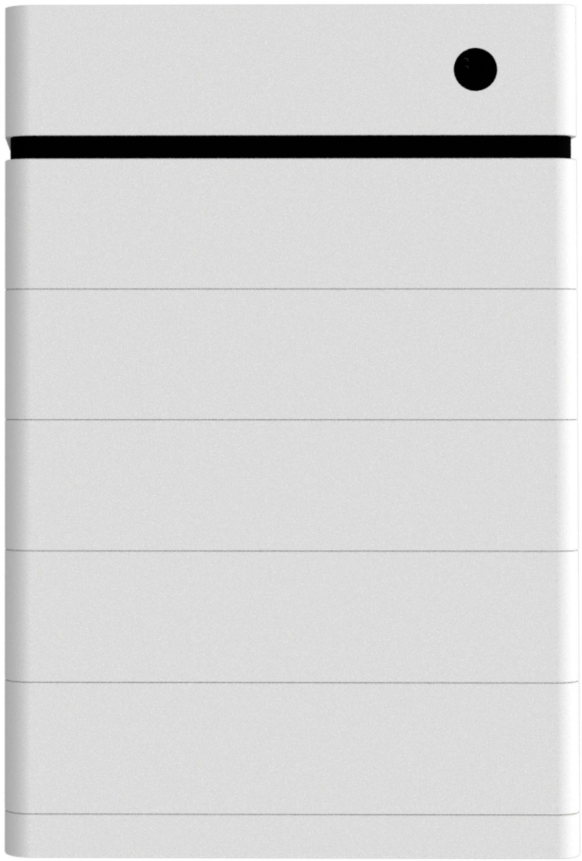
PowerCool-SHL005RA1 Series

Operation Manual



Version:1.0,November 10,2024

Disclaimer

The material furnished in this manual is believed to be accurate and reliable. The information and recommendations in this manual do not constitute commitments or warranties in the form of assignments. The information in this document is subject to change without notice.

This manual mainly describes the product information, guidelines for installation, operation, maintenance and troubleshooting. And this manual applies to the PowerCool-SHL005RA1 system, including the hybrid inverter. Please keep the Manual properly and operate in strict accordance with all safety and operating instructions in this manual. Please do not operate the product before reading through the manual.

All brands and product names are trademarks or registered trademarks of their respective holders.

This manual introduces PowerCool-SHL005RA1 system and hybrid inverter manufactured by our company. Please read this manual before you install the product and follow the instructions carefully during the installation process. Our company shall not be liable for any consequences resulting from the violation of the storage, transportation, installation, and operation regulations outlined in this document. Should you have any confusion, please contact our company for advice and clarification.

We will continuously update the product information. If you want to obtain the latest version, you can refer to the official website (http://www.solareastess.com) for the most up-to-date version.

CONTENTS

1 Introduction

1.1 Content and Structure of this Document

This document is valid for PowerCool-SHL005RA1 battery system.

This document describes the product information, and guidance for installation.

Observe all documentation that accompanies the product, keep them in a convenient place and available at all times.

Illustrations in this document are reduced to the essential information and may deviate from the real product.

1.2 Target Group

This manual is intended for qualified persons and end users. Only qualified persons are allowed to perform the operations marked with a warning symbol in this manual. Tasks that do not require any specific qualifications will not be marked and can be performed by the end user. Qualified persons must have:

- Knowledge of working principle of Li-ion battery.
- Knowledge of how to deal with the dangers and risks associated with installing and using electrical devices, batteries and systems.
- Knowledge of the installation and commissioning of electrical devices and systems.
- Knowledge of the applicable standards and directives.
- Understood and complied with this document, including all safety precautions.
- Understood and complied with the documents of the battery and inverter manufacturer, all safety precautions included.

1.3 Levels of Warning Messages

DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

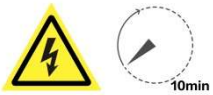
CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE indicates a situation which, if not avoided, can result in property damage.

1.4 Marks

	Warning electric shock.		Do not operate until 10 minutes after discharge
	Warning Fire		Read the product and operation manual before operating the battery system!
	Do not reverse connect the positive and negative		CE mark
	Do not place near open flame		Recyclable
	Do not place at the children or pet touchable area		Grounding

1.5 Definition of Abbreviations and Nouns

Abbreviation	Noun
AC	Alternating Current
BAT	Battery
BMS	Battery Management System
DC	Direct Current
INV	Inverter
PV	Photovoltaic
SOC	State of Charge
SOH	State of Health

2 Safety Instruction

This product is designed and tested in accordance with international safety requirements IEC 62619:2022 and IEC 63056:2020, but as with all electrical and electronic equipment, certain precautions must be observed when installing and operating the product. To reduce the risk of personal injury and ensure the safe installation and operation of the product, more attention should be paid on following all instructions, cautions and warnings in this Manual.

2.1 Battery precautions

WARNING

It is important and necessary to read the user manual carefully before installing or using battery. 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 battery, potentially rendering it inoperable.

- When the storage time is less than three months, it is recommended to store at a temperature of 0-45 ℃, ≤ 85% RH, and an SOC range of 20%-50% SOC. When the storage time is more than three months, it is recommended to store at a temperature of 15-30 ℃, ≤ 85% RH, and an SOC range of 20%-50% SOC.When the storage time exceeds 6 months, it is necessary to adjust the SOC of the battery cell to 20- 50% SOC, ≤ 85% RH, and the recommended storage temperature is 5℃-25 ℃.
- High SOC (>50% SOC) storage is not allowed during storage, and full charge storage is prohibited.
- Battery needs to be recharged within 12 hours after being fully discharged.
- Do not have the product installed in any environment that falls outside the range of temperature or humidity set out in the Manual.

