Operating Manual

Model: 108-2
Size: "
Serial #:
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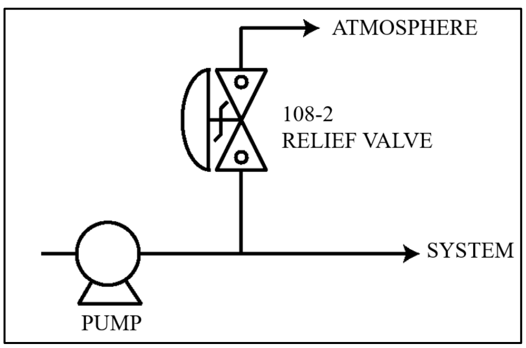
Installation, Operating,
Maintenance Instructions

Pressure Relief / Sustaining

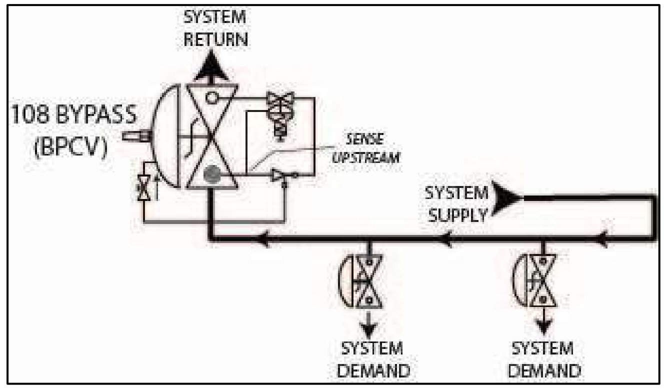
Model 108-2

108-2 SERIES - APPLICATION DESCRIPTION

The OCV Model 108-2 Series main function is to control the pressure upstream of the valve. There are multiple applications that the 108-2 series can serve using the same control valve trim package. Some applications will operate on/off and other applications will throttle the main valve to hold a constant pressure at multiple flowrates. Regardless of application, the 108-2 series valve is always going to open when upstream pressure is above setpoint and close when the upstream pressure is below setpoint.



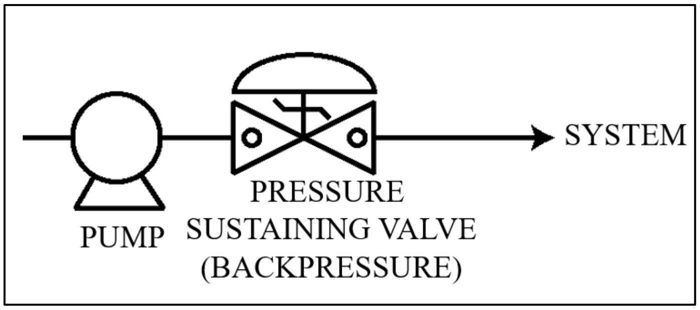
Pressure Relief – A 108-2 Pressure Relief valve is usually installed on a pump bypass line and opens to keep the upstream pressure from going too high. Most of the time the valve is inactive and closed. When upstream pressure increases above the setpoint, the main valve will open quickly to remove excess pressure and then will close the main valve at a controlled rate. The main valve is usually installed to quickly relieve high surges from the system. Normally, these valves are sized smaller than the main line since they operate intermittently. One example of a pressure relief is the 2" PCV valve typically installed in Type III hydrant systems. These valves are not meant to act as a "Safety Relief" device.



Bypass– A 108-2 Bypass valve helps control upstream pressure at various flows and, in doing so, balances "system demand" and "system return."

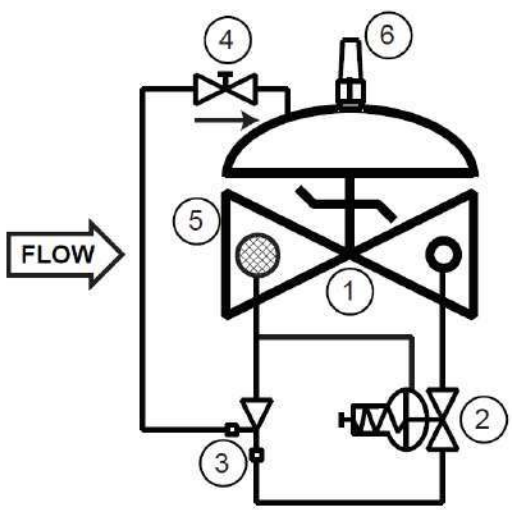
- **When most "system demand" increases, the pressure upstream of the 108-2 bypass valve tends to decrease**. As the upstream pressure falls, the 108-2 closes to sustain or limit upstream pressure and flow sent back to the "system return".
- **When the system demand decreases, the pressure upstream of the 108-2 increases.** As the upstream pressure increases, the 108-2 opens to remove excess pressure and flow back to "system return."

The BPCV (Backpressure Control Valve) and D/FV (Defuel /Flush valves) used in Type III military fueling systems are great examples of a bypass relief valve.



Backpressure – A 108-2 backpressure or pressure sustaining valve are very similar to the bypass relief in that it prevents the upstream pressure from falling too low across multiple flow points. Backpressure valves see's continuous system flows, and thus the main valve is the same size as the system piping. Backpressure valves are usually installed on the discharge of a pump to keep a centrifugal pump at the most optimum point on the pump curve during higher system flows.

GENERAL DESCRIPTION



The 108-2 consists of the following components:

1. **Model 65 Basic Valve (Fail-Open)**, a hydraulically operated, diaphragm actuated, globe valve that closes with an elastomer-on-metal seal.
2. **Model 1330P Pressure Relief Pilots**, two-way, normally-closed pilot valves that sense upstream pressure under their diaphragm and balance it against an adjustable spring load. An increase in upstream pressure tends to make the pilot open.
3. **Model 126 Ejector**, a simple "tee" fitting with a fixed orifice in the upstream port. The ejector provides the proper pressure to the diaphragm chamber of the main valve depending on the position of the pressure relief pilot.
4. **Model 141-3 Flow Control Valve** that controls the closing speed of the main valve.
5. **Model 123 Inline Strainer** that protects the pilot system from solid contaminants in the line fluid.
6. **Model 155 Visual Indicator** that enables the user to determine the valve's operating position at a glance.

THEORY OF OPERATION

To understand how the 108-2 operates, it is best to start with the EJECTOR (3). 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 relief pilot (2). 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 (1) 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 (1) is in fact controlled by the relief pilot (2). As the diaphragm pressure decreases, the main valve opens; as the diaphragm pressure increases, the main valve closes.

Putting it all together:

Upstream pressure tends to increase above the set point of the pressure-relief pilot. 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 slightly to lower the upstream pressure to below the set point.

Upstream pressure tends to decrease below the set point. The pilot moves further closed. This results in an increase 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. This mode of operation is normally seen for 108-2 sustaining or bypass relief valve.

INSTALLATION

The 108-2 is furnished fully factory-assembled and ready for installation in a bypass line. The user is referred to the Basic Valve section of this manual for full installation details.

STARTUP AND ADJUSTMENT

1. The following procedures should be followed in the order presented in order to affect an initial startup of the 108-2.
2. Install a pressure gauge of the proper range upstream of the 108-2.
3. Turn the adjusting screw of the flow control valve (4) fully **clockwise,** then **counterclockwise** two full turns.

   CAUTION

   For Relief valves, ensure that the system will not be damaged if the main valve is in the "closed" position when system is started. PD (positive Displacement pumps) cannot be started against a dead-end system.

4. Remove the plastic cap from the pressure relief pilot (2) and loosen the adjusting screw jam nut. Turn the adjusting screw **clockwise** to a full stop.
5. 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.**
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. For a relief valve application
   a. Close downstream main line isolation valves to reduce system demand as much as possible, allowing inlet pressure to build 10-15 psi above the desired maximum.
   b. Slowly turn the adjusting screw of the pressure relief pilot (2) **counterclockwise** until the inlet pressure falls to the desired set point.
8. For in-line sustaining valves:
   a. With the 108-2 still closed, upstream pressure should be above the relief pilot setting.
   b. To set the pilot, slowly turn the adjusting screw of the pressure relief pilot (2) **counterclockwise** until the main valve opens and the inlet pressure falls to the desired set point.
   c. If upstream system pressure will not drop to the desired setting, throttle upstream

isolation valves or increase demand downstream.

9. After pilot has been set, tighten the adjusting screw jam nut and replace the plastic cap.

MAINTENANCE

Due to the simplicity of design of the 108-2, it 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.

TROUBLESHOOTING

In the event of malfunction of the 108-2, the following guide should enable the technician to isolate the specific cause of the problem.

MAIN VALVE FAILS TO OPEN — INLET PRESSURE TOO HIGH

1. Valve closed upstream or downstream of 108-2 - Open as required.
2. Pressure relief pilots (2) adjusted too far clockwise — See Adjustment instructions.
3. Stem of pressure relief pilot (2) binding or diaphragm ruptured — See 1330P section of this manual.
4. Stem of main valve binding —- See the Model 65 Basic Valve section of this manual.

