



BigBattery.com

Your Source For Power

48V LYNX

(FLYNX-48053-G1)



USER MANUAL
INSTALLATION GUIDE

Version 1.0

Table of Contents

1. Introduction	2
2. Features & Applications	2
3. Product Specifications	3
3.1 Front Panel	3
3.2 Battery Specs	4
3.3 BMS Specs	5
3.4 BMS Protections	7
3.5 Control Panel Indicators	8
4. Warnings & Precautions	10
5. Parts & Components	11
5.1 Installation Safety Guidelines	11
5.2 Parts & Components	11
5.3 Environmental Requirements	12
5.4 Battery Installation	12
6. PC Software Operation	15
7. Common Errors & Solutions	17
8. Recycling	17
9. Warranty & Returns	18

1. Introduction

Introducing BigBattery's 48V LYNX! The LYNX is designed specifically for your telecom and off-grid applications, packing 5.3 kWh of capacity in a compact and portable housing! This is the BEST battery money can buy. These units utilize a lithium iron phosphate (LiFePO4/LFP) chemistry, which is the SAFEST battery chemistry in the world. This User Manual is designed to provide you with an understanding of the specs, features, capabilities, and installation of the 48V LYNX. Read and take note of all safety information prior to installing or operating your battery. This document applies to the BigBattery 48V LYNX (FLYNX-48053-G1).

2. Features & Applications

Applications

- **Telecom**
- **Solar**
- **Emergency Power**
- **Data Centers**
- **Off-Grid**
- **Backup Power**

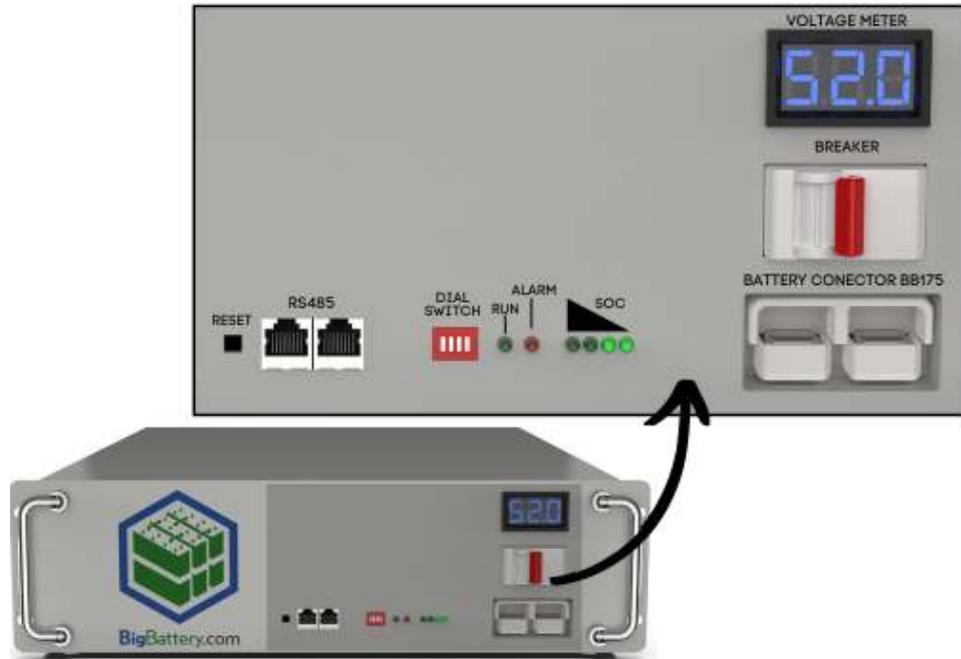
Features

- Advanced BMS (Battery Management System)
- Lithium-Ion LiFePO4/LFP Chemistry
- LED BMS Alarm Indicators
- Dual Ethernet ports (RS485 Communications)
- DIP Dial Switch
- High quality & durable steel construction
- Standardized 175-amp connector for battery power source
- LED SoC Indicators & Voltage Display
- Internal Fire Extinguisher