- All the power terminals must be disconnected for maintenance.
- Please contact the supplier within 24 hours in case of anything abnormal.
- Do not use cleaning solvents to clean battery.
- Do not expose battery to flammable or harsh chemicals or vapors.
- Do not paint any part of battery, include any internal or external components.
- Do not connect battery with PV solar wiring directly.
- Any foreign object is prohibited to insert into any part of battery.
- The warranty claims are excluded for direct or indirect damage due to above reasons.
- Recycle batteries in accordance with local regulations.

2.2 Emergency situation

DANGER

This product is designed with multiple safety strategies to prevent hazards resulting from failure. However, hazards and dangers could emerge in few uncertain situations.

Fire

The battery PACK may catch fire when heated over 150°C.Ensure an ABC or carbon dioxide extinguisher nearby the battery, and do not use water to extinguish the fire. If a fire breaks out where the battery is installed, perform the following actions:

- Extinguish the fire before the battery catches fire.
- If the battery has caught fire, do not try to extinguish the fire. The fired battery will produce poisonous gases, please evacuate people immediately.

Leaking

If the battery PACK leaks, avoid contact with the leaking liquid or gas. Electrolyte is corrosive and contact may cause skin irritation and chemical burns. If one is exposed to the leaked substance, perform the following actions:

- Inhalation: Evacuate the contaminated area and seek medical attention immediately.
- Eyes contact: Rinse eyes with flowing water for 15 minutes and seek medical attention immediately.
- Skin contact: Wash the affected area thoroughly with soap and water and seek medical attention immediately.
- Ingestion: Induce vomiting as soon as possible and seek medical attention immediately.

Wet battery

If the battery is wet or submerged in water, do not try to access it. Contact customer service for technical assistance.

Damaged battery

Damaged battery may emit toxic gas or/and flammable gas, which could cause hazards to lives or property. If the battery is damaged, please keep away from the battery and contact customer service for help as soon as possible.

3 System Introduction

3.1 Parameters of energy storage system

Product name	Rechargeable Li-ion Battery System				
Battery Module	PowerCool-SHL005RA1				
Battery Type/Model	PowerCool-SHL 005RA1-5	PowerCool-SHL 005RA1-10	PowerCool-SHL 005RA1-15	PowerCool-SHL 005RA1-20	PowerCool-SHL 005RA1-25
Number of PACK (PCS）	1	2	3	4	5
Total Energy (kWh)	5.32	10.64	15.97	21.29	26.62
Usable Energy (kWh)*	5.06	10.11	15.18	20.24	25.30
Voltage Range (V)	89.6~115.2	179.2~230.4	268.8~345.6	358.4~460.8	448~576

Nominal Voltage (V)	102.4	204.8	307.2	409.6	512
Charging Voltage Declared by Manufacturer (V)	115.2	230.4	345.6	460.8	576
Nominal Charging Current (A)	30				
Nominal Discharge Current (A)	30				
DOD (%)	95				
Communication	CAN/RS485				
Dimension(L*W*H) (mm)	(660±2)* (390±2)* (378±3)	(660±2)* (390±2)* (528±5)	(660±2)* (390±2)* (678±7)	(660±2)* (390±2)* (828±9)	(660±2)* (390±2)* (978±9)
Net Weight (kg)	63±2	108±4	153±6	198±6	243±6
Operating Condition	Indoor or outdoor				
Storage Temperature Range	＞3 month 15~30℃；≤3 month 0~45℃				
Operating Temperature – Charging	0~52 ℃				
Operating Temperature – Discharging	-15~52 ℃				
Humidity	15% ~ 85%RH(No Condensation)				
Operating Frequency*	2412MHz-2472MHz(EIRP <20dBm) 2402MHz. 2480MH/(EIRP <10dBm)				
Cooling Type	Natural				
Operating Altitude(m)	< 2000(Derating above 2000 m)				
IP Rating of Enclosure	IP66				
Class of Protection	Class I				
Installation Method	Stacked installation				
Supply Connection	Fixed power cord				
Warranty	10 years (5 free warranty + 5 paid warranty)				

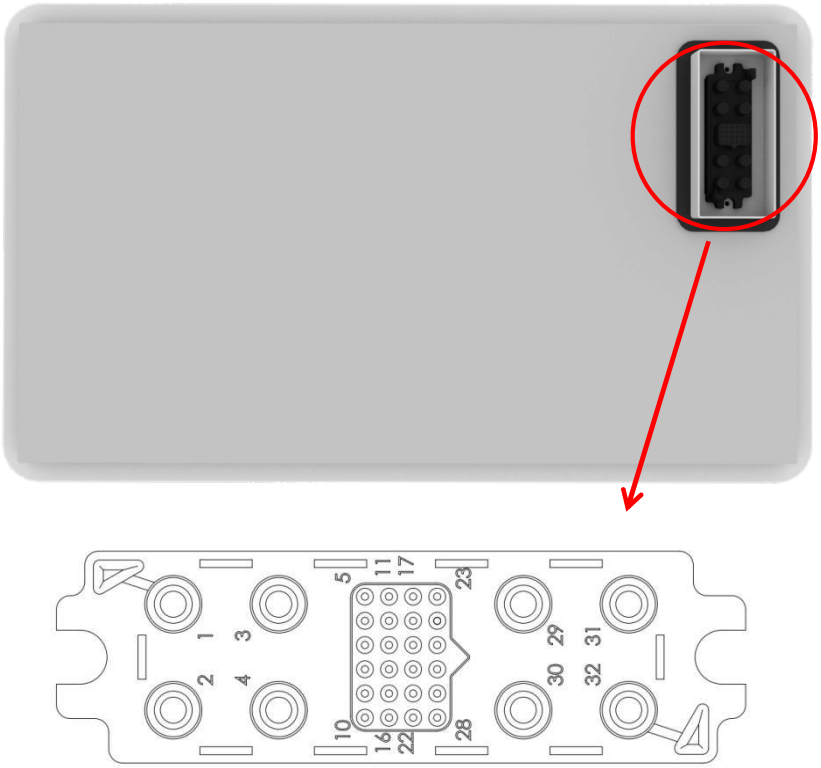
*Testing conditions based on temperature 25℃ at the beginning of life. Total Energy/Usable Energy are measured with a standard test method: 0.2C Charge and Discharge. As per the characteristics of lithium batteries, such parameters as the charge/ discharge current and efficiency listed above are subject to change. The final right of interpretation is reserved our company.
*Our company hereby declares that the radio module of this energy storage battery complies with the requirements of Directive 2014/53/EU.
*You can visit our official website (http://www.solareastess.com) to download the latest user manual or get more information.

