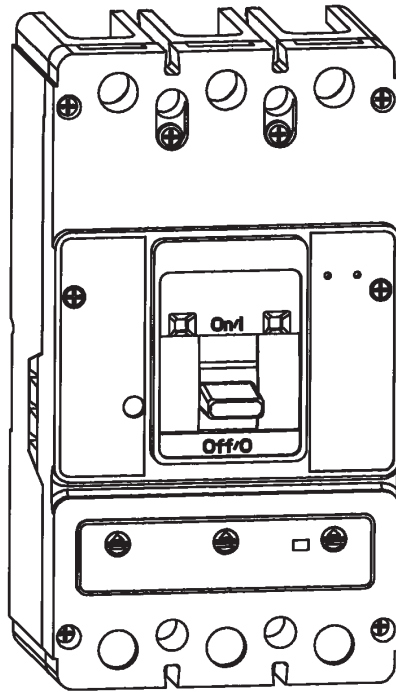


Installation Instructions for E²KMA Mining Service Circuit Breaker



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Powering Business Worldwide

⚠ WARNING

DO NOT ATTEMPT TO INSTALL OR PERFORM MAINTENANCE ON EQUIPMENT WHILE IT IS ENERGIZED. DEATH, SEVERE PERSONAL INJURY, OR SUBSTANTIAL PROPERTY DAMAGE CAN RESULT FROM CONTACT WITH ENERGIZED EQUIPMENT. ALWAYS VERIFY THAT NO VOLTAGE IS PRESENT BEFORE PROCEEDING WITH THE TASK, AND ALWAYS FOLLOW GENERALLY ACCEPTED SAFETY PROCEDURES. EATON IS NOT LIABLE FOR THE MISAPPLICATION OR MISINSTALLATION OF ITS PRODUCTS.

The user is cautioned to observe all recommendations, warnings, and cautions relating to the safety of personnel and equipment as well as all general and local health and safety laws, codes, and procedures.

The recommendations and information contained herein are based on Eaton experience and judgment, but should not be considered to be all-inclusive or covering every application or circumstance which may arise. If any questions arise, contact Eaton for further information or instructions.

1. Introduction

General Information

The E²KMA mining service circuit breakers (Figure 1) are 1150 Vac maximum rated devices with interchangeable thermal-magnetic trip units rated 400 A maximum continuous current.

This instruction leaflet (IL) gives procedures for installing and field testing of the E²KMA mining service circuit breakers. For this publication, the term circuit breaker shall be used when discussing mining service circuit breakers.

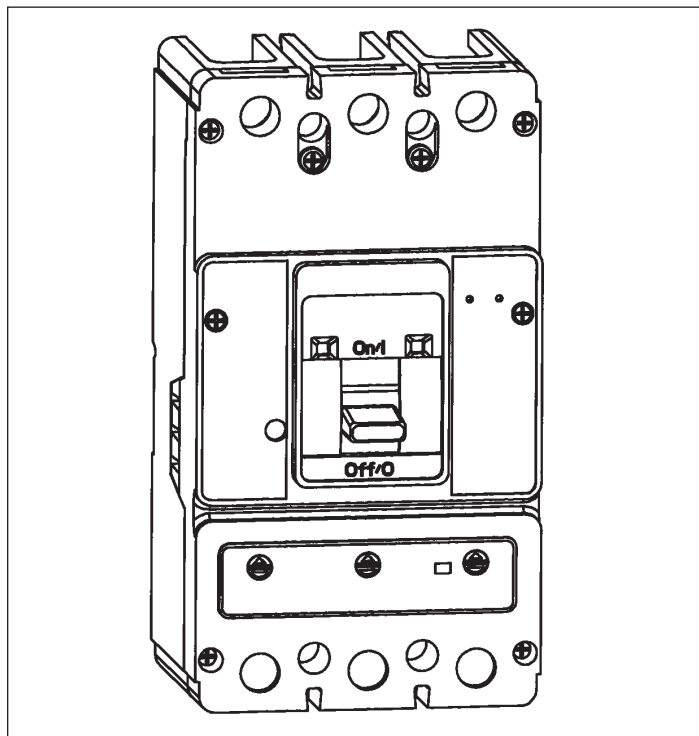


Figure 1.E²KMA Mining Service Circuit Breaker with TM Trip Unit Installed.

