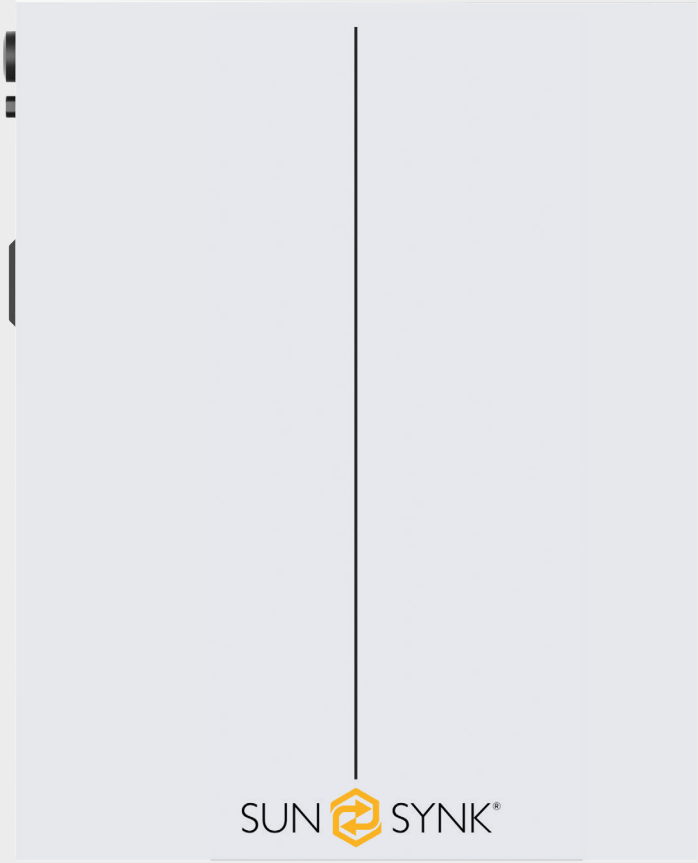
SUN SYNK®

SUN-X-10.24-F



USER MANUAL

v.10 (07/08/25)

PLEASE RETAIN FOR FUTURE REFERENCE

Table of Contents

SAFETY

Sunsynk's products are designed with full consideration for safety. However, all electrical appliances can be dangerous if used inappropriately; they can cause a fire or electric shock, leading to severe injury or death. For your protection, please read these safety precautions thoroughly.

General Safety

- It is crucial and necessary to read the user manual carefully (in the accessories) before installing or using the SUN-X-10.24-F battery. Failure to do so or to follow any of the instructions or warnings in this document can result in electrical shock, serious injury, death, or damage to the battery, potentially rendering it inoperable.
- It is required to charge the battery every six months, and the SOC should be no less than 50% in case it is stored for a long time.
- The battery module needs to be recharged within 12 hours after being fully discharged..
- Do not expose the cable outside.
- All the battery terminals must be disconnected before starting the maintenance.
- Please, contact the supplier within 24 hours if something abnormal happens.
- Do not use cleaning solvents to clean the battery.
- Do not expose the battery to flammable or harsh chemicals or vapours.
- Do not paint any part of the battery, including any internal or external components.
- Do not connect the battery with PV solar panel wiring directly.
- The warranty claims are excluded for direct or indirect damage due to the items above.
- Any foreign object is prohibited from inserting into any part of the battery.

Symbols/Safety Signs

Many symbols are present with the battery product and used materials to install it. Next, a list of symbols and their meanings is presented.

	This symbol indicates information that if ignored, could result in personal injury, physical damage or even death due to incorrect handling.		This product's batteries contain an explosive, self-reactive material that could blow up when heated.
	Electrical Hazard.		Read the manual.
	Danger.		Indicates that this product is recyclable.
	The Battery is heavy and can cause injury if not handled safely.		Do not place near open fire or incinerate. Do not use near heaters or hot temperature sources.
	Do not submerge the battery in water or expose it to moisture or liquid.		Do not disassemble or alter the battery in any way. Do not strike or puncture the battery.

Do not drop, deform, or impact the battery.	Do not step or put any objects onto the battery.
Keep out of reach of children, animals, and insects.	Li-ion Battery.
Rechargeable.	Charging and Discharging.

Direct Current.	Product exposure.	Recommended Charge Instructions

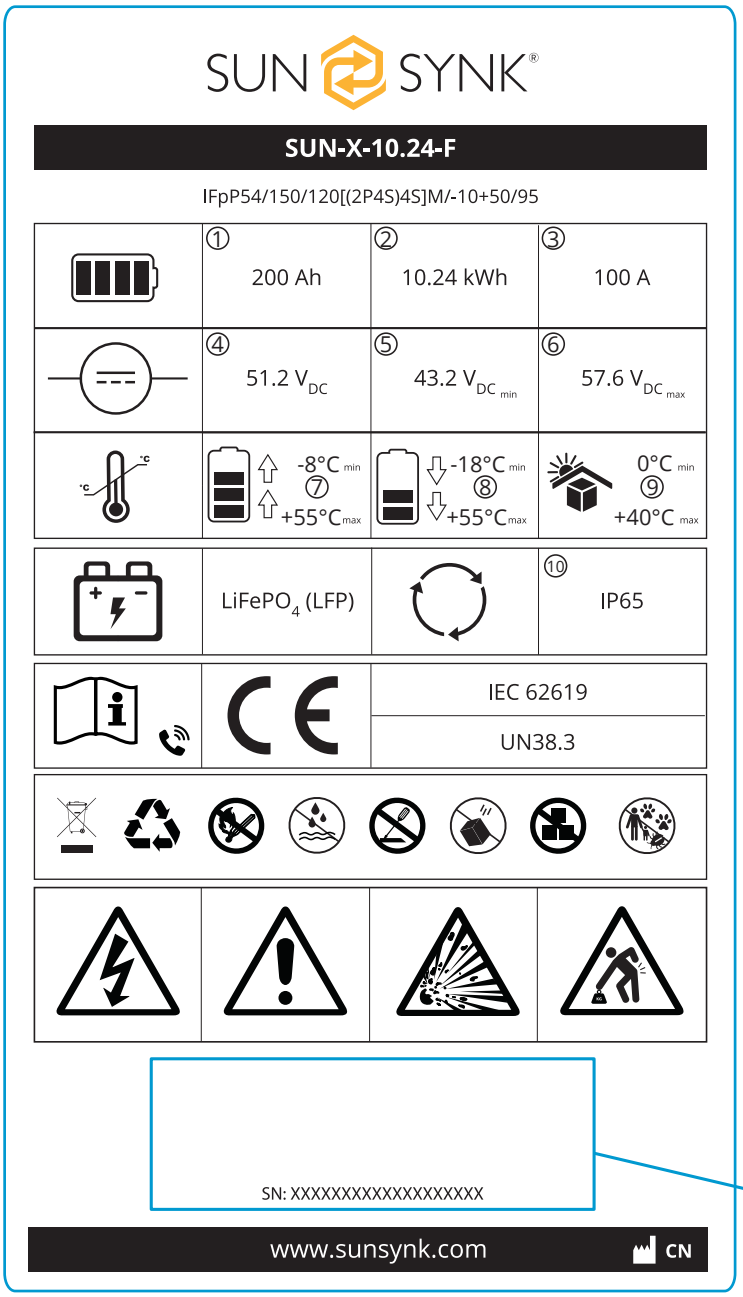
Follow the indicated temperatures.	**BATTERY INPUT** Battery Discharge Voltage, Battery Discharge Current, Input Voltage Type, Battery Discharge Power.
Contact the supplier within 24 hours if there is anything wrong. In case of leakage contact with eyes or skin, immediately clean with water and seek help from a doctor.	Do not dispose the device, accessories, and packaging with regular waste. Follow local ordinances or contact the manufacturer for disposal guidance.
The UKCA marking is used for products placed on the market in Great Britain (England, Scotland and Wales). The UKCA marking applies to most products for which the CE marking could be used.	CE mark is attached to the solar inverter to verify that the unit follows the provisions of the European Low Voltage and EMC Directives.

CAUTION!
Do not plug or unplug the power cables when the T-BAT System is on, doing so could result in an arc discharge shich could cause serious harm!

CAUTION!
Ground connection is mandatory!

WARNING!
Handle with care: No external force allows on BMS slot.

Rating Label Breakdown



Item	Requirement	SUN-X-10.24-F
1	Rated Capacity	200Ah
2	Battery Usable Energy	10.24kWh
3	Max. Charge & Discharge Current	100A
4	Rated Voltage	51.2Vdc
5	Min. Operating Voltage	43.2Vdc
6	Max. Operating Voltage	57.6Vdc
7	Min./Max. Charge Temperature	-8 °C / 55 °C
8	Min./Max. Discharge Temperature	-18 °C / 55 °C
9	Min./Max. Storage Temperature	0 °C / 40 °C
10	Ingress Protection Rating	IP65

Procedures and Precautions Before Connecting

- Before unpacking, check the external packaging for any signs of damage. If damaged, contact your local retailer.
- After unpacking, check the product and included spare parts against the spare parts list. If any items are missing or damaged, contact your local retailer.
- Connect only to the specified compatible inverter.
- Before installation, disconnect the grid power and ensure the battery is turned off.
- Do not connect the battery directly to an AC power source.
- All electrical wiring must be installed in accordance with local regulations.
- The battery must be properly grounded with a resistance of less than 0.1Ω.

- Ensure correct wiring, do not reverse the positive and negative cables, and avoid any short circuits with external devices.
- The battery is designed for parallel connection only. DO NOT connect batteries in series.
- Ensure that the electrical performance of the battery system is compatible with the connected equipment.
- The installation site must be equipped with appropriate fire safety equipment, such as fire sand or dry powder fire extinguishers, in compliance with relevant safety regulations.

Safety Precautions While Using

- Cut off the power and completely shut down the battery before moving or repairing the battery.
- Connecting the SUN-X-10.24-F battery with a different type of battery is prohibited.
- It is forbidden to put the batteries working with faulty or incompatible inverters.
- It is not permitted to disassemble the battery.
- The battery module can be managed and maintained through RS232, RS485, CAN or OTA.
- OTA upgrading on cloud platform (Optional).
- When the battery is too warm, the LED will flash red.
- Liquid fire extinguishers are forbidden. In case of fire, only dry fire extinguishers can be used.
- Please do not open, repair, or disassemble the battery except staff from SUNSYNK or authorized by SUNSYNK. We do not undertake any consequences or related responsibility because of violation of safety operation or violation of design, production, and equipment safety standards.

Handling

- The battery should only be used as instructed.
- DO NOT use the battery if it seems broken or damaged.
- The battery is non-user-serviceable and should not be opened for repair.
- Handle the battery with care when installing or transporting it.
- Chemicals should not be used to clean the battery.

Damaged Battery

A damaged battery should not be used and should be returned to Sunsynk or properly discarded via a recycling facility. Leaking electrolytes can cause skin irruption and chemical burns, so contact should be avoided.

Eye	Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin	Remove contaminated clothes and rinse skin with plenty of water or shower for 15 minutes. Get medical aid.
Inhalation	Remove from exposure and move to fresh air immediately. Use oxygen if available.
Ingestion	Give at least two glasses of milk or water. Induce vomiting unless the patient is unconscious. Call a physician.

PRODUCT INTRODUCTION

Thank you for choosing Sunsynk's energy storage system!

SUN-X-10.24-F lithium iron phosphate battery is one of the new energy storage products developed and produced by SUNSYNK. SUN-X-10.24-F is especially suitable for application scenarios of high power, limited installation space, and long cycle life. It can be used to support reliable power for various types of equipment and systems.

The energy storage module includes lithium-ion rechargeable batteries with 10.24kWh capacity, and the controller enables a central of multiple modules. Thus, batteries can be connected in parallel to expand capacity and power for applications that require larger capacity and longer power support.

SUN-X-10.24-F has a built-in BMS (battery management system), which can manage and monitor cell-battery information, including voltage, current, and temperature. Moreover, the BMS can balance cells charging and discharging to extend cycle life.

This manual provides information regarding safety precautions to prevent possible accidents and how to use the product. Please read this manual carefully before use for safety and keep this manual handy for reference.

