

Types 4H single-phase and 6H three-phase vacuum interrupter conversion kits



Powering Business Worldwide

DISCLAIMER OF WARRANTIES AND LIMITATION OF LIABILITY

The information, recommendations, descriptions and safety notations in this document are based on Eaton Corporation's ("Eaton") experience and judgment and may not cover all contingencies. If further information is required, an Eaton sales office should be consulted. Sale of the product shown in this literature is subject to the terms and conditions outlined in appropriate Eaton selling policies or other contractual agreement between Eaton and the purchaser.

THERE ARE NO UNDERSTANDINGS, AGREEMENTS, WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY, OTHER THAN THOSE SPECIFICALLY SET OUT IN ANY EXISTING CONTRACT BETWEEN THE PARTIES. ANY SUCH CONTRACT STATES THE ENTIRE OBLIGATION OF EATON. THE CONTENTS OF THIS DOCUMENT SHALL NOT BECOME PART OF OR MODIFY ANY CONTRACT BETWEEN THE PARTIES.

In no event will Eaton be responsible to the purchaser or user in contract, in tort (including negligence), strict liability or otherwise for any special, indirect, incidental or consequential damage or loss whatsoever, including but not limited to damage or loss of use of equipment, plant or power system, cost of capital, loss of power, additional expenses in the use of existing power facilities, or claims against the purchaser or user by its customers resulting from the use of the information, recommendations and descriptions contained herein. The information contained in this manual is subject to change without notice.

Contents

SAFETY INFORMATION

Hazard statement definitions	iv
Safety instructions	iv

PRODUCT INFORMATION

Introduction	1
Read this manual first	1
Additional information	1
Acceptance and initial inspection	1
Handling and storage	1
ANSI standards	1
Quality standards	1
Description	1
Kit components	1

TYPE 4H RECLOSER INTERRUPTER CONVERSION

Installation	2
------------------------	---

TYPE 6H RECLOSER INTERRUPTER CONVERSION 3

UPRATING VACUUM RECLOSERS 3



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.

G122.3

Product information

Introduction

Service Information MN280014EN provides installation instructions for Eaton's Cooper Power™ series 4H single-phase and 6H three-phase recloser replacing current interrupter with a vacuum interrupter kit, KA700V4H, and the associated up-rating kits.

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 to provide directions for meeting every possible contingency during installation, operation, or maintenance. For additional information, please contact your Eaton representative.

Acceptance and initial inspection

This product 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 kit 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 is equipment to minimize the possibility of damage.

ANSI standards

Eaton reclosers are designed and tested in accordance with ANSI standards C37.60 and C37.85 and ANSI guideline C37.61.

Quality standards

ISO 9001 Certified Quality Management System

Description

Less frequent maintenance and longer service life can be extended to Types 4H and 6H oil circuit reclosers by installing vacuum interrupters in place of present oil interrupters. Originally limited to a continuous-current rating and coil size of 100 A, 4H and 6H reclosers converted to vacuum interruption can be uprated to 140 A by an exchange of coils and bushing leads. Up-rating coil kits as well as vacuum-interrupter kits can be conveniently installed during routine shop maintenance procedures.

One KA700V4H kit is required to convert a single-phase Type 4H oil recloser; three KA700V4H kits are required to convert a three-phase Type 6H oil recloser. To uprate a converted Type 4H recloser to 140 A, one KA701V4H1 kit is required; to uprate a converted V6H recloser to 140 A, three KA701V4H1 kits are required. To uprate a converted Type V4H recloser to 200 A, one KA701V4H2 kit is required; to uprate a converted V6H recloser to 200 A, one KA701V4H4 kit is required.

