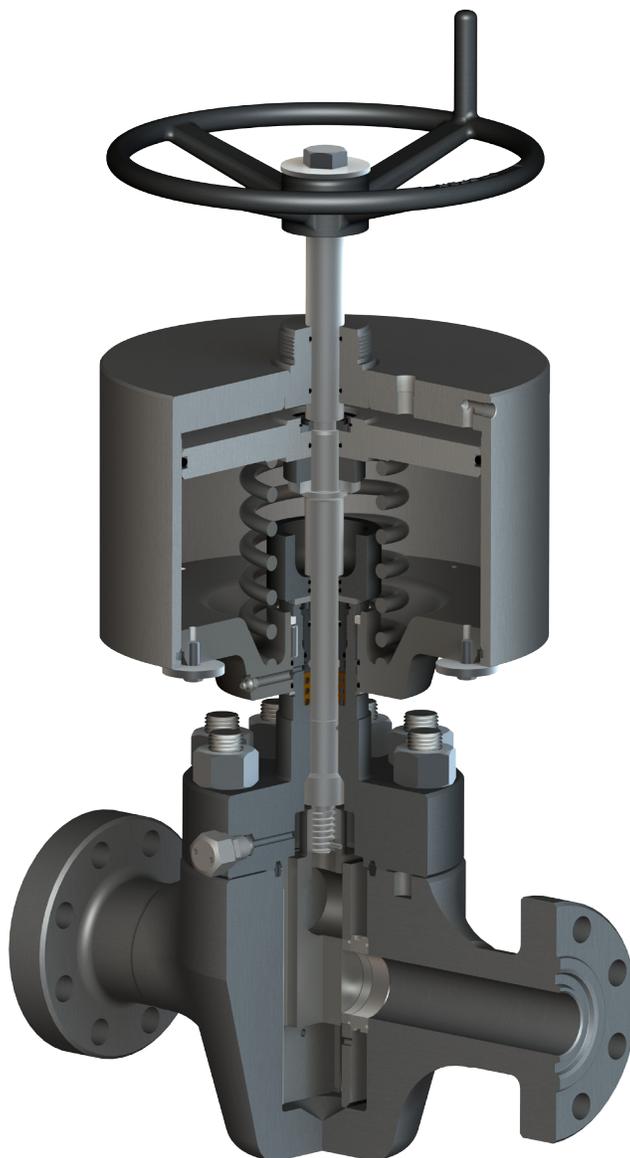


*Model PMX  
Pneumatic Piston Actuator  
With Integrated Manual Override*



**OPERATION & MAINTENANCE MANUAL**

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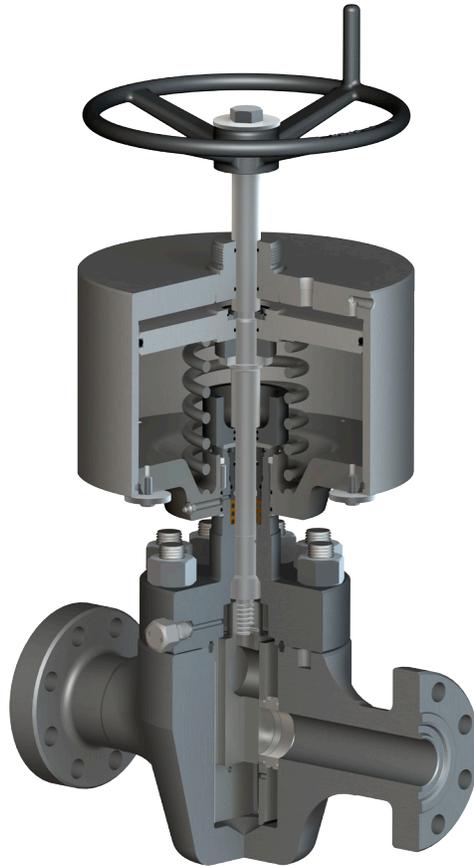
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## INTRODUCTION

Omni Model PMX Pneumatic Piston actuators are designed to operate surface safety or shutdown valves on oil and gas wellhead, transmission storage, manifold or other application where fail-safe capability is required.

Model PMX actuators can be used for land or off shore installations and are engineered to provide reliable service in a variety of operation conditions.

Omni can provide Model PMX actuators already mounted on valves and ready to deploy.



### Construction:

The Omni Piston Actuator is constructed of the following main parts:

- Handwheel
- Shaft
- Piston Housing
- Piston
- Bearings
- Spring
- Seals

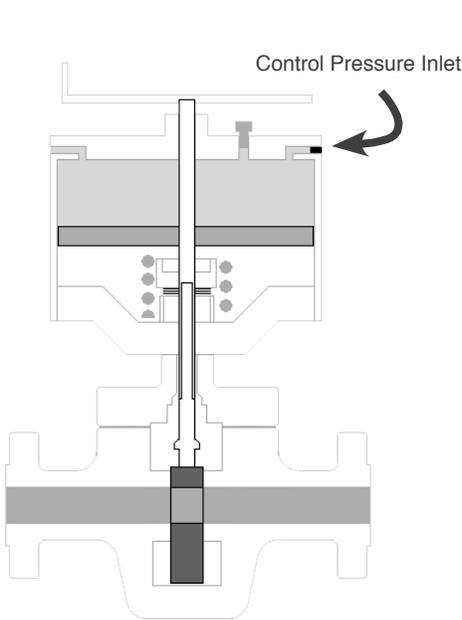
One piece construction of the outside housing provides the actuator fewer leak paths than our standard piston actuator. In addition, all critical parts are coated with xylan coating which has exceptional resistance to a wide range of alkalies, acids, solvents, and marine environments. Stainless steel operating shafts is standard for the actuator. An external safety rupture disc safeguards against over pressure of the actuator.

# ACTUATOR OPERATION

## FAIL-SAFE OPERATION

Fail “closed” operation is depicted. Fail “open” operation is available upon request.

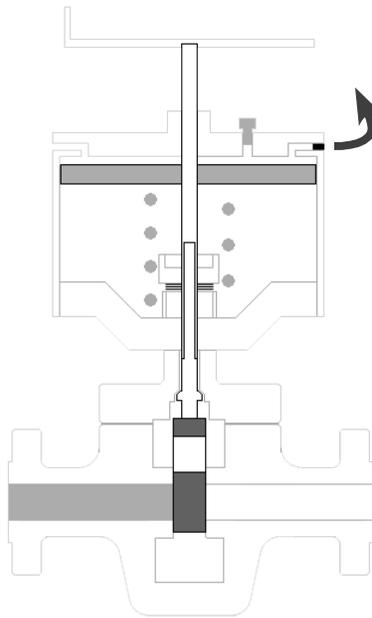
**Automatic Open**



**NOTE:** Valve must be in the manually closed position before placing in automatic operation.

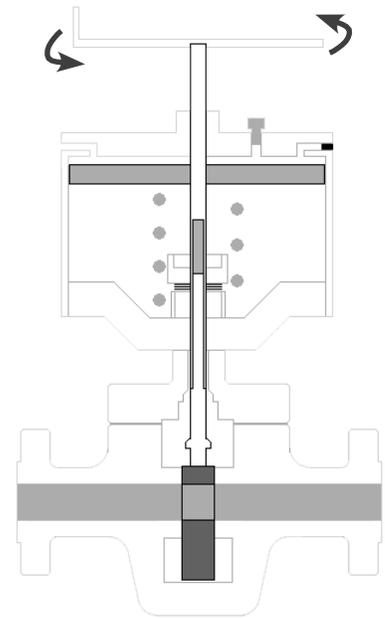
Opened by applying adequate control pressure to the actuator inlet. This moves reverse acting gate downward. Handwheel down indicates open position.

**Automatic Closed**



Closed by exhausting the control pressure from the actuator. Valve body pressure acting on effective area of stem generates sufficient force to close the gate. Spring aids closing of valve in absence of body pressure. Handwheel up indicates closed position of gate.

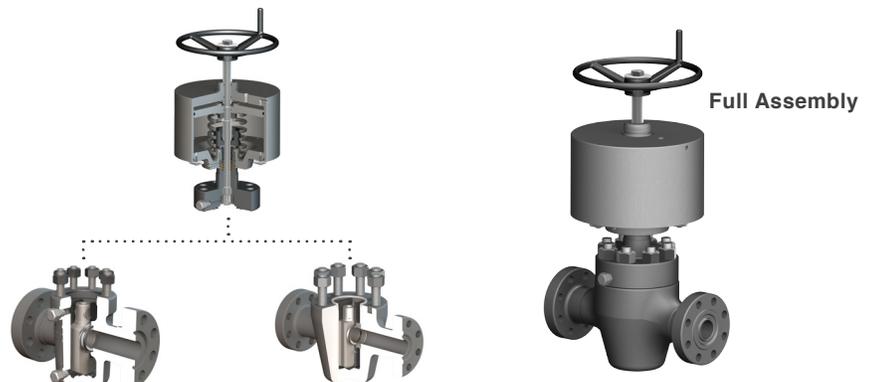
**Direct Mechanical Manual Open**



When the control pressure is removed from the actuator, the valve may be opened by rotating handwheel counterclockwise. Gate and stem are fully balanced so body pressure does not resist movement of gate into body cavity. In this case, the handwheel does not indicate position of gate.

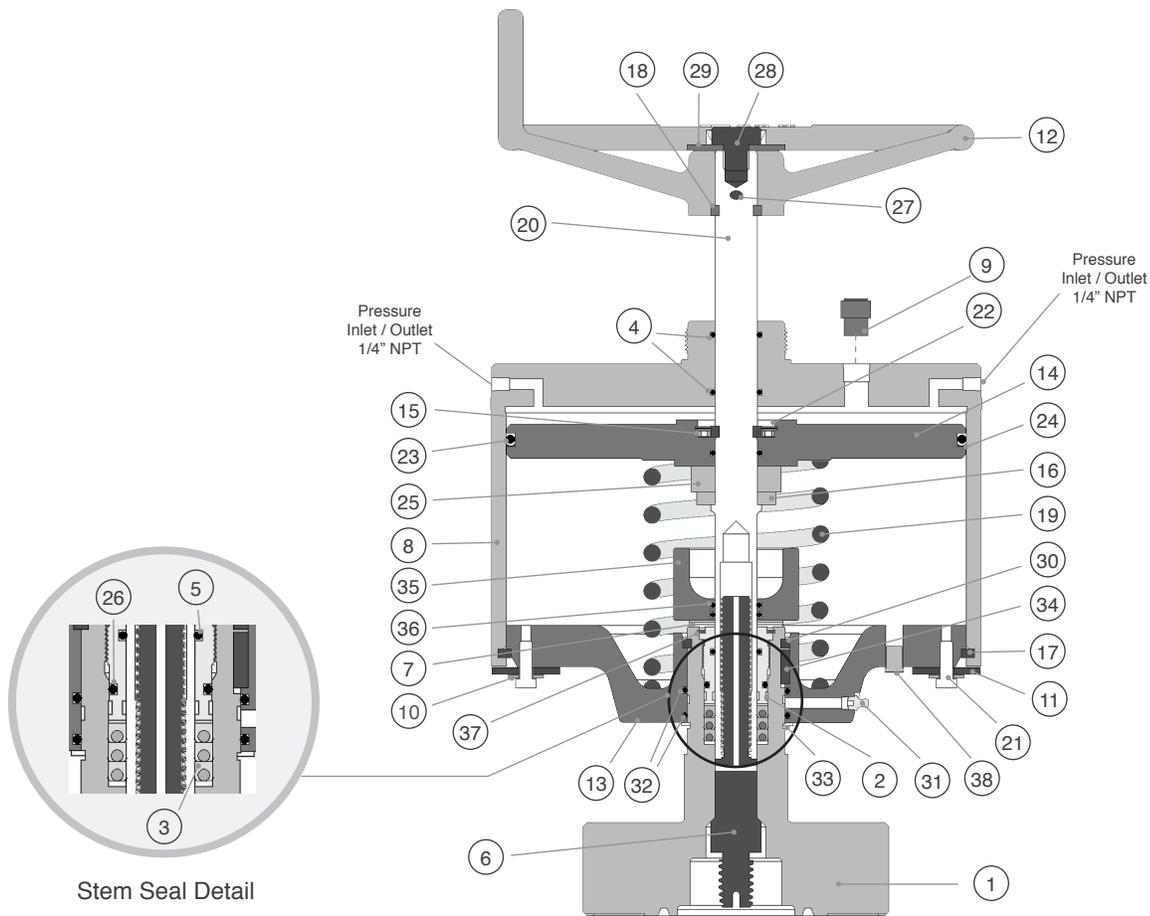
### OMNI GATE VALVES PREPARED FOR ACTUATOR:

Omni offers a complete line of cast and forged body reverse acting slab gate valves prepared for actuator. All Omni valves prepared for actuator are designed to be used as surface safety valves for oil and natural gas wellhead, manifold or other critical service applications with operating pressures from 2,000 to 15,000 psi.



# INTERNAL CONFIGURATION

Actuator depicted with typical 10,000 psi bonnet. See Note 2 below.



Component	Description	Qty
1	Valve Bonnet (see <b>Note 2</b> )	1
2	Packing Retainer	1
3	Bonnet Packing	3 (BRK)
4	Upper Stem Seal O-Ring (Buna N 70D 218)	3 (ARK)
5	Inner Packing Retainer O-Ring (Buna N 70D 218)	1 (BRK)
6	Stem - Male	1
7	Drift Shim	3
8	Piston Housing	1
9	Pressure Relief Fitting (250 psi)	1 (ARK)
10	Cylinder Retaining Lock Washer	4
11	Cylinder Retaining Washer	4
12	Manual Override Hand Wheel	1
13	Lower Plate	1
14	Piston	1
15	Piston Retainer Bushing	1
16	Stem Shoulder Ring	1
17	Cylinder Snap Ring	1
18	Hand Wheel Split Ring	2
19	Spring	1

Component	Description	Qty
20	Upper Stem	1
21	Cylinder Retaining Bolt	4
22	Piston Retaining Ring / Fastener	1
23	Piston O-Ring (Buna N 70D 455)	1 (ARK)
24	Piston Backup Ring (Buna N 454)	1 (ARK)
25	Thrust Bearing	1
26	Outer Packing Retainer O-Ring (Buna N 70D 223)	1 (BRK)
27	Hand Wheel Pin (Bolt, Nut, Lock Washer)	1 (ARK)
28	Hand Wheel Bolt	1
29	Hand Wheel Washer	1
30	Bonnet Retaining Ring	2
31	Grease Fitting	1 (ARK)
32	Lower Plate O-Ring (Buna N 70D 233)	2 (ARK)
33	Lower Plate Retaining Ring / Fastener	1
34	Lower Plate Lock Pin	1
35	Down Stop	1
36	Down Stop Stem Seal O-Ring (Buna N 70D 218)	2 (ARK)
37	Packing Retainer Ring	1 (BRK)
38	Breather Vent	1 (ARK)

(ARK = Actuator Redress Kit Item)

(BRK = Bonnet Redress Kit Item)

**Note 1:** Pressure relief valve is set at 250 psi. Valve will relieve any pressure above 250 psi inside the cylinder and then automatically reset.

**Note 2:** Configuration of flange face is different for 5,000 psi bonnets.

# REBUILDING MODEL PMX ACTUATOR IN THE FIELD USING ACTUATOR REPAIR KIT

## REBUILD

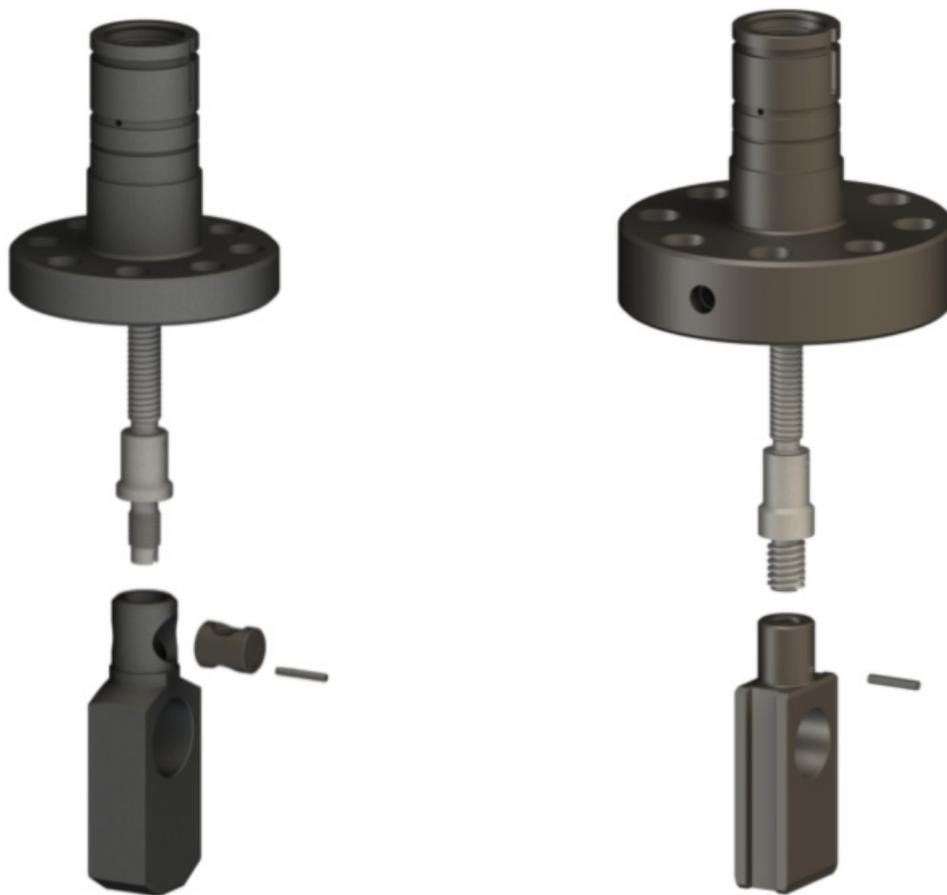
1. Disconnect control pressure supply from actuator port and ensure that the actuator is in the fully relieved position. (Valve fully closed in a failsafe closed application). There should not be any pressure in the actuator. Caution: Quick exhaust valves can trap residual pressure in the actuator. The actuator should not have any accessories mounted to the upper boss. These include Lock Open Cap, Fusible Lock Open Cap, Manual Override Assembly, and Fusible Manual Override Assembly.
2. Unscrew handwheel bolt and remove along with handwheel washer.
3. Remove hex head bolt, lock washer and nut that attach the actuator operating stem to the handwheel.
4. Remove handwheel and handwheel split ring. Inspect and replace if necessary.
5. Remove the hex head bolts and washers that are attached to the lower plate assembly.
6. With two sets of C-Clamps or other equivalent method of uniformly depressing the piston housing, force the piston housing down until the cylinder snap ring is exposed and can be removed.
7. Remove the cylinder snap ring.
8. Remove the piston housing off of piston and actuator operating stem assembly and set aside.
9. Inspect and clean piston. Remove the piston O-ring and Back-up ring. Clean o-ring groove and grease lightly with Dow Corning 111 or equivalent. Inspect all parts for damage and replace if necessary.
10. Clean and inspect ID of piston housing, look for gall marks, excess wear, porosity, or excess rust. Check threads of piston housing.
11. Replace O-rings in top of piston housing. Clean and inspect grooves prior to installation. Grease lightly with Dow Corning 111 or equivalent.
12. Check actuator operating stem for surface finish condition and ID threads. Replace if necessary.
13. Install relief fitting in the NPT port in the top of actuator assembly.
14. Lift piston housing over and down onto piston and lower plate assembly.
15. With the two C-Clamps or some other equivalent method, uniformly depress the piston housing while forcing down until the cylinder snap ring can be installed in the groove of the piston housing.
16. Insert cylinder snap ring between lower plate and piston housing ring groove to secure assembly.
17. Release tension on C-Clamps.
18. Thread hex bolts and flat washer in lower plate holes and tighten.
19. Caution: Over tightening bolts will cause damage.
20. Install the handwheel split ring on the actuator operating stem groove. Hold the split ring in place and lower the handwheel down and over the split ring. Seat handwheel carefully.
21. Align hole in the actuator operating stem and handwheel and insert the hex head screw through hole. Place lock washer and hex nut on the end of the hex head screw and secure tightly.
22. Place flat washer over the end of the actuator operating stem and thread a hex head bolt into the end of the operating stem.
23. Reinstall control pressure line. Pressure up actuator and check for leaks prior to reinstalling any of the accessories.





## BONNET TO GATE VALVE ASSEMBLY

1. Push the male stem down until the lower threaded portion is exposed.
2. Thread gate on to stem. Depending on design this may or may not require installation of a gate nut.
3. Thread gate as far on to the stem as possible and still be able to install the gate pin.
4. The gate pin should be fully captured by the slot in the end of the stem.
5. Support the gate or gate nut while driving in the gate pin. Caution: Damage could be caused to the stem or bonnet if not supported.
6. Lube gate with assembly lube prior to installing in body.
7. Install new bonnet seal ring in the valve body and then carefully lower the gate into the valve body, between the seats and allow the bonnet to pass over the valve body studs.
8. Install the valve body/ bonnet nuts on the studs and make up the connection as required by the valve manufacturer.
9. Pull the bonnet stem up into the fully closed and back seated position.



## ASSEMBLY OF LOWER PLATE ASSEMBLY TO BONNET

1. Slide the lower plate retainer ring down over the bonnet shoulder out of the groove to allow the lower plate to move past the bonnet retaining ring groove at the top of the bonnet.
2. Clean and inspect o-ring grooves. Install two O-rings into ID grooves in the lower plate. Grease O-rings lightly with Dow Corning 111 or equivalent.
3. Install weep fitting. Do not use Teflon or liquid. Tighten securely.
4. Thread the breather vent fitting into the lower plate. Do not use Teflon or liquid. Tighten securely.
5. Install lower plate onto the bonnet. It should drop to shoulder of bonnet resting on top of the retainer ring.
6. Rotate the lower plate until the milled slot lines up with the milled slot in the bonnet.
7. Insert lower plate lock pin into slot. Grease thoroughly and depress pin into slot.
8. Install bonnet retaining ring set into groove at top of the bonnet.
9. Lift the lower plate upward with both hands until it stops on the shoulder of the bonnet retaining ring. Hold in place and install the lower plate retaining ring into the groove located at the base of the lower plate. Ensure to properly seat the retainer ring into the groove.
10. Continuation of full assembly on next page.



## ASSEMBLY OF MAIN PMX ACTUATOR ASSEMBLY

1. Check actuator operating stem for surface finish condition and ID threads. Apply never seize to internal threads.
2. Clean and inspect grooves of down stop. Grease thoroughly and install two down stop seal O-rings in the down stop.
3. Slide drift shims over the male stem and then place the down stop on top of the shims.
4. Place operating stem down onto the male stem and rotate clockwise to engage.
5. Place stem shoulder ring down and onto the OD of the actuator operating stem, stopping on shoulder.
6. Grease thrust bearing and place it onto the top of the stem shoulder ring.
7. Place spring over bonnet nose and nest properly in the lower plate.
8. Place the piston on a flat surface. Install stem seal o-ring into piston. Grease thoroughly using Dow Corning 111 or equivalent.
9. Slide the ID bore of the piston over the actuator operating stem. Push continuously until the piston sets on the thrust bearing and exposes the retainer ring groove on the operating stem.
10. Install the piston retainer bushing into the top of the piston counter bore. The piston retaining ring must be installed properly for the bushing to keep the piston retaining ring captured. Grease area slightly. Install spiral wound retainer ring.
11. Place lower plate/bonnet assembly in a vertical position as installed on a valve.
12. Place piston and operating stem assembly down onto spring and center carefully. Rotate clockwise to engage male stem.
13. Install the handwheel split ring on the actuator operating stem groove. Hold the split ring in place and lower the handwheel down and over the split ring. Seat handwheel carefully.
14. Align hole in the actuator operating stem and handwheel and insert the hex head screw through hole. Place lock washer and hex nut on the end of the hex head screw and secure tightly.
15. Place flat washer over the end of the actuator operating stem and thread a hex head bolt into the end of the operating stem.
16. Set the gate valve drift per instructions in this manual.
17. Remove handwheel once the gate valve drift has been set.
18. Grease thoroughly using Dow Corning 111 or equivalent and install the piston o-ring and backup ring to the o-ring groove on the outer OD surface.
19. Place two O-rings in the ID grooves of the piston housing.
20. Lube upper shaft and slide piston housing over the top of actuator operating stem down onto piston and lower plate assembly.
21. With the two C-Clamps or some other equivalent method, uniformly depress the piston housing while forcing down until the cylinder snap ring can be installed in the groove of the piston housing.
22. Insert cylinder snap ring between piston housing and lower plate assembly ring groove to secure.
23. Release tension from C-Clamps.
24. Thread hex bolts and flat washer in lower plate assembly holes and tighten.
25. Install relief fitting in the NPT port in the top of actuator assembly.
26. Install the handwheel split ring on the actuator operating stem groove. Hold the split ring in place and lower the handwheel down and over the split ring. Seat handwheel carefully.
27. Align hole in the actuator operating stem and handwheel and insert the hex head screw through hole. Place lock washer and hex nut on the end of the hex head screw and secure tightly.
28. Place flat washer over the end of the actuator operating stem and thread a hex head bolt into the end of the operating stem.
29. Stroke actuator a minimum of three times at operating pressure.
30. Retighten bolts in the bonnet clamp rings on lower part of actuator.
31. Check actuator for leaks and proper operation. Operation should be smooth.
32. Apply Pressure to actuator and stroke three times at operating pressures proper actuation.
33. Open and close valve manually to insure proper operation.
34. **Note:** Never jam the valve fully open or fully closed. Always back off a quarter (1/4) turn after fully opening and closing to ensure proper sealing of gate, seat and metal-metal bonnet seal.

## REPLACEMENT OF BONNET SEALS

1. With the bonnet neck facing up clean and inspect the packing bore for damage. Carefully check the ID threads for damage.
2. Lightly lube the polypaks and insert in the packing bore with O-ring facing down.
3. Lightly lube both O-rings and install on the ID and OD of the packing retainer.
4. Lube threads of the packing retainer and thread into the bonnet until the flange of the packing retainer stops on the neck of the bonnet. Tighten using a spanner wrench.
5. Insert Retaining ring in bonnet retaining ring groove.
6. Lube entire sealing surface and backseat area of stem and insert into the bonnet. Take care not to damage the packing with the threads of the stem or the nose of the stem. Push stem up until it backseats.



## SETTING THE GATE VALVE DRIFT

1. Setting the drift can only be accomplished after the bonnet assembly has been installed on the gate valve. All studs and bolts have been torqued with all stem to gate connections completed.
2. Place the gate valve in the vertical position.
3. Remove piston and stem assembly.
4. Install down stop and shims by sliding down stop flat surface down above shims.
5. Using both hands, push down on the stem to bottom out the down stop on top of the shims.
6. Check the drift alignment by running the appropriate size drift tool through the bore. If the gate is not aligned with the valve bore, pull up on stem to the fully closed position and remove the down stop and add or subtract shims as required to properly align the gate with the gate valve bore.
7. The stroke length is now set. Proceed with actuator installation.

**Remove Shims**



**Add Shims**



# SERVICING OF OMNI VALVE ACTUATOR ASSEMBLIES

1. Prior to servicing the actuator assembly, it is recommended that this manual be read in its entirety. Should the service technician have any questions or feel that a certain procedure cannot be performed safely, contact Omni Valve for assistance.
2. Proper personal protective equipment should be worn at all times during servicing any equipment. Actuator valves assemblies contain pressurized fluids and contained compressed springs.
3. Do not attempt to remove any components or perform any service work with the actuator under pressure. Bleed off all control pressure and disconnect control pressure supply lines before performing any service to the actuator. Failure to do so could result in damage to equipment or serious personal injury.
4. Keep all elastomers and or replacement parts in original packaging until ready to install.
5. Inspect all parts new or used, for burrs, sharp edges or damage prior to reassembly. Special attention should be given to all sealing surfaces for damage.
6. All parts should be clean and properly lubed prior to reassembly.

**Caution:** If the SDV is in the flow line, bleed pressure from flow line, valve body, control pressure lines and actuator housing. Make sure that the system is properly shut in by positive methods. Leave the gate valve body bleed port open.

Lock ring segments MUST fit squarely into the piston housing grooves. A twisted lock ring under pressure can exert enough force to crack the piston housing.

**Tools:** 10", 12", 18" Adjustable wrenches, medium screwdriver, two (2) actuator clamps, retainer snap ring pliers (internal), retainer snap ring pliers (external), O-ring removal tool.

**Warnings:** Do not use hammer or other tools that could damage piston housing and components during or after disassembly and assembly.

## Periodic Maintenance

Recommended service intervals for Omni Valve Actuators are as follows

Maintenance Operation	Interval
Cycle actuator under normal operating conditions	Monthly
Inspect pressure relief device damage and proper operation	Monthly
Inspect upper shaft sealing surface for damage	Monthly
Check upper shaft packing retainer and retainer ring in top of actuator	Monthly
Replace all seals and wear bearings	Every five years or when leakage occurs

## TESTING BEFORE RETURNING ASSEMBLY TO SERVICE

1. Verify that all mechanical lock open devices are removed prior to performing operational testing and back seat testing.
2. No lock open caps are to be used during hydrostatic testing.
3. Pressure test actuator after any service work. Check for any leaks and repair as necessary.
4. Actuator should be stroked to check for functionality. The actuator should operate smoothly in both directions without any hang-ups.
5. Check for proper operation of pressure relief device.

TROUBLE	PROBABLE CAUSE	REMEDY
Piston and shaft of actuator fails to move down when control pressure is applied to actuator inlet.	Failure at one or more of the following: O-rings, or safety relief valve	Replace appropriate O-rings or safety.
	Accumulation of foreign matter or corrosion between piston and piston housing and/or upper stem and piston housing.	Clean areas, relubricate, and replace appropriate O-rings.
	Binding in bonnet packing	Lubricate packing thoroughly or replace packing.
	Binding or galling of gate and seats of valve body.	Replace gate and seat.
	Hydrates in valve body cavity.	Drain hydrates from valve body.
	Upper portion of actuator upper stem bent.	Replace actuator Upper stem.
	Control pressure line is damaged.	Check for cuts, bends, pinched control lines and replace if necessary.
	Quick exhaust valve.	Check quick exhaust and replace if necessary.
Valve fails to return to a closed position when control pressure is bled from the actuator.	Accumulation of foreign matter or corrosion between piston housing and/or upper stem and piston housing.	Clean areas, relubricate, and replace appropriate O-rings.
	Binding in bonnet packing	Lubricate packing thoroughly or replace packing.
	Binding or galling of gate and seats of valve body.	Replace gates and seats.
	Hydrates in valve body.	Drain hydrates from valve body cavity.
	Valve is manually open.	Turn handwheel fully clockwise.
	Quick exhaust valve malfunction	Check quick exhaust valve and replace if necessary.
Handwheel extremely hard to turn.	Bearings not functioning.	Grease and/or replace bearings.
	Accumulations in upper stem or valve body.	Clean upper stem and valve body thoroughly.
	Bent upper stem or male stem.	Replace upper stem and/or male stem.
	The upper stem and male stem are galled.	Replace upper stem and/or male stem.
	The upper stem corroded in piston housing.	Clean affected area and replace if necessary.



# Model PMX Pneumatic Piston Actuator with Integrated Manual Override

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## Limited Product Warranty

All products manufactured or sold by Omni are warranted against defects of material and workmanship for a period of twelve (12) months from the date of installation or eighteen (18) months from date of shipment, whichever period first expires, when all such products are used in the service and within the pressure range for which they were manufactured.

In the case of products or parts not wholly of Omni's manufacture, Omni's liability shall be limited to the extent of Omni's recovery from the original manufacturer of such products or parts under its warranty or liability to Omni.

Any repair work performed by Omni is warranted for one year from completion of such repairs and applies only to work performed. If, within these specified periods, Omni receives notice from Buyer of any alleged defect in or nonconformance of any product or repair and if in Omni's sole judgment the product or repair does not conform or is found to be defective in material or workmanship, then, Buyer shall, at Omni's request, return the part or product F.O.B. to Omni's designated plant or service location.

Omni has no liability for removal or reinstallation of products or equipment. Omni, at its option and expense, shall repair or replace the defective part or product, or repay to Buyer the full price paid by Buyer for such defective part, repair or product. Any repayment of purchase price shall be without interest.

Omni's warranty liability, including defects caused by Omni's negligence, shall be limited to such repair, replacement or refund, and shall not include claims for labor costs, expenses of Buyer resulting from such defects, recovery under general tort law or strict liability or for damages resulting from delays, loss of use, or other direct, indirect, incidental or consequential damages of any kind.

Omni will not be responsible for failures of products which have been in any way tampered with or altered by anyone other than an authorized representative of Omni, failures due to lack of compliance with recommended maintenance procedures or products which have been repaired or altered in such a way (in Omni's judgment) as to affect the products adversely.

**THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS, STATUTORY OR IMPLIED, INCLUDING THE WARRANTY OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE WHICH EXCEED THE FOREGOING WARRANTY.**

If you have questions regarding this warranty or if you would like information about other Omni products and services please contact us at the address and phone numbers below.