KA864-R1/KA864-R2 time-delay units (four-curve) installation and calibration instructions

Powering Business Worldwide

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Contents

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. G122.2

Product information

Introduction

Service Information MN280029EN provides calibration instructions for Eaton's Cooper Power™ series KA864-R1 or KA864-R2 time-delay unit with a four-curve capability. Prior to the installation or calibration process, carefully read and understand the contents of this manual.

For additional information, refer to the applicable service information bulletin.

- *MN280027EN Type D, DV Single-Phase Reclosers Maintenance Instructions.*
- *S280-30-1 Types W, WV27, WV38X, VW, VWV27 and VWV38X; Three-Phase, Hydraulically-Controlled Reclosers; Installation and Operation Instructions.*
- *MN280026EN Type R Three-Phase Recloser Maintenance Instructions*
- *S280-30-3 Type W Three-Phase Recloser Maintenance Instructions*
- *S280-30-4 Types RV and WV Three-Phase Reclosers Maintenance Instructions*
- *S280-30-7 Types VW, VWV27, and VWV38 Reclosers Maintenance Instructions*
- *S280-30-8 Types RX and W Reclosers Maintenance Instructions*
- *S280-30-9 Types RV and WV Reclosers Maintenance Instructions*

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. For additional information, contact your Eaton representative.

Standards

Eaton's reclosers are designed and tested in accordance with IEEE Std C37.85™-1989, ANSI/IEEE Std C37.60™-1981, ANSI® C37.61-1973 standards.

Quality standards

ISO 9001 Certified Quality Management System

Acceptance and initial inspection

Each KA864-R1 or KA864-R2 time-delay unit is completely assembled, tested, and inspected at the factory. It is carefully calibrated, adjusted, and in good condition when accepted by the carrier for shipment.

Upon receipt, inspect the carton for signs of damage. Unpack the time-delay unit 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 time-delay unit to minimize the possibility of damage. If the unit is to be stored for any length of time prior to installation, provide a clean, dry storage area.

Description

A time-delay unit is a sealed unit that provides consistent delay action by forcing hydraulic fluid through an orifice. A special time-delay fluid minimizes temperature effects.

Prior to this particular design, a KA864-R1 or KA864-R2 time-delay unit only could be set for two curves. This unit allows operators to configure the time-delay unit to any one of four curves: B, C, D or E.

This unit is a direct replacement for existing time-delay units and is universal to the majority of Eaton's Cooper Power series Types D, R, and W reclosers.

Note: This time unit delay replaces an existing time-delay unit with the same part number.

Installation

CAUTION

Equipment damage. Keep work areas clean to prevent debris from accumulating on or in the hydraulic mechanism during disassembly and reassembly of components. Failure to comply can result in hydraulic failure and recloser misoperation. T254.0

IMPORTANT

Before beginning the disassembly process, ensure the recloser is in the open position.

Refer to the appropriate service instructions for the step-by-step procedures to remove the recloser from service and for specific disassembly and reassembly procedures.

- *MN280027EN Type D, DV Single-Phase Recloser Maintenance Instructions.*
- *S280-30-1 Types W, WV27, WV38X, VW, VWV27 and VWV38X; Three-Phase, Hydraulically- Controlled Reclosers; Installation and Operation Instructions*
- *MN280026EN Type R, Three-Phase Recloser Maintenance Instructions*
- *S280-30-3 Type W, Three-Phase Recloser Maintenance Instructions*
- *S280-30-4 Types RV and WV; Three-Phase Reclosers Maintenance Instructions*
- *S280-30-7 Types VW, VWV27, and VWV38 Reclosers, Maintenance Instructions*
- *S280-30-8 Types RX and W Reclosers, Maintenance Instructions*
- *S280-30-9 Types RV and WV Reclosers, Maintenance Instructions*