Some main features of this product are:

- The whole module is non-toxic, non-polluting, and environmentally friendly.
- The cathode material is made from $LiFePO_4$ with safety performance and long cycle life.
- Battery management system (BMS) has protection functions, including over-discharge, over-charge, over-current, and high/low temperature.
- The system can automatically manage the charge and discharge state and balance the current and voltage of each cell.
- Flexible configuration, multiple battery modules can be connected in parallel for expanding capacity and power.
- Adopted self-cooling mode rapidly reduced entire system noise.
- The module has less self-discharge, up to 6 months without charging it on the shelf, no memory effect, and excellent shallow charge and discharge performance.
- Battery module communication address auto networking, easy maintenance, and support monitoring and upgrading the firmware remotely.
- High-power density: flat design, wall or ground-mounted, saving installation space.

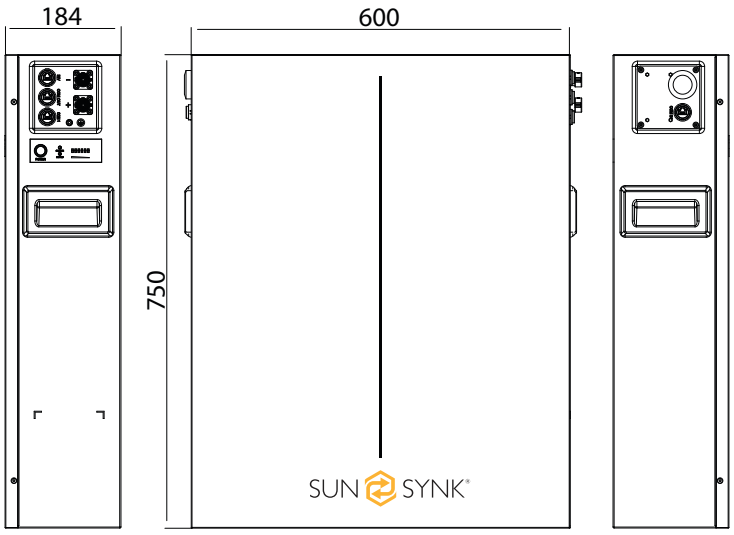
Battery Expansion and Use

- The production date of the original batteries and newly added batteries should be as close as possible, within one year is best. If the time differences of production are too long, the battery capacity deviation will be large, and the batteries' energy cannot be fully utilised.
- Before expansion, please fully charge the original batteries to 100% (keep SOC 100%), and then charge the batteries that need to be added to SOC 100%. Next, assemble to achieve the purpose of expansion. The original batteries can be charged using an inverter; The newly added batteries need to be charged separately with the battery charger.
- Please consult relevant technical personnel before expansion. The individual will bear all consequences caused by personal misoperation, not covered by the Sunsynk warranty.
- Sunsynk lithium battery is prohibited to work in Lead-acid Mode. Any failure caused by using a Lead-acid model is not covered by the Sunsynk warranty.

Dimensions

SUN-X-10.24-F dimensions are presented below:

SUN-X-10.24-F	
Depth	184mm
Width	600mm
Height	750mm
Weight	101kg

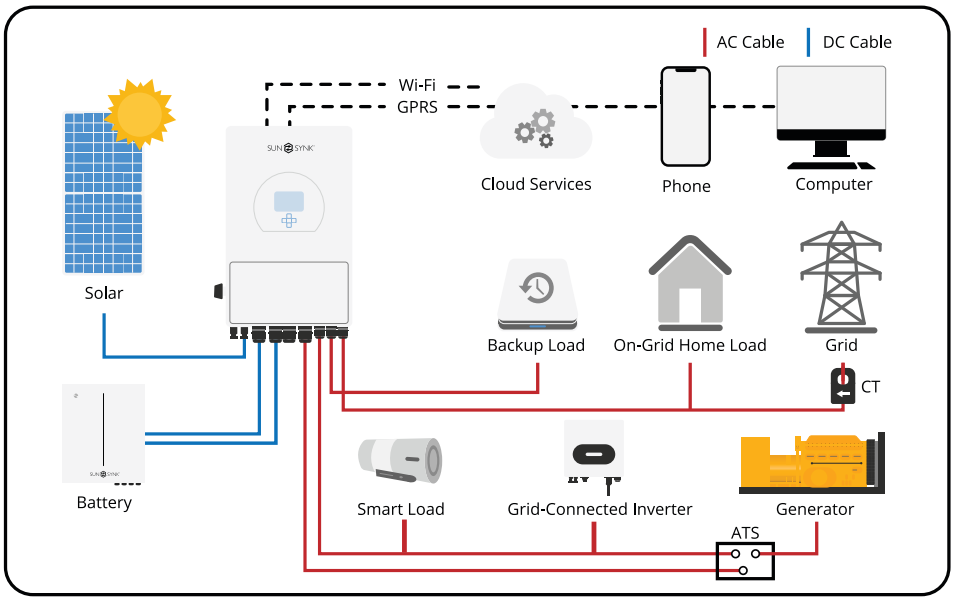


Basic System Architecture

The following illustration shows basic application of this battery.

It also includes following devices to have a complete running system.

- Generator or Utility
- PV modules
- Hybrid Inverters (Charge & Discharge)



Contact our customer service or an accredited seller for precise information about application cases of the SUN-X-10.24-F battery.

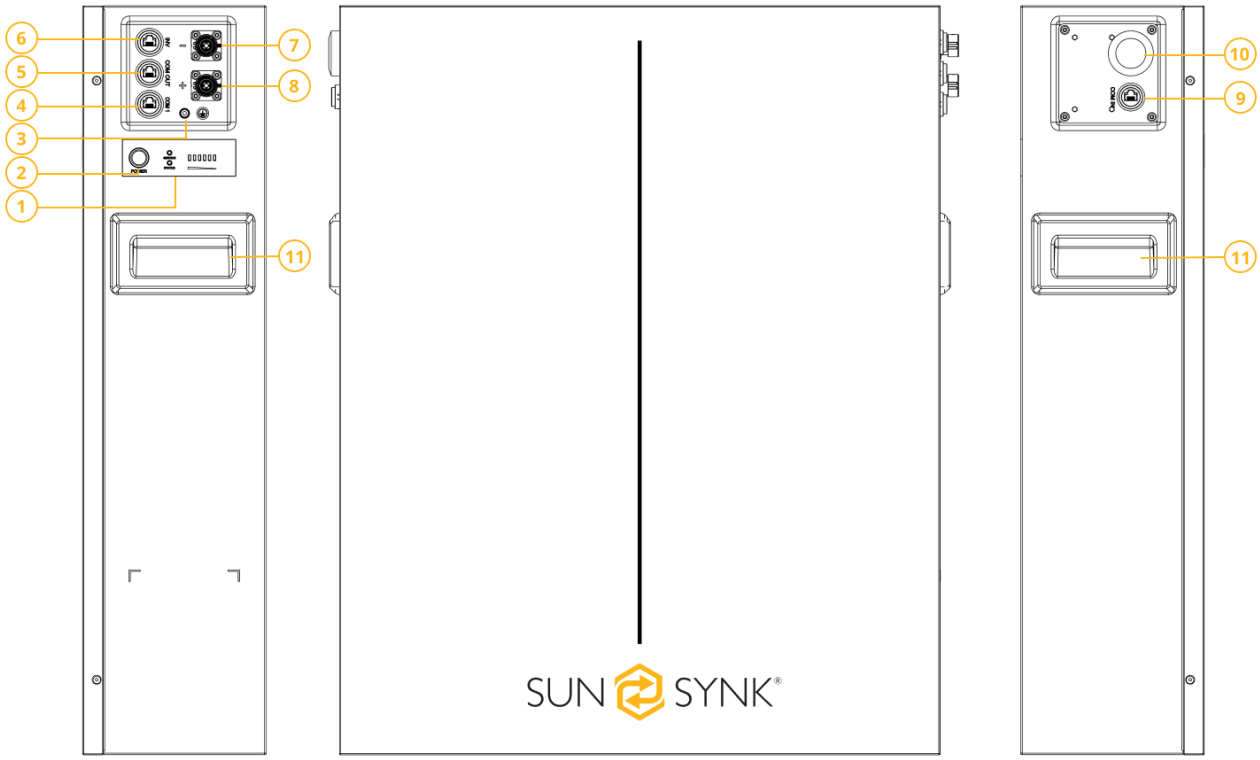
TECHNICAL DATA

Model	SUN-X-10.24-F
Main Parameter	
Battery Chemistry	$LiFePO_4$
Nominal Energy [1]	10.24kWh
Nominal Capacity	200Ah
Rated Voltage	51.2Vdc
Operating Voltage Range	43.2Vdc~57.6Vdc
Max. Charge/Discharge Current [2]	100A/150A
Scalability	Recommended ≤3, (Max. 8 in Parallel)
Other Parameter	
Depth of Discharge	95%
Communication	RS485, CAN, Wi-Fi (Optional)
Dimensions (WxDxH)	600x184x750mm
Weight	101kg
Operating Temperature	Charge: -8~55°C Discharge: -18~55°C
Humidity	5~95%RH, No Condensation
Altitude	<2000m
Protection Level	IP65
Protection Class	Class I
Installation	Wall-mounted, Floor-to-battery
Cycle Life	>6000@25°C@0.5C
Certification	IEC62619, CE, UN38.3, RoHs
Warranty	5 Years/10 Years The warranty period depends on the final installation site of the Inverter. For more information please refer to warranty policy.
Manufacturer Country	China
Wi-Fi Frequency Range	2412-2472MHz
Wi-Fi Max. Transmission Power	<20dBm

[1] Test conditions: Fresh battery, cell voltage 2.0~3.65V, 25 ± 2°C , 0.5C charge and 0.5C discharge.
[2] Dependent on the temperature and SOC of the battery.

EQUIPMENT INTERFACE INSTRUCTION

This section details the front and side panel of the interface functions. Following, you will find the SUN-X-10.24-F illustrations.



1. Battery Indicators
2. Battery Switch
3. Grounding Bolt
4. Debug Port
5. Parallel Communication Port OUT
6. PCS
7. Battery Negative -
8. Battery Positive +
9. Parallel Communication Port IN
10. Antenna (optional)
11. Handle

Interface	Description and Instructions
Battery Switch	Battery Switch to turn ON/OFF the whole battery BMS standby, no power output.
RUN	RUN LED: 1 green LED lighting to show the battery running status.
Alarm	Alarm LED: 1 red LED flashing to show the battery has an alarm, lighting to show the battery is under protection. See LED indicator table for details. Inform the manufacturer or professional engineer for commissioning or maintenance.
SOC	SOC LED: 6 green LEDs to show the battery's current capacity.
PCS	The battery communicates with the inverter through CAN protocol or RS485 protocol, with default baud rates 500 kbps and 9600 bps. The recommended communication method is the CAN protocol. See PCS Port Definition table.
Power Terminal	Power cable terminals: There are two pairs of terminals with the same function, which are respectively connected to the inverter and battery module. For power cables uses water-proofed connectors. Must keep pressing this Lock Button while pulling out the power plug

Interface	Description and Instructions
Parallel IN/OUT	The RS485 protocol is recommended for communication between multiple parallel batteries. See IN/OUT Port Definition table.. The output port of Parallel RS485 OUT is connected to the Parallel RS485 IN of the next battery, and so on. Up to 8 batteries can be connected in parallel. The module communicating with the inverter is the host. After the high-voltage line and communication line of the parallel machine are connected, turn on the master battery. The system starts up and carries out automatic coding, and If the coding fails, the red light will flash.
Debug	Dry contact 1: On - closed at low capacity. (NO1 COM1) Dry contact 2: On - closed under protection status. (NO2 COM2) RS 232: Software upgrade and debugging port. See Debug Port Definition table.
Grounding Bolt	Used for the battery connecting to the PE.

The following table presents the LED indicatior definition:

Indicator Light Description:

The indicator light is off.

The indicator light is on.

The indicator is flashing.

