

USING DC POWER SUPPLIES & CHARGERS WITH LITHIUM-ION BATTERIES

With interest growing in the use of Li-ion batteries for backup power at wireless communication sites, it is important to understand how they can interoperate with DC power supplies

The use of Li-ion batteries at tower sites is still relatively new, with sealed or valve regulated lead acid batteries still the predominant battery type in use today. However, Li-ion battery vendors are making strides in providing 'drop in' replacement alternatives for stationary lead acid battery applications. These include improved acquisition cost, safety improvements, and advanced Battery Management Systems (BMS) that are simplifying the installation and use of Li-ion at communications sites.

Lithium-ion (Li-ion) batteries claim some potential advantages over traditional lead acid batteries, including longer life, smaller size and weight, and lower cost of ownership over time.

BATTERY MANAGEMENT SYSTEM

If considering using Li-ion batteries, one of the most important aspects to consider is the battery management system (BMS). The BMS is an integral part of the battery, and constantly monitors battery temperature, charge level, and charge rate to protect it against short circuit and overcharging. The BMS also protects the cells from damage by balancing the cell voltage levels, and by preventing the voltage from getting too low during discharge.

USE WITH DC POWER SUPPLIES

In general, most Li-ion batteries will work with a constant voltage, constant current DC power supply. However, there are some critical parameters that must be met in order for safe, reliable operation.

Charge Voltage:

Most Li-ion batteries perform at their best with a constant float voltage from the DC power supply. For example, a 48 volt Li-ion power plant may have an optimal float voltage of 54.0 volts DC. You can then utilize an intelligent power supply's output settings to maintain an output of 54.0 volts. It is important to consult the battery manufacturer specifications to determine the correct float voltage required.

Charge Rate:

Li-ion batteries will often require that the rate of charge be limited to 1C or less. This means that if the battery is rated at 100 amp hours, then the charge rate should not exceed 100A. You can either select a DC power supply that is at or below that current output rating, or utilize the intelligent power supply's settings to limit the charge rate to at or below 1C.

Temperature Compensated Charging:

Li-ion batteries do not require temperature compensated charging. This feature should be disabled on the DC power supply.

Low Voltage Disconnect:

If the DC power supply or DC power system incorporates a Low Voltage Disconnect (LVD), certain characteristics need to be considered. The Li-ion BMS will normally have its own LVD function to protect the battery. A 48 volt Li-ion power plant may have its BMS LVD disconnect set to open at 40.5 volts DC. When that happens, the voltage reading on the battery terminals will give a zero volts reading. When AC power returns, some DC power supplies will see the zero volts reading and avoid providing charge current to the battery. This is done to prevent damaging a heavily discharged lead acid battery.

The way to configure for this is to set the DC power supply LVD to disconnect at a level above the BMS disconnect voltage, for example at 45.0 volts. Based on the discharge profile of lithium ion batteries, in most cases this will have a negligible effect on available battery capacity.



