

# INSTALLATION, OPERATION AND MAINTENANCE MANUAL

**Figures 4500-D, 4500-U, Drawing D-1032  
2½” to 8” Pressure Reducing Valves**

**Figures 4900-D, 4900-U, Drawing D-1060  
2½” to 8” Pressure Reducing Valves  
with Stop-Check Piston**

**SECTION 1 – 2½” to 8” Figures 4500 & 4900 Pilot-Operated  
Pressure Reducing Valve Instructions**

**SECTION 2 – Differential Piston Main Valve Instructions**

**SECTION 3 – Figure 43223 Small Reducing Pilot Instructions**



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Manual O&M 2.5-8inch 4500-4900 Small Pilot 091121



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# Section 1

# INSTALLATION, OPERATION AND MAINTENANCE MANUAL

**Figures 4500-D, 4500-U, Drawing D-1032  
2½” to 8” Pressure Reducing Valves**

**Figures 4900-D, 4900-U, Drawing D-1060  
2½” to 8” Pressure Reducing Valves  
with Stop-Check Piston**

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# INSTALLATION, OPERATION and MAINTENANCE

## 2½” – 8” Figures 4500-D, 4500-U, 4900-D, and 4900-U Pilot Operated Pressure Reducing Valves

### INTRODUCTION

This manual provides information to install, operate and maintain GA Industries pilot-operated pressure reducing valves to ensure a long service life. The valve is ruggedly constructed to provide many decades of dependable service with minimal maintenance.

### CAUTION

The valve is NOT recommended for use with toxic, corrosive, or flammable fluids.

The Shop Order (SO) Number, Figure Number, size, and pressure rating are stamped on a nameplate attached to the valve. Please refer to the SO number when ordering parts.

### DESCRIPTION OF OPERATION

Pressure reducing valves reduce a higher, fluctuating inlet pressure to a lower, steady outlet pressure regardless of variations in demand.

The valve consists of a differential piston main valve and a pilot system, pre-piped and factory installed on the main valve. The main valve consists of just one moving part – the piston – with the top of the piston being larger than the bottom. System pressure applied to the bottom of the piston provides an opening force. When system pressure is simultaneously applied to the larger area on top of the piston, a greater closing force produced. Thus, applying system pressure to the top of the piston closes the valve while exhausting it from the top allows system pressure to lift the piston and open the valve.

The pilot system consists of a reducing pilot, closing speed needle valve, wye strainer and pilot isolating valves. The reducing pilot senses the pressure at the outlet side of the main valve. The pilot responds to changes in the downstream pressure caused by changes in demand, opening on decreasing pressure and closing on increasing pressure.

Inlet pressure is constantly admitted to the top of the piston through the closing speed needle valve. When demand is zero the pilot is closed, trapping system pressure on top of the piston holding the main valve closed. An increase in demand causes the

downstream pressure to fall, opening the pilot and allowing water to flow off the top of the piston through the pilot faster than it's flowing onto the piston through the needle valve thereby lowering the pressure on top of the piston. Inlet pressure acting on the underside of the piston then lifts the piston and allows flow through the main valve.

The main valve opens until the flow through the valve matches demand at the downstream pressure set on the pilot.

As demand varies, the pilot will throttle the main valve as needed to maintain the downstream pressure at the desired pressure within a narrow deadband.

If supplied with the "Stop-Check Piston" feature, the valve will "check" to prevent reverse flow should inlet pressure fall below outlet pressure.

### RECEIVING AND STORAGE

Inspect the valve upon receipt for damage during shipment. Carefully unload all valves to the ground without dropping.

Valves should remain in a clean, dry, and weather protected area until installed. After completion of shop testing the valve is drained of the test water but a small residual amount could remain so the valve should be protected from freezing during storage.

### INSTALLATION

Figure Numbers suffixed with "D" indicate the valve has ANSI Class 125 flanged connections, Figure Numbers suffixed with "U" indicate the valve has ANSI Class 250 flanged connections.

GA Industries differential piston pressure reducing valves are typically supplied with a globe body main valve where the inlet and outlet connections in line. They can be supplied with an angle body main valve that have the inlet and outlet connections 90 degrees apart. Angle body pressure reducing valves are designated with an "A" (e.g. 4500-DA. 4900-UA).

Install the valve in the proper flow direction noting the "INLET" tag on the valve. The INLET is the high-pressure side of the valve.

The valve is configured to be installed in the orientation specified by the engineer. Consult the drawings of record to verify the valve is installed in the proper orientation.

Figure 4900-D/-U with Stop-Check Piston should be installed with the bolted cover parallel to the floor/ground to ensure proper operation of the check feature.

Prior to installation ensure all debris, packing material or other foreign material has been removed from both ports.

If installed outdoors, below ground in a vault or in an unheated area, adequate freeze protection must be provided.

Adequate isolating valves should be installed between the valve and the pipeline or system to facilitate maintenance.

A pressure gauge should be installed between the pressure reducing valve and the downstream isolating valve to facilitate start-up and pressure adjustments.

The valve should be installed with sufficient clearance to permit maintenance and removal of internal components.

The valve is not designed to support adjacent equipment, piping loads should not be imposed on the valve and large valves should be properly supported. Ensure mating flanges are square and parallel to the valve flanges before tightening flange bolts.

Flat-faced flanged valves should be mated with flat-faced flanges and full-face gaskets. If ring gaskets are used the bolt material shall be ASTM A307 Grade B (or equivalent). Higher strength bolting should only be used with full-face gaskets.

Lower heavy valves using slings or chains around the valve body and/or the lifting eyes. **DO NOT LIFT BY THE EXTERNAL PILOT PIPING.** Lubricate the bolts or studs and insert around flange. Lightly tighten bolts until gaps are eliminated. Torque bolts in an alternating pattern in graduated steps. If leakage occurs wait 24 hours and re-torque the bolts but do not compress the gasket more than 50% or exceed bolt maximum torque rating.

**START-UP**

The valve generally does not require any calibration or adjustment prior to start-up. The reduced pressure is factory set at the pressure specified by the engineer and indicated on the tag affixed to the pilot.

Refer to Page 4 for the location of components.

The closing speed needle valve (C) should be initially opened ¼ to ½ turn from closed. Close the needle

valve completely then turn the handwheel ¼ to ½ turn counterclockwise.

Stop valves (A) and (B) must be fully open.

NOTE: If the valve is being installed in an orientation that the main valve's bolted cover is not parallel to the floor/ground, it's recommended the main valve's piston be filled with water before installation. This can be done by removing an unused pipe plug from the valve's cover and filling the valve through a funnel. Replace the pipe plug before installing the valve.

After the valve has been installed, slowly open the inlet isolating valve to introduce pressure to the valve. Air in the valve and pilot system should be bled before putting the valve into service. Loosen a pipe union at a high point in the pilot system so air can escape. Tighten the union after all the air has been vented.

The pressure reducing valve is factory set at "zero flow." Slowly open the downstream isolating valve. When flow through the valve begins the downstream pressure will fall off a little from the "zero flow" factory setting. Once open, the valve will maintain the downstream pressure within a narrow range as demand changes.

A slight and/or intermittent discharge of water from the main valve side vent tube is normal and has no effect on the valve's operation.

**ADJUSTING THE PRESSURE SETTING**

The downstream pressure can be field adjusted within the range of the pilot's installed spring.

If the required pressure setting is higher or lower than the installed spring's range, the spring (or pilot) must be changed.

Turning the pilot screw clockwise raises the downstream pressure, turning it counterclockwise lowers the downstream pressure.

GA Industries 2½" to 8" Figures 4500-D/-U and 4900-D/-U are standard with Figure 43223 Small Pressure Reducing Pilot. Depending on pressure conditions, other pilots may be utilized, consult drawings of record to verify.

**Valve Sizes 2½" to 8"  
Small Pressure Reducing Pilot**

SPRING CODE	REDUCED PRESSURE RANGE
JA	25 – 75 PSI
JB	75 – 145 PSI
JC	10 – 25 PSI

## PREVENTATIVE MAINTENANCE

No routine lubrication or adjustments are needed. The valve should be visually inspected once a month for the first 3 to 6 months after initial start-up to check for leaks and the wye-strainer should be flushed of collected debris.

Flushing the wye-strainer can be facilitated by installing a small ball or gate valve in place of the pipe plug in the bottom of the wye-strainer. Opening the valve while there is pressure in the system will “blow off” collected debris.

After the initial period, once every three (3) months the strainer should be flushed of collected debris as described above. The time between strainer flushing can be extended if no debris is found.

Visually inspect for leaks around the indicator rod, side vent tube or pilot vent hole. If leakage is detected, see **TROUBLESHOOTING** to resolve.

### WARNING

Personal injury may occur if the valve is disassembled while pressurized. Before attempting disassembly, follow appropriate lockout/tag out procedures to prevent accidental pressurization.

Once a year the valve should be isolated, depressurized and the wye-strainer screen removed and cleaned. At the same time the closing speed needle valve should be inspected. First, note the number of turns required to close it fully. Remove the needle valve bonnet and needle and inspect the needle for wear. Replace if needed. Clear needle valve seat of collected debris and reinstall the bonnet and needle. Open to the noted position.

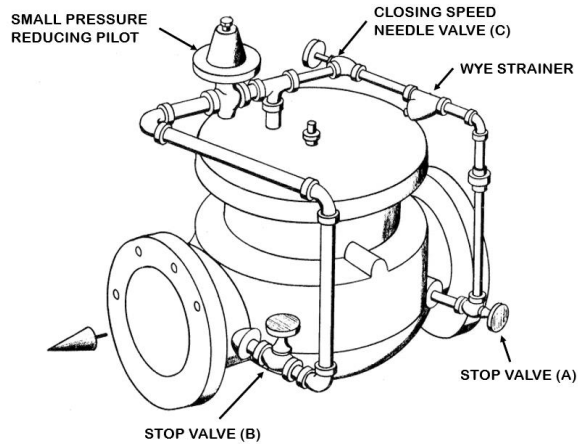
## TROUBLESHOOTING

SYMPTOM or PROBLEM	SOLUTION
<b>Main valve will not open</b>	
<ul style="list-style-type: none"> <li>Water cannot exhaust from top of piston through pilot</li> </ul>	Check status of stop valve (B) in external pilot piping
<ul style="list-style-type: none"> <li>Insufficient differential pressure</li> </ul>	Ensure inlet pressure is nominally 20% higher than the reduced pressure setting.
<ul style="list-style-type: none"> <li>Vent tube blocked</li> </ul>	Ensure vent tube is open to atmosphere
<ul style="list-style-type: none"> <li>Indicator rod packing too tight</li> </ul>	Turn indicator gland counterclockwise in quarter turn increments
<b>Main valve will not close</b>	
<ul style="list-style-type: none"> <li>Inlet pressure cannot be applied to top of piston</li> </ul>	Check status of stop valve (A) in external pilot piping
<ul style="list-style-type: none"> <li>Wye-strainer clogged</li> </ul>	Flush strainer or remove screen to clear debris
<ul style="list-style-type: none"> <li>Closing speed needle valve (C) closed</li> </ul>	Turn handwheel counterclockwise ¼ turn
<ul style="list-style-type: none"> <li>Debris in main valve</li> </ul>	Isolate the valve, remove pilot piping and valve cover, clear debris and inspect internal components for damage. Replace as needed
<b>Leakage through valve when closed</b>	
<ul style="list-style-type: none"> <li>Debris in valve</li> </ul>	Remove debris, inspect for damage
<ul style="list-style-type: none"> <li>Worn or damaged main valve seat ring</li> </ul>	Inspect, replace (See Main Valve Repair Instructions)
<ul style="list-style-type: none"> <li>Worn or damaged pilot valve seat ring</li> </ul>	Inspect, replace (See Pilot Repair Instructions)
<b>Main Valve “Hunts” (Cycles Up and Down)</b>	
<ul style="list-style-type: none"> <li>Closing speed needle valve (C) open too far</li> </ul>	Slowly close (turn handwheel clockwise) until cycling stops/diminishes
<ul style="list-style-type: none"> <li>Closing speed needle valve (C) worm</li> </ul>	Replace
<b>Excessive leakage through vent tube (slight and/or intermittent leakage is normal)</b>	
<ul style="list-style-type: none"> <li>Worn piston and/or liner seals</li> </ul>	Replace (See Main Valve Repair Instructions)
<ul style="list-style-type: none"> <li>Vent tube loose or its threaded connection to liner not sealed</li> </ul>	Tighten and/or apply thread sealant. (See Main Valve Repair Instructions)
<b>Excessive leakage past indicator rod (slight and/or intermittent leakage is normal)</b>	
<ul style="list-style-type: none"> <li>Indicator packing worn or not sufficiently compressed</li> </ul>	Turn indicator gland clockwise one quarter to one half turn. DO NOT OVERTIGHTEN. If leakage does not stop, replace indicator packing.

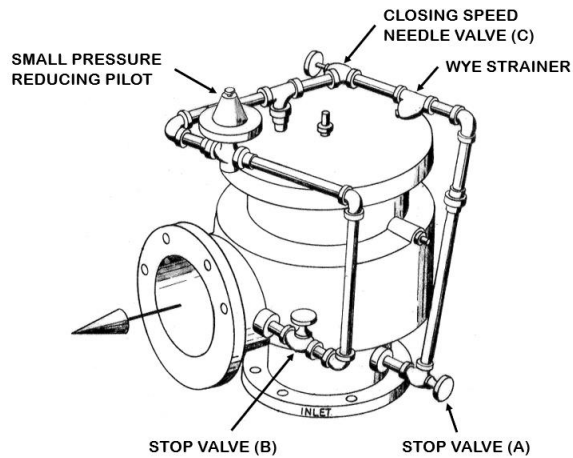
## REPAIR INSTRUCTIONS

Instructions for the inspection, troubleshooting and repair of the main valves utilized in the GA Industries 2½” to 8” Figure 4500-D/-U and 4900-D/-U pressure reducing valves are provided in IOM-DPMV2.5-10 (Latest Rev)

Instructions for the inspection, troubleshooting and repair of the Figure 43223 Small Pressure Reducing Pilot utilized in the 2½” to 8” GA Industries Figure 4500-D/-U and 4900-D/-U Pressure Reducing Valves are provided in IOM-43223P (Latest Rev).



**Figure 4500-D, 4500-U, 4900-D, 4900-U  
Globe Body**



**Figure 4500-DA, 4500-UA, 4900-DA, 4900-UA  
Angle Body**

**REPLACEMENT PARTS**

Genuine replacement parts are available from your local GA Industries representative or from the factory:

VAG USA, LLC  
 234 Clay Avenue  
 Mars, PA 16046 USA  
 Telephone: 724-776-1020  
 Fax: 724-776-1254  
 E-mail: [quotes-ga@vag-group.com](mailto:quotes-ga@vag-group.com)

Please have the nameplate data available when ordering parts.

**WARRANTY:**

The Warranty for GA Industries valves is included in our Terms and Conditions which can be found here: <https://gaindustries.com/terms>

# Section 2



# OPERATION AND MAINTENANCE MANUAL

## 2½” to 10” Differential Piston Main Valves

Drawings G-1035, G-1036, G-1037, G-1041, G-1047, G-1051,  
D-1028 and D-1161

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# INSTALLATION, OPERATION and MAINTENANCE

## 2½” to 10” Differential Piston Main Valve

### INTRODUCTION

This manual provides information about the operation and proper maintenance of standard GA Industries differential piston main valves. The main valve is an integral part of all GA Industries differential piston pilot-operated control valve. The valve is ruggedly constructed to provide many decades of dependable service with minimal maintenance.

### CAUTION

The valve is NOT recommended for use with toxic, corrosive, or flammable fluids.

The Shop Order (SO) Number, Figure Number, size and pressure rating are stamped on a nameplate attached to the valve. Please refer to the SO number when ordering parts.

### DESCRIPTION OF OPERATION

The operation of the main valve is controlled by the pilot system which automatically closes, opens or throttles the main valve. The main valve consists on one moving part, the piston. Applying inlet pressure to the underside of the piston creates an opening force but simultaneously applying it to the larger area on top of the piston creates a greater closing force. Thus, applying inlet pressure to the top of the piston closes the main valve (Figure 1) while exhausting it from the top opens the main valve (Figure 2).

A regulating pilot controls the pressure applied to the top of the piston so that the opening and closing forces are balanced and the main valve is in a partially open, “throttled” position to control pressure level or flow (Figure 3).

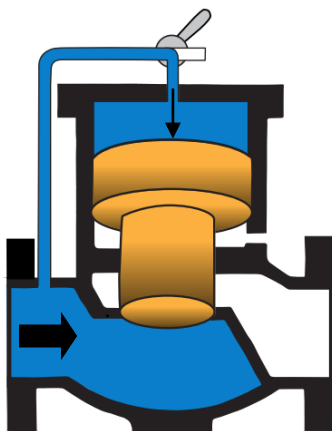


Figure 1. Valve Closed

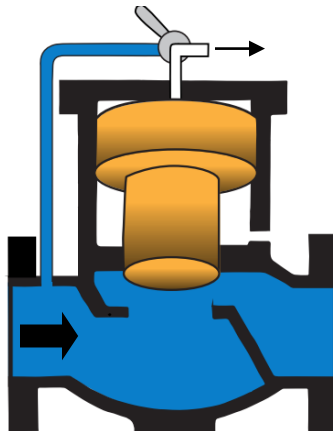


Figure 2. Valve Open

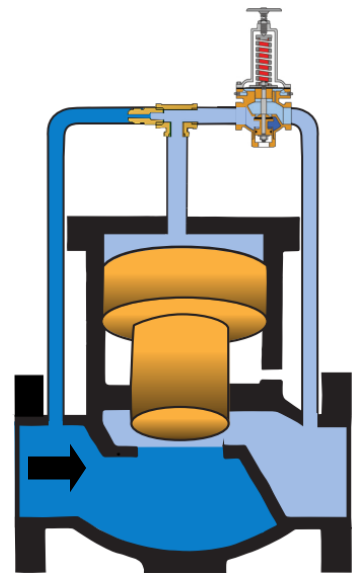


Figure 3. Valve Throttling

### TYPES OF DIFFERENTIAL PISTON MAIN VALVES

There are two basic types of differential piston main valves: Water Service and Reducing Service. While there are exceptions, water service main valves are typically used in GA Industries pilot-operated control valves that perform an “open/close” (non-throttling) function (e.g., pump control, altitude, surge relief, solenoid) and reducing service main valves are typically used in GA Industries pilot-operated control

valves that regulate or throttle (e.g., pressure reducing, pressure sustaining, flow control). The parts for water service main valves are different than for reducing service so it's important to know the type of main valve. To aid in identifying, Table 1 lists the diameter of the top of the piston or the factory can identify which type by the valve's serial (SO) number

**Table 1 Top of Piston Diameter**

SIZE	Water Service	Reducing Service
2½"	4.25"	3.50"
3"	4.25"	3.50"
4"	5.63"	4.63"
6"	8.00"	6.75"
8"	10.50"	8.75"
10"	13.00"	10.75"

Most GA Industries differential piston main valves incorporate a 1-piece piston. Some main valves are supplied with optional 2-piece "stop-check" piston (Figure 4). If the valve is open and there is a pressure reversal, the bottom part of the piston (the "baffle") drops and checks to prevent back flow through the valve.

The "stop-check" piston can be supplied in both water service and reducing service main valves.

Repair procedures and parts (except for the piston, baffle, and indicator rod) are the same whether a 1-piece or 2-piece piston.



Figure 4

#### RECEIVING AND STORAGE

Inspect the valve upon receipt for damage during shipment. Carefully unload all valves to the ground without dropping.

Valves should remain in a clean, dry and weather protected area until installed. After completion of shop testing the valve is drained of the test water but a small residual amount could remain so the valve should be protected from freezing during storage.

#### INSTALLATION

Figure Numbers suffixed with "D" indicate the valve has ANSI Class 125 flanged connections, Figure Numbers suffixed with "U" indicate the valve has ANSI Class 250 flanged connections.

GA Industries differential piston globe body main valves have the inlet and outlet connections in line while angle body main valves have the inlet and outlet connections 90 degrees apart.

Install the valve in the proper flow direction noting the "INLET" tag on the valve.

The valve is configured to be installed in the orientation specified by the engineer. Consult the drawings of record to verify the valve is installed in the proper orientation.

Prior to installation ensure all debris, packing material or other foreign material has been removed from both ports.

If installed outdoors, below ground in a vault or in an unheated area, adequate freeze protection must be provided.

Adequate isolating valves should be installed between the valve and the pipeline or system to facilitate maintenance.

The valve should be installed with sufficient clearance to permit maintenance and removal of internal components.

The valve is not designed to support adjacent equipment, piping loads should not be imposed on the valve and large valves should be properly supported. Ensure mating flanges are square and parallel to the valve flanges before tightening flange bolts.

Flat-faced flanged valves should be mated with flat-faced flanges and full-face gaskets. If ring gaskets are used the bolt material shall be ASTM A307 Grade B (or equivalent). Higher strength bolting should only be used with full-face gaskets.

Lower heavy valves using slings or chains around the valve body and/or the lifting eyes. DO NOT LIFT BY THE EXTERNAL PILOT PIPING. Lubricate the bolts or studs and insert around flange. Lightly tighten bolts until gaps are eliminated. Torque bolts in an alternating pattern in graduated steps. If leakage occurs wait 24 hours and re-torque the bolts but do not compress the gasket more than 50% or exceed bolt maximum torque rating.

#### MAIN VALVE CONSTRUCTION

The standard valve has a flanged cast iron body with a bolted cover. The piston and liner are made from bronze. The piston has a replaceable rubber seat, held in place by a brass or stainless steel follower ring and stainless steel screws. A brass or stainless steel visual position indicator is attached to the piston and extends through the valve cover through a packing gland. A brass or stainless steel vent tube protrudes from the side of the main valve.

Refer to Pages 5 to 7 for parts identification and location for each type of main valve.

#### START-UP

Refer to the Installation, Operation and Maintenance Manual for the start-up procedure applicable to the pilot-operated control valve being installed.

#### PREVENTATIVE MAINTENANCE

The differential piston main valve does not require routine lubrication or adjustments. After the initial start-up, periodic visual inspection is recommended.

Perform any additional preventative maintenance procedures as recommended in the Installation, Operation and Maintenance Manual for the pilot-operated control valve being installed.

## TROUBLESHOOTING

SYMPTOM or PROBLEM	SOLUTION
<b>Main valve will not open</b>	
<ul style="list-style-type: none"> <li>• Water cannot exhaust from top of piston</li> </ul>	Check status of manual valves and electrical connection to solenoids (if any) in external pilot piping
<ul style="list-style-type: none"> <li>• Insufficient inlet pressure</li> </ul>	Ensure inlet isolating valve is open and there is at least 5 to 10 PSI inlet pressure present. Small sizes require 10 PSI, minimum decreases with size.
<ul style="list-style-type: none"> <li>• Vent tube blocked</li> </ul>	Ensure vent tube (22) is open to atmosphere
<ul style="list-style-type: none"> <li>• Indicator rod packing too tight</li> </ul>	Turn indicator gland (17) counterclockwise in quarter turn increments
<b>Main valve will not close</b>	
<ul style="list-style-type: none"> <li>• Inlet pressure cannot be applied to top of piston</li> </ul>	Check status of manual valves and electrical connection to solenoids (if any) in external pilot piping
<ul style="list-style-type: none"> <li>• Wye-strainer clogged</li> </ul>	Clean strainer
<b>Leakage through main valve when closed</b>	
<ul style="list-style-type: none"> <li>• Debris in valve</li> </ul>	Remove debris, inspect for damage
<ul style="list-style-type: none"> <li>• Worn or damaged seat ring (10)</li> </ul>	Inspect, replace
<b>Excessive leakage through vent tube (slight or intermittent leakage is normal)</b>	
<ul style="list-style-type: none"> <li>• Worn piston cup (4) and/or liner cup (7)</li> </ul>	Replace
<ul style="list-style-type: none"> <li>• Vent tube (22) loose or its threaded connection to liner (3) not sealed</li> </ul>	Connection into liner (3) must be leak tight. Tighten and/or apply thread sealant.
<b>Excessive leakage past indicator rod (slight or intermittent leakage is normal)</b>	
<ul style="list-style-type: none"> <li>• Indicator packing (18) worn or not sufficiently compressed</li> </ul>	Turn indicator gland (17) clockwise one quarter to one half turn. DO NOT OVERTIGHTEN. If leakage does not stop, replace indicator packing.

### REPAIR PROCEDURES

GA Industries differential piston main valves are fully serviceable and repairable while the body remains bolted in the line. No special tools are required for normal repair. Due to the weight of the internal components, servicing large valves requires overhead lifting equipment.

Special care must be utilized when servicing differential piston main valves when installed such that the piston is in a horizontal position. Service can be more easily performed if large valves installed in this manner are first removed from the line.

Repair kits are available (see REPAIR KITS) and should be on hand before starting any repairs.

The valve should be disassembled only to the point necessary to perform the repair.

These repair procedures apply only to the main valve. External pilot piping should be removed prior to undertaking disassembly of the main valve. Adequate unions are provided in the control piping to facilitate removal.

#### CAUTION

Repairs should be conducted by skilled technicians who have read all instructions and are familiar with the equipment and associated drawings. Follow all safety procedures.

#### WARNING

Before starting repairs, ensure valve is isolated from the system and properly locked out and tagged to prevent accidental pressurization. Completely depressurize the valve before commencing work.

#### INSTALLING A 2½" to 10" REPAIR KIT

1. Remove indicator gland (17) and indicator packing (18)
2. Scribe or mark an alignment line on the OD of the cover and the top flange of the valve body to ensure cover is properly aligned during assembly
3. Remove cover bolts/nuts (14)
4. Remove cover (13) lifting straight up to avoid damaging or bending the indicator rod (16)
5. Remove cover O-ring (32)
6. Loosen indicator rod lock nut (20) and remove indicator rod (16).
7. Remove piston (2). DO NOT use indicator rod to pull out the piston. If necessary, remove indicator rod bushing (19) and install 5/8-11 eyebolt to lift piston out of the valve.
8. Remove the piston U-cup (4A)
9. Remove the seat ring (10) by removing the follower screws (12) and follower (12).
10. Reach inside the liner and remove the liner U-cup (7A)
11. Using very fine wet or dry emery cloth, sand the large ID of the liner and the small OD of the piston to shiny metal. Inspect for deep scoring or gouges on those surfaces that cannot be polished out. Consult factory for evaluation if unsure.

12. Install new liner U-cup ensuring the lips are pointing into the valve. Apply a very light coating of lightweight lubricant such as petroleum jelly.
13. Replace seat ring (10), follower ring (11) and screws (12) and tighten. Do not over-tighten to the point where the seat ring or the follower ring deforms.
  - a. Reducing service pistons: trim any rubber that extrudes beyond the small OD of the piston with a sharp utility type razor knife.
14. Install the new piston U-cup (4A) ensuring the lips are pointed toward the large diameter end of the piston. Apply a very light coating of lightweight lubricant such as petroleum jelly.
15. Apply a thin coating of lubricant to the large ID of the liner and the small OD of the piston.
16. Install the piston being careful not to damage the cups.
17. Install the indicator rod bushing (19). Clean and polish the indicator rod (16) with very fine emery cloth and install with indicator rod lock nut (20). Tighten lock nut.
18. Install cover new O-ring (32).
19. Align cover (13) and lower over indicator rod (16) *being careful not to bend the rod. Install cover bolt/nuts (14) and tighten in alternating pattern.*
20. Install new indicator packing (18) by wrapping it around the indicator rod and tamping until 2 or 3 threads are exposed. Cut off excess.
21. Install indicator gland (17) and tighten to compress packing only until resistance is felt. **DO NOT OVERTIGHTEN.** Packing compression can be adjusted once pressure has been introduced.
22. If desired, remove vent tube gland (23) and vent tube packing (24). **DO NOT LOOSEN OR REMOVE** vent tube (22). Replace packing as in step 20 above. Install vent tube gland (23) and tighten to compress packing.
23. Replace pilot piping, slowly introduce pressure to the valve and check for leaks. Tighten indicator rod gland only as much as needed to stop leakage.

### LINER REMOVAL & INSTALLATION

1. Mark a line across top of liner and the top of the valve body to ensure the liner is properly aligned when installed.
2. Remove the vent tube gland (23), packing (24) and unscrew the vent tube (22). **DO NOT DAMAGE THE VENT TUBE SEALING SURFACE.**
3. Reach inside the liner (3) through the V-ports and pull up while slightly rotating. In the unlikely event the liner cannot be extracted from the valve body in this manner, follow steps 3a through 3h. Otherwise, proceed to step 4.
  - a. Refer to Figure 5.
  - b. The "lower bar" is a steel bar approximately 1" x 1/2" x long enough to be inserted through opposite V-ports and engage the liner. It should be drilled and tapped 5/8"-11 at its center.
  - c. The "upper bar" is a steel bar the same size as the lower bar but with a length equal to the OD

of the valve's top flange. It should be drilled through 11/32" at its center.

- d. Support the upper bar on wooden blocks positioned just outside the OD of the liner.
- e. Insert a piece of 5/8"-11 all-thread through the upper bar and thread into the lower bar. It should be long enough to extend 1 to 2 inches beyond the upper bar.
- f. Install two 5/8"-11 hex nuts on the all thread and turn both nuts clockwise until resistance is felt.
- g. Continue to slowly turn the nuts to "jack" the liner outward. After a few turns the liner should "pop" at which time it can be removed.
- h. Note the liner in some 8" and 10" valves is in two pieces, a liner (3) and seat crown (21). Both pieces will be extracted using this method.

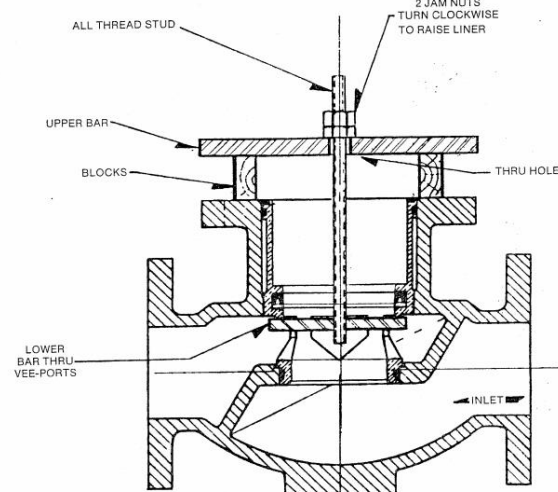


Figure 5

4. Once liner is extracted, remove top (33) and lower (35) liner O-rings.
5. Using very fine wet or dry emery cloth, sand the liner ID to shiny metal. Inspect for deep scoring or gouges that cannot be polished out. Consult factory for evaluation if unsure. Should a new liner be required, see **INSTALLING A NEW LINER**
6. Before installing the liner (and seat crown), lubricate the O-ring grooves and the top (33) and lower (35) O-rings and install in the appropriate grooves.
7. Clean and lubricate the areas of the valve body where the O-rings will seal.
8. Install the liner (3) so that it aligns with the mark, being careful not to damage the O-rings. If 2-piece liner, first install seat crown (21) then the liner (3).
9. The top of the liner should be flush with the top of the valve body. A mallet or wooden block can be used to bump the liner into position.
10. Apply pipe sealant or tape to the threads on one end of the vent tube (22) and thread into the liner. Tighten to a leak tight joint.

11. Install vent tube packing (24) and gland (23) and tighten to compress packing.

### INSTALLING A NEW LINER

New liners are not drilled and tapped to accept the vent tube. Follow these instructions to ensure the liner is properly aligned before drilling/tapping.

#### 1-Piece Liner

1. Locate the raised boss on the OD of the liner, compare to old liner
2. Install liner (3) without any O-rings in the valve body ensuring it is flush with the top of the valve body. Center the liner's boss on the vent tube hole in the side of the valve body.
3. Loosely install the vent tube gland (23) and slide in the vent tube (22). Insert a center punch through the vent tube and punch a mark in the liner.
4. Make an alignment mark across the liner and the top flange of the valve body
5. Remove the vent tube (22), gland (23) and liner (3).
6. Tap drill the liner 11/32" centered on the punch mark and tap 1/8" NPT.
7. Install liner in body and loosely screw in the vent tube and gland. If everything fits, remove gland, vent tube and liner and proceed with reassembly.

#### 2-Piece Liner

1. There is no raised boss on the 2-piece liner
2. Install seat crown (21) and liner (3) without any O-rings in the valve body ensuring the liner is flush with the top of the valve body.
3. Loosely install the vent tube gland (23) and slide in the vent tube (22). Insert a center punch through the vent tube and punch a mark in the liner.
4. Make an alignment mark across the liner and the top flange of the valve body
5. Remove the vent tube (22), gland (23) and liner (3).
6. Tap drill the liner 11/32" centered on the punch mark and tap 1/8" NPT.
7. Install liner in body and loosely screw in the vent tube and gland. If everything fits, remove gland, vent tube and liner and proceed with reassembly.

### REPLACEMENT PARTS

Genuine replacement parts are available from your local GA Industries representative or from the factory:

VAG USA, LLC  
 234 Clay Avenue  
 Mars, PA 16046 USA  
 Telephone: 724-776-1020  
 Fax: 724-776-1254  
 E-mail: [quotes-ga@vag-group.com](mailto:quotes-ga@vag-group.com)

Please have the nameplate data available when ordering parts.

### REPAIR KITS

The below Soft Goods Repair Kits are applicable to 2½" to 10" GA Industries differential piston main valves with a serial number 800000 or higher. The kits contain part numbers 4A, 7A, 10, 18, 24, 32, 33 and 35.

#### Reducing Service Kits

Size	Kit Number	Part Number
2½"	GA3R	2-80-23000-007
3"	GA3R	2-80-23000-007
4"	GA4R	2-80-23000-009
6"	GA6R	2-80-23000-012
8"	GA8R	2-80-23000-015
10"	GA10R	2-80-23000-004

#### Water Service Kits

Size	Kit Number	Part Number
2½"	GA3W	2-80-23000-008
3"	GA3W	2-80-23000-008
4"	GA4W	2-80-23000-010
6"	GA6W	2-80-23000-014
8"	GA8W	2-80-23000-016
10"	GA10W	2-80-23000-005

All other parts are ordered separately.

Consult factory for valves with lower serial numbers.

### PARTS LIST

Refer to Figures 6, 7, 8 and 9 for parts location.

Item	Part Name
1	Body
2	Piston
2a	Baffle
3	Liner
4a	Piston U-Cup
7a	Liner U-Cup
10	Seat Ring
12	Sear Ring Follower Screws
14	Cover Bolts/Nuts
16	Indicator Rod
17	Indicator Gland
18	Indicator Packing
19	Indicator Bushing
20	Indicator Lock Nut
22	Vent Tube
23	Vent Tube Gland
24	Vent Packing
32	Cover O-Ring
33	Top Liner O-Ring
35	Lower Liner O-Ring

### WARRANTY:

The Warranty for GA Industries valves is included in our Terms and Conditions which can be found here: <https://gaindustries.com/terms>

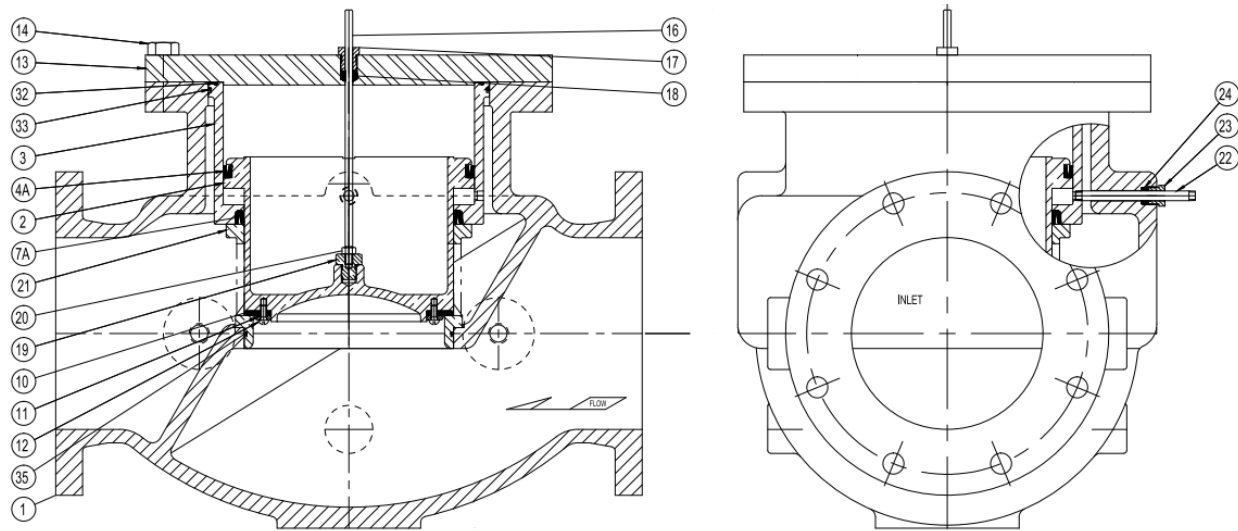


Figure 6 Globe Body

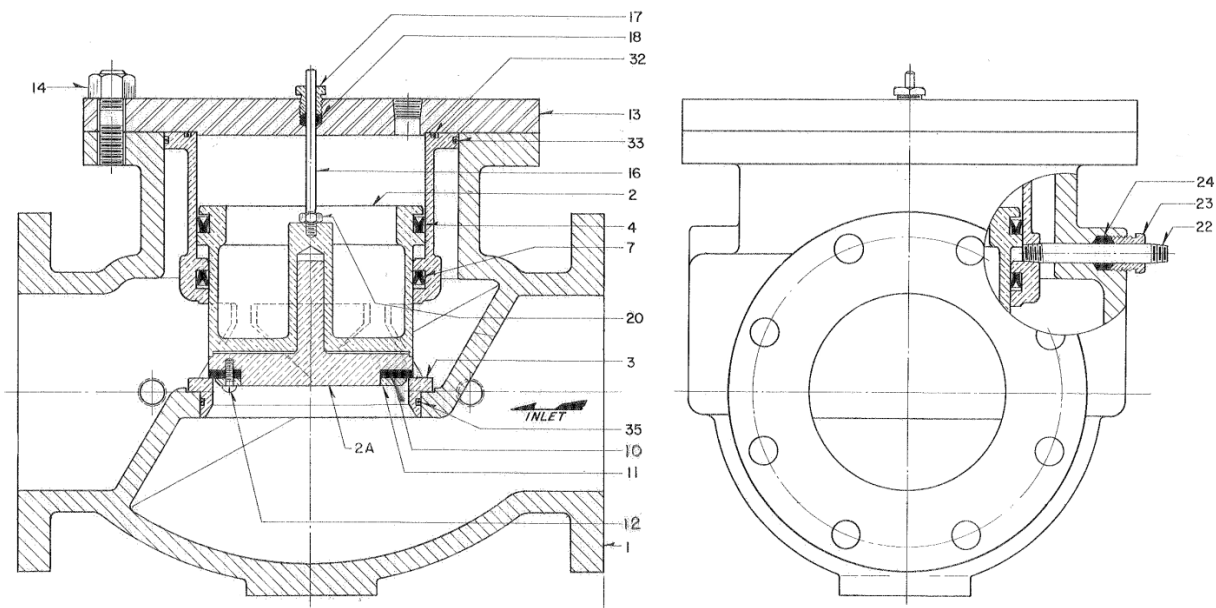


Figure 7 Globe Body, Stop Check



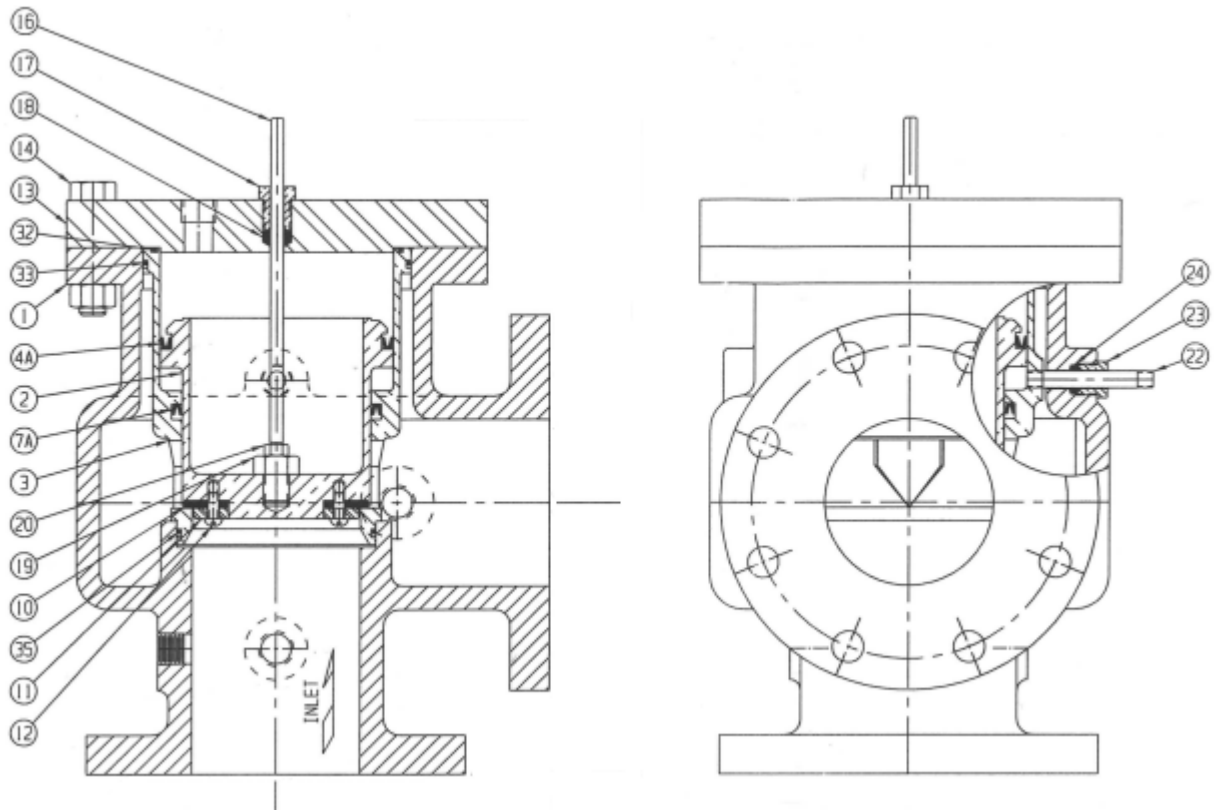


Figure 8 Angle Body

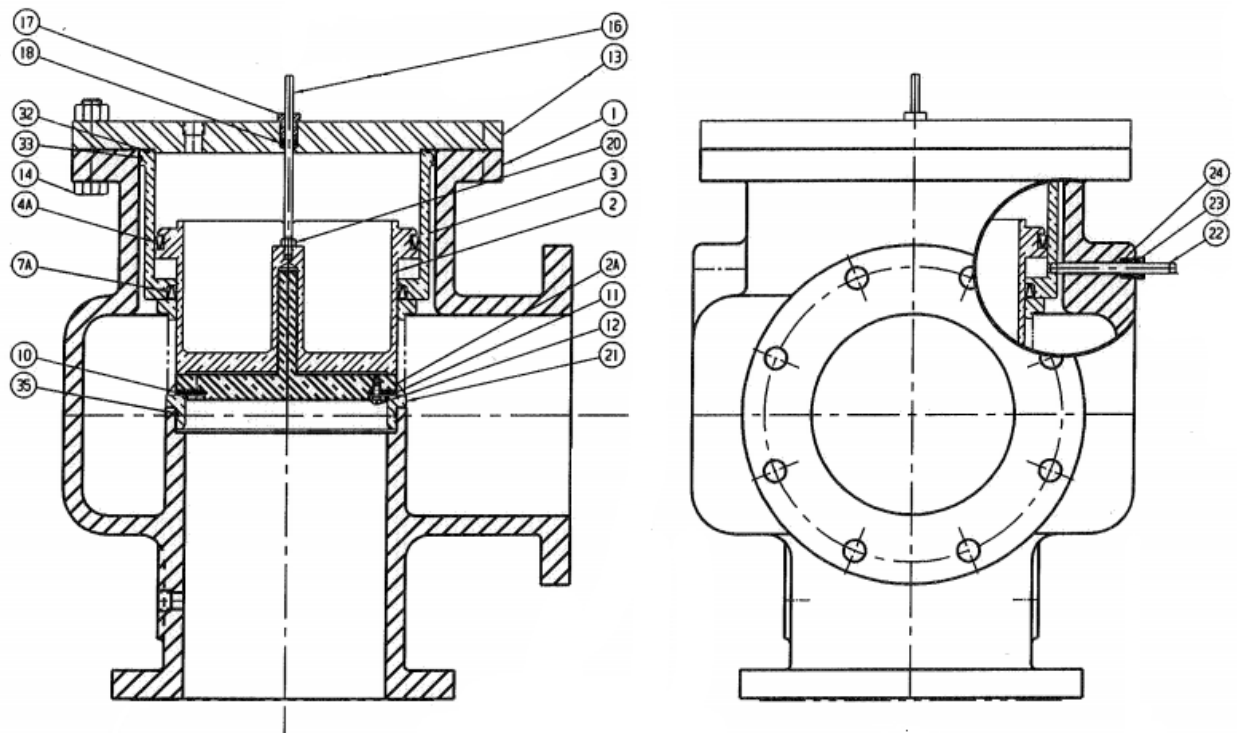


Figure 9 Angle Body, Stop Check



# Section 3

# OPERATION AND MAINTENANCE MANUAL

## 1/2" Figure 43223 Small Reducing Pilot

### Drawing D-1035

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Manual Number IOM-43223P-091321



**WARNING: Cancer and Reproductive Harm – [www.Prop65Warnings.ca.gov](http://www.Prop65Warnings.ca.gov)**

# OPERATION and MAINTENANCE

## 1/2" Small Pressure Reducing Pilot

### INTRODUCTION

This manual provides information about the operation and proper maintenance of the GA Industries Figure 43223 reducing pilot. The reducing pilot is an integral part of all GA Industries differential piston actuated, pilot-operated pressure reducing valves. The pilot valve is ruggedly constructed to provide many decades of dependable service with minimal maintenance.

### CAUTION

The valve is NOT recommended for use with toxic, corrosive, or flammable fluids.

The Shop Order (SO) Number, Figure Number, size, and pressure rating are stamped on a nameplate attached to the valve. Please refer to the SO number when ordering parts.

### DESCRIPTION OF OPERATION

The Figure 43223 pilot is a direct acting, spring loaded, diaphragm actuated valve. In the absence of pressure, the pilot valve is pushed open by the force of the compression spring. Downstream system pressure applied to the underside of the diaphragm through an "impulse line" produces a closing force. The amount of spring compression determines the pilot's reduced pressure setting.

This small pressure reducing pilot valve is typically incorporated into 2 1/2" to 8" GA Industries differential piston pressure reducing valve pilot system and regulates the pressure applied to the top of the main valve piston. Its action determines whether the main valve is closed or open.

### VALVE CONSTRUCTION

The valve body and internal "wetted" components are made from lead-free bronze. The valve seat is made from Buna-N rubber.

The diaphragm is nylon reinforced Buna-N. The adjusting spring is alloy steel.

Refer to Page 3 for parts identification and location.

### START-UP

Refer to the Installation, Operation and Maintenance Manual for the start-up procedure applicable to the GA Industries pilot-operated control valve being installed.



### PREVENTATIVE MAINTENANCE

The Figure 43223 small pressure reducing pilot does not require routine lubrication or adjustments. After the initial start-up, periodic visual inspection is recommended.

Perform any additional preventative maintenance procedures as recommended in the Installation, Operation and Maintenance Manual for the pilot-operated control valve being installed.

### ADJUSTING THE REDUCED PRESSURE SETTING

The Figure 43223 small pressure reducing pilot's reduced pressure setting is factory set but can be field adjusted within the range of the pilot's installed spring.

If the required pressure setting is higher or lower than the installed spring's reduced pressure range, the adjusting spring or the pilot must be changed.

Turning the pilot adjusting screw clockwise raises the reduced pressure, turning it counterclockwise lowers the reduced pressure.

1/2" Figure 43223  
Small Pressure Reducing Pilot

SPRING CODE	REDUCED PRESSURE RANGE
JA	25-75 PSI
JB	75-145 PSI
JC	10-25 PSI

## TROUBLESHOOTING

### Leakage from the bottom of the valve

- Loose bottom cap (W18) – Tighten

### Leakage from weep hole in spring chamber (W11)

- Loose diaphragm nut (W8) - Tighten
- Worn/damaged diaphragm (W9) – Replace

### Leakage detected from main valve outlet that stops when pilot discharge stop valve is closed

- Worn/damaged renewable seat (W2) – Replace
- Damaged valve body seat ring (W5) – Replace

Refer to pages 3 for part location. Replaceable parts are included in Repair Kit, see page 3

## REPAIR PROCEDURE

Most repairs involve the installation of a repair kit. In the rare case that any of the metal components are worn or damaged, the complete pilot should be replaced.

### **CAUTION**

Repairs should be conducted by skilled technicians who have read all instructions and are familiar with the equipment and associated drawings. Follow all safety procedures.

### **WARNING**

Before starting repairs, ensure valve is isolated from the system and properly locked out and tagged to prevent accidental pressurization. Completely depressurize the valve before commencing work.

The pilot valve can be repaired without removing it from the control valve piping. Ensure all stop valves in control piping that could supply pressure to the pilot being repaired are closed.

### Disassembly:

1. Note the position of the adjusting screw (W15) by exactly measuring its distance from the adjusting screw locknut (W14) or counting the number of exposed threads. This will allow the pilot to be returned to its original pressure setting after repair.
2. Loosen the adjusting screw locknut (W14) and turn the adjusting screw (W15) counterclockwise to relieve all spring compression. It's not 16) from the spring chamber (W11).
3. Remove the spring chamber screws (W7) and lift off the spring chamber (W11) exposing the spring washer (W13) and spring (W12). Inspect the spring for excessive corrosion, replace if necessary. Remove the spring washer and spring and set aside.
4. Using a wrench, loosen the diaphragm nut (W8) and remove along with the diaphragm washer (W10) and diaphragm (W9).
5. Remove the bottom cap (W17) and bottom cap seal (W3).

6. Using a screwdriver, unscrew the seat holder (W4) from the yoke (W6) and remove the yoke.
7. Remove the seat screw (W16) and the renewable seat (W2)
8. It is not necessary to remove the seat ring (W5) unless it is being replaced. Using a socket, remove it along with the seat gasket (W18).
9. Inspect all parts for wear, scoring or gouges. Pay particular attention to the surface where the renewable seat (W2) seals on the seat ring (W5) for evidence of wear or damage. Clean and polish all sealing surfaces using very fine wet or dry emery cloth. Replace entire pilot if any components cannot be returned to an unblemished sealing surface.

### Reassembly:

1. Install seat ring (W5) and seat gasket (W18) and tighten using a socket.
2. Install renewable seat (W2) in the seat holder (W4). Install seat screw (W16) and tighten. Do not distort the renewable seat.
3. Apply a small amount of low strength thread lock to the seat holder (W4) threads. Position yoke (W6) and install seat holder. Tighten but do not over torque.
4. Install diaphragm (W9) so that its holes align with those in the body. Install diaphragm washer (W10), diaphragm lock washer and nut (W8) and tighten.
5. Place spring (W12) and spring washer (W13) on diaphragm washer (W10).
6. Install spring chamber (W11) being careful not to disturb the spring and spring washer.
7. Install spring chamber screws (W7) and tighten in an alternating pattern.
8. Return adjusting screw (W15) to original position and tighten lock nut (W14).
9. If it had been removed, the pilot can now be re-installed in the control valve pilot piping.
10. Slowly open isolating and/or stop valves to introduce pressure.
11. The control valve can now be put back into service.

## REPLACEMENT PARTS

Genuine replacement parts are available from your local GA Industries representative or from the factory:

VAG USA, LLC  
234 Clay Avenue  
Mars, PA 16046 USA  
Telephone: 724-776-1020  
Fax: 724-776-1254  
E-mail: [quotes-ga@vag-group.com](mailto:quotes-ga@vag-group.com)

Please have the nameplate data available when ordering parts.

**REPAIR KITS**

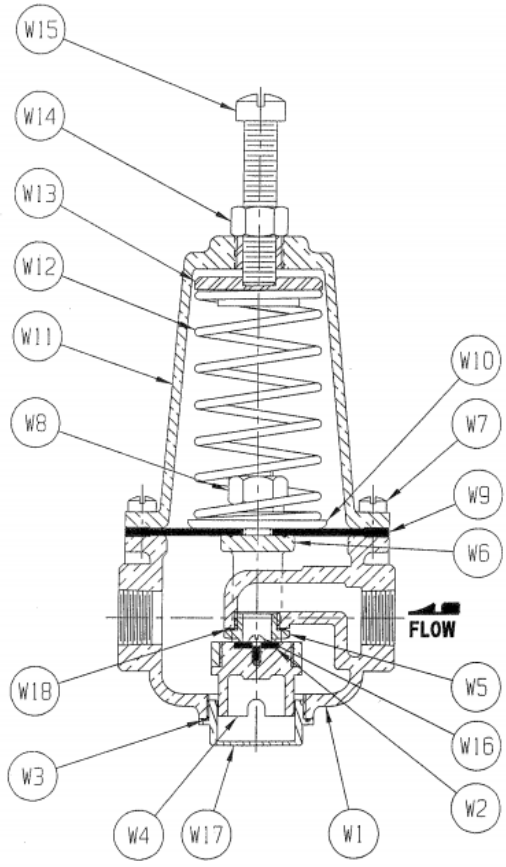
The below Soft Goods Repair Kit is applicable to the GA Industries Figure 43223 small pressure reducing pilot. The 1/2" pilot repair kits contain item numbers W2, W3, W5, W9, W16 and W18.

**WARRANTY:**

The Warranty for GA Industries valves is included in our Terms and Conditions which can be found here: <https://gaindustries.com/terms>

**Figure 43223  
Small Pressure Reducing Pilot Repair Kit**

Size	Kit Number	Part Number
1/2"	223P	1-80-23000-038



**1/2" PILOT PARTS LIST**

Item	Description
W1	Body
W2	Renewable Seat
W3	Bottom Cap Seal
W4	Seat Holder
W5	Seat Ring
W6	Yoke
W7	Chamber Screws
W8	Diaphragm Nut & Lock Washer
W9	Diaphragm
W10	Diaphragm Washer
W11	Spring Chamber
W12	Spring
W13	Spring Washer
W14	Stem Locknut
W15	Adjusting Screw
W16	Seat Screw
W17	Bottom Cap
W18	Seat Gasket