HUBBELL POWER SYSTEMS, INC.
210 North Allen Street
Centralia, MO 65240-1395
Telephone: (573) 682-5521

PSP8182074
Rev. B

IMPORTANT!
Keep this manual readily available for future reference.

Installation, Operation and Maintenance Manual

Type AR Unitized, Inverted Mounting Gang-Operated Overhead Switches for Distribution Switching

Swing Handle Control

Hook Stick Control
**Warnings**

**DANGER**

Electrical equipment contains hazardous voltages and high speed moving parts. Contact with these hazards will cause death, serious personal injury or damage equipment.

Only qualified personnel shall install, operate and maintain this equipment. Always properly ground equipment and lock out electric power (de-energize) before maintenance. Using non-specified/ unauthorized parts or components to repair equipment, or tampering with safety devices/systems will result in dangerous conditions which can cause death, severe personal injury or damage to equipment. Take note of and follow all safety instructions contained in this installation, operation and maintenance manual.

**IMPORTANT**

These installation, operation and maintenance instructions do not claim to cover all details or variations in equipment. Nor do they provide for all possible conditions encountered while installing, operating or maintaining this equipment. If further information is desired or needed to address any particular installation, operation or maintenance problem not covered in this document, contact your authorized factory representative.

The information in this document does not relieve the user from exercising good judgment in selecting equipment for suitability of application. Nor does it relieve the user from using sound practices in installation, operation and maintenance of the equipment purchased.

Note: Because Hubbell has a policy of continuous product improvement, we reserve the right to change design and specifications without notice. Should a conflict arise between the general information in this document and the contents of drawings or supplementary material, or both, the latter shall take precedence.

**QUALIFIED PERSON**

For the purpose of this manual, a qualified person is:

(a) **familiar with the installation, construction or operation** of the subject equipment and the hazards involved with its installation, operation and maintenance.

(b) **trained** to de-energize, clear, ground, and tag circuits and equipment in accordance with established safety practices.

(c) **trained** in the proper care and use of protective equipment such as rubber gloves, hard hat, safety glasses or face shields, flash clothing, etc., in accordance with established utility safety practices.

(d) **trained** to render first aid.

**SUMMARY**

The information in this document does not claim to cover all details or variations in equipment, nor to provide for every possible contingency encountered with installation, operation, or maintenance. Should further information be needed or problems arise that are not covered sufficiently, contact your factory representative.

The contents of this document are not part of, nor do they modify, any prior or existing agreement, commitment or relationship. Hubbell Power Systems, Inc. terms and conditions of sale constitute the entire obligation of Hubbell Power Systems, Inc. The warranty in the terms and conditions of sale is the sole warranty of Hubbell Power Systems, Inc.. Any statements in this document do not create new warranties or modify any existing warranty.
Contents

Section Subject ...........................................................Page Number
1 — Overview ......................................................................5
2 — Installation Requirements ..........................................7
3 — Receiving and Handling .............................................8
  3a – Inspect Packaging ...................................................8
  3b – Switch .................................................................8
  3c – Swing Handle Control ...........................................9
4 — Switch Installation.....................................................10
  4a – Switch Options .....................................................10
  4b – Switch .................................................................11
5 — Control Installation* ..................................................12
  5a – Swing Handle Control ............................................12
6 — Control Adjustment ..................................................16
  6a – Swing Handle Control ............................................16
7 — Pre-Operation Checks ..............................................17
8 — Dead-Ending & Wiring .............................................19
  8a – Dead-Ending ........................................................19
  8b – Wiring .................................................................19
9 — Operation ...............................................................20
  9a – Swing Handle Control ............................................20
  9b – Hook Stick Control ...............................................20
10 — Maintenance ........................................................21
11 — Trouble Shooting ..................................................22
12 — Control Drawing Sample ........................................23

*Hook stick operable control is factory assembled. No control components installation required.
## Contents

### Tables............................................................................ Page Number

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-1</td>
<td>Hardware torque specifications</td>
<td>7</td>
</tr>
<tr>
<td>11-1</td>
<td>Trouble shooting guide</td>
<td>22</td>
</tr>
</tbody>
</table>