⚠ WARNING

Hazardous voltage. De-energize the switchgear before installing this kit. Follow all locally approved safety practices and procedures when working around high voltage lines and equipment. Failure to comply can result in contact with high voltage, which will cause death or severe personal injury. T232.3

CAUTION

Follow all locally approved safety practices when lifting and mounting the equipment. Use the tapped lifting provisions provided. Lift the load smoothly and do not allow the load to shift. Improper lifting can result in equipment damage. G126.0

The entire installation process should be conducted in a clean environment, such as a repair shop:

1. Bypass, trip, and de-energize the recloser.
2. Carefully transport the unit to a suitable service facility.

⚠ CAUTION

Equipment damage. Refer to the specific switchgear unit maintenance manual for tanking/untanking procedures and related instructions. Failure to follow these instructiosn could result in equipment damage or personal injury. T238.0

CAUTION

Equipment damage. Recloser must be open (yellow operating handle, under sleet-hood, down) before untanking. Tripping the mechanism out of oil will cause excessive mechanical shock to the operating mechanism, which will cause accelerated wear and/or damage to the mechanism. T202.0

3. With the recloser in the open position, untank the recloser by loosening the head bolts and washers on the head casting. Carefully lift the head assembly out of the tank using the lifting lug(s).
4. Remove the mechanism from the head assembly.
5. Securely mount the mechanism to a suitable work rack.
6. Remove the old time-delay unit from the mechanism.

Note: Refer to the applicable *Service Instructions* to locate the placement of the time-delay unit.

   A. Disconnect the minimum trip spring from the time-delay unit.

   B. Loosen the curve identification bracket and move aside to gain access to screws securing the unit to the mechanism.

   C. Unscrew the four screws securing the unit to the mechanism with a flathead screwdriver.

7. Install the new time-delay unit:

   A. Line up the unit screw holes over the appropriate mechanism screw holes.

   B. Secure the unit to the mechanism by screwing the four screws through the unit and mechanism with a flathead screwdriver.

   C. Move the curve identification bracket back to the original position and tighten.

   D. Reconnect the minimum trip spring to the time-delay unit.

8. Complete all procedures in the **Calibration** section of this manual.
9. Return the recloser to service. Refer to the applicable *Service Instructions*.

Calibration

Complete all of the procedures in this section prior to putting the time-delay unit into service.

Check hydraulic fluid level

Always check hydraulic fluid level before putting the unit into service. Low hydraulic fluid level in a time-delay unit can result in erratic recloser operation.

IMPORTANT

While checking the hydraulic fluid level, avoid introducing any dirt, metal, or lint into the unit. An orifice plugged by foreign material will cause erratic time-delay operation.

To check hydraulic fluid level, follow this procedure:

1. Remove the filler-plug screw on the fron side of the unit.
2. Observe if hydraulic fluid leaks from the hole (Figure 1) and proceed as follows.
   A. Hydraulic fluid leakage indicates an adequate fluid level.
   B. If hydraulic fluid does not leak from the hole, add additional fluid until observing slight leakage.

Note: A hydraulic fluid restoration kit (Catalog Number KA806-R2) is available. This kit contains an eye dropper and two ounces of approved time-delay unit fluid – Hydraulic Fluid, Aircraft (HFA).

3. Replace and tighten the filler plug.

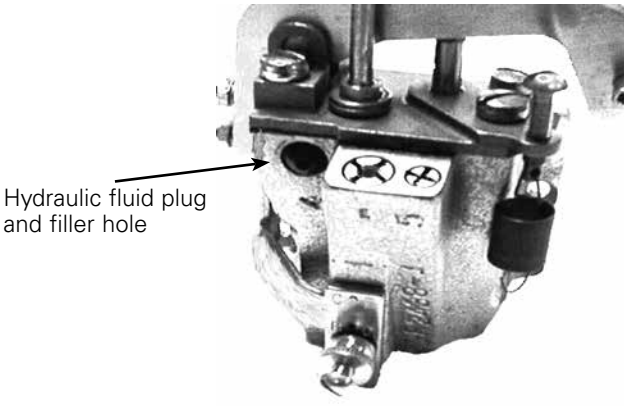

Figure 1. Hydraulic fluid plug location.

Factory preset curve

This time-delay unit was shipped as a replacement part. Unless otherwise requested, the unit left the factory preset to the curve ordered by the customer.

Figure 2 illustrates the general location of the mark indicating the curve was preset at the factory. Also, the housing locator pin will reside in the bracket locator hole adjacent to the active curve. As an example, the pin in the upper bracket hole and the mark placed as shown in Figure 2 indicates E curve is active.

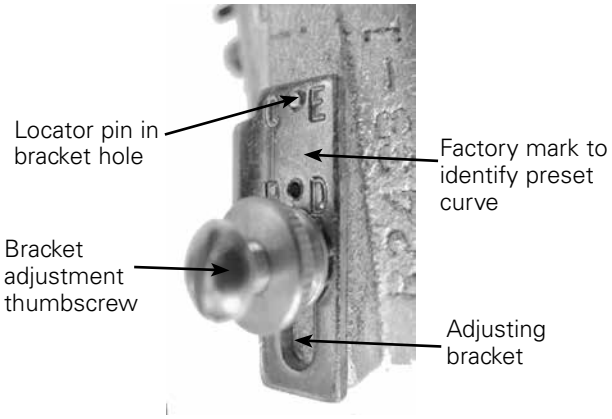

Figure 2. Identifying factory preset curve.

If the pin were in the lower hole with the mark as shown in Figure 2, D would be the active curve.

If the mark had been on the opposite side of the bracket and the pin in the upper hole, the active curve would be C. If the pin was in the lower hole, the active curve would be B.

- Each KA864-R1 time-delay unit leaves the factory preset to either the B or C curve.
- Each KA864-R2 time-delay unit leaves the factory preset to either the D or E curve.

If an application requires setting a recloser to a different curve, the time-delay unit must be recalibrated. Refer to **Adjust Timing Values** section.

Calibration test setup

Test equipment must maintain a constant current and keep accurate time. Use a test setup as specified in *Reference Data R280-90-2, Low-Voltage AC Testing of Hydraulic Reclosers.*

Pre-calibration procedures

When the unit left the factory, technicians calibrated timing values to 4, 6–8, and 12–18 times continuous coil rating, depending on the size of the coil.

Before attempting to calibrate timing values, the following procedures must be completed:

1. Position the bracket for the curve. Refer to **Bracket Placement** procedure.
2. Set the clearance between roll pin and engagement arm. Refer to **Adjust Roll Pin Clearance** procedure.

Bracket placement

To correctly configure the time-delay characteristic, the bracket hole directly adjacent the selected curve must be placed onto the housing locator pin.

1. Loosen the thumbscrew and pull the bracket off the housing locating pin (Figure 3).

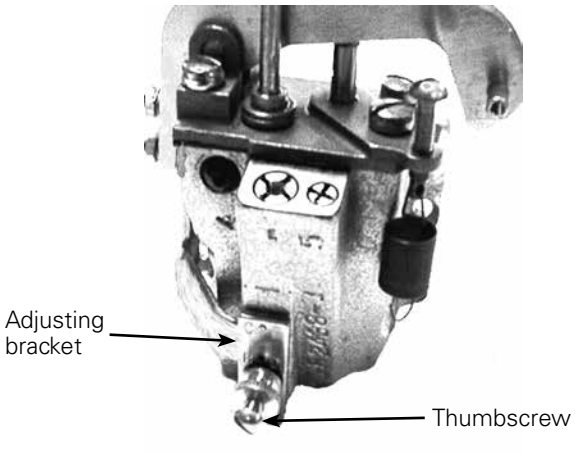

Figure 3. Adjustment mechanism

2. Index the adjustment bracket so that the bracket hole for the selected curve (B / D or C / E) seats over the pin (Figure 4).

