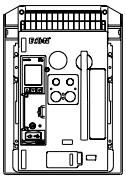
Instruction Leaflet **IL0131087EN**

Supersedes April 2015
Effective January 2019

Power Defense – ICCB

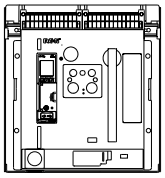
Instructions for Undervoltage Release, Shunt Trip, and Overcurrent Trip Switch

Instructions apply to:



UL489 : **PD-NF**

IEC : **PD-NF, IZMX16**



UL489 : **PD-RF**

IEC : **PD-RF, IZMX40**

⚠ WARNING

(1) ONLY QUALIFIED ELECTRICAL PERSONNEL SHOULD BE PERMITTED TO WORK ON THE EQUIPMENT.
(2) ALWAYS DE-ENERGIZE PRIMARY AND SECONDARY CIRCUITS IF A CIRCUIT BREAKER CANNOT BE REMOVED TO A SAFE WORK LOCATION.
(3) DRAWOUT CIRCUIT BREAKERS SHOULD BE LEVERED (RACKED) OUT TO THE DISCONNECT POSITION.
(4) ALL CIRCUIT BREAKERS SHOULD BE SWITCHED TO THE OFF POSITION AND MECHANISM SPRINGS DISCHARGED.

FAILURE TO FOLLOW THESE STEPS FOR ALL PROCEDURES DESCRIBED IN THIS INSTRUCTION LEAFLET COULD RESULT IN DEATH, BODILY INJURY, OR PROPERTY DAMAGE.

⚠ WARNING

THE INSTRUCTIONS CONTAINED IN THIS IL AND ON PRODUCT LABELS HAVE TO BE FOLLOWED. OBSERVE THE FIVE SAFETY RULES:
– DISCONNECTING;
– ENSURE THAT DEVICES CANNOT BE ACCIDENTALLY RESTARTED;
– VERIFY ISOLATION FROM THE SUPPLY;
– EARTHING AND SHORT-CIRCUITING; AND
– COVERING OR PROVIDING BARRIERS TO ADJACENT LIVE PARTS.

DISCONNECT THE EQUIPMENT FROM THE SUPPLY. USE ONLY AUTHORIZED SPARE PARTS IN THE REPAIR OF THE EQUIPMENT. HE SPECIFIED MAINTENANCE INTERVALS AS WELL AS THE INSTRUCTIONS FOR REPAIR AND EXCHANGE MUST BE STRICTLY ADHERED TO PREVENT INJURY TO PERSONNEL AND DAMAGE TO THE SWITCHBOARD.

Power Defense™

Powering Business Worldwide

Section 1: General Information

The left accessory tray will accommodate a maximum of four accessory devices as follows (see Figure 1):

- Zero or two (OTS);
- Zero or one (UVR);
- Zero, one, or two (ST); and
- Combination (one ST and one UVR).

Shunt Trip (ST)

The shunt trip opens the circuit breaker when its coil is energized by a voltage input (see **Table 1**). It is supplied with yellow and white secondary leads connected to a secondary connector plug (see **Figure 2**).

Undervoltage Release (UVR)

The undervoltage release opens the circuit breaker when its supply voltage falls to between 35 - 60% of rated voltage. If the release is not energized to 85% of its supply voltage, the circuit breaker cannot be closed electrically or manually (see **Table 2**). It is supplied with orange and brown secondary leads connected to a secondary connector plug (see **Figure 3**). A UVR should only be installed in the right side of the tray.

Overcurrent Trip Switch (OTS)

An overcurrent trip switch (bell alarm) provides an electrical indication when a circuit breaker trips as a result of the trip unit reacting to an overcurrent condition. An electrical indication will not occur unless a standard or interlocking Trip Indicator is installed (refer to IL01301058E). Opening as a result of a circuit breaker's manual open button, ST or UVR does not cause the overcurrent trip switch to operate (see Table 3). OTSs are always supplied as a two-switch combination. The combination is supplied with red, blue, and black secondary leads connected to three secondary connector plugs (Figure 3).

Note: A number of graphics in this instruction leaflet use the NF Frame breaker only as typical examples. The RF Frame is similar in those situations.

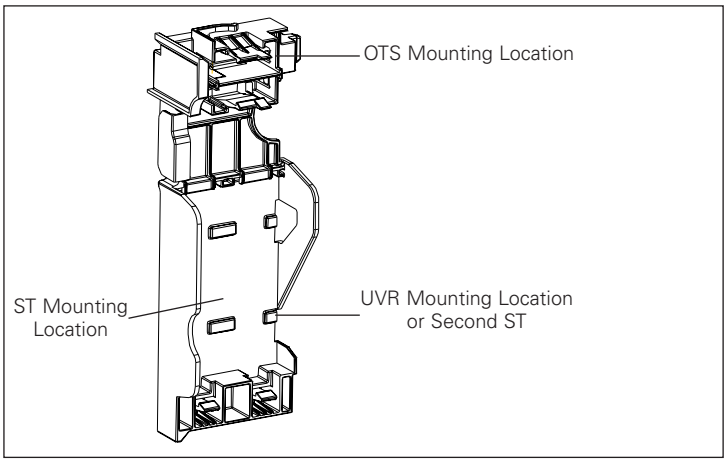


Figure 1. Unpopulated Left Accessory Tray (NF Frame Shown).

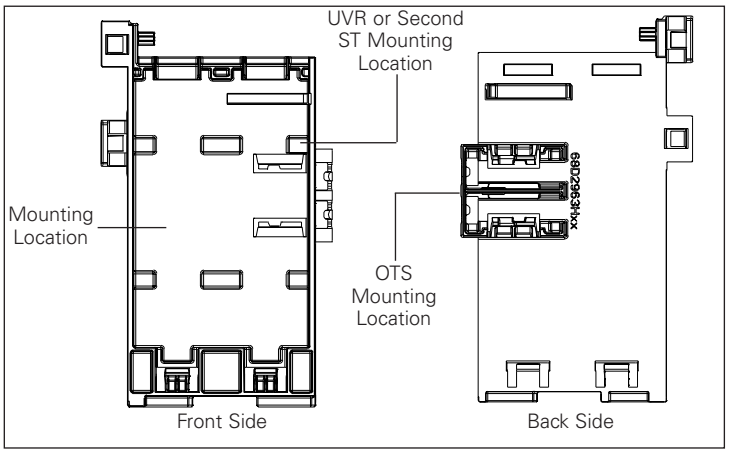


Figure 2. Unpopulated Left Accessory Tray (RF Frame Shown).

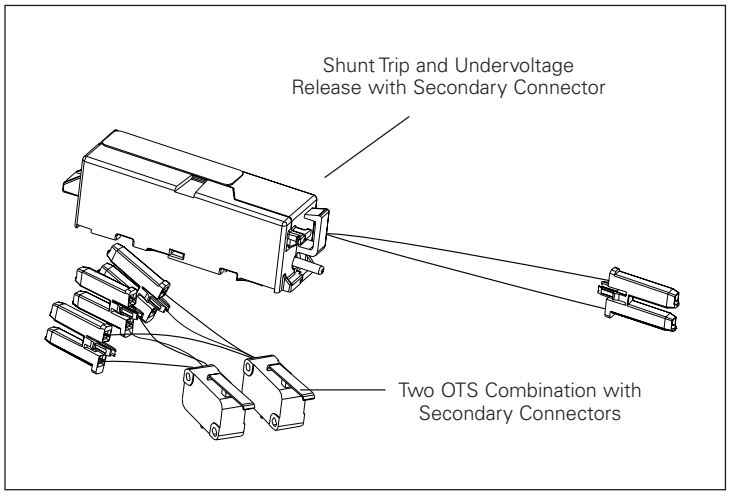


Figure 3. Left Tray Accessories.

