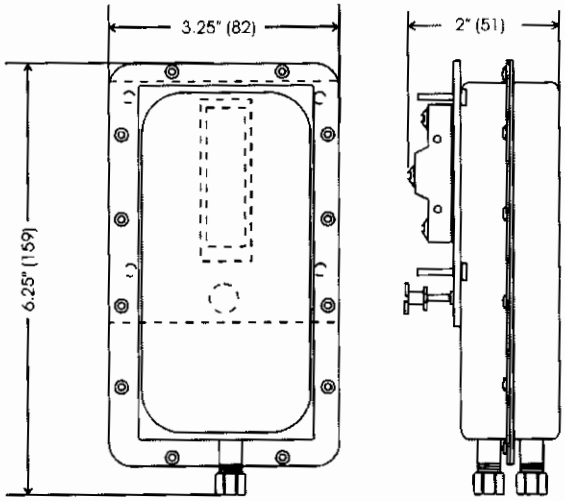
CLEVELAND CONTROLS

Model AFS–227–161

Air Pressure Sensing Switch with Adjustable Set Point Range

APPLICATION

Model AFS–227-161 is a general purpose proving switch designed for HVAC and Energy Management applications. It may be used to sense positive, negative, or differential air pressure.



Approximate Dimensions in Inches (Millimeters)

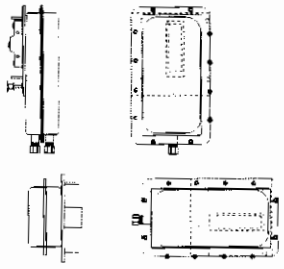
GENERAL DESCRIPTION & OPERATION

The plated housing contains a diaphragm, a calibration spring, and a snap-acting **SPDT** switch. The sample connections located on each side of the diaphragm accept ¼" OD metallic tubing via the integral compression ferrule and nut. The electrical connection consists of screw top terminals with cup washers.

MOUNTING (SEE FIGURE 1)

Select a mounting location which is free from vibration. The **AFS–227-161** must be mounted with the diaphragm in any vertical plane in order to maintain the specified operating set point. Avoid mounting with the sample line connections in the "up" position.

Figure 1: Mount with the diaphragm in any vertical plane.



Surface mount via the four 0.375" length studs on the zinc-plated mounting bracket.The mounting studs are 2.5" apart.

AIR SAMPLING CONNECTION (FIGURE 2)

The **AFS–227-161** is designed to accept firm-wall sample lines of ¼" OD tubing by means of ferrule and nut compression connections. For sample lines of up to 10 feet, ¼" OD tubing is acceptable. For lines up to 20 feet, use ¼" ID tubing. For lines up to 60 feet, use ½" ID tubing. A ¼" OD adapter, suitable for slip-on flexible tubing is available: order part number 18311.Locate the sampling probe a minimum of 1.5 duct diameters downstream from the air source. Install the sampling probe as close to the center of the airstream as possible.

Figure 2

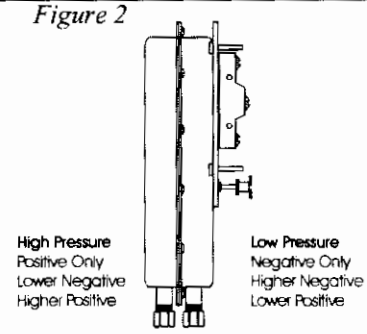


Figure 3

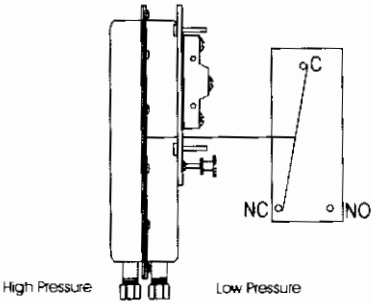


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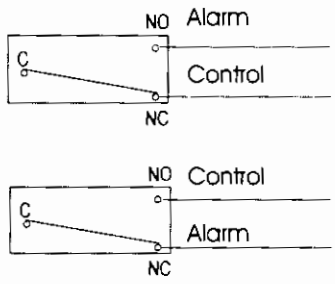
Figure 4



Refer to **Figure 2** to identify the **high pressure inlet (H)** and **the low pressure inlet (L).** Select one of the five application options listed below, and connect the sample lines as recommended.

Positive pressure only: Connect the sample line to inlet **H**: inlet **L** remains open to the atmosphere.

Negative pressure only: Connect the sample line to inlet **L**: inlet **H** remains open to the atmosphere.

Two Negative Samples: Connect the higher negative sample to inlet **L**. Connect the lower negative sample to inlet **H**.

Two Positive Samples: Connect the higher positive sample to inlet **H**. Connect the lower positive sample to inlet **L**.

One Positive and One Negative Sample: Connect the positive sample to inlet **H**. Connect the negative sample to inlet **L**.

ELECTRICAL CONNECTIONS (FIGURES 3 & 4)

Before pressure is applied to the diaphragm, the switch contacts will be in the normally closed (NC) position. The snap switch has screw top terminals with cup washers. Wire control and alarm functions as shown in **Figure 4.**

FIELD ADJUSTMENT

The adjustment range of an **AFS–227-161** Air Switch is 0.05±0.02"w.c. to 12.0" w.c.

To adjust the set point, turn the adjusting screw counterclockwise until motion has stopped. Next, turn the adjusting screw 4 complete turns clockwise to engage the spring.

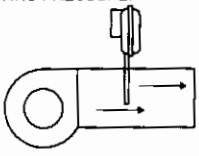
From this point, the next ten turns will be used for the actual calibration. **Each full turn represents approximately 1.2" w.c.**

Please note: To properly calibrate an air switch, a digital manometer or other measuring device should be used to confirm the actual set point.

PRESSURE CONVERSION TABLE		
1" H_2O = 0.0361 lbs/sq. in.	= 0.0735 in. Hg	
1 in Hg = 0.491 lbs/sq. in	= 13.6 in H_2O	
1 psi = 27.7 in. H_2O	= 2.036 in. Hg	

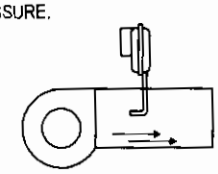
Location of Sample Lines for Typical Applications

FAN OPERATION OR TRUE AIR FLOW WITH LITTLE OR NO STATIC PRESSURE.

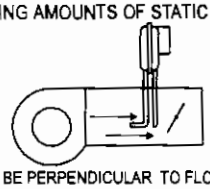


PROBE MUST BE PERPENDICULAR TO FLOW.

FAN OPERATION OR AIR FLOW WITH NO STATIC PRESSURE.

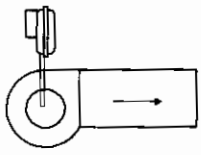


FAN OPERATION AND TRUE AIR FLOW WITH VARYING AMOUNTS OF STATIC PRESSURE.

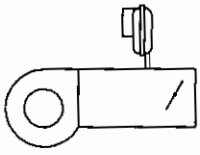


PROBE MUST BE PERPENDICULAR TO FLOW.

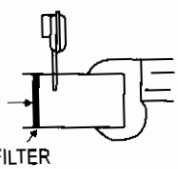
SUCTION OR FAN OPERATION.



PROVE POSITIVE STATIC PRESSURE.



NEGATIVE PRESSURE INCREASES AS FILTER GETS DIRTY.



FILTER

SPECIFICATIONS
MODEL AFS-227-161 AIR PRESSURE SENSING SWITCH WITH ADJUSTABLE SET POINT RANGE

Mounting Position: Mount with the diaphragm in any vertical plane.
Set Point Range: 0.05 ± .02"w.c. to 12.0" w.c.
Field Adjustable "Operate Range": 0.07"w.c. to 12.0."w.c
Field Adjustable "Release Range": 0.04"w.c. to 11.2"w.c.
Approximate Switch Differential: Progressive, increasing from 0.02±0.01"w.c. at minimum set point to approximately 0.8"w.c. at maximum set point.
Measured Media: Air or combustion by-products that will not degrade silicone.
Maximum Pressure: ½ psi (0.03 bar)
Operating Temperature Range: –40 to 180F (–40.0 to 82.2C)
Life: 100,000 cycles minimum at ½ psi maximum pressure each cycle and at maximum rated electrical load.
Electrical Rating: 300 VA pilot duty at 115 to 277 VAC; 15 amp noninductive to 277 VAC, 60 Hz.
Contact Arrangement: SPDT
Electrical Connections: Screw type terminals with cup washers.
Sample Line Connectors: Male, externally threaded 7/16" 24 UNS 2A thread, complete with nuts and self-aligning ferrules.
Sample Line Connections: Connectors will accept ¼" OD rigid or semi-rigid tubing.
Approvals: UL, CSA, CE
Shipping Weight: 1.2 lbs

Accessories:

- Sample line probes
- Orifice plugs (pulsation dampers)

CLEVELAND CONTROLS

MAXITROL®

325 Series Appliance Pressure Regulators

For 2 psi, 5 psi, and 10 psi piping systems.

TABLE OF CONTENTS

DESCRIPTION

325 Series pounds to inches regulators are for use on residential, commercial, and industrial applications.

The 325 Series features a high leverage valve linkage assembly to deliver positive dead-end lock-up. The regulators are capable of precise regulating control from full flow down to pilot flow.

B Models: Imblue Technology™ increases corrosion resistance and provides extra protection against the elements for regulators used in outdoor applications.

NOTE: (B) in model number designates Imblue Technology™.

NOTICE

These regulators provide no downstream over-pressure protection in the event of failure. At supply pressures in excess of 2 psi, they should not be used unless downstream appliance controls are rated for supply pressure or protected by some other means. For Technical Support contact a Maxitrol Technical Support Representative. See Maxitrol Safety Warning Instructions, GPR_MI_EN.ES

SPECIFICATIONS

Gases
Suitable for natural, manufactured, mixed gases, liquefied petroleum gases, and LP gas-air mixtures.

Approvals
325-3(B), 325-5(B).....CSA: ANSI Z21.18/CSA 6.3

Maximum Inlet Pressure

Model	CSA Certified	Maxitrol Tested
325-3(B) 325-5(B)	2 psi (13.8 kPa), 5 psi (34.5 kPa)	10 psi (69 kPa)
325-7A(B)	Not Certified	
Model	**With 12A09, 12A39, or 12A49 Installed Maximum Inlet Pressure**	
325-3(B) 325-5(B) 325-7A(B)	NAT: 5 psi (34.5 kPa) LP: 2 psi (13.8 kPa)	

Outlet Pressure Range (CSA Certified)

Model	Inlet Pressure	Spring Ranges
325-3(B) 325-5(B)	2 psi (13.8 kPa)	5-9" w.c. 7-11" w.c.
325-3(B) 325-5(B)	5 psi (34.5 kPa)	6-10" w.c. 7-11" w.c.
325-3(B)	5 psi (34.5 kPa)	15-30" w.c.

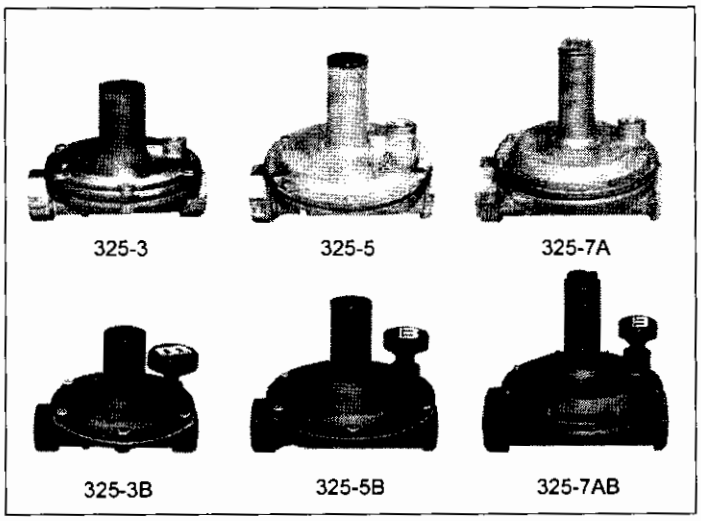


Figure 1: 325 Series Appliance Regulators

Emergency Exposure Limits
All models (Inlet Side Only)..... 65 psi (450 kPa)

Maximum Individual Load
Largest single appliance served by the regulator.
325-3(B) .....100,000 Btu/hr
325-5(B) ..... 325,000 Btu/hr
325-7A(B) ..... 1,250,000 Btu/hr

Capacity
Total load of multiple appliances combined.
325-3(B) (3/8", 1/2") .....150,000 Btu/hr
325-5(B) (1/2", 3/4", 1") ..... 325,000 Btu/hr
325-7A(B) (1 1/4", 1 1/2") ..... 1,250,000 Btu/hr

NOTE: Capacity table is used to determine the maximum multiple appliance load. The largest single appliance served by the regulator should not exceed the maximum individual load specified above.

Ambient Temperature Limits
All Models ..... -40°F to 205°F (-40°C to 96°C)

Vent Pipe Connections
325-3(B) .....1/8" NPT
325-5(B) ..... 3/8" NPT
325-7A(B) .....1/2" NPT

Mounting Position
The 325 Series is suitable for multi-poise mounting, but when used with a vent limiting device, the regulator must be mounted in a horizontal upright position (see Figure 2). Install the regulator properly with gas flowing as indicated by the arrow on the casting. (See Maxitrol Safety Warning Instructions, GPR_MI_EN.ES)

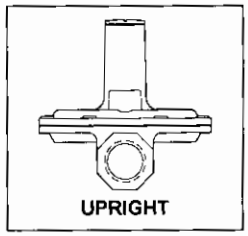


Figure 2: 325 Regulator in Upright Postion

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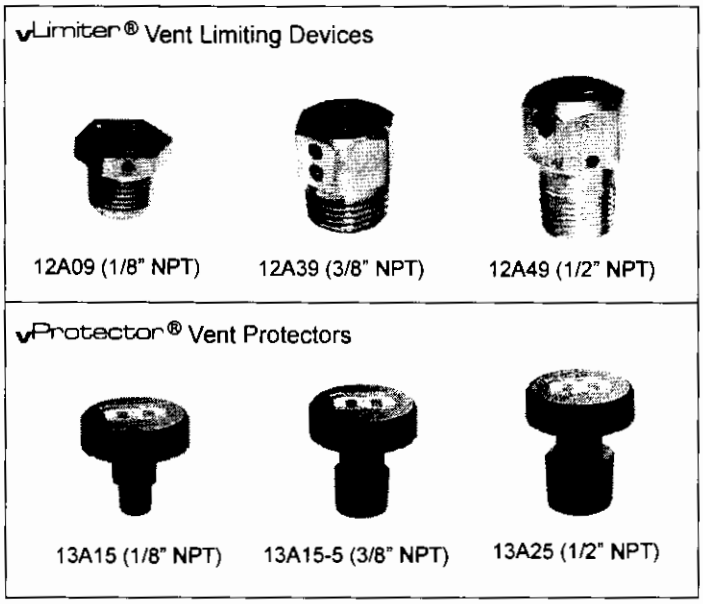

Figure 3: Vent Accessories

vLimiter® Vent Limiting Device for Indoor Applications:

325-3(B) 12A09
325-5(B) 12A39
325-7A(B) 12A49

NOTICE

Maxitrol vent limiting devices eliminate the need to run vent piping to the outside. Vent limiting devices are designed for use indoors and in spaces where limiting the amount of gas escapement due to diaphragm failure is critical. **Vent limiting devices should not be used outdoors if they are exposed to the environment.** Vent protectors are available for all outdoor applications to ensure proper vent protection.

vProtector® Vent Protectors for Outdoor Applications:

325-3(B) 13A15
325-5(B) 13A15-5
325-7A(B).....13A25

PRESSURE DROP - 0.64 sp. gr. gas expressed in CFH (m³/h) (for system pressure drop calculations)

Model	Pressure Drop				
	7.0" w.c. (1.7 kPa)	1/2 psi (3.4 kPa)	3/4 psi (5 kPa)	1 psi (7 kPa)	2 psi (13.8 kPa)
325-3(B)	145 (4.0)	204 (5.8)	250 (7.0)	289 (8.2)	—
325-5(B)	400 (11.3)	550 (15.6)	670 (19.0)	770 (21.8)	—
325-7A(B)	815 (23.1)	1149 (32.5)	1405 (39.8)	1624 (46.0)	2305 (65.3)

NOTE: All Maxitrol gas appliance regulators must be installed and operated in accordance with Maxitrol's Safety Warning Instructions.

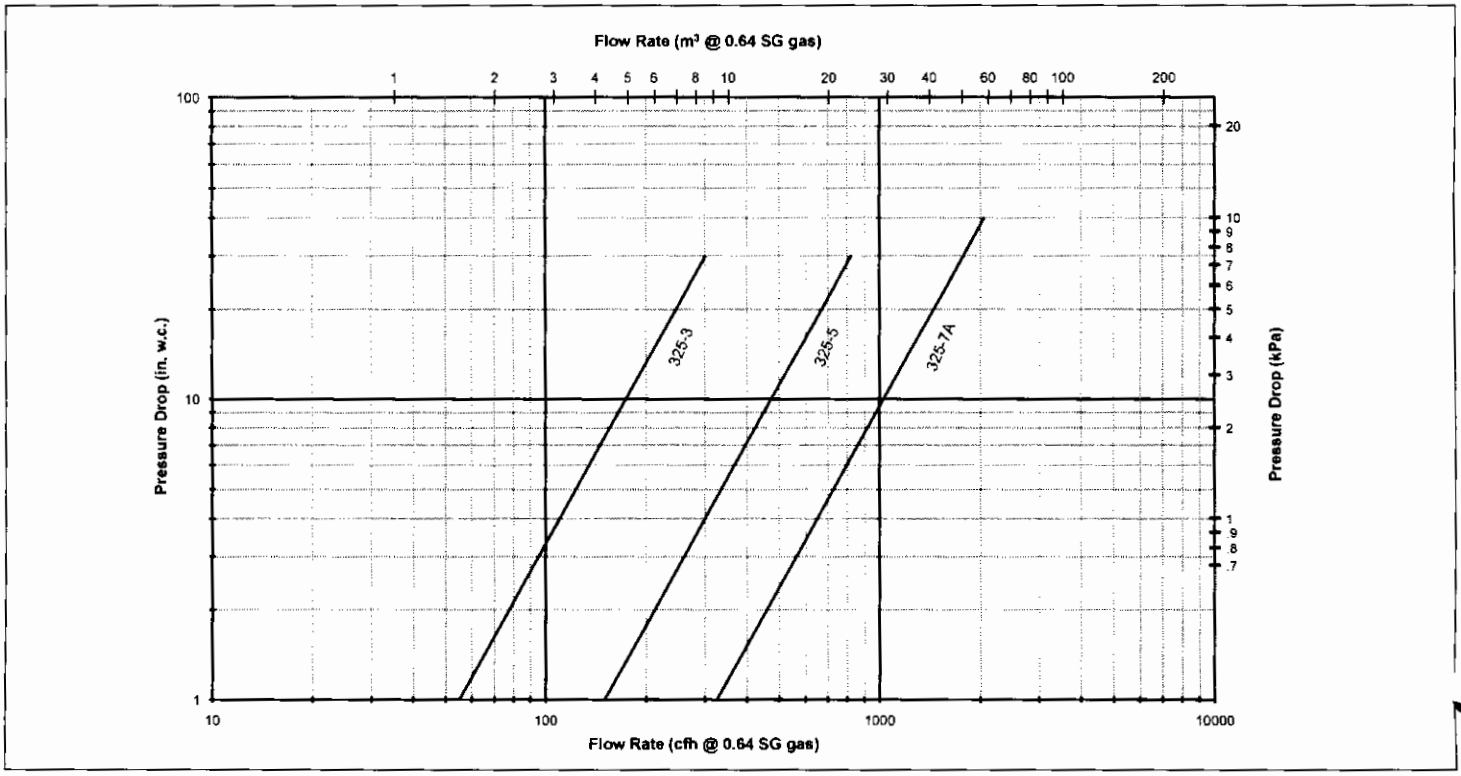

Figure 4: Pressure Drop Chart

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CAPACITIES - Based on 1" w.c. pressure drop from set point**.

Capacities expressed in CFH (m^3/h) @ 0.64 sp gr gas

Model Number (pipe size)	Outlet Pressure Set Point	CSA Maximum	Operating Inlet Pressure					
			0.5 psi (3.4 kPa)	0.75 psi (5 kPa)	1 psi (7 kPa)	2 psi (13.8 kPa)	5 psi (34.5 kPa)	10 psi (69 kPa)
325-3(B) (3/8", 1/2")	4.0" w.c. (1.0 kPa)	150 (4.2)	160 (4.5)	190 (5.4)	220 (6.2)	220 (6.2)	300 (8.5)	320 (9.1)
	7.0" w.c. (1.7 kPa)	150 (4.2)	120 (3.4)	150 (4.2)	180 (5.1)	220 (6.2)	290 (8.2)	320 (9.1)
	10.0" w.c. (2.5 kPa)	150 (4.2)	100 (2.8)	120 (3.4)	150 (4.2)	220 (6.2)	280 (7.9)	320 (9.1)
325-5(B) (1/2", 3/4", 1")	4.0" w.c. (1.0 kPa)	325 (9.2)	340 (9.6)	390 (11.0)	450 (12.7)	560 (15.9)	680 (19.3)	750 (21.2)
	7.0" w.c. (1.7 kPa)	325 (9.2)	260 (7.4)	360 (10.2)	410 (11.6)	530 (15.0)	680 (19.3)	750 (21.2)
	10.0" w.c. (2.5 kPa)	325 (9.2)	240 (6.8)	320 (9.1)	360 (10.2)	300 (8.5)	650 (18.4)	750 (21.2)
325-7A(B) (1 1/4", 1 1/2")	4.0" w.c. (1.0 kPa)	---	850 (24.0)	1060 (30.0)	1190 (33.7)	1600 (45.3)	2090 (59.2)	2190 (62.0)
	7.0" w.c. (1.7 kPa)	---	780 (22.0)	950 (26.9)	1060 (30.0)	1500 (42.5)	1860 (52.7)	2060 (58.3)
	10.0" w.c. (2.5 kPa)	---	650 (18.4)	860 (24.4)	990 (28.0)	1300 (36.8)	1620 (45.9)	2060 (58.3)

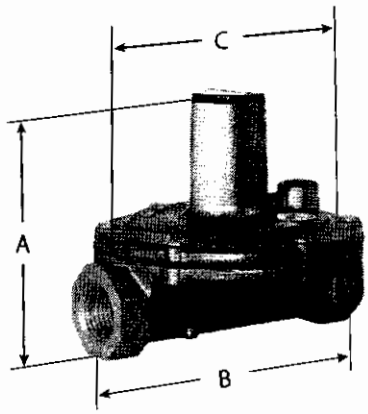
** Set points (in CFH): 325-3(B) = 50, 325-5(B) = 150, 325-7A(B) = 500.
NOTE: Maximum individual load for 325-3(B) is 100 CFH (2.8 m^3/h), 325-5(B) is 325 CFH (9.2 m^3/h), 325-7A(B) is 1250 CFH (35.4 m^3/h)
Approval based on use as an appliance regulator.

DIMENSIONS

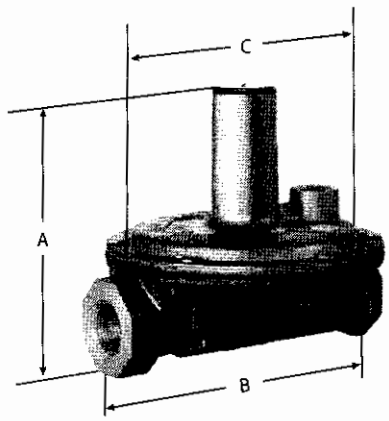
Model Number	Pipe Size*	Swing Radius	Dimensions		
			A	B	C
325-3(B)	3/8", 1/2"	3" (76 mm)	3.5" (89 mm)	4.2" (108 mm)	3.9" (98 mm)
325-5(B)	1/2", 3/4", 1"	4.9" (124 mm)	5.3" (133 mm)	5.9" (149 mm)	5.4" (138 mm)
325-7A(B)	1 1/4", 1 1/2"	6.1" (156 mm)	7.3" (184 mm)	8" (203 mm)	7" (178 mm)

NOTE: Dimensions are to be used only as an aid in designing clearance for the regulator. Actual production dimensions may vary somewhat from those shown.

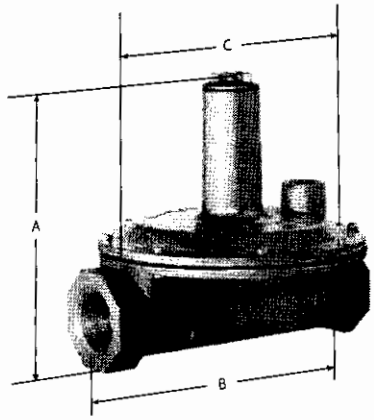
* Standard models NPT threads; 'M' models available with BSP threads.



