

# LiFePO4

LITHIUM IRON PHOSPHATE

User Manual



 25.6V-100Ah

 25.6V-100Ah Smart

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**25.6V 100Ah**

**(100A BMS)**

Lithium Iron phosphate  
(LiFePO<sub>4</sub>) Battery



## CAUTION & WARNING

Read and follow all safety instructions before handling, installing, or operating the battery. Failure to do so may result in fire, explosion, severe personal injury, or property damage.

### **Hazard Prevention Mandates**

- To mitigate risks of fire, explosion, and burns, strictly adhere to the following:
- Do not short-circuit, crush, puncture, or disassemble the battery.
- Do not incinerate or expose the battery to excessive heat above 65°C (149°F).
- Do not immerse or expose the battery to water or moisture.
- Do not reverse the polarity during connections between the battery and charger/load.
- Avoid exposing the battery to direct flame, hazardous chemicals, or combustible materials.
- Avoid severe mechanical impact or vibration.
- Use only insulated tools when handling or connecting the battery.

### **Charging & Electrical Safety**

- Do not exceed the maximum charging voltage of 15.0V.
- Charge only with a dedicated Lithium Iron Phosphate (LiFePO<sub>4</sub>) charger set to 14.6V ± 0.2V.
- Do not connect batteries of different brands, chemistries, or models in series or parallel, as BMS incompatibility may lead to critical failures.

## Prohibited Usage Environments

- Prohibited for use in environments with strong static electricity or powerful magnetic fields.
- Such exposure can interfere with or damage the Battery Management System (BMS), compromising safety protections and creating potential hazards.

## Battery Disposal Protocol

- At end of life, insulate the terminals with insulating tape before disposal.
- Dispose of the waste battery at a designated recycling facility in accordance with local regulations. Do not dispose of in household waste.

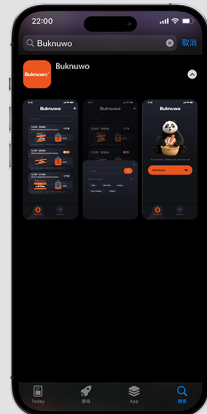
## APP Introduction

This application is developed and designed by Buknuwo®. It specializes in monitoring lithium batteries, providing real-time status readings such as the voltage, charging and discharging current, alarm prompts, protection status, etc. This allows users to clearly understand the status of lithium batteries and ensure safe use.



You can search "Buknuwo" in the App Store or Download via Customer Support

\*This app only supports for smart batteries.



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## Key Features

- Lithium Iron Phosphate (LiFePO4) Chemistry: Provides superior stability and consistent performance throughout the product's lifespan.
- Advanced Battery Management System (BMS): Ensures product safety and extended service lifespan.
- Fast Charging & Discharging with Constant Voltage.
- Stable Voltage & 100% Usable Capacity at any SOC.
- High-Power Output for Golf Cart Compatibility: Delivers robust performance, making it an ideal power solution for mainstream golf cart models.
- Universal Fit Design: Standardized industrial ensures direct replacement with most vehicle battery compartments.
- Real-Time Power Monitoring: The built-in coulomb meter provides accurate real-time SOC and energy consumption data for precise power management.
- Grade UL94V-0 (Fireproof).

## NOTICE BEFORE USING

Please read the following important information carefully before installing and operating this product. Proper handling and maintenance are essential for ensuring battery performance, safety, and service life.

### **Initial State Information**

To comply with transportation safety regulations, the battery is shipped with a State of Charge (SOC) between 30% and 50%. A full charge is recommended before initial use.

### **Electrical Connection Safety**

When making connections, avoid direct contact between the positive and negative cable terminals to prevent short circuits, which can render the battery irreversible or cause permanent damage.

It is strongly recommended to wrap all cable terminals with insulating tape during the wiring process to eliminate the risk of accidental short circuits.

Ensure the battery is correctly connected to the load/device. Reverse polarity connection is strictly prohibited.

