

Low-Voltage Disconnects - Who Needs 'em?

As many of you know, Philips Bodine fluorescent emergency ballasts do not contain a low-voltage disconnect circuit. Some of our competitors' models do have a hard cutoff mechanism to remove the load from the battery at the end of discharge. You almost certainly have sold against these products where the low-voltage disconnect was touted as a valuable feature. This article will give reasons for using a low-voltage disconnect, and explain why Philips Bodine emergency ballasts are better without them.

The function of a low-voltage disconnect (LVD) is to protect the battery against deep-discharge. Deep-discharge of a sealed lead acid battery is very damaging to the plates: causing sulfation, loss of capacity and raising internal impedance. Lead-acid batteries must not be allowed to remain in a heavily discharged condition. Nicad batteries, on the other hand, can be stored discharged without incurring damage. The potential risk in deep discharging nicad batteries is in encountering a process called "cell reversal." Cell reversal occurs when a battery of mismatched cells is discharged deeper than the capacity of the weakest cell. Beyond this point, the stronger cells force current through the completely discharged cell, in effect charging it in reverse. This causes hydrogen gas to be generated within the cell. If severe enough, this gas will develop sufficient pressure to be released from the safety vent and lost from the cell. Repeated reversals will lead to capacity loss from excessive hydrogen loss.

Philips Bodine fluorescent emergency ballasts do not have LVD circuits because:

- Nicad batteries that can be fully discharged and stored fully discharged are used instead of less expensive sealed lead-acid batteries.
- The battery is composed of matched-capacity cells all from the same lot and from manufacturers chosen for their tight process controls.
- Our batteries are composed of a few large-capacity cells, rather than many low-capacity cells. This greatly minimizes the possibility of cells being reversed.
- The purpose of emergency lighting equipment is to provide emergency illumination. Shutting off the lamp with energy still in the battery defeats that purpose.
- An LVD is a band-aid approach that raises parts cost and lowers circuit reliability.
- As mentioned in our article on nicad memory myths, complete discharging erases the voltage depression that comes from extended overcharge. It can be beneficial if the battery is made of matched cells.
- Finally, Philips Bodine ballasts have an inherent "soft cutoff" that occurs when the battery voltage falls to the point that the fluorescent lamp drops out. At this point the inverter discharge current is greatly reduced.

For these reasons, Philips Bodine decided to develop emergency lighting without an LVD. With this kind of technology, we just don't need a low-voltage disconnect circuit.