Flashing Type	Duration of Indicator On	Duration of Indicator Off
1 1	0.25s	3.75s
2 2	0.5s	0.5s
3 3	0.5s	1.5s

Status	Mode	RUN	ALM	Capacity Indicator LED						Description
				SOC1	SOC 2	SOC 3	SOC 4	SOC 5	SOC 6	
Power off	Sleep	○	○	○	○	○	○	○	○	All OFF
Standby	Normal	1	○	Display according to actual power						Standby
	ALM	1	3							
CH	Normal	●	○	Display according to actual power						Corresponding led light flashes to indicate charging progress.
	ALM	●	3							
	OCH Protection	●	●	●	●	●	●	●	●	Stop Charging
	T/C/SC/RC Protection	○	●	○	○	○	○	○	○	
DCH	Normal	3	○	Display according to actual power						
	ALM	3	3							
	UV Protection	3	●	○	○	○	○	○	○	Stop Discharging
	T/C/SC/RC Protection	○	●	○	○	○	○	○	○	
Failure		○	●	○	○	○	○	○	○	Stop Charging and Discharging

Abbreviation Description:

Abbreviation	Full Name	Abbreviation	Full Name
CH	Charge	T	Temperature
DCH	Discharge	C	Current
RUN	Work normally	SC	Short-circuit
ALM	Alarm	RC	Reverse connection
UV	Under-voltage	F	Failure
OCH	Overcharge		

Battery Level Indicators Instructions:

State		Charge						Discharge					
Capacity Indicator LED		L6	L5	L4	L3	L2	L1	L6	L5	L4	L3	L2	L1
Power	0 ~16%	○	○	○	○	○	2	○	○	○	○	○	●
	16~32%	○	○	○	○	2	●	○	○	○	○	●	●
	32~48%	○	○	○	2	●	●	○	○	○	●	●	●
	48~64%	○	○	2	●	●	●	○	○	●	●	●	●
	64~80%	○	2	●	●	●	●	○	●	●	●	●	●
	80~100%	2	●	●	●	●	●	●	●	●	●	●	●
Indicator Light				●						3			

CAN Port

CAN Communication Terminal (RJ45 port), connect to inverter, follow CAN protocol.

PIN	Definition
1	RS485-B
2	RS485-A
3	GND
4	CANH
5	CANL

RS485 Port

RS485 Communication Terminal (RJ45 port), connect to inverter, follow RS485 protocol.

PIN	Definition
1, 8	RS485-B
2, 7	RS485-A
3, 6	GND
4	CANL
5	CANH

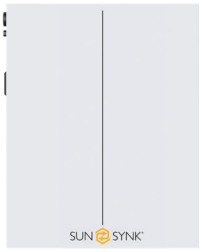
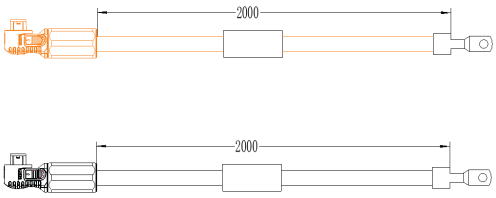
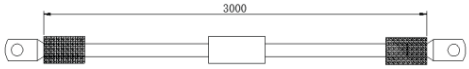
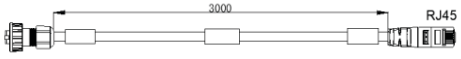
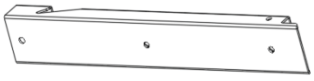
RS232 Port

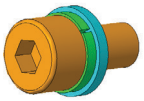
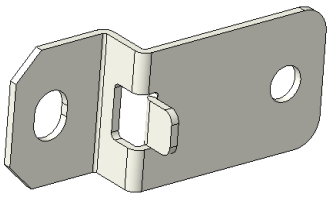
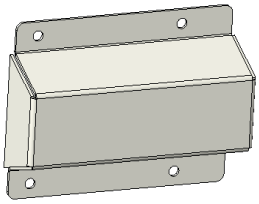
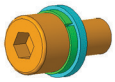
RS232 Communication Terminal (RJ45 port) follow RS232 protocol, for manufacturer or professional engineer to debug or service.

PIN	Definition
Pin 1	NO1
Pin 2	COM1
Pin 3	RS232_TX (single)
Pin 4	RS232_RX (single)
Pin 5	SGND
Pin 6	NO2
Pin 7	COM2

INSTALLATION

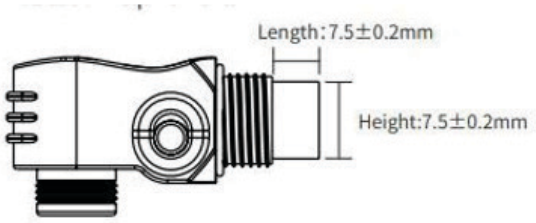
Parts List

No	Pictures	Description	Quantity
1		Battery	1pcs
2		Power cable: 2 AWG, peak current capacity 190A, constant 175A	2pcs
3		Parallel communication cable (Optional)	1pcs
4		Grounding cable	1pcs
5		Communication cable to PCS	1pcs
6		wall bracket (Optional)	1pcs
7		Expansion screws M6*50	8pcs
8		Bracket	2pcs

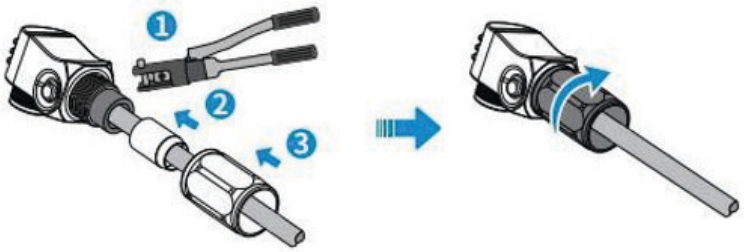
No	Pictures	Description	Quantity
9		Bolts M6*12	6pcs
10		Z-shaped wall fixed bracket	2pcs
11		Self tapping screws ST6.3*50	3pc
12		Plastic expansion pipe 10*50	3pcs
13		Base	2pcs
14		Combined bolt M5*10	10pcs
15		User Pamphlet	1pcs

Cable Requirements

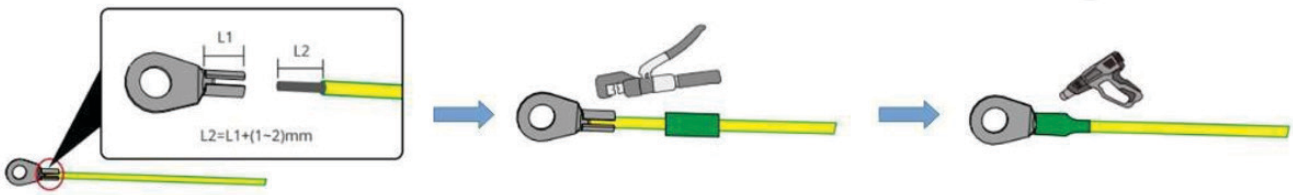
1. Power Cable:
   - Connect the orange power cable to the orange harness and the black power cable to the black harness.
   - Crimping specifications:
     - Cross-sectional area: 35 mm²
     - Withstand voltage: DC 1500V
     - Operating temperature range: -40°C to 115°C
     - Stripped conductor length: 23 ± 1 mm
   - Secure the back shell and ensure there are no gaps or loose connections.
   - Use a manual hydraulic tong with a 35 mm² die.
   - Ensure a minimum tensile force of ≥ 2200N after crimping.
   - If the battery is not connected, cover the port with a protective cover to prevent dust, moisture, or accidental contact.



1. Crimp the power cable.
2. Put the rubber seal ring.
3. Secure the back shell.



2. PE Cable:
   - Disconnect the power supply before disassembling the equipment.
   - Use a PE cable for grounding.
   - After crimping, ensure the traction force of the cable is at least 400N.
   - At least one of the two grounding cables must be connected to the ground.
   - Keep all other grounding cables intact.
   - Cable gauge: 10 AWG.
   - Must be suitable for outdoor use and meet relevant safety requirements.



Environmental Requirements

The location of the battery should follow the operating temperature range and IP rating specified in the manual. While the battery operates at low temperatures, proper airflow around it is recommended to maintain performance and longevity.

To ensure safe and efficient operation, follow these environmental guidelines:

- Maintain the operating temperature within the range of -18°C to 55°C.
- The optimal temperature range for best battery performance is 15°C to 35°C.
- Ensure proper ventilation to allow heat dissipation and prevent overheating.
- Avoid excessive moisture, dust, smoke, steam, or salt air, which can damage the battery.
- Do not install in areas with high humidity levels exceeding 95% or direct exposure to precipitation.
- The installation site should be at an altitude below 2000 meters above sea level.

Installation Precautions

To prevent overheating, fire hazards, or system failure, consider the following:

- DO NOT install the battery in a completely closed area without air-conditioning.
- DO NOT place it in direct sunlight or near heat sources such as heaters.
- DO NOT install the battery in areas where flammable or explosive materials are stored.
- DO NOT place the battery in a cool, damp, or dirty environment.
- If installing near the ocean, use appropriate air filtration to prevent salt accumulation on the battery.
- Allow at least 30 cm of clearance around the battery for proper airflow.

Mounting Area Selection

The installation location must meet these conditions:

- The area should be fully waterproof.
- The wall or floor should be flat and level.
- There should be minimal dust and dirt in the environment.
- Keep the battery at least 2 meters away from heat sources.
- Keep the battery at least 0.5 meters away from inverter air outlets.
- DO NOT cover or wrap the battery case or cabinet.
- DO NOT install the battery in children's play areas or pet enclosures.

WARNING

If the ambient temperature exceeds the operating range, the battery may stop functioning to protect itself. Continuous exposure to extreme temperatures can degrade battery performance and shorten its lifespan.

Compliance with UK Regulations:

In the UK, installation of products must comply with relevant PAS regulations. In addition to the conditions above, the battery MUST NOT be installed in the following locations to comply with safety and regulatory standards:

- Rooms where people sleep.
- Escape routes (e.g., landings, staircases, corridors) that are not protected escape routes.
- Corridors, shafts, staircases, or lobbies within protected escape routes.
- Firefighting lobbies, shafts, or staircases.
- Storage spaces or cupboards that open into rooms where people sleep.
- Outdoors (ground-mounted or wall-mounted) within 1 meter of:
  - Escape routes.
  - Doors, windows, or ventilation ports.
- Voids, roof spaces, or lofts.
- Areas within 2 meters of flammable materials, fuel storage tanks, or cylinders.
- Cellars or basements without direct access to the exterior.
- Ensure the installation complies with all relevant PAS regulations.

Tools and Safety Gears Necessary

The following tools are required to install the battery:

Wire Cutter

Modular Crimping Plier

Screwdriver

Electric Drill

We recommend wearing the following safety gear when dealing with the battery pack installation or maintenance.

Insulated Gloves

Safety Goggles

Safety Shoes

WARNING

Use adequately insulated tools to prevent accidents tale electric shocks or short circuits. If insulated tools are not available, cover the entire exposed metal surfaces of the available tools, except their tips, with electrical tape.

Mounting the Battery

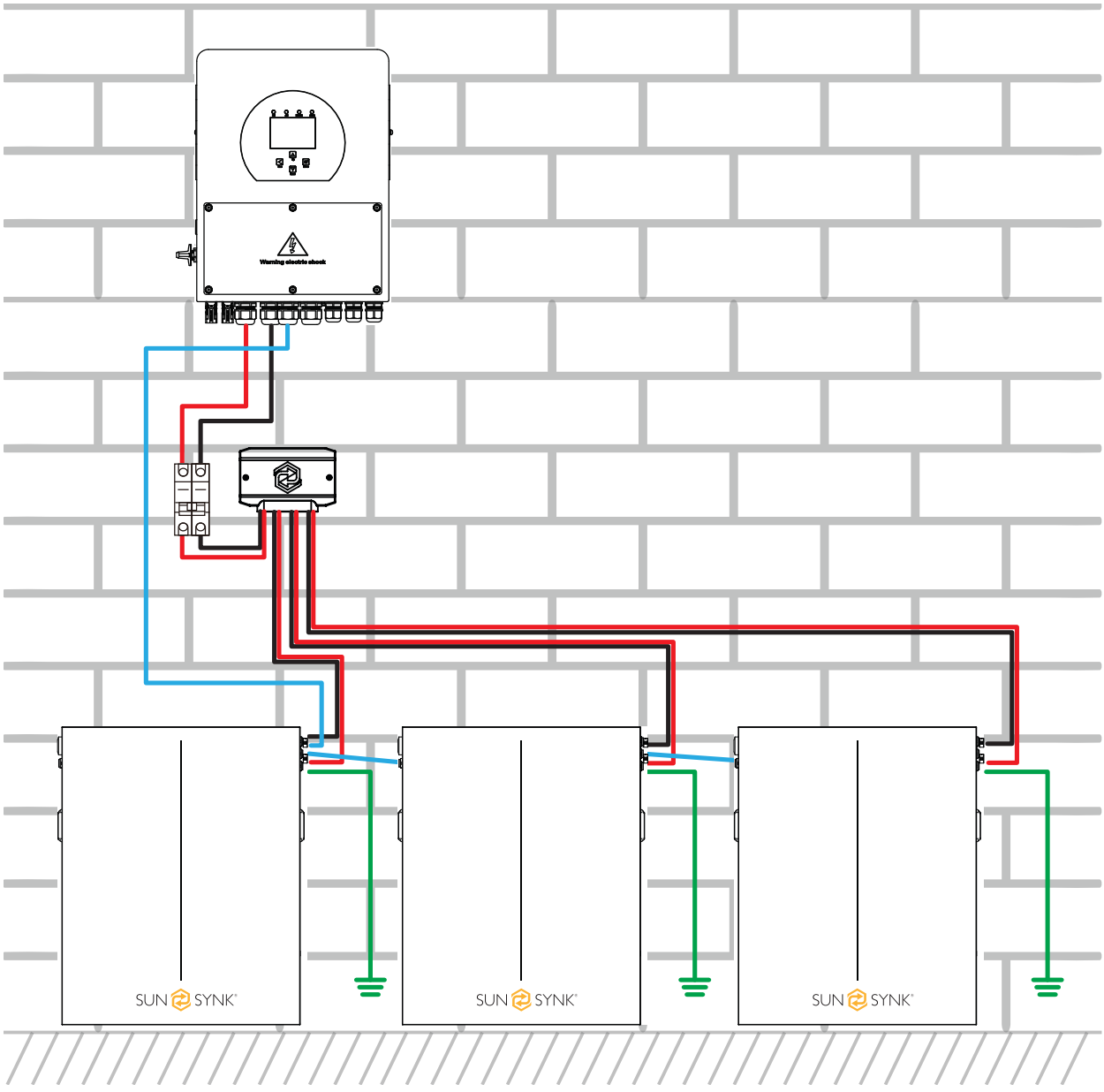
WARNING

Risk of injury (Heavy Object).