3.2 PACK

Battery Module Type		PowerCool-SHL005RA1
Total energy (kWh）		5.32
Usable Energy (kWh)		5.06
Voltage Range (V)		89.6~115.2
Nominal Voltage (V)		102.4
Max. Charge Voltage (V)		115.2
Discharge cut-off voltage(V)		89.6
Lower limit discharging voltage(V)		83.2
Max.continuous charging current (A)		30
Max.continuous discharge current (A)		30
DOD%		95
Dimension(L*W*H) (mm)		（660±2）*（390±2）*（150±2）
Net Weight (kg)		45±2
Operating Condition		Indoor or outdoor
Operating Temperature	Charging	0~52 ℃
	Discharging	-15~52 ℃

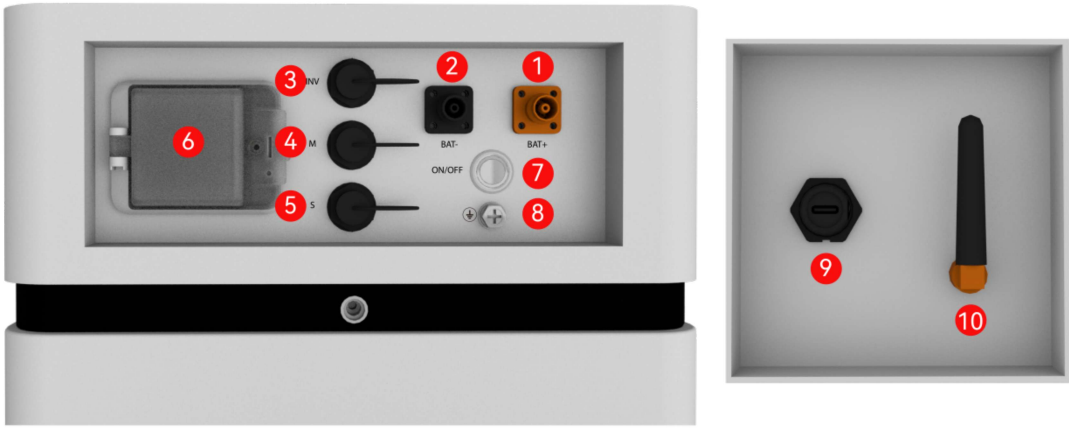
Humidity	15%~85%RH (No Condensation)
IP rating of enclosure	IP66
Configuration	(16S)2S
Warranty	10 years (5 free warranty + 5 paid warranty)

Schematic diagram and definition of the connection terminals



Pin Number	Definition	Pin Number	Definition
1	B+	7	Coded Transmission
32	B-	8	BMU VCC
4	Protective Ground	9	BMU GND
5	CAN-H	17、23	Heating Film-
6	CAN-L	22、28	Heating Film+

3.3 Battery Control Box



(1) BAT+

Battery anode

(2) BAT-

Battery cathode

(3) Inverter Port

Communication port to inverter (CAN/RS485).

3#RJ45 PIN	definition	PIN	definition
PIN1	-	PIN5	CAN L
PIN2	-	PIN6	-
PIN3	-	PIN7	RS485A
PIN4	CAN H	PIN8	RS485B

(4) Communication Port/M

Parallel signal output port

2#RJ45 PIN/M	Definition	PIN	Definition
PIN1	Addr_out	PIN5	CANL2
PIN2	-	PIN6	CAN2_GND
PIN3	-	PIN7	-
PIN4	CANH2	PIN8	-

(5) Communication Port/S

Parallel signal input port and upper computer communication port

1#RJ45 PIN/S	Definition	PIN	Definition
PIN1	Addr_IN	PIN5	CANL2
PIN2	-	PIN6	CAN2_GND
PIN3	-	PIN7	RS485A1
PIN4	CANH2	PIN8	RS485B1

(6) DC Circuit Breaker

Rated Voltage	Rated Current	Release Type	Dimension(L*W*H)
DC 750 V	40 A	B	87.5*54*66 mm
Limiting Breaking Capacity（I_{cu}）	Pole	Rated Insulation Voltage(U_i)	
6 kA	3P	AC 1200 V	

(7) Button Switch

Open the circuit breaker waterproof cover A, switch the circuit breaker to ON, and then press the button switch B to light it up, the battery system successfully started. Switch the circuit breaker to OFF, the battery system is closed.

