CLEAPSS

Airgineers®

LITHIUM POLYMER BATTERIES

Lithium polymer batteries, sometimes referred to as LiPos are the most popular type of battery for use with drones and other forms of electric powered model aircraft. The reason for their popularity in this application is their high energy density and their ability to supply large discharge currents. This means they are much lighter than many other battery types whilst being able to provide a lot of power.

LITHIUM POLYMER BATTERY TERMINOLOGY

To safely use LiPo batteries, it is important to understand some of the terminology that is used when referring to them. The most common terms are explained below.

Cell/Battery – When it comes to batteries, these often get confused but technically, a cell is a single sealed unit and a battery is a collection of cells in a single unit, usually with a common output. In the case of the Airgineers competition a Micro Class Drone is powered by a single cell.

However, in day-to-day life, both cells and batteries are usually referred to as batteries. For example, an AA battery is actually an alkaline cell, but we always refer to them as batteries.

Voltage – The mean voltage of a LiPo cell is 3.7V. Its maximum charge is 4.2V and it should never be discharged below 3.2V. Therefore, the battery (cell) for the Micro Drone is referred to as a 3.7V battery.

A single cell battery is often known as a 1S battery.

Capacity – The capacity of a battery of this size is usually referred to in milliamp hours or mAh. This relates to the amount of current that a battery could supply for an hour. In the case of the Airgineers Micro Class Drone battery, the capacity is 270mAh meaning it can supply 270mAh constantly for an hour until it is considered discharged. If you are drawing more than 270mAh, the battery will last less than an hour. If you draw less than 270mAh, it will last more than an hour.

C rating - LiPo batteries are given a C rating and it is directly related to the capacity. The C ratings are used to determine the maximum amount of current you can safely draw from a battery and also how to safely charge it. The C rating is directly linked to the capacity.

For example, the Tattu 11.1V 1550mAh battery has a C rating of 75C. This means the maximum current that can be drawn from the battery safely is 75 time it's capacity – 75 x 1550 = 116,250mA or 116 Amps. Which is a lot.

You should also never charge batteries at more than 1C, so a 1550mAh battery should be charged at a maximum of 1550mA.

Balancing – When we talk about LiPo battery packs, we often talk about balancing. As already mentioned, battery packs have more than 1 cell and when they are charged, it is important to keep all the cells at the same voltage, especially to avoid over charging any individual cell above 4.2V. As well as the main power connector with 2 big wires, the battery packs also have a small balance connector with 4 small wires. This allows the charger to individually monitor all 3 cells in the pack.

The charger takes care of this for you, but it is important to remember to always use a balanced charger for battery packs.

The Micro Class batteries are a single cell and so do not need to be balanced. However, you should always use the supplied charger to ensure the batteries are not over charged.

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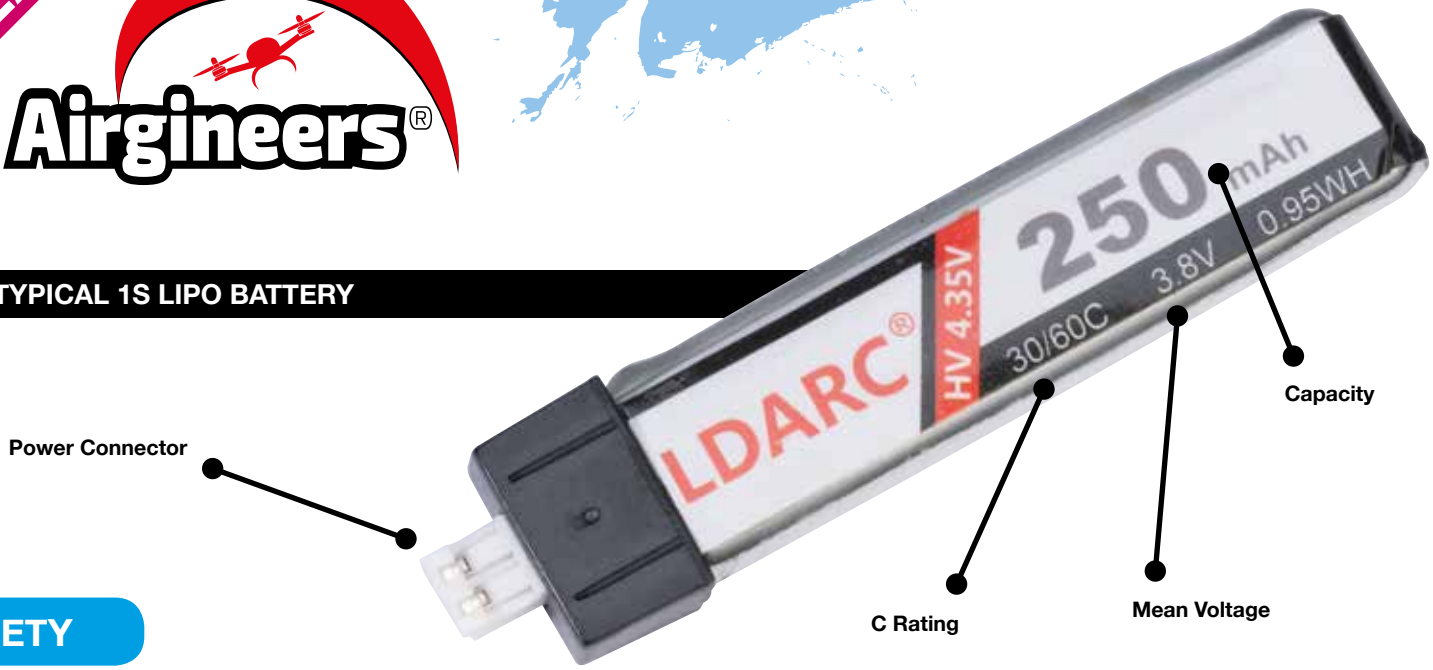
A TYPICAL 1S LIPO BATTERY



SAFETY

This is the really important bit – staying safe. Understanding the above terminology will help you understand how to use LiPo batteries safely.

As with many electrical items, in very rare cases, LiPo batteries can catch fire. LiPo batteries contain chemicals which when ignited, can create a self-sustaining fire which does not require atmospheric oxygen to burn and as such, fire extinguishers are of little use and so the use of fire safe bags is extremely important.

However, when used correctly, LiPo batteries are perfectly safe so it is important to follow these simple rules to help avoid the risk of fire:

Charging

1) Only use a battery charger that is specifically designed for lithium polymer batteries

2) For battery packs with more than 1 cell, always use a balanced charger

3) Never try to charge a LiPo cell above 4.2V

4) Never leave LiPos unattended when charging

5) Always charge LiPo batteries in a LiPo battery safety bag

6) Always store LiPo batteries in a fireproof container such as a safety bag

7) Avoid over-discharging cells. In the case of the 3S drone, set your battery alarm to 3.2V and land as soon as you can after the battery alarm sounds. In the case of the Micro Drone, land once you see a noticeable degradation in performance.

8) Never puncture a LiPo battery

If you notice any damage to the leads or the battery itself, do not attempt to charge or use the battery. Instead, store it in a fire proof safety bag until it can be disposed of at your local authority recycling centre who will have provision for disposal of batteries. As with all batteries, do not place in the normal rubbish.

Any batteries that have reached the end of their serviceable life should also be disposed of in this way.

For further information regarding the safe disposal of batteries, contact **CLEAPSS http://www.cleapss.org.uk**