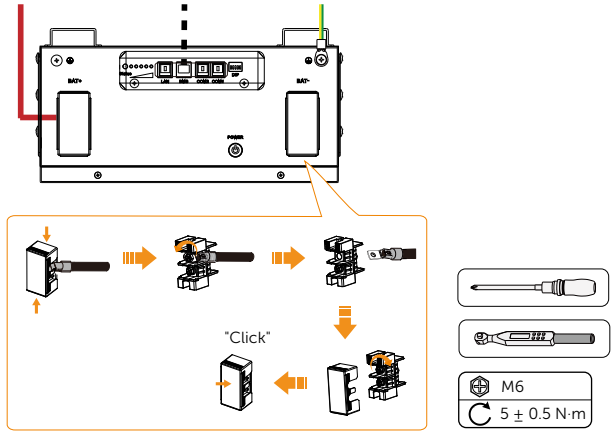


Figure 11-2 Unplugging negative power cable

Step 3: Prress the top and bottom sides of the "BAT +" cover to remove it.
Unscrew M6 screw and unplug positive power cable.
Secure M6 screw again and press the cover to reinstall it (A clicking sound will be heard) (Tightening torque: 5±0.5 N·m).

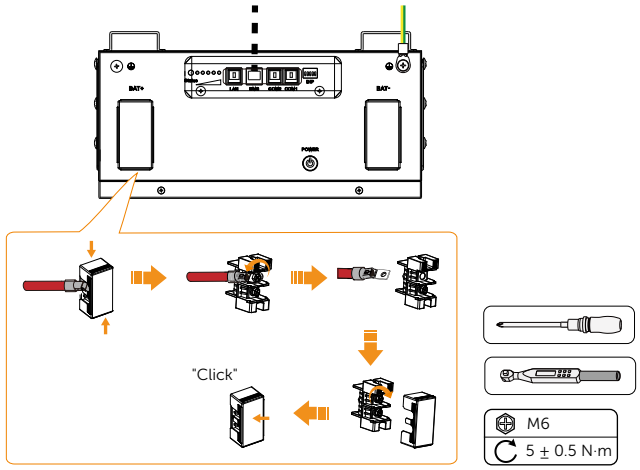


Figure 11-3 Unplugging positive power cable

Step 4: Remove the cable cover.
Unplug the communication cable from "BMS", "COM 1" and "COM 2" ports.
Insert waterproof caps into "BMS", "COM 1" and "COM 2" ports.

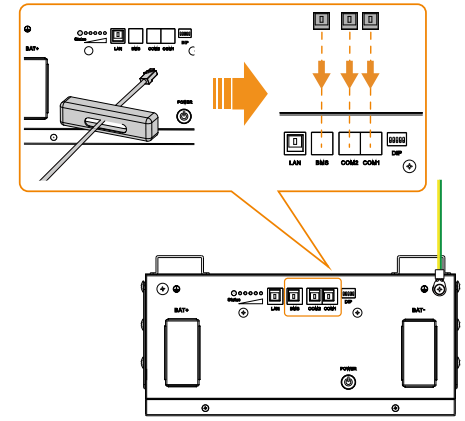


Figure 11-4 Unplugging communication cable

Step 5: Unscrew the M5 screw and unplug PE cable.
Secure and tighten M5 screw (Tightening torque: 2.2-2.5 N·m).

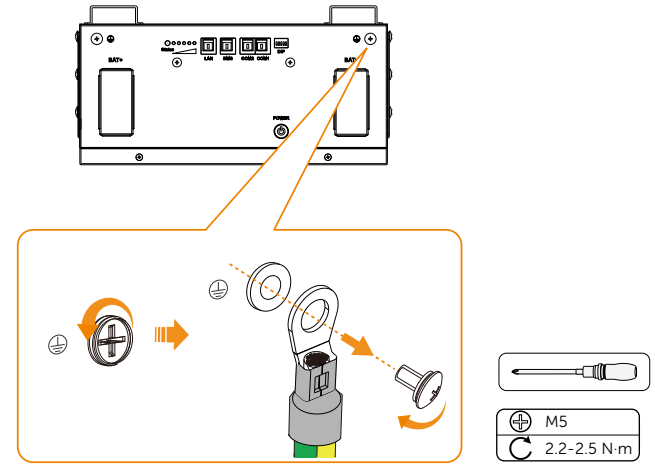


Figure 11-5 Unplugging PE cable

11.2 Packing

- Load the battery pack into the original packing material if possible.
- If the original packing material is not available, you can also use the packing material which meets the following requirements:
  - » Suitable for the weight of product;
  - » Easy to carry;
  - » Be capable of being closed completely.

