



**BigBattery**  
— Your Source For Power

# RAPTOR 2 USER MANUAL



APPLIES TO:

36V RAPTOR 2  
(FRPTR-36038-G2)

72V RAPTOR 2  
(FRPTR-72076-G2)

Version 1.1

## VERSION HISTORY

Edition	Date	Chapters	Reason for Change
01	12/26/2023	All	Manual development

# Table of Contents

---

1. Definition of Terms.....	3
2. Safety Instructions.....	4
3. Introduction.....	6
3.1 Product Description.....	6
3.2 Features & Applications.....	6
4. Packed Components.....	7
4.1 36V RAPTOR 2.....	7
4.2 72V RAPTOR 2.....	8
5. Product Specifications.....	8
5.1 Battery Overview.....	8
5.2 Battery Specs.....	10
5.3 Battery Diagram.....	11
6. Installation.....	12
6.1 Installation Safety Guidelines.....	12
6.2 Battery Installation.....	12
7. Battery Operation Guide.....	14
7.1 Charging.....	14
7.2 Discharging.....	14
7.3 State of Charge.....	15
7.3 Storage.....	15
7.4 Extend the life of your Battery.....	16
8. Service.....	17
8.1 Troubleshooting.....	17
8.2 Maintenance.....	17
9. Recycling.....	18
10. Warranty & Returns.....	18

# 1. Definition of Terms

---

- AWG – American Wire Gauge
- A – Amp(s)
- Ah – Amp hour(s)
- AC – Alternating Current
- Battery Module – Single battery
- Battery System – Two or more battery modules connected to a controller box
- BMS – Battery Management System
- Capacity – Measure of stored energy, typically in Ah or mAh
- Controller Box – Master BMS Unit
- Cell Balancing – Process of ensuring uniform charge among cells in a battery
- Cycle Life – Total charge-discharge cycles before capacity decline
- C-rating – Charging/discharging rate relative to battery capacity
- DC – Direct Current
- DOD – Depth of Discharge
- ESS – Energy Storage System
- kW – Kilowatt
- kWh – Kilowatt-hour
- LFP – Lithium Iron Phosphate or LiFePO<sub>4</sub>
- mm – Millimeter(s)
- mV – Millivolt(s)
- Overcharge – Charging beyond recommended voltage limits
- PPE – Personal Protective Equipment
- PV – Photovoltaic
- Self-Discharge – Natural battery discharge over time
- State of Charge (SOC) – Battery's remaining charge as a percentage
- State of Health (SOH) – Overall battery condition and performance
- Thermal Runaway – Dangerous overheating with potential battery damage
- V – Volt(s)

## 2. Safety Instructions











---

Before you start working, make sure to read and follow all safety instructions for handling the battery. When installing it, be sure to meet all the rules and regulations in your area. Ask your local authority for the right permits and approvals before you install it.




















Lithium Iron Phosphate (LiFePO<sub>4</sub>) batteries are an inherently safe chemistry. However, safety measures should always be taken as consideration before, during, and after installation and during ongoing use and maintenance. The following safety notices are crucial for both the installer and end users when operating this product normally.

**Improper installation could result in harm to the installer, the operator, or others, as well as damage to the battery or connected equipment.**

### WARNING:

-  Do not make any connections or disconnections to the system when the batteries are in operation. Working with active batteries can lead to system component damage or pose a risk of electrical shock.
-  Do not charge with a charge voltage above the specified on section 5.1.
-  Do not charge nor discharge battery when ambient temperature is above **55 °C (131 °F)**.
-  Do not install battery where it may contact conductive materials, water, seawater, strong oxidizers, nor strong acids.
-  Do not install battery in a location exposed to direct sun, hot surfaces, nor hot locations. Do not install batteries in a tight clearance compartment, overheating may result.
-  Keep any flammable/combustible material (e.g. paper, cloth, plastic, etc.) that may be ignited by heat, sparks, flames, or any other heat source at a minimum distance of two feet away from the batteries.
-  Disconnect batteries immediately if, during operation or charging, they emit an unusual smell, develop heat, or behave abnormally.
-  Have a Class ABC or Class BC fire extinguisher on the premises.
-  Never short-circuit DC inputs: may result in a risk of electric shock or fire.
-  Do not disassemble the battery: Contact BigBattery for proper handling instructions. Incorrect servicing or re-assembly may result in a risk of electric shock or fire and voiding the warranty

