



User Manual

EX Series

LITHIUM ION BATTERIES



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Pytes EX Series LFP Battery User Manual

Dear valued customer,

Thank you for purchasing our Pytes EX series LFP battery for home energy storage system. This product is designed for balcony photovoltaic energy storage applications, featuring safety, reliability, and easy installation. The compact and easy-to-install battery pack can be used as a basic building block in an energy storage system by connecting in parallel.

We strongly recommend that you carefully read this manual before using the product. This manual provides all the necessary information on installation, usage of the EX series battery pack. Please be advised that only qualified personnel (such as an electrician) should install and perform maintenance on the battery pack.

It is important to keep in mind the boundaries of use, as described in this manual. The EX series battery pack is not intended for use in medical or aviation-related applications, and should only be used for its intended purpose as described in this manual. Improper use of the battery pack will void the warranty of the product, and Pytes cannot be held responsible for any damage caused by improper or incorrect use of the product.

For your safety and the safety of others, please follow all user safety instructions during the use of this product. This manual is intended for the installers and users of the EX series battery pack.

Please keep this manual in a safe location, as it is the original manual. For the latest version of all manuals, please visit our website at <http://www.pytesgroup.com>.

Thank you again for choosing Pytes, and please do not hesitate to contact us if you have any questions or concerns about your EX series battery pack.

Best regards,

Pytes

Shanghai Pytes Energy CO., LTD.

Add: No.3492 Jinqian Road, Fengxian District, Shanghai, China.

Website: <http://www.pytesgroup.com>

Email: ess_support@pytesgroup.com

Before Using

Please read and follow these instructions carefully:

Warning

This equipment should only be installed, operated by qualified personnel (electricians). The local safety regulations and relevant operating procedures must be followed during the installation, operation and maintenance of the equipment, otherwise the equipment may be damaged. The safety precautions mentioned in this manual are supplementary to the local safety regulations.

Caution

Do not short-circuit the Li-ion battery.

Follow the positive (+) and negative (-) marks on the Li-ion battery and equipment and ensure correct use. Do not reverse the Li-ion battery.

Do not dismantle, crush, puncture, open, or shred the Li-ion battery.

Before removing or reconnecting with the running system, make sure to turn off the power and shut down the system to avoid the risk of electric shock.

Do not expose the Li-ion battery to heat or fire. In case of fire, use a dry powder fire extinguisher.

Do not dismantle any part of the system without contacting PYTES or PYTES authorized technical engineers. System failure caused by such actions will not be covered by the warranty.

Before operating the inverter, ensure that all batteries have been started up.

The following precautions should be taken when working on batteries:

- a) Shut down the power and loads before connecting or disconnecting battery terminals.
- b) Do not wear any metal objects such as watches and rings.
- c) Use tools with insulated handles.
- d) Do not lay tools or metal parts on top of batteries.
- e) Wear personal protective equipment.
- f) Make sure the battery is well grounded. Contact with any part of a poorly grounded or ungrounded battery can cause electric shock and burns by high short-circuit current.

The battery should be charged within 12 hours when it's fully discharged or over-discharging protection mode is activated. Failure to follow this instruction will damage the battery and is not covered by warranty.

Danger

Do not dispose of batteries in fire, as the batteries may explode.









Keep the Li-ion battery away from water, dust, and contamination to avoid explosion or other harmful conditions that may even lead to personal injury.

When using this battery, do not allow water to submerge it beyond 20mm, as this may lead to leakage! Do not open or mutilate batteries. Released electrolyte can be harmful to the skin and eyes and may be toxic.

A battery can pose a risk of electric shock and burns due to high short-circuit current.

A malfunctioning battery can reach temperatures that exceed the safe contact level.

Symbols

	Read the instruction manual before starting installation and operation.
	Caution, do not dispose of batteries in a fire, the battery may explode.
	Caution, a battery can present a risk of electric shock and burns by high short-circuit current. do not short-circuit the Li-ion battery.
	Caution, do not dispose the product with household wastes.
	Danger, keep the Li-ion battery away from water, dust and contamination, otherwise it may cause explosion or lead to personal injury.
	Danger, do not place near open flame or flammable materials.
	Danger, do not place at children or pets touchable areas.
	Recyclable.

