UPS fan replacement

Frequently asked questions

Fans are one of the few UPS components that are mechanical in nature. They wear out over time and eventually need to be replaced, usually after six or seven years of use.

The information in this document applies to a variety of UPS models. Replacement recommendations will vary based on the specific model and fan type.

Q: What do fans inside a UPS do?

A: Fans cool electronic components inside the UPS to keep them working properly.

Q: Are there any UPS applications that make fan systems more critical?

A: Yes. UPSs operating at 80 percent of rated capacity generate more heat and are more susceptible to overheating because of fan failures. UPSs without redundant fan systems or that only have one fan carry more risk.

Q: Where are the fans located in my UPS?

A: Although most of the fan assemblies are mounted on the front, there are fan assemblies throughout the device. These fans have been specifically placed to maintain proper cooling of the various components inside the UPS.

Q: Do fans degrade over time under normal use?

A: Yes, fans are one of the few components in a UPS that are mechanical in nature. Sealed bearings inside fans contain grease, which dissipates over time due to temperature. This results in reduced revolutions per minute (RPMs), increased noise and failure to start. Clogged air filters can also contribute to higher ambient temperatures inside the UPS, impacting fan life.

Q: What happens when a fan fails?

A: Individual fan failures may lead to UPS overheating, which can cause the unit to transfer to bypass, leaving the critical load unprotected. Modern UPSs like the Eaton® Power Xpert 9395 and 93PM models have redundant fan designs and are rated to 40°C, even with individual fan failures. If a fan fails, replacement can be scheduled with an Eaton service technician.

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Q: When should I consider full proactive fan replacements for my UPS?

A: In general, a single fan that fails in the early months of the UPS's life is an infant mortality event—only that particular fan needs to be replaced. On the other hand, if your UPS is more than six years old, the fans are nearing the end of their expected useful lives and should be replaced proactively.

Fan failures prompt UPS alarms, which can become a nuisance if fans are replaced only as they fail. Modern units like Eaton's 93PM UPS have a tachometer monitoring circuit built in to detect if/when a fan is approaching its end of life. Eaton technicians use this information during preventive maintenance visits to recommend proactive fan replacements.

Running a UPS in power efficiency modes like Eaton's Energy Saver System (ESS) and Variable Module Management System (VMMS) will lengthen fan life. When the UPS is in ready-to-serve mode, the fans are shut down and not spinning.

Q: Are there different types of fans for different applications?

A: All Eaton UPSs use similar types of fans. The differences are physical size (length, width or diameter) and volumetric air flow. The quantity of fans in a UPS varies relative to its size and kVA/kW rating to ensure there is adequate cooling for the power train. The specific fan assemblies are designed to deliver the appropriate cubic feet per minute (CFM) of airflow needed to properly cool critical components in the UPS.

Q: Are all fans created equal?

A: No. Fan components are specifically selected by Eaton's engineers to meet the performance standard for the product. Eaton replacement fans are the same ones approved for use in new equipment. Beware of third party service providers' potential use of used fans or fans harvested from retired UPSs.

Q: How long do fans usually last?

A: After six or seven years of around-the-clock use, the mechanical parts of fans begin to wear out. A fan's life expectancy is directly related to the temperature in which it operates.

Q: How can you tell if a fan is going to fail?

A: Eaton 93PM UPSs have fan assemblies with tachometers that monitor fan speed. The logic in the UPS is set to annunciate a fan failure if the speed of the tachometer exceeds permissible thresholds. Fan assemblies that do not have tachometer monitoring may have other indicators such as an air-vane switch or heatsink temperature monitoring that will provide annunciation in the event of a fan failure.

Q: Can fans be monitored by my DCIM software?

A: Some products have intelligent fan assemblies, so fan failures will trigger alarms that can be monitored using DCIM software. Fan failures in products with standard fan assemblies cannot be monitored at the individual fan level. However, if the temperature of the unit increases, an over-temp alarm can be monitored using DCIM software.

Q: When should I proactively replace fans in my UPS?

A: Eaton recommends full fan replacements at the same time as full capacitor replacements. (This is typically around seven years of service for most Eaton UPS modules.) Replacing capacitors and fans during the same maintenance window saves labor expense and maintains consistency for replacement.

Q: What is the benefit of a full fan replacement?

A: The benefit of a full fan replacement at a fixed interval is to avoid multiple fans within the UPS reaching end-of-life at the same time. This could result in a system transfer to bypass at a high ambient temperature and/or from operating at high loads. In extreme cases, the UPS might overheat and shut down if too many fans are not able to operate at rated speed.

Q: Why aren't full fan replacements covered under my service contract?

A: Individual fan failures are covered under Eaton service contracts with full parts and labor coverage.

Full fan replacements, like full battery and full capacitor replacements, are excluded as these components are high-wear, consumable parts and part of normal lifecycle replacement costs. Proactive full replacements of fans, batteries and capacitors are recommended to ensure UPS reliability and continued performance.

Here's an overview of the estimated capacitor useful life and types of capacitors inside Eaton UPSs. We recommend doing full fan replacements at 6-7 years at the same time as full capacitor replacements for most models.

Capacitor type	9330	9355	93E	93PM 208V	93PM 480V	9390	9315	9395	9395 High Performance
DC (Electrolytic)	Life of UPS	Life of UPS	Life of UPS	Life of UPS	10 years	Life of UPS	6 years	Life of UPS	Life of UPS
DC (Oil filled)	N/A	N/A	N/A	N/A	N/A	7 years	N/A	7 years	10 years
AC (Oil filled)	7 years	N/A	N/A	N/A	N/A	7 years	7 years	7 years	10 years

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