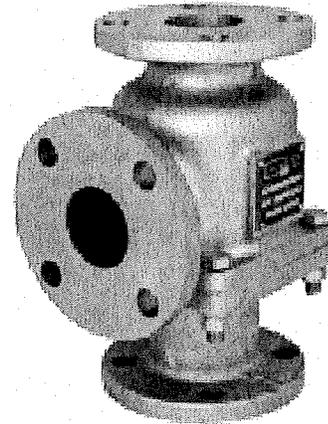


AVERY

MEMA

Thermostatic Valves



FEATURES

- FLOW RATES OF 68 - 1200 USGPM
- TAMPER-PROOF TEMPERATURE SETTINGS OF 55°F - 240°F
- COMPLETELY SELF-CONTAINED
- POSITIVE 3-WAY VALVE ACTION
- AVAILABLE IN CAST IRON, DUCTILE IRON, BRONZE, STEEL, AND STAINLESS STEEL
- 1-1/2" - 6" PIPE SIZES: FLANGED, AND THREADED CONNECTION

APPLICATIONS

- ENGINE & COMPRESSOR COOLING SYSTEM
- LUBE OIL SYSTEMS
- COGENERATION HEAT RECOVERY LOOPS
- PROCESS CONTROL
- TEMPERATURE MIXING OR DIVERTING

AMOT Model B Thermostatic Valves are fully automatic, 3-way fluid temperature control valves for diverting or mixing applications. They provide reliable control of fluid temperatures in engine jacket water and lubrication oil cooling systems. These valves are suitable for process control and industrial applications where fluids must be mixed or diverted depending on their temperatures. They may also be applied to cogeneration systems to control temperatures in the heat recovery loop assuring proper engine cooling and maximizing heat recovery.

TAMPER-PROOF

As with other AMOT thermostatic valve the Model B utilizes fully enclosed, factory-set temperature element assemblies which provide tamper-proof operation. To change a valve setting it is necessary to exchange the temperature element assemblies inside the valve.

HIGH RESISTANCE TO SHOCK

Model B thermostatic valves display excellent reliability even under extreme shocks or vibration and many models have been qualified to MIL-S-901 and MIL-V-19772.

MANUAL OVERRIDE

If desired, AMOT Model B thermostatic valves can be supplied with a manual override which allows the user to direct flows through Ports A and C. On valves equipped with the manual override option, there is one manual override device for each of the temperature element assemblies. To engage the manual override function, flip the lever(s) 180° from "Auto" to "Manual" position.

OPERATION

The valve is supplied with the temperature element assemblies factory-set to the nominal temperature setting. Temperature is sensed at Port A which remains open to Port B (bypass) until the fluid temperature reaches a point 5 - 10°F below the nominal setting. As the temperature continues to rise, the sliding valve moves to close off Port B and open Port C (connected to the cooler or heat exchanger) Port B is fully closed 8 - 10°F above the nominal setting. The valve continually modulates the fluid flow to maintain the nominal temperature. For optimum control, the system should be sized so about 1/2 the total fluid flow is passing through the cooler at full load.

For long life, AMOT Model B valves should not be exposed to continuous temperatures exceeding 25°F above their nominal temperature setting. For occasional short periods (1/2 hour or less), they can be exposed to temperatures of 50°F above their nominal temperature setting, but not to exceed 250°F maximum.

For higher over-temperatures, reduced stroke element assemblies (5566X) are available. They will withstand continuous temperatures of 60°F above their nominal temperature setting but add 30% to the valve pressure drop. Reduced stroke elements are not available in all temperatures.

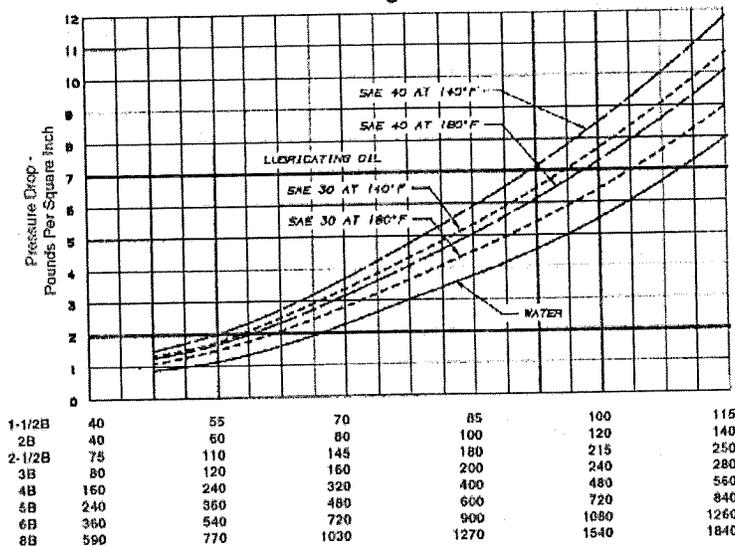
INSTALLATION

AMOT thermostatic valves operate in any position and may be oriented at the convenience of the system designer. In the smaller sizes, the valve may be supported by the connecting pipe but should not be subjected to excessive bending. Line up the piping before tightening the connecting bolts. Larger sizes should not be used to support long and heavy lengths of pipe nor used to draw up lengths of pipe which have been fabricated too short.

If the valve is mounted at the high point of the system, the system should be properly vented to prevent trapping air at the temperature element assemblies.

For piping diagrams regarding specific applications, refer to Form 913, AMOT Thermostatic Valves General Information.

Figure 1



Flow in U.S. Gallons Per Minute
Recommended pressure drop is 2 to 7 psi.

SELECTION

AMOT thermostatic valves are selected by the anticipated flow rate through the valve. Refer to Fig. 1. Pressure drop across the valve is usually limited to approximately 2 psi to 7 psi to maintain good temperature regulation.

Threaded end connections are available on 1 1/2 and 2 inch sizes. Models with cast iron, ductile iron, or bronze housings have ANSI 125 lb flat face flanges. Steel or Stainless Steel housings feature ANSI Class 150 or 300 raised face flanges. Metric connections also available.

Models with steel housings have ANSI 150 lb/300 lb Class compatible raised face flanges.

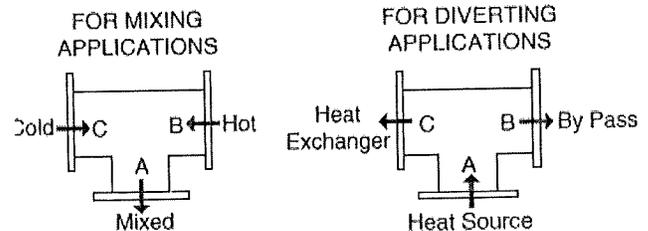
Versions available from USA factory.

Cast Iron	Ductile Iron	Bronze	Steel
1-1/2BOCT	2BMDF	1-1/2BOBT	2BCSJ
1-1/2BHCT	2BDFD	2BOBT	2BCSH
2BOCT	2-1/2BMDF	2BCBF	2BMSJ
2BHCT	3BODF	2BFBF	2BMSH
2BDCF	4BEDF	2-1/2BMBF	2-1/2BOSJ
2BCCF	4BODF	3BOBF	2-1/2BMSJ
2BFCF	4BMDF	3BMBF	3BOSJ
2-1/2BOCF	5BODF	4BEBF	3BMSJ
2-1/2BDCF	5BMDF	4BOBF	3BOSH
3BOCF	6BODF	4BMBF	
3BDCF	6BMDF	5BOBF	
4BECF		5BMBF	
4BOCF		6BOBF	
4BDCF		6BMBF	
5BOCF			
5BDCF			
6BOCF			
6BDCF			

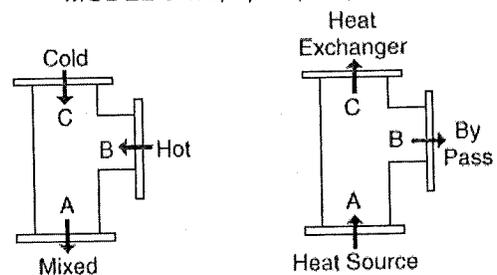
Indicates Non-Standard

PIPING DIAGRAMS

MODELS BO, BC, BM



MODEL 1-1/2, 2, BO, BH, BF



SPECIFICATIONS

Internal Trim Materials Bronze and Stainless Steel
 Standard Seal Material Buna N
 Max. Pressure Drop Across Valve 20 psi (1.4 Bar)
 Valve Pressure Ratings at 250°F
 Cast Iron, Ductile Iron, Bronze 150 psi (10 Bar)
 Cast Iron, Model BH 340 psi (23 Bar)
 Steel, Class 150, 245 psi (17 Bar)
 Steel, Class 300, 665 psi (46 Bar)
 Stainless Steel Class 150, 228 psi (15 Bar)
 Stainless Steel Class 300, 590 psi (41 Bar)

Shipping Weights:	Cast Iron	Ductile Iron	Bronze	Steel
1-1/2BO/2BO	25	--	--	--
1-1/2BH/2BH	32	--	--	--
1-1/2BM	--	--	25	--
2BC, BM	30	30	35	45
2BF	35	35	40	--
2-1/2B	55	55	75	75
3B	60	60	80	80
4B	135	135	150	--
5B	200	200	240	--
6B	270	270	300	--

HOW TO ORDER

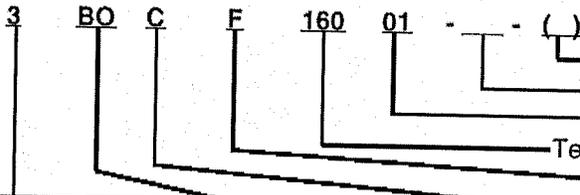
(Refer to Model Code System Below.)

When ordering please specify the following:

1. Valve size connection (see Table A).
2. Valve Type (see Table B).
3. Housing material (see Table C).
4. Type of End Connection (see Table D).
5. Nominal temperature setting (see Table E).
6. Any of the following special features if required:
 - a) Viton or neoprene seals (instead of Buna N).
 - b) Electroless Nickel plated temperature element assembly.
 - c) Element leak hole (see Table G).
 - d) Reduced stroke element assembly for high over-temperature.

This product may be ordered using the full description as shown above or by constructing a Model No. using the Model Code System below. For special requirements, contact the AMOT factory or your local representative.

MODEL CODE SYSTEM



Special Requirements, (MTO) Made-To-Order

Element Assembly Leak Hole, See Table G

Element Assembly Type, See Table F

Temperature Setting, See Table E

1-1/2	(40)
2	(50)
2-1/2	(65)
3	(80)
4	(100)
5	(125)
6	(150)
8	(200)

BO	Standard
BM	Manual Override
BC	Tee config, Flanged 1-1/2, 2" only
BF	Flanged, 2" only
BH	1-1/2, 2" only
BR	Manual override (UK)

C	Cast Iron
S	Steel
B	Bronze
D	Ductile Iron
R	Stainless Steel

F	ANSI B16.1 Class 125 FF Flange
J	ANSI B16.5 Class 150 RF Flange
H	ANSI B16.34 Class 300 RF Flange
A	ND6 (Metric) Flange
B	ND10 (Metric) Flange
C	ND16 (Metric) Flange
N	Navy Flange
P	JIS 5K FF Flange
T	NPT Threaded
V	BSP-TR / JIS Threaded
W	SAE Threaded (straight thread, O-ring seal)

*055	55	(13)
075	75	(24)
090	90	(32)
095	95	(35)
100	100	(38)
105	105	(41)
110	110	(43)
115	115	(46)
120	120	(49)
*130	130	(54)
135	135	(57)
140	140	(60)
145	145	(63)
*150	150	(66)
155	155	(69)

160	160	(71)
165	165	(74)
170	170	(77)
175	175	(79)
180	180	(83)
185	185	(85)
195	195	(91)
205	205	(96)
215	215	(102)
225	225	(107)
230	230	(110)
235	235	(113)
240	240	(116)

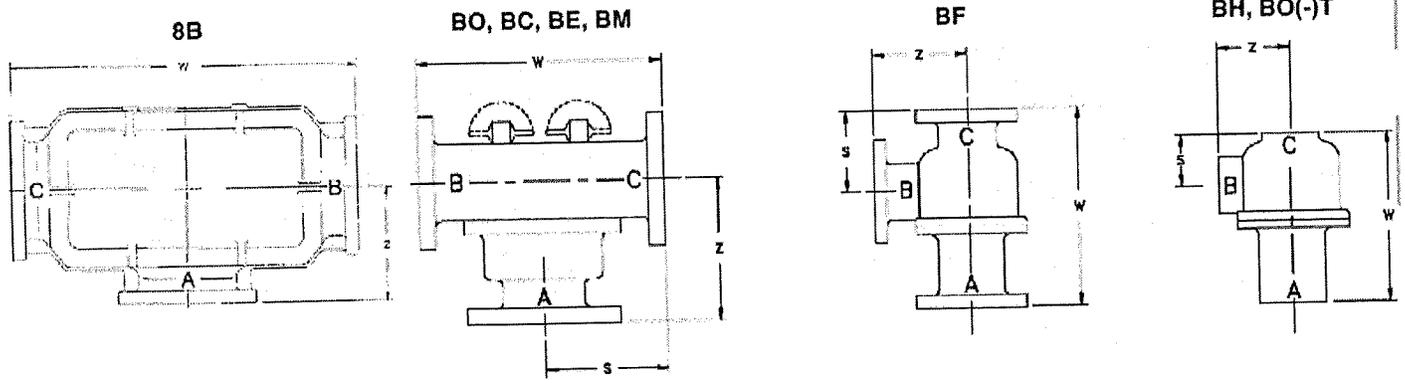
Temperatures apply only to 1096 and 2433 Element Assemblies.

01	1096X	Standard
02	1096P	Plated with Viton
03	1096X	with Viton seals
07	2433X	Manual Override
11	5566X	Reduced stroke
05	6836S	Saltwater
44	1096X	with Neoprene
45	1096P	with Neoprene
20	5566X	with Viton
12	5566P	Plated
53	2433X	with Viton
50	6836K	Electroless Nickel with Neoprene

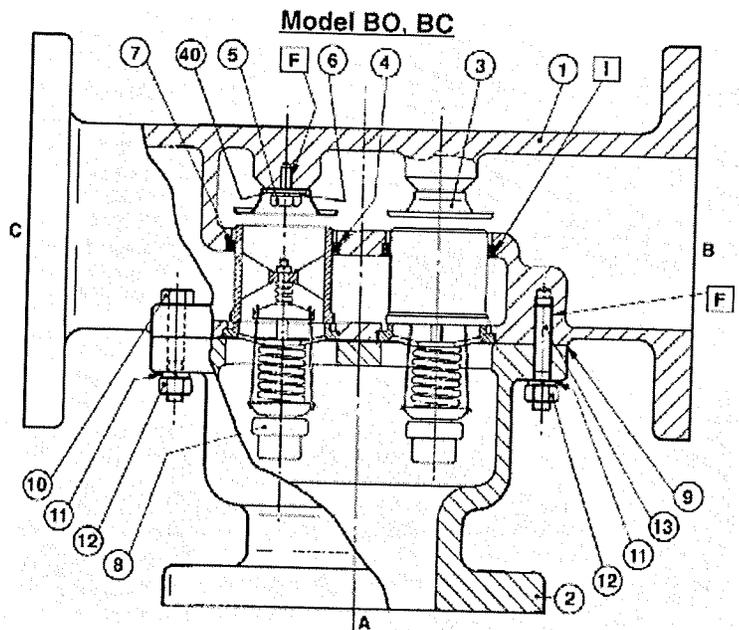
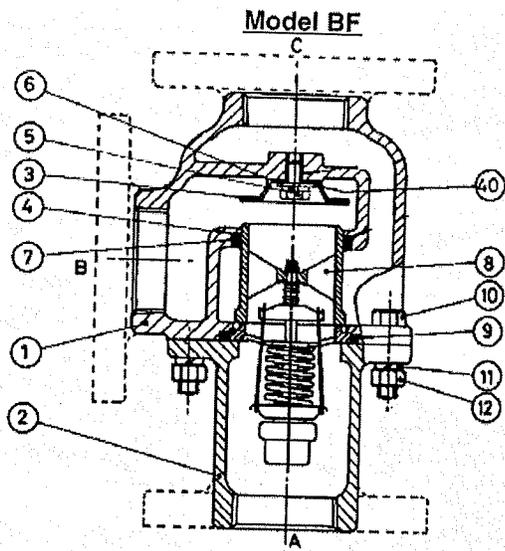
none (standard)		
A	1/2"	(12.5)
B	1/4"	(6.4)
C	3/8"	(9.5)
D	1/8"	(3.2)
E	1/16"	(1.6)
F	3/32"	(2.4)
G	3/16"	(4.8)
H	5/16"	(7.9)

* = Also avail. as reduced stroke. Contact factory for other temps.
 indicates Non-Standard, MTO

DIMENSIONS

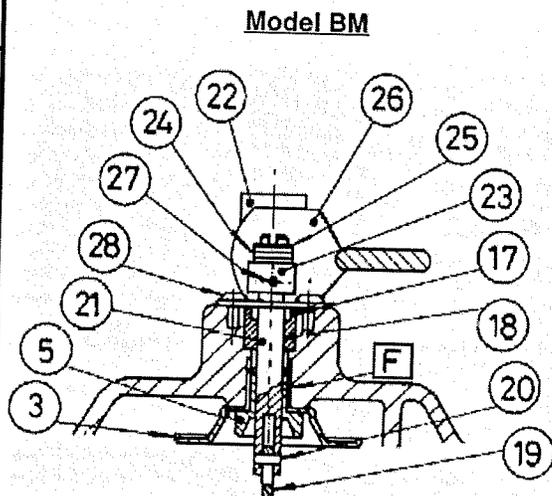


Model No.	Nominal Pipe Size	Principal Dimensions			Width in the Other Plane	Flange Drilling			No. of Element Assemblies
		"S"	"W"	"Z"		No. of Holes	Dia. of Holes	Bolt Circle	
1-1/2BO(-)T	1-1/2 (40)	3-13/16 (97)	9-11/16 (246)	3-9/16 (90)	5-1/2 (140)	—	—	—	1
1-1/2BHCT	1-1/2 (40)	4-1/16 (103)	10-11/16 (271)	4 (102)	5-3/4 (146)	—	—	—	1
2BC(-)F 2BM(-)F	2 (50)	4-7/16 (113)	8-7/8 (225)	5-7/8 (149)	6 (152)	4	3/4 (19)	4-3/4 (121)	1
2BF(-)F	2 (50)	4-3/4 (121)	10-5/8 (270)	4-7/16 (113)	6 (152)	4	3/4 (19)	4-3/4 (121)	1
2BCSJ 2BMSJ	2 (50)	4-7/16 (112)	8-7/8 (225)	5-7/8 (149)	6 (152)	4	3/4 (19)	4-3/4 (121)	1
2BCSH 2BMSH	2 (50)	4-7/16 (112)	8-7/8 (225)	5-7/8 (149)	6 (152)	8	3/4 (19)	5 (127)	1
2BO(-)T	2 (50)	3-13/16 (97)	9-11/16 (246)	3-9/16 (90)	5-1/2 (140)	—	—	—	1
2BHCT	2 (50)	4-1/16 (103)	10-11/16 (271)	4 (102)	5-3/4 (146)	—	—	—	1
2-1/2BO(-)F 2-1/2BM(-)F	2-1/2 (65)	5 (127)	10 (254)	6-1/2 (165)	8-1/4 (210)	4	3/4 (19)	5-1/2 (140)	2
2-1/2BOSJ 2-1/2BMSJ	2-1/2 (65)	5 (127)	10 (254)	6-1/2 (165)	8-1/4 (210)	4	3/4 (19)	5-1/2 (140)	2
3BO(-)F 3BM(-)F	3 (80)	5-1/4 (133)	10-1/2 (267)	6-3/4 (172)	8-1/4 (210)	4	3/4 (19)	6 (152)	2
3BOSJ 3BMSJ	3 (80)	5-1/4 (133)	10-1/2 (267)	6-3/4 (172)	8-1/4 (210)	4	3/4 (19)	6 (152)	2
3BOSH 3BMSH	3 (80)	5-1/4 (133)	10-1/2 (267)	6-3/4 (172)	8-1/4 (210)	8	3/4 (19)	6-5/8 (168)	2
4BO(-)F 4BM(-)F	4 (100)	7-15/16 (201)	15-7/8 (403)	8-9/16 (218)	12-1/8 (308)	8	3/4 (19)	7-1/2 (190)	4
5BO(-)F 5BM(-)F	5 (125)	9-5/8 (249)	19-1/4 (489)	9-1/2 (241)	13-3/4 (349)	8	7/8 (22)	8-1/2 (216)	6
6BO(-)F 6BM(-)F	6 (150)	9-5/8 (244)	19-1/4 (489)	10 (254)	19 (483)	8	7/8 (22)	9-1/2 (241)	9
8BO(-)F 8BR(-)F	8 (200)	16-1/2 (420)	33 (840)	11 (280)	19-11/16(500) 26-3/4(680)	8	7/8 (22)	11-3/4 (298)	18



**SERVICE PARTS FOR MODELS
BO, BC, BF, BH, BM**

Ref No.	Part No.	Description
3	9585L001	Seat, Bolted-In (Except BM)
3	9585L002	Seat (BM only)
4	1182	Sleeve
5	11132L050	Capscrew
6	11133	Lockwasher
7	1183	Element O-ring, Buna N (Standard)
7	1183L002	Element O-ring Seal, Viton
8	1096X(temp)	Element Assembly (Standard)
8	1096P(temp)	Element Assembly, plated
8	2433X(temp)	Element Assembly, manual override
9	761	O-ring 1-1/2 - 3B, Buna N
9	761L001	O-ring 1-1/2 - 3B, Viton
9	1094	Gasket 2-1/2 B, 3B, (Old Versions)
9	1123	Gasket 4B
9	1117	Gasket 5B
9	1149	Gasket 6B
17	358	O-ring, Buna N (BM only)
17	358L001	O-ring, Viton (BM only)



This Parts List effective with Valve Serial No. B941.

MAINTENANCE

Properly applied and installed, AMOT Thermostatic Valves require practically no maintenance.

If necessary, temperature element assemblies may be easily replaced. Remove Nuts (12) or Bolts (6) and separate the Upper (1) and Lower (2) Housing. Remove Element Assembly (8) and Element O-ring Seal (7). Remove Housing O-ring (9) or Gasket and clean any foreign material from sealing surfaces. Lubricate new Element O-ring Seal (7) with a good grade of petroleum grease and re-insert in the groove in Upper Housing (1). Insert Element Assembly (8) through Element O-ring Seal (7) with a twisting motion. Install Housing O-ring (9) or Gasket around the Element Assembly (8).

AMOT designs and tests all its products to ensure that high quality standards are met. For good product life, carefully follow AMOT's installation and maintenance instruction; failure to do so could result in damage to the equipment being protected or controlled.

When communicating with AMOT regarding operation of a control, always give the Model No. and Serial No. If ordering service parts, also include description, part no., and quantity desired. If any parts are ordered by Reference No. only, please include the Form No., Revision No., and date of this brochure.

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Type D2 FloPro™ Control Valve

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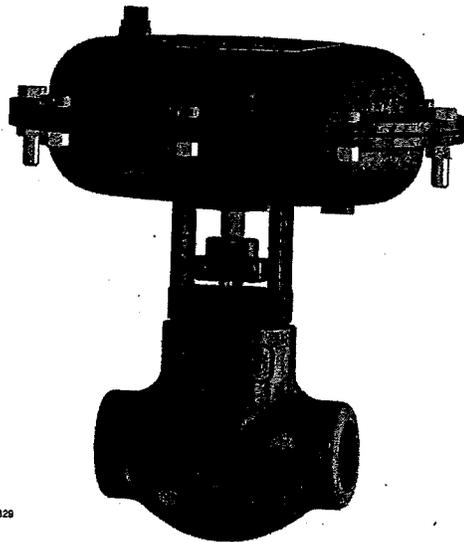


Figure 1. Type D2 FloPro Control Valve

Introduction

Scope of Manual

This instruction manual provides installation, maintenance, and parts information for the 1-inch Type D2 FloPro control valve and actuator.

No person may install, operate, or maintain a Type D2 FloPro control valve without first (1) being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance, and (2) carefully reading and understanding the contents of this manual. If you have any questions about these instructions, contact your Fisher sales office before proceeding.

Description

The Type D2 FloPro control valve (patents pending) (figures 1 and 2) is a compact, rugged valve designed for on-off control of a variety of fluids at

pressures up to 155 bar (2250 psig). This valve is ideal for use as a dump valve on gas separators and scrubbers. It is also well suited for other high pressure applications in natural gas production, compression, and processing. The Type D2 FloPro valve has threaded end connections and is available in a 1-inch globe style body.

Note

Fisher does not assume responsibility for the selection, use, or maintenance of any product. Responsibility for proper selection, use, and maintenance of any Fisher product remains solely with the purchaser and end-user.

Specifications

Table 1 lists specifications for the Type D2 FloPro control valve. Some of the specifications for a given control valve as it originally comes from the factory are stamped on a nameplate located on the upper diaphragm casing flange.

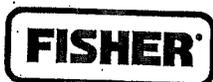


Table 1. Specifications

<p>Valve Assembly Pressure Class ASME B16.34 Class 900</p> <p>Maximum Inlet Pressure and Temperature⁽¹⁾ 155 bar from -46 to 93°C, and 150 bar at 149°C. (2250 psig from -50 to 200°F, and 2185 psig at 300°F)</p> <p>Maximum Allowable Pressure Drop⁽¹⁾ Spring-to-Close - Flow Down⁽²⁾: 155 bar (2250 psig) Spring-to-Open - Flow Down⁽²⁾: 103 bar (1500 psig) Spring-to-Close - Flow Up: 103 bar (1500 psig) Spring-to-Open - Flow Up: 103 bar (1500 psig)</p> <p>Shutoff Classification ANSI Class IV ANSI/FCI 70-2 and IEC 60534-4</p> <p>Construction Materials Valve Body and Bonnet: ASME SA 352 LCC Stress relieved Valve Plug and Seat: (R0006) Alloy 6 Valve Stem: (S31600) 316 SST O-Rings: (HNBR) Hydrogenated Nitrile Packing: PTFE/Carbon PTFE Packing Springs: (N07718) Inconel 718 Stem Bushing: (Ryton) PPS Actuator Diaphragm: Nitrile/Polyester Actuator Springs: Zinc-plated steel</p> <p>Flow Characteristic <i>FloPro</i> Characterized</p>	<p>Port Diameter 13 mm (1/2 inch)</p> <p>Maximum Travel 13 mm (1/2 inch)</p> <p>Approximate Weight 7.7 kg (17 lb)</p> <p>Material Temperature Capabilities Valve Body Assembly: -46 to 149°C (-50 to 300°F) Actuator Assembly: -46 to 93°C (-50 to 200°F)</p> <p>Bonnet/Body Connection Threaded with leakoff bleed</p> <p>Actuator Configuration The <i>D2 FloPro</i> actuator is an on-off spring-and-diaphragm. Actuator action is Spring-to-Close from the factory. For Spring-to-Open actuator action, a Spring-to-Open Spring Kit (10C1998X012) must be used</p> <p>Maximum Actuator Casing Pressure 2.4 bar (35 psig)</p> <p>Minimum Required Actuator Casing Pressure 2.1 to 2.4 bar (30 to 35 psig)</p> <p>Actuator Diaphragm Effective Area 194 cm² (30 square inches)</p> <p>Actuator Pressure Connections 1/4 inch NPT female</p>
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1. The pressure or temperature limits in the referenced tables and any applicable ASME code limitations should not be exceeded.
2. Standard flow direction.

Installation

WARNING

Always wear protective gloves, clothing, and eyewear when performing any installation operations to avoid personal injury.

Personal injury or equipment damage caused by sudden release of pressure may result if the valve assembly is installed where service conditions could exceed the limits given in table 1 or on the appropriate nameplates. To avoid such injury or damage, provide a relief valve for overpressure protection as required by accepted industry or local, state, and Federal codes and good engineering practices.

Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

CAUTION

This valve is intended for a specific range of pressures, temperatures, and other service conditions (see table 1). Applying different pressure, temperature, and other conditions to the valve could result in parts damage, malfunction of the valve, or loss of control of the process. *Do not expose this valve to service conditions or variables other than those for which this valve is intended.* If you are not sure what these conditions are, you should contact Fisher for more complete specifications. Provide the product serial number (shown on the nameplate) and all other pertinent information.

1. Before installing the valve, inspect it to be certain that the valve body cavity is free of foreign material. Clean out all pipelines to remove scale, welding slag, and other foreign materials.

2. The control valve assembly may be installed in any orientation unless limited by seismic criteria. However, the normal method is with the actuator vertical above the valve body.

The standard flow direction is indicated by the arrow on the valve body.

3. Use accepted piping practices when installing the valve in the pipeline.

4. If continuous operation is required during inspection or maintenance, install a three-valve bypass around the control valve assembly.

Note

The 1-inch Type D2 FloPro valve is equipped with ENVIRO-SEAL® D2 packing.

The actuator, as shipped from the factory, is spring-to-close. If spring-to-open action is required, see the Changing Actuator Action section in this manual.

Additionally, the actuator as shipped from the factory, has the FloPro flow adjuster set at a 3/8 inch port flow rate position. If some other flow rate is desired, see the Setting Valve Flow Rate section in this manual.

Setting Valve FloPro Flow Adjuster

Spring-to-Close Actuator Action

1. To change the valve flow rate, loosen the flow adjuster socket head cap screws (key 29), and reposition the flow adjuster halves (key 14 and 15) to the desired flow rate position. See figure 4 for flow rate settings.

Spring-to-Open Actuator Action

1. Attach a pressure line to the actuator. Supply pressure to the actuator to seat the plug in the seat ring.

2. To change the valve flow rate, loosen the flow adjuster socket head cap screws (key 29), and reposition the flow adjuster halves (key 14 and 15) to the desired flow rate position. See figure 4 for flow rate settings.

Changing Actuator Action from (Spring-to-Close) to (Spring-to-Open)

Key numbers are referenced in figures 6 and 7.

Note

The following procedure requires use of Spring Kit 10C1998X012.

1. Remove the six **short** actuator casing cap screws (key 22) first. Once these have been removed from the actuator assembly, carefully remove the two **long** actuator cap screws (key 30).

Note

Be aware as you loosen and remove the actuator cap screws that the actuator springs are under compression.

2. Remove the upper casing (key 21) and the springs (key 27).

3. Do not turn the valve stem (key 4) while removing the diaphragm hex nut (key 26). Use an appropriate tool on the machined flats located on the valve stem above the flow adjuster for this procedure. Continue the actuator disassembly by removing the washer (key 24) diaphragm plate (key 25), diaphragm (key 19), and washer (key 24). Inspect the diaphragm for any wear or damage. Replace with a new one if necessary.

4. Unscrew the socket head cap screws (key 29), and remove the flow adjuster halves (key 14 and 15). Position the stem (key 4) to its most upward position.

5. Place the 3 springs (key 27) from the Spring Kit in their approximate, equally spaced, locations in the bottom casing (key 20). Place the washer (key 24) over the valve stem. Then install the diaphragm plate (key 25) and, using the diaphragm plate, correctly position the actuator springs.

6. Place the diaphragm (key 19) over the stem, along with washer (key 24). Position the diaphragm so the holes in the diaphragm align with the holes in the bottom casing.

7. Insert a 1/8 inch diameter drift punch, or other suitable device through the 5/32 diameter hole in the valve stem located below the bottom of the previously removed flow adjuster. Install hex nut (key 26) and tighten to 11 N•m (95 lbf•in). Remove the 1/8 inch drift punch or other holding device.

8. Attach the upper casing by first installing the two **long** cap screws (key 30) opposite one another. Begin tightening the two long screws evenly until the remaining six shorter cap screws (key 22) can be installed with their hex nuts. Continue tightening the actuator casing cap screws evenly using a cross-tightening procedure. Torque to 14 N•m (10 lbf•ft).

9. Connect a pressure line to the top actuator pressure connection, and apply pressure to the

actuator. Stroke the actuator until the valve plug is seated on the seat ring. Install the flow adjuster, positioning it to the desired travel. Tighten the flow adjuster socket head cap screws to 3 N•m (26 lbf•in).

10. Release the actuator pressure, and install the vent plug (key 28) into the bottom casing pressure connection.

Maintenance

Valve parts are subject to normal wear and must be inspected and replaced as necessary. Inspection and maintenance frequency depends on the severity of service conditions. This section includes instructions for packing and trim maintenance, reversing the action, and replacing actuator parts.

All maintenance operations can be performed with the valve in the line.

Note

Whenever a gasket seal or O-ring is disturbed by removing or shifting gasketed parts, a new gasket should be installed upon reassembly. This is necessary to ensure a good gasket seal, since the used gasket or O-ring will not seal properly.

WARNING

Avoid personal injury from sudden release of process pressure. Before performing any maintenance operations:

- Always wear protective gloves, clothing, and eyewear when performing any maintenance operations to avoid personal injury.

- Disconnect any operating lines providing air pressure or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.

- Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure on both sides of the valve. Drain the process media from both sides of the valve.

- Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.

- The valve packing box may contain process fluids that are pressurized, *even when the valve has been removed from the pipeline.* Process fluids may spray out under pressure when removing the packing hardware or packing rings.

- Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

Valve Trim Maintenance

Note

The following maintenance procedures apply to both spring-to-close and spring-to-open actuator configurations, except for steps 2 and 8 as noted.

Key numbers are referenced in figures 6 and 7.

1. Isolate the control valve from the line pressure, release pressure from both sides of the valve body, and drain the process media from both sides of the valve.
2. **For spring-to-close actuator action only**, apply pressure to the actuator to fully stroke it open. This will raise the plug off its seat so that the valve stem serrations are visible inside the flow adjuster window (see figure 5). Loosen the socket head screws (key 29) and lower the flow adjuster (key 14 and 15) to its lowest position on the valve stem. Retighten the socket head screws (key 29) to 3 N•m (26 lbf•in). Relieve pressure to the actuator, shut off all pressure lines to the actuator, and disconnect. Use lockout procedures to be sure that the above measures stay in effect while you work on the equipment.

Note

The preceding step is intended to prevent damage to the valve plug (key 3) and seat ring (key 5) during the removal of the bonnet and actuator.

3. Unscrew the bonnet from the valve body.

WARNING

Avoid personal injury from sudden release of process pressure. If the process media starts to escape from the safety vent (see figure 4) located in the bonnet neck of the valve body,

STOP DISASSEMBLY IMMEDIATELY!

The escape of process media indicates that the valve has NOT been isolated from the process media, or process pressure is trapped in the valve body.

4. Once the bonnet has been removed from the valve body, inspect the seat ring (key 5) for wear or damage. If the seating surface has been damaged, remove it from the valve body. Also remove the seat ring gasket (key 6). Clean and inspect the valve body gasket surface for damage. Visually inspect the valve body interior below the seat ring for erosion. Replace the valve body if necessary.

To replace the seat ring, first install a new seat ring gasket. Install the new seat ring and tighten to 230 N•m (170 lbf•ft).

Cover the opening in the valve body to prevent foreign material from getting into the valve body cavity.

5. Inspect the valve stem for scratches or wear, and valve plug for wear or damage. Replace if necessary.
6. If the valve plug requires replacement, use an appropriate tool on the machined flats located on the valve stem above the flow adjuster and unscrew the valve plug from the valve stem. Replace it with a new valve plug. Screw the valve plug into the valve stem, being careful not to damage the plug seat or plug contour. Tighten to 18 N•m (13 lbf•ft).
7. Lubricate a new O-ring (key 13) with Dow Corning 111 compound or equivalent and place it into the valve body as shown in figure 6 or 7. Ensure that no foreign material blocks the safety vent hole. Screw the bonnet into the valve body, and torque to a range of 542.3 to 677.9 N•m (400 to 500 lbf•ft).
8. **For spring-to-close actuator action only**, attach the pressure line to the actuator, and supply pressure to the actuator. Move the flow adjuster to approximately midpoint on the valve stem serration. Release the pressure to the actuator. This allows the plug to find its seated position.
9. Set the flow adjuster to the desired travel position (see figure 4), and tighten the flow adjuster socket head cap screws to 3 N•m (26 lbf•in).

Packing and Valve Trim Maintenance

Note

The following maintenance procedures apply to both spring-to-close and spring-to-open actuator configurations, except for steps 2, 23, and 26 as noted.

Key numbers are referenced in figures 6 and 7.

1. Isolate the control valve from the line pressure, release pressure from both sides of the valve body, and drain the process media from both sides of the valve.
2. **For spring-to-close actuator action only**, apply pressure to the actuator to fully stroke it open. This will raise the plug off its seat so that the valve stem serrations are visible inside the flow adjuster window (see figure 5). Loosen the socket head screws (key 29) and lower the flow adjuster (key 14 and 15) to its lowest position on the valve stem. Retighten the socket head screws (key 29) to 3 N•m (26 lbf•in). Relieve pressure to the actuator, shut off all pressure lines to actuator, and disconnect. Use lockout procedures to be sure that the above measures stay in effect while you work on the equipment.

Note

The preceding step is intended to prevent damage to the valve plug (key 3) and seat ring (key 5) during the removal of the bonnet and actuator.

3. Unscrew the bonnet from the valve body.

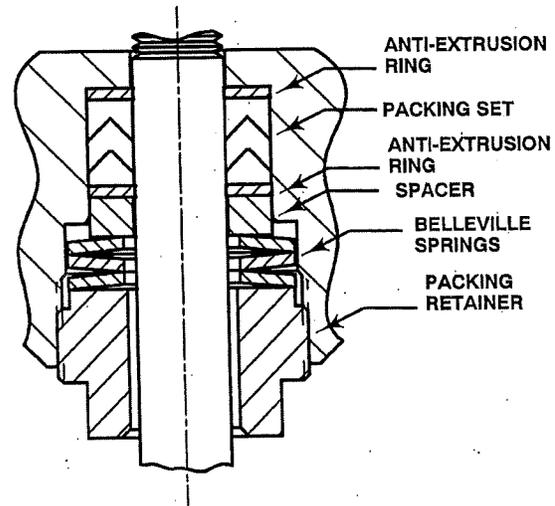
WARNING

Avoid personal injury from sudden release of process pressure. If the process media starts to escape from the safety vent (see figure 4) located in the bonnet neck of the valve body,

STOP DISASSEMBLY IMMEDIATELY!

The escape of process media indicates that the valve has NOT been isolated from the process media, or process pressure is trapped in the valve body.

4. Once the bonnet has been removed from the valve body, inspect the valve seat (key 5) for wear or



E0784-1

Figure 2. Packing and Belleville Spring Stacking Order

damage. If the seating surface has been damaged, remove it from the valve body. Also remove the seat ring gasket (key 6). Clean and inspect the valve body gasket surface for damage. Visually inspect the valve body interior below the seat ring for erosion. Replace the valve body if necessary.

To replace the seat ring, first install a new seat ring gasket. Install the new seat ring and tighten to 230 N•m (170 lbf•ft).

Cover the opening in the valve body to prevent foreign material from getting into the valve body cavity.

5. Remove the six **short** actuator casing cap screws (key 22) first. Once these have been removed from the actuator assembly, carefully remove the two **long** actuator cap screws (key 30).

Note

Be aware as you loosen and remove the actuator cap screws that the actuator springs are under compression.

6. Remove the upper casing (key 21) and the springs (key 27).
7. Do not turn the valve stem (key 4) while removing the diaphragm hex nut (key 26). Use an appropriate tool on the machined flats located on the valve stem above the flow adjuster for this procedure. Continue the actuator disassembly by removing the washer (key 24) diaphragm plate (key 25), diaphragm (key 19), and washer (key 24 for spring-to-open or key 36

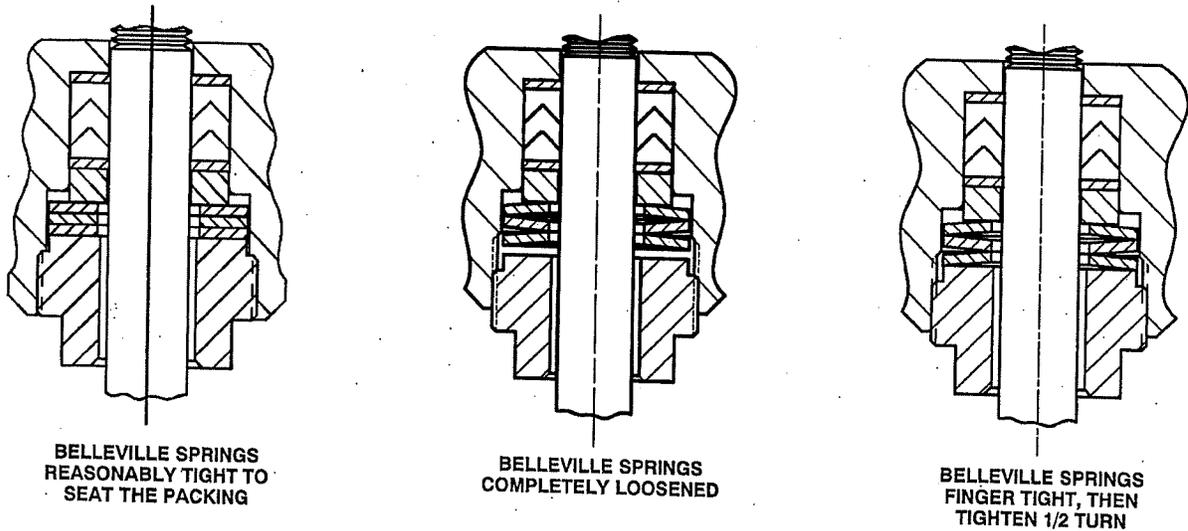


Figure 3. Belleville Spring Procedure

for spring-to-close). Inspect the diaphragm for any wear or damage. Replace with a new one if necessary.

If you wish to inspect/replace the bonnet to actuator casing O-ring (key 16), mark the orientation of the actuator pressure connection to the bonnet for later reference (see figure 5). Unscrew the hex nut (key 18) from the bonnet. Remove the bottom casing (key 18).

8. Unscrew the flow adjuster socket head cap screws (key 29), and remove the flow adjuster halves.

9. Unscrew the packing retainer (key 7) from the bonnet (key 2). After the packing retainer has been unscrewed from the bonnet, pull the valve stem and plug out of the bonnet.

10. Remove the three Belleville springs (key 9), packing spacer (key 10), packing (key 11), and two anti-extrusion rings (key 12) from the bonnet. See figure 2.

11. Clean and inspect the packing box wall to ensure that the packing surfaces are not damaged. If the surface condition is damaged, and cannot be improved by light sanding, replace the bonnet by contacting your Fisher sales office.

12. Inspect the valve stem for scratches or wear, and valve plug for wear or damage. Replace if necessary.

13. If the valve plug requires replacement, use an appropriate tool on the machined flats located on the valve stem above the flow adjuster and unscrew the

valve plug from the valve stem. Replace it with a new valve plug. Screw the valve plug into the valve stem, being careful not to damage the plug seat or plug contour. Tighten to 18 N•m (13 lbf•ft).

14. Inspect the valve stem bushing (key 8) located in the upper end of the bonnet. If damaged, remove and replace it with new bushing (key 8). Replace the valve stem bushing by inserting the bushing, flange end first, into the bore located at the top of the bonnet flow adjuster window. Insert until the flange snaps into the groove provided for it.

15. Remove the O-ring (key 17) from the upper end of the bonnet. Replace it with a new one, and lubricate it with Dow Corning 111 compound or equivalent.

16. Install new packing according to the packing arrangement shown in figure 2. Slide the valve stem through the packing retainer. Place the Belleville springs over the valve stem, positioned as shown in figure 2. Carefully slide the stem through the packing to a point where the serration extends completely into the flow adjuster window of the bonnet (see figure 5).

17. Apply a light film of Dow Corning 111 lubricant or equivalent (key 33) to the threads of the packing retainer (key 7).

18. Install the packing retainer into the bonnet and tighten until the Belleville springs (key 9) are reasonably tight to seat the packing. See figure 3.

19. Completely loosen the packing retainer to relieve all Belleville spring compression. See figure 3.

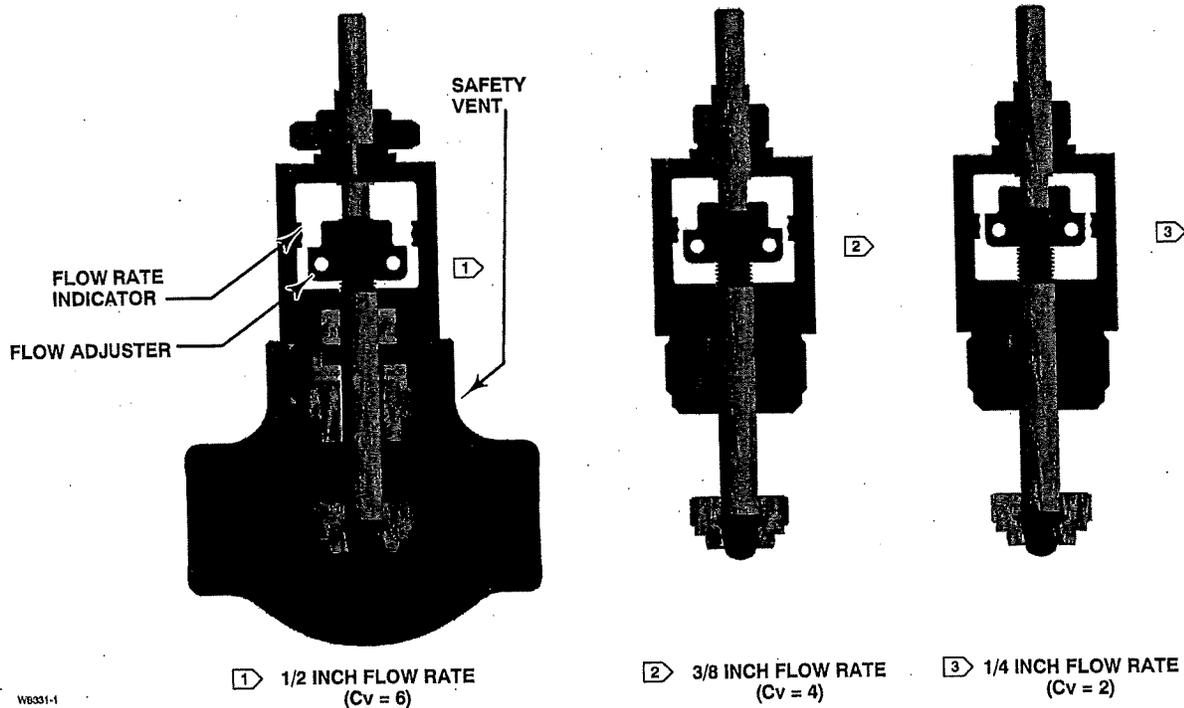


Figure 4. Flow Rate Adjustments

20. Retighten the packing retainer with your fingers until the packing retainer contacts the Belleville springs. See figure 3.

21. Tighten the packing retainer 1/2 turn clockwise. See figure 3.

22. If the bottom casing (key 20) has been removed, place O-ring (key 16) into the groove provided in the top of the bonnet. Place the bottom casing on the bonnet, oriented in the same position as marked in step 7 on page 7. Screw the hex nut (key 18) onto the bonnet, and tighten to 203 N•m (150 lbf•ft).

23. **For spring-to-close actuator action only,** assemble the actuator by first placing the washer (key 24) over the valve stem. Then place the diaphragm (key 19) over the valve stem, and position it so the holes in the diaphragm match the holes in the casing. Place the diaphragm plate (key 25) over the valve stem. Install the washer (key 24), diaphragm hex nut (key 26). Tighten the diaphragm hex nut to 11 N•m (95 lbf•in), while holding the stem by the flats. Install the springs (key 27) and attach the upper casing (key 21) by first installing the two long cap screws (key 30) opposite one another.

24. Begin tightening the two long screws evenly until the remaining six shorter cap screws (key 22)

can be installed with their hex nuts. Continue tightening the actuator casing cap screws evenly using a cross-tightening procedure. Torque to 14 N•m (10 lbf•ft).

25. Lubricate a new O-ring (key 13) with Dow Corning 111 compound or equivalent and place it into the valve body as shown in figure 6 or 7. Ensure that no foreign material blocks the safety vent hole. Screw the bonnet into the valve body, and torque to a range of 542 to 678 N•m (400 to 500 lbf•ft).

26. **For spring-to-close actuator action only,** attach the pressure line to the actuator, and supply pressure to the actuator. Move the flow adjuster to approximately midpoint on the valve stem serration. Release the pressure to the actuator. This allows the plug to find its seated position.

27. Set the flow adjuster to the desired travel position (see figure 4), and tighten the flow adjuster socket head cap screws to 3 N•m (26 lbf•in).

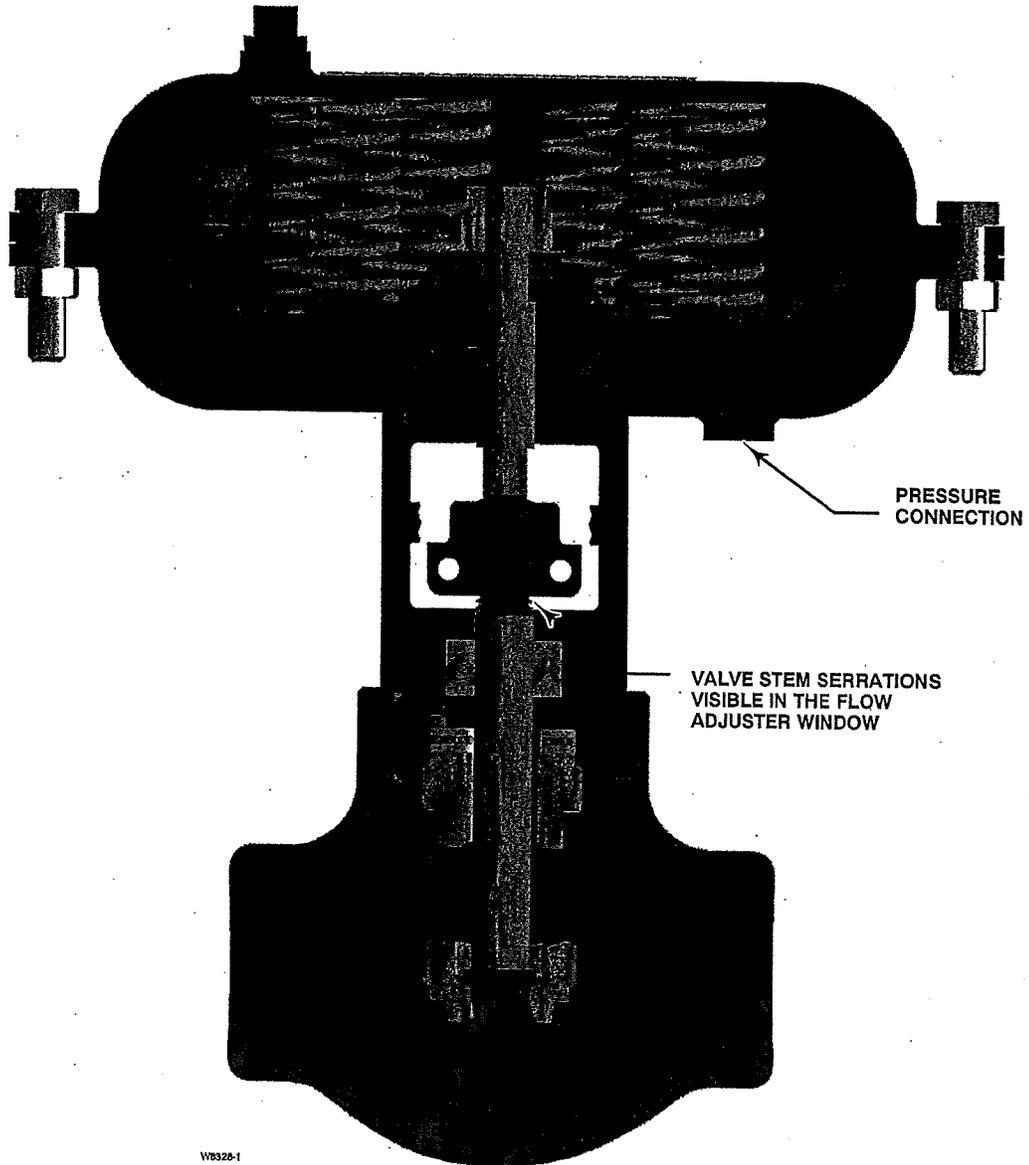
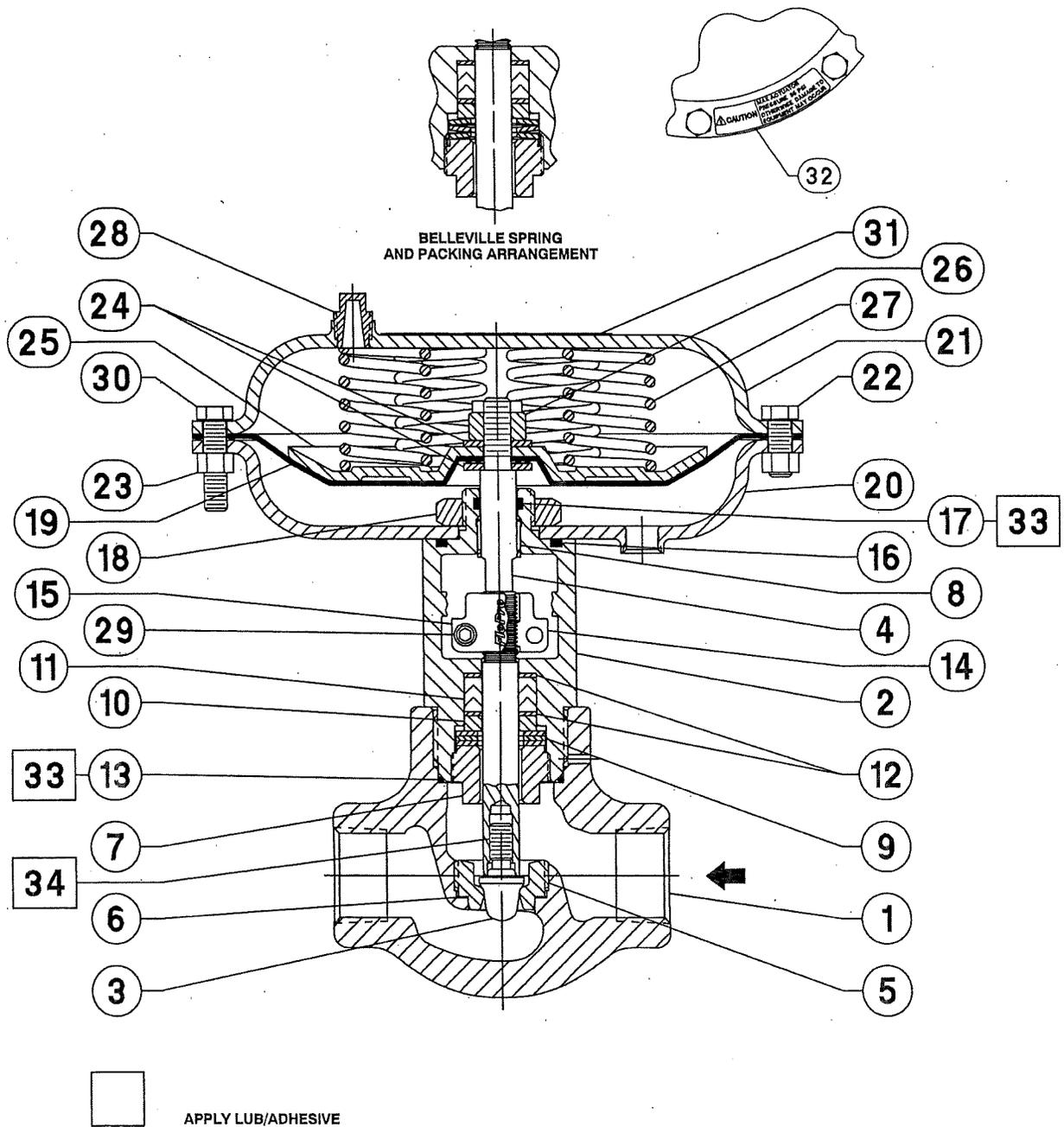
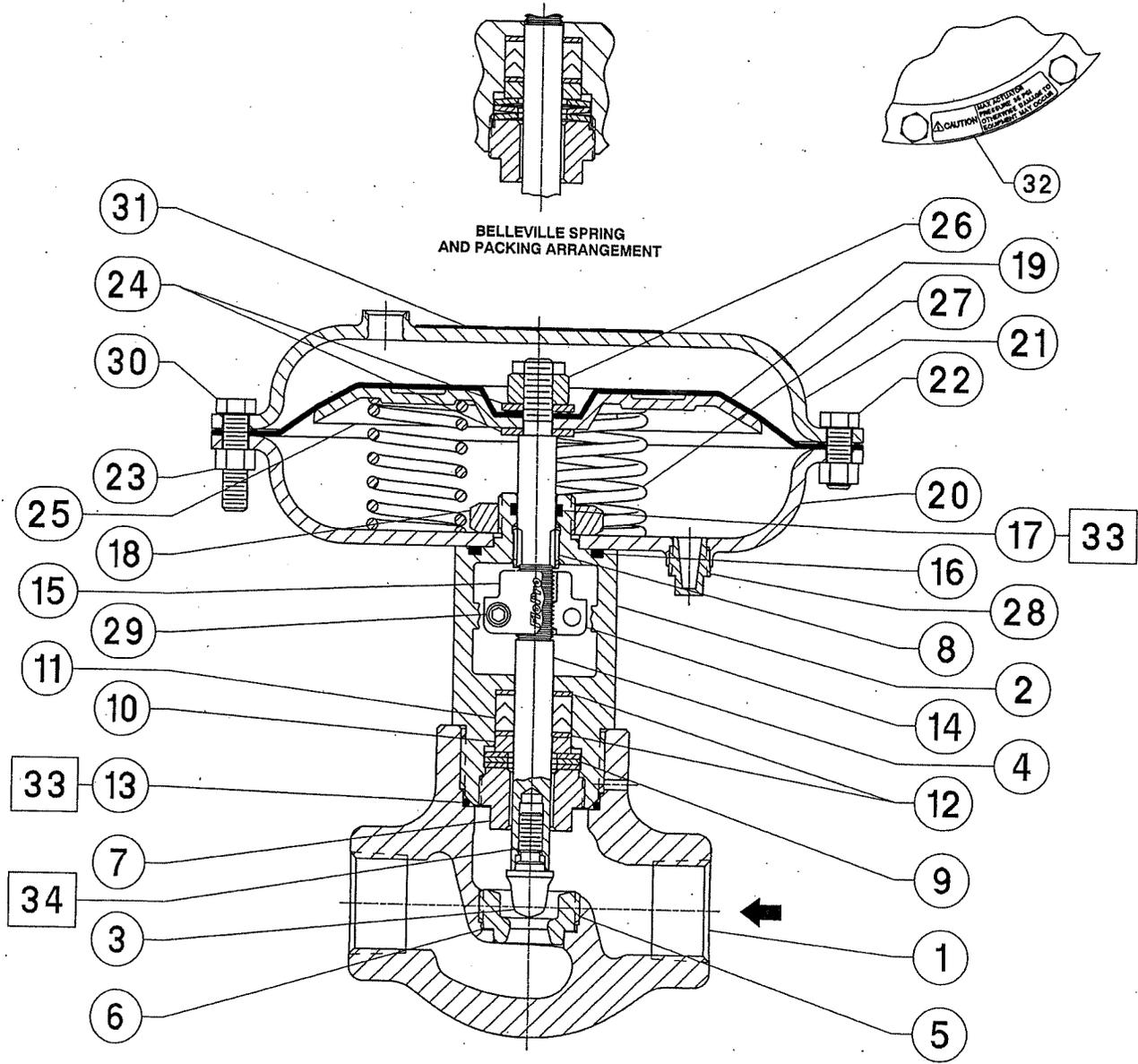


Figure 5. Type D2 FloPro Interior Detail



3965892-F

Figure 6. Type D2 FloPro Assembly—Spring-to-Close



□ APPLY LUB/ADHESIVE

988450-F

Figure 7. Type D2 FloPro Assembly—Spring-to-Open

Parts Ordering

Components that are not manufactured by Fisher should not, under any circumstances, be used in any Fisher valve. The use of parts not manufactured by Fisher may adversely affect the performance of the valve as well as worker and workplace safety.

Note

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Parts Kits

Description	Part Number
* Valve Trim Kit Includes key numbers 3, 5, 6, and 13	19B8485X012
* Valve Packing Kit Includes key numbers 8, 11, 12 (2 req'd), 13, 16, and 17	19B8486X012
* Spring-to-Open Spring Kit Includes key number 27 (3 springs)	10C1998X012

Parts List

Note

Part numbers are shown for recommended spares only. For part numbers not shown, contact your Fisher sales office.

Key	Description	Part Number
1	Valve Body	
2	Bonnet	
3	Valve Plug	
4*	Valve Stem	39B5914X012
5	Seat Ring	
6*	Seat Ring Gasket	19B5887X012
7	Packing Retainer	
8	Valve Stem Bushing	
9	Belleville Springs (3 req'd)	
10	Packing Spacer	
11	ENVIRO-SEAL D2 Packing Set	
12	Anti-Extrusion Ring (2 req'd)	
13	Valve Body O-ring	
14	Flow Adjuster Half	
15	Flow Adjuster Half	
16	Casing O-ring	
17	Valve Stem O-ring	
18	Hex Nut	
19*	Diaphragm	39B3849X012
20	Bottom Casing	
21	Upper Casing	
22	Short Actuator Casing Cap Screws (6 req'd)	
23	Nut	
24	Washer (2 req'd for spring-to-open, 1 req'd for spring-to-close)	
25	Diaphragm Plate	
26	Diaphragm Hex Nut	
27	Springs Spring-to-Close (6 springs) Spring-to-Open (Spring Kit, 3 springs included)	
28	Vent Plug	
29	Flow Adjuster Socket Head Cap Screws (2 req'd)	
30	Long Actuator Casing Cap Screws (2 req'd)	
31	Nameplate	
32	Caution Label	
33	Lubricant, Dow Corning 111 Compound or equivalent	
36	Washer (spring-to-close)	

*Recommended spare parts

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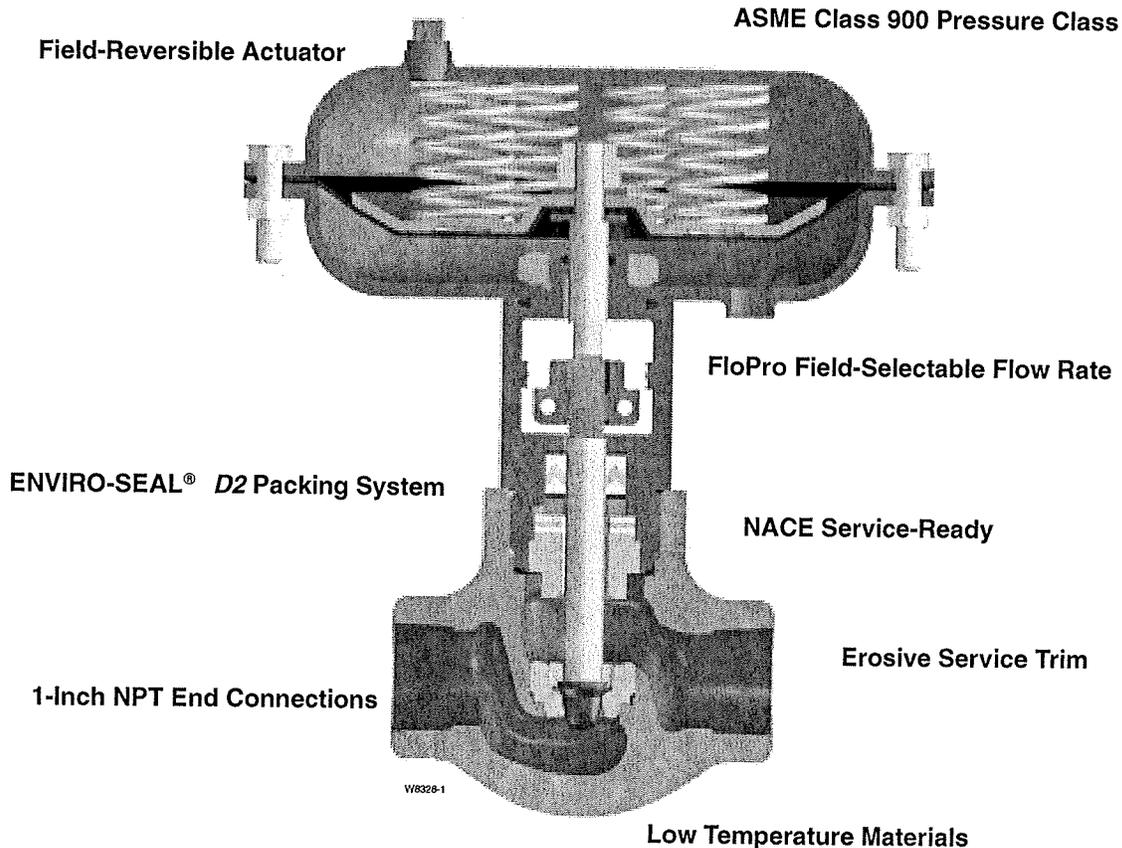
Fisher
Marshalltown, Iowa 50158 USA
Cernay 68700 France
Sao Paulo 05424 Brazil
Singapore 128461

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Type D2 FloPro™ Control Valve

**One Standard Construction
Patents Pending**



***NOW.....Everything you've asked for in a 1-inch, high-pressure,
dump valve is available in a single product.
Prove it to yourself by reviewing D2's standard (and only) construction
in this bulletin***

Figure 1. Type D2 FloPro Control Valve



D2 FloPro Valve

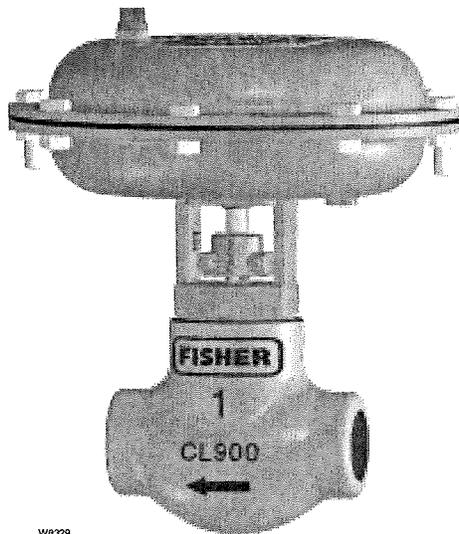


Figure 2. Type D2 FloPro Control Valve

The Type D2 FloPro™ control valve (patents pending) (figure 2) is a compact, rugged valve designed for on-off control. This valve is ideal for use as a dump valve on gas separators and scrubbers. It is also well suited for other high pressure applications in natural gas production, compression, and processing. The Type D2 FloPro valve has threaded end connections and is available in a 1-inch globe style body.

Features

- **Field-Selectable Flow Rates**—The FloPro feature allows easy setting of 1/4, 3/8, and 1/2 inch flow rates, eliminating the need for more than one port size.
- **Erosive Service Trim**—The valve plug and seat ring are constructed from solid R30006 (Alloy 6), providing excellent wear capability for erosive service and longer trim life.
- **ENVIRO-SEAL D2 Packing System**—The ENVIRO-SEAL D2 packing system provides a superior stem seal to prevent the loss of valuable or hazardous process fluids or gases. It features a live-loading feature, providing reduced packing maintenance.
- **NACE Service-Ready**—NACE trim is the standard construction for the D2 FloPro control valve. The valve body, bonnet, and trim materials comply with the recommendations of NACE MR0175 (National Association of Corrosion Engineers).
- **ASME Class 900**—Valve assembly is designed and specified for ASME B16.34 Class 900 service.
- **Low Temperature Materials**—Valve and actuator construction materials allow use in low temperature applications of -46°C .
- **Field-Reversible Actuator**—The Type D2 FloPro actuator can be converted in the field from Spring-to-Close to Spring-to-Open actuator action using a Spring-to-Open Spring Kit.
- **Easy Installation**—Compact design allows installation where space is a premium.
- **Easy Maintenance**—Screwed bonnet/body joint allows repair or maintenance with a minimum of tools, without removing the valve body from the piping system.