**PRECAUTION:**

-  Qualified personnel must handle all product work to reduce the risk of electric shock.
-  Follow local and national electrical standards for installation and confirm utility provider and local authorities requirements before grid connection.
-  Maintain visibility of warning labels and nameplates.
-  Choose battery placement with future user safety in mind.
-  Keep children away from the battery and systems.
-  Use team lift technique due to battery weight.
-  Use batteries as directed; do not open or modify.
-  Avoid inserting foreign objects into battery terminals.
-  Handle batteries and/or battery-powered devices cautiously when using metal tools or when around the system. Risk of electrical arcs or short-circuits can cause serious harm, death, and equipment damage.
-  Do not charge or discharge the battery if ambient temperature is below **-20** °C (**-4** °F).
-  Beware of the battery current: Please ensure that the battery is “off” before installing or working on the battery. Use a voltmeter to confirm there is no voltage present.
-  Always wear protective gear when handling batteries (PPE).
-  Handle batteries carefully to prevent damage; avoid pulling, dragging, or mishandling.
-  Inspect batteries before use; don't use damaged or swollen ones; contact BigBattery immediately.
-  Don't paint any part of the batteries, inside or out.
-  Make sure all cable connections are properly tightened and secured, and to prevent any accident caused by improper installation.
-  Install and remove batteries using the handles provided.
-  Do not place any objects on top of batteries.
-  Before storing battery for more than 6 months, fully charge the battery and disconnect batteries from your system.

**Disclaimer:**

*BigBattery, Inc has the authority to modify the content here without prior notice. To access the latest manual version, please visit our website at [www.bigbattery.com](http://www.bigbattery.com).*

## 3. Introduction

---

Introducing BigBattery's RAPTOR 2! These revolutionary lithium battery systems designed to push the boundaries of efficiency, flexibility, and reliability in energy management are the BEST Batteries Money can Buy. The RAPTOR 2 represents a leap forward in energy storage technology, offering a compact and scalable solution for mobile, industrial and off-grid applications. With its cutting-edge features and intelligent design, this advanced lithium battery system promises to empower individuals and organizations to take control of their energy usage like never before. Equipped with one of our RAPTOR 2 battery systems from BigBattery, you'll stay powered and prepared!

This User Manual is designed to provide you with an understanding of the specs, features, capabilities, and installation of these batteries. Read and take note of all safety information prior to installing or operating your battery. This document applies to the 36V and 72V RAPTOR 2 battery systems.

### 3.1 Product Description

---

The 36V (3.84 kWh) and 72V (7.68 kWh) RAPTOR 2 battery systems are ideal for low-voltage applications and for your industrial equipment, golf carts, RV's, off-grid power systems, emergency power supplies, and more. These batteries utilize lithium iron phosphate (LiFePO<sub>4</sub> or LFP) cells, renowned for their top-notch safety.

They are waterproof and equipped with an intelligent Battery Management System (BMS) that continuously monitors and records cell voltage, along with real-time data on current, voltage, and temperature for the module. The BMS features a passive balance function and an advanced battery control method, which collectively enhance battery pack performance. Furthermore, the battery includes built-in fire-extinguishing modules for added safety. It has built-in heating elements so the battery can be charged in freezing environments temperatures. The battery utilizes a standard M8 bolt connection, which easily and safely secures power to your battery unit. Designed to endure, the RAPTOR 2 has a lifespan of over 10 years and is engineered to withstand more than 4000 - 6000 cycles at 80% Depth of Discharge (DOD) at a rate of 0.5C.

You can always monitor the batteries' remaining capacity with the led meter.