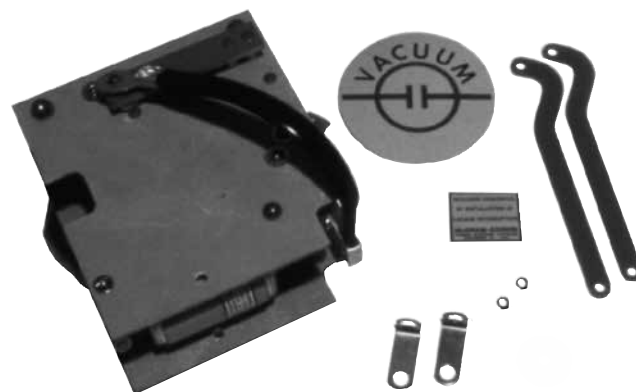


Figure 1. Kit KA700V4H.

Table 1. KA700V4H kit parts*

Description	Qty.	Catalog No.
Vacuum Interrupter Assembly	1	KA101V4H
Pump Links, to replace KA185H4	2	KP1039V4H
Retaining Ring	2	KP2013A8
Square Decal	2	KP1042V4H
Round Decal	1	KP1041V4H
Coil Gap Leads	2	KP442H

* One kit is required to convert a single-phase recloser; three kits are required to convert a three-phase recloser.

Type 4H recloser interrupter conversion

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

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

T238.0

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

CAUTION

Equipment damage. Recloser must be open (yellow operating handle, under sleethood, 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

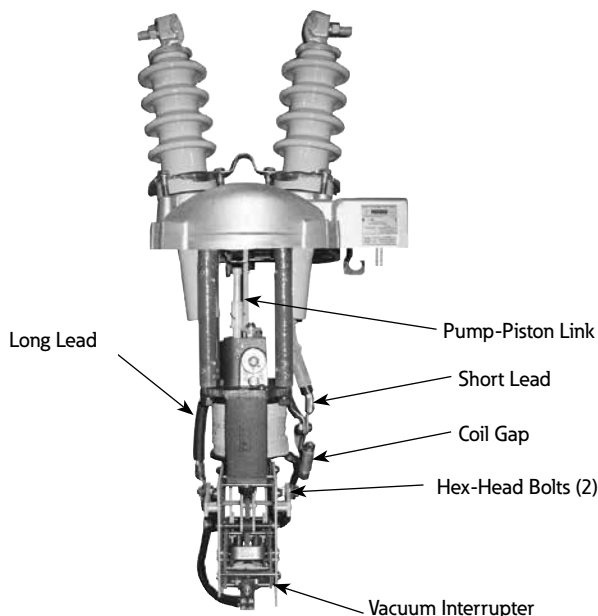


Figure 2. Type 4H recloser converted to vacuum interruption.

CAUTION

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

T254.0

One KA700V4H vacuum interrupter kit is required to convert a single-phase Type 4H oil recloser. Components of the conversion kit are shown in Figure 2 and listed in Table 1. Refer to *Service Information S280-10-3 Type 4H and V4H Recloser Maintenance Instructions*.

CAUTION

Equipment Damage. Never operate a vacuum recloser with a dc test source. The vacuum interrupters will be severely damaged if a dc arc interruption is attempted.

T229.1

Do not use a dc source to check the operation of Types 4H or 6H reclosers that have been converted to vacuum interruption. If high-potential testing is to be performed, refer to *Service Information S280-90-1: Vacuum Interrupter Withstand Test Voltage Ratings Information*.

Installation

1. Bypass and remove the recloser from service.
2. Loosen the bolts that secure the head casting to the tank.
3. Remove the mechanism from the tank and allow excess oil to drain off.

Note: The procedures that follow will be simplified if the work bench is arranged so that mechanism can be inverted (bushings down). No special tools are required for any of the conversion procedures.

4. Lock the operating mechanism in the CLOSED position by closing the yellow operating handle.
5. Disconnect the long bushing lead from one side of the interrupter assembly; disconnect the coil lead and bypass gap from the other side.
6. Remove the two, long hex-head bolts that attach the arc-interrupting structure to the solenoid frame and remove the entire oil-interrupter assembly.

Note: If the recloser is to be updated to 140 A or 200 A, follow the procedure described in the UPRATING VACUUM RECLOSERS section of this manual; otherwise, continue to Step 7.

