BV 3

ANDERSON GREENWOOD
H1RDC2
1/4” FNPT BLEED VALVE, 6000 PSI

ANGI PART NUMBER 330-07231

NO REBUILD KIT AVAILABLE

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Soft Seated Hand Valves – H1

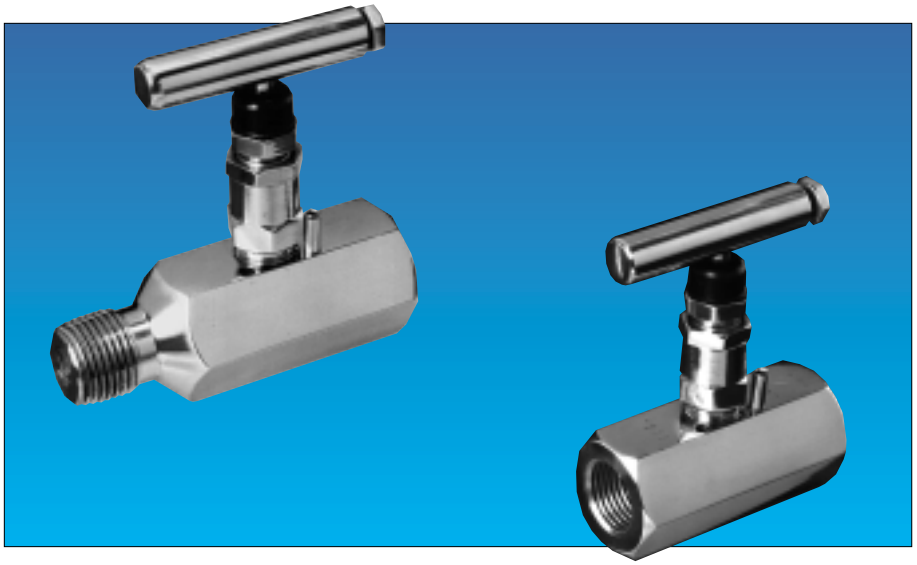
3/16-inch [4.8 mm] and 1/4-inch [6.4 mm] Orifice: 6000 and 10,000 psig [414 and 689 barg]

Product Overview

The H1 Series valves are designed for maximum system reliability. The design criteria includes repetitive bubble-tight closure, safety, and a long, trouble-free life with easy maintenance.

Anderson Greenwood utilizes a replaceable soft seat that gives premium tightness at closure, even in dirty service. The H1's straight-through rising plug design provides good regulation and high capacity with bi-directional flow, and is also roddable for easy cleaning.

These valves are standard with a variety of end connections, seat materials, and stem packing, in SS or CS, and are available with trim to meet the requirements of NACE MR0175-latest revision. All valves are 100 percent pressure tested with material traceability of the body available on request.



Features and Benefits

- **Replaceable soft seat** allows replacement of the soft seat insert without removing the valve from the line. It operates in dirty service with repetitive bubble-tight shutoff.
- **Packing below threads** prevents lubricant washout, thread corrosion, and keeps solids from entering the thread area, which can cause galling. It also prevents process contamination.
- **Adjustable Teflon® packing** adjusts easily: loosen jam nut, tighten bushing slightly, then retighten jam nut. Decreases packing replacement downtime and increases valve life.
- **Dust cover** prevents lubricant washout and keeps contaminants (dirt, rain, etc.) out of bonnet assembly.
- **Safety back seating** prevents stem blowout or accidental removal while in operation and provides a metal-to-metal secondary stem seal while in the full open position.
- **Chrome plating of 316 SS stem** prevents galling or freezing of stem threads when similar metals mate. CS valves use a 303 SS stem.
- **Rolled threads** provide additional thread strength. The stem, bonnet, and male NPT threads are rolled, not cut.
- **Mirror stem finish** burnished to a 16 RMS finish in the packing area enables smooth stem operation and extends packing life.
- **Straight-through flow path** provides high flow capacity, bi-directional flow, and rodding capabilities.
- **Body-to-bonnet seal** is metal-to-metal in constant compression below the bonnet threads. Prevents bonnet thread corrosion, eliminates possible tensile breakage of bonnet, and gives a reliable seal point.

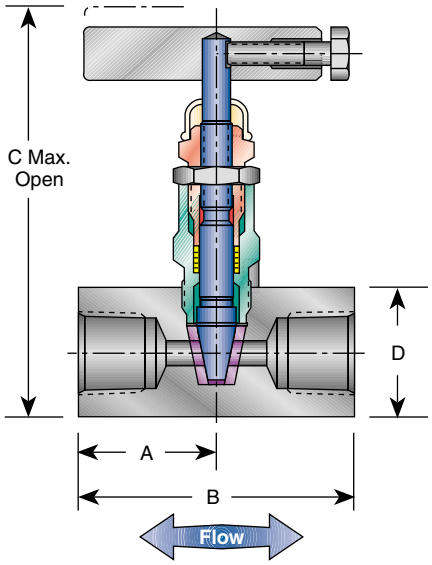
Note

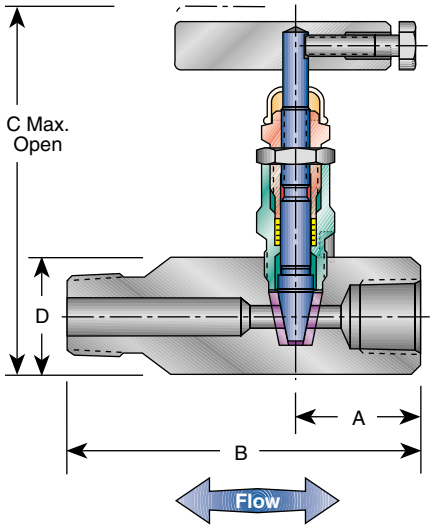
1. Teflon® is a registered trademark of the E.I. duPont de Nemours Company.

H1 Specifications

3/16-inch [4.8 mm] and 1/4-inch [6.4 mm] Orifice: 6000 psig [414 barg]

Dimensions, inches [mm]





FNPT by FNPT

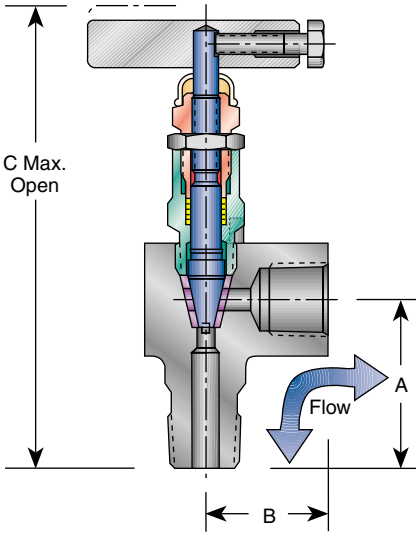
Valve[1]	A	B	C[2]	D
1/4" F x 1/4" F	1.05 [26.7]	2.10 [53.3]	3.70 [94.0]	1.00 [25.4]
1/2" F x 1/2" F	1.35 [34.3]	2.70 [68.6]	3.85 [97.8]	1.25 [31.7]

FNPT by MNPT

Valve[1]	A	B	C[2]	D
1/4" F x 1/4" M	1.18 [30.0]	3.50 [88.9]	3.70 [94.0]	1.00 [25.4]
1/4" F x 1/2" M	1.18 [30.0]	3.50 [88.9]	3.70 [94.0]	1.00 [25.4]
1/2" F x 1/2" M	1.35 [34.3]	3.50 [88.9]	3.85 [97.8]	1.25 [31.7]

Notes

1. Approximate valve weight: 1.3 lb [0.6 kg].
2. Valve C_V maximum
   3/16-inch [4.8 mm] – 0.83.
   1/4-inch [6.4 mm] – 1.40.



FNPT by MNPT (Angle)

Valve	A	B	C
1/2" F x 1/2" M	1.73 [43.9]	1.40 [35.6]	5.00 [127.0]

H1 Specifications

Standard Materials
H1 – 3⁄16-inch [4.8 mm] and 1⁄4-inch [6.4 mm] Orifice: 6000 psig [414 barg]

Valve	Body and Bonnet[1]	Stem	Packing[2]	Seat[3]
CS	A108	A581-303	Teflon® or Viton® O-ring with Teflon® backup ring	Delrin®
SS	A479-316	A276-316 Chrome Plated	Teflon® or Viton® O-ring with Teflon® backup ring	Delrin®
SG[4]	A479-316	Monel® 400	Teflon®	Delrin®

Standard Materials
H1 – 1⁄4-inch [6.4mm] Orifice: 10,000 psig [689 barg]

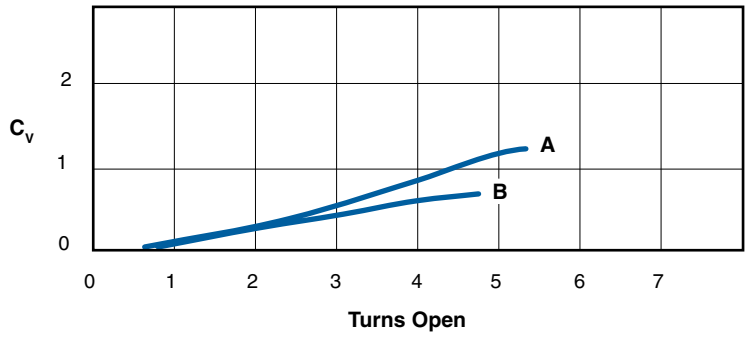
Valve	Body and Bonnet[1]	Stem	Packing[2]	Seat[3]
CS	A108	A581-303	Teflon® or Viton® O-ring with Teflon® backup ring	Delrin®
SS	A479-316	Monel® K500	Teflon® or Viton® O-ring with Teflon® backup ring	Delrin®
SG[4]	A479-316	Monel® K500	Teflon® or Viton® O-ring with Teflon® backup ring	Delrin®

Notes

1. CS is zinc cobalt plated to prevent corrosion.
2. Teflon® packing is patented.
3. PCTFE (Polychlorotrifluoroethylene is the exact equivalent of Kel-F®), PEEK, and Teflon® seats are also available.
4. SG (Sour Gas) meets the requirements of NACE MR0175-latest revision.
5. Monel® is a registered trademark of International Nickel Company.
6. Delrin® is a registered trademark of the E.I. duPont de Nemours Company.

H1 Specifications

Flow Characteristics – 3/16-inch [4.8 mm] and 1/4-inch [6.4 mm] Orifice



A = 1/4-inch [6.4 mm] orifice, valve C_V 1.4 maximum
B = 3/16-inch [4.8 mm] orifice, valve C_V .83 maximum

Formulas

Liquids

$$Q_L = C_V \sqrt{\frac{(P_1 - P_2)\ (62.4)}{\rho}}$$

Gases (Where $P_2 > .5P_1$)

$$Q_V = (23.18)\ C_V \sqrt{\frac{(P_1 - P_2)\ P_2}{(S.G.)\ T}}$$

Gases (Where $P_2 < .5P_1$)

$$Q_V = \frac{(11.59)\ P_1 C_V}{\sqrt{S.G.\ (T)}}$$

Where:

Q_L = Flow (gpm)

Q_V = Flow (scfm)

ρ = Density of Liquid (lb/ft³)

P_1 = Upstream Pressure (psia)

P_2 = Downstream Pressure (psia)

T = Flowing Temperature (°R)
(°R = °F + 460)

ρ (Water) = 62.4 lb/ft³ @ 60°F [16°C]

S.G. = Specific Gravity of Gas
(M.W. of Air/28.96)

S.G. Air = 1.000

S.G. Nitrogen = 0.967

S.G. Oxygen = 1.105

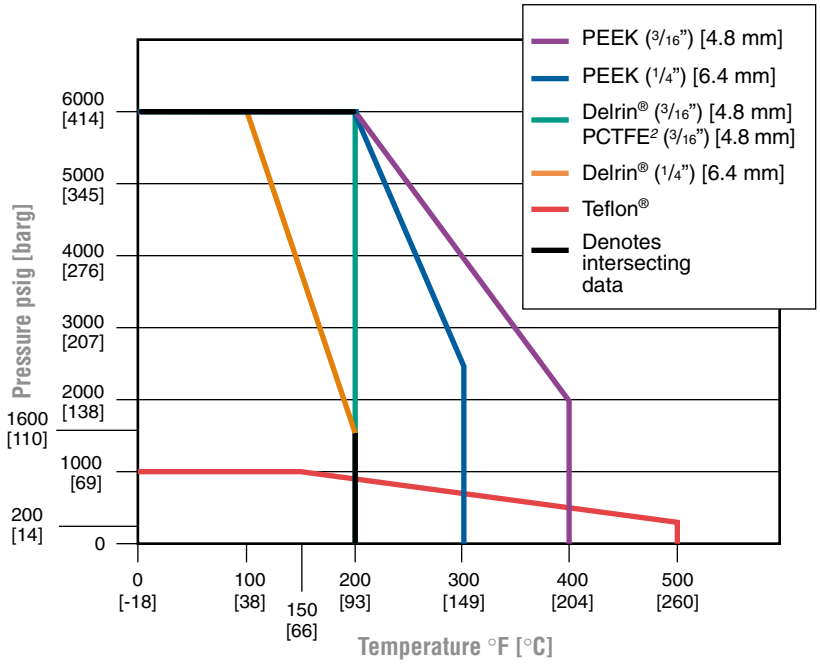
S.G. Helium = 0.138

S.G. Hydrogen = 0.0696

H1 Specifications

3/16-inch [4.8 mm] and 1/4-inch [6.4 mm] Orifice: 6000 psig [414 barg]

Pressure vs. Temperature



Pressure and Temperature Ratings

Valve	3/16-inch [4.8 mm] Orifice	
Delrin® and PCTFE[1] Seat	6000 psig @ 200°F	[414 barg @ 93°C]
PEEK Seat	6000 psig @ 200°F	[414 barg @ 93°C]
	2000 psig @ 400°F	[138 barg @ 204°C]
Teflon® Seat	1000 psig @ 150°F	[69 barg @ 66°C]
	200 psig @ 500°F	[14 barg @ 260°C]

Valve	1/4-inch [6.4 mm] Orifice	
Delrin® Seat	6000 psig @ 100°F	[414 barg @ 38°C]
	1600 psig @ 200°F	[110 barg @ 93°C]
PEEK Seat	6000 psig @ 200°F	[414 barg @ 93°C]
	2500 psig @ 300°F	[172 barg @ 149°C]

Note

1. PCTFE (Polychlorotrifluoroethylene) is the exact equivalent of Kel-F®.

H1 Specifications

3/16-inch [4.8 mm] and 1/4-inch [6.4 mm] Orifice: 6000 psig [414 barg]

Ordering Information

H1 V D S – 44Q – SG

Packing

V – Teflon®
R – Viton® O-ring with Teflon® backup ring

Seat

D – Delrin® (standard)
K – PCTFE[1]
E – PEEK
V – Teflon®

Material

C – CS
S – 316 SS
M – Monel® (Teflon® packed only)
Special alloys available on request.

Connections (Bidirectional)

3/16-inch [4.8 mm] Orifice

2 – 1/4-inch F x 1/4-inch F
22 – 1/4-inch F x 1/4-inch M
24 – 1/4-inch F x 1/2-inch M
4Q – 1/2-inch F x 1/2-inch F
44Q – 1/2-inch F x 1/2-inch M
44QA – 1/2-inch F x 1/2-inch M (Angle)

1/4-inch [6.4 mm] Orifice (Delrin® and PEEK Seats only)

4QR – 1/2-inch F x 1/2-inch F
44QR – 1/2-inch F x 1/2-inch M

Options

BL – Bonnet Lock Device (patent protected) (page 21)
PHB – Phenolic Black Round Handle
SG – Sour Gas meets the requirements of NACE MR0175-latest revision (316 SS only)
SP – Special Requirements - please specify

Note

1. PCTFE (Polychlorotrifluoroethylene) is the exact equivalent of Kel-F®.

1.0 INTRODUCTION

Anderson, Greenwood and Co, commercial, hand valves and 3-valve manifolds are soft-seated with a *plug* configuration designed for general *service. The seat* is a rotating plug sealing on a replaceable seat insert. O-Ring stem seals or Teflon packing is available with a variety of end connections. For maximum pressure/temperature ratings see applicable valve assembly drawing.

2.0 INSTALLATION

2.1 Check hand valve body for flow arrow for proper flow orientation. If no flow arrow is stamped on the valve body, flow may be in either direction.

2.2 Check manifold nameplate, if so equipped, for schematic of valve arrangement and note which ports are for process connections and instrument connections.

2.3 *For all field* welds of pipe or tube to valves, it *is* recommended that the valve seat be in *the* partially open position during welding.

2.4 Immediately prior to valve installation, check the piping to which the valve is to be connected for cleanliness and freedom from foreign materials.

2.5 THREADED VALVE INSTALLATION

Threaded pipe joints depend on a good intimate fit between the *male and female* pipe threads, therefore the use of a thread sealant is recommended and the pipe fitting connections must be made up tight.

2.6 WELD JOINT VALVE INSTALLATION

Welded joints, properly made, provide a structural and metallurgical continuity between the pipe and the valve body. All welding should be in accordance with any Code or jurisdictional regulations applicable to the piping system construction and with complete and approved welding procedures.

Heat input should be kept to a minimum, by controlling the amperage and voltage to the lowest practical levels, A minimum travel speed of three (3) I.P.M. should be maintained and the interpass temperature should not exceed 200°F. The process employed should be GTAW with argon gas and a maximum diameter weld of 1/8".

3.0 ***OPERATION***

Valves which have been reasonably matched to a typical valve service application and properly installed in its piping system can expect to have a long service life with a minimum of attention. However, these valves have moving and wearing parts and depend on long term preservation of highly finished surfaces on these parts for *satisfactory valve performance.*

3.1 The use of a "cheater" to operate *the valve handle is not necessary and not* recommended. This practice can cause valve damage.

3.2 All valves have rising stems with right hand thread. Rotate the handle counter-clockwise to open and clockwise to close.

3.3 Bonnets with rising stems are provided with a backseat. Backseats in rising stem bonnets should be considered basically as stops to prevent overtravel when opening valves. It is recommended not to leave the upper stem in the backseat position. Note MSS SP-92, MSS Valve User Guide", paragraph 4.3.

3.4 OPERATION OF 2 VALVE MANIFOLD

The schematic for two valve manifolds is shown in Figure 3. These valves are designed for use on static pressure transmitters, switches or gauges.

3.4.1 In normal operation of the system the block valve between the process and instrument ports will be open and the calibration valve will, be closed.

3.4.2 To check zero, close the block valve to isolate the instrument from the system. Open the calibration valve to bleed the instrument pressure to atmospheric pressure. When fully vented, the instrument should show zero output. A threaded outlet is provided for field spot-check or reset of the instrument.

3.5 OPERATION OF 3-VALVE MANIFOLD

The schematic for the Ml, M4A & M4T manifold is illustrated in Figure 4. These manifolds are three valve units designed for use with differential pressure transmitters or other flow metering instruments. Two valves on the sides of the body are block valves for shutting off the high and low side connections to the d/p transmitter when the instrument is *to be adjusted or* removed from service. The third valve in the center of the body is an equalizing valve for *equalizing pressure on the two* sides of the instrument while readjusting.

3.5.1 In norma, operation of the system the two block valves will *be open and* the equalizer valve *will be closed.*

3.5.2 To readjust the instrument to zero, close the block valve to the low pressure *side (downstream sjde) of* the instrument and open the center valve to equalize the pressure on both sides of the instrument.

3.5.3 To return the instrument to service, close the equalizer *valve and open the block valve to the low* pressure sde of the instrument.

3.6 OPERATION OF M6D AND M19 MANIFOLDS

The schematic for the M6D and M19 manifold is shown in Figure 5. Both valves are used with flow metering instruments, however, the M19 *manifold is* designed specifically to be used with bellows meters. The two end valves are equalizer valves while the center valve is the vent. On the M19, the vent valve is a separate hand valve piped to the manifold body, where on the M6D, the vent valve is integral to the manifold. Block valves on both the M19 and M6D are offered as separate hand valves.

3.6.1 In normal operation of the system, the two block valves and the vent valve will be open and the two equalizer valves will be closed.

3.6.2 To readjust the instrument to zero, close the block valve on the low pressure side (downstream side) of *the instrument along* with the vent valve. Then open the two equalizer valves to equalize pressure *on both* sides of the instrument.

3.6.3 To return the instrument to service, close the two equalizer valves and open the block valve to the low pressure side of the instrument along with the vent valve.

4.0 HAND VALVE AND MANIFOLD MAINTENANCE

The important performance parameters are pressure boundary integrity, actuating force required and internal leak tightness. Maintenance should logically address the importance of preserving the performance parameters.

Valves which remain in one position for long periods of time may be subject to some degree of operability due to the loss of effective lubricants *in* threads, aging of packing, surface corrosion of moving parts or accumulation of harmful solids. In same applications it may be desirable to schedule periodic partial or full, cycle exercising of these valves.

4.1 Stern seal leakage usually results from seal *wear, and can* usually be corrected by tightening the bonnet bushing. Overtightening can cause high stem friction, accelerated wear and shortened stem seal life.

4.2 If stem seal replacement is needed, safe practice *requires* depressurizing the valve before removal of the bonnet bushing. Use of backseat to permit repacking under pressure should be considered unsafe.

4.3 STEM SEAL REPLACEMENT

Teflon packings do not often need replacement if, leakage occurs. Usually the leak can be stopped by tightening the bonnet bushing.

a. Refer to Figures 1 & 2 for part identifications.

b. Remove bonnet lock pin (item 10) from valve body by using heavy duty pliers or wire cutters.

c. Unscrew bonnet counter-clockwise to remove bonnet assembly from valve body.

d. Place bonnet assembly in soft-jawed vise to facilitate disassembly.

e. Remove handle (item 8) by loosening handle bolt (item 7).

f. Remove dust boot (item 6) from upper portion of bushing (item, 3).

g. Loosen jam nut (item 4) and unscrew bushing off stem and out of the bonnet,

h. Remove stem (item 1) from bonnet (item 2) by pushing it downward.

i. Remove stem seal (item 5) from the bonnet and back-up ring *(item 9) if so equipped.*

j. Clean all bonnet *assembly* parts with Acetone or Alcohol.

k. Inspect parts for damage, particularly the stern threads and plug end. Replace both stem and bonnet bushing if threads do not engage smoothly.

l. Lubricate the stem threads with the appropriate lubricant specified on the *assembly drawing.*

m. Insert the stem (item 1), threaded end first, into the end of the bonnet (item 2) that is threaded externally.

n. Push stem upward from the bottom of the bonnet.

o. Place the stem seal (item 5) over the threaded end of the stem and push it down into the body of the bonnet.

p, <u>For O-ring bonnet</u>, install back-up ring (item 9) into bonnet.

q. Lubricate the bushing (item 3) threads with the appropriate lubricant.

r. Install jam nut (item 4) onto bushing (item 3).

s. Place the bushing with jam nut over the stem and start the threads for both the stem and bonnet by hand. Screw the bushing down into the bonnet until it reaches the stem seal.

t. Place the boot (item 6) over the upper portion of the valve stem.

u. Place the handle (item 8) onto the upper portion of the stem and tighten handle bolt to 32 ft lb, Be careful not to bend the stem.

4.4 VALVE ASSEMBLY

a. Lightly lubricate the bonnet threads with the appropriate lubricant.

b. Place bonnet assembly into the seat cavity and screw the bonnet into the valve body by hand.

c. Tighten the bonnet to the proper torque value shown below using the preset torque wrench.

Carbon Steel.....32-38 ft lb
Stainless Steel ...35-40 ft 1b

d. For Teflon Packed Bonnets Onlv:

Tighten the bonnet bushing using a wrench. The bushing should be tightened snugly but not over-tightened. check the bushing tightness by *turning* the handle. If it feels too loose you may tighten the bushing more. If it feels too tight, the stem *seal must* be replaced and the bushing retightened.

The bushing tightness is a matter of both judgment and experience. The basic considerations axe:

Too Loose - the bonnet ;gill leak.

Too Tight - The handle will be hard to turn and the stem seal may be ruined.

e. For O-ring bonnet only, adjust jam nut to where it is .09 ± .03 below thread relief on bushing (ref. Figure 2) then screw bushing down till jam nut contacts bonnet.

f. Once the bushing is properly adjusted, tighten the jam nut(item 4) to lock the *bushing* in place.

g. Tap one bonnet lock pin into *one of the two holes that one* of the flats on *the* bonnet hex best centers over.

5.0 SEAT REPLACEMENT

If seat replacement is needed, safe practice requires depressuring the valve before removal, of the bonnet.

1. Refer to sEction 4.3 for bonnet removal.

2. Refer to Figures 1 and 2 for part identification.

3. Remove seat (item 11) from seat cavity. The seat may be removed from the seat cavity with any smooth surface bar, used as a pry box, inserted into one of *the* orifice holes *in* the seat.

4. Clean seat cavity *with* Acetone ox Alcohol.

5. Inspect seat cavity fon damage, such as *scratches that go from* one hole to the other or heavy corrosion *in the area where the seat goes. If seat cavity is damaged* the body must be *replaced.*

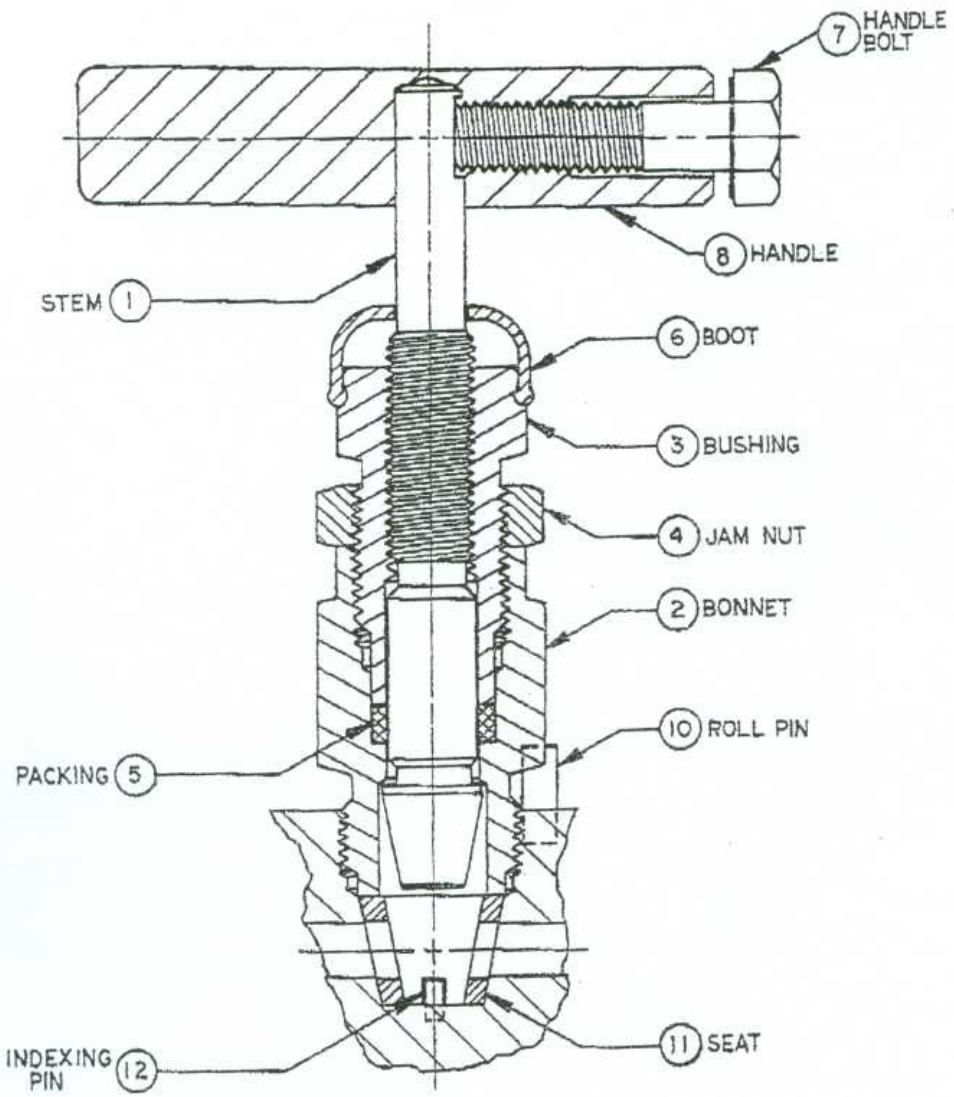
6. Make sure that *indexing* pin (item 12) is still *securely in*stalled into the hole in the bottom of the seat cavity.

