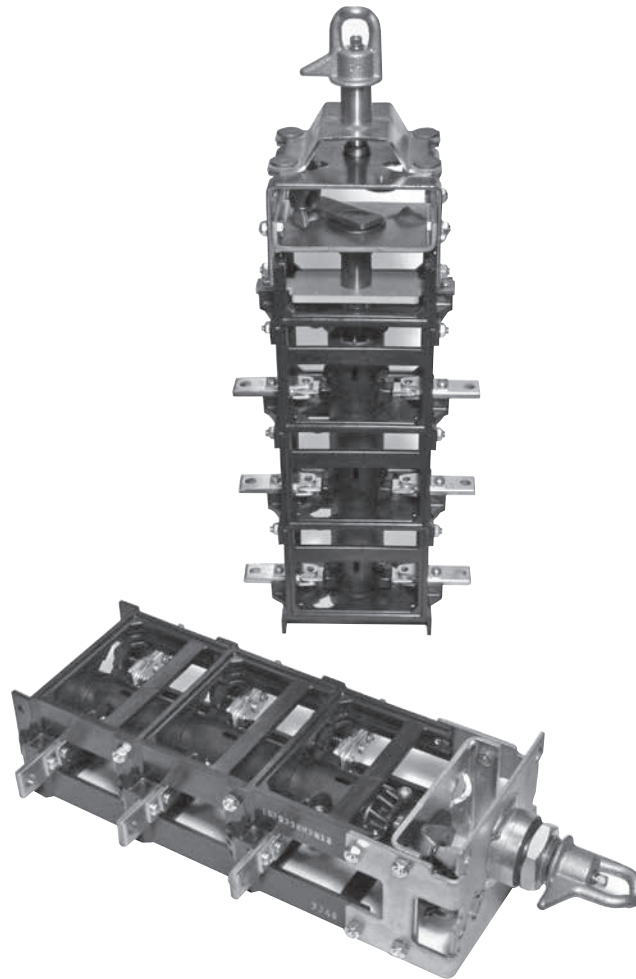


Two-position sidewall (horizontal) and cover (vertical) mounted loadbreak switches installation instructions



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Safety for life



Eaton meets or exceeds all applicable industry standards relating to product safety in its Cooper Power™ series products. We actively promote safe practices in the use and maintenance of our products through our service literature, instructional training programs, and the continuous efforts of all Eaton employees involved in product design, manufacture, marketing, and service.

We strongly urge that you always follow all locally approved safety procedures and safety instructions when working around high voltage lines and equipment, and support our “Safety For Life” mission.

Safety information

The instructions in this manual are not intended as a substitute for proper training or adequate experience in the safe operation of the equipment described. Only competent technicians who are familiar with this equipment should install, operate, and service it.

A competent technician has these qualifications:

- Is thoroughly familiar with these instructions.
- Is trained in industry-accepted high and low-voltage safe operating practices and procedures.
- Is trained and authorized to energize, de-energize, clear, and ground power distribution equipment.
- Is trained in the care and use of protective equipment such as arc flash clothing, safety glasses, face shield, hard hat, rubber gloves, clampstick, hotstick, etc.

Following is important safety information. For safe installation and operation of this equipment, be sure to read and understand all cautions and warnings.

Hazard Statement Definitions

This manual may contain four types of hazard statements:

DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in equipment damage only.

Safety instructions

Following are general caution and warning statements that apply to this equipment. Additional statements, related to specific tasks and procedures, are located throughout the manual.

DANGER

Hazardous voltage. Contact with hazardous voltage will cause death or severe personal injury. Follow all locally approved safety procedures when working around high- and low-voltage lines and equipment.

G103.3

WARNING

Before installing, operating, maintaining, or testing this equipment, carefully read and understand the contents of this manual. Improper operation, handling or maintenance can result in death, severe personal injury, and equipment damage.

G101.0

WARNING

This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply can result in death, severe personal injury and equipment damage.

G102.1

WARNING

Power distribution and transmission equipment must be properly selected for the intended application. It must be installed and serviced by competent personnel who have been trained and understand proper safety procedures. These instructions are written for such personnel and are not a substitute for adequate training and experience in safety procedures. Failure to properly select, install or maintain power distribution and transmission equipment can result in death, severe personal injury, and equipment damage.

