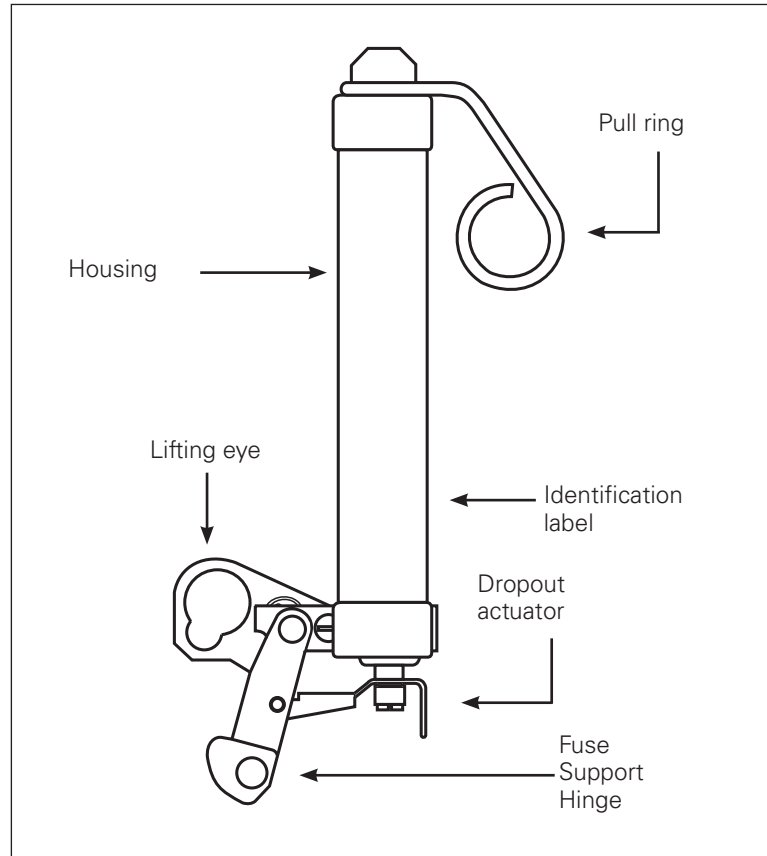


ELF™ Current-Limiting Dropout Fuse Installation Instructions



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Safety for life



Eaton's Cooper Power series products meet or exceed all applicable industry standards relating to product safety. We actively promote safe practices in the use and maintenance of our products through our service literature, instructional training programs, and the continuous efforts of all Eaton employees involved in product design, manufacture, marketing and service.

We strongly urge that you always follow all locally approved safety procedures and safety instructions when working around high-voltage lines and equipment and support our "Safety For Life" mission.

Safety information

The instructions in this manual are not intended as a substitute for proper training or adequate experience in the safe operation of the equipment described. Only competent technicians, who are familiar with this equipment should install, operate and service it.

A competent technician has these qualifications:

- Is thoroughly familiar with these instructions.
- Is trained in industry-accepted high- and low-voltage safe operating practices and procedures.
- Is trained and authorized to energize, de-energize, clear, and ground power distribution equipment.
- Is trained in the care and use of protective equipment such as flash clothing, safety glasses, face shield, hard hat, rubber gloves, clampstick, hotstick, etc.

Following is important safety information. For safe installation and operation of this equipment, be sure to read and understand all cautions and warnings.

Hazard Statement Definitions

This manual may contain four types of hazard statements:

DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION

Indicates a hazardous situation which, if not avoided, may result in equipment damage only.

Safety instructions

Following are general caution and warning statements that apply to this equipment. Additional statements, related to specific tasks and procedures, are located throughout the manual.

DANGER

Hazardous voltage. Contact with high voltage will cause death or severe personal injury. Follow all locally approved safety procedures when working around high- and low-voltage lines and equipment.

WARNING

Before installing, operating, maintaining, or testing this equipment, carefully read and understand the contents of this manual. Improper operation, handling or maintenance can result in death, severe personal injury, and equipment damage.

WARNING

This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply may result in death, severe personal injury and equipment damage.

WARNING

Power distribution and transmission equipment must be properly selected for the intended application. It must be installed and serviced by competent personnel who have been trained and understand proper safety procedures. These instructions are written for such personnel and are not a substitute for adequate training and experience in safety procedures. Failure to properly select, install or maintain power distribution and transmission equipment can result in death, severe personal injury, and equipment damage.

