



# Operation and Maintenance Manual **Lithium Iron Phosphate Battery** **QPower LFP R05R-3U5**

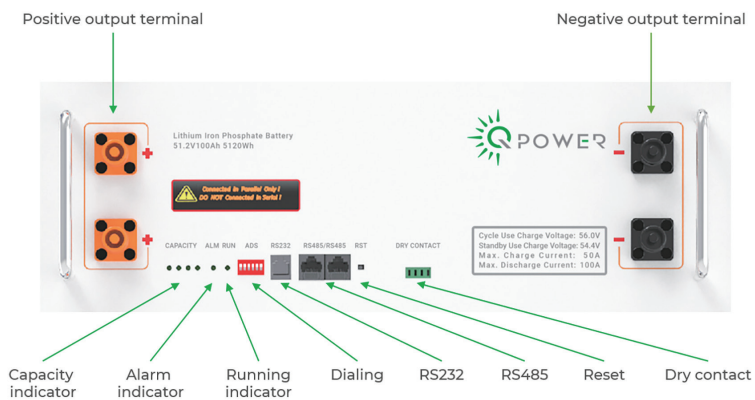
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# 1. Product Introduction

This product is composed of 16 strings of battery cells, and the battery cell configuration adopts intelligent sorting, which is accurate and reliable. BMS uses a professional protection board testing system to conduct comprehensive testing before going online, ensuring that BMS provides comprehensive and effective protection for the battery pack during use. This product has characteristics such as high energy density, long cycle life, safety and reliability, light weight, and wide temperature range, making it a trustworthy green and environmentally friendly product for you.

## 1.1 Device Panel Interface Description



### I. When charging the battery:

- Four capacity indicator lights (CAPACITY) will be displayed based on the current battery capacity.
- The running indicator light (RUN) flashes every approximately 1 second.
- When the four capacity indicator lights of the battery are constantly on, when the RUN light is off, the battery is fully charged.

### II. When the battery is discharged:

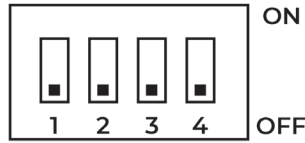
- The RUN light is constantly on.
- Four capacity indicator lights (CAPACITY) will be displayed based on the remaining capacity of the battery after discharge.
- When the battery is discharged to the protection voltage, it enters the protection state. All battery indicator lights will turn off.

### III. Battery alarm:

When there is a problem with the battery, the ALM light is displayed in red and a battery failure alarm is displayed.

#### IV. ADS dialing:

The Dip switch is located on the left of the protection board socket, and its shape is shown in the following figure:



The Dip switch is used to control the address of the protection board. Dial control uses binary methods to control addresses. In the figure above, 1 represents the lowest bit and 4 represents the highest bit. Each dial UP represents 1, and dial DOWN represents 0. Four bit binary can represent 0, 1, 2-1, 4, 15, a total of 16 addresses.

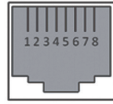
- As shown in the above figure, it indicates that bits 1-4 are all 0, indicating that the address is 0;
- If you dial 3 UP, the address is  $2^2=4$
- If both 3 and 4 are set DOWN, the binary is  $2^2+2^3=4+8=12$
- If you want to set the protection board address to 3, you need to find 1 and 2 on it, instead of dialing 3 to it. Please refer to the following table:

Address	Dip switch position				Illustrate
	#1	#2	#3	#4	
0	OFF	OFF	OFF	OFF	Set to Pack0 (Unserviceable)
1	ON	OFF	OFF	OFF	Set to Pack1 (Parallel starting from address 1)
2	OFF	ON	OFF	OFF	Set to Pack2
3	ON	ON	OFF	OFF	Set to Pack3
4	OFF	OFF	ON	OFF	Set to Pack4
5	ON	OFF	ON	OFF	Set to Pack5
6	OFF	ON	ON	OFF	Set to Pack6
7	ON	ON	ON	OFF	Set to Pack7
8	OFF	OFF	OFF	ON	Set to Pack8
9	ON	OFF	OFF	ON	Set to Pack9
10	OFF	ON	OFF	ON	Set to Pack10
11	ON	ON	OFF	ON	Set to Pack11
12	OFF	OFF	ON	ON	Set to Pack12
13	ON	OFF	ON	ON	Set to Pack13
14	OFF	ON	ON	ON	Set to Pack14
15	ON	ON	ON	ON	Set to Pack15

## V. RS485 Communication Port:

RS485 cascade communication interface. When the system is cascaded, the data transmission adopts RS485 serial communication mode. The cascaded Pack system uses RS485 communication internally, and the upper computer system obtains data from each Slave Pack through Mask.