(8) GND

Grounding protection

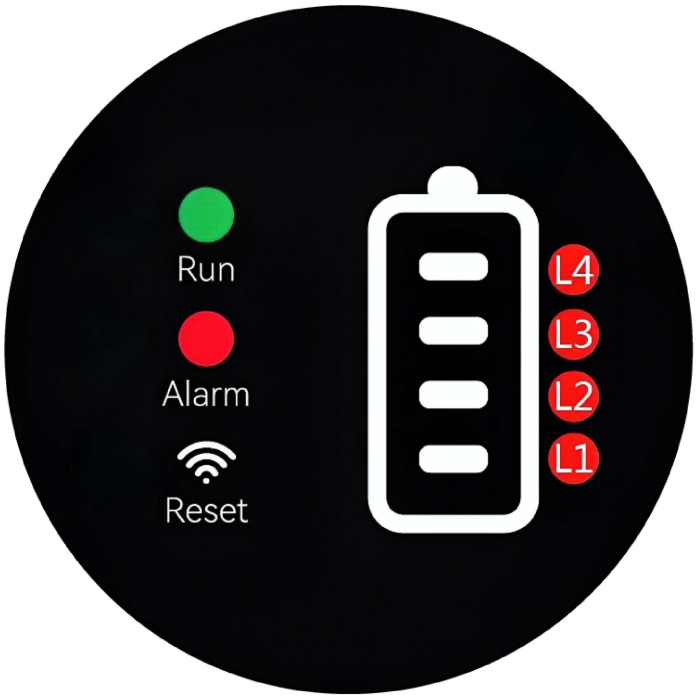
(9) Type-C Port

When the battery capacity is too low, the BMS hibernation, you can wake up the BMS by forcing a charge through the type-c port.

(10) WIFI

Wi-Fi module

LED Status Indicators：



SOC Indicators

SOC indicators		L4 ●	L3 ●	L2 ●	L1 ●
SOC (%)	0%～25%	OFF	OFF	OFF	ON
	25%～50%	OFF	OFF	ON	ON
	50%～75%	OFF	ON	ON	ON
	75%～100%	ON	ON	ON	ON

Working status indication：

State of Fault	ALM	RUN	Indicators			
			L4	L3	L2	L1
	●	●	●	●	●	●
Cell Fault	ON	OFF	OFF	OFF	OFF	OFF
NTC Fault	ON	OFF	OFF	OFF	OFF	ON
Precharge Fault	ON	OFF	OFF	OFF	ON	OFF
Short-Circuit Fault	ON	OFF	OFF	OFF	ON	ON

Charging Contactor Fault	ON	OFF	OFF	ON	OFF	OFF
Discharging Contactor Fault	ON	OFF	OFF	ON	OFF	ON
Precharge Contactor Fault	ON	OFF	OFF	ON	ON	OFF
Negative Contactor Fault	ON	OFF	OFF	ON	ON	ON
Level 3 Charging Cell Overvoltage Protection	Blink	OFF	ON	OFF	OFF	OFF
Level 3 Charging Overall Overvoltage Protection	Blink	OFF	ON	OFF	OFF	ON
Level 3 Charge Overcurrent Protection	Blink	OFF	ON	OFF	ON	OFF
Level 3 Discharge Cell Undervoltage Protection	Blink	OFF	ON	OFF	ON	ON
Level 3 Discharge Overall Undervoltage Protection	Blink	OFF	ON	ON	OFF	OFF
Level 3 Discharge Overcurrent Protection	Blink	OFF	ON	ON	OFF	ON
Level 3 Charging High Temperature, Low Temperature Protection	Blink	OFF	ON	ON	ON	OFF
Level 3 Discharging High Temperature, Low Temperature Protection	Blink	OFF	ON	ON	ON	ON

RUN ●	Blink 1
ALM ●	OFF(The indicator is on when third-level alarm is triggered. See assistance from local distributor)
Reset	If WiFi is to be reconnected, press the button and hold for 5s till the WIFI icon on the screen flashes, and then proceed with WiFi

Blinking LED Indicators:

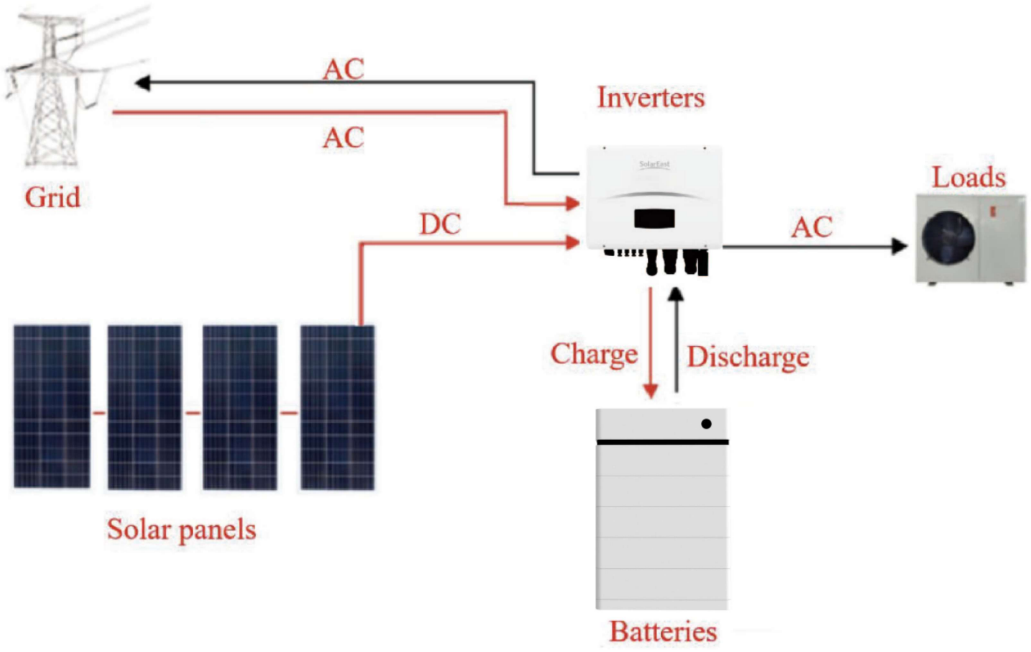
Blink Mode	ON	OFF
Blink 1	0.5S	0.5S

The system lock

The battery system have a non-resettable function to stop operation. If the voltage, current, temperature and other information reach the system lock threshold, the system will enter the system lock state. In this state, the system cannot be restored by restarting the system or any other operation. Please contact the professional operating system of this product and then ask them to exit the system lock state.