### Figures..................................................................... Page Number

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-1</td>
<td>Switch in crate</td>
<td>8</td>
</tr>
<tr>
<td>3-2</td>
<td>Crate opened</td>
<td>8</td>
</tr>
<tr>
<td>3-3</td>
<td>Remove straps</td>
<td>8</td>
</tr>
<tr>
<td>3-4</td>
<td>Swing handle control and mounting components</td>
<td>9</td>
</tr>
<tr>
<td>4-1</td>
<td>Mounting</td>
<td>11</td>
</tr>
<tr>
<td>4-2</td>
<td>Hoisting</td>
<td>11</td>
</tr>
<tr>
<td>5-1</td>
<td>Swing handle control installation Steps 1–3</td>
<td>12</td>
</tr>
<tr>
<td>5-2</td>
<td>Swing handle control installation Step 4</td>
<td>13</td>
</tr>
<tr>
<td>5-3</td>
<td>Swing handle control installation Step 5</td>
<td>14</td>
</tr>
<tr>
<td>5-4</td>
<td>Swing handle control installation Step 6</td>
<td>15</td>
</tr>
<tr>
<td>6-1</td>
<td>Swing handle control adjustment</td>
<td>16</td>
</tr>
<tr>
<td>7-1</td>
<td>Switch sub-assembly components</td>
<td>17</td>
</tr>
<tr>
<td>7-2</td>
<td>Switch sequencing 1</td>
<td>18</td>
</tr>
<tr>
<td>7-3</td>
<td>Switch sequencing 2</td>
<td>18</td>
</tr>
<tr>
<td>7-4</td>
<td>Switch sequencing 3</td>
<td>18</td>
</tr>
<tr>
<td>9-1</td>
<td>Hook stick control opening</td>
<td>20</td>
</tr>
<tr>
<td>9-2</td>
<td>Hook stick control closing</td>
<td>20</td>
</tr>
<tr>
<td>9-3</td>
<td>Hook stick control lock out/tag out</td>
<td>20</td>
</tr>
<tr>
<td>12-1</td>
<td>Sample control drawing</td>
<td>23 &amp; 24</td>
</tr>
</tbody>
</table>
1 – Overview

About This Manual
This manual covers the inverted mounting of the Type AR unitized switch and its various control types.

Watch For This Arrow
The arrow at the end of each procedure will direct you to the next appropriate section and page number of the installation process.

Introduction
This manual is to guide you through the installation, operation and maintenance of the inverted Type AR unitized, gang-operated overhead switch. This manual does not claim to cover all situations that may arise during installation. If additional information is needed, contact your factory representative. Nor does this manual supersede your company's established guidelines and practices for similar equipment. Take note of and heed all danger, warning and cautions contained in this document.

Qualified Person
Only qualified trained and competent personnel that understand proper safety procedures must select, install and service this equipment.

Read and understand these instructions before installing, operating or maintaining this equipment.

This guide is not a substitute for adequate training and experience in safety procedures for this type of equipment.

Each is clearly noted in the title. At the end of each is an arrow with directions to the next appropriate sub-section.

Be sure you know the configuration and control type you are installing. This will greatly aid in navigating to the next step in the installation and adjustment process.

Note: This manual does not contain all necessary information. It is supplemented with a “control drawing” that presents dimensions and specifications unique to the switch configuration you are installing.

The Control Drawing
A separate control drawing is supplied with this manual. It is specific to the particular configuration and control ordered. It provides detailed information about the switch and must be used with this manual to assure a proper installation. Refer to the control drawing to obtain:
- Catalog numbers
- Installation notes
- Phase-to-phase spacing
- Pole mounting bracket and control pipe hole drilling locations
- Option descriptions and installation locations
- Switch and option parts lists
A sample control drawing is shown in Section 12.

Signal Words
The signal words “DANGER,” “WARNING” and “CAUTION” (along with their assigned symbol) throughout this manual indicate the degree of hazard the user may encounter. These symbols and words are defined as:

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
CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

Product
The products covered by this manual are the inverted Type AR unitized gang-operated overhead switches for medium voltage electrical distribution switching.

These products are designed for distribution switching only at their rated capacities. They cannot be field modified for capacities other than what was shipped with the units. If a different capacity is desired, contact your supervisor or factory representative to secure the appropriate unit.

Function
These products are loadbreak switches designed to provide a means for disconnecting, sectionalizing and isolating the electrical distribution system.

DANGER
Hazardous voltage.

Will cause death, severe personal injury, or property damage.

Only qualified personnel should work on or around this equipment after becoming thoroughly familiar with this document and other publications regarding this equipment.
1 — Overview

Switch Control Types
The inverted Type AR switch may be operated by two control types: down the pole swing handle or hookstick operation. The hook stick control is factory assembled and requires no control installation.

Application/Mounting
The inverted Type AR unitized gang-operated overhead switch is designed for mounting on wooden utility poles. If the utility pole is steel or concrete, mounting may be accomplished by means of holes made in the pole or by using brackets. Contact your factory representative for details on mounting the unit on steel or concrete utility poles.

Operating Environment
The inverted Type AR unitized switch is designed for outdoor installation and can be operated in direct sunlight in ambient temperatures between -40°C and +40°C.

Specifications

Electrical
- Nominal voltage ratings of 14.4 kV, 25 kV or 34.5 kV (model dependent)
- Lightning impulse peak withstand ratings of 110 kV or 150 kV (model dependent)
- Continuous current rating of 900 amperes
- Load current interrupt rating of 900 amperes
- Short time current withstand rating:
  - 25 kA symmetrical, 3 seconds
  - 65 kA peak
- Fault closing rating (close time < 0.5 second):
  - 25 kA asymmetrical 1 time
  - 20 kA asymmetrical 3 times

Dead-Ending
- Equal loading 8000 pounds (3630 kg)
- Unequal loading 700 pounds (320 kg)

Dimensions
Refer to the separate control drawing supplied with this manual for information specific to the switch ordered.