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1 Specifications

Table 1-1 Battery Pack Specifications

Battery Model	EX2000
Power Terminal	Amphenol Floating Mate Connector
Chemistry	LFP
Nominal Voltage	51.2V
Voltage Range	47.5V~56.8V
Nominal Capacity	50Ah
Nominal Energy	2.56kWh
Unit Dimension	L450mm*W160mm*H410mm(3.2U) L17.72in*W6.30in*H16.14in(3.2U)
Unit Dimension	32kg / 70.55lbs
Recommended Charge/ Discharge Current ^[1]	25A
Max Charge/ Discharge Current ^[2]	25A
Peak Charge/ Discharge Current	45A (15sec)
Round-Trip Efficiency	≥External Communication
External Communication	Internal Communication
Internal Communication	RS-232
IP rating of Enclosure	IP65
Cycle Life ^[3]	≥6000 Cycles
Calendar Life	≥10 Years
Operating Temperature	Charging: 2°C~57°C(35.6°F~134.6°F) Discharge: -20°C~57°C(-4°F~134.6°F)
Certificates	UN38.3, CE, IEC62619,UL1973
Storage Temperature	Within 1 month: -20°C~50°C(-4°F~122°F) Within 1 to 3months: -10°C~40°C(14°F~104°F) 3-12 months: > 0°C~30°C(32°F~86°F)
Heating System ^[4]	Temperature Rise 10°C(18°F)/Hour, -18°C~15°C(14°F~104°F) Operation Temperature -18°C~15°C(-0.4°F~59°F)

[1], [2]: The recommended and Max continuous charge and discharge current is for a battery cell temperature within 10°C~40°C(50°F~104°F) to consider. It will result in a derating on current if out of the temperature range.

[3]: Test conditions 0.2C Charging/Discharging, @25°C(77°F), 90% DOD.

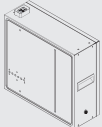

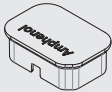


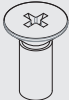

[4]: Optional Device. Specified on Battery package whether integrated.


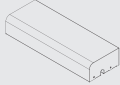
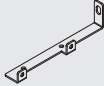
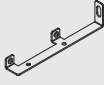


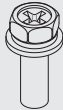
Working with some inverters, heating system may consume energy from battery when there's voltage difference among system Follow 5.3.3 of this manual for multiple batteries power cable connection to minimize the influence of the circular current, thus decreasing the number of batteries in the system.

Follow 5.3.3 of this manual for multiple batteries power cable connection to minimize influence of the circular current, thus decrease battery energy loss.

1.1 Product standard configuration

EX2000 Version

Package	Items	Quantity	Specification	Picture
Battery Pack Material	EX2000 Battery	1	LFP battery pack Voltage: 51.2V Capacity: 50Ah Energy:2.56kWh Power Terminal. Amphenol Floating Mate Connector	
	User Manual	1	/	
	Upper Stacking Connector Dust Cover	1	Rubber-39.3*25.6*15mm- UL 94 V0-Black	
	Lower Stacking Connector Waterproof Cover	1	Rubber-35.5*21.8*16mm- UL 94 V0-Black-IP65	
	EX2000 Battery Interlock Bracket	4	EX2000 Battery Interlock Bracket-40.6*20*1.5mm- SGCC	
	Cross recessed countersunk head screws M5*10	4	M5-10-Machine thread screws-Countersunk head-GB/T 819.2 - 2016- Flat-tailed-Stainless steel- Grade 8.8-Natural color- Fall-resistant	
	Cross recessed countersunk head screws M4*10	4	M4-10-1401-Machine thread screws- Countersunk head-GB/T 819.2 - 2016- Flat-tailed-Stainless steel- Grade 8.8-Natural color- Fall-resistant	

