

## Battery overview

### Battery picked

Two 6S batteries are more affordable to find, and allow for the batteries to be placed in disparate locations. There is also the thermal dissipation benefits for having two separate batteries. We picked this battery as it has roughly half the voltage we needed, and was small enough that it could fit in the enclosure.

[https://www.banggood.com/ZOP-POWER-22\\_2V-8000mAh-60C-6S-Lipo-Battery-With-XT60-Plug-For-RC-Model-p-1328629.html](https://www.banggood.com/ZOP-POWER-22_2V-8000mAh-60C-6S-Lipo-Battery-With-XT60-Plug-For-RC-Model-p-1328629.html)

Stats:

- Watt hour capacity: 177.6Wh each
- Cell count: 6S
- Voltage: 22.2V
- Size: 90x46x158mm
- Mass: 1.24Kg

2 batteries in parallel, 355.2Wh

The batteries will be in series, so the capacity will be 178Wh together, but the operating voltage will be 44.4V.

### Battery charging

<https://electronics.stackexchange.com/questions/115795/charging-batteries-in-parallel-when-they-are-connected-in-series-in-the-circuit> Since we have two separate batteries that are being used in parallel, we will either need a charger that can handle a 12S system or we will have to do some TDMA parallel charging. [https://www.flitetest.com/articles/Parallel\\_Charging\\_Your\\_LiPo\\_Batteries](https://www.flitetest.com/articles/Parallel_Charging_Your_LiPo_Batteries)

### Battery charging mode

When in operation, the batteries are in series to get the correct operating voltage, but for charging they need to be in parallel for the charger to work.

### Battery microcontroller

Low power, separate coin battery supply, min lifespan 5 years

Power supply CR2032 - 225 mAh, 3V nominal

LED indicator:

- Off - hibernating
- On - functioning
- Blinking - dead

Battery status monitor:

- 2 ADC, voltage
- 1 Ammeter, current

Battery capacity line, report both battery voltages to arduino Battery draw line, report current usage

## Battery states

Battery system state

- Hibernation (battery isolated, LED indicator)
- Idle state (battery live, V+S, V-S, V+P, V-P all off)
- Charge state (V+P, V-P on, V+S, V-S off)
- Drive state (V+P, V-P off, V+S, V-S on)
- Battery disabled state (All off, LED indicator) - wake Arduino state reason?