Motor Operator
For motorized or remote operation of the Type AR switch, review Catalog Section 14C or contact your factory representative.
2 — Installation Requirements

User Supplied Requirements
The following is required for installation. Be sure to have these items on hand before beginning installation.

Safety Equipment
• Hard hat
• Steel-toe work boots
• Appropriate eye protection per your company's policy
• Other safety equipment as required by your company's policies

Hardware
• 5/8 inch (16 mm) galvanized thru-bolts (or equivalent) long enough to pass through the center of the utility pole, plus 3 inches (75 mm)
• Curved galvanized washers for the 5/8 inch (16 mm) thru-bolts
• Galvanized nuts for 5/8 inch (16 mm) thru-bolts
• 1/2 inch (12 mm) and 5/8 inch (16 mm) galvanized lag screws (or equivalent)
• Flat galvanized washers for 1/2 inch (12 mm) and 5/8 inch (16 mm) lag screws
• Extension links (if not ordered with switch)

Electrical
• Terminal pad connectors (if not ordered with switch)
• Hubbell sealing paste (or equivalent)
• Surge arresters and wire (if needed)
• Pole grounding means
• Sensors, wire and connectors (if needed)

Options
Required items such as additional control pipe, surge arrester brackets, terminal connectors, extension links and crossarm braces not included in the basic switch package must be sourced separately. Contact your factory representative for ordering.

Hubbell Supplied Requirements
All necessary components and hardware specific to the installation of the Type AR switch ordered are included. Carefully check the components and hardware items against those listed in the separate control drawing (sample shown in Section 12). Contact your factory representative if any parts are missing.

Required Torque Specifications
It is the installing personnel's responsibility to be sure all threaded fasteners are installed with the correct torque. All user supplied hardware is to be torqued according to company standards. For switch and control hardware torque specifications, are listed in Table 2-1.

Table 2-1 — Hardware Torque Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>User Supplied Hardware</th>
<th>Hubbell Supplied Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>ft-lbs. N•m</td>
<td>Notes</td>
</tr>
<tr>
<td>5/8 inch (16 mm) thru-bolts</td>
<td>N/A</td>
<td>Company standards apply</td>
</tr>
<tr>
<td>5/8 inch (16 mm) lag screws</td>
<td>N/A</td>
<td>Company standards apply</td>
</tr>
<tr>
<td>1/2 inch (12 mm) lag screws</td>
<td>N/A</td>
<td>Company standards apply</td>
</tr>
<tr>
<td>Terminal connectors</td>
<td>N/A</td>
<td>Company standards apply</td>
</tr>
<tr>
<td>Item</td>
<td>ft-lbs. N•m</td>
<td>Notes</td>
</tr>
<tr>
<td>3/8 inch coupling spline bolts (locknuts)</td>
<td>25 34</td>
<td></td>
</tr>
<tr>
<td>3/8 inch adjustable guide bracket bolt</td>
<td>25 34</td>
<td></td>
</tr>
<tr>
<td>1/2 inch pole band bolts</td>
<td>60 81</td>
<td></td>
</tr>
<tr>
<td>1/2 inch pole band &quot;J&quot; bolts</td>
<td>60 81</td>
<td></td>
</tr>
<tr>
<td>Ground strap assembly</td>
<td>25 34</td>
<td>- 3/8 inch control pipe clamp</td>
</tr>
<tr>
<td></td>
<td>60 81</td>
<td>- 1/2 inch bracket clamp</td>
</tr>
<tr>
<td></td>
<td>25 34</td>
<td>- 3/8 inch parallel groove ground wire clamp</td>
</tr>
<tr>
<td>5/8 inch handle clamp bolt</td>
<td>25 34</td>
<td></td>
</tr>
<tr>
<td>3/8 inch U-bolts</td>
<td>25 34</td>
<td>Apply star torque pattern</td>
</tr>
<tr>
<td>Control Insulator</td>
<td></td>
<td>- 12 ft-lbs. (17 N•m) first pass</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 25 ft-lbs. (34 N•m) second pass</td>
</tr>
<tr>
<td>1/2 inch U-bolts (Surge arrester brackets)</td>
<td>60 81</td>
<td>Apply star torque pattern</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 30 ft-lbs. (40 N•m) first pass</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- 60 ft-lbs. (81 N•m) second pass</td>
</tr>
<tr>
<td>1/2 inch terminal hardware</td>
<td>60 81</td>
<td></td>
</tr>
<tr>
<td>1/2 inch crossarm brace bolt</td>
<td>25 34</td>
<td>Steel and fiberglass crossarm</td>
</tr>
<tr>
<td>3/8 inch sensor bracket bolts</td>
<td>25 34</td>
<td></td>
</tr>
</tbody>
</table>
3 — Receiving & Handling

3a – Inspect Packaging
Step 1. — Perform Inspection
• Upon receipt, immediately inspect packaging for signs of damage
• Start inspection with the packaging material and proceed to the equipment within
• Look for concealed damage
• If damage is found, note damage on “Bill of Lading” prior to accepting delivery, if possible

Note: Documentation of visible shipping damage can determine the outcome of any damage claim. Notifying the carrier of concealed damage within 15 days is essential to resolving or minimizing unsettled claims. Immediately file your claim and notify your factory representative.

