

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

Figures 4050-D, 4050-U, 4050-DA, 4050-UA 2½” to 8” Pilot-Operated Pressure Reducing Valves with Solenoid

**SECTION 1 – 2½” to 8” Figure 4050 Pilot-Operated Pressure Reducing
Valves with Solenoid Instructions**

SECTION 2 – 2½” to 10” Differential Piston Main Valve Instructions

SECTION 3 – Figure 43223 Small Reducing Pilot Instructions

SECTION 4 – Solenoid Instructions

- General Instructions I&M V6950 JB
- De-energize to Close Valve ASCO 8210G094 I&M V5825 GA
- Energize to Close Valve ASCO 8210G034 I&M V5983 GA



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Manual Number IOM Fig 4050-2.5-8inch-43223 Pilot 080922



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Section 1

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

**Figures 4050-D, 4050-U, 4050-DA, 4050-UA
2½” to 8” Pressure Reducing Valves with Solenoid**

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INSTALLATION, OPERATION and MAINTENANCE

2½”–8” Pilot Operated Pressure Reducing & Solenoid 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 and solenoid valves reduce a higher, fluctuating inlet pressure to a lower, steady outlet pressure regardless of variations in demand but can be closed anytime by remote electrical signal.

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 standard pilot system consists of a reducing pilot, 120V solenoid 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.

The solenoid overrides the reducing pilot and closes the main valve whenever it is energized or de-energized, depending on how configured.

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.

Figures 4050-DC, 4050-DCA, 4050-UC and 4050-UCA are supplied with a "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., 4050-DA, 4050-UAC).

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 4050-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.

Follow all local and national electrical codes when wiring the solenoid.

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 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 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 reduced 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" Pressure Reducing and Solenoid Valves 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
Main valve will not open	
• Water cannot exhaust from top of piston through pilot	Check status of stop valve (B) in external pilot piping
• Insufficient differential pressure	Ensure inlet pressure is nominally 20% higher than the reduced pressure setting.
• Solenoid pilot not functioning	Verify solenoid operation, replace coil if necessary
• Vent tube blocked	Ensure vent tube is open to atmosphere
• Indicator rod packing too tight	Turn indicator gland counterclockwise in quarter turn increments
Main valve will not close	
• Inlet pressure cannot be applied to top of piston	Check status of stop valve (A) in external pilot piping
• Wye-strainer clogged	Flush strainer or remove screen to clear debris
• Closing speed needle valve (C) closed	Turn handwheel counterclockwise ¼ turn
• Solenoid pilot not functioning	Verify solenoid operation, replace coil if necessary
• Debris in main valve	Isolate the valve, remove pilot piping and valve cover, clear debris and inspect internal components for damage. Replace as needed
Leakage through valve when closed	
• Debris in valve	Remove debris, inspect for damage
• Worn or damaged main valve seat ring	Inspect, replace (See Main Valve Repair Instructions)
• Worn or damaged pilot valve seat ring	Inspect, replace (See Pilot Repair Instructions)
Main Valve “Hunts” (Cycles Up and Down)	
• Closing speed needle valve (C) open too far	Slowly close (turn handwheel clockwise) until cycling stops/diminishes
• Closing speed needle valve (C) worm	Replace
Excessive leakage through vent tube (slight and/or intermittent leakage is normal)	
• Worn piston and/or liner seals	Replace (See Main Valve Repair Instructions)
• Vent tube loose or its threaded connection to liner not sealed	Tighten and/or apply thread sealant. (See Main Valve Repair Instructions)
Excessive leakage past indicator rod (slight and/or intermittent leakage is normal)	
• Indicator packing worn or not sufficiently compressed	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" Pressure Reducing and Solenoid 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 GA Industries 2½" to 8" Pressure Reducing Valves are provided in IOM-43223P (Latest Rev).

REPLACEMENT PARTS

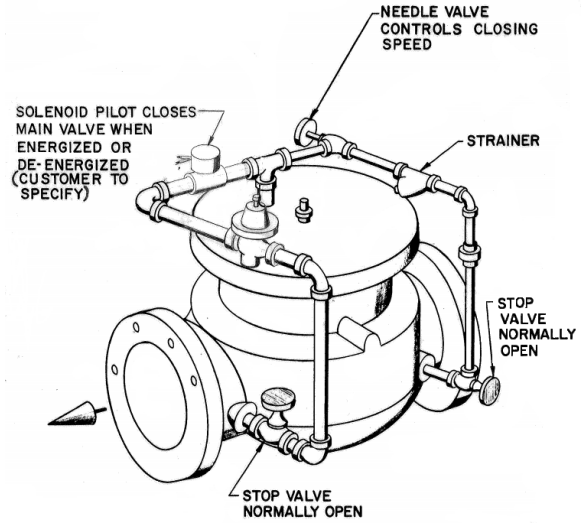
Genuine replacement parts are available from your local GA Industries representative or from the factory:

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

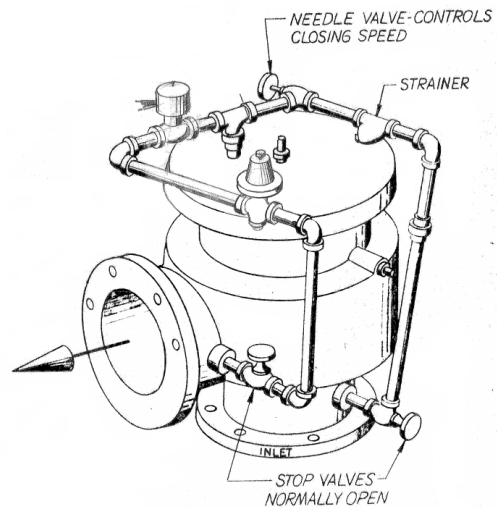
Please have the nameplate data available when ordering parts.

WARRANTY:

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



**Figures 4050-D, 4050-U
Globe Body**



**Figures 4050-DA, 4050-UA
Angle Body**

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).

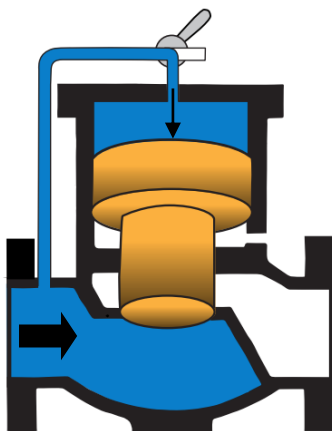


Figure 1. Valve Closed

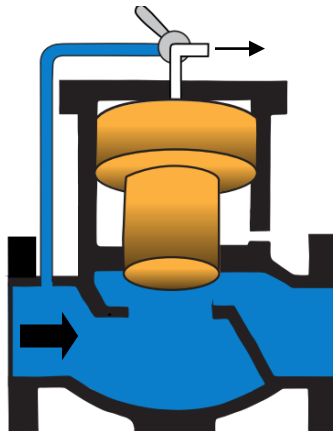


Figure 2. Valve Open

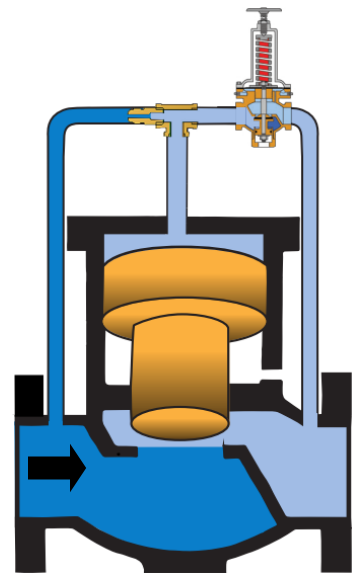


Figure 3. Valve Throttling

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

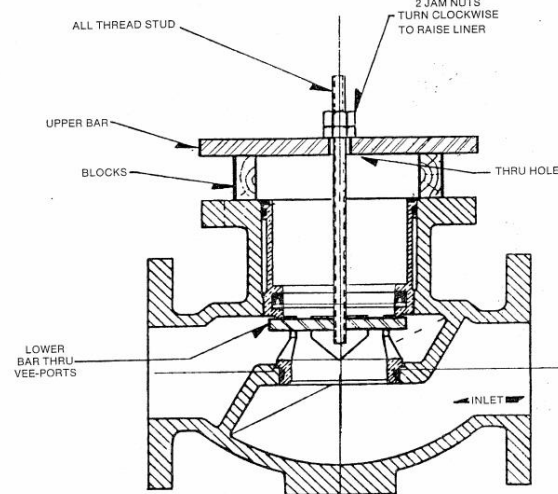


Figure 5

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

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	Seal 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>

