

ZERO-Hertz Retrofit Kit

Retrofit Kit Instructions for
Westinghouse
DB-75/100
2-Pole, DC Low Voltage Breaker

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LIMITED WARRANTY

Utility Relay Company 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.

Should any warranty claim arise within the warranty period, contact Utility Relay Company 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.

Warranty Disclaimer and Liability Limitation

Utility Relay Company will repair or replace the trip unit and/or retrofit component(s) at no cost to the customer. The customer is liable and shall pay for shipment of defective products back to Utility Relay Company.

Excluded from this warranty and not warranted by Utility Relay Company in any fashion, either expressed or implied are:

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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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TABLE OF CONTENTS

| | PAGE |
|---|------|
| Section 1.0 General | 1 |
| 1.1 Inspection | 1 |
| 2.0 Initial Breaker Tests | 2 |
| 3.0 Remove Existing Series Trip Units | 3 |
| 4.0 Transducer Installation | 4 |
| 5.0 Actuator Installation | 6 |
| 5.1 Install actuator | 6 |
| 5.2 Install Trip Paddle | 7 |
| 5.3 Adjust Actuator | 8 |
| 6.0 Trip Unit Installation | 9 |
| 6.1 Install Trip Unit | 9 |
| 6.2 Ground Trip Unit | 9 |
| 7.0 Wiring | 10 |
| 7.1 Install Fuse Block | 10 |
| 7.2 Install Power Wiring | 11 |
| 7.3 Install Actuator Wiring | 11 |
| 7.4 Install Transducer Cables | 12 |
| 8.0 Calibrate Transducers | 13 |
| 9.0 Final Test | 15 |

ILLUSTRATIONS

| | |
|---|----|
| Figure 1 Front View..... | 17 |
| 2 Side View - Trip Unit Installation..... | 18 |
| 3 Actuator/Trip Paddle Installation..... | 19 |
| 4 Transducer Installation..... | 20 |
| 5 Cross Section: Transducer Installation..... | 21 |
| 6 Fuse Block Installation..... | 22 |
| 7 Wiring Diagram..... | 23 |

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Westinghouse DB-75/100
2-Pole, DC
Manually or Electrically Operated Breaker

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 ZERO-Hertz trip unit instruction manual before proceeding with the retrofit.

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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 Maintenance Specifications or PEARL Reconditioning Standards 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.

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3.0 Remove Series Trip Units

On both poles, remove the existing series trip unit as follows:

- 1) Remove two (2) 3/8-16 X 3/4 H.C. screws from the top of the series trip unit.
- 2) Remove two 3/8-16 X 1 1/2 H.C. screws from the bottom of the series trip unit.
- 3) After the screws are removed, the series trip unit mechanism will slip out. The remainder of the iron laminations will be removed as described in section 4.0.

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4.0 Transducer Installation

Each transducer will straddle its moving pole arm as shown in Figures 4 & 5.

For each pole, install the transducer as follows:

- 1) Remove the arc chute.
- 2) Remove the remaining iron laminations by removing the two opening springs and keepers and then removing the 3/8-16 X 1 1/4 H.C. screw. To get enough room to remove the laminations, one of the pins must be temporarily removed from the operating linkage of the moving pole arm.
- 3) Install the BR-404 transducer spring support bracket in the same position as the iron laminations just removed. Use the existing 3/8-16 X 1 1/4 H.C. screw.
- 4) Replace the opening springs and keepers.
- 5) Replace the linkage pin.
- 6) Install the BR-403 transducer bracket using:
 - (1) BR-403 transducer bracket
 - (2) 1/4-20 X 3 1/2 H.C. screws and lock washers
 - (2) BR-733 1/4 ID X 2 3/4 phenolic spacers

The BR-403 transducer bracket should be mounted with the 8-32 hole toward the outside of the breaker and the 1/2" wide tab toward the front of the breaker.

- 7) Attach one transducer to the front of each BR-403 bracket using one (1) 8-32 X 1 1/2 R.H. S.S. screw and lock washer.
- 8) Make sure there is sufficient clearance for the moving pole arm. Make sure the 8-32 transducer screw is sufficiently clear of the moving pole arm when it is in the open position.
- 9) Replace the arc chutes.

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Use the following guidelines when installing the transducers:

- a) On the "+" pole only, make sure that the arrow on the transducer label is pointing in the direction of the normal current flow.
- b) On the "-" pole, the orientation of the transducer is not important. It is best to orient the transducer the same way as the transducer on the "+" pole.

IMPORTANT: Both transducers must be calibrated before the breaker is placed in service.

See Section 8.0.

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5.0 Actuator Installation

5.1 Install Actuator

See Figures 1 & 3 for the following.

- 1) Replace the existing actuator rod with the 6" actuator rod provided. Thread the stop nuts on the actuator rod as shown in Figure 3.

Use caution since the plunger is spring loaded.

- 2) Attach the actuator to the BR-134 bracket with three (3) 10-32 X 3/8 R.H. screws and lock washers.

On this breaker design, the actuator fires towards the front of the breaker and will pull the trip paddle forward.

- 3) Using the actuator/bracket assembly and the dimension from Figure 3 as a guide, mark suitable locations for the mounting holes. Drill and tap two (2) 1/4-20 holes in the locations marked.
- 4) Attach the actuator/bracket assembly to the breaker frame using two (2) 1/4-20 X 1/2 H.C. screws and lock washers in the previously tapped holes.
- 5) Install the reset knob on the end of the actuator rod that previously had the rubber tip and lock in place with a 1/4-20 jam nut and lock washer as shown in Figure 3. The rubber tip can be discarded.
- 6) Attach the "PUSH TO RESET" sticker on the actuator knob.