8P8C vertical RJ485 socket	
Pin	define
1,3	RS485-B
7	RS485-A
2,6	GND
4	CANH
5	CANL
8	NC



RJ45 Port



RJ45 Plug

## VI. RST reset key:

RST: Indicates a reset. When there is an abnormality in the system, this key can be used to reset the system and restore its normal operation.

Manual operation instructions for RST reset key	Power on	BMS is in shutdown state, press button 3S to power on
	Shutdown	BMS not in standby state, press button 3S to shut down
	Reset	BMS is not in standby state, press the button for 10 seconds until all LEDs are lit and reset

## 2. Technical specifications

	Model	LFP R05K-3U5
Electrical	Nominal voltage	51.2V
Characteristics	Nominal capacity @ 0.2C Nominal energy Maximum continuous power	100Ah 5120Wh 5kW
	Maximum number of parallel connections	RS485: 15
	Tandem use	Not Supported
	Communication function	RS232; RS485; CAN(optional)
Charge characteristics	Average charge voltage	54.4V
	Standard charge current/power	20A/1000W
	Maximum charge current/power	50A/2500W
Discharge characteristics	Standard discharge current/power	20A/1000W
	Maximum discharge current/power	100A/5000W
	Discharge termination voltage	43.2V
Mechanical properties	Size (W × D × H) mm	440×420×156 (19inch 3.5U)
	Shell material	Sheet metal shell
	Weight (approximately)	47Kg
	IP level	IP20 (for indoor use)
Environmental	Charge temperature	0°C to 50°C
	Discharge temperature	-20°C to 55°C
	Optimal performance temperature	10°C to 40°C
	Storage temperature	≤ 25°C 50% SOC, 12 months
	Storage temperature	≤ 35°C 50% SOC, 6 months
	Storage temperature	≤ 45°C 50% SOC, 3 months
	Storage humidity	≤90%RH

### 3. Equipment connection instructions

R485 interface connection diagram: (dual 485 interfaces)

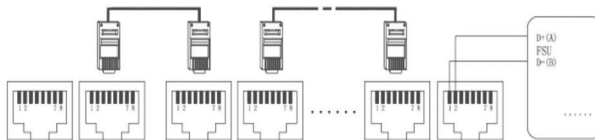
1. After the installation of the battery system is completed, it is necessary to connect the 485 port of the BMS module with a communication network cable. Multiple BMS modules can be cascaded through communication network cables (without cascading when using a single module).

2. When multiple BMS modules are used in parallel, the communication address needs to be set (that is, the Dip switch ADS). When a single BMS module is used, the communication address is 1. When multiple modules are used, the dial address needs to be set. Refer to the following figure for the dial address.

The first set of batteries is connected to the inverter device



Standard network cable



Note: When a dual 485 interface BMS is connected, one by one corresponding network cable is sufficient. One 485 port of the first battery group is directly connected to the 485 port of the second battery group, and so on. Finally, the other 485 port of the first group is connected to the terminal device or FSU, and the wiring sequence is 1B2A. (If there are differences, please refer to the definition of the communication protocol).

### 3.1. Capacity indication

State		Charge				Discharge			
Capacity indicator light		L1	L2	L3	L4	L1	L2	L3	L4
	0...25%	OFF	OFF	OFF	Blinking	OFF	OFF	OFF	ON
	25...50%	OFF	OFF	Blinking	ON	OFF	OFF	ON	ON
	50...75%	OFF	Blinking	ON	ON	OFF	ON	ON	ON
	75...100%	Blinking	ON	ON	ON	ON	ON	ON	ON
RUN		ON				Blinking			

Battery capacity indicators: 4 green lights, each light represents 25% capacity.