⚠ CAUTION

ANY SPECIFIC ACCESSORY LEAD ROUTING INSTRUCTIONS PRESENTED IN THIS DOCUMENT SHOULD BE CAREFULLY ADHERED TO AT ALL TIMES. FAILURE TO DO SO COULD RESULT IN LEAD DAMAGE AND/OR NO/INAPPROPRIATE TRIPPING.

Table 1. Shunt Trip Ratings.

Control Voltage	Frequency	Operational Voltage (Range 70 - 110%)	Inrush/Continuous Power Consumption (VA)	Opening Time (ms)
24	DC	17 - 26	400/2	25
48	DC	34 - 53	500/3	25
60	DC	42 - 66	500/4	25
110–127	50 - 60 Hz	77 - 140	800/8	25
110–125	DC	77 - 138	800/8	25
208–240	50 - 60 Hz	146 - 264	850/8	25
220–250	DC	154 - 275	850/8	25

Table 2. Undervoltage Release Ratings.

Control Voltage	Frequency	Operational Voltage Range (85 - 110%)	Dropout Voltage Range (35 - 60%)	Inrush/Continuous Power Consumption (VA)	Opening Time (ms)
24	DC	20 - 26	8 - 14	425/2	50
32	DC	27 - 35	11 - 19	N/A	50
48	DC	41 - 53	17 - 29	750/3	50
60	DC	51 - 66	21 - 36	825/4	50
110 - 127	50–60 Hz	94 - 140	44 - 66	1150/8	50
110 - 125	DC	94 - 138	44 - 66	1150/8	50
208 - 240	50–60 Hz	177 - 264	84 - 125	1200/8	50
220 - 250	DC	187 - 275	88 - 132	1200/8	50
380 - 415	AC	323 - 457	145 - 228	N/A	50
480	AC	408 - 528	168 - 288	N/A	50
600	AC	510 - 660	210 - 360	N/A	50

Table 3. Overcurrent Trip Switch Ratings.

Control Voltage	Frequency	Contact Rating (Amperes)
250	50 - 60 Hz	10
125	DC	0.5
250	DC	0.25

Section 2: Installation of Undervoltage Release and/or Shunt Trip in Left Accessory Tray

Proceed with the following 13 steps:

Step 1: Remove the four screws holding the front cover in place (two on each side of the cover).

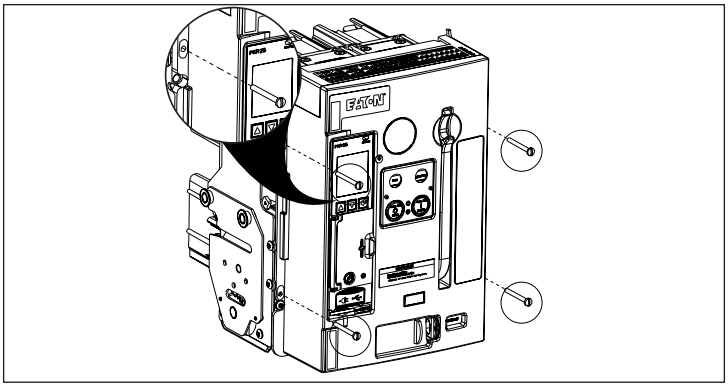


Figure 4. Step 1 (NF Frame Shown).

Step 2: Remove the front cover. Pull down on the charging handle to simplify removal.

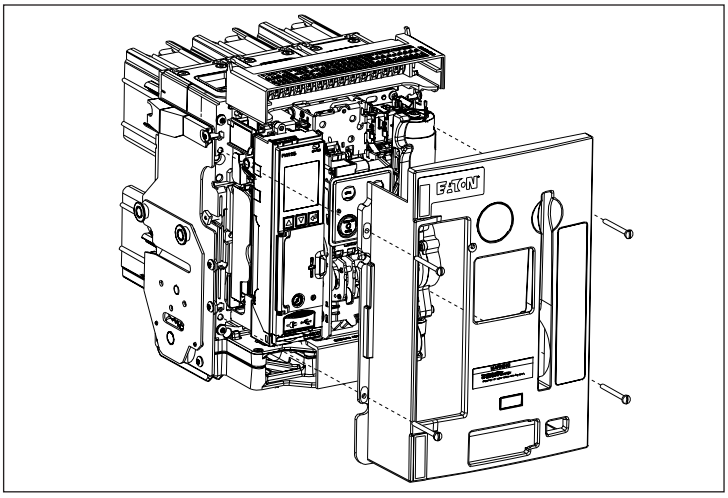


Figure 5. Step 2 (NF Frame Shown).

Step 3: Locate the left accessory tray behind the trip unit. For the NF Frame, place a finger on each end of the tray and slide the tray to the left for removal. For the RF Frame, press the thumb tab down and slide the tray to the left for removal.

Note: A minimum of 2 inches (50.8 mm) for NF Frame and 3 inches (77 mm) for RF Frame of side clearance is required on an installed fixed breaker for tray removal.

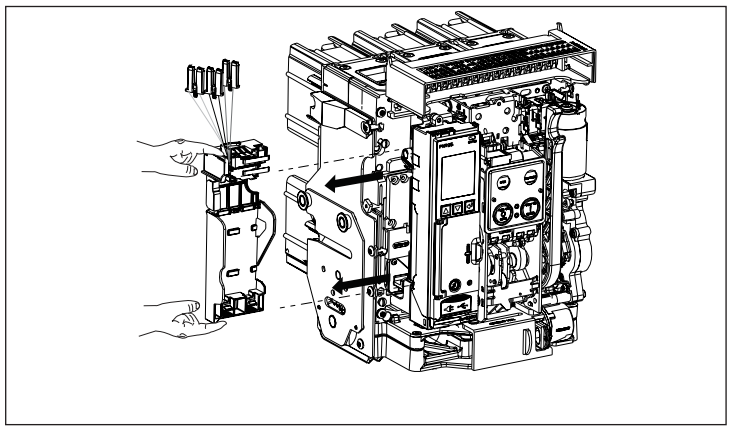


Figure 6. Step 3 (NF Frame Shown).

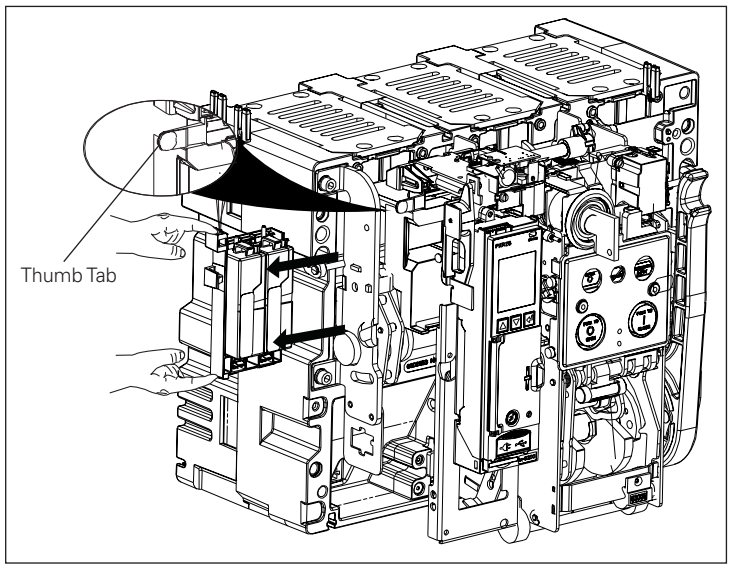


Figure 7. Step 3 (RF Frame Shown).

Step 4: With the left accessory tray positioned as shown, tilt the UVR or ST back to properly position it in the tray.