7. Install new seat making sure that the notch in the side of the seat is centered over the indexing pin.

8. Install bonnet assembly back into body per Section 4.4.

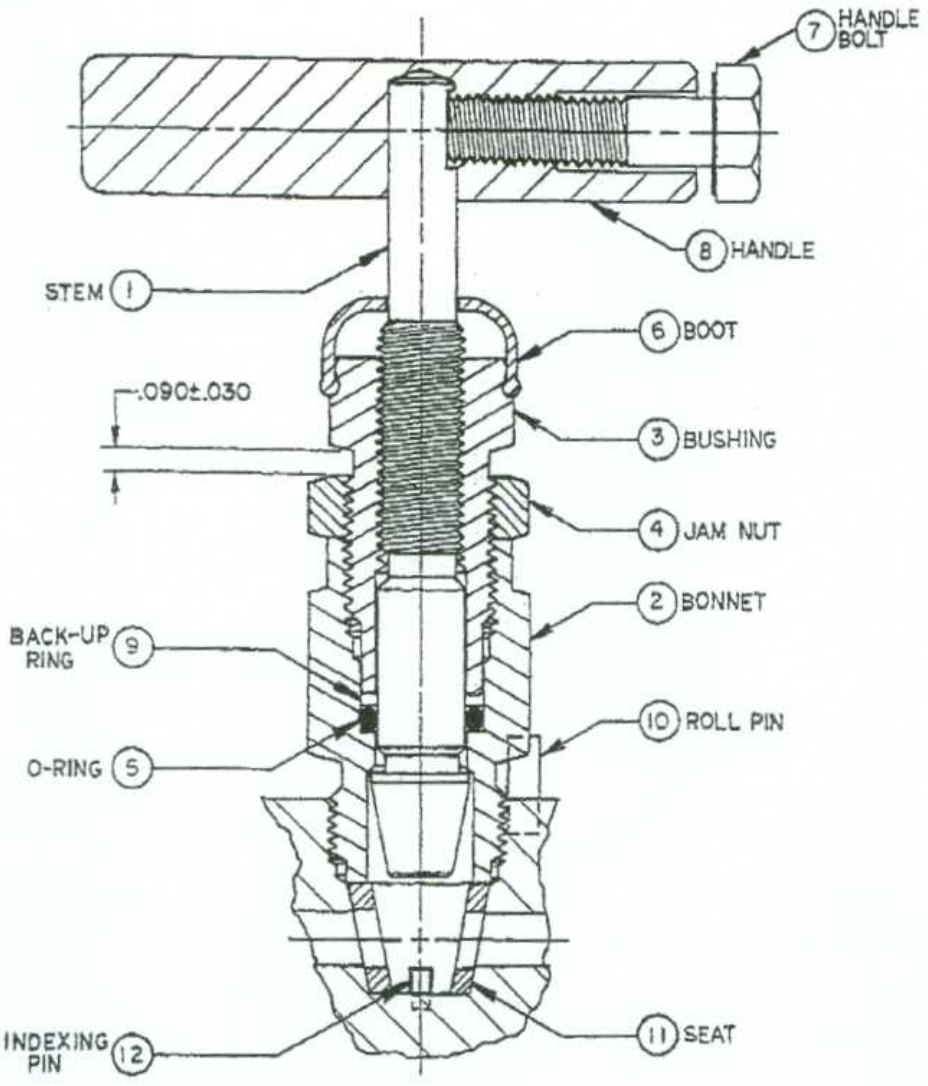
6.0 POST ASSEMBLY INSPECTION

Turn the handle to open and close the valve. Check for binding, *rubbing or any resistance to smooth operation.*



TEFLON PACKED BONNET

FIGURE 1



O-RING BONNET

FIGURE 2

BV 7

HOKE
6610M4Y

PURGE VALVE – ¼” MNPT 6000 PSI STAINLESS STEEL

ANGI PART NUMBER - 330-07281

NO REBUILD KIT AVAILABLE

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6600 SERIES BLEED VALVE

Purpose:

- Hoke 6600 Series Bleed Valves allow for quick, easy manual bleed off of system pressure

Typical Applications:

- Air, Hydraulic Systems or Natural Gas

Technical Data: 6610, 6660, 6670, and 6680 Series Bleed Valves:

- Maximum Operating Pressure: 6000 PSIG @ 70°F (414 Bar @ 21°C)
- Operating Temperature Range: -40° to 600°F (-40° to 316°C)
- End Connections: 1/4, 3/8, 1/2 inch Gyrolok®

Technical Data: 6631 Series Bleed Valves:

- Maximum Operating Pressure: 5000 PSIG @ 70°F (345 Bar @ 21°C)
- Operating Temperature Range: -20° to 425°F (-29° to 218°C)
- Orifice: .125 in. (3.2mm)
- End Connections: 1/4" NPT, 1/4" Tube Stub

Features:

- Compact Installation
- 316 Stainless Steel Construction
- Straight, Union, Elbow or Tee Flow Configurations
- Integral Tube Ends

Benefits:

- Safe
- Reliable
- Gyrolok® Fitting Connections Eliminate Pipe Thread Leak Paths

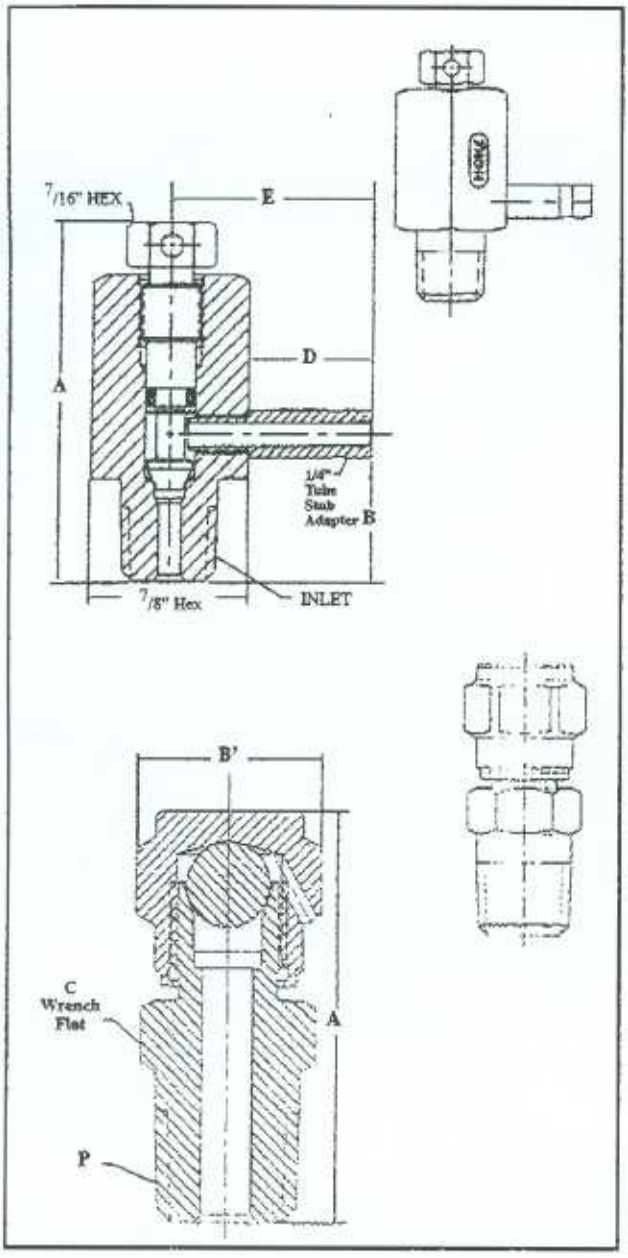
Operation Instructions: (For all but the 6631 Series Valves)

- Valve is operated by turning the bleed port nut with a wrench. Use appropriate back-up wrench to hold body, while turning bleed nut.
- As bleed nut is turned, pressure forces ball off seat. Pressure is vented through a hole drilled in the nut, angled back toward the body of the valve. Make sure flow is directed away from user.
- Those using the valves should wear protective clothing, especially goggles.
- No attempt should be made to repair or dismantle the valve.

6600 SERIES BLEED VALVE

Part Number/Ordering Chart:

Series Designation	Configuration	End Type	End Size	Material
66 - Bleed Valve	10-Straight 31-Directed 60-Elbow 70-Union 80-Tee	G-Gyrolok H-Male NPT x Tube Stub M-Male NPT	4-1/4 in. 6-3/8 in. 8-1/2 in.	Y-316SS



6631 Series Bleed Valves:

Hoke's 6631 Bleed Valve allows the user to direct the bled fluid as desired. To operate simply turn the 7/16" nut with a wrench or the optional loose fit handle, part number 96706-103.

Part Number	Inlet	A (open)	B	D	E
6631H4Y	1/4 Male NPT	2 (51mm)	3/4 (19mm)	11/16 (17mm)	1 1/8 (29mm)
6631H84Y	1/2 Male NPT	2 1/8 (54mm)	29/32 (23mm)	11/16 (17mm)	1 1/8 (29mm)

6610, 6660, 6670, And 6680 Series Bleed Valves:

These Hoke Valves come in a variety of configurations including Straight, Elbow, Union, and Tee. See operating instructions and technical data on front cover.

Part Number	P Thread NPT	A Open	B' Hex	C Wrench Flat
6610M4Y	1/4	1 17/32 (39mm)	5/8	9/16
6610MGY	3/8	1 19/32 (40mm)	5/8	11/16
6610M8Y	1/2	1 13/16 (46mm)	5/8	7/8

• Dimensions for reference only and are subject to change without notice.

CH 5

KIM HOTSTART
OE615100-000
1”NPT OIL HEATER, 120V, 150W

ANGI PART NUMBER 707-07241

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INSTALLATION INSTRUCTIONS

LUBE OIL HEATERS AND LUBE OIL THERMOSTATS

216061-042 rev1

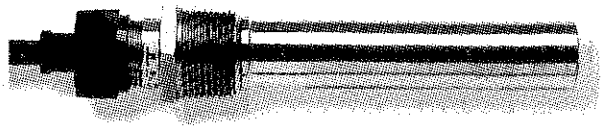
READ CAREFULLY FOR PROPER INSTALLATION & OPERATION

KIM HOTSTART SINCE 1942

I. OPERATING INFORMATION

The Lube Oil Heater is a cartridge heating element. The Lube Oil Thermostat is a temperature sensing device in an aluminum well.

Kim Hotstart recommends the use of a thermostat with a Lube Oil Heater. The thermostat prevents the possibility of overheating and thus damaging the oil. The Lube Oil Heater can be controlled by a lube oil thermostat or by a Kim-Stat on a coolant heater.



II. INSTALLING THE LUBE OIL HEATER

CAUTION: Do not install the Lube Oil Heater in the oil sump drain.

A. Drain the oil sump.

B. Remove the oil pan if drilling or welding is required.

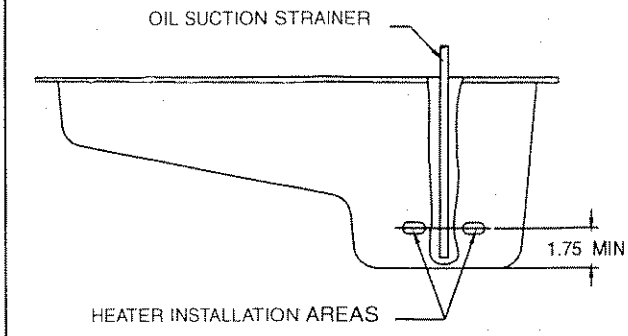
C. Install the Lube Oil Heater low in the side of the oil pan or sump. Do not install it closer than 1 3/4" from the bottom or walls of the sump. Keep the heater away from internal objects.

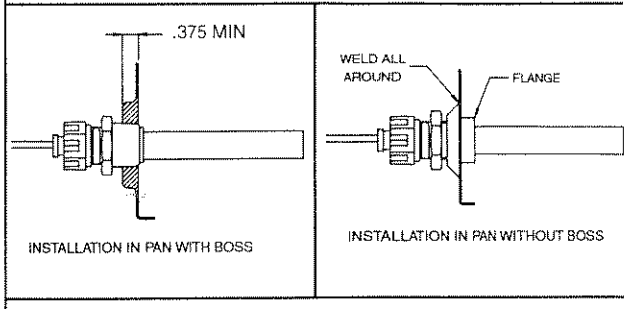
NOTE: Some manufacturers provide additional openings or bosses in the sump. Use an available opening if its location is acceptable per step C.

NOTE: The wall of the sump or boss must be at least 3/8" (10MM) thick to provide an adequate mounting hole. If the sump wall is too thin a flange must be installed to mount the heater.

Oil Heater Thread Size

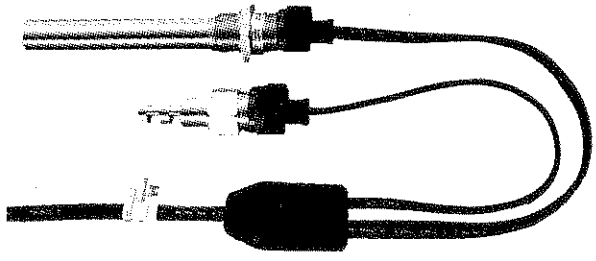
OW6 or OE6 — 1" NPT
OW4 or OE4 — 3/4" NPT
OW2 or OE2 — 1/2" NPT





NOTE: When installing a Lube Oil Heater with Y-Cord and thermostat, follow the steps below.

1. Disconnect cord from heater and install per section II.
2. Disconnect cord from thermostat assembly and install per section III.
3. Re-attach cord to heater and thermostat.

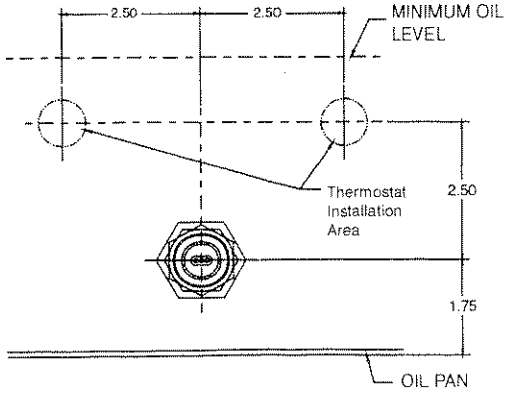


III. INSTALLING THE LUBE-OIL THERMOSTAT

A. Install the thermostat approximately 2 1/2" (64MM) to either side of the oil heater and 2 1/2" (64MM) above the heater.

CAUTION: The thermostat must be installed below the minimum oil level in the sump. If the thermostat is not immersed in the oil it will not control the oil temperature.

NOTE: The same conditions concerning the sump wall and bosses apply for the thermostat as for the oil heater in Section II.



IV. WIRING THE OIL HEATER AND LUBE-STAT

NOTE: In this case the lube oil thermostat is wired in series with the oil heater.

A. Make a 4" (102MM) cut down a groove in the end of the thermostat cord. Strip the cord as shown.

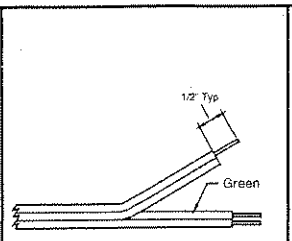
B. Make an 8" (203MM) cut in a groove of the oil heater cord at a point where the thermostat cord will reach. Cut the green wire and one power lead. Strip the cord as shown.

C. Splice the wires together as shown. Use insulated crimp type connectors.

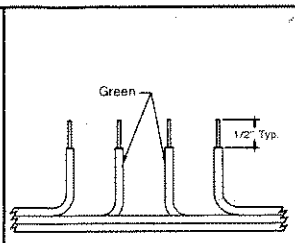
D. Wrap splice with electrical tape to protect the splice and reduce strain.

NOTE: The following diagrams show some common wiring configurations. When wiring an oil heater in parallel with a coolant heater do not exceed the amperage rating of the coolant heater plug or thermostat.

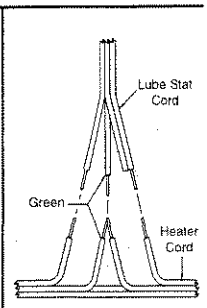
NOTE: Models with the prefix "-OE" have a termination enclosure to meet NEC Class I, Division I, Group D requirements when wired in compliance with NEC specifications.



THERMOSTAT CORD



OIL HEATER CORD



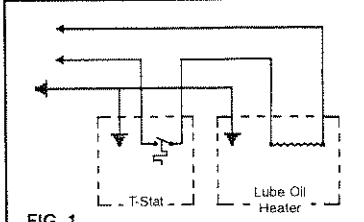


FIG. 1

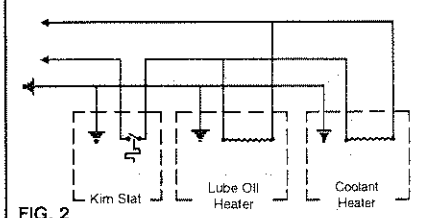


FIG. 2

Caution must be used with FIG. 2 wiring because the oil temperature is not being monitored. If the oil heater wattage is too high the oil may be damaged before the KIM-STAT shuts the heaters off.

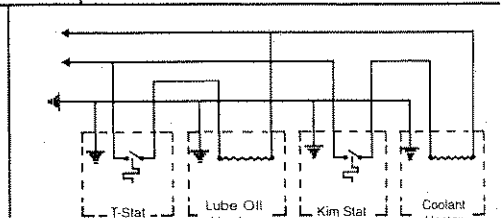
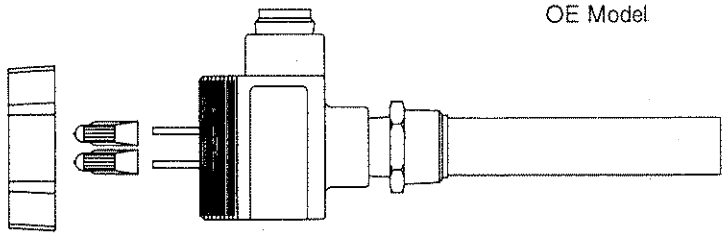


FIG. 3

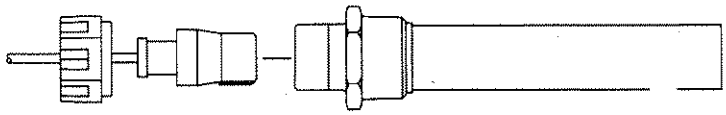
V. HEATER REPLACEMENT

LUBE OIL HEATER

Heater replacement only. No replacement parts.



Assembly View Only — No Replacement Parts



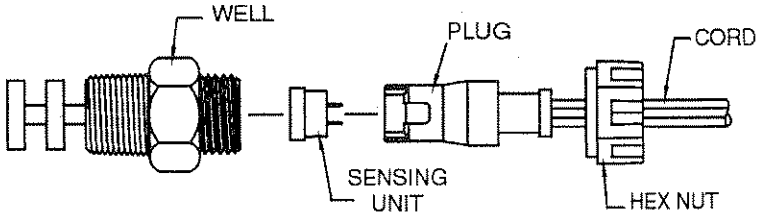
LUBE OIL THERMOSTAT SENSING UNIT

A. Unscrew the hex cap. Pull the cord and sensing unit out of the well.

B. Pull sensing unit off the cord plug.

C. Insert new sensing unit into cord. Spade terminals should not be exposed.

D. Insert the sensing unit and cord into the well and screw the hex cap down snug. Do not overtighten.



CV 24

MCMASTER CARR
4753K32

1/2” FNPT CHECK VALVE BRASS 200 PSI

ANGI PART NUMBER 336-07231

NO REBUILD KIT AVAILABLE

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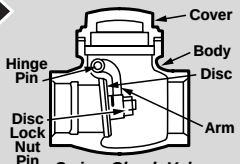
About Check Valves



Swing Check Valve

Check valves have a disc, ball, poppet, or piston that opens when forward flow starts in the pipeline. When pressure drops, either gravity, back pressure, or a mechanical spring force the disc, ball, poppet, or piston back against its seat, preventing backflow. Most check valves are general service and suitable for air, water, oil, or gases (W.O.G.), subject to compatibility with the construction materials.

Cv factor (coefficient of volume) is the amount of water (in gpm) that will pass through a fully open valve at 1 psi with 1 specific gravity (60° F). For a pressure drop other than 1 psi, use this formula:

$$GPM = Cv\sqrt{\frac{\text{Pressure Drop}}{\text{Specific Gravity of the Liquid}}}$$

All valves have a metal-to-metal seat unless noted.

Cracking pressure is the minimum psi required to open a valve.

Spring-loaded (silent) check valves have a spring-assist mechanism (controlled by the flow) to open and close the valve. Flow resistance is moderate. For horizontal and vertical use.

Ball-check valves are primarily for handling viscous fluids. While fluid is flowing, the ball rotates constantly, equalizing wear on ball and valve seat. They offer little flow resistance. For horizontal and vertical use.

Swing-check valves have hinged discs or flaps that swing on a hinged pin. They offer little flow resistance. For horizontal and vertical use (when installed vertically, flow must be upward).

Horizontal-lift (gravity) check valves have a disc floating in the seat that rises by upward flow pressure. These have considerable flow resistance. For horizontal use.

Metal Check Valves

For information about pipe size, see pages 2-3.

Pipe OD to Pipe Size Conversions

Pipe OD	0.405″	0.540″	0.675″	0.840″	1.050″	1.315″	1.660″	1.900″	2.375″	2.875″	3.500″
Pipe Size	1/8″	1/4″	3/8″	1/2″	3/4″	1″	1 1/4″	1 1/2″	2″	2 1/2″	3″

Brass Spring-Loaded Poppet Check Valves

- Maximum Pressure: 200 psi (Steam: 125 psi)
- Cracking Pressure: 1 to 2 psi
- Maximum Temperature: 300° F

A spring-loaded conical-shaped poppet assures positive, easy seating. Poppet and spring are 300 series stainless steel.

Valve bodies are made of NSF61-accepted red brass. ***Brass*** is for steam service. ***Nickel-plated brass*** is for food and beverage service.

Connections: NPT female.

Pipe Size	O'all Lg.	Cv Factor	Brass	Nickel-Plated Brass
3/8″	2 5/8″	2.56	4753K31	4753K22
1/2″	2 3/4″	2.69	4753K32	4753K28
3/4″	3 9/16″	4.38	4753K33	4753K21
1″	3 11/16″	8.00	4753K34	4753K23
1 1/4″	4 1/2″	16.00	4753K35	4753K25
1 1/2″	4 7/8″	17.10	4753K36	4753K27
2″	5 9/16″	27.50	4753K37	4753K29

Brass Spring-Loaded Poppet Check Valves with Rubber Seats

- Maximum Pressure: 200 psi
- Cracking Pressure: 1 psi
- Maximum Temperature: 225° F

Flexible conical-shaped rubber poppets help increase service life and allow positive seating. They perform better than O-ring and metal-seating check valves. Spring is Type 303 stainless steel.

The valves are made of NSF61-accepted red brass. ***Buna-S poppet*** is for air and water; use with submersible pumps and in irrigation applications. ***Buna-N poppet*** is for gasoline and oil.

Note: Not for compressed air. **Connections:** NPT female.

Pipe Size	O'all Lg.	Cv Factor	Buna-S Poppet	Buna-N Poppet
3/4″	3 9/16″	4.38	7746K12	7746K32
1″	3 11/16″	8.00	7746K13	7746K33
1 1/4″	4 1/2″	16.00	7746K14	7746K34
1 1/2″	4 7/8″	17.10	7746K15	7746K35
2″	5 9/16″	27.50	7746K16	7746K36

Brass Spring-Loaded Poppet Check Valves—Low-Cracking PSI


Female × Female


Male × Male

- Maximum Pressure: 1000 psi
- Cracking Pressure: 0.3 psi
- Maximum Temperature:
  Buna-N: 250° F
  Viton: 400° F

Engineered for sensitive applications, these valves feature an extra-low cracking pressure of just 0.3 psi. They also have a brass poppet, Type 304 stainless steel spring, and your choice of Buna-N or Viton seats.

Connections: NPTF (Dryseal).

Pipe Size	O'all Lg.	Cv Factor	Buna-N Seat	Viton Seat
Female × Female				
1/8″	1 7/32″	1.1	7775K11	7775K51
1/4″	1 3/4″	1.1	7775K12	7775K52
3/8″	2 13/32″	5.5	7775K13	7775K53
1/2″	2 1/2″	5.5	7775K14	7775K54
Male × Male				
1/8″	1 1/8″	0.5	7775K21	7775K61
1/4″	2 1/16″	1.1	7775K22	7775K62
3/8″	2 11/32″	5.5	7775K23	7775K63
1/2″	2 1/2″	5.5	7775K24	7775K64

High-Pressure Spring-Loaded Ball and Poppet Check Valves


Ball-Check Valve

- Maximum Pressure:
  Brass: 2000 psi
  Carbon steel: 5000 psi
  Type 203 stainless steel: 5000 psi
- Cracking Pressure:
  1/4″ to 3/4″ sizes: 1 to 2.5 psi
  1″ size: 3 to 5 psi
- Maximum Temperature: 200° F

These valves are at home in hydraulic applications. They have a Type 302 stainless steel spring and metal-to-metal seat. Ball-check valves (straight design) have a Type 440 stainless steel ball; poppet check valves (tee design) have a Type 302 stainless steel poppet. **Connections:** NPT female.

Pipe Size	O'all Lg.	Cv Factor	Brass	Carbon Steel	Type 203 Stainless Steel
Ball-Check Valves					
1/4″	2″	1.47	4620K21	4620K41	4620K81
3/8″	2 1/2″	3.30	4620K22	4620K42	4620K82
1/2″	2 7/8″	3.60	4620K23	4620K43	4620K83
3/4″	3 1/4″	5.41	4620K24	4620K44	4620K84
Poppet Check Valves					
1″	4 1/2″	9.60	4620K25★	4620K45▲	

★ Naval bronze body. ▲ Ductile iron body.

High-Temperature Spring-Loaded Ball-Check Valves

- Maximum Pressure:
  Brass: 2000 psi
  Carbon Steel: 5000 psi
  Type 203 Stainless Steel: 5000 psi
- Cracking Pressure: 1 to 2.5 psi
- Maximum Temperature: 400° F

Our hex-shaped, ball-check valves are designed for high pressure and temperature applications. Ball is Type 440 stainless steel; spring is Type 302 stainless steel; seat is Viton with Teflon backup washer. **Connections:** NPTF (Dryseal) female.

Pipe Size	O'all Lg.	Cv Factor	Brass	Carbon Steel	Type 203 Stainless Steel
1/8″	1 15/32″	0.23	5010K71	5010K51	5010K61
1/4″	2″	0.54	5010K72	5010K52	5010K62
3/8″	2 1/4″	0.83	5010K73	5010K53	5010K63
1/2″	2 21/32″	1.47	5010K74	5010K54	5010K64
3/4″	2 15/16″	1.90	5010K46	5010K26	

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CV 50

HOKE
CVH-027

CHECK VALVE - ½” FML 6000 PSI STAINLESS STEEL
20 PSI CRACKING PRESSURE

ANGI PART NUMBER - 336-07260

O'RING - 761-07553

SPRING - 650-07357

HOKE

A division of CIRCOR International, Inc.

CVH Series Check Valves

The CVH Series Check Valves are engineered for a competitive price with no compromise of quality and performance to meet the growing requirements of instrumentation valves. The function of this valve series is to maintain system integrity by preventing back flow of a wide variety of fluids over a broad range of pressures.

