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67CF Series Installation Sheet

Introduction

This installation sheet covers the installation and startup of the 67CF Series filter regulators. If maintenance is required, refer to the 67CF Series Instruction Manual, form 5469. Contact your Fisher Sales Representative or Sales Office to receive a copy of the instruction manual.

Specifications

- **Maximum Inlet Pressure:**
250 psig (17,2 bar)
- **Maximum Outlet Pressure:**
50 psi (3,4 bar) over outlet pressure setting
- **Outlet Pressure Ranges:**
0 to 35 psig (0 to 1,4 bar)
0 to 60 psig (0 to 2,4 bar)
0 to 125 psig (0 to 8,6 bar)
- **Temperature Capabilities with Nitrile (NBR):**
-40° to 180°F (-40°C to 82°C)

Installation



WARNING

Personal injury, property damage, equipment damage, or leakage due to escaping gas or bursting of pressure-containing parts may result if this regulator is overpressured or is installed where service conditions could exceed the limits given in the specifications, or where conditions exceed any ratings of the adjacent piping or piping connections. To avoid such injury or damage, provide pressure-relieving or pressure-limiting devices (as required by the appropriate code, regulation, or standard) to prevent service conditions from exceeding those limits.

The internal relief valve in the Type 67CFR regulator does not provide full overpressure protection. The internal relief valve is designed for minor seat leakage only. If maximum inlet pressure to the Type 67CFR exceeds the maximum pressure ratings of the downstream equipment or exceeds the maximum allowable outlet pressure of the Type 67CFR, additional overpressure protection is required.

1. Regulator operation within ratings does not preclude the possibility of physical damage from external sources

or debris in the lines. Regulators should be inspected for damage periodically and after an overpressure condition.

2. Only personnel qualified through training and experience should install, operate, and maintain a regulator. Make sure there is no damage to or foreign material in the regulator and all tubing/piping is free of debris.

3. Install the regulator so that flow is from the IN to the OUT connection as marked on the regulator body.

4. For best drainage, orient the drain valve (key 2) to the lowest possible point on the dripwell (key 5). This orientation may be improved by rotating the dripwell with respect to the body (key 1).



WARNING

A regulator may vent some gas to the atmosphere. In hazardous or flammable gas service, vented gas may accumulate and cause personal injury, death, or property damage due to fire or explosion. Vent a regulator in hazardous gas service to a remote, safe location away from air intakes or any hazardous area. The vent line or stack opening must be protected against condensation or clogging.

5. A clogged spring case vent hole may cause the regulator to function improperly. To keep this vent hole from being plugged (and to keep the spring case from collecting moisture, corrosive chemicals, or other foreign material) orient the vent to the lowest possible point on the spring case or otherwise protect it. Inspect the vent hole regularly to make sure it is not plugged. Spring case vent hole orientation may be changed by rotating the spring case with respect to the body. A 1/4-inch NPT spring case vent may be remotely vented by installing tubing or piping into the vent.

6. For regulator shutdown, install upstream block and vent valves and downstream block and vent valves (if required), or provide some other suitable means of properly venting the regulator inlet and outlet pressures.

7. Apply a good grade of pipe compound to the male pipe threads before making connections, making sure not to get the pipe compound inside the regulator.

8. Install tubing fitting or piping into the 1/4-inch NPT inlet connection on the body (key 1) and into the 1/4-inch NPT body outlet connection.

9. The second 1/4-inch NPT outlet can be used for a gauge or other use. If not used, it must be plugged.

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10. When installing a 67CF Series regulator in an existing installation, it may be necessary to use spacers to adapt the installation. If the mounting bolts are too long, place a spacer on the bolt. To be sure the regulator is secure, the bolts should have at least two full threads of engagement.

Startup and Adjustment

1. With proper installation completed and downstream equipment properly adjusted, slowly open the upstream and downstream shutoff valve (when used) while using pressure gauges to monitor pressure.



WARNING

To avoid personal injury, property damage, or equipment damage caused by bursting of pressure containing parts or explosion of accumulated gas, never adjust the control spring to produce an outlet pressure higher than the upper limit of the outlet pressure range for that particular spring. If the desired outlet pressure is not within the range of the control spring, install a spring of the proper range.

2. If outlet pressure adjustment is necessary, monitor outlet pressure with a gauge during the adjustment procedure. The regulator is adjusted by loosening the locknut (key 19), if used, and turning the adjusting screw or handwheel (key 18) clockwise to increase or counter-clockwise to decrease the outlet pressure setting. Tighten the locknut to maintain the adjustment position.

Parts List

Key	Description	Key	Description
1	Body	16 ⁽¹⁾	Diaphragm Assembly
2	Drain Valve	17	Spring
3	Flange Screw	18	Adjusting Screw
4 ⁽¹⁾	O-Ring	19	Locknut
5	Dripwell	20	Upper Spring Seat
6 ⁽¹⁾	Filter Element	22	Pressure Gauge
7	Spring Case	23	1/4-Inch Pipe Plug
9	Filter Retainer	24	Tire Valve
10 ^(1, 2)	Valve Cartridge	26 ⁽¹⁾	Filter Gasket
11 ^(1, 2)	Valve Plug	31	Panel Mounting Nut
12 ^(1, 2)	Valve Spring	32	Wire Seal
13 ^(1, 2)	Valve Retainer	33	Closing Cap
14 ^(1, 2)	O-Ring	34	Spacer
15 ^(1, 2)	Soft Seat		

1. Recommended Spare Part

2. Valve cartridge assembly includes keys 10, 11, 12, 13, 14, and 15.

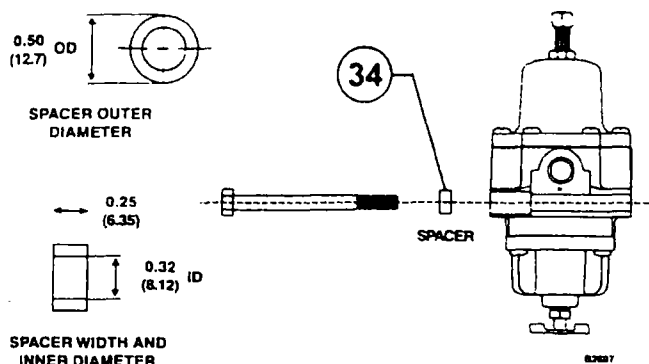


Figure 1. Spacer Diameter and Installation

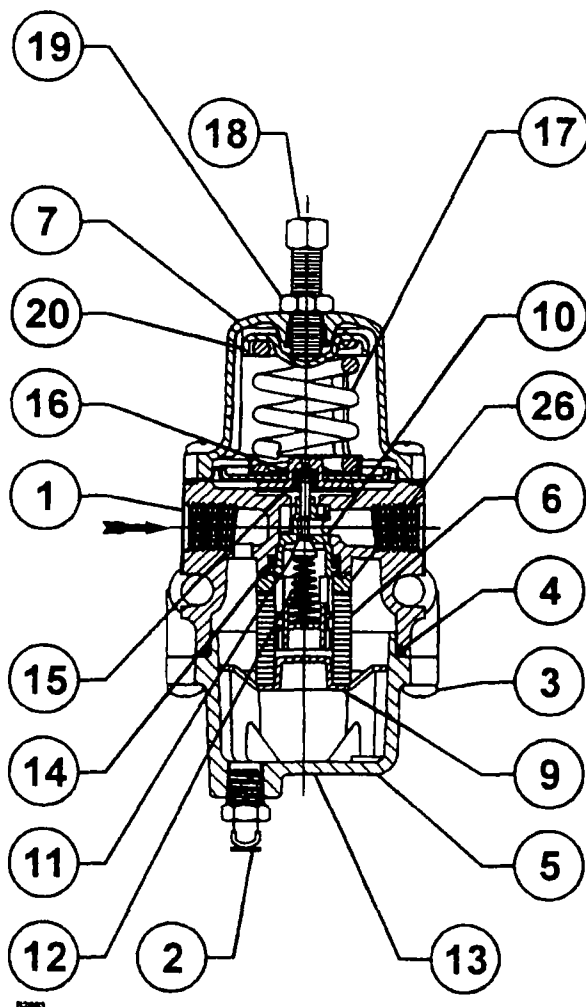


Figure 2. 67CF Series Assembly Drawings

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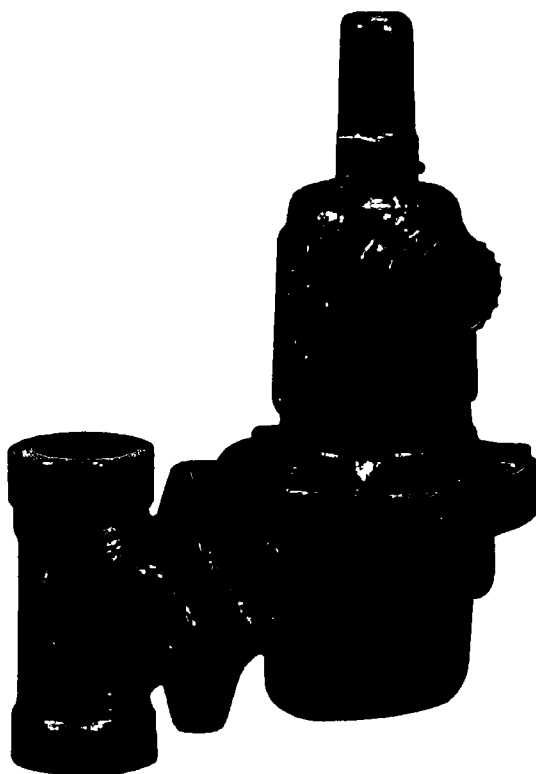
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627 Series Pressure Reducing Regulators

Introduction

Scope of Manual

This manual provides instructions for the installation, adjustment, maintenance, and parts ordering for the 627 Series regulators. These regulators usually are shipped separate for line installation, although sometimes they are shipped installed on other equipment. Refer to the instruction manual for the other equipment for installation and operating instructions.



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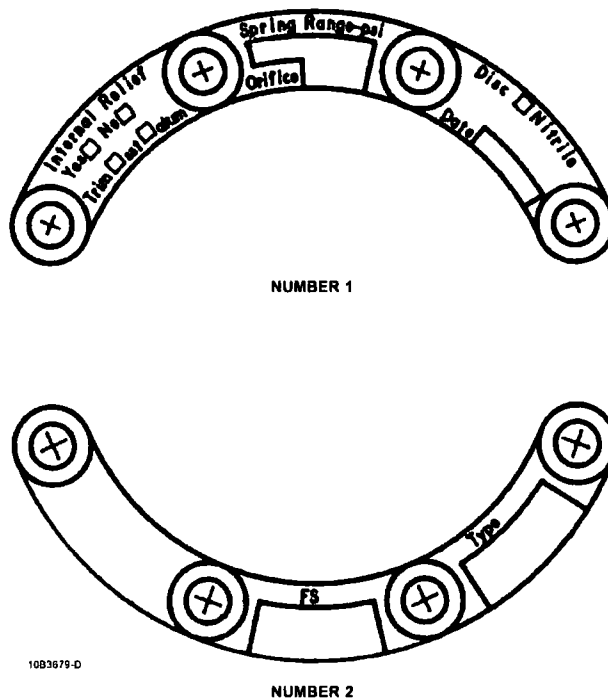
Figure 1. Typical 627 Series Self-Operated Pressure Reducing Regulator

Description

The 627 Series self-operated pressure reducing regulators (figure 1) are for high and low pressure systems. These regulators can be used with natural gas, air, or a variety of other gases. Performance characteristics vary according to construction (see the AVAILABLE CONFIGURATIONS specification in table 1).

Specifications

Table 1 gives some general specifications for the 627 Series regulators. The nameplates (figure 2) gives detailed information for a particular regulator as it comes from the factory.



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Figure 2. Nameplates



627 Series

Table 1. Specifications

Available Constructions	Maximum Body Outlet Pressure⁽¹⁾ (Type 627M, 627MR, and 627HM Only)
<p>Type 627: Self-operated pressure reducing regulator equipped with a pitot tube for greater regulated capacities (figure 7)</p>	<p>2000 psig (138 bar) for screwed steel, 1480 psig (102 bar) for RF flanged steel, or 1000 psig (69 bar) for ductile iron. (Type 627 and 627R are limited by maximum diaphragm casing pressure)</p>
<p>Type 627R: Type 627 with internal relief and with an open throat (figure 8)</p>	Port Diameters
<p>Type 627M: Type 627 with a stem seal between the body outlet pressure and diaphragm case. Pressure is measured under the diaphragm through the 1/4-inch NPT downstream control line connection (figure 9)</p>	<p>See table 2</p>
<p>Type 627MR: Type 627M with internal relief (figure 10)</p>	Internal Relief Performance
<p>Type 627H: Type 627 with a diaphragm limiter to deliver a higher outlet pressure (figure 11)</p>	<p>Type 627R: See table 4</p>
<p>Type 627HM: Type 627H with a stem seal between the body outlet pressure and diaphragm case. Pressure is measured under the diaphragm through two 1/4-inch NPT downstream control line connections (figure 12)</p>	<p>Type 627MR: Limited by field-installed control line piping</p>
Body Sizes	Temperature Capabilities⁽¹⁾
<p>3/4, 1, or 2-inch</p>	<p>-20 to 180°F (-29 to 82°C)</p>
End Connection Styles	Pressure Registration
<p>3/4, 1, or 2-inch body sizes: NPT</p>	<p>Type 627, 627H or 627R: Internal</p>
<p>1 or 2-inch body sizes: ANSI Class 300 or 600 RF flanged</p>	<p>Type 627M, 627HM or 627MR: External through 1/4-inch NPT control line connection in the diaphragm casing</p>
Maximum Inlet Pressure⁽¹⁾ (Body Rating)	De-Icer System
<p>2000 psig (138 bar) for NPT steel, 1480 psig (102 bar) for RF flanged steel, or 1000 psig (69 bar) for ductile iron</p>	<p>See figure 3 and Type 627M Regulator De-Icer System Application section</p>
Maximum Valve Disk Inlet Pressure Rating⁽¹⁾	Relief Indicator
<p>2000 psig (138 bar) for nylon disk or 1000 psig (69 bar) for nitrile disk</p>	<p>For 627R and 627MR (see figures 8 and 9)</p>
Maximum Operating Inlet Pressure, Pressure Differential, and Outlet Pressure Ranges⁽¹⁾	Spring Case Vent Connection
<p>See table 2 for pressures by port and spring range</p>	<p>3/4-inch NPT female with removable screened vent assembly</p>
Maximum Spring and Diaphragm Casing Pressure⁽¹⁾	Control Line Connection (Type 627M, 627HM or 627MR Only)
<p>See table 3</p>	<p>1/4-inch NPT female</p>
	Approximate Weight
	<p>Ductile Iron or Steel Casings: 10 pounds (4,5 kg)</p>
	<p>Aluminum Casings: 6.3 pounds (2.8 kg)</p>

1. The pressure/temperature limits in this instruction manual or any applicable standard limitation should not be exceeded.

Table 2. Maximum Inlet Pressures, Differential Pressures, and Outlet Pressure Ranges

TYPE NUMBER	OUTLET PRESSURE RANGE, SPRING PART NUMBER, AND COLOR	ORIFICE SIZE, INCHES (mm)	MAXIMUM INLET PRESSURE, PSIG (bar)	MAXIMUM DIFFERENTIAL PRESSURE, PSID (bar)
627 and 627M ⁽³⁾	5 ⁽²⁾ to 20 psig (0,34 to 1,4 bar) 10B3076X012 Yellow	3/32 (2,4)	2000 (138) ⁽¹⁾	2000 (138) ⁽¹⁾
		1/8 (3,2)	1000 (69) ⁽¹⁾	1000 (69) ⁽¹⁾
		3/16 (4,8)	750 (51,7)	750 (51,7)
		1/4 (6,4)	500 (34,5)	500 (34,5)
		3/8 (9,5)	300 (20,7)	300 (20,7)
		1/2 (12,7)	250 (17,2)	250 (17,2)
	15 to 40 psig (1,0 to 2,8 bar) 10B3077X012 Green	3/32 (2,4)	2000 (138) ⁽¹⁾	2000 (138) ⁽¹⁾
		1/8 (3,2)	1500 (103) ⁽¹⁾	1500 (103) ⁽¹⁾
		3/16 (4,8)	1000 (69) ⁽¹⁾	1000 (69) ⁽¹⁾
		1/4 (6,4)	750 (51,7)	750 (51,7)
		3/8 (9,5)	500 (34,5)	500 (34,5)
		1/2 (12,7)	300 (20,7)	300 (20,7)
	35 to 80 psig (2,4 to 5,5 bar) 10B3078X012 Blue	3/32 (2,4)	2000 (138) ⁽¹⁾	2000 (138) ⁽¹⁾
		1/8 (3,2)	2000 (138) ⁽¹⁾	2000 (138) ⁽¹⁾
		3/16 (4,8)	1750 (121) ⁽¹⁾	1750 (121) ⁽¹⁾
		1/4 (6,4)	1500 (103) ⁽¹⁾	1500 (103) ⁽¹⁾
		3/8 (9,5)	1000 (69) ⁽¹⁾	1000 (69) ⁽¹⁾
		1/2 (12,7)	750 (51,7)	750 (51,7)
	70 to 150 psig (4,8 to 10,3 bar) 10B3079X012 Red	3/32 (2,4)	2000 (138) ⁽¹⁾	2000 (138) ⁽¹⁾
		1/8 (3,2)	2000 (138) ⁽¹⁾	2000 (138) ⁽¹⁾
		3/16 (4,8)	2000 (138) ⁽¹⁾	2000 (138) ⁽¹⁾
		1/4 (6,4)	1750 (121) ⁽¹⁾	1750 (121) ⁽¹⁾
		3/8 (9,5)	1250 (86,2) ⁽¹⁾	1250 (86,2) ⁽¹⁾
		1/2 (12,7)	750 (51,7)	750 (51,7)
627R and 627MR	5 ⁽²⁾ to 20 psig (0,34 to 1,4 bar) 10B3076X012 Yellow	3/32 (2,4)	2000 (138) ⁽¹⁾	2000 (138) ⁽¹⁾
		1/8 (3,2)	1000 (69) ⁽¹⁾	1000 (69) ⁽¹⁾
		3/16 (4,8)	750 (51,7)	750 (51,7)
		1/4 (6,4)	500 (34,5)	500 (34,5)
		3/8 (9,5)	300 (20,7)	300 (20,7)
		1/2 (12,7)	200 (13,8)	200 (13,8)
	15 to 40 psig (1,0 to 2,8 bar) 10B3077X012 Green	3/32 (2,4)	2000 (138) ⁽¹⁾	2000 (138) ⁽¹⁾
		1/8 (3,2)	1500 (103) ⁽¹⁾	1500 (103) ⁽¹⁾
		3/16 (4,8)	1000 (69) ⁽¹⁾	1000 (69) ⁽¹⁾
		1/4 (6,4)	750 (51,7)	750 (51,7)
		3/8 (9,5)	300 (20,7)	300 (20,7)
		1/2 (12,7)	200 (13,8)	200 (13,8)
	35 to 80 psig (2,4 to 5,5 bar) 10B3078X012 Blue	3/32 (2,4)	2000 (138) ⁽¹⁾	2000 (138) ⁽¹⁾
		1/8 (3,2)	1750 (121) ⁽¹⁾	1750 (121) ⁽¹⁾
		3/16 (4,8)	1000 (69) ⁽¹⁾	1000 (69) ⁽¹⁾
		1/4 (6,4)	750 (51,7)	750 (51,7)
		3/8 (9,5)	300 (20,7)	300 (20,7)
		1/2 (12,7)	200 (13,8)	200 (13,8)
	70 to 150 psig (4,8 to 10,3 bar) 10B3079X012 Red	3/32 (2,4)	2000 (138) ⁽¹⁾	2000 (138) ⁽¹⁾
		1/8 (3,2)	1000 (69) ⁽¹⁾	1000 (69) ⁽¹⁾
		3/16 (4,8)	500 (34,5)	500 (34,5)
		1/4 (6,4)	300 (20,7)	300 (20,7)
		3/8 (9,5)	200 (13,8)	200 (13,8)
		1/2 (12,7)	200 (13,8)	200 (13,8)
627H and 627MH ⁽³⁾	140 to 250 psig (9,7 to 17,2 bar) 10B3078X012 Blue	3/32 (2,4)	2000 (138) ⁽¹⁾	2000 (138) ⁽¹⁾
		1/8 (3,2)	2000 (138) ⁽¹⁾	2000 (138) ⁽¹⁾
		3/16 (4,8)	1750 (121) ⁽¹⁾	1750 (121) ⁽¹⁾
		1/4 (6,4)	1500 (103) ⁽¹⁾	1000 (69) ⁽¹⁾
		3/8 (9,5)	1000 (69) ⁽¹⁾	500 (34,5)
		1/2 (12,7)	750 (51,7)	250 (17,2)
	240 to 500 psig (16,5 to 34,5 bar) 10B3079X012 Red	3/32 (2,4)	2000 (138) ⁽¹⁾	2000 (138) ⁽¹⁾
		1/8 (3,2)	2000 (138) ⁽¹⁾	2000 (138) ⁽¹⁾
		3/16 (4,8)	1750 (121) ⁽¹⁾	1750 (121) ⁽¹⁾
		1/4 (6,4)	1500 (103) ⁽¹⁾	1000 (69) ⁽¹⁾
		3/8 (9,5)	1000 (69) ⁽¹⁾	500 (34,5)
		1/2 (12,7)	750 (51,7)	250 (17,2)

1. For inlet pressure in excess of 1000 psig (69 bar), refer to the maximum body and disk pressure ratings in the specification table.

2. For pressure settings under 10 psig (0,69 bar), inlet pressure should be limited to approximately 100 psig (6,9 bar) so the setpoint adjustment can be obtained.

3. The unbalance forces change from the wide-open monitor mode to an active regulator mode such that the Type 627M or 627MH should have a 3/8-inch (9,5 mm) or larger orifice when used as a wide-open monitor.

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Table 3. Maximum Spring and Diaphragm Casing Pressure(1)

MAXIMUM PRESSURE DESCRIPTION	SPRING AND DIAPHRAGM CASING STYLE	TYPE 627, PSIG (bar)	TYPE 627R, PSIG (bar)	TYPE 627M, PSIG (bar)	TYPE 627MR, PSIG (bar)	TYPE 627H AND 627HM, PSIG (bar)
Maximum pressure to spring and diaphragm casings to prevent leak to atmosphere other than relief action (internal parts damage may occur)	Die cast aluminum	250 (17,2)	250 (17,2)	Not Available	Not Available	Not Available
	Die cast aluminum	250 (17,2)	250 (17,2)	250 (17,2)	Not Available	Not Available
	Steel	250 (17,2)	250 (17,2)	250 (17,2)	250 (17,2)	800 (55,2)
Maximum pressure to spring and diaphragm casings to prevent burst of casings during abnormal operation (leak to atmosphere and internal parts damage may occur)	Die cast aluminum	375 (25,9)	375 (25,9)	Not Available	Not Available	Not Available
	Ductile iron	465 (32)	465 (32)	465 (32)	465 (32)	Not Available
	Steel	1500 (103)	1500 (103)	1500 (103)	1500 (103)	1500 (103)
Maximum diaphragm casing overpressure (above setpoint) to prevent damage to internal parts	All styles	60 (4,1)	120 (8,3)	60 (4,1)	120 (8,3)	120 (8,3)
1. If the spring case is pressurized, a metal adjusting screw cap is required. Contact your Fisher Sales Representative.						



WARNING

Personal injury, property damage, equipment damage, or leakage due to escaping gas or bursting of pressure-containing parts may result if this regulator is over-pressured or is installed where service conditions could exceed the limits given in tables 1, 2, 3, and 4, or where conditions exceed any ratings of the adjacent piping or piping connections.

To avoid such injury or damage, provide pressure-relieving or pressure-limiting devices (as required by the appropriate code, regulation, or standard) to prevent service conditions from exceeding those limits. The Type 627R or 627MR regulator with internal relief will provide downstream overpressure protection within the limits given in tables 1, 2, 3 and 4. If these limits are exceeded additional downstream overpressure protection must be provided by the user.

Additionally, physical damage to the regulator could cause personal injury or property damage due to escaping gas. To avoid such injury or damage, install the regulator in a safe location.

Installation

Regulator operation within ratings does not preclude the possibility of damage from debris in the lines or from external sources. A regulator should be inspected for damage periodically and after any overpressure condition. Key numbers referenced in this section are shown in figures 7 through 12. Ensure that the operating temperature capabilities listed in table 1 are not exceeded.

Like most regulators, 627 Series regulators have outlet pressure ratings that are lower than their inlet pressure ratings. A pressure relieving or pressure limiting device must be provided by the user for the Type 627, 627H, 627M, and 627HM regulators if the inlet pressure can exceed the outlet pressure rating, since these regulators do not have internal relief.

Type 627R regulators provide internal relief which limits the total outlet pressure buildup over setpoint. Use table 4 to determine the total outlet pressure. This internal relief may be adequate for the application, if not, provide additional pressure relief or a pressure limiting device downstream.

Note

If the regulator is shipped mounted on another unit, install that unit according to the appropriate instruction manual.

Perform steps 1 through 6 for all types of regulators:

1. Only personnel qualified through training and experience should install, operate, or maintain this regulator.
2. For a regulator that is shipped separately, make sure that there is no damage to, or foreign material in, the regulator.
3. Ensure that all tubing and piping have been blown free of foreign debris.
4. The regulator may be installed in any position as long as the flow through the body is in the direction indicated by the arrow cast on the body.
5. If continuous operation is required during inspection or maintenance, install a three-valve bypass around the regulator.

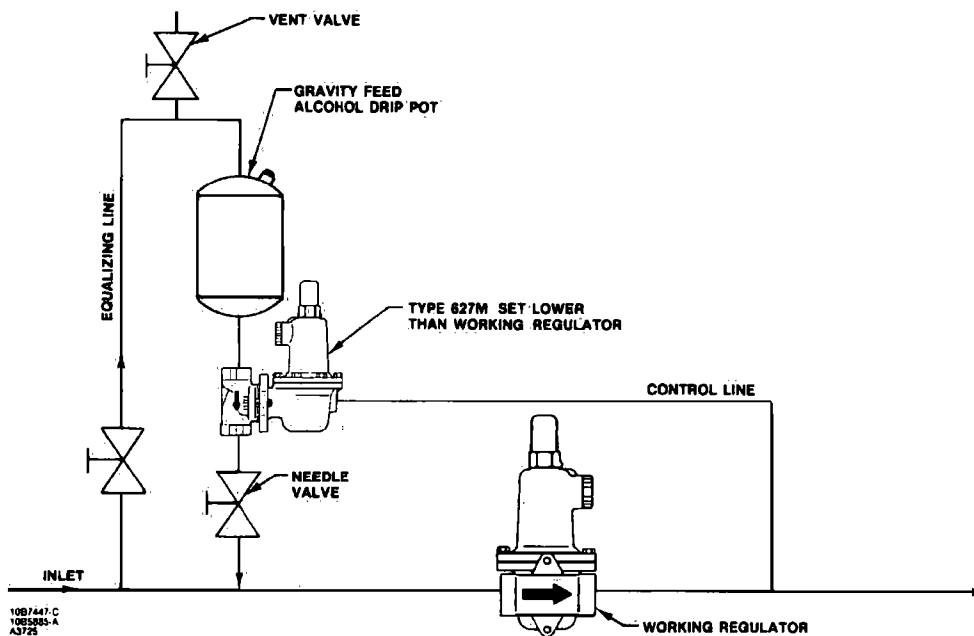


Figure 3. Schematic of De-Icer System



WARNING

A regulator may vent some gas to the atmosphere. In hazardous or flammable gas service, vented gas may accumulate and cause personal injury, death, or property damage due to fire or explosion. Vent a regulator in hazardous gas service to a remote, safe location away from air intakes or any hazardous area. The vent line or stack opening must be protected against condensation or clogging.

6. Position the body (key 1) and/or diaphragm spring case (key 29) so it will not collect moisture or debris into the screened vent. If the regulator requires repositioning, refer to the body area maintenance procedures and/or the diaphragm case area maintenance procedures in the Maintenance section to reposition the screened vent for the application.

Perform steps 7 through 9 for Types 627M, 627HM, and 627MR regulators only:

7. A Type 627M, 627HM, or 627MR regulator requires a downstream control line. Install the control line before putting the regulator into operation.

8. Ensure that the downstream control line piping is at least 3/8-inch or larger outside diameter tubing and

connected to a straight section of outlet piping 10 diameters downstream of the regulator.

9. A hand valve should be installed in the control line. This hand valve can be used to throttle down and dampen outlet pulsations in control pressure which may cause instability or cycling of the regulator.

Remote Vent Line Installation

All 627 series regulators have a vent assembly installed in the 3/4-inch NPT spring case vent opening. The vent assembly can be removed to install a remote vent line if necessary. Remote vent lines must have the largest practical diameter. The vent line should be as short as possible with a minimum number of bends or elbows.

Protect the remote vent opening against entrance of rain, snow, or any other foreign material that may plug the vent or vent line and prevent proper operation of the regulator. Periodically check the vent opening to be sure it is not plugged with foreign debris.

