

GEH-6303 Installation Instructions

## Enhanced MicroVersaTrip Plus™ and MicroVersaTrip PM™ Trip Unit

For Replacement of MicroVersaTrip® 4, MicroVersaTrip® 9, RMS-9, Epic™, MicroVersaTrip Plus™, and MicroVersaTrip PM™ Programmable Trip Units in AKR and Power Break® Circuit Breakers

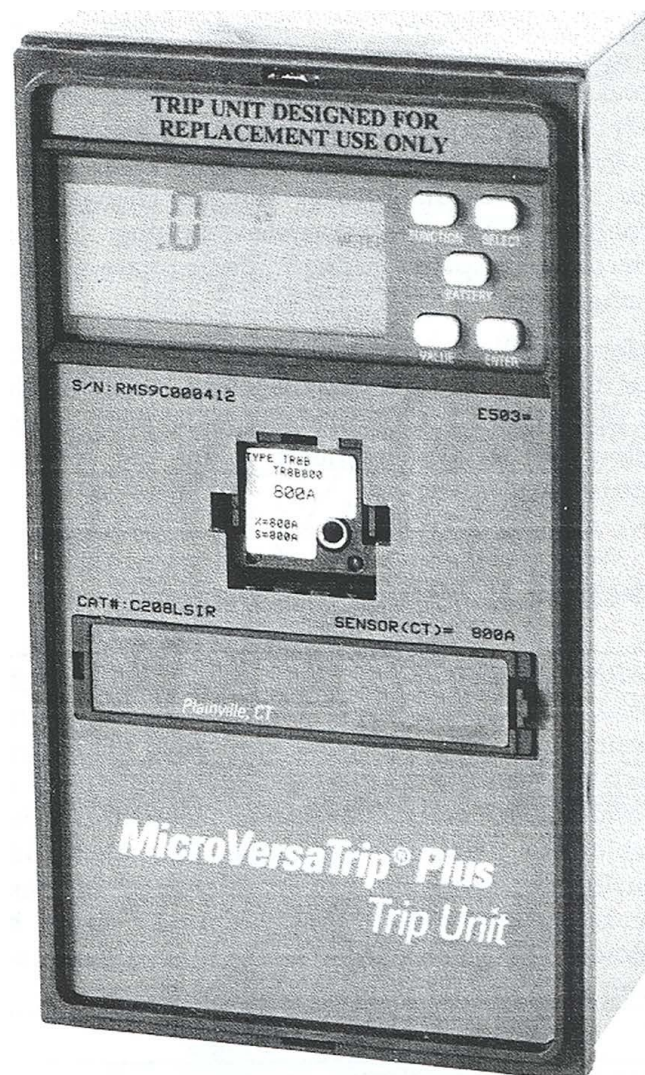
### Introduction

The Enhanced MicroVersaTrip Plus™ and MicroVersaTrip PM™ programmable Trip Units are the latest in solid state protection for industrial circuit breakers. This new generation of MicroVersaTrip® series RMS-9C Trip Units is compatible with all MicroVersaTrip 4 Function, MicroVersaTrip 9 Function, RMS-9, Epic, MicroVersaTrip Plus, and MicroVersaTrip PM Trip Units. Enhanced MicroVersaTrip Plus and MicroVersaTrip PM Trip Units are compatible with AKR low-voltage power circuit breakers and Power Break insulated-case circuit breakers.

These Trip Units may be installed in the following breakers manufactured after 1980:

- Power Break frames TP, THP, TC, and THC.
- AKR frames AKR-30, AKR-30S, AKR-30H, AKR-50, AKRT-50, AKR-75, and AKR-100.
- All breakers equipped with a MicroVersaTrip Plus or MicroVersaTrip PM conversion kit.

This publication covers the drop in replacement installation of all Enhanced MicroVersaTrip Plus and MicroVersaTrip PM programmable Trip Units.



## **Section 1. General Information**

Installation of a replacement MicroVersaTrip Plus™ or MicroVersaTrip PM™ programmable Trip Unit is straightforward, but requires careful attention to these instructions. On AKR low-voltage power circuit breakers, the breaker is racked out to the disconnect position to access the programmer disconnect bracket. On all Power Break® insulated case circuit breakers, the power must be disconnected and the front cover removed to access the programmer. The replacement of a programmer in a Power Break circuit breaker must be completed by a qualified factory service representative to maintain the UL listing of the breaker.

