

Arc Quenching Magnum PXR switchgear



Superior protection – in a flash

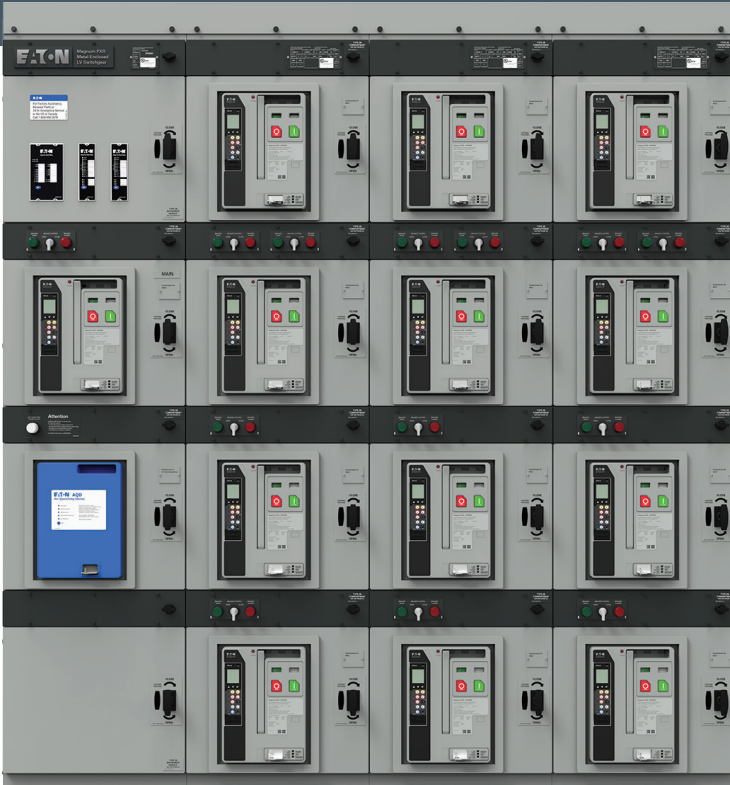
Innovation in arc flash safety

Eaton continues to demonstrate leadership in electrical safety solutions with the introduction of an arc flash quenching system for low-voltage applications. Eaton's Arc Quenching switchgear advances the state-of-the-art for arc flash safety solutions by reducing incident energy to a level where the switchgear will survive an arc flash event, while providing enhanced safety and minimal equipment downtime.

EATON

Powering Business Worldwide

Arc Quenching Switchgear



Incident energy is the amount of energy, at a prescribed distance from the equipment, generated during an electrical arc event. It increases as available fault current and clearing time increase.

Incident energy from an arc flash event destroys electrical equipment, injures personnel and contributes to extended periods of downtime.

Eaton's Arc Quenching switchgear drastically reduces incident energy to provide an unprecedented level of safety, switchgear protection and process uptime.

Incident energy reduction

Complies with NEC section 240.87

- Arc Quenching switchgear detects and mitigates an arcfash in less than 4 ms
- Reacts more than 10 times faster than systems that rely on a circuit breaker to clear an arc fault, such as maintenance switches, ZSI, bus differential relaying and arc detection relays. A faster clearing time results in lower incident energy
- Reduces incident energy below 1.2 cal/cm² which may reduce PPE requirements*
- May reduce arc flash boundaries
- Does not interfere with selective coordination

* For 600 V systems with 100,000 A of available fault current or less at a working distance of 24". End user to determine PPE requirements based on system, application and task.

Methods for arc energy reduction

Methods for arc energy reduction

Arc Quenching switchgear

Arcflash reduction maintenance system™

Bus differential relay

Arc detection relay

Software instantaneous trip

Zone selective interlocking

Incident energy (cal/cm²)

Incident energy reduction

Reduced far below methods that rely solely on a circuit breaker to clear the fault

