Section 3 - OVERHEAD TRANSMISSION SWITCHES

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INERTIA Engineering and Machine Works, Inc. adapted the industry leading design features of its distribution class switches, to produce a high quality, cost effective, unitized sidebreak style transmission switch.

The ease of installation that unitized distribution class switches provide is now available for transmission class switches. The phase units are shipped as completely factory assembled and adjusted units. The actual configuration is delivered fully unitized or modularized for fast, simple and easy field installation.

The LineBOSS™ 46 kV and 69 kV sidebreak switches are the lowest “cost to own” switches available today. Fully unitized or modular switches are hung on the pole in hours, not days. These switches also provide lower operating costs. Unbalanced conductor load or seasonal temperature changes can create line sag leading to contact misalignment on other style switches. This maintenance headache is eliminated by the LineBOSS™ sidebreak switch. Custom phase bases are available for installation on a wide variety of structures.

STANDARD FEATURES

- Unitized or modular construction on aluminum or steel crossarms for fast and easy installations.
- Factory adjusted, ready to mount with minimal, if any, field assembly required.
- Available with silicone (std.) or porcelain insulators.
- Reverse loop, silver plated copper jaw contacts.
- Maintenance-free, sealed, stainless steel ball bearings.
- Meets all applicable NEMA and ANSI standards.
- All ferrous components are hot dip galvanized.
- Tinned copper two-hole and four-hole terminal pads
- TDG (Thermal Diffusion Galvanized) coated ferrous components available for increased corrosion resistance.

STANDARD CONFIGURATIONS

- Horizontal, Center Mount
- Vertical, Phase over phase
- Delta, Triangular/Pole Top
- Twin Circuit
- Tap Switch: 1, 2, and 3-way
- Vertical, Tiered Outboard
- Horizontal, Underarm
- In-Line Tap
- Riser Switch
- Horizontal, Pole Top
- Vertical Twin Circuit
- Avian/Wildlife Protection

SPECIFICATIONS

<table>
<thead>
<tr>
<th>Voltage Class:</th>
<th>46 kV (48 kV max.) &amp; 69 kV (72.5 kV max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Class:</td>
<td>600, 900 and 1200 A, continuous</td>
</tr>
<tr>
<td>Momentary current:</td>
<td>600 A: 40,000 A-rms, 10 cycles</td>
</tr>
<tr>
<td></td>
<td>25,000 A-rms, 3 seconds</td>
</tr>
<tr>
<td></td>
<td>900 A: 51,000 A-rms, 10 cycles</td>
</tr>
<tr>
<td></td>
<td>32,000 A-rms, 3 seconds</td>
</tr>
<tr>
<td></td>
<td>1200 A: 70,000 A-rms, 10 cycles</td>
</tr>
<tr>
<td></td>
<td>44,000 A-rms, 3 seconds</td>
</tr>
</tbody>
</table>

Meets or Exceeds All Applicable NEMA, IEEE, ANSI, and IEC Standards

Continuous current ratings tested to IEEE C37.32-2005.

INTERRUPTER/LOADBREAK RATINGS (Maximum)

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Cable Charging</th>
<th>Magnetizing</th>
</tr>
</thead>
<tbody>
<tr>
<td>46 kV</td>
<td>18 A-rms</td>
<td>18 A-rms</td>
</tr>
<tr>
<td>69 kV</td>
<td>15 A-rms</td>
<td>15 A-rms</td>
</tr>
</tbody>
</table>

Vacuum Bottle Interrupters

<table>
<thead>
<tr>
<th>Voltage Class</th>
<th>AmpVac™ V</th>
<th>V4</th>
<th>V7</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.5 kV, 25 kV, 38 kV*</td>
<td>48.0 kV</td>
<td>72.5 kV</td>
<td></td>
</tr>
<tr>
<td>Interrupting Current</td>
<td>2000 A</td>
<td>2000 A</td>
<td>2000 A</td>
</tr>
<tr>
<td>Parallel Break Current</td>
<td>1500 A</td>
<td>2000 A</td>
<td>2000 A</td>
</tr>
<tr>
<td>Cable Charging Current</td>
<td>40 A</td>
<td>10 A</td>
<td>10 A</td>
</tr>
<tr>
<td>Magnetizing Current</td>
<td>21 A</td>
<td>70 A</td>
<td>70 A</td>
</tr>
</tbody>
</table>
LineBOSS™ Standard Configurations

