

Managing battery cells

The word battery suggests an array or collection of things operating in concert. For example we speak of a battery of cannons. In an electrical battery we are referring to more than one electrochemical cell connected, usually in series. The individual cell voltages accumulate to give us the total battery voltage. In the domestic renewables world battery nominal voltages range from 48 volts to over 500 volts

In a lithium ion cell the nominal or average voltage varies with the chemistry employed. 3.2 volts for lithium ferro phosphate and 3.7 volts for those cells containing nickel, manganese, cobalt. As the cell charges and discharges these voltages rise and fall. There are upper limits over which the cell's life can be compromised and overheating may occur and lower voltages where permanent damage will occur.

In the battery manufacturing process, cells are chosen to have closely matched characteristics before being joined to form a battery. However no matter how closely they are matched, during the charging phase individual cell voltages inevitably drift apart and this causes problems. Unchecked, some cells may rise to the dangerous overvoltage region and with some chemistries, catastrophic failure accompanied by fire.

Enter the electronic module attached to the battery called the Battery Management System (BMS).

This device monitors each cell voltage, and in some systems each cell temperature and should a cell start to deviate from the norm by more than several thousandths of a volt the BMS switches a resistor across that cell to bleed energy from that cell until it equals the correct value. Because of the criticality of managing cell overvoltage the reliability of the BMS is extremely important.

Self managed and managed batteries. A battery which manages itself without any outside intervention is called a self managed battery. Those which have internal management supplemented by oversight from the connected inverter are called managed batteries. Today's high voltage batteries, those with nominal battery voltages above 48 volts, are exclusively managed batteries. Some, low voltage batteries are managed batteries.



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