Enhanced safety

Exceeds ANSI/IEEE C37.20.7 arc-resistant testing requirements

Switchgear protection

Protects valuable switchgear assets from arc flash damage

Reduced downtime

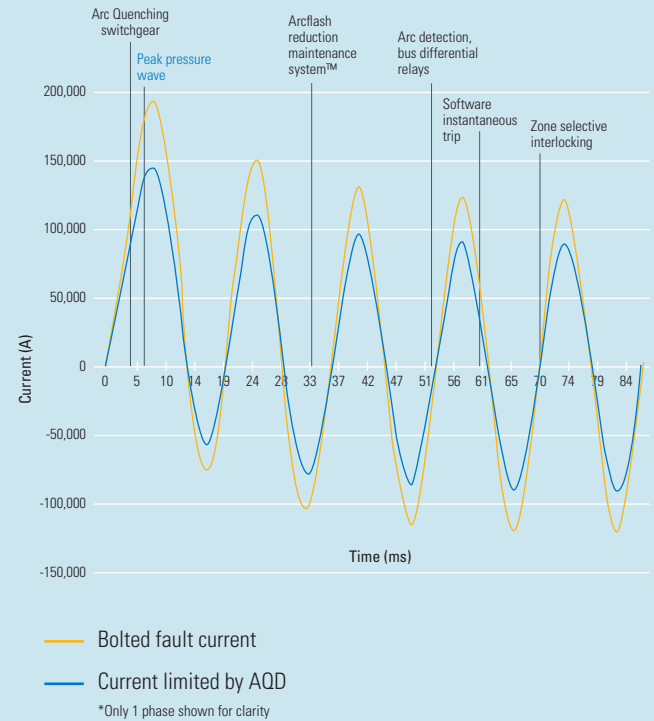
Switchgear can be quickly returned to service after an arc flash event

Enhanced safety

Safety is the highest priority

- Arc Quenching switchgear is tested to the ANSI/IEEE C37.20.7 arc-resistant test guide and third-party listed by UL
- Exceeds testing requirements of C37.20.7 by demonstrating acceptance even when breakers are removed, doors are open and covers are removed
- No venting into the room. Heat, light and toxic arc gases are fully contained inside the Arc Quenching Device (AQD)
- Always-on protection does not require special activation for maintenance activities

