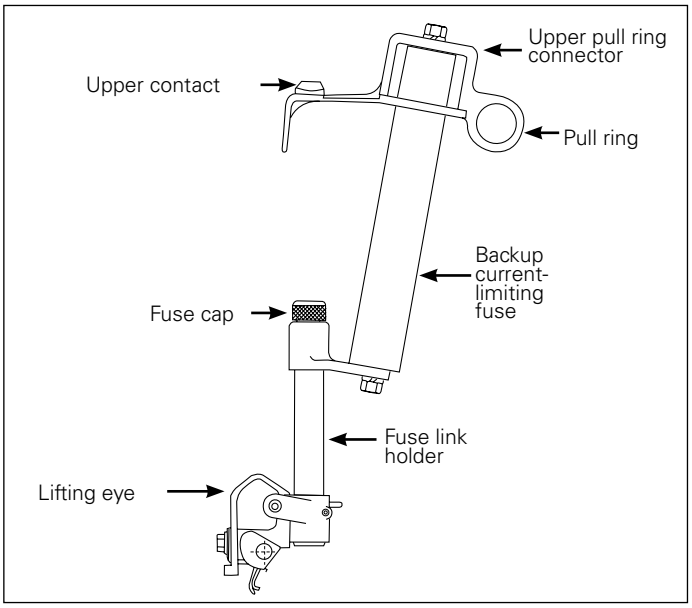
Tandem ELF Current-Limiting Dropout Fuse Installation Instructions



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Contents

Safety for life

Eaton meets or exceeds all applicable industry standards relating to product safety in its Cooper Power™ series products. 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 arc 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 an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

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

CAUTION

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

NOTICE

Indicates a potentially 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 hazardous voltage will cause death or severe personal injury. Follow all locally-approved safety procedures when working around high- and low-voltage lines and equipment. G103.3

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. G101.0

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 can result in death, severe personal injury, and equipment damage. G102.1

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. G122.2

⚠ CAUTION

Eaton's Cooper Power series Tandem ELF Fuse is designed to be installed 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 Tandem ELF Fuse. The Tandem ELF 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 Tandem ELF current-limiting fuse is designed for transformer protection. The Tandem ELF fuse can be applied for fusing single-phase transformers and for fusing three-phase transformers (or three-phase banks of single-phase transformers). This fuse combines the features of a series fuse link and a backup current-limiting fuse in one package. The Tandem ELF fuse (refer to Figure 1) features a unique design for fast replacement of the fuse link after a low fault current operation or excessive transformer overload current or replacement of both the fuse link and backup current-limiting fuse after a high fault current operation. Note that when using recommended fuse links or other properly coordinated fuse links, the fuse link will operate to provide for the dropout action of the Tandem ELF fuse following an interruption.

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, contact your Eaton representative.

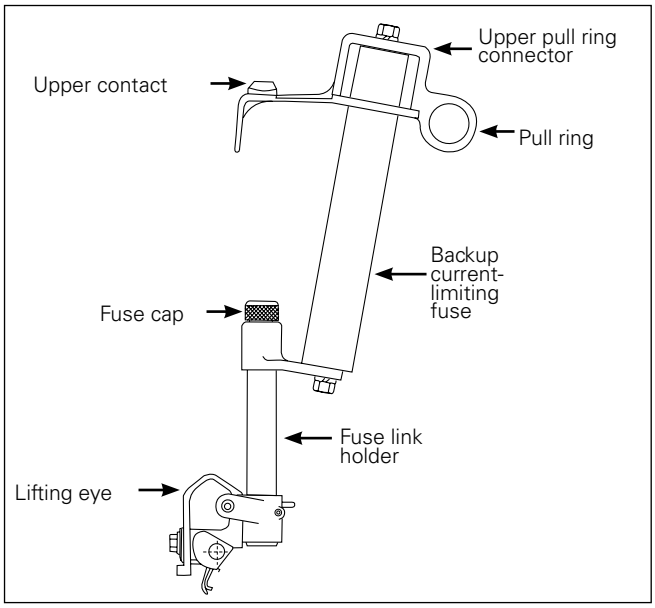

Figure 1. Tandem ELF fuse assembly

Acceptance and initial inspection

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

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

	Coordinates with fuse links up through								
Backup current-Limiting fuse	**Edison type D**	**Kearney type X**	**Kearney type QA**	**NEMA type K**	**Kearney Type 200**	**Edison type N**	**NEMA type T**	**Edison type H**	**Kearney type KS**
25 K	20	10	30	25	20	30	15	8	7