- High Flow — 7.4 Cv Maximum
- High Pressure — 0 to 6000 psig
- High Performance — Quick acting, zero leakage, low maintenance
- Size Range — 1/8" to 1" 6mm to 25mm

Features & Specifications

- Colored band makes the o-ring easy to identify and promotes safety
- Resilient o-ring seat provides cushioned, quiet closing and zero leakage
- Floating o-ring design – o-ring is continually cleaned and contaminants do not prevent sealing
- Various materials of construction can be used with any liquid or gas service
- Various end connections can be assembled in any system or application
- Spring-loaded poppet can be mounted in any orientation
- Full flow with minimal restriction for maximum Cv rates
- Virtually maintenance free for maximum dependability
- Pressure up to 6000 psig
- Cracking pressure range is .5 to 20psi
- Flow up to 7.4 Cv maximum
- More than 100,000 life cycles

CVH Series Check Valves

Specifications

Pressure Range	0 to 6000 PSIG/ 0 to 414 BAR
Temperature Range	-320° F to +900° F / -196° C to +482° C
Flow Range	.32 Cv to 7.4 Cv
Crack Pressure Range	.5 to 20 PSI / .035 to 1.379 BAR
Leakage	External All – zero Internal Soft seat – zero Teflon seat --< 5cc/minute Metal seat -- < 30cc/minute
Life Cycles	In excess of 100,000 cycles

Operating Temperatures

Seal Material	Temperature F	Temperature C	Color Band
Teflon®	-320° to +400°	-196° to +204°	Maroon
Chemraz	-20° to +425°	-29° to +218°	Olive
Viton®	-20° to +400°	-29° to +204°	Blue
Neoprene	-40° to +250°	-40° to +121°	Red
Ethylene Propylene	-65° to +300°	-54° to + 149°	Purple
Fluorosilicone	-80° to +350°	-62° to +177°	Black
Kalrez®	-40° to +550°	-40° to +288°	Olive
Buna-N	-65° to +275°	-54° to +135°	Green
Metal	-320° to +900°	-196° to +482°	Gold

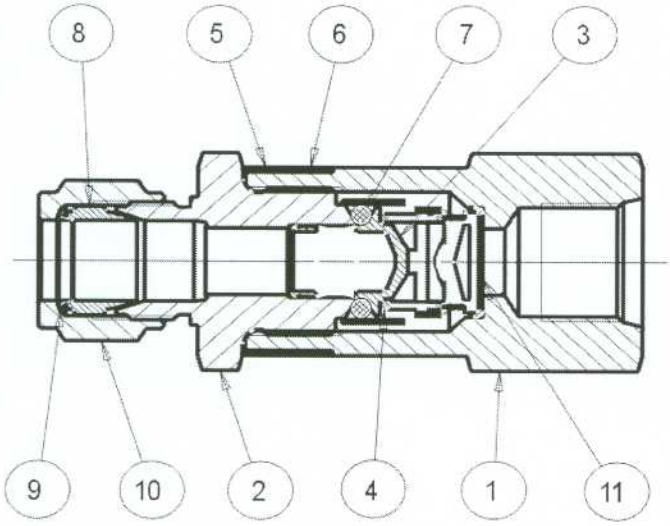
Flow Chart

Valve Size	2	4	6	8	10	12	16
Cv	.32	.79	1.71	3.08	3.87	7.38	7.38

Materials of Construction

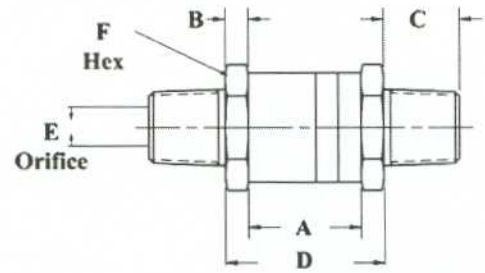
Item	Part	Standard Materials (others on request)
1.	Body* (outlet)	316 stainless steel
2.	End Adapter* (inlet)	316 stainless steel
3.	Poppet*	316 stainless steel
4.	Spring*	302 stainless steel
5.	Part Number Band	Anodized Aluminum
6.	O-ring Band	Anodized Aluminum
7.	O-ring*	Viton®
8.	Front Ferrule*	316 stainless steel
9.	Rear Ferrule	316 stainless steel
10.	Nut	316 stainless steel
11.	Spring Guide	316 stainless steel

*Wetted component



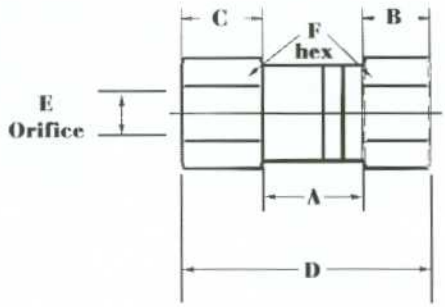
CVH Series Check Valves

Charts of Dimensions



Male NPT

	Size	A	B	C	D	E	F
Fractional (Inches)	02	0.83	0.20	0.40	1.23	.19	0.81
	04	0.83	0.20	0.59	1.23	.19	0.81
	06	1.26	0.20	0.59	1.66	.39	1.19
	08	1.26	0.20	0.77	1.66	.42	1.19
	12	2.05	0.50	0.77	3.05	.66	2.00
	16	2.05	0.50	0.98	3.05	.66	2.00



Female NPT

	Size	A	B Inlet	C Outlet	D	E	F
Fractional (Inches)	02	0.83	0.68	0.78	2.29	.19	0.81
	04	0.83	0.91	1.01	2.75	.19	0.81
	06	1.26	0.92	0.97	3.15	.39	1.19
	08	1.26	1.12	1.17	3.55	.42	1.19
	12	2.05	1.40	1.12	4.57	.66	2.00
	16	2.05	1.61	1.33	4.99	.66	2.00

CVH Series Check Valves

How to Order

CVH Y 04 G 04 M 32 010 A O H

Material

B	Brass	**C**	Carpenter 20
I	Inconel	**O**	254 SMO CRES
M	Monel	**H**	Hastelloy C276
Y	316 SS	**T**	Titanium

Inlet Size

02	1/8"	**14**	14mm
04	4mm, 1/4"	**16**	16mm, 1"
06	6mm, 3/8"	**18**	18mm
08	8mm, 1/2"	**22**	22mm
10	10mm	**25**	25mm
12	12mm, 3/4"		

Inlet Type

G	Gyrolok™ Tube Fitting-Per HOKE
A	Gyrolok™ Tube Adapter- Per HOKE
Z	Metric Gyrolok™ Tube Fitting-Per HOKE
W	Metric Gyrolok™ Tube Adapter-Per HOKE
S	Male SAE-Per J514
R	Female SAE-Per J1926
L	Male British Parallel Pipe-Per ISO 1179
K	Female British Parallel Pipe-Per ISO 1179
M	Male NPT-Per ANSI/ASME B1.20.1
F	Female NPT-Per ANSI/ASME B1.20.1
Q	Male British Tapered Pipe ISO 7/1
P	Female British Tapered Pipe ISO 7/1

Outlet Size

02	1/8"	**14**	14mm
04	4mm, 1/4"	**16**	16mm, 1"
06	6mm, 3/8"	**18**	18mm
08	8mm, 1/2"	**22**	22mm
10	10mm	**25**	25mm
12	12mm, 3/4"		

Outlet Type

G	Gyrolok™ Tube Fitting-Per HOKE
A	Gyrolok™ Tube Adapter-Per HOKE
Z	Metric Gyrolok™ Tube Fitting-Per HOKE
W	Metric Gyrolok™ Tube Adapter-Per HOKE
S	Male SAE-Per J514
R	Female SAE-Per J1926
L	Male British Parallel Pipe-Per ISO 1179
K	Female British Parallel Pipe-Per ISO 1179
M	Male NPT-Per ANSI/ASME B1.20.1
F	Female NPT-Per ANSI/ASME B1.20.1
Q	Male British Tapered Pipe ISO 7/1
P	Female British Tapered Pipe ISO 7/1

Seal Materials

20	Teflon®
25	Chemraz
32	Viton®
40	Teflon® (Cryogenic Service)
53	Neoprene
62	Ethylene Propylene
64	Fluorosilicone
65	Kalrez®
77	Buna N
00	Metal (high temperature service)

Cracking Pressure

005	00.5 PSI/.035 BAR	**050**	05.0 PSI/0.344 BAR
010	01.0 PSI/.069 BAR	**100**	10.0 PSI/.688 BAR
030	03.0 PSI/0.206 BAR	**200**	20.0 PSI/1.379 BAR

(others available on request)

Band Options

A	Aluminum Bands (std.)
Y	Stainless Steel Bands

Cleaning Options

O	Standard	**C**	Cyrogenic Cleaning
B	Industrial Cleaning	**D**	NACE Compliant

Hoke

CV 55

HOKE
CVH-025

3/8” FNPT CHECK VALVE, SS, 6000 PSI
20 PSI CRACKING PRESSURE SPRING,
W/ 90 DURO VITON O’RING

ANGI PART NUMBER 336-07266

POPPET CHECK VALVE 3/8 – 700-07943

O’RING CHECK VALVE 3/8, 90 DURO VITON – 761-07384

SPRING – 650-07356

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CAD DRAWING - NO MANUAL REVISIONS ALLOWED

DWG NO. CVH-025 SHT 1

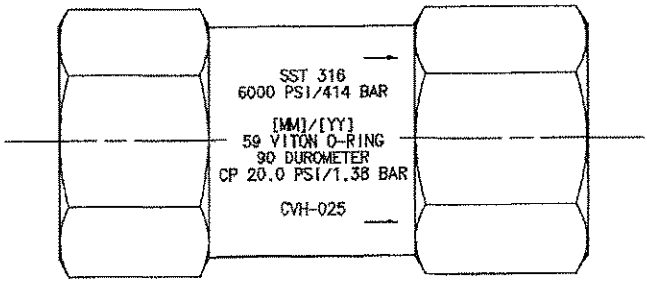
REVISIONS			
REV	DESCRIPTION	DATE	APPROVED
-	RELEASE PER ECO 30055	05/02/11	SLG
A	REVISED PER ECO 30195	05/05/26	MW

CVH-025 CONSISTS OF:
(ITEM BALLOONS PER CVH DWG)

1. END P/N 40287-6T1
2. BODY P/N 40288-6T1
3. POPPET P/N A253T1
4. SPRING P/N -255-20
5. BAND P/N 40271-8A1W
6. BAND P/N 40271-8A1Y
7. SPRING GUIDE P/N 40436-8T1
8. O-RING P/N 58-112-59
9. SHROUD P/N A250T1

NOTES:

1. ASSEMBLY AND TECHNICAL DATA PER CVH DRAWING REV C PER ECO 18573C.
2. MARK ASSY PER VIEW BELOW.
3. BASIC MATERIAL: SST 316
4. THIS ASSEMBLY SAME AS CVHY06F06F32200AOH EXCEPT NEW ITEM 8.



UNLESS OTHERWISE SPECIFIED:

DIMENSIONS IN INCHES
REMOVE BURRS
FILLET RADII .005 TO .035
MACHINE FINISH 125
DRILL POINTS STD
TOLERANCES ARE:
DECIMALS: .XX = ±.010
.XXX = ±.005
ANGLES: ±1°
CONCENTRICITY .010 DIA
DO NOT SCALE DRAWING

APPROVALS		DATE
DRAWN	MH	05/02/11
CHECKED	SLG	05/02/11
APPROVED	RA	05/02/14

INITIAL USAGE (REF ONLY)

CAD FILE: CVH-025

HOKE INC

TITLE
CHECK VALVE, 20 PSI CRACKING PRESSURE
3/8 FEMALE NPT CONNECTIONS

SIZE	CAGE CODE	DWG NO.	REV
A	28968	CVH-025	A

SCALE NONE | CALC. WT | ACT. WT | SHEET 1 OF 1

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F 30

ROSEDALE
C-2857

ELEMENT-RSDL STAINLESS MESH 13"

ANGI PART NUMBER - 770-07239

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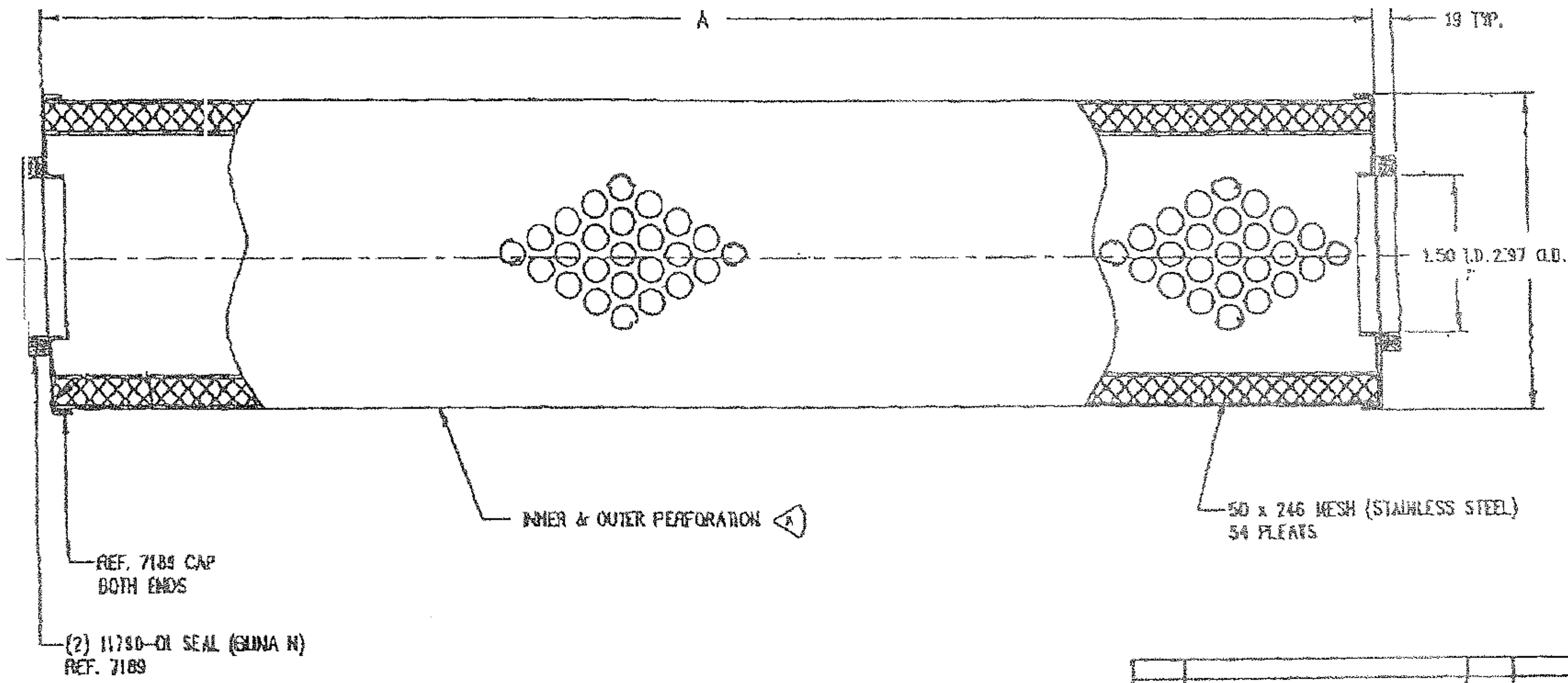

		PART NO.	DIM "A"	
F30 —	C-2857	8807	13"	50 x 246 mesh
F31 —	C-2858	8808	18"	50 x 246 mesh
F52 —	C-2867	8807	13"	30 X 150
F67 —	C-2864	8808	18"	30 K 150

LETTER	REVISION	BY	DATE
A	ADDED BULK PERFORATION (FOR ROSEDALE)	C DAY	05-05-98

DO NOT SCALE DRAWING
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES

ORIG FILE
DWF. 3.4.5
ASS'Y REF

DR. C DAY
DATE 04-30-98
CH.
DATE
SCALE FULL

MATERIAL:
TITLE ELEMENT
RFQ-3152
PART NO. 8807 / 8808
DRAWING NO. 11790-10
REV. A

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F 49

ROSEDALE
C18501.10
4” CLASS 150 FILTER W/NO ELEMENT

ANGI PART NUMBER 770-07267

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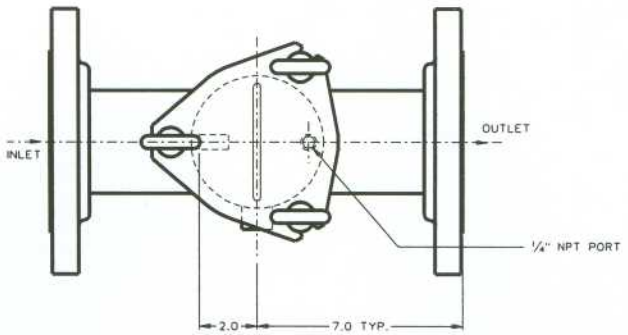
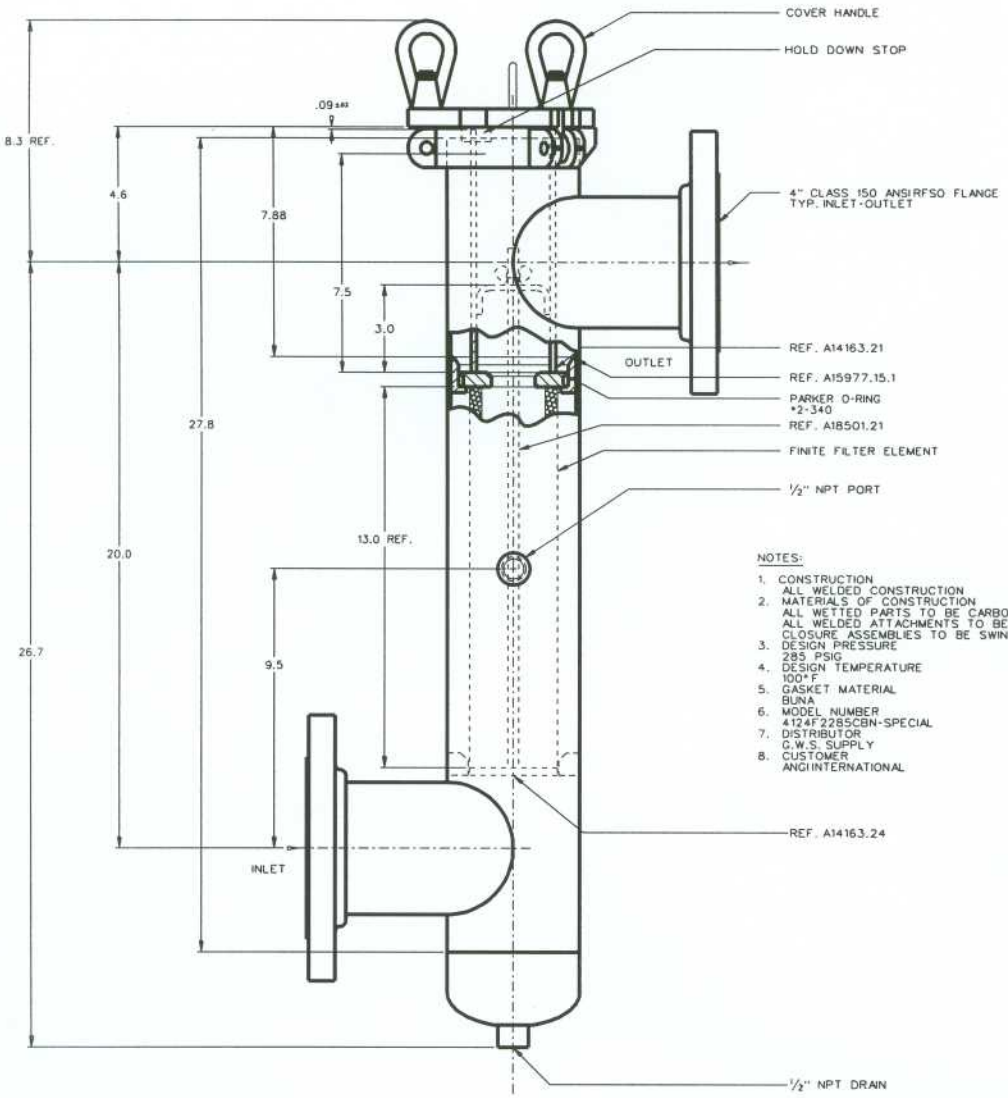
DRAWING NO. D18501.10 REV. B





NOTES:

1. CONSTRUCTION
   ALL WELDED CONSTRUCTION
2. MATERIALS OF CONSTRUCTION
   ALL WETTED PARTS TO BE CARBON STEEL
   ALL WELDED ATTACHMENTS TO BE CARBON STEEL
   CLOSURE ASSEMBLIES TO BE SWING BOLT TYPE
3. DESIGN PRESSURE
   285 PSIG
4. DESIGN TEMPERATURE
   100°F
5. GASKET MATERIAL
   BUNA
6. MODEL NUMBER
   4124F2285CBN-SPECIAL
7. DISTRIBUTOR
   G.W.S. SUPPLY
8. CUSTOMER
   ANGI INTERNATIONAL

LET.	REVISION	BY	DATE
B	UPDATED HOLD DOWN	JTK	
A	WAS 150#, 400°F	JP	

DO NOT SCALE DRAWING
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES
2 PLACE ±
3 PLACE ±
OTHER ±
ANGULAR ±
BREAK ALL EDGES
FINISH
MATERIAL SEE NOTE
ASS'Y REF.
DR. REF
DATE 285CP00
CH.
DATE
SCALE ½

ROSEDALE PRODUCTS, INC.

TITLE
MODEL 4
4124F2285CBN-SPECIAL
W/RETAINER TO ACCEPT
FINITE 3PU25-130 ELEMENT
G.W.S. SUPPLY
ANGI INTERNATIONAL

ITEM NO.
SHEET 1 of 1
DRAWING NO. D18501.10
REV. B

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F 101

FINITE
MS8S-10CVG

SAE-32 MS8S FILTER W/GRADE 10 COALESCING ELEMENT

ANGI PART NUMBER – 772-07274

ELEMENT - 770-07320

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800 PSIG Pressure Filters

M-Series

PET bottle blowing plants rely on the filtration protection of the M-Series to meet stringent standards for contact with food and beverage containers.

Finite's M-Series provides the needed filtration for a wide variety of compressed air/gas applications. Varied porting and connection styles, along with a robust design make this an extremely versatile filter. It is a perfect fit for interstage filtration applications for multistage, high pressure gas compressors. The aluminum heads and drawn aluminum bowls are compatible with special gases such as argon, hydrogen, compressed natural gas and helium. This housing design minimizes the problem of porosity often present with housings made by die casting.

Specifications:

Model Number	Port Size NPT	Max. Pressure	Max. Temp.	Materials of Construction				Sump Capacity	Weight	Dimensions	
				Head	Internals	Bowl	Seals			Length	Width
MN1S	1/4"	800 PSIG (55 bar)	175°F (79°C)	Machined Aluminum	Stainless Steel/Plastic	Aluminum	Buna-N	5.1 oz. (150 ml)	1.83 lbs. (0.83 kgs.)	7.89" (200 mm)	3.06" (78 mm)
MN1L	1/4"	800 PSIG (55 bar)	175°F (79°C)	Machined Aluminum	Stainless Steel/Plastic	Aluminum	Buna-N	4.7 oz. (140 ml)	2.19 lbs. (0.99 kgs.)	10.28" (261 mm)	3.06" (78 mm)
MN15S	3/8"	800 PSIG (55 bar)	175°F (79°C)	Machined Aluminum	Stainless Steel/Plastic	Aluminum	Buna-N	5.1 oz. (150 ml)	1.82 lbs. (0.82 kgs.)	7.89" (200 mm)	3.06" (78 mm)
MN15L	3/8"	800 PSIG (55 bar)	175°F (79°C)	Machined Aluminum	Stainless Steel/Plastic	Aluminum	Buna-N	4.7 oz. (140 ml)	2.17 lbs. (0.98 kgs.)	10.28" (261 mm)	3.06" (78 mm)
MN2S	1/2"	800 PSIG (55 bar)	175°F (79°C)	Machined Aluminum	Stainless Steel/Plastic	Aluminum	Buna-N	5.1 oz. (150 ml)	1.80 lbs. (0.82 kgs.)	7.89" (200 mm)	3.06" (78 mm)
MN2L	1/2"	800 PSIG (55 bar)	175°F (79°C)	Machined Aluminum	Stainless Steel/Plastic	Aluminum	Buna-N	4.7 oz. (140 ml)	2.15 lbs. (0.98 kgs.)	10.28" (261 mm)	3.06" (78 mm)
MN3S	3/4"	800 PSIG (55 bar)	175°F (79°C)	Machined Aluminum	Stainless Steel/Plastic	Aluminum	Buna-N	9.1 oz. (270 ml)	5.01 lbs. (2.27 kgs.)	10.83" (275 mm)	4.55" (116 mm)
MN4S	1"	800 PSIG (55 bar)	175°F (79°C)	Machined Aluminum	Stainless Steel/Plastic	Aluminum	Buna-N	9.1 oz. (270 ml)	4.90 lbs. (2.22 kgs.)	10.83" (275 mm)	4.55" (116 mm)
MN4L	1"	800 PSIG (55 bar)	175°F (79°C)	Machined Aluminum	Stainless Steel/Plastic	Aluminum	Buna-N	9.1 oz. (270 ml)	5.54 lbs. (2.51 kgs.)	14.36" (365 mm)	4.55" (116 mm)
MN8S	2"	800 PSIG (55 bar)	175°F (79°C)	Sand Cast Aluminum	Aluminum	Aluminum	Buna-N	14.9 oz. (440 ml)	10.37 lbs. (4.71 kgs.)	18.60" (472 mm)	5.91" (150 mm)

How to Order:

Series Name	Port Type	Port Size	Bowl	-	Element Grade	Element Type	End Seal	Accessories
M	**N** (NPT) **T** (BSPT) **F** (BSPF)	**1** (1/4") **15** (3/8") **2** (1/2") **3** (3/4") **4** (1") **8** (2")	**S** (Standard) **L** (Long) Note: L is not available for 3/4" and 2" port size housings		**4** **6** **8** **10**	**C** (Coalescer)	1/4" - 1" port size: Leave blank for no end seal or **U** (Urethane) 2" port size: **V** (Fluorocarbon)	**N** (No Accessories) **G** (Gauge) Standard on 2" port
					4 **6** **8** **10**	**Q** (Coalescer with built-in prefilter)	**U** (Urethane) Standard on all sizes	
					Leave blank	**100WS**	1/4" - 1" port size: **U** (Urethane) For 2" leave blank (standard fluorocarbon end seals)	
					Leave blank	**7CVP** (only available on 2" port)	Leave blank (standard fluorocarbon end seals)	
					Leave blank	**3P** (Pleated Cellulose) Particulate element	1/4" - 1" port size: **U** (Urethane) 2" port size: **V** (Fluorocarbon)	
					Leave Blank	**A** (Adsorber)	1/4" - 1" port size: **U** (Urethane) 2" port size: **V** (Fluorocarbon)	

Examples: MN2S-6QUG
MN3L-3PUN
MN8S-6CVG
MN8S-7CVPG

This (**G**) option is a great way to monitor pressure drop and determine when to replace the filter element.

Mounting brackets available: MB-2 (1/4" - 1/2" port size)
BK-3 (3/4" - 1" port size)

How to Order Replacement Elements:

Housings are sold with one element. Build your own replacement element with the chart below:

Housing	Element Grade and Type	Element Size
M_1S M_15S M_2S	*C,*CU,*QU, 3PU, AU, 100WSU	10-025
M_1L M_15L M_2L	*C,*CU,*QU, 3PU, AU, 100WSU	10-050 (for 100WSU use 10-025)
M_3S M_4S	*C,*CU,*QU, 3PU, AU, 100WSU	15-060
M_4L	*C,*CU,*QU, 3PU, AU, 100WSU	15-095 (for 100WSU use 15-060)
M_8S	*CV,*QU, 3PV, AV, 100WS, 7CVP	25-130

Note: _insert port type. See How to Order above for more information.

1. Determine the housing you have by choosing from the "Housing" column on the chart.

2. Determine the element type and grade you need. *Insert grades 4,6,8 or 10 for C, CU, CV or QU. See page 6-7 for more detail on grade selection.

3. Determine the corresponding element size by choosing from the "Element Size" column on the chart.

4. Combine "Element Grade and Type" designation with "Element Size" to get element part number.

Ex: 3PU10-025 or 6CU10-025

Element box quantity depends on media type selected.

For M-Series Flow Rates... see next page!

M-Series (800 PSIG) Flow Rates (SCFM):

Filter Housing	Media Grade	100 PSIG	250 PSIG	500 PSIG	800 PSIG
M_1S	4C/4Q	11	25	49	78
	6C/6Q	15	35	67	107
	7CVP	NA	NA	NA	NA
	8C/8Q	20	46	90	142
	10C/10Q	25	58	112	178
	3P	25	58	112	178
	100WS	50	115	224	355
	A	15	35	67	107
M_1L	4C/4Q	23	53	103	163
	6C/6Q	30	69	135	213
	7CVP	NA	NA	NA	NA
	8C/8Q	41	95	184	291
	10C/10Q	50	115	224	355
	3P	50	115	224	355
	100WS	50	115	224	355
	A	30	69	135	213
M_15S	4C/4Q	15	35	67	107
	6C/6Q	20	46	90	142
	7CVP	NA	NA	NA	NA
	8C/8Q	27	62	121	192
	10C/10Q	33	76	148	235
	3P	33	76	148	235
	100WS	66	152	296	469
	A	20	46	90	142
M_15L	4C/4Q	30	69	135	213
	6C/6Q	40	92	179	285
	7CVP	NA	NA	NA	NA
	8C/8Q	55	127	247	391
	10C/10Q	66	152	296	469
	3P	66	152	296	469
	100WS	66	152	296	469
	A	40	92	179	285
M_2S	4C/4Q	19	44	85	135
	6C/6Q	25	57	112	178
	7CVP	NA	NA	NA	NA
	8C/8Q	34	78	153	242
	10C/10Q	42	97	189	299
	3P	42	97	189	299
	100WS	83	192	372	590
	A	25	58	112	178

Filter Housing	Media Grade	100 PSIG	250 PSIG	500 PSIG	800 PSIG
M_2L	4C/4Q	38	88	171	270
	6C/6Q	50	115	224	355
	7CVP	NA	NA	NA	NA
	8C/8Q	68	157	305	483
	10C/10Q	83	192	372	590
	3P	83	192	372	590
	100WS	83	192	372	590
	A	50	115	224	355
M_3S	4C/4Q	61	141	274	434
	6C/6Q	80	185	359	569
	7CVP	NA	NA	NA	NA
	8C/8Q	109	252	489	775
	10C/10Q	133	307	597	946
	3P	133	307	597	946
	100WS	133	307	597	946
	A	80	184	359	569
M_4S	4C/4Q	76	175	341	541
	6C/6Q	100	231	449	711
	7CVP	NA	NA	NA	NA
	8C/8Q	136	314	610	967
	10C/10Q	166	383	745	1181
	3P	166	383	745	1181
	100WS	232	535	1041	1650
	A	100	231	449	711
M_4L	4C/4Q	106	245	476	754
	6C/6Q	140	323	628	995
	7CVP	NA	NA	NA	NA
	8C/8Q	191	441	857	1358
	10C/10Q	232	535	1041	1650
	3P	232	535	1041	1650
	100WS	232	535	1041	1650
	A	140	323	628	995
M_8S	4C/4Q	260	600	1167	1849
	6C/6Q	350	808	1571	2489
	7CVP	600	1385	2692	4267
	8C/8Q	465	1073	2087	3307
	10C/10Q	600	1385	2692	4267
	3P	600	1385	2692	4267
	100WS	600	1385	2692	4267
	A	350	808	1571	2489

Note: _insert port type. See How to Order on page 11 for more information.