BigBattery's 48V LYNX is the ultimate solution for your telecom and data center power supplies, solar and off-grid systems, emergency power storage, and more. These batteries come equipped with our advanced BMS, and can operate safely within a wide temperature range. They will last at least 3,700 – 8,000 Complete Full Charge/Discharge Cycles, and are incredibly versatile, allowing you to easily connect to and provide power to a variety of larger power systems. The battery utilizes a standard 175 connection, which easily and safely secures power to your battery unit. Equipped with the 48V LYNX from BigBattery, you'll stay powered and prepared!

3. Product Specifications

3.1 Front Panel



No.	Name	Description	Notes
1	Handles	For carrying and handling	
2	Fixture	Rack mount enclosure	
3	LED Voltmeter	Displays battery voltage	
4	100A Safety Breaker	Switch the battery output between on and off	
5	BB175 Connector	Easy and safe connection for charging and discharging	
6	Reset	Reset battery to default specs	
7	RS485	RS485 communication interface	
8	ID (Dial Switch)	Assign addresses to each module	See Section 5.4
9	RUN	Operating LED indicator	ON = Constant CHRG/DISCHRG = Flashing
10	ALARM	Alarm LED indicator	
11	SoC	State of Charge	Four green LEDs (25% each)

3.2 Battery Specs

Parameter	Specification	Unit
Chemistry	Lithium Iron Phosphate,	LiFePO4/LFP
Cell Configuration	16S	n/a
Nominal Voltage	48	Volts (DC)
Capacity (kWh)	5.3	Kilowatt-hours
Capacity (Ah)	103	Amp-hours
Operating Voltage Range	43 – 58.8	Volts (DC)
Charging Voltage Range	55.2 - 57.6	Volts (DC)
Max Charging Voltage	58.8	Volts (DC)
 WARNING: Do NOT exceed max charging voltage.		
Charging Current Limit (Continuous)	90	Amps
Discharging Current Limit (Continuous)	105	Amps
Max Peak Discharge Current (Over 6 seconds)	350	Amps
Charge Temp Range	0 - 55 (32 - 131)	°C (°F)
Discharge Temp Range	-30 - 55 (-22 – 131)	°C (°F)
Optimal Discharge Temp Range	15 - 35 (59 - 95)	°C (°F)
Storage Temperature Range (Max 6 months) (Humidity < 90%)	-5 - 35 (23 - 95)	°C (°F)
Optimal Storage Temp Range	15 - 35 (59 - 95)	°C (°F)
Weight	49 (108)	kg (lb)
Length	62.23 (24.5)	cm (in)
Width	48.26 (19)	cm (in)
Height	13.34 (5.25)	cm (in)

Safety Features	BMS (Over/Under Voltage & Over-Current Protection, Thermal Management System) 100A Breaker
Max Battery Connections	Series: Not series capable Parallel: Max. 8 connections

3.2 BMS Specs

Category	Function	Specification	Unit
Charge Voltage Protection	Maximum Charger Voltage (CC-CV)	58.8	Volts (DC)
	Overcharge Voltage Limit Cutoff Protection (each cell)	3.8 - 3.9	Volts (DC)
	Overcharge Voltage Limit Protection Delay Time	2000	Milliseconds
	Overcharge Protection Recovery Voltage	3.45	Volts (DC)
Discharge Voltage Protection	Low Voltage Protection Limit Range	2.5 - 2.3	Volts (DC)
	Low Voltage Protection Delay Time	2000	Milliseconds
	Low Voltage Protection Recovery	3.1	Volts (DC)
Overcurrent Protection	Charge Overcurrent Protection Value Range	102 (120)	Amps
	Charge Overcurrent Delay	10 (3)	Seconds
	Charge Overcurrent Release Recovery Condition	Reconnection delayed 180 seconds	
	Scenario 1: Discharge Overcurrent Protection	130 (150)	Amps
	Scenario 1: Discharge Overcurrent Protection Delay	10 (3)	Seconds
	Scenario 2 (Short Circuit): Discharge Overcurrent Protection Range	350	Amps

