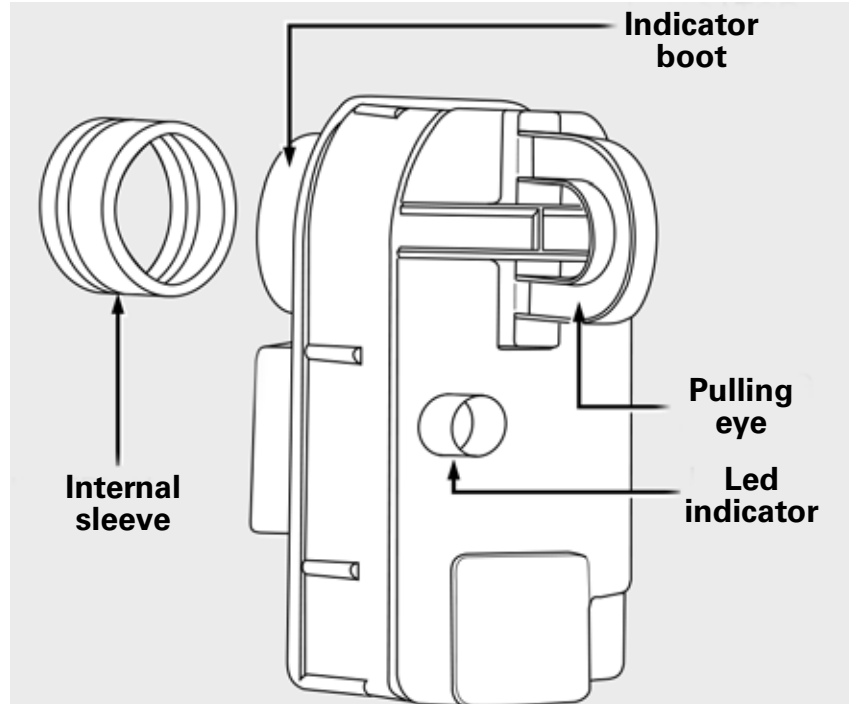


S.T.A.R.™ PATHFINDER™ variable trip TPR faulted circuit indicator installation instructions



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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 lowvoltage 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

The Eaton Cooper Power series S.T.A.R.™ PATHFINDER™ Variable Trip 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

The Eaton Cooper Power series S.T.A.R. PATHFINDER Variable Trip 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 shot-gun stick using the pulling eye. The FCI indicates the passage of fault current by a high-intensity LED 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 status of the FCI will not change as a result of mechanical shock or vibration.

The FCI uses a variable trip design, which senses load current and trips based on a rise in current above normal load. A minimum of 200 A (load current plus fault current) is required to trip the FCI.

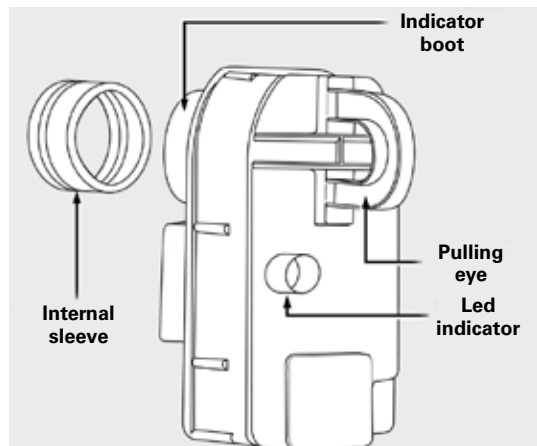


Figure 1. S.T.A.R. Type TPR faulted circuit indicator with internal sleeve

Note: At least 2.4 kV line-to-ground must be present to provide proper voltage sensing for the device.

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.

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.
 - A. If fiber optic cable remote is to be used with the FCI, snap the fiber optic fitting onto the LED indicator display on the housing of the FCI, prior to attaching the FCI to the hotstick (see Figure 6).
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.
 - A. If fiber optic cable remote is to be used with the FCI, snap the fiber optic fitting onto the LED indicator display on the housing of the FCI, prior to attaching the FCI to the hotstick (see Figure 5).