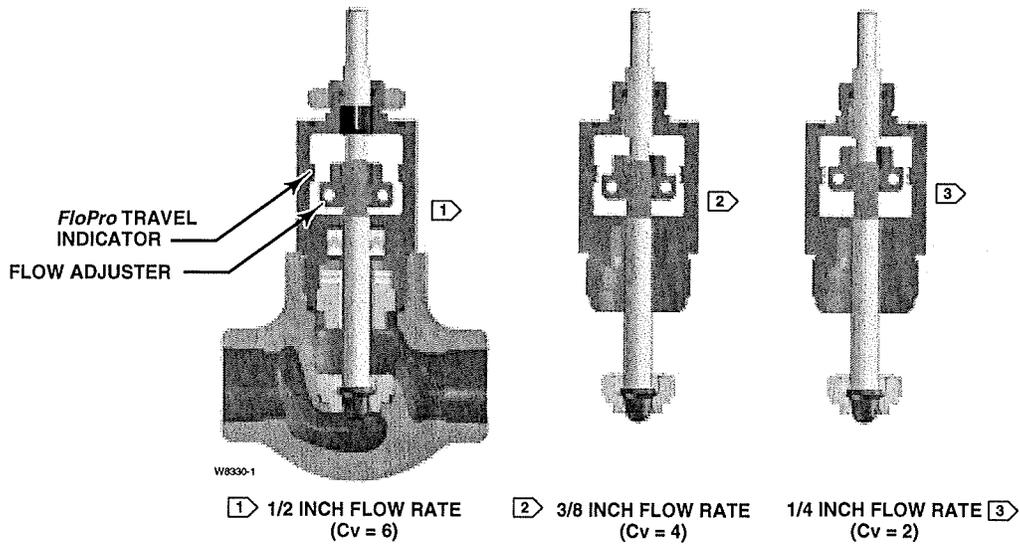


Figure 3. Travel and Flow Coefficients

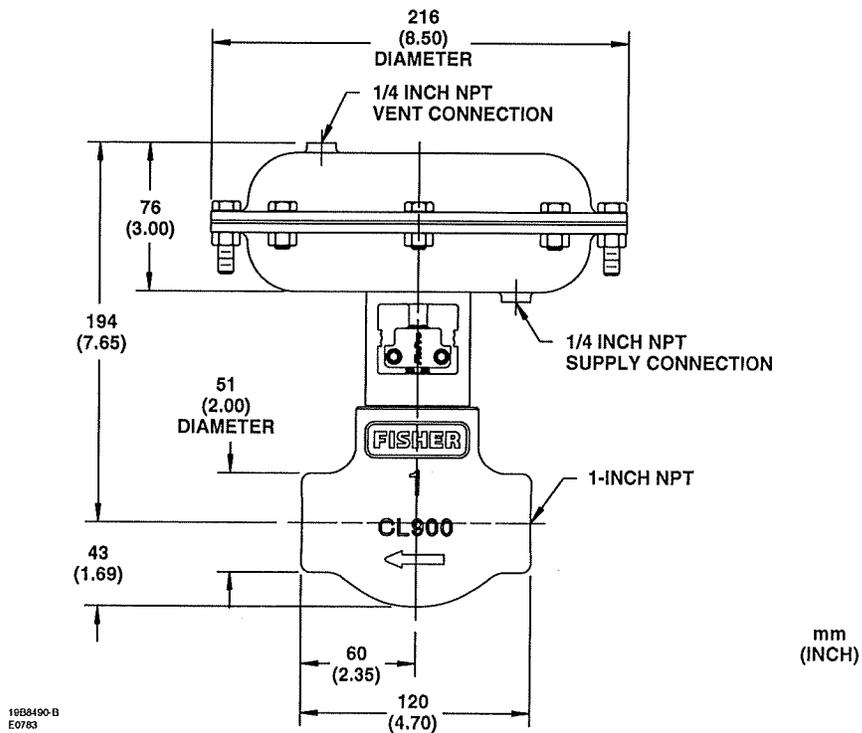


Figure 4. Type D2 Dimensions (Spring-to-Close Configuration Shown)

Specifications

<p>Valve Assembly Pressure Class⁽¹⁾ ASME B16.34 Class 900</p> <p>Maximum Inlet Pressure and Temperature⁽¹⁾ 155 bar from -46 to 93°C, and 150 bar at 149°C. (2250 psig from -50 to 200°F, and 2185 psig at 300°F)</p> <p>Maximum Allowable Pressure Drop⁽¹⁾ Spring-to-Close - Flow Down⁽²⁾: 155 bar (2250 psig) Spring-to-Open - Flow Down⁽²⁾: 103 bar (1500 psig) Spring-to-Close - Flow Up: 103 bar (1500 psig) Spring-to-Open - Flow Up: 103 bar (1500 psig)</p> <p>Shutoff Classification ANSI Class IV ANSI/FCI 70-2 and IEC 60534-4</p> <p>Construction Materials Valve Body and Bonnet: ASME SA 352 LCC Stress relieved Valve Plug and Seat: (R0006) Alloy 6 Valve Stem: (S31600) 316 SST O-Rings: (HNBR) Hydrogenated Nitrile Packing: PTFE/Carbon PTFE Packing Springs: (N07718) Inconel 718 Stem Bushing: (Ryton) PPS Actuator Diaphragm: Nitrile/Polyester Actuator Springs: Zinc-plated steel</p> <p>Flow Characteristic <i>FloPro</i> Characterized</p> <p>Flow Coefficients See figure 3</p>	<p>Port Diameter 13 mm (1/2 inch)</p> <p>Maximum Travel 13 mm (1/2 inch)</p> <p>Valve Travel Indications See figure 3</p> <p>Approximate Weight 7.7 kg (17 lb)</p> <p>Dimensions See figure 4</p> <p>Material Temperature Capabilities Valve Body Assembly: -46 to 149°C (-50 to 300°F) Actuator Assembly: -46 to 93°C (-50 to 200°F)</p> <p>Bonnet/Body Connection Screwed with leakoff bleed</p> <p>Actuator Configuration The <i>D2 FloPro</i> actuator is an on-off spring-and-diaphragm. Actuator action is Spring-to-Close from the factory. For Spring-to-Open actuator action, a Spring-to-Open Spring Kit (10C1998X012) must be used</p> <p>Maximum Actuator Casing Pressure 2.4 bar (35 psig)</p> <p>Minimum Required Actuator Casing Pressure 2.1 to 2.4 bar (30 to 35 psig)</p> <p>Actuator Diaphragm Effective Area 194 cm² (30 square inches)</p> <p>Actuator Pressure Connections 1/4 inch NPT female; see figure 4 for locations</p>
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1. The pressure or temperature limits in the referenced tables and any applicable ASME code limitations should not be exceeded.

2. Standard flow direction.

Product Bulletin

51.2:D2

September 2003

D2 FloPro Valve

Ordering Information

Note

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D2 FloPro Valve

Product Bulletin

51.2:D2

September 2003

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Design D4 Control Valve Assembly

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Introduction

Scope of Manual

This instruction manual provides installation, maintenance, and parts information for the Design D4 control valve.

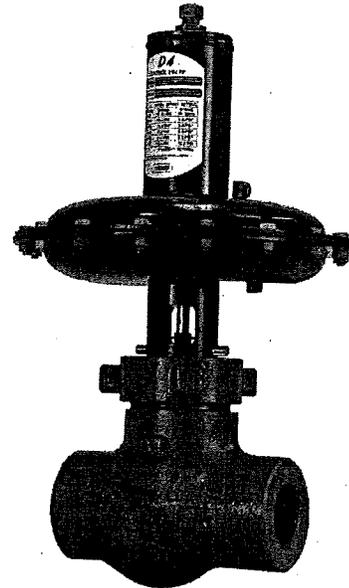
No person may install, operate, or maintain a Design D4 control valve without first • being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance, and • carefully reading and understanding the contents of this manual. If you have any questions about these instructions, contact your Fisher sales office before proceeding.

Note

Fisher does not assume responsibility for the selection, use, or maintenance of any product. Responsibility for proper selection, use, and maintenance of any Fisher product remains solely with the purchaser and end-user.

Description

The Design D4 control valve is a compact, rugged valve designed primarily for high-pressure throttling



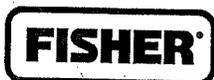
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Figure 1. Design D4 Control Valve

applications. This valve is ideal for use on pressure and flow control applications within the oil and gas production industry. The Design D4 valve also makes an excellent dump valve for high-pressure separators and scrubbers.

Specifications

Table 1 lists specifications for the Design D4 control valve. Some of the specifications for a given control valve as it originally comes from the factory are stamped on a nameplate located on the actuator spring barrel.



D4 Valve

Table 1. Specifications

<p>Available Configurations Spring-to-Close Spring-to-Open</p> <p>Valve Body Sizes and End Connection Styles⁽¹⁾ See table 2</p> <p>Maximum Inlet Pressures and Temperatures⁽¹⁾ If the valve nameplate shows an ASME pressure-temperature class, maximum inlet pressure and temperature is consistent with the applicable class per ASME B16.34. If the nameplate does not show an ASME class, it will show a maximum cold working pressure at 38°C (100°F) (for example, 248 bar [3600 psi])</p> <p>Maximum Pressure Drops⁽¹⁾ See tables 3, 4, 5, and 6</p> <p>Input Signal to Actuator See tables 3, 4, 5, and 6</p> <p>Actuator Maximum Casing Pressure⁽¹⁾ 3.4 bar (50 psig)</p> <p>Shutoff Classification per ANSI/FCI 70-2 and IEC 60534-4 Class IV</p>	<p>Material Temperature Capabilities⁽¹⁾ Actuator Assembly: -40 to 93°C (-40 to 200°F) Valve Body Assembly: <i>Standard Bonnet O-Ring:</i> -46 to 149°C (-50 to 300°F) <i>Optional Fluoroelastomer Bonnet O-Ring:</i> -23 to 204°C (-10 to 400°F)</p> <p>Flow Characteristic Equal percentage</p> <p>Flow Direction Flow up only</p> <p>Port Diameters See table 2</p> <p>Valve Plug Travel 19 mm (0.75 inch)</p> <p>Valve Plug Style Micro-Form™ valve plug</p> <p>Actuator Diaphragm Effective Area 452 cm² (69 inches²)</p> <p>Actuator Pressure Connection Size 0.25 inch NPT female</p>
--	--

1. The pressure or temperature limits in the referenced tables and any applicable ASME code limitations should not be exceeded.

Table 2. Valve Sizes and Connection Styles

VALVE SIZE, INCHES	PORT DIAMETER, (INCHES)	SCREWED	RAISED FACE (RF) FLANGED				RING TYPE JOINT (RTJ) FLANGED	
		3600 psi	Class 150	Class 300	Class 600	Class 900 and 1500	Class 600	Class 900 and 1500
1	0.25, 0.375, 0.5, 0.75	X	X	X	X	X	X	X
2	0.25, 0.375, 0.5, 0.75, 1, 1.25	X	X	X	X	X	X	X

X = Available construction.

Instruction Manual

Form 5755
April 2004

D4 Valve

Table 3. Maximum Shutoff Pressure Drops⁽¹⁾ for Design D4 Control Valves (Spring-to-Close)
When Used with Typical Control Instrumentation⁽²⁾

INPUT SIGNAL TO ACTUATOR		0 to 1.2 Bar (0 to 18 Psig)		0 to 1.4 Bar (0 to 20 Psig)		0 to 2.0 Bar (0 to 30 Psig)		0 to 2.3 Bar (0 to 33 Psig)		0 to 2.4 Bar (0 to 35 Psig)		0 to 3.4 Bar (0 to 50 Psig)	
SPRING		Light Rate											
INITIAL SPRING SETTING		0.77 Bar (11.2 Psig)		0.77 Bar (11.2 Psig)		0.85 Bar (12.4 Psig)		1.05 Bar (15.3 Psig)		1.18 Bar (17.1 Psig)		1.18 Bar (17.1 Psig)	
PORT DIAMETER		Maximum Pressure Drop											
mm	Inches	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi
6.4	0.25	259 ⁽³⁾	3750 ⁽³⁾	259 ⁽³⁾	3750 ⁽³⁾	259	3750	259	3750	259	3750	259	3750
9.5	0.375	259 ⁽³⁾	3750 ⁽³⁾	259 ⁽³⁾	3750 ⁽³⁾	259	3750	259	3750	259	3750	259	3750
12.7	0.5	191	2765	191	2765	219	3180	259	3750	259	3750	259	3750
19.1	0.75	80	1160	80	1160	92	1340	123	1785	143	2080	143	2080
25.4	1	42	610	42	610	49	715	67	965	78	1130	78	1130
31.8	1.25	25	365	25	365	30	430	41	590	48	700	48	700

1. The pressure or temperature limits in the referenced tables and any applicable ASME code limitations should not be exceeded.
2. For example, use the column marked 0-1.4 bar (0-20 psig) for a 0.21-1.0 bar (3-15 psig) pneumatic controller with 1.4 bar (20 psig) supply pressure.
3. For applications with downstream pressure in excess of 196 bar (2845 psig), use 196 bar (2845 psig) for Maximum Shutoff Pressure.

Table 4. Maximum Shutoff Pressure Drops⁽¹⁾ for Design D4 Control Valves (Spring-to-Close)
When Used with Instrumentation with Restricted Output Range⁽²⁾

INPUT SIGNAL TO ACTUATOR		0.2 to 1.0 Bar (3 to 15 Psig)				0.4 to 2.0 Bar (6 to 30 Psig)			
SPRING		Light Rate							
INITIAL SPRING SETTING		0.67 Bar (9.7 Psig)				0.97 Bar (14.0 Psig)			
PORT DIAMETER		Maximum Pressure Drop							
mm	Inches	Bar		Psi		Bar		Psi	
6.4	0.25	259 ⁽³⁾		3750 ⁽³⁾		259 ⁽⁴⁾		3750 ⁽⁴⁾	
9.5	0.375	152 ⁽³⁾		2205 ⁽³⁾		210 ⁽⁴⁾		3045 ⁽⁴⁾	
12.7	0.5	80		1160		113		1635	
19.1	0.75	31		445		45		655	
25.4	1	14		210		23		330	
31.8	1.25	7.6		110		13		185	

1. The pressure or temperature limits in the referenced tables and any applicable ASME code limitations should not be exceeded.
2. For example, an Electro-Pneumatic Transducer calibrated for 0.21-1.0 bar (3-15 psig) output pressure.
3. For applications with downstream pressure in excess of 85 bar (1240 psig), use 85 bar (1240 psig) for Maximum Shutoff Pressure.
3. For applications with downstream pressure in excess of 118 bar (1715 psig), use 118 bar (1715 psig) for Maximum Shutoff Pressure.

Installation

WARNING

Always wear protective gloves, clothing, and eyewear when performing any installation operations to avoid personal injury.

To avoid personal injury or property damage caused by bursting of pressure-retaining parts or by uncontrolled process fluid, be certain the service conditions do not exceed

the limits shown on the valve nameplate and in tables 1, 3, 4, 5, and 6. Use pressure-relieving devices required by government or accepted industry codes and good engineering practices.

Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

If installing into an existing application, also refer to the WARNING at the beginning of the Maintenance section in this instruction manual.

D4 Valve

Table 5. Maximum Shutoff Pressure Drops⁽¹⁾ for Design D4 Control Valves (Spring-to-Open)
When Used with Typical Control Instrumentation⁽²⁾

INPUT SIGNAL TO ACTUATOR		0 to 1.2 Bar (0 to 18 Psig)		0 to 1.4 Bar (0 to 20 Psig)		0 to 2.0 Bar (0 to 30 Psig)		0 to 2.3 Bar (0 to 33 Psig)		0 to 2.4 Bar (0 to 35 Psig)		0 to 3.4 Bar (0 to 50 Psig)	
SPRING		Light Rate						Heavy Rate					
INITIAL SPRING SETTING		0.23 Bar (3.4 Psig)		0.23 Bar (3.4 Psig)		0.28 Bar (4.0 Psig)		0.28 Bar (4.0 Psig)		0.28 Bar (4.0 Psig)		0.28 Bar (4.0 Psig)	
PORT DIAMETER		Maximum Pressure Drop											
mm	Inches	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi	Bar	Psi
6.4	0.25	259 ⁽³⁾	3750 ⁽³⁾	259 ⁽³⁾	3750 ⁽³⁾	259	3750	259	3750	259	3750	259	3750
9.5	0.375	259 ⁽³⁾	3750 ⁽³⁾	259 ⁽³⁾	3750 ⁽³⁾	259	3750	259	3750	259	3750	259	3750
12.7	0.5	187	2715	233	3380	259	3750	259	3750	259	3750	259	3750
19.1	0.75	78	1135	99	1430	147	2130	178	2575	198	2875	259	3750
25.4	1	41	600	53	765	80	1160	97	1410	109	1575	195	2830
31.8	1.25	24	355	32	465	49	715	60	875	68	985	123	1785

1. The pressure or temperature limits in the referenced tables and any applicable ASME code limitations should not be exceeded.
2. For example, use the column marked 0-1.4 bar (0-20 psig) for a 0.21-1.0 bar (3-15 psig) pneumatic controller with 1.4 bar (20 psig) supply pressure.
3. For applications with downstream pressure in excess of 190 bar (2760 psig), use 190 bar (2760 psig) for Maximum Shutoff Pressure.

Table 6. Maximum Shutoff Pressure Drops⁽¹⁾ for Design D4 Control Valves (Spring-to-Open)
When Used with Instrumentation with Restricted Output Range⁽²⁾

INPUT SIGNAL TO ACTUATOR		0.2 to 1.0 Bar (3 to 15 Psig)				0.4 to 2.0 Bar (6 to 30 Psig)			
SPRING		Light Rate				Heavy Rate			
INITIAL SPRING SETTING		0.43 Bar (6.2 Psig)				0.69 Bar (10.0 Psig)			
PORT DIAMETER		Maximum Pressure Drop							
mm	Inches	Bar		Psi		Bar		Psi	
6.4	0.25	226 ⁽³⁾		3275 ⁽³⁾		259 ⁽⁴⁾		3750 ⁽⁴⁾	
9.5	0.375	91 ⁽³⁾		1315 ⁽³⁾		259 ⁽⁴⁾		2845	
12.7	0.5	46		660		82		1195	
19.1	0.75	15		220		43		630	
25.4	1	---		---		26		380	
31.8	1.25	---		---		---		---	

1. The pressure or temperature limits in the referenced tables and any applicable ASME code limitations should not be exceeded.
2. For example, an Electro-Pneumatic Transducer calibrated for 0.21-1.0 bar (3-15 psig) output pressure.
3. For applications with downstream pressure in excess of 51 bar (740 psig), use 51 bar (740 psig) for Maximum Shutoff Pressure.
3. For applications with downstream pressure in excess of 202 bar (2925 psig), use 202 bar (2925 psig) for Maximum Shutoff Pressure.

CAUTION

When ordered, the valve configuration and construction materials were selected to meet particular pressure, temperature, pressure drop, and controlled fluid conditions. Responsibility for the safety of process media and compatibility of valve materials with process media rests solely with the purchaser and end-user. Since some body/trim material combinations are limited in their pressure drop and temperature ranges, do not apply any other conditions to the valve without first contacting your Fisher sales office.

1. Before installing the control valve assembly, inspect it for any damage and for any foreign material that may have collected in the valve body.
2. Remove any pipe scale, welding slag, and other foreign material from the pipeline.
3. The control valve can be installed in any position, but normally the actuator is vertical above the valve. Install the valve so the flow direction arrow on the side of the valve indicates the direction of the process flow.
4. Install the valve following local and national piping codes when they apply to the application. For screwed connections, treat the male pipe threads with a good grade pipe compound. For flanged valves, use suitable gaskets between valve and pipeline flanges.
5. If continuous operation is required during maintenance and inspection, install a conventional three-valve bypass around the valve.

6. Connect loading pressure for the Spring-to-Open configuration to the 0.25-18 NPT connection in the upper casing assembly (key 23) as shown in figure 4. The Spring-to-Close configuration loading pressure connection is in the lower casing assembly (key 39) as shown in figure 3.

Spring Adjustment

The spring has a fixed pressure span over which loading pressure will stroke the valve. Adjustment of the spring compression shifts the span so that more or less loading pressure is required to start travel. Since the span does not change, there will be a corresponding increase or decrease in the pressure requirements at the end of the valve stroke.

In order to maximize shutoff pressure drop values, the actuator spring must be accurately adjusted for each Input Signal Pressure Range. If the actuator has been disassembled or pressure conditions have changed, the spring may require adjustment. Refer to tables 2 and 3 to determine the Initial Spring Set values based on the Input Signal range that is available to the actuator. These values include packing friction.

Spring-to-Close

Refer to figure 3.

1. Loosen the adjusting screw nut (key 44).
2. Turn the adjusting screw (key 31) clockwise to compress the spring or counterclockwise to decrease spring compression.
3. After adjustment, tighten the adjusting screw nut (key 44).

Spring-to-Open

Refer to figure 4.

1. Unscrew the spring case assembly (key 27).
2. Turn the adjusting stem nut (key 44) clockwise to compress the spring or counterclockwise to decrease spring compression.
3. After adjustment, replace the spring case assembly (key 27).

Maintenance

Refer to figure 3.

Valve parts are subject to normal wear and must be inspected and replaced as necessary. The frequency of inspection and maintenance depends on the severity of the service conditions.

WARNING

Avoid personal injury from sudden release of process pressure or bursting of parts. Before performing any maintenance operations:

- Always wear protective gloves, clothing, and eyewear when performing any maintenance operations to avoid personal injury.
- Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.
- Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure on both sides of the valve. Drain the process media from both sides of the valve.
- Vent the power actuator loading pressure and relieve any actuator spring precompression.
- Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.
- The valve packing box may contain process fluids that are pressurized, *even when the valve has been removed from the pipeline.* Process fluids may spray out under pressure when removing the packing hardware or packing rings.
- Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

Valve Plug and Seat Ring

The Design D4 control valve is designed to allow easy access to the valve plug and seat ring without disturbing the packing. Refer to other sections of this instruction manual if additional maintenance is required.

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Disassembly

1. Remove the loading pressure tubing and any accessories that may hamper disassembly.
2. Break the hammer nut (key 6) loose with a hammer. Continue turning the hammer nut by using a hammer or a large adjustable wrench, tightened around one ear of the hammer nut. If the bonnet is stuck on the valve, continue to unscrew the hammer nut. The hammer nut will contact the spring pins (key 7) and will force the bonnet out of the valve. Carefully lift the actuator, bonnet, and valve plug assembly from the valve body.

Note

The spring pins must always be in place during valve operation. They provide a safeguard against injury when the unit is being disassembled.

3. Use a socket wrench to loosen the seat ring (key 3).
4. Remove the seat ring (key 3) and seat ring gasket (key 9) from the valve body.
5. Inspect parts for wear or damage that would prevent proper operation of the valve body. Carefully clean the seat ring gasket surfaces and seat ring threads.

CAUTION

Be careful to avoid damaging the seating surface on the valve plug or seat ring as damage in these areas will allow excessive leakage at shutoff. Avoid damaging the highly polished valve stem surface. A damaged valve stem could cut the packing and allow process fluid to leak to the atmosphere.

6. **For spring-to-close only:** To remove the valve plug (key 2), drive out the groove pin (key 4) and unscrew the valve plug from the stem (key 47).

If the valve plug cannot be easily unscrewed from the stem, use a punch to keep the stem from turning as the plug is removed.

7. **For spring-to-open only:** To remove the valve plug (key 2), first remove the spring case assembly

(key 27). Remove the adjustment screw nut (key 44), the upper spring seat (key 29), and the spring (key 30). Push the adjustment stem (key 31) fully downward until the diaphragm plate (key 40) contacts the cap screws (key 38), exposing the groove pin (key 4) in the plug. Drive out the groove pin (key 4) and unscrew the valve plug from the stem (key 47).

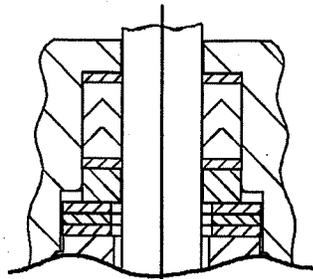
If the valve plug cannot be easily unscrewed from the stem, use a punch to keep the stem from turning as the plug is removed.

Table 7. Torque for Seat Ring (Key 3)

VALVE SIZE		RECOMMENDED TORQUE	
mm	Inches	N•m	Lbf•ft
25.4	1	407	300
50.8	2	698	515

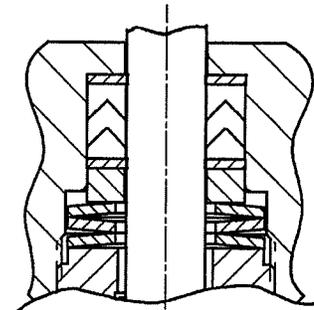
Assembly

1. Make sure the bonnet O-ring (key 8) is on the bonnet and lubricated with Lubriplate Mag-1 or equivalent (key 49).
2. Install the plug (key 2) on the stem (key 47) and insert a new groove pin (key 4).
3. Thoroughly clean the seat ring and bonnet threads in the valve body (key 1). Also clean the valve body seat ring gasket surfaces.
4. Apply Never-Seez Nickel Special lubricant or equivalent (key 54) to the threads of the seat ring (key 3), and its mating threads in the valve body.
5. Apply Never-Seez Nickel Special lubricant or equivalent (key 54) to the seat ring gasket (key 9) and install into the valve body.
6. Screw the seat ring into the valve body. Use a socket wrench to tighten the seat ring to the torque values shown in table 7. Remove all excess lubricant after tightening.
7. Lubricate (key 54) the threads on the valve body and hammer nut and the contact surfaces of the bonnet and hammer nut flange. Install the bonnet and actuator assembly with pinned valve plug onto the valve body. Tighten the hammer nut using an adjustable wrench until the nut stops turning. A few hammer blows will be required to ensure that the assembly is tight.
8. See the actuator assembly and spring adjustment sections of this manual.



BELLEVILLE SPRINGS REASONABLY TIGHT TO SEAT THE PACKING

E0662



BELLEVILLE SPRINGS FINGER TIGHT, THEN TIGHTEN 5/6 TURN (5 FLATS ON THE RETAINER)

Figure 2. Design D4 Belleville Spring Procedure

Valve Packing

WARNING

Observe the warning at the start of the Maintenance section.

The valve stem packing can only be accessed from within the valve body. If packing maintenance is required, first disassemble per steps 1, 2, and 6 or 7 in the Valve Plug and Seat Ring Disassembly section of this document.

Disassembly

1. Loosen the packing retainer locknut (key 22) with a spanner wrench or with a punch and hammer.
2. Unscrew the packing retainer (key 10) from the bonnet (key 5).
3. Remove the three Belleville springs (key 11), packing spacer (key 14), packing (key 13), and two anti-extrusion rings (key 12) from the bonnet, using a formed wire hook.
4. Clean and inspect the packing box wall to ensure that the packing surfaces are not damaged. If the surface condition is damaged, and cannot be improved by light sanding, replace the bonnet by contacting your Fisher sales office.

5. Inspect the valve stem for scratches or wear, and valve plug for wear or damage. Replace if necessary.

Assembly

Refer to figures 2 and 3.

1. Install new packing and Belleville springs according to the packing arrangement shown in figure 2.
2. Apply a light film of lubricant (key 54) to the threads of the packing retainer (key 10).
3. Install the packing retainer into the bonnet and tighten until the Belleville springs (key 11) are reasonably tight to fully seat the packing and anti-extrusion rings.
4. Completely loosen the packing retainer to relieve all Belleville spring compression.
5. Retighten the packing retainer by hand until the packing retainer firmly contacts the Belleville springs.
6. Tighten the packing retainer clockwise 5/6 turn (5 flats on the retainer).
7. Lock the packing retainer (key 10) solidly in place by tightening the packing retainer locknut (key 22) using a spanner wrench, or a hammer with a punch or chisel.

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Actuator (Spring-to-Close)



WARNING

Observe the warning at the start of the Maintenance section.

Refer to figure 3.

Before disassembling the actuator, disassemble the valve plug, seat ring, and packing according to instructions in this manual.

Disassembly

1. Loosen the adjusting screw nut (key 44) and turn the adjusting screw (key 31) counterclockwise to remove all spring compression.
2. Unscrew the casing cap screws and hex nuts (keys 45 and 46), and remove the upper casing assembly (key 23) from the lower casing (key 39).
3. Remove the spring seat (key 29) and actuator spring (key 30).
4. Lift out the diaphragm, diaphragm plate, and stem assembly. Remove the travel indicator (key 32) when the bottom of the stem enters the yoke window.
5. To replace the diaphragm (key 15), separate the diaphragm assembly by using a wrench on the hex nuts (key 42) to unscrew the assembly.
6. Separate the parts—diaphragm washer, actuator O-ring (keys 41 and 25), diaphragm, and diaphragm plate, (keys 15 and 40).
7. Inspect the diaphragm and the actuator O-ring for damage or deterioration, and replace if necessary. If the diaphragm is replaced, a new O-ring should also be installed.
8. Inspect the stem O-ring (key 19) and bonnet bushing (key 20); replace if necessary. To inspect the casing O-ring (key 18), remove the cap screws (key 38) and lift off the lower casing (key 39). Replace the O-ring if necessary.
9. If the hammer nut needs to be removed from the bonnet, the spring pins (key 7) can be removed with locking pliers.

Assembly

1. Before starting assembly, make sure all parts are clean and in good condition. There should be no

burrs or sharp edges on any threads or surfaces that might cut or damage an O-ring, bushing, the packing, or the diaphragm. When replacing O-rings and bushings, be sure the O-ring or bushing groove is clean and undamaged. Using a general purpose lubricant (key 49), lubricate all bushings and O-rings and the threads of parts that have to pass through the bushings and O-rings.

CAUTION

The threads on factory-produced valve stems have been specially machined to avoid O-ring, bushing, or packing damage during trim maintenance. Use of other than a factory-produced valve stem may result in early stem O-ring, bushing, and packing failure.

Note

Do not lubricate cap screws (key 38) before inserting them in the following procedure.

2. Place the hammer nut and spring pins on the bonnet, if removed. Install the casing O-ring (key 18), the stem O-ring (key 19), and the bonnet bushing (key 20). Position the lower casing (key 39) on the bonnet. Insert the nonlubricated cap screws (key 38), and torque to 49 N•m (36 lbf•ft).

Note

Spring pins must always be in place during valve operation, acting as a safeguard against injury when the unit is being disassembled.

3. Assemble the diaphragm plate assembly. Place the patterned side of the diaphragm (key 15) against the diaphragm plate (key 40). Be sure to turn the diaphragm washer (key 41) so that the side that is beveled on the inside diameter is against the O-ring (key 25). Also, make sure that it is assembled for installation with the diaphragm on the loading pressure side and the lockwasher (key 43) and lower spring seat (key 28) are on the spring side.
4. Fasten the diaphragm and diaphragm plate assembly on the stem with hex nuts (key 42). Place the diaphragm and diaphragm plate, and stem assembly into the lower casing and bonnet. Install the travel indicator (key 32) on the stem as the bottom of the stem enters the yoke window.

CAUTION

Over-tightening the diaphragm casing cap screws and nuts (keys 45 and 46) can damage the diaphragm. Do not exceed 27 N•m (20 lbf•ft) torque.

5. Replace the spring (key 30) on the diaphragm plate (key 40). Replace the upper spring seat (key 29). Position the upper casing (key 23) on the lower casing (key 39). Insert the cap screws (key 45) and tighten the hex nuts (key 46). Torque the casing cap screws evenly to 27 N•m (20 lbf•ft) using a crisscross pattern.
6. Adjust the initial spring set per the Spring Adjustment section in this manual.

Actuator (Spring-to-Open)

WARNING

Observe the warning at the start of the Maintenance section.

Refer to figure 4.

Before disassembling the actuator, disassemble the valve plug, seat ring, and packing according to instructions in this manual.

Disassembly

1. Unscrew the spring case assembly (key 27). Turn the adjusting screw nut (key 44) counterclockwise to remove all spring compression. Remove the adjusting screw nut, upper spring seat, and spring (keys 44, 29, and 30)
2. Unscrew the casing cap screws and hex nuts (keys 45 and 46), and remove the upper casing assembly (key 23) from the lower casing (key 39). Remove the cotter pin (key 36) and unscrew the adjusting stem (key 31).
3. Lift out the diaphragm (key 15), diaphragm plate (key 40), and stem assembly. Remove the travel indicator (key 32) when the bottom of the stem enters the yoke window.
4. To replace the diaphragm (key 15), separate the diaphragm assembly by using a wrench on the hex nuts (key 42) to unscrew the assembly.
5. Separate the parts—diaphragm washer, actuator O-ring (keys 41 and 25), diaphragm, and diaphragm plate, (keys 15 and 40).

6. Inspect the diaphragm and the actuator O-ring for damage or deterioration, and replace if necessary. If the diaphragm is replaced, a new O-ring should also be installed.

7. Inspect the stem O-ring (key 19) and bonnet bushing (key 20); replace if necessary. To inspect the casing O-ring (key 18), remove the cap screws (key 38) and lift off the lower casing (key 39). Replace the O-ring if necessary. Inspect the adjusting stem bushing (key 26) and actuator stem O-ring (key 53). Replace if necessary.

8. If the hammer nut needs to be removed from the bonnet, the spring pins (key 7) can be removed with locking pliers.

Assembly

1. Before starting assembly, make sure all parts are clean and in good condition. There should be no burrs or sharp edges on any threads or surfaces that might cut or damage an O-ring, bushing, the packing, or the diaphragm. When replacing O-rings and bushings, be sure the O-ring or bushing groove is clean and undamaged. Using a general purpose lubricant (key 49), lubricate all bushings and O-rings and the threads of parts that have to pass through the bushings and O-rings.

CAUTION

The threads on factory-produced valve stems have been specially machined to avoid O-ring, bushing, or packing damage during trim maintenance. Use of other than a factory-produced valve stem may result in early stem O-ring, bushing, and packing failure.

Note

Do not lubricate cap screws (key 38) before inserting them in the following procedure.

2. Place the hammer nut and spring pins on the bonnet, if removed. Install the casing O-ring (key 18), the stem O-ring (key 19), and the bonnet bushing (key 20). Position the lower casing (key 39) on the bonnet. Insert the nonlubricated cap screws (key 38), and torque to 49 N•m (36 lbf•ft).
3. Assemble the diaphragm plate assembly. Place the patterned side of the diaphragm (key 15) against the diaphragm plate (key 40). Be sure to turn the diaphragm washer (key 41) so that the side that is beveled on the inside diameter is against the O-ring

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(key 25). Also, make sure that it is assembled for installation with the diaphragm on the loading pressure side and the lockwasher (key 43) and diaphragm washer (key 41) are on the upper side.

Note

Spring pins must always be in place during valve operation, acting as a safeguard against injury when the unit is being disassembled.

4. Fasten the diaphragm and diaphragm plate assembly on the stem with hex nuts (key 42). Place the diaphragm and diaphragm plate, and stem assembly into the lower casing and bonnet. Install the travel indicator (key 32) on the stem as the bottom of the stem enters the yoke window.
5. Screw the adjusting stem (key 31) onto the stem (key 47) and secure the cotter pin (key 36). Make sure the bushing and O-ring are in place in the upper casing.

CAUTION

Over-tightening the diaphragm casing cap screws and nuts (keys 45 and 46) can damage the diaphragm. Do not exceed 27 N•m (20 lbf•ft) torque.

6. Position the upper casing (key 23) on the lower casing (key 39). Insert the cap screws (key 45) and tighten the hex nuts (key 46). Torque the casing cap screws evenly to 27 N•m (20 lbf•ft) using a crisscross pattern.
7. Replace the spring (key 30), spring seat (key 29), and adjusting stem nut (key 44) over the adjusting stem. Replace the spring case assembly (key 27).
8. Adjust the initial spring set per the Spring Adjustment section in this manual.

Parts Ordering

Each Design D4 control valve is assigned a serial number, which can be found on the nameplate. Refer to the number when contacting your Fisher representative for assistance or when ordering replacement parts.

Note

Use only genuine Fisher replacement parts. Components that are not supplied by Fisher should not, under any circumstances, be used in any Fisher valve, because they will void your warranty, might adversely affect the performance of the valve, and might jeopardize worker and workplace safety.

Note

Fisher does not assume responsibility for the selection, use, or maintenance of any product. Responsibility for proper selection, use, and maintenance of any Fisher product remains solely with the purchaser and end-user.

Repair Kits

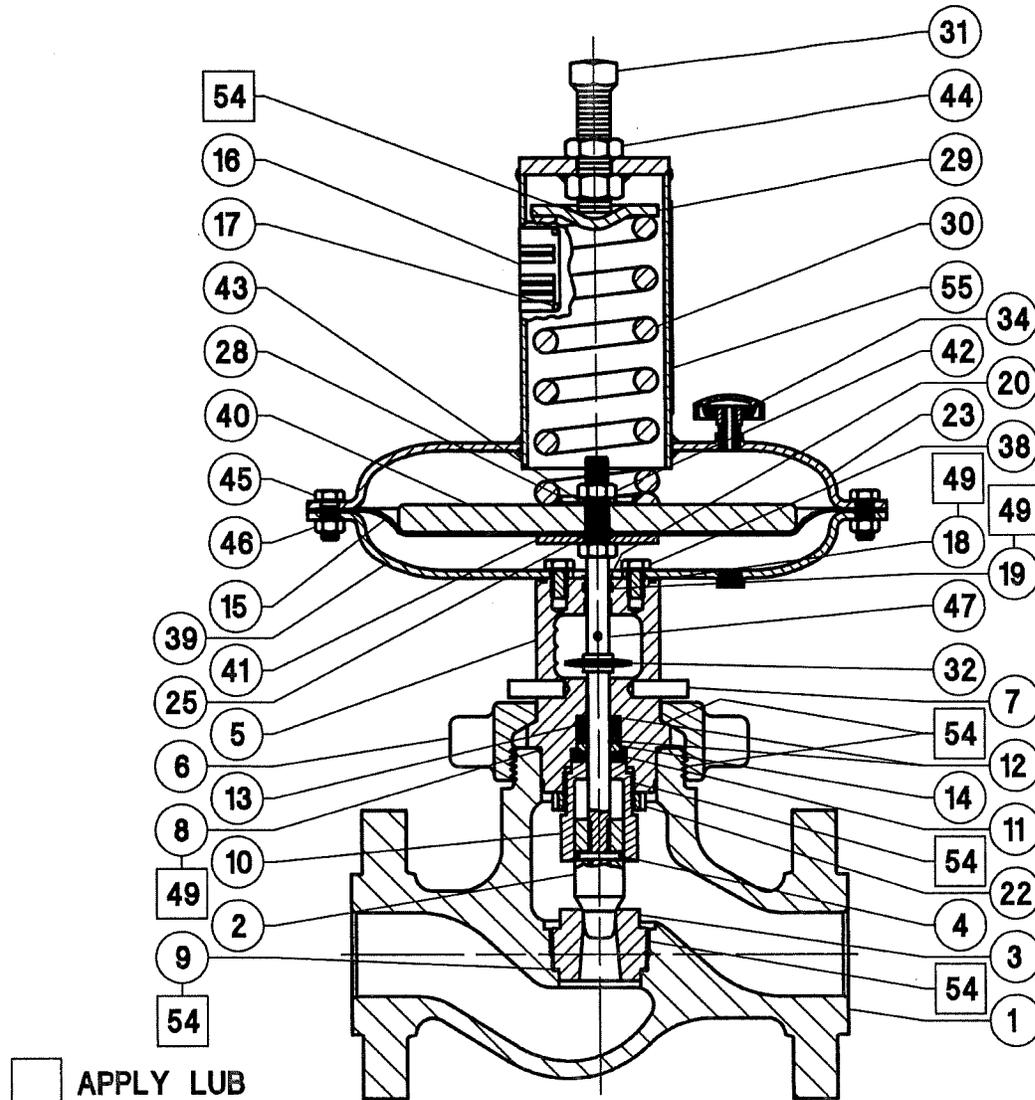
Note

All repair kits are supplied with hydrogenated nitrile bonnet O-ring. Viton bonnet O-ring must be ordered separately when required.

Description	Part Number
* Packing Repair Kit Includes key numbers 4, 8, 12 (2 req'd), and 13	RD4X0000012
* Actuator Repair Kit Includes key numbers 4, 8, 12 (2 req'd), 13, 15, 18, 19, 20, 25, 26, 36, and 53	RD4X0000022

Parts List

Key	Description	Part Number	Key	Description	Part Number
				2-inch valve	
				0.25 inch port diameter	GE07389X012
				0.375 inch port diameter	GE07394X012
				0.5 inch port diameter	GE07397X012
				0.75 inch port diameter	GE07398X012
				1-inch port diameter	GE07399X012
				1.25 inch port diameter	GE07406X012
				1-inch valve	GE01163X012
				0.25 inch port diameter	20C3692X012
				0.375 inch port diameter	20C3693X012
				0.5 inch port diameter	20C3694X012
				0.75 inch port diameter	GE01557X012
				2-inch valve	
				0.25 inch port diameter	GE00992X012
				0.375 inch port diameter	GE00993X012
				0.5 inch port diameter	GE00994X012
				0.75 inch port diameter	GE01558X012
				1-inch port diameter	GE01561X012
				1.25 inch port diameter	GE01555X012
				S17400 H1150 DbI	
				1-inch valve	
				0.25 inch port diameter	20C3692X032
				0.375 inch port diameter	20C3693X032
				0.5 inch port diameter	20C3694X032
				0.75 inch port diameter	GE01557X032
				2-inch valve	
				0.25 inch port diameter	GE00992X032
				0.375 inch port diameter	GE00993X032
				0.5 inch port diameter	GE00994X032
				0.75 inch port diameter	GE01558X032
				1-inch port diameter	GE01561X032
				1.25 inch port diameter	GE01555X032
				Tungsten Carbide	
				1-inch valve	
				0.25 inch port diameter	20C3696X012
				0.375 inch port diameter	20C3697X012
				0.5 inch port diameter	20C3698X012
				0.75 inch port diameter	20C3699X012
				2-inch valve	
				0.25 inch port diameter	20C3682X012
				0.375 inch port diameter	20C3683X012
				0.5 inch port diameter	20C3685X012
				0.75 inch port diameter	20C3686X012
				1-inch port diameter	20C3687X012
				1.25 inch port diameter	20C3688X012
				Seat Ring	
				S17400 H1150 DbI	
				1-inch valve	
				0.25 inch port diameter	GE00982X032
				0.375 inch port diameter	GE00983X032
				0.5 inch port diameter	GE00984X032
				0.75 inch port diameter	GE00985X032
				2-inch valve	
				0.25 inch port diameter	GE00986X032
				0.375 inch port diameter	GE00987X032
				0.5 inch port diameter	GE00988X032
				0.75 inch port diameter	GE00989X032
				1-inch port diameter	GE00990X032
				1.25 inch port diameter	GE00991X032
				Tungsten Carbide	
				1-inch valve	
				0.25 inch port diameter	GE07347X012
				0.375 inch port diameter	GE07363X012
				0.5 inch port diameter	GE07364X012
				0.75 inch port diameter	GE07365X012
				4*	Groove Pin
				5	Bonnet
				6	Hammer Nut
				7	Spring Pin
				8*	Bonnet O-ring
					Hydrogenated Nitrile
					-46 to 149°C (-50 to 300°F)
					10C3680X012
					Viton, -23 to 204°C (-10 to 400°F)
					10C3680X022
				9*	Seat Ring Gasket
					For 1-inch valve
					1B198636042
					For 2-inch valve
					1B198836042
				10	Packing Retainer
				11	Belleville Springs
				12*	Anti-Extrusion Washer, 2 req'd
					12B6335X022
				13*	Packing Set
					12B6667X012
				14	Packing Spacer
				15*	Diaphragm
					22B3521X012
				16	Nameplate
				17	Drive Screw
				18*	Casing O-ring
					1F9141X0142
				19*	Stem O-ring
					1K7561X0072
				20*	Bonnet Bushing
					17A7112X012
				22	Locknut
				23	Upper Casing Assembly
				25*	Actuator O-ring
					1K7561X0072
				26*	Adjusting Stem Bushing (spring-to-open only)
					17A4059X012
				27	Spring Case Assembly
				28	Lower Spring Seat
				29	Upper Spring Seat
				30	Spring
					Spring-to-Close, Light Rate
					1F176827092
					Spring-to-Close, Heavy Rate
					1E792427082
					Spring-to-Open, Light Rate
					1F176727032
					Spring-to-Open, Heavy Rate
					1F714327092
				31	Adjustment Screw or Stem
				32	Travel Indicator
				34	Vent Assembly
				36*	Cotter Pin (spring-to-open only)
					1C608035022
				37	Pipe Plug
				38	Cap Screw
				39	Lower Casing
				40	Diaphragm Plate
				41	Diaphragm Washer
				42	Hex Nut
				43	Lockwasher
				44	Adjustment Screw Nut
				45	Cap Screw
				46	Hex Nut
				47*	Valve Stem
					Nitronic 50, Reverse Acting
					20C3681X022
					Nitronic 50, Direct Acting
					20C3716X022
				49	Lubricant (Lubriplate MAG-1 or equivalent)
				50	NACE Tag (not shown)
				51	Drive Screw
				53*	Actuator Stem O-ring (spring-to-open only)
					1C7821X0182
				54	Lubricant (Never-Seez or equivalent)
				55	Spring Setting Label (not shown)



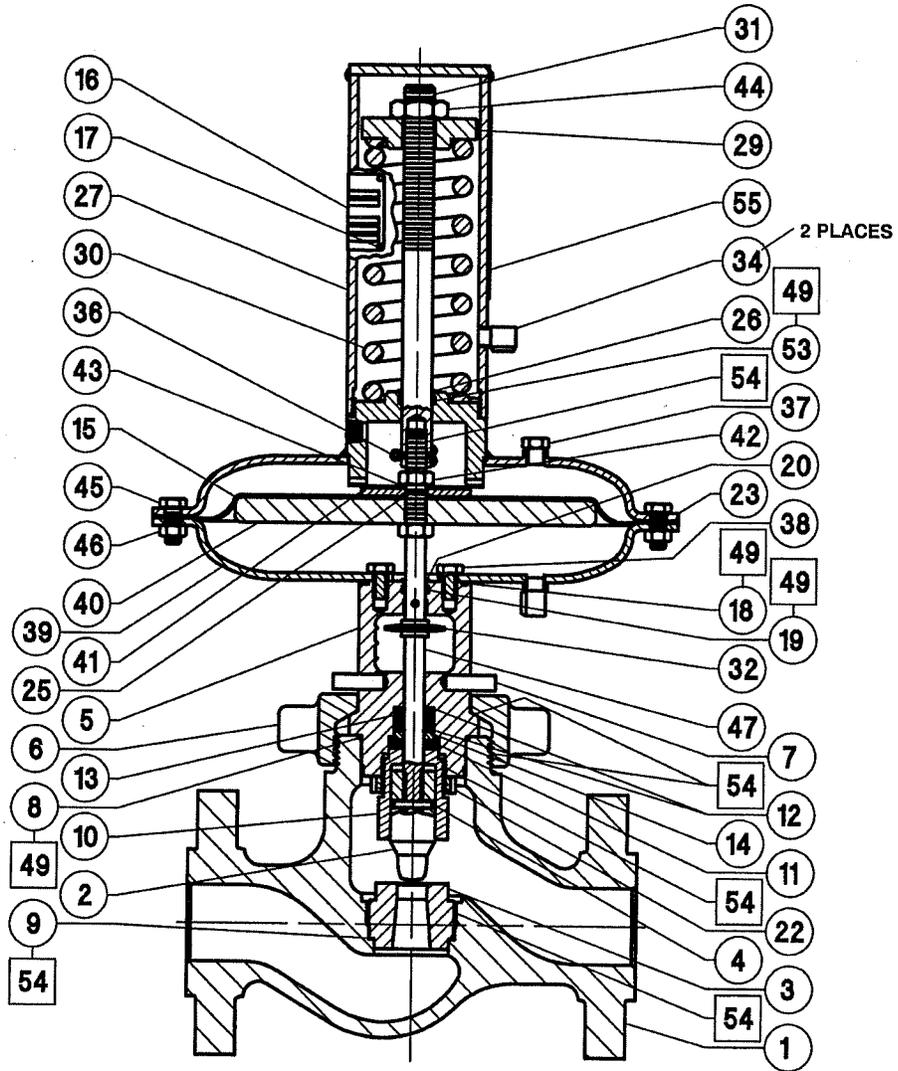
GE02332-A

Figure 3. Design D4 Valve Assembly (Spring-to-Close)

Instruction Manual

Form 5755
April 2004

D4 Valve



060234A

APPLY LUB

Figure 4. Design D4 Valve Assembly (Spring-to-Open)

D4 Valve

Instruction Manual

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D4 Valve

Instruction Manual

Form 5755

April 2004

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Vee-Ball® Design V150, V200 and V300 Rotary Control Valves Sizes 1- through 12-Inch

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Introduction

Scope of Manual

This instruction manual provides installation, operation, maintenance, and parts information for the Vee-Ball® Design V150 (1- through 12-inch sizes), V200 (1- through 10-inch sizes), and V300

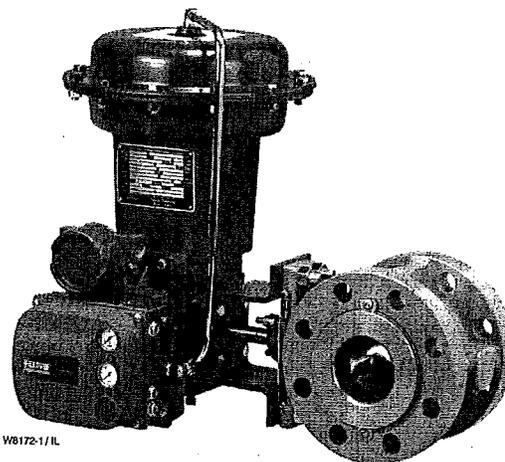


Figure 1. Type Vee-Ball with Type 1052 Actuator and DVC5020 Positioner

(1- through 12-inch sizes) rotary control valves (see figure 1). Sizes 3- through 12-inch without an attenuator currently in production are referred to as Series B (for more information on this distinction see Appendix A).

For larger valves (14-, 16-, and 20-inch size), refer to a separate instruction manual. For information on ENVIRO-SEAL® packing, see the ENVIRO-SEAL Packing System for Rotary Valves instruction manual (form 5305). Refer to separate manuals for information concerning the actuator, positioner and accessories.

No person may install, operate, or maintain Designs V150, V200, and V300 valves without first • being fully trained and qualified in valve, actuator, and accessory installation, operation, and maintenance and • carefully reading and understanding the contents of this manual. If you have any questions about these instructions, contact your Fisher sales office before proceeding.



Vee-Ball Valves

Table 1. Specifications

<p>Valve Sizes and End Connection Styles</p> <p>Design V150: ■ 1, ■ 1.5, ■ 2, ■ 3, ■ 4, ■ 6, ■ 8, ■ 10, and ■ 12-inch sizes with Class 150 raised-face flanges</p> <p>Design V200: ■ 1, ■ 1.5, ■ 2, ■ 3, ■ 4, ■ 6, ■ 8, and ■ 10-inch flangeless valves that mate with Class 150, 300, or 600 (for size 1 through 8-inches) raised-face flanges</p> <p>Design V300: ■ 1, ■ 1.5, ■ 2, ■ 3, ■ 4, ■ 6, ■ 8, ■ 10, and ■ 12-inch valves with Class 300 raised-face flanges</p> <p>Standard Flow Direction</p> <p>Forward (into the convex face of the Vee-ball)</p>	<p>Actuator Mounting</p> <p>■ Right-hand, standard or ■ left-hand, optional, as viewed from upstream end of valve (see figure 23 and the Actuator Mounting section)</p> <p>Maximum Ball Rotation</p> <p>Standard: Ball rotates counterclockwise to close when viewed from actuator side of valve</p> <p>Optional: Ball rotates clockwise to close</p> <p>Ball rotation is 90 degrees</p> <p>Valve/Actuator Action</p> <p>With diaphragm or piston rotary actuator, field-reversible between: ■ push-down-to-close (extending actuator rod closes valve) and ■ push-down-to-open (extending actuator rod opens valve.) See actuator manual for details</p>
--	--

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

Note

Fisher does not assume responsibility for the selection, use, or maintenance of any product. Responsibility for the selection, use, and maintenance of any Fisher product remains solely with the purchaser and end-user.

Description

The Designs V150, V200, and V300 Vee-Ball valves (figure 1) with a V-notch ball are used in throttling or on-off service. The Design V200 is a flangeless construction. The Design V150 and V300 valves are raised-face flanged constructions. The splined valve shaft of all these valves connect to a variety of rotary-shaft actuators.

Specification

Specifications for these valves are shown in table 1 and in bulletin 51.3:Vee-Ball.

Installation

Separate installation steps are provided in this section for Design V150 and V300 flanged valves, and for Design V200 flangeless valves. Key numbers in installation procedures are shown in figures 24, 25 and 26 unless otherwise indicated.

Some types of ceramic trim, including VTC, can create a spark under certain conditions. If an edge of a ceramic part is struck against a second ceramic part with enough force, it can produce a spark.

WARNING

Avoid personal injury and property damage from ignition of process fluid caused by sparks from ceramic trim. Do not use ceramic trim where the process fluid is unstable or if it is an explosive mixture (such as ether and air).

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Vee-Ball Valves

Table 2. Flange Stud Lengths Required for Seal Protector Ring End of Design V150 and V300 Valves

VALVE SIZE, INCHES	DESIGN V150				DESIGN V300	
	ISA S75.04 Face-to-Face		ASME B16.10 Short Face-to-Face		ISA S75.04 Face-to-Face	
	mm	Inches	mm	Inches	mm	Inches
1	70	2.75	95	3.75	89	3.50
1.5	83	3.25	127	5.00	102	4.00
2	95	3.75	146	5.75	95	3.75
3	95	3.75	133	5.25	121	4.75
4	108	4.25	146	5.75	127	5.00
6	114	4.50	152	6.00	140	5.50
8	121	4.75	171	6.75	152	6.00
10	133	5.25	165	6.50	171	6.75
12	140	5.50	159	6.25	184	7.25

WARNING

Always wear protective gloves, clothing, and eyewear when performing any installation operations to avoid personal injury.

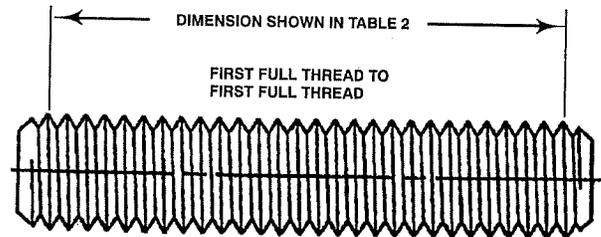
Personal injury or equipment damage caused by sudden release of pressure may result if the valve assembly is installed where service conditions could exceed either the valve body rating or the mating pipe flange joint rating. To avoid such injury or damage, provide a relief valve for overpressure protection as required by government or accepted industry codes and good engineering practices.

Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

If installing into an existing application, also refer to the WARNING at the beginning of the Maintenance section in this instruction manual.

CAUTION

When ordered, the valve configuration and construction materials were selected to meet particular pressure, temperature, pressure drop, and controlled fluid conditions. Responsibility for the safety of process media and compatibility of valve materials with process media rests solely with the purchaser and end-user. Because some valve/trim material combinations are limited in



1A4520/JL

Figure 2. Flange Stud Length for Seal Protector End

their pressure drop and temperature ranges, do not apply any other conditions to the valve without first contacting your Fisher sales office.

WARNING

The valve drive shaft is not necessarily grounded to the pipeline when installed. Personal injury or property damage could result from an explosion caused by a discharge of static electricity from valve components if the process fluid or the atmosphere around the valve is flammable. If the atmosphere around the valve or the process fluid is flammable, electrically bond the drive shaft to the valve.

Note

Standard PTFE packing is composed of a partially conductive carbon-filled PTFE female adaptor with PTFE V-ring packing. Standard graphite packing is composed of all conductive graphite ribbon packing. Alternate shaft-to-valve body bonding is

Vee-Ball Valves

available for hazardous service areas where the standard packing is not sufficient to bond the shaft to the valve (see the following step).

Attach the optional bonding strap assembly (key 131, figure 3) to the valve drive shaft (key 6) with the clamp (key 130, figure 3) and connect the other end of the bonding strap assembly to the valve body with the cap screw (key 23).

1. If the valve is to be stored before installation, protect the flange mating surfaces and keep the valve body cavity dry and free of foreign material.
2. Install a three-valve bypass around the control valve assembly if continuous operation will be necessary during inspection and maintenance of the valve.
3. The valve is normally shipped as part of a control valve assembly, with an actuator mounted on the valve. If the valve and actuator have been purchased separately or if the actuator has been removed, mount the actuator according to the Actuator Mounting section and the appropriate actuator instruction manual.
4. Standard flow direction is with the seal protector ring (key 3) facing upstream.
5. Install the valve in a horizontal or vertical pipeline with the drive shaft in a horizontal position.

CAUTION

Do not allow the valve to be installed in the pipeline with the drive shaft in the vertical position because of excessive wear to valve component parts.

6. The actuator can be right- or left-hand mounted with the shaft in a horizontal orientation as shown in figure 1. If necessary, refer to the appropriate actuator instruction manual for actuator installation and adjustment procedures.
7. Be certain the valve and adjacent pipelines are free of any foreign material that could damage the valve sealing surfaces.
8. Be sure the pipeline flanges are in line with each other.

Installing Design V150 and V300 Valves

1. Install the Design V150 and V300 valve using studs (keys 32 and 33, not shown) and nuts to

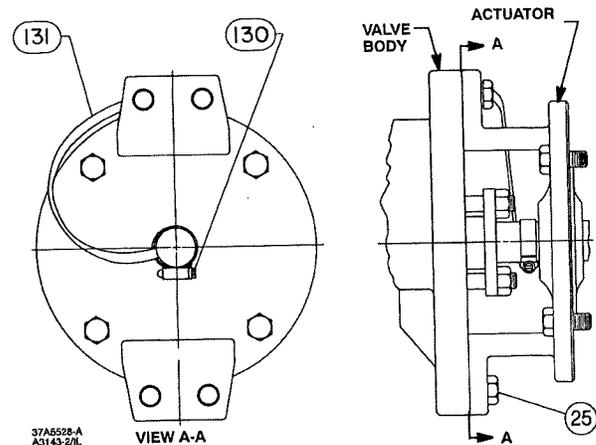


Figure 3. Optional Shaft-to-Body Bonding Strap Assembly

connect the valve flanges to the pipeline flanges. The seal protector ring (key 3) end of the valve requires longer line flange studs (key 32) than standard. Do not use standard-length line flange studs for the seal protector ring end of the valve.

2. See table 2 and figure 2 for length of studs for the seal protector ring end of Design V150 and V300 valves. Lubricate the studs with Never-Seez Nickel Special or equivalent lubricant.
3. Insert flat-sheet line flange gaskets (or spiral-wound gaskets with compression-controlling center rings) that are compatible with the flowing media.
4. Connect pressure lines to the actuator as indicated in the actuator instruction manual. When an auxiliary manual actuator is used with a power actuator, install a bypass valve on the power actuator (if one is not supplied) for use during manual operation.

WARNING

Personal injury could result from packing leakage. Valve packing was tightened before shipment; however the packing might require some readjustment to meet specific service conditions. Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

DESIGN V200 VALVE SIZE, INCHES	DIMENSION						
	A		B	M			
	Standard ISA S75.04 ⁽¹⁾	Class 150 ASME B16.10 ⁽²⁾ Short (Optional)		Standard Class 150 S75.04 ⁽¹⁾	Class 150 ASME B16.10 ⁽²⁾ Short (Optional)	Class 300	Class 600
mm							
1	102	127	58	176	202	202	202
1.5	114	165	64	189	240	224	224
2	124	178	57	211	268	237	237
3	165	203	87	254	286	279	286
4	194	229	92	286	321	305	343
6	229	267	119	343	381	362	423
8	243	292	119	343	394	387	426
10	297	330	151	419	451	---	---
Inches							
1	4.00	5.00	2.29	6.94	7.94	7.94	7.94
1.5	4.50	6.50	2.50	7.44	9.44	8.81	8.81
2	4.88	7.00	2.25	8.31	10.56	9.31	9.31
3	6.50	8.00	3.44	10.00	11.25	11.00	11.25
4	7.62	9.00	3.62	11.25	12.62	12.00	13.50
6	9.00	10.50	4.69	13.50	15.00	14.25	16.25
8	9.56	11.50	4.69	13.50	15.50	15.25	16.75
10	11.69	13.00	5.94	16.50	17.75	---	---

1. IEC 534-3-2 face-to-face dimensions are equivalent to S75.04 face-to-face dimensions.
2. 150 lb class only.

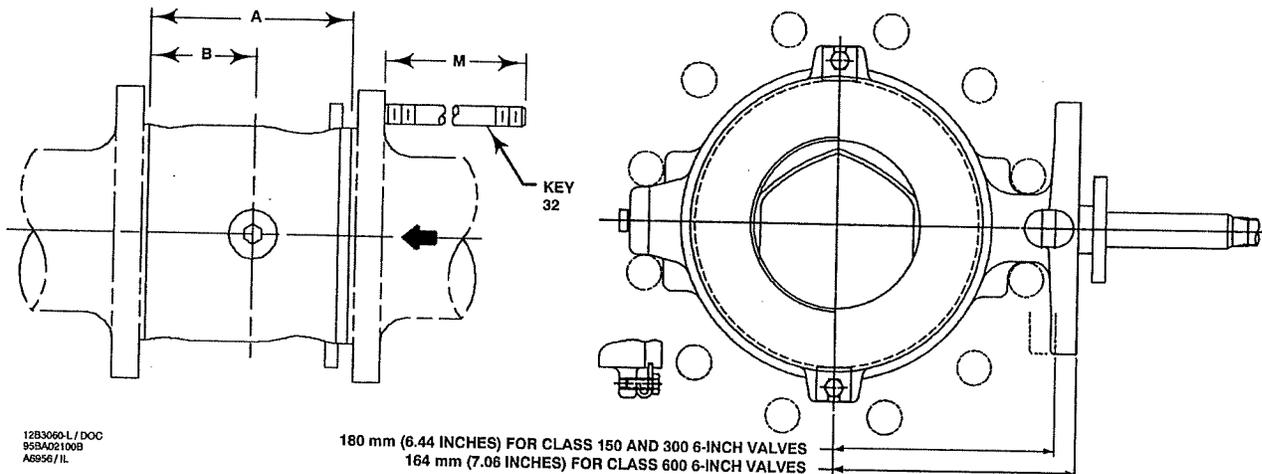


Figure 4. Design V200 Dimensions and Required Clearances for Installation

If the valve has ENVIRO-SEAL live-loaded packing installed, this initial re-adjustment will probably not be required. See ENVIRO-SEAL Packing System for Rotary Valves instruction manual (form 5305) for packing instructions.

Installing Design V200 Valves

Stud length dimensions are shown in figure 4 for the seal protector ring end of the valve. For Design V200, ANSI Class 600, the dimension from the

center line of the valve bore to the mounting flange face is larger than a Class 150 or 300 valve.

1. Install the Design V200 valve using long studs (key 32, figure 4) to connect the two pipeline flanges. Refer to figure 4 for the size of studs required. Lubricate the studs with Never-Seez Pure Nickel Special or equivalent lubricant.
2. Install two studs in the flanges before you place the valve in the line. Place the two studs so they will contact the line-centering notches at the bottom of the valve body.

Vee-Ball Valves

3. Insert flat-sheet line flange gaskets (or spiral-wound gaskets with compression-controlling center rings) that are compatible with the process fluid.
4. Place the valve on the two studs. Install all remaining studs. Measure carefully to be sure the valve is centered on the pipeline flanges, and tighten the flange stud nuts. Tighten the nuts in a criss-cross sequence to be sure the flange gaskets are properly torqued.
5. Connect pressure lines to the actuator as indicated in the actuator instruction manual. When an auxiliary manual actuator is used with a power actuator, install a bypass valve on the power actuator (if one is not supplied) for use during manual operation.

WARNING

Personal injury could result from packing leakage. Valve packing was tightened before shipment; however the packing might require some readjustment to meet specific service conditions. Check with your process or safety engineer for any additional measures that must be taken to protect against process media.

Maintenance

Note

Fisher does not assume responsibility for the selection, use, or maintenance of any product. Responsibility for the selection, use, and maintenance of any Fisher products rests solely with the purchaser and end-user.

Valve parts are subject to normal wear and must be inspected and replaced as necessary. The frequency of inspection and replacement depends upon the severity of service conditions.

Key numbers in this procedure are shown in figures 24, 25, and 26, unless otherwise noted.

WARNING

The Vee-ball closes with a shearing, cutting motion, which could result in personal injury. To avoid injury, keep hands, tools, and other objects away from the Vee-ball while stroking the valve.

Avoid personal injury from sudden release of process pressure. Before performing any maintenance operations:

- **Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.**
- **Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure from both sides of the valve. Drain the process media from both sides of the valve.**
- **Vent the power actuator loading pressure and relieve any actuator spring precompression.**
- **Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.**
- **Always wear protective gloves, clothing, and eyewear when performing any maintenance operations.**
- **The valve packing area may contain process fluids that are pressurized, *even when the valve has been removed from the pipeline.* Process fluids may spray out under pressure when removing the packing hardware or packing rings.**
- **Check with your process or safety engineer for any additional measures that must be taken to protect against process media.**

Packing Maintenance

Key numbers in this procedure are shown in figures 24, 25, and 26, unless otherwise noted. A detailed view of the packing is also shown in figure 5.

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If the valve is equipped with the ENVIRO-SEAL Packing System, refer to:

- the separate ENVIRO-SEAL Packing System for Rotary Valves instruction manual (form 5305) for maintenance instructions, and
- the Parts List section of this manual for retrofit kits, parts kits, and individual parts.

If the packing is relatively new and tight on the drive shaft (key 6), and if tightening the packing follower nuts does not stop leakage, it is possible that the drive shaft is worn or nicked so that a seal cannot be made. If the leakage comes from the outside diameter of the packing, it is possible that the leakage is caused by nicks or scratches on the packing box wall. Inspect the drive shaft and packing box wall for nicks or scratches while performing the following procedure.

Replacing Packing

When using this procedure, it is recommended that the actuator **not** be removed from the valve while the valve is still in the pipeline or between flanges. Valve/actuator adjustments must be made with the valve out of the pipeline. Refer to the Determining Closed Position portion of the Actuator Mounting section.

Disassembly

WARNING

Observe the steps in the WARNING at the beginning of the Maintenance section.

1. Isolate the control valve from the line pressure, release pressure from both sides of the valve body, and drain the process media from both sides of the valve. If using a power actuator, shut off all pressure lines to the power actuator, release pressure from the actuator, and disconnect the pressure lines from the actuator. Use lock-out procedures to be sure that the above measures stay in effect while you are working on the equipment.
2. Remove line bolting, remove the control valve from the pipeline, and place the valve/actuator assembly on a flat surface with the seal protector ring facing up.

3. Remove the actuator cover. Take note of the orientation of the actuator with respect to the valve body and the lever orientation with respect to the valve drive shaft (see figure 6).

WARNING

When the actuator is removed from the valve, the ball/shaft assembly may suddenly rotate, with a shearing, cutting motion, which could result in personal injury. To avoid injury, carefully rotate the ball to a stable position after the actuator is removed.

CAUTION

When removing the actuator from the valve, do not use a hammer or similar tool to drive the lever or actuator off the valve shaft. Driving the lever or actuator off the valve shaft could damage the ball, seal, and valve.

If necessary, use a puller to remove the lever or actuator from the valve shaft. It is okay to tap the puller screw lightly to loosen lever or actuator, but hitting the screw with excessive force could damage the ball, seal, and valve.

4. Remove the clamped lever (do not loosen the actuator turnbuckle adjustment), remove the actuator mounting screws and nuts (keys 23 and 24), and remove the actuator. (If necessary, refer to the actuator instruction manual for assistance.)
5. If applicable, remove the bonding strap assembly before attempting to remove the packing (see figure 3).
6. Remove the packing follower nuts and packing follower (keys 17 and 20). For alloy packing constructions, the packing follower (key 17) and a separate packing flange (key 40) must be removed if present.