	Scenario 2 (Short Circuit): Discharge Overcurrent Protection Delay Range	1	Second
	Discharge Overcurrent Protection Recovery Condition	Reconnection delayed 60 seconds	
Balance Function	Maximum Cell Voltage to Activate Cell Balancing	3.4	Volts (DC)
	Voltage Difference to Activate Cell Balancing	40	Millivolts (DC)
	Balancing Mode	Balance when charging	
	Balancing Current Range	100	Milliamps
Temperature Protection	High Temperature Protection Value when Charging	60 (140)	°C (°F)
	High Temperature Protection Release Value when Charging	55 (131)	°C (°F)
	Low Temperature Protection Value when Charging	-5 (23)	°C (°F)
	Low Temperature Protection Release Value when Charging	0 (32)	°C (°F)
	High Temperature Protection Value when Discharging	60 (140)	°C (°F)
	High Temperature Protection Release Value when Discharging	55 (131)	°C (°F)
	Low Temperature Protection Value when Discharging	-20 (-4)	°C (°F)
	Low Temperature Protection Release Value when Discharging	-10 (14)	°C (°F)

3.3 BMS Protections

For all BMS protection and recovery values, refer to Section 3.2 above.

Over Charge Protection

During charging, if the voltage of any cell exceeds the setting for cell protection or the total voltage of the system is greater than the Max Charging Voltage, the BMS stops charging. When the voltage of each cell and the total voltage of the battery drops to the recovery values, the protection is removed.

Over Discharge Protection

During discharge, if the voltage of any cell or the total voltage of the battery is lower than the protection values, the BMS stops discharging. When all cell voltages and the total voltage reach the recovery values, the protection is removed.

Charging Over Current Protection

During charging, if the current surpasses the protection value, the BMS will limit the charging current to less than the protection value.

Discharging Over Current Protection

During discharging, if the current surpasses the protection value, the BMS stops discharging. Remove the load or charge the battery to remove the protection.

Short Circuit Protection

During discharging, if the current is so much bigger than the normal working current, it's considered a short circuit, the BMS will stop discharging.

Reverse Polarity Protection

When the battery and rectifier are in reverse connection, the BMS will immediately enter a state of polarity protection to protect the battery and rectifier from being damaged by high currents.

Cell Temperature Protection

If the temperature of any cell surpasses 70°C or drops below 0°C, the BMS will stop charging. If the temperature of any cell surpasses 75°C or drops below -20°C, the BMS will stop the discharge.

PCB High Temperature Protection

If the PCB temperature surpasses 95 °C, the BMS will stop charging or discharging until the temperature drops below the recovery value.

Cell Balancing

During charging, if all cell voltages are greater than 3.4V and the voltage difference between cells (ΔU) is $> 40\text{mV}$ ($\Delta U = \text{Max. Cell Voltage} - \text{Min. Cell Voltage}$), the BMS will trigger the balancing process.

3.4 Control Panel Indicators

BMS Protection Indicators

When the LED alarm light comes on, a BMS protection has been triggered and the battery has been protected. Please refer to the table below for individual warning indicators and their recovery process and take the appropriate action.

State	Protection	Indicator	Recovery
Charging	Over Voltage	ALARM	Stop charging. Check module voltage and charger.
	Over Current	ALARM	Stop charging. Check settings and limitations.
	Temperature	ALARM	Stop charging. Wait for the temperature recovery condition.
Discharging	Under Voltage	ALARM	Stop discharging. Begin charging.
	Over Current	ALARM	Stop discharging. Check for current overload.
	Temperature	ALARM	Stop discharging. Wait for the temperature recovery condition.