11.3 Disposing of the Rechargeable Battery

Please dispose of the rechargeable battery or accessories in accordance with the disposal regulations for electronic waste which is applied at the installation site.

12 Technical Data

Parameter display

Battery pack	TB-LD51
Nominal Voltage (V)	51.2
Operating Voltage Range (V)	42.4 ~ 57.6
Rated Capacity (Ah)	100
Nominal Energy (kWh)	5.12
Usable Energy 90% DOD (kWh)[1]	4.6
Max. Charge Current (A)	100
Max. Discharge Current (A)	135
Peak Current (A)	200 (10 seconds, 25°C)
Charge Temperature	0°C ~ 55°C
Discharge Temperature	-20°C ~ 55°C
Storage Temperature	30°C ~ 60°C (6 months); -20°C ~ 30°C (12 months)
Ingress Protection	IP40
Protection Class	I
Dimension (W × H ×D) (mm)	326.0 × 625.7 × 165.4
Net Weight (kg)	41.5 ± 1

NOTICE!

1. Test conditions: 90% DOD, 0.5 C charge & discharge @ +25°C.
2. System usable energy may vary due to system configuration parameters.
3. Discharge: In case of battery cell's temperature range of -20°C ~ 10°C and 45°C ~ 55°C, the discharge current will be reduced;
   Charge: In case of battery cell's temperature range of 0°C ~ 25°C and 45°C ~ 55°C, the charge current will be reduced. Product charge or discharge power depends on the actual temperature of the battery cell.
4. The battery can only be discharged and cannot be charged when the battery cell's temperature range is between -20°C and 0°C.

13 Appendix

13.1 Power Expansion

NOTICE!

As for power expansion, it may have to dismantle the inverter or the battery. In that case, please strictly follow the *User Manual* to remove or install.

- Up to six battery packs can be installed together in the case of power expansion.
- Please confirm that there is enough space to increase the number of battery packs.
- Please make sure that the ground and wall that are used to install the new battery packs can handle the additional weight.

13.1.1 Cable Connection

Step 1: Flip at least one of the DIP switches 1~4 of the master battery pack to the "ON" position. Do not operate the DIP switches of slave battery packs.

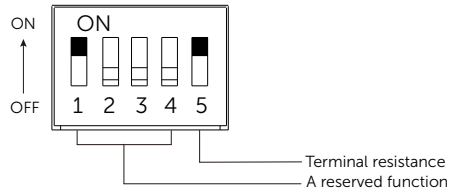


Figure 13-1 Flipping the DIP switch

Step 2: Connect positive power cables to "BAT +" ports of all battery packs and inverter;

Connect negative power cables to "BAT -" ports of all battery packs and inverter.

Connect communication cables between the master battery pack and inverter and between adjacent slave battery packs.

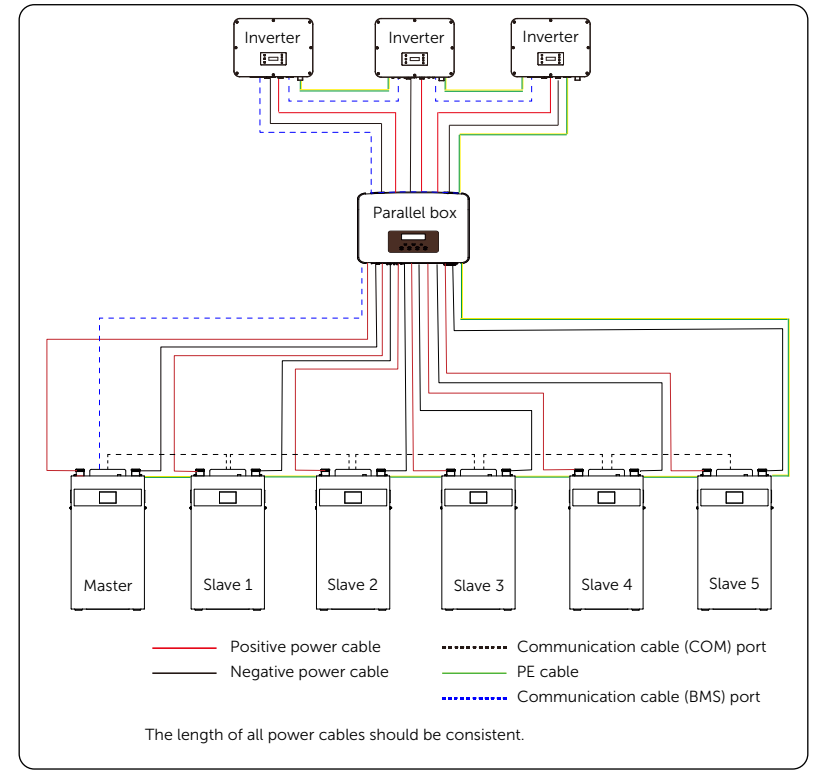


Figure 13-2 Wiring diagram

NOTICE!