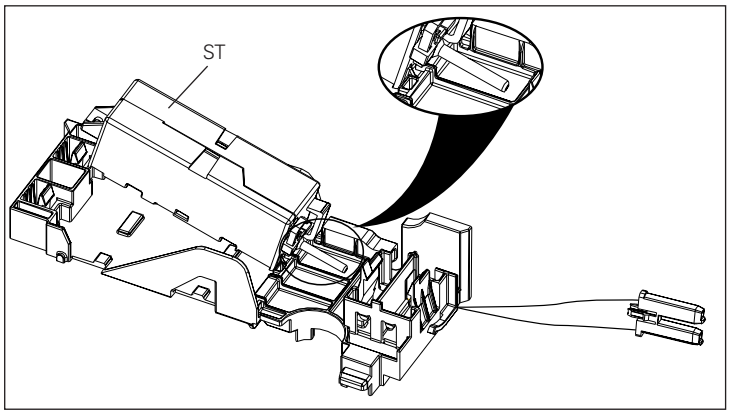


Figure 8. Step 4 (NF Frame shown).

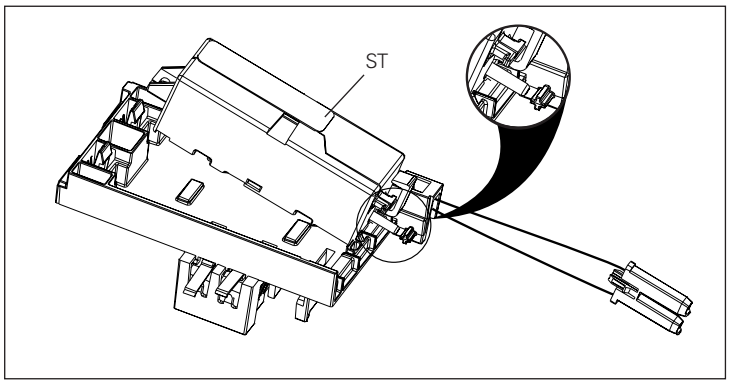


Figure 9. Step 4 (RF Frame Shown).

Step 5: Carefully push the other end of the UVR or ST down into the tray until a snapping sound is heard. This sound indicates the accessory is locked in position.

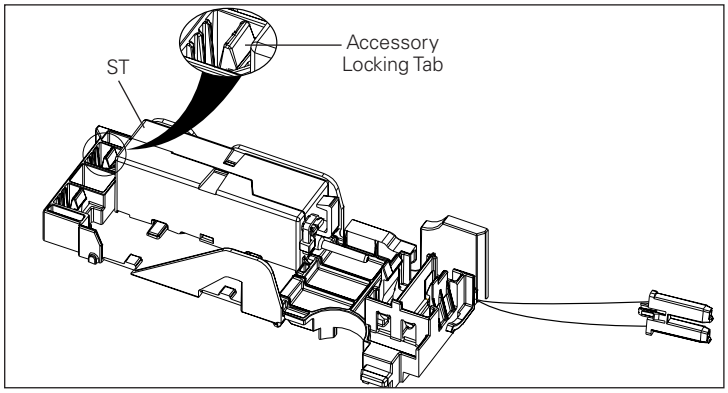


Figure 10. Step 5 (NF Frame Shown).

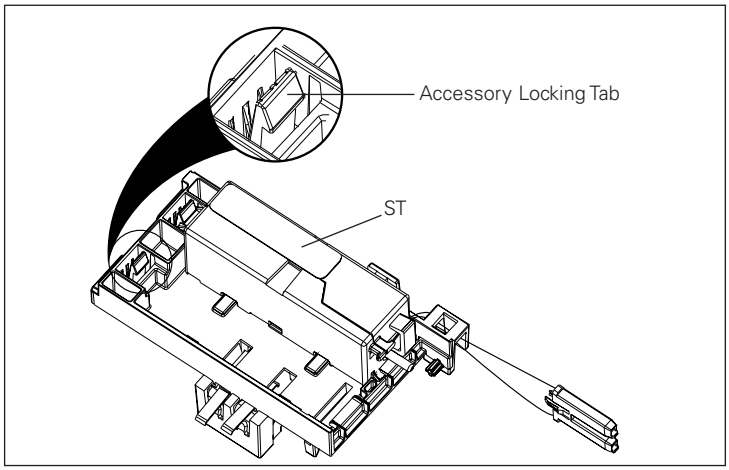


Figure 11. Step 5 (RF Frame Shown).

Step 6: Route the two secondary leads behind the first molded tab, down under a second molded tab, and out the end of the accessory tray.

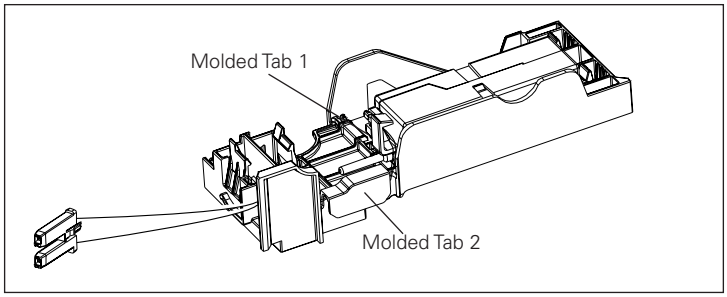


Figure 12. Step 6 (NF Frame Shown).

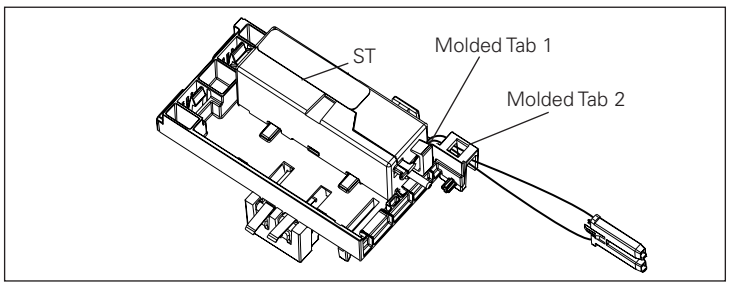


Figure 13. Step 6 (RF Frame Shown).

Step 7: If there is another UVR or ST to install in the other available space of the left accessory tray, install it by repeating Steps 4 and 5.

Step 8: Carefully route the secondary leads of the second installed accessory by following the same routing path and using the same molded tabs as the first installed accessory from Step 6.

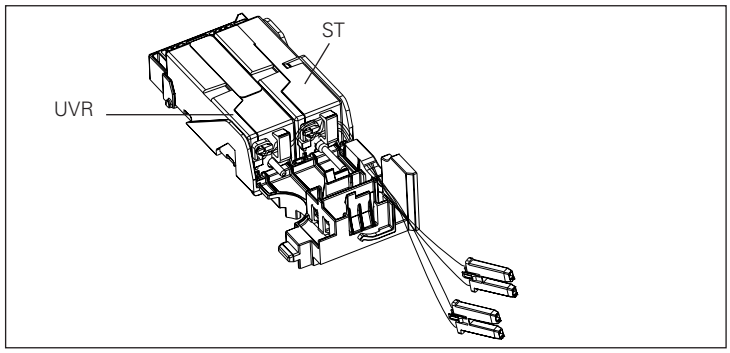


Figure 14. Step 8 (NF Frame Shown).

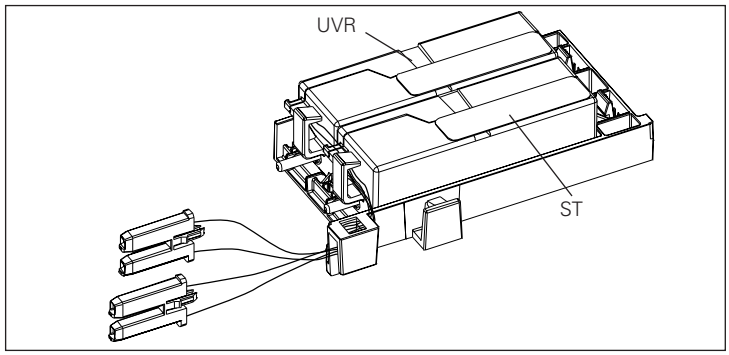


Figure 15. Step 8 (RF Frame Shown).

Step 9: The left accessory tray should look as shown in Figure 15 with two accessories installed and secondary wires properly routed.

Step 10: Place the left accessory tray with the installed UVR and/or ST accessories back in its original position. Be careful not to bind secondary wires or connector plugs.