General LED Indicators

State	Warning/Normal	RUN	ALARM	SOC LED*			
				25%	50%	75%	100%
Standby	Normal	ON	OFF	ON as battery capacity indicates			
	Warning	ON	Flash 2*				
	Protection	OFF	ON				
Charge	Normal	Flash 1*	OFF				
	Warning	Flash 1*	Flash 2*				
	Protection	OFF	ON				
Discharge	Normal	Flash 2*	OFF				
	Warning	Flash 2*	Flash 2*				
	Protection	OFF	ON				
BMS Failure		OFF	Flash 2*	OFF			

*For State of Charge (SOC), each ON LED indicates an increment of 25% SOC.

**Flash 1 = One flash every 1.2 seconds; Flash 2 = One flash every 2.4 seconds.

4. Warnings & Precautions

Lithium Iron Phosphate (LiFePO₄) batteries are an inherently safe chemistry. However, safety measures should always be taken. Adhere to the instructions within this User Manual for safe handling and operation.

Warnings:

-  Do not charge with a charge voltage above 58.8V.
-  Do not charge/discharge battery when ambient temperature is $\geq 55^{\circ}\text{C}$ (**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.

Precautions:

-  Handle batteries and/or battery-powered devices cautiously to not damage the battery casing or connections.
-  Do not charge battery if ambient temperature is below 0°C (**32** °F), nor discharge battery if ambient temperature is below -30°C (**-22** °F).
-  Before storing battery for ≥ 6 months, charge the battery to 53V or above.
-  For long-term storage, disconnect batteries from your power system.
-  Always wear protective gear when handling batteries.
-  Do not place any objects on top of batteries.
-  Make sure all cable connections are properly tightened.
-  Install and remove batteries using the handles provided.

5. Parts & Components

⚠ WARNING: Before installing, make sure to review all warnings and precautions in Section 4, as well as the installation safety guidelines in Section 5.1 below.

5.1 Installation Safety Guidelines

- Inspect batteries upon receipt for any signs of damage before use.
- Check to ensure that all cables are in good condition.
- Use a screwdriver with a rubber coated handle.
- When your battery has been charging and has come to maximum charge (up to 58.8V max.), your battery may experience a slight voltage drop either immediately or within the hour after unplugging. This is normal and should be no cause for concern.

5.2 Parts & Components

General	
<p>LYNX Unit (1) 62.23 x 48.26 x 13.34 cm (24.5 x 19 x 5.25 in)</p>	
<p>Ring Terminal to 175-amp Connector Cable (1) 101.6 cm (40 in)</p>	

5.3 Environmental Requirements

The installed battery module requires specific environment parameters for safe, long-term operation. The environmental requirements are shown in the table below.

Type	Requirement
Working Temperature Range (Ambient)	(0° C - 55° C) 32° F - 131° F
Storage Temperature Range (Ambient)	(0° C - 35° C) 32° F - 95° F
Relative Humidity	≤ 95%
Atmospheric Pressure Range	86 kPa - 106 kPa
Site Environment	No conductive dust, corrosive gas, or vibration. Keep away from heat or flame.

5.4 Battery Installation

Before installing, ensure all grid power sources are turned off. Turn off all batteries and disconnect all loads. Ensure there are no voltages present before proceeding.

Machinery Installation

Step 1 - Mounting Brackets Installation

Ensure mounting brackets are attached to both sides of the battery. If they are not attached, locate the mounting brackets and hardware within the shipment packaging and connect a mounting bracket to each side of the battery. Ensure the mounting brackets are attached securely.

Step 2 - Battery Installation

The preferred method to mount the battery is within a standard 19-in. rack or cabinet. Use the battery handles to lift the battery onto the rack's supporting plate then push the battery into the rack until the mounting brackets touch the rack frame. Then attach the mounting bolts through the battery mounting brackets to the corresponding mounting nuts on the rack frame. Ensure the mounting brackets fit firmly against the rack frame, then tighten the bolts.

Electrical Installation

Step 1 - Connecting the Grounding Cable

Connect a grounding wire of sufficient gauge from the battery enclosure grounding screw to the cabinet or rack frame ground point. Ensure the connection is secure and corrosion free.

