

S.T.A.R.™ Type TPR faulted circuit indicator 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, 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 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.

CAUTION

Eaton's Cooper Power series S.T.A.R.™ Type TPR Faulted Circuit Indicator 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 faulted circuit indicator.

Faulted circuit indicators should be installed and serviced only by personnel familiar with good safety practice and the handling of high-voltage electrical equipment. Improper operation, handling, or maintenance can result in death, severe personal injury, and equipment damage.

Product information

Eaton's Cooper Power series S.T.A.R. Test Point Reset (TPR) Faulted Circuit Indicators (FCIs) are used on both 200 A separable connectors and 600 A terminators with voltage test points. They are easily installed with a shotgun stick using the pulling eye. The FCI indicates the passage of fault current by showing a "fault" flag in the window of the display. When the system is re-energized, the indicator resets automatically.

The FCI is weatherproof, submersible and meets or exceeds **ANSI®/IEEE 495-1986™** Testing Guide. The flag will not change status as a result of mechanical shock or vibration.

The FCI is available with either a low or high trip rating. A low trip rating will trip at approximately 400 A rms and a high trip rating will trip at approximately 800 A rms. Trip rating varies slightly with different kV class elbows and different elbow manufacturers.

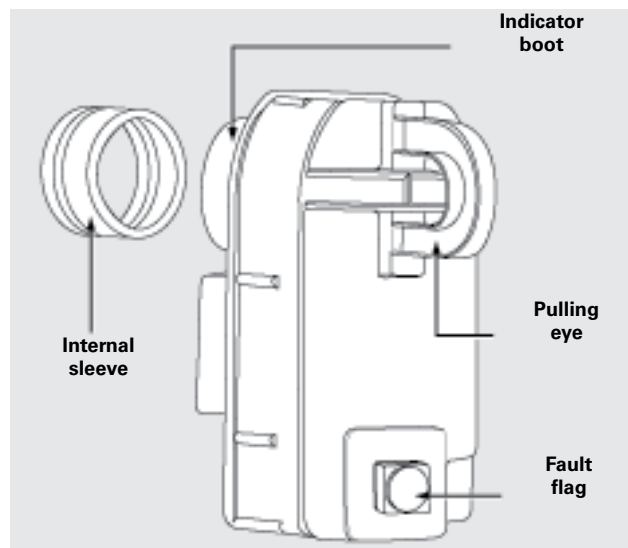


Figure 1. S.T.A.R. Type TPR Faulted Circuit Indicator with internal sleeve

These instructions do not claim to cover all details or variations in the equipment, procedure, or process described, nor to provide directions for meeting every 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.

Note: At least 5 kV line-to-ground must be present to provide sufficient stored energy to both trip and reset the device.

Installation procedures

The TPR Faulted Circuit Indicator can be installed on most manufacturers' elbows. Instructions are included herein for RTE, Elastimold, Blackburn, Joslyn and GE-Chardon elbows. Where an adapter is required, a kit must be ordered separately.

For RTE 15, 25, and 35 kV loadbreak elbows and GE-Chardon 15 and 35 kV elbows

1. **The FCI can be installed on live elbows.** As an alternative, de-energize the circuit and elbow terminator and ground the terminator according to approved procedures.
2. **Remove the cap** from the elbow test point using a hotstick.
3. **Be sure the test point area is clean and dry.**
4. **Discard the internal sleeve.**
5. **Lightly lubricate the inside of the indicator boot** using a silicone lubricant.
6. **Attach the pulling eye** of the indicator to the hotstick.
7. **Using steady pressure**, push the boot over the test point while rotating the boot.
8. **Align the pulling eye on the indicator with the elbow pulling eye.** (See Figures 3 and 4.)

