

# AC-PRO Retrofit Kit

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Retrofit Kit Instructions for  
Westinghouse  
DA-50  
Low Voltage Breaker

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## LIMITED WARRANTY

Utility Relay Co., Ltd. warrants that every AC-PRO and ZERO-Hertz trip unit and related retrofit kit components (herein collectively referred to as "product") shall be free from defects in material and workmanship, and will perform as described in Utility Relay Company's sales literature and Instruction Manuals, under normal use and service for a period of (2) two years from date of invoice. EXCEPT AS SET FORTH HEREIN, IT IS EXPRESSLY AGREED THAT THERE IS NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, AND THERE IS NO OTHER WARRANTY, EXPRESS, IMPLIED OR STATUTORY, BY UTILITY RELAY CO., LTD. WITH REFERENCE TO THE PRODUCT.

Should any warranty claim arise within the warranty period, contact Utility Relay Co., Ltd. at 888-289-2864 and do the following:

- 1.) Provide a complete description of the problem with the trip unit or retrofit kit component.
- 2.) Provide the Serial Number located on the back of the trip unit from the warranted retrofit kit.
- 3.) Obtain a Returned Materials Authorization number (RMA) and return shipping instructions.
- 4.) Promptly return the defective material to Utility Relay Company.

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- 2.) Defects or damage to the Product resulting from wear, tear, misuse, negligence, improper storage, improper testing, impacts, or use with non-approved accessories.
- 3.) Products used for any other purpose other than originally intended by Utility Relay Company.

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Westinghouse  
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*1.0 General*

All possible contingencies, which may arise during the installation, operation or maintenance, and all details and variations of this equipment, are not necessarily covered by these instructions.

*1.1 Inspection*

Carefully inspect the retrofit kit on arrival. If any damage is found, file a claim with the carrier and contact Utility Relay Co. for replacement parts.

Verify that this is the correct kit for the circuit breaker being retrofitted.

Check the contents of the retrofit kit package against the kit bill of material to make sure that all the required parts are included.

Thoroughly read and understand these installation instructions as well as the AC-PRO trip unit instruction manual before proceeding with the retrofit.

## 2.0 Initial Breaker Tests

Before starting the retrofit, perform a visual/mechanical inspection and an electrical test of the breaker to determine its condition.

Refer to the breaker manufacturer's instruction manual and accepted test standards such as the NETA or PEARL Maintenance Specifications to verify that the breaker is in acceptable mechanical and electrical operating condition.

As a minimum, perform the following:

- a) Close and trip operation of the breaker.
- b) Measure contact resistance of each pole.
- c) Measure insulation resistance from pole to pole, from pole to frame and across open contacts.
- d) Check contact compression.
- e) Check for sufficient finger cluster spring tension at the rear stabs.

Rectify any abnormalities found. Clean and lubricate the breaker as required.

## 3.0 Existing Series Trip Units

The existing "sucker disk" series trip units must be disabled.

On each pole:

- 1) Remove the oil cup, sucker disk/armature/push rod assembly.
- 2) The trip unit coil will be left in place.

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| <p><b>IMPORTANT:</b> Verify that the current transformer rating is NOT GREATER than the coil current rating.</p> |
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#### 4.0 Trip Paddle

Skip this section and go to section 5.0 if the actuator will be installed on a breaker without the side frames. Install the trip paddle as follows:

Refer to Figures 5 & 6 for the following:

- 1) On the trip bar, measure 5 1/2" out from the inside of the right side frame. This is the centerline of the trip paddle.
- 2) Using the trip paddle as a guide, mark the location of the two (2) mounting holes. Drill two 7/32 dia. holes through the trip bar.
- 3) Attach the BR-2A023 trip paddle using two (2) 10-32 X 1 1/4 R.H. screws, flat washers, lock washers and hex nuts.

## 5.0 Manual Reset Actuator

Skip this section and go to section 6.0 if the auto-reset module will be installed with the actuator.

### 5.1 Install Actuator - Standard Installation

Use this section for manual or electrically operated breakers with side frames.

Refer to Figure 5 for the following:

- 1) Using the template from Figure 9, locate the existing hole on the right side of the mechanism frame. This hole will be use as one of the mounting holes for the actuator bracket. Mark the location of the other mounting hole.
- 2) Drill a 9/32 dia. hole in the mechanism frame. Countersink this hole and the existing hole for 1/4-20 Flat head screws.
- 3) Attach the BR-143 actuator bracket to the mechanism frame using two (2) 1/4-20 X 3/4 Flat head screws, lock washers, flat washers and hex nuts.
- 4) Remove the reset knob from the actuator.
- 5) Attach the actuator to bracket BR-143 with three (3) 10-32 X 3/8 R.H. screws and lock washers.
- 6) Replace the reset knob on the end of the actuator rod and lock in place with the 1/4-20 jam nut.
- 7) Verify that the actuator rod is in line with the center of the trip paddle.

## 5.2 Install Actuator - Alternate Installation

Use this section for breakers without side frames. The actuator will mount on the left breaker support bracket and will trip the breaker by striking the existing trip interlock bracket attached to the trip paddle.

Refer to Figure 7 for the following:

- 1) Using the dimensions from Figure 10 mark the location of the two (2) mounting holes on the left breaker support.
- 2) Drill (2) 9/32 dia. holes where marked.
- 3) Attach the BR-177 actuator bracket to the left breaker support using two (2) 1/4-20 X 5/8 H.C. screws, lock washers and hex nuts.
- 4) Remove the reset knob from the actuator.
- 5) Attach the actuator to bracket BR-175 with three (3) 10-32 X 3/8 R.H. screws and lock washers.
- 6) Replace the reset knob on the end of the actuator rod and lock in place with the 1/4-20 jam nut.
- 7) Attach the actuator/BR-175 bracket assembly to the BR-177 bracket using two (2) 1/4-20 X 1/2 H.C. screws and lock washers.
- 8) Verify that the actuator rod is in line with the center of the existing trip interlock bracket.

### 5.3 Adjust Actuator

- 1) Adjust the actuator rod position by screwing it in or out until the tip of the actuator rod is about 1/64" from the trip paddle (or trip interlock bracket).
- 2) After adjusting the actuator rod position, trip the actuator and tighten the 10-32 set screw in the actuator plunger with an Allen wrench. This locks the actuator rod in position.
- 3) Verify that the breaker is held trip free (in the event the actuator is not reset) by trying to close the breaker with the actuator in the trip position.

Adjust the location of the stop nuts as necessary to positively assure that the breaker is held trip free with the actuator not reset.

- 4) Repeat the above until completely satisfied with the operation of the actuator.

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| <p><b>IMPORTANT:</b>        WHEN THE ACTUATOR IS IN THE TRIP POSITION<br/>                              (NOT RESET), THE BREAKER MUST BE TRIP-FREE.</p> <p>                              THE SET SCREW IN THE PLUNGER MUST BE TIGHTENED<br/>                              TO ENSURE THAT THE ACTUATOR ROD REMAINS IN<br/>                              PROPER ADJUSTMENT.</p> <p>                              WITH THE ACTUATOR RESET, THE RESET KNOB MUST<br/>                              NOT PROTRUDE PAST THE BREAKER FRONT.</p> |
|--|

## 6.0 Auto-Reset Module & Actuator

Skip this section if the auto-reset module will NOT be installed.

### 6.1 Install Actuator - Standard Installation

Use these instructions for manually or electrically operated breakers with side frames.

Refer to Figure 6 for the following:

- 1) Using the template from Figure 9, locate the existing hole on the right side of the mechanism frame. This hole will be use as one of the mounting holes for the actuator bracket. Mark the location of the other mounting hole.
- 2) Drill a 9/32 dia. hole in the mechanism frame. Countersink this hole and the existing hole for 1/4-20 Flat head screws.
- 3) Attach the BR-143 actuator bracket to the mechanism frame using two (2) 1/4-20 X 3/4 Flat head screws, lock washers, flat washers and hex nuts.
- 4) Replace the existing actuator rod with the 6" rod provided. Transfer the plastic tip and one of the 1/4-20 nuts to the new actuator rod as a safety precaution.

*Use caution since the plunger is spring loaded.*

- 5) Attach the actuator to the BR-143 bracket using:
  - (3) #10 lock washers
  - (3) AR-012 spacers
  - (3) 10-32 X 1/2 Button Head screws  
(use 1/8 Allen Wrench)

The lock washers should be against the BR-143 bracket.

- 6) Verify that the actuator rod is in line with the center of the trip paddle.

## 6.2 Install Actuator - Alternate Installation

Use this section for breakers without side frames. The actuator and reset module will mount on the left breaker support bracket and will trip the breaker by striking the existing trip interlock bracket attached to the trip paddle.