2. Installation

The installation procedure consists of inspecting the circuit breaker and, as applicable, installing the trip unit, accessories, interphase barriers and terminals; mounting the circuit breaker; connecting the line and load conductors; torquing terminals; attaching terminal shields; and installing back sheets. Circuit breaker frames, trip units, accessories, mounting hardware, back sheets, and unmounted terminals may be supplied in separate packages. To install the circuit breaker, perform the following steps.

If required, internal accessory installation in any type of circuit breaker should be done before the circuit breaker is mounted and connected. Refer to individual accessory instruction leaflets.

Circuit breaker mounting hardware is supplied separately.

- 2.1. Make sure that the circuit breaker frame is suitable for the intended installation by comparing nameplate data with existing ratings and system requirements. Inspect the circuit breaker for completeness, and check for damage before mounting. Uninstalled cover mounting hardware is supplied in a plastic bag with the circuit breaker frame (see Figure 2).

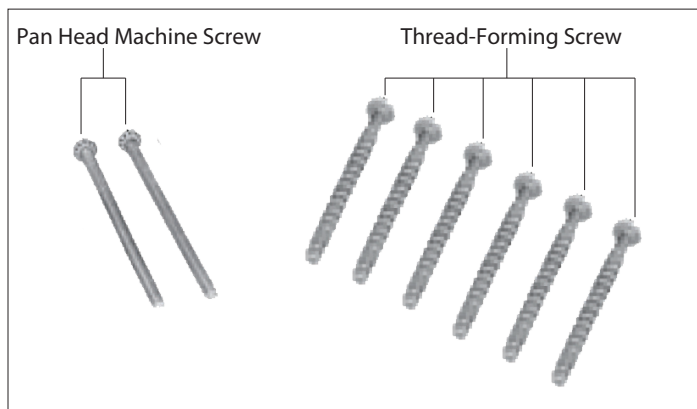


Figure 2. Cover Mounting Hardware.

NOTICE

THE CIRCUIT BREAKER HANDLE MUST BE IN THE TRIPPED OR OFF POSITION TO REMOVE THE COVER. INSTRUCTIONS FOR INSTALLING THE TRIP UNIT ACCESSORIES ARE SUPPLIED WITH THE DEVICES.

- 2.2. Remove installed cover screws and cover.
- 2.3. If not already installed, mount trip unit and accessories (if required) in circuit breaker frame.
- 2.4. Install cover, and secure with pan-head screws followed by thread-forming screws, as shown in Figure 3.

⚠ CAUTION

WHEN REMOVED AND REINSTALLED, THREAD-FORMING SCREWS WILL TRY TO REFORM THE THREADS IN THE BASE. CARE SHOULD BE TAKEN EVERY TIME A THREAD-FORMING SCREW IS USED TO ENSURE THE SCREW STARTS IN THE ORIGINAL THREADS. DAMAGED THREADS CAN RESULT IN IMPROPER CIRCUIT BREAKER COVER RETENTION.