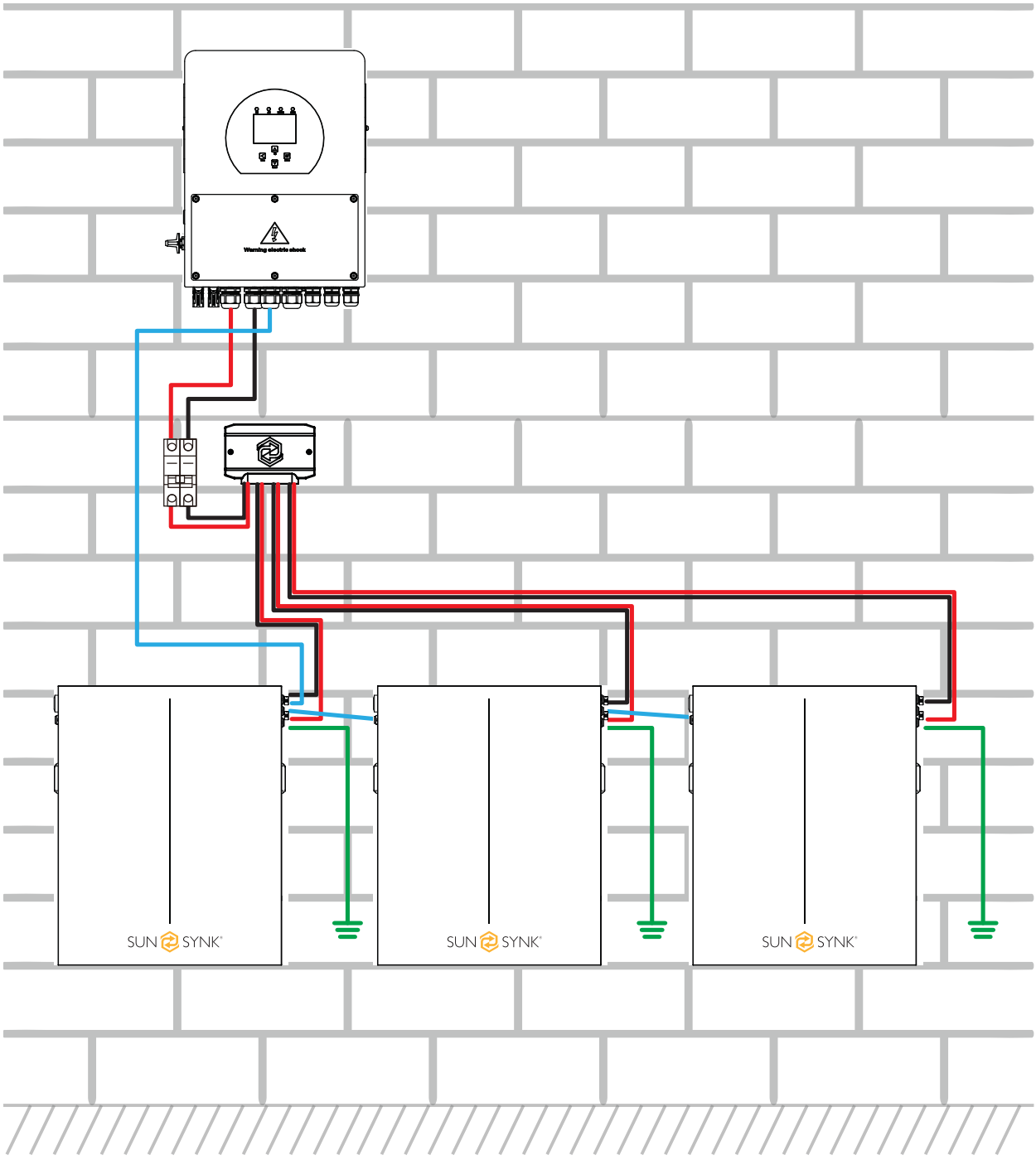
Remember that this storage system is heavy (85kg), so users must carefully handle the unit during installation, especially when mounting or removing it from the wall.

Ensure the battery is installed upright, as upside-down or sidelong orientations are not allowed. The following placements are recommended.

1. Ground Mounted:
   - Ensure that the Angle of the battery pack is less than 5°.
   - The ground is smooth and there is no water.
   - The recommended distance between battery packs is 200 mm to 400mm.



2. Wall Mounted:
   - Ensure that each installation point of the battery pack can support at least 90kg.
   - Ensure that the bracket is close to the wall.
   - Ensure that the Angle of the battery pack is less than 5°.
   - The recommended distance between battery packs is 200mm to 400mm.



Installation Steps

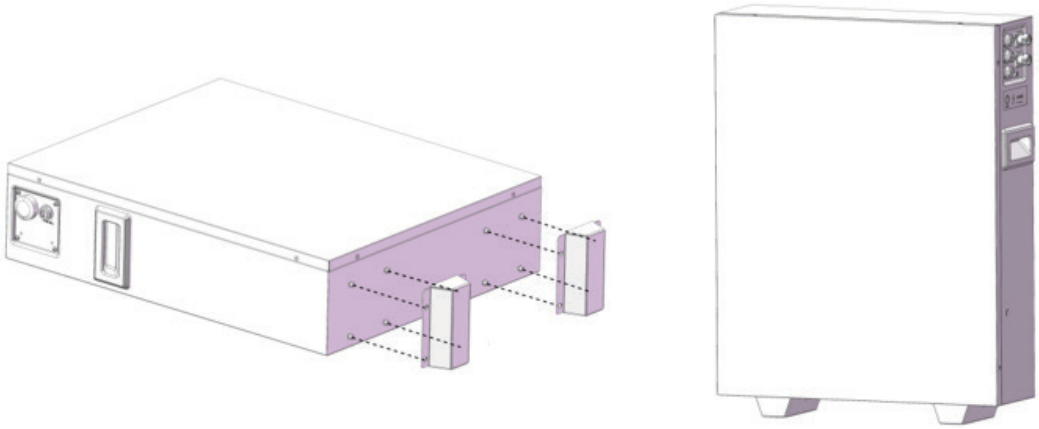
WARNING

Follow local electric safety and installation policy, a suitable breaker between battery system and inverter is required.

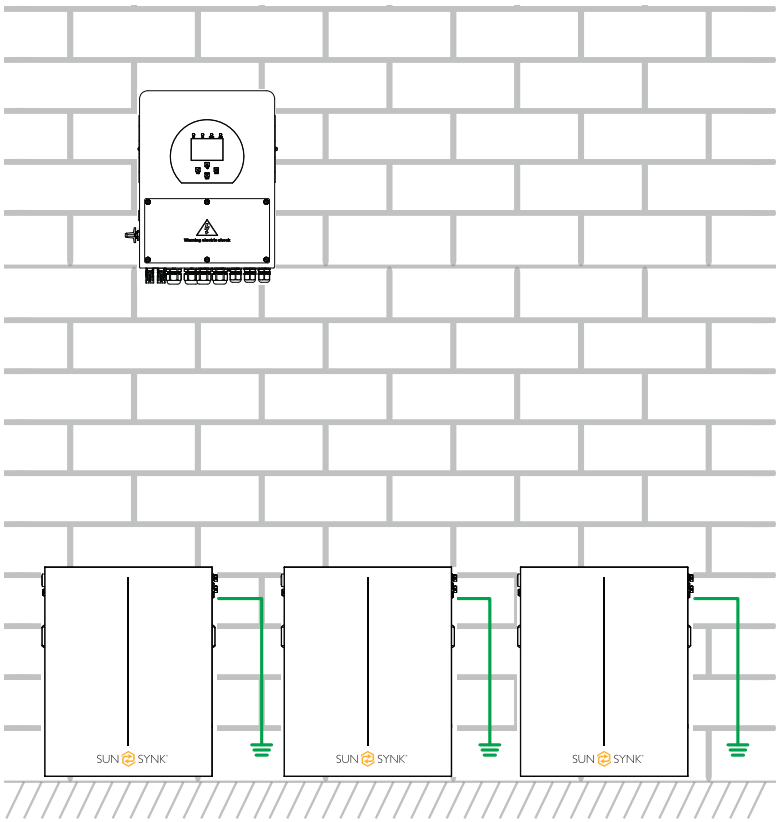
All installation and operation must follow local electric standard and requirements.

When battery modules are paralleled, the system should be powered off before installation operation.

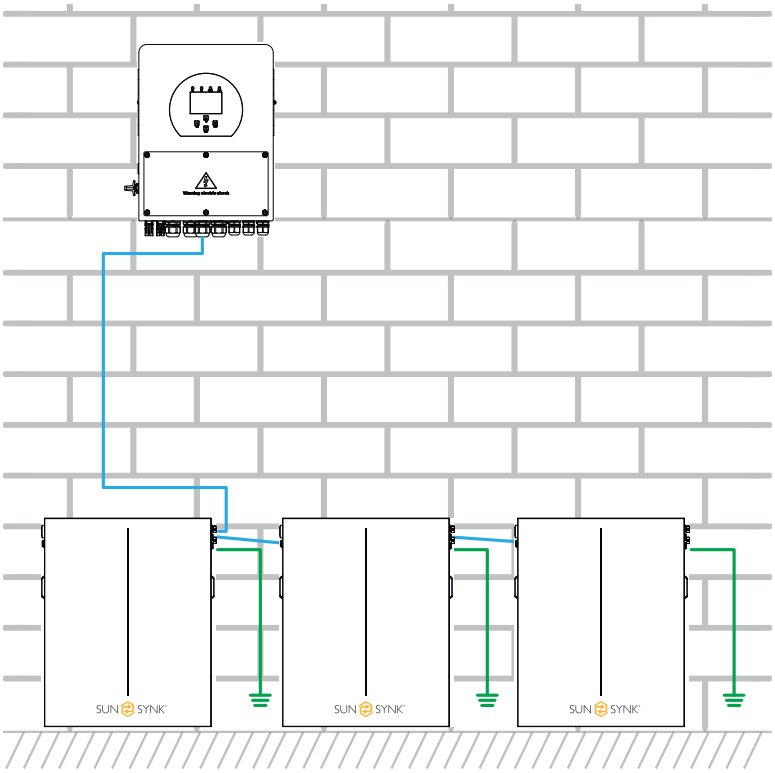
1. Ground Mounted:
   a. Install the Supports: Secure the supports to the bottom of the battery pack using eight M6 crown bolts with a locking torque of 4 N·m and fix the product on the wall with two Z-shaped wall fixed brackets.



