



CLOSURE SPECIALISTS SINCE 1981

# MODCO™ FIGURE 500 CLOSURE

## INSTALLATION INSTRUCTIONS

**(!) THE INFORMATION PROVIDED IN THIS DOCUMENT IS VERY IMPORTANT (!)**

**&**

**(!) needs to be shared with everyone involved in installing the closure. (!)**

**(!) Modco appreciates the support of all SUPERVISORS. (!)**

**This document and under a separate cover “Operations & Maintenance Instructions”  
comes with every shipment.**

**If you are unsure about the provided information or can't identify parts of this**

**6 pages long document, please contact immediately (!) customer service:**

**1-(800)-378-8893 or 1-(936)-539-9222**

**sales@modcoind.com**

# PART 1: Disassembly of not installed closure

## 1.1 Disassembly of Horizontal Hinge Closure

1. If a Pressure Alert Valve (PAV) is present, remove the stem and screw it into the retainer on the cap.
2. On closures 14" and under, unscrew the cap from the hub and lift the attached hinge components from hinge base.
3. On closures 16" and larger, remove the outer set collar from the cap pin and remove the hanger arm from the cap pin. Leave the inner set collar in place, this will retain the parallel balance set by the manufacturer.

**NOTE:** A burr may be left behind by the set screw in the collar. Using a file or emery cloth, remove the burr to ease removal of the hanger arm and/or related components.

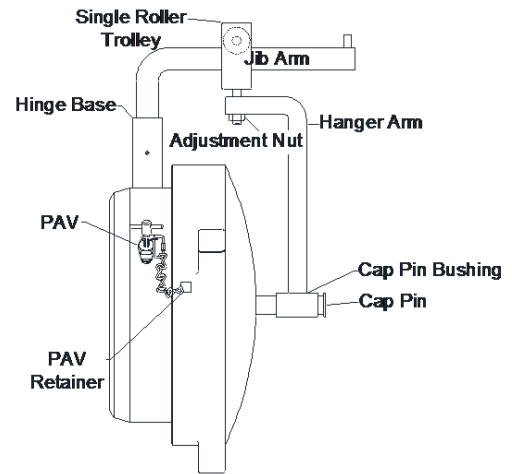
16" to 24" ANSI 300 class closures are equipped with a single roller trolley. Slide the hanger arm from the cap pin and lift the hinge components from the jib arm.

24" ANSI 600 and larger closures are equipped with a dual wheel trolley. Measure the distance from the bottom of the jib arm to the top of the hanger arm, or put a reference mark on the adjustment bolt above the hanger arm. Remove the nut, block and hanger arm from the closure. Do not remove the trolley from the jib arm.

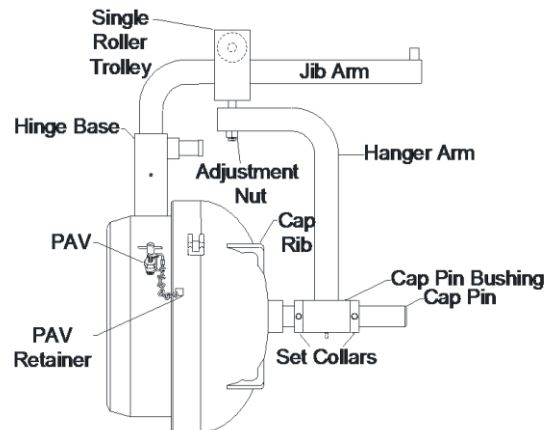
**NOTE:** 36" ANSI 600 closures and larger have roller bearings inside the cap pin bushing. Make sure the cap pin is free of all burrs to ease removal of the inner bearing race. Store bearings with care and keep them protected from dust, grit and other contaminants.

4. Remove the jib arm from the hinge base. The jib assembly of 24" ANSI 600 and larger closures are equipped with a brass bushing and tapered roller bearing inside the hinge base. Take care not to damage these components. Remove the tapered bearing race from the bottom of the hinge base.
5. Attach a hook sling to at least three cap ribs. Use the supplied opening tool to break the seal and loosen the cap if necessary. Using a crane, continue to unscrew the cap using just enough lift to keep the cap floating between threads. Keep lifting and turning till the cap clears the hub. Place the cap face down on a clean, flat surface. Plywood or a wooden pallet is preferred.

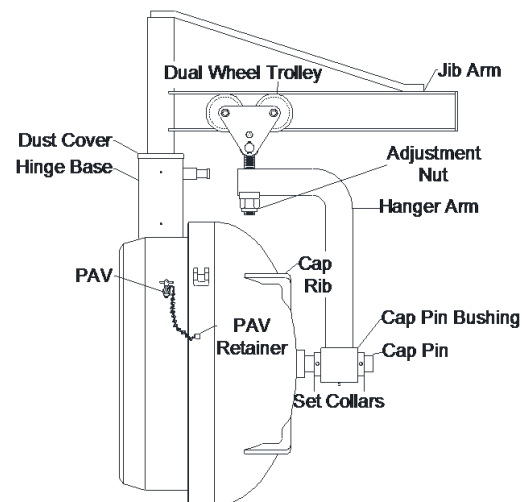
### Horizontal 6"-14" drawing



### Horizontal 16-24 300" drawing



### Horizontal 24 600"- 48" drawing



## 1.2 Disassembly of Vertical Hinge Closure

1. Locate the Pressure Alert Valve (PAV), remove the stem and screw it into the retainer on the cap. The PAV is standard on all closures 6" and larger, optional on sizes 2", 3", and 4".
2. On closures 14" and under, unscrew the cap from the hub and cap with lift the attached hinge components out of the davit base.

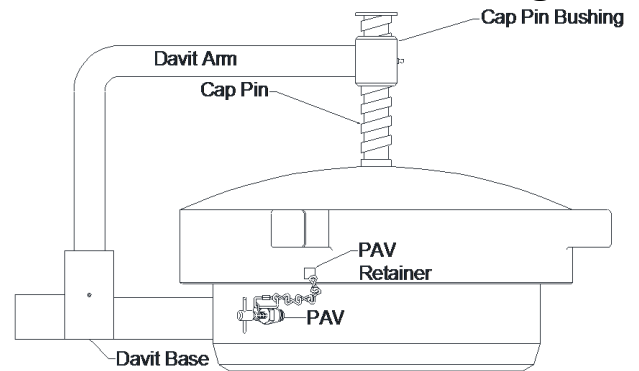
**IMPORTANT:** Keep the cap centered over the hub at this time. Swinging the cap to the side will cause a weight imbalance and the closure may fall over causing injuries and equipment damage.

On 16" and larger closures, use the supplied ratchet tool to break the seal, than unscrew the cap.

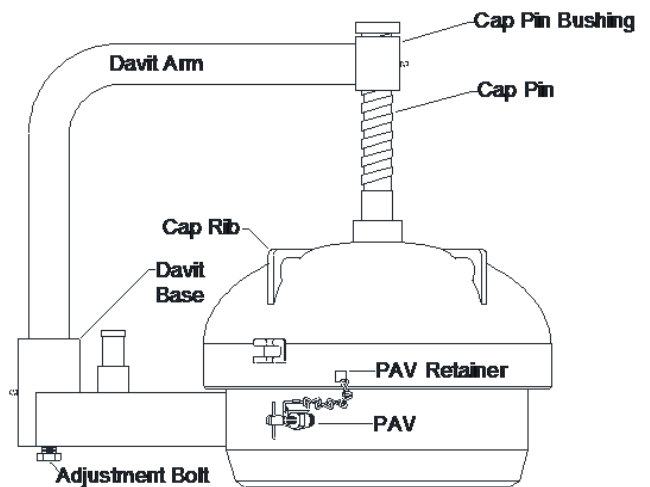
**IMPORTANT:** Keep the cap centered over the hub at this time. Swinging the cap to the side will cause a weight imbalance and the closure may fall over causing injuries and equipment damage.

3. Using a hook sling on at least 3 cap ribs and lift the cap with its hinge components out of the davit base. Support the davit arm also if needed. Please be aware the davit arm of 24" ANSI 600 and larger closures are equipped with a bronze bushing and tapered roller bearing inside the hinge base. Take care not to damage these components. Remove the tapered bearing race from the bottom of the davit base. Place cap face down on a clean flat surface allowing the arm to hang freely. Stacked wooden pallets are preferred.

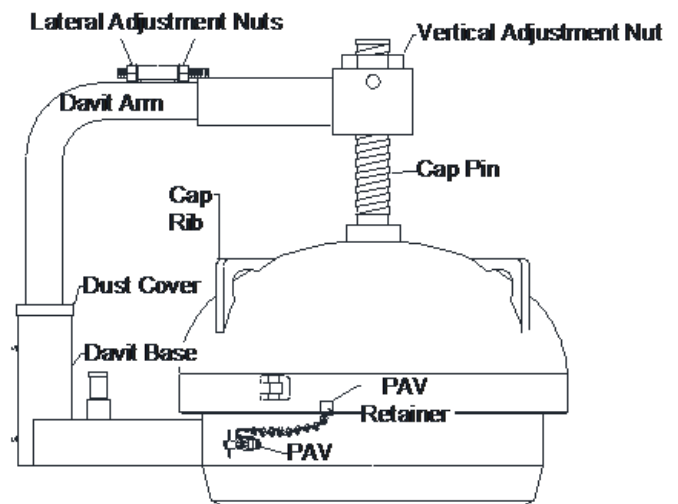
### Vertical 6"-14" drawing



### Vertical 16-24 300" drawing



### Vertical 24 600"- 48" drawing

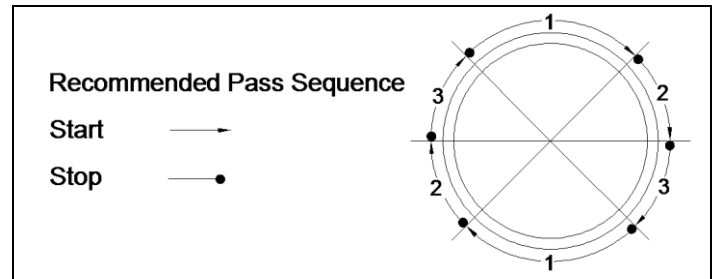


## PART 2: Attachment of the Closure

### Important:

All welding should be performed by qualified welders in accordance with qualified procedures. To avoid hub warpage, complete all nozzle and attachment welds prior to the closure installation!

### Recommended Pass:



### 2.1 For Closure Hub in the Field (Manual Welding)

1. Remove the PAV, O-ring, and cap from the closure hub. Remove the hinge components as shown in “PART 1”.
2. Fit the hub to the vessel. The use of internal or “spider” bracing is recommended, especially with thinner wall thicknesses.
  - 2a. No hinge closures shall be fit with the PAV in the 12 o’clock position on horizontal applications.
  - 2b. Hinged closures shall be fit with the hinge base level vertically.
3. Weld root and hot passes. The amount of heat should be minimized to avoid possible hub sealing warpage. Using two welders on opposite sides of the closure to reduce the amount of residual stress induced is highly recommended on sizes 16” and larger. A recommended pass sequence is illustrated on the top of the page.
4. Replace the PAV and reassemble the closure. Make any necessary adjustments. Reference the horizontal or vertical adjustment section of the Operations & Maintenance Manual for proper adjustment procedures.

### 2.2 For Closure Hub in the Fabrication Shops (Automatic Welding)

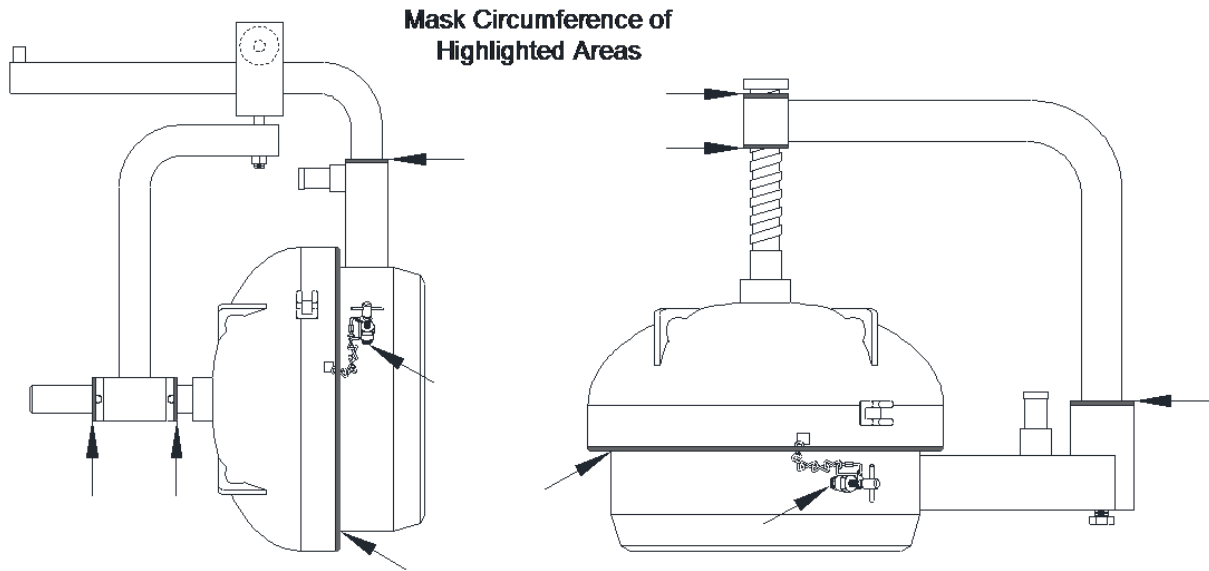
1. Remove the PAV, O-ring, and cap from the closure hub. Remove the hinge components as shown in “PART 1”.
2. Fit the hub to the vessel. The use of internal or “spider” bracing is recommended, especially with thinner wall thicknesses.
  - 2a. No hinge closures shall be fit with the PAV in the 12 o’clock position on horizontal applications.
  - 2b. Hinged closures shall be fit with the hinge base level vertically.
3. Weld the root pass. Using two welders on opposite sides of the closure to reduce the amount of residual stress is highly recommended on sizes 16” and larger. A recommended pass sequence is illustrated on the top of the page.
4. Complete the hub to vessel weld using care to minimize heat build up to avoid possible warpage of the hub seal face.
5. Before post weld heat treatment, remove all grease from the hub threads. A coating of an anti-splatter product used for welding will protect against scale build up during the post weld heat treatment. **DO NOT PERFORM POST WELD HEAT TREATMENT ON HINGE COMPONENTS OR THE CAP!**
6. Replace the PAV and reassemble the closure. Make any necessary adjustments. Reference the vertical or horizontal adjustment section of the Operation & Maintenance Manual for proper adjustment procedures.

## PART 3: Final tune ups

### 3.1. Sandblasting

Take the following precautions to avoid trapping abrasive media in critical areas. Abrasive media trapped in threads, seal, and moving parts may lead to operation trouble and severe thread galling.

- a. Mask critical areas with a suitable masking material.
- b. Thoroughly clean the thread, seal, and moving parts after blasting.
- c. Avoid blasting directly towards masked areas as shown below.



### 3.2 Ready to go Actions

Before delivery to the end user or storage plans, ensure the closure is ready for reliable service in the field. During final make-ready, grease all grease zerks until grease flows from the joint, then wipe away excess. The closure should operate with little to no thread drag. Operate the closure, if resistance or thread drag is felt, see section 5 of the Operations Manual for proper adjustment procedure. Keep the cat tool or lug wrench with their respective closures.



**CLOSURE SPECIALISTS SINCE 1981**

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# **MODCO™ FIGURE 500 CLOSURE**

## **OPERATION AND MAINTENANCE INSTRUCTIONS**

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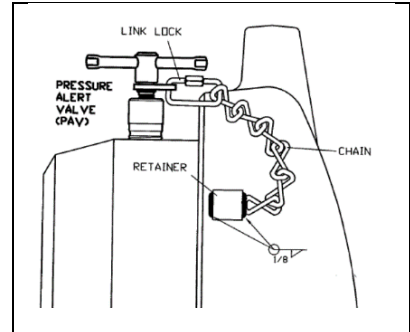
[sales@modcoind.com](mailto:sales@modcoind.com)

## Part 1: Operation Instructions

### Opening the Figure 500 Closure

- a. Make certain all pressure has been safely bled from the vessel or pipeline. Attempting to open a closure without doing so could lead to a violent expulsion of pressure resulting in injury or death.
- b. Remove the Pressure Alert Valve (PAV) stem, if so equipped, and screw it into the retainer on the cap. The PAV is used to alert the operator of residual pressure in the vessel or pipeline. Unrelieved pressure can cause severe injury or death. If residual pressure is indicated, replace the PAV stem and ensure the vessel or pipeline is bled of all pressure. Do NOT use the PAV to bleed pressure from the vessel.

**NOTE:** The Pressure Alert Valve (PIC #1) is standard on all 6 inch and larger closures. The PAV may not be present on two, three, or four-inch closures as it is an option on these sizes on non ASME code stamp closure.



PIC #1

- c. Check for reference marks indicating the closed position of the cap and hub (PIC#2&3). If none are present, make a temporary mark across the cap and hub (PIC#4), then follow the instruction in the “First Time Start Up” section of this manual.
- d. Rotate the cap counterclockwise with the lug wrench or ratchet tool provided (PIC#5&#7). Do not use a hammer to open the cap. Hammering will deform the lugs on the cap and possibly lead to cracking in the cap or injuries.
- e. Rotate the cap until it is free of the hub. Then swing the cap to the side to gain access to the vessel or pipeline.

**IMPORTANT:** For the safety of the operator and other crew members, stand to the side of the closure when opening the cap. Do not stand directly in front of the closure when opening (PIC#6 wrong & PIC#7 correct).

### Closing the Figure 500 Closure

- a. Align the cap to the hub and rotate clockwise. Tighten the cap with a lug wrench or ratchet tool until your reference marks line up (PIC#2,3&4). The reference marks indicate a metal to metal contact of the cap and hub sealing surface.
- b. On closures with a PAV, replace and tighten the PAV stem into the PAV body hand tight. Do not use tools to tighten the PAV, damage to the PAV may result.

**IMPORTANT:** The cap will tighten sufficiently with the included lug wrench or ratchet tool. Overtightening the cap will result in damage to the threads and sealing surfaces of the cap. Do not use a hammer to tighten the closure.





**PIC #2**



**PIC #3**



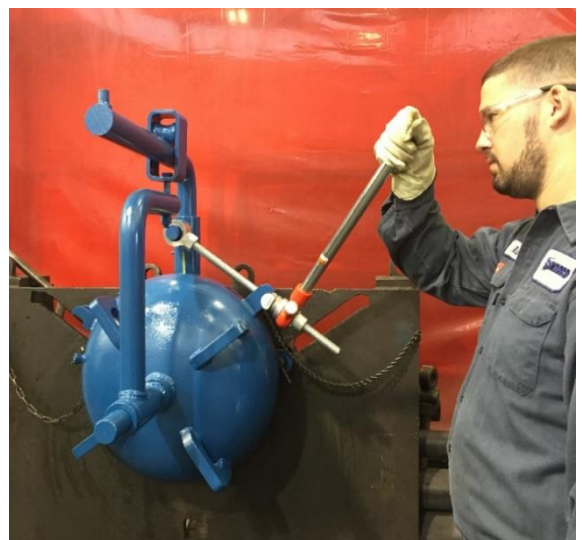
**PIC #4**



**PIC #5**



**PIC #6**



**PIC #7**

## First Time – Start up

- a. Open the closure as shown in the section “Opening a Figure 500 closure”.
- b. With the closure open, remove the O-ring and clean the sealing surfaces of the cap and hub removing all grease and debris.
- c. Apply a thin film of clean grease or Prussian Blue non-drying dye to the sealing surface of the cap. Carefully close the cap until it makes solid contact with the hub. Use caution to avoid over tightening or unnecessary force when mating the cap to the hub. The sealing surface of the hub and cap should now have metal to metal contact and cannot be tightened further. At this point, make permanent alignment marks on the cap and hub for future reference.
- d. Remove cap from hub and check for a clean and consistent transfer of grease or dye from the sealing face of the cap to the hub. If dye was used, clean it from the sealing surfaces now. Grease can remain on the closure.
- e. After verifying the condition of the closure and O-ring as described in “Part 2 Maintenance Instructions”, place the o-ring into the o-ring groove and make sure it is seated fully and not twisted. Apply lubricant to the threads and seal area of the closure. Use anti-galling lubricant, like light to medium lithium grease. Do not use silicone type grease.
- f. Close the cap until the alignment marks on the cap and hub return to their original positions. Use your ratchet tool or lug wrench if necessary to compress the O-ring. The closure should now have metal to metal contact between cap and hub with the O-ring in the groove and fully sealed. Take care not to over tighten the closure after all relative motion stops, or your reference marks line up. Overtightening may result in damage to closure or tightening tool.

## Proper adjustment of the Closure - Horizontal hinged closure

### a. 3”-4” Horizontal Hinged closure:

These closures are manufactured with no adjustment mechanism. No adjustment is necessary.

### b. Horizontal hinge closures 6 through 14 inch:

Center the cap to hub using the vertical adjustment nut below the hinge arm (PIC#8&11).

### c. Horizontal closures 16” and larger:

Vertical adjustment to center the cap to the hub is made by turning the adjustment nut located under the trolley assembly (PIC#8).

Position the cap close to the hub to inspect parallel alignment. Adjustments are made by moving the hanger arm in or out along the cap pin.

**Important:** Parallel Adjustment must to be made with the cap threaded on to the hub!  
Otherwise the cap may fall when the set collars are loose.

If the cap is closer at the top of the hub, loosen the inside set collar (closure must be closed) and move the hanger arm in towards the cap. When parallel alignment has been achieved move the outer set collar in towards the cap accordingly. If the cap is closer at the bottom of the hub, loosen the outer set collar (closure must be closed) and move the hanger arm away from the cap (PIC#8). When parallel alignment has been achieved move the inner set collar away from the cap accordingly and tighten both set collars. **Never leave the outer set collar loose!**

**Note:** Set collars may leave a bur on the cap pin due to the set screw in the collar. Remove the bur with a file or emery cloth to ease movement of the hanger arm.

## Proper adjustment of the Closure - Vertical hinged closure

### a. 3"-8" ANSI 150-900 closures and 10"-14 ANSI 150-600 closures:

These closures are manufactured with no adjustment mechanism. No adjustment is necessary.

### b. 10" - 14" ANSI 900 closures:

The cap should screw on to the hub with little to no thread drag. Use the adjustment bolt located in the bottom of the davit base (PIC#9) to lift or lower the cap to eliminate contact between the two components.

### c. 16" - 24" ANSI 300:

The cap should screw on to the hub with no thread drag. Use the adjustment bolt located in the bottom of the davit base (PIC#9) to lift or lower the cap to eliminate contact between the two components.

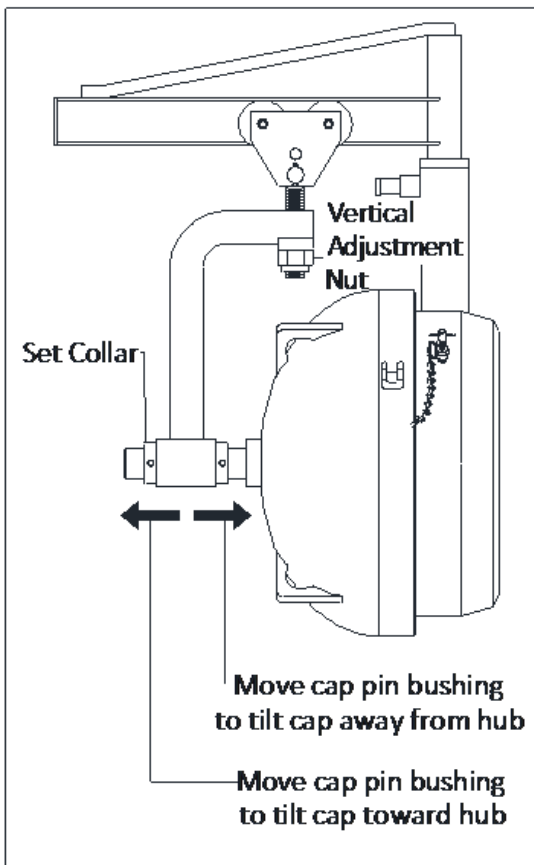
### d. 24" ANSI 600 and larger:

#### Lateral Adjustment:

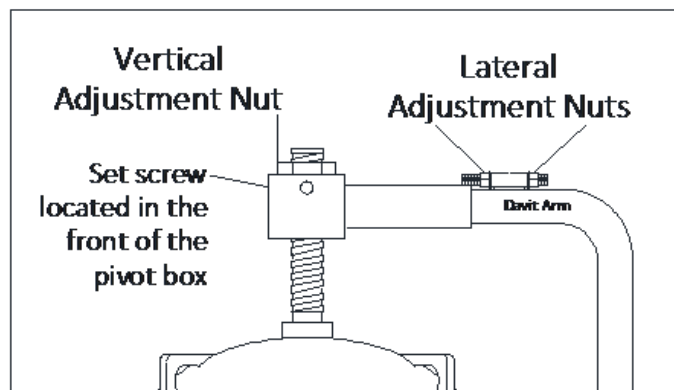
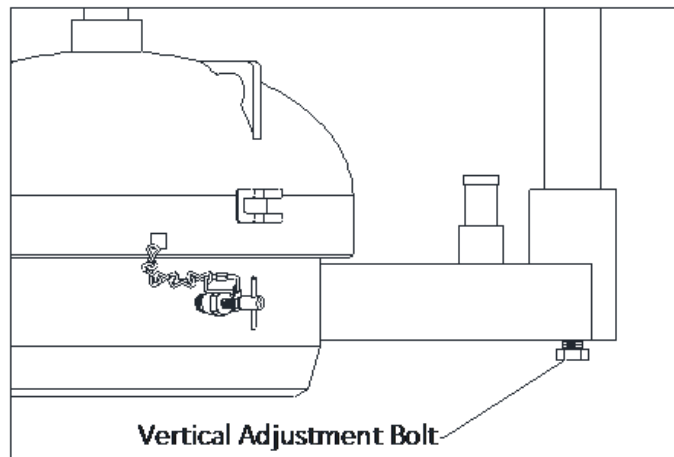
Center the cap with the hub with the adjuster located on top of the davit arm adjustment sleeve (PIC#10). **Be sure to tighten** both sides of the adjuster when complete.

#### Vertical Adjustment:

Loosen the set screw in the pivot box assembly (PIC#10). Turn the vertical adjustment nut clockwise to raise the cap and counterclockwise to lower the cap. Tighten the set screw after adjustments when checking the operation of the closure. Make only small adjustments and repeat as necessary to obtain minimal thread drag.



PIC #8



PIC #9 & PIC #10

## Part 2: Maintenance and Inspection

### Maintenance Instruction

Every time your Modco closure is opened, visually inspect the closure to ensure trouble free reliable service:

- a. Clean the closure threads, sealing surface, o-ring and o-ring groove. Remove grease and any debris from hub and inside the cap.
- b. If any cracks are found in the cap or hub, discontinue use and replace the component.
- c. Lubricate threads, sealing surface, cap pin bushing and hinge base. Lubricate the o-ring groove with a thin film of grease, just enough to support the o-ring to sink into the o-ring groove smoothly. Use anti-galling lubricant, like light to medium lithium grease. Do not use silicone type grease.
- d. If adjustment to the vertical or horizontal hinge is needed, reference section "Proper adjustment of the Closure".

### Inspection of the condition of the closure

- a. Inspect the O-ring for rough surfaces, nicks, or cuts. If any defects are found, replace it with an O-ring from Modco to ensure the dimensional integrity. Clean new or re-used O-rings, lubricate them lightly and place them in the O-ring groove.
- b. Procedure for thread inspection:

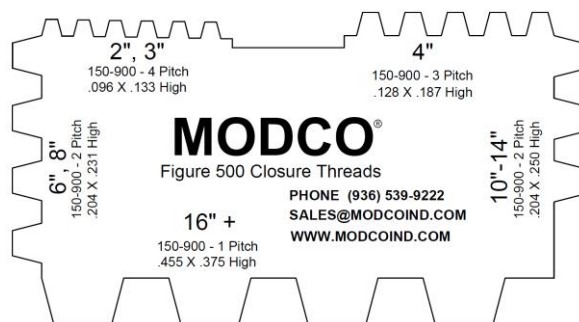
**NOTE:** A thread gauge is available from Modco. It is a template with the five thread profiles used on Modco closures. The gauge allows the user to evaluate thread wear based on a visual comparison of the thread form between the gauge and the closure component.

Find the thread profile that matches the threads on your closure and snugly insert the gauge. Inspect both the cap and hub for:

- Galling, Gouges or nicks
- Excessive wear/corrosion
- Worn thread flanks
- Rounded thread crests
- Deformed thread profiles
- Cracks, especially at the thread root.
- Check the closure in at least four places on cap and hub. 12:00, 3:00, 6:00 & 9:00 positions are recommended



Gauge handling



Thread Gauge

# Disassembly and reassembly of an installed closure – Horizontal hinged closure

## a. Disassembly

Locate the Pressure Alert Valve (PAV), remove the stem and screw it into the PAV retainer on the cap (PIC#11-14). The PAV is standard on all closures 6” and larger. Never attempt to open the closure while under pressure!

### Closures 6” to 14”:

Open the closure (reference section “Opening the Fig. 500 Closure”). While supporting the cap to prevent it from falling freely, remove the adjustment nut from the trolley assembly and safely lower the cap away from the closure. Lift the hinge components out of the base.

### Closures 16” to 48”:

- Determine if the service to be performed requires opening the closure. The closure hinge components may be removed without opening the closure.
- If the closure can remain closed, remove the outer set collar from the cap pin and slide the hanger arm away from the cap pin. Leave the inner set collar in place, this will retain the parallel balance set by the manufacturer.
- Remove the vertical adjustment nut from the trolley assembly and safely lower the hanger arm off of the trolley.
- Lift the hinge components from the hinge base.
- If the closure needs to be open, reference section “Opening A Figure 500 Closure”.
- Mark the position of the vertical adjustment nut. Place a lifting strap near the bend of the hanger arm. Make sure the set collars on the cap pin are secured. Lift slightly the cap and hanger arm together to facilitate removal of the vertical adjustment nut.
- Remove the vertical adjustment nut and lower the cap and jib arm until they clear the trolley assembly.
- Place the cap on a flat clean surface. Plywood or wooden pallets are preferred.
- Lift the hinge components from the hinge base. If the closure is equipped with a dual wheel trolley, do not remove them from the jib arm.

**NOTE:** Closures 24” 600 and up are equipped with a tapered roller bearing and a brass bushing on the jib post. Do not damage these components during handling.

## b. Assembly

**NOTE:** Prior closing the closure follow the section: “Maintenance Instruction”.

- Insert the jib arm and trolley assembly into the hinge base.
- If the cap was left on the closure, lift the hanger arm onto the trolley assembly and replace the saddle block (24” ANSI 600 and up) and vertical adjustment nut.
- If the cap was removed, lift the cap and hinge arm onto the trolley assembly and replace the saddle block (24” ANSI 600 and up) and vertical adjustment nut.
- Adjust the closure for proper operation (reference section “Proper Adjustment of the Closure”).
- Replace and tighten cap (reference section “Closing the Figure 500 Closure”), replace the PAV stem into the PAV body and return the unit to service.

# Disassembly and reassembly of an installed closure – Vertical hinged closure

## a. Disassembly

Locate the Pressure Alert Valve (PAV), remove the stem and screw it into the retainer on the cap (PIC#15-18). The PAV is standard on all closures 6” and larger. Never attempt to open the closure while under pressure!

### **Closures 6” to 14” ANSI 900:**

Unscrew the cap until the cap pin bottoms out on the cap pin bushing. Lift the hinge components with the cap from the base.

### **Closures 16” to 24” ANSI 300:**

Unscrew the cap until the cap pin bottoms out on the cap pin bushing. Attach a sling to a minimum of three cap ribs. Carefully lift the assembly until the davit arm is free of the base.

### **Closures 24” ANSI 600 and larger:**

Unscrew the cap until the cap pin bottoms out on the cap pin bushing. Attach a sling to a minimum of three cap ribs. Carefully lift the assembly until the davit arm clears the base.

**NOTE:** Make sure not to damage the tapered roller bearing and brass bushing on the davit arm during the handling.

Place the cap face down on a clean level surface. Plywood or wooden pallets are preferred.

## b: Assembly

**NOTE:** Follow the section “Maintenance Instruction” prior closing the closure.

### **6” to 14” closures:**

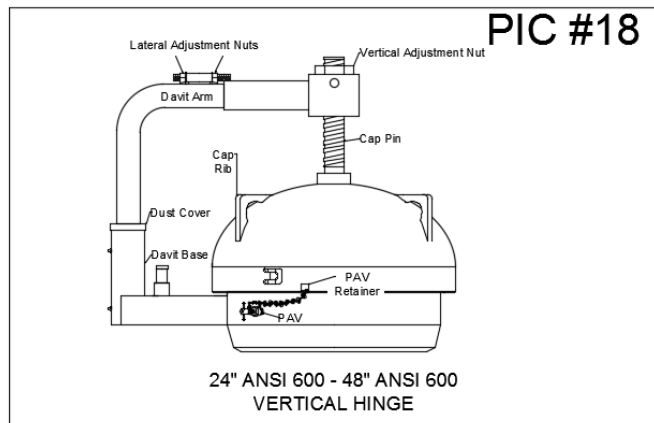
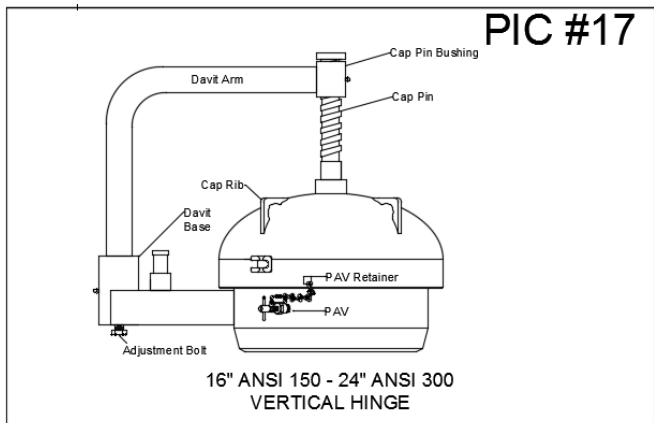
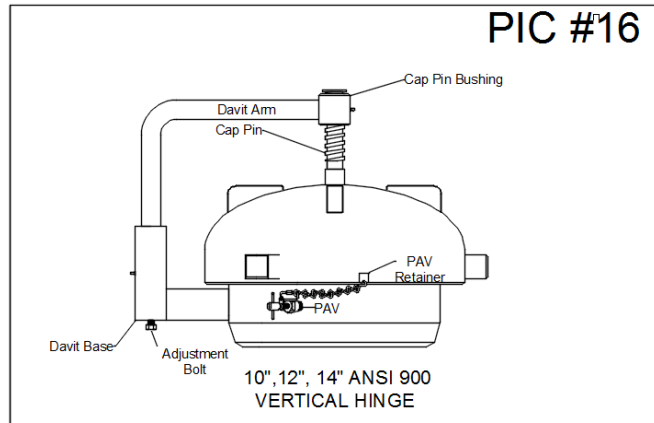
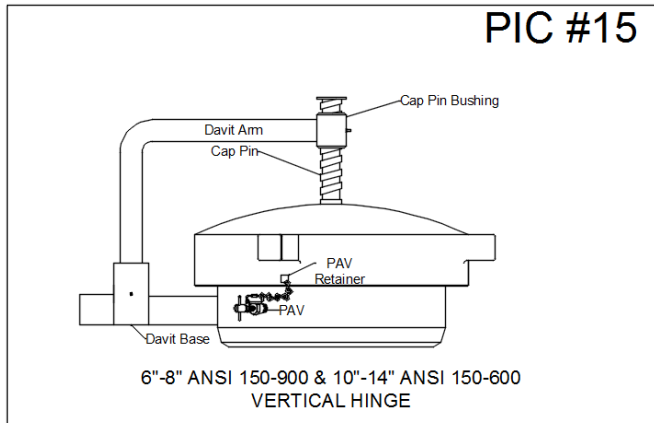
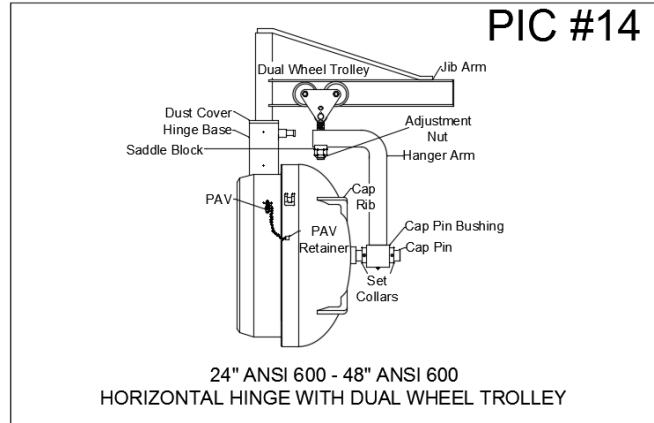
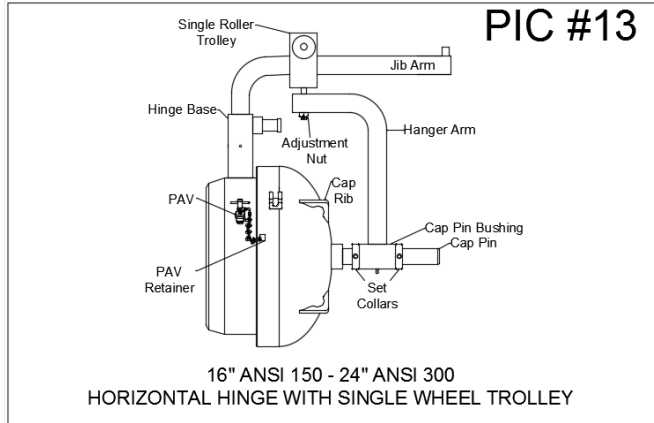
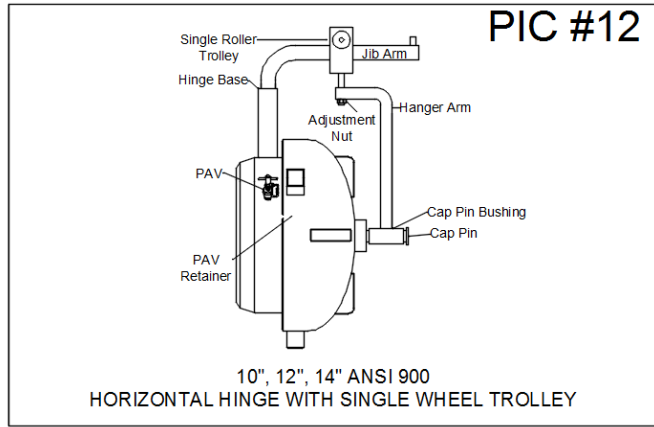
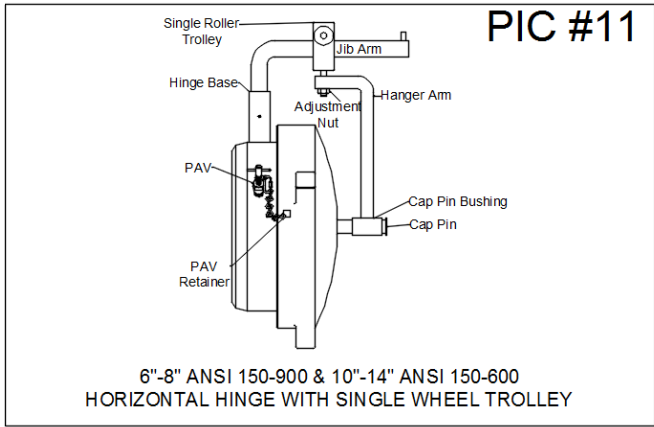
Insert Davit arm into base until fully seated. Screw the cap on. Replace the PAV stem into the PAV body.

### **16” to 24” ANSI 300:**

Insert davit arm into the base until fully seated. While closing the cap verify proper vertical adjustment (reference section vertical adjustment). Replace the PAV stem into the PAV body.

### **24” ANSI 600 and larger:**

Insert davit arm into the base. While screwing the cap onto the hub verify proper vertical and horizontal adjustment. The cap should screw down with no thread drag. If noticeable resistance is felt adjust the closure. Reference Section: Proper Adjustment of the Closure.





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