## 3.2 Features & Applications

---

### Applications:

- Electric Industrial Equipment
- Electric-Powered Vehicles
- Golf carts
- RVs
- Boats
- Backup Power
- Home
- Off-Grid Cabin

### Features:

- Advanced BMS (Battery Management System)
- Lithium-Ion LiFePO4/LFP Chemistry
- Easy connection to a larger power system
- Expandable system with easy parallel connections
- Multiple layers of safety and battery protection
- Built-in fire suppression system
- Impact Resistant
- Waterproof Good insulation performance
- High quality & durable ABS construction
- Utilizes standardized M8-bolt connector for battery power source.
- LED SOC Meter

## 4. Packed Components

---

### 4.1 36V RAPTOR 2



(x1) 36V 3.84kWh  
(FRPTR-36038-G2)



(x1) 2AWG B&R Ring  
Terminal Cables [3 feet]  
(CBL015)



(x4) Mounting  
Screws



(x1) Ring Terminal  
Plastic Covers

#### ADD UPS

---



(x1) Raptor2 SOC Battery  
Meter (MTR106)



## 4.2 72V RAPTOR 2



## 5. Product Specifications

### 5.1 Battery Overview

Figure 1: 36V RAPTOR 2 Battery Overview



**Figure 2: 72V RAPTOR 2 Battery Overview**



*Before handling the battery, always switch it off and verify there is no voltage with a voltmeter to prevent accidental contact with live terminals. Failure to do so could lead to severe injury or fatality.*