Type 627M or 627HM Regulator De-Icer System Application

For the Type 627M or 627HM regulator de-icer system, refer to the application shown in figure 3. With a large pressure drop across the working regulator, ice can

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Table 4. Type 627R Internal Relief Performance⁽¹⁾

OUTLET PRESSURE RANGE, SPRING PART NUMBER, AND COLOR	OUTLET PRESSURE SETTING, PSIG (bar)	MAXIMUM ALLOWABLE DOWNSTREAM SYSTEM PRESSURE, PSIG (bar)	MAXIMUM INLET PRESSURE TO KEEP MAXIMUM ALLOWABLE DOWNSTREAM SYSTEM PRESSURE FROM BEING EXCEEDED, PSIG (bar) ⁽²⁾					
			Orifice Size, Inches (mm)					
			3/32 (2,4)	1/8 (3,2)	3/16 (4,8)	1/4 (6,4)	3/8 (9,5)	1/2 (12,7)
5 ⁽³⁾ to 20 psig (0,34 to 1,4 bar) 10B3076X012 Yellow	10 (0,69)	60 (4,1)	1250 (86,2)	740 (51,1)	320 (22,1)	190 (13,1)	95 (6,56)	75 (5,18)
		100 (6,9)	2000 (138)	1500 (103)	620 (42,7)	390 (26,9)	180 (12,4)	130 (8,97)
		125 (8,6)	2000 (138)	1900 (131)	830 (57,2)	480 (33,1)	220 (15,2)	160 (11,0)
		175 (12,1)	2000 (138)	2000 (138)	1100 (75,8)	670 (46,2)	320 (22,1)	220 (15,2)
		200 (13,8)	2000 (138)	2000 (138)	1300 (89,6)	770 (53,1)	360 (24,8)	260 (17,9)
		250 (17,2)	2000 (138)	2000 (138)	1600 (110)	960 (66,2)	450 (31,0)	320 (22,1)
	15 (1,0)	60 (4,1)	1000 (69,0)	620 (42,7)	260 (17,9)	170 (11,7)	90 (6,2)	70 (4,8)
		100 (6,9)	2000 (138)	1400 (96,5)	610 (42,1)	370 (25,5)	170 (11,7)	130 (8,97)
		125 (8,6)	2000 (138)	1900 (131)	810 (55,8)	480 (33,1)	220 (15,2)	160 (11,0)
		175 (12,1)	2000 (138)	2000 (138)	1100 (75,8)	670 (46,2)	320 (22,1)	220 (15,2)
		200 (13,8)	2000 (138)	2000 (138)	1300 (89,6)	770 (53,1)	360 (24,8)	260 (17,9)
		250 (17,2)	2000 (138)	2000 (138)	1600 (110)	960 (66,2)	450 (31,0)	320 (22,1)
	20 (1,4)	60 (4,1)	850 (58,6)	490 (33,8)	210 (14,5)	130 (9,0)	80 (5,52)	65 (4,49)
		100 (6,9)	2000 (138)	1300 (89,6)	600 (41,4)	360 (24,8)	170 (11,7)	120 (8,28)
		125 (8,6)	2000 (138)	1800 (124)	800 (55,2)	480 (33,1)	220 (15,2)	160 (11,0)
		175 (12,1)	2000 (138)	2000 (138)	1100 (75,8)	670 (46,2)	320 (22,1)	220 (15,2)
		200 (13,8)	2000 (138)	2000 (138)	1300 (89,6)	770 (53,1)	360 (24,8)	260 (17,9)
		250 (17,2)	2000 (138)	2000 (138)	1600 (110)	960 (66,2)	450 (31,0)	320 (22,1)
15 to 40 psig (1,0 to 2,8 bar) 10B3077X012 Green	15 (1,0)	60 (4,1)	1000 (69,0)	380 (26,2)	210 (14,5)	130 (8,97)	80 (5,5)	65 (4,49)
		100 (6,9)	2000 (138)	1300 (89,6)	590 (40,7)	350 (24,1)	170 (11,7)	120 (8,28)
		125 (8,6)	2000 (138)	1800 (124)	800 (55,2)	470 (32,4)	220 (15,2)	160 (11,0)
		175 (12,1)	2000 (138)	2000 (138)	1100 (75,8)	640 (44,1)	320 (22,1)	220 (15,2)
		200 (13,8)	2000 (138)	2000 (138)	1300 (89,6)	780 (53,8)	370 (25,5)	260 (17,9)
		250 (17,2)	2000 (138)	2000 (138)	1600 (66,2)	960 (66,2)	450 (31,0)	320 (22,1)
	20 (1,4)	60 (4,1)	630 (43,4)	200 (13,8)	150 (10,3)	100 (6,9)	70 (4,83)	65 (4,49)
		100 (6,9)	2000 (138)	1200 (82,7)	550 (37,9)	330 (22,8)	160 (11,0)	120 (8,28)
		125 (8,6)	2000 (138)	1700 (117)	760 (52,4)	450 (31,1)	210 (14,5)	160 (11,0)
		175 (12,1)	2000 (138)	2000 (138)	1100 (75,8)	630 (43,4)	320 (22,1)	220 (15,2)
		200 (13,8)	2000 (138)	2000 (138)	1300 (89,6)	770 (53,1)	360 (24,8)	260 (17,9)
		250 (17,2)	2000 (138)	2000 (138)	1600 (66,2)	960 (66,2)	460 (31,7)	320 (22,1)
	30 (2,1)	100 (6,9)	2000 (138)	950 (65,5)	450 (31,1)	260 (17,9)	140 (9,66)	110 (7,59)
		125 (8,6)	2000 (138)	1500 (103)	670 (46,2)	400 (27,6)	190 (13,1)	150 (10,3)
		175 (12,1)	2000 (138)	2000 (138)	1000 (69,0)	610 (42,1)	300 (20,7)	220 (15,2)
		200 (13,8)	2000 (138)	2000 (138)	1200 (82,7)	760 (52,4)	360 (24,8)	260 (17,9)
		250 (17,2)	2000 (138)	2000 (138)	1600 (110)	970 (66,9)	460 (31,7)	320 (22,1)
	40 (2,8)	100 (6,9)	1500 (103)	700 (48,3)	330 (22,8)	200 (13,8)	120 (8,28)	108 (7,45)
		125 (8,6)	2000 (138)	1300 (89,6)	560 (38,6)	340 (23,4)	180 (12,4)	140 (9,66)
		175 (12,1)	2000 (138)	1800 (124)	1000 (69,0)	550 (37,9)	290 (20,0)	220 (15,2)
		200 (13,8)	2000 (138)	2000 (138)	1200 (82,7)	730 (50,3)	350 (24,1)	250 (17,2)
		250 (17,2)	2000 (138)	2000 (138)	1600 (110)	970 (66,9)	460 (31,7)	320 (22,1)

form with in this regulator. The formation of ice decreases the size of the port opening, so the regulator is unable to supply enough flow to satisfy the downstream demand. When the downstream pressure falls below the outlet pressure setting of the Type 627M or 627HM regulator, the disk assembly of the Type 627M or 627HM regulator moves off its seat ring, permitting alcohol to flow into the main gas line. The alcohol carried to the main regulator by the flow stream prevents additional ice from forming on the seat ring. When normal flow resumes, and as pressure in the downstream system is restored, the Type 627M or 627HM regulator shuts off.

Startup and Adjustment

Startup



WARNING

To avoid personal injury or property damage due to explosion or damage to regulator or downstream components during startup, release downstream pressure to prevent an overpressure condition on the diaphragm of the regulator.

Table 4. Type 627R Internal Relief Performance⁽¹⁾ (continued)

OUTLET PRESSURE RANGE, SPRING PART NUMBER, AND COLOR	OUTLET PRESSURE SETTING, PSIG (bar)	MAXIMUM ALLOWABLE DOWNSTREAM SYSTEM PRESSURE, PSIG (bar)	MAXIMUM INLET PRESSURE TO KEEP MAXIMUM ALLOWABLE DOWNSTREAM SYSTEM PRESSURE FROM BEING EXCEEDED, PSIG (bar) ⁽²⁾					
			Orifice Size, Inches (mm)					
			3/32 (2,4)	1/8 (3,2)	3/16 (4,8)	1/4 (6,4)	3/8 (9,5)	1/2 (12,7)
35 to 80 psig (2,4 to 5,5 bar) 10B3078X012 Blue	40 (2,8)	125 (8,6)	2000 (138)	1100 (75,8)	500 (34,5)	300 (20,7)	170 (11,7)	140 (9,66)
		150 (10,3)	2000 (138)	1600 (110)	750 (51,7)	440 (30,3)	230 (15,9)	180 (12,4)
		175 (12,1)	2000 (138)	2000 (138)	980 (67,6)	580 (40,0)	290 (20,0)	220 (15,2)
		200 (13,8)	2000 (138)	2000 (138)	1200 (82,7)	720 (49,6)	340 (23,4)	250 (17,2)
		250 (17,2)	2000 (138)	2000 (138)	1600 (110)	940 (64,8)	450 (31,0)	320 (22,1)
	50 (3,4)	125 (8,6)	1400 (96,5)	820 (56,5)	400 (27,6)	230 (15,9)	150 (10,3)	140 (9,66)
		150 (10,3)	2000 (138)	1400 (96,5)	650 (44,8)	370 (25,5)	210 (14,5)	170 (11,7)
		175 (12,1)	2000 (138)	1900 (131)	700 (48,3)	530 (36,5)	270 (18,6)	210 (14,5)
		200 (13,8)	2000 (138)	2000 (138)	1100 (75,8)	670 (46,2)	330 (22,8)	240 (16,5)
		250 (17,2)	2000 (138)	2000 (138)	1500 (103)	920 (63,4)	430 (29,6)	320 (22,1)
	60 (4,1)	125 (8,6)	900 (62,1)	450 (31,1)	270 (18,6)	190 (13,1)	140 (9,66)	130 (8,97)
		150 (10,3)	1700 (117)	1100 (75,8)	540 (37,2)	300 (20,7)	190 (13,1)	160 (11,0)
		175 (12,1)	2000 (138)	1700 (117)	780 (53,8)	470 (32,4)	250 (17,2)	200 (13,8)
		200 (13,8)	2000 (138)	2000 (138)	1000 (69,0)	610 (42,1)	310 (21,4)	230 (15,9)
		250 (17,2)	2000 (138)	2000 (138)	1400 (96,5)	880 (60,7)	420 (29,0)	310 (21,4)
	70 (4,8)	150 (10,3)	1200 (82,7)	850 (58,6)	430 (29,6)	250 (17,2)	170 (11,7)	160 (11,0)
		175 (12,1)	2000 (138)	1400 (96,5)	670 (46,2)	400 (27,6)	230 (15,9)	190 (13,1)
		200 (13,8)	2000 (138)	2000 (138)	920 (63,4)	550 (37,9)	280 (19,3)	230 (15,9)
		250 (17,2)	2000 (138)	2000 (138)	1300 (89,6)	830 (57,2)	400 (27,6)	310 (21,4)
		150 (10,3)	800 (55,2)	500 (34,5)	300 (20,7)	200 (13,8)	160 (11,0)	150 (10,3)
	80 (5,5)	175 (12,1)	1500 (103)	1200 (82,7)	550 (37,9)	330 (22,8)	210 (14,5)	190 (13,1)
		200 (13,8)	2000 (138)	1700 (117)	800 (55,2)	480 (33,1)	270 (18,6)	220 (15,2)
		250 (17,2)	2000 (138)	2000 (138)	1200 (82,7)	770 (53,1)	390 (26,9)	300 (20,7)
		175 (12,1)	1900 (131)	600 (41,4)	400 (27,6)	260 (17,9)	200 (13,8)	175 (12,1)
		200 (13,8)	2000 (138)	1200 (82,7)	630 (43,4)	380 (26,2)	250 (17,2)	210 (14,5)
70 to 150 psig (4,8 to 10,3 bar) 10B3079X012 Red	70 (4,8)	250 (17,2)	2000 (138)	2000 (138)	1100 (75,8)	680 (46,9)	360 (24,8)	290 (20,0)
		175 (12,1)	1400 (96,5)	250 (17,2)	240 (16,5)	200 (13,8)	190 (13,1)	175 (12,1)
		200 (13,8)	2000 (138)	960 (66,2)	520 (35,9)	330 (22,8)	240 (16,5)	210 (14,5)
	80 (5,5)	250 (17,2)	2000 (138)	2000 (138)	1000 (69,0)	620 (42,7)	350 (24,1)	280 (19,3)
		200 (13,8)	1500 (103)	250 (17,2)	240 (16,5)	230 (15,9)	210 (14,5)	210 (14,5)
		250 (17,2)	2000 (138)	1600 (110)	770 (53,1)	520 (35,9)	320 (22,1)	270 (18,6)
	100 (6,9)	200 (13,8)	2000 (138)	1000 (69,0)	500 (34,5)	390 (26,9)	290 (20,0)	260 (17,9)
		250 (17,2)	2000 (138)	1000 (69,0)	500 (34,5)	390 (26,9)	290 (20,0)	260 (17,9)
	125 (8,6)	250 (17,2)	2000 (138)	1000 (69,0)	500 (34,5)	390 (26,9)	290 (20,0)	260 (17,9)
		250 (17,2)	2000 (138)	1000 (69,0)	500 (34,5)	390 (26,9)	290 (20,0)	260 (17,9)
	150 (10,3)	250 (17,2)	1200 (82,7)	260 (17,9)	260 (17,9)	260 (17,9)	260 (17,9)	260 (17,9)

1. The internal relief performance values are obtained by removing the disk assembly.

2. For inlet pressures in excess of 1000 psig (69 bar), refer to the maximum body and disk pressure ratings in the specifications table.

3. For pressure settings under 10 psig (0,69 bar), inlet pressure should be limited to approximately 100 psig (6,9 bar) so the setpoint adjustment can be obtained.

Shaded areas indicate maximum inlet pressures allowed during system malfunction only. Table 6 gives the maximum inlet pressure for normal regulator operation.

In order to avoid an overpressure condition and possible equipment damage, pressure gauges should always be used to monitor pressures during startup.

1. Slowly open the upstream shutoff valve.
2. Slowly open the downstream shutoff valve.
3. Check all connections for leaks.
4. Make final control spring adjustments according to the adjustment procedures.

Adjustment

The range of allowable pressure settings is marked on the nameplate (figure 2). If a pressure setting beyond this range is necessary, substitute the appropriate regulator control spring. Change the nameplate to indicate the new pressure range.

Before increasing the setting, refer to tables 2, 3, or 4. Review the pressure limits for the control spring range being used and be certain that the new pressure setting will not result in an overpressure condition.

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Table 5. Maximum Torque Values

KEY NUMBER ⁽¹⁾	DESCRIPTION	MAXIMUM TORQUE, FOOT-POUNDS (N•m)
2	Seat ring	25 (34)
3	Cap screw (w/ aluminum diaphragm casing)	16 (22)
	Cap screw (w/ ductile iron or steel diaphragm casing)	25 (34)
18	Lever cap screw	7 (9)
22	Diaphragm connector nut	17 (23)
26	Guide retainer (for Type 627R and 627MR only)	3 (4)
37	Spring case cap screw (w/ aluminum or ductile iron diaphragm casing)	7 (9)
	Spring case cap screw (w/ steel diaphragm casing)	35 (47)
46	Diaphragm cap screw (w/Type 627 or 627M)	7 (9)
	Diaphragm cap screw (w/Type 627H or 627MH)	14 (19)

1. Refer to figures 7 through 10 for key number locations.

Note

Always use a pressure gauge to monitor pressure when making adjustments.

Refer to figures 7 through 12 for key number locations.

1. Remove the adjusting screw cap (key 36).
2. Loosen the locknut (key 34).
3. Increase the outlet pressure setting by turning the adjusting screw (key 35) clockwise. Decrease the outlet pressure setting by turning the adjusting screw counter-clockwise.
4. When the desired pressure is obtained, hold the adjusting screw (key 35) in place and tighten the locknut (key 34).

Shutdown



WARNING

To avoid personal injury or property damage due to explosion or damage to regulator or downstream components during shutdown, release downstream pressure to prevent an overpressure condition on the diaphragm of the regulator.

1. Close the nearest upstream shutoff valve.
2. Close the nearest downstream shutoff valve.

3. Open the vent valve between the regulator and the downstream shutoff valve nearest to it.

4. For a Type 627, 627H, or 627R regulator, the regulator will open to release pressure between the upstream shutoff valve and the regulator.

5. A Type 627M, 627HM, or 627MR regulator requires venting the control line and downstream pressure from the regulator before maintenance. The pressure between these shutoff valves is released through the open regulator because the disk assembly remains open in response to the decrease in control line pressure.

Maintenance

Unless otherwise specified, the following maintenance procedures apply to all types of regulators. For a summary of maximum torque values required for all types of regulators, refer to table 5.

Due to normal wear, damage from external sources, or debris in the air or gas line, regulator parts such as the disk assembly, seat ring, and diaphragm must be inspected periodically and replaced as necessary to ensure correct performance. The frequency of inspection and replacement depends upon the severity of conditions and the requirements of state and federal laws. Normal wear of the seat ring and disk assembly is accelerated with high pressure drops and with large amounts of impurities in the flow stream. Instructions are given below for replacing the disk assembly, seat ring, diaphragm, and O-rings. These procedures may also be used for disassembly required for inspection and replacement of other parts.

Problem Indication for Type 627R and 627MR Regulators



WARNING

Isolate the regulator from all pressure to avoid personal injury and equipment damage due to explosion or sudden release of process pressure. Cautiously release pressure from the regulator before attempting disassembly.

The vent assembly is equipped with a relief indicator (key 49, figure 4). The cap for the relief indicator snaps over the vent assembly opening. If the relief valve opens wide, exhaust gas pops the cap off the screen vent assembly opening indicating a problem with the regulator. If the cap pops off, refer to the shutdown and to the body area maintenance procedures to inspect the disk assembly and seat ring.

If the disk assembly and seat ring are not damaged, refer to the diaphragm and spring case area maintenance procedures in this section.

The disk assembly and seat ring can be inspected, removed, and replaced without removing the regulator body from the line connections. Refer to the body area maintenance procedures.

Body Area Maintenance Procedures

These procedures are for gaining access to the disk assembly, seat ring, diaphragm casing O-ring and stem assembly. All pressure must be released from the diaphragm casing before the performing these steps.

While using the following procedures, refer to figures 7 through 12 for key number locations.

Replacing the Disk Assembly or Seat Ring

1. To inspect and replace the disk assembly (key 9) or seat ring (key 2), remove the cap screws (key 3, figure 5), and separate the diaphragm casing (key 5) from the body (key 1).

2. Inspect and, if necessary, remove the seat ring (key 2). If removed, coat the threads of the replacement seat ring with lubricant (key 38) and torque to 25 foot-pounds (34 N•m).

3. Inspect the disk assembly and, if necessary, remove the hair pin clip (key 13) that holds the disk assembly (key 9) in place. If replacing the disk assembly is the only maintenance required, skip to step 16.

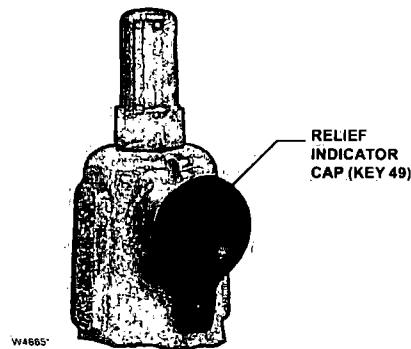


Figure 4. Relief Indicator

Replacing the Stem Assembly

If it is necessary to perform maintenance on the stem assembly, continue with steps 4 through 8 and 15 through 19 for Type 627, 627H, and 627R regulators, or steps 9 through 19 for Type 627M, 627HM, and 627MR regulators.

Perform steps 4 through 8 for Type 627, 627H, and 627R Regulators only:

4. For Type 627, 627H, and 627R regulators (figure 5), use steps 5 through 8 to remove and replace the stem assembly.

5. Remove the boost body (key 6), stabilizer (key 7), and stem guide (key 8) from the diaphragm casing (key 5). Unhook and remove the stem (key 10) from the diaphragm casing (key 5).

6. Remove and inspect the diaphragm casing O-ring (key 4, figure 7, 8, or 11) and replace it if necessary.

7. Apply lubricant (key 42) to a replacement diaphragm casing O-ring (key 4, figure 7, 8, or 11) and install it onto the boost body (key 6). Skip to step 14.

8. For the Type 627 or 627H regulators, be sure to insert the pitot tube (tab) into the outlet side of the body (see figure 7 or 11). Skip to step 14.

Perform steps 9 through 19 for Type 627M, 627HM, and 627MR Regulators only:

9. For Type 627M, 627HM, and 627MR regulators (figure 5), use steps 10 through 14 to remove and replace the stem assembly.

10. To remove the blocked throat (key 43), insert a screw driver blade into the groove provided in the throat and pry it out of the diaphragm casing (key 5). Inspect and replace parts as necessary.

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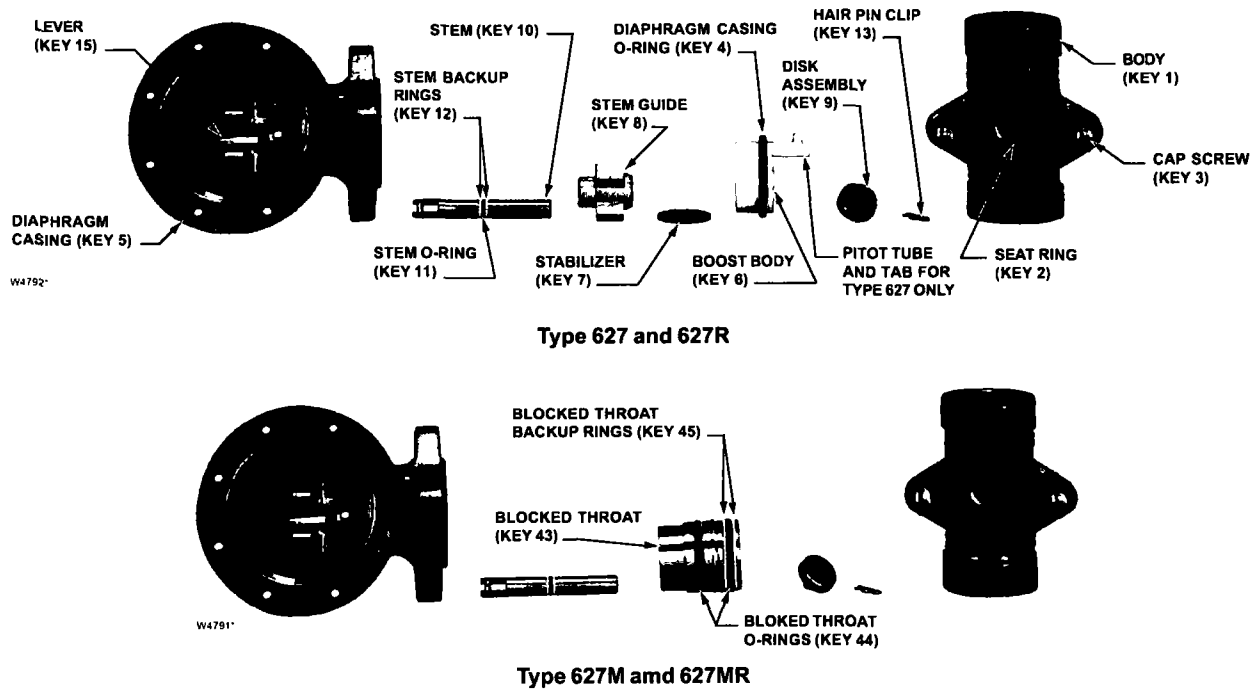


Figure 5. Stem Assemblies

11. Inspect and, if necessary, replace the blocked throat O-rings (key 44, figure 5) and backup rings (key 45, figure 5).

12. Apply lubricant (key 42) to replacement blocked throat O-rings (key 44) and backup rings (key 45).

13. Apply lubricant (key 42) to the replacement stem O-ring (key 11) and stem backup rings (key 12) and install them on the stem (key 10).

14. For assembly, insert the stem (key 10) into the diaphragm casing (key 5) and hook it on the lever (key 15).

15. Insert parts into the diaphragm casing (key 5) that were removed in steps 5 and 6 or step 10 (see figure 5).

16. Install the the disk assembly (key 9), line up the hole in the disk assembly and stem (key 10) and insert the hair pin clip (key 13).

17. Position the diaphragm casing plus attached parts in relation to the body (key 1) so that they are correct for the application.

18. Secure the diaphragm casing to the body with the cap screws (key 3, figure 5). For an aluminum diaphragm casing (key 5), torque the cap screws (key 3) to 16 foot-pounds (22 N•m). For ductile iron or steel diaphragm casings, torque the cap screws (key 3) to 25 foot-pounds (34 N•m).

19. It may be necessary to reposition the diaphragm spring case to prevent rain, ice, and foreign debris from entering the spring case. Refer to the diaphragm and spring case area maintenance procedures, steps 1, 2, and 21 through 25.

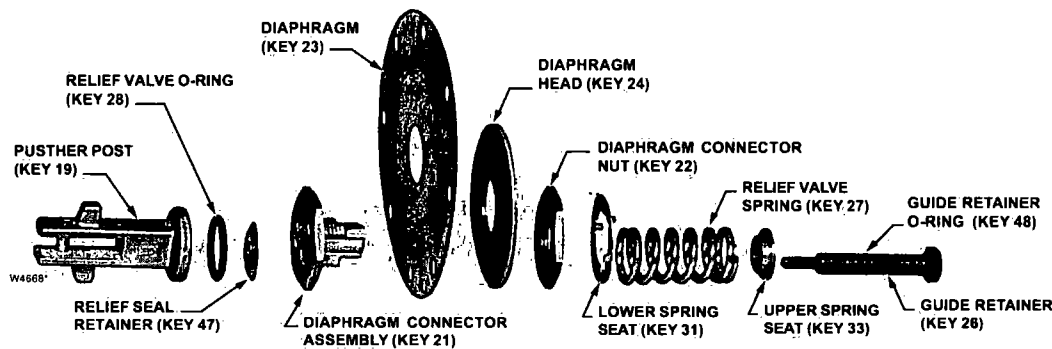
Diaphragm and Spring Case Area Maintenance Procedures

These procedures are for gaining access to the control spring, diaphragm assembly, and lever assembly. All spring pressure must be released from the diaphragm casing before these steps can be performed.

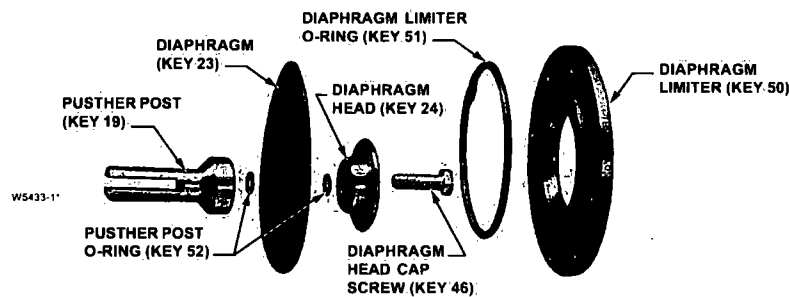
While using the following procedures, refer to figures 7 through 12 for key number locations.

1. Remove the adjusting screw cap (key 36), loosen the lock nut, and turn the adjusting screw (key 35) counterclockwise until all compression is removed from the control spring (key 32).

2. Remove the spring case cap screws (key 37), the nameplates, and lift off the spring case (key 29). If changing the control spring (key 32) or repositioning the spring case (key 29) is the only maintenance required, install the replacement control spring or rotate the spring case so it is correct for the application. Skip to step 21. For diaphragm area maintenance, continue with step 3.



Type 627, 627R, 627M, or 627MR



Type 627H and 627HM

Figure 6. Diaphragm Assemblies

3. Remove the diaphragm limiter and O-ring (keys 50 and 51, on the Type 627H or 627HM only). Remove the diaphragm assembly by tilting it so that the pusher post (key 19) slips off the lever (key 15).

4. If it is necessary to replace the lever assembly, remove the lever cap screws (key 18).

5. Install the replacement lever (key 15) into the lever retainer (key 16) by inserting the lever pin (key 17). Secure the lever assembly into the diaphragm casing with the cap screws (key 18) and torque the cap screws to 7 foot-pounds (9 N•m).

If it is necessary to perform maintenance on the diaphragm assembly, continue with steps 6 through 11 and step 20 for Type 627, 627H, 627M, and 627HM regulators, or steps 12 through 19 for Type 627R and 627MR regulators.

Perform steps 6 through 11 for Type 627, 627H, 627M, and 627HM Regulators only:

6. For Type 627, 627H, 627M, and 627HM regulators (figures 5 & 6), use steps 7 through 11 to disassemble and reassemble the diaphragm assembly.

7. Remove the diaphragm head cap screw (key 46), lower spring seat (key 31, Type 627 or 627M only), and diaphragm head (key 24). On the Type 627H or 627HM, remove the diaphragm cap screw O-rings (key 52). Separate the diaphragm (key 23) from the pusher post (key 19).

8. Install the diaphragm (key 23), in reverse order in step 7, on the pusher post (key 19), insert and finger tighten the diaphragm head cap screw (key 46).

9. Hook the pusher post on the lever (key 15), then turn the diaphragm (key 23) to match the holes in the diaphragm with the holes in the spring casing.

10. Unhook the pusher post from the lever and torque the diaphragm head cap screw (key 46) to 7 foot-pounds (9 N•m) for the Type 627 or 627M. On the Type 627H or 627HM torque the diaphragm head cap screw to 14 foot-pounds (18 N•m).

11. Hook the pusher post on the lever (key 15) and check the hole alignment. If necessary, loosen the cap screw (key 46) and reposition the diaphragm (key 23) on the pusher post (key 19). Retorque the screw (see step 10). Skip to step 20.

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Perform steps 12 through 19 for Type 627R and 627MR Regulators only:

12. For Type 627R and 627MR regulators (figure 6), use steps 13 through 19 to disassemble and reassemble the diaphragm assembly:

13. Remove the guide retainer (key 26) and separate the diaphragm parts. Refer to figure 6 for the sequence of parts.

14. To remove the diaphragm (key 23), remove the diaphragm connector nut (key 22) and lift off the diaphragm head (key 24) and diaphragm (key 23) from the connector assembly (key 21). Do not attempt to disassemble the connector assembly (key 21).

15. Position the replacement diaphragm (key 23) on the connector assembly (key 21), install the diaphragm head (key 24) and connector nut (key 22), then torque to 17 foot-pounds (32 N•m).

16. If necessary, replace the guide retainer O-ring (key 48) and, set the guide retainer (key 26) aside, ready for assembly.

17. On the pusher post (key 19) install the relief seal O-ring (key 28) and lubricate (key 42). Also, install the relief seal retainer (key 47), diaphragm connector assembly (key 21, with attached parts) relief spring (key 27), upper relief spring seat (key 33), and guide retainer (key 26). Torque the guide retainer (key 26) to 3 foot-pounds (4 N•m).

18. Hook the pusher post (with attached parts) on the lever (key 15) to check the alignment of the holes in the diaphragm with the holes in the spring casing. If the holes do not line up, unhook the pusher post from the lever, hold the pusher post, and rotate the diaphragm to the correct position.

19. Install the lower spring seat (key 31) over the relief spring so it rests flat on the connector nut (key 22).

20. Insert the diaphragm assembly into the diaphragm casing (key 5) and hook the pusher post on the lever (key 15).

21. Install the control spring (key 32) and upper spring seat (key 33), and apply lubricant (key 38) to the upper spring seat (key 33).

22. Install the spring case (key 29) so that the screened vent assembly (key 30) is in the correct position for the application. Place the nameplates (key 39) over the screw holes, insert the spring case cap screws (key 37), and finger tighten.

23. Screw in the adjustment screw to put slack into the diaphragm (key 23).

24. Using a crisscross pattern, finish tightening the spring case cap screws (key 37) to 7 foot-pounds (9 N•m) of torque.

25. If necessary, refer to the installation and/or the startup and adjustment procedures.

26. Install the adjusting screw cap (key 34) after regulator adjustment.

Parts Ordering

When corresponding with your Fisher sales office or sales representative about this regulator, always reference the type number which is found on the nameplate (key 39, figures 7 through 12).

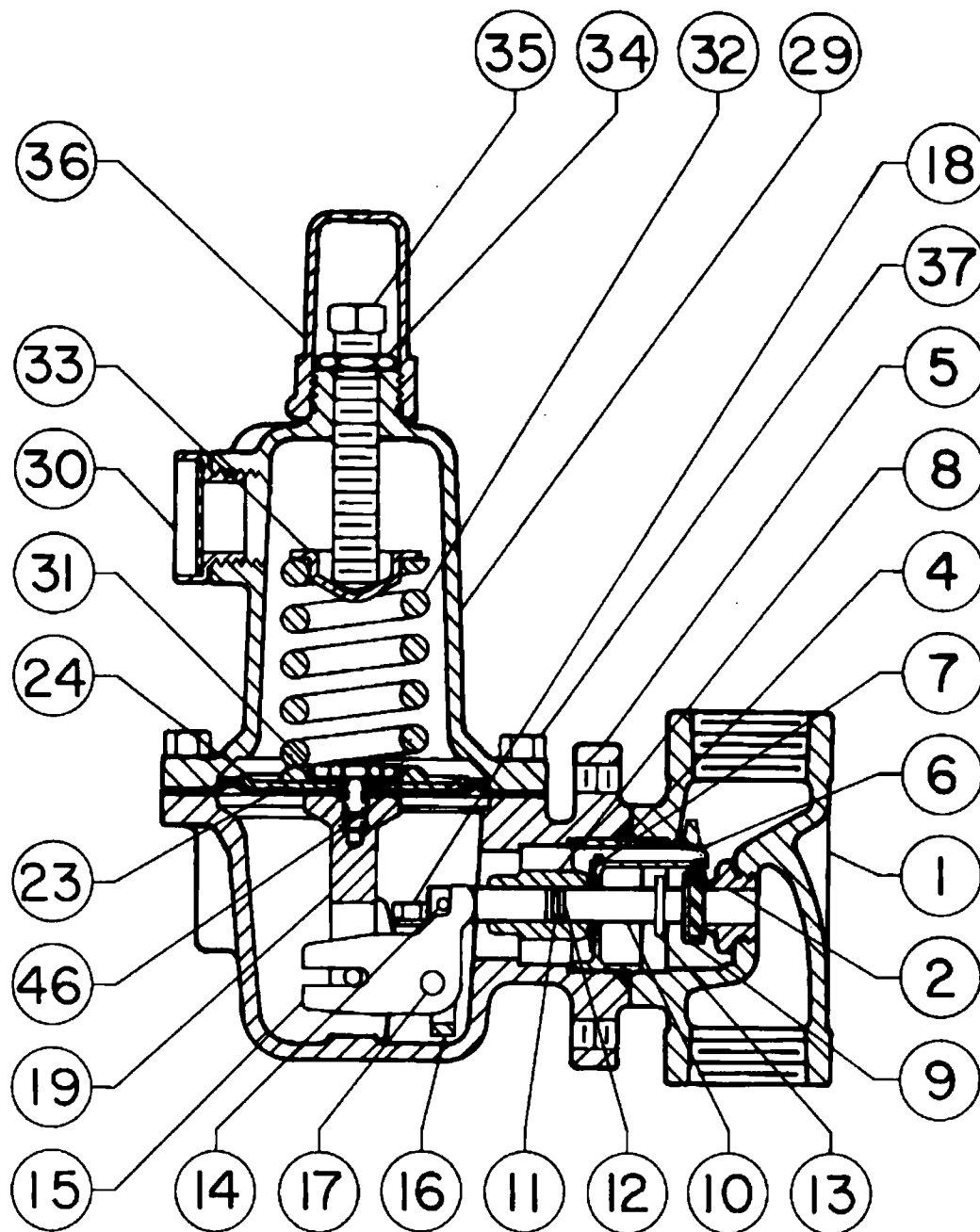
When ordering replacement parts, reference the key number of each needed part as found in the following parts list.

Parts List

Key	Description	Part Number
	Type 627 Parts Kit with aluminum/nitrile trim (includes keys 4, 9, 11, 12, and 23)	R627X000A12
	Type 627 Parts Kit with stainless steel/nitrile trim (includes keys 4, 9, 11, 12, and 23)	R627X000S12
	Type 627R Parts Kit with aluminum/nitrile trim (includes keys 4, 9, 11, 12, 23, 28, and 48)	R627RX00A12
	Type 627R Parts Kit with stainless steel/nitrile trim (includes keys 4, 9, 11, 12, 23, 28, and 48)	R627RX00S12
1	Body	
	Ductile iron	
	1000 psig (69 bar) max inlet pressure	
	3/4-inch NPT size	30B3046X012
	1-inch NPT size	30B3048X012
	2-inch NPT size	30B3096X012
	Steel	
	2000 psig (138 bar) max inlet pressure	
	3/4-inch NPT size	30B3050X012
	1-inch NPT size	30B3051X012
	2-inch NPT size	30B7452X012
	Steel, ANSI Class 600 RF flanged	
	1480 psig (102 bar) max inlet pressure	
	1-inch size	40B6754X012
	2-inch size	40B6756X012
2*	Seat ring	
	Aluminum	
	3/32-inch (2.4 mm) port diameter	0R044109022
	1/8-inch (3.2 mm) port diameter	1A936709012
	3/16-inch (4.8 mm) port diameter	00991209012
	1/4-inch (6.4 mm) port diameter	0B042009012
	3/8-inch (9.5 mm) port diameter	0B042209012
	1/2-inch (12.7 mm) port diameter	1A928809012
	303 Stainless steel	
	3/32-inch (2.4 mm) port diameter	0R044135032
	1/8-inch (3.2 mm) port diameter	1A936735032
	3/16-inch (4.8 mm) port diameter	00991235032
	1/4-inch (6.4 mm) port diameter	0B042035032
	3/8-inch (9.5 mm) port diameter	0B042235032
	1/2-inch (12.7 mm) port diameter	1A928835032

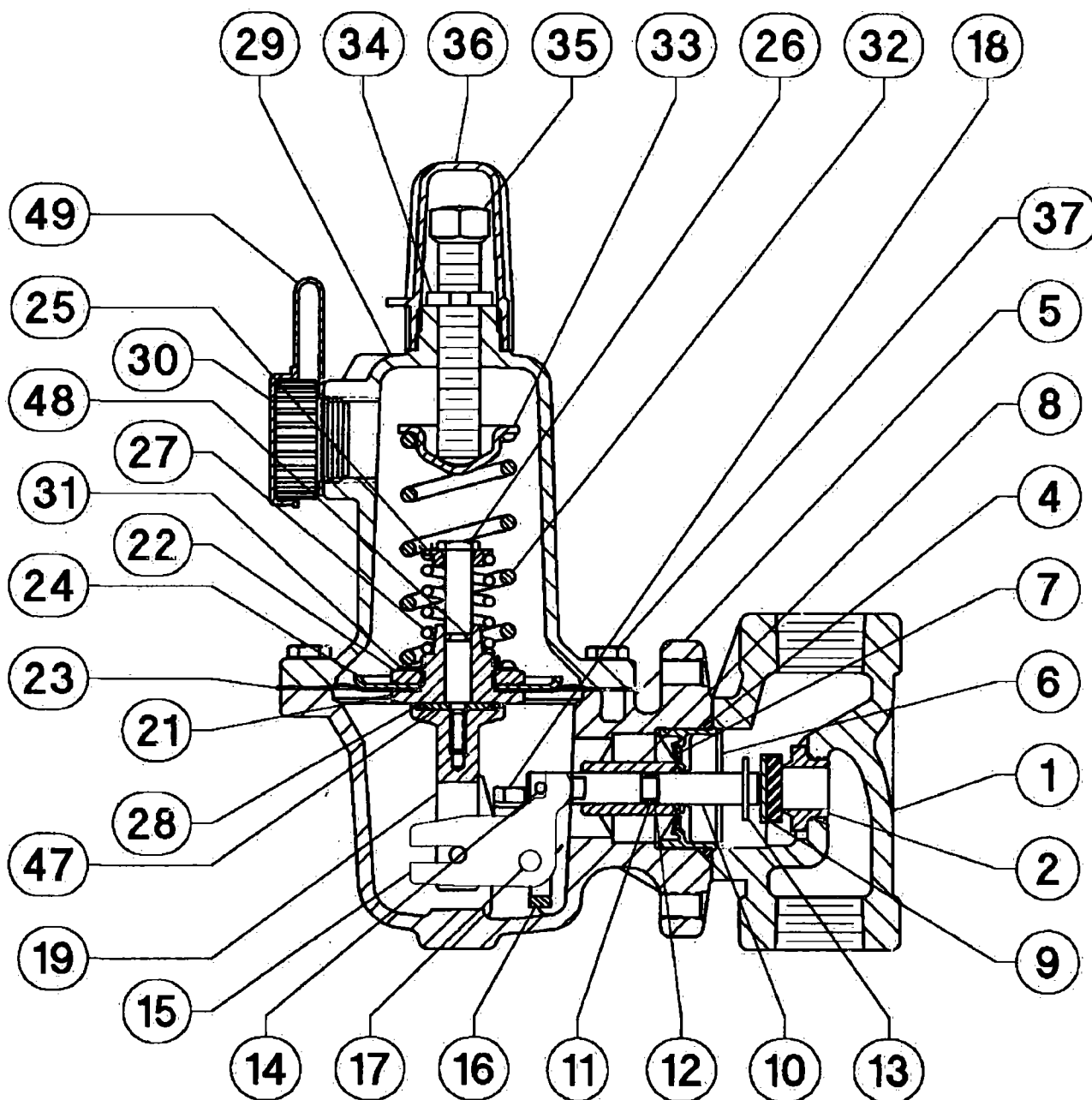
*Recommended spare part.

Key	Description	Part Number	Key	Description	Part Number
2*	Seat ring (continued)		23*	Diaphragm, nitrile (continued)	
	316 Stainless steel, NACE ⁽¹⁾ construction only			For Type 627 or 627M w/steel	
	3/32-inch (2.4 mm) port diameter	0R0441X0012		diaphragm case	10B8735X012
	1/8-inch (3.2 mm) port diameter	1A9367X0022		For Type 627R or 627MR w/aluminum	
	3/16-inch (4.8 mm) port diameter	009912X0012		or ductile iron diaphragm case	10B3068X012
	1/4-inch (6.4 mm) port diameter	0B0420X0012		For Type 627R or 627MR w/steel	
	3/8-inch (9.5 mm) port diameter	0B0422X0012		diaphragm case	10B8736X012
	1/2-inch (12.7 mm) port diameter	1A9288X0012		For Type 627H or 627HM w/steel	
3	Cap Screw (not shown), (2 req'd)			diaphragm case (diaphragm is neoprene	
	Type 627 and 627R w/aluminum			with nylon fabric)	12B0178X012
	diaphragm case, pl steel	18A1087X012	24	Diaphragm Head,* plated steel	
	All Types w/ductile iron			For Type 627 or 627M, plated steel	1D666428982
	diaphragm case, pl steel	1C403824052		For Type 627R or 627MR, plated steel	10B3071X012
	or steel diaphragm case, pl steel	1C403024052		For Type 627H or 627HM, 416 stainless steel	12B0175X012
4*	Diaphragm Case O-Ring (Type 627, 627H, or 627R only), nitrile	17A2325X022	25	Relief Spring Seat (for Type 627R or 627MR only), steel	10B7446X012
5	Diaphragm Case		26	Guide Retainer (for Type 627R or 627MR only), stainless steel	10B7450X012
	For Type 627 or 627R		27	Relief Spring (for Type 627R or 627MR only), plated steel	10B6757X012
	Aluminum w/o 1/8-inch gauge tap	40B3084X012	28*	Relief Seal O-Ring (for Type 627R or 627MR only), nitrile	1J108506992
	Aluminum with 1/8-inch gauge tap		29	Spring Case	
	for Type 627 only	11B5380X012		For Type 627 or 627R	
	Ductile iron w/o 1/8-inch gauge tap	30B3053X012		Aluminum	40B3086X012
	Ductile iron with 1/8-inch gauge tap			Ductile iron	30B3055X012
	for Type 627 only	31B0641X012		Steel	30B3102X012
	Steel	30B3104X012		For Type 627M or 627MR	
	For Type 627M or 627MR			Ductile iron	30B3055X012
	Ductile iron	39A5987X012		Steel	30B3102X012
	Steel	30B8734X012		For Type 627H or 627HM	
	For Type 627H, steel	30B3104X012		Steel	30B3102X012
	For Type 627HM, steel	30B8734X012	30	Screened Vent Assembly, plastic	10B3093X012
6	Boost Body (not for Type 627M, 627HM, or 627MR), Delrin ⁽²⁾		31	Lower Spring Seat, plated steel	
	For Type 627 or 627H	30B3056X012		For Type 627 or 627M	1D666625072
	For Type 627R	30B3057X012		For Type 627R or 627MR	20B3073X012
7	Stabilizer (for Type 627, 627H, and 627R only), nitrile	10B3060X012	32	Control Spring, pl steel	
8	Stem Guide (for Type 627, 627H, and 627R only), powdered metal	20B3061X012		5 to 20 psig (0.34 to 1.4 bar), yellow	10B3076X012
9*	Disk Assembly (for all port diameters)			15 to 40 psig (1.0 to 2.8 bar), green	10B3077X012
	Aluminum holder and nitrile disk	1C4248X0212		35 to 80 psig (2.4 to 5.5 bar), blue	10B3078X012
	303 Stainless steel holder and nitrile disk	1C4248X0202		70 to 150 psig (4.8 to 10.3 bar), red	10B3079X012
	Aluminum holder and nylon disk	1C4248X00A2		140 to 250 psig range (9.6 to 17.2 bar), blue, used in a Type 627H or 627HM	10B3078X012
	303 Stainless steel holder and nylon disk	1C4248X0062		240 to 500 psig range (16.5 to 34.5 bar), red, used in a Type 627H or 627HM	10B3079X012
	NACE construction only		33	Upper Spring Seat, plated steel	1D667125072
	Aluminum holder and nitrile disk	1C4248X0212	34	Locknut, plated steel	1D667728982
	316 Stainless steel holder and nitrile disk	1C4248X0252	35	Adjusting Screw, pl steel	
	Aluminum holder and nylon disk	1C4248X00A2		For Type 627 or 627M	10B3081X012
	316 Stainless steel holder and nylon disk	1C4248X0262		For Type 627H or 627HM	10B3081X012
10	Stem			For Type 627R or 627MR	10B3080X012
	303 stainless steel	10B3059X012	36	Adjusting Screw Cap, plastic	20B3082X012
	316 stainless steel (NACE)	10B3059X022	37	Spring Case Cap Screw, pl steel (8 required)	
11*	Stem O-Ring, nitrile	1D687506992		For aluminum or ductile iron diaphragm case	1A391724052
12	Stem Backup Ring, TFE (2 required)	1K786806992		For steel diaphragm case	10B8737X012
13	Hair Pin Clip, stainless steel	10B3058X012		For Type 627H/HM, steel diaphragm case	1A346424052
14	Drive Pin, plated steel	1A953228982	39	Nameplate	-----
15	Lever, plated steel	20B3063X012	43	Blocked Throat (for Type 627M, 627HM or 627MR only), stainless steel	10B3085X012
16	Lever Retainer, plated steel	30B3097X012	44	Blocked Throat O-Ring (for Type 627M, 627HM, or 627MR only), nitrile (2 required)	1E264306992
17	Lever Pin		45	Blocked Throat Backup Ring (for Type 627M, 627HM, or 627MR only), TFE (2 required)	10B3106X012
	Stainless steel	10B3083X012	46	Diaphragm Head Cap Screw, steel	
	316 stainless steel (NACE)	10B3083X022		For Type 627 or 627M	1K920724052
18	Lever Cap Screw (2 required)			For Type 627H or 627HM	1C379124052
	Plated steel	10B7454X012	47	Relief Seal Retainer (for Type 627R or 627MR only), stainless steel	10B7445X012
	316 stainless steel (NACE)	10B7454X022	48*	Guide Retainer O-Ring (for Type 627R or 627MR only), nitrile	1D682506992
19	Pusher Post, aluminum		49	Relief Indicator (for Type 627R or 627MR only), rubber (not shown)	30B3100X012
	For Type 627 or 627M	10B3098 X012	50	Diaphragm Limiter	22B0176X012
	For Type 627R or 627MR	10B3098 X022	51*	Diaphragm Limiter O-Ring	1K877606992
	For Type 627H or 627HM, 416 stainless steel	10B3098 X032	52*	Pusher Post O-Ring (2 required)	1C853806992
21	Diaphragm Connector (for Type 627R or 627MR only), stainless steel	10B6758X012			
22	Diaphragm Connector Nut (for Type 627R or 627MR only), stainless steel	10B7449X012			
23*	Diaphragm, nitrile				
	For Type 627 or 627M w/aluminum or ductile iron diaphragm case	10B3069X012			



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Figure 7. Type 627 Regulator Components



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Figure 8. Type 627R Regulator Components

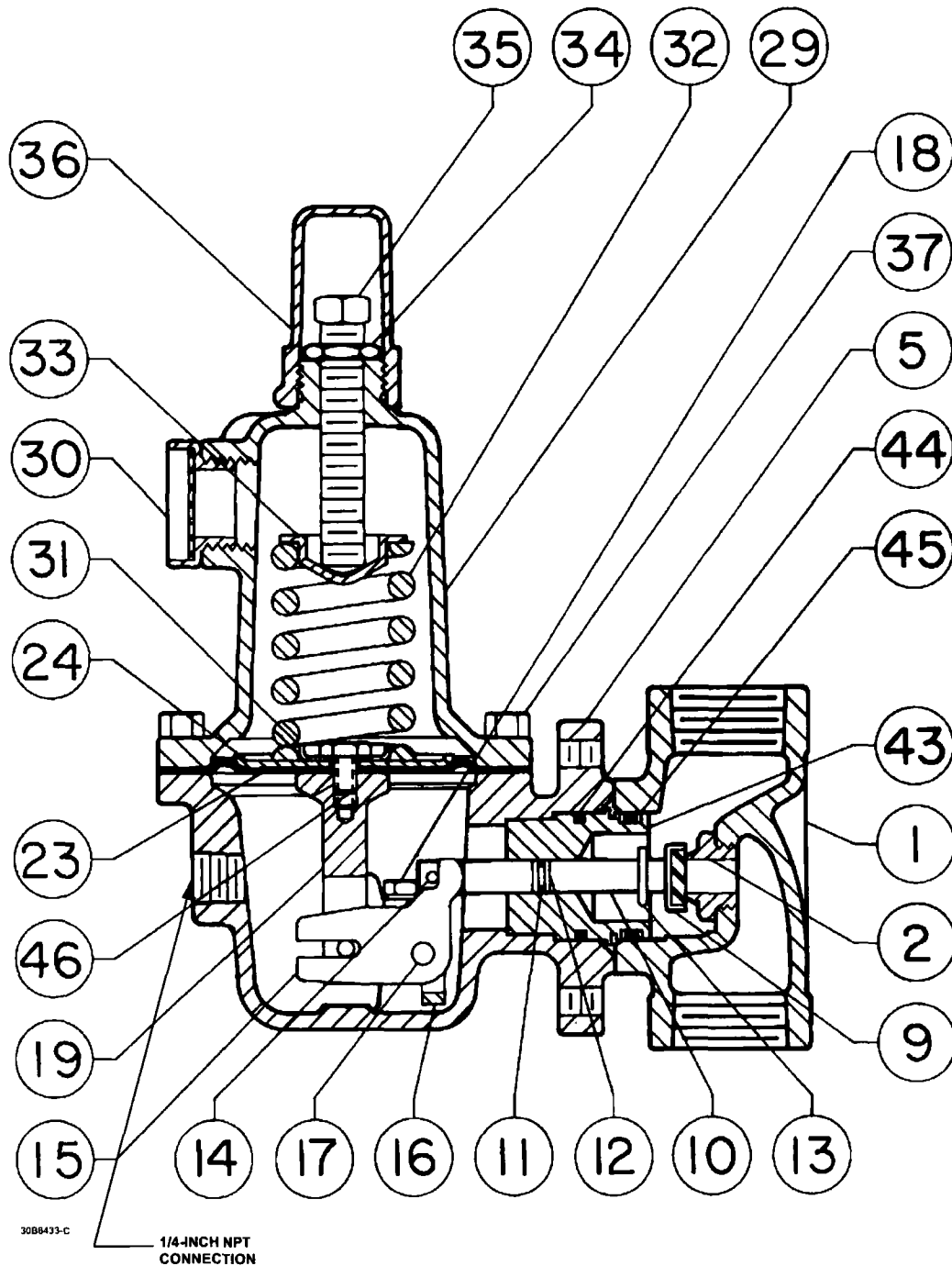


Figure 9. Type 627M Regulator Components

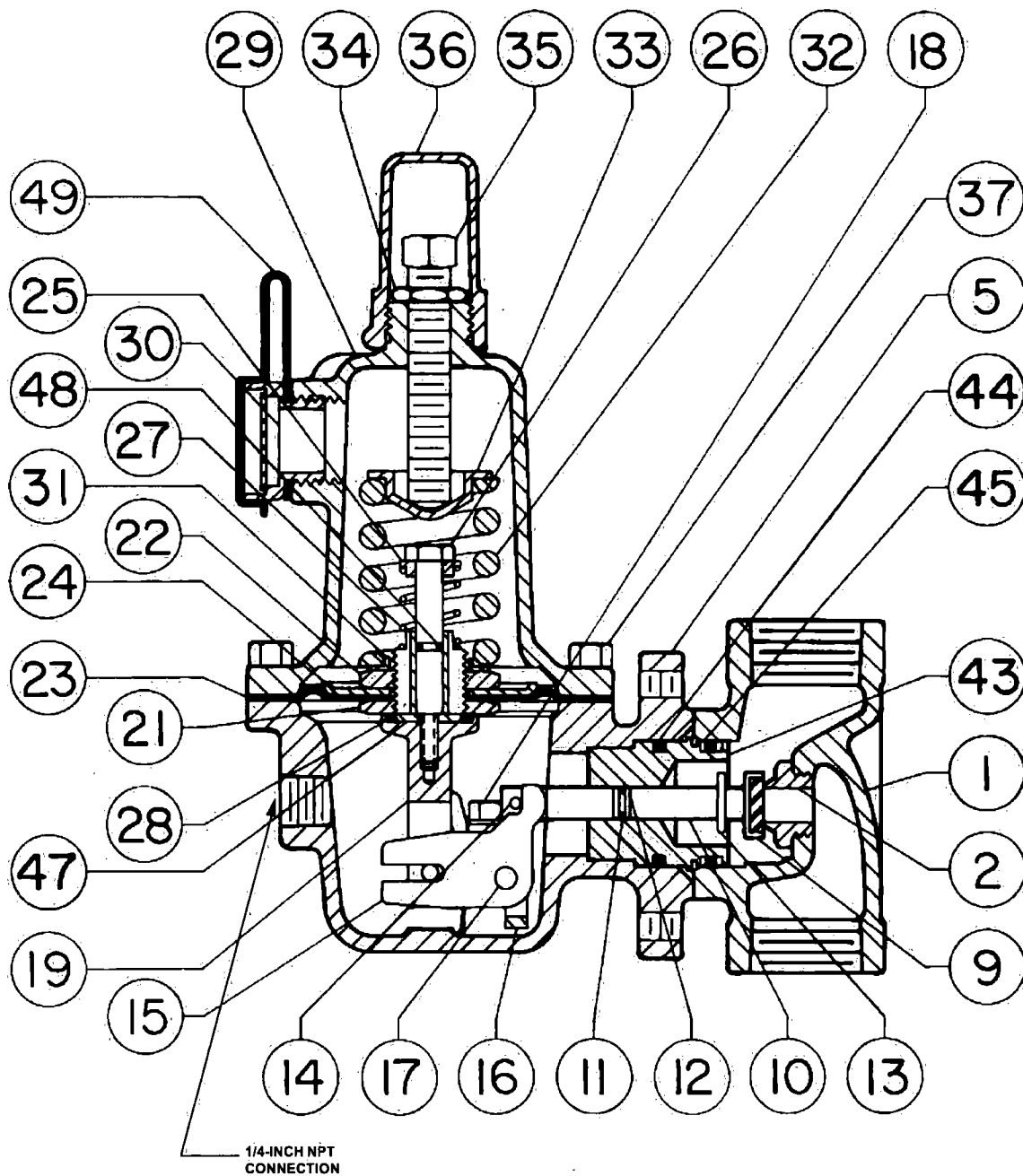


Figure 10. Type 627MR Regulator Components

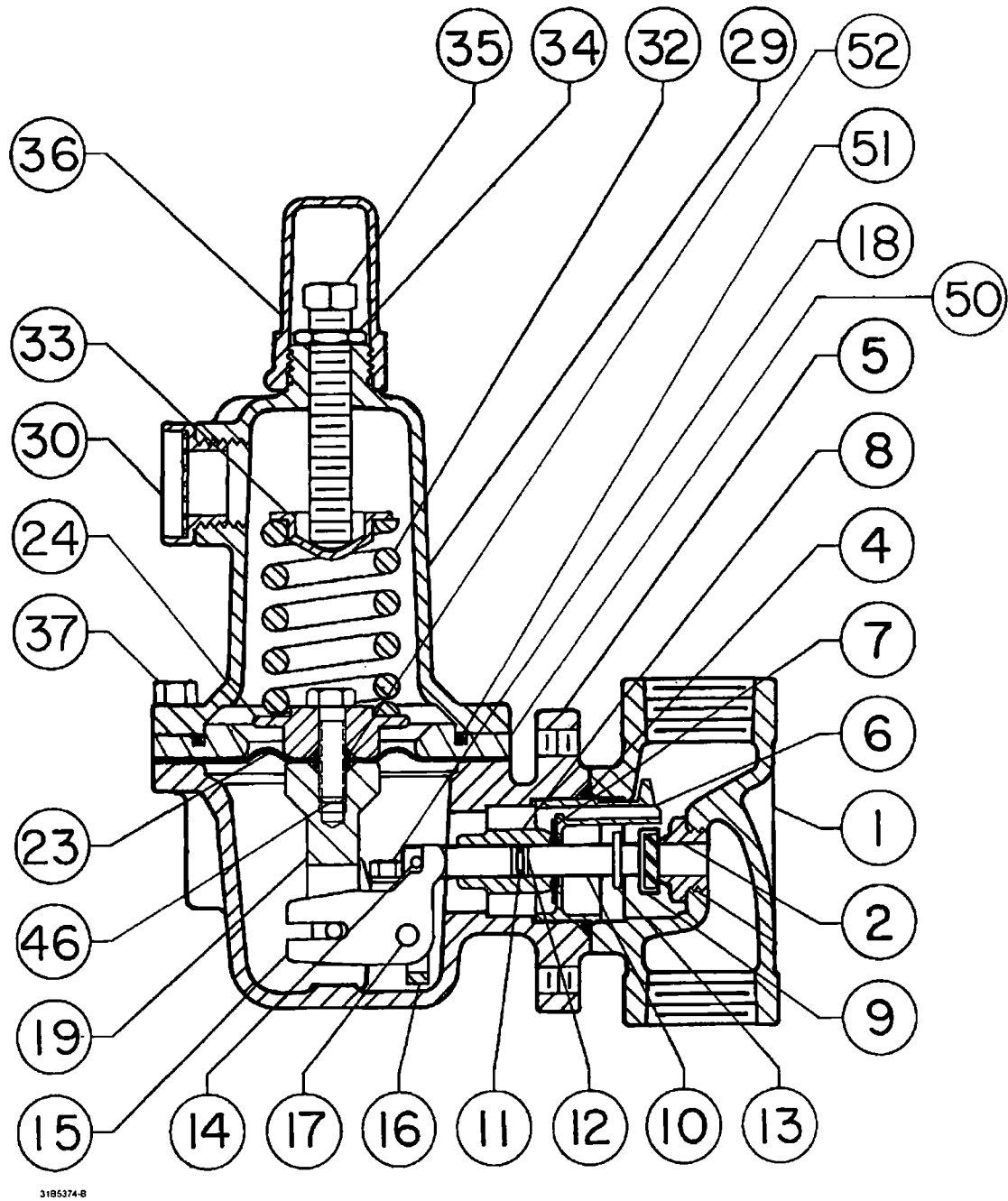
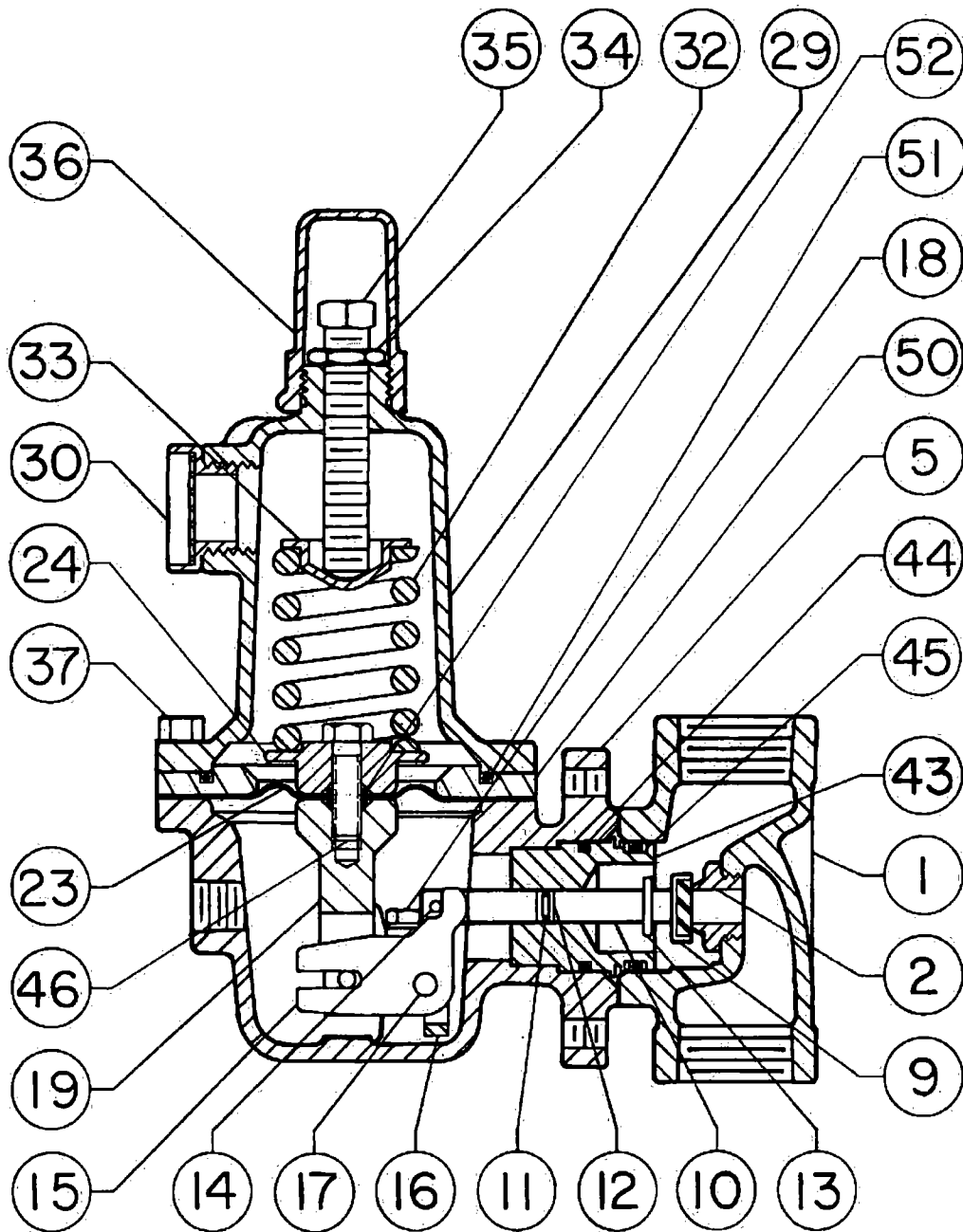


Figure 11. Type 627H Regulator Components



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Figure 12. Type 627HM Regulator Components

Errata Sheet for

627 Series
Form 5252, July 1989

This errata sheet includes information covering the Type 627LB extended body regulator. This new body style is available on all 627 Series configurations and will be an addition to key 1 in the Parts List. The pressure ratings on the Type 627LB bodies will be identical to the existing specifications stated in the current 627 Series Instruction Manual. Each bullet on this errata sheet refers to a section of the 627 Series Instruction Manual (form 5252) where this information needs to be added.

• Add the following to the Available Constructions section of Table 1. Specifications on page 2.

Type 627LB: A 627 Series construction with an extended NPT screwed body. Note: The pressure ratings and capacities for a Type 627LB depend on the 627 Series construction. See the above listed constructions for ratings and specifications.

• Add the following to the Parts List on page 12.

Key	Description	Part Number
1	Body	
	Type 627LB - Ductile iron	
	1000 psig (69 bar) max inlet pressure	
	3/4-inch NPT screwed body	39B2450X012
	1-inch NPT screwed body	39B2451X012
	2-inch NPT screwed body	39B0414X012
	Type 627LB - Steel	
	2000 psig (138 bar) max inlet pressure	
	3/4-inch NPT screwed body	39B0411X012
	1-inch NPT screwed body	39B0412X012
	2-inch NPT screwed body	39B0415X012

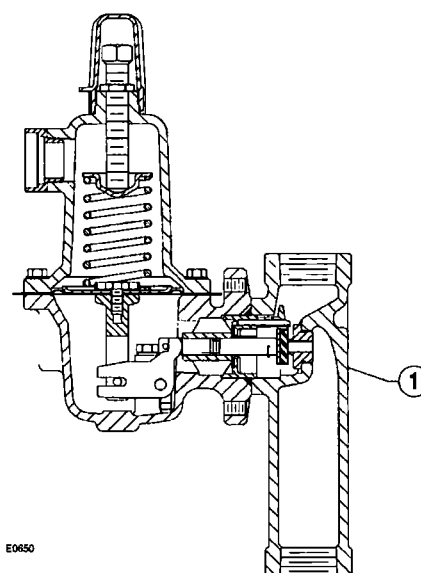


Figure 13. Type 627LB Regulator Body

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November 2002

299H Series Pressure Reducing Regulators

Introduction



WARNING

Installation, operation, and maintenance procedures performed by unqualified personnel may result in improper adjustment and unsafe operation. Either condition may result in equipment damage or personal injury. Use qualified personnel when installing, operating, and maintaining the 299H Series regulators.

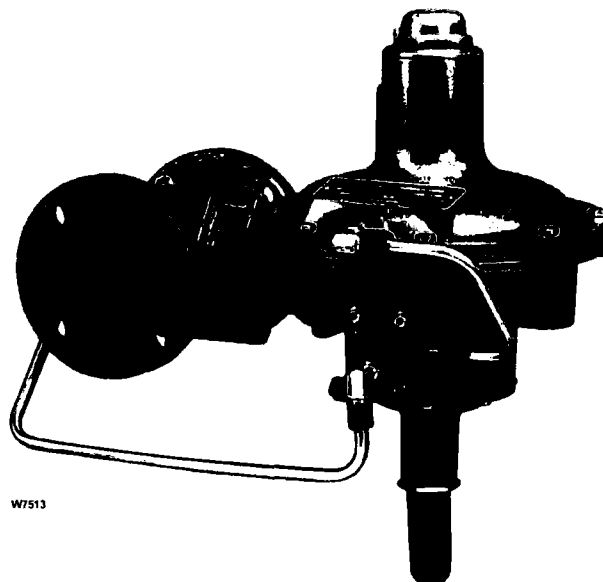
Scope of Manual

This instruction manual provides installation, adjustment, and maintenance instructions, and a parts list for the 299H Series regulators. Complete instructions and parts lists for the 67 Series filtered pilot supply regulator, and other Fisher equipment are found in separate instruction manuals.

Description

The 299H Series pressure reducing regulators provide a broad capacity for controlled pressure ranges and capacities in a wide variety of distribution, industrial, and commercial applications. A 299H Series regulator has a pilot integrally mounted to the actuator casing. The 299H Series regulators can handle inlet pressures up to 175 psi (12,1 bar) depending on orifice size.

The integral token relief on the Type 299HR regulator is located in the pilot and opens to relieve minor overpressure conditions.



W7513

Figure 1. 299H Series Pressure Reducing Regulator

Specifications



WARNING

Since a pilot-operated regulator is constructed of both a pilot and a main valve, do not exceed the maximum inlet pressure shown on the nameplate.

Specifications for 299H Series constructions are given on page 2. Some specifications for a given regulator as it originally comes from the factory are stamped on a nameplate located on the actuator upper casing.

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EMERSON
Process Management

299H Series

Specifications

Available Configurations

Type 299H: Pilot-Operated pressure reducing regulator with a pilot integrally mounted to the actuator casing

Type 299HR: A Type 299H with a token internal relief valve to relieve minor overpressure caused by thermal expansion.

Body Size And End Connection Styles

See table 1

Maximum Operating Pressure⁽¹⁾ by Orifice Size

1/4 x 3/8-inch (6,4 x 9,5 mm)	175 psig (12,1 bar)
3/8-inch (9,5 mm)	175 psig (12,1 bar)
1/2-inch (12,7 mm)	175 psig (12,1 bar)
3/4-inch (19,1 mm)	150 psig (10,3 bar)
7/8-inch (22,2 mm)	125 psig (8,6 bar)
1-inch (25,4 mm)	100 psig (6,9 bar)
1-3/16-inch (30,2 mm)	80 psig (5,5 bar)

Maximum Emergency Outlet Pressure⁽¹⁾

66 psig (4,6 bar)

Outlet (Control) Pressure Ranges⁽¹⁾⁽²⁾

See table 2

Pressure Control Accuracy (Fixed Factor)(PFM)

±1%⁽³⁾ of absolute control pressure

Minimum Differential Pressure For Full Stroke

1.5 psi (0,10 bar)

Control Line Connections

3/4-inch NPT

Temperature Capabilities⁽¹⁾

-20° to 150°F (-29° to 66°C)

Approximate Weight

21 pounds (9,5 kg)

Fixed Restriction Sizes

0.044-inch (1,12 mm), red (standard gain)
0.071-inch (1,80 mm), green (low gain)
0.082-inch (2,08 mm), blue (lower gain)

Options

- **Filter⁽³⁾:** A P590 Series filter installed in the pilot supply tubing between main body and pilot
- **Filtered pilot supply regulator⁽³⁾⁽⁴⁾:** A 67 Series supply regulator with an internal 40 micron filter

1. The pressure/temperature limits in this manual and any applicable standard or code limitation should not be exceeded.
2. For optimum performance, a pilot supply regulator may be installed in the pilot supply tubing between the main valve and pilot.
3. For inches w.c. use a pilot supply regulator if actual inlet pressure varies more than ±20 psi (±1,4 bar) and published accuracy is required.
4. A pilot supply regulator or a P590 Series filter (only one may be used, not both) may be ordered with the Type 299H, but not both.

Table 1. Body Sizes and End Connection Styles

BODY SIZE, INCHES (DN)	BODY MATERIAL AND END CONNECTION STYLE		
	Cast Iron	Ductile Iron	Steel
1-1/4 (32)	NPT screwed	---	---
1-1/2 (40)	NPT screwed	NPT screwed	NPT screwed
2 (50)	NPT screwed; ANSI Class 125 ⁽¹⁾ FF and 250 RF flanged	NPT screwed; ANSI Class 125 FF and 250 RF flanged; and PN 10 and 16 flanged	NPT screwed; ANSI Class 150 RF and 300 RF flanged; and PN 16 flanged

1. This flange is available with a face-to-face dimension of 7.5-inches (191 mm) or 10-inches (254 mm).

Table 2. Outlet Pressure Ranges

OUTLET (CONTROL) PRESSURE RANGE	TYPE NUMBER		PILOT CONTROL SPRING			
	299H	299HR	Part Number	Color	Free Length, Inches (mm)	Wire Diameter, Inches (mm)
3.5 to 6-inches w.c. (9 to 15 mbar) ⁽¹⁾	X	X	T13707T0012	Black	1.86 (47,2)	0.055 (1,4)
5 to 9-inches w.c. (12 to 22 mbar) ⁽¹⁾	X	X	T13589T0012	Yellow	2.05 (52,0)	0.051 (1,3)
7 to 20-inches w.c. (17 to 49 mbar) ⁽¹⁾	X	X	1N3112X0012	Silver	2.18 (55,4)	0.075 (1,9)
16 to 40-inches w.c. (40 to 99 mbar) ⁽¹⁾	X	X	1B413727222	Purple	2.12 (53,8)	0.092 (2,3)
1 to 3.25 psig (0,069 to 0,22 bar)	X	X	T13593T0012	Light blue	2.12 (53,8)	0.105 (2,7)
2.75 to 6 psig (0,19 to 0,41 bar)	X	X	T13671T0012	Orange	2.40 (61,1)	0.120 (3,0)
5 to 16 psig (0,34 to 1,10 bar)	X		T13600T0012	Red	2.10 (53,3)	0.142 (3,6)
14 to 35 psig (0,97 to 2,4 bar)	X		T13771T0012	Zinc	2.15 (54,6)	0.207 (5,3)
30 to 60 psig (2,07 to 4,14 bar)	X		T14096T0012	Green	2.75 (69,9)	0.225 (5,7)

1. Use a pilot supply regulator if actual inlet pressure varies more than ±20 psi (1,4 bar) and the published accuracy is required.

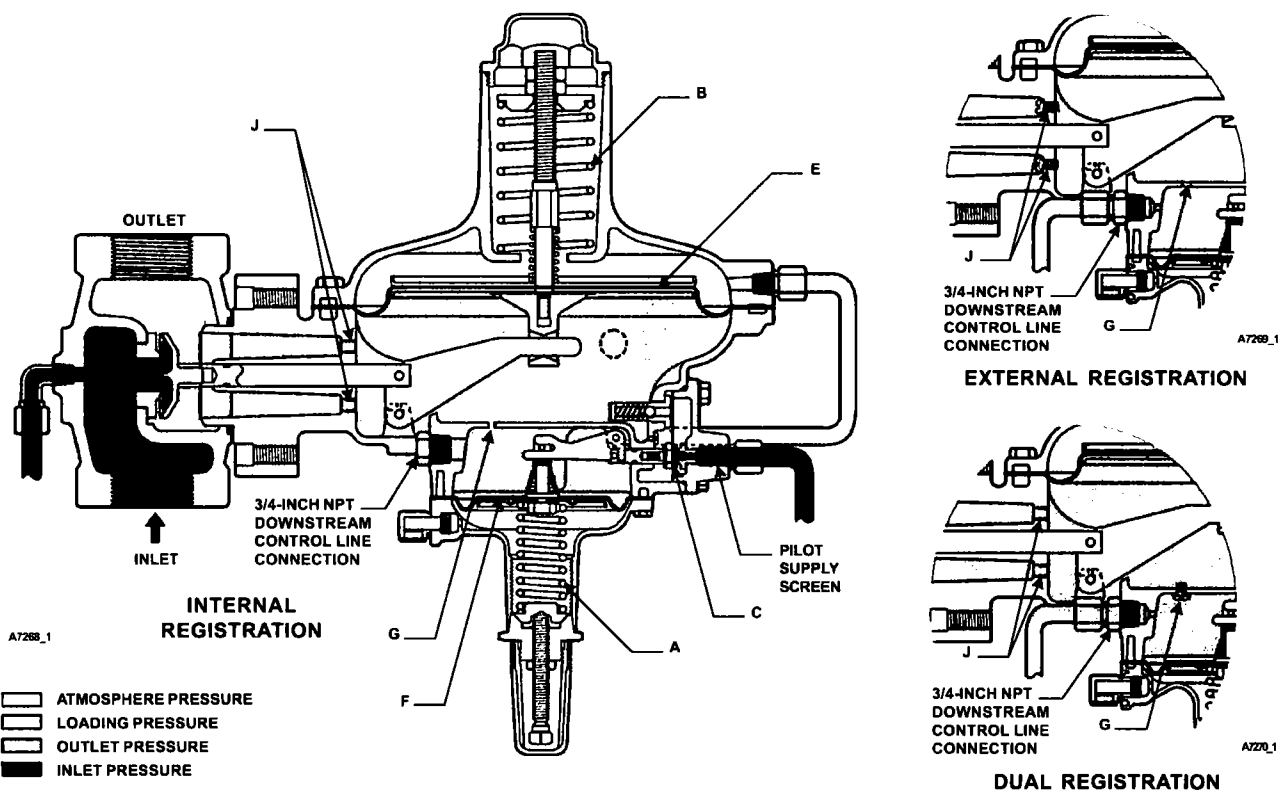


Figure 2. 299H Series Operational Schematic

Principle of Operation

Letter keys in this section refer to figure 2 unless otherwise noted. Fast response and accuracy are made possible by the amplifying effect of the pilot and by the two-path control system. The function of the pilot is to sense change in the controlled pressure and amplify it into a larger change in the loading pressure. Any changes in outlet pressure act quickly on both the actuator diaphragm and the loading pilot, thus providing the precise pressure control that is characteristic of a two-path piloting system.

Upstream or inlet pressure is utilized as the operating medium, which is reduced through pilot operation to load the main diaphragm chamber. Tubing connects the inlet pressure to the pilot. Downstream or outlet pressure registers underneath the main diaphragm (E) and on top of pilot diaphragm (F). There are three different versions of registration for the 299H Series.

Internal registration—Outlet pressure is registered through the throat to the main diaphragm chamber and then through a small port (G) to the top of the pilot diaphragm.

External registration—The throat is blocked and a downstream control line is connected to the pilot upper

chamber. A small port (G) connects the two chambers.

Dual registration—The lower main diaphragm chamber registers outlet pressure through the throat and the upper pilot diaphragm chamber registers downstream pressure by using a downstream control line. The port (G) between the chambers is blocked.

In operation, assume the outlet pressure is less than the setting of the pilot control spring (A). The top side of pilot diaphragm assembly (F) will have a lower pressure than the setting of the control spring (A). The control spring (A) forces the diaphragm assembly upward, opening the pilot orifice (C). Additional loading pressure is supplied from the pilot orifice to the top side of the main diaphragm (E).

This creates a higher pressure on the top side of the main diaphragm (E) than on the bottom side, forcing the diaphragm downward. This motion is transmitted through a lever, which pulls the valve disk open, allowing inlet pressure to flow through the valve.

When the demand in the downstream system has been satisfied, the outlet pressure increases. The increased pressure is transmitted through the downstream control line and acts on top of the pilot diaphragm (F). This

299H Series

pressure exceeds the pilot spring setting and forces the diaphragm down, closing the orifice (C). The loading pressure acting on the main diaphragm (E) bleeds to the downstream system through a bleed restriction (H).

With a decrease in loading pressure on top of the main diaphragm (E), the main closing spring (B) exerts an upward force on the diaphragm post which is connected to the main diaphragm (E), pulling it upward. This moves the main valve disk toward its seat, decreasing flow to the downstream system.

Type 299HR

During normal operation the Type 299HR performance is identical to the Type 299H. If an overpressure condition occurs, the pilot diaphragm head will separate from the pilot diaphragm post and travel until it contacts the pilot spring case. The movement of the diaphragm head creates a path and a token, or small amount of gas will be released.

When the overpressure condition ceases the pilot diaphragm head will return to the diaphragm post, and the regulator will return to normal operation.

Installation



WARNING

Personal injury, equipment damage, or leakage due to escaping gas or bursting of pressure-containing parts might result if this regulator is overpressured or is installed where service conditions could exceed the limits for which the regulator was designed, or where conditions exceed any ratings of the adjacent piping or piping connections. To avoid such injury or damage, provide pressure-relieving or pressure-limiting devices (as required by the appropriate code, regulation, or standard) to prevent service conditions from exceeding those limits.

A regulator may vent some gas to the atmosphere in hazardous or flammable gas service. Vented gas might accumulate and cause personal injury, death or property damage due to fire or explosion. Vent a regulator in hazardous gas service to a remote, safe location away from air intakes or any hazardous location. Protect the vent line or stack opening against condensation or clogging.

If the regulator is exposed to an over-pressure condition, it should be inspected for any damage that may have occurred. Operation below these limits does not preclude the possibility of damage from external sources or from debris in the pipeline.

Like most regulators, the 299H Series regulators have an outlet pressure rating lower than its inlet pressure rating. Complete downstream overpressure protection is needed if the actual inlet pressure can exceed the regulator outlet pressure rating or the pressure ratings of any downstream equipment. Regulator operation within ratings does not preclude the possibility of damage from external sources or from debris in the lines. A regulator should be inspected for damage periodically and after any overpressure condition.

Clean out all pipelines before installation and check to be sure the regulator has not been damaged or collected foreign material during shipping.

Apply pipe compound to the male pipe threads only with a screwed body, or use suitable line gaskets and good bolting practices with a flanged body. This regulator may be installed in any position desired as long as the flow through the body is in the direction indicated by the arrow on the body. Install a three-valve bypass around the regulator if continuous operation is necessary during maintenance or inspection.

Although the standard orientation of the actuator and pilot to the main valve body is as shown in figure 1, this orientation may be changed in 90° intervals rotating the actuator lower casing (key 1) 90°, rotate the elbow fitting in the same direction, and reinstalling the cap screws. To keep the pilot spring case from being plugged or the spring case from collecting moisture, corrosive chemicals, or other foreign material, the vent must be pointed down, oriented to the lowest possible point on the spring case, or otherwise protected. Vent orientation may be changed by rotating the pilot spring case with respect to the pilot body.

To remotely vent the pilot, remove the screwed-in vent assembly (key 27) from the pilot spring case and install obstruction-free tubing or piping into the 1/4-inch NPT vent tapping. Provide protection on a remote vent by installing a screened vent cap into the remote end of the vent pipe.

An upstream pilot supply line is not required because of the integral pilot supply tubing (key 21). However, as long as the 1/4-inch NPT tapping in the main valve body is plugged, this tubing may be disconnected from

the main valve (key 17) in order to install a pilot supply line from a desired remote location into the pilot.

If using a control line, attach the control line from the pilot tap two to three feet (0,6 to 0,9 meters) downstream of the regulator in a straight run of pipe. If impossible to comply with this recommendation due to the pipe arrangement, it may be better to make the control line tap nearer the regulator outlet rather than downstream of a block valve. Do not make the tap near any elbow, swage, or nipple which might cause turbulence. For optimal performance, use as large of a control line as practical.

In many instances, it will be necessary to enlarge the downstream piping to keep flow velocities within good engineering practices. Expand the piping as close to the regulator outlet as possible.



WARNING

Adjustment of the pilot control spring to produce an outlet pressure higher than the upper limit of the outlet pressure range for that particular spring can cause personal injury or equipment damage due to bursting of pressure-containing parts or the dangerous accumulation of gases if the maximum actuator emergency casing pressure is exceeded. If the desired outlet pressure is not within the range of the pilot control spring, install a spring of the proper range according to the Maintenance section.

Each regulator is factory-set for the pressure setting specified on the order. If no setting was specified, the outlet pressure was set midrange of the pilot control spring. In all cases, check the control spring setting to make sure it is correct for the application.

Registration Conversion

To convert the Type 299H regulators from one type of registration to another all that is required is adding or removing screws and O-rings.

To change an internal registration regulator to an external registration regulator with a downstream control line, block the two ports in the throat with screws and O-rings (J in figure 2). Remove either the 3/4 inch NPT pipe plug in the pilot casing or the 3/4-inch NPT pipe plug in the lower casing and add a downstream control line.

To convert an external registration regulator to a dual registration regulator, remove the two screws and O-rings (J in figure 2) from the throat and use a screw

and an O-ring to block the port (G in figure 2) between the lower diaphragm chamber and pilot diaphragm chamber. Remove the 3/4-inch NPT pipe plug in the pilot lower casing and add a downstream control line.

Startup

With proper installation completed and downstream equipment properly adjusted, perform the following procedure while monitoring the pressure with gauges.

1. Very slowly open the upstream block valve.
2. Slowly open the hand valve (if used) in the control line. The regulator will control downstream pressure at the pilot control spring setting. See the Adjustment section following these numbered steps if changes in the setting are necessary during the startup procedure.
3. Slowly open the downstream block valve.
4. Slowly close the bypass valve, if used.
5. Check all connections for leaks.

Adjustment

Keys are referenced in figure 4. The only adjustment on the regulator is the reduced pressure setting affected by the pilot control spring (key 32). Remove the closing cap (key 29) and turn the adjusting screw (key 36). Turning the adjusting screw clockwise into the spring case increases the controlled or reduced pressure setting. Turning the screw counterclockwise decreases the reduced pressure setting. Always tighten the locknut (key 35) and replace the closing cap after making adjustments.

Shutdown

Installation arrangements may vary, but in any installation it is important to open and close valves slowly and the outlet pressure be vented before venting inlet pressure to prevent damage caused by reverse pressurization of the regulator. Isolate the regulator from the system. Vent the downstream pressure; then vent inlet pressure to release any remaining pressure in the regulator.

Maintenance

Regulator parts are subject to normal wear and must be inspected periodically and replaced as necessary. The frequency of inspection and replacement depends upon the severity of service conditions and upon applicable codes and government regulations.

Due to the care Fisher takes in meeting all manufacturing requirements (heat treating, dimensional

299H Series

tolerances, etc.), use only replacement parts manufactured or furnished by Fisher.



WARNING

Avoid personal injury or damage to property from sudden release of pressure or uncontrolled gas or other process fluid. Before starting to disassemble, carefully release all pressures according to the Shutdown procedure. Use gauges to monitor inlet, loading, and outlet pressures while releasing these pressures.

On reassembly of the regulator, it is recommended that a good quality pipe thread sealant be applied to pressure connections and fittings and a good quality lubricant be applied to all O-rings. Also apply an anti-seize compound to the adjusting screw threads and other areas as needed.

Note

The regulator body may remain in the pipeline during maintenance procedures.

Main Actuator Diaphragm

Follow this procedure to change the actuator diaphragm, or to inspect, clean, or replace any other parts in the main actuator. Part key numbers are referenced in figure 5.

1. Cut the wire seal (being careful not to lose the warning tag) and remove the closing cap (key 3). Inspect the O-ring (key 9) and replace if necessary.
2. Carefully loosen and remove the double nuts (key 5) on the actuator diaphragm post (key 10). When removing the adjusting nuts, do not twist or unscrew the diaphragm post, as this action will loosen the joint between the diaphragm post and the pusher post (keys 10 and 11).
3. Remove the spring seat (key 4) and closing spring (key 6).
4. Remove the eight hex head cap screws (key 23) and lift off the upper casing (key 2).
5. Remove the diaphragm assembly (key 8) by tipping it so that the lever (key 26) slips out of the pusher post (key 11).
6. Separate the diaphragm assembly by unscrewing the diaphragm post (key 10) from the pusher post

(key 11) and remove the diaphragm post, pressure equalization spring (key 7), diaphragm head (key 81), diaphragm (key 8), the second diaphragm head (key 81), and diaphragm pad (key 80). Inspect the diaphragm parts for damage and replace if necessary.

7. Inspect the lever (key 26) and replace if necessary. To replace the valve stem (key 16), also perform Main Body Valve Disk and Orifice maintenance procedure steps 1, 2, and 3, remove disk, and pull the stem out of the lower casing assembly (key 1). Lightly lubricate the replacement stem O-ring (key 14) and install it on the valve stem. Reinstall the valve stem into the lower casing assembly. Reinstall the body or continue with the reassembly of the diaphragm.

Note

When assembling the diaphragm assembly (keys 8, 80, and 81), lubricate the actuator diaphragm post (key 10) threads.

8. Loosely reassemble the diaphragm and diaphragm post parts so that the bolt holes in the diaphragm align with the corresponding holes in the lower casing (key 1) when the lever (key 26) is fitted properly into the pusher post. When this orientation is made, tighten the diaphragm post into the pusher post (keys 10 and 11).
9. Reinstall the diaphragm assembly using the reverse order of step 5.
10. Install the upper casing (key 2) and secure it to the lower casing (key 1) with the eight hex head screws. Tighten the hex head screws evenly using a crisscross pattern to avoid placing a uneven strain on the regulator. Tighten the screws to a final bolt torque of 10 to 13 foot-pounds (13 to 17 N·m) to avoid crushing the diaphragm.



CAUTION

In step 11, the spring seat (key 4) is under spring pressure. Use constant hand pressure to hold the spring down when installing the hex nuts (key 5).

11. Install the closing spring (key 6) and the spring seat (key 4). Push and hold down on the spring seat, cocking it to one side until the seat catches onto the threads of the diaphragm post. Then, pull up on the diaphragm post allowing access to the post threads so that the adjusting two hex nuts (key 5) can be installed. Install the adjusting hex nuts as shown in figure 5.

The closing spring must be adjusted down to a depth of 1/2 inch (12,7 mm) from the top of the upper case

opening to the top of the spring seat (see figure 3). When tightening the two hex nuts, use care not to rotate the diaphragm post, which may damage the post.

12. Lightly lubricate the O-ring (key 9) on the closing cap and reinstall the closing cap (key 3).



WARNING

The seal and warning tag (keys 68 and 69) contain important safety information, make sure they are attached when maintenance is completed.

13. Install the seal and warning tag (keys 68 and 69).

Main Body Valve Disk and Orifice

Follow this procedure to inspect, clean, or replace the main body valve disk or to inspect or replace the orifice. Part key numbers are referenced in figure 5.

Note

The regulator body may remain in the pipeline during maintenance procedures.

1. Disconnect the pilot supply tubing (key 21) from the main body (key 17).
2. Remove the two hex head cap screws (key 18) which hold the lower casing (key 1) to the body. Separate the lower casing from the body. Inspect the body O-ring and replace if worn or damaged.
3. Examine the valve disk (key 13) and orifice (key 12) for nicks, cuts, and other damage. Unscrew the disk holder assembly from the valve stem assembly (key 16) and replace it with a new part if necessary.

If the orifice is being replaced with a new or different size orifice, change the nameplate (key 63) to state the new size and maximum inlet pressure. Lubricate the threads and flat face of the orifice with a good grade of anti-seize lubricant. Install the orifice using 75 to 100 foot-pounds (102 to 136 N·m) of torque.

4. After replacing all damaged parts, slide the entire assembly into the valve body and secure with the two hex head cap screws.
5. Connect the pilot supply tubing, then refer to the Startup section for putting the regulator into operation.

Integral Pilot Valve Disk and Orifice

Follow this procedure to inspect, clean, or replace the integral pilot valve disk or orifice. Part key numbers are referenced in figures 4 and 6.

1. Remove or loosen the pilot supply tubing (key 21).
2. Remove the inlet fitting (key 47), remove the four machine screws (key 46).
3. Examine the valve disk (key 52) for nicks, cuts, and other damage. Unscrew the disk holder assembly from the valve stem and replace if necessary.
4. If the seating edge of the orifice (key 50) is nicked or rough, use a thin-walled socket to remove the orifice from the inlet fitting (key 47). Install a new orifice and a lightly lubricated O-ring when reassembling the regulator.
5. Inspect the check valve assembly (key 45) and the bleed restriction (key 70) for damage and replace if necessary.
6. The Type 299H has a wire inlet screen (key 51) in the pilot supply inlet fitting (key 47). If clogging is suspected in the pilot supply, remove the elbow fitting and clean the wire screen.
7. Lightly lubricate the O-ring (key 54) on the inlet fitting (key 47) and reinstall using the four machine screws (key 46). Torque the machine screws to 30 to 40 inch-pounds (3,4 to 4,5 N·m). Then install and tighten the pilot supply tubing.

Integral Pilot Control Spring and Diaphragm

Follow this procedure to change the pilot control spring or to inspect, clean, or replace the diaphragm. Part key numbers are referenced in figure 4 and 6.

1. Remove the pilot closing cap (key 29) and loosen the hex lock nut (key 35). Turn the adjusting screw (key 36) counterclockwise to ease spring compression.
2. Unscrew the bonnet (key 34).
3. Remove the bonnet (key 34), spring seat (key 33), and control spring (key 32).
4. If only replacing the control spring, sparingly apply lubricant to the control spring seat (key 33) and reassemble in the reverse order.

Note

When replacing the control spring with a different spring range, be sure to delete the spring range appearing on the nameplate and indicate the new range.

5. Remove the machine screws (key 30) and spring case (key 31) from the lower casing (key 1).
6. Remove the diaphragm assembly (key 28) by tilting them so that the pusher post (key 40) slips off the lever (key 57). To separate the diaphragm from the attached

299H Series

parts, unscrew the hex nut (key 37) and separate the parts: washer (key 38), diaphragm post (key 39), pusher post (key 40), overtravel spring (key 41), machine screw (key 42), spring seat (key 88) (Type 299HR only), rivet (key 43), and retaining ring (key 44).

7. To replace the lever assembly (key 57) remove the lever pin (key 25). To replace the valve stem (key 48), also perform Integral Pilot Valve Disk and Orifice maintenance procedure steps 1, 2, and 3 and pull the stem (key 48) out of the lower casing assembly (key 1). Lightly lubricate the replacement stem O-ring (key 53) and install it on the valve stem.

8. Install the valve stem into the lower casing assembly. Be careful not to cut the O-ring (key 53) when sliding the valve stem into the lower casing.

9. Reinstall the diaphragm assembly using the reverse order of step 6.

10. Place the spring case (key 31) on the lower casing (key 1) with the vent (key 27) oriented to prevent clogging or entrance of moisture. Install the machine screws (key 30) and tighten in a crisscross pattern using 12 to 18 inch-pounds (1,4 to 2,0 N•m) of torque.

11. When all maintenance is complete, refer to the Startup section to put the regulator back into operation, and adjust the pressure setting. Tighten the locknut (key 35) and install the closing cap (key 29).

Optional P590 Series Filter

Figures are referenced in figure 3. If clogging is suspected in the upstream regulator passages, disconnect the pilot supply tubing (key 21), remove the filter assembly, and check for filter clogging. If necessary, to clean or replace filter parts, remove the following: filter body (key 1), machine screw (key 4), spring washer (key 6), gasket (key 7), washer (key 5), and filter element (key 2). Upon reassembly, place one flat washer between the filter element and filter head (key 3) and the other between the filter element and gasket.

Optional 67 Series Pilot Supply Regulator

For complete installation, maintenance and parts listing refer to the 67 Series instruction manual.

Parts Ordering

The type number, orifice size, spring range, and date of manufacture are stamped on the nameplate. Provide this information along with the eleven-character part number to your Fisher Representative

when ordering parts. If construction changes are made in the field, be sure that the nameplate is also changed to reflect the most recent construction.

Parts List

299H Series Regulator (figure 3)

Key	Description	Part Number
1	Lower Casing, aluminum	T80447T0012
2	Upper Casing, aluminum	T40577T0012
3	Closing Cap, aluminum	1L928308012
4	Spring Seat, steel	T13831T0012
5	Adjustment Nut, steel (2 required)	1A341224122
6	Closing Spring, steel	T13918T0012
7	Pressure Equalization Spring, steel	T13463T0012
8*	Diaphragm, nitrile	T20986T0012
9*	O-ring, nitrile	1F914106992
10	Diaphragm Post, steel	T13814T0012
11	Pusher Post, aluminum	1L143311992
12	Orifice, aluminum	
	1/4 x 3/8-inch (6,4 x 9,5 mm)	T13833T0012
	3/8-inch (9,5 mm)	1H979309022
	1/2-inch (12,7 mm)	1H979409022
	3/4-inch (19,1 mm)	1H979509022
	7/8-inch (22,2 mm)	T14098T0012
	1-inch (25,4 mm)	1H979609022
	1-3/16 (30,2 mm)	1H979709022
13*	Disk, nitrile	1P7349000A2
14*	O-ring, nitrile	1E216306992
15*	O-ring, nitrile	T12587T0012
16	Valve Stem Assembly	1L1426000A2
17	Valve Body	
	Cast Iron	
	1-1/4-inch (DN 32), NPT screwed	T40578T0012
	1-1/2-inch (DN 40), NPT screwed	1J190419012
	2-inch (DN 50)	
	NPT screwed	1H968919012
	125 FF flanged	
	7.5-inch (191 mm) face-to-face dimension	T80445T0012
	10-inch (254 mm) face-to-face dimension	2L425119012
	250 RF flanged	T40488T0012
	Ductile Iron	
	1-1/2-inch (DN 40), NPT screwed	T40561T0012
	2-inch (DN 50)	
	NPT screwed	T40562T0012
	125 FF flanged	T80424T0012
	250 RF flanged	T80425T0012
	PN 10-16 flanged	T80426T0012
	Steel	
	1-1/2-inch (DN 40), NPT screwed	1J1904T0022
	2-inch (DN 50)	
	NPT screwed	1H9689T0022
	150 RF flanged	T80415T0012
	300 RF flanged	T80416T0012
	PN 16 flanged	T80417T0012
18	Cap Screw, steel (2 required)	T14034T0012
19	Elbow, cast iron or steel bodies require 3 elbows and ductile iron bodies require 2 elbows	
	Steel	15A6002X472
	Stainless steel	15A6002X612
20	Connector	
	Cast Iron or Steel Bodies	
	Without filter and pilot supply regulator require 1 connector	
	All other combinations of filter and/or pilot supply regulator require 3 connectors.	

* Recommended spare part

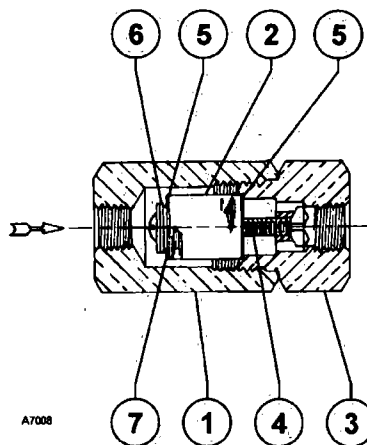
Key	Description	Part Number
20	Connector (continued) Ductile Iron Bodies Without filter and pilot supply regulator require 2 connectors All other combinations of filter and/or pilot supply regulator require 4 connectors.	
	Steel	15A6002X462
	Stainless steel	15A6002X602
21	Pilot Supply Tubing, Stainless steel, without filter	T14247T0022
	Stainless steel, without filter ⁽¹⁾	T14017T0022
22	Loading Tubing, Stainless steel	T14246T0022
23	Cap Screw, steel (8 required)	1C379124052
24	Machine Screw, steel (2 required)	1B420428982
25	Pin, lever, stainless steel (2 required)	1H972935032
26	Lever, steel	T13813T0012
27	Type Y602-12 Vent Assembly	27A5516X012
28	Diaphragm Assembly	T14259T0012
29	Closing Cap, UV resistant nylon	24B1301X012
30	Machine Screw, steel (8 required)	T14069T0012
31	Spring Case, aluminum	T14097T0012
32	Control Spring 3.5 to 6-inches w.c. (9 to 15 mbar) 5 to 9-inches w.c. (12 to 22 mbar) 7 to 20-inches w.c. (17 to 49 mbar) 16 to 40-inches w.c. (40 to 99 mbar) 1 to 3.25 psig (0.069 to 0.22 bar) 2.75 to 6 psig (0.19 to 0.41 bar) 5 to 16 psig (0.41 to 1.10 bar) (299H only) 14 to 35 psig (0.97 to 2.4 bar) (299H only) 30 to 60 psig (2.07 to 4.14 bar) (299H only)	T13707T0012 T13589T0012 1N3112X0012 1B413727222 T13593T0012 T13671T0012 T13600T0012 T13771T0012 T14096T0012
33	Spring Seat, steel	T13917T0012
34	Bonnet, steel	T14135T0012
35	Locknut, steel	1A352224122
36	Adjusting Screw, steel	T14133T0012
37	Hex Nut, steel	1E985324142
38	Washer, steel	1F230328992
39	Diaphragm Post, stainless steel Type 299H Type 299HR	T13915T0012 T14033T0012 T13914T0012
40	Pusher Post, steel	
41	Overtravel Spring, stainless steel Type 299H Type 299HR	T14136T0012 T14031T0012
42	Machine Screw, steel	1A954828992
43	Rivet, flat head, stainless steel	T13916T0012
44	Retaining Ring, steel	16A6977X012
45	Check Valve Assembly	T14258T0012
46	Machine Screw, steel (4 required)	T13920T0012
47	Inlet Fitting, aluminum	T13824T0012
48	Stem Assembly	1H9666T0012
49*	O-ring, nitrile	T13939T0012
50	Pilot Orifice, aluminum	T13825T0012
51	Inlet Screen, stainless steel	T13791T0012
52*	Pilot Disk Assembly	T13955T0012
53*	O-ring, nitrile	1D682506992
54*	O-ring, nitrile	13A2331X022
56	Screw, steel (External Registration - 2 required or Dual Registration - 1 required)	1E175828982
57	Lever, steel	T14134T0012
58	Pipe Plug, steel	1A7715T0012
59	Pipe Plug, Internal Registration only, steel	1A7715T0012
61	O-ring, Nitrile (External Registration - 2 required or Dual Registration - 1 required)	17A0960X012
62	Drive Screw, steel (2 required)	1E501728982
63	Nameplate, aluminum	-----
68*	Wire Seal	T14088T0012
69	Warning Tag, aluminum	T13815T0012

* Recommended spare part
1. Ductile iron bodies only.

Key	Description	Part Number
70	Bleed Restriction, steel 0.044-inch (1.1 mm) red (standard) 0.071-inch (1.8 mm) green 0.082-inch (2.1 mm) blue	17A2029X012 17A2030X012 17A7277X012
72	Optional P590 Series Filter	See P590 Series
76	Optional Pilot Supply Regulator	See 67 Series
78	Pilot Supply Tubing, long Stainless steel, w/ filter Stainless steel, w/ filter ⁽¹⁾	T13969T0022 T14022T0022
79	Pilot Supply Tubing, short Stainless steel, w/ filter	T13968T0022
80	Pad, nitrile	T13830T0012
81	Diaphragm Head, steel (2 required)	T13812T0012
82	Insert, aluminum ⁽¹⁾	T14013T0012
83	O-ring, nitrile ⁽¹⁾	T1072606562
84	Plate (for ductile iron body), steel ⁽¹⁾	T14039T0012
85	O-ring (for ductile iron body), nitrile ⁽¹⁾	T13769T0012
86	O-ring (for ductile iron body), nitrile ⁽¹⁾	T13772T0012
87	Set Screw (for ductile iron body) (4 required) ⁽¹⁾	1C629828992
88	Spring Seat, Type 299HR only	T14030T0012
89	Label, (not shown) Type 299H Type 299HR	T1215806032 T1215906032

Optional P590 Series Filter (Key 72)

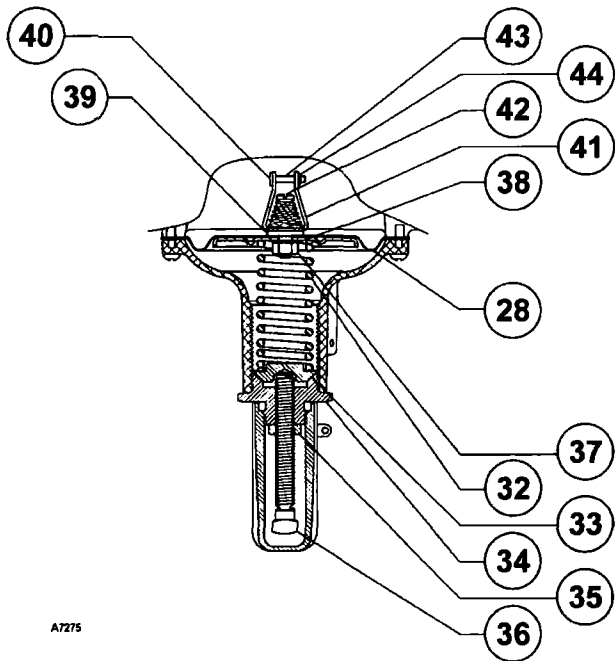
Key	Description	Part Number
1	Filter Body Type P594-1, brass Type P593-1, aluminum	1E312414012 1E312409012
2*	Filter Element, cellulose	1E312606992
3	Filter Head Type P594-1, brass Type P593-1, aluminum	1E312514012 1E312509012
4	Machine Screw Type P594-1, brass Type P593-1, aluminum	1J500218992 1J500209012
5	Washer (2 required) Type P594-1, brass Type P593-1, aluminum	1J500018992 1J500010062
6	Spring Washer, plated carbon steel	1H885128982
7*	Gasket, composition	1F826804022



KEY 72 - OPTIONAL P590 SERIES FILTER

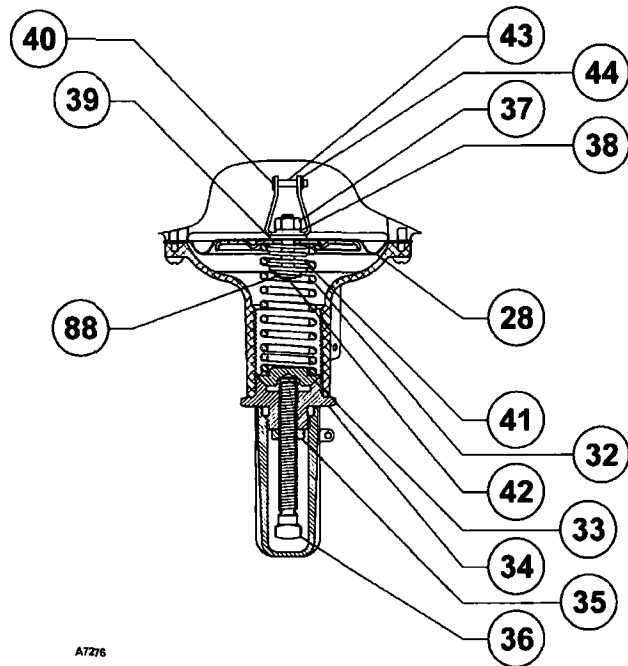
Figure 3. Optional P590 Series Filter

299H Series



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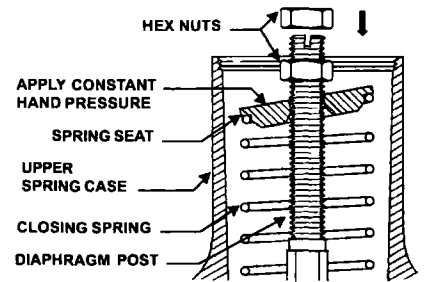
TYPE 299H PILOT (WITHOUT RELIEF VALVE)



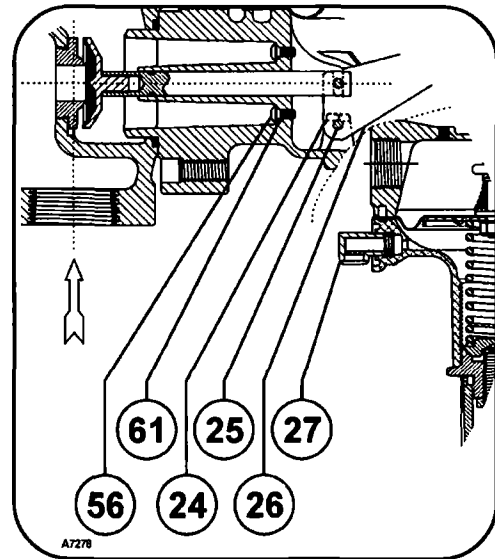
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TYPE 299HR PILOT WITH TOKEN RELIEF VALVE

Figure 4. 299H Series Pilot Assemblies

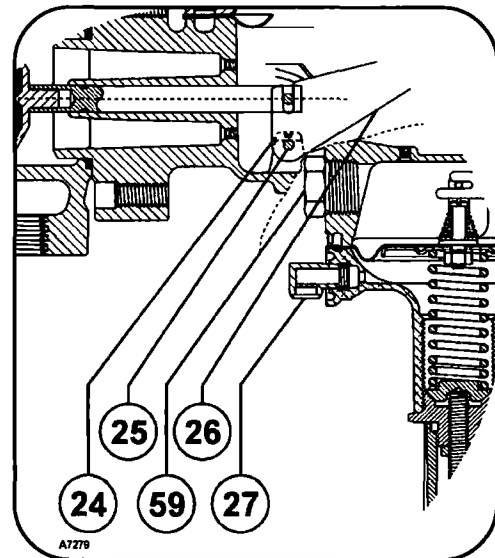


LOCKING DOWN THE SPRING SEAT TO FACILITATE INSTALLING THE HEX NUTS



A7278

EXTERNAL REGISTRATION



A7279

INTERNAL REGISTRATION

Figure 5. 299H Series Interior Assembly

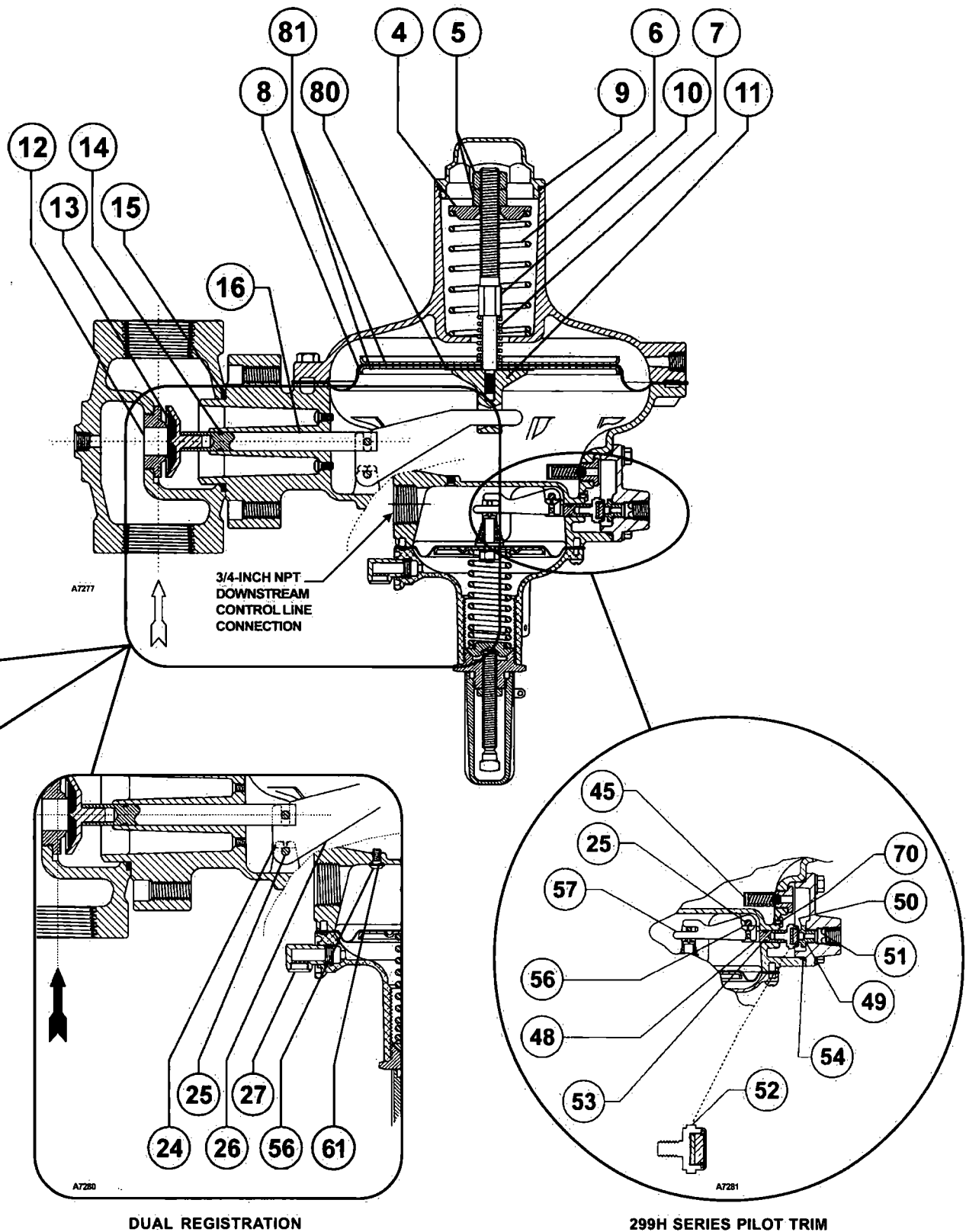
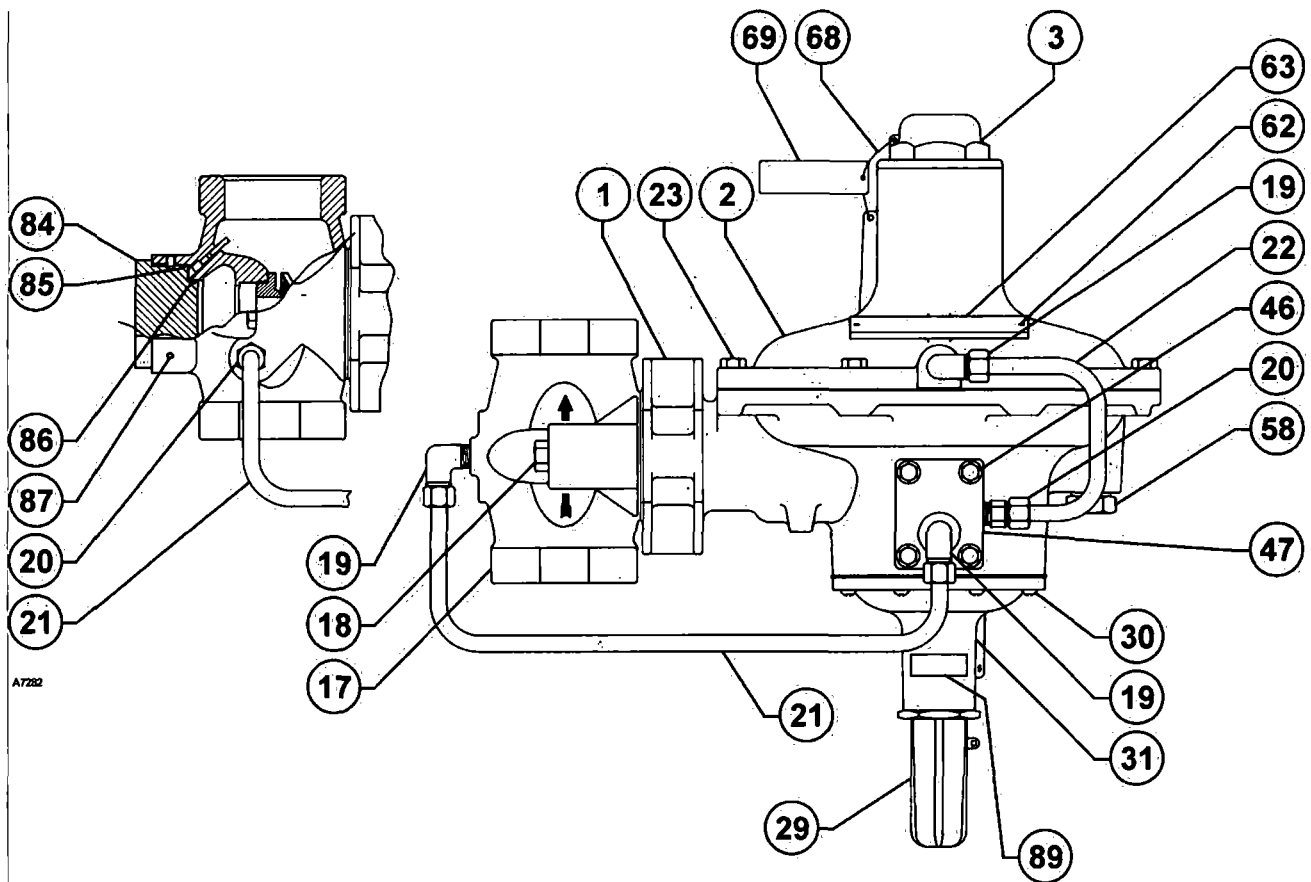
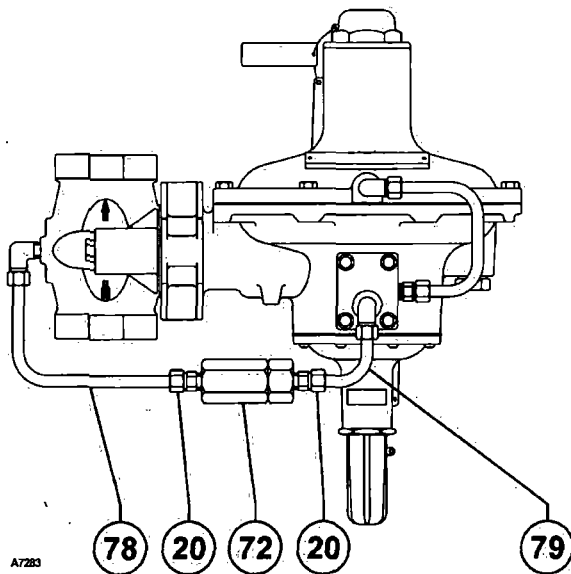


Figure 5. 299H Series Interior Assembly (continued)

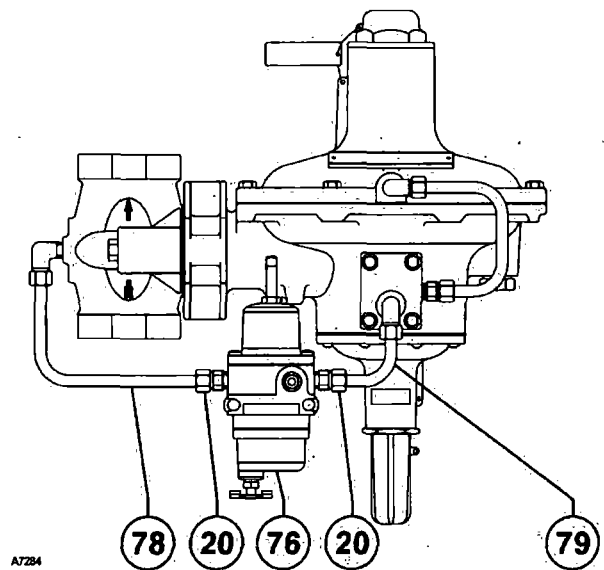
299H Series



299H SERIES EXTERIOR VIEW



**TUBING AND FITTINGS WITH
OPTIONAL TYPE P590 FILTER**



**TUBING AND FITTINGS WITH
OPTIONAL 67 SERIES PILOT SUPPLY REGULATOR**

Figure 6. 299H Series Exterior Assembly

January 2000

Errata Sheet for

**299H Series Pressure Reducing Regulators
Form 5497, June 1999**

The 299H Series is now available with an integral slam-shut device. Add the following information to the 299H Series Instruction Manual, form 5497.

- **Add the following paragraph to the Description section on page 1.**

The Type 299HS provides over or over and underpressure protection by completely shutting off the flow of gas to the downstream system. The shut-off device's actions are independent of the main valve and of variations to the inlet pressure. The slam-shut device has internal or external registration. External registration requires a downstream sensing line.

- **Add the following paragraphs to the Principle of Operation section on page 4.**

Type 299HS

The Type VSX-2 slam-shut device on the Type 299H regulator is a fast acting shut-off valve which provides over or over and underpressure protection by completely shutting off the flow of gas to the downstream system. The shut-off module's actions are independent of the Type 299H regulator and of variations to the inlet pressure. The VSX-2 has internal or external registration. External registration requires a downstream sensing line.

The shut-off disk is held in the open position (reset position) by a small ball holding the disk stem. If the pressure below the diaphragm increases (or decreases) reaching the Type VSX-2 setpoint, the diaphragm will travel upwards (or downwards) operating a lever which in turn releases the ball.

Once the ball is released, the spring force on the stem will push the stem and disk to the closed position against the seat shutting off all gas flow. The pilot supply pressure is also shut off when the Type VSX-2 is closed. The manual reset has an internal bypass to equalize the reset pressure on either side on the shut-off disk.

- **Add the following paragraph to the Installation warning on page 4.**

If the Type VSX-2 is exposed to an overpressure condition, it should be inspected for any damage that may have occurred. Operation below these limits does not preclude the possibility of damage from external sources or from debris in the pipeline.

299H Series

- Add the following information to the Specifications section on page 2.

Specifications

Available Configurations <p>Type 299HS: Same as the Type 299H with a Type VSX-2 shutoff valve which provides over or over and underpressure protection.</p> <p>Type 299HSR: Same as the Type 299HS with an internal token relief valve.</p>	<p>Maximum Outlet Pressure⁽¹⁾ 66 psig (4,6 bar)</p> <p>Maximum Set Pressure for Type 299HS⁽¹⁾ 16 psig (1,1 bar)</p> <p>Type 299HS Outlet (Control) Pressure Ranges⁽¹⁾ See table 1</p> <p>Maximum Set Pressure for Slam-Shut Device⁽¹⁾ 23 psig (1,6 bar)</p> <p>Minimum and Maximum Trip Pressure Ranges See table 2</p> <p>Type VSX-2 Sensing Line Connection 1/4-inch NPT screwed</p>
Body Size And End Connection Styles <p>Note: The Type 299HS is only available in Ductile iron</p>	
Maximum Inlet Pressure⁽¹⁾ by Orifice Size <p>Note: The Type 299HS is not available with 7/8-inch (22,2 mm), 1-inch (25,4 mm), or 1-3/16-inch (30,2 mm) orifice</p>	

1. The pressure/temperature limits in this bulletin and any applicable standard or code limitation should not be exceeded.

- Add the following table to the instruction manual.

Table 1. Type 299HS Outlet Pressure Ranges

SPRING NUMBER	OUTLET (CONTROL) PRESSURE RANGE	PILOT CONTROL SPRING			
		Part Number	Color Code	Free Length, Inches (mm)	Wire Diameter, Inches (mm)
1	3.5 to 6-inches w.c. (9 to 15 mbar) ⁽¹⁾	T13707T0012	Black	1.86 (47,2)	0.055 (1,4)
2	5 to 9-inches w.c. (12 to 22 mbar) ⁽¹⁾	T13589T0012	Yellow	2.05 (52,0)	0.051 (1,3)
3	7 to 20-inches w.c. (17 to 49 mbar) ⁽¹⁾	1N3112X0012	Silver	2.18 (55,4)	0.075 (1,9)
4	16 to 40-inches w.c. (40 to 99 mbar) ⁽¹⁾	1B413727222	Purple	2.12 (53,8)	0.092 (2,3)
5	1 to 3.25 psig (0,069 to 0,22 bar)	T13593T0012	Light blue	2.12 (53,8)	0.105 (2,7)
6	2.75 to 6 psig (0,19 to 0,41 bar)	T13671T0012	Orange	2.40 (61,1)	0.120 (3,0)
7	5 to 16 psig (0,34 to 1,10 bar)	T13600T0012	Red	2.10 (53,3)	0.142 (3,6)

1. Use a pilot supply regulator if actual inlet pressure varies more than ± 20 psi (1,4 bar) and published accuracy is required.

- Add the following paragraphs to the Registration Conversion section on page 5.

Type VSX-2 Slam-Shut Device

To convert the Type VSX-2 from one type of registration to another all that is required is adding or removing a screw and gasket.

To change an internal registration Type VSX-2 to an external or dual registration Type VSX-2 with downstream control line, block the body pitot tube with a screw and gasket (keys 10 and 11, figure 7). Remove the pipe plug in the Type VSX-2 and add a downstream control line.

- Add the following step between steps 1 and 2 of the Startup procedure on page 5.

On a Type 299HS the Type VSX-2 is shipped in the tripped position and will need to be reset. If the Type VSX-2 is a high trip only, it can be reset before starting the regulator. If the Type VSX-2 is a high and low trip, the regulator will need to be started and the downstream system pressurized before the Type VSX-2 can be reset. See the section for Type VSX-2 reset.

- Add the following to figure 2 on page 3.

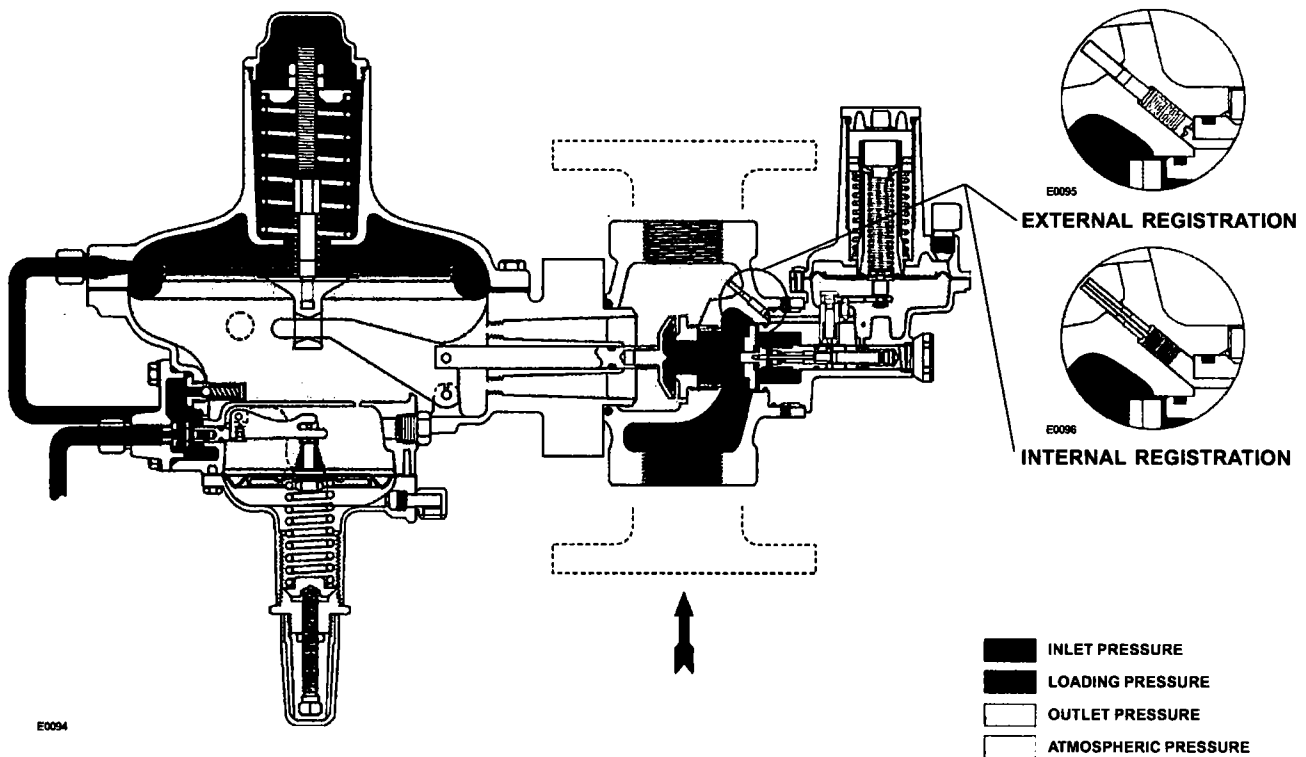


Figure 2. 299HS Operational Schematic

299H Series

- Add the following table to the instruction manual.

Table 2. Type VSX-2 High and Low Trip Pressure Ranges

SETPOINT RANGES	SLAM-SHUT TYPE	FOR USE WITH MAIN VALVE SPRING NUMBER ⁽¹⁾	MINIMUM TO MAXIMUM TRIP PRESSURE	TYPE VSX-2 SPRING PART NUMBER	SPRING FREE LENGTH, INCHES (mm)	SPRING WIRE DIAMETER, INCHES (mm)
High Pressure Trip	LP	1, 2	12 to 25-inches w.c. (30 to 63 mbar)	T14162T0012	3.15 (80)	0.067 (1.7)
		1, 2, 3	20 to 52-inches w.c. (50 to 130 mbar)	T14163T0012	3.15 (80)	0.080 (2.0)
		3, 4	1.4 to 3.9 psig (95 to 270 mbar)	T14164T0012	3.15 (80)	0.091 (2.3)
		4, 5, 6	3.8 to 8.7 psig (260 to 600 mbar)	T14165T0012	3.15 (80)	0.120 (3.0)
		6, 7	5.8 to 16 psig (400 to 1100 mbar)	T14166T0012	3.15 (80)	0.138 (3.5)
		7	11.6 to 23 psig (800 to 1600 mbar)	T14167T0012	3.15 (80)	0.170 (4.3)
Low Pressure Trip	LP	2, 3	2 to 12-inches w.c. (6 to 30 mbar)	T14168T0012	3.15 (80)	0.043 (1.1)
		3, 4	4 to 30-inches w.c. (10 to 75 mbar)	T14169T0012	3.15 (80)	0.055 (1.4)
		5, 6	0.36 to 2.3 psig (25 to 160 mbar)	T14170T0012	3.15 (80)	0.067 (1.7)
		6, 7	1.5 to 10.8 psig (100 to 750 mbar)	T14171T0012	3.15 (80)	0.125 (3.2)

1. See table 1 for main valve spring number.
Note: Other spring combinations are available, please contact your Fisher Sales Representative for additional information.

- Add the following section after the Registration Conversion section on page 5.

Type VSX-2 Installation

Note

The Type VSX-2 slam-shut module should be mounted so that the spring case vent points towards the ground.

Place new O-rings (keys 2 and 3, figure 7) on the Type VSX-2 and slide the module into the Type 299HS body (key 17, figure 7). Secure the Type VSX-2 to the Type 299HS body with the four set screws (key 4, figure 7). The Type VSX-2 device may be oriented in any direction with respect to the sensor line connection.

- Add the following sections after the Adjustment section on page 5.

Type VSX-2 Reset

Note

The over and under trip pressures can only be reset if the Type 299HS outlet pressure is between the over and under tip pressure.

Use the following procedure to reset the Type VSX-2:

1. Unscrew the brass knob to open the equalizing bypass.
2. Pull out on the knob until it stops. This resets the tripping mechanism.
3. Push in and tighten the knob.

- Add the following sections after the Adjustment section on page 5.

Type VSX-2 Trip Adjustment

Note

An adjustment tool is included with the Type VSX-2 (see figure 8). Use only this tool to make adjustments to the Type VSX-2. To make adjustments, the overpressure trip spring is found under the outer adjusting screw and the underpressure trip spring is found under the inner adjusting screw.

Use the following procedure to adjust the Overpressure Trip Spring:

1. Use the VSX adjusting tool to adjust the overpressure trip spring to its maximum compression.
2. If present adjust the underpressure spring (using the VSX adjusting tool) to its minimum compression.
3. Backpressure the unit with the desired trip pressure.
4. Reduce the overpressure trip spring compression until the Type VSX-2 trips.

Use the following procedure to adjust the Underpressure Trip Spring:

1. Use the VSX adjusting tool to adjust the underpressure trip spring to its minimum compression.
2. Backpressure the unit with the desired trip pressure.
3. Increase the underpressure trip spring compression until the Type VSX-2 trips.

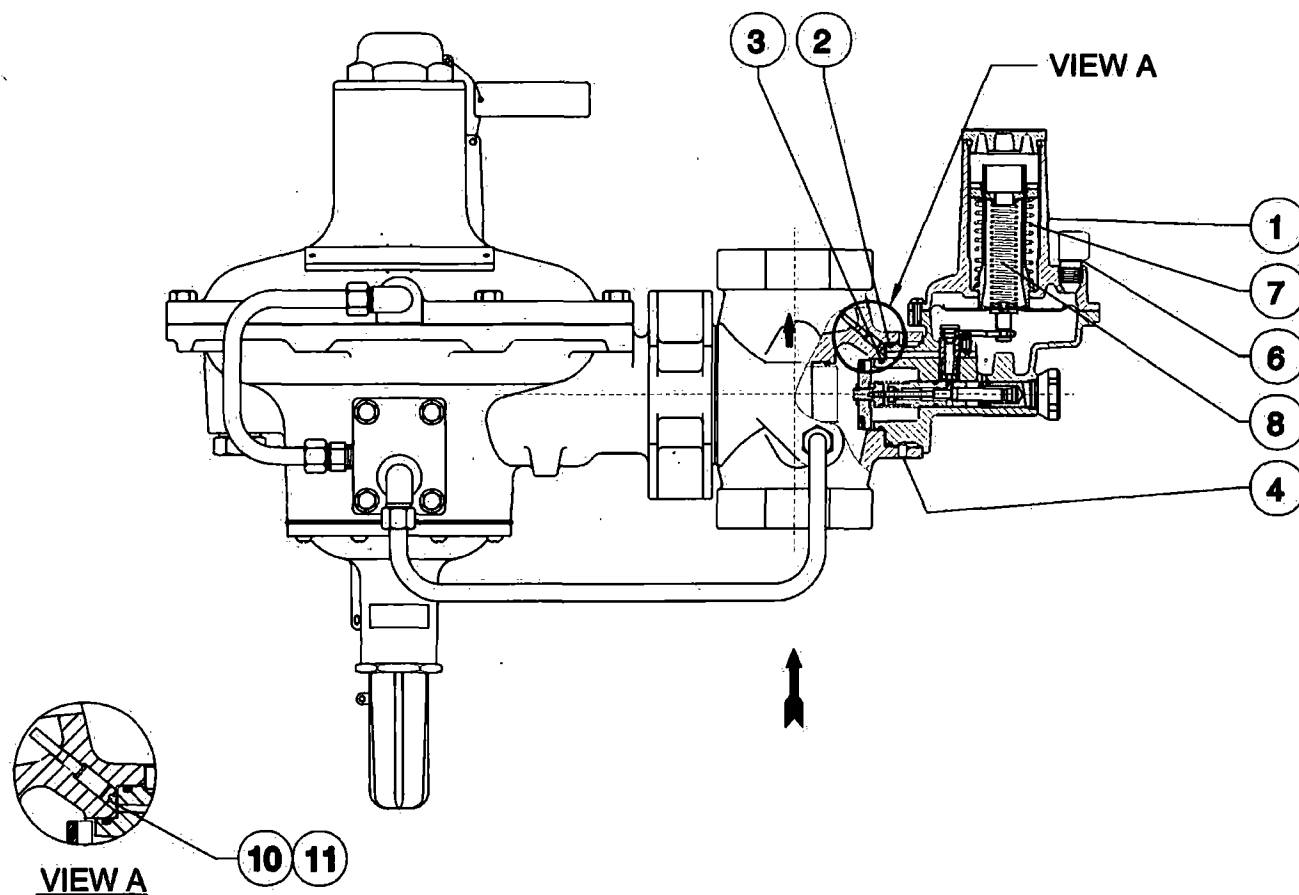
- Add the following section after the Integral Pilot Control Spring and Diaphragm section beginning on page 8.

Type VSX-2 Maintenance

The Type VSX-2 device (key 1, figure 7) is designed to be removed as a unit from the Type 299HS body (key 17, figure 7) and be replaced as a complete unit. The high and low pressure springs may be adjusted or replaced without removing the slam-shut from the Type 299HS body.

299H Series

- Add the figure below.



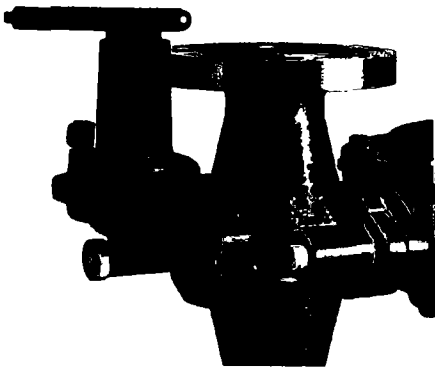
E0098

Figure 7. Type VSX-2 Assembly

• Add the figure below.



VSX ADJUSTING TOOL



VSX TOOL BEING USED TO ADJUST A TYPE VSX-2

Figure 8. VSX Adjusting Tool

• Add the following to the Parts List on page 9.

Type VSX-2 Slam-Shut Device (figure 7)

Key	Description	Part Number
1	VSX-2 Module	FA196247X12
2	Upper O-ring	T13769T0012
3	Lower O-ring	T13772T0012
4	Set Screw (4 required)	1C629828992
6	Vent Assembly	27A5516X012
7	High pressure Control Spring, zinc plated steel	
	12 to 25-inches w.c. (30 to 63 mbar), black	T14162T0012
	20 to 52-inches w.c. (50 to 130 mbar), brown	T14163T0012
	1.4 to 3.9 psi (95 to 270 mbar), red	T14164T0012
	3.8 to 8.7 psig (260 to 600 mbar), orange	T14164T0012
	5.8 to 16 psig (400 to 1100 mbar), yellow	T14166T0012
	11.6 to 23 psig (800 to 1600 mbar), green	T14167T0012
8	Low pressure Control Spring, zinc plated steel	
	2 to 12-inches w.c. (6 to 30 mbar), white	T14168T0012
	4 to 30-inches w.c. (10 to 75 mbar), blue	T14169T0012
	0.36 to 2.3 psig (25 to 160 mbar), silver	T14170T0012
	1.5 to 10.8 psig (100 to 750 mbar), olive	T14171T0012
10	Machine Screw (for external control line), steel	1H8162X0012
11	Gasket (for external control line)	T14075T0012
12	Adjustment Tool	FA142932X12
13	Pipe Plug (for internal registration)	1A767524662

299H Series

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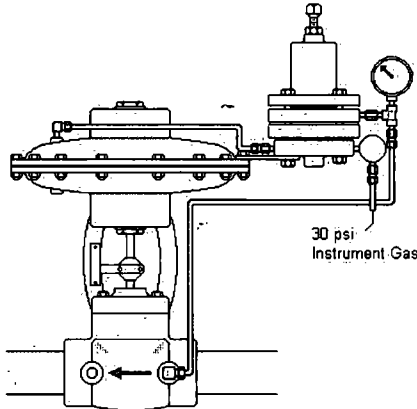
For information, contact Fisher:
Marshalltown, Iowa 50158 USA
McKinney, Texas 75070 USA
28320 Gallardon, France
40013 Castel Maggiore (BO), Italy
Sao Paulo 05424 Brazil
Singapore 128461

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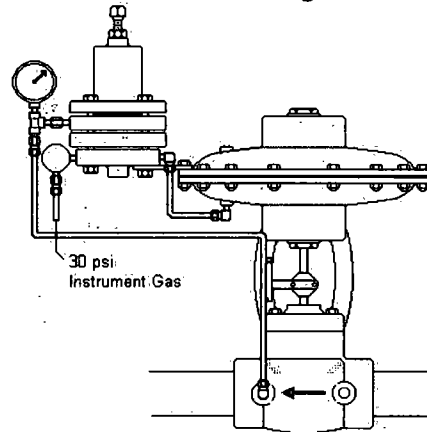
www.FISHERregulators.com



When a regulator is required where shut-in pressure may range above 300 psi, the maximum operating pressure of our S/FGT Regulators, we recommend the use of a combination of High Pressure Motor Valve and Pilot. Any of the Kimray High Pressure Motor Valves, 1" through 4", may be operated with a 30 HPG PR, 75 PG, or 150 PG Pilot, depending on the desired set point. These pilot/valve combinations can be configured for Back Pressure or Pressure Reducing service.

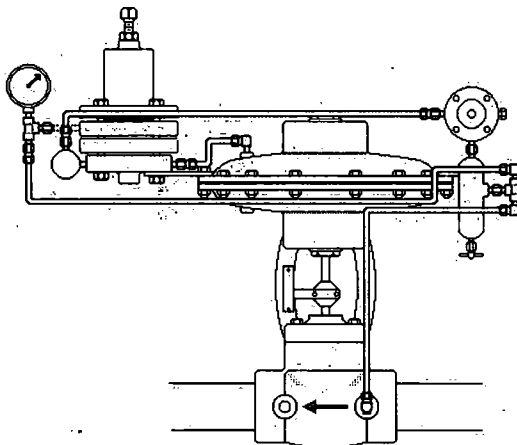
Back Pressure

In a Back Pressure configuration the sense line is connected upstream and the valve is typically operated in a pressure closing (fail open) mode.

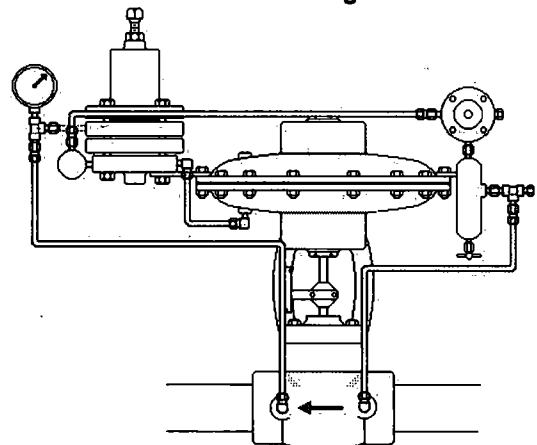
Pressure Reducing

In a Pressure Reducing Configuration the sense line is connected downstream, and the valve is operated in a pressure opening (fail closed) mode.

In applications where no instrument gas or "outside supply" is available an Instrument Gas Regulator is added to cut upstream pressure to the recommended pressure for the operation of the topworks of the motor valve. We also add a drip pot to collect any liquid that might be in the upstream gas.

Back Pressure

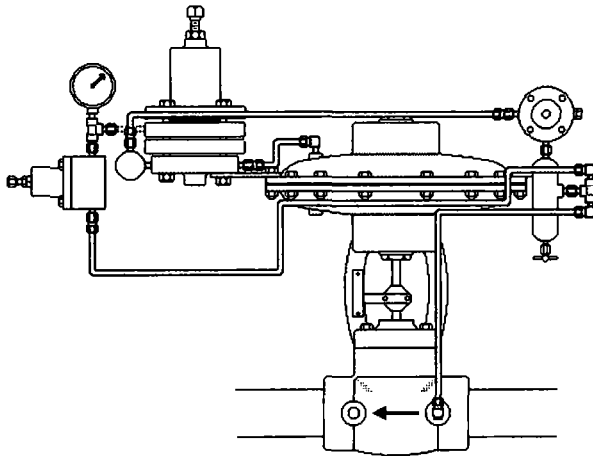
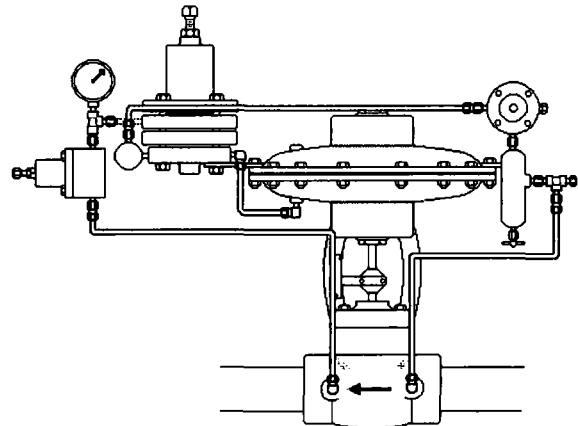
The Back Pressure Regulator is now fully self-contained with both supply and sense being connected to the upstream end of the valve.

Pressure Reducing

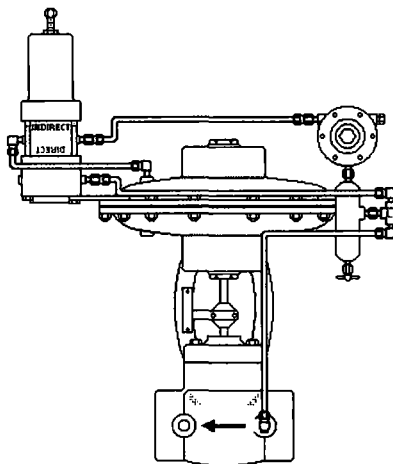
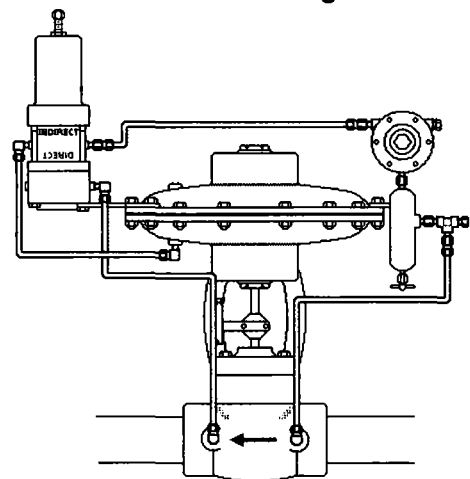
The Pressure Reducing Regulator is also a self-contained unit. Supply is taken from upstream while the sense line is connected down stream.

Notice the plugged tee on the side of the drip pot. This will provide a tap for an upstream gauge.

If the pressure sensed by the 30 HPG PR Pilot could potentially exceed the 300 psi maximum working pressure, a Sense Line Protector is recommended. It is installed on the sense line between valve and pilot. The Sense Line Protector is designed to protect the pilot by blocking any sensed pressure which exceeds its adjustable maximum of 300 psi.

Back Pressure**Pressure Reducing**

When the desired setpoint is between 300 psi and 750 psi the 75 PG Pilot is used.
When the desired setpoint is between 750 psi and 1500 psi the 150 PG Pilot is used.

Back Pressure**Pressure Reducing**

In regulating upstream pressures between 300 and 1500 psi the 30 HPG Pilot is replaced with the 75 PG or 150 PG Pilot.

The 75 PG or 150 PG Pilot replaces the 30 HPG Pilot for regulating downstream pressures between 300 and 1500 psi as well.

APPLICATIONS:

Low pressure regulator for maintaining vapor pressure on storage tanks, controlling compressor by-pass for gas recirculation and maintaining low pressure head on flash separators.

FEATURES:





- Non-bleed pilot
- Soft seat for bubble tight shut-off
- Static sense line allowing remote sensing
- Outside pilot supply can be used to isolate process stream from instrument supply gas.

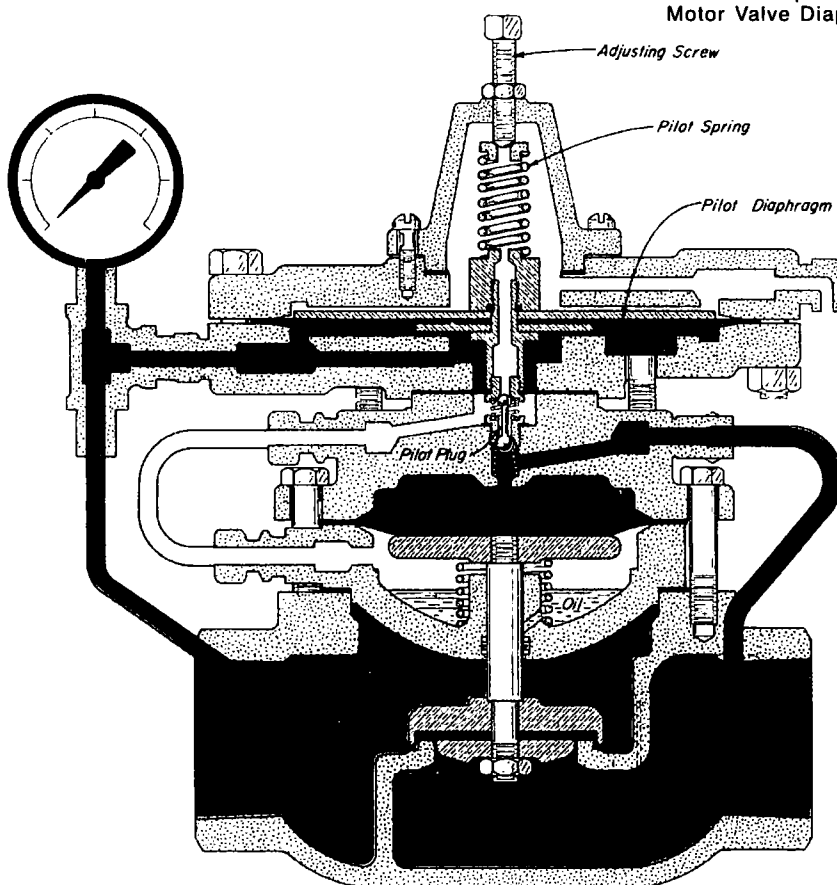
PRESSURE RANGE:

Downstream: 0.5 oz psig to 2.5 psig (additional spring ranges are available to 20 psig)
Upstream: 3 psig to 125 psig

CAPACITY:

See capacity chart, this section.

-  Motor Valve Stem Assembly
-  Upstream Pressure
-  Downstream Pressure
-  Motor Valve Diaphragm Pressure

**OPERATION:**

This valve is used to regulate Downstream Pressure (Blue) from 0.5 oz to 2.5 psig by metering gas from the upstream source to the downstream side as required.

The Pilot Assembly and Motor Valve Stem Assembly (Crosshatched) are the only moving units in the regulator.

The PILOT PLUG consists of two stainless balls rigidly connected together. Upstream Pressure (Red) is the supply pressure to the pilot and is also in constant communication with the top side of the MOTOR VALVE DIAPHRAGM. The area of the MOTOR VALVE DIAPHRAGM is twice the area of the motor valve seat, assuring a positive shut-off.

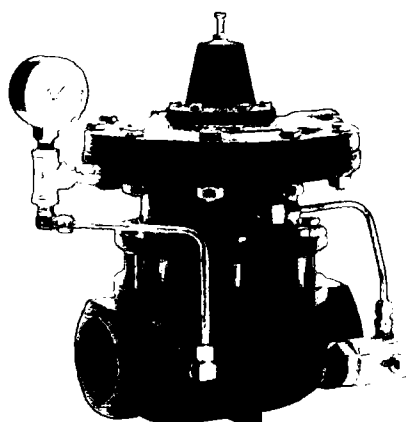
The upper seat for the PILOT PLUG is the pressure vent (Yellow to Atmosphere). The lower PILOT PLUG seat is the Motor Valve Diaphragm Pressure inlet (Red to Yellow). The Pilot Assembly actuates the PILOT PLUG. The PILOT SPRING loads the upper side of the Pilot Assembly and is opposed on the underneath side by the controlled Downstream Pressure (Blue).

Assume the PILOT SPRING is compressed with the ADJUSTING SCREW for a desired Downstream Pressure setting. With Downstream Pressure (Blue) too low, the PILOT SPRING forces the Pilot Assembly downward to close the upper seat (Yellow to Atmosphere) and open the lower seat (Red to Yellow).

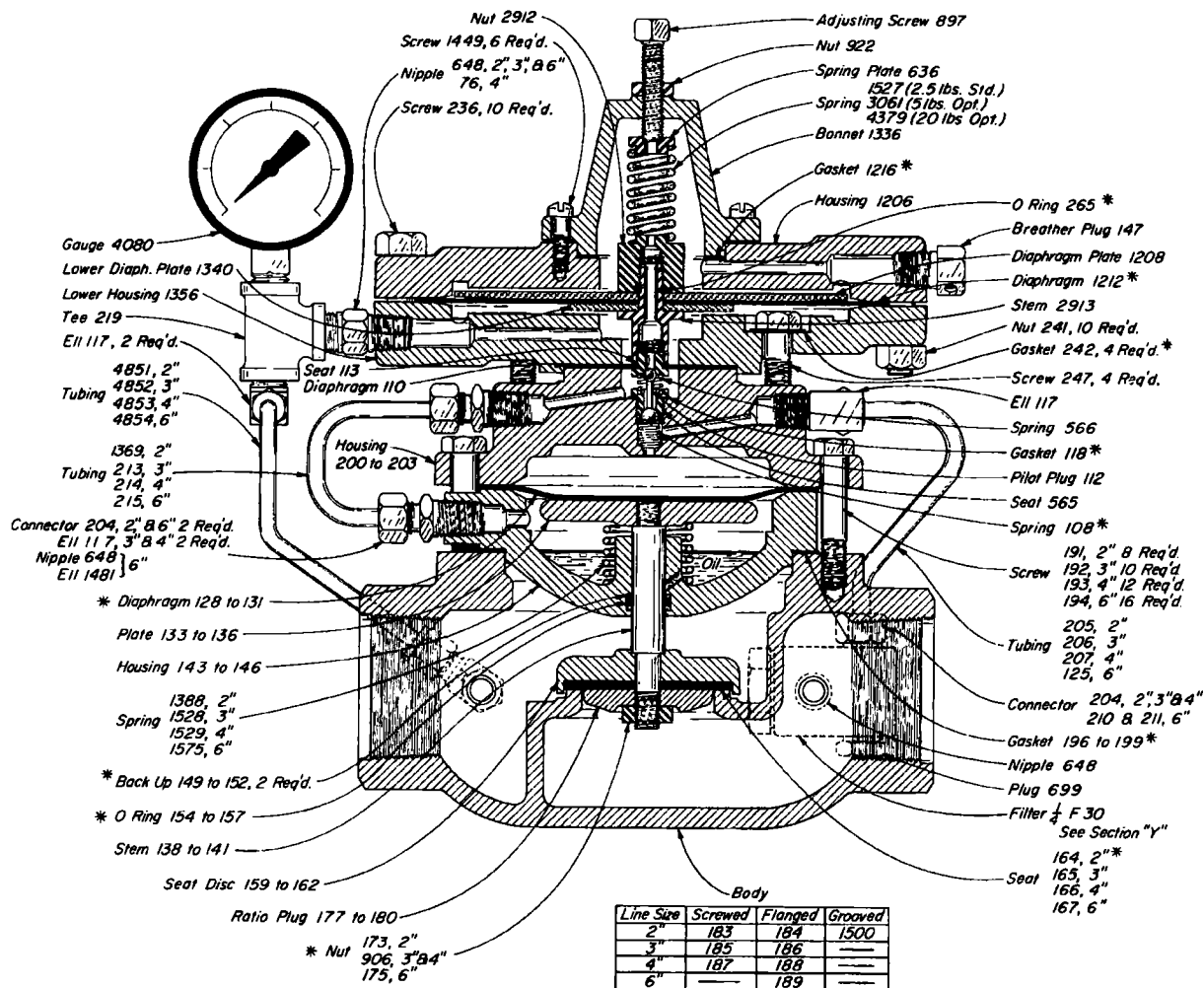
This lets full Upstream Pressure (Red) load the underneath side of the MOTOR VALVE DIAPHRAGM to balance the pressure on the top side. Upstream Pressure (Red) acting under the motor valve seat, opens the valve. As Downstream Pressure (Blue) increases to the set pressure, the Pilot Assembly assumes a position in which both seats of the PILOT PLUG are closed.

Should Downstream Pressure (Blue) rise above the set pressure, the Pilot Assembly moves upward against the PILOT SPRING to open the pressure vent (Yellow to Atmosphere). Motor Valve Diaphragm Pressure (Yellow) decreases to reposition the Motor Valve Stem Assembly.

The non-bleed three-way valve action of the PILOT PLUG against its seat adjusts the Motor Valve Diaphragm Pressure (Yellow) to reposition the Motor Valve Stem Assembly to accommodate any rate of flow. The rapid but stable repositioning produces a true throttling action.



2", 3", 4" & 6" S/F/GGT OPR
CAST IRON
2.5 lbs. W.P.



VALVES AVAILABLE: CAST IRON

CAT. NO.	SIZE	TYPE	REG. NO	DES. PRESS.	OPER. PRESS.
AOS-2.5	2"	SCRD.	2.2 SGT OPR	175	2.5
AOT-2.5	2"	FLGD. ^a	2.2 FGT OPR	175	2.5
AOU-2.5	2"	GRVD.	2.2 GGT OPR	175	2.5
AOV-2.5	3"	SCRD.	3.2 SGT OPR	175	2.5
AOW-2.5	3"	FLGD. ^a	3.2 FGT OPR	175	2.5
AOY-2.5	4"	SCRD.	4.2 SGT OPR	175	2.5
AOZ-2.5	4"	FLGD. ^a	4.2 FGT OPR	175	2.5
APC-2.5	6"	FLGD. ^a	6.2 FGT OPR	175	2.5

To order regulator with option spring, specify catalog code followed by spring rate:

For example: AOS-5 for 5 lbs., AOS-20 for 20 lbs.

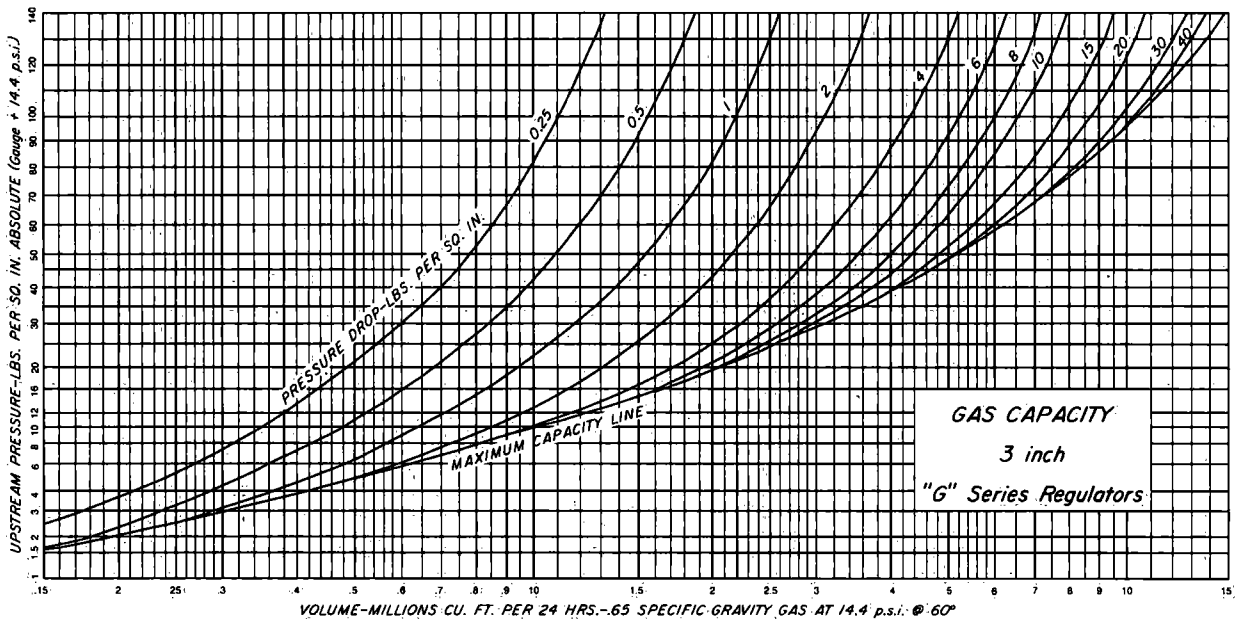
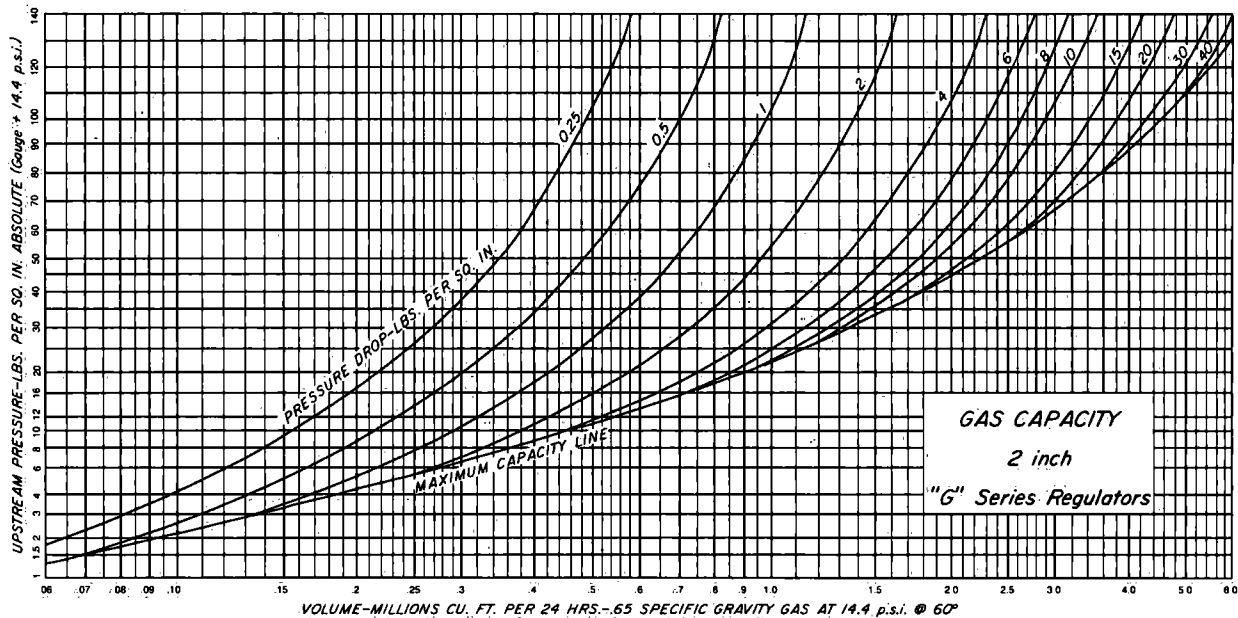
^aCompanion flanges, nuts, bolts and gaskets are furnished at extra cost. Refer to Section "Y" for ordering.

Dimensions refer to Table of Contents.

*These are recommended spare parts and are stocked as repair kits. To order repair kit, specify size of regulator: Example: "2" 2.5 OPR Repair Kit, RUA; 3" 3.5 OPR Repair Kit, RUB; 4" 4.5 OPR Repair Kit, RUC; 6" 6.5 OPR Repair Kit, RUD"

NOTE: The number of a series assigned to a part indicated different line sizes. For example: Diaphragm 128-2", 129-3", 130-4" and 131-6".

125 lbs. Maximum W.P. Valves



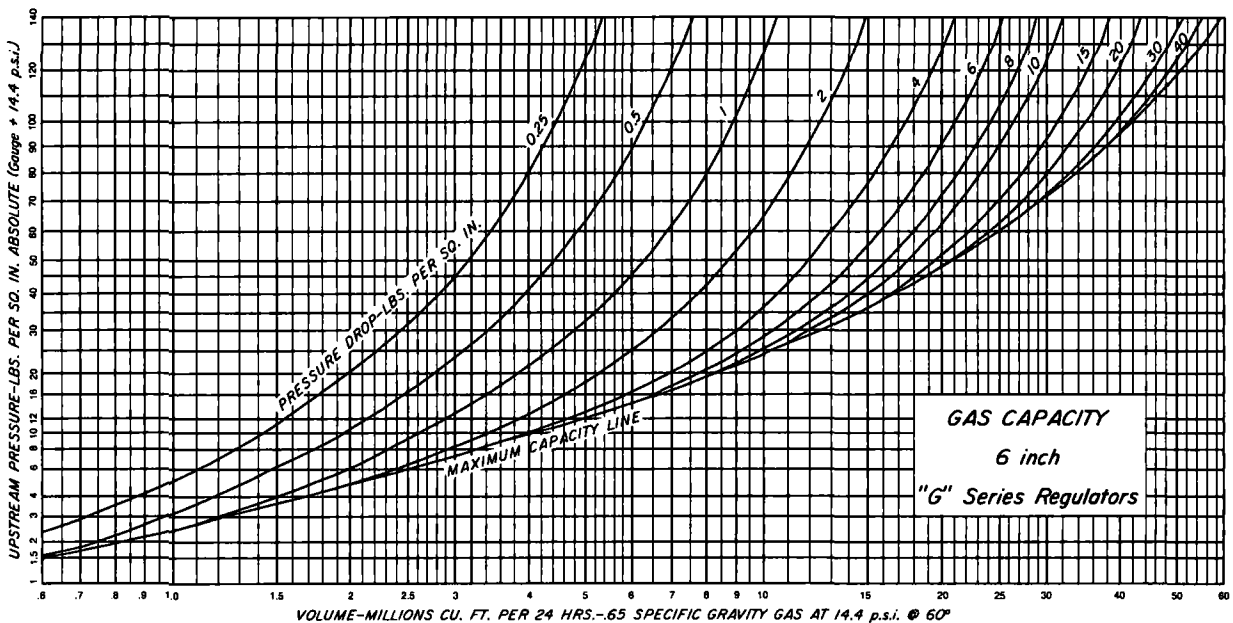
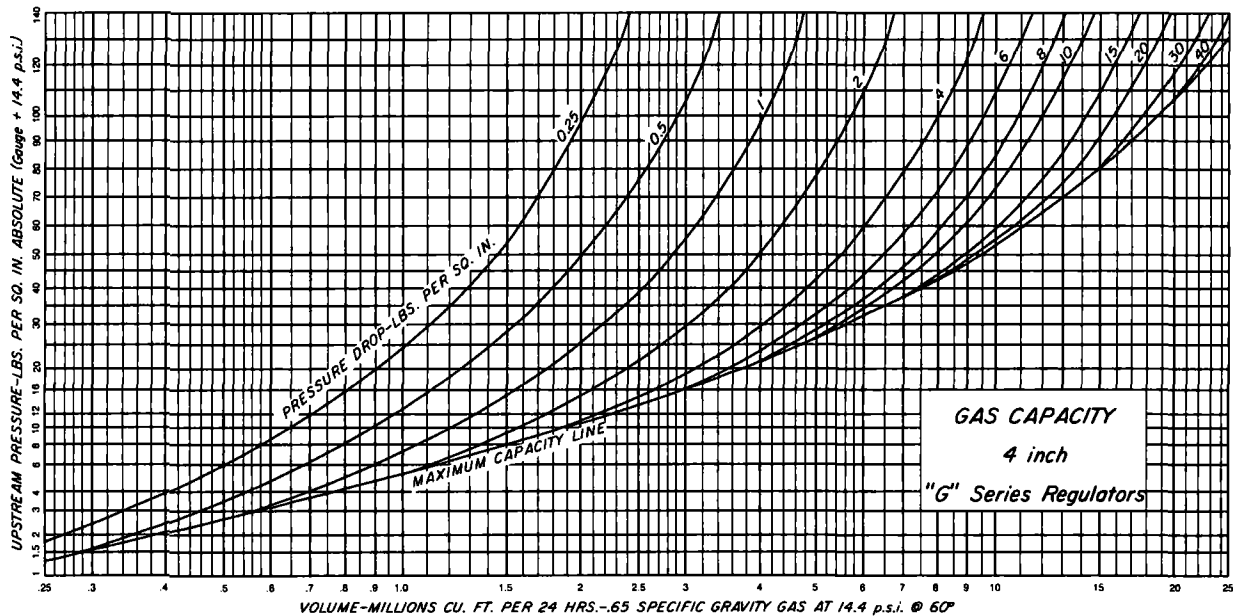
Gas capacities are based on pressure taken immediately upstream and downstream from the regulator in a wide open position.

Critical flow exists across a valve or orifice when the downstream absolute pressure is approximately half of the upstream absolute pressure. Any decrease in downstream pressure will not increase the flow through the valve. Critical flow conditions on the charts are represented by the MAXIMUM CAPACITY LINE.

HOW TO USE CHARTS: Locate UPSTREAM PRESSURE at left of chart. Follow horizontally across to PRESSURE DROP (upstream minus downstream pressure). Read VOLUME directly below. If the horizontal projection of the upstream pressure does not intersect the given pressure drop, flow is critical. In this case project UPSTREAM PRESSURE horizontally to the MAXIMUM CAPACITY LINE and read VOLUME directly below.

*For gravity correction multiply above capacities by $\sqrt{\frac{.65}{G}}$ where G equals specific gravity of gas.

125 lbs. Maximum W.P. Valves



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*For gravity correction multiply above capacities by $\sqrt{\frac{.65}{G}}$ where G equals specific gravity of gas.

300 lbs. Maximum W.P. Valves

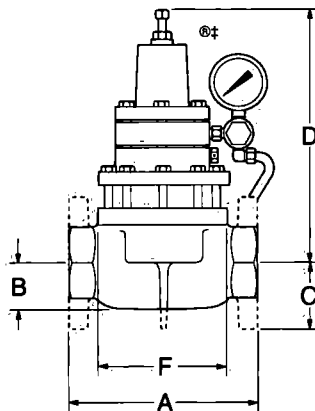
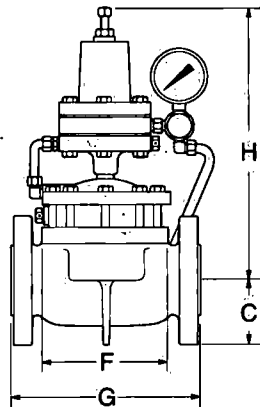
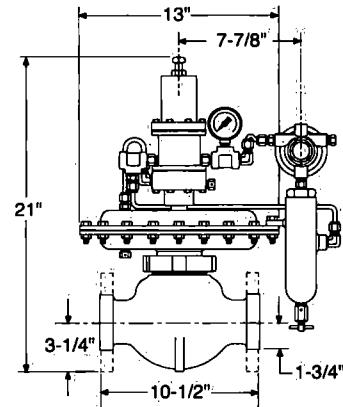
CAPACITY-Bbls. Water/Day, Steady Flow

PRESSURE DROP ACROSS VALVE PSIG	VALVE SIZE - INCHES			
	1	2	3	4
1	745	1,760	3,350	7,800
2	1,060	2,500	4,900	11,000
3	1,300	3,050	6,100	13,500
4	1,500	3,500	7,000	15,600
5	1,700	3,900	7,800	17,500
10	2,300	5,600	11,000	24,700
15	2,900	6,800	13,500	30,200
20	3,300	7,900	15,600	34,900
30	4,100	9,600	19,200	42,700
40	4,700	11,100	22,100	49,300
50	5,300	12,400	24,800	55,200
60	5,800	13,600	27,100	60,500
70	6,200	14,700	29,300	65,400
80	6,700	15,700	31,300	69,800
100	7,500	17,600	33,500	78,200
125	8,400	19,700	39,200	87,500
150	9,300	21,500	40,750	93,000
200	10,750	25,000	47,000	108,000
250	12,100	28,000	52,000	120,000
300	13,300	30,900	57,250	130,000

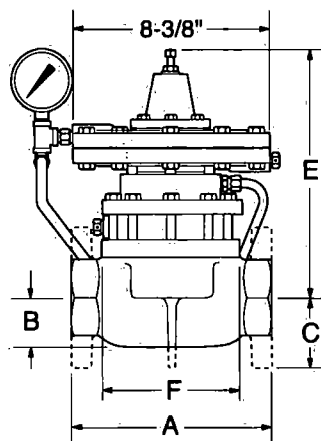
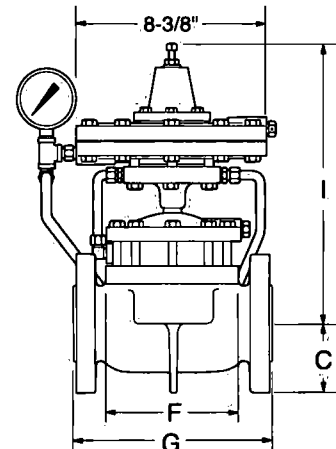
For gravity correction, multiply the above figures by $\sqrt{\frac{1}{G}}$
 Where "G" is the specific gravity of the flowing liquid.

FOR:
 BACK PRESSURE
 UPSTREAM DIFFERENTIAL PRESSURE
 PRESSURE REDUCING-BALANCED
 PRESSURE REDUCING VACUUM

PRESSURE DIFFERENTIAL
 PRESSURE REDUCING
 BACK PRESSURE VACUUM
 LIQUID BACK PRESSURE

CAST IRON OR DUCTILE**STEEL****250 S/FGT-BP-S**

FOR:
 LOW PRESSURE BACK PRESSURE
 OUNCES BACK PRESSURE TO VACUUM
 OUNCES PRESSURE REDUCING
 OUNCES PRESSURE REDUCING VACUUM
 VACUUM BACK PRESSURE TO VACUUM

CAST IRON OR DUCTILE**STEEL**

LINE SIZE	BODY STYLE	A	B	C	D*	E	F	G	H*	I
1 "	SCRD	4 3/8"	1 1/8"		7 1/2"	11 5/8"	3 1/4"			
2 "	SCRD	8 1/2"	2 1/8"		11 1/2"	10 1/2"	6 1/2"			
	FLGD	9"		3	11 1/2"	10 1/2"	6 1/2"	9 1/8"	14 1/2"	14"
	GRVD	8 3/4"	2 1/8"		11 1/2"	10 1/2"	6 1/2"			
250 S/FGT	SCRD			1 3/4"				10 1/2"		
	FLGD			3 1/4"				10 1/2"		
3 "	SCRD	12"	3 1/16"		13"	12"	8 1/2"			
	FLGD	12 3/16"		3 3/4"	13"	12"	8 1/2"	12 5/16"	16 1/2"	15 1/2"
4 "	SCRD	15"	4"		14 1/2"	13 3/16"	10 1/2"			
	FLGD	15 1/8"		4 1/2"	14 1/2"	13 3/16"	10 1/2"	15"	18 1/2"	16 11/16"
6 "	FLGD	22 1/8"		5 1/2"	17"	14 7/8"	16"	22"	20 1/2"	18 3/8"

FLANGE DIMENSIONS ARE ASA 150 LB. STANDARD. *Add 7/8" to PRB and USDP Regulators for this dimension.

APPLICATION:

Regulation of inlet pressure to gas compressors. Control of supply or distribution system pressure






PRESSURE RANGE:

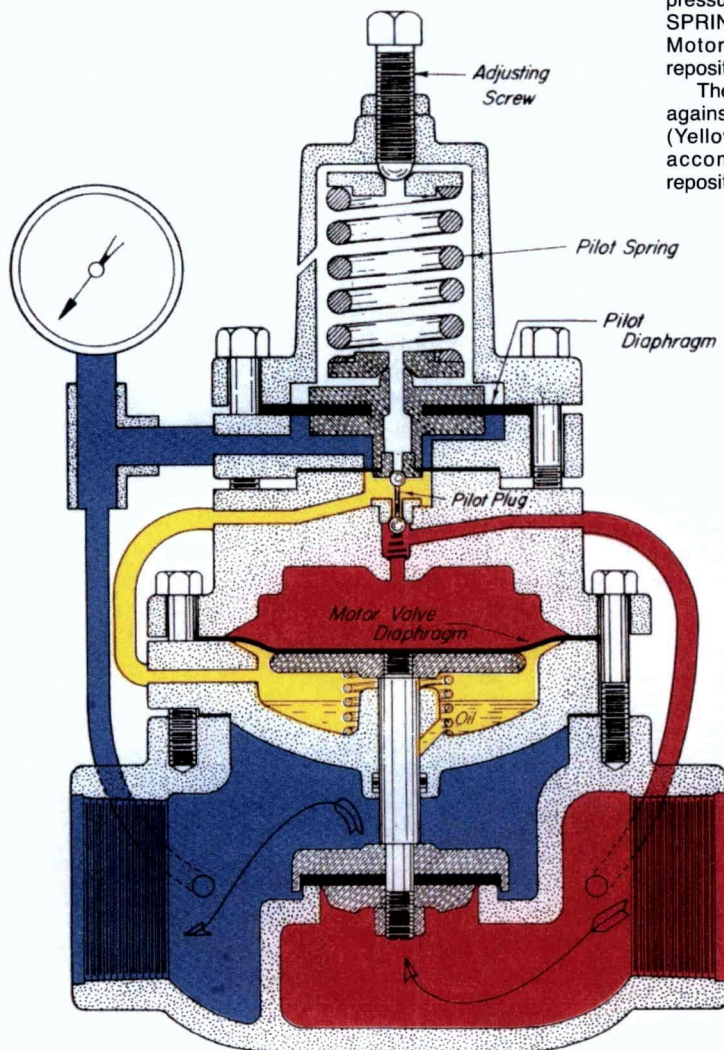
Upstream: 10 psig to 300 psig

Downstream: 3 psig to 280 psig

CAPACITY:

Refer to Table of Contents

-  Pilot Assembly
-  Motor Valve Stem Assembly
-  Upstream Pressure
-  Downstream Pressure
-  Motor Valve Diaphragm Pressure

**OPERATION:**

The Pilot Assembly and Motor Valve Stem Assembly (Crosshatched) are the only moving units in the regulator.

The PILOT PLUG consists of two stainless balls rigidly connected together. Upstream Pressure (Red) is the supply pressure to the pilot and is also in constant communication with the top side of the MOTOR VALVE DIAPHRAGM. The area of the MOTOR VALVE DIAPHRAGM is twice the area of the motor valve seat, assuring a positive shut-off.

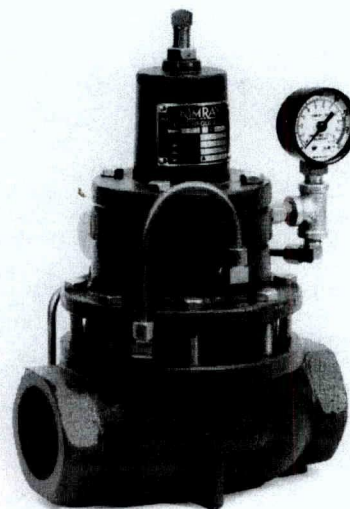
The lower seat for the PILOT PLUG is the Motor Valve Diaphragm Pressure inlet (Red to Yellow). The upper seat for the PILOT PLUG is the pressure vent (Yellow to Atmosphere). The PILOT SPRING loads the upper side of the Pilot Assembly and is opposed on the underneath side by the controlled Downstream Pressure (Blue).

Assume the PILOT SPRING is compressed with the ADJUSTING SCREW for a desired Downstream Pressure setting. With Downstream Pressure (Blue) too low, the PILOT SPRING forces the Pilot Assembly downward to close the upper seat (Yellow to Atmosphere) and open the lower seat (Red to Yellow).

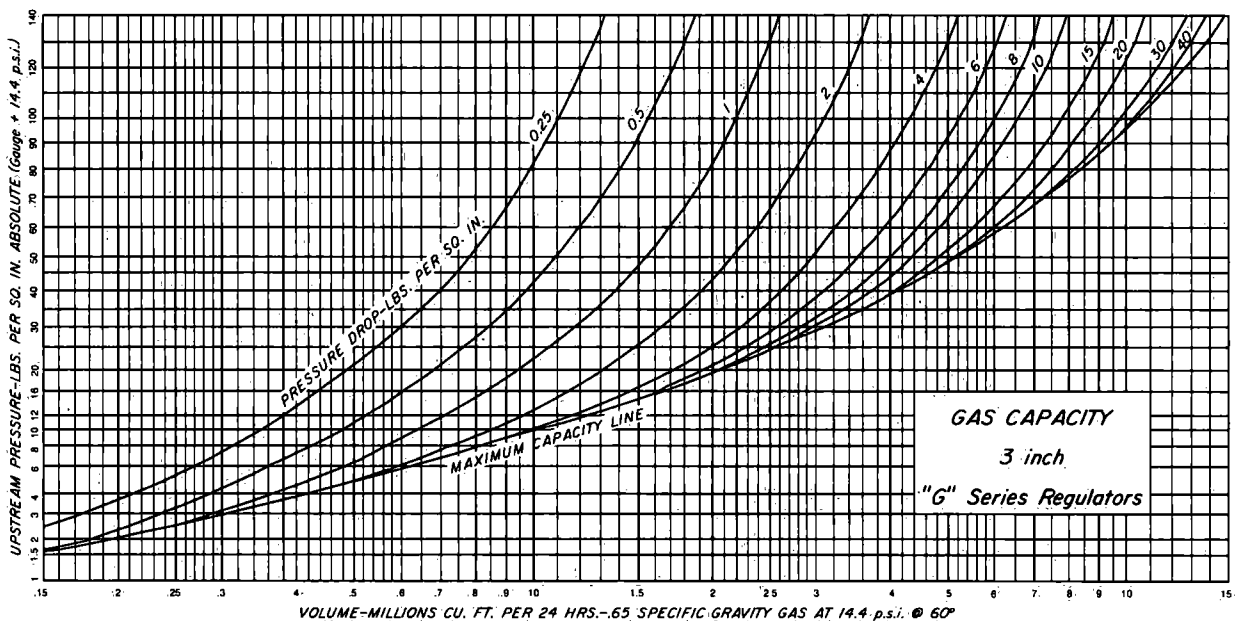
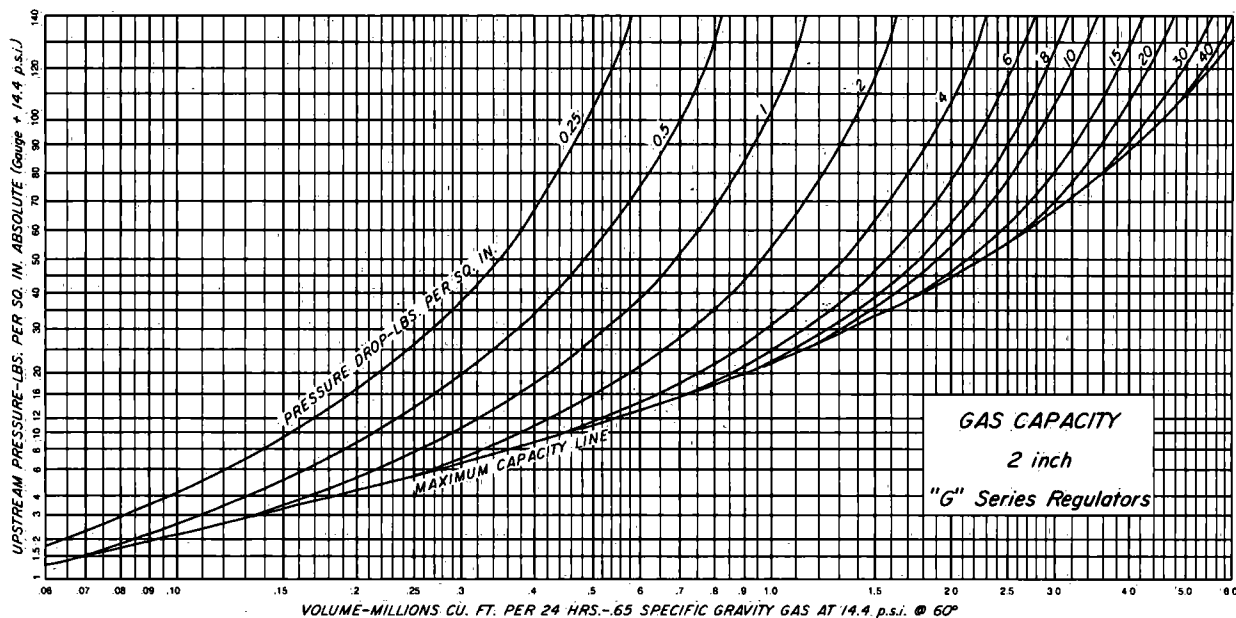
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125 lbs. Maximum W.P. Valves



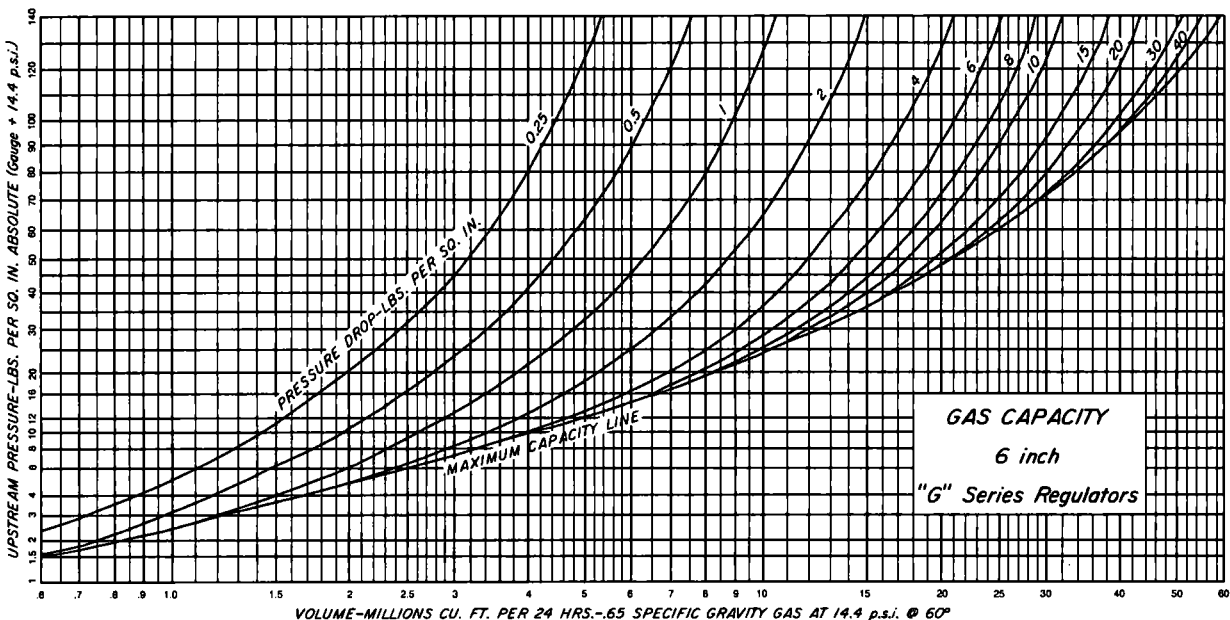
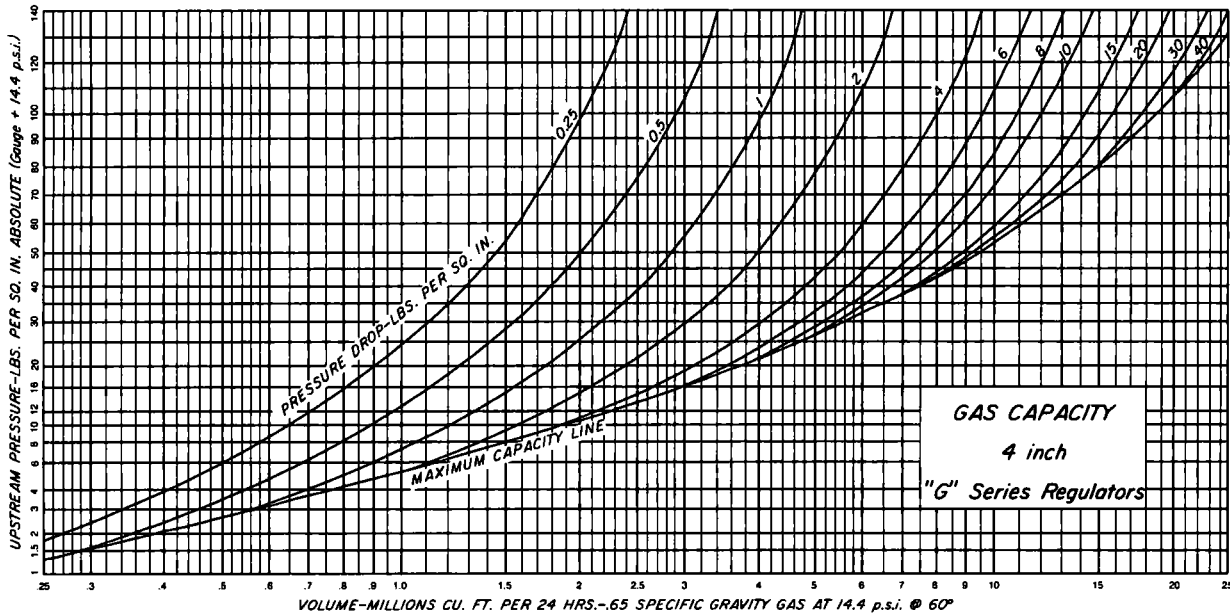
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*For gravity correction multiply above capacities by $\sqrt{\frac{.65}{G}}$ where G equals specific gravity of gas.

125 lbs. Maximum W.P. Valves



Gas capacities are based on pressure taken immediately upstream and downstream from the regulator in a wide open position.

Critical flow exists across a valve or orifice when the downstream absolute pressure is approximately half of the upstream absolute pressure. Any decrease in downstream pressure will not increase the flow through the valve. Critical flow conditions on the charts are represented by the MAXIMUM CAPACITY LINE.

HOW TO USE CHARTS: Locate UPSTREAM PRESSURE at left of chart. Follow horizontally across to PRESSURE DROP (upstream minus downstream pressure). Read VOLUME directly below. If the horizontal projection of the upstream pressure does not intersect the given pressure drop, flow is critical. In this case project UPSTREAM PRESSURE horizontally to the MAXIMUM CAPACITY LINE and read VOLUME directly below.

*For gravity correction multiply above capacities by $\sqrt{\frac{.65}{G}}$ where G equals specific gravity of gas.

300 lbs. Maximum W.P. Valves

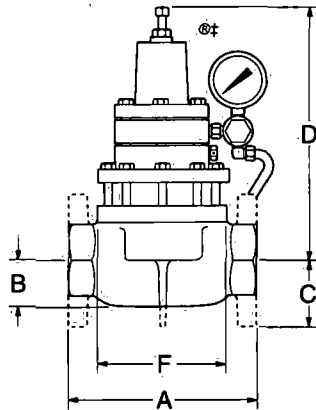
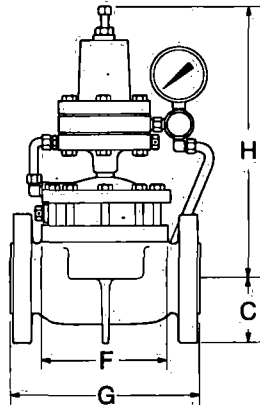
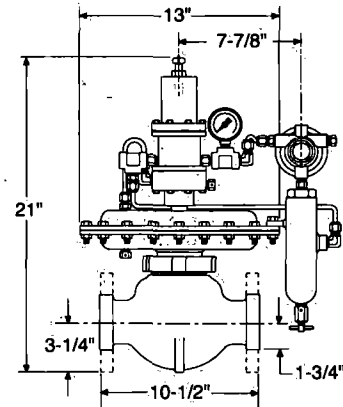
CAPACITY-Bbls. Water/Day, Steady Flow

PRESSURE DROP ACROSS VALVE PSIG	VALVE SIZE - INCHES			
	1	2	3	4
1	745	1,760	3,350	7,800
2	1,060	2,500	4,900	11,000
3	1,300	3,050	6,100	13,500
4	1,500	3,500	7,000	15,600
5	1,700	3,900	7,800	17,500
10	2,300	5,600	11,000	24,700
15	2,900	6,800	13,500	30,200
20	3,300	7,900	15,600	34,900
30	4,100	9,600	19,200	42,700
40	4,700	11,100	22,100	49,300
50	5,300	12,400	24,800	55,200
60	5,800	13,600	27,100	60,500
70	6,200	14,700	29,300	65,400
80	6,700	15,700	31,300	69,800
100	7,500	17,600	33,500	78,200
125	8,400	19,700	39,200	87,500
150	9,300	21,500	40,750	93,000
200	10,750	25,000	47,000	108,000
250	12,100	28,000	52,000	120,000
300	13,300	30,900	57,250	130,000

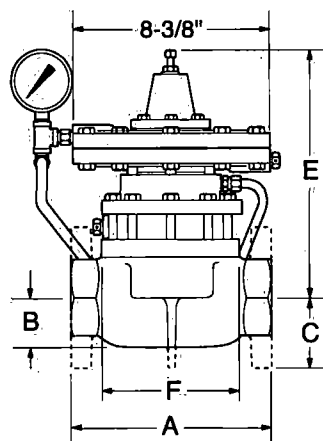
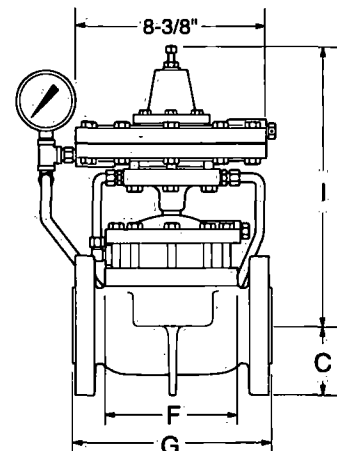
For gravity correction, multiply the above figures by $\sqrt{\frac{1}{G}}$
 Where "G" is the specific gravity of the flowing liquid.

FOR:
 BACK PRESSURE
 UPSTREAM DIFFERENTIAL PRESSURE
 PRESSURE REDUCING-BALANCED
 PRESSURE REDUCING VACUUM

**PRESSURE DIFFERENTIAL
 PRESSURE REDUCING
 BACK PRESSURE VACUUM
 LIQUID BACK PRESSURE**

CAST IRON OR DUCTILE**STEEL****250 S/FGT-BP-S**

FOR:
 LOW PRESSURE BACK PRESSURE
 OUNCES BACK PRESSURE TO VACUUM
 OUNCES PRESSURE REDUCING
 OUNCES PRESSURE REDUCING VACUUM
 VACUUM BACK PRESSURE TO VACUUM

CAST IRON OR DUCTILE**STEEL**

LINE SIZE	BODY STYLE	A	B	C	D*	E	F	G	H*	I
1 "	SCRD	4 ³ / ₈ "	1 ¹ / ₈ "		7 ¹ / ₂ "	11 ⁵ / ₈ "	3 ¹ / ₄ "			
2 "	SCRD	8 ¹ / ₂ "	2 ¹ / ₈ "		11 ¹ / ₂ "	10 ¹ / ₂ "	6 ¹ / ₂ "			
	FLGD	9"		3	11 ¹ / ₂ "	10 ¹ / ₂ "	6 ¹ / ₂ "	9 ¹ / ₈ "	14 ¹ / ₂ "	14"
	GRVD	8 ³ / ₄ "	2 ¹ / ₈ "		11 ¹ / ₂ "	10 ¹ / ₂ "	6 ¹ / ₂ "			
250 S/FGT	SCRD			1 ³ / ₄ "				10 ¹ / ₂ "		
	FLGD			3 ¹ / ₄ "				10 ¹ / ₂ "		
3 "	SCRD	12"	3 ¹ / ₁₆ "		13"	12"	8 ¹ / ₂ "			
	FLGD	12 ³ / ₁₆ "		3 ³ / ₄ "	13"	12"	8 ¹ / ₂ "	12 ⁵ / ₁₆ "	16 ¹ / ₂ "	15 ¹ / ₂ "
4 "	SCRD	15"	4"		14 ¹ / ₂ "	13 ³ / ₁₆ "	10 ¹ / ₂ "			
	FLGD	15 ¹ / ₈ "		4 ¹ / ₂ "	14 ¹ / ₂ "	13 ³ / ₁₆ "	10 ¹ / ₂ "	15"	18 ¹ / ₂ "	16 ¹¹ / ₁₆ "
6 "	FLGD	22 ¹ / ₈ "		5 ¹ / ₂ "	17"	14 ⁷ / ₈ "	16"	22"	20 ¹ / ₂ "	18 ³ / ₈ "

FLANGE DIMENSIONS ARE ASA 150 LB. STANDARD. *Add 7/8" to PRB and USDP Regulators for this dimension.

APPLICATION:





Vent lines on oil separators, flow treaters, compressor stations, gas gathering systems.

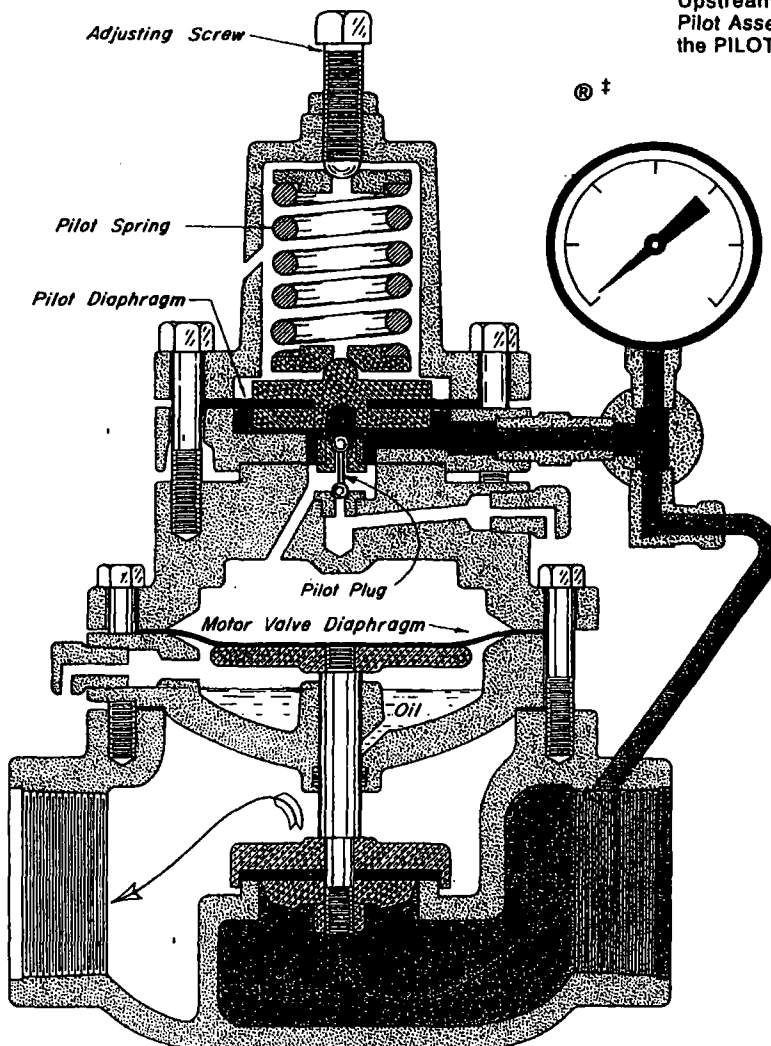
PRESSURE RANGE:

3 psig to 280 psig

CAPACITY:

Refer to Table of Contents.

-  Pilot Assembly
-  Motor Valve Stem Assembly
-  Upstream Pressure
-  Motor Valve Diaphragm Pressure

**OPERATION:**

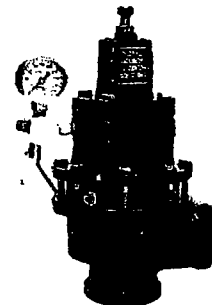
The Pilot Assembly and Motor Valve Stem Assembly (Crosshatched) are the only moving units in the regulator. The PILOT PLUG consists of two stainless balls rigidly connected together. The upper seat for the PILOT PLUG is the Motor Valve Diaphragm Pressure inlet (Red to Yellow). The lower seat for the PILOT PLUG is the pressure vent (Yellow to Atmosphere).

The PILOT SPRING in the bonnet loads the upper side of the Pilot Assembly and is opposed on the underside by Upstream Pressure (Red).

Assume the PILOT SPRING is compressed with the ADJUSTING SCREW for a set pressure greater than the Upstream Pressure (Red). The Pilot Assembly is forced downward by the PILOT SPRING. The lower seat for the PILOT PLUG (Yellow to Atmosphere) is closed and the upper seat for the PILOT PLUG (Red to Yellow) is open. This lets full Upstream Pressure (Red) load the motor valve. The area of the MOTOR VALVE DIAPHRAGM is twice the area of the motor valve seat, assuring a positive shut-off.

As the Upstream Pressure (Red) increases to the set pressure, the Pilot Assembly moves upward against the PILOT SPRING to first close the upper seat (Red to Yellow) and open the pressure vent (Yellow to Atmosphere). As the Motor Valve Diaphragm Pressure (Yellow) is decreased, the Upstream Pressure (Red) acting under the motor valve seat, opens the valve. With relief of Upstream Pressure (Red) through the motor valve, the Pilot Assembly assumes a position in which both seats of the PILOT PLUG are closed.

The non-bleed, three-way valve action of the PILOT PLUG against its seat adjusts the Motor Valve Diaphragm Pressure (Yellow), repositioning the Motor Valve Stem Assembly to accommodate any rate of flow. The rapid but stable repositioning produces a true throttling action.

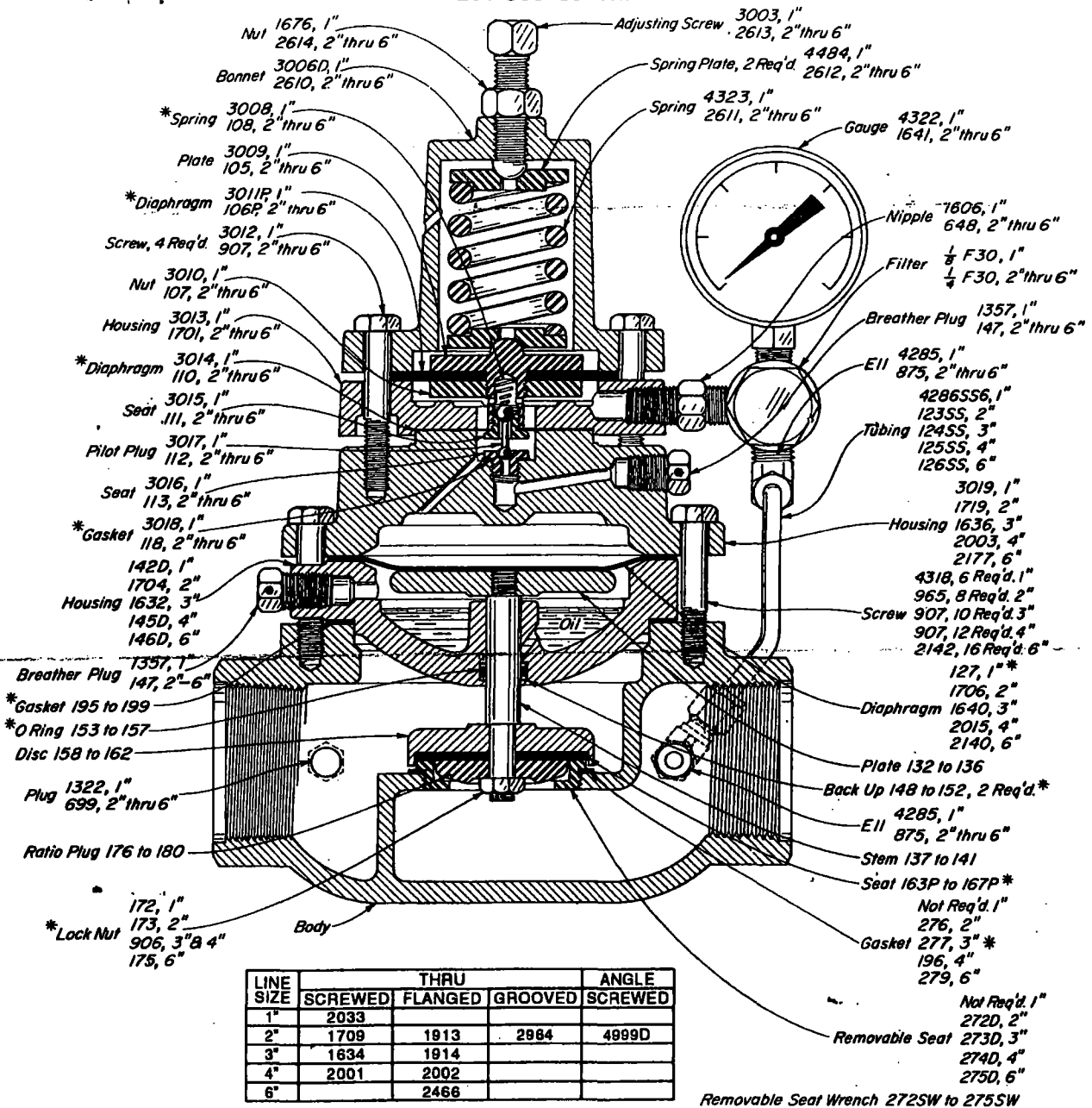


212 SGA BP



212 SGT BP

1", 2", 3", 4" & 6" S/F/GGT/A BP-D
DUCTILE
250-300 lbs. W.P.



THRU VALVES AVAILABLE: DUCTILE IRON

CAT. NO.	SIZE	TYPE	REG. NO.	DES. PRESS.	OPER. PRESS.
AKB	1"	SCRD.	130 SGT BP-D	300	300
AAR	2"	SCRD.	230 SGT BP-D	300	300
AAS	2"	FLGD.	218 FGT BP-D	250	250
AAQ	2"	GRVD.	230 GGT BP-D	300	300
AAT	3"	SCRD.	330 SGT BP-D	300	300
AAU	3"	FLGD.	318 FGT BP-D	250	250
AAW	4"	SCRD.	430 SGT BP-D	300	300
AAX	4"	FLGD.	418 FGT BP-D	250	250
AAV	6"	FLGD.	618 FGT BP-D	250	250

ANGLE VALVES AVAILABLE: DUCTILE IRON

CAT. NO.	SIZE	TYPE	REG. NO.	DES. PRESS.	OPER. PRESS.
ASR	2"	SCRD.	230 SGA BP-D	300	300

Dimensions, refer to Table of Contents.

*These parts are recommended spare parts and are stocked as repair kits. To order repair kit, specify size of regulator. Example: "2" 230G Repair Kit."

NOTE: The numbers of a series assigned to a part indicate different line sizes. For example: Seat 163P-1", 164P-2", 165P-3", 166P-4", 167P-6".

There are several contributing causes for regulators to act unstably.

Small volume piping - This can create a volume downstream of the regulator such that any flow into or out of this volume will cause rapid or large changes in the piping pressure. These changes can require a regulator to respond more rapidly than is possible, thus the control of pressure will be erratic.

Restricted piping - This occurs where the piping volume downstream has restrictions due to abrupt changes in direction or piping volume and can act very much the same as small volume piping.

Turbulent piping - This would most often be the result of extreme piping expansions or contractions from swages or other piping components

Fast changing flow - A rapid change in flow rate out of the downstream piping system causes a transient decrease in control pressure. The regulator, having a mass, will not instantly travel to the new position to increase the flow into the system. Therefore, the pressure will fall below setpoint even though for a short period of time. When the regulator does begin to travel and achieves the load flow equivalent, many times the mass of the moving parts in the regulator will not stop at the appropriate position but will overshoot. This can be the beginning of a sustained cycle.

Changes in flow rate could be caused by an other device such as another regulator or compressor valving which is actually intermittently blocking flow.

Oversized valve - This can result in the regulator being able to too quickly satisfy downstream requirements and to then exceed downstream requirements. In the next instant the valve is called on to reduce the flow, and due to its mass the valve overshoots the appropriate position initiating a cycle.

Excessive pressure drop - The result can often be the same as in the oversized valve.

The most common application in which we encounter these problems is in the area of compressor suction control. The difficulty arises from the need for an unrestricted flow through the regulator. To reduce the restriction a large throated regulator is selected. At relatively low pressure this arrangement works satisfactorily. The real problem comes when the compressor is shut down for a period of time, and the pressure from the field rises substantially. When the compressor is restarted the regulator is suddenly called upon to control a large and many times excessive pressure drop. The regulator is at this point too large for stable control.

Some of the recommended remedies for this situation are

1. Use reduced trim
2. Change upstream pressure
3. Move the sense line
4. Restrict the actuator line
5. Use stiffer pilot spring
6. Change the set point
7. Reduce pilot supply pressure
8. Move the regulator
9. Install two regulators--one large, one small, and a pilot to switch between the two.

Most of the recommended remedies will not apply to your situation, but we most frequently recommend moving the regulator or at least moving the sense line connection point.

We make it a practice to strongly recommend installing the regulator with as much piping volume between it and the compressor inlet as is possible.