



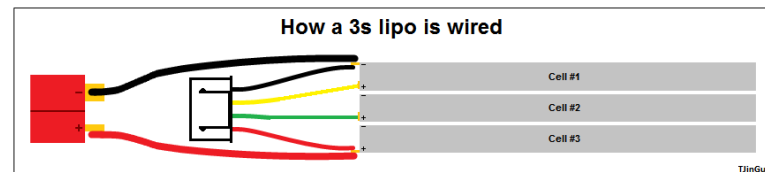
Electric Power Systems Workshop

Lithium Polymer Batteries and Charging

How to read the label of a Lithium Polymer (LiPo) battery:

- **Capacity (mAh):** This is how much energy the battery can hold, measure in milli Amp-Hours (note that 1 Amp-Hour = 1000 milli Amp-Hours). It is also a measure of how many amps the battery can put out for one hour before reaching the lowest safe voltage of 3V per cell.
- **Cells in series and parallel:** For example, 3S1P. This means that there are 3 cells in series and 1 in parallel. Remember, series increases voltage and parallel increases capacity.
- **Discharge rate (C):** How many amps the battery can put out. This is usually specified in continuous output and in short burst output.

1C = 1 X capacity (in Ah) / 1 Hour. So a 20c 2Ah battery can put out 40A because **20C X 2Ah / 1 Hour = 40A.** Please note that C also applies to charging (see next section)



Charging

Important factors:

- **Charger setting:** Make sure you are using a charger intended for charging LiPo batteries, and that it is on the LiPo setting.
- **Charge rate (C):** Same as discharge rate, except energy is being put back in not taken out. Most lipo batteries can be charged at 1C (2 amps on a 2Ah battery), or 2C for a faster charge. Some high discharge batteries can be charged at up to 6C.

Estimating charge time: Simply divide 1 hour by the charge rate (C). For example, a 2C charge rate will fully charge the battery in roughly .5 hours, or 30 minutes.

Balancing: Most LiPo batteries have a main power plug (+ & -) separate plug with multiple wires for balancing. This plug connects a wire to each separate cell in the battery pack, which allows the individual cells to be monitored and equalized. Most modern chargers will allow you to charge through the balance plug, and will equalize the voltage of each cell while charging. This is important because each cell has a slightly different resistance, and will “wear” at a different rate. If a pack is out of balance, the average voltage of the cells could be within the 3V per cell for the pack, but individual cells might get over-charged or over-drained.

LiPo battery care and precautions: Do not discharge a lipo battery below 3V per cell or the battery will break down, and decrease its life. Most ESC's will automatically slow down or stop the motor when the battery reaches that point. However it is still wise to check the settings and confirm this cut-off is properly set. Also, **NEVER** puncture or over-charge a LiPo battery. Doing so can cause the battery to catch on fire and explode.