PowMr

STACKED LITHIUM IRON PHOSPHATE BATTERY

User Manual

Table of Contents

1 Overview

1.1 Scope

This user manual provides information, operating instructions, and maintenance guidelines for the POW-LIO51400-16S low-voltage residential energy storage battery series. The POW-LIO51 residential energy storage series is a lithium battery system developed by PowMr, designed to be compatible with various inverter brands available in the market.

1.2 Intended Audience

This manual is intended for professional technical personnel involved in the installation, operation, and maintenance of lithium batteries, as well as end-users seeking technical information.

1.3 Manual Usage

1. Before using the product, carefully review this user manual and keep it in a readily accessible location.
2. All information in this user manual, including images and symbols, is proprietary to PowMr. Unauthorized use of any part or all of the content is strictly prohibited for individuals outside the company.
3. Considering the potential for updates and corrections to the manual content, users are advised to use the provided documentation as a reference. For the latest user manual, please refer to the product documentation provided or contact customer service through the official website.

2　Product Introduction

2.1　Introduction

1. The POW-LIO51 residential energy storage series is a battery module developed by PowMr Energy designed for low-voltage lithium battery systems, primarily applied in the home energy storage sector. It achieves high-precision multi-cell voltage and temperature acquisition.

2. The module employs passive balancing, with a maximum balancing current of 300mA, enhancing the overall lifespan of the battery pack.

3. The communication interfaces include CAN, RS485, and dry contact communication methods, enabling parallel communication for up to 16 batteries.

4. Featuring an embedded BMS system, it effectively monitors battery over-temperature, over-voltage, over-current, and other conditions, reducing the risk of battery damage or even fire, thereby ensuring personal and property safety.

5. This manual covers the types, sizes, performance, technical characteristics, warnings, and precautions of the lithium battery system. This specification is applicable exclusively to the battery systems provided by PowMr Energy.

3　Safety Instructions
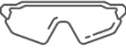
3.1　Labeling Explanation

To ensure user safety during product use, relevant labeling information with appropriate symbols is provided in this manual. The following lists symbols that may be used in this manual, so please read carefully.

Icon	Description
⚠️	Signifies a low-level potential hazard. Failure to avoid may result in minor or moderate injury to personnel.
⚡	Indicates the presence of high voltage inside the battery module. Touching may lead to electric shock hazards.
⏚	This is the ground protection port (PE). It should be securely grounded to ensure the safety of operating personnel.

3.2 Installation Tools

Prior to installation, prepare the following tools:

Category	Tools		
General Tools	Multimeter	Protective gloves	Insulated safety shoes
	Protective clothing	Safety goggles	Antistatic wrist strap
Installation Tools	Electric screwdriver	Socket wrench	Wire stripper
	Phillips screwdriver (M4/M6)	Electric drill	Hammer

3.3 Precautions

3.3.1 Manual Storage

1. This manual covers crucial information for the POW–LIO51 Home Energy Storage Series. Prior to operating the product, carefully read this manual as it provides essential assistance in acquainting you with the product.

2. Store this manual securely for the convenience of relevant installation and maintenance personnel to refer to during operations.

3. Strictly follow the descriptions in this manual when operating the PowMr Home Energy Storage Series to avoid equipment damage, injuries, property loss, and other potential issues.

3.3.2 Label Protection

1. Warning labels on the POW–LIO51 Home Energy Storage Series contain crucial safety operation information. It is strictly prohibited to intentionally tear or damage them!

2. The product has a nameplate on the casing, providing essential parameter information. It is strictly prohibited to intentionally tear or damage it!

3.3.3 Safety Warning Labels

When conducting installation, routine maintenance, inspections, etc., on the POW–LIO51 Home Energy Storage Series, to prevent unauthorized individuals from approaching, engaging in improper operations, or accidents, adhere to the following conventions:

1. Erect clear signage at the switch locations of the PowMr products to prevent accidents caused by accidental closing.

2. Set warning signs or establish safety warning tape near the operating area to prevent unrelated personnel from approaching.