## 5.2 Battery Specs

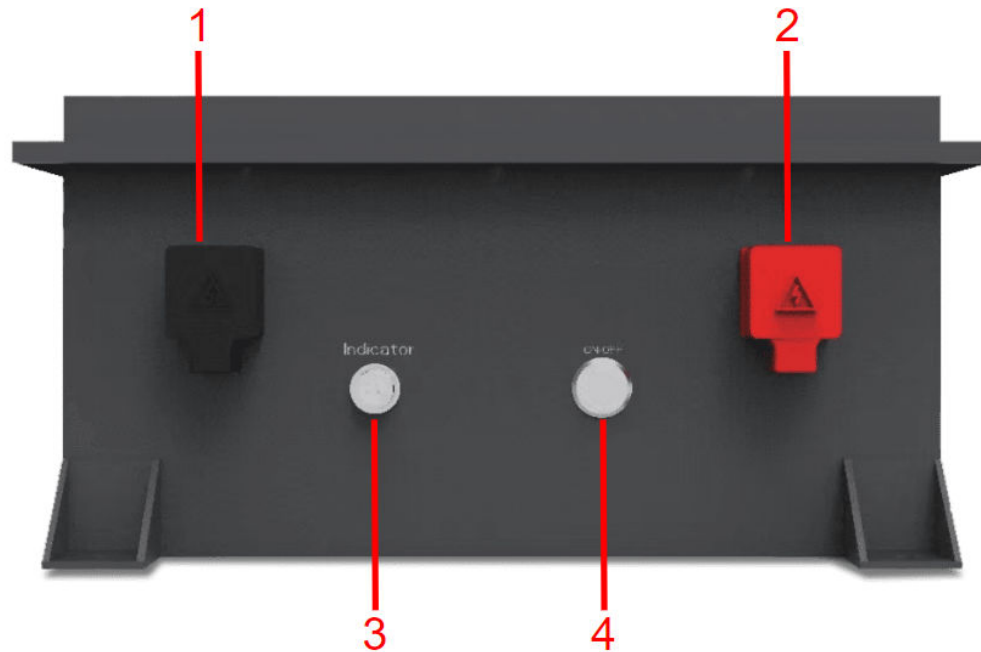
### BATTERY SPECIFICATIONS



SKU	FRPTR-36038-G2	FRPTR-72076-G2
System Voltage	36V	72V
Nominal Voltage	38.4V	76.8V
Chemistry	LiFePO4	LiFePO4
kWh Capacity	3.84 kWh	7.68 kWh
Ah Capacity	100 Ah	100 Ah
Charging Voltage Range	41V - 43.8V	85.2V - 87.6V
Max Charge Voltage	44V	87.6V
Operating Voltage Range	36V - 43.8V	72V - 87.6V
Suggested Low Voltage Cutoff	36V - 38.1V	72V - 76.2V
BMS Cutoff Range	31.5V - 35.25V	66V - 70.5V
Cell Configuration	12S	24S
Max Continuous Discharge Current	150A	150A
Max Continuous Power	3840W	7680W
Max Discharge Peak Current	300A (Max 5 seconds)	300A (Max 5 seconds)
Max Charge Current	100A	100A
Charge Temperature Range	32°F - 113°F (0°C - 45°C)	32°F - 113°F (0°C - 45°C)
Discharge Temperature Range	-4°F - 131°F (-20°C - 55°C)	-4°F - 149°F (-20°C - 65°C)
Optimal Discharge Temp. Range	59°F - 95°F (15°C - 35°C)	59°F - 95°F (15°C - 35°C)
Storage Temperature Range	23°F - 95°F (-5°C - 35°C) (Max 3 months, SoC >50%)	23°F - 95°F (-5°C - 35°C) (Max 3 months, SoC >50%)
Dimensions (DxWxH)	15.3 x 18.3 x 7.4 in (387 x 465 x 188 mm)	14.1 x 31.2 x 7.4 in (358 x 792.5 x 188 mm)
Weight	79.3 lbs (36 kg)	143 lbs (64.9 kg)
Protection Rating	IP65	IP65
Communications	RS485	RS485

## 5.3 Battery Diagram

**Figure 3: RAPTOR 2 Battery Diagram**




Item	Name	Description	Details
1	BAT-	Negative Battery Terminal	M8 Screw
2	BAT+	Positive Battery Terminal	M8 Screw
3	Com port	For capacity meter	
4	On/Off Button	Button Switch On/Off the BMS	

**Figure 4: Capacity meter Diagram**



## 6. Installation

---

-  **WARNING:** Before installing, make sure to review all warnings and precautions in Section 2, as well as the installation safety guidelines in Section 6.1 below.

### 6.1 Installation Safety Guidelines

- Inspect batteries upon receipt for any signs of damage before use. In case of battery damage, reach out to BigBattery for repair or replacement. Avoid using a defective battery as it may result in incorrect battery voltage that could potentially ruin your appliances. Damaged batteries have the potential to cause fire hazards.
- Check to ensure that all cables are in good condition.
- Be sure your battery packs are powered “**OFF**” before making/removing any connections.
- It is crucial to never create a short circuit on the external battery terminals. When attaching the battery, ensure that each cable is properly connected to the correct terminal. There should be no conductive material between the terminals that could cause a short circuit.
- Use a screwdriver with a rubber coated handle.
- **Do not put the RAPTOR 2 batteries in series.** The BMS and internal components are not designed to handle this setup, which could cause the modules to fail.
- Always mount the battery in an upright position.