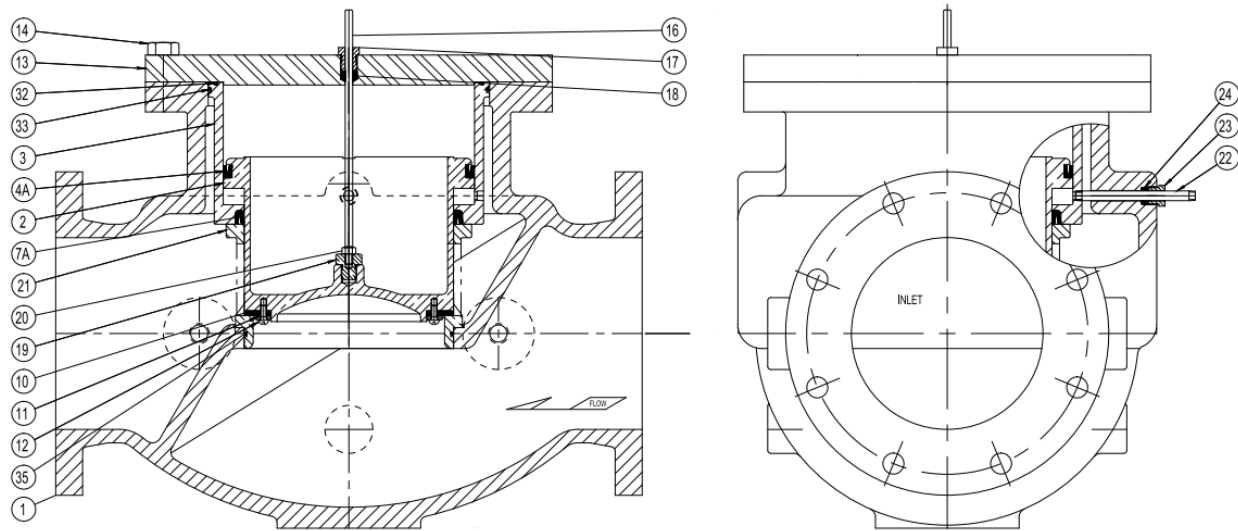


Figure 6 Globe Body

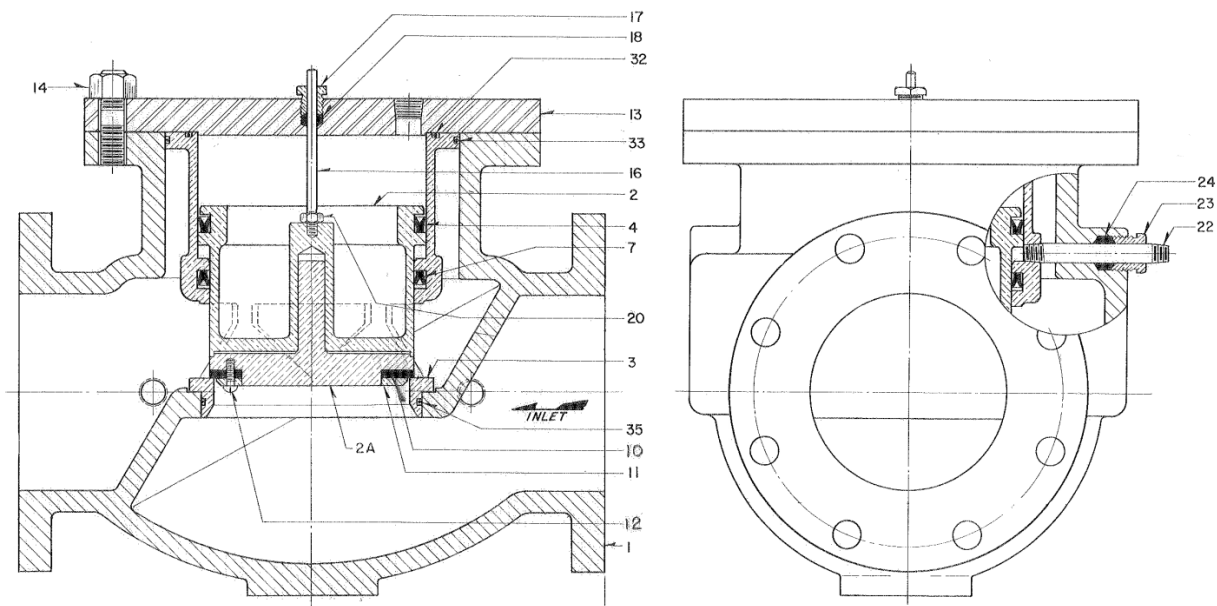


Figure 7 Globe Body, Stop Check

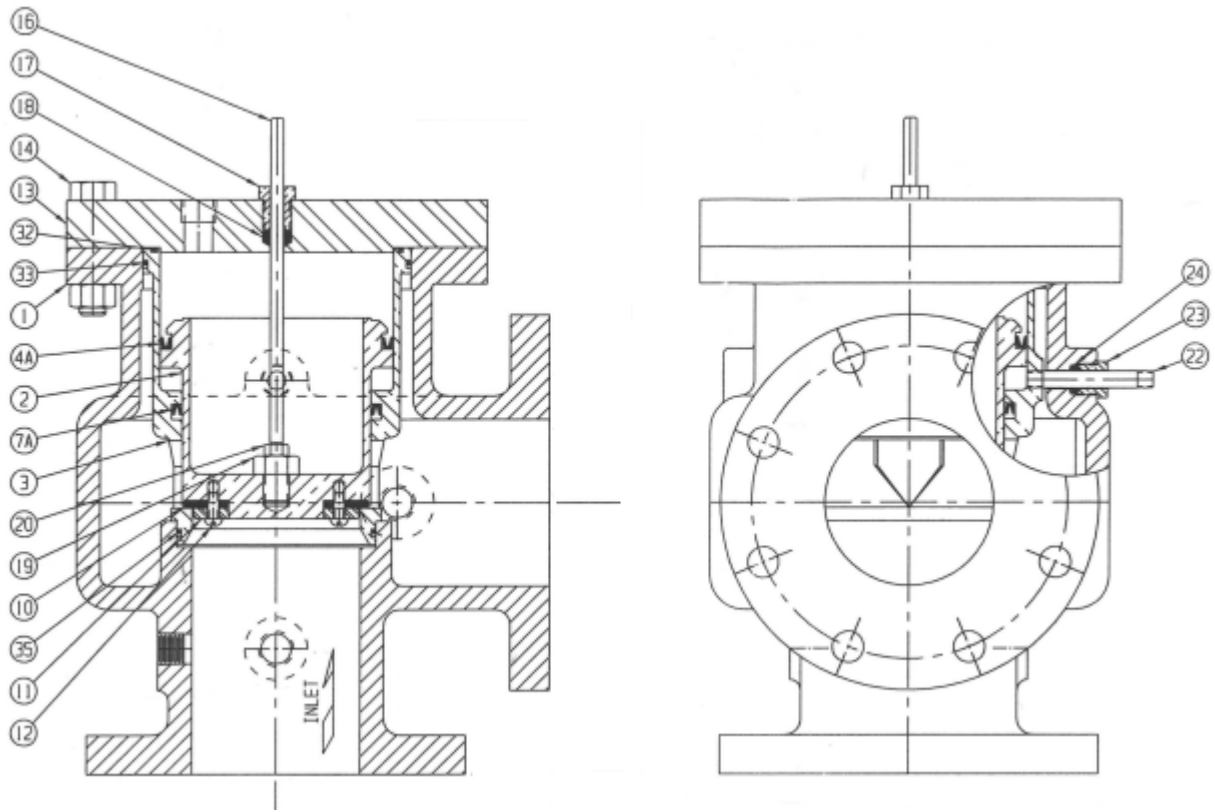


Figure 8 Angle Body

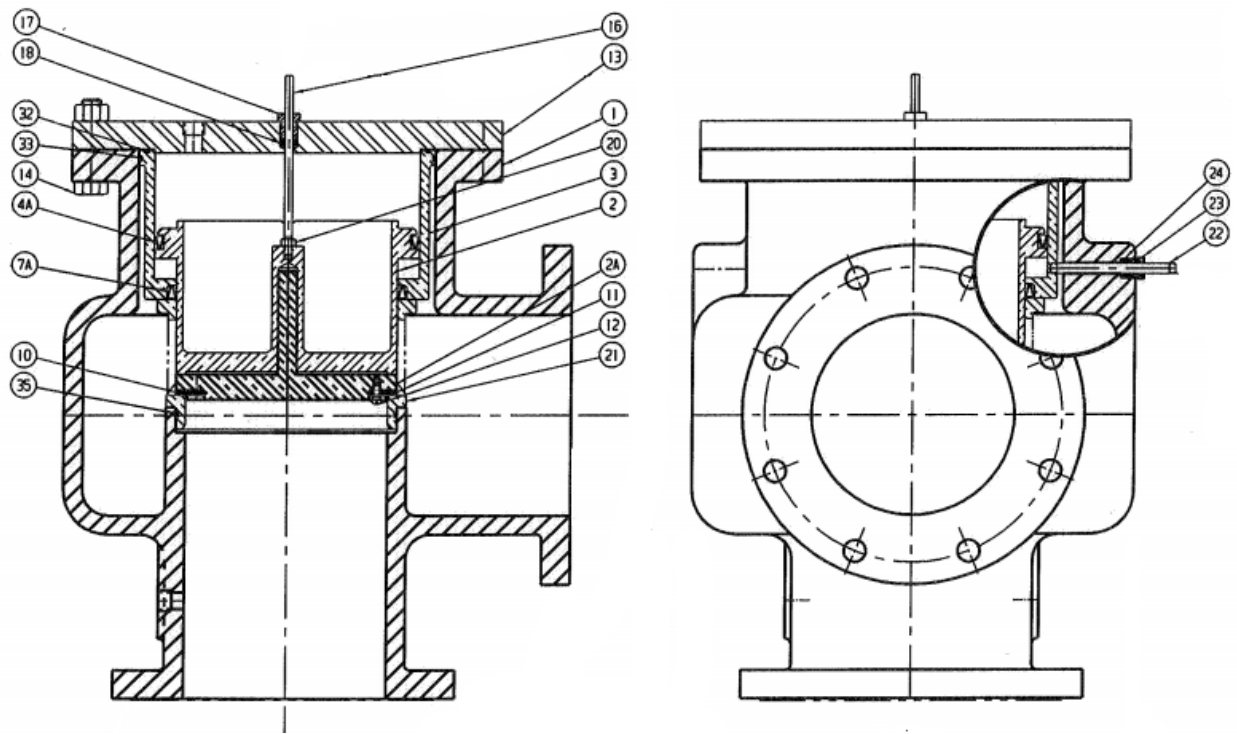


Figure 9 Angle Body, Stop Check

Section 3

OPERATION AND MAINTENANCE MANUAL

1/2" Figure 43223 Small Reducing Pilot

Drawing D-1035

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234 Clay Avenue • Mars, PA 16046 USA
Telephone (724) 776-1020 • Fax (724) 776-1254
E-mail: info-ga@vag-group.com

Manual Number IOM-43223P-091321R1



WARNING: Cancer and Reproductive Harm – 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	CHANGE PER FULL TURN OF ADJUSTING SCREW
JA	25-75 PSI	3.0 PSI
JB	50-145 PSI	5.0 PSI
JC	10-25 PSI	1.5 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

Please have the nameplate data available when ordering parts.

REPAIR KITS

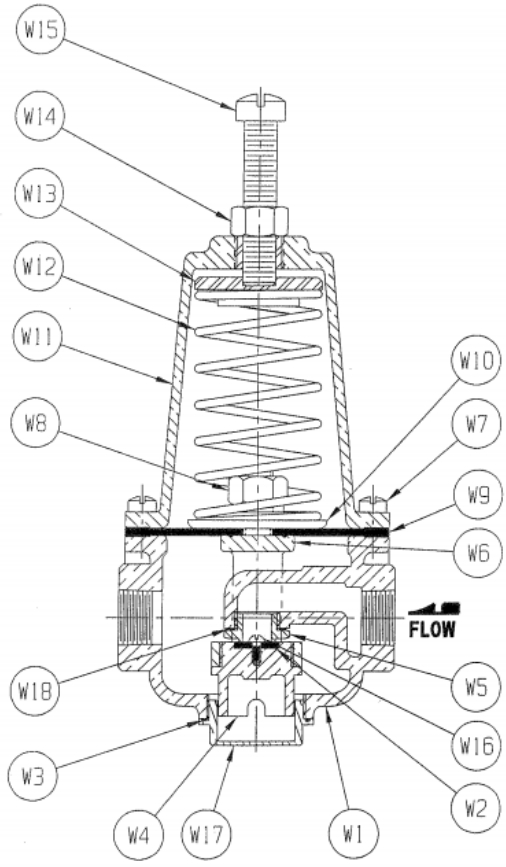
The below Soft Goods Repair Kit is applicable to the GA Industries Figure 43223 small pressure reducing pilot. The 1/2" pilot repair kits contain item numbers W2, W3, W5, W9, W16 and W18.

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

Section 4

ASCO™ General Service Solenoid Valves

Brass or Stainless Steel Bodies | Pilot Operated | 3/8" to 2 1/2"

2/2
SERIES
210

Features

- Wide range of pressure ratings, sizes, and resilient materials provide long service life and low internal leakage
- High flow valves for liquid, corrosive, and air/inert gas service
- Lead-free versions available for Safe Drinking Water Act Section 1417 and NSF/ANSI 372 compliance
- Industrial applications include:
 - Car wash
 - Laundry equipment
 - Air compressors
 - Industrial water control
 - Pumps

Construction

Valve Parts in Contact with Fluids		
Body	Brass	304 Stainless Steel*
Seals and Discs	NBR or PTFE	
Disc-Holder	PA	
Core Tube	305 Stainless Steel	
Core and Plugnut	430F Stainless Steel	
Springs	302 Stainless Steel	
Shading Coil	Copper	Silver

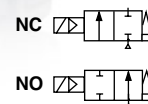
* Catalog Numbers 8210G127, 8210G129, 8210G132, 8210G133 have 316L Stainless Steel bodies.

** In accordance with the Safe Drinking Water Act (SDWA) Section 1417, and compliant to NSF/ANSI 372 low lead requirements.

Electrical

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part Number			
	DC Watts	AC			General Purpose		Explosionproof	
		Watts	VA Holding	VA Inrush	AC	DC	AC	DC
F	-	6.1	16	40	238210	-	238214	-
F	11.6	10.1	25	70	238610	238710	238614	238714
F	15.8	-	-	-	-	501695	-	501696
F	16.8	16.1	35	180	272610	97617	272614	97617
F	-	17.1	40	93	238610	-	238614	-
F	-	20	43	240	99257	-	99257	-
F	-	20.1	48	240	272610	-	272614	-
F	30.8	-	-	-	-	501695	-	501696
H	11.6	-	-	-	-	238910	-	238914
H	40.6	-	-	-	-	238910	-	-

Standard Voltages: 24, 120, 240, 480 volts AC, 60 Hz (or 110, 220 volts AC, 50 Hz).
6, 12, 24, 120, 240 volts DC. Must be specified when ordering.
Other voltages available when required.



Solenoid Enclosures

Standard:

RedHat II - Watertight, Types 1, 2, 3, 3S, 4, and 4X
RedHat - Type I.

Optional:

RedHat II - Explosionproof and Watertight, Types 3, 3S, 4, 4X, 6, 6P, 7, and 9
Red-Hat - Explosionproof and Watertight, Types 3, 4, 4X, 7, & 9.

(To order, add prefix "EF" to catalog number, except Catalog Numbers 8210B057, 8210B058, and 8210B059, which are not available with Explosionproof enclosures.)

See Optional Features Section for other available options.

Nominal Ambient Temp. Ranges

RedHat II/RedHat AC: 32 °F to 125 °F (0 °C to 52 °C)

RedHat II DC: 32 °F to 104 °F (0 °C to 40 °C)

RedHat DC: 32 °F to 77 °F (0 °C to 25 °C)
(104 °F/40 °C occasionally)

8210G227 AC: 32 °F to 130 °F (0 °C to 54 °C)
DC: 32 °F to 90 °F (0 °C to 32 °C)

Refer to Engineering Section for details.

Approvals

- UL listed as indicated.
- CSA certified.
- RedHat II meets applicable CE directives. Refer to Engineering Section for details.
- ATEX/IECEx certified with prefix "EV" as listed. Refer to Optional Features Electrical Section for details.
- Compliance with the Safe Drinking Water Act (SDWA) Section 1417 Lead Free Requirements as indicated.
- Compliance with NSF/ANSI 372 low lead requirements.

Specifications (English units)

Pipe Size (in)	Orifice Size (in)	Cv Flow Factor	Operating Pressure Differential (psi)									Max. Fluid Temp. °F		Brass Body			Stainless Steel Body			Watt Rating/Class of Coil Insulation ①	
			Min.	Max. AC			Max. DC			AC	DC	Catalog Number	Const. Ref. ④	UL ⑤ Listing	Catalog Number	Const. Ref. ④	UL ⑤ Listing	AC	DC		
				Air-Inert Gas	Water	Light Oil @ 300 SSU	Air-Inert Gas	Water	Light Oil @ 300 SSU												
NORMALLY CLOSED (Closed when de-energized), NBR or PTFE ② Seating																					
3/8	3/8	1.5	③	150	125	-	40	40	-	180	150	8210G073 ③	1P	●	8210G036 ③	1P	●	6.1/F	11.6/F		
3/8	5/8	3	0	150	150	-	40	40	-	180	150	8210G093 ④	5D	○	-	-	-	10.1/F	11.6/F		
3/8	5/8	3	5	200	150	135	125	100	100	180	150	8210G001 ▼▲	6D	○	-	-	-	6.1/F	11.6/F		
3/8	5/8	3	5	300	300	300	-	-	-	175	-	8210G006 ✓	5D	○	-	-	-	17.1/F	-		
1/2	7/16	2.2	③	150	125	-	40	40	-	180	150	8210G015 ③	2P	●	8210G037 ③	2P	●	6.1/F	11.6/F		
1/2	5/8	4	0	150	150	-	40	40	-	180	150	8210G094 ✓▲	5D	○	-	-	-	10.1/F	11.6/F		
1/2	5/8	4	0	150	150	125	40	40	-	175	150	-	-	-	8210G087 ✓	7D	●	17.1/F	11.6/F		
1/2	5/8	4	5	200	150	135	125	100	100	180	150	8210G002 ▼▲	6D	○	-	-	-	6.1/F	11.6/F		
1/2	5/8	4	5	300	300	300	-	-	-	175	-	8210G007	5D	○	-	-	-	17.1/F	-		
1/2	3/4	4	5	-	300	-	-	300	-	130	90	8210G227	5D	○+	-	-	-	17.1/F	40.6/H		
3/4	5/8	4.5	0	150	150	125	40	40	-	175	150	-	-	-	8210G088 ✓	7D	●	17.1/F	11.6/F		
3/4	3/4	5	5	125	125	125	100	90	75	180	150	8210G009 ▼▲	9D	○	-	-	-	6.1/F	11.6/F		
3/4	3/4	5	0	150	150	-	40	40	-	180	150	8210G095 ✓▲	8D	○	-	-	-	10.1/F	11.6/F		
3/4	3/4	6.5	5	250	150	100	125	125	125	180	150	8210G003 ▼	11D	○	-	-	-	6.1/F	11.6/F		
3/4	3/4	6	0	350	300	200	200	200	200	180	180	8210G026 ②±◆	40P/10D	●	-	-	-	16.1/F	30.8/F		
1	1	13	0	150	125	125	135	120	120	180	150	8210G054 ②±◆	41D/31D ②	●	8210G089 ②±◆	45D/15D ②	●	16.1/F	30.8/F		
1	1	13	5	150	150	100	125	125	125	180	150	8210G004 ▼▲	12D	○	-	-	-	6.1/F	11.6/F		
1	1	13.5	0	300	225	115	-	-	-	200	-	8210G027	42P ②	●	-	-	-	20.1/F	-		
1	1	13.5	10	300	300	300	-	-	-	175	-	8210G078 ②	13P	-	-	-	-	17.1/F	-		
1 1/4	1 1/8	15	0	150	125	125	135	120	120	180	180	8210G055 ②◆	43D/32D ②	●	-	-	-	16.1/F	30.8/F		
1 1/4	1 1/8	15	5	150	150	100	125	125	125	180	150	8210G008 ▼▲	16D	○	-	-	-	6.1/F	11.6/F		
1 1/2	1 1/4	22.5	0	150	125	125	135	120	120	180	180	8210G056 ②◆	44D/33D ②	●	-	-	-	16.1/F	30.8/F		
1 1/2	1 1/4	22.5	5	150	150	100	125	125	125	180	150	8210G022 ▼▲	18D	○	8210G127	52D ②	●	6.1/F	11.6/H		
2	1 3/4	43	5	150	125	90	50	50	50	180	150	8210G100 ▲	20P	●	8210G129	53P	●	6.1/F	11.6/H		
2 1/2	1 3/4	45	5	150	125	90	50	50	50	180	150	8210G101	21P	●	-	-	-	6.1/F	11.6/F		
NORMALLY OPEN (Open when de-energized), NBR Seating (PA Disc-Holder, except as noted)																					
3/8	5/8	3	0	150	150	125	125	125	80	180	150	8210G033	23D	●	-	-	-	10.1/F	11.6/F		
3/8	5/8	3	5	250	200	200	250	200	200	180	180	8210G011 ②③	39D	●	-	-	-	10.1/F	11.6/F		
1/2	5/8	4	0	150	150	125	125	125	80	180	150	8210G034 ✓▲	23D	●	-	-	-	10.1/F	11.6/F		
1/2	5/8	3	0	150	150	100	125	125	80	180	150	-	-	-	8210G030 ✓	37D	●	10.1/F	11.6/F		
1/2	5/8	4	5	250	200	200	250	200	200	180	180	8210G012 ②③	39D	●	-	-	-	10.1/F	11.6/F		
3/4	3/4	5.5	0	150	150	125	125	125	80	180	150	8210G035 ✓▲	25D	●	-	-	-	10.1/F	11.6/F		
3/4	5/8	3	0	150	150	100	125	125	80	180	150	-	-	-	8210G038 ✓	38D	●	10.1/F	11.6/F		
3/4	3/4	6.5	5	250	200	200	250	200	200	180	180	8210G013	46D/52D	●	-	-	-	16.1/F	15.8/F		
1	1	13	0	125	125	125	-	-	-	180	-	8210B057 ②③	34D ②	●	-	-	-	20/F	-		
1	1	13	5	150	150	125	150	150	125	180	180	8210G014 ▲	47D/53D	●	-	-	-	16.1/F	15.8/F		
1 1/4	1 1/8	15	0	125	125	125	-	-	-	180	-	8210B058 ②③	35D ②	●	-	-	-	20/F	-		
1 1/4	1 1/8	15	5	150	150	125	150	150	125	180	-	8210G018 ▲	48D/54D	●	-	-	-	16.1/F	15.8/F		
1 1/2	1 1/4	22.5	0	125	125	125	-	-	-	180	-	8210B059 ②③	36D ②	●	-	-	-	20/F	-		
1 1/2	1 1/4	22.5	5	150	150	125	150	150	125	180	180	8210G032 ▲	49D/55D	●	8210G132	29D	●	16.1/F	15.8/F		
2	1 3/4	43	5	150	125	125	150	150	125	180	180	8210G103 ▲	50P/56P	●	8210G133	30P	●	16.1/F	15.8/F		
2 1/2	1 3/4	45	5	150	125	125	150	150	125	180	180	8210G104	51P/57P	●	-	-	-	16.1/F	15.8/F		

