Three-way cable interlock for Magnum fixed circuit breaker (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. 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.

Section 1: General information

A family of mechanical interlocks is available to interlock the closing of two or three Magnum® circuit breakers. The mechanical interlock holds one or more circuit breakers tripped (prevents closure) when others are closed. 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. Cables can be used for any orientation of the breakers.

Required tools

- 10 mm socket and 1/4 in drive socket
- 10 mm open-end wrench
- 11/16 in open-end wrench
- 3/8 in open-end wrench
- 0.5 mm feeler gauge
- 4 mm Allen® wrench
- Drive extension

Kit parts identification

Refer to Figure 1 and Figure 2 for a visual identification of the parts listed below for the different kits.

Kit 1 (Figure 1): Interlock kit parts to mount to breaker. Does not include the cable.
(A) M6 x 12 mm hex bolt (12)
(B) M6 x 25 mm flat-head screw (3)
(C) M6 lock washer (18)
(D) M6 x 20 mm hex bolt (6)
(E) Drive arm (3)
(F) M6 square nut (9)
(G) Interlock assembly (3)
(H) Grease tube (1)
(I) M6 fender washer (9)
(J) Mounting plate (3)

Figure 1. Contents of Kit 2A11857G06
Kit 2 (Figure 2): Interconnecting kit. Includes cables.
(K) Cable bracket (2)
(L) M6 lock washer (4)
(M) M6 x 10 mm thread-forming screws (4)
(N) Cable assembly (2) (in 5 ft, 6 ft, 8 ft, and 10 ft lengths)

Note: Three sets of kits (six cables) are required to connect three breakers so that any two of the three breakers can be closed at once. Closing two breakers holds the third one tripped. Refer to Table 1 on Page 4.

Figure 2. Contents of Kit 2A11858G01–04

Section 2: Installation of two-way cable interlock

Proceed with the following 11 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 in drive socket. Then hold the charge handle down approximately 45 degrees to pull off the cover.

Figure 3. Step 1

Step 2: Remove the knockout from the right side of the front cover using pliers to break out the U-shaped tab. Carefully file any excess material from broken edge.

Figure 4. Step 2

Step 3: Install the drive arm (E) to the right end of the pole shaft with the drive arm lever extending downward as shown. Use an M6 x 25 mm flat-head screw (B) to make the connection and torque to 65 in-lb to 85 in-lb (7.3 Nm to 9.6 Nm).

Figure 5. Step 3
Step 4: Reinstall front cover removed in Step 1.

Step 5: Attach the interlock assemblies (G) and cable brackets (K) to the mounting plates (J). The interlock assembly is attached to the mounting plate using three M6 x 12 hex bolts (A) and lock washers (C). Torque to 40 in-lb to 50 in-lb (4.5 Nm to 5.6 Nm). Fasten the cable brackets to the mounting plates using two M6 x 10 thread-forming screws (M) and lock washers (L). Torque to 65 in-lb to 85 in-lb (7 Nm to 9 Nm).

Step 6: Attach the interlock assemblies from Step 5 to the right side of the breakers. Start by removing the M6 hex bolt, nut, lock washer, and grounding (earthing) wire installed in the lower front corner of the mounting foot. This bolt assembly will be reinstalled through the adapter plate near the end of this step.

Slide an M6 square nut (F) into the slot in the upper rear part of the case with the flat face toward the outside. The nut may have to be tapped to fully seat it into the slot. Install an M6 x 20 hex bolt (D), lock washer (C), and flat spacer washer (I) into the square nut a few turns. Locate another captive square nut into a slot in the upper part of the case, forward of the square nut just installed. Install another M6 x 20 hex bolt, lock washer, and spacer washer combination in this square nut. Slide the spacer washers fully against the case and the lock washers fully against the heads of the bolts. This creates a space into which the open slots in the top of the mounting plate will slide.

Now insert the mounting bracket slots onto the upper bolts and rotate the bracket down against the side of the breaker. Make sure that the drive paddle slides in behind the wireform tripper bar, and the follower arm slides in behind the drive arm pin.

Reinstall the lower front bolt assembly (removed earlier), making sure to reconnect the ground (earthing) wire. Tighten the upper bolts to stabilize the plate. Now insert an M6 x 12 hex bolt and M6 lock washer through the rear plate and mounting foot, retaining it with square nut on the inside of the mounting foot. Torque to 65 in-lb to 85 in-lb (7 Nm to 9 Nm).

Check the interference of the lever assembly to the breaker to ensure that flapper arm is behind tripper bar, and follower is BEHIND drive arm pin. If not, remove adapter plate and reinstall properly. Check clearances between end of drive arm and end of follower (1 mm to 4 mm). The tip of the pin on the end of the drive arm should protrude slightly beyond the follower. If this condition is not observed, it may be necessary to adjust the position of the mounting bracket relative to the breaker using upper spacer washers.

Step 7: At this point in the process, check the functioning of the lever assemblies of each breaker by performing the three following checks in conjunction with provided graphics:

Check 1: With the breaker OPEN and CONNECTED, observe the position of the lower drive lever on each breaker. The gap between the lower right-hand corner of the drive lever and the mounting bracket flange should be from 0 mm to 2 mm (see Figure 8 Breaker OPEN). Now CLOSE the breaker. The drive lever should rotate 60 degrees counterclockwise. There should be a minimum gap of 1 mm and a maximum gap of 4 mm between the lower left-hand corner of the lever and the mounting bracket flange (see Figure 8 Breaker CLOSED). If either of these gaps are out of specification, the installation should not continue. Consult Eaton for additional instructions.

Figure 6. Step 5

Figure 7. Step 6

Figure 8. Step 7
**Step 8:** This step describes how to route the cables. Before installing the cables, however, check to be sure that all cables move freely in their cable housing. Route the cables between cassettes in such a fashion that there are no sharp bends in the cable housing and the total number of bends are minimized. The minimum allowable cable housing bend radius is 4 in (102 mm). After completing the installation and adjustment of the cables, attach the cable housing to the structure at a suitable number of points along the cable run, being careful not to compress the cable housing. The use of plastic wire clamps or wire ties will minimize the likelihood of binding the cables. After the cables are installed, recheck to be sure that the cables still move freely. Refer to Table 1 and Figure 9 for installation details.

**Table 1. Step 8 Cable Routing**

<table>
<thead>
<tr>
<th>Type 32 (Six Cables)</th>
<th>From Cassette/Fitting</th>
<th>To Breaker/Fitting</th>
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<td>1A</td>
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**Figure 9. Step 8**
Step 9: This step describes how to attach the cables to the interlock assembly and illustrates the attachment of the driven (long rod) end of the cable. Remove nut and spacer tube from the end of the rod. Slide the rubber boot toward the tip of the rod. Unthread the outer bulkhead nut and slide the nut and lock washer toward the tip. Insert the threaded end of the rod into the swivel fitting while simultaneously sliding the smaller diameter portion of the bulkhead fitting into the slot in the mounting plate. Raise the cable assembly until the threaded portion of the bulkhead fitting enters the slotted hole and fasten the bulkhead washer and nut finger tight. Adjust the two bulkhead nuts so that the fitting is approximately centered on the cable mounting bracket and hand tighten the nuts. Slide the rubber boot back into place over the end of the bulkhead fitting. Replace the tube spacer and upper nut on the rod end. The lower nuts should be shouldered against the end of the thread and the upper nuts tightened against the spacer tube. While holding the lower nuts, torque to 30 in-lb to 40 in-lb (3.3 Nm to 4.5 Nm). Repeat this process to attach the other end of the cables to the other breaker interlock assembly. See Figure 9 for number and mounting position of cables.

The only difference is that the drive (short) rod uses a compression spring. Locate compression spring for Position A below the swivel fitting. The compression spring for the Position C must be located above the swivel fitting (see Figure 10). Therefore, the spring for Position C must be removed before installation and replaced as shown before the installation of the upper rod nut.

Note: Hold the cable rod with pliers while removing and installing the nuts to prevent the cable from rotating.

Figure 10. Step 9
Step 10 This step describes how to adjust the cables (see Figure 10 and Figure 11 for details). The initial adjustments are made with all breakers OPEN. The bulkhead nuts for each cable should be set so that they are approximately midway on the threaded bulkhead fitting (see Figure 10). The bulkhead nuts should not be moved anymore. Check if all endplates are in the horizontal position and if there is a 1 mm gap as shown in Figure 11 A. To adjust the endplates correctly, use the upper cable nuts above the spacer tube. Check the function of the mechanical interlock assembly according to the logic table (Table 2) on Page 7. Further adjustments (if necessary) can be done by using the bulkhead nuts. Adjust the upper cable nuts again so that all endplates are in the horizontal position. Check the function of the mechanical interlock assembly again according to the logic table (Table 2) on Page 7. Keep adjusting the interlock assembly until it functions correctly. Once the adjustment is completed, the bulkhead nuts and the upper cable nuts can be secured to ensure safety by applying sealing wax.
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Step 11: Test of a six-cable interlock assembly (Type 32):

1. Open all breakers.
2. Charge and close Breaker A. Breakers B and C should be held in the OPEN condition. Open Breaker A.
3. Charge and close Breaker B. Breakers A and C should be held in the OPEN condition. Open Breaker B.
4. Charge and close Breaker C. Breakers A and B should 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. Open Breakers A and B.
6. Charge and close Breakers B and C. Breaker A should be held in the OPEN condition. Open Breakers B and C.
7. Charge and close Breakers A and C. Breaker B should be held in the OPEN condition. Open Breakers A and C.

Table 2. Step 11 Logic

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