3.4 Application scenario

The PowerCool-SHL005RA1 series energy storage system are designed to increase energy independence for homeowners. Energy management is based on time-of-use and demand charge rate structures, significantly reduce the amount of energy purchased from the public grid and optimize self-consumption. The system can be applied in DC-coupled systems and Off-grid (with Generator) systems.



3.5 Features

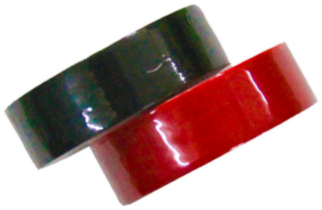
- The battery is non-toxic, pollution-free and environmental-friendly.
- Anode material is made from $LiFePO_4$ with safety performance and long cycle life.
- BMS has protection functions including over-discharge, over-charge, over-current and high/low temperature.

- Flexible configuration, multiple battery modules can be connected in series to increase storage energy.

4 Installation

4.1 Tools and safety gear

The displayed tools are recommended and could be used in the installation of batteries and hybrid inverter. And the safety gear should be worn correctly during installation. During operation, consider that the noise emitted based on the environment could possibly exceed the legal thresholds (less than 70 dB), therefore, suitable ear protection must be worn.

 Screwdriver	 Wire cutter	 Crimping modular plier
 Voltmeter	 Pocket knife	 Insulating tape
 Insulated gloves	 Safety goggles	 Safety shoes

 Socket wrench	 Percussion drill	

4.2 Package Items

Unpacking

On receiving the products, please check to make sure the packing and all components are not missing or damaged. Please contact your dealer directly for supports if there is any damage or missing components.

Package list of battery control box and battery PACK

Open the package, please check the packing list shown as below.

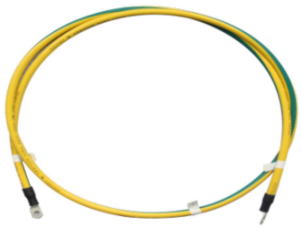
Battery Control Box		
No.	Qty	Items
1	1	Battery Control Box
2	1	Battery Pedestal
3	1	1.5m power cable (6AWG) to inverter BAT+ port
4	1	1.5m power cable (6AWG) to inverter BAT- port
5	1	1.5m ground wire (6AWG)
6	1	1.5m communication cable to inverter communication port
7	1	User Manual & Warranty Card
8	2	M5*22 enclosure connection screws
9	1	Pretective cover
10	2	M4*10 fixed screws
11	1	Product Qualification Pass
12	1	Test Report
13	1	Packing List

PACK		
No.	Qty	Items
1	1	PACK
2	2	M5*22 enclosure connection screws
3	1	Packing List

Power cables to inverter *2 - (6 AWG;Optional; used to be connected Master battery to Inverter or parallel connection)

F. RJ45 communication cable to inverter *1- (Optional; used to be connected Master battery to Inverter)

G. Ground wire *1 - (8 AWG;Optional; used for earthing of Master battery or parallel connection)

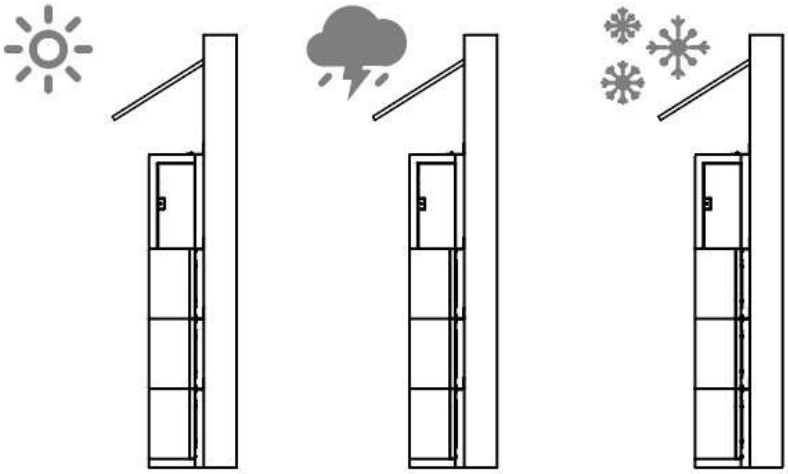


4.3 Installation Location

Make sure that the installation location meets the following conditions:

- The floor is flat and level;
- There are no flammable or explosive materials nearby;
- The ambient temperature is within the range from 0°C to 55°C;
- Humidity is maintained at 15% - 85% (RH) (no condensing);
- The distance from heat source is more than 2 meters;
- The distance from air outlet of inverter is more than 0.5 meters;
- The installation areas shall avoid of direct sunlight;
- There are no mandatory ventilation requirements for battery module, but please avoid of installation in confined area. The aeration shall avoid of high salinity, humidity or temperature;
- Please install the battery system on a foundation about 30cm above the ground.The foundation shall bear a load of 400 kg;

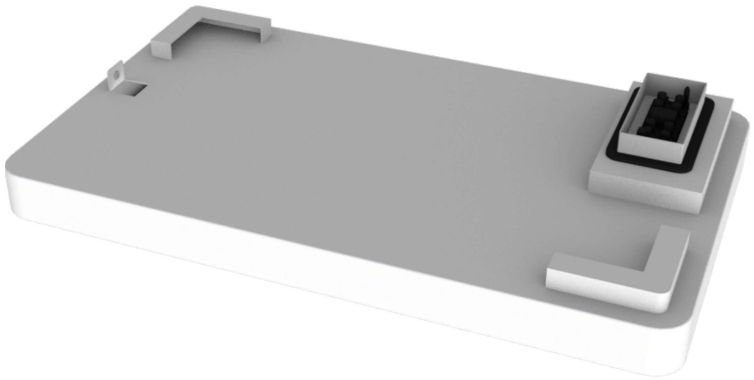
- Outdoor installation requires a protective device above the battery to reduce the erosion of rain, snow and strong ultraviolet rays.



