Victorias LFP installation

When I changed from AGM to LFP I wanted to keep as much as possible of the existing installation I could not find any simple solution that addressed all the issues wanted to solve. And since I've been working 38 years in the electronic business, I decided to build my own solution. I did a lot of reading of scientific reports and blogs in order not to repeat already done mistakes. This is a short description of the result.

I have 200 Ah bank built from 8 100 Ah Winston cells, connected in a 2P4S configuration, used as the power source for everything: starter, windlass, bow thruster as well as for all other equipment on board. The reason for not using 200 Ah cells is: smaller cells are more tolerant for the movements in the boat and have less risk of being damaged from it, and they shall be installed standing up and then the 200 Ah cells were too high for my battery compartment, and lastly if one pair of cells breaks down, I can always reconfigure it to a 100 Ah bank with four of the remaining ok cells.

200Ah battery built from Winston LFP cells in a 2P4S configuration.

The BMS is the black box, and the metal cylinder on top of the cells is a temperature sensor that the BMS uses to ensure the batteries do not get too hot. Not really needed since I do not either charge or discharge with any high current, but it doesn't harm either.

I have also kept the AGM battery, that used to be for the starter, as a backup in case of a real emergency, so far never used:

100 Ah backup battery

To get current status I look at the red LED. If it starts to flash, I have less than 20% energy left in the LFP battery.

The main user interface, a lamp for low energy early warning and a button for simple temporary changes

The green button is used to:

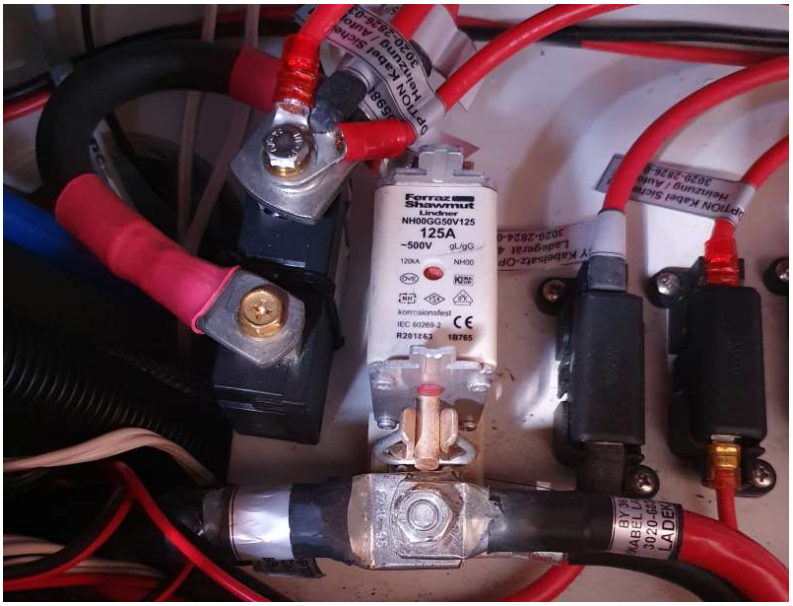
1) wake up the Bluetooth interface (since I let it go to sleep if unused for three hours, will bring down BMS current from 13 mA to 3 mA),

2) temporarily change setting for stop charging (when motoring home and will be leaving the boat for a while I do not want it to be fully charged).

If I do not start charging when the LED starts blinking, then when there is around 10% energy left, the alarm will start beeping.

Alarm, beeping when something is wrong.

And If I still do not do anything, soon the power will be switched off by a bi-stable relay placed beside and in series with the main fuse:



A bistable 100 A capable relay installed beside the main fuse, used to handle low voltage events.

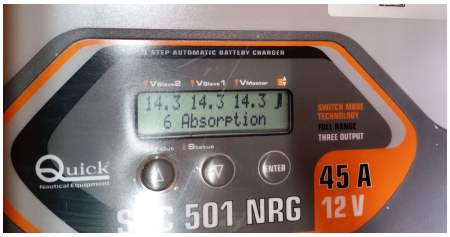
When I start the engine, the alternator is connected directly to the LFP bank. The voltage sense cable is connected to the BMS since it uses it to control the alternator. I have a temperature sensor connected directly on the stator on the alternator.

A temperature sensor mounted on the alternator.

The stator gives fairly rapid feedback on the temperature, and when it reaches 100 degrees, the BMS will trick the alternator to believe that the battery is almost full by increasing the voltage on the sense-wire. The alternator will then lower the produced current so the temperature is kept at the set limit.

And when the first cell reaches 3.6 V, I've defined the battery as full. The BMS will then increase the voltage on the sense wire further so the alternator will stop the charging completely.

On my existing shore charger, I connected an NC relay on the 230 V side which is controlled by the "Charge OFF" output.



But this has proven to be completely unnecessary because I never need to connect to shore power nowadays. So, when I switched to the latest version of my BMS, I did not bother to connect the relay. If I were to connect shore power at some point in a guest harbor, the BMS will sound an alarm when it considers the battery to be fully charged, and it notices that it cannot interrupt charging. Then I can turn off the charger manually, or disconnect the LFP and let it continue to charge my AGM backup battery.

If my solarpanels would have had enough watts to fill my battery I would have connected them via a NC relay controlled by the "Charge OFF" port on the BMS. I only have them connected while using the boat, so I find this unnecessary. But if it would happen that they charged the battery to full, then the BMS will beep an alarm when it has noticed that it could not stop the charging.

If anything has failed, or is on its way to fail, the BMS will start beeping a code a fault code stating what the problem is.

I can at any time connect to the BMS with my mobile phone, and handle everything from reconfigurations to check actual values and logs.

Almost all values in the BMS can be changed, and it can be configured to be used in many other setups, but this setup have now worked for me for many years without any problems.