

# GripHeat Wiring Guide (3S Li-ion with BMS + Heater + LED Button)

## Main Components Recap

1. 3S 18650 battery pack (11.1 V nominal, 12.6 V max)
2. BMS board (3S protection type)
3. Silicone heat pad (12 V DC, 15–20 W)
4. LED button module (momentary, with built-in LED ring)
5. Thermal fuse + temperature sensor
6. USB-C charging module (connected to BMS “P+ / P-”)

## Battery → BMS Wiring

From	To	Description
Cell 1 (negative)	B- on BMS	Pack ground reference
Cell 1 positive	B1 on BMS	First sense wire
Cell 2 positive	B2 on BMS	Second sense wire
Cell 3 positive	B+ on BMS	Final pack positive lead

→ You'll end up with **4 wires total** going from the cells to the BMS (B-, B1, B2, B+). Use nickel strips between cells in series and 22 AWG silicone wire for balance leads.

## BMS → Heater (Load) Wiring

From	To	Description
P+ on BMS	Heater positive (red)	Power output from pack
P- on BMS	Thermal fuse → Heater negative (black)	Fuse in-line before heater ground

→ The thermal fuse should be in series with the negative line between P- and heater-. Use high-temp 20–22 AWG silicone wire.

## Thermal Sensor

- Mount to the aluminum core or battery surface using Kapton tape or silicone adhesive.
- Connect to BMS “TEMP” pins (or controller input if using a separate thermostat board).
- This allows the BMS or controller to cut power when overheating occurs.

## LED Button Module Wiring

Pin	Connection	Notes
NO (Normally Open)	One side of heater power line	Acts as switch to toggle heater ON/OFF
C (Common)	To P+ from BMS	Power feed through switch
LED +	To P+ (via resistor if needed)	LED ring illumination
LED -	To P- or pack negative	LED ground

→ The button switches the heater circuit only, not the charger.  
If it's a latching button (click on/off), wire inline with P+ to heater.  
If it's momentary, use a small MOSFET/relay board for toggling.

## Charging Port (USB-C)

- Module input → BMS P+ / P-

- Module output (if BMS has no charge controller) → battery B+ / B-
- Use a 5V → 12.6V charging boost board or a dedicated 3S Li-ion charger with USB-C port.
- Always include a reverse-current blocking diode (e.g. SS14) between charger and pack.

### Recommended Wire Colors

Function	Wire Color
Heater +	Red
Heater -	Black
Battery +	Red
Battery -	Black
Balance leads	Blue / White / Yellow
LED ring +	Red
LED ring -	Black

### Safety Notes

- Place thermal fuse physically near the heater zone, rated for ~80–100°C.
- Use heat-resistant sleeving around all wires that contact the aluminum core.
- Add shrink tubing or potting compound near solder joints for insulation.
- Ensure BMS FETs have a metal contact path for heat dissipation.

### System Summary

1. Battery → BMS → Heater (through fuse & button).
2. LED ring powered in parallel with heater circuit (same polarity).
3. USB-C port connects to BMS for charging, not directly to cells.
4. Thermal sensor ensures system shuts down when core overheats.