

AC6000 UPS

Li Ion - Battery Safety

ADVANCEMENTS IN BATTERY TECHNOLOGIES

Considering the number of Li-ion batteries that are used and deployed, and the fact that they have a relatively good safety record, there still are concerns that lithium-ion batteries are not as safe as VRLA (valve-regulated lead-acid) batteries. While this statement can be true, there have been numerous advancements in Li-ion battery cell and battery pack design that have resulted in a marked improvement in Li-ion battery cell, pack and Li-ion UPS safety

Looking into the differences between battery cell types, Lithium-ion batteries use a different chemical process than VRLA or “flooded” lead-acid batteries. In a Li-Ion battery cell, the charged lithium-ion moves back and forth between the positive and negative plates through an electrolyte of lithium salt in an organic solution. Different combinations of chemicals can be used for the cathode and anode. The two primary types use lithium iron phosphate (LFP) or nickel, cobalt, and manganese (NCM).

PRECAUTIONS

Li-ion batteries have a much higher energy density, a greater depth of discharge, a longer lifecycle and better energy efficiency than VRLA batteries. In short, lithium-ion batteries deliver more power in a smaller footprint while using less energy over a longer period. These characteristics, specifically the higher energy density, means they could be susceptible to go into “thermal runaway”. Thermal runaway is a condition where the cell heats up rapidly and releases electrolytes, dangerous fumes and potentially even flames.

There are multiple precautions taken to prevent this condition. Li-ion cells and battery packs are designed and tested to limit (potentially prevent) thermal runaway



conditions. In addition, UPS manufacturers employ safety precautions such as thermal/electrical fusing and Battery Management Systems (or BMS) to monitor numerous battery cell and pack conditions to prevent such events.

BATTERY MANAGEMENT SYSTEM

The BMS in UPS designs includes thermal management at both the battery cell and battery pack level, monitoring of the battery pack/cell charging, current and voltage sensing, monitoring and reporting these conditions, as well as implementing thermal/electrical fusing or cutoffs.

SAFETY TESTS AND EVALUATIONS

The Enconnex AC6000 UPS and Li-Ion Battery pack (AC6000Batt) have undergone extensive safety evaluations to UL1778, UL991, UL1998, IEC 62619 and IEC 62133-2. The AC6000 uses an automotive-grade lithium-ion battery pack that is designed to maintain battery cell power balance. It features an advanced BMS, integrated safety electronics, and thermal management for individual cells. The multifunctional LCD panel displays critical performance metrics and alerts, and the UPS supports serial and SNMP communications for remote monitoring and management.

You should feel confident that the AC6000 (and any well-designed lithium-ion UPS) deployed and managed in accordance with the manufacturer’s specifications is highly safe.