MAIN VALVE FAILS TO CLOSE

1. Flow control valve (4) closed fully — Open as required. See Adjustment instructions.
2. Strainer (5) clogged — Clean as required.
3. Pressure relief pilot (2) adjusted too far counterclockwise — See adjustment instructions.
4. Pressure relief pilot (2) stem binding or seat badly deteriorated — Disassemble pilot and determine cause. See 1330P section of this manual.

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Installation, Operating, and Maintenance Instructions

Model 65/765

basic control valve

GENERAL DESCRIPTION

The OCV Series 65 is a hydraulically operated, diaphragm-actuated valve, *full port* valve. The globe configuration (Model 65) is available in sizes 1 ¼" thru 16" and 24". The angle configuration (Model 65A) is available in sizes 1 ¼" thru 12" and 16".

The Series 765 is the same as the Series 65, except that it is a *reduced port* valve. It is available only in the globe configuration in sizes 3" thru 24".

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. A synthetic rubber seat disc forms a tight seal with the valve seat when pressure is applied above the diaphragm.

FUNCTIONAL DESCRIPTION

Because the Series 65/765 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.

CAUTION: Take appropriate care to protect personnel and equipment when lifting the valve for uncrating and for installation. Use appropriate lifting equipment. Lifting eyes are provided on 8" and larger valves to facilitate this task.

3. Install the valve in the line according to the flow arrow on the inlet flange. The arrow should point downstream.
4. When installing flanged-end valves, use the proper number and size of flange bolts when installing the valve (see Tables 1 & 2). Make sure flange gaskets are of the proper material for the service. To ensure a tight seal, flange bolts should be tightened evenly in a criss-cross pattern. Tables 1 & 2 also shows the proper final torque values for the flange bolts.

5. Allow sufficient room around the valve for ease of adjustment and maintenance service.
6. After the lines are filled with liquid, bleed all air from the diaphragm chamber. This can be done by carefully loosening a pipe plug in the bonnet until fluid begins to appear around the threads. When only clear liquid (no air) is flowing, retighten the plug.

In addition, it is highly recommended that:

1. Isolation valves (e.g., 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 examination of the valve interior, be conducted. Particular attention should be paid to the rubber 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

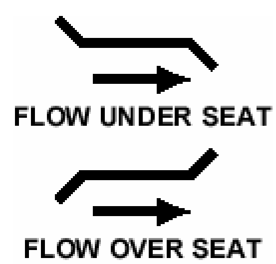
2. VALVE FAILS TO CLOSE

a. Diaphragm damaged* - See Procedure A
b. Stem binding - See Procedure B
c. Object lodged in valve - See Procedure B

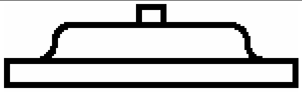
3. VALVE OPENS AND CLOSES BUT LEAKS WHEN CLOSED

a. Seat disc damaged - See Procedure C
b. Seat ring damaged - See Procedure D

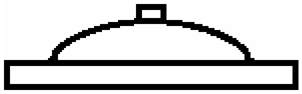
**A diaphragm failure can prevent the valve from either opening or closing, depending on the flow direction. Most water service valves flow “under the seat”, in which case a diaphragm failure will keep the valve from closing. On the other hand, most fuel service valves flow “over the seat”, in which 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, and then compare it with the figures below.*



IMPORTANT: Over the years, OCV has made significant design changes to the 3”, 4”, 8”, 10” and 12” valves. Therefore, before ordering rubber kits or other parts, you will need to determine which style valve you have (old or new). This can be easily determined by looking at the valve *bonnet*. As shown below, old-style valves have flat bonnets; new-style valves (except for the 3” full port and 4” reduced port valves) have domed bonnets.



FLAT BONNET



DOMED BONNET

For 3" valves, simply measure the *diameter* of the bonnet. Old-style bonnets have a 7-11/16" (195 mm) diameter; new style bonnets have an 8-3/4" (222 mm) diameter. That same 8-3/4" diameter flat bonnet is also used on the 4" reduced port valve.

PROCEDURE A: DIAPHRAGM REPLACEMENT

1. Wear appropriate clothing and equipment to protect the skin and eyes from exposure to the line fluid.
2. Isolate the valve from the system by closing upstream and downstream block valves.
3. Bleed all pressure from the valve.

WARNING! IT IS EXTREMELY IMPORTANT THAT ALL PRESSURE BE REMOVED FROM THE VALVE BEFORE DOING EVEN PARTIAL DISASSEMBLY.

4. Loosen one of the tubing connections on the bonnet. Allow any residual pressure to bleed off.
5. To minimize any possible fluid spillage, drain the upstream and downstream sides of the valve as much as possible. Unused side ports in the main valve body can be used for this purpose. They will bring the fluid level down to approximately the centerline of the piping.
6. Remove all tubing connected at the bonnet.
7. Remove the bonnet nuts.
8. 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.
9. Remove the spring.
10. Remove the diaphragm plate capscrews and the diaphragm plate.
11. Remove the old diaphragm.
12. 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.
13. Replace the diaphragm plate and the diaphragm plate capscrews.
14. Tighten all diaphragm plate capscrews snugly. See Table 4 for proper torque values.
15. Replace the spring.
16. Replace the bonnet and reinstall the bonnet nuts.
17. Tighten the bonnet nuts snugly using a criss-cross tightening pattern. See Table 3 for torque requirements.
18. Reinstall the control tubing.
19. Reopen the upstream and downstream block valves.
20. Before placing the valve back in service, perform the air bleed procedure described in the Installation section of this manual.

PROCEDURE B: CORRECTION OF BINDING STEM

1. Perform Steps 1 thru 9 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. The 24" valve is threaded 3/4-10.
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 15 thru 20 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 3” or smaller valve, or a 4” old-style valve, follow Steps 4 thru 9, below.
3. If you are working on a new-style 4” valve, or any valve 6” or larger, follow Steps 10 thru 16, below.
4. Seat rings in the smaller valves are threaded into the valve body. To remove, you will need a special seat ring tool. One may be purchased from OCV, or one may be fabricated. (See Table 5 for details.)
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 on larger valves 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.

TABLE 1
FLANGE BOLTING REQUIREMENTS – CLASS 150 FLANGES

VALVE SIZE (DN)	NO. OF BOLTS	BOLT SIZE	RECOMMENDED TORQUE (FT-LB)	RECOMMENDED TORQUE (N-M)
1 ¼" (32)	4	1/2-13 X 2.50" LONG	75	102
1 ½" (40)	4	1/2-13 X 2.50" LONG	75	102
2" (50)	4	1/2-13 X 2.50" LONG	75	102
2 ½" (65)	4	5/8-11 X 3.00" LONG	150	204
3" (80)	4	5/8-11 X 3.25" LONG	150	204
4" (100)	8	5/8-11 X 3.25" LONG	150	204
6" (150	8	3/4-10 X 3.50" LONG	250	339
8" (200)	8	3/4-10 X 3.75" LONG	250	339
10" (250)	12	7/8-9 X 4.00" LONG	378	513
12"(300)	12	7/8-9 X 4.25" LONG	378	513
14" (350)	12	1-8 X 4.50" LONG	583	791
16" (400)	16	1-8 X 4.75" LONG	583	791
18" (450)	16	1 1/8" X 5.00" LONG	782	1061
20" (500)	20	1 1/8 X 5.50" LONG	782	1061
24" (600)	20	1 1/4"-7 X 6.00" LONG	1097	1488

TABLE 2
FLANGE BOLTING REQUIREMENTS – CLASS 300 FLANGES

VALVE SIZE (DN)	NO. OF BOLTS	BOLT SIZE	RECOMMENDED TORQUE (FT-LB)	RECOMMENDED TORQUE (N-M)
1 ¼" (32)	4	5/8-11 X 2.75" LONG	150	204
1 ½" (40)	4	3/4-10 X 3.00" LONG	250	339
2" (50)*	6 2	5/8-11 X 3.00" LONG 5/8-11 X 2.25" LONG	150 150	204 204
2 ½" (65)	8	3/4-10X 3.25" LONG	250	339
3" (80)	8	3/4-10 X 3.50" LONG	250	339
4" (100)	8	3/4-10 X 3.75" LONG	250	339
6" (150)	12	3/4-10 X 4.25" LONG	250	339
8" (200)	12	7/8-9 X 4.75" LONG	378	513
10" (250)	16	1-8 X 5.50" LONG	583	791
12"(300)	16	1 1/8-7 X 5.75" LONG	782	1061
14" (350)	20	1 1/8-7 X 6.25" LONG	782	1061
16" (400)*	18 2	1 1/4-7 X 6.50" LONG 1 1/4-7 X 5.50" LONG	1097 1097	1488 1488
18" (450)	24	1 1/4-7 X 6.75" LONG	1097	1488
20" (500)	24	1 1/4-7 X 7.25" LONG	1097	1488
24" (600)	24	1 1/2-6 X 8.00" LONG	1750	2375

* TOP TWO HOLES ON VALVE FLANGES ARE DRILLED & TAPPED. USE THE SHORTER BOLTS LISTED IN THESE HOLES.

