Fusing Equipment
MN132010EN

Effective February 2016
Supersedes S240-64A-1 October 1998

COOPER POWER SERIES

K-Limiter back-up current-limiting fuse installation instructions

Powering Business Worldwide

DISCLAIMER OF WARRANTIES AND LIMITATION OF LIABILITY

The information, recommendations, descriptions and safety notations in this document are based on Eaton Corporation's ("Eaton") experience and judgment and may not cover all contingencies. If further information is required, an Eaton sales office should be consulted. Sale of the product shown in this literature is subject to the terms and conditions outlined in appropriate Eaton selling policies or other contractual agreement between Eaton and the purchaser.

THERE ARE NO UNDERSTANDINGS, AGREEMENTS, WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY, OTHER THAN THOSE SPECIFICALLY SET OUT IN ANY EXISTING CONTRACT BETWEEN THE PARTIES. ANY SUCH CONTRACT STATES THE ENTIRE OBLIGATION OF EATON. THE CONTENTS OF THIS DOCUMENT SHALL NOT BECOME PART OF OR MODIFY ANY CONTRACT BETWEEN THE PARTIES.

In no event will Eaton be responsible to the purchaser or user in contract, in tort (including negligence), strict liability or otherwise for any special, indirect, incidental or consequential damage or loss whatsoever, including but not limited to damage or loss of use of equipment, plant or power system, cost of capital, loss of power, additional expenses in the use of existing power facilities, or claims against the purchaser or user by its customers resulting from the use of the information, recommendations and descriptions contained herein. The information contained in this manual is subject to change without notice.

Contents

SAFETY INFORMATION

Safety Information . . . . . **iv**

PRODUCT INFORMATION

Introduction **1**

Acceptance and Initial Inspection **1**

Handling and Storage **1**

Quality standards **1**

General **1**

Application **1**

INSTALLATION INSTRUCTIONS **2**

OPERATION INSPECTION **3**

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.

CAUTION

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. G122.3

Product information

Introduction

Eaton provides installation instructions in *Service Information MN132010N* for its Cooper Power™ series K-Limiter back-up current-limiting fuse.

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 can not cover all details or variations in the equipment, procedures, or processes described nor provide directions for meeting every possible contingency during installation, operation, or maintenance. For additional information, please contact your Eaton representative.

Acceptance and initial inspection

Each fuse is completely assembled, tested, and inspected at the factory. It is in good condition when accepted by the carrier for shipment. Upon receipt, inspect the shipping container for signs of damage. Unpack the fuse and inspect it thoroughly for damage incurred during shipment. If damage is discovered, file a claim with the carrier immediately.

Handling and storage

Be careful during handling and storage of the fuse to minimize the possibility of damage. If the fuse is to be stored for any length of time prior to installation, provide a clean, dry storage area.

Quality standards

ISO 9001 Certified Quality Management System

⚠ CAUTION

The K-Limiter back-up current-limiting 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 instructions before re-fusing a K-Limiter back-up current-limiting fuse.

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

General

Eaton's Cooper Power series K-Limiter fuse is a partial range, back-up current-limiting fuse designed to be used in series with a fused cutout or similar fuse capable of interrupting currents up to and including the minimum interrupting current of the K-Limiter fuse. The K-limiter fuse limits the energy input during a high fault current condition.

Application

When selecting the proper size K-Limiter fuse for each installation, continuous current, voltage rating, and both upstream and downstream coordination should be taken into account.

The K-Limiter fuse rating indicates the largest ANSI® Type K-rated fuse link that properly coordinates with the fuse. Select a K-Limiter fuse size that is greater than or equal to the K-fuse size used in the cutout at that location. For fuse links other than Type K links, select the proper link based on Table 1. For other fuse links recommendations contact your Eaton representative.

The voltage ratings recommended for the K-limiter fuse on most commonly encountered distribution systems are listed in Table 2.

For further information concerning the coordination of the K-Limiter fuse, see *Catalog CA132059EN K-Limiter High Ampere Companion II Fuse* or contact your Eaton representative.

⚠ WARNING

When installing on hot lines, be sure to observe proper clearances between live and de-energized parts. Use only approved safety practices.