For all Eaton Cooper Power series 200 A, 250 A and 400 A deadbreak elbows, Elastimold 15, 25 and 35 kV (pce) elbows and new design* Blackburn 15 kV elbows

1. **The FCI can be installed on live Elastimold (PCE) or new design Blackburn elbows.** As an alternative, de-energize the circuit and elbow terminator and ground the terminator according to approved procedures.
2. **Remove the cap** from the elbow test point using a hotstick.
3. **Be sure the test point area is clean and dry.**
4. **Insert the internal sleeve** into the indicator boot. (See Figure 2.)
5. **Lightly lubricate the inside of the internal sleeve** using a silicone lubricant.
6. **Attach the pulling eye** of the indicator to the hotstick.
7. **Using steady pressure**, push the boot over the test point while rotating the boot.

- Align the pulling eye on the indicator with the elbow pulling eye. (See Figures 3 and 4.)

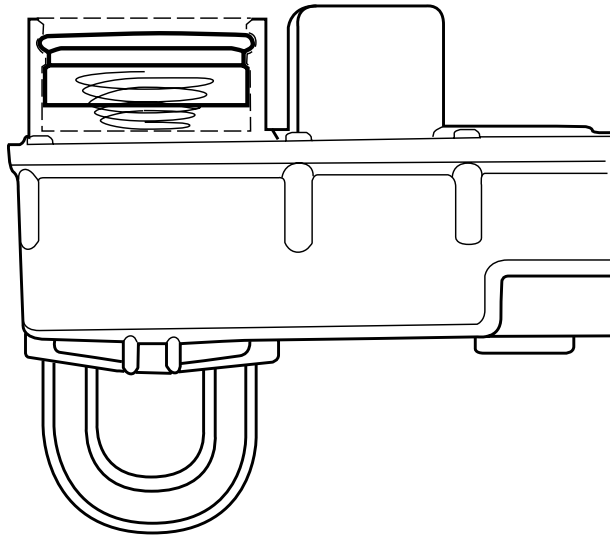


Figure 2. Internal sleeve inserted into indicator boot

For old design* 15 and 25 kV Blackburn elbows, Elastimold 15, 25 and 35 kV (not pce) elbows, Joslyn 15 kV elbows and GE-Chardon 25 kV elbows

- A separate adapter (Catalog # STAK) is required for the old design 15 and 25 kV Blackburn, Elastimold 15, 25 and 35 kV (not PCE), Joslyn 15 kV and GE-Chardon 25 kV elbows. It is not included with the FCI and must be ordered separately. Because an adapter is needed, a slotted screwdriver and hex head driver mounted on a hotstick with tool holder is also required.
- De-energize the circuit and elbow terminator and ground the terminator according to approved procedures.
- Remove the cap from the elbow test point.
- Remove and discard the screw and steel washer from the center of the test point.
- Select the proper adapter screw and thread size from the adapter kit, according to the elbow being used, as outlined in Table 1.

Table 1. Adapter screw and thread sizes**

Elbow manufacturer	Screw & thread size		Plastic washer side facing out
15 and 25 kV Blackburn – Old Design	3/8 in.	24	A
15 kV Joslyn, Elastimold 15, 25 and 35 kV (Not PCE)	5/16 in.	24	B
25 kV GE-Chardon	1/4 in.	20	B

* Blackburn completed an elbow design change around July, 1992. Any Blackburn elbow sold and/or shipped prior to July, 1992 could be of either the old or new design. After determining the design, follow the appropriate instructions for installing the FCI.

**Consult your Eaton representative for other available screw sizes.

- Select the proper side of the plastic washer to face out from the test point, according to the elbow being used, as outlined in Table 1. This will ensure the best fit for the screw and plastic washer, within the test point.
- Be sure the test point is clean and dry.
- Using the 7/64 inch hex wrench provided, screw the adapter and plastic washer into the test point using the hotstick with tool holder.
- Discard the internal sleeve.
- Lightly lubricate the inside of the indicator boot using a silicone lubricant.
- Attach the pulling eye of the indicator to the hotstick.
- Using steady pressure, push the boot over the test point while rotating the boot.
- Align the pulling eye on the indicator with the elbow pulling eye. (See Figures 3 and 4.)

