

Li-ONYX

LITHIUM IRON PHOSPHATE
LiFePO₄ BATTERY

16.07kWh

BATTERY SYSTEM

USER MANUAL



SAFE & RELIABLE

Advanced protection for total peace of mind



HIGH PERFORMANCE

Maximum efficiency for every cycle.



CLEAN ENERGY

Sustainable power for a greener tomorrow.



SMART INTEGRATION

Seamless compatibility with modern systems.



(SM-LI-ONYX - 16kWh)



DESIGNED FOR POWERFUL PERFORMANCE

Seamless Energy for Everyday Life



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VERSION 0.0

Preface

About This Manual

This manual describes the installation, electrical connection, commissioning, maintenance of the PV 16kWh Battery System. Please first read the manual and related documents carefully before using the product and store it in a place where installation, operation and maintenance personnel can access it at any time. The illustration in this user manual is for reference only. This user manual is subject to change without prior notice. (The actual product should prevail.)

Target Group

PV 16kWh Battery System must be installed by professional electrical engineers who have obtained relevant qualifications.

Scope

This manual is applicable to the following battery system:

- 16kWh

Conventions

The following safety instructions and general information are used within this user manual.

 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	Indicates a situation which, if not avoided, can result in property damage.
 NOTE	Information that is important for a specific topic or goal, however not related to safety.

CONTENTS

Preface.....	2
1. Detailed Specifications	4
2. Safety	5
2.1 Important Safety Instruction	5
2.2 Installation Requirement.....	6
2.3 Grounding Requirement	6
2.4 Personal Safety	6
2.5 Equipment Safety.....	6
2.6 Symbols on the Label	7
3. Unpacking and Storage	9
3.1 Unpacking	9
3.2 Scope of Delivery	9
3.3 Storage Recommendation	9
4. Product Overview	10
4.1 Interfaces and Functions	10
4.2 LED Indicator Definition	11
5. Installation.....	13
5.1 Installation Environment Requirement	13
5.2 Wall Mounting Steps.....	13
6. Electrical Connection.....	15
6.1 Requirements for the Electrical Connection	15
6.2 Electrical Connection Steps	17
6.3 Battery Activation	19
7. System Diagram.....	20
7.1 Single Unit	20
7.2 Multiple Units	21
8. Bluetooth.....	23
9. Maintenance.....	23
9.1 Routine maintenance.....	23
9.2 Troubleshooting	24
10. Decommissioning and Disposal.....	25
10.1 Decommissioning	25
10.2 Disposal.....	25

1. Detailed Specifications

Item Name	Specification
Rated Capacity	314 Ah
Rated Voltage	51.2 V
Rated Current	157 A
Working Voltage Range	43.2 to 57.6 V
Rated Energy	16.07 kWh
Max. Parallel Quantity	Max. 16 Sets in Parallel, 257.12 kWh
Max Charge Current	160 A
Max Discharge Current	200 A
Standard Charging Method	157 A to 57.6 V;25°C
Dimensions [W*D*H]	800 mm * 235 mm * 450 mm
Weight	~115 kg
Operating Temperature ¹	Charge: 0 °C to 55 °C Discharge: -20 °C to 60 °C
Storage Temperature and Humidity ²	Temperature:-15°C to 55°C Humidity: 5%~95% RH,no condensation
Working Humidity	5%~95% RH (non-condensing)
Altitude ³	≤ 3000 m
Communication	CAN, RS485, Bluetooth, WiFi (Optional)
Certifications	UN38.3
Designed Cycle Life	6000 cls@0.5CC/0.5DC , 70%SOH
IP Rating (25°C ± 2°C)	IP20
Cooling	Natural Cooling
Fire Protection	Aerosol fire suppression

¹ Recommended operating temperature: 10°C to 30°C.

² Recommended Storage temperature: 10°C to 30°C.

³ Recommended operating altitude ≤ 2000 m, maximum operating altitude 3000 m.

2. Safety

2.1 Important Safety Instruction

This product is designed and rigorously tested in compliance with international safety standards. Like all electrical and electronic equipment, residual risks remain despite meticulous manufacturing. To avoid personal injury and property loss, and ensure stable long-term operation, thoroughly read and strictly follow all safety instructions herein.

 DANGER	Electric shock hazard if surge protection is not used! Without surge protection, voltage surges can enter the building and connected devices through power, network, or other cables. Contact with live parts may cause death or serious injury. • Ensure all devices in the same system are integrated into existing surge protection systems/devices. • Refer to local installation codes and regulations to determine the requirements for the installation of surge protection devices.
 WARNING	Electric shock hazard from damaged measuring devices! Overvoltage may damage measuring devices, leaving hazardous voltage inside the enclosure. Contact with the enclosure may cause death or serious injury. • Only use measuring devices with a voltage rating exceeding the system battery voltage.
 CAUTION	Risk of injury from heavy product! Improper lifting or accidental dropping during transportation or installation may result in personal injury. • Lift and transport the product carefully. • Wear appropriate personal protective equipment, in accordance with local regulations, when handling the product.
 NOTICE	Electrostatic discharge may cause permanent damage to internal components of the battery system. • Ground yourself before touching any internal component.

2.2 Installation Requirement

Personnel must complete training on all safety precautions and proper operating procedures prior to installing, operating, or maintaining the device.

