

# pressure reducing and solenoid shutoff valve

## installation, operating, and maintenance instructions

### model 127-80

#### GENERAL DESCRIPTION

The OCV Model 127-80 Pressure-Reducing/Solenoid Valve is designed to perform the following functions:

1. Reduce a higher upstream pressure into a lower, constant downstream pressure.
2. Open or close in response to an electrical signal.

The 127-80 consists of the following components:

1. **Model 65 Basic Control Valve**, a hydraulically-operated, diaphragm-actuated globe or angle valve which closes with an elastomer-on-metal seal.
2. **Model 1340 Pressure-Reducing Pilot**, a two-way, normally-open pilot valve which senses downstream pressure under its diaphragm and balances it against an adjustable spring load. An increase in downstream pressure tends to make the pilot close.
3. **Model 451 Solenoid Pilot**, a two-way, normally-closed, electrically-operated valve. Applying power to the solenoid coil causes this valve to open.
4. **Model 126 Ejector**, a simple "tee" fitting with a fixed orifice in its upstream port. It provides the proper pressure to the diaphragm chamber of the main valve, depending on the position of the pressure-reducing pilot.
5. **Model 141-3 Flow Control Valve**, a needle-type valve which provides adjustable, restricted flow in one direction and free flow in the opposite direction. On the 127-80, the flow control valve is connected as an opening speed control.
6. **Model 159 Y-Strainer** (standard on water service valves) or **Model 123 Inline Strainer** (standard on fuel service valves). The strainer protects the pilot system from solid contaminants in the line fluid.

7. Two **Model 141-4 Ball Valves** (standard on water service valves, optional on fuel service valves), useful for isolating the pilot system for maintenance or troubleshooting.

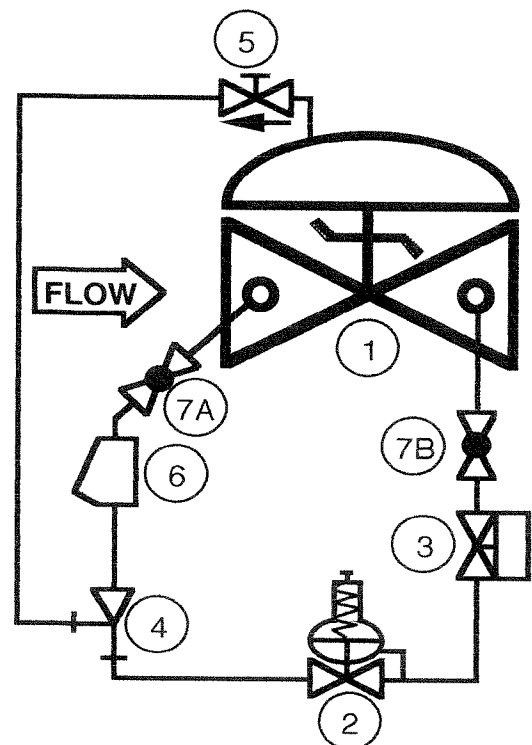
At user option, the 127-80 may also be equipped with the following:

1. Model 155 Visual Indicator.
2. Model 150 Limit Switch Assembly (includes visual indicator).
3. Model 141-3 Closing Speed Control.

#### THEORY OF OPERATION (Refer to schematic diagram)

##### A. PRESSURE-REDUCING ACTION:

To understand how the 127-80 operates, it is best to



start with the EJECTOR. Due to the orifice in its upstream port, the ejector creates a pressure drop proportional to the flow through it. The flow through the ejector is in turn controlled by the degree of opening of the PRESSURE REDUCING PILOT. The wider the pilot opens, the greater the flow through the ejector and the lower the pressure downstream of the orifice. Conversely, the more the pilot closes, the lower the flow through the ejector and the greater the pressure downstream of the orifice.

Now note that the diaphragm chamber of the MAIN VALVE is connected to the branch port of the ejector and is thus downstream of the orifice. In this manner, the pressure in the diaphragm chamber of the main valve is in fact controlled by the pressure-reducing pilot. As the diaphragm pressure decreases, the main valve opens; as the diaphragm pressure increases, the main valve closes.

Putting it all together, as downstream pressure tends to increase above the set point of the pressure-reducing pilot, the pilot moves further closed. This results in an increase in pressure in the diaphragm chamber of the main valve. The main valve then closes slightly to restore the downstream pressure to the set point. Conversely, as downstream pressure tends to decrease below the set point, the pilot moves further open. This results in a decrease in pressure in the diaphragm chamber of the main valve. The main valve then opens wider to bring the downstream pressure back up to the set point. The net result of all this is a constant modulating action by the pilot and main valve and a downstream pressure which remains constant despite fluctuations in demand or inlet pressure.

#### B. ELECTRICAL ON-OFF ACTION:

When the coil of the solenoid pilot is de-energized, the pilot is closed. This completely blocks the pilot system and allows full inlet pressure to build up in the diaphragm chamber of the main valve. Thus, the main valve remains tightly closed. However, if the coil is energized, the pilot opens fully, which allows the main valve to open and come under control of the reducing pilot as described above.

#### INSTALLATION

The 127-80 is furnished fully factory-assembled and ready for installation at the appropriate point in the system. The user is referred to the Basic Valve section of this manual for full installation details.

Once the main valve is installed, the solenoid pilot is wired into the control system. This is a simple two-wire hookup.

#### STARTUP AND ADJUSTMENT

The following procedures should be followed in the order presented in order to effect an initial startup of the 127-80:

1. Install pressure gauges of the proper range upstream and downstream of the 127-80.
2. Remove the plastic cap from the pressure-reducing pilot, and loosen the adjusting screw jam nut. Turn the adjusting screw **counterclockwise** until it is loose enough to be turned by hand.
3. Turn the adjusting screw of the flow control valve fully **clockwise**, then back it off **three full turns**.
4. Start the pump, or otherwise start the system flowing. The main valve will at this time be either fully closed or open only a very small amount.
5. Energize the solenoid pilot. The main valve should remain closed or else open only a very small amount.
6. Carefully loosen one of the pipe plugs in the main valve bonnet until fluid appears around the threads. When only clear fluid (no air) is discharging, retighten the plug.
7. Check downstream pressure. It should be lower than desired at this point. If it is already too high, there is too much restriction downstream. Open further valves or otherwise increase demand until the pressure falls below the desired set point.
8. Slowly turn the adjusting screw of the pressure-reducing pilot **clockwise** until downstream pressure rises to the desired set point. Tighten the adjusting screw jam nut and replace the plastic cap.
9. If there are small-scale oscillations in the downstream pressure, slowly turn the adjusting screw of the flow control valve **clockwise** until the oscillations disappear. **CAUTION:** Never close this valve fully. To do so will prevent the main valve from opening.
10. De-energize the solenoid pilot and observe that the valve closes.
11. If pressure readjustment should ever be required, the pressure-reducing pilot is adjusted **clockwise** to **increase** pressure; **counterclockwise** to **decrease** pressure.

## MAINTENANCE

Due to the simplicity of design of the 127-80, required maintenance is minimal. However, the following checks, periodically performed, will do much to keep the valve operating properly and efficiently.

1. Check for chipped or peeling paint.
2. Check for leaks at fittings and around flanges and connections. Tighten as required.
3. Check for frayed or loose electrical connections.
4. If the valve is equipped with a Y-strainer, check the screen for buildup of solid material. Clean as required. This point is most important, as a clogged strainer can keep the valve from operating properly. On new installations, it is recommended that the strainer be checked every day or two until experience dictates a greater or lesser interval.

## TROUBLESHOOTING

In the event of malfunction of the 127-80, the following guide should enable the technician to isolate the specific cause of the problem.

### A. MAIN VALVE FAILS TO OPEN:

1. Valve closed downstream of 127-80. Open as required.
2. Downstream pilot system ball valve closed. Open as required.
3. Solenoid not energized. Check electrical system.
4. Flow control valve fully closed. See Adjustment instructions.
5. Pressure-reducing pilot adjusted too far counterclockwise. See Adjustment instructions.
6. Solenoid pilot stuck closed or coil burned out. See Solenoid Valve section of this manual.
7. Stem of pressure-reducing pilot binding. See 1340 section of this manual.
8. Stem of main valve binding. See Basic Valve section of this manual.

### B. MAIN VALVE FAILS TO CLOSE:

1. Upstream pilot system ball valve closed. Open as required.
2. Solenoid not de-energized. Check electrical system.
3. Strainer clogged. Clean as required.
4. Pressure-reducing pilot adjusted too far clockwise. See Adjustment instructions.
5. Diaphragm of pressure-reducing pilot ruptured.

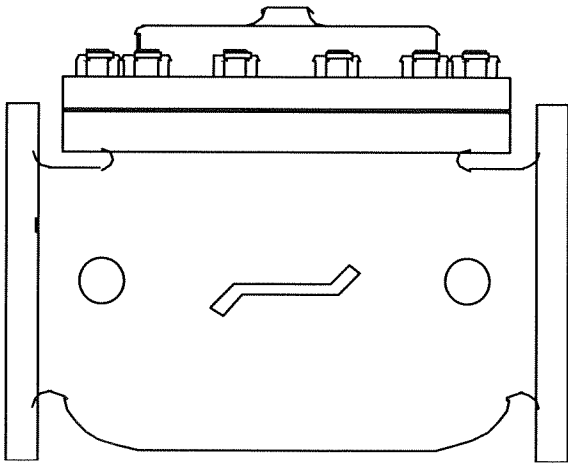
This will be evidenced by a discharge of fluid from the vent port in the pilot bonnet. Disassemble pilot and replace diaphragm.