① 5 psi on Air; 1 psi on Water.
 ② Valve provided with PTFE main disc.
 ③ Valve includes Ultem (G.E. trademark) piston.
 ④ Letter "D" = diaphragm construction; "P" = piston construction.
 ⑤ ○ Safety Shutoff Valve; ● General Purpose Valve.
 Refer to Engineering Section (Approvals) for details.
 ⑥ Valves not available with Explosionproof enclosures.
 ⑦ On 50 hertz service, the watt rating for the 6.1/F solenoid is 8.1 watts.
 ⑧ AC construction also has PA seating.
 ⑨ No disc-holder.
 ⑩ Stainless steel disc-holder.
 ⑪ Constructions with NPT size 1" and larger are not offered with MB option (mounting bracket).

+ UL listed for fire protection systems per UL429A 120/60, 110/50 24VDC, no prefix and voltage options offered.
 ‡ DC constructions must have solenoid mounted vertical and upright.
 ✓ ATEX/IECEX certified solenoid with prefix "EV".
 ▼ ATEX/IECEX certified solenoid for DC only with prefix "EV".
 ◆ Not available in 6 Volt DC. EF and HB prefix only.
 ▲ Valve available with lead-free brass body and bonnet using suffix "LF". The term "Lead-Free" for brass materials is defined by SDWA 1417 as having a maximum weighted average lead content of 0.25% on the wetted surface area. Valves are compliant to NSF/ANSI 372 low lead requirements.

ASCO™ General Service Solenoid Valves

Brass or Stainless Steel Bodies | Pilot Operated | 3/8" to 2 1/2"

2/2
SERIES
210

Specifications (Metric units)

Pipe Size (in)	Orifice Size (mm)	Kv Flow Factor (m ³ /hr)	Operating Pressure Differential (bar)									Max. Fluid Temp. °C		Brass Body			Stainless Steel Body			Watt Rating/Class of Coil Insulation ②	
			Min.	Max. AC			Max. DC			AC	DC	Catalog Number	Const. Ref. ④	UL ③ Listing	Catalog Number	Const. Ref. ④	UL ③ Listing	AC	DC		
				Air-Inert Gas	Water	Light Oil @ 300 SSU	Air-Inert Gas	Water	Light Oil @ 300 SSU												
NORMALLY CLOSED (Closed when de-energized), NBR or PTFE ⑤ Seating																					
3/8	10	1.3	①	10	9	-	3	3	-	82	65	8210G073 ③	1P	●	8210G036 ③	1P	●	6.1/F	11.6/F		
3/8	16	2.6	0	10	10	-	3	3	-	82	65	8210G093 ④	5D	○	-	-	-	10.1/F	11.6/F		
3/8	16	2.6	0.3	14	10	9	9	7	7	82	65	8210G001 ④	6D	○	-	-	-	6.1/F	11.6/F		
3/8	16	2.6	0.3	21	21	21	-	-	-	79	-	8210G006 ④	5D	○	-	-	-	17.1/F	-		
1/2	11	1.9	①	10	9	-	3	3	-	82	65	8210G015 ③	2P	●	8210G037 ③	2P	●	6.1/F	11.6/F		
1/2	16	3.4	0	10	10	-	3	3	-	82	65	8210G094 ④	5D	○	-	-	-	10.1/F	11.6/F		
1/2	16	3.4	0	10	10	9	3	3	-	79	65	-	-	-	8210G087 ④	7D	●	17.1/F	11.6/F		
1/2	16	3.4	0.3	14	10	9	9	7	7	82	65	8210G002 ④	6D	○	-	-	-	6.1/F	11.6/F		
1/2	16	3.4	0.3	21	21	21	-	-	-	79	-	8210G007	5D	○	-	-	-	17.1/F	-		
1/2	19	3.4	0.3	-	21	-	-	21	-	54	32	8210G227	5D	○ †	-	-	-	17.1/F	40.6H		
3/4	16	3.9	0	10	10	9	3	3	-	79	65	-	-	-	8210G088 ④	7D	●	17.1/F	11.6/F		
3/4	19	4.3	0.3	9	9	9	7	6	5	82	65	8210G009 ④	9D	○	-	-	-	6.1/F	11.6/F		
3/4	19	4.3	0	10	10	-	3	3	-	82	65	8210G095 ④	8D	○	-	-	-	10.1/F	11.6/F		
3/4	19	5.6	0.3	17	10	7	9	9	9	82	65	8210G003 ④	11D	○	-	-	-	6.1/F	11.6/F		
3/4	19	5.1	0	24	21	14	14	14	14	93	82	8210G026 ④ †	40P/10D	●	-	-	-	16.1F	30.8F		
1	25	11	0	10	9	9	9	8	8	82	82	8210G054 †	41D/31D ③	●	8210G089 †	45D/15D ③	●	16.1/F	30.8/F		
1	25	11	0.3	10	10	7	9	9	9	82	65	8210G004 ④	12D	○	-	-	-	6.1/F	11.6/F		
1	25	11.5	0	21	16	8	-	-	-	93	-	8210G027	42P ③	●	-	-	-	20.1/F	-		
1	25	11.5	0.7	21	21	21	-	-	-	79	-	8210G078 ③	13P	-	-	-	-	17.1/F	-		
1 1/4	29	13	0	10	9	9	9	8	8	82	82	8210G055 †	43D/32D ③	●	-	-	-	16.1/F	30.8/F		
1 1/4	29	13	0.3	10	10	7	9	9	9	82	65	8210G008 ④	16D	○	-	-	-	6.1/F	11.6/F		
1 1/2	32	19.5	0	10	9	9	9	8	8	82	82	8210G056 †	44D/33D ③	●	-	-	-	16.1/F	30.8/F		
1 1/2	32	19.5	0.3	10	10	7	9	9	9	82	65	8210G022 ④	18D	○	8210G127	52D ③	●	6.1/F	11.6/H		
2	44	37	0.3	10	9	6	3	3	3	82	65	8210G100 ④	20P	●	8210G129	53P	●	6.1/F	11.6H		
2 1/2	44	39	0.3	10	9	6	3	3	3	82	65	8210G101	21P	●	-	-	-	6.1/F	11.6/F		
NORMALLY OPEN (Open when de-energized), NBR Seating (PA Disc-Holder, except as noted)																					
3/8	16	2.6	0.0	10	10	9	9	9	6	82	65	8210G033	23D	●	-	-	-	10.1/F	11.6/F		
3/8	16	2.6	0.3	17	14	14	17	14	14	82	82	8210G011 ③	39D	●	-	-	-	10.1/F	11.6/F		
1/2	16	3.4	0	10	10	9	9	9	6	82	65	8210G034 ④	23D	●	-	-	-	10.1/F	11.6/F		
1/2	16	2.6	0	10	10	7	9	9	6	82	65	-	-	-	8210G030 ④	37D	●	10.1/F	11.6/F		
1/2	16	3.4	0.3	17	14	14	17	14	14	82	82	8210G012 ③	39D	●	-	-	-	10.1/F	11.6/F		
3/4	19	4.7	0	10	10	9	9	9	6	82	65	8210G035 ④	25D	●	-	-	-	10.1/F	11.6/F		
3/4	16	2.6	0	10	10	7	9	9	6	82	65	-	-	-	8210G038 ④	38D	●	10.1/F	11.6/F		
3/4	19	5.6	0.3	17	14	14	17	14	14	82	82	8210G013	46D/52D	●	-	-	-	16.1/F	15.8/F		
1	25	11	0	9	9	9	-	-	-	82	-	8210B057 ③	34D	●	-	-	-	20/F	-		
1	25	11	0.3	10	10	9	10	10	9	82	82	8210G014 ④	47D/53D	●	-	-	-	16.1/F	15.8/F		
1 1/4	29	13	0	9	9	9	-	-	-	82	-	8210B058 ③	35D ③	●	-	-	-	20/F	-		
1 1/4	29	13	0.3	10	10	9	10	10	9	82	-	8210G018 ④	48D/54D	●	-	-	-	16.1/F	15.8/F		
1 1/2	32	19.5	0	9	9	9	-	-	-	82	-	8210B059 ③	36D ③	●	-	-	-	20/F	-		
1 1/2	32	19.5	0.3	10	10	9	10	10	9	82	82	8210G032 ④	49D/55D	●	8210G132	29D	●	16.1/F	15.8/F		
2	44	37	0.3	10	9	9	10	9	9	82	82	8210G103 ④	50P/56P	●	8210G133	30P	●	16.1/F	15.8/F		
2 1/2	44	39	0.3	10	9	9	10	9	9	82	82	8210G104	51P/57P	●	-	-	-	16.1/F	15.8/F		

- ① 5 psi on Air; 1 psi on Water.
- ② Valve provided with PTFE main disc.
- ③ Valve includes Ulterm (G.E. trademark) piston.
- ④ Letter "D" = diaphragm construction; "P" = piston construction.
- ⑤ ○ Safety Shutoff Valve; ● General Purpose Valve.
Refer to Engineering Section (Approvals) for details.
- ⑥ Valves not available with Explosionproof enclosures.
- ⑦ On 50 hertz service, the watt rating for the 6.1/F solenoid is 8.1 watts.
- ⑧ AC construction also has PA seating.
- ⑨ No disc-holder.
- ⑩ Stainless steel disc-holder.
- ⑪ Constructions with NPT size 1" and larger are not offered with MB option (mounting bracket).

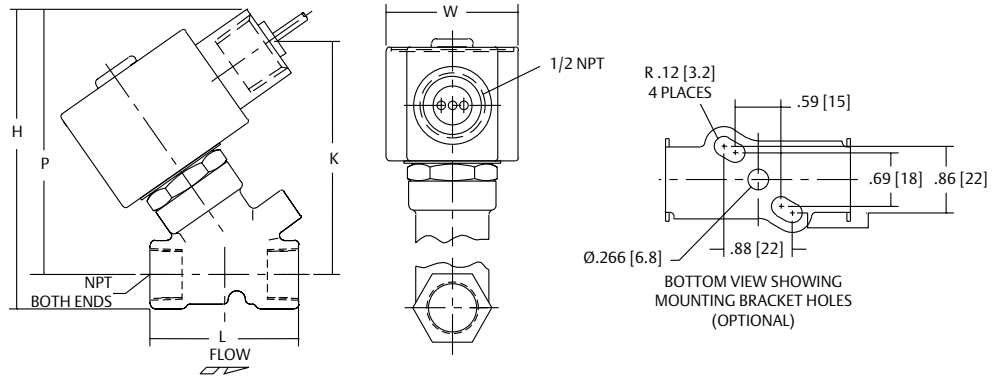
- † UL listed for fire protection systems per UL429A 120/60, 110/50 24VDC, no prefix and voltage options offered.
- ‡ DC constructions must have solenoid mounted vertical and upright.
- ✓ ATEX/IECEx certified solenoid with prefix "EV".
- ▼ ATEX/IECEx certified solenoid for DC only with prefix "EV".
- ◆ Not available in 6 Volt DC. EF and HB prefix only.
- ♣ Valve available with lead-free brass body and bonnet using suffix "LF". The term "Lead-Free" for brass materials is defined by SDWA 1417 as having a maximum weighted average lead content of 0.25% on the wetted surface area. Valves are compliant to NSF/ANSI 372 low lead requirements.