G122.3

⚠ WARNING

Loadbreak Switch should be installed only by personnel familiar with good safety practice and handling of high voltage electrical equipment. Failure to comply can result in death, severe personal injury, and equipment damage.

Product information

Introduction

Eaton's Cooper Power™ series compact two-position mounted loadbreak/loadmake switch is designed for use in transformer oil, Envirotemp™ FR3™ fluid, or an approved equivalent fluid-filled "Class 1" pad-mounted transformers, submersible distribution transformers, or distribution switchgear.

The two-position switch is hook stick operable and requires minimal input torque to operate. The switch mechanism uses a manually charged, over-toggle, stored energy spring assembly, which is independent of operator speed. The mechanism ensures quick loadbreak or loadmake operation in less than one cycle. Also incorporated into the switch mechanism are internal stops which restrict the handle orientation to only two positions, approximately 90° apart.

Read this manual first

Read and understand the contents of this manual and follow all locally approved procedures and safety practices before installing or operating this equipment.

Additional information

These instructions cannot cover all details or variations in the equipment, procedures, or process described nor provide directions for meeting every possible contingency during installation, operation, or maintenance. For additional information, contact your representative.

Acceptance and initial inspection

Each switch is in good condition when accepted by the carrier for shipment. Upon receipt, inspect the shipping container for signs of damage. Unpack the switch and inspect it thoroughly for damage incurred during shipment. If damage is discovered, file a claim with the carrier immediately.

Handling and storage

Be careful during handling and storage of the switch to minimize the possibility of damage. If the loadbreak switch is to be stored for any length of time prior to installation, provide a clean, dry storage area.

Standards

ISO 9001 Certified Quality Management System

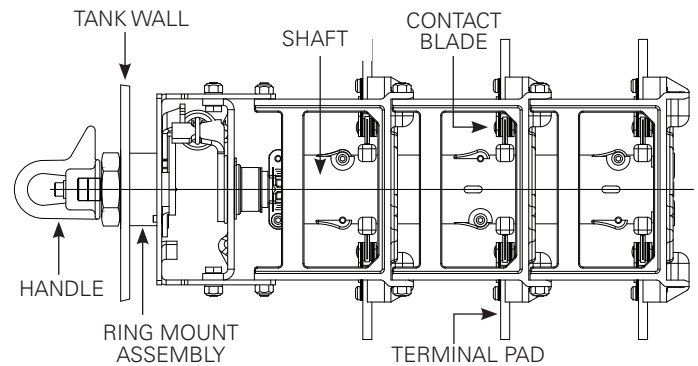


Figure 1. Line illustration of loadbreak switch with ring mount assembly.

Electrical ratings

Table 1. Ratings and Characteristics

Description	Units	Ratings			
Rated Voltage					
Maximum rating phase-to-phase	kV	15.5	27.6	38	46
Maximum rating phase-to-ground	kV	8.9	15.6	21.9	26.5
Power Frequency	Hz	60	60	60	60
Current Rating (Continuous)	A	550	400	300	65
Switching Current	A	550	400	300	65
Magnetizing Interrupting Current	A	21	21	10.5	10.5
Cable Charging Current	A	10	25	20	15
Fault Withstand Current (Momentary)					
10 cycle symmetric rms	kA	12	12	12	12
10 cycle asymmetric rms	kA	19.2	19.2	19.2	19.2
45 cycles symmetric rms	kA	16	16	16	16
1 second symmetric rms	kA	12	12	12	12
2 second symmetric rms	kA	8	8	8	8
3 second symmetric rms	kA	7	7	7	7
Fault Close and Latch					
10 cycle symmetric rms	kA		12	12	12
10 cycle asymmetric rms	kA		19.2	19.2	19.2
15 cycle symmetric rms	kA	12			
15 cycle asymmetric rms	kA	19.2			
Impulse Withstand Voltage (1.2/50 μs)					
To ground and between phases	kV	200	200	200	200
Across open contacts	kV	235	235	235	235
Power Frequency Withstand (1 minute)					
To ground and between phases	kV	70	70	70	70
Across open contacts	kV	95	95	95	95
DC Withstand (15 minutes)					
To ground, between phases and across	kV	103	103	103	103
Contacts					
Corona (Extinction)	kV	26	26	26	26
Mechanical Life (Minimum Operations)	2,000	2,000	2,000	2,000	2,000

Installation procedure

All parts should be inspected for damage before using. If there is evidence of physical damage, the unit should not be installed unless approved by your Eaton representative.

