Types of rechargeable lithium batteries

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Lithium batteries are more popular today than ever before. You’ll find them in your cell phone, laptop computer, cordless power tools, and even electric vehicles. However, just because all of these electronics use lithium batteries doesn’t mean they use the same type of lithium batteries. We’ll take a closer look at the six main types of lithium batteries pros and cons, as well as the best applications for each.

Lithium batteries rely on lithium ions to store energy by creating an electrical potential difference between the negative and positive poles of the battery. An insulating layer called a “separator” divides the two sides of the battery and blocks the electrons while still allowing the lithium ions to pass through.

During the charging phase, lithium ions move from the positive side of the battery to the negative side through the separator. While you discharge the battery, the ions move in the reverse direction.

This movement of lithium ions causes the electrical potential difference mentioned before. This electrical potential difference is called “voltage.” When you connect your electronics to a lithium battery, the electrons which are blocked by the separator are forced to pass through your device and power it.

Different types of lithium batteries rely on unique active materials and chemical reactions to store energy. Each type of lithium battery has its benefits and drawbacks, along with its best-suited applications.

Lithium iron phosphate (LFP) batteries use phosphate as the cathode material and a graphitic carbon electrode as the anode. LFP batteries have a long life cycle with good thermal stability and electrochemical performance.

LFP battery cells have a nominal voltage of 3.2 volts, so connecting four of them in series results in a 12.8-volt battery. This makes LFP batteries the most common type of lithium battery for replacing lead-acid deep-cycle batteries.

There are quite a few benefits to lithium iron phosphate batteries that make them one of the most popular options for applications requiring a large amount of power. The primary benefits, however, are durability, a long life cycle, and safety.

LFP batteries typically have a lifecycle rating of 2,000 cycles or more. Unlike lead-acid batteries, depth of discharge has a minimal impact on the lifespan of LFP batteries. Most LFP manufacturers rate their batteries at 80% depth of discharge, and some even allow 100% discharging without damaging the battery.

The materials used in lithium iron phosphate batteries offer low resistance, making them inherently safe and highly stable. The thermal runaway threshold is about 518 degrees Fahrenheit, making LFP batteries one of

the safest lithium battery options, even when fully charged.

There are a few drawbacks to LFP batteries. The first is that compared to other lithium battery types, they have a relatively low specific energy. Their performance can also suffer in low temperatures. Combining the low specific energy and reduced performance in cold temperatures means LFP batteries may not be a great fit in some high cranking applications.

Lithium cobalt oxide (LCO) batteries have high specific energy but low specific power. This means that they do not perform well in high-load applications, but they can deliver power over a long period.

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