All enhanced MicroVersaTrip Plus and MicroVersaTrip PM Trip Units are manufactured to work with only one current sensor rating. If the breaker is equipped with tapped current sensors, they should be set on the maximum tap and the programmable Trip Unit ordered accordingly. The rating of the breaker can be changed by ordering the appropriate rating plug. MicroVersaTrip® rating plugs are interchangeable.

Before installing the replacement Trip Unit, verify that the correct unit was supplied and that the current sensor ratings match. As a final check, follow the testing procedures at the end of these instructions.

## **Section 2. Before Installation**

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**WARNING:** Power circuit breakers contain high speed, stored-energy spring operating mechanisms. The breakers and their enclosures contain Interlocks and safety features intended to provide safe, proper operating sequences. For maximum personnel protection associated with installation, operation, and maintenance of these breakers, the following procedures must be followed. Failure to follow these procedures may result in personal injury or property damage.

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**WARNING:** Before starting any work, turn off and lock out all power sources leading to the breaker (primary and secondary)

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The following rules must be observed during installation of these Trip units:

- Only qualified persons, as defined in the National Electrical Code, who are familiar with the installation and maintenance of power circuit breakers should perform any work associated with these circuit breakers.
- Turn off and lock out the power source feeding the breaker before attempting any installation, maintenance, or modification. Follow all the lockout and tagging rules of OSHA requirements and all applicable codes.
- Do not work on a closed breaker or a breaker with charged closing springs. Trip the breaker OPEN and be sure the stored-energy springs are discharged, to avoid the possibility that the breaker may trip OPEN or the charging springs discharge, which could cause injury.
- Do not perform any maintenance, including breaker charging, closing, tripping, or any other function that could cause significant movement of the breaker while it is on the draw-out extension rails.
- Do not leave the breaker in an intermediate position. Always leave it in the CONNECTED, TEST, or DISCONNECTED position. Failure to heed this rule could lead to improper positioning of the breaker and flashback.

## **Section 3. Trip Unit Installation**

The replacement of a ABB programmable Trip Unit requires only minor modifications to the breaker in preparation for the new unit. Follow the appropriate step-by-step instructions below to ease the installation. The circuit breaker must be tested before it is returned to service.

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**NOTE:** If a MicroVersaTrip PM Trip Unit is installed in an AKR or a Power Break circuit breaker that previously did not have a metering or communication type Trip Unit, the breaker may not be equipped with the required accessories. Please contact the factory.

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## Power Break® Circuit Breakers (800-2000 A Frames)

**WARNING:** All metal parts of the internal mechanism are always live when the breaker is bottom or reverse fed, even in the OFF position.

Use the following procedure to install an Enhanced MicroVersaTrip Plus™ or MicroVersaTrip PM™ Trip Unit in an 800-2000 A Power Break® breaker, as illustrated in Figure 1.

1. Disconnect all power to the circuit breaker.
2. Open the breaker by pushing the red OFF button on the front of breaker cover. With draw out breakers, rack the breaker all the way out.
3. Remove the line shield (if present) and the breaker cover. The cover is held in place by four large screws in the barrier separating the three phases, as shown in Figure 1.
4. On the right side of the Trip Unit, push the PROGRAMMER RELEASE LEVER in toward the Trip Unit and lift the old unit out.
5. If the breaker was equipped with a MicroVersaTrip® 4 or MicroVersaTrip 9 Trip Unit (catalog number has a V in the third or fourth digit), the 36-pin trip unit connector must be removed and remounted on the adapter bracket, as shown in Figure 2.

**WARNING:** The adapter bracket must be installed onto the harness plug as shown in Figure 2. Failure to do so will result in failure of the harness plug and the Trip Unit will not provide protection.

6. Install the new MicroVersaTrip Plus or MicroVersaTrip PM Trip Unit by aligning the holes in the back of the Trip Unit with the guide pins on the mounting plate, as illustrated in Figure 3. Push down firmly on the Trip Unit, then push in the PROGRAMMER RELEASE LEVER.
7. Install the breaker cover (and line shield, if applicable).
8. Initialize the Trip Unit settings as described in GEH-6273.