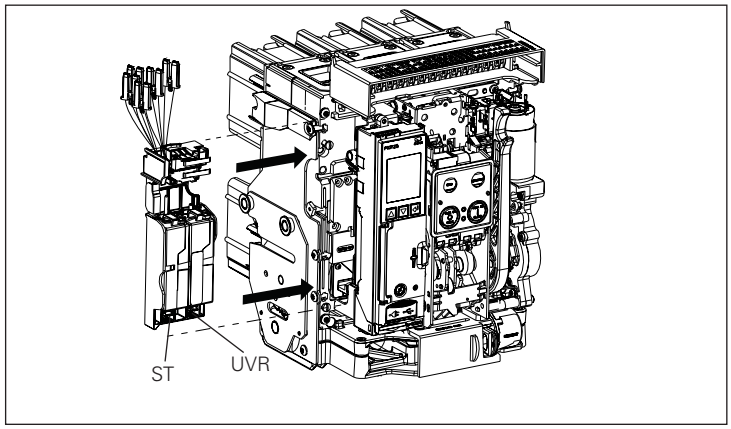


Figure 16. Step 10 (NF Frame Shown).

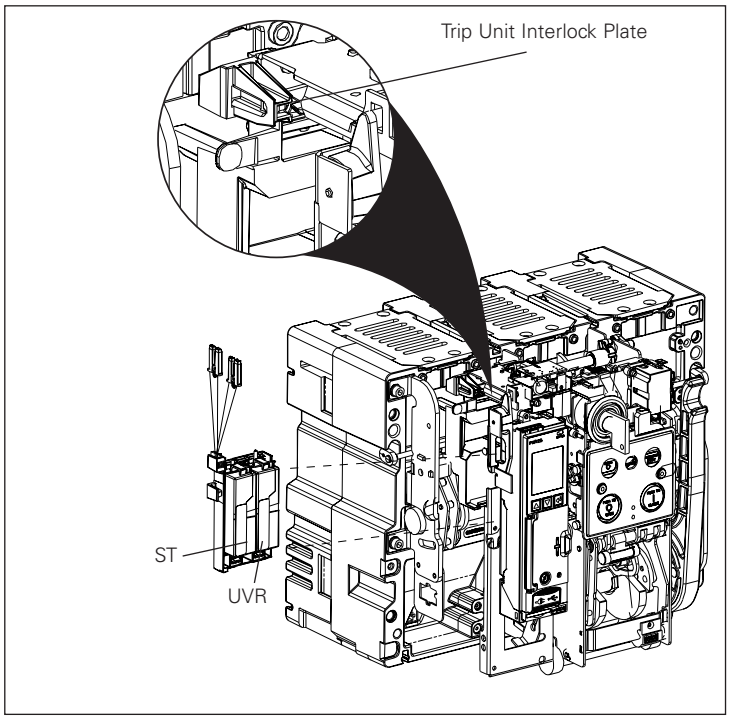


Figure 17. Step 10 (RF Frame Shown).

Note: The Proper routing of leads will prevent the wires from being pinched by the trip unit interlock plate in the RF Frame breaker.

Step 11: The installed left accessory tray should look as shown with secondary leads extending out behind the trip unit. Secondary connections can now be made.

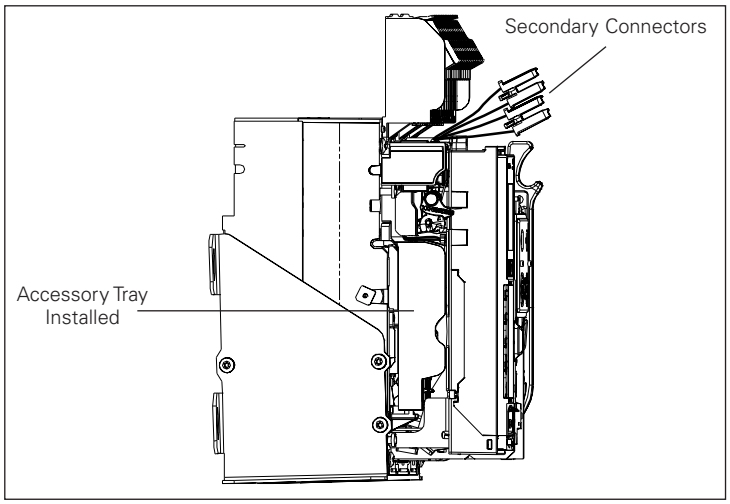


Figure 18. Step 11 (NF Frame Shown).

Step 12: Make the appropriate secondary connections as outlined in Section 6. If necessary, bundle secondary wires using industry-accepted wire tie practices.

Step 13: Replace the front cover, and secure it in place with the four mounting screws previously removed in Step 1.

Section 3: Removal of Undervoltage Release and/or Shunt Trip in Left Accessory Tray

Proceed with the following seven steps:

Step 1: If necessary, remove the front cover from the breaker by first performing Steps 1 and 2 of Section 2.

Step 2: Locate the left accessory tray behind the trip unit and disconnect the appropriate secondary connections as described in Section 6.

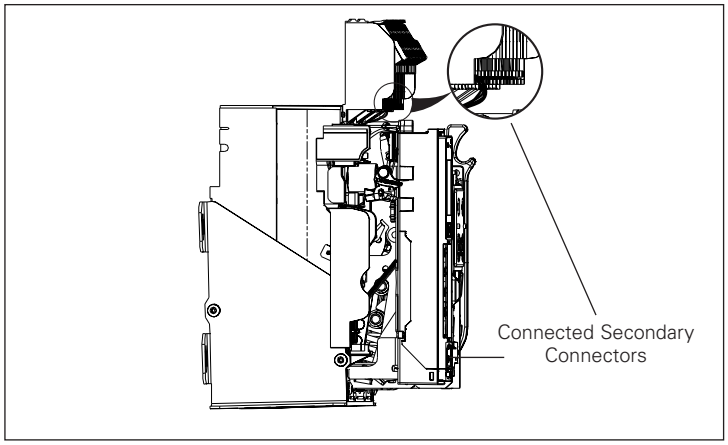


Figure 19. Step 2 (NF Frame Shown).

Step 3: Once the secondary leads are disconnected, finger depress the tabs on each end of the NF Frame tray and slide it to the left for removal. For the RF Frame tray, press the thumb tab down and slide the tray to the left for removal.

Note: A minimum of 2 inches (50.8 mm) for NF Frame and 3 inches (77 mm) for RF Frame of side clearance is required on an installed fixed breaker for tray removal.

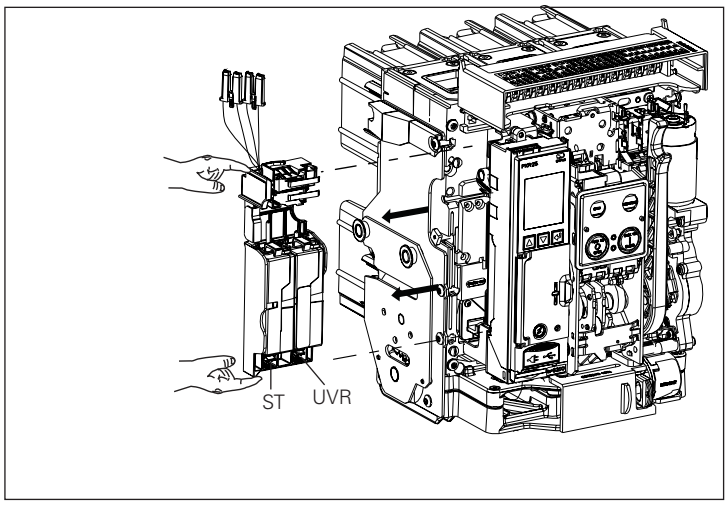


Figure 20. Step 3 (NF Frame Shown).