3. After maintenance or inspection, conduct a thorough on–site safety check.

3.3.4 Personnel Requirements

1. Only personnel with relevant professional qualifications are allowed to perform various operations on this product.

2. Operating personnel should be thoroughly familiar with the composition and working principles of the entire POW–LIO51 Home Energy Storage Series system.

3. Operating personnel should be fully acquainted with the "User Manual" for this product.

3.3.5 Power-On Measurement

> ⚠️ **DANGER**

After the energy storage battery is installed, there is a high voltage present, and accidental contact with the positive and negative terminals may result in electric shock injuries. Therefore, when conducting power-on measurements, attention should be paid to the following:

1. Take necessary insulation protection measures (such as wearing insulated gloves).
2. Accompanying personnel must be present to ensure personal safety.

3.3.6 Measuring Instruments

> ⚠️ **WARNING**

When performing electrical connections and trial operations on the energy storage backup battery, and to ensure that electrical parameters meet requirements, relevant electrical measuring equipment such as multimeters, power meters, etc., should be used. Note the following:

1. Use measuring equipment with a suitable range that conforms to on-site working conditions.
2. Ensure the correct and standardized electrical connections of the instruments to avoid dangers such as electric arcs.

3.3.7 Maintenance and Inspection

> ⚠️ **WARNING**

When both the energy storage battery and the inverter are turned off, and electrical connections are confirmed to be disconnected, maintenance or inspection operations can be carried out on the energy storage battery cabinet. Pay attention to the following:

1. Ensure that the energy storage battery will not be accidentally re-energized.
2. Use a multimeter to ensure that the energy storage battery is completely de-energized.
3. For parts near potentially live components during operations, use insulating materials for insulation covering or grounding.
4. It is strictly prohibited to perform maintenance or inspection operations on live equipment! When performing maintenance or inspection on equipment, it must be ensured that at least two personnel are present at the site. Maintenance operations can only be carried out after the equipment is safely de-energized, fully charged, or discharged.

PowMr

4   Overview of Main Components

No.	Image	Name	Quantity
1		Battery	4
2		Top Cover	1
3		Base	1
4		Rad–Positive Power Line Black–negative Power Line	8
5		Communication Cable	4
8	User Manual	Product User Manual	1

5　Product Introduction

5.1　Overview

The POW-LIO household energy storage series lithium battery module integrates PowMr's high-capacity, high-safety lithium iron phosphate battery cells. It adopts a stacked design with advantages in footprint and vertical space utilization. The module incorporates a high-precision Battery Management System (BMS) unit, monitoring and collecting real-time data on voltage and temperature inside the module. This enables intelligent temperature control at the cell level and smart cell balancing, enhancing system efficiency and battery cycle life. The module features a shock-resistant structure within a cold-rolled sheet metal shell for high safety and reliability, meeting household standards. Additionally, the module is designed for high stability and disturbance resistance, ensuring the safe and reliable operation of the battery system.

![PowMr logo]

5.2   Product Appearance

1	Top Cover	6	Handle
2	Base	7	Rear Panel
3	Battery	8	Output Port
4	Low Voltage Switch	9	Back Port Panel
5	Battery Capacity Indicator Light		