Refer to Figure 8 for the following:

- 1) Using the dimensions from Figure 10, mark the location of the two (2) mounting holes on the left breaker support.
- 2) Drill (2) 9/32 holes where marked.
- 3) Attach the BR-177 actuator bracket to the mechanism frame using two (2) 1/4-20 X 5/8 H.C. screws, lock washers and hex nuts.
- 4) Replace the existing actuator rod with the 6" rod provided. Transfer the plastic tip and one of the 1/4-20 nuts to the new actuator rod as a safety precaution.

*Use caution since the plunger is spring loaded.*

- 5) Attach the actuator to the BR-175 bracket using:
  - (3) #10 lock washers
  - (3) AR-012 spacers
  - (3) 10-32 X 1/2 Button head screws  
(use 1/8 Allen wrench)

The lock washers should be against the BR-143 bracket.

- 6) Verify that the actuator rod is in line with the center of the existing trip interlock bracket.

### 6.3 Adjust Actuator

- 1) With the breaker closed, and the actuator reset, adjust the position of the actuator rod by screwing it in or out until the end of the rod is about 1/64" from the trip paddle (or trip interlock bracket).
- 2) After adjusting the actuator rod position, trip the actuator and tighten the 10-32 set screw in the actuator plunger with an Allen wrench. This locks the actuator rod in position.

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| <p><b>IMPORTANT:</b>        THE SET SCREW IN THE PLUNGER MUST BE TIGHTENED TO ENSURE THAT THE ACTUATOR ROD REMAINS IN PROPER ADJUSTMENT.</p> |
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#### 6.4 Install Reset Module

- 1) After removing the temporary 1/4-20 nut, slide the reset module on the actuator rod with the 3 keyhole slots towards the actuator.
- 2) Push the reset module towards the actuator so the screw heads bottom out and rotate the reset module clockwise until the screw heads lock into position in the keyhole slots.
- 3) Try twisting the reset module to verify that it is fully locked in position.
- 4) Screw the AR-023-R1ASM brass push nut onto the end of the actuator rod. The long end of the push nut must be towards the reset module.

The split retainer on the push nut must bottom out on the back of the reset module but do NOT use a wrench to tighten.

The AR-023-R1ASM push nut provides 0.30" of actuator travel with the standard adjustment.

- 5) Remove the split retainer by using a pair of pliers to squeeze the two ends together. This opens up the split retainer and it can be removed and discarded.
- 6) Screw the AR-023-R1ASM brass push nut another 1 full turn onto the actuator rod. This will reduce the actuator travel by about .05".
- 7) Lock the push nut in position with a Belleville washer and the AR-027 brass nut. Hold the push nut with a wrench to keep it from turning while tightening the hex nut.

### 6.5 Adjust the Reset Module

- 1) Manually trip and reset the actuator a few times to verify that it operates smoothly without any binding or drag.
- 2) With the actuator in the trip position, verify that the trip paddle is not against its limit of rotation and is keeping the push nut from bottoming out inside the reset module.

*The push nut must bottom out inside the reset module in the trip position for the reset module to operate properly.*

If the trip paddle is against its limit of rotation and the push nut is still not bottomed out, reduce the travel by loosening the hex nut and screwing the push nut in slightly. Tighten the hex nut again.

Repeat the above if necessary for proper operation.

- 3) Verify trip-free operation of the actuator as follows:

- a) With the actuator in the trip position, attempt to close the breaker without resetting the actuator. The breaker must NOT CLOSE and must be trip-free.

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| <p><b>IMPORTANT:</b> With the actuator in the trip position (not reset), the breaker <b>MUST BE TRIP-FREE.</b></p> |
|--|

- 4) Electrically test the operation of the reset module after the installation is complete.

Follow the instructions as outlined in the "A-200 Auto-Reset Module" instructions.

### 6.6 Fuse Block Installation

Install the fuse block on the back of the breaker as follows:

- 1) Find a suitable location close to the rear stabs that will be tapped.
- 2) Using the fuse block as a template, mark the location of the two (2) mounting holes.
- 3) Drill & tap two (2) 8-32 holes where marked.
- 4) Attach the fuse block to the breaker back using two (2) 8-32 X 3/8 P.H. screws and lock washers.

### 7.0 CT Installation

Refer to Figure 11 or 12 for the following:

The CTs are mounted behind the finger clusters on the upper breaker stabs.

- 1) Slide a CT over each upper stab. Use Silicone RTV to keep the CTs in place.
- 2) Replace the finger clusters.

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| <b>IMPORTANT:</b> The phase barriers in the cubical must be modified to clear the CTs. |
|--|

## 8.0 AC-PRO Installation

Refer to Figures 1, 2, 3 and 4 for the following:

- 1) Using the dimensions from figure 4 locate and drill (2) two 5/16 dia. holes in the breaker slate back and frame. The slate back of the manually & electrically operated breakers is different from the breakers without side frames. The location of the trip unit may be standardized by measuring from the arc chute.
- 2) Install the BR-138-3 bracket on the back of the breaker using (2) two 1/4-20 x 2-3/4 H.C. screws, flat washers, lock washers and hex nuts.
- 3) Install the BR-009-1 bracket and the BR-027 shield on the back of the trip unit using (2) two 8-32 x 3/8 Phillips head screws and lock washers.

The BR-027 shield should be behind the BR-009-1 bracket as shown in Figure 4.

- 4) Mount the trip unit and bracket assembly to BR-138-3 using two (2) 8-32 X 1/2 Phillips screws, flat washers, lock washers and hex nuts.
- 5) Ground the trip unit as described in Section 9.6.

## 9.0 Wiring

Refer to Figure 13 for the following:

Use the wiring harness provided to make the connections to the CTs and the actuator.

The wiring harness plugs into the top of the AC-PRO. Be sure to tighten the two plug retaining screws after the wiring is complete.

Shorten the wires and tubing as required and use the cable ties and holders provided to make a clean installation. Make sure the wires will not be pinched, cut or chaffed by any moving parts or sharp edges.

### 9.1 Color Codes and Connections

The wiring harness connector color code and connections are as follows from left to right:

| <u>Terminal #</u> | <u>Wire Color</u> | <u>Use</u>                   |
|-------------------|-------------------|------------------------------|
| 1                 | Red (R)           | Actuator "+"                 |
| 2                 | Black (B)         | Actuator "-"                 |
| 3                 | Blue (L)          | Phase "A" "Dot"              |
| 4                 | White (W)         | Phase "A" Tap                |
| 5                 | Yellow (Y)        | Phase "B" "Dot"              |
| 6                 | White (W)         | Phase "B" Tap                |
| 7                 | Brown (N)         | Phase "C" "Dot"              |
| 8                 | White (W)         | Phase "C" Tap                |
| 9                 | Green (G)         | Neutral "Dot" (4W & GF only) |
| 10                | White (W)         | Neutral Tap (4W & GF only)   |

### 9.2 Current Transformer Connections

Each set of CT wires in the wiring harness is housed inside an individual PVC tube for added physical protection and to simplify the wiring process.

Connect to the #10-32 lugs using the ring tongue terminals provided. Make sure that the same tap is used on all three CTs.

### 9.3 Neutral Current Transformer

A neutral CT is only required on a 4-wire system with the ground fault function on.

On a 3-wire system, a neutral CT is not required even if the ground fault function is on.

The neutral CT and neutral wiring assembly are provided with the neutral CT kit.

When wiring to the neutral CT, make sure the same tap is used as the phase CTs.

### 9.4 Actuator Connection

Route the red and black wires from the actuator to the "ACTUATOR" terminal block on the trip unit. Trim the wires to an appropriate length. Use the protective sleeving on the wires.

Connect the red actuator wire to the "+" terminal on the wiring harness trip unit connector. Similarly, connect the black actuator wire to other actuator terminal on the trip unit.

### 9.5 Auto-Reset Module

Determine the line side of the breaker and drill and tap a 10-32 hole in two of the line side stabs.

Use #14 SIS wire from the line side stabs to the fuse block.

Connect the varistor to the load side of the fuse block. The varistor provides voltage surge protection for the reset module.

Route the two orange wires from the reset module to the load side of the fuse block. Use the 3/8" mesh sleeving to protect the wires.

Also see the instructions in the "A-200 Auto-Reset Module" instruction manual.

## 9.6 *Ground Trip Unit*

Ground the trip unit as follows (See Figure 4):

- 1) Attach one end of the #14 SIS wire to the trip unit using a #10 ring terminal.
- 2) Attach the other end of the #14 SIS wire to the BR-138-3 bracket using a #10 ring terminal.
- 3) Use a length of #14 AWG SIS wire and 1/4 ring terminal to ground the trip unit bracket to the breaker ground stab.
- 4) Make sure the wire will not be pinched, cut or chaffed by any moving parts or sharp edges.