### **System Compatibility & Operation**

Before connecting the load, verify that the battery's rated output power can meet the peak power demand of the load to prevent overload conditions.

#### **Long-Term Storage Guidelines**

For extended storage (exceeding 3 months), charge the battery to approximately 50% SOC and store it in a dry environment between 10°C and 35°C (50°F to 95°F). To maintain battery health, recharge it every three months.

### **Important Safety Warnings**

Do not disassemble the battery under any circumstances.

The battery is designed for upright installation with terminals facing upward. Do not install it upside down.

If your application requires lateral (side) mounting, you must contact our technical support team at [gmail@buknuwo.com](mailto:gmail@buknuwo.com) to confirm the specific orientation before proceeding.

## BATTERY PARAMETERS

Capacity	25.6V 100Ah
Battery Weight	18.9kg/41.67lbs
Dimensions (Nylon Handle)	21.06×8.07×8.46in/ 53.5*20.5*21.5cm
Rated Capacity	100Ah
Energy	2560Wh
Cycle Life	≥4000 cycles (to 80% capacity)
Internal Resistance	≤40mΩ
Charge Method	CC/CV
Housing Material	ABS(Flame Retardant Plastic)
Protection Class	IP65
Recommended Terminal Torque	106.2 to 123.9inch·lbs/ 12 to14 N.m
Charge Limit Voltage	29.2V
Overcharge Protection Voltage	29.2V
Overcharge Recovery Voltage	28.4V
Recommended Charging Voltage	29.2V
Recommended Charging Current	20A-50A
Recommended Discharge Current	0A-60A
Maximum Continuous Charging Current	100A
Maximum Continuous Discharge Current	100A
Maximum Power	2560W

Over-discharge Protection Voltage	20V
Over-discharge Recovery Voltage	21.6V
Discharge Overcurrent Protection	450(±50)
Short Circuit Protection Current	2000A
MOS transistor High Temperature Protection and Recovery Temperature	212±7°F/167±27°F
Charging High Temperature Protection and Recovery Temperature	149±9°F/131±9°F
Charging Low temperature protection and recovery temperature	32±9°F/50±9°F
Discharge high temperature protection and recovery temperature	158±9°F/140±9°F
Discharge Low temperature protection and recovery temperature	-4±9°F/14±9°F
Operating Temperature Range	-4°F~176°F
Shipping Voltage	13.1-13.2V
Shipping SOC	40%
Self-Discharge Rate	<3% per month
Series/Parallel	Max 1S4P
Communication	Not supported
Pack Certifications	CE/UN38.3/Class 9/IEC62133/RoHS
Storage Temperature	-10~45°C
Case Material	ABS Plastic
Terminal Bolt Size	M8

## Battery Management System (BMS) Specifications

Technical Notes	State of Charge	Voltage
Full charge voltage (BMS cutoff:29.2V)	100%	27V
High SOC operating range	80%	26.8V
Standard working voltage	60%	26.6V
Mid-discharge voltage	40%	26.3V
Low voltage warning zone	20%	25.2V
Deep discharge limit	10%	24.4V
Absolute minimum (cell damage risk)	0%	20V

\*Note: The above data is for reference only.

The actual voltage depends on the charger used for charging and other machine parameters.

**STEP 01**

Charge each battery fully.

**STEP 02**

Allow the batteries to rest for **15** minutes.

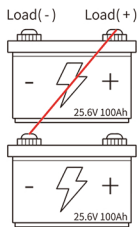
Then confirm that the voltage of each battery is greater than **29.2V**.

**STEP 03**

Connect the batteries in series or parallel.

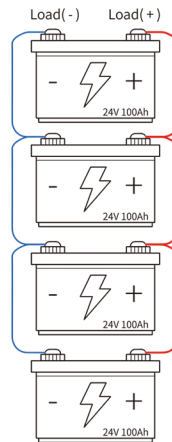
**Series Connection**

48V(51.2V) 100Ah



**Parallel Connection**

24V(25.6) 400Ah



## CHARGING METHODS

Buknuwo LiFePO<sub>4</sub> batteries offer flexible charging convenience similar to electronic devices. Unlike traditional lead-acid batteries, LiFePO<sub>4</sub> batteries are not harmed by being left in a partial charge state, so you don't need to worry about charging them immediately after use. Additionally, these batteries are free from memory effect, allowing you to recharge them without completely discharging.