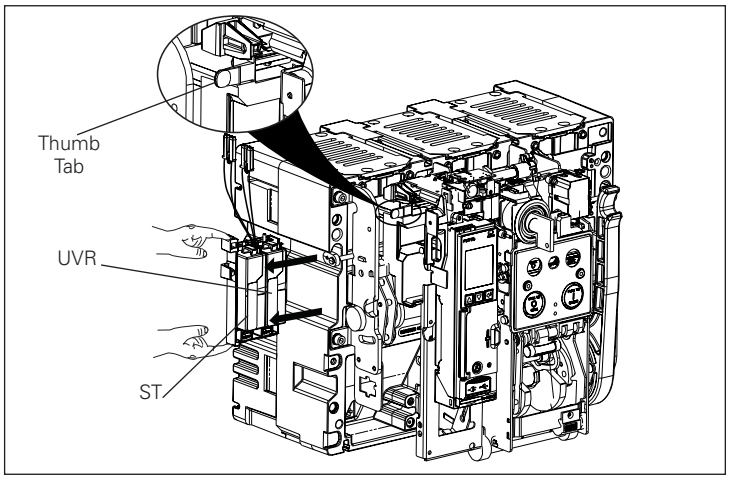


Figure 21. Step 3 (RF Frame Shown).

Step 4: Position the tray as shown and remove secondary leads from behind molded retaining tabs of the accessory being removed. Pull back on the locking tab to unlock the UVR or ST from the left accessory tray.

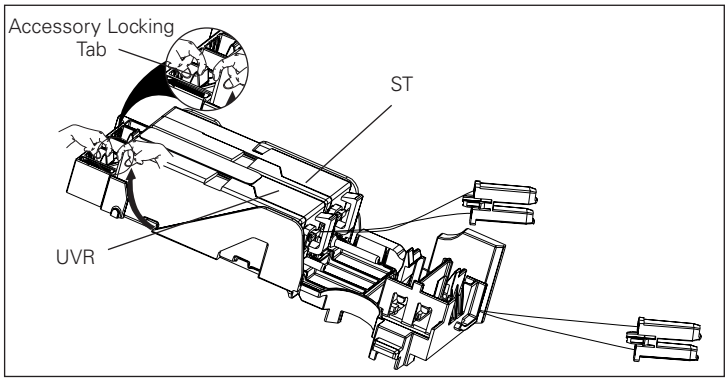


Figure 22. Step 4 (NF Frame Shown).

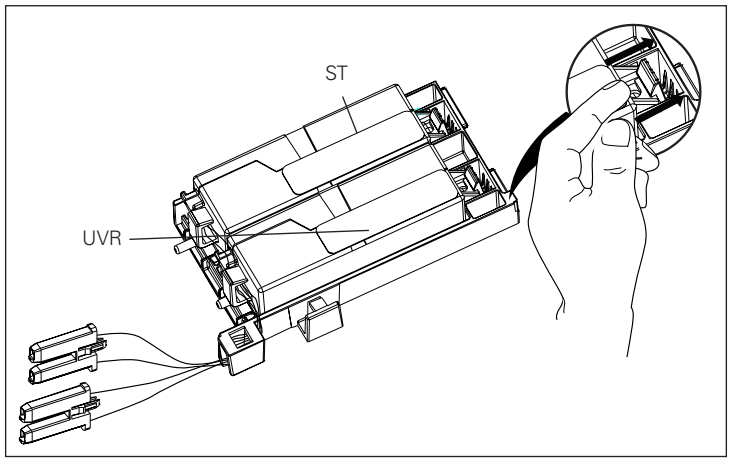


Figure 23. Step 4 (RF Frame Shown).

Step 5: Remove the UVR or ST by lifting it upward and out.

Step 6: Repeat Steps 4 and 5 if the other accessory is also to be removed.

Step 7: If the tray will have a new ST and/or UVR installed, follow steps 4 through 13 of Section 2. If not, just complete Steps 10 through 13 of Section 2.

Section 4: Installation of Overcurrent Trip in Left Accessory Tray

Proceed with the following seven steps:

Step 1: If necessary, remove the front cover from the breaker by first performing Steps 1 and 2 of Section 2.

Step 2: Position the left accessory tray as shown and bring the two OTS switches down for insertion into the left accessory tray. Carefully push the OTS switches down until they lock in place.

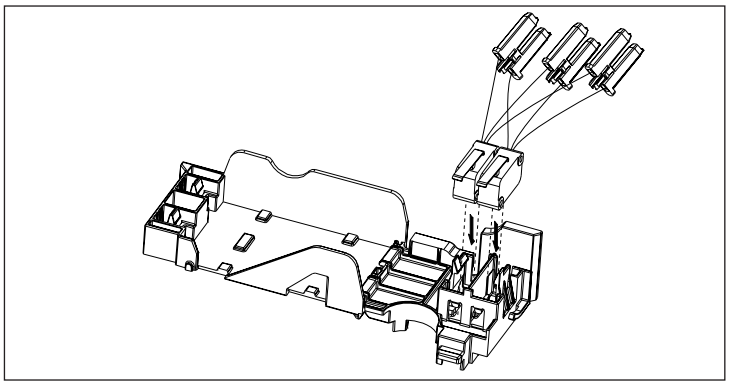


Figure 24. Step 2 (NF Frame Shown).

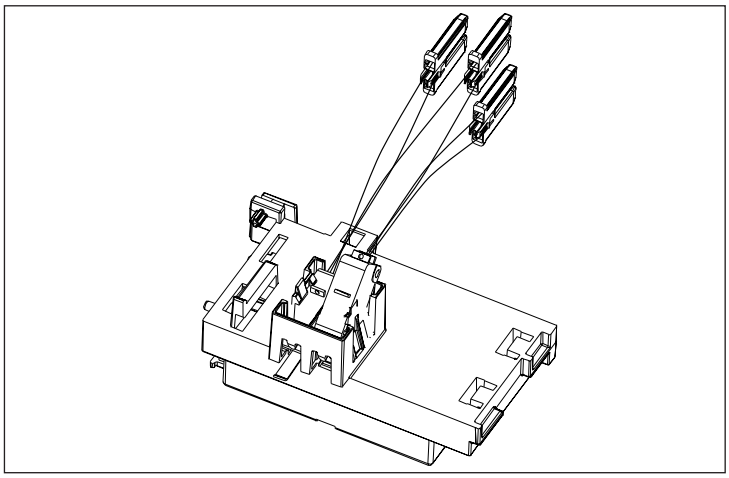


Figure 25. Step 2 (RF Frame Shown).

Note: For the RF Frame, the metal lever must pass through the opening before locking switch in place.

Step 3: Route the six secondary leads and three connectors forward and to the right out the end of the accessory tray for the NF Frame. For the RF Frame, route the leads out as shown.

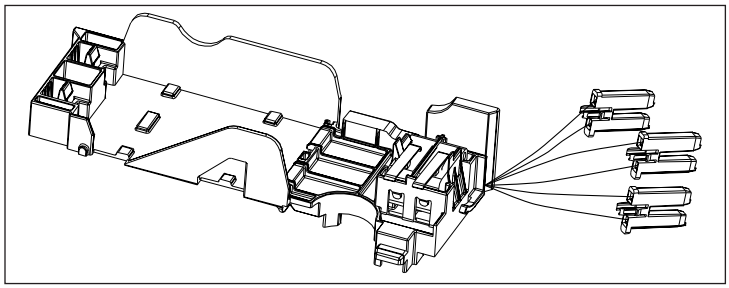


Figure 26. Step 3 (NF Frame Shown).