Weld-in assembly (horizontal and vertical mount)



WARNING

The portion of the switch that is inside the tank does not contain user adjustable parts and should not be altered during installation. Failure to comply can result in death, severe personal injury, and equipment damage.

Note: The tank wall should have a 1.00"± .010" hole, (25.4 mm). Switch should be located to ensure recommended clearances in Figure 5 are maintained.

1. Remove the weld-in bracket assembly from the switch and insert the bracket assembly through the tank hole (from inside). (Refer to Figure 2.)
2. Position the bracket as desired and weld completely around the outside of the bracket neck.

3. Bracket should be located to insure recommended clearances in Figure 5 are maintained.
4. After welding process has been completed, the I.D. of the bracket neck should be checked with a .629" (16 mm) plug gauge to assure proper clearances have been maintained for acceptance of switch shaft.
5. Align the switch into the bracket and onto the welded threaded studs (insure correct orientation) and re-install the 3/8" lock nuts (supplied). Tighten nuts to the recommended torque in Table 3.
6. Install handle onto the switch shaft with the stainless steel hex socket cap screw and lockwasher supplied and tighten to recommended torque in Table 3.
7. It is recommended that a sealing test be performed to ensure the integrity of the weld joint.

Table 2. Recommended Torque (WELD-IN)

Part	Torque Level
Mounting Nuts (3/8" Lock):	35-100 in-lbs (4-11 Nm)
Switch Handle Bolt:	40-60 in-lbs (5-7 Nm)

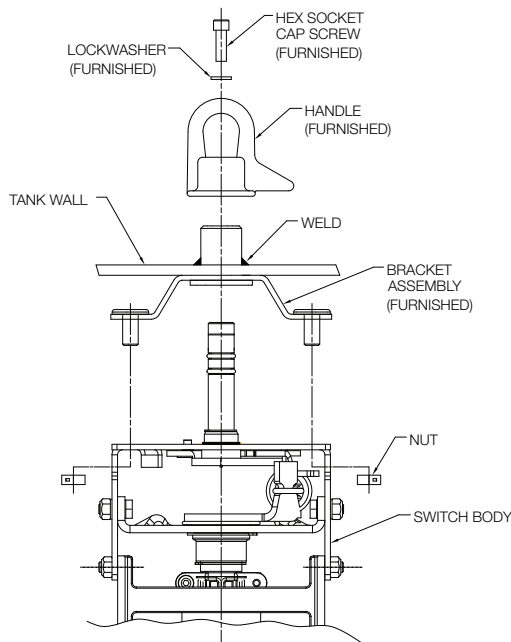


Figure 2. 2-position weld-in mount offset loadbreak switch.

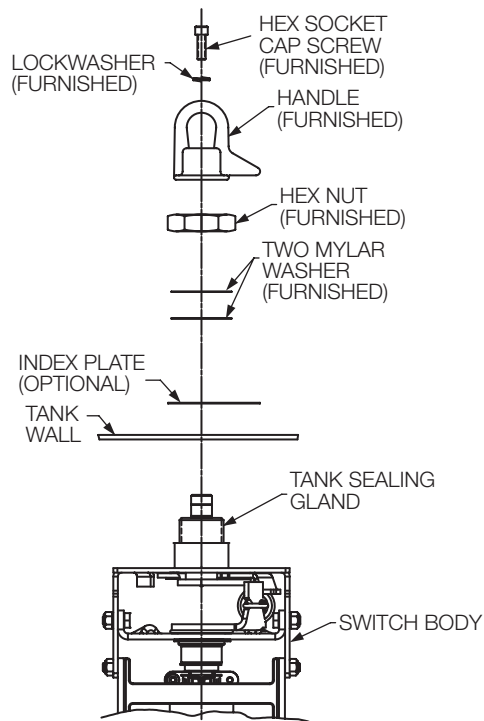


Figure 3. Two-position ring mount offset loadbreak switch.