6. Close downstream pilot system ball valve.
  - a. If main valve closes, proceed to Step 9.
  - b. If main valve remains open, proceed to Step 9.
7. Pressure-reducing pilot stem binding or seat badly deteriorated. Disassemble pilot and determine cause. See 1340 section of this manual.
8. Solenoid pilot stuck open. See Solenoid Valve section of this manual.
9. Close both pilot system ball valves, and loosen a pipe plug in the main valve bonnet. A continuous discharge of fluid from the loosened plug indicates that the main valve diaphragm is ruptured. See Basic Valve section of this manual. SEE NOTE BELOW.
10. Main valve stem binding or object in valve. Disassemble valve and determine cause. See Basic Valve section of this manual.

**NOTE:** Certain valves, predominantly those in fuel service, are assembled "fail closed." In this case, a ruptured diaphragm would keep the valve from opening, rather than keep it from closing. To determine which type you have, examine the bridge mark cast into the side of the main valve body. If the bridge mark slants downward on the upstream end, the valve is "fail closed." If the bridge mark slants upward on the upstream end, the valve is "fail open."

### C. MAIN VALVE OPEN AND CLOSSES, BUT DOES NOT CONTROL DOWNSTREAM PRESSURE:

1. If pressure remains **too high** despite adjustment of the pressure-reducing pilot, refer to MAIN VALVE FAILS TO CLOSE, above.
2. If pressure remains **too low** despite adjustment of the pressure-reducing pilot, refer to MAIN VALVE FAILS TO OPEN, above.
3. If pressure oscillates, you may likely be in a period of very low demand. Frequently this problem will disappear as demand increases. In the meantime, further closing of the flow control valve may help damp out the oscillations. In an extreme case, try adjusting the pressure slightly higher.



# installation, operating, and maintenance instructions

## series 65 basic control valve

### GENERAL DESCRIPTION

The OCV Series 65 is a hydraulically-operated, diaphragm-actuated valve. It is available in either a globe (Model 65) or angle (Model 65A) configuration. The diaphragm is nylon-fabric bonded with synthetic rubber and forms a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure. An elastomeric seat disc forms a tight seal with the valve seat when pressure is applied above the diaphragm.

### FUNCTIONAL DESCRIPTION

Because the Series 65 is a hydraulically operated valve, it requires a minimum line pressure of approximately 5 psig in order to function. The valve functions on a simple principle of pressure differential. The line pressure at the inlet of the valve is bypassed through the pilot control piping to the diaphragm chamber of the valve. This pressure, together with the valve spring, works against the pressure under the valve seat. Because the effective area of the diaphragm is greater than that of the seat, the valve is held tightly closed. As the controlling pilot(s) allow the pressure to bleed off the diaphragm chamber, the two opposing pressures begin to balance and the valve will begin to open. The valve can be used to perform a simple on-off function, or with the proper pilot system, a modulating, or regulating function.

In cases where the line fluid is unusually dirty, or is otherwise unsuitable for operating the valve, an independent operating pressure source may be employed. The pressure available from such a source must be equal to, or greater than, line pressure.

### INSTALLATION

In order to insure safe, accurate and efficient operation of the OCV control valve, the following list of checkpoints and procedures should be followed when installing the

valve.

1. Make a careful visual inspection of the valve to insure that there has been no damage to the external piping, fittings or controls. Check that all fittings are tight.
2. Thoroughly flush all interconnecting piping of chips, scale and foreign matter prior to mounting the valve.
3. Install the valve in the line according to the flow arrow on the inlet flange. The arrow should point downstream.
4. Allow sufficient room around the valve for ease of adjustment and maintenance service.

In addition, it is highly recommended that:

1. Isolation valves (eg., gate or butterfly) be installed on the inlet and discharge sides of the valve to facilitate isolating the valve for maintenance.
2. Pressure gauges be installed at the inlet and outlet sides of the valve to provide monitoring of the valve during initial start-up and during operation. The body side ports, if unused by the pilot system, provide a convenient connection for the gauges.
3. All valves larger than 6" be installed horizontally, i.e., with the bonnet pointed up, for ease of adjustment and maintenance servicing.

### MAINTENANCE

The OCV control valve requires no lubrication and a minimum of maintenance. However, a periodic inspection should be established to determine how the fluid being handled is affecting the efficiency of the valve. In a water system, for example, the fluid velocity as well as the substances occurring in natural waters, such as dissolved minerals and suspended particles, vary in every installation. The effect of these actions or substances must be determined by inspection. It is recommended that an annual inspection, which includes ex-

amination of the valve interior, be conducted. Particular attention should be paid to the elastomeric parts, i.e., the diaphragm and seat disc. Any obviously worn parts should be replaced.

### REPAIR PROCEDURES

In the event of malfunction of the OCV control valve, troubleshooting should be conducted according to the procedures outlined for the specific model of valve. Then, if those steps indicate a problem with the main valve, this section will outline the procedures necessary to correct the problem.

Problems with the main valve can be classed in three basic categories:

1. VALVE FAILS TO OPEN
  - a. Diaphragm damaged\* - See Procedure A
  - b. Stem binding - See Procedure B
2. VALVE FAILS TO CLOSE
  - a. Diaphragm damaged\* - See Procedure A
  - b. Stem binding - See Procedure B
  - c. Object lodged in valve - See Procedure B
3. VALVE OPENS AND CLOSES BUT LEAKS WHEN CLOSED
  - a. Seat disc damaged - See Procedure C
  - b. Seat ring damaged - See Procedure D

\*A diaphragm failure can prevent the valve from either opening or closing, depending on the flow direction. Most water service valves flow "under the seat", in which case a diaphragm failure will keep the valve from closing. On the other hand, most fuel service valves flow "over the seat", in which case a diaphragm failure will keep the valve from opening. To determine which you have, examine the bridge mark cast into the side of the valve body, then compare it with the figures below.

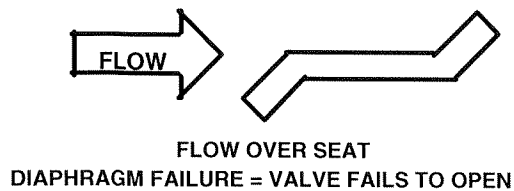
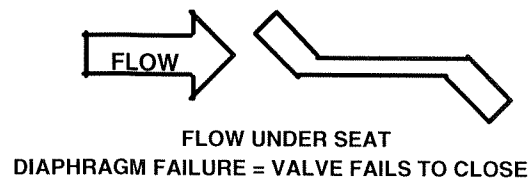
#### PROCEDURE A : DIAPHRAGM REPLACEMENT

1. Isolate the valve from the system by closing upstream and downstream block valves.
2. Loosen one of the tubing connections on the bonnet. Allow any residual pressure to bleed off.
3. Remove all tubing connected at the bonnet.
4. Remove the bonnet nuts.
5. Remove the bonnet. If the bonnet sticks in place, it may be loosened by rapping sharply around its edge with a rubber-headed mallet. *NOTE: 8" and larger valves are equipped with eye bolts through which a chain can be fastened to aid in*

- lifting the bonnet.*
6. Remove the spring.
7. Remove the diaphragm plate capscrews and the diaphragm plate.
8. Remove the old diaphragm.
9. Making sure the dowel pin holes are in the proper location, place the new diaphragm over the studs and press down until it is flat against the body and spool.
10. Replace the diaphragm plate and the diaphragm plate capscrews.
11. Tighten all diaphragm plate capscrews snugly.
12. Replace the spring.
13. Replace the bonnet and reinstall the bonnet nuts.
14. Tighten the bonnet nuts snugly using a criss-cross tightening pattern.
15. Reinstall the control tubing.
16. Reopen the upstream and downstream block valves.
17. Before placing the valve back in service, perform the air bleed procedure described in the first section of this manual.

#### PROCEDURE B: CORRECTION OF BINDING STEM

1. Perform Steps 1 thru 6 of Procedure A, above.
2. Remove the spool assembly from the valve. *NOTE:*



*On smaller valves, this can be accomplished simply by grasping the stem and pulling upward. Valves 6" and larger have the top of the stem threaded to accept an eyebolt to aid in lifting the spool out of the body. 6" thru 12" valves are threaded 3/8-16. 14" and 16" valves are threaded 5/8-11.*

3. Carefully examine both ends of the stem for deep scratches, scoring or buildup of mineral deposits.

- Polish the stem if necessary using a fine grade of emery cloth.
- 4. Similarly, examine and polish the upper bushing (in the bonnet) and the lower guide (in the seat ring).
- 5. Reinstall the spool assembly.
- 6. Reassemble the valve, following Steps 12 thru 17 in Procedure A.