If the valve is equipped with the ENVIRO-SEAL packing system, refer to the ENVIRO-SEAL Packing System for Rotary Valves instruction manual (form 5305) for disassembly.

7. Remove the packing parts (see figure 5, keys 16, 17, 35, and 39 depending on construction) using a formed wire hook with a sharp end. Pierce the rings with the sharp end of the hook in order to remove them. Do not scratch the drive shaft or packing box

Vee-Ball Valves

wall; scratching these surfaces could cause leakage. Clean all accessible metal parts and surfaces to remove particles that would prevent the packing from sealing.

Assembly

If the valve is equipped with the ENVIRO-SEAL packing system, refer to the ENVIRO-SEAL Packing System for Rotary Valves instruction manual (form 5305) for assembly.

Series B only

1. For 8-, 10-, and 12-inch valves, install the packing spacer (key 34) if it has been removed.
2. To help ensure correct centering of the Vee-ball (key 2) on the seal (key 11), make sure the ball is closed while you install or tighten new packing. Insert a screw driver, pry bar, or similar tool between the lower ear of the ball and the valve body. Use the pry to move the ball tightly against the bearing on the actuator side of the valve (see figure 6). Keep the ball in that position until you have completed packing installation and adjustment.
3. Install the new packing parts using the parts sequence shown in figure 5. Install the packing follower (key 17). Alloy constructions have a packing follower (key 17) and a separate packing flange (key 40) that must be replaced.
4. Secure the packing follower with the packing follower nuts (key 20). Tighten the nuts far enough to stop leakage under operating conditions.

Handle the seal protector ring, seal, and other parts carefully to prevent damage. A new gasket (key 15) is required whenever the seal protector ring (key 3) (figure 11) is removed.

Flow ring construction does not use a seal, shims, or spring seal. Use this procedure to remove the seal protector ring from flow ring constructions, but disregard any instructions calling for the seal, shims, or spring seal.

Note

If the valve is equipped with a bonding strap assembly (figure 3), re-install the assembly.

5. Reconnect the actuator and lever in accordance with the orientations that were noted in step 3 of the disassembly procedures. If necessary, use figure 23 to identify the correct index marks.

6. Refer to the appropriate actuator instruction manual to complete actuator assembly and adjustment.
7. When the control valve is in operation, check the packing follower for leakage and retighten the packing follower nuts (key 20) as necessary.

Replacing the Ball Seal

Disassembly

Perform this procedure if the control valve is not shutting off properly or if seal inspection is necessary. If you find upon inspection that the ball, shaft, or bearings need to be replaced, use this procedure to remove the ball seal. Then, proceed to the Bearing and Ball Maintenance procedures. Then, return to this procedure and begin with the assembly of the ball seal steps.

While the actuator/valve assembly must be removed from the pipeline, the actuator may remain mounted on the valve as you replace the ball seal.

Key numbers are shown in figures 24, 25, and 26, unless otherwise indicated. Ball Seal assembly details (with key numbers) are also shown in figures 8, 9 and 10.

WARNING

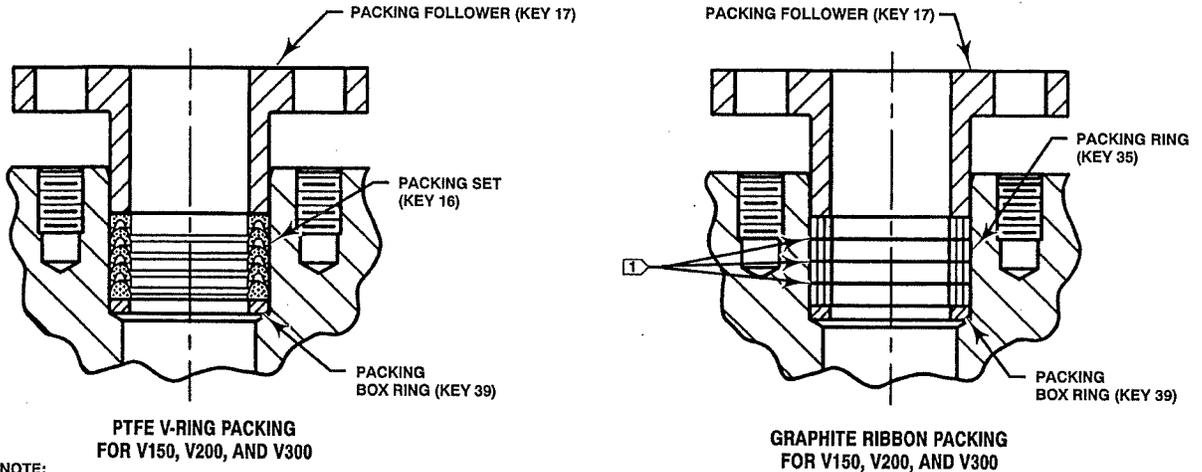
Perform the steps in the WARNING at the beginning of the Maintenance section of this manual.

1. Remove line bolting, remove the control valve from the pipeline, and place the valve on a flat surface with the seal protector ring facing up. Carefully rotate the ball to the open position.
2. Remove protector ring screws and washers (keys 21 and 22). Carefully remove the seal protector ring and gasket (keys 3 and 15). (For flow ring constructions, go to step 4.)
 - a. **For a Fisher TCM seal**, remove the seal (key 11) from the valve body. For 1-, 1.5, and 2-inch valves, also remove the backup ring (key 14, figure 8) from the valve body.
 - b. **For a flat metal seal**, remove the spring seal, seal, and shims (keys 13, 11, and 12). (Note: It may be necessary to re-use some of the original shims when reassembling the flat metal seal.)

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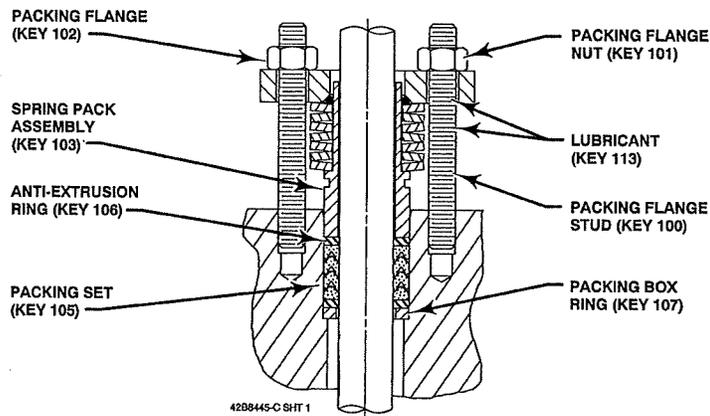
Vee-Ball Valves



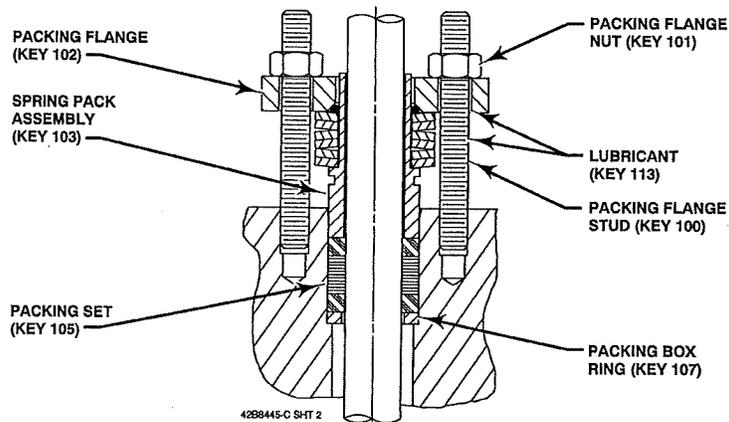
NOTE:
 INCLUDES ZINC WASHERS (KEY 36) FOR GRAPHITE RIBBON PACKING ONLY.

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STANDARD PACKING



ENVIRO-SEAL PTFE PACKING SYSTEM



ENVIRO-SEAL GRAPHITE PACKING SYSTEM

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Figure 5. Packing Arrangements

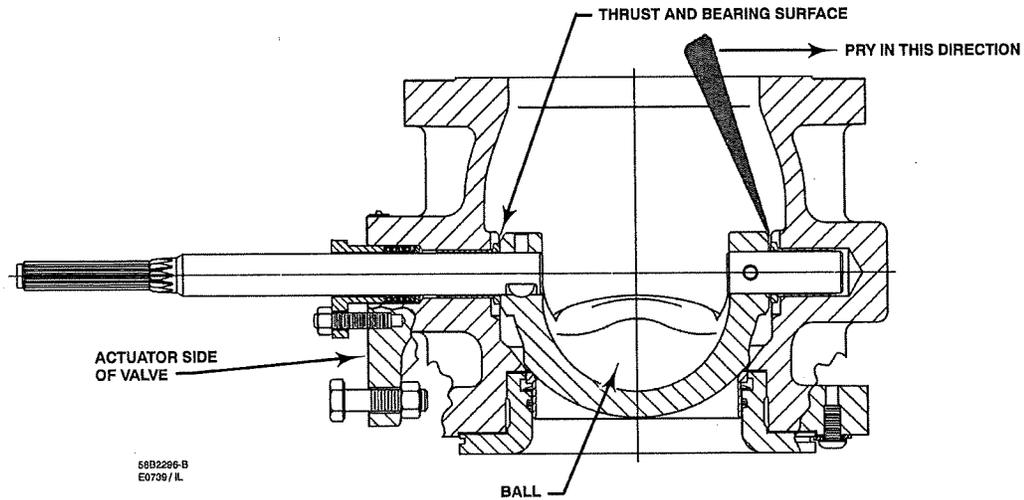


Figure 6. Typical Vee-Ball Valve Showing Pry Bar

c. For an HD metal seal or a high temperature HD metal seal, once the protector ring has been removed from the valve, push the metal seal (key 11) out of the seal protector ring (key 3). Remove the wave spring (key 13), and on the HD metal seal, the radial seal (key 37).

Note

The high temperature HD metal seal also has a piston ring (key 133) that will need to be removed. It will be in two pieces for the 1, 1.5 and 2-inch valves, and one piece with a break in it for the 3- through 12-inch valves.

- It might be necessary to remove the HD metal seal by carefully tapping it with a soft punch and hammer. Take care not to damage the seal protector ring.
- 3- through 12-inch valves, if the seal is difficult to push out, it is recommended that a seal removal plate be used to press the HD metal seal out of the seal protector ring. Refer to figure 12 for dimensions of the seal removal plate.
- 10- and 12-inch valves with an attenuator only: Remove the retaining ring (key 41) in the seal protector ring. This retaining ring is an octagonal-shaped support wire. To remove the retaining ring, find one of the free ends of the ring. Use a

screwdriver or similar tool to pry inward and upward until the ring is removed.

3. Inspect the gasket and sealing surfaces on the valve body (key 1 or 1A), the seal protector ring (key 3), Vee-ball (key 2), and the retaining ring (key 41 for 10- and 12-inch valves with an attenuator only). Be sure the sealing surfaces are not damaged.
4. If replacement of the ball, shafts (keys 6 or 9), or bearings (key 10) is needed, proceed to the Bearing and Ball Maintenance procedure. If only the seal is to be replaced, proceed to the Assembly steps below.

Assembly

Refer to figures 8, 9, and 10 for key number locations during seal installation. Valve key number locations are shown in figures 24, 25, and 26.

1. Thoroughly clean all parts that are to be re-used and obtain replacement parts. Be sure that all sealing surfaces are in good condition without scratches or wear. If the valve has been installed between line flanges and the flange studs and nuts have been tightened, always replace the gasket (key 15) with a new gasket.
2. To help ensure correct side-to-side centering of the ball (key 2) on the seal (key 11), make sure the ball is closed while you install the seal or flow ring and seal protector ring. Insert a screw driver, pry bar, or similar tool between the lower ear of the ball and the valve body (see figure 6).

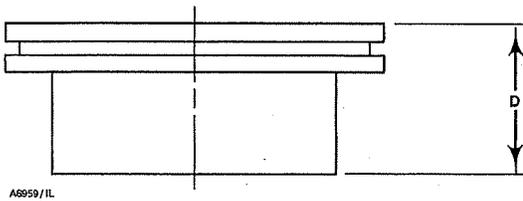
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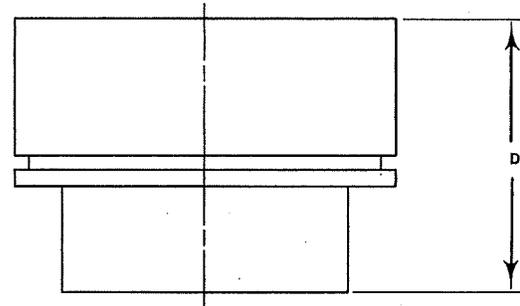
Vee-Ball Valves

Valve Size, Inches	Construction (1)	TCM Seal "D"	HD Seal "D"	Flow Ring "D"
mm				
1	New	37.6	44.7	39.6
	Old	25.1	33.0	26.9
1.5	New	39.1	44.5	40.9
	Old	27.4	32.8	29.2
Inches				
1	New	1.48	1.76	1.56
	Old	0.99	1.30	1.06
1.5	New	1.54	1.75	1.61
	Old	1.08	1.29	1.15
1. See the Note on page 14 of this Instruction Manual.				

Valve Size, Inches	Construction (1)	TCM Seal "D"	HD Seal "D"	Flow Ring "D"
mm				
1	New	63.0	70.1	65.0
	Old	50.5	58.4	52.3
1.5	New	89.9	95.3	91.7
	Old	78.2	83.6	80.0
Inches				
1	New	2.48	2.76	2.56
	Old	1.99	2.30	2.06
1.5	New	3.54	3.75	3.61
	Old	3.08	3.29	3.15
1. See the Note on page 14 of this Instruction Manual.				

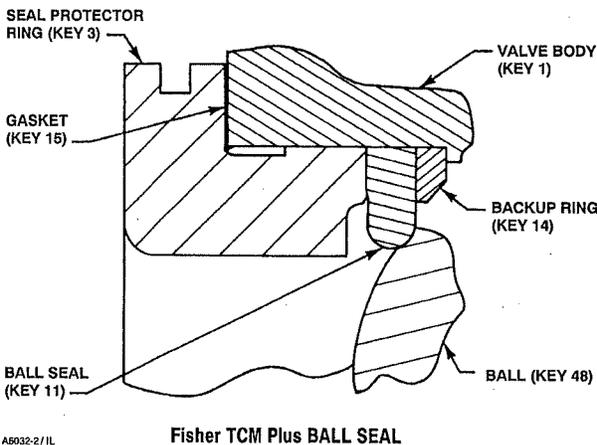


ISA S75.04 FACE-TO-FACE VALVE

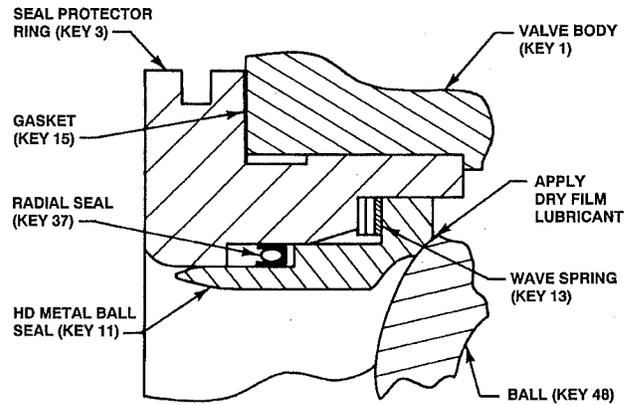


CLASS 150 ANSI B16.10 (SHORT) FACE-TO-FACE VALVE

Figure 7. 1 and 1.5 Inch Seal Protector Ring Measurements



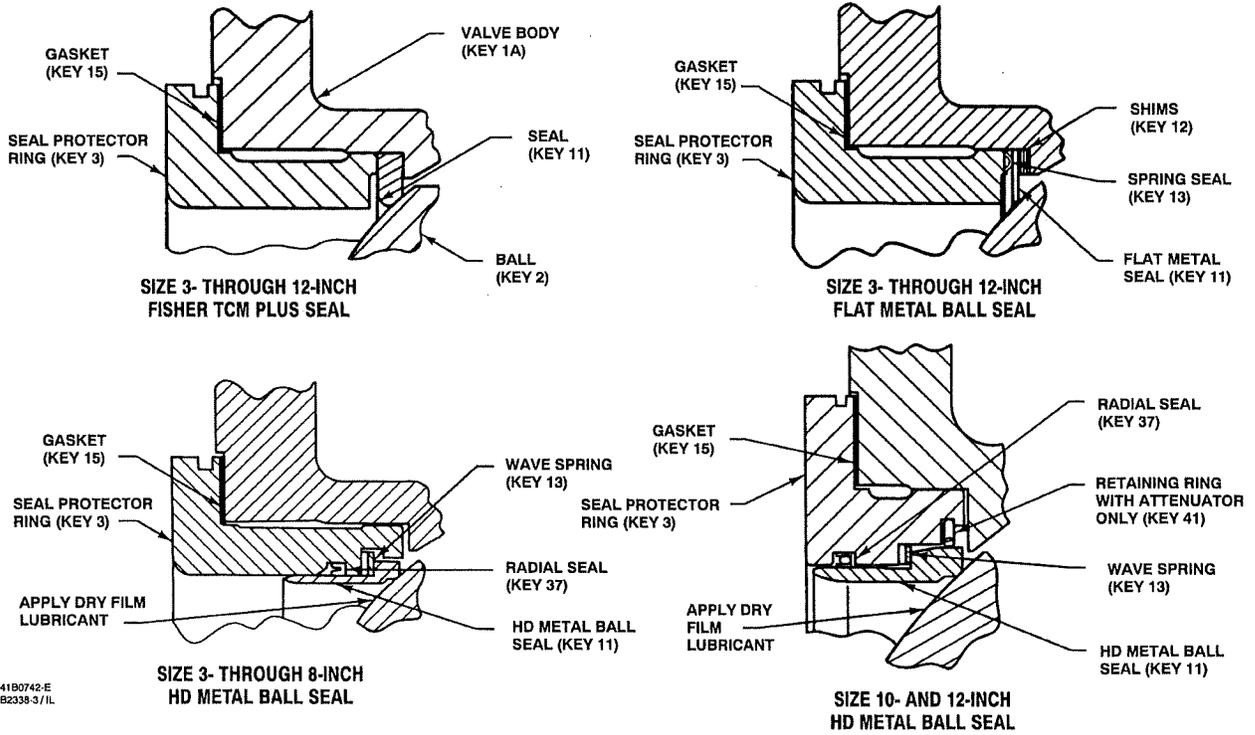
Fisher TCM Plus BALL SEAL



HD METAL BALL SEAL

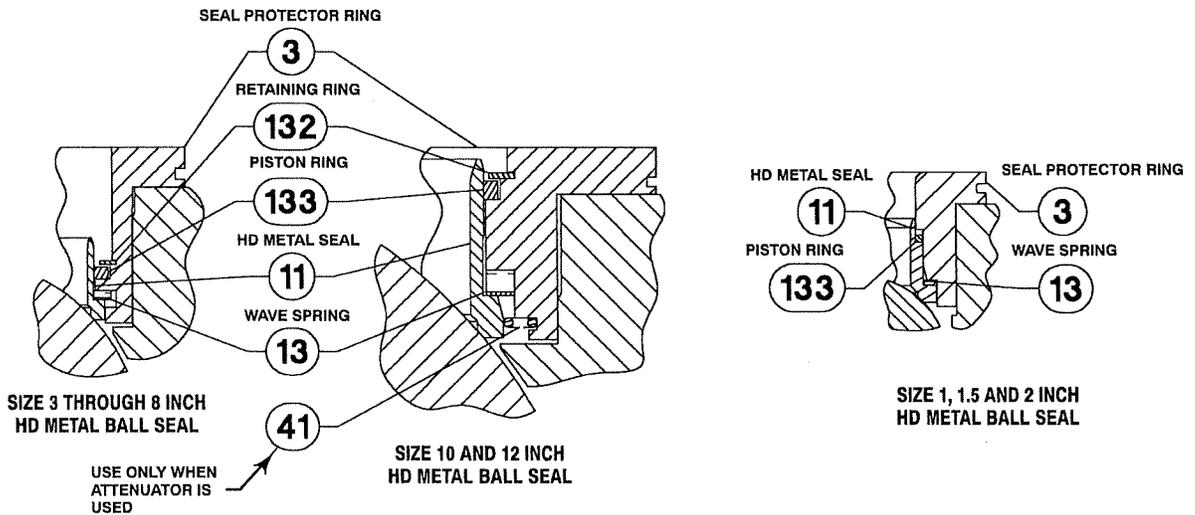
Figure 8. Ball Seal Assembly for Size 1, 1.5, and 2-Inch Valves

Vee-Ball Valves



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Figure 9. Ball Seal Assembly for Size 3 through 12-inch Valves



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Figure 10. High Temperature HD Metal Seal Details

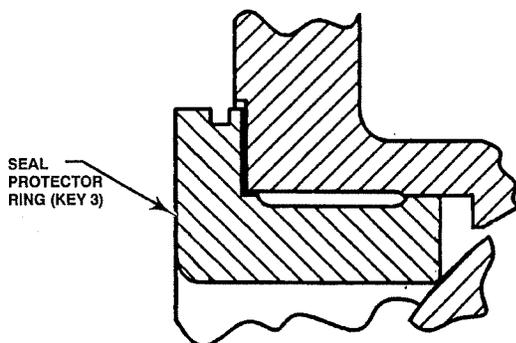
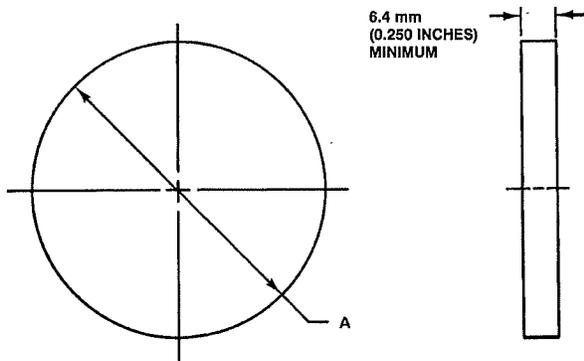


Figure 11. Seal Protector Ring

VALVE SIZE, INCHES	DIMENSION A	
	Minimum-Maximum, mm	Minimum-Maximum, Inches
3	75.9-76.2	2.990-3.000
4	95.0-95.3	3.740-3.750
6	126.7-127.0	4.990-5.000
8	158.5-158.8	6.240-6.250
10	212.5-212.7	8.365-8.375
12	263.3-263.5	10.365-10.375



A5544 / IL

Figure 12. HD Seal Removal Plate Dimensions

3. Use the pry to move the ball tightly against the bearing on the actuator side of the valve. Be careful, excessive force may damage the ball. Keep the ball in that position until you have completed seal or flow ring installation. Check the ball's position periodically, and re-center if necessary, during lever assembly and packing adjustments.

WARNING

The Vee-Ball closes with a shearing, cutting motion, which could result in

personal injury. To avoid injury or property damage, keep hands, tools, and other objects away from the Vee-Ball while stroking the valve.

4. Install the seal.

CAUTION

Due to the Vee-ball shape, take care to never completely rotate either the front skirted edge or the circular back edge of the ball out of the ball seal as the seal could be damaged.

Installing Fisher TCM Plus or Extra ball seals:

a. **1-, 1.5, and 2-inch valves:** Install the backup ring (key 14). Install the Fisher TCM seal (key 11) into the valve body. Refer to figure 7.

- Install the gasket (key 15) on the valve body.

- Install the seal protector ring (key 3) into the valve body. Now go to step 5 in this procedure.

b. **3- through 12-inch valves:** Install the Fisher TCM seal (key 11) into the valve body.

- Install the gasket (key 15) on the valve body.

- Install the seal protector ring (key 3) into the valve body. Now go to step 5 in this procedure.

Installing flat metal seals:

a. Install 12 shims in the valve and install the flat metal seal on top of the shims.

b. Install the spring seal (key 13) on the flat metal seal (key 11) with the convex side of the spring seal facing the ball.

c. Install the seal protector ring, and install the protector ring screws and washers (keys 21 and 22). Tighten the screws.

d. Add or remove shims under the ball seal as necessary to obtain zero ball seal deflection as accurately as possible.

Note

Zero ball seal deflection for a flat metal seal is the point at which the addition

Vee-Ball Valves

of one 0.13 mm (0.005 inch) thick shim causes contact between the ball and ball seal to be broken. Hold the parts tightly together when determining zero deflection, or improper zero deflection might result.

e. After zero deflection is reached, remove the seal protector ring, spring seal, seal and 4 shims. Final assembly of the control valve should not exceed a maximum of 9 shims for zero deflection. If more than 9 shims are required, contact your Fisher sales office.

f. Install the gasket (key 15) on the valve body.

g. Install the seal protector ring (key 3) into the valve body. Now go to step 5 in this procedure.

Installing HD metal seals:

Note

The older and newer designs of the 1- and 1.5 inch seal protector ring are functionally the same, but are different lengths and not interchangeable. All 1- and 1.5 inch sizes of Design V150 and V300 valves are the newer design. The change in seal protector ring length occurred in the 1992/1993 timeframe and affects 1- and 1.5 inch Design V200 valves only. To determine whether you have the older or newer design, measure the length of the seal protector ring (key 3, figure 26) from its pipeline flange mating surface to its opposite end. Compare your measurement to those listed in figure 7.

a. **For 1-, and 1.5 inch valves:** The older and newer designs of the 1- and 1.5 inch seal protector rings are functionally the same, but are different lengths and not interchangeable. Refer to figure 7 for protector ring dimensions.

- Install the wave spring (key 13) onto the ball seal.

- Lubricate and install the radial seal (key 37) onto the ball seal (key 11). Make sure the open side of the radial seal faces away from the ball.

- Push the ball seal assembly into the seal protector ring (key 3).

- Go to step 5 in this procedure.

b. For all 3- through 8-inch valves and 10- and 12-inch valves without attenuator:

- Lubricate and install the radial seal (key 37) into the appropriate groove in the seal protector ring making sure the open side of the radial seal faces away from the ball.

- Install the wave spring (key 13) into the seal protector ring (key 3).

- Install the HD metal seal (key 11) into the seal protector ring (key 3), past the radial seal. While pushing it past the radial seal, make sure the HD metal seal is level. Go to step 5 in this procedure.

c. For 10- and 12-inch valves with attenuator:

- Lubricate the radial seal with Lubriplate, or equivalent, and install the radial seal (key 37) into the appropriate groove in the seal protector ring making sure the open side of the radial seal faces away from the ball.

- Install the wave spring (key 13) into the seal protector ring (key 3).

- To install the retaining ring (key 41), find one of the free ends of the ring. Insert the free end into the groove in the seal protector ring. Work around the ring, pressing it into the groove until the ring is completely in its groove.

- Install the HD metal seal (key 11) into the seal protector ring (key 3), past the radial seal. While pushing it past the radial seal, make sure the HD metal seal is level.

- The HD metal seal uses a retaining ring (key 41) for 10- and 12-inch sizes only. This retaining ring is an octagonal-shaped support wire. Go to step 5 in this procedure.

Installing high temperature HD metal seals:

a. **For 1-, 1.5 and 2-inch valves:** The older and newer designs of the 1- and 1.5 inch seal protector rings are functionally the same, but are

different lengths and not interchangeable. All part numbers in this manual are for the newer design. Refer to figure 7 for ring dimensions.

- Place the wave spring (key 13) on top of the HD metal seal (key 11).
- Break the piston ring (key 133) into two approximately equal pieces either by placing the ring over a pencil or similar object and applying pressure down-wards on the ring until the ring snaps. Be sure to match the broken ends together as you install it on the HD metal seal (key 11).
- Lay the HD metal seal (key 11) down on a flat surface and push the seal protector ring (key 3) into place. Make sure the seal is level. Go to step 5 in this procedure.

b. For 3- through 8-inch valves:

- Place the piston ring (key 133) and retaining ring (key 132) into the appropriate groove in the seal protector ring (key 3). The piston ring has one break in it; do **not** break it further.
- Lay the HD metal seal (key 11) down on a flat surface and push the seal protector ring (key 3) past the piston ring (key 133) and into place. Make sure the seal is level. Go to step 5 in this procedure.

c. For 10- and 12-inch valves:

- Place the piston ring (key 133) and retaining ring (key 132) into the appropriate groove in the seal protector ring (key 3). The piston ring has one break in it; do **not** break it further.
- Install the wave spring (key 13) into the seal protector ring (key 3).
- If the valve has an attenuator, install the retaining ring (key 41). The octagonal shaped support wire ring has two free ends. Place one of the free ends into the groove in the seal protector ring. Then starting at the inserted end, press the rest of the ring into the groove completely.

- Lay the HD metal seal (key 11) down on a flat surface and push the seal protector ring (key 3) past the piston ring (key 133) and into place. Make sure the seal is level. Go to step 5 in this procedure.

5. Install a replacement gasket (key 15) on the valve body (key 1 or 1A). Install the HD metal ball seal/seal protector ring assembly into the valve body (key 1 or 1A).

6. Install washers (or clips), and screws that clamp the seal protector ring to the valve body [keys 3, 21, and 22; the Design V200 valve uses clips (key 22) in place of washers].

7. If necessary, refer to the Packing Maintenance procedures to install the packing. Install the actuator using the Actuator Mounting procedures or to the appropriate actuator instruction manual.

HD Metal Seal Lubrication

To assist with break-in of the HD metal seals, it is recommended that the ball and seal be lubricated with Dow Corning 321 dry film lubricant or equivalent moly disulfide.

Bearing and Ball Maintenance



Before performing the steps in this section, observe the WARNING at the beginning of the Maintenance section on page 6.

3- through 12-Inch Valves

Procedures for disassembly and assembly of the bearings and ball cannot be accomplished until the ball seal and valve packing are removed from the valve.

Refer to the Replacing Packing procedures to remove the actuator, and to remove the packing flange and packing follower from the valve. When the packing disassembly steps are complete, return to this section.

Refer to the Replacing the Ball Seal procedures to remove the ball seal from the valve.

Vee-Ball Valves

Table 3. Continuous Threaded Rod

Valve Size, Inches	Threaded Rod Thread Size	Thread Depth in Follower Shaft
3	0.25-20	0.5
4	0.25-20	0.5
6	0.25-20	0.5
8	0.3125-18	0.62
10	0.3125-18	0.62
12	0.3125-18	0.94

Disassembly

WARNING

When the actuator is removed from the valve, the ball/shaft assembly may suddenly rotate, with a shearing, cutting motion, which could result in personal injury. To avoid injury, carefully rotate the ball to a stable position at the bottom of the valve body cavity. Make sure the ball will not rotate.

Key numbers in this procedure are shown in figures 24, 25, and 26, unless otherwise indicated.

1. A taper key (key 4, figures 14, 24, 25 and 31) is used to connect the ball and drive shaft in 3- through 12-inch valves.
2. Carefully rotate the ball to the open position after the actuator is disconnected. Make sure the ball will not rotate (see warning above). Provide support for the ball during the following disassembly.
3. Working from the small end of the groove pin (key 7), use a pin punch to drive the groove pin out of the ball ear and follower shaft.

For tack welded taper keys, driving the taper key out of the ball ear will shear the tack welding.

4. Locate the small end of the taper key (key 4, see figures 14, 24, 25 and 31). Using a pin punch on the smaller end of the taper key, drive it out of the ball (key 2) and drive shaft (key 6). Note: driving the taper key in the wrong direction will tighten it.
5. Pull the drive shaft (key 6) out of the actuator side of the valve body.
6. The ball will be free to move when both shafts are removed. Make sure the sealing surface of the ball is not damaged while removing the follower shaft.

a. Unscrew the pipe plug (key 25) if one is installed. Use a punch to drive the follower shaft (key 9) into the center of the ball.

b. If a pipe plug is not installed, use a piece of continuous threaded rod as a removal rod when moving the follower shaft (key 9) into the center of the ball. Refer to the table 3 for a description of the size threaded rod needed. The length of the rod should allow easy working room from the valve body.

7. Carefully remove the follower shaft and ball (key 2) from the valve body.

For 4-inch valves with attenuator, remove the ball/attenuator through the inlet of the valve. Taking hold of the follower shaft ear on the ball/attenuator, you must position the scalloped edge of the attenuator against the valve bore opening and then pivot, or roll, the ball/attenuator out of the valve body (see figure 18).

For 6-, 8-, 10-, and 12-inch valves with attenuator, remove the ball/attenuator through the outlet of the valve by carefully turning and manipulating the ball. The 6-, 8-, 10-, or 12-inch ball/attenuator will not come straight out of the valve body.

8. Remove the bearings (key 10) by hand. If the bearings are tight in the valve body, then pull or drive them out with a slight pressure.

- To remove the follower shaft bearings, use a blind-hole bearing puller similar to CG2545AB, which is made by Snap-On Tools. If you do not have such a tool, you can machine the bearing out.

9. Thoroughly clean surfaces of all parts that are to be re-used or obtain replacement parts.

Assembly

1. Inspect all sealing surfaces to ensure they are in good condition and without scratches or wear.
2. Install the replacement bearings (key 10) by hand. The bearing flanged end should touch the valve body.
3. **Installing the Vee-Ball:**

WARNING

The ball might be damaged if it is allowed to fall into the valve body. To avoid personal injury or damage to the

sealing surfaces, support the ball to prevent it from falling into or out of the valve body cavity.

Note

For ease of assembly, the follower shaft (key 9) should be inserted into the ball before installing the ball in the following applications:

- 3-inch valve without ball/attenuator
- 4- through 12-inch valves with ball/attenuator.

Carefully install the ball into the valve body cavity.

• For Vee-Ball with attenuator (sizes 4 through 12-inch valves), carefully install the ball into the valve body cavity. For 4-inch valves, install the ball/attenuator through the inlet of the valve. For 6-, 8-, 10-, and 12-inch valves, install the ball/attenuator through the outlet of the valve. Taking hold of the follower shaft ear on the ball/attenuator, you must position the scalloped edge of the attenuator against the valve bore opening and then carefully pivot, or roll, the ball/attenuator into the valve body (see figure 18).

After you have installed the ball (key 2) into the valve body assembly, firmly support the ball while installing the shafts.

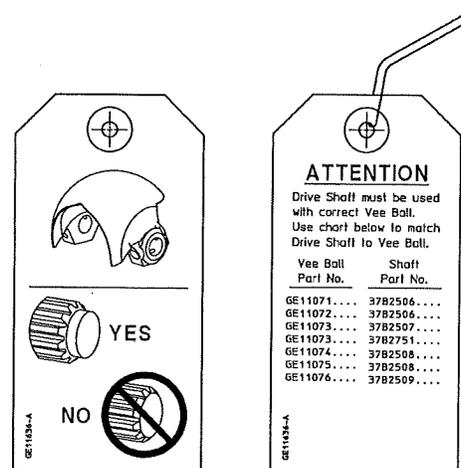
4. Installing the follower shaft (key 9):

• **For 3-inch valves:** The follower shaft (key 9) should already have been inserted into the ball before the ball was put into the valve body. Insert the follower shaft (key 9) into the valve body bearing (key 10).

• **For 4-inch and larger valves:** Insert the follower shaft (key 9) through the ball, and into the valve body bearing (key 10).

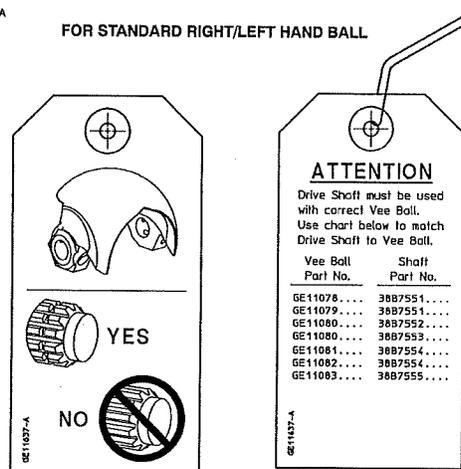
• **For 4- through 12-inch valves with ball/attenuator:** The follower shaft (key 9) should already have been inserted into the ball/attenuator before the ball was put into the valve body. Insert the follower shaft (key 9) into the valve body bearing (key 10).

Then for all sizes, align the hole in the follower shaft with the holes in the ball. Insert the small end of the groove pin (key 7) into the hole in the ball and



GE11636-A

FOR STANDARD RIGHT/LEFT HAND BALL



GE11637-A

FOR OPTIONAL LEFT HAND BALL

Figure 13. Informational Tag

into the follower shaft. The pin will hold the parts in place while the drive shaft (key 6) is being installed.

5. Installing the Drive Shaft:

CAUTION

The drive shaft must be used with the correct Vee-Ball. Refer to the tag (see figure 13) attached to the Vee-Ball and to the drive shaft.

Failure to use the correct Vee-Ball/shaft combination may result in the ball not being in the position indicated by the slash mark on the end of the

Vee-Ball Valves

shaft. If the ball is not properly aligned with the slash mark, the valve will not function correctly and seal damage may result.

CAUTION

Make sure the drive shaft is free of oil or grease, otherwise the taper pin or taper key will not seat properly. Failure to properly set the taper pin or taper key could result in it coming loose while in service. Loosening of the taper key in service could result in improper valve function and equipment damage.

- a. Insert the drive shaft into the valve body bearing (key 10), and into the ball ear. Align the hole in the drive shaft with the holes in the ball.
- b. Insert the taper key into the ball and drive shaft as shown in figure 14.

● **Installing the Taper Key**

Current standard construction materials for all 3- through 12-inch valves require the taper key (key 4, figure 14) to be tack welded in place **after properly seating**, using the following procedure. Use standard welding preparations when preparing parts for reassembly.

CAUTION

Make sure the drive shaft (key 6) is free of oil or grease, otherwise the taper key will not seat properly. Failure to properly set the taper pin or taper key could result in it coming loose while in service. Loosening of the taper key in service could result in improper valve function and equipment damage.

6. Install the drive shaft (key 6) into the valve body through the ball and into the lower bearing.
7. Insert the taper key (key 4) into ball and drive shaft (keys 2 and 6) as shown in figure 14. The taper key inserts, with the flat side of the key, facing the drive shaft (key 6).

Table 4. Taper Key Minimum Depth

Valve Size, Inches	Minimum Depth To Drive Taper Key After Initial Solid Contact, mm (Inches)
3, 4, 6	4.8 (0.188)
8, 10, 12	5.6 (0.219)

Table 5. Taper Key Maximum Depth

Valve Size, Inches	Maximum Depth To Drive Taper Key After Initial Solid Contact, mm (Inches)
3, 4	7.1 (0.281)
6	7.9 (0.312)
8, 10	9.5 (0.375)
12	10.3 (0.406)

8. Using a flat end punch, drive the groove pin (key 7) into the ball ear and follower shaft until it is flat with the ball ear surface. Stake both ends of the pin hole with a center punch to ensure the groove pin does not come out.
9. Using a flat end punch, drive the taper key (key 4) into the ball ear and drive shaft (key 6) until solid, heavy contact is obtained between the key and shaft.
10. Measure the position of the taper key head.
11. Drive the taper key in further using the minimum distance shown in table 4.
12. Inspect the ball/shaft taper key connection to verify that the taper key spans the entire shaft flat width. If not, the taper key must be driven in further until this condition is satisfied. However, do not exceed the maximum depths shown in table 5.

Note

All valve taper keys are tack welded, except titanium.

13. When the above conditions are met, tack weld the taper key (key 4) to the ball ear on the head end of the key (see figures 24 and 25). Use a:
 - 0.125 inch diameter weld on 3- through 6-inch valves,
 - 0.1875 inch diameter weld on an 8- through 10-inch valves, and
 - 0.25 inch diameter weld on 12-inch valves.

For all constructions: Refer to Replacing the Ball Seal, Packing Maintenance, and other procedures as necessary to complete the assembly of the valve.

1- through 2-Inch Sizes

Procedures for disassembly and assembly of the bearings and ball cannot be accomplished until the

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Vee-Ball Valves

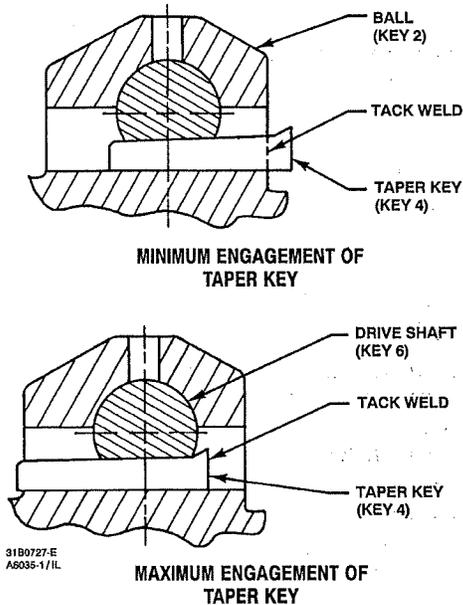


Figure 14. Taper Key Installation

ball seal and valve packing are removed from the valve.

Refer to the Replacing Packing procedures to remove the actuator, and to remove the packing flange and packing follower from the valve. When the packing disassembly steps are complete, return to this section.

Refer to the Replacing the Ball Seal procedures to remove the ball seal from the valve.

Disassembly

WARNING

When the actuator is removed from the valve, the ball/shaft assembly may suddenly rotate, with a shearing, cutting motion, which could result in personal injury. To avoid injury, carefully rotate the ball to a stable position at the bottom of the valve body cavity. Make sure the ball will not rotate.

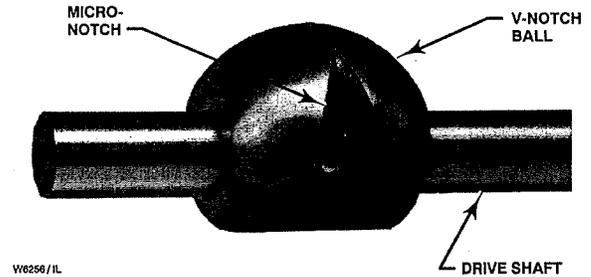


Figure 15. Typical Metal Micro-Notch™ Ball and Drive Shaft

Key numbers in this procedure are shown in figures 24, 25, and 26, unless otherwise indicated.

1. A taper pin (key 4, figure 20) is used in the 1-, 1.5, and 2-inch size valves, and in the 1-inch size Metal Micro-Notch valve (figure 21).
2. **Ceramic Micro Notch ball constructions:** A screw (key 4, figure 22) is used to attach the ball to the drive shaft.
 - a. The parts are held together with a screw and an adhesive. Remove the screw (key 4) and separate the drive shaft from the ball. In some cases, a small amount of heat can be applied to help loosen the adhesive. However, excessive heat may damage other valve component parts.
 - b. Once the shafts have been removed from the valve body, the ball may fall. To avoid personal injury or damage to the sealing surfaces, provide support for the ball to prevent it from falling as the shaft(s) are being removed.
3. Carefully rotate the ball to the open position after the actuator is disconnected. Make sure the ball will not rotate (see warning above). Provide support for the ball during the following disassembly.
4. Unscrew the pipe plug (key 25). (The pipe plug is optional and may not be available.)
5. Working from the small end of the groove pin (key 7), use a pin punch to drive the groove pin out of the ball ear and follower shaft.

Note

All 1-inch Micro-Notch constructions use a one piece shaft. They do not have a follower shaft.

Vee-Ball Valves

Table 6. Continuous Threaded Rod

Valve Size, Inches	Threaded Rod Thread Size	Thread Depth in Follower Shaft
1	0.25-20	0.5
1.5	0.25-20	0.5
2	0.25-20	0.5

VALVE SIZE, INCHES	NEW - WITHOUT THRUST WASHER		OLD - WITH THRUST WASHER	
	mm	Inches	mm	Inches
1	32.9	1.29	31.8	1.25
1.5	48.6	1.91	47.7	1.88
2	64.5	2.54	63.4	2.50

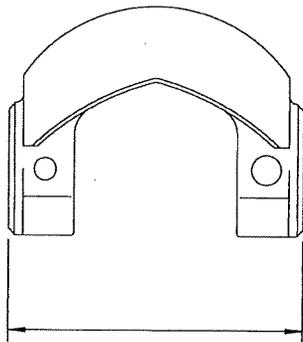


Figure 16. Dimensions of Ball in Ball / Shaft Assembly

6. Locate the small end of the taper key (key 4, figure 14). Using a pin punch on the smaller end of the taper key, drive it out of the ball (key 2) and drive shaft (key 6). Note: driving the taper key in the wrong direction will tighten it.

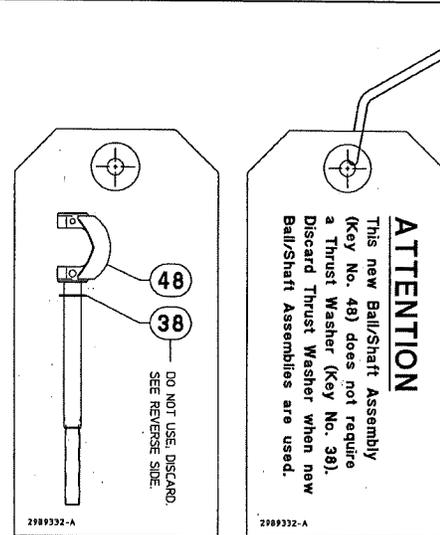
7. Pull the drive shaft (key 6) out of the actuator side of the valve body.

Note

The new ball/shaft assembly (key 48) does not require a thrust washer (key 38) in valves ordered after November 01, 2001.

Discard the thrust washer in valves ordered prior to this date when new ball/shaft assemblies are used as spare parts.

Figure 17 shows the informational tag that is attached with the new ball/shaft



2989332

Figure 17. Informational Tag

assembly when shipped as a spare part. Refer to figure 16 for dimensions of the ball in the ball/shaft assembly.

8. Make sure the sealing surface of the ball is not damaged while removing the follower shaft.

a. If a pipe plug (key 25) is installed, use a punch to drive the follower shaft (key 9) into the center of the ball.

b. If a pipe plug is not installed, use a piece of continuous threaded rod as a removal rod when moving the follower shaft (key 9) into the center of the ball. Refer to the table 6 shown below for a description of the size threaded rod needed. The length of the rod should allow easy working room from the valve body.

9. Remove the ball (key 2) by carefully removing the follower shaft and ball from the valve body.

10. Remove the bearings (key 10) by hand. If the bearings are tight in the valve body, then pull or drive them out with a slight pressure.

11. Thoroughly clean surfaces of all parts that are to be re-used or obtain replacement parts.

Assembly

1. Inspect all sealing surfaces to ensure they are in good condition and without scratches or wear.

2. Install bearings (key 10) by hand. The bearing flanged end should touch the body.

3. Installing the ball (key 2):

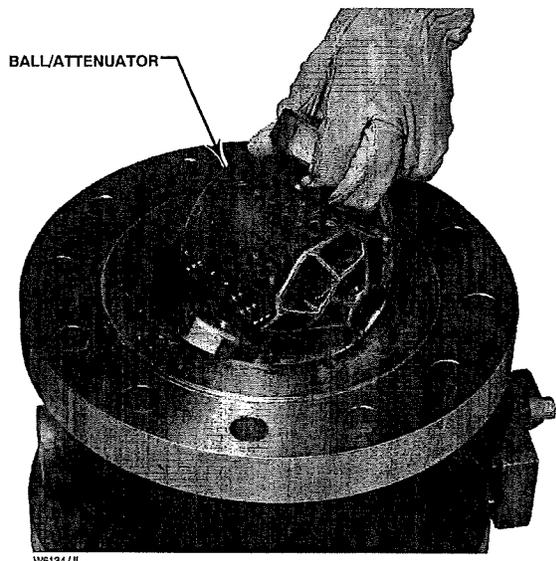


Figure 18. Ball/Attenuator Installation and Removal Method

WARNING

The Vee-Ball might be damaged if it is allowed to fall into the valve body. To avoid personal injury or damage to the sealing surfaces, support the ball to prevent it from falling into or out of the valve body cavity.

Note

For ease of assembly, the follower shaft (key 9) should be inserted into the ball before installing the ball in a 3-inch valve without ball/attenuator

Carefully install the ball into the valve body cavity.

After you have installed the ball (key 2) into the valve body assembly, firmly support the ball while installing the shafts.

4. Installing the follower shaft (key 9):

- **For 1- through 2-inch valves:** The follower shaft (key 9) should already have been inserted into the ball before the ball was put into the valve body. Insert the follower shaft (key 9) into the valve body bearing (key 10).

Note

All 1-inch Micro-Notch constructions use a one piece shaft. They do not have a follower shaft.

5. Installing the Drive Shaft for Valves with Taper Pins

CAUTION

The drive shaft must be used with the correct Vee-Ball. Refer to the tag (see figure 13) attached to the Vee-Ball and to the drive shaft.

Failure to use the correct Vee-Ball/shaft combination may result in the ball not being in the position indicated by the slash mark on the end of the shaft. If the ball is not properly aligned with the slash mark, the valve will not function correctly and seal damage may result.

CAUTION

Make sure the drive shaft is free of oil or grease, otherwise the taper pin will not seat properly. Failure to properly set the taper pin or taper key could result in it coming loose while in service. Loosening of the taper key in service could result in improper valve function and equipment damage.

6. Insert the drive shaft into the valve body bearing (key 10), and into the ball ear (or ball, for Micro-Notch constructions). Align the hole in the drive shaft with the holes in the ball.

Note

There is an indicator hole drilled in all Micro-Notch balls. This indicator hole must be oriented closest to the follower end of the ball/shaft assembly. See figure 19.

7. Insert the taper pin into the ball and drive shaft as shown in figures 20 and 21. The small end of the taper pin must be inserted into the larger hole side of the ball ear (or ball, for Micro-Notch constructions), and into the large hole side of the drive shaft.

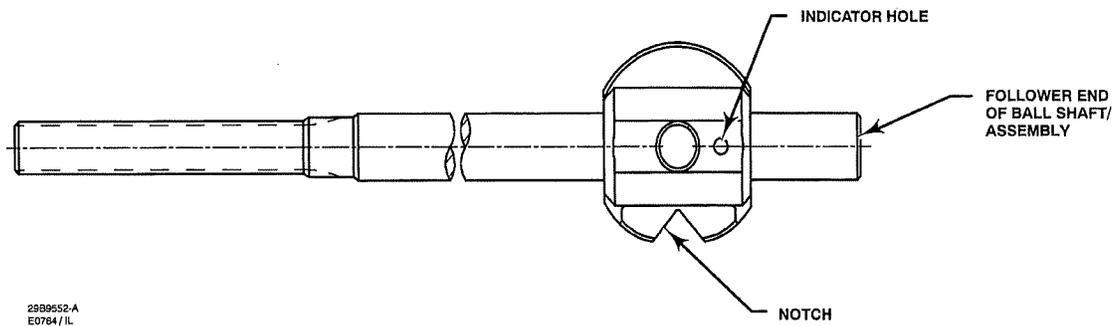


Figure 19. Location of Indicator Hole in Micro-Notch Vee-Balls

Note

The taper pin will not fit correctly if inserted in the wrong direction through the ball ear (or ball, for Micro-Notch constructions) or through the drive shaft. Make sure the drive shaft and ball ear (or ball, for Micro-Notch constructions) are in the correct orientation for installing the pin.

● Installing Taper Pins in 1-, 1.5, and 2-inch Valves

Note

For 1-, 1.5, and 2-inch valves, the taper pins (figure 20) do not require welding.

Using a flat-end punch, drive the taper pin into the ball ear (or ball, for Micro-Notch constructions) and drive shaft until solid heavy contact is felt. Make sure the taper pin spans the width of the ball.

Using a flat end punch, drive the groove pin (key 7) into the ball and follower shaft until it is flat with the ball surface.

Installing the Drive Shaft in VTC Ceramic Vee-Ball Valves

CAUTION

The drive shaft must be used with the correct Vee-Ball. Refer to the tag (see figure 13) attached to the Vee-Ball and to the drive shaft.

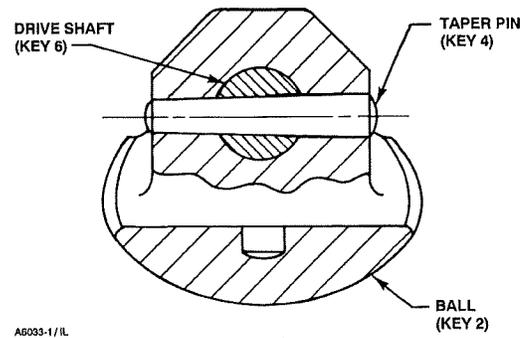


Figure 20. Taper Pin Installation for Design V150, V200, and V300 Sizes 1, 1.5, and 2-Inch Valves.

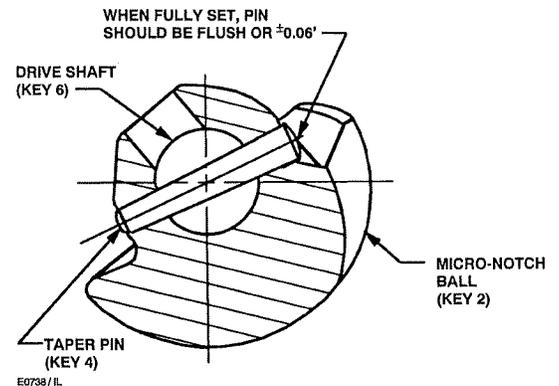


Figure 21. Taper Pin Installation for Design V150, V200, and V300 Size 1-Inch Valves with Micro-Notch Ball Construction

Failure to use the correct Vee-Ball/shaft combination may result in the ball not being in the position indicated by the slash mark on the end of the shaft. If the ball is not properly aligned

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with the slash mark, the valve will not function correctly and seal damage may result.

Valves with 1-inch ceramic micro-notch balls use a screw with a threaded valve shaft to connect the ball to the shaft. An adhesive is used to lock the screw in the valve shaft (keys 4 and 6, figure 22).

Note

There is an indicator hole drilled in all Micro-Notch balls. The orientation of this hole in the ceramic Vee-Ball is to the right of the screw in the ball, and must be located closest to the follower end of the ball/shaft assembly. See figures 19 and 22.



WARNING

Avoid personal injury and property damage from ignition of process fluid caused by sparks from ceramic trim.

Do not use ceramic trim where the process fluid is unstable or if it is an explosive mixture (such as ether and air).

Within the valve body:

8. The threaded hole in the shaft, the screw and screw clearance hole in the ball must be free of oil and grease before applying an activator.
9. Apply Loctite Depend Activator 7387 to threaded hole, screw and ball clearance hole. Assemble the ball onto the shaft while aligning threaded shaft hole within the ball clearance hole.
10. The flat on the shaft must be oriented so that the head of the cap screw seats on the flat.
11. Apply 5 drops of Loctite Depend 330 into the hole in the ball.
12. Thread the screw into the shaft tightening it to 9.2 N•m (81 in•lbs) torque. Remove excess adhesive, Allow four hours to cure fully before continuing with assembly.

For all constructions: Refer to Replacing the Ball Seal, Packing Maintenance, and other procedures as necessary to complete the assembly of the valve.

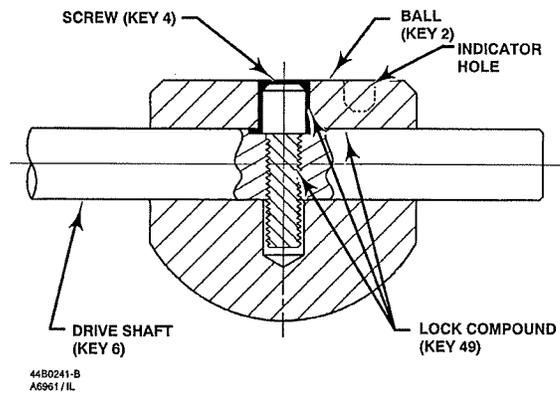


Figure 22. Screw Installation for Design V200, Size 1-Inch Valves with VTC Ceramic Micro-Notch Ball Construction

Actuator Mounting

Use the appropriate actuator instruction manual, this section of this manual, and figure 23 of this manual when mounting the actuator or changing actuator styles and positions.

1. To help ensure correct centering of the Vee-Ball (key 2) on the seal (key 11), be sure the ball is closed when mounting the actuator (for applications other than Spring Return Fail-Open).
2. Clean the valve shaft and actuator lever splines to be sure the actuator lever will slide on easily. Only drive the lever in if absolutely necessary.
3. Carefully wedge the ball solidly against the actuator-side bearing, using a screwdriver or similar tool inserted between the lower ear of the ball and the valve body. This will center the ball. See figure 6.
4. Keep the wedge in place while installing the lever, if necessary. Remove the wedge after you have clamped the actuator lever on the valve shaft and have connected the lever to the actuator piston rod or diaphragm rod.

Determining Mounting Position

The actuator can be either right or left-hand mounted, with the actuator on the right or left side when viewed from upstream (see figure 23).

The Series B Vee-Ball, sizes 4- through 12-inch with attenuator, and the 1-inch micro-notch Vee-Ball have one V-notch. For **right-hand mounting (standard)**, the ball will be in the top of the valve body when the valve is open and the shaft is horizontal. In this position the ball rotates CCW to Close. For **left-hand mounting (standard)**, the ball will be in the bottom of the valve body when the valve is open

Vee-Ball Valves

and the shaft is horizontal. In this position the ball rotates CCW to Close. An optional ball for **left-hand mounting**, which rotates into the top of the valve body when the shaft is horizontal, is also available. In this position the ball rotates CW to Close.

The 1- through 2-inch has two notches, and can be rotated in either direction.

Determining Closed Position

1. The valve must be removed from the line to check the position of the ball.



WARNING

The Vee-Ball closes with a shearing, cutting motion. To avoid personal injury, keep hands, tools, and other objects away from the ball while stroking the valve.

2. Rotate the ball to the closed position.
3. Position the ball in the proper location

For Series B:

- When viewed from the valve body inlet, the ball is in the proper position when the flat spot on the top of the ball is exactly in the center of the seal package.

Make a copy of the centering template in figure 28 out of a suitable stiff material. Place the centering template in the opening at the seal (See figure 27). Find the center of the template and make sure the spot on the ball is centered directly below it.

For valves with attenuators and 1-, 1.5, and 2-inch sizes: Follow one of the procedures below:

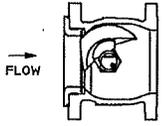
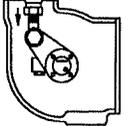
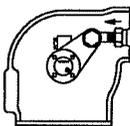
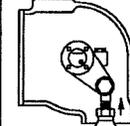
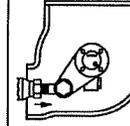
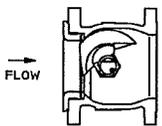
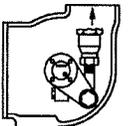
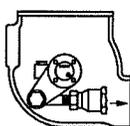
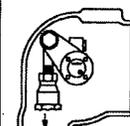
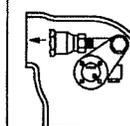
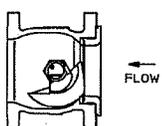
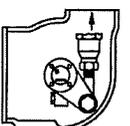
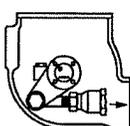
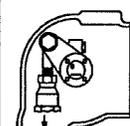
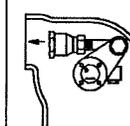
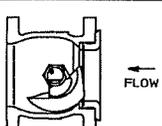
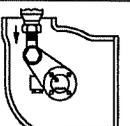
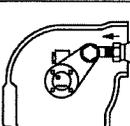
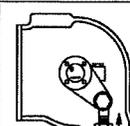
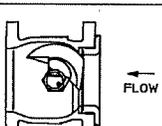
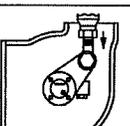
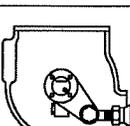
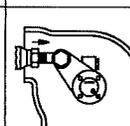
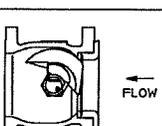
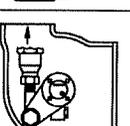
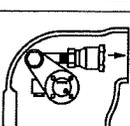
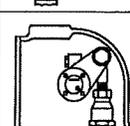
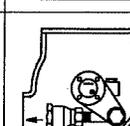
- When viewed from the valve body inlet, the ball is in the proper position when both V-notches of the ball are centered between the machined diameter of the ledge that supports the seal.

- If the ball has a spot machined on the top, align that spot to the exact center of the seal cavity.

4. Adjust the actuator linkage as described in the appropriate actuator instruction manual until the ball is centered in the closed position. A line is stamped on the actuator end of the drive shaft (see figure 23) to indicate the ball position.

Use the appropriate actuator instruction manual and figure 23 of this manual when mounting the actuator or changing actuator styles and positions.

The Micro-Notch ball closed position is approximately 5 degrees closed from the first point of flow. This establishes the zero degree position for the ball.

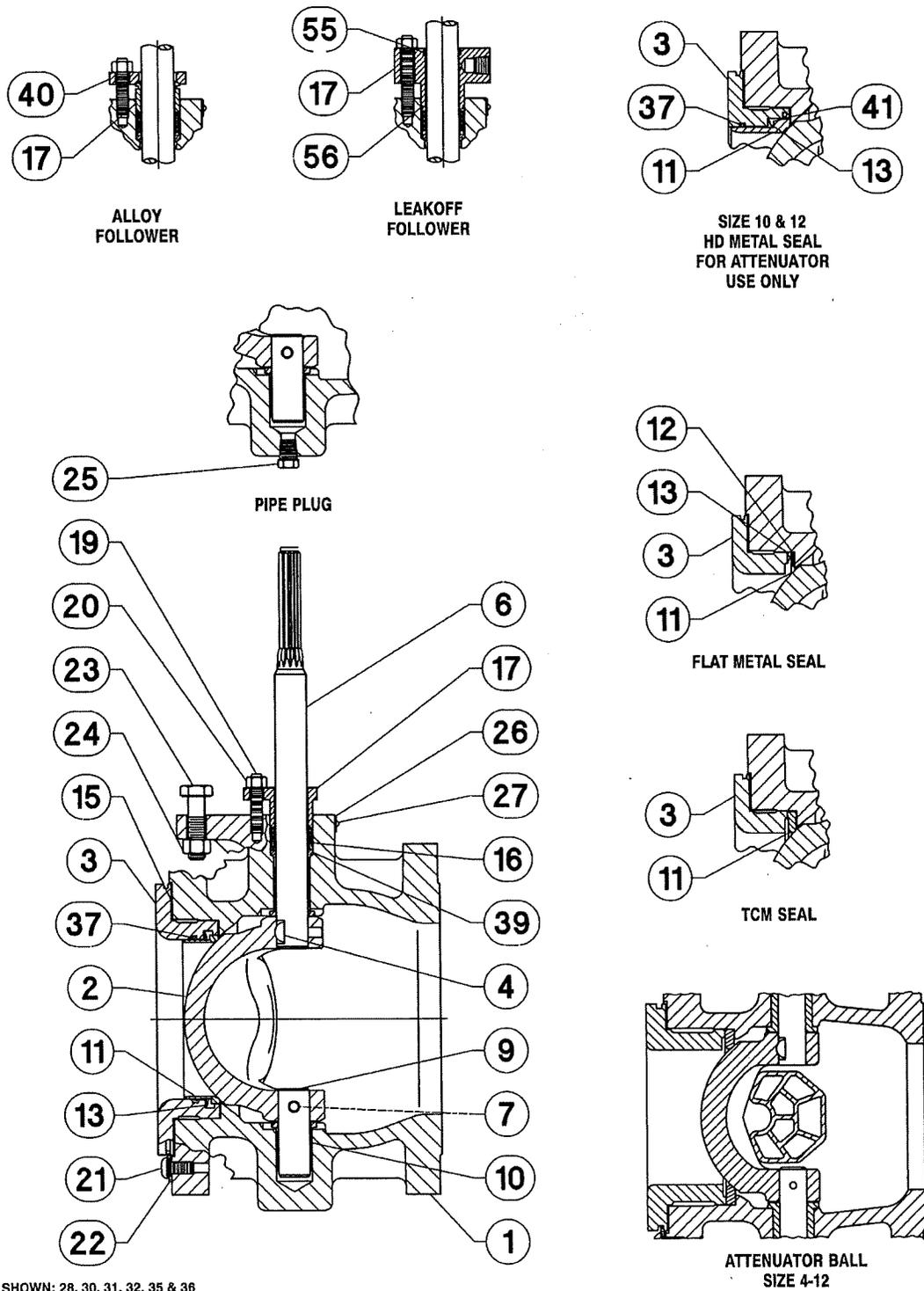
ACTUATOR		VALVE OPEN	ACTUATOR POSITION			
MOUNTING	STYLE		1	2	3	4
(STANDARD) RIGHT-HAND	STYLE A PUSH DOWN TO CLOSE					
	STYLE B PUSH DOWN TO OPEN					
(STANDARD) LEFT-HAND	STYLE C PUSH DOWN TO OPEN					
	STYLE D PUSH DOWN TO CLOSE					
(OPTIONAL) ² LEFT-HAND	STYLE C PUSH DOWN TO CLOSE					
	STYLE D PUSH DOWN TO OPEN					

NOTE:
 1. ARROW ON LEVER INDICATES DIRECTION OF ACTUATOR THRUST TO CLOSE VALVE.
 2. THE OPTIONAL LEFT-HAND ORIENTATION IS NOT AVAILABLE FOR MICRO-NOTCH VEE-BALLS.

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Figure 23. Index Marks for Actuator Lever Orientation for 1- through 12-inch Valves with or without Attenuator

Vee-Ball Valves



PARTS NOT SHOWN: 28, 30, 31, 32, 35 & 36
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Figure 24. Design V150 or V300 Size 3- through 12-inch Valve Assembly
(Details are typical for Design V200, except Design V200 does not have flanges).