### 3.2. Status indicator

System state	Abnormal events	RUN	ALM	CAPACITY
Shutdown		OFF	OFF	ALL OF
Standby	Normal	Blinking	OFF	ALL OF
	Alarm	ALM and RUN lights flash synchronously		ALL OF
Charge	Normal	ON	OFF	Based on battery indicator LED Blinking
	Overtoltage alarm	ON	OFF	Maximum indicator LED Blinking
	Overcurrent and temperature alarm	ON	Blinking	Based on battery indicator LED Blinking
	Overtoltage protection	ON	OFF	ON
	Overcurrent protection	ON	OFF	Based on battery indicator LED Blinking
Discharge	Normal	Blinking	OFF	Based on battery indicator LED Blinking
	Alarm	Blinking	Blinking	Based on battery indicator LED Blinking
	Undervoltage protection	OFF	OFF	ALL OF
	Overcurrent, short circuit, temperature, transposition, protection	OFF	ON	ALL OF

## 4. Installation and maintenance precautions

### 4.1. Installation precautions:

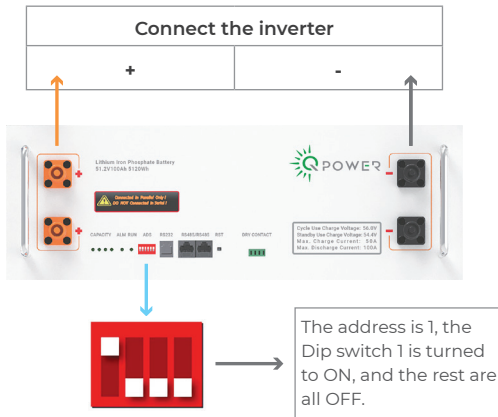
1. Unpacking and inspecting the number of accessories and battery appearance before installation.
2. Install hanging ears and handles, and check the battery level when turning on. Generally, the factory charged capacity of the battery is between  $30\% \pm 2\%$ .
3. Before wiring, check the positive and negative terminals of the battery. It is strictly prohibited to connect the positive and negative terminals in reverse during battery installation.
4. During the battery connection process, please wear protective gloves. When using metal tools such as torque wrenches, please insulate and package the metal tools to absolutely avoid both ends of torque wrenches and other metal tools coming into contact with the positive and negative terminals of the battery, causing a short circuit in the battery.
5. Before connecting to an external device, keep the device disconnected and recheck whether the polarity and total voltage of the battery are correct. Then, connect the positive pole of the battery to the positive pole of the device and the negative pole of the battery to the negative pole of the device, and tighten the connecting wire.
6. The battery must be handled with care during transportation and placement, and it is strictly prohibited to fall, impact, throw, or hit to damage the battery or cause safety hazards.
7. Do not use sharp parts of tools to come into contact with the surface of the battery box, scratch or damage the battery box.
8. Unauthorized disassembly of battery boxes is prohibited.
9. It is prohibited to place any metal or conductive materials together with the battery or assemble them into the battery box.

#### Installation method:

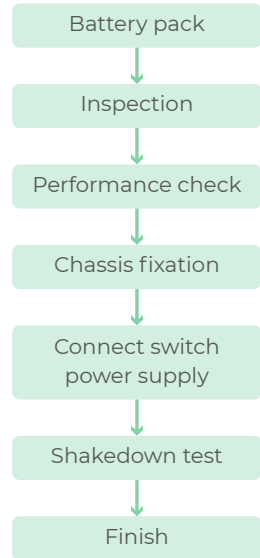
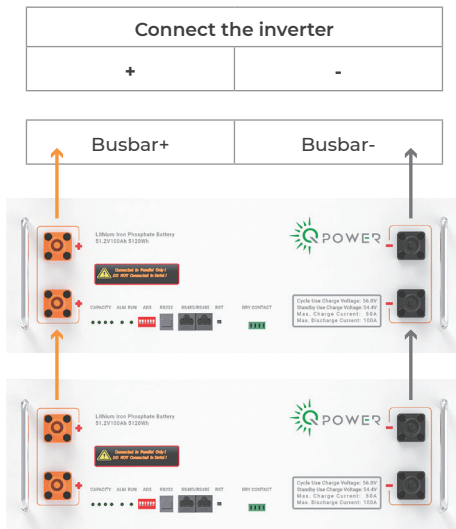
- Standard cabinet (rack) installation: Install the battery pack with supporting lugs and fix it inside the standard cabinet, and add tray protection to the battery box.
- Wall hanging box installation: Ensure that the wall meets the wall hanging requirements before installation; According to the design plan location, install a dedicated lithium battery wall hanging box: the battery pack is fixed to the wall hanging box in a hanging ear manner.
- Integrated indoor and outdoor cabinet (box) installation: Install according to the customized integrated cabinet (box) installation specifications.