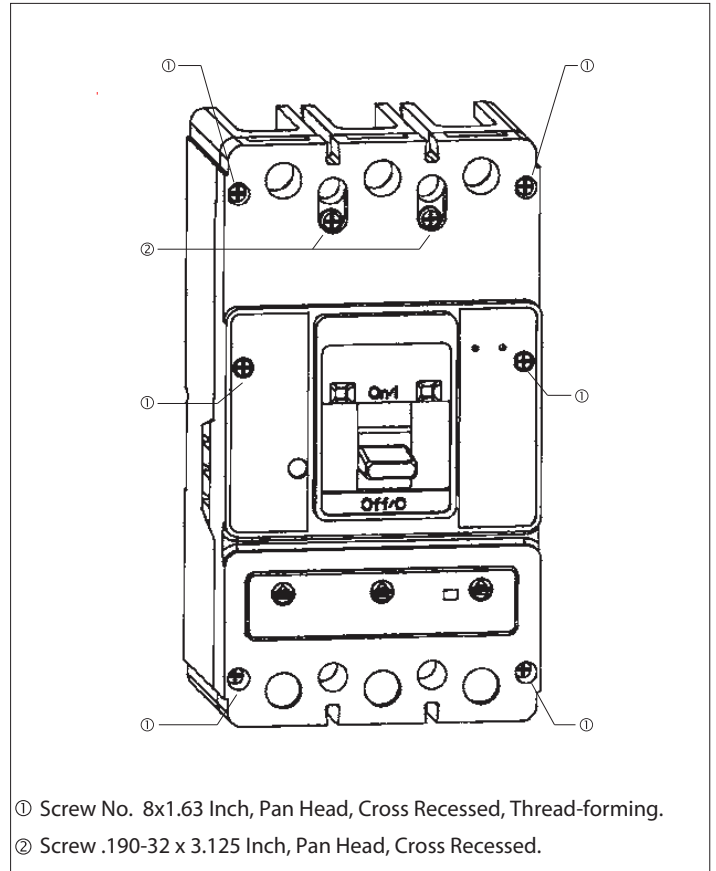


Figure 3. Cover Screw Installation Positions.

- 2.5. If not already installed, mount terminal as shown in Figure 4. When using terminal (Catalog No. TA350K), secure the terminal to the circuit breaker using 1/4-inch (6.35 mm) hex key. Torque to 6-8 lb-ft (8.1 - 10.9 N-m).

⚠ WARNING

THE VOLTAGES IN ENERGIZED EQUIPMENT CAN CAUSE DEATH OR SEVERE PERSONAL INJURY. BEFORE MOUNTING THE CIRCUIT BREAKER IN AN ELECTRICAL SYSTEM, MAKE SURE THERE IS NO VOLTAGE PRESENT WHERE WORK IS TO BE PERFORMED. SPECIAL ATTENTION SHOULD BE PAID TO REVERSE FEED APPLICATIONS TO ENSURE NO VOLTAGE IS PRESENT.

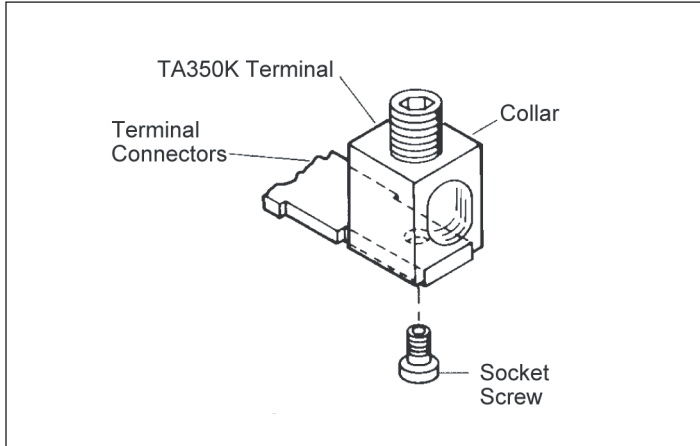


Figure 4. Terminal Installation.

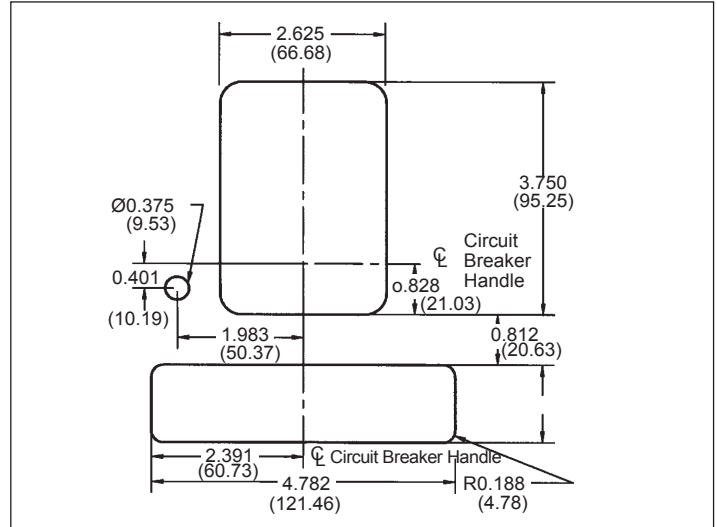


Figure 6. Escutcheon Dimensions.

NOTICE

DEPENDING ON THE EQUIPMENT CONFIGURATION, THE CIRCUIT BREAKER CAN BE MOUNTED USING DIFFERENT STYLES OF HARDWARE. THE FOLLOWING STEPS DESCRIBE HOW TO MOUNT THE CIRCUIT BREAKER USING STANDARD HARDWARE. WHEN SPECIAL HARDWARE IS NEEDED (FOR EXAMPLE, WITH THE ELECTRICAL OPERATOR), THE INSTRUCTION LEAFLET DESCRIBING THE ACCESSORY ALSO DESCRIBES THE SPECIAL MOUNTING ARRANGEMENTS.