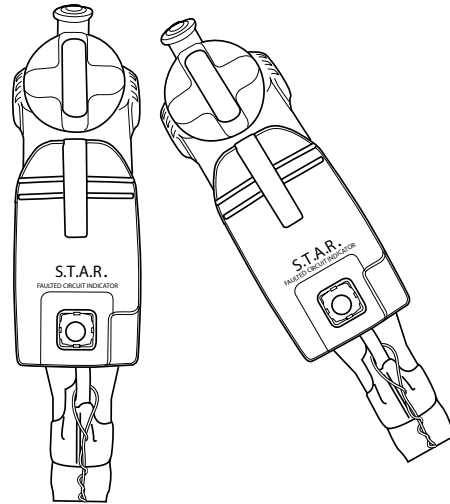


Figure 3. Correct methods of aligning loadbreak elbow with fault indicator



Figure 4. Incorrect methods of aligning loadbreak elbow with fault indicator

Installation instructions for remote Fisheye™ display

⚠ WARNING

The Eaton Cooper Power series S.T.A.R. Type TPR Faulted Circuit Indicator with remote display and/or auxiliary contact outputs are designed for installation at Ground Potential Only. Remote indicators and auxiliary contacts are not insulated for high voltage application. If high voltage is applied across the fault indicator, flashover may occur, possibly resulting in death, severe personal injury, and equipment damage.

1. **Punch or drill** four 0.5" (13 mm) and one 1.75" (45 mm) holes as shown in Figure 5. Hole rims may need to be treated for corrosion resistance. Consult enclosure manufacturer for recommendation.
2. **Position the FISHEYE display** against the back side of the enclosure aligning the four 0.5" (13 mm) holes with the corresponding holes on the FISHEYE display. The indicator ball of the FISHEYE display should protrude through the 1.75" (45 mm) hole and be visible from the outside of the enclosure.
3. **Install the four 3/8-16 UNC carriage bolts** through the four 0.5" holes with the heads on the outside of the enclosure and the bolts extending through the four holes on the FISHEYE display.
4. **Install the four 3/8" flat washers, lock washers,** and hex nuts onto the carriage bolts and hand tighten.
5. **Adjust the display** to the desired alignment and tighten the hex nuts to flatten the lock washers. **DO NOT OVERTIGHTEN THE HEX NUTS.**

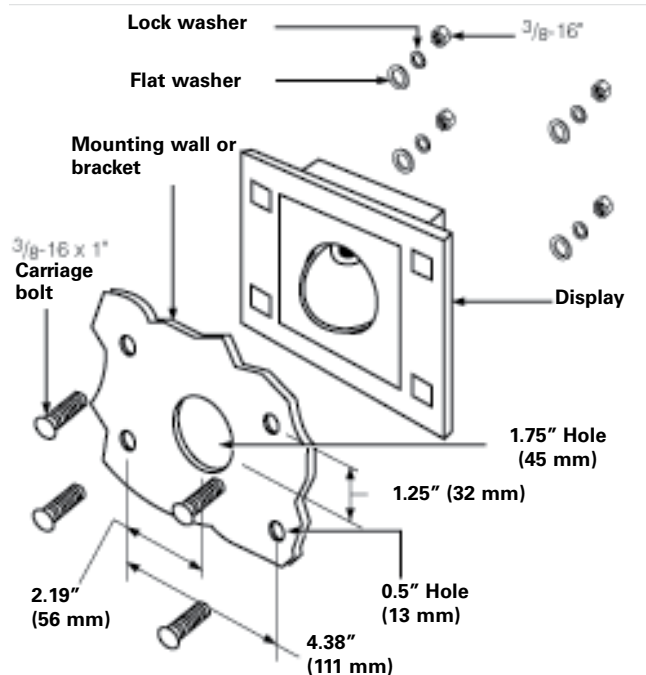


Figure 5. Remote FISHEYE™ display installation diagram

Installation instructions for small remote display

⚠ WARNING

The Eaton Cooper Power series S.T.A.R. Type TPR Faulted Circuit Indicator with remote display and/or auxiliary contact outputs are designed for installation at Ground Potential Only. Remote indicators and auxiliary contacts are not insulated for high voltage application. If high voltage is applied across the fault indicator, flashover may occur, possibly resulting in death, severe personal injury, and equipment damage.