- Only qualified and trained personnel are allowed to install, operate, and maintain devices.
- Only qualified professionals are allowed to remove safety facilities and repair equipment.
- The product must be installed and used in accordance with the specifications described in this manual. Improper use may cause malfunction. Damage and faults incurred therefrom are not covered under warranty.

2.3 Grounding Requirement

The following applies only to devices that need to be grounded (except energy storage units).

- When installing devices, ground them. When removing the device, remove the ground cable at the end.
- Do not damage the ground conductor.
- Do not operate the device without a ground conductor installed. Before operating the device, check the electrical connections of the device to ensure that the device is reliably grounded.

2.4 Personal Safety

- Do not operate devices or cables during thunderstorms.
- Before opening a device, wear ESD clothes, ESD gloves, and an ESD wrist strap. Remove conductive objects such as jewelry and watches to avoid electric shocks or burns.
- If there is a fire, evacuate the building or equipment area and press the fire alarm bell, or call the fire alarm number. Under no circumstances is it permitted to re-enter a burning building.
- Do not turn on the switch before the device installation is complete.

2.5 Equipment Safety

- Before operation, the device should be securely fixed to the floor or other stable objects, such as walls or mounting bracket.
- Before powering on the device, ensure that screws inside the device are secured to prevent them from falling off during running.
- After installing the device, clear the empty packing materials from the device area.
- Replace unclear hazard signs promptly.
- In any case, do not change the structure of the equipment, installation sequence, etc., without the permission of the manufacturer.
- Never clean internal electrical components and equipment enclosure with water.
- Do not drill holes on the equipment enclosure.

2.6 Symbols on the Label



This symbol indicates that the product must be additionally grounded if additional grounding or equipotential bonding is required at the installation site.



Beware of high voltage and operating current!
The product operates at a high voltage and current. Work on the product must only be carried out by skilled and authorized personnel.



WEEE Designation
Do not dispose of the product together with household waste. Dispose the product in accordance with local disposal regulations for electronic waste.



The battery is recyclable
The battery can be recycled by a professional recycling organization, please refer to the relevant local regulations.



Observe the documentation
Read and understand all documentation supplied with the product.

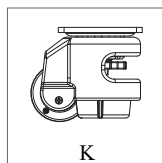
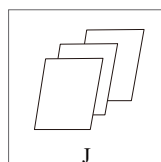
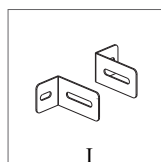
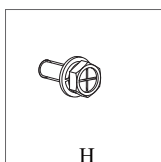
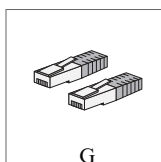
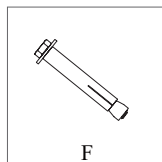
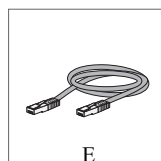
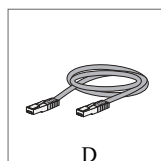
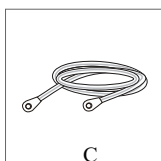
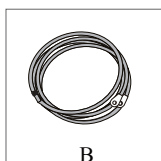
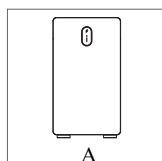
3. Unpacking and Storage

3.1 Unpacking

- Choose an appropriate place to set battery.
- Take the battery from the package.

3.2 Scope of Delivery

Check the scope of delivery for un completeness and any visible external damage. Contact your supplier if the package is damaged upon delivery or is incomplete.



Object	Item Name	Details	Quantity	Notes
A	Battery Pack		1 PC	
B	Output Cable	L=1500 mm	2 PCS	
C	Grounding Cable	Ground cable yellow & green, BVR2.5 square, L=2000 mm, double RNB2-6	1 PC	
D	Communication Cable	Black Category 5e unshielded cable sequence: 4 pairs, 4 pairs, 5 pairs, 5 pairs, wire length: 2000 mm-RJ45 crystal plug	1 PC	For inverter
E	Communication Cable	Black Category 5e unshielded T568B color wire sequence, wire length 2000 mm-RJ45 crystal plug	1 PC	For parallel
F	Expansion Bolt	M6*60 mm	2 PCS	
G	RJ45 Terminal		4 PCS	Spare
H	Screw	M6*12 mm	2 PCS	
I	Mounting Lug		2 PCS	
J	File Package	User manual / Shipment report / Shipment listing	1 PC	
K	Caster		4 PCS	Optional

3.3 Storage Recommendations

Long-term battery storage is not recommended. Use batteries promptly after on-site installation and follow handling regulations.

Required Storage Temperature	Actual Storage Temperature	Recharge Interval	Remarks
$-15^{\circ}\text{C} < T \leq 55^{\circ}\text{C}$	$T \leq -15^{\circ}\text{C}$	Not allowed	Not reaching the time for recharge: Use the batteries as soon as possible.
	$-15^{\circ}\text{C} < T \leq -10^{\circ}\text{C}$	6 months	
	$-10^{\circ}\text{C} < T \leq +25^{\circ}\text{C}$	12 months	
	$25^{\circ}\text{C} < T \leq 35^{\circ}\text{C}$	9 months	Reaching the time for recharge: Recharge the batteries.
	$35^{\circ}\text{C} < T \leq 55^{\circ}\text{C}$	6 months	
	$55^{\circ}\text{C} < T$	Not allowed	