4.4 Module Installation

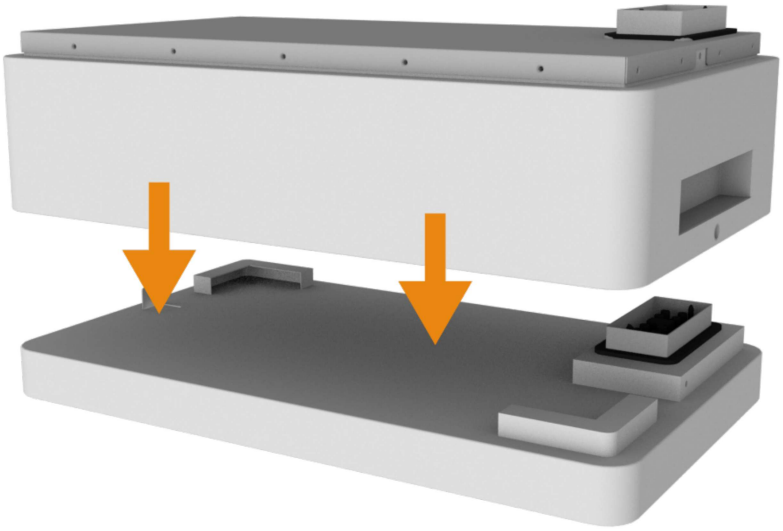
Step 1

Select a evenly level ground, place the base 40mm away from the wall, keep the base plane level, and mark the location of the base with a marker (the details about installation position described in chapter 4.3).



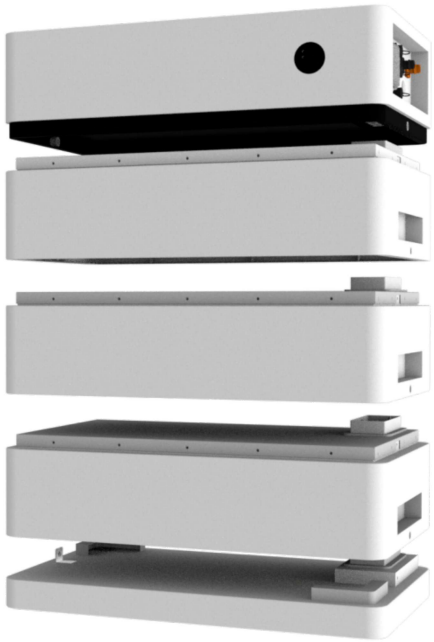
Step 2

Place battery pack in the right place of the pedestal. CAUTION: align the battery pack and pedestal before putting it on, make sure the couplings are on the same line to avoid any structural damage.



Step 3

Stack the packs one by one (5 at most) , and finally place the control box on the top layer.



CAUTION

Before placing battery pack or Battery Control Box on the pedestal, please align it with the pedestal and make sure the couplings are on the same line to avoid any structural damage or render installation impossible. Since each pack is as heavy as 47kg, if mechanical tools are not available, it is recommended to have at least 2 workers working on battery installation.

Step 4

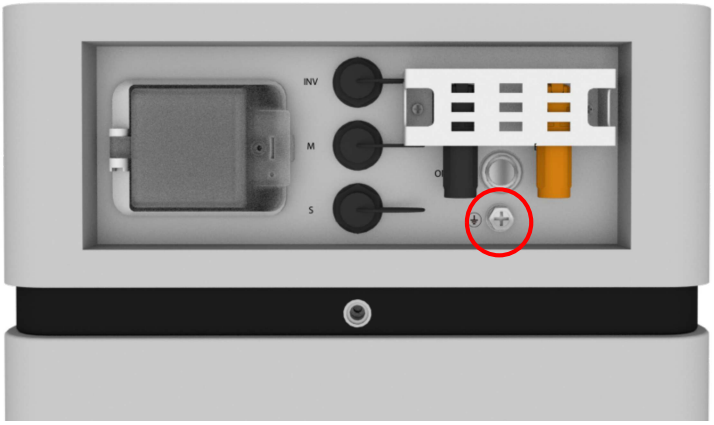
Tighten M6*12 screws into the threaded holes on both sides of Battery Control Box and each pack.

Step 5

Connect BAT+ and BAT- power cables by leading them from Battery Control Box to corresponding ports of inverter.Then, fix the protective cover according to the illustration to cover the positive and negative connector.

Step 6

Finally, connect the ground cable to the grounding point of the Battery Control Box. Ground cable is 8 AWG(Red circle). The cable shall be copper with yellow-green color.