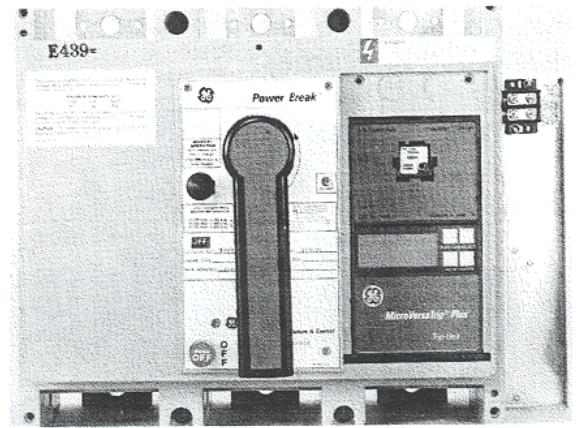


Figure 1. 800 A Power Break circuit breaker

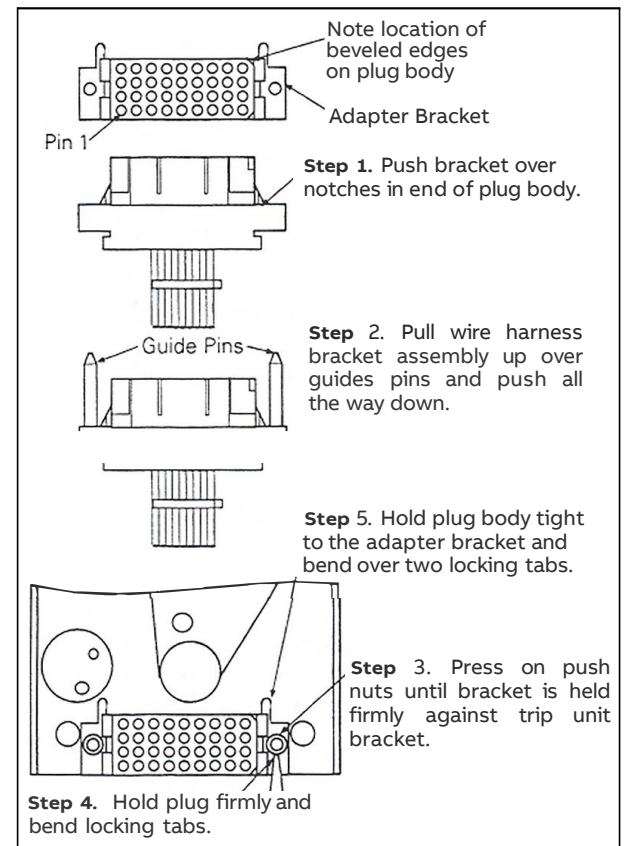


Figure 2. Installation of the 36-pin trip unit connector (MicroVersaTrip 4 or 9 Trip Unit) on the adapter bracket.

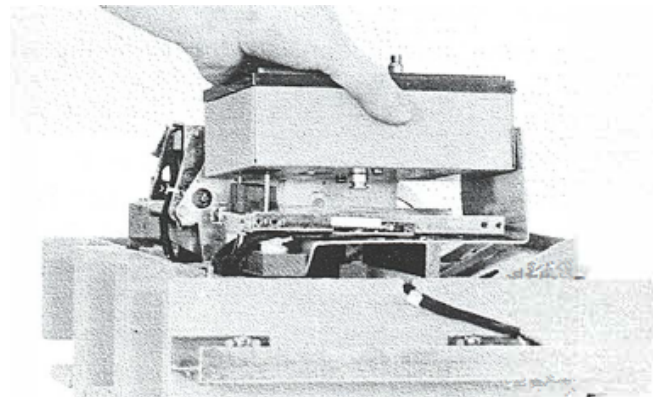


Figure 3. Aligning the Trip Unit on the mounting plate on 800- 2000 A Power Break breaker.



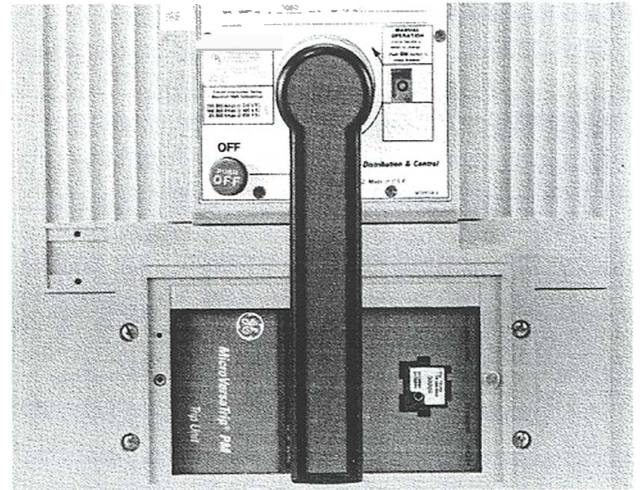
## ***Power Break® Circuit Breakers (2500-4000 A Frames)***

**WARNING:** All metal parts of the internal mechanism are always live when the breaker is bottom or reverse fed, even in the OFF position.