5.3 Battery Port Panel
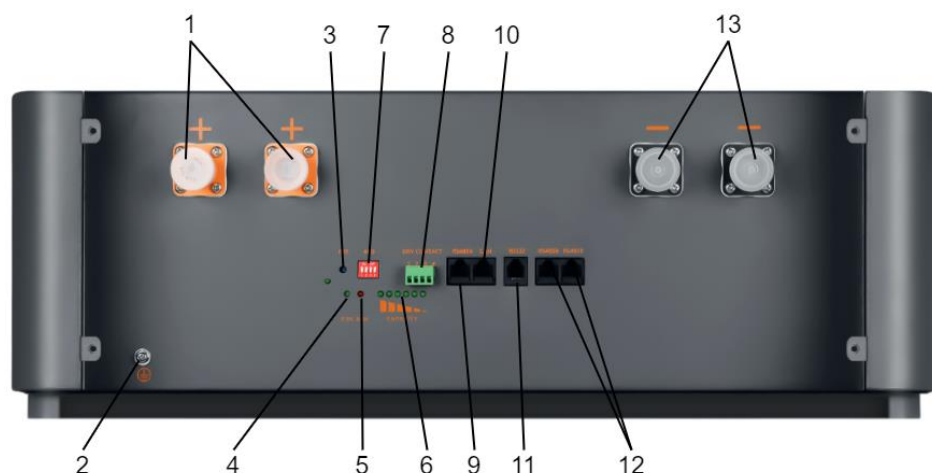
No.	Name	Function	Notes
1	Positive Terminal Port (+)	Battery Positive Output	
2	Ground Terminal Port	Battery Ground	
3	Reset Button (RST)	Battery Reset	Briefly tap and release within 1–3 seconds.
4	Operation Light (RUN)	Battery Operation Indicator Light	
5	Alarm Light (ALM)	Battery Alarm Indicator Light	
6	Capacity Light (CAPACITY)	Battery Capacity Indicator Light	
7	DIP Switch (ADS)	Define Battery Communication Code	
8	Dry Contact	Dry Contact Communication	1. Dry Contact 1 - PIN1 to PIN2: Normally open, closed

			during fault protection; 2. Dry Contact 2 – PIN3 to PIN4: Normally open, closed during low battery alarm.
9	RS485A	485 Communication Interface	Communication with inverter via RS485
10	CAN	CAN Communication Interface	Communication with inverter via CAN
11	RS232	1. Monitor batteries and modify parameters. 2. Perform software upgrades.	
12	RS485B	Communication between batteries.	Functions are the same, no distinction between left and right.
13	Negative Terminal Port (–)	Battery Negative Output	

6 Battery Installation and Wiring

6.1 Battery Installation

Step 1. Prepare tools: Cross-head screwdriver, multimeter, insulated gloves, rack, Ethernet cable, power cable.

Step 2. Unboxing: Take the battery and other items from the packaging, first check if the battery's appearance is intact, then verify the completeness of accessories referring to the accessory list.

Step 3. Assembly: Stack the components in the order of base > battery > top cover.

> **Attention:**
> ● The maximum limit for stacking batteries is 4 units. If you need to parallel more than 4 batteries, ensure that each group is stacked with 4 batteries or less.

Step 4. Before connecting in parallel, manually activate the low-voltage switch, use a multimeter to check if the voltage of each battery is consistent. If consistent, close the battery and proceed with wiring.
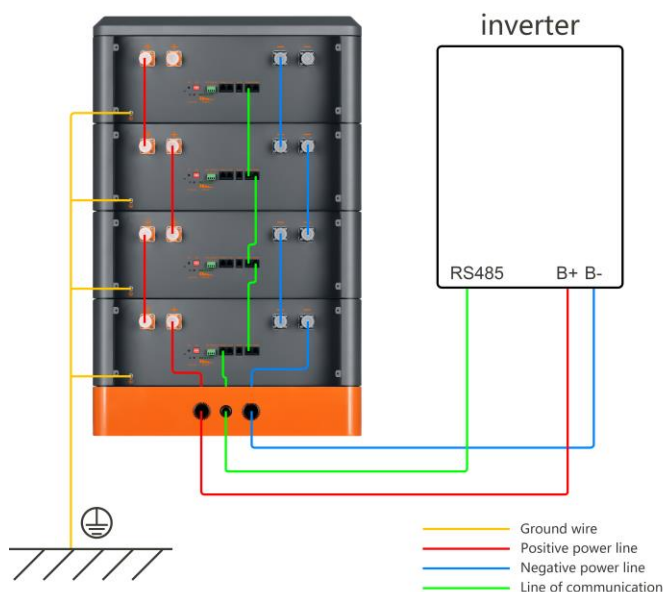
Step 5.   Connect the positive pole (+) of the battery using the positive power cable, and then connect the negative pole (–) using the negative power cable.

Step 6.   Use a communication cable to connect the RS485B communication interface of adjacent batteries (RS485B battery parallel ports have the same function and are not distinguished).

Step 7.   Ground all batteries by connecting the ground wire. The ground terminal is located at the bottom left corner of the battery; lock the ground wire terminal in this place.