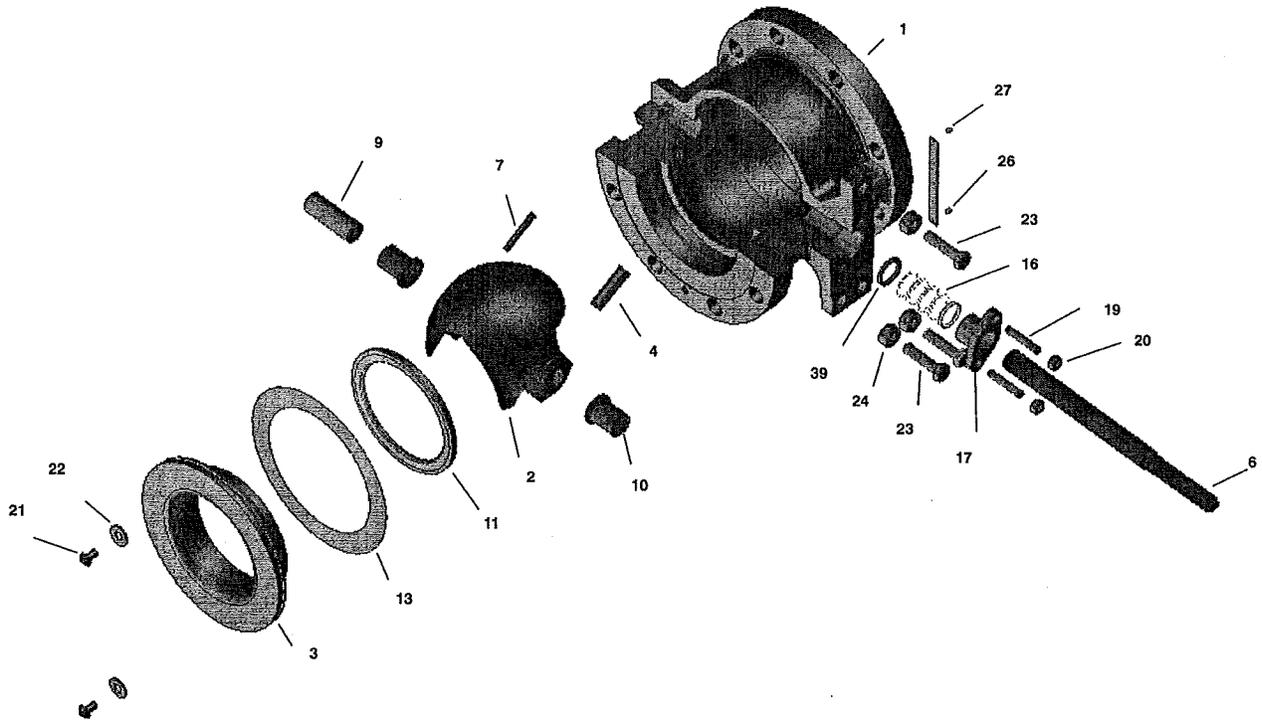
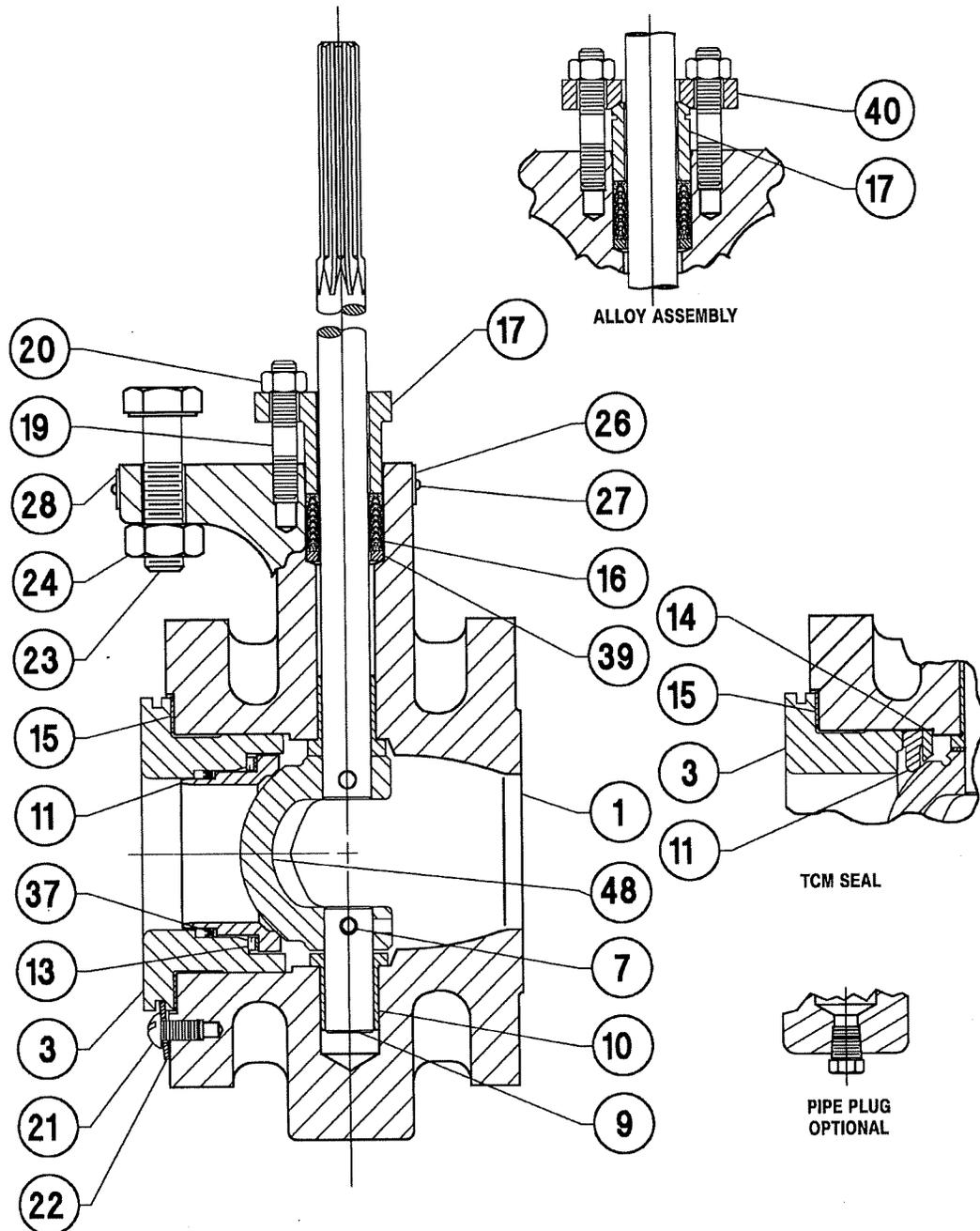
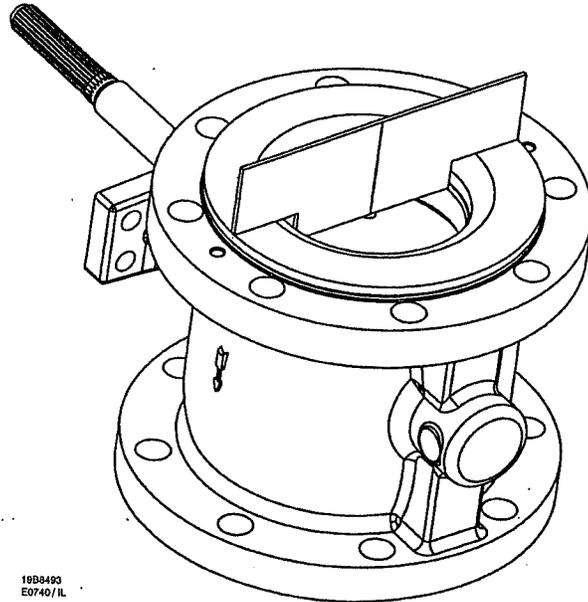


Figure 25. Exploded View, Design V150 and V300 Sizes 3- through 12-inch without Attenuator Assembly.



NOTE:
 PARTS NOT SHOWN: 30, 31, 32, 33, 35 & 36
 4482228-B/DOC

Figure 26. Design V150 or V300 Size 1, 1.5, and 2-Inch Valve Assembly
 (Details are typical for Design V200, except Design V200 does not have flanges)

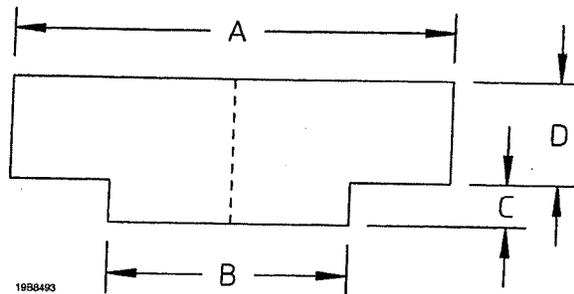


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E0740/IL

Figure 27. Centering Template in Use

VALVE SIZE, INCHES	A (FOR ANSI VALVES)	A (FOR DIN VALVES)	B ⁽¹⁾	C ⁽¹⁾ (ISA S75.04)	C (ASME B16.10 Short ⁽²⁾)	D ⁽¹⁾
mm						
1	63	68	19	35	61	25
1.5	82	88	28	34	85	25
2	102	102	38	31	85	25
3	127	138	63	24	62	38
4	157	157	82	36	71	44
6	216	212	117	21	59	51
8	270	268	139	12	61	57
10	324	320	203	2	35	60
12	381	378	254	2	20	63
Inches						
1	2.50	2.68	0.75	1.40	2.40	1.00
1.5	3.25	3.46	1.12	1.34	3.34	1.00
2	4.02	4.02	1.50	1.22	3.34	1.00
3	5.00	4.55	2.50	0.94	2.44	1.50
4	6.19	6.19	3.25	1.42	2.80	1.75
6	8.50	8.35	4.62	0.82	2.32	2.00
8	10.62	10.55	5.50	0.48	2.42	2.25
10	12.75	12.60	8.00	0.09	1.40	2.38
12	15.00	14.88	10.00	0.09	0.78	2.50

1. These dimensions are the same for ANSI and DIN valves.
 2. Note that ASME B16.10 Short dimensions are actually longer than ISA S75.04 dimensions.



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Figure 28. Centering Template Dimensions

Vee-Ball Valves

Parts Ordering

A serial number is assigned to each valve and stamped on the nameplate. Always refer to the valve serial number when corresponding with your Fisher sales office regarding spare parts or technical information. When ordering replacement parts, also specify the complete 11-character part number from the parts kits or parts list information.

Note

Use only genuine Fisher replacement parts. Components that are not supplied by Fisher should not, under any circumstances, be used in any Fisher valve, because they will void your warranty, might adversely affect the performance of the valve, and might jeopardize worker and workplace safety.

Note

Fisher does not assume responsibility for the selection, use, or maintenance of any product. Responsibility for proper selection, use, and maintenance of any Fisher product remains solely with the purchaser and end-user.

Note

For the 2-inch Design V150 valve, this manual covers valves with serial numbers 12551183 and higher. Always reference the serial number of your valve when corresponding with your Fisher sales office.

Retrofit Kits

Retrofit Kits include parts to convert existing valves to HD metal ball seal construction. See following table.

HD Metal Ball Seal Retrofit Kits for ISA S75.04 Face-to-Face Valves

VALVE SIZE, INCHES		RETROFIT KIT NUMBER FOR HD METAL BALL SEAL	
For WCC Steel Seal Protector Ring		CF10SMnN (Nitronic 60) Seal Material	CD7MCuN (Alloy 255 Duplex SST) Seal Material
2 ⁽¹⁾		RV150X0R012	RV150XCR012
2 ⁽²⁾		RV150X0R152	RV150XCR152
3		RV150X0R022	RV150XCR022
4		RV150X0R032	RV150XCR032
6		RV150X0R042	RV150XCR042
8		RV150X0R052	RV150XCR052
10		RV150X0R062	RV150XCR062
12 ⁽³⁾		RV150X0R072	RV150XCR072
For CG8M (317 SST) Seal Protector Ring		CF10SMnN Seal Material	CD7MCuN Seal Material
2 ⁽¹⁾		RV150X0R082	RV150XCR082
2 ⁽²⁾		RV150X0R162	RV150XCR162
3		RV150X0R092	RV150XCR092
4		RV150X0R102	RV150XCR102
6		RV150X0R112	RV150XCR112
8		RV150X0R122	RV150XCR122
10		RV150X0R132	RV150XCR132
12 ⁽³⁾		RV150X0R142	RV150XCR142
Parts Included in Kit		Quantity in Kit	
Key No.	Description		
3	Seal Protector Ring	1	1
11	Ball seal	1	1
13	Wave spring	1	1
15	Gasket	1	1
21	Retainer screw	2 or 4 ⁽⁴⁾	2 or 4 ⁽⁴⁾
22	Retainer washer	2 or 4 ⁽⁴⁾	2 or 4 ⁽⁴⁾
37	Radial seal	1	1
41 ⁽⁵⁾	Retaining ring	1	1

1. V150's only for serial numbers below 12551183.
 2. V150's for serial numbers 12551183 and above. All V200's and V300's.
 3. Design V200 is not available in 12-inch sizes.
 4. A quantity of 2 is supplied for 1- through 8-inch valves, and a quantity of 4 is supplied for 10- and 12-inch valve kits.
 5. Retaining rings (key 41) are supplied for sizes 10- and 12-inch valve kits.

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Retrofit Kits for ENVIRO-SEAL Packing

Retrofit kits include parts to convert existing V150, V200 and V300 valves with shallow (single packing depth) packing box to the ENVIRO-SEAL packing box construction. Retrofit kits include single PTFE packing. See following table.

ENVIRO-SEAL Packing Retrofit Kits

SHAFT DIAMETER ⁽¹⁾		PART NUMBER	
mm	Inches	Single PTFE	Graphite
12.7	0.5	RRTYXRT0012	RRTYXRT0312
15.9	0.625	RRTYXRT0022	RRTYXRT0322
19.1	0.75	RRTYXRT0032	RRTYXRT0332
25.4	1	RRTYXRT0052	RRTYXRT0352
31.8	1.25	RRTYXRT0062	RRTYXRT0362
38.1	1.5	RRTYXRT0072	RRTYXRT0372
Parts Included in Kit			
Key	Description	Quantity	
100	Packing stud	2	2
101	Packing nut	2	2
102	Packing flange	1	1
103	Spring pack assembly	1	1
105	Packing set	1	1
106	Anti-extrusion washer	2	---
107	Packing box ring ⁽²⁾	1	1
---	Tag	1	1
---	Tie Cable	1	1

1. Diameter through the packing box.
2. Not required for all sizes of Design V150 and V200 or for V300 with 1.25 or 1.5 inch diameter shafts.

Repair Kits for ENVIRO-SEAL Packing

Repair kits include valves parts for shallow (single packing depth) for ENVIRO-SEAL packing box construction. Repair kits include single PTFE or graphite packing. See following table.

ENVIRO-SEAL Packing Repair Kits

SHAFT DIAMETER ⁽¹⁾		PART NUMBER	
mm	Inches	PTFE	Graphite
12.7	0.5	RRTYX000012	13B8816X012
15.9	0.625	RRTYX000022	13B8816X032
19.1	0.75	RRTYX000032	13B8816X052
25.4	1	RRTYX000052	13B8816X092
31.8	1.25	RRTYX000062	13B8816X112
38.1	1.5	RRTYX000072	13B8816X142
Parts Included in Kit			
Key	Description	Quantity	
105	Packing set	1	1
106	Anti-extrusion washer	2	--- ⁽²⁾

1. Diameter through the packing box.
2. Included in key 105.

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Repair Kits

Seal repair kits include recommended spare parts for Fisher TCM Plus, S31600 stainless steel,

CF10SMnN, or CD7MCuN ball seal constructions. The following table indicates the repair kit part number and the quantity of parts included in the kit.

Design V150, V200, and V300 Repair Kits

VALVE SIZE, INCHES		KIT PART NUMBER			
		Ball Seal Material			
		TCM Plus	---	Alloy 6	CD7MCuN (Alloy 255 Duplex SST)
1	RV150X00CA2	---	RV150XHDAA2	RV150XHDCA2	
1.5	RV150X00CB2	---	RV150XHDAB2	RV150XHDCB2	
VALVE SIZE, INCHES		Ball Seal Material			
		TCM Plus	S31600 (316 SST)	CF10SMnN (Nitronic 60)	CD7MCuN (Alloy 255 Duplex SST)
		2 ⁽¹⁾	RV150X00C12	RV150X00M12	RV150X0HD12
2 ⁽²⁾	RV150X00C82	---	RV150X0H082	RV150XHDC82	
3	RV150X00C22	RV150X00M22	RV150X0HD22	RV150XHDC22	
4	RV150X00C32	RV150X00M32	RV150X0HD32	RV150XHDC32	
6	RV150X00C42	RV150X00M42	RV150X0HD42	RV150XHDC42	
8	RV150X00C52	RV150X00M52	RV150X0HD52	RV150XHDC52	
10	RV150X00C62	RV150X00M62	RV150X0HD62	RV150XHDC62	
12	RV150X00C72	RV150X00M72	RV150X0HD72	RV150XHDC72	
Parts Included in Kit		Quantity in Kit			
Key No.	Description				
11	Ball seal	1	1	1	1
12	Shim seal ⁽³⁾	---	4	---	---
13	Spring seal	---	1	---	---
13	Wave spring	---	---	1	1
15	Gasket	1	1	1	1
37	Radial seal	---	---	1	1
21	Retainer screw	2 or 4 ⁽⁴⁾	2 or 4 ⁽⁴⁾	2 or 4 ⁽⁴⁾	2 or 4 ⁽⁴⁾
22	Retainer washer	2 or 4 ⁽⁴⁾	2 or 4 ⁽⁴⁾	2 or 4 ⁽⁴⁾	2 or 4 ⁽⁴⁾
<p>1. V150's only for serial numbers below 12551183. 2. V150's for serial numbers 12551183 and above. All V200's and V300's. 3. Fewer shim seals are furnished in the parts kits than are used in the original construction of the valve. Most original shim seals can be reused. 4. A quantity of 2 is supplied for 2- through 8-inch valves, and a quantity of 4 is supplied for 10- and 12-inch valves.</p>					

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Parts List

Note

Part numbers are shown for recommended spares only. For other part numbers, contact your Fisher sales office.

Common Parts (figures 24, 25 & 26)

Key	Description	Part Number
1	If you need a valve body as a replacement part, order by valve size, serial number, and desired valve body material. Contact your Fisher sales office for assistance.	
2	Ball	
2	Ball w/ attenuator	
3	Seal Protector Ring	
4*	Taper Key	
	R30006 (cobalt alloy 6 casting)	
	3 and 4-inch	12B9530X012
	6-inch	12B9531X012
	8- & 10-inch	12B9532X012
	12-inch	12B9533X012
	N10276 (Hastelloy C)	
	3 and 4-inch	11B0674X032
	6-inch	11B0695X032
	8- & 10-inch	11B0722X032
	12-inch	11B4684X032
6	Drive Shaft	
6	Drive Shaft w/ attenuator	
7*	Groove Pin	
	S31600 (316 stainless steel)	
	1-inch	13B0345X012
	1.5 inch and 2-inch	11B0705X012
	3- and 4-inch	18A6135X012
	6-inch	18A6138X012
	8-inch	11B0738X012
	10- and 12-inch	11B8596X012
	N10276	
	1-inch	13B0345X022
	1.5 inch and 2-inch	11B0705X022
	3- and 4-inch	18A6135X022
	6-inch	18A6138X032
9	Follower Shaft	
9	Follower Shaft w/ attenuator	
10*	Bearing (2 req'd)	
	PEEK/PTFE	
	1-inch	14B3351X012
	1.5 inch	14B3352X012
	2-inch	14B3353X012
	3- and 4-inch	17B7142X012
	6-inch	27B7136X012
	8 and 10-inch	27B7775X012
	12-inch	27B9470X012
	Alloy 6B	
	1-inch	23B0342X012
	1.5 inch	23B6819X022
	2-inch	23B6682X012
	3- and 4-inch	27B9673X012
	6-inch	27B9670X012
	8 and 10-inch	27B9547X012
	12-inch	27B9471X012

Key	Description	Part Number
10*	Bearing (2 req'd) (continued)	
	Silver-plated alloy 6B	
	1-inch	23B0343X012
	1.5 inch	23B6820X012
	2-inch	23B6683X012
	3- and 4-inch	28B2950X012
	6-inch	28B2951X012
	8 and 10-inch	28B2952X012
	12-inch	28B2953X012
	316L SST Nitride	
	1-inch	23B0342X032
	1.5 inch	23B6819X032
	2-inch	23B6682X032
	3- and 4-inch	27B9673X022
	6-inch	27B9670X022
	8 and 10-inch	27B9547X022
	12-inch	27B9471X022
	Carbon-filled PTFE with N10276 sleeve	
	1-inch	13B0349X012
	1.5 inch	13B6822X012
	2-inch	13B6685X012
	3- and 4-inch	17B9675X012
	6-inch	12B9672X012
	8 and 10-inch	27B9549X012
	12-inch	27B9472X012
	Glass-filled PTFE with N10276 sleeve	
	1-inch	13B0349X042
	1.5 inch	13B6822X042
	2-inch	13B6685X022
	3- and 4-inch	17B9675X022
	6-inch	27B9672X022
	8 and 10-inch	27B9549X022
	12-inch	27B9473X022
11*	Ball Seal	
	Fisher TCM Plus	
	1-inch	13B0339X052
	1.5 inch	13B6815X062
	2-inch	13B6686X062
	3-inch	13A2565X102
	4-inch	13A2585X102
	6-inch	13A2619X102
	8-inch	13A2645X072
	10-inch	13A2662X052
	12-inch	13A2677X062
	Fisher TCM Ultra	
	1-inch	13B0339X062
	1.5 inch	13B6815X072
	2-inch	13B6686X072
	3-inch	13A2565X112
	4-inch	13A2585X112
	6-inch	13A2619X112
	8-inch	13A2645X082
	10-inch	13A2662X062
	12-inch	13A2677X072
	Flat Metal	
	S31600	
	3-inch	11B4688X012
	4-inch	11B5704X012
	6-inch	11B5708X012
	8-inch	11B5712X012
	10-inch	11B5717X012
	S30200	
	12-inch	11B5722X012

*Recommended spare parts

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Key	Description	Part Number	Key	Description	Part Number
11*	Ball Seal (continued)		15*	Gasket	
	HD (Heavy-Duty) Metal			Graphite laminate (Standard)	
	CF10SMnN (Nitronic 60 SST)			1-inch	13B0344X032
	2-inch	33B6676X012		1.5 inch	13B6823X042
	3-inch	34B4766X012		2-inch	13B6687X052
	4-inch	34B4767X012		3-inch	11B0660X042
	6-inch	34B4768X012		4-inch	11B0672X052
	8-inch	34B4769X012		6-inch	11B0681X032
	10-inch	34B3365X012		8-inch	11B0693X032
	12-inch	34B3366X012		10-inch	11B0720X022
	CD7MCuN (alloy 255 duplex SST)			12-inch	11B4682X022
	1-inch	33B0341X022		Graphite for Oxygen Service	
	1.5 inch	33B6817X022		1-inch	13B0344X022
	2-inch	33B6676X022		1.5 inch	13B6823X022
	3-inch	34B4766X022		2-inch	13B6687X022
	4-inch	34B4767X022		3-inch	11B0660X052
	6-inch	34B4768X022		4-inch	11B0672X062
	8-inch	34B4769X022		6-inch	11B0681X042
	10-inch	34B3365X022		8-inch	11B0693X042
	12-inch	34B3366X022		10-inch	11B0720X032
	R30006 cobalt alloy 6 casting			12-inch	11B4682X032
	1-inch	33B0341X012	16*	Packing Set, PTFE and carbon-filled PTFE V-ring	
	1.5 inch	33B6817X032		1-inch	12A9016X022
	2-inch	33B6676X032		1.5 inch and 2-inch	1R5795X0012
	3-inch	34B4766X032		3 and 4-inch	12A8995X022
	4-inch	34B4767X032		6-inch	12A8832X022
	6-inch	34B4768X032		8 and 10-inch	12A8951X022
	8-inch	34B4769X032		12-inch	12A8935X022
	S31700 (317 SST) w/ alloy 6 seat		17	Packing Follower w/integral flange	
	10-inch	34B3365X032	17	Packing Follower w/o integral flange	
	12-inch	34B3366X032	19	Packing Follower Stud	
12*	Shim Seal, S31600 (12 req'd)		20	Packing Follower Nut	
	Use w/flat metal seal only		21	Seal Protector Screw	
	3-inch	11B4689X012	22	Seal Protector Clip	
	4-inch	11B5706X012	23	Actuator Mounting Screw	
	6-inch	11B5710X012	24	Actuator Mounting Nut	
	8-inch	11B5714X012	25	Pipe Plug (Optional) (not shown)	
	10-inch	11B5718X012	26	Identification Nameplate	15A0460X012
	12-inch	11B5721X012	27	Drive Screw	
13*	Spring Seal, S31600		28	Flow Arrow	
	Use w/ flat metal seal only		30	Nameplate	
	3-inch	21B4687X012	31	Nameplate Wire (not shown)	
	4-inch	21B5705X012	32	Line Flange Stud	
	6-inch	21B5707X012	33	Line Flange Stud	
	8-inch	21B5713X012	34	Spacer	
	10-inch	21B5716X012	35*	Packing Ring, graphite ribbon (4 req'd)	
	12-inch	21B5720X012		1-inch	12A9134X012
13*	Wave Spring, N07750 Inconel (NACE)			1.5 and 2-inch	12A9135X012
	use w/ HD Metal Seal only			3- and 4-inch	12A9136X012
	1-inch	23B0347X012		6-inch	12A9137X012
	1.5 inch	23B6825X012		8- and 10-inch	12A9138X012
	2-inch	23B6689X012		12-inch	12A9139X012
	3-inch	24B4760X012	36*	Packing Washer, zinc	
	4-inch	24B4761X012		1-inch (3 req'd)	14A8362X012
	6-inch	24B4762X012		1.5 and 2-inch	14A9771X012
	8-inch	24B4763X012		3- and 4-inch (3 req'd)	14A8363X012
	10-inch	22B4509X012		6-inch (3 req'd)	14A8365X012
	12-inch	22B4514X012		8- and 10-inch (3 req'd)	14A8366X012
14	Backup Ring (Composition seal only)			12-inch (3 req'd)	14A8367X012

*Recommended spare parts

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Appendix A Instructions for Non-Series B

The Series B changes affected only the 3- through 12-inch valves without attenuators. To determine if a Vee-Ball valve is Series B, you will need to examine several of the internal parts. Compare the distinctive skirted V-notch outline of the forward side and the circular edge on the reverse side of the Series B design ball to the V-notch on both sides of the non-series B design ball. Then look for bushings. The lack of bushings indicates the valve body is Series B.

All Vee-Ball valves 3- through 12-inch valves produced before the Series B design changes use the Specifications table, the Installation, Maintenance, Packing Maintenance, Replacing Packing, and Replacing the Ball Seal instructions found elsewhere in this manual. Bearing and Vee-Ball Maintenance and Actuator Mounting instructions for these valves may be found below.

Maintenance

Note

Fisher does not assume responsibility for the selection, use, or maintenance of any product. Responsibility for the selection, use, and maintenance of any Fisher products rests solely with the purchaser and end-user.

WARNING

The Vee-ball closes with a shearing, cutting motion, which could result in personal injury. To avoid injury, keep hands, tools, and other objects away from the Vee-ball while stroking the valve.

Avoid personal injury from sudden release of process pressure. Before performing any maintenance operations:

- **Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.**

- **Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure from both sides of the valve. Drain the process media from both sides of the valve.**

- **Vent the power actuator loading pressure and relieve any actuator spring precompression.**

- **Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.**

- **Always wear protective gloves, clothing, and eyewear when performing any maintenance operations to avoid personal injury.**

- **The valve packing area may contain process fluids that are pressurized, *even when the valve has been removed from the pipeline.* Process fluids may spray out under pressure when removing the packing hardware or packing rings.**

- **Check with your process or safety engineer for any additional measures that must be taken to protect against process media.**

Procedures for disassembly and assembly of the bearings and ball cannot be accomplished until the ball seal and valve packing are removed from the valve.

1. Refer to the Replacing Packing procedures to remove the actuator, and to remove the packing flange and packing follower from the valve. When the packing disassembly steps are complete, return to this section.

2. Refer to the Replacing the Ball Seal procedures to remove the ball seal from the valve.

Disassembly

WARNING

When the actuator is removed from the valve, the ball/shaft assembly may suddenly rotate, with a shearing, cutting motion, which could result in personal injury. To avoid injury, carefully rotate the ball to a stable position. Make sure the ball will not rotate.

Key numbers in this procedure are shown in figures 24, 26, and 31, unless otherwise indicated. A taper key (key 4, figure 14) is used in 3- through 12-inch Non-Series B valves.

3. Carefully rotate the ball to the open position after the actuator is disconnected. Make sure the ball will not rotate (see warning above). Provide support for the ball during the following disassembly.

4. Unscrew the pipe plug (key 25). (With newer valve constructions, the pipe plug is optional and may not be available.)

5. Working from the small end of the groove pin (key 7), use a pin punch to drive the groove pin out of the ball ear and follower shaft.

For tack welded taper keys, driving the taper key out of the ball ear will shear the tack welding.

6. Locate the small end of the taper key (key 4, see figure 14). Using a pin punch on the smaller end of the taper key, drive it out of the ball (key 2) and drive shaft (key 6). Note: driving the taper key in the wrong direction will tighten it.

7. Pull the drive shaft (key 6) out of the actuator side of the valve body.

8. Make sure the sealing surface of the ball is not damaged while removing the follower shaft.

a. If a pipe plug (key 25) is installed, use a punch to drive the follower shaft (key 9) into the center of the ball.

b. If a pipe plug is not installed, use a piece of continuous threaded rod as a removal rod when moving the follower shaft (key 9) into the center of the V-notch ball. Refer to the table 7 for a description of the size threaded rod needed. The length of the rod should allow easy working room from the valve body.

9. **Remove the ball** (key 2) by carefully removing the follower shaft and ball from the valve body.

10. Remove the packing box spacer (key 34) for 8-, 10-, and 12-inch valves.

11. **Removing the bearings (key 10):**

a. **For composition bearings**, remove the bearings by hand. If the bearings are tight in the valve body, then pull or drive them out with a slight pressure. Allow the bushings (key 5 or 8) to remain in the valve body.

Table 7. Continuous Threaded Rod

Valve Size, Inches	Threaded Rod Thread Size	Thread Depth in Follower Shaft
3	0.25-20	0.5
4	0.25-20	0.5
6	0.25-20	0.5
8	0.3125-18	0.62
10	0.3125-18	0.62
12	0.3125-18	0.94

b. **For metal bearings**, use a press and ram to remove the drive shaft bearings out of the valve body. Refer to figure 30 ram dimensions. The bushings (key 5 or 8) will normally remain in the valve body.

To remove the follower shaft bearings, use a blind-hole bearing puller similar to CG2545AB, which is made by Snap-On Tools. If you do not have such a tool, you can machine the bearing out.

Note

For proper shutoff performance, the ball and seal require the bearing (key 10) to be positioned correctly. If you removed the bearings (key 10), be sure to locate the new bearings as shown in figure 30.

12. Thoroughly clean surfaces of all parts that are to be re-used or obtain replacement parts.

Assembly

1. Inspect all sealing surfaces to ensure they are in good condition and without scratches or wear.

2. **Installing bearings (key 10):**

a. **For composition bearings**, install the bearings by hand. The bearing flanged end should touch the bushing (key 5 or 8).

b. **For metal bearings:**

● Use a press and ram to install the bearings (key 10). Refer to figure 30.

● Press the bearings in until each bearing is flush with the bushing (key 5 or 8). The acceptable tolerance for bearing location is: flush with the bushing to 1.52 mm (0.060 inches) inside the bushing. That is, the bearings should not protrude into the flow cavity of the valve, and they should not be more than 1.52 mm (0.060 inches) inside the bushing.

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- Take care not to change the position of the bushings (key 5 or 8) when pressing in new bearings (key 10), otherwise the ball will not center in the valve body and seal.

3. Installing the Vee-Ball (key 2):

WARNING

The Vee-Ball might be damaged if it is allowed to fall into the valve body. To avoid personal injury or damage to the sealing surfaces, support the ball to prevent it from falling into or out of the valve body cavity.

Note

For ease of assembly, the follower shaft (key 9) should be inserted into the ball before installing the ball in a 3-inch valve without ball/attenuator

Carefully install the ball into the valve body cavity.

After you have installed the ball (key 2) into the valve body assembly, firmly support the ball while installing the shafts.

4. Installing the follower shaft (key 9):

- **For 3-inch valves:** The follower shaft (key 9) should already have been inserted into the ball before the ball was put into the valve body. Insert the follower shaft (key 9) into the valve body bearing (key 10).

- **For 4-inch and larger valves without attenuator:** Insert the follower shaft (key 9) through the ball, and into the valve body bearing (key 10).

Then for all sizes, align the hole in the follower shaft with the holes in the ball. Insert the small end of the groove pin (key 7) into the hole in the ball and into the follower shaft. The pin will hold the parts in place while the drive shaft (key 6) is being installed.

5. Insert the drive shaft (key 6) into the valve body bearing (key 10), and into the ball ear. Align the hole in the drive shaft with the holes in the ball.

CAUTION

The drive shaft must be used with the correct Vee-Ball. Refer to the tag (see figure 13) attached to the Vee-Ball and to the drive shaft.

Failure to use the correct Vee-Ball/shaft combination may result in the ball not being in the position indicated by the slash mark on the end of the shaft. If the ball is not properly aligned with the slash mark, the valve will not function correctly and seal damage may result.

6. Installing the Taper Key (key 4):

Current standard construction materials for all 3 through 12-inch valves require the taper key (key 4, figure 14) to be tack welded in place using the following procedure. Use standard welding preparations when preparing parts for reassembly.

CAUTION

Make sure the drive shaft (key 6) is free of oil or grease, otherwise the taper key will not seat properly. Failure to properly set the taper pin or taper key could result in it coming loose while in service. Loosening of the taper key in service could result in improper valve function and equipment damage.

1. Install the drive shaft (key 6) into the valve body through the ball and into the lower bearing.
2. Insert the taper key (key 4) into ball and drive shaft (keys 2 and 6) as shown in figure 14. The taper key inserts, with the flat side of the key, facing the drive shaft (key 6).
3. Using a flat end punch, drive the groove pin (key 7) into the ball ear and follower shaft until it is flat with the ball ear surface.
4. Using a flat end punch, drive the taper key (key 4) into the ball ear and drive shaft (key 6) until solid, heavy contact is obtained between the key and shaft.
5. Measure the position of the taper key head.
6. Drive the taper key in further using the minimum distance shown in table 7.

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Table 8. Taper Key Minimum Depth

VALVE SIZE, INCHES	MINIMUM DEPTH TO DRIVE TAPER KEY AFTER INITIAL SOLID CONTACT, mm (INCHES)
3, 4, 6	4.8 (0.188)
8, 10, 12	5.6 (0.219)

Table 9. Taper Key Maximum Depth

VALVE SIZE, INCHES	MAXIMUM DEPTH TO DRIVE TAPER KEY AFTER INITIAL SOLID CONTACT, mm (INCHES)
3, 4	7.1 (0.281)
6	7.9 (0.312)
8, 10	9.5 (0.375)
12	10.3 (0.406)

7. Inspect the ball/shaft taper key connection to verify that the taper key spans the entire shaft flat width. If not, the taper key must be driven in further until this condition is satisfied. However, do not exceed the maximum depths shown in table 8.

Note

When welding standard valves that have a CG8M (317 SST) or CF3M (316L SST) ball, use 309 or 309L filler rod material.

Alloy valve taper keys are normally not welded.

8. When the above conditions are met, tack weld the taper key (key 4) to the ball ear on the head end of the key (see figure 26). Use a:

- 0.125 inch diameter weld on 3- through 6-inch valves,
- 0.1875 inch diameter weld on 8- through 10-inch valves, and
- 0.25 inch diameter weld on 12-inch valves.

For all constructions: Refer to Replacing the Ball Seal, Packing Maintenance, and other procedures as necessary to complete the assembly of the valve.

Actuator Mounting

Use the appropriate actuator instruction manual and figure 23 of this manual when mounting the actuator or changing actuator styles and positions.

To help ensure correct centering of the ball (key 2) on the seal (key 11), be sure the ball is closed when mounting the actuator. Do not use a hammer or

other tool to drive the actuator lever onto the valve shaft.

Clean the valve shaft and actuator lever splines to be sure the actuator lever will slide on easily. If the lever does not slide on easily, carefully wedge the ball solidly against the actuator-side bearing using a screw driver or similar tool inserted between the lower ear of the ball and the valve body.

Keep the wedge in place while installing the lever, but again, do not drive on the lever. Remove the wedge after you have clamped the actuator lever on the valve shaft and connected the lever to the actuator piston rod or diaphragm rod.

Determining Mounting Position

The actuator can be either right or left-hand mounted.

Note

Right-hand mounting—Actuator is on the right side of the valve when viewed from valve inlet.

Left-hand mounting—Actuator is on the left side of the valve when viewed from valve inlet.

The preferred location of the ball is in the top of the valve body when the valve is open. To convert from right to left hand-mounting, turn the valve to position the actuator mounting pad on the left and rotate the ball to the top of the valve.

The number one V-notch controls flow on right-hand mounting. Turn the valve 180 degrees, and rotate the ball to the top of the valve to obtain left-hand mounting. The number two V-notch controls flow for this construction. See figure 29.

Vee-Ball Valves

Determining Closed Position

1. The valve must be removed from the line to check the position of the ball.

WARNING

The ball closes with a shearing, cutting motion. To avoid personal injury, keep hands, tools, and other objects away from the ball while stroking the valve.

2. Rotate the ball to the closed position.
3. Follow one of the procedures below:

- When viewed from the valve body inlet, the ball is in the proper position when both V-notches of the ball are centered between the machined diameter of the ledge that supports the seal.

- If the ball has a spot machined on the top, align that spot to the exact center of the seal cavity.

4. Adjust the actuator linkage as described in the appropriate actuator instruction manual until the condition described in step 3 exists. A line is stamped on the actuator end of the drive shaft (see figure 23) to indicate the ball position.

Note

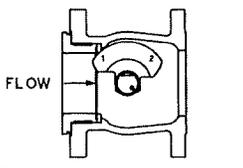
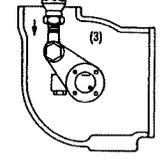
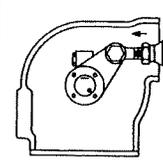
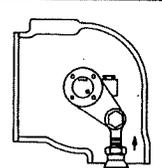
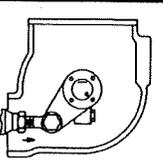
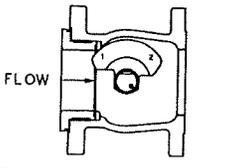
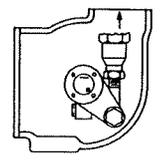
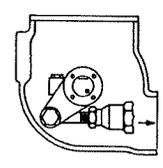
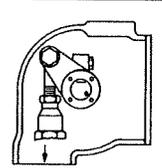
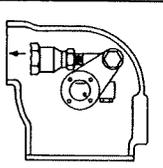
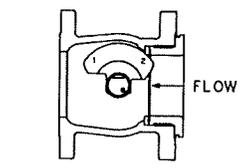
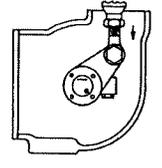
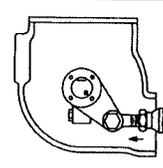
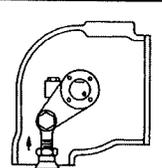
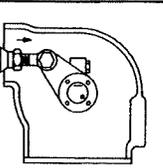
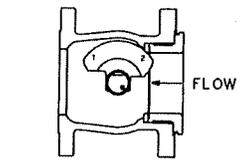
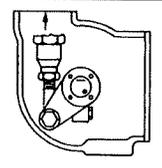
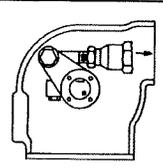
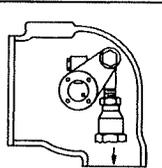
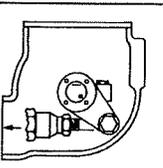
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Non-Series B Design Parts (figure 31)

Note

Part numbers are shown for recommended spares only. For part numbers not shown, contact your Fisher sales office.

Key	Description	Part Number
2	Ball	
2	Ball with attenuator (RH mtg in Common parts section)	
6	Drive Shaft	
9	Follower Shaft	
10*	Bearing (2 req'd)	
	PEEK	
	3- and 4-inch	14B3354X012
	6-inch	14B3355X012
	8 and 10-inch	14B3356X012
	12-inch	14B3357X012
	S44004 (440C SST)	
	2-inch	23B6682X022
	3- and 4-inch	14A5698X012
	6-inch	14A4618X012
	8 and 10-inch	14A5699X012
	12-inch	14A6549X012
	Alloy 6B	
	3- and 4-inch	14A6546X012
	6-inch	14A6547X012
	8 and 10-inch	14A6548X012
	12-inch	14A6550X012
	Silver-plated alloy 6B	
	3- and 4-inch	14A6537X012
	6-inch	14A2498X012
	8 and 10-inch	14A6538X012
	12-inch	14A6539X012
	Carbon-filled PTFE with N10276 sleeve	
	3- and 4-inch	12B5944X012
	6-inch	12B5945X012
	Glass-filled PTFE with N10276 sleeve	
	3- and 4-inch	12B5944X042
	6-inch	12B5945X042

ACTUATOR		VALVE OPEN	ACTUATOR POSITION			
MOUNTING	STYLE		1	2	3	4
RIGHT-HAND ⁽¹⁾	STYLE A (PDTC) ⁽²⁾					
	STYLE B (PDTO) ⁽²⁾					
LEFT-HAND ⁽¹⁾	STYLE C (PDTC) ⁽²⁾					
	STYLE D (PDTO) ⁽²⁾					

1. Right-hand mounting controls with v notch no. 1; Left-hand mounting controls with v notch no. 2
 2. PDTC-push down to close; PDTO-push down to open
 3. Arrow on lever indicates direction of actuator thrust to close valve

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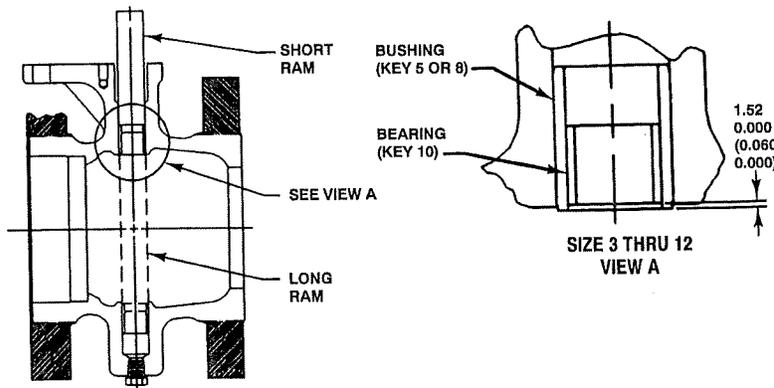
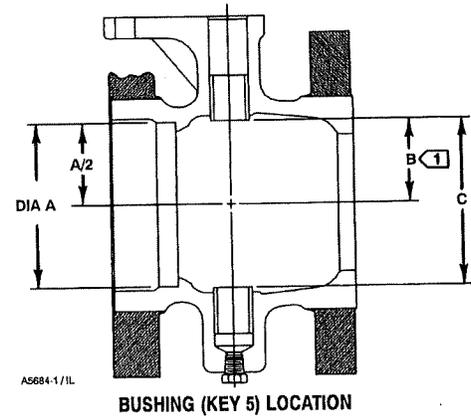
Figure 29. Index Marks for Actuator Lever Orientation for Non-Series B Design Valves

Vee-Ball Valves

VALVE SIZE, INCHES	BEARING RAM DIMENSIONS								BUSHING RAM DIMENSIONS					
	Ram Lengths				Ram Diameters				Ram Diameters					
	L		M		D		d		D		Long Ram d		Short Ram d	
	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches	mm	Inches
3 & 4	201.42	7.930	95.25	3.750	22.86	0.900	19.05	0.750	28.19	1.110	19.05	0.750	22.86	0.900
	MIN	MIN ⁽¹⁾	MIN	MIN	22.61	0.890	18.80	0.740	27.94	1.100	18.80	0.740	22.61	0.890
6	247.65	9.750	95.25	3.750	29.21	1.150	25.40	1.000	34.54	1.360	25.40	1.000	29.21	1.150
	MIN	MIN	MIN	MIN	28.96	1.140	25.15	0.990	34.29	1.350	25.15	0.990	28.96	1.140
8	338.75	13.310	139.70	5.500	35.56	1.400	31.75	1.250	40.89	1.610	31.75	1.250	35.56	1.400
	MIN	MIN	MIN	MIN	35.31	1.390	31.50	1.240	40.64	1.600	31.50	1.240	35.31	1.390
10	396.75	15.620	139.70	5.500	35.56	1.400	31.75	1.250	40.89	1.610	31.75	1.250	35.56	1.400
	MIN	MIN	MIN	MIN	35.31	1.390	31.50	1.240	40.64	1.600	31.50	1.240	35.31	1.390
12	476.25	18.750	152.40	6.000	41.91	1.650	38.10	1.500	50.42	1.985	38.10	1.500	41.91	1.650
	MIN	MIN	MIN	MIN	41.66	1.640	37.85	1.490	50.17	1.975	37.85	1.490	41.66	1.640

1. MIN = Minimum.

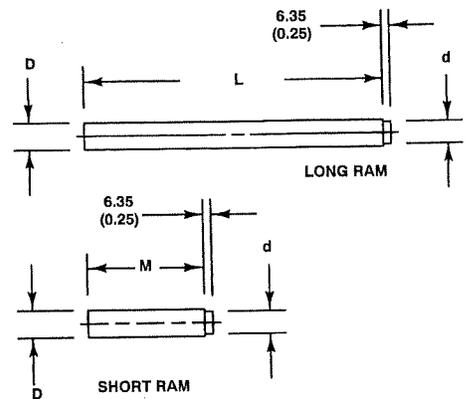
VALVE SIZE, INCHES	DIMENSION			
	B	C	B	C
	Millimeters		Inches	
3	48.26	100.38	1.960	3.952
	50.04	100.63	1.970	3.962
4	60.10	121.01	2.366	4.764
	60.35	121.26	2.376	4.774
6	83.59	168.00	3.291	6.614
	83.85	168.25	3.301	6.624
8	106.20	213.21	4.181	8.394
	106.45	213.46	4.191	8.404
10	135.33	271.48	5.328	10.688
	135.59	271.73	5.338	10.698
12	169.67	340.16	6.680	13.392
	169.93	340.41	6.690	13.402



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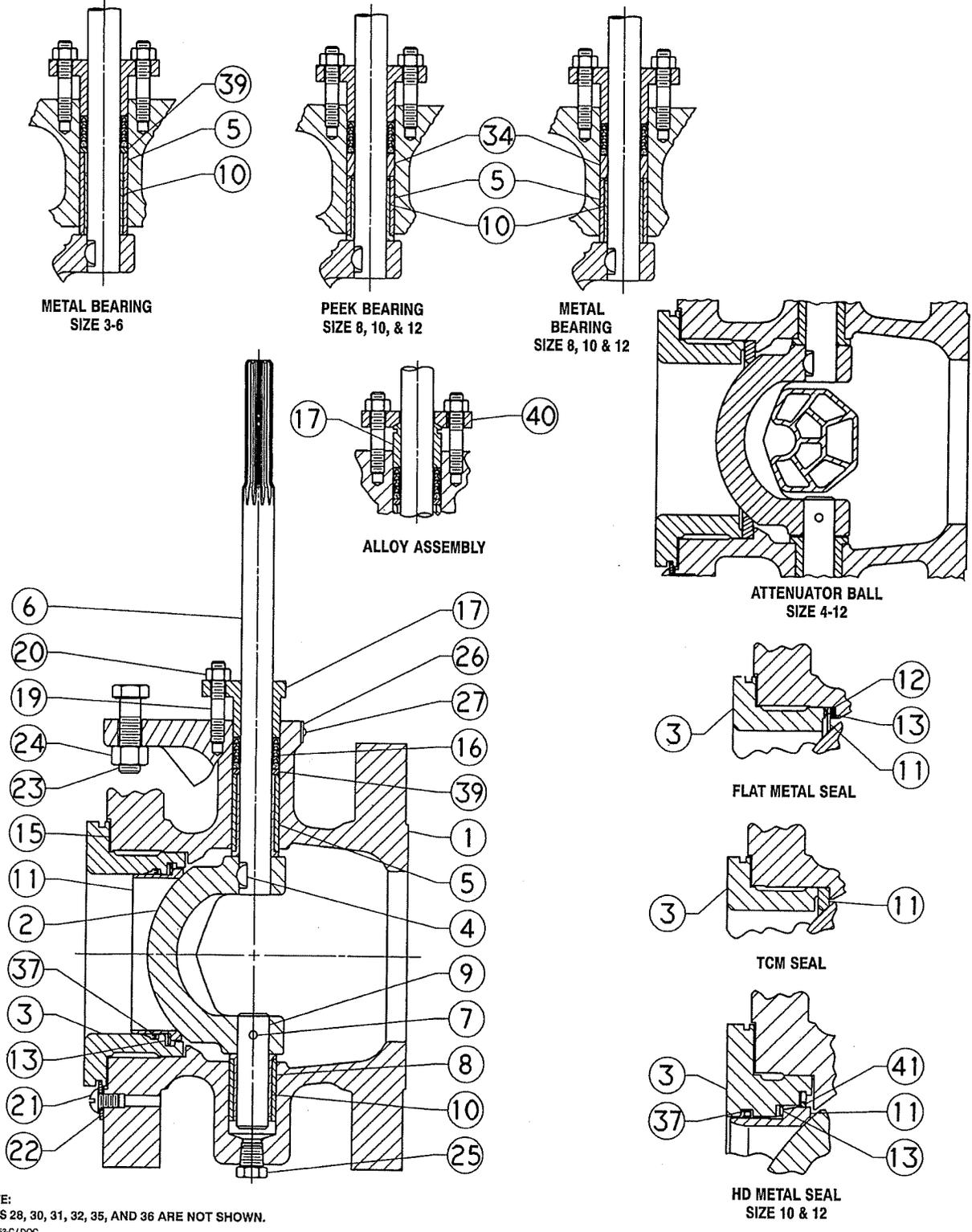
NOTES:
 DIMENSION B IS THE DISTANCE BETWEEN THE GUIDE BUSHING AND THE CENTER OF DIAMETER A.

BEARING RAM



mm
(INCHES)

Figure 30. Metal Bearing Ram and Bushing Location



NOTE:
 KEYS 28, 30, 31, 32, 35, AND 36 ARE NOT SHOWN.
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Figure 31. Designs V150 and V300 Non-Series B Valve Assembly (3- 12- Inch Sizes)
 (Details are typical for Design V200 Valves except Design V200 does not have flanges)

Vee-Ball Valves

Instruction Manual

Form 5290

September 2004

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Types 1051 & 1052 Styles F & G Size 40, 60 & 70 Rotary Actuators

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Introduction

Scope of Manual

This instruction manual includes installation, adjustment, maintenance, and parts ordering information for the Type 1051 (size 40 and 60) and Type 1052 (Size 40, 60, and 70) pneumatic piston

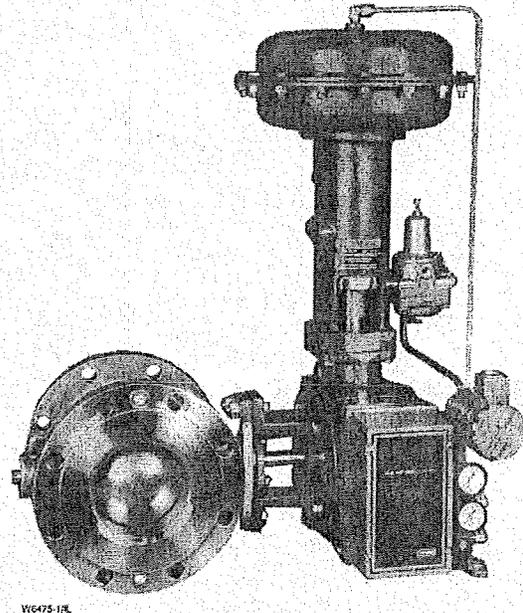


Figure 1. Type 1052 Actuator Mounted on Design V150 Vee-Ball® Valve with a Type 3620J Positioner

rotary actuator with F and G mounting adaptations (see figure 1).

The G mounting adaptation is for Type 7600 and 9500 valves, and the F mounting adaptation is for all other *edisc*® or Vee-Ball® valves. Also, this instruction manual provides information for the optional top-mounted handwheel, up and down travel stops, locking mechanism, and pipe-away vent.

Instructions for the control valve, positioner, accessories, and other sizes of actuators are covered in separate instruction manuals.

Top-Mounted handwheels can be applied for infrequent service as a manual handwheel actuator. Also, an adjustable up travel stop can be added to the actuator to limit its stroke in the upward direction, or an adjustable down travel stop can be added to limit actuator stroke in the downward direction.



FISHER-ROSEMOUNT™

Types 1051 & 1052 with F & G Mounting

Table 1. Type 1051 and 1052 Actuator Specifications

<p>Operation</p> <p>Direct Acting: Increasing loading pressure extends the diaphragm rod out of the spring barrel</p> <p>Service:</p> <p><i>Type 1051:</i> For on-off or throttling service with positioner</p> <p><i>Type 1052:</i> For on-off or throttling service with or without a positioner</p> <p>Actuator Sizes</p> <p>Type 1051: ■ 40 and ■ 60</p> <p>Type 1052: ■ 40, ■ 60, and ■ 70</p> <p>Maximum Diaphragm Sizing Pressure⁽¹⁾</p> <p>Size 40: 4.5 bar (65 psig)</p> <p>Size 60: 2.8 bar (40 psig)</p> <p>Size 70: 3.8 bar (55 psig)</p> <p>Maximum Diaphragm Casing Pressure⁽¹⁾</p> <p>Size 40: 5.2 bar (75 psig)</p> <p>Size 60: 3.4 bar (50 psig)</p> <p>Size 70: 4.5 bar (65 psig)</p> <p>Maximum Valve Shaft Rotation</p> <p>90 degrees rotation (standard) travel stop, or 60 degrees (optional) travel stop for Type 1051 and 1052 actuators, or 75 degrees (optional) travel stop for Type 1052 actuators</p> <p>Valve Shaft Diameters, mm (Inches)</p> <p>Size 40: ■ 12.7 (1/2), ■ 15.9 (5/8), ■ 19.1 (3/4), ■ 22.2 (7/8), ■ 25.4 (1), or ■ 31.8, (1-1/4)</p> <p>Size 60: ■ 19.1 (3/4), ■ 22.2 (7/8), ■ 25.4 (1), ■ 31.8 (1-1/4), ■ 38.1 (1-1/2), ■ 44.5 (1-3/4), or ■ 50.8 (2)</p>	<p>Size 70: ■ 31.8 (1-1/4), ■ 38.1 (1-1/2), ■ 44.5 (1-3/4), or ■ 50.8 (2)</p> <p>Stroking Time</p> <p>Dependent on actuator size, rotation, spring rate, initial spring compression, and supply pressure. If stroking time is critical, consult your Fisher sales office</p> <p>Material Temperature Capabilities</p> <p>Nitrile Diaphragm: -40 to 82°C (-40 to 180°F)</p> <p>Silicone Diaphragm: -40 to 149°C (-40 to 300°F)</p> <p>Nitrile O-Rings: -40 to 82°C (-40 to 180°F), Nitrile O-rings are used in optional top-mounted handwheel, adjustable down travel stop, and adjustable up travel stop assemblies</p> <p>Travel Indication</p> <p>Graduated disk and pointer combination located on actuator end of valve shaft</p> <p>Pressure Connections</p> <p>Standard: 1/4 inch NPT female thread</p> <p>Optional: ■ 1/2 or ■ 3/4-inch NPT female, and ■ 3/4-inch NPT female thread for pipe-away vent</p> <p>Mounting Positions</p> <p>See figure figure 3.</p> <p>Approximate Weights</p> <p>See table 2</p> <p>Additional Specifications</p> <p>For casing pressure ranges and for material identification of the parts, see the <i>Parts List</i></p>
---	--

¹ Use this value to determine the maximum torque output allowed. The pressure/temperature limits in this manual and any applicable standard or code limitation for valve should not be exceeded.

Only personnel qualified through training or experience should install, operate, and maintain this actuator. If you have any questions concerning these instructions, contact your Fisher sales office before proceeding.

throttling service when equipped with a valve positioner. The Type 1052 actuator can be used for on-off service, or it can be used for throttling service when equipped with or without a valve positioner. The Type 1052 actuator spring is adjustable (see figure 2).

Description

The Type 1051 and 1052 diaphragm rotary actuators are pneumatic spring-return actuators for use with rotary-shaft control valves. The Type 1051 actuator can be used for on-off service, or it can be used for

Specifications

Specifications are shown in table 1. Specifications for actuator operation, as it originally comes from the factory, are stamped on the nameplate attached to the actuator.

Types 1051 & 1052 with F & G Mounting

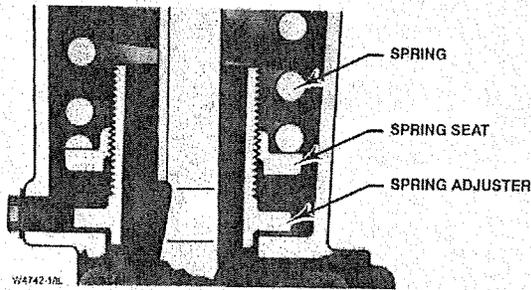


Figure 2. Typical Type 1052 Actuator Adjustable Spring Seat

Installation

When an actuator and valve body are shipped together, the actuator is normally mounted on the valve. Follow the valve body instructions when installing the control valve in the pipeline, and then perform the procedures presented in the *Loading Connection* section. If the actuator is shipped separately or if it is necessary to mount the actuator on the valve, perform the procedures presented in the *Actuator Mounting* section. And, if the actuator requires a pipe-away vent, or if a retrofit pipe-away kit needs to be installed, refer to the *Pipe-Away Vent* section.

WARNING

To avoid personal injury or property damage caused by bursting of pressure-retaining parts, be certain the diaphragm sizing pressure does not exceed the limits listed in table 1. Use pressure-limiting or pressure-relieving devices to prevent the diaphragm sizing pressure from exceeding these limits.

Actuator Mounting

Use the following steps to connect a valve and an actuator. Key numbers are shown in figure 8 for Type 1051 actuators and in figure 9 for Type 1052 actuators.

WARNING

Perform the steps in the WARNING at the beginning of the *Maintenance* section to isolate the control valve and actuator.

Table 2. Approximate Actuator Weights

SIZE	TYPE 1051		TYPE 1052		TOP-MOUNTED HANDWHEEL	
	Kg	Lb	Kg	Lb	Kg	Lb
40	43	94	45	99	7.3	16
60	89	197	92	203	11	24
70	- - -	- - -	123	272	21	47

1. Unscrew cap screws and washers (keys 34 and 63), and remove cover (key 33).
2. Refer to figure 3 for available mounting styles and positions. When mounting on a Vee-Ball Design V150, V200 or V300 valve, check the valve manual to determine if it is Series B. The actuator is normally positioned vertically with the valve in a horizontal pipeline (see figure 4).

Note

Due to its weight, the Type 1052 size 70 actuator must be externally supported if mounted in the horizontal position.

3. When mounting the actuators, make sure that the bushing (key 67) and valve shaft are in-line so that the bushing will slide onto the valve shaft without damage.
4. Mount the actuator on the valve body and secure it with the valve mounting screws. The torques for 1/2 to 1-inch shafts is 88 N•m (65 lbf•ft); for 1-1/4 to 1-1/2 inch shafts is 136 N•m (100 lbf•ft); for 1-3/4 to 2-inch shafts is 183 N•m (135 lbf•ft).

CAUTION

Exceeding any torque requirement may impair the safe operation of this actuator by causing broken or damaged parts. Refer to table 3 for the bolting torque requirements.

Types 1051 & 1052 with F & G Mounting

Table 3. Recommended Bolting Torques

DESCRIPTION, KEY NUMBER	ACTUATOR SIZE								
	40			60			70		
	Size	N•m	lbf•ft	Size	N•m	lbf•ft	Size	N•m	lbf•ft
Diaphragm Casing, 5	3/8-24	27	20	3/8-24	27	20	3/8-24	27	20
Casing to spring barrel, 7	3/8-16	41	30	3/8-16	41	30	3/8-24	27	20
Diaphragm to rod, 9 (1051)	1/2-13	34	25	3/4-10	102	75	1/2-13	102	75
Diaphragm to rod, 9 (1052)	1/2-20	34	25	3/4-16	102	75	3/4-16	102	75
Rod end bearing, 16	1/2-20	34	25	5/8-18	61	45	3/4-16	102	75
Turnbuckle to lever, 18	1/2-13	81	60	5/8-11	163	120	3/4-10	271	200
Spring barrel to housing, 21	5/16-18	23	17	7/16-14	68	50	5/8-18	68	50
Housing to yoke, 23	3/8-16	34	25	1/2-13	81	60	1/2-13	81	60
Travel stop to lever, 28	1/2-13	81	60	5/8-11	163	120	3/4-10	271	200
Side of housing, 34 304/4200/PMV 1076 w/ NAMCO/NAMCO SW	3/8-16	34	25	1/2-13	81	60	1/2-13	81	60
Handwheel top, 54	1/2-20	34	25	5/8-18	34	25	---	34	25
Diaphragm head to rod/Adjustable down travel stop, 54 (1051)	1/2-13	27	20	3/4-10	66	49	---	69	51
Diaphragm head to rod/Adjustable down travel stop, 54 (1052)	1/2-20	27	20	3/4-16	66	49	3/4-16	69	51
Rod end to turnbuckle, 58	3/4-16-LH	102	75	7/8-14-LH	163	120	7/8-14-LH	163	120
Handwheel to actuator, 141	3/8-16	41	30	3/8-16	41	30	1/2-13	81	60

5. Screw the left-hand threaded locknut (key 58) onto the diaphragm rod (key 10) as far as possible.

6. Screw the turnbuckle (key 57) as far as it will go onto the actuator rod.

7. Screw the locknut (key 16) as far as it will go onto the rod end bearing (key 17). Thread this assembly completely into the turnbuckle (key 57).

8. If the lever (key 27) is attached to the rod end bearing, remove the cap screw and hex nut (keys 18 and 19).

9. If the Type 1052 spring adjustment has been changed, complete the Initial Setting portion of the *Type 1052 Spring Adjustment* section before proceeding.

10. Consult the appropriate valve instruction manual's *Installation* section for lever/valve shaft orientation marks, and slide the lever into place (see figure 5). Clamp with the cap screw (key 28).

11. Rotate the lever (key 27) to align with the rod end bearing (key 17). This connection can be aided by moving the actuator off its up travel stop with a regulated air source and adjusting the turnbuckle (key 57) slightly.

12. Apply sealant (key 77) or equivalent thread-locking compound to the threads of the cap screw (key 18).

13. Connect the lever (key 27) and the rod end bearing (key 17) with the cap screw and hex nut (keys 18 and 19). Tighten the cap screw to the recommended bolt torque shown in table 3.

14. Note the valve position and direction of rotation. Position the travel indicator (key 37) accordingly.

a. If no handwheel actuator is to be used, position travel indicator (key 37) according to the valve position just noted. Replace the cover (key 33), and secure with washers and cap screws (keys 34 and 63). If holes in the cover and housing (key 20) do not align, temporarily loosen cap screws (key 23), and shift the housing slightly. Do not stroke the actuator while the cover is off.

b. If a manual handwheel actuator is to be used, refer to the separate handwheel actuator instruction manual for mounting instructions.

15. Replace the cover (key 33), and secure with cap screws and washers (keys 34 and 63). If the holes in the cover and housing (key 20) do not align, use a regulated air source to move the actuator slightly off the up travel stop. If the hole alignment cannot be

Types 1051 & 1052 with F & G Mounting

MOUNTING	ACTION ⁽¹⁾	VALVE SERIES OR DESIGN				VALVE SERIES OR DESIGN		
		BALL/PLUG ROTATION TO CLOSE	V250	V150, V200 & V300	CV500 V500	DISK/BALL ROTATION TO CLOSE	V250	8510B, 8532, 8560 & 9500
Right-Hand	PDTC	CCW	A	A	A	CW	NA	B
	PDTO	CCW	B	B	B	CW	NA	A
Left-Hand	PDTC	CCW	NA	D	D	CW	C	C
	PDTO	CCW	NA	C	C	CW	D	D
Left-Hand (Optional) ⁽²⁾	PDTC	CW	NA	C	NA	NA	NA	NA
	PDTO	CW	NA	D	NA	NA	NA	NA

1. PDTC—Push-down-to-close, and PDTO—Push-down-to-open.
2. A left hand ball will be required for the 3- through 12-inch Series B and the 14- to 20-inch, with or without attenuator.

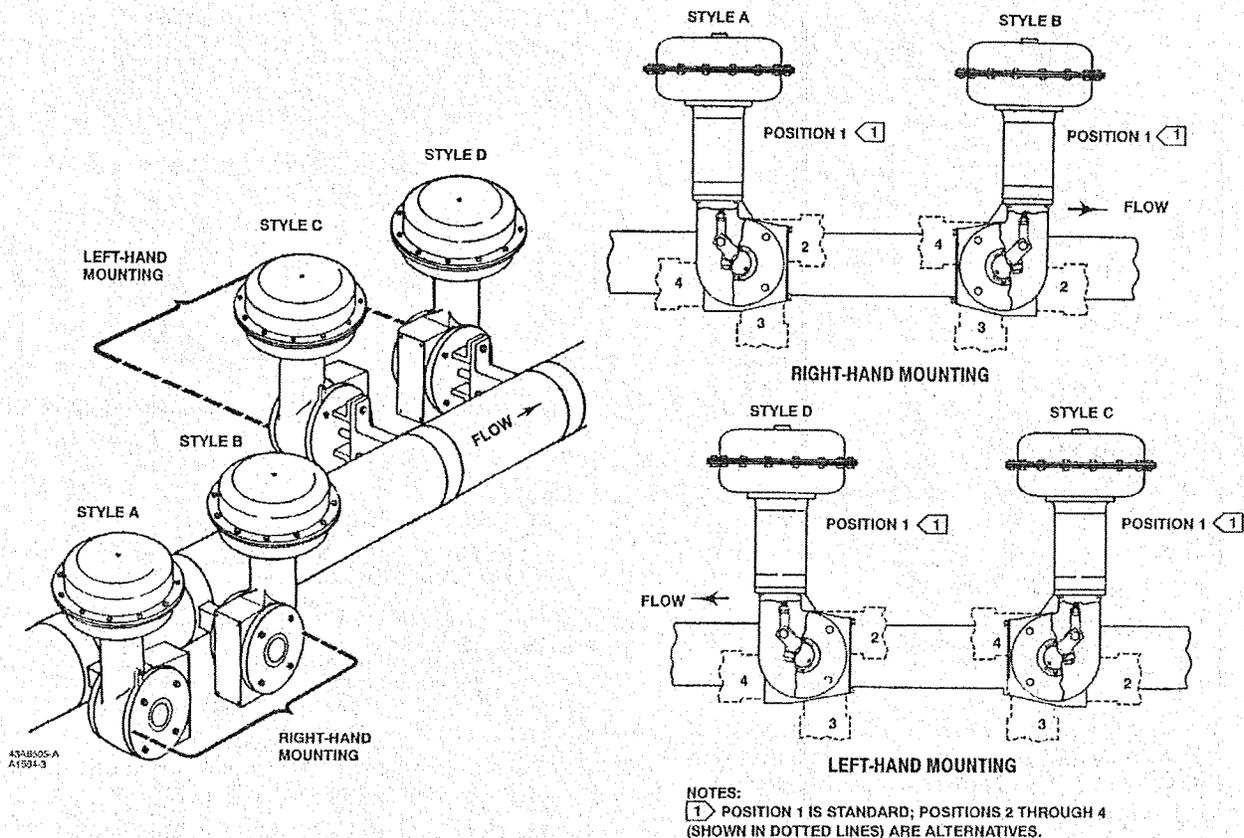


Figure 3. Mounting Styles and Positions for the Type 1051 and 1052 Actuator

obtained in this manner, temporarily loosen the cap screws (key 23), and shift the housing slightly. Do not stroke the actuator while the cover is off.

16. Follow the instructions given in the *Turnbuckle Adjustment* section before proceeding to the *Loading Connection* section.

Valve Flow Direction

Valve construction can change the flow direction for a control valve assembly. It is important to observe the

flow direction in all valve applications **before** installing the valve in the pipeline (see figure 4). Refer to the appropriate valve bulletin.

Note

Observe all warnings and cautions provided in the appropriate valve instruction manual Installation section.

Types 1051 & 1052 with F & G Mounting

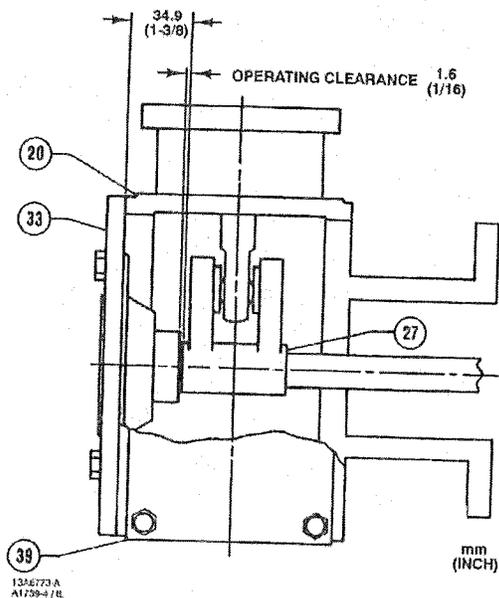


Figure 4. Lever Operating Clearance

Loading Connection

1. Connect the loading pressure piping to the pressure connection in the top of the diaphragm casing.
 - a. **For size 40 through 60 actuators:** Run either 1/4-inch pipe or 3/8-inch tubing between the 1/4-inch pressure connection and the instrument.
 - b. **For size 70 actuators:** Run either pipe or tubing between the pressure connection and the instrument. If necessary, remove the 1/4-inch bushing in the pressure connection to increase connection size.
2. Keep the length of pipe or tubing as short as possible to avoid transmission lag in the control signal. If an accessory (such as a volume booster or a valve positioner) is used, be sure that the accessory is properly connected to the actuator. If a valve positioner is part of the assembly, the pressure connection to the actuator will normally be made at the factory.
3. When the control valve is completely installed and connected to the instrument, check for correct action (air-to-open or air-to-close) to match the controlling instrument. For successful operation, the actuator stem and valve shaft must move freely in response to the loading pressure change on the diaphragm.

Adjustment

Turnbuckle Adjustment

Correct turnbuckle adjustment ensures that the valve is correctly closed when the actuator is against its travel stops. The turnbuckle adjustment is the only adjustment necessary on the Type 1051 actuator. Key numbers are shown in figure 8 for Type 1051 actuators and in figure 9 for Type 1052 actuators.

