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Your Source For Power

48V EAGLE

(FEAGL-48015-G1)

USER MANUAL
INSTALLATION GUIDE

For Video Installation Instructions click link below,
https://bigbattery.com/eagle

Version 1.0

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1. Introduction

Introducing BigBattery's **EAGLE**! The 48V **EAGLE** is a small, yet remarkably powerful battery, with huge capacity for its size. Its sleek design is one indication of the care that is taken in the engineering and manufacturing of BigBattery batteries. Our design is intentional: to make a drop-in replacement of traditional lead-acid or lithium batteries a simple feat.

The **EAGLE** battery features the safest lithium battery chemistry currently available, LiFePO4 (lithium iron phosphate), or LFP. By installing these batteries, you will reduce the overall weight of your vehicle, while adding a substantial amount of power. For example, just two (2) **EAGLE** units will increase power, and add range, while subtracting weight, when upgrading from a traditional 48V battery system (6 8-Volts, etc.). One (1) **EAGLE** unit can deliver 4,000 Watts of continuous power. It has 1.536 kWh of capacity, with a max discharge peak current of 180 Amps, for 6 seconds.

BigBattery's **EAGLE** batteries are guaranteed to last you at least 3,700 cycles, and realistically up to 5,500 or more full charge and discharge cycles.

The **EAGLE** battery is an excellent solution for your golf cart needs. Our User Manual describes in detail the different viable installation methods, to get your golf cart outfitted right away with BigBattery state-of-the-art batteries. The mounting brackets provided give you several more options for mounting them in your battery bay. The brackets can add height, for example, to provide clearance over any dividers that may exist within your battery bay. Select from our **EAGLE Kits** (2-8 **EAGLE** units), to allow even more power, and more range, and a less overall amperage draw from your battery system, increasing its cycle life even more.

Please make special note of Section 7 towards the end of this Manual. You have the opportunity to share a tutorial of your BigBattery experience, which can help spread the word of our state-of-the-art batteries. Sharing your review may make you eligible for a special discount on future battery orders at BigBattery.com.

We hope you enjoy reading, and thank you for choosing BigBattery!

The BigBattery Team
9667 Owensmouth Ave., Suite 105
Chatsworth, CA 91311
(818) 280-3091
sales@bigbattery.com

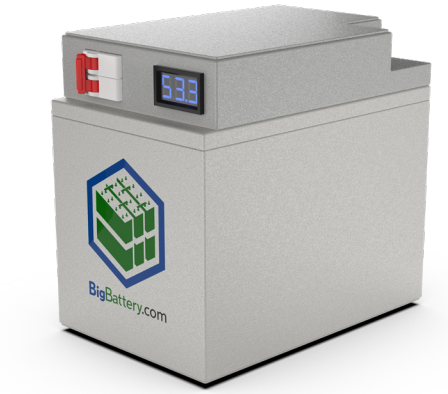
2. Features & Applications

Features

- Advanced BMS (Battery Management System)
- Drop-in replacement for GC2, GC8, or larger form factor batteries
- Safe Lithium-Ion LiFePO4/LFP Chemistry
- Multiple layers of battery protection and redundancy
- External BMS Reset button
- State of Charge (SoC) Meter with Extension Cable
- High quality & durable steel construction
- Utilizes standardized 175-amp connector for battery power source
- LED Voltage Display
- Unsurpassed 10-year Non-prorated Warranty

Applications

- **Golf Carts**
- **Electric-Powered Vehicles**
- **Electric Industrial Equipment**
- **Remote Lighting Systems**
- **Tiny House**
- **Backup Power**
- **Home**
- **Cabin Off-Grid**
- **Backup Power**



The **EAGLE** is the ultimate 48V solution. It is the best solution for any upgrade from a 48V lead-acid system. The battery utilizes a standardized 175-amp connector, which safely and securely connects your battery units down the line. The battery comes equipped with an LED interface, which displays the battery's current potential voltage. The battery State-of-Charge (SoC) meter, mounted on your dash, allows you to monitor your battery's current energy level at any point. You can expect the EAGLE to last 3,700 - 5,500 full-charge/discharge cycles to 100% Depth-of-Discharge (DoD), from the battery's rated capacity. BigBattery is so confident in the quality and performance of our products that we provide for you, a 10 year non-prorated warranty.

The choice is clear. To fulfill your power needs, the EAGLE or other select BigBattery batteries will be the best answer, whether it's for your golf cart, battery powered equipment, small ESS, or a lithium-ion upgrade from any 48V application that was previously lead-acid. In choosing a battery solution from BigBattery, you have chosen a battery that provides the superior performance, reliability, and unparalleled value that our customers have come to expect. Equipped with the 48V **EAGLE** from BigBattery, you'll stay powered and prepared!