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)

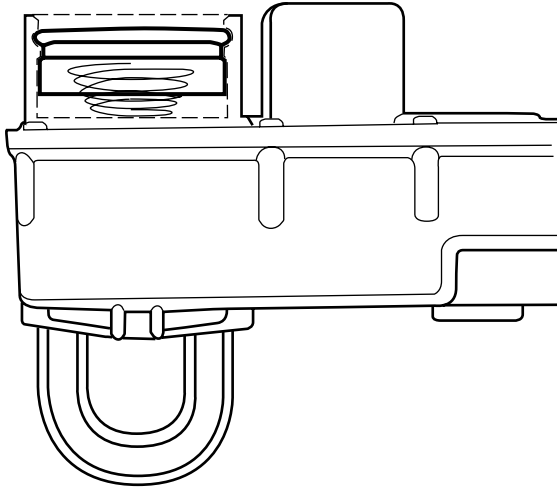


Figure 2. Internal sleeve inserted into indicator boot

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

1. **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.
2. **De-energize the circuit** and elbow terminator and ground the terminator according to approved procedures.
3. **Remove the cap from the elbow test point.**
4. **Remove and discard the screw and steel washer** from the center of the test point. From the referenced adapter kit, select the proper adapter screw and thread size from Table 1.

* 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.

Table 1. Adapter screw and thread sizes**

Elbow manufacturer	Screw & thread size	
15 and 25 kV Blackburn – old design	3/8 in.	24
15 kV Joslyn, Elastimold 15, 25 and 35 kV (Not PCE)	5/16 in.	24
25 kV GE-Chardon	1/4 in.	20

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

5. **Be sure the test point is clean and dry.**
6. **Using the 7/64 inch hex wrench** provided, screw the adapter and plastic washer into the test point using the hotstick with tool holder.
7. **Discard the internal sleeve.**
8. **Lightly lubricate the inside of the indicator boot** using a silicone lubricant.
 - A. If fiber optic cable remote is to be used with the FCI, snap the fiber optic fitting onto the LED indicator display on the housing of the FCI, prior to attaching the FCI to the hotstick (see Figure 6).
9. **Attach the pulling eye** of the indicator to the hotstick.
10. **Using steady pressure,** push the boot over the test point while rotating the boot.
11. **Align the pulling eye on the indicator** with the elbow pulling eye. (See Figures 3 and 4).

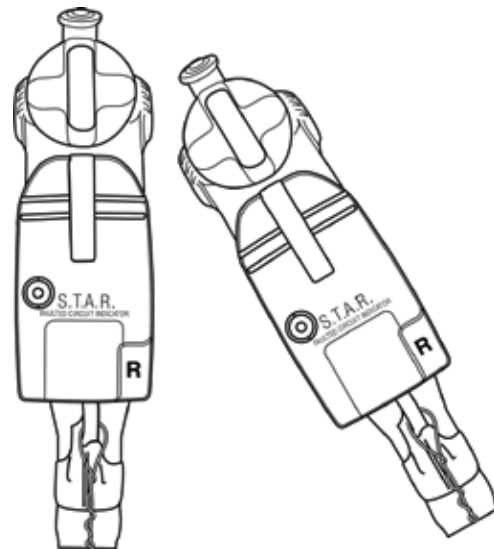


Figure 3. Correct methods of aligning Loadbreak elbow with fault indicator



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



Figure 5. Interrogating the Variable Trip TPR faulted circuit indicator

Note: If the Variable Trip TPR FCI is removed while indicating a fault, or in the energy saving (BLOC) mode, the device will only reset if installed on a system with the same line voltage at which the device had been previously installed, or, if manually reset using the testing/reset tool. It is recommended that the unit be reset manually using the testing/reset tool, to initialize the unit, after being installed.

Operation

Once installed on the test point, the manual testing/reset tool should be used to initialize the FCI and check for proper operation (see Figure 5). The indicator is then ready for use. When a fault occurs, the LED display will flash for a period of 4 hours. The unit may be manually reset prior to the 4 hour time delay following the fault, using the manual testing/reset tool (catalog SMRT). The unit will reset automatically if normal system voltage is restored.