7. Using the same hardware, attach the new vacuum interrupter assembly to the solenoid frame and reconnect the long bushing lead to the interrupter.
8. Replace the coil-gap leads with the new leads from the kit and connect the coil gap and lower coil lead to the other side of the interrupter. A converted 4H mechanism assembly is shown in Figure 2.

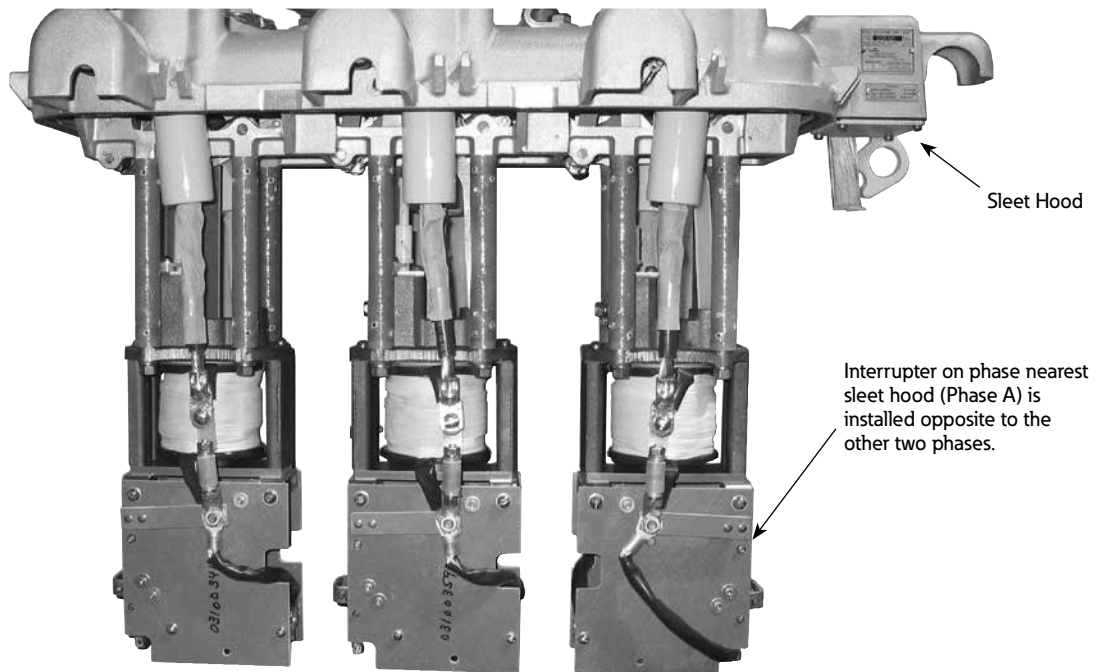


Figure 3. Position of vacuum interrupter assemblies for Type V6H recloser.

9. On earlier models of the 4H and 6H reclosers, the solid pump-piston link must also be replaced with the new double-links. See steps 9A through 9F below.

Note: Newer models of the 4H and 6H reclosers are equipped with the new double links during manufacture and need not be replaced. If so, omit step 9.

- A. Disconnect the upper end of the pump-piston link by removing the retaining ring that secures the pump-link pin and remove the pin. (Refer to S280-10-3.)
- B. Pull the pump link and piston out of the hydraulic mechanism.
- C. Note the position of the pump shell on the pump piston. Unscrew the shell far enough to expose the steel pin which attaches the link to the piston. Push out the pin and remove the piston from the link.

Note: The pump shell is staked to the top few threads of the pump piston to prevent the adjustment from shifting. To break the staking, turn the shell counterclockwise further onto the piston until the staked spot clears the top of the piston. Unscrew the shell by turning clockwise. Be careful not to mar the surface of the pump shell. Use a cloth wrapping before applying any tool to the shell.

- D. Replace the single link with the two new links side by side and attach to the piston. Reposition the threaded shell back to its original position on the pump piston.

- E. Install the pump piston and link assembly into the hydraulic mechanism, attach the upper end of

the links with the link pin, and secure with a new retaining ring.

