Installation and Removal Instructions for Series NRX Drawout Breaker Three-Way Cable Interlock Kit

Instructions apply to:

Series NRX, Type NF Frame
ANSI, UL1066, UL489 / IEC, IZMX16, IZM91

⚠️ 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
– COVER OR PROVIDING BARRIERS TO ADJACENT LIVE PARTS

DISCONNECT THE EQUIPMENT FROM THE SUPPLY. USE ONLY AUTHORIZED SPARE PARTS IN THE REPAIR OF THE EQUIPMENT. THE 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.
Section 1: General information

The mechanical interlock holds one or more of the breakers tripped (prevents closure) when one or more of the others is closed. A lever assembly is mounted on each breaker and interfaces with the pole shaft and tripper bar. The lever assemblies are interconnected with cables. Cables 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 drive socket
• 11/16-inch open-end wrench
• 3/8-inch open-end wrench
• 3/8-inch socket drive socket
• 4 mm feeler gauge
• 2 mm Allen wrench
• Drive extension
• Adjustable wrench

Kit Parts identification

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

(A) M6 x 12 mm hex bolt (9)
(B) Lock washer (9)
(C) M3 x 8 mm flat-head screw (6)
(D) Drive arm (3)
(Ea) Interlock assembly - Types 31 or 33 (3)
(Eb) Interlock assembly - Type 32 (3)
(F) Trip pin (3)
(G) Grease tube (1)
(H) Cable bracket - Type 31 (8) or Types 32 and 33 (12)
(I) M6 x 10 mm thread-forming screws - Type 31 (8) or Types 32 and 33 (12)
(J) Cable assembly - Type 31 (4) or Types 32 and 33 (6) – 5, 6, 8 and 10-foot lengths (1.5; 1, 8; 2.4 and 3.0m)

Figure 1. Kit Contents

Section 2: Installation of three-way cable interlock

Proceed with the following 9 steps:

Step 1: Install drive arm (D) to the end of the pole shaft using an M3 x 8 mm flat-head screw (C). The drive arm should be oriented as shown. Torque to 3-5 in-lbs (0,3 - 0,6 Nm).
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Step 2: Install trip pin (F) to the trip arm using an M3 x 8mm flat-head screw (C). Use a wrench to hold the trip lever during installation as shown. Torque to 3-5 in-lbs (0,3 - 0,6 Nm).

Figure 2. Steps 1 and 2

Step 3: Fasten interlock assembly (Ea or Eb) to drawout cassette’s right-side sheet using three M6 x 12mm hex bolts (A) and lock washers (B). Torque to 40 – 50 in-lbs (4,5 – 5,6 Nm).

Figure 3. Steps 1 and 2

Step 4: For Type 32 and 33 interlock kits, fasten four cable brackets (H) to the drawout cassette’s right-side sheet just below the interlock assembly mounted in Step 3 using four M6 x 10mm thread forming screws (I). Torque to 65-85 in-lbs (7,3 - 9,36 Nm). (Refer to Figure 7 for the correct configuration of Type 31 interlock kits).

Figure 4. Step 3

Figure 5. Step 4
**Step 5:** This step offers cable routing and installation procedures. Make sure that cables move freely in their cable housings before installation.

**ATTENTION**

**FIGURE 6 SHOWS THE TYPICAL CABLE ROUTING FOR BOTH TYPES 32 AND 33 INTERLOCKS AND FIGURE 7 SHOWS THE TYPICAL ROUTING FOR TYPE 31. THE CABLE MOUNTING ON THE DRIVE SIDE IS THE SAME FOR ALL TYPES. MOUNTING FOR THE DRIVEN SIDE OF TYPES 31 AND 33 IS SHOWN IN FIGURES 12-14. MOUNTING FOR THE DRIVEN SIDE OF TYPE 32 IS SHOWN IN FIGURES 15-18.**

**Installation recommendations:**
- 4 inch (102mm) minimum allowable cable housing bend radius
- Use plastic wire ties/clamps to attach cable housing to structure after installation and adjustment
- Do not compress cable housing
- Recheck to ensure cables move freely

**Figure 6. Step 5**

**Step 6:** This step describes how to first attach the drive (short rod) end of a cable to its interlock assembly and cable bracket. See Figures 8 to 12 for details:

1. Remove small nut, compression spring and spacer tube from end of rod.
2. Slide rubber boot toward tip of rod.
3. Unthread outer bulkhead nut and slide nut and lock washer toward tip.
4. Insert threaded end of rod into swivel fitting.
5. Slide smaller diameter portion of bulkhead fitting into cable bracket slot (see Figure 9).
6. Raise cable assembly until threaded portion of bulkhead fitting enters slotted hole in cable bracket (threads show above bracket).
7. Bring bulkhead washer and nut down to threads and hand tighten.
8. Adjust two bulkhead nuts to approximately center bulk head fitting on cable mounting bracket.
9. Hand tighten bulkhead nuts only at this time.
10. Slide rubber boot back into place over end of bulkhead fitting.
11. Replace spacer tube, compression spring and small nut on end of rod.
12. Lower nuts should be shouldered against end of thread and upper nut tightened against spacer tube (see Figure 11).
13. Hold lower nuts and torque upper nut to 30 – 40 in-lbs (3.3 – 4.5 Nm).
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Figure 8. Step 6

Figure 9. Step 6 - Cable Assembly (Details)

Figure 10. Step 6 - Mounting Cable Assembly in Cable Bracket

Figure 11. Step 6

Step 7: This step describes how to attach the driven (long rod) end of a cable to its interlock assembly and cable bracket on another breaker. This is accomplished by repeating Step 6, except the driven end does not utilize a compression spring between the swivel and outer nut. Install the second cable.

Figure 12. Step 7
**Step 7:** This step describes how to adjust **Types 31 and 33** cables. Cable adjustments are made with the large bulkhead nuts only. Smaller nuts on the rod ends should not be moved. Adjustments are made with all breakers OPEN.

Ensure all bulkhead fittings are still approximately centered on the cable mounting bracket, allowing for adjustment room in either direction. Repeat Items 8 and 9 of Step 6 if any bulkhead fitting requires centering.

Perform initial adjustments on driven (long rod) end of cable (refer to Figure 13). There should be 4-5 mm clearance between upper rod nut and face of swivel on which it pulls (refer to Figure 14).

- **Too much clearance** – adjust both bulkhead nuts to retract cable housing.
- **No clearance** – advance cable housing in a similar manner.
- **For additional adjustment length** – bulkhead nuts on other end of cable can be used.

Torque cable bulkhead nuts on both ends to 100 -120 in-lbs (11 – 13 Nm) when proper clearance is attained on driven end.

**Step 8:** This step describes how to adjust **Type 32** cables. Cable adjustments are made with the large bulkhead nuts only. Smaller nuts on the rod ends should not be moved. Adjustments are made to the connected breakers in various OPEN and CLOSED conditions. Refer to Figures 15-18.

Ensure all bulkhead fittings are still approximately centered on the cable mounting brackets, allowing for adjustment room in either direction. Repeat Items 8 and 9 of Step 6 if any bulkhead fittings requires centering.

Perform initial adjustments on driven (long rod) end of cable (refer to Figure 13). As adjustments are made with the connected breakers in different states of OPEN and CLOSED, make certain that gaps between the swivel fittings and the nuts are as indicated in the applicable figure (Figures 15-18). In addition, the lever plate should not rotate except when the connected breakers are CLOSED. In that case, the lever plate will rotate approximately 60 degrees clockwise.

Torque cable bulkhead nuts on both ends to 100 – 120 in-lbs (11 - 13 Nm) when proper clearance is attained on driven end.
Section 3: Functional Test of Interlock Assembly

**Type 33** – Six-cable interlock assembly test. Refer to Table 1 for logic details.

1. CHARGE and CLOSE Breaker A – Breakers B and C should not be held in OPEN condition. Charge Breakers B and C and attempt to CLOSE them - they should not respond to the CLOSE attempt. OPEN Breaker A – the interlock should release

2. CLOSE Breaker B – verify it closes with the OPEN/CLOSED indicator. Breakers A and C should be held in OPEN condition. Charge Breakers A and C and attempt to CLOSE them - they should not respond to the CLOSE attempt. OPEN Breaker B – the interlock should release

3. CLOSE Breaker C – verify it closes with the OPEN/CLOSED indicator. Breakers A and B should be held in OPEN condition. Charge Breakers A and B and attempt to CLOSE them - they should not respond to the CLOSE attempt. OPEN Breaker C – the interlock should release

**Type 31** – Four-cable interlock assembly test. Refer to Table 1 for logic details

1. CLOSE Breaker A. Attempt to CLOSE Breaker B – it should not respond to the CLOSE attempt

2. CLOSE Breaker C – verify Breaker A remains CLOSED. Again verify Breaker B will not respond to CLOSE attempt

3. OPEN Breaker A – verify Breaker B will not respond to CLOSE attempt

4. OPEN Breaker C – all breakers are now OPEN. CLOSE Breaker B – verify Breakers A and C will not respond to CLOSE attempt

The mechanical interlocks are now properly installed with the successful completion of the appropriate tests. Utilize a light amount of the supplied lubricant grease (G) if any interlock parts are sticky. This is only recommended if needed.

**Table 1. Types 33 and 31 Logic**

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**Table 2. Types 32 Logic**

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