Accessory Box Materials	EX2000 to Inverter Wiring Harness ⁽¹⁾	1	EX2000 Inverter Wiring Harness - UL2517/ 10AWG*2/18AWG/ 24AWG*2-2000mm-Black	
	EX2000 Decorative Upper Cover	1	EX2000 Decorative Upper Cover- 450*160*80mm-SGCC	
	EX2000 Locking Wall Bracket 1	1	EX2000 Locking Wall Bracket 1- 167.5*25.4*38mm-SGCC	
	EX2000 Locking Wall Bracket 2	1	EX2000 Locking Wall Bracket 2- 167.5*25.4*38mm-SGCC	
	Expansion Screws	2	1408-Screw-GB-T22795(TGQ)-2008-M6--M6×40-Carbon Steel-Blue White Zinc Plated-Silver-72H	
	Metal Strapping Band	6	Self-locking Metal Ties-Stainless Steel with Plastic Spray- 8mm*400mm	
	EX2000 accessories box packing list Paper	1	A3-Color Printing	
	M5*10 hexagon socket cross recessed triple combination drop resistant machine thread screws	4	M5-10-Machine thread screws-hexagon socket cross recessed-GB 9074.13 - 1988-Flat-tailed-Carbon steel-Carbon steel-Nickel-plated-Silver color-Fall-resistant-96H	

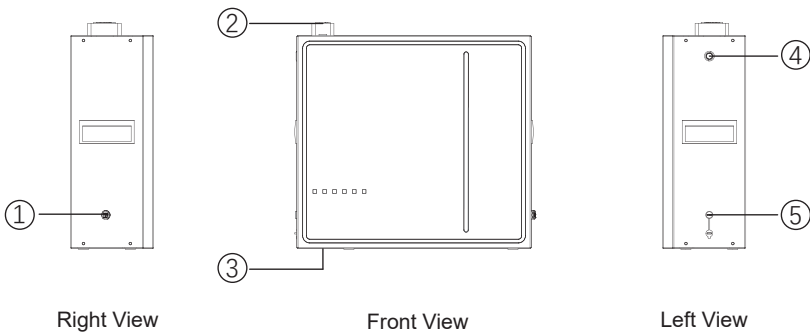
[1]: Wiring harness includes Power cables, communication cables and grounding cables (3in1).

1.2 BMS Functions

Protection and Alarm	Management and Monitor
Charge / Discharge End Cut-off	Cells Balance
Charge over Voltage Protection	Intelligent Charge
Discharge under Voltage Protection	Charge/Discharge Current Limitation
Charge / Discharge over Current Protection	Remaining Power Calculation
High / Low Temperature Warning Over / Under Temperature Protection	Administrator Monitoring
Short Circuit Protection	Log Record
Power Cable Reverse Protection	

2 Interface and protection functions

2.1 Interface Instructions



2.2 Components

No.	Name	Functions description
1	Breather Vent	Ventilation of the internal and external environment of the battery
2	Amphenol Floating Mate Connector A	Integral connector for power positive, power negative, and communication interfaces to connect to the lower stacker or to the inverter harness
3	Amphenol Floating Mate Connector B (With Weatherproof Terminal Cover)	Power Positive, Power Negative, Communication Interface Integral Connector, Connects to Upper Stacker
4	Switch	When the switch is pressed, the battery is turned on; when the switch is pressed and held down again for more than 0.5s, the battery is turned off
5	Console	Connect to the host computer through the host computer cable

3 Operating Environment

- ◇ Battery operating environment requirements:
- ◇ Operating Temperature: -20°C~57°C(-4°F~134.6°F)
- ◇ Relative Humidity: 20%-80%, no condensation
- ◇ Altitude: <4000m
- ◇ Site environment requirements: Away from heat source, avoid direct sunlight, no corrosive gases, no explosive gases, no insulating gases, no insulating conductive dust.

4 Packaging, transportation, storage requirements

4.1 Transportation

Always check all applicable local, national, and international regulations before transporting Li-ion Batteries.

During transportation, protect the battery from severe vibration, shock or squeezing, and from exposure to sunlight and rain.

During the loading and unloading process, the battery should be handled gently to prevent it from falling, rolling and being subjected to heavy pressure.

4.2 Storage

- Relative humidity: 20%-80%, no condensation
- Altitude: <4000m
- Store the battery in a cool, dry place, away from heat sources and no direct sunlight.
- Keep away from conductive substances such as conductive dust

For long-term storage (>6 months), charge the LFP battery to more than 90% of its rated capacity. The battery needs to be charged to more than 90% of its rated capacity every 6 months.

Keep the SOC of the battery at 40%-60% during storage. The Self-discharge of the LFP battery pack is 1-2% per month. If there is no power left when checking the LFP battery, do not charge or use it without permission, contact your installer for the next step.

