

Bike Wheel Light Kit User Manual

v0.3.0 (updated 2025/10/21)

Safety Guidelines & Warnings

IMPORTANT SAFETY NOTICE

Lithium-ion batteries require proper handling and knowledge to ensure safe usage. Failure to follow safety guidelines may result in fire, explosion, serious injury, or property damage.

General Safety Guidelines

- **Only purchase and use if you fully understand lithium-ion battery safety.**
- **Always charge in or on a fire-resistant surface**—never leave batteries charging unattended.
- **Use only a compatible smart charger** designed specifically for this type of battery.
- **Store batteries in a protective case**—never carry them loose in a pocket, bag, or purse.
- **Keep away from metal objects** (keys, coins, tools) to prevent short circuits.
- **Use only within manufacturer-listed specifications** and in protected battery packs.
- **Resellers must provide these warnings** to all customers.

Prohibited Uses & Handling

- **DO NOT** use this battery in **e-cigarettes, vaporizers, or similar devices.**
- **DO NOT** mix **old and new**, or **used and unused** batteries.
- **DO NOT** short circuit, puncture, cut, crush, incinerate, or modify the battery.
- **DO NOT** use if the battery wrapper is **torn or damaged** in any way.
- **DO NOT** overcharge or over-discharge—this can lead to battery failure.
- **DO NOT** expose the battery to **liquids, extreme heat, or direct sunlight.**
- **DO NOT** solder directly—only **use spot welding** for battery pack assembly.

User Responsibility & Risk Acknowledgment

- **The user assumes full responsibility** for proper handling, charging, and storage.
- **Misuse or mishandling may result in serious injury or damage.**
- **No guarantee of compatibility** with any specific device is provided.
- **Usage of this battery is at your own risk.**

By using the Bike Wheel Light Kit, you **acknowledge and agree** to follow all safety guidelines. **Failure to comply may result in hazardous consequences.**

Stay safe and handle responsibly.

Contents

For each wheel, the kit contains:

- Hub Battery with a foam spacer
- LED light controller with one or two plugs – attached to the battery
- LED RF remote
- LED light(s) with two mounting disks each
- 12V wall charger
- 3mm hex wrench

Specs

Battery

- 12.6V S3 5000mAh (60Wh) rechargeable lithium-ion battery

Lights

- SMD2835 120 LED/meter
- Small lights have 36 LEDs
 - One light lasts 36-17 hours
 - Two lights last 18-19 hours
- Large lights have 54 LEDs
 - One light lasts 24-25 hours
 - Two lights last 12-23 hours

Bill of Materials

If you need to repair or replace parts of the kit.

Part	Per Wheel	Supplier
5000mAh 21700 Li-ion Cell	3	18650batterystore.com imrbatteries.com
DFRobot FIT0869 BMS	1	mouser.com digikey.com
Keystone Electronics 209 – Battery Clip	3	mouser.com digikey.com
Keystone Electronics 228 – Battery Clip	3	mouser.com digikey.com
Adafruit 743 – Waterproof DC Connector	1 + 1 per light	mouser.com digikey.com
2835 120/meter LED strip	12” - 36”	superbrightleds.com
Single Color RF Mini LED Controller	1	superbrightleds.com

Except for the Li-ion cells, these parts can all be found on Amazon.

Unboxing

Before you install your new bike wheel light kit, take a moment to make sure it works. Connect the battery to the charger. If there is a light on the charger, it should turn red, indicating that the battery is charging. If it does not, refer to the troubleshooting section on page 5. If there is not a light on the charger, disconnect it, and connect an LED directly into the battery to verify that it is “on”.

Connect the LED controller to the battery. Connect the light(s) to the LED controller. Remove the plastic tab from the LED remote. Press the power button to turn on the lights. If they do not turn on, refer to the troubleshooting section on page 5.

Once you have confirmed that the kit is working, you are ready to install it on your bike.

Installation

Battery

With the battery plug facing away from you, the six screws around the perimeter of the case are at 12, 2, 4, 6, 8, and 10 o'clock.

1. Remove the two screws holding the LED controller to the battery case – at 6 and 8 o'clock.
2. Loosen the two screws in the battery hinges at 10 and 2 o'clock until you can unfold the case
3. Install the foam spacer around the hub.
4. Insert the battery through the largest opening in the spokes. Maneuver the battery into the wheel until it encircles the hub¹. Tuck the wires into the openings in the battery case.
5. Re-attach the LED controller to the battery. Install the screw at 8 o'clock first.
6. Ensure that the battery is well secured and does not move independently of the wheel.