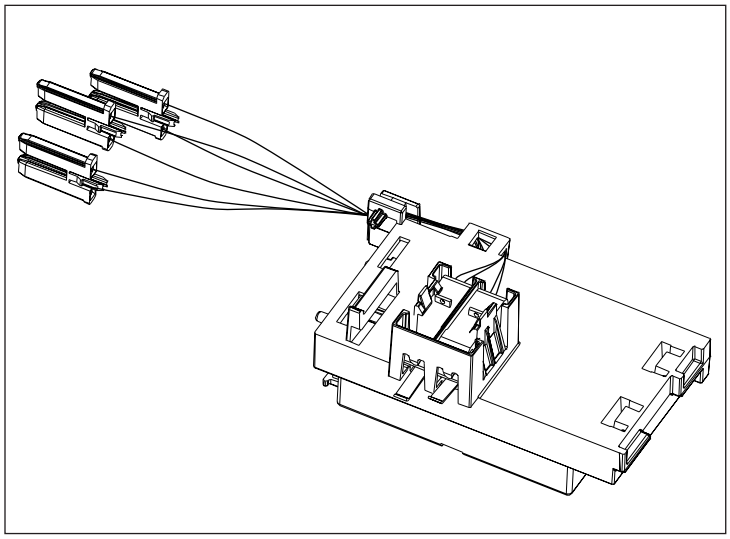


Figure 27. Step 3 (RF Frame Shown)

Step 4: Place the left accessory tray with the installed OTS switches back in its original position as shown. Be careful not to bind secondary wires or connector plugs.

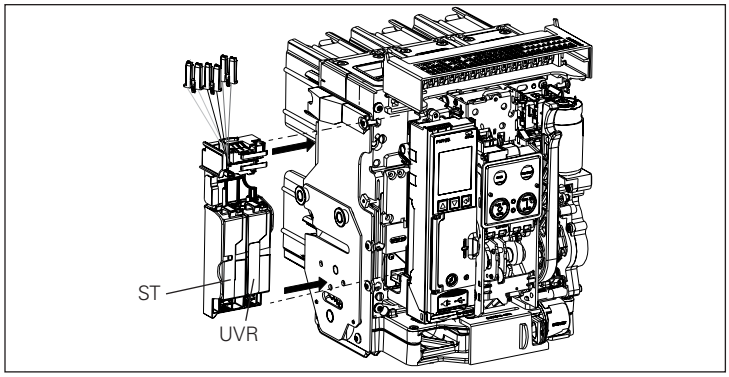


Figure 28. Step 4 (NF Frame Shown).

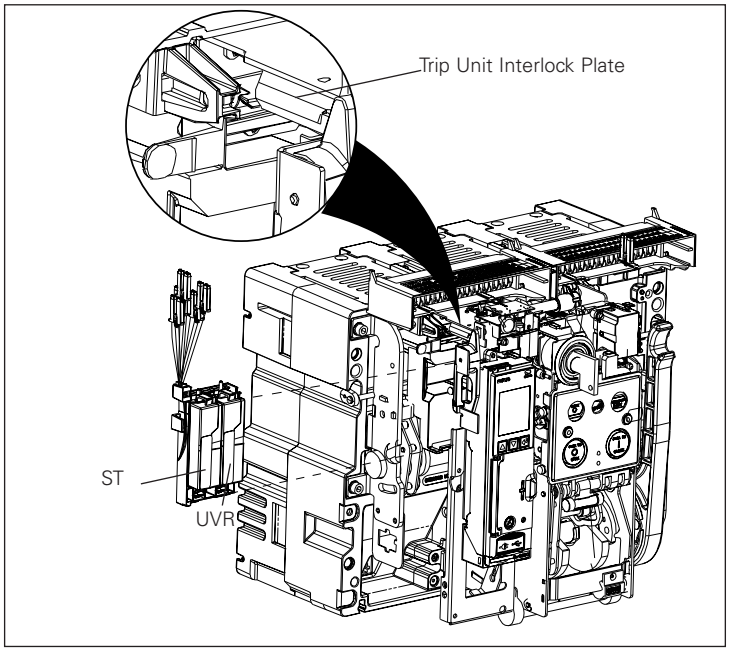


Figure 29. Step 4 (RF Frame Shown).

Note: The Proper routing of leads will prevent the wires from being pinched by the trip unit interlock plate in the RF Frame breaker.

Step 5: The installed left accessory tray should look as shown in Figure 30 with secondary leads extending out behind the trip unit mounting plate location. Secondary connections can now be made.

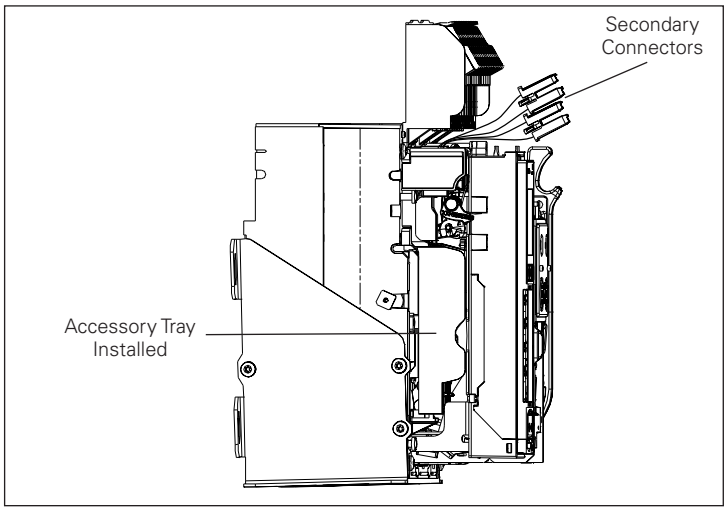


Figure 30. Step 5 (NF Frame Shown).

Step 6: Make the appropriate secondary connections as outlined in Section 6. If necessary, bundle secondary wires using industry-accepted wire tie practices.

Step 7: Replace the front cover and secure it in place with the four mounting screws previously removed in Step 1.

Section 5: Removal of Overcurrent Trip from Left Accessory Tray

Proceed with the following six steps:

Step 1: If necessary, remove the front cover from the breaker by first performing Steps 1 and 2 of Section 2.

Step 2: Locate the left accessory tray behind the trip unit and disconnect the appropriate secondary connections as described in Section 6.

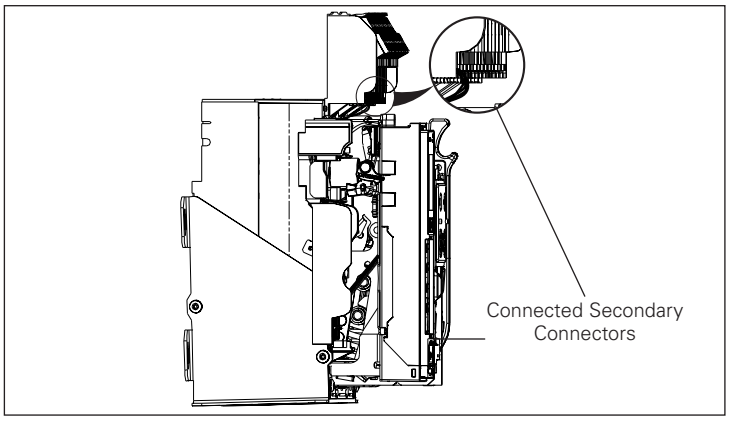


Figure 31. Step 2 (NF Frame Shown).

Step 3: Once the secondary leads are disconnected, finger depress the tabs on each end of the NF Frame tray and slide it to the left as shown for removal. For the RF Frame tray, press the thumb tab down and slide the tray to the left for removal.

Note: A minimum of 2 inches (50.8 mm) for NF Frame and 3 inches (77 mm) for RF Frame of side clearance is required on an installed fixed breaker for tray removal.

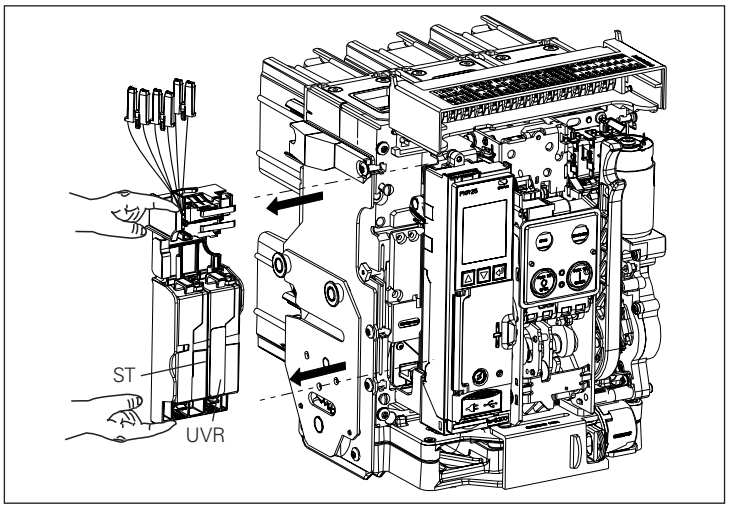


Figure 32. Step 3 (NF Frame Shown).