Follow the storage instructions in this section and refer to Table 1-1 Battery Pack Specifications for storage temperature to optimize the battery lifespan during storage. Any failure or damage to the battery caused by failure of following these instructions is not covered by the warranty.

4.3 Disposal

Disposal of the batteries should be in accordance with local laws and regulations and should be carried out by an expert with specialized knowledge and experience in electrical and environmental safety, at designated waste disposal facilities using safe and appropriate method.

5 Installation and configuration

5.1 Installation preparation

5.1.1 Safety Requirements

Only those who have received training in the power system and possess a comprehensive understanding of the same are allowed to install the equipment. It is imperative to follow the safety regulations defined by local authorities and adhere to the safety requirements listed below during the installation process.

Before installing or removing the battery, make sure that the system is disconnected from any power source and that the battery system is turned off. Distribution cabling needs to be handled carefully with essential protective measures to avoid any safety hazards during the maintenance and operation.

5.1.2 Checking the operation environment

The operation environment must comply with the requirements outlined in Chapter 3, "Operation Environment." If not, necessary adjustments must be made and subsequently reevaluated.

5.1.3 Tools

The tools that may be used are shown in Table 5-1.

Table 5-1 Tools

Tools	
Screwdriver (Slotted, Phillips)	Multimeter
Wrench	Clip-on ammeter
Diagonal pliers	Insulating tape
Thermometer	Pliers
Anti-static wrist ring	Clip Pliers
Tapes	Strippers

5.1.4 Technical preparation

Electrical interface settings:

If the battery is directly connected to the energy storage inverter or DC charger, please verify: if the operating voltage, current, and power of the equipment align with the battery parameters listed in "Table 1-1 Battery Pack Specifications".

Safety inspection:

Fire-fighting equipment such as portable dry powder fire extinguishers in proximity to the battery is mandatory. Dangerous substances such as flammable or explosive materials must not be stored near the battery.

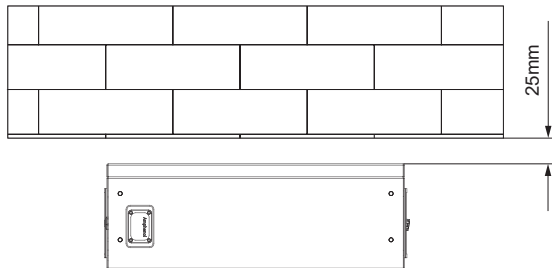
5.2 Unpacking

- ◇ When the battery arrives at the installation site, it must be unloaded and stored properly and prevented from the direct sunshine and rain. Before installation, check if there is any component missing according to 1.1 product standard configuration and check whether the box appearance is intact;
- ◇ Carefully handling the unpacking to preserve the insulation coating on the casing's surface.
- ◇ Please contact PYTES if there is any damage or missing of products and / or components.

5.3 Installation

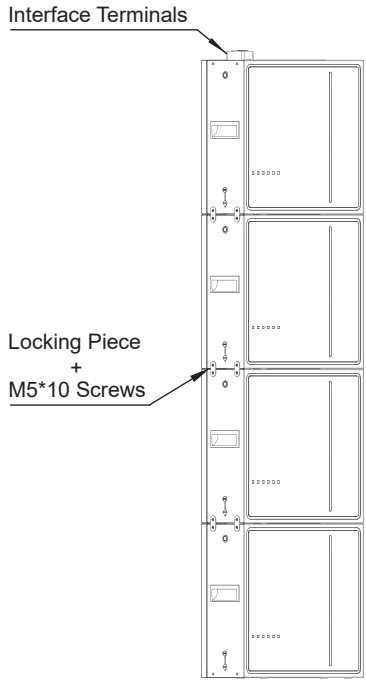
5.3.1 Place EX2000 to Determine Specific Installation Location

- 1) Place the EX2000 along a wall with 25mm/0.98 inches between the back of the EX2000 and the wall.