325-3(B)



325-5(B)



325-7A(B)

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SPRING SELECTION CHART - Inches w.c (kPa) unless noted

Model Number	CSA Certified				Standard Spring	Other Springs Available			
	2 psi (13.8 kPa)		5 psi (34.5 kPa)						
325-3(B)	5 to 9 (1.25 to 2.25) Plated	7 to 11 (1.7 to 2.7) White	6 to 10 (1.5 to 2.5) Plated	7 to 11 (1.7 to 2.7) White	4 to 12 (1.0 to 3.0) Violet	2 to 6 (0.5 to 1.5) Plated	10 to 22 (2.5 to 5.5) Red	15 to 30 (3.7 to 1.5) Yellow	1 to 2 psi (6.9 to 13.9) Tagged
325-5(B)	5 to 9 (1.25 to 2.25) Plated	7 to 11 (1.7 to 2.7) White	6 to 10 (1.5 to 2.5) Plated	7 to 11 (1.7 to 2.7) White	4 to 12 (1.0 to 3.0) Violet	2 to 6 (0.5 to 1.5) Plated	10 to 22 (2.5 to 5.5) Red	15 to 30 (3.7 to 1.5) Yellow	1 to 2 psi (6.9 to 13.9) Tagged
325-7A(B)	—	—	—	—	4 to 12 (1.0 to 3.0) Violet	2 to 5 (0.5 to 1.2) Plated	10 to 22 (2.5 to 5.5) Red	15 to 30 (3.7 to 1.5) Yellow	20 to 42 (5.0 to 10.4) Black

SIZING INSTRUCTIONS

When 325 Series regulators are used on 2 psi piping systems, often times the 2 psi systems are sized with a 1 psi pressure drop through the copper or stainless steel tubing. This means there will be 2 psi at the inlet of the regulator under no flow conditions, and 1 psi at the regulator inlet under maximum flow conditions.

TO SELECT AN APPLIANCE REGULATOR OF SUFFICIENT FLOW - ONE MUST KNOW:

1. Available inlet pressure (maximum static/minimum operating).
2. Desired outlet pressure.
3. Required maximum flow rate.
4. Pipe size.

Example: To select a 325 series regulator of sufficient capacity to handle flow...

KNOWN:

A. Desired flow rate 145 CFH.

B. Pipe size 1/2".

C. Operating inlet pressure 2 psi.

D. Outlet pressure 7" w.c.

E. Lockup required.

SOLUTION:

A. Check pressure drop chart, page 2.

B. The 325-3's pressure drop at a flow rate of 145 CFH is 7" w.c. This is well below the available differential of 1.75 psi.

C. The 325-3 (1/2") used with a 5" to 9" spring, set at 7", is the correct regulator to use for this application.

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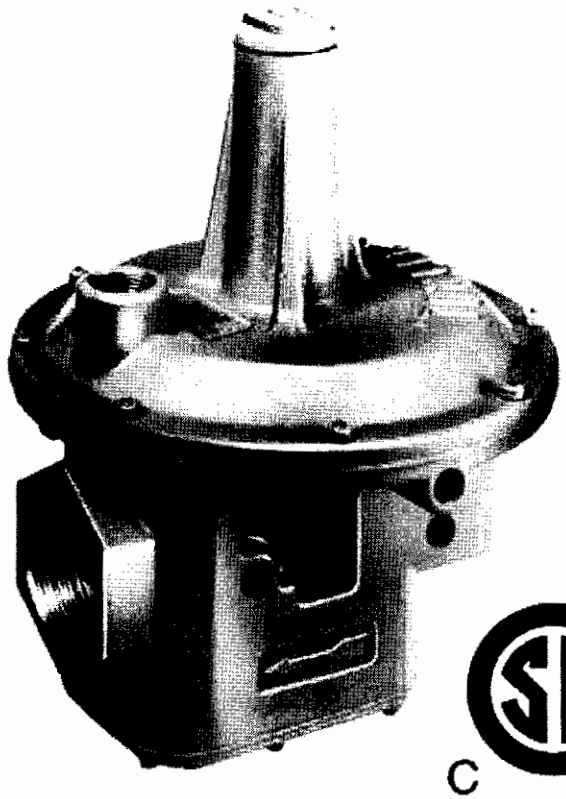
BULLETIN MS2013 - 12/03

MAXITROL® company

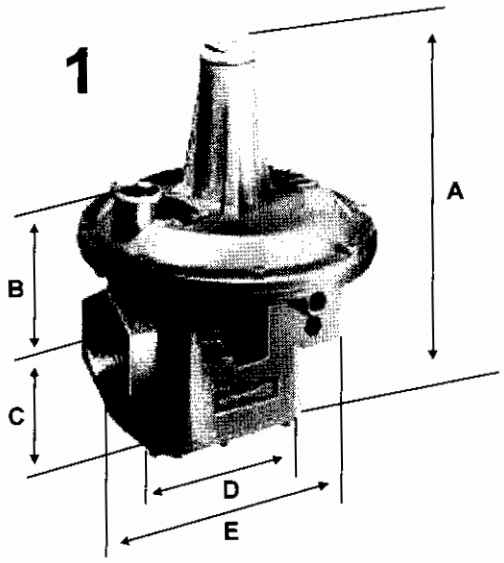
210 & 220 series gas pressure regulators for industrial applications

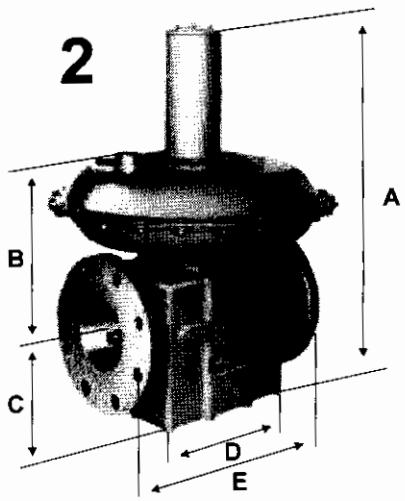


C

210 Series

Dimensions and Spring Ranges





DIMENSIONS

Model and Illustration Number		Pipe Size	Diameter	Dimensions				
				A	B	C	D	E
210D	1	1x1 $1^{1/4}$ x $1^{1/4}$ $1^{1/2}$ x $1^{1/2}$	7 in. 178 mm	$8^{7/8}$ in. 225 mm	$3^{5/8}$ in 92 mm	$2^{7/16}$ in. 62 mm	$3^{7/8}$ in. 98 mm	$5^{1/2}$ in. 140 mm
210E	1	$1^{1/2}$ x $1^{1/2}$ 2 x 2	$9^{1/8}$ in. 232 mm	$11^{1/4}$ in. 286 mm	$4^{5/16}$ in. 110 mm	$2^{5/16}$ in. 59 mm	$5^{3/4}$ in. 146 mm	$7^{5/8}$ in. 194 mm
210G	1	$2^{1/2}$ x $2^{1/2}$ 3 x 3	$13^{7/16}$ in. 341 mm	$16^{1/16}$ in. 408 mm	$6^{1/8}$ in. 156 mm	$4^{1/4}$ in. 105 mm	$8^{1/8}$ in. 206 mm	$10^{3/8}$ in. 265 mm
210J	2	4 x 4	18 in. 457 mm	$24^{3/16}$ in. 615 mm	$10^{7/16}$ in. 265 mm	$5^{7/16}$ in. 138 mm	$9^{7/8}$ in. 251 mm	$13^{3/4}$ in. 349 mm

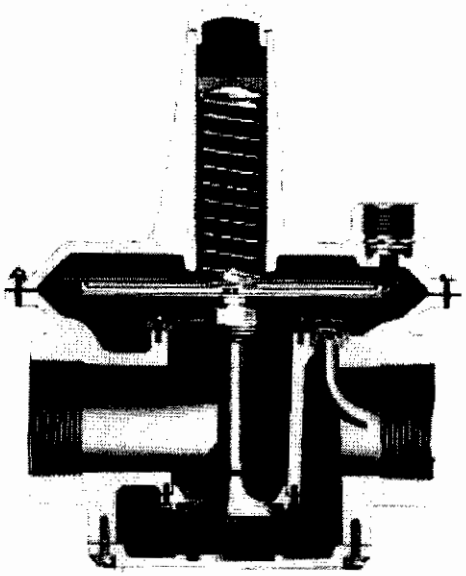
SPRING RANGE SELECTION CHART (inches w.c.)

For additional information see Bulletin MP2012

Model Number	Standard* Plated	Brown	Orange	Green	Cd Plt	Pink	Violet	Blue	Red	Yellow	Black
210D	3 to 6	1 to 3.5	4 to 8	5 to 15	2 to 5	3 to 8	4 to 12	5 to 12	10 to 22	15 to 30	20 to 42
210E	3 to 6	1 to 3.5	4 to 8	5 to 15	2 to 5	3 to 8	4 to 12	5 to 12	10 to 22	15 to 30	20 to 42
210G	3 to 6	1 to 3.5	4 to 8	5 to 15	2 to 5	3 to 8	4 to 12	5 to 12	10 to 22	15 to 30	20 to 42
210J	3 to 6	—	—	—	2 to 5	3 to 8	4 to 12	5 to 12	10 to 22	15 to 30	20 to 42

**Factory set at 4.0 w.c.*

210 series spring loaded models



CAPACITIES . . . . . to 50,000 CFH
EMERGENCY EXPOSURE . . . . . .25 psi
INLET PRESSURES . . . . . to 10 psi
OUTLET PRESSURE . . . . . .1.0″ w.c. to 42″ w.c.

The 210 series is a lock-up type regulator and complies with codes using the specification.

The 210 series has been designed for maximum control functions in an easy-to-use package. For gas-fired boilers, steam generators, industrial furnaces, ovens and similar high demand equipment.

Balanced valve design eliminates the inlet pressure effect acting on the valve. Regulating stability is improved and hunting tendencies reduced by the use of dampening mechanisms in both the breather outlet and sensing tube. You get precise regulation over a broad range of pressures and flow rates with a Maxitrol 210, including "zero governor" application.

Housings of the 210D, E & G models are of high-strength aluminum alloy. The housings are reinforced with webs for maximum strength. The 210J models are of cast aluminum and steel construction with 125 pound flange connections. . . . . Internal parts are cast or machined from corrosion resistant metals or are electroplated. Diaphragms are of the finest quality synthetic coated fabrics. 210J regulators are painted providing a protective coating if used out-of-doors (optional on D, E, G).

210 series industrial regulators are intended for use with all fuel gases. Ambient temperature limits are -40°F to 200°F. Maximum emergency exposure pressure is 25 psi. At this pressure, the regulator will suffer no internal damage but it may not provide accurate regulation.

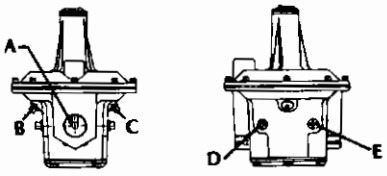
The regulator should be mounted in an upright position in a horizontal pipe run. Gas flow must be oriented to arrow on bottom casting. When selecting a regulator, Maxitrol recommends that the regulator is within one size of the manifold pipe size. Maxitrol also recommends 10 pipe diameters of straight pipe at the inlet & outlet of the regulator. Remote sensing is available.

For "zero governor" applications, a counterspring is mounted beneath the valve. A maximum inlet pressure of 5 psi is recommended. Outlet pressure may be adjusted from -1.0" w.c. to +1.5" w.c. The Maxitrol 210 is designed to operate as a zero governor in the normal upright position.

SENSING TAPS AVAILABLE

Tap locations are available for downstream sensing, cross connections , and differential control. Four convenient locations can be tapped and plugged for measuring pressure. Remote sensing also available on most models.

Vertical vent tapped - 3/8" NPT on 210D, 1/2" NPT on 210E, 3/4" NPT on 210G & J.



A. Internal sensing #7 — furnished as standard.
B. Remote sensing tap #5.
C. Remote sensing tap #6.
D. Outlet pressure tape #2. #1 on side opposite.
E. Inlet pressure tap #4. #3 on side opposite.

Capacities for spring loaded models

CUBIC FEET PER HOUR (0.64 sp gr gas)

Inlet Pressure	Outlet Pressure - Inches w.c.								
	2	4	6	9	12	16	20	24	28
210D 1"									
8.0" w.c.	2,400	1,900	1,300						
0.5 psi	3,400	3,100	2,700	2,200					
0.75 psi	3,500	4,000	3,800	3,400	2,900	2,200			
1.0 psi	3,500	4,000	4,500	4,300	3,900	3,400	2,700	1,900	
1.5 psi	3,500	4,000	4,500	4,800	4,800	5,000	4,600	4,100	3,600
2.0 psi	3,500	4,000	4,500	4,800	4,800	5,000	5,000	5,000	5,000
3.0 psi	3,500	4,000	4,500	4,800	4,800	5,000	5,000	5,000	5,000
5.0 psi	3,500	4,000	4,500	4,800	4,800	5,000	5,000	5,000	5,000
7.5 psi	3,500	4,000	4,500	4,800	4,800	5,000	5,000	5,000	5,000
10.0 psi	3,500	4,000	4,500	4,800	4,800	5,000	5,000	5,000	5,000
210D 1-1/4"									
8.0" w.c.	3,000	2,400	1,700						
0.5 psi	4,000	3,905	3,400	2,700					
0.75 psi	4,000	5,000	4,700	4,200	3,700	2,700			
1.0 psi	4,000	5,000	5,000	5,300	4,900	4,200	3,400	2,400	
1.5 psi	4,000	5,000	5,000	6,000	6,000	6,000	5,700	5,200	4,600
2.0 psi	4,000	5,000	5,000	6,000	6,000	6,000	6,500	6,500	6,500
3.0 psi	4,000	5,000	5,000	6,000	6,000	6,000	6,500	6,500	6,500
5.0 psi	4,000	5,000	5,000	6,000	6,000	6,000	6,500	6,500	6,500
7.5 psi	4,000	5,000	5,000	6,000	6,000	6,000	6,500	6,500	6,500
10.0 psi	4,000	5,000	5,000	6,000	6,000	6,000	6,500	6,500	6,500
210D 1-1/2"									
8.0" w.c.	3,100	2,500	1,800						
0.5 psi	4,000	4,000	3,600	2,800					
0.75 psi	4,000	5,000	5,000	4,400	3,800	2,800			
1.0 psi	4,000	5,000	5,000	5,600	5,100	4,400	3,600	2,500	
1.5 psi	4,000	5,000	5,000	6,000	6,000	6,500	6,000	5,400	4,800
2.0 psi	4,000	5,000	5,000	6,000	6,000	6,500	6,500	6,500	6,500
3.0 psi	4,000	5,000	5,000	6,000	6,000	6,500	6,500	6,500	6,500
5.0 psi	4,000	5,000	5,000	6,000	6,000	6,500	6,500	6,500	6,500
7.5 psi	4,000	5,000	5,000	6,000	6,000	6,500	6,500	6,500	6,500
10.0 psi	4,000	5,000	5,000	6,000	6,000	6,500	6,500	6,500	6,500
210E 1-1/2"									
8.0" w.c.	4,450	3,650	2,550						
0.5 psi	6,300	5,750	5,150	4,050					
0.75 psi	7,000	7,500	7,050	6,300	5,450	4,050			
1.0 psi	7,000	8,800	8,500	7,950	7,250	6,300	5,150	3,650	
1.5 psi	7,000	8,800	8,800	10,450	9,950	9,250	8,550	7,700	6,800
2.0 psi	7,000	8,800	8,800	10,500	10,500	10,500	10,500	10,250	9,600
3.0 psi	7,000	8,800	8,800	10,500	10,500	10,500	10,500	10,500	10,500
5.0 psi	7,000	8,800	8,800	10,500	10,500	10,500	10,500	10,250	10,500
7.5 psi	7,000	8,800	8,800	10,500	10,500	10,500	10,500	10,250	10,500
10.0 psi	7,000	8,800	8,800	10,500	10,500	10,500	10,500	10,250	10,500

CUBIC FEET PER HOUR (0.64 sp gr gas)

Inlet Pressure	Outlet Pressure - Inches w.c.								
	2	4	6	9	12	16	20	24	28
210E 2"									
8.0" w.c.	5,150	4,200	2,950						
0.5 psi	7,250	6,650	5,950	4,700					
0.75 psi	8,000	8,650	8,150	7,250	6,300	4,700			
1.0 psi	8,000	10,000	9,850	9,150	8,400	7,250	5,950	4,200	
1.5 psi	8,000	10,000	10,000	12,000	11,500	10,700	9,850	8,900	7,850
2.0 psi	8,000	10,000	10,000	12,000	12,000	12,000	12,000	11,850	11,000
3.0 psi	8,000	10,000	10,000	12,000	12,000	12,000	12,000	12,000	12,000
5.0 psi	8,000	10,000	10,000	12,000	12,000	12,000	12,000	12,000	12,000
7.5 psi	8,000	10,000	10,000	12,000	12,000	12,000	12,000	12,000	12,000
10.0 psi	8,000	10,000	10,000	12,000	12,000	12,000	12,000	12,000	12,000
210G 2-1/2"									
8.0" w.c.	10,400	8,500	6,000						
0.5 psi	14,700	13,410	12,000	9,500					
0.75 psi	16,000	17,500	16,400	14,700	12,750	9,500			
1.0 psi	16,000	20,000	19,900	18,500	16,950	14,700	12,000	8,500	
1.5 psi	16,000	20,000	20,000	24,000	23,250	21,600	19,900	18,000	15,850
2.0 psi	16,000	20,000	20,000	24,000	24,000	24,000	24,000	24,000	22,450
3.0 psi	16,000	20,000	20,000	24,000	24,000	24,000	24,000	24,000	24,000
5.0 psi	16,000	20,000	20,000	24,000	24,000	24,000	24,000	24,000	24,000
7.5 psi	16,000	20,000	20,000	24,000	24,000	24,000	24,000	24,000	24,000
10.0 psi	16,000	20,000	20,000	24,000	24,000	24,000	24,000	24,000	24,000
210G 3"									
8.0" w.c.	11,500	9,400	6,600						
0.5 psi	16,000	14,800	13,200	10,450					
0.75 psi	16,000	19,300	18,100	16,200	14,000	10,450			
1.0 psi	16,000	20,000	20,000	20,350	18,700	16,200	13,200	9,350	
1.5 psi	16,000	20,000	20,000	24,000	24,000	23,800	21,900	19,800	17,450
2.0 psi	16,000	20,000	20,000	24,000	24,000	27,000	27,000	26,400	24,700
3.0 psi	16,000	20,000	20,000	24,000	24,000	27,000	27,000	27,000	27,000
5.0 psi	16,000	20,000	20,000	24,000	24,000	27,000	27,000	27,000	27,000
7.5 psi	16,000	20,000	20,000	24,000	24,000	27,000	27,000	27,000	27,000
10.0 psi	16,000	20,000	20,000	24,000	24,000	27,000	27,000	27,000	27,000
210J 4"									
8.0" w.c.	20,800	17,000	12,000						
0.5 psi	29,500	27,000	24,000	19,000					
0.75 psi	32,000	35,000	33,000	29,420	25,500	19,000			
1.0 psi	32,000	40,000	40,000	37,000	34,000	29,420	24,000	17,000	
1.5 psi	32,000	40,000	40,000	48,000	47,000	43,350	39,700	36,000	31,800
2.0 psi	32,000	40,000	40,000	48,000	48,000	50,000	50,000	48,000	45,000
3.0 psi	32,000	40,000	40,000	48,000	48,000	50,000	50,000	50,000	50,000
5.0 psi	32,000	40,000	40,000	48,000	48,000	50,000	50,000	50,000	50,000
7.5 psi	32,000	40,000	40,000	48,000	48,000	50,000	50,000	50,000	50,000
10.0 psi	32,000	40,000	40,000	48,000	48,000	50,000	50,000	50,000	50,000

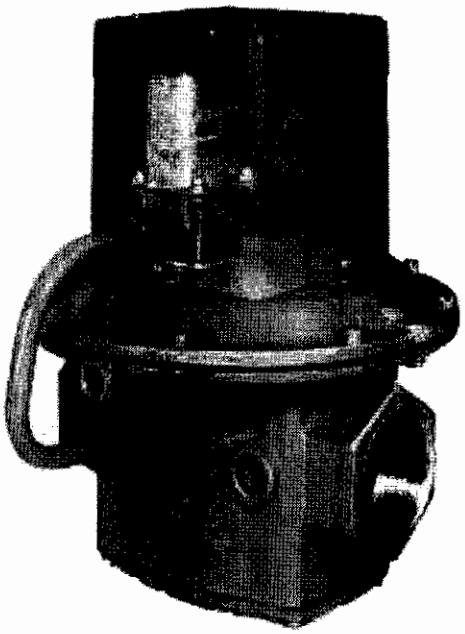
Pressure Drop

SPRING LOADED DESIGN

Flow Rate CFH	Values expressed in inches w.c.							
	210D			210E		210G		210J
	1"	1 1/4"	1 1/2"	1 1/2"	2"	2 1/2"	3"	4"
500	0.23	0.15	0.14					
1,000	0.92	0.59	0.54	0.27	0.20	0.05	0.04	0.01
1,500	2.08	1.33	1.22					
2,000	3.70	2.37	2.16	1.09	0.82	0.20	0.17	0.05
2,500	5.78	3.70	3.38					
3,000	8.32	5.33	4.87	2.46	1.84	0.45	0.37	0.12
3,500	11.33	7.25	6.62					
4,000	14.79	9.47	8.65	4.37	3.28	0.80	0.66	0.21
4,500	18.72	11.98	10.95					
5,000	23.11	14.79	13.52	6.82	5.12	1.25	1.03	0.34
5,500	27.97	17.90	16.35					
6,000	33.28	21.30	19.46	9.82	7.37	1.80	1.48	0.49
6,500		25.00	22.84					
7,000		28.99	26.49	13.36	10.05	2.45	2.02	0.66
7,500			30.41					
8,000				17.45	13.10	3.20	2.64	0.87
8,500								
9,000				22.10	16.60	4.05	3.35	1.10
9,500								
10,000				27.30	20.50	5.00	4.15	1.35
11,000				33.00	24.80	6.05	5.00	
12,000				39.30	29.50	7.20	5.95	1.95
13,000					34.60	8.50	7.00	
14,000					40.15	9.85	8.10	2.68
15,000						11.30	9.30	
16,000						12.85	10.60	3.47
17,000						14.50	11.95	
18,000						16.25	13.40	4.40
19,000						18.10	14.90	
20,000						20.05	16.50	5.42
22,000						24.25	20.00	6.56
24,000						28.85	23.80	7.81
26,000						33.85	27.90	9.06
28,000						39.25	32.40	10.62
30,000							37.20	12.41
32,000								13.90
34,000								15.69
36,000								17.60
38,000								19.60
40,000								21.70
45,000								27.40
50,000								33.80
55,000								41.00

NOTE: The maximum capacities for the different models listed on the capacity chart and represented by the heavy line on the pressure drop table are values at which these controls have been certified by the CSA (except for the 210J).

220 series pilot loaded models



NOT CSA CERTIFIED

CAPACITIES . . . . . to 50,000 CFH
EMERGENCY EXPOSURE . . . . . 25 psi
INLET PRESSURES . . . . . to 10 psi
OUTLET PRESSURE . . . . . 1 psi to 5 psi

The 220 series, utilizing a servo-operated design rather than the more conventional spring-loaded design, delivers higher outlet pressure than the spring loaded models.

The main diaphragm on the Maxitrol 220 is loaded with gas pressure rather than with a spring. This gas pressure is precisely controlled by a small pilot regulator in the upper housing. When the regulated outlet pressure of the pilot regulator is changed, by spring adjustment, the outlet pressure of the main regulator will change proportionately.

Outlet pressure adjustments are readily made by first removing the hood of the Maxitrol 220. Then remove the cap atop the pilot regulator, which exposes the adjusting screw, and adjust to desired pressure.

Three positions can be tapped and plugged for making inlet or outlet pressure readings. The fourth position is used to supply inlet pressure to the pilot regulator. Remote sensing is also available.

220 series industrial regulators are intended for use with all fuel gases.

The regulator will perform most accurately when mounted in an upright postion in a horizontal pipe run. Gas flow must be oriented to arrow on regulator. When selecting for pipe size, make sure regulator is not more than one size larger or smaller than manifold pipe size.

Single vent, equipped with model 12A06 vent limiting orifice, is located in upper housing.

Ambient temperature limits are -40°F to 200°F. Maximum emergency exposure pressure is 25 psi. At this pressure the regulator will suffer no internal damage but it may not provide accurate regulation.

Two outlet pressure adjustment springs are available.