1. **Punch or drill** one 1" diameter hole as shown in Figure 6. Hole rim may need to be treated for corrosion resistance. Consult enclosure manufacturer for recommendation.
2. **Insert the outer fitting** through the 1" diameter hole with the threads extending through the hole in the enclosure.
3. **Insert the end of the FCI display** into the outer display fitting. Note that the lens of the FCI display is keyed to fit the slot on the outer fitting.
4. **Thread the bushing** at the end of the remote display, onto the outer fitting.
5. **Adjust the display** to the desired alignment and tighten the bushing to pull the outer fitting against the front of the enclosure. Tighten sufficiently to prevent removal of the outer fitting from outside the cabinet, but do not overtighten the bushing.

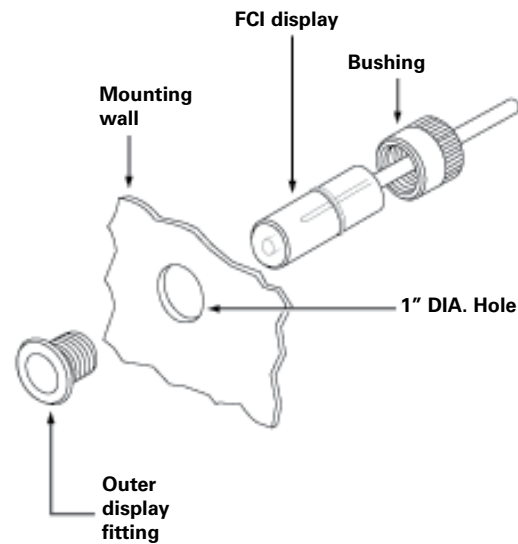


Figure 6. Small remote display installation diagram

Operation

The indicator is shipped in the fault indicating position. The trip target rotates out of view a few minutes after the circuit is energized with a system voltage of at least 5 kV. The indicator is then ready for use.

When the auxiliary contact option is included with the FCI the following applies: the auxiliary contacts provide a relay closure when the FCI is in the faulted position. The contacts are normally open, and the FCI comes supplied with a pair of 6 foot conductor leads. The contacts will open when the FCI is reset with the appropriate system voltage of at least 5 kV. The auxiliary contacts are rated as follows:

1 A	30 VDC
0.5 A	125 VAC
0.3 A	110 VAC

Eaton's Cooper Power series S.T.A.R. Test Point Reset FCIs are available with auxiliary contacts as an option. The contact provides a means to monitor the status of the FCI remotely. The contact mirrors the status of the faulted circuit indicator. If the FCI is in the faulted position, the dry contacts will latch closed. If the FCI is in the reset position, the dry contacts will latch in the open position. A simple control diagram of the contacts is shown in Figure 7.

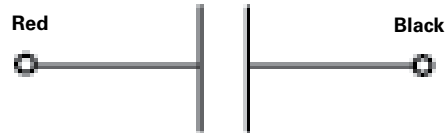


Figure 7. Control drawing of auxiliary contacts

Installation instructions for auxiliary contacts

WARNING

The Auxiliary Contact option is intended solely for use with faulted circuit indicators being installed on dead-front design equipment. DO NOT USE the auxiliary contact feature on fault indicators being applied to overhead conductors or live-front equipment. Exposed ends of the auxiliary contact cable may contact bare conductors or other energized equipment, and may result in electrocution hazard. The faulted circuit indicators should be installed and serviced only by personnel familiar with good safety practice and the handling of high-voltage electrical equipment.

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