Ring mount assembly (horizontal and vertical mount)

Note: The tank wall should have a 1.320" (33.5 mm) diameter hole with an anti-rotation key. Switch should be located to ensure recommended clearances in Figure 5 are maintained.

Note: Recommended socket for securing the locking nut is a 1-3/4" socket with 1-1/2" (38 mm) minimum socket depth.

1. Install the gasket over the threaded switch boss (with integral sealing gland) and insert the switch assembly through the tank hole (Refer to Figures 3 and 4).

Note: Make sure the gasket is properly seated in its proper location.

2. Position the switch with the stamping "TOP" visible at the top of the switch.
3. (Optional) Install indicator plate over the protruding threaded boss.
4. Install Mylar® polyester film washers (2) over the protruding threaded boss.
5. Assemble and tighten furnished locking hex nut to recommended torque in Table 4.
6. Install handle onto the switch shaft with the stainless steel hex socket cap screw and lock washer supplied and tighten to recommended torque in Table 4.

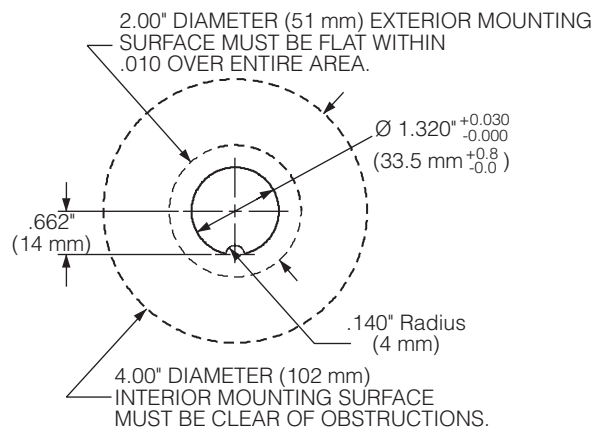


Figure 4. Hole detail (required for ring mount design).

Table 3. Recommended Torque (RING MOUNT)

Part	Torque Level
Locking Nut	40-60 ft-lbs (54-82 Nm)
Switch Handle Bolt	40-60 in-lbs (5-7 Nm)

Connect internal leads

1. Connect internal leads to the switch contacts with 3/8" or M10 hardware, (not supplied). (Max. cable connections 300 MCM or 125 mm²). Use torque values recommended by fastener manufacturers. Apply torque to the fasteners, not to the switch terminals.

WARNING

All leads, connections and contact blades must remain under oil. Failure to do so could cause arcing which may result in component failure, property damage or possible severe personal injury.

Recommended clearances

Mechanical

- External handle must be clear of obstruction. Clearances are also required for hook-stick operation.

Dielectric (under-oil)

- Clouds of gas rise during switch operation, so it is not recommended that other components be located above the switch, unless they are outside the arc clearance zone and have an insulated barrier between them that will deflect gas bubbles from switch operation away from the component above the switch.

The outline drawing shown in Figure 5 describes the switch and its application to oil-filled apparatus. This information should be used only by trained personnel familiar with the design requirements for oil-filled apparatus. This information is not intended as a substitute for adequate training and experience in such design. Should clarification or further information be required for the user's purposes, contact your Eaton representative.