For accurate adjustment to the zero-degree valve disk or ball position, remove valve from pipeline. Refer to the valve instruction manual for instructions.

A regulated air supply will be required to stroke the actuator. Refer to table 4 for the sizes of the three open-end wrenches required for this procedure.

Table 4. Wrench Size Required for Turnbuckle Adjustment, Inches

ACTUATOR		TURN- BUCKLE (KEY 57)	LOWER LOCKNUT (KEY 16)	UPPER LOCKNUT (KEY 58)
Type	Size			
1051 &	40	1-1/8	3/4	1-1/8
1052	60	1-5/16	15/16	1-5/16
1052	70	1-5/16	1-1/8	1-5/16

1. Remove the access plate (key 59). Also remove the machine screws (key 60), if present.

Note

For the most accurate adjustment of the actuator, do not remove cover (key 33) during this procedure.

2. Loosen the lower locknut (key 16).
3. Make sure the actuator housing (key 20) is clear of any tools or other instruments that could obstruct the actuator stroke path. Pressure the diaphragm casing enough to stroke the actuator down so that the left-hand threaded upper locknut (key 58) is accessible through the access opening. Loosen the locknut.
4. Consult the appropriate valve instruction manual for determining the closed position of the valve. Then use one of the following:
 - a. **Push-down-to-close**—Slowly stroke the actuator to the down travel stop. Adjust the turnbuckle (key 57) until the valve is in the closed position. Lock this adjustment with the left-hand threaded locknut (key 58). Stroke the actuator to the mid-travel position, and tighten the locknut (key 16).
 - b. **Push-down-to-open**—Release all pressure from the diaphragm casing, making sure the diaphragm is against its up travel stop. Be sure that the optional handwheel is adjusted to its topmost position so that the zero position of the actuator and valve can be reached simultaneously. Check

Types 1051 & 1052 with F & G Mounting

the valve position. Stroke the actuator so the turnbuckle (key 57) is accessible through the access opening. Adjust the linkage. Release pressure to the actuator, and check the new adjustment. Continue this procedure until the valve is in the closed position when the actuator is resting on its up travel stop. Stroke the actuator to the mid-travel position, and tighten locknut (key 16). Stroke the actuator, and tighten left-hand threaded locknut (key 58).

5. Replace the access plate (key 59).
6. Loosen the self-tapping screws (key 38), adjust the travel indicator (key 27), and re-tighten the self-tapping screws.

Type 1052 Spring Adjustment

Initial Setting

The Type 1052 nameplate specifies an initial spring setting, which is the initial setting adjusted into the actuator spring. Initial setting is the casing pressure at which the diaphragm and diaphragm rod begin to move away from the up travel stop **with the actuator disconnected from the valve**. (With the actuator connected to the valve and pressure applied to the valve, a higher pressure will be required to start actuator travel).

The initial setting was selected (based upon the service conditions specified when the actuator was ordered) so that, when the actuator and valve are in service, the valve will seat properly and full travel will be obtained within a diaphragm casing range of 0 to 1.2, 0 to 2.3, 0 to 2.8, or 0 to 3.8 bar (0 to 18, 0 to 33, 0 to 40, or 0 to 55 psig) depending on specific actuator size and construction.

If the actuator has been disassembled or if the spring adjustment was changed, and it is desired to match the initial setting stated on the nameplate, make sure the rod end bearing (key 17, figure 8 or 9) has been disconnected from the lever (key 27, figure 8 or 9). Adjust the spring so that the diaphragm rod just starts to travel at the spring set pressure specified on the nameplate.

Be sure the rod end bearing does not hit the lever as the diaphragm and diaphragm rod move away from the up travel stop. To adjust the spring, insert a round rod into one of the holes in the lower bearing seat (key 73, figure 9). Hole diameter is 9.5 mm (3/8-inch) for size 40 actuators, 15.9 mm (5/8-inch) for size 60 actuators, and 10.1 mm (3/4-inch) for size 70 actuators. Rotate the bearing seat to move it toward the casing to increase initial setting or away from the casing to decrease initial setting (keys 1 and 2, figure 9).

Stroking Range

The initial spring setting listed on the nameplate has been determined to be the optimum setting, and it is not recommended to make spring adjustments that will cause this value to change or be exceeded. For push-down-to-open valve action, the initial spring setting is the maximum allowable to provide the maximum spring closing force. Any increase of this setting will over-stress the spring at full travel. For push-down-to-close valve action, the initial spring set has been determined to be the optimum balance between the air to close and the spring to open breakout torque.

If the Type 1052 actuator is to be changed from one valve action to another (i.e., push-down-to-close to push-down-to-open), first, refer to the table for key 11 in the *Parts List* section to determine the proper initial spring setting; then, adjust the unit according to the procedures in the Initial Settings portion of the *Type 1052 Spring Adjustment* section.

Principle of Operation

The diaphragm rod moves down as loading pressure is increased on top of the diaphragm. As the loading pressure is decreased, the spring forces the diaphragm rod upward.

The spring and diaphragm have been selected to meet the requirements of the application and, in service, the actuator should produce full travel of the valve with the diaphragm pressure as indicated on the nameplate.

Consult the separate positioner instruction manual for actuator principle of operation with positioner.

Maintenance

Actuator parts are subject to normal wear and must be inspected and replaced as necessary. The frequency of inspection and replacement depends upon the severity of service conditions. Key numbers are shown in figure 8 for Type 1051 actuators and in figure 9 for Type 1052 actuators.

WARNING

Avoid personal injury or property damage from sudden release of process pressure or uncontrolled movement of parts. Before performing any maintenance operations:

- Always wear protective gloves, clothing, and eyewear when performing any maintenance operations to avoid personal injury.
- Disconnect any operating lines providing air pressure, electric power, or

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a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.

- Use bypass valves or completely shut off the process to isolate the valve from process pressure. Relieve process pressure from both sides of the valve. Drain the process media from both sides of the valve.

- Vent the power actuator loading pressure and relieve any actuator spring precompression.

- Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.

- The valve packing box may contain process fluids that are pressurized, even when the valve has been removed from the pipeline. Process fluids may spray out under pressure when removing the packing hardware or packing rings, or when loosening the packing box pipe plug.

Disassembly

The following procedure describes how to completely disassemble the actuator. When inspecting and replacing parts, perform only those steps necessary to accomplish the repair.

Do **not**, under ordinary circumstances, remove the cap screws (keys 7, 8, and 21) at this time. Use the following disassembly steps if removal is necessary.

CAUTION

Cap screw (key 18) must be disengaged from the lever (key 27) before removing the diaphragm casing (key 1). Failure to do so will allow the spring precompression to rotate the valve beyond its fully open or closed position. This could cause damage to the valve components and/or seal.

1. Perform the steps in the **WARNING** at the beginning of the *Maintenance* section to isolate the control valve and actuator.
2. Remove the tubing or piping from the top of the actuator.
3. Remove the positioner, if used. If necessary, refer to the positioner instruction manual for removal instructions.

4. Unscrew the cap screws and washers (keys 34 and 63), and remove the cover (key 33).

5. Remove the retaining ring (key 30), and slide the hub (key 29) from the cover. If necessary, remove the travel indicator (key 37) from the hub (key 29).

6. Inspect, and if necessary, replace the cover bushing (key 31). Remove the travel indicator scale (key 35) by removing the self-tapping screws (key 36). Press the bushing out of the cover (key 33).

7. Remove the cap screw and hex nut (keys 18 and 19).

8. Make note of the lever/valve shaft orientation, and then loosen the cap screw (key 28).

CAUTION

When removing the actuator from the valve, do not use a hammer or similar tool to drive the lever (key 27) off the valve shaft. Driving the lever could damage internal valve parts. On some valve types, driving the lever off the shaft could move the valve disk or ball and bearings away from the centered position, causing subsequent damage to valve parts as the valve is operated.

If necessary, use a wheel puller to remove the lever. It is okay to tap the wheel puller screw lightly to loosen the lever, but hitting the screw with excessive force could also damage valve parts or disrupt the centered position of the valve disk and bearings.

9. Rotate the handwheel (if one is used) counterclockwise until the handwheel is not compressing the spring (key 11).

WARNING

To avoid personal injury from pre-compressed spring force suddenly thrusting the upper diaphragm casing (key 1) away from the actuator, relieve Type 1052 spring compression, or carefully remove Type 1051 casing cap screws before proceeding further.

10. To relieve spring compression:

- a. For Type 1051 actuators:

- Loosen, but do not remove, all casing cap screws and hex nuts (keys 5 and 6). Make sure there is no spring force to the upper diaphragm casing.

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- Unscrew and remove the cap screws and hex nuts (keys 5 and 6), and then remove the upper diaphragm casing and the diaphragm (key 3).

b. For Type 1052 actuators:

- Insert a round rod into one of the holes in the lower bearing seat (key 73). Use the rod to rotate the lower bearing seat, and move it away from the actuator casings. Continue rotating the lower bearing seat until spring compression is completely removed. Rod hole diameter is 9.5 mm (3/8 inch) for size 40 actuators, 15.9 mm (5/8 inch) for size 60 actuators, and 19.1 mm (3/4 inch) for size 70 actuators.

- Unscrew and remove the cap screws and hex nuts (keys 5 and 6), and then remove the upper diaphragm casing and the diaphragm (key 3).

11. Removing the diaphragm plate (key 4):

a. For Type 1051 actuators:

- Pull the diaphragm plate (key 4) and attached parts out of the actuator. The spring (key 11), diaphragm rod (key 10), cap screw (key 9), spring seat (key 13), hex nut (key 58), turnbuckle (key 57), hex nut (key 16), and rod end bearing (key 17) will be attached to the diaphragm head assembly.

- The diaphragm plate (key 4) may be wedged against the diaphragm rod (key 10), thereby preventing the spring compression from being relieved as the cap screw (key 9) is loosened.



Dislodge the diaphragm plate (key 4) from the diaphragm rod (key 10) before completely removing the cap screw (key 9). Failure to check for this condition could cause personal injury due to the sudden release of spring compression.

- Dislodge the diaphragm plate (key 4) from the diaphragm rod (key 10) by loosening the cap screw (key 9) one full turn and tapping the underside of the diaphragm plate until it follows the cap screw as it is being removed. Failure to check for this condition before completely removing the cap screw (key 9) could cause personal injury due to the sudden release of spring compression.

- Slowly remove the cap screw (key 9) while making sure that the diaphragm head assembly is following the cap screw disassembly. Note—Make sure that spring load is zero before the cap screw is

completely removed. If necessary, separate the remaining parts of the assembly.

b. For Type 1052 actuators:

(1.) Remove the rod end bearing (key 17), the hex nut (key 16), turnbuckle (key 57), and the hex nut (key 58) from the diaphragm rod (key 10).

(2.) Pull the diaphragm plate (key 4) and attached parts out of the actuator. Then remove the cap screw (key 9) to separate the diaphragm plate and the diaphragm rod.

(3.) Proceed as appropriate:

- **For Size 40 and 60 actuators:** Remove the actuator spring (key 11) from the actuator. If it is necessary to remove the adjusting screw (key 74) from the spring barrel during this procedure, heat the base of the adjusting screw to 177°C (350°F) long enough for the thread-locking compound (key 77) to lose its holding strength. Then, unscrew the adjusting screw from the spring barrel. If the spring seat and the lower bearing seat (keys 13 and 73) are to be replaced, unscrew the lower bearing seat from the adjusting screw, and then remove the thrust bearing and the bearing races (keys 71 and 72) from the lower bearing seat.

- **For Size 70 actuators:** Remove the actuator spring (key 11) from the actuator. Remove the cap screws (key 21) then, remove the spring barrel (key 12) from the actuator housing. If it is necessary to remove the spring adjustment parts, loosen the set screw (key 75), and unscrew the spring adjusting screw (key 74) from the spring barrel (key 12).

12. Unscrew the cap screws (key 23), and remove the actuator housing assembly (key 20).

13. Unbolt the mounting yoke (key 22) from the valve.

14. Check the bushing (key 67) in the mounting yoke. Press out and replace the bushing if necessary.

Assembly

This procedure assumes that the actuator was completely disassembled. If the actuator was not completely disassembled, start these instructions at the appropriate step. This procedure also assumes that the valve is removed from the pipeline for ease in actuator assembly and adjustment.

Key numbers are shown in figure 8 for Type 1051 actuators and in figure 9 for Type 1052 actuators.

1. Installing the spring barrel (key 12):

a. **For Type 1051 actuators:** Place the spring barrel onto the housing (key 2). Secure the spring barrel with cap screws (key 21). Tighten the cap screws to the torque value shown in table 3.

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b. *For Type 1052 actuators:* If the spring barrel (key 12) was removed from the housing (key 20), align the spring barrel to the housing as described below to ensure that the offset hole in the base of the spring barrel will be located properly.

- *For Size 40 and 60 actuators:* Note that one of the accessory mounting bosses on the spring barrel is closer to the diaphragm end of the spring barrel. Place the spring barrel onto the housing with the upper boss (the one closer to the diaphragm end) on the same side as the boss located on the housing (see figures 8 and 9). This ensures proper positioning of the offset hole. Secure the spring barrel with cap screws (key 21). On final assembly, tighten the screws to the torque value shown in table 3.

- *For Size 70 actuators:* The spring barrel need not be aligned in any particular position when placing it on the housing.

2. If the bushing (key 67) was removed, press in the new bushing. The end of the bushing should be flush with the bottom of the recess in the mounting yoke (key 22).

3. Slide the mounting yoke over the valve shaft, and secure it to the valve with the valve mounting cap screws.

4. Tighten the valve mounting cap screws to the bolting torque listed in step 6 of the *Installation* procedures. Exceeding any torque requirement may impair the safe operation of the actuator.

5. Refer to figure 4 for the desired orientation of the housing (key 20). Secure the housing to the mounting yoke with cap screws (key 23).

6. Coat with Lubriplate MAG-1 (key 93) or equivalent lubricant on the cap screw threads (key 9), and the tapered end of the diaphragm rod (key 10).

7. Proceed as appropriate:

a. **For Type 1051 actuators (see figure 8)**

- Assemble the diaphragm rod, spring seat (key 13), spring (key 11), and diaphragm plate (key 4), and secure with the cap screw (key 9). Tightening the cap screw will compress the spring. Be certain the tapered end of the diaphragm rod is seated in the corresponding hole in the diaphragm plate, that the spring is seated in the spring seat, and that the cap screw is tightened to the torque specified in table 3.

- Install the hex nut (key 58), turnbuckle (key 57), hex nut (key 16), and rod end bearing (key 17) onto the diaphragm rod.

- Be certain the travel stops (key 8) are located as shown in figure 5.

- Install the diaphragm plate and attached parts into the actuator.

- Be sure the warning nameplate (key 56) is in place. Install the diaphragm (key 3) and the upper diaphragm casing (key 1). Install the cap screws and hex nuts (keys 5 and 6). Tighten the cap screws evenly in a crisscross pattern to compress the spring and secure the upper diaphragm casing. Refer to table 3 for torque values.

b. **For Type 1052 actuators (see figure 9):**

- *For actuator designs without a set screw (key 75) in the spring barrel (key 12):* if the adjusting screw and attached parts were removed, first clean and then lubricate the upper threads of the adjusting screw (key 12) with a lubricant (key 76) or equivalent as shown in figure 10. Install the lower bearing seat (key 73), the thrust bearing (key 71), the thrust bearing races (key 72), and the spring seat (key 13) onto the adjusting screw.

- First, clean and then coat the lower end of the adjusting screw with sealant (key 77) or equivalent thread-locking compound as shown in figure 9, and install the entire assembly into the spring barrel (key 12). Let the adjusting screw stand undisturbed for at least two hours after installation to allow the thread-locking compound to cure.

CAUTION

Apply lubricant to the upper threads and thread-locking compound to the lower threads of the adjusting screw. Do not overlap the coat of lubricant with the coat of thread-locking compound since this will adversely affect the performance quality of both substances.

- *For actuator designs with a set screw (key 75),* if the adjusting screw (key 74) and attached parts were removed, lubricate the threads of the adjusting screw with the lubricant (key 76) or equivalent. Install the lower bearing seat (key 73), the thrust bearing (key 71), the thrust bearing races (key 72), and the spring seat (key 13) onto the adjusting screw. Install this assembly into the spring barrel (key 12). Secure the adjusting screw with the set screw (key 75).

8. Coat the tapered end of the diaphragm rod (key 10) and the threads of the cap screw (key 9) with the lubricant (key 76) or equivalent. Bolt the diaphragm plate to the diaphragm rod.

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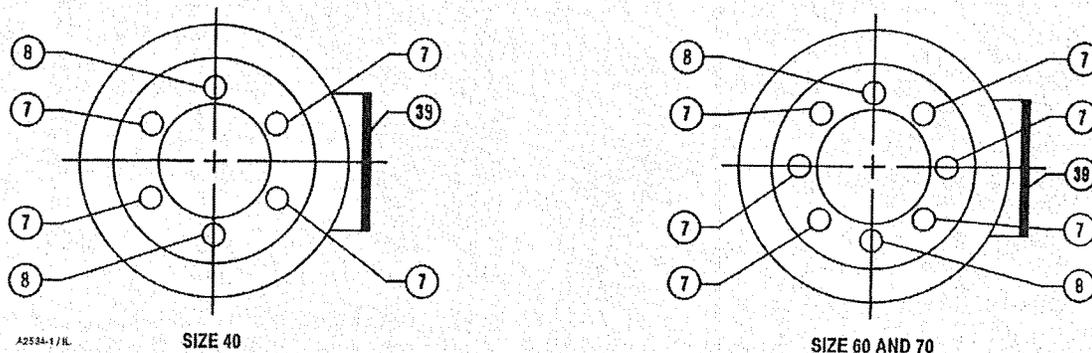


Figure 5. Travel Stop Orientation

9. Be certain the travel stops (key 8) are located as shown in figure 5.

10. Install the spring (key 11) into the spring barrel. Install the diaphragm plate and diaphragm rod into the actuator. Attach the hex nut (key 58), turnbuckle (key 57), hex nut (key 16), and rod end bearing (key 17) to the diaphragm rod.

11. Installing the diaphragm:

- Place the upper diaphragm casing (key 1) onto the lower diaphragm casing (key 2). If necessary, rotate the lower bearing seat (key 73) so that the upper diaphragm casing travel stop will not contact the diaphragm when the casing cap screws and nuts (key 5 and 6) are tightened.

- Secure the upper diaphragm casing with the cap screws and hex nuts (keys 5 and 6). Be sure the warning nameplate is in place on the casing. Tighten the nuts on the cap screws to the torque value shown in table 3.

12. For Type 1052 actuators, complete the Initial Setting portion of the *1052 Spring Adjustment* section before proceeding.

13. Refer to the appropriate valve instruction manual for lever/valve shaft orientation marks, and slide the lever (key 27) into place; see figure 5 for correct lever operating clearance. Clamp with the cap screw (key 28, figure 9).

14. Rotate the lever (key 27) to align with the rod end bearing (key 17). This connection can be aided by carefully stroking the actuator off its up travel stop with a regulated air source.

15. Apply sealant (key 77) or equivalent thread-locking compound to the threads of the cap screw (key 18).

16. Connect the lever (key 27) and the rod end bearing (key 17) with the cap screw and hex nut (keys 18 and 19). Tighten the nut on the cap screw (see table 3).

17. Coat the bearing surfaces of the hub (key 29), and cover (key 33) with lubricant (key 76) or equivalent. Install the bushing (key 31) and hub into the cover. Secure with the retaining ring (key 30).

18. Install the travel indicator scale (key 35), and secure it with the self-tapping screws (key 36). Then install the travel indicator (key 37), and secure it with the self-tapping screws (key 38).

19. Note the valve disk or ball position, and direction of rotation. Position the travel indicator (key 37) accordingly.

20. Replace the cover (key 33), and secure with cap screws and washers (keys 34 and 63). If the holes in the cover and housing (key 20) do not align, use a regulated air source to move the actuator slightly off the up travel stop. If hole alignment cannot be obtained in this manner, temporarily loosen cap screws (key 23), and shift the housing slightly. Do not stroke the actuator while the cover is off.

21. If a valve positioner is to be used, consult the separate valve positioner instruction manual for proper positioner installation.

22. Follow the instructions in the *Turnbuckle Adjustment* section.

Changing Actuator Mounting

The actuator is normally positioned vertically in a horizontal pipeline. However, four mounting styles and four positions for each style are possible (see figure 4).

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Note

Due to its weight, the Type 1052, size 70 actuator must be externally supported if mounted in the horizontal position.

Correct lever/valve shaft positioning is important to ensure proper valve action. Consult the appropriate valve instruction manual.

Style A is right-hand mounted, while style D is left-hand mounted. In all other ways, the styles A and D are identical.

Style B is right-hand mounted, while style C is left-hand mounted. In all other ways, the styles B and C are identical.

Use the following procedure along with figures 8 and 9, for key number references, to convert from styles A and D to styles B and C or visa versa or to change the mounting position.

1. Perform the steps in the **WARNING** at the beginning of the *Maintenance* section to isolate the control valve and actuator.
2. Remove the tubing or piping from the top of the actuator.
3. Remove the cover (key 33) by unscrewing and removing the cap screws and washers (keys 34 and 63).
4. Unscrew cap screw (key 18). Loosen cap screw (key 28).

CAUTION

When removing the actuator from the valve body, do not use a hammer or similar tool to drive the lever (key 27) or actuator off the valve shaft. Driving the lever or actuator could damage internal valve parts. On some valve types, driving the lever (key 27) could move the valve disk and bearings away from the centered position causing subsequent damage to valve parts.

If necessary, use a wheel puller to remove the lever. It is okay to tap the wheel puller screw lightly to loosen the lever, but hitting the screw with excessive force could also damage valve parts or disrupt the centered position of the valve disk and bearings.

5. If changing styles,

- Unscrew cap screws (key 23), and remove the actuator housing (key 20) from the mounting yoke (key 22).

- Rotate the housing 180 degrees, maintaining the appropriate position (1, 2, 3, or 4), and place the actuator onto the mounting yoke (key 22).

6. If changing positions, unscrew cap screws (key 23), and rotate the actuator housing to the desired position.

7. Secure actuator housing (key 20) to the mounting yoke (key 22) with cap screws (key 23). Consult table 3 for appropriate bolt torques.

8. Consult the appropriate valve instruction manual for lever/valve shaft orientation marks, and slide the lever (key 27) into place; see figure 5 for correct lever operating clearance. Clamp with the cap screw (key 28).

9. Rotate the lever (key 27) to align with the rod end bearing (key 17). This connection can be aided by stroking the actuator off its up travel stop with a regulated air source.

10. Apply sealant (key 77) or equivalent thread-locking compound to the threads of the cap screw (key 18).

11. Connect the lever (key 27) and the rod end bearing (key 17) with the cap screw and hex nut (keys 18 and 19). Tighten cap screw to the recommended bolt torque shown in table 3. This connection can be aided by stroking the actuator from its up travel stop with a regulated air source.

12. Note the valve position and direction of rotation. Position the travel indicator (key 37) accordingly. Replace the cover (key 33), and secure it with cap screws and washers (keys 34 and 63).

- If the holes in the cover and housing (key 20) do not align, use a regulated air source to move the actuator slightly off the up travel stop.

- If hole alignment cannot be obtained in this manner, temporarily loosen cap screws (key 23) and shift the housing slightly. Do not stroke the actuator while the cover is off.

13. Follow the instructions given in the *Turnbuckle Adjustment* section.

Top-Mounted Handwheels and Adjustable Travel Stops

Principle of Operation for Handwheels

Note

If repeated or daily manual operation is expected or desired, the unit should be equipped with a manual handwheel.

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actuator. Refer to the separate manual handwheel actuator instruction manual for mounting instructions.

Top-Mounted Handwheel Assembly is attached to a special upper diaphragm casing (key 1, figures 8 and 9) with cap screws (key 141, figure 10). A hex nut (key 137, figure 11) locks the handwheel in position. Turning the handwheel (key 51, figure 10) clockwise into the upper diaphragm casing forces the pusher (key 135, figure 10) against the diaphragm and diaphragm plate (keys 3 and 4, figures 8 and 9) to compress the spring (key 11, figures 8 and 9) and move the diaphragm rod downward.

Turning the handwheel counterclockwise allows the actuator spring to move the diaphragm rod upward.

- If the valve is push-down-to-close, full opening can be restricted by positioning the handwheel at the desired position.
- If the valve is push-down-to-open, full closing of the valve can be restricted by use of the handwheel.

Adjustable Up Travel Stop (figure 11) limits the actuator stroke in the upward direction. To make adjustments, first relieve actuator loading pressure before removing the closing cap (key 187) as it is a pressure retaining part. Remove the closing cap (key 187). Also, for size 70 actuators, the hex nut (key 137) must be loosened. Then turn the stem (key 133) clockwise into the diaphragm case to move the actuator stem downward or counterclockwise to allow the spring to move the actuator stem upward.

- If the valve has push-down-to-close action, full opening can be restricted by the position of the adjustable travel stop. Or,
- If the valve has push-down-to-open action, full closing can be restricted by the position of the adjustable travel stop.

For size 70, tighten the hex nut and replace the closing cap after adjustment.

Adjustable Down Travel Stop (figure 12) limits the actuator stroke in the downward direction. To make adjustments, first relieve actuator loading pressure before removing the closing cap (key 187) as it is a pressure retaining part. Remove the closing cap (key 187). Loosen the hex jam nut (key 189) and either turn the hex nut (key 63 for size 40 and 70 actuators; or key 54 for size 60 actuators) down on the stem (key 133) to limit travel, or up on the stem to allow more travel. Lock the jam nut against the hex nut, and replace the closing cap after the adjustment has been made.

Handwheel Maintenance and Adjustable Travel Stop

If loading pressure seems to be leaking from either the handwheel or adjustable up stop, the O-rings (key 138 and 139, figures 10 and 11) may need replacement. If the adjustable down stop leaks, the O-ring (key 139, figure 12) may need replacement or possibly the closing cap (key 187, figure 11) is not tight. To tighten the closing cap, apply a good grade of thread sealant to the closing cap threads.

For ease of operation, the stem threads (key 133, figures 10, 11, and 12) may need an occasional application of lubricant (key 241) or equivalent. A grease fitting (key 169, figures 10 and 11) is provided for this purpose in the size 70. The size 70 may also need to have the thrust bearing (key 175, figures 10 and 11) packed with lubricant (key 241) or equivalent. Travel stops for the smaller casings can be lubricated between the stem and pusher (key 135, figures 10 and 11) with the lubricant (key 241) or equivalent.

The following disassembly procedures are separated where appropriate between the top-mounted handwheel and adjustable up travel stop assemblies (figures 10 and 11) and the adjustable down travel stop assembly (figure 12).

1. Perform the steps in the **WARNING** at the beginning of the *Maintenance* section to isolate the control valve and actuator.
2. Remove the tubing or pipe from the handwheel body (key 142, figures 10, 11, and 12).

WARNING

To avoid personal injury from the pre-compressed spring force thrusting the upper diaphragm casing (key 1, figures 8 and 9) away from the actuator, either relieve Type 1052 spring compression, or carefully remove Type 1051 casing cap screws by following the instructions that are referenced in the steps below before removing the casing.

3. Relieve all actuator spring compression by following the procedures presented in the Disassembly portion of the *Maintenance* section. Then, rotate either the handwheel (key 51, figure 10) or the travel stop stem (key 133, figures 11 and 12) counterclockwise until the handwheel or travel stop assembly is no longer compressing the spring.

Types 1051 & 1052 with F & G Mounting

CAUTION

For Type 1051 actuators with *ēdisc* valves and push-down-to-open action, the cap screw (key 18, figure 8) should be disengaged from the lever (key 27, figure 9) before removing the diaphragm casing (key 1, figure 8) as specified in the following steps. Failure to do so will allow the spring precompression to rotate the valve beyond its closed position. This could cause damage to the valve seal, seat, or other valve components.

4. Proceed as appropriate:

For Adjustable Up Travel Stops:

- a. Remove the upper diaphragm casing (key 1, figures 8 and 9) by following steps 1, 3, 7, 9, 10, and 11 of the Disassembly portion of the *Maintenance* section.
- b. Remove the cap screws (key 141, figures 10 and 11), and separate the assembly from the upper casing.
- c. Loosen the locknut (key 137, figure 10), or remove the closing cap (key 187, figure 11).
- d. Turn the stem (key 133, figures 10 and 11) clockwise out of the valve body. On handwheel assemblies, the cotter pin and hex nut (keys 247 and 54, figure 10) will have to be removed so that the handwheel (key 51, figure 10) and locknut can be taken off the stem first.
- e. Remove and inspect the O-rings (keys 138 and 139, figures 10 and 11); replace them if necessary.

f. To complete disassembly:

For sizes 40 and 60: Drive out the groove pin (key 140, figures 10 and 11), and slide the pusher (key 135, figures 10 and 11) off the stem.

For size 70: The pusher unit is held to the stem by a retaining screw (key 174, figures 10, 11 or 12). Removing the retaining screw and pusher exposes the thrust bearing (key 175, figures 10 and 11) for inspection.

For Adjustable Down Travel Stops:

Key numbers are shown in figure 12 unless otherwise noted. For ease of operation, the stem (key 133) threads may need an occasional application of lubricant.

a. Remove the closing cap (key 187), and unscrew the jam nut and hex nut (keys 189 and 63 for size 40 and 70 actuators; or keys 189 and 43 for size 60 actuators) off the stem (key 133).

b. Remove the upper diaphragm casing (key 1, figures 8 and 9) and travel stop body (key 142) by following steps 1, 3, 7, 9, 10, and 11 of the Disassembly portion of the *Actuator Maintenance* section.

c. Unscrew cap screws (key 141), and remove the body from the diaphragm case.

d. Check the condition of the O-ring (key 139), and replace it if necessary.

e. Loosen the hex nut (key 54), and then unscrew the travel stop stem (key 133) out of the actuator stem. The lower diaphragm plate (key 82) can now be removed and the rest of the actuator disassembled.

5. Reassemble by reversing the order of the disassembly steps, being sure to apply lubricant as previously mentioned and as shown by the lubrication boxes (key 241) in figures 10 and 11. For size 70 handwheels or up travel stop assemblies, coat the threads of the retaining screws (key 174, figures 10 and 11) with sealant (key 242) or equivalent thread-locking compound.

6. Readjust the spring to obtain the appropriate travel stop restriction by following the steps in the *Top Mounted Handwheel Assembly* section, and then return the unit to operation.

Locking Mechanism

Refer to figure 6 when installing, operating, and locking the mechanism. Key numbers are shown in figure 6 unless otherwise noted.

Installing the Locking Mechanism

1. Perform the steps in the **WARNING** at the beginning of the *Maintenance* section to isolate the control valve and actuator.
2. To add the locking mechanism to an existing actuator, purchase the required parts from Fisher. The required parts are the locking mechanism and a modified actuator housing.
3. To remove old housing, use the Disassembly procedures in the *Maintenance* section.
4. Attach the mounting plate (key 123) to the modified housing (key 20) as shown in figure 6. Attach it with

Types 1051 & 1052 with F & G Mounting

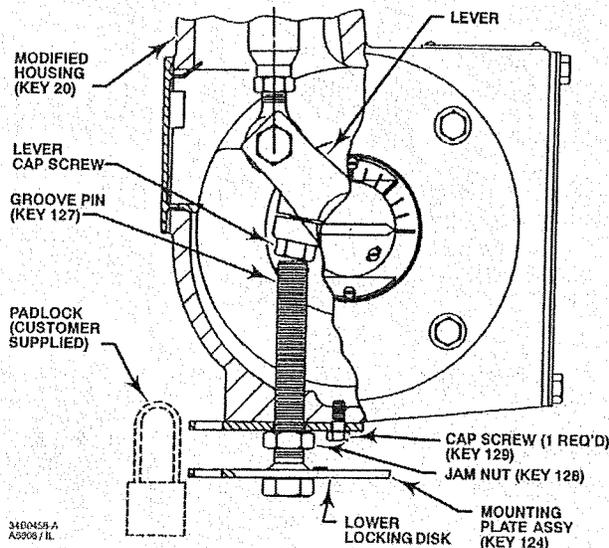


Figure 6. Actuator Locking Mechanism

the cap screw (key 129). Make sure the hole in the center of the mounting plate lines up with the large tapped hole in the housing.

5. Make sure the jam nut (key 128) is threaded onto the threaded bolt before threading it into the housing.
6. After the bolt is threaded into the housing, install the groove pin (key 127) into the end of the bolt. (Note: The groove pin will prevent the threaded bolt from being totally un-threaded from the actuator housing.)
7. Make sure that the bolt is not threaded in so far that it will interfere with re-assembly of the actuator.
8. Reassemble actuator using the Assembly procedure in the *Maintenance* section.
9. Make sure the actuator diaphragm rod is retracted fully. This will be the locked position of the valve. For a push-down-to-close valve and actuator, the valve will be fully open when locked. For a push-down-to-open valve and actuator, the valve will be fully closed when locked.
10. Screw the threaded bolt into the housing until it contacts the head on the lever cap screw (see figure 6).
11. Insert the padlock (not furnished by Fisher) to connect the mounting plate (key 123) with the lower locking disk on the mounting plate assembly (key 124). You might have to back off the lower locking disk a slight amount to line up the holes for the padlock.

Note

In the larger sized actuators, the layers of the mounting plate assembly may be far enough apart that you will need to purchase a padlock with a longer loop. Do not attempt to force the layers closer to fit a small looped padlock.

12. Tighten the jam nut (key 128) against the mounting plate.

Operating the Locking Mechanism

To Unlock the Actuator

1. Remove the padlock. Loosen the jam nut (key 128), and unscrew the threaded bolt until it is stopped by the groove pin (key 127) in the threaded bolt.

Note

For normal operation of the actuator, the threaded bolt must be unscrewed far enough so that the actuator lever will not contact the bolt in normal actuator operation.

2. If you are going to leave the bolt threaded into the housing, lock it by tightening the jam nut (key 128) against the mounting plate so that it cannot be screwed into the housing and interfere with normal actuator operation.

To Lock the Actuator

1. Make sure the actuator diaphragm rod is retracted fully. This will be the locked position of the valve. For a push-down-to-close valve and actuator, the valve will be fully open when locked. For a push-down-to-open valve and actuator, the valve will be fully closed when locked.
2. Make sure the jam nut (key 128) is loose. Screw the threaded bolt into the housing until it contacts the head on the lever cap screw (see figure 6).
3. Rotate the threaded bolt until one of the holes in the lower locking disk (which is welded to the bolt) is in line with the hole in the mounting plate (key 123). Tighten the jam nut against the mounting plate.
4. Lock the plate and disk together with a padlock. (The padlock is not furnished by Fisher.)

Types 1051 & 1052 with F & G Mounting

Pipe-Away Vent

Some applications require venting of gas from the rotary actuator housing. The 3610 Series positioners vent into the actuator housing, and from there, the gas has numerous avenues of escape.

Note

This modification is NOT intended to be a leak-proof or pressure-tight design. It is intended to aid in containing the gas that vents from the positioner and allow for connection of piping to carry it away.

Take care that an adequate vent pipe size is used. This is particularly important with the larger size actuators that have fast stroking speed requirements. In these situations, large quantities of gas can be vented very quickly through the positioner, and adequate pipe-away capability must be obtained. Keep the vent piping as short as possible with few bends.

Refer to the Disassembly and Assembly steps in the *Maintenance* section to gain access to the following parts. Key numbers are shown in figure 7 unless otherwise noted.

Bushings—Remove the mounting yoke bushing (key 67), and the end plate cover bushing (key 31, figures 8 and 9). Replace them with the pipe-away vent parts, as shown in figure 7. The mounting yoke bushing (key 132) is a two-piece bushing with an O-ring (key 133). The end plate cover completes the assembly with a two-piece bushing (key 134) with an O-ring (key 135).

Travel Indicator—A gasket (key 136) is placed under the travel indicator plate. Remove the indicator plate (key 37, figures 8 and 9), install the gasket (key 136) as shown in figure 7.

Access Plate Assembly—A modified metal access plate assembly (key 137) is provided with a 3/4-inch NPT vent connection as shown in figure 7. If the actuator had a plastic access plate, it will be necessary to drill and tap the actuator housing to install the machine screws (key 138) as shown in figure 7. Use the drilling and tapping pattern shown in figure 7, or use the holes in the access plate as a template to mark holes.

When finished with all maintenance procedures requiring the access plate assembly (key 137) to be removed, use the sealant (key 139, or equivalent) provided with the kit to seal the plate in place.

Housing Vent Plug—A vent is provided in the housing design. To plug this opening, the pipe-away vent kit provides a hex pipe plug (key 140) for this opening, as shown in figure 7. Install the hex plug (key 140) into this opening and tighten it.

Accessories Mounting Boss—If accessories are not installed on the mounting boss, install cap screws (key 143) to plug openings. The location to install the cap screws (key 143) is shown in figure 7. A mounting boss is located on both sides of the spring barrel (key 12, figures 8 and 9).

Type 1052 Spring Barrel Access Cover—For field conversion of Type 1052 actuators, attach the cover (key 141) over the spring barrel adjustment opening with self-tapping screws (key 142). Use key 141 as a drilling template. Drill size is 2.6 mm (A #37 drill) (0.104-inches) by 9.6 mm (0.38-inches) deep.

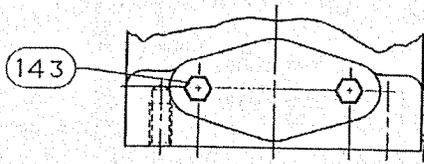
WARNING

If a flammable, toxic, or reactive gas is being used as a supply medium, personal injury, or property damage could result from fire or explosion of accumulated gas. A remote vent pipe cannot be relied upon to vent all gases from the installed location. Provide adequate ventilation for the actuator/positioner assembly. Comply with local and regional codes, and keep the vent pipeline as short as possible with few bends.

Parts Ordering

When corresponding with your Fisher sales office about this equipment, refer to the serial number found on the actuator nameplate (key 41, figures 8 and 10). Also, specify the complete 11-character part number from the following parts list when ordering replacement parts. The Size 70 actuator is available only in Type 1052 actuators.

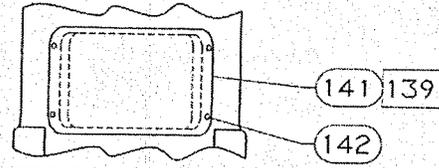
Types 1051 & 1052 with F & G Mounting



33A6525-F / IL

NOTE:
IF ACCESSORIES ARE NOT INSTALLED ON THE MOUNTING BOSS, INSTALL CAP SCREWS (KEY 143) TO PLUG OPENINGS. A MOUNTING BOSS IS LOCATED ON BOTH SIDES OF THE SPRING BARREL.

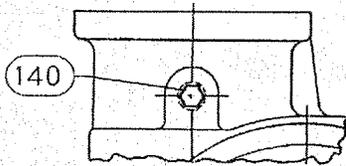
ACCESSORIES MOUNTING BOSS



34D4546-B / IL

NOTE:
FOR FIELD CONVERSION OF TYPE 1052 ACTUATORS, ATTACH COVER (KEY 141) OVER THE SPRING BARREL ADJUSTMENT OPENING WITH SELF-TAPPING SCREWS (KEY 142). USE KEY 141 AS A DRILLING TEMPLATE. USE DRILL SIZE 2.6 mm (A #37 DRILL) (0.104-INCH) BY 9.6 mm (0.38-INCH) DEEP.
□ APPLY SEALANT

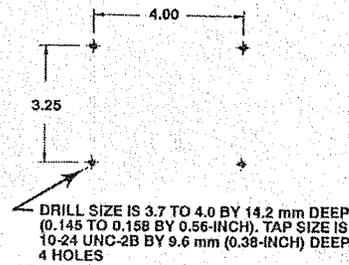
TYPE 1052 SPRING BARREL ACCESS COVER



40B3345-B / IL

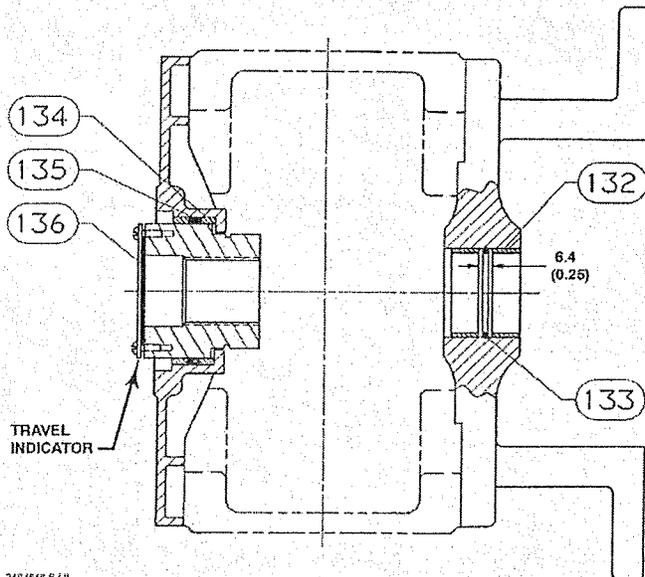
NOTE:
INSTALL THE HEX HEAD PLUG (KEY 140) INTO THE VENT OPENING LOCATED IN THE ACTUATOR HOUSING.

HOUSING VENT PLUG LOCATION



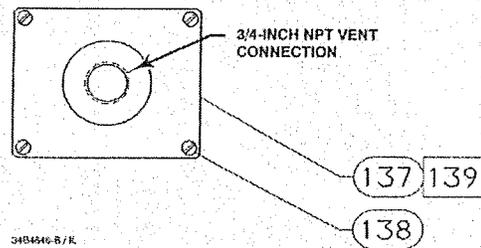
34B4546-B

DRILLING AND TAPPING PATTERN ACCESS PLATE ASSEMBLY



34D4646-B / IL

MOUNTING YOKE AND COVER ASSEMBLY



34B4546-B / IL

NOTE:
FOR FIELD CONVERSION, DRILL AND TAP HOLE PATTERN IF HOUSING HAS A NON-METALLIC ACCESS PLATE. USE KEY 137 AS A DRILLING TEMPLATE IF DESIRED. OR, USE THE DIMENSIONS PROVIDED IN THIS FIGURE FOR DRILLING AND TAPPING.
□ APPLY SEALANT

ACCESS PLATE ASSEMBLY

mm
(INCH)

Figure 7. Pipe Away Vent Assembly

Types 1051 & 1052 with F & G Mounting

Pipe-Away Vent Retrofit Kit Numbers

SHAFT DIAMETER		TYPE 1051 SIZE	KIT PART NUMBER	TYPE 1052	
mm	Inches			SIZE	KIT PART NUMBER
12.7	1/2	40	34B4646X022	30	34B4646X152
				40	34B4646X162
15.9	5/8	40	34B4646X032	30	34B4646X172
				40	34B4646X182
19.1	3/4	40	34B4646X042	30	34B4646X192
				40	34B4646X202
22.2	7/8	60	34B4646X052	60	34B4646X212
				40	34B4646X222
25.4	1	60	34B4646X072	60	34B4646X232
				40	34B4646X082
31.8	1-1/4	60	34B4646X092	40	34B4646X242
				60	34B4646X252
38.1	1-1/2	60	34B4646X102	60	34B4646X262
				70	34B4646X272
44.5	1-3/4	60	34B4646X112	60	34B4646X282
				70	34B4646X292
50.8	2	60	34B4646X122	60	34B4646X302
				70	34B4646X312
50.8	2	60	34B4646X132	60	34B4646X322
				70	34B4646X332
50.8	2	60	34B4646X142	60	34B4646X342
				70	34B4646X352

Parts Kits

Top-Mounted Handwheel Retrofit Kits

KIT PROVIDES PARTS TO ADD A TOP-MOUNTED HANDWHEEL. KIT NUMBER 1 INCLUDES THE HANDWHEEL ASSEMBLY ONLY. KIT NUMBER 2 INCLUDES KIT NUMBER 1 AND A NEW UPPER CASE (KEY 1) THAT IS REQUIRED TO MOUNT THE HANDWHEEL ASSEMBLY.

Kit Number 1

Key	Description	Part Number	Qty
	SIZE 40	38A1213X032	1
	SIZE 60,	38A1213X062	1
	SIZE 70 TYPE 1052 ONLY	CV8010X0052	1

Kit Number 2

Key	Description	Part Number	Qty
	SIZE 40	38A1213X072	1
	SIZE 60,	38A1213X022	1
	SIZE 70 TYPE 1052 ONLY	CV8010X0062	1

Pipe-Away Vent Retrofit Kit

VENT-AWAY KITS INCLUDES: ACCESS PLATE, TWO-PIECE BUSHING, TWO O-RINGS, GASKET, AND THE APPLICATION OF A SEALANT (SEALANT SUPPLIED WITH RETROFIT KIT). FOR TYPE 1052, AN ADDITIONAL COVER PLATE AND SCREWS ARE REQUIRED FOR THE SPRING ADJUSTMENT ACCESS.

(SEE FIGURE 7).

Types 1051 & 1052 with F & G Mounting

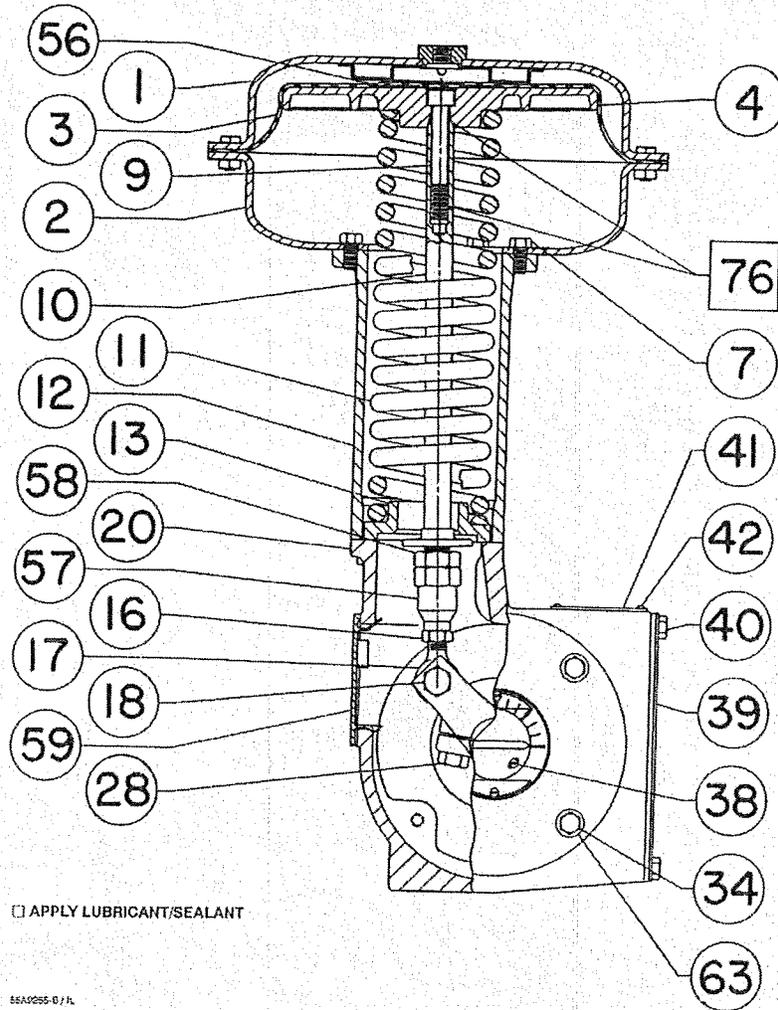


Figure 8. Typical Type 1051 Actuator Assembly

Parts List

Common Parts (Figures 8 and 9)

Key	Description	Part Number	Qty	Key	Description	Part Number	Qty
1	CASING, UPPER				SIZE 60	2E8597X0032	1
2	DIAPHRAGM CASING, LOWER (STEEL ZN PL)				SIZE 70	2N1269X0012	1
3*	DIAPHRAGM, MOLDED (NITRILE/NYLON)				W/ ADJ DOWN STOP		
	STANDARD				SIZE 40	2E6699X0042	1
	W/HANDWHEEL, OR W/ADJ UP STOP				SIZE 60	2E8598X0012	1
	SIZE 40	2E670002202	1		SIZE 70	2N1309X0012	1
	SIZE 60	2E859702202	1	4	DIAPHRAGM HEAD		
	SIZE 70	2N126902202	1	5	SCREW, CAP, HEX HD		
	W/ADJ DOWN STOP			6	NUT, HEX		
	SIZE 40	2E669902202	1	7	SCREW, CAP, HEX HD		
	SIZE 60	2E859802202	1	8	STOP, TRAVEL		
	SIZE 70	2N130902202	1	9	SCREW, CAP, HEX SOCKET		
	DIAPHRAGM, MOLDED (SILICONE/POLYESTER)			10	DIAPHRAGM ROD		
	STANDARD,			11	SPRING	SEE FOLLOWING TABLE	
	W/HANDWHEEL, OR W/ADJ UP STOP			12	SPRING BARREL		
	SIZE 40	2E6700X0012	1	13	SPRING SEAT	SEE FOLLOWING TABLE	
				16	NUT, HEX		
				17	BEARING ROD END		
				18	SCREW, CAP, HEX HD		
				19	NUT, HEX, JAM		

*Recommended spare parts

Types 1051 & 1052 with F & G Mounting

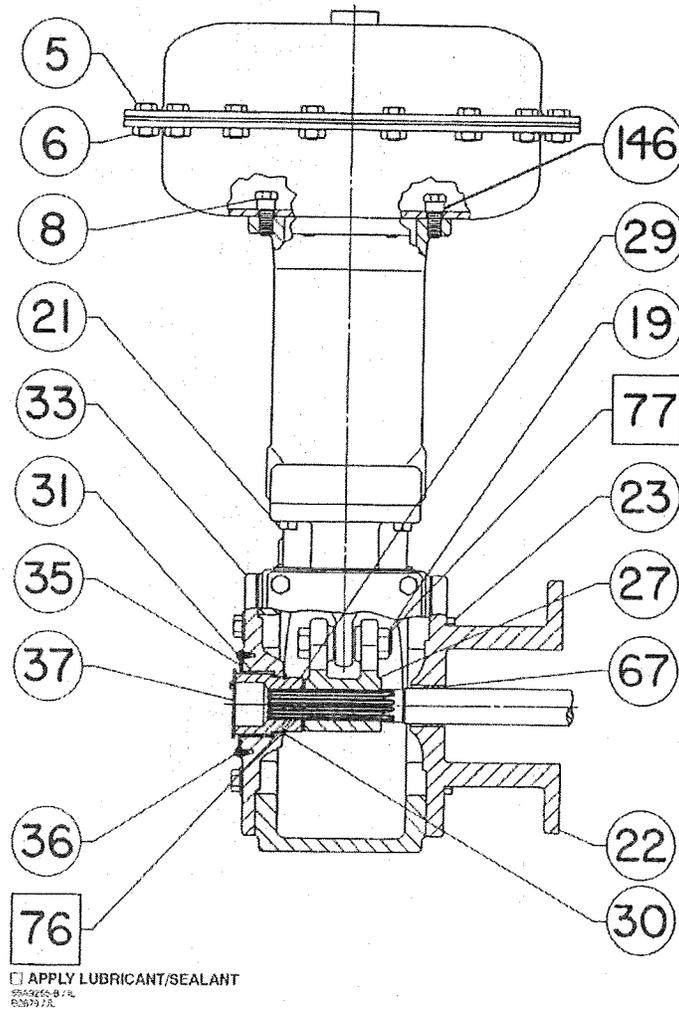


Figure 8. Typical Type 1051 Actuator Assembly (Continued)

Key	Description	Part Number	Qty	Key	Description	Part Number	Qty
20	HOUSING			41	NAMEPLATE		
20	MODIFIED HOUSING			42	SCREW, DRIVE		
21	SCREW, CAP, HEX HD			56	WARNING LABEL		
22	YOKE, MOUNTING			57	TURNBUCKLE		
23	SCREW, CAP, HEX HEAD			58	NUT, HEX, JAM		
27	LEVER			59	PLATE, ACCESS		
28	SCREW, CAP, HEX HD			63	WASHER, PLAIN		
29	HUB			67*	BUSHING		
30	RING, RETAINING, EXT			71	BEARING, THRUST		
31*	BUSHING			72	BEARING RACE		
	SIZE 40	12A9373X012	1	73	BEARING SEAT		
	SIZES 60 & 70	12A9374X012	1	74	SCREW, ADJUSTING		
33	COVER			75	SET SCREW, HEX SOCKET		
34	SCREW, CAP, HEX HD			76	LUBRIPLATE MAG-1, LUBRICANT OR EQUIVALENT		
35	SCALE, INDICATOR			77	LOCTITE 271 SEALANT OR EQUIVALENT		
36	SCREW, SELF TAPPING			78	SCREW, CAP		
37	TRAVEL INDICATOR			82	DIAPHRAGM HEAD, LOWER		
38	SELF-TAPPING SCREW			83	PLUG, PROTECTIVE		
38	MACHINE SCREW			---	PIPE BUSHING (NOT SHOWN)		
39	PLATE, COVER			144	WARNING NAMEPLATE		
40	SCREW, CAP, HEX HD			146	SPACER		

SEE FOLLOWING TABLE

Types 1051 & 1052 with F & G Mounting

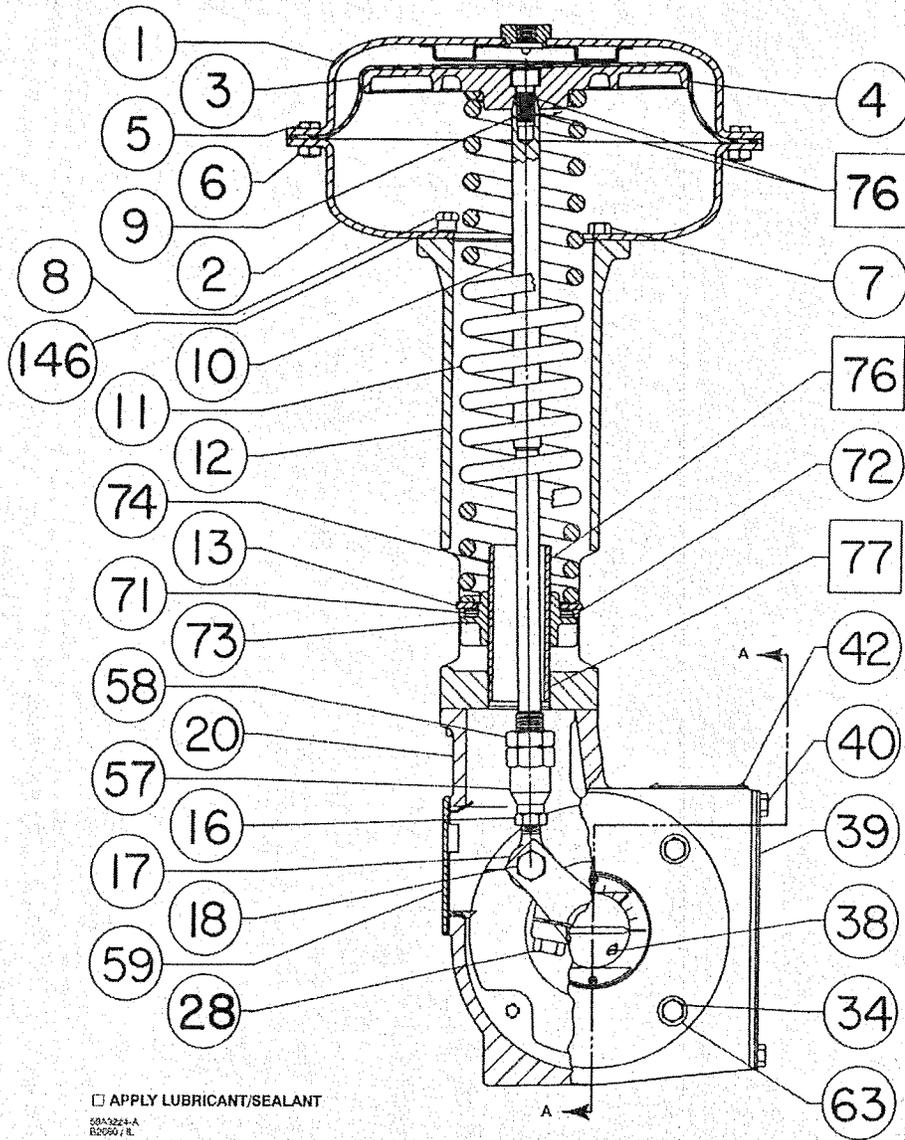


Figure 9. Typical Type 1052 Assembly

Top-Mounted Handwheel (Figure 10)

Key	Description	Part Number	Qty	Key	Description	Part Number	Qty
51	HANDWHEEL			139*	O-RING, (NITRILE) (continued)		
54	NUT, HEX, SLOTTED				SIZE 70	1D269106992	1
133	STEM			140*	PIN, GROOVE, CARBON STEEL-PLATED		
135	PLATE, PUSHER				SIZE 40	1F118028992	1
137	NUT, HEX, JAM,				S31600 (316 SST)		
138*	O-RING, (NITRILE)				SIZE 60	1B527035072	1
	SIZE 40	1D237506992	1	141	SCREW, CAP, HEX HD		
	SIZE 60	1B885506992	1	142	BODY		
	SIZE 70	1C415706992	1	164	BODY EXTENSION		
139*	O-RING, (NITRILE)			169	GREASE FITTING		
	SIZE 40	1D267306992	1	171	WASHER, PLAIN		
	SIZE 60	1D547106992	1	174	RETAINING SCREW		
				175	BEARING, THRUST		

*Recommended spare parts

Types 1051 & 1052 with F & G Mounting

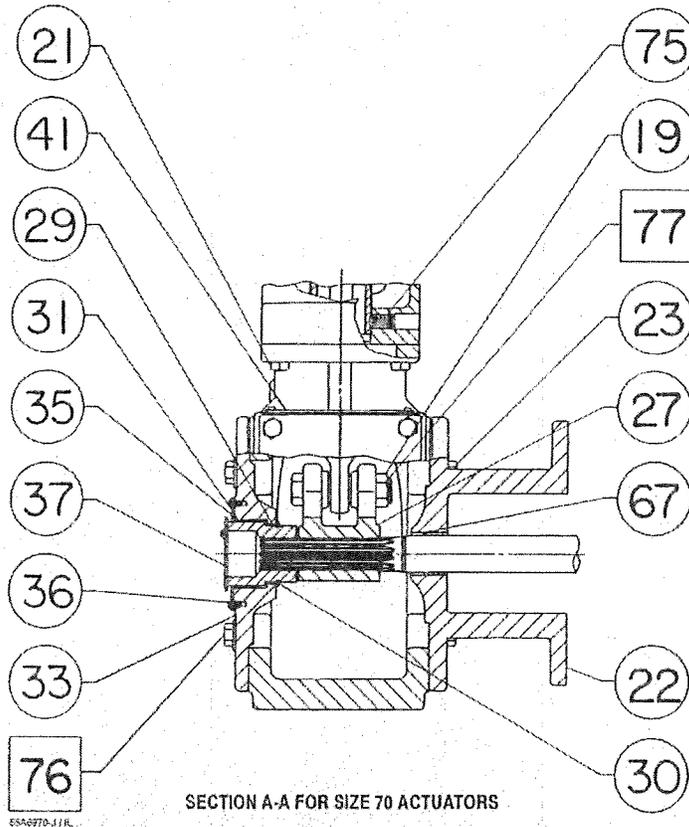
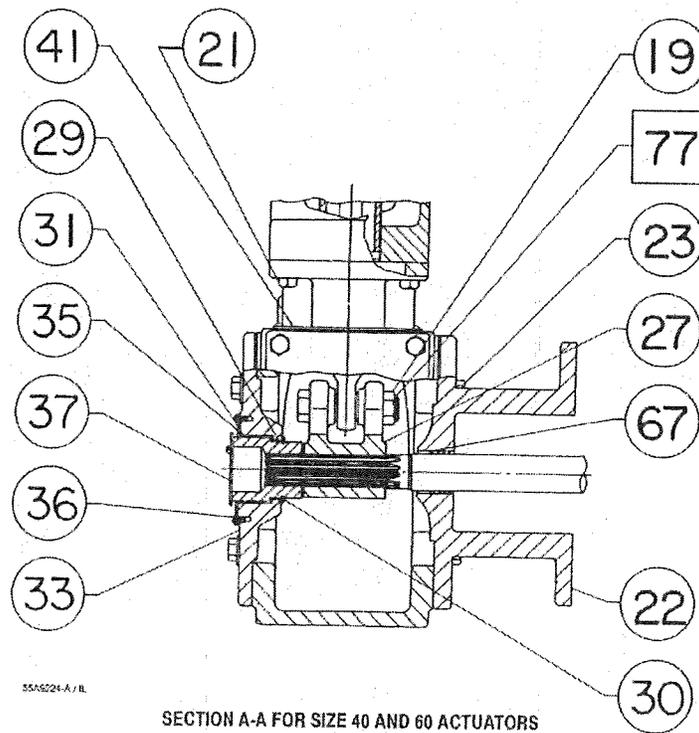
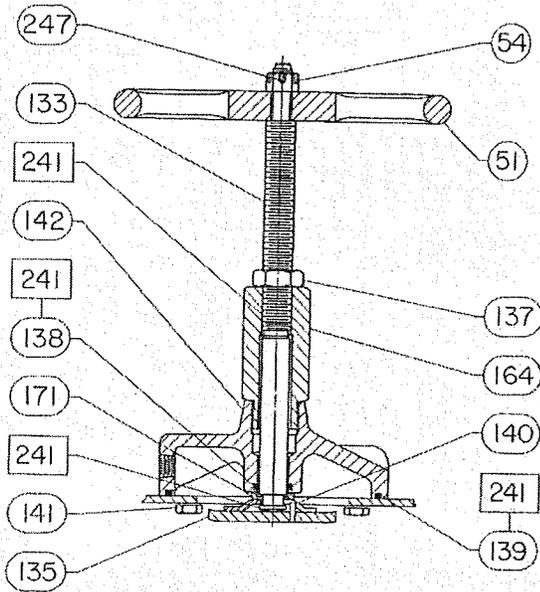


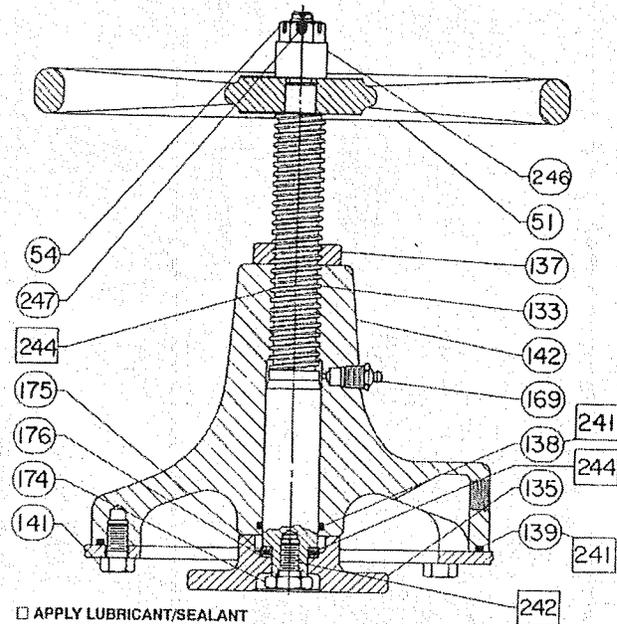
Figure 9. Typical Type 1052 Assembly (continued)

Types 1051 & 1052 with F & G Mounting



□ APPLY LUBRICANT
DRA1213-B / JL

TOP-MOUNTED HANDWHEEL ASSEMBLY FOR
SIZE 30, 40, AND 60 ACTUATORS



□ APPLY LUBRICANT/SEALANT
C/2610-G / JL

TOP-MOUNTED HANDWHEEL ASSEMBLY FOR
SIZE 70 ACTUATOR

Figure 10. Handwheel Assemblies

Key	Description	Part Number	Qty
176	BEARING RACE, THRUST		
241	LUBRIPLATE MAG-1, LUBRICANT OR EQUIVALENT		
242	LOCTITE 271 SEALANT OR EQUIVALENT		
244	NEVER-SEEZ OR EQUIVALENT		
246	SPACER		
247	PIN, COTTER		

Key	Description	Part Number	Qty
174	RETAINING SCREW		
175	BEARING, THRUST		
176	BEARING RACE, THRUST		
187	TRAVEL STOP CAP		
241	LUBRIPLATE MAG-1, LUBRICANT OR EQUIVALENT		
242	LOCTITE 271 SEALANT OR EQUIVALENT		

Adjustable Up Travel Stop (Figure 11)

133	STEM		
135	PLATE, PUSHER		
137	NUT, TRAVEL STOP		
138*	O-RING, (NITRILE)		
	SIZE 40	1D237506992	1
	SIZE 60	1B885506992	1
	SIZE 70	1C415706992	1
139*	O-RING, (NITRILE)		
	SIZE 40	1D267306992	1
	SIZE 60	1D547106992	1
	SIZE 70	1D269106992	1
140*	PIN, GROOVE CARBON STEEL-PLATED		
	SIZE 40	1F118028992	1
	S31600 (316 SST)		
	SIZE 60	1B627035072	1
141	SCREW, CAP, HEX HD		
142	BODY		
164	BODY EXTENSION		
169	GREASE FITTING		
171	SPACER		

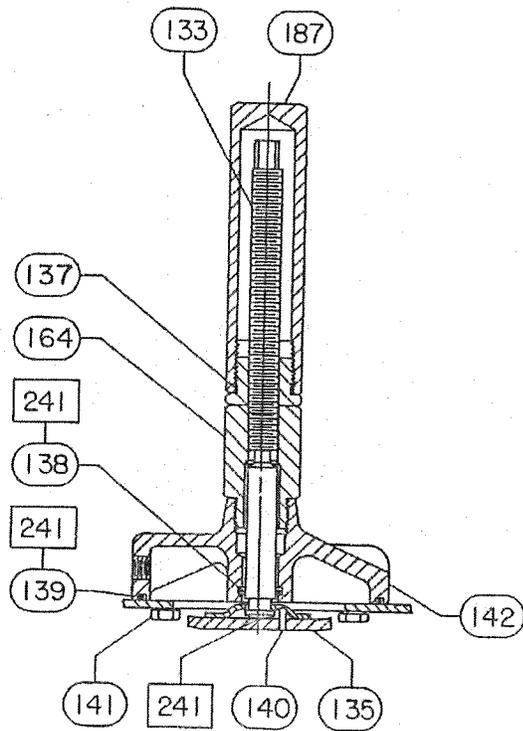
Adjustable Down Travel Stop (Figure 12)

54	NUT, HEX		
63	FLANGE NUT		
133	TRAVEL STOP STEM		
134	WASHER (PLAIN CARBON STEEL)		
139*	O-RING (NITRILE)		
	SIZE 40	1D267306992	1
	SIZE 60	1D547106992	1
	SIZE 70	1D269106992	1
141	SCREW, CAP, HEX HD (STEEL ZN PL)		
142	TRAVEL STOP BODY		
187	TRAVEL STOP CAP		
189	NUT, HEX, JAM		
241	LUBRIPLATE MAG-1, LUBRICANT OR EQUIVALENT		

Locking Assembly (Figure 6) (Size 40, 60, and 70 Actuators)

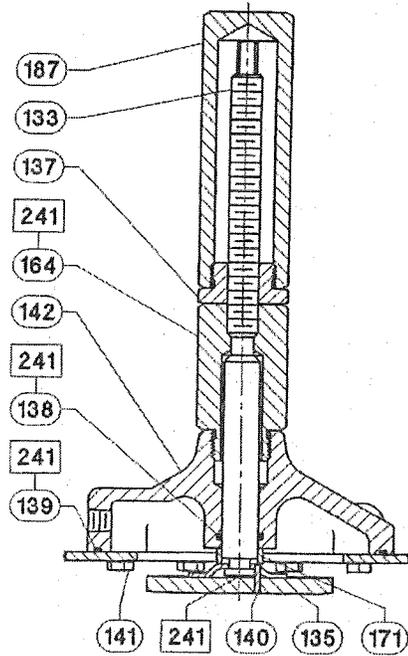
123	MOUNTING PLATE
127	GROOVE PIN
128	JAM NUT
129	CAP SCREW

Types 1051 & 1052 with F & G Mounting



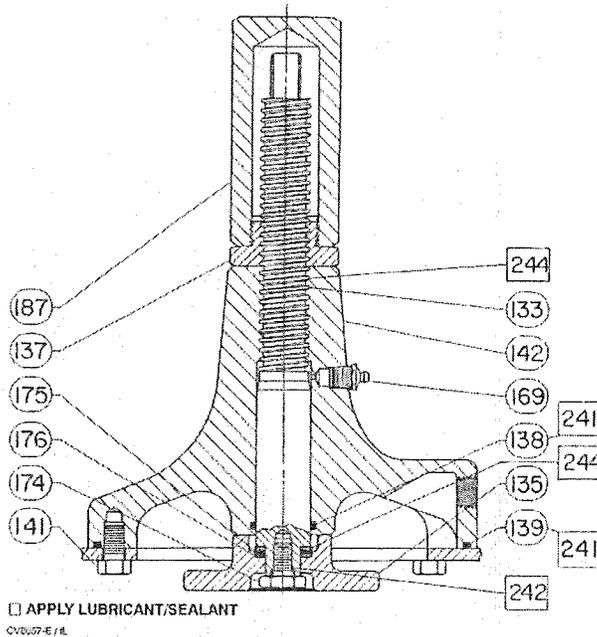
□ APPLY LUBRICANT
26A1207 B / R.