Step 8.   Use a standard Category 6 cable. Connect one end to the RS485A (or CAN) communication interface of the battery and the other end to the RS485 (or CAN) interface of the inverter (note that the pin definition of the inverter communication should correspond to the battery).

Step 9.   Connect the negative (–) terminal of the last battery module to the battery negative terminal interface of the inverter using a power cable through the output port. Next, use a power cable to connect the positive (+) terminal of the last battery module to the battery positive terminal interface of the inverter through the output port (after battery parallel connection, the remaining two positive terminal connection ports have the same function and are not distinguished; the same applies to the two negative terminal connection columns).

Step 10. DIP Switch Definition: Define the battery connected to the inverter as 1, indicating the host. Define other batteries sequentially as 2–15.

Attention:

- Define the topmost battery on the rack as the first one, and the bottommost battery as the last one.
- Batteries directly connected to the inverter via communication cables are defined as hosts. The host's DIP switch is set to 1, and it needs to be switched before powering on.
- Define other batteries sequentially from 2 to 15. Do not repeat the setting of DIP switch 1.

---

7 Debugging

7.1 Battery Communication Pin Definitions

1. The interfaces for communication between the battery and the inverter through RS485A (default baud rate: 9600 bps) are defined as follows:

PIN2/7 (white orange)	485–A
PIN1/8 (orange)	485–B
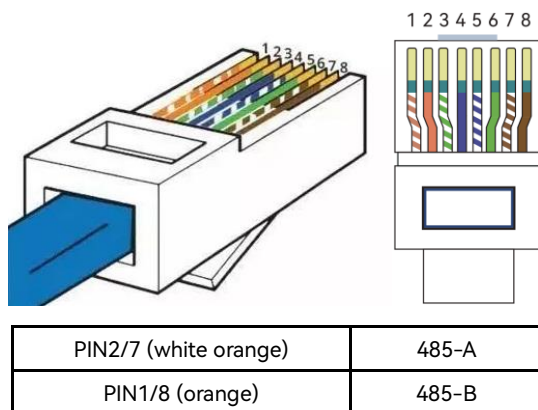
Note:
- The default RS485 protocol for the battery is set to Pylontech RS485 (V3.5) protocol. If compatibility with other inverters is needed, it is necessary to communicate through RS232 with the host computer to change the default protocol.

2. The interfaces for communication between the battery and the inverter through CAN (default baud rate: 500K) are defined as follows:
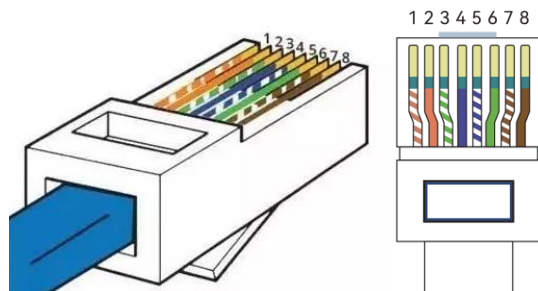
PIN4(blue): CANH; PIN5(blue & white): CANL

> **Note:**
> - The battery is factory-set with the default CAN protocol, defaulting to Pylontech CAN (V1.2) protocol. If compatibility with other inverters is required, it is necessary to communicate through RS232 with the upper computer to change the default protocol.
>
> **Tip:**
> - For battery and inverter communication, choose either RS485 or CAN.
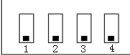
7.2 RS232 Upper Computer Communication

✧ Refer to the Upper Computer Software Operation Guide for details.

7.3 ADS DIP Switch Definitions

Address	DIP Switch Position				Illustration
	#1	**#2**	**#3**	**#4**	
0	OFF	OFF	OFF	OFF	
1	ON	OFF	OFF	OFF	
2	OFF	ON	OFF	OFF	
3	ON	ON	OFF	OFF	
4	OFF	OFF	ON	OFF	
5	ON	OFF	ON	OFF	
6	OFF	ON	ON	OFF	
7	ON	ON	ON	OFF	