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TABLE 3
BONNET BOLTING TORQUE SPECIFICATIONS
NEW-STYLE FULL PORT VALVES (SERIES 65)

VALVE SIZE (DN)	NO. OF STUDS	STUD SIZE	REC. TORQUE FT-LB (N-M)	VALVE SIZE (DN)	NO. OF SCREWS	SCREW SIZE	REC. TORQUE FT-LB (N-M)
1 ¼” (32)	8	3/8-16	31 (42)	8” (200)	12	7/8-9	378 (513)
1 ½” (40)	8	3/8-16	31 (42)	10” (250)	16	7/8-9	378 (513)
2” (50)	8	3/8-16	31 (42)	12” (300)	20	1 1/8-7	782 (1061)
2 ½” (65)	8	1/2-13	75 (102)	14” (350)	20	1 1/8-7	782 (1061)
3” (80)	8	1/2-13	75 (102)	16” (400)	20	1 1/4-7	1097 (1488)
4” (100)	8	3/4-10	250 (339)	24” (400)	28	1 1/2-6	1750 (2375)
6” (150)	12	3/4-10	250 (339)				

NEW-STYLE REDUCED PORT VALVES (SERIES 765)

VALVE SIZE (DN)	NO. OF STUDS	STUD SIZE	REC. TORQUE FT-LB (N-M)	VALVE SIZE (DN)	NO. OF SCREWS	SCREW SIZE	REC. TORQUE FT-LB (N-M)
3” (80)	8	3/8-16	31 (42)	12” (300)	16	7/8-9	378 (513)
4” (100)	8	1/2-13	75 (102)	16” (250)	20	1 1/8-7	782 (1061)
6” (150)	8	3/4-10	250 (339)	18” (300)	20	1 1/4-7	1097 (1488)
8” (200)	12	3/4-10	250 (339)	20” (350)	20	1 1/4-7	1097 (1488)
10” (250)	12	7/8-9	378 (513)	24” (400)	20	1 1/4-7	1097 (1488)

OLD-STYLE FULL PORT VALVES (SERIES 65)

VALVE SIZE (DN)	NO. OF SCREWS	STUD SIZE	REC. TORQUE FT-LB (N-M)	VALVE SIZE (DN)	NO. OF SCREWS	SCREW SIZE	REC. TORQUE FT-LB (N-M)
3” (80)	8	3/8-16	31 (42)	10” (250)	16	3/4-10	250 (339)
4” (100)	8	7/16-20	50 (68)	12” (300)	20	1 1/8-7	782 (1061)
8” (200)	12	3/4-10	250 (339)				

TABLE 4
DIAPHRAGM PLATE CAPSCREW TORQUE SPECIFICATIONS
NEW-STYLE FULL PORT VALVES (SERIES 65)

VALVE SIZE (DN)	NO. OF SCREWS	SCREW SIZE	REC. TORQUE FT-LB (N-M)	VALVE SIZE (DN)	NO. OF SCREWS	SCREW SIZE	REC. TORQUE FT-LB (N-M)
1 ¼” (32)	1	3/8-24 N	21.5 (29)	8” (200)	8	1/2-13 H	43 (58)
1 ½” (40)	1	3/8-24 N	21.5 (29)	10” (250)	12	1/2-13 H	43 (58)
2” (50)	4	1/4-20 A	6.3 (8.6)	12” (300)	12	1/2-13 H	43 (58)
2 ½” (65)	6	10-32 A	2.7 (3.7)	14” (350)	16	3/8-16 H	19.7 (27)
3” (80)	6	1/4-20 A	6.3 (8.6)	16” (400)	16	1/2-13 H	43 (58)
4” (100)	6	3/8-16 H	19.7 (27)	24” (400)	16	1-8 H	286 (383)
6” (150)	8	3/8-16 H	19.7 (27)				

NEW-STYLE REDUCED PORT VALVES (SERIES 765)

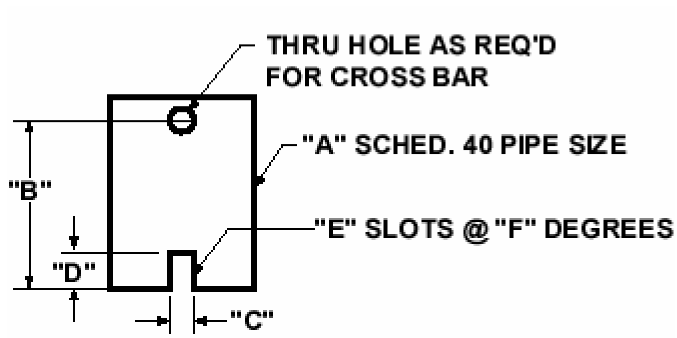
VALVE SIZE (DN)	NO. OF SCREWS	SCREW SIZE	REC. TORQUE FT-LB (N-M)	VALVE SIZE (DN)	NO. OF SCREWS	SCREW SIZE	REC. TORQUE FT-LB (N-M)
3” (80)	4	1/4-20 A	6.3 (8.6)	12” (300)	12	1/2-13 H	43 (58)
4” (100)	6	1/4-20 A	6.3 (8.6)	16” (250)	12	1/2-13 H	43 (58)
6” (150)	6	3/8-16 H	19.7 (27)	18” (300)	12	1/2-13 H	43 (58)
8” (200)	8	3/8-16 H	19.7 (27)	20” (350)	12	1/2-13 H	43 (58)
10” (250)	8	1/2-13 H	43 (58)	24” (400)	12	1/2-13 H	43 (58)

OLD-STYLE FULL PORT VALVES (SERIES 65)

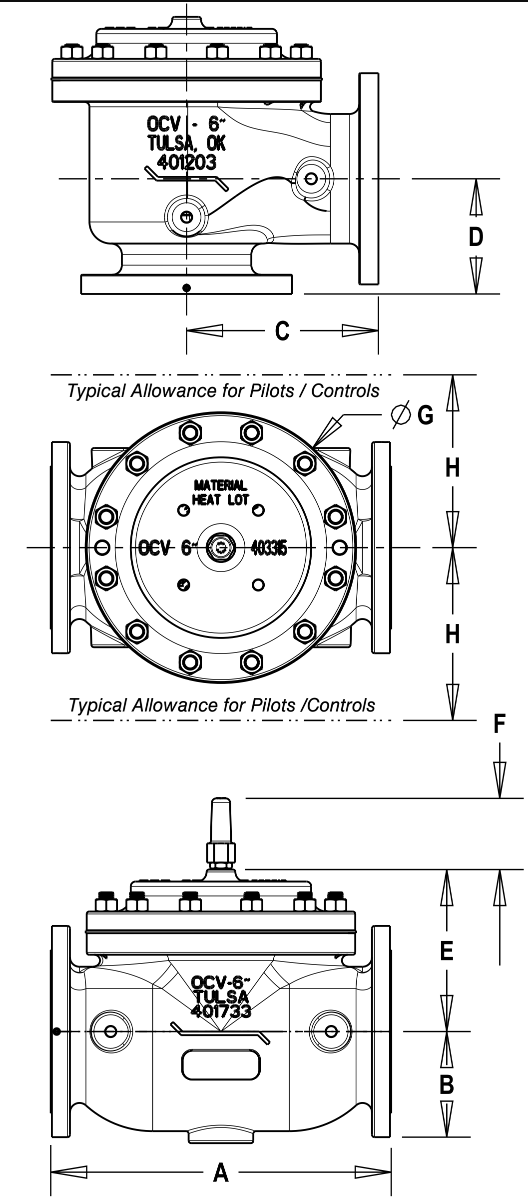
VALVE SIZE (DN)	NO. OF SCREWS	SCREW SIZE	REC. TORQUE FT-LB (N-M)	VALVE SIZE (DN)	NO. OF SCREWS	SCREW SIZE	REC. TORQUE FT-LB (N-M)
3” (80)	4	1/4-20 H	6.3 (8.6)	10” (250)	12	3/8-16 H	19.7 (27)
4” (100)	6	1/4-20 H	6.3 (8.6)	12” (300)	12	1/2-13 H	43 (58)
8” (200)	8	3/8-16 H	19.7 (27)				

N = SINGLE HEX NUT ON VALVE STEM
A = ALLEN-HEAD CAPSCREWS
H = HEX-HEAD CAPSCREWS

TABLE 5
SEAT RING TOOL DETAILS



VALVE SIZE FULL PORT	VALVE SIZE RED. PORT	“A” PIPE SIZE	“B” MIN. LENGTH	“C” SLOT WIDTH	“D” SLOT DEPTH	“E” # SLOTS	“F” 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”	3”	1 1/2	7”	3/8”	3/8”	2	180°
2 1/2"	--	2	8”	1/2"	1/2"	3	120°
3” NEW	4”	2 1/2	9”	1/4"	3/8”	3	120°
3” OLD	--	2 1/2	9”	5/8”	5/8”	2	180°
4” OLD	--	3	10”	5/8”	5/8”	2	180°



