Load Break Switch
Type LBOR-II, Oil Immersed
PTAT-LIR975
IZUA 5321-100

Technical Guide
Nut Mount
Weld Mount
General Description

The ABB Type “LBOR-II” switch is a manually operated, two position, load make or break, oil immersed rotary switch. The LBOR-II switch is designed for use with distribution transformers (pad mounted or submersible) and self contained distribution switchgear. The LBOR-II switch is designed to provide high reliability, strength, and operating current performance.

Features & Advantage

High Momentary Current

The LBOR-II switch is capable of momentarily withstanding or closing-in on symmetrical currents as great as 16kA. The contacts are designed to utilize the magnetic effects of these high currents to minimize the required operating force and the amount of contact wear per operation. The contacts are made from an arc weld resistant, copper tungsten alloy, and are silver plated for lower resistance. See TD 44-814 for further information on both current and voltage withstand testing.

Weld-In Mounting System

Installed with an ‘A’ frame mounting bracket, the weld-in mounting system is a time proven method for secure mounting of the LBOR switch. The switch is supported by a stainless steel mounting boss on top of an ‘A’ frame that is welded to the tank wall. The switch is then bolted to the ‘A’ frame and the internal seals and switch handle are installed. This provides a stout, reliable system for mounting and sealing the LBOR switch.

Nut Mounting System

Installed with a retained gasket and single mounting nut, the LBOR-II switch with the nut mounting system allows for quick mounting in both OEM and replacement installations. The main boss assembly of the switch is inserted through the hole in the tank wall and secured with the mounting nut. The handle is then bolted to the external shaft assembly. The cantilever feet on top of the upper frame is designed to support the switch without the use of a welded boss or mounting studs, allowing both quick installation and reduced installation cost.

Unitized Shaft

The unitized shaft assembly ensures accurate and positive contact alignment on all decks and eliminates backlash between opening and closing operations. The rotor is fabricated from a filament wound glass epoxy tube which combines high strength with very good arc and track resistance.

High Temperature Insulating Materials

All of the LBOR’s insulating materials are made from high temperature, arc and track resistant, glass reinforced, thermoset resins. These types of materials have demonstrated, by their many years of field use, that they can withstand the high temperatures and operating forces that the switch will experience over the life of the transformer.
Corrosion Resistance
The LBOR switch has been designed for superior corrosion resistance when exposed to normal environmental conditions. The weld design uses a tin plated brass handle, stainless steel handle hardware, stainless steel mounting boss and operating shaft, an exterior Nitrile® seal and an internal silicon shaft seal. The nut mount design uses an aluminum operating handle, stainless steel handle hardware, yellow chromate sealer over zinc plated carbon steel for the mounting boss, nut and operating shaft, and a stainless steel retaining clip. The two internal operating shaft seals are made from Viton® while the mounting boss’ retained gasket is made from a high temperature Nitrile® elastomer.

Interlock Handle (optional)
An optional padlock / interlock handle may be ordered to replace the standard handle on either mounting design of the LBOR-II switch. Each of the interlock handles is designed for applications where a padlock or mechanical interlock with other devices is deemed appropriate. The weld mount’s interlock handle is made from tin plated brass and the nut mount’s interlock handle is cast aluminum. See Accessories section for ordering information.

Design Tests
The LBOR-II was submitted to a battery of design tests and meets or exceeds the requirements of ANSI standard C37.71 and IEC 265-1 (for details see TD 44-814) including:
• Verification of the switch’s load current rating.
• Verification of the ability to close into and interrupt magnetizing current.
• Verification of the switch’s ability to withstand high current surges.
• Verification of the switch’s ability to make a faulted circuit following any adverse conditions caused by switching operations.
• One second test to verify the switch’s ability to further withstand high current surges.
• 60 Hz withstand test and an impulse withstand tests
• Mechanical life test.

Production tests
In addition to the design testing, the following routine production tests are done to insure compliance to requirements:
• Dimension check to verify that all critical ANSI/IEEE dimensions are met. (audit test)
• Opening and closing speed test to verify proper mechanical function of the LBOR-II switch(audit test)
• Contact Alignment and contact pressure tests to verify proper contact force and position. (audit test)
• 3 cycle operation test to verify proper mechanical function. (all switches)
Table 1: Ordering Information for LBOR-II Switches

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<tr>
<th>BIL</th>
<th>kV 1</th>
<th>Amperes</th>
<th>Phase</th>
<th># of Decks</th>
<th>Switch Mounting</th>
<th>Hz</th>
<th>Tested per Standards2</th>
<th>Weld-In Style Number</th>
<th>Nut-Mounted Style Number</th>
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<tbody>
<tr>
<td>95</td>
<td>8.9</td>
<td>300</td>
<td>1</td>
<td>1</td>
<td>Wall</td>
<td>60</td>
<td>ANSI &amp; IEC</td>
<td>272D914G11</td>
<td>L095NC3001</td>
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<td>95</td>
<td>8.9</td>
<td>300</td>
<td>1</td>
<td>2</td>
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<td>60</td>
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<td>Wall</td>
<td>60</td>
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<td>ANSI &amp; IEC</td>
<td>272D923G13</td>
<td>L150NC4003</td>
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</tbody>
</table>

1 Single Phase Voltage: Line to Ground  
Three Phase Voltage: Line to Line

2 ANSI C37.71 - See TD 44-814, part I  
IEC 265-1 - See TD 44-814, part II

3 Magnetizing Interrupting Current Tested at 27 kV Line-to-Line, See TD 44-814 for further clarification

Ordering Information

LBOR switch ratings and ordering information may be found in Table 1: Ordering Information for LBOR-II Switches.

Accessories

Standard hardware mounting kits which include everything necessary to mount the LBOR switch are included with the switches listed in Table 1. To order an LBOR-II weld mount switch with an interlock handle, contact your ABB sales representative for a proper style number. To order an LBOR-II nut mount switch with an interlock handle, substitute “JC” for “NC” in the style number (i.e. L150NC3003 - includes hardware kit, L150JC3003 - no hardware kit), and order the interlock hardware kit, 3A33949G02 separate (standard hardware kit is 3A33949G05).

ABB Inc.  
1128 S. Cavalier Drive  
Alamo, TN 38001  
Telephone: 731-696-5561  
Fax: 731-696-5362  
www.abb.com
THIS OUTLINE CAN BE USED FOR MOUNTING PURPOSES. IT IS NOT TO BE REGARDED AS INDICATING THE EXACT DETAILS OF CONSTRUCTION. SEE DRAWING 44-884 PAGE 13-14 FOR INSTALLATION INSTRUCTIONS. SEE DRAWING 44-884 PAGE 20 FOR ELECTRICAL CLEARANCE.
<table>
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<th>STYLE No.</th>
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<td>2</td>
</tr>
<tr>
<td>272D914G13</td>
<td>3</td>
</tr>
</tbody>
</table>

TANK HOLE

- MOUNTING SURFACE FOR "A" FRAME MUST BE CLEAR FROM OBSTRUCTION.
- DIAMETER MOUNTING HOLE

- 1.06 (26.92mm)
- 1.28 (32.51mm)
- 3.00 (76.20mm)

TANK WALL

- 2.69 (68.33mm)
- 3.69 (93.73mm)
- 0.44 DIAMETER (11.18mm)
- 3.59 (91.19mm)
- 4.00 (101.60mm)

- 5.72 (145.29mm)
- 3.48 (88.39mm)

14.38 (365.25mm) (3 DECK)
10.88 (276.35mm) (2 DECK)
7.38 (187.45mm) (1 DECK)

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SEE FOLLOWING LBOR OUTLINES:
44-884 PAGE 10 - 95 kV BIL, 300 A
44-884 PAGE 11 - 150 kV BIL, 300 A
44-884 PAGE 12 - 150 kV BIL, 400 A

OIL TIGHT WELD TO OUTSIDE TANK WALL.
REAM HOLE TO .380 (9.65mm)

WELD THIS SURFACE TO INSIDE TANK WALL.

INTERLOCK HANDLE
5144B85H02 "OPTIONAL"

SEAL RING
2746A48H03

SPIROL PIN
12D9120H08

O-RING
12D9120H08

STOVER NUT

STANDARD HANDLE
813A774H04

TANK WALL

DIMENSIONS ARE IN INCHES.
Instruction to Install ABB LBOR Switch

1. Remove spirol pin from the shaft of the LBOR by pushing it 3/4 through the handle.

2. Lubricate the shaft with silicone grease. Make sure the shaft is free from burrs, contaminants, or other debris.

3. Inspect the hole through the stainless steel boss. Verify that the heat of welding the A-frame to the tank has not deformed the hole. If it has, ream the hole to 0.380 (9.65mm) +0.001 (0.025mm) -0.000 (0.00mm). Make sure the hole is free from burrs, weld splatter, paint, metal flakes, and other debris.

4. Slide the shaft through the hole in the stainless steel boss.

5. Attach the top frame to the welded A-frame using the stover nuts (enclosed in the hardware kits).

6. Lubricate and install the seal ring. Use the handle to force the seal ring between the boss and shaft.

7. Lubricate and install the O-ring.

8. If using a spacer (9817A60H01), fit the spacer over the shaft.

9. Re-pin the handle into the shaft.
STANDARD MOUNTING CONFIGURATION

TANK MOUNTING HOLE

LOCATING TAB

POSITION INDICATOR PLATE
(3A33926H01)
"STANDARD"

INTERLOCK HANDLE
(1B11085H01)
"STANDARD"
POSITION

OPEN

110°

CLOSED

NOTE: WHEN FACING HANDLE -
TURN CLOCKWISE TO CLOSE SWITCH.
TURN COUNTER CLOCKWISE TO OPEN SWITCH.

OPTIONAL MOUNTING CONFIGURATION

TANK MOUNTING HOLE

LOCATING TAB

POSITION INDICATOR PLATE
(3A33950H01)
"OPTIONAL"

HANDLE
(1B11085H01)
"OPTIONAL"
POSITION

CLOSED

OPEN

110°
AREA OF CONTACT OF FOUR FEET MUST BE LEFT CLEAR FROM OBSTRUCTION

1.325 DIAMETER MOUNTING TAB
+ .000 TANK HOLE
- .000

2.00 DIAMETER MOUNTING SURFACE MUST BE FLAT WITHIN .010 INCH OVER ENTIRE AREA.

VIEWS SHOWN ARE TO CLEARLY ILLUSTRATE SWITCH DIMENSIONS; NOT SWITCH ORIENTATION.

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AREA OF CONTACT OF FOUR FEET MUST BE LEFT CLEAR FROM OBSTRUCTION.

0.140 RADIUS MOUNTING TAB

1.325 DIAMETER +.000 TANK HOLE -.000

2.00 DIAMETER MOUNTING SURFACE MUST BE FLAT WITHIN .010 INCH OVER ENTIRE AREA.

TANK WALL

3.18

0.44 DIAMETER

2.00

4.00

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SINGLE PHASE:  THREE PHASE:
8.9 - 21.9 kV  15.5 - 38.0 kV
95 - 150 kV BIL  95 - 150 kV BIL
300 AMPERES  300 - 400 AMPERES

NOTES:
ALL ENERGIZED PARTS OF THE LBOR SWITCH MUST BE UNDER OIL AND SPACED AWAY FROM OTHER ENERGIZED PARTS OR GROUND WITH SUFFICIENT DISTANCE TO WITHSTAND ALL OPERATING AND TEST VOLTAGES.

IN ORDER FOR PROPER SWITCH OPERARION TO OCCUR, AN ARC CLEARANCE ZONE IS REQUIRED AROUND THE LBOR SWITCH. THIS ZONE SHOULD BE UNDER OIL AND FREE OF ALL FOREIGN MATERIALS. THE BOUNDARIES OF THIS ZONE ARE DEFINED IN THIS OUTLINE DRAWING.