R325C10-1022 (K spring) . . . . . 1 psi to 3 psi
R325C10-1530 (L spring) . . . . . 2 psi to 5 psi

Pressure drop and dimensions

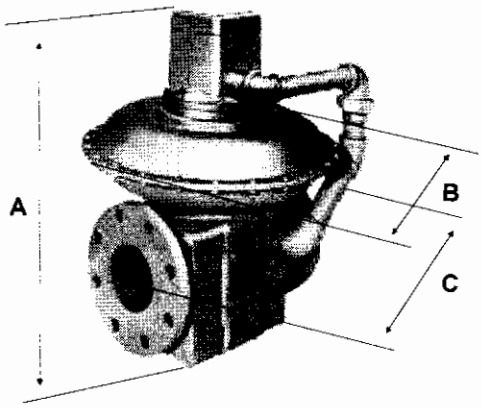
PILOT LOADED DESIGN

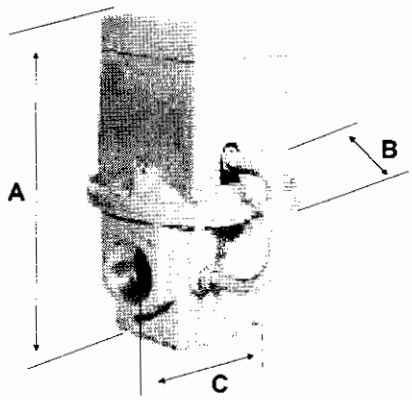
Flow Rate CFH	Values expressed in inches w.c.							
	220D			220E		220G		220J
	1"	1 1/4"	1 1/2"	1 1/2"	2"	2 1/2"	3"	4"
1,000	1.90	1.70	1.70					
2,000	4.93	3.10	2.90	1.90	1.90			
3,000	11.10	7.42	5.40	2.90	2.40			
4,000	19.70	13.20	11.10	4.93	4.00	2.00	1.90	1.70
5,000	30.80	20.70	17.40	7.70	6.25	2.20	2.10	1.70
6,000	44.20	29.70	25.00	11.10	9.00	2.60	2.30	1.70
7,000		40.60	34.00	15.10	12.25	3.00	2.60	1.70
8,000			44.50	19.70	16.00	4.00	3.00	1.80
9,000				24.90	20.25	5.00	3.80	1.90
10,000				30.80	25.00	6.22	4.60	2.10
12,000				44.20	36.00	9.00	6.80	2.40
14,000						12.20	9.30	2.80
16,000						16.00	12.10	3.40
18,000						20.20	15.30	4.40
20,000						25.00	18.90	5.40
25,000						40.60	30.70	8.90
30,000							42.50	12.40
35,000								17.05
40,000								21.70
45,000								27.40
50,000								33.80
55,000								41.00

NOTE: Do not exceed 36" pressure drop when determining acceptable capacities at which these controls may be used. Under some conditions these limits may be surpassed, but only after consultation with Maxitrol Company. (NOT CSA CERTIFIED)

DIMENSIONS

Model	A	B	C
220D	10-3/16"	7"	6"
220E	11-1/4"	9-1/8"	7-5/8"
220G	14-3/4"	13-1/2"	10-3/8"
220J	20-1/2"	18"	13-7/8"





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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:

1. 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.

2. Do **not** use a gas pressure regulator if it appears to have been subjected to high temperatures, damaged in any way, 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

3.

a. Install the regulator properly with gas flowing as indicated by the arrow on the casting.
b. 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.
c. 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.
d. Make sure markings or wording on regulator are not painted over or obliterated.

4. 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.

5. 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 inlet pressure, as shown in the following chart, turn off the gas and have the system checked by an expert.

(over)

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:

1. 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.

2. **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.

3.

a. Instalar el regulador correctamente con el gas fluyendo como se indica en la flecha en la carcasa de fundición.
b. Usar un compuesto sellador de tubería o hilo sellador de rosca, tuberías correctamente roscadas y procedimientos de ensamble cuidadoso, asegurándose de que no haya trasroscados, lo cual podría causar daños o fugas.
c. Aplicar únicamente la presión de una llave o tornillo 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.
d. Asegurarse de que no se pinten o tachen las marcas o escritura en el regulador.

4. 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 si 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

5. Aumentos 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.

(a la vuelta)

MAXITROL® company
23555 Telegraph Rd. • P.O. Box 2230 • Southfield, MI U.S.A. 48037-2230
Phone 248.356.1400 • Fax 248.356.0829
www.maxitrol.com

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: 248/356-1400.

6. La ventilación **deberá** estar controlada de acuerdo con los códigos y reglamentos 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 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 lleva a cabo podría resultar en una llama excesiva del aparato 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.

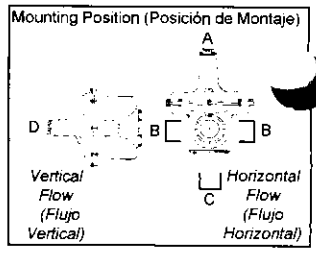
9. **Un regulador MAXITROL deberá usarse** dentro del rango de temperatura y no deberá excederse la presión máxima de entrada que se muestra en la tabla siguiente y deberá estar en la posición indicada de montaje. Los reguladores MAXITROL pueden usarse con todo tipo de gases combustibles.

10. En caso de dudas, favor de comunicarse con el Service Manager (Gerente de Servicio), Maxitrol Company, Southfield, MI USA. Teléfono: 248-356-1400.

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] (Posiciónde Montaje) [ver abajo]**
RV12LT, RV20LT	1/2 psi (34 mbar)	-40° to 275° F (-40° to 135° C)	A, B, C, D
RV20L	1/2 psi (34 mbar)	32° to 225° F (0° 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, RV91	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	1psi (69 mbar)	-40° to 205° F (-40° to 96° C)	A, B, C, D, (*1)
210D, E, G, J	10 psi (690 mbar)	-40° to 205° F (-40° to 96° C)	A only (únicamente)
210DZ, EZ, GZ, JZ	5 psi (345 mbar)	-40° to 205° F (-40° to 96° C)	A only (únicamente)
220D, 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) 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 may interfere with lockup or cause pilot outage, where 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.

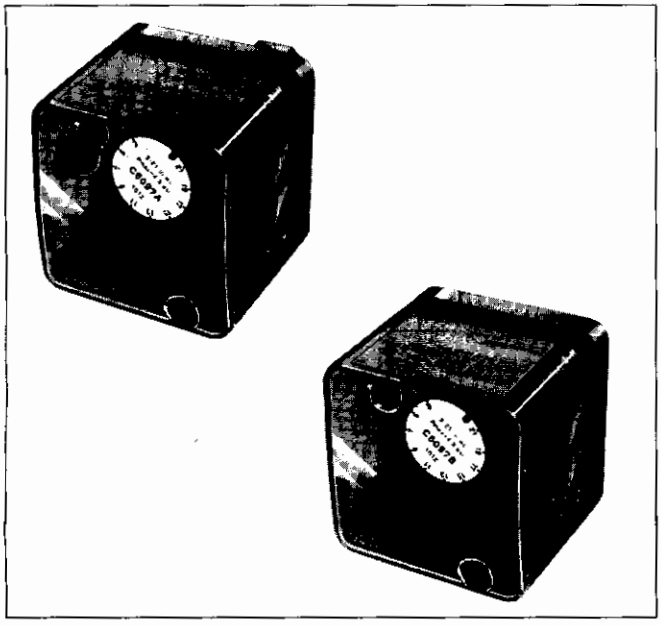
(*1) Para estar seguro que el regulador responde con rapidez cuando está equipado con un dispositivo limitador de ventilación automático tipo bola (12A04, 12A09,12A39), los reguladores deberán estar en posición vertical (A) con el limitador de ventilación instalado directamente a las roscas del tubo de ventilación. **Si se usa cualquier otra posición durante su instalación, esto podrá interferir con el cierre o causar que el piloto se apague.** 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) requerirán una línea de ventilación.



Honeywell

C6097A,B Pressure Switches

PRODUCT DATA



APPLICATION

The C6097 Pressure Switches are safety devices used in positive-pressure or differential-pressure systems to sense gas or air pressure changes.

FEATURES

- **For use with natural gas, liquid propane (LP) gas, or air.**
- **Diaphragm-actuated safety-limit switch.**
- **Switch can be wired to turn on alarm.**
- **C6097A models break control circuit at setpoint on pressure fall.**
- **C6097B models break control circuit at setpoint on pressure rise.**
- **Lockout with manual reset and recycle options.**
- **Lockout models have external manual reset button.**
- **Removable transparent cover protects scaleplate and adjusting knob.**
- **Pipe tappings allow selection of positive pressure, differential pressure (air only) or venting connections (NPT mount only).**
- **1/4 in. NPT or flange mount models for direct mounting to Honeywell Integrated Valve Train.**
- **Optional switch position indicator lamp available.**
- **IP54 enclosure standard.**
- **Ranges: 0.4 to 5 in. wc, 3 to 21 in. wc, 12 to 60 in. wc or 1.5 to 7 psi.**
- **Surge orifice.**
- **Integral Vent Limiter.**

Contents

CP-UM-5109E

5th Edition: Issued in Jan. 2008

65-0237-05

SPECIFICATIONS

Models:
C6097A Pressure Switch: Breaks a circuit when pressure falls to scale setting. See Table 1.
C6097B Pressure Switch: Breaks a circuit when pressure rises to scale setting. See Table 1.
Table 2 shows switch ratings and Table 3 shows alternate electrical ratings when used with Honeywell Flame Safeguard Programmers.

Minimum Ambient Temperature: -40°F (-40°C).

Maximum Ambient Temperature: 140°F (60°C).

Connections (Depending on Model):
1/4-18 NPT tapping for main or high-pressure connection.
1/8-27 NPT tapping for vent or low-pressure connection (air only).
Flange mount for connection to Honeywell Integrated Valve Train (internal vent only, no external connections).

Scale Range:
0.4 to 5 in. wc (0.10 kPa to 1.25 kPa).
3 to 21 in. wc (0.75 to 5.23 kPa).
12 to 60 in. wc (3.0 kPa to 15 kPa).
1.5 to 7 psi (10.3 kPa to 48 kPa).

Approvals:
Underwriters Laboratories Inc. listed.
Canadian Standards Association listed.
Factory Mutual: Approved.
Industrial Risk Insurers: Acceptable.
CSD-1 AFB: Acceptable.

Accessories:
32003041-001 C6097 Cover for manual reset models.
32003040-001 C6097 Cover for recycle models.
32003039-001 Position Indication Lamp Kit.

Dimensions: See Fig. 1 and 2.

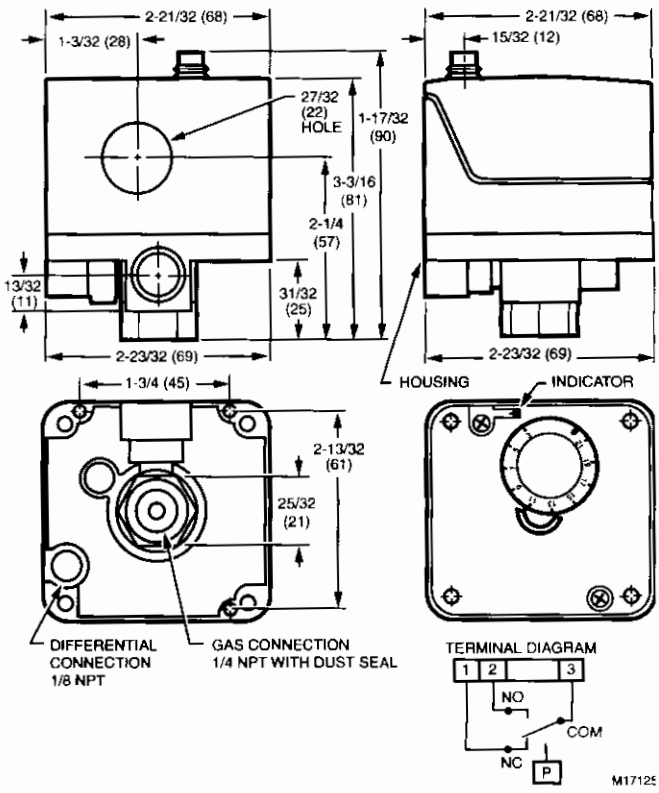


Fig. 1. C6097 1/4 in. NPT Mount dimensions in in. (mm).

ORDERING INFORMATION

When purchasing replacement and modernization products from your TRADELINE® wholesaler or distributor, refer to the TRADELINE® Catalog or price sheets for complete ordering number.

If you have additional questions, need further information, or would like to comment on our products or services, please write or phone:

1. Your local Honeywell Automation and Control Products Sales Office (check white pages of your phone directory).
2. Honeywell Customer Care
   1885 Douglas Drive North
   Minneapolis, Minnesota 55422-4386

In Canada—Honeywell Limited/Honeywell Limitée, 35 Dynamic Drive, Toronto, Ontario M1V 4Z9.
International Sales and Service Offices in all principal cities of the world. Manufacturing in Australia, Canada, Finland, France, Germany, Japan, Mexico, Netherlands, Spain, Taiwan, United Kingdom, U.S.A.

Table 1. Pressure Switch Model Selection.

Model	Operating Pressure Range	Manual Reset Differential		Non-Manual Reset Differential		Differential Type	Maximum Rated Pressure (continuous) (psi)	Manual Reset	Media[a]	Switch Action at Setpoint	Comments
		Maximum at Minimum Setpoint	Maximum at Maximum Setpoint	Nominal	Maximum						
C6097A1004	0.4 to 5 in. wc	—	—	0.16 in. wc	0.24 in. wc	Additive	2.9	No	Air/Gas	Breaks N.O. to C. connection on pressure fall.	1/4 in. NPT Mount
C6097A1012	3 to 21 in. wc	2.4 in. wc	4.2 in. wc	—	—		5.0	Yes	Air/Gas		1/4 in. NPT Mount
C6097A1020	3 to 21 in. wc	2.4 in. wc	4.2 in. wc	—	—		5.0	Yes	Air/Gas		Flange Mount
C6097A1038	12 to 60 in. wc	10 in. wc	12 in. wc	—	—		5.0	Yes	Air/Gas		1/4 in. NPT Mount
C6097A1046	12 to 60 in. wc	10 in. wc	12 in. wc	—	—		5.0	Yes	Air/Gas		Flange Mount
C6097A1053	3 to 21 in. wc	—		0.24 in. wc	0.48 in. wc		5.0	No	Air/Gas		1/4 in. NPT Mount
C6097A1061	3 to 21 in. wc	—	—	0.24 in. wc	0.48 in. wc		5.0	No	Air/Gas		Flange Mount
C6097A1079	12 to 60 in. wc	—	—	1.1 in. wc	2.4 in. wc		5.0	No	Air/Gas		1/4 in. NPT Mount
C6097A1087	12 to 60 in. wc	—	—	1.1 in. wc	2.4 in. wc		5.0	No	Air/Gas		Flange Mount
C6097A1095	0.4 to 5 in. wc	0.6 in. wc	1.0 in. wc	—	—		2.9	Yes	Air/Gas		1/4 in. NPT Mount
C6097A1103	1.5 to 7 psi	1.1 psi	1.4 psi	—	—		9.3	Yes	Air/Gas		Flange Mount
C6097A1111	1.5 to 7 psi	1.1 psi	1.4 psi	—	—		9.3	Yes	Air/Gas		14 in. NPT Mount
C6097A1129	1.5 to 7 psi	—	—	0.1 psi	0.3		9.3	No	Air/Gas		Flange Mount
C6097A1137	1.5 to 7 psi	—	—	0.1 psi	0.3		9.3	No	Air/Gas		1/4 in. NPT Mount
C6097A1210	0.4 to 5 in. wc	—	—	0.16 in. wc	0.24 in. wc		2.9	No	Air/Gas		Flange Mount
C6097A1228	0.4 to 5 in. wc	—	—	—	—		2.9	Yes	Air/Gas		Flange Mount
C6097B1002	12 to 60 in. wc	10 in. wc	12 in. wc	—	—	Subtractive	5.0	Yes	Air/Gas	Breaks N.C. to C. connection on pressure rise.	1/4 in. NPT Mount
C6097B1010	12 to 60 in. wc	10 in. wc	12 in. wc	—	—		5.0	Yes	Air/Gas		Flange Mount
C6097B1028	3 to 21 in. wc	2.4 in. wc	4.2 in. wc	—	—		5.0	Yes	Air/Gas		1/4 in. NPT Mount
C6097B1036	3 to 21 in. wc	2.4 in. wc	4.2 in. wc	—	—		5.0	Yes	Air/Gas		Flange Mount
C6097B1044	1.5 to 7 psi	1.1 psi	1.4 psi	—	—		9.3	Yes	Air/Gas		Flange Mount
C6097B1051	1.5 to 7 psi	1.1 psi	1.4 psi	—	—		9.3	Yes	Air/Gas		1/4 in. NPT Mount
C6097B1069	3 to 21 in. wc	—	—	0.24 in. wc	0.48 in. wc		5.0	No	Air/Gas		Flange Mount
C6097B1077	12 to 60 in. wc	—	—	1.1 in. wc	2.4 in. wc		5.0	No	Air/Gas		Flange Mount
C6097B1085	12 to 60 in. wc	—	—	1.1 in. wc	2.4 in. wc		5.0	No	Air/Gas		1/4 in. NPT Mount
C6097B1093	1.5 to 7 psi	—	—	0.1 psi	0.3 psi		9.3	No	Air/Gas		Flange Mount
C6097B1101	1.5 to 7 psi	—	—	0.1 psi	0.3 psi		9.3	No	Air/Gas		1/4 in. NPT Mount
C6097B1119	3 to 21 in. wc	—	—	0.24 in. wc	0.48 in. wc		5.0	No	Air/Gas		1/4 in. NPT Mount

[a] Acceptable media: Natural gas, liquid propane (LP) gas, and air.

Table 2. Switch Ratings (Amperes).

120/240 Vac, 50/60 Hz		
Inductive	Full Load	3.0
	Locked Rotor	18.0
Resistive		5.0

Table 3. Alternate Electrical Ratings when used with Honeywell Flame Safeguard Programmers.

Device	Rating
Ignition Transformer	540 VA
Pilot Valve	50 VA
Main Valve	400 VA with 2-1/2 times inrush.

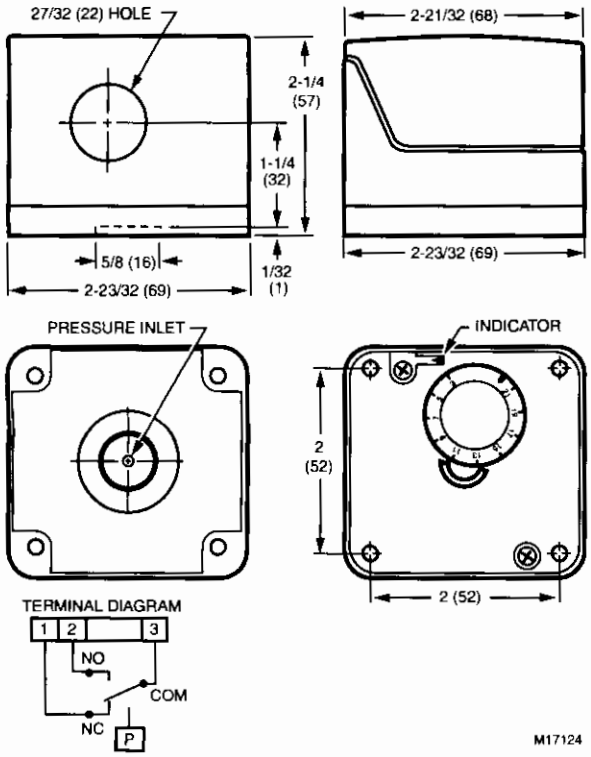


Fig. 2. C6097 Flange Mount dimensions in in. (mm).

INSTALLATION

⚠ WARNING

Explosion or Fire Hazard.
Can cause severe personal injury, death or property damage.
Observe all safety requirements each time a control is installed on a burner.

When Installing this Product...

1. Read these instructions carefully. Failure to follow them can damage the product or cause a hazardous condition.
2. Check the ratings given in the instructions and on the product to make sure that the product is suitable for your application.
3. Installer must be a trained, experienced service technician.
4. After installation is completed, check out product operation as provided in these instructions.

⚠ WARNING

Electrical Shock Hazard.
Can cause serious personal injury or death.
Disconnect power supply before beginning installation. More than one disconnection can be involved.

Mounting

NOTE: On flange models, remove the label holding the O-ring in place and make sure O-ring seal is in place before mounting the pressure switch on the valve.

The C6097 models allow NPT or flange (directly to valve) mounting. The NPT models have a hexagonal fitting with a 1/4 in. NPT tapping, which is the high pressure connection, in differential applications. The bleed fitting is 1/8 in. NPT tapped. In differential pressure control applications using air only, connect the lower pressure to the bleed fitting. See Fig. 1.

Both the flange mount and NPT mount models are supplied with an Integral Vent Limiter. External vent line is not required. If necessary, this 1/8-in. atmospheric vent fitting can be used for the vent line connection.

C6097 models with flange mount can be fitted directly to Honeywell Integrated Valve Train (model specific). See Fig. 2 and Table 1. The flange mount models vent internally, with no external tap.

Mount the C6097A,B in any position.

Leak Check

After installation, perform a leak check on the pressure switch:

1. Turn on main gas. Make sure gas has reached the pressure switch (e.g., high gas pressure switch)
2. Check installation for gas leaks using a gas leak detector or a soap solution.

OPTIONAL SWITCH POSITION INDICATION LAMP

The 32003039-001 Switch Position Indicator Lamp Kit consists of a plastic bag containing the following parts (see Fig. 1):

1. Lamp and wires.
2. Terminal plate.
3. Captive screw and nut.
4. Screw.

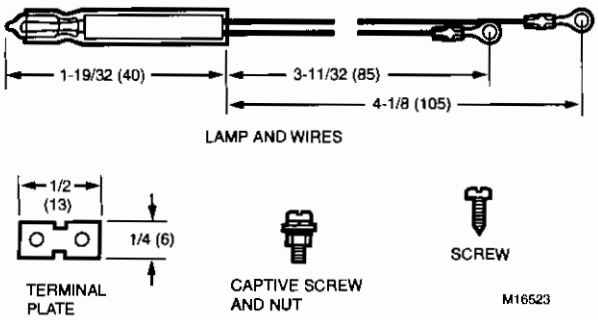


Fig. 3. 32003039-001 Position Indication Lamp Kit.

Installation

⚠ WARNING

Explosion or Fire Hazard.
Can cause severe personal injury, death or property damage.
Observe all safety requirements each time a control is installed on a burner.

⚠ WARNING

Electrical Shock Hazard.
Can cause serious personal injury or death.
Disconnect power supply before beginning installation. More than one disconnection can be involved.

Installing the Position Indication Lamp Kit (See Fig. 4)

1. Remove the cover from the C6097 by removing the screws in the upper left and lower right quadrants of the cover.
2. Place the lamp in the slot to the right of the dial, in the upper right-hand corner of the C6097, with the base down. Run the two lamp wires through the slit in the upper left corner of the lamp slot.
3. Place the nut in the hexagonal depression in the lower left-hand corner of the C6097.
4. Place the terminal plate over the nut and fasten the terminal plate to the C6097 with the screw through the bottom hole in the terminal plate.
5. Place the captive screw through the terminal lug on the shorter wire and fasten the wire to the terminal plate with the captive screw secured by the nut under the terminal plate.
6. Using Fig. 5 or 6 for reference, fasten the terminal lug on the longer lamp wire to either the normally open (NO) or normally closed (NC) terminal of the C6097.

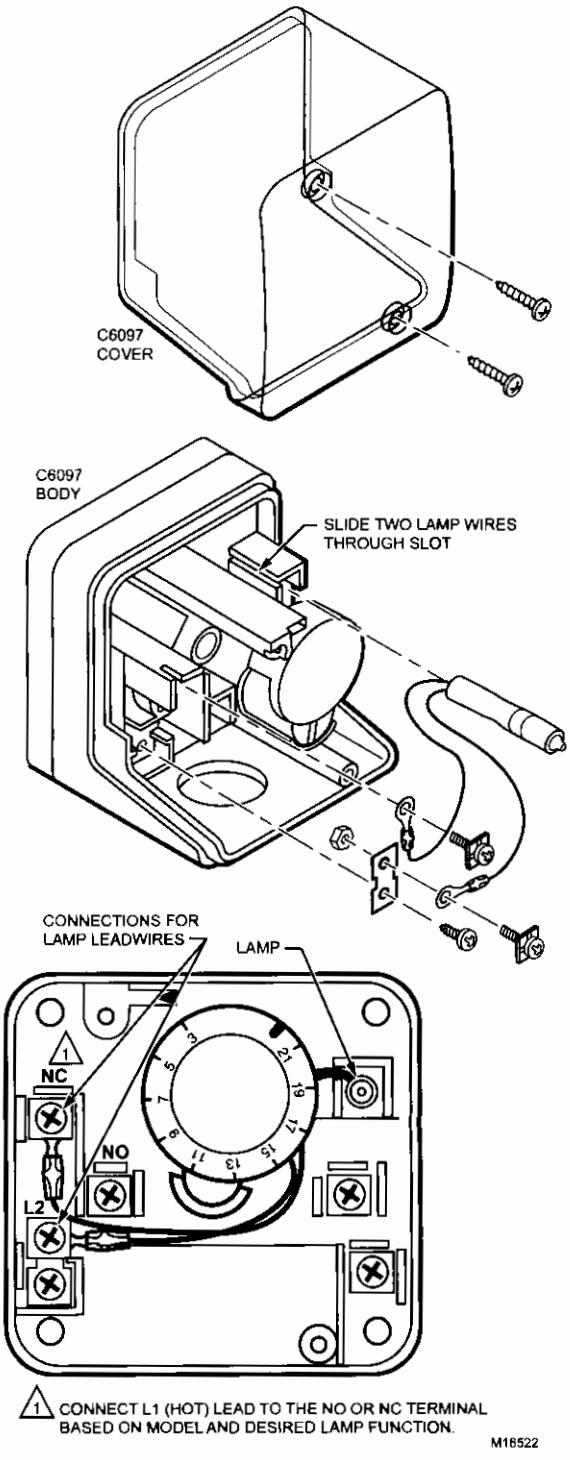


Fig. 4. Installing the Position Indicator Lamp Kit.

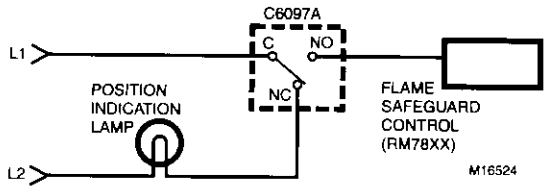


Fig. 5. Wiring the Position Indicator Lamp Kit in the C6097A.

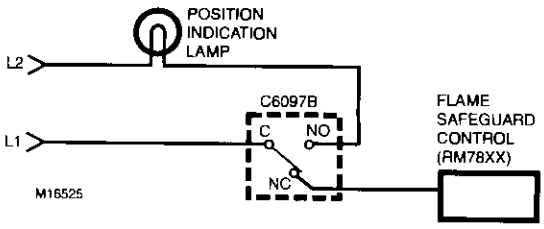


Fig. 6. Wiring the Position Indicator Lamp Kit in the C6097B.