**PROCEDURE C: SEAT DISC REPLACEMENT**

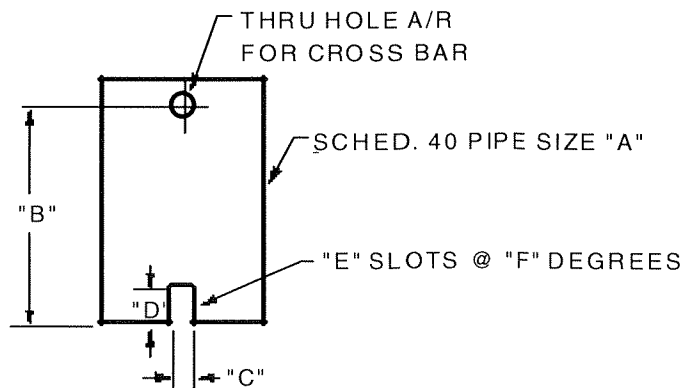
- 1. Perform Steps 1 and 2 of Procedure B, above.
  - 2. With the spool assembly removed from the body, remove the seat retainer screws.
  - 3. Slide the seat retainer off the lower end of the stem.
  - 4. Remove the seat disc from its groove in the spool.
- NOTE: The seat disc may fit quite tightly in the groove. If necessary, it may be pried out using a thin-bladed screwdriver or similar tool.*
- 5. Install the new seat disc in the groove.
  - 6. Reinstall the seat retainer and tighten the seat retainer screws.
  - 7. Reassemble the valve, following Steps 5 and 6 of Procedure B.

**PROCEDURE D: SEAT RING REPLACEMENT**

*NOTE: It is rare for a seat ring to require replacement. Minor nicks and scratches in the seating surface can usually be smoothed out with emery cloth.*

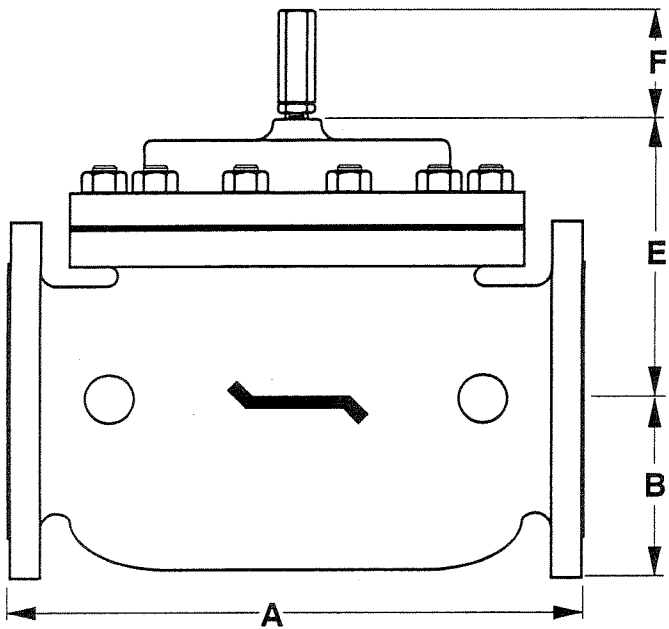
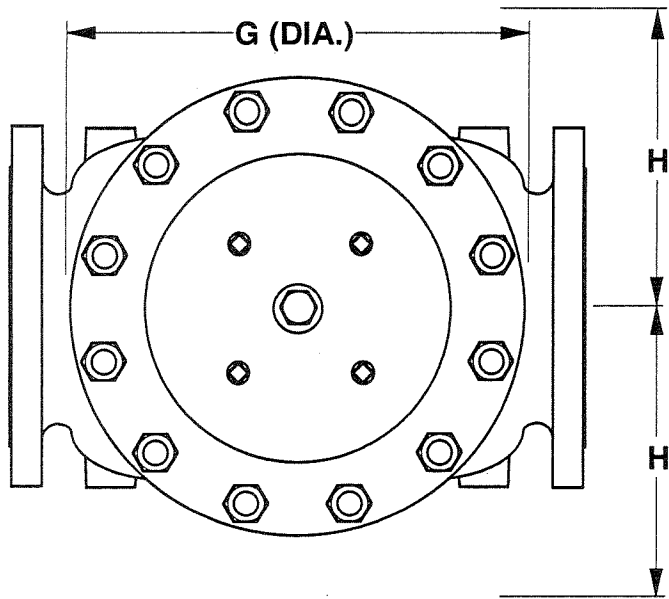
- 1. Perform Steps 1 and 2 of Procedure B, above.
- 2. If you are working on a 4" or smaller valve, follow Steps 3 thru 9, below.
- 3. If you are working on a 6" or larger valve, follow Steps 10 thru 16, below.

- 4. Seat rings in valves 4" and smaller are threaded into the valve body. To remove, you will need a special seat ring tool. You may fabricate one using standard pipe as shown in the sketch below, or one may be purchased from OCV.
- 5. Using the seat ring tool, unthread the seat ring from the body.
- 6. Remove the old o-ring from the counterbore in the body.
- 7. Install the new o-ring in the counterbore.
- 8. Using the seat ring tool, install the new seat ring.
- 9. Reassemble the valve, following Steps 5 & 6 of Procedure B.
- 10. Seat rings in valves 6" and larger are bolted into the body with socket head capscrews. In addition you will note that the seat ring is equipped with additional threaded holes that may be used for "jacking" the seat ring out of the body.
- 11. Remove the socket head capscrews.
- 12. Remove the old seat ring from the body by temporarily installing two or more of the capscrews in the "jacking" holes.
- 13. Install a new o-ring in the groove of the new seat ring. Lubricate the o-ring and outer seat ring wall with Vaseline® or similar lubricant.
- 14. Install the new seat ring in the body, making sure that the capscrew holes line up.
- 15. Replace and tighten all the capscrews.
- 16. Reassemble the valve, following Steps 5 and 6 of Procedure B.

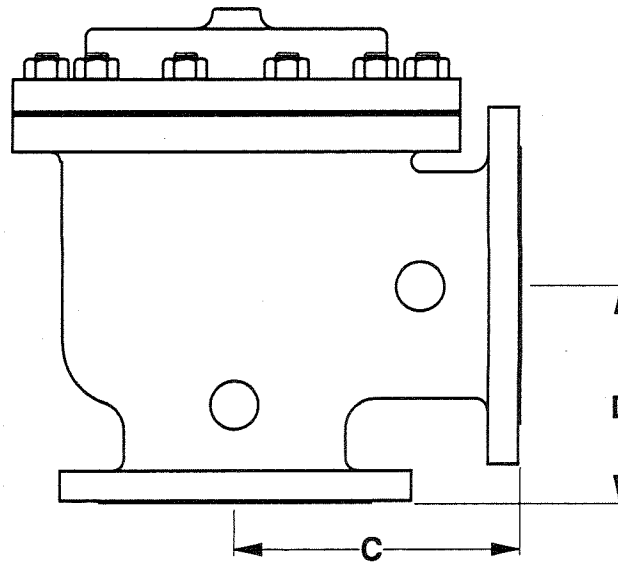


VALVE SIZE	"A" PIPE SIZE	"B" MIN. LENGTH	"C" SLOT WIDTH	"D" SLOT DEPTH	"E" NO. OF SLOTS	"F" SLOT SPACING
1-1/4"	3/4"	6"	3/8"	3/8"	2	180°
1-1/2"	3/4"	6"	3/8"	3/8"	2	180°
2"	1-1/2"	7"	3/8"	3/8"	2	180°
2-1/2"	2"	8"	1/2"	1/2"	3	120°
3"	2-1/2"	9"	5/8"	5/8"	2	180°
4"	3"	10"	5/8"	5/8"	2	180°

REVISED 3-17-97




DIM	ANSI CLASS	VALVE SIZE												
		1 1/4	1 1/2	2	2 1/2	3	4	6	8	10	12	14	16	24
A	SE	8.75	8.75	9.88	10.50	13.00	-	-	-	-	-	-	-	-
	150	8.50	8.50	9.38	10.50	12.00	15.00	17.75	25.38	29.75	34.00	39.00	40.38	62.00
	300	8.75	8.75	9.88	11.12	12.75	15.62	18.62	26.38	31.12	35.50	40.50	42.00	63.75
B	SE	1.44	1.44	1.69	1.88	2.25	-	-	-	-	-	-	-	-
	150	2.31	2.50	3.00	3.50	3.75	4.50	5.50	6.75	8.00	9.50	10.62	11.75	16.00
	300	2.62	3.06	3.25	3.75	4.12	5.00	6.25	7.50	8.75	10.25	11.50	12.75	18.00
C	SE	4.38	4.38	4.75	6.00	6.50	-	-	-	-	-	-	-	-
	150	4.25	4.25	4.75	6.00	6.00	7.50	10.00	12.69	14.88	17.00	-	20.81	-
	300	4 3/8	4.38	5.00	6.38	6.38	7.81	10.50	13.19	15.56	17.75	-	21.62	-
D	SE	3.12	3.12	3.88	4.00	4.50	-	-	-	-	-	-	-	-
	150	3.00	3.00	3.88	4.00	4.00	5.50	6.00	8.00	11.38	11.00	-	15.69	-
	300	3.25	3.25	4.12	4.38	4.38	5.81	6.50	8.50	12.06	11.75	-	16.50	-
E	ALL	6.00	6.00	6.00	7.00	6.50	7.92	10.00	11.88	15.38	17.00	18.00	19.00	27.00
F	ALL	3.88	3.88	3.88	3.88	3.88	3.88	3.88	6.38	6.38	6.38	6.38	6.38	8.00
G	ALL	6.00	6.00	6.75	7.69	8.75	11.75	14.00	21.00	24.50	28.00	31.25	34.50	52.00
H	ALL	10.00	10.00	11.00	11.00	11.00	12.00	13.00	14.00	17.00	18.00	20.00	20.00	28.50