ELF™ Current-Limiting Dropout Fuse Installation Instructions

CAUTION

Eaton's Cooper Power series ELF Current-Limiting Dropout Fuse is designed to be operated in accordance with normal safe operating procedures. These instructions are not intended to supersede or replace existing safety and operating procedures. **READ ALL THE INSTRUCTIONS BEFORE INSTALLING THE ELF DROPOUT FUSE.**

The ELF dropout fuse should be installed and serviced only by personnel familiar with good safety practice and the handling of high-voltage electrical equipment.

Product information

Introduction

Eaton's Cooper Power series ELF™ Current-Limiting Dropout Fuse is designed for use in an interchangeable cutout mounting, as indicated in Table 1, that is presently used for expulsion fuses. The ELF dropout fuse provides full-range current-limiting response to limit fault current and energy let-thru levels. The ELF dropout fuse operates silently without the shower that exists with an expulsion fuse. This offers increased safety to line personnel during circuit energization operations. In addition, the reliable drop open design makes fault location easy.

Read this manual first

Read and understand the contents of this manual and follow all locally approved procedures and safety practices before installing or operating this equipment.

Additional information

These instructions cannot cover all details or variations in the equipment, procedures, or process described nor provide directions for meeting every possible contingency during installation, operation, or maintenance. When additional information is desired to satisfy a problem not covered sufficiently for the user's purpose, please contact your Eaton representative.

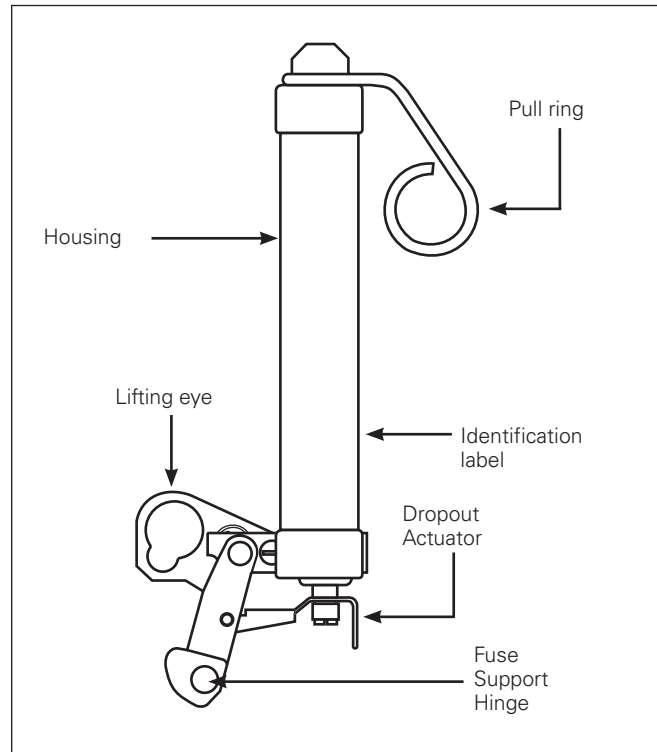


Figure 1. Line illustration of ELF dropout fuse

Acceptance and initial inspection

Each ELF fuse is completely inspected at the factory and will be in good condition when accepted by the carrier for shipment. Upon receipt of the ELF fuse, inspect it thoroughly for damage and loss of parts incurred during shipment. If damage or loss is discovered, file a claim with the carrier immediately.

Handling and storage

If the ELF fuse is to be stored for an appreciable time before installation, provide a clean, dry storage area. Store the ELF fuse so as to minimize the possibility of physical damage.

Quality standards

ISO 9001 Certified Quality Management System

Application

The ELF fuse is designed to be used to protect poletype transformers, single- and three-phase laterals and underground taps. The ELF fuse is designed to be mounted in 15 kV and 27 kV, (110 kV, 125 kV or 150 kV BIL) rated interchangeable open distribution cutouts including MacLean/S&C Type XS™, Hubble Type C™ and ABB Type ICX™ cutouts. Designs for use in 35 kV (170 kV BIL) rated ABB Series V™ cutouts are also available.

The fuse amp rating is selected using the user's fusing schedule as it relates to transformer kVA size and/or system coordination. (Standard recommendations are available from your Eaton representative upon request.)

The voltage ratings recommended for the ELF fuse on most commonly encountered distribution systems are listed in Table 1.