DIM	END CONN.	1 1/4	1 1/2	2	2 1/2	3	4	6 STD	6 EXT	8	10	12	14	16	24
U.S. DIMENSIONS (INCHES)															
A	SCREWED	8 3/4	8 3/4	9 7/8	10 1/2	13	--	--	--	--	--	--	--	--	--
	GROOVED	8 3/4	8 3/4	9 7/8	10 1/2	13	15 1/4	20	--	--	--	--	--	--	--
	150# FLGD	8 1/2	8 1/2	9 3/8	10 1/2	12	15	17 3/4	20	25 3/8	29 3/4	34	39	40 3/8	62
	300# FLGD	8 3/4	8 3/4	9 7/8	11 1/8	12 3/4	15 5/8	18 5/8	21	26 3/8	31 1/8	35 1/2	40 1/2	42	63 3/4
B	SCREWED	1 7/16	1 7/16	1 11/16	1 7/8	2 1/4	--	--	--	--	--	--	--	--	--
	GROOVED	--	1	1 3/16	1 7/16	1 3/4	2 1/4	3 5/16	--	--	--	--	--	--	--
	150# FLGD	2 5/16	2 1/2	3	3 1/2	3 3/4	4 1/2	5 1/2	5 1/2	6 3/4	8	9 1/2	10 5/8	11 3/4	16
	300# FLGD	2 5/8	3 1/16	3 1/4	3 3/4	4 1/8	5	6 1/4	--	7 1/2	8 3/4	10 1/4	11 1/2	12 3/4	18
C ANGLE	SCREWED	4 3/8	4 3/8	4 3/4	6	6 1/2	--	--	--	--	--	--	--	--	--
	GROOVED	4 3/8	4 3/8	4 3/4	6	6 1/2	7 5/8	--	--	--	--	--	--	--	--
	150# FLGD	4 1/4	4 1/4	4 3/4	6	6	7 1/2	10	--	12 11/16	14 7/8	17	--	20 13/16	--
	300# FLGD	4 3/8	4 3/8	5	6 3/8	6 3/8	7 13/16	10 1/2	--	13 3/16	15 9/16	17 3/4	--	21 5/8	--
D ANGLE	SCREWED	3 1/8	3 1/8	3 7/8	4	4 1/2	--	--	--	--	--	--	--	--	--
	GROOVED	3 1/8	3 1/8	3 7/8	4	4 1/2	5 5/8	--	--	--	--	--	--	--	--
	150# FLGD	3	3	3 7/8	4	4	5 1/2	6	--	8	11 3/8	11	--	15 11/16	--
	300# FLGD	3 1/8	3 1/8	4 1/8	4 3/8	4 3/8	5 13/16	6 1/2	--	8 1/2	12 1/16	11 3/4	--	16 1/2	--
E	ALL	6	6	6	7	6 1/2	8	10	10	11 7/8	15 3/8	17	18	19	27
F	ALL	3 7/8	3 7/8	3 7/8	3 7/8	3 7/8	3 7/8	3 7/8	3 7/8	6 3/8	6 3/8	6 3/8	6 3/8	6 3/8	8
G	ALL	6	6	6 3/4	7 11/16	8 3/4	11 3/4	14	14	21	24 1/2	28	31 1/4	34 1/2	52
H	ALL	10	10	11	11	11	12	13	13	14	17	18	20	20	28 1/2

DIM	END CONN.	DN32	DN40	DN50	DN65	DN80	DN100	DN150 STD	DN150 EXT	DN200	DN250	DN300	DN350	DN400	DN600
METRIC DIMENSIONS (MILLIMETERS)															
A	SCREWED	222	222	251	267	330	--	--	--	--	--	--	--	--	--
	GROOVED	222	222	251	267	330	387	508	--	--	--	--	--	--	--
	150# FLGD	216	216	238	267	305	381	451	508	645	756	864	991	1026	1575
	300# FLGD	222	222	251	283	324	397	473	533	670	791	902	1029	1067	1619
B	SCREWED	37	37	43	48	57	--	--	--	--	--	--	--	--	--
	GROOVED	--	25	30	37	44	57	84	--	--	--	--	--	--	--
	150# FLGD	59	64	76	89	95	114	140	140	171	203	241	270	298	406
	300# FLGD	67	78	83	95	105	127	159	--	191	222	260	292	324	457
C ANGLE	SCREWED	111	111	121	152	165	--	--	--	--	--	--	--	--	--
	GROOVED	111	111	121	152	165	194	--	--	--	--	--	--	--	--
	150# FLGD	108	108	121	152	152	191	254	--	322	378	432	--	529	--
	300# FLGD	111	111	127	162	162	198	267	--	335	395	451	--	549	--
D ANGLE	SCREWED	79	79	98	102	114	--	--	--	--	--	--	--	--	--
	GROOVED	79	79	98	102	114	143	--	--	--	--	--	--	--	--
	150# FLGD	76	76	98	102	102	140	152	--	203	289	279	--	398	--
	300# FLGD	79	79	105	111	111	148	165	--	216	306	298	--	419	--
E	ALL	152	152	152	178	165	203	254	254	302	391	432	457	483	686
F	ALL	98	98	98	98	98	98	98	98	162	162	162	162	162	203
G	ALL	152	152	171	195	222	298	356	356	533	622	711	794	876	1321
H	ALL	254	254	279	279	279	305	330	330	356	432	457	508	508	724