**LineBOSS™ Selection Guide 46 kV - 69 kV (48 kV - 72.5 kV)**

**LineBOSS™ Selection Guide (48.0 kV - 72.5 kV)**

**LineBOSS™ Utilized Sidebreaker Switch**

**Voltage Class:** 48.0 kV (250 kV BIL) = 4
27.5 kV (350 kV BIL) = 6

**Current Rating:**
- 600 A = 6
- 900 A = 6
- 900 A = 9
- 1200 A = 1

**Insulator Type:**
- Polymeric Silicone® = S
- Porcelain® = P

*For increased insulation creepage:
  Add “1” for +1 voltage class

**Interrupter Type:**
- Arc Horn = A
- Arc Whip, Quick-break = Q
- High Speed Whip = SH
- Sectionalizer = SV
- Vacuum = 15.5 - 38.0 kV = V
- 48 kV = V4
- 72.5 kV = V7

**No Interrupter**

**Crossarm Type:**
- Galv. Steel = S
- No Xarm = X

*Customer specified loading (call factory).

---

**Control Rod Length:**
- 30 feet (standard) = 3
- Specify (10’ Sections) = __

**Control Rod Type:**
- Reciprocating (R) = 1
- 1 3/4” square fiberglass = 1
- 1” galvanized pipe = 4
- Torsional (T) = 6
- 1 1/2” galvanized pipe = 6

**Control Location:**
- Specify the quadrant by number, where the control is to be located.
- See Control Options Chart.

**Control Mechanism:**
- Reciprocating handle (R) = 1
- Torsional handle (T) = 2
- Motorized Operator (M) = M

---

*Note: Not all configurations are possible. Some design limitations may apply. Torsional control mechanisms are not available in all configurations.
Please contact us to see if your specific design configuration(s) is available.

---

ENG-2020 TRANSMISSION SELECTION GUIDE REV 2 RELEASE DATE: 4-29-2020
LineBOSS™
48 kV - 72.5 kV TRANSMISSION SWITCH
REQUEST FOR QUOTATION
E-MAIL: sales@inertiaworks.com | FAX: (209) 931-8186

Make copies of this form to transmit your switch requirements. If you have your own standard’s drawing, please fill out the customer information and send it with this fax form.

Step 1. Voltage Class _______ kV  Continuous Current Rating (ANSI)¹: ___________ Amps

Step 2. Insulator Type:  ☐ Silicone  ☐ Porcelain

Step 3. Interrupter Type:  ☐ ArcHorn  ☐ ArcWhip  ☐ Hi-speed Break  ☐ AmpVac 'V'  ☐ V4  ☐ V7

Step 4. Select Crossarm Type:  ☐ Galvanized Steel  ☐ Aluminum

Step 5. Select the configuration (circle one):

Step 6. Select Spacing:

☐ Standard  ☐ Custom (Fill in Spacing Dimensions below using configurations in Step 5.)

A” ________ “B” ________ “C” ________ “D” ________ “E” ________

Step 7. Select the control mechanism:

☐ Reciprocating (₋₋)  ☐ Torsional (₋₋)  Clockwise or Counterclockwise to open; viewed looking down on the handle.

*Note: Torsional control mechanisms are not available in all configurations. Please contact us to see if your specific design configuration(s) is available.

Step 8. Select the control mechanism quadrant (see fig. 1): ________

¹LineBOSS™ switches are ANSI rated switches. The LineBOSS™ Lx6xxxx is rated 600 Amps continuous current per the ANSI C37.30 temperature rise test requirements, and for 900 Amp continuous current per the IEEE 1247 temperature rise test requirements. The LineBOSS™ Lx9xxxx is rated 900 Amps continuous current per the ANSI C37.30 temperature rise test requirements. The LineBOSS™ Lx1xxxx is rated 1200 Amps continuous current per the ANSI C37.30 temperature rise test requirements.