### 6.2 Battery Installation

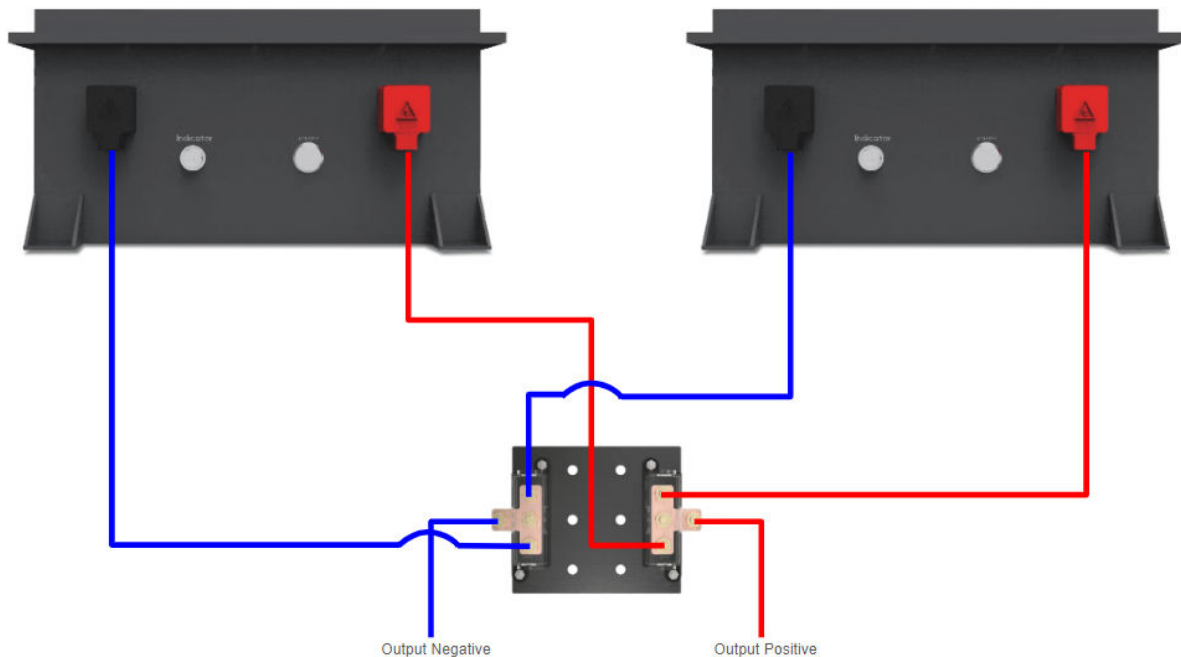
①

Place the battery on a flat floor or shelf.

②


Connect the positive battery terminal to the positive side of the busbar and the negative battery terminal to the negative side of the busbar using the included power cables, as shown in figure 5. Do this for each battery in the system. If the number of batteries exceeds the number of posts on the busbar, it is ok to stack multiple ring terminals on a single post.

**Figure 5: RAPTOR 2 Power Cable Connection Diagram**



- ③ Connect the positive and negative terminals of the output (motor controller, electrical equipment, inverter, ect.) to the proper ends on the busbar as shown in the above figure.
- ④ Connect the capacity meter to the indicator port on one of the batteries and then power on all the batteries, verify that the meter is reading the proper voltage. The busbar should also show around the same voltage when measured with a multimeter.

## 7. Battery Operation Guide

 **WARNING:** Before installing, make sure to review all the parameters listed on chapter 5.2.

### 7.1 Charging

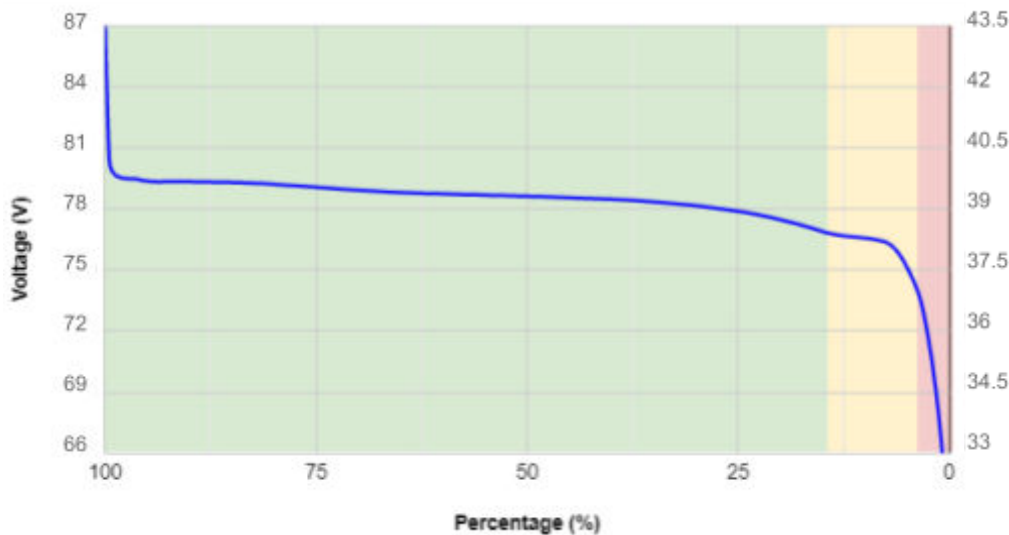
- During the initial charging, monitor the battery's charge voltage to ensure it is within appropriate voltage limits.
- Only use the battery charger provided by BigBattery, or the inverter charging settings listed on section 5.2. Using non-recommended chargers may cause improper charging and damage the battery's capacity.
- The battery cannot be charged in freezing temperatures. When charging is attempted below 0°C / 32°F, the BMS will prevent charging until the battery temperature is above 0°C / 32°F.
- Use LiFePO4 batteries for "opportunity charging." Charge them whenever you can but do it with small amounts of energy. It's better to do this than using fast chargers. Fast charging can make the battery's life shorter.
- It is suggested to charge the battery when it has a minimum of 10-20% SOC. Deep discharge won't harm the battery's health, but the BMS requires some voltage to function properly.
- The Bulk/Absorb Voltage of an LFP battery is the same as the charging voltage. BigBattery products do not need Float Voltage, Equalize voltage or absorption time.