CHG	ECN	DATE	BY	
E				
D				
C				
B				
A				
REVISIONS				REF DWG NO'S

MATERIAL

TOLERANCES
UNLESS NOTED
.XX ±.015
.XXX ±.005
ANGULAR ±0.5°
MACH. FINISH 125

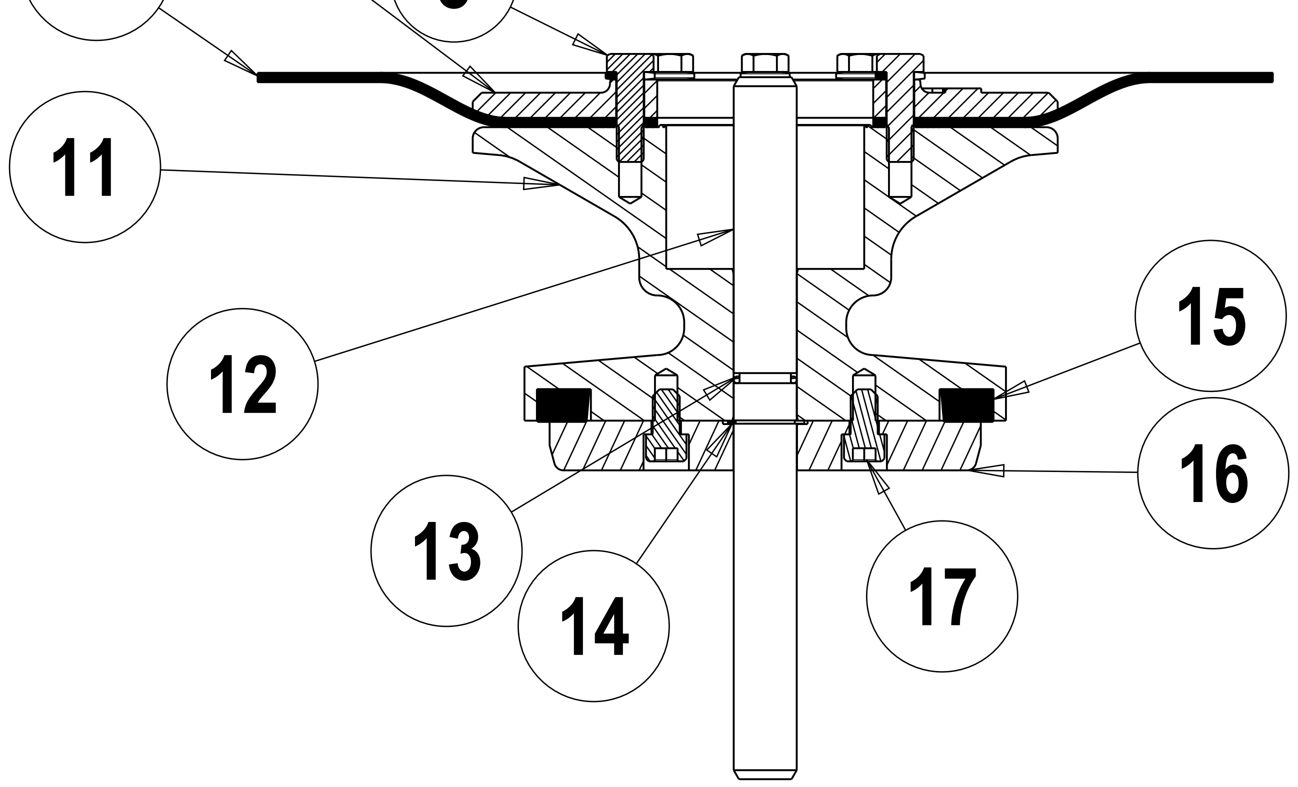
OCV Control Valves

TULSA OKLAHOMA USA

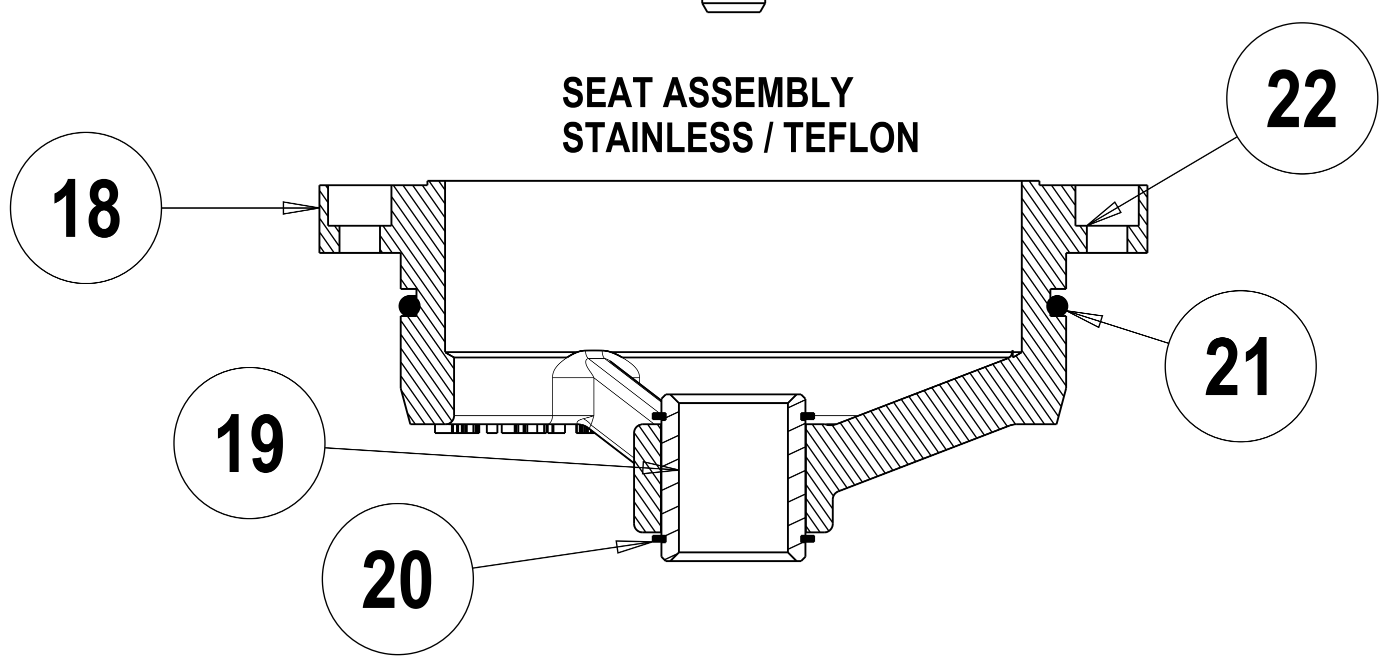
65D GENERAL VALVE DIMENSIONS

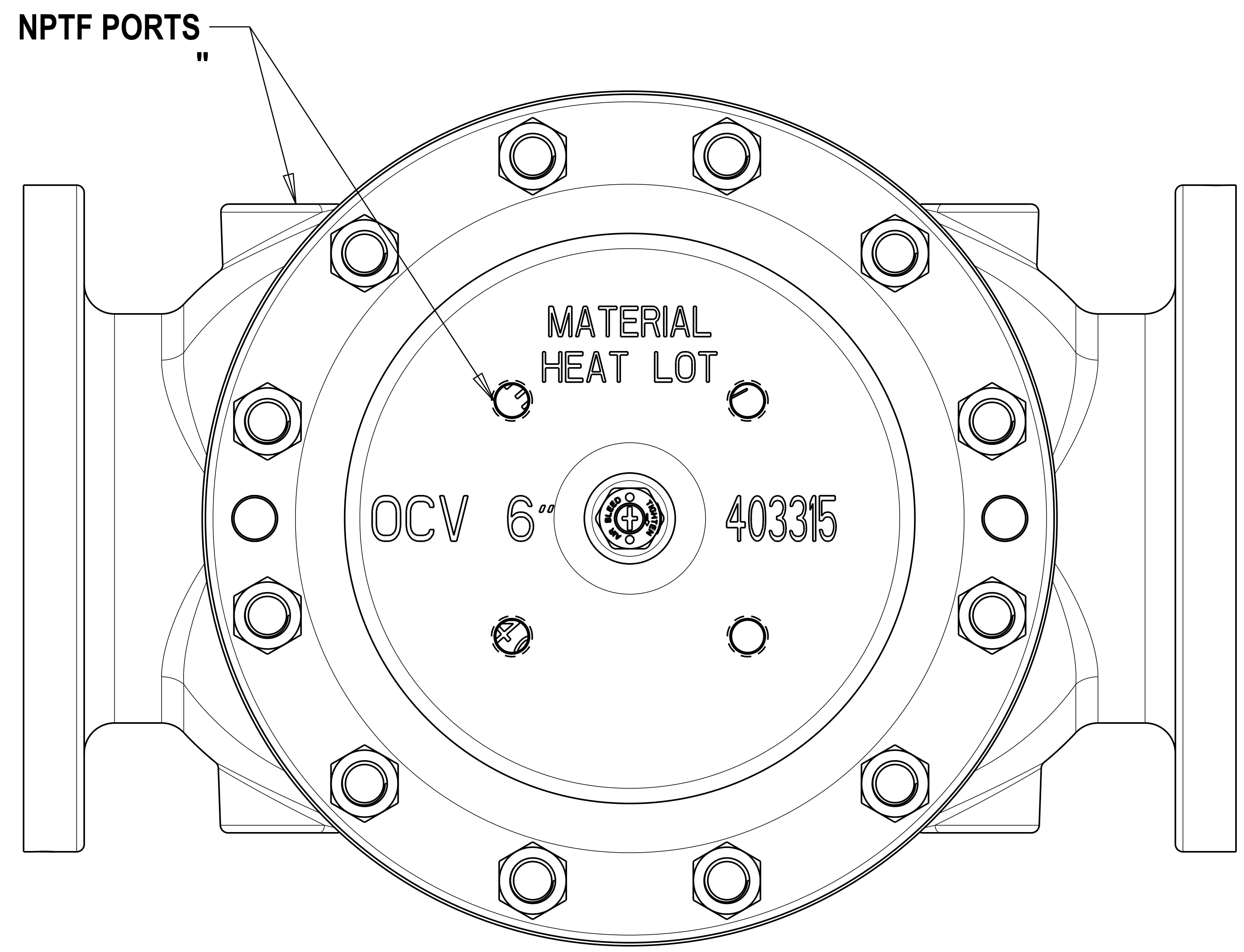
NO. REQ'D	DRAWN BY	DATE	SIZE	DRAWING NUMBER	REV
	RLA	3/8/16	A	65D_DIM_DWG	C
SCALE	CHKD BY	DATE			
NOT TO SCALE					