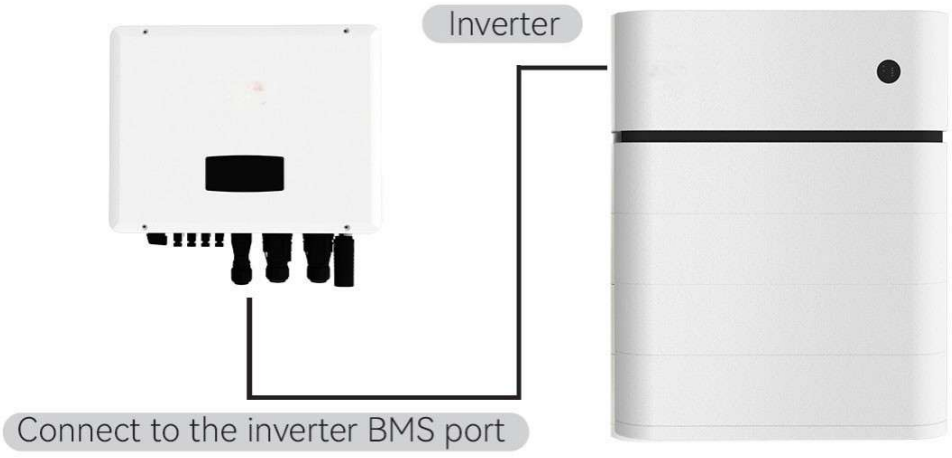


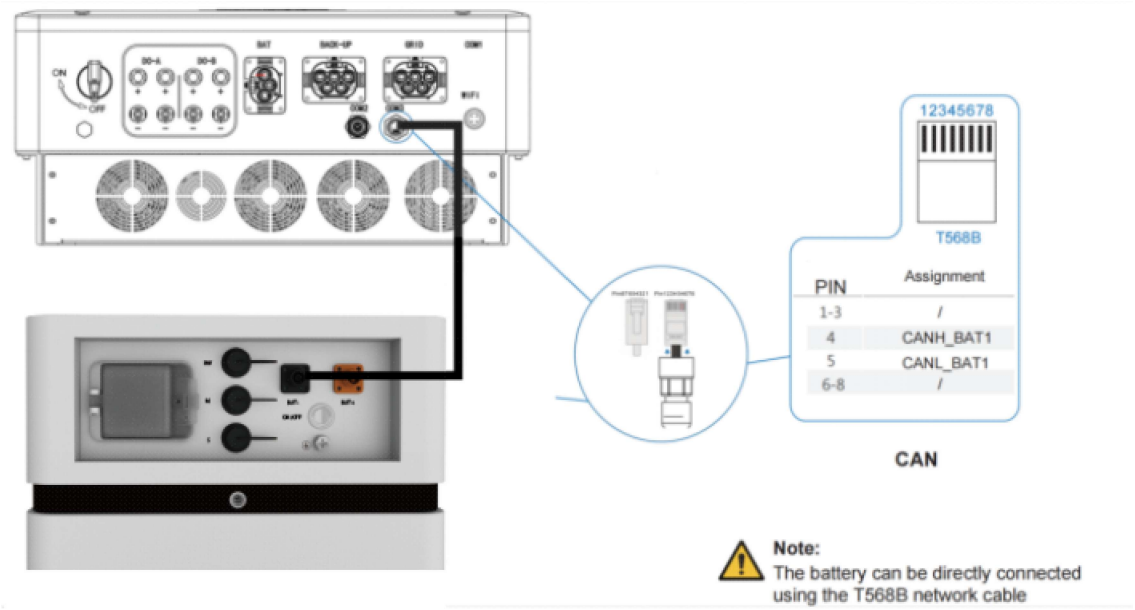
4.5 Cables Connection

Single battery system:

Step 1

Connect the communication cable by leading it from the inverter port of Battery Control Box to the inverter BMS port.

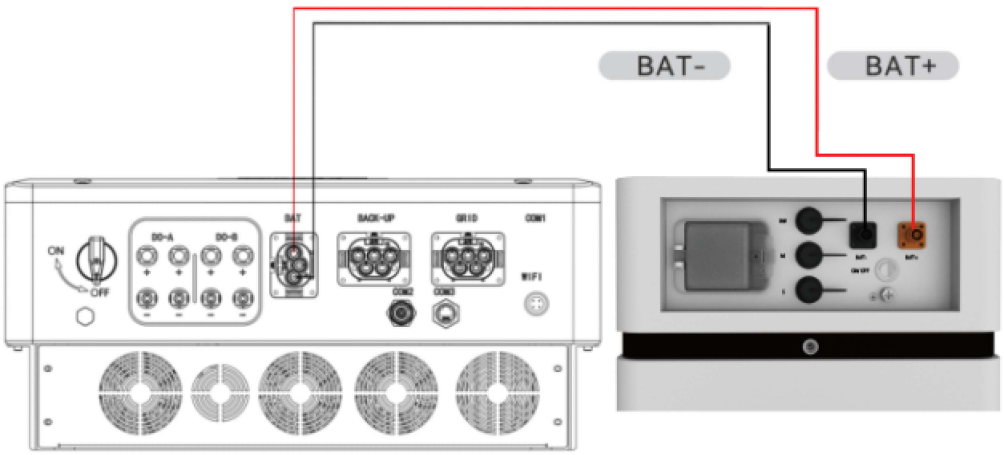




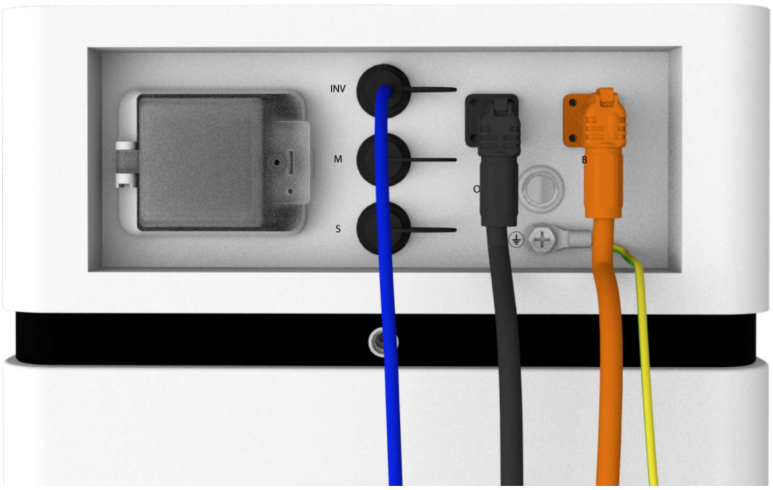
Step 2

Connect BAT+ and BAT- power cables（6AWG） by leading them from Battery Control Box to corresponding ports of inverter.

Battery connecting to the inverter (BAT+, BAT-)



Finally, the electrical connection of a single battery is shown as in the figure.