8	OFF	OFF	OFF	ON	![DIP switches 1-4: 1 OFF, 2 OFF, 3 OFF, 4 ON]
9	ON	OFF	OFF	ON	![DIP switches 1-4: 1 ON, 2 OFF, 3 OFF, 4 ON]
10	OFF	ON	OFF	ON	![DIP switches 1-4: 1 OFF, 2 ON, 3 OFF, 4 ON]
11	ON	ON	OFF	ON	![DIP switches 1-4: 1 ON, 2 ON, 3 OFF, 4 ON]
12	OFF	OFF	ON	ON	![DIP switches 1-4: 1 OFF, 2 OFF, 3 ON, 4 ON]
13	ON	OFF	ON	ON	![DIP switches 1-4: 1 ON, 2 OFF, 3 ON, 4 ON]
14	OFF	ON	ON	ON	![DIP switches 1-4: 1 OFF, 2 ON, 3 ON, 4 ON]
15	ON	ON	ON	ON	![DIP switches 1-4: 1 ON, 2 ON, 3 ON, 4 ON]

7.4 Battery Parallel Connection DIP Switch Diagram

1 Battery	2 Battery	3 Battery	4 Battery	5 Battery	6 Battery	7 Battery	8 Battery

9 Battery	10 Battery	11 Battery	12 Battery	13 Battery	14 Battery	15 Battery	16 Battery

7.5 Power-On Sequence

After the completion of the connections between the inverter, battery, and mains power, start each battery one by one. Then, turn on the inverter. After the battery startup, check if the communication between the inverter and the battery is normal. If the battery data is successfully uploaded to the inverter, it indicates successful communication between the inverter and the battery.

7.6 Common Issues and Solutions

No.	Fault Symptoms	Cause Analysis	Solution
1	No DC Output	Battery Voltage Too Low, Protection Activated	Startup after Charging Activation
2	Short Power Supply Time	Insufficient Battery Capacity or Failure to Reach Full Charge	Confirm Maintenance or Replace Battery
3	Battery Cannot Reach Full Charge	DC Voltage Output from Power System Lower than Minimum Charging Voltage	Adjust Device's DC Output Voltage to Suitable Charging Voltage for Battery
4	Unstable Battery Output Voltage with Significant Fluctuations	Interference with Management System Operation	Restart the System
5	Temperature Monitoring Too Low	Damage to Temperature-Sensing Crystal Head	Replace the Collection Line with a Temperature-Sensing Crystal Head
6	Unable to Charge	Single Cell Protection Activated upon Full Battery Charge	Discharge Protection Removal
7	Unable to Charge and Discharge	Short Interval between Battery and Inverter	Remove Inverter, Reconnect According to the Specified

		Startup, Unable to Complete Pre-discharge Process	Sequence
8	Unable to Charge and Discharge	Restart Battery after Normal Operation or Adjust Time Interval between Battery and Inverter Startup	Remove Inverter, Reconnect According to the Specified Sequence
9	Unable to Discharge	Overload Usage, Discharge Protection	Remove Inverter, Reduce Load Power, Reconnect According to the Specified Sequence
10	Unable to Charge	High-Temperature Protection during Charging	Remove Inverter, Reconnect After Battery Temperature Decreases, According to the Specified Sequence

7.7 Inverter Matching Information

Inverter Brand	LOGO	Communication Method	Inverter Communication Pin	Battery Communication Pin	Remarks
PowMr	PowMr	RS485	PIN7:RS485A PIN8:RS485B	PIN2/7:RS485A PIN1/8:RS485B	Default Battery Protocol Matching
SMA	SMA	CAN	PIN4:CANH PIN5:CANL	PIN4:CANH PIN5:CANL	Battery Protocol Change
VICTRON	victron energy	CAN	PIN7:CANH PIN8:CANL	PIN4:CANH PIN5:CANL	1. Battery Protocol Change 2. Customized Network Cable
Growatt	Growatt	RS485	PIN7:RS485A PIN8:RS485B	PIN2/7:RS485A PIN1/8:RS485B	1. Default Battery Protocol Matching 2. Inverter Protocol Setting Option 2
GOODWE	固德威 GOODWE	CAN	PIN4:CANH PIN5:CANL	PIN4:CANH PIN5:CANL	Default Battery Protocol Matching
PYLONTECH	PYLONTECH	RS485	PIN7:RS485A PIN8:RS485B	PIN2/7:RS485A PIN1/8:RS485B	Default Battery Protocol Matching