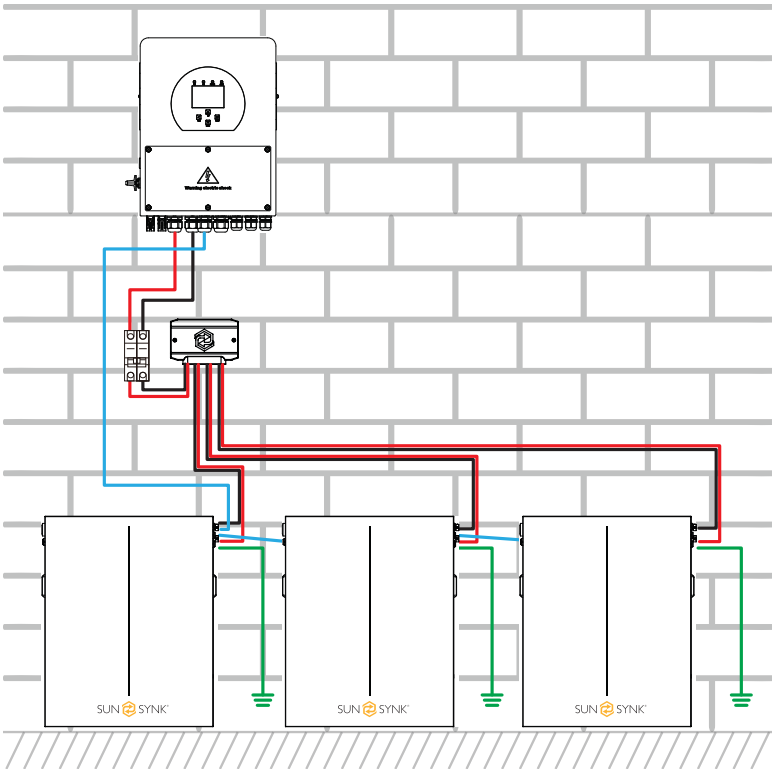
   b. Connect the Ground Wire: Properly ground each module to ensure electrical safety.



c. Connect the Communication Cables: Ensure both the inverter and batteries are turned off during these operations. First, connect the parallel communication cables between the batteries, connect the COM OUT of Battery 1 to the COM IN of Battery 2, connect the COM OUT of Battery 2 to the COM IN of Battery 3, and so on. Next, connect the CAN or RS485 communication cable between Battery 1 (the master battery) and the inverter.



d. Connect the Power Cable: Attach the positive (red) and negative (blue) cables from the battery system to the corresponding terminals on the busbar. Then, connect the power cables from the busbar to the inverter's DC input terminals. Install the DC breaker between the busbar and the inverter for protection.

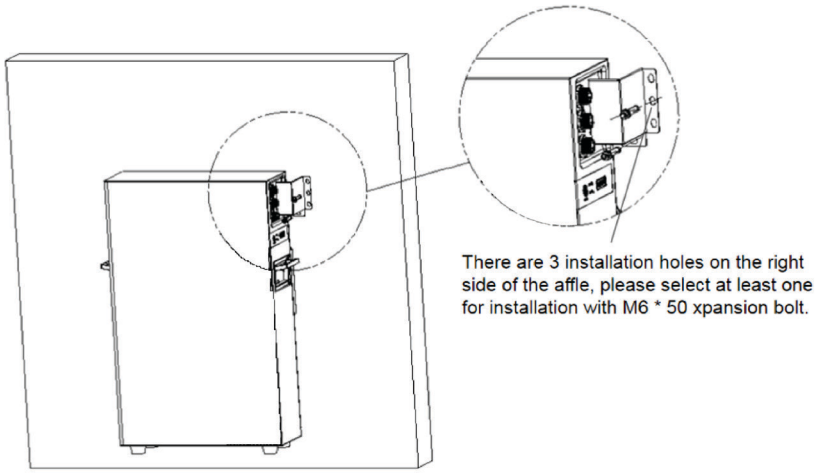


e. After connecting the power cable, it is necessary to secure it properly to prevent movement. Follow these steps:

i. Fix the Baffle: Position the baffle against the wall, aligning it with the lower edge of the terminals.

ii. Mark the Drilling Positions: Mark the spots on the wall where holes need to be drilled for securing the baffle.

iii. Drill and Install Expansion Bolts: Remove the baffle, drill the marked holes, and insert one expansion bolt at the lower side and at least one expansion bolt on the right side of the baffle.



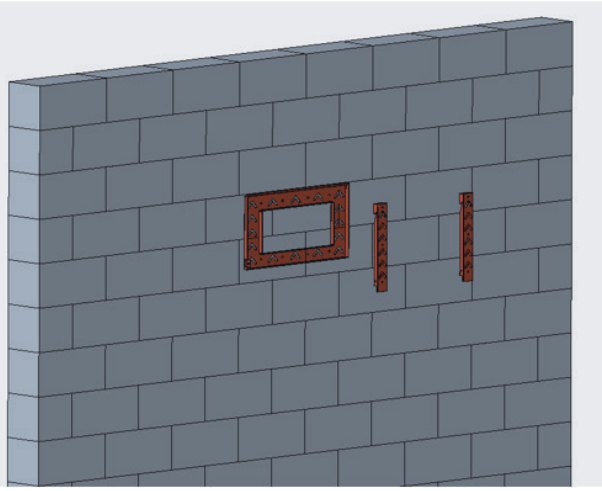
iv. Tighten the Baffle: Re-attach the baffle to the battery box and tighten it securely using a torque of 10 N·m to lock it in place.

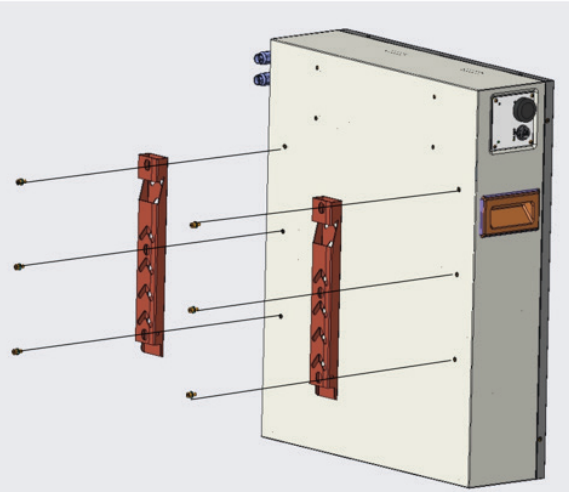
2. Wall-Mounted:

a. Mount the Wall Bracket: Secure the wall bracket to the wall using eight expansion screws. Ensure that the screws are firmly tightened and the bracket is level.

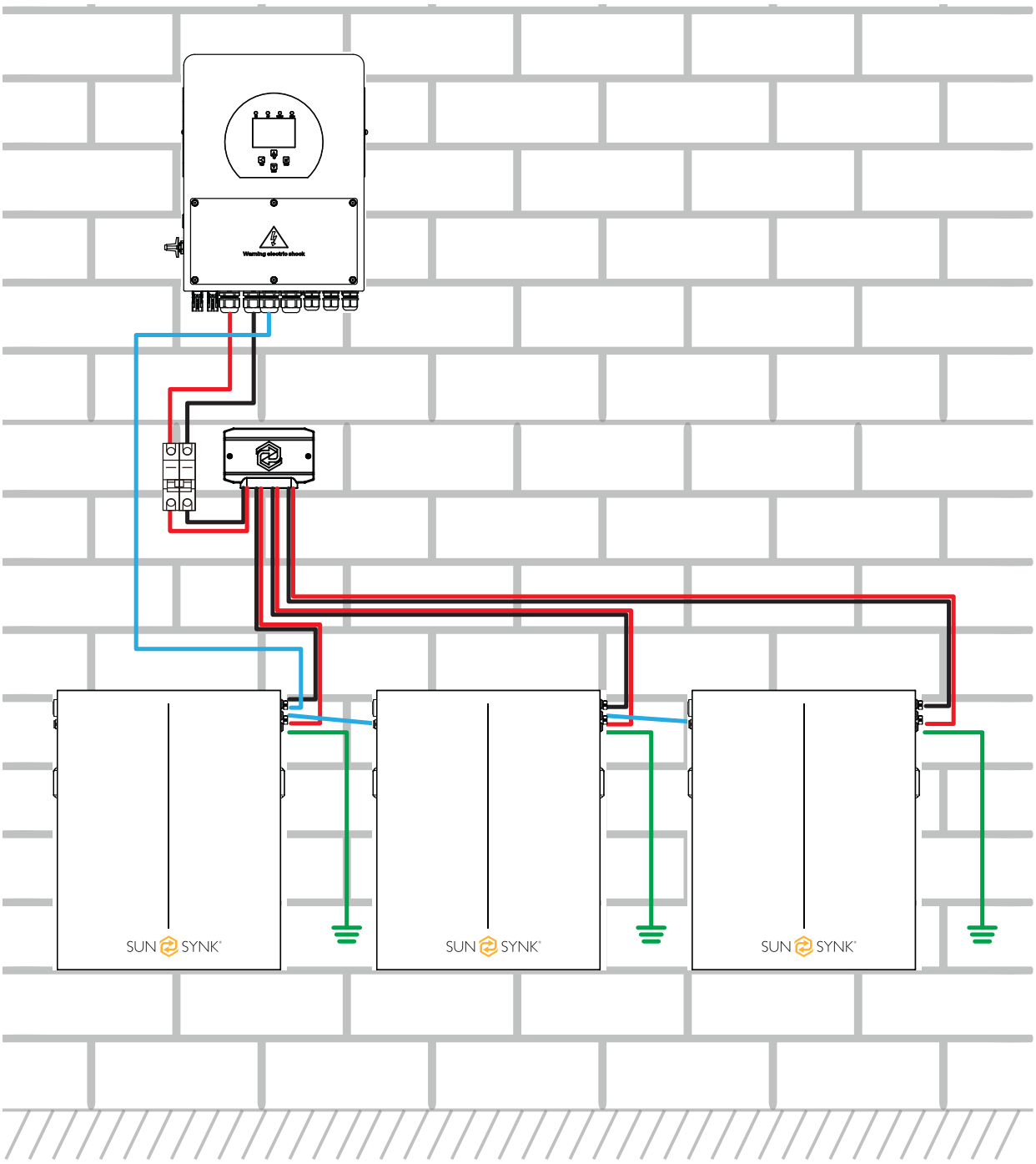
b. Attach the Bracket to the Battery Pack: Install the bracket onto the battery pack using six M6 bolts. Tighten the bolts to a locking torque of 9 N·m to ensure a secure connection.

c. Mount the Battery Pack: Carefully mount the battery pack onto the wall bracket, ensuring it is properly aligned and supported.





d. Connect the Cables: Refer to the Ground-Mounted installation section for the steps to safely start the system.



Starting the SUN-X-10.24-F Battery

Before powering on the system, double-check that all power and communication cables are properly connected.

1. Master and Slave Batteries: The battery that communicates with the inverter is the master battery, and all other battery modules are slave batteries. A maximum of 1 master battery and 7 slave battery modules can be configured.
2. Start the System: Press the START metal switch on the master battery to power up the system. The LED indicator lights will turn on successively, starting from the "RUN" LED for 0.5 seconds.
3. System Status: If the system is operating normally, the fault light will remain off. If the fault light is on, please verify the wiring or the startup steps.

Before capacity expansion, the system must be powered off. When connecting modules with different SOC/ voltages in parallel, ensure the voltage difference is less than 2V. Let the system idle for at least 15 minutes or until the SOC LEDs show a ≤1 point difference.

The system will exit sleep mode and enter normal operation mode if any of the following conditions are met:

- A charger is connected, and the charger output voltage exceeds 52V.
- The START button is pressed and held for 3-6 seconds and then released.
- RS232 communication is activated.

Powering off the SUN-X-10.24-F Battery

To power off the system, follow these steps:

1. Enter Sleep Mode: Press the START metal switch on the master battery and release it. The system will enter sleep mode, and all LED indicators will turn off sequentially.

The system will enter sleep mode under any of the following conditions:

- The over-discharge protection is triggered and not released within 300 seconds.
- The START button is pressed and held for 3-6 seconds and then released.
- The lowest unit voltage falls below the sleep voltage, and the duration exceeds the sleep delay time (with no communication, no protection, no balancing, and no current).
- The system has been in standby mode for more than 24 hours (with no communication, charge, or discharge).
- A forced shutdown by the upper control system.
- System hardware failure.

MONITORING

Battery monitoring is conveniently accessible through the Sunsynk Connect App. Sunsynk inverter systems are equipped with the capability to monitor connected lithium batteries using the CANBUS protocol, ensuring continuous communication with the batteries. Users can easily access this monitoring data through the Sunsynk data logger via the Sunsynk Connect app. External monitoring is also supported for added convenience.