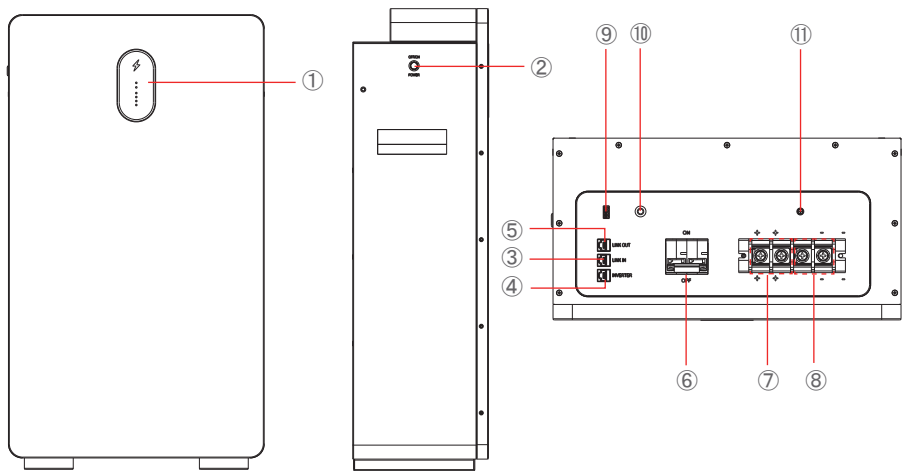


CAUTION

Failure to comply with storage guidelines will significantly reduce battery cycle life.

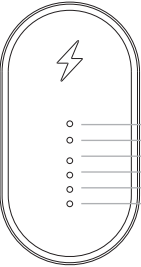
4. Product Overview

4.1 Interfaces and Functions



Number	Name	Details	Notes
1	Indicator Lights		SOC indicators and running & alarm indicator
2	Power Switch		
3	Link In	RJ45	Internal RS485 communication between batteries
4	CAN	RJ45	The battery communicate with the inverter
5	Link Out	RJ45	Internal RS485 communication between batteries
6	125A DC Breaker x2		
7	Port Positive	P+	Connected to the positive terminal of the inverter
8	Port Negative	P-	Connected to the negative terminal of the inverter
9	DRY Port		Dry1 Point + Contact Max 600V/Max 80mA Dry1 Point - Contact Max 600V/Max 80mA Dry2 Point + 24V/Max 80mA Dry2 Point - 24V/Max 80mA
10	WiFi Antenna		Optional
11	GND	M4*8	Yellow/Green, 12 AWG

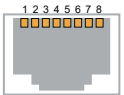
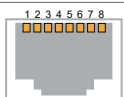
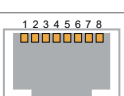
4.2 LED Indicator Definition



Battery LED Indicator light status description									
Battery Status	Battery Information	RUN	ALA	Battery SOC LED				Remark	Duration
		LED6	LED5	LED4	LED3	LED2	LED1		
Remote		★	● or ●					LED5 depending on the previous status	
Bootload		★		★	★	★	★	2Hz	1~2S
Short press power Switch to display parallel machine address	Master-Slave Definition	●		●	●	●	●	Master	
		●					●	Slave1	
		●				●		Slave2	
		●				●	●	Slave3	
		●			●			Slave4	
		●			●		●	Slave5	
		●			●	●		Slave6	
		●			●	●	●	Slave7	
		●		●				Slave8	
		●		●			●	Slave9	
		●		●		●		Slave10	
		●		●		●	●	Slave11	
		●		●	●			Slave12	
		●		●	●		●	Slave13	
		●		●	●	●		Slave14	
		●					★	Slave15	
Application Mode Checking	Parallel or single application mode checking success	★		Display according to actual SOC				Blink 5 times	2S
	Wait for the power loop to dynamically incorporate Battery	★		Display according to actual SOC				1Hz	

Battery Status	Battery Information	RUN	ALA	Battery SOC LED				Remark	Duration
		LED6	LED5	LED4	LED3	LED2	LED1		
Charge	0~25% SOC	●					■		
	25.1% to 50% SOC	●				■	■		
	50.1% to 75% SOC	●			■	■	■		
	75.1% to 99.9% SOC	●		■	■	■	■		
	100% SOC	●		●	●	●	●		
Discharge& Stanby	100% to 75.1%	●		●	●	●	●		
	75% to 50.1%	●			●	●	●		
	50% to 25.1%	●				●	●		
	25% to 0%	●					●		
Battery Fault	BMS fault(Classification of internal faults such as MOS Adhesion)	●		●or★	●or● or★	●or● or★	●or● or★	LED1~LED4 depending on the previous status	
Shutdown		●or● or★	●or● or★	★	★	★	★	LED5, LED6 depending on the previous status, blink 2times, then shutdown	
Remark: ★: Blue LED Blink , ●: Blue LED On ■: Blue LED flash display(The LEDs are illuminated in the form of a running light at intervals of 500ms according to the current SOC, and are then all extinguished simultaneously upon completion. After the end of one cycle, the LEDs light up again in a cyclic manner) ☆: Green LED Blink ●: Green LED On ★: Red LED Blink ●: Red LED on ●: LED off									