Momentary current ratings (10 cycle) are: 600 A (ANSI C37.30) = 40 kA  900 A (ANSI C37.30) = 51 kA  1200 A(ANSI C37.30) = 70 kA

INERTIA Engineering & Machine Works, Inc.  6665 Hardaway Road  •  Stockton, CA  95215  Tel: 800-791-9997 | Fax: 209-931-8186  E-mail: sales@inertiaworks.com
Step 9. Select control rod (circle one):  
- Galvanized pipe: 1" 1½" other________  
- Fiberglass: 1¾” square other________

Step 10. Select control rod length (circle one):  
- 30 ft.  
- 40 ft.  
- other________

Step 11. Select additional accessories and modifications (check off and write in)  
- Provision for Neutral (4-wire)  
- Pole mounting bands  
- Substation mounting: Specify base mounting dimensions or furnish drawing.  
- Surge Arrestor brackets:  
  - set of 3 arrestor brackets  
  - set of 6 arrestor brackets  
- Extension links:  
  - set of 6; each 6” long  
  - set of 6; each 14” long  
  - “Y” Ball Clevis  
- Terminals:  
  - Terminal paddle for fired wedge connectors ______________________(specify size)  
  - Terminals, 2-hole copper NEMA pad #2-500 kcmil (600 & 900 A switch) Specify:_______  
  - Terminals, 4-hole copper NEMA pad 500-750 kcmil (1200 A switch) Specify:________  
  - Terminals, other; ______________________(specify size)  
- Sensor Brackets: 1 set of 3 brackets  
- Current/Voltage Sensors (Package Qty. of 3):  
  - Current  
  - Voltage  
  - Current/Voltage  
- Fiberglass section in pipe control rod:  
  - 1¾” square fiberglass  
- Station post insulator in control rod section  
- Intermediate control rod guides  
- Swing-arm type  
- Bonded handle  
- Grounding connector on crossarm _________AWG range  
- Key Interlock - single key for circuit switching safety (“locked open”)  
- Double Lifting Point  
- ArmorGalv® AG3000 (Thermal Diffusion Galvanizing) ferrous component coating³.

---
² Torsional control rods available in 1-1/2” Galvanized Pipe Only.
³ Ferrous components come Hot Dipped Galvanized (HDG) standard. Armorgalv AG3000 Thermal Diffusion Galvanizing (TDG) offers increased corrosion resistance.
ArcHorn
(Not an Interrupter)
The Arc Horn is not an interrupter and has no ratings. It is used as an arc deflecting mechanism to save the life of switch blades and contact clips. The ArcHorn, also known as “sacrificial arcing horn”, is the first point of contact during switch closing operations. The initial making current during a closing operation creates small arcs; pitting the arc horns. This “sacrificial” mechanism prevents degradation of the main contacts. The Arc Horn is used to redirect the arc resulting from residual or stored charge left in a line after a down-line circuit is opened. Arc Horns will not prevent damage from the inadvertent opening of a loaded switch.

ArcWhip
The ArcWhip has a small interrupting rating between 10 and 20 amps. ArcWhips can clear arcs from residual energy stored in capacitor banks, transformers or conductors. ArcWhips are only in the current path during switch opening operations. Quick break whips have an average life of 150 open operations.

AmpVac™ ‘V’
The AmpVac is an enclosed vacuum bottle interrupter where no gases are vented to the atmosphere. The AmpVac interrupter has much higher interruption capabilities than other load break devices. Single contact AmpVac interrupters break loads up to 1500 amps at 35 kV. Single vacuum bottle interrupters may be used at reduced voltages for parallel or loop switching applications as long as the peak recovery voltage does not exceed 38 kV. The is rated for 5000 operations. The AmpVac was tested to IEEE 1247.