- F. Refer to Service Information S280-10-3 for test procedures to verify proper operation of the pump. Lightly stake the shell to the top few threads of the piston after proper operation has been verified.

10. Affix the decals to the tank and the head.

11. Perform all other routine inspection and maintenance services, including a refill with new transformer oil before returning the recloser to service (see S280-10-3).

Type 6H recloser interrupter conversion

Three KA700V4H interrupter kits are required to convert a three-phase Type 6H oil recloser. Follow the procedure described for Type 4H interrupter replacement for each phase of the Type 6H recloser. Refer to *Service Information S280-10-5 Type 6H Recloser Maintenance Instructions*.

Figure 3 shows the proper positioning of the vacuum interrupter assemblies during reassembly. Note that the vacuum interrupter on the phase nearest the operating handle is positioned 180°

Upgrading vacuum reclosers

To upgrade a converted Type 4H recloser to 140 A, one KA701V4H1 kit is required; to upgrade a converted V6H recloser to 140 A, three KA701V4H1 kits are required. To upgrade a converted Type V4H recloser to 200 A, one KA701V4H2 kit is required; to upgrade a converted V6H recloser to 200 A, one KA701V4H4 kit is required.

Components of the various upgrading kits are listed in Table 2.

To exchange series trip coils, remove the arc-interrupting assembly as previously described and then proceed as follows. Refer to Figures 4 and 5.

1. To prevent inadvertent tripping of the operating mechanism, lock out the mechanism. While securely holding the yellow operating handle in the closed position, trip the lockout latch and then slowly release the operating handle.
2. Remove the bridge plate. Observe the position of the bridge plate with respect to the solenoid frame. The bridge plate must be reinstalled in the same position for proper recloser operation.

Note: Early models of both Types 4H/V4H, and Types 6H/V6H reclosers do not have the plunger stop swaged to the bridge plate and must be removed separately.

3. Remove and discard the lower solenoid gasket.

Table 2. Upgrading Kit Parts

Description	KA701V4H1 140 A (V4H & V6H)	KA701V4H2 200 A (V4H)	KA701V4H4 200 A (V6H)
Series Trip Coil	KA24H140	KA24H200	KA24H200 (3)
Lower Solenoid Gasket	KP2090A60	KP2090A60	KP2090A60 (3)
Upper Solenoid Gasket (current version)	KP2090A23	KP2090A23	KP2090A23 (3)
Upper Solenoid Gasket (early version)	KP2090A55	KP2090A55	KP2090A55 (3)
Coil Data Plate	KP2123A3	KP2123A4	KP2123A4 (3)
Long Bushing Lead	–	KA223H44	KA223H67 (3)
Short Bushing Lead	–	KA223H46	KA223H65 (3)
Bushing Terminal Gasket	–	KP2090A57 (2)	KP2090A57 (6)
Lower Bushing Gasket	–	KP2090A29 (2)	KP2090A29 (6)

