

Companion™ II back-up current-limiting fuse installation instructions



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Contents

SAFETY INFORMATION

Safety information	iv
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PRODUCT INFORMATION

Introduction	1
Acceptance and initial inspection	1
Handling and storage	1
Quality standards	1

APPLICATION

Fuse application	2
------------------------	---

INSTALLATION PROCEDURE

Installation of the Companion II fuse	2
Installation of terminal options	4

RE-FUSING

Re-fusing	7
Testing	7



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 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, could 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

CAUTION

The Companion II 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 COMPANION II DISTRIBUTION FUSE.** The Companion II 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 Companion™ II fuse is a back-up current-limiting fuse designed to be used in series with a distribution cutout or similar fuse capable of interrupting currents up to and including the minimum interrupting current of the Companion II fuse. The Companion II fuse limits the energy input during a high fault current condition.

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.

Acceptance and initial inspection

Each Companion II 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 Companion II 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.

Handling and storage

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

Quality standards

ISO 9001 Certified Quality Management System

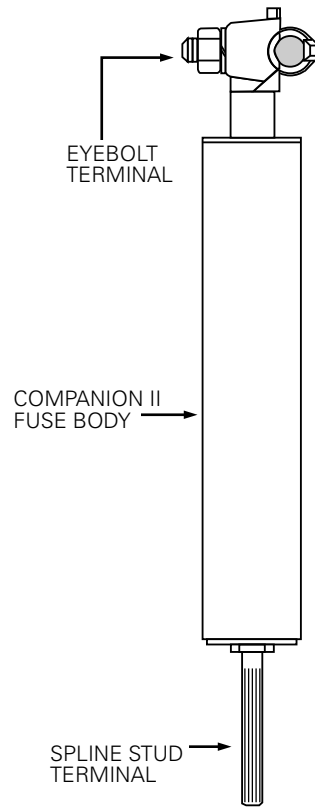


Figure 1. Companion II back-up current-limiting fuse with spline stud and eyebolt terminal options.

Fuse application

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

The Companion II fuse rating indicates the largest Type K fuse link that properly coordinates with the fuse. Select a Companion II fuse size that is greater than or equal to the Type K fuse link size used in the cutout at that location. For fuse links other than Type K links, select the proper Companion II fuse based on Table 1. For fuse links not included in this table, contact your Eaton representative.

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

For further information concerning the coordination of the Companion II fuse, see *Catalog CA132021EN Companion II Back-up Current-Limiting 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.

**Table 1. Companion II Fuse-Fuse Link Coordination
Coordinated With Fuse Links Up Through**

Companion II Fuse Rating	Edison™					
	Type K	Type T	Type N	Type S	Type H	Type D
12K	12	8	20	5	8	1.5
25K	25	15	30	7	8	20
40K	40	20	50	15	8	20
Kearney						
Companion II Fuse Rating	Kearney™		Kearney		Kearney	
	Type X™	QA™	Type 200™	Type	Type KS™	
12K	2.5	15	10	3		
25K	10	30	20	7		
40K	15	50	30	15		

Installation procedure

Figures 2 through 7 show typical installations of the Companion II fuse. It may be installed on the source side (Figure 2) or load side (Figure 3) of a distribution cutout. It may be hung from a bail attached to the overhead line (Figure 4), or it may be attached directly to the transformer bushing (Figures 5 or 6).

The lightning protection is connected to the line side of the Companion II fuse and the distribution cutout.

Installation of the Companion II fuse

Once the end terminals have been installed on the Companion II 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.

Table 2. Companion II Fuse Voltage Application

System Voltage (kV)		Recommended Companion II Rating (kV)	
Nominal	Maximum	Four-Wire Multi-grounded Neutral	Delta
2.4	2.54	–	8.3
2.4/4.16	2.54/4.4	8.3	–
4.16	4.4	–	8.3
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	7.3/12.7	8.3	–
7.2	7.62	–	8.3
7.62/12.47	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	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**
19.9/34.5	21.1/36.5	23	–
34.5	36.5*	–	23**
46	48.3*	–	23**