## 10.0 *Final Test*

Perform a final electrical test of the breaker as in Section 1.

A primary injection test is recommended as the final test of the AC-PRO retrofit. See Section 11 "TESTING" in the AC-PRO instruction manual for complete details.

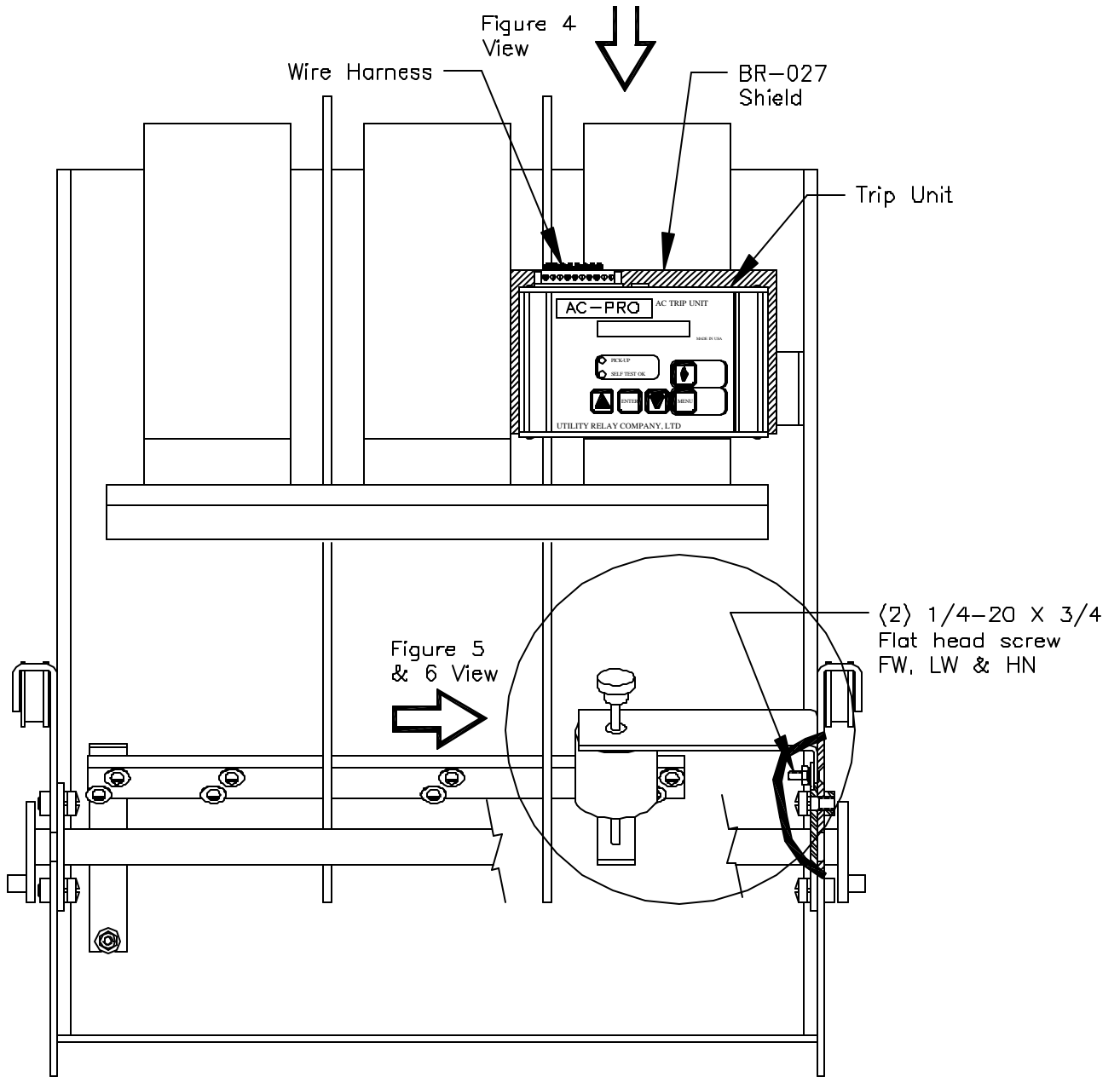
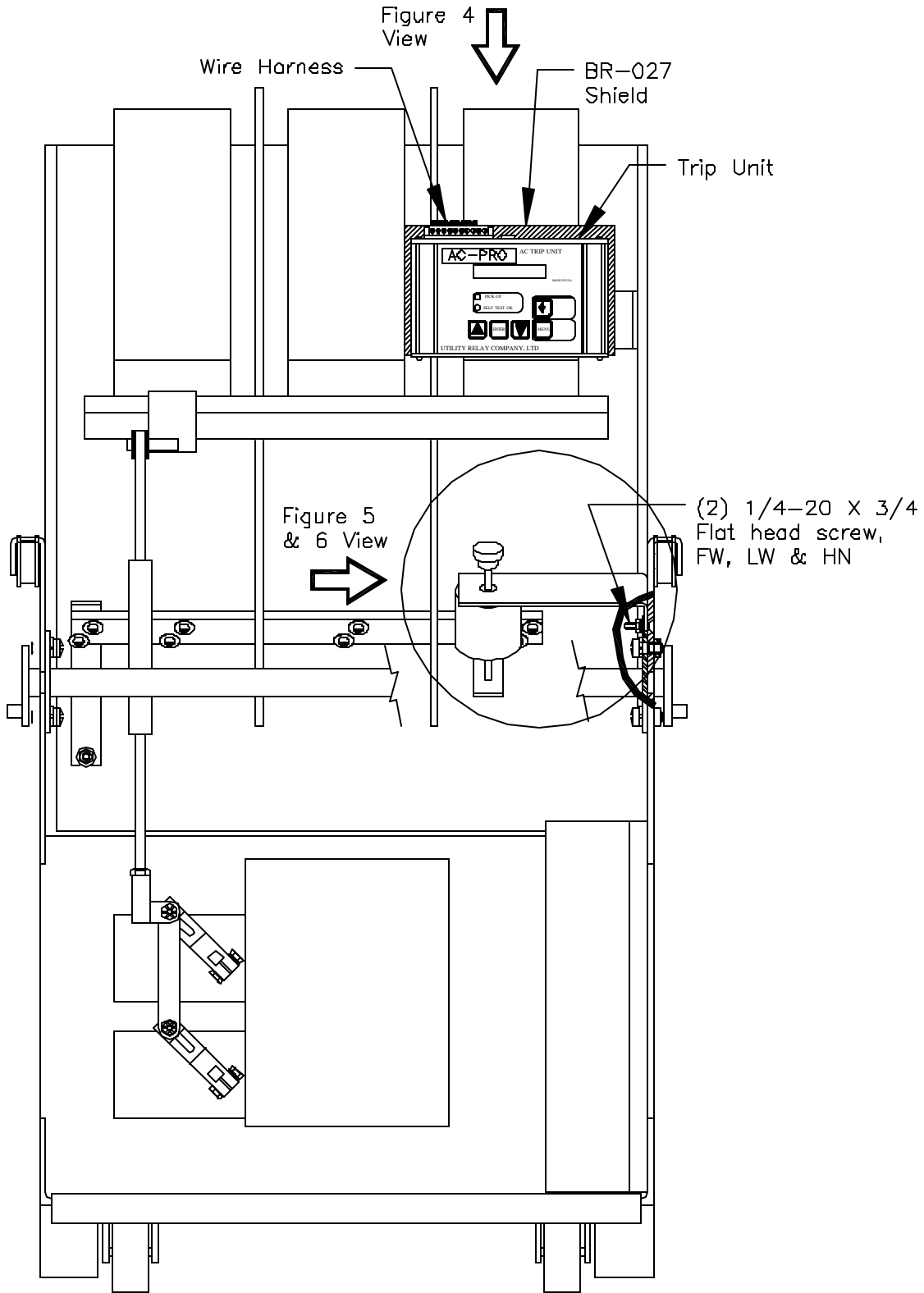
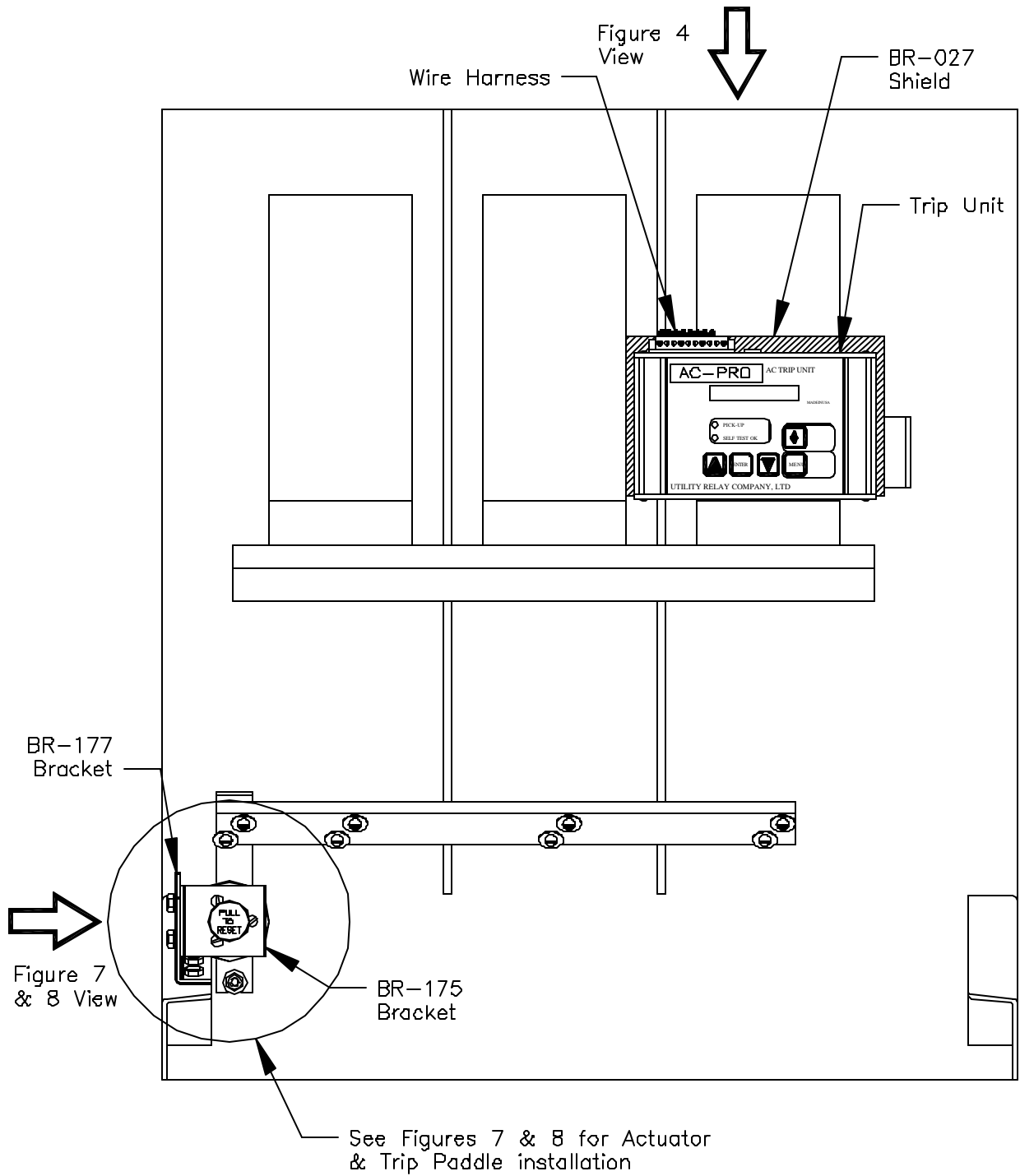


