

Battery Report

Date: 16th June 2005

Battery Type: Poly-Quest PQ-2100XP-3S Li-Po
3 x series Lithium-Polymer battery pack)

Weight: 179g

Dimensions: 127mm x 40mm x 21mm

Manufacturers Rating: 11.1V 2100mAh, max discharge current 20C (42A) constant.

Note: All tests are carried out in a controlled 24C ambient for consistency.

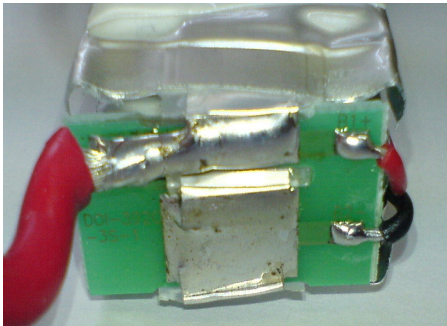
Author: Mark Hopkins



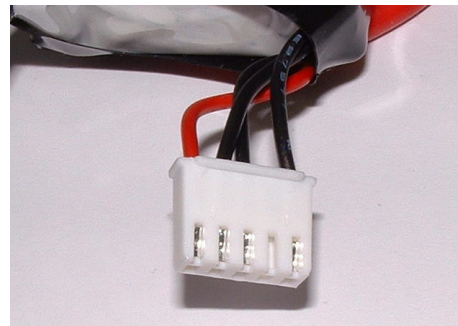
The Poly Quest PQ-2100XP-3S
Battery Pack

Mechanical.

The battery is in a 3 x series Li-Po configuration, with the cells stacked horizontally on top of each other similar to the previous examples I have tested. The two out-put wires (+ve & -ve) exit from opposite ends, which is the first example I have seen that does this. The wires are extremely heavy duty and quite capable of carrying serious current and are more than adequate for small model helicopter use without any problem at all. A very useful additional connector exits from the negative end carrying four wires. These are connected to the individual cells allowing the user to monitor the balance of each cell and correct if necessary. The cells in this battery are slightly different than other Li-Po cells I have seen, as the positive and negative terminals exit from opposite ends. The pack was built with a PCB at each end for the terminals to be soldered to. As mentioned in previous reports of other batteries, there was no protection circuit fitted to the pack to protect from over voltage, under voltage, over current, over/under temperature, cell imbalance, etc. The three cells are stacked with no air gap for the middle cell, similar to all the other packs I have reviewed so far, meaning the middle cell will get hotter than the other cells during extreme usage and will most likely fail earlier than the other cells. The ability to balance the cell pack should certainly extend battery life if utilised correctly.



A view of the PCB inside the PQ Series packs
(Taken from the PQ1800XP-3S)



The very useful external connector for
checking and balancing your pack

Electrical

The voltage of each cell was measured before commencing charge and the pack was found to be reasonably well in balance. The pack was then charged to 12.6V (4.2V per cell) with a current limit of 1200mA, in a 24C ambient, and with a termination current of 100mA at 12.6V.

The pack was discharged at C rate (2100mA) with a 8.5V cut-off voltage. The capacity at this rate was 2.03Ah, 23Wh, the cell pack reached a maximum temperature of 32.6C. The battery was then charged as before then discharged at 10A and 20A respectively, the following results were recorded:

At 10A the capacity was 2.03Ah, 21Wh, the cell pack reached a maximum temperature of 50.2C.

At 20A the capacity was 1.98Ah, 21.22Wh, the cell pack reached a maximum temperature of 59.4C.

After a 30 minute rest the voltages were recorded as:

Cell 1 - 3.681V

Cell 2 - 3.438V

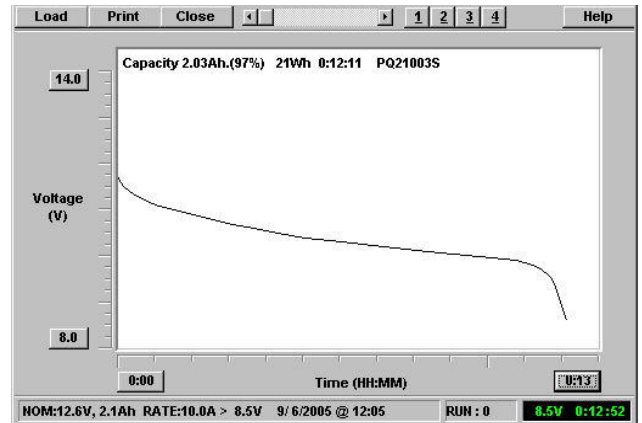
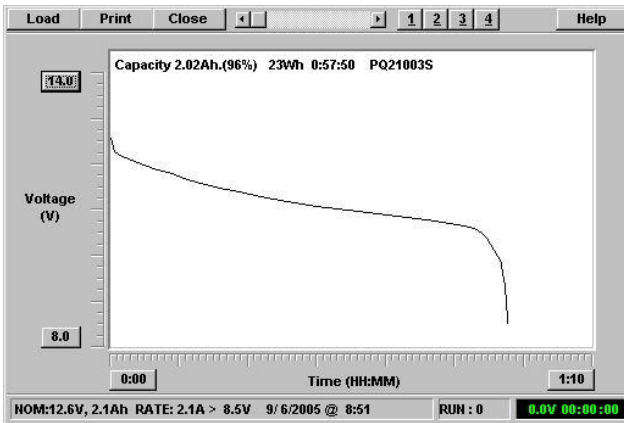
Cell 3 - 3.525V

A slight imbalance across the cell pack.

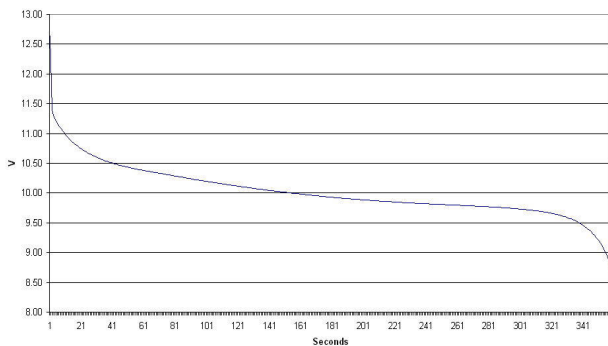
Pack Performance at a Glance

Current	Capacity (Ah)	Capacity (Wh)	Gravimetric Energy Density (Wh per kg)	Max Temp/ Comments
2.1A	2.03	23	128.49	32.6C ok
10A	2.03	21	117.31	50.2C ok
20A	1.98	21.22	118.54	59.4C ok

Discharge Graphs



PolyQuest PQ2100XP-3S (Amb 24C)
Discharge Current 20A. Capacity 1.98Ah, 21.22Wh.



Conclusion

The output wires on this pack are very 'Heavy Duty' and are extremely good for the micro heli market. The battery performed well under the various tests and at 20A the temperature kept within acceptable parameters and the voltage held up ok. I did not test to the full 20C continuous rating, but this kind of current is not really achieved in micro heli's anyway. The ability to monitor and balance your pack is a useful feature, but there was a slight imbalance noted at the end of testing, although this could be corrected if using the appropriate charger.

As usual I have to mention the lack of protection to be a concern, but overall the pack under test held up quite well and at the 20A rate it performed among some better packs I have seen so far.

Mark Hopkins

(Research & Development Engineer/Designer and ISO 9001:2000 Auditor for PAG Advanced Battery Systems Ltd)