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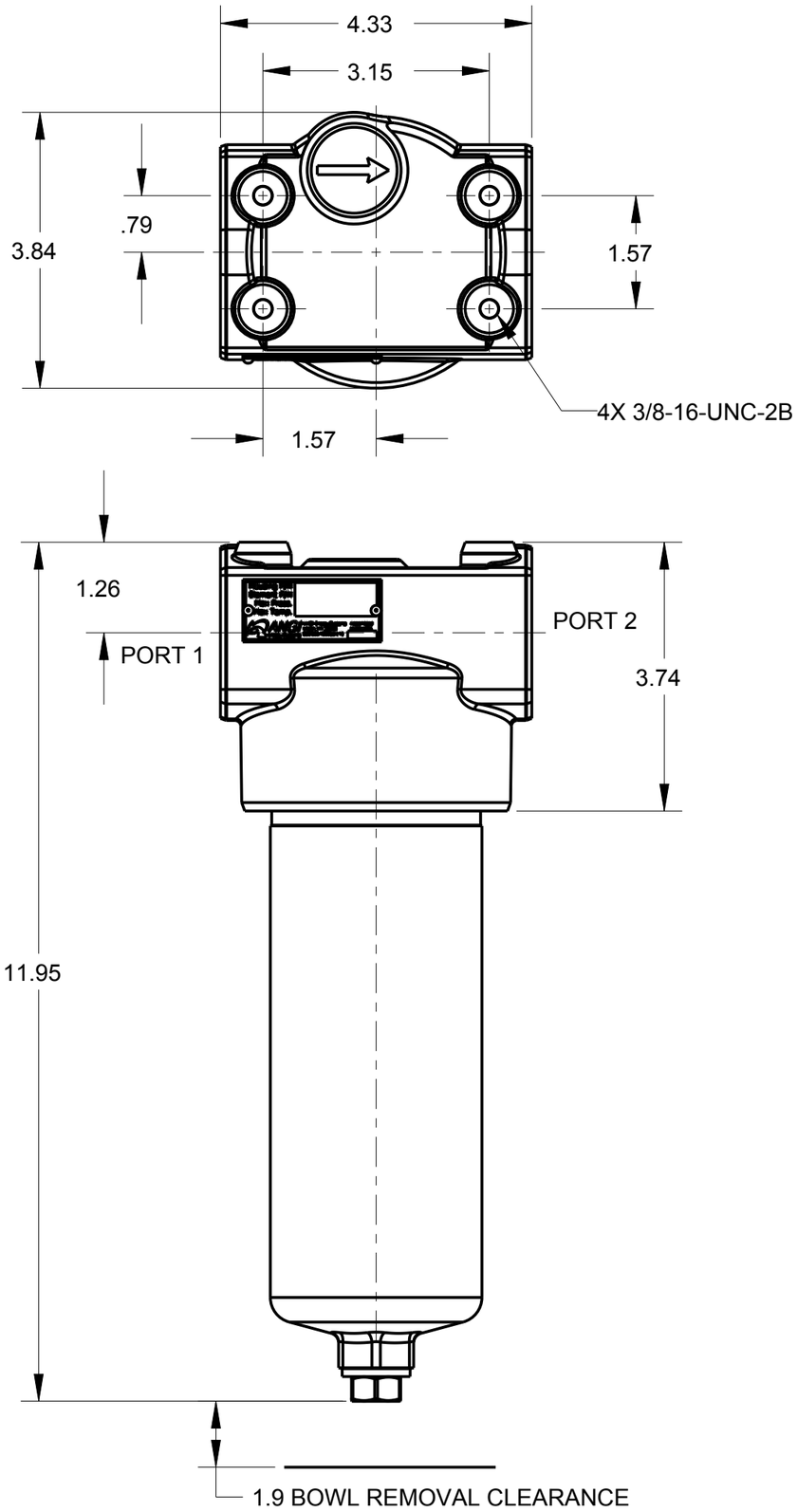
F 170

ANGI
JS3B-WSN

FILTER - SAE-12 JS3B STAINLESS STEEL
SEPARATOR ELEMENT 100 MICRON 5500PSI

ANGI PART NUMBER – 772-07300

ELEMENT – 772-07317



ASSEMBLY NUMBER: JS3B

PORT TYPE & SIZE

FLOW PORTS 1 & 2: SAE-12 (1-1/16-12)

DRAIN: SAE-6 (9/16-18), PLUG INCLUDED
MAXIMUM PRESSURE: 5,500 PSIG
MAXIMUM TEMPERATURE (HOUSING ONLY): 350° F
MAX. DIFFERENTIAL PRESSURE AT ELEMENT REPLACEMENT: 10 PSID
SUMP CAPACITY: 180ML
MOUNTING: LINE MOUNTED, VERTICAL AS SHOWN, MOUNTING HOLES PROVIDED
ASSEMBLY WEIGHT: 13.0 LBS

MATERIALS

HEAD: NICKEL-PLATED SG IRON, POWDER PAINTED WHITE
BOWL: NICKEL-PLATED STEEL, POWDER PAINTED WHITE

DRAIN PLUG: ZINC-PLATED STEEL
SEALS: FLUOROCARBON
NON-WETTED BACKING RING: NITRILE RUBBER
FILTER ELEMENT: SEE TABLE

FILTER ASSEMBLY P/N	REPLACEMENT ELEMENT P/N	MEDIA TYPE	RATED FLOW at 100 PSIG	RATED FLOW at 3000 PSIG	RATED FLOW at 5000 PSIG
772-07300	772-07317	LIQUID SEPARATOR	130 SCFM	3415 SCFM	5685 SCFM

REV	DATE/BY	DESCRIPTION
C	09/10/2012 MDP	UPDATE

REV	DATE/BY	DESCRIPTION

ANGI ENERGY SYSTEMS
15 PLUMB STREET
MILTON, WI 53563
PH: 608-868-4626
FX: 608-868-2723

UNLESS OTHERWISE SPECIFIED
BREAK SHARP EDGES
ALL DIMENSIONS IN INCHES

FRACTIONAL	±.125
TWO PLACE DECIMAL	±.010
THREE PLACE DECIMAL	±.005
ANGLES	±1°

TITLE	FILTER-ANGI SAE-12 JS3B SEPARATOR 100 MICRON (F170)
CUSTOMER	PROJECT NO.
SHEET: 1 of 1	SCALE: 0.500
DRAWN BY: MDP	DATE: 06/27/2011
DRAWING NO.: 772-07300	REV.: C

F 171

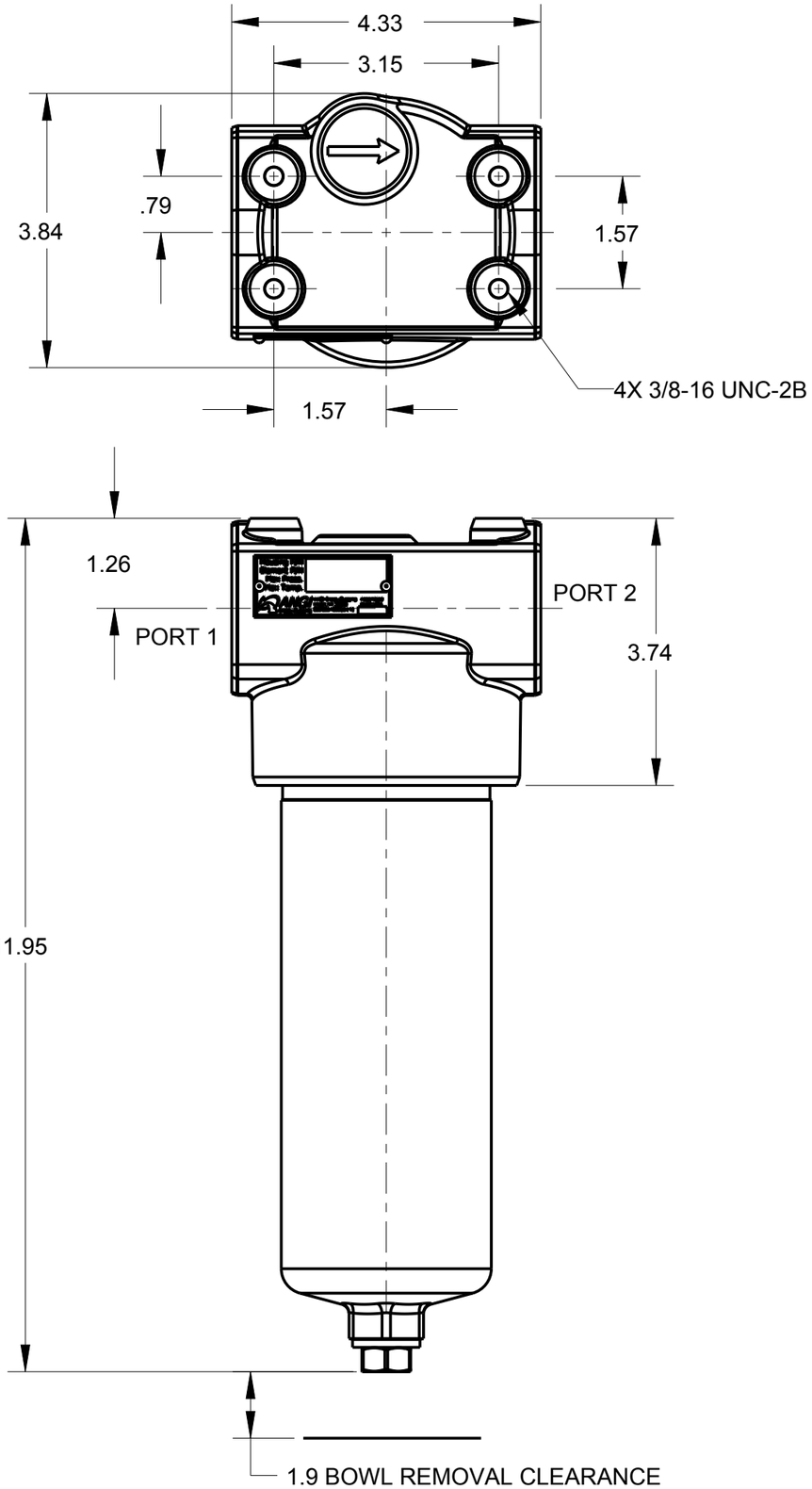
ANGI
JS3B-10CN

FILTER - SAE-12 GR10 COALESCING
ELEMENT 5500PSI

ANGI PART NUMBER – 772-07301

ELEMENT – 772-07318

SEAL KIT – 760-07382



ASSEMBLY NUMBER: JS3B

PORT TYPE & SIZE

FLOW PORTS 1 & 2: SAE-12 (1-1/16-12)

DRAIN: SAE-6 (9/16-18), PLUG INCLUDED
MAXIMUM PRESSURE: 5,500 PSIG
MAXIMUM TEMPERATURE (HOUSING ONLY): 350° F
MAX. DIFFERENTIAL PRESSURE AT ELEMENT REPLACEMENT: 10 PSID
SUMP CAPACITY: 180ML
MOUNTING: LINE MOUNTED, VERTICAL AS SHOWN, MOUNTING HOLES PROVIDED
ASSEMBLY WEIGHT: 13.0 LBS

MATERIALS

HEAD: NICKEL-PLATED SG IRON, POWDER PAINTED WHITE
BOWL: NICKEL-PLATED STEEL, POWDER PAINTED WHITE

DRAIN PLUG: ZINC-PLATED STEEL
SEALS: FLUOROCARBON
NON-WETTED BACKING RING: NITRILE RUBBER
FILTER ELEMENT: SEE TABLE

FILTER ASSEMBLY P/N	REPLACEMENT ELEMENT P/N	MEDIA TYPE	RATED FLOW at 100 PSIG	RATED FLOW at 3000 PSIG	RATED FLOW at 5000 PSIG
772-07301	772-07318	PRE-COALESCER	130 SCFM	3415 SCFM	5685 SCFM

REV	DATE/BY	DESCRIPTION
C	09/10/2012 MDP	UPDATE

ANGI ENERGY SYSTEMS
15 PLUMB STREET
MILTON, WI 53563
PH: 608-868-4626
FX: 608-868-2723

UNLESS OTHERWISE SPECIFIED
BREAK SHARP EDGES
ALL DIMENSIONS IN INCHES

FRACTIONAL	±.125
TWO PLACE DECIMAL	±.010
THREE PLACE DECIMAL	±.005
ANGLES	±1°

TITLE	FILTER-ANGI SAE-12 JS3B GR10 COALESCER (F171)
CUSTOMER	PROJECT NO.
SHEET 1 of 1	SCALE 0.500
DRAWING NO. 772-07301	REV. C
DRAWN BY MDP	DATE 06/27/2011

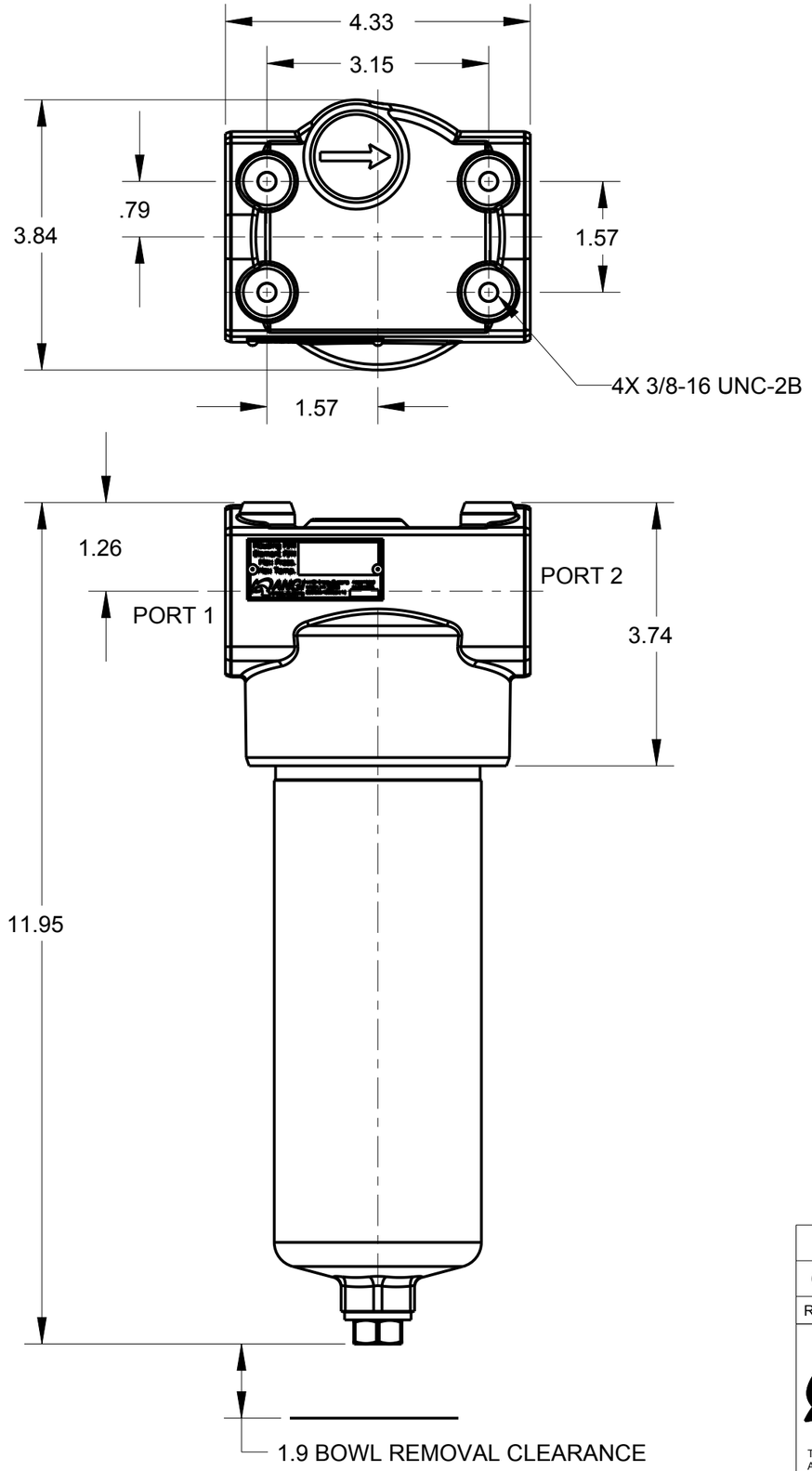
F 172

ANGI
JS3B-4CN

FILTER - SAE-12 GR4 COALESCING
ELEMENT 5500PSI

ANGI PART NUMBER – 772-07302

ELEMENT – 772-07319



ASSEMBLY NUMBER: JS3B

PORT TYPE & SIZE

FLOW PORTS 1 & 2: SAE-12 (1-1/16-12)

DRAIN: SAE-6 (9/16-18), PLUG INCLUDED
MAXIMUM PRESSURE: 5,500 PSIG
MAXIMUM TEMPERATURE (HOUSING ONLY): 350° F
MAX. DIFFERENTIAL PRESSURE AT ELEMENT REPLACEMENT: 10 PSID
SUMP CAPACITY: 180ML
MOUNTING: LINE MOUNTED, VERTICAL AS SHOWN, MOUNTING HOLES PROVIDED
ASSEMBLY WEIGHT: 13.0 LBS

MATERIALS

HEAD: NICKEL-PLATED SG IRON, POWDER PAINTED WHITE
BOWL: NICKEL-PLATED STEEL, POWDER PAINTED WHITE

DRAIN PLUG: ZINC-PLATED STEEL
SEALS: FLUOROCARBON
NON-WETTED BACKING RING: NITRILE RUBBER
FILTER ELEMENT: SEE TABLE

FILTER ASSEMBLY P/N	REPLACEMENT ELEMENT P/N	MEDIA TYPE	RATED FLOW at 100 PSIG	RATED FLOW at 3000 PSIG	RATED FLOW at 5000 PSIG
772-07302	772-07319	COALESCER	60 SCFM	1575 SCFM	2525 SCFM

REV	DATE/BY	DESCRIPTION
C	09/10/2012 MDP	UPDATE

REV	DATE/BY	DESCRIPTION

ANGI ENERGY SYSTEMS
15 PLUMB STREET
MILTON, WI 53563
PH: 608-868-4626
FX: 608-868-2723

UNLESS OTHERWISE SPECIFIED
BREAK SHARP EDGES
ALL DIMENSIONS IN INCHES

FRACTIONAL	±.125
TWO PLACE DECIMAL	±.010
THREE PLACE DECIMAL	±.005
ANGLES	±1°

TITLE	FILTER-ANGI SAE-12 JS3B GR4 COALESCER (F172)		
CUSTOMER		PROJECT NO.	
SHEET 1 of 1	SCALE 0.500	DRAWING NO. 772-07302	REV. C
DRAWN BY MDP	DATE 06/27/2011		

F 173

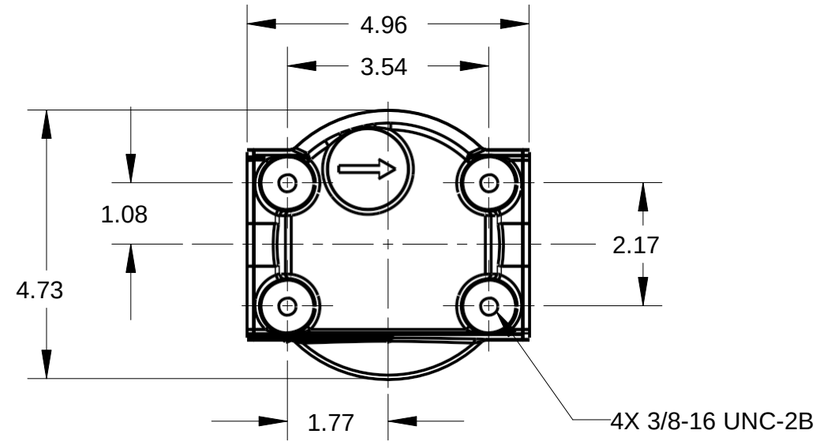
ANGI
JS4C-WSN

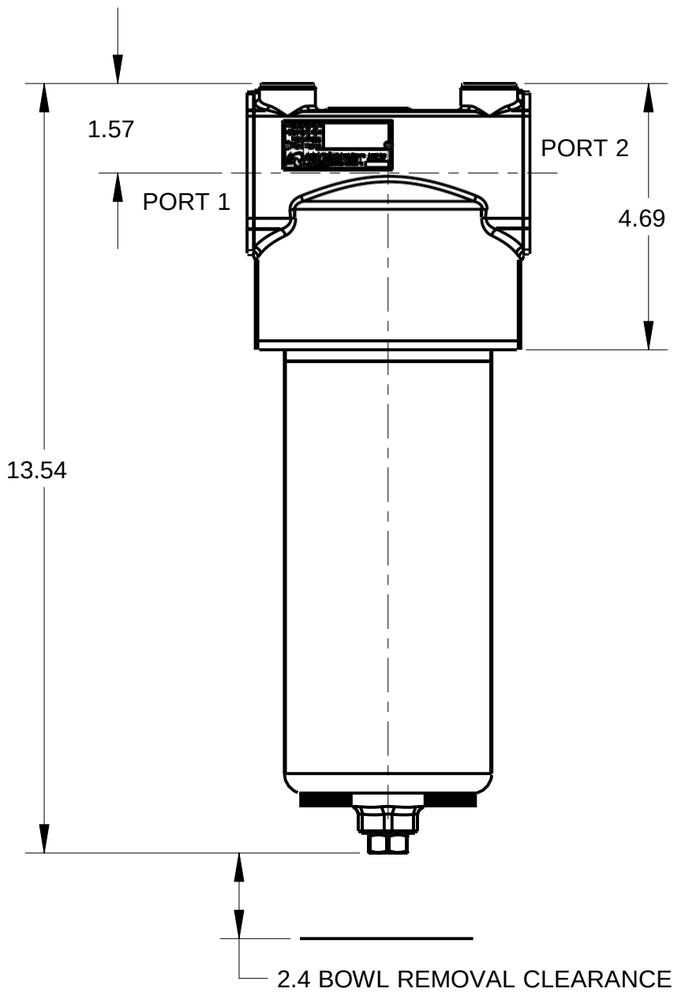
FILTER - SAE-16 STAIMLESS STEEL SEPARATOR
ELEMENT 100 MICRON 5500PSI

ANGI PART NUMBER – 772-07303

ELEMENT – 772-07323

SEAL KIT – 760-07383





ASSEMBLY NUMBER: JS4C

PORT TYPE & SIZE

FLOW PORTS 1 & 2: SAE-16 (1-5/16-12)

DRAIN: SAE-6 (9/16-18), PLUG INCLUDED
MAXIMUM PRESSURE: 5,500 PSIG
MAXIMUM TEMPERATURE (HOUSING ONLY): 350°F
MAX. DIFFERENTIAL PRESSURE AT ELEMENT REPLACEMENT: 10 PSID
SUMP CAPACITY: 230ML
MOUNTING: LINE MOUNTED, VERTICAL AS SHOWN, MOUNTING HOLES PROVIDED
ASSEMBLY WEIGHT: 21.0 LBS

MATERIALS

HEAD: NICKEL-PLATED SG IRON, POWDER PAINTED WHITE
BOWL: NICKEL-PLATED STEEL, POWDER PAINTED WHITE

DRAIN PLUG: ZINC-PLATED STEEL
SEALS: FLUOROCARBON
NON-WETTED BACKING RING: NITRILE RUBBER
FILTER ELEMENT: SEE TABLE

FILTER ASSEMBLY P/N	REPLACEMENT ELEMENT P/N	MEDIA TYPE	RATED FLOW at 100 PSIG	RATED FLOW at 3000 PSIG	RATED FLOW at 5000 PSIG
772-07303	772-07323	LIQUID SEPARATOR	200 SCFM	5255 SCFM	8745 SCFM

REV	DATE/BY	DESCRIPTION
C	09/10/2012 MDP	UPDATE

REV	DATE/BY	DESCRIPTION

ANGI ENERGY SYSTEMS
15 PLUMB STREET
MILTON, WI 53563
PH: 608-868-4626
FX: 608-868-2723

UNLESS OTHERWISE SPECIFIED
BREAK SHARP EDGES
ALL DIMENSIONS IN INCHES
FRACTIONAL ±.125
THREE PLACE DECIMAL ±.005
TWO PLACE DECIMAL ±.010
ANGLES ±1°

TITLE	FILTER-ANGI SAE-16 SEPARATOR 100 MICRON 5500# (F173)
CUSTOMER	PROJECT NO.
SHEET 1 of 1	SCALE 0.375
DRAWING NO. 772-07303	REV. C
DRAWN BY	DATE

G 22

WIKA
50394771

0-200 PSI/BAR PRESSURE GAUGE

ANGI PART NUMBER 741-07240

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WIKA

Industrial Gauges

Type 23X.53

Liquid Fillable

- Stainless Steel Case & Crimp Ring
- Welded Case-to-Socket Connection
- Field Liquid-Fillable

Type 232.53 - Dry case
Type 233.53 - Liquid filled case

The rugged construction of WIKA Type 23X.53 stainless steel gauges provides resistance to the most corrosive media and environments. These gauges feature 316 stainless steel wetted parts and a 304 stainless steel case and crimped ring, and can be liquid-filled in the field.

Standard Features

- **Nominal Case Size:** 2" (53 mm), 2½" (68 mm), 4" (100 mm)
- **Case Material:** 304 stainless steel
- **Wetted Parts:** 316 SS
- **Window Type & Material:** 2½" Polycarbonate; 4" Acrylic
- **Removable Window:** No
- **Dial Material:** White aluminum
- **Bezel Ring Type & Material:** Crimp on SS polished
- **Liquid Fillable Gauge:** Yes
- **Case-to-Socket O-ring Material:** Welded
- **"Other" Gaskets/O-ring Types & Materials:** Window gasket, BUNA-N
- **Pointer Material/Type:** Black aluminum
- **Adjustable Pointer:** No
- **Accuracy:** ±1.5% of span (2" & 2½"); (4") ± 1.0% of span-ASME B40.100 Grade 1A
- **Connection locations:** LM (Lower Mount), CBM (Center Back Mount) & LBM (Lower Back Mount) (4" only)
- **Media Operating Temperature:** 212°F
- **Ambient Operating Temperature:** -40°F to 140°F dry; -4°F to 140°F glycerine case fill; -40°F to 140°F silicone case fill

Available Options
"Dampened Movement" Option: Yes, (N/A on 2½" CBM or 2" LM/CBM) & LBM
U-Clamp Bracket: Yes (CBM only)
Front Flange: Yes (CBM & LBM only)
Rear Flange: Yes (LM, CBM & LBM)
Restrictor: Yes
Safety Glass Window: No
Instrument Glass Window (flat glass): No
Drag Pointer (maximum reading indicator): Yes
Cleaned for Use in Oxygen Service: Yes
Panel Mount Kit: Yes (see front flange or u-clamp option)
Magnetic or Inductive Contact Switches: No
Receiver Gauge Scales: Yes
Special Connection: Limited to wrench flat area

Type	232.53				
Connection	LM	CBM			
Conn. Size	1/4" NPT				
Size	2½"				
Pressure Scale[1]	PSI	PSI	PSI/BAR	PSI/KPA	PSI/KG/CM²
30" Hg	9768777	9768394			
30"-0-15 PSI					
30"-0-30 PSI	9768769	9768386			
30"-0-60 PSI	9768750	9768378			
30"-0-100 PSI					
30"-0-160 PSI	9768742	9768360			
30"-0-200 PSI					
15 PSI	9768734	9768351			
30 PSI	9768726	9768343			
60 PSI	9768718	9768335	8992848	8993089	8992962
100 PSI	9768700	9768327	8992856	8993097	8992970
160 PSI	9768696	9768319	8992865	8993101	8992988
200 PSI	9768688	9768300	8992873	8993119	8992996
300 PSI	9768670	9768297	8992881	8993127	8993004
400 PSI	9768661	9768289			
600 PSI	9768653	9768270	9779685	9779693	
800 PSI					
1,000 PSI	9768645	9768262	8992899	8993135	8993012
1,500 PSI	9768637	9768254	8992903	8993144	8993020
2,000 PSI	9768629	9768246	8992911	8993152	8993038
3,000 PSI	9768610	9768238	8992929	8993160	8993046
5,000 PSI	9768602	9768220	8992937	8993178	8993055
6,000 PSI		8993208	8992945	8993186	8993063
10,000 PSI	9768599	9768211	8992954	8993195	8993071
15,000 PSI		9779715	9776715		9779731

[1]"PSI/BAR" denotes dual scale; PSI outside in black, BAR inside in red; "PSI/KPA" denotes dual scale; PSI outside in black, KPA inside in red; "PSI/KG/CM²" denotes dual scale; PSI outside in black, KG/CM² inside in red. Note: Vacuum scale: 30" Hg outside in black; 760 mm Hg inside in red. [2]

Note: For options not shown - consult your WIKA Distributor or the Factory.

Data sheet: 23X.53

For liquid filled gauges, add "-829" to part numbers above for 2½" size or "-834" for 4" size.

Items shown with part numbers indicate readily available standard WIKA products. Items shown without part numbers are available on special order.