### Battery Charger(mains power)

- It is recommended to use a lithium iron phosphate battery charger for LiFePO<sub>4</sub> batteries, as it is specifically programmed with the correct voltage parameters. While most lead-acid battery chargers may function adequately, they may not achieve full charge capacity due to voltage characteristic differences:

For example, a 48V lithium battery at 20% capacity will maintain voltage around 51.2V, while a comparable lead-acid battery will have a voltage around 40V at the same charge level. As such, using a lead-acid charger to charge a lithium battery may result in incomplete charging.

### Solar panel(DC power)

- The Buknuwo LiFePO<sub>4</sub> battery can be efficiently charged using a solar panel, provided a suitable charge controller is employed. But it is essential to select a controller that supports either the LiFePO<sub>4</sub> or Li-ion battery mode. Both PWM and MPPT controllers are compatible with the Buknuwo battery system.

- In the absence of a controller, you can connect the battery directly to the solar panel. The BMS inside will provide essential protection in most scenarios. However, please be aware that if a fault occurs within the BMS, there is a risk of battery damage.
- For accurate voltage testing of the battery, please ensure all connections are disconnected, and allow the battery to rest for at least 30 minutes before measuring its voltage.
- When selecting a charger for your Buknuwo battery, please ensure that the charger is capable of fully charging the Buknuwo battery. The rated output/charging voltage should correspond to the standard charge voltage for LiFePO<sub>4</sub> batteries, which may vary based on battery types. For specific voltage

## 01 STEP

### Overcharge Protection (>29.2V)

- The BMS immediately stops the charging process if any individual cell voltage exceeds the predefined safety threshold, ensuring protection against overcharging.

## 02 STEP

### Over-Discharge Protection (<20V)

- Discharge cutoff: The BMS automatically halts when battery voltage drops below the threshold.
- Auto-Recovery: The system resume operation after 15 seconds if the voltage recovers to > 21.6V.

## 03 STEP

### Temperature Protection

High-Temperature Cutoff	Charging is disabled at $\geq 65^{\circ}\text{C}$ (149°F)
	Discharging is disabled at $\geq 70^{\circ}\text{C}$ (158°F)
Low-Temperature Cutoff	Charging is blocked at $\leq 0^{\circ}\text{C}$ (32°F)
	Discharging is operational down to $-20^{\circ}\text{C}$ (-4°F)

## 04 STEP

### Over current/Short-Circuit Protection

- The system disconnects all output in the event of overcurrent or short-circuit conditions to prevent damage.

- **Recovery Steps:**

Disconnect All battery cables.

Check voltage with a multimeter:

>21.6V: Reconnect to restart.

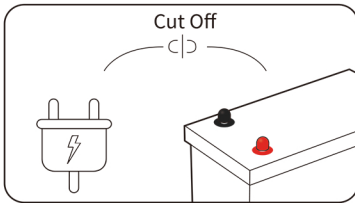
≤20V: Contact [gmail@buknuwo.com](mailto:gmail@buknuwo.com) for support.

## BMS RECOVERY PROCEDURE

If the BMS cuts off the battery for protection, follow these steps to restore functionality:

### STEP 01

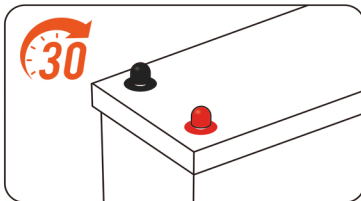
Disconnect all connections from the battery.



### STEP 02

Leave the battery aside for 30 minutes.

Then the battery will automatically return to normal voltage (>20V) and can be used after fully charged.



### Activation Criteria

- The cell balancing function is automatically activated once the following conditions are all met:  
Completion of the charging cycle (approaching full capacity).  
System voltage >28.4V.