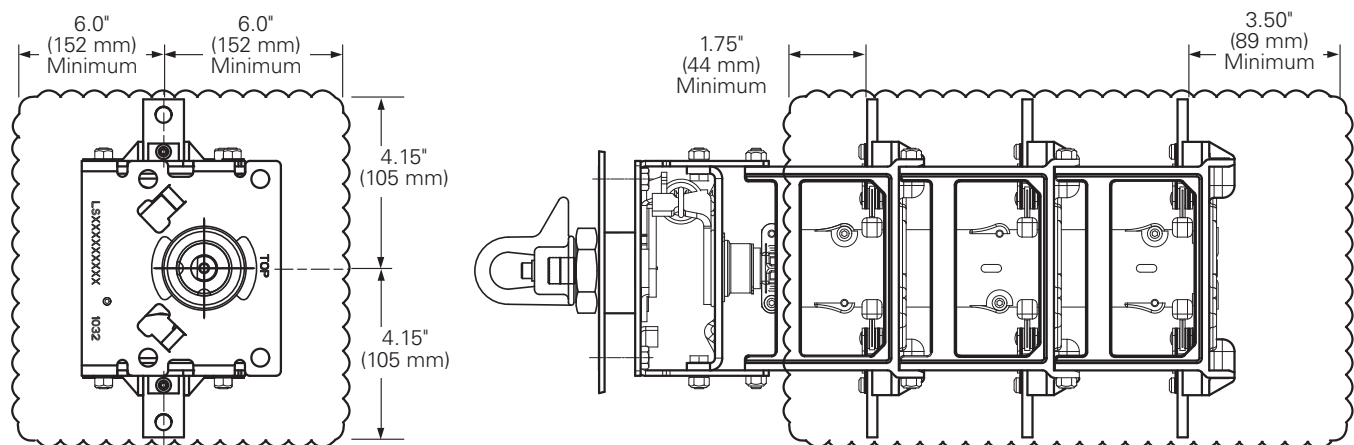


Figure 5. Arc clearance zone.

WARNING

Recommended (minimum) under-oil clearances must be followed to avoid internal arcing which could result in component failure, property damage or possible severe personal injury.

All energized parts of the 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 switch. This zone should be under oil and free of all foreign materials. The boundaries of this zone are defined in this outline drawing.

Dimensional information

Table 4. Dimensional Information for Figure 6

Number of Decks or Phases	Dimensions w/Standard Configuration (No Extensions) Inches/(mm)		Dimensions w/Short (1/2) Deck Extension Inches/(mm)		Dimensions w/Full Deck Extension Inches/(mm)		Dimensions w/Short (1/2) Deck + Full Deck Extension Inches/(mm)	
	"A"	"B"	"A"	"B"	"A"	"B"	"A"	"B"
1	8.14 (207)		10.2 (259)		12.0 (305)		14.0 (356)	
2	11.95 (303)	6.75 (171)	14.0 (356)	8.8 (224)	15.8 (400)	10.6 (269)	17.8 (452)	12.6 (321)
3	15.75 (400)		17.8 (452)		19.6 (497)		21.6 (549)	

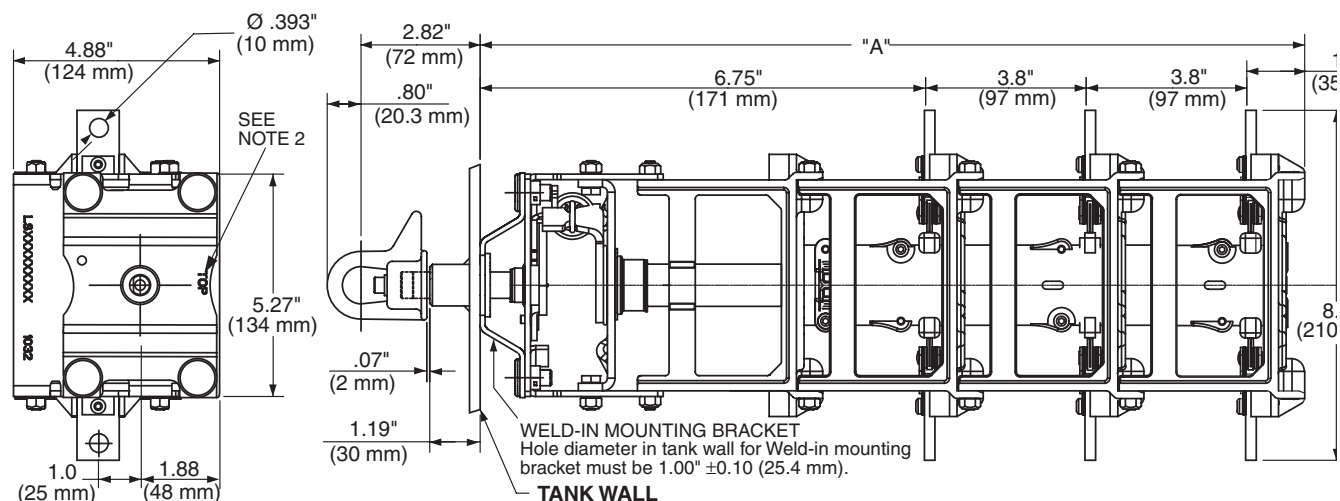


Figure 6. Line Illustration with dimensions of loadbreak switch with "Weld-in System" for horizontal or vertical mounting.