Handling and storage

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

Quality Standards

ISO 9001-Certified Quality Management System

Application

When selecting the proper size Tandem ELF fuse for each installation; transformer current, system voltage, and upstream coordination should be taken into account.

The Tandem ELF fuse uses the 25 K Companion II backup current-limiting fuse. This Companion II fuse rating indicates the largest Type K-rated fuse link that properly coordinates with the fuse. The highest current ratings for other fuse link types that will properly coordinate with the Tandem ELF backup current-limiting fuse are shown in Table 1.

The voltage ratings recommended for the Tandem ELF fuse on most commonly encountered distribution systems are listed in Table 2.

For further information concerning the coordination of the Tandem ELF fuse see Eaton's Cooper Power series catalog section CA132028EN or contact your Eaton representative.

Installation procedure

The Tandem ELF fuse is shipped only with the backup current-limiting fuse installed. Remove the fuse link (if supplied and of the proper rating) from the package and install into Tandem ELF fuse following the instructions below:

Note: If the fuse link is not supplied, select the correct fuse link ampere size based on the application section in catalog section CA132028EN and with the current rating for the respective fuse link type selected not to exceed the values shown in Table 1 of these instructions.

Table 2. Tandem ELF Fuse Voltage Application

System voltage (kV)		Recommended Tandem ELF fuse Voltage class rating (kV)	
Nominal	**Maximum**	**Wye**	**Delta**
2.4	2.54	–	15
2.4/4.16	2.54/4.4	15	–
4.16	4.4	–	15
4.8	5.1	–	15
4.8/8.32	5.1/8.8	15	–
6.9	7.26	–	15
6.93/12.0	7.3/12.7	15	–
7.2	7.62	–	15
7.2/12.47	7.62/13.2	15	–
7.62	8.1	–	15
7.62/13.2	8.1/14.0	15	–
7.97	8.4	–	15
7.97/13.8	8.4/14.5	15	–
8.32	8.8	–	15
8.32/14.4	8.8/15.2	15	–
12/20.8	12.7/22.0	27	–
12.47	13.2	–	15*
13.2/22.9	14/24.2	27	–
13.2	13.9	–	15*
13.8	14.5	–	15*
14.4/24.9	15.2/26.4	27	–
14.4	15.2	–	15*
19.94/34.54	21.1/36.5	27	–
23.0	24.3	–	27*

* For single-phase applications on delta systems, one Tandem ELF fuse of this rating is required in each phase.