2.6 To mount the circuit breaker, perform the following steps.

- a. For individual surface mounting, drill mounting panel using the drilling plan shown in Figure 5. For panelboard mounting, only load end support mounting holes are required. For deadfront cover applications, cut out cover to correct escutcheon dimensions (see Figure 6)

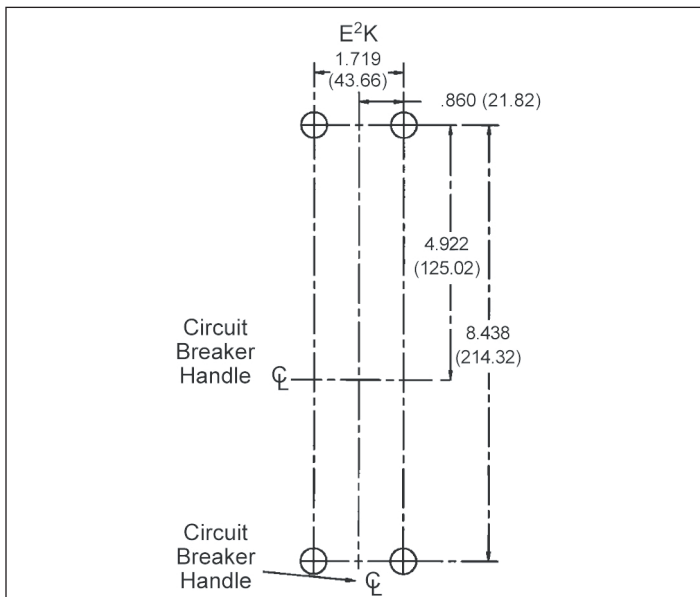


Figure 5. Mounting Bolt Drilling Plans.

NOTICE

LABELS WITH ACCESSORY CONNECTION SCHEMATIC DIAGRAMS ARE PROVIDED ON THE SIDE OF THE CIRCUIT BREAKER. A NOTE SHOULD BE MADE OF THE DIAGRAMS IF THE LABELS CANNOT BE SEEN WHEN THE CIRCUIT BREAKER IS MOUNTED.

- b. If circuit breaker includes factory- or field-installed internal accessories, make sure that accessory wiring can be reached when the circuit breaker is mounted.
- c. Install supplied back sheet, per Figure 7.

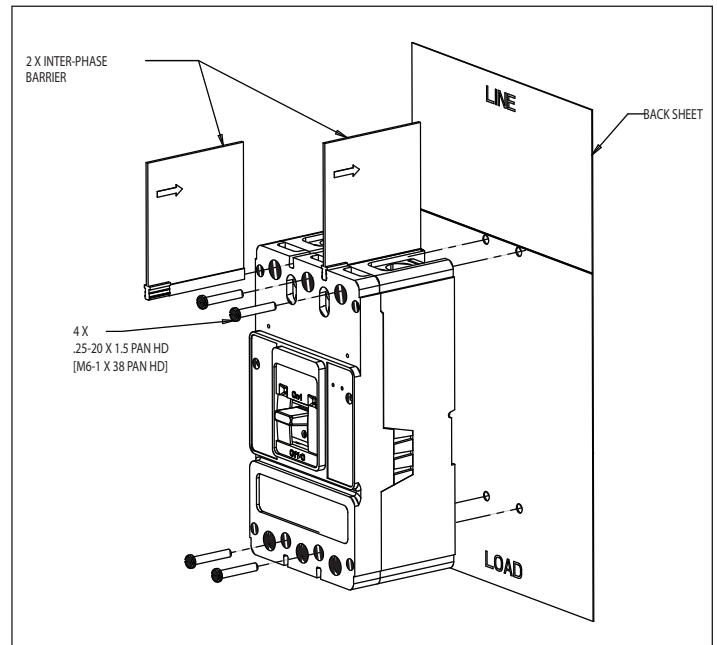


Figure 7. Installing Back Sheets.

- d. Position circuit breaker on mounting surface.
- e. Install circuit breaker mounting screws and washers. Tighten screws firmly, but do not exceed 28 pound-inches (3.1 N.m.).