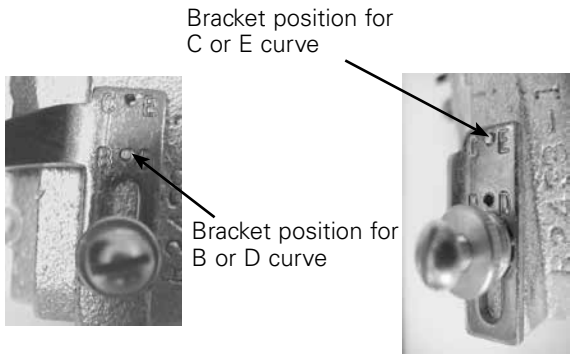

Figure 4. Bracket positions.

3. Securely tighten the thumbscrew.

Note: If the unit is reset to a curve other than the factory preset curve, clearly mark the unit to identify the curve actually in use.

Adjust roll pin clearance

Set clearance between roll pin and engagement arm for appropriate curve:

B or D curves

When configuring a time-delay unit for a B or D curve, ensure there is a 2.38 mm (3/32 inch) clearance between the roll pin and lower portion (start of sloped area) of the engagement arm as shown in Figure 5.

Turn lower adjustment screw as required until specified clearance is achieved.

C or E curves

When configuring a time-delay unit for a C or E curve, ensure there is a 2.38 mm (3/32 inch) clearance between the roll pin and the upper portion (notched area) of the engagement arm as shown in Figure 5.

Turn upper adjustment screw as required until specified clearance is achieved.

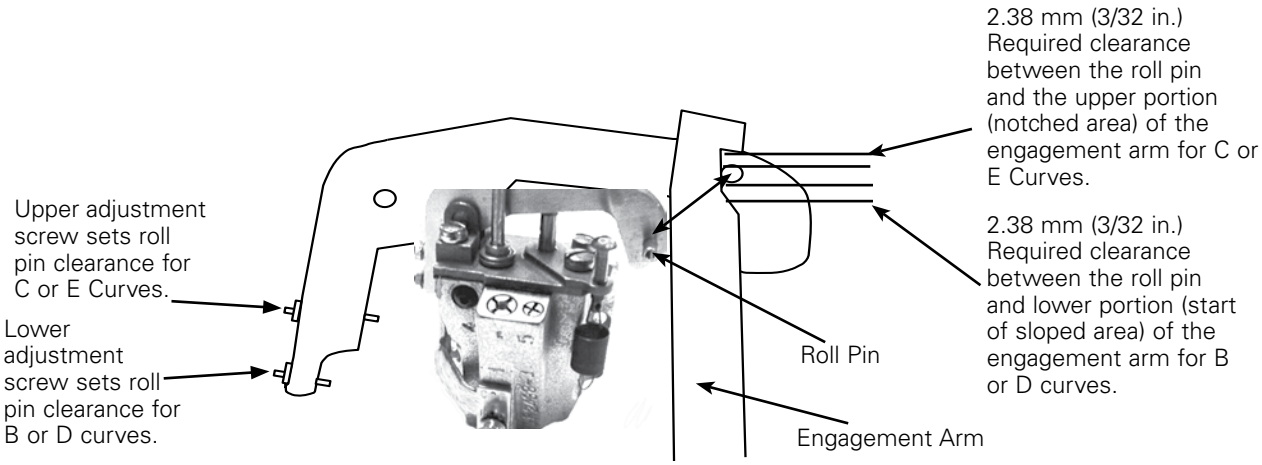

Figure 5. Roll pin adjustment for a B or D and C or E curve

Adjust timing values

Refer to Figure 6 for adjustment screw locations.

Note: Timing values are ±10 % of current or time, whichever is greater.

Note: Always make small set-screw adjustments to avoid over-correcting.