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

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

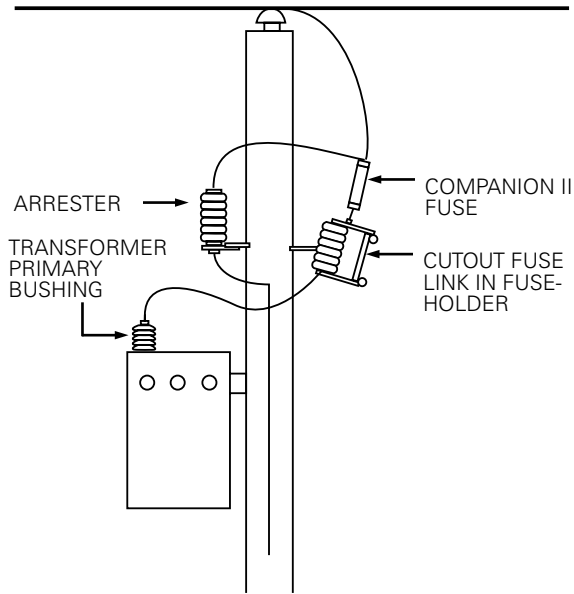


Figure 2. Companion II fuse mounted on the source side of the cutout.

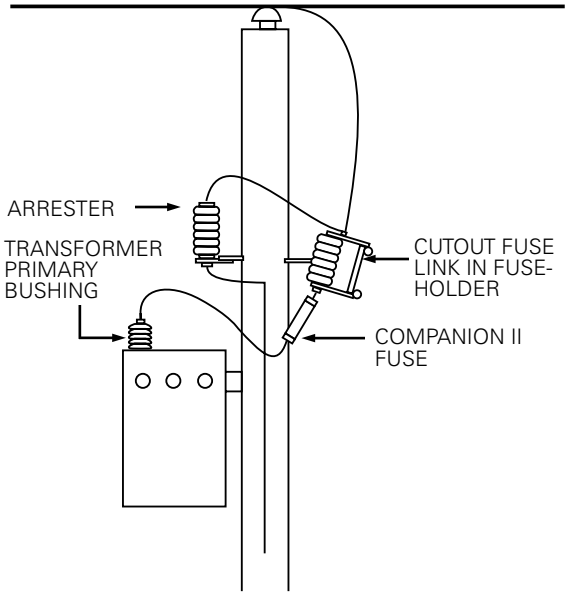


Figure 3. Companion II fuse mounted on the load side of the cutout.

2. Wire brush all terminals, connectors and electrical conductors.
3. Apply an oxide inhibitor prior to making electrical connections.
4. Insert Companion II fuse and conductors into connectors and tighten.
 - Maintain a minimum of 14" of clearance from the source leads to the lower end of the Companion II fuse and related energized hardware of the cutout.
 - When mounting the Companion II 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 Companion II fuse.
 - Apply minimal cantilever load to the Companion II fuse.
5. Re-energize the line using approved safety procedures.

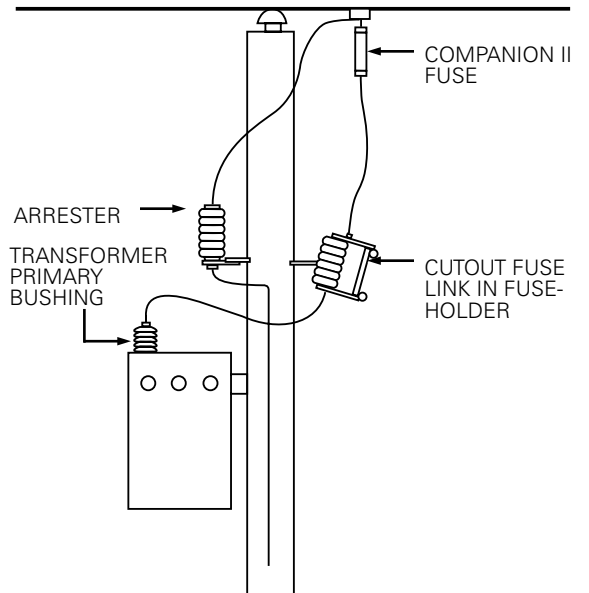


Figure 4. Companion II fuse mounted from a bail attached to the overhead line.

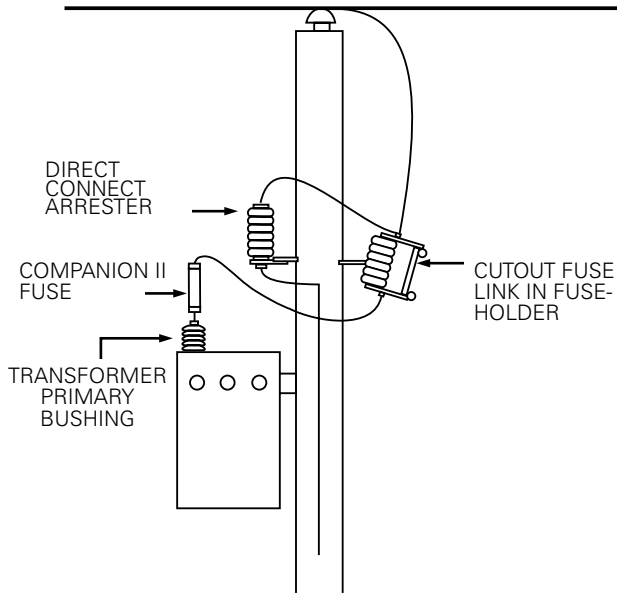


Figure 5. Transformer-mounted Companion II fuse with distribution cutout.