SPOOL ASSEMBLY



SEAT ASSEMBLY
STAINLESS / TEFLON

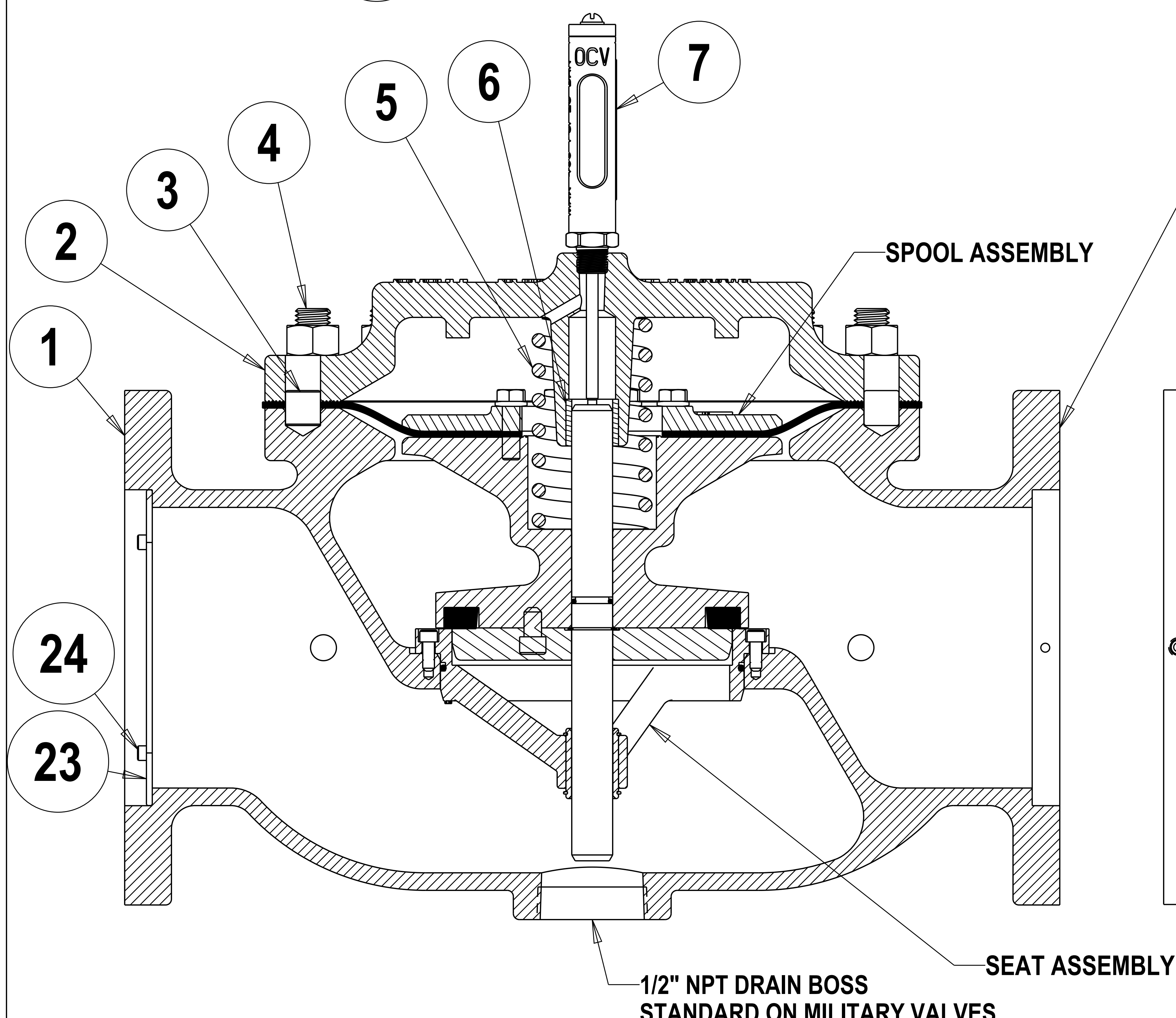


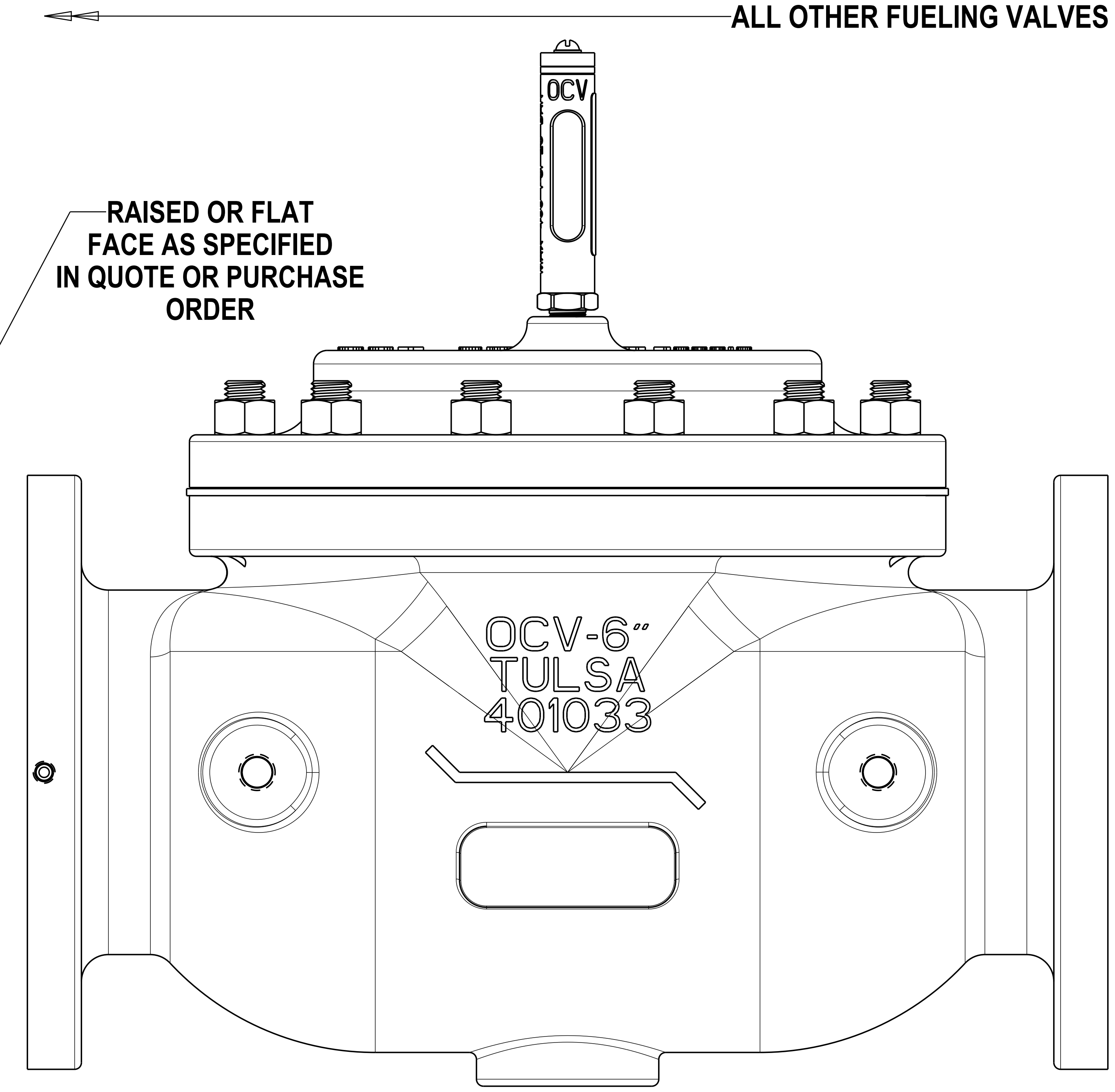


FLOW DIRECTION

RELIEF VALVES AND NON SURGE CHECK VALVES

ALL OTHER FUELING VALVES





ITEM	DESCRIPTION
1	BODY
2	BONNET
3	DOWEL PINS, ALIGNMENT
4	STUDS & NUTS
5	SPRING
6	UPPER BUSHING
7	VISUAL INDICATOR
*	SPOOL ASSEMBLY
8	CAPSCREWS, DIA. PLATE
9	DIAPHRAGM PLATE
10	DIAPHRAGM, RUBBER
11	SPOOL
12	STEM
13	O-RING, STEM
14	SNAP RING, STEM
15	SEAT DISC, RUBBER
16	SEAT RETAINER
17	CAPSCREW, SEAT RETAINER
*	SEAT ASSEMBLY
18	SEAT RING
19	BUSHING, LOWER
20	SNAP RING, BUSHING
21	O-RING, SEAT
22	CAPSCREWS, SEAT
*	FLOW CONTROL ASSEMBLY
23	ORIFICE PLATE
24	SNAP RING OR CAPSCREWS

NOTES:
1. EXTERNAL/INTERNAL COATING & MATERIALS PER OCV MATERIAL OF CONSTRUCTION SHEET
2. ABS DESIGN APPROVED
3. UL LISTED DESIGN
4. TOTAL OF (9) NPTF PIPE TAPS PROVIDED FOR THE PILOT SYSTEM AND ACCESSORIES. (5) ON THE BONNET & (4) ON THE BODY.
5. ANGLE BODYS ARE ALSO AVAILABLE

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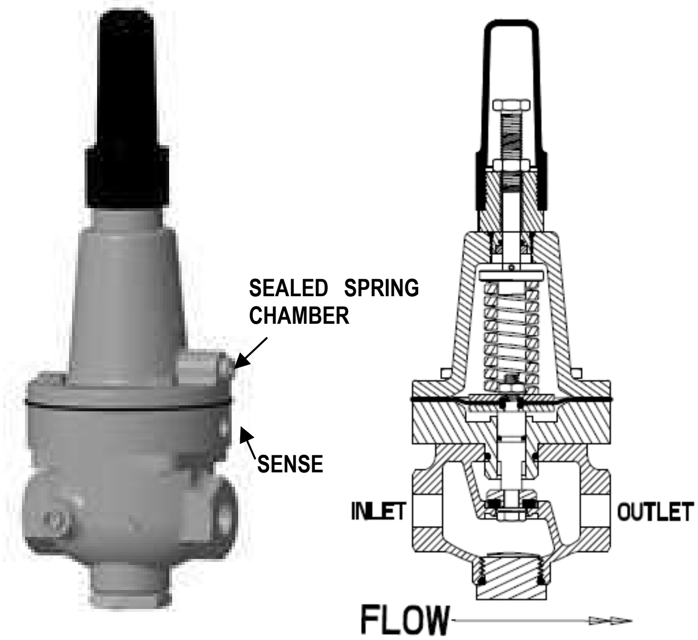
65 SERIES GLOBE VALVE MILITARY SERVICE		
SIZE	DRAWING NUMBER	REV
C	65_BASIC_FUEL	



Installation, Operating, Maintenance Instructions

Pressure Relief Pilot

For petroleum Service

Model 1330P

GENERAL DESCRIPTION

The Model 1330P Pressure Sustaining/Pressure Relief Pilot is a normally closed, direct-acting, spring-loaded, diaphragm-type control pilot with remote or local downstream sense capabilities. The 1330p can serve many functions depending on its installation location:

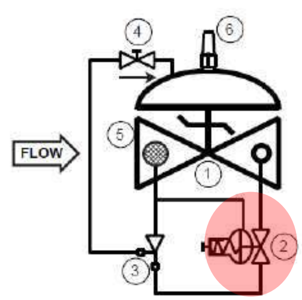
1. As the primary control pilot for OCV 108 control valves sold into the petroleum fluids market, it is designed to hold a constant preset inlet pressure on the main valve.
2. For 127/114 pressure reducing valves, the 1330P may also be used by as downstream surge control pilot.
3. It can be used as a standalone direct acting backpressure regulator for small systems, but system requirements must accept a CV of less than 1.7.

