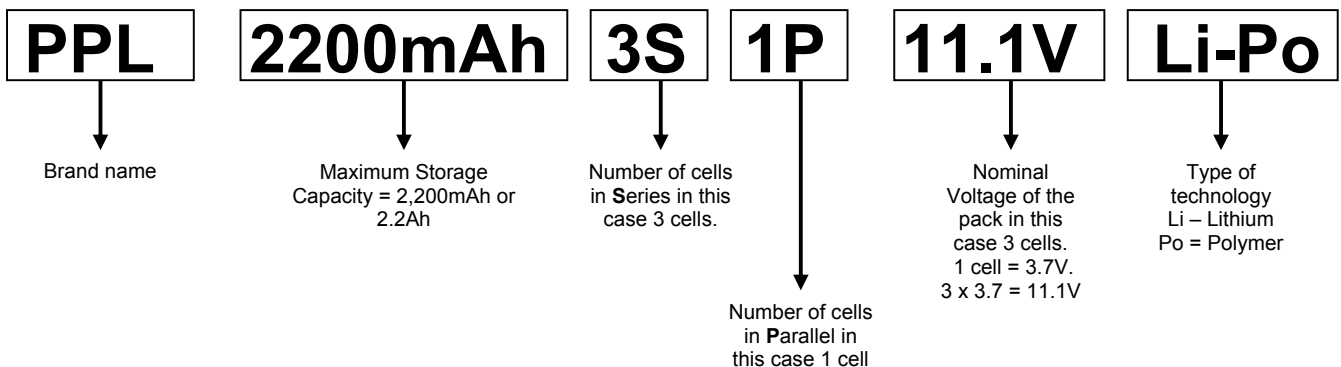




## What The Numbers Mean with Regards to LiPo cells

This is just a brief explanation as to what the numbers mean on Lithium Polymer cells

### Example: 2,200mAh 3S1P 11.1V Li-Po



#### **PPL - Brand Name/Part Number**

Not much I can say about this except it's a Brand Name/Part Number.

#### **2,200mAh - Maximum Storage Capacity**

The amount of energy a battery can store is measured in milli Amp Hours or shortened to "mAh" In this instance this battery could supply 2,200mA for 1 hour. 2,200mAh is the same as 2.2Ah. This figure of 2,200mAh is important as we use it to work out the charge current and the maximum current we can safely draw from this size of battery.

#### **3S – Number of cells in Series**

This is also very important as it determines the voltage of the battery. The nominal voltage of a single LiPo cell is 3.70V. Therefore 3 cells in Series is equal to  $3 \times 3.70V = 11.1V$ . More cells in series equals higher voltage. Voltage is important in electric flight as brushless motors have a RPM per volt figure. The higher the voltage, the higher the RPM which means more power. The down side of more voltage is that more cells are required therefore more weight. Most ESC's (Electronic Speed Controllers) can only be used on 2S or 3S battery packs. Some ESC's will work on 4S but then the BEC (Battery Eliminator Circuit) is no longer usable and a separate battery will have to be used to power the receiver and servos. ESC's that are designed to work on 5S – 15S will not have any BEC. See below for a more detailed description of what a BEC does.

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### **1P – Number of cells in Parallel**

For us in the UK this figure is not important as batteries are referred to the maximum TOTAL storage capacity of the WHOLE pack.

In USA some manufactures refer to the storage capacity per CELL and not as the whole pack.

Example: UK = 5S2P 5,000mAh, Some USA manufactures might call this identical pack a 5S2P 2,500mAh.

They are identical packs with the same voltage and storage capacity, just with different markings, so check and double check.

### **11.1V – Nominal Voltage of the battery pack**

The nominal voltage of 1 LiPo cell is 3.70V

The maximum voltage of 1 LiPo cell is 4.20V (absolute maximum is 4.25V)

The minimum voltage of 1 LiPo Cell is 3.30V - no load (absolute minimum is 3.00V per cell – no load)

Battery packs are always referenced to the nominal voltage. In this particular example this battery pack has 3 cells in Series therefore the nominal voltage is  $3 \times 3.7V = 11.1V$

### **Li-Po**

Li-Po is indicating that this battery is a Lithium Polymer battery

### **20C Continuous**

This is referring to the maximum continuous current that can be drawn from this battery safely without **immediately** destroying the battery pack.

C is the maximum storage capacity of the battery in this case 2,200mAh or 2.2Ah. As this is a 20C pack therefore the maximum continuous current is....

20 times the maximum storage capacity ( $20 \times 2,200 = 44,000\text{mAh}$  or 44Ah).

***If every discharge is done at 44Amps then this battery will only last 20-50 cycles.***

A good maximum current to aim for is 60% of the maximum continuous rating in this example 60% of 44A is 26.4A. This will greatly extend the life of your expensive LiPo's.

### **30C Sustained**

This is referring to the maximum current that can be drawn from this battery safely without immediately destroying the battery pack for a maximum period of 30 seconds in one discharge cycle.

### **40C Peak or Burst**

This is referring to the maximum current that can be drawn from this battery safely without immediately destroying the battery pack for a maximum period of 10 seconds in one discharge cycle.

### **BEC**

BEC is short for **B**attery **E**liminator **C**ircuit.

The BEC part of an ESC or Electronic Speed Controller is completely separate from the circuitry which controls the speed of your electric motor.

Contrary to popular belief it does **NOT** cut power to the motor when the battery voltage drops below a set level. Other circuitry within your ESC controls this function.

The BEC's only job is to supply the receiver and servos with power that it converts down from the battery that supplies your motor, eliminating the need for a separate battery to power your receiver and servos.

Hence the name, Battery Eliminator Circuit.

Your ESC may or may not have a BEC built in. It's best to check before hand to make sure and also check the maximum number of servos it can supply to ensure you are not going to blow the BEC which would cause a loss of power to your receiver and servos which in turn would cause an expensive crash. If you don't want to trust your expensive model to a BEC then fit a separate receiver battery.

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### **Charging Current**

Current LiPo technology does not allow for charging currents to exceed 1C. C = Capacity of battery.

In this example the battery's capacity is 2,200mAh or 2.2Ah.

Therefore 1C = 1 x 2,200mAh = 2,200mAh or 2.2A.

To extend the life of your battery only charge at 0.8C. Therefore 0.8 x 2,200mAh = 1,760mA or 1.76A.

Some manufactures are claiming that you can charge their cells at up to 2.5C.

Yes, you can charge them at 2.5C safely..... BUT..... you will reduce the number of cycles you get out of them.

If you only charge your cells to 95% of their capacity i.e. 4.15V per cell (12.45V for a 3S pack) instead of the 4.2V per cell (12.6V for a 3S pack) not only will this will extend the life of your cells but it will also cut down your charge time by about 15-20 minutes.

George Worley