3b – Switch
Step 1. — Unpack Switch
• Place shipping crate on stable, level surface near the utility pole
• Compare unitized switch with the illustration in Figure 3-1 and the parts list on the separate control drawing to be sure all items have been included
• Contact your factory representative if any parts are missing
• Remove the top, ends, and one side from the shipping crate as in Figure 3-2
• Remove hardware and straps holding switch to crate as in Figure 3-3
• Leave unitized switch on its pallet until ready to install

Next Step
Unpack Controls:
• Swing Handle Control — 3c, Page 9
• Hook Stick Control - Factory Installed — Go to 4a, Page 10
3c – Swing Handle Control

Step 1. — Unpack Control and Mounting Components

- Leave control pipe and handle on the shipping pallet until ready to install
- Compare the control pipe and handle components in Figure 3-4 with the parts list on the separate control drawing to be sure all items have been included
- Compare hardware items shown in Figure 3-2 with those listed on the separate control drawing to be sure all items have been included
- Contact your factory representative if any parts are missing

Install Switch:

- Switch Options — 4a, Page 10
4 — Switch Installation

4a – Switch Options

Hubbell makes available several options to enhance installation and operation of the Type AR unitized switch.

Note: Some of these options may have been ordered with the switch.

If the desired option(s) was not ordered with the switch, contact your factory representative.

Options

Additional Control Pipe

The extra 7 foot (2.1 m) control pipe section includes guide(s), coupling and all necessary hardware for attachment.

Extension Links

Extension links must be used on Type AR unitized overhead switch to provide dead end clearance. When extension links are ordered as an option, they are 14 inches (355 mm) long, hot-dipped galvanized and REA accepted. A.B. Chance catalog number C207-0112 (6 required per switch).

Control Insulators

A polymer insulator having a lightning impulse withstand rating of 150 kV and 26 inches (660 mm) of leakage distance is supplied with all necessary hardware.

Surge Arrester Brackets

When ordered as an option, 3 brackets are supplied for mounting 6 surge arresters (user supplied) for over-voltage protection.

Crossarm Braces

Crossarm braces may be ordered as an option in two versions:
- Steel — 1-3/4 inch (45 mm) hot-dipped galvanized steel angle
- Wood — 2 inch (50 mm) square pressure-treated wood

Terminal Connectors

Tin-plated aluminum parallel-groove clamps can be supplied as an option. Cable range is from a minimum of No. 2 solid copper (0.258 inch/6.55 mm) to a maximum of 500 kcmil (0.811 inch/20.6 mm) (6 per switch).

Sensor Bracket

Six channel formed galvanized steel brackets and hardware are supplied for 3 inch (75 mm) bolt circle or 3/4 inch (20 mm) center mounted voltage and current sensors. Sensor hardware not included.

Captive Hardware

When ordered, two stainless steel spline bolts are pressed into each terminal pad. Nuts and lockwashers are included.

Related Equipment

Hubbell makes available other parts and equipment to further enhance installation or operation. These are not available as an option on the Type AR switch and must be ordered separately.

Motor Operator

For motorized or remote operation of the Type AR Switch, review Catalog Section 14C or contact your factory representative.

Other Items

Any other electrical and/or hardware items used in the installation and maintenance of this switch can be supplied by Hubbell. Contact your factory representative for selection and ordering.
4b – Switch

Step 1. — Drill Holes and Install Hardware

- Refer to the separate control drawing and Figure 4-1
- Drill 2 — 11/16 inch (18 mm) holes on the utility pole's centerline according to dimensions given on the separate control drawing
- Install 2 — 5/8 inch (16 mm) thru-bolts, washers and nuts (user supplied) with bolt heads on the side of the utility pole the switch is to be mounted on
- Leave bolt heads sticking out 1 inch (25 mm)

Step 1. — Hoist Switch into Position

- Refer to Figure 4-2
- Secure lifting sling to pull-off brackets (30° minimum)
- Secure guide rope (not shown) as required.
- Using your standard company practice, hoist the switch into position
- Place unit so the upper bolt head sticks out of the mounting bracket's upper key hole and the lower mounting bracket slot is over the lower mounting bolt
- Lower switch until switch weight is resting on the mounting bolts
- Torque nuts to specified value per Table 2-1
- Remove lifting provisions used to hoist the switch