### Operation Methodology

- Intelligently redirects surplus energy from high-voltage cells using precision shunt resistors.
- The system ensures uniformity in the State of Charge (SOC) of each cell, maintaining a tolerance within  $\pm 1\%$ .

### Performance Benefits

- **Optimized Battery Performance**  
Reduces voltage deviation to <30mV between cells.
- **Extended Battery Lifespan**  
Prevents premature aging of overcharged cells.
- **Robust Overcharge Protection**  
Enforces a strict 3.65V per cell limit during the balancing process to safeguard against overcharging.

## CABLE SIZE

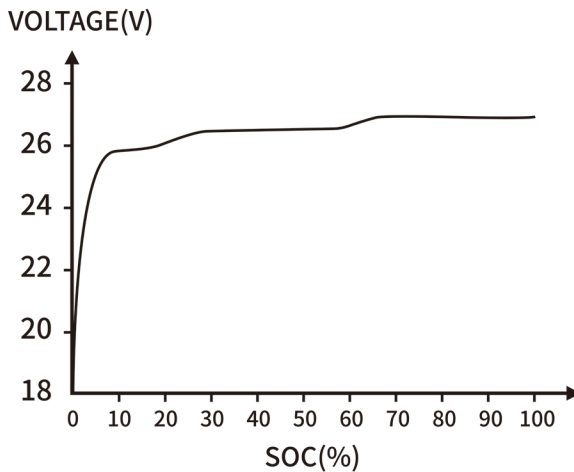
When selecting cable size, ensure it is based on the expected load requirements. Refer to the following table for the current capacity of copper cables in various sizes:

PVC COPPER CABLE SIZE(AWG/MM2)	AMPACITY(A)
14(2.08)	20
12(3.31)	25
10(5.25)	35
8(8.36)	50
6(13.3)	65
4(21.1)	85
2(33.6)	115
1(42.4)	130
1/0(53.5)	150
2/0(67.4)	175
4/0(107)	230

The above values are from NEC Table 310.15 (B)16 for copper cables rated at 167°F (75°C) operating at an ambient temperature not exceeding 86°F (30°C). Cables longer than 6 feet (1829 mm) or ambient temperature higher than 86°F (30°C) may require heavier gauges to avoid excessive voltage drops with undersized ones.

## STATE OF CHARGE (SOC)

- The battery capacity could be approximately estimated by measuring its resting voltage (not charging / discharging voltage)<sup>①</sup>.
- Please note that variations in voltage readings can occur due to differences in individual battery characteristics, measurement instruments, and environmental conditions such as ambient temperature. Consequently, the following voltage thresholds are provided as a general reference. The actual SOC of the battery is based on the discharge capacity under load.
- Resting Voltage Measurement:  
The resting voltage should be recorded after the battery has been disconnected from both the charger and load, with no current flow, and allowed to stabilize for a minimum of 3 hours.



SOC (%)	VOLTAGE (V)
0	20 to 24
25	26 to 26.3
50	26.3 to 26.4
75	26.6 to 26.66
100	$\geq 26.66$

① Based on the characteristics of LiFePO<sub>4</sub> batteries, the voltage measured by all LiFePO<sub>4</sub> batteries during charging/ discharging is not the real voltage of the battery. Therefore, after charging/ discharging and disconnecting the battery from the power source, the voltage of the battery will gradually drop/ increase to its real voltage.

## APPLICATION EXAMPLES

### Intended Use Cases

This battery is engineered for deep-cycle applications in a wide range of scenarios, including but not limited to:

### Outdoor Recreation & Mobile Living

- Recreational Vehicles & Camper Vans
- Marine & Boating Electronics (e.g., Trolling Motors, Fish Finders)
- Overlanding & Off-Grid Power Systems

### Industrial & Commercial Use

- Telecommunications Backup Power
- Floor Cleaning Machines & Industrial Equipment
- Material Handling Equipment
- UPS & Emergency Lighting Systems

### Direct Replacement

- A drop-in upgrade for 12V Lead-Acid, AGM, or Gel batteries in existing systems.

