



EN

User Manual

STE-ES Li-HV System

sunways

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

» 1 Preface

※ 1.1 Overview

This manual is an integral part of Sunways STE-ES series LFP battery system (hereinafter referred to as the battery or STE-ES battery). It mainly introduces the assembly, installation, electrical connection, debugging, maintenance and troubleshooting of the products. Before installing and using battery, please read this manual carefully, understand the safety information and be familiar with the functions and characteristics of hybrid battery.

※ 1.2 Target Groups

This manual is applicable to the electrical installers with professional qualifications and end-users. If there are any problems in the installation process, please call Sunways service telephone at +86 400-9922-958 or email Sunways at service@sunways-tech.com for consultation.

» 2 Safety Instructions

※ 2.1 Safety Notes

Before installation, please read this manual and warning labels on battery carefully and follow the instructions in this manual strictly.

※ 2.2 Important Safety Matters

SAVE THESE IMPORTANT SAFETY INSTRUCTIONS.

STE-ES stackable Li-HV system installation and repair instructions assume knowledge of high voltage electricity and should only be performed by Sunways certified installers. Sunways assumes no liability for injury or property damage due to repairs attempted by unqualified individuals or a failure to properly follow these instructions. These warnings and cautions must be followed when using our product.

 Warning	Read this entire document before installing or using STE-ES stackable Li-HV system. Failure to do so or to follow any of the instructions or warnings in this document can result in electrical shock, serious injury, or death, or can damage STE-ES stackable Li-HV system, potentially rendering it inoperable.
 Warning	A battery can present a risk of electrical shock, fire, or explosion from vented gases. Observe proper precautions.
 Warning	STE-ES stackable Li-HV storage system installation must be carried out only by Sunways Certified Installers, who have been trained in dealing with high voltage electricity.
 Warning	The product is heavy and challenging to lift.

 Warning	Use STE-ES Battery only as directed.
 Warning	Do not use STE-ES Battery if it is defective, appears cracked, broken, or otherwise damaged, or fails to operate.
 Warning	Do not use STE-ES Battery if it is defective, appears cracked, broken, or otherwise damaged, or fails to operate.
 Warning	Do not attempt to open, disassemble, repair, tamper with, or modify STE-ES Battery. STE-ES Battery is not user serviceable. LFP Cells in STE-ES Battery are not replaceable. Contact the STE-ES Authorized Reseller who sold the STE-ES Battery for any repairs.
 Warning	Do not connect STE-ES Battery to alternating current carrying conductors. STE-ES storage system including battery and battery must be wired to either a battery or a DC combiner panel that is then wired to an inverter. No other wiring configuration may be used.
 Warning	STE-ES Battery contains components, such as switches and relays, that can produce arcs or sparks.
 Warning	To protect STE-ES Battery and its components from damage when transporting, handle with care. Do not impact, pull, drag, or step on STE-ES Battery. Do not subject STE-ES Battery to any strong force. To prevent damage, leave STE-ES Battery in its shipping packaging until it is ready to be installed.
 Warning	Do not insert foreign objects into any part of STE-ES Battery.

 Warning	Do not expose STE-ES Battery or its components to direct flame.
 Warning	Do not install STE-ES Battery near heating equipment.
 Warning	Do not immerse STE-ES Battery or its components in water or other fluids.
 Caution	Do not use cleaning solvents to clean STE-ES Battery, or expose STE-ES Battery to flammable or harsh chemicals or vapors.
 Caution	Do not use fluids, parts, or accessories other than those specified in this manual, including use of non-genuine STE-ES parts or accessories, or parts or accessories not purchased directly from STE-ES or a STE-ES -certified party.
 Caution	Do not place STE-ES Battery in a storage condition for more than one (1) month, or permit the electrical feed on the STE-ES Battery to be severed for more than one (1) month, without placing STE-ES Battery into a storage condition in accordance with STE-ES' s storage specifications.
 Caution	Do not paint any part of STE-ES Battery, including any internal or external components such as the exterior shell or casing.
 Caution	Do not connect STE-ES Battery directly to photovoltaic (PV) solar wiring.

 Caution	When installing STE-ES Battery in a garage or near vehicles, keep it out of the driving path. If possible, install the STE-ES Battery on a side wall and/or above the height of vehicle bumpers.
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※ 2.3 Environmental Conditions

 Warning	Install STE-ES Battery at a height that prevents damage from flooding.
 Warning	Operating or storing STE-ES Battery in temperatures outside its specified range might cause damage to STE-ES Battery.
 Warning	Do not expose the STE-ES Battery to ambient temperatures above 45°C (113°F) or below 0°C (32°F).
 Caution	Ensure that no water sources are above or near STE-ES Battery, including downspouts, sprinklers, or faucets.

※ 2.4 Statement

Sunways Technologies Co.,Ltd. has the right not to undertake quality assurance in any of the following circumstances:

- ① Damages caused by improper transportation.
- ② Damages caused by incorrect storage, installation or use.

- ③ Damages caused by installation and use of equipment by non-professionals or untrained personnel.
- ④ Damages caused by failure to comply with the instructions and safety warnings in this document.
- ⑤ Damages of running in an environment that does not meet the requirements stated in this document.
- ⑥ Damages caused by operation beyond the parameters specified in applicable technical specifications.
- ⑦ Damages caused by unauthorized disassembly, alteration of products or modification of software codes.
- ⑧ Damages caused by abnormal natural environment (force majeure, such as lightning, earthquake, fire, storm, etc.).
- ⑨ Any damages caused by the process of installation and operation which don't follow the local standards and regulations.
- ⑩ Products beyond the warranty period.

※ 2.5 Symbol on the Battery Label

Sunways Technologies Co.,Ltd. has the right not to undertake quality assurance in any of the following circumstances:

- ① Damages caused by improper transportation.
- ② Damages caused by incorrect storage, installation or use.

Symbol	Description
	Do not sit or put things on battery.
	Do not disconnect or disassemble by non-professional personnel.

	Do not place near open flame or flammable material.
	Do not place at a children's or pet's reach area.
	Electric shock hazard, live parts, risk of electric shock, do not touch.
	If fire, switch off the breaker on DC side and stay away from battery.
	Please read the instructions carefully before installation.
	The battery cannot be disposed of with household waste.

※ 2.6 Symbol on the Packing Box

Symbol	Description
	Handle with care.
	This side up.
	Keep dry.
	Stacked layers.

» 3 Product Description

※ 3.1 Basic Features

▼ 3.1.1 Function

The STE-ES series is a stackable mounted energy storage battery.

▼ 3.1.2 Models

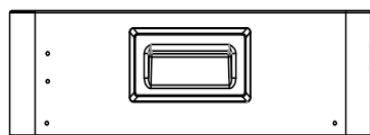
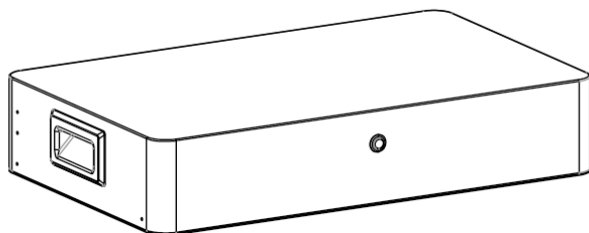
The STE-ES series battery includes 6 models which are listed below:

STE-ES5, STE-ES10, STE-ES15, STE-ES20, STE-ES25, STE-ES30.

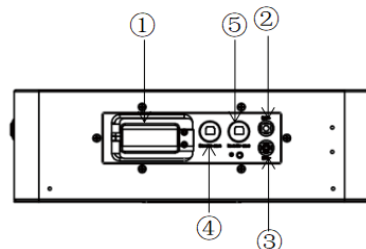
» 4 Battery Introduction

※ 4.1 Appearance Introduction

▼ 4.1.1 Control Module



Left side view



Right side view

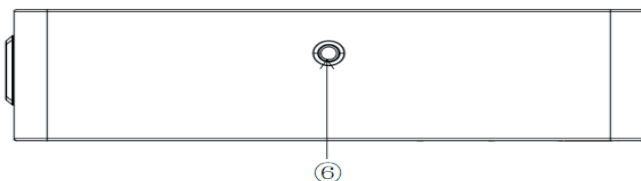


Figure 4-1 Control module

Item	Terminal	Note
1	Battery MCB	Control battery output
2	Battery output +	
3	Battery output -	
4	Service COM	Specified Debug Interface
5	Inverter COM	Connect to the inverter communication port
6	Power button	Turn the battery on and off

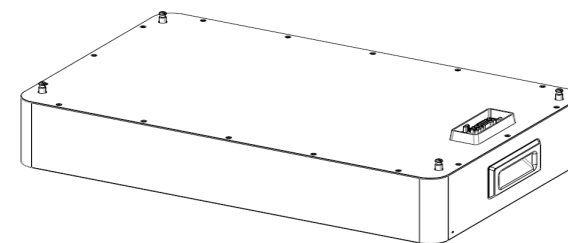


Figure 4-2 Battery Module

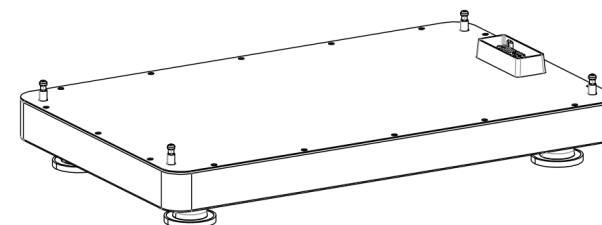
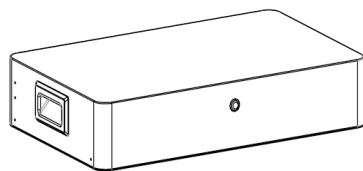


Figure 4-3 Base

※ 4.2 Packing List

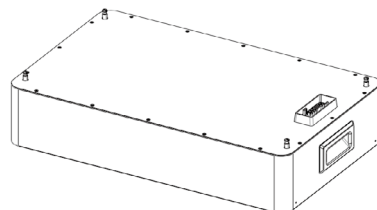
The package of the battery includes the following accessories. Please check whether the accessories in the packing box are complete when receiving the goods. See Figure 3-7 for the packing list.

▼ Control Module×1



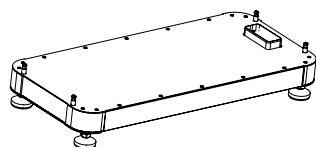
STE -M5120

▼ Battery Module×2~10

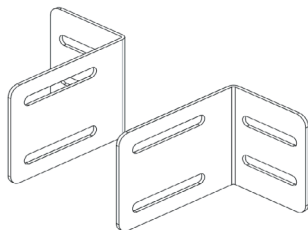


STE -P5120

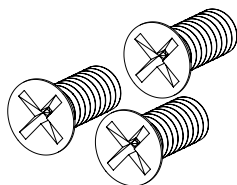
▼ Base×1



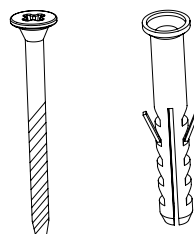
▼ Fixings×2



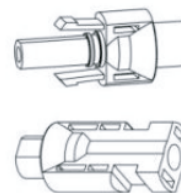
▼ Fixed Bolt M4-1×4 M4-2×4 M5*1



▼ Expansion×4



▼ Battery Plug×1



▼ PE Terminal×1



» 5 Installation

※ 5.1 Location

- ① The area is completely water proof. The floor is flat and level.
- ② There are no flammable or explosive materials.
- ③ The ambient temperature is within the range from 0 to 50.
- ④ The temperature and humidity are maintained at a constant level. There is minimal dust and dirt in the area.
- ⑤ The distance from heat source is more than 2 meters.
- ⑥ The distance from air outlet of whole system is more than 0.5 meters. Do not cover or wrap the battery case or cabinet.
- ⑦ Do not place at children or pet touchable area. The installation area shall avoid direct sunlight.
- ⑧ There are no mandatory ventilation requirements for battery module, but please avoid installation in confined area (minimum 300mm to top/left/right/front).
- ⑨ The aeration shall avoid of high salinity, humidity, or temperature.

※ 5.2 Mounting

▼ 5.2.1 Install the Base

- ① Check the installation environment to ensure ground level.
- ② Place the base on the ground, and make sure it is level and stable.

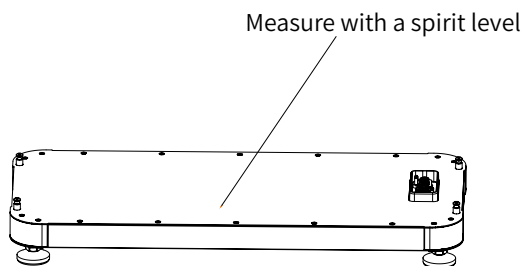


Figure 5-1 Adjust the base to level state

- ③ Distance between base and wall is 20mm~120mm.

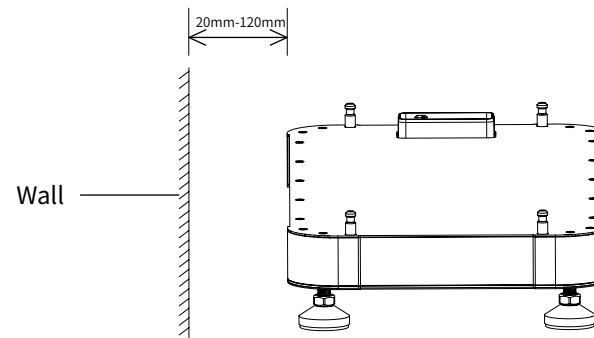


Figure 5-2 Distance between base and wall

▼ 5.2.2 Install the Module

- ① After the base is installed, remove the protective film of the terminals, and the remaining battery module and control module are then placed in turn.

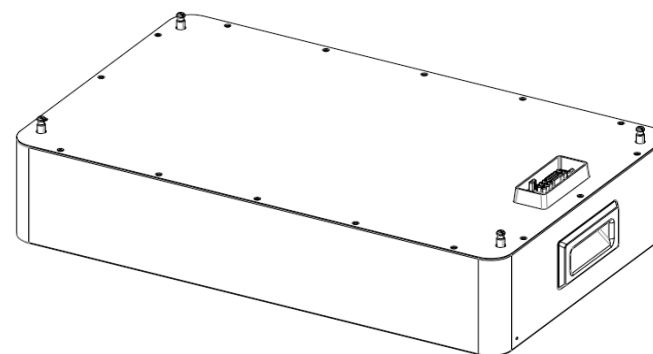


Figure 5-3 Remove the protective film

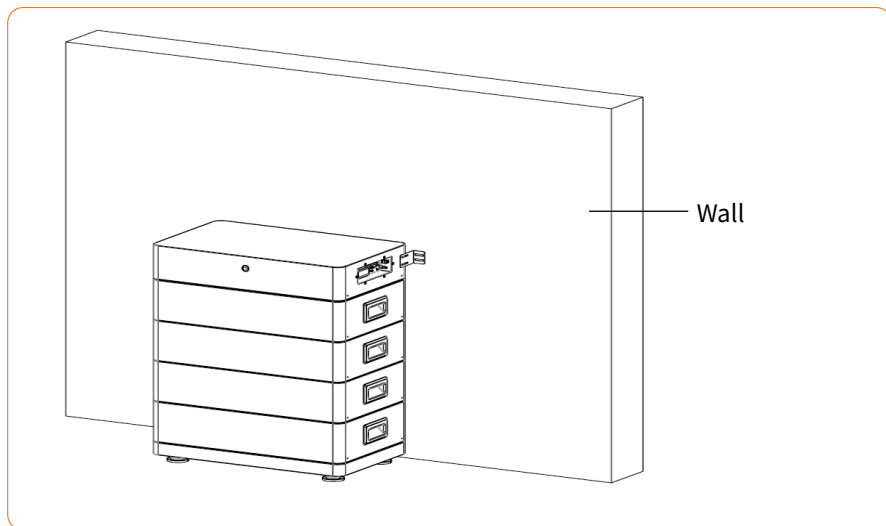


Figure 5-4 Place the battery modules

② Install the fixings on both sides of the control module.

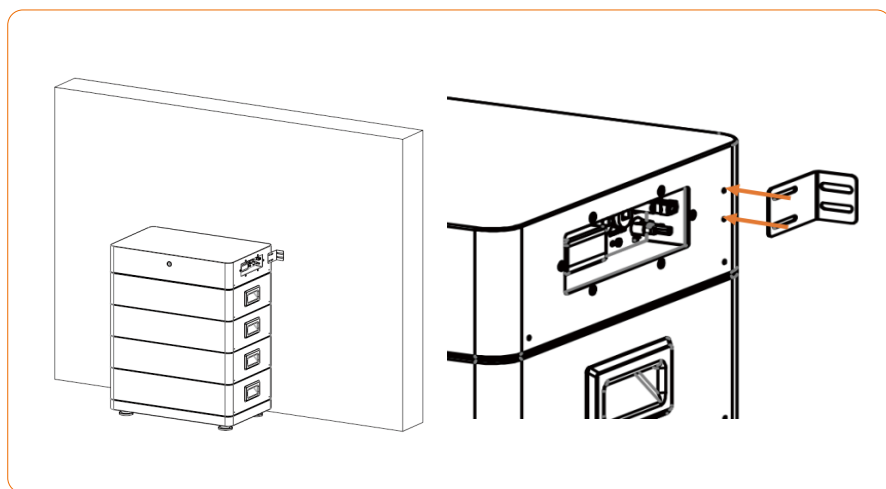


Figure 5-5 Install the fixings

③ Use the fixings as the template to mark the position of 4 holes on the wall.

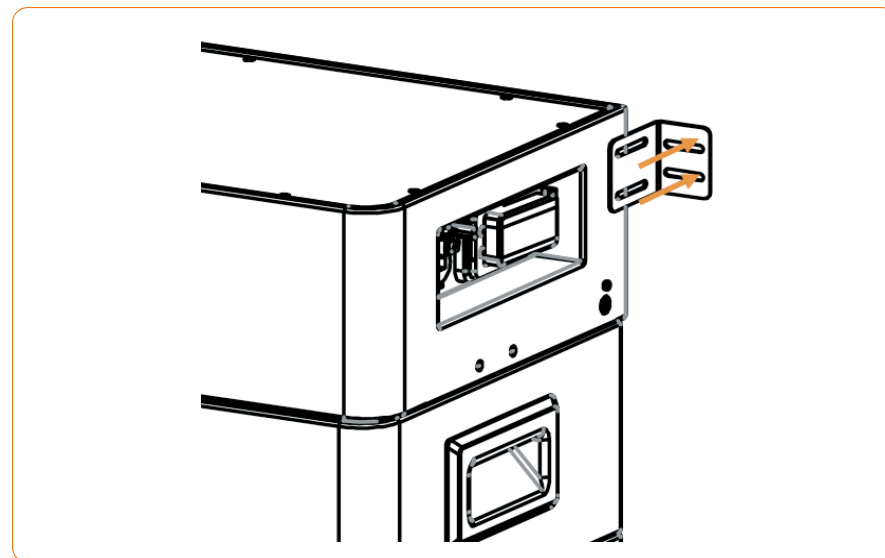


Figure 5-6 Mark the position

④ Remove the control module.

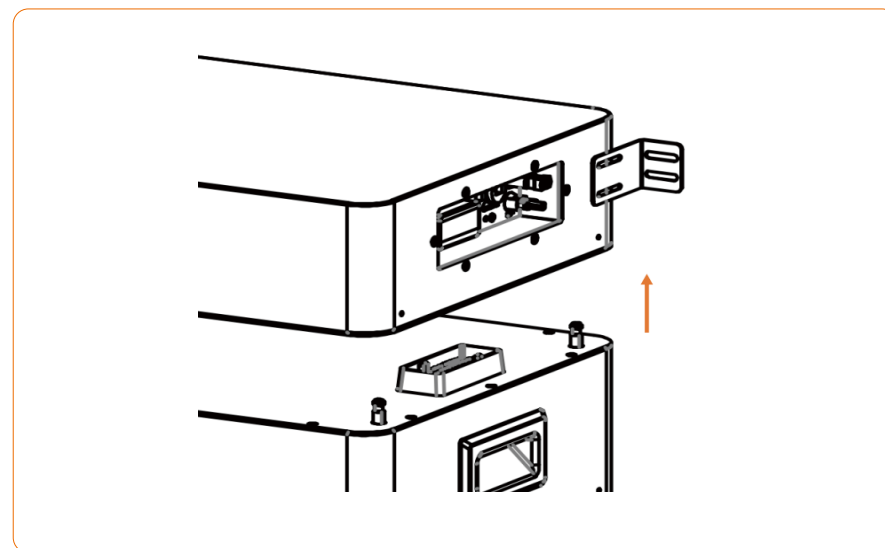


Figure 5-7 Remove the control module

- ⑤ Use an electrical drill with 10mm diameter bit to drill 4 holes in the wall with 80mm depth.

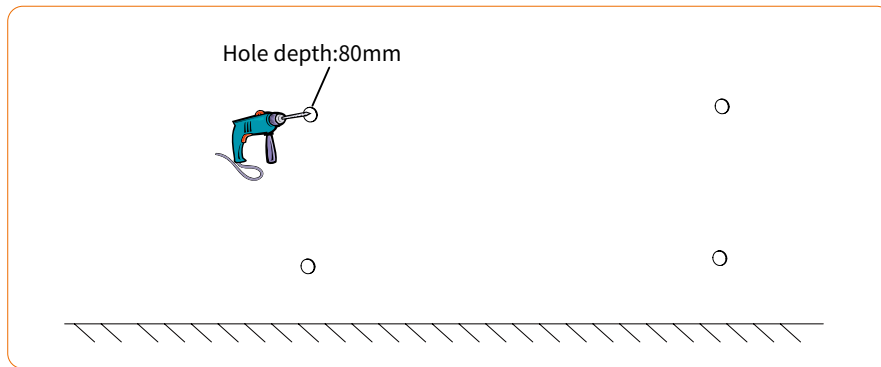


Figure 5-8 Drill holes



Warning

Before drilling, make sure to avoid any buried water tube and electric wires in the wall.

- ⑥ Insert the expansion tubes into the holes.

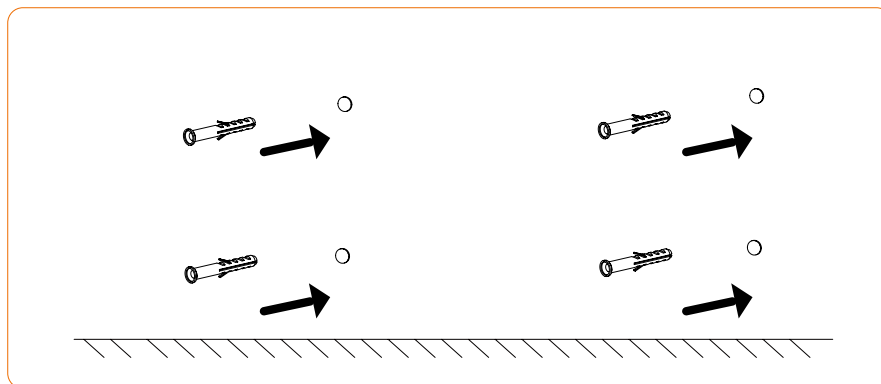


Figure 5-9 Insert the expansion tubes

- ⑦ Place the control module on battery module.

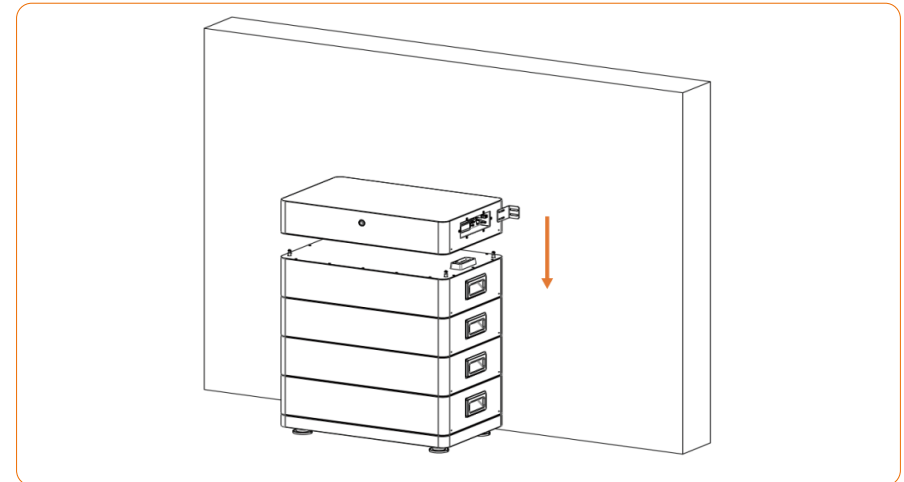


Figure 5-10 Place the control module

- ⑧ Tighten modules with fixed bolt on the left and right side.

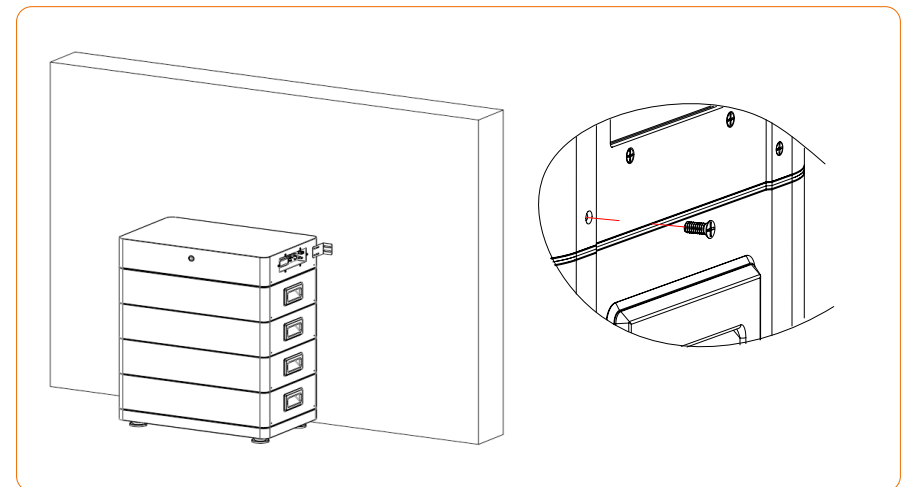


Figure 5-11 Tighten modules

- ⑨ Insert the expansion screws into the holes, then fix the fixings onto the wall with expansion screws by using a cross screwdriver.

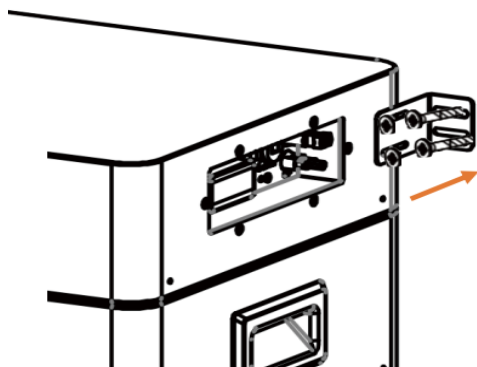


Figure 5-12 Fix the fixings

- ⑩ Turn the adjusting screw to fix the battery onto the wall by using a wrench.

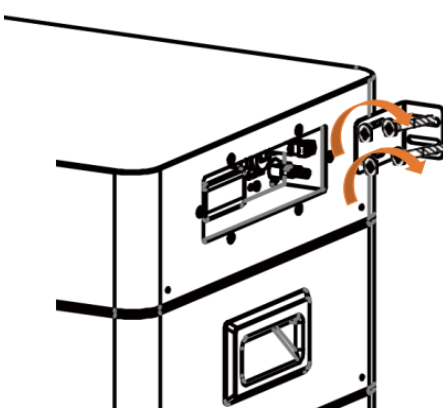


Figure 5-13 Fix the battery

▼ 5.2.3 Ground Connection



Attention

Proper grounding is good for resisting surge voltage shock and improving EMI performance. Battery must be well-grounded.
For a system with only one battery, the PE cable needs to be grounded.
For a multi-battery system, all batteries PE wires need to be connected to the same grounding copper bar to ensure equipotential bonding.

Ground terminal connection steps:

- ① The external grounding terminal is located in the right side of the control module.
- ② Fix the grounding terminal to the PE wire with a proper tool and lock the grounding terminal to the grounding hole in the right side of the control module.
- ③ The cross-sectional area of the external grounding cable is 6mm^2 .

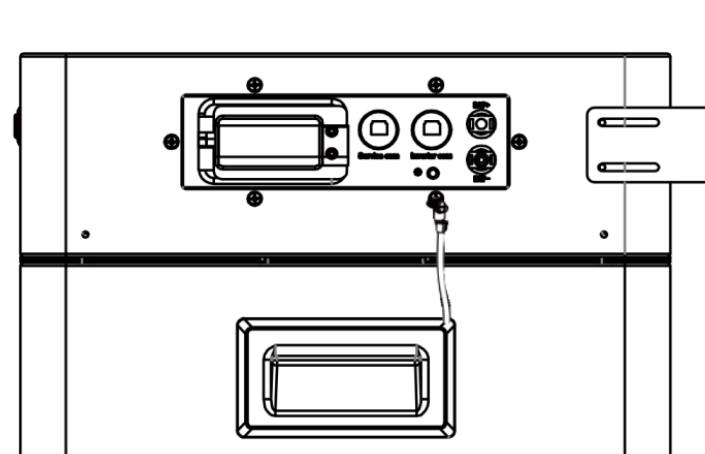


Figure 5-14 Grounding terminal connection

※ 5.3 Electrical Connection

 Warning	A high voltage in the conductive part of the battery may cause an electric shock. When installing the battery, make sure that the DC sides of the battery is completely de-energized.
 Warning	Do not ground the positive or negative pole of the battery output, otherwise it will cause serious damage to the battery.
 Warning	Static may cause damage to the electronic components of the battery. Anti- static measures should be taken during installation and maintenance.
 Attention	Do not use other brands or other types of terminals other than the terminals in the accessory package. Sunways has the right to refuse to held liable of all damages caused by the mixed-use of terminals.
 Attention	Moisture and dust can damage the battery, ensure the cable gland is securely tightened during installation. The warranty claim will be invalidated if the battery is damaged as a result of using poorly connected cable connector.

▼ 5.3.1 Cables Connection

After mechanical installation is finished, here are positive power line, negative power line, communication cable and earth cable between inverter and control module need to be connected.

The picture on this page shows the cables connection. Please follow the instruction and make sure all the cables are connected correctly.

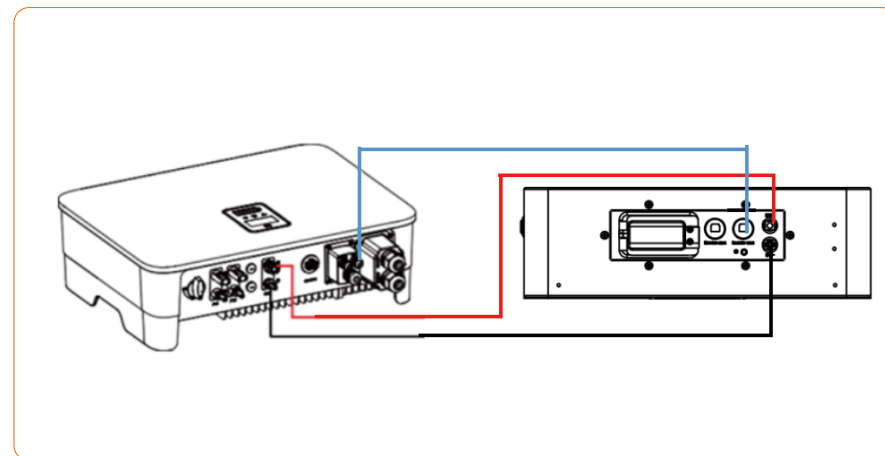


Figure 5-15 Wiring diagram

▼ 5.3.2 Battery Power Connector Assembly Procedures

① Select an appropriate DC cable.

Cable type	Conductor cross-sectional area (mm ²)	
	Outside diameter (mm ²)	Conductor core section (mm ²)
AWG 10	5.5-8.0	4.0-6.0

② Peel off the DC cable insulation sleeve for 15 mm, as shown in Figure 5-16:

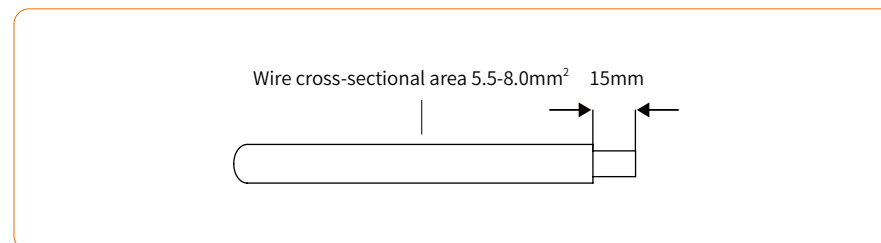


Figure 5-16

③ First press the male inner core and female inner core into line,as shown in Figure 5-17:



Figure 5-17

④ Then insert the inner core of the male and female heads into the connector of the male and female heads,as shown in Figure 5-18:



Figure e 5-18

⑤ Insert the positive and negative connectors separately into the battery terminals,as shown in Figure 5-19:



Figure 5-19



Warning

① Before making the battery connector, please make sure the polarity of the cable is correct.

② Use a multimeter to measure the voltage of the battery pack and make sure the voltage is within the inverter limitation and the polarity is correct.

⑥ Insert the positive and negative connector into the inverter battery terminals respectively, and a “click” sound represents the assembly in place, as shown in Figure 5-20:

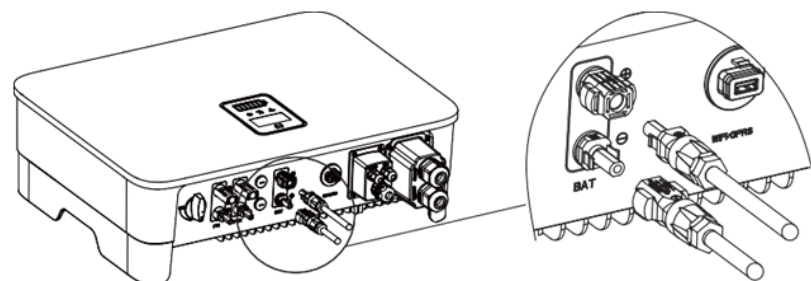


Figure 5-20

▼ 5.3.3 Communication Cable Connection

One side of the communication cable used to connect the inverter and control module port is preinstalled on the inverter before leaving the factory, insert the other side to the “Inverter COM” port in the control module when installing it.

Communication interface and definition:

Item	PIN	Cable color	Net definition	Remarks
RJ45 TypeB connection 	1	Orange & White	A1	485 communication
	2	Orange	B1	
	3	Green&White	/	
	4	Blue	CAN_H	CAN Communication
	5	Blue&White	CAN_L	
	6	Green	/	
	7	Brown&White	/	
	8	Brown	/	

» 6 System Start and Stop

※ 6.1 Start System

When starting the system, follow these steps:

- ① Turn on the DC Switch in the bottom of inverter.
- ② Turn on the DC Switch on the control module.

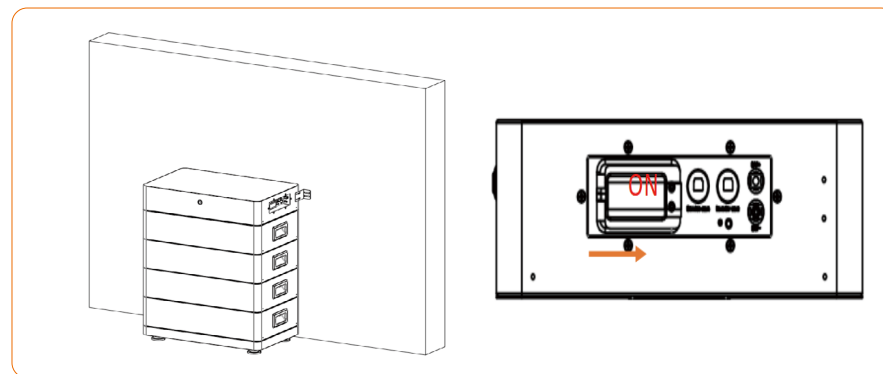


Figure 6-1

- ③ Hold down the POWER button for 5 seconds until the power button lights up.

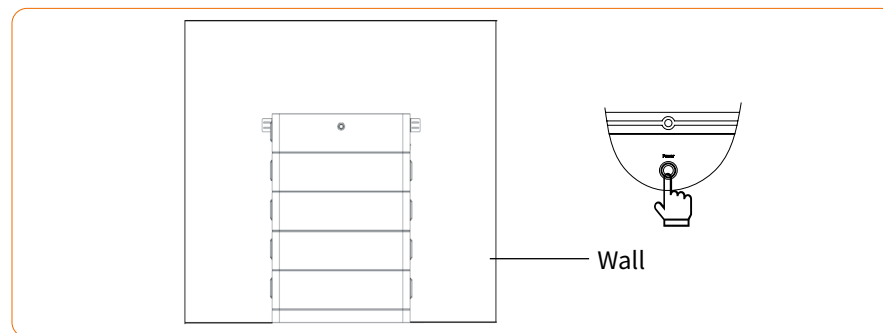


Figure 6-2

- ④ Observe the status indicator, green light flashing indicates the normal output.
- ⑤ Switch on the AC breaker first.

⑥ The inverter will start to check the DC and AC input parameters and self-check, and if everything is normal, the inverter will start to work according to the work mode which you set on the App. The inverter display and indicators will show relevant parameters and status.

※ 6.2 Stop System

When turning off the system, please follow the steps below:

- ① Shut off the inverter through the APP or the button on the display first.
- ② Disconnect the breakers on the grid and load side.
- ③ Turn off the DC Switch on the control module.
- ④ Wait 30 seconds and then turn the inverter DC switch to the “OFF” . At this time, there is remaining power in the inverter capacitor. Wait for 5 minutes until the inverter is completely de-energized before operating.
- ⑤ Disconnect the AC and DC cables.

» 7 Battery Storage

※ 7.1 Storage Requirements

The STE-ES battery storage environment requirements are as follows. :

- Ambient temperature: 18–25° C
- Relative humidity: less than 40%
- Dry, clean, and well-ventilated
- Away from corrosive organic solvents and gases
- Away from direct sunlight
- At least 2 meters away from heat sources

- 1) The batteries in storage must be disconnected from external devices. The indicators (if any) on the batteries must be off.
- 2) Ensure that the storage duration is updated after every charge.
- 3) The warehouse keeper should collect battery storage information every month and periodically report the battery inventory information. The batteries that have been stored overdue should be recharged in a timely manner.
- 4) Do not unpack batteries. Batteries should be recharged during storage by professionals as required, and they should be put back to their packaging after recharge.
- 5) If batteries have been stored overdue, promptly report the event to the person in charge.
- 6) Ensure that batteries are delivered based on the “first in, first out” rule.
- 7) Handle batteries with caution to avoid damage.
- 8) Inappropriate storage will cause the battery performance and service life may be affected. Sunways Technologies Co.,Ltd. has the right not to undertake quality assurance in irregular storage.



Warning

Ensure that batteries are stored indoors. Install batteries in a dry, clean, and ventilated 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 sunlight or water and keep them far away from sources of heat and ignition.

 Warning	Risk of battery damage or personal injury due to incorrect service. Dispose of bulged, deformed, damaged, or leaking batteries irrespective of how long they have been stored.
 Warning	Place batteries correctly according to the signs on the packing case during storage. Do not place batteries upside down, lay them on one side, or tilt them. Stack batteries in accordance with the stacking requirements on the packing cases.
 Warning	Store batteries in a separate place. Do not store batteries together with other devices. Do not stack batteries too high. The site must be equipped with qualified fire suppression facilities, such as firefighting sands and fire extinguishers.
 Caution	Batteries should be used soon after being deployed onsite. Batteries that have been stored for an extended period should be recharged periodically. Otherwise, they may be damaged.
 Caution	Only trained and qualified personnel are allowed to recharge batteries. Wear insulated gloves and use dedicated insulated tools during the operation.
 Caution	Observe onsite during recharge and handle any exceptions in a timely manner.
 Caution	If a battery experiences an abnormality such as bulging or smoking during recharge, stop charging immediately and dispose of it.

※ 7.2 Storage Duration Overdue and Recharge

Do not store batteries for extended periods. Otherwise, the battery performance and service life may be affected.

- The total storage and transportation time of the battery packs cannot exceed six months (starting from manufacture date or the latest charge date).

If it exceeds six months, discharge the battery to 0% SOC and then charge to 50% SOC.

If it exceeds twelve months, discharge the battery to 0% SOC, then charge to 100% SOC and finally discharge to 50% SOC.

- Dispose of deformed, damaged, or leaking batteries directly irrespective of how long they have been stored.

» 8 Troubleshooting

※ 8.1 Maintenance

 Danger	Risk of battery damage or personal injury due to incorrect service!
 Caution	Keep non-qualified persons away!
 Attention	Restart the battery only after removing the fault that impairs safety performance. Never arbitrarily replace any internal components. For any maintenance support, please contact Sunways. Otherwise, Sunways shall not be held liable for any damage caused.
 Note	Servicing of the device in accordance with the manual should never be undertaken in the absence of proper tools, test equipment or the latest revision of the manual which has been clearly and thoroughly understood

Maintenance of electrical components:

Item	Project	Checkpoint	Methods	Repair Condition	Repair Solution
1	Electrical	Check whether the voltage output is normal.	Multi-mete	The battery voltage exceeds the preset range	Contact the dealer or manufacturer.
2	Failure to check	Check whether the light is normal.	Visual inspection	Warning	

3	Cable	Insulation, terminal	Visual inspection	Insulation crack, aging, the terminal is peeling or corroded.	Replace the cable, replace the terminal board.
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Battery Maintenance:

Item	Frequency	Project	Solution
1	Every month	Working environment	Keep away from heat sources and direct sunlight.
1		Visual inspection	If there is damage, leakage or deformation, isolate the faulty battery pack, take photos and replace the battery.
2	Every quarter	Visual inspection	Clean appearance with cotton cloth. Be careful when cleaning.
2		Connection status	Check each terminal for loose bolts and tighten again. Check the cable temperature.
3	Half a year	Measure and record voltage	Collect discharge data at least once every six months in the first year. In the second year, discharge data were collected every three months. Check the historical records through the RS232 port. If the alarm information shows that the battery is frequently overcharged, the battery has reached the charging and discharging protection point. This may lead to insufficient time for power preparation. It is recommended to replace the battery immediately.

※ 8.2 Troubleshooting

If any battery fault occurs, record the fault information, shut down the battery according to the shutdown procedure, and contact the distributor or Sunways. Do not handle the fault by yourself.

» 9 Technical Parameters

Model	STE-ES5	STE-ES7	STE-ES10	STE-ES5	STE-ES7	STE-ES10
Nominal Capacity (KWh)	5.12	10.24	15.36	20.48	25.6	30.72
Usable Energy (KWh)	4.61	9.22	13.82	18.43	23.04	27.65
Nominal Voltage (V)	102.4	204.8	307.2	409.6	512	614.4
Recommend Charge/Discharge Current (A)	30/30					
Max Charge/Discharge Current (A)	50/50					
Round-Trip Efficiency	≥ 97.5%					
Communication	CAN, RJ45					
Charge Temperature (° C)	0-50					
Discharge Temperature (° C)	-20-60					
Weight (kg)	73	122	171	220	269	318
Dimension [W*H*D] (mm)	700*365*430	700*530*430	700*695*430	700*860*430	700*1025*430	700*1190*430
Module Numbler	1	2	3	4	5	6
Enclosure Protection Rating	IP45					
Recommend DOD	90%					
Cycle Life	≥ 6,000(25° C)					
Design Life	20+ Years (25° C@77° F)					
Humidity	5%- 95%					
Altitude (m)	< 2,000					
Installation	Stackable					
Warranty	5Years					
Safety Standard	UL1973/IEC62619/UN38.3					



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