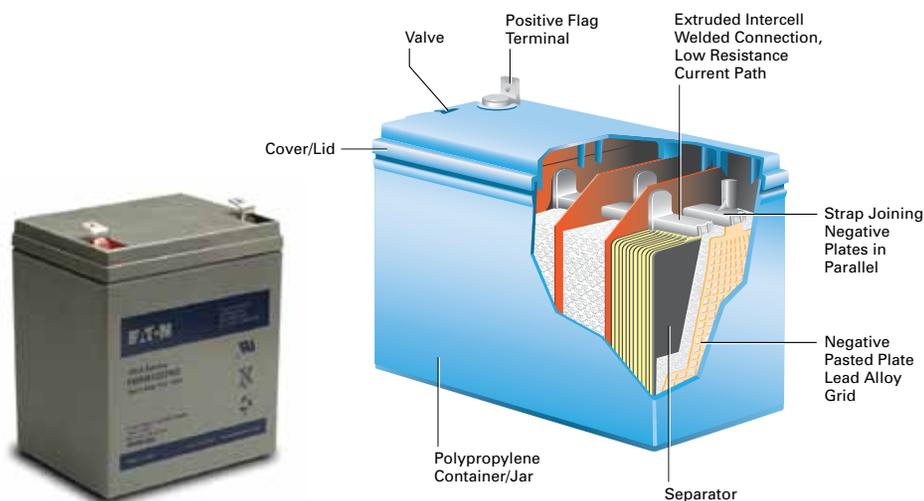




UPS battery overview

It's well known that the battery is the most vulnerable part of a UPS. In fact, battery failure is a leading cause of load loss. Yet understanding how to properly maintain and manage UPS batteries can not only extend battery service life, but can also help prevent costly downtime.



Internal and external components of a valve-regulated lead acid (VRLA) battery.

VRLA batteries are frequently used in UPS or other high-rate applications.

The most common type of battery used in UPSs is valve-regulated lead acid (VRLA) batteries, also known as sealed or maintenance free. VRLA batteries are sealed, usually within polypropylene plastic, which offers the advantage of not containing any sloshing liquid that might leak or drip. Because water cannot be added to VRLA batteries, recombination of water is critical to their life and health, and any factor that increases the rate of evaporation or water loss — such as temperature or heat from the charging current — reduces the life of the battery.

Frequently asked questions: batteries

1. What is the "end of useful life?"

The IEEE defines "end of useful life" for a UPS battery as being the point when it can no longer supply 80 percent of its rated capacity in ampere-hours. When your battery reaches 80 percent of its rated capacity, the aging process accelerates and the battery should be replaced.

2. Is there any difference between the batteries used by smaller UPSs, from 250 VA to 3 kVA, and the ones used by larger UPSs?

While basic battery technology, and the risks to battery life, remains the same regardless of UPS size, there are some inherent differences between large and small applications. First, smaller UPSs typically have only one VRLA battery that supports the load and needs maintenance. As systems get larger, increasing battery capacity to support the load gets more complicated. Larger systems may require multiple strings of batteries, introducing complexity to battery maintenance and support. Individual batteries must be monitored to prevent a single bad battery from taking down an entire string, and putting the load at risk. Also, as systems get larger, wet-cell batteries become much more common.

3. My UPS has been in storage for over a year. Are the batteries still good?

As batteries sit unused, with no charging regimen, their battery life will decrease. Due to the self-discharge characteristics of lead-

acid batteries, it is imperative that they be charged after every six to 10 months of storage. Otherwise, permanent loss of capacity will occur between 18 and 30 months. To prolong shelf life without charging, store batteries at 10°C (50°F) or less.

4. What is the difference between hot-swappable and user-replaceable batteries?

Hot-swappable batteries allow the batteries to be changed out while the UPS is running. User-replaceable batteries are usually found in smaller UPSs and require no special tools or training to replace. Batteries can be both hot-swappable and user-replaceable.



UPS models like the Eaton 9130 feature hot-swappable batteries for maximum uptime

5. How is battery runtime affected if I reduce the load on the UPS?

The battery runtime will increase if the load is reduced. As a general rule, if you reduce the load by half, you triple the runtime.

6. If I add more batteries to a UPS can I add more load?

Adding more batteries to a UPS can increase the battery runtime to support the load. However, adding more batteries to the UPS does not increase the UPS capacity. Be sure your UPS is adequately sized for your load, then add batteries to fit your runtime needs.



Adding extended battery modules increases runtime but does not increase the power rating or capacity of the UPS

7. If my UPS is in storage how often should I charge the batteries?

The batteries should be charged every three or four months to prevent loss of capacity.

8. What is the average lifespan of UPS batteries?

The standard lifespan for VRLA batteries is three to five years. However, expected life can vary greatly due to environmental conditions, number of discharge cycles, and adequate maintenance. Have a regular schedule of battery maintenance and monitoring to ensure you know when your batteries are reaching their end-of-life. The typical life of an Eaton UPS with ABM technology is 50% longer than with standard models.

9. Why are batteries disconnected on small, single-phase UPSs when they are shipped?

This is done to ensure that they are in compliance with Department of Transportation regulations.

10. Does the UPS need to have a load on it to charge its batteries?

The UPS should have a minimum of 10% load to charge its batteries. Once connected to a standard supply of electricity (via input plug or hardwiring), your UPS should charge its batteries regardless of how much load, if any, is attached to it

11. How can you be sure UPS batteries are in good condition and ensure they have maximum holdover in the event of a power failure? What preventive maintenance procedures should be done and how often?

The batteries used in the UPS and associated battery modules and cabinets are sealed, lead-acid batteries often referred to as maintenance-free batteries. While this type of battery is sealed and you do not need to check the fluid level in the battery, they do require some attention to assure proper operation. You should inspect the UPS a minimum of once per year by initiating a self-test of the UPS.

12. How long does it take for the UPS batteries to recharge?

On average, it takes 10 times the discharge time for the UPS batteries to recover. (A 30-minute battery discharge requires about 300 minutes to recharge.) After each power outage, the recharge process begins immediately. It is important to note that the load is fully protected while the batteries are recharging. However, if the batteries are needed during the recharge time, the

holdover time available will be less than it would have been if the batteries were fully charged.

13. What are the risks associated with a lack of battery maintenance?

The primary risks of improperly maintained batteries are load loss, fire, property damage and personal injury.

14. What is thermal runaway?

Thermal runaway occurs when the heat generated in a lead-acid cell exceeds its ability to dissipate that heat, which can lead to an explosion, especially in sealed cells. The heat generated in the cell may occur without any warning signs and may be caused by overcharging, excessive charging, internal physical damage, internal short circuit or a hot environment.

15. Why do batteries fail?

Batteries can fail for a multitude of reasons, but common reasons are:

- High or uneven temperatures
- Inaccurate float charge voltage
- Loose inter-cell links or connections
- Loss of electrolyte due to drying out or damaged case
- Lack of maintenance, aging

16. How is battery performance generally measured?

Batteries are generally rated for 100+ discharges and recharges, but many batteries show a marked decline in charging capacity after as few as 10 discharges. The lower the charge the battery can accept, the less runtime it can deliver. Look for batteries with a high-rate design that sustains stable performance for a long service term.