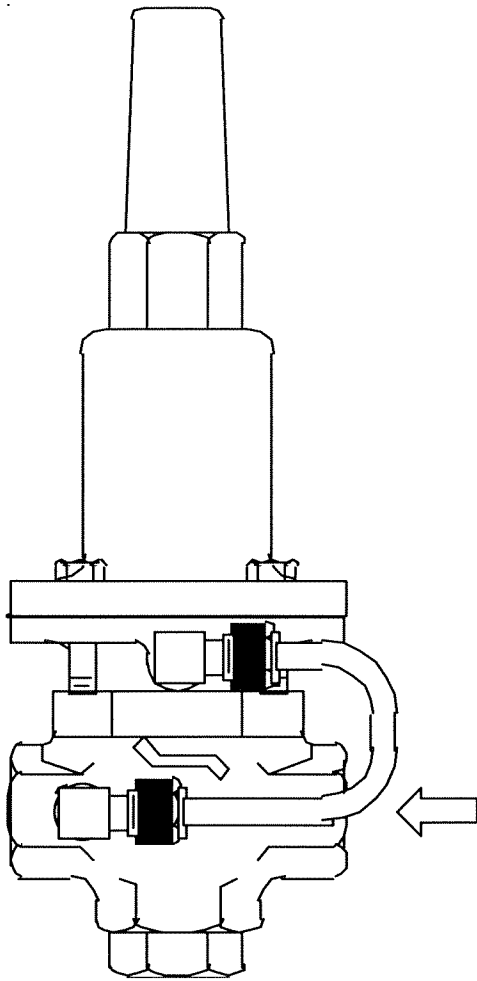


NOTE: 3" VALVE DIMENSIONS ARE FOR NEW MODEL 3100

4" VALVE DIMENSIONS ARE FOR NEW MODEL 4400

REV. A SDJ 6-6-02  
REV. B SDJ 2-3-03

<b>TOLERANCES</b>		 <b>OCV Control Valves</b> TULSA, OKLAHOMA U.S.A.		
UNLESS NOTED FRACTIONAL $\pm 1/64$ DECIMAL $\pm .005$ MACH. FINISH 125/ $\sqrt{\quad}$ ANGULAR $\pm 1/2^\circ$				
<b>GENERAL VALVE DIMENSIONS</b>				
DRAWN BY SDJ	DATE 10-6-97	SIZE	DRAWING NUMBER	REV.
CHKD. BY	DATE	<b>A</b>	<b>65D</b>	<b>B</b>



## installation, operating, and maintenance instructions

### pressure reducing pilot

# model 1340

#### GENERAL DESCRIPTION

The Model 1340 Pressure Reducing Pilot is a normally-open, direct-acting, spring-loaded, diaphragm-type control pilot. As the primary control pilot for the OCV Series 127 control valves, it is designed to maintain a constant preset discharge pressure from the main valve. It is a constant throttling device, maintaining precise, positive control of the main valve.

The 1340 may also be used by itself as a downstream pressure regulator.

The 1340 is available in bronze or stainless steel construction and with 3/8 NPT or 1/2 NPT end connections.

The 1340 is available with four different adjustment ranges:

5-30 psi	65-180 psi
20-80 psi	100-300 psi

#### FUNCTIONAL DESCRIPTION

The 1340 controls the pressure in the diaphragm chamber of the main valve, hence the degree of opening or closing of the valve. The downstream pressure is sensed under the diaphragm of the pilot and is balanced against

an adjustable spring load. As the downstream pressure decreases below the set point, the pilot opens wider, decreasing the pressure in the diaphragm chamber of the main valve, opening the valve a proportionate amount. Conversely, as downstream pressure increases above the set point, the pilot closes further, increasing the pressure in the diaphragm chamber of the main valve, closing the valve a proportionate amount. The net result is a constant modulating action of the pilot and main valve, keeping the downstream pressure at the set point within very close limits.

#### INSTALLATION AND ADJUSTMENT

The 1340 is normally installed in the main valve control piping between the ejector and the downstream body tap. Flow must be in the direction indicated. In most cases, a sense line is factory installed between the diaphragm sense port and the downstream pilot body side port, as shown in the drawing. The pilot can also be remote sensed by running a line (typically 1/4" O.D. tubing) from the 1/8 NPT connection under the pilot diaphragm to the desired downstream point where the pressure control is desired.



Pressure adjustment is made by means of the single adjusting screw:

**Clockwise** adjustment **increases** downstream pressure.

**Counterclockwise** adjustment **decreases** downstream pressure.

## MAINTENANCE

Required maintenance of the 1340 is minimal. Fittings and bolts should be periodically checked, and the body should be inspected for damage or excessive buildup of foreign material.

## TROUBLESHOOTING

Other than improper adjustment, there are basically only three malfunctions which can occur with the 1340 pilot. These, and the symptoms they can cause, are as follows:

1. **PILOT DIAPHRAGM RUPTURED:** Results in failure of the main valve to close and/or downstream pressure that is too high. A ruptured pilot diaphragm will be evidenced by leakage through the vent hole in the pilot bonnet.
2. **PILOT SEAT DISC DETERIORATED:** Results in a downstream pressure that drifts too high under dead-end (zero flow) conditions.
3. **PILOT STEM BINDING:** Typically results in poor pressure control, though in extreme cases, it can result in failure of the main valve to open or close.

## REPAIR PROCEDURES

Refer to the 1340 assembly drawing for parts identification.

### A. DIAPHRAGM REPLACEMENT

1. Prior to disassembling the pilot, turn the adjusting screw (10) fully counterclockwise until it is loose enough to be turned with the fingers.
2. Remove the four bonnet capscrews (17).
3. Remove the bonnet (2). Set the spring (9) and spring retainers (11) aside in a safe place.
4. Remove the plug (4) from the bottom of the pilot.
5. Using a 7/16" socket as a backup on capscrew (12), remove hex nut (16), lockwasher (22), upper diaphragm plate (8) and o'ring (20).
6. Remove old diaphragm (5).

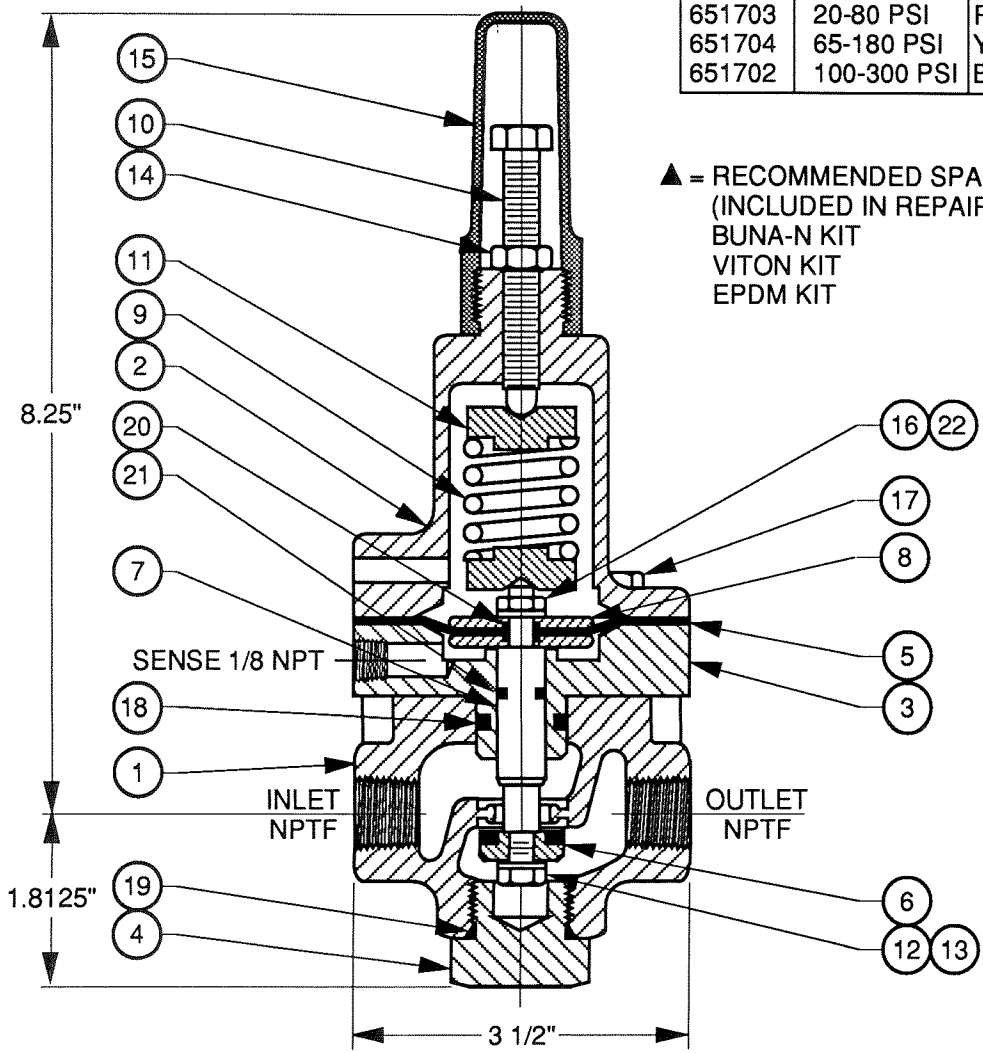
7. Inspect both diaphragm plate o'rings (20). Replace if necessary.
8. Place new diaphragm on stem (7).
9. Replace upper diaphragm plate (8), o'ring (20), lockwasher (22) and hex nut (16). Tighten securely.
10. Reinstall plug (4).
11. Hold spring (9) and spring retainers (11) together in the proper orientation, and insert them into the bonnet (2).
12. Place the bonnet over the adapter, and insert the bonnet capscrews (17). Tighten securely.
13. Place valve back in service, following the startup and adjustment procedures given in the main portion of this manual.