### **IMPORTANT: NOT SUITABLE FOR ENGINE STARTING**

This battery is not designed for cranking gasoline or diesel engines. Its BMS is configured for sustained discharge, not the instantaneous high-current surge required for engine starting.



### Warranty Exclusions:

The manufacturer's warranty does not cover:

#### Installation & Usage Related

1. Improper installation, use, maintenance, or servicing.
2. Insufficient or improper fastening of battery components.
3. Loose terminal connections.
4. Reverse polarity connections.
5. Electrical system malfunctions causing battery failure.
6. Use with unauthorized third-party products.
7. Product modifications without manufacturer's written approval.
8. Applications exceeding design specifications (including repeated engine starts or exceeding rated discharge current).

#### Configuration & Connections

1. Series connections exceeding **4 batteries** (>48V systems).
2. Parallel connections exceeding **4 batteries**.
3. Short circuits (accidental, intentional, or unintentional).
4. High resistance from corroded terminals, poor crimping, or undersized cables.

#### Physical & Environmental Damage

1. Impact, collision, or drop damage.
2. Improper storage conditions.
3. Force majeure events (fires, natural disasters, etc).

## Maintenance & Charging

1. Improper charging (under/overcharging per manual specifications).
2. Batteries left uncharged for over **12 months**.
3. Commercial applications with  $\geq 80\%$  daily depth of discharge.
4. Failure to follow recommended charging protocols.

## General Conditions

1. Any damage resulting from user negligence or failure to follow safety guidelines.
2. Consequences of product misuse or improper operation.

All warranty claims are subject to manufacturer's inspection and approval. Proper installation and maintenance as specified in the user manual are required to maintain warranty coverage.

## Warranty and Returns

### After-Sales Support

1. For any product support needs, please contact our service team at: [gmail@buknuwo.com](mailto:gmail@buknuwo.com).
2. Our technical specialists will provide prompt assistance.

### Battery Storage Guidelines

1. For optimal storage:  
Charge the battery to approximately **50%** capacity.  
Disconnect all loads by removing the negative terminal connection.  
Store in a temperature-controlled environment (ideal: **25°C/77°F**).
2. Storage Characteristics:  
Typical self-discharge rate: **<3%** per month (at **25°C/77°F**).

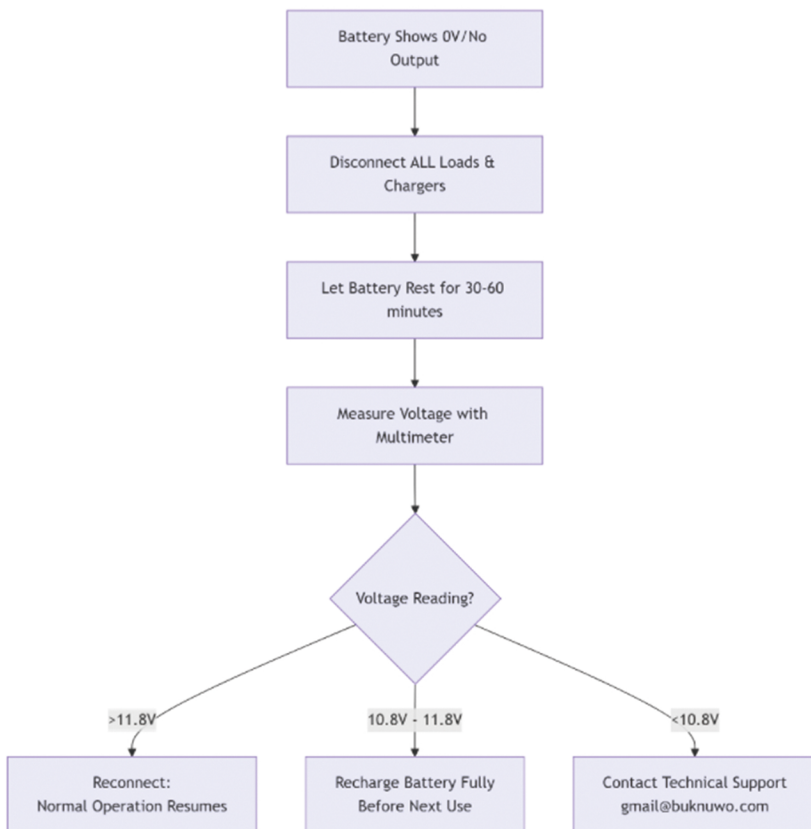
**Note: Discharge rates may increase significantly under extreme environmental conditions.**