Step 3. — Install Pole Band

- Assemble pole band halves with nut, washer and bolt provided so band approximates 1/2 of the utility pole's circumference, and allows for installing and tightening the J-hook bolts to the switch mounting bracket
- Set pole band in position, insert J-hook bolts into switch mounting bracket and tighten to specified value per Table 2-1
- Secure pole band to utility pole with a 1/2 inch (12 mm) lag screw and washer (user supplied)

Step 4. — Bracing

- Crossarm braces are recommended if: 1) the pole mounting bracket poorly fits the pole curvature 2) the thru-holes are drilled larger than recommended or 3) the switch asymmetry causes excessive weight to be on one side of the pole.
- Drill an 11/16 inch (18 mm) thru-hole on center line of pole as shown on the separate control drawing
- Secure crossarm brace to the utility pole with a 5/8 inch (16 mm) thru-bolt (user supplied) and to the crossarm with the supplied hardware
- Torque nuts to specified values per Table 2-1

Next Step

Install Controls:
- Swing Handle Control — 5a, Page 12
- Hook Stick Control - Factory Installed — Go to Section 7, Page 17
5 — Control Installation

5a – Swing Handle Control

Step 1. — Prepare Control Pipes

- Locate control pipes, universal section, couplings, spline bolts and lock nuts
- Install a small-diameter coupling in one end of each control pipe using the spline bolts and lock nuts provided; the large diameter coupling attaches to the universal section
- Spline bolts may be tapped in to engage pipe and coupling
- Tighten lock nuts to specified value per Table 2-1

Note: There will be one control pipe without any coupling. This will be installed last.

Step 2. — Connect Universal Section To Switch

- Refer to Figure 5-1
- Connect universal section (steel or fiberglass) to the switch drive shaft using the larger dia. coupling, spline bolt, and lock nut provided and tighten to specified value per Table 2-1

Step 3. — Mount Upper Control Pipe Guide Bracket

Note: The upper control pipe guide bracket is fixed and its length cannot be adjusted.

- Refer to Figure 5-1
- Position the lower end of top universal section on the utility pole’s centerline
- Mark and drill on the utility pole’s centerline 6 inches (150 mm) below the end of the universal section an 11/16 inch (18 mm) diameter thru-hole as shown in Figure 5-1
- Mount the upper control pipe guide bracket (fixed) to the pole with a 5/8 inch (16 mm) thru-bolt, curved washer and nut (user supplied) placed through the bracket’s round hole
- Place a 5/8 inch (16 mm) lag screw with washer (user supplied) through the bracket’s slotted hole

Step 1 — Attach couplings to one end of control pipes using spline bolts and lock nuts. Note: One pipe will not have a coupling, it will be installed last.

Step 2 — Attach universal joint to switch drive shaft using large coupling, spline bolt, and lock nut.

Step 3 — Mount upper control guide bracket on utility pole’s centerline 6 inches (150 mm) below the bottom of the universal section.
5 — Control Installation

5a — Swing Handle Control

Figure 5-2 — Swing Handle Control Installation Step 4 (continued)

Step 4. — Install Pipes and Adjustable Pipe Guide Brackets

Note: Pipe guide brackets must be a minimum of 3 inches (75 mm) below any control pipe coupling spline bolt.

- Refer to Figure 5-2
- Insert the end of the control pipe (without the coupling) up through the top pipe guide bracket and connect it to the universal section using the spline bolt and lock nut provided; tighten to specified value per Table 2-1
- Mark and drill on the utility pole's centerline an 11/16 inch (18 mm) diameter thru-hole 6 inches (150 mm) below the end of the control pipe just installed
- Mount the next control pipe guide bracket (adjustable) to the pole with a 5/8 inch (16 mm) thru-bolt, curved washer and nut (user supplied) placed through the bracket's slotted hole
- Place a 5/8 inch (16 mm) lag screw with washer (user supplied) through the bracket's slotted hole
- Loosen the adjustment bolt in the control pipe guide bracket until Step 6
- Repeat the above procedures until all adjustable control pipe guide brackets and control pipe sections are installed

Note: The last control pipe section may need cutting to comply with your company's control handle mounting height specification/policy. If this is the case, establish the handle height and cut the last control pipe section to length prior to mounting. See separate control drawing for dimensions. Treat cut end with zinc-rich paint.

Step 4 — Bring end of first control pipe section (end without coupling) up through fixed guide and connect to the bottom of the universal section.

