

Charging a Buddipole 4S2P or 4S4P A123 battery pack with a Cellpro 10s charger

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<http://www.charlespreston.net/batteryop/Charging-BP-10s.pdf>

Cellpro 10s fastest charging method

Set the chemistry to A123, charge current to 10 A, and connect both the Powerpole (connect first) and balance connector to the 10s. Press and release the start button (less than 1 second) to switch to FASTER CHARGE instead of ACCURATE CHARGE and that should provide the maximum rate charge, and shortest charge time, the 10s can provide. Press and hold the start button (more than 1 second) to start charging.

Details

Probably the very best care for the A123 cells is to charge them at a 1C (1 x capacity) rate. As far as I know all the Buddipole battery packs use a 26650M1 2.3 Ah capacity cell (2.3 A 1C charge rate). Since there are 2 cells in parallel in a 4S2P pack, that would be about 4A. For a 4S4P pack, a 1C rate would be about 9A. This is normal charge rate current.

A123 says that the recommended fast charge rate current per 2.3 Ah cell is 10 A.

<http://www.a123systems.com/cms/product/pdf/1/ ANR26650M1A.pdf>

4 cells in parallel in a 4S4P battery pack that remain perfectly balanced through the charging process could be charged at 40A without damage during the constant current part of the charging cycle. However, each cell and each paralleled group of cells does not charge at exactly the same rate. The 10s can provide 10 A for each group of 4 paralleled cells. Having each group of 4 paralleled cells in a 4S series arrangement doesn't change the 10 A available for each group of 4 paralleled cells. Even if you had really high charging current that was much higher than the maximum 10 A from a 10s charger it would be good to leave some margin for different individual cell charging rates.

Since the Cellpro 10s will only charge at 10 A for one connected battery pack, either a FASTER CHARGE or slower, more carefully balanced ACCURATE CHARGE shouldn't hurt the cells at all, and actually will be close to their maximum-life 1C charge rate for a 4S4P battery pack. In this case 10 A is being split somewhat equally among 4 A123 cells. That's 10 A x 3.5 VDC for each cell or group of paralleled cells.

The total 10s charger power supplied to a 4S4P battery pack is approximately 3.5 VDC x 10 A x 4 = 140 W (remember, the charger is furnishing about 14 VDC).

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For the 10s charger there is a setting for A123 chemistry, and by holding down the mode switch as you step through the choices, you can set the charge rate at anything you want, up to 10 A.

I don't have any hesitation charging my 4S2P packs at 10A. This will probably shorten their lifespan to some degree, since the current is split somewhat equally between 2 cells. I usually choose ACCURATE CHARGE because I prefer more accurate cell balancing.

Even if you choose ACCURATE CHARGE for a 4S4P or 4S2P battery pack, as you cycle through the readout screens with the mode switch you may see A123 FAST C. This doesn't mean the charger is ignoring the ACCURATE CHARGE setting. FAST C. is a normal stage even in the ACCURATE CHARGE cycle.

As far as higher current and faster charging, there is a new Cellpro charger available that I haven't tested yet, but I expect to be charging these battery packs at about 15 A for a 4S2P. One of the advantages of A123 cells over other lithium batteries, even some LiFePO4 batteries, is their high safe maximum charging rate.

Lifespan is probably not a problem

As you can see from the A123 spec sheet in the URL above, they rate the life at over 1000 cycles for 100% depth of discharge (no lower than 2.0 VDC for any cell), even with a 10C rate for discharge at room temperature. For a 4S4P, this would be a 92 A rate (23 A x 4 = 92 A).

In fact, this next A123 fact sheet shows about 7000 cycles at 1C charge/discharge. I think I will be getting good value for my money if I get around 1000 cycles with faster charging.

<http://www.a123systems.com/a123/technology/life>

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