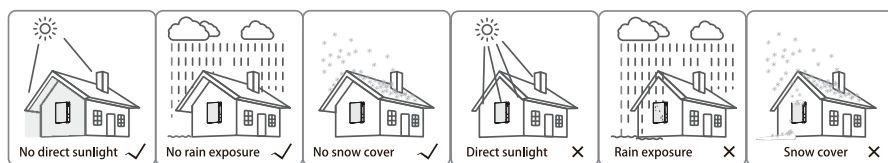
• RJ45 Port Pin Definition

View	Item	Port	1	2	3	4	5	6	7	8
	1	LINK IN	CAN2_H	CAN2_L	GND_ISO	GND_ISO	SS	GND_ISO	E_IN	SOUT
	2	LINK OUT	CAN2_H	CAN2_L	GND_ISO	GND_ISO	MS	GND_ISO	E_OT	SOUT
	3	INVERTER	CAN2_H	CAN2_L	E12-	CAN1_H	CAN1_L	EXT_12V+	RS485_B	RS485_A

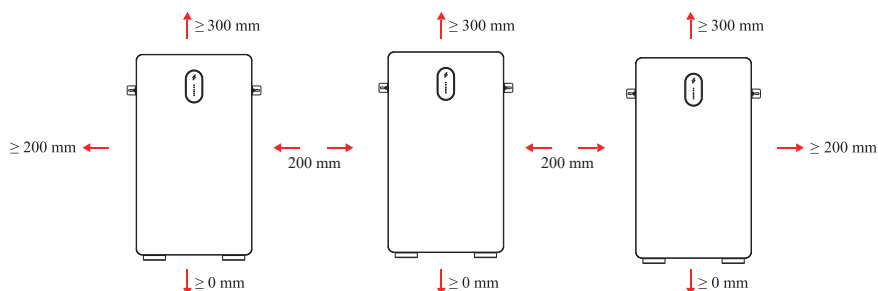
5. Installation

5.1 Installation Environment Requirements

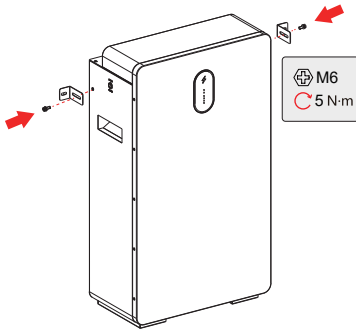
1. Ensure that the equipment is installed in a dry and well-ventilated environment.
2. The installation position must be away from direct sunlight and rain.
3. The installation position must be far away from fire sources.
4. The installation position must be far away from water sources such as taps, sewer pipes, and sprinklers to prevent water seepage.
5. Do not expose the equipment to flammable or explosive gases or vapors .
6. Humidity: 5 to 95%RH (non-condensing); Operating temperature: -15°C to +55°C.



5.2 Wall Mounting Steps

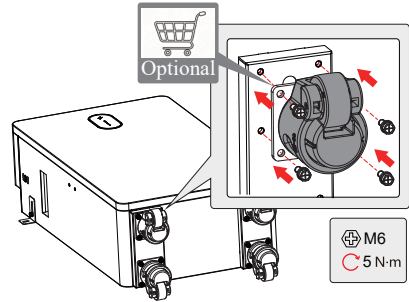


 CAUTION	• The walls may contain electrical cable or pipes (for example, gas or water). Ensure that power cable or pipes are not damaged when drilling. • Injuries may result if the device is lifted incorrectly or dropped while being transported or mounted. • Wear appropriate personal protective equipment per local regulations during operation.
 NOTICE	• Expansion bolts are mainly used for solid brick-concrete walls and concrete floors. For other wall and floor types, verify load capacity and select suitable bolts accordingly. • Ensure that the mounting holes is level with the floor.

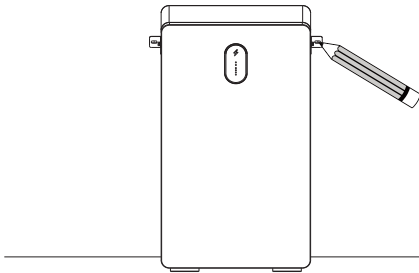


1 Install the mounting lugs.

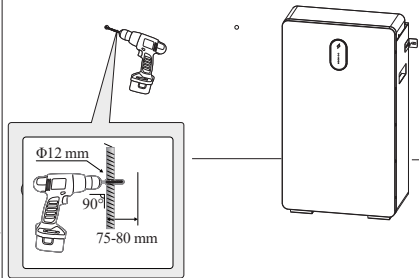
 Risk of tipping when moving with these casters



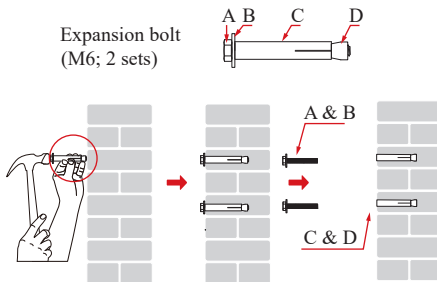
2 Install the casters as needed.



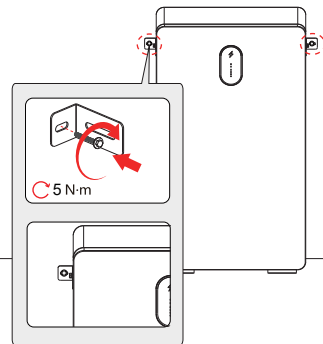
3 Mark the drill holes on the wall.



4 Remove the battery pack and drill the holes.



5 Install the expansion bolts in the wall, then remove the screws.



6 Secure the mounting screws to the battery pack and mounting completed.

6. Electrical Connection

6.1 Requirements for the Electrical Connection

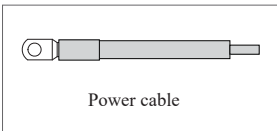
6.1.1 Power Cable (For parallel)

Material List (plug components may be purchased separately from supplier.)