⚠ CAUTION

Carefully connect the K-Limiter fuse to avoid placing excessive cantilever loading on the fuse's end fitting.

Table 1. K-Limiter Fuse-Fuse Link Coordination

Coordinates With Fuse Links Up Through			
K-Limiter Fuse Rating	**ANSI Type K**	**ANSI Type T**	**M.E. Type N**
50 K	50	30	60
65 K	65	30	60
80 K	80	40	75
100 K	100	50	75
140 K	140	80	85
		Kearney Type QA	**Kearney Type KS**
50 K		60	20
65 K		75	25
80 K		75	30
100 K		100	30
140 K		150	50

Table 2. K-Limiter Fuse Voltage Application

System Voltage (kV) Nominal	Recommended K-Limiter Rating (kV) Maximum	Four Wire Multi-grounded Neutral	Delta
2.4	2.54	–	4.3
2.4/4.16	2.54/4.4	4.3	–
4.16	4.4	–	4.3
4.8	5.1	–	8.3
4.8/8.32	5.1/8.8	8.3	–
6.9	7.26	–	8.3
6.93/12.0	7.3/12.7	8.3	–
7.2	7.62	–	8.3
7.2/12.47	7.62/13.2	8.3	–
7.62	8.1	–	8.3
7.62/13.2	8.1/14.0	8.3	–
7.97	8.4	–	8.3
7.97/13.8	8.4/14.5	8.3	–
8.32	8.8	–	8.3
8.32/14.4	8.8/15.2	8.3	–
12/20.8	12.7/22.0	15.5	–
12.47	13.2*	–	8.3**
13.2/22.9	14/24.2	15.5	–
13.2	14*	–	8.3**
13.8	14.5*	–	8.3**
14.4/24.9	15 2/26.4	15.5	–
14.4	15.2*	–	8.3**

* Fuse voltage ratings recommended for these systems are based on simultaneous operation of the K-Limiter fuses for high current faults.

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

Installation instructions

K-Limiter fuses may be mounted on the line or load-side of a distribution fuse, or directly on a bushing of a distribution transformer. See Figures 2-7 on page 4 illustrating typical installations.

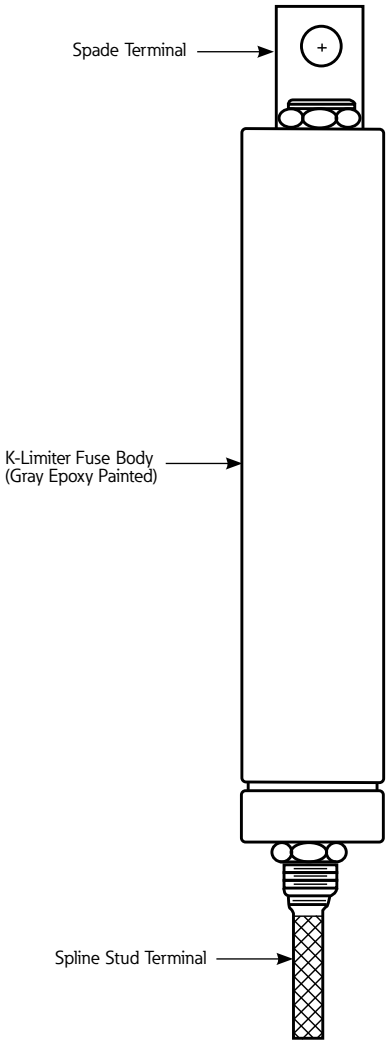

Figure 1. K-Limiter back-up current-limiting fuse shown with spline stud and spade terminal options.

Installation of the K-Limiter fuse

Once the end terminals have been installed on the K-Limiter fuse (refer to "Installation of Terminal Options" on page 4):

1. Remove fuseholder from distribution cutout using a hookstick.
   - Always use a loadbreak device to open an energized cutout. Follow manufacturer's recommendations for operation of loadbreak tools or cutouts which are designed to break load current.
2. Wire brush all terminals, connectors and electrical conductors.
3. Apply an oxide inhibitor prior to making electrical connections.
4. Insert K-Limiter fuse and conductors into connectors and tighten.
   - Maintain a minimum of 14" of clearance from the source leads to the lower end of the K-Limiter fuse and related energized hardware of the cutout.
   - When mounting the K-Limiter fuse in the upper terminal of a fused cutout, replace expendable caps with solid caps.
   - Make sure vents from the cutout fuse holder will not direct expulsion gases towards the K-Limiter fuse.
   - Apply minimal cantilever load to the K-Limiter fuse.
5. Re-energize the line using approved safety procedures.