Mount adjustable guide bracket on utility pole's centerline 6 inches (150 mm) below the bottom of the control pipe just installed.
5 — Control Installation

5a — Swing Handle Control (continued)

Step 5. — Mount Handle Assembly, Handle Guide Bracket and Ground Strap Assembly

- Refer to Figure 5-3
- Measure and mark on the utility pole’s center line 6 inches (150 mm) up from the bottom of the last control pipe
- Drill an 11/16 inch (18 mm) hole through the utility pole’s centerline
- Slide ground strap clamp (pipe clamp end) up the control pipe approximately 24 inches (610 mm)
- Install handle assembly on control pipe so the handle points down
- Slide handle assembly up the control pipe approximately 18 inches (460 mm) and lightly tighten the clamp bolt to keep the assembly from sliding off — DO NOT set the piercing screw
- Slide the handle guide bracket (name-plate) up the control pipe and fasten it to the pole with two 5/8 inch (16 mm) thru-bolts, curved washers and nuts (user supplied)
- Loosen handle assembly clamp and slide it down the control pipe so the lock hasp on the handle can swing under the handle guide bracket with minimum clearance
- Rotate handle assembly to the “CLOSED” position and tighten handle clamp bolt
- Slide grounding strap clamp on the control pipe into position so it won’t interfere with handle rotation/operation and tighten to specified value per Table 2-1
- Mount parallel groove clamp end of the grounding strap to the handle bracket using the supplied hardware as shown in Figure 5-3 detail
- Install a suitable earth ground wire in clamp’s parallel groove and tighten to specified value per Table 2-1

![Figure 5-3 — Swing Handle Control Installation Step 5](image-url)

**WARNING**

High voltage electric contact hazard. Can cause death, severe personal injury or property damage. Install control handle with appropriate safeguards to prevent unauthorized switch operation, such as mounting out of reach or inside a fenced area, and padlocking control handle according to your company’s standard operating procedures.

Note: Grounding recommendations may differ from those of your company. Where differences exist, the operating procedures of your company shall take precedence.
5 — Control Installation

5a — Swing Handle Control  Figure 5-4 — Swing Handle Control Installation Step 6 (continued)

Step 6. — Set Adjustable Control Pipe Guides

• Refer to Figure 5-4

• Make sure all adjustable pipe guides are loose

• Use the pipe guide adjustment mechanism to align the control pipes so they form a straight line between the top (fixed) guide and bottom handle lock bracket

• Tighten adjustable pipe guides to specified values per Table 2-1

Step 6 — Set adjustable pipe guide brackets so control pipes don’t bind and are straight between the top and bottom fixed guides.

Adjust control pipe alignment by moving guides in or out, and side to side; then tighten carriage bolts per Table 2-1.
6 — Control Adjustment

6a — Swing Handle Control

Note: The Type AR unitized switch is shipped in the “CLOSED” position. The correct amount of overtoggle for positive switch closure is built into the drive mechanism. If for some reason the switch has been opened, return it to its full “CLOSED” position before proceeding.

Step 1. — Preparation

• Open and close switch several times
• Inspect entire installation for proper and unrestricted operation
• If undue restriction is encountered, readjust pipe guides and/or eliminate source of obstruction as needed

Step 2. — Set Control Handle in Closed Position

• Refer to Figure 6-1
• Rotate control handle until the switch is in the fully “CLOSED” position and drive mechanism is overtoggled
• Inspect handle position to be sure it rests in the center of the “CLOSED” side of the handle bracket, and the handle lock hasp freely swings down into position under the handle bracket
• If needed, loosen handle clamp bolt and adjust handle position; retighten handle clamp bolt

Step 3. — Check Switch and Control Handle Operation

• Gently cycle control handle; observe control pipe and switch operation
• Recheck control handle location relative to fully “CLOSED” and “OPEN” positions
• If all settings are correct and switch cycles freely, tighten handle clamp bolt to specified torque per Table 2-1 and set piercing screw
• If control mechanism or switch show signs of undue binding, check control guide alignment and make adjustments as required

Figure 6-1 — Swing Handle Control Adjustment

Step 2 — Make sure control handle is in the “CLOSED” position and the switch drive mechanism is overtoggled to the “CLOSED” position.

Pre-Operation Checks — Section 7, Page 17
7 — Pre-Operation Checks

General

Note: All switch contacts come factory lubricated. DO NOT remove this lubrication. If lubrication is removed, immediately relubricate with Dow Corning FS-1292 Silicone grease or equivalent.

The following pre-operation checks apply to all Type AR configurations.

The Type AR unitized switch is fully adjusted and function checked at the factory. To determine if shipping or installation damage has occurred, perform the following operational checks prior to placing the switch into active service.

Step 1. — Cycle Switch

• Slowly open and close the switch via control handle or hook stick (whichever applies)
• Observe switch blades to see if all three phases move together
• When fully closed, the control handle or hook stick (whichever applies) should overtoggle the operating arm to the drive phase of the switch by about 10° of rotation
• All three switch blades should now be fully seated in their contacts and against the back of the blade guide
• When fully open, the switch blades should be from 80° to 90° of rotation from the closed position
7 — Pre-Operation Checks

Step 2 — Opening Sequence

- Refer to Figure 7-2
- When closed, the blade should touch the back of the blade guide and completely engage all six of the stationary contact fingers
- Refer to Figure 7-3
- Upon initial opening, the “V” on the blade’s deflector should receive the interrupter pick-up lever

Note: The exposed metal portion of the deflector’s base should engage the interrupter pick-up lever’s exposed metal surface prior to the blade leaving the last set of contact fingers.