## 4.2. Installation and usage instructions:

### Single group usage:



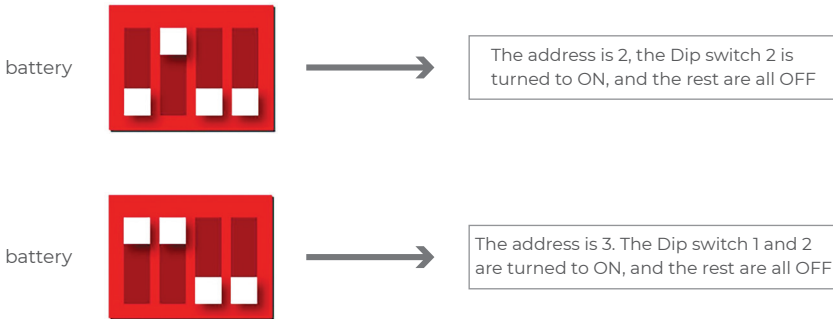
### Multi group usage (two or more groups in parallel):



battery ①

battery ②

Note: According to the on-site battery R485 network cable routing, the battery pack can be divided into battery and battery (specific on-site shall prevail)



1. Appearance inspection: After opening the outer packaging of the chassis, confirm whether the appearance is complete and free from deformation and mechanical damage.

2. Performance testing: Turn on the chassis switch or press the reset button to observe whether the battery level display is normal. If 2-3 green lights remain on, it indicates that the battery pack is normal. If the red light flashes or remains on, it indicates that the battery pack is abnormal. Alternatively, use a multimeter to measure whether the output terminal has output voltage. If there is output voltage, the battery pack is normal. If the output voltage is 0V, the battery pack is abnormal.

3. Fixing the chassis: Place the battery pack with normal performance in the corresponding rack. Before placing it, turn off the battery pack switch (i.e. RST button), and ensure that the rack is placed flat and free of any foreign objects or metal burrs. Use screws of the corresponding specifications to lock the chassis lifting ears on the rack.

4. Connecting equipment: Remove the terminal cover and use the corresponding connecting cable to connect the positive and negative poles of the equipment to the positive and negative poles of the battery. The connection method must meet the on-site installation appearance requirements. The positive and negative poles must not be reversed, and the fixing screws must not be loose. After confirming that the connection is correct, cover the terminal cover and provide insulation protection.

5. Test: Turn on the battery module switch, turn on the device power, use the device power to charge the battery pack, observe whether the switch power is in good operation status, and whether the battery level display light is normal. The running light and corresponding capacity display light flash, indicating normal charging status. If the running light and capacity display light do not flash, indicating that they are not in charging status, it is necessary to recheck the connection line.

### 4.3. Maintenance precautions

Due to its low self-discharge rate, floating charge resistance, ultra long service life and other performances, our lithium iron phosphate battery pack is maintenance free. The fully intelligent BMS battery management system replaces the manual detection link, which can automatically monitor the voltage of each single battery in the battery pack and the total voltage and current of the battery pack. During the charging and discharging process, the single battery is balanced to prevent overcharge and overdischarge. The automatic detection and protection functions of the battery management system greatly reduce the failure rate of the battery pack, extend its service life, and greatly reduce the cost of use in the communication industry.

In the later stage of installation and use, a simple maintenance inspection can be carried out on the iron lithium battery. Due to its maintenance free feature, the maintenance cycle can be extended, such as once every 3 months

Check whether the pole and connecting wire of lithium iron phosphate battery are loose, damaged, deformed or corroded, and whether the battery shell is damaged or deformed;

Observe the status of the battery pack operation indicator light. Under normal conditions, the green light is on. When the battery pack CAPACITY light is only the last one flashing, it indicates that the battery level is low and the battery is about to discharge and turn off the output;

If a malfunction occurs and the ALM red light of the battery pack flashes, an alarm is issued. Please check if the battery connection is correct or if there is an overcurrent situation. Afterwards, press the RST reset button, restart the battery, and check if the fault is resolved. If it cannot be resolved, please contact the manufacturer for assistance. Do not open the battery pack box without authorization. For application scenarios where multiple batteries are connected in parallel, if one of the batteries fails and needs to be replaced, please ensure that the voltage difference between the newly replaced battery pack and the other battery packs to be connected in parallel is within 2V. If the voltage difference is large, the high voltage battery pack will charge the low voltage battery pack with high current, and the low voltage battery pack will experience charging overcurrent protection, resulting in inability to charge.