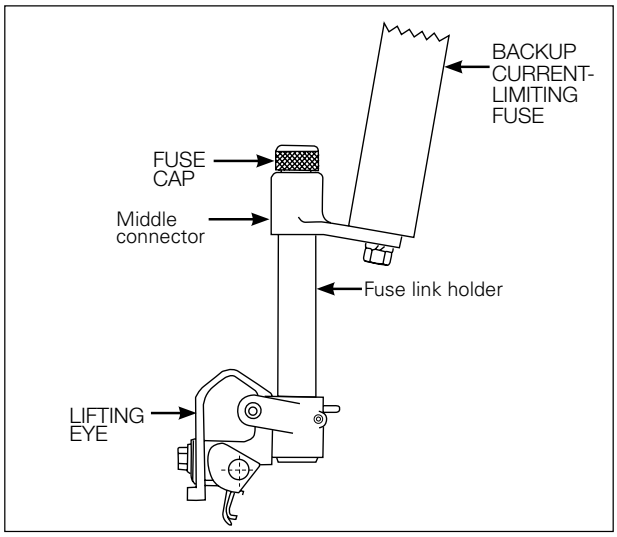

Figure 2. Tandem ELF fuse link holder assembly

Installing a fuse link in fuse link holder

1. **Remove the fuse cap** from the middle connector of the fuse link holder assembly. See Figure 2.
2. **Insert the fuse link,** cable end first, into the top of the fuse link holder and pull out at the lower end or in accordance with the fuse link manufacturer's instructions.
3. **Replace the fuse cap** on the fuse link holder middle connector and tighten with a wrench.
4. **Holding the lower end of the fuse link holder, depress the latch, feed the cable over the latch and around the fuse link clamping nut in a clockwise direction to prevent strand breakage when the clamping nut is tightened.** See Figure 3.
5. **While maintaining tension of the fuse link cable, tighten the fuse link clamping nut with a wrench.**
6. **Cut excess fuse link cable.**

Note: Never insert excess leader into fuse link holder tube.

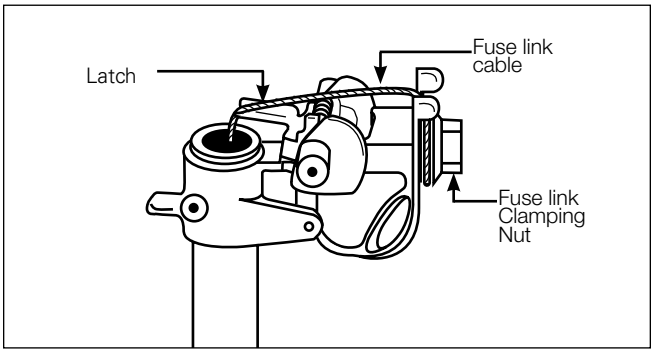

Figure 3. Installation of a fuse link into the fuse link holder

Installing a tandem ELF fuse in cutout

Once the fuse link has been installed in the fuse link holder:

1. Insert the hook stick into the Tandem ELF fuse's lifting eye.
2. Place the Tandem ELF fuse into the hinge of the cutout. See Figure 4.

⚠ WARNING

When using the Tandem ELF fuse in the cutout, hot gasses and high velocity particles are expelled from fuseholder during interruption. This expulsion could cause serious injury.

⚠ CAUTION

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

3. Remove the hook stick.
4. Take a position well clear of the vented end and exhaust path of the cutout in the closed position and then place the hook stick in the pull ring on the upper connector of the Tandem ELF fuse.
5. Rotate the Tandem ELF fuse to an intermediate position as in Figure 5.
6. While looking away from the cutout, quickly and firmly (with minimal side thrust) drive the Tandem ELF fuse into the upper contact of the interchangeable cutout.
7. Remove the hook stick from the pull ring carefully to avoid opening the Tandem ELF fuse.