### B. SEAT DISC REPLACEMENT

1. Follow Steps 1 through 4 under DIAPHRAGM REPLACEMENT, above.
2. Using a 7/16" socket as a backup on capscrew (12), remove hex nut (16), lockwasher (22), diaphragm plates (8) and o'rings (20).
3. Remove stem (7) and seat disc (12) through bottom of pilot.
4. Remove capscrew (12), seal washer (13) and old seat disc (6).
5. Place new seat disc, new seal washer and capscrew (12) on stem. Tighten securely.
6. Reinsert stem through bottom of pilot.
7. Reinstall diaphragm plates (8), o'rings (20), diaphragm (5), lockwasher (22) and hex nut (16). Tighten securely.
8. Reassemble pilot following Steps 10 through 13 under DIAPHRAGM REPLACEMENT, above.

### C. STEM REPAIR

1. Follow Steps 1 through 3 under SEAT DISC REPLACEMENT, above.
2. Inspect stem and o'ring (21) carefully.
3. Remove any foreign material or light scratches from the stem with a fine grade of emery cloth. A badly scored stem should be replaced.
4. Replace o'ring (21).
5. Lubricate the o'ring and stem liberally with Vaseline® or similar lubricant.
6. Reassemble pilot following Steps 6 through 8 under SEAT DISC REPLACEMENT, above.



SPRING CHART		
651701	5-30 PSI	GREEN
651703	20-80 PSI	RED
651704	65-180 PSI	YELLOW
651702	100-300 PSI	BLUE


▲ = RECOMMENDED SPARE PARTS  
(INCLUDED IN REPAIR KITS)

BUNA-N KIT PN 930000  
VITON KIT PN 930100  
EPDM KIT PN 930400

ITEM	PART NO	QTY	DESCRIPTION	MATERIAL
1	302102	1	BODY	3/8" NPTF
	302104			1/2" NPTF
	302702			3/8" NPTF
	302704			1/2" NPTF
2	304102	1	BONNET	BRONZE
	304702			STN STEEL
3	300129	1	ADAPTOR	BRONZE
	300719			STN STEEL
4	692502	1	PLUG	ZINC PLTD STL
	310730			STN STEEL
5	694002	1	DIAPHRAGM	BUNA-N / NYLON
	694102			VITON / NYLON
	694016			EPDM / NYLON
6	310703	1	SEAT DISC	BUNA-N / SS
	310709			VITON / SS
	310707			EPDM / SS
7	314704	1	STEM	STN STEEL
	314004			MONEL
8	308102	2	DIAPHRAGM PLATE	BRASS
	308702			STN STEEL
9	CHART	1	SPRING	STN STEEL
10	300700	1	ADJUSTING SCREW	STN STEEL
11	300134	2	SPRING RETAINER	BRASS
	300729			STN STEEL
12	531700	1	HEX HEAD CAPSCREW	STN STEEL
13	685760	1	LOCKWASHER	STN STEEL
14	590717	1	HEX NUT	STN STEEL
15	692002	1	CAP	PVC
16	590712	1	HEX NUT	STN STEEL
17	531701	4	HEX HEAD CAPSCREW	STN STEEL
18	611116	1	O-RING	VITON
	614116			EPDM
19	610912	1	O-RING	BUNA-N
	611912			VITON
	914912			EPDM
20	611010	2	O-RING	VITON
	614010			EPDM
21	611012	1	O-RING	VITON
	614012			EPDM
22	685700	1	LOCKWASHER	STN STEEL

CHG	E.C. NO.	DATE	BY	REVISIONS

MATERIAL	TOLERANCES
NOTED	UNLESS NOTED FRACTIONAL ±1/64 DECIMAL ±.005 MACH. FINISH 125/ ANGULAR ±1/2°
NO. REQ'D	DRAWN BY RON
	DATE 2-15-96
SCALE 1/2	CHKD. BY 
	DATE 


**Control Valves** TULSA, OKLAHOMA U.S.A.

**MODEL 1340 PILOT 3/8"-1/2" NPTF  
PRESSURE REDUCING**

<b>SIZE</b>	<b>DRAWING NUMBER</b>	<b>REV.</b>
<b>A</b>	<b>1340</b>	

# INSTALLATION AND MAINTENANCE INSTRUCTIONS

2-WAY INTERNAL PILOT OPERATED SOLENOID VALVES  
DIAPHRAGM TYPE - 3/8, 1/2 AND 3/4 N.P.T.  
NORMALLY CLOSED OPERATION

BULLETINS

8210  
8211

ASCO

Form No. V-5848

## DESCRIPTION

Bulletin 8210's are 2-way, normally closed internal pilot operated solenoid valves. Valve bodies and bonnets are of brass construction. Standard valves have a General Purpose, NEMA Type 1 Solenoid Enclosure.

Bulletin 8211's are the same as Bulletin 8210's except the solenoids are equipped with an enclosure which is designed to meet NEMA Type 4, Watertight, NEMA Type 7 (C or D) Hazardous Locations - Class I, Group C or D and NEMA Type 9 (E, F or G) Hazardous Locations - Class II, Groups E, F or G. The Explosion-Proof/Watertight Solenoid Enclosures are shown on separate sheets of Installation and Maintenance Instructions, Form Numbers V-5380 and V-5391.

## OPERATION

Normally Closed: Valve is closed when solenoid is de-energized and opens when solenoid is energized.

### MANUAL OPERATOR (Optional)

Valves with Suffix 'MO' in the 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 clockwise 180°. Disengage manual operator by rotating knurled cap counterclockwise 180° before operating electrically.

### MANUAL OPERATOR LOCATION (Refer to Figures 1 and 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: Depressurize valve and turn off electrical power supply.**

1. 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.
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. Replace solenoid enclosure and retaining clip or cap.

## INSTALLATION

Check nameplate for correct catalog number, pressure, voltage and service.

### TEMPERATURE LIMITATIONS

For maximum valve ambient and fluid temperatures, refer to chart. 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	COIL CLASS	CATALOG NUMBER PREFIX	MAX. AMBIENT TEMP. °F	MAX. FLUID TEMP. °F
A-C Construction (Alternating Current)	A	None or DA	77	180
	F	DF or FT	122	180
	H	HT	140	180
D-C Construction (Direct Current)	A, F or H	None, FT or HT	77	150

## POSITIONING/MOUNTING

This valve is designed to perform properly when mounted in any position. **However**, for optimum life and performance, the solenoid should be mounted vertical and upright so as to reduce the possibility of foreign matter accumulating in the core tube area. For mounting bracket (optional feature) dimensions, refer to Figure 2.

## PIPING

Connect piping to valve according to markings on valve body. Apply pipe compound sparingly to male pipe threads only; if applied to valve threads, it may enter the valve and cause operational difficulty. Pipe strain should be avoided by proper support and alignment of piping. When tightening the pipe, do not use valve as a lever. Wrenches applied to valve body or piping are to be located as close as possible to connection point.

**IMPORTANT:** For the protection of the solenoid valve, install a strainer or filter suitable for the service involved in the inlet side as close to the valve as possible. Periodic cleaning is required depending on the service conditions. See Bulletins 8600, 8601 and 8602 for strainers.

## WIRING

Wiring must comply with Local and National Electrical Codes. Housings for all solenoids are provided with connections for 1/2 inch conduit. The general purpose solenoid enclosure may be rotated to facilitate wiring by removing the retaining cap or clip. **CAUTION:** When metal retaining clip disengages, it will spring upwards. Rotate to desired position. Replace retaining cap or clip before operating.

**NOTE:** Alternating Current (A-C) and Direct Current (D-C) solenoids are built differently. To convert from one to the other, it is necessary to change the complete solenoid including the solenoid base sub-assembly and core assembly.

## SOLENOID TEMPERATURE

Standard catalog valves are supplied with coils designed for continuous duty service. When the solenoid is energized for a long period, the solenoid enclosure becomes hot and can be touched with the hand only for an instant. This is a safe operating temperature. Any excessive heating will be indicated by the smoke and odor of burning coil insulation.

## MAINTENANCE

**WARNING:** Turn off electrical power supply and depressurize valve before making repairs. It is not necessary to remove the valve from the pipe line for repairs.

## CLEANING

A periodic cleaning of all solenoid valves is desirable. The time between cleanings will vary, depending on media and service conditions. In general, if the voltage to the coil is correct, sluggish valve operation, excessive leakage or noise will indicate that cleaning is required.