Notes:

1. Dimensions given are for reference only.
2. Switch shown with contacts "CLOSED" and flat of shaft on "BOTTOM" to position cast handle pointer to 9 o'clock when looking at switch with side marked "TOP" up. Handle is rotated approximately 90° CCW when it is in the "OPEN" position.
3. Handle can be used on 14 gauge .075 inch (1.9 mm) to .25 inch (6.4 mm) thick frontplate. 14 gauge shown.
4. Optional padlock handle and index plate are available. See catalog section CA800019EN.
5. See catalog section CA800019EN for switch types, number of phases, and catalog numbers.

Table 5. Dimensional Information for Figure 7

Ring Mount w/Standard Configuration (No Extensions) Inches/(mm)			Ring Mount w/Full Deck Extension Inches/(mm)		
Number of Decks or Phases	"A"	"B"	Number of Decks or Phases	"A"	"B"
1	7.83 (198 mm)		1	11.6 (295 mm)	
2	11.64 (296 mm)	6.4 (163 mm)	2	15.4 (391 mm)	10.2 (259 mm)
3	15.44 (392 mm)		3	19.3 (490 mm)	
Ring Mount w/ 1/2 Deck Extension Inches/(mm)			Ring Mount with 1/2 Deck + Full Deck Extension Inches/(mm)		
Number of Decks or Phases	"A"	"B"	Number of Decks or Phases	"A"	"B"
1	9.9 (251 mm)		1	13.7 (347 mm)	
2	13.7 (34.7 mm)	8.5 (215 mm)	2	17.5 (444 mm)	12.3 (312 mm)
3	17.5 (444 mm)		3	21.3 (541 mm)	

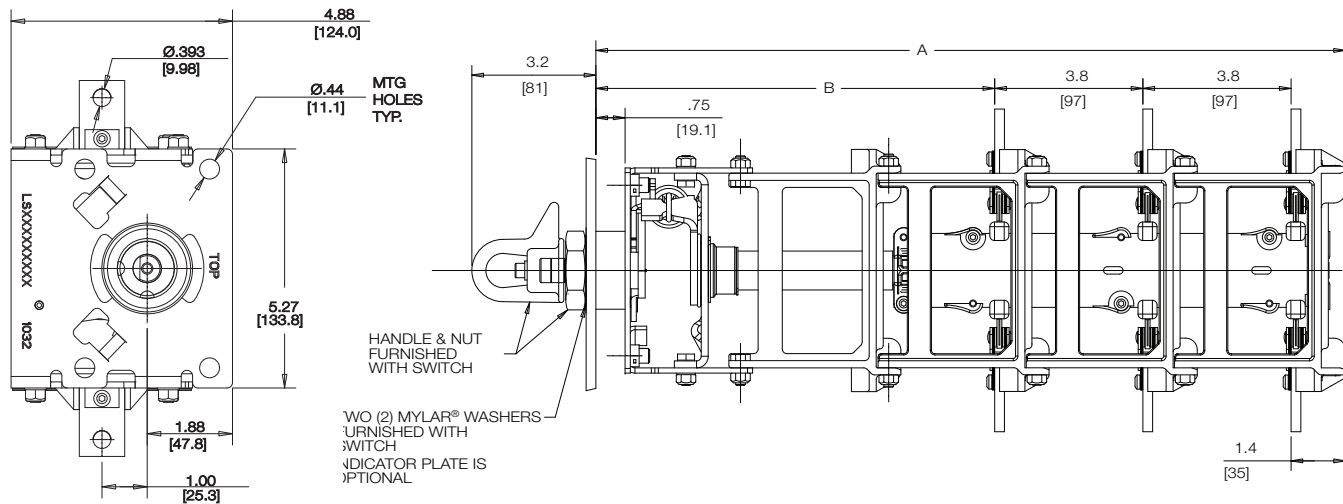


Figure 7. Line Illustration with dimensions of loadbreak switch with "Ring Mount System" for horizontal or vertical mounting.