⚠ CAUTION

WHEN ALUMINUM CONDUCTORS ARE USED, THE APPLICATION OF A SUITABLE JOINT COMPOUND IS RECOMMENDED TO REDUCE THE POSSIBILITY OF TERMINAL OVERHEATING. OVERHEATING CAN CAUSE NUISANCE TRIPPING AND DAMAGE TO THE CIRCUIT BREAKER.

- 2.7. Connect line and load conductors and accessory leads.
- 2.8. If required, install terminal shield on circuit breaker cover with mounting screws provided. The supplied Interphase Barriers should be installed to the LINE END of the circuit breaker by sliding the barrier into the dovetail groove on the cover.
- 2.9. After the circuit breaker is installed, check all mounting hardware and terminal connecting hardware for correct torque loading. Torque values for line/load terminals are given in Table 1 and on the circuit breaker nameplate.

Table 1. Terminal Types.

Terminal Catalog Number	Terminal Material Body	Screw Head Type	AWG Wire Range	Metric Wire Range	Wire Type	Torque Value lb-in (N.m.)
TA350K	Aluminum	Socket	250-500 MCM	120-240	Cu Al	375 (42)
3TA400K	Aluminum	Socket	3/0-250 (2)	95-120	Cu Al	275 (31)

3. Manual Operation, and Thermal-Magnetic Adjustment

Manual Operation

Manual operation of the circuit breaker is controlled by the circuit breaker handle and the PUSH-TO-TRIP button in the trip unit. The circuit breaker handle has three positions, two of which are shown on the cover with raised lettering to indicate ON and OFF. On the sliding handle barrier, ON, OFF, and Trip are also shown by a color-coded strip for each circuit breaker handle position: red for ON, white for Tripped, and green for OFF. ON/OFF is also shown with the international symbols I/O (see Figure 8).

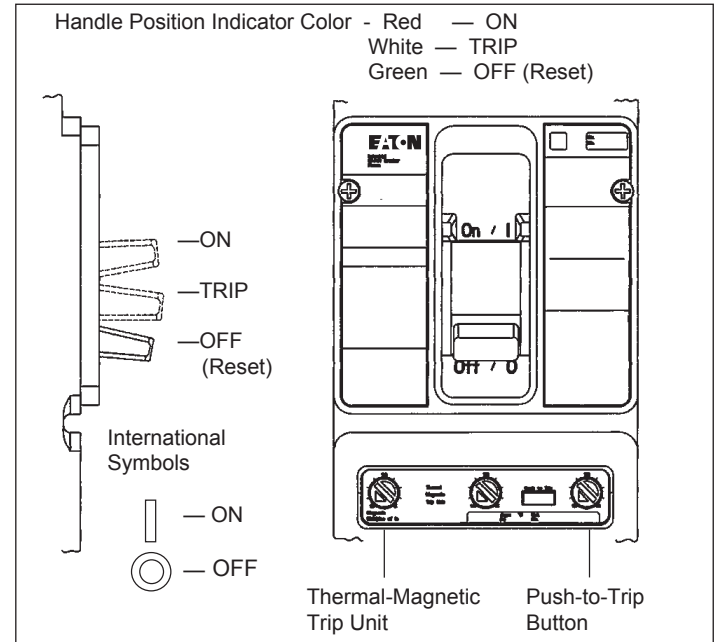


Figure 8. Circuit Breaker Manual Controls.

Circuit Breaker Reset

After an automatic or accessory initiated trip, or a manual Push-to-Trip operation, the circuit breaker is reset by moving the circuit breaker handle to the extreme OFF position.

NOTICE

IN THE EVENT OF A THERMAL TRIP IN A THERMAL MAGNETIC TYPE TRIP UNIT, THE CIRCUIT BREAKER CANNOT BE RESET UNTIL THE THERMAL ELEMENT IN THE TRIP UNIT COOLS.

NO CIRCUIT BREAKER SHOULD BE RECLOSED UNTIL THE CAUSE OF TRIP IS KNOWN AND THE SITUATION RECTIFIED.

PUSH-TO-TRIP Button

The PUSH-TO-TRIP button checks the circuit breaker tripping function and is used to periodically exercise the operating mechanism in thermal-magnetic trip units. The button is designed to be operated by a small screwdriver.