WIKA

Type	232.53- liquid fillable		
Connection	LM	LM	LBM
Conn. Size	1/4" NPT	1/2" NPT	
Size	4"		
Pressure Scale	PSI	PSI	PSI
30" Hg	9767576	9768459	9737057
30"-0-15 PSI	9737910	9768467	9737065
30"-0-30 PSI	9767398	9768475	9737073
30"-0-60 PSI	9767401	9768483	9737081
30"-0-100 PSI	9737898	9737880	9737090
30"-0-160 PSI	9767410	9768491	9737103
30"-0-200 PSI	9737901	9768505	9737111
30"-0-300 PSI	4260147		
30"-0-400 PSI	4260155		
15 PSI	9767428	9768513	9737120
30 PSI	9767436	9768521	9737138
60 PSI	9767444	9768530	9737146
100 PSI	9767452	9768548	9737154
160 PSI	9767460	9768556	9737162
200 PSI	9767479	9768564	9737170
300 PSI	9767487	9768572	9737189
400 PSI	9767495	9768580	9737197
600 PSI	9767509	9768963	9737200
800 PSI			9737219
1,000 PSI	9767517	9768858	9737227
1,500 PSI		9768866	9737235
2,000 PSI		9768807	9737243
3,000 PSI		9768874	9737251
5,000 PSI		9768823	9737260
10,000 PSI		9768831	9737278
15,000 PSI		9768840	9737286

Type	233.53- glycerine filled				
Connection	LM		LM	LBM	CBM
Conn. Size	1/4" NPT		1/2" NPT		1/4" NPT
Size	2½"	4"	4"		2½"
Pressure Scale	PSI	PSI	PSI	PSI	PSI
30" Hg	9833646	9833124	9833328	9831504	9833310
30"-0-15 PSI		9831775	9833336	9831512	
30"-0-30 PSI	9833638	9832993	9833345	9831520	9833302
30"-0-60 PSI	9833620	9833000	9833353	9831538	9833298
30"-0-100 PSI		9831759	9831741	9831546	
30"-0-160 PSI	9833612	9833018	9833361	9831555	9833280
30"-0-200 PSI		9831767	9833379	9831563	
30"-0-300 PSI					
30"-0-400 PSI					
15 PSI	9833604	9833026	9833387	9831571	9833272
30 PSI	9833590	9833035	9833395	9831589	9833264
60 PSI	9833582	9833043	9833409	9831597	9833255
100 PSI	9833574	9833051	9833417	9831601	9833247
160 PSI	9833565	9833069	9833425	9831619	9833239
200 PSI	9833557	9833077	9833434	9831627	9833221
300 PSI	9833549	9833085	9833442	9831635	9833213
400 PSI	9833531	9833094	9833450	9831644	9833205
600 PSI	9833523	9833107	9833727	9831652	9833191
800 PSI					
1,000 PSI	9833515	9833115	9833697	9831678	9833183
1,500 PSI	9833506		9833701	9831686	9833175
2,000 PSI	9833493		9833655	9831695	9833166
3,000 PSI	9833485		9833719	9831708	9833158
5,000 PSI	9833476		9833663	9831716	9833140
10,000 PSI	9833468		9833671	9831725	9833132
15,000 PSI			9833689	9831733	

Type	232.53- Stock Gauges with Ammonia Scales	
Size	2 ½"	4"
Connection	LM	
Conn. Size	1/4" NPT	
30"-0-150 PSI / 84°F	9797144	9797127
30"-0-300 PSI / 126°F	9797152	9797135

G 23

WIKA
50395670

0-300 PSI/BAR PRESSURE GAUGE

ANGI PART NUMBER 741-07241

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WIKA

Industrial Gauges

Type 23X.53

Liquid Fillable

- Stainless Steel Case & Crimp Ring
- Welded Case-to-Socket Connection
- Field Liquid-Fillable

Type 232.53 - Dry case
Type 233.53 - Liquid filled case

The rugged construction of WIKA Type 23X.53 stainless steel gauges provides resistance to the most corrosive media and environments. These gauges feature 316 stainless steel wetted parts and a 304 stainless steel case and crimped ring, and can be liquid-filled in the field.

Standard Features

- **Nominal Case Size:** 2" (53 mm), 2½" (68 mm), 4" (100 mm)
- **Case Material:** 304 stainless steel
- **Wetted Parts:** 316 SS
- **Window Type & Material:** 2½" Polycarbonate; 4" Acrylic
- **Removable Window:** No
- **Dial Material:** White aluminum
- **Bezel Ring Type & Material:** Crimp on SS polished
- **Liquid Fillable Gauge:** Yes
- **Case-to-Socket O-ring Material:** Welded
- **"Other" Gaskets/O-ring Types & Materials:** Window gasket, BUNA-N
- **Pointer Material/Type:** Black aluminum
- **Adjustable Pointer:** No
- **Accuracy:** ±1.5% of span (2" & 2½"); (4") ± 1.0% of span-ASME B40.100 Grade 1A
- **Connection locations:** LM (Lower Mount), CBM (Center Back Mount) & LBM (Lower Back Mount) (4" only)
- **Media Operating Temperature:** 212°F
- **Ambient Operating Temperature:** -40°F to 140°F dry; -4°F to 140°F glycerine case fill; -40°F to 140°F silicone case fill

Available Options
"Dampened Movement" Option: Yes, (N/A on 2½" CBM or 2" LM/CBM) & LBM
U-Clamp Bracket: Yes (CBM only)
Front Flange: Yes (CBM & LBM only)
Rear Flange: Yes (LM, CBM & LBM)
Restrictor: Yes
Safety Glass Window: No
Instrument Glass Window (flat glass): No
Drag Pointer (maximum reading indicator): Yes
Cleaned for Use in Oxygen Service: Yes
Panel Mount Kit: Yes (see front flange or u-clamp option)
Magnetic or Inductive Contact Switches: No
Receiver Gauge Scales: Yes
Special Connection: Limited to wrench flat area

Type	232.53				
Connection	LM		CBM		
Conn. Size	1/4" NPT				
Size	2½"				
Pressure Scale[1]	PSI	PSI	PSI/BAR	PSI/KPA	PSI/KG/CM²
30" Hg	9768777	9768394			
30"-0-15 PSI					
30"-0-30 PSI	9768769	9768386			
30"-0-60 PSI	9768750	9768378			
30"-0-100 PSI					
30"-0-160 PSI	9768742	9768360			
30"-0-200 PSI					
15 PSI	9768734	9768351			
30 PSI	9768726	9768343			
60 PSI	9768718	9768335	8992848	8993089	8992962
100 PSI	9768700	9768327	8992856	8993097	8992970
160 PSI	9768696	9768319	8992865	8993101	8992988
200 PSI	9768688	9768300	8992873	8993119	8992996
300 PSI	9768670	9768297	8992881	8993127	8993004
400 PSI	9768661	9768289			
600 PSI	9768653	9768270	9779685	9779693	
800 PSI					
1,000 PSI	9768645	9768262	8992899	8993135	8993012
1,500 PSI	9768637	9768254	8992903	8993144	8993020
2,000 PSI	9768629	9768246	8992911	8993152	8993038
3,000 PSI	9768610	9768238	8992929	8993160	8993046
5,000 PSI	9768602	9768220	8992937	8993178	8993055
6,000 PSI		8993208	8992945	8993186	8993063
10,000 PSI	9768599	9768211	8992954	8993195	8993071
15,000 PSI		9779715	9776715		9779731

[1]"PSI/BAR" denotes dual scale; PSI outside in black, BAR inside in red; "PSI/KPA" denotes dual scale; PSI outside in black, KPA inside in red; "PSI/KG/CM²" denotes dual scale; PSI outside in black, KG/CM² inside in red. Note: Vacuum scale: 30" Hg outside in black; 760 mm Hg inside in red. [2]

Note: For options not shown - consult your WIKA Distributor or the Factory.

Data sheet: 23X.53

For liquid filled gauges, add "-829" to part numbers above for 2½" size or "-834" for 4" size.

Items shown with part numbers indicate readily available standard WIKA products. Items shown without part numbers are available on special order.

WIKA

Type	232.53- liquid fillable		
Connection	LM	LM	LBM
Conn. Size	1/4" NPT	1/2" NPT	
Size	4"		
Pressure Scale	PSI	PSI	PSI
30" Hg	9767576	9768459	9737057
30"-0-15 PSI	9737910	9768467	9737065
30"-0-30 PSI	9767398	9768475	9737073
30"-0-60 PSI	9767401	9768483	9737081
30"-0-100 PSI	9737898	9737880	9737090
30"-0-160 PSI	9767410	9768491	9737103
30"-0-200 PSI	9737901	9768505	9737111
30"-0-300 PSI	4260147		
30"-0-400 PSI	4260155		
15 PSI	9767428	9768513	9737120
30 PSI	9767436	9768521	9737138
60 PSI	9767444	9768530	9737146
100 PSI	9767452	9768548	9737154
160 PSI	9767460	9768556	9737162
200 PSI	9767479	9768564	9737170
300 PSI	9767487	9768572	9737189
400 PSI	9767495	9768580	9737197
600 PSI	9767509	9768963	9737200
800 PSI			9737219
1,000 PSI	9767517	9768858	9737227
1,500 PSI		9768866	9737235
2,000 PSI		9768807	9737243
3,000 PSI		9768874	9737251
5,000 PSI		9768823	9737260
10,000 PSI		9768831	9737278
15,000 PSI		9768840	9737286

Type	233.53- glycerine filled				
Connection	LM		LM	LBM	CBM
Conn. Size	1/4" NPT		1/2" NPT		1/4" NPT
Size	2½"	4"	4"		2½"
Pressure Scale	PSI	PSI	PSI	PSI	PSI
30" Hg	9833646	9833124	9833328	9831504	9833310
30"-0-15 PSI		9831775	9833336	9831512	
30"-0-30 PSI	9833638	9832993	9833345	9831520	9833302
30"-0-60 PSI	9833620	9833000	9833353	9831538	9833298
30"-0-100 PSI		9831759	9831741	9831546	
30"-0-160 PSI	9833612	9833018	9833361	9831555	9833280
30"-0-200 PSI		9831767	9833379	9831563	
30"-0-300 PSI					
30"-0-400 PSI					
15 PSI	9833604	9833026	9833387	9831571	9833272
30 PSI	9833590	9833035	9833395	9831589	9833264
60 PSI	9833582	9833043	9833409	9831597	9833255
100 PSI	9833574	9833051	9833417	9831601	9833247
160 PSI	9833565	9833069	9833425	9831619	9833239
200 PSI	9833557	9833077	9833434	9831627	9833221
300 PSI	9833549	9833085	9833442	9831635	9833213
400 PSI	9833531	9833094	9833450	9831644	9833205
600 PSI	9833523	9833107	9833727	9831652	9833191
800 PSI					
1,000 PSI	9833515	9833115	9833697	9831678	9833183
1,500 PSI	9833506		9833701	9831686	9833175
2,000 PSI	9833493		9833655	9831695	9833166
3,000 PSI	9833485		9833719	9831708	9833158
5,000 PSI	9833476		9833663	9831716	9833140
10,000 PSI	9833468		9833671	9831725	9833132
15,000 PSI			9833689	9831733	

Type	232.53- Stock Gauges with Ammonia Scales	
Size	2 ½"	4"
Connection	LM	
Conn. Size	1/4" NPT	
30"-0-150 PSI / 84°F	9797144	9797127
30"-0-300 PSI / 126°F	9797152	9797135

G 25

WIKA
9779685-0002

0-600 PSI/BAR PRESSURE GAUGE

ANGI PART NUMBER 741-07243

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WIKA

Industrial Gauges

Type 23X.53

Liquid Fillable

- Stainless Steel Case & Crimp Ring
- Welded Case-to-Socket Connection
- Field Liquid-Fillable

Type 232.53 - Dry case
Type 233.53 - Liquid filled case

The rugged construction of WIKA Type 23X.53 stainless steel gauges provides resistance to the most corrosive media and environments. These gauges feature 316 stainless steel wetted parts and a 304 stainless steel case and crimped ring, and can be liquid-filled in the field.

Standard Features

- **Nominal Case Size:** 2" (53 mm), 2½" (68 mm), 4" (100 mm)
- **Case Material:** 304 stainless steel
- **Wetted Parts:** 316 SS
- **Window Type & Material:** 2½" Polycarbonate; 4" Acrylic
- **Removable Window:** No
- **Dial Material:** White aluminum
- **Bezel Ring Type & Material:** Crimp on SS polished
- **Liquid Fillable Gauge:** Yes
- **Case-to-Socket O-ring Material:** Welded
- **"Other" Gaskets/O-ring Types & Materials:** Window gasket, BUNA-N
- **Pointer Material/Type:** Black aluminum
- **Adjustable Pointer:** No
- **Accuracy:** ±1.5% of span (2" & 2½"); (4") ± 1.0% of span-ASME B40.100 Grade 1A
- **Connection locations:** LM (Lower Mount), CBM (Center Back Mount) & LBM (Lower Back Mount) (4" only)
- **Media Operating Temperature:** 212°F
- **Ambient Operating Temperature:** -40°F to 140°F dry; -4°F to 140°F glycerine case fill; -40°F to 140°F silicone case fill

Available Options
"Dampened Movement" Option: Yes, (N/A on 2½" CBM or 2" LM/CBM) & LBM
U-Clamp Bracket: Yes (CBM only)
Front Flange: Yes (CBM & LBM only)
Rear Flange: Yes (LM, CBM & LBM)
Restrictor: Yes
Safety Glass Window: No
Instrument Glass Window (flat glass): No
Drag Pointer (maximum reading indicator): Yes
Cleaned for Use in Oxygen Service: Yes
Panel Mount Kit: Yes (see front flange or u-clamp option)
Magnetic or Inductive Contact Switches: No
Receiver Gauge Scales: Yes
Special Connection: Limited to wrench flat area

Type	232.53				
Connection	LM	CBM			
Conn. Size	1/4" NPT				
Size	2½"				
Pressure Scale[1]	PSI	PSI	PSI/BAR	PSI/KPA	PSI/KG/CM²
30" Hg	9768777	9768394			
30"-0-15 PSI					
30"-0-30 PSI	9768769	9768386			
30"-0-60 PSI	9768750	9768378			
30"-0-100 PSI					
30"-0-160 PSI	9768742	9768360			
30"-0-200 PSI					
15 PSI	9768734	9768351			
30 PSI	9768726	9768343			
60 PSI	9768718	9768335	8992848	8993089	8992962
100 PSI	9768700	9768327	8992856	8993097	8992970
160 PSI	9768696	9768319	8992865	8993101	8992988
200 PSI	9768688	9768300	8992873	8993119	8992996
300 PSI	9768670	9768297	8992881	8993127	8993004
400 PSI	9768661	9768289			
600 PSI	9768653	9768270	9779685	9779693	
800 PSI					
1,000 PSI	9768645	9768262	8992899	8993135	8993012
1,500 PSI	9768637	9768254	8992903	8993144	8993020
2,000 PSI	9768629	9768246	8992911	8993152	8993038
3,000 PSI	9768610	9768238	8992929	8993160	8993046
5,000 PSI	9768602	9768220	8992937	8993178	8993055
6,000 PSI		8993208	8992945	8993186	8993063
10,000 PSI	9768599	9768211	8992954	8993195	8993071
15,000 PSI		9779715	9776715		9779731

[1]"PSI/BAR" denotes dual scale; PSI outside in black, BAR inside in red; "PSI/KPA" denotes dual scale; PSI outside in black, KPA inside in red; "PSI/KG/CM²" denotes dual scale; PSI outside in black, KG/CM² inside in red. Note: Vacuum scale: 30" Hg outside in black; 760 mm Hg inside in red. [2]

Note: For options not shown - consult your WIKA Distributor or the Factory.

Data sheet: 23X.53

For liquid filled gauges, add "-829" to part numbers above for 2½" size or "-834" for 4" size.

Items shown with part numbers indicate readily available standard WIKA products. Items shown without part numbers are available on special order.

WIKA

Type	232.53- liquid fillable		
Connection	LM	LM	LBM
Conn. Size	1/4" NPT	1/2" NPT	
Size	4"		
Pressure Scale	PSI	PSI	PSI
30" Hg	9767576	9768459	9737057
30"-0-15 PSI	9737910	9768467	9737065
30"-0-30 PSI	9767398	9768475	9737073
30"-0-60 PSI	9767401	9768483	9737081
30"-0-100 PSI	9737898	9737880	9737090
30"-0-160 PSI	9767410	9768491	9737103
30"-0-200 PSI	9737901	9768505	9737111
30"-0-300 PSI	4260147		
30"-0-400 PSI	4260155		
15 PSI	9767428	9768513	9737120
30 PSI	9767436	9768521	9737138
60 PSI	9767444	9768530	9737146
100 PSI	9767452	9768548	9737154
160 PSI	9767460	9768556	9737162
200 PSI	9767479	9768564	9737170
300 PSI	9767487	9768572	9737189
400 PSI	9767495	9768580	9737197
600 PSI	9767509	9768963	9737200
800 PSI			9737219
1,000 PSI	9767517	9768858	9737227
1,500 PSI		9768866	9737235
2,000 PSI		9768807	9737243
3,000 PSI		9768874	9737251
5,000 PSI		9768823	9737260
10,000 PSI		9768831	9737278
15,000 PSI		9768840	9737286

Type	233.53- glycerine filled				
Connection	LM		LM	LBM	CBM
Conn. Size	1/4" NPT		1/2" NPT		1/4" NPT
Size	2½"	4"	4"		2½"
Pressure Scale	PSI	PSI	PSI	PSI	PSI
30" Hg	9833646	9833124	9833328	9831504	9833310
30"-0-15 PSI		9831775	9833336	9831512	
30"-0-30 PSI	9833638	9832993	9833345	9831520	9833302
30"-0-60 PSI	9833620	9833000	9833353	9831538	9833298
30"-0-100 PSI		9831759	9831741	9831546	
30"-0-160 PSI	9833612	9833018	9833361	9831555	9833280
30"-0-200 PSI		9831767	9833379	9831563	
30"-0-300 PSI					
30"-0-400 PSI					
15 PSI	9833604	9833026	9833387	9831571	9833272
30 PSI	9833590	9833035	9833395	9831589	9833264
60 PSI	9833582	9833043	9833409	9831597	9833255
100 PSI	9833574	9833051	9833417	9831601	9833247
160 PSI	9833565	9833069	9833425	9831619	9833239
200 PSI	9833557	9833077	9833434	9831627	9833221
300 PSI	9833549	9833085	9833442	9831635	9833213
400 PSI	9833531	9833094	9833450	9831644	9833205
600 PSI	9833523	9833107	9833727	9831652	9833191
800 PSI					
1,000 PSI	9833515	9833115	9833697	9831678	9833183
1,500 PSI	9833506		9833701	9831686	9833175
2,000 PSI	9833493		9833655	9831695	9833166
3,000 PSI	9833485		9833719	9831708	9833158
5,000 PSI	9833476		9833663	9831716	9833140
10,000 PSI	9833468		9833671	9831725	9833132
15,000 PSI			9833689	9831733	

Type	232.53- Stock Gauges with Ammonia Scales	
Size	2 ½"	4"
Connection	LM	
Conn. Size	1/4" NPT	
30"-0-150 PSI / 84°F	9797144	9797127
30"-0-300 PSI / 126°F	9797152	9797135

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WIKA
8992929-0003

0-3000 PSI/BAR PRESSURE GAUGE

ANGI PART NUMBER 741-07245

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WIKA

Industrial Gauges

Type 23X.53

Liquid Fillable

- Stainless Steel Case & Crimp Ring
- Welded Case-to-Socket Connection
- Field Liquid-Fillable

Type 232.53 - Dry case
Type 233.53 - Liquid filled case

The rugged construction of WIKA Type 23X.53 stainless steel gauges provides resistance to the most corrosive media and environments. These gauges feature 316 stainless steel wetted parts and a 304 stainless steel case and crimped ring, and can be liquid-filled in the field.

Standard Features

- **Nominal Case Size:** 2" (53 mm), 2½" (68 mm), 4" (100 mm)
- **Case Material:** 304 stainless steel
- **Wetted Parts:** 316 SS
- **Window Type & Material:** 2½" Polycarbonate; 4" Acrylic
- **Removable Window:** No
- **Dial Material:** White aluminum
- **Bezel Ring Type & Material:** Crimp on SS polished
- **Liquid Fillable Gauge:** Yes
- **Case-to-Socket O-ring Material:** Welded
- **"Other" Gaskets/O-ring Types & Materials:** Window gasket, BUNA-N
- **Pointer Material/Type:** Black aluminum
- **Adjustable Pointer:** No
- **Accuracy:** ±1.5% of span (2" & 2½"); (4") ± 1.0% of span-ASME B40.100 Grade 1A
- **Connection locations:** LM (Lower Mount), CBM (Center Back Mount) & LBM (Lower Back Mount) (4" only)
- **Media Operating Temperature:** 212°F
- **Ambient Operating Temperature:** -40°F to 140°F dry; -4°F to 140°F glycerine case fill; -40°F to 140°F silicone case fill

Available Options
"Dampened Movement" Option: Yes, (N/A on 2½" CBM or 2" LM/CBM) & LBM
U-Clamp Bracket: Yes (CBM only)
Front Flange: Yes (CBM & LBM only)
Rear Flange: Yes (LM, CBM & LBM)
Restrictor: Yes
Safety Glass Window: No
Instrument Glass Window (flat glass): No
Drag Pointer (maximum reading indicator): Yes
Cleaned for Use in Oxygen Service: Yes
Panel Mount Kit: Yes (see front flange or u-clamp option)
Magnetic or Inductive Contact Switches: No
Receiver Gauge Scales: Yes
Special Connection: Limited to wrench flat area

Type	232.53				
Connection	LM	CBM			
Conn. Size	1/4" NPT				
Size	2½"				
Pressure Scale[1]	PSI	PSI	PSI/BAR	PSI/KPA	PSI/KG/CM²
30" Hg	9768777	9768394			
30"-0-15 PSI					
30"-0-30 PSI	9768769	9768386			
30"-0-60 PSI	9768750	9768378			
30"-0-100 PSI					
30"-0-160 PSI	9768742	9768360			
30"-0-200 PSI					
15 PSI	9768734	9768351			
30 PSI	9768726	9768343			
60 PSI	9768718	9768335	8992848	8993089	8992962
100 PSI	9768700	9768327	8992856	8993097	8992970
160 PSI	9768696	9768319	8992865	8993101	8992988
200 PSI	9768688	9768300	8992873	8993119	8992996
300 PSI	9768670	9768297	8992881	8993127	8993004
400 PSI	9768661	9768289			
600 PSI	9768653	9768270	9779685	9779693	
800 PSI					
1,000 PSI	9768645	9768262	8992899	8993135	8993012
1,500 PSI	9768637	9768254	8992903	8993144	8993020
2,000 PSI	9768629	9768246	8992911	8993152	8993038
3,000 PSI	9768610	9768238	8992929	8993160	8993046
5,000 PSI	9768602	9768220	8992937	8993178	8993055
6,000 PSI		8993208	8992945	8993186	8993063
10,000 PSI	9768599	9768211	8992954	8993195	8993071
15,000 PSI		9779715	9776715		9779731

[1]"PSI/BAR" denotes dual scale; PSI outside in black, BAR inside in red; "PSI/KPA" denotes dual scale; PSI outside in black, KPA inside in red; "PSI/KG/CM²" denotes dual scale; PSI outside in black, KG/CM² inside in red. Note: Vacuum scale: 30" Hg outside in black; 760 mm Hg inside in red. [2]

Note: For options not shown - consult your WIKA Distributor or the Factory.

Data sheet: 23X.53

For liquid filled gauges, add "-829" to part numbers above for 2½" size or "-834" for 4" size.

Items shown with part numbers indicate readily available standard WIKA products. Items shown without part numbers are available on special order.

WIKA

Type	232.53- liquid fillable		
Connection	LM	LM	LBM
Conn. Size	1/4" NPT	1/2" NPT	
Size	4"		
Pressure Scale	PSI	PSI	PSI
30" Hg	9767576	9768459	9737057
30"-0-15 PSI	9737910	9768467	9737065
30"-0-30 PSI	9767398	9768475	9737073
30"-0-60 PSI	9767401	9768483	9737081
30"-0-100 PSI	9737898	9737880	9737090
30"-0-160 PSI	9767410	9768491	9737103
30"-0-200 PSI	9737901	9768505	9737111
30"-0-300 PSI	4260147		
30"-0-400 PSI	4260155		
15 PSI	9767428	9768513	9737120
30 PSI	9767436	9768521	9737138
60 PSI	9767444	9768530	9737146
100 PSI	9767452	9768548	9737154
160 PSI	9767460	9768556	9737162
200 PSI	9767479	9768564	9737170
300 PSI	9767487	9768572	9737189
400 PSI	9767495	9768580	9737197
600 PSI	9767509	9768963	9737200
800 PSI			9737219
1,000 PSI	9767517	9768858	9737227
1,500 PSI		9768866	9737235
2,000 PSI		9768807	9737243
3,000 PSI		9768874	9737251
5,000 PSI		9768823	9737260
10,000 PSI		9768831	9737278
15,000 PSI		9768840	9737286

Type	233.53- glycerine filled				
Connection	LM		LM	LBM	CBM
Conn. Size	1/4" NPT		1/2" NPT		1/4" NPT
Size	2½"	4"	4"		2½"
Pressure Scale	PSI	PSI	PSI	PSI	PSI
30" Hg	9833646	9833124	9833328	9831504	9833310
30"-0-15 PSI		9831775	9833336	9831512	
30"-0-30 PSI	9833638	9832993	9833345	9831520	9833302
30"-0-60 PSI	9833620	9833000	9833353	9831538	9833298
30"-0-100 PSI		9831759	9831741	9831546	
30"-0-160 PSI	9833612	9833018	9833361	9831555	9833280
30"-0-200 PSI		9831767	9833379	9831563	
30"-0-300 PSI					
30"-0-400 PSI					
15 PSI	9833604	9833026	9833387	9831571	9833272
30 PSI	9833590	9833035	9833395	9831589	9833264
60 PSI	9833582	9833043	9833409	9831597	9833255
100 PSI	9833574	9833051	9833417	9831601	9833247
160 PSI	9833565	9833069	9833425	9831619	9833239
200 PSI	9833557	9833077	9833434	9831627	9833221
300 PSI	9833549	9833085	9833442	9831635	9833213
400 PSI	9833531	9833094	9833450	9831644	9833205
600 PSI	9833523	9833107	9833727	9831652	9833191
800 PSI					
1,000 PSI	9833515	9833115	9833697	9831678	9833183
1,500 PSI	9833506		9833701	9831686	9833175
2,000 PSI	9833493		9833655	9831695	9833166
3,000 PSI	9833485		9833719	9831708	9833158
5,000 PSI	9833476		9833663	9831716	9833140
10,000 PSI	9833468		9833671	9831725	9833132
15,000 PSI			9833689	9831733	

Type	232.53- Stock Gauges with Ammonia Scales	
Size	2 ½"	4"
Connection	LM	
Conn. Size	1/4" NPT	
30"-0-150 PSI / 84°F	9797144	9797127
30"-0-300 PSI / 126°F	9797152	9797135

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WIKA
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0-1000 PSI/BAR PRESSURE GAUGE

ANGI PART NUMBER 741-07251

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WIKA

Industrial Gauges

Type 23X.53

Liquid Fillable

- Stainless Steel Case & Crimp Ring
- Welded Case-to-Socket Connection
- Field Liquid-Fillable

Type 232.53 - Dry case
Type 233.53 - Liquid filled case

The rugged construction of WIKA Type 23X.53 stainless steel gauges provides resistance to the most corrosive media and environments. These gauges feature 316 stainless steel wetted parts and a 304 stainless steel case and crimped ring, and can be liquid-filled in the field.

Standard Features

- **Nominal Case Size:** 2" (53 mm), 2½" (68 mm), 4" (100 mm)
- **Case Material:** 304 stainless steel
- **Wetted Parts:** 316 SS
- **Window Type & Material:** 2½" Polycarbonate; 4" Acrylic
- **Removable Window:** No
- **Dial Material:** White aluminum
- **Bezel Ring Type & Material:** Crimp on SS polished
- **Liquid Fillable Gauge:** Yes
- **Case-to-Socket O-ring Material:** Welded
- **"Other" Gaskets/O-ring Types & Materials:** Window gasket, BUNA-N
- **Pointer Material/Type:** Black aluminum
- **Adjustable Pointer:** No
- **Accuracy:** ±1.5% of span (2" & 2½"); (4") ± 1.0% of span-ASME B40.100 Grade 1A
- **Connection locations:** LM (Lower Mount), CBM (Center Back Mount) & LBM (Lower Back Mount) (4" only)
- **Media Operating Temperature:** 212°F
- **Ambient Operating Temperature:** -40°F to 140°F dry; -4°F to 140°F glycerine case fill; -40°F to 140°F silicone case fill

Available Options
"Dampened Movement" Option: Yes, (N/A on 2½" CBM or 2" LM/CBM) & LBM
U-Clamp Bracket: Yes (CBM only)
Front Flange: Yes (CBM & LBM only)
Rear Flange: Yes (LM, CBM & LBM)
Restrictor: Yes
Safety Glass Window: No
Instrument Glass Window (flat glass): No
Drag Pointer (maximum reading indicator): Yes
Cleaned for Use in Oxygen Service: Yes
Panel Mount Kit: Yes (see front flange or u-clamp option)
Magnetic or Inductive Contact Switches: No
Receiver Gauge Scales: Yes
Special Connection: Limited to wrench flat area

Type	232.53				
Connection	LM	CBM			
Conn. Size	1/4" NPT				
Size	2½"				
Pressure Scale[1]	PSI	PSI	PSI/BAR	PSI/KPA	PSI/KG/CM²
30" Hg	9768777	9768394			
30"-0-15 PSI					
30"-0-30 PSI	9768769	9768386			
30"-0-60 PSI	9768750	9768378			
30"-0-100 PSI					
30"-0-160 PSI	9768742	9768360			
30"-0-200 PSI					
15 PSI	9768734	9768351			
30 PSI	9768726	9768343			
60 PSI	9768718	9768335	8992848	8993089	8992962
100 PSI	9768700	9768327	8992856	8993097	8992970
160 PSI	9768696	9768319	8992865	8993101	8992988
200 PSI	9768688	9768300	8992873	8993119	8992996
300 PSI	9768670	9768297	8992881	8993127	8993004
400 PSI	9768661	9768289			
600 PSI	9768653	9768270	9779685	9779693	
800 PSI					
1,000 PSI	9768645	9768262	8992899	8993135	8993012
1,500 PSI	9768637	9768254	8992903	8993144	8993020
2,000 PSI	9768629	9768246	8992911	8993152	8993038
3,000 PSI	9768610	9768238	8992929	8993160	8993046
5,000 PSI	9768602	9768220	8992937	8993178	8993055
6,000 PSI		8993208	8992945	8993186	8993063
10,000 PSI	9768599	9768211	8992954	8993195	8993071
15,000 PSI		9779715	9776715		9779731

[1]"PSI/BAR" denotes dual scale; PSI outside in black, BAR inside in red; "PSI/KPA" denotes dual scale; PSI outside in black, KPA inside in red; "PSI/KG/CM²" denotes dual scale; PSI outside in black, KG/CM² inside in red. Note: Vacuum scale: 30" Hg outside in black; 760 mm Hg inside in red. [2]

Note: For options not shown - consult your WIKA Distributor or the Factory.