Table 1. Recommended ELF current-limiting dropout fuse voltage ratings

System voltage (kV)		Recommended fuse ratings (kV)			
		Four-wire multi-grounded neutral		Three-wire wye or delta	
Nominal	Maximum	Single-phase	Three-phase	Single-phase (Line-to-line)	Three-phase
2.4	2.54	–	–	8.3	8.3
4.16/2.4	4.4/2.54	8.3	8.3	–	–
4.16	4.4	–	–	8.3	8.3
4.8	5.08	–	–	8.3	8.3
6.9	7.26	–	–	8.3	8.3
7.2	7.62	–	–	8.3	8.3
7.97	8.4	–	–	8.3	8.3
8.32/4.8	8.8/5.08	8.3	8.3	–	–
11.0	12.0	–	–	15	15
12.0/6.93	12.7/7.33	8.3	15 or 8.3a	–	–
12.47/7.2	13.2/7.62	8.3	15 or 8.3a	–	–
12.47	13.2	–	–	15	15
13.2/7.62	13.97/8.07	8.3	15 or 8.3a	–	–
13.2	13.97	–	–	15	15
13.8/7.97	14.52/8.38	8.3	15 or 8.3a	–	–
13.8	14.52	–	–	15	15
14.4	15.24	–	–	15	15
16.3	17.1	–	–	15c	15c
20.78/12.0	22.0/12.7	15	23 or 15a	–	–
22.0	24.0	–	–	23b	23b
22.86/13.2	24.2/13.97	15	23 or 15a	–	–
23.0	24.34	–	–	23b	23b
24.9/14.4	26.4/15.24	15	15a,c	–	–
34.5/19.92	36.51/21.08	23	–	–	–

Note: a- This lower voltage fuse rating may be used if either of the following conditions are met:

1) If the probability of a line-to-line or a three-phase ungrounded fault is very low.

-or-

2) If all of the below conditions are met:

- If the probability of a three-phase ungrounded primary fault is very low.
- If a secondary breaker or other series connected device is used to interrupt secondary faults.
- If no more than 50% of the secondary load is delta connected.
- If the line-to-line primary fault current is high enough to assure simultaneous operation of two fuses by melting at a maximum of 0.2 seconds.

b- A 23 kV rated fuse is recommended where 125 kV BIL interchangeable cutout mountings are used and a 24 kV rated fuse is recommended where 170 kV BIL interchangeable cutout mountings are used.

c- 15 kV, 125 kV BIL, 6 through 25 A (single barrel part numbers FAK44W6 through FAK44W25) and 30 through 50 A (double barrel part numbers FAK44W30P, FAK44W40, and FAK44W50) are recommended for this application.

ELF™ Current-Limiting Dropout Fuse Installation Instructions

Installation

An ELF dropout fuse is installed into an interchangeable cutout per the following steps:

- With a clampstick, hook the lifting eye of the ELF fuse.
- Raise the fuse towards the lower contact of the interchangeable cutout. Lower the fuse support hinge into the lower contact.
- Move the hook of the clampstick into the pull ring of the ELF fuse.
- To properly close, the operator should rotate the ELF fuse to an intermediate position shown in Figure 2.
- Quickly and firmly (with minimal side thrust) drive the ELF fuse into the upper contact of the interchangeable cutout.

CAUTION

If a fault is present when installing an ELF fuse, the dropout actuator will operate. When the clampstick is removed, the ELF fuse will drop open. The operator will be unable to permanently close the operated ELF fuse into the upper contact of the cutout.

Removal

Always use a loadbreak device to open an energized cutout with an ELF dropout fuse. Follow manufacturers' recommendations for operation of loadbreak tools or cutouts which are designed to break load current.

CAUTION

As always when working near live high voltage equipment follow all approved safety practices when installing or removing an ELF fuse.