## FREQUENTLY ASKED QUESTIONS

Q1: My battery shows 0V and has no output. What is the cause and solution?

A: A 0V reading typically indicates that the Battery Management System has activated protection due to over-discharge, short-circuit, or over-current.

Please follow this systematic troubleshooting guide:



Q2: Is initial charging required before first use?

A: Yes, it is mandatory to fully charge the battery before its first operation. This ensures the cell chemistry is properly activated and the State of Charge is calibrated. This requirement is equally critical when configuring new batteries in series or parallel.

Q3: What is the proper method to verify battery voltage?

A: For an accurate state-of-charge assessment, use a digital multimeter:

Set the multimeter to DC Voltage (V<sup>-</sup>) mode.

Connect the red probe to the positive (+) terminal and the black probe to the negative (-) terminal.

A reading of approximately 13.3V to 13.5V indicates a fully charged battery.

Q4: What are the installation orientation requirements?

A: Our batteries are designed for flexible mounting and can be installed in any orientation (upright, on its side, etc.), provided the terminals are: Properly secured to the specified torque to prevent arcing or overheating.

Protected from accidental contact with conductive materials or moisture to prevent short circuits.

Q5: What conditions will trigger the Over-Discharge Sleep of the battery?

A:

- Sleep Mode 1: Over-Discharge Sleep

Sleep Condition: Sleep is triggered if cell over-discharge or overall

over-discharge is not resolved within 30 seconds. Wake-up Condition:

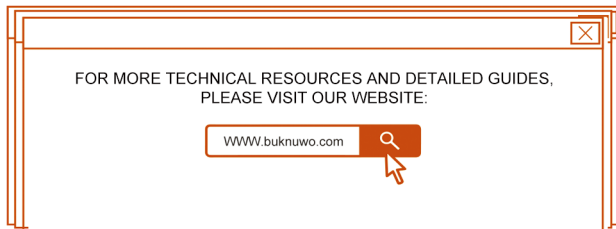
Wake-up by charging.

- Sleep Mode 2: Command Sleep

Sleep Condition: Sleep is triggered by a command (from upper computer or Bluetooth software). Wake-up Conditions: Wake-up by charging, wake-up by discharging, wake-up by Bluetooth communication, automatic wake-up.

- Sleep Mode 3: Idle Sleep

Sleep Condition: Sleep is triggered if the battery remains static for 24 hours with no current, no communication, no Bluetooth connection, and the minimum cell voltage is above 3V. Wake-up Conditions: Wake-up by charging, wake-up by discharging, wake-up by Bluetooth communication, automatic wake-up.



## **A Heartfelt Thank You for Choosing Buknuwo**

Dear Valued Customer:

We extend our deepest gratitude for the trust you have placed in Buknuwo Batteries. Your unwavering support serves as a constant inspiration, driving our team to pursue innovation and deliver state-of-the-art battery solutions, all while maintaining an uncompromising commitment to service excellence.

It is through your invaluable feedback and the relentless dedication of our team that we are able to provide superior products at competitive prices, ensuring your complete satisfaction. Your confidence in our brand fuels our passion to continually raise the standard in energy solutions.

We take immense pride in the engineering and craftsmanship of our products and sincerely hope they exceed your expectations. Should you require any assistance, our dedicated team remains readily available to support you.

With sincere appreciation,  
The Buknuwo Team

**Buknuwo**®

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