Data sheet: 23X.53

For liquid filled gauges, add "-829" to part numbers above for 2½" size or "-834" for 4" size.

Items shown with part numbers indicate readily available standard WIKA products. Items shown without part numbers are available on special order.

WIKA

Type	232.53- liquid fillable		
Connection	LM	LM	LBM
Conn. Size	1/4" NPT	1/2" NPT	
Size	4"		
Pressure Scale	PSI	PSI	PSI
30" Hg	9767576	9768459	9737057
30"-0-15 PSI	9737910	9768467	9737065
30"-0-30 PSI	9767398	9768475	9737073
30"-0-60 PSI	9767401	9768483	9737081
30"-0-100 PSI	9737898	9737880	9737090
30"-0-160 PSI	9767410	9768491	9737103
30"-0-200 PSI	9737901	9768505	9737111
30"-0-300 PSI	4260147		
30"-0-400 PSI	4260155		
15 PSI	9767428	9768513	9737120
30 PSI	9767436	9768521	9737138
60 PSI	9767444	9768530	9737146
100 PSI	9767452	9768548	9737154
160 PSI	9767460	9768556	9737162
200 PSI	9767479	9768564	9737170
300 PSI	9767487	9768572	9737189
400 PSI	9767495	9768580	9737197
600 PSI	9767509	9768963	9737200
800 PSI			9737219
1,000 PSI	9767517	9768858	9737227
1,500 PSI		9768866	9737235
2,000 PSI		9768807	9737243
3,000 PSI		9768874	9737251
5,000 PSI		9768823	9737260
10,000 PSI		9768831	9737278
15,000 PSI		9768840	9737286

Type	233.53- glycerine filled				
Connection	LM		LM	LBM	CBM
Conn. Size	1/4" NPT		1/2" NPT		1/4" NPT
Size	2½"	4"	4"		2½"
Pressure Scale	PSI	PSI	PSI	PSI	PSI
30" Hg	9833646	9833124	9833328	9831504	9833310
30"-0-15 PSI		9831775	9833336	9831512	
30"-0-30 PSI	9833638	9832993	9833345	9831520	9833302
30"-0-60 PSI	9833620	9833000	9833353	9831538	9833298
30"-0-100 PSI		9831759	9831741	9831546	
30"-0-160 PSI	9833612	9833018	9833361	9831555	9833280
30"-0-200 PSI		9831767	9833379	9831563	
30"-0-300 PSI					
30"-0-400 PSI					
15 PSI	9833604	9833026	9833387	9831571	9833272
30 PSI	9833590	9833035	9833395	9831589	9833264
60 PSI	9833582	9833043	9833409	9831597	9833255
100 PSI	9833574	9833051	9833417	9831601	9833247
160 PSI	9833565	9833069	9833425	9831619	9833239
200 PSI	9833557	9833077	9833434	9831627	9833221
300 PSI	9833549	9833085	9833442	9831635	9833213
400 PSI	9833531	9833094	9833450	9831644	9833205
600 PSI	9833523	9833107	9833727	9831652	9833191
800 PSI					
1,000 PSI	9833515	9833115	9833697	9831678	9833183
1,500 PSI	9833506		9833701	9831686	9833175
2,000 PSI	9833493		9833655	9831695	9833166
3,000 PSI	9833485		9833719	9831708	9833158
5,000 PSI	9833476		9833663	9831716	9833140
10,000 PSI	9833468		9833671	9831725	9833132
15,000 PSI			9833689	9831733	

Type	232.53- Stock Gauges with Ammonia Scales	
Size	2 ½"	4"
Connection	LM	
Conn. Size	1/4" NPT	
30"-0-150 PSI / 84°F	9797144	9797127
30"-0-300 PSI / 126°F	9797152	9797135

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WIKA
4272016
0-10,000 PSI/BAR PRESSURE GAUGE

ANGI PART NUMBER 741-07289

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WIKA

Industrial Gauges

Type 23X.53

Liquid Fillable

- Stainless Steel Case & Crimp Ring
- Welded Case-to-Socket Connection
- Field Liquid-Fillable

Type 232.53 - Dry case
Type 233.53 - Liquid filled case

The rugged construction of WIKA Type 23X.53 stainless steel gauges provides resistance to the most corrosive media and environments. These gauges feature 316 stainless steel wetted parts and a 304 stainless steel case and crimped ring, and can be liquid-filled in the field.

Standard Features

- **Nominal Case Size:** 2" (53 mm), 2½" (68 mm), 4" (100 mm)
- **Case Material:** 304 stainless steel
- **Wetted Parts:** 316 SS
- **Window Type & Material:** 2½" Polycarbonate; 4" Acrylic
- **Removable Window:** No
- **Dial Material:** White aluminum
- **Bezel Ring Type & Material:** Crimp on SS polished
- **Liquid Fillable Gauge:** Yes
- **Case-to-Socket O-ring Material:** Welded
- **"Other" Gaskets/O-ring Types & Materials:** Window gasket, BUNA-N
- **Pointer Material/Type:** Black aluminum
- **Adjustable Pointer:** No
- **Accuracy:** ±1.5% of span (2" & 2½"); (4") ± 1.0% of span-ASME B40.100 Grade 1A
- **Connection locations:** LM (Lower Mount), CBM (Center Back Mount) & LBM (Lower Back Mount) (4" only)
- **Media Operating Temperature:** 212°F
- **Ambient Operating Temperature:** -40°F to 140°F dry; -4°F to 140°F glycerine case fill; -40°F to 140°F silicone case fill

Available Options
"Dampened Movement" Option: Yes, (N/A on 2½" CBM or 2" LM/CBM) & LBM
U-Clamp Bracket: Yes (CBM only)
Front Flange: Yes (CBM & LBM only)
Rear Flange: Yes (LM, CBM & LBM)
Restrictor: Yes
Safety Glass Window: No
Instrument Glass Window (flat glass): No
Drag Pointer (maximum reading indicator): Yes
Cleaned for Use in Oxygen Service: Yes
Panel Mount Kit: Yes (see front flange or u-clamp option)
Magnetic or Inductive Contact Switches: No
Receiver Gauge Scales: Yes
Special Connection: Limited to wrench flat area

Type	232.53				
Connection	LM	CBM			
Conn. Size	1/4" NPT				
Size	2½"				
Pressure Scale[1]	PSI	PSI	PSI/BAR	PSI/KPA	PSI/KG/CM²
30" Hg	9768777	9768394			
30"-0-15 PSI					
30"-0-30 PSI	9768769	9768386			
30"-0-60 PSI	9768750	9768378			
30"-0-100 PSI					
30"-0-160 PSI	9768742	9768360			
30"-0-200 PSI					
15 PSI	9768734	9768351			
30 PSI	9768726	9768343			
60 PSI	9768718	9768335	8992848	8993089	8992962
100 PSI	9768700	9768327	8992856	8993097	8992970
160 PSI	9768696	9768319	8992865	8993101	8992988
200 PSI	9768688	9768300	8992873	8993119	8992996
300 PSI	9768670	9768297	8992881	8993127	8993004
400 PSI	9768661	9768289			
600 PSI	9768653	9768270	9779685	9779693	
800 PSI					
1,000 PSI	9768645	9768262	8992899	8993135	8993012
1,500 PSI	9768637	9768254	8992903	8993144	8993020
2,000 PSI	9768629	9768246	8992911	8993152	8993038
3,000 PSI	9768610	9768238	8992929	8993160	8993046
5,000 PSI	9768602	9768220	8992937	8993178	8993055
6,000 PSI		8993208	8992945	8993186	8993063
10,000 PSI	9768599	9768211	8992954	8993195	8993071
15,000 PSI		9779715	9776715		9779731

[1]"PSI/BAR" denotes dual scale; PSI outside in black, BAR inside in red; "PSI/KPA" denotes dual scale; PSI outside in black, KPA inside in red; "PSI/KG/CM²" denotes dual scale; PSI outside in black, KG/CM² inside in red. Note: Vacuum scale: 30" Hg outside in black; 760 mm Hg inside in red. [2]

Note: For options not shown - consult your WIKA Distributor or the Factory.

Data sheet: 23X.53

For liquid filled gauges, add "-829" to part numbers above for 2½" size or "-834" for 4" size.

Items shown with part numbers indicate readily available standard WIKA products. Items shown without part numbers are available on special order.

WIKA

Type	232.53- liquid fillable		
Connection	LM	LM	LBM
Conn. Size	1/4" NPT	1/2" NPT	
Size	4"		
Pressure Scale	PSI	PSI	PSI
30" Hg	9767576	9768459	9737057
30"-0-15 PSI	9737910	9768467	9737065
30"-0-30 PSI	9767398	9768475	9737073
30"-0-60 PSI	9767401	9768483	9737081
30"-0-100 PSI	9737898	9737880	9737090
30"-0-160 PSI	9767410	9768491	9737103
30"-0-200 PSI	9737901	9768505	9737111
30"-0-300 PSI	4260147		
30"-0-400 PSI	4260155		
15 PSI	9767428	9768513	9737120
30 PSI	9767436	9768521	9737138
60 PSI	9767444	9768530	9737146
100 PSI	9767452	9768548	9737154
160 PSI	9767460	9768556	9737162
200 PSI	9767479	9768564	9737170
300 PSI	9767487	9768572	9737189
400 PSI	9767495	9768580	9737197
600 PSI	9767509	9768963	9737200
800 PSI			9737219
1,000 PSI	9767517	9768858	9737227
1,500 PSI		9768866	9737235
2,000 PSI		9768807	9737243
3,000 PSI		9768874	9737251
5,000 PSI		9768823	9737260
10,000 PSI		9768831	9737278
15,000 PSI		9768840	9737286

Type	233.53- glycerine filled				
Connection	LM		LM	LBM	CBM
Conn. Size	1/4" NPT		1/2" NPT		1/4" NPT
Size	2½"	4"	4"		2½"
Pressure Scale	PSI	PSI	PSI	PSI	PSI
30" Hg	9833646	9833124	9833328	9831504	9833310
30"-0-15 PSI		9831775	9833336	9831512	
30"-0-30 PSI	9833638	9832993	9833345	9831520	9833302
30"-0-60 PSI	9833620	9833000	9833353	9831538	9833298
30"-0-100 PSI		9831759	9831741	9831546	
30"-0-160 PSI	9833612	9833018	9833361	9831555	9833280
30"-0-200 PSI		9831767	9833379	9831563	
30"-0-300 PSI					
30"-0-400 PSI					
15 PSI	9833604	9833026	9833387	9831571	9833272
30 PSI	9833590	9833035	9833395	9831589	9833264
60 PSI	9833582	9833043	9833409	9831597	9833255
100 PSI	9833574	9833051	9833417	9831601	9833247
160 PSI	9833565	9833069	9833425	9831619	9833239
200 PSI	9833557	9833077	9833434	9831627	9833221
300 PSI	9833549	9833085	9833442	9831635	9833213
400 PSI	9833531	9833094	9833450	9831644	9833205
600 PSI	9833523	9833107	9833727	9831652	9833191
800 PSI					
1,000 PSI	9833515	9833115	9833697	9831678	9833183
1,500 PSI	9833506		9833701	9831686	9833175
2,000 PSI	9833493		9833655	9831695	9833166
3,000 PSI	9833485		9833719	9831708	9833158
5,000 PSI	9833476		9833663	9831716	9833140
10,000 PSI	9833468		9833671	9831725	9833132
15,000 PSI			9833689	9831733	

Type	232.53- Stock Gauges with Ammonia Scales	
Size	2 ½"	4"
Connection	LM	
Conn. Size	1/4" NPT	
30"-0-150 PSI / 84°F	9797144	9797127
30"-0-300 PSI / 126°F	9797152	9797135

G 77

WIKA
233.30 2.5 200PSI/BAR 1/4L
0-300 PSI /B LM GF PRESSURE GAUGE
¼”MNPT W/ 2-1/2” DIAL FACE (LOWER MOUNT)
SOLID FRONT / BLOW OUT BLACK SAFETY CASE

ANGI PART NUMBER 741-07331

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Bourdon Tube Pressure Gauges
Stainless Steel Series, Solid Front Case
Type 232.30 - Dry Case
Type 233.30 - Liquid-filled Case

Applications

- With liquid filled case for applications with high dynamic pressure pulsations or vibration
- Suitable for corrosive environments and gaseous or liquid media that will not obstruct the pressure system
- Process industry: chemical/petrochemical, power stations, mining, on and offshore, environmental technology, mechanical engineering and plant construction

Special Features

- Solid-front stainless steel case
- Excellent load-cycle stability and shock resistance
- All stainless steel construction
- Positive pressure ranges to 20,000 PSI

Bourdon Tube Pressure Gauge Model 232.30

Standard Features

Design
ASME B40.100 & EN 837-1

Sizes
2½", 4", 4½" & 6" (63, 100, 115 and 160 mm)

Accuracy class
2½": ± 2/1/2% of span (ASME B40.100 Grade A)
4", 4½" & 6": ± 1.0% of span (ASME B40.100 Grade 1A)

Ranges
Vacuum / Compound to 200 psi
Pressure from 0/15 to 0/15,000 psi - 2½" , 4", 4½"
Pressure from 0/10 to 0/20,000 psi - 6"
or other equivalent units of pressure or vacuum

Working pressure

2½":	Steady:	3/4 full scale
	Fluctuating:	2/3 full scale
	Short time:	full scale value
4", 4½" & 6":	Steady:	full scale value
	Fluctuating:	0.9 x full scale value
	Short time:	1.3 x full scale value

Operating temperature
Ambient: -40°F to +140°F (-40°C to +60°C) - dry
-4°F to +140°F (-20°C to +60°C) - glycerine filled
-40°F to +140°F (-40°C to +60°C) - silicone filled
Medium: +392°F (+200°C) maximum - dry
+212°F (+100°C) maximum - liquid filled

Temperature error
Additional error when temperature changes from reference temperature of 68°F (20°C) ±0.4% for every 18°F (10°C) rising or falling. Percentage of span.

Weather protection
Weather tight (NEMA 4X / IP65)

Pressure connection
Material: 316L stainless steel
Lower mount (LM)
Lower back mount (LBM) - 2½" & 4" size only
1/4" NPT or 1/2" NPT limited to wrench flat area

Bourdon tube
Material: 316L stainless steel
≤ 1,000 PSI: C-type,
≥ 1,500 PSI: helical type

Movement
Stainless steel

Dial
White aluminum with black lettering, 2½" with stop pin

Pointer
Black aluminum, adjustable

Case
304 stainless steel with solid baffle wall and blowout back (safety case)

Window
Polycarbonate (2½") and Safety Glass (4", 4½" & 6") with Buna-N gasket)

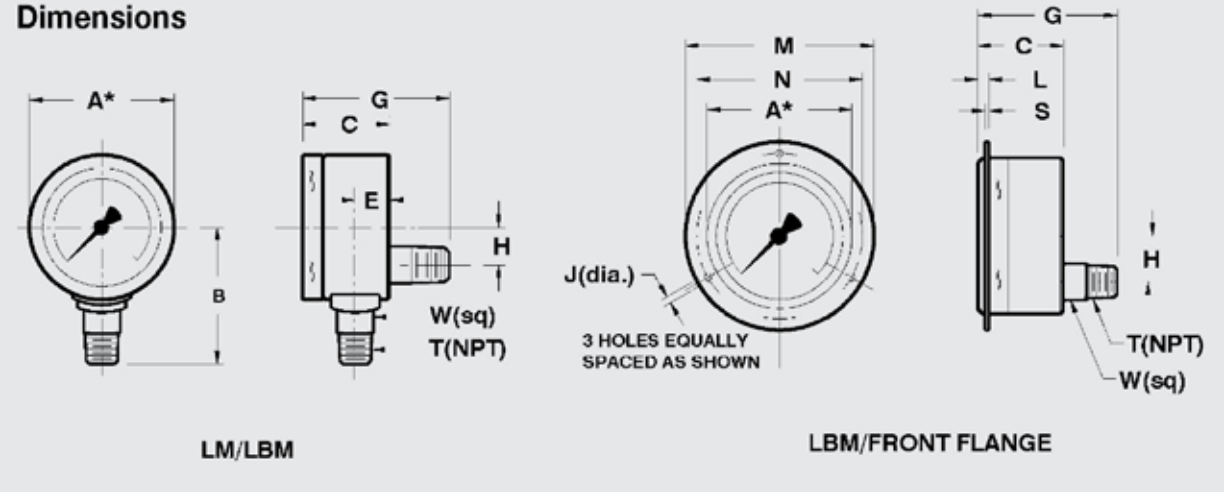
Bezel ring
Stainless steel, bayonet-type

Case fill
Glycerine 99.7% - Type 233.30 (LM only)

Optional extras

- Other pressure connections
- Monel® wetted parts (Type 26X.30)
- Front flange, SS (LBM only)
- Mounting lugs for wall mounting*
- Silicone or Halocarbon case filling (LM only)
- Red drag pointer or mark pointer
- Non-adjustable pointer
- Safety glass window
- Custom dial layout
- Integral alarm contacts or transmitters
- Other pressure scales available: bar, kPa, MPa, kg/cm² and dual scales

Dimensions



Size		A	B	C[1]	E	G	H	J	L	M	N	S	T	W	Weight
2.5"	mm	63	48	42	17.5	63	18.5	4	3	85	75	2		14	0.44 lb. dry
	in	2.48	1.89	1.65	0.69	2.48	0.73	0.16	0.12	3.35	2.95	0.08	1/4"	0.55	0.57 lb. filled
4"	mm	101	86	57.5	24	93	30	4.8	3	132	116	2		22	1.43 lb. dry
	in	3.98	3.35	2.26	0.94	3.66	1.18	0.19	0.12	5.20	4.57	0.08	1/2"	0.87	2.38 lb. filled
4.5"	mm	121	97	59.5	25	X	X	X	X	X	X	X		22	1.43 lb. dry
	in	4.76	3.82	2.34	0.99	X	-	X	X	X	X	X	1/2"	0.87	2.38 lb. filled
6"	mm	161	116	58	24	-	-	5.8	3	196	178	2		22	2.86 lb. dry
	in	6.34	4.57	2.28	0.94	-	-	0.23	0.12	7.72	7.01	0.08	1/2"	0.87	5.15 lb. filled

[1] For 6" LM range 20,000 psi, C dimension changes to 75.5 mm / 2.97 in.

[2] Weight without optional accessories.

Note: For 2½" size, front flange is a 2-piece design. Hole panel cutout dimension for this option is 66.5 mm.

* Note: When mounting rear lugs, leave 15 mm between the back of the gauge and the mounting surface.

Recommended panel cutout is dimension D + 1 mm

Ordering information
Pressure gauge model / Nominal size / Scale range / Size of connection / Optional extras required
Specifications and dimensions given in this leaflet represent the state of engineering at the time of printing.
Modifications may take place and materials specified may be replaced by others without prior notice.

WIKA Instrument Corporation
1000 Wiegand Boulevard
Lawrenceville, GA 30043
Tel (770) 513-8200 Toll-free 1-888-WIKA-USA
Fax (770) 338-5118
E-Mail info@wika.com
www.wika.com

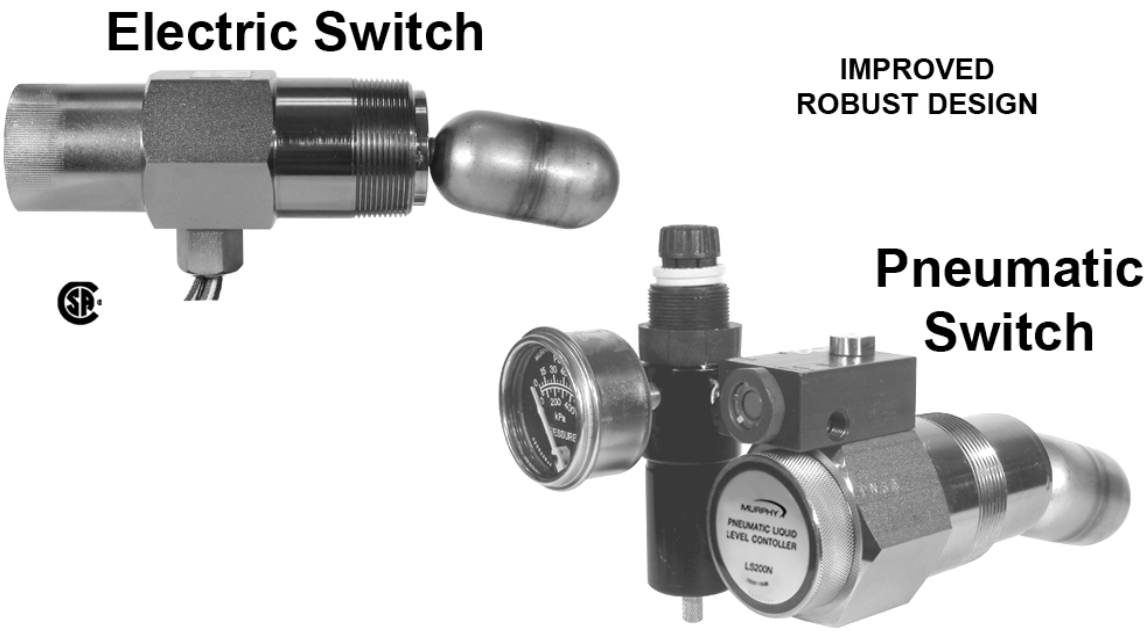
LLS 7

MURPHY
L-1100

1-1/2” LIQUID LEVEL SWITCH 1500 PSI

ANGI PART NUMBER 485-02138

MURPHY®



LS200, LS200N, LS200NDVOR Series and L1100 Liquid Level Switches

Installation and Operations Manual

00-02-0671
09-15-08
Section 15

In order to consistently bring you the highest quality full featured products, we reserve the right to change our specifications and designs at any time. The latest version of this manual can be found at www.fwmurphy.com.

Warranty - A limited warranty on materials and workmanship for one year is given with this FW Murphy product. A copy of the warranty may be viewed or printed by going to www.fwmurphy.com/support/warranty.htm

CAUTION: LS200 Series parts are not interchangeable with other Murphy liquid level products. Damage caused by using incorrect parts is not covered by our Limited Warranty.

Please read the following information before installing. A visual inspection for damage during shipping is recommended before mounting.

BEFORE BEGINNING INSTALLATION OF THIS MURPHY PRODUCT:

- Disconnect all electrical power to the machine.
- Make sure the machine cannot operate during installation.
- Follow all safety warnings of the machine manufacturer.
- Read and follow all installation instructions.
- OBSERVE all pressure and electrical ratings and requirements for the devices and the operating environment.
- BE SURE all pressure HAS BEEN REMOVED from the vessel before opening any pressure connections.
- Please contact FW MURPHY immediately if you have any questions.

Table of Contents

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Product Information

Features

- Designed for harsh gas compressor scrubber applications
- 304 stainless steel float
- LS200 series rated for 2000 psi (13.8 MPa) [138 bar] working pressure
- Electric and pneumatic models available
- Improved design provides better dependability with reduced number of moving parts
- All models screw directly into the vessel or can be mounted via external float chamber
- Nickel plated body to provide enhanced corrosion protection
- Listed for Class I, Div. 1, Grp. C & D locations
- Canadian Registration Number OF1476.2

Minimum Allowable Specific Gravity for LS200

Table 1
LS200 Minimum Allowable Specific Gravity

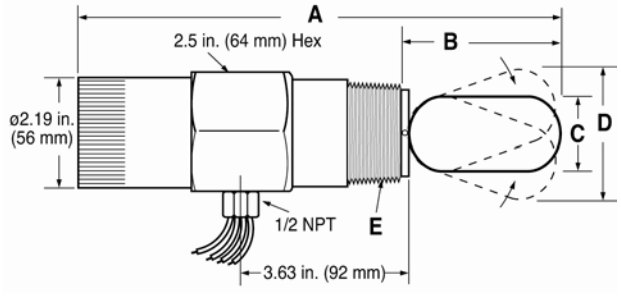
Model	Float Extension length (inch)	Pressure (psi)	Specific Gravity
LS200	0	2000	0.55
	1		0.7
	6		1
LS200NDVO	0	2000	0.63
	1		0.73
	6		1.02

*__Note__: The min. allowable SG will decrease with a decrease in operating pressure

LS200, L1100

LS200 Liquid Level Switches with 2” NPT mounting are float activated to operate an electrical SPDT snap switch (optional DPDT on some models) for alarm or shutdown of an engine or electric motor. The LS200 connects directly into the vessel wall and can be used with a Murphy weld collar (P/N 15050375) or Murphy external float chamber.

L1100 models (1-1/2” NPT) are also available. Refer to the specification table below for product dimensions.



LS200, L1100

Table 2

	LS200	L1100
A	10.16 in. (258 mm)	11 in. (279 mm)
B	3.44 in. (87 mm)	3.50 in. (189 mm)
C	1.75 in. (44 mm)	1.56 in. (40 mm)
D	2.80 in. (71 mm)	3.4 in. (71 mm)
E	2 NPT	1-1/2 NPT

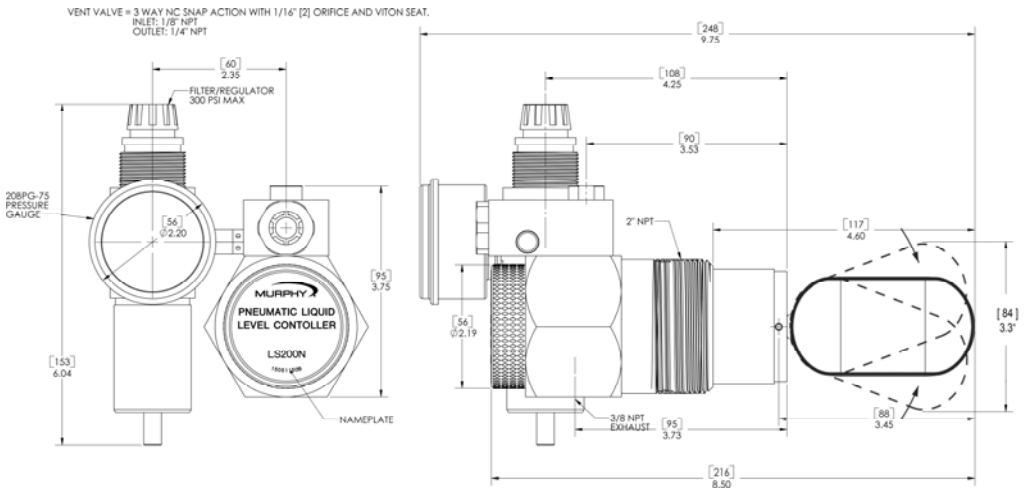
NOTE: Refer to Table 3 and Table 4 for clearances.

LS200NDVOR

LS200NDVOR is a float-activated, pneumatic-vent level device used to operate dump valves or similar devices.

The LS200NDVOR provides a 2” NPT mounting with a pneumatic output for interfacing with pneumatic devices such as our Murphy pneumatic dump valve or with other pneumatic instrumentation.

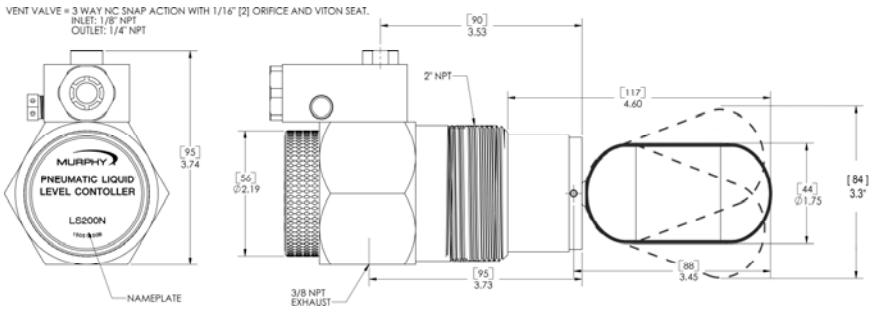
Pneumatic media devices require clean, dry, instrument quality air or gas. This unit is supplied with a pressure regulator, filter and Murphy 20BPG pressure gage for improved system life and trouble-free operation.



LS200NDVOR pneumatic level switch with dump valve operator, pressure regulator and gage

LS200NDVO

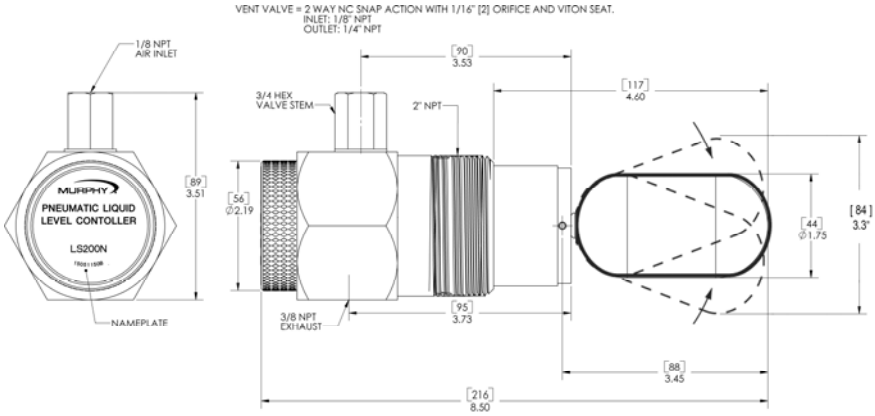
Pneumatic level switch with Dump Valve Operator (DVO) without the pressure regulator for those applications where the system provides a filter regulator for “instrument quality” air or gas as the control medium.



LS200NDVO pneumatic level switch with dump valve operator

LS200N

Pneumatic level switch without the DVO and filter regulator.