LUXPOWER		RS485	PIN2:RS485A PIN1:RS485B	PIN2/7:RS485A PIN1/8:RS485B	1. Battery Protocol Change 2. Customized Network Cable
Voltronic Power		RS485	PIN5:RS485A PIN3:RS485B	PIN2/7:RS485A PIN1/8:RS485B	1. Default Battery Protocol Matching 2. Customized Network Cable
SOFAR		CAN	PIN1:CANH PIN2:CANL	PIN4:CANH PIN5:CANL	1. Battery Protocol Change 2. Customized Network Cable
SRNE		RS485	PIN7:RS485A PIN8:RS485B	PIN2/7:RS485A PIN1/8:RS485B	1. Default Battery Protocol Matching 2. Inverter Protocol Setting PYL
Geye		RS485 CAN	PIN4:CANH PIN5:CANL	PIN4:CANH PIN5:CANL	Default Battery Protocol Matching
MEGAREVO		CAN	PIN4:CANH PIN5:CANL	PIN4:CANH PIN5:CANL	Default Battery Protocol Matching
MUST		CAN	PIN6:CANH PIN5:CANL	PIN4:CANH PIN5:CANL	1. Battery Protocol Change 2. Customized Network Cable

8 Technical Specifications

Battery Model	POW-LIO51400-16S
Equalization Charging Voltage	56.8V
Float Charging Voltage	56V
Max. Discharge Cutoff Voltage	43.2V
Recommended Discharge Cutoff Voltage	46.4V
Max. Charging Current	100A
Recommended Charging Current	20A
Max. Discharge Current	100A
Recommended Discharge Current	50A
Max. Parallel Connection of Batteries	16
Communication Interface	RS232/RS485/CAN
Cycle Life	≥6000 Times @80%DOD, 25℃
Operating Temp	Charging: 0~60℃; Discharging: –10℃~65℃
Nominal Operation Altitude	< 3000m
Recommended Operation Environment	Indoor
Single Battery Dimensions (LxWxH)	635x500x155mm
Top Cover Dimensions (LxWxH)	635x500x80mm
Base Dimensions (LxWxH)	635x500x100mm
Single Battery Net Weight	47kg
Top Cover Net Weight	8kg
Base Net Weight	10kg

9 Precautions

1. Do not immerse the battery in water. When not in use, store it in a cool and dry environment.
2. Avoid placing the battery in a fire or heating it externally to prevent explosions or other hazards.
3. Never invert the polarity of the battery, throw it into a fire, or directly connect it to a power outlet. Short-circuiting the positive and negative terminals is strictly prohibited.
4. Do not mix batteries from different manufacturers or different types.
5. Do not insert batteries that are heating up, swelling, deforming, or leaking into devices for charging or discharging.
6. Prohibit piercing the battery with nails or other sharp objects. Avoid throwing, stepping on, hitting, or impacting the battery.
7. Disassembling or dismantling the battery and its components is strictly prohibited. Any damage resulting from unauthorized disassembly or repair will not be the responsibility of our company.
8. If customers find any signs of heating, swelling, or unusual odors in the purchased battery, do not use it and return it immediately.
9. For prolonged storage, perform a charge-discharge cycle on the battery every three months to maintain optimal performance, ensuring it is stored with a 40%~60% charge.
10. Use the battery within the specified temperature range as outlined in the specifications.
11. Follow the prescribed power-up sequence for both the battery and inverter.
12. It is recommended that the load power of the battery does not exceed the maximum continuous discharge current (100A).
13. If the battery is idle for more than 3 months, periodic manual charging is necessary to prevent complete discharge.

Note:
- For any technical issues or situations not covered above, please contact our technical support promptly.

PowMr

SHENZHEN HEHEJIN INDUSTRIAL CO.,LTD

Tel/Fax: +86 755-28219903
Email: support@powmr.com
Web: www.powmr.com
Add: Henggang Street, Longgang District, Shenzhen, Guangdong, China