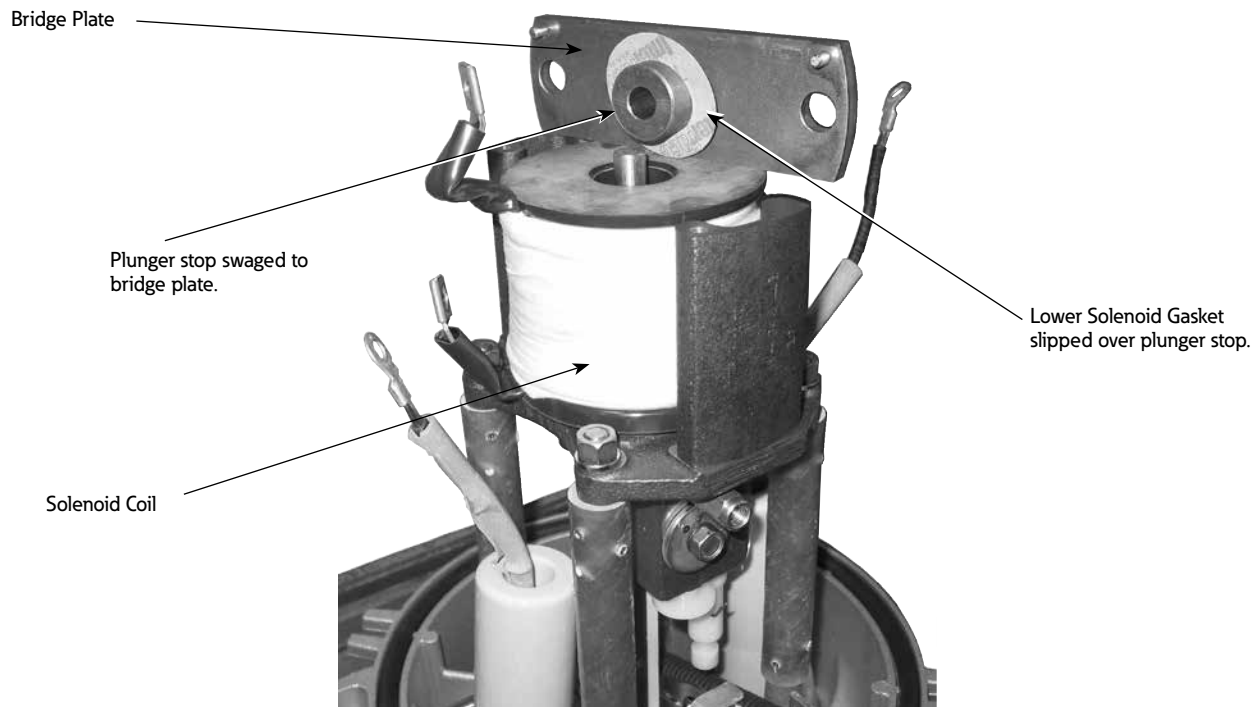


Figure 4. Lower coil assembly. (Shown with unit inverted.)