Position Indicator Lamp Operation

The Position Indicator Lamp will light when the C6097 Pressure Switch opens and provides power to the lamp (see Fig. 5or 6). An option alarm circuit can also be connected as shown in the same figures.

WIRING

⚠ WARNING

Electrical Shock Hazard.
Can cause serious personal injury or death.
Disconnect power supply before beginning installation. More than one disconnection can be involved.

Make sure that all wiring agrees with all applicable local codes, ordinances and regulations. An opening is provided to accommodate rigid conduit or armored cable for line voltage operation (see Fig. 3 and 4). Do not overload the switch contacts (see Switch Ratings in the Specifications section). The switching schematic is shown in Fig. 5.

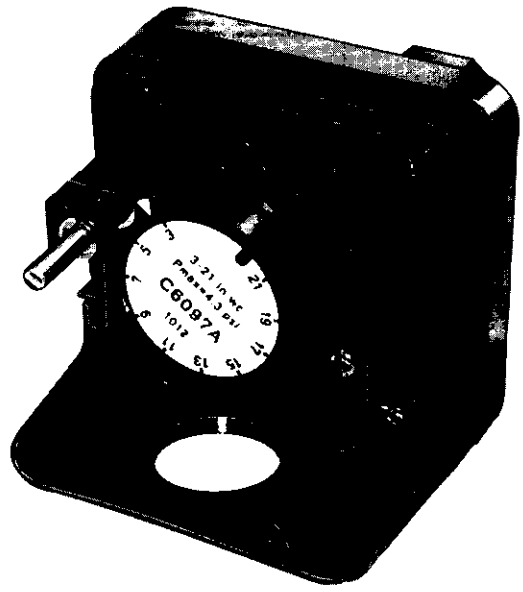


Fig. 7. C6097 (manual reset switch model) with cover removed.

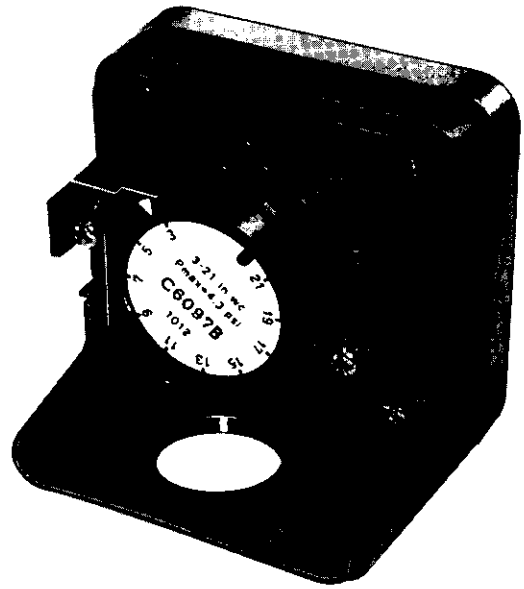
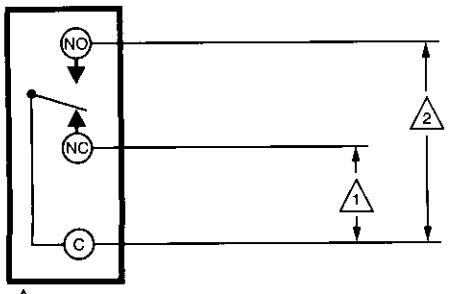


Fig. 8. C6097 (recycle model) with cover removed.

SETTINGS AND ADJUSTMENTS

Pressure Setpoint Adjustment

To adjust the pressure setting, turn the setpoint adjustment dial (Fig. 3, 4 and 5) clockwise ↷ to increase the pressure setting and counterclockwise ↶ to decrease the pressure setting.



1 C6097A BREAKS C-NO, MAKES C-NC ON PRESSURE FALL. MANUAL RESET MODELS LOCK OUT.

2 C6097B BREAKS C-NC, MAKES C-NO ON PRESSURE RISE AND LOCKS OUT. M17123

Fig. 9. C6097 schematic.

OPERATION AND CHECKOUT

Operation

The manual reset C6097A diaphragm actuates the snap-acting switch to break a control circuit and lock out when pressure falls to the scale setting. The recycle C6097A models recycle automatically when the control circuit returns to scale setting plus differential.

The manual reset C6097B diaphragm actuates the snap-acting switch that breaks a control circuit and locks out when the pressure rises to the scale setting. The recycle C6097B models recycle automatically when the control pressure falls to the scale setting minus differential.

Manual Resetting

The C6097A manual reset models lock out when pressure falls to the scale setting and require manual resetting after the pressure rises to scale setting plus differential to resume normal operation.

The C6097B manual reset models lock out when pressure rises to the scale setting and require manual resetting after the pressure falls to scale setting minus the differential to resume normal operation.

To reset, once normal operating pressure is restored, push the reset button in as far as it goes, then release.

IMPORTANT

Lockout models cannot be made to recycle automatically by permanently holding in the reset lever.

Checkout

C6097 Gas Fuel Application

1. Set cutoff pressure.
2. Open main supply line. Depress reset lever on lockout models until switch makes control circuit.
3. Set controller and limit switch to call for heat.
4. For C6097A: Close the manual gas shutoff valve. C6097 should open control circuit when pressure reaches cutoff point.
   For C6097B: Open the manual gas shutoff valve, wait a few minutes for the pressure to rise; then lower the scale setting until the switch breaks control circuit and locks out.
5. For C6097A: Open the shutoff valve, return the pressure switch to its original setting and press the reset button (if necessary).
   For C6097B: raise setting to normal and press reset button (if necessary).
6. Allow system to operate through at least one complete cycle to make sure all components are functioning properly.

C6097A Air Application

1. Set cutoff pressure.
2. Turn on fan.
3. Block fan inlet or filter area. Switch should break control circuit when pressure drops to cutoff point. Manual reset models lock out.
4. Remove obstruction. Press reset lever (manual reset models) and allow system to operate through at least one complete cycle to be sure all components are functioning properly.

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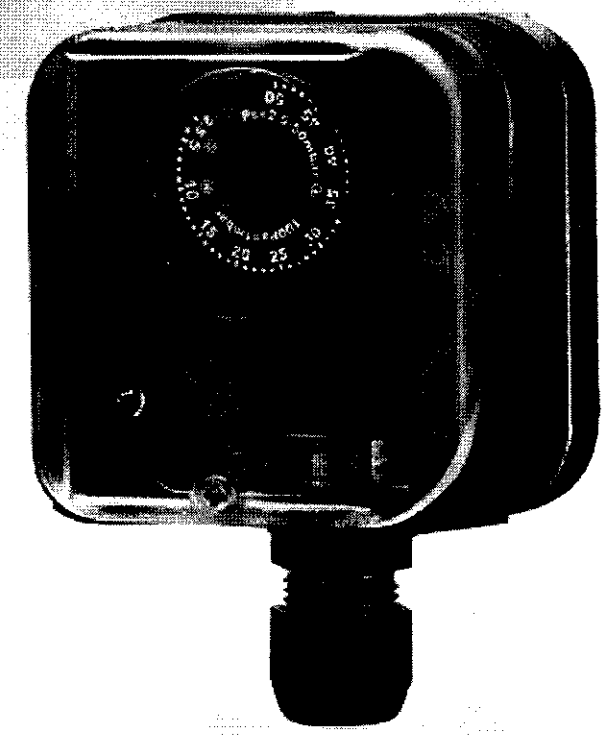
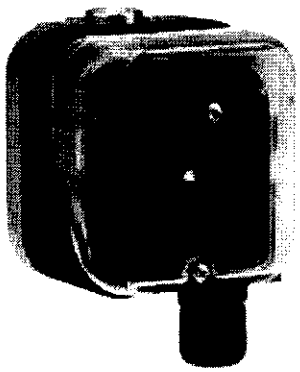
Printed in Japan

krom schroder

Pressure switch for gas DG

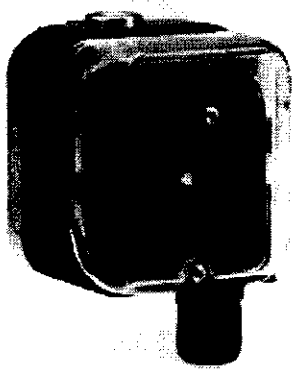
Product brochure · GB
4 Edition 02.13





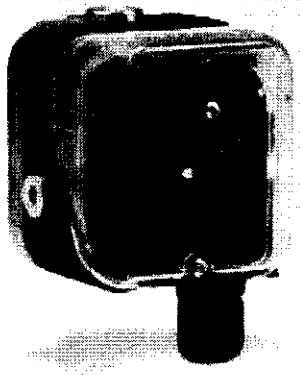
- Monitoring of gas and air pressures (positive, negative and differential pressures)
- EC type-tested and certified pursuant to EN 1854 and class "S"
- DG..T: FM approved and UL listed
- Certified pursuant to GOST-R and AGA
- Certified for systems up to SIL 3 and PL e
- Pressure switch with internal lock and manual reset
- Suitable for biologically produced methane (can be used on pipes with Zone 2 explosive atmospheres without isolating amplifier)
- With approved isolating amplifier for Zone 1 and 2 hazardous areas
- RoHS 2002/95/EC

Application



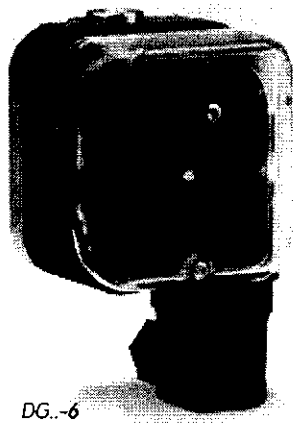
DG..U-3

Adjustable switching point



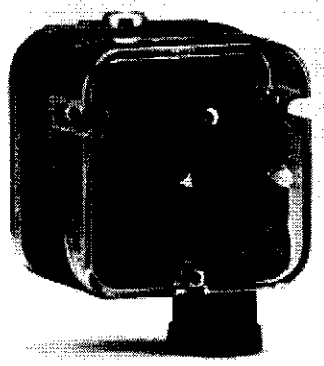
DG..H, DG..N

DG..H: switches and locks off with rising pressure. DG..N: switches and locks off with falling pressure. Manual reset.



DG..-6

With fitted socket pursuant to DIN EN 175301-803



DG..T

Hand wheel with "WC and mbar scale. NPT conduit for electrical connection.

The gas pressure switch DG monitors extremely low pressure differentiols and triggers switch-on, switch-off or switch-over operotions if a set switching point is reached. The switching point is odjustable via a hand wheel.

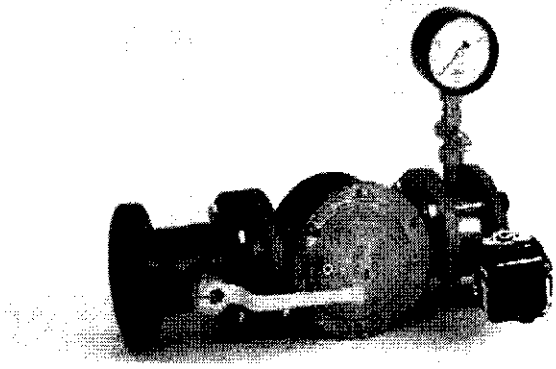
It monitors positive ond negative gas pressures on various industrial gas and air applionces, such as bailer fan monitoring and differential pressure monitoring in firing, ventilation and air-conditioning systems.

The TÜV-tested special-design pressure switch is used as defined by VdTÜV Code of Practice "Druck 100/1" (Pressure 100/1) in firing installations for steam and hot-water generators in accordance with TRD 604, Para. 3.6.4, as well as class "S" for DG..B, DG..U and DG..I pursuant to EN 1854.

Type	Pasitive pressure	Negative pressure	Differential pressure
DG..B	**Gas, air, flue gas or biomethane**	–	–
DG..U, DG..T	Gas, air, flue gas or biomethane	Air or flue gas	Air or flue gas
DG..H, DG..N, DG..HT, DG..NT	**Gas, air, flue gas or biomethane**	**Air or flue gas**	**Air or flue gas**
DG..I	Air or flue gas	Gas, air, flue gas or biomethane	Air or flue gas
DG..S	**NH_3 or O_2**	–	–

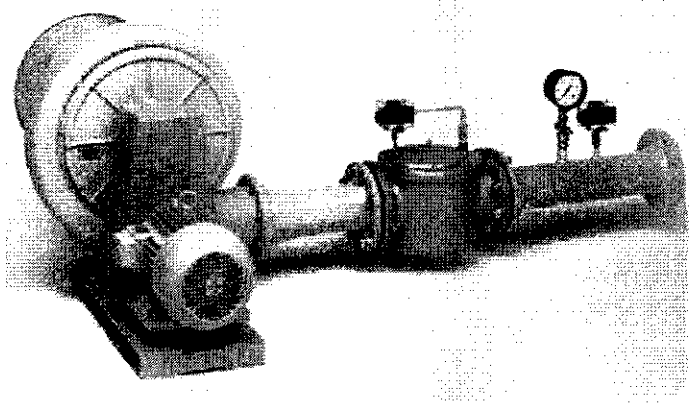
Examples of application

Gas deficiency monitoring



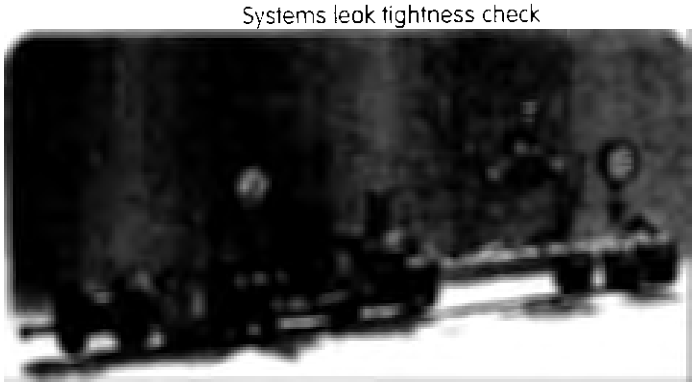
For monitoring the minimum gas inlet pressure

Differential pressure monitoring



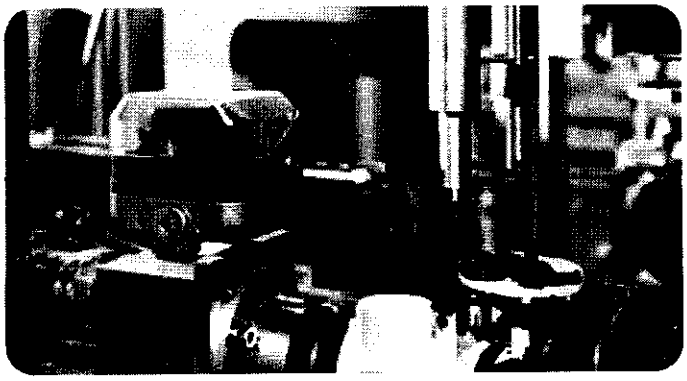
Differential pressure switch for monitoring air filters

Systems leak tightness check



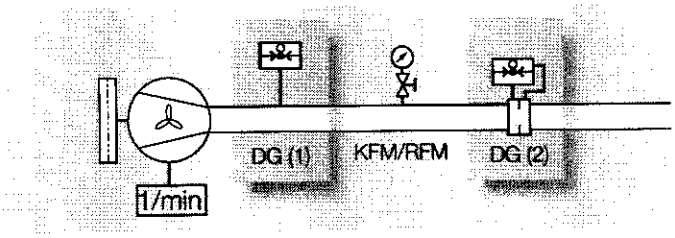
Electronic safety shut-off valve SAV with closed position check of downstream devices.

Negative pressure monitoring



Monitoring the negative pressure ensures the correct positioning of the components during fully automatic assembly of gas meters.

Air line with minimum pressure and flow monitoring



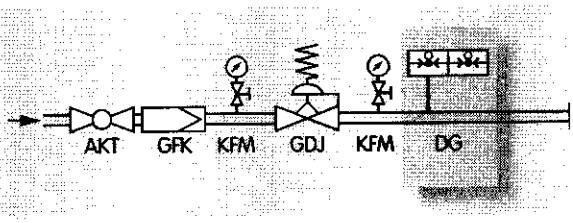
The air flow generated by the fan may be monitored as follows:

The static pressure is monitored by pressure switch DG (1), as long as it can be demonstrated that the display consequently shows an adequate and secured flow of air, or

DG (2) controls the flow of air via the differential pressure on the orifice.

If there is no air pressure supplied or if there is no differential pressure on the orifice, the system will be blocked.

Low-pressure cut-off and high gas pressure protection device



If the pressure is either too low or too high, the min./max. pressure switch DG switches in order to avoid start-up or to initiate a safety shut-down.

Type code

Code	Description
DG	Pressure switch for gas
1,5–500	**Maximum setting in mbar**
B	Positive pressure
U	Positive pressure, negative pressure, differential pressure
H	Locks off with rising pressure
N	Locks off with falling pressure
I	Negative pressure for gas
S	Positive pressure only, for oxygen and ammonia
T	**T-product**
G	With gold-plated contacts
	Electrical connection:
-3	**via screw terminals**
-4	**via screw terminals, IP 65**
-5	**via 4-pin plug, without socket**
-6	**via 4-pin plug, with socket**
-9	**via 4-pin plug, with socket, IP 65**
K2	Red/green pilot LED for 24 V DC/AC
T	Blue pilot lamp for 230 V AC
T2	Red/green pilot LED for 230 V AC
N	Blue pilot lamp for 120 V AC
A	**External adjustment**

Technical data

Gas type: natural gas, town gas, LPG (goseous), flue gas, biologically produced methane (max. 0.1 %-by-vol. H_2S) and air.

DG: max. inlet pressure $p_{u\ max.}$ ± 600 mbar (8.5 psig).
Max. test pressure for testing the entire system:
temporarily < 15 minutes 2 bar (29 psig).

Switching capacity:

DG:
U = 24 – 250 V AC,
I = 0.05 – 5 A at cos φ =1,
I = 0.05 – 1 A at cos φ = 0.6.

DG..G:
U = 5 – 250 V AC,
I = 0.01 – 5 A at cos φ = 1,
I = 0.01 – 1 A at cos φ = 0.6.

DG..G
U = 5 – 48 V DC,
I = 0.01 – 1 A.

DG..T:
U = 30 – 240 V AC,
I = 5 A at cos φ = 1,
I = 0.5 A at cos φ = 0.6.

DG..TG:
U = < 30 V AC,
I = 0.1 A at cas φ = 1,
I = 0.05 A at cos φ = 0.6.

Maximum medium and ambient temperatures:
DG..B, DG..U, DG..I, DG..S: -15 to +80°C (5 to 176°F),
DG..H, DG..N: -15 to +60°C (5 to 140°F).

Storage and transport temperature:
-40 to +80°C (-40 to 176°F).

RoHS compliant pursuant to 2002/95/EC.

Diaphrogm pressure switch, silicone-free.

Diaphragm:
NBR for DG..U, B, N, H, I,
IIR for DG..S.

Housing: glass fibre reinforced PBT plastic with law gas release.

Lower housing section: AlSi 12.

Enclosure: IP 54 or IP 65.

Safety class: 1.

Maintenance cycles

At least once a year, twice a year in the case of biologically produced methane.

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Detailed information on this product

Contact

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Installation & Maintenance Instructions

2–WAY INTERNAL PILOT–OPERATED SOLENOID VALVES
NORMALLY CLOSED OPERATION – ¾", 1", 1¼", 1½" OR 2" NPT
FUEL GAS SERVICE

SERIES

8214

Form No.V6766R5–Sec. 1
(Section 1 of 2)

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

For exploded views, see Form No. V6766R5 – Section 2.

DESCRIPTION

Series 8214 valves are 2–way normally closed diaphragm–type solenoid valves designed for fuel gas service. Valve bodies are made of rugged aluminum with trim and internal parts made of steel and stainless steel. Series 8214 valve may be provided with a general purpose, general purpose junction box or watertight/explosionproof solenoid depending upon basic valve construction.

Valve catalog numbers with ***Suffix C*** have an integral electrical and visual position indicator and proof of closure construction. Valves with ***Suffix VI*** (in the catalog number) have a visual only position indictor. The position indicator gives visual indication of ***Open*** and ***Shut*** positions by means of a small ball. The ball travels up and down in a transparent holder between labels ***Open*** and ***Shut***. Electrical indication is accomplished by the operation of a single pole single throw reed switch. Reed switch contact is closed when solenoid is de–energized; open when energized.

Note: Position indicators not supplied with DC valve construction.

Provisions for Pressure and Seat Leakage Testing

(See Figure 1.)

Series 8214 valves are provided with four 1/8" KNIT tapped and plugged holes, two on either side of valve body. Two upstream for pressure testing; two downstream for seat leakage testing. Leakage testing frequency shall be at least annually in accordance with NFPA–86 or original equipment manufacturer recommendations. Testing is also required after valve disassembly and reassembly for inspection, cleaning or rebuilding.

OPERATION

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

Operating Pressure Differential

- Minimum 0 psig
- Maximum 5 psig

INSTALLATION

Check nameplate for correct catalog number, pressure, voltage, frequency, and service. Never apply incompatible fluids or exceed pressure rating of the valve. Installation and valve maintenance to be performed by qualified personnel.

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Temperature Limitations

For valve ambient and fluid temperatures, refer to chart below.

Catalog Numbers ‡	Service AC or DC	Insulation Class	Minimum and Maximum Ambient and Fluid Temperatures
821435 821450 821460 821470 821480	AC ‡	F	–40°F (–40°C) to 125°F (54°C)
		H	–40°F (–40°C) to 140°F (60°C)
	DC	B or H	–20°F(–29°C) to 77°F (25°C)

‡ Includes catalog numbers with or without ***Suffix C*** or ***VI***.

Positioning

Valve must be mounted with solenoid vertical and upright.

Piping

Connect piping to valve according to markings on valve body. Apply pipe compound sparingly to male pipe threads only. If applied to valve threads, the compound may enter the valve and cause operational difficulty. Avoid pipe strain by properly supporting and aligning piping. When tightening the pipe, do not use valve or solenoid as a lever. Locate wrenches applied to valve body or piping as close as possible to connection point. Valve should be checked for external leakage at piping connections after installation, see ***Testing for External Leakage*** section.

⚠ CAUTION: To avoid damage to the valve body, DO NOT OVERTIGHTEN PIPE CONNECTIONS. If Teflon* tape, paste, spray, or similar lubricant is used, use extra care when tightening due to reduced friction.

⚠ CAUTION: To protect the solenoid valve, install a strainer or filter, suitable for the service involved, in the inlet side as close to the valve as possible. Clean periodically depending on service conditions. See ASCO Series 8600, 8601 and 8602 for strainers.

Testing for External Leakage

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

1. Block gas flow on downstream side of valve.
2. Apply pressure to valve within nameplate rating and energize solenoid.
3. Apply a soapy solution or a commercially available leak detecting solution to the pipe connections and check for bubbles. If the valve has been tested for seat leakage or disassembled and reassembled for inspecting, cleaning, or rebuilding apply the solution around solenoid base sub–assembly, bonnet/body joint and pipe plugs.

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4. If leakage exists, depressurize valve and turn off electrical power supply. Tighten connections as required and retest following the above steps.

Wiring (Electrical Position Indicator)

Wiring must comply with local codes and the National Electrical Code. Switch housing has a 1/2" conduit connection. The position indicator switch has been preset at the factory and requires no adjustment upon installation. Position indicator housing assembly can be rotated 360° for desirable visual position. Position indicator is furnished standard with one reed switch having a single contact to open when the valve is in the open position. The switch rating is 1 amp maximum, 120/60 AC maximum and 15 volts–amps maximum (Resistive Load) or 1 amp maximum, 120 volts DC maximum and 15 watts maximum (Resistive Load). For lamp and inductive loads, contact protection is required.

MAINTENANCE

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

Cleaning

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

Preventive Maintenance

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

Causes of Improper Operation

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

Valve Disassembly

NOTE: Determine valve construction AC (Figure 2 on page 4) or DC (Figure 5 on page 7) then proceed as follows:

1. Remove solenoid enclosure, see separate instructions. If position indicator construction is present, refer to appropriate instructions regarding disassembly, reassembly or adjustment.
2. For AC Construction, unscrew solenoid base sub–assembly. For DC Construction, unscrew solenoid base sub–assembly with special wrench adapter provided in ASCO Rebuild Kit. For wrench adapter only, order kit No. K218949. NOTE: For alternate type open end wrench, order kit No. K168146–1 which is available for solenoid base sub–assembly removal or replacement.
3. Remove bonnet screws, valve bonnet, bonnet gasket, core/diaphragm sub–assembly, and body gasket.
4. All parts are now accessible to clean or replace. If parts are worn or damaged, install a complete ASCO Rebuild Kit.

Valve Reassembly

1. Lubricate bonnet gasket and body gasket with a light coat of DOW CORNING® 200 Fluid lubricant or an equivalent high–grade silicone fluid.
2. Apply a light coat of RemGrit TFL 50® Dry Lubricant to:
   - Valve seat
   - Valve body flange where diaphragm assembly contacts the valve body and body gasket.
   - Internal surface of valve bonnet where diaphragm assembly contacts bonnet when valve is in the energized (open position).

IMPORTANT: If valve has been disassembled for inspection and cleaning only and a Rebuild Kit is not being installed, lubricate the following with RemGrit TFL 50® Dry Lubricant:

- Diaphragm assembly on both sides.
- Main disc at base of core/diaphragm sub–assembly.
- Pilot disc at base of core assembly.