## PREVENTIVE MAINTENANCE

1. Keep the medium flowing through the valve as free from dirt and foreign material as possible.
2. While in service, operate the valve at least once a month to insure proper opening and closing.
3. Periodic inspection (depending on media and service conditions) of internal valve parts for damage or excessive wear is recommended. Thoroughly clean all parts. Replace any parts that are worn or damaged.

ASCO Valves



## IMPROPER OPERATION

1. **Faulty Control Circuit:** Check the electrical system by energizing the solenoid. A metallic click signifies that the solenoid is operating. Absence of the click indicates loss of power supply. Check for loose or blown-out fuses, open circuited or grounded coil, broken lead wires or splice connections.
2. **Burned-Out Coil:** Check for open circuited coil. Replace coil if necessary.
3. **Low Voltage:** Check voltage across coil leads. Voltage must be at least 85% of nameplate rating.
4. **Incorrect Pressure:** Check valve pressure. Pressure to valve must be within range specified on nameplate.
5. **Excessive Leakage:** Disassemble valve and clean all parts. Replace worn or damaged parts with a complete Spare Parts Kit for best results.

## COIL REPLACEMENT (Refer to Figures 1, 2 and 3)

Turn off electrical power supply and disconnect coil lead wires. Proceed in the following manner:

1. Remove retaining cap or clip, nameplate and cover. CAUTION: When metal retaining clip disengages, it will spring upwards.
2. Slip yoke containing coil, sleeves and insulating washers off the solenoid base sub-assembly. For D-C Construction, slip spring washer, coil and insulating washers off the solenoid base sub-assembly. Insulating washers are omitted when a molded coil is used.
3. Reassemble in reverse order of disassembly paying careful attention to exploded views provided for identification and placement of parts.

CAUTION: Solenoid must be fully reassembled as the housing and internal parts are part of and complete the magnetic circuit. Place insulating washers at each end of coil, if required.

## VALVE DISASSEMBLY

Depressurize valve and turn off electrical power supply. For A-C Construction, refer to Figures 1 and 2. For D-C Construction, refer to Figure 3. Proceed in the following manner:

1. Disassemble valve in an orderly fashion. Pay careful attention to exploded views provided for identification of parts.
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 bonnet gasket, core assembly and core spring.
4. For A-C Construction without manual operator, remove valve bonnet screws (4). Remove solenoid base sub-assembly, core assembly and core spring.
5. Remove diaphragm spring (A-C Construction only), diaphragm assembly and body gasket.
6. For normal maintenance, it is not necessary to disassemble the manual operator unless external leakage is evident. To disassemble, remove stem pin, manual operator stem, stem spring and stem gasket.
7. 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. Replace body gasket and diaphragm assembly. Locate bleed hole in diaphragm assembly approximately 45° from valve outlet.
3. Replace valve bonnet and bonnet screws. Torque bonnet screws (4) in a crisscross manner to 110 ± 10 inch pounds.
4. For A-C Construction, the diaphragm spring, core assembly and core spring must be installed prior to assembly of bonnet as this is the solenoid base sub-assembly. Be sure diaphragm spring is installed properly. Closed turns of spring to seat on diaphragm assembly. For valves with a manual operator (see Figure 1), the small end of diaphragm spring seats on diaphragm assembly.
5. Install core spring in core assembly. Be sure core spring is inserted into core assembly with wide end in first. Closed end protrudes from top of core assembly.
6. Replace bonnet gasket, core assembly, core spring and solenoid base sub-assembly. Torque solenoid base sub-assembly to 175 ± 25 inch pounds.
7. If removed, replace manual operator stem gasket, stem spring, stem and stem pin.
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.

## SPARE PARTS KITS

Spare Parts Kits and Coils are available for ASCO valves. Parts marked with an asterisk (\*) are supplied in Spare Parts Kits.

### ORDERING INFORMATION FOR SPARE PARTS KITS

When Ordering Spare Parts Kits or Coils  
Specify Valve Catalog Number,  
Serial Number and Voltage.

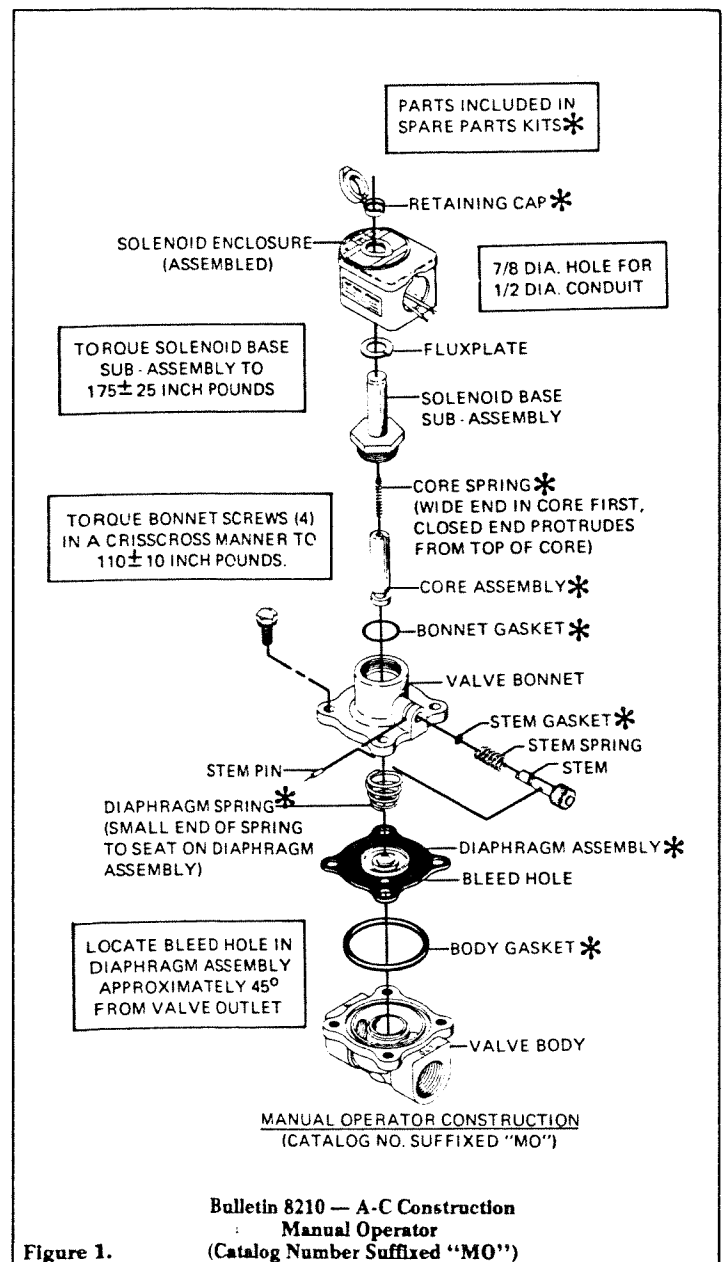


Figure 1.

Bulletin 8210 — A-C Construction  
Manual Operator  
(Catalog Number Suffix "MO")

