

Load Break Switch

Type LBOR-II, Oil Immersed

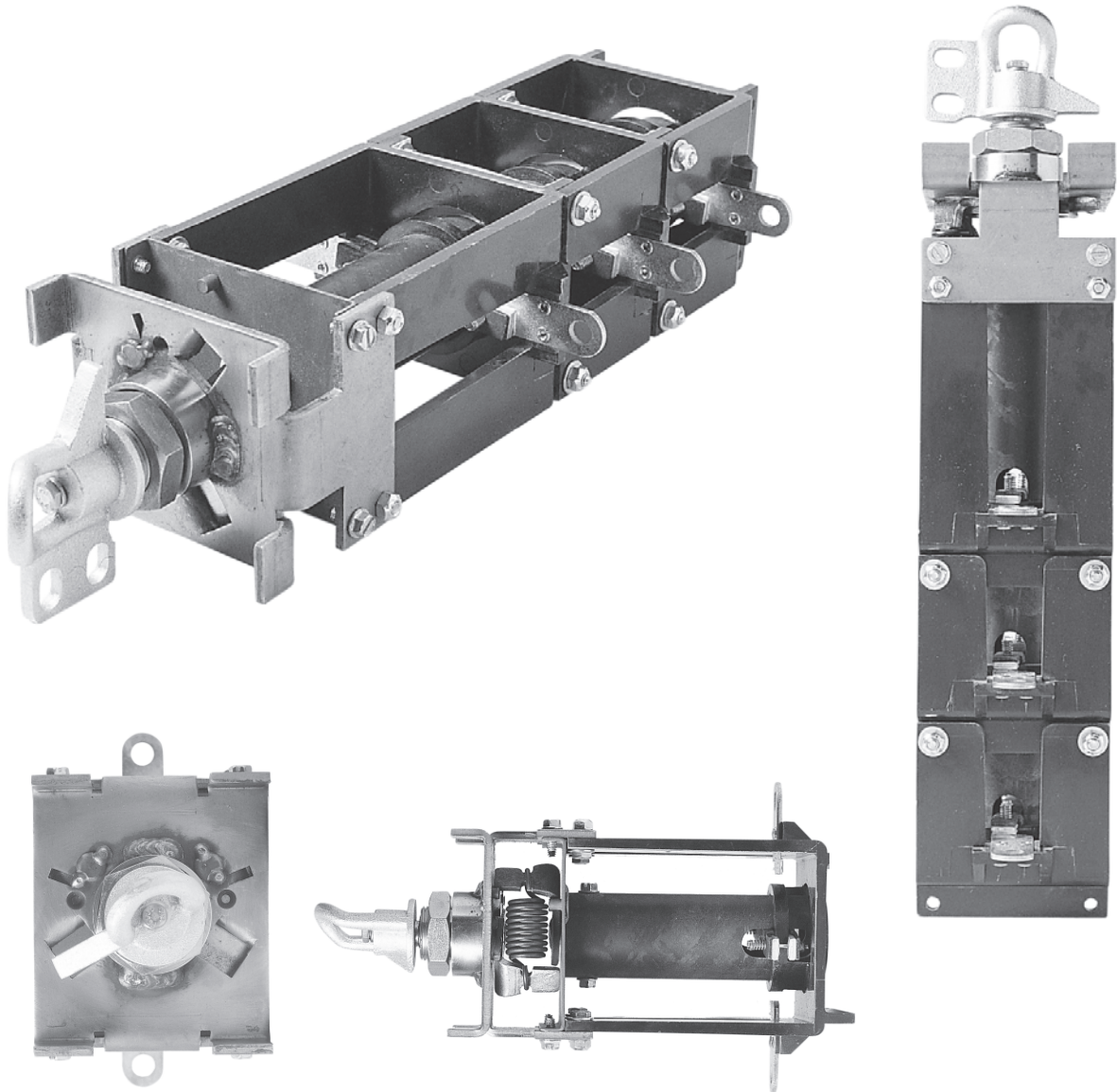
PTAT-LIR975

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.

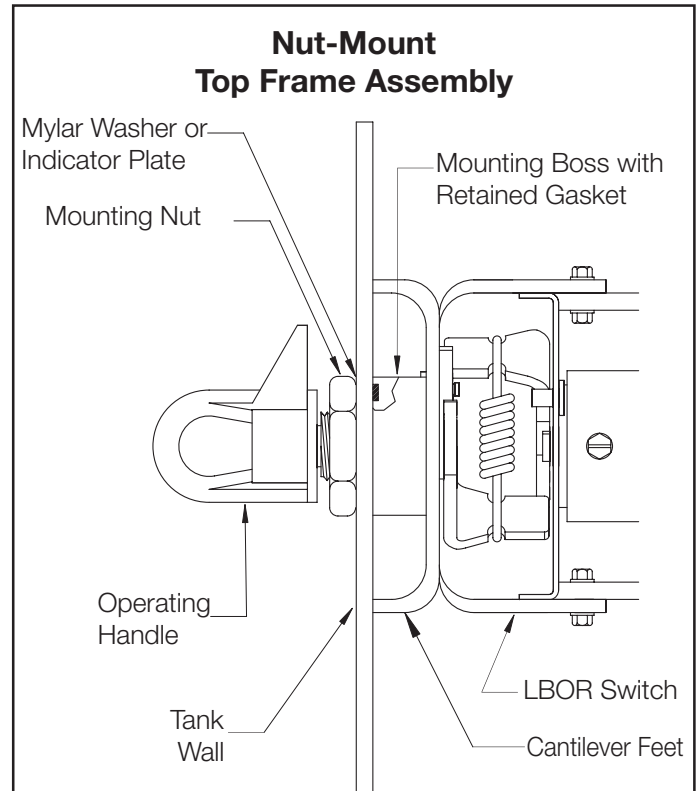
Features & Advantage

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

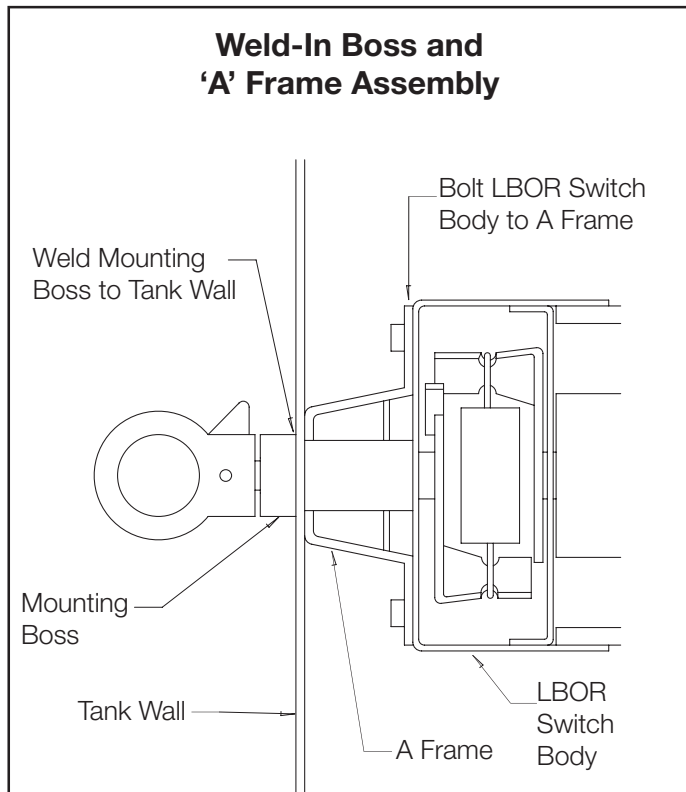
Installed with a retained gasket and single mounting nut, the LBOR-II switch with the nut mounting system allows for quick mounting in both OEM and replacement installations. The main boss assembly of the switch is inserted through the hole in the tank wall and secured with the mounting nut. The handle 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.

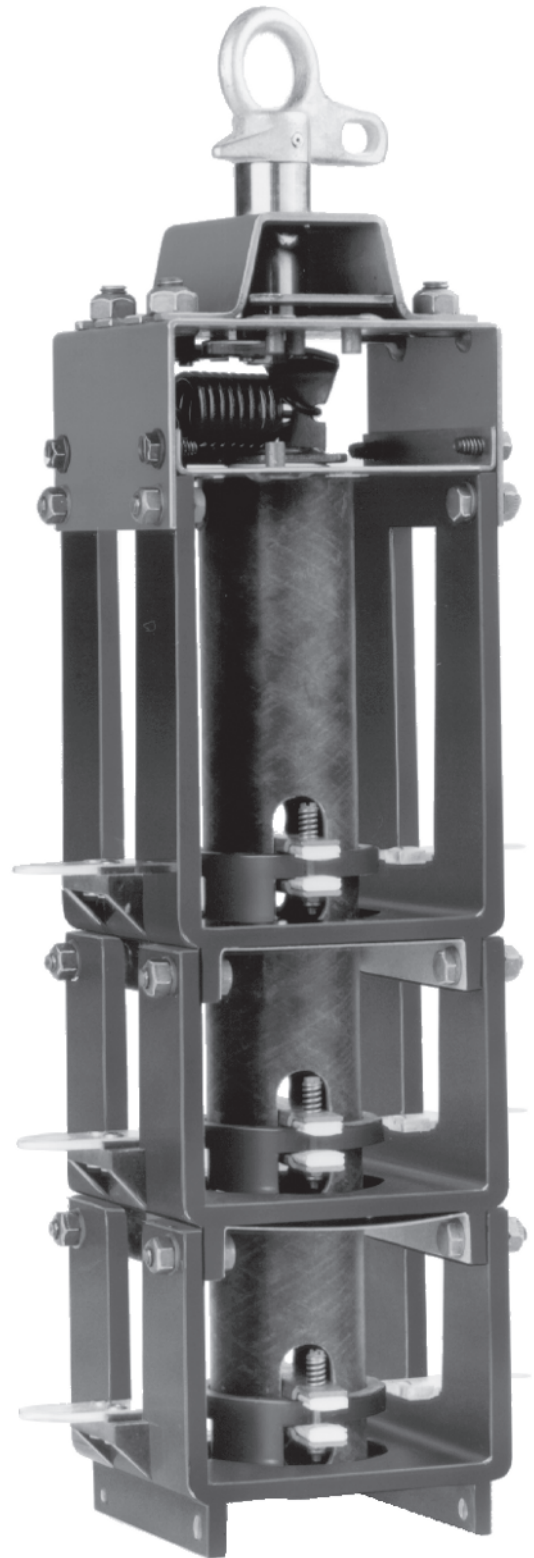
Production tests

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)

3 Deck Weld-In LBOR Switch

(Shown with Interlock Handle)



**Table 1:
Ordering Information for LBOR-II Switches**

BIL	kV ¹	Amperes	Phase	# of Decks	Switch Mounting	Hz	Tested per Standards ²	Weld-In Style Number	Nut-Mounted Style Number
95	8.9	300	1	1	Wall	60	ANSI & IEC	272D914G11	L095NC3001
95	8.9	300	1	2	Wall	60	ANSI & IEC	272D914G12	L095NC3002
95	15.5	300	3	3	Wall	60	ANSI & IEC	272D914G13	L095NC3003
150	21.9	300	1	1	Wall/Cover	60	ANSI & IEC ³	272D913G11	L150NC3001
150	21.9	300	1	2	Wall/Cover	60	ANSI & IEC ³	272D913G12	L150NC3002
150*	38	300	3	3	Wall/Cover	60	ANSI & IEC ³	272D913G13	L150NC3003
150	15.5	400	1	1	Wall/Cover	60	ANSI & IEC	272D923G11	L150NC4001
150	15.5	400	1	2	Wall/Cover	60	ANSI & IEC	272D923G12	L150NC4002
150*	27	400	3	3	Wall/Cover	60	ANSI & IEC	272D923G13	L150NC4003

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

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

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

* IEC 265-1 - 180 kV BIL

Ordering Information

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

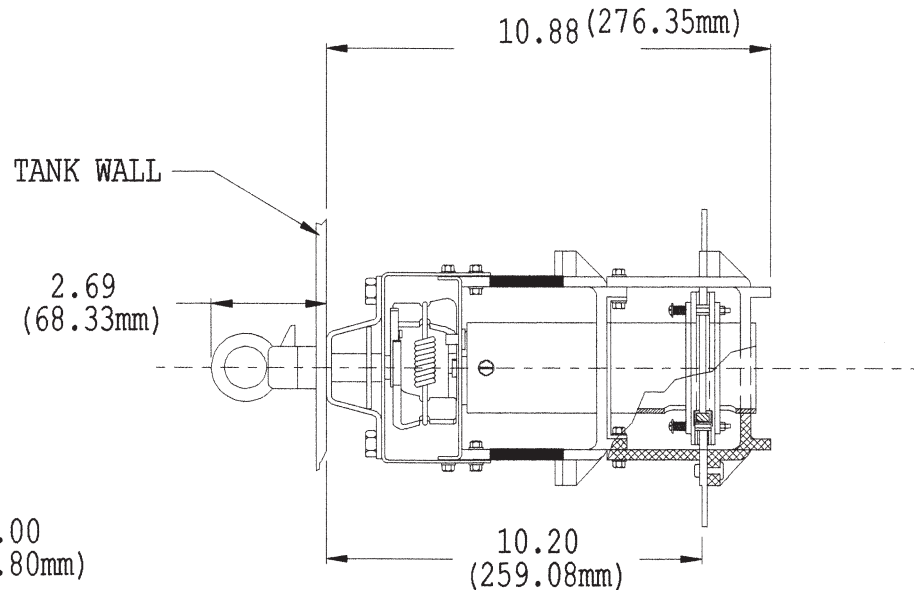
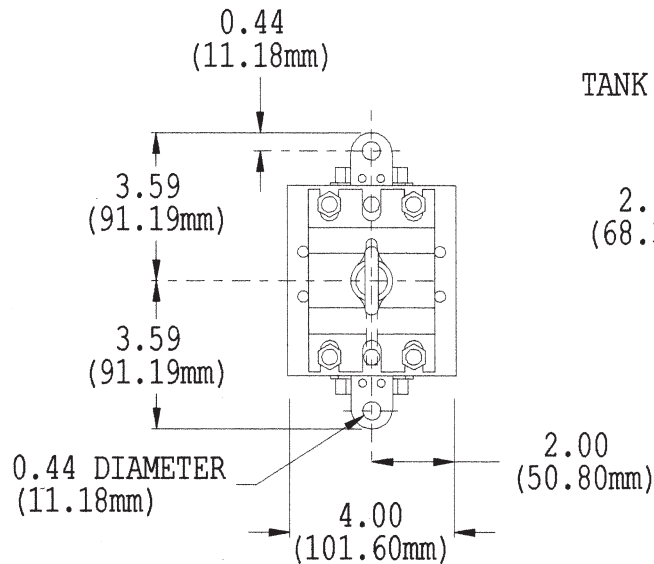
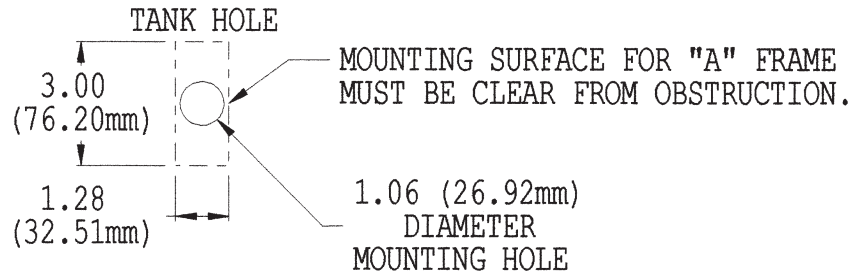
Accessories

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
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Fax: 731-696-5362
www.abb.com

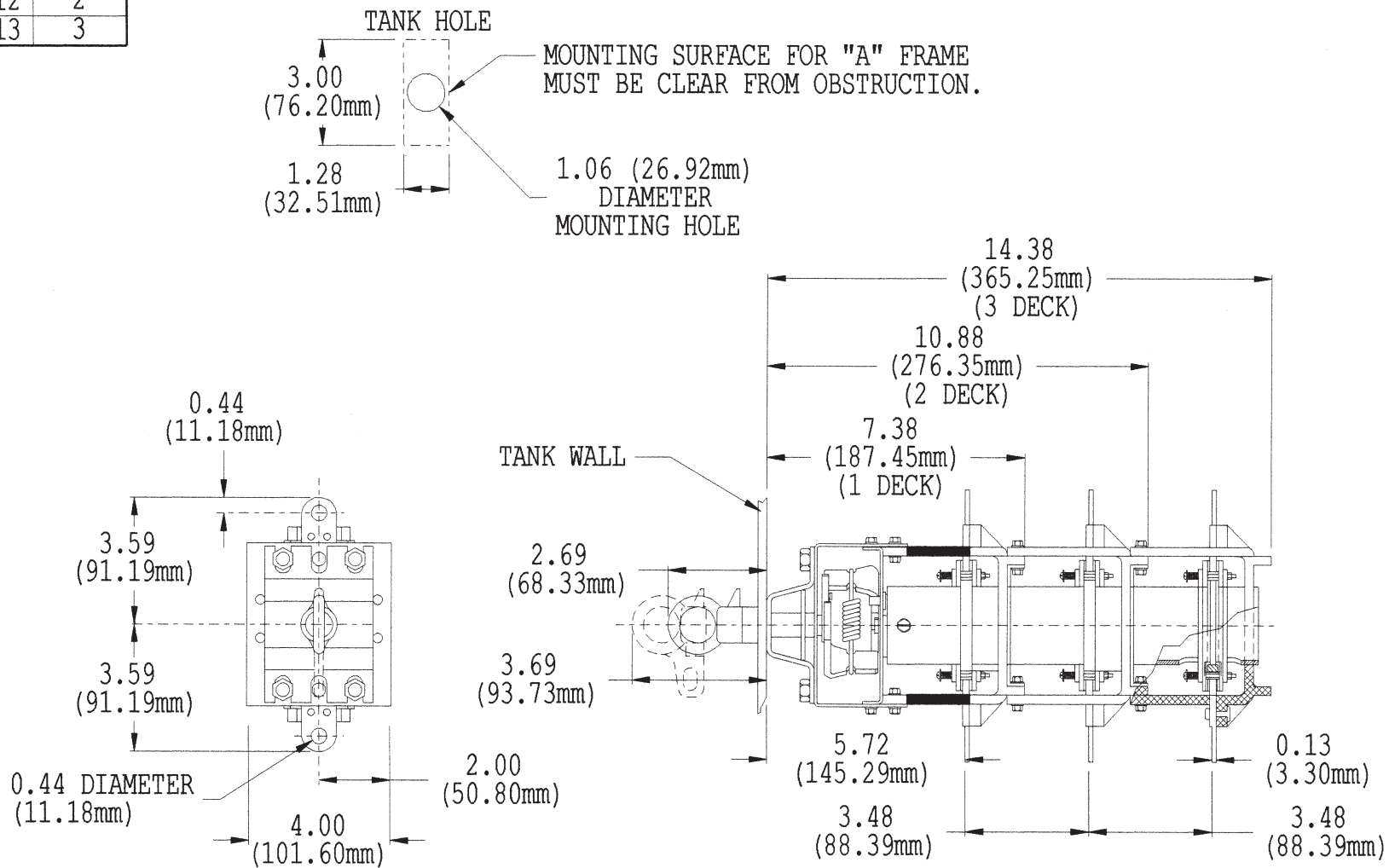
STYLE No.	DECKS
272D914G50	1



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.

ABB Inc.		
Components & Insulation Material		
TITLE 95 kV BIL WELD-IN 300 AMP LBOR OUTLINE		
DIMENSION SHEET:	PAGE:	REVISION:
44-884	09	02
DIMENSIONS ARE IN INCHES.		

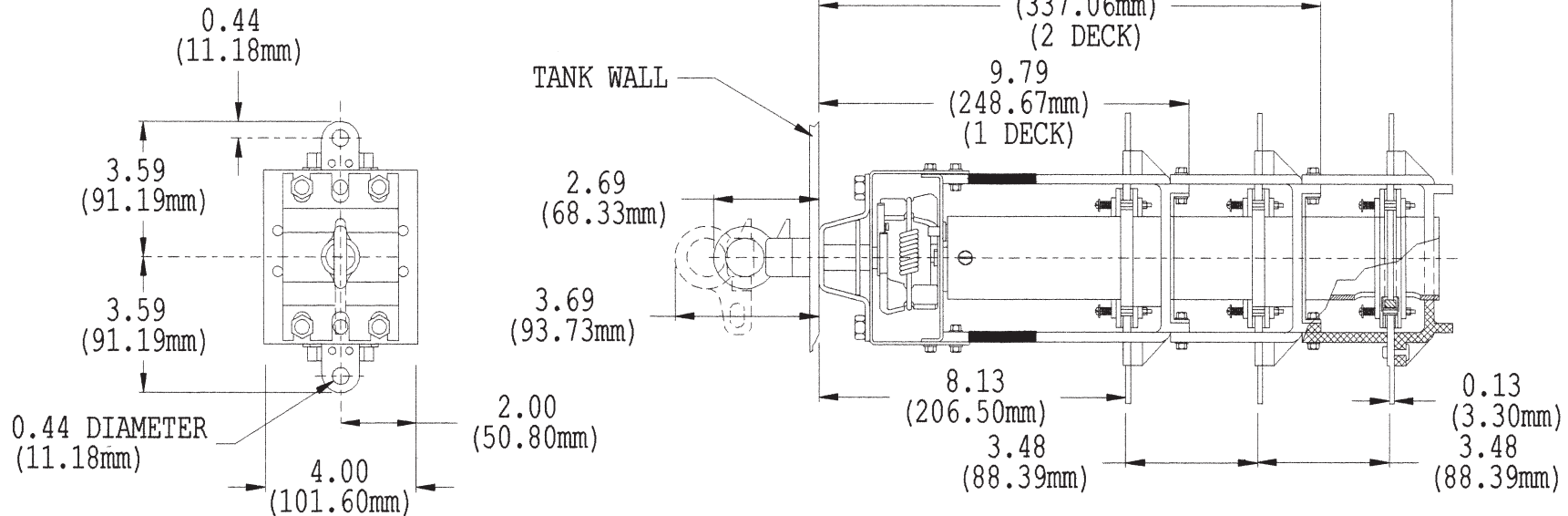
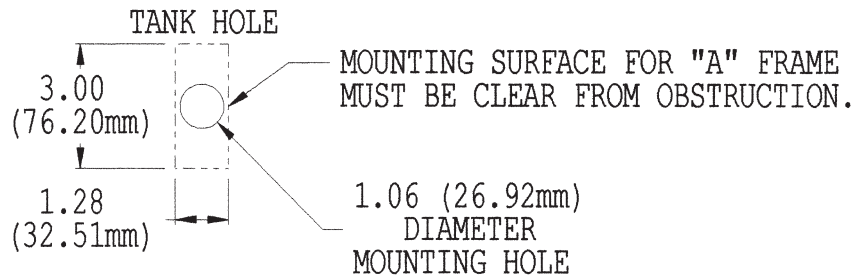
STYLE No.	DECKS
272D914G11	1
272D914G12	2
272D914G13	3



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Components & Insulation Material		
TITLE 95 kV BIL WELD-IN 300 AMP LBOR OUTLINE		
DIMENSION SHEET:	PAGE:	REVISION:
44-884	10	02
DIMENSIONS ARE IN INCHES.		

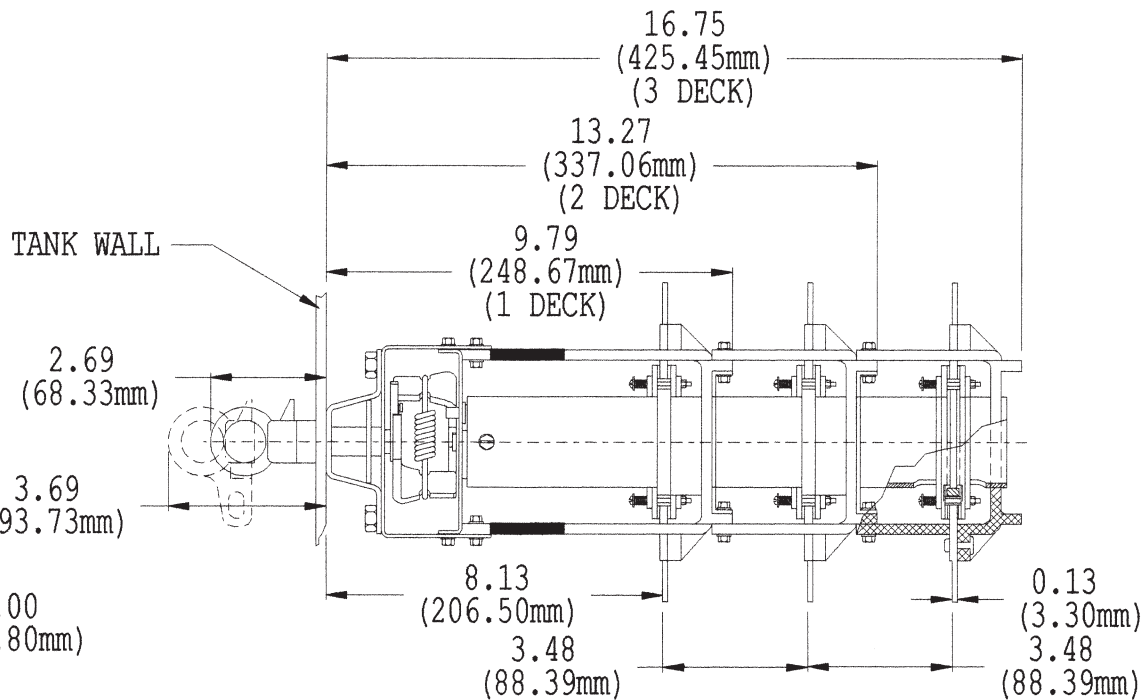
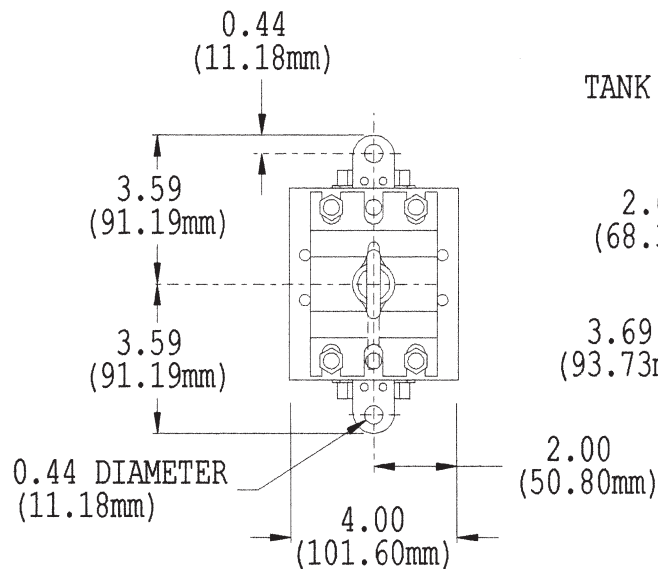
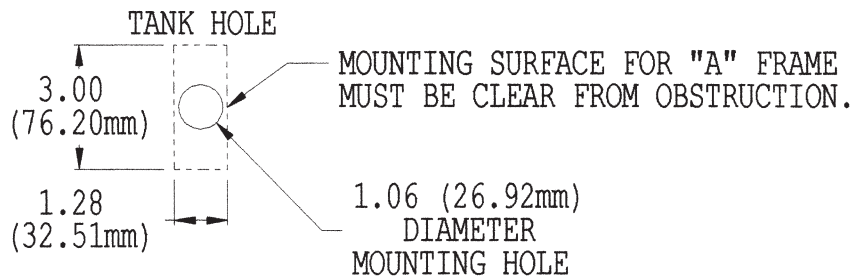
STYLE No.	DECKS
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272D913G12	2
272D913G13	3



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Components & Insulation Material		
TITLE 150 kV BIL WELD-IN 300 AMP LBOR OUTLINE		
DIMENSION SHEET:	PAGE:	REVISION:
44-884	11	02
DIMENSIONS ARE IN INCHES.		

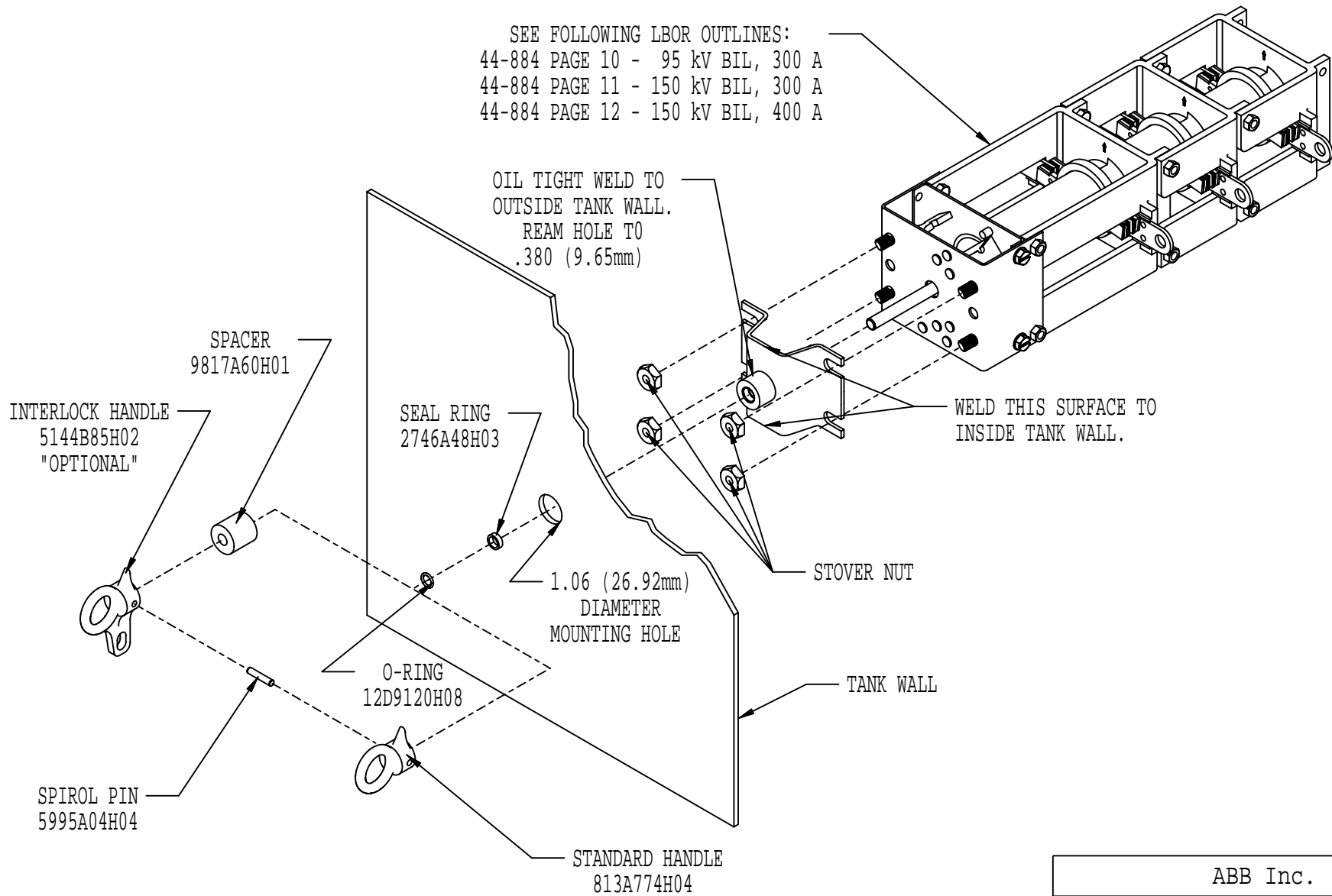
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272D923G12	2
272D923G13	3



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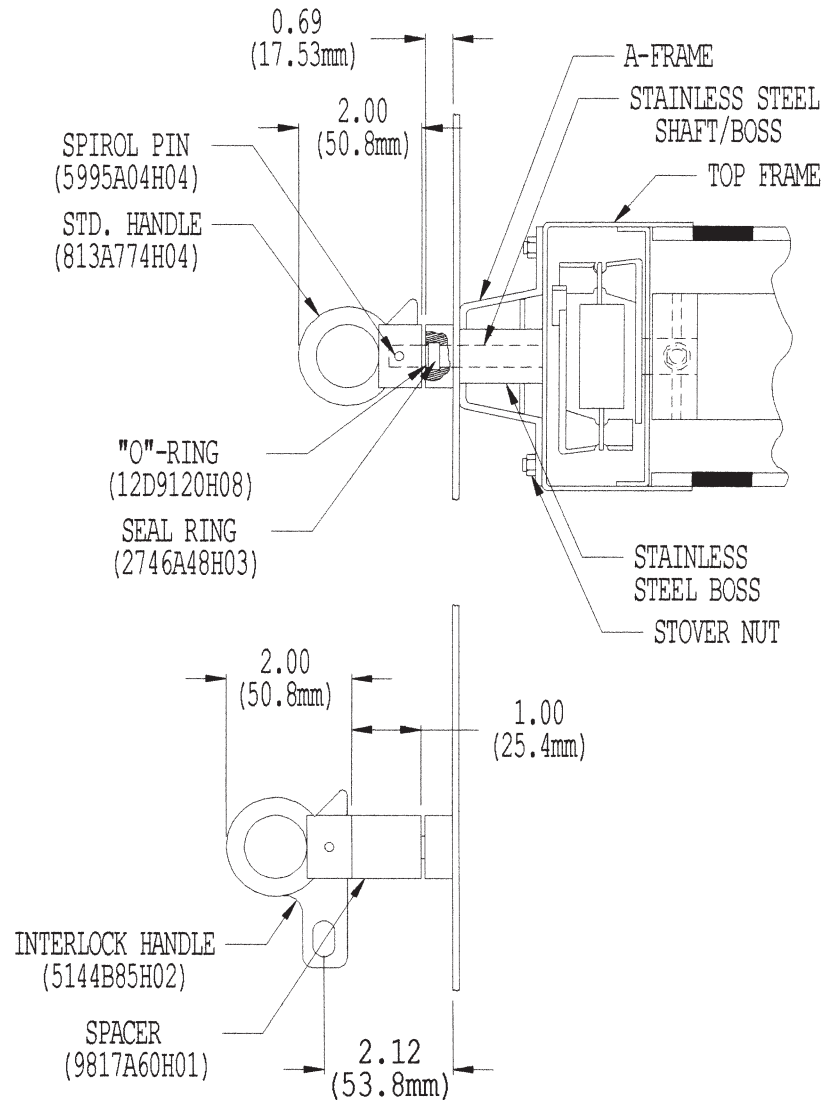
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Components & Insulation Material		
TITLE 150 kV BIL WELD-IN		
400 AMP LBOR OUTLINE		
DIMENSION SHEET:	PAGE:	REVISION:
44-884	12	02
DIMENSIONS ARE IN INCHES.		

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



THIS DRAWING CAN BE USED FOR MOUNTING PURPOSES. IT IS NOT TO BE REGARDED AS INDICATING THE EXACT DETAILS OF CONSTRUCTION.

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Components & Insulation Material		
TITLE WELD-IN LBOR		
INSTALLATION INSTRUCTIONS		
DIMENSION SHEET:	PAGE:	REVISION:
44-884	13	03
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.

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Components & Insulation Material

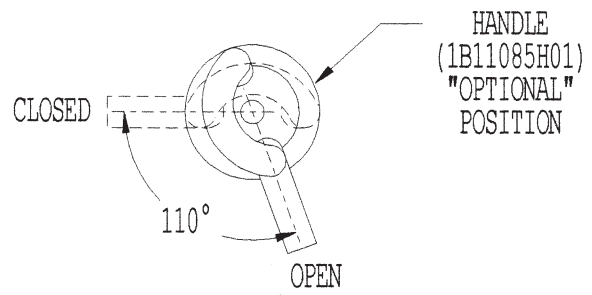
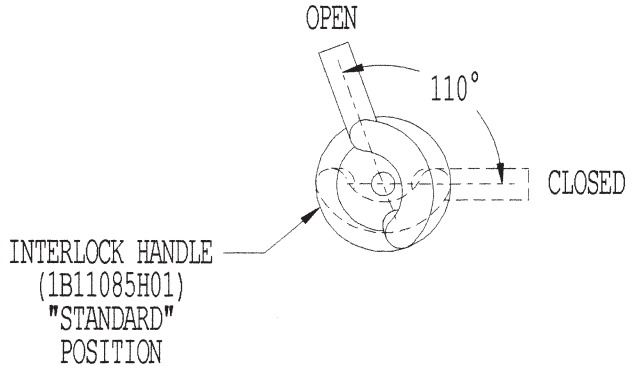
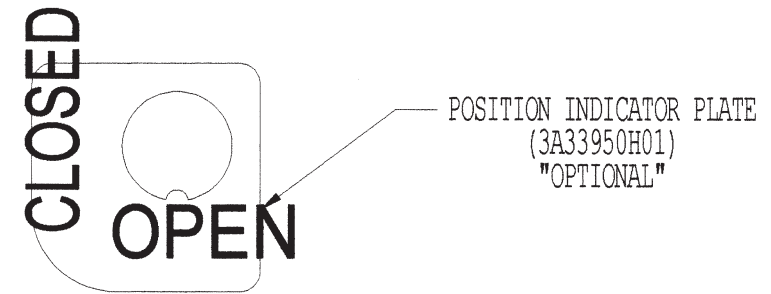
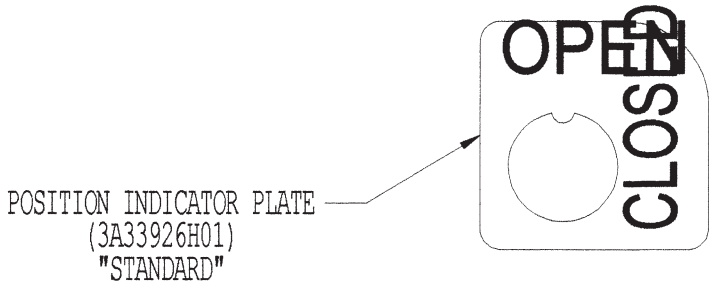
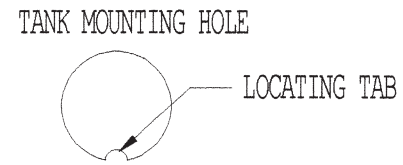
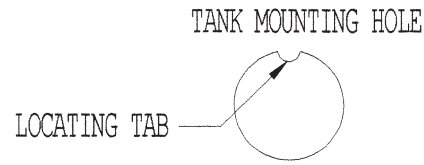
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WELD MOUNT LBOR
INSTALLATION INSTRUCTIONS

DIMENSION SHEET:	PAGE:	REVISION:
44-884	14	04

DIMENSIONS ARE IN INCHES.

STANDARD MOUNTING CONFIGURATION

OPTIONAL MOUNTING CONFIGURATION



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

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TITLE HANDLE POSITION		
DIMENSION SHEET:	PAGE:	REVISION:
44-884	15	04
DIMENSIONS ARE IN INCHES.		

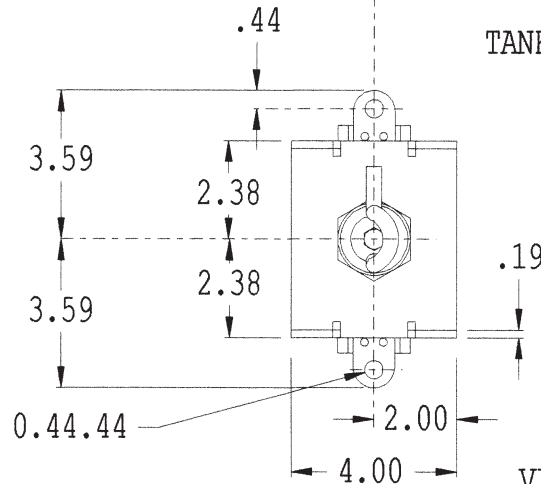
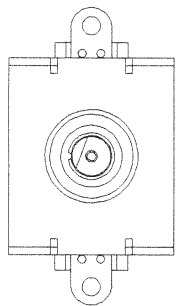
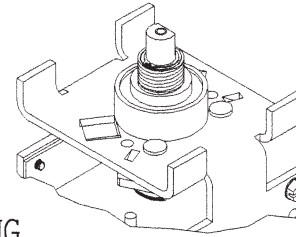
STYLE No.	DECKS
L095NC3001	1
L095NC3002	2
L095NC3003	3

0.140 RADIUS
MOUNTING TAB

1.325 DIAMETER
TANK HOLE
+.000
-.000

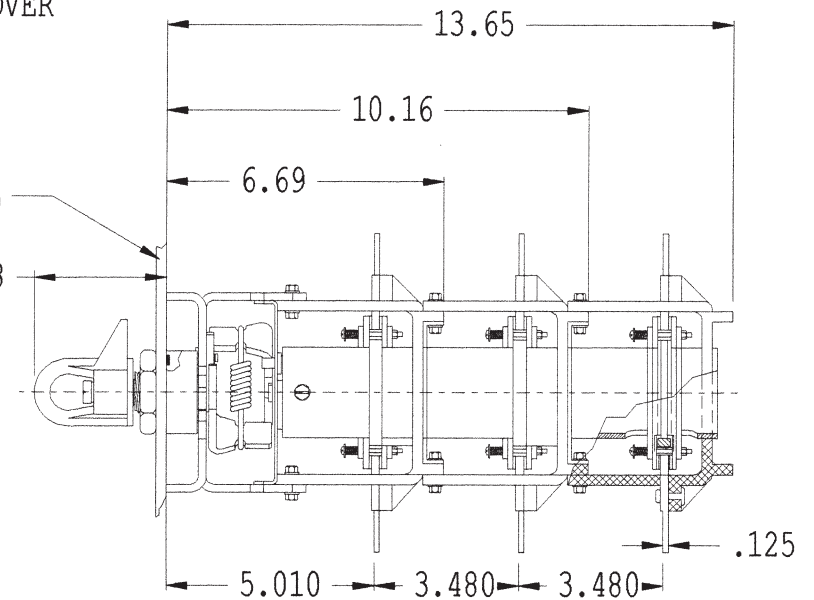
2.00 DIAMETER MOUNTING
SURFACE MUST BE FLAT
WITHIN .010 INCH OVER
ENTIRE AREA.

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



TANK WALL

3.18



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

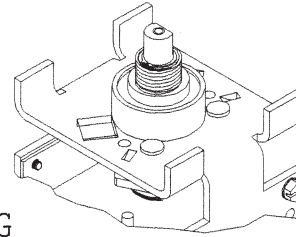
THIS OUTLINE CAN BE USED FOR MOUNTING PURPOSES. IT IS NOT TO
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SEE DRAWING 44-884 PAGE 24 FOR INSTALLATION INSTRUCTIONS.
SEE DRAWING 44-884 PAGE 25 FOR ELECTRICAL CLEARANCE.

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Components & Insulation Material		
TITLE 95 kV BIL CENTER MOUNT 300 AMP LBOR OUTLINE		
DIMENSION SHEET:	PAGE:	REVISION:
44-884	16	06
DIMENSIONS ARE IN INCHES.		

STYLE No.	DECKS
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L150NC3002	2
L150NC3003	3

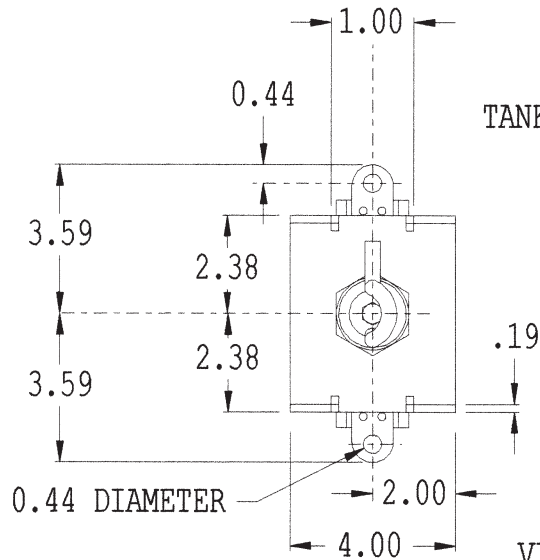
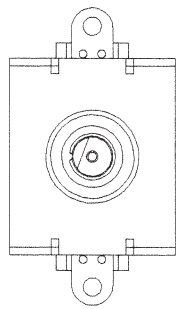
0.140 RADIUS
MOUNTING TAB

1.325 DIAMETER
TANK HOLE
+.000
-.000



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

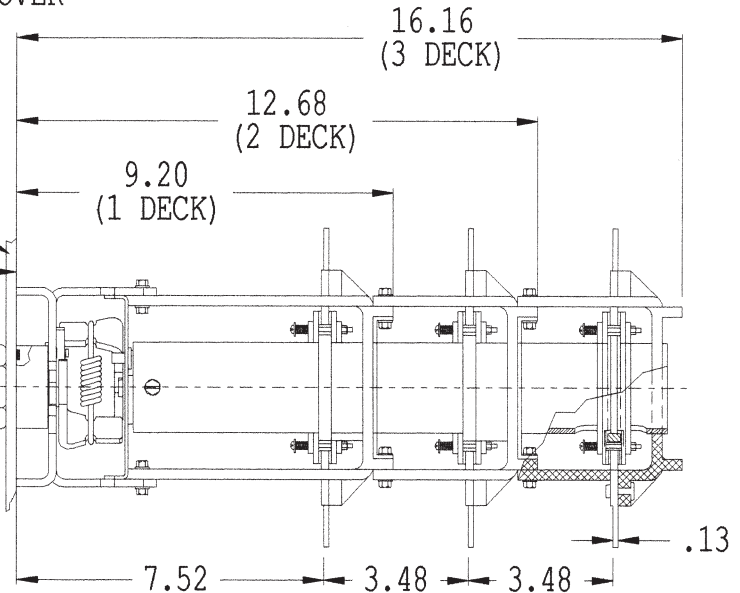
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TANK WALL

3.18

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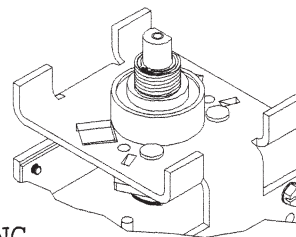
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SEE DRAWING 44-884 PAGE 25 FOR ELECTRICAL CLEARANCE.

ABB Inc.		
Components & Insulation Material		
TITLE 150 kV BIL CENTER MOUNT 300 AMP LBOR OUTLINE		
DIMENSION SHEET:	PAGE:	REVISION:
44-884	17	06
DIMENSIONS ARE IN INCHES.		

STYLE No.	DECKS
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L150NC4002	2
L150NC4003	3

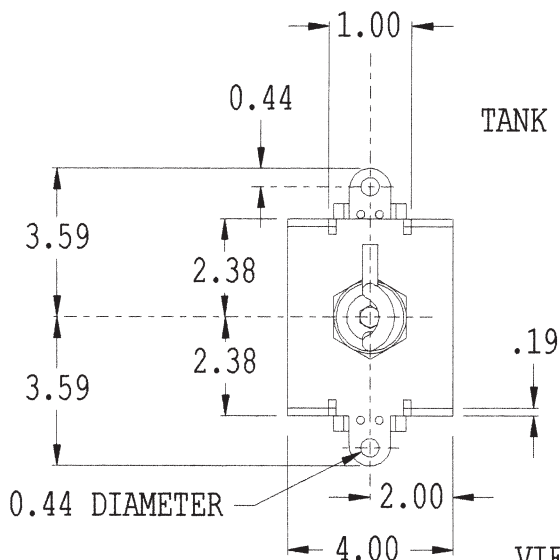
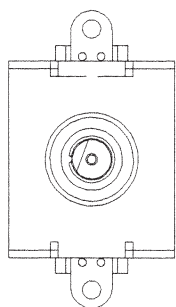
0.140 RADIUS
MOUNTING TAB

1.325 DIAMETER
TANK HOLE
+.000
-.000



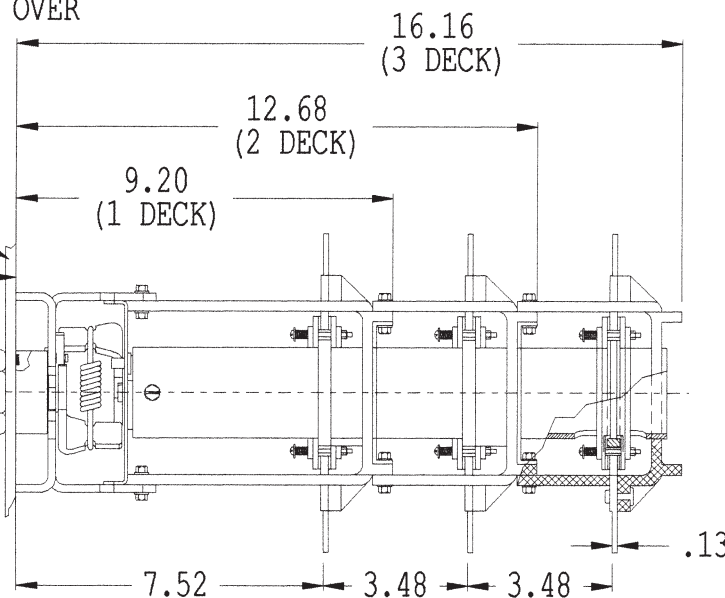
2.00 DIAMETER MOUNTING
SURFACE MUST BE FLAT
WITHIN .010 INCH OVER
ENTIRE AREA.

AREA OF CONTACT OF FOUR FEET MUST BE
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TANK WALL

3.18



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

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SEE DRAWING 44-884 PAGE 25 FOR ELECTRICAL CLEARANCE.