⚠ CAUTION: Do not distort hanger spring between core assembly and diaphragm assembly when lubricating pilot disc.

3. Replace body gasket and core/diaphragm sub–assembly with closing spring attached. Locate bleed hole in core/diaphragm sub–assembly approximately 30° from the valve inlet.
4. Replace valve bonnet and bonnet screws (6). Torque screws in a crisscross manner to 100 ±10 in–lbs [11,3 ± 1,1 Nm].
5. For AC construction, replace bonnet gasket and solenoid base sub–assembly and torque solenoid base sub–assembly to 45 ± 5 ft–lbs (61,1 ± 6,8 Nm). For DC construction refer to separate ***Solenoid Installation and Maintenance Instructions*** for lubrication instructions; then install bonnet gasket, housing and solenoid base sub–assembly, position solenoid base sub–assembly into housing and then engage with valve body using special wrench adapter and torque solenoid base sub–assembly to 30 ± 5 ft–lbs (40,7 ± 6,8 Nm).
6. Replace solenoid (see separate instructions) and make electrical hookup.

⚠ WARNING: To prevent the possibility of severe personal injury or property damage, check valve for proper operation before returning to service. Also perform internal seat and external leakage tests (with a nonhazardous, noncombustible fluid if practical).

7. Check valve for external leakage as indicated under the ***Piping*** section, and for internal (seat) leakage as follows.

Testing for Internal (Seat) Leakage

⚠ CAUTION: Be sure valve can be tested without affecting other equipment.

1. Using a 3/16 hex key wrench, remove the 1/8" NPT pipe plug from the downstream side of the valve body. Then install suitable test piping (e.g.; two short nipples and an elbow or tubing) to check for leakage.
2. Block flow downstream of valve.
3. Restore electrical power supply and pressurize valve to nameplate rating.
4. With valve de–energized, immerse end of test piping in a cup of water for 20–30 seconds and look for bubbles, which would be indicative of seat leakage. Repeat this procedure several times. Between each test, remove cup of water and operate valve.

5. If seat leakage is detected, turn off electrical power and depressurize valve. Disassemble and check for proper placement of parts, or any foreign matter that may have entered the valve. Clean as necessary, reassemble and re–test valve for both external and internal leakage.
6. If no seat leakage is detected, remove test piping. Apply a small amount of Loctite Corporation's PST® Pipe Sealant 567 (or equivalent) to the pipe plug threads. Reinstall the pipe plug and tighten securely.
7. Test for external leakage as described in ***Piping*** section.
8. When maintenance is complete, operate the valve a few times to be sure of proper operation. A metallic *click* indicates the solenoid is operating.

Disassembly and Reassembly of (Suffix C) Electrical and Visual Position Indicator (Refer to Figure 4)

1. Remove cover screws, cover washers, cover and cover gasket.
2. Unscrew tube assembly with special wrench (Order No. K070704–97) provided in ASCO Rebuild Kit. Remove tube gasket, flat washer and spring washer.
3. Compress tube assembly into switch holder assembly and remove from housing.
4. Remove tube assembly, spring, switch holder washer and indicator ball. All parts are now accessible for cleaning or replacement.
5. Reassemble in reverse order of disassembly paying careful attention to exploded view provided in Figure 4 for identification and placement of parts.
6. Lubricate tube gasket with DOW CORNING® 200 Fluid lubricant or an equivalent high–grade silicone fluid.
7. Torque tube assembly to 175 ± 25 in–lbs [19,8 ± 2,8 Nm].
8. Be sure indicator ball is properly located in groove in switch holder assembly. For adjustment of position indicator switch, see ***Position Indicator Switch Adjustment*** section
9. When replacing cover, reassemble gasket by inserting screws through cover washer, cover and cover gasket. Torque cover screws in a crisscross manner to 4–6 in–lbs [0,5 – 0,7 Nm].

Electrical Position Indicator Switch Adjustment

NOTE: Valve must be completely assembled with electrical hookup to the solenoid when adjustment to electrical position indicator switch is done.

1. De–energize valve, then connect a battery powered test lamp to the switch lead wires.
2. Turn the adjusting screw into the switch holder assembly until the test lamp is ***Off.***
3. Then back the adjusting screw out of the switch holder assembly until test lamp goes ***On.***
4. Operate valve several times to be sure light goes ***On*** each time the valve is de–energized. Then back adjusting screw out an additional one–half turn.
5. Then complete reassembly of the position indicator.

Disassembly and Reassembly of (Suffix VI) Visual Only Position Indicator (Refer to Figure 3)

1. Remove retaining clip and slip end cap, holder, position indicator ball, end cap and spring washer off tube assembly.
2. Unscrew tube assembly and remove tube gasket. All parts are now accessible for cleaning or replacement.
3. Reassemble in reverse order of disassembly paying careful attention to exploded view provided in Figure 3 for identification and placement of parts.
4. Lubricate tube gasket with DOW CORNING® 200 Fluid lubricant or an equivalent high–grade silicone fluid.
5. Torque tube assembly to 175 ± 25 in–lbs [19,8 ± 2,8 Nm].
6. After reassembly, operate the valve a few times to be sure of proper visual indication.

ORDERING INFORMATION FOR ASCO REBUILD KITS

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

Torque and Lubrication Chart

[1] Part Name Tool	Torque Value	Torque Value Newton–Meters
Solenoid base sub–assembly	AC Construction 45 ± 5 ft–lbs DC Construction 30± 5 ft–lbs	AC Construction 61,1 ± 6,8 DC Construction 40,7 ± 6,8
Tube assembly	175± 25 in–lbs	19,8 ± 2,8
Bonnet screws	100 ± 10 in–lbs	11,3 ± 1,1
Lubrication	**Parts to be lubricated**	
DOW CORNING® 200 Fluid lubricant or an equivalent high–grade silicone fluid	Solenoid base gasket, body gasket and tube gasket	
RemGrit TFL 50® Dry Lubricant or equivalent	Valve seat Valve body flange where diaphragm assembly seats against valve body and body gasket. Internal surface of valve bonnet where diaphragm assembly seats when valve is in the energized (open position). [2] Diaphragm assembly on both sides [2] Main disc at base of core/diaphragm sub–assembly [2] Pilot disc at base of core assembly	

Notes: [1] Thread all parts by hand as far as possible. Then torque evenly in a crisscross manner where applicable.
[2] Lubricate these parts if a rebuild kit is not installed.

Partial side view of valve body showing location of tapped and plugged holes for pressure and seat leakage testing

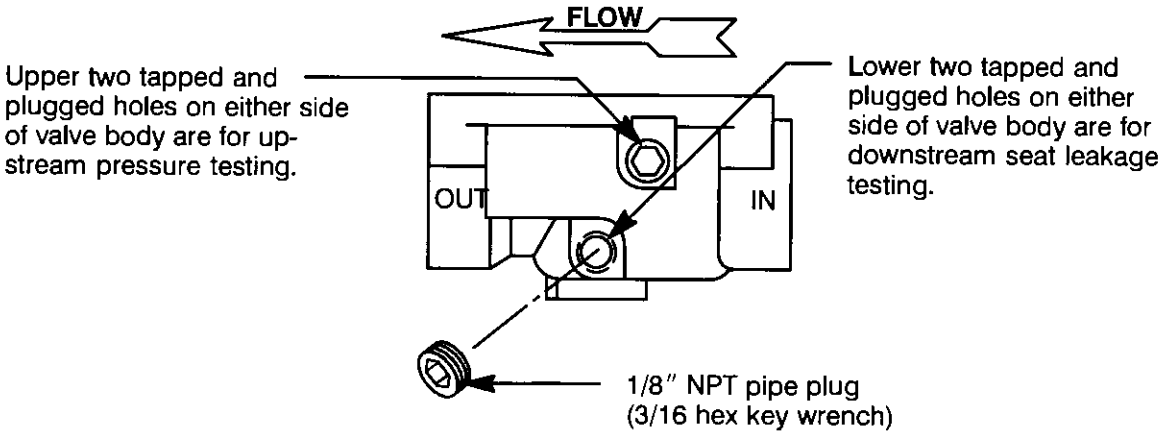

Figure 1. Provisions for pressure and seat leakage testing.

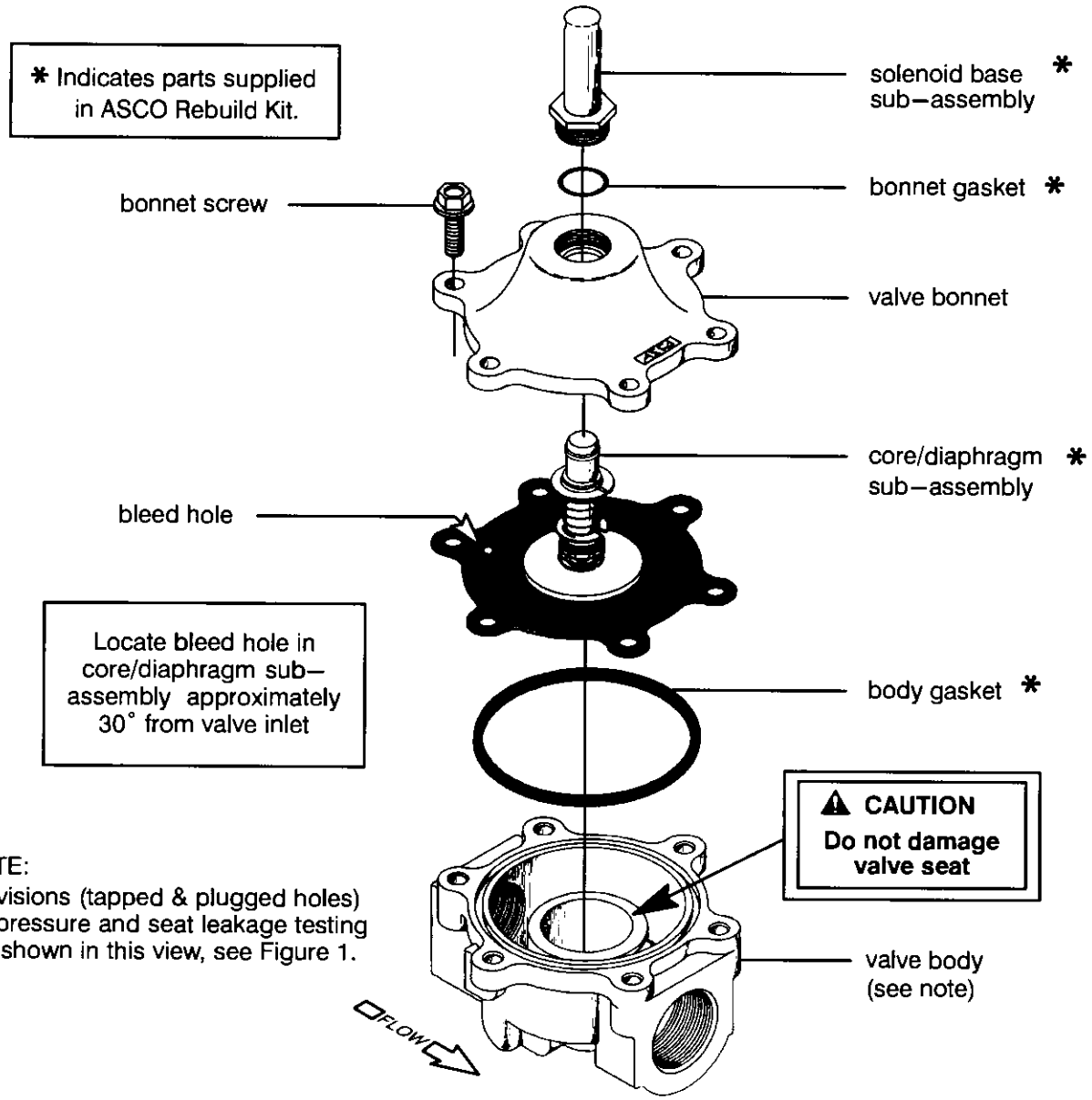

Figure 2. Series 8214 valve without solenoid, AC construction.

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Installation & Maintenance Instructions

2–WAY INTERNAL PILOT–OPERATED SOLENOID VALVES
NORMALLY CLOSED OPERATION – ¾″, 1″, 1¼″, 1½″ OR 2″ NPT
FUEL GAS SERVICE

SERIES

8214

Form No.V6766R5–Sec. 2
(Section 2 of 2)

NOTICE: For instructions and exploded view, see Form No. V6766R5– Section 1.

IMPORTANT
See Torque and Lubrication Chart

* Indicates parts supplied in ASCO Rebuild Kit

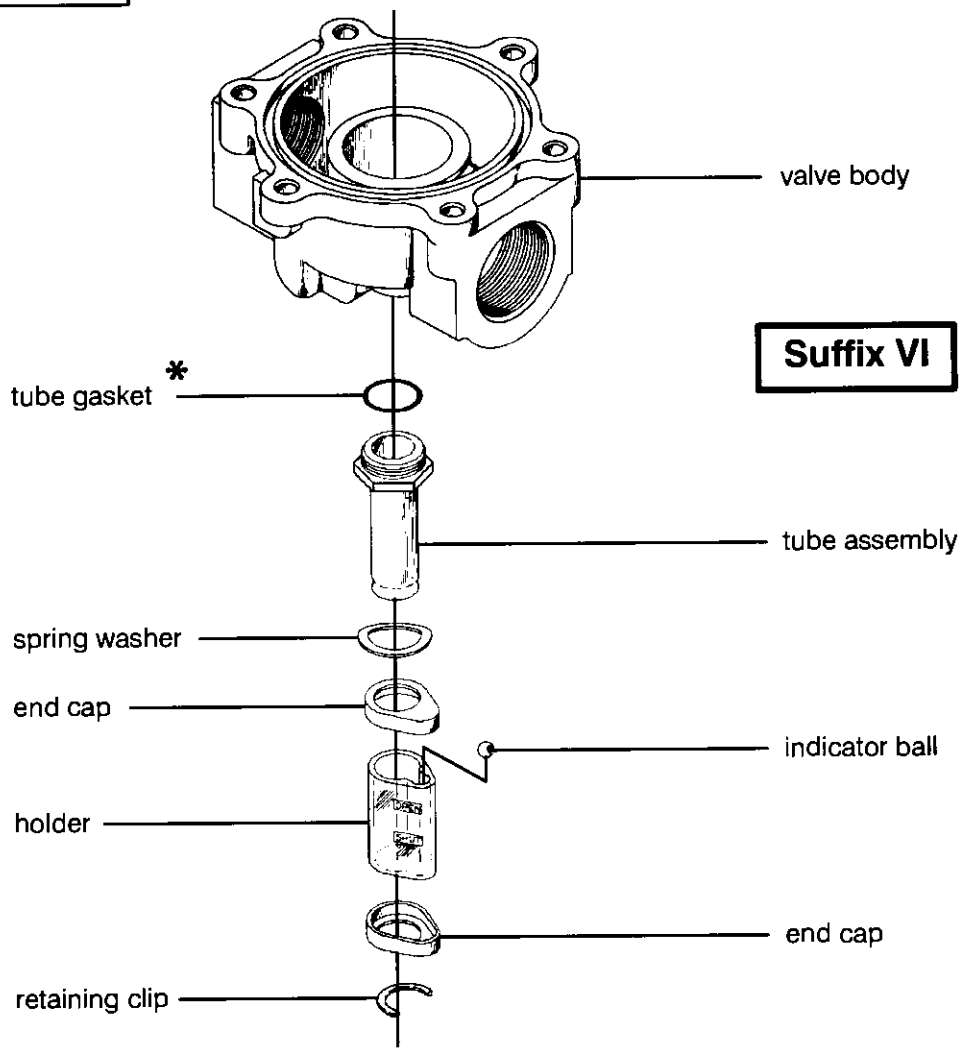

Figure 3. Visual position indicator (partial view).

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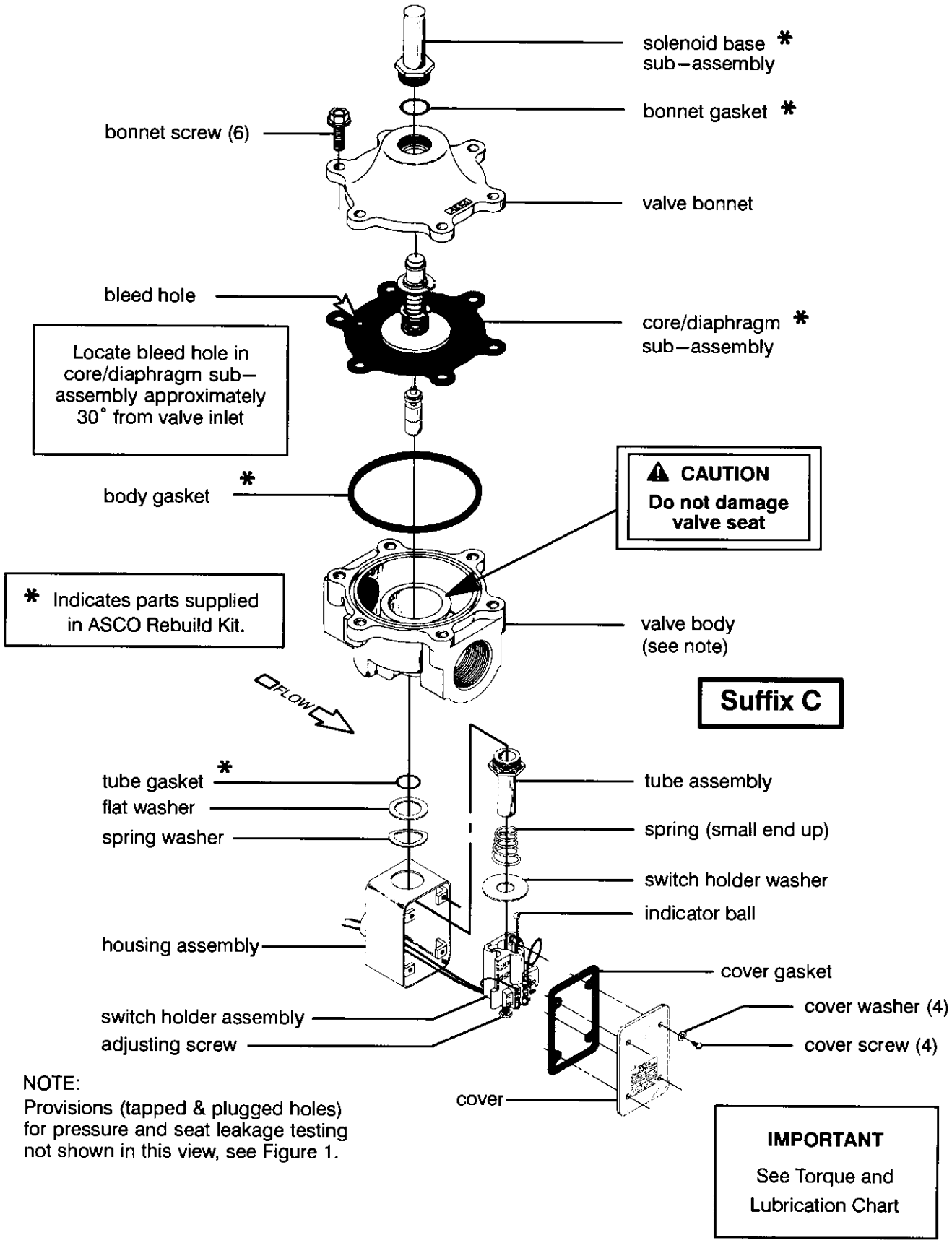

Figure 4. Series 8214 with electrical and visual position indicator.

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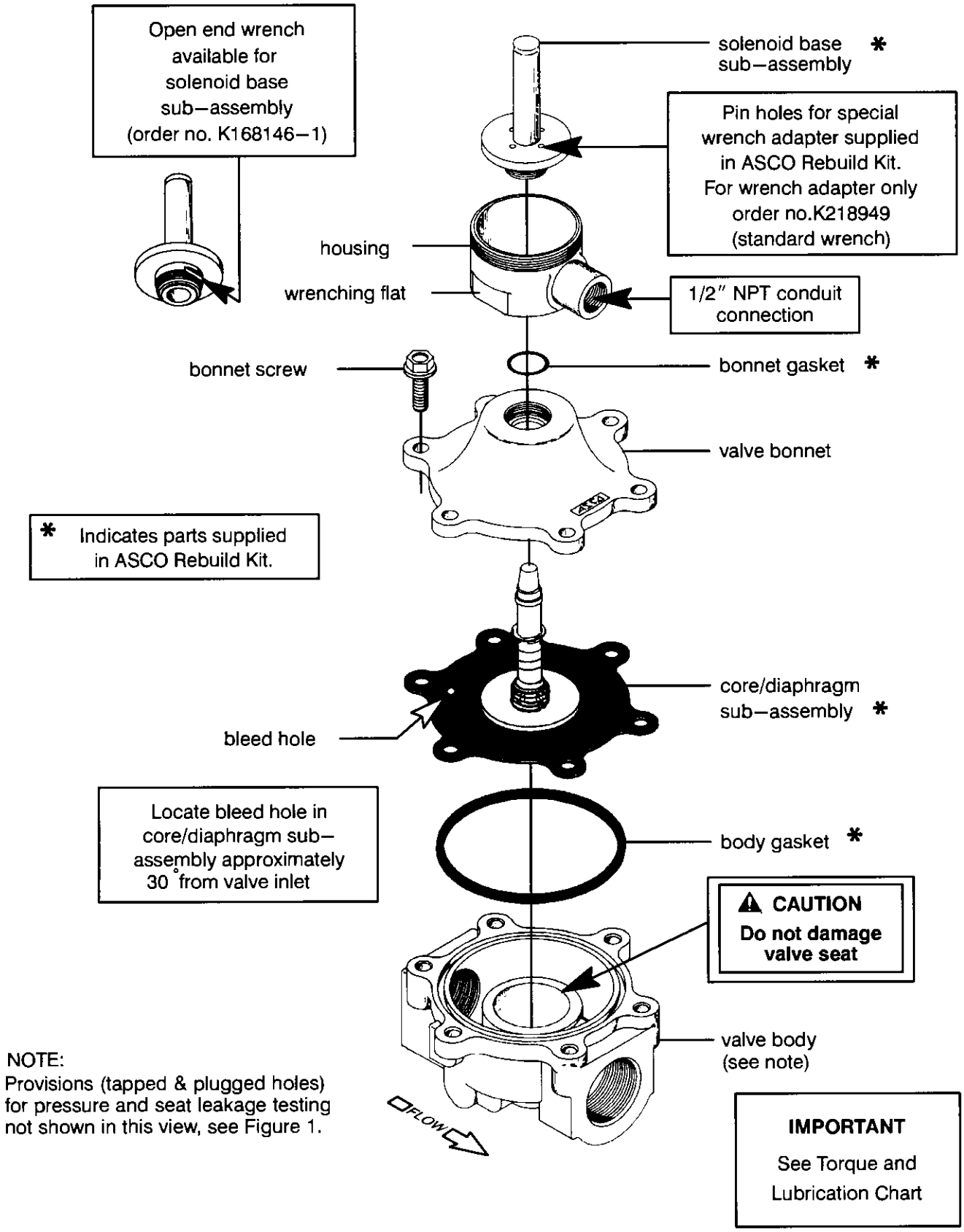

Figure 5. Series 8214 valves without solenoid, DC construction.

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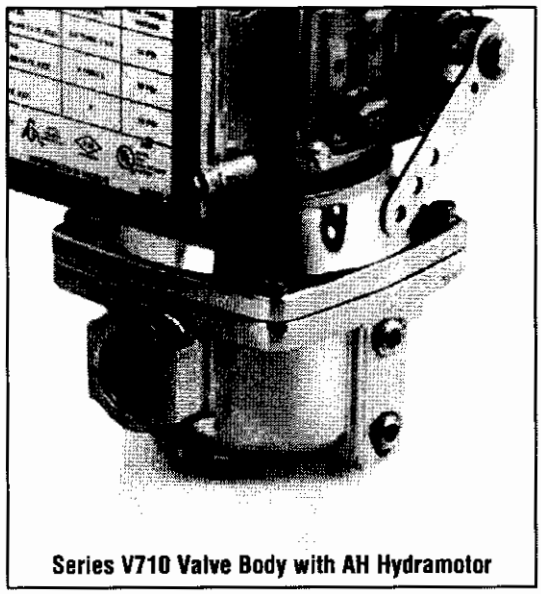
General Description

These 2-way normally closed globe type valve bodies are designed for on/off or proportional control of commecial or industrial gas burners. The V710 is designed exclusively for use with the AH Hydramotor actuator. The AH Hydramotor valve consists of two assemblies; the valve body and the AH Hydramotor actuator.

The V710 is a push-to-open valve which opens when the valve stem is depressed by an AH Hydramotor actuator. An internal return spring closes the valve when the Hydramotor actuator is de-energized.



Series V710 Valve Body with AH Hydramotor

Model Types

Quick Opening Trim: (Standard)
For applications where metered flow control is not required.

Quick Opening w/Valve Seal Overtravel Trim: (Suffix V22)
For any "on-off" application where the user, code or approval agency requires a valve seal overtravel arrangement.

Linear Trim: (Suffix V15)
For applications that require flow control, such as slow opening, low fire urn down, or proportional control.

Linear w/Valve Seal Overtravel Trim: (Suffix V25)
For applications where both valve seal overtravel and flow control are required. (Not available in 4" flange size).