Step 2 - Power Line Installation

When using a single battery, connect the battery directly to the source or load, ensuring proper connection polarity. When using multiple batteries connected in parallel, ensure that all battery output voltages are within 0.1 volts (100 millivolts) of each other before proceeding. If battery output voltages are not within 0.1 volts of each other, charge the under-voltage batteries until they are. Ensure all batteries are turned off before connecting each battery to its respective rack busbar, using the connection cable provided.

Step 3 - Connecting to the Busbar

Connect all sources and loads to the rack busbar, observing proper polarity. NOTE: There may be fuses, contactors, switches, etc. between the rack busbar and the connected sources and/or loads.

Step 4 - Communication Cable Installation

If using only a single battery, skip this step. When multiple batteries are connected in parallel, set the battery address (or ID) of each battery according to the table on the next page. Ensure no duplicate address codes are used. Then connect one end of the provided RJ45 communication cable into a battery's RJ45 port and connect the remaining end of the RJ45 cable into another battery's RJ45 port. Continue connecting communication cables until all batteries are connected.

Assignment of ID Addresses

Code				Address	Assign
1	2	3	4		
ON	ON	ON	ON	0	Module 1
ON	ON	ON	OFF	1	Reserved for inverter comms.
ON	ON	OFF	ON	2	Module 2
ON	ON	OFF	OFF	3	Module 3
ON	OFF	ON	ON	4	Module 4
ON	OFF	ON	OFF	5	Module 5
ON	OFF	OFF	ON	6	Module 6
ON	OFF	OFF	OFF	7	Module 7
OFF	ON	ON	ON	8	Module 8
OFF	ON	ON	OFF	9	Module 9
OFF	ON	OFF	ON	10	Module 10
OFF	ON	OFF	OFF	11	Module 11
OFF	OFF	ON	ON	12	Module 12
OFF	OFF	ON	OFF	13	Module 13
OFF	OFF	OFF	ON	14	Module 14
OFF	OFF	OFF	OFF	15	Module 15

Electrical Commissioning

After all previous steps have been completed, turn on each battery module (including their respective circuit breakers), one at a time, pausing between each battery to allow them to stabilize. Continue until all battery modules are on and terminal voltage is detected on the busbar. If any battery does not start, an alarm light turns on, or a circuit breaker turns off, immediately turn off all batteries and disconnect the malfunctioning batteries from the rack busbar and remove it from the rack for inspection. Once all connected batteries are deemed functional, turn on all power sources and loads, one at a time, while monitoring the batteries, sources, and loads for any anomalies. If any batteries' alarm light turns on, any batteries' circuit breaker turns off, a fuse blows, arcs, or smokes, immediately turn off all battery modules, sources, and loads and correct the fault before proceeding.

6. PC Software Operation

Program Menu

Tab	Description
BMS Monitoring	Displays BMS information, battery data, and status
BMS Parameter	Check and set battery parameters
BMS Control	BMS status controls
BMS Datalog	BMS status data storage and export
Historical Record	Historical data storage and export
Communication	Real-time data and communication with the BMS
Software Parameter	Program and language settings

Step 1

Download and install the software "BMS_TOOLS.exe". Run the program.

Step 2

Connect the communication cable (RS485 - USB) to the port (DB9 interface or RJ45 interface) on the main battery and to the USB Port on your computer respectively.

Step 3

Set the baud rate to 9600, as seen in Fig. 1 on the next page.

Step 4

Click “Search Device”, as seen in Fig. 1. and the BMS will connect automatically. Once connected, all battery data can be displayed in the program.