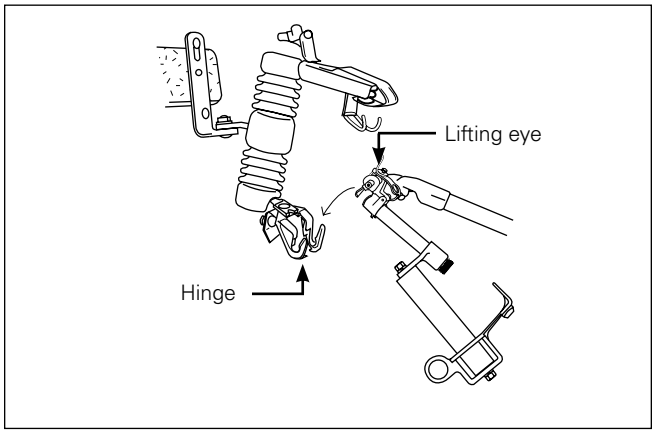

Figure 4. Inserting a Tandem ELF fuse into the interchangeable cutout

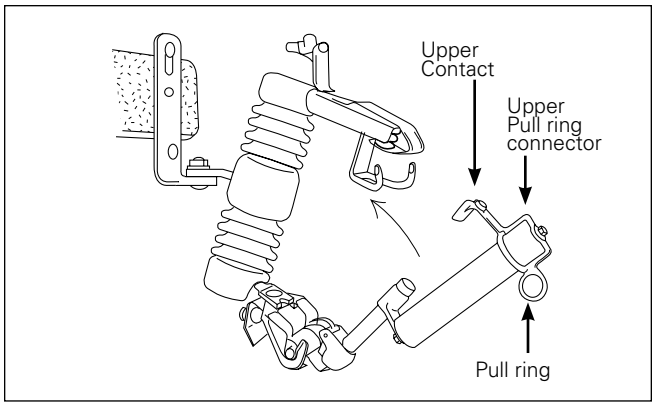

Figure 5. Closing the Tandem ELF fuse into the interchangeable cutout

⚠ WARNING

Do not attempt to interrupt load current by pulling on the Tandem ELF fuse pull ring to open the cutout. An arc started by opening a cutout under load in this manner could cause injury or damage to equipment.

Note: Interchangeable cutouts are equipped with hooks for use with a loadbreak tool. To open the Tandem ELF fuse from the cutout, use ONLY an approved loadbreak tool designed for use with cutouts and follow the instructions provided with such tool.

Operation and refusing

⚠ CAUTION

Only qualified personnel should operate a cutout. Such personnel should always wear appropriate protective equipment such as rubber gloves, hard hats, safety glasses, etc., in accordance with established utility and safety practices.

⚠ CAUTION

A Tandem ELF fuse open in a cutout indicates a blown fuse due to an overload or fault condition. Faults and/or visibly failed equipment should be located and repaired before refusing a Tandem ELF fuse.

When the Tandem ELF fuse (refer to Figure 6) operates, the fuse will drop open in the cutout.

Removal of the tandem ELF fuse

1. **Insert a hook stick into the lifting eye of the Tandem ELF fuse and remove it from the hinge of the cutout.**

⚠ CAUTION

If the Tandem ELF fuse operates for a high current fault, the backup current-limiting fuse may be hot enough to cause burns. Wear gloves and handle the Tandem ELF fuse by the fuse link holder to avoid burns.

Testing of the backup current-limiting fuse

The backup current-limiting fuse should always be tested after an operation of the Tandem ELF fuse.

1. **Perform a continuity check on the backup current-limiting fuse as shown in Figure 7.**

⚠ CAUTION

Failure to check the Tandem ELF's backup current-limiting fuse may result in placing an operated/damaged fuse back in service. This could result in personal injury, fire, or equipment damage.

2. **If the backup current-limiting fuse does not have continuity,** change out the fuses as described in "Refusing the Backup Current-Limiting Fuse" on page 6. **If the fuse does have continuity,** skip to "Refusing Fuse Link in Fuse Link Holder" on page 6.