The 1330P is sold standard in stainless steel construction and with 3/8 NPT or 1/2 NPT end connections. The 1330p has a sealed top spring chamber to prevent petroleum product from leaking if the diaphragm should ever fail. The 1330P is available with four different adjustment ranges:

5-30 psi (green)	20-200 psi (Red/square)
20-80 psi (red/round)	100-300 psi (Blue)

FUNCTIONAL DESCRIPTION

When installed on OCV 108 Sustaining/Relief control valve exterior pilot systems, the 1330P senses upstream pressure and modulates the pressure in the diaphragm chamber of the main valve, hence the degree of opening or closing of the valve. The upstream pressure is sensed under the diaphragm of the pilot and is balanced against an adjustable spring load. As the upstream pressure increases above 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 upstream pressure decreases below 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 upstream pressure at the set point within very close limits.



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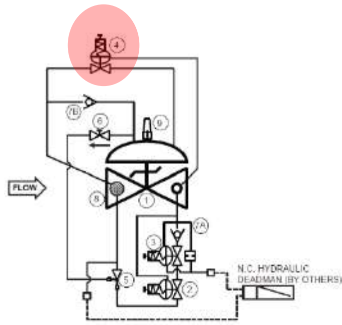

The 1330P may also be installed on 127-5 and 114 pressure reducing control valve external pilot systems as a surge pilot sensing outlet pressure. The pilot operates under the same principles described before, but is installed to control the main valve differently. The 1330P doesn't modulate the main valve in this installation, and instead provides additional closing speed for the main valve when outlet pressure surges too fast. When installed as a surge pilot, the 1330p pilot will open when downstream pressure rises above the pilot setpoint. When the 1330P surge pilot opens, it directly supplies inlet pressure to the cover of the main valve which causes the main valve to close rapidly.

INSTALLATION AND ADJUSTMENT

For 108 backpressure and relief models, the 1330P 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 upstream control piping ahead of the ejector, 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 upstream point where the pressure control is desired.

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

- **Clockwise** adjustment **increases** upstream pressure.
- **Counterclockwise** adjustment **decreases** upstream pressure.

For 127-5 and 114 models with downstream surge control, the 1330p is normally installed in the main valve control piping between the upstream body tap and the top bonnet tap. Flow must still be in the direction indicated. In most cases, a sense line is factory installed between the diaphragm sense port and the downstream body tap, as shown in the drawing. The pilot can also be remotely sensed further downstream, as is common in direct fueling to aircraft.

Surge pilot pressure setting is normally 5-10psi higher than the primary pressure reducing pilot. Be sure to review instructions in the 127/114 control valve manual for more specific instructions. Adjustment is made by means of a single adjusting screw

- **Clockwise** adjustment **increases** downstream pressure.
- **Counterclockwise** adjustment **decreases** downstream pressure.

MAINTENANCE

Required maintenance of the 1330P 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 1330P pilot. These, and the symptoms they can cause, are as follows:

1. PILOT DIAPHRAGM RUPTURED: A ruptured pilot diaphragm will be evidenced by leakage through the plugged vent hole in the pilot bonnet. Removal of the 1/8" NPT plug will be required to inspect diaphragm condition.
   a. 108 Installation - Results in failure of the main valve to open and/or upstream pressure that is too high.
   b. 127/114 Series - Results in the main valve closing too slowly. Downstream pressure may rise too high during sudden reductions in flow.
2. PILOT SEAT DISC DETERIORATED:
   a. 108 Series: Results in a failure of the valve to seal off completely (pressure relief service). Can also cause poor pressure control upstream.
   b. 127/114 Series: Outlet pressure may be unstable or too low under flowing 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 1330P assembly drawing for parts identification. It is recommended to replace all rubber elastomers when repairing pilot.

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.

BONNET CHAMBER SEAL REPLACEMENT

4. Remove adapter (28) assembly from bonnet (2).
5. Remove old o-ring (25).
6. Remove cotter key (25) from adjusting screw (10)
7. Remove adjusting screw. Check that adjusting screw lower polished seal surface is clean.
8. Remove and install new o-ring (23) in adapter (28).
9. Re-install adjusting screw (10) and cotter key (25).
10. Re-install adapter assembly (28) and new o-ring (25) back onto bonnet (2). Set aside.

DIAPHRAGM / SEAT DISC / STEM REPLACEMENT

11. Pull the adapter (3) out of the pilot body (1).
12. Remove hex nut (16), lock washer (22), diaphragm plates (8) and o'rings (20). Remove old diaphragm (5).
13. Remove Stem (7) and seat disc assembly from adapter (3).
    a. Remove capscrew (12), seal washer (13), and old seat disc (6).
    b. Inspect stem and o'ring (21) carefully.
    c. Remove any foreign material or light scratches from the stem with a fine grade of emery cloth. A badly scored stem should be replaced.
    d. Replace o'ring (21).
    e. Lubricate the o'ring and stem liberally with Vaseline® or similar lubricant.
    f. Place a new seat disc, new seal washer (13), and capscrew (12) on the stem. Tighten Securely.
14. Install Stem (7) and seat disc(6) assembly back in adapter (3).
15. Install lower diaphragm plate (8), o'ring (20),
16. Install new diaphragm (5).
17. Replace upper diaphragm plate (8), o'ring (20), lock washer (22) and hex nut (16). Tighten securely.
18. Insert adapter (3) back into body (1) and install new o-ring (18).
19. Hold spring (9) and spring retainers (11) together in the proper orientation and insert them into the bonnet (2).
20. Place the bonnet assembly over the adapter (3) and insert the bonnet capscrews (17). Tighten securely.
21. Place valve back in service, following the startup and adjustment procedures given in the main portion of this manual.

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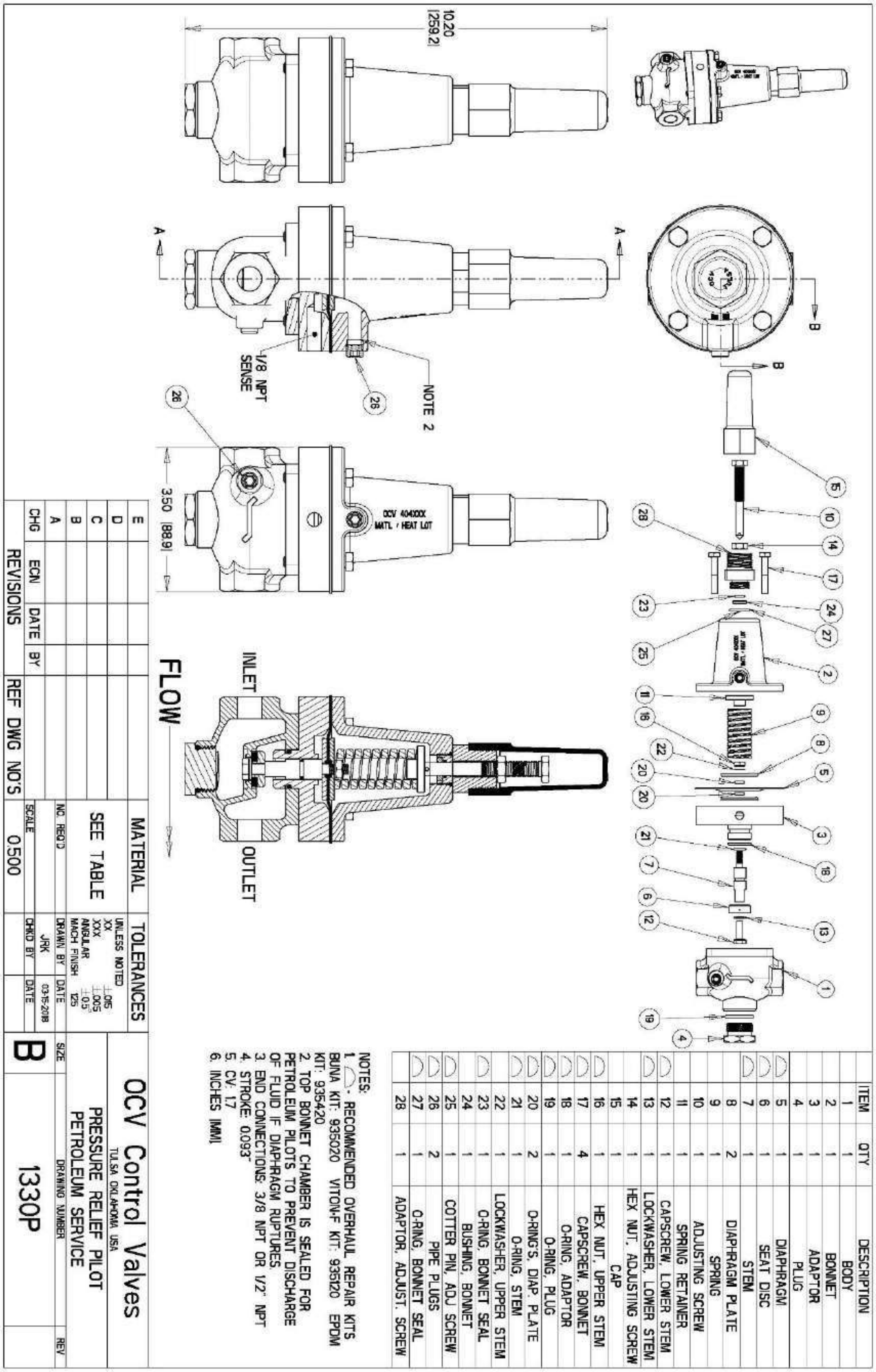
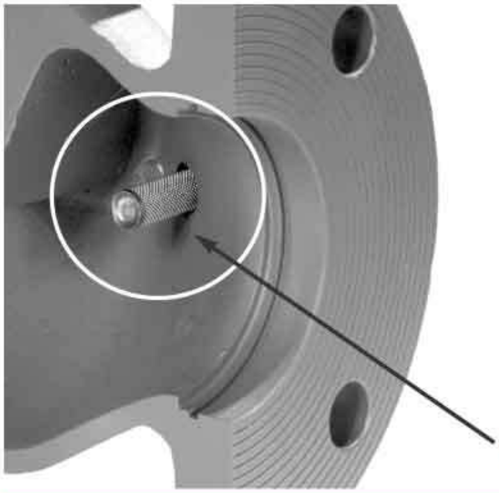