Specifications

Pressure Taps: Two 1/4" NPT downstream, two 1/4" NPT upstream.
Fluid: Fuel Gas
Valve Parts in Contact with Fluid:
Body: 3/4" to 3" NPT, Die-cast aluminum, 4" Flange - cast iron
Bonnet: Die-Cast aluminum
Seals: Nitrile
Springs: Zinc-plated music wire
Stem Bushing: Delrin
Valve Stem: 303 s.s.
Retaining Ring: 17-7 s.s.
Pipe Plugs: Zinc-plated steel
Seal Ring: Teflon (models with overtravel)
Closeoff Pressure: 25 psi (1.7 bar) maximum

Installation

V710 valve body mounts in any position directly to AH2, AH4, AH8 Hydromotor Actuator.

Approvals

V710 valve with AH Hydramotor.

File # MP932, Vol. 17, Sec. 3, Safety Valves

CSA Certified to:
1) Automatic Gas Valves Z21.21 (6.5), File 109157 and 113070.
2) Automatic Gas Safety Shutoff Valves C/I (3.9), File 113070.

JI 3000606
Gas Safety Shut-off Valves.

Ordering Information

Important: Order by Catalog Number.
e.g. V710EASV22

COMBUSTION

Specifications (English units)

Pipe Size (ins.)	Cv Flow Factor	Gas Capacity ① Btu/hr.	Operating Pressure Differential (psi) Min.	Max.	Fluid & Ambient Temp. °F Min.	Max.	Catalog Numbers: Quick Opening Trim	Quick Opening w/Valve Seal Overtravel Trim	Linear Trim	Linear w/Valve Seal Overtravel Trim	Const. Ref.	Approx. Shipping Weight (lbs)
COMBUSTION (Fuel Gas) - Normally Closed												
3/4	12	665,000	0	15	-40	150	V710EAS	V710EASV22	V710EASV15	V710EASV25	1	4.0
1	17	960,000	0	15	-40	150	V710FAS	V710FASV22	V710FASV15	V710FASV25	1	4.0
1 1/4	25	1,406,000	0	15	-40	150	V710GAS	V710GASV22	V710GASV15	V710GASV25	2	4.2
1 1/2	30	1,717,000	0	15	-40	150	V710HAS	V710HASV22	V710HASV15	V710HASV25	2	4.2
2	64	3,620,000	0	10	-40	150	V710JAS	V710JASV22	V710JASV15	V710JASV25	3	9.5
2 1/2	75	4,250,000	0	10	-40	150	V710KAS	V710KASV22	V710KASV15	V710KASV25	4	13.0
3	92	5,230,000	0	10	-40	150	V710LAS	V710LASV22	V710LASV15	V710LASV25	4	12.0
4 (Flange)	180	10,200,000	0	15	-40	150	V710NCF	V710NCFV22	V710NCFV15	-	5	100.0

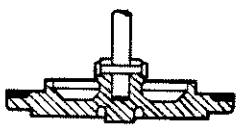
* 1" W.C. Drop @ 2" W.C. Inlet Pressure, 1,000 Btu/cu.ft. or more, 0.64 Specific Gravity Gas.

Specifications (Metric units)

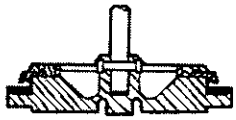
Pipe Size (ins.)	Kv Flow (m^3/hr)	Gas Capacity ① Btu/hr.	Operating Pressure Differential (bar) Min.	Max.	Fluid & Ambient Temp. °C Min.	Max.	Catalog Numbers: Quick Opening Trim	Quick Opening w/Valve Seal Overtravel Trim	Linear Trim	Linear w/Valve Seal Overtravel Trim	Const. Ref.	Approx. Shipping Weight (kgs)
COMBUSTION (Fuel Gas) - Normally Closed												
3/4	10.2	665,000	0	1	-40	66	V710EAS	V710EASV22	V710EASV15	V710EASV25	1	1.8
1	14.5	960,000	0	1	-40	66	V710FAS	V710FASV22	V710FASV15	V710FASV25	1	1.8
1 1/4	21.3	1,406,000	0	1	-40	66	V710GAS	V710GASV22	V710GASV15	V710GASV25	2	1.9
1 1/2	25.5	1,717,000	0	1	-40	66	V710HAS	V710HASV22	V710HASV15	V710HASV25	2	1.9
2	54.4	3,620,000	0	0.7	-40	66	V710JAS	V710JASV22	V710JASV15	V710JASV25	3	4.3
2 1/2	63.8	4,250,000	0	0.7	-40	66	V710KAS	V710KASV22	V710KASV15	V710KASV25	4	5.9
3	78.2	5,230,000	0	0.7	-40	66	V710LAS	V710LASV22	V710LASV15	V710LASV25	4	5.5
4 (Flange)	153	10,200,000	0	1	-40	66	V710NCF	V710NCFV22	V710NCFV15	-	5	45.5

* 1" W.C. Drop @ 2" W.C. Inlet Pressure, 1,000 Btu/cu.ft. or more, 0.64 Specific Gravity Gas.

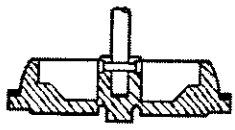
Trim Types



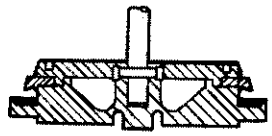
Quick Opening Trim (Standard)



Quick Opening with Valve Seal Overtravel Trim Suffix "V22"



Linear Trim Suffix "V15"

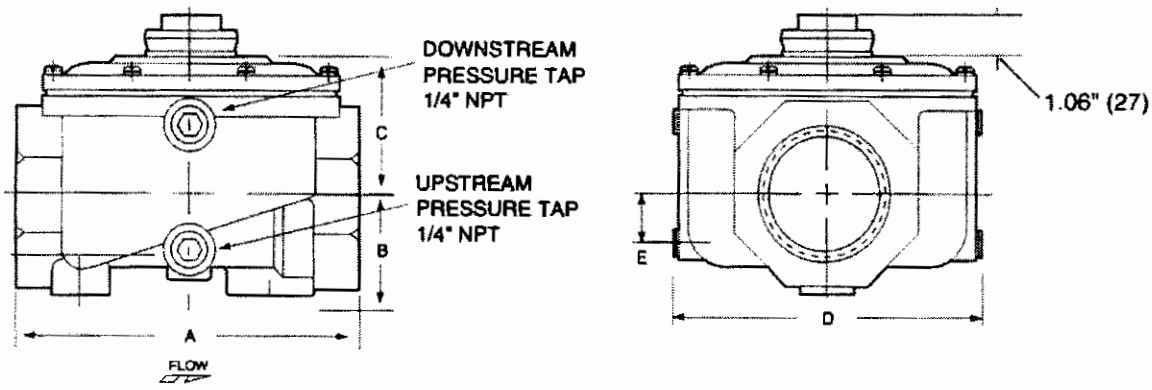


Linear with Valve Seal Overtravel Trim Suffix "V25"

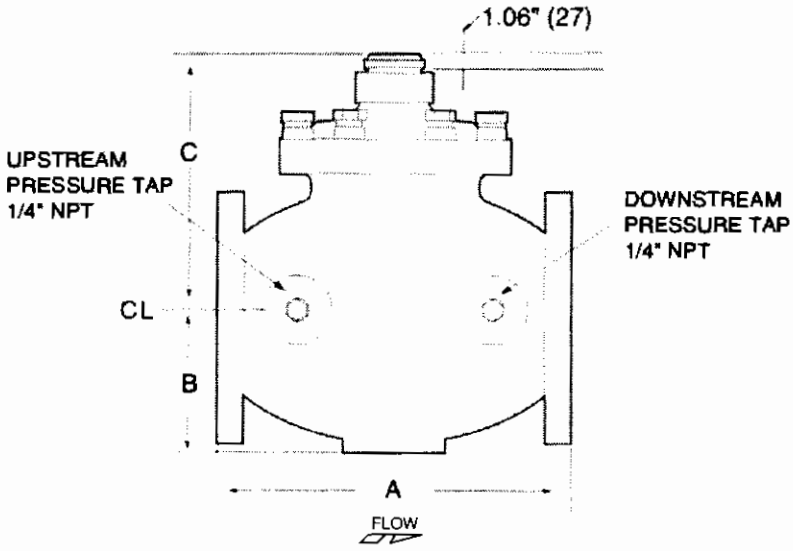
Dimensions inches (mm)

Const. Ref.		A	B	C	D	E
1	ins.	5.78	1.95	2.64	5.19	1.16
	mm	147	50	67	132	29
2	ins.	5.78	2.01	2.94	5.19	0.70
	mm	147	51	75	132	18
3	ins.	8.12	2.66	3.05	8.01	0.96
	mm	206	68	77	203	24
4	ins.	9.00	2.96	3.87	8.01	0.70
	mm	229	75	98	203	18
5	ins.	13.88	5.00	7.40	9.00	0.00
	mm	353	127	188	229	0

Const. Ref. 1 - 4



Const. Ref. 5



COMBUSTION

Installation & Maintenance Instructions

HYDRAMOTOR® PUSH-TYPE LINEAR ACTUATOR WITH GENERAL PURPOSE OR WATERTIGHT ENCLOSURE

SERIES

AH2E

⚠ WARNING

To prevent the possibility of death, serious injury or property damage, the Hydramotor® Actuator must be installed and serviced only by a qualified service technician avoiding the following hazards:

- **Electrical hazard. Turn off all electrical power to Hydramotor® Actuator.**
- **Risk of electric shock – More than one disconnect switch may be required to de-energize the device for servicing.**
- **Pressure hazard. Depressurize valve and vent hazardous or combustible fluid to a safe area before inspection or removal of the actuator or valve from service.**
- **Explosion, fire or toxic gas hazards. Extinguish all open flames and avoid any type of sparking or ignition during leakage testing.**

Service Notices

See separate V710 Gas Valve Installation and Maintenance Instructions for information on: Operation, Positioning, Mounting, Piping, Strainer or Filter Requirements, Flow Controls, Preventive Maintenance, and Cause of Improper Operation.

Do not install an actuator with General Purpose Enclosure in a location subject to weather, wash down, or other sources for water ingress. Use watertight enclosure for these locations.

Front cover gasket, window o-ring, mounting gasket and electrical cover gasket are supplied with watertight version only (AH2E1xxx).

DESCRIPTION

AH2E Hydramotors® are self-contained linear, push-type actuators which extend when powered and retract by spring force upon power interruption.

The AH actuator is typically used for control of gas-fired heating equipment, commonly to open and close a valve or both a valve and damper. AH2E actuators position V710 Series gas valve assemblies.

OPERATION

Application of electrical power simultaneously drives an electric pump and closes a normally-open dump valve, resulting in up to 250 pounds of force on the actuator stem. This extends the actuator stem and attached valve poppet, to open the valve and/or damper.

Upon reaching the fully extended position, a travel limit switch interrupts power to the electric motor while maintaining power to the dump valve, thus stabilizing hydraulic pressure to hold shaft position. Position indicators on both sides of the actuator show the actual position of the valve stem.

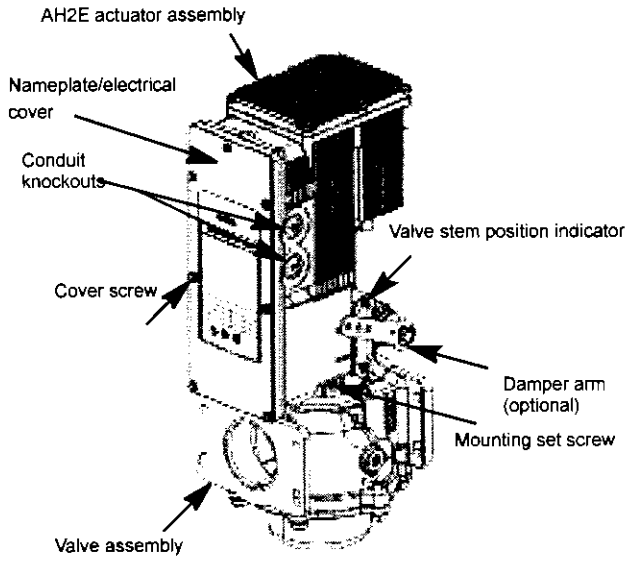
Upon power interruption, the dump valve opens releasing hydraulic pressure, and allowing the return spring to retract the stem and close the valve fully. Closing time is one second or less.

ACTUATOR / VALVE COMPATIBILITY

The AH2E series actuator is **designed for use with ASCO V710 series valves only** and is compatible with all ASCO V710 series valves.

OPTIONAL FEATURES

- **Damper Shaft Arm** Is factory-mounted on RH side. The arm is field-adjustable to 8 positions and can be switched to the LH side.
  - » **Damper Arm Rating:** Drives damper in one direction only. 20 lb maximum at 2.85 in. radius at 20°F to 150°F (-7°C to 65°C) and 10 lb maximum at -40°F to 20°F (-40°C to -7°C). Damper spring and linkage must provide sufficient return force.
  - » **Damper Arm Travel:** 2"
- **Auxiliary Switch** One or two integral SPDT switches, field adjustable to actuate at any position of stroke. This is not a safety switch.
- **Overtravel Proof-of-Closure Switch** A single factory set non-field adjustable SPDT switch to be used in conjunction with V710 Series Gas Valves with overtravel seal (V22 orV25 suffix in catalog number).



AH2E Actuator and V710 Valve Assembly
Figure 1

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Specifications

Force Output: 250 lbs

Stroke: 1 1/8" maximum

Electrical Characteristics:

Operating Voltage / Frequency	Current, in Amperes		
	Inrush	Opening	Holding
24/60	28	8.2	0.49
120/60*	5.6	2.1	0.09
240/60*	2.8	1.1	0.04

*Current increases by 20% for 50Hz operation.

Opening Time: Fast Opening: 6 to 14 seconds
Slow Opening: 14 to 26 seconds

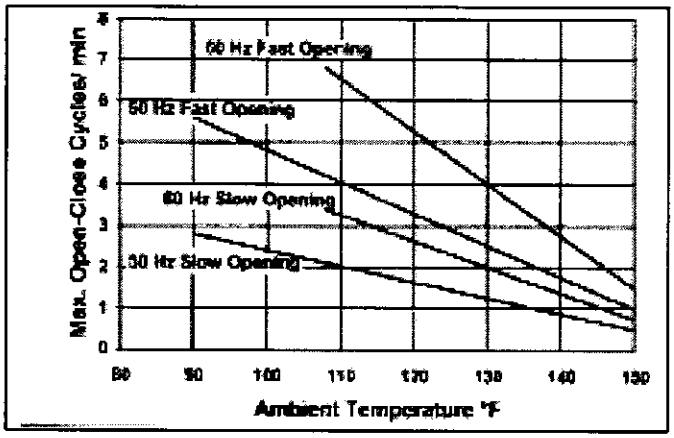
Note:

- Opening time doubles below -30°F (-34°C).
- 50Hz operation increases opening time by 20%.
- Opening time is not field adjustable.

Maximum Closing Time: One second

Ambient Temperature and Duty Cycle Limitations

The actuator may be operated in ambient temperature conditions from -40°F to 150° F (-40°C to 65°C). Actuator can be cycled open / close continuously below 108°F (42°C) for 60Hz and below 90°F (32°C) for 50 Hz. See chart below for limitations (open / close cycles) at elevated temperatures.



NOTICE

The AH2E actuator is fitted with a self-resetting thermal cutout device. If the recommended temperatures and duty cycles above are exceeded, the thermal cutout may trip causing the actuator to stop in its current position during valve opening. The valve closing time remains one second or less regardless of thermal cutout trip. Once the actuator cools,the cutout will self-reset and the actuator will resume operation. If the cutout trips repeatedly, verify that the application is within the ambient temperature and the duty cycle limits of the actuator. If the application is within the specified operating limits and the cutout continues to trip, replace actuator.

INSTALLATION

Positioning/Mounting

Follow the V710 Series Gas valve and/or damper manufacturer's instructions when installing the Hydramotor®.

1. AH2E actuators can be installed to operate in any position.
2. Check to ensure that the mounting gasket (if applicable) is in the proper position, clean and without damage. Position the actuator to operate the valve **(and damper if appropriate)**. Secure actuator with the three mounting set screws. Tighten set screws to 80 ± 5 in-lbs [9,0 ± 0,5 Nm] using a 5/32" hex key wrench. (See Figure 1)

Wiring (Refer to Figure 2)

⚠ WARNING: Electrical hazard. To prevent the possibility of death, serious injury or property damage, open all circuits before inspection, service or disassembly.

Wiring must comply with local codes and the National Electrical Code. Limit controls must conform with actuator rating (voltage, amperage, hertz). Wiring to meet NEC Class I, suitable for 90°C. Wire limit controls to the hot side of power supply.

1. Check the nameplate and confirm that the appropriate power is being supplied to the unit. Remove the front cover (with nameplate) and set aside to access electrical connections taking care not to damage the cover gasket if supplied. A diagram is located on the inside of the cover to aid in making electrical connections.
2. Remove the desired electrical knock out and install appropriate electrical fittings. Type4 fittings must be used with watertight units. Route wiring through the fitting. Take care not to scratch or otherwise damage the cover sealing surface when working on watertight enclosure.
3. Connect the power to terminals 1 and 2. The neutral wire, if applicable, should be connected to terminal 1. Connect the ground wire to the grounding screw provided on the housing next to the terminal strip.
4. Torque terminal screws: 8 to 12 in-lbs [0.9 to 1.3 Nm]. Torque ground screw: 20 to 25 in-lbs (2.3 to 2.8 Nm)
5. If a proof of closure or auxiliary switch is being used make those electrical connections. **Use the markings located on the insulators to determine normally open and normally closed terminals.** Torque electrical connection screws 8 to 12 in-lbs (0.9 to 1.3 Nm). Refer to auxiliary switch adjustment section on page 3 for instructions on adjusting switch. Proof of closure switches are set at the factory. **Do not adjust proof of closure switches.**
6. Install the cover. Be certain that the gasket (if applicable) and sealing surfaces are clean and there is no damage to the surfaces or gasket. Snug down all screws before tightening. Torque screws 20 to 25 in-lbs (2.3 to 2.8 Nm) evenly using a crisscross pattern starting in the middle and not in the corner.
7. If the damper arm is being used, connect linkage and adjust as needed for proper operation of the damper.

   Damper Arm Adjustment: To reposition the damper arm, remove the e-ring retainer and damper arm then reposition arm and reinstall e-ring. When repositioning arm onto the opposite side, remove e-rings on both sides and reposition and install on opposite sides. DO NOT remove the square damper shaft.
8. Operate actuator (with valve) through five cycles to verify proper operation of valve and damper/ linkage system prior to use.

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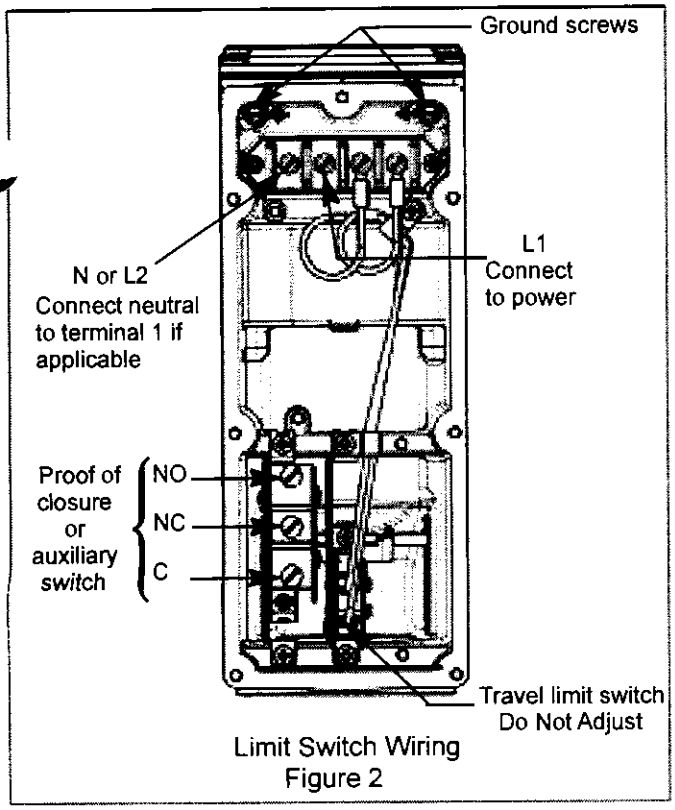


Limit Switch Wiring
Figure 2

Auxiliary and Overtravel Proof-of-Closure Switch Ratings

120VAC: 15 Amps, 1/3 HP
240VAC: 7.5 Amps, 1/2 HP

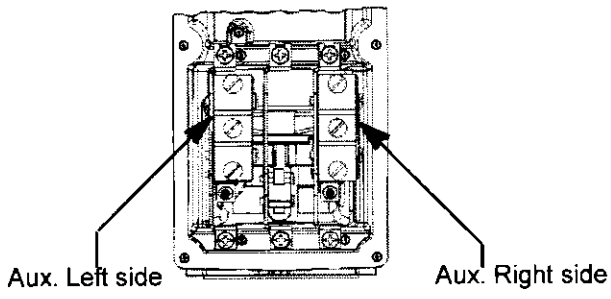
Total connected load of auxiliary and overtravel proof-of-closure switches not to exceed 1800VA.

CAUTION: Overtravel Proof-of-closure switch must only be used with V710 Series Gas Valves having an overtravel seal (V22 or V25 Suffix in catalog number).

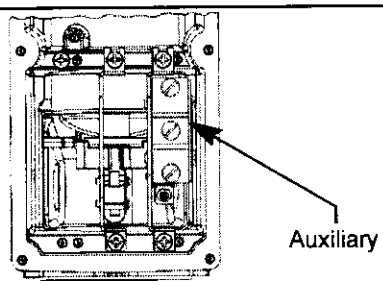
Overtravel Proof-of-Closure Switch

The optional valve overtravel proof-of-closure switch is set at the factory to provide both a mechanical and electrical means of proving valve closed position interlock to the primary control. **This switch is not to be field adjusted.**

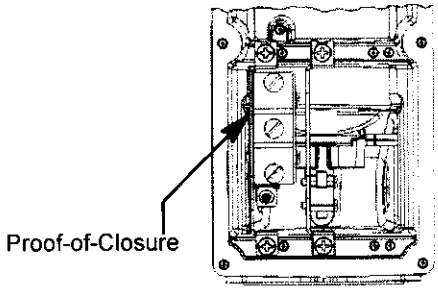
Optional Auxiliary and Overtravel Proof-of-Closure Switch Combinations (Partial Views)



Two Auxiliary Switches
Figure 3



Single Auxiliary Switch
Figure 4

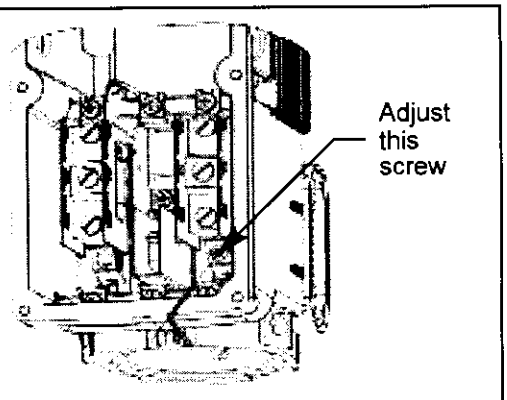


Proof-of-Closure Switch
Figure 5

Auxiliary Switch Adjustment (Refer to Figure 6)

Note: The Auxiliary switch is not a safety switch.

1. **Before removing the cover, review WARNING statements on page 1.** Remove cover screws and nameplate/electrical cover (with gasket if fitted). Take care not to damage the sealing surfaces and cover gasket if supplied.
2. Insert 1/16" Allen key into adjusting screw on auxiliary switch assembly.
3. Turn screw clockwise to move set point towards beginning of actuator stroke. Turn screw counterclockwise to move setpoint toward the end of the actuator stroke. (approximately 8.5 turns from 0 to 100% travel)
4. Cycle the actuator to verify the switch setting and readjust as required.
5. Install the cover. Be certain that the gasket (if applicable) and sealing surfaces are clean and without damage. Snug down all screws before tightening. Torque screws 20 to 25 in-lbs (2.3 to 2.8 Nm) evenly using a crisscross pattern starting in the middle.



Auxiliary Switch Adjustment
Figure 6

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MAINTENANCE

Before inspection, maintenance or rebuild, review WARNING statements on page 1. Maintenance should include annual inspection and cleaning. Use a mild cleaning fluid, not aggressive solvents to remove dirt and oil. Organize a maintenance schedule based on environment and frequency of use. Check for loose electrical and mechanical connections and replace damaged parts. Do not remove the top cover for maintenance. There are no serviceable parts contained inside the actuator housing.

Field Service Notice

Field service replacement kits are limited to the following:

1. Auxiliary Switch Replacement Kit 296804.
2. Proof of Closure Switch Replacement Kit 296806.
3. Travel Limit Switch Replacement Kit 296807.
4. If applicable, Gasket and Screw Replacement Kit 296808. Kit contains:
   - Front cover gasket and screws
   - Window o-ring and screws
   - Mounting gasket and set screws.

To order, specify the kit or part number, as well as the actuator model number.

Auxiliary Switch Replacement (Refer to Figure 7)

Note: The Auxiliary switch is not a safety switch.