Operation inspection

If the K-Limiter fuse is connected in series, the expulsion fuse operates, the K-Limiter fuse should also be inspected during expulsion fuse replacement. Visually check the physical condition of the K-Limiter. If no physical damage is apparent, then check it for continuity using a low voltage continuity tester. If the K-Limiter shows continuity, it may then be placed in service.

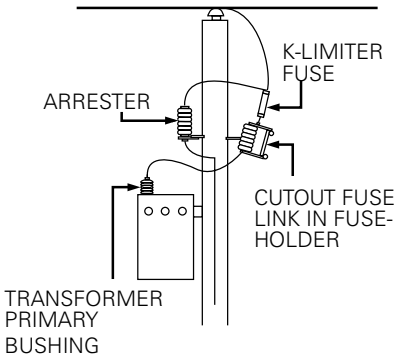

Figure 2. Source-side cutout installation.

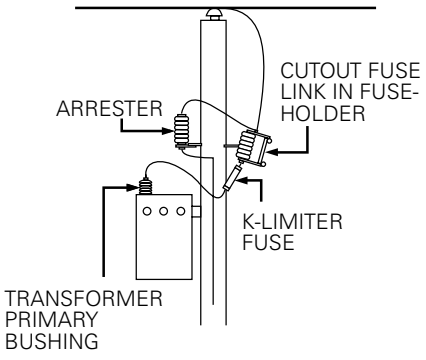

Figure 4. Load-side cutout installation.

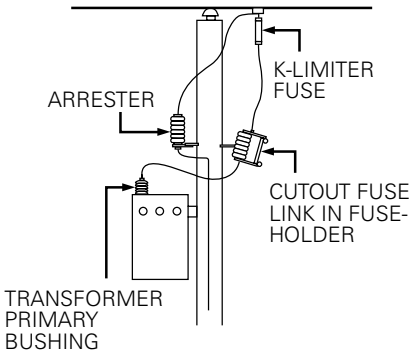

Figure 6. Hot-line/bail installation.

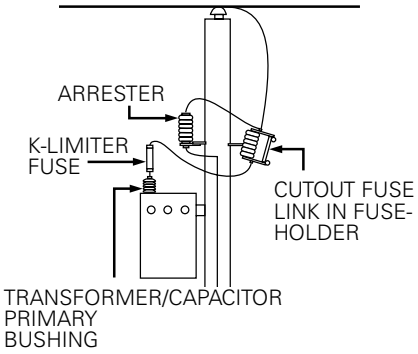

Figure 3. Bushing mount installation.

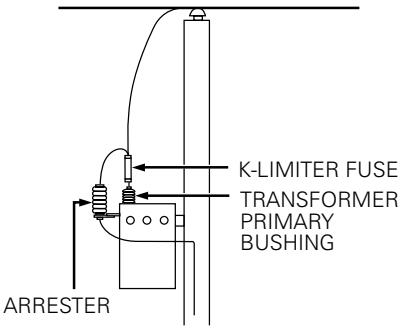

Figure 5. CSP transformer installation.

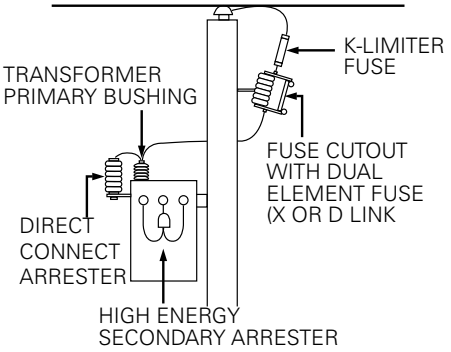

Figure 7. Lightning-Protected transformer (LPT) installation.