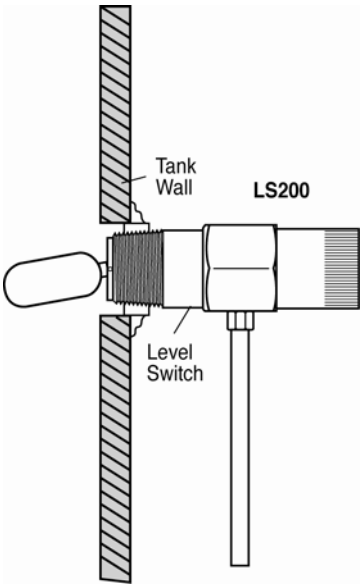
LS200N pneumatic level switch

Pressure Vessel Installation: LS200, LS200N and L1100

Direct Installation into the Wall of the Pressure Vessel

CAUTION: Determine that the float travel is not obstructed by the coupling in the vessel wall, internal baffles, etc.
Refer to tables 1, 2, 3 and 4 for application data.

1. Make certain the float and extension are tight.
2. Before installing the level switch, use of a pipe thread sealant is recommended. Screw the unit directly into the threaded connection in the wall of the pressure vessel.
3. For LS200 and L1100, verify that the electrical connection is positioned at the bottom.
4. For LS200N the 1/8” NPT pneumatic connection should be on top, the 3/8” NPT vent connection should be on the bottom.
5. Make the electrical wiring connections according to appropriate wiring diagrams for the alarm or shutdown system to be used. The electrical connection is 1/2”-14 NPT.
6. Ensure all electrical connections are insulated and the cover is fully installed before reconnecting electrical power.
7. Verify all pressure connections are tight before pressurizing the system.



Clearance Reference Tables

Table 3
Pipe Data

Nom. Size (inches)	O.D. (inches)	Schedule Number	Wall Thickness (inches)	Inside Diameter (inches)
3	3.5	40ST	0.216	3.068
3	3.5	80XS	0.3	2.9
4	4.5	40ST	0.237	4.026
4	4.5	80XS	0.337	3.826

Table 4
Minimum Clearance

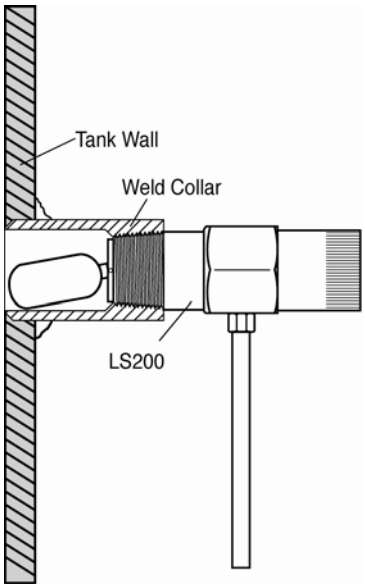
Product Name	Insertion Depth (inches)		Vertical Clearance (inches)	
	Std.	w/ 1” Extension	Std.	w/ 1” Extension
LS 200	4.6	5.6	2.8	3.15
LS 200N	5.43	6.4	3.3	3.9
L 1200	4.65	5.7	3.9	4.55
L 1200N	5.6	6.7	5.3	6.9
L 1100	4.4	5.4	3.4	4.05

Installation with a Weld Collar

1. The weld collar, P/N 15050375, must be welded into the wall of the pressure vessel according to code standards and good welding practices.

2. Follow above instructions for installation directly into the wall of the pressure vessel.

> **NOTE**: Weld collar 15050375 can be used ONLY with model LS200.

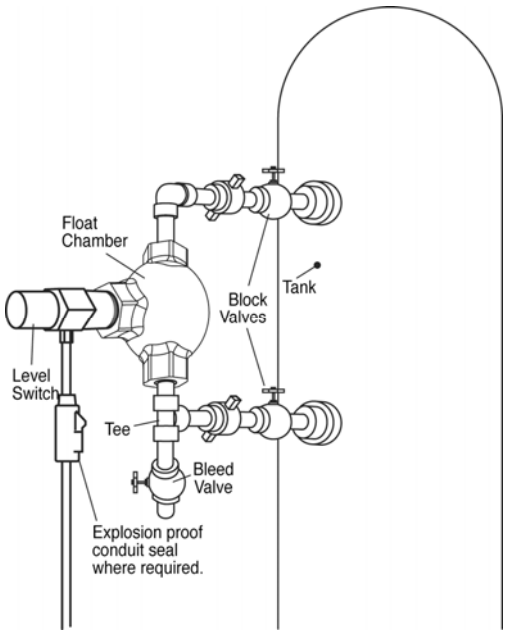


Installation Using Murphy External Float Chamber

1. Install the Murphy float chamber 15051098 or 15700799 on the outside wall of the pressure vessel using 1” NPT piping or use the mounting surface with a bracket. Position the 2” NPT threaded connection at the height where you want the level switch to operate. The 2” NPT threaded connection must be positioned away from the tank wall.

2. A tee and bleed valve are typically installed at the bottom of the lower 1 inch pipe riser to allow draining of the float chamber for servicing or replacement.

> **NOTE**: A typical installation with blocking and bleed valves is shown at right.



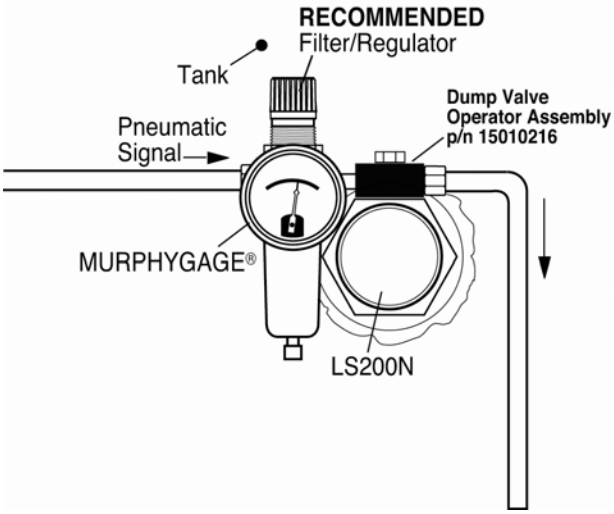
3. Install the LS200 or LS200N/NDVO/NDVOR in the 2” NPT connection of the float chamber. BE SURE float travel is not restricted and that the float is tight onto the float shaft.

4. To complete installation and wiring, follow the instructions for mounting directly into wall of the vessel and for wiring.

CAUTION: Float extensions cannot be used with float chambers.

Installation and Adjustment for Pneumatic Models

1. All pneumatic models operate on the vent principle. **The pneumatic signal source must be clean and dry "Instrument Quality" air or natural gas. The input pneumatic signal must be regulated between 30 and 70 psi (207-483 kPa) [2 -4.83 bar].** If produced gas is used as the signal source, it should be taken after gas passes through the final scrubber. A suitable filter must be positioned before the LS200NDVO to prevent liquids and/or particulates from entering the dump valve operator.



> **NOTE**: Check filter periodically for wear and tear and elements that hamper the flow of the pneumatic signal.

2. All pressure connections must be tight and maintained tight so as not to leak air/gas.

> CAUTION: Avoid excessive Teflon tape which may inhibit proper operation.
>
> Each switch is set to vent on rising level at the factory and should not need field adjustment. For testing the system, Murphy has provided the red "Manual Valve Operator" on the operator pilot valve.

3. **Valve seat adjustment can be made if air/gas begins to leak. Care should be taken when adjusting as only slight movement is necessary to stop the leakage; excessive force will bind the seating mechanism. See the instruction below for adjustment.**

Replacing and Installing the DVO Assembly

> **NOTE**: When replacing/installing the DVO assembly, tubing and fitting modifications may be required. We suggest removing the LS200NDVO/DVOR from the vessel. Relieve pressure from the vessel or use block valves before removing the LS200NDVO/DVOR.

Models LS200NDVO & LS200NDVOR

> **NOTE:** Clean, dry instrument-quality gas should be used. Use and regular maintenance of filters will improve service life and reliability.

Tools Needed

- 2-1/2 inch hex wrench, or pipe wrench with smooth jaws
- 9/16” Hex wrench
- Tubing cutters and benders

CAUTION: LS200 series parts are not interchangeable with the L1200 Series.

Instructions

1. Block off and bleed the instrument gas pressure supply to the LS200NDVO/DVOR.
2. Remove the tubing between the LS200NDVO/DVOR and the scrubber dump valve, and remove the supply gas tubing (regulator [-R-] if used).
3. Remove the LS200NDVO/DVOR from the vessel (optional).
4. If the LS200NDVO/DVOR was removed from the vessel, mount it in a suitable vise on a work bench (if possible).
5. Using the proper tools, disconnect the Inlet, Outlet, and Exhaust fittings from the existing DVO. See ***Figure 1***. You will re-connect these to the new DVO in a later step.

> **NOTE**: The following steps must be done with the DVO in the upright position (on top of the LS200NDVO).

6. Remove the LS200NDVO/DVOR cover. The use of a strap wrench or a pipe wrench may be needed.
7. With a 9/16" hex wrench, loosen the hex head bolt on top of the DVO and remove the existing DVO from the body.
8. Ensure that the adjustable orifice is fully raised up so that the actuator arm is not bent when inserted into the body. See ***Figure 2***.
9. Insert the new DVO onto the body. The DVO manual valve operator must face away from the vessel. See ***Figure 3***.

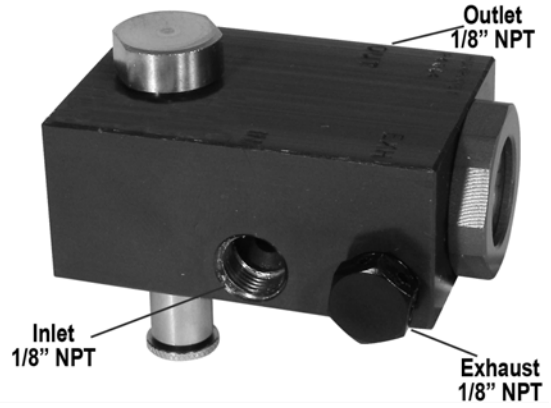


Figure 1 - DVO

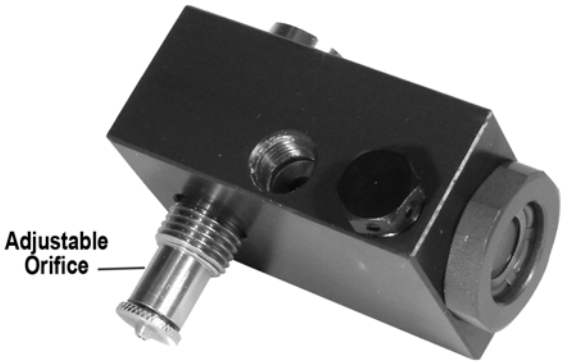


Figure 2 – Adjustable Orifice

CAUTION: Ensure that the actuator arm is not bent during reassembly

10. With the DVO aligned over the hex on the LS200NDVO body, tighten the valve using the 9/16” hex wrench. You may need to hold the DVO while tightening to keep it from rotating.

11. The pneumatic input signal should be regulated between 30 and 70 psi for proper setting of the adjustable orifice. With the float in the down position adjust the adjustable orifice down until it touches the seat. See ***Figure 4***.

    If the DVO is still leaking make slight adjustments (1/32 turn). Excessive adjustments will lock up mechanisms. After adjusting make sure float moves freely up and down.

12. Replace the LS200NDVO/DVOR cover.

13. Using the appropriate tools re-install the inlet, outlet, and exhaust fittings to the new DVO.

> **NOTE:** Thread sealant is recommended although care should be used to not allow excess to enter valve.

Figure 3 – DVO manual valve operator

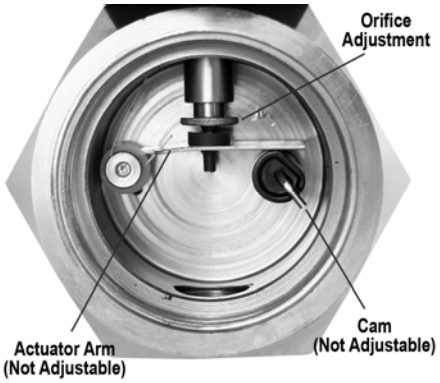
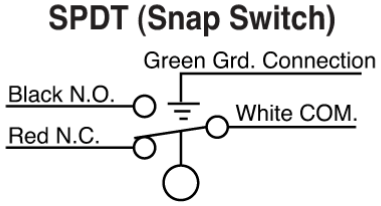


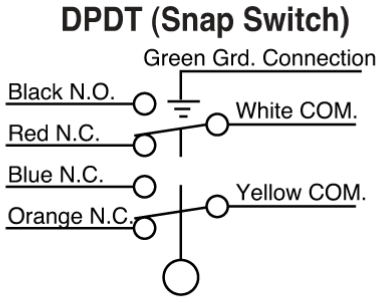
Figure 4 – Orifice Adjustment with float in down position

14. Connect to the inlet, outlet, and exhaust fittings according to installation drawings.

Electrical



Switch Rating: 5 A @ 125-250- 480 VAC
1/2 A @ 125 VDC
1/4 A @ 250 VDC
2A @ 6-30 VDC Resistive
1A @ 6-30 VDC Inductive



Switch Rating: 10 A @ 125-250 VAC
1/2 A @ 125 VDC
1/4 A @ 250 VDC
10 A @ 6-24 VDC
Inductive/Resistive

Replacement Parts

CAUTION: LS200 Series parts are not interchangeable with other Murphy liquid level products. Damage caused by the above mentioned is not covered by our Limited Warranty.

Order by part number designation.

LS200

15000479: Stainless Steel float for LS200 (not interchangeable with L1200)
15000124: SPDT snap switch assembly
15000478: 1” Float shaft extension (not interchangeable with L1200)

LS200N

15000479: Stainless steel float for LS200N (not interchangeable with L1200)
15051133: Valve stem

LS200NDVO and LS200NDVOR

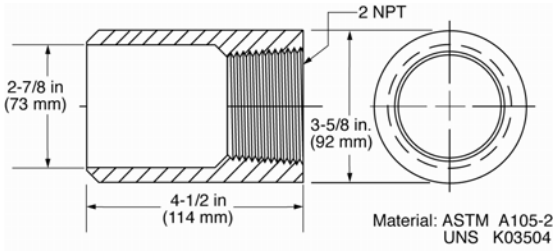
55050621: Regulator only
05706499: 20BPG-D-75 Pressure MURPHYGAGE®
0-75 psi (517 kPa) [5.17 bar]
15010267: Assembly (**LS200N DVO Assembly**)

L1100

15000893: BUOYGLAS™ float
15000937: Stainless steel float
15000124: SPDT snaps switch assembly
15000892: 1” Float shaft extension

Accessories

15050375: Weld Collar

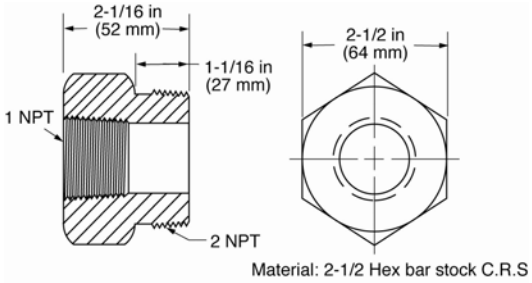


Operating Pressure: 2000 psi (13.8 MPa) [138 bar].

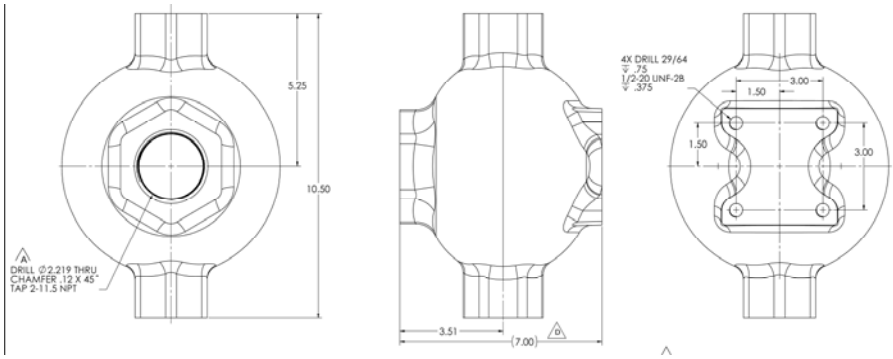
Operating Temperature: 400°F (204°C).

55050617: DVU150/DVU175 Adapter Bushing

Order by part number designation

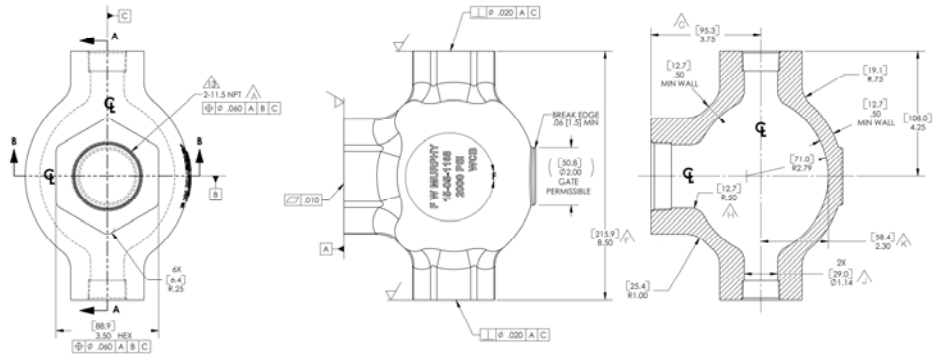


15051098: External Float Chamber



Operating pressure: 2000 psi (13.8 MPa) [138 bar]
Operating temperature: 400°F (204°C).

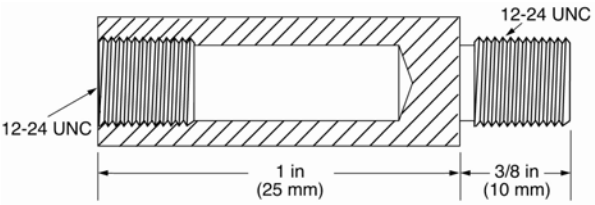
15700799: Series 100 External Float Chamber



Operating pressure: 2000 psi (13.8 MPa) [138 bar]

Operating temperature: 400°F (204°C).

15000478: Float Shaft Extension for the LS200

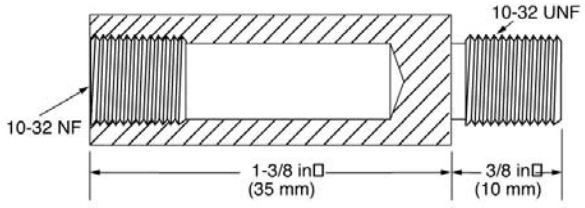


Material: AISI 303, UNS-S30300

CAUTION: Not interchangeable with L1200 parts.

Use of 1" extension requires additional clearance. Refer to Tables 1,2,3, and 4 for application data.

15000892: Float Shaft Extension for the L1100



Material: AISI 304, UNS-S30400

The Murphy Gas Compressor Scrubber Level System (SLS)

The system provides for liquid control in gas scrubber applications, by dumping liquids to drain and protecting compressors with a high liquid level switch. Wetted metal parts are made to survive constant use in corrosive environments. *See Bulletin: SLS-04005B for more details.*

High Level Shutdown Switch

Stainless steel float actuated level switches to alarm and/or shutdown the equipment.

LS200: 2" NPT pipe connection; Rated 2000 psi (13.7MPa) (137bar); Class 1, Division 1, SPDT snap-switch standard. DPDT Optional.

Filter/Regulator & MURPHYGAGE

"Instrument Quality Air/Gas Supply"

Control Panel

Pneumatic Level Control

Float actuated level snap-acting switch controls pneumatic pressure to open and close dump valve.

LS200NDVOR: Dump Valve Operator, pressure regulator, and pressure indicating MURPHYGAGE.

Pneumatic Dump Valves

See DVU-01069B for more details

Two piece union design with manual valve operator allows soft plug and hard seat to be replaced without disassembling outlet piping or scrubber pipe connection. Diaphram actuated valves operate on 30-70 psi (207-483 kPa; 2-5 bar).

Specifications

All Models

- Body: Nickel plated steel; optional 316 stainless steel (meets NACE standard MR-01-75 for direct exposure to H_2S service)
- Float: 304 stainless steel
- Pressure rating: 2000 psig (13.8 MPa) [138 bar] (LS200 models only)
- O-ring: Viton

LS200

- Process connection: 2" NPT
- Temperature rating: -20 to 300°F (-29 to 149°C)
- Electrical: SPDT std. (see "Electrical" section for configuration/rating.
- Wiring: 18 AWG x 36 in. (1.0 mm2 x 916 mm)

LS200NDVOR

- Process connection: 2" NPT
- DVO valve: 3 way N.C. w/manual operator, all connections 1/8" NPT (minimum 30 psig required)
- Filter/pressure regulator set:
- Regulator: 0 to 75 psig (0 to 517 kPa) [0 to 5.17 bar] range
- Maximum input pressure: 300 psig (2.07 MPa) [20.7 bar]

LS200NDVO

- Process connection: 2" NPT
- DVO valve: 3 way N.C. w/manual operator; all connections 1/8" NPT

LS200 N

- Process connection: 2" NPT
- Vent valve: 2 way N.C. w/ 1/16in. (2mm) orifice and Viton seat; Inlet: 1/8" NPT; outlet 3/8" NPT

L1100

- Process connection: 1-1/2" NPT
- Pressure rating: 1500 psig (10.3 MPa) [103.2 bar]
- Float: BUOYGLAS™ operates to 0.5 specific gravity;
  Optional stainless steel to operate in 0.65 specific gravity
- Electrical: SPDT switch

Approximate Shipping Weights and Dimensions

- All models: 6 lb. 10 oz. (3 kg);
- Dimensions: 14 x 5 x 3-1/2 in. (356 x 127 x 89 mm)

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ISO 9001 REGISTERED
USA-ISO 9001:2000 FM 29221
UK-ISO 9001:2000 FM 29422
Printed in U.S.A.

LLS 17

KENCO ENGINEERING
KLCM – 09

OIL LEVEL SWITCH 9.5 PSI

ANGI PART NUMBER 485-07239

REBUILD KIT – GASKET/SEALS FOR KLCM SERIES – 761-07493

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OPERATING PRINCIPLE FOR OIL LEVEL CONTROLLERS

Kenco oil level controllers are designed to control a constant oil level in the crankcase of stationary engines, compressors, and mechanical lubricator boxes. The Kenco oil controller works in conjunction with an overhead oil supply system which feeds the oil level controller. As the oil is consumed, the oil controller supplies the required oil. The oil controller controls the amount of oil in the crankcase by a float controlled valve. The valve opens and closes as oil is needed in the crankcase to provide a constant oil level.

OPERATING PRINCIPLE FOR OIL LEVEL SWITCHES

Oil level switches are designed as a safety device for the stationary engine or compressor. The oil level switch monitors the oil level in the crankcase. The level within the crankcase directly corresponds with the oil level in the oil level switch housing. The engine or compressor constantly consumes the oil from the crankcase. If the oil level in the crankcase drops past the designated level, the switch will trip and trigger an alarm.

FEATURES

Featured at top KLCE-48-FS is an oil level controller with an electric switch in an explosion proof enclosure with a direct mounting bracket for an Ariel compressor, with re safe valves.

Featured on cover: KLCE-9-FS is an oil level controller with an electric switch in an explosion proof enclosure with a slotted universal mounting adapter, with re safe valves. A 1618 low ow meter is also installed in this application.

Featured at right: KLCE-24 is an oil level controller with an electric switch in an explosion proof enclosure with a direct mounting bracket for an Ariel compressor.

-Reduces maintenance by maintaining a constant oil level

-Protects against lubrication failure

-Controller mechanism fully removable without draining oil.

-Easy view convex sight window

-Low to high pressure applications

-Oil inlet allows for piping configurations from any direction

-Oil outlets on either side of housing and in the bottom to allow for various piping configurations

-Easy access to switch float through 3/8" vent hole in top of housing for simple testing of switch operation

-Direct mount adapters eliminate equalizing problems and reduce installation costs

-Group B explosion proof certification for hydrogen gas environments now available on KLCE/KHL/KSHL/KSLL/KES

-Oil level controllers for synthetic oil applications now available

APPLICATIONS

- Stationary engines
- Stationary compressors
- Mechanical lubricators
- Pumps

LOCATION COURTESY OF SCFM COMPRESSION SYSTEMS, TULSA OKLAHOMA

MODEL SPECIFICATIONS

MODEL KLCM OIL LEVEL CONTROLLER WITH SWITCH IN CSA® TYPE 4 ENCLOSURE

Application of Model KCLM:
The Kenco KLCM utilizes the operating principles of both the oil level controller and the electric switch. The switch may be wired either normally open or normally closed.

Applications:
Intrinsically safe applications with an approved safety barrier.

Standard Materials of Construction:
Valve Seat: Nitrile (Fluorocarbon also available)
Housing and Valve Orifice Material: Aluminum
Float Material: Closed Cell Polyurethane
Oil Inlet Screen: 20 Mesh Brass Cloth
Sight Window: U.V. Stabilized Clear Polycarbonate

Process Connections:
Inlet Connection Size: 1/2" FNPT
Outlet Connection Size: (3) 3/4" FNPT

Oil Inlet Data:
Static Head Pressure Range: 2 –15 Feet
High Pressure Models-
HP-A: 5-35 psi
HP-B: 36-70 psi

Minimum Flow Rate Test Results:
(Standard unit tested at 32°F, SAE 30)
2' Head: 1.141 GPH
4' Head: 2.122 GPH
7' Head:2.853 GPH
12' Head:3.043 GPH
(HP-A Unit Tested at 20°F, SAE 30)
5 psi- 0.163 GPH
20 psi-0.266 GPH
(HP-B unit tested at 55°F, SAE 30)
70 psi- 0.277 GPH

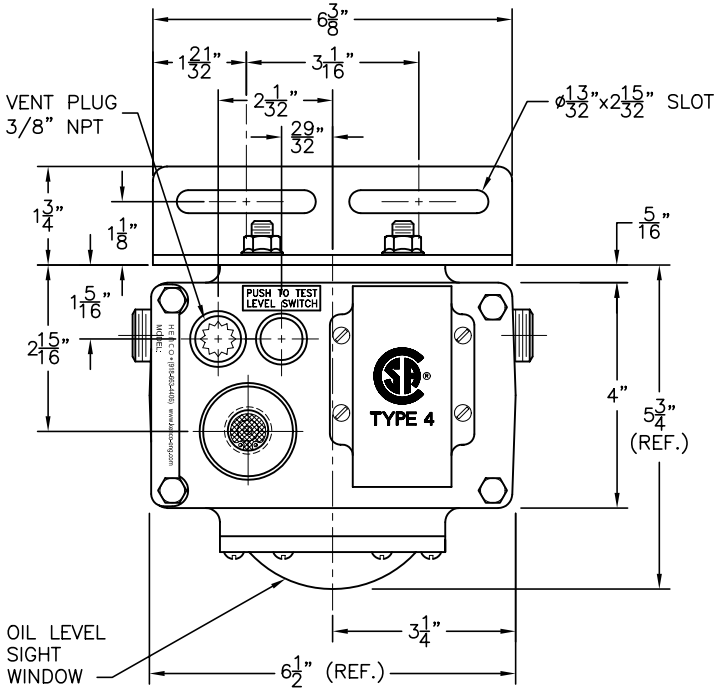
Electric Switch Specifications:
Switch Trip Point: 3/4" Drop
Switch Rating: 10 amp, 125/250 VAC or VDC
Max. Temp: 180°F/ 82°C
Electrical Connection Size: 1/2" FNPT
Circuitry: Single Pole Double Throw
Switch Test Button Standard

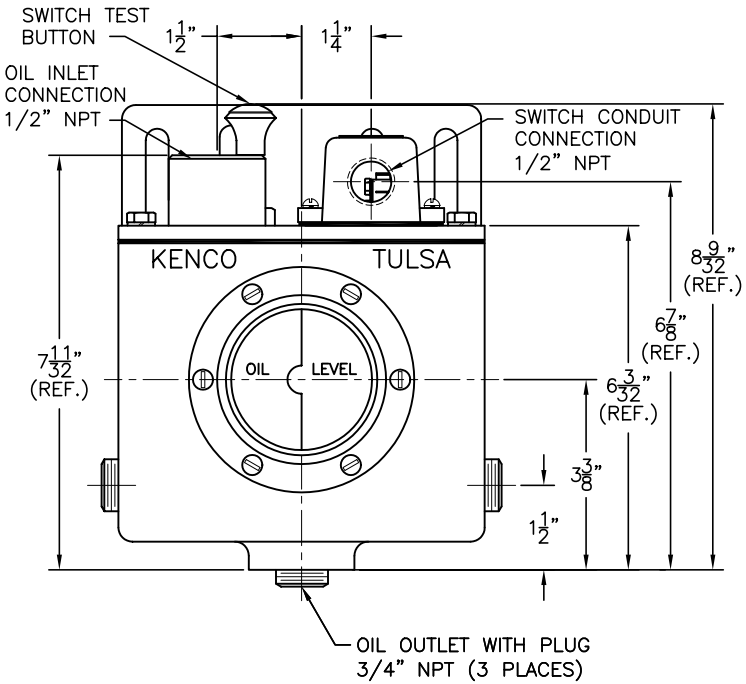
Wire Color Code:
Red: Normally Closed
Blue: Normally Open
White: Common

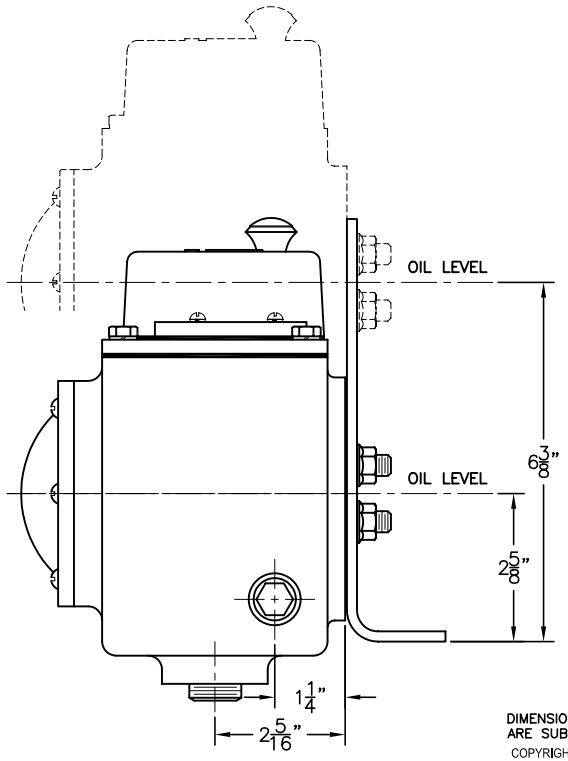
Also Available:
SYN: Synthetic Oil Applications - Call Kenco with Specific Gravity

Class III, Type 4

MODEL KLCM-9







DIMENSION ARE FOR REFERENCE PURPOSES ONLY AND ARE SUBJECT TO CHANGE AT ANY TIME WITHOUT NOTICE.