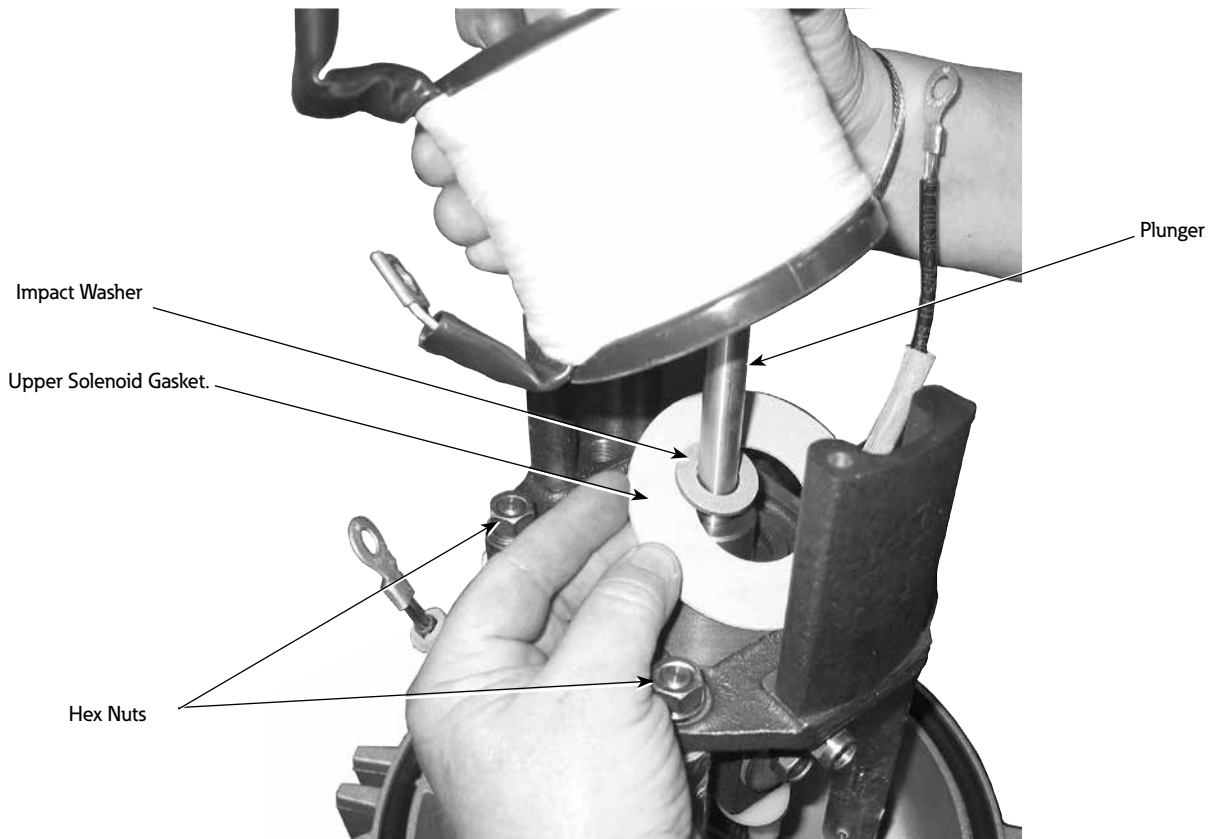


Figure 5. Upper coil assembly.

4. Disconnect the bushing lead and coil-gap assembly from the upper coil lead.
5. Remove the solenoid coil, upper solenoid gasket, and impact washer, as shown in Figure 5. Whenever the coil is replaced, the upper and lower solenoid gaskets must be replaced to maintain proper timing characteristics. The KP2090A23 gasket is used on Type H units with a plunger return force spring. The KP2090A55 gasket is used on Type H units without a plunger return force spring.
6. Replace the solenoid coil with one of the desired rating by reversing the above procedure. Use new upper and lower solenoid gaskets. Make sure that the coil leads are on the same side as the operations counter and that the bridge plate is properly installed for easiest plunger movement.
7. For three-phase reclosers, repeat steps 1 through 6 for each of the three phases.
8. Discard the old and install the new coil-data plate on the sleet hood. Two new self-tapping screws are provided in the kit.
9. If bushing-lead replacement is required to uprate the recloser to 200 A, use the following procedure for each bushing.
 - A. Remove the three-hex-head capscrews and bushing claps securing the bushing to the head casting, and lift the entire bushing assembly up through the head.
 - B. Unscrew the bushing terminal and withdraw the lead from the lower end of the bushing.
 - C. Insert new lead of proper length until it protrudes through the tip of the porcelain. Twist lead as necessary to seat the lock-pin at the upper end of the lead into the slot in the bushing.
 - D. Apply a very small amount of petrolatum jelly to the inside face of the terminal (over the knurling) before assembling the terminal to the lead. Use a new terminal gasket between the terminal and the porcelain.
 - E. Replace the bushing assembly using a new gasket between the bushing flange and the head casting.
 - F. Position the aluminum clamping ring with the split in the ring centered between two clamping bolts to assure proper stress distribution. Replace the bushing clamps, and tighten the capscrews evenly, a little at a time. Clamping torque should not exceed 1.5 Nm (10 ft-lbs).
10. To complete reassembly, lock-in the operating mechanism and continue with steps 6 through 11 in the **Interrupter Conversion** section of this manual.

This page is intentionally left blank.

This page is intentionally left blank.



Eaton
1000 Eaton Boulevard
Cleveland, OH 44122
United States
Eaton.com

**Eaton's Cooper Power Systems
Division**
2300 Badger Drive
Waukesha, WI 53188
United States
Eaton.com/cooperpowerseries

© 2015 Eaton
All Rights Reserved
Printed in USA
Publication No. MN280014EN
KA2048-108 Rev. 02

Eaton is a registered trademark.

All trademarks are property
of their respective owners.

For Eaton's Cooper Power series product
information call 1-877-277-4636 or visit:
www.eaton.com/cooperpowerseries.