Light

1. Remove the screws holding the mounting disks to the lights (if applicable).
2. Attach the mounting disks to two adjacent spokes.
 1. For small lights, use crossing adjacent spokes.
 2. For large lights, use non-crossing adjacent spokes.
3. Align the light to the mounting disks on the outside of the wheel, on the street side of the bike, flush with the rim.
4. Secure the light to the mounting disks with the provided screws.

Wires

1. Route the wires so that they remain inside the spokes. If desired, use zip ties to secure them.
2. Connect the light(s) to the LED controller.
3. Connect the LED controller to the battery. The lights may briefly flash.
4. Using the remote, turn on the lights.

¹ If you do not have enough clearance to install the battery, try removing the other two hinge screws. This will let give you more degrees of freedom for maneuvering the battery.

Troubleshooting

Battery

If the LED charger doesn't turn red when you connect the battery, there may be a fault in the circuit. Remove all screws and open the case. Remove the cells and set them aside.

Using a multi-meter, measure the voltage of each cell. They should read between 2.5V – 4.2V. If a cell reads below 2.5V, it is dead and needs to be replaced. See the bill of materials on page 6. All three cells need to be replaced together. Do not mix old and new batteries.

Inspect the solder joints on each battery clip.

Inspect the solder joints on the BMS (Battery Management System) chip.

With the cells removed, connect the battery to the charger. Using a multi-meter, measure the voltage on the BMS between the contacts. They should read as follows:

Contacts	Voltage
P- / P+	8 – 12.6V
B- / B+	8 – 12.6V
B- / B1	3 – 4.2V
B- / B2	6 – 8.6V
B1 / B2	3 – 4.2V
B1 / B+	6 – 8.6V
B2 / B+	3 – 4.2V

If there are voltage readings on all the B (battery) contacts, but not the P (power) contacts, the BMS has entered standby mode and needs to be reset. While connected to a charger, use a paperclip or a short wire and momentarily short the P+ / B+ contacts. The charger light should go from green to red.

Disconnect the battery from the charger, and re-install the cells. The positive terminal is labeled on the cells, and on the battery case.

Lights

If the battery is good, but the lights do not turn on, there may be a fault in the circuit. Carefully open the light, and the controller. Inspect the solder joints on the LED strips and controller.

Remote

If only one set of lights turns on/off when using the remote, press and hold the power button, and wave the remote around until both sets turn on/off. Yes, really.

Repair

If there are any issues with the battery or the lights, you may repair them if you have the skills. Or, you can contact me to return it to be repaired.

About the Lights

I bought an e-bike in the spring of 2024, and started biking to work as often as I could. No matter what route I take to work, my commute is along major suburban arterial roads, so I have always been concerned about being visible. As the days grew shorter, my concern grew. I started looking for supplemental bike lights and found the existing options to be lacking: Cheap, low effort solutions that felt more appropriate for kids riding around their neighborhood than for a working adult with a twelve mile commute.

Eventually, I came to the conclusion that if I wanted this done right, I would have to do it myself. I learned CAD and bought a 3D printer and started iterating on a design. Within a few months I had my first working prototype, which promptly failed when I took it out for a test ride. Undeterred, I worked through the issues one by one until I had a robust solution, one that could stand up to the bumpy suburban streets and unrelenting rain of the greater Portland area.

Next, I turned my attention to the lights. I knew from the start that I didn't want use adhesive backed LED strips. This led me to test almost every type of LEDs I could find, such as “neon” diffuser tubes, and “rope” lights. While these worked, they looked tacky, especially when unlit. And they were expensive – rope light costs almost \$9 a foot, and I could only find “neon” tubes with a vertical bend from a Chinese company.

I started to think outside the box, and did a quick test with a light 3D printed from translucent filament. It worked remarkably well. As a bonus, the lights looked like over-sized reflectors, so they didn't look as out of place as the other LED options when turned off. Several iterations later, I finally had a solution I was happy with.

I have been riding with these wheel lights for several months now, and they are amazing. Before I had to wrangle half dozen small, rechargeable LED lights all over my bike to feel seen at night. Now, I can push a button and light up my wheels in a way that screams to even the most inattentive driver, “Look, a bicycle!”

In a perfect world, bike wheels would have batteries and LEDs built in. But this is the next best thing. I hope you like them!