Terminal Options

The K-Limiter fuse is available with several types of terminal options. Any combination of spline stud, parallel-groove, spade or eyebolt connector is available.

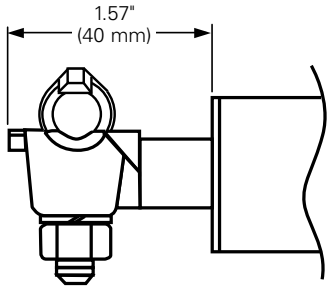

Figure 8.Eyebolt terminal (#8 through 2/0).

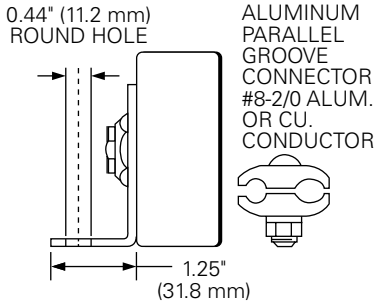

Figure 9. Spade with Parallel Groove connector terminal.

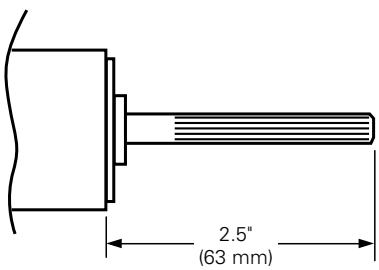

Figure 10. Spline stud terminal.

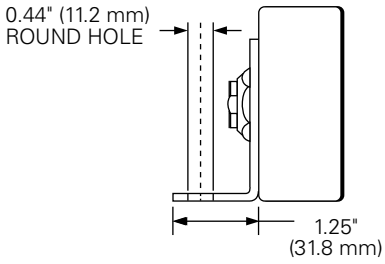

Figure 11. Spade terminal.

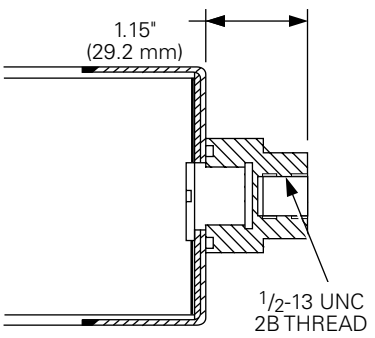

Figure 12. End boss terminal.

Re-fusing

CAUTION

When removing the K-Limiter fuse, observe appropriate clearances between live and de-energized parts.

1. Remove the fuseholder from the fuse cutout using the manufacturer's recommended procedure.
2. Loosen the line terminal on the K-Limiter fuse and remove the line conductor.
3. Loosen the terminal that connects the K-Limiter fuse to the fuse cutout and remove the K-Limiter fuse.
4. Check the K-Limiter fuse per the procedure in the "Testing" section.
5. Replace the operated fuse link with the proper type and current rating using the manufacturer's recommended procedure.

CAUTION

Faults and/or visibly failed equipment should be located and repaired before re-installing a replacement K-Limiter fuse.

Testing

The K-Limiter fuse should always be tested after an operation of the fuse cutout.

CAUTION

Failure to check the K-Limiter back-up current-limiting fuse may result in placing an operated/damaged fuse back in service. This could result in personal injury, fire or equipment damage.

1. Perform a continuity check on the K-Limiter fuse.
2. If the K-Limiter fuse does have continuity, go to the Installation Procedure on page 2.
3. If the K-Limiter fuse does not have continuity, replace the operated fuse with an appropriate new fuse. The new fuse should have proper voltage and current rating.

This page is intentionally left blank.

This page is intentionally left blank.

Eaton
1000 Eaton Boulevard
Cleveland, OH 44122
United States
Eaton.com

Eaton's Cooper Power Systems Division
2300 Badger Drive
Waukesha, WI 53188
United States
Eaton.com/cooperpowerseries

Printed in USA
Publication No. MN132010EN Rev 00
(Replaces 5000050833 Rev 00)

For Eaton's Cooper Power series product information call 1-877-277-4636 or visit: www.eaton.com/cooperpowerseries.

Powering Business Worldwide