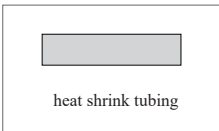
- Plug Components (A)



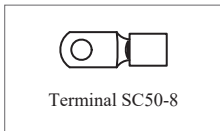
Terminal SC50-8



Power cable



heat shrink tubing



Terminal SC50-8

- Positive DC Cable and Negative DC Cable (B)
* This cable is already included in the accessories list.



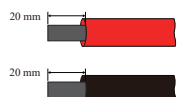
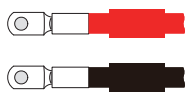
Positive DC Cable



Negative DC Cable

6.1.2 Assembly Parallel Cable

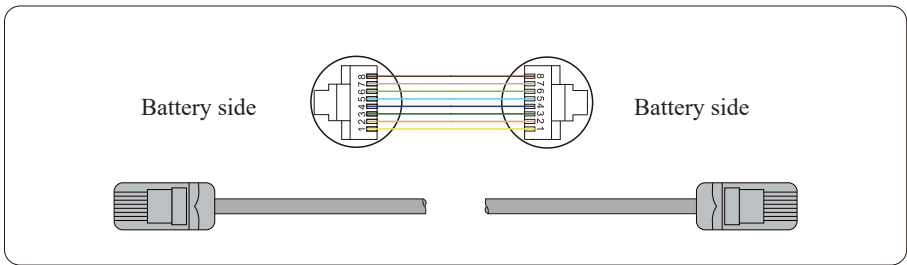
- Crimping Procedure for Plug Components (A)

 1 Slide the cable into the heat shrink tubing.	 2 Strip 20 mm of the cable insulation (± 0.5 mm).
 3 Red plug for positive cable, black plug for negative cable. Crimp cable ends onto terminals with crimp pliers.	 4 Fit heat shrink tubing over insulated wires and terminals, then heat with a hair dryer to shrink tightly.

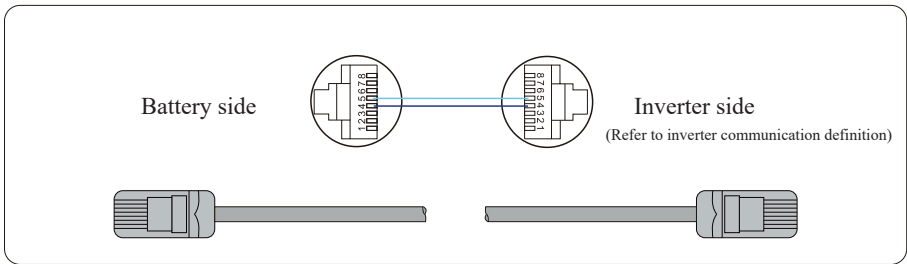
6.1.3 Communication Cable

Battery to Battery Communication Cable.

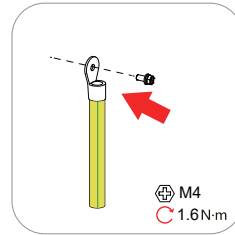
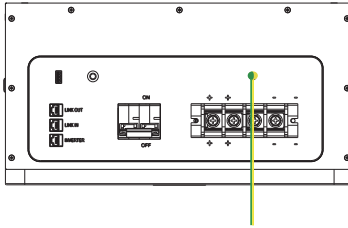
Pin definition as below, alternatively a standard straight CAT5 Ethernet cable can be used.



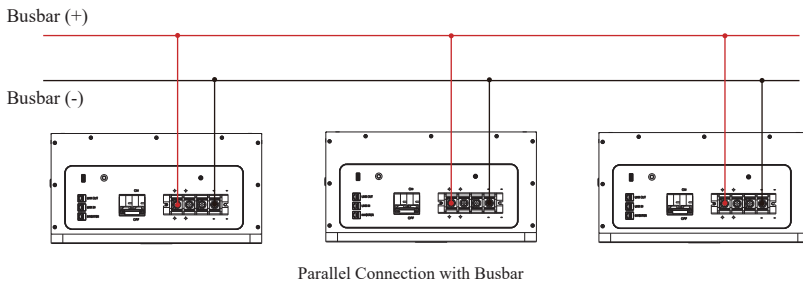
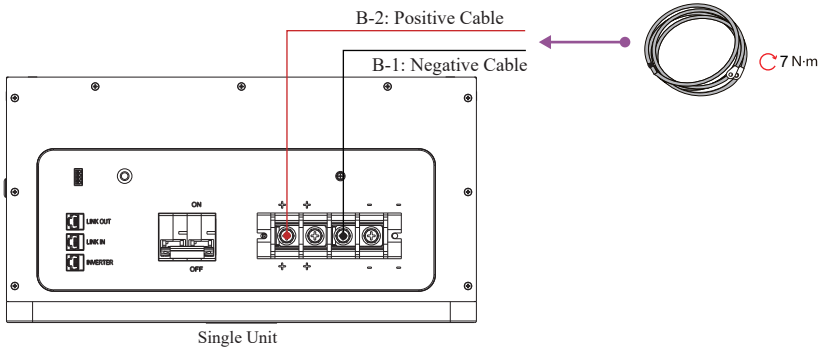
Battery to Inverter Communication Cable



