Three-way cable interlock kit for Magnum drawout circuit breakers (Type 32 interlock)

⚠️ 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
- COVERING OR PROVIDING BARRIERS TO ADJACENT LIVE PARTS
DISCONNECT THE EQUIPMENT FROM THE SUPPLY.
USE ONLY AUTHORIZED SPARE PARTS IN THE REPAIR OF EQUIPMENT. THE SPECIFIED MAINTENANCE INTERVALS AS WELL AS THE INSTRUCTIONS FOR REPAIR AND EXCHANGE MUST BE STRICTLY ADHERED TO IN ORDER TO PREVENT INJURY TO PERSONNEL AND DAMAGE TO THE SWITCHBOARD.

Section 1: General information
These instructions deal with the installation and operation of the Magnum three-way mechanical cable interlock (type 32). This mechanical interlock allows any two breakers to close while holding the third in the open (tripped) position. A lever assembly is mounted on each breaker that interfaces with the pole shaft and the tripper bar. The lever assemblies are interconnected with cables. Cable can be used for any orientation of the breakers, and are available in 5, 6, 8, and 10-foot lengths (1.5; 1.8; 2.4; and 3.0 m). Individual cable kits are ordered separately.

Required tools
- 10 mm socket and 1/4-inch drive socket
- 10 mm open end wrench
- 11/16-inch open end wrench
- 3/8-inch open end wrench (2)
- 0.5 mm feeler gauge
- 4 mm Allen wrench
- Drive extension
- Pliers

Kit parts identification
Refer to Figure 1 and Figure 2 for visual identification of the parts listed below:

Kit 1 (2A11857G05, shown in Figure 1): Interlock Assembly Kit
(A) M6 x 12 mm hex bolt (nine)
(B) M6 x 25 mm flat-head screw (three)
(C) M6 lock washer (nine)
(D) M6 x 16 mm hex bolt (six)
(E) Drive arm (three)
(F) Interlock assembly (three)
(G) Grease tube (one)

Note: Three sets of kit 2A11858G01, G02, G03, or G04 (six cables total) are required for this installation.

Note: Part (D) is not used for this installation.
Section 2: Installation of three-way cable interlock

Proceed with the following 12 steps:

Step 1: Remove the front cover by unscrewing the hex-head captive bolts (four for three-pole, six for four-pole) that join the cover to the breaker housing using a 10 mm 1/4-inch drive socket. Then hold the charge handle down approximately 45 degrees to pull off the cover.
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Step 4: Reinstall front cover (removed in Step 1). Perform Steps 1 to 4 for each breaker.

Step 5: Fasten the interlock assembly (F) to the drawout cassette’s right-side sheet as shown, using three M6 x 12 mm hex bolts (A) and lock washers (C). Torque to 40–50 in-lbs (4.5–5.6 Nm).

Step 6: Fasten the cable bracket (H) to the drawout cassette’s right-side sheet (below the interlock assembly installed in Step 5) as shown, using two M6 x 10 mm thread-forming screws (I). Torque to 65 – 85 in-lbs (7.3 – 9.6 Nm). Perform Steps 5 to 6 for each breaker.

Check 2:

- With the breaker OPEN and CONNECTED, observe the position of the DRIVE (LOWER) LEVER. There should be a 0 – 4 mm gap between the lower right-hand corner of the drive lever and the mounting bracket flange (see Figure 8 Breaker OPEN).
- Now CHARGE and CLOSE the breaker. The drive lever should rotate approximately 60 degrees counterclockwise. There should be a 1 – 7 mm gap between the lower left-hand corner of the lever and the interlock assembly flange (see Figure 8 Breaker CLOSED).
- If either of these gaps is out of specification, DO NOT CONTINUE THE INSTALLATION. Consult Eaton for additional instructions. To reach an EatonCare representative, call (877) 386-2273.
- Perform this check for each breaker.

Step 7: Check the functionality of the interlock assemblies by performing the following two checks. Refer to Figure 8:

Check 1:

- Fully insert the breaker into its cassette to the CONNECTED position.
- Make sure the drive arm (E) and the interlock assembly’s inner trip arm pass clearance. The teardrop-shaped follower arm of the interlock assembly should engage with the pin on the drive arm. The inner trip arm of the interlock assembly should engage with the tripper bar of the breaker.

Step 8: This step will prepare the cables before they are attached to the interlock assembly. Check to be sure that all cables move freely in their cable housing. Each cable should have a long rod end and a short rod end. To perform the cable prep:

1. Remove the upper lock nut and spacer tube from both rod ends.
2. Remove the compression spring from the short rod.
3. Two loose nuts should be positioned on the threads of each rod. Shoulder the lower nut against the rod threads until the nut stops. Using two 3/8” wrenches, tighten the upper nut against the lower nut (see Figure 10).

Repeat the above process on both long and short rods on any given cable.
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Step 9: This step describes how to route the cables between breakers. Each breaker should be in the OPEN and DISCHARGED position. When routing cables, adhere to the following recommendations:

- 4 inch (102 mm) minimum allowable cable housing bend radius and minimal number of total bends
- Use plastic wire ties/clamps to attach cable housing to the structure after installation and adjustment
- Do not compress cable housing
- Recheck to ensure cables move freely

Refer to Table 1 and Figure 11 for installation details.

Table 1. Cable Routing

<table>
<thead>
<tr>
<th>From Cassette/Fitting</th>
<th>To Cassette/Fitting</th>
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<tbody>
<tr>
<td>1A</td>
<td>3D</td>
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<tr>
<td>1C</td>
<td>2B</td>
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<td>3A</td>
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<td>3C</td>
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Step 10: This step describes how to attach the cables to the interlock assemblies. Each breaker needs two long rods and two short rods attached. The short (drive) rods will be attached first.

1. Slide the rubber boot toward the tip of the rod.
2. Unthread the outer bulkhead nut and slide the nut and lock washer upwards.
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3. Slide the smaller diameter portion of bulkhead fitting in to the slot on the cable bracket (see Figure 12).
4. Raise cable assembly until threads of the bulkhead fitting show above the slotted hole in the bracket (See Figure 12).
5. Insert threaded end of rod into its swivel fitting.
6. Bring the bulkhead washer and nut down to the threads and hand-tighten.
7. Adjust the two bulkhead nuts to approximately center the fitting on the slot and hand-tighten.
8. Replace the rubber boot over end of fitting.
9. If short rod is in Position A (see Figure 11):
   a. Lower threaded rod tip back through swivel.
   b. Replace spacer tube and compression spring on rod end before sliding the rod tip through the swivel fitting of the lower lever. To aid in sliding the rod tip, grip the nuts that were tightened in Step 8.
10. If short rod is in Position C (see Figure 11):
    a. Replace spacer tube on rod end.
    b. Replace compression spring on rod end.
    c. Manually compress the compression spring to replace the lock nut.
11. Replace the lock nut on the rod end.
12. Hold the nuts that were tightened in Step 8 and use a 3/8-inch socket or a 3/8-inch open-ended wrench to tighten the lock nut until it touches the spacer tube. Torque to 30-40 in-lbs (3.3-4.5 Nm).

Next, the long (driven) rods will be attached. The long rods are attached in the same way as the short rods except they do not use compression springs.

Repeat the above processes for all cable ends. At the end of cable installation, the breakers should still be in the OPEN position.

Figure 12. Step 10

Figure 13. Step 10 - Short Rod Assembly (Position C)

Figure 14. Step 10 - Long Rod Assembly (Position B)

Figure 15. Step 10

Step 11: This step describes how to adjust the cables. The initial adjustments are made with all breakers OPEN. The bulkhead nuts for each cable should be set so that the threaded bulkhead fitting is approximately centered on the cable bracket slot. Initial adjustments will be performed on the driven (long) rods.
   • Check the upper lever on each interlock assembly. There should be about a 1 mm gap between the top of the center slot in the lever and the top of the upper roller.
Step 11:
- If adjustment is needed, use the bulkhead nuts to appropriately adjust the cable housing.
  - **Too much clearance**: adjust both bulkhead nuts to retract cable housing
  - **No clearance**: advance cable housing in a similar manner
  - **For additional adjustment length**: use bulkhead nuts on other end of cable

At the end of adjustment, adjust the rods using the upper cable nuts (tightened in Step 8) so that all upper levers are in the position demonstrated in **Figure 16**. Check the function of the mechanical interlock assembly according to the functional tests in the **Step 12**. Review **Steps 3 – 12** and keep adjusting the interlock assembly until it functions correctly.

**Note**: If experiencing difficulty or operating in a confined space, consider using an 11/16-inch flare nut crowfoot wrench drive to perform adjustments.

**Step 12**: Perform the following functional tests and verify that the assembly conforms to all states in **Table 2**:

1. Open all breakers.
2. Charge and close Breaker A. Breakers B and C should not be held in the OPEN condition. Open Breaker A.
3. Charge and close Breaker B. Breakers A and C should not be held in the OPEN condition. Open Breaker B.
4. Charge and close Breaker C. Breakers A and B should not be held in the OPEN condition. Open Breaker C.
5. Charge and close Breakers A and B. Breaker C should be held in the OPEN condition and not respond to a CLOSE attempt (no noise, no contact motion, no spring discharge). Open Breakers A and B.
6. Charge and close Breakers B and C. Breaker A should be held in the OPEN condition and not respond to a CLOSE attempt (no noise, no contact motion, no spring discharge). Open Breakers B and C.
7. Charge and close Breakers A and C. Breaker B should be held in the OPEN condition and not respond to a CLOSE attempt (no noise, no contact motion, no spring discharge). Open Breakers A and C.
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Table 2. Step 12 Logic

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<thead>
<tr>
<th></th>
<th>A</th>
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The mechanical interlock is now appropriately installed and adjusted.

To ensure safety, secure the bulkhead nuts and upper cable nuts in
proper position by applying sealing wax.

If some interlock parts are sticky, use a light amount of the lubricant
grease (G) to reduce the friction. This is ONLY recommended if
needed.
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