The accompanying images highlight the monitoring features of Sunsynk inverter and app systems, with a specific focus on the battery. The screens showcase the Li-BMS interface on the inverter, providing detailed insights into battery performance. The Sunsynk battery, known for its IP65 model, offers superior monitoring capabilities compared to other battery types, ensuring seamless integration with Sunsynk inverters and delivering comprehensive performance information.

Li BMS Help

Sum Data	Details Data

Battery Voltage: 53.06V
Battery Current: -1A
Battery Temp: 22.0C
Total SOC: 85%
Total SOH: 100%
Battery Chage Voltage: 58.0V
Charge Current Limit: 50A
Discharge Current Limit: 50A

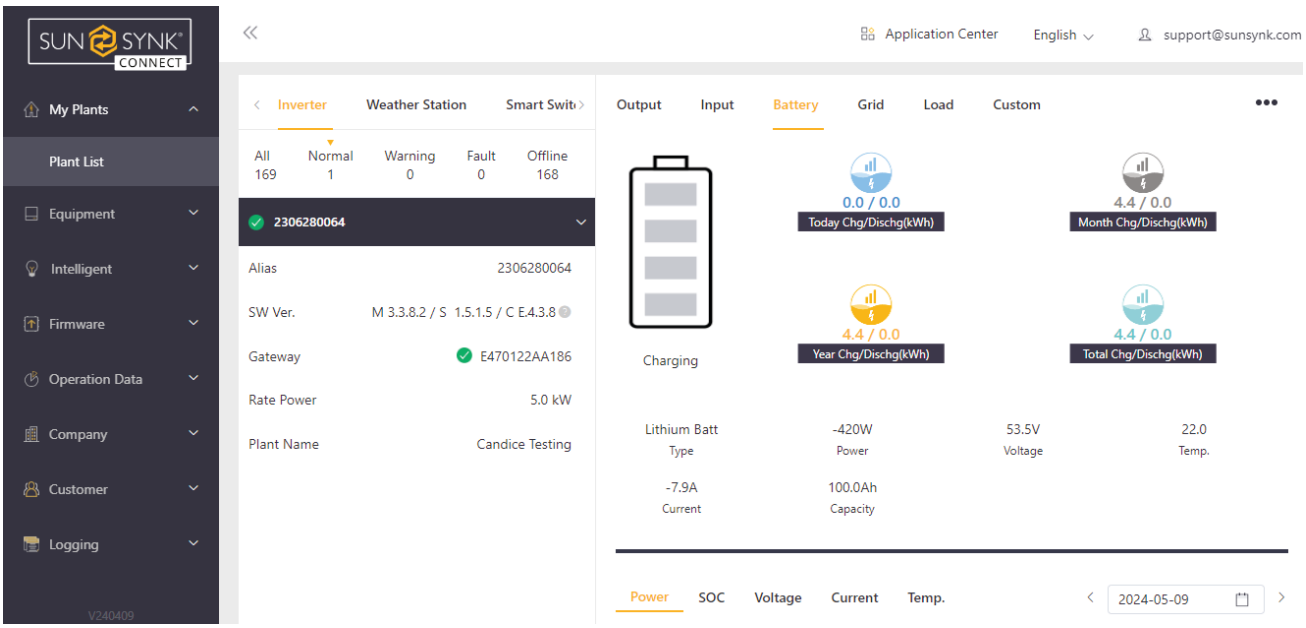
Li BMS Help

Sum Data					Details Data		
					Charge		
	Volt	Curr	Tem	SOC	Energy	Volt	Curr	Fault
1	50.31V	19.70A	29.6C	33.0%	26.0Ah	0.0V	0.0A	0 0 0
2	50.38V	31.70A	37.6C	51.0%	25.5Ah	53.2V	25.0A	0 0 0
3	50.35V	25.10A	29.9C	52.0%	6.0Ah	53.2V	25.0A	0 0 0
4	50.37V	30.70A	32.1C	12.0%	26.0Ah	0.0V	0.0A	0 0 0
5	50.35V	00.00A	30.6C	48.0%	32.0Ah	0.0V	0.0A	0 0 0
6	50.36V	15.40A	30.6C	52.0%	39.1Ah	0.0V	0.0A	0 0 0
7	00.00V	00.00A	0.0C	00.0%	00.0Ah	0.0V	0.0A	0 0 0
8	50.38V	19.30A	31.0C	52.0%	25.5Ah	0.0V	0.0A	0 0 0
9	50.39V	16.30A	30.6C	52.0%	26.0Ah	0.0V	0.0A	0 0 0
10	00.00V	00.00A	0.0C	00.0%	00.0Ah	0.0V	0.0A	0 0 0
11	00.00V	00.00A	0.0C	00.0%	00.0Ah	0.0V	0.0A	0 0 0
12	00.00V	00.00A	0.0C	00.0%	00.0Ah	0.0V	0.0A	0 0 0
13	00.00V	00.00A	0.0C	00.0%	00.0Ah	0.0V	0.0A	0 0 0
14	00.00V	00.00A	0.0C	00.0%	00.0Ah	0.0V	0.0A	0 0 0
15	00.00V	00.00A	0.0C	00.0%	00.0Ah	0.0V	0.0A	0 0 0

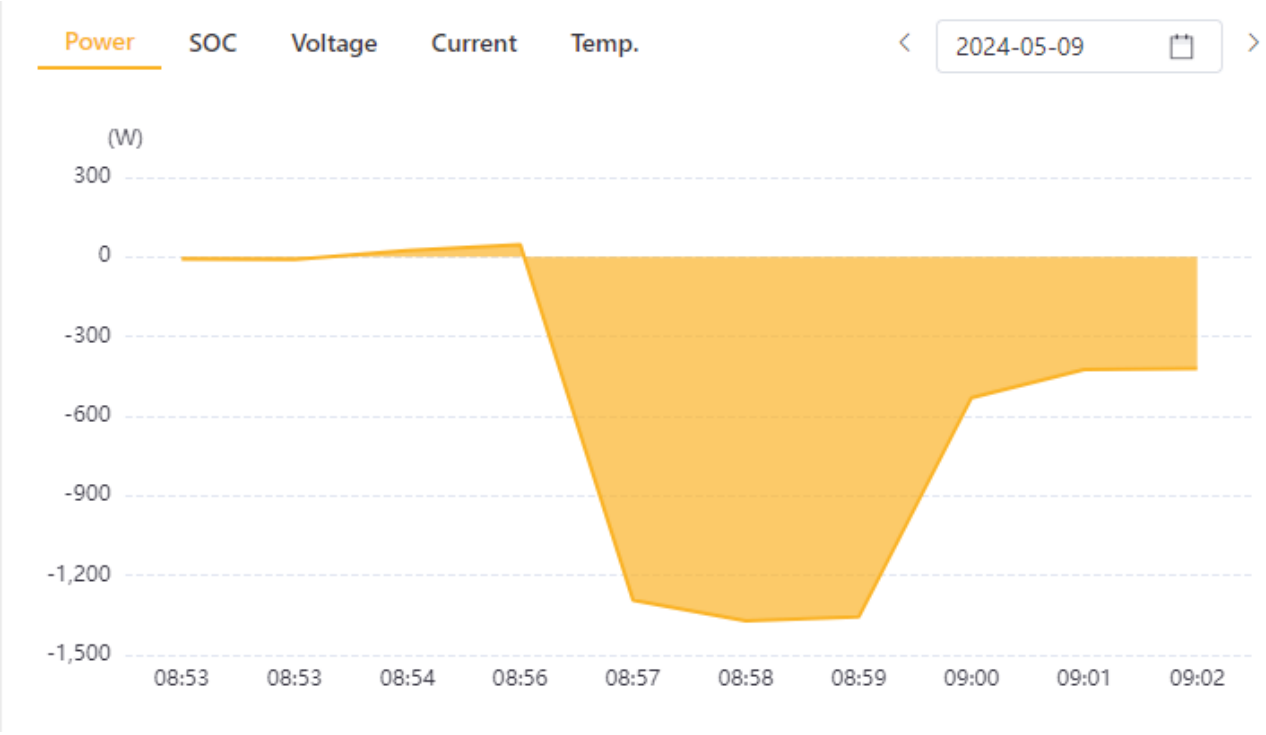
The summary data screen offers a comprehensive snapshot of the battery's current status, consolidating vital information for quick understanding at a glance.

On the other hand, the detailed data screen provides in-depth insights into the battery's specifics, including temperature readings and high/low cell voltages. This detailed view allows for a clearer understanding of the battery's internal condition and performance.

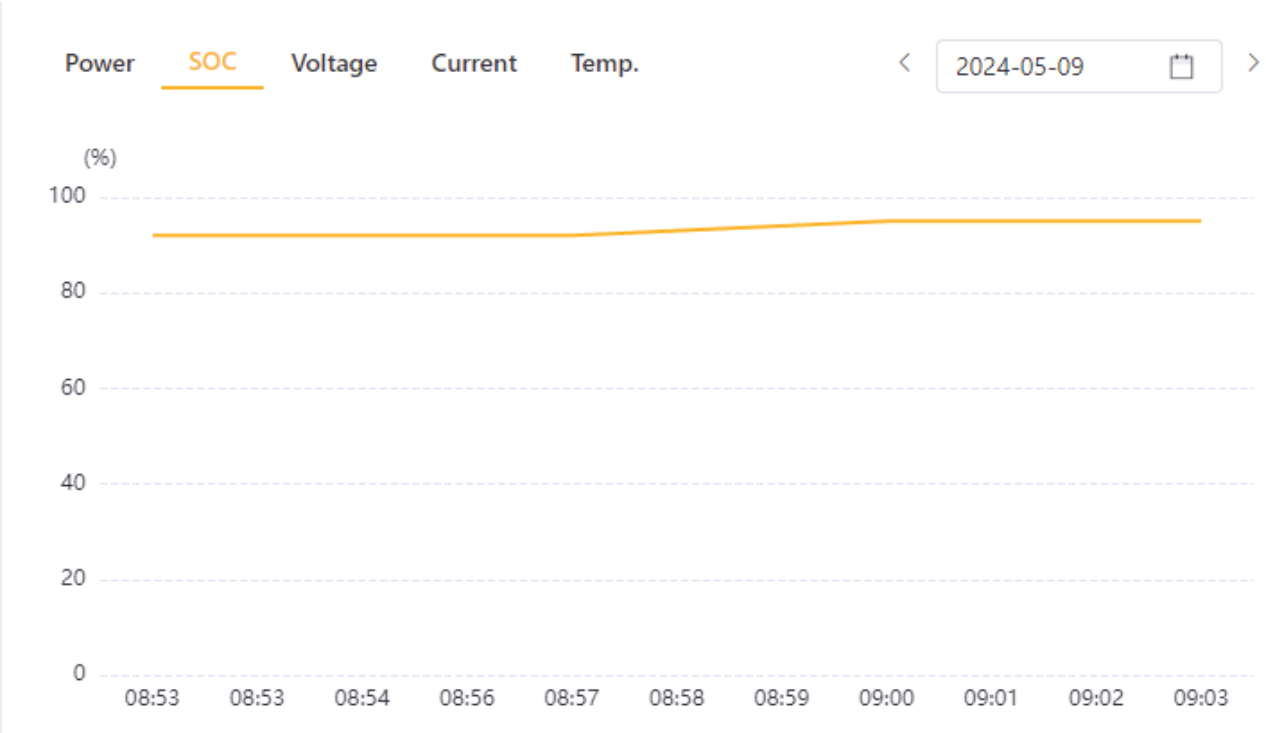
This simple Li-BMS screen offers a basic overview of the details. This screen is visible only when communication is active. For older versions of software on the battery's LCD, this screen will also show up. The newer Li-BMS display screen is available starting from LCD software E426.



