How To Select the Correct Charger

We get asked a lot what size charger do I need? It's a fairly simple calculation and this is how we do it.

Something to remember is that if you use anything at, or near it's stated maximum it won't last very long. For example if you drove your car with the revs on the red line all the time you would wear your engine out very very quickly, if not make it go bang because it over heated, the same goes for electronics.

The first thing we need to decide upon is the maximum size of LiPo battery you are using or likely to use on the foreseeable future. Let's do a couple of examples to understand what we need to calculate to get the right charger.

Example 1.

Let's say you're in to small park flyer type aircraft with a maximum size of battery at 3S 2,200mAh LiPo.
A fully charged LiPo has a voltage of 4.2V per cell. Therefore a 3 cell LiPo should have a maximum voltage of....
3(No. of cells) x 4.2(fully charged voltage of a single cell) = 12.6V.
If you want to get the most out of your batteries then we suggest you only charge at 1C (1 x the capacity in Ah of your pack) therefore in this example we would want to charge a 1 x 2.2Ah (2200mAh = 2.2Ah) = 2.2A
Basic Ohms law says that Watts = Volts x Current. Putting our examples in to this equation gives us 12.6(Volts) x 2.2(Ah) = 27.72W.
Chargers are never 100% efficient, therefore we should allow an extra 20% for in-efficiency. 27.72W x 1.2 = 33.26W.
So we should select a charger with at least a 40W output, 50W would be better as we wouldn't be using it near it's limit.

Example 2.

Let's to the other extreme and say the largest pack you use is a 6S 6,000mAh.
6(No. of cells) x 4.2(fully charged voltage of a single cell) = 25.2V.
If you want to get the most out of your batteries then we suggest you only charge at 1C (1 x the capacity in Ah of your pack) therefore in this example we would want to charge a 1 x 6Ah (6000mAh = 6Ah) = 6A
Basic Ohms law says that Watts = Volts x Current. Putting our examples in to this equation gives us 25.2(Volts) x 6(Ah) = 151.2W.
Chargers are never 100% efficient, therefore we should allow an extra 20% for in-efficiency. 151.2W x 1.2 = 181.44W.
So we should select a charger with at least a 200W output, larger would be better as we wouldn't be using it near it's limit.

February 2014 Rev1.

How To Select the Correct PSU (Power Supply Unit)

OK we've decided on the size of charger we need. Now to select the size of PSU needed to power the charger from mains electricity, assuming your charger does not have a built in mains PSU.

Using the previous two examples....

Example 1.

34W (rounding up) is needed.
Going back to Ohms law we remember Watts = Amps x Volts. Transposing the formula we get Amps = Watts divided by Volts.
Most PSU's output either 12V DC or 13.8V DC, let's assume 12V DC for our examples.
Therefore 34(Watts) divided by 12(voltage output of PSU) = 2.83A.
Therefore a 5A output PSU would be good for this example

Example 2.

182W (rounding up) is needed.
Going back to Ohms law we remember Watts = Amps x Volts. Transposing the formula we get Amps = Watts divided by Volts.
Most PSU's output either 12V DC or 13.8V DC, lets assume 12V DC for our examples.
Therefore 182(Watts) divided by 12(voltage output of PSU) = 15.16A.
Therefore a 20A output PSU would be good for this example.

Multiple output Chargers

There are several dual and quad output chargers available now-a-days so we need to double up or quadruple up our results respectively.