3. Product Specifications

3.1 Choosing Your Kit

Min. No. of EAGLEs Needed for Your Motor/Controller

Minimum No. of Units	Motor/Controller Wattage	Motor/Controller Horsepower
2 EAGLEs	>8,000	10
3 EAGLEs	>11,500	15
4 EAGLEs	>15,000	20
5+ EAGLEs	>18,500	24

Typical Battery Run Time (each unit)

Amps	Run Time	Unit
10	180	Minutes
20	90	Minutes
30	60	Minutes
40	45	Minutes
50	36	Minutes

3.2 Battery Specs

Parameter		Specification	Unit
Chemistry		Lithium Iron Phosphate, LFP	LiFePO4
Cell Configuration		16S	n/a
System Configuration	2 EAGLE Kit	16S (2P)	n/a
	3 EAGLE Kit	16S (3P)	n/a
	4 EAGLE Kit	16S (4P)	n/a
Nominal Voltage		48	Volts (DC)
Capacity (Ah)	1 EAGLE	30	Amp-hours
	2 EAGLE Kit	60	Amp-hours
	3 EAGLE Kit	90	Amp-hours
	4 EAGLE Kit	120	Amp-hours
Capacity (kWh)	1 EAGLE	1.536	Kilowatt-hours
	2 EAGLE Kit	3.072	Kilowatt-hours
	3 EAGLE Kit	4.608	Kilowatt-hours
	4 EAGLE Kit	6.144	Kilowatt-hours
Operating Voltage Range		43 - 58.8	Volts (DC)
Max Continuous Power	1 EAGLE	4000	Watts
	2 EAGLE Kit	8000	Watts
	3 EAGLE Kit	11500	Watts
	4 EAGLE Kit	15000	Watts
Charging Voltage Range		55.6 - 58.0	Volts (DC)

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Parameter		Specification	Unit
Max Charging Voltage		58.8	Volts (DC)
⚠ WARNING: Do NOT exceed max charging voltage.			
Charging Current Limit (Continuous)	1 EAGLE	30	Amps
	2 EAGLE Kit	60	Amps
	3 EAGLE Kit	90	Amps
	4 EAGLE Kit	120	Amps
Discharging Current Limit (Continuous)	1 EAGLE	80	Amps
	2 EAGLE Kit	160	Amps
	3 EAGLE Kit	240	Amps
	4 EAGLE Kit	320	Amps
Max Peak Discharge Current (Over 6 seconds)	1 EAGLE	180	Amps
	2 EAGLE Kit	360	Amps
	3 EAGLE Kit	540	Amps
	4 EAGLE Kit	720	Amps
Charge Temp Range		0 - 55 (32 - 131)	°C (°F)
Discharge Temp Range		-20 - 55 (-4 – 131)	°C (°F)
Optimal Discharge Temp Range		15 - 35 (59 - 95)	°C (°F)
Storage Temp Range (Max 6 months) (Humidity < 90%)		-20 - 35 (-4 - 95)	°C (°F)
Optimal Storage Temp Range		15 - 35 (59 - 95)	°C (°F)
Weight		17.3 (38)	kg (lb)
Length		26.4 (10.4)	cm (in)
Width		18.3 (7.2)	cm (in)
Height		23.6 (9.3)	cm (in)

Safety Features	BMS (Battery Management System), Over Voltage, Under Voltage, Over Current Protection, Thermal Management System, 250A Breaker
Max Battery Connections	Series: Not series capable Parallel: Max. 8 connections

3.3 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	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 - 2.7	Volts (DC)
	Low Voltage Protection Delay Time	2000	Milliseconds
	Low Voltage Protection Recovery	3.0	Volts (DC)
Overcurrent Protection	Charge Overcurrent Protection Value Range	270 - 330	Amps
	Charge Overcurrent Delay	10	Seconds
	Charge Overcurrent Release Recovery Condition	Reconnection delayed 120 seconds	
	Scenario 1: Discharge Overcurrent Protection	300	Amps
	Scenario 1: Discharge Overcurrent Protection Delay	10	Seconds
	Scenario 2 (Short Circuit): Discharge Overcurrent Protection Range	800 - 1200	Amps
	Scenario 2 (Short Circuit): Discharge Overcurrent Protection Delay Range	600 - 1800	Milliseconds
	Discharge Overcurrent Protection Recovery Condition	Reconnection delayed 120 seconds	
Balance Function	Minimum Cell Voltage to Activate Cell Balancing	3.35	Volts (DC)
	Voltage Difference to Activate Cell Balancing	10	Millivolts (DC)
	Balancing Mode	Balance when charging	
	Balancing Current Range	100 - 260	Milliamps

Temperature Protection	High Temperature Protection Value when Charging	65 (149)	°C (°F)
	High Temperature Protection Release Value when Charging	55 (131)	°C (°F)
	Low Temperature Protection Value when Charging	-2 (28.4)	°C (°F)
	Low Temperature Protection Release Value when Charging	3 (37.4)	°C (°F)
	High Temperature Protection Value when Discharging	75 (167)	°C (°F)
	High Temperature Protection Release Value when Discharging	65 (149)	°C (°F)
	Low Temperature Protection Value when Discharging	-20 (-4)	°C (°F)
	Low Temperature Protection Release Value when Discharging	-10 (14)	°C (°F)
Resistance	Resistance in the Discharge Circuit Range	5 - 10	Milliohms
Self-Power Consumption	Operating Mode Range (relay closed)	35 - 50	Microamps
	Sleep Mode	0.5	Microamps
	Sleep Conditions	No current, communication, or prolonged protection states	
	Time to Sleep Mode	18 hours	