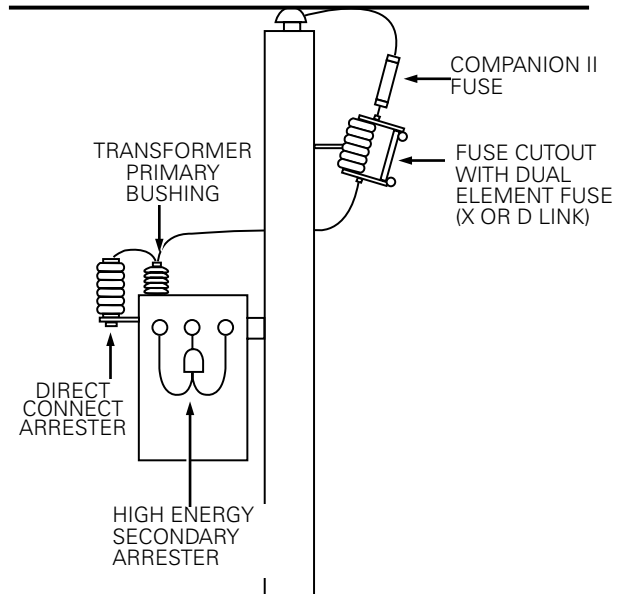


Figure 7. Lightning-protected transformer (LPT) installation.

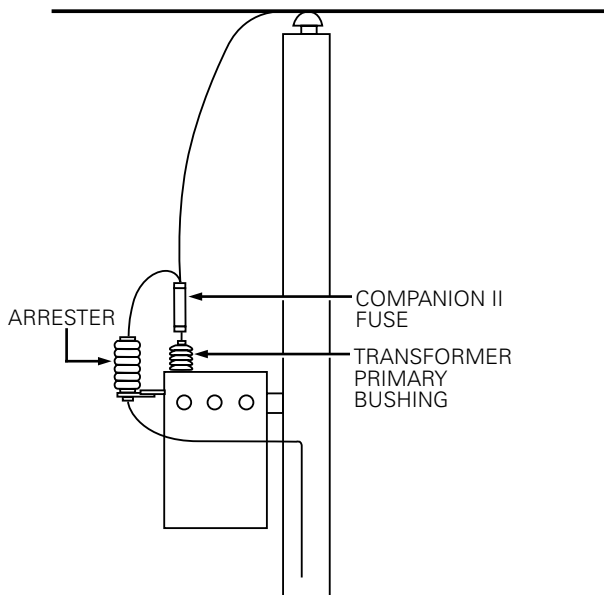


Figure 6. Completely Self-Protected (CSP) transformer-mounted Companion II fuse without separate distribution cutout.

Installation of terminal options

Eyebolt terminal (Terminal code - B)

1. Insert threaded end of the eyebolt terminal body into the tapped center hole of the Companion II fuse and torque the eyebolt terminal to 10-15 ft-lbs. (Figure 8.)

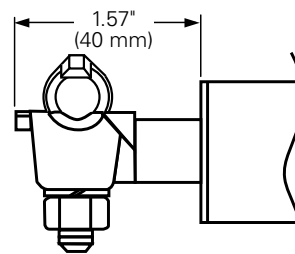


Figure 8. Eyebolt terminal.

Parallel-groove terminal (Terminal code - C)

1. Align the circular hole of the spade adapter with the tapped center hole of the Companion II fuse.
2. Place the internal-tooth lock washer onto the bolt, and insert the bolt through the spade adapter hole into the tapped center hole of the fuse (as shown in Figure 8) and torque the bolt to 10-15 ft-lbs.
3. Assemble carriage bolt, terminal clamp, split lock washer and hex nut on the spade adapter as shown in Figure 9.