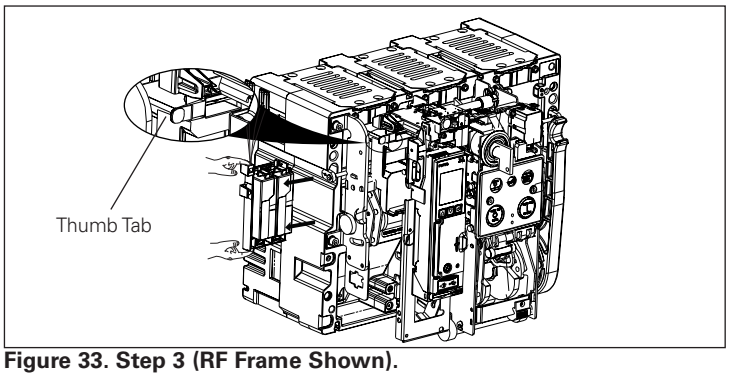


Figure 33. Step 3 (RF Frame Shown).

Step 4: With the left accessory tray positioned as shown, pull back on the locking tab of each OTS switch to unlock them from the left accessory tray.

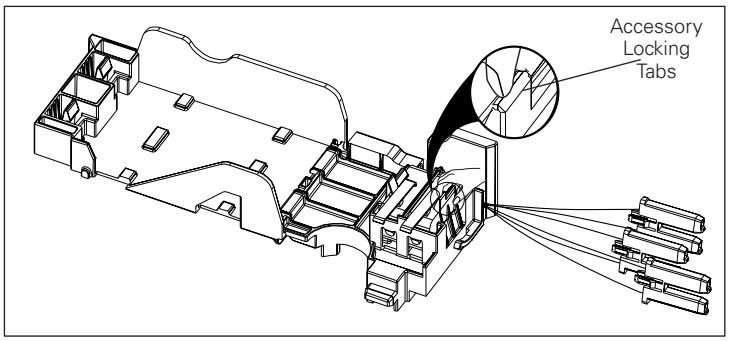


Figure 34. Step 4 (NF Frame Shown).

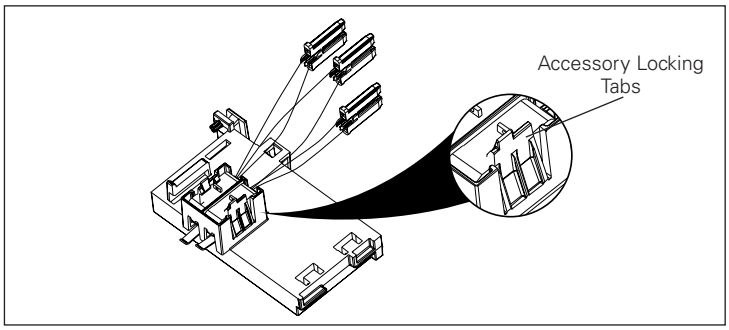


Figure 35. Step 4 (RF Frame Shown).

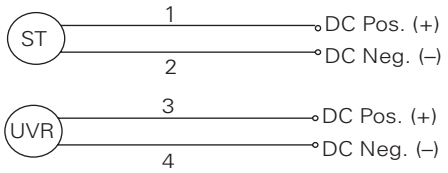
Step 5: Remove both OTS switches by lifting them upward and out of the tray.

Step 6: If the tray will have a new two OTS switch combination installed, follow Steps 2 through 7 of Section 4. If not, just complete Steps 4 through 7 of Section 4.

Section 6: Accessory Secondary Connections

⚠ CAUTION

BECOME FAMILIAR WITH THIS CAUTION ON POLARITY BEFORE PROCEEDING. FAILURE TO APPLY THE CORRECT POLARITY WILL RESULT IN DAMAGE TO THE DEVICE.



When connecting a 24 Vdc shunt trip or a 24 Vdc undervoltage release, be certain to apply positive (+) voltage to either secondary terminal 1 (ST) or secondary terminal 3 (UVR).

General Information

1 Electrical accessory leads are tagged with numbers associated with the applicable connection diagram located in technical document TD013001EN. Leads are also supplied with keyed secondary connector plugs to ensure proper connections (Figure 36).

2 Secondary connections are made by plugging the connector plugs into the appropriate location. A connector plug already connected can be removed by squeezing two release tabs together with small needle nose pliers and pulling out (Figure 37).

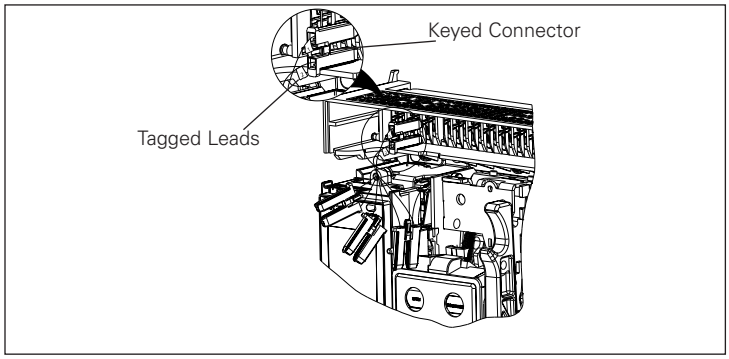


Figure 36. Leads and Connectors.

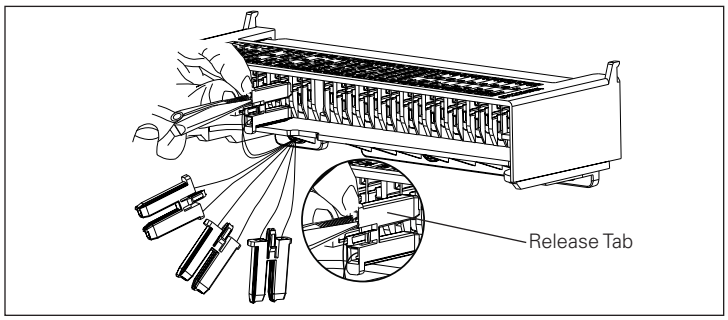


Figure 37. Connector Plug Removal.

Fixed Breaker Connections

Proceed with the following five steps:

Step 1: Become familiar with the fixed terminal block DIN rail type mounting plate where secondary connections are made.

Note: Secondary connection points have numerical and descriptive laser-etched identifications.

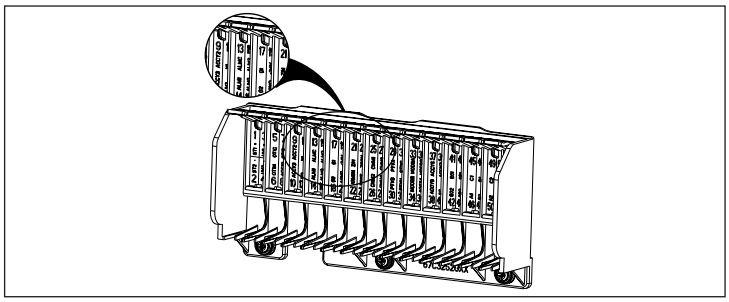


Figure 38. Step 1.

Step 2: Plug accessory connector plug into fixed secondary terminal block.

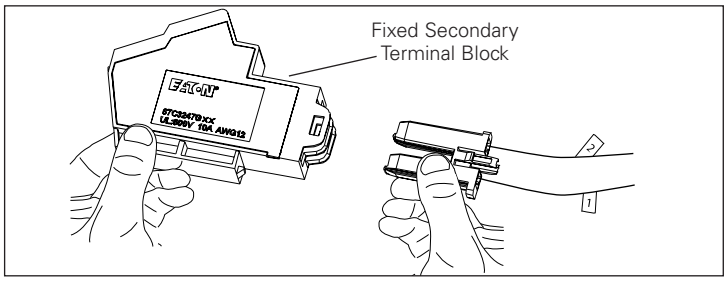


Figure 39. Step 2.

Step 3: Identify correct mounting location on fixed terminal block mounting plate for mounting fixed secondary terminal block. First insert the bottom end of the fixed secondary terminal block into the proper location on the DIN rail type mounting plate.

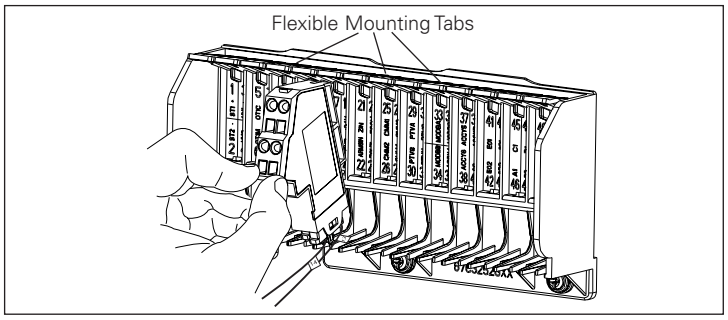


Figure 40. Step 3.

Step 4: Rotate the top end of the terminal block in until it engages the appropriate flexible mounting tab at the top of the mounting plate with a clicking sound.

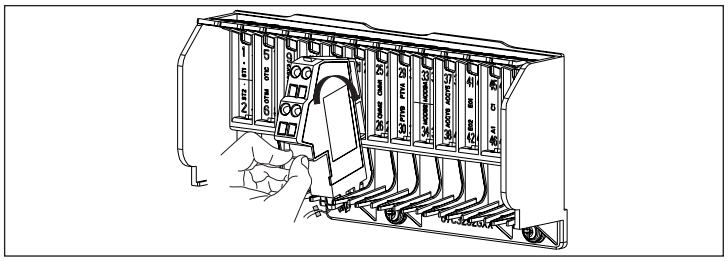


Figure 41. Step 4.

⚠ IMPORTANT

TO REMOVE RIGHT AND LEFT ACCESSORY TRAYS OR ANY OTHER ELECTRICAL ACCESSORY, THE APPROPRIATE ACCESSORY CONNECTOR PLUG MUST FIRST BE DISCONNECTED.

Step 5: To remove an accessory plug on a fixed circuit breaker, the appropriate fixed secondary terminal block must first be removed. To remove a fixed secondary terminal block, lift up on the small flexible mounting tab at the top of the fixed terminal block mounting plate, and rotate the terminal block out in the opposite direction shown in Step 4. Once the terminal block is removed, the accessory connector plug can be unplugged from the bottom of the terminal block. Refer to Item 2 and Figure 37 under the heading "General Information" in this section for detailed assistance with the removal.

Drawout Breaker Connections

Proceed with the following three steps:

Step 1: Become familiar with the drawout secondary plug housing where secondary connections are made.

Note: Secondary connection points have numerical and descriptive laser-etched identifications on top of the housing directly matching the plug-in locations below.

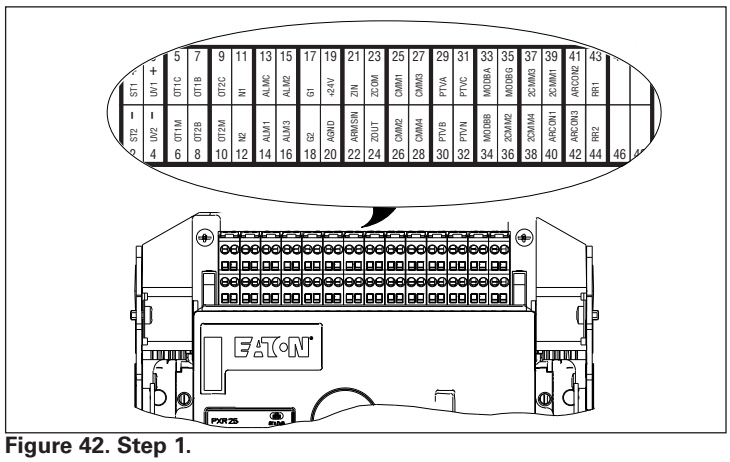


Figure 42. Step 1.

Step 2: Plug accessory connector plug into position in the secondary plug housing matching the laser-etched identification on top of the housing.

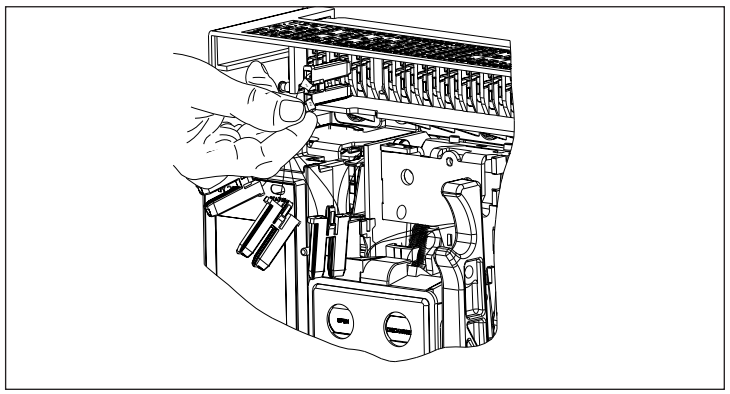


Figure 43. Step 2.

⚠ IMPORTANT

TO REMOVE RIGHT AND LEFT ACCESSORY TRAYS OR ANY OTHER ELECTRICAL ACCESSORY, THE APPROPRIATE ACCESSORY CONNECTOR PLUG MUST FIRST BE DISCONNECTED.

Step 3: To remove an accessory connector plug on a drawout circuit breaker, unplug it from its secondary plug housing. Refer to Item 2 and Figure 37 under the heading "General Information" in this section for detailed assistance with the removal.

Section 7: UVR and ST Testing

Before performing any test activities, lever a drawout circuit breaker to the Test position. For fixed type circuit breakers, make sure primary circuits are de-energized.

Undervoltage Release Testing

1. Charge the breaker using the manual handle. With no voltage applied to the UVR, attempt to close the circuit breaker using the manual pushbutton. Verify that the breaker does not toggle to the Closed position.
2. Apply rated voltage to the UVR as shown in Table 2. Ensure the breaker is in the Charged position, then close the breaker using the manual pushbutton. Verify that the breaker is in the Closed position.
3. Remove voltage from the UVR and verify that the breaker toggles to the Open position.

Shunt Trip Testing

1. Charge the breaker using the manual handle. With no voltage applied to the shunt trip, close the circuit breaker using the manual pushbutton. Verify that the breaker toggles to the Closed position.
2. Apply rated voltage to the shunt trip as shown in Table 1. Verify that the breaker toggles to the Open position.

OTS Testing

1. Remove the Accessory Tray and verify continuity between leads 5 and 6 for OT1 and continuity between leads 9 and 10 for OT2.
2. Reinstall the Accessory Tray and ensure the Trip Indicator is depressed. Then verify continuity between leads 5 and 7 for OT1 and continuity between leads 8 and 9 for OT2.

OR, if an Eaton approved Trip Unit Tester is available, perform the following steps with the Accessory Tray installed in the circuit breaker.

1. Ensure the Trip Indicator is depressed and verify continuity between leads 5 and 7 for OT1 and continuity between leads 8 and 9 for OT2.
2. Trip the breaker using the Trip Unit Tester.
3. The Trip Indicator will extend from the breaker.
4. Verify continuity between leads 5 and 7 for OT1 and continuity between leads 8 and 9 for OT2.
5. Depress the Trip Indicator.

Notes:

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