4. Warnings & Precautions

Lithium Iron Phosphate (LiFePO4) is 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 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, or strong acids.
- Do not install battery in a location exposed to direct sun, hot surfaces, or hot locations. Do not install batteries in a tight clearance compartment as 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 so as 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 more than 6 months, charge 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 & Installation

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 an hour after unplugging. This is normal and should be no cause for concern.

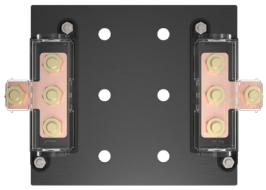
5.2 Parts & Components

2x - 4x **EAGLE**
26.1 x 18.1 x 23.5 cm
(10.25 x 7.1 x 9.25 in)

2x **Rope Handles**
(per EAGLE)
50 cm
(19.7 in)

1x **Charge Display**
1x **Extension Cable**

3x - 5x **BB175 - Ring Terminal Cable**
(6 AWG)
116 cm
(45.7 in)



1x **Busbar**
18 x 13.5 cm
(7.1 x 5.3 in)

6x **Busbar Screws**

2x **Mounting Brackets**
(per EAGLE)
18 x 5 cm
(7.1 x 2 in)

4x **Self-Tapping Screws**
(per EAGLE)

4x **Self-Tapping Screws**
(per EAGLE)

1x **48V Charger***
Input: 110V
Output Current: 15A

*Can be upgraded to our Heavy-Duty Charger

5.3 Battery Installation

Step 1:

Remove old batteries from your battery tray.

- Set your parking brake, turn the ignition key to the OFF position, and remove the key.
- If your cart has a Run/Tow switch, switch it to the Tow position.
- Disconnect all cabling, watering systems, and accessories from your old batteries and remove them.

Step 2:

Decide how you'll install your busbar and set your EAGLEs into your battery tray.

- Things to consider:
  - Proper weight distribution
  - Proximity to where you'll be installing your busbar
  - Ability to easily connect or disconnect cables (cart to busbar and busbar to batteries)

Step 3:

Install your busbar using the hardware provided.

Step 4:

Connect cables to your busbar.

- Make sure you are always connecting your positive (+) terminals to the positive end of the busbar, and the negative (-) terminals to the negative end of the busbar.
- You should have one cable left over that is not plugged into an EAGLE unit. This will be for charging.

Step 5:

Set your EAGLEs in your battery tray and secure them with the mounting hardware provided.

- Mounting brackets are height-adjustable and can be installed on any side of your EAGLEs so you can clear any dividers in your battery tray.

Step 6:

Plug in cables connected to your busbar to your EAGLE batteries.

- Ensure cables have a secure connection by pushing them in all the way.

For video instructions, click here.

Step 7:

Connect Charge Display to your EAGLEs.

- Identify which EAGLE(s) has the Charge Display pigtail coming out of the back of the unit.
- Connect your Display extension cable to that EAGLE.
- Connect the Display extension cable to your Charge Display.

For video instructions, click here.

Step 8:

Install your Charge Display in the cabin area or on the dashboard of your golf cart.

- 3 options for installation:
  1. Remove adhesive covering from back of unit and stick entire unit onto cart. Secure cable to cart.
  2. Remove back cover of unit. Disconnect Display extension cable. Make a cutout on your cart and secure front of unit in the cutout. Feed extension cable through cart and reconnect unit.
  3. Unplug and remove black LED display from unit. Make a cutout on your cart and secure LED display to your cart. Feed cable through your cart and recconnect cable to the LED display.

5.4 Charging & Troubleshooting

Charging Option 1

- Connect the spare 175A connector in your battery tray to the 175A connector on your charger.
- Connect the AC plug on your charger to an outlet or other 110V power source and begin charging.

Charging Option 2

- Remove your spare 175A connector cable from your busbar.
- Connect your cart's onboard charging terminals to your busbar.
- Connect the charging adapter for your cart to the 175A connector on your charger.
- Connect the AC plug on your charger to an outlet or other 110V power source and begin charging.

Troubleshooting

If the breaker trips or the battery turns off:

1. **Unplug all EAGLEs**
   - If an EAGLE unit remains on after you have unplugged it, this means that the unit was properly synced and connected and no further action needs to be taken.
   - If an EAGLE unit shuts off after unplugging, then you willhave to turn it back on by cycling the breaker or pressing the BMS Reset button found on the back of the unit.

6. Recycling

Please dispose of LiFePO4 batteries at an authorized lithium recycling facility, or return to BigBattery. We can take care of recycling your batteries for you.

7. 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 (power cables, 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 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 warrantied 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