High Speed Whip
The HSW, high speed whip (break) Interrupters are used to interrupt line charging current at system voltages up to 72.5 kV. They can also interrupt transformer magnetizing current at system voltages up to 72.5 kV. These interrupters are designed for 5000 open operations.
The V4 and V7 vacuum interrupters are single-gap load-breaking devices that utilize vacuum bottle technology, where no gases are vented to the atmosphere. The new single vacuum bottle design can break loads up to 2000 Amps at 46 kV and 69 kV (48kV and 72.5 kV); where it now replaces the original V2 and V3 multi-vacuum bottle designs. Vacuum bottle interrupters are not in the current path during the switch closing operation, and have no fault closing capabilities. The V4 and V7 vacuum interrupter is rated for 5000 operations.

Sectionalizer

Transmission line load sectionalizing requires moving blade gang operated switches to be able to interrupt parallel loops, line charging, and transformer magnetizing currents at system voltage levels. This is accomplished by combining the voltage interrupting capabilities of the High Speed Whip and the current interrupting capabilities of the AmpVac™ single gap vacuum interrupter.

Vacuum Bottle Interrupter Applications:

<table>
<thead>
<tr>
<th>Type of Switching</th>
<th>AmpVac™ V*</th>
<th>V4</th>
<th>V7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Rating:</td>
<td>15.5 kV, 25 kV, 38 kV*</td>
<td>48.0 kV</td>
<td>72.5 kV</td>
</tr>
<tr>
<td>Loadbreak, 70% PF</td>
<td>2000 A</td>
<td>2000 A</td>
<td>2000 A</td>
</tr>
<tr>
<td>Parallel Break &lt; 30% PF</td>
<td>1500 A</td>
<td>2000 A</td>
<td>2000 A</td>
</tr>
<tr>
<td>Cable Charging</td>
<td>40 A</td>
<td>10 A</td>
<td>10 A</td>
</tr>
<tr>
<td>Magnetizing</td>
<td>21 A</td>
<td>70 A</td>
<td>70 A</td>
</tr>
</tbody>
</table>

* Recovery voltage between source and load must be less than 38 kV, immediately.

Interrupter Attachment Device Application:

<table>
<thead>
<tr>
<th>Type of Switching</th>
<th>ArcHorn</th>
<th>ArcWhip</th>
<th>High Speed Whip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage Rating:</td>
<td>N/A</td>
<td>48.0 kV</td>
<td>72.5 kV</td>
</tr>
<tr>
<td>Cable Charging</td>
<td>N/A</td>
<td>15 A-rms</td>
<td>5 A-rms</td>
</tr>
<tr>
<td>Line Charging</td>
<td>N/A</td>
<td>3500kVA</td>
<td>3500 kVA</td>
</tr>
<tr>
<td>Magnetizing</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

3.12.1
Inertia’s unitized transmission switches install with the speed and ease of distribution switches and provide years of maintenance-free operation. Featuring the lowest installed, lowest operating cost switch comprised of quality components to ensure longer service-life.

### FEATURES

**Unitized/Modular Switches**

The LineBOSS™ 46 kV and 69 kV switches come from the factory with each phase unit completely unitized and adjusted. When the switch configuration calls for partial assembly, the LBS switch is broken down into easily assembled modules. The locations of the modules are fixed, requiring very little, if any, adjustment.

Benefit: Greatly reduced installed cost with minimal field assembly and adjustment of the switch.

**Interlocking phase base design with through-hole mounting bolts.**

The LBS 46 kV and 69 kV phase units have an interlocking design that securely clamps and locates each phase unit on the crossarm. Secure phase bases result in minimal movement over the life of the switch. Adjustments to the switch are virtually eliminated. The through-bolt fastening assures that user specified phase spacing is met without additional field measurements or adjustments.

Benefit: Reduced installed cost due to minimal assembly

Reduced maintenance cost through secure clamping

**Stainless steel/brass bearings in the bellcrank**

Bearings in the bellcrank mechanism reduce the force required to operate the switch and eliminate corrosion caused by plated metal-to-metal abrasion and wear.

Benefit: The ease of operation reduces risk of injury to personnel operating the switch and also translates into greater switch life.

**Busbar grade copper contact components.**

Inertia uses busbar grade copper contact components as they are structurally and electrically superior to cast contact materials. Cast aluminum and copper bronze contact castings are 34-36% conductive and often contain unseen surface irregularities and voids that create ‘hot spots’. Busbar grade C110 copper is 99% conductive and is many times smoother to provide better connection surfaces and is not subject to porosity.