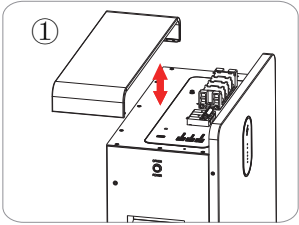
6.2 Electrical Connection Steps



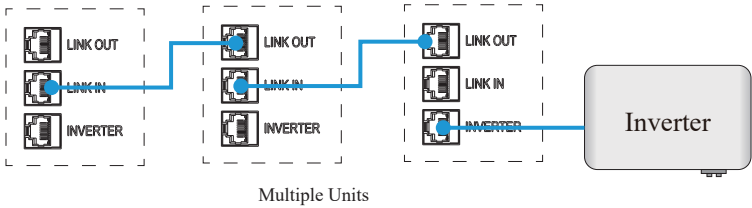
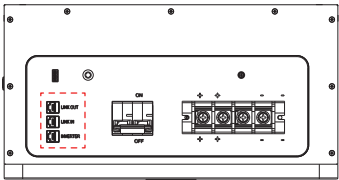
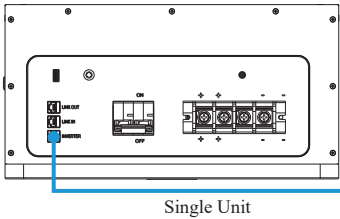
- 1 Connect ground cable.



- 2 Connect power cable.



②



NOTICE

Power off batteries prior to parallel cable connection to avoid parallel connection failure.

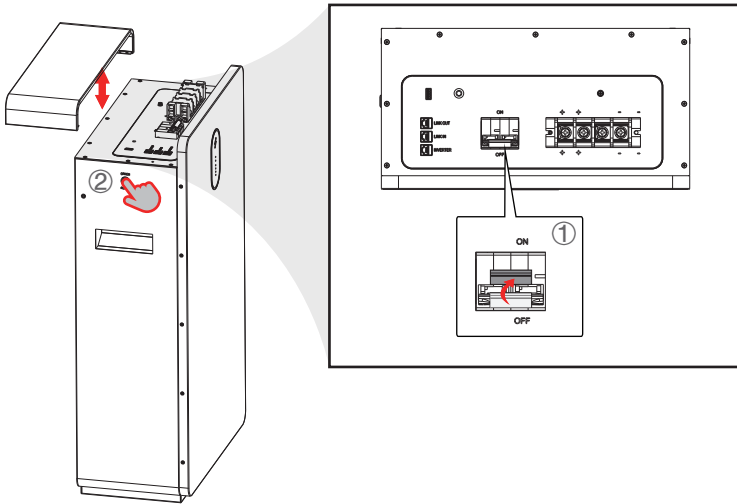
3 Connect communication cable.

6.3 Battery Activation



NOTICE

Failing to turn on all circuit breakers between the battery and inverter before turning on the battery power switch will disable the pre-charge/soft-start function. This would cause very high currents to flow between the inverter and battery for a short duration, potentially damaging the battery, inverter or wiring.



STARTUP PROCEDURE

Battery Side:

1. Switch on the circuit breaker on the battery side.
2. Press and hold the battery's "POWER" switch for 3 seconds, and confirm that the status indicator and SOC indicators light up normally.

Startup Status Display Instructions:

For Single Battery Pack

Press and hold the "POWER" switch for 3 seconds. The status indicator lights up, and the SOC indicators flash and then stay lit corresponding to actual power, startup completed.

For Parallel Battery Packs

First, check if the communication connection cables are properly installed. Then, press and hold the "POWER" switch on the master battery pack for 3 seconds. The status indicators of all batteries in the parallel system will stay on. The slave addresses will display for 3 seconds, and then automatically switch to real-time SOC status.

SHUTDOWN PROCEDURE

Battery Side:

1. Turn off the circuit breaker on the battery side.
2. Press and hold the battery's "POWER" switch for 3 seconds to shut down the battery system, and ensure that the indicators are all turned off.

Shutdown Status Indicator Instructions:

Shutdown for Single Battery Pack

Press and hold the POWER switch for 3 seconds. The SOC indicators flash several times, then turn off along with the status indicator, the shutdown process is complete.

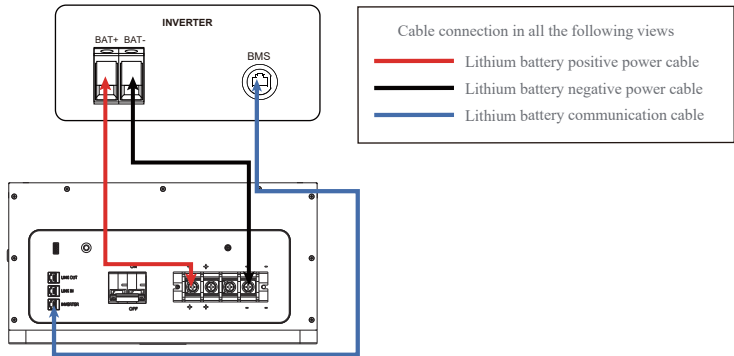
Shutdown for Parallel Battery Packs

Press and hold the POWER switch on the master battery pack for 3 seconds. The SOC indicators flash several times, then turn off along with the status indicator, the parallel system shutdown process is complete.