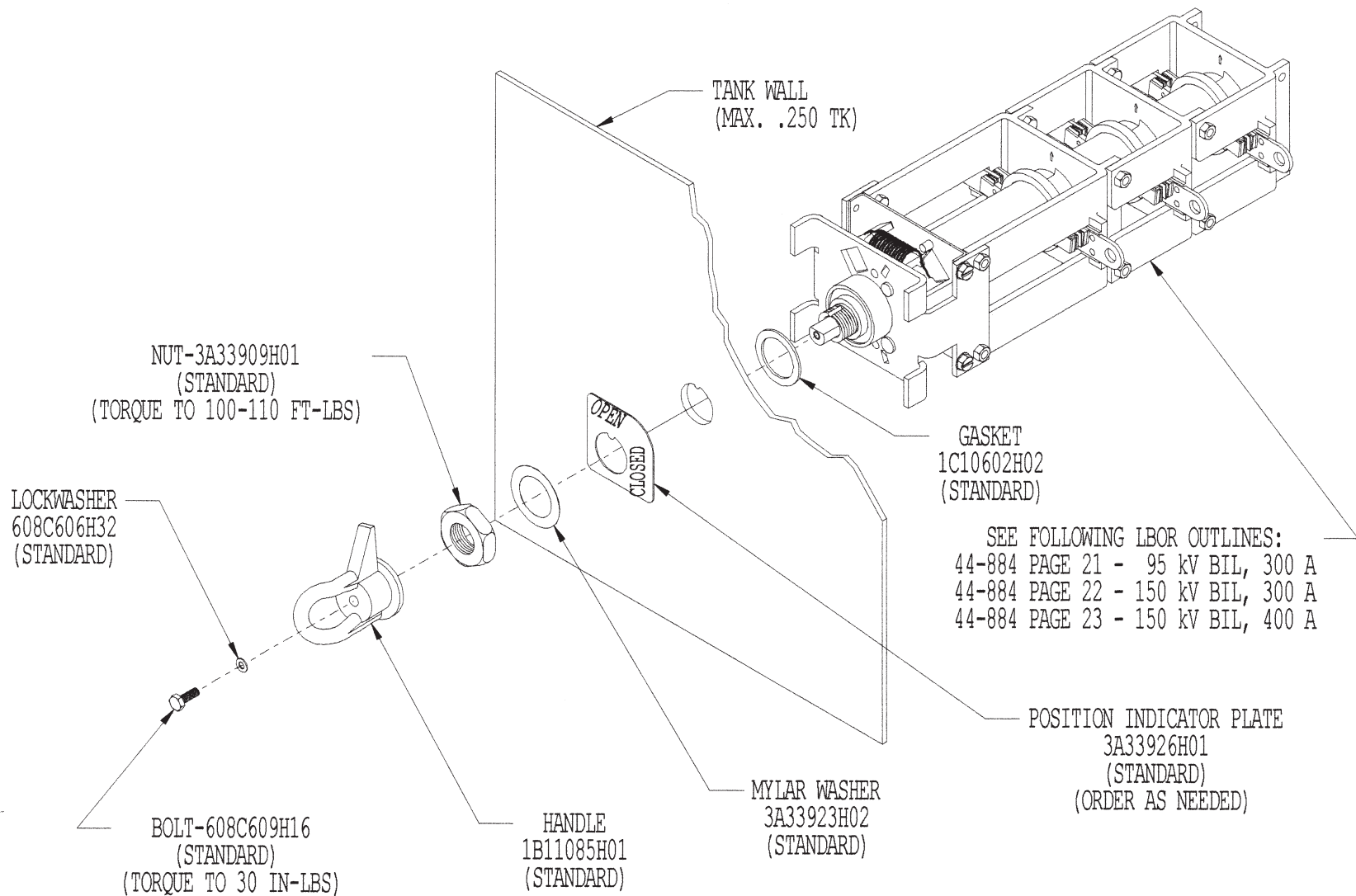
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Components & Insulation Material

TITLE 150 kV BIL CENTER MOUNT
400 AMP LBOR OUTLINE

DIMENSION SHEET: 44-884 PAGE: 18 REVISION: 06

DIMENSIONS ARE IN INCHES.

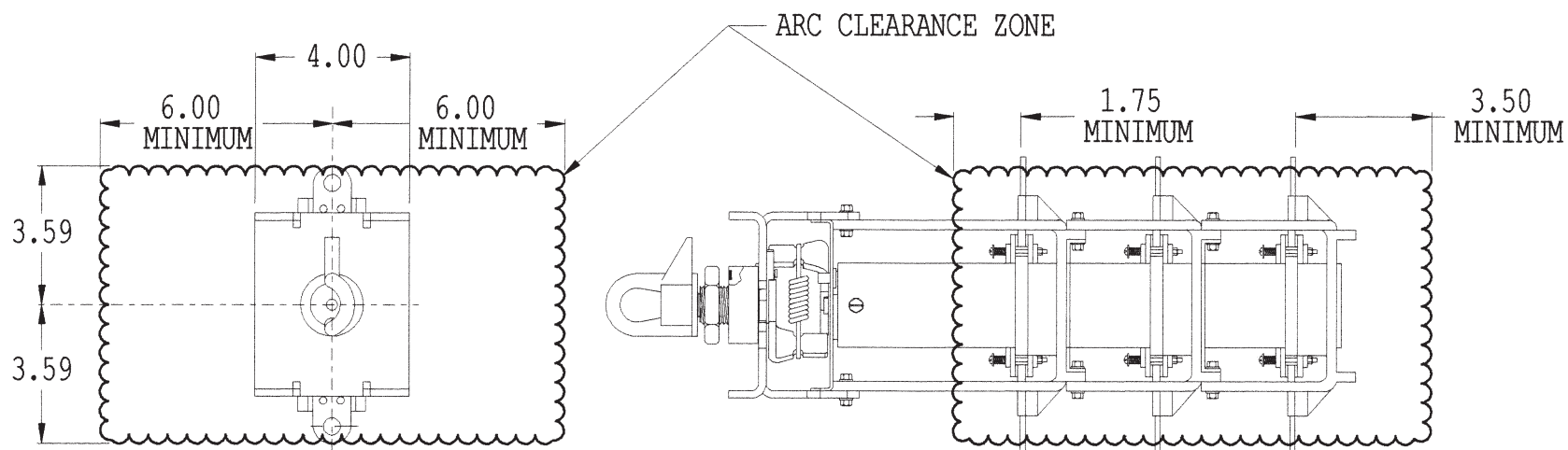


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ABB Inc.		
Components & Insulation Material		
TITLE CENTER MOUNT LBOR INSTALLATION INSTRUCTIONS		
DIMENSION SHEET:	PAGE:	REVISION:
44-884	19	06
DIMENSIONS ARE IN INCHES.		

SINGLE PHASE:
 8.9 - 21.9 kV
 95 - 150 kV BIL
 300 AMPERES

THREE PHASE:
 15.5 - 38.0 kV
 95 - 150 kV BIL
 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 OPERATION 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.

ABB Inc.		
Components & Insulating Material		
TITLE ELECTRICAL CLEARANCES OUTLINE		
DIMENSION SHEET:	PAGE:	REVISION:
44-884	20	03
DIMENSIONS ARE IN INCHES.		