Fault current and arc clearing time comparison*



Switchgear protection

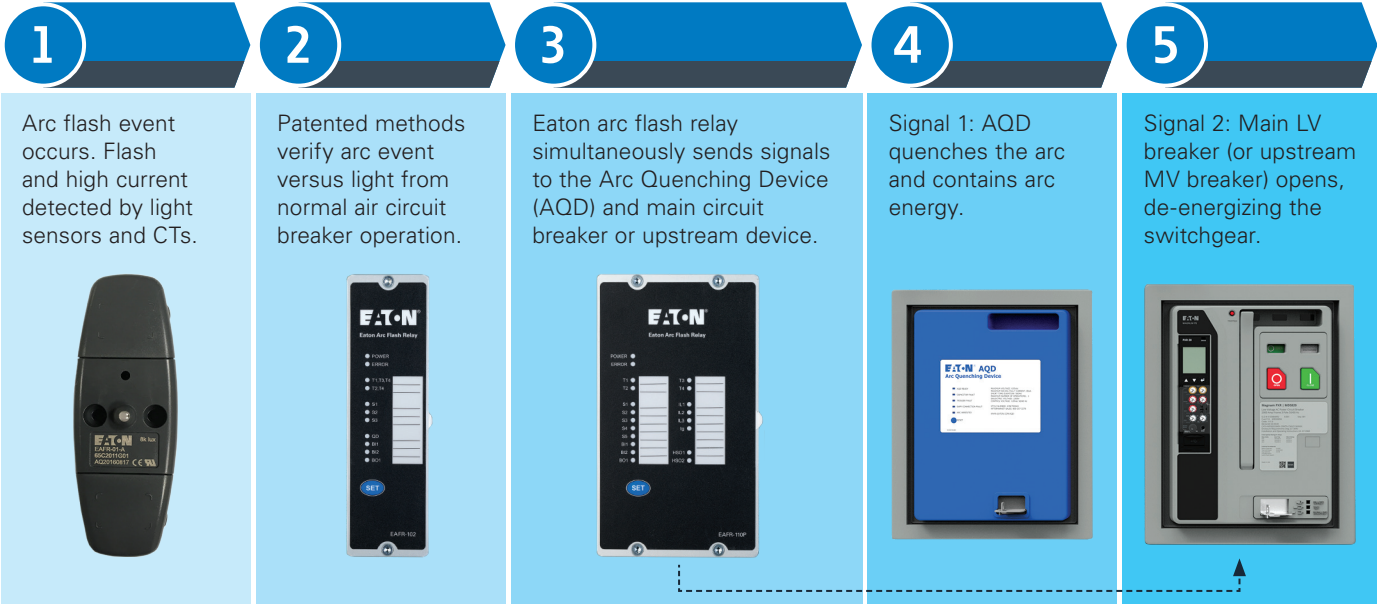
Longevity and asset protection

- Traditional arc-resistant construction does not protect the switchgear from arc flash damage
- Arc Quenching system minimizes or eliminates damage to switchgear in the event of an arc flash
- Reduces peak fault current by at least 25% compared to the prospective bolted fault current
- Reduces peak stress on upstream equipment by at least 44% compared to the prospective bolted fault current

Reduced downtime

Increased uptime and reduced risk

- Arc flash events can damage circuit breakers, compartments, structures and even the entire lineup leading to costly downtime
- Arc Quenching switchgear minimizes or eliminates damage from an arc flash thereby reducing downtime from weeks or months to hours
- Restoring service is accomplished by returning the switchgear to normal operating condition and replacing the draw-out AQD
- Eaton Arc Flash Relay utilizes advanced algorithms to prevent nuisance operation of the AQD due to the light emitted from a power circuit breaker while interrupting a fault external to the switchgear



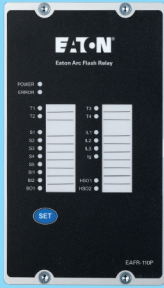
1 Arc flash event occurs. Flash and high current detected by light sensors and CTs.



2 Patented methods verify arc event versus light from normal air circuit breaker operation.



3 Eaton arc flash relay simultaneously sends signals to the Arc Quenching Device (AOD) and main circuit breaker or upstream device.



4 Signal 1: AOD quenches the arc and contains arc energy.



5 Signal 2: Main LV breaker (or upstream MV breaker) opens, de-energizing the switchgear.



Arc quenched in <4 ms **Breaker trips within 67 ms**

Standard features

- Tested to ANSI/IEEE C37.20.7,
- Type 2B test guide in NEMA 1 construction
- Arc Quenching Device (AOD) is a UL Recognized Component per UL 2748
- Arc Quenching switchgear designed to UL 1558, ANSI
- C37.20.1, CSA C22.2 No. 31-10, and C37.51
- Short circuit withstand rating up to 100 kA at 635 Vac
- <4 ms Arc Quenching time
- >25% reduction in peakfault current
- >44% reduction in peak system stress
- Complete system selfsupervision with health status communicated via Modbus and dry contacts
- Available in rear access and front access switchgear configurations
- Anti- nuisance trip technology
- Arc Quenching switchgear available from 480 V to 600 V

Enclosure configurations

Arc Quenching switchgear is available in various enclosure constructions to meet specific application requirements:

Traditional arc-resistant construction

- Active arc-resistant protection and incident energy reduction under normal operating conditions
- Arc-resistant switchgear construction currently only available with Magnum DS switchgear

NEMA 1 construction

- Active arc-resistant protection and incident energy reduction without the need for ducts, plenums, or special enclosure construction
- Reduced installation costs and reduced overhead clearance requirements compared to traditional arc-resistant switchgear

NEMA 3R (walk-in) construction

- Industry-exclusive NEMA 3R arcresistant protection
- Arc-resistant protection and incident energy reduction for outdoor switchgear

How the Arc Quenching device works

When the AOD receives a trigger signal from the Eaton Arc Flash Relay, it produces a lower impedance arc in a controlled micro-environment within the Arc Containment Vessels located in the AOD. The lower impedance arc collapses the voltage and immediately extinguishes the unintended arcing fault as the current begins to flow into the AOD. This quenching operation occurs in less than 4 ms. The arcing continues safely contained inside the AOD until the upstream power circuit breaker trips.

Configuration comparison

	UL 1558 metal-enclosed	C37.20.7 Arc-resistant	Passive system	Active system	Equipment protection	Reduced downtime
Arc-Resistant switchgear + Arc Quenching system	•	•	•	•	•	•
Arc Quenching switchgear *	•	•		•	•	•
Arc-Resistant switchgear	•	•	•			
Standard switchgear	•					

*Arc-resistant switchgear construction currently only available with Magnum DS, Magnum PXR version will be releasing in the second half of 2022.

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