7. System Diagram

1. Before electrical connection, ensure that the DC breaker / power switch of the battery and all switches connected to the energy storage equipment are in the OFF state. Otherwise, electric shock may occur.
2. Parallel cables require additional purchase.

7.1 Single Unit

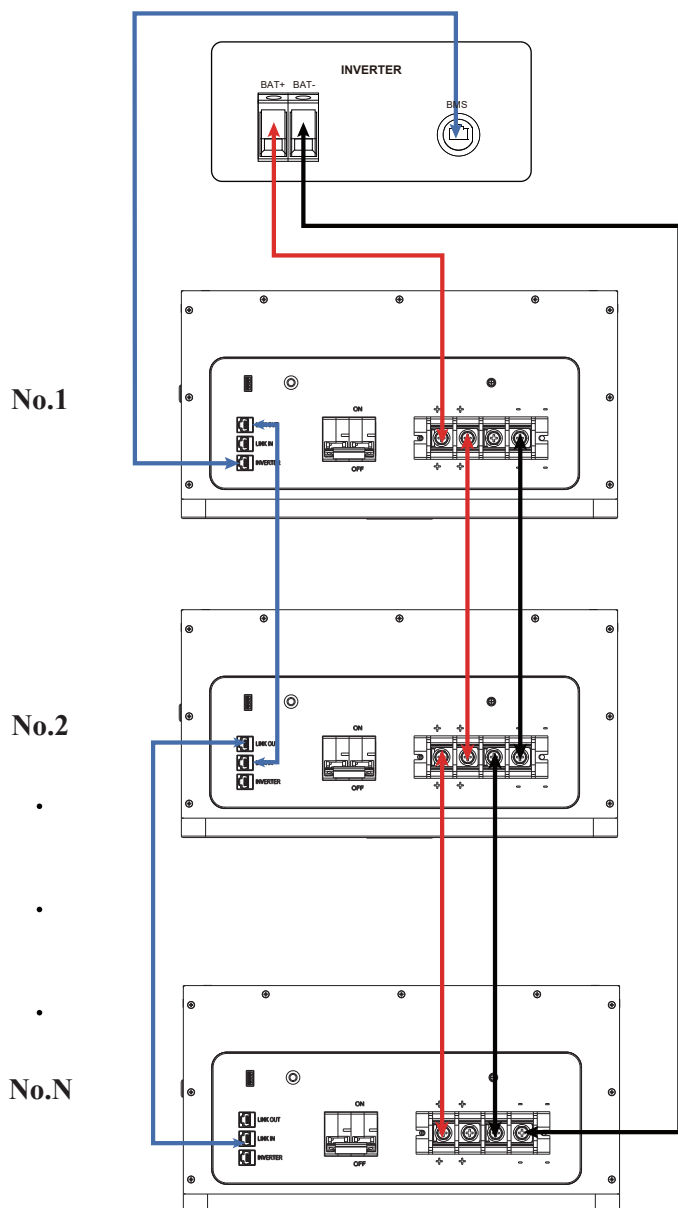


 DANGER	Ensure power cables are installed with the correct polarity. A dangerous situation may arise if the polarities are reversed.
 DANGER	Do not create a short circuit between the positive and negative terminals of the battery. Ensure the polarity is correct during installation.
 WARNING	Incorrect communication cable connection will cause the may lead battery system to operate in unexpected ways which to system failure.

7.2 Multiple Units

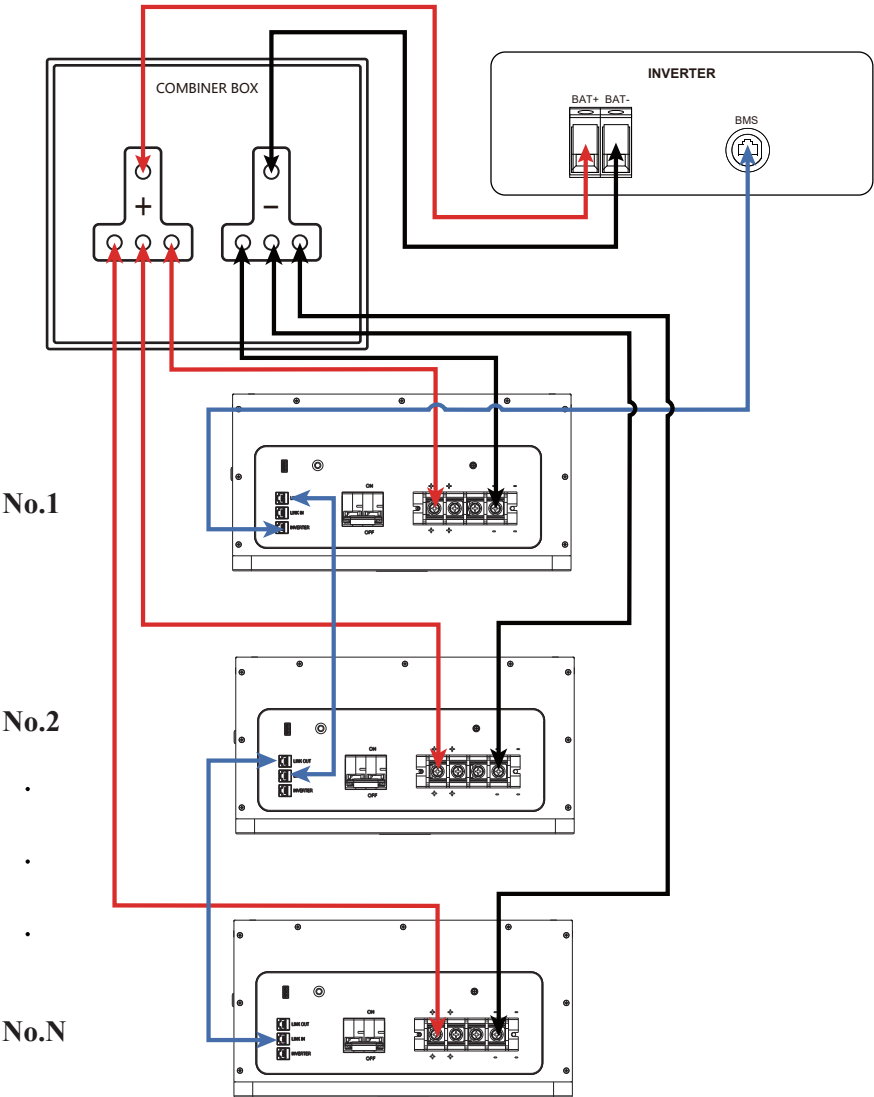
7.2.1 Wiring Diagram ($2 \leq N \leq 16$, inverter power below 10 kW)