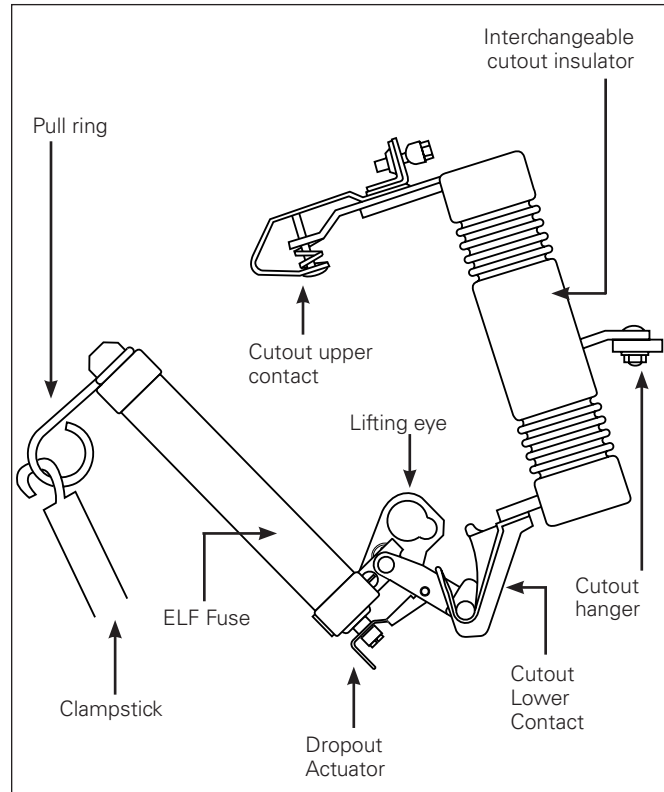


Figure 2. Intermediate position for the installation of ELF fuse into interchangeable cutout

Operation

When the ELF fuse clears a fault, the dropout actuator operates and allows the fuse to drop open in the cutout. (Refer to Figure 3.)

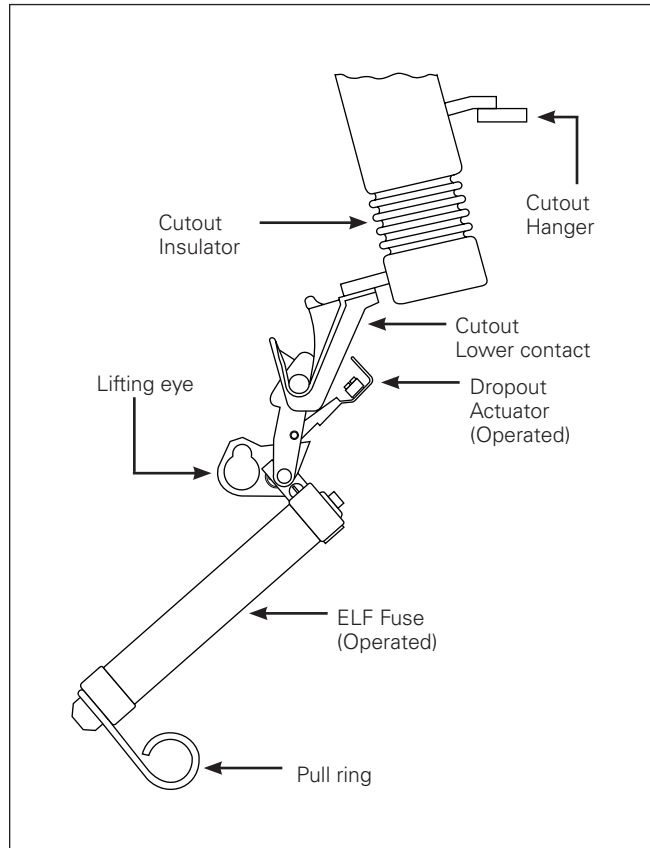


Figure 3. ELF fuse in interchangeable cutout after dropping open due to operation of dropout actuator

CAUTION

An ELF fuse open in a cutout with the dropout actuator operated indicates a blown fuse due to an overload or fault condition. Faults and/or visibly failed equipment should be located and repaired before re-installing a replacement ELF fuse.

- Hook a clampstick in the lifting eye of the ELF fuse and remove it from the lower contact of the cutout.
- After verifying proper voltage and current ratings for the application, follow the preceding installation procedures with a new ELF fuse.

CAUTION

If a fault is present when installing an ELF fuse, the dropout actuator will operate. When the clampstick is removed the ELF fuse will drop open. The operator will be unable to permanently close the operated ELF fuse into the upper contact of the cutout.

- If the fault has been cleared, the ELF fuse will remain intact in the upper contact of the cutout.

WARNING

Additional fault locating and repair in accordance with existing procedures should be completed before replacing the ELF fuse for a second time.

Testing

CAUTION

The ELF fuse should not be installed if it has any visual signs of operation and/or damage.

- A continuity test in the field can determine if the fuse element is open. This can be done using an ohmmeter or self-powered continuity tester.
- To confirm the integrity of the current-limiting section, additional shop testing using a micro-ohmmeter to verify the nominal resistance is recommended.

Maintenance

In areas of severe contamination, periodically examine cutouts for build-up. All pivot points must swing freely to assure dropout. Contact surfaces must be free of contaminants.

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