IMPORTANT

Any adjustments to one current setting value may affect the other current setting values. After changing a setting value, always recheck the other two current setting values to make sure they have remained within stated tolerances. If necessary, continue to readjust and recheck until all three current setting value remain within their specified limits.

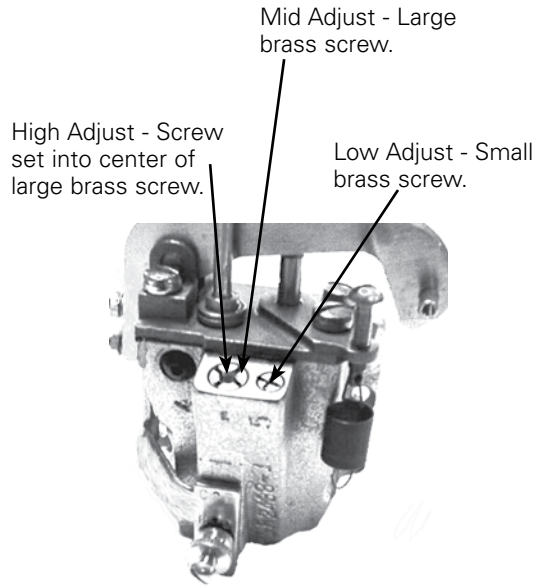

Figure 6. Adjustment screw locations.

Low current adjustment

Low current must be set as close as possible to a value equal to 4-times the maximum continuous rating of the series coil.

IMPORTANT

Never set the low current setting below 4-times the maximum continuous rating of the series coil.

Calibrate as follows:

To raise the value, turn the small external brass screw to the right (clockwise). To lower the value, turn the small external brass screw to the left (counter-clockwise).

After changing a setting value, always recheck the other two current setting values to make sure they have remained within stated tolerances. If necessary, continue to readjust and recheck until all three current setting value remain within their specified limits.

Mid current adjustment

Mid current must be set to between 6- and 8-times the maximum continuous rating of the series coil. Calibrate as follows:

To raise the value, turn the large external brass screw to the right (clockwise).

To lower the value, turn the large external brass screw to the left (counter-clockwise). After changing a setting value, always recheck the other two current setting values to make sure they have remained within stated tolerances. If necessary, continue to readjust and recheck until all three current setting value remain within their specified limits.

High current adjustment

High current just be set to between 12 to 18 times the maximum continuous rating of the series coil. Use a 2.38 mm (3/32 inch) Allen wrench and calibrate as follows:

To raise the value, turn the set screw (recessed into the center of the large brass screw) to the right (clockwise).

To lower the value, turn the set screw (recessed into the center of the large brass screw) to the left (counterclockwise).

After changing a setting value, always recheck the other two current setting values to make sure they have remained within stated tolerances. If necessary, continue to readjust and recheck until all three current setting value remain within their specified limits.

Additional information

⚠ CAUTION

This equipment requires routine inspection and maintenance to ensure proper operation. If it is not maintained, it can fail to operate properly. Improper operation can cause equipment damage and possible personal injury. G105.1

Replacement kits

Replacement kits are available through the factory Service Department. To order these kits, refer to *S260-01 through S280-01 Distribution Switchgear Parts Guide* for catalog numbers. Contact your Eaton representative for additional information and order procedures.

Factory-authorized service centers

Factory-authorized service centers are located throughout the continental United States to provide maintenance, repair and testing services for Eaton's controls and reclosers. For further information, contact your Eaton representative.

Factory maintenance classes

The factory service department offers a basic testing and troubleshooting course for Eaton's Cooper Power series single- and three- phase hydraulic reclosers. This course, taught by experienced service technicians, is held at the factory's inhouse training facility. For additional information, contact your Eaton representative.

Supplemental Training

A 30-minute DVD program, *KSPV5A Mechanical Operation, Service and Testing for Three-Phase Hydraulic Reclosers* is available as a supplemental training aid for service personnel.

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