Dimensions: inches (mm)

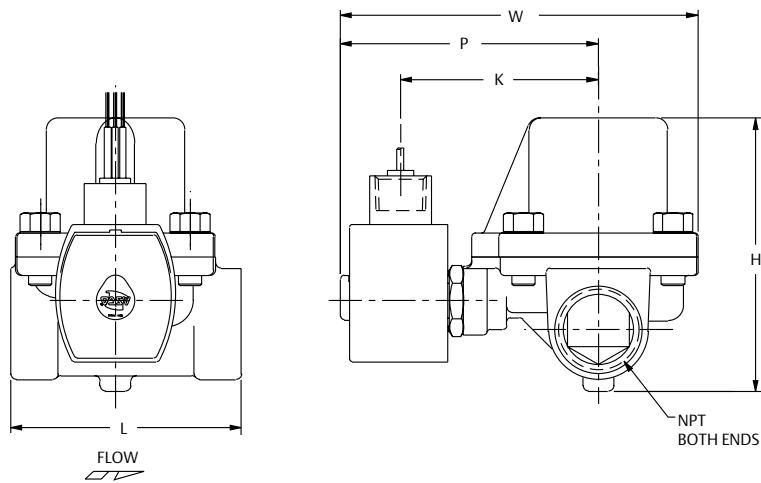
Const. Ref.		H	K	L	P	W
1*	in	3.85	3.00	1.91	3.41	1.69
	mm	98	76	49	87	43
2*	in	4.17	3.25	2.28	3.63	1.69
	mm	106	83	58	92	43
5	in	3.84	2.31	2.75	3.28	2.28
	mm	98	59	70	83	58
6*	in	3.38	1.94	2.75	2.80	2.28
	mm	86	49	70	71	58
7	in	4.19	2.50	2.81	3.47	2.39
	mm	106	64	71	88	61
8	in	4.13	2.47	2.81	3.44	2.29
	mm	105	63	71	87	58
9*	in	3.66	2.10	2.81	2.96	2.28
	mm	93	53	71	75	58
10*	in	5.20	3.40	2.80	4.50	2.50
	mm	131	86	71	114	62
11*	in	4.16	2.66	3.84	3.52	2.75
	mm	106	68	98	89	70
12	in	5.64	3.15	3.75	4.01	3.36
	mm	143	80	95	102	85
13	in	4.44	3.22	3.75	4.19	5.81
	mm	113	82	95	106	147
15*	in	5.20	3.30	3.80	4.40	3.80
	mm	133	83	98	111	98
16	in	5.64	3.15	3.66	4.01	3.56
	mm	143	80	93	102	90
18*	in	6.11	3.30	4.38	4.16	3.92
	mm	155	84	111	106	100
20*	in	7.33	3.71	5.06	4.57	4.87
	mm	186	94	129	116	124
21*	in	7.33	3.71	5.50	4.57	4.87
	mm	186	94	140	116	124
23	in	4.35	2.65	2.75	3.79	2.28
	mm	110	67	70	96	58
24	in	5.06	X	3.78	4.44	2.75
	mm	129	X	96	113	70
25	in	4.64	2.81	2.81	3.94	2.28
	mm	118	71	71	100	58
26	in	6.53	X	3.75	4.91	3.19
	mm	166	X	95	125	81
27	in	8.22	X	5.50	5.47	4.87
	mm	209	X	140	139	124
28	in	6.53	X	3.66	4.91	3.19
	mm	166	X	93	125	81
29	in	7.03	X	4.38	5.06	4.40
	mm	179	X	111	129	112

* DC dimensions slightly larger.
IMPORTANT: Valves may be mounted in any position, except as noted in specifications table.

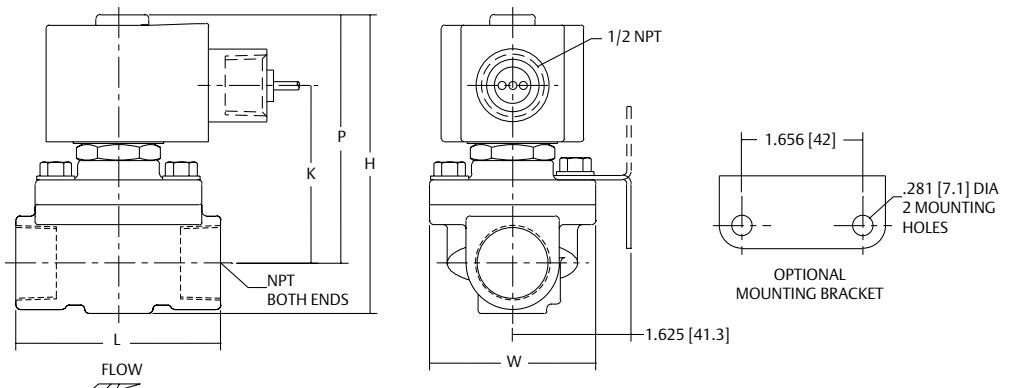
Const. Ref. 1, 2



Const. Ref. 13



Const. Ref. 5-9, 11, 23, 25, 37, 38, 40-46, 52



ASCO™ General Service Solenoid Valves

Brass or Stainless Steel Bodies | Pilot Operated | 3/8" to 2 1/2"

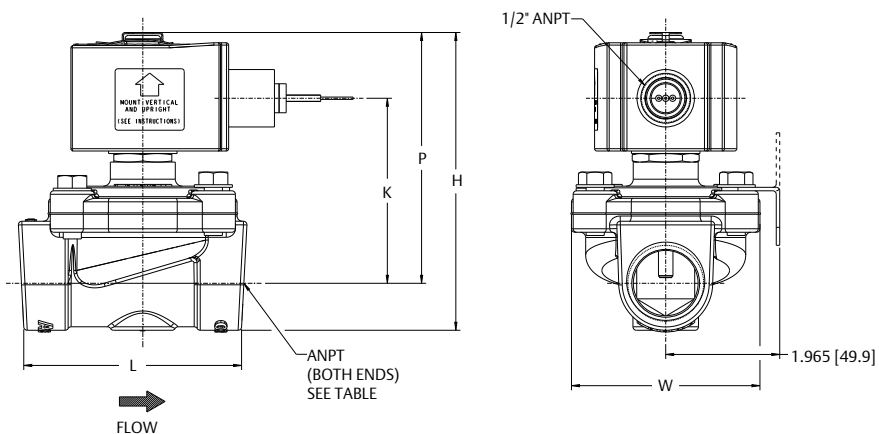
2/2
SERIES
210

Dimensions: inches (mm)

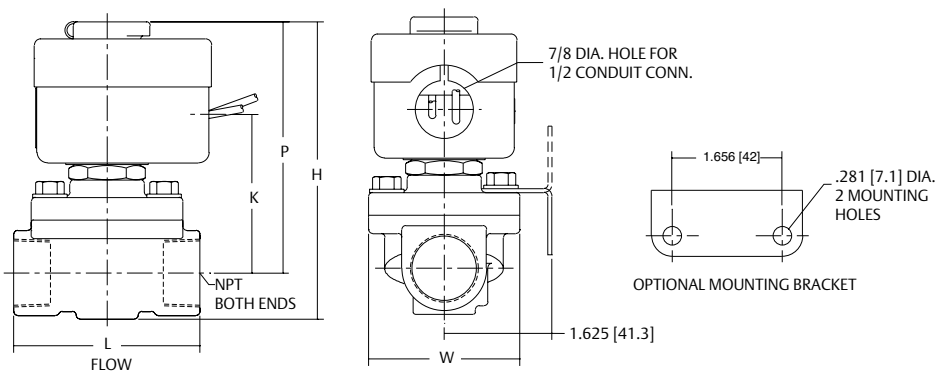
Const. Ref.		H	K	L	P	W
30	in	8.22	X	5.06	5.47	4.87
	mm	209	X	129	139	124
31	in	5.13	3.19	3.76	4.32	3.27
	mm	130	81	95	110	83
32	in	5.60	3.44	3.66	4.57	3.27
	mm	142	87	93	116	83
33	in	5.92	3.66	4.51	4.80	3.89
	mm	150	93	115	122	99
34	in	6.91	X	3.75	6.09	3.25
	mm	176	X	95	155	83
35	in	7.34	X	3.66	6.34	3.25
	mm	186	X	93	161	83
36	in	7.66	X	4.38	6.56	3.91
	mm	1.95	X	111	167	99
37	in	4.61	2.75	2.81	3.89	2.39
	mm	117	70	71	99	61
38	in	4.61	2.75	2.81	3.89	2.39
	mm	117	70	71	99	61
39	in	5.42	2.31	2.75	4.86	3.80
	mm	138	59	70	123	97
40	in	5.20	3.29	2.81	4.50	2.28
	mm	132	83	71	114	58
41	in	5.13	3.10	3.75	4.32	3.25
	mm	130	79	95	110	83
42	in	6.43	4.40	3.93	5.62	3.25
	mm	163	112	100	143	83
43	in	5.57	3.35	3.66	4.57	3.25
	mm	142	85	93	116	83
44	in	5.90	3.57	4.38	4.79	3.91
	mm	150	91	111	122	99
45	in	5.26	3.17	3.75	4.38	3.84
	mm	134	81	95	111	98
46	in	4.95	3.10	3.84	4.31	2.75
	mm	126	79	98	110	70
47	in	6.43	3.59	3.75	4.81	3.52
	mm	163	91	95	122	90
48	in	6.43	3.59	3.66	4.81	3.73
	mm	163	91	93	122	95

IMPORTANT: Valves may be mounted in any position, except as noted in specifications table.

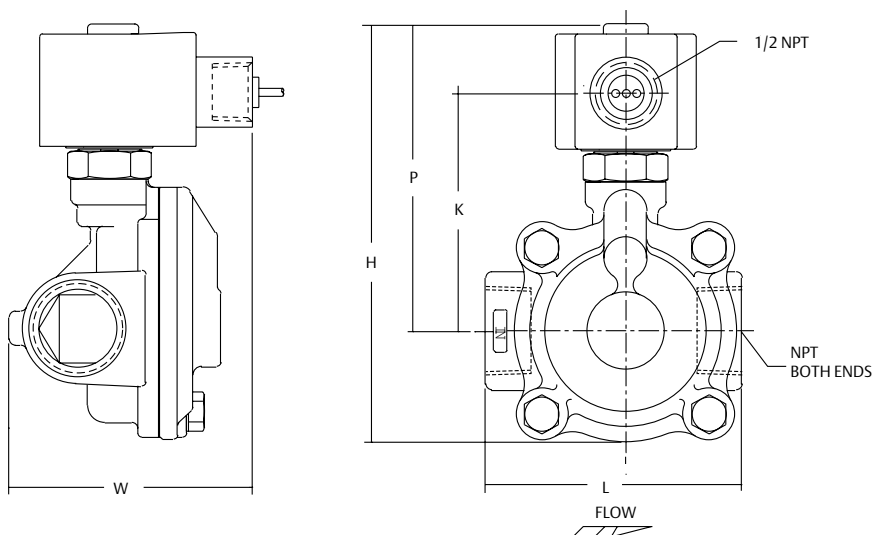
Const. Ref. 10, 15, 31, 32, 33



Const. Ref. 24, 34, 35, 36



Const. Ref. 12, 16, 26, 28, 47, 48, 53, 54, 55

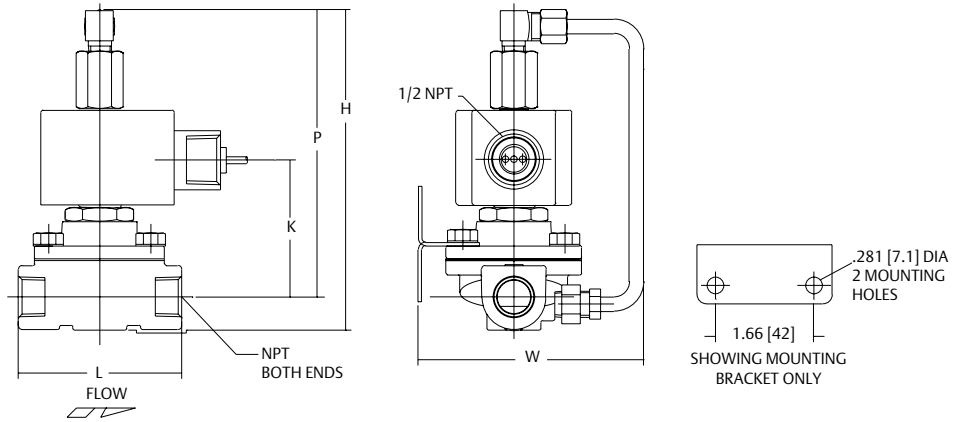


Dimensions: inches (mm)

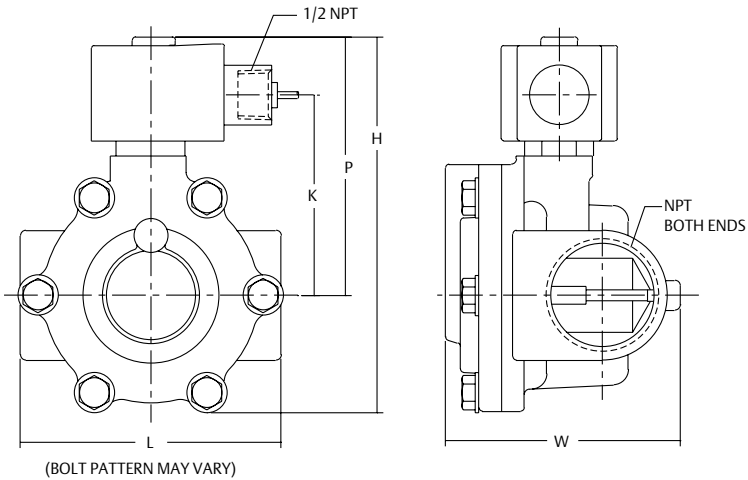
Const. Ref.		H	K	L	P	W
49	in	6.91	3.75	4.38	4.96	4.40
	mm	176	95	111	126	112
50	in	8.13	4.15	5.06	5.37	4.87
	mm	207	105	129	136	124
51	in	8.13	4.15	5.50	5.37	5.18
	mm	207	105	140	136	132
52	in	5.00	3.08	3.84	4.33	3.18
	mm	127	110	98	110	81
53	in	6.46	3.57	3.75	4.83	3.74
	mm	164	91	95	123	95
54	in	6.47	3.57	3.66	4.83	3.94
	mm	164	91	93	123	100
55	in	6.93	3.72	4.38	4.98	4.30
	mm	176	95	111	126	109
56	in	8.17	4.13	5.06	5.39	4.71
	mm	208	105	129	137	120
57	in	8.17	4.13	5.50	5.39	5.21
	mm	208	105	140	137	132

IMPORTANT: Valves may be mounted in any position, except as noted in specifications table.

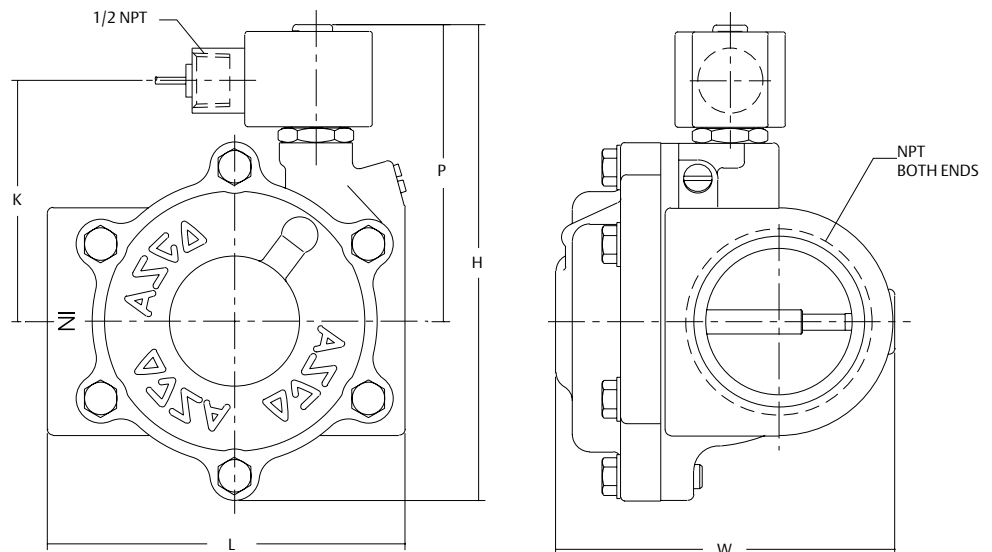
Const. Ref. 39



Const. Ref. 18, 29, 49



Const. Ref. 20, 21, 27, 30, 50, 51, 56, 57



通用安装与维护说明书

注意：通用安装维护说明书必须和具体产品说明书一起参照阅读。

安装

ASCO Numatics组件的使用范围仅限铭牌所示的技术特性。在取得厂商或代表同意后，才可以对设备进行更改。安装前，对管道系统进行泄压，并对其内部进行清洁。产品上如无箭头所指示的安装规定，该设备可以按任意方位安装。阀体上标明了流体流动方向和管道连接。管道必须按照铭牌上的尺寸连接，并做相应的接口匹配。

警告：

- 接口尺寸的减小可能会造成操作故障。
- 为了保证阀门的正常操作，在进口端需安装符合操作条件的过滤器或过滤网，并尽可能地靠近阀门的进口。
- 在安装拧紧时，如果使用润滑胶带、润滑膏、润滑剂，或类似润滑品，应防止颗粒物进入装置。
- 使用适当的工具，扳手位置应尽可能靠近连接点。
- 为了避免损坏设备，不得过度拧紧管道连接。
- 不得将阀门或电磁铁用作杠杆。
- 管道连接处不得对阀门产生任何受力、扭矩或张力。

电气连接

只允许由专业人士按照当地的规定和标准进行电气连接。

警告：

- 在开始工作前，关闭电源，断开电路和电压部件的供电。
- 在运行前，所有电气接线端子必须按照标准进行适当拧紧。
- 根据电压的不同，电气组件必须接地，并符合当地规定和标准。

根据型号的不同，本装置可以有以下电气接线端：

- 铲形插头连接（按照ISO-4400 或 3 x DIN-46244标准）（当正确安装后，本连接会提供IP-65保护）。
- 嵌入式螺旋式接线柱，有金属外壳和“Pg”电缆密封套。
- 悬空引线或电缆。

投入使用

对系统进行加压前，先进行一次电气试验。对于电磁阀，多次对线圈通电和断电，并注意金属撞击声，这表示电磁铁在工作。

运行

大多电磁阀都配有耐久运行的线圈。为了防止人员受伤或财产损失，不要触碰电磁线圈，因为其在正常运行条件下会变得很烫。

噪声

噪声取决于所用设备的应用状况、媒质和使用方式。只能由将该阀门安装于其系统的用户来确定实际的噪声水平。

维护

ASCO Numatics产品的维护取决于使用情况。建议进行定期清洁，清洁时间取决于媒质和使用情况。使用期间，应检查组件，以防止过度磨损。我们提供一整套的内部零件，作为备件套件。如果在安装/维护期间出现问题，或有疑问，请联系ASCO Numatics或授权代理商。

对于一些特定产品，根据提供产品的标识号和序列号，可以按要求提供一份关于EEC-Directive 2006/42/EEC附件II B的公司声明。

对于有CE标记的产品，满足EMC/2014/108/EC（截至2016年4月20号）和EMC/2014/30/EU（始于2016年4月20号）和LVD/2006/95/EC（截至2016年4月20号）和LVD/2014/35/EC（始于2016年4月20号）的必须要求。如有需要，根据提供的对应产品标识号和序列号，我们可以提供一份单独的符合性声明。

有关EU RoHS和 REACH信息请访问以下网址。

www3.emersonprocess.com/RoHSSearch

<h1 style="margin: 0;">Installation & Maintenance Instructions</h1> <p style="margin: 0;">2-WAY INTERNAL PILOT-OPERATED SOLENOID VALVES HUNG DIAPHRAGM — 3/8", 1/2" AND 3/4" NPT NORMALLY CLOSED OPERATION</p>	<p style="margin: 0;">SERIES</p> <p style="margin: 0;">8210</p> <p style="margin: 0;">8211</p>
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⚠ WARNING To reduce the risk of death, serious injury, or property damage:

- Personnel installing, maintaining, or operating this equipment must be qualified and follow these instructions. See also separate solenoid installation & maintenance instructions. Keep this document.

- Before installing or maintaining the valve, turn off electrical power, depressurize valve, extinguish all open flames and avoid any type of sparking or ignition. Vent hazardous or combustible fluid to a safe area.

NOTICE: See separate solenoid installation and maintenance instructions for information on: Wiring, Solenoid Temperature, Cause of Improper Operation, Coil or Solenoid Replacement.

DESCRIPTION

Series 8210 valves are 2-way normally closed, internal pilot operated solenoid valves. Valve body and bonnet are of brass construction. Series 8210 valves may be provided with a general purpose/watertight, open-frame or explosionproof/watertight solenoid.

Series 8210 and 8211 valves with suffix “HW” in the catalog number are specifically designed for hot water service.

NOTICE: Standard valves are not certified as lead-free under the Safe Drinking Water Act SDWA 1417 and are not intended for use on drinking water systems. They are intended for control of water in industrial applications. Consult ASCO for valves rated for use in potable water applications.

NOTICE: Constructions with an “LF” suffix meet the lead free-brass requirement of SDWA 1417 having 0.25% or less lead (Pb) in brass. Due to the variety of operating conditions and applications of these products, the user, through analysis and testing, is solely responsible for making the final selection of the products and assuring that all performance, safety, and warning requirements of the applications are met.

OPERATION

Normally Closed: Valve is closed when solenoid is de-energized; open when energized.

Manual Operator (Optional)

Valves with suffix “MO” in catalog number are provided with a manual operator which allows manual operation when desired or during an interruption of electrical power. To operate valve manually, push in knurled cap and rotate 180°. Disengage manual operator by rotating knurled cap counterclockwise 180° before operating electrically.

Manual Operator Location (Refer to Figure 3)

Manual operator (when shipped from factory) will be located over the valve outlet. Manual operator may be relocated at 90° increments by rotating valve bonnet. Remove bonnet screws (4) and rotate valve bonnet with solenoid to desired position. Replace bonnet screws (4) and torque in a crisscross manner to 110±10 inch pounds.

If valve is installed in the system and is operational, proceed in the following manner:

⚠ WARNING To prevent the possibility of death, serious injury or property damage, depressurize valve and vent fluid to a safe area before servicing the valve.

1. Remove the solenoid - see separate solenoid instructions.
2. Remove bonnet screws (4) and rotate valve bonnet to desired position.
3. Replace bonnet screws (4) and torque in a crisscross manner to 110±10 inch pounds.
4. Replace all solenoid parts.

INSTALLATION

Product verification

Check nameplate for correct catalog number, pressure, voltage, frequency, and service. Never apply incompatible fluids or exceed pressure rating of the valve. Installation and valve maintenance to be performed by qualified personnel. Contact ASCO or your supplier for more information about this valve or other valve options if this valve is not suitable for your application.

IMPORTANT: Never apply incompatible fluids or exceed pressure rating of the valve. Installation and valve maintenance to be performed by qualified personnel.

Temperature Limitations

For maximum valve ambient and fluid temperatures, refer to chart or as limited by solenoid approvals. See solenoid installation and maintenance instructions. The temperature limitations listed are for UL applications. For non UL applications, higher ambient and fluid temperature limitations are available. Consult factory. Check catalog number on nameplate to determine maximum temperatures.

Construction	Max. Fluid Temp, °F
AC Construction (Alternating Current)	180
DC Construction (Direct Current)	150
<u>Catalog Numbers Suffixed “HW”</u> AC Construction (Alternating Current)	210

Note: For Maximum Ambient Temperature specifications, see separate solenoid instructions.

Positioning

This valve is designed to perform properly when mounted in any position. However, for optimum life and performance, the solenoid should be mounted vertically and upright to reduce the possibility of foreign matter accumulating in the solenoid base sub-assembly area.

Mounting

For mounting bracket (optional feature) dimensions, refer to Figure 1.

Piping

Connect piping to valve according to markings on valve body. Apply pipe compound or PTFE tape sparingly to male pipe threads only. If applied to valve threads, the compound may enter the valve and cause operational difficulty. Avoid pipe strain by properly supporting and aligning piping. When tightening the pipe, do not use valve or solenoid as a lever. Locate wrenches applied to valve body or piping as close as possible to connection point. To avoid damage to the valve body, **DO NOT OVERTIGHTEN PIPE CONNECTIONS**. If PTFE tape, paste, spray, or similar lubricant is used, use extra care when tightening due to reduced friction

NOTICE: Valves with Suffix “HW” in the catalog number have a special diaphragm material which is specifically compounded for hot water service. This material can be attacked by oil and grease. Wipe the pipe threads clean of cutting oils and use PTFE tape to seal pipe joints.

NOTICE: To protect the solenoid valve, install a strainer or filter suitable for the service involved in the inlet side as close to the valve as possible. Clean periodically depending on service conditions. See ASCO Series 8600 and 8601 for strainers.

MAINTENANCE

!WARNING To prevent the possibility of death, serious injury or property damage, depressurize valve and vent fluid to a safe area before servicing the valve.

NOTE: It is not necessary to remove the valve from the pipeline for repairs.

Cleaning

All solenoid valves should be cleaned periodically. The time between cleanings will vary depending on the medium and service conditions. In general, if the voltage to the coil is correct, sluggish valve operation, excessive noise or leakage will indicate that cleaning is required. In the extreme case, faulty valve operation will occur and the valve may fail to open or close. Clean strainer or filter when cleaning the valve.

Preventive Maintenance

- Keep the medium flowing through the valve as free from dirt and foreign material as possible.
- Periodic exercise of the valve should be considered if ambient or fluid conditions are such that corrosion, elastomer degradation, fluid contamination build up, or other conditions that could impede solenoid valve shifting are possible. The actual frequency of exercise necessary will depend on specific operating conditions. A successful operating history is the

best indication of a proper interval between exercise cycles.

- Depending on the medium and service conditions, periodic inspection of internal valve parts for damage or excessive wear is recommended. Thoroughly clean all parts. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

Causes of Improper Operation

- **Incorrect Pressure:** Check valve pressure. Pressure to valve must be within range specified on nameplate.
- **Excessive Leakage:** Disassemble valve and clean all parts. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

Coil Replacement (See separate solenoid instructions)

Valve Disassembly (Refer to Figures 2 and 3)

1. Remove the solenoid - see separate solenoid instructions.
 2. Unscrew solenoid base sub-assembly and remove bonnet gasket.
 3. Remove valve bonnet screws (4) and valve bonnet.
 4. For normal maintenance, it is not necessary to disassemble the manual operator (optional feature) unless external leakage is evident. To disassemble, remove stem pin, manual operator stem, stem spring and stem gasket.
 5. Remove core spring, core/diaphragm sub-assembly and body gasket.
- !CAUTION** Do not distort hanger spring between core assembly and diaphragm assembly when lubricating pilot disc.
6. All parts are now accessible for cleaning or replacement. Replace worn or damaged parts with a complete Spare Parts Kit for best results.

Valve Reassembly

1. Reassemble in reverse order of disassembly paying careful attention to exploded views provided for identification and placement of parts.
2. Lubricate body gasket and solenoid base gasket with Xiameter® PMX 200 Silicone Fluid or an equivalent high-grade silicone fluid. Lubricate manual operator stem gasket with Molykote® 111 Compound or equivalent high-grade silicone grease. On oxygen valves Suffix “N” and special cleaning valves where silicone lubricants are not allowed use FLOROLUBE® GR-362, LG-160 or KRYTOX® GPL -226.

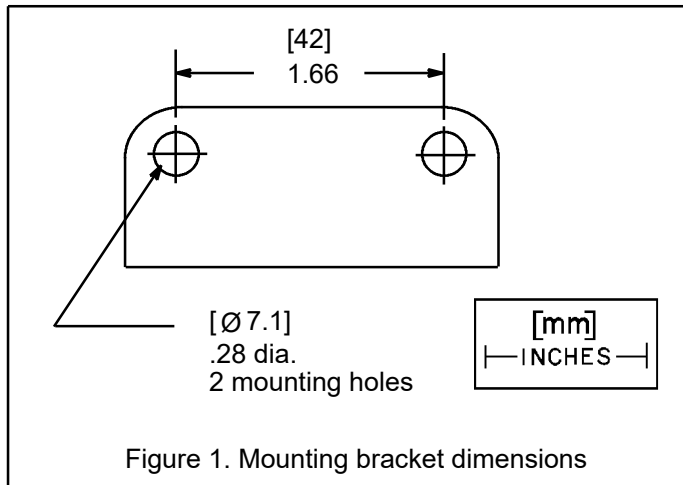
NOTE: Only the gaskets specified above should be lubricated.

3. Replace body gasket and core/diaphragm sub-assembly. Locate the bleed hole in core/diaphragm sub-assembly approximately 45° from the valve outlet.
4. Replace core spring with wide end in core first; closed end protrudes from top of core.
5. If removed, replace manual operator stem, stem spring, stem gasket and stem pin.
6. Replace valve bonnet and bonnet screws (4). Torque bonnet screws (4) in a crisscross manner to 110±10 inch pounds.
7. Replace bonnet gasket and solenoid base sub-assembly. Put solenoid base sub-assembly to 175±25 inch pounds.
8. Replace solenoid enclosure and retaining cap or clip.
9. After maintenance, operate the valve a few times to be sure of proper opening and closing.
10. Restore line pressure and electrical power supply to valve.

11. After maintenance is completed, operate the valve a few times to be sure of proper operation. A metallic click signifies the solenoid is operating.

ORDERING INFORMATION FOR ASCO REBUILD KITS

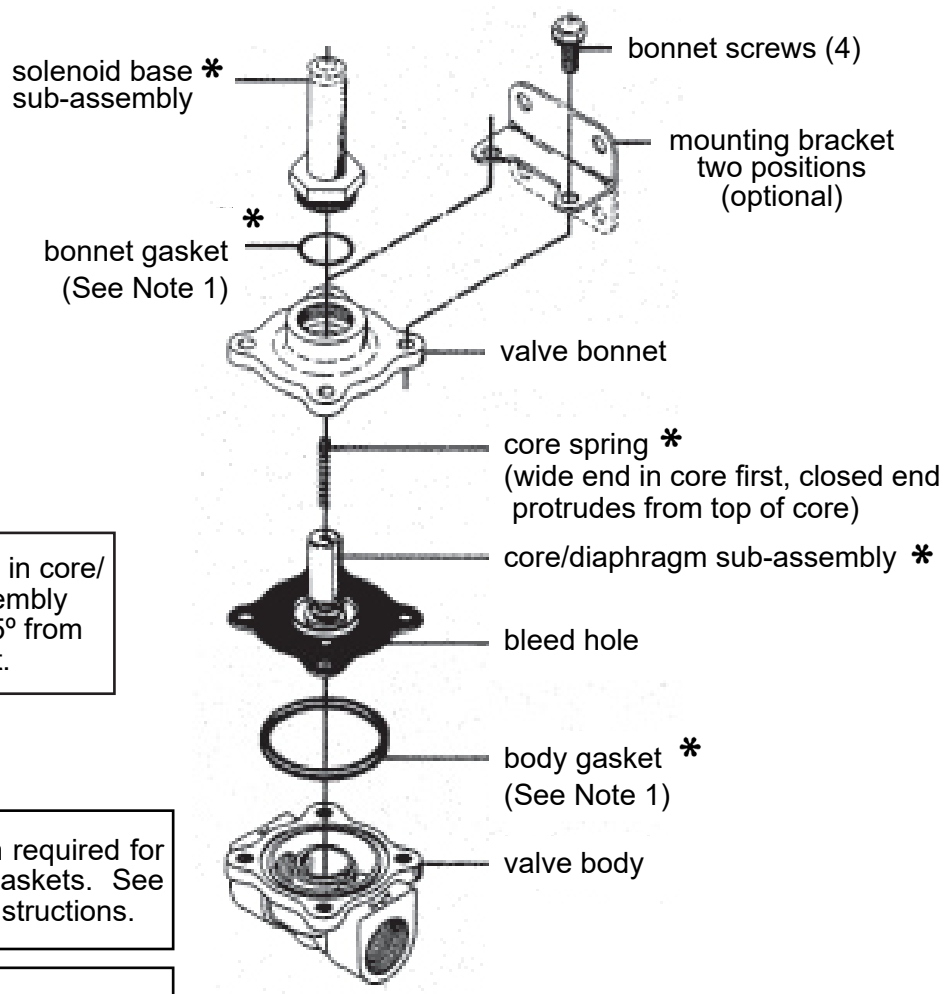
Parts marked with an asterisk(*) in the exploded view are supplied in Rebuild Kits. When Ordering Rebuild Kits for ASCO Valves, order the Rebuild Kit number stamped on the valve nameplate. If the number of the kit is not visible, order by indicating the number of kits required, and the Catalog Number and Serial Number of the valve(s) for which they are intended.



* Indicates parts supplied in ASCO Rebuild Kit

Torque solenoid base sub-assembly to 175±25 inch pounds.

Torque bonnet screws (4) in a crisscross manner to 110±10 inch pounds.



Locate bleed hole in core/diaphragm assembly approximately 45° from valve outlet.

Note 1: Lubrication required for body and bonnet gaskets. See valve reassembly instructions.

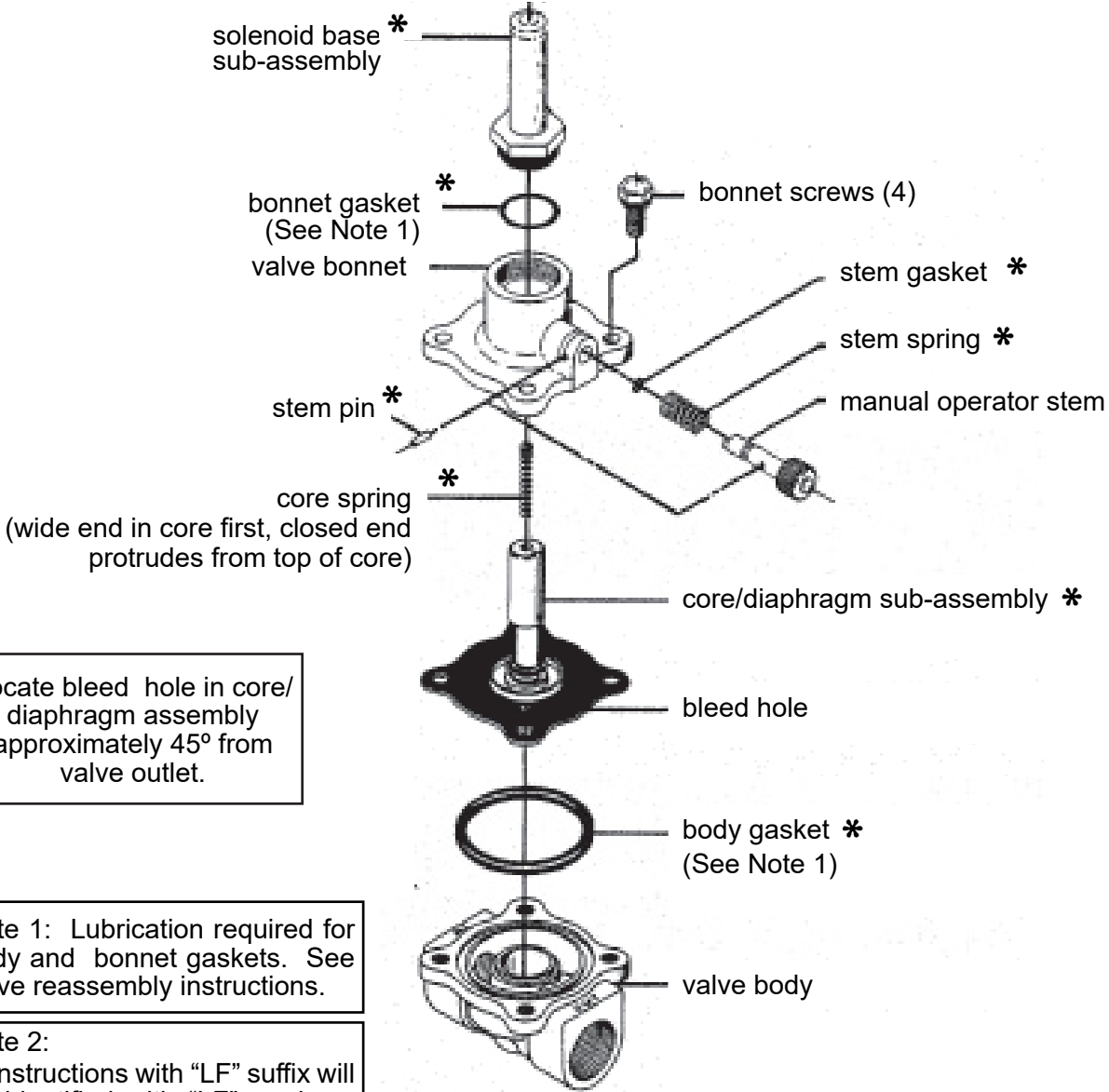
Note 2: Constructions with "LF" suffix will be identified with "LF" mark on body and bonnet.

Figure 2. Series 8210 - 3/8", 1/2" & 3/4" NPT - AC Construction

* Indicates parts supplied in ASCO Rebuild Kit

Torque solenoid base sub-assembly to 175±25 inch pounds.

Torque bonnet screws (4) in a crisscross manner to 110±10 inch pounds.



Locate bleed hole in core/diaphragm assembly approximately 45° from valve outlet.

Note 1: Lubrication required for body and bonnet gaskets. See valve reassembly instructions.

Note 2: Constructions with "LF" suffix will be identified with "LF" mark on body and bonnet.

Figure 3. Series 8210 - Manual Operator

Installation & Maintenance Instructions

2-WAY INTERNAL PILOT-OPERATED SOLENOID VALVES DIAPHRAGM TYPE — 3/8 , 1/2 AND 3/4 NPT NORMALLY OPEN OPERATION

SERIES
8210
8211

⚠ WARNING To reduce the risk of death, serious injury, or property damage:

- Personnel installing, maintaining, or operating this equipment must be qualified and follow these instructions. See also separate solenoid installation & maintenance instructions. Keep this document.
- Before installing or maintaining the valve, turn off electrical power, depressurize valve, extinguish all open flames and avoid any type of sparking or ignition. Vent hazardous or combustible fluid to a safe area.

DESCRIPTION

Series 8210 valves are 2-way normally open, internal pilot operated solenoid valves. Valve body and bonnet are of brass construction.

NOTICE: These valves are not certified as lead-free under the Safe Water Drinking Act SWDA 1417 and are not intended for use on drinking water systems. They are intended for control of water in industrial applications. Consult ASCO for valves rated for use in potable water applications.

NOTICE: Constructions with an “LF” suffix meet the lead free-brass requirement of SDWA 1417 having 0.25% or less lead (Pb) in brass. Due to the variety of operating conditions and applications of these products, the user, through analysis and testing, is solely responsible for making the final selection of the products and assuring that all performance, safety, and warning requirements of the applications are met.

OPERATION

Normally Open: Valve is open when solenoid is de-energized; closed when energized.

INSTALLATION

Product verification

Check nameplate for correct catalog number, pressure, voltage, frequency, and service. Never apply incompatible fluids or exceed pressure rating of the valve - contact ASCO or your supplier for more information about this valve or other valve options if this valve is not suitable for your application. Installation and valve maintenance to be performed by qualified personnel.

Temperature Limitations

For maximum ambient and fluid temperatures, refer to chart below. For higher ambient and fluid temperatures, consult factory. Check catalog number and watt rating on nameplate to determine the maximum temperatures.

Construction	Max. Fluid Temp
AC Construction (Alternating Current)	200 °F (93.33 °C)
DC Construction (Direct Current)	180 °F (82.22 °C)

NOTE: For Maximum Ambient Temperature specifications, see separate solenoid instructions.

Positioning

This valve is designed to perform properly when mounted in any position. However, for optimum life and performance, the solenoid

should be mounted vertically and upright to reduce the possibility of foreign matter accumulating in the solenoid base sub-assembly area.

Mounting

For mounting bracket (optional feature) dimensions, refer to Figure 1.

Piping

Connect piping to valve according to markings on valve body. Apply pipe compound or PTFE tape sparingly to male pipe threads only. If applied to valve threads, the compound may enter the valve and cause operational difficulty. Avoid pipe strain and valve damage by properly supporting and aligning piping. When tightening the pipe, do not use valve or solenoid as a lever. Locate wrenches applied to valve body or piping as close as possible to connection point. To avoid damage to the valve body, **DO NOT OVERTIGHTEN PIPE CONNECTIONS.** If PTFE tape, paste, spray, or similar lubricant is used, use extra care when tightening due to reduced friction.

Strainer or filter requirement

⚠ CAUTION To protect the solenoid valve, install a strainer or filter suitable for the service involved in the inlet side as close to the valve as possible. Clean periodically depending on service conditions. See ASCO Series 8600 and 8601 for strainers.

MAINTENANCE

⚠ WARNING To prevent the possibility of severe personal injury or property damage, turn off electrical power, depressurize valve, extinguish all open flames, and avoid any type of sparking or ignition. Vent hazardous or combustible fluid to a safe area before servicing the valve.

NOTE: It is not necessary to remove the valve from the pipeline for repairs.

Cleaning

All solenoid valves should be cleaned periodically. The time between cleanings will vary depending on the medium and service conditions. In general, if the voltage to the coil is correct, sluggish valve operation, excessive noise or leakage will indicate that cleaning is required. In the extreme case, faulty valve operation will occur and the valve may fail to open or close. Clean strainer or filter when cleaning the valve.

Preventive Maintenance

- Keep the medium flowing through the valve as free from dirt and foreign material as possible.
- Periodic exercise of the valve should be considered if ambient or fluid conditions are such that corrosion, elastomer degradation, fluid contamination build up, or other conditions that could impede solenoid valve shifting are possible. The actual frequency of exercise necessary will depend on specific operating conditions. A successful operating history is the best indication of a proper interval between exercise cycles.
- Depending on the medium and service conditions, periodic inspection of internal valve parts for damage or excessive wear is recommended. Thoroughly clean all parts. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

Causes of Improper Operation

- **Incorrect Pressure:** Check valve pressure. Pressure to valve must be within range specified on nameplate.

- **Excessive Leakage:** Disassemble valve and clean all parts. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

Coil Replacement (See separate solenoid instructions)

Valve Disassembly

Depressurize valve and turn off electrical power supply. For bass construction, refer to Figure 2. For stainless steel construction, refer to Figure 3. Proceed in the following manner:

1. See separate solenoid instructions.
2. Remove retaining cap or clip and slip the entire solenoid enclosure off the solenoid base sub-assembly. CAUTION: When metal retaining clip disengages, it will spring upwards.
3. Unscrew solenoid base sub-assembly and remove core, plugnut gasket, plugnut assembly and solenoid base gasket.
4. For stainless steel construction, remove adapter and adapter gasket.
5. Remove bonnet screws (4), valve bonnet, disc holder sub-assembly, disc holder spring, diaphragm/spring sub-assembly and body gasket.
6. All parts are now accessible for cleaning or replacement. Replace worn or damaged parts with a complete Spare Parts Kit for best results.

⚠ CAUTION To ensure proper valve operation, install all parts supplied in ASCO Rebuild Kit. Do not mix old and new parts.

Valve Reassembly

1. Reassemble in reverse order of disassembly paying careful attention to exploded views provided for identification and placement of parts.
2. Lubricate body gasket and solenoid base gasket with Xiameter® PMX 200 Silicone Fluid or an equivalent high-grade silicone fluid. Lubricate manual operator stem gasket with Molykote® 111 Compound lubricant or an equivalent high-grade silicone grease. On oxygen valves Suffix "N" and special cleaning valves where silicone lubricants are not allowed use FLOROLUBE® GR-362, LG-160 or KRYTOX® GPL -226.

NOTE: Only the gaskets specified above should be lubricated.

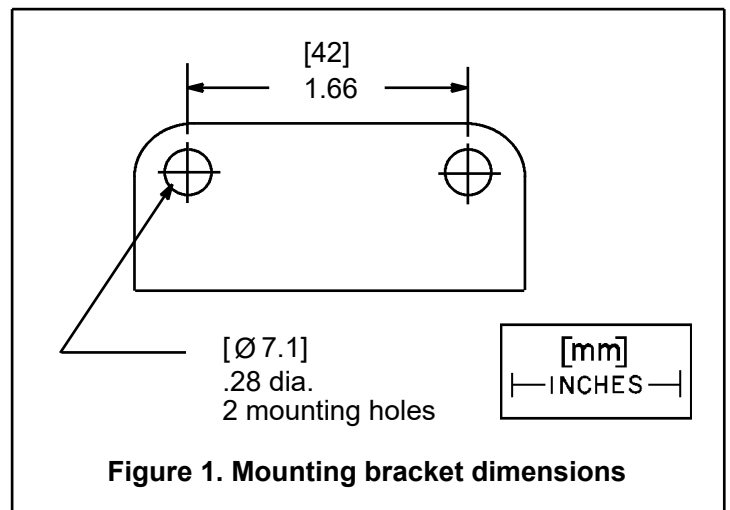
3. Replace body gasket and core/diaphragm sub-assembly. Locate the bleed hole in core/diaphragm sub-assembly approximately 45° from the valve outlet.

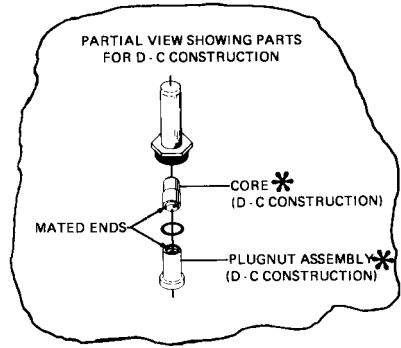
NOTE: Should diaphragm/spring sub-assembly become disassembled, be sure to replace the diaphragm/spring support with lip facing upward towards the valve bonnet.

4. Replace disc holder spring and disc holder sub-assembly.
5. Replace valve bonnet and bonnet screws. Torque bonnet screws in a crisscross manner to 95 ± 10 inch pounds.
6. For stainless steel construction, replace adapter gasket and adapter. Torque adapter to 175 ± 25 inch pounds.
7. Install solenoid base gasket, plugnut assembly and plugnut gasket. Position core (small end up for AC Construction) on plugnut assembly. For DC Construction, be sure plugnut assembly and core are installed with mated ends together.
8. Replace bonnet gasket and solenoid base sub-assembly. Torque solenoid base sub-assembly to 175 ± 25 inch pounds.
9. Replace solenoid enclosure and retaining cap or clip.
10. After maintenance, operate the valve a few times to be sure of proper opening and closing.

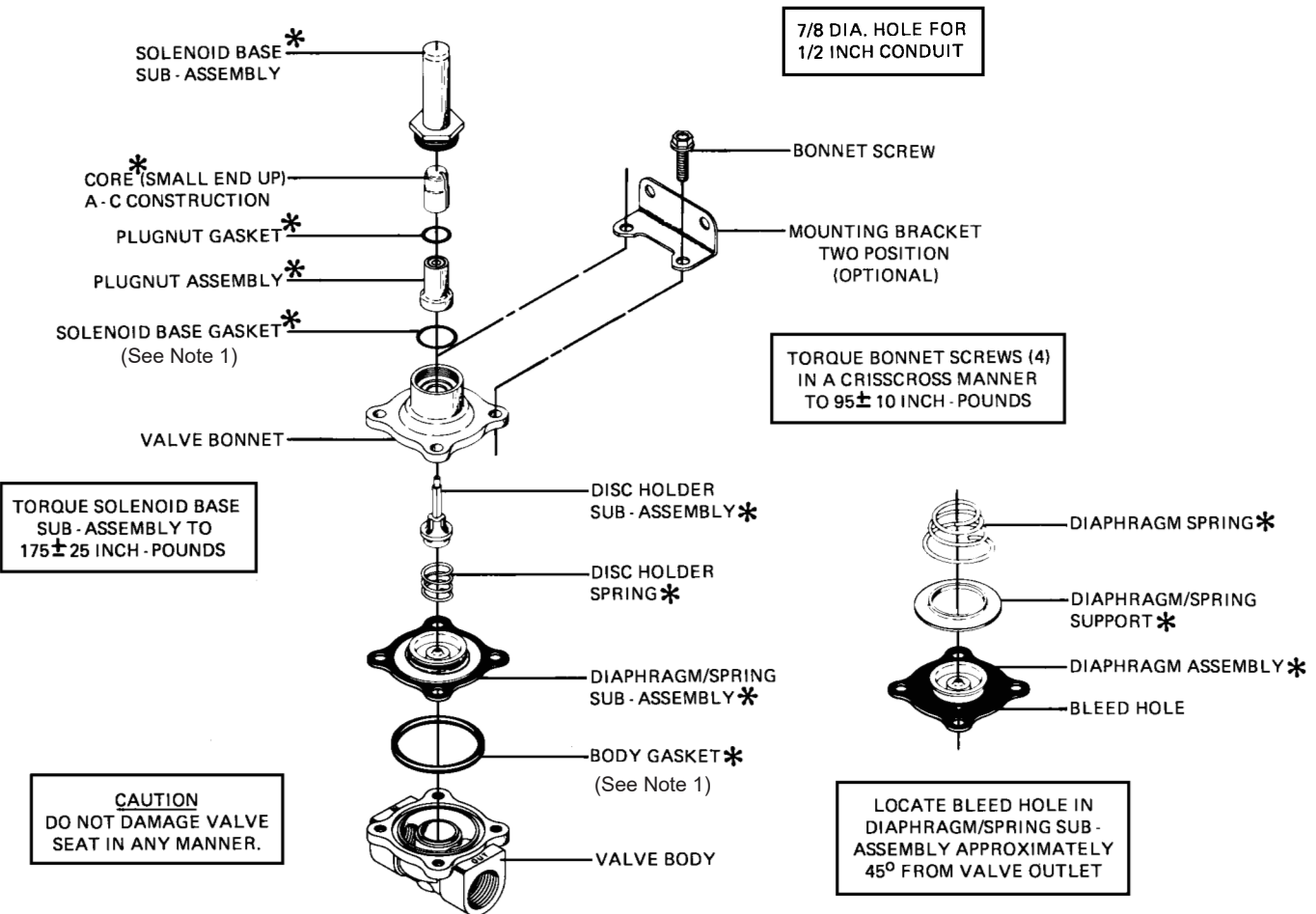
ORDERING INFORMATION FOR ASCO REBUILD KITS

Parts marked with an asterisk(*) in the exploded view are supplied in Rebuild Kits. When Ordering Rebuild Kits for ASCO Valves, order the Rebuild Kit number stamped on the valve nameplate. If the number of the kit is not visible, order by indicating the number of kits required, and the Catalog Number and Serial Number of the valve(s) for which they are intended.





PARTS INCLUDED IN SPARE PARTS KIT *



TORQUE SOLENOID BASE SUB - ASSEMBLY TO 175 ± 25 INCH - POUNDS

7/8 DIA. HOLE FOR 1/2 INCH CONDUIT

TORQUE BONNET SCREWS (4) IN A CRISSCROSS MANNER TO 95 ± 10 INCH - POUNDS

CAUTION
DO NOT DAMAGE VALVE SEAT IN ANY MANNER.

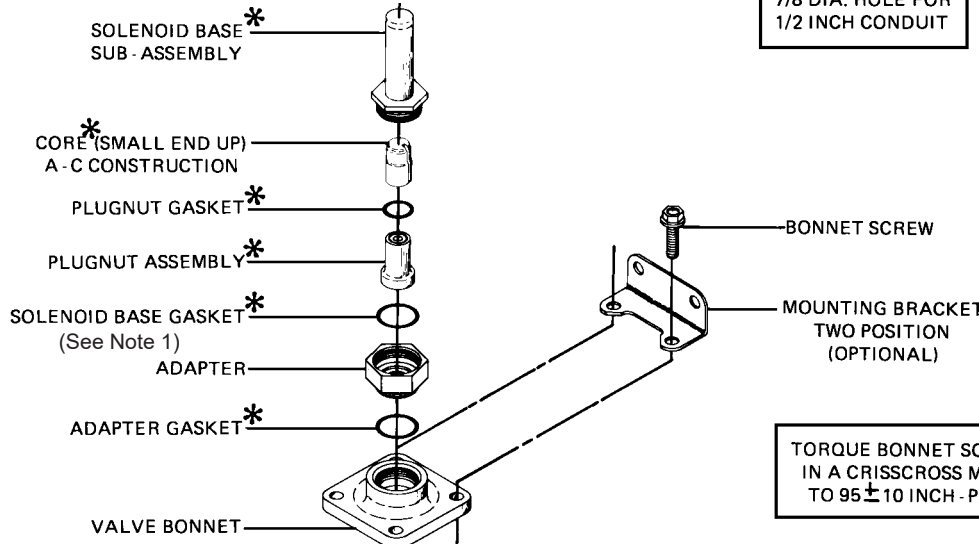
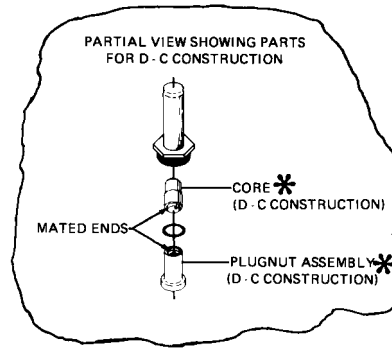
LOCATE BLEED HOLE IN DIAPHRAGM/SPRING SUB - ASSEMBLY APPROXIMATELY 45° FROM VALVE OUTLET

NOTE 1: Lubrication required for body and solenoid base gaskets. See valve reassembly instructions.

Series 8210 - 3/8, 1/2 and 3/4 NPT - Brass Construction
General Purpose Solenoid Enclosure Shown.

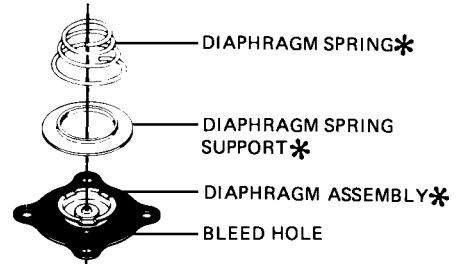
Figure 2. For Explosion-Proof/Watertight Solenoid Enclosure used on Series 8211 See Form No. V_5709.

PARTS INCLUDED IN SPARE PARTS KIT *



TORQUE BONNET SCREWS (4) IN A CRISSCROSS MANNER TO 95 ± 10 INCH - POUNDS

TORQUE ADAPTER AND SOLENOID BASE SUB - ASSEMBLY TO 175 ± 25 INCH - POUNDS



CAUTION
DO NOT DAMAGE VALVE SEAT IN ANY MANNER.

LOCATE BLEED HOLE IN DIAPHRAGM/SPRING SUB - ASSEMBLY APPROXIMATELY 45° FROM VALVE OUTLET

NOTE 1: Lubrication required for body and solenoid base gaskets. See valve reassembly instructions

Series 8210 - 1/2 and 3/4 NPT - Stainless Steel Construction
General Purpose Solenoid Enclosure Shown.

Figure 3. For Explosion-Proof/Watertight Solenoid Enclosure used on Series 8211 See Form No. V_5709.

Installation & Maintenance Instructions

2-WAY INTERNAL PILOT-OPERATED SOLENOID VALVES
HUNG DIAPHRAGM — 3/8", 1/2" AND 3/4" NPT
NORMALLY CLOSED OPERATION

SERIES
8210
8211

⚠ WARNING To reduce the risk of death, serious injury, or property damage:

- Personnel installing, maintaining, or operating this equipment must be qualified and follow these instructions. See also separate solenoid installation & maintenance instructions. Keep this document.

- Before installing or maintaining the valve, turn off electrical power, depressurize valve, extinguish all open flames and avoid any type of sparking or ignition. Vent hazardous or combustible fluid to a safe area.

NOTICE: See separate solenoid installation and maintenance instructions for information on: Wiring, Solenoid Temperature, Cause of Improper Operation, Coil or Solenoid Replacement.

DESCRIPTION

Series 8210 valves are 2-way normally closed, internal pilot operated solenoid valves. Valve body and bonnet are of brass construction. Series 8210 valves may be provided with a general purpose/watertight, open-frame or explosionproof/watertight solenoid.

Series 8210 and 8211 valves with suffix "HW" in the catalog number are specifically designed for hot water service.

NOTICE: Standard valves are not certified as lead-free under the Safe Drinking Water Act SDWA 1417 and are not intended for use on drinking water systems. They are intended for control of water in industrial applications. Consult ASCO for valves rated for use in potable water applications.

NOTICE: Constructions with an "LF" suffix meet the lead free-brass requirement of SDWA 1417 having 0.25% or less lead (Pb) in brass. Due to the variety of operating conditions and applications of these products, the user, through analysis and testing, is solely responsible for making the final selection of the products and assuring that all performance, safety, and warning requirements of the applications are met.

OPERATION

Normally Closed: Valve is closed when solenoid is de-energized; open when energized.

Manual Operator (Optional)

Valves with suffix "MO" in catalog number are provided with a manual operator which allows manual operation when desired or during an interruption of electrical power. To operate valve manually, push in knurled cap and rotate 180°. Disengage manual operator by rotating knurled cap counterclockwise 180° before operating electrically.

Manual Operator Location (Refer to Figure 3)

Manual operator (when shipped from factory) will be located over the valve outlet. Manual operator may be relocated at 90° increments by rotating valve bonnet. Remove bonnet screws (4) and rotate valve bonnet with solenoid to desired position. Replace bonnet screws (4) and torque in a crisscross manner to 110±10 inch pounds.

If valve is installed in the system and is operational, proceed in the following manner:

⚠ WARNING To prevent the possibility of death, serious injury or property damage, depressurize valve and vent fluid to a safe area before servicing the valve.

- Remove the solenoid - see separate solenoid instructions.
- Remove bonnet screws (4) and rotate valve bonnet to desired position.
- Replace bonnet screws (4) and torque in a crisscross manner to 110±10 inch pounds.
- Replace all solenoid parts.

INSTALLATION

Product verification

Check nameplate for correct catalog number, pressure, voltage, frequency, and service. Never apply incompatible fluids or exceed pressure rating of the valve. Installation and valve maintenance to be performed by qualified personnel. Contact ASCO or your supplier for more information about this valve or other valve options if this valve is not suitable for your application.

IMPORTANT: Never apply incompatible fluids or exceed pressure rating of the valve. Installation and valve maintenance to be performed by qualified personnel.