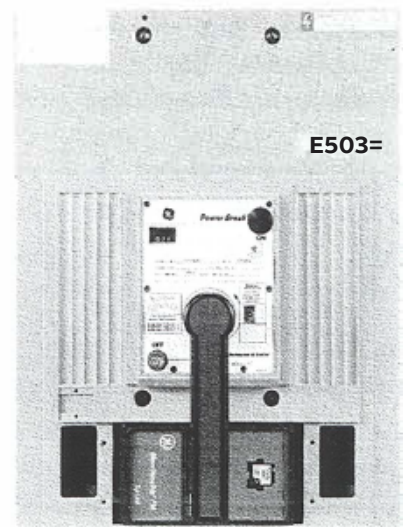
Use the following procedure to install an Enhanced MicroVersaTrip Plus™ or MicroVersaTrip PM™ Trip Unit in an 2500-4000 A Power Break breaker, as illustrated in Figure 4.

1. Disconnect all power to the circuit breaker.
2. Open the breaker by pushing the red OFF button on the front of breaker cover. With draw out breakers, rack the breaker all the way out.
3. Remove the escutcheon plate over the programmer. The escutcheon plate is held in place with four screws, one at each corner of the plate on the front of the breaker, as shown in Figure 4.
4. Remove the breaker cover and line shield (if present). The cover is held in place by four large screws in the barrier separating the phases, as shown in Figure 5.
5. On the bottom of the Trip Unit, push the **PROGRAMMER RELEASE LEVER** in toward the Trip Unit and lift the old unit out
6. If the breaker was equipped with a MicroVersaTrip® 4 or MicroVersaTrip 9 Trip Unit (catalog number has a V in the third or fourth digit), the 36-pin trip unit connector must be removed and remounted on the adapter bracket provided. Remove the two screws holding the trip unit mounting plate to the center-phase sensor shell, as shown in Figure 6. A small pencil magnet can be used to hold the nuts in place in the shell.
7. Slide the connector out of the mounting plate and install it on the adapter bracket, as illustrated in Figure 2. Reinstall the trip unit mounting plate.

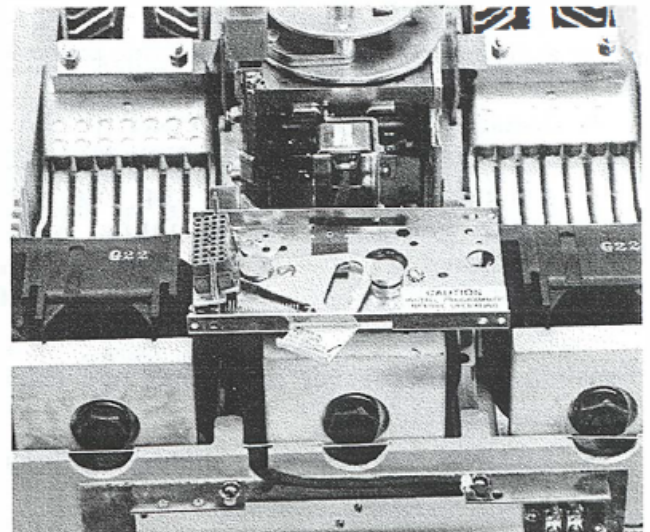
**WARNING:** The adapter bracket must be installed onto the harness plug as shown in Figure 2. Failure to do so will result in failure of the harness plug and the Trip Unit will not provide protection.



**Figure 4. Escutcheon plate removal on 2500-4000A Power Break breaker.**



**Figure 5. 3000 A Power Break circuit breaker.**



**Figure 6. Trip unit mounting plate on 2500-4000 A Power Break® breaker.**

8. Install the new MicroVersaTrip Plus™ or MicroVersa Trip PM™ Trip Unit by aligning the holes in the back of the Trip Unit with the guide pins on the mounting plate, as illustrated in Figure 7. Push down firmly on the trip Unit, then push in the PROGRAMMER RELEASE LEVER.
9. Install the breaker cover (and line shield, if applicable) and escutcheon plate.
10. Initialize the Trip Unit settings as described in GEH-6273.