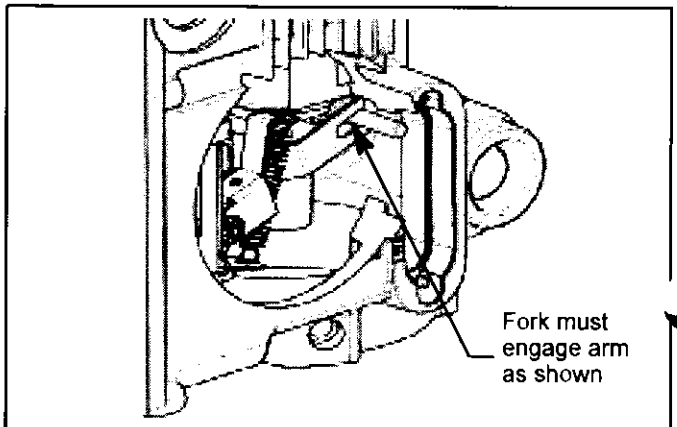
1. **Before removing the cover, review WARNING statements on page 1.** Remove the front cover (with nameplate) and set aside. Take care not to damage the cover gasket if supplied or sealing surfaces. A diagram is located on the inside of the cover to aid in making electrical connections.
2. Disconnect auxiliary switch wiring.
3. Remove two mounting screws and the auxiliary switch.
4. Install new auxiliary switch in the actuator making sure that the fork of the switch actuation lever engages the indicator arm as shown in Figure 8.
5. Torque mounting screws 20 to 25 in-lbs (2.3 to 2.8 Nm).
6. Reconnect switch wiring and torque terminal screws 8 to 12 in-lbs (0.9 to 1.3 Nm).
7. See instructions on page 3 for auxiliary switch adjustment, starting at Step 2.

Proof of Closure Switch Replacement

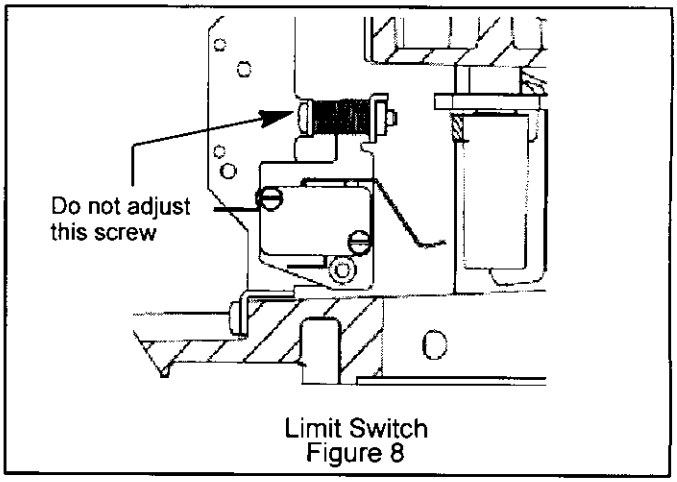
Same as auxiliary switch replacement except switch must NOT be adjusted.

Travel Limit Switch Replacement (Refer to Figure 8)

1. **Before removing the cover, review WARNING statements on page 1.** Remove the front cover (with nameplate) and set aside. Take care not to damage the cover gasket if supplied or sealing surfaces. A diagram i located on the inside of the cover to aid in making electrica connections.
2. Remove the two mounting screws.
3. Disconnect wiring from the travel limit switch taking care not to strain the wire connection at the terminal.
4. Install new travel limit switch. Torque mounting screws 20 to 25 in-lbs (2.3 to 2.8 Nm). Travel limit switches are set at the factory. DO NOT adjust.
5. Plug terminal connections to travel limit switch.
6. Install the cover. Be certain that the gasket (if applicable) and sealing surfaces are clean and without damage. Snug down all screws before tightening. Torque screws 20 to 25 in-lbs (2.3 to 2.8 Nm) evenly using a crisscross pattern starting at the middle.
7. Operate actuator (with valve) through five cycles to verify proper operation prior to use.



Auxiliary Switch
Figure 7



Limit Switch
Figure 8

Gasket replacement (If applicable)

The gaskets have an adhesive attachment. Use a nonmarring tool to peel off the old gasket. Remove backing from new gasket and stick on in the same location as the old gasket.

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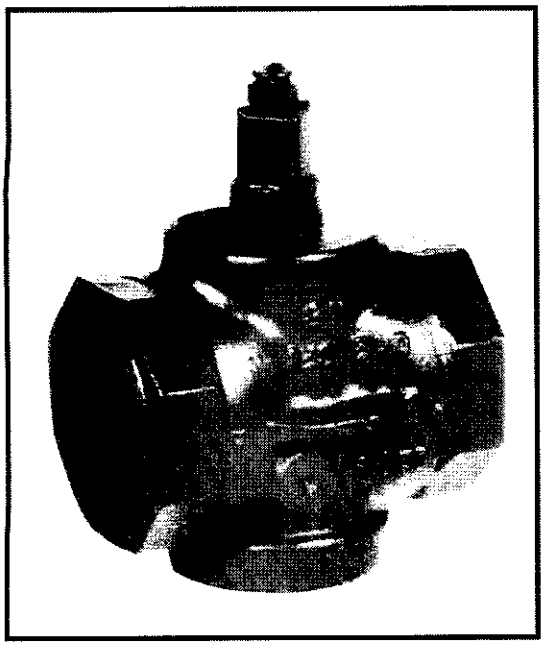
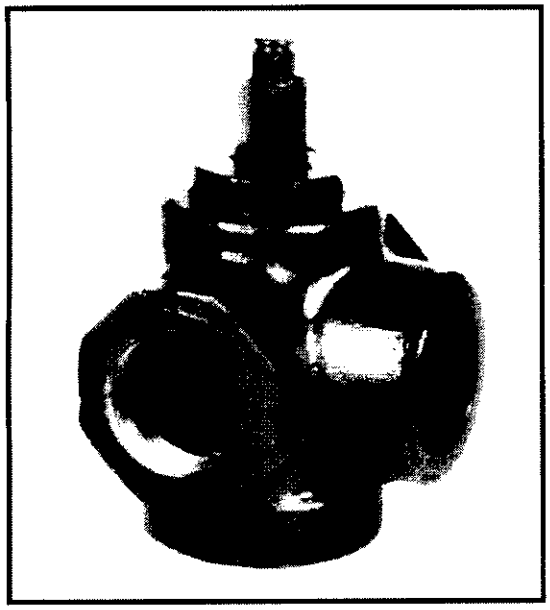
HOMESTEAD®

Valve Division

A Division of Olson Technologies, Inc.

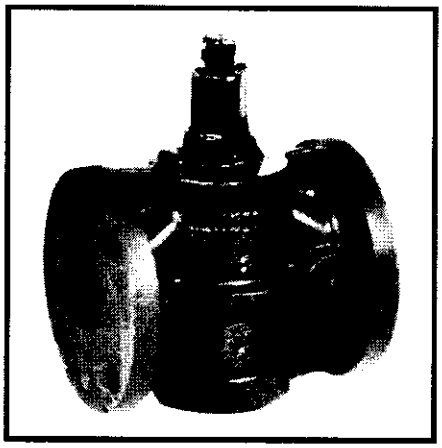
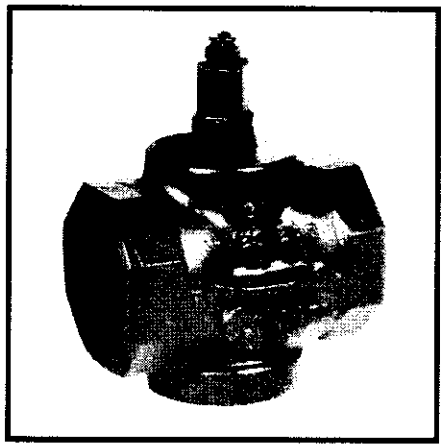
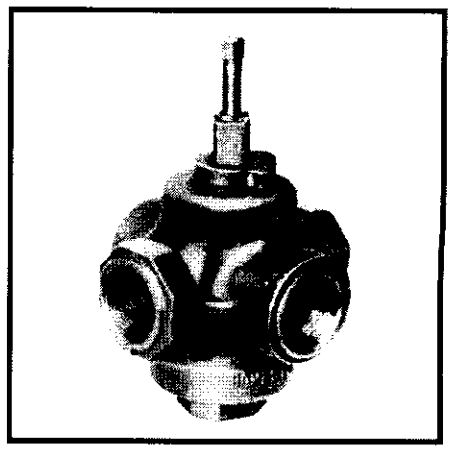




Homestead Plug Valve Service Manual

Homestead Plug Valve Sealants
Sealant Injection Method and Equipment

Homestead Valve Sealant/Maintenance Manual

The maintenance procedures detailed in this manual are intended to assist in obtaining optimum performance of your high quality Homestead Lubricated Plug Valve.

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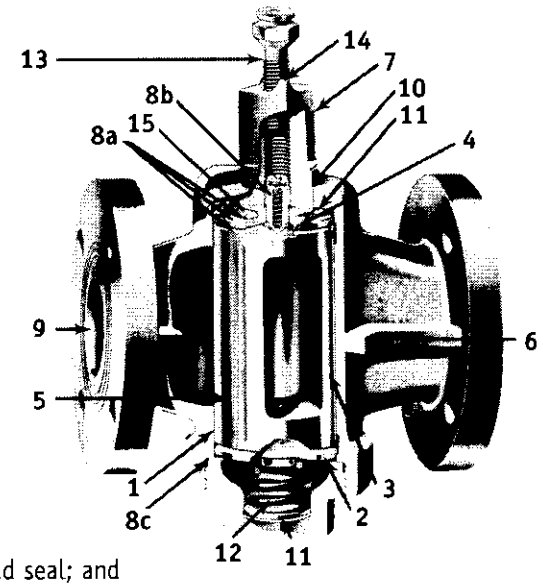
1. Their design assures extra long valve life. Clearance between plug and body is so close, and so uniform that the chemical seal can easily give the valve many times longer leakless service than any other valves. Even with over 300 pounds lubricant pressure, there is practically no seepage of lubricant into line to contaminate fluids, clog orifices or meters, or ruin rubber diaphragms.

2. They are positively prevented from sticking by Homestead's exclusive controlled pressurized lubricant system which moves the plug downward, piston-like, during each lubrication. Spring and line pressure instantly return the plug to stem-sealed position.

3. Thorough penetration of lubricant to vital surfaces is guaranteed by the high pressure lubricant system. Chemical seal is forced through lubricant grooves, over all sealing surfaces, and into complete sealing rings around ports. During lubrication, lubricant pressure increases in proportion to the increase of line pressure to insure effective lubrication.

4. Metering grooves prevent pressure build-up on top of plug before all lubricant grooves are filled. The high pressure developed within this exclusive orifice-controlled lubricant system guarantees complete coverage of all sealing surfaces – assures added valve life.



5. Sealing surfaces are protected in both open and closed positions from the corrosive, abrasive, or erosive effect of line fluids.

6. They are simple, dependable, and minimize human error. They require no mechanical adjustments of packing glands, nuts, etc. Bodies are extra strong to withstand line strain and lubricant pressure.

7. They operate quickly. A quarter-turn of the plug fully opens or closes valve.

8. Leakage is prevented to outside of valve by:
   (a) a reinforced *Teflon stem seal and two rings of lubricant;
   (b) a spring loaded ball and lubricant sealed check valve with thread seal; and
   (c) a positive metal to metal seal at bonnet.
   Reinforced Teflon stem seal resists cold flow.

9. They give full flow with minimum pressure drop. Port areas are equal to 100% of the area of standard pipe. Where restricted flow is permissible venturi types are available, and at worthwhile savings in first cost.

10. They prevent waste of lubricant by extruding a ring of lubricant around the stem when system is full. This telltale ring of lubricant serves as a stop signal to the man lubricating the valve.

11. They are comparatively easy to turn, because the cylindrical plug offers minimum resistance to turning; and it is floated between a low friction reinforced Teflon ring at top, and a Teflon disc at bottom.

12. Less maintenance is assured. Spring rotates with plug on Teflon and steel discs. Elimination of torsional stress, and round cross section spring construction which more evenly distributes strain, prevents spring breakage. Spring is subjected only to compression, for which it is designed.

13. Dirt is prevented from being forced into lubricant system by a practically full threaded combination lubricant screw and button head fitting. Clean lubricant is just as important in a valve as in any other machine.

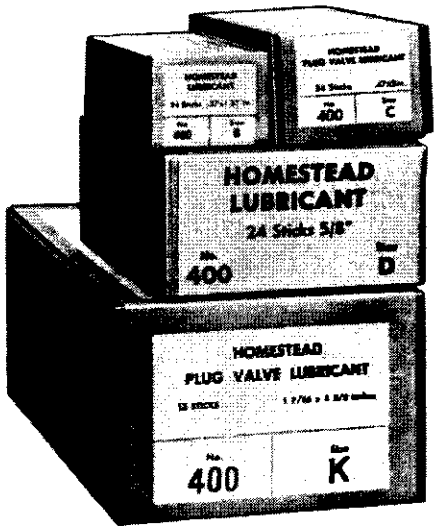
14. Indicator on top of stem shows position of ports in plug.

15. A positive sealing pressure of as much as 500 pounds (spring pressure plus line pressure) is applied to stem seal.

* Teflon DuPont Co.

Homestead Plug Valve Sealants

Homestead plug valve sealants are specifically formulated for various service applications. Selection of sealants in accordanc with the sealant recommendation chart on page 9 is essential maximum performance and efficiency of your Homestead plug valves. This sealant chart designates applicable service conditions (chemical and/or temperature) for which the various sealants are suitable.

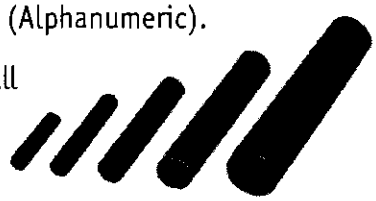


HOMESTEAD LUBRICANT

Stick/Bulk Grade Sealants

Homestead plug valve sealants are available in stick, cartridge and bulk form. The chart on pages 10 and 11 details appropriate sealant number ordering information (Alphanumeric).

Stick grade sealant is generally used in applications involving small numbers of valves or wide dispersion of valves. Moreover, stick grade sealant is particularly suitable for high pressure/high temperature applications. Bulk grade sealant is of soft consistency, being more suited for low temperature service and usage in larger size valves. Additionally, bulk grade sealant is formulated for normal use in pressure pumping injection equipment.



STICK SEALANT

Assembly Sealant/Factory Service

Homestead plug valves, as received by the customer, are factory serviced with #650 general purpose sealant, unless otherwise specified. This "Assembly" sealant is a multi-purpose sealant, suitable for hydrocarbons, L.P.G. and Natural Gas (etc.). If possible, it is recommended that customer orders indicate line fluid, pressure and temperature. Olson Technologies can then inject the valve with the proper sealant at the factory. There is no additional charge for this factory injection unless a special purpose sealant is required. Refer to pages 10 and 11 for sealant recommendations.

Installation Service

Valves are shipped from the factory fully charged with sealant. The sealant tag attached to the valve indicates which sealant was used for injection at the factory. However, after installation, it is recommended that the valves be serviced with the proper sealant.

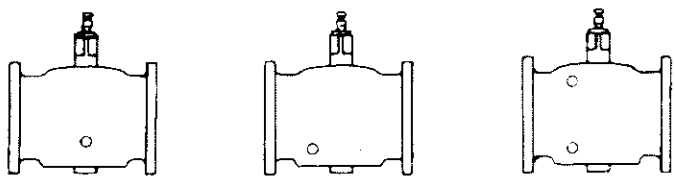
This injection will renew the lubricant seal and replace any sealant that may have been lost in transit or storage. Refer to sealant maintenance for servicing recommendations thereafter.

Body Lube Fittings

Body sealant injection fittings are provided on valves which are six inch or larger (Full port area valves) and eight inch or larger (Reduced port valves). The number and specific location of these fittings depend on the particular service application. If service applications are not specified by customer, factory will supply (1) one or (2) two bottom fittings (Depending on valve size and style). Note: Large valves may require three or more fittings.

It is important to note that these fittings are provided to facilitate proper distribution of the sealant throughout the valve sealant channels. If sealant is not injected through these body fittings then leakage may result from inadequately lubricated areas. Proper servicing procedures require that the valve be lubricated first through these fittings starting at bottom, then working upwards. A couple of pumps applied to the pressure gun (Type A or Type B) are normally adequate for proper sealant injection through these fittings.

Note: If excess sealant is injected through these fittings, sealant can be discharged into port areas.



BODY LUBE FITTINGS

Combination Sealant Screw

Homestead lubricated plug valves are all furnished with the combination giant buttonhead fitting and sealant screw unless otherwise specified. Sealant screw is equipped with a spring loaded check valve and permits either usage of manual stick sealant or that of gun injection. Thus no change of hydraulic fittings is required for sealant injection by either method.

Sealant Injection Equipment

Combination sealant screw/giant buttonhead fitting

(Standard Equipment)

Old style sealant screw

Hydraulic Fittings

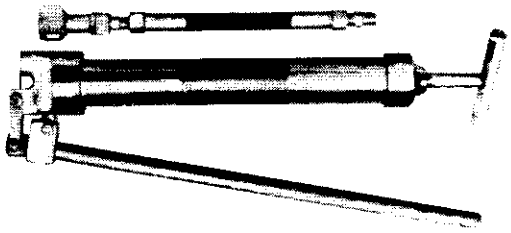
A. Giant Buttonhead Fitting

B. Standard Buttonhead Fitting

C. Hydraulic Fitting

Lubrication Accessories

Homestead Lubricated Plug Valves are all furnished with combination buttonhead fitting and lubricant screw unless otherwise specified. If desired, valves will be furnished with choice of standard or giant buttonhead fitting at no extra cost.



TYPE "A" and "AS" LUBRICANT GUN

GIANT BUTTONHEAD FITTING

STANDARD BUTTONHEAD FITTING

TYPE "B" HYPRESSURE LUBRICANT GUN

*COMBINATION BUTTONHEAD FITTING AND LUBRICANT SCREW (STANDARD EQUIPMENT)

OPTIONAL STRAIGHT HEAD FOR TYPE "A" "AS" OR "B" GUNS

Type "A" Gun – Screw Primed Gun

A heavy duty lever gun for use with either stick or bulk sealant. Approximate weight 11 lbs. 4 oz.

Type "AS" Gun – Screw Primed Gun

A heavy duty lever gun for use with cartridge sealant. Approximate weight 11 lbs. 4 oz.

Type "B" Hypressure Gun

An extra heavy duty gun, self-priming, suitable for use with either sticks or bulk sealant. Built-in safety features protect the gun and the valve from possible excessive pressures. To lead, by-pass valve is opened to relieve pressure; charging cap is removed, piston is returned to bottom of cylinder and by-pass valve is closed. Sealant is then inserted in cylinder, and charging cap replaced. Approximate weight 15 lbs. 8 oz.

Giant Buttonhead Coupler/Hose Assembly

For usage with type "A", "AS", or "B" guns.

Sealant Screw and Stick Sizes

Valve Style	Size	Combination Sealant Screw			
		Part Number	Screw Diameter	Sealant Stick Diameter	No. Sticks Per Box
Fig. 611/612	1", 1 1/4", 1 1/2", 2"	1546130102	1/4" Pipe	3/8"	24
Fig. 611/612	2 1/2" - 8"	1546120102	3/8" Pipe	1/2"	24
Fig. 612A	6", 8", 10"	1546120102	3/8" Pipe	1/2"	24
Fig. 612A	12" - 24"	1546140102	1/2" Pipe	5/8"	24
Fig. 601/602 Fig. 602/622	1/2" - 1 1/2"	1546130102	1/4" Pipe	3/8"	24
602A/622A	2" - 6"	1546120102	3/8" Pipe	1/2"	24
Fig. 602A/622A	8" - 18"	1546140102	1/2" Pipe	5/8"	24
Fig. 651/652	3/8" - 1 1/2"	1546130102	1/4" Pipe	3/8"	24
Fig. 651/652	2", 2 1/2", 3"	1546120102	3/8" Pipe	1/2"	24
Fig. 651/652	4" - 10"	1546140102	1/2" Pipe	5/8"	24
Fig. 641/642	1/2" - 1 1/2"	1546130102	1/4" Pipe	3/8"	24
	2" - 6"	1546120102	3/8" Pipe	1/2"	24
	8" - 10"	1546140102	1/2" Pipe	5/8"	24
Fig. 603/604/ 605/606	3/8" - 1 1/2"	1546130102	1/4" Pipe	3/8"	24
	2" - 6"	1546120102	3/8" Pipe	1/2"	24
	8"	1546140102	1/2" Pipe	5/8"	24
Fig. 607/608	3/8" - 1 1/2"	1546130102	1/4" Pipe	3/8"	24
	2" - 6"	1546120102	3/8" Pipe	1/2"	24

5 Service Procedure – Assembly/Disassembly

Disassembly

1) Remove wrench or gear actuator.
2) Remove snap-ring retainer and valve stop ring.
3) Match mark cap/body mounting surface to ensure proper re-assembly alignment. Remove bolted cover plate (cap) on top entry valves. Remove cap/body sealing gasket.
4) Remove bonnet and associated spring, teflon washer and steel disc. This bonnet is securely tightened at the factory, so usage of an impact wrench or application of hammer blows on the pipe wrench being used may be required to loosen it. Caution: Care must be exercised to prevent damage or damage to the valve itself.
5) Remove the valve plug and teflon head seal. If the plug is difficult to remove, place a piece of hard wood across the top to the stem. Hammer the wood with a sledge or appropriate mallet, taking care not to damage the plug. On top entry valves, a jack screw can be used to withdraw the plug, if necessary.
6) Clean or inspect parts as necessary.

Assembly

1) Install teflon head seal on plug; ensure that the wider surface contact area of seal is positioned against the plug surface.
2) Install plug in valve body.
3) Install teflon and steel discs in bonnet recess. Ensure that teflon disc is against bonnet surface followed by steel disc.
4) Position spring on top of steel disc.
5) Install bonnet assembly in valve body against valve plug. Usage of an impact wrench or hammer blows on the wrench are required to properly seal the bonnet/body joint.
6) If the valve is top entry style, install the cap/body gasket, then install the bolted cap, lining match marks up accordingly.
7) Install stop ring and retainer if supplied.
8) Load valve with sealant, per servicing instructions on page 7 or 8.

A) Periodic application of sealant to Homestead plug valves is the only recommended maintenance necessary under normal operating conditions. Sealant is essential to proper operation of the valve. It functions to not only seal the valve but protect the valve metal sealing surfaces from corrosion. As the sealant provides the tight renewable seal, it requires replacement when depleted due to conditions of pressure, temperature and/or frequency of operation. Frequency of servicing depends on the specific application as well as frequency of operation.

Valves which remain in either the open or closed position for a year or so should be re-lubricated at least once every six months so that the sealant in the valve is kept fresh and pliable. Moreover, working the plug, not necessarily the full turn, but partially will aid in keeping the valve in satisfactory operating condition. Compliance with the above will help assure the efficiency of the valve so that when it is time to operate the valve it will operate freely.

Valves which are cycled many times a day may need daily sealant injection. Valves operated only a few times a day may require weekly or semi-weekly sealant injection. Monthly sealant injection may be necessary in applications where valves are cycled several times a week.

Sealant usage of a lubricated plug valve varies widely. Severe service conditions such as high pressure, high temperature or fluid with suspended solids may demand a more frequent sealant injection program. In addition, actuator cycle time may necessitate a more frequent sealant injection. A slowly actuated valve which spends a lot of time in the intermediate position will use more sealant than service of an actuator which quickly opens and closes the valve. A regular sealant service program will maintain the valve in good operating condition and aid in obtaining optimum valve performance.

If sealing problems occur, check the following:

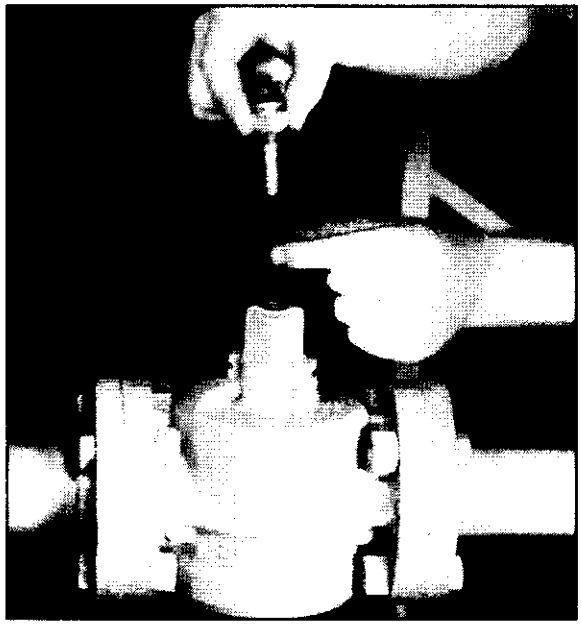
1) That the valve is properly lubricated, i.e. the valve is fully injected with sealant. Inject the valve with sealant and check for the telltale ring (or movement thereof) of sealant around the valve stem. (Please note that just visually inspecting the valve and observing a pliable telltale ring present is not always a true indication of the valve sealant condition. Sealant may be totally absent in sealant grooves of plug/body with no sealant film present on the valve plug. Therefore, the injection, as mentioned above, is necessary for a proper check of sealant condition.)
2) That the sealant is suitable for the application. Refer to the sealant selection chart for verification. If mixed service conditions apply, consult factory for a recommendation. Generally, select a sealant recommended for the predominant part of the mixture.
3) If the valve has been highly damaged from wear due to lack of periodic sealant injection or chemical dissolution of the sealant itself.
4) That the valve has been properly installed and no damage from nearby piping components, line strain, etc. are evident.

