Are you considering changing to Lithium LFP Batteries in your boat (You Should)

General information about Lithium iron phosphate batteries

Lithium iron phosphate (LiFePO4 or LFP) is the safest of the mainstream li-ion battery types. The nominal voltage of a LFP cell is 3,2V (lead-acid: 2V/cell). A 12.8V LFP battery therefore consists of 4 cells connected in series; and a 25.6V battery consists of 8 cells connected in series.

2.1 Rugged A lead-acid battery will fail prematurely due to sulfation Etc: • (i. e. if the battery is rarely, or never at all, fully charged). • it is left partially charged or worse, fully discharged.
A LFP battery does not need to be fully charged. This is a major advantage of LFP compared to lead-acid. Other advantages are the wide operating temperature range, excellent cycling performance, low internal resistance and high efficiency (see below). LFP is therefore the chemistry of choice for very demanding applications.
2.2 Efficient In several applications (especially Boats off-grid solar and/or wind), energy efficiency can be of crucial importance. The round trip energy efficiency (discharge from 100% to 0% and back to 100% charged) of the average lead-acid battery is 80%. The round trip energy efficiency of a LFP battery is 92%. The charge process of lead-acid batteries becomes particularly inefficient when the 80% state of charge has been reached, resulting in efficiencies of 50% or even less in solar systems where several days of reserve energy is required (battery operating in 70% to 100% charged state). In contrast, a LFP battery will still achieve 90% efficiency under shallow discharge conditions.
2.3 Size and weight Saves up to 75%
2.4 Endless flexibility LFP batteries are easier to charge than lead-acid batteries. The charge voltage may vary from 14V to 16V (as long as no cell is subjected to more than 4,2V), and they do not need to be fully charged.
2.5 Most existing charging systems can be used without any MAJOR changes.

Huge Battery Life

What a lot of people don't know is that a Lithium Phospate battery is not finished/Dead after 2000 cycles (Unlike Lead Acid Batteries)
2,000-2500 cycles the battery is reduced to 80% of its original capacity (upto 14 years based on 1 Cycle every 2 days)
3,000 cycles the battery is reduced to 70% of its original capacity
4,000-5,000 cycles the battery is reduced to 60% of its original capacity (upto 28 years based on 1 Cycle every 2 days)
6,000-10,000 cycles the battery is reduced to 50% of its original capacity (has not been tested by the manufactuer.)
Also at any point you can add new batteries to increase capacity (no need to trough out the old ones)

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ESSENTIAL)

Important facts:

1. A LFP cell will fail if the voltage over the cell falls to less than 2,0V
2. A LFP cell will fail if the voltage over the cell increases to more than 4,2V.
3. The cells of a LFP battery do not auto-balance at the end of the charge cycle.
4. The cells in a LFP battery are not 100% identical. Therefore, when cycled, some cells will be fully charged or discharged earlier than others. The differences will increase if the cells are not balanced/equalized from time to time. In a lead-acid battery a small current will continue to flow even after one or more cells are fully charged (the main effect of this current is decomposition of water into hydrogen and oxygen). This current helps to fully charge other cells that are lagging behind, thus equalizing the charge state of all cells. The current through a LFP cell however, when fully charged, is nearly zero, and lagging cells will therefore not be fully charged. Over time the differences between cells may become so extreme that, even though the overall battery voltage is within limits, some cells will fail due to over or under voltage. Cell balancing is therefore highly recommended.

Important warning LFP batteries can be damaged due to over discharge or over charge.

3 Operation

4.1 Cell balancing and alarms Each 12,8V battery consists of four series connected cells, and the cell balancing system will:

a) Measure the voltage of each cell and move Ah from cells with the highest voltage to cells with a lower voltage until the voltage difference between cells is less than 10mV (active balancing).

b) b) Give an over voltage (cell voltage > 3,7V) or under voltage (cell voltage < 2,8V) alarm.

c) c) Give an over temperature (T > 50°C) alarm. Note: During the batteries lifespan, the cells within the battery may become unbalanced due to high discharge currents and short float charge periods. The available battery capacity will be reduced, and a cell overvoltage alarm may occur.

d) 4.2 Charge voltage Recommended charge voltage: 14V-14,4V per battery (14,2V recommended). Absorption time: 1 hr for a 100% charge, or a few minutes for a 98% charge. Maximum charge voltage: 14,4V per battery. Recommended storage/float voltage: 13,5V per battery. Batteries must be regularly (at least once every month) charged to 14V (max. 14,4V) in order to fully balance the cells

4.3 Battery Management System (BMS) is in our opinion EXTREMLY important.