Temperature Limitations

For maximum valve ambient and fluid temperatures, refer to chart or as limited by solenoid approvals. See solenoid installation and maintenance instructions. The temperature limitations listed are for UL applications. For non UL applications, higher ambient and fluid temperature limitations are available. Consult factory. Check catalog number on nameplate to determine maximum temperatures.

Construction	Max. Fluid Temp, °F
AC Construction (Alternating Current)	180
DC Construction (Direct Current)	150
<u>Catalog Numbers Suffix "HW"</u> AC Construction (Alternating Current)	210

Note: For Maximum Ambient Temperature specifications, see separate solenoid instructions.

Positioning

This valve is designed to perform properly when mounted in any position. However, for optimum life and performance, the solenoid should be mounted vertically and upright to reduce the possibility of foreign matter accumulating in the solenoid base sub-assembly area.

Mounting

For mounting bracket (optional feature) dimensions, refer to Figure 1.

Piping

Connect piping to valve according to markings on valve body. Apply pipe compound or PTFE tape sparingly to male pipe threads only. If applied to valve threads, the compound may enter the valve and cause operational difficulty. Avoid pipe strain by properly supporting and aligning piping. When tightening the pipe, do not use valve or solenoid as a lever. Locate wrenches applied to valve body or piping as close as possible to connection point. To avoid damage to the valve body, **DO NOT OVERTIGHTEN PIPE CONNECTIONS**. If PTFE tape, paste, spray, or similar lubricant is used, use extra care when tightening due to reduced friction

NOTICE: Valves with Suffix “HW” in the catalog number have a special diaphragm material which is specifically compounded for hot water service. This material can be attacked by oil and grease. Wipe the pipe threads clean of cutting oils and use PTFE tape to seal pipe joints.

NOTICE: To protect the solenoid valve, install a strainer or filter suitable for the service involved in the inlet side as close to the valve as possible. Clean periodically depending on service conditions. See ASCO Series 8600 and 8601 for strainers.

MAINTENANCE

⚠ WARNING To prevent the possibility of death, serious injury or property damage, depressurize valve and vent fluid to a safe area before servicing the valve.

NOTE: It is not necessary to remove the valve from the pipeline for repairs.

Cleaning

All solenoid valves should be cleaned periodically. The time between cleanings will vary depending on the medium and service conditions. In general, if the voltage to the coil is correct, sluggish valve operation, excessive noise or leakage will indicate that cleaning is required. In the extreme case, faulty valve operation will occur and the valve may fail to open or close. Clean strainer or filter when cleaning the valve.

Preventive Maintenance

- Keep the medium flowing through the valve as free from dirt and foreign material as possible.
- Periodic exercise of the valve should be considered if ambient or fluid conditions are such that corrosion, elastomer degradation, fluid contamination build up, or other conditions that could impede solenoid valve shifting are possible. The actual frequency of exercise necessary will depend on specific operating conditions. A successful operating history is the

best indication of a proper interval between exercise cycles.

- Depending on the medium and service conditions, periodic inspection of internal valve parts for damage or excessive wear is recommended. Thoroughly clean all parts. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

Causes of Improper Operation

- **Incorrect Pressure:** Check valve pressure. Pressure to valve must be within range specified on nameplate.
- **Excessive Leakage:** Disassemble valve and clean all parts. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

Coil Replacement (See separate solenoid instructions)

Valve Disassembly (Refer to Figures 2 and 3)

1. Remove the solenoid - see separate solenoid instructions.
 2. Unscrew solenoid base sub-assembly and remove bonnet gasket.
 3. Remove valve bonnet screws (4) and valve bonnet.
 4. For normal maintenance, it is not necessary to disassemble the manual operator (optional feature) unless external leakage is evident. To disassemble, remove stem pin, manual operator stem, stem spring and stem gasket.
 5. Remove core spring, core/diaphragm sub-assembly and body gasket.
- ⚠ CAUTION** Do not distort hanger spring between core assembly and diaphragm assembly when lubricating pilot disc.
6. All parts are now accessible for cleaning or replacement. Replace worn or damaged parts with a complete Spare Parts Kit for best results.

Valve Reassembly

1. Reassemble in reverse order of disassembly paying careful attention to exploded views provided for identification and placement of parts.
2. Lubricate body gasket and solenoid base gasket with Xiameter® PMX 200 Silicone Fluid or an equivalent high-grade silicone fluid. Lubricate manual operator stem gasket with Molykote® 111 Compound or equivalent high-grade silicone grease. On oxygen valves Suffix “N” and special cleaning valves where silicone lubricants are not allowed use FLOROLUBE® GR-362, LG-160 or KRYTOX® GPL -226.

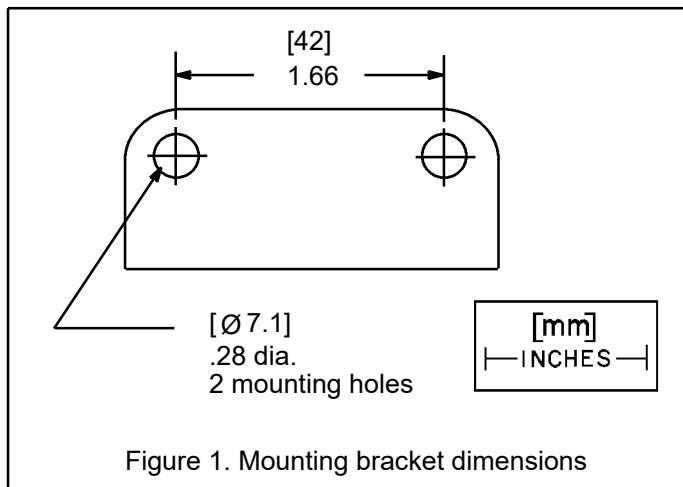
NOTE: Only the gaskets specified above should be lubricated.

3. Replace body gasket and core/diaphragm sub-assembly. Locate the bleed hole in core/diaphragm sub-assembly approximately 45° from the valve outlet.
4. Replace core spring with wide end in core first; closed end protrudes from top of core.
5. If removed, replace manual operator stem, stem spring, stem gasket and stem pin.
6. Replace valve bonnet and bonnet screws (4). Torque bonnet screws (4) in a crisscross manner to 110±10 inch pounds.
7. Replace bonnet gasket and solenoid base sub-assembly. Put solenoid base sub-assembly to 175±25 inch pounds.
8. Replace solenoid enclosure and retaining cap or clip.
9. After maintenance, operate the valve a few times to be sure of proper opening and closing.
10. Restore line pressure and electrical power supply to valve.

11. After maintenance is completed, operate the valve a few times to be sure of proper operation. A metallic click signifies the solenoid is operating.

ORDERING INFORMATION FOR ASCO REBUILD KITS

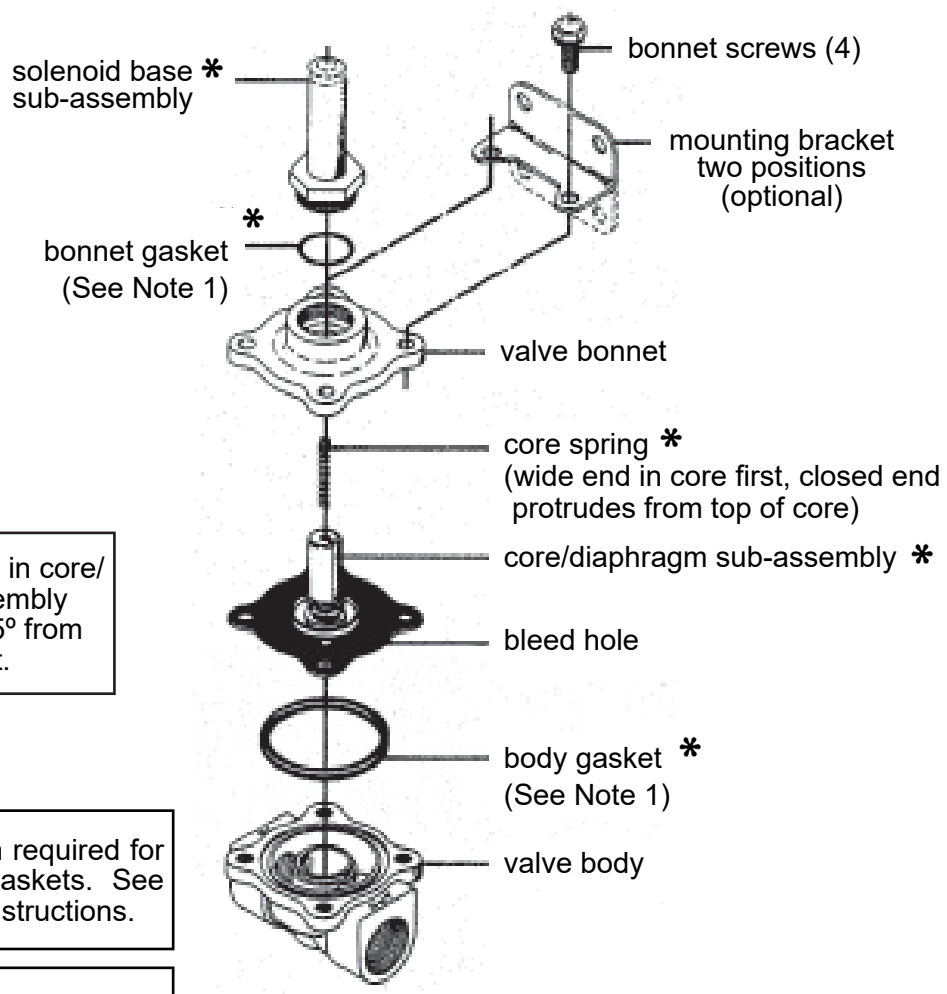
Parts marked with an asterisk(*) in the exploded view are supplied in Rebuild Kits. When Ordering Rebuild Kits for ASCO Valves, order the Rebuild Kit number stamped on the valve nameplate. If the number of the kit is not visible, order by indicating the number of kits required, and the Catalog Number and Serial Number of the valve(s) for which they are intended.



* Indicates parts supplied in ASCO Rebuild Kit

Torque solenoid base sub-assembly to 175±25 inch pounds.

Torque bonnet screws (4) in a crisscross manner to 110±10 inch pounds.



Locate bleed hole in core/diaphragm assembly approximately 45° from valve outlet.

Note 1: Lubrication required for body and bonnet gaskets. See valve reassembly instructions.

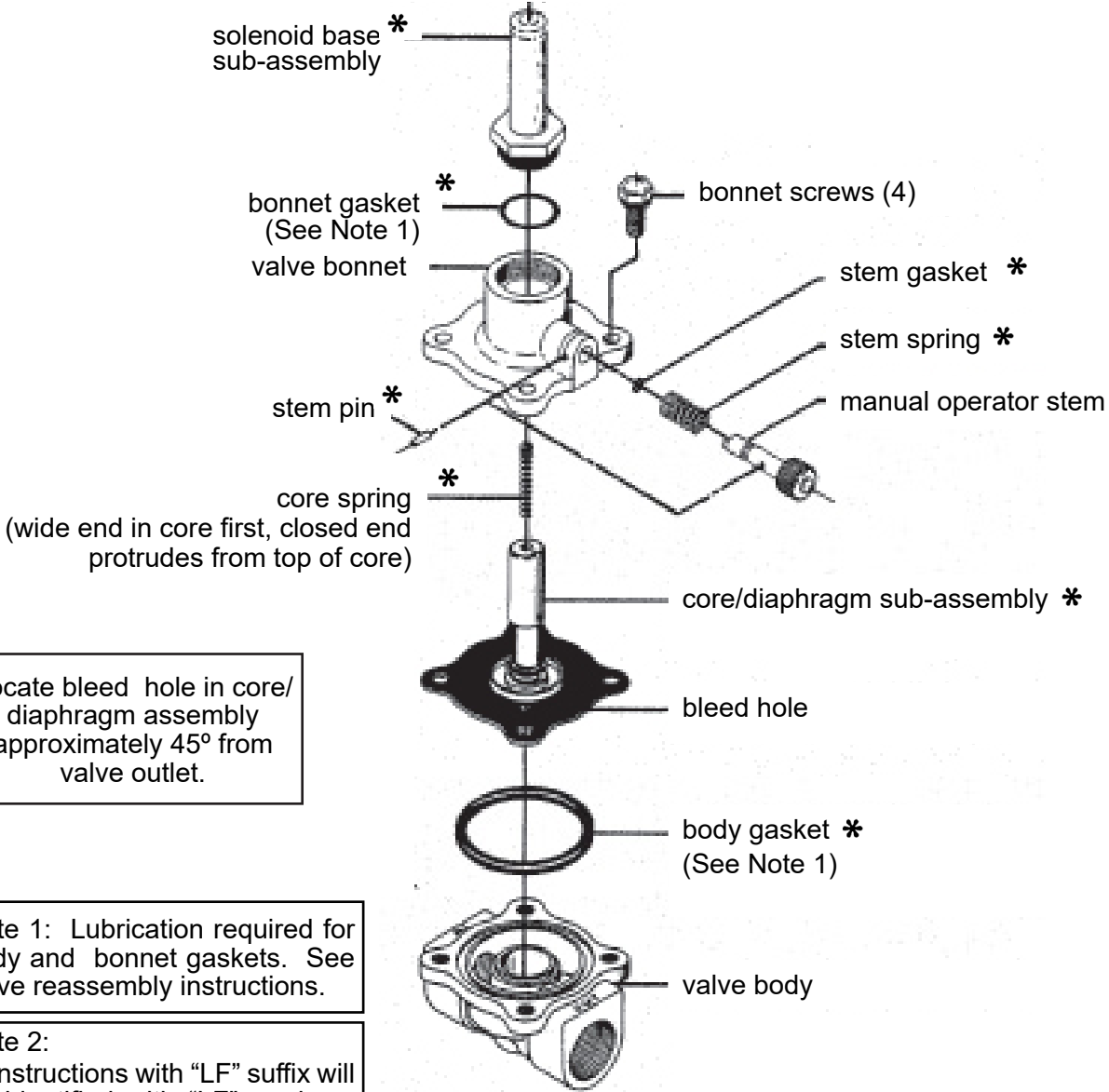
Note 2: Constructions with "LF" suffix will be identified with "LF" mark on body and bonnet.

Figure 2. Series 8210 - 3/8", 1/2" & 3/4" NPT - AC Construction

* Indicates parts supplied in ASCO Rebuild Kit

Torque solenoid base sub-assembly to 175±25 inch pounds.

Torque bonnet screws (4) in a crisscross manner to 110±10 inch pounds.



Locate bleed hole in core/diaphragm assembly approximately 45° from valve outlet.

Note 1: Lubrication required for body and bonnet gaskets. See valve reassembly instructions.

Note 2: Constructions with "LF" suffix will be identified with "LF" mark on body and bonnet.

Figure 3. Series 8210 - Manual Operator