### 7.2 Discharging

- The battery can be fully discharged. Unlike lead-acid batteries, the Voltage of a lithium battery stays very constant during discharge, delivering the same amount of power and energy from 100% to 0% SOC.
- LFP batteries handle discharging to 0% safely, but shallower cycles offer benefits. Opting for 20% SOC, instead of 0%, extends the battery's lifespan to more than 6000 cycles.
- Do not discharge if the temperature is above 55 °C / 131 °F.
- You will see an apparent loss of capacity when discharging at below-freezing temperatures that reverses when the battery gets above freezing.
- The BMS will automatically shut down when the battery reaches a low voltage, so there's no need for manual intervention. Avoid over discharging by removing the load when the battery's discharge is done.

## 7.3 State of Charge

This is the Depth of Discharge of the RAPTOR 2 family batteries:



	Cycling in this zone will ensure a reasonable life expectancy
	Ocasionally this zone is OK
	Dropping into this zone can lock the battery. Could reduce lifespan.

## 7.3 Storage

- LFP batteries have an extremely low self-discharge rate, which makes long-term storage convenient. Storing a lithium battery for up to a year is not an issue, as long as it has some charge remaining before being placed in storage.
- Before storing lithium-ion batteries, charge them to at least 50% charging level. Do not store batteries that are fully discharged. In the case of a fully charged battery, it should be discharged to 80% before it is stored.
- If you need to store batteries for longer periods, be sure to simply disconnect all wires from them. That way there can not be any stray loads that slowly discharge the batteries.
- Make sure that you store the battery within the temperatures listed on section 5.2. Storing them at low temperatures is certainly much better than storage at high temperatures. The electrolyte in LiFePO4 cells does not contain any water, so even when it freezes it does not expand, and



does not damage the cells. Just let the battery warm up a bit before you start discharging it again, which is OK at -4 °F (-20 °C).

This is the storage temperature that the batteries should be stored, and the charging intervals and methods to do so.

Storage Temperature	Charging Interval	Charging Method	Model
≤20°C	Once / 9M	42V 50A CC/CV Charging to 42V, cut-off current: 5A	36V RAPTOR 2
20°C~30°C	Once / 6M		
30°C~40°C	Once / 3M		
≤20°C	Once / 9M	84V 30A CC/CV Charging to 84V, cut-off current: 5A	72V RAPTOR 2
20°C~30°C	Once / 6M		
30°C~40°C	Once / 3M		

## 7.4 Extend the life of your Battery

The RAPTOR 2 Battery is designed 10 years or more when used correctly. To ensure a proper battery operation, you must follow the previous listed instructions and battery parameters. In order to extend the lifespan of your battery, follow these recommendations.

- Avoid discharging the battery more than 80% Depth of Discharge (DOD) unless it is truly necessary.
- Keep the battery temperature under 95 °F (35 °C) and above 59 °F (15 °C)
- Keep battery charge and discharge current under 0.5 of the Capacity (C-rating)
- Never disassemble the battery, unless our tech support guides you. If the battery has any problems, contact us for assistance.
- Keep the battery away from excessive physical shocks or vibration. These can damage the battery's internal structure and hamper its operation.
- Dirty battery terminals can lead to improper flow of current during operation. Therefore, it is recommended that you clean the terminals while installing the battery pack.

## 8. Service

### 8.1 Troubleshooting

No.	Error	Description	Solution
1	No DC output	Battery is off or low voltage	Turn ON or charge the battery
2	Power supply time is too short	Battery capacity lack or not fully charged	Fully Charge the battery. Maintenance or replacement
3	Battery can't be charged fully	Power system DC output voltage falls below the minimum charge voltage	Regulating DC output voltage of power supply to battery suitable charging voltage
5	The battery output voltage is unstable	Battery management system do not operate normally	Press the switch to restart the battery
6	The charge and discharge capacity is insufficient	Unbalance voltage with cell	Examine/balance the cell
7	Unable to charge and discharge	BMS or cell/temperature sensor damaged	Maintenance or replacement
8	Different SOC value of batteries in parallel	Normal phenomenon	No operation

