Lipo Battery Charging & Safety Guide

Lithium Polymer or LiPo batteries are a great new way of storing energy for portable devices from cell phones to RC helicopters.

They're great because they can store 350% (approximately) more energy than a typical Nickel Cadmium (NiCd) battery pack and weigh 10% - 20% less. They can also discharge much more current than a NiCd battery and be fully charged in about an hour. LiPo batteries also don't develop memory or voltage depression characteristics like NiCd batteries, and do not need to be discharged before being charged.

But they're not without their downside. Mishandling of these batteries can lead to fire, explosions and toxic smoke inhalation. In the rest of this guide, we'll discuss how to charge, store and handle lithium polymer batteries safely so you can enjoy them again and again.

Please note that the information contained in this guide is for informational purposes only. You should consult your batteries manual for specific instructions regarding the handling, charging and safe usage of your lithium polymer batteries.

Charging

Lithium Polymer or LiPo batteries have very specific charging requirements and MUST only be changed by specific chargers designed to charge lithium polymer batteries.

A 1s or 1 cell LiPo battery has a nominal voltage of 3.7v. When fully charged it has a maximum voltage of 4.2v and when fully discharged, it should never go below 3.0v without risking cell damage.

A 5s4p battery pack means that the pack contains 5 cells in a series circuit and 4 cells in a parallel circuit.

Since each cell is 3.7v (nominal) a 5s LiPo battery has a nominal voltage of 18.5v, a fully charged voltage of 21.0v and a maximum discharged voltage of 15.0v before damage occurs.

When charging LiPo batteries, they must be charged at the voltage of the number of cells in series, therefore a 5s4p pack must be charged as a 5 cell pack.

The LiPo charger you're using must be able to handle the cell count of the battery you are charging.

Most of the more expensive LiPo chargers will automatically detect the cell count of the battery being charged while the cheaper ones will require a manual setting. Wile some of the really good ones will allow you to manually select the cell count and then will double check it automatically for you.

Please also note that some chargers (such as those used for toys or cell phones) are made to charge a specific cell count and are not configurable for other cell counts. It is very important that these chargers only be used to charge the batteries they are designed for.

Also, chargers that auto detect the cell count of a LiPo battery can sometimes be wrong. They use the current voltage of the battery to determine the cell count and if the battery is fully charged or at a lower voltage than it should be, it may read the cell count incorrectly. This is why it is very important to double check that it reads he right cell count which is typically displayed on the LCD display.

For example a 5 cell 18.5 volt LiPo battery that's been depleted to less than 15 volts may be confused with a 4 cell, 14.8v battery and thus charged as such. Also, a fully charged 5 cell battery at 21.0v may be confused as a 6 cell 22.0v battery and charged as such.

Charging a lithium polymer battery at a higher voltage than it's rated for, or overcharging it, can lead to a fire or an explosion (see video below).

LiPo Battery Charging Tips

• Always use a charger made to charge LiPo packs.

• Double check that the settings for the lithium polymer charger are correct for the pack being charged – this includes the cell count as well as the current settings.

• In general, most lithium polymer batteries should be charged to no more than 4.2 volts per cell or depleted to less than 3.0 volts per cell. There are new generation batteries available that can handle higher / lower voltages, but they are still new and thus are the exception to the rule.

• Ensure that charging leads are connected correctly. Reverse charging can lead to cell damage or a fire or explosion.

• Always charge LiPo batteries on surfaces that won't catch on fire such as cement, steel, ceramic or stone. Wooden tables and carpeted floors are not recommended charging surfaces.

• Do not charge batteries near flammable products or liquids.

• Never charge a LiPo battery while inside your model or other electronic device. If it catches fire it can lead to total destruction of the item it is being charged in.

• LiPo batteries should be charged within a temperature range of 0C to 50C. Batteries charged outside this temperature range may experience leakage, heat generation or cell damage.

• Never leave a charging lithium polymer battery pack unattended.

• Do not charge inside an automobile, especially while driving.

• Do not store batteries inside an automobile.

• Do not charge a lithium polymer battery pack at a rate over 1C.

• Never charge a LiPo pack that has ballooned or swelled due to over / under charging or from a crash.

• Never charge a lithium polymer battery pack that has been punctured or damaged in a crash.

• Never, under ANY circumstances let the positive and negative battery leads touch. It can lead to cell ballooning, cell damage or fire or an explosion.

• Have a fire extinguisher near the charging area or a large bucket of dry sand. Do not try to distinguish with water.

• If you notice your LiPo battery pack is swelling, stop the charging process immediately, put the battery in a safe container and observe it for 15 minutes.

LiPo Battery Handling & Storage

• Keep LiPo battery packs WELL out of reach of children.

• Do not put battery packs in pockets or bags where they can short circuit.

• Do not store or transport or store batteries where they can come into contact with
sharp or metallic objects.

• Do not store your LiPo pack in extreme temperatures below 0C or above 50C.

• Always store your LiPo pack in a safe and non flammable container away from flammable objects. A LiPo Sack or metal / ceramic storage container is best.

• Always store your LiPo's partially charged. They will maintain their performance levels over time and there's no need to cycle them unless stored for periods longer than 3-6 months.

Other LiPo Battery Tips

• Do not immerse the battery in water or allow the battery to get wet.

• Do not short circuit the battery.

• Do not pierce the lithium polymer battery with a sharp object – it will lead to ignition or an explosion.

• Do not short circuit the battery.

• Do not solder directly to the battery.

• Do not hit the battery with a hard object such as a hammer or rock.

• Do not dispose of in fire or heat.

• Do not use the battery with the positive and negative terminals reversed.

• Do not disassemble or modify the battery.

• Do not fully discharge your LiPo battery pack. Discharging a LiPo beyond it's critical minimum voltage (often 3.0v) can cause damage to the battery.

• Do not breath in the smoke fumes of a LiPo battery that is on fire. They are toxic.

• When mailing or shipping LiPo batteries, always ship them at a 30% charged state for safety reasons.

• When storing batteries for extended periods, store at a half charged state.

• To dispose of a LiPo battery, discharge it fully then place it in a bucket of salt water for one week. To dispose of, follow your municipal battery disposal guidelines.

• If your battery becomes damaged, do not place it on a flammable surface - it's possible that a chemical reaction can take place which could cause a fire. Put the battery in a safe and non flammable place and observe it for at least an hour.
If the electrolyte in the cells gets on your skin, thoroughly wash with soap and water. If it gets in your eyes, rinse thoroughly with cool water and seek immediate medical attention.

• Finally, always follow the manufacturer's safety instructions and

charging guidelines for lithium polymer battery packs.

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