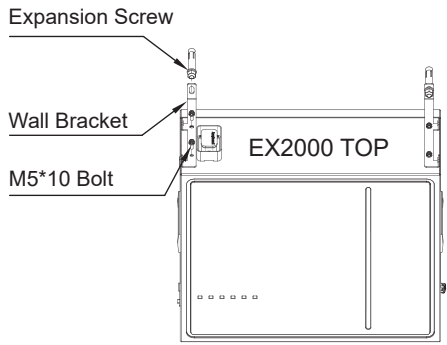


5.3.2 Team Lift to Stack up EX2000

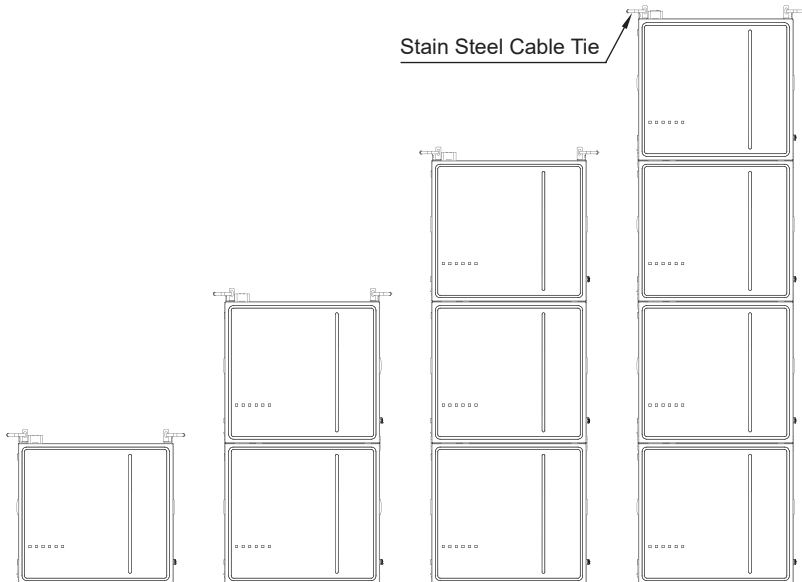
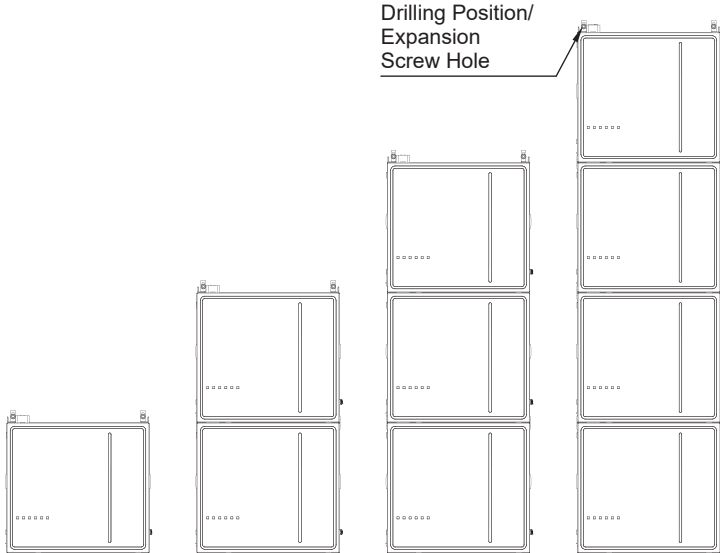
- 2) Place the second EX2000 on top of the first EX2000, pay attention to the direction of the second unit, make sure that the connectors of the first unit and the second unit are on the same side, and secure the two EX2000s to each other with the locking piece*2 and M5*10 screws.
- 3) Repeat the operation. Stack the corresponding interface terminals in sequence and connect the EX2000 (team lift). Secure the neighboring modules to each other with locking pieces and M5*10 screws.



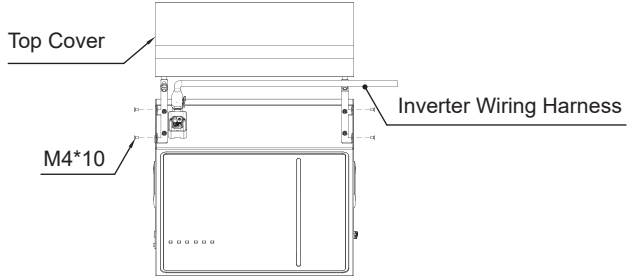
4) Attach the wall mounting bracket to the top of the topmost EX2000 with M5*10 bolts and install the expansion screws.



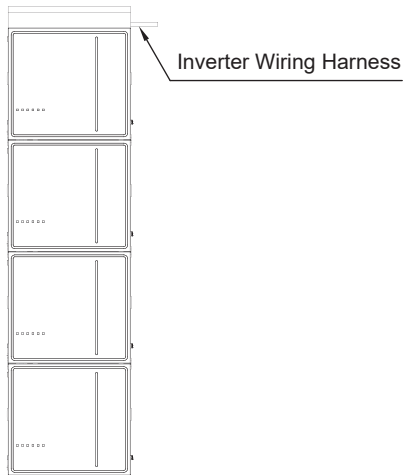
5) Hold the bracket part of EX2000 against the wall. Mark the position of the expansion screws on the wall with a pencil for electric drill work. Make sure there are no cables laid in the wall to avoid damaging the cables when drilling. Or use stainless steel ties to fix the EX2000 at the balcony railing or other fixed position.



6) Connect the inverter harness and fix the top cover to the top of EX2000 with M4*10 screws.

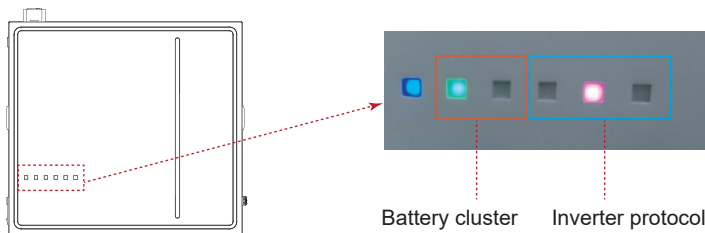


7) The successful installation schematic is shown below.



5.4 Battery Clusters and Inverter Protocol Configuration

- a) First light indicates battery state.
- b) Next two led light indicates battery group/clusters.
- c) Last three led light indicates the inverter protocol. Green light indicates inverter selection mode and purple light indicate selection confirmed.



When battery is in the power-on state

1. Short press the switch three times within 1.5 seconds to enter the selection/setting mode. The first blue light indicates that the selection state has been entered.
2. Battery clusters and inverter protocol need to setup separately.
3. Press and hold switch for 0.5 seconds to exit the settings mode after each selection and restart battery. Restart the battery after each selection.

5.4.1 Parallel connection of battery clusters

1. Short press switch can choose battery cluster and a maximum of 3 clusters can be connected. Follow the table to select battery groups.

Led Indicators	Battery groups
Left led	Cluster 1
Right Led	Cluster 2
Both Led	Cluster 3

2. When not in cluster mode (only single group of batteries), you must set it to Cluster 1 to communicate with the inverter.
3. Press and hold switch for 0.5 seconds to exit the settings mode. Restart the battery.

5.4.2 Inverter Protocol

1. Short press switch can select inverter, green light mean select inverter press switch for 0.5s to confirm inverter, Purple Led means selection confirmed. Follow the table to select inverter.

Led Indicators	Inverter
Left led	APsystem
Middle Led	Hoymiles
Right Led	Reserved

2. Press and hold switch for 0.5 seconds to exit the settings mode. Restart the battery.

6 Communication

The battery has a CAN communication port , which can get the battery status.

CAN

CAN communication terminal to read the battery information through the microinverter's app .

RS232

The RS232 communication terminal follows the RS232 protocol and reads the battery information via the host computer.

6.1 RS232 port

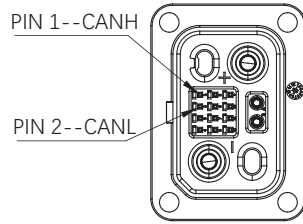
The USB Type-C port is used to communicate with the host computer.
 The default baud rate of RS-232C port : 115200bps.

6.2 CAN port.

Default baud rate of RS-485 port: 9600bps
 Default baud rate of CAN port: 500K

Table 6-2 RS485 and CAN Connector Pin Assignments

Pin number	CAN
1	CANH
2	CANL
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	



7 Troubleshooting

Please refer to the troubleshooting methods mentioned below. Please read the “Table 7-1 LED indication” of this manual before troubleshooting to avoid false operations.
 For example, the blinking or constant red light of the ALM alarm on the front panel does not necessarily indicate a faulty battery. In most cases, the "alarm" indication signifies normal operation and requires no troubleshooting. Furthermore, if the battery indicates "protection," it will resume normal operation automatically once the "protection" status is released.

Table 7-1 LED indications

Battery status	Protection / Alarm / Normal	RUN led	Capacity LED	Descriptions
		■	■ ■ ■ ■ ■	
Shut down		OFF	OFF	All off
Power-on	Normal	Red on	ON	All lights stay on simultaneously for one second
Standby	Normal	Green blink 1	OFF	Standby
	Alarm	Red blink 3	OFF	Low voltage/High voltage
Charge	Normal	Green light	Base on capacity	Protection triggered, charging stops
	Alarm	Red blink 3		
	Protection	Red light	OFF	
Discharge	Normal	Green blink 3	Base on capacity	Protection triggered, discharging stops
	Alarm	Red blink 3		
	Protection	Red light	OFF	

! Note: The blinking descriptions: Blink 1“0.5s on/3.5s off”; Blink 2 “0.5s on / 0.5s off”;Blink 3“0.5s on / 1.5s off”; Blink 4“0.7s on / 9.3s off”

7.1 Unable to start

Problem	Troubleshooting Steps	Solution
Press the switch for 1 second, but the LED indicator doesn't respond or all the LEDs are off after this 1s duration.	<ol style="list-style-type: none"> 1. Confirm that the battery remains in the "ON" state; 2. Charge the battery correctly and observe if the battery can be charged properly. 	<ol style="list-style-type: none"> 1. If the battery enters into charging mode, it should return to its normal state after completing the charging process. 2. If not, please contact the local reseller or Pytes.

7.2 Unable to charge

Problem	Troubleshooting Steps	Solution
The not fully charged battery cannot be charged properly.	<ol style="list-style-type: none"> 1. Confirm that the battery is turned on; 2. Inspect the power cable to make sure that it is correctly plugged in and that the charging circuit is functioning properly; 3. Check the battery indicator LED to determine if the battery is under "Protection" state. If so, unplug the battery power cable, find the cause of the protection, and correct the issue before restarting the battery. 4. Ensure that the charging voltage meets the battery's charging requirements. If not, adjust the power supply voltage to the proper range. 	If the battery still does not charge properly after following the steps, please contact the local reseller or Pytes.

7.3 Unable to discharge

Problem	Troubleshooting Steps	Solution
The battery cannot be discharged properly.	<ol style="list-style-type: none"> 1. Confirm that the battery is turned on; 2. Check the power cables to ensure that they are properly connected. 3. Unplug the battery power cable and measure the battery power output voltage. If the battery voltage is too low, charge it immediately. 4. Check the battery indicator LED to see if the battery is under "Protection" state. If so, unplug the battery power cables, find the cause of the protection, resolve the issue, and thereafter restart the battery. 	If the battery still does not discharge properly after following the above steps, please contact the local reseller or Pytes.

7.4 ALM indicator(alarm) constantly on

When the ALM indicator is constantly red and the other indicators are off, the battery is in the “Protection” state. Once the condition that triggered protection is released, the battery will automatically return to normal operation. However, there are a few issues requiring immediate measures.

Problem	Troubleshooting Steps	Solution
The ALM indicator remains in a constant state of red, while all other indicators remain inactive.	<ol style="list-style-type: none">1.Check the power cables to ensure that they are properly connected.2.Check whether the charging voltage, charging/discharging current, battery/cell voltage and temperature meet the relevant protection conditions, and release the “protection” state to ensure that the voltage, current and temperature are within the normal working range.	If the battery protection state cannot be released, or if the ALM indicator is constantly on when the battery is properly charged after it is restarted, please contact your local reseller or Pytes.

 **Warning:** Do not repair the battery if no authorization from Pytes!

Warranty Card

Customer Information			
Contact Name			
Phone Number		Email	
Address			
Product Information			
Battery Model		Inverter Brand/Model	
Battery Quantity		Inverter Quantity	
Purchase Date		Inverter Using Time	
Serial Number		on/off Grid	
Installer Information			
Installer Name		Installation Date	
Problem Description			
Photos of Battery Wiring			
Photos of Inverter Wiring and Panels			



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