FIGURE 1  
Front View  
Manually Operated Breaker  
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**FIGURE 2**  
**Front View**  
**Electrically Operated Breaker**  
**Page 18**



**FIGURE 3**  
**Front View**  
**Breaker w/o Side Frames**

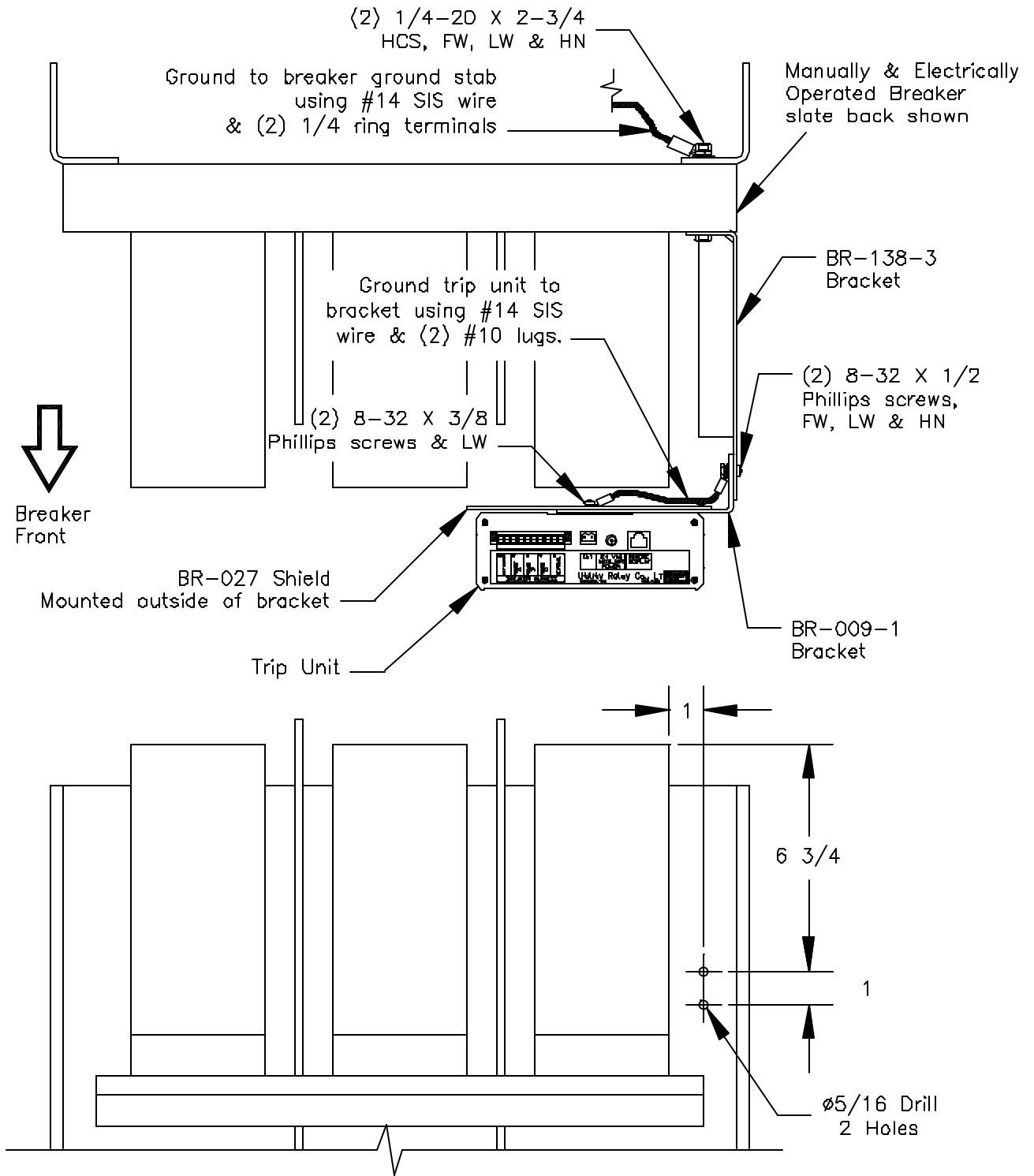
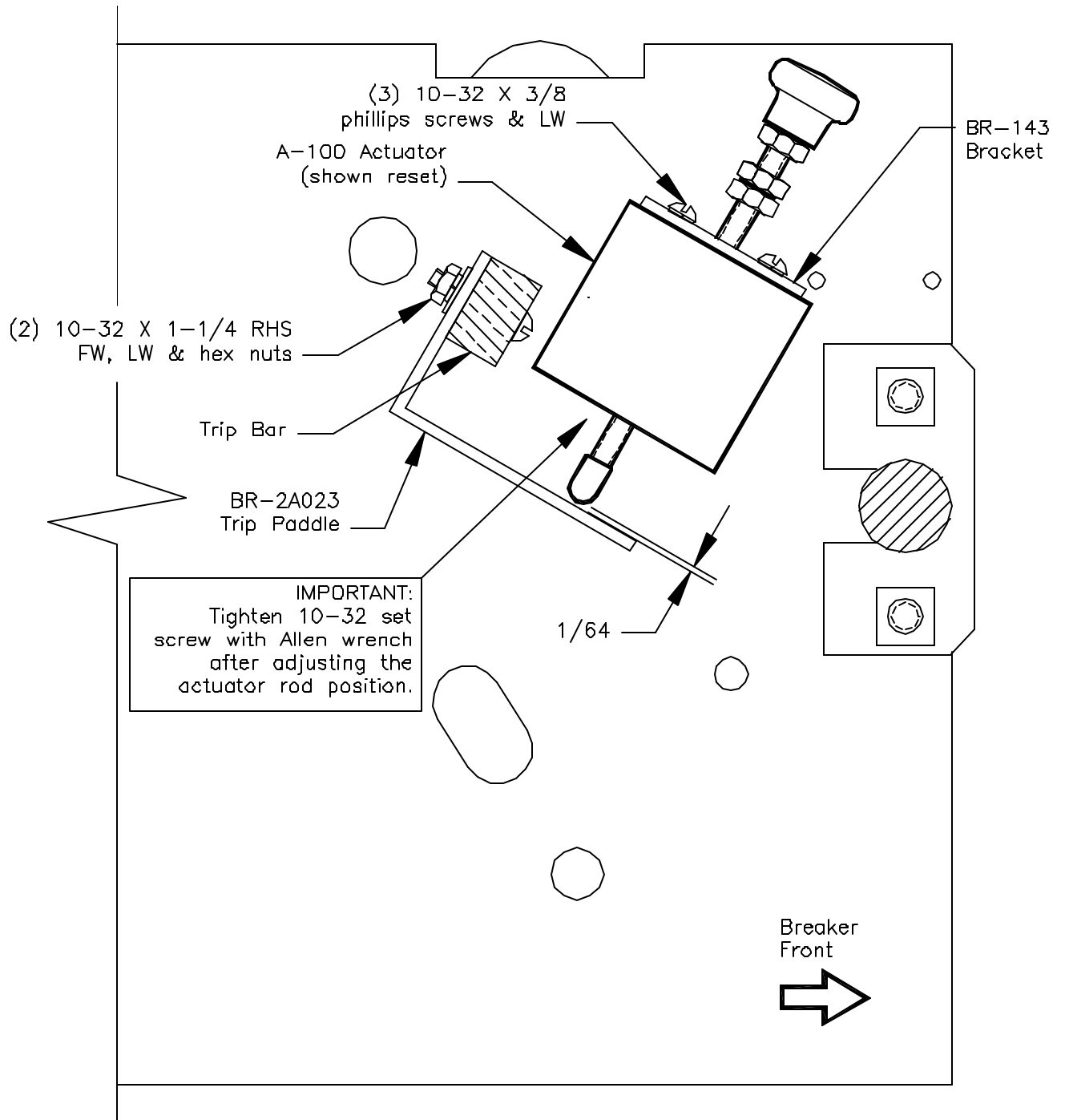
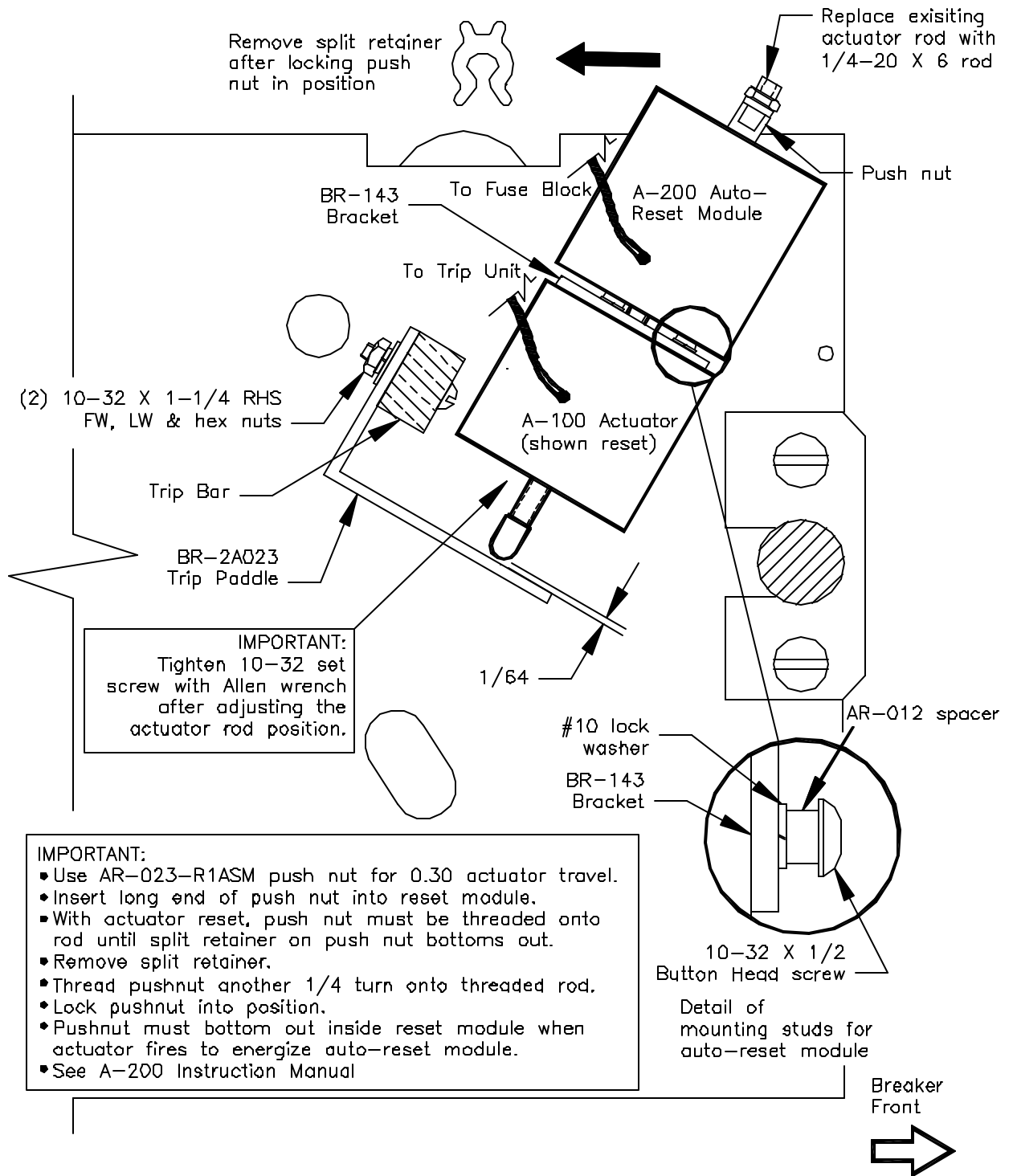


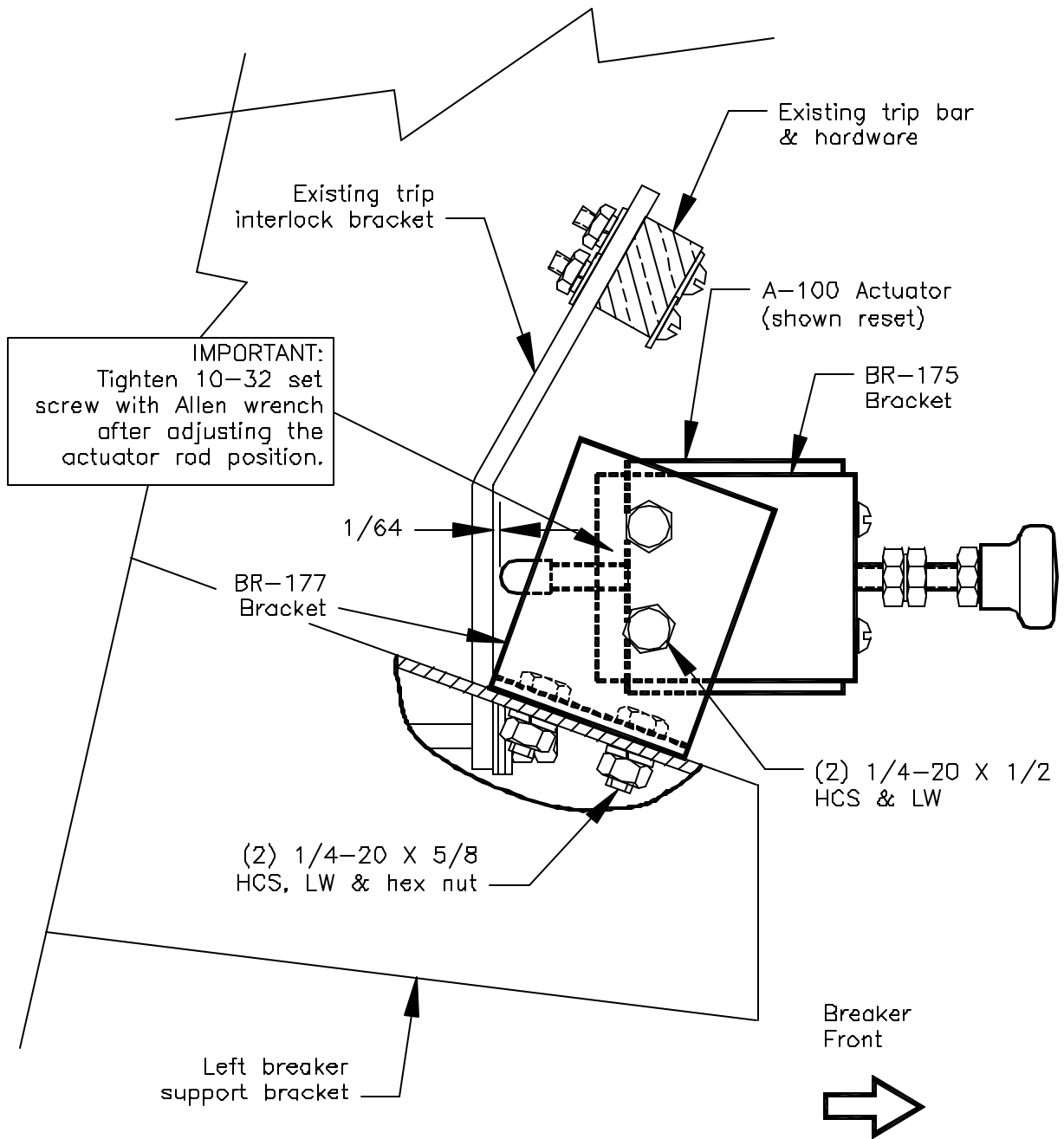
FIGURE 4  
Trip Unit Installation



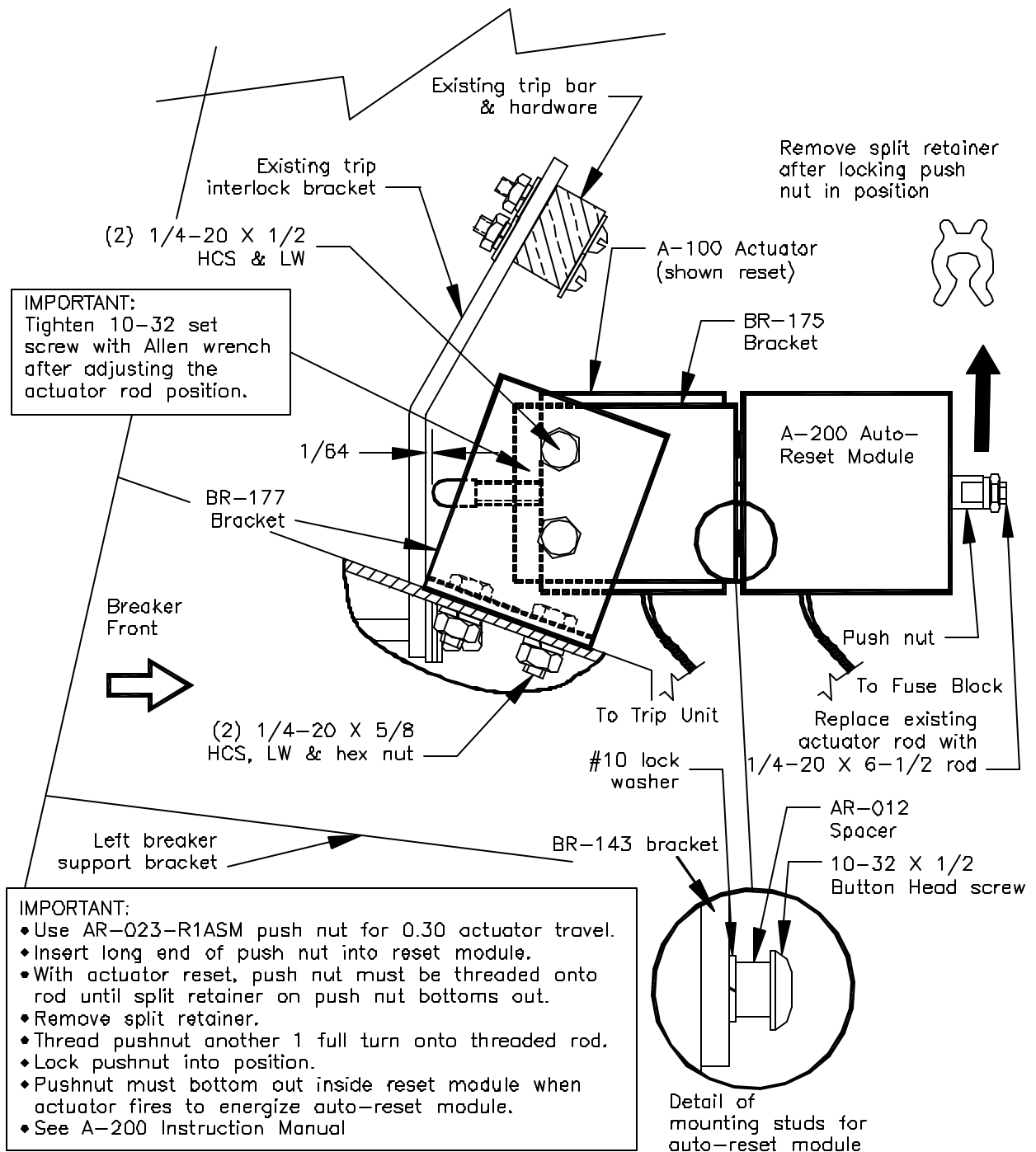
**FIGURE 5**  
**Manual Reset Actuator Installation**



**FIGURE 6**  
Auto-Reset Module & Actuator Installation



**FIGURE 7**  
**Manual Reset Actuator Installation**  
**Breaker w/o Side Frames**



**FIGURE 8**  
**Auto-Reset Module & Actuator Installation**  
**Breaker w/o Side Frames**

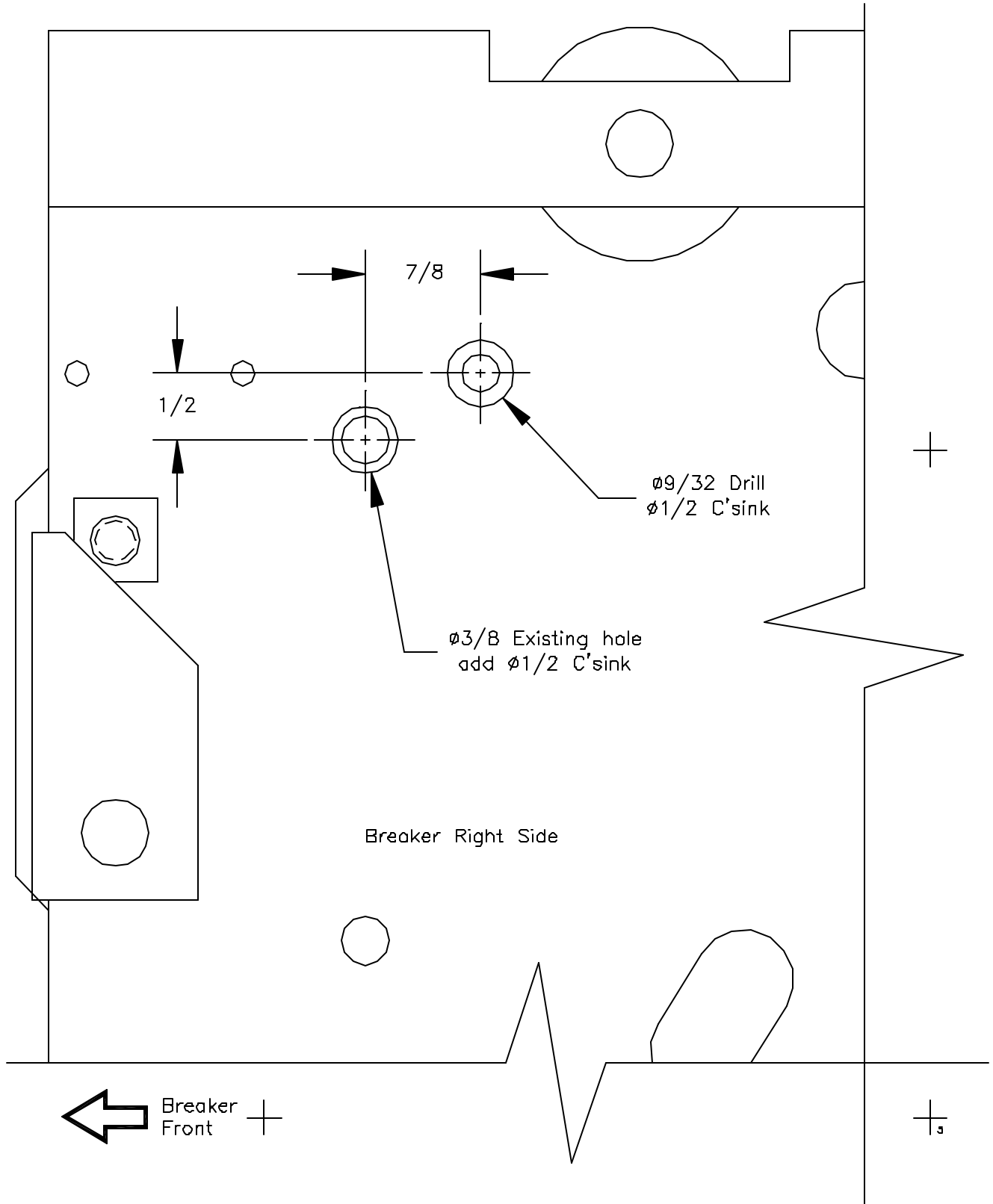


FIGURE 9  
TEMPLATE: Actuator Bracket  
Manually & Electrically Operated Breaker  
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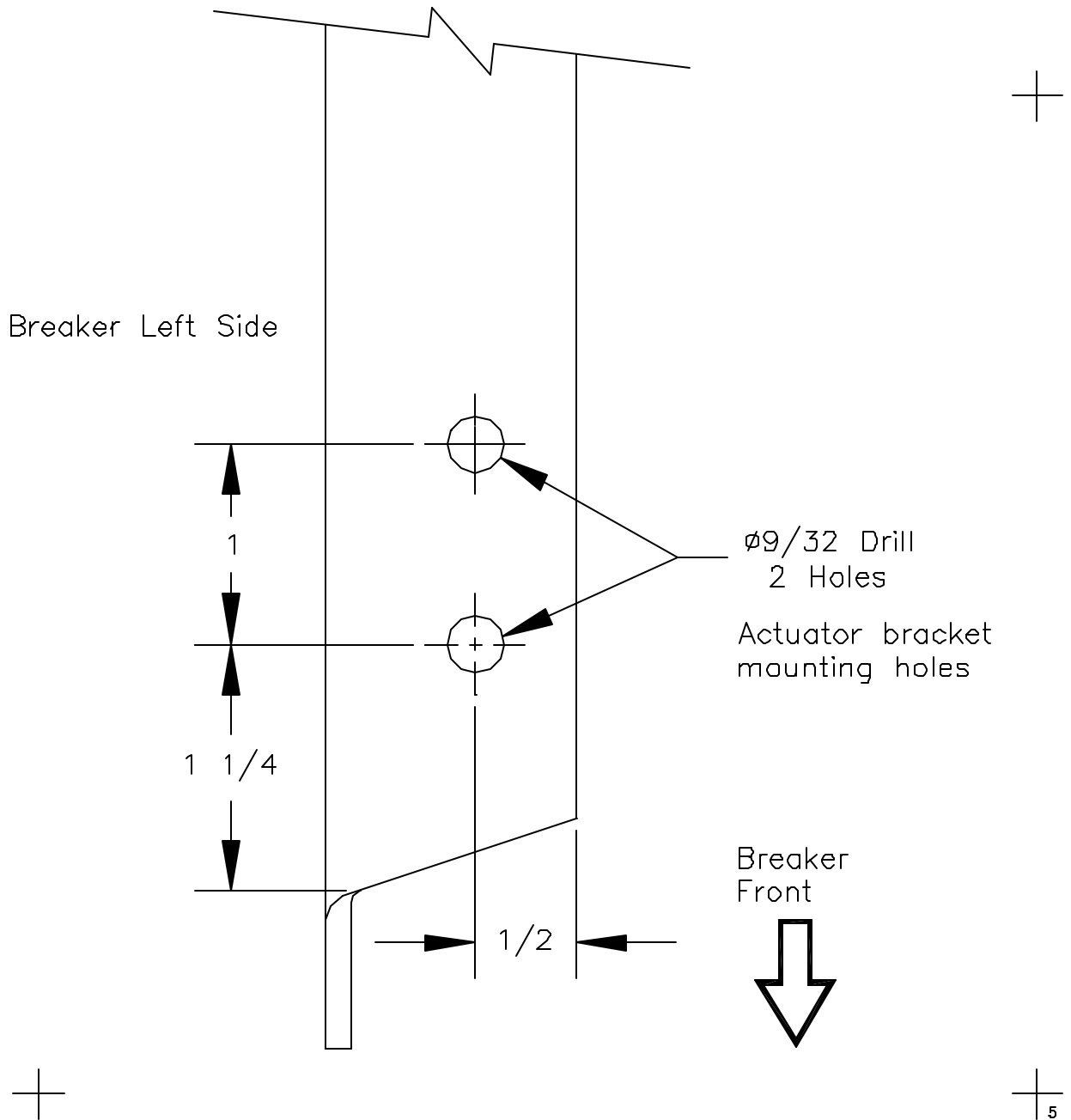
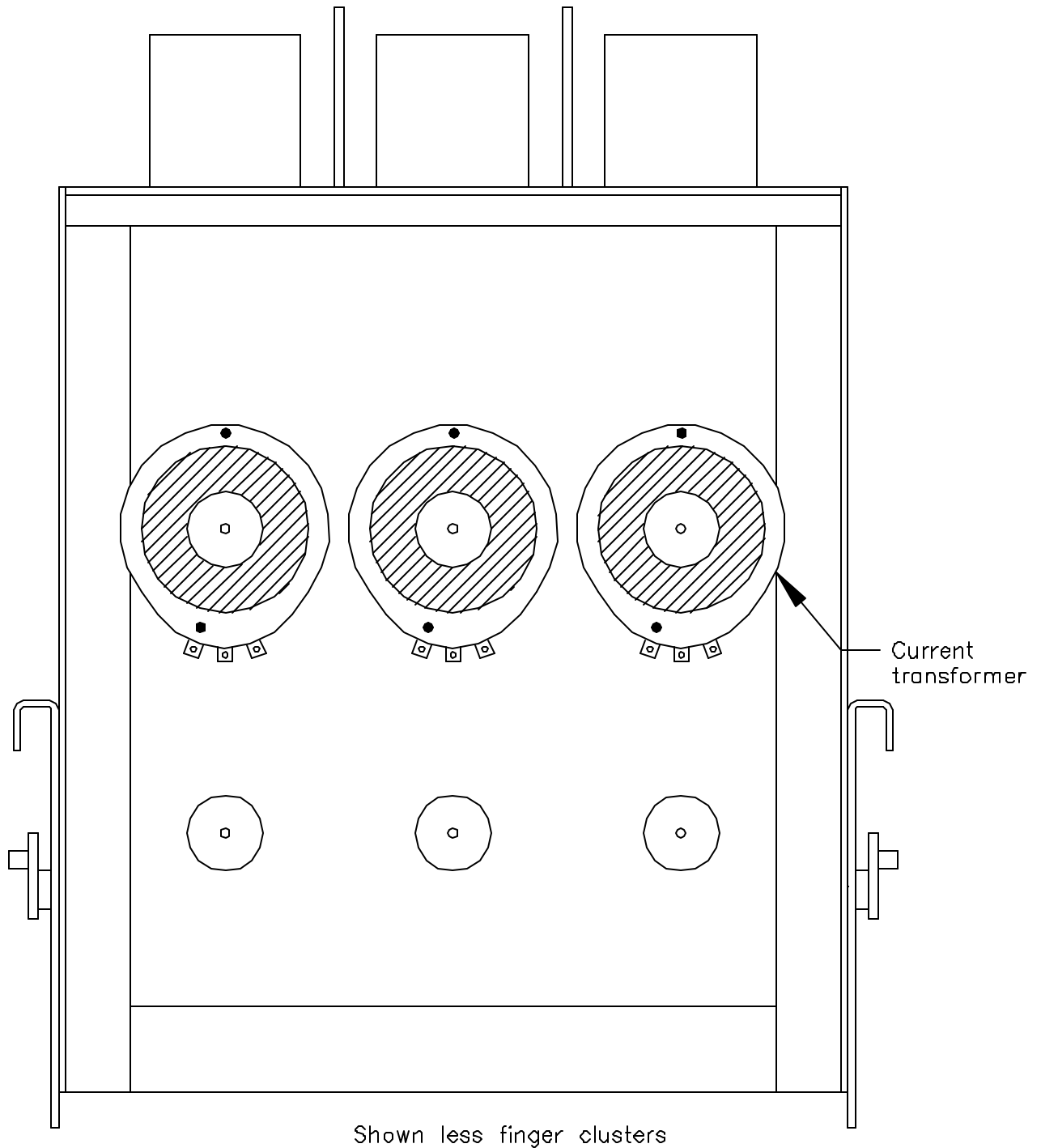
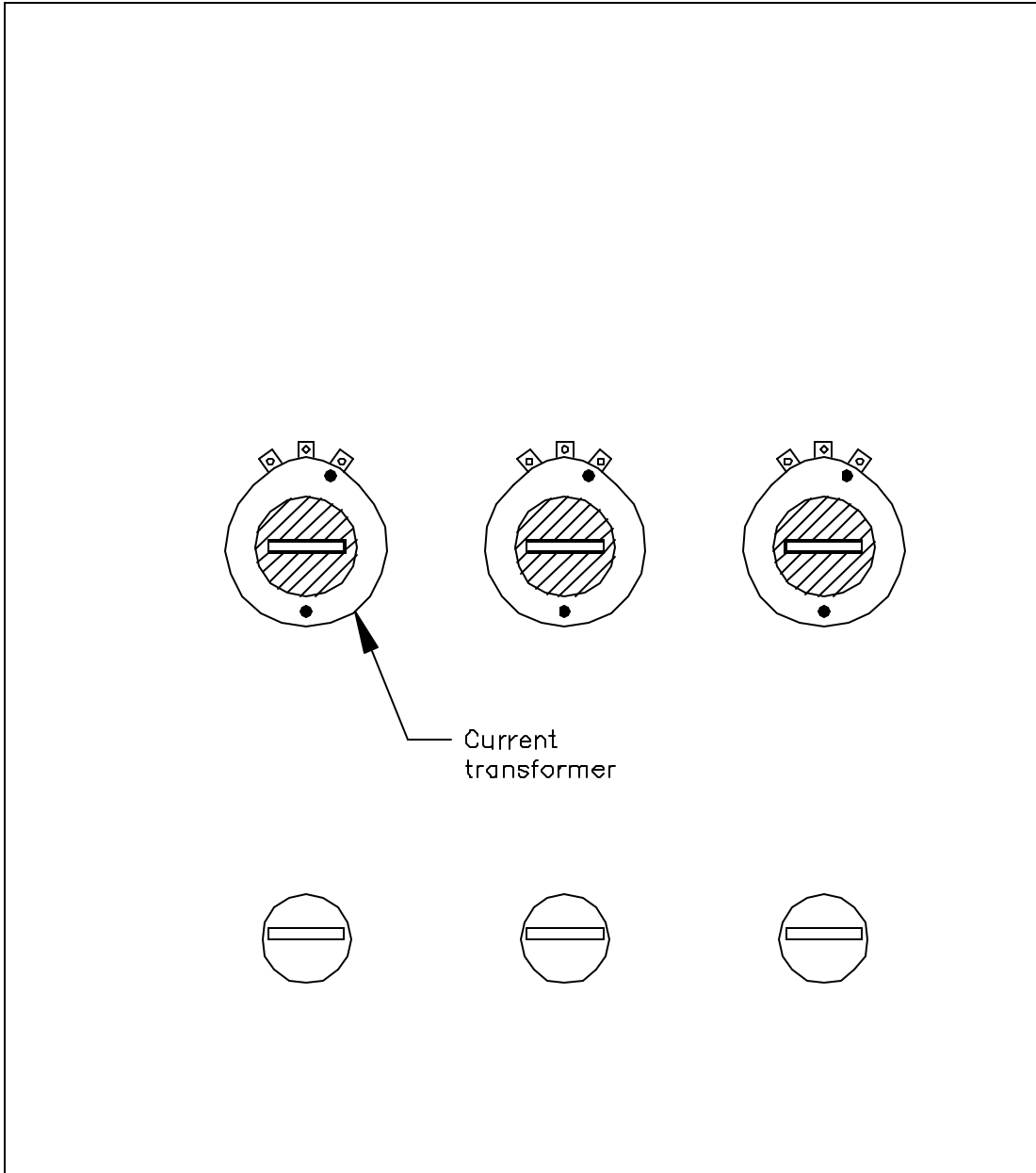


FIGURE 10  
TEMPLATE: Actuator Bracket  
Breaker w/o Side Frames



NOTE:  
Phase barriers in cubical must be modified to clear CTs

**FIGURE 11**  
**CT Installation**



Shown less finger clusters

NOTE:  
Phase barriers in cubical must be modified to clear CTs

**FIGURE 12**  
**CT Installation**  
**500A w/Rectangular Stabs Shown**  
**Breaker w/o Side Frames**

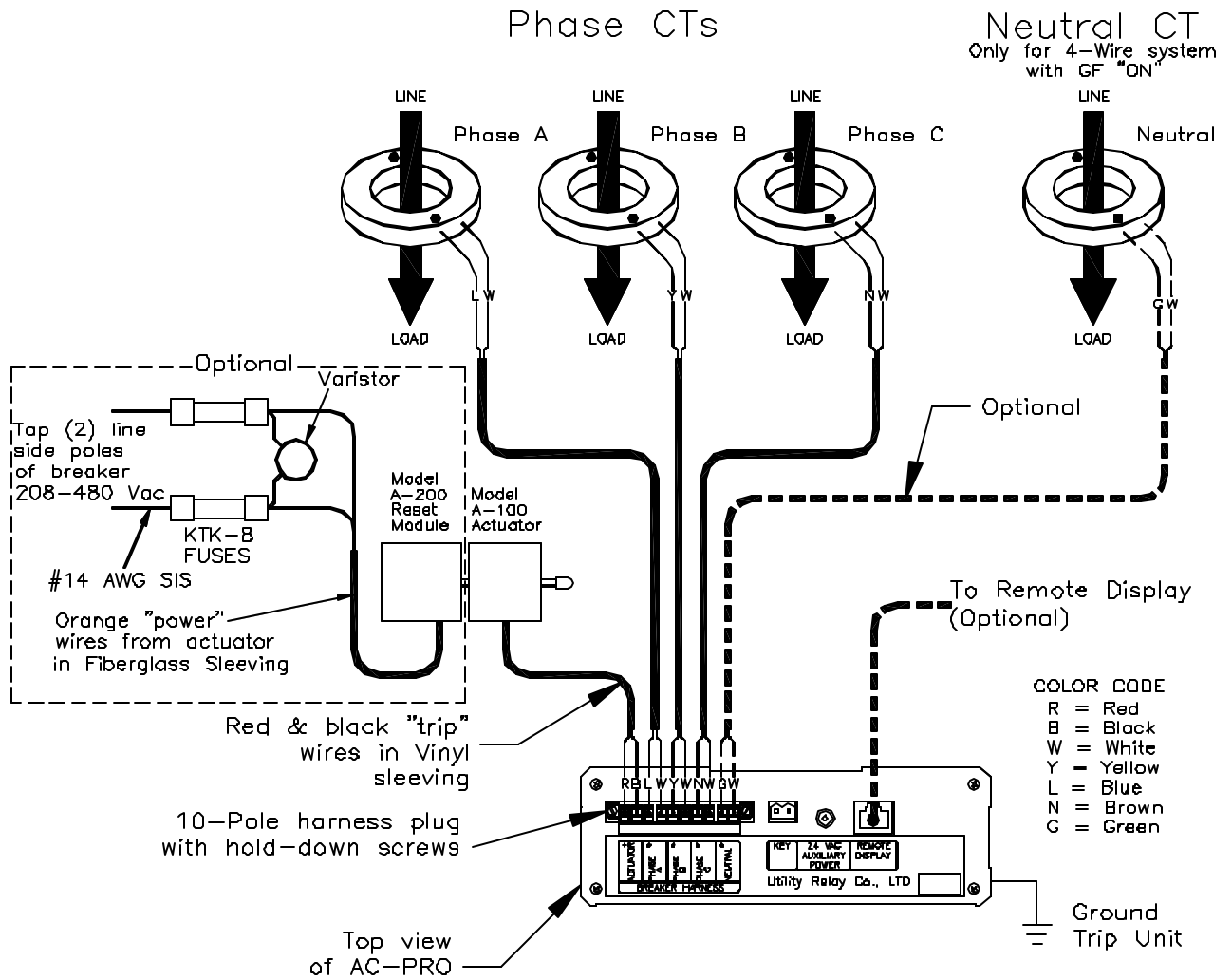


FIGURE 13  
Wiring Diagram