If the unit is not reset manually and system voltage has not been restored, the Battery Life Optimization Circuit (BLOC) operates after the 4 hour time delay, turning off the LED display to conserve battery life. The unit retains a log of the fault until interrogated using the manual testing/reset tool, or until normal system power has been restored.

To interrogate the FCI following the 4 hour time delay, but prior to restoration of normal system power, touch the manual testing/reset tool to the "R" on the lower right side of the housing, as shown in Figure 4. If the FCI recorded a fault prior to the operation of the BLOC feature, a series of short, rapid flashes will be seen on the LED display for approximately 5 seconds. If no fault was detected by the FCI prior to loss of system power, 3 longer flashes will be seen on the LED display. After interrogating the FCI, it is then reset and ready to detect the next fault occurrence.

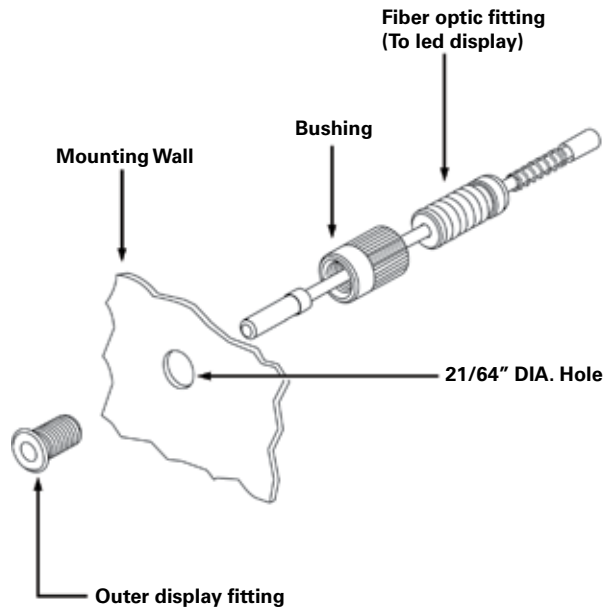


Figure 6. Remote fiber optic cable display installation diagram

Installation instructions for remote fiber optic display

⚠ WARNING

The Eaton Cooper Power series S.T.A.R. PATHFINDER Variable Trip 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. **Drill** one 21/64 inch diameter hole as shown in Figure 5. Hole rim may need to be treated for corrosion resistance. Consult enclosure manufacturer for recommendation.
2. **Ensure that the fiber optic fitting** has been snapped onto the LED display of the FCI housing. If this was not done prior to installing the FCI on a live elbow, use gloved hands to snap the fiber optic fitting of the remote display cable onto the LED display of the FCI.
3. **Insert the outer fitting** through the 21/64 inch diameter hole with the threads extending through the hole in the enclosure.
4. **Insert the end of the fiber optic cable** into the outer display fitting.
5. **Thread the bushing** at the end of the fiber optic cable, onto the outer fitting.
6. **Adjust the display** to the desired alignment and tighten the nut 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 nuts.

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.

Eaton's Cooper Power series S.T.A.R. PATHFINDER Variable Trip 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 has sensed a fault, the dry contacts will latch closed until the FCI is reset manually or until normal system power is restored, following the fault. If the FCI has been reset, the dry contacts will latch in the open position. A simple control diagram of the contacts is shown in Figure 7.

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 2.4 kV. The auxiliary contacts are rated as follows:

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

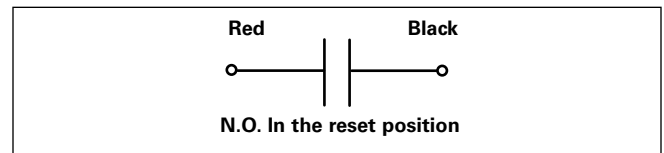


Figure 7. Control drawing of auxiliary contacts

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Printed in USA
Publication No. MN320003EN
March 2017
#5000050837 Rev. 2

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