REV.	DATE	BY	ECN	EXPLANATION:

KENCO ENGINEERING COMPANY
TULSA, OKLAHOMA

CONTROLLER, OIL LEVEL WITH MOUNT
(OUTLINE DRAWING) MODEL KLCM-9

DATE: 02-03-03	SHEET: 1 OF 1	DRAWING NUMBER
DRN. BY: DS	CHKD. BY:	C-44749
SCALE: NONE	REVISION:	

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KENCO ENGINEERING COMPANY

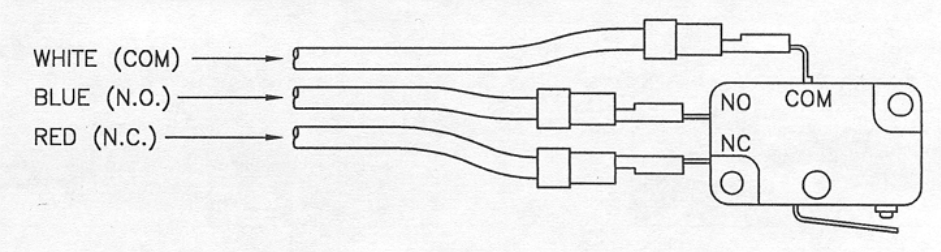
INSTALLATION INSTRUCTIONS FOR MODEL KLCM OIL LEVEL CONTROLLERS WITH ADAPTERS (INCLUDING HIGH PRESSURE MODELS)

Note: For fire safe oil level controllers (LCM-FS) see additional instructions in this work sheet covering installation of fire safe valves.

I. SWITCH SPECIFICATIONS:

Class III, Type 4

Figure 1: Model LCM Switch Wire Color Code



Electrical Ratings:

10 AMP, 125/250 VAC
0.5 AMP, 125 VDC
0.25 AMP, 250 VDC
1/8 HP, 125 VDC
¼ HP, 250 VAC
125 VAC "L"Lamp Load

Circuitry: Single Pole Double Throw

Note: Switch trip point is factory set at a ¾" drop . For adjustment instructions, please consult the factory.

II. INSTALLATION AND MAINTENANCE INSTRUCTIONS FOR OIL INLET VALVE:

- **Connect the oil supply line to the oil inlet on the oil level controller. The minimum recommended supply line is ¾" I.D. The supply line must be clean and it is recommended that it be flushed with solvent before installation.**
- **Connect the oil supply line to the oil supply tank. If there is no existing valve at the tank or the existing supply outlet, a shut-off valve should be placed in the line to prevent oil loss when cleaning the inlet screen or filter.**
- **For high pressure models HP-A, pressure range must be between 5 psi and 34 psi. For high pressure units HP-B , pressure range must be between 35 psi and 70 psi.**
- **The oil inlet valve is adjusted to maintain the oil level at the center of the sight glass. Low or high levels are often caused by two problems:**
  1. **Excessive oil inlet pressure, which will cause the unit to overfill.**
  2. **Improper equalizing lines between the crankcase and the controller will also result in improper levels.**

Note: Low pressure models require a minimum of 2' of head pressure and a maximum of 15' of oil inlet head pressure.

III. INSTALLATION INSTRUCTIONS FOR UNITS WITH ADAPTERS:

OIL LEVEL CONTROLLERS WITH –1 (Clark MA & CFA) –2 (Clark HMB & TMB), -3 (Clark RA, HRA, HBA, HCA, HLA, TLA), -6 (Cooper-Bessemer GMW), -7 (Cooper-Bessemer GMV), -8 (Cooper-Bessemer GMX), -16, -16-R, -16-6.25 (Cooper-Bessemer BMV & 275) AND FS OPTIONS

- **Remove the visual oil gauge assembly from the engine and replace it with the oil level controller and adapter assembly supplied with a gasket and mounting bolts when applicable.**

OIL LEVEL CONTROLLERS WITH –4 (Ingersoll-Rand SVG & KVS), -5 (Ingersoll-Rand KVG) AND FS OPTIONS

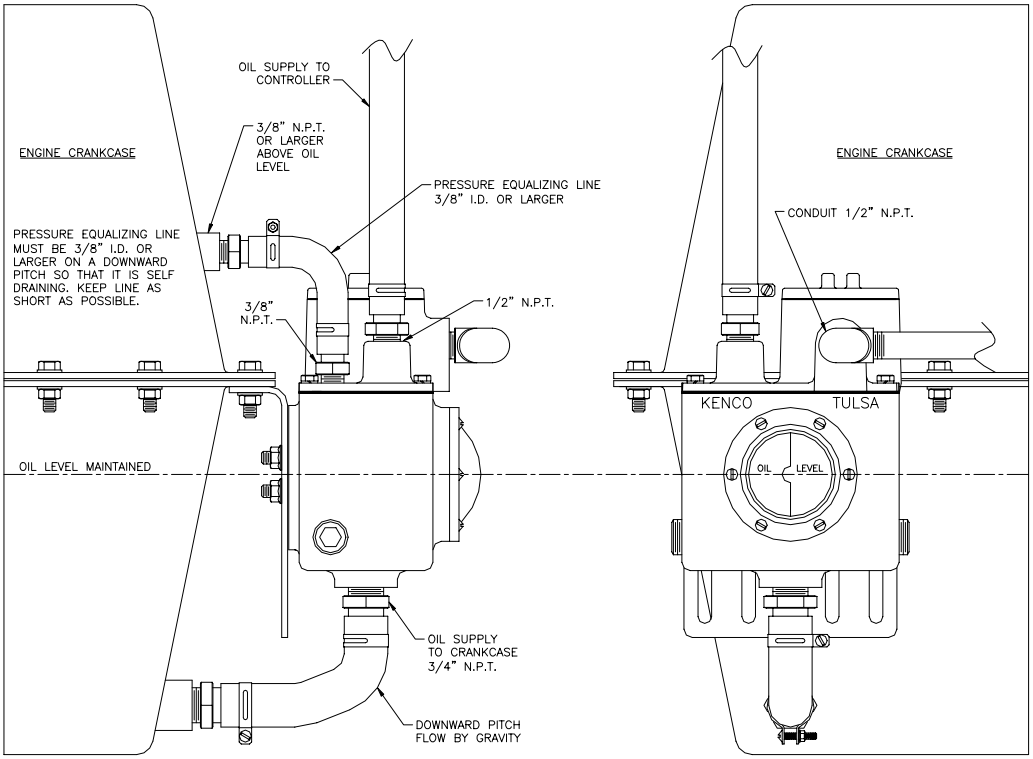
- **Remove the visual oil gauge assembly from the engine and replace it with the oil level controller and adapter assembly supplied with a gasket and mounting bolts when applicable.**
- **If an equalizing exists for the engine sight glass and detach the equalizing line from the sight glass while still attached to the engine.**
- **Install the oil controller and then reattach the equalizing line to the vent located at the top of the adapter.**

Note: It is important to insure that there are no loops in this line for it must be trap free and self draining.

OIL LEVEL CONTROLLERS WITH –9 (Universal adapter), -10(Slotted universal adapter),-12 (Pole mounted adapter) AND – FS OPTIONS

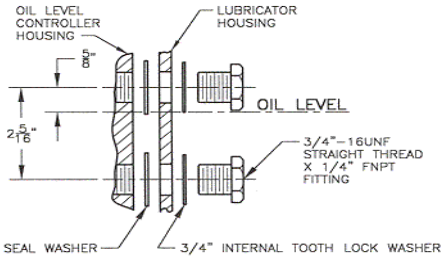
- **Set the controller so that the centerline of the sight window corresponds to the desired oil level in the crankcase.**
- **Mount the controller close to the crankcase and connect the hose from the ¾" outlet located on the controller to the crankcase. NOTE: The outlet port on the oil level controller must be located below the oil level in the crankcase.**
- **An equalizing line must be used between the controller and crankcase in order to equalize the pressure. The tubing must be a minimum of 1/2" I.D. and must be kept under 2 feet. DO NOT loop this line. It must be trap free and self draining, with a downward pitch flow by gravity.**

Figure 2: Typical Mount of –9 Adapter



OIL LEVEL CONTROLLER WITH –11 AND –11-FS OPTION (for Mechanical Lubricators): See Figure 3

Figure 3



- **Drill holes in the lubricator housing as shown, and mount the controller with the inlet located on the top side using the seal washers and mounting bolts provided.**
- **Place the seal washers between the controller and the lubricator housing.**

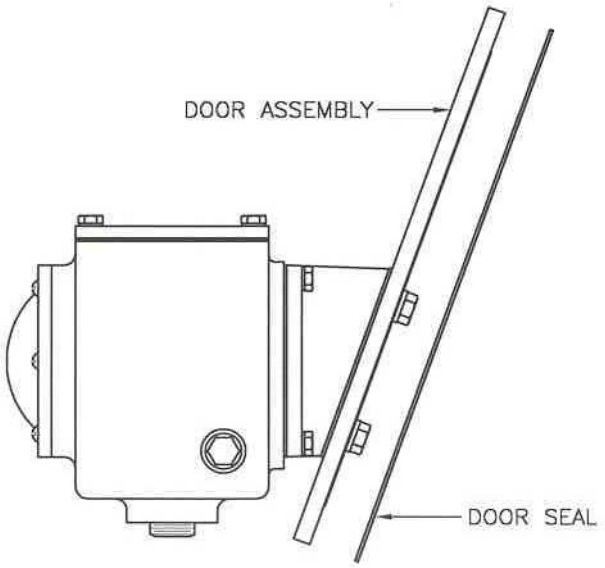
OIL LEVEL CONTROLLER WITH –14 AND –14 –FS OPTION (White Compressor)

- **Remove the triangular blind flange located on the compressor and mount the controller assembly in its place.**

OIL LEVEL CONTROLLER WITH –17 (Waukesha VHP Engines F2895, F3251, F5108, L5790 & L7042), -18 (-17 w/ meter), -27 (for newer Waukesha engines same as –17), –37 (Waukesha P9390), -38 (same as –37 w/ meter), -47(Waukesha VGF L36 and P 48 Engines) and –FS OPTIONS

- **Remove the cast aluminum inspection door from the engine. Remove the clamp bar from the old door.**
- **For –17, -18, -37, -38 install the o-ring into the groove of the Kenco door and replace the clamp bar on the back side of the door using the 5/8" bolts and the stat-o-seals supplied by Kenco.**
- **For –27, install the o-ring into the groove of the Kenco door and replace the clamp bar on the back side of the door using the 7/16" bolts and the stat-o-seals supplied by Kenco.**
- **For –47, mount the inspection door with the bolts, seal washers, and gasket provided.**
- **For –17, -27, -37, -38, place the controller assembly into the inspection port of the engine and tighten the center bolt(s) down.**
- **Install the equalizing line between the controller cover plate and the door (Tubing and connectors supplied by Kenco).**
- **Place the controller assembly into the inspection port of the engine and tighten the center bolt(s) down.**
- **Install oil inlet line into the controller oil valve or the meter inlet port.**
- **NOTE: For the –18 model, refer to the additional instructions supplied with the 1618 Kenco Low Flow meter.**

Figure 4: -Door Assembly for –17, -18, -27, -37, -38, -47



OIL LEVEL CONTROLLER WITH -24 (Ariel Compressor JGB, JGE, JGH, JGK, JGR, JGT, JGV, & JGW) and -48 (Ariel compressor JGC & JGD) AND –FS OPTIONS

- **Remove the sight glass located on the crankcase and replace it with the oil controller assembly using the mounting bolts and gasket supplied with the unit.**

IV. INSTALLATION INSTRUCTIONS FOR FIRE SAFE VALVES: See Figure 5 below

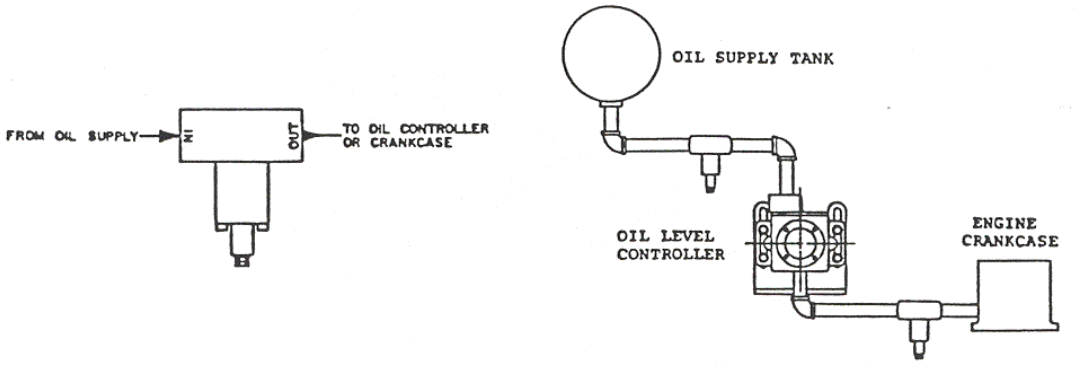
MODEL 50-FS AND 75-FS (PATENT NO. 3,877,476)

NOTE: All lines between thermal valves, supply tanks and the controller must be made of steel. DO NOT use rubber hose. The lines should be 3/4" I.D.

- **The eutectic fuse element should always be in a downward position to help the element melt when heat is applied to the valve.**
- **The 50-FS valve has 1/2" FNPT threads and should be installed in the oil supply line as close to the controller as possible. Meters, filters and pressure regulators should be installed between the controller and the 50-FS.**
- **The 75-FS valve has 3/4" FNPT threads and should be located as close to the crankcase as possible and the oil outlet line should be a minimum ¾" I.D. to insure adequate oil flow to the crankcase.**

NOTE: The 75-FS valve is not required when using –FS adapters other than –9 and –12.

FIGURE 5: FIRE SAFE VALVE INSTALLATION



V. START-UP PROCEDURES

- **Flush the supply system and supply line with solvent to remove all burrs and construction debris.**
- **Insure that the oil supply tank is full.**
- **After the engine has been running for 1 hour, visually check the oil level in the sight glass. The oil level should be in the center of the sight glass.**
- **With the engine running, check the crankcase oil level. It should be the same as the oil level in the oil controller. If not, check the installation of the equalizing line (if applicable) see instruction for the equalizing line at –9.**
- **Check all piping connections for leaks and repair as needed.**

VI .SIX MONTH SUGGESTED MAINTENANCE PLAN

Oil Valve Service

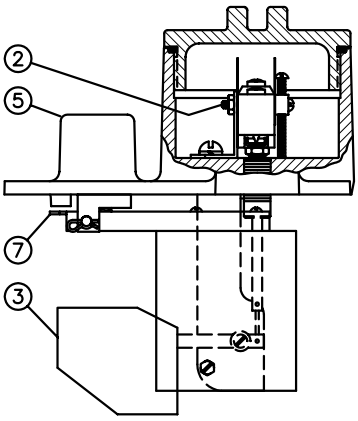
- **Close the oil supply valve and discount the oil inlet supply line.**
- **Place a pan under the controller to catch the oil from the oil supply line.**
- **Remove the inlet oil housing and clean the screen.**
- **Once the screen is clean, reassemble and open the oil supply valve.**

Note: Dispose of oil in a proper container.

Switch Service

- **Test switches to insure that the switches are operating correctly.**
- **Shut the engine off.**
- **Disconnect the equalizing line (if applicable).**
- **Place a blunt rod through the vent hole on the cover plate and depress the oil float.**
- **Observe the engine panel to determine if the switches make and break contact.**
- **If the switch is functioning properly, replace the equalizing line or vent plug.**
- **If the switch does not function, it must be replaced (refer to a replacement parts list).**

REPLACEMENT KITS



KLCE Replacement Parts Kits

Kit 1: Replacement Kit Of All Working Parts
Order #RK-KLCE

Consists of:
1-Complete Cover Plate Assembly As Shown Above
1-Cover Plate Gasket
4-Mounting Bolts
4-Lock Washers
1-Vent Plug

KIt 2: SwItch KIt
Order #MS-KLCE

Consists of:
1-Switch Assembly With Bracket
1-Switch Bracket Isolator
2-Mounting Screws
2-Lock Washers

Kit 3: Switch Float Kit
Order #MF-KLCE

Consists of:
1-Switch Float Assembly With Bracket
2-Mounting Screws
1-Switch Push Rod Retainer Wire

Kit 4: Controller Gasket / Seal Kit
Order #GS-KLCE

Consists of:
1-Cover Plate Gasket
1-Sight Window O-Ring Seal
1-Oil Inlet Float Seal
1-Switch Enclosure O-Ring Seal
1-Switch Push Rod O-Ring Seal

KIt 5: OII Inlet HousIng KIt
Order #OI-KLCE

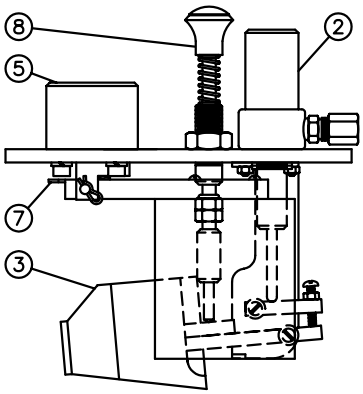
Consists of:
1-Oil Inlet Screen
1-Screen Retainer Ring

Kit 6: Controller Housing Sight Window Kit
Order #GL-KLC

Consists of:
1-Sight Window
1-Sight Window O-Ring Seal
6-Mounting Screws

Kit 7: Oil Inlet Float Kit
Order #OF-KLC

Consists of:
1-Float Assembly
1-Clevis Pin
1-Hitch Pin Clip



KLCP Replacement Parts Kits

Kit 1: Replacement Kit Of All Working Parts
Order #RK-KLCP

Consists of:
1-Complete Cover Plate Assembly As Shown Above
1-Cover Plate Gasket
4-Mounting Bolts
4-Lock Washers
1-Vent Plug

Kit 2: Air Valve Kit
Order #AV-KLCP

Consists of:
1-Complete Air Valve Assembly
1-Exhaust Ring
1-Exhaust Ring O-Ring Seal
1-Air Exhaust Connector
1-Actuator Rod

Kit 3: Air Valve Float Kit
Order #AF-KLCP

Consists of:
1-Air Valve Float Assembly With Bracket
2-Mounting Screws
2-Hexagon Nuts

Kit 4: Controller Gasket / Seal Kit
Order #GS-KLCP

Consists of:
1-Cover Plate Gasket
1-Sight Window O-Ring Seal
1-Oil Inlet Float Seal
1-Oil Inlet Housing O-Ring Seal
1-Air Valve Internal O-Ring Seal
1-Test Button Push Rod O-Ring Seal
1-Air Valve Exhaust Ring O-Ring Seal

KIt 5: OII Inlet HousIng KIt
Order #OI-KLC

Consists of:
1-Oil Inlet Screen
1-Screen Retainer Ring
1-Oil Inlet Housing
1-Housing O-Ring Seal
3-Mounting Screws
3-Lock Washers

Kit 6: Controller Housing SIght WIndow KIt
Order #GL-KLC

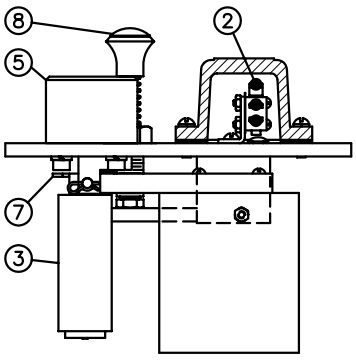
Consists of:
1-Sight Window
1-Sight Window O-Ring Seal
6-Mounting Screws

KIt 7: OII Inlet Float KIt
Order #OF-KLC

Consists of:
1-Float Assembly
1-Clevis Pin
1-Hitch Pin Clip

Kit 8: Test Button Kit
Order #TB-KLCP

Consists of:
1-Complete Test Button Assembly



KLCM Replacement Parts Kits

Kit 1: Replacement Kit Of All Working Parts
Order #RK-KLCM

Consists of:
1-Complete Cover Plate Assembly As Shown Above
1-Cover Plate Gasket
4-Mounting Bolts
4-Mounting Bolt O-Ring Seals
1-Vent Plug

KIt 2: SwItch KIt
Order #MS-KLCM

Consists of:
1-Switch Assembly with Bracket
2-Switch Assembly Mounting Screws
1-Switch Enclosure Gasket
4-Switch Enclosure Mounting Screws
4-Lock Washers

Kit 3: Switch Float Kit
Order #MF-KLCM

Consists of:
1-Switch Float Assembly With Bracket
2-Mounting Screws
1-Switch Push Rod Retainer Wire

Kit 4: Controller Gasket / Seal Kit
Order #GS-KLCM

Consists of:
1-Cover Plate Gasket
1-Sight Window O-Ring Seal
1-Oil Inlet Float Seal
1-Oil Inlet Housing O-Ring Seal
1-Switch Push Rod O-Ring Seal
1-Test Button Push Rod O-Ring Seal
1-Switch Enclosure Gasket
4-Mounting Bolt O-Ring Seals

Kit 5: Oil Inlet Housing Kit
Order #OI-KLC

Consists of:
1-Oil Inlet Screen
1-Screen Retainer Ring
1-Oil Inlet Housing
1-Housing O-Ring Seal
3-Mounting Screws
3-Lock Washers

Kit 6: Controller Housing Sight Window Kit
Order #GL-KLC

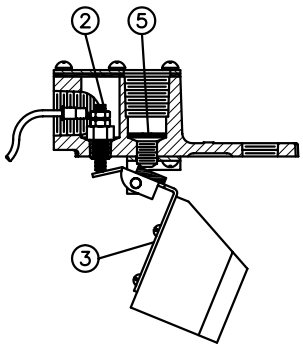
Consists of:
1-Sight Window
1-Sight Window O-Ring Seal
6-Mounting Screws

Kit 7: Oil Inlet Float Kit
Order #OF-KLC

Consists of:
1-Float Assembly
1-Clevis Pin
1-Hitch Pin Clip

Kit 8: Test Button Kit
Order #TB-KLCM

Consists of:
1-Complete Test Button Assembly



512/512-TB Replacement Parts Kits

Kit 1A: 512 Replacement Kit Of All Working Parts
Order #RK-512

Consists of:
1-Complete Cover Plate Assembly As Shown Above
1-Cover Plate Gasket
4-Mounting Bolts
4-Lock Washers
1-Vent Plug

Kit 1B: 512-TB Replacement Kit Of All Working Parts
Order #RK-512-TB

Consists of:
1-Complete Cover Plate Assembly As Shown Above Except With Test Button
1-Cover Plate Gasket
4-Mounting Bolts
4-Lock Washers
1-Vent Plug

Kit 2: Switch Kit
Order #MS-512

Consists of:
1-Insulator Bushing
1-Set Screw
2-Hexagon Nuts
1-Ring Terminal

Kit 3: Switch Float Kit
Order #MF-512
Order #MF-K512

Consists of:
1-Float Assembly
1-Clevis Pin
1-Hitch Pin Clip

Kit 4A: 512 Gasket / Seal Kit
Order #GS-512

Consists of:
1-Cover Plate Gasket Set
1-Sight Window O-Ring Seal
1-Oil Inlet Float Seal

KIt 4B: 512-TB Gasket / Seal KIt
Order #GS-512-TB

Consists of:
1-Cover Plate Gasket Set
1-Sight Window O-Ring Seal
1-Oil Inlet Float Seal
1-Test Button O-Ring Seal

Kit 5: Oil Inlet Housing Kit
Order #OI-512
Order #OI-K512

Consists of:
1-Oil Inlet Screen
1-Screen Retainer Ring

Kit 6: Controller Housing SIght WIndow KIt
Order #GL-512

Consists of:
1-Sight Window
1-Sight Window O-Ring Seal
4-Mounting Screws

Kit 7: 512-TB Test Button Kit
Order #TB-512

Consists of:
1-Complete Test Button Assembly

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MLV 13

WIKA
9799325

NEEDLE VALVE - ½” FNPT 90°F ANGLE 10,000 PSI
316 STAINLESS STEAL BODY
HARD SEAT
CV FACTOR = .52

ANGI PART NUMBER – 338-07241

NO REBUILD KIT AVAILABLE

Pressure Gauge Accessories
Instrument Grade Needle Valves
Type 910.11

Accessories, Mechanical

Application
Intended to isolate the pressure gauge from the measured fluid or to provide a means of throttling or dampening pressure pulsation.

Pressure Rating
Hard seat models 10,000 psi
Soft seat models 6,000 psi

Operating Temperature
Media: max. 200°F (+93°C)
min. 0°F (-18°C)

Flow Rate
Hard seat models Max. C_v .52
Soft seat models Max. C_v .83

Standard Features

Valve Body
12L14 carbon steel, nickel plated, or 316 stainless steel, electro-polished

Bonnet
12L14 carbon steel or 316 stainless steel

Valve Stem
316 stainless steel (hard chromed on hard seat models)

Handle
12L14 carbon steel or 316 stainless steel

Handle Bolt
12L14 carbon steel or 18-8 stainless steel

Stem Seals
Viton o-ring with PTFE back-up ring

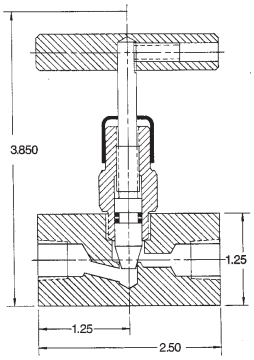
Stem Seal Lock (soft seat model)
12L14 carbon steel or 316 stainless steel

Stem Seat (soft seat model)
Delrin

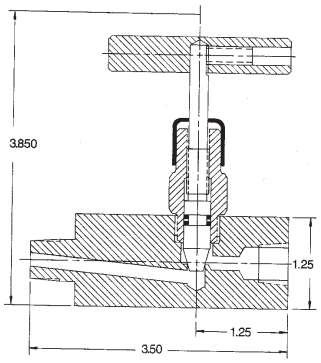
Orifice Size
0.187 inches (4.75 mm)

Order Options
Panel mounting bracket

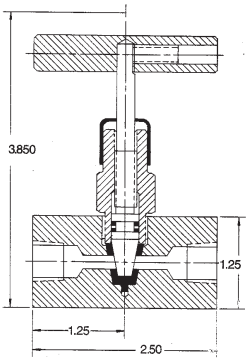
Hard Seat
Female - Female



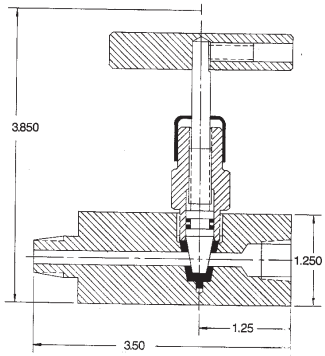
Hard Seat
Male - Female



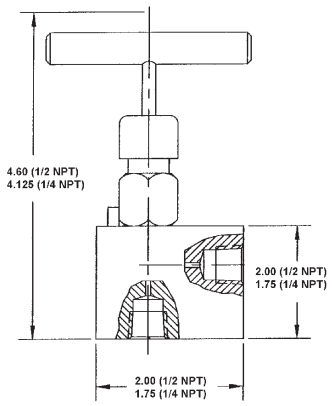
Soft Seat
Female - Female



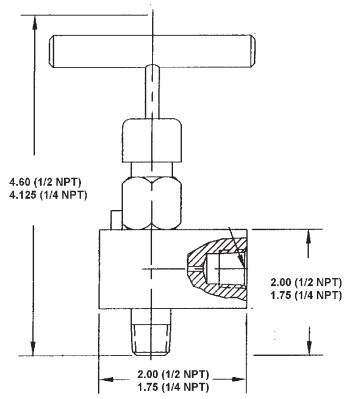
Soft Seat
Male - Female



Hard Seat
Female - Female
Angle Valve



Hard Seat
Male - Female
Angle Valve



THE MEASURE OF

Total Performance™

Ordering Information:
State computer part number (if available) / model number / size / range / connection size and location / options required.

Specifications given in this price list represent the state of engineering at the time of printing. Modifications may take place and the specified materials may change without prior notice

WIKA Instrument Corporation
1000 Wiegand Boulevard
Lawrenceville, Georgia 30043-5868
Tel: 770-513-8200 Fax: 770-338-5118
http://www.wika.com e-mail: info@wika.com

MV 2

HOKE
7115F4Y
1/4” FNPT BALL VALVE, 6000 PSI

ANGI PART NUMBER 339-02423

REBUILD KIT – HOKE 7100 SERIