



EN

User Manual

STE-OS5~20

51.2V 100Ah

sunways

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» 1 Preface

※ 1.1 Overview

This manual is an integral part of Sunways STE-OS5~20 series LFP battery system (hereinafter referred to as the battery or STE-OS5~20 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 Introduction

※ 2.1 Safety Instructions

For safety reasons, please read this entire manual before installing, servicing or using. Failure to comply with the instructions can result in electrical shock, serious injury, death or can damage the battery, potentially rendering it inoperable.

 Caution	Proper disposal of batteries is required. Please refer to your local regulations for disposal requirements.
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※ 2.2 Symbols in this document

This manual uses the following symbols to highlight essential information:

Symbol	Description
	WARNING
	CAUTION
	RISK OF ELECTRIC SHOCK
	REFER TO OPERATING INSTRUCTIONS
	DO NOT THROW AWAY

Symbol	Description
	RECYCLABLE
	HEAVY WEIGHT MAY CAUSE SERIOUS INJURIES
	GROUND (EARTH) CONNECTION
	RISK OF ELECTRIC SHOCK ENERGY STORAGE DISCHARGE TIME

※ 2.3 Qualified personnel

• Battery Management System (BMS) installation and maintenance must be carried out only by certified installers who possess all following qualifications and experience:

- Knowledge of the installation of electrical devices.
- Knowledge of the functional principles and operation of on-grid and off-grid systems.
- Knowledge of the dangers and risks associated with installing and using electrical devices and acceptable mitigation methods.
- Knowledge of and adherence to this manual and all safety precautions and best practices.
- Knowledge of the protective measures to minimize hazards to themselves and others.

※ 2.4 Equipment requirements

• Battery Management System (BMS) installation and maintenance must be carried out only by certified installers who possess all following qualifications and experience:

- Knowledge of the installation of electrical devices.
- Knowledge of the functional principles and operation of on-grid and off-grid systems.

- Knowledge of the dangers and risks associated with installing and using electrical devices and acceptable mitigation methods.
- Knowledge of and adherence to this manual and all safety precautions and best practices.
- Knowledge of the protective measures to minimize hazards to themselves and others.

※ 2.5 Electrical requirements

- Ensure that the power setting matches the rated input of this power supply.
- Make sure to connect the protective grounding to prevent an electric shock before activating the power.
- Never sever the internal or external protective grounding wire, or disconnect the wiring of protective grounding terminal. Such actions can create a shock hazard, potentially causing injury.
- Do not connect the battery module directly to photo-voltaic (PV) solar wiring.
- Do not short-circuit the wiring terminals of the battery module. Short circuits can cause a fire hazard.

 DANGER	Before connecting cables, ensure that the equipment is intact. Otherwise, electric shocks or fire hazards may occur.
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※ 2.6 Installation requirements

- Understand the components and functioning of a grid-tied PV power system and relevant local standards.
- Do not install, use, or operate outdoor equipment and cables in harsh weather conditions such as lightning, rain, snow, and level 6 or stronger wind.
- Wear proper personal protective equipment (PPE) during operation. If there is a probability of personal injury or equipment damage, immediately stop the operations, report the case to the supervisor, and take feasible protective measures.
- Tighten screws using tools when installing the battery module.

- To prevent fire due to high temperature, ensure that the ventilation vents of the heat dissipation system are not blocked when the battery is running.
- After installing the battery module, remove idle packing materials such as cartons, foam, plastics and cable ties from the equipment area.

 DANGER	Do not work with power turned on during installation.
 Note	Stacking new battery module on the old modules which have been in use for more than 6 months is not allowed, as it will affect the overall battery capacity.

※ 2.7 Environment requirements

Operating Temperature	Optional: Charge: 0° C - 50° C/Discharge: -20° C - 50° C(without heating film)
Humidity	≤ 95%
Storage≤6 months	Stage of Energy (SOE):50% initial
Maximum Altitude	Max.3000m

- Install the battery module in a dry and well-ventilated environment to ensure good heat dissipation.
- Install the battery module in a sheltered place or install an awning over it.
- Install the battery module at a height that prevents damage from flooding.
- Avoid exposing the battery module to direct sunlight or water.
- Do not install the battery module near heating equipment.
- Do not place any flammable or explosive materials around the battery module.
- Do not subject the battery module to high pressures.
- Do not place any objects on top of the battery module.
- Do not expose the battery module to ambient temperatures above 60°C (140°F) or below -30°C (-22°F).
- Children are not allowed to enter the installation position.

- Operating or storing the battery module in temperatures outside its specified range might cause damage to the battery module.
- Ensure that there is minimal dust and dirt in the area.
- Ensure that no water sources are above or near the battery module, including downspouts, sprinklers, or faucets.
- The battery module site must be equipped with qualified fire extinguishing facilities, such as fire extinguishing sands and powder fire extinguishers.

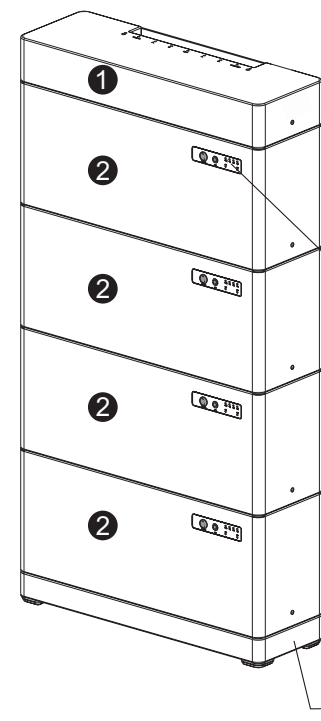


DANGER

Do not work with power turned on during installation.

» 3 Product Introduction

※ 3.1 Appearance



- ① Break Box (BB)
- ② Battery Modules
- ③ Installation Base
- ④ LED-Indicator



NOTE

This manual will show you the installation and cable connection of a Battery System consists of 4 Battery Modules.

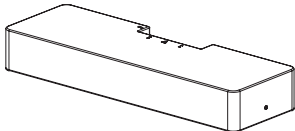
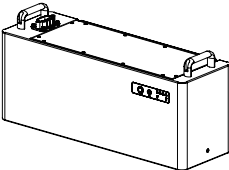
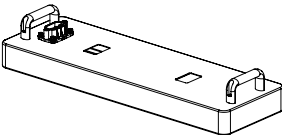
※ 3.2 Dimension and weight

Break Box (BB) is an electronic system to control battery modules.

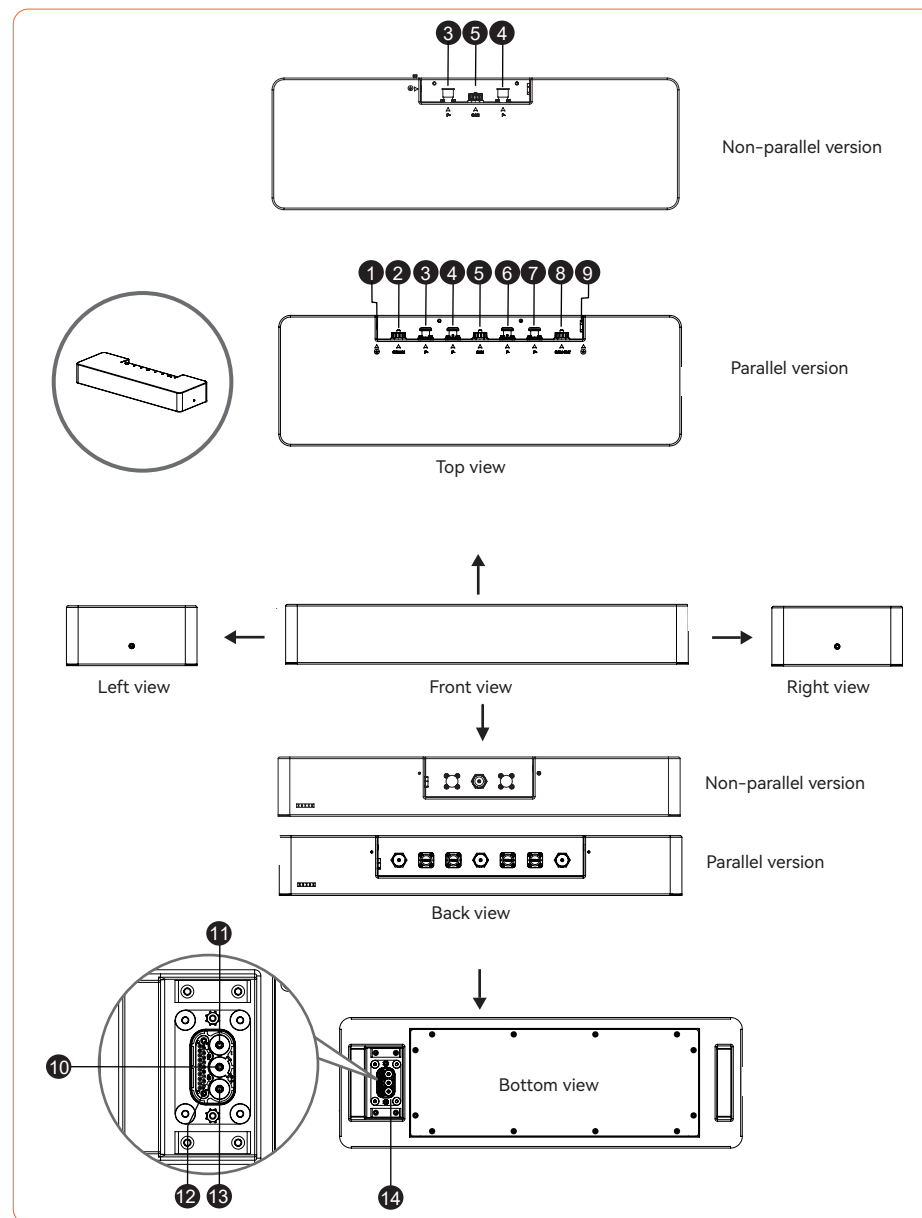
Battery Module is the residential battery which can be charged, discharged into a load.

Base is a SPCC bottom to make the battery module and BB stable on the floor.

The Battery System includes the Break Box, Battery Modules and the Base.

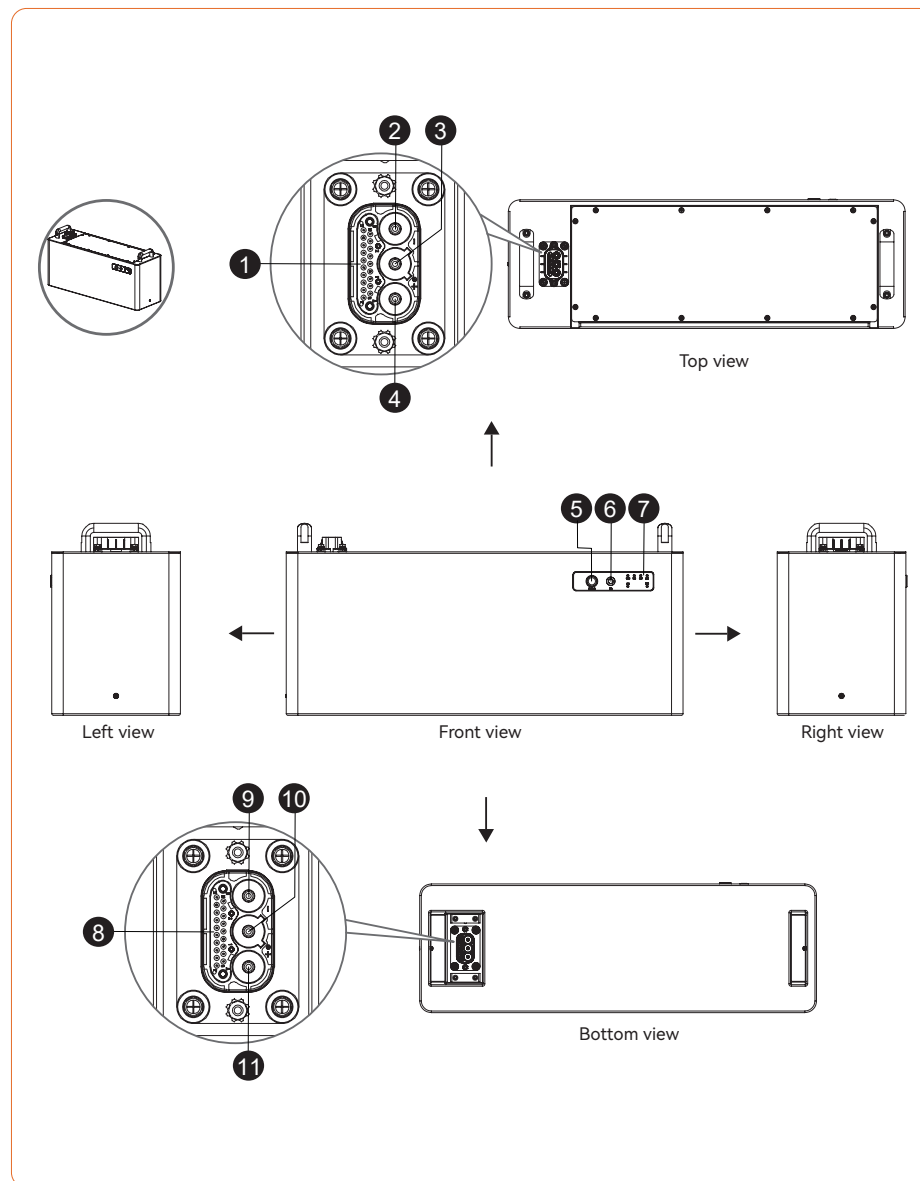
	Break Box	Non-parallel version	W*D*H:	740*240*110mm
		Parallel version	Weight:	9KG
	Battery Module		W*D*H:	740*240*305mm
			Weight:	49.3KG
	Base		W*D*H:	740*240*75mm
			Weight:	5KG
	Battery System		W*D*H:	740*240*1405mm
			PWeight:	210.8KG

▼ 3.2.1 Break Box



No.	Port Signs	Funcation Description
1		Grounding Point (BB to PCS)
2	COM-IN	COM cable port (Connect to COM-OUT of last BB)
3	P+	Power + (BB to PCS, BB to battery cluster)
4	P-	Power - (BB to PCS, BB to battery cluster)
5	CAN	CAN cable port (BB to PCS)
6	P-	Power - (BB to PCS, BB to battery cluster)
7	P+	Power + (BB to PCS, BB to battery cluster)
8	COM-OUT	Com cable port (Connect to COM-IN of next BB)
9		Grounding Point (BB to electric box)
10		Grounding Point (BB to BAT)
11	B-	Power - (BB to BAT)
12	COM	Com cable port (BB to BAT)
13	B+	Power + (BB to BAT)
14	Composite connector-Male	Power +/- and communication port (BB to BAT)

▼ 3.2.2 Battery Module



No.	Port Signs	Funcation Description
1	COM-IN	COM cable port (BB to BAT, BAT to BAT)
2	B-	Power - (BB to BAT, BAT to BAT)
3		Grounding point (BB to BAT, BAT to BAT)
4	B+	Power + (BB to BAT, BAT to BAT)
5	Switch	Switch on/off the battery system
6	Fn	Function button ^①
7	LED	Indicates the battery system status, running green light, warning red light
8	COM-OUT	Com cable port (BB to BAT)
9	B-	Power - (BAT to BAT)
10		Grounding point (BAT to BAT)
11	B+	Power + (BAT to BAT)

	Function button: 1. Short press to assign addresses 2. Long press for 3s to clear the hardware fault 3. Long press 10s to power supply mode
---	--

Note

※ 3.3 Battery system specifications

STE-OS5~20 Battery System Configuration List				
Battery System Type	STE-OS5	STE-OS10	STE-OS15	STE-OS20
Nominal Energy [kWh]	5.12	10.24	15.36	20.48
Battery Module	51.2V 5.12kWh			
Number of Modules	1	2	3	4
Cell Type	LFP (LiFePO4)			
Nominal Voltage [V]	51.2			
Operating Voltage Range [V]	40-58.4			
Max. Charge / Discharge Current [A]	100	120	120	120
Continue Discharge Output [kW]	5	6	6	6
Dimension [W/D/H. mm]	740*240*490	740*240*795	740*240*1100	740*240*1405
Approximate Weight [KG]	63.2	112.4	161.6	210.8

※ 3.4 Performance

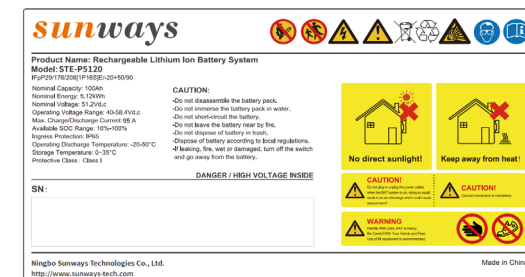
Recommended max.Depth of Discharge	90%
LED Indicator	4 SOC LED (SOC: 25%~SOC 100% blue), 2 Condition LED (working green, alarming red)
IP Rating of Enclosure	IP65 (Outdoor)
Operating Temperature	Optional: Charge: 0° C - 50° C/Discharge: -20° C - 50° C(without heating film)
Storage Temperature	0° C~35° C
Humidity	≤ 95%
Altitude	≤ 3000m
Cycle Life	10+ years, 6000 cycles (70% EOL; 80% DOD, 25° C)
Installation	Stack, Floor-Mounted
Communication Port	CAN
Certification	EN IEC61000-6-1, EN IEC61000-6-2, EN IEC61000-6-3, EN IEC61000-6-4; IEC62619; IEC63056

[1] DC usable energy, test conditions: 90% DOD, 1C charge & discharge at 25° C. System usable energy may vary due to system configuration parameters.

[2] The current is affected by temperature and SOC.

※ 3.5 Labels

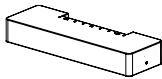
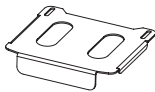
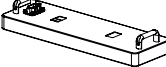
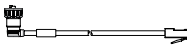
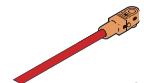
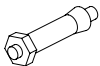
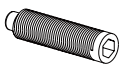
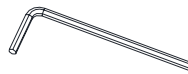
▼ 3.5.1 Labels overview



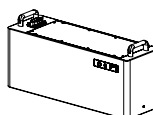
» 4 Installation instructions

※ 4.1 Installation contents

The following items are required for BB installation.

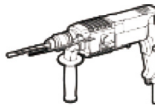
Break Box			
			
Break Box × 1	Wall-locking plate × 1	Wall-hanging plate × 1 (For brick wall)	Wall-hanging plate × 1 (For wooden wall)
			
Baffle × 1	Hole marking template × 1	Battery base × 1	CAN COM Cable (BB-PCS) × 1
			
Positive power cable (Red) (BB-PCS) × 1	Negative Power Cable (Black) (BB-PCS) × 1	Ground Cable (BB-Electric Box) × 1	Positive power cable (Red) (BB-BB) × 1*
			
Negative Power Cable (Black) (BB-BB) × 1*	Ground Cable (BB-BB) × 1*	CAN COM Cable (BB-BB) × 1*	M5 Screw × 5
			
M8 Screw × 4	Ball Plunger × 2	M6 Screw × 4	Plastic Foot Mats × 4
			
Transfer nut × 4	Anti-slip rubber mats × 4	Hex Wrench × 1	

*Stands for optional item according to demand.

Battery Module	
	
Battery Module × 2	Ball Plunger × 2

※ 4.2 Tools & Instruments prepared (not supplied)

The following tools shall be prepared before installation.

No.	Tool	Tool Name	Remarks
1		Driller	Drill holes on the wall
2		Wrench Set	Turn the screws
3		Screwdriver	Turn the screws
4		Marker	Mark the drilling hole positions on the wall
5		Safety gloves	Protect the hand



WARNING

The battery modules are heavy. Wear appropriate personal protective equipment (such as gloves and safety shoes) when handling the unit. Only a sufficient number of trained movers should lift the battery modules. The use of lift equipment is recommended.

※ 4.3 Installation location and clearance

Installation location requirements:

- There must be not highly flammable or explosive materials nearby.
- The ambient temperature should be within the range of -20°C to 50°C (-4°F to 122°F).
- The battery module must be installed on flat leveled ground that can support its weight.
- Product shall be installed indoors (e.g. in a basement or a garage) or outdoors under an eave out of direct sunlight.

Recommendations:

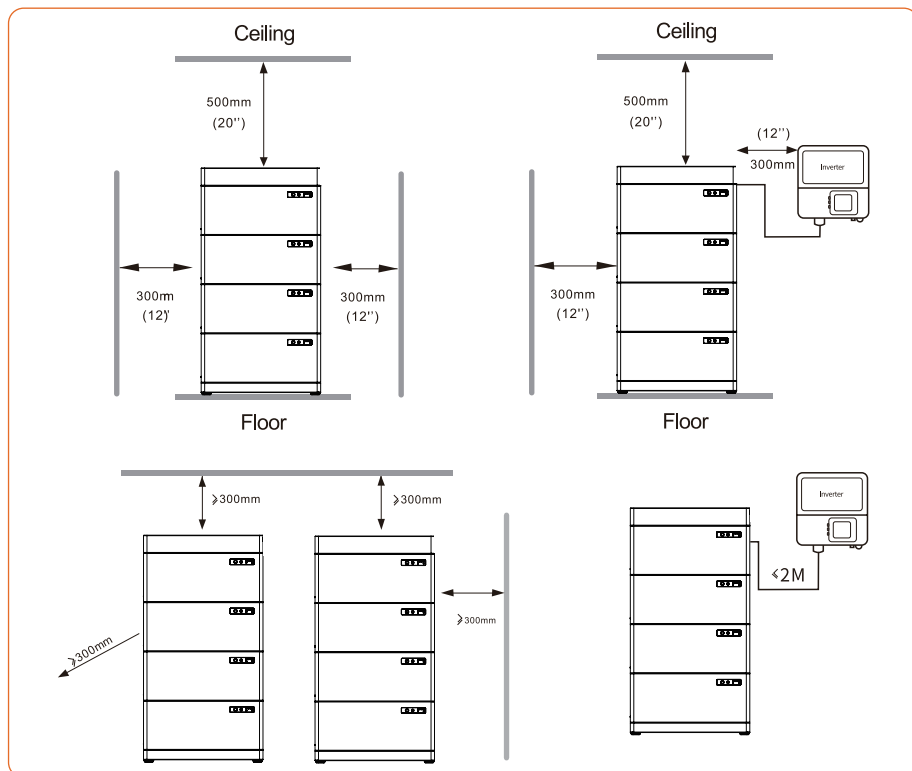
- The building should be designed to withstand earthquakes.
- The area should be waterproof and properly ventilated (IP65).
- The product should be installed out of reach of children and animals.



CAUTION

If the ambient temperature is outside the operating range, the battery module will stop operating to protect itself. The optimal temperature range for the battery module to operate is from 15° C to 30 °C (59° F to 86° F). Frequent exposure to harsh temperatures may deteriorate the performance and lifespan of the battery module.

Clearance:



Recommended clearance for the left, right and top of the product is shown in the figure for the proper ventilation and installer convenience.

※ 4.4 Equipment installation

Step 1: Install the base

For Base, you have three optional assembly methods

Method 1: Without installing the feet, directly hit the expansion bolts.

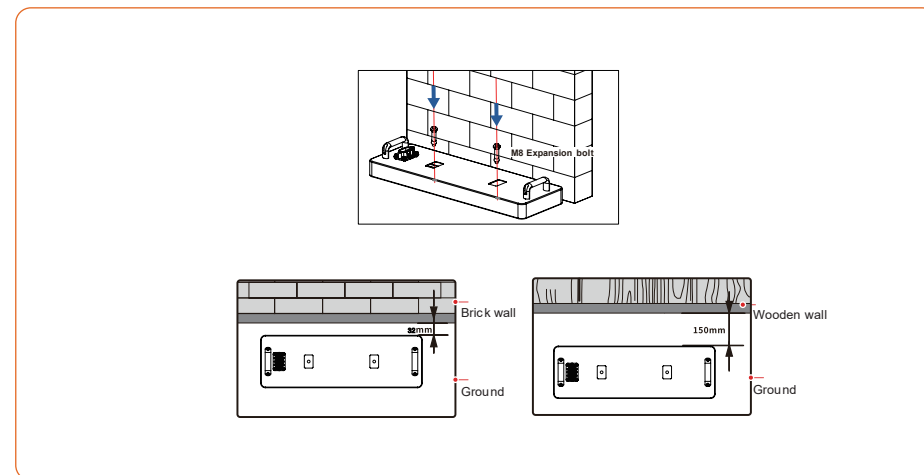
Method 2: Install foot mats.

Method 3: Optional installation of adjustable foot cups(Self-purchase as per customer's requirement).

Method 1:

- Lie the base flat on the floor horizontally.
- Align the installation base with the wall and keep 35mm away from the brick wall, or 150mm away from the wooden wall.
- Mark the drilling hole positions using a marker on the floor.
- Then drill the hole and install the base with M8 expansion bolts.
- Hole diameter 12mm and depth 60mm. Fix the M8 Expansion bolts, tightening torque:

20N.m.



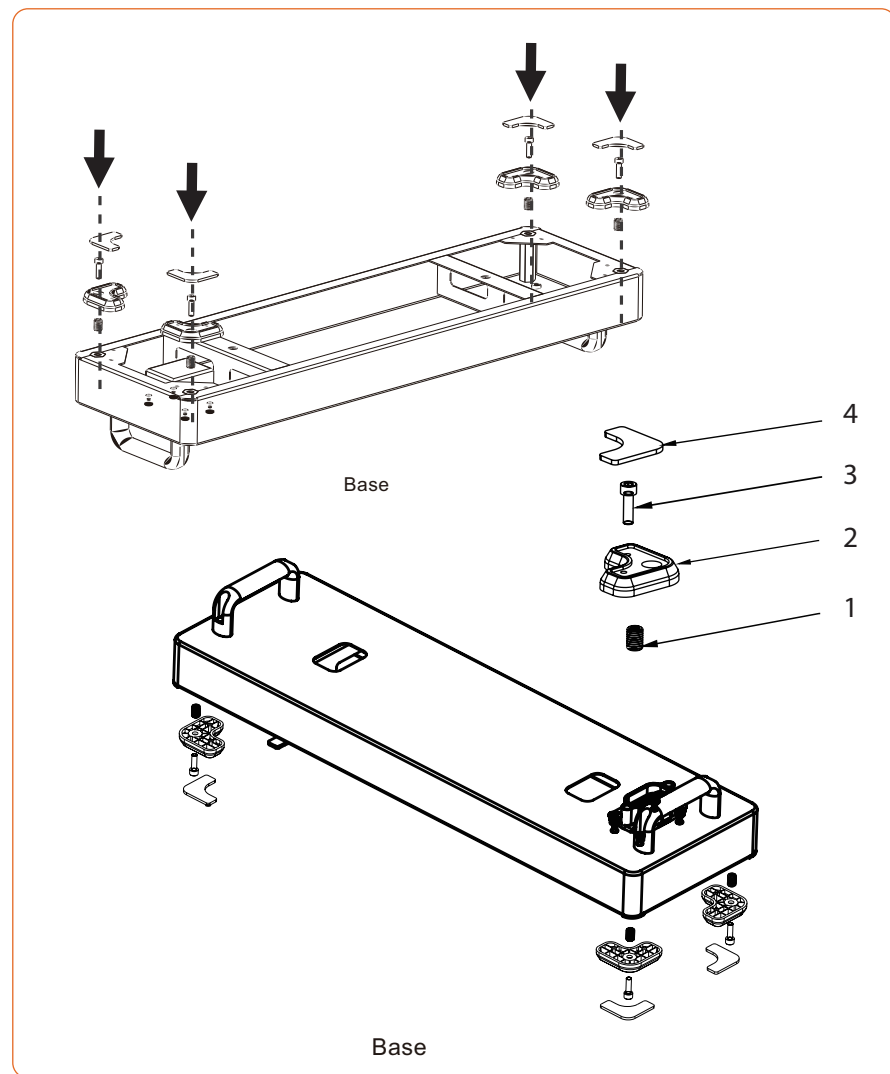
Method 2:

Step1:Tighten transfer nuts with Slotted screwdriver.

Step2:Place plastic stands.

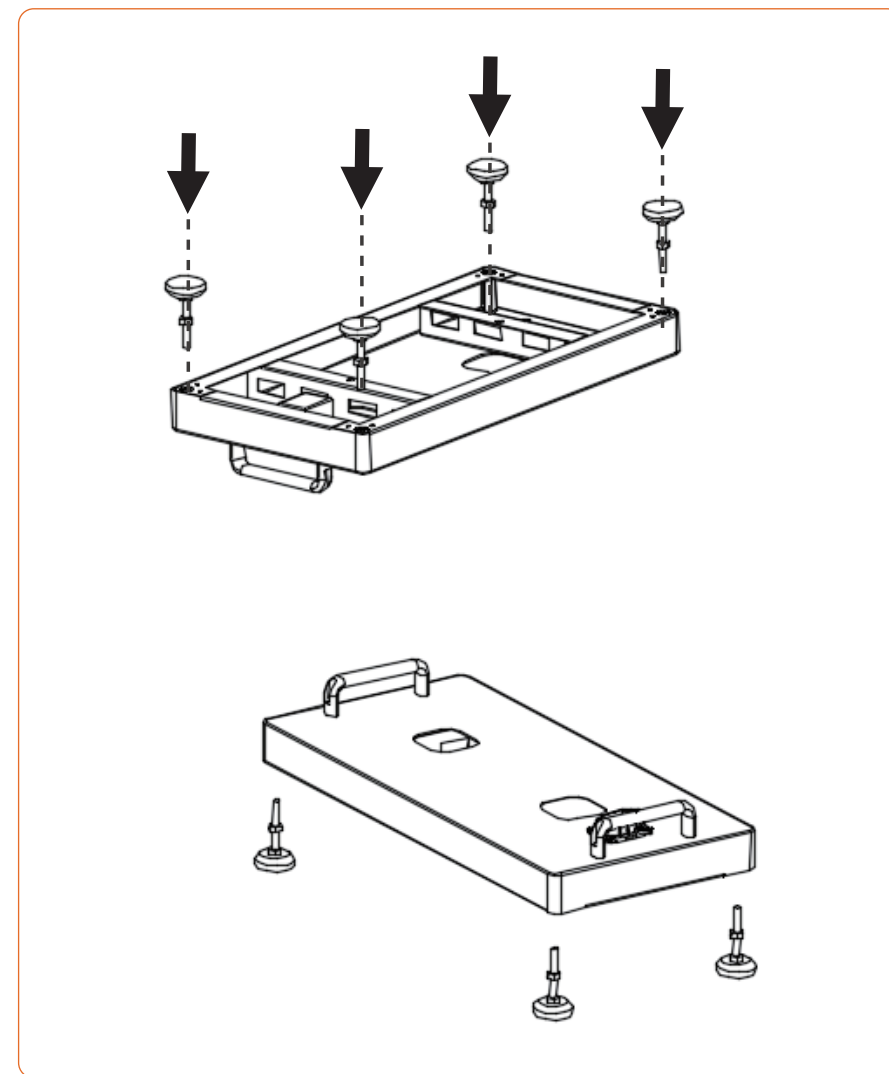
Step3:Tighten Hexagon socket head cap screws by Allen wrench.

Step4:Stick antiskid rubber pads to the surface.



Method 3:

If you do not use expansion screws to fix the base or install plastic feet, you can choose the right size of M10 foot cups to be installed on the bottom of the base as needed to fine-tune the battery.

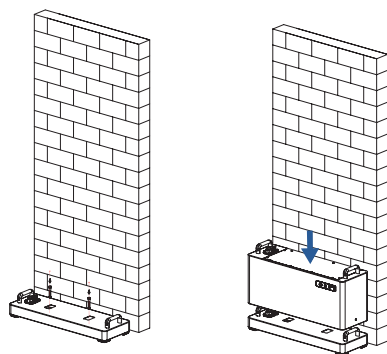


Step 2:

Place the first battery module on the base.

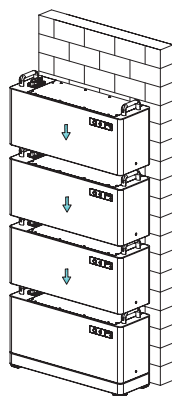


Place the battery module or Break Box at both ends on the base.
Otherwise the composite connector pins will be damaged and the battery system cannot run.



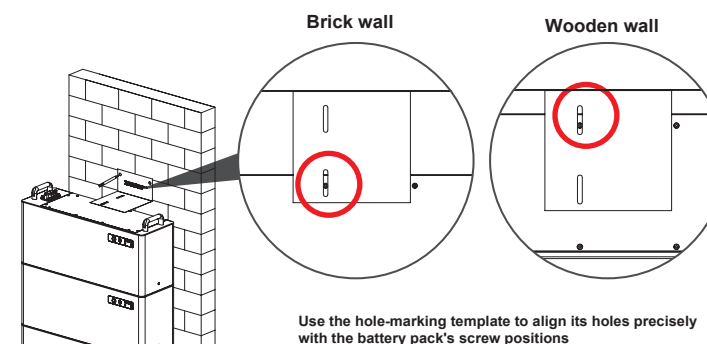
Step 3:

Put the second battery expansion module, the third and the fourth battery expansion module.

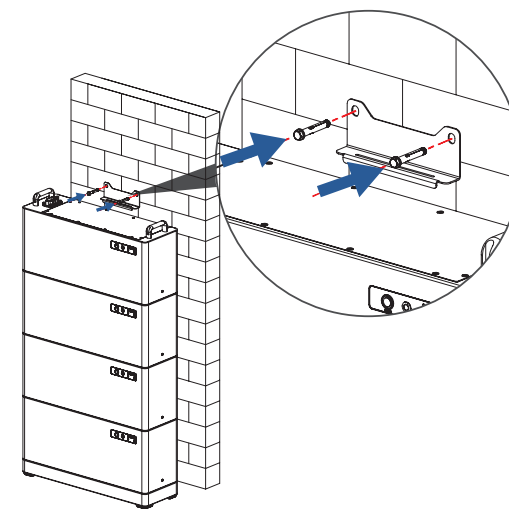


Step 4:

- Use the hole-marking template, reference the screws on the battery to mark hole positions on the wall with a marker.

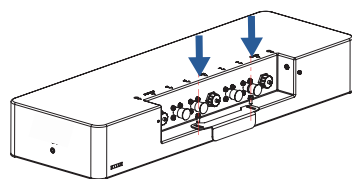


- Drill holes at the marked positions using an impact drill, insert expansion screws, and install the wall-locking plate.

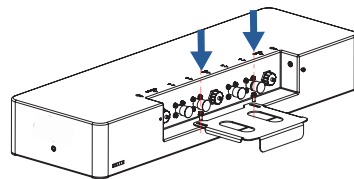


Step 5:

- Install the wall-hanging plate onto the Break Box(BB) and secure it with screws.



Brick wall

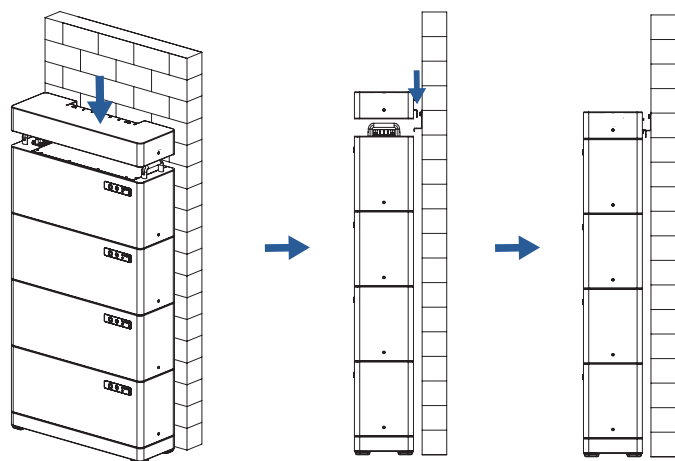


Wooden wall

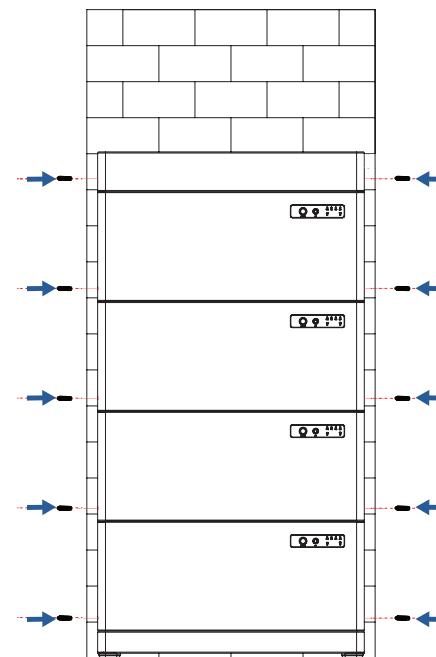


Take the parallel version of Break Box (BB) as an installation example.
The installation process for the non-parallel version is the same.

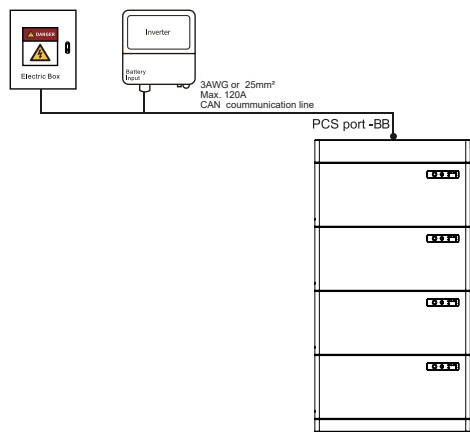
- Assemble Break Box (BB) onto the battery pack, insert the Wall-hanging plate into the slot of the wall-locking panel.



- After stacking is completed, install the screws on the sides of the battery pack and Break Box (BB), installation complete.

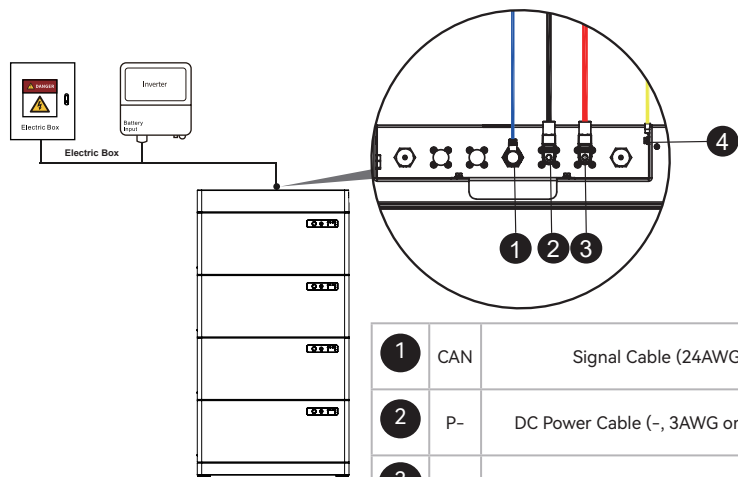


» 5 Cable connection



※ 5.1 Equipment installation

Install the battery system through the following steps:



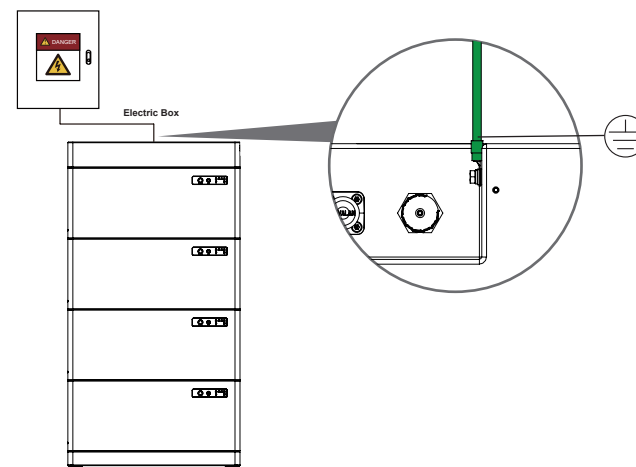
1	CAN	Signal Cable (24AWG)
2	P-	DC Power Cable (-, 3AWG or 25mm²)
3	P+	DC Power Cable (+, 3AWG or 25mm²)
4	⊕	Grounding (6AWG)

※ 5.2 Installing an external grounding

Connect the ground point (⊕) of the cabinet to the external Electric Box. Otherwise, electric shocks may occur.

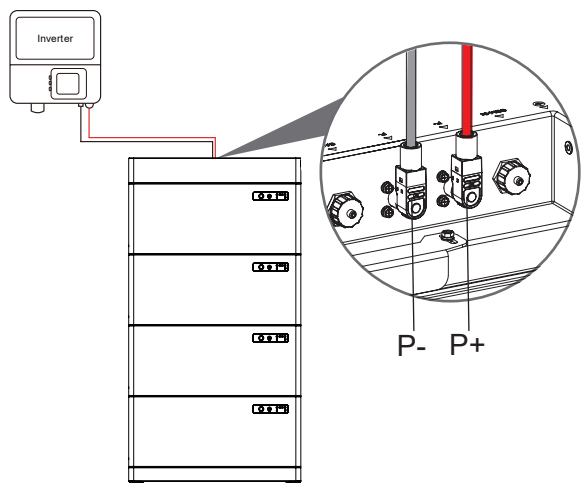


Do not connect the ground point (⊕) of the BB to the external hybrid inverter. Otherwise, BMS may be disturbed and can not work properly.



※ 5.3 Installing external DC power cables

Insert the positive and negative battery connectors into the corresponding DC input terminals (P+ and P-). The positive power cable (BAT+) is red and negative power cable (BAT-) is black. Before assembling DC connectors, label the cable polarities correctly to ensure correct cable connections.



※ 5.4 Installing an external signal cable

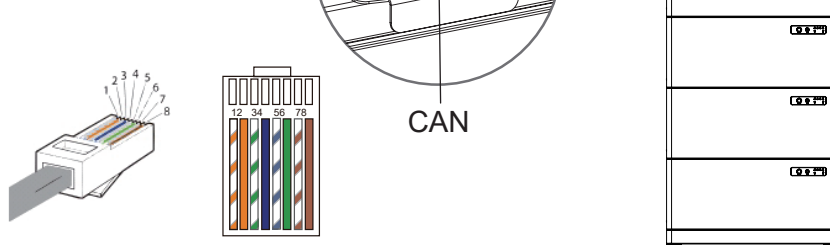
Choose signal cable type (CAN cable/ RS485 cable) based on the Inverter when laying out a signal cable.

Separate the Signal Cable from power cables when connect it between the BB and the Inverter and keep it away from strong interference sources to prevent communication interruption.

CAN cable:

The wiring order of the signal cable is as follows:

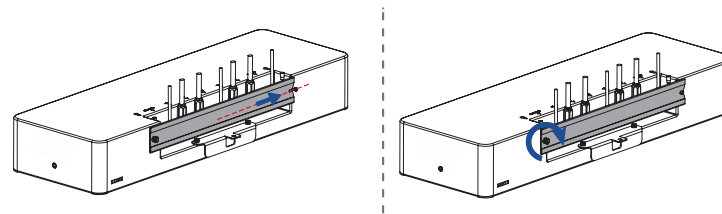
- (1) White with an orange stripe
- (2) Orange
- (3) White with a green stripe
- (4) Blue
- (5) White with a blue stripe
- (6) Green
- (7) White with a brown stripe
- (8) Brown



Sequence	1	2	3	4	5	6	7	8
CAN	NC	NC	NC	CAN-H	CAN-L	NC	NC	NC

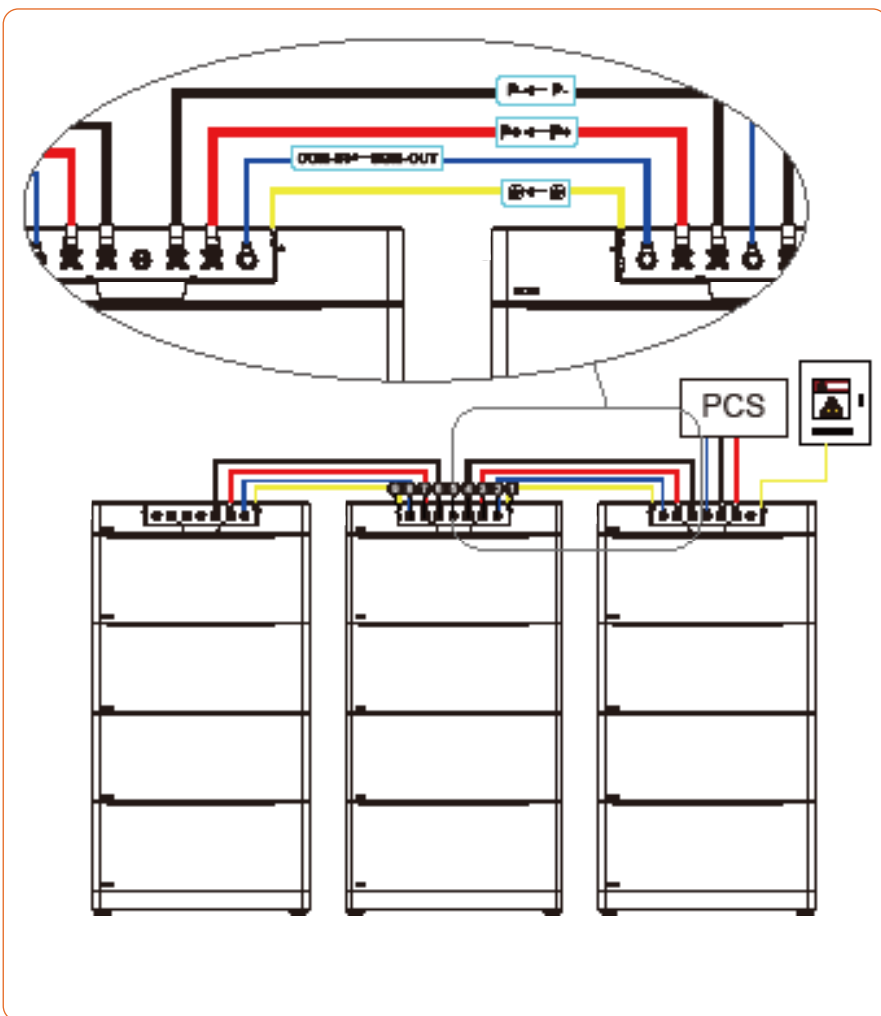
※ 5.5 Assembling baffle to break box

After connecting the cables with inverter, you can assemble the baffle to battery as below.



※ 5.6 Parallel connection of batteries

You can connect the cables between two batteries as below. 4 battery clusters can be connected in parallel.



» 6 System commissioning

※ 6.1 Inspection before power on

Table: Checklist and Acceptance Criteria

No.	Check Item	Acceptance Criteria
1	Installation	The installation is correct and reliable.
2	Grounding	The GD cable is connected correctly, securely and reliably.
3	Cable connection	The DC power cables, signal cables and ground cables are connected correctly, securely, and reliably.
4	Installation environment	The installation space is proper, and the installation environment is clean and tidy.

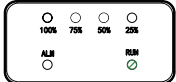
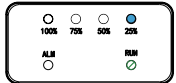
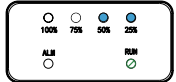
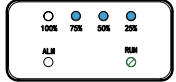
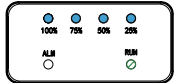
※ 6.2 System power on

Power on the system through the following steps:

- Press the switch button (SW) on equipment, If parallel connection is required, then press the FN key on the master unit.
- The green running LED should normally be ON.
- If it is failed to switch on the system, check that all the electrical connections are correct.
- If the electrical connections are correct but the system is still not able to switch on, contact our after-sale service within 48 hours.

※ 6.3 LED indicators

6.3.1 Normal state

LED Indicator	SOC Indicator Description	Acceptance Criteria
- Red light is off - Green light blinking for 1s - Blue light is displayed as shown in the figure		SOC=0%
		0%<SOC<25%
		25% ≤ SOC < 50%
		50% ≤ SOC < 75%
		75% ≤ SOC ≤ 100%

※ 6.4 Power off

Power off the system through the following steps:

1. Turn off the inverter.
2. Press the switch button(SW) to be OFF.
3. Ensure that all LED indicators are OFF and the system has shut down completely.
4. Disconnect all the system wiring.



Warning

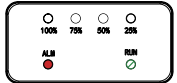
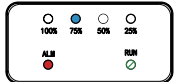
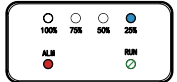
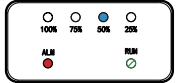
After the system powers off, residual electricity and heat may still pose risks of electric shocks and burns. Therefore, it is advisable to wear protective gloves and wait 15 minutes after the system has powered off before performing any operations on the system.

6.3.1 Normal state



Note

- refers to the LED indicator is off
- refers to the LED indicator is on
- ◐ refers to the LED indicator is blinking

Button Indicator	LED & SOC Indicator	Fault Description
- Green light blinking for 1s - Red light on - Blue light is displayed as shown in the figure		Over voltage
		Over current
		Under voltage
		Over temperature

» 7 System maintenance

※ 7.1 Routine maintenance

To ensure that the system can operate properly for a long term, it is recommended to perform routine maintenance according to the description in this chapter.



CAYTION

Power off the system before cleaning the system, connecting cables and ensuring the grounding reliability.

Check Item	Check Method	Maintenance Period
Appearance status	Check that the battery module is not damaged or deformed.	Once every 6 months
System running Status	Check that the battery module does not generate abnormal sound when it is in operation.	Once every 6 months
System running Status	Check that cables are secured and intact. In particular, the parts touching the metallic surface are not scratched.	The first inspection is 6 months after the initial commissioning. From then on, the interval can be 6 to 12 months.
Ground reliability	Check that ground cables are securely connected.	The first inspection is 6 months after the initial commissioning. From then on, the interval can be 6 to 12 months.

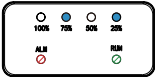
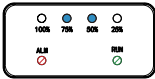
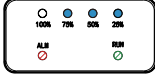
※ 7.2 Troubleshooting

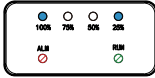
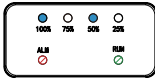
Common alarms find troubleshooting measures as follow:

No.	Software Error	LED & SOC Indicator	Troubleshooting
1	Over voltage		Please contact your dealer or technical support.
2	Under voltage		Please contact your dealer or technical support.
3	Over temperature		Wait till the temperature of cell goes back to the normal state.

No.	Software Error	LED & SOC Indicator	Troubleshooting
4	Under temperature		Wait till the temperature of cell goes back to the normal state.
5	Over current		Please contact your dealer or technical support.
6	Self-test error		Wait till the temperature of cell goes back to the normal state.
7	Precharge error		Please contact your dealer or technical support.
8	Relay error		Please contact your dealer or technical support.
9	Communication timeout		Please contact your dealer or technical support.
10	Large differential voltage		Please contact your dealer or technical support.
11	Large differential temperature		Please contact your dealer or technical support.
12	Reverse connection error		Please contact your dealer or technical support.

No.	Hardware Error	LED & SOC Indicator	Troubleshooting
1	Over voltage		Please contact your dealer or technical support.
2	Under voltage		Please contact your dealer or technical support.
3	Over temperature		Wait till the temperature of cell goes back to the normal state.
4	External short circuit		Please contact your dealer or technical support.
5	Over current		Please contact your dealer or technical support.

6	AFE error		Please contact your dealer or technical support.
7	Voltage sensor error		Please contact your dealer or technical support.
8	Temperature sensor error		Please contact your dealer or technical support.
9	Current sensor error		Please contact your dealer or technical support.

No.	Associated Address Error	LED & SOC Indicator	Troubleshooting
1	Timeout		Please contact your dealer or technical support.
2	Error		Please contact your dealer or technical support.

 CAUTION	If you meet other types of LED & SOC indicator that you cannot deal with, please contact your dealer or technical support.
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» 8 What to do in case of an emergency

In the event of any threat to health or safety, always begin with these two steps before addressing the other

suggestions below:

1. Immediately contact the fire department or other relevant emergency response team.
2. Notify all people who might be affected and ensure that they can evacuate the area.



Only perform the suggested actions below, if it is safe to do so.

※ 8.1 In case of fire

The battery module may catch fire when heated about 150° C.

- Press the Switch button (SW) to be OFF.
- Turn off the breaker to the inverter.
- Acceptable fire extinguisher types are CO₂ and ABC.

※ 8.2 In case of flooding

- 1. Stay out of the water if any part of the battery module or any wiring is submerged.
- 2. Press the Switch button (SW) to be OFF.
- 3. Turn off the breaker to the inverter.
- 4. If possible, protect the system by finding and stopping the source of the water, and pumping water away.
- 5. Let the area dry completely before use.

※ 8.3 In case of unusual noises

- Press the Switch button (SW) to be OFF.
- Turn off the breaker to the inverter.
- Ensure that nothing is inside the case, then restart the system and if there are still unusual

noises, please contact your dealer or technical support.

※ **8.4 In case of unusual smell or smoke**

- Please ensure your safety first, then contact your dealer or fire department based on the actual situation to move to the next step.
- Press the Switch button (SW) to be OFF.
- Turn off the breaker to the inverter.
- Ensure nothing is in contact with the battery system.



sunways

📍 No. 1, Second Road, Green Industrial Zone, Chongshou Town,
Cixi City, ZheJiang Province, PRC

🌐 www.sunways-tech.com

✉ service@sunways-tech.com