ADJUSTABLE UP TRAVEL STOP FOR
SIZE 40 ACTUATORS



□ APPLY LUBRICANT
26A1214 A / R.

ADJUSTABLE UP TRAVEL STOP FOR
SIZE 60 ACTUATORS



□ APPLY LUBRICANT/SEALANT
CVD657-E / R.

ADJUSTABLE UP TRAVEL STOP FOR SIZE 70
TYPE 1052 ACTUATORS

Figure 11. Adjustable Up Travel Stops

Types 1051 & 1052 with F & G Mounting

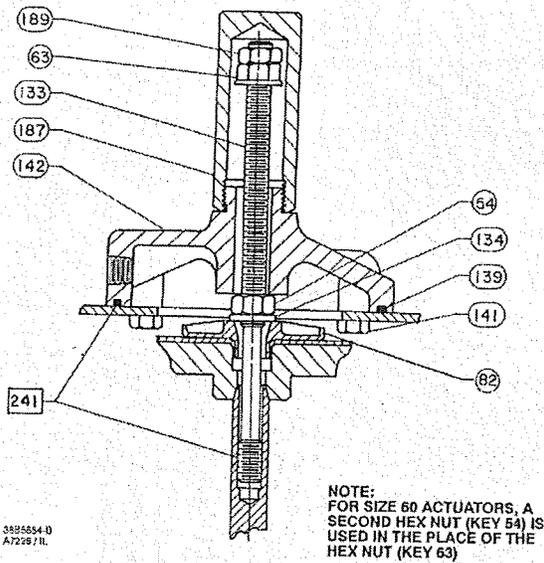


Figure 12. Adjustable Down Travel Stop

Pipe-Away Vent (Figure 7)

COMPLETE RETROFIT KITS ARE LISTED AT THE BEGINNING OF THE PARTS LIST. USE THIS LISTING FOR INDIVIDUAL REPLACEMENT PARTS

Key	Description	Part Number	Qty
132*	LINED BUSHING (STEEL/PTFE) YOKE SIDE (continued)		
	31.8 mm (1-1/4 INCH) DIA. SHAFT	14B4633X012	2
	38.1 mm (1-1/2 INCH) DIA. SHAFT	14B4634X012	2
	44.5 mm (1-3/4-INCH) DIA. SHAFT	14B4635X012	2
	50.8 mm (2-INCH) DIA. SHAFT	G1668548112	2
133*	O-RING (NITRILE)		
	12.7 mm (1/2-INCH) DIA. SHAFT	1J4888X0052	1
	15.9 mm (5/8-INCH) DIA. SHAFT	11A8741X052	1
	19.1 mm (3/4-INCH) DIA. SHAFT	1F4636X0032	1
	22.2 mm (7/8-INCH) DIA. SHAFT	10A3805X012	1
	25.4 mm (1-INCH) DIA. SHAFT	10A8217X042	1
	31.8 mm (1-1/4 INCH) DIA. SHAFT	14A6981X012	1
	38.1 mm (1-1/2 INCH) DIA. SHAFT	1F1153X0012	1
	44.5 mm (1-3/4-INCH) DIA. SHAFT	1P1676X0012	1
	50.8 mm (2-INCH) DIA. SHAFT	10A3800X012	1
134*	BUSHING (STEEL/PTFE) HUB SIDE		
	SIZE 30/40		
	12.7 TO 22.2 mm (1/2- TO 7/8-INCH) DIA. SHAFT	14B3503X012	2
	SIZE 40		
	25.4 TO 31.8 mm (1- TO 1-1/4 INCH) DIA. SHAFT	14B3503X012	2
	SIZE 60		
	19.1 TO 50.8 mm (3/4- TO 2-INCH) DIA. SHAFT	14B4310X012	2
135*	O-RING HUB SIDE		
	SIZE 30/40		
	12.7 TO 22.2 mm (1/2- TO 7/8-INCH) DIA. SHAFT	1K594906562	1
	SIZE 40		
	25.4 TO 31.8 mm (1- TO 1-1/4 INCH) DIA. SHAFT	1K594906562	1
	SIZE 60		
	19.1 TO 50.8 mm (3/4- TO 2-INCH) DIA. SHAFT	1U2504X0042	1
136	TRAVEL IND GASKET		
137	ACCESS PLATE ASSEMBLY		
138	MACHINE SCREW		
139	PERMATEX BLUE RTV OR EQUIVALENT		
140	PLUG		
141	SPRING BARREL COVER TYPE 1052 ONLY		
142	SELF-TAPPING SCREW		
143	CAP SCREW		
132*	LINED BUSHING (STEEL/PTFE) YOKE SIDE		
	12.7 mm (1/2-INCH) DIA. SHAFT	1U902599402	2
	15.9 mm (5/8-INCH) DIA. SHAFT	14B4642X012	2
	19.1 mm (3/4-INCH) DIA. SHAFT	F1918348112	2
	22.2 mm (7/8-INCH) DIA. SHAFT	14B4631X012	2
	25.4 mm (1-INCH) DIA. SHAFT	14B4632X012	2

Types 1051 & 1052 with F & G Mounting

Key 11. Spring⁽¹⁾ for Type 1052 Actuator Only (Steel)
 Key 13. Spring Seat⁽¹⁾ for Type 1052 Actuator Only (Steel)

CASING PRESSURE		ACTUATOR SIZE	KEY 11 SPRING PART NUMBER	KEY 13 SPRING SEAT PART NO.
Bar	Psig			
0 to 1.2	0 to 18	40	1L217427042	12A9447X012
		60	1K162727082 1N937327082 1N937327082	12A9450X012 12A9448X012 12A9449X012
0 to 2.3	0 to 33	40	1L217327042 1P637127082	12A9446X012 12A9447X012
		60	1K162827082 1K162827082 1N937327082 1N937327082	12A9448X012 12A9449X012 12A9448X012 12A9449X012
0 to 2.8	0 to 40	40	1L217327042	12A9446X012
		60	1K162827082 1K162829082	12A9448X012 12A9449X012
0 to 3.8	0 to 55	40	1L217327042	12A9446X012
0.2 to 1.0	3 to 15	60	1K162727082	12A9450X012
0.2 to 2.1	3 to 30	40	1L217327042 1P637127082	12A9446X012 12A9447X012
		60	1K162827082 1N937327082	12A9449X012 12A9449X012

Key 11. Spring⁽¹⁾ for Type 1052 Actuators Only (Steel)

CASING PRESSURE		ACTUATOR SIZE	INITIAL SPRING COMPRESSION				KEY 11 SPRING PART NUMBER
Bar	Psig		Push-down-to-open		Push-down-to-close		
			Bar	Psig	Bar	Psig	
0 to 1.2	0 to 18	40	0.2	3.0	0.2	3.0	1L217427042
			0.3	4.3	0.2	3.0	1P637127082
	0 to 18	60	0.3	3.7	0.2	3.0	1K162727082
			0.2	3.5	0.2	3.0	1N937327082
0 to 2.3	0 to 33	40	0.3	4.3	0.3	4.3	1P637127082
			0.4	6.0	0.2	3.0	1L217327042
			0.3	4.4	0.2	3.0	1N844027082
	0 to 33	60	0.2	3.5	0.2	3.5	1N937327082
			0.5	7.0	0.2	3.0	1K162827082
			0.5	6.8	0.2	3.0	1P270227042
	0 to 33	70	0.7	10.1	0.2	3.0	1R676027082
0 to 2.8	0 to 40	40	0.3	4.4	0.2	3.0	1N844027082
			0.4	6.0	0.2	3.0	1L217327042
	0 to 40	60	0.5	6.8	0.2	3.0	1P270227042
			0.5	7.0	0.2	3.1	1K162827082
	0 to 40	70	0.7	10.1	0.2	3.3	1R676027082
0 to 3.8	0 to 55	40	0.3	4.4	0.2	3.5	1N844027082
	0 to 55	70	0.7	10.1	0.7	10.1	1R676027082
0.2 to 1.0	3 to 15	40	---	---	0.2	3.0	1L217427042
	3 to 15	60	0.3	3.7	0.2	3.0	1K162727082
0.2 to 2.1	3 to 30	40	0.3	4.3	0.3	4.3	1P637127082
			0.4	6.0	0.2	3.0	1L217327042
			---	---	0.2	3.0	1N844027082
	3 to 30	60	0.2	3.5	0.2	3.5	1N937327082
			0.5	7.0	0.2	3.0	1K162827082
			---	---	0.2	3.0	1P270227042
	3 to 30	70	0.7	10.1	0.2	3.0	1R676027082

1. For more detailed ordering information concerning spring selection to obtain the torque required by the valve, consult your Fisher sales office.

Types 1051 & 1052 with F & G Mounting

Keys 22 and 67⁽¹⁾*. Mounting Yoke Assembly

VALVE DESIGN	ACTUATOR SIZE	VALVE SHAFT DIAMETER	VALVE SHAFT DIAMETER	KEY 22 YOKE CAST IRON		KEY 67 BUSHING, PTFE
		mm	Inches			
CV500, V100, V150, V200, V250, V300, 8510, 8522, 8532, 8560, and 7800 (2-12 Inch) for F Mounting	40	12.7	1/2	12A9799X0A2	---	1U902599402
		15.9	5/8	12A9799X0B2	---	12A9555X012
		19.1	3/4	12A9799X0C2	---	12A9556X012
	40	22.2	7/8	12A9799X0E2	---	12A9557X012
		25.4	1	12A9799X0G2	---	12A9775X012
		31.8	1-1/4	12A9799X112	---	12A9558X012
	60	19.1	3/4	12A9799X0D2	---	12A9556X012
		22.2	7/8	12A9799X0F2	---	12A9557X012
		25.4	1	12A9799X0H2	---	12A9775X012
	60 and 70	31.8	1-1/4	12A9799X0J2	---	12A9558X012
		38.1	1-1/2	12A9799X0K2	---	12A9559X012
		44.5	1-3/4	12A9799X0L2	---	10A3648X012
7600 and 9500 for G Mounting	40	12.7	1/2	---	32A9755X012	1U902599402
		15.9	5/8	---	32A9742X012	12A9555X012
		19.1	3/4	---	32A9743X012	12A9556X012
	40	25.4	1	---	32A9757X012	12A9575X012
		31.8	1-1/4	---	32A9746X012	12A9558X012
		19.1	3/4	---	32A9750X012	12A9556X012
	60	25.4	1	---	32A9778X012	12A9775X012
		31.8	1-1/4	---	32A9753X012	12A9558X012
		38.1	1-1/2	---	32A9754X012	12A9559X012
	60 and 70	44.5	1-3/4	---	35A9704X012	12A9560X012
		50.8	2	---	35A9705X012	12A9561X012

1. The yokes in this column are available as yoke-bushing assemblies, However, the bushings are available as replacement parts.

Types 1051 & 1052 with F & G Mounting

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FISHER-ROSEMOUNT™

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.

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).

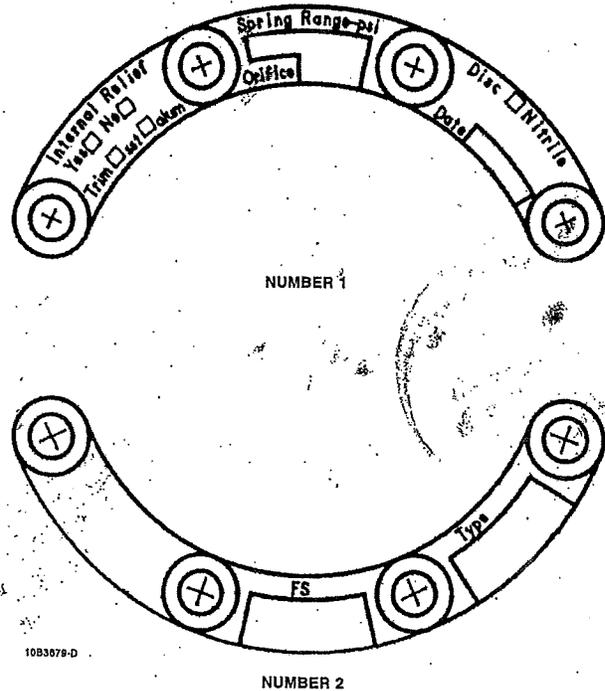
Specifications

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.



W4783

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



10B3079-D

Figure 2. Nameplates

627 Series

Table 1. Specifications

Available Constructions

Type 627: Self-operated pressure reducing regulator equipped with a pitot tube for greater regulated capacities (figure 7)

Type 627R: Type 627 with internal relief and with an open throat (figure 8)

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)

Type 627MR: Type 627M with internal relief (figure 10)

Type 627H: Type 627 with a diaphragm limiter to deliver a higher outlet pressure (figure 11)

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)

Body Sizes

3/4, 1, or 2-inch

End Connection Styles

3/4, 1, or 2-inch body sizes: NPT

1 or 2-inch body sizes: ANSI Class 300 or 600 RF flanged

Maximum Inlet Pressure⁽¹⁾ (Body Rating)

2000 psig (138 bar) for NPT steel, 1480 psig (102 bar) for RF flanged steel, or 1000 psig (69 bar) for ductile iron

Maximum Valve Disk Inlet Pressure Rating⁽¹⁾

2000 psig (138 bar) for nylon disk or 1000 psig (69 bar) for nitrile disk

Maximum Operating Inlet Pressure, Pressure Differential, and Outlet Pressure Ranges⁽¹⁾

See table 2 for pressures by port and spring range

Maximum Spring and Diaphragm Casing Pressure⁽¹⁾

See table 3

Maximum Body Outlet Pressure⁽¹⁾ (Type 627M, 627MR, and 627HM Only)

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)

Port Diameters

See table 2

Internal Relief Performance

Type 627R: See table 4

Type 627MR: Limited by field-installed control line piping

Temperature Capabilities⁽¹⁾

-20 to 180°F (-29 to 82°C)

Pressure Registration

Type 627, 627H or 627R: Internal

Type 627M, 627HM or 627MR: External through 1/4-inch NPT control line connection in the diaphragm casing

De-Icer System

See figure 3 and Type 627M Regulator De-Icer System Application section

Relief Indicator

For 627R and 627MR (see figures 8 and 9)

Spring Case Vent Connection

3/4-inch NPT female with removable screened vent assembly

Control Line Connection (Type 627M, 627HM or 627MR Only)

1/4-inch NPT female

Approximate Weight

Ductile Iron or Steel Casings: 10 pounds (4,5 kg)

Aluminum Casings: 6.3 pounds (2.8 kg)

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

627 Series

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) 1/8 (3,2) 3/16 (4,8) 1/4 (6,4) 3/8 (9,5) 1/2 (12,7)	2000 (138) ⁽¹⁾ 1000 (69) ⁽¹⁾ 750 (51,7) 500 (34,5) 300 (20,7) 250 (17,2)	2000 (138) ⁽¹⁾ 1000 (69) ⁽¹⁾ 750 (51,7) 500 (34,5) 300 (20,7) 250 (17,2)
	15 to 40 psig (1,0 to 2,8 bar) 10B3077X012 Green	3/32 (2,4) 1/8 (3,2) 3/16 (4,8) 1/4 (6,4) 3/8 (9,5) 1/2 (12,7)	2000 (138) ⁽¹⁾ 1500 (103) ⁽¹⁾ 1000 (69) ⁽¹⁾ 750 (51,7) 500 (34,5) 300 (20,7)	2000 (138) ⁽¹⁾ 1500 (103) ⁽¹⁾ 1000 (69) ⁽¹⁾ 750 (51,7) 500 (34,5) 300 (20,7)
	35 to 80 psig (2,4 to 5,5 bar) 10B3078X012 Blue	3/32 (2,4) 1/8 (3,2) 3/16 (4,8) 1/4 (6,4) 3/8 (9,5) 1/2 (12,7)	2000 (138) ⁽¹⁾ 2000 (138) ⁽¹⁾ 1750 (121) ⁽¹⁾ 1500 (103) ⁽¹⁾ 1000 (69) ⁽¹⁾ 750 (51,7)	2000 (138) ⁽¹⁾ 2000 (138) ⁽¹⁾ 1750 (121) ⁽¹⁾ 1500 (103) ⁽¹⁾ 1000 (69) ⁽¹⁾ 750 (51,7)
	70 to 150 psig (4,8 to 10,3 bar) 10B3079X012 Red	3/32 (2,4) 1/8 (3,2) 3/16 (4,8) 1/4 (6,4) 3/8 (9,5) 1/2 (12,7)	2000 (138) ⁽¹⁾ 2000 (138) ⁽¹⁾ 2000 (138) ⁽¹⁾ 1750 (121) ⁽¹⁾ 1250 (86,2) ⁽¹⁾ 750 (51,7)	2000 (138) ⁽¹⁾ 2000 (138) ⁽¹⁾ 2000 (138) ⁽¹⁾ 1750 (121) ⁽¹⁾ 1250 (86,2) ⁽¹⁾ 750 (51,7)
627R and 627MR	5 ⁽²⁾ to 20 psig (0,34 to 1,4 bar) 10B3076X012 Yellow	3/32 (2,4) 1/8 (3,2) 3/16 (4,8) 1/4 (6,4) 3/8 (9,5) 1/2 (12,7)	2000 (138) ⁽¹⁾ 1000 (69) ⁽¹⁾ 750 (51,7) 500 (34,5) 300 (20,7) 200 (13,8)	2000 (138) ⁽¹⁾ 1000 (69) ⁽¹⁾ 750 (51,7) 500 (34,5) 300 (20,7) 200 (13,8)
	15 to 40 psig (1,0 to 2,8 bar) 10B3077X012 Green	3/32 (2,4) 1/8 (3,2) 3/16 (4,8) 1/4 (6,4) 3/8 (9,5) 1/2 (12,7)	2000 (138) ⁽¹⁾ 1500 (103) ⁽¹⁾ 1000 (69) ⁽¹⁾ 750 (51,7) 300 (20,7) 200 (13,8)	2000 (138) ⁽¹⁾ 1500 (103) ⁽¹⁾ 1000 (69) ⁽¹⁾ 750 (51,7) 300 (20,7) 200 (13,8)
	35 to 80 psig (2,4 to 5,5 bar) 10B3078X012 Blue	3/32 (2,4) 1/8 (3,2) 3/16 (4,8) 1/4 (6,4) 3/8 (9,5) 1/2 (12,7)	2000 (138) ⁽¹⁾ 1750 (121) ⁽¹⁾ 1000 (69) ⁽¹⁾ 750 (51,7) 300 (20,7) 200 (13,8)	2000 (138) ⁽¹⁾ 1750 (121) ⁽¹⁾ 1000 (69) ⁽¹⁾ 750 (51,7) 300 (20,7) 200 (13,8)
	70 to 150 psig (4,8 to 10,3 bar) 10B3079X012 Red	3/32 (2,4) 1/8 (3,2) 3/16 (4,8) 1/4 (6,4) 3/8 (9,5) 1/2 (12,7)	2000 (138) ⁽¹⁾ 1000 (69) ⁽¹⁾ 500 (34,5) 300 (20,7) 200 (13,8) 200 (13,8)	2000 (138) ⁽¹⁾ 1000 (69) ⁽¹⁾ 500 (34,5) 300 (20,7) 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) 1/8 (3,2) 3/16 (4,8) 1/4 (6,4) 3/8 (9,5) 1/2 (12,7)	2000 (138) ⁽¹⁾ 2000 (138) ⁽¹⁾ 1750 (121) ⁽¹⁾ 1500 (103) ⁽¹⁾ 1000 (69) ⁽¹⁾ 750 (51,7)	2000 (138) ⁽¹⁾ 2000 (138) ⁽¹⁾ 1750 (121) ⁽¹⁾ 1000 (69) ⁽¹⁾ 500 (34,5) 250 (17,2)
	240 to 500 psig (16,5 to 34,5 bar) 10B3079X012 Red	3/32 (2,4) 1/8 (3,2) 3/16 (4,8) 1/4 (6,4) 3/8 (9,5) 1/2 (12,7)	2000 (138) ⁽¹⁾ 2000 (138) ⁽¹⁾ 1750 (121) ⁽¹⁾ 1500 (103) ⁽¹⁾ 1000 (69) ⁽¹⁾ 750 (51,7)	2000 (138) ⁽¹⁾ 2000 (138) ⁽¹⁾ 1750 (121) ⁽¹⁾ 1000 (69) ⁽¹⁾ 500 (34,5) 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.

627 Series

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.

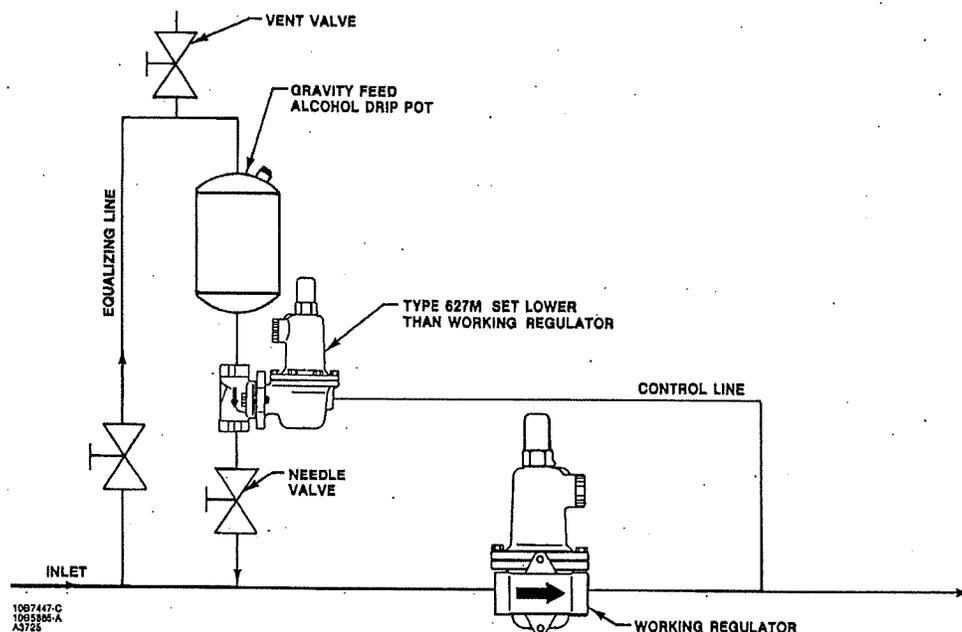


Figure 3. Schematic of De-Icer System



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)		480 (33,1)	220 (15,2)	160 (11,0)
		175 (12,1)	2000 (138)	2000 (138)				
		200 (13,8)	2000 (138)	2000 (138)				
		250 (17,2)	2000 (138)	2000 (138)				
	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)		480 (33,1)	220 (15,2)	160 (11,0)
		175 (12,1)	2000 (138)	2000 (138)				
		200 (13,8)	2000 (138)	2000 (138)				
		250 (17,2)	2000 (138)	2000 (138)				
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)		480 (33,1)	220 (15,2)	160 (11,0)	
	175 (12,1)	2000 (138)	2000 (138)					
	200 (13,8)	2000 (138)	2000 (138)					
	250 (17,2)	2000 (138)	2000 (138)					
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)		
		200 (13,8)	2000 (138)	2000 (138)	1300 (89,6)			
		250 (17,2)	2000 (138)	2000 (138)	1600 (66,2)			
	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)		
		200 (13,8)	2000 (138)	2000 (138)	1300 (89,6)			
		250 (17,2)	2000 (138)	2000 (138)	1600 (66,2)			
	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)	
		200 (13,8)	2000 (138)	2000 (138)	1200 (82,7)			
		250 (17,2)	2000 (138)	2000 (138)	1600 (110)			
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)		
	200 (13,8)	2000 (138)	2000 (138)	1200 (82,7)	730 (50,3)			
	250 (17,2)	2000 (138)	2000 (138)	1600 (110)				

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 627Mor 627HMregulator 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



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)	
		200 (13,8)	2000 (138)	2000 (138)	1200 (82,7)	720 (49,6)		
		250 (17,2)	2000 (138)	2000 (138)	1600 (110)			
	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)	
		200 (13,8)	2000 (138)	2000 (138)	1100 (75,8)	670 (46,2)		
		250 (17,2)	2000 (138)	2000 (138)	1500 (103)			
	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)		
		250 (17,2)	2000 (138)	2000 (138)	1400 (96,5)			
	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)		
		250 (17,2)	2000 (138)	2000 (138)	1300 (89,6)			
80 (5,5)	150 (10,3)	800 (55,2)	500 (34,5)	300 (20,7)	200 (13,8)	160 (11,0)	150 (10,3)	
	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)		
	250 (17,2)	2000 (138)	2000 (138)	1200 (82,7)				
70 to 150 psig (4,8 to 10,3 bar) 10B3079X012 Red	70 (4,8)	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)				
		250 (17,2)	2000 (138)	2000 (138)				
	80 (5,5)	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)				
100 (6,9)	200 (13,8)	1500 (103)	250 (17,2)	240 (16,5)	230 (15,9)			
	250 (17,2)	2000 (138)	1600 (110)					
125 (8,6)	250 (17,2)	2000 (138)	1000 (69,0)	500 (34,5)				
150 (10,3)	250 (17,2)	1200 (82,7)	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.

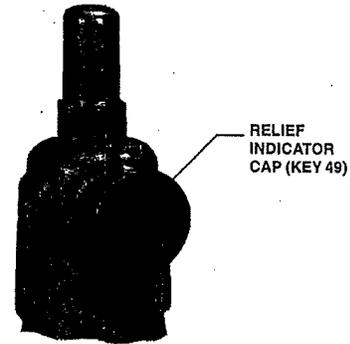


Figure 4. Relief Indicator

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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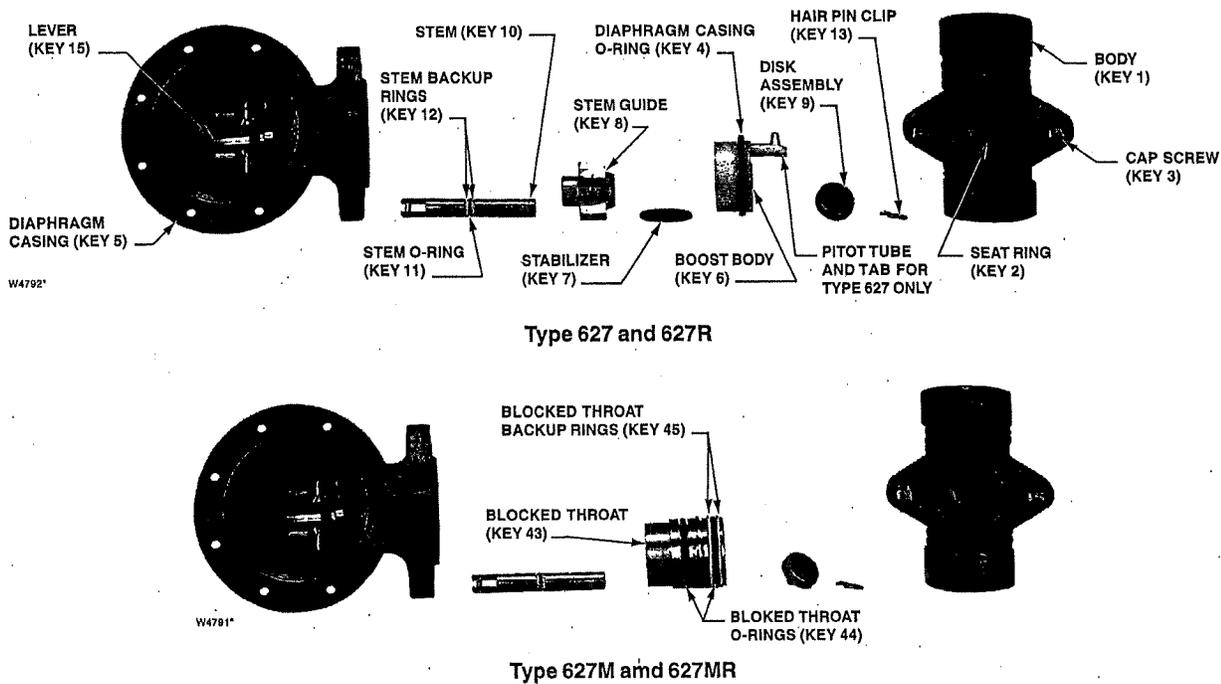


Figure 5. Stem Assemblies

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.

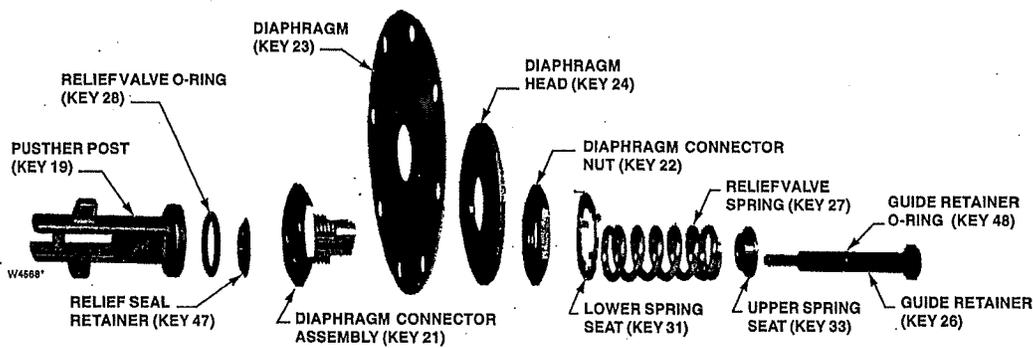
Diaphragm and Spring Case Area Maintenance Procedures

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.

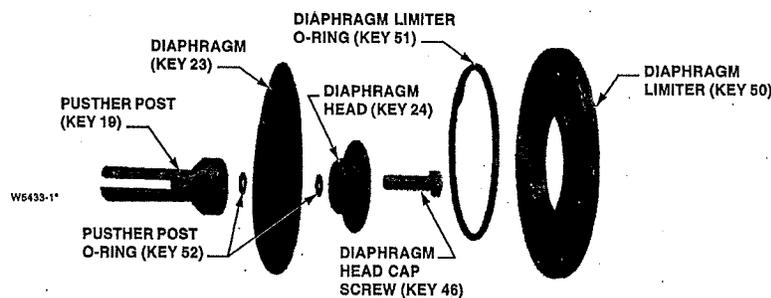
While using the following procedures, refer to figures 7 through 12 for key number locations.

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

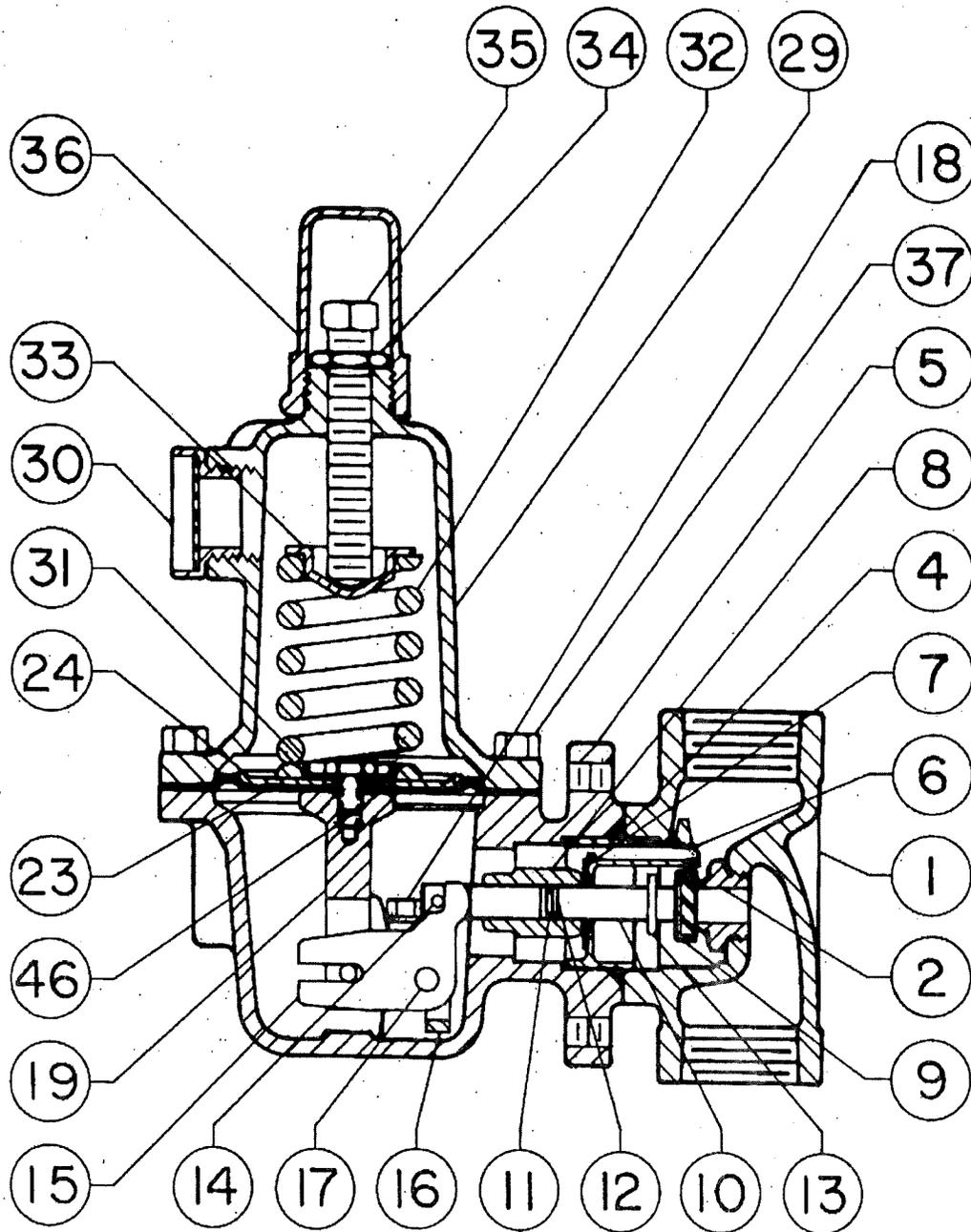
Key	Description	Part Number
	Type 627 Parts Kit with aluminum/nitrile trim (Includes keys 4, 9, 11, 12, and 23)	R627X000A12
	Type 627 Parts Kit with stainless steel/nitrile trim (includes keys 4, 9, 11, 12, and 23)	R627X000S12
	Type 627R Parts Kit with aluminum/nitrile trim (Includes keys 4, 9, 11, 12, 23, 28, and 48)	R627RX000A12
	Type 627R Parts Kit with stainless steel/nitrile trim (Includes keys 4, 9, 11, 12, 23, 28, and 48)	R627RX000S12
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.

627 Series

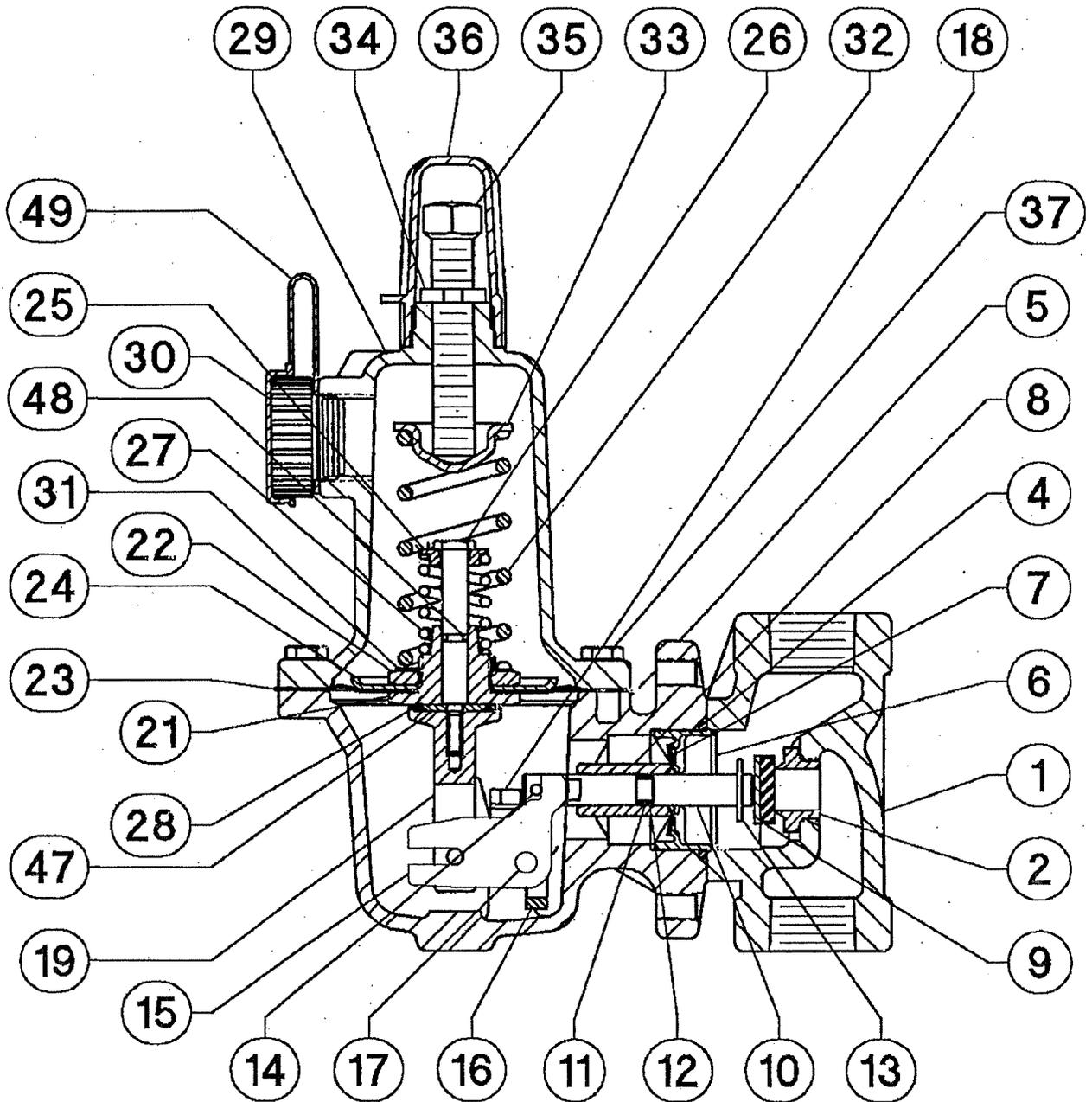
Key	Description	Part Number	Key	Description	Part Number
2*	Seat ring (continued) 316 Stainless steel, NACE ⁽¹⁾ construction only		23*	Diaphragm, nitrile (continued)	
	3/32-inch (2.4 mm) port diameter	0R0441X0012		For Type 627 or 627M w/steel diaphragm case	10B8735X012
	1/8-inch (3.2 mm) port diameter	1A9367X0022		For Type 627R or 627MR w/aluminum or ductile iron diaphragm case	10B3068X012
	3/16-inch (4.8 mm) port diameter	009912X0012		For Type 627R or 627MR w/steel diaphragm case	10B8736X012
	1/4-inch (6.4 mm) port diameter	0B0420X0012		For Type 627H or 627HM w/steel diaphragm case (diaphragm is neoprene with nylon fabric)	12B0178X012
	3/8-inch (9.5 mm) port diameter	0B0422X0012	24	Diaphragm Head, plated steel	
	1/2-inch (12.7 mm) port diameter	1A9288X0012		For Type 627 or 627M, plated steel	1D666428982
3	Cap Screw (not shown), (2 req'd) Type 627 and 627R w/aluminum diaphragm case, pl steel	18A1087X012		For Type 627R or 627MR, plated steel	10B3071X012
	All Types w/ductile iron diaphragm case, pl steel	1C403824052		For Type 627H or 627HM, 416 stainless steel	12B0175X012
	or steel diaphragm case, pl steel	1C403024052	25	Relief Spring Seat (for Type 627R or 627MR only), steel	10B7446X012
4*	Diaphragm Case O-Ring (Type 627, 627H, or 627R only), nitrile	17A2325X022	26	Guide Retainer (for Type 627R or 627MR only), stainless steel	10B7450X012
5	Diaphragm Case 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 for Type 627 only	11B5380X012	29	Spring Case	
	Ductile iron w/o 1/8-inch gauge tap	30B3053X012		For Type 627 or 627R	
	Ductile iron with 1/8-inch gauge tap for Type 627 only	31B0641X012		Aluminum	40B3086X012
	Steel	30B3104X012		Ductile iron	30B3055X012
	For Type 627M or 627MR			Steel	30B3102X012
	Ductile iron	39A5987X012		For Type 627M or 627MR	
	Steel	30B8734X012		Ductile iron	30B3055X012
	For Type 627H, steel	30B3104X012		Steel	30B3102X012
	For Type 627HM, steel	30B8734X012		For Type 627H or 627HM	
6	Boost Body (not for Type 627M, 627HM, or 627MR), Delrin ⁽²⁾		30	Screened Vent Assembly, plastic	30B3102X012
	For Type 627 or 627H	30B3056X012	31	Lower Spring Seat, plated steel	10B3093X012
	For Type 627R	30B3057X012		For Type 627 or 627M	1D666625072
7	Stabilizer (for Type 627, 627H, and 627R only), nitrile	10B3060X012		For Type 627R or 627MR	20B3073X012
8	Stem Guide (for Type 627, 627H, and 627R only), powdered metal	20B3061X012	32	Control Spring, pl steel	
9*	Disk Assembly (for all port diameters)			5 to 20 psig (0.34 to 1.4 bar), yellow	10B3076X012
	Aluminum holder and nitrile disk	1C4248X0212		15 to 40 psig (1.0 to 2.8 bar), green	10B3077X012
	303 Stainless steel holder and nitrile disk	1C4248X0202		35 to 80 psig (2.4 to 5.5 bar), blue	10B3078X012
	Aluminum holder and nylon disk	1C4248X00A2		70 to 150 psig (4.8 to 10.3 bar), red	10B3079X012
	303 Stainless steel holder and nylon disk	1C4248X0062		140 to 250 psig range (9.6 to 17.2 bar), blue, used in a Type 627H or 627HM	10B3078X012
	NACE construction only			240 to 500 psig range (16.5 to 34.5 bar), red, used in a Type 627H or 627HM	10B3079X012
	Aluminum holder and nitrile disk	1C4248X0212	33	Upper Spring Seat, plated steel	1D667125072
	316 Stainless steel holder and nitrile disk	1C4248X0252	34	Locknut, plated steel	1D667728982
	Aluminum holder and nylon disk	1C4248X00A2	35	Adjusting Screw, pl steel	
	316 Stainless steel holder and nylon disk	1C4248X0262		For Type 627 or 627M	10B3081X012
10	Stem			For Type 627H or 627HM	10B3081X012
	303 stainless steel	10B3059X012		For Type 627R or 627MR	10B3080X012
	316 stainless steel (NACE)	10B3059X022	36	Adjusting Screw Cap, plastic	20B3082X012
11*	Stem O-Ring, nitrile	1D687506992	37	Spring Case Cap Screw, pl steel (8 required)	
12	Stem Backup Ring, TFE (2 required)	1K786806992		For aluminum or ductile iron diaphragm case	1A391724052
13	Hair Pin Clip, stainless steel	10B3058X012		For steel diaphragm case	10B8737X012
14	Drive Pin, plated steel	1A953228982		For Type 627H/HM, steel diaphragm case	1A346424052
15	Lever, plated steel	20B3063X012	39	Nameplate	-----
16	Lever Retainer, plated steel	30B3097X012	43	Blocked Throat (for Type 627M, 627HM or 627MR only), stainless steel	10B3085X012
17	Lever Pin		44	Blocked Throat O-Ring (for Type 627M, 627HM, or 627MR only), nitrile (2 required)	1E264306992
	Stainless steel	10B3083X012	45	Blocked Throat Backup Ring (for Type 627M, 627HM, or 627MR only), TFE (2 required)	10B3106X012
	316 stainless steel (NACE)	10B3083X022	46	Diaphragm Head Cap Screw, steel	
18	Lever Cap Screw (2 required)			For Type 627 or 627M	1K920724052
	Plated steel	10B7454X012		For Type 627H or 627HM	1C379124052
	316 stainless steel (NACE)	10B7454X022	47	Relief Seal Retainer (for Type 627R or 627MR only), stainless steel	10B7445X012
19	Pusher Post, aluminum		48*	Guide Retainer O-Ring (for Type 627R or 627MR only), nitrile	1D682506992
	For Type 627 or 627M	10B3098 X012	49	Relief Indicator (for Type 627R or 627MR only), rubber (not shown)	
	For Type 627R or 627MR	10B3098 X022	50	Diaphragm Limiter	22B0176X012
	For Type 627H or 627HM, 416 stainless steel	10B3098 X032	51*	Diaphragm Limiter O-Ring	1K877606992
21	Diaphragm Connector (for Type 627R or 627MR only), stainless steel	10B6758X012	52*	Pusher Post O-Ring (2 required)	1C853806992
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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0083002-D

Figure 7. Type 627 Regulator Components



3083089-D

Figure 8. Type 627R Regulator Components

627 Series

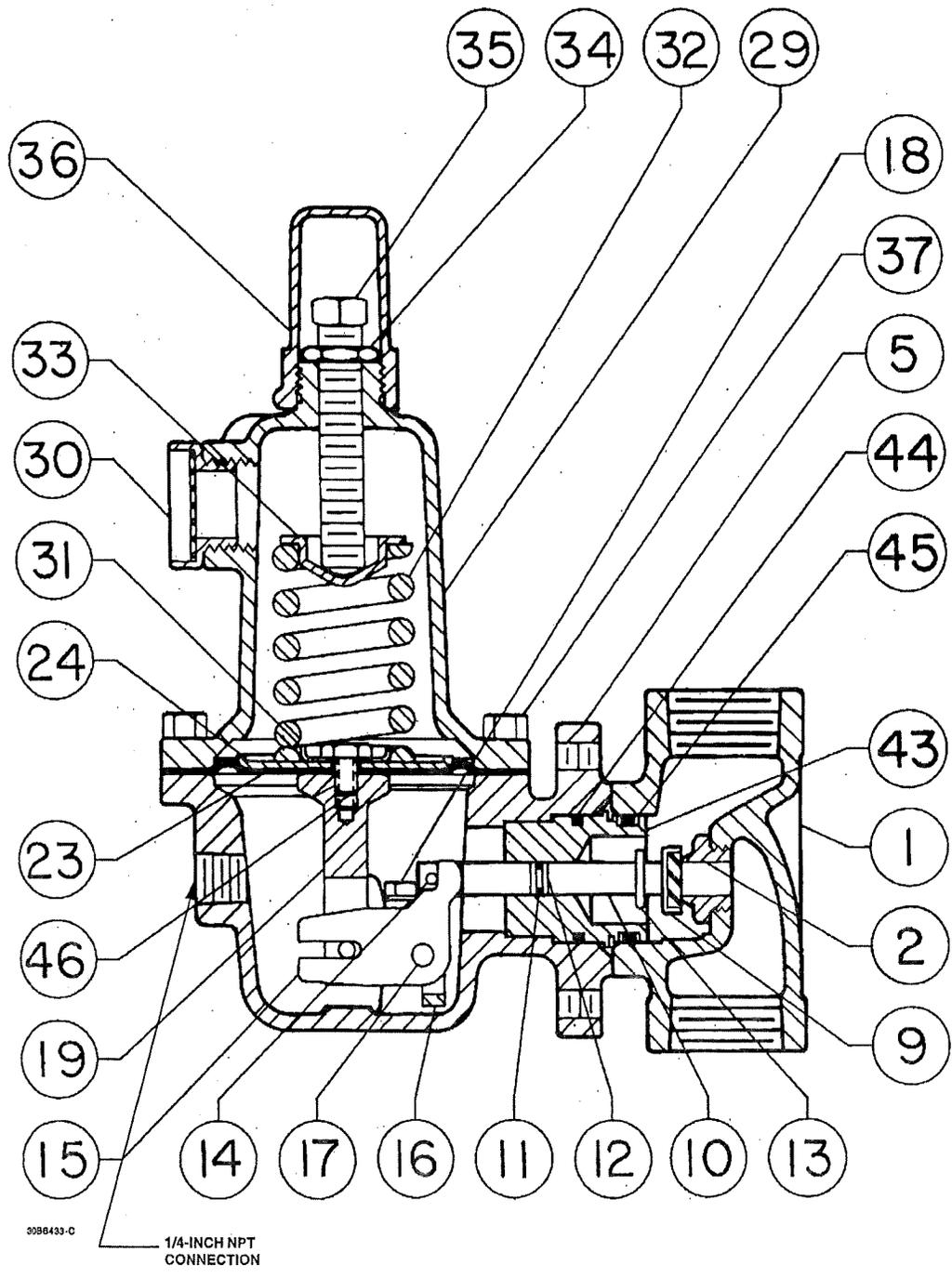


Figure 9. Type 627M Regulator Components

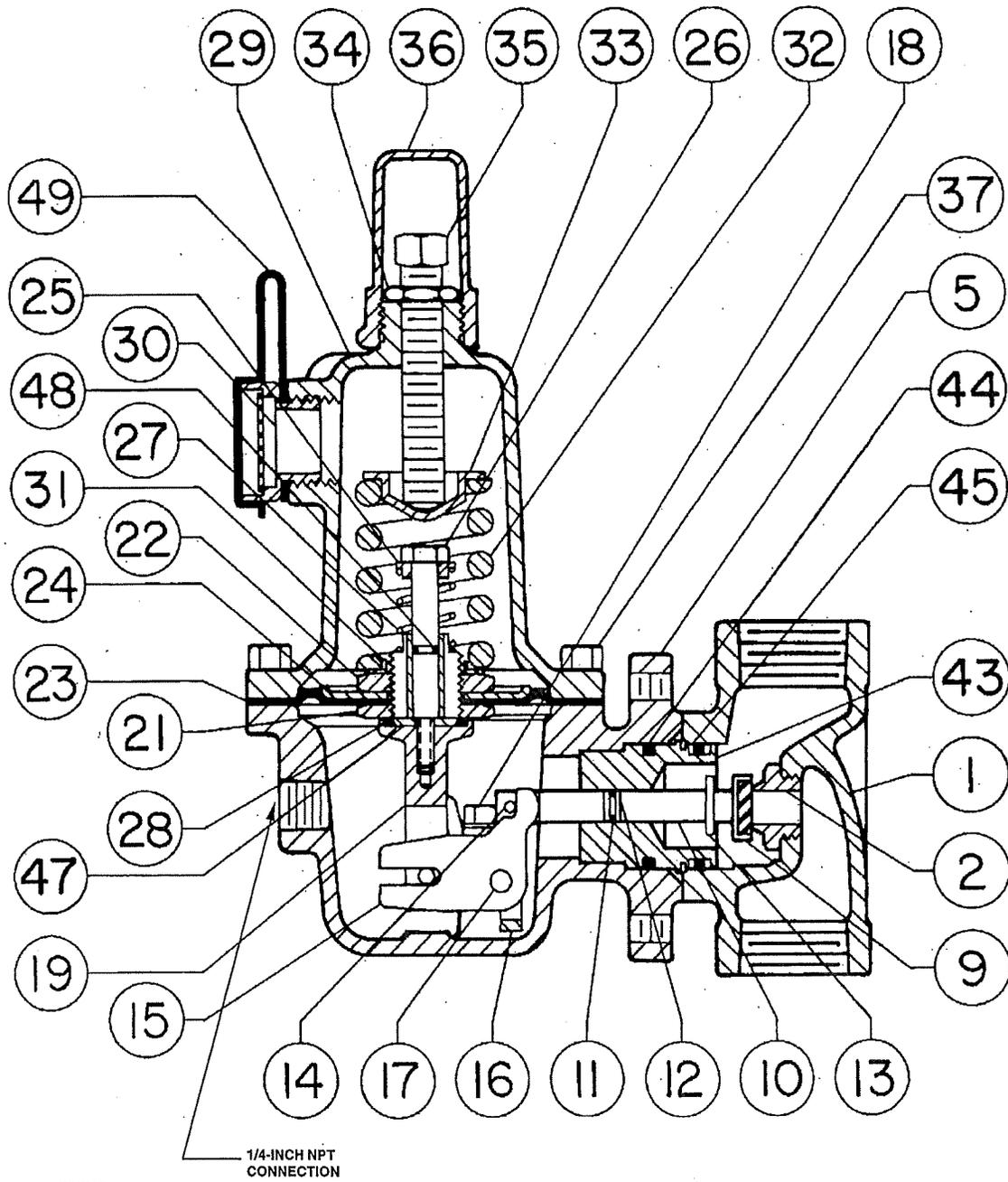
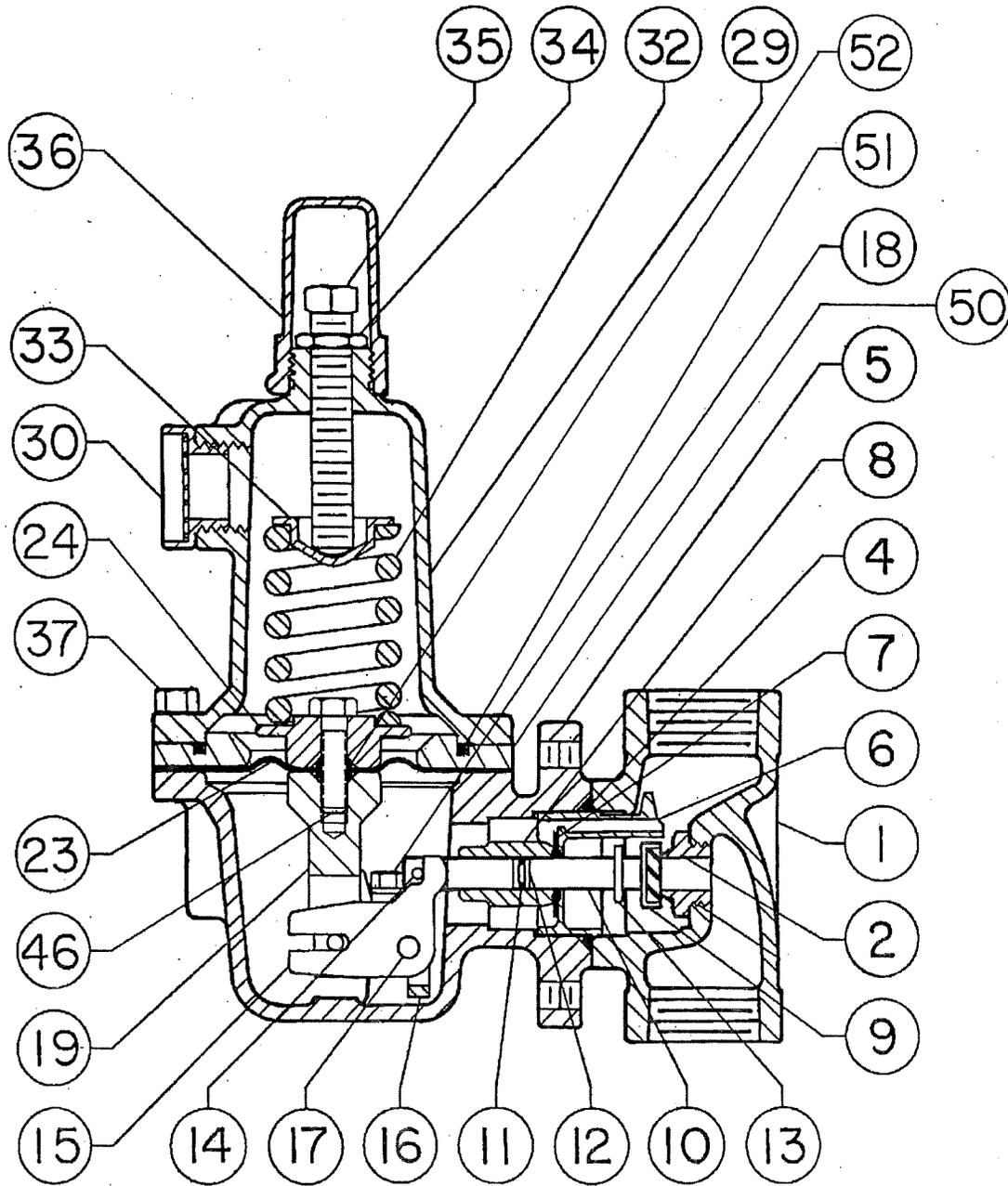


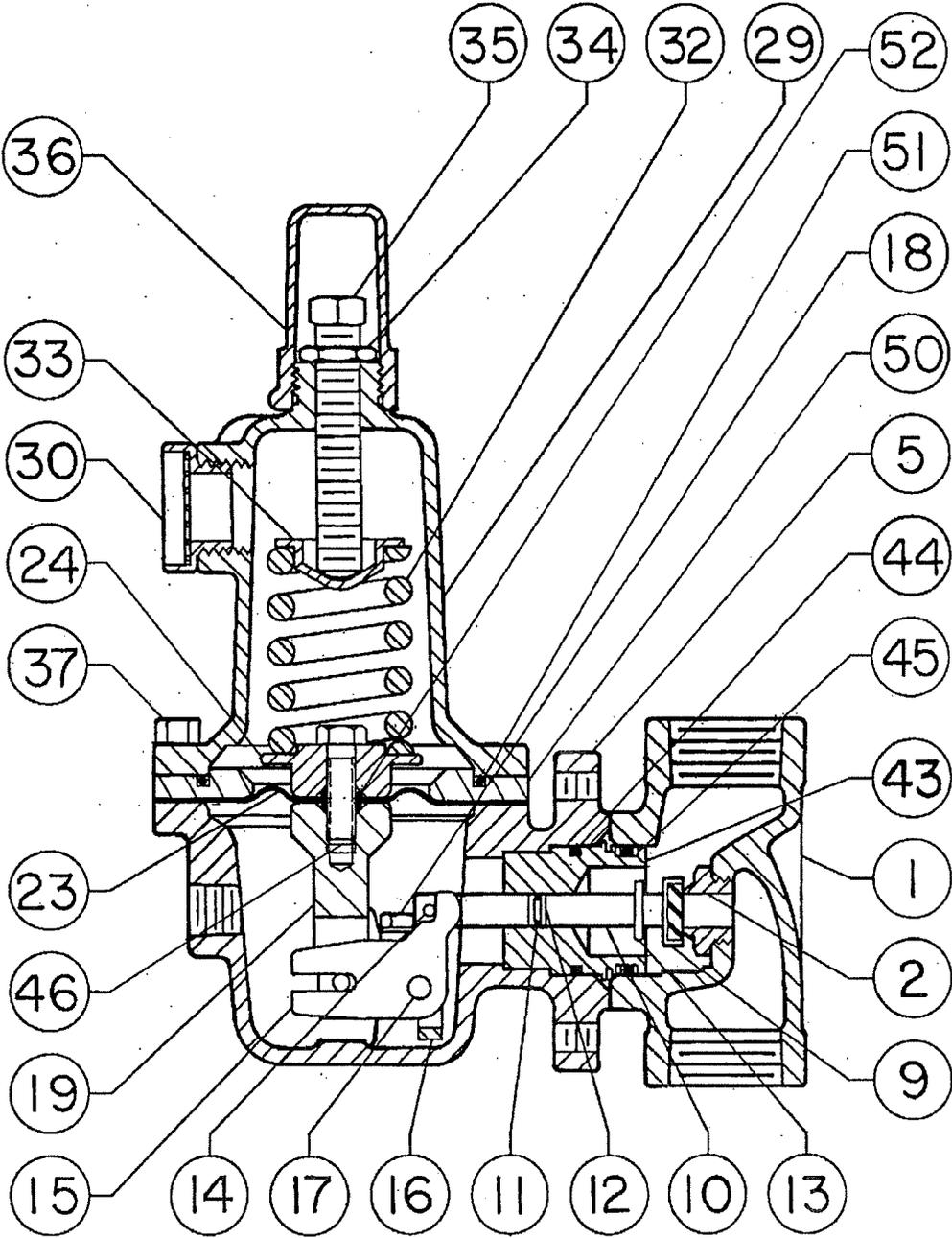
Figure 10. Type 627MR Regulator Components

627 Series



3185374-B

Figure 11. Type 627H Regulator Components



31B9872-8

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.
- Add the following figure to the end of page 18.

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	

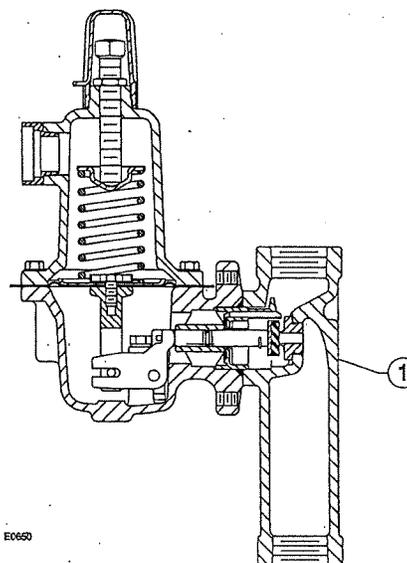


Figure 13. Type 627LB Regulator Body

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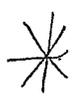
627 Series

OED I

1 May 2005

TYPE 627 REGULATOR (continued)

BODY SIZE, INCH	BODY MATERIAL	SPRING AND DIAPHRAGM CASING MATERIAL	TRIM MATERIAL	PORT DIAMETER, INCH	FS NUMBER FOR SPRING, PSIG			
					5 to 20	15 to 40	35 to 80	70 to 150
3/4 NPT screwed	WCB steel	Ductile Iron	Aluminum	3/32	B 627-259	B 627-260	B 627-261	B 627-262
				1/8	B 627-201	B 627-202	B 627-203	B 627-204
				3/16	B 627-206	B 627-207	B 627-208	B 627-209
				1/4	B 627-211	B 627-212	B 627-213	B 627-214
				3/8	B 627-216	B 627-217	B 627-218	B 627-219
			1/2	B 627-221	B 627-222	B 627-223	B 627-224	
			Stainless steel	3/32	A 627-263	A 627-264	A 627-265	B 627-266
				1/8	A 627-226	A 627-227	A 627-228	B 627-229
				3/16	A 627-231	A 627-232	A 627-233	B 627-234
				1/4	A 627-236	A 627-237	A 627-238	B 627-239
		3/8		A 627-241	A 627-242	A 627-243	B 627-244	
		1/2	A 627-246	A 627-247	A 627-248	B 627-249		
		Aluminum	Aluminum	3/32	B 627-267	B 627-268	B 627-269	B 627-270
				1/8	B 627-441	B 627-442	B 627-443	B 627-444
				3/16	B 627-445	B 627-446	B 627-447	B 627-448
				1/4	B 627-449	B 627-450	B 627-451	B 627-452
				3/8	B 627-453	B 627-454	B 627-455	B 627-456
			1/2	B 627-457	B 627-458	B 627-459	B 627-460	
			Stainless steel	3/32	A 627-271	A 627-272	A 627-273	B 627-274
				1/8	A 627-461	A 627-462	A 627-463	B 627-464
3/16	A 627-465			A 627-466	A 627-467	B 627-468		
1/4	A 627-469			A 627-470	A 627-471	B 627-472		
3/8	A 627-473	A 627-474		A 627-475	B 627-476			
1/2	A 627-477	A 627-478	A 627-479	B 627-480				
WCB steel	Stainless steel	3/32	A 627-725	A 627-726	A 627-727	A 627-728		
		1/8	A 627-729	A 627-730	A 627-731	A 627-732		
		3/16	A 627-733	A 627-734	A 627-735	A 627-736		
		1/4	A 627-737	A 627-738	A 627-739	A 627-740		
		3/8	A 627-741	A 627-742	A 627-743	A 627-744		
		1/2	A 627-745	A 627-746	A 627-747	A 627-748		
		Ductile Iron	Aluminum	3/32	A 627-105	A 627-110	A 627-115	B 627-120
				1/8	A 627-101	A 627-102	A 627-103	B 627-104
				3/16	A 627-106	A 627-107	A 627-108	B 627-100
				1/4	A 627-111	A 627-112	A 627-113	B 627-114
3/8	A 627-116			A 627-117	A 627-118	B 627-119		
1/2	A 627-121		A 627-122	A 627-123	B 627-124			
Stainless steel	3/32		A 627-125	A 627-130	A 627-135	B 627-140		
	1/8		A 627-126	A 627-127	A 627-128	B 627-129		
	3/16		A 627-131	A 627-132	A 627-133	B 627-134		
	1/4		A 627-136	A 627-137	A 627-138	B 627-139		
	3/8	A 627-141	A 627-142	A 627-143	B 627-144			
1/2	A 627-146	A 627-147	A 627-148	B 627-149				
1 NPT screwed	Ductile Iron	Aluminum	3/32	A 627-275	A 627-276	A 627-277	B 627-278	
			1/8	A 627-481	A 627-482	A 627-483	B 627-484	
			3/16	A 627-485	A 627-486	A 627-487	B 627-488	
			1/4	A 627-489	A 627-490	A 627-491	B 627-640	
			3/8	A 627-492	A 627-493	A 627-494	B 627-495	
		1/2	A 627-496	A 627-497	A 627-498	B 627-499		
		Stainless steel	3/32	A 627-279	A 627-280	A 627-281	B 627-282	
			1/8	A 627-500	A 627-501	A 627-502	B 627-503	
			3/16	A 627-504	A 627-505	A 627-506	B 627-507	
			1/4	A 627-508	A 627-509	A 627-510	B 627-511	
3/8	A 627-512		A 627-513	A 627-514	B 627-515			
1/2	A 627-516	A 627-517	A 627-518	B 627-519				

Use these 

- continued -

TYPE 627 REGULATOR (continued)

BODY SIZE, INCH	BODY MATERIAL	SPRING AND DIAPHRAGM CASING MATERIAL	TRIM MATERIAL	PORT DIAMETER, INCH	FS NUMBER FOR SPRING, PSIG								
					5 to 20	15 to 40	35 to 80	70 to 150					
1 NPT screwed	WCB steel	Ductile iron	Aluminum	3/32	B 627-305	B 627-310	B 627-315	B 627-320					
				1/8	B 627-301	B 627-302	B 627-303	B 627-304					
				3/16	B 627-306	B 627-307	B 627-308	B 627-309					
				1/4	B 627-311	B 627-312	B 627-313	B 627-314					
				3/8	B 627-316	B 627-317	B 627-318	B 627-319					
				1/2	B 627-321	B 627-322	B 627-323	B 627-324					
			Stainless steel	3/32	A 627-325	A 627-330	A 627-335	B 627-340					
				1/8	A 627-326	A 627-327	A 627-328	B 627-329					
				3/16	A 627-331	A 627-332	A 627-333	B 627-334					
				1/4	A 627-336	A 627-337	A 627-338	B 627-339					
				3/8	A 627-341	A 627-342	A 627-343	B 627-344					
				1/2	A 627-346	A 627-347	A 627-348	B 627-349					
		Aluminum	Aluminum	3/32	B 627-283	B 627-284	B 627-285	B 627-286					
				1/8	B 627-520	B 627-521	B 627-522	B 627-523					
				3/16	B 627-524	B 627-525	B 627-526	B 627-527					
				1/4	B 627-528	B 627-529	B 627-530	B 627-531					
				3/8	B 627-532	B 627-533	B 627-534	B 627-535					
				1/2	B 627-536	B 627-537	B 627-538	B 627-539					
			Stainless steel	3/32	A 627-287	A 627-288	A 627-289	B 627-290					
				1/8	A 627-540	A 627-541	A 627-542	B 627-543					
				3/16	A 627-544	A 627-545	A 627-546	B 627-547					
				1/4	A 627-548	A 627-549	A 627-550	B 627-551					
				3/8	A 627-552	A 627-553	A 627-554	B 627-555					
				1/2	A 627-556	A 627-557	A 627-558	B 627-559					
WCB steel	Stainless steel	3/32	A 627-825	A 627-826	A 627-827	A 627-828							
		1/8	A 627-829	A 627-830	A 627-831	A 627-832							
		3/16	A 627-833	A 627-834	A 627-835	A 627-836							
		1/4	A 627-837	A 627-838	A 627-839	A 627-840							
		3/8	A 627-841	A 627-842	A 627-843	A 627-844							
		1/2	A 627-845	A 627-846	A 627-847	A 627-848							
1 600 RF	WCB steel	WCB steel	Stainless steel	3/32	B 627-1121	B 627-1122	B 627-1123	B 627-1124					
				1/8	B 627-1125	B 627-1126	B 627-1127	B 627-1128					
				3/16	B 627-1129	B 627-1130	B 627-1131	B 627-1132					
				1/4	B 627-1133	B 627-1134	B 627-1135	B 627-1136					
				3/8	B 627-1137	B 627-1138	B 627-1139	B 627-1140					
				1/2	B 627-1141	B 627-1142	B 627-1143	B 627-1144					
				2 NPT screwed	Ductile iron	Ductile iron	Aluminum	3/32	A 627-91	A 627-92	A 627-93	B 627-94	
								1/8	A 627-51	A 627-52	A 627-53	B 627-54	
								3/16	A 627-55	A 627-56	A 627-57	B 627-58	
								1/4	A 627-59	A 627-60	A 627-61	B 627-62	
								3/8	A 627-63	A 627-64	A 627-65	B 627-66	
								1/2	A 627-67	A 627-68	A 627-69	B 627-70	
Stainless steel	3/32	A 627-95	A 627-96				A 627-97	B 627-98					
	1/8	A 627-71	A 627-72				A 627-73	B 627-74					
	3/16	A 627-75	A 627-76				A 627-77	B 627-78					
	1/4	A 627-79	A 627-80				A 627-81	B 627-82					
	3/8	A 627-83	A 627-84				A 627-85	B 627-86					
	1/2	A 627-87	A 627-88				A 627-89	B 627-90					
Aluminum	Aluminum	3/32	A 627-291			A 627-292	A 627-293	B 627-294					
		1/8	A 627-560			A 627-561	A 627-562	B 627-563					
		3/16	A 627-564			A 627-565	A 627-566	B 627-567					
		1/4	A 627-568			A 627-569	A 627-570	B 627-571					
		3/8	A 627-572			A 627-573	A 627-574	B 627-575					
		1/2	A 627-576			A 627-577	A 627-578	B 627-579					
	Stainless steel	3/32	A 627-295			A 627-296	A 627-297	B 627-298					
		1/8	A 627-580			A 627-581	A 627-582	B 627-583					
		3/16	A 627-584			A 627-585	A 627-586	B 627-587					
		1/4	A 627-588			A 627-589	A 627-590	B 627-591					
		3/8	A 627-592			A 627-593	A 627-594	B 627-595					
		1/2	A 627-596			A 627-597	A 627-598	B 627-599					

Use these

Use these

Use these

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- continued -

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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67CF Series

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.

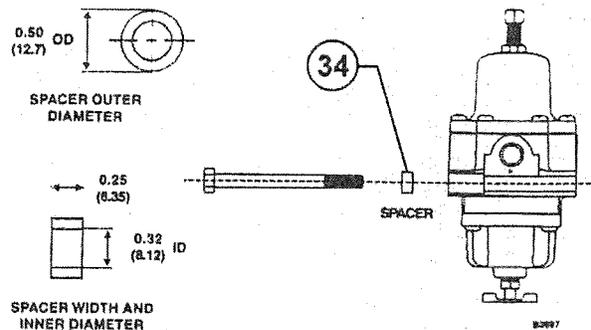


Figure 1. Spacer Diameter and Installation

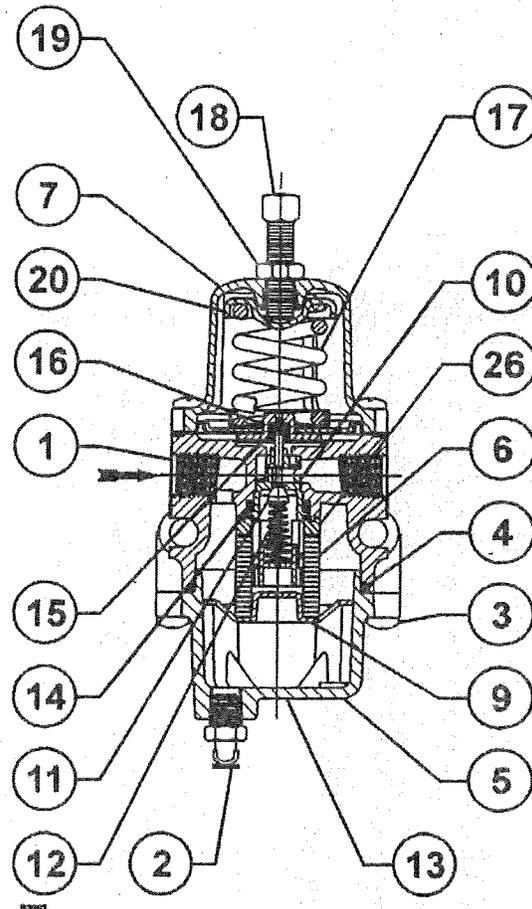


Figure 2. 67CF Series Assembly Drawings

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67CF Series Filter Regulators

Introduction

Scope of Manual

This manual provides instructions and parts lists for 67CF Series filter regulators. Instructions and parts lists for other equipment mentioned in this instruction manual, as well as for other 67 Series regulators, are found in separate manuals.

Product Description

The 67CF Series direct-operated regulators are equipped with a filter for removing particles from the supply gas. They are typically used to provide constantly controlled, reduced pressures to pneumatic and electropneumatic controllers and other instruments. These are suitable for most air or gas applications. Other applications include providing reduced pressures to air chucks, air jets, and spray guns.

The Type 67CFR regulator has an integral low-capacity internal relief valve. A downstream pressure increase above the outlet pressure setting moves the diaphragm assembly off the soft seat, venting the excess pressure through a hole or vent in the spring case.

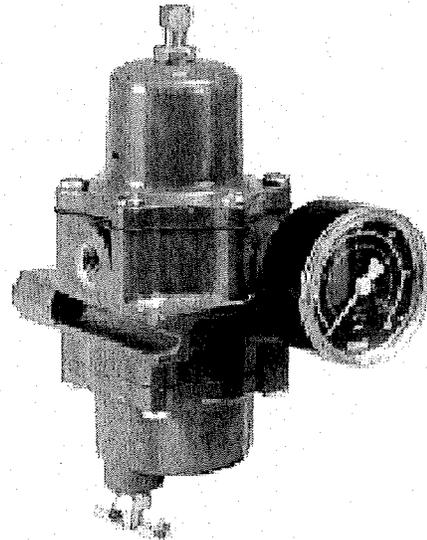
Specifications

Some general 67CF Series ratings and other specifications are given on page 2. A label on the spring case gives the control spring range for a given regulator as it comes from the factory.

Installation

Note

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



W7412

Figure 1. Typical Type 67CF Filter Regulator with Optional Gauge



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 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.

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Specifications

Body Size, Inlet and Outlets Connection Style

1/4-inch NPT screwed

Maximum Inlet Pressure (Body Rating)⁽¹⁾

250 psig (17,2 bar)

Outlet Pressure Ranges

OUTLET PRESSURE RANGES, PSIG (bar)	CONTROL SPRING DATA		
	Part Number	Color	Wire Diameter, Inch (mm)
0 to 20 (0 to 1,4)	T14130T0012	green stripe	0.135 (3,43)
0 to 35 (0 to 2,4)	T14059T0012	silver	0.156 (3,96)
0 to 60 (0 to 4,1)	T14058T0012	blue stripe	0.170 (4,32)
0 to 125 (0 to 8,6)	T14060T0012	red stripe	0.207 (5,26)

Maximum Emergency Outlet Pressure⁽¹⁾

50 psi (3,4 bar) over outlet pressure setting

Wide-Open Flow Coefficients

Main Valve: C_g : 11.7; C_v : 0.36; C_r : 32.2

Internal Relief Valve: C_g : 1.45; C_v : 0.045; C_r : 32.8

Pressure Registration

Internal

Accuracy

Inlet Sensitivity: Less than 0.2 psig (0,014 bar) change in outlet pressure for every 25 psig (1,72 bar) change in inlet pressure

Repeatability: 0.1 psig (0,0069 bar)⁽²⁾

Air Consumption: testing repeatedly shows no discernible leakage

Regulator Temperature Capabilities

With Nitrile (NBR): -40° to 180°F (-40° to 82°C)

With Fluoroelastomer (FKM):

0° to 300°F (-18° to 149°C)

With Silicone (VMQ)⁽³⁾: -60° to 180°F (-51° to 82°C)

Drain Valve and Spring Case Vent Location

Aligned with inlet, other positions optional

Type 67CFR Internal Relief Performance

Low capacity for minor seat leakage only; other overpressure protection must be provided if inlet pressure can exceed the maximum pressure rating of downstream equipment or exceeds maximum outlet pressure rating of the Type 67CFR

Filter Capabilities

Free Area: 12 times pipe area

Micron Rating:

Cellulose Element: 40 microns

Glass Fiber Element: 10 microns

Stainless Steel Element: 40 microns

Approximate Unit Weight

1 pound (0,5 kg)

Options

- Handwheel adjusting screw
- NACE (MR0175) compliant construction
- Ammonia service construction
- Panel mount (includes spring case with 1/4-inch vent, handwheel, and panel mounting nut)
- Closing cap (available on spring case with 1/4-inch NPT vent)
- Aluminum or stainless steel drain valve
- Fluoroelastomer (FKM) elastomers for high temperatures and/or corrosive chemicals
- Silicone (VMQ) elastomers for cold temperatures
- Triple scale outlet pressure gauge (brass or stainless steel)
- Stainless steel stem on the valve plug
- Fixed bleed restriction mounted in the side outlet
- Tire valve in second outlet
- Pipe plug in second outlet

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

2. Repeatability is the measure of the regulator's ability to return to setpoint consistently when traveling from steady state to transient to steady state.

3. Silicone is not compatible with hydrocarbon gas.



WARNING

The internal relief valve of 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 maximum pressure ratings of the downstream equipment or exceeds maximum allowable outlet pressure of the Type 67CFR, additional overpressure protection is required.

1. Regulator operation within ratings does not preclude the possibility of damage from debris in the lines or from external sources. Regulators should be inspected for damage periodically and after any overpressure condition.

2. Only personnel qualified through training and experience should install, operate, and maintain a regulator. Make sure that there is no damage to or foreign material in the regulator. Also ensure that all tubing and 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 obstruction-free tubing or piping into the vent. Protect the remote vent by installing a screened vent cap on the remote end of the vent pipe.

6. For use in 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. Install a pressure gauge to monitor instruments on startup.

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.

Installing a 67CF Series Regulator in an Existing Installation

When installing a 67CF Series regulator in an existing installation, it may be necessary to use spacers (key 34, figure 6) to adapt the installation. If the mounting bolts are too long, place a spacer on the bolt (see figure 6). To be sure the regulator is secure, the bolts should have at least two full threads of engagement.

Startup and Adjustment

Key numbers are referenced in figure 2.

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 according to the diaphragm parts maintenance procedure.

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 counterclockwise to decrease the outlet pressure setting. Retighten the locknut to maintain the adjustment position.

Shutdown

First, close the nearest upstream block valve and then close the nearest downstream block valve (when used). Next, open the downstream vent valve. Since the regulator remains open in response to the

67CF Series

decreasing downstream pressure, pressure between the closed block valves will be released through the open vent valve.

Maintenance

Regulator parts are subject to normal wear and must be inspected and replaced as necessary. The frequency of inspection and replacement of parts depends on the severity of service conditions and upon applicable codes and government regulations. Open the drain valve (key 2) regularly to empty accumulated liquid from the dripwell (key 5).

Note

If sufficient clearance exists, the body (key 1) may remain mounted on other equipment or in a line or panel during maintenance unless the entire regulator will be replaced.



WARNING

To avoid personal injury, property damage, or equipment damage caused by sudden release of pressure or explosion of accumulated gas, do not attempt any maintenance or disassembly without first isolating the regulator from system pressure and relieving all internal pressure from the regulator.

Filter Element and Trim Maintenance

Key numbers are referenced in figures 2 and 3.

1. Remove four dripwell screws (key 3) from the dripwell (key 5) and separate the dripwell and O-ring (key 4) from the body (key 1). The filter retainer (key 9), filter element (key 6), and gasket (key 26) may come off with dripwell. If not, remove these parts.
2. Inspect the removed parts for damage and debris. Replace any damaged parts. If a replacement is not available, the filter element may be cleaned.
3. To remove the valve cartridge assembly, grasp the end of cartridge and pull it straight out of body (key 1). Replace with new cartridge assembly. The cartridge

assembly may be disassembled and parts may be cleaned or replaced. If the soft seat (key 15) was removed, make sure it is properly snapped into place before installing the valve cartridge assembly.

4. Apply lubricant to the O-ring (key 14), then align cartridge key to keyway in body and insert. Reinstall the gasket (key 26), filter (key 6), and filter retainer (key 9). Reinstall the O-ring (key 4), secure the dripwell with screws (key 3), and torque to 24 to 36 inch-pounds (2,7 to 4,1 N·m).

Diaphragm Maintenance

Key numbers are referenced in figure 2.

1. Back out the adjusting screw or handwheel (key 18) until compression is removed from the spring (key 17).
2. Remove the six spring case screws (key 3) to separate the spring case (key 7) from the body (key 1). Remove the upper spring seat (key 20) and spring (key 17).
3. Remove the diaphragm assembly (key 16), inspect the diaphragm, and replace the assembly, if necessary.
4. Place the diaphragm assembly (key 16) on the body (key 1) as shown in figure 4. Push down on the diaphragm assembly to make sure the valve plug (key 11) strokes smoothly and approximately 1/16-inch (2 mm).

Note

In step 5, if installing a control spring of a different range, be sure to delete the spring range originally appearing on the label and indicate the new spring range.

5. Stack the control spring (key 17) and upper spring seat (key 20) onto the diaphragm assembly (key 16).
6. Install the spring case (key 7) on the body (key 1) with the vent oriented to prevent clogging or entrance of moisture. Install the six spring case screws (key 3) using a crisscross pattern and torque to 24 to 36 inch-pounds (3 to 4 N·m).
7. When all maintenance is complete, refer to the Startup and Adjustment section to put the regulator back into operation and adjust the pressure setting. Tighten the locknut (key 19) if used, and install the closing cap if used.

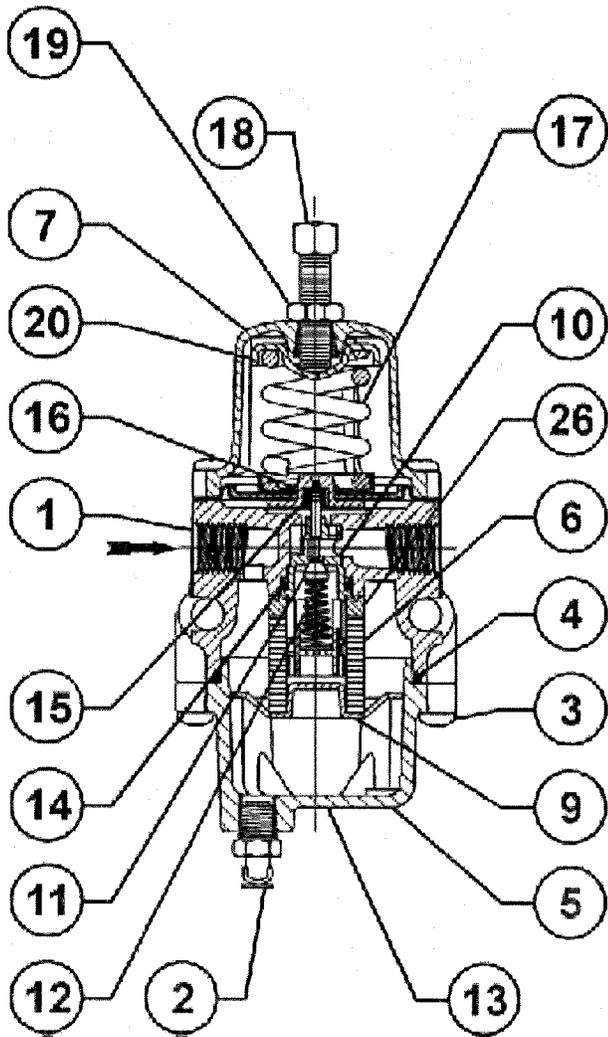
Parts Ordering

When corresponding with the Fisher Sales Office or Sales Representative about this regulator, include the type number and all other pertinent information printed on the label. Specify the eleven-character part number when ordering new parts from the following parts list.

Parts List

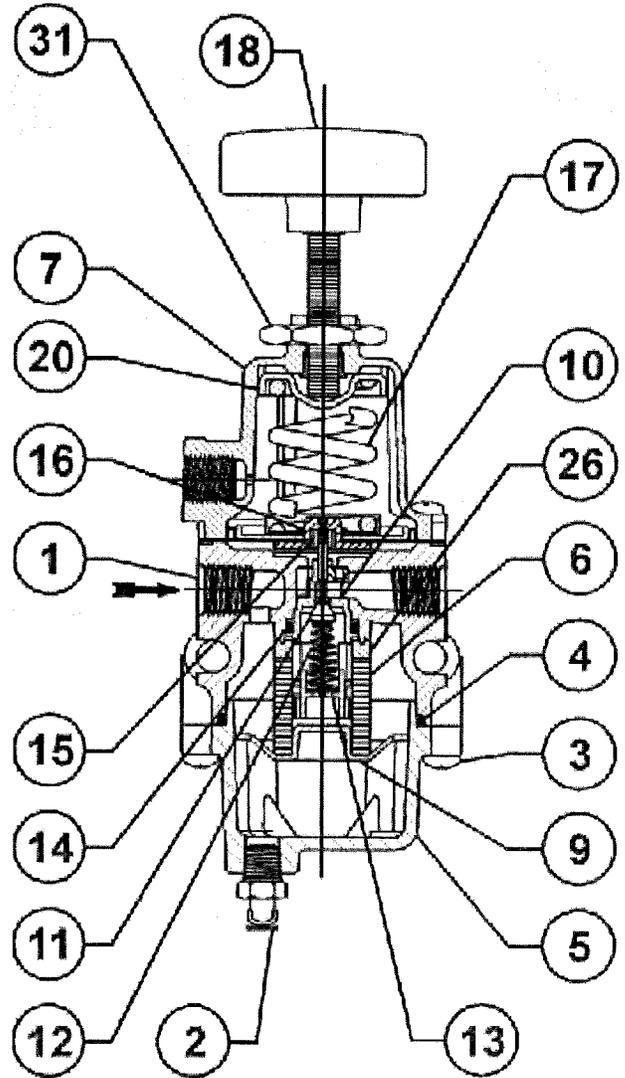
Key	Description	Part Number
	Parts Kit	
	Includes valve cartridge assembly (contains keys 10, 11, 12, 13, 14, and 15), diaphragm assembly (key 16), filter element (key 6), filter gasket (key 26), and four screws (key 3)	
	Type 67CF (without relief)	
	Brass stem with nitrile plug	R67CFX00012
	Aluminum stem with nitrile plug (NACE)	R67CFX00N12
	Type 67CFR (with relief)	
	Brass stem with nitrile plug	R67CFRX0012
	Aluminum stem with nitrile plug (NACE)	R67CFRX0N12
	Valve Cartridge Assembly Only	
	Brass stem	
	With nitrile plug	T14121T0012
	With fluoroelastomer plug	T14121T0022
	Aluminum stem	
	with nitrile plug	T14121T0042
	with nitrile plug (NACE)	T14121T0052
1	Body, Aluminum	T80432T0012
2	Drain Valve	
	Brass	1K418918992
	Aluminum	1K4189000B2
	Stainless steel	AH3946X0012
3	Flange Screw	
	Standard spring case and spring case with 1/4-inch NPT vent (10 required)	T13526T0012
	For wire seal	
	Flange Screw (9 required)	T13526T0012
	Flange Screw (1 required)	14B3987X012
4 ⁽¹⁾	O-Ring	
	Nitrile (NBR)	T14057T0012
	Fluoroelastomer (FKM)	T14057T0022
	Silicone (VMQ)	T14057T0032
5	Dripwell	T21040T0012
6 ⁽¹⁾	Filter Element	
	Cellulose (40 microns) (standard)	1F257706992
	Glass fiber (10 microns)	17A1457X012
	Stainless steel (40 microns)	15A5967X012
7	Spring Case, Aluminum	
	Drilled hole vent (standard)	T14070T0012
	1/4-inch NPT vent	T14070T0022
9	Filter Retainer	T14052T0012
10 ^(1, 2)	Valve Cartridge	T80434T0012
11 ^(1, 2)	Valve Plug	
	Brass stem, nitrile (NBR) plug	T14053T0012
	Aluminum stem, fluoroelastomer (FKM) plug	T14053T0022
	Aluminum stem, nitrile (NBR) plug	T14053T0032
12 ^(1, 2)	Valve Spring	
	Stainless steel	T14105T0012
	Inconel (NACE)	T14116T0012
13 ^(1, 2)	Valve Retainer	T14071T0012
14 ^(1, 2)	O-Ring	
	Nitrile (NBR)	T14063T0012
	Fluoroelastomer (FKM)	T14063T0022
	Silicone (VMQ)	T14063T0032
15 ^(1, 2)	Soft Seat	
	Nitrile (NBR)	T14055T0012
	Fluoroelastomer (FKM)	T14055T0022
16 ⁽¹⁾	Diaphragm Assembly	
	67CF (without relief)	
	Nitrile (NBR)	T14119T0022
	Fluoroelastomer (FKM)	T14119T0042
	Type 67CFR (with relief)	
	Nitrile (NBR)	T14119T0012
	Fluoroelastomer (FKM)	T14119T0032
	Silicone (VMQ)	T14119T0052
17	Spring	
	Types 67CF and 67CFR, Plated steel (standard)	
	0 to 20 psig (0 to 1,4 bar), Green stripe	T14130T0012
	0 to 35 psig (0 to 2,4 bar), Silver	T14059T0012
	0 to 60 psig (0 to 4,1 bar), Blue stripe	T14058T0012
	0 to 125 psig (0 to 8,6 bar), Red stripe	T14060T0012
	Type 67CFR (NACE), Inconel (NACE)	
	0 to 35 psig (0 to 2,4 bar), Silver stripe	T14113T0012
	0 to 60 psig (0 to 4,1 bar), Blue	T14114T0012
	0 to 125 psig (0 to 8,6 bar), Red	T14115T0012
18	Adjusting Screw	
	For standard spring case	
	Square head (standard)	T14061T0012
	Handwheel	T14102T0012
	Wire seal (not shown)	T14104T0012
	For spring case with 1/4-inch NPT vent	
	Square head for closing cap	T14101T0012
	Handwheel	T14103T0012
19	Locknut	1A946324122
20	Upper Spring Seat	1B798525062
22	Pressure Gauge	
	Brass	
	0 to 30 psig/0 to 2 bar/0 to 0,2 MPa	11B8579X022
	0 to 60 psig/0 to 4 bar/0 to 0,4 MPa	11B8579X032
	0 to 160 psig/0 to 11 bar/0 to 1,1 MPa	11B8579X042
	Stainless Steel	
	0 to 30 psig/0 to 2 bar/0 to 0,2 MPa	11B9639X012
	0 to 60 psig/0 to 4 bar/0 to 0,4 MPa	11B9639X022
	0 to 160 psig/0 to 11 bar/0 to 1,1 MPa	11B9639X032
23	1/4-Inch Pipe Plug	
	Socket head, steel	1C333528992
	Hex head, stainless steel	1A767535072
24	Tire Valve	1H447099022
26 ⁽¹⁾	Filter Gasket	
	Nitrile (NBR)	T14081T0012
	Fluoroelastomer (FKM)	T14081T0022
31	Panel Mounting Nut	10B2657X012
32	Wire Seal (not shown)	1U7581000A2
33	Closing Cap	23B9152X012
34	Spacer	T14123T0012
35	Mounting adaptor plate for Fisher 2500 Series Controller	T21043T0012

67CF Series



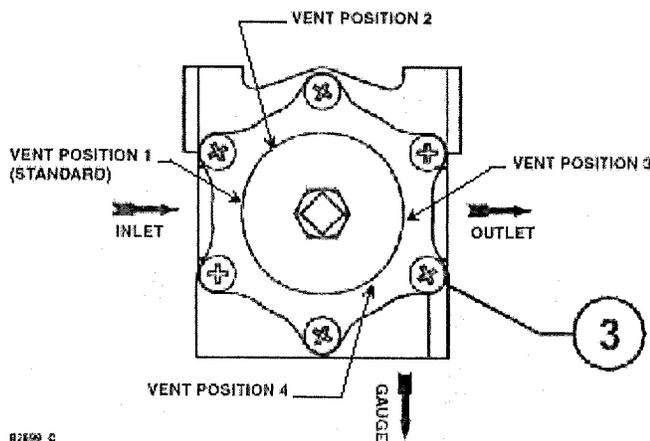
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STANDARD CONSTRUCTION



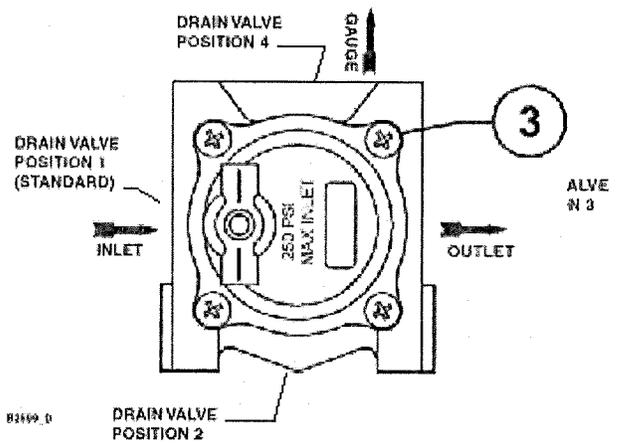
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PANEL MOUNT OPTION
(INCLUDES HANDWHEEL, MOUNTING NUT,
AND 1/4-INCH NPT SPRING CASE VENT)



B2199.C

SPRING CASE VENT POSITIONS



B2199.D

DRAIN VALVE POSITIONS

Figure 2. 67CF Series Assembly Drawings

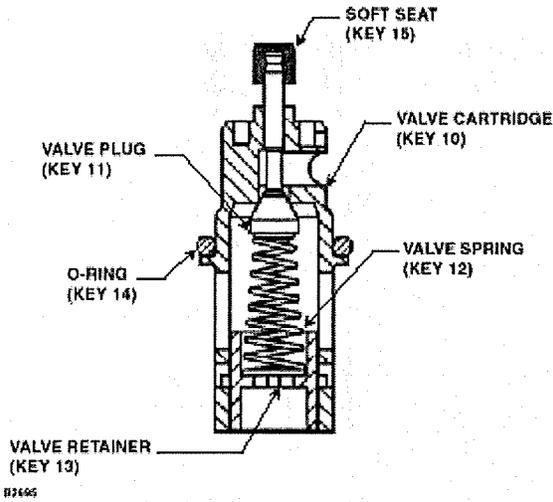


Figure 3. Valve Cartridge Assembly

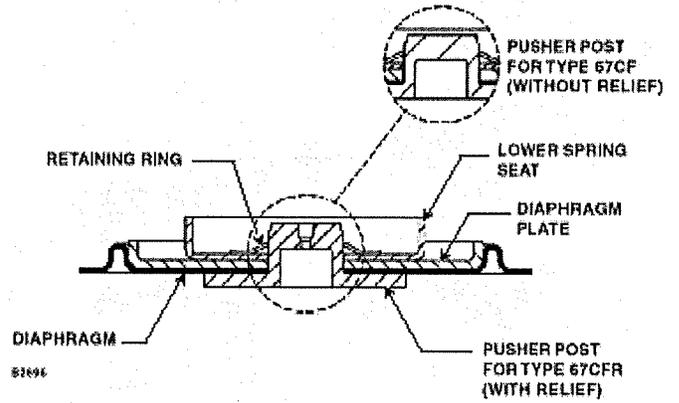


Figure 4. Diaphragm Assembly (Key 16)

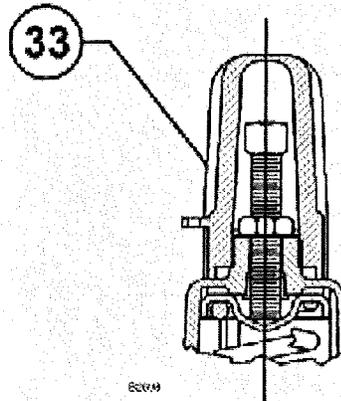


Figure 5. Optional Closing Cap (Only Available with the 1/4-inch Spring Case Vent)

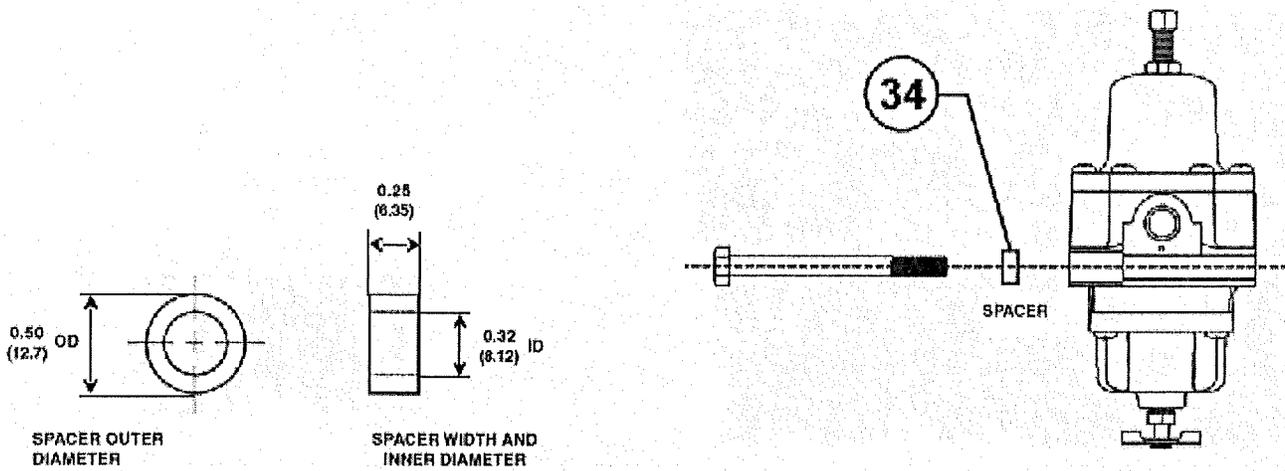


Figure 6. Spacer Diameter and Assembly
(For Installing 67CF Series Regulator in an Existing Installation if the Mounting Bolts are too Long)

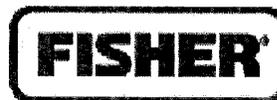
67CF Series

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FISHER-ROSEMOUNT™ Managing The Process Better.™

Y600A Series Pressure Reducing Regulators

Y600A Series direct-operated, spring-loaded regulators provide economical pressure-reducing control for a variety of residential, commercial, and industrial applications.

Features

- **Precision Control at Low-Pressure Settings:**

The large diaphragm area provides more accurate control at low-pressure settings. The pitot tube of Types Y600A and Y600AR (figure 2) regulators also creates a dynamic boost that helps provide greater capacity.

- **Easy Conversion Between Type Y600A and Type Y600AM:**

The throat seal can be modified to either version. A new lower casing is not needed.

- **Tamper-Resistant Adjustment:**

The closing cap and spring case (figures 2 and 3) allow the installation of sealing wire to discourage or detect unauthorized adjustment of the pressure setting.

- **Easy to Maintain:**

Trim parts can be replaced without removing the regulator body from the pipeline. A two-bolt connection between the body and diaphragm casing simplifies disassembly for maintenance.

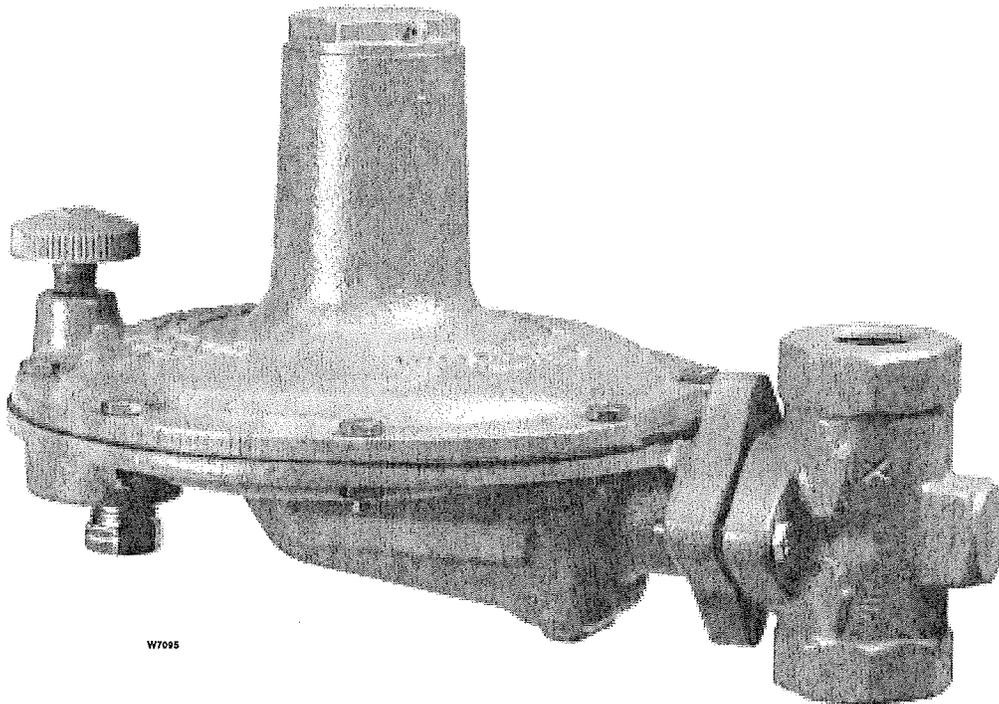


Figure 1. Type Y600A Pressure Reducing Regulator



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Specifications

Available Configurations

See table 2

Body Sizes (Inlet x Outlet)

3/4 x 3/4 or 1 x 1-inch

End Connection Style⁽¹⁾

NPT screwed

Maximum Inlet Pressure (Body Rating)⁽²⁾

150 psig (10,3 bar)

Outlet Pressure Ranges⁽²⁾

See table 3

Maximum Outlet (Casing) Pressure⁽²⁾

20 psig (1,4 bar)

Maximum Operating Outlet Pressure to Avoid Internal Parts Damage⁽²⁾

2 psig (0,14 bar) above outlet pressure setting

Flow Coefficients

See table 4

Pressure Registration

See table 2

Material Temperature Capabilities⁽²⁾

-20° to 180°F (-29° to 82°C)

Spring Case Vent Connection

1/4-inch NPT

Diaphragm Case Connection

1/2-inch NPT

Construction Materials

See table 5

Pressure Setting Adjustment

Adjusting screw

Approximate Weight

13 pounds (5,9 kg)

1. End connections for other than U.S. standards can usually be provided; consult the Fisher Sales Office or Sales Representative.
2. The pressure/temperature limits in this bulletin and any applicable standard or code limitation should not be exceeded.

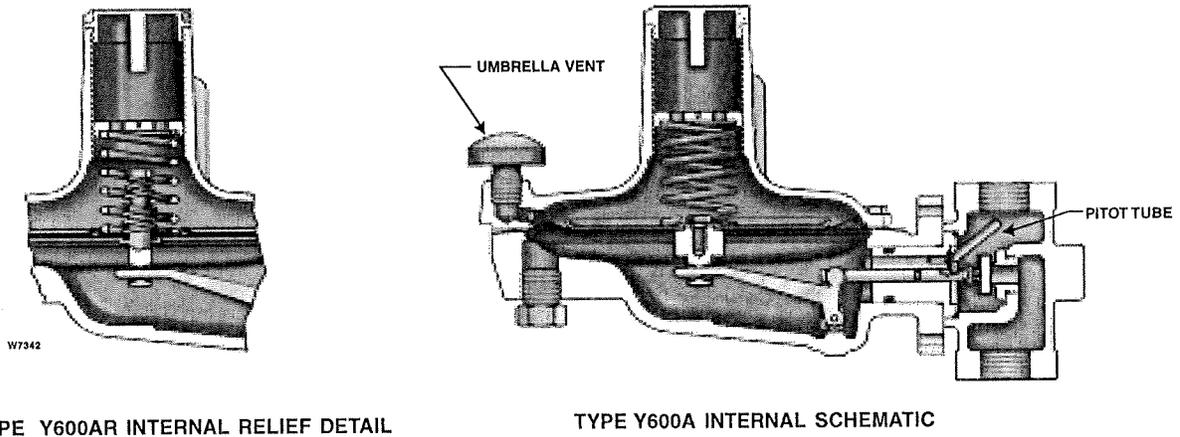


Figure 2. Types Y600A and Y600AR Internal Schematics

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Table 2. Available Configurations

CONSTRUCTION FEATURE	TYPE NUMBER		
	Y600A	Y600AR	Y600AM
Internal pressure registration with pitot tube	X	X	
External pressure registration with 1/2-inch NPT downstream control line connection and O-ring stem seal			X
Internal relief		X	

Table 3. Outlet (Control) Pressure Ranges

TYPE NUMBER	CONTROL SPRING COLOR	CONTROL SPRING PART NUMBER	OUTLET PRESSURE RANGE WITH SPRING CASE ABOVE DIAPHRAGM ⁽¹⁾	APPROXIMATE POINT ABOVE PRESSURE SETTING AT WHICH TYPE Y600AR INTERNAL RELIEF STARTS TO DISCHARGE
Y600A, Y600AM, Y600AR	Red	1B653827052	4 to 8-inches w.c. (10 to 20 mbar)	10 to 24-inches w.c. (25 to 60 mbar)
	Olive drab	1B653927022	7 to 16-inches w.c. (17 to 40 mbar)	10 to 26-inches w.c. (25 to 65 mbar)
	Yellow	1B537027052	15-inches w.c. to 1.2 psig (37 to 83 mbar)	
	Light green	1B537127022	1.2 to 2.5 psig (0,083 to 0,17 bar)	0.5 to 2 psig (0,034 to 0,14 bar)
	Light blue	1B537227022	2.5 to 4.5 psig (0,17 to 0,31 bar)	0.5 to 3 psig (0,034 to 0,21 bar)
	Black	1B537327052	4.5 to 7 psig (0,31 to 0,52 bar)	1 to 4 psig (0,69 to 0,28 bar)

1. Minimum outlet pressure setting may be approximately 1-inch w.c. lower if spring case is below diaphragm.

Table 4. Maximum Operating Inlet Pressures

ORIFICE SIZE, INCHES (mm)	MAXIMUM OPERATING INLET PRESSURE, PSIG (bar)				WIDE-OPEN FLOW COEFFICIENTS FOR EXTERNAL RELIEF SIZING		
	With 1.2 Psig (0,08 bar) or Less Outlet Pressure Setting	With 1.2 to 2.5 Psig (0,08 to 0,17 bar) Outlet Pressure Setting	With 2.5 to 4.5 Psig (0,17 to 0,31 bar) Outlet Pressure Setting	With 4.5 to 7 Psig (0,31 to 0,52 bar) Outlet Pressure Setting	C _g	C _v	C ₁
1/8 (3,2)	150 (10,3)	150 (10,3)	150 (10,3)	150 (10,3)	12.3	0.35	35
3/16 (4,8)	150 (10,3)	150 (10,3)	150 (10,3)	150 (10,3)	27.6	0.79	
1/4 (6,4)	75 (5,2)	150 (10,3)	150 (10,3)	150 (10,3)	50	1.43	
3/8 (9,5)	35 (2,4)	60 (4,1)	60 (4,1)	60 (4,1)	110	3.14	
1/2 (12,7)	8 (0,55)	10 (0,69)	12 (0,83)	12 (0,83)	200	5.71	
9/16 (14,3)	5 (0,34)	6 (0,41)	8 (0,55)	9 (0,62)	250	7.14	

Table 5. Construction Materials

PART	BODY, DIAPHRAGM CASING, AND SPRING CASE	ORIFICE	SPRING, DIAPHRAGM HEAD, AND LEVER ASSEMBLY	DIAPHRAGM AND DISK	PUSHER POST AND ADJUSTING SCREW	DISK HOLDER	CLOSING CAP	STEM
Material	Cast iron	Aluminum	Plated steel	Nitrile	Types Y600A and Y600AM: Aluminum Type Y600AR: Zinc	Aluminum	Thermoplastic	Stainless steel

Table 6. Additional Construction Materials

TYPE	PITOT TUBE	RELIEF VALVE SPRING AND SPRING HOLDER
Y600A	S30400 Stainless steel	---
Y600AR	S30400 Stainless steel	Plated steel

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Table 7. Y600A Series Capacities for 3/4-Inch Body Sizes

OUTLET PRESSURE RANGE, CONTROL SPRING PART NUMBER, AND COLOR	OFFSET FROM SETPOINT	OUTLET PRESSURE SETTING	INLET PRESSURE, PSIG (bar)	3/4-INCH BODY SIZE					
				Orifice Size, Inches (mm)					
				Capacities in SCFH (m³/h(n)) of 0.6 Specific Gravity Natural Gas					
				1/8 (3,2)	3/16 (4,8)	1/4 (6,4)	3/8 (9,5)	1/2 (12,7)	9/16 (14,3)
4 to 8-inches w.c. (10 to 19 mbar) 1B653827052 Red	1-inch w.c. (2 mbar)	7-inches w.c. (17 mbar)	1 (0,069)	90 (2,42)	170 (4,50)	230 (6,61)	250 (6,57)	410 (11,0)	440 (11,8)
			5 (0,34)	220 (5,87)	280 (7,61)	450 (12,1)	490 (13,1)	520 (13,8)	970 (25,9)
			8 (0,55)	230 (6,22)	480 (12,8)	530 (14,2)	540 (14,5)	590 (15,9)	
			20 (1,4)	520 (13,8)	600 (16,2)	620 (16,6)	650 (17,3)		
			35 (2,4)	660 (17,6)	670 (18,0)	840 (22,5)	900 (24,2)		
			75 (5,2)	770 (20,7)	840 (22,5)	960 (25,6)			
			150 (10,3)	1680 (44,9)	2310 (61,9)				
7 to 16-inches w.c. (17 to 39 mbar) 1B653927022 Olive drab	1-inch w.c. (2 mbar)	11-inches w.c. (27 mbar)	1 (0,069)	90 (2,42)	130 (3,46)	160 (4,15)	190 (5,20)	230 (6,22)	250 (6,57)
			5 (0,34)	160 (4,15)	250 (6,57)	280 (7,61)	350 (9,33)	530 (14,2)	750 (20,0)
			8 (0,55)	170 (4,50)	350 (9,33)	430 (11,4)	450 (12,1)	540 (14,5)	
			20 (1,4)	350 (9,33)	490 (13,1)	590 (15,9)	610 (16,2)		
			35 (2,4)	520 (13,8)	530 (14,2)	620 (16,6)	650 (17,3)		
			75 (5,2)	650 (17,3)	660 (17,6)	940 (25,2)			
			150 (10,3)	1680 (44,9)	2060 (55,3)				
15-inches w.c. to 1.2 psig (37 mbar to 83 mbar) 1B537027052 Yellow	5-1/2-inches w.c. (14 mbar)	15-inches w.c. (37 mbar)	2 (0,14)	90 (2,42)	340 (8,98)	500 (13,5)	900 (24,2)	1100 (29,4)	1150 (30,8)
			6 (0,41)	250 (6,57)	540 (14,5)	930 (24,9)	1640 (43,9)	2100 (56,4)	
			10 (0,69)	340 (8,98)	800 (21,4)	1380 (37,0)	1940 (51,9)		
			30 (2,1)	680 (18,3)	1450 (38,7)	2390 (64,0)	2450 (65,7)		
			60 (4,1)	1160 (31,1)	2460 (66,0)	3480 (93,3)			
			150 (10,3)	2570 (68,8)	2710 (72,6)				
			2 (0,14)	90 (2,42)	260 (6,91)	410 (11,1)	600 (16,2)	810 (21,8)	700 (18,7)
	6 (0,41)	250 (6,57)	460 (12,4)	700 (18,7)	1290 (34,6)	1420 (38,0)			
	10 (0,69)	310 (8,31)	660 (17,6)	1020 (27,3)	1420 (38,0)				
	30 (2,1)	670 (18,0)	1109 (29,7)	2060 (55,3)	2430 (65,0)				
	60 (4,1)	1140 (30,4)	2180 (58,4)	3350 (89,9)					
	150 (10,3)	2480 (66,4)	2650 (70,9)						

Shaded areas indicate inlet pressure is too high for orifice size.

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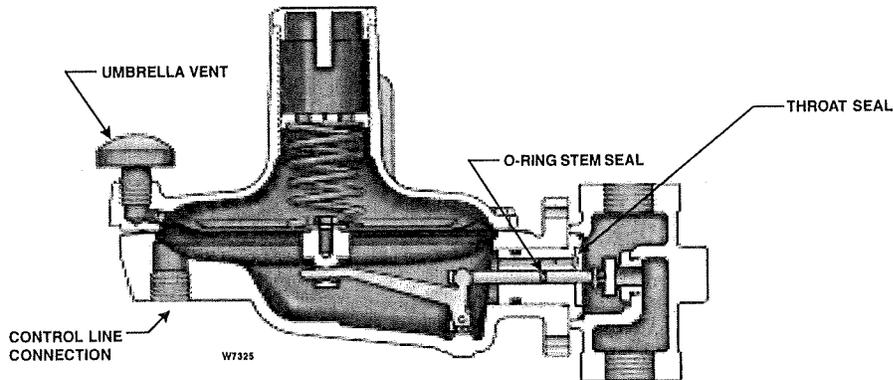


Figure 3. Type Y600AM Internal Schematic

Table 7. Y600A Series Capacities for 3/4-Inch Body Sizes (Continued)

OUTLET PRESSURE RANGE, CONTROL SPRING PART NUMBER, AND COLOR	OFFSET FROM SETPOINT	OUTLET PRESSURE SETTING	INLET PRESSURE, PSIG (bar)	3/4-INCH BODY SIZE					
				Orifice Size, Inches (mm)					
				Capacities in SCFH (m³/h(n)) of 0.6 Specific Gravity Natural Gas					
				1/8 (3,2)	3/16 (4,8)	1/4 (6,4)	3/8 (9,5)	1/2 (12,7)	9/16 (14,3)
1.2 to 2.5 psig (83 to 172 mbar) 1B537127022 Light green	0.2 psig (14 mbar)	1.2 psig (83 mbar)	2 (0,14)	120 (3,11)	170 (4,50)	220 (5,87)	350 (9,33)	490 (13,1)	520 (13,8)
			6 (0,41)	180 (4,85)	340 (8,98)	450 (12,1)	740 (19,7)	850 (22,8)	1070 (28,7)
			10 (0,69)	190 (5,20)	440 (11,8)	590 (15,9)	1010 (27,0)	1170 (31,5)	
			30 (2,1)	560 (14,9)	900 (24,2)	1550 (41,5)	1720 (46,0)		
			60 (4,1)	860 (23,2)	1110 (29,7)	2480 (66,4)	2340 (62,6)		
			150 (10,3)	1990 (53,3)	3480 (93,3)	3500 (93,8)			
	2.5 psig (172 mbar)	6 (0,41)	140 (3,81)	190 (5,20)	260 (6,91)	450 (12,1)	590 (15,9)	680 (18,3)	
		10 (0,69)	170 (4,50)	340 (8,98)	490 (13,1)	570 (15,2)	860 (23,2)		
		30 (2,1)	430 (11,4)	660 (17,6)	980 (26,3)	1030 (27,7)			
		60 (4,1)	750 (20,0)	850 (22,8)	1940 (51,9)	2250 (60,2)			
		150 (10,3)	1480 (39,8)	2320 (62,2)	3350 (89,9)				
2.5 to 4.5 psig (172 to 310 mbar) 1B537227022 Light blue	0.3 psig (21 mbar)	2.5 psig (172 mbar)	4 (0,28)	130 (3,46)	180 (4,85)	190 (5,20)	310 (8,31)	370 (10,0)	480 (12,8)
			8 (0,55)	140 (3,81)	280 (7,61)	360 (9,67)	520 (13,8)	710 (19,0)	800 (21,4)
			12 (0,82)	190 (5,20)	360 (9,67)	490 (13,1)	680 (18,3)	930 (24,9)	
			30 (2,1)	430 (11,4)	620 (16,6)	900 (24,2)	1110 (29,7)		
			60 (4,1)	660 (17,6)	1010 (27,0)	1730 (46,3)	1830 (49,1)		
			150 (10,3)	1570 (42,2)	2060 (55,3)	4620 (124)			
	4.5 psig (310 mbar)	8 (0,55)	120 (3,11)	190 (5,20)	250 (6,57)	400 (10,7)	520 (13,8)	540 (14,5)	
		12 (0,82)	160 (4,15)	210 (5,52)	320 (8,66)	530 (14,2)	720 (19,3)		
		30 (2,1)	300 (7,96)	460 (12,4)	760 (20,4)	830 (22,1)			
		60 (4,1)	590 (15,9)	810 (21,8)	1230 (32,9)	1340 (36,0)			
		150 (10,3)	1230 (32,9)	1640 (43,9)	3610 (96,8)				
4.5 to 7 psig (310 to 483 mbar) 1B537327052 Black	0.7 psig (48 mbar)	4.5 psig (310 mbar)	9 (0,62)	190 (5,20)	310 (8,31)	430 (11,4)	620 (16,6)	930 (24,9)	990 (26,6)
			12 (0,83)	210 (5,52)	400 (10,7)	560 (14,9)	810 (21,8)	1150 (30,8)	
			30 (2,1)	520 (13,8)	860 (23,2)	1100 (29,4)	1810 (48,4)		
			60 (4,1)	860 (23,2)	1520 (40,8)	2050 (55,0)	2710 (72,6)		
			150 (10,3)	1960 (52,6)	3480 (93,3)	5040 (135)			
	7 psig (483 mbar)	9 (0,62)	160 (4,15)	210 (5,52)	270 (7,26)	520 (13,8)	620 (16,6)	660 (17,6)	
		12 (0,83)	190 (5,20)	310 (8,31)	370 (10,0)	650 (17,3)	860 (23,2)		
		30 (2,1)	370 (9,92)	700 (18,7)	900 (24,2)	1330 (35,6)			
		60 (4,1)	800 (21,4)	1290 (34,6)	1720 (46,0)	2450 (65,7)			
		150 (10,3)	1910 (51,2)	3350 (89,9)	4050 (109)				

 - Shaded areas indicate inlet pressure is too high for orifice size.

Construction Features

- Internal Relief:**

The Type Y600AR regulator (figure 2) has limited capacity internal relief across the diaphragm to help minimize overpressure that could occur due to seat leakage. Any outlet pressure above the start-to-discharge point of the non-adjustable relief valve spring moves the diaphragm off the relief valve seat, allowing excess pressure to bleed out through the spring case vent.

- Downstream Control Line Connection:**

The Type Y600AM regulator (figure 3) has a blocked throat and a 1/2-inch NPT control line tapping in the diaphragm casing. A regulator with a downstream control line is used for monitoring installations or other applications where there is other equipment installed between the regulator and the pressure control point.

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Table 8. Y600A Series Capacities for 1-Inch Body Sizes

OUTLET PRESSURE RANGE, CONTROL SPRING PART NUMBER, AND COLOR	OFFSET FROM SETPOINT	OUTLET PRESSURE SETTING	INLET PRESSURE, PSIG (bar)	1-INCH BODY SIZE					
				Orifice Size, Inches (mm)					
				Capacities in SCFH (m ³ /h(n)) of 0.6 Specific Gravity Natural Gas					
				1/8 (3,2)	3/16 (4,8)	1/4 (6,4)	3/8 (9,5)	1/2 (12,7)	9/16 (14,3)
4 to 8-inches w.c. (10 to 20 mbar) 1B653827052 Red	1-inch w.c. (2 mbar)	7-inches w.c. (17 mbar)	1 (0,069)	90 (2,42)	220 (5,87)	250 (6,57)	300 (7,96)	410 (11,1)	530 (14,2)
			5 (0,34)	220 (5,87)	430 (11,4)	450 (12,1)	1140 (30,4)	1900 (50,8)	1920 (51,5)
			8 (0,55)	230 (6,22)	490 (13,1)	530 (14,2)	2140 (57,4)	2360 (63,3)	
			20 (1,4)	520 (13,8)	970 (25,9)	1810 (48,4)	1170 (31,5) ⁽¹⁾		
			35 (2,4)	710 (19,0)	1480 (39,8)	2300 (61,5) ⁽¹⁾	930 (24,9) ⁽¹⁾		
			75 (5,2)	1030 (27,7)	1100 (29,4) ⁽¹⁾	1390 (37,3) ⁽¹⁾			
			150 (10,3)	1680 (44,9) ⁽¹⁾	1160 (31,1) ⁽¹⁾				
7 to 16-inches w.c. (17 to 40 mbar) 1B653927022 Olive drab	1-inch w.c. (2 mbar)	11-inches w.c. (27 mbar)	1 (0,069)	90 (2,42)	160 (4,15)	170 (4,50)	210 (5,52)	230 (6,22)	250 (6,57)
			5 (0,34)	160 (4,15)	300 (7,96)	310 (8,31)	520 (13,8)	620 (16,6)	1160 (31,1)
			8 (0,55)	170 (4,50)	360 (9,67)	430 (11,4)	1160 (31,1)	1460 (39,1)	
			20 (1,4)	350 (9,33)	580 (15,6)	780 (20,7)	1630 (43,6)		
			35 (2,4)	560 (14,9)	1030 (27,7)	2840 (37,5)	1190 (31,8) ⁽¹⁾		
			75 (5,2)	1230 (32,9)	1290 (34,6)	1510 (40,4) ⁽¹⁾			
			150 (10,3)	1740 (46,7)	1240 (33,2) ⁽¹⁾				
15-inches w.c. to 1.2 psig (37 mbar to 83 mbar) 1B537027052 Yellow	5-1/2-inches w.c. (14 mbar)	15-inches w.c. (37 mbar)	2 (0,14)	90 (2,42)	460 (12,3)	500 (13,4)	1100 (29,5)	1160 (31,1)	1300 (34,8)
			6 (0,41)	250 (6,70)	750 (20,1)	930 (24,9)	2500 (67,0)	2800 (75,0)	
			10 (0,69)	340 (9,11)	920 (24,7)	1590 (42,6)	3250 (87,1)		
			30 (2,1)	680 (18,2)	1560 (41,8)	2830 (75,8)	5460 (146)		
			60 (4,1)	1160 (31,1)	2550 (68,3)	4620 (124)			
		150 (10,3)	2570 (2,42)	2770 (74,2)					
		1.2 psig (83 mbar)	2 (0,14)	90 (2,42)	400 (10,7)	460 (12,3)	820 (22,0)	840 (22,5)	900 (24,1)
	6 (0,41)		250 (6,57)	630 (16,9)	700 (18,8)	1550 (41,5)	1610 (43,1)		
	10 (0,69)		320 (8,58)	860 (23,0)	1020 (27,3)	2320 (62,2)			
	30 (2,1)		670 (18,0)	1540 (41,3)	2550 (68,3)	4390 (118)			
	60 (4,1)		1140 (30,6)	2550 (68,3)	4190 (112)				
	150 (10,3)		2570 (68,9)	3100 (83,1)					

1. Indicates capacity limited due to boost.
 Shaded areas indicate inlet pressure is too high for orifice size.

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Capacity Information

Tables 7 and 8 give the natural gas regulating capacities of Y600A Series regulators at selected inlet pressures and outlet pressure settings. Flows are in scfh (60°F and 14.7 psia) of 0.6 specific gravity gas at 60°F. To determine equivalent capacities for air, propane, butane, or nitrogen, multiply the table 7 or 8 capacity by the following appropriate conversion factor: 0.775 for air, 0.628 for propane, 0.548 for butane, or 0.789 for nitrogen. For gases of other specific gravities, multiply the given capacity by 0.775, and divide by the square root of the appropriate specific gravity. Then, if capacity is desired in normal cubic meters per hour at 0°C and 1.01325 bar, multiply scfh by 0.0168. To

determine wide-open flow capacities for relief sizing, use the following formula:

where,

$$Q = \sqrt{\frac{520}{GT}} C_g P_1 \text{SIN} \left(\frac{3417}{C_1} \sqrt{\frac{\Delta P}{P_1}} \right)_{\text{deg}}$$

C_g = gas sizing coefficient from table 4

C_1 = C_g / C_v , or 35 from table 4

G = gas specific gravity (air = 1.0)

$P_{1\text{abs}}$ = inlet pressure, psia (add 14.7 psi to gauge inlet pressure to obtain absolute inlet pressure)

Q = flow rate, scfh

T = absolute temperature of gas at inlet in °Rankine

ΔP = differential pressure, psid

Table 8. Y600A Series Capacities for 1-Inch Body Sizes (Continued)

OUTLET PRESSURE RANGE, CONTROL SPRING PART NUMBER, AND COLOR	OFFSET FROM SETPOINT	OUTLET PRESSURE SETTING	INLET PRESSURE, PSIG (bar)	1-INCH BODY SIZE						
				Orifice Size, Inches (mm)						
				Capacities in SCFH (m ³ /h(n)) of 0.6 Specific Gravity Natural Gas						
				1/8 (3,2)	3/16 (4,8)	1/4 (6,4)	3/8 (9,5)	1/2 (12,7)	9/16 (14,3)	
1.2 to 2.5 psig (83 to 172 mbar) 1B537127022 Light green	0.2 psig (14 mbar)	1.2 psig (83 mbar)	2 (0,14)	120 (3,11)	210 (5,52)	230 (6,22)	360 (9,65)	620 (16,6)	660 (17,6)	
			6 (0,41)	180 (4,85)	340 (8,98)	450 (12,1)	750 (20,1)	880 (23,5)	1080 (29,1)	
			10 (0,69)	190 (5,20)	560 (14,9)	650 (17,3)	1150 (30,8)	1750 (47,0)		
			30 (2,1)	630 (16,9)	1230 (32,9)	1600 (42,9)	1910 (51,2)			
			60 (4,1)	1010 (27,0)	2450 (65,7)	3600 (96,5)	2420 (64,9)			
			150 (10,3)	2440 (65,3)	3480 (93,3)	3870 (104)				
	2.5 psig (172 mbar)	2.5 psig (172 mbar)	6 (0,41)	140 (3,81)	260 (6,91)	270 (7,26)	500 (13,4)	670 (18,0)	680 (18,3)	
			10 (0,69)	180 (4,85)	450 (12,1)	490 (13,1)	710 (19,0)	860 (23,2)		
			30 (2,1)	570 (15,2)	720 (19,3)	1030 (27,7)	1640 (44,0)			
			60 (4,1)	850 (22,8)	1830 (49,1)	2520 (67,4)	3130 (83,9)			
			150 (10,3)	2190 (58,8)	3350 (89,9)	3480 (93,3)				
2.5 to 4.5 psig (172 to 310 mbar) 1B537227022 Light blue	0.3 psig (21 mbar)	2.5 psig (172 mbar)	4 (0,28)	140 (3,81)	180 (4,85)	190 (5,20)	410 (11,1)	430 (11,4)	480 (12,8)	
			8 (0,55)	180 (4,85)	320 (8,66)	360 (9,67)	710 (19,0)	740 (19,7)	900 (24,2)	
			12 (0,82)	190 (5,20)	400 (10,7)	490 (13,1)	930 (24,9)	960 (25,6)		
			30 (2,1)	430 (11,4)	620 (16,6)	900 (24,2)	1830 (49,1)			
			60 (4,1)	660 (17,6)	1610 (43,2)	1740 (46,7)	2970 (79,6)			
		150 (10,3)	2010 (53,9)	4090 (110)	6660 (178)					
		4.5 psig (310 mbar)	8 (0,55)	120 (3,11)	190 (5,20)	250 (6,57)	490 (13,1)	520 (13,8)	540 (14,5)	
			12 (0,82)	160 (4,15)	210 (5,52)	320 (8,66)	610 (16,2)	850 (22,8)		
	30 (2,1)		390 (10,4)	520 (13,8)	760 (20,4)	1360 (36,3)				
	60 (4,1)		630 (16,9)	840 (22,5)	1230 (32,9)	2580 (69,1)				
	150 (10,3)		1390 (37,3)	2880 (77,1)	4990 (134)					
	4.5 to 7 psig (310 to 483 mbar) 1B537327052 Black	0.7 psig (48 mbar)	4.5 psig (310 mbar)	9 (0,62)	210 (5,52)	310 (8,31)	430 (11,4)	770 (20,6)	970 (25,9)	1050 (28,0)
				12 (0,83)	230 (6,22)	400 (10,7)	560 (14,9)	1010 (27,0)	1290 (34,6)	
				30 (2,1)	520 (13,8)	860 (23,2)	1100 (29,4)	2080 (55,7)		
60 (4,1)				880 (23,5)	1520 (40,8)	2050 (55,0)	3650 (97,8)			
150 (10,3)				2060 (55,3)	3510 (94,0)	6000 (161)				
7 psig (483 mbar)		9 (0,62)	160 (4,15)	210 (5,52)	270 (7,26)	590 (15,9)	620 (16,6)	660 (17,6)		
		12 (0,83)	210 (5,52)	310 (8,31)	370 (10,0)	770 (20,7)	890 (23,9)			
		30 (2,1)	370 (10,0)	700 (18,7)	900 (24,2)	1650 (44,2)				
		60 (4,1)	800 (21,4)	1290 (34,6)	1720 (46,0)	2760 (74,0)				
		150 (10,3)	2010 (53,9)	3390 (90,9)	4140 (111)					

Shaded areas indicate inlet pressure is too high for orifice size.

Overpressure Protection

Like most pressure-reducing regulators, Y600A Series regulators have outlet pressure ratings that are lower than their inlet pressure ratings. A pressure relieving or pressure limiting device is needed if the inlet pressure can exceed the outlet pressure rating. A Type Y600AR regulator—because of its internal relief—does provide limited downstream overpressure protection, but this internal relief should not be considered complete protection against overpres-

sure. Overpressuring any portion of a regulator or associated equipment may cause personal injury, leakage, or property damage due to bursting of pressure-containing parts or explosion of accumulated gas. Regulator operation within ratings does not prevent the possibility of damage from external sources or from debris in the pipeline. Refer to the Capacity Information section and the relief sizing coefficients in table 4 to determine the required relief valve capacity.

Bulletin 71.1:Y600A

BODY SIZE, INCHES (DN)	DIMENSION, INCHES (mm)					APPROXIMATE SHIPPING WEIGHT, POUNDS (kg)
	A	D (Diameter)	E	F	G	
3/4 and 1 (25)	3.62 (92)	8.38 (213)	6.25 (159)	10.69 (272)	1.00 (25)	13 (5,9)

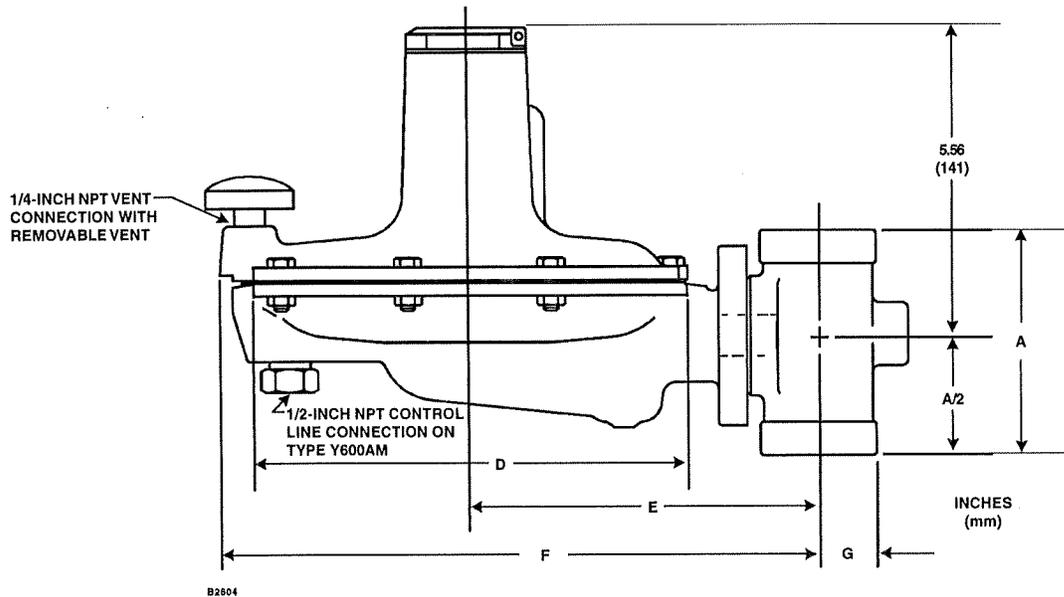


Figure 4. Dimensions

Installation

A Y600A Series regulator may be installed in any orientation as long as flow through it matches the direction of the arrow cast on the body. Normal installation is with the spring case vertical above or below the diaphragm case. External dimensions and connections are shown in figure 4.

Ordering Information

When ordering, specify:

Application

1. Type of regulator
2. Body, spring case, diaphragm case, and trim materials
3. Control spring range in psig (bar)

Construction

Refer to the page 2 specifications and to each referenced table. Specify the desired selection whenever there is a choice to be made. Always be sure to specify the regulator type number.

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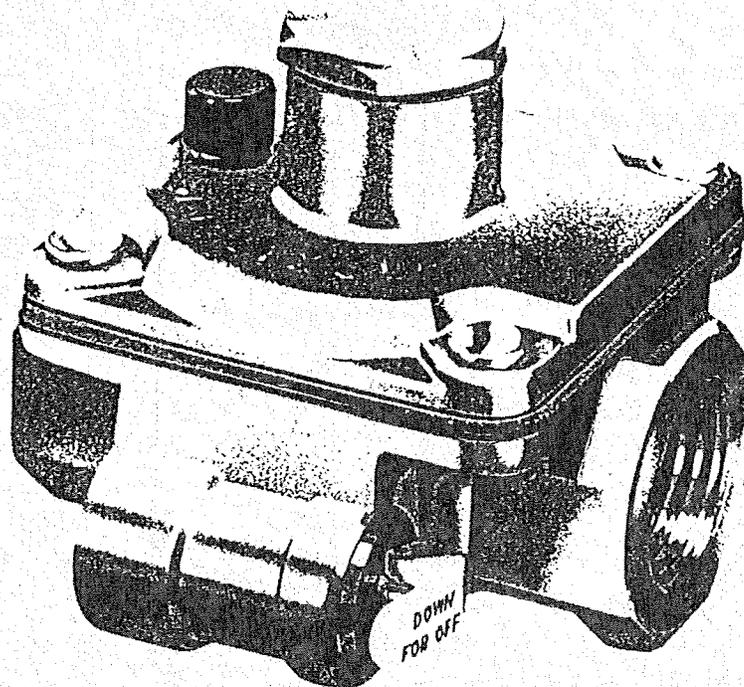
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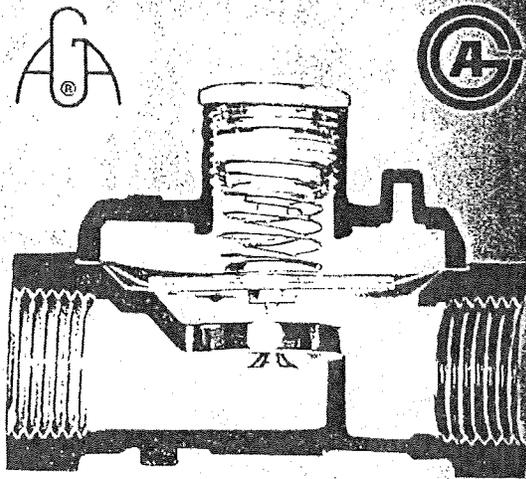
m Gas Appliance
Pressure Regulators

**Rubber Seat —
Poppet Models**



MAXITROL company

RV/CV Series — RV12, RV20, RV47 RV48 and CV47



These rubber seat poppet type regulators are designed primarily for main burner and pilot load applications where precise control of tiny flows is an essential operating requirement. © certified (.15 CFH).

Housings are of high strength aluminum die castings. All models have been tested for multi-poise mounting and may be installed in any plane or angle without restriction. Other than normal upright position will result in slight difference of outlet pressure. They may be used with natural, manufactured, mixed, LP, or LP gas-air mixture.

Models having the letters A, C, D, E, F, L, M, MK, N, R, SR, S, T, or a combination of any of these suffix letters, indicates the design modifications described below:

- A — short stack — limited spring adjustment (RV47 & CV47)
- C — convertible regulators — preset to deliver outlet pressures for either NAT or LP gases (RV20, RV47, RV48 & CV47)
- D — integral ball check limiting device that permits normal opening and restricts closing cycle (RV47 & CV47)
- E — excessive pressure rated
- F — factory-set, fixed/non-adjustable regulator
- F6 — 3/8" tube inverted flare
- I — left side integral manual valve — outlet faces main inlet (CV47)
- L — an integral vent limiting orifice as the breather hole
- L3 — 1/8" outlet tube loxit (RV12)
- L4 — 1/2" outlet tube loxit (RV47)
- L6 — 3/8" outlet tube loxit (RV20)

MAXIMUM INLET PRESSURE:

RV12, RV20, RV47, RV47A,
RV48 & CV47, CV47A 1/2 psi (34 mbar),
RV20L 2 psi (140 mbar)

EMERGENCY EXPOSURE LIMITS:

RV12, RV20, RV47, RV47A, RV48
& CV47, CV47A 2.5 psi (172 mbar)

AMBIENT TEMPERATURE LIMITS:

RV12LT & RV20LT ... -40° to 275°F (-40° to 135°C)
RV48T 32° to 275°F (0° to 135°C)
RV20L -40° to 225°F (-40° to 107°C)
RV20C, RV47, RV47A, RV47C, RV48, RV48C &
CV47, CV47A, CV47C 32° to 225°F (0° to 107°C)

GASES: Natural, manufactured, mixed, liquified petroleum or LP gas-air mixture.

MOUNTING: Other than normal upright position will result in slight difference of outlet pressure — mount with flow direction as marked on bottom casting.

NOTE: All Maxitrol gas appliance pressure regulators should be installed and operated in accordance with Maxitrol's "Safety Warning" Bulletin. Different models have American Gas Association, German D.V.G.W., European EN-88, Canadian Gas Association, and Australian Gas Association certifications.

- M — B.S.P. - PL parallel thread — conforms to ISO 7-1, where pressure tight joints are made on the threads.
- MK — B.S.P. - TR taper thread — conforms to ISO 7-1, where pressure tight joints are made on the threads.
- N — main burner only — includes internal by-pass orifice to prevent lockup (RV20, RV47, RV48 & CV47)
- R — right side integral manual valve — outlet faces main outlet (CV47)
- SR — side tap — right side 1/8" N.P.T. (RV20 & RV47)
- S — side tap — left side 1/8" N.P.T. (RV20, RV47 & CV47)
- T — model variation for operating at higher ambient temperatures to 275°F (135°C) (RV48, RV20 & RV12)

The CV47 can best be described as an RV47 with an extra regulated outlet. This outlet contains an integral manual valve, and is located on the valve body's side.

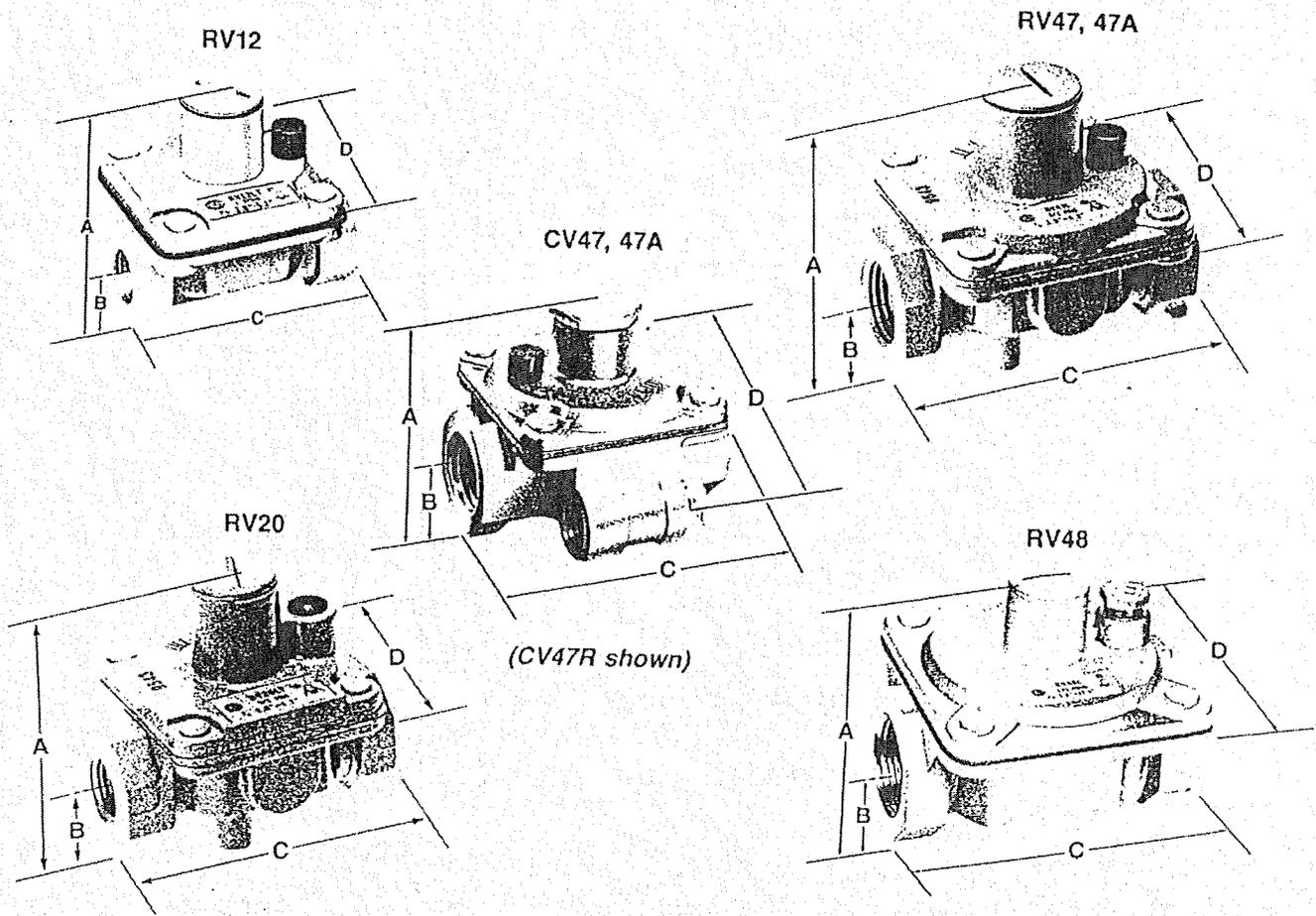
The short stack models have an adjustment range of less than 2" w.c. (5 mbar). These models are advantageous where installation must be made in limited space.

Convertible regulators are designed to deliver either of two fixed outlet pressures, for natural or LP gases. RV20C 4" to 10" w.c. RV47C & CV47C 4", 5" or 6" to 10" or 11" w.c. RV48C 5" to 10" w.c.

The RV48 model may be used with either a 12A04 ball check device, or a 12A06 fixed orifice vent limiting device.

Maxitrol rubber seat poppet models offer the ultimate in design features and performance capabilities to meet specific appliance or utility requirements.

Specifications



*Dimensions are maximums and are to be used only as an aid in designing clearance for the valve. Actual production dimensions may vary somewhat from those shown.

DIMENSIONS*: inches (millimeters)

Model	Vent Tap	Swing Radius	Call-Outs			
			A	B	C	D
RV12	None (Integral)	1-3/8 (35)	1-11/16 (43)	3/8 (10)	1-11/16 (43)	1-3/8 (35)
RV20	a 5/16-24	1-5/8 (41)	2-1/8 (54)	1/2 (13)	2-3/8 (61)	1-3/4 (45)
RV47 CV47	b None (Integral)	1-7/8 (48)	2-1/2 (64)	5/8 (16)	2-15/16 (75)	2-1/4 (57)
RV47A CV47A	b None (Integral)	1-5/8 (41)	2-1/4 (57)	5/8 (16)	2-15/16 (75)	2-1/4 (57)
RV48	c 1/8" NPT	2 (51)	2-3/4 (70)	3/4 (19)	3-3/8 (86)	3 (76)

A For 1/8" tube connector.

B Order with "D" or "L" suffix.

C Can be supplied with 12A04 or 12A06 vent limiting device.

SPRING SELECTION CHART — inches water column (millibars)

Model	Standard Spring	Other Springs Available										
		1.0-3.5 (2.5-8.8)	—	—	—	4.0-8.0 (10-20)	—	—	—	6.0-10 (15-25)	8.0-12 (20-30)	—
'12	2.8" to 5.2" (6.9 to 13)	1.0-3.5 (2.5-8.8)	—	—	—	4.0-8.0 (10-20)	—	—	—	6.0-10 (15-25)	8.0-12 (20-30)	—
RV20	2.8" to 5.2" (6.9 to 13)	1.0-3.5 (2.5-8.8)	—	—	—	4.0-8.0 (10-20)	—	—	—	6.0-10 (15-25)	8.0-12 (20-30)	9-12 (22.5-30)
CV47 RV47	2.8" to 5.2" (6.9 to 13)	1.0-3.5 (2.5-8.8)	—	—	3.8-4.3 (9.5-10.8)	4.0-8.0 (10-20)	4.7-5.3 (11.8-13.3)	—	5.6-6.4 (14-16)	6.0-10 (15-25)	8.0-12 (20-30)	9.7-11.3 (24.2-28.3)
RV48	3.0" to 6.0" (7.5 to 15)	1.0-3.5 (2.5-8.8)	—	—	—	4.0-8.0 (10-20)	—	5.0-12 (12.5-30)	—	6.0-10 (15-25)	—	—

CAPACITY CHART— expressed in Btu/h (cubic meters/h) — 0.64 sp gr gas

Model	Pipe Size	Pressure Drop @ 0.3" w.c. or (.7mb)	Range of Regulations		Individual Load	
			Main Burner	M.B. and Pilot	Fixed Orifice	Ball Check Devices
RV12	1/8" x 1/8"* 3/16" Lox x 3/16" Lox	14,800 (.42) 8,800 (.25)	30,000 (.85)	25,000 (.71) 15,000 (.43)	20,000 (.56) 15,000 (.43)	—
RV20	1/4" x 1/4"* 3/8" x 3/8"*	30,000 (.85)	65,000 (1.84)	50,000 (1.4)	30,000 (.85)	—
RV20C	1/4" x 1/4"* 3/8" x 3/8"	30,000 (.85)	75,000 (2.11)	50,000 (1.4)	15,000 (.42)	—
CV47 RV47	3/8" x 3/8"* 1/2" x 1/2"*	55,000 (1.5) 60,000 (1.7)	125,000 (3.5)	90,000 (2.5)	40,000 (1.1)	90,000 (2.5)
CV47A & C RV47A & C	3/8" x 3/8"* 1/2" x 1/2"	55,000 (1.5) 60,000 (1.7)	125,000 (3.5)	125,000 (3.5)	40,000 (1.1)	125,000 (3.5)
RV48	1/2" x 1/2"* 3/4" x 3/4"	130,000 (3.7) 150,000 (4.2)	230,000 (6.5) 250,000 (7.1)	230,000 (6.5) 250,000 (7.1)	40,000 (1.1)	160,000 (4.5)
RV48C	1/2" x 1/2"* 3/4" x 3/4"	130,000 (3.7) 150,000 (4.2)	400,000 (11.3)	275,000 Nat (7.0) 250,000 LP (2.8)	40,000 (1.1)	160,000 (4.5)

NOTE: Minimum main burner regulation capacity for all models (except "N") is 150 Btu/h (.0042 m³/h).

* Available as loxit connection.

HOW TO CALCULATE PRESSURE DROP AT VARIOUS FLOW RATES FROM CAPACITY CHART:

$$\text{FORMULA: } P_2 = P_1 \times (Q_2/Q_1)^2$$

P₂ = Pressure drop at desired flow rate.

Q₂ = Desired flow rate.

P₁ = Known pressure drop (in this case 0.3" w.c.).

Q₁ = Known flow rate at 0.3" w.c. (see chart)

SELECTING A REGULATOR WITH SUFFICIENT CAPACITY:

- A. Check Capacity Chart insuring regulator has ample range of regulation and individual load capacities (for use with pilot) for the application.

Minimum inlet pressure = 7.0" w.c.

Required outlet pressure = 5.0" w.c.

- B. Know minimum encountered inlet pressure.

MINIMUM INLET PRESSURE MINUS "P₂" MUST BE GREATER THAN DESIRED OUTLET PRESSURE.

Solve for "P₂" using above formula.

Using the Capacity Chart shows the RV48 is the only regulator satisfying the requirements in "A".

$P_2 = 0.3" \text{ w.c.} \times (150,000 / 130,000)^2 = 0.4" \text{ w.c.}$

7.0" w.c. — 0.4" w.c. = 6.6" w.c.

6.6" w.c. is greater than the required Po of 5.0" w.c.

EXAMPLE: 1/2"NPT regulator required for main burner and pilot.

Desired maximum flow rate = 150,000 btu/h.

Maximum individual load = 150,000 btu/h.

THE RV48 (non "L" fixed orifice), VENTED OR W/12A04 BALL CHECK DEVICE, IS THE CORRECT REGULATOR FOR THIS APPLICATION.

MAXITROL[®] company

Inc.

mbH

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Capacity Charts for Gas Pressure Regulators

The capacity of any regulator is not an absolute value, but will vary with the application depending on the prevailing differential. We hope the following charts will help you in your selection of a properly sized regulator.

Maxitrol gas appliance regulators should be installed and operated in accordance with our "Safety Warning Bulletin" — no untrained person should attempt to install, maintain, or service a gas pressure regulator.

POPPET MODELS — capacities expressed in Btu/h. — 0.64 sp gr gas Maxitrol recommended maximum inlet pressure 1/2 psi

Model	Pipe Size	Pressure Drop @ 0.3" w.c.	Range of Regulation		Individual Load	
			Main Burner	M.B. and Pilot	Fixed Orifice	Ball Check Devices
RV12	1/8" x 1/8" 3/16" x 3/16"	14,800 8,800	30,000	25,000 15,000	20,000 15,000	—
RV20	1/4" x 1/4" 3/8" x 3/8"	30,000	65,000	50,000	30,000	—
RV20C	1/4" x 1/4" 3/8" x 3/8"	30,000	75,000	50,000	15,000	—
CV47 RV47	3/8" x 3/8" 1/2" x 1/2"	55,000 60,000	125,000	90,000	40,000	80,000
CV47A & C RV47A & C	3/8" x 3/8" 1/2" x 1/2"	55,000 60,000	125,000	125,000	40,000	125,000
RV48	1/2" x 1/2" 3/4" x 3/4"	130,000 150,000	230,000 250,000	230,000 250,000	40,000	160,000
RV48C	1/2" x 1/2" 3/4" x 3/4"	130,000 150,000	400,000	275,000 Nat 250,000 LP	40,000	160,000

NOTE: Minimum main burner regulation capacity for all models (except "N") is 150 Btu/h.

STRAIGHT-THRU-FLOW — capacities expressed in CFH — 0.64 sp gr gas Maxitrol recommended maximum inlet pressure: RV52 & 53 1/2 psi RV61, 81, 91 & 111 .. 1 psi RV131 2 psi

Model Number and Pipe Size	A.G.A. MAX.	Pressure Drop (Inches w.c.)													
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	2.0	3.0	4.0	
RV52 1/2 x 1/2	450	151	214	262	302	338	370	400	427	453	478	676	828	856	
RV53 3/4 x 3/4	450	151	214	262	302	338	370	400	427	453	478	676	828	856	
RV61 1 x 1	710	217	306	375	433	484	530	573	612	650	684	968	1185	1369	
RV81 1-1/4 x 1-1/4	1100	379	536	675	799	848	929	1004	1073	1138	1200	1742	2134	2464	
RV91 1-1/2 x 1-1/2	1100	379	536	675	799	848	929	1004	1073	1138	1200	1742	2134	2464	
RV111 2 x 2	2500	780	1102	1350	1559	1743	1909	2062	2204	2339	2465	3485	4269	4929	
RV131 2-1/2 x 2-1/2	2500	780	1102	1350	1559	1743	1909	2062	2204	2339	2465	3485	4269	4929	
RV131 3 x 3	3500	1272	1878	2300	2745	3011	3299	3504	3637	3767	3894	5222	6410	7468	
RV131 3-1/2 x 3-1/2	3500	1272	1878	2300	2745	3011	3299	3504	3637	3767	3894	5222	6410	7468	

325 SERIES — capacities expressed in CFH — 0.64 sp gr gas
 Maxitrol recommended maximum inlet pressure..... 10 psi

Model Number and Pipe Size		Pressure Drop								
		0.1"	0.5"	1.0"	3.0"	5.0"	7.0"	1/2 psi	3/4 psi	1 psi
325-3	3/8 x 3/8	30	38	55	85	122	145	204	250	289
	1/2 x 1/2	30	30	55	85	122	145	204	250	289
325-5A	1/2 x 1/2	70	80	128	221	286	338	476	503	673
	3/4 x 3/4	70	80	120	221	286	338	476	503	673
	1 x 1	70	80	128	221	286	338	476	503	673
325-7	1-1/4 x 1-1/4 1-1/2 x 1-1/2	1.0"	3.0"	5.0"	7.0"	1/2 psi	3/4 psi	1 psi	1.5 psi	1.75 psi
		260	450	501	690	872	1191	1375	1685	1820

210 SERIES — capacities expressed in CFH — 0.64 sp gr gas
 Maxitrol recommended maximum inlet pressure..... 10 psi

Model Number and Pipe Size		Pressure Drop (Inches w.c.)										
		0.1	0.3	0.5	1.0	3.0	5.0	7.0	1/2 psi	3/4 psi	1 psi	1.5 psi
210D	1 x 1	—	—	—	900	1600	2000	2400	3300	4100	4750	5800
	1-1/4 x 1-1/4	—	—	—	1100	1900	2500	2900	4100	5000	5850	7150
	1-1/2 x 1-1/2	—	—	—	1200	2100	2700	3200	4500	5500	6350	7750
210E	1-1/2 x 1-1/2	—	1050	1350	1915	3315	4280	5065	7125	8725	10075	12340
210G	2-1/2 x 2-1/2	1410	2450	3160	4470	7740	8995	11825	16635	20375	23525	28810
	3 x 3	1555	2695	3475	4920	8520	11000	13020	18310	22425	25890	31710
210J	4 x 4	2700	4700	6000	8600	15000	19000	23000	32000	40000	45500	55700

R/R/S SERIES — capacities expressed in CFH — 0.64 sp gr gas
 Maxitrol recommended maximum inlet pressure: R Model..... 1 psi
 RS Model..... 5 psi

Model Number and Pipe Size		Pressure Drop (Inches w.c.)										
		0.2	0.4	0.6	0.8	1.0	1.5	2.0	2.5	3.0	3.5	4.0
R400 & R400S	3/8 x 3/8	77	110	134	155	174	212	245	274	—	—	—
	1/2 x 1/2	86	121	148	172	192	235	271	303	—	—	—
R500 & R500S	1/2 x 1/2	163	231	283	327	366	447	516	577	635	685	730
	3/4 x 3/4	186	277	340	392	438	537	620	693	760	820	876
R600 & R600S	3/4 x 3/4	298	421	516	595	666	816	942	1054	1150	1245	1335
	1 x 1	330	468	572	661	739	906	1046	1169	1280	1380	1480

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SAFETY WARNING INSTRUCTIONS FOR MAXITROL GAS PRESSURE REGULATORS

NOTE: GAS PRESSURE REGULATORS WILL NOT
TURN OFF THE FLOW OF GAS.

SPECIAL WARNINGS

IF YOU DO NOT FOLLOW THESE INSTRUCTIONS EXACTLY, A FIRE OR EXPLOSION MAY RESULT CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR LOSS OF LIFE. NO UNTRAINED PERSON SHOULD ATTEMPT TO INSTALL, MAINTAIN, OR SERVICE GAS PRESSURE REGULATORS.

To minimize the possibility of FIRE, EXPLOSION, and OTHER HAZARDS:

- All products, including gas pressure regulators, used with combustible gas must be installed and used strictly in accordance with the instructions of the manufacturer, with government codes and regulations, and plumbing codes and practices.
- Do not use a gas pressure regulator if it appears to have been subjected to high temperatures, damaged in any way, or to have been taken apart or tampered with. Any of these may be signs of possible leakage or other damage that may affect proper operation and cause potentially dangerous combustion problems.
- Install the regulator properly with gas flowing as indicated by the arrow on the casting. Use pipe compound or thread sealant, properly threaded pipes and careful assembly procedure so that there is no cross threading, etc., which might cause damage or leakage.
 - Apply wrench or vise pressure only to the flat areas around the pipe tappings at the end being threaded to the pipe to avoid possible fracture of the regulator body which could result in leakage.
 - Make sure markings or wording on regulator are not painted over or obliterated.
- Check carefully for gas leaks immediately after the regulator has been installed and the gas turned on. Do this before attempting to operate the appliance or other gas burning device. Use a rich soap solution (or other accepted leak tester) around the diaphragm flanges, bottom plate, vent opening, seal cap, pipe connections, and all other joints. Wipe clean with a damp rag. It is a good practice to periodically check for leakage during use of the appliance. Absolutely no leakage should occur, otherwise there is a danger of fire or explosion depending upon conditions. Never use if leakage is detected.

CAUTION

NEVER CONNECT REGULATOR DIRECTLY TO THE PROPANE SUPPLY SOURCE. MAXITROL REGULATORS REQUIRE AN EXTERNAL REGULATOR (NOT SUPPLIED). INSTALL THE EXTERNAL REGULATOR BETWEEN THE PROPANE SUPPLY SOURCE AND MAXITROL REGULATOR.

- Very high pressure surges in the gas supply line (or as a result of exposing the system to high pressure) may result in serious internal damage and cause leakage or affect regulator operation. If you suspect that a Maxitrol regulator has been exposed to more than twice the maximum operating pressure, as shown in the following chart, turn off the gas and have the system checked by an expert.

MAXITROL

INSTRUCCIONES PARA PRECAUCIONES DE SEGURIDAD

PARA REGULADORES DE PRESION DE GAS MAXITROL

NOTA: LOS REGULADORES DE PRESION DE GAS NO CORTAN EL FLUJO DE GAS

¡PRECAUCIONES ESPECIALES!

SI USTED NO SIGUE ESTAS INSTRUCCIONES EXACTAMENTE, PUEDE OCURRIR UN INCENDIO O UNA EXPLOSION, CAUSANDO DAÑOS A LA PROPIEDAD, LESIONES PERSONALES O PERDIDA DE VIDAS. NADIE QUE NO HAYA SIDO ENTRENADO DEBERA DE TRATAR DE INSTALAR, DAR SERVICIO O DAR MANTENIMIENTO A LOS REGULADORES DE PRESION DE GAS

Para reducir la posibilidad de INCENDIO, EXPLOSION Y OTROS RIESGOS:

- Todos los productos, incluyendo los reguladores de presión de gas, que se usan con gases combustibles deberán instalarse y usarse estrictamente de acuerdo con las instrucciones del fabricante, usando los códigos y reglamentos gubernamentales así como los códigos y prácticas de plomería.
- No usar un regulador de presión de gas si parece haber estado expuesto a altas temperaturas, dañado en alguna forma o que se haya desmantelado o maltratado. Cualquiera de éstas pueden ser señales de posibles fugas u otros daños que pueden afectar el funcionamiento correcto y causar problemas de combustión potencialmente peligrosos.
- Instalar el regulador correctamente con el gas fluyendo como se indica en la flecha en la carcasa de fundición.
 - Usar un compuesto sellador de tubería o hilo sellador de rosca, tuberías correctamente roscadas y procedimientos de ensamble cuidadosos, asegurándose de que no haya trasroscados, lo cual podría causar daños o fugas.
 - Aplicar únicamente la presión de una llave o llomo de banco en las áreas planas alrededor de las roscas de la tubería del extremo a enroscar para evitar la posible rotura del cuerpo del regulador que podría resultar en fugas.
 - Asegurarse de que no se pinten o tachan las marcas o escritura en el regulador.
- Verificar inmediatamente que no haya fugas de gas después de que el regulador haya sido instalado y se haya abierto el paso del gas. Esto deberá hacerse antes de tratar de operar el aparato electrodoméstico o cualquier otro dispositivo quemador de gas. Usar una solución espesa de jabón (u otro probador de fugas aceptado) alrededor de las bridas del diafragma, el fondo del plato, la apertura de ventilación, la tapa selladora y las conexiones de la tubería y todas las demás juntas. Limpiar con un trapo húmedo. Es una buena práctica verificar periódicamente que no haya fugas durante el uso del aparato electrodoméstico. Absolutamente no deberá haber ninguna fuga. De otra forma hay peligro de incendio o explosión dependiendo de las condiciones. Nunca deberá usarse el se detectan fugas.

¡PRECAUCION!

NUNCA CONECTAR EL REGULADOR DIRECTAMENTE AL SUMINISTRO DE PROPANO. LOS REGULADORES MAXITROL REQUIEREN UN REGULADOR EXTERNO (NO PROVISTO). INSTALAR EL REGULADOR EXTERNO ENTRE EL SUMINISTRO DE PROPANO Y EL REGULADOR MAXITROL.

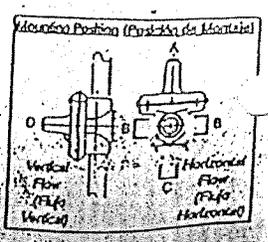
- Alimentos grandes de presión en la línea de suministro de gas (o como resultado de exponer el sistema a alta presión) pueden resultar en daños internos y causar fugas o afectar el funcionamiento del regulador. Si usted sospecha que un regulador Maxitrol ha sido expuesto a más del doble de la presión máxima de entrada, como se muestra en la tabla siguiente, cierre el paso del gas y haga que el sistema sea verificado por un experto.

6. Venting must be controlled in accordance with government and plumbing codes and regulations to avoid the danger of escaping gas should there be internal leakage. Vent pipes must be open and the open end protected against entry of foreign matter, including water.
7. The outlet pressure of the regulator must be measured to make sure it is in accordance with intended usage. If a spring change is required to develop the required outlet pressure, the spring must be one specified by MAXITROL.
8. Caution should be used to guarantee that there is sufficient inlet pressure to achieve the desired outlet pressure and no readjustment of the outlet pressure setting should be made unless the inlet pressure is within the proper limits for the regulator. Failure to follow this may result in overfiring of the appliance or other gas burning device. The MAXITROL bulletin for the regulator should be consulted for specific inlet and outlet pressure relationships.
9. A MAXITROL regulator must be used within the temperature range and not in excess of the maximum inlet pressure shown in the following table and should be in the mounting position indicated. Maxitrol regulators can be used with all fuel-gases.
10. In case of any doubt, please contact the Service Manager, Maxitrol Company, Southfield, MI USA. Phone: 810/356-1400.
6. La ventilación deberá estar controlada de acuerdo con los códigos y regulaciones gubernamentales de plomería para evitar el peligro de que se escape el gas en caso de una fuga interna. Los tubos de ventilación deberán estar abiertos y el extremo abierto deberá estar protegido contra cualquier materia extraña, incluyendo el agua.
7. La presión de salida del regulador deberá medirse para asegurarse que está de acuerdo para el uso que se pretende. Si se necesita cambiar un resorte para desarrollar la presión de salida requerida, el resorte deberá ser el especificado por MAXITROL y la nueva presión de salida deberá anotarse en el regulador.
8. Deberá usarse precaución para garantizar que hay suficiente presión interna para alcanzar la presión de salida deseada y no deberá hacerse ningún reajuste en la presión de salida a menos que la presión interna esté dentro de los límites correctos para el regulador. Si esto no se hace a cabo podría resultar en una llama excesiva para el electrodoméstico u otro dispositivo quemador de gas. Deberá consultarse el boletín MAXITROL para el regulador para ver la relación específica entre la presión de entrada y la de salida.
9. Un regulador MAXITROL deberá usarse dentro del rango de temperatura y deberá excederse la presión máxima de entrada que se muestra en la tabla siguiente y deberá estar en la posición indicada de montaje. Los reguladores MAXITROL pueden usarse con todo tipo de gases combustibles.
10. En caso de dudas, favor de comunicarse con el Servicio Manager (Gerente de Servicio), Maxitrol Company, Southfield, MI USA. Teléfono: 810-356-1400.

Model Number (Número de Modelo)	Maximum Operating Inlet Pressure (Presión Máxima de Entrada para Operación)	Ambient Temperature Range (Rango de Temperatura Ambiente)	Mounting Position (see below) (Posición de Montaje) (ver abajo)
RV12LT, RV20LT	1/2 psi (34 mbar)	-40° to 275° F (-40° to 135° C)	A, B, C, D
RV20L	2 psi (138 mbar)	-40° to 225° F (-40° to 107° C)	A, B, C, D
RV47, RV48 (*1)	1/2 psi (34 mbar)	32° to 225° F (0° to 107° C)	A, B, C, D, (*1)
RV48T (*1)	1/2 psi (34 mbar)	32° to 275° F (0° to 135° C)	A, B, C, D, (*1)
RV52, RV53, (*1)	1/2 psi (34 mbar)	-40° to 205° F (-40° to 96° C)	A, B, C, D, (*1)
RV61, (*1)	1 psi (69 mbar)	-40° to 205° F (-40° to 96° C)	A, B, C, D, (*1)
RV81, RV81	1 psi (69 mbar)	-40° to 205° F (-40° to 96° C)	A only (únicamente)
RV111	1 psi (69 mbar)	-40° to 205° F (-40° to 96° C)	A only (únicamente)
RV131	2 psi (138 mbar)	-40° to 125° F (-40° to 52° C)	A only (únicamente)
R400, R500, R600, (*1)	1 psi (69 mbar)	-40° to 205° F (-40° to 96° C)	A, B, C, D, (*1)
R400S, R500S, R600S, (*1)	5 psi (345 mbar)	-40° to 205° F (-40° to 96° C)	A, B, C, D, (*1)
R400Z, R500Z, R600Z	1 psi (69 mbar)	-40° to 205° F (-40° to 96° C)	A, B, C, D, (*1)
2100, E, G, J	10 psi (690 mbar)	-40° to 205° F (-40° to 96° C)	A only (únicamente)
2100Z, EZ, GZ, JZ	5 psi (345 mbar)	-40° to 205° F (-40° to 96° C)	A only (únicamente)
2200, E, G, J	10 psi (690 mbar)	-40° to 205° F (-40° to 96° C)	A only (únicamente)
325-3 (*1), 325-5A (*1), 325-7	10 psi (690 mbar) (*1)	-40° to 205° F (-40° to 96° C)	A, B, C, D, (*1)

(*1) To ensure fast response of the regulator when equipped with a ball-check type automatic vent limiting device (12A04, 12A09, 12A39), regulators must be in upright position (A) with non-integral vent limiter installed directly into vent threads. Any other mounting position interferes with lockup or cause pilot outage. If applicable, Maximum inlet pressure for regulators with 12A09 or 12A39 is 2 psi (LP) or 5 psi (natural) inlet pressures exceeding 2 psi (LP) or 5 psi (natural) require a vent line.

(*1) Para estar seguro que el regulador responde con rapidez cuando está equipado con un dispositivo limitador de ventilación automático tipo bola (12A04, 12A09, 12A39), los reguladores deberán estar en posición vertical (A) con el limitador de ventilación instalado directamente a las roscas del tubo de ventilación. Si se usa cualquier otra posición durante su instalación, esto podrá interferir con el cierre o causar que el piloto se apague. Si es aplicable, la presión máxima de admisión para reguladores con los dispositivos 12A09 o 12A39 es de 2 psi (gas licuado) o 5 psi (gas natural). Las presiones de admisión que excedan 2 psi (gas licuado) o 5 psi (gas natural) requieren una línea de ventilación.



Fisher Controls

Instruction Manual

912 Series Pressure Regulators



May 1991

Form 5124

WARNING

To avoid injury or equipment damage, these regulators should be installed, operated, and maintained in accordance with federal, state and local codes, rules and regulations, and Fisher instructions. Only a qualified person must install or service a regulator. Be certain the control spring range label is updated to accurately indicate any field changes in equipment, materials, service conditions, or pressure settings.

Immediately call a qualified technician in case of trouble. If venting occurs, or a leak develops in the system, it indicates that service is required. Failure to correct the situation immediately may create a hazardous condition.

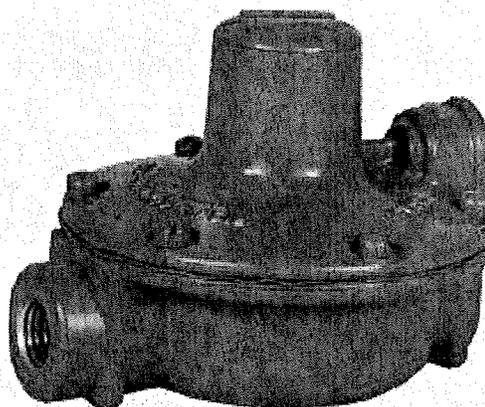


Figure 1. Type 912 Regulator

close the inlet. Pressure in excess of the relief valve spring force opens the relief valve, allowing excess pressure to bleed through the screened vent in the spring case.

INTRODUCTION

Scope of Manual

This manual provides installation, maintenance, and parts information for the 912 Series pressure regulators (figure 1) as used in industrial/natural gas applications.

Description

The 912 Series pressure regulators are self-operated, spring-loaded devices built to provide accurate, sensitive control suited to a variety of applications.

As outlet pressure begins to exceed the set pressure, the diaphragm inside the regulator lifts, operating a lever to

Specifications

Specifications for the 912 Series pressure regulators are listed in table 1.

INSTALLATION

WARNING

Personal injury or equipment damage may result if the regulator is installed where service conditions could exceed the pressure or temperature specifications in table 1. The regulator must not be used for hazardous gas service in a closed area unless the vent is piped to a safe



Table 1. Specifications

AVAILABLE CONFIGURATIONS	See table 2	INTERNAL RELIEF PERFORMANCE	Approximate Internal Relief Valve Start-to-Discharge Point: See table 2 Capacity: Adequate only for relieving minor buildup situations such as are caused by chips or dirt blocking the seat partly open; for major malfunctions, external relief is required according to the Installation section.
BODY SIZES AND END CONNECTION STYLES	Inlet: 1/4-inch NPT screwed Outlet: ■ 1/4 or ■ 3/8-inch NPT screwed	MATERIAL TEMPERATURE CAPABILITIES	-20 to 160°F (-29 to 71°C)
MAXIMUM ALLOWABLE INLET PRESSURE	250 psig (17 bar)	PRESSURE REGISTRATION	Internal
OUTLET PRESSURE RANGES	See table 2	APPROXIMATE WEIGHT	1.3 pounds (0.6 kg)
MAXIMUM ALLOWABLE OUTLET PRESSURE	Maximum Emergency Outlet Pressure: 20 psig (1.4 bar) Maximum Recommended Outlet Pressure to Avoid Internal Part Damage: 3 psi (0.21 bar, differential) above outlet pressure setting		

Table 2. Outlet Pressure Range Data

AVAILABLE CONFIGURATION	OUTLET PRESSURE RANGE	APPROXIMATE POINT ABOVE OUTLET PRESSURE SETTING AT WHICH INTERNAL RELIEF STARTS TO DISCHARGE	CONTROL SPRING SELECTION	
			Part Number	Color Code
Type 912 without handwheel	3 to 7 inches w.c. (7 to 17 mbar)	5 to 21 inches w.c. (12 to 52 mbar)	1B7843 27222	Red
	5 to 10 inches w.c. (12 to 25 mbar)	8 to 30 inches w.c. (20 to 75 mbar)	1B7844 27222	Orange
	9.25 to 13 inches w.c. (23 to 32 mbar)	16 to 39 inches w.c. (40 to 97 mbar)	1L5079 37022	Cadmium
	12 to 24 inches w.c. (30 to 60 mbar)	17 inches w.c. to 3 psig (42 to 210 mbar)	1B7845 27222	Blue
Type 912H without handwheel	1 to 2.5 psig (69 to 172 mbar)	0.7 to 8.8 psig (0.05 to 0.47 bar)	1B7846 27222	Yellow
	2.7 to 5 psig (186 to 340 mbar)	3.8 to 12.5 psig (0.26 to 0.86 bar)	1B7847 27222	Green
912 Series with handwheel	0 to 1 psig (0 to 69 mbar)	0 to 3 psig (0 to 210 mbar)	1C5804 27222	Black
	0 to 5 psig (0 to 340 mbar)	0 to 12.5 psig (0 to 0.86 bar)	1C5805 27012	Brown

area. The vent opening on the regulator or the opening on the remote vent pipe (if one is used) should be pointed down to minimize clogging from collected moisture, corrosive chemicals, or other foreign material. Overpressuring the downstream system (and risk of explosion) could result from a clogged vent.

Overpressuring any portion of a regulator or associated equipment may cause leakage, part damage, or personal injury due to bursting of pressure-containing parts or explosion of accumulated gas.

Like most regulators, the 912 Series regulators have an outlet pressure rating lower than the inlet pressure rating. Downstream protection is required if the actual inlet pressure can exceed the regulator outlet pressure rating or the pressure rating 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.

Ensure that the regulator is undamaged and contains no foreign material. Install the regulator so that flow through it leaves the outlet port (marked on the body). The regulator may be installed in any position, however, the spring case vent should be pointed down. Spring case/vent orientation can be changed by rotating the spring case with respect to the body.

For an indoor installation, if the regulator controls a gas that is flammable or otherwise hazardous, a spring case with the optional tapped vent should be used so that the exhaust can be piped away. Provide protection on a remote vent by installing a screened vent cap into the remote end of the vent pipe. The vent should be pointed down.

Apply a good grade of pipe compound to the pipe threads before making the connections. Install piping into the 1/4-inch NPT inlet connection and the 1/4-inch or 3/8-inch NPT outlet connection.

Each regulator is factory-set for the pressure setting specified on the order. If no setting was specified, the outlet pressure is factory-set at the mid-range of the control spring. The procedure for adjusting the output pressure is given in the Startup section.

STARTUP

Key numbers are referenced in figure 2.

With installation completed and downstream equipment properly adjusted, slowly open the upstream and downstream shutoff valves while monitoring the regulator output pressure.

WARNING

For the 912 Series constructions with no drive screw in the spring case, never adjust the control spring to produce an outlet pressure higher than the outlet pressure range for that particular spring. Doing so could overpressure the system and cause personal injury or equipment damage. If the desired outlet pressure is not within the range of the control spring, install a spring of the proper range according to the Maintenance section.

If outlet pressure adjustment is necessary, monitor the outlet pressure with a gauge while performing the following procedure:

1. For units without a handwheel, unscrew the closing cap (key 3) and insert a screwdriver blade into the adjusting screw (key 4).
2. Slowly turn the adjusting screw or handwheel clockwise to increase or counterclockwise to decrease the output pressure setting.
3. With the output pressure adjusted to the desired value, replace the closing cap on units without a handwheel.

SHUTDOWN

Close the nearest upstream shutoff valve, then close the nearest downstream shutoff valve, and vent pressure from the outlet of the regulator.

MAINTENANCE

Regulator parts are subject to normal wear and must be inspected and replaced as necessary. The frequency of inspection and replacement of parts depends on the severity of service conditions or the requirements of local, state, and federal rules and regulations.

WARNING

To avoid personal injury or equipment damage, do not attempt any maintenance or disassembly without first isolating the regulator from system pressure and relieving all internal pressure from the regulator.

This procedure is to be performed if changing the control spring for one of a different range, or for inspecting, cleaning, or replacing any other parts. Key numbers are referenced in figure 2.

Note

If sufficient clearance exists, the regulator body (key 1) can remain in the line during spring replacement or other maintenance procedures.

Control Spring Replacement

On units without the handwheel, unscrew the closing cap (key 3) and turn the adjusting screw out of the spring case. Lift out the control spring (key 5).

On units with a handwheel, turn the handwheel counterclockwise until the tension is relieved from the control spring. Unscrew the nut at the base of the handwheel and lift the handwheel off the spring case. Lift out the adjusting screw and the control spring.

Replace the control spring and complete the assembly by replacing the adjusting screw and the closing cap or handwheel. Adjust the spring tension as described in the Startup section.

Diaphragm and Relief Valve Replacement

Remove cap screws (key 14) and separate the spring case from the valve body. Remove the control spring (key 5) and the diaphragm (key 15) along with the diaphragm head (key 10), the relief valve seat (key 9) and the relief valve spring (key 6). Separate these parts by removing the pin (key 8) and the spring seat (key 7). Remove the disk holder assembly (key 11) by removing two screws (key 13).



To re-assemble the regulator, first assemble the relief valve spring assembly, then replace the relief valve spring assembly, the disk holder assembly, the diaphragm, the diaphragm head, and fit the spring case to the body. Install and tighten cap screws (key 14) in a criss-cross manner. Adjust the control spring tension as described in the Startup section.

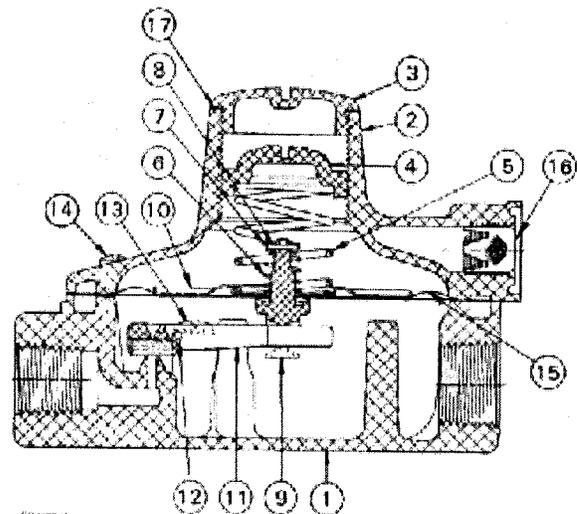


Figure 2. 912 Series Pressure Regulator Assembly

PARTS ORDERING

When corresponding with the Fisher representative about this regulator, include the type number, date of manufacture, and all other pertinent information from the labels. Specify the eleven-character part number when ordering new parts from the following parts list.

PARTS LIST			Key	Description	Part Number	Key	Description	Part Number
Key	Description	Part Number						
1	Body, zinc 1/4 x 1/4-inch NPT 0.073 inch (1.8 mm) port dia 1/4 x 3/8-inch NPT 0.073 inch (1.8 mm) port dia	3D3771 44042	5	Regulator Spring, steel pl. 9.25 to 13 inch w.c. (23 to 32 mbar), cad. 3 to 7 inch w.c. (7 to 17 mbar), red 5 to 10 inch w.c. (12 to 25 mbar), orange 10 inch w.c. to 1 psi (25 to 69 mbar), blue 0.5 to 2.7 psig (35 to 188 mbar), yellow 0 to 1 psig (0 to 69 mbar), black 0 to 5 psig (0 to 340 mbar), brown	1L5079 37022 1B7843 27222 1B7844 27222 1B7845 27222 1B7846 27222 1C5804 27222 1C5805 27012	14	Machine Screw, steel pl (6 req'd)	1B7839 28982
2	Spring Case, zinc For use with control springs 1B7847 27222 (complete with drive screw) Untapped 1/8-inch NPT tapped vent	1B7840 T00012 T10895 T00012	6	Relief Valve Spring, steel pl	1B7848 27012	15	Diaphragm, rubber	1B7837 02012
	For all other constructions Untapped 1/8-inch NPT tapped vent	3E2944 44042 1E2955 44042	7	Spring Seat, steel pl	1B7834 25072	16	Vent Screen, Monel	0W0863 43062
3	Closing Cap 912 Series w/handwheel, brass All others, plastic	1C2344 14012 T10276 06992	8	Pin, SST	1B7835 35032	17*	Closing Cap Gasket, asbestos (use with tapped vent only)	1E7652 04022
4	Adjusting Screw 912 Series w/handwheel, zinc & steel All others, plastic	1B7992 000A2 T10277 06992	9	Relief Valve Ass y, brass/zinc	1C3650 X0012	18	Closing Spring, SST, 912 Series w/handwheel, only	1E3020 37022
			10	Diaphragm Plate, steel Zn pl	1B7838 24132	19	Spacer Ring, brass, 912 Series w/handwheel, only	1C5807 14012
			11	Disk Holder Ass y, zinc/nitrile	1E3003 000A2	20	Lockwheel, brass, 912 Series w/handwheel, only	1C2346 14012
			12	Fulcrum Rod, SST	0U0914 35032	22	Warning Label (not shown)	1P4879 06032
			13	Machine Screw, steel pl (2 req'd)	1A3461 28982	23	Spring Range Label (not shown) 1 to 2.5 psi (69 to 172 mbar) 2.7 to 5 psi (188 to 340 mbar) 0 to 1 psi (0 to 69 mbar) 0 to 5 psi (0 to 340 mbar)	T10800 06992 T10801 06992 T10802 06992 T10803 06992
						25	Spring Seat, brass, 912 Series w/handwheel	1C2345 14012

*Recommended spare part.

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Fisher Controls

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Singapore 0512



H17 Series BASO® Automatic Pilot Valve

The H17 Series BASO® pilot valves provide complete shutoff in the event that the flame heating the thermocouple is extinguished. Applications include room heaters, infrared heaters, salamanders, and refrigerators.

H17 models are also available with a higher ambient temperature, up to a maximum of 150°C (300°F), for use on commercial ovens, broilers, and other applications.

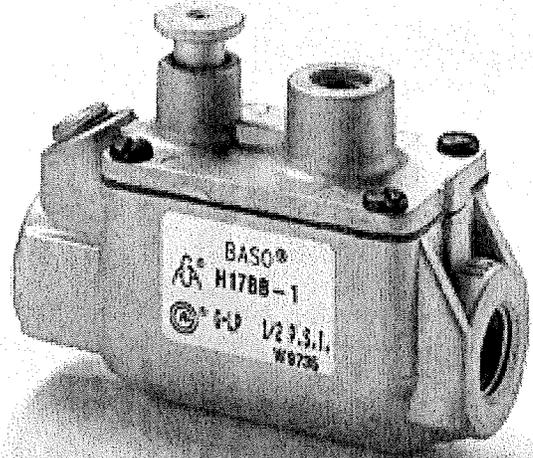


Figure 1: H17 Automatic Pilot Valve

Features and Benefits	
<input type="checkbox"/> Compact Design	Permits installation in dimensionally restricted applications
<input type="checkbox"/> Versatile Mounting	Allows easy access to the reset button for lighting
<input type="checkbox"/> Reliable	Proven by thousands of units in service

Product Overview

Application

The H17 Series valves provide complete shutoff in the event that the flame heating the thermocouple is extinguished. They are suitable for use with natural gas, Liquefied Petroleum (LP) gas, or LP gas-air mixtures at pressures up to 35 mbar (0.5 psi). The H17 is suitable for operation over a (surface) temperature range of -40 to 66°C (-40 to 150°F) for standard models. High temperature models are suitable for operation over a temperature range of -40 to 150°C (-40 to 300°F).

Description

H17 valves are compact, straight-through aluminum valves with pipe sizes from 1/8 to 1/2 inch.

H17 valves do not have a flow interrupter, therefore, gas flows to both the main burner and pilot burner (if used) when the reset button is depressed. Where a pilot is not used, the pilot outlet is omitted and the tip of the thermocouple is inserted directly in the main burner flame.

Mounting

H17 valves may be mounted in any position. This permits the reset button to be located in the most accessible location.

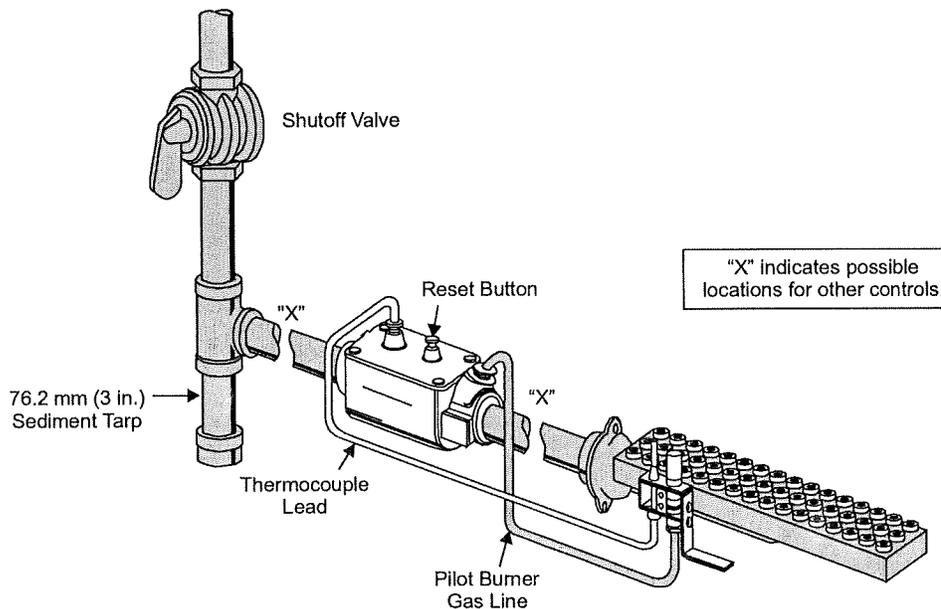


Figure 2: Typical H17 Installation

Dimensions

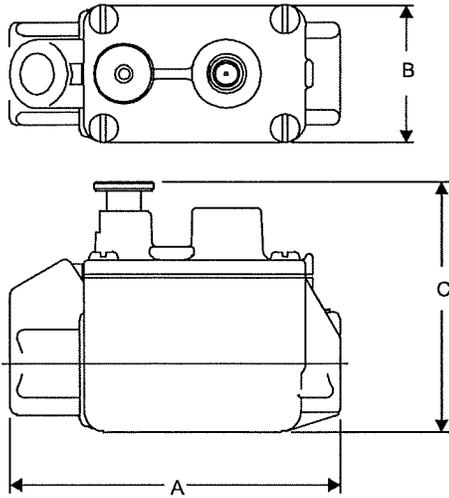


Figure 3: H17A, B, C_ Dimension Drawing

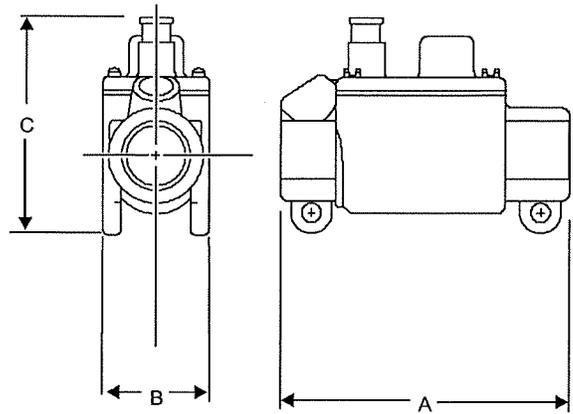


Figure 4: H17D_ Dimension Drawing

Table 1: Maximum Ambient Temperatures and Dimensions

Product Number	Maximum Ambient Temperature		A Maximum Length		B Maximum Width		C Maximum Height	
	°C	°F	mm	in.	mm	in.	mm	in.
H17AA	66	150	76	3	32	1.25	58	2.28
H17AB	150	300						
H17BA	66	150						
H17BB	150	300						
H17CA	66	150						
H17CB	150	300						
H17DA	66	150	87	3.43	32	1.25	67	2.62
H17DB	150	300	87	3.43	32	1.25	67	2.62

Flow Capacity

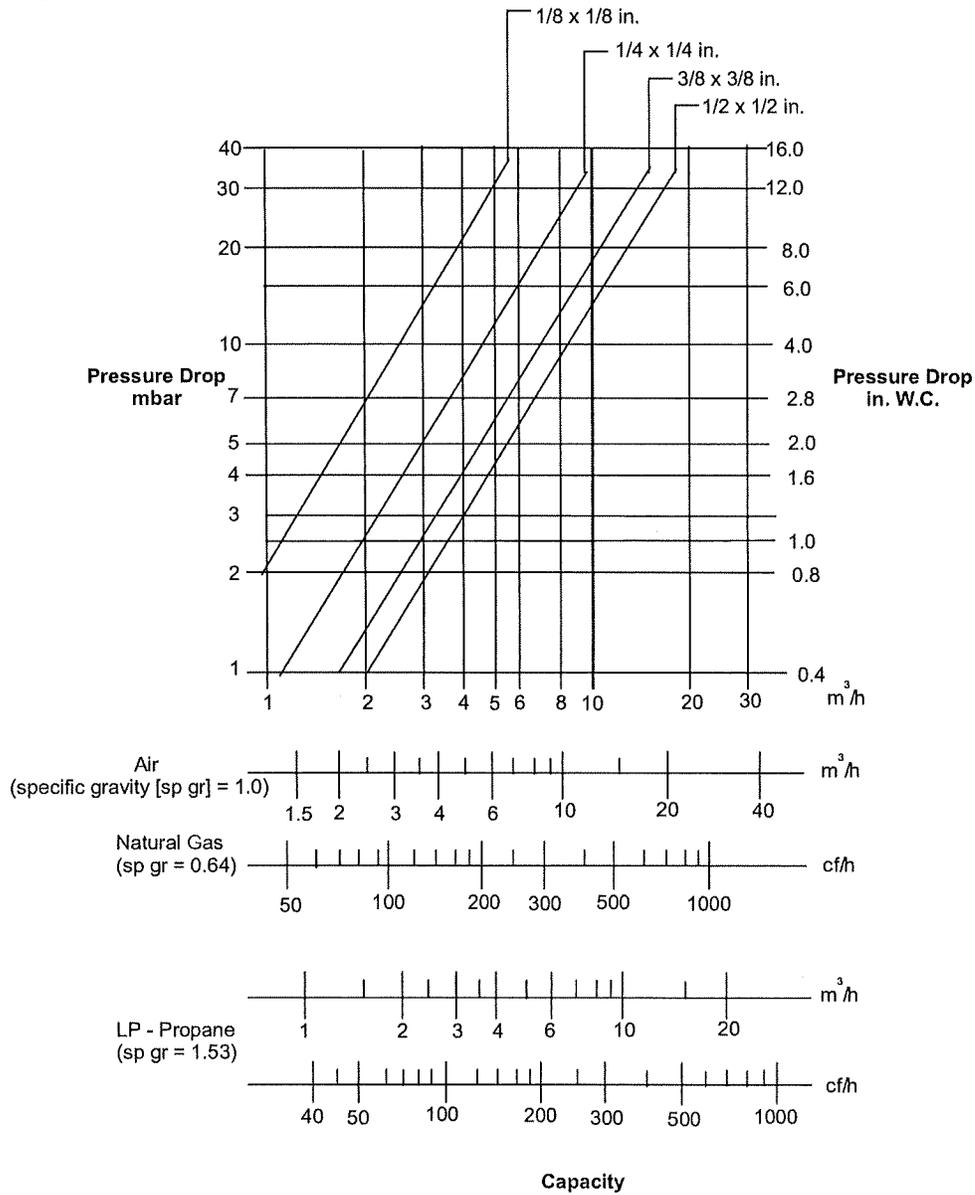


Figure 5: Maximum Flow Capacity

Ordering Information

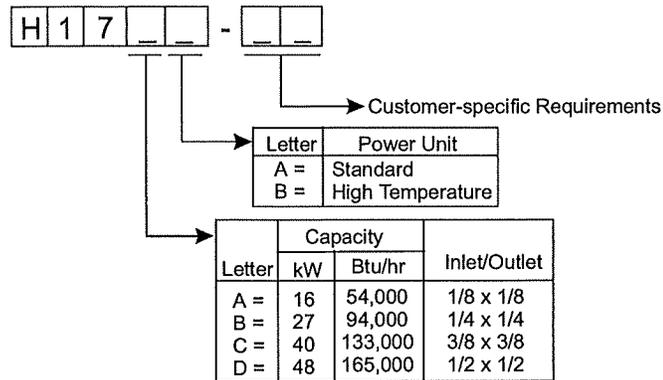


Figure 6: Ordering Matrix

Technical Specifications

Product	H17 BASO Automatic Pilot Valves
Maximum Operating Pressure	35 mbar (0.5 psi)
Valve Body	Aluminum
Permissible Ambient (Surface) Temperature	-40 to 66°C (-40 to 150°F) standard models -40 to 150°C (-40 to 300°F) high temperature models
Recommended Thermocouple Lead Lengths	K15: 305 to 1,220 mm (12 to 48 in.) K16: 305 to 1,830 mm (12 to 72 in.) K19: 457 to 1,830 mm (18 to 72 in.)
Inlet/Outlet Pipe Size	1/8, 1/4, 3/8, and 1/2 in. NPT
Types of Gas	Natural, Liquefied Petroleum (LP), or LP gas-air mixtures
Packaging	Bulk pack supplied to original equipment manufacturer (individual pack optional)
Bulk Pack Quantity	60
Bulk Pack Weight	12 kg (27 lb)
Agency Listing	CSA (AGA, CGA) Certificate Number 176835-1134608 UL File Number MH2926 (H17AA, BA, and CA only)
Specification Standards	ANSI Standard Z21.20 CAN1-6.4 UL Standard 372

The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult BASO Gas Products. BASO Gas Products shall not be liable for damages resulting from misapplication or misuse of its products.

Refer to the H17 Series BASO Automatic Pilot Valve Installation Instructions (Part No. 24-8711-625) for necessary information on the installation, use, and servicing of this product.



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H17 Series BASO® Automatic Pilot Valve

Application

The H17 Series pilot valves provide complete shutoff in the event that the flame heating the thermocouple is extinguished. Applications include room heaters, infrared heaters, salamanders, and refrigerators.

H17 models are also available with a higher ambient temperature, up to a maximum of 300°F (150°C), for use on commercial ovens, broilers, and other applications.

IMPORTANT: Only qualified personnel should install or service BASO® Gas Products. These instructions are a guide for such personnel. Carefully follow all instructions in this document and all instructions for the appliance.

IMPORTANT: Make all gas installations in accordance with applicable local, national, and regional regulations.



CAUTION: Risk of Electric Shock.
Disconnect power supply before making electrical connections to avoid electric shock.

Note: In applications that do not require electrical power, disregard the above caution.



WARNING: Risk of Explosion or Fire.
Shut off the gas supply at the main manual shutoff valve before installing or servicing the H17. Failure to shut off the gas supply can result in the release of gas during installation or servicing, which can lead to an explosion or fire, and may result in severe personal injury or death.

IMPORTANT: Verify that the valve is installed only in applications where the specified maximum ambient (surface) temperature and maximum operating pressures do not exceed the limits in the *Technical Specifications* section.

To install the H17 valve:

1. Shut off power to the appliance (if applicable).
2. Shut off the gas at the main manual shutoff valve.
3. Ensure that the gas flows through the valve body in the direction indicated by the arrow on the valve body. If the valve is installed with the gas flow in the opposite direction of the arrow, leakage can occur.

IMPORTANT: Do not use a wrench on any surface other than the casting flats provided at the inlet and outlet ends of the valve body. The H17 may be damaged in the mounting process if a wrench is used on any other surface. Using a wrench incorrectly may void the warranty.

4. Mount the valve to the pipework. The H17 valve may be mounted in any convenient position. Use an approved pipe joint sealing compound on the male threads before assembly. Remove excess compound after mounting the valve to the pipework. Threads of the pipe and nipples must be smooth and free of tears and burrs. Steam clean all piping to remove foreign substances such as cutting oil or thread chips. A sediment trap should also be installed in accordance with the National Fuel Gas Code (ANSI Z223.1). See Figure 1.
5. Attach the thermocouple securely to the pilot burner, and screw the terminal end to the BASO® power unit terminal on the valve. Make sure this connection is clean. Tighten the thermocouple lead nut finger tight plus a maximum of 1/8 turn. Do not overtighten.

6. Attach the pilot gas line to the pilot burner fitting and to the pilot gas outlet of the H17 valve. In applications that light the main burner directly, the pilot tap should be fit with a suitable plug.

! WARNING: Risk of Explosion or Fire.
 Verify that there are no gas leaks by testing with appropriate equipment. Never use a match or lighter to test for the presence of gas. Failure to test properly can lead to an explosion or fire and may result in severe personal injury or death.

7. Check for leakage.
 - a. Shut off the gas at the main manual shutoff valve, and open the pressure connection between the manual shutoff valve and the H17 valve.
 - b. Connect air tubing with a maximum pressure of 1-1/2 times the valve's maximum operating pressure (as indicated on the valve) to the opened pressure connection.
 - c. Paint all pipe and pilot tube connections with a rich soap and water solution.

 If bubbles occur, this is an indication of a leak. To stop a leak, tighten joints and connections. Replace the part if the leak cannot be stopped.

 If bubbles do not occur, remove the air tubing and close the pressure connection.
8. Perform the *Checkout* section before leaving the installation.

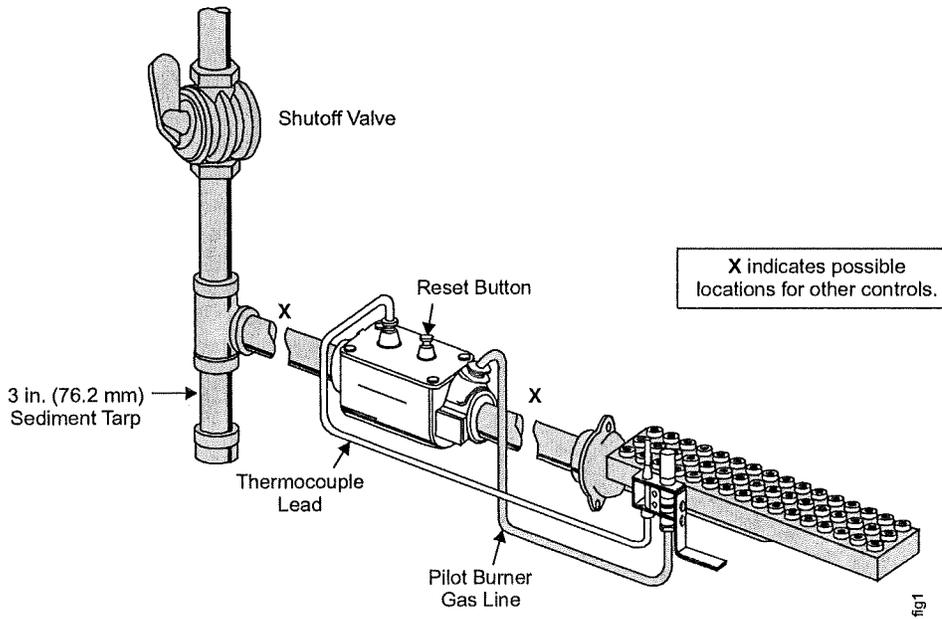


Figure 1: Typical H17 Installation

Setup and Adjustments

Checkout Procedure

 **WARNING: Risk of Explosion or Fire.**
Follow this or an equivalent checkout procedure after installation. Before leaving the installation, verify that the gas valve functions properly and that the system has no gas leaks. Gas leaks can lead to an explosion or fire, and may result in severe personal injury or death.

 **WARNING: Risk of Explosion or Fire.**
Keep hands and clothing clear when manually lighting the pilot. Gas flows to both main and pilot burners when reset button is pressed. Excess gas can lead to an explosion or fire and may result in severe personal injury or death.

Make sure all components are functioning properly by performing the following test:

1. Test all joints and connections for leaks with a rich soap and water solution. If leaks occur, see Step 7 in the *Installation* section.
2. Close the manual shutoff valve and wait at least 5 minutes for unburned gas to escape from the appliance, and then reopen the shutoff valve.
3. Push the reset button of the BASO power unit and light the pilot burner, or the main burner in applications without a pilot burner. Continue to hold the reset button for 30 to 45 seconds or until the pilot or main burner remains burning when the reset button is released.
4. In applications that use a pilot burner along with a thermostatically operated electric valve, set the thermostat to the highest setting. The main burner ignites from the pilot burner.
5. Set the thermostat to the lowest setting. The main burner will extinguish.
6. Extinguish all flames by closing the manual shutoff valve. Verify that the valve drops out within 90 seconds.
7. Relight the pilot burner or main burner in required applications.
8. Check the millivoltage output of the thermocouple and milliampere dropout range at the BASO power unit terminal to see that they meet the values in Table 1 and Table 2. Step-by-step procedures for these checks are included with the *Y99AB-4 BASO Test Kit Application Note (Part No. 24-8711-838)*.
9. Observe at least three complete operating cycles to make sure that all components are functioning properly.
10. Return the thermostat to the desired setting before leaving the installation.

Table 1: Thermocouple Output

Thermocouple		mV Range	
Lead Type	Turn Down	Normal	Not Less Than
K15	4 mV	20-28	15
K16	4 mV	25-35	17
K19	4 mV	25-35	17

Table 2: Dropout Range

Series Number	mA Range of Power Unit Assembly	
	Low	High
H17_A	100	300
H17_B	50	165

Pilot Servicing

If pilot flame problems occur, check the following:

- If the pilot flame burns yellow, it may be due to dirt or lint covering the lower portion of the pilot burner. Remove this using a soft brush or a vacuum.
- A flame approximately 1/2 in. (12.7 mm) high must surround the thermocouple tip. See Figure 2.
- Because this is an electrical connection, the thermocouple lead connection to the BASO power unit must be clean and free of grease.

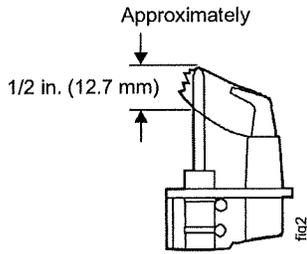


Figure 2: Flame Position

Repairs and Replacements



WARNING: Risk of Explosion or Fire.

Shut off the gas supply at the main manual shutoff valve before installing or servicing the H17. Failure to shut off the gas supply can result in the release of gas during installation or servicing, which can lead to an explosion or fire, and may result in severe personal injury or death.

Field repairs **must not** be made to the H17 valve. If the thermocouple meets the output listed in Table 1 and the valve does not function, replace the entire valve. Any attempt to repair this assembly voids the manufacturer's warranty. For a replacement valve, contact the original equipment manufacturer or the nearest BASO Gas Products distributor.

Technical Specifications

Product	H17 Series BASO Automatic Pilot Valve
Maximum Operating Pressure	0.5 psi (35 mbar)
Valve Body	Aluminum
Permissible Ambient (Surface) Temperature	-40 to 150°F (-40 to 66°C) standard models -40 to 300°F (-40 to 150°C) high temperature models
Recommended Thermocouple Lead Lengths	K15: 12 to 48 in. (305 to 1,220 mm) K16: 12 to 72 in. (305 to 1,830 mm) K19: 18 to 72 in. (457 to 1,830 mm)
Inlet/Outlet Pipe Size	1/8, 1/4, 3/8, and 1/2 in. NPT
Types of Gas	Natural, Liquefied Petroleum (LP), or LP gas-air mixtures
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The performance specifications are nominal and conform to acceptable industry standards. For application at conditions beyond these specifications, consult BASO Gas Products. BASO Gas Products shall not be liable for damages resulting from misapplication or misuse of its products.

Refer to the *H17 Series BASO Automatic Pilot Valve Product Bulletin (LIT-4350020)* for necessary information on operating and performance specifications of this product.



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