- Refer to Figure 7-4
- The interrupter must trip while the metal portion of the deflector’s “V” is in contact with the interrupter pick-up lever’s exposed metal surface
- If the switch fails to operate as described, contact your factory representative

Step 3 — Closing Sequence

- The switch closing sequence is opposite the opening sequence except the deflector passes under the interrupter pick-up lever
- The interrupter pick-up lever then drops to its normal position ready to engage the deflector’s “V” upon switch opening
- If the switch fails to operate as described, contact your factory representative

Next Step

Figure 7-2 — Switch Sequencing 1

Figure 7-3 — Switch Sequencing 2

Figure 7-4 — Switch Sequencing 3

• Deadending & Wiring — Section 8, Page 19
8a – Dead-Ending

General
Type AR switch has dead-ending brackets as an integral part of the cross arm. Located at the base of each switch phase, the dead-end rating is 8,000 pounds (3630 kg) where conductor pull-off forces are applied to both sides of the switch. The dead-end rating is 700 pounds (318 kg) where conductor pull-off forces are applied to only one side of the switch. Extension links are required to dead-end from the switch. Extension links may be supplied with the switch if that option was ordered. If not, extension links must be supplied by the user.

Note: If dead-ending on only one side, install switch so mounting bracket is on the side of the utility pole opposite the conductors.

Using your company’s standard practices, connect the extension links, insulators and conductors to the dead end brackets.

8b – Wiring

Step 1. — Jumper Conductors
• Using your company’s standard practices, jumper the conductors to the switch terminal pads
• Use sufficient conductor length to allow for free switch movement
• Train jumpers from the high voltage line to the switch terminal pads to avoid applying excessive bending forces to the terminal pads
• Form/train jumpers such that minimal mechanical load is applied to the terminal pads
• Excess mechanical forces may bend terminal pads causing contact misalignment - Refer to ANSI C37.30 series of standards for terminal pad mechanical load ratings and line conductor application

Step 2. — Connect High Voltage Conductors
• Wire brush mating surface of the switch terminal pads and terminal connectors
• Wire brush connector surfaces where conductors will be secured
• Wire brush conductor surfaces
• Apply a contact sealing paste to the cleaned surfaces (Hubbell or equivalent)
• Assemble connectors, conductors and hardware to the switch terminal pads
• Torque all hardware to specified values per Table 2-1

CAUTION
Excessive Terminal Pad Mechanical Load
May cause arcing, improper operation or switch damage
Minimize terminal pad mechanical load by forming/training the jumper connection to align with the terminal pad before securing to the terminal pad.

Next Step

Operation:
• Swing Handle Control — 9a, Page 20
• Hook Stick Control — 9b, Page 20
9 — Operation

9a — Swing Handle/Torsional Control
Note: Operate the switch quickly and without hesitation to its fully "OPEN" and/or "CLOSED" position. Slow switch operation and partial opening and/or closing must not be done. Fault closing rating requires less than 1/2 second operation of the switch.

Step 1 — Opening/Closing Switch
- Unlock control handle
- Move control handle from its locked position to a horizontal position
- Position feet and body in a manner that provides good stability and allows for control handle to move without losing a steady footing
- Under ice conditions, be prepared to use greater force to overcome the additional resistance
- Quickly and firmly move the control handle to its opposite position
- Move control handle into its locked position
- Lock control handle in accordance with your company’s standard operating procedure.

WARNING
High voltage electrical contact hazard.
Can cause death, severe personal injury or property damage.
Visually inspect switch blades to be sure they are in the desired position. Control handle position may not indicate true open or closed position of switch blades. Lock control handle according to your company’s standard operating procedure.

Step 2 — Lock Out/Tag Out (If applicable)
- Use your company’s standard practices to apply a lock out/tag out device into position utilizing provisions as shown.

9b — Hook Stick Control
Note: Operate the switch quickly and without hesitation to its fully "OPEN" and/or "CLOSED" position. Slow switch operation and partial opening and/or closing must not be done. Fault closing rating requires less than 1/2 second operation of the switch.