B) Stick service procedure (Manual Injection)

1) Place valve in fully open/closed position. (Recommended position is open since valve will lubricate under pressure much easier.)
2) Remove combination sealant screw and insert the appropriate size/type sealant stick into the stem.
3) Replace the sealant screw and slowly turn the screw until the telltale ring of sealant is observed around the valve stem at neck of the valve.

Note: Larger valves MAY require several sticks of sealant due to the capacity of the sealant injection system.

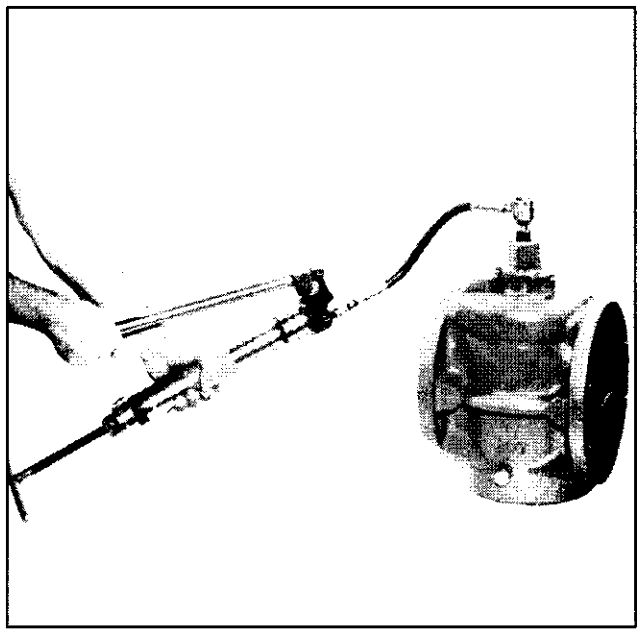
4) Rotate valve to opposite position of that originally set in step 1. Repeat step 3.
5) Add sealant as necessary to obtain telltale sealant ring.
6) Rotate plug several times to properly distribute the sealant about the valve plug.
7) Repeat above steps as necessary.



C) Gun Service Procedure

1) Place valve in fully open/closed position. (Open position recommended for easy servicing.)
2) On valves supplied with only the combination giant buttonhead sealant screw, connect the grease gun giant buttonhead coupler to this combo screw/fitting and slowly pump sealant until signs of the telltale ring are shown.
3) On larger valves which are supplied with body sealant injection fittings, connect grease gun to body sealant fittings. Pump sealant several times with pressure gun (see body lube fittings).
4) Connect grease gun to the other body fitting/s, if present, and proceed as in step 3, pumping sealant (until the telltale ring is displayed). (See body lube fittings.)
5) Rotate valve to position opposite that of valve in step 1. Repeat steps 2, 3, and 4, as applicable.
6) Turn valve plug several times to obtain an adequate smear of sealant for valve sealing.
7) On valves with body lube fitting/s, inject a small amount of sealant into stem fitting to ensure an adequate filled system.
8) Repeat the above servicing steps as required.

*NOTE: If valve is in closed position and under line pressure, lubricate valve only until leakage stops.



Standard Lubricant Features

Sealant Number Stick	Bulk	*Temp. Range Degrees F. From	To	Color	Principal Uses	Solvent
6	6-S	+32°	+275°	Gray	Hot Water Services	Naphtha
400		+20°	+130°	Red	Acids and Alkalies	Naphtha
	400-S	0°	+110°			
400-A		+20°	+130°	Amber	Aqueous solutions of acids,	Naphtha
	400-AS	0°	+110°		alkalies and amines	
450		+20°	+130°	White	Food Products	Naphtha
	450-S					
600	600-S	0°	+120°	Brown	Hydrocarbon services	Perchlorethylene
650		0°	+180°	Green	Hydrocarbons, L.P.G.,	Chlorethane
	650-S	-20°	+150°		and Natural Gas	
711	711-S	-10°	+150°	Clear	Internal combustion fuels	Chlorethane
750		+20°	+400°	Black	Asphalt & hot oil services	Naphtha
800			+250°	White	Hydrocarbons and aromatics	Perchlorethylene
	800-S	-10°	+200°			
900		+10°	+240°	Black	Hydrocarbons, aromatics	Perchlorethylene
	900-S	0°	+200°		and asphalt	

Note: The Homestead lubricated plug valves may be used at temperatures exceeding the above table, but at a reduced pressure value. Please consult factory for applications outside the designated temperature range.

The sealants recommended above for use in Homestead plug valves are specifically formulated for cylindrical parallel style plug valves. Moreover, these chemical compounds are manufactured to meet the proper adhesion, cohesive and viscosity requirements essential to proper performance of the valves.

Homestead Plug Valve Lubricants Recommendation Chart

SERVICE	LUBRICANTS
A	
Absorption Oil	800
Acetone	400-A
Acetylene	400
Acrolein	400
Air	900
Air Dryers	400-A
Alcohol, Ethyl	450
Alcohol, Methyl	400-A
Alcohol, Propyl	400-A
Aldehydes and Water	400
Al. Chloride, 100%	400
Aluminum Hydroxide	400
Ammonia Gas, Liquid	400-A
Ammonia, Anhydrous	400-A
Ammonia and Creosote	400-A
Ammonia Liquor (Crude)	400-A
Ammonia and Tar	400-A
Ammonium Hydroxide	400-A
Ammonium Phosphate	400-A
Ammonium Sulfate	400
Ammonium Slft. Liquor	400
Ammonium Sulfide	400
Amyl Acetate	800
Amyl Chloride	800
Aniline	800
Aniline Dyes	800
Aniline Oil	800
Animal Oil	650
Anthracene Oil	800
Argon Gas	400-A
Aromatic Solvents	800
Arsenic Oxide	400
Asphalt	900
Asphalt Emulsions	900
Asphalt Paints	800
B	
Banana Oil	800
Barium Carbonate	400
Barium Hydroxide	400
Barium Nitrate	400
Barium Sulfate	400
Barium Sulfide	400
Beet Sugar Liquids	400
Benzaldehyde, 100%	800
Benzene	900
Benzoate of Soda	400
Benzol	900
Benzol Vapors & Steam	900
Bituminous Paints	800
Black Liquor	400-A
Black Liquor Evaporates	400-A
Blast Furnace Gas	400-A
Bleach Liquors	400
Boiler Feed Water	400-A
Bone Oil	400-A
Borax	400-A
Bottle Gas	800
Brake Fluid	900
Bunker "C" Oil	800
Butadiene	800
Butane	800
C	
Calcium Arsenate	400
Calcium Carbide	400-A
Calcium Chlorate	400-A
Calcium Citrate	400-A
Calcium Chloride	400-A
Calcium Hydrochloride	400-A
Calcium Hydroxide	400-A
Calcium Oxide	400-A
Calcium Sulfate	400-A
Cane Juice	400-A
Cane Sugar Liquid	400-A
Carbide	400-A
Carbolic Acid	900
Carbon Dioxide, 100%	800
Carbon Monoxide	800
Carnauba Wax	800
Casein	650
Casein Paint	650
Casing Head Gas	650
Castor Oil	400-A
Cellosolve, Methyl	900
Cellulose Acetate	900
Cellulose Nitrate	400-A
Cement Slurries	400-A
Chalk Solutions	400-A
Charcoal Water	400-A
Chilled Water	400-A
Chocolate	450
Chromic Acid	400
Clay Slip	400-A
Coal Gas	800
Coal Slurry	400-A
Coal Tar	800
Coal Tar Oil	900
Coal Tar Paint	900
Coconut Oil	400-A
Cod Liver Oil	450
Coke Oven Gas	400-A
Collodian	800
Copper Acetate	400-A
Copper Cyanide	400-A
Corn Oil	450
Corn Syrup	450
Cottonseed Oil	450
Creosote	900
Cresol	400-A
Cresylic Acid	400-A
Crotonaldehyde	800
Crude Oil	650
Cumene	800
Cutting Oil	800
D	
Denatured Alcohol	450
Diesel Fuel	800
Diethanolamine	400
Dipentene	800
Disodium Phosphate	400
Distilled Water	400-A
Doctor Solution	400-A
Dowtherm	800
Drilling Mud	400-A
Drinking Water	450
Drip Cocks (Gas)	650
Dyes, Oil Soluble	800
Dyes, Water Soluble	400-A
F	
Fertilizer Solutions	400-A
Fish Oil	800
Flue Gas	800
Foamite	400-A
Freon	650
Fuel Oil	800
Fuel Oil and Gasoline	711-S
Fuel Oil and Pitch	900
Fuel Oil and Tar	900
Furfural	400-A
Furfural and Oil	400-A
G	
Gallic Acid	400
Gas and Water	400-A
Gas and Ammonia	400-A
Gas (Fuel)	650
Gas (Hydrocarbon)	650
Gas (Manufactured)	650
Gas (Natural)	650
Gas Oil	800
Gasoline, Refined	711-S
Gasoline and Grease	711-S
Gasoline and Inhibitor	711-S
Gasoline and Oil	711-S
Gasoline and Steam	711-S
Gasoline and Water	711-S
Gelatin	450
Gin	450
Glaubers Salt	400
Glucose	450
Glue	650
Grain Alcohol	450
Grease, Mineral	650
Grease, Vegetable	400-A
Green Liquor	400
Green Soup	400
Gypsum	400
H	
Helium	400-A
Heptane	800
Hexane	800
Hot Water	6-S
Hydraulic Oil	800
Hydrogen	400-A
I	
Isobutane	800
Iso-Octane	711-S
Isopropyl Acetate	800
Isopropyl Alcohol	450
J	
Jet Fuel	711-S
K	
Kerosene	800
Kerosene and Naphtha	800
Kerosene and Water	800
L	
Lard	450
Latex	650
Lead Carbonate in Oil	650
Light Naphtha	650

Homestead Plug Valve Lubricants continued

SERVICE	LUBRICANTS
Light Naphtha & Steam	650
Light Oil (Coal Tar)	650
Lignin in Solution	400-A
Lime (Milk of Lime)	400-A
Lime Sulfur	400
Linseed Oil	800
Liquified Petroleum Gas	650
Lubricating Oil (Min.)	650
Lubricating Oil (Veg.)	400-A
Lye, 20%	400-A

M

Magma	400-A
Magnesia Slurry	400-A
Magnesium Silicate	400
Magnesium Hydroxide	400
Magnesium Sulfate	400
Manufactured Gas	650
Mash (Distillery)	450
Mercury	800
Methane	800
Methanol	450
Methyl Chloride	800
Methylene Chloride	800
Milk of Lime	400-A
Milk of Magnesia	450
Mineral Oil	800
Mine Water	400-A
Mononethanolamine	400-A
Molasses	450
Monochlorobenzene	800
Mud	400-A
Muriate of Potash	400-A

N

Naphtha	800
Naphthalene	800
Naphtha and Oil	800
Naphtha and Paint	800
Naphtha and Steam	800
Naphtha Vapors	800
Naphtha and Water	800
Natural Gas	650
Nickel Plating Solution	400
Nitrobenzene	800
Nitrobenzene & Water	800
Nitrogen	400-A
Nitromethane	800
Nitrous Oxide	400-A

O

Oakite	400
Oil, Crude	650
Oil, Edible	450
Oil, Mineral Lubricating	650
Oil, Petroleum	650
Oil, Animal	400-A
Oil Gas	650
Oil and Steam	900
Oil and Water	650
Oleomargarine	450

P

Paint	800
Paint Thinner	800
Phthalic Anhydride	400-A
Peanut Oil	450
Pentane	711-S
Petroleum	650
Petroleum Gas	900
Petroleum Residue Oil	900
Petroleum Solvent	800
Pine gum	800
Pitch	900
Pitch and Fuel OiL	900
Plaster of Paris	400-A
Polyester Resin & Styrene	800
Potash	400-A
Potassium Bichromate	400-A
Potassium Carbonate	400-A
Potassium Chloride	400-A
Potassium Nitrate	400-A
Potassium Sulfide	400-A
Producer Gas	900
Propane Gas, Dry	800
Propane Gas, Wet	900
Propane & Cresylic Acid	800
Propyl Acetate	800
Propyl Alcohol	450
Propylene, Liquid	800
Propylene, Vapor	800
Propylene Oxide	800
Pulp, Wood	400-A

R

Rape Seed Oil	650
Red Lead in Oil	800
Refinery Gas	900
Resin	400
Resin and Alcohol	400
Road Tar	900
Roofing Pitch	900
Rubber Compounds	800
Rubber Solvent	800

S

Sal Soda	400-A
Sand and Water	400-A
Sewage	400-A
Sewage Gas	400-A
Shellac	400
Slop, Brewery	450
Soap, Liquor	400-A
Soap Solution	400
Soap Stock	400
Soapstone	650
Soda Ash	400-A
Soda, Crude	450
Sodium Arsenate	450
Sodium Bicarbonate	450
Sodium Bichromate	450
Sodium Borate	400
Sodium Carbonate	400
Sodium Chloride	400
Sodium Chromate	400
Sodium Cyanide	400
Sodium Formate	400
Sodium Hydroxide, 20%	400-A
Sodium Nitrate	400
Sodium Plumbate	400
Sodium Phosphate	400
Sodium Silicate	400
Sodium Sulfate	400
Sodium Sulfide	400
Soluble Oil	800
Soya Bean Oil	450
Spent Soap Lye	400-A
Steam	6-S
Stoddard Solvent	800
Styrene	800
Sugar of Lead	400-A
Sulfur, Molten	400
Sulfur Dichloride	800
Sulfur Dioxide	400
Sulfuric Acid, 95%	400
Syrup	450

T

Tall Oil	400-A
Tallow	400-A
Tannic Acid	400
Tar	800
Tar and Ammonia	400-A
Tar Oil	800
Tar Residue	800
Tar and Water	800
Toluene	900
Toluol	900
Toluol and Steam	900
Toluol and Water	900
Triethanolomine	400-A
Trisodium Phosphate	400-A
Tung Oil	400-A
Turpentine	800
Turp. and Linseed Oil	800

W

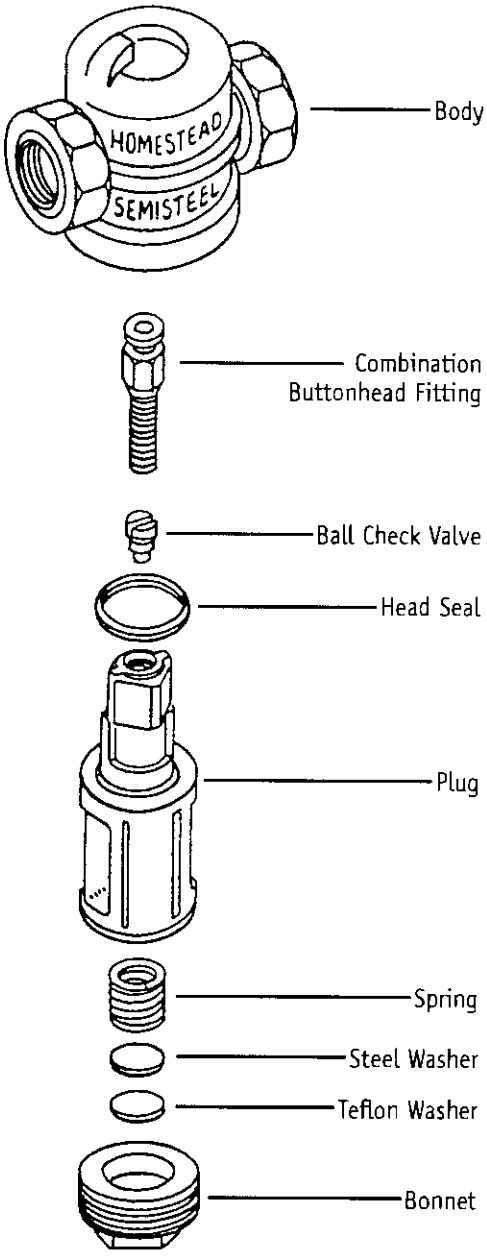
Waste Water	400-A
Water, Fresh	400-A
Water and Alcohol	400-A
Water, Chilled	6-S
Water Gas	400-A
Water Gas and Tar	400-A
Water Glass	400-A
Water and Glycol	6-S
Water, Hot (275°)	6-S
Wax Emulsions	400-A
Whale Oil	450
White Liquor	400-A
Wood Alcohol	450
Wood Pulp	400-A

X

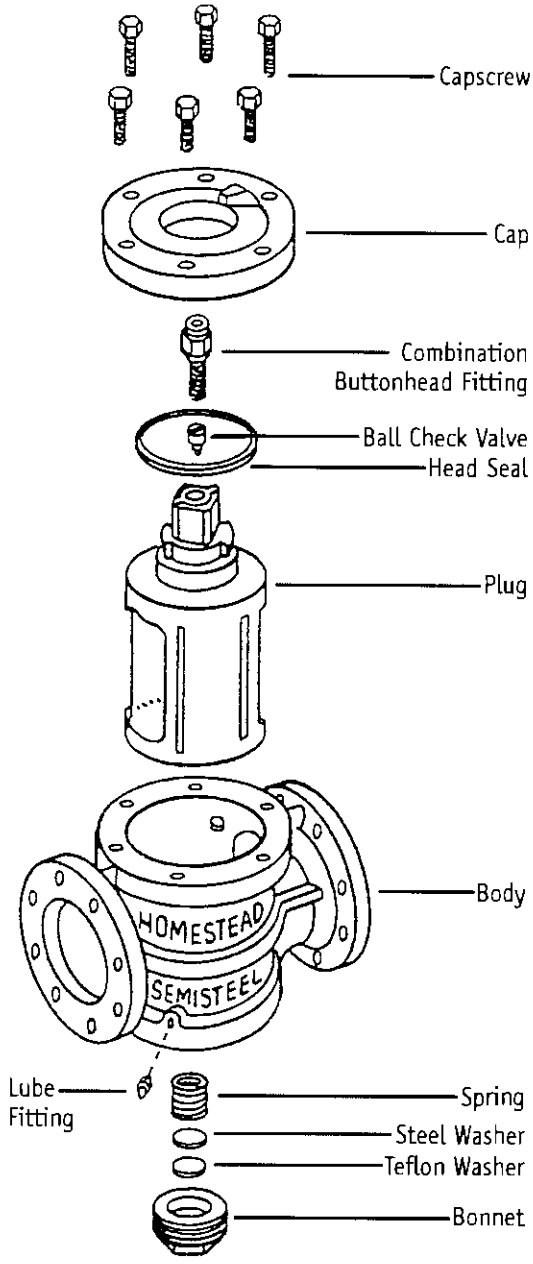
Xylene	800
Xylene and Water	800
Xylol	800

** In most applications the above lubricants will function as listed, we do not warrant the above in all applications. If you have a special problem call the factory.*

Bottom Entry Construction



Top Entry Construction



HOMESTEAD® VALVE DIVISION

A DIVISION OF OLSON TECHNOLOGIES, INC.

160 Walnut Street
Allentown, PA 18102

PH: 610-770-1100
FX: 610-770-1108

Floyd Bell Inc
SOUND SOLUTIONS

AudioLarm II

MW-09-201-S

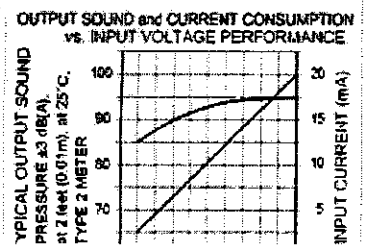
More Information

Warble Tone

Spec Sheet

UL Recognized

RoHS Compliant



Specifications
Revision: 2.17

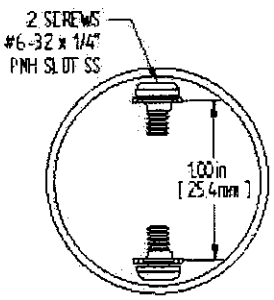
Medium Loud Warble Tone; Extra Fast Rate; Panel Mount Case and Quick Connect Blades with Screws Termination

Mounting:	Panel Mount
Operating Mode:	Medium Loud Extra Fast Warble Tone
Operating Voltage:	30-120 Vac
Operating Frequency:	
Typical Operating Current:	5 mA at 30 Vac 20 mA at 120 Vac
Typical Sound Pressure:	85±5 dB(A), at 30 Vac, at 24 inches (61 cm), at 25°C 95±5 dB(A), at 120 Vac, at 24 inches (61 cm), at 25°C
Termination:	Quick Connect Blades with Screws
Termination Strength:	Pull test with a maximum of 22 pounds (10 kg) load
Operating Temperature:	-20_C to +65_C
Storage Temperatura:	-40_C to +85_C
Surge Voltage:	20% over maximum rated voltage for less than 5 minutes
Reverse Voltage Protection:	To the maximum operating voltage
Construction Materials:	Internal Circuit- Audio-oscillator and piezoelectric driver Potting- 2 parts epoxy resin or silicone, black Diaphragm- Stainless Steel 304
Gasket:	
Environmental Durability:	ASTM B117 Certified - Withstands exposure to salt spray for 300 hours IP 68 Certified - Withstands water submergence and dust exposure Humidity- 95% relative humidity at +40_C continuously for 100 hours. Vibration- Withstands vibration between 0 and 55 Hz. on all axes.
Life Expectancy:	10 years under normal operating conditions.
Warranty:	For a period of two years from the date of manufacture under normal operating conditions.

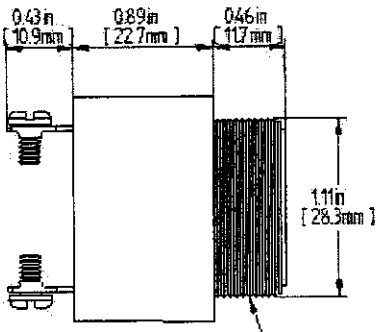
View Terms and Conditions of Sale

Dimensions

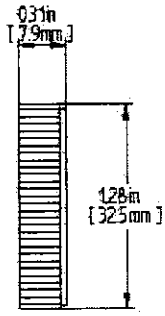
REAR



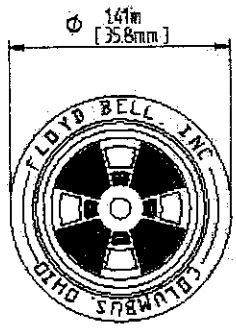
SIDE



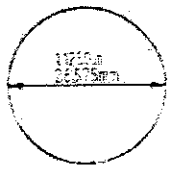
RING



FRONT



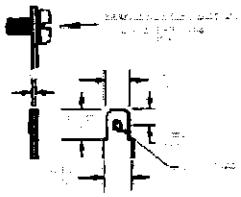
PANEL MOUNTING



FITS PANELS UP TO
0.25in [6.35mm] THICK

TOLERANCES ARE: ±0.03in.
[±0.76mm]

"S" TERMINALS



Full Port Brass Ball Valves Thread End with Locking Handle

Description:

Lead Free Brass Ball Valve NPT,Female*Female with Locking Handle

Lead Free and dezincification resistant (DZR) material

IAPMO listed to NSF/ANSI-61, NSF/ANSI-372 ,IGC-157

CSA-1/4"thru 4" : ANSI Z21.15 / CSA 9.1 for 1/2 psig valves

ASME B16.44,CGA CR91-002 for 2&5psig valves

CAN / CGA 3.16,ASME B16.33(1/2"-2") for 125psig valves

UL 125 ,UL 842-for size 1/4" thru 2",125psig

FM 1140-for size 1/4" thru 2"

600 psi (WOG) 150 psi (WSP) Service

Thread conform ANSI B1.20.1

Temperature Range : -40° F to 365° F

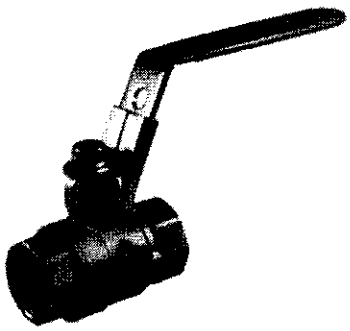
Construction:Forging Brass Body

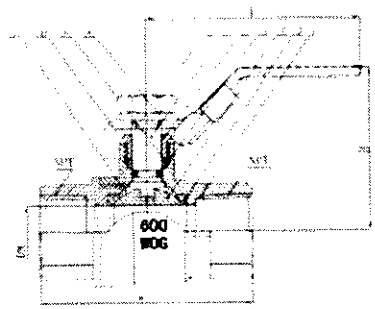
PTFE Ball Seats

Blow Out Proof Brass Stem

Stainless Steel Ball

Steel Handle w/Vinyl Grip





Material List

No. Part Name Material QTY

1 BODY BRASS 1

2 SEAT PTFE 2

3 BALL BRASS/ S.S. 1

4 O-RING NBR 1

5 PACKING NUT BRASS 1

6 STEM BRASS/ S.S. 1

7 HANDLE NUT PLATED STEEL 1

8 LOCK WASHER PLATED STEEL 1

9 PACKING PTFE 1

Modle SIZE DN (mm) W (mm) H (mm) L (mm)

TXSSN025-LH 1/4" 10 44 49.2 114

TXSSN038-LH 3/8" 10 44.5 49.2 114

TXSSN050-LH 1/2" 15 57 51.5 114

TXSSN075-LH 3/4" 19 64 63.2 117

TXSSN100-LH 1" 25 75.5 67.2 117

TXSSN125-LH 11/4" 32 87.5 72.7 135

TXSSN150-LH 11/2" 40 98.5 78.2 135

TXSSN200-LH 2" 49.3 109 85.7 135

TXSSN250-LH 21/2" 64 140.5 117 195

TXSSN300-LH 3" 73 155 128 202

TXSSN400-LH 4" 97 198 152 222

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