#### **AKR Type Circuit Breakers (225-5000 A Frames)**

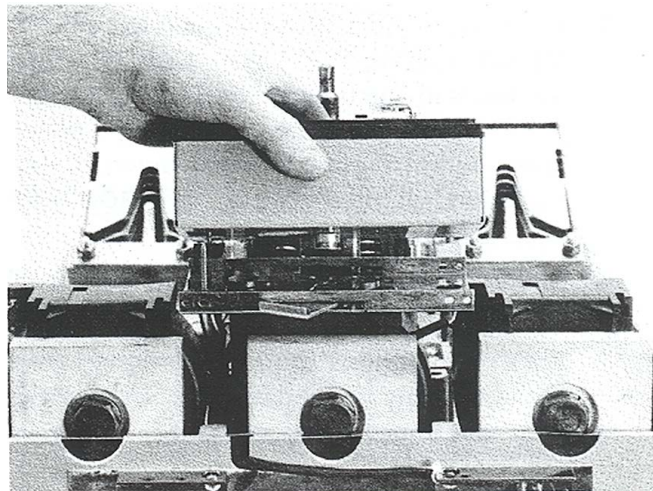
Use the following procedure to install an enhanced MicroVersaTrip Plus or MicroVersaTrip PM Trip Unit in an AKR breaker.

1. Disconnect all power to the circuit breaker.
2. Open the breaker by pressing the red TRIP button on the front of the breaker escutcheon. Disconnect any secondary wire harnesses between the breaker and the switchgear. On draw-out breakers, rack the breaker all the way out to the DISCONNECT position.
3. Follow the instructions on the label attached to the PROGRAMMER RELEASE LEVER to remove the Trip Unit. There are three types of mounting plates, as follows:
  - On one type, push in the lever to release the Trip Unit.
  - A newer mounting system requires pulling out the lever to release the Trip Unit, as shown in Figure 8.
  - The third design uses a lever that wraps around to the front of the unit. The Trip Unit is released by pushing down on the lever, as shown in Figure 9.
4. If the breaker was equipped with a MicroVersaTrip® 9 Trip Unit, the 36-pin trip unit connector must be removed and remounted on the adapter bracket provided. Slide the connector out of the mounting plate and install it on the adapter bracket, as illustrated in Figure 2.

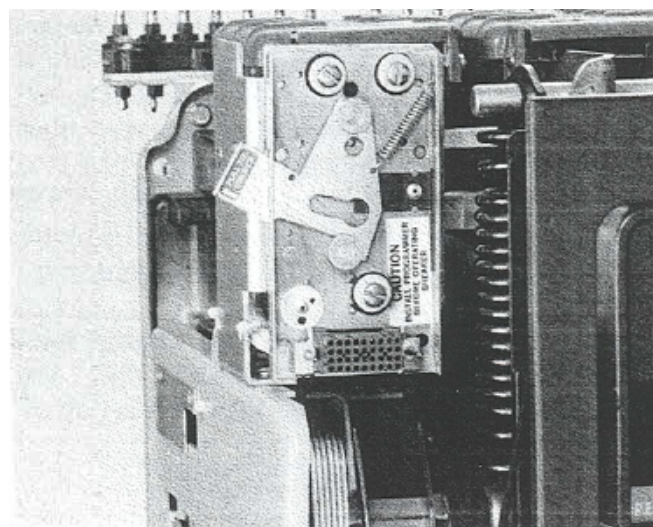
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**WARNING:** The adapter bracket must be installed onto the harness plug as shown in Figure 2. Failure to do so will result in failure of the harness plug and the Trip Unit will not provide protection.