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5.2 Install Trip Paddle

- 1) Loosely install the BR-287 trip paddle as shown in Figure 3 using the BR-215 clamp, two (2) 8-32 X 3/4 R.H. screws and lock washers and one (1) 8-32 X 1/4 set screw.
- 2) Locate the trip paddle so the actuator rod is centered in the slot in the trip paddle and tighten the 8-32 screws and set screw.
- 3) Thread the HW-9903-3 clamp-on-collar on the end of the actuator rod. Do not lock in place at this time.

IMPORTANT: Trip paddle must be centered on the actuator rod and not bind when rotating.

With actuator reset, manually rotate the trip bar to the trip position to positively verify free movement.

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5.3 Adjust Actuator

- 1) Thread the actuator rod so the reset knob and 1/4-20 nut are up against the actuator plunger as shown in Figure 3.
- 2) Trip the actuator by pulling on the reset knob. Lock the actuator rod in position by tightening the 10-32 set screw with an Allen wrench.
- 3) With the actuator reset, adjust the position of the HW-9903-3 clamp-on-collar by screwing it in or out until the collar is about 1/64" from the trip paddle, then lock the collar in place.
- 4) Adjust the stop nuts as necessary to limit the actuator rod travel within the limits of the trip paddle rotation.
- 5) With the actuator reset, close the breaker. If the breaker will not close because the actuator rod is interfering with the trip paddle, re-adjust the position of the HW-9903-3 clamp-on-collar.
- 6) Operate the actuator by pulling on the reset knob. The breaker should trip. Verify that the trip paddle is not against its limit of travel.
- 7) Attempt to close the breaker without resetting the actuator. The breaker should trip free, if not, increase the actuator rod travel.
- 8) Repeat the above until completely satisfied with the operation of the actuator.

IMPORTANT: WHEN THE ACTUATOR IS IN THE TRIP POSITION (NOT RESET), THE BREAKER MUST BE TRIP-FREE.

THE SET SCREW IN THE PLUNGER MUST BE TIGHTENED TO ENSURE THAT THE ACTUATOR ROD REMAINS IN PROPER ADJUSTMENT.

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6.0 Trip Unit Installation

6.1 Install Trip Unit

Refer to Figures 1 and 2 for the following:

- 1) Remove the two arc chute screws from one of the arc chutes. Remove a flat washer from each of the screws. Replace the arc chute and screws but leave space for BR-002 bracket when tightening the screws.
- 2) Attach the BR-001 bracket to the top of BR-002 bracket using two (2) 8-32 X 1/2 R.H. screws and lock washers. The short leg of the trip unit bracket should be pointing forward.
- 3) Attach the AC-PRO and the BR-027 shield to the BR-001/BR-002 bracket assembly using two (2) 8-32 X 3/8 Phillips screws and lock washers.

The BR-027 shield should be behind the BR-001 bracket as shown in Figure 2.

- 4) Slip the trip unit/bracket assembly under the heads and lock washers of the two arc chute screws. Fully tighten the arc chute screws.

6.2 Ground Trip Unit

Ground the trip unit as follows (See Figure 2):

- 1) Use a length of 14 AWG SIS wire to ground the trip unit bracket to the breaker ground stab.

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7.0 Wiring

For circuit voltage between 90 VDC to 340 VDC, the trip unit is powered directly from the line side stabs of the breaker.

Two Bussman KLM-5 fast-acting fuses are used to protect the power circuit.

See Figure 7 for the wiring diagram.

7.1 Install Fuse Block

See Figure 6 for the following.

- 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 breaker back using two (2) 8-32 X 3/8 P.H. screws and lock washers.

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7.2 Install Power Wiring

See Figure 6 & 7 for the following.

- 1) Determine the line side of the breaker.
- 2) Drill and tap for a 10-32 X 3/8 screw into each of the two (2) line side stabs for the bus taps.
- 3) Use #14 AWG type SIS wire for the connection from the bus taps to the fuse block. Use care in routing the wires.
- 4) Route two (2) 18 AWG black wires from the load side of the fuse block to the "POWER" terminal block on the trip unit.

Use spiral wrap sleeving on the two (2) wires from the fuse block to the trip unit.

- 5) When meggering the breaker or primary injection testing, temporarily remove the power fuses.

7.3 Install Actuator Wiring

- 1) 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 protective sleeving on the wires.
- 2) Connect the red actuator wire to the "RED" terminal on the trip unit. Similarly, connect the black actuator wire to the "BLACK" terminal on the trip unit.

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7.4 Install Transducer Cables

See Figure 7 for the following.

The transducer cables are 6 conductor, shielded cable with shielded modular connectors on both ends.

The cables are symmetrical and it does not matter which end plugs into the transducer and which end plugs into the trip unit.

- 1) Plug the "+" transducer cable into the "+" pole transducer and route the cable to the trip unit. Neatly coil any excess cable. Plug the cable into the "PLUS TRANSDUCER" jack on the trip unit. Make sure the cable is away from any sharp edges or moving parts on the breaker.
- 2) Install the "-" transducer cable in a similar manor and plug into the "MINUS TRANSDUCER" jack on the trip unit.

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8.0 Calibrate Transducers

The transducers **MUST BE CALIBRATED** before the breaker is placed in service. A high current test set with an accurate ammeter is required to calibrate the transducers after they are mounted on the breaker.

If a DC high current test set is not available, an AC high current test set can be used with equally good results.

Calibrate the transducers as follows...

- 1) Commission the trip unit as outlined in Section 5.0 of the ZERO-Hertz trip unit instruction manual included in this kit.
- 2) *It is very important that the transducer rating entered in the trip unit is not greater than the frame rating of the breaker.*
- 3) Temporarily remove the two power fuses and connect 120 VAC to the "POWER INPUT" terminal block to power the trip unit for calibration.
- 4) Plug the "+" pole stabs of the breaker onto the test set stabs.
- 5) If the GF function is ON, then temporarily unplug the transducer cable for the pole not being calibrated to defeat GF.
- 6) If the RC function is ON, then temporarily jumper the terminals marked "Jumper to defeat Reverse Current trip when AC testing" of the "AC TEST/KEY" terminal block to defeat RC.

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- 7) Inject a current on the "+" pole equal to the transducer rating entered in the trip unit.
- 8) Using a small non-magnetized flat blade screwdriver, adjust the multi-turn adjustment screw on the "+" transducer until the displayed current on the trip unit LCD matches the injected current.
- 9) Increase the test set current to about 2 times the transducer rating and verify that the trip unit displayed current matches the test set current
- 10) Calibrate the "-" transducer in a similar fashion.

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9.0 Final Test

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

A primary injection test is recommended as the final test of the ZERO-Hertz DC retrofit.

If a DC high current test set is available it should be used.

If a DC test set is not available, a 60Hz AC high current test set can be used with equally good results.

Remember to temporarily remove the two power fuses when testing.

Temporarily connect 120 VAC to the "POWER INPUT" terminal block to power the trip unit for the tests.

See Section 9 of the ZERO-Hertz instruction manual for complete details on testing the retrofit.

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As a summary:

To defeat Reverse Current (RC) when AC testing the other trip functions...

Jumper terminals "Jumper to defeat Reverse Current trip when AC testing" of the "AC TEST/KEY" terminal block. See Section 9.3 of the trip unit instruction manual.

To defeat Ground Fault (GF) when DC or AC testing the other trip functions...

Temporarily unplug the transducer cable from the pole not being tested. This will turn off the GF trip function until both the transducer cables are again connected. See Section 9.5 of the trip unit instruction manual.

To test the Reverse Current (RC) trip function with an AC test set...

Temporarily jumper terminals "Jumper to test Reverse Current trip when AC testing" of the of the "AC TEST/KEY" terminal block. This forces the trip unit to treat the test current as reverse current. See Section 9.8 of the trip unit instruction manual.

NOTE: Reverse Current is only sensed on the "+" pole. Do not test the Reverse Current trip function on the "-" pole.

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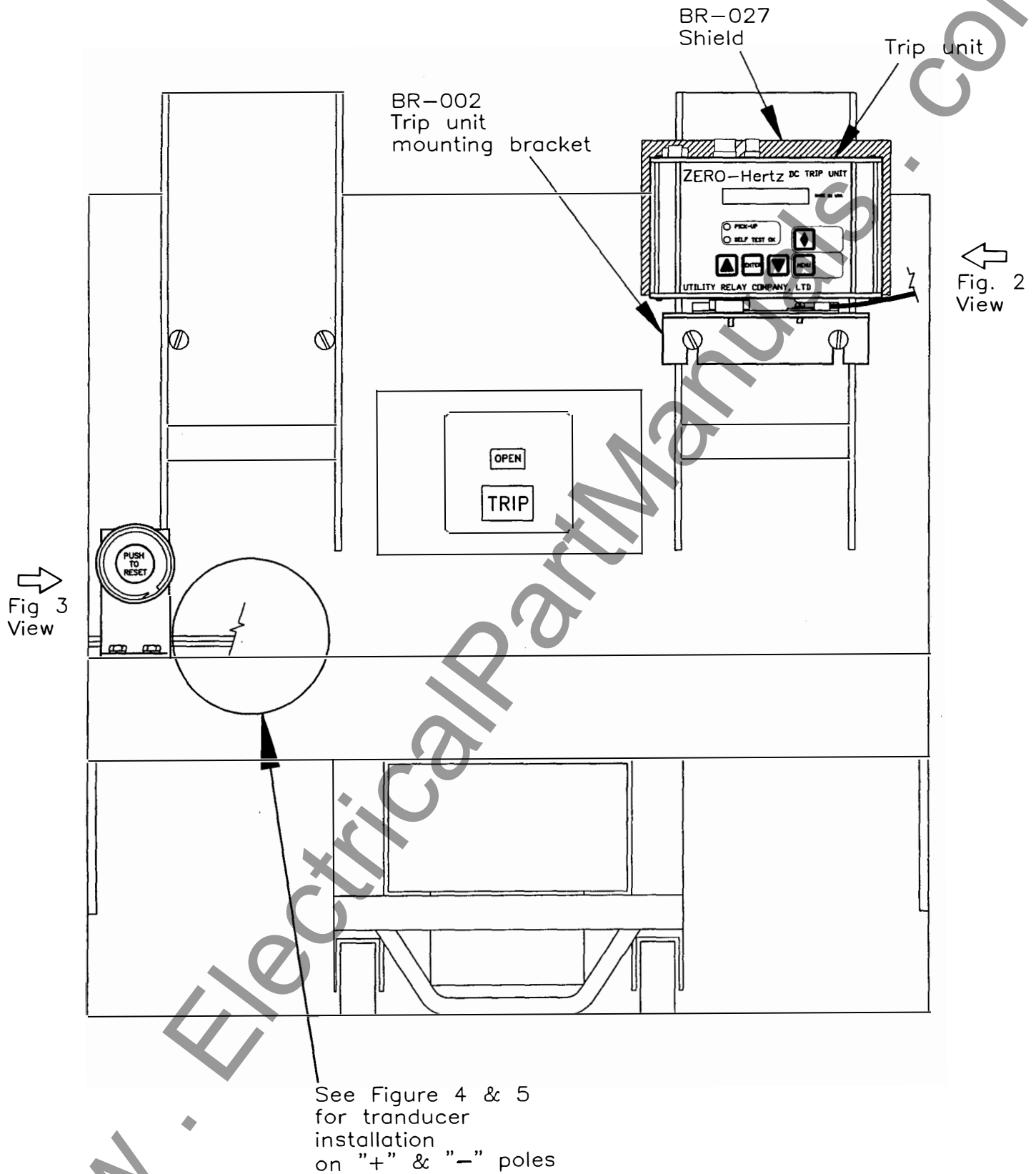


FIGURE 1
Front View

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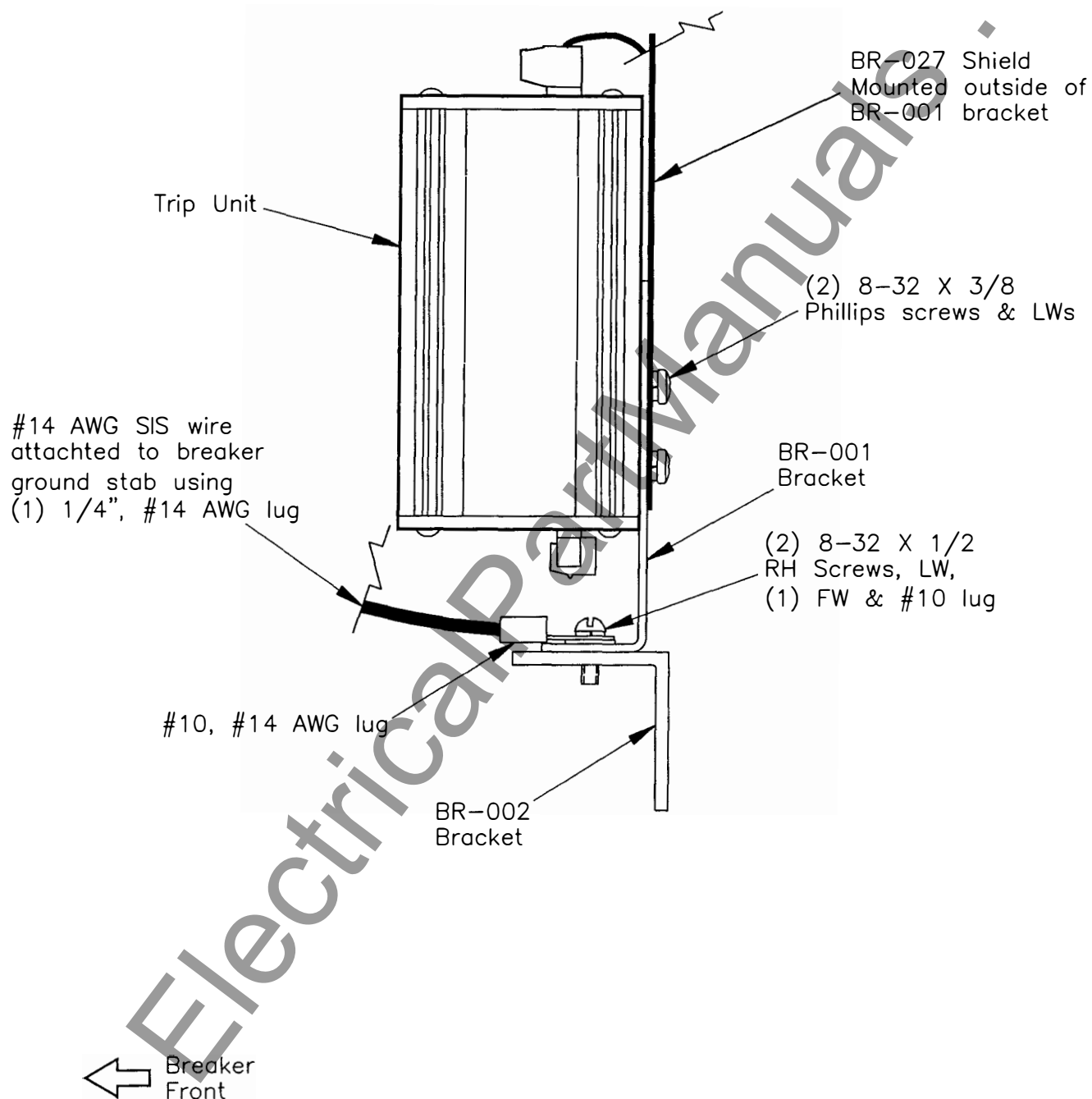


FIGURE 2
Side View
Trip Unit Installation

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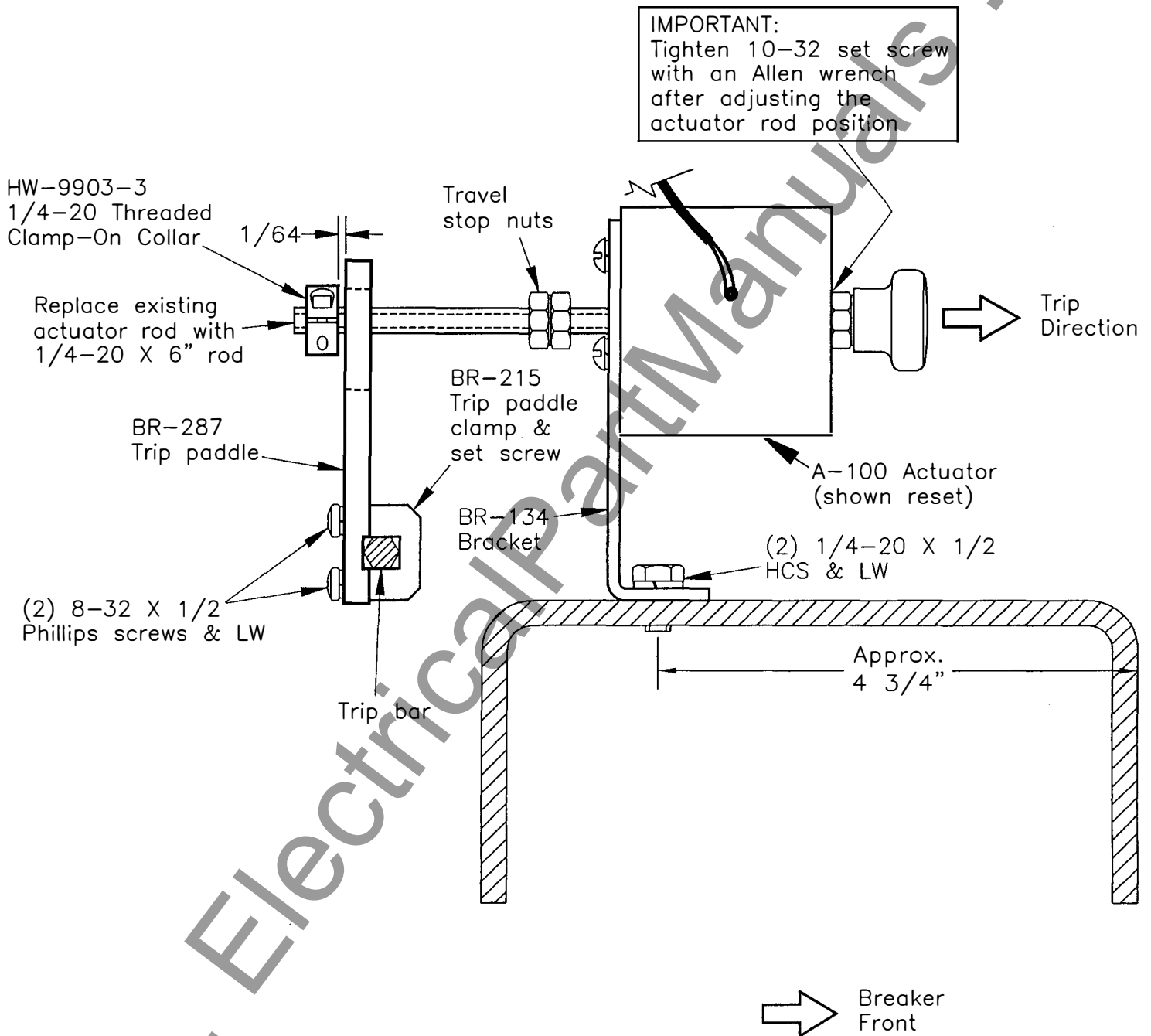


FIGURE 3
Actuator/Trip Paddle Installation

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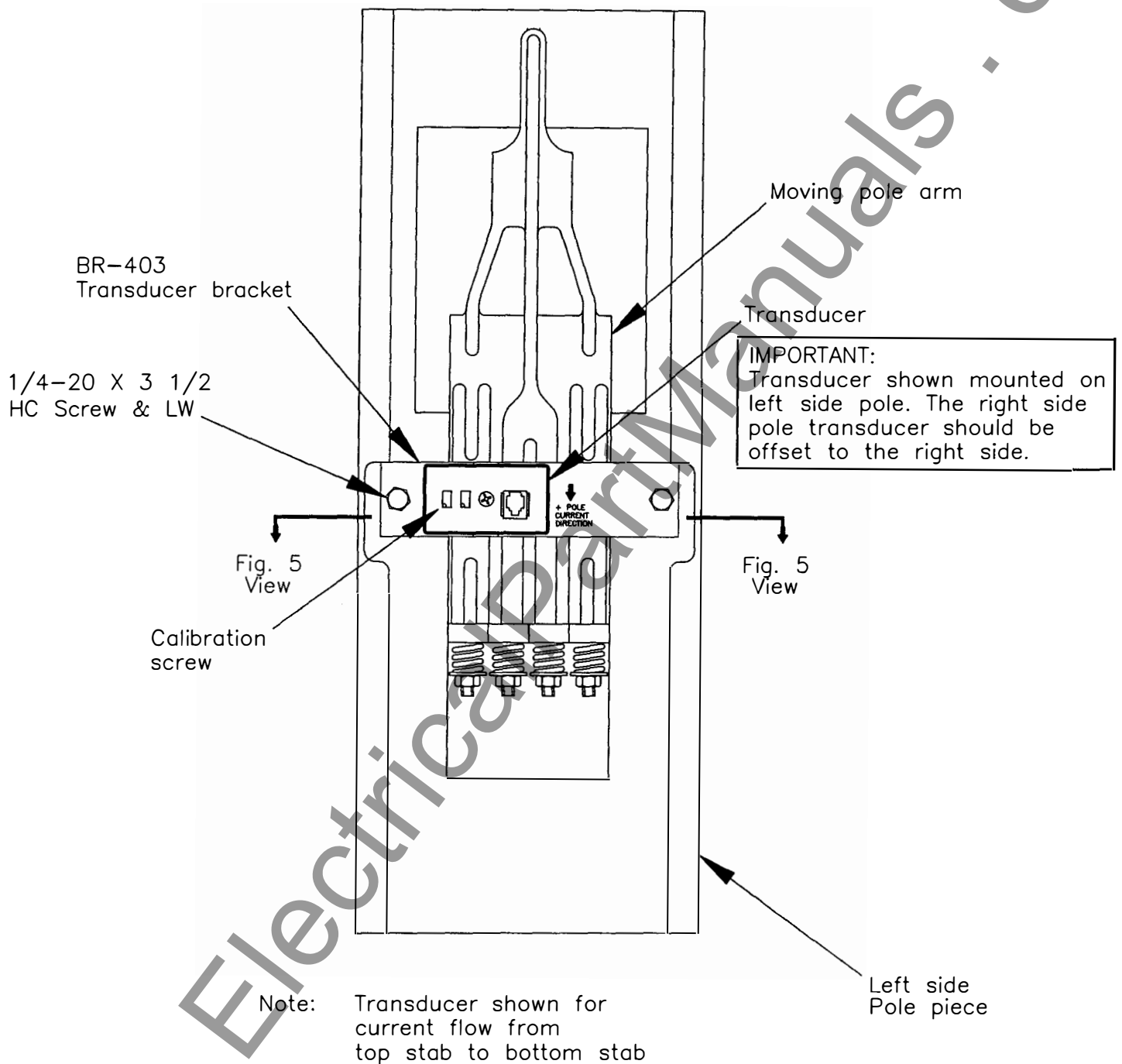


FIGURE 4
Transducer Installation

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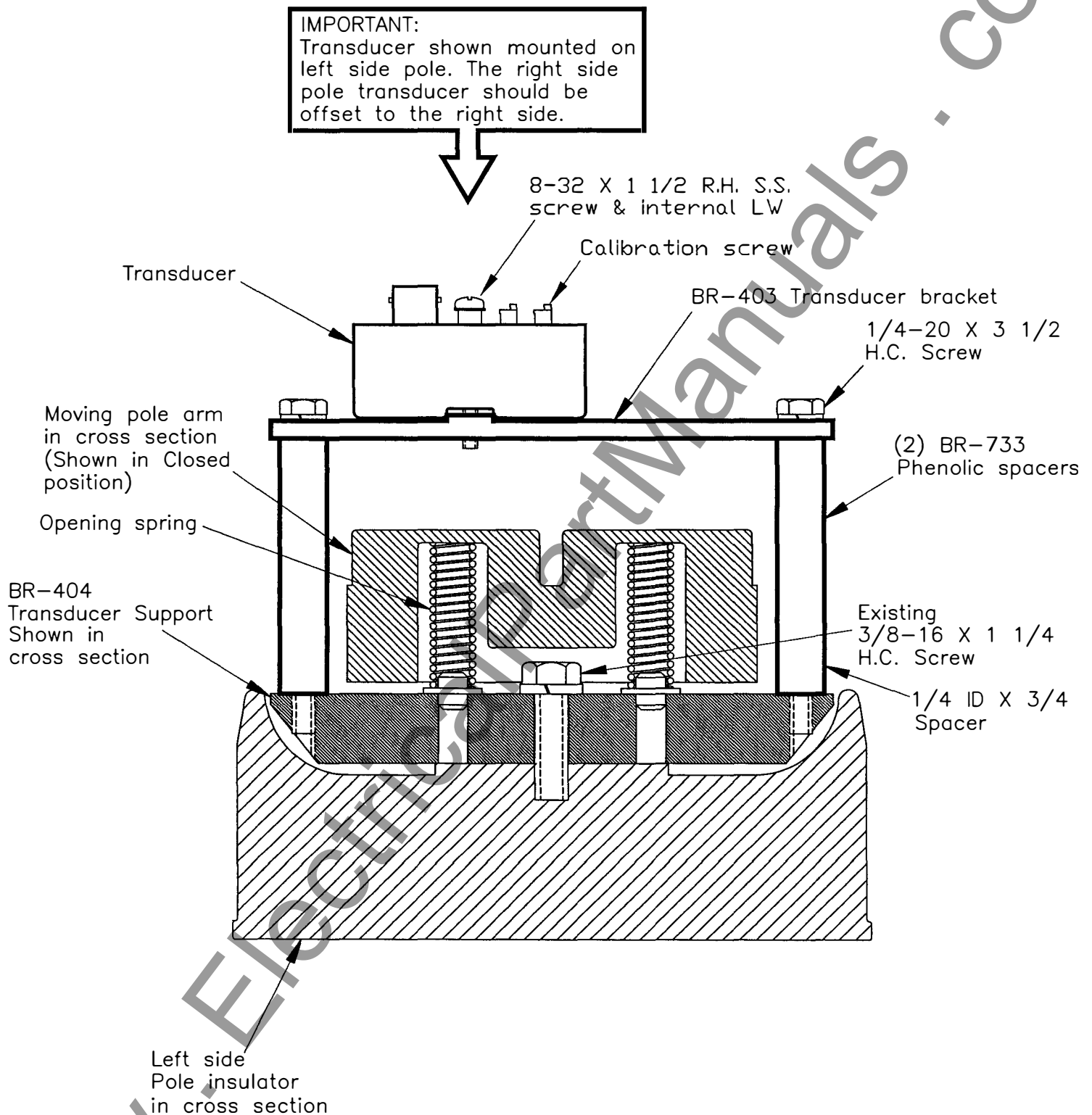
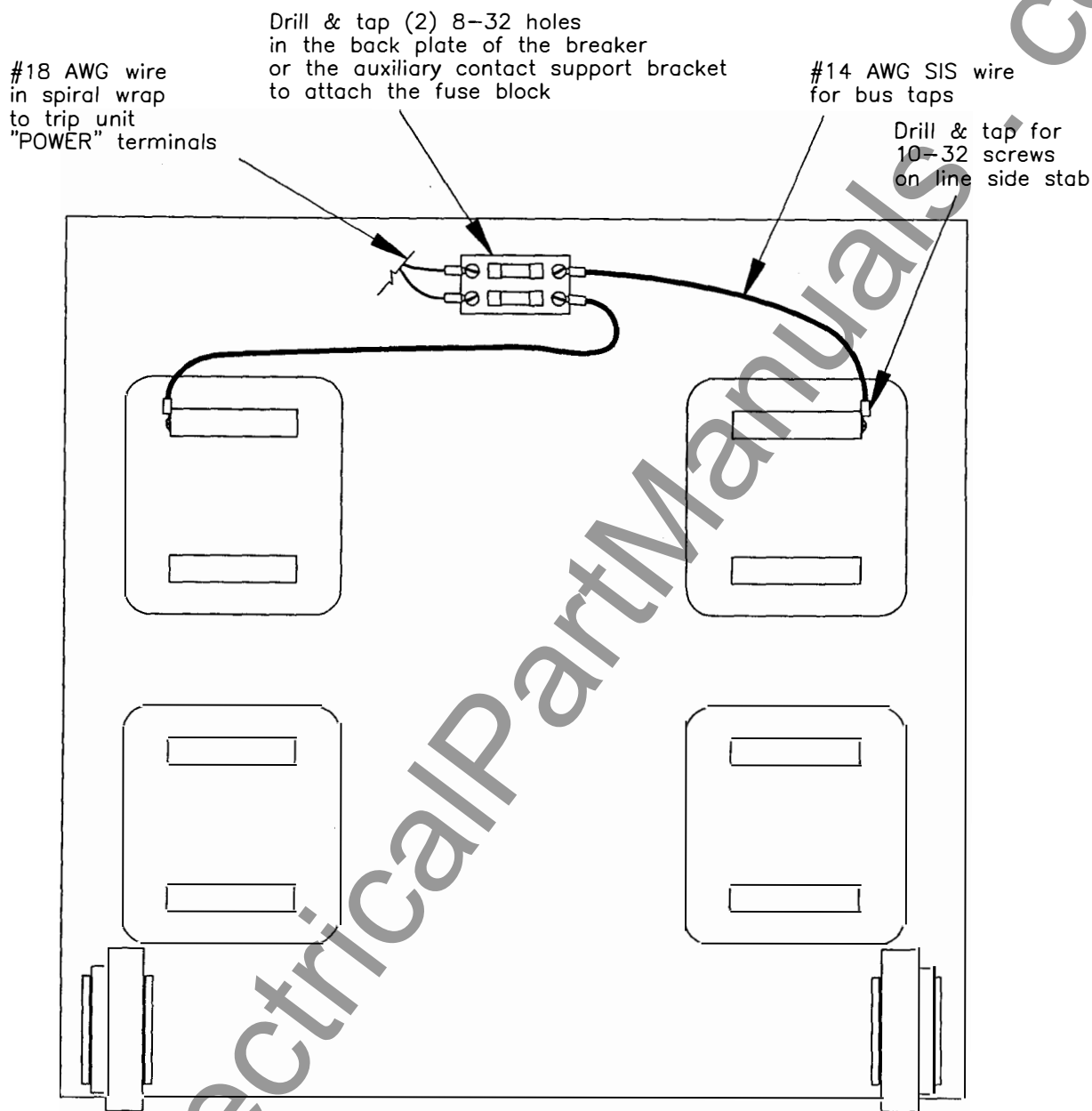


FIGURE 5
CROSS SECTION: Transducer Installation

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Rear View of Breaker
Shown with top stabs as line side
Shown less finger clusters

FIGURE 6
Fuse Block Installation

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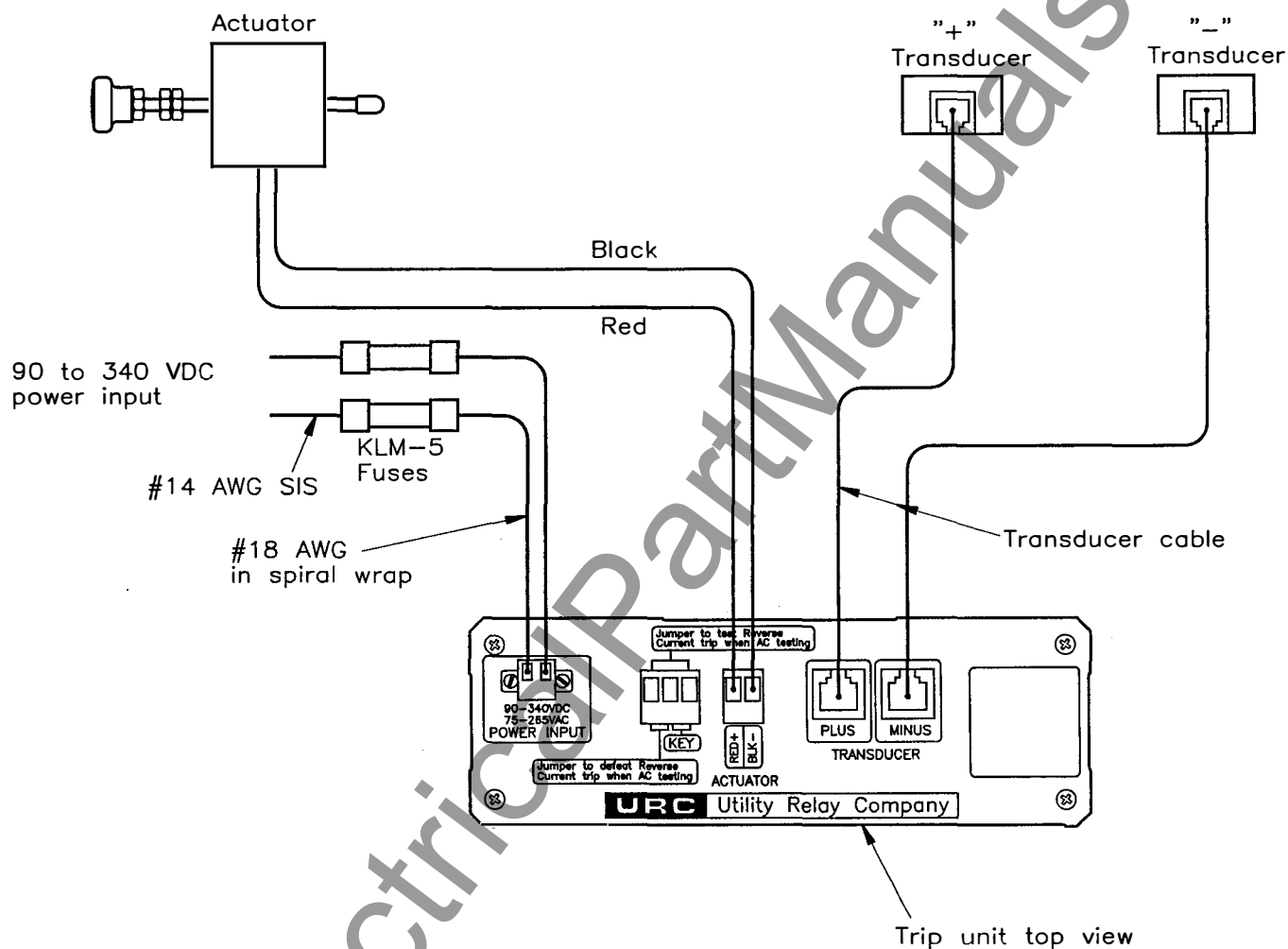
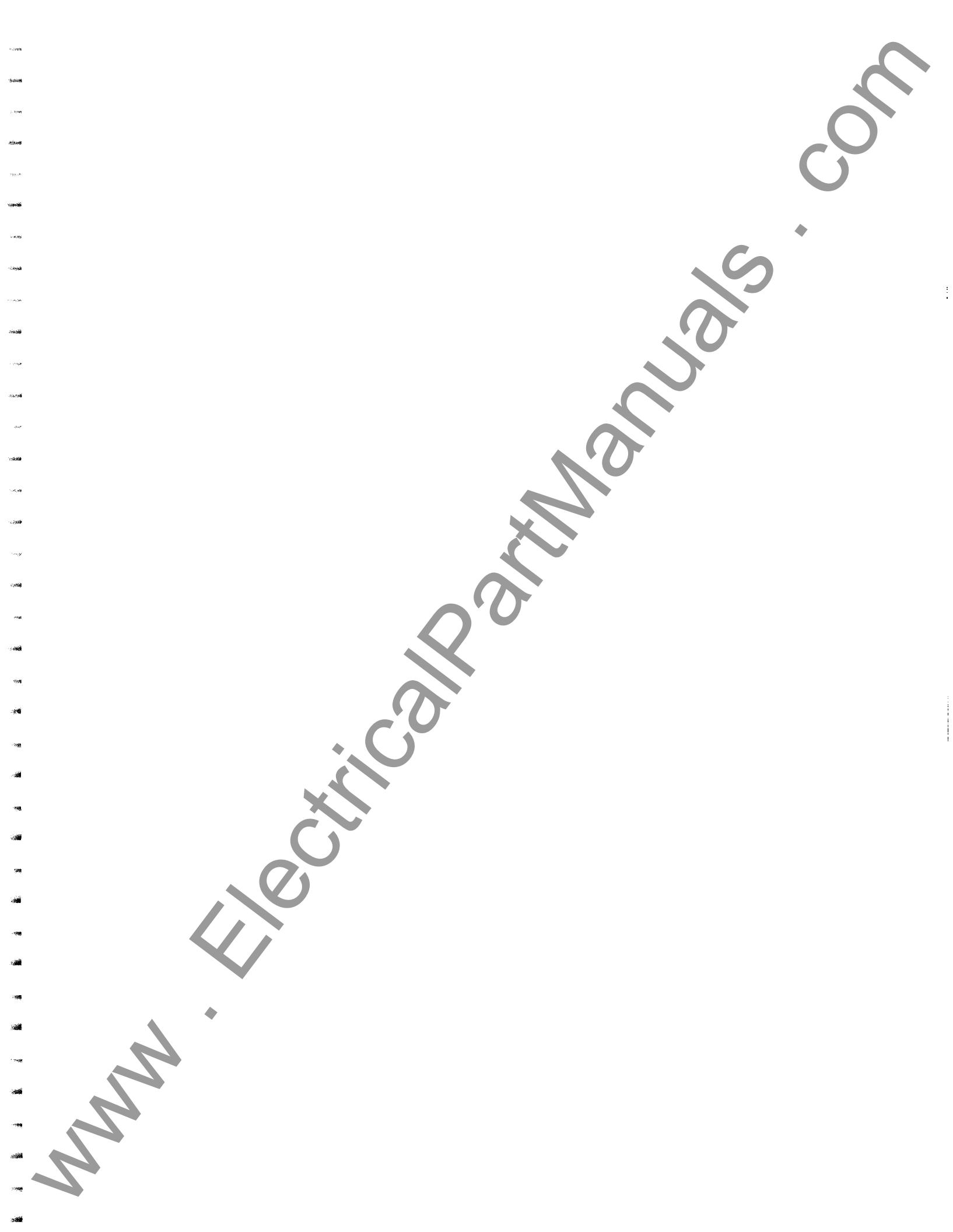


FIGURE 7
Wiring Diagram

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