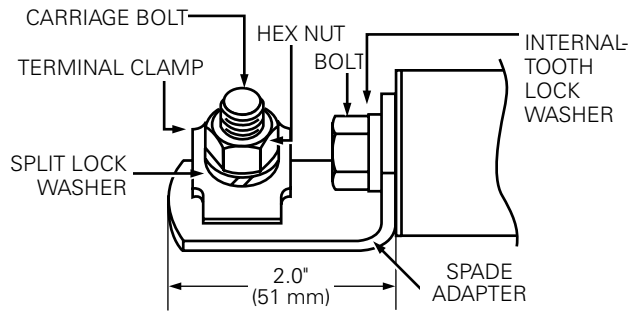


Figure 9. Parallel-groove terminal.

Spade terminal (Terminal code - D)

1. Align the circular hole of the spade adapter with the tapped center hole of the Companion II fuse.
2. Place the internal-tooth lock washer onto the bolt and insert the bolt through the spade adapter hole into the tapped center hole of the fuse and torque the bolt to 10-15 ft-lbs. (Figure 10.)

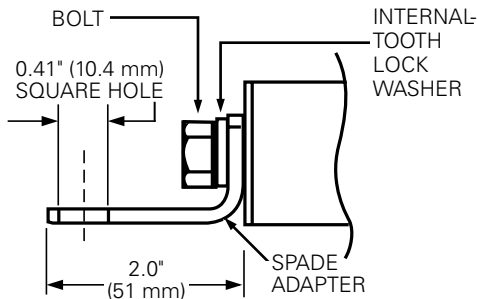


Figure 10. Spade terminal.

Spline stud terminal (Terminal code - G)

1. Insert threaded end of the spline stud into the tapped center hole of the Companion II fuse and torque spline stud to 10-15 ft-lbs. (Figure 11.)

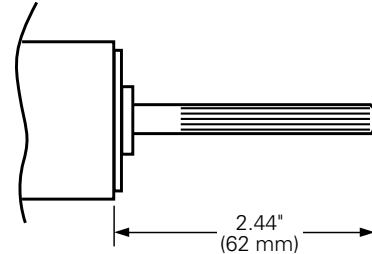


Figure 11. Spline stud terminal.

Offset adapter (Terminal code - J)

1. Align the hole of the offset adapter with the tapped center hole of the Companion II fuse.
2. Place the washer onto the bolt and insert the bolt through the hole of the offset adapter into the tapped center hole of the fuse and torque the bolt to 10-15 ft-lbs. (Figure 12.)

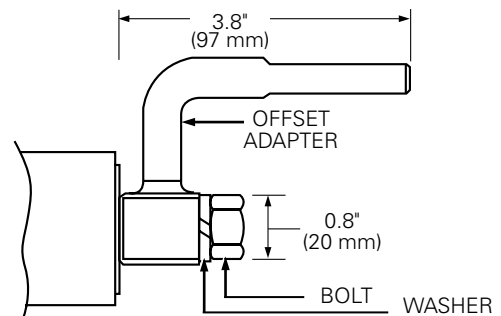


Figure 12. Offset adapter terminal.

Universal adapter (Terminal code - L)

1. Align the circular hole of the spade adapter with the tapped center hole of the Companion II fuse.
2. Place the internal-tooth lock washer onto the bolt and insert the bolt through the spade adapter hole into the tapped center hole of the fuse and torque the bolt to 10-15 ft-lbs. (Figure 13.)

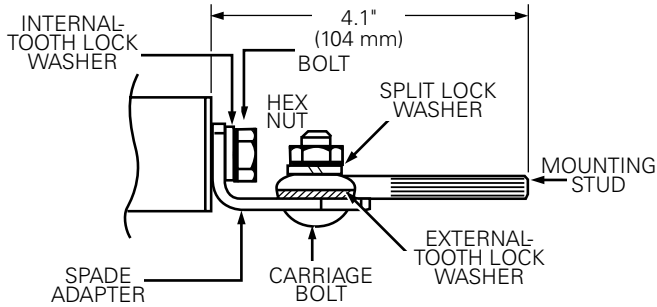


Figure 13. Universal adapter terminal.

3. Assemble carriage bolt, external-tooth lock washer, mounting stud, split lock washer and hex nut on the spade adapter as shown in Figure 14.

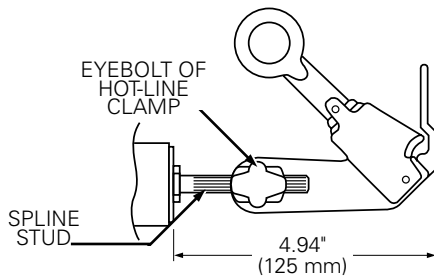


Figure 14. Hot-line clamp.

