

Batteries – the heart of your UPS

Unless you are protecting your equipment with an Eaton® UPS, your batteries could fail without warning – and take your critical load down when they go.

The battery challenge

Batteries are the most critical component in the reliability of any UPS, but they face three fundamental challenges:

- **All batteries need charging**, but extended charging significantly shortens battery life. Most batteries are charged via a trickle-charging process (a constant voltage feeding a low current to the battery). This method dries up the electrolyte and corrodes the plates, reducing potential life by up to 50%.
- **Batteries take time to recharge** – and users can't wait. During prolonged power outages, the UPS batteries will discharge and not recharge until the power returns. Where there is a subsequent power failure before the batteries recharge, the UPS will not have full backup time. Overly rapid charging can cause premature battery failure, so the trick is to charge at the fastest rate that is safe for the battery.
- **All batteries will eventually fail**. The question isn't "Will it happen?" Because UPS batteries are valve-regulated sealed lead acid, there has previously been no practical way to provide the user with any meaningful advance notice that they need to be replaced. In the past, the only way to know when the batteries are dead is when the power fails and takes your computer down with it. Typically, UPS batteries have required replacement every two to three years.

Eaton's exclusive ABM technology solves all these UPS battery problems. It increases the service life of UPS batteries by 50% (see Figure 1), provides the fastest safe recharge time, and provides reliable advanced notice when batteries need replacement.

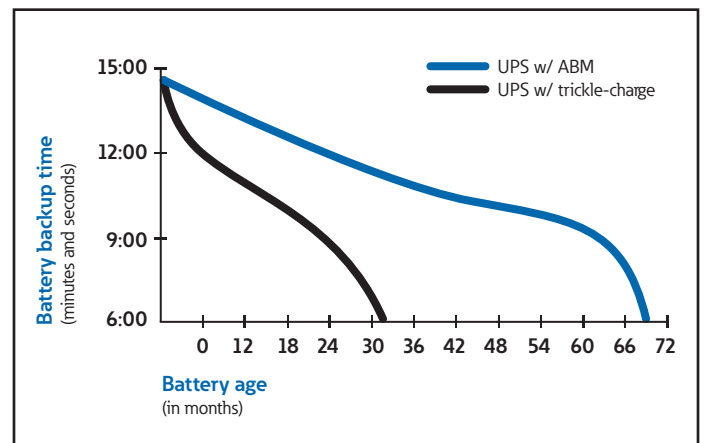


Figure 1: Multi-stage charging increases the service life of UPS batteries by 50% compared with batteries that are constantly trickle-charged.

How does ABM work?

Three-stage charging: ABM increases battery life by 50% via a three-stage charging process. The microprocessor-controlled technology rapidly charges the battery via the following three steps. (See Figure 2)

- **Charge:** A rapid constant current charge brings the battery to near full capacity in approximately three hours compared to 15 or more hours with many other UPSs.
- **Float:** Next, a constant voltage trickle-charge (of 2.3 volts per cell), similar to that used in other UPSs, continues for approximately 48 hours or until the batteries are solidly “topped off.”
- **Rest:** At this point, the charger is turned off.

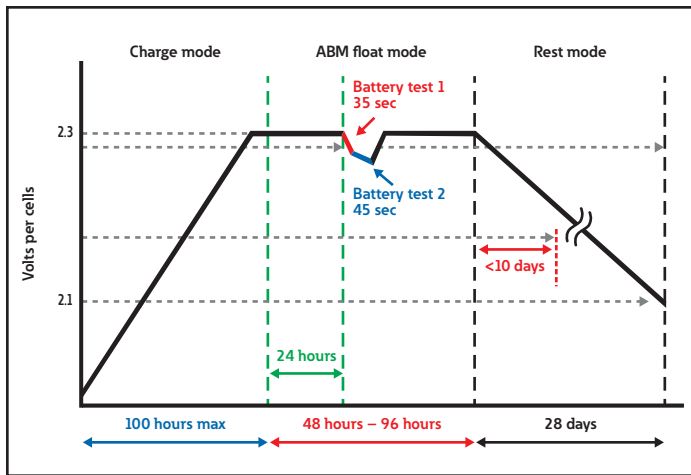


Figure 2: Eaton's three-stage battery-charging technique.

The charger is turned on again when required due to use or natural decay during extended periods of non-use. This means that UPSs with ABM technology are more energy efficient, only being charged on an average of a few minutes a day, compared to competitors' UPSs that are charged 24 hours a day every day. Since UPS batteries use the same technology as car batteries, a simple correlation can be observed. It is easy to see that car batteries, which are charged on when the car is running, typically last two to three times longer than traditional UPS batteries due to the “rest” state that occurs when the car is not running. If car batteries were constantly trickle-charged, they too would last less than two years.

However, this only lessens the problem, it does not eliminate it. In fact, if the temperature-sensing circuitry is not properly calibrated, it may have no benefit at all. Simple turning the charge off avoids these problems.

Advanced notification: ABM is the only technology currently available that reliably provides true advanced notification prior to battery failure. Other UPS manufacturers primarily perform a simple check of the DC voltage level. This only indicates potential, not capacity – letting the user know that the battery is dead only after it is dead. Because competitive systems use a constant trickle-charge, these tests are particularly unreliable since the voltage is tested only while the battery is being charged, leading to false indications of a healthy battery.

Before the days of sealed, maintenance-free batteries, you could check the battery's electrolyte with a hydrometer to determine its ability to retain a charge. Now, with sealed batteries, the only way to measure battery capacity is to discharge the cell. To accomplish this, ABM technology periodically initiates a brief discharge cycle to check the internal impedance which is calculated and compared to the ideal. In addition, the open-cell voltage and decay rate of the battery are continuously monitored after every charging cycle. Further, during a utility failure, the actual capacity of the battery is measured and compared to the expected capacity. When any of these three tests detect a significant change from the normal, the microprocessor indicates, well in advance, when the battery needs to be replaced.

Only with Eaton

Eaton is the only UPS manufacturer that can increase battery life by 50% and provide advanced warning of pending battery failure, with the fastest recharge time.

ABM is not a new battery management feature. Eaton has been using ABM in its UPS products and it has proven itself beneficial in the field for more than two decades.

When you purchase an Eaton UPS, you are assured of the maximum network power protection. These features, combined with competitive pricing and comprehensive warranties, make Eaton the only logical choice when it comes to selecting a UPS to protect your mission-critical equipment.

Eaton
Electrical Sector
1000 Eaton Boulevard
Cleveland, OH 44122 USA
Eaton.com

Powerquality.eaton.com

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