



**Southern
States, Inc.**

The Quality Name in High Voltage Products

Type TA-OC Copper

Three Phase, Group Operated Switch
15.5 – 72.5 kV, 600-1200 A

INSTALLATION &

INSTRUCTION

MANUAL

Safety Information

DANGER

IMPROPER HANDLING, INSTALLATION, OPERATION OR MAINTENANCE OF THIS EQUIPMENT MAY CAUSE IMMEDIATE HAZARDS WHICH WILL LIKELY RESULT IN SERIOUS PERSONNEL INJURY OR DEATH.

WARNING

The equipment covered by this publication must be handled, installed, operated and maintained by qualified persons who have direct knowledge and experience dealing with the hazards involved and are thoroughly trained in the handling, installation, operation and maintenance of high voltage transmission and distribution equipment. These instructions are meant for only such **Qualified Persons**. They are not intended to be a substitute for adequate training and experience in safety procedures for this type of equipment.

A **Qualified Person** is one who is trained in and has skills necessary:

- to read and comprehend this instruction book – understanding that these instructions are general in nature
- to accept personal responsibility to prepare and maintain an intrinsically safe work environment and maintain control of the work site to safeguard all persons present
- to develop and implement a proper rigging, lifting, and installation plan along with all safety precautions required to insure safe and proper lifting and installation of the equipment.
- to distinguish between energized and non energized parts
- to determine proper approach distances to energized parts
- to properly work with and around energized or de-energized equipment that may be pressurized with gas
- for proper use of personal protective equipment, insulating and shielding materials, insulated tools for working near energized and /or pressurized electrical equipment
- to recognize and take necessary precautions for the unique and dynamic conditions of site and specialized equipment to maintain a safe work environment during handling, installation, operation, and maintenance of high voltage switching equipment

The instructions in this manual are general guidelines for this type of equipment and not specific to the equipment supplied. Portions of it may not be applicable or may not have complete instructions for your specific equipment.

If you do not understand any part of these instructions or need assistance, contact Southern States Service Division at 770-946-4562 during normal business hours (EST) or 770-946-4565 after normal business hours.



LIMITED WARRANTY

Southern States, LLC (“SLLC”) warrants only to the Warranty Holder (hereinafter defined as the “End User” or the “Immediate Purchaser”, as applicable, pursuant to the terms and conditions of this Limited Warranty as set forth below), that the Product identified below will, upon shipment, be free of defects in workmanship and material for the applicable Warranty Period. The “Warranty Period” is that period of time during which this Limited Warranty is effective, and such period begins on the invoice date issued by SLLC for the Product, and continues until the earlier to occur of (1) the expiration of the Warranty Duration period, or (2) the Number of Operations, both as specified in the table below. If the Product is both purchased and installed within the United States or Canada, this Limited Warranty is granted to each end user of the Product who acquired the Product for its own use during the Warranty Period (“End User”). In all other situations, this Limited Warranty is granted only to the first purchaser of the Product (“Immediate Purchaser”) from SLLC. No primary or remote purchaser or owner of the Product who is not a Warranty Holder may claim any benefit under this Limited Warranty, or any remedial promise included in this Limited Warranty. SLLC shall, upon prompt written notice from the Warranty Holder, correct a nonconforming Product by repair or replacement at the sole discretion of SLLC of the nonconforming Product or any part or component of a nonconforming Product necessary in SLLC’s discretion to make such Product conforming. Any transportation charges, labor for removing, reinstalling the Product or part, and/or costs related to providing access to the Product shall be the responsibility of the Warranty Holder. Correction in this manner will constitute the Warranty Holder’s exclusive remedy and fulfillment of all SLLC’s liabilities and responsibilities hereunder. SLLC’s duty to perform under this limited warranty may be delayed, at SLLC’s sole option, until SLLC has been paid in full for all products purchased by the Warranty Holder. No such delay will extend the Warranty Period. If SLLC does not make such repair or replacement, SLLC’s liability for damages on account of any claimed nonconformity will in no event exceed the purchase price of the Product in question. This Limited Warranty does not apply to any Product that has been disassembled, repaired, or altered by anyone other than SLLC. This Limited Warranty will not apply to any Product that has been subjected to improper or abnormal use of the Product. SLLC has no responsibility to repair or replace any Product or component thereof manufactured by another party, but SLLC will assign, to the extent assignable, to the Warranty Holder any manufacturers’ warranty that applies to products and components not manufactured by SLLC.

THIS LIMITED WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES. THERE ARE NO OTHER EXPRESS, IMPLIED, OR STATUTORY WARRANTIES. ALL IMPLIED WARRANTIES WHICH MAY ARISE BY IMPLICATION OF LAW, OR APPLICATION OF COURSE OF DEALING OR USAGE OF TRADE, INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, NONINFRINGEMENT OR OTHERWISE ARE EXPRESSLY EXCLUDED. SLLC SHALL NOT BE LIABLE OR RESPONSIBLE FOR ANY CONSEQUENTIAL, INCIDENTAL, INDIRECT, EXEMPLARY, SPECIAL, OR PUNITIVE DAMAGES, EVEN IF SLLC HAS BEEN ADVISED OF THE POSSIBILITY OF SAME. THE WARRANTY HOLDER IS SOLELY RESPONSIBLE FOR THE SUITABILITY OF THE PRODUCT FOR ANY PARTICULAR APPLICATION.

Product Purchased Region	Product Installed Region	Warranty Holder	Warranty Duration
U.S and Canada	U.S and Canada	End User	Five (5) Years
All Other Conditions		Immediate Purchaser	Earlier of 1 year from installation or 18 months from shipment

The type TA-OC Switch is a three-pole, single-throw, three insulator, center rotating stack, vertical break, group operated outdoor air disconnect switch.

1 Assembly and Adjustment

A. When insulators are shipped installed on the switch, proceed to Part 2. When shipped less insulators, proceed with Paragraph B.

B. Set up bases at ground level on transverse beams (base supports). Make sure the base support beams are level, then secure the switch bases to them so that during adjustment the switch does not tip over. The switch poles, in most cases, are easily tipped over after installing insulators.

C. Removal of live parts.

Open the blade and remove the jaw end live parts by removing the bolts holding the jaw to the insulator spacer. Then close the blade and remove the hinge end live parts. Discard the bolts and the red steel temporary blade stop used for shipping (Figure 3). Live parts on this switch may be removed and installed by hand. Take care not to damage live parts when removing and installing on the switch.

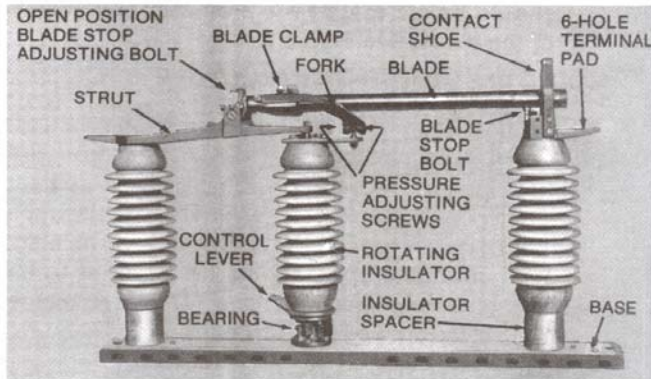


Figure 1 - Typical single-pole assembly.

D. Stack insulators

Consult your single-pole assembly and control arrangement drawings for proper position of levers, spacers, etc. Sort out hardware. Make sure the rotating insulator bearing is in the closed position before mounting insulators. Then mount and plumb insulators. Leave all bolts snug. Do not tighten!

E. Mount live parts on insulators.

Mount the jaw end assembly. Install the blade stop bolt and jam nut. See single-pole sub-assembly drawing for proper size bolt. Mount the hinge end assembly. Make sure the blade and the rotating bearing are both in the closed position. Tighten bolts on center rotating insulator stack.

F. Adjustment of switch in closed position.

With the blade in the front contact, as shown in Figure 2, be sure that there is good silver-to-silver contact between the blade and the contact shoes. Be sure the blade is square and centered in the contacts. Now tighten the bolts holding the contact assembly to the insulator. Tighten the hinge end insulator stack bolts. Adjust the blade stop bolt so that the blade will stop, centered ($\pm 1/8$ inch) in the contacts, as shown in Figure 2.

G. Adjust blade on front stop.

The blade should bear firmly against the blade stop as the blade begins its (wiping) rotating motion on the front contacts. This adjustment is made at the factory and should not need

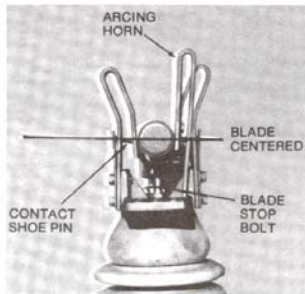


Figure 2 - Blade in front contact.

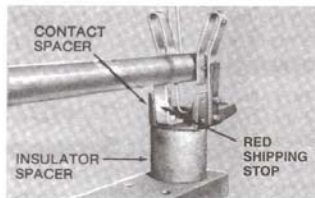


Figure 3 - Contact end.

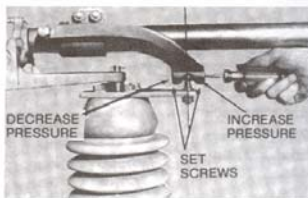


Fig. 4 - Closed blade stop adjustment.

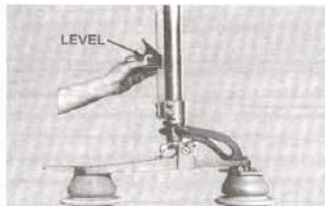


Figure 5a - 90° Blade opening.



Figure 5b - 70° Blade opening.

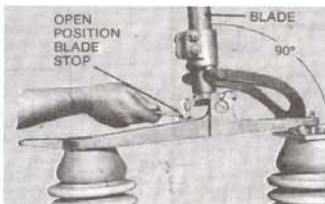


Figure 6 - Adjusting open blade stop.

correcting in the field. However, due to variation of the insulators, spacers or the addition of grounding switches, which were not a part of the original order, a change may be necessary. To adjust the pressure, loosen the set screws and turn the adjusting screws as shown in Figure 4. Both adjusting screws must be tight to maintain proper pressure on the ball joint. Re-tighten set screws after final adjustment.

H. Adjust switch in open position.

Rotate the center insulator stack to open the single pole. Be sure the open stop on the bearing at the base of the stack is backed off to allow the blade to open the proper amount. For **horizontal** mounted switches, blades should open 90 degrees; for **vertical** mounted and underhung mounted switches, the blades will open 70 degrees. Adjustment of the blade stop for 90 degrees opening is shown in Figure 5a. For 70 degree blade opening, adjust as shown in Figure 5b. Use stop bolt at the end of the blade (Figure 6) to adjust the blade opening until it is level as shown in Figures 5a or 5b. Set stop at base of rotating insulator to give a 1/8 inch gap between the rotating stop and the stop adjusting screw when the switch is in the full open position. The closed position blade stop should be set to give the proper closed position of the blade. (See Figure 7.)

2 Mounting Switch on Structure

A. CAUTION: Rigging used to lift switch poles should be attached to base! Lift poles onto structure, making sure the switch pole is in the closed and toggled position (Figure 9). It may be desirable to tie the fork to the strut to insure that the blade does not come open during lifting. Refer to the control arrangement drawing for proper placement of switch poles on structure.

B. Check mounting surfaces for unevenness. Switch bases will warp on uneven surfaces. Use shims under base to level if necessary.

C. Bolt bases solidly to structure.

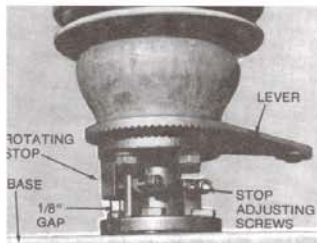


Figure 7 - Rotating insulator bearing.

3 Check Single Pole Adjustments

Be sure each single pole is properly adjusted before connecting the controls and operator.

A. With the switch bolted to the structure, check to make sure that the single pole opens as specified in the single-pole sub-assembly drawing. If a readjustment is required, refer to Part 1, Item H.

B. Check blades entering contacts. Be sure the blade enters the contacts in the center and, when rotated to the horizontal position, that silver-to-silver contact is made.

C. Check to see that the blade is horizontal in the contacts (refer to Figure 2).

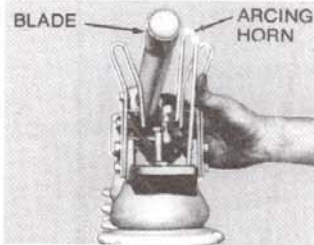


Figure 8 - Arcing horn adjustment.

4 Adjust Arcing Horns

(Fig. 8)

A. Arcing horns are shipped fully assembled and adjusted on the switch, but adjustment may become necessary. The arcing horn should be turned so that the curve is against the blade as shown in Figure 8.

B. Operate switch. Blade should make a light to firm sliding contact from the top of the curved horn to the fully closed position when the blade is rotated into the jaw contacts. Readjust the position of the arcing horn by bending as shown in Figure 8, until action is correct as described.

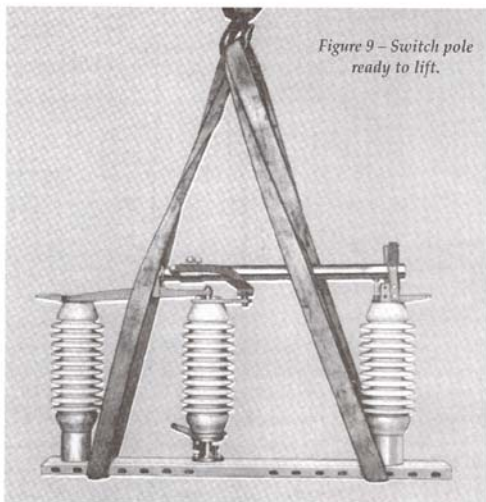


Figure 9 - Switch pole ready to lift.

5 Maintenance

This switch has been designed to operate with minimum maintenance. However, the following inspections will usually result in a safer and easier operating switch.

A. Before energizing switch, be sure to follow ANSI/IEEE C37.35-1976 "Guide for the Application, Installation, Operation and Maintenance of High-Voltage Air Disconnecting and Load Interrupter Switches." Pay particular attention to Section 5.11 "Inspection."

B. The switch should be cleaned periodically to remove contaminant particles that have been on the switch. Cleaning after installation is recommended to remove dirt or other contaminants that have been deposited on the switch during shipment, storage or installation.

C. Check for loose bolts and nuts; tighten if needed.

D. Examine the contact surfaces.
1. Switches are shipped with the contact surfaces coated with a conductive contact lubricant to prevent contact damage during

transit. Although the contacts are designed to operate dry, switch operating effort may be reduced with the use of the contact lubricant. If lubricant renewal is desired, apply C5-A lubricant after cleaning the contact surfaces.

2. If damage has occurred from pitting or wear, replace the damaged parts.

E. Examine the switch for blade contact alignment and realign, if necessary.

F. Check all galvanized surfaces for chips. If chipping has occurred, use an appropriated zinc rich coating as touch-up.

Operating Mechanism Installation

MANUAL AND MOTOR OPERATED

These switches are designed to be opened and closed as a three-phase unit by a system of pipes that translates the rotation movement of an operator on the ground—whether manual or motor—to simultaneous rotation of the end insulator of each switch pole. The illustration shows a typical operating mechanism for a 115 kV vertical break switch. Figure 2 shows, in plan view, alternate operating mechanism designs, each of which is employed as being the simplest arrangement for a given structure. In all cases, however, the operating principle remains the same, and the methods of installation and adjustment are virtually identical.

Refer to the Operating Mechanism Drawing provided with your switch and follow these steps:

- 1 Have all switch poles completely closed. Install all components shown on the Operating Mechanism Drawing, including interphase pipe, vertical pipe, all brackets, bushings, etc., and the adjustable crank arm.

IMPORTANT: The weight of the vertical pipe must be entirely supported by the pipe collar above the vertical bearing. The housing of neither the manual gear operator nor the motor operator was designed to support this weight. Additionally, if the vertical pipe is not suspended at the dimension shown, the decoupler mechanism will jam.

Figure 1 (Sketch only)

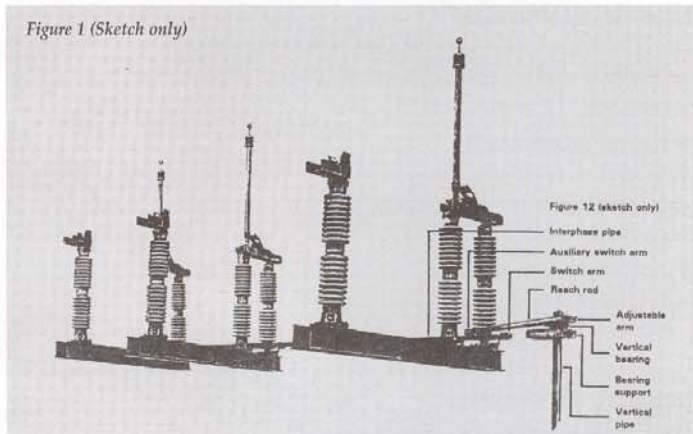


Figure 2

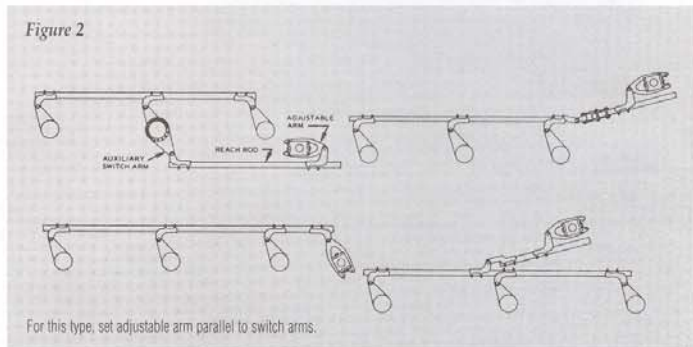
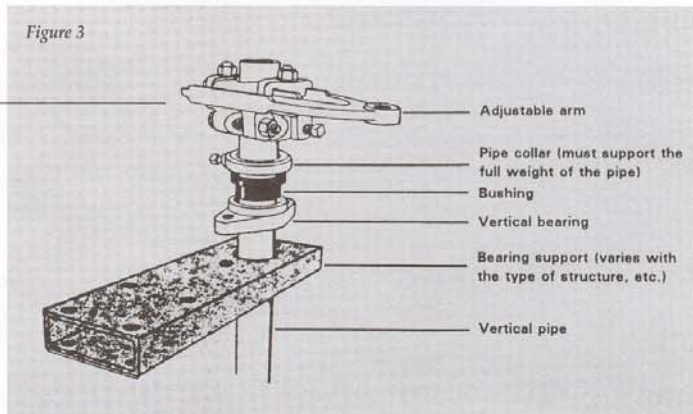


Figure 3



GENERAL INSTALLATION NOTE:

When a switch uses an auxiliary switch arm, installation will be easier if this pole is adjusted before installing the interphase pipe. This will eliminate trying to coordinate and adjust all three poles at once.

GENERAL INSTALLATION NOTE:

If the components have self-piercing set screws, during installation tighten them to only grip the pipe (*match mark to check for slippage*) and drive them in only after adjustments are completed.

2 If a motor operator is used, at this point refer to its installation instructions for mounting, checkout procedure and trial operations.

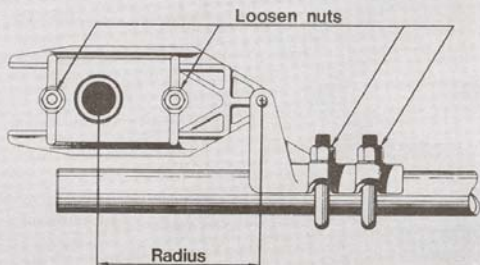
Operating Mechanism Adjustment

(If a motor operator is used, DO NOT USE ELECTRICAL OPERATION until the following adjustments are completed.)

NOTE: The setting of the adjustable arm on the Operating Mechanism Drawing is a calculated dimension. **To adjust precisely:**

- 1 The adjustable arm should travel 180 degrees from toggle closed to toggle open. (*Exceptions may occur. Refer to the Oper. Mech. Drawing.*) Manually test operate.
- 2 If the switch does not fully open, the radius of the arm is too short. **To correct:**
 - A. Check first to see that nothing has slipped.
 - B. Return the switch to the closed position.
 - C. Loosen the adjustable arm and clevis bolts as shown below.
 - D. Lengthen the radius of the adjustable arm about 1/4 inch and allow the clevis to reposition itself the same distance (*shortening the pipe*).
 - E. Test operate again and adjust as necessary.

Figure 4



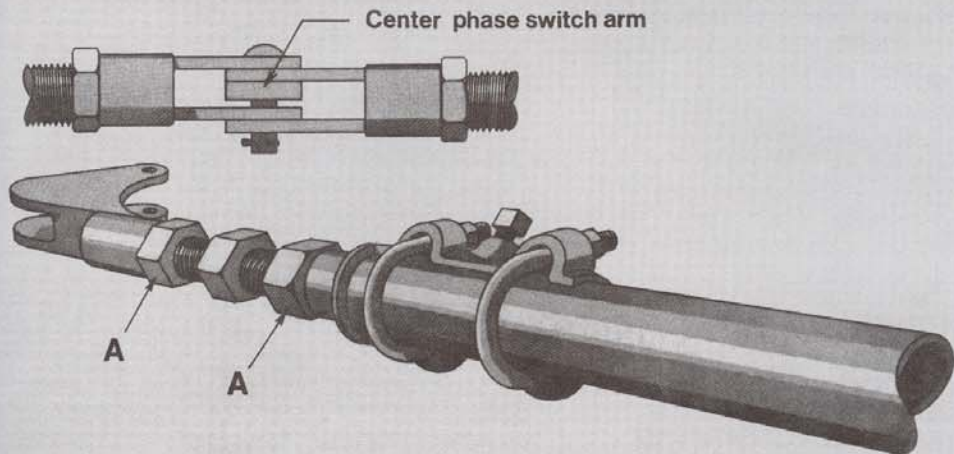
3 If the switch is fully open before the control handle reaches the open position, the radius of the adjustable arm is too long. **To correct:**

- A. Check to see that nothing has slipped.
- B. Return the switch to the closed position.
- C. Loosen the adjustable arm and clevis bolts as shown above.
- D. Shorten the radius of the adjustable arm about 1/4 inch and allow the clevis to reposition itself (*lengthening the pipe*).
- E. Test operate again and adjust as necessary.

All poles of the fully adjusted switch should operate simultaneously. Slight adjustment of the interphase clevises may be necessary to coordinate all three poles.

4 When the switch is completely adjusted, securely tighten all bolts, and tighten all set screw until the pipe walls are pierced. (*For heavy wall pipe, drill the set screw holes, using the threaded drill guides supplied and a 1/4" drill.*)

General instructions for threaded clevises



When threaded clevises are specified, one is generally attached to the adjustable arm, and two more to the center phase switch arm (*Refer to the plan view of the operating mechanism drawing, and the illustration below.*)

Operating mechanism adjustments consist mainly of incremental lengthening and/or shortenings of the pipes that connect the switch arms together. To make these adjustments, simply loosen both jam nuts "A" and screw the stud in or out as required. Be sure to retighten both jam nuts securely.

CAUTION! DANGER:

DO NOT SCREW THE STUD OUT OF THE CLEVISES.

This could cause the pipe to fall, resulting in serious injury to personnel below. Be sure the initial setting is correct, and do not adjust beyond the maximum allowable dimension. If adjustment beyond the maximum allowable dimension is needed, loosen the U-bolts on the outboard phase clevis and reposition the pipe toward the center phase.

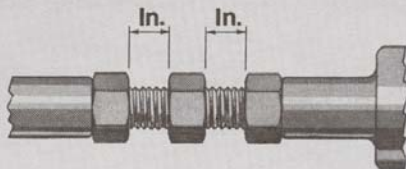
General instructions for threaded clevises

INITIAL DIMENSION:

...for 3/4" stud is 11/16"

INITIAL DIMENSION:

...for 1" stud is 1/2"

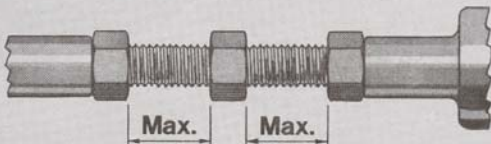


MAXIMUM ALLOWABLE

...for 3/4" stud is 1-3/16"

MAXIMUM ALLOWABLE

...for 1" stud is 1"



CAUTION! DANGER:

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This could cause the pipe to fall, resulting in serious injury to personnel below. Be sure the initial setting is correct, and do not adjust beyond the maximum allowable dimension. If adjustment beyond the maximum allowable dimension is needed, loosen the U-bolts on the outboard phase clevis and reposition the pipe toward the center phase.



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