Thermal-Magnetic Trip Unit Adjustment

The magnetic element of each pole of the trip unit can be adjusted by rotating the adjustment buttons on the front face of the trip unit with a screwdriver. The buttons have several settings, as indicated on the nameplate, with values in multiples of the trip unit ampere rating (In)(see Figure 9). To adjust the setting, rotate each button clockwise until arrow on button points to desired setting.

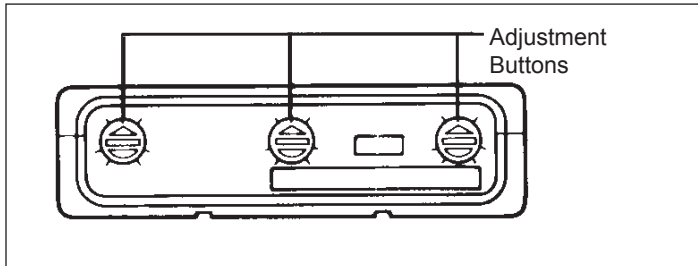


Figure 9. Trip Unit Magnetic Trip Adjustment Buttons

4. Inspection

Circuit breakers are designed to provide years of almost maintenance-free operation. The following procedure describes how to inspect and test a circuit breaker in service.

Inspection

Circuit breakers in service should be inspected periodically. The inspection should include the following checks (4.1 through 4.8).

⚠ WARNING

THE VOLTAGES IN ENERGIZED EQUIPMENT CAN CAUSE DEATH OR SEVERE PERSONAL INJURY. BEFORE INSPECTING THE CIRCUIT BREAKER IN AN ELECTRICAL SYSTEM, MAKE SURE THERE IS NO VOLTAGE PRESENT WHERE WORK IS TO BE PERFORMED. SPECIAL ATTENTION SHOULD BE PAID TO REVERSE FEED APPLICATIONS TO ENSURE NO VOLTAGE IS PRESENT.

⚠ CAUTION

MAKE SURE THAT CLEANING AGENTS OR SOLVENTS USED TO CLEAN THE CIRCUIT BREAKER ARE SUITABLE FOR THE JOB. SOME COMMERCIAL CLEANING AGENTS WILL DAMAGE THE NAMEPLATES OR MOLDED PARTS.

- 4.1. Remove dust, dirt, soot, grease, or moisture from the surface of the circuit breaker using a lint-free dry cloth, brush, or vacuum cleaner. Do not blow debris into circuit breaker. If contamination is found, look for the source and eliminate the problem.
- 4.2. Switch circuit breaker to ON and OFF several times to be sure that the mechanical linkages are free and do not bind. If mechanical linkages are not free, replace circuit breaker.
- 4.3. With the circuit breaker in the ON position, press the PUSH TO-TRIP button to mechanically trip the circuit breaker. Trip, reset, and switch circuit breaker ON several times. If mechanism does not reset each time the circuit breaker is tripped, replace the circuit breaker.
- 4.4. Check base, cover, and operating handle for cracks, chipping, and discoloration. Circuit breakers should be replaced if cracks or severe discoloration is found.
- 4.5. Check terminals and connectors for looseness or signs of overheating. Overheating will show as discoloration, melting, or blistering of conductor insulation, or as pitting or melting of conductor surfaces due to arcing. If there is no evidence of overheating or looseness, do not disturb or tighten the connections. If there is evidence of overheating, terminations should be cleaned or replaced. Before reenergizing the circuit breaker, all terminations and cable should be refurbished to the condition when originally installed.
- 4.6. Check circuit breaker mounting hardware. Tighten if necessary.
- 4.7. Check area where circuit breaker is installed for any safety hazards, including personal safety and fire hazards. Exposure to certain types of chemicals can cause deterioration of electrical connections.
- 4.8. The operation of circuit breakers with electronic trip units can be field-tested periodically using the Seltronic test kit.

NOTES:

The instructions for installation, testing, maintenance, or repair herein are provided for the use of the product in general commercial applications and may not be appropriate for use in nuclear applications. Additional instructions may be available upon specific request to replace, amend, or supplement these instructions to qualify them for use with the product in safety-related applications in a nuclear facility.

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Eaton Corporation
Electrical Sector
1111 Superior Ave.
Cleveland, OH 44114
United States
877-ETN-CARE (877-386-2273)
Eaton.com

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