

# Medium Voltage Circuit Breakers Frequently Asked Questions

## ABB AMVAC Magnetically Actuated Circuit Breaker

**Are the permanent magnets dependent on temperature?**

The flux density of Koerdym 280 (neodymium-iron-boron) is reduced only fractions of a percent over a 100 year time period at an ambient temperature of 120°C. When applied in ANSI switchgear rated at 40°C, the permanent magnet will exceed the longevity of the switchgear it is used in.

**Do permanent magnets or armature bearings age due to physical switching operation?**

The AMVAC magnetically actuated breaker has demonstrated 100,000 operations in many tests. UL Laboratories have witnessed testing throughout the development process.



**What is the risk of corrosion over time to the material of permanent magnets?**

The permanent magnets used in the AMVAC breaker element are of the rare earth magnetic material neodymium-iron-boron. The risk of corrosion has been virtually eliminated by tin plating and the addition of corrosion inhibiting materials to the magnets.

**How does the magnetic actuated breaker reduce maintenance costs?**

The magnetic actuator is a self-contained mechanism that requires no periodic maintenance or adjustment. The AMVAC breakers only require periodic inspection under normal use.



**Does the physical vibrations caused by switching operations reduce the life of the electronic controller?**

Numerous endurance tests completed as part of the development process have proven the electronic controller to be very durable. No degradation of the controller has been noted.

**Is there risk of corrosion to the laminated core?**

The laminated core is coated with protective paint, resistant to corrosion.

**What is the anticipated lifetime of the components on the electronic controller?**

The empirical, data gained by extensive testing, indicates a lifetime of over 25 years under normal environmental conditions can be expected.



**Are there any concerns with regards to performance over the lifetime of the capacitors?**

The power supply of the AMVAC circuit breaker element provides constant DC voltage without an AC component. This constitutes ideal electrical conditions for operation of electronics. At 50°C, the capacitor lifetime is approximately 45 years.



**Are sensors monitored during the switching operation?**

The sensor logic is included in the self-monitoring system of the electronic controller. The controller will detect an error if a switching command is issued and the sensors do not detect a change in mechanical state.

**Why is magnetic actuation advantageous over traditional mechanical breakers?**

The magnetic actuator provides a more reliable design with greater longevity of the circuit breaker and reduced maintenance costs.

**Why is magnetic actuation more reliable?**

The magnetic actuator design utilizes approximately 90% fewer moving parts than traditional spring charged breakers. This reduction in moving parts provides fewer modes of potential failure and an overall more reliable design.



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**How are the vacuum interrupters replaced when necessary?**

The vacuum interrupters in the AMVAC breaker element are completely embedded in the pole parts. Accordingly, complete breaker poles have to be replaced. This is usually not required during the lifetime of the equipment except under extreme service conditions.

**What is the expected service life of the pole pieces?**

The pole pieces are rated for 30,000 operations at rated current. Additionally, testing has shown that more than 100 operations under short circuit conditions are possible.

**What happens if the auxiliary voltage fails?**

The breaker can be operated electrically until the internal capacitors discharge. Thereafter, the circuit breaker can be opened manually.

**How does the AMVAC breaker store energy?**

The AMVAC breaker with the magnetic actuator uses capacitors integrated directly to the control circuitry internal to the breaker as a means of storing energy.

**What is the mean time between failure (MTBF) of the capacitors?**

The MTBF is 20 years for the capacitors on the AMVAC circuit breaker element.