- Please connect cables properly, and do not cross or wrap the cables together.
- Regarding the specific wiring procedure, please refer to "7.1 PE Connection", "7.2 Ring Terminal Connection" and "7.4.1 Cable Connection of One Battery Pack".

13.1.2 Materials Requirement

The battery is allowed to be connected in parallel by installing parallel box. As for the parallel box and related materials, users need to provide for themselves on their actual needs.

Power Cable Requirement

In addition to power cables included in accessories kit, users may need to provide power cables for themselves according to different currents. The suitable power cables are as follows:

Table 13-1 Power cables for parallel connection

No.	Current (A)	Cross-sectional Area (mm^2)
1	200	≥50
2	250	≥70
3	300	≥95
4	400	≥120

Wiring Requirement for Cooper Bar of Parallel Box

NOTICE!

Requirements for the positive and negative copper bars:
- The recommended distance between the positive and negative copper bars is greater than 20mm.
- The recommended distance between wiring holes on the copper bars is greater than 40mm.
- To the capacity expansion for 6 battery clusters, the recommended cross-sectional area for the copper bars is 250 (50*5) mm^2.

NOTICE!

Requirements for the positive and negative power cables:
- The recommended length of the positive and negative power cables is less than 3m.
- The length of all power cables should be consistent.
- To the power cables connecting the battery, KST RNBL38-8 terminals are recommended for crimping.

13.2 Device Networking

Users can connect a ethernet cable to the "LAN" port of the battery pack for networking. Here are the wiring steps for connecting ethernet cable.

Step 1: Remove the waterproof cap on the "LAN" port.

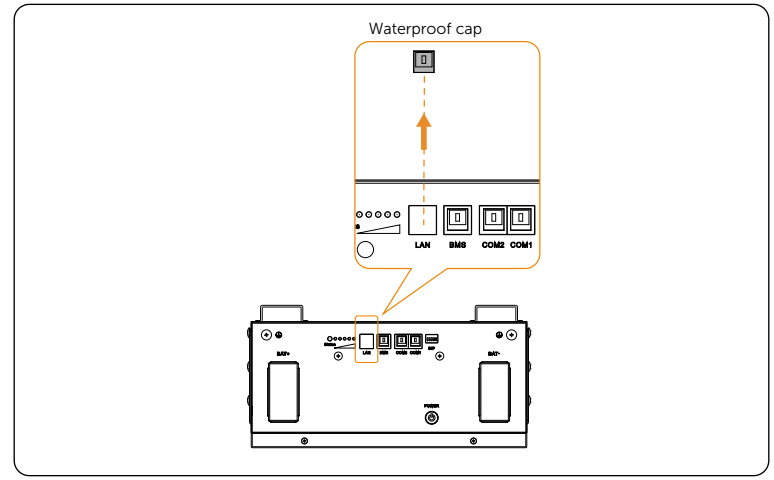


Figure 13-3 Removing waterproof cap

Step 2: Thread one end of the ethernet cable into the hole on the cable cover (Part E), and connect it to the "LAN" port of the battery pack. Secure the cable cover.

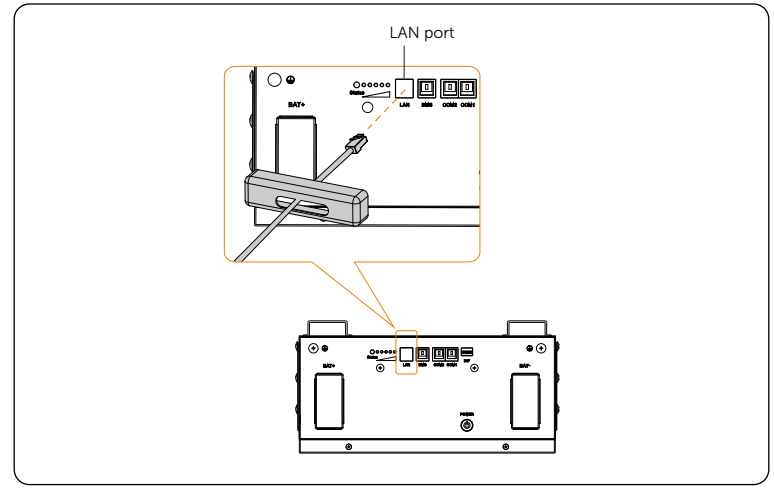


Figure 13-4 Connecting ethernet cable

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