Hot-line clamp-bronze (Terminal code - M)

1. Install the spline stud terminal as described above and shown in Figure 11.
2. Place the eyebolt terminal of the hot-line clamp over the spline stud, align and torque (as required) the eyebolt nut of the hot-line clamp as shown in Figure 14.

Large parallel-groove terminal (Terminal code - N)

1. Align the hole of the large parallel-groove connector's short leg with the tapped center hole of the Companion II fuse.
2. Place the split lock washer onto the bolt and insert the bolt through the connector hole into the tapped center hole of the fuse and torque the bolt to 10-15 ft-lbs. (Figure 15.)
3. Assemble carriage bolt, parallel-groove clamp, split lock washer and hex nut on the connector as shown in Figure 15.

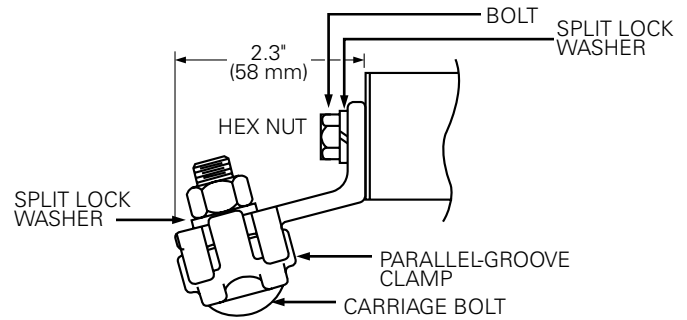


Figure 15. Large parallel-groove terminal (250 mcm).

Medium parallel-groove terminal (Terminal code - P)

1. Assemble hex bolt, terminal clamp, and hex nut on the spade adapter as shown in Figure 16.
2. Insert threaded end of the assembled medium parallel-groove terminal into the tapped center hole of the Companion II fuse and torque terminal to 10-15 ft-lbs.

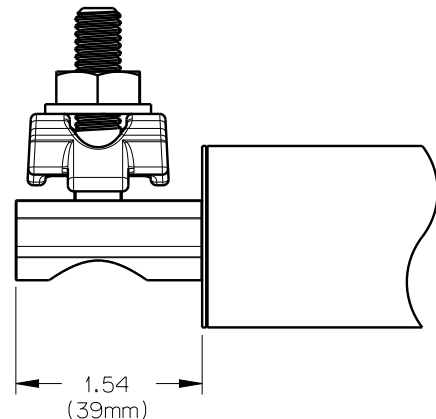


Figure 16. Medium parallel-groove terminal (#8-2/0 cable sizes). (-P)

Parallel-groove terminal (Terminal code - Q)

1. Align the circular hole of the spade adapter with the tapped center hole of the Companion II fuse.
2. Place the internal-tooth lock washer onto the bolt and insert the bolt through the spade adapter hole into the tapped center hole of the fuse and torque the bolt to 10-15 ft-lbs. (Figure 17.)
3. Attach parallel groove connector (in a bag) onto spade adapter as shown in Figure 17.

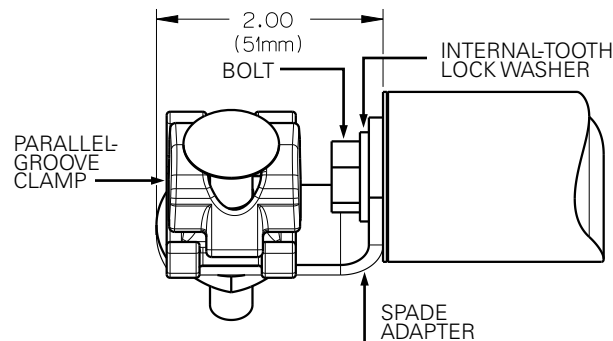


Figure 17. Parallel-groove terminal (#8 through 2/0 cable sizes). (-Q)

Note: Parallel-groove connector is shipped in a bag with fuse (not installed) as shown above.

Re-fusing

CAUTION

When removing the Companion II 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 Companion II fuse and remove the line conductor.
3. Loosen the terminal that connects the Companion II fuse to the fuse cutout and remove the Companion II fuse.
4. Check the Companion II 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 Companion II fuse.

Testing

The Companion II fuse should always be tested after an operation of the fuse cutout.

CAUTION

Failure to check the Companion II 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 Companion II fuse.
2. If the Companion II fuse does have continuity, go to the Installation Procedure on page 2.
3. If the Companion II fuse does not have continuity, replace the operated fuse with an appropriate new fuse. The new fuse should have proper voltage and current rating.



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