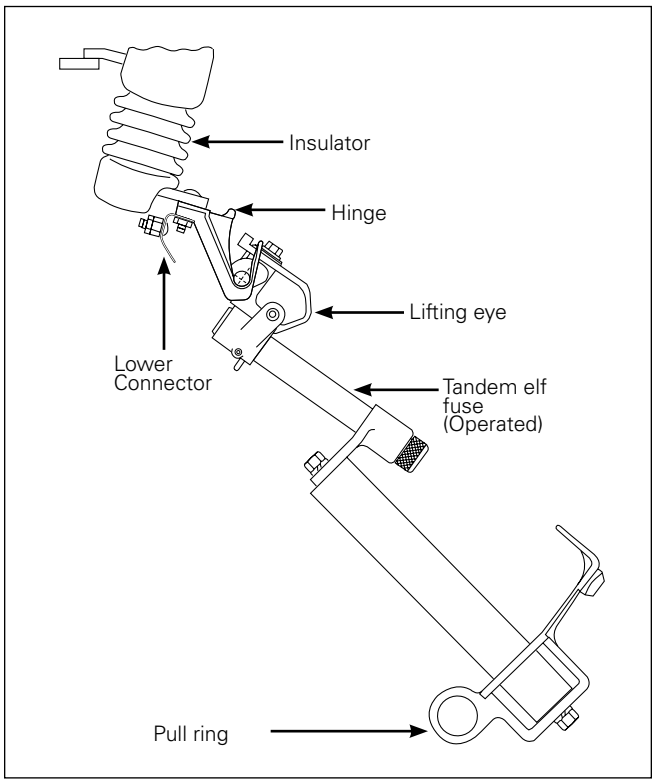

Figure 6. Tandem ELF fuse in Type L cutout after operation

Refusing the backup current-limiting fuse

1. **Remove the backup current-limiting fuse by unbolting it from the middle connector.**
2. **Unbolt the upper pull ring connector from the backup current-limiting fuse and replace with a new backup current-limiting fuse.** Bolt the reused upper pull ring connector to the new backup current-limiting fuse noting proper engagement of the alignment key. See Figure 8.
3. **Bolt the backup current-limiting fuse to the middle connector noting proper engagement of the alignment key as shown in Figure 8.**

Refusing the fuse link in fuse link holder

1. **Remove the fuse cap and then the operated fuse link from the fuse link holder of the Tandem ELF fuse.**
2. **Visually inspect the fuse link holder bore and remove any debris.**
3. **Continue with the steps outlined in "Installing a Fuse Link in Fuse Link Holder"** on page 2.

Maintenance

Refer to ANSI Standards (C37.48) as a general guide for maintenance of the cutout.

1. **Periodically inspect the fuse link at the lower end of the fuse link holder for evidence of corrosion.**
2. **Replace fuse links which show signs of deterioration** (broken strands, heavy corrosion, etc).
3. **Replace broken or cracked porcelain and clean or replace if heavily contaminated.**
4. **Inspect contacts for excessive pitting or burning and replace as necessary.**
5. **Check the fuse link holder fiber liner for cracking or excessive erosion.** If cracked or if the I.D. is larger than 0.45", then replace the fuse link holder.
6. **If the fuse link holder shows any signs of electrical tracking it should be replaced.**

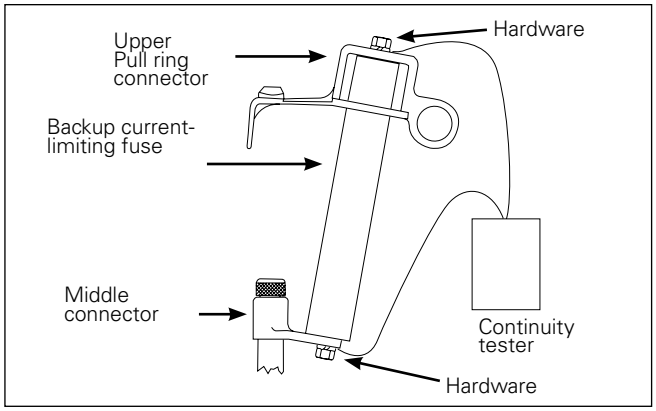

Figure 7. Testing/refusing the backup current-limiting fuse

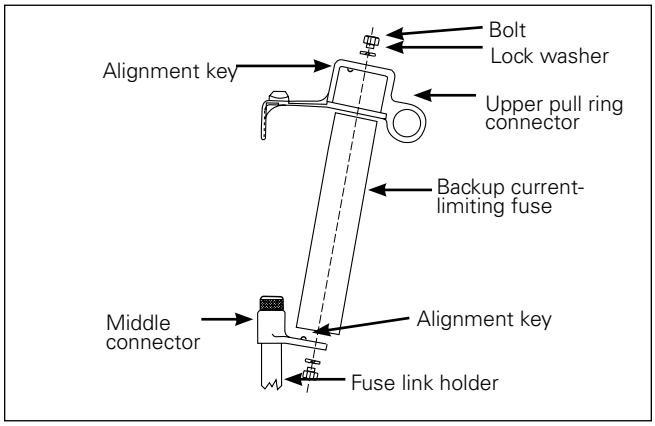

Figure 8. Refusing the backup current-limiting fuse

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