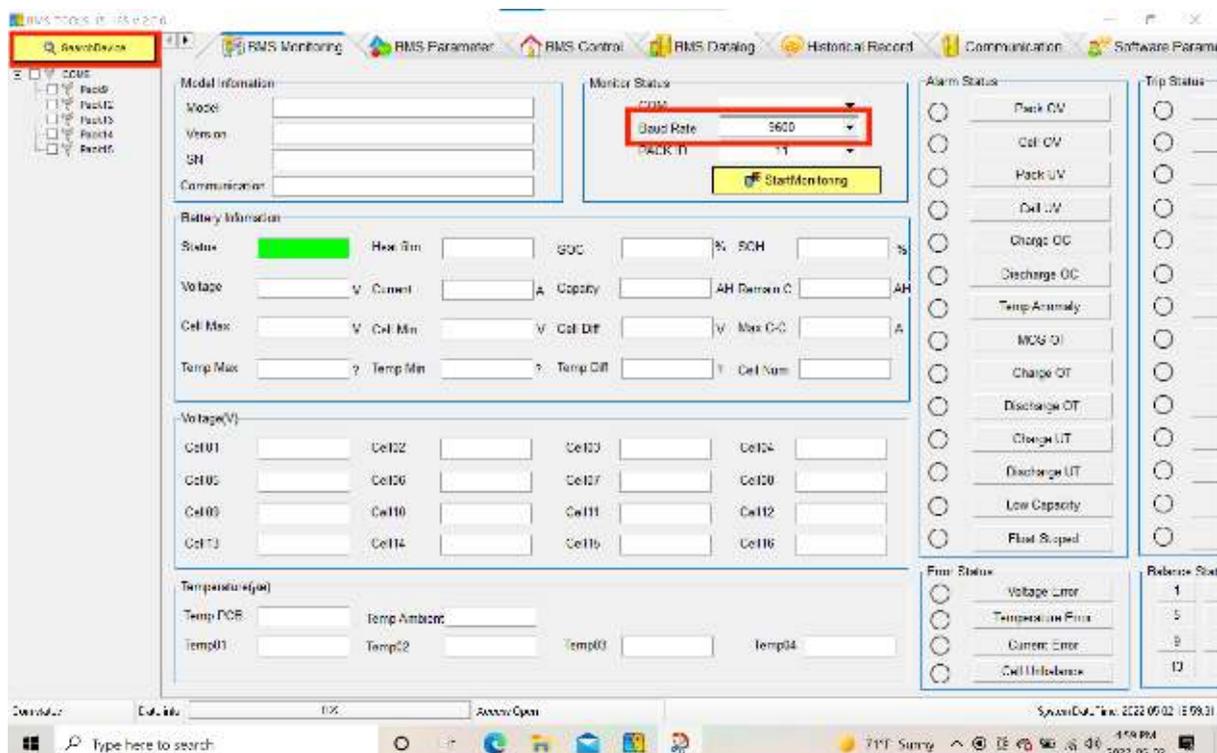


Fig. 1

7. Common Errors & Solutions

No.	Error	Description	Solution
1	No Output Power	Low Voltage Indicator	Fully charge battery and try again
2	Power delivery time too short	Unbalanced or damaged cells	Fully cycle battery / Maintenance
3	Battery can't be fully charged	Charger Voltage is below suggested charge voltage	Modify power supply to match battery's specs
4	ALARM LED is always ON	Short-circuit on power line connection	Disconnect and check all connections
5	Output Voltage fluctuates	Cables are loose or BMS doesn't work properly	Reset the systems by pressing the reset button, and reboot system / Verify connections
6	Communication lost	Communication settings failure	Check settings and correct them

8. Recycling

Currently, BigBattery is the only US battery manufacturer that offers free recycling at the end-of-life of all our products. We are willing to help our customers ship our products back to our facilities and will recycle them at no extra charge to our customers. We maintain a zero-landfill policy and have partnered with certified recyclers to make sure these batteries don't end up in landfills. Please contact us at the contact information on the next page to set up your end-of-life return.

9. 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.
- 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.
- 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 3.1) 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.

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
(818) 280-3091, ext. 1005
9667 Owensmouth Ave., Suite 105
Chatsworth, California 91311