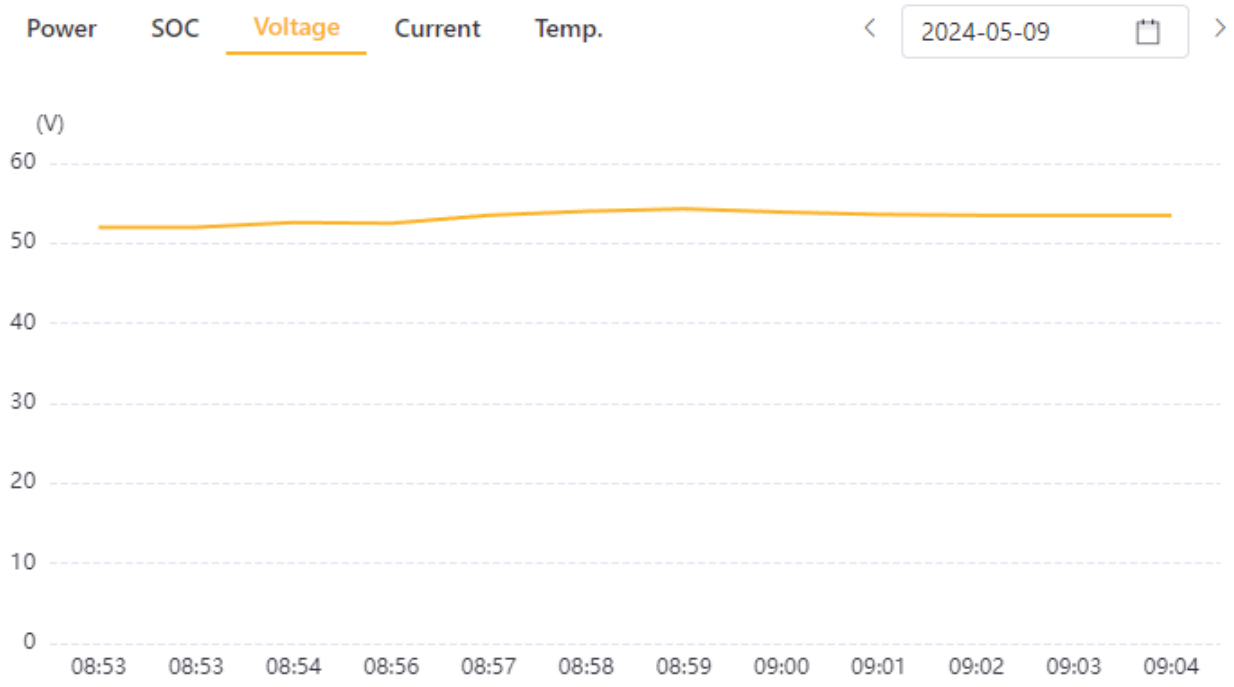
The power tab in the battery section shows the amount of power going into and out of the battery during the chosen time period. This helps you understand how much power the battery is using.



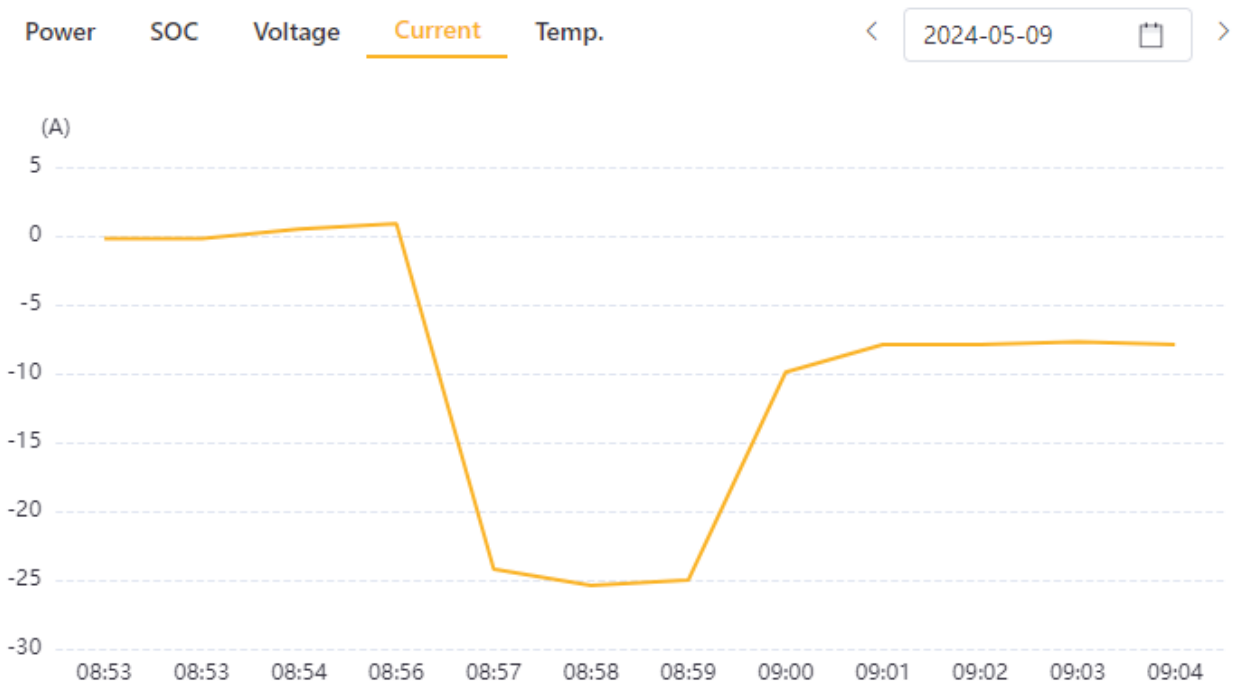
The SOC tab displays the battery's state of charge.



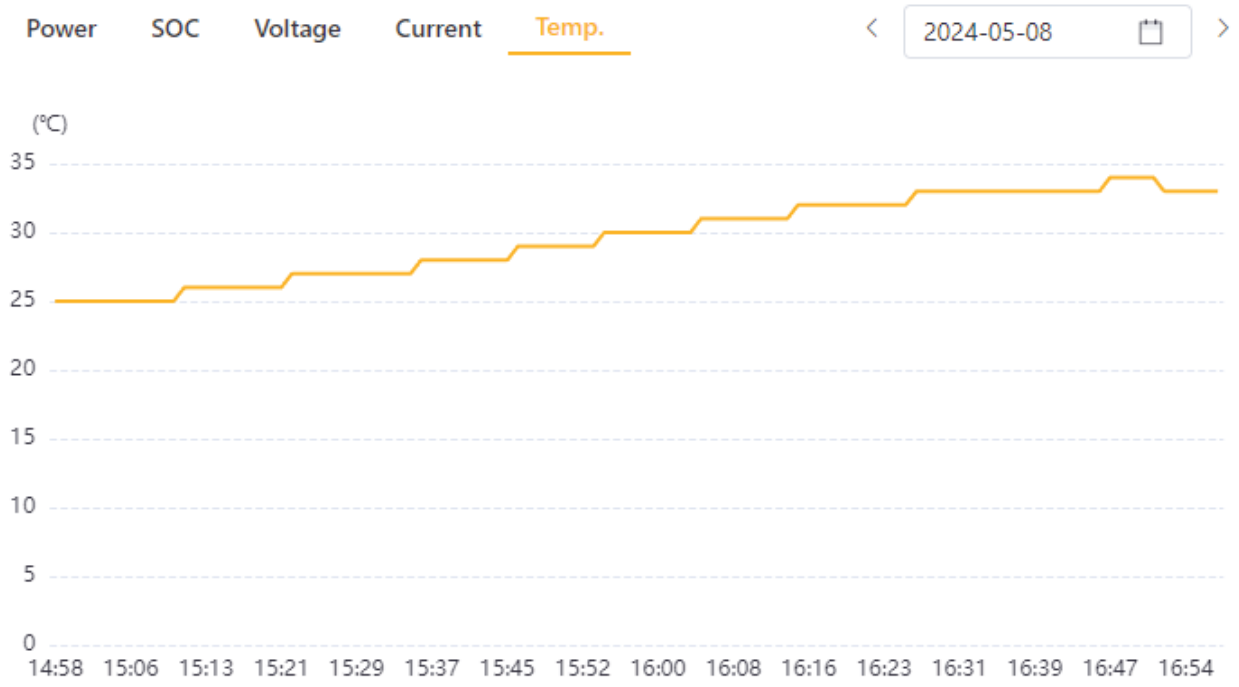
The voltage tab indicates the state of the voltage of the battery.



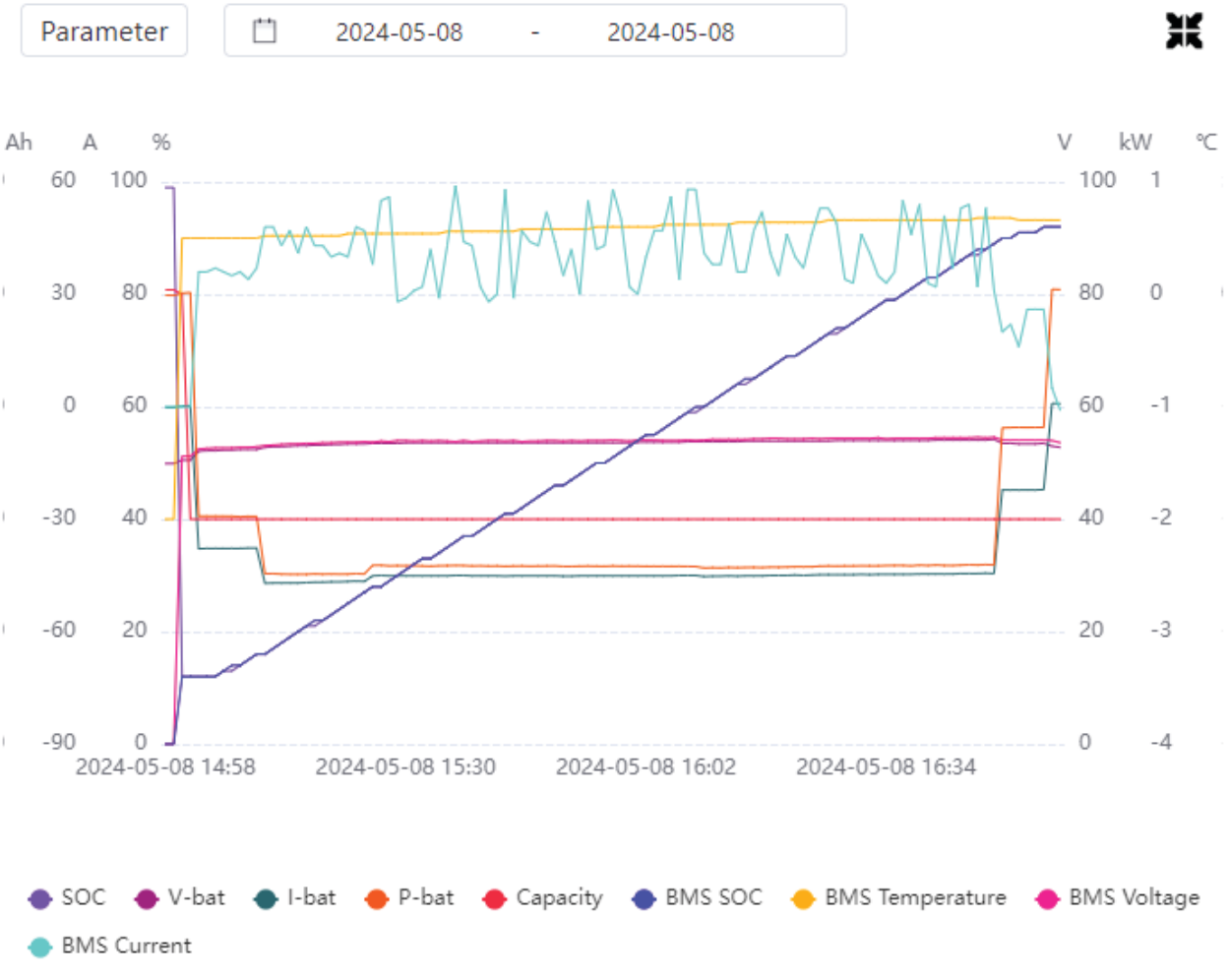
The current tab shows the current through the battery at any given time.

