

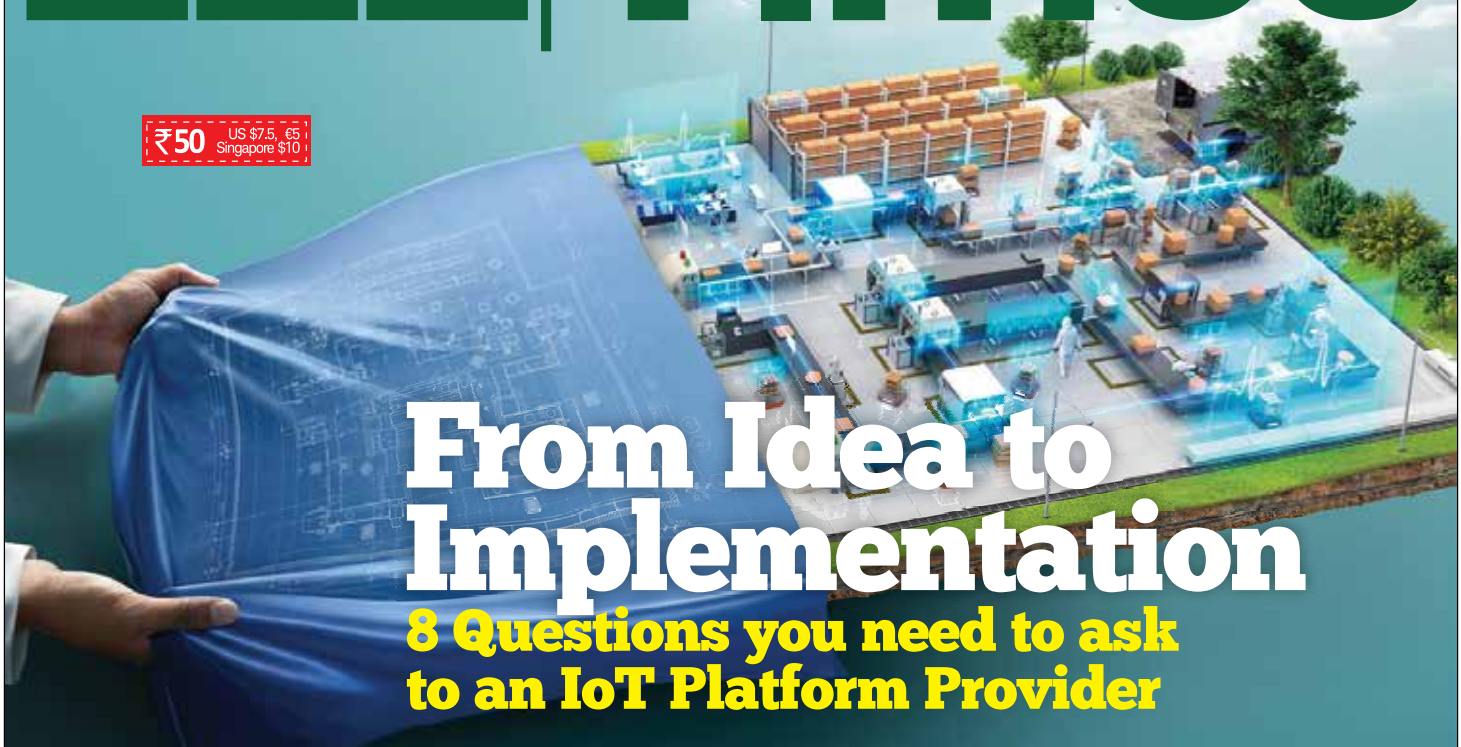
Vol : 8, Issue 04 **April, 2019** Monthly, Pages - 68

RNI No. DELENG/2012/45770
Mailed on 27-28th of Advance Month
Delhi Postal Reg. No. DL(E)20/5424/2019-2021

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Importance of battery management system in LiFePO₄ Battery



Lithium iron phosphate batteries constructed of more than single cells connected together. It also consists of Battery management system (BMS) which is not visible to the end user, which ensures that each cell of the battery remains within the safe limits. Elecorev's lithium iron phosphate batteries come along with BMS integrated inside or outside which protects, increase lifetime, monitor, balance and communicate with different modules which ensures safe operation over wide range of conditions.



