Why lithium-iron-phosphate?

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.

**Rugged**
A lead-acid battery will fail prematurely due to sulfation:
- If it operates in deficit mode during long periods of time (i.e. if the battery is rarely, or never at all, fully charged).
- If it is left partially charged or worse, fully discharged (yacht or mobile home during wintertime).

A LFP battery does not need to be fully charged. Service life even slightly improves in case of partial charge instead of a full charge. 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 demanding applications.

**Efficient**
In several applications (especially 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.

**Size and weight**
- Saves up to 70% in space
- Saves up to 70% in weight

**Expensive?**
LFP batteries are expensive when compared to lead-acid. But in demanding applications, the high initial cost will be more than compensated by longer service life, superior reliability and excellent efficiency.

**Bluetooth**
With Bluetooth cell voltages, temperature and alarm status can be monitored. Very useful to localize a (potential) problem, such as cell imbalance.
Our LFP batteries have integrated cell balancing and cell monitoring. Up to 5 batteries can be paralleled and up to four 12V batteries or two 24V batteries can be series connected, so that a 48V battery bank of up to 1500Ah can be assembled. The cell balancing/monitoring cables can be daisy-chained and must be connected to a Battery Management System (BMS).

**Battery Management System (BMS)**

The BMS will:
1. Generate a pre-alarm whenever the voltage of a battery cell decreases to less than 3,1V (adjustable 2,85 - 3,15 V).
2. Disconnect or shut down the load whenever the voltage of a battery cell decreases to less than 2,8V (adjustable 2,6 V - 2,8 V).
3. Stop the charging process whenever the voltage of a battery cell increases to more than 3,75 V or the temperature increases to more than 60°C.

See the BMS datasheets for more features.

### Battery specification

<table>
<thead>
<tr>
<th>VOLTAGE AND CAPACITY</th>
<th>LFP-Smart 12,8/50</th>
<th>LFP-Smart 12,8/60</th>
<th>LFP-Smart 12,8/100</th>
<th>LFP-Smart 12,8/160</th>
<th>LFP-Smart 12,8/200</th>
<th>LFP-Smart 12,8/300</th>
<th>LFP-Smart 25,6/100</th>
<th>LFP-Smart 25,6/200</th>
<th>LFP-Smart 25,6/200-a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal voltage</td>
<td>12,8V</td>
<td>12,8V</td>
<td>12,8V</td>
<td>12,8V</td>
<td>12,8V</td>
<td>12,8V</td>
<td>25,6V</td>
<td>25,6V</td>
<td>25,6V</td>
</tr>
<tr>
<td>Nominal capacity @ 25°C*</td>
<td>50Ah</td>
<td>60Ah</td>
<td>100Ah</td>
<td>160Ah</td>
<td>200Ah</td>
<td>300Ah</td>
<td>100Ah</td>
<td>200Ah</td>
<td>200Ah</td>
</tr>
<tr>
<td>Nominal capacity @ 0°C*</td>
<td>40Ah</td>
<td>48Ah</td>
<td>80Ah</td>
<td>130Ah</td>
<td>160Ah</td>
<td>240Ah</td>
<td>80Ah</td>
<td>160Ah</td>
<td>160Ah</td>
</tr>
<tr>
<td>Nominal capacity @ -20°C*</td>
<td>25Ah</td>
<td>30Ah</td>
<td>50Ah</td>
<td>80Ah</td>
<td>100Ah</td>
<td>150Ah</td>
<td>50Ah</td>
<td>100Ah</td>
<td>100Ah</td>
</tr>
<tr>
<td>Nominal energy @ 25°C*</td>
<td>640Wh</td>
<td>768Wh</td>
<td>1280Wh</td>
<td>2048Wh</td>
<td>2560Wh</td>
<td>3840Wh</td>
<td>4220Wh</td>
<td>2560Wh</td>
<td>5120Wh</td>
</tr>
</tbody>
</table>

*Discharge current ≤1C

**CYCLE LIFE (capacity ≥ 80% of nominal)**

<table>
<thead>
<tr>
<th>80% DoD</th>
<th>50% DoD</th>
</tr>
</thead>
<tbody>
<tr>
<td>2500 cycles</td>
<td>5000 cycles</td>
</tr>
</tbody>
</table>

**DISCHARGE**

- Recommended continuous discharge current: ≤50A, ≤60A, ≤100A, ≤160A, ≤200A, ≤300A, ≤300A, ≤100A, ≤200A, ≤200A
- End of discharge voltage: 11,2V, 11,2V, 11,2V, 11,2V, 11,2V, 11,2V, 11,2V, 22,4V, 22,4V, 22,4V

**OPERATING CONDITIONS**

- Operating temperature: Discharge: -20°C to +50°C, Charge: +5°C to +50°C
- Storage temperature: -45°C to +70°C
- Humidity (non-condensing): Max. 95%
- Protection class: IP 22

**CHARGE**

- Charge voltage: Between 14V/28V and 14,4V/28,8V (14,2V/28,4V recommended)
- Float voltage: 13,5V/27V
- Recommended charge current: ≤30A, ≤30A, ≤50A, ≤80A, ≤100A, ≤150A, ≤150A, ≤50A, ≤100A, ≤100A

**OTHER**

- Max storage time @ 25°C*: 1 year
- BMS connection: Male + female cable with M8 circular connector, length 50cm
- Power connection (threaded inserts): M8, M8, M8, M8, M8, M10, M10, M8, M8
- Dimensions (h x w x d) mm: 199 x 188 x 147, 239 x 286 x 132, 197 x 321 x 152, 237 x 321 x 152, 347 x 425 x 274, 265 x 359 x 206, 197 x 650 x 163, 317 x 631 x 208, 237 x 650 x 163
- Weight: 7kg, 12kg, 14kg, 18kg, 20kg, 51kg, 30kg, 28kg, 56kg, 39kg

*When fully charged