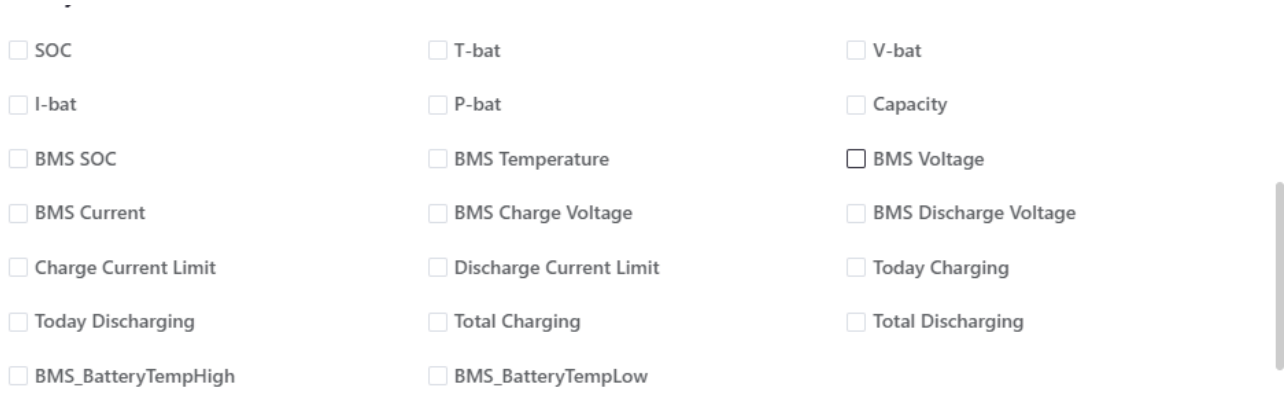


The temperature tab indicates the internal battery temperature of the battery according to the BMS.

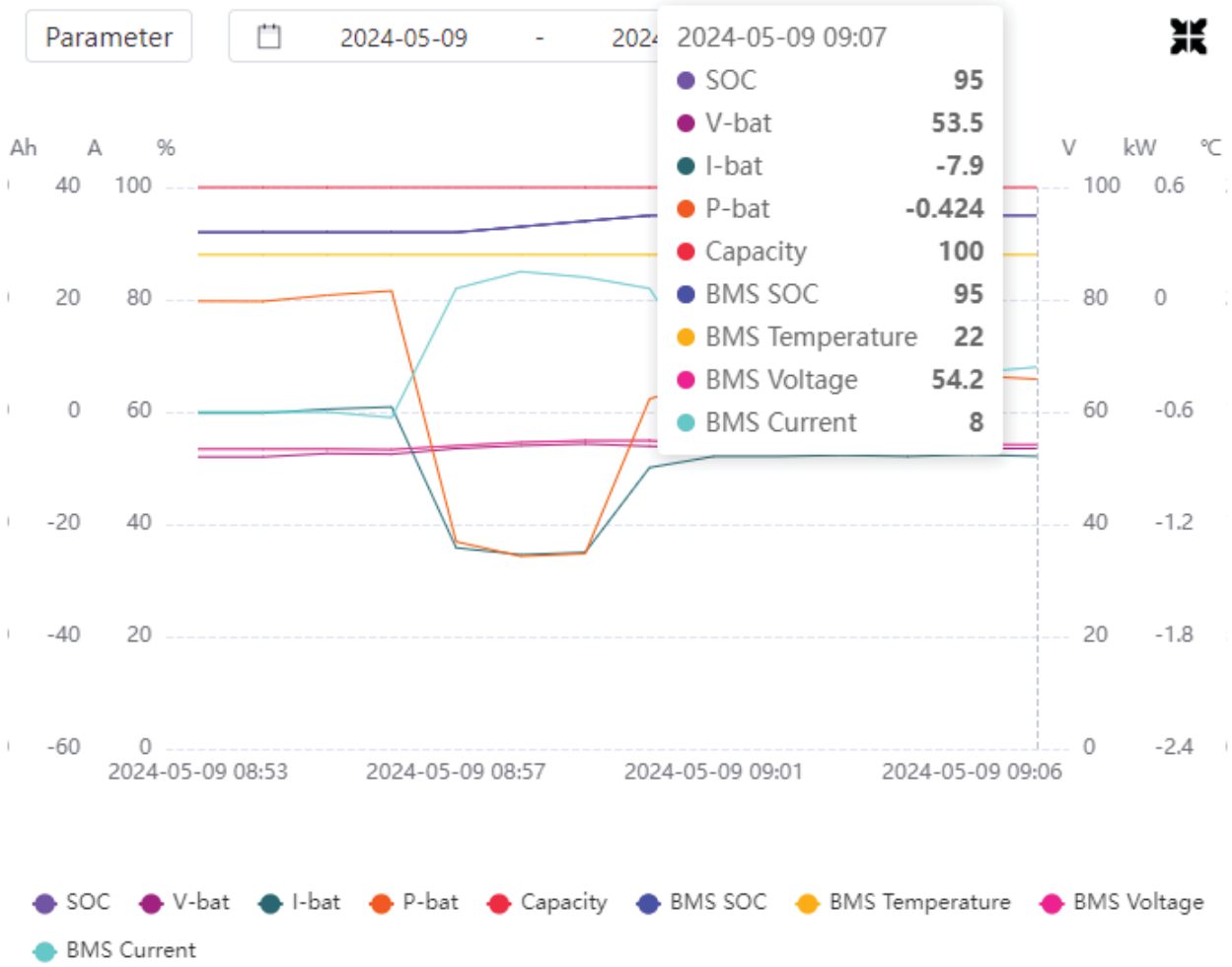


If you select the custom tab, you'll find a graph that provides detailed insights into the inverter's operations, including those related to the battery. The parameter tab grants access to all available data for the battery.





The graph displays the selected options you've chosen, with a maximum of ten selections at a time. You can select and view different battery parameters for the required operational period. Hovering your cursor over the graph allows you to inspect and get more details.



INSPECTION, CLEANING AND MAINTENANCE

General Information

- The SUN-X-10.24-F battery isn't fully charged upon shipment. We suggest installing it within three months of arrival.
- During maintenance, avoid reinstalling batteries in the SUN-X-10.24-F to prevent reduced product performance.
- Do not dismantle or dissect any battery in the SUN-X-10.24-F; it's strictly prohibited.
- After over-discharging the SUN-X-10.24-F battery, recharge it within 48 hours. You can also charge the SUN-X-10.24-F in parallel. Connect the charger to the output port of any SUN-X-10.24-F after connecting batteries in parallel.
- Do not open or dismantle the battery as it doesn't contain serviceable parts internally.
- Before cleaning or performing maintenance tasks, disconnect the SUN-X-10.24-F Li-Ion battery from all loads and charging devices. Use the enclosed protective caps on terminals during these activities to avoid terminal contact risks.

Inspection

Inspect the wiring and contacts for looseness or damage, including cracks, deformations, leaks, or any other type of damage. If any damage is found, replace the battery immediately.

- Do not attempt to charge or use damaged batteries under any circumstances.

IMPORTANT: Avoid contact with liquid from a ruptured battery.

Regularly monitor the battery's state of charge. Lithium Iron Phosphate batteries gradually discharge when not in use or during storage. Consider replacing the battery if you notice either of the following conditions:

1. The battery's run time decreases below 70% of the original run time.
2. The battery's charge time significantly increases.

Cleaning

If cleaning is required, use a soft, dry cloth to clean the Li-Ion battery. Avoid using liquids, solvents, or abrasives for cleaning purposes.

Maintenance

The Li-Ion battery is maintenance-free. Charge the battery to approximately over 80% of its capacity at least once every year to maintain its capacity.

Storage

The battery product should be stored in a dry and cool environment. Typically, the maximum storage period at room temperature is six months. If storing the battery for over six months, it's recommended to check the battery voltage. If the voltage exceeds 51.2V, you can continue storing the battery. However, it's important to check the voltage at least once a month until it drops below 51.2V. Once the voltage is lower than 51.2V, charge the battery according to the following strategy:

1. Discharge the battery to the cut-off voltage using a 0.2C (20A) current.
2. Charge the battery with a 0.2C (20A) current for approximately 3 hours.
3. Maintain the State of Charge (SOC) of the battery at 15%-40% during storage.

When storing the battery, ensure it's kept away from explosive and flammable areas, and keep ignition sources and high temperatures distant from the battery.

TROUBLESHOOTING

To assess the battery system's status, users need to utilize additional battery status monitoring software to check the protection mode. Please refer to the installation manual for instructions on using the monitoring software. Once the user identifies the protection mode, consult the following table for solutions and further information.

Fault Type	Fault Generation Condition	Possible Causes	Troubleshooting
BMS fault	The cell voltage sampling circuit is faulty. The cell temperature sampling circuit is faulty	The welding point for cell voltage sampling is loose or disconnected. The voltage sampling terminal is disconnected. The fuse in the voltage sampling circuit is blown. The cell temperature sensor has failed.	Replace the battery.
Electrochemical cell fault	The voltage of the cell is low or unbalanced.	Due to large self-discharge, the cell over-discharges to below 2.0V after long-term storage. External factors damage the cell, and short circuits, pinpricks, or crushing occurs.	Replace the battery.
Over-voltage protection	The cell voltage is greater than 3.63 V in the charging state. The battery voltage is greater than 58.08 V.	The bus-bar input voltage exceeds the standard value. Cells are not consistent. The capacity of some cells deteriorates too fast, or the internal resistance of some cells is too high.	Contact local engineers to rectify the fault if the battery cannot be recovered due to protection against abnormality.
Under voltage protection	The battery voltage is less than 43.2V. The minimum cell voltage is less than 2.7V	The mains power failure has lasted for a long time. Cells are not consistent. The capacity of some cells deteriorates too fast, or the internal resistance of some cells is too high.	Contact local engineers to rectify the fault if the battery cannot be recovered due to protection against abnormality.
Charge or discharge high-tempera-ture protection	The maximum cell temperature is greater than 55°C	The battery ambient temperature is too high. There are abnormal heat sources around.	Contact local engineers to rectify the fault if the battery cannot be recovered due to protection against abnormality.
Charge low-temperature protection	The minimum cell temperature is less than -8°C	The battery ambient temperature is too low.	Contact local engineers to rectify the fault if the battery cannot be recovered due to protection against abnormality.
Discharge low-temperature protection	The minimum cell temperature is less than -18°C	The battery ambient temperature is too low.	Contact local engineers to rectify the fault if the battery cannot be recovered due to protection against abnormality.

After checking the above data, please send it to our service personnel. Thus, we will evaluate your problem and reply with the best solution.

BATTERY RECOVERY

The advanced hydro-metallurgical process is used to recover aluminium, copper, lithium, iron, and other metal materials from discarded $LiFePO_4$ batteries. This process can achieve a recovery efficiency of up to 80%. Here are the steps involved in the process:

Recovery Process and Steps of Cathode Materials

Aluminium foil, being an amphoteric metal, is dissolved in a NaOH alkali solution to form $NaAlO_2$, which enters the solution. After filtration, the filtrate is neutralized with sulphuric acid and precipitated to obtain $Al(OH)_3$. When the pH is above 9.0, most of the aluminium precipitates, and the obtained $Al(OH)_3$ achieves chemical purity after analysis.

The filter residue is dissolved with sulphuric acid and hydrogen peroxide. This process allows lithium iron phosphate to enter the solution in the form of $Fe_2(SO_4)_3$ and Li_2SO_4, separating it from carbon black and carbon coating on the lithium iron phosphate surface. After filtration and separation, the pH of the filtrate is adjusted with NaOH and ammonia water. Iron is first precipitated with $Fe(OH)_3$, and then the remaining solution is precipitated with saturated Na_2CO_3 solution at 90°C.

Since $FePO_4$ is slightly soluble in nitric acid, the filter residue is dissolved with nitric acid and hydrogen peroxide. This process directly precipitates $FePO_4$ and separates impurities like carbon black from the acid solution. It also leaches $Fe(OH)_3$ from the filter residue and precipitates Li_2CO_3 with saturated Na_2CO_3 solution at 90°C.

Recovery of Anode Materials

The recovery process for anode materials is relatively straightforward. Following the separation of the anode plates, the purity of copper can exceed 99%. This high-purity copper can then undergo further refining to produce electrolytic copper.

Recovery of Diaphragm

The diaphragm material is mainly harmless and has no recycling value.

List of Recycling Equipment

Automatic dismantling machine, pulverize, wet gold pool, etc.

TRANSPORTATION REQUIREMENTS

Transport battery products immediately after packaging using cars, trains, or ships. During transportation, avoid exposing the packaging to severe vibration, impact, or compression, as well as direct sunlight or rain.

Always ensure compliance with local, national, and international regulations before transporting Lithium Iron Phosphate batteries. Note that the transport of end-of-life, damaged, or recalled batteries may be restricted or prohibited in some cases.

The transport of Li-Ion batteries is classified under hazard class UN3480, class 9, falling into packaging group PI965 Section I for transport by water, air, or land.

For transportation of lithium-ion batteries assigned to Class 9, use Class 9 Miscellaneous Dangerous Goods and UN Identification labels. Refer to relevant transportation documents for further guidance.