Home | Log In

Product Categories

Brushless Motors
MMT NoiseSinks
Plugs, Tools, & Misc.
Servos
Speed Controllers
7.4V - LiPoly Packs
11.1V - LiPoly Packs
14.8V - LiPoly Packs
18.5V - LiPoly Packs

New Products ...

Search

Search
Advanced Search

Reviews [more]

There are currently no product reviews.

Product Information

LiPoly Overview
LiPoly Usage Guidelines
Brushless Motor Info
Suggested RC Setups

Store Information

Shipping & Returns
Privacy Notice
Conditions of Use
Contact Us
Gift Certificate FAQ

Home :: Lithium Polymer Information

Lithium Polymer Battery Technology

Information Provided Courtesy of ***Redline Batteries™***.

About Lithium Polymer Batteries - Lithium Polymer technology is widely used in laptop computers, cellular phones, and other personal electronics. When handled and used properly, Lithium Polymer batteries can be quite safe. Lithium Polymer batteries also offer a number of distinct advantages over other sources of stored electrical potential.

High Energy Density – For their weight, Lithium Polymer batteries are capable of storing a proportionately high amount of energy compared to older technologies such as those found in NiCd and NiMH batteries. In many cases, they offer over 4 times the energy capacity for the weight.

Flat Voltage Curve – Lithium Polymer cells are fully charged at 4.2 volts and are considered fully discharged at 3.0 volts. This allows for a relatively flat voltage discharge curve, providing solid performance throughout the discharge cycle.

No Memory Effect – Lithium Polymer cells do not develop a memory effect from being only partially discharged and then charged again (such as that experienced by NiCd cells). The cells may be partially charged and discharged without damaging their performance so long as they are kept within their normal operating voltage parameters.

Low Self Discharge – Unlike NiMH and NiCd batteries, Lithium Polymer cells experience a very low rate of self-discharge when not in use. Lithium Polymer cells experience a self-discharge rate of approximately 5% per month, compared with over 30% per month and 20% per month in NiHM batteries and NiCd batteries respectively. This means that users can now fully charge their Lithium Polymer batteries one day and then use them weeks later, at which time they will still have nearly a full charge.

Continuous Discharge Rating ("C Rating"): The notation on Redline battery packs lists their continuous discharge rating in terms of the pack's capacity "C". For example:

A 1,000 mAh battery with a "20C" continuous discharge rating can be discharged continuously at a rate of 20 times its 1,000 mAh capacity without damaging the cell.

(1,000 mAh Capacity x 20 = 20,000mA = 20 Amps Continuous Discharge)

A 1,000 mAh battery with a "15C" continuous discharge rating can be discharged continuously at a rate of 15 times its 1,000 mAh capacity without damaging the pack.

(1,000 mAh Capacity x 15 = 15,000mA = 15 Amps Continuous Discharge)

Pack Configuration and Notation

Series Configurations - Individual Lithium Polymer cells have a nominal voltage (average operating voltage) of 3.7 volts per cell. Lithium Polymer cells are wired in series in packs to create the following voltages:

1 Cell = 3.7 V
2 Cells = 7.4 V
3 Cells = 11.1 V
4 Cells = 14.8 V
and so on…

Parallel Configurations – Multiple like Lithium Polymer packs, unlike NiCd and NiMH, can be wired in parallel to effectively create one, larger pack with the combined capacity of both packs. This also has the beneficial effect of splitting the current draw between each pack and thus enabling a higher current draw.

For example, two 1,000 mAh Lithium Polymer cells with 15C continuous discharge ratings that were wired in parallel would create one 3.7 V pack with a 2,000 mAh capacity and could support an application where the total current draw was up to 30C (30 Amps).

Notation - The configuration of Redline Lithium Polymer battery packs is listed as a very simple 4-digit code on the label. Examples follow:

3S2P - This means that "**3**" cells are wired together in "**S**" series to create an 11.1 V pack and that "**2**" of these three cell groups are wired in "**P**" parallel. This code could be read as "**three cells** in **series** times **two groups** in **parallel**".

2S1P - This means that "**2**" cells are wired in "**S**" series to create a 7.4 V pack and that only this "**1**" group of cells exists in the pack.

1S3P – Although an unlikely combination, a pack with this code would represent a 3.7 V pack consisting of single cells "**1**" wired together to create a pack of "**3**" cells wired in "**P**" parallel.

The Versitility of *Redline's* Lithium Polymer Technology - By arranging packs various combinations of series (to specify voltage) and parallel (to specify total capacity and to limit each individual cell's current exposure), Redline's Lithium Polymer technology can be tailored to power virtually any application.