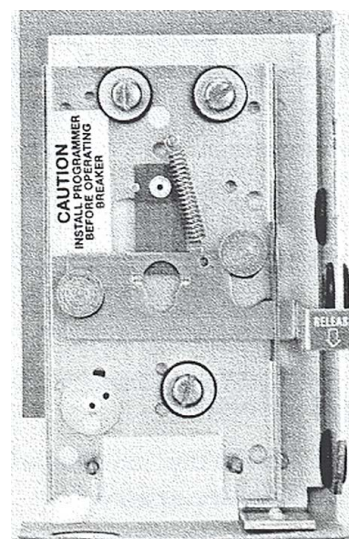
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**Figure 7. Installation of new Trip Unit on 2500-4000 A Power Break breaker.**



**Figure 8. Programmer release lever on newer AKR breakers.**



**Figure 9. Programmer release lever on older AKR breakers.**



5. Install the new MicroVersaTrip Plus™ or MicroVersa Trip PM™ Trip Unit by aligning the holes in the back of the Trip Unit with the guide pins on the mounting plate, as illustrated in Figure 10. Push down firmly on the Trip Unit, then push in the PROGRAMMER RELEASE LEVER.
6. Initialize the Trip Unit settings as described in GEH-6273.
7. Rack the breaker into the switchgear and reconnect any secondary wire harnesses that were disconnected in step 2.

#### **Section 4. Testing and Trouble-Shooting**

Before a breaker with a replacement Trip Unit is returned to service, it should be tested. Follow the procedure below using the ABB portable Digital Test Kit, catalog number TVRMS2. A primary injection test using a commercially available high-current test set is also an effective test means. The TVRMS2 Test Kit will temporarily defeat the ground-fault protection during single-pole over current tests.

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**NOTE:** The ABB portable Test Kits, catalog numbers TVTS1 and TVRMS, will not test a MicroVersaTrip Plus™ or MicroVersa Trip PM™ series RMS9C Trip Unit.

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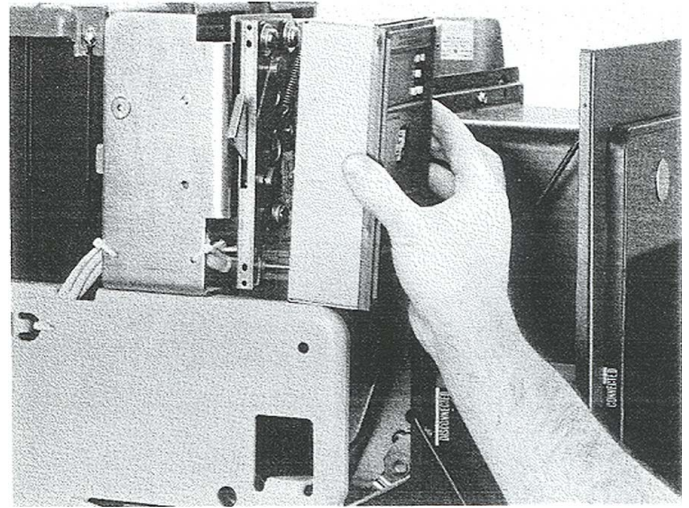
#### **Testing the Trip Unit**

1. Verify that the Trip Unit is securely installed. The phase sensors must not be energized if they are open-circuited.
2. Connect the TVRMS2 Digital Test Kit to the Trip Unit through the test port in the front of the rating plug.
3. Test the Trip Unit by following the instructions in GEK-97367A, the Digital Test Kit instruction manual. Verify that the flux shifter is operating properly by tripping the breaker through the Test Kit.

#### **Additional Checks**

Perform the following additional checks before returning the breaker to service.

- Check that all the phase sensors (CTs) are the same type and ampere range. If tapped CTs are used, ensure that the tap in use corresponds to the sensor rating printed on the front of the Trip Unit.

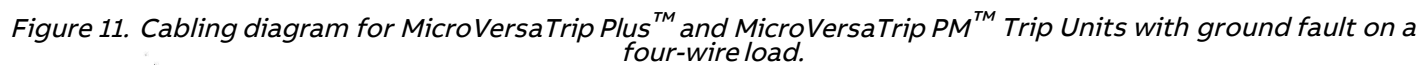


**Figure 10. Trip Unit installation on AKR breakers.**

- Verify that the 36-pin trip unit connector is correctly assembled on the adapter bracket, such that it makes proper connection with the Trip Unit pins.
- Verify that the harness connections to the sensors meet the polarity constraints indicated by the cabling diagram in Figure 11.

#### **Trouble-Shooting**

For trouble-shooting the operation of the Trip Unit, consult the Trouble-Shooting Guide in GEH-6273.



These instructions do not cover all details or variations in equipment nor do they provide for every possible contingency that may be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise that are not covered sufficiently for the purchaser's purposes, the matter should be referred to the ABB Inc.

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