Record the time and frequency of power outages, and make detailed statistics on the power supply time of batteries.

## 4.4. Common problem analysis and solutions

### 4.4.1. Under voltage protection

Phenomenon: The ALM alarm indicator light is off, and the RUN operation indicator light is off. Reason analysis:

1. The battery pack voltage is too low, exceeding the low voltage protection value of the battery.
2. The battery protection board is faulty.

Solution: After the protection board enters the undervoltage state, it will lock the state until a charger is added to the charging input or the voltage reaches the recovery value, which can be activated.

### 4.4.2. Discharge overcurrent protection

Phenomenon: The ALM alarm indicator light is constantly on, and the RUN operation indicator light is off.

Reason analysis:

1. The load current is too high, exceeding the battery discharge protection value.
2. The battery protection board is faulty.

Solution: After the protection board enters the overcurrent state, it will lock the state until a charger can be activated at the charging input end.

### 4.4.3. Temperature protection

Phenomenon: The ALM alarm indicator light is constantly on, and the RUN operation indicator light is off.

Cause analysis: The ambient temperature may be too high or too low

Solution: When the temperature at the NTC end returns to normal, the protection board will return to the temperature protection state and the red ALM light will go out.

### 4.4.4. Battery has no voltage output

Phenomenon: The battery indicator light is off, and the measured voltage at both ends of the battery is 0V.

Reason analysis: The battery is not activated or the battery management system is abnormal.

Solution: Activate the battery or use the reset button «RST» on the battery panel to reset the battery while it is active, but there is still no voltage output. Contact the manufacturer's professional personnel for handling.

## 5. Packaging, transportation, and storage

### 5.1. Packaging

The lithium iron phosphate battery group shall be packaged as a whole to ensure that the product is free from any harmful gas, chemical pollution, static electricity, moisture and mechanical damage during handling, transportation and storage.

### 5.2. Transportation

The battery handling process should pay attention to the following aspects.

1. It should be handled gently to avoid severe vibration of the equipment.
2. Do not invert, roll, drop, or collide with the battery to avoid damaging its appearance.
3. Batteries should avoid exposure to sunlight and rain, and it is prohibited to directly submerge the entire battery in water.
4. Prohibit short circuits between positive and negative poles.

### 5.3. Storage

1. The external terminals of the battery pack are in an insulation protection state.
2. Batteries with a storage period exceeding 3 months should be recharged and charged at 0.2c-0.3C for 2-3 hours.
3. Batteries should be stored in a dry, clean, ventilated, and non corrosive environment, away from ignition sources, avoiding exposure to sunlight, and not stored or placed for a long time at high temperatures exceeding 60 degrees Celsius, otherwise it may cause functional decline and reduced lifespan.

## 6. Accessories

NO	Accessory Name	remarks
1	Hanging ear X2	
2	Hanging screw X12	
3	Screw clamp X4	
4	Certificate of Conformity	
5	Instructions	

## 7. Safety instructions

Please read the safety instructions before performing any operation on the device. The safety precautions mentioned in this manual do not represent all safety precautions that should be followed, but only serve as a supplement to all safety precautions. When installing, operating, and maintaining equipment, local safety regulations and specifications should be followed. Only trained professionals can install, operate, and maintain equipment. Our company does not assume any responsibility for losses caused by violating general safety operation requirements or violating design, production, and use equipment safety standards. Installation and maintenance personnel must possess technical skills in high-voltage and AC power operation. When installing, operating, and maintaining equipment, do not wear any conductive objects such as watches, bracelets, bracelets, and rings, and prevent moisture from entering the equipment.



High voltage hazard: High voltage power supplies power for the operation of equipment, and direct contact or indirect contact with damp objects can pose a fatal hazard.



Using special tools: When working on high voltage and AC power sources, it is necessary to use specialized tools instead of personal tools.



Anti static: The static electricity generated by the human body can damage the static sensitive components on the single board. Before touching the plug-in, circuit board, or chip, it is necessary to ensure correct anti-static measures.



Disconnect power during operation: When operating the power supply, it is necessary to first cut off the power supply and prohibit live operation.



DC short-circuit hazard: The power system provides a DC regulated power supply, and a DC short circuit can damage equipment and cause fatal danger.