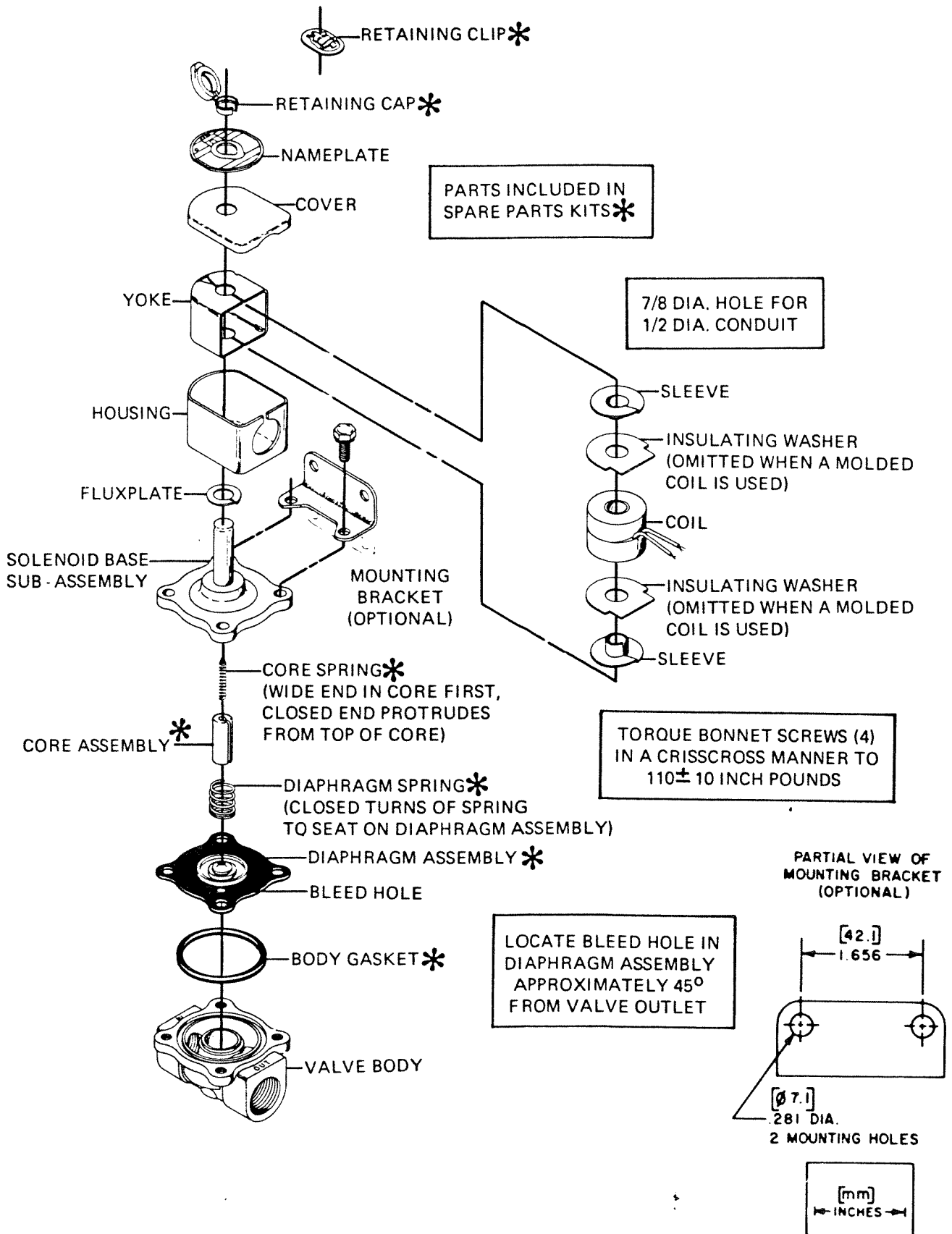
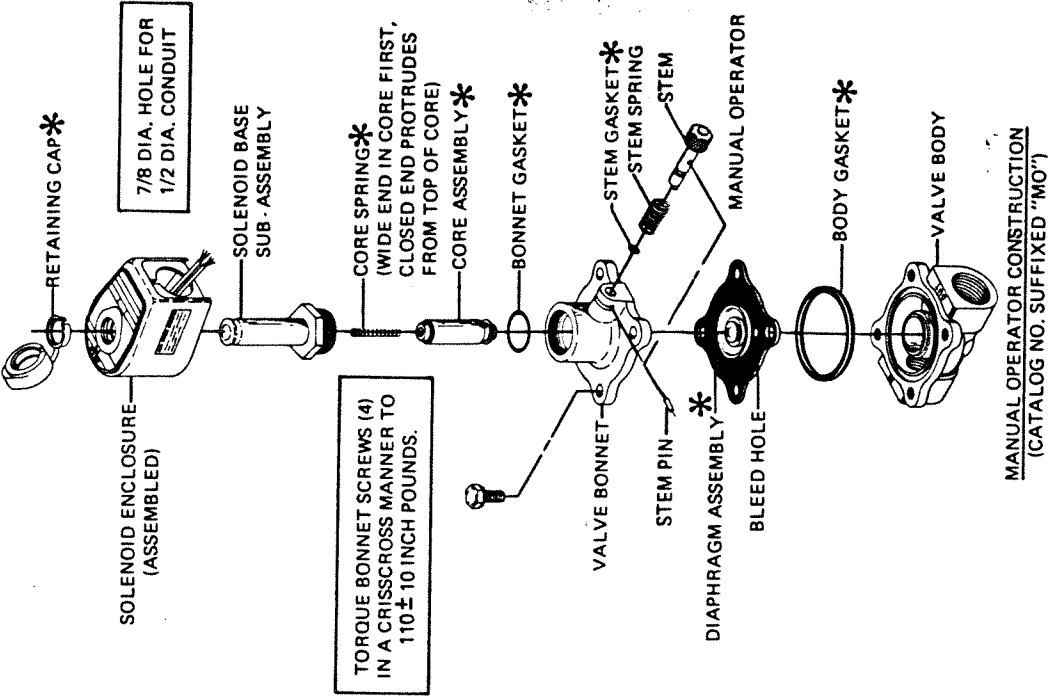
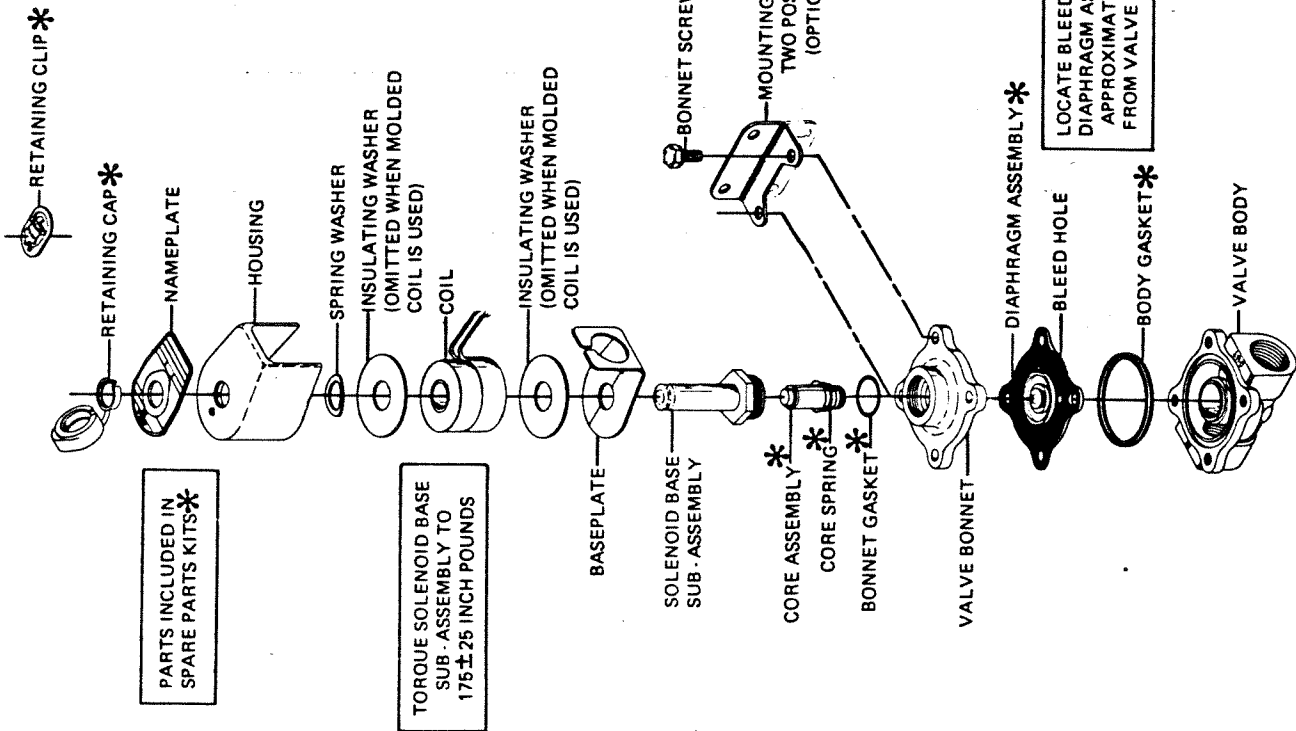


Figure 2. Bulletin 8210 — A-C Construction  
General Purpose Solenoid Enclosure Shown.  
For Explosion-Proof/Watertight Solenoid Enclosure used on Bulletin 8211, see Form No. V-5391.



Bulletin 8210 — D.C. Construction  
 General Purpose Solenoid Enclosure Shown.  
 For Explosion-Proof/Watertight Solenoid Enclosure used on Bulletin 8211, see Form No. V-5360.

Figure 3.

**DESCRIPTION**



**MODEL 126 EJECTOR**  
 The Model 126 ejector is a simple tee fitting with a fixed orifice in its inlet port. It provides the proper supply pressure to the main valve diaphragm chamber, allowing various two-way control pilots to control the valve position.

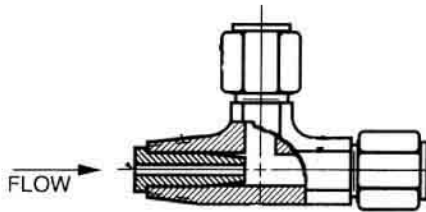
**MODEL 126 EJECTOR DIAGRAM**

Brass Construction / Stainless Steel Construction

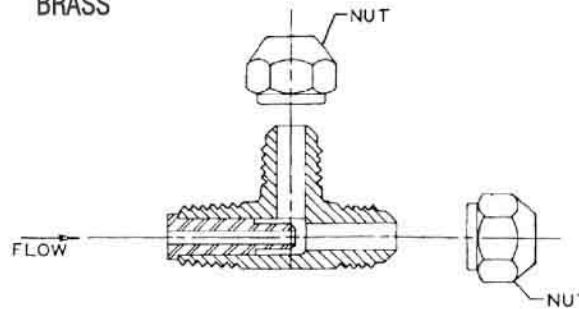
MATERIAL	PART NUMBER	P (NPT)	T-TUBE O.D.	STD. ORIFICE	USED ON VALVE SIZES
Brass	213100	3/8"	3/8"	.125"	1 1/4"-6"
Brass	214100	1/2"	1/2"	.188"	8"-10"
Brass	215100	3/4"	3/4"	.188"	12"-16"
316 Stn. Steel	213700	1/4"	3/8"	.090"	1 1/4"-6"
316 Stn. Steel	214700	3/8"	1/2"	.125"	8"-10"
316 Stn. Steel	215700	1/2"	3/4"	.188"	12"-16"

Orifice bushings are stainless steel.