NOTICE

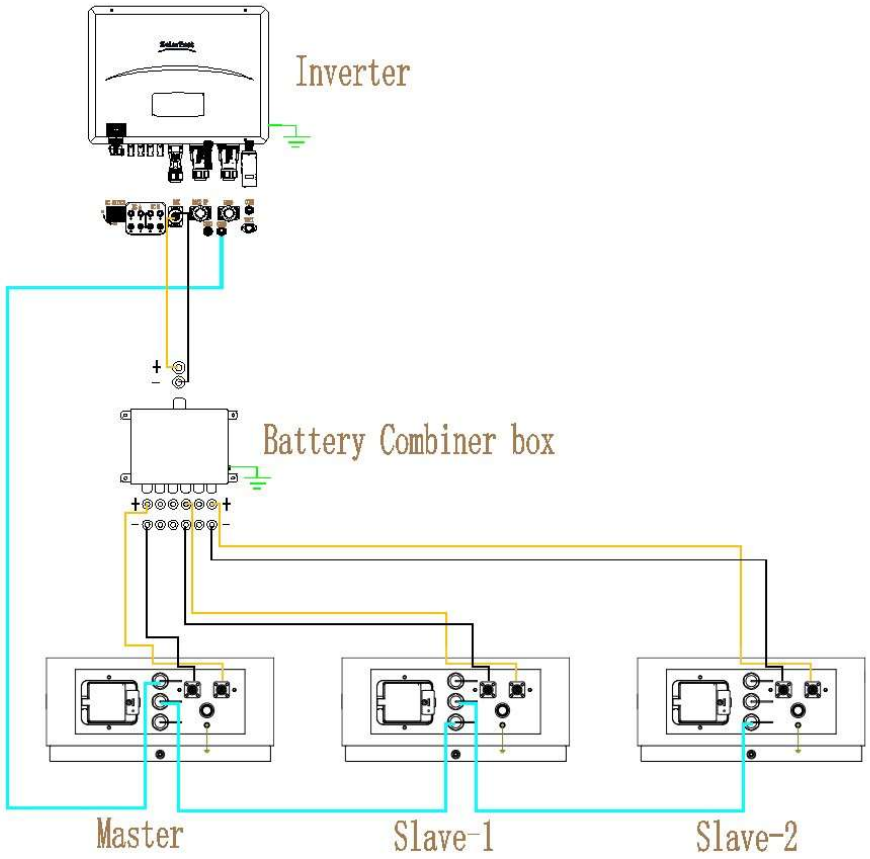
The PowerCool-SHL005RA1 battery system is designed to support both CAN and RS485 communication with the inverter.

Multi stake connection：

The product also supports parallel connection via Power Port. For parallel connection of battery systems, a battery combiner box (including terminal resistor) shall be separately purchased (available at additional cost). In addition, a DC cable to be connected between the output terminal of battery combiner box and the BAT terminal of inverter shall be additionally prepared by the user (some inverter suppliers may provide such cable in the packing items). The output terminal of the battery combiner box is compatible with 2 - 4 AWG cables (outer diameter 9 -12mm).

S.N.	Description	Quantity（pcs）	Remarks
1	Combiner box (including terminal resistor)	1	Provided at additional cost
2	2~4AWG cable	1	Provided together with the inverter or separately prepared by the user. The cable is used for connection Between the output terminal of battery combiner box and the BAT terminal of inverter.

The following Figs demonstrate wiring diagram of 3 strings of 4*5.22kWh battery systems.



Positive cable		terminal resistor	
Negative cable		Communication cable	
Ground wire			

- Before parallel connection, make sure the SOC of each battery system is identical. Measure the voltage with multimeter at the +/- interface of the Control Box and make sure the voltage difference of each battery system is less than 1.5V;
- Only Master battery is allowed to communicate with the inverter via RS485 or CAN interface;
- Communication between Master and Slave, Slave and Slave is realized via M/S interface. Both the Master and the last Slave shall be equipped with terminal resistance;
- Before connected to the inverter, +/- power cables leading from the battery system shall go through the combiner box first.
- Insert the parallel electrical resistance into the M network port of the first host and the S network port of the last slave machine.

4.6 Power on

First of all, check all the power cables and communication cables between Battery Control Box and inverter. Check and make sure grounding is connected.

Standalone System:

(1) Turn on the Breaker on the Battery Control Box.

(2) Switch ON the disconnection device between Battery Control Box and inverter if available.

(3) When the button switch flashes a green light, press and hold the button for 5 to 10 seconds to complete the startup.

Parallel System：

(1) First, open the circuit breaker of the main unit, then open the circuit breakers of all slave units one by one.

(2) Finally, hold down the power-on button of the main unit for 5 to 10 seconds to complete the one-click power-on.

4.7 Power off

Turn off the circuit breaker on the control box to complete the shutdown of the battery system.

DANGER

If you need to remove the cables, remember to turn off the inverter first.

5 Transport and Maintenance

5.1 Annual inspection

Every year after installation. The connection of power connectors, grounding points, power cables and screws are to be checked. Make sure there is no loosening, fracture or corrosion at any connection point. Check the installation environment such as dust, water, insect etc. and make sure it is suitable for IP66 battery system.

5.2 Transport requirement

The product transportation process shall meet the following requirements:

- Observe the caution signs on the packaging of the device before transportation.
- Battery energy state is 20%~50%, disconnect the high voltage circuit;
- When carrying the equipment by hand, wear protective gloves to prevent injuries.
- Handle the product gently during transportation to prevent dropping,tumbling and heavy pressure;
- Prevent severe vibration, inversion, impact, extrusion, sun and rain during product transportation.

5.3 Storage

- The device must be stored indoors.
- Do not remove the original packaging material and check the outer packaging material regularly.
- The storage temperature should be between 0℃ and 45℃ . The humidity should be between 5% and 65%.
- Stack the device in accordance with the caution signs on the carton to prevent the device falling down and damage. Do not place it upside down.