Step 1 — Opening/Closing Switch
- Position yourself below and slightly to the front of the switch’s hook stick mechanism
- Position feet and body in a manner that provides good stability and allows for hook stick use without losing a steady footing
- Under ice conditions, be prepared to use greater force to overcome the additional resistance
- From the front, insert hook stick (user supplied) into the uppermost (highest) operating "eye" of the hook stick lever
- Allow a minimum of 24 inches (610 mm) clearance from the bottom of the hook stick to the ground
- Quickly and firmly pull the hook stick down to rotate the hook stick lever to its opposite position
- Remove hook stick from the operating "eye" of the hook stick lever

Step 2 — Lock Out/Tag Out (If applicable)
- Use your company’s standard practices to apply a lock out/tag out device into position utilizing provisions as shown.
Maintenance

Prolong the life of the Type AR switch with a periodic inspection and maintenance program. Although the switch is designed for long-term exposure in all weather conditions, certain environments may reduce its life without periodic maintenance. Following these minimum inspection and maintenance procedures will help ensure long service life.

Note: It is recommended that all switches go through a maintenance check at least once a year; more frequently if located in a contaminated area.

For additional recommendations, refer to ANSI C37.35 “IEEE Guide for the Application, Installation, Operation, And Maintenance of High Voltage Air Disconnection and Load Interrupter Switches.

Inspection:

Insulators

Step 1 — Inspect Insulators

• Check all insulators for cracks, breaks or burns

Power Conductors

Step 1 — Inspect Conductors

• Be sure all conductors are routed so they do not interfere with switch operation
• Inspect all conductors to be sure terminations are tight and corrosion free
• Clean, retighten and apply contact sealing paste as needed (Hubbell or equivalent)

Switch

Step 1 — Check Mounting Hardware

• Check and tighten all thru-bolts and mounting hardware according to your company’s practices
• Inspect all pins, rivets and bolted connections for damaged or worn-out parts

Step 2 — Cycle Switch

• Open and close the switch several times to clean the contact surfaces and loosen moving parts

Step 3 — Check Switching Sequence

• Refer to Section 7 for details on switch cycling
• Inspect the switch for proper operating sequence

Step 4 — Inspect Switch Components

• Inspect for eroded fault making contacts
• Inspect for alignment and corrosion of the “live parts”
• Lubricate all contacts with Dow Corning FS-1292 silicone grease or equivalent
• Inspect for erosion of the exposed metal in the “V” of the deflector. Replace if exposed metal is eroded down to the plastic surround material.

Step 5 — Inspect Moving Parts

• Inspect all interphase and moving parts for damaged or worn-out components
• Lubricate as needed all control components with Hubbell silicone spray or equivalent

Step 6 — Inspect Interrupter

• Interrupters are sealed, non-service-able units
• Make sure interrupters are operating freely

Control Pipes & Handles

Step 1 — Check Mounting Hardware

• Check and tighten all thru-bolts, lag screws and mounting hardware according to your company’s practices

Step 2 — Inspect Control Components

• Inspect all pins, rivets and bolted connections for damaged or worn-out parts
• Lubricate as needed all control components with Hubbell silicone spray or equivalent

Replacement:

Parts & Parts Kits

To repair damaged switches, Hubbell makes available replacement parts and part kits. These are available for individual components and sub-assemblies of the switch, and the controls. To secure replacement parts or part kits, contact your factory representative. Have the model number, configuration and control type information to assure securing the correct part(s) or part kit(s).

DO NOT mix parts or cannibalize old switches. Use only Hubbell new replacement parts.
The following table presents the most common symptoms, their possible cause(s) and likely corrective action(s). These do not cover all possible problems. If you are unable to correct a problem using this trouble shooting guide, contact your factory representative.

Table 11-1 – Trouble Shooting Guide

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Possible Cause(s)</th>
<th>Corrective Action(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Switch blade(s) will not close</td>
<td>a) Drive lever not overtoggled</td>
<td>a) Adjust control handle for additional rotation</td>
</tr>
<tr>
<td></td>
<td>b) Overtoggle out of adjustment</td>
<td>b) Consult factory representative</td>
</tr>
<tr>
<td></td>
<td>c) Interphase out of adjustment</td>
<td>c) Consult factory representative</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switch blade(s) will not open</td>
<td>a) Inadequate rotation/travel in control handle</td>
<td>a) Adjust control handle for additional rotation</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switch blade(s) will not pick up</td>
<td>a) Switch blade(s) not full closed</td>
<td>a) See first symptom above</td>
</tr>
<tr>
<td>interrupter lever</td>
<td>b) Interrupter lever improperly aligned</td>
<td>b) Consult factory representative</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Switch is hard to operate</td>
<td>a) Swing handle control pipes and mechanism binding</td>
<td>a) Adjust alignment of guide brackets, tighten loose hardware</td>
</tr>
<tr>
<td></td>
<td>b) Corroded or worn control mechanism</td>
<td>b) Inspect and replace worn parts, and lubricate as needed,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interrupter fails to suppress arc</td>
<td>a) Worn or damaged interrupter</td>
<td>a) Replace as needed with factory authorized new parts</td>
</tr>
<tr>
<td>upon switch opening</td>
<td>b) Improper switch/interrupter sequencing/alignment</td>
<td>b) Consult factory representative</td>
</tr>
</tbody>
</table>
Figure 12-1 – Sample Control Drawing