Notes:

1. Dimensions given are for reference only.
2. Switch shown with contacts "CLOSED" and flat of shaft on "BOTTOM" to position cast handle pointer to 9 o'clock when looking at switch with side marked "TOP" up. Handle is rotated approximately 90° CCW when it is in the "OPEN" position.
3. Handle can be used on 14 gauge .075 inch (1.9 mm) to .25 inch (6.4 mm) thick frontplate. 14 gauge shown.
4. Optional padlock handle and index plate are available. See catalog section CA800019EN.
5. See catalog section CA800019EN for switch types, number of phases, and catalog numbers.

Operation

The operating torque is approximately 7-14 ft-lbs (9.5-19 Nm). During transformer assembly, it is recommended to operate the switch one complete cycle, after oil fill, (one cycle consists of open-close-open).

It is recommended that remote energization be used whenever possible, however, when operating loadbreak switches, use a hotstick tool. (Recommended tool - External Rod Clampstick with a Universal Fit-On head together with Leverage Bar CS125UFLTOOL. Refer to Catalog Section 325-30.) After loadbreak switch is switched to "open" position, verify that transformer secondary terminals have zero voltage and then ground the secondary terminals to prevent transformer backfeed energization.

Rotate the switch in one quick, continuous motion until the Loadbreak Switch handle has completed its movement from either the "Open" to "Close" position or the "Close" to "Open" position. After the desired position of the handle is reached, the operator should attempt to rotate the switch handle further, in the same direction, to ensure that it has completed its operation. If the switch handle has already fully completed its operation from the initial rotation of the handle, the operator will not be able to turn the handle further. At this point, the operator will know that the switch handle is fully in the desired position. If it is possible to move the handle further in the intended direction, then the rotation of the switch handle has not yet been completed and the operator should rotate the handle further until the switch handle operation has been completed.

The secondary voltage of the transformer should always be measured prior to doing any work on the secondary. If the switch has not operated properly or if there is an alternate source of power to the bushings, contact with the still energized bushings can result in burns or electrocution.

WARNING

The misapplication of the switch constitutes a potential hazard to life and property. Accordingly, the user must exercise due care in utilizing these instructions to assure that the switch is properly applied.

WARNING

Hazardous voltage.

- **Do not operate loadbreak equipment if a fault condition is suspected. Doing so can cause an explosion or fire.**
- **Use a hotstick to operate transformer loadbreak equipment.**
- **After operating transformer loadbreak equipment, check that voltages at transformer terminals are the expected values. Checking voltages verifies that loadbreak equipment operated properly and the electrical circuit conditions are as expected.**
- **Before servicing transformer secondary connected equipment, verify that all transformer secondary terminals have zero voltage and ground the transformer secondary terminals following industry accepted safe grounding practices. Grounding secondary terminals protects against situations such as a standby generator energizing transformer from the secondary circuit.**
- **Follow industry accepted safety practices. Utilize protective clothing and equipment when working with loadbreak equipment.**
- **These recommendations are in addition to any utility, end user, federal, state, local, or municipal regulations which may apply.**
- **Failure to follow this warning could result in component failure, property damage, severe injury, or death.**

WARNING

Transformers use conventional transformer oil or Envirotemp™ FR3™ fluid for an insulating liquid. When the insulating liquid temperature is less than -20 °C (-4 °F) for conventional transformer oil or less than 0 °C (32 °F) for Envirotemp™ FR3™ fluid, the increase in fluid viscosity may reduce make and break capabilities of loadbreak devices. Below these temperatures, under-oil loadbreak accessories should not be used to make or break a load (no more than two operations). Instead, de-energize transformer from a remote upstream source before operating under-oil loadbreak devices. Failure to comply may result in equipment damage, severe injury, or death.

WARNING

Enclosed "Warning" decal (Cooper P/N 1139596B02) must be displayed at or near operating handle of switch as a warning to service personnel. Failure to do so will constitute a waiver of all warranty and indemnity obligations which may be attributable to Eaton.



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