(The number of units in the middle of the diagram is omitted.)



7.2.2 Wiring Diagram ($2 \leq N \leq 16$, inverter power over 10 kW)

When using an inverter of 10kW or above, the positive and negative ports of each battery must be connected to the combiner cabinet in the wiring method shown in the figure below.
(The number of units in the middle of the diagram is omitted.)



8. Bluetooth Configuration

The built-in Bluetooth module allows users to connect to the APP for real-time monitoring and management of the battery system.

Scan the QR code below to download and install the APP.



iOS



Android

9. Maintenance

9.1 Routine maintenance

To ensure the long-term running of the energy storage system, you are advised to maintain batteries regularly.

Check content	Inspection method	Maintenance cycle
System appearance	Check whether the appearance of the system is damaged or deformed.	Once every 6 to 12 months
System running state	1. Check whether the battery produces abnormal noise during operation. 2. Check whether the battery parameters are correctly set when the battery is running.	Once every 6 months
Electrical connection	1. Check whether cables are secured. 2. Check whether cables are intact, and that in particular, the parts touching the metallic surface are not scratched.	Once every 6 months
Ground reliability	Check whether 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.

9.2 Troubleshooting

Items	Solution	Measure
Unable to start	1. When the Power Switch is set to the ON position, the LED indicators may fail to respond, or all LEDs may turn off after 1 second if the DC Breaker remains off. 2. Charge the battery using a charger or inverter that supplies a voltage of 54 V to 57.6 V, and verify that the battery can be started.	If the abnormal persists alive after performing above steps, please contact your supplier.
Unable to charge	1. Check whether the cable connection between the battery and the inverter / charger is correct. 2. Check whether the inverter / charger setting is correct. 3. Check whether the battery is in charge protection mode, if yes, try to discharge the battery.	
Unable to discharge	1. Check whether the cable connection between the battery and the inverter / charger is correct. 2. Check the battery for short circuit, reverse connection, pre-charge failure when connecting it to the inverter. 3. Check whether the battery is in discharge protection mode, if yes, try to charge the battery.	If any situation (s) not listed in this table, fully power off the battery system and contact the supplier.
High / Low temperature	1. Power off the battery system for a while, check whether the installation location temperature meet the requirement. 2. Avoid continuous full charging and discharging of the battery.	
High current	Check whether the configuration and parameters setting on the inverter / charger is correct.	
ALM always on	Turn off all the batteries, and remove the faulty battery from the system.	
Communication fail	1. Check whether the communication cable type is correct and is contacted well. 2. Check whether the inverter communication pin definition is 4H5L. If it is not, modify the communication cable according to the inverter's requirements. 3. Check whether the inverter protocol related setting is correct. 4. Check whether both battery and inverter are working properly.	

Note: Please restart after software upgrade.

10. Decommissioning and Disposal

10.1 Decommissioning

Before decommissioning the battery system, all operations shall be performed by qualified personnel in accordance with local regulations and applicable safety standards.

1. Switch off the system using the Power Switch and confirm that all indicators (LEDs) are off.
2. Disconnect the system from all external power sources, including the inverter, grid, and loads, and switch off all related DC and AC circuit breakers.
3. After shutdown, wait at least 5 minutes to allow internal capacitors to fully discharge.
4. Disconnect all power and communication cables in the reverse order of installation, and protect all connectors against short circuits.
5. If the battery shows signs of damage (such as deformation, leakage, overheating, smoke, or abnormal odor), immediately stop operation and isolate the battery. Do not open, disassemble, or attempt to repair the battery. Contact the installer, distributor, or manufacturer for further instructions.
6. Store decommissioned batteries in a dry, well-ventilated location, protected from moisture, direct sunlight, high temperatures, and mechanical impact.

10.2 Disposal

This section specifies mandatory legal and environmental requirements for the disposal of used or decommissioned batteries.

- Batteries, including rechargeable batteries, must not be disposed of in household or general waste.
- Used or damaged batteries shall be delivered to authorized collection or recycling facilities in accordance with applicable local regulations.
- Batteries may contain hazardous substances as well as valuable recyclable materials; improper disposal may harm human health and the environment.
- During storage and transportation, batteries shall be protected against short circuits, leakage, and mechanical damage.