Lithium Polymer Usage Guidelines

Please familiarize yourself with the following information *before* using Lithium Polymer batteries:

Charging and Use: If a Lithium Polymer battery is improperly charged it may become an explosive fireball spewing reactant chemicals at very high temperatures. You MUST utilize a charger specifically designed to charge Lithium Polymer batteries. Check and double-check to be positive that the manual cell count selector, if your charger has one, is correctly set for the specific battery being charged.

Do Not charge Lithium Polymer batteries at rates higher than the specified charge rate.

Do Not fully discharge Lithium Polymer batteries. The low voltage limit for discharge is 3.0 volts per cell. Allowing the cell to drop below this voltage will irreversibly damage its internal chemistry.

Do Not use packs that appear to be damaged, warped, swollen or otherwise appear different than their like-new condition.

IMPORTANT! - If for any reason, a Lithium Polymer battery appears deformed or is unusually warm to the touch, or after any usual circumstances (such as a radio-controlled airplane crash), take extreme caution. Lithium Polymer battery packs with internal chemical leaks have been known to explode minutes, even hours, after being damaged.

Balancing Packs with Taps - (Individual Cell Tapping Plugs): Standard lithium battery chargers and battery cut-out circuitry, such as that found on electronic speed controls, must rely upon the average voltage of the entire pack to determine when charging and/or discharging is complete. This is because the cells in the pack are effectively wired in a series configuration.

Unfortunately, this has a negative drawback. If for some reason one of the cell's voltages becomes higher or lower than the other cells in the pack, the charger or battery cut-out circuit may improperly sense the voltage of the cells in the pack (because of voltage averaging). When this happens, the averaged voltage of the pack will no longer properly reflect the voltage of each cell in the pack. This improper information may lead to the over-charging or over-discharging of one or more of the pack's cells. Lithium Polymer chemistry is such that over-charging or over-discharging may substantially reduce the life of the cell and in some cases, MAY POSE A SERIOUS FIRE HAZARD.

Taps - Some Lithium Polymer batteries are equipped with special plugs called "Taps." Tap plugs provide access to each cell in the pack individually. Individual access to each cell provides reliable voltage readings, allowing one to correct an imbalance should one develop. Taps allow each cell to be charged individually. However, Taps must be shown a great deal of respect. Depending upon the equipment used, it may be very easy for one to accidentally short one or more of the cells by simply allowing testing gear or exposed testing leads to come into contact with one another or a conducting surface.

USE EXTREME CAUTION WHEN USING TAPS. Take every precaution to prevent short-circuiting Lithium Polymer cells, not just because this will almost instantly ruin the cell, but because it may pose a fire hazard. DO NOT ATTEMPT TO CUT TAP CONNECTORS OFF OF A LITHIUM BATTERY PACK - THE CUTTING INSTRUMENT MAY BE CONDUCTIVE AND MAY SHORT-CIRCUIT THE CELLS.

A number of products are on the market to facilitate cell balancing for packs with Tap plugs. A properly configured adapter and use of a pack balancer will greatly reduce the risk of mistakenly short-circuiting a cell. Taps, when used properly, are a great feature, and may significantly improve the life and performance of your Lithium Polymer batteries.

Soldering Pre-Configured Packs: Do Not attempt to reconfigure or solder the tabs on pre-configured packs. Most packs have tabs that are Spot-Welded. The tabs on Lithium Polymer cells do not take well to conventional solder and the heat of conventional soldering equipment may quickly melt the membranes of the cell, causing chemical seepage that could cause a fire.

Long-Term Storage: Store Lithium Polymer batteries at a partial charge, ideally 40% of capacity. (for seasonal storage)

Warnings: Fire, Explosion and Burn Hazard.

- Do Not short circuit.
- Do Not discharge at a rate higher than the recommended rate.
- Do Not charge at a rate higher than the recommended rate.
- Charging improperly, short-circuiting, or improper discharging may cause Lithium Polymer cells to swell and explosively burst into flames.
- Do Not open battery, dispose of in fire, heat above 100°C (212°F), or expose to water.

Fire: In case of a fire where lithium batteries are present, apply a smothering agent such as METL-X, sand, dry-ground dolomite, soda ash, or flood the area with water.

A smothering agent will help extinguish burning lithium batteries. Water may not extinguish burning batteries but will help to cool any adjacent batteries and control the spread of fire. When water is used, however, hydrogen gas may evolve. In a confined space, hydrogen gas can form an explosive mixture. In such a circumstances, smothering agents are recommended.

Disposal: Dispose in accordance with all applicable federal, state and local regulations.

Disclaimer: Use Lithium Polymer batteries at *YOUR OWN RISK*. We are not responsible for accidents caused by the use, proper or otherwise, of Lithium Polymer batteries. Use of Redline Batteries products constitutes an agreement with these terms.

*Note: A great resource for information regarding batteries and battery technology of all sorts can be found at http://www.batteryuniversity.com (we are not responsible for the information on this site).

< Back

| **Home** |