Shridhar Pandey
Managing Director
Elecorev Energy

“Lithium iron phosphate batteries come in a single package with a lot of power and value

Lithium iron phosphate batteries come in a single package with a lot of power and value. This chemistry of lithium offers superior performance. But all reputed commercial batteries which include another vital component along with Lithium phosphate batteries i.e. carefully planned and designed Battery Management system (BMS). A cautiously designed Battery management system protects, increase lifetime, monitor, balance and communicate with different modules which ensures safe operation over a wide range of conditions.

Over and Under Voltage

Lithium iron phosphate cells are operated safely over the range of voltages ranging typically from 2.0V to 4.2V. Lithium Phosphate cells are more tolerant compared with other lithium chemistries. But significant over voltage for an extended period at the time of charging can cause plating of metallic lithium on the anode of the battery

which can permanently degrade the life of a battery's performance. Meanwhile, oxidation may happen on the cathode material and the cell becomes less stable and can produce CO₂ which



Lithium iron phosphate batteries find major differences from easily available lead-acid batteries when it leads to balance the voltage in each individual cells during charging. Because of minor differences in operating or manufacturing conditions each cell of the battery charges at the different rate.

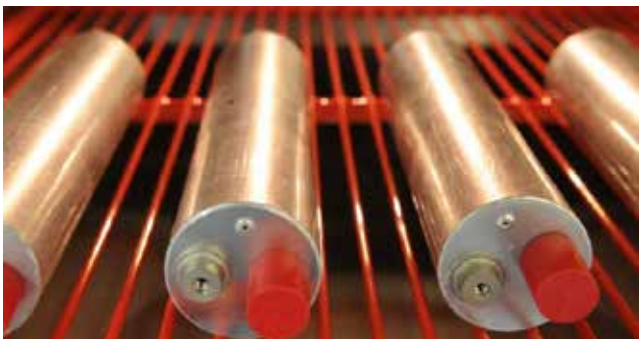
may lead to building pressure in the cell. All Elecorev Battery management systems limit the maximum voltage of the battery and the cell.

Under voltage in the course of battery, discharge is also a concern because discharging LiFePO₄ cells below 2.0V may lead to a breakdown of the electrode materials. Lithium Phosphate battery recommends minimum operational voltage. The BMS disconnects the battery if its voltage goes below 2.0V.

Overcurrent and Short Circuit Protection

Each battery is designated with the maximum specified current of its smooth and safe operations. When the load is connected to the battery which is drawing a higher current than the designated currents, it can result in overheating of the battery. So it is very important to keep the drawing current below the maximum specifications. The BMS of the battery again acts as backstop against overcurrent condi-

Technology



tions and disconnects the battery from its operations.

The BMS disconnects the battery from the circuit if it draws the higher current. The short circuit in the battery is the most serious thing form of over-current conditions. The short circuit generally happens because of accidental connection of its terminals to the piece of metal. The BMS quickly detects the short-circuit currents and draw-

ing of massive currents overheats the battery and creates the catastrophic damage to the battery.

Over Temperature

Unlike other chemistries of the battery such as Lead acid or lithium cobalt oxide batteries, Lithium iron phosphate batteries operates at coherently and safely at temperatures up to 60°C or more. But at higher

operating and storage temperatures the electrode material begins to degrade. The BMS of the battery consists of thermistors which actively monitors the temperature of the battery during operation and it will disconnect the battery over the specified temperature.

Cell Imbalance

Lithium iron phosphate batteries find major differences from easily available

lead-acid batteries when it leads to balance the voltage in each individual cells during charging. Because of minor differences in operating or manufacturing conditions each cell of the battery charges at the different rate. Meanwhile in lead acid battery, if one cell of the battery charges at a faster rate and reaches to its full voltage, the typically other cells which are charging slowly can be accompanied and self-balancing will happen and others cells will also get fully charged.

But in the case of Lithium Iron Phosphate batteries, when a cell is fully charged the voltage of the cell begins to rise further which will lead to damage in the electrode. The entire charge of the battery will stop when only one cell is fully charged state and remaining cells will not reach full charge and the battery will operate at low peak capacity. Elecorev BMS ensures that each cell charges fully and safely before entire process of charging is complete.



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