**STAINLESS**

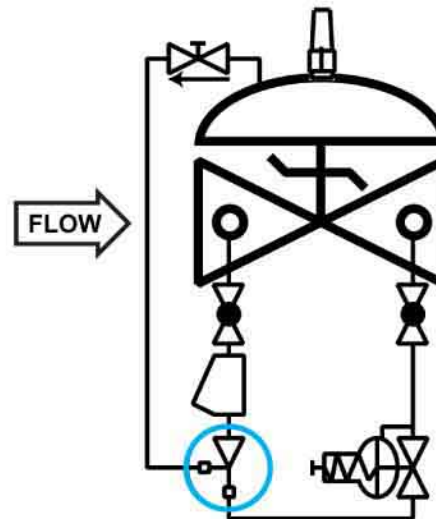
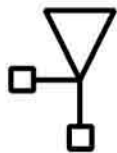


**BRASS**



**SCHEMATIC SYMBOL**

The Model 126 Ejector is shown on OCV Valve Schematics as:



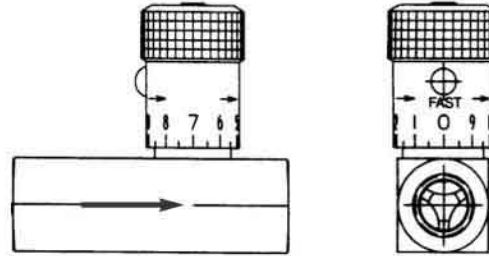
EXAMPLE: Shown here on a MODEL 127-3 Pressure Reducing Valve

**DESCRIPTION**



The Model 141-3 Flow Control Valve is an adjustable restriction device, installed in the control circuit tubing. The flow control valve differs from a standard needle valve in that it includes an internal check valve. Thus it allows free flow in one direction (through the check) and restricted flow in the other direction (through the needle). The setting of the flow control valve meters the flow into or out of the main valve diaphragm chamber,

thus controlling either the opening or closing speed of the main valve. These can be installed in series for separate opening and closing speed control. Restricted flow is in the direction of the flow arrow on the body.

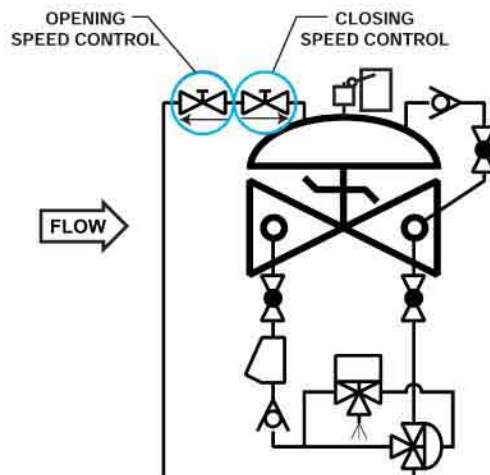


**MODEL 141-3 MATRIX**

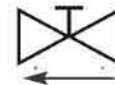
MATERIAL	PART NUMBER	INLET/OUTLET (NPT)	A	USED ON VALVE SIZE*
Brass	682100	1/4	2 3/8	1 1/4"-2"
Brass	682101	3/8	2 3/4	2 1/2"-6"
Brass	682102	1/2	3 1/4	8"-10"
Brass	682103	3/4	3 7/8	12"-16"
Stn. Steel	682700	1/4	2 3/8	1 1/4"-2" Stn.
Stn. Steel	682701	3/8	2 3/4	2 1/2"-6"
Stn. Steel	682702	1/2	3 1/4	8"-10"
Stn. Steel	682703	3/4	3 5/8	12"-16"

Note: Flow control valve use and size may vary on valve application. Consult factory.

**SCHEMATIC SYMBOL**



The Model 141-3 Flow Control Valve is shown on OCV Valve Schematics as:



EXAMPLE: Shown here on a MODEL 125 Pump Control Valve as separate opening and closing speeds.





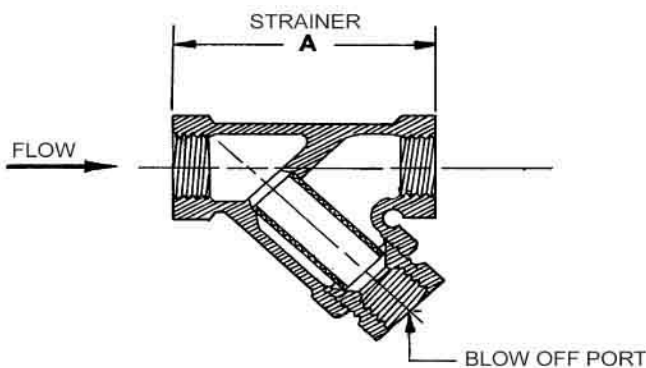
**DESCRIPTION**

**MODEL 159 Y-STRAINER**

The 159 Y-Strainer installs in the inlet piping of the pilot system and protects the pilot system from solid contaminants in the line fluid. It is the standard strainer for water service valves.

**MODEL 159 Y-STRAINER MATRIX**

MATERIAL	PART NUMBER	INLET/OUTLET (NPT)	BLOW OFF PORT (NP)	A	STD. MESH	USED ON VALVE SIZE
Bronze	660100	3/8	3/8	2 11/16	24	1 1/4"-6"
Bronze	660101	1/2	3/8	2 5/8	24	8"-10"
Bronze	660102	3/4	3/8	3 5/16	24	12"-16"
Stn. Steel	660700	3/8	1/4	2 1/2	20	1 1/4"-6"
Stn. Steel	660701	1/2	1/4	2 1/2	20	8"-10"
Stn. Steel	660702	3/4	1/4	3 1/8	20	12"-16"



**MATERIALS**

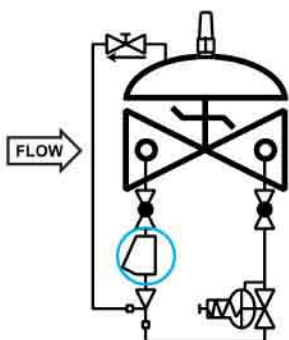
Bronze, ASTM B62  
Optional mesh sizes: 50, 100

Stainless Steel, CF8-M (316)  
Optional mesh sizes: 60, 80, 100

Screens are stainless steel

**SCHEMATIC SYMBOL**

The Model 159 Y-Strainer is shown on OCV Valve Schematics as:



EXAMPLE: Shown here on a MODEL 127-3 Pressure Reducing Valve

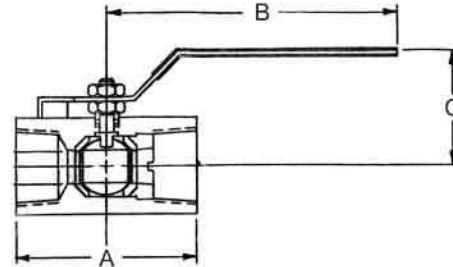
**MAINTENANCE**

Routine cleaning and checking of the Y-Strainer will aid in keeping the control valve functioning properly. Pilot system isolation ball valves are supplied on valves equipped with the Model 159 Y-Strainer. These allow flushing of the screen through the blow off port, or removal of the screen itself for manual cleaning.

**DESCRIPTION**

The Model 141-4 Ball Valve is a ¼-turn shutoff device used for isolating the pilot system from the main valve. They are extremely useful for performing routine maintenance and troubleshooting.

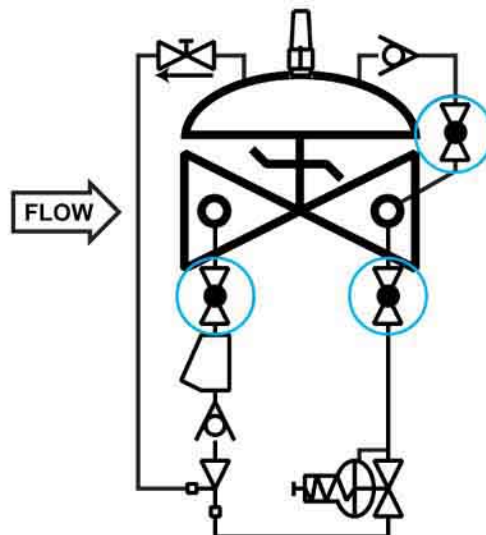
Ball valves are standard on water service valves; optional on fuel service valves.



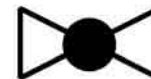
**MODEL 141-4 MATRIX**

MATERIAL	PART NUMBER	INLET/OUTLET (NPT)	A	B	C	USED ON VALVE SIZE*
Bronze	680100	3/8	1 3/4	3 1/2	1 7/8	1 ¼"-6"
Bronze	680101	1/2	2	3 1/2	2 1/4	8"-10"
Bronze	680102	3/4	3	4 3/4	2 1/4	12"-16"
Stn. Steel	680700	3/8	2	3 3/4	2 1/8	1 ¼"-6"
Stn. Steel	680701	1/2	2 1/4	3 3/4	2 1/2	8"-10"
Stn. Steel	680702	3/4	3	4 3/4	2 1/4	12"-16"

**SCHEMATIC SYMBOL**



The Model 141-4 Ball Valve is shown on OCV Valve Schematics as:



EXAMPLE: Shown here on a MODEL 127-4 Pressure Reducing / Check Valve.