### 8.2 Maintenance

Item	Maintenance	Maintenance Intervals
Power Cables	Check whether there is mechanical damage to the power cable and whether the terminal insulation sleeve has fallen off; if there is such a phenomenon, please turn off the machine and carry out maintenance or replacement	Once every 6 months
	check whether the power cable is loose; if there is any sign of looseness, please use a standard torque wrench to tighten it	
	check the system for loose screws or discoloration of the copper bus bar; if the screws are loose, please tighten them with a standard torque wrench; if the copper bus bar is discolored, please contact the manufacturer for after-sales replacement	

Comm Cables	check whether the parallel communication cable terminal is loose, if it is loose, re-tighten it	Once a year
	check whether the color of the communication cable has obvious discoloration, if discoloration, please shut down the machine to replace the communication cable	
Cabinet	Check the cleanliness of the front door, back door and battery module inside the cabinet, if there is obvious dusty, please clean up in time.	Once 6-12 months
System Running Status	check if all parameters are normal when the system is running (voltage, current, temperature, etc.)	Once every 6 months
	check whether the main core components of the system are normal, including system switches, contactors, etc. are normal	
	check whether the system air inlet and outlet, air ducts are normal, if there is blockage and congestion, need to clean up in time	
Charge and Discharge Maintenance	Use light load and shallow charge/discharge to check whether the SOC, SOH status of the battery is normal (using the upper computer software to read); it is recommended that the depth of discharge and charge/discharge power should not exceed 20% of the rated value	Once every 6 months

## 9. Recycling

Lithium iron phosphate batteries are potentially dangerous and shouldn't be tossed in the trash. Many websites and organizations can recycle them for free. If you're in the U.S. or anywhere globally, search for "Lithium Battery Disposal Near Me" online. Numerous places can safely dispose of these batteries. Make sure to call first to confirm they're open.

If you can't find a safe disposal option, contact our customer service team instead of improperly disposing of the battery. We can take care of recycling your batteries for you.

## 10. Warranty & Returns

---

In the unlikely event you are having an issue with one of our batteries we have developed a straightforward warranty & return policy which includes the following:

- For all returns or warranty claims contact [support@bigbattery.com](mailto:support@bigbattery.com).

- 30-day money back guarantee. Returns of undamaged batteries unrelated to warranty claims may be issued full refunds less a 20% restocking fee.
- We have a 10-year warranty on all new batteries. For more information, visit the Policies page at [BigBattery.com](http://BigBattery.com).
- We offer a 30-day warranty on all cells, accessories & complimentary products (Anderson connectors, wires, chargers, etc.).
- Warranty only applies to original owner (non-transferable).
- Warranties can be used for an exchange of a component only once per component.
- Operating the battery outside of acceptable parameters, according to our listed battery specs (ref. Section 5.2) will void your warranty.
  - Example: Using an incorrect charger may exceed max. charging voltage specifications.
  - **WARNING:** Make sure to use the appropriate charger for your battery.
- Customer pays return shipping on returns or warranted component inspections initiated after the first 30 days of ownership. Please note some battery returns may require special documentation and packaging, and these instances will encounter extra fees. This is to correctly comply with lithium battery shipping regulations.
- If you have a quality issue with a product, please contact our support team to help properly diagnose the problem. If the product you receive does not meet our rigorous quality standards, then we will issue you a replacement component or fix the original at no additional cost. Replacement batteries or components will only be sent after we have received your returned battery or component and finished an inspection to determine the cause of any problems. BigBattery is not responsible for return shipping.
- DIY modifications or damage due to gross negligence or abuse are not covered by the warranty.

Please visit [www.bigbattery.com](http://www.bigbattery.com) to review the latest policy.

For all returns, please mail your package in a traceable method to the address below. Include a note with your name, your order number and describing your situation and/or request.

**BigBattery Inc.**  
**Technical Support Team**  
[support@bigbattery.com](mailto:support@bigbattery.com)  
(818) 280-3091, ext. 1005  
9667 Owensmouth Ave., Suite 105  
Chatsworth, California 91311