	ITEM	QTY	DESCRIPTION
	1	1	BODY
	2	1	BONNET
	3	1	ADAPTOR
	4	1	PLUG
◠	5	1	DIAPHRAGM
◠	6	1	SEAT DISC
◠	7	1	STEM
	8	2	DIAPHRAGM PLATE
	9	1	SPRING
	10	1	ADJUSTING SCREW
	11	1	SPRING RETAINER
◠	12	1	CAPSCREW, LOWER STEM
◠	13	1	LOCKWASHER, LOWER STEM
	14	1	HEX NUT, ADJUSTING SCREW
	15	1	CAP
◠	16	1	HEX NUT, UPPER STEM
◠	17	4	CAPSCREW, BONNET
◠	18	1	O-RING, ADAPTOR
◠	19	1	O-RING, PLUG
◠	20	2	O-RING'S, DIAP. PLATE
◠	21	1	O-RING, STEM
	22	1	LOCKWASHER, UPPER STEM
◠	23	1	O-RING, BONNET SEAL
	24	1	BUSHING, BONNET
◠	25	1	COTTER PIN, ADJ SCREW
◠	26	2	PIPE PLUGS
◠	27	1	O-RING, BONNET SEAL
	28	1	ADAPTOR, ADJUST. SCREW

NOTES:
1. ◠ - RECOMMENDED OVERHAUL REPAIR KITS BUNA KIT: 935020 VITON-F KIT: 935120 EPDM KIT: 935420
2. TOP BONNET CHAMBER IS SEALED FOR PETROLEUM PILOTS TO PREVENT DISCHARGE OF FLUID IF DIAPHRAGM RUPTURES.
3. END CONNECTIONS: 3/8 NPT OR 1/2" NPT
4. STROKE: 0.093"
5. CV: 1.7
6. INCHES [MM]



◀Strainer Shown Installed

DESCRIPTION

The 123 Inline Strainer installs in the inlet side port of the main valve, and protects the pilot system from solid contaminates in the line fluid. The screen prevents the entrance of particles into the pilot system piping while flow through the main valve washes the screen clean. Recommended use on petroleum valve applications where flushing or removal of the screen for cleaning is not practical or may be considered hazardous.

DIMENSIONS

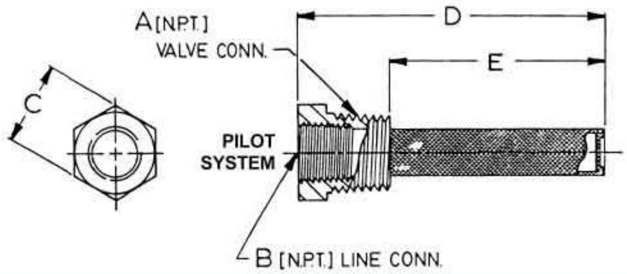
PART NUMBER	A	B	C	D	E	USED ON VALVE SIZE
660704	3/8	1/4	11/16	2 3/16	1 1/2	1 1/4"-6"
660705	1/2	3/8	7/8	2 1/4	1 1/2	8"-10"
660706	3/4	1/2	1 1/8	2 3/8	1 1/2	12"-16"

MATERIALS

Inline strainers are all-stainless steel construction.

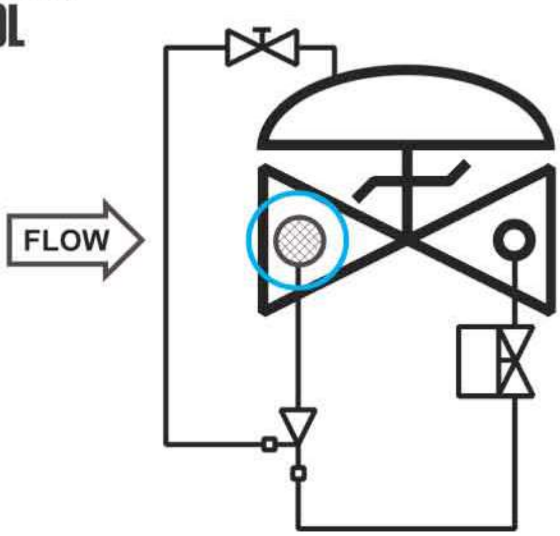
SCREEN SIZE

Standard screen is 40 mesh. Other mesh sizes are available.



SCHEMATIC SYMBOL

The Model 123 Inline Strainer is shown on OCV Valve Schematics as:



EXAMPLE: Shown here on a MODEL 115-2 Solenoid Valve.

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Inline Strainer 123

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.

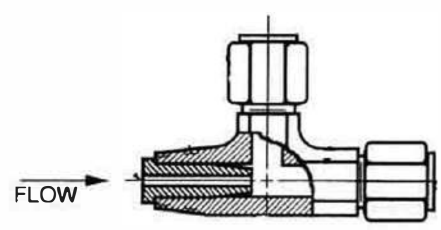
MODEL 126 EJECTOR DIAGRAM

Stainless Steel Construction

MATERIAL	PART NUMBER	P (NPT)	T-TUBE O.D.	STD. ORIFICE	USED ON VALVE SIZES
316 Stn. Steel	213700	1/4"	3/8"	.090"	1 ¼"-6"
316 Stn. Steel	214700	3/8"	1/2"	.125"	8"-10"
316 Stn. Steel	215700	1/2"	3/4"	.188"	12"-16"

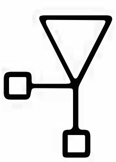
Orifice bushings are stainless steel.

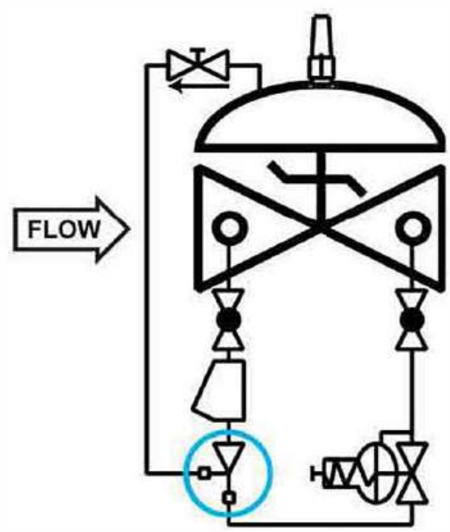
STAINLESS



SCHEMATIC SYMBOL

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



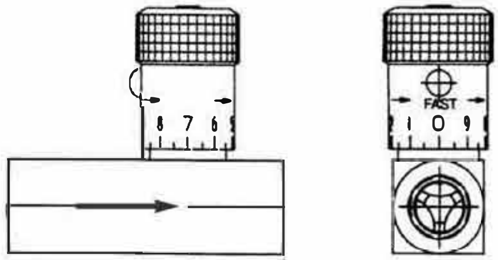


EXAMPLE: Shown here on a MODEL 127-3 Pressure Reducing Valve

TOLL FREE 1.888.628.8258 • **phone:** (918)627.1942 • **fax:** (918)622.8916 • 7400 East 42nd Place, Tulsa, OK 74145
email: sales@controlvalves.com • **website:** www.controlvalves.com

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.

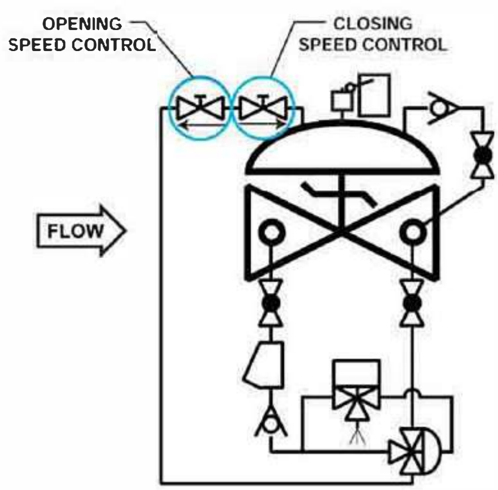


MODEL 141-3 MATRIX

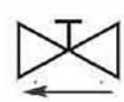
MATERIAL	PART NUMBER	INLET/OUTLET (NPT)	A	USED ON VALVE SIZE*
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Stn. Steel	682700	1/4	2 3/8	1 ¼"-2" Stn.
Stn. Steel	682701	3/8	2 3/4	2 ½"-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.

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