Benefit: Reduced operating cost due to a cooler running switch. Longer service life with reduced energy loss.

**ANSI TR2xx series, 3” (48kV) & 5”(72.5kV) bolt circle station post insulators are provided in silicone or porcelain. Sealed stainless steel ball bearings on rotating stacks**

The LBS switches are offered with silicone or porcelain, three inch (3”) and five inch (5”) bolt circle station post insulators. Silicone insulators are standard, with porcelain available as a lower cost alternate.

Benefit: Silicone insulated switches are lighter and easier to install with minimal chance of damage when un-crating and erecting. Porcelain insulators provide a lower cost option.

The rotating insulators pivot on double sealed stainless steel ball bearings at both the top and bottom of the phase base providing smooth maintenance-free operation of the switch throughout its life.

Benefit: Total operating cost of the switch is reduced as less site visits are required for maintenance.

### BENEFITS

#### 3.13

**Inertia Engineering & Machine Works, Inc.**

6665 Hardaway Road • Stockton, CA 95215

Tel: 800-791-9997 | Fax: 209-931-8186

E-mail: sales@inertiaworks.com
**Design Specifications:**

1. Nominal voltage: 48 kV or 72.5 kV (46 kV or 69 kV), continuous current rating: (600 A, 900 A or 1200 A)
2. Insulators: Silicone rubber station post, BIL rating: 48 kV: 250 kV BIL, 72.5 kV: 350 kV BIL
3. Switch bearings: Sealed stainless steel ball bearings on all rotating insulators.
5. The switch shall provide means to attach line current/voltage sensors.
6. All ferrous components shall be hot dip galvanized.
7. Loadbreak shall be self-resetting; where the tripping speed of the loadbreak is independent of the switch operating speed.
8. Switch base (crossarm) is to be hot dipped galvanized steel or aluminum. Pole clearance spacing can be specified by the customer.
9. Operating rod: specify type and length of control rod, and insulated section, if required (see selection guide).
10. The gang operated sidebreak style switch shall be capable of seamless automation with a reciprocating motor operator. It shall be available with the motorized switch operator replacing the manual handle.
11. Switch phases shall be completely factory assembled. The switch configuration shall be either fully factory unitized and adjusted, or be modularized including factory assembled phase units for easy field assembly.
12. Crossarms shall have pre-drilled galvanized locating/mounting holes as prescribed by customer specified phase spacings.
13. Meets or Exceeds All Applicable NEMA, IEEE, ANSI, and IEC Standards as applicable for 46 kV (48 kV max.) & 69 kV (72.5 kV max.) (system voltage).

### Switch Ratings:

<table>
<thead>
<tr>
<th>Voltage Class:</th>
<th>Current Class:</th>
<th>Momentary Loadbreak:</th>
</tr>
</thead>
<tbody>
<tr>
<td>46 kV (48 kV max.) &amp; 69 kV (72.5 kV max.)</td>
<td>600, 900 and 1200 A continuous current</td>
<td>40,000 A-rms 10 cycles</td>
</tr>
<tr>
<td></td>
<td></td>
<td>25,000 A-rms 3 seconds</td>
</tr>
<tr>
<td></td>
<td></td>
<td>900 A: 51,000 A-rms 10 cycles</td>
</tr>
<tr>
<td></td>
<td></td>
<td>32,000 A-rms 3 seconds</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1200 A: 70,000 A-rms 10 cycles</td>
</tr>
<tr>
<td></td>
<td></td>
<td>44,000 A-rms 3 seconds</td>
</tr>
</tbody>
</table>

### Loadbreak Device Ratings:

#### ArcWhip Loadbreak:

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Cable Charging</th>
<th>Line Charging</th>
</tr>
</thead>
<tbody>
<tr>
<td>48.0 kV</td>
<td>15 A-rms</td>
<td>3500 kVA</td>
</tr>
<tr>
<td>72.5 kV</td>
<td>5 A-rms</td>
<td>3500 kVA</td>
</tr>
</tbody>
</table>

#### High Speed Whip Loadbreak:

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Cable Charging</th>
<th>Line Charging</th>
</tr>
</thead>
<tbody>
<tr>
<td>48.0 kV</td>
<td>25 A-rms</td>
<td>70 MVA</td>
</tr>
<tr>
<td>72.5 kV</td>
<td>20 A-rms</td>
<td>70 MVA</td>
</tr>
</tbody>
</table>
46 kV (48 kV) Single Phase Dimensions

ALL LBS4 SERIES SWITCHES USE SEALED, STAINLESS STEEL BALL BEARINGS.

ALL CURRENT CARRYING COMPONENTS & CONTACT SILVER PLATED C110 COPPER.

ALL FERROUS COMPONENTS ARE HOT DIP GALVANIZED.

NO ALUMINUM OR COPPER CAST COMPONENTS USED.

INSULATORS: PORCELAIN OR SILICONE RUBBER: 250 kV B.I.L

This drawing is for illustrative purposes only and therefore; may, or may not reflect the current revision of this drawing. Please request the current revision from the factory upon quote.

<table>
<thead>
<tr>
<th>Materials:</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Finish:</td>
<td>HDG</td>
</tr>
<tr>
<td>Scale:</td>
<td>NTS</td>
</tr>
<tr>
<td>Drawn By:</td>
<td>N/A</td>
</tr>
<tr>
<td>Date:</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Description: LBS4, 46 kV (48 kV) , Horizontal, Upright Dimensions

Drawing No.: 9223M

Revision: 00
46 kV (48 kV) Horizontal Upright Dimensions

This drawing is for illustrative purposes only and therefore may, or may not reflect the current revision of this drawing. Please request the current revision from the factory upon quote.

| Materials: | N/A | Description: | LBS, 46 kV (48 kV), Horizontal, Upright Dimensions |
| Finish:     | HDG | Drawing No.: | 9232M |
| Scale:      | NTS | Revision:    | 00   |
| Drawn By:   | N/A | Date:        | N/A  |
46 kV (48 kV) Horizontal Upright Dimensions

This drawing is for illustrative purposes only and therefore, may, or may not reflect the current revision of this drawing. Please request the current revision from the factory upon quote.

| Materials: | N/A | Description: |
| Finish: | HDG | LBS, 46 kV (48 kV), Horizontal (center mount), Dimensions |
| Scale: | NTS | |
| Drawn By: | N/A | Drawing No.: 9222M |
| Date: | N/A | Revision: 00 |
This drawing is for illustrative purposes only and therefore; may, or may not reflect the current revision of this drawing. Please request the current revision from the factory upon quote.

Materials: N/A
Finish: N/A
Scale: NTS
Drawn By: YU
Date: 12/14/16

Description:
LBS, 46 kV (48 kV), Vertical (Phase over Phase), Dimensions

Drawing No.: 9224M
Revision: 00
46 kV (48 kV) - 69 kV (72.5 kV) Tap Switch Dimensions

The vertically mounted tap switch is a gang operated pole mounted switch which can be used in various construction applications. Right hand (shown) and left hand operating models are adaptable to extreme horizontal and vertical line angles. Tin plated copper buss "tees" and bolted conductor clamps are available for connecting two, three, and four-way switch configurations.

NOTE: Minimum phase spacing shown. Alternate spacing is available. Reciprocating control mechanism shown. Torsional "swing" handle controls are available.

This drawing is for illustrative purposes only and therefore; may, or may not reflect the current revision of this drawing. Please request the current revision from the factory upon quote.

<table>
<thead>
<tr>
<th>Materials:</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Finish:</td>
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<td>Description:</td>
<td>LBS, 46 kV (48 kV) - 69 kV (72.5 kV), Tap Switch Dimensions</td>
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NOTE: MINIMUM PHASE SPACING SHOWN. ALTERNATE SPACING IS AVAILABLE. RECIPIROCATING CONTROL MECHANISM SHOWN. TORSIONAL "SWING" HANDLE CONTROLS ARE AVAILABLE.
46 kV (48 kV) Riser Substation H-Frame Dimensions

MINIMUM PHASE SPACING

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<th>Nominal Voltage Rating</th>
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NOTE: MINIMUM PHASE SPACING SHOWN. ALTERNATE SPACING IS AVAILABLE. RECIPROCATING CONTROL MECHANISM SHOWN. TORSIONAL “SWING” HANDLE CONTROLS ARE AVAILABLE.

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| Materials: | N/A |
| Scale:     | NTS |
| Drawn By:  | JN  |
| Date:      | N/A |
| Description: | LBS4, 46 kV (48 kV), RISER Substation H-Frame Mounted, Switch Dimensions |
| Drawing No.: | 9661-31M |
| Revision:   | 00   |
This drawing is for illustrative purposes only and therefore; may, or may not reflect the current revision of this drawing. Please request the current revision from the factory upon quote.

Materials: N/A
Finish: N/A
Scale: NTS
Drawn By: YU
Date: 12/19/16

Description: LBS6 69 kV (72.5 kV) Single Phase Unit, Dimensions

Drawing No.: 7000M
Revision: 00

NOTE: MINIMUM PHASE SPACING SHOWN. ALTERNATE SPACING IS AVAILABLE. RECIPROCATING CONTROL MECHANISM SHOWN. TORSIONAL "SWING" HANDLE CONTROLS ARE AVAILABLE.
**69 kV (72.5 kV) Horizontal Pole Top Dimensions**

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**NOTE:**
- MINIMUM PHASE SPACING SHOWN. ALTERNATE SPACING IS AVAILABLE.
- RECIPROCATING CONTROL MECHANISM SHOWN.
- TORSIONAL “SWING” HANDLE CONTROLS ARE AVAILABLE.

### Materials:
- N/A

### Dimensions:
- LBS6, 69 kV (72.5 kV), Horizontal (pole top),
- Control Rod Location
- 1/2" X 2-1/2" X 2-1/2" Dead End Brackets
- (5X) 1/4" Extension Links Provided
69 kV (72.5 kV) Vertical Phase Over Phase Dimensions

This drawing is for illustrative purposes only and therefore; may, or may not reflect the current revision of this drawing. Please request the current revision from the factory upon quote.

Materials: N/A
Finish: N/A
Scale: NTS
Drawn By: Y.X.
Date: N/A

Description:
LBS6, 69 kV (72.5 kV), Vertical (Phase over phase), Dimensions

Drawing No.: 9210M
Revision: 00
This drawing is for illustrative purposes only and therefore, may, or may not reflect the current revision of this drawing. Please request the current revision from the factory upon quote.

Materials: N/A
Finish: N/A
Scale: NTS
Drawn By: N/A
Date: N/A

Description:
LBS6, 69 kV (72.5 kV), Vertical (Phase over phase), Twin Circuit Dimensions

Drawing No.: 9212M
Revision: 00

NOTE: MINIMUM PHASE SPACING SHOWN. ALTERNATE SPACING IS AVAILABLE. RECIPROCATING CONTROL MECHANISM SHOWN. TORSIONAL “SWING” HANDLE CONTROLS ARE AVAILABLE.
69 kV (72.5 kV) Delta (Triangular) Dimensions

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NOTE: MINIMUM PHASE SPACING SHOWN. ALTERNATE SPACING IS AVAILABLE. RECIPROCATING CONTROL MECHANISM SHOWN. TORSIONAL "SWING" HANDLE CONTROLS ARE AVAILABLE.
NOTE: MINIMUM PHASE SPACING SHOWN. ALTERNATE SPACING IS AVAILABLE. RECIPROCATING CONTROL MECHANISM SHOWN. TORSIONAL “SWING” HANDLE CONTROLS ARE AVAILABLE.

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**Materials:** N/A
**Finish:** HDG
**Scale:** NTS
**Drawn By:** N/A
**Date:** N/A

**Description:**
LBS6, 69 kV (72.5 kV), Vertical (Tiered Outboard), 2 Right 1 Left, Switch Dimensions

**Drawing No.:** 9515M
**Revision:** 00