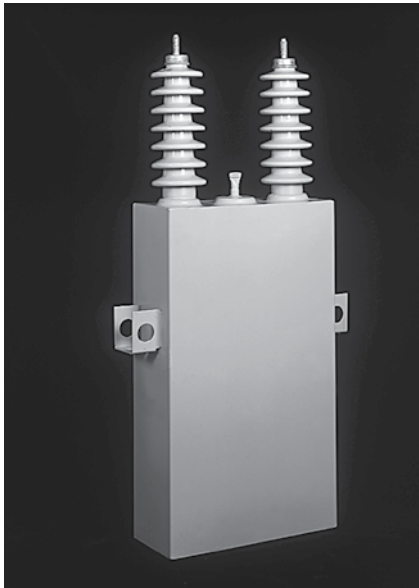


# EX<sup>®</sup>-7Li and EX<sup>®</sup>-7Fi single-phase internally fused medium-voltage capacitor units



## General

Eaton's EX<sup>®</sup>-7Li and EX-7<sup>®</sup>Fi all-film internally fused capacitors, a Cooper Power™ series product, feature design innovations; extended foil, solderless connections, CLEANBREAK™ element fusing system and both laser-cut and folded edge aluminum foil. Designed, manufactured, and tested to meet or exceed the requirements of all applicable ANSI®, IEEE®, and IEC standards, their low cost per kvar makes these capacitors a simple, economical source of reactive power on electric power systems for:

- Power factor correction
- Voltage support
- Loss reduction
- Improving power transfer capability
- Releasing system capacity.

Internally fused, power capacitors can be installed individually or in factory-assembled switched or unswitched:

- Open style indoor and substation banks
- Metal enclosed banks

**Note:** Eaton does not recommend the use of internally fused capacitors on pole-mounted, distribution rack applications or in any capacitor bank configuration without unbalance protection.

Eaton's exclusive all-film, extended foil/mechanically connected capacitors provide:

- Low dielectric losses (0.05 watt/kvar)
- Superior electrical performance and reliability
- Environmentally acceptable Edisol® VI Non-PCB dielectric fluid
- CLEANBREAK element fusing system



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## Capacitor application

Capacitor application requires an evaluation of the power system to determine:

- The kvar requirements
- The most effective location
- Interaction with system
- The necessary protection

In general, capacitors are installed:

- At the substation, to supply the system kvar needs most effectively
- At or near the load center, to obtain the optimum kvar supply and voltage correction
- At the end of the line, to achieve maximum voltage correction
- In series with a distribution feeder to minimize flicker and provide voltage support
- In series with a transmission line to minimize the reactance of the line, improving stability and controlling voltage drop

## Ratings

Capacitors from Eaton are rated in continuous kvar, voltage, BIL and frequency and are subjected to all applicable ANSI®, IEEE®, or IEC routine tests. The capacitor unit rated voltage is the voltage at rated frequency that can be applied terminal-to-terminal continuously. See the standard to which the capacitor unit is manufactured for guidance in operation above rated voltage.

Single-phase capacitor units are designed to produce rated kvar at rated voltage and frequency within the tolerance of the applicable standard. As the capacitor's kvar output is proportional to the square of the applied voltage, proper application requires attention to the applied voltage.

Available capacitor unit ratings can be obtained by contacting the factory.

## Construction features

Construction features of Eaton power capacitors include:

- CLEANBREAK element fusing system. Each element is protected with a series connected CLEANBREAK current limiting fuse. This patented fusing system incorporates the following features:
  - Polymer fuse card provides isolated fuse mounting which prevents potential damage to adjacent capacitor elements and fuses
  - Fuses are individually mounted within a polymer fuse tube. The tube protects the fuse from damage due to adjacent element failures and fuse operations. This design also requires no paper in the fusing dielectric, thereby eliminating the generation of extensive carbon arc by-products in the dielectric fluid. This significantly improves the dielectric performance by preventing fluid contamination and promotes proper clearing of element fuse.
  - The CLEANBREAK fuse operates in a current limiting mode to chop the fault current into the failed element. This prevents the energy stored in the parallel connected elements from being discharged into the fault thus minimizing gassing and damage to the failed element and adjacent dielectric.
- EX mechanical connection system. Provides solderless internal connections that eliminate localized heating and cold solder joints. The EX crimping system also allows 100% inspection during assembly assuring integrity of internal connections and maximizes operational safety.
- Individual closed loop capacitor fluid impregnation system. Assures superior fluid impregnation and gas molecule evacuation

resulting in low infantile failure rates and long lasting electrical performance.

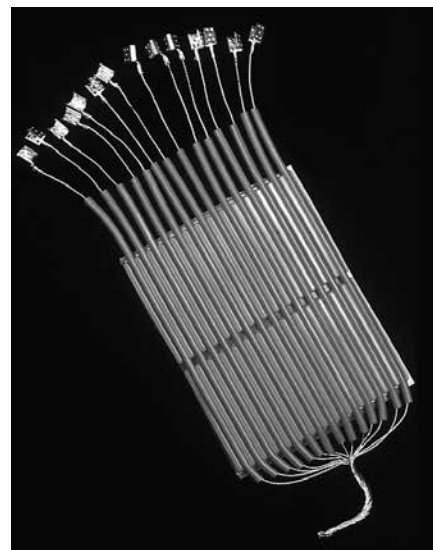
- Stainless steel tank with light-gray finish for resistance to severely corrosive atmospheres. Tank is finished with an epoxy primer and a urethane topcoat coating system. This system has been tested to the ANSI® C57.12.31 pole mounted standard and the ANSI® C57.12.29 coastal environment standard.
- High stacking factor design utilizing aluminum foil electrodes with a laser-cut or folded foil active edge. The region of the dielectric exposed to the highest electric field stress is located at the active edge of the electrode. The high stacking factor and the rounded active edge shapes and reduces the electric field stress thereby significantly increasing the discharge inception voltage (DIV). Given their high DIV capability, Eaton capacitors are designed to have the highest design margin to DIV in the industry.
- Light-gray, wet-process-porcelain bushings; glazed for high strength and durability and hermetically sealed to the capacitor tank. Single piece cover construction provides superior sealing characteristics.
- Stainless-steel mounting brackets with industry-standard 397 mm mounting centers for unit interchangeability; under-side of each bracket is unpainted to properly establish tank potential
- Parallel-groove terminals accommodate copper or aluminum conductors from No. 8 solid to No. 1 stranded. Parallel-groove connectors are supplied on all capacitors sold as individual units
- Internal discharge resistors that reduce terminal voltage as specified per the relevant ANSI®, IEEE®, or IEC standards
- Stainless-steel nameplate containing required IEC or IEEE® data. Nameplate lettering is mechanically scribed to ensure long lasting performance. Nameplate is mechanically secured to the tank ensuring that it will remain in place throughout the life of the capacitor.
- Blue non-PCB decal

**Table 1. Bushing Characteristics and Weights**

<b>BIL (kV)</b>	<b>Creepage Distance in. (mm)</b>	<b>Strike Distance in. (mm)</b>	<b>50/60-Hz Withstand</b>	
			<b>60-Sec. Dry (kV)</b>	<b>10-Sec. Wet (kV)</b>
95*	12.00 (305)	6.25 (158)	35	30
150**	22.00 (559)	9.50 (241)	60	50
200	32.00 (813)	14.00 (355)	80	75

\* The bushings used in 95 kV BIL rated capacitors are also capable of meeting 110 kV BIL and are used in 110 kV BIL rated capacitors.

\*\* The bushings used in 150 kV BIL rated capacitors are also used in 125 kV BIL rated capacitor designs.

**Figure 1. CLEANBREAK fuse protection system.**