4s2p lifepo4 bms

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When I decided to build a battery pack out of 18650 lithium ion cells for a project, I took apart my old laptop battery, got the batteries out, soldered them together with metal strips into a battery pack. However, I learned on my first attempt that it wasn"t that easy. Lithium ion batteries are not like nickle metal hydride, lead acid, or nickle cadmium batteries. They are sensitive to over discharging, over charging, and short circuits, and need special care to keep them from overheating, melting, or exploding.

Other miscellaneous items were 18 gauge (1.02 mm diameter), 26 gauge (.40 mm diameter) to 24 gauge (.51 mm) wire, masking tape, and or electrical tape, or heat shrink film.

Next you need a way to stick the cells together. You can use steel solder tabs or nickle strips. I am using pure nickle strips, not nickle plated steel because at high current draws, steel has higher resistance than nickle, which can cause heat buildup.I am soldering them to the cells. This isn"t the recommended way because if you hold the soldering iron on the cell for too long, it will damage the cell and cause it lose capacity. The best way is to use a purpose-made spot welder like this: https://

For the soldering iron, I recommend at least a 30 watt iron and good solder. Good solder is critical. Do not use lead-free solder for this because it has a higher melting temperature. Also, a weaker soldering iron won"t get hot enough to properly bond the cells to the nickle strips.

To solder the cells, rough up the positive and negative terminals of the cells and apply a small amount of solder. Next, arrange the cells into the proper order for the series/parallel connection as shown in the diagrams. I taped the cells together with masking tape for this, but you can also use battery spacers.

Cut the nickle strips to the correct length to connect the cells together. I used some side cutters for this, but tin snips or sheet metal cutters work too. Apply solder to each end of the strip, and solder the strip to the battery terminals. Don"t hold the soldering iron on too long, just enough to melt the solder. I taped the cells together before soldering the final connections to keep them aligned correctly.

Connecting it is easy. Once our battery is soldered together, we need to measure the voltages across the series cells with a multimeter. You should have 14.8 volts for battery positive, 3.7V volts, 7.4V volts, and 11.1 volts. There are 5 connections for a 4S balance plug: one for battery positive or cell #4, one for negative, cell #1, cell #2, and cell #3. Measure these by putting the negative probe on the negative side of the pack, and measuring across the connections. Once they all match, you can solder the balance wires from each connection to the correct pads on the BMS.

I used 26 gauge wire (.40 mm diameter) for the balance connections, and 18 gauge (1.02 mm diameter) for the battery +/- and load outputs since they will be handling almost 10 amps of current. You can use smaller wire

for the balance connections since they aren"t handling hardly any current, just the respective voltage from the connections. I wouldn"t go under 26 gauge though for this. Once you have the pack connected, you can connect the balance plug leads to the proper battery outputs.

Now that we have everything connected, we can connect our pack to the charger and make sure it charges. This is how you will know if your connections are wrong, because your charger will not charge and warn you for incorrect voltage connections.