

# W90 Series

## ASEPTIC DIAPHRAGM STEM SEAL VALVES

FORM NO.: 95-03055 REVISION: 02/2013

READ AND UNDERSTAND THIS MANUAL PRIOR TO OPERATING OR SERVICING THIS PRODUCT.



**> Waukesha Cherry-Burrell**





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## Warranty

Seller warrants its products to be free from defect in materials and workmanship for a period of one (1) year from the date of shipment. This warranty shall not apply to products which require repair or replacement due to normal wear and tear or to products which are subjected to accident, misuse or improper maintenance. This warranty extends only to the original Buyer. Products manufactured by others but furnished by Seller are exempted from this warranty and are limited to the original manufacturer's warranty.

Seller's sole obligation under this warranty shall be to repair or replace any products that Seller determines, in its discretion, to be defective. Seller reserves the right either to inspect the products in the field or to request their prepaid return to Seller. Seller shall not be responsible for any transportation charges, duty, taxes, freight, labor or other costs. The cost of removing and/or installing products which have been repaired or replaced shall be at Buyer's expense.

Seller expressly disclaims all other warranties, express or implied, including without limitation any warranty of merchantability of fitness for a particular purpose. The foregoing sets forth Seller's entire and exclusive liability, and Buyer's exclusive and sole remedy, for any claim of damages in connection with the sale of products. In no event shall Seller be liable for any special consequential incidental or indirect damages (including without limitation attorney's fees and expenses), nor shall Seller be liable for any loss of profit or material arising out of or relating to the sale or operation of the products based on contract, tort (including negligence), strict liability or otherwise.

## Shipping Damage or Loss

If equipment is damaged or lost in transit, file a claim at once with the delivering carrier. The carrier has signed the Bill of Lading acknowledging that the shipment has been received from SPX Flow Technology in good condition. SPX Flow Technology is not responsible for the collection of claims or replacement of materials due to transit shortages or damages.

## Warranty Claim

Warranty claims must have a **Returned Goods Authorization (RGA)** from the Seller before returns will be accepted.

Claims for shortages or other errors, exclusive of transit shortages or damages, must be made in writing to Seller within ten (10) days after delivery. Failure to give such notice shall constitute acceptance and waiver of all such claims by Buyer.

## Safety

### READ AND UNDERSTAND THIS MANUAL PRIOR TO INSTALLING, OPERATING OR SERVICING THIS EQUIPMENT

Waukesha Cherry-Burrell recommends users of our equipment and designs follow the latest Industrial Safety Standards. At a minimum, these should include the industrial safety requirements established by:

1. Occupational Safety and Health Administration (OSHA), Title 29 of the CFR  
Section 1910.212- General Requirements for all Machines
2. National Fire Protection Association, ANSI/NFPA 79  
ANSI/NFPA 79- Electrical Standards for Industrial Machinery
3. National Electrical Code, ANSI/NFPA 70  
ANSI/NFPA 70- National Electrical Code  
ANSI/NFPA 70E- Electrical Safety Requirement for Employee Workplaces
4. American National Standards Institute, Section B11

**Attention:** Servicing energized industrial equipment can be hazardous. Severe injury or death can result from electrical shock, burn, or unintended actuation of controlled equipment. Recommended practice is to disconnect and lockout industrial equipment from power sources, and release stored energy, if present. Refer to the National Fire Protection Association Standard No. NFPA70E, Part II and (as applicable) OSHA rules for Control of Hazardous Energy Sources (Lockout-Tagout) and OSHA Electrical Safety Related Work Practices, including procedural requirements for:

- Lockout-tagout
- Personnel qualifications and training requirements
- When it is not feasible to de-energize and lockout-tagout electrical circuits and equipment before working on or near exposed circuit parts

**Locking and Interlocking Devices:** These devices should be checked for proper working condition and capability of performing their intended functions. Make replacements only with the original manufacturer's renewal parts or kits. Adjust or repair in accordance with the manufacturer's instructions.

**Periodic Inspection:** Industrial equipment should be inspected periodically. Inspection intervals should be based on environmental and operating conditions and adjusted as indicated by experience. At a minimum, an initial inspection within 3 to 4 months after installation is recommended. Inspection of the electrical control systems should meet the recommendations as specified in the National Electrical Manufacturers Association (NEMA) Standard No. ICS 1.3, Preventative Maintenance of Industrial Control and Systems Equipment, for the general guidelines for setting-up a periodic maintenance program.

**Replacement Equipment:** Use only replacement parts and devices recommended by the manufacturer to maintain the integrity of the equipment. Make sure the parts are properly matched to the equipment series, model, serial number, and revision level of the equipment.

Warnings and cautions are provided in this manual to help avoid serious injury and/or possible damage to equipment:



**DANGER:** marked with a stop sign.

*Immediate hazards which WILL result in severe personal injury or death.*



**WARNING:** marked with a warning triangle.

*Hazards or unsafe practices which COULD result in severe personal injury or death.*



**CAUTION:** marked with a warning triangle.

*Hazards or unsafe practices which COULD result in minor personal injury or product or property damage.*

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## Care of Stainless Steel

### **Stainless Steel Corrosion**

Corrosion resistance is greatest when a layer of oxide film is formed on the surface of stainless steel. If film is disturbed or destroyed, stainless steel becomes much less resistant to corrosion and may rust, pit or crack.

Corrosion pitting, rusting and stress cracks may occur due to chemical attack. Use only cleaning chemicals specified by a reputable chemical manufacturer for use with 300 series stainless steel. Do not use excessive concentrations, temperatures or exposure times. Avoid contact with highly corrosive acids such as hydrofluoric, hydrochloric or sulfuric. Also avoid prolonged contact with chloride-containing chemicals, especially in presence of acid. If chlorine-based sanitizers are used, such as sodium hypochlorite (bleach), do not exceed concentrations of 150 ppm available chlorine, do not exceed contact time of 20 minutes, and do not exceed temperatures of 104°F (40°C).

Corrosion discoloration, deposits or pitting may occur under product deposits or under gaskets. Keep surfaces clean, including those under gaskets or in grooves or tight corners. Clean immediately after use. Do not allow equipment to set idle, exposed to air with accumulated foreign material on the surface.

Corrosion pitting may occur when stray electrical currents come in contact with moist stainless steel. Ensure all electrical devices connected to the equipment are correctly grounded.

### **Elastomer Seal Replacement Following Passivation**

Passivation chemicals can damage product contact areas of WCB equipment. Elastomers (rubber components) are most likely to be affected. Always inspect all elastomer seals after passivation is completed. Replace any seals showing signs of chemical attack. Indications may include swelling, cracks, loss of elasticity or any other noticeable changes when compared with new components.

## Introduction

*For control top information, please refer to publication 95-03083 (2-piece) or 95-03077 (3-Piece (obsoleted)). For additional product information, please see our web site at [www.spx.com/en/waukesha-cherry-burrell/resources/product-literature](http://www.spx.com/en/waukesha-cherry-burrell/resources/product-literature).*

## General Information

Information in this manual should be read by all personnel involved in installation, setup, operation and maintenance of W90 valves.

Always use installation tools and lubricants recommended by Waukesha Cherry-Burrell. Waukesha Cherry-Burrell products are subject to intensive intermediate and final leakage and functional tests.

W90 Series valves meet 3-A and EHEDG standards for sanitation, design, and style.

Waukesha Cherry-Burrell W90 Series valves are designed to be used in Aseptic systems, or other systems for extended shelf life products where complete separation between the product and the environment is essential. In W90 Series valves, a flexible diaphragm accomplishes this separation. The diaphragm material complies with FDA regulations and is recommended for short periods of steam service (sterilization). The diaphragm has a fabric backing for strength and flexibility.

Service life of the diaphragm will vary depending on the severity of the above operating parameters and the number of operation cycles (opening/closing.) To avoid diaphragm failure while in service, use an effective preventive maintenance schedule for diaphragm replacement. Contact WCB Technical Service for assistance with your application.

## Factory Inspection

Each Waukesha Cherry-Burrell valve is shipped completely assembled, lubricated and ready for use.

## Models and Specifications

### Materials

- Product Wetted: ASTM 316L  
(UNS-S31603); (DIN-1.4404)
- Non-Product: ASTM 304  
(UNS-S30400); (DIN-1.4301)
- Seat Material: Tef-Flow™ P (standard)  
Tri Ring (optional)  
Metal (optional)
- Elastomers: FKM (standard)  
EPDM (optional)

## Equipment Serial Number

Waukesha Cherry-Burrell valves are identified by a serial number found on the label on the actuator cylinder.



## Operating Parameters

W90 Series valves are designed to work in room environments between 30° and 190°F (-1° - 88°C) and are intended for hot water sterilization (270°F (132°C)) and normal cleaning procedures.

The recommended operating temperature is determined by the material used for the diaphragm.

## Seal Compatibility

**Table 1: Seal Compatibility for FKM/EPDM Seals**

	<b>Fluorelastomer (FKM) Seals</b>	<b>EPDM Seals</b>
<b>Thermal Range of Application</b>	32°F to 375°F (0°C to 190°C)	0°F to 275°F (-18°C to 135°C)
<b>Chemical Resistance</b>	Silicone oil and grease	Silicone oil and grease
	Ozone, aging and weather resistant	Ozone, aging and weather resistant
	Oils and fats	Hot water and steam up to 275°F (135°C)
	Aliphatic, chlorinated and aromatic hydrocarbons	Many organic and inorganic acids
		Cleaning agents, soda and potassium alkalis
<b>Not compatible with</b>	Superheated steam	Mineral oil products (oils, greases and fuels)
	Formic and acetic acids	

Contact WCB Application Engineering for other fluid compatibility.

FKM and EPDM seals comply with FDA regulations.

Solenoid valves should not be used in the control module in room environments below 32°F (0°C) and over 122°F (50°C), as their function cannot be guaranteed. If solenoid valves are used, install them in a separate solenoid cabinet.

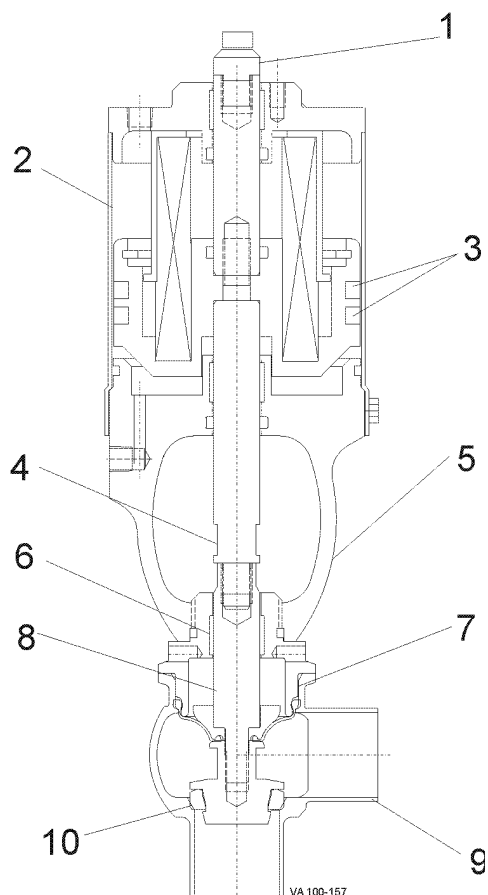
## Pressure

The normal operating pressure is below 100 psi (6.9 bar).

## Valve Description

The cutaway view in Figure 1 shows a stainless steel single body model of heavy-duty design.

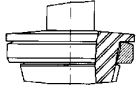
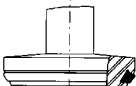
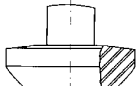
The complete valve is made of easy-to-maintain stainless steel for sanitary operations. All product contact surfaces are made of type 316L stainless steel for the best corrosion resistance.



**Figure 1: Typical Valve Cross Section  
(W91 Shown)**

1. The valve position indicator on top of the actuator is provided as standard.
2. 4", 5", 6", or Manual actuators are interchangeable on all Waukesha Cherry-Burrell automatic valve bodies.
3. Piston U-cups and o-rings provide positive sealing against air pressure.
4. The valve stem is detachable without disassembly of the actuator.
5. The wide, open-yoke design shows the stem position and prevents the product from leaking into the actuator.
6. PTFE stem bearing.
7. The rigid actuator-to-valve assembly uses an interlocking body-to-adapter connection, which ensures positive alignment with an S-Line clamp. Valve bodies provide full drainage even when mounted upside down.
8. Heavy duty 3/4" stem for greater strength.
9. Product inlets and outlets can be equipped with I-clamp, S-clamp, or butt weld fittings, for 1" through 4" size valves.
10. Waukesha Cherry-Burrell's exclusive snap-on Tef-Flow "P" seat rings on the valve stems are chemically inert, able to withstand high temperatures, and economically field replaceable. The rings provide a positive seal and are of sanitary design to permit CIP (clean in place) cleaning.

## Seat Options

SEAT TYPE		MAXIMUM TEMPERATURE	APPLICATION
Standard	 Tef-Flow™ P (TFP) Gray in color	280°F (137°C)	High Temperature High Pressure Over Pressure Valves
Standard	 Tri Ring (TR) EPDM, FKM	Operation 280°F (137°C) EPDM Sterile 275°F (135°C) EPDM Operation 350°F (176°C) FKM Sterile (Consult Factory) FKM	High Pressure Particulate EHEDG
Optional	 Metal (M)	375°F (190°C)	High Pressure High Flow Particulate

For higher temperature applications than those listed, please consult the factory.

\*Operating conditions such as flow rate and pressure must be considered when operating near maximum temperature rating.

## Installation



**WARNING:** To avoid electrocution, ALL electrical work should be done by a registered electrician, following industrial safety standards and local codes. All power must be OFF and Locked Out during installation.

When installing valves, ensure that no foreign materials (e.g. tools, screws, welding wire, lubricants, cloths, etc.) are enclosed in the system.

## Welding Instructions



**CAUTION:** Inspect each valve prior to installation. When using butt-welded connections on two- and three-piece body valves, clamp connections **MUST** be used on one or more bodies to allow service to the body o-ring(s) after installation.

**NOTE:** The W92 and W93 Valve **CANNOT BE WELDED IN PLACE ON THE UPPER BODY**. This is because it is necessary to remove the upper body and actuator assembly with the valve bodies in place to access the diaphragm for service.

W90 valves with welded connections require the following before welding:

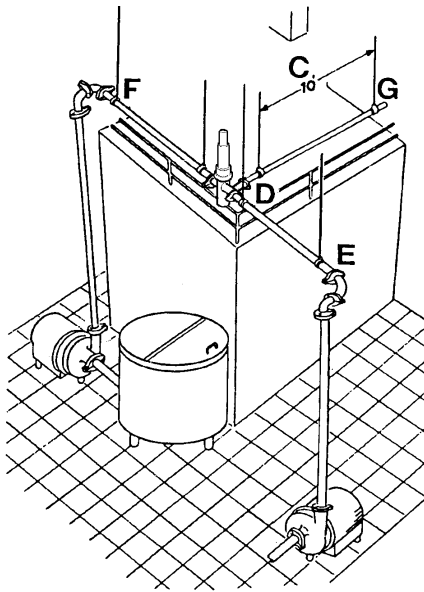
1. Remove the stem and actuator assembly.
2. Remove all seals from the body.
3. Weld the body into position, ensuring that the connection is free of tension and distortion.
4. Dissipate heat away from the valve body to prevent warping.

## Air Supply

Install the valves using dry, filtered air. Lubrication is not required. If using lubricated air, refer to the solenoid manufacturer's specifications.

## Pipeline Support

Install adequate supports to prevent strain on the fittings, valves, and equipment connections.

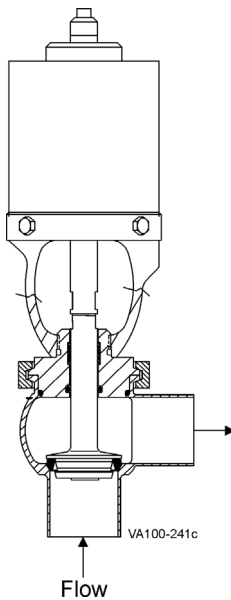


**Figure 2: Pipeline Support**

1. Install supports at least every 10 feet (3 meters) on straight runs of piping (Figure 2, item C).
2. Install supports on both sides of the valves as close as possible to the connections (Figure 2, item D).
3. Install supports at each change of pipeline direction (Figure 2, item E and F).
4. For pipelines passing through walls, floors or ceilings, provide at least 1 inch (25 mm) of clearance around the pipe to allow for expansion and contraction (Figure 2, item G).

## Flow Direction

Install the valves to close against the flow to prevent hammering.

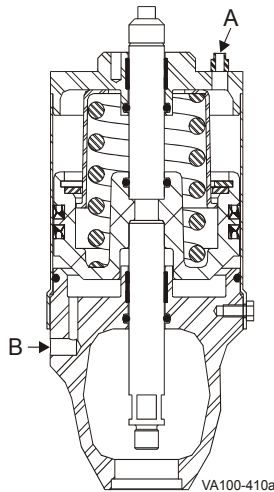


**Figure 3: Flow Direction**

## Operation

### Air Connections

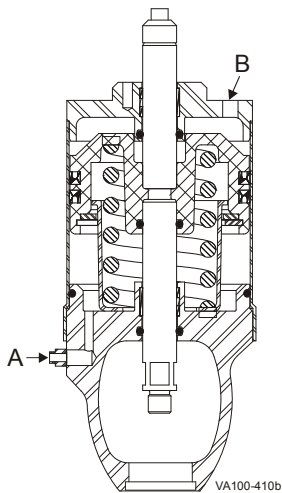
**NOTE:** Actual air pressure values may vary depending on the valve size, actuator size, holding pressure requirements and spring selection.



A. Vent  
B. Air In

- 4" and 5" Air Pressure Range = minimum 50 psi to maximum 90 psi (3.4 bar to 6.1 bar)
- 6" Air Pressure Range = minimum 75 psi to maximum 90 psi (5.1 bar to 6.1 bar)
- 1/8"-27 NPT Threads

**Figure 4: 4", 5", and 6" Air-to-Raise**



A. Vent  
B. Air In

- 4" and 5" Air Pressure Range = minimum 50 psi to maximum 90 psi (3.4 bar to 6.1 bar)
- 6" Air Pressure Range = minimum 75 psi to maximum 90 psi (5.1 bar to 6.1 bar)
- 1/8"-27 NPT Threads

**Figure 5: 4", 5", and 6" Air-to-Lower**

## Maintenance

### Maintenance Intervals

Maintain adequate stock of replacement parts. See the items in bold beginning on page 24 for recommended spare parts.

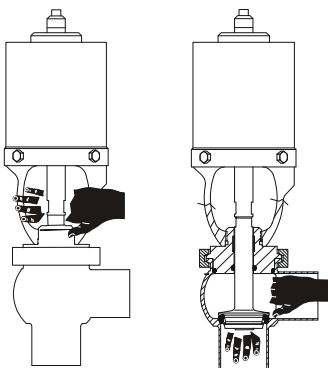
Maintenance intervals should be determined by the user and specific application, based on the following conditions:

- Daily operation period
- Switching frequency
- Application parameters such as temperature, pressure, and flow
- Product type

### Inspection



**DANGER:** Do not put a hand into the yoke or body of a pneumatically actuated valve.



VA100-359a

Inspect the following on a regular basis:

- Actuator connections for air leaks
- Valve body and stem o-rings.
- Valve seats (If leakage occurs, see “Troubleshooting” on page 44)
- Pneumatic connections:
  - Air pressure at supply connection
  - Air lines for kinks and leaks
  - Threaded connections for tight fit
  - Threaded stress relief for tight fit
- Electrical connections secure on the control module:
  - Wire connections tight on the terminal strip
  - Clean air filter at regular intervals.

### Lubrication

No lubrication is required other than as noted in the disassembly and assembly procedures. (Use food grade non-petroleum (silicone) grease on seals and o-rings.)

Apply Bostik Never-Seez® White Food Grade with PTFE or equivalent to all bolts and threaded stem parts.

### Cleaning



**CAUTION:** Avoid splashing any liquid into the air vent of the actuator during clean up.

#### Cleaning-In-Place (CIP)

**NOTE:** Actuate each valve a minimum of twice each cycle to ensure effective cleaning and sanitizing.

CIP methods can be used to clean installed automatic valves without disassembly. Select methods based on the specific requirements of sanitarians and each application. Check with local chemical suppliers for the most effective cleaning agents and procedures.

## Removing the Valve from the System (W91 Valves)

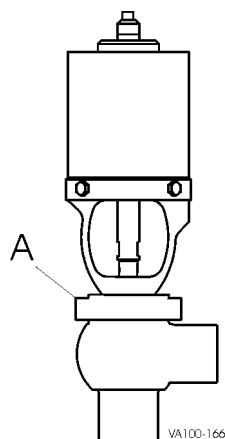


Figure 6: Location of Adapter Clamp

1. Stop the material flow to the valve.
2. For valves with an air-to-raise actuator, apply air to the actuator to raise the stem.
3. Remove the clamp holding the body to the adapter (Figure 6, item A).
4. Lift the actuator stem from the body and loosen the spacer around the diaphragm.
5. For valves 2-inch through 4-inch size, pull the spacer (Figure 7, item B) off the adapter (item E), away from the actuator. This should free the diaphragm (item C).
6. Shut off the air and lock out the electrical power to the valve.
7. Disconnect the air line and electrical connections.
8. Move the actuator and stem assembly to a work station.

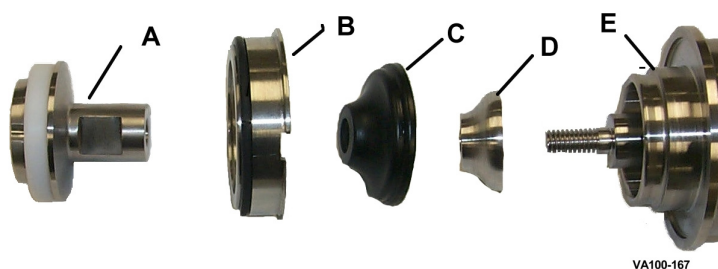


Figure 7: Diaphragm and Valve Assembly for Valves Greater than 1½ inch

## Replacing the Valve Diaphragm (W91 Valves)

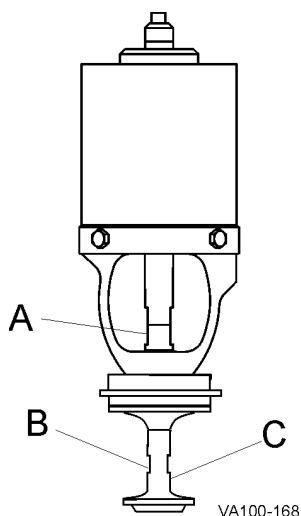


Figure 8: Location of Wrench Flats

**NOTE:** Do not use petroleum-based lubricants.

The following procedure assumes that the actuator and stem assembly has been removed from the valve body.

### Air-to-Raise (AR) Actuators

**NOTE:** Perform this procedure near the installation location, as air is applied to the valve during the procedure and must remain until the actuator assembly is installed in the valve body.

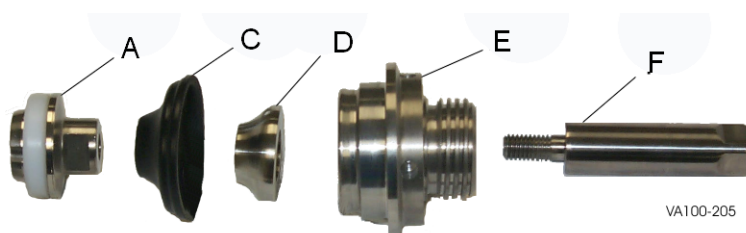
1. Using two 5/8 inch wrenches; one on the lower set of wrench flats in the yoke (Figure 8, item A), and the other on the wrench flats just above the valve plug (Figure 8, item B), unscrew the two stem halves and remove the plug stem (Figure 8, item C) from the assembly.
2. For valve sizes 2-inch through 4-inch, pull the spacer (Figure 7, item B) off the adapter (item E), away from the actuator. This should free the diaphragm (item C).
3. Remove the old diaphragm.
4. Install the new diaphragm over the threaded extension of the upper stem half and center it on the guide in the diaphragm support (Figure 7, item D).
5. Lubricate the outer perimeter of the diaphragm with Dow Corning #7 Silicone lubricant.

**NOTE:** On air-to-lower actuators, it is not necessary to apply air pressure to the actuator to install the diaphragm.

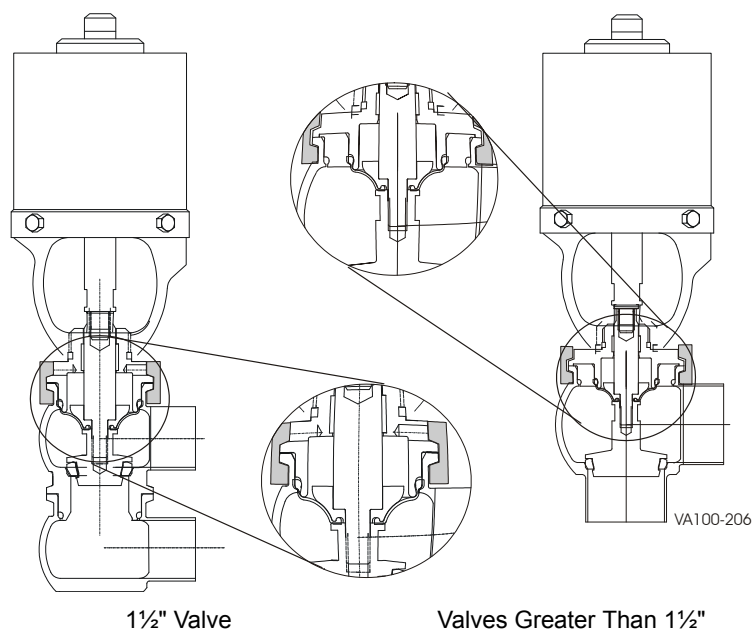


**CAUTION:** DO NOT remove the air pressure from the actuator until the actuator/stem assembly is clamped in the body. If the air is released, the diaphragm will be stretched, causing premature failure.

6. Place the spacer over the lower stem portion. Do not push the spacer over the adapter. For 1½ inch valves there is no spacer. See Figure 9 and Figure 10.
7. Screw the two stem halves together tightly, taking care not to over-tighten. See Figure 8.
8. Apply air to the actuator to raise the stem.
9. Slide the outer part of the diaphragm (Figure 7, item C) over the adapter (item E).
10. For 1½ inch valves, skip to step 12.
11. Slide the spacer (Figure 7, item B) over the diaphragm/adapter. Check that the diaphragm is held flatly and evenly between the adapter and the spacer all the way around.
12. With Dow Corning #7, lubricate the upper portion of the valve body where the o-ring on the spacer contacts the body.
13. Push the valve and actuator assembly straight into the body. Do not force it in at an angle.
14. Attach the adapter to the body using the body clamp.
15. Release the air pressure from the actuator.
16. Connect the control top (if used) and air supply.



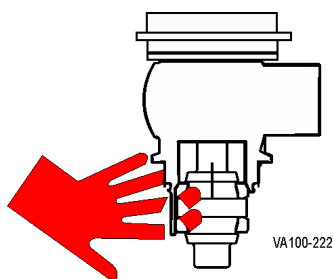
**Figure 9: Diaphragm and Valve Assembly for 1½ inch Valves**



**Figure 10: Cross Section of Diaphragm Installed**



## Removing the Valve from the System (W92 Valves)



1. Disconnect the control top connection and air supply connection from the valve.



**DANGER:** The bottom of the upper body has a retainer to support the stem. **KEEP ALL FINGERS AWAY FROM THE RETAINER WHEN ACTUATING THE VALVE.** The retainer and stem create a pinch point.

2. Apply air to raise the actuator using an air supply equipped with an air pressure regulator.

**NOTE:** On air-to-lower actuators, it is not necessary to apply air pressure to the actuator to remove it from the system.

3. Remove the clamp between the upper and lower body and the clamps from the upper body to the product lines.
4. Remove the actuator/upper body assembly from the system.

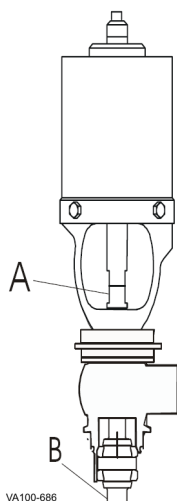
## Replacing the Valve Diaphragm (W92 Valves)

### Air-To-Raise (AR) Actuators:

1. Remove the upper body/adapter clamp.
2. Slowly reduce the air pressure on the actuator and pull the body from the adapter as the stem moves down. Do not release all of the air pressure.
3. When the body has moved down to expose the o-ring on the spacer or the diaphragm, stop reducing the air pressure.
4. On 2-inch valves or larger, use two screwdrivers to pry the spacer ring from the adapter. This will free the diaphragm from the adapter. On 1½ inch valves, there is no spacer ring, so the diaphragm is freed when the body is pulled from the adapter.
5. Release the balance of the air pressure from the AR actuator and disconnect the air line.
6. Unscrew the stem from the valve by using two 5/8 inch wrenches, one in the yoke and one on the end of the stem (Figure 11, item A and B).
7. Remove the stem, upper body, and the old diaphragm from the valve.

### Air To Lower (AL) Actuators

1. On Air-to-Lower valves, slowly apply air pressure to extend the stem from the body. Do not apply full air pressure, as it will stretch and damage the diaphragm.
2. As the stem extends, pull the upper body down to expose the o-ring on the spacer or the diaphragm.
3. On 2 inch valves or larger, use two screw drivers to pry the spacer ring from the adapter. This will free the diaphragm from the adapter. On 1½ inch valves there is no spacer ring, so the diaphragm is free when the body is pulled from the adapter.
4. Unscrew the stem from the valve by using two 5/8 inch wrenches, one in the yoke and one on the end of the stem. See Figure 11, item A and B.
5. Remove the stem, upper body and diaphragm from the valve.



**Figure 11: Location of Wrench Flats**

## Installing the Diaphragm (W92 Valves)



**WARNING:** DO NOT push the body on the adapter before installing the lower stem.

### ***Air-to-Raise (AR) Actuators***

1. Lubricate the new diaphragm with Dow Silicone #7 around the outer edge where it contacts the body (1½ inch valves) or the spacer (2 inch valves or larger).
2. Place the diaphragm on the threaded stem extension. Make sure the support (Figure 9, page 16, item D) is on the stem before the diaphragm is put in place.
3. Lubricate the o-ring on the spacer and push the spacer into the upper body (2 inch valves or larger). There is no spacer on the 1½ inch valves.
4. Put the stem through the upper body and screw it onto the threaded upper stem.
5. Tighten the stems using two 5/8 inch wrenches (Figure 11, item A and B).
6. Connect the air supply to the actuator.

**NOTE:** The air supply must have a regulator.

7. Slowly increase the air supply pressure to the actuator so the stem is pulled up against the lower part of the upper body. Continue to apply the air pressure, causing the body and spacer to pull up over the diaphragm and adapter. As the body and spacer are pulled into place, the diaphragm is pulled into the groove and seated in the adapter all the way around.
8. With the air pressure still applied, clamp the upper body to the adapter.
9. Install the actuator/upper body in the system in the reverse order of removal.

### ***Air-to-Lower (AL) Actuators***

1. Once the diaphragm is removed, keep air pressure on the actuator.
2. Lubricate the new diaphragm with Dow Silicone #7 around the outer edge where it contacts the body (1½ inch valves) or the spacer (2-inch valves or larger).
3. Place the diaphragm on the threaded stem extension. Make sure the support (Figure 9, page 16, item D) is on the stem before the diaphragm is put in place.
4. Lubricate the spacer o-ring and push the spacer into the upper body (2 inch valves or larger). There is no spacer on the 1½ inch valves.
5. Put the stem through the upper body and screw it onto the threaded upper stem.
6. Tighten the stems using two 5/8 inch wrenches. See Figure 11 on page 17, items A and B.



**WARNING:** DO NOT push the body on the adapter before installing the lower stem.

7. Slowly decrease the air supply pressure to the actuator so the stem is pulled up against the lower part of the upper body. Continue to decrease the air pressure, causing the body and spacer to pull up over the diaphragm and adapter. As the body and spacer are pulled into place, the diaphragm is pulled into the groove and seated in the adapter all the way around.
8. Clamp the upper body to the adapter.
9. Install the actuator/upper body in the system in the reverse order of removal.

## Seat Replacement

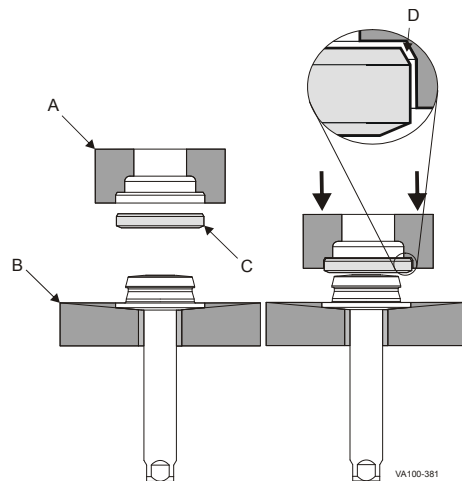


Figure 12: Tef-Flow™ P Seat



**CAUTION:** DO NOT use a hammer to install.

## Standard Tef-Flow™ P Seat

Tef-Flow™ P seats are gray and must be melted through for proper removal.

1. Melt through the seat ring using a clean plastic cutting tip on a heavy-duty soldering iron capable of maintaining a 700°F (371°C) tip temperature.

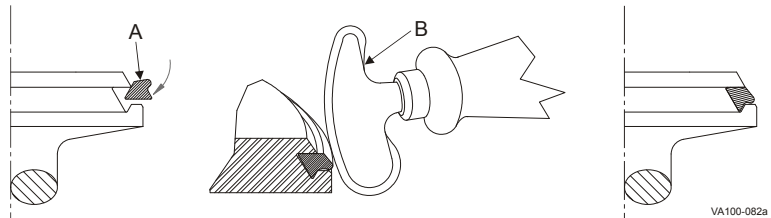


**CAUTION:** Do not use a knife to cut the seat ring from the stem to avoid personal injury and/or damage to the stem.

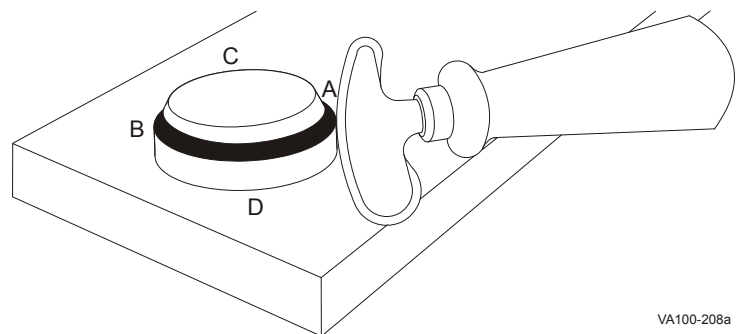
2. To install a new seat, place the installation tool base onto a table or bench with a 1.0" (25 mm) hole (Figure 12, item B). For tool part numbers, see "Optional Tools" on page 37.
3. Place the stem through the hole in the base.
4. Place a new seat ring (item C) onto the stem with the seat angle (item D) and flat side facing away from the base as shown in Figure 12.
5. Place the seat ring tool (Figure 12, item A) over the seat ring. For tool part numbers, see "Optional Tools" on page 37.
6. Using an arbor press, apply a constant steady pressure to the seat ring tool, snapping the seat ring into place.
7. The valve seat will spin freely when properly installed.

### Standard Tri Ring Seat

1. Remove the Tri Ring seat by carefully cutting or using an o-ring tool to pull the seat out of the groove. Do not scratch or nick the metal seating surface.
2. Clean the Tri Ring groove after removing the seat.
3. Lubricate the new Tri Ring (Figure 13, item A) with acceptable cleansing solution or lubricant.
4. Place the stem through a 1-1/8 inch (30 mm) hole bored through a board, secured by a vise.
5. Start the Tri Ring as shown in Figure 13.
6. Using the installation tool, part number 102797+ (Figure 13, item B), press the Tri Ring into the plug at locations A, B, C, and D (Figure 14). If the tool is not used, DO NOT use a knife or any other sharp item that will tear or cut the Tri Ring.
7. To finish installation, press small sections of the seal, alternating from side to side (A-B-C-D), avoiding large loops of seal.
8. When properly installed, the Tri Ring seat lip will protrude slightly from the seat edge as shown in Figure 13.



**Figure 13: Installing New Tri Ring Seat**



**Figure 14: Pressing Tri Ring Into Plug**

### Metal Seat Stems

Metal seat stems do not require maintenance. If the seating surface becomes damaged, purchase a new stem. Do not attempt to re-lap or machine the seating surfaces.

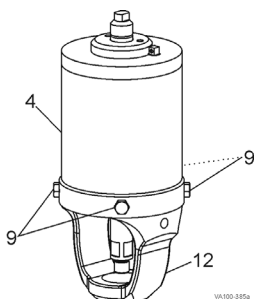
## Servicing Actuators: U-cups, O-rings and Bearings

Shut off the air and disconnect the air supply line to the actuator. Disconnect/lockout the electrical power to the valve.

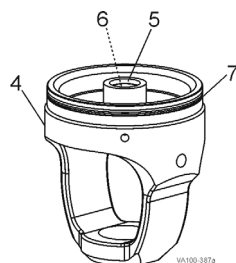
### Valves with Control Module

For control top information, please refer to publication 95-03077 (three-piece); for two-piece, see publication 95-03083. For additional product information, please see our web site at <http://www.gowcb.com/literature.asp>.

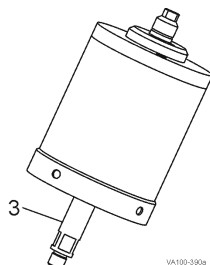
For the Set and Forget Switch option, remove the target on the indicator stem before removing the actuator can.



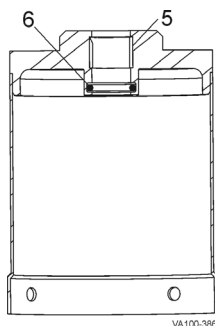
**Figure 15: Remove Yoke**



**Figure 16: Remove Yoke O-ring and Guide Bearing**



**Figure 17: Pull Lower Stem**



**Figure 18: Remove O-ring and Bearing**

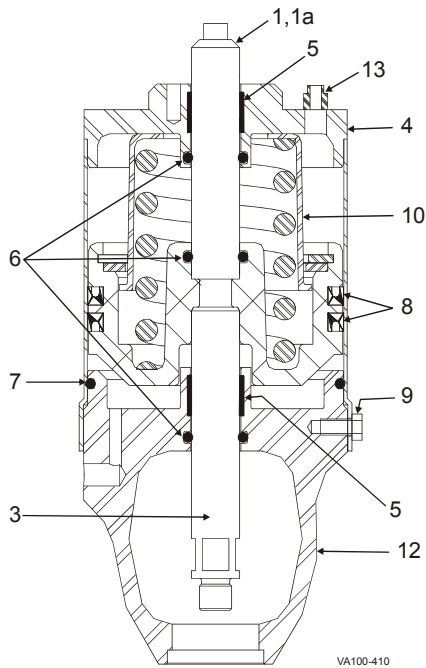
### O-ring and Bearing Replacement: 4", 5" and 6" Actuator

1. Remove the cap screws (Figure 15, item 9) and pull the yoke (item 12) from the actuator cylinder (item 4).
2. Remove the yoke (Figure 16) 4). Inspect the lower stem o-ring (item 6) and cylinder o-ring seals (item 7).
3. Remove the worn o-ring seals. Coat the new o-ring seals with Dow Corning® #7 Silicone Lubricant or equivalent, and replace them.
4. Remove the PTFE guide bearing (Figure 16, item 5) by placing a screwdriver behind the bearing to pry it away from the wall of the yoke. Use needle-nose pliers to grip and remove the bearing.
5. Pull the lower stem (Figure 17, item 3) to remove the caged spring assembly from the actuator cylinder.



**DANGER:** Do not use air to remove the caged spring assembly.

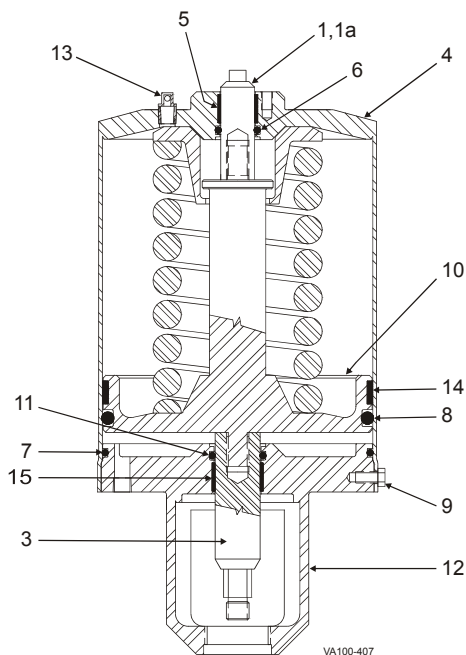
6. Remove and inspect the upper stem o-ring (Figure 18) 6) in the top of the actuator cylinder.
7. Remove the worn o-ring seals. Coat the new o-ring seals with Dow Corning® #7 Silicone Lubricant or equivalent, and replace them.
8. Inspect and replace the PTFE guide bearing (Figure 18) 5) in the actuator cylinder as needed.



**Figure 19: 4" and 5" Actuator**

### U-cup Replacement: 4" and 5" Actuator

1. Inspect the piston U-cup seal (Figure 19, item 8).
2. Remove the worn U-cup seal. Do not score or nick grooves in the piston (item 10).
3. Coat the new U-cup seal with Dow Corning® #7 Silicone Lubricant or equivalent.
4. Slightly stretch the lubricated seal to fit over the piston. Install the lower seal first with the "U" pointing down. Install the upper seal with the "U" pointing up. U-cup seals flare slightly at the outer edges when they are properly installed.
5. Place the piston and spring assembly in the cylinder.
6. Place the cylinder over the yoke, and install cap screws (item 9) to secure it.

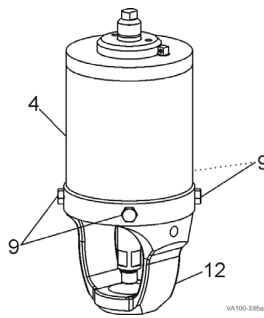


**Figure 20: 6" Actuator**

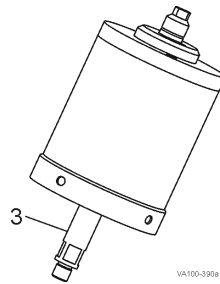
### O-ring and Bearing Replacement: 6" Actuator

1. Inspect the piston o-ring seal (Figure 20, item 8).
2. Remove the worn o-ring seal. Do not score or nick grooves in the piston (item 10).
3. Coat the new o-ring seal with Dow Corning® #7 Silicone Lubricant or equivalent.
4. Slightly stretch the lubricated seal to fit over the piston.
5. Inspect and replace the PTFE guide bearing (item 14) on the piston as needed.
6. Place the piston and spring assembly in the cylinder.
7. Place the cylinder over the yoke, and install cap screws (item 9) to secure it.

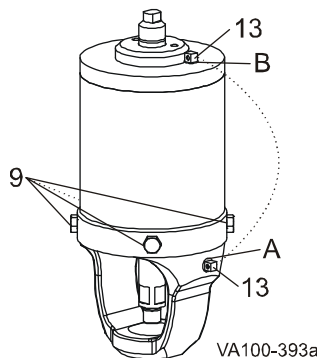
## Reversing the Spring Action



**Figure 21: Remove Yoke**

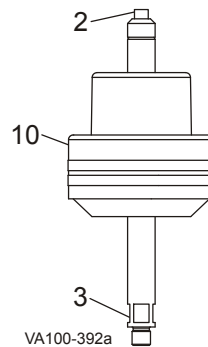


**Figure 22: Pull Lower Stem**



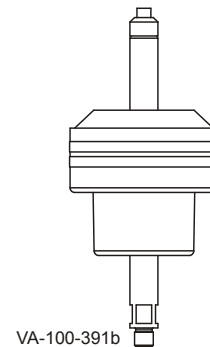
**Figure 25: Cap Screws and Vent Plug**

1. Remove the cap screws (Figure 21, item 9) and pull the yoke (item 12) from the actuator cylinder (item 4).
2. Pull the lower stem (Figure 22, item 3) to remove the caged spring assembly from the actuator cylinder.
3. Using a 5/8-inch wrench on the lower stem (Figure 22, item 3) and a 3/8-inch wrench on the upper stem (item 2), unscrew and remove the two actuator stem halves.
4. Turn the piston/spring assembly (item 10) over.
5. Install the actuator stem halves in the piston/spring assembly and tighten to 200 in/lbs. See Figure 23 for Air-to-Raise configuration; Figure 24 for Air-to-Lower configuration.



**Air-to-Raise**

**Figure 23: Remove Actuator Stem Halves**



**Air-to-Lower**

**Figure 24: Actuator Piston/Spring Configuration**

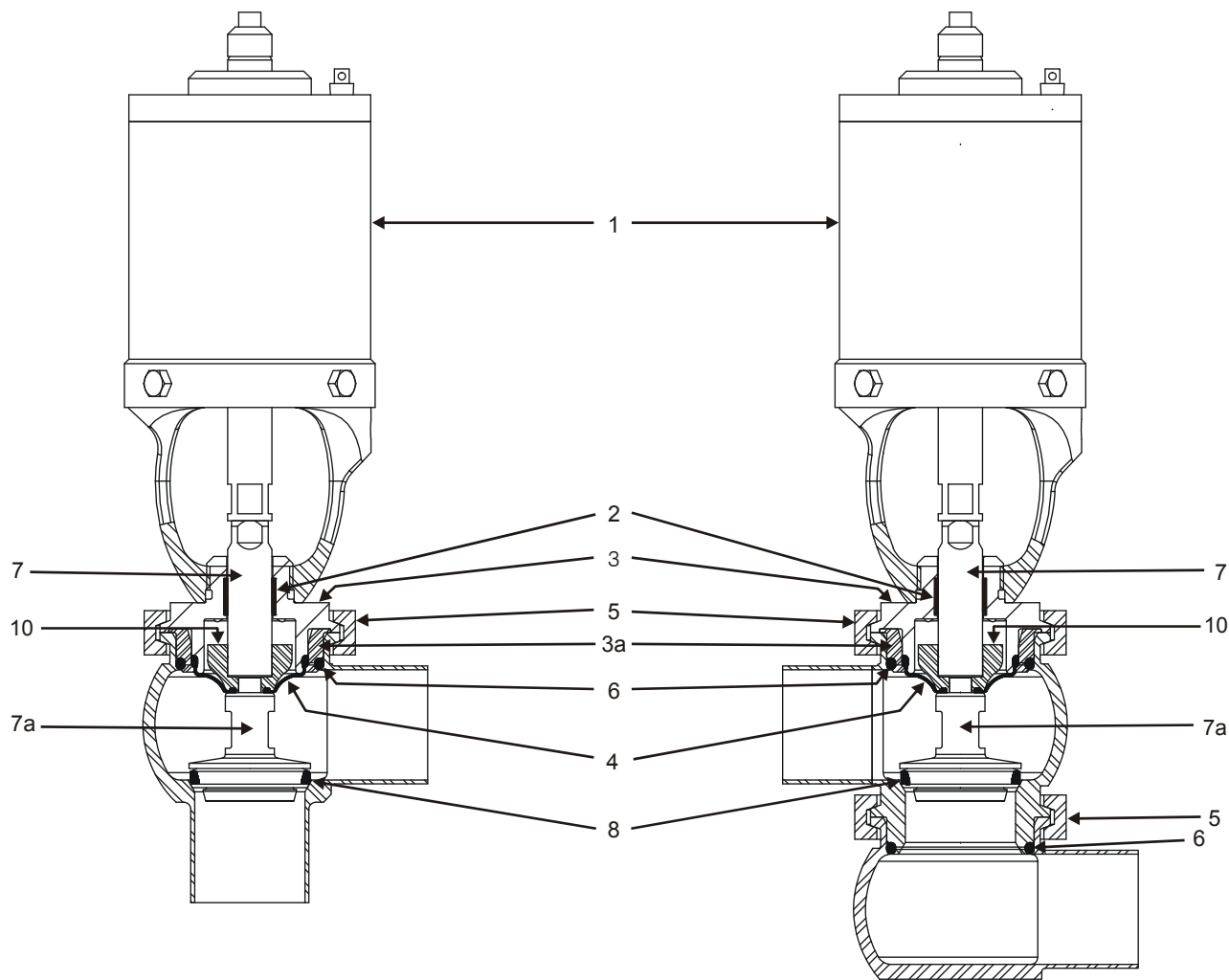
6. Coat the U-cup and o-ring seals with Dow Corning® #7 Silicone Lubricant or equivalent.
7. Install the piston/spring assembly in the actuator cylinder and assemble them with cap screws (Figure 25, item 9).
8. Reverse the vent plug (Figure 25, item 13) as follows:

**Air-to-Raise Actuator:** The vent plug must be located on TOP of the actuator in Port B (Figure 25, item B).

**Air-to-Lower Actuator:** The vent plug must be located on the SIDE of the yoke in Port A (Figure 25, item A).

Parts Lists

W91 Diaphragm Stem Seal - Shutoff Valve



VA100-422



**W91 Diaphragm Stem Seal - Shutoff Valve**

Item #	Part Description	1-1/2"	2"	2-1/2"	3"	4"
	Control Top	Contact Factory				
1	Actuator	+*+*+*				
* 2	<b>Bearing</b>	102757+	102757+	102757+	102757+	102757+
3	Adapter, W90	112617+	112612+	112610+	112606+	112603+
3a	Spacer	N/A	112611+	112609+	112605+	112602+
* 4	<b>Diaphragm</b>	<b>EPDM</b>	112616+	112616+	112616+	112616+
		<b>FKM</b>	112625+	112625+	112625+	112625+
5	Clamp	119-30	119-33	119-34	119-51	119-87
* 6	<b>O-ring, Body<sup>1</sup></b>	<b>EPDM</b>	E70223	E70228	E70232	E70236
		<b>FKM</b>	V70223	V70228	V70232	V70236
7	Stem (upper & lower) - see note 2, below.					
* 8	<b>Seat Ring</b>	<b>Tef-Flow™ P</b>	115347+	115348+	115349+	115350+
10	Support		117587+	117587+	117587+	117587+

**Notes**

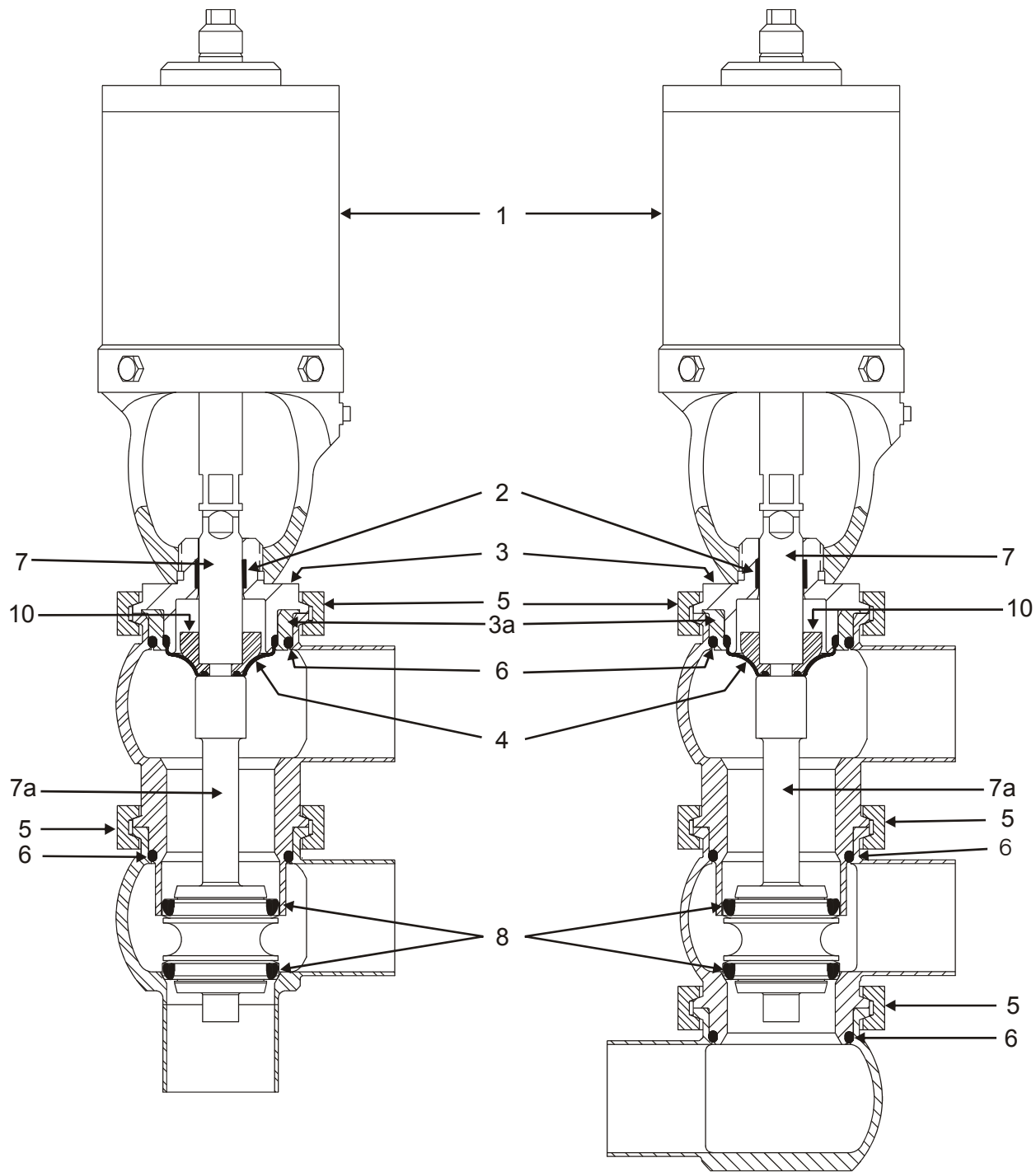
PL5027-CH13

\* **Recommended Spare Parts**

\*\*\* See Actuator Parts Lists

1. 1-1/2" size valves do not require an upper body o-ring (item 6); only used for lower body on two-piece configurations.
2. For item 7, see W91/W94R Valve Stems chart.

W92 Diaphragm Stem Seal - Divert Valve



VA100-423

**W92 Diaphragm Stem Seal - Divert Valve**

Item #	Part Description	1-1/2"	2"	2-1/2"	3"	4"
	Control Top	Contact Factory				
1	Actuator	***				
* 2	<b>Bearing</b>	102757+	102757+	102757+	102757+	102757+
3	Adapter, W90	112617+	112612+	112610+	112606+	112603+
3a	Spacer	N/A	112611+	112609+	112605+	112602+
* 4	<b>Diaphragm</b>	<b>EPDM</b>	112616+	112616+	112616+	112616+
		<b>FKM</b>	112625+	112625+	112625+	112625+
5	Clamp	119-30	119-33	119-34	119-51	119-87
* 6	<b>O-ring, Body<sup>1</sup></b>	<b>EPDM</b>	E70223	E70228	E70232	E70236
		<b>FKM</b>	V70223	V70228	V70232	V70236
7	Stem (upper & lower) - see note 2, below.					
* 8	<b>Seat Ring</b>	<b>Tef-Flow™ P</b>	115347+	115348+	115349+	115350+
10	Support		117587+	117587+	117587+	117587+

**Notes**

PL5027-CH14

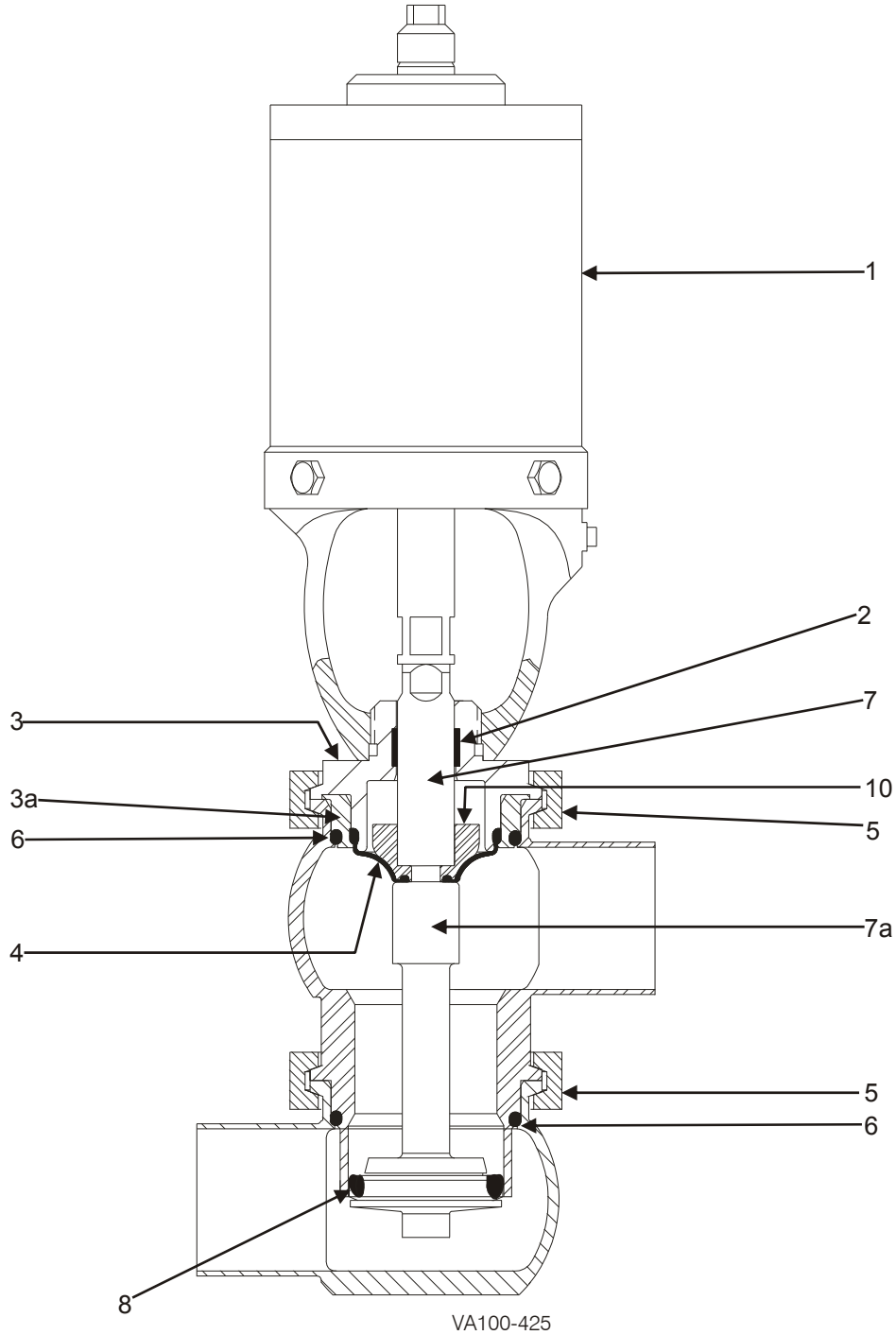
\* **Recommended Spare Parts**

\*\*\* See Actuator Parts Lists

1. 1-1/2" size valves do not require an upper body o-ring (item 6); only used for lower body on two-piece configurations.

2. For item 7, see W92 Valve Stems chart.

W93 Diaphragm Stem Seal - Reverse Shutoff Valve



**W93 Diaphragm Stem Seal - Reverse Shutoff Valve**

Item #	Part Description	1-1/2"	2"	2-1/2"	3"	4"
	Control Top	Contact Factory				
1	Actuator	***				
* 2	<b>Bearing</b>	106047+	106047+	106047+	106047+	106047+
3	Adapter, W90	113157+	113158+	113159+	113160+	113161+
3a	Spacer	N/A	112611+	112609+	112605+	112602+
* 4	<b>Diaphragm</b>					
	EPDM	112616+	112616+	112616+	112616+	112616+
	FKM	112625+	112625+	112625+	112625+	112625+
5	Clamp	119-30	119-33	119-34	119-51	119-87
* 6	<b>O-ring, Body<sup>1</sup></b>					
	EPDM	E70223	E70228	E70232	E70236	E70244
	FKM	V70223	V70228	V70232	V70236	V70244
7	Stem (upper & lower) - see note 2, below.					
* 8	<b>Seat Ring</b>					
	Tef-Flow™ P	115347+	115348+	115349+	115350+	115351+
10	Support	117587+	117587+	117587+	117587+	117587+

**Notes**

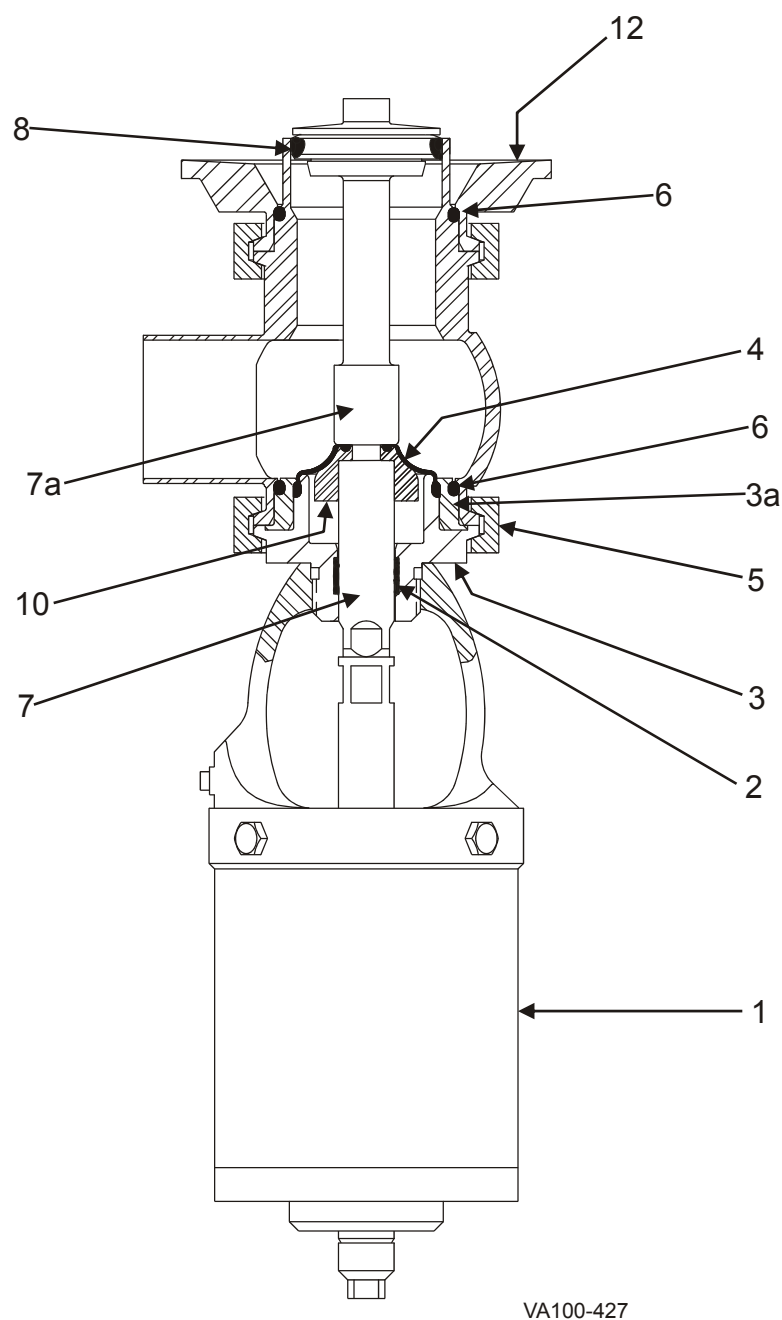
PL5027-CH15

\* **Recommended Spare Parts**

\*\*\* See Actuator Parts Lists

1. 1-1/2" size valves do not require an upper body o-ring (item 6); only used for lower body on two-piece configurations.
2. For item 7, see W93/W94 Valve Stems chart.

W94 Diaphragm Stem Seal - Tank Outlet Valve



**W94 Diaphragm Stem Seal - Tank Outlet Valve**

Item #	Part Description	1-1/2"	2"	2-1/2"	3"	4"
	Control Top	Contact Factory				
1	Actuator	***				
* 2	<b>Bearing</b>	106047+	106047+	106047+	106047+	106047+
3	Adapter, W90	113157+	113158+	113159+	113160+	113161+
3a	Spacer	N/A	112611+	112609+	112605+	112602+
* 4	<b>Diaphragm</b>					
	EPDM	112616+	112616+	112616+	112616+	112616+
	FKM	112625+	112625+	112625+	112625+	112625+
5	Clamp	119-30	119-33	119-34	119-51	119-87
* 6	<b>O-ring, Body<sup>1</sup></b>					
	EPDM	E70223	E70228	E70232	E70236	E70244
	FKM	V70223	V70228	V70232	V70236	V70244
7	Stem (upper & lower) - see note 2, below.					
* 8	<b>Seat Ring</b>					
	Tef-Flow™ P	115347+	115348+	115349+	115350+	115351+
10	Support	117587+	117587+	117587+	117587+	117587+

**Notes**

PL5027-CH15

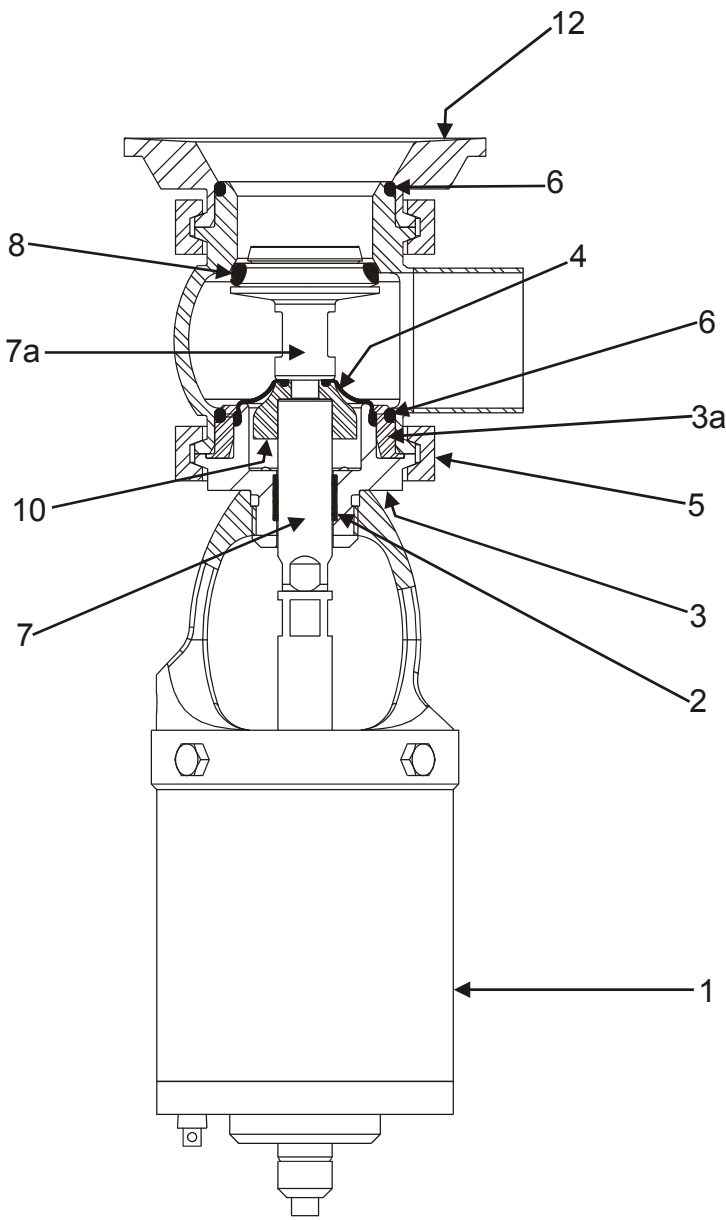
\* **Recommended Spare Parts**

\*\*\* See Actuator Parts Lists

1. 1-1/2" size valves do not require an upper body o-ring (item 6); only used for lower body on two-piece configurations.

2. For item 7, see W93/W94 Valve Stems chart.

W94R Diaphragm Stem Seal - Tank Outlet Valve



VA100-428



**W94R Diaphragm Stem Seal - Tank Outlet Valve**

Item #	Part Description	1-1/2"	2"	2-1/2"	3"	4"
	Control Top	Contact Factory				
1	Actuator	***				
* 2	<b>Bearing</b>	102757+	102757+	102757+	102757+	102757+
3	Adapter, W90	112617+	112612+	112610+	112606+	112603+
3a	Spacer	N/A	112611+	112609+	112605+	112602+
* 4	<b>Diaphragm</b> <b>EPDM</b>	112616+	112616+	112616+	112616+	112616+
		<b>FKM</b> 112625+	112625+	112625+	112625+	112625+
5	Clamp	119-30	119-33	119-34	119-51	119-87
* 6	<b>O-ring, Body</b> <b>EPDM</b>	E70223	E70228	E70232	E70236	E70244
		<b>FKM</b> V70223	V70228	V70232	V70236	V70244
7	Stem (upper & lower) - see note 2, below.					
* 8	<b>Seat Ring</b> <b>Tef-Flow™ P</b>	115347+	115348+	115349+	115350+	115351+
10	Support	117587+	117587+	117587+	117587+	117587+
12	Tank Flange      1/8" Thick	114824+	114825+	114826+	114827+	114828+
		1/4" Thick 114829+	114830+	114831+	114832+	114833+

**Notes**

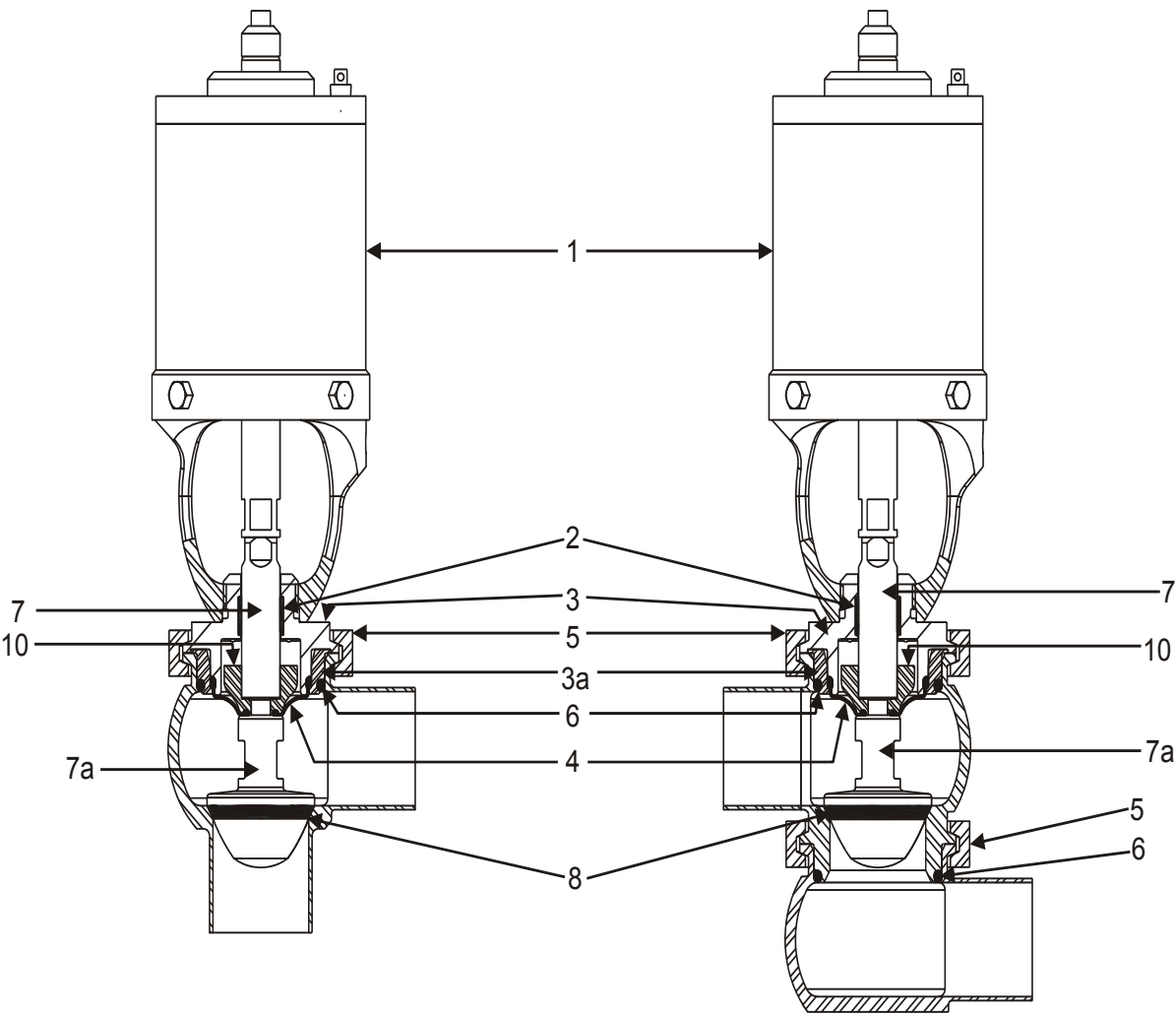
PL5027-CH17

\* **Recommended Spare Parts**

\*\*\* See Actuator Parts Lists

1. 1-1/2" size valves do not require an upper body o-ring (item 6); only used for lower body on two-piece configurations.
2. For item 7, see W91/W94R Valve Stems chart.

W98 Diaphragm Stem Seal - Throttling Valve



VA100-426

**W98 Diaphragm Stem Seal - Throttling Valve**

Item #	Part Description	1-1/2"	2"	2-1/2"	3"	4"
	Control Top	Contact Factory				
1	Actuator	***				
* 2	<b>Bearing</b>	102757+	102757+	102757+	102757+	102757+
3	Adapter, W90	112617+	112612+	112610+	112606+	112603+
3a	Spacer	N/A	112611+	112609+	112605+	112602+
* 4	<b>Diaphragm</b>					
	<b>EPDM</b>	112616+	112616+	112616+	112616+	112616+
	<b>FKM</b>	112625+	112625+	112625+	112625+	112625+
5	Clamp	119-30	119-33	119-34	119-51	119-87
* 6	<b>O-ring, Body<sup>1</sup></b>					
	<b>EPDM</b>	E70223	E70228	E70232	E70236	E70244
	<b>FKM</b>	V70223	V70228	V70232	V70236	V70244
7	Stem (upper & lower) - see note 2, below.					
* 8	<b>Seat Ring</b>					
	<b>Tri Ring, EPDM</b>	107692+	107695+	107048+	102488+	107698+
	<b>Tri Ring, FKM</b>	107983+	107986+	107982+	107974+	107989+
10	Support	117587+	117587+	117587+	117587+	117587+

**Notes**

PL5027-CH19

\* **Recommended Spare Parts**

\*\*\* See Actuator Parts Lists

1. 1-1/2" size valves do not require an upper body o-ring (item 6); only used for lower body on two-piece configurations.
2. For item 7, see W98 Valve Stems chart

## Valve Stems

## W91/W94R Valve Stems

Item #	Part Description	1-1/2"	2"	2-1/2"	3"	4"
7	Stem, Upper	112618+	112618+	112618+	112618+	112618+
7a	Stem, Lower Tef-Flow™ P	112614+	112613+	112608+	112607+	112604+

PL5027-CH34

## W92 Valve Stems

Item #	Part Description	1-1/2"	2"	2-1/2"	3"	4"
7	Stem, Upper	112618+	112618+	112618+	112618+	112618+
7a	Stem, Lower Tef-Flow™ P	117606+	117613+	117585+	117645+	117601+

PL5027-CH110

## W93/W94 Valve Stems

Item #	Part Description	1-1/2"	2"	2-1/2"	3"	4"
7	Stem, Upper	113156+	113156+	113156+	113156+	113156+
7a	Stem, Lower Tef-Flow™ P	117974+	117975+	117976+	117977+	117978+

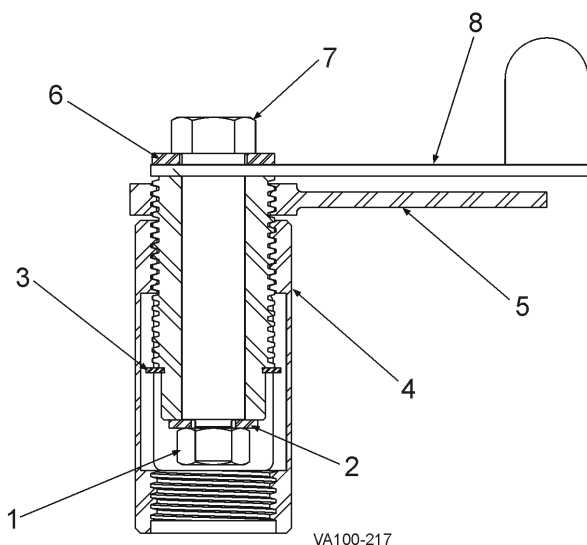
PL5027-CH112

## W98 Valve Stems

Item #	Part Description	1-1/2"	2"	2-1/2"	3"	4"
7	Stem, Upper	112618+	112618+	112618+	112618+	112618+
7a	Stem, Lower Metal, Low Flow Plug	117688+	117690+	112992+	117602+	113000+
	Metal, High Flow Plug	117608+	117668+	112994+	112998+	113002+
	Tri Ring, Low Flow Plug	117689+	117612+	112993+	117603+	113001+
	Tri Ring, High Flow Plug	117609+	117669+	112995+	112999+	113003+

PL5027-CH114

## Hand Lock Manual Handle



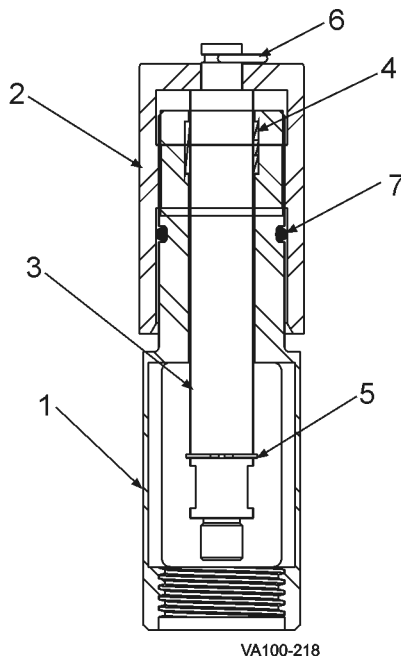
Item #	Part Description	Part No
	Actuator Assembly	105167+
1	Hex Nut <sup>1</sup>	36-54
2	Plane Washer	43-31
3	Retaining Ring	2104600
4	Nut-Adjusting	2098700
5	Locknut with Handle	36-50
6	Plain Washer	43-55
7	Stem - Manual Actuator	105168+
8	Adjusting Screw Assembly	105170+

PL5027-CH

## Notes

1. The hex nut is only used for shipping. The hex nut is not used when the actuator is installed on a valve.

## Micrometer Handle



Item #	Part Description	Part No.
	Actuator Assembly	112884+
1	Yoke	112881+
2	Handle	112882+
3	Stem	112883+
4	Bearing	102757+
5	Retaining Ring	113163+
6	Clip	65-1
7	O-Ring, PTFE Coated	9-40

PL5027-CH41

## Notes

- When the micrometer handle assembly is ordered as loose component, a vernier scale is not acid-etched on the handle and body.

## Optional Tools

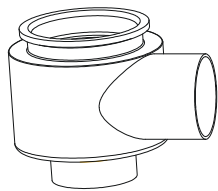
Tef-Flow™ P Tools		1" 25 mm	1-1/2" 40 mm	2" 50 mm	2-1/2" 65 mm	3" 80 mm	4" 100 mm	6" 150 mm
A	Seat Ring Tool	115654+	115654+	115655+	115656+	115657+	115658+	117955+
B	Base	115653+	115653+	115653+	115653+	115653+	115653+	115653+

PL5027-CH66

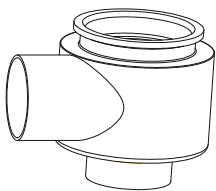
Tri Ring Tool	102797+
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PL5027-CH85

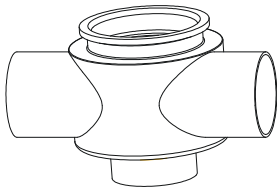
W90 Series Single Seat Valve Bodies



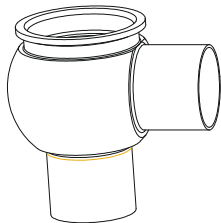
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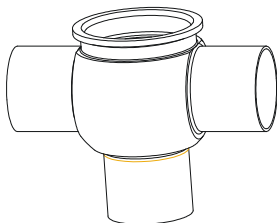
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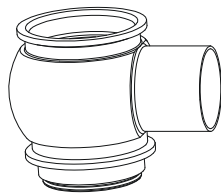
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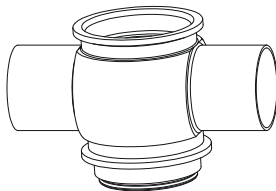
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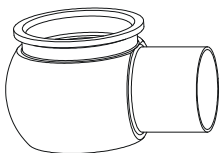
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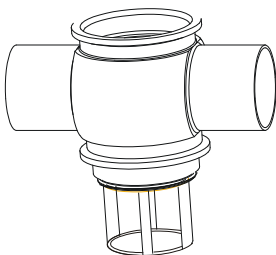
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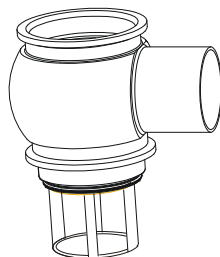
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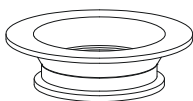
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11



12



13

VA100-209

**W90 Series Single Seat Valve Bodies - inch O.D. Tube sizes**

Item	Part Description		1"	1-1/2"	2"	2-1/2"	3"	4"	6" <sup>1</sup>
1	Tee, Offset Port - Right (TOPR)	Buttweld	108321+	108322+	108323+	108324+	108325+	108326+	116739+
		S-Line	108433+	108438+	108443+	108448+	108453+	108458+	POA
2	Tee, Offset Port - Left (TOPL)	Buttweld	108327+	108328+	108329+	108330+	108331+	108332+	116735+
		S-Line	108463+	108468+	108473+	108478+	108483+	108488+	118920+
3	Cross, Offset Port (COP)	Buttweld	108333+	108334+	108335+	108336+	108337+	108338+	POA
		S-Line	108493+	108498+	108503+	108508+	108513+	108518+	POA
4	Tee (T)	Buttweld	102400+	102401+	102402+	102403+	102404+	102405+	114296+
		S-Line	104143+	104147+	104151+	104155+	104159+	104163+	117205+
5	Cross (C)	Buttweld	102449+	102450+	102451+	102452+	102453+	102454+	114297+
		S-Line	104191+	104195+	104199+	104203+	104207+	104211+	POA
6	Upper Tee (T)	Buttweld	102144+	102145+	102146+	102147+	102148+	102149+	119245+
		S-Line	104167+	104171+	104175+	104179+	104183+	104187+	119247+
7	Double Side Port (D)	Buttweld	102785+	102786+	102787+	102788+	102789+	102790+	POA
		S-Line	104263+	104267+	104271+	104275+	104279+	104283+	POA
8	Upper Cross (C)	Buttweld	102455+	102456+	102457+	102458+	102459+	102460+	119246+
		S-Line	104215+	104219+	104223+	104227+	104231+	104235+	POA
9	Lower Bottom Port (B)	Buttweld	102779+	102780+	102781+	102782+	102783+	102784+	POA
		S-Line	104287+	104291+	104295+	104299+	104923+	104927+	POA
10	Single Side Port (S)	Buttweld	102773+	102774+	102775+	102776+	102777+	102778+	POA
		S-Line	104239+	104243+	104247+	104251+	104255+	104259+	POA
12	Tee, Port Short (TPS)	S-Line	111709+	111710+	111711+	111712+	109955+	111713+	POA
13	Cross, Port Short (CPS)	S-Line	112408+	112409+	112410+	112411+	112412+	112413+	POA
14	Cross, Manifold (CM)	Buttweld	105586+	105587+	105588+	105589+	105590+	105591+	POA
15	Tee, Manifold (TM)	Buttweld	105580+	105581+	105582+	105583+	105584+	105585+	POA
16	In-line Body (L)	Buttweld	107685+	107686+	107687+	107688+	107689+	107690+	POA
		S-Line	107702+	107706+	107710+	107714+	107718+	107722+	POA
17	Lower Tee (T)	Buttweld	106269+	106061+	106062+	106063+	106064+	106065+	124955+
		S-Line	106341+	106345+	106349+	106353+	106357+	106361+	POA
18	Lower Cross (C)	Buttweld	106270+	106262+	106263+	106264+	106265+	106266+	124956+
		S-Line	106365+	106369+	106373+	106377+	106381+	106385+	POA
19	Elbow Outlet (ET) <sup>1</sup>	S-Line	POA	POA	117906+	117907+	117908+	POA	POA
20	Y Body (Y) <sup>1</sup>	Buttweld	POA	POA	POA	121663+	121769+	121770+	POA
		S-Line	POA	POA	POA	119556+	119555+	119554+	POA

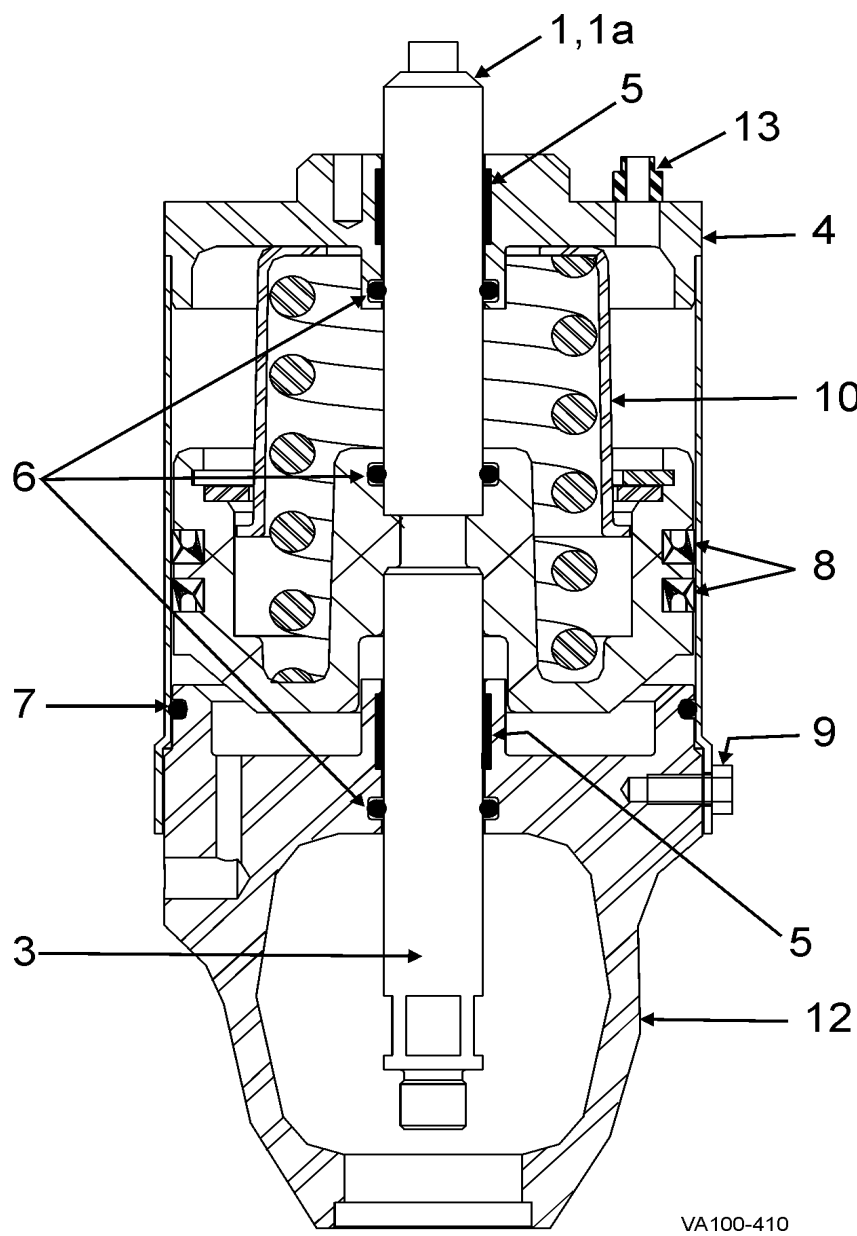
**Notes:**

PL5027-CH20

1. Bodies and 6" sizes are not currently available for W68, W88 or W90 series.

POA: Contact Factory

4" (101 mm) and 5" (127 mm) Air-to-Spring or Air-to-Air Actuators



VA100-410



**4" (101 mm) and 5" (127 mm) Air-to-Spring or Air-to-Air Actuators**

Item #	Part Description	4" Diameter (101 mm)	5" Diameter (127 mm)
1	Indicator Stem - Visual	121007+	118937+
1a	Indicator Stem - Control Top	118938+	118939+
3	Stem, Lower	102141+	102134+
4	Cylinder	102136+	102130+
* 5	<b>Bearing, Cylinder</b>	102757+	102757+
* 6	<b>O-ring</b> <b>Nitrile</b>	N70210	N70210
* 7	<b>O-ring, Cylinder</b> <b>Nitrile</b>	N70240	N70248
* 8	<b>Seal, U-cup</b>	57-15	120026+
9	Cap Screw, 1/4-20 x .375" lg.	30-68	30-68
10	Piston & Spring Assembly Standard Spring	118144+	118145+
	Heavy Duty Spring	118146+	118147+
	Air-to-Air (no spring)	118148+	118149+
12	Yoke	102137+	102131+
13	Vent Plug	3023957+	3023957+

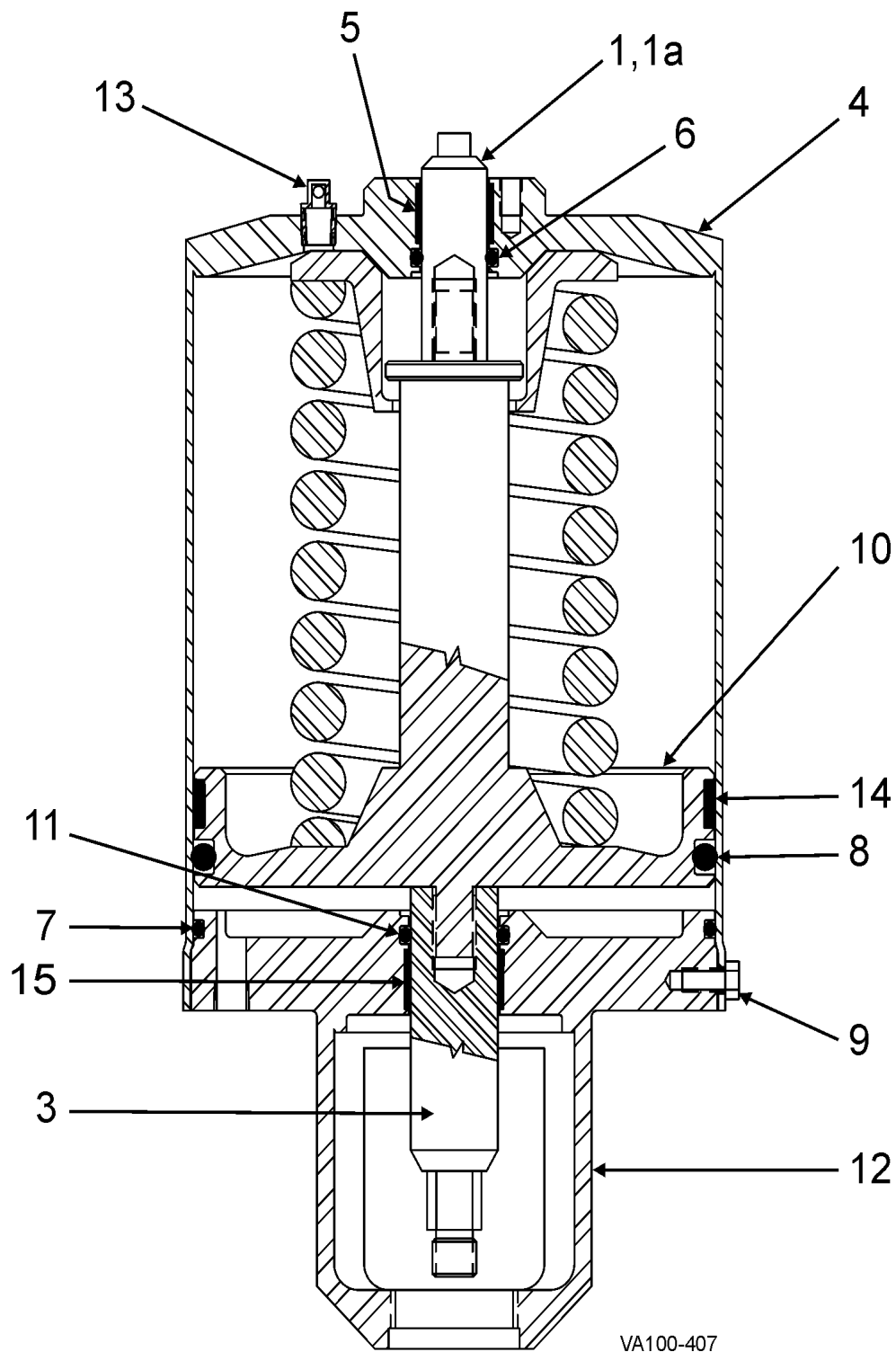
**Complete Actuator Assemblies**

Part Description	Spring	4" Diameter (101 mm)	5" Diameter (127 mm)
Air-to-Raise Visual Indicator Stem Control Top Indicator Stem	Standard	ACT00205	ACT00206
	Heavy Duty	ACT00207	ACT00208
	Standard	ACT00215	ACT00216
	Heavy Duty	ACT00217	ACT00218
Air-to-Lower Visual Indicator Stem Control Top Indicator Stem	Standard	ACT00209	ACT00210
	Heavy Duty	ACT00211	ACT00212
	Standard	ACT00219	ACT00220
	Heavy Duty	ACT00221	ACT00222
Air-to-Air Visual Indicator Stem Control Top Indicator Stem		ACT00213	ACT00214
		ACT00223	ACT00224

PL5027-CH21

**Notes****\* Recommended Spare Parts**

1. Air-to-Air is the same as Air-to-Raise without use of a spring.  
(part # 5900032+ on 4-inch (101 mm) actuator, part # 5900035+ on 5-inch (127 mm) actuator)

**6" (152 mm) Air-to-Spring or Air-to-Air Actuators**

**6" (152 mm) Air-to-Spring or Air-to-Air Actuators**

Item #	Part Description	6" (152 mm) Diameter
1	Indicator Stem - Visual	108834+
1a	Indicator Stem - Control Top	108830+
3	Stem, Lower	108825+
4	Cylinder	106007+
* 5	<b>Bearing, Cylinder</b>	102757+
* 6	<b>O-ring</b> <b>Nitrile</b>	N70210
* 7	<b>O-ring, Cylinder</b> <b>Nitrile</b>	N70255
* 8	<b>O-Ring, Piston</b> <b>Nitrile</b>	N70433
9	Cap Screw, 1/4-20 x .375" lg.	30-68
10	Piston & Spring Assembly Light Spring	110288+
	Standard Spring	108832+
	Air-to-Air (no spring)	118200+
* 11	<b>O-ring</b> <b>Nitrile</b>	N70214
12	Yoke	108827+
13	Vent Plug	3023957+
* 14	<b>Bearing, Piston</b>	102052+
* 15	<b>Bearing, Yoke</b>	106047+

**Complete Actuator Assemblies**

Part Description	Spring	6" (152 mm) Diameter
Air-to-Raise Visual Indicator Stem	Light	ACT00225
	Standard	ACT00226
	Control Top Indicator Stem	Light
		Standard
Air-to-Lower Visual Indicator Stem	Light	ACT00227
	Standard	ACT00228
	Control Top Indicator Stem	Light
		Standard
Air-to-Air Visual Indicator Stem		ACT00229
		ACT00230
Control Top Indicator Stem	Light	ACT00231
	Standard	ACT00232
Air-to-Air Visual Indicator Stem		ACT00233
		ACT00234

PL5027-CH23

**Notes****\* Recommended Spare Parts**

1. Air-to-Air is the same as Air-to-Raise without use of a spring.
2. This actuator is for W60/W80/W90 series valves.

## Troubleshooting

PROBLEM	POSSIBLE CAUSE	SUGGESTED ACTION
<b>Leakage</b>		
<b>Leakage from inside port with valve closed</b>	Seat ring failure	Replace seat rings.
	Debris trapped in valve seats	Remove valve from service. Inspect and replace seat as needed.
	Seat ring not on valve body seat	Check actuator for function.
	Stem loose	Tighten actuator stems. Tighten valve stem to actuator stem in yoke.
	Actuator loose at adapter	Remove body and stem. Tighten adapter as needed.
<b>Leakage around yoke</b>	Internal stem adapter o-ring failure	Replace o-ring.
	External body adapter o-ring failure	Replace o-ring.
<b>Leakage from leak detection ports in adapter</b>	Diaphragm failure	Remove and replace diaphragm.
	Upper and lower valve stems loose	Remove actuator/stem assembly and tighten stems.
<b>Operation</b>		
<b>Valve fails to open</b>	Air pressure too low	For 4" (101 mm), 5" (127 mm) and 6" (152 mm) light spring actuators, set air pressure to 60 psi (4 bar). For 6" (152 mm) standard spring actuators, set air pressure to 80 psi (6 bar).
	Control failure	Check control sequence. Check control wiring and power source.
<b>Valve fails to close</b>	Control failure	Check control sequence. Check air supply. Check for loose stems. Check control wiring and power source.
	Debris trapped in valve seat	Remove valve from service. Inspect and replace seat as needed.
<b>Actuator moves when valve opens</b>	Clamp loose	Tighten clamp with valve open.
	Yoke loose	Tighten yoke to adapter by turning actuator.
<b>Slow valve operation</b>	Air not exhausting fast enough	Install quick exhaust. Move solenoid closer to valve or install in control top.
	Valve not opening fast enough	Use a bigger diameter air line.

## Electrical

For control top information, please refer to publication 95-03083 (2-piece) or 95-03077 (3-Piece (obsoleted)). For additional product information, please see our web site at [www.spx.com/en/waukesha-cherry-burrell/resources/product-literature](http://www.spx.com/en/waukesha-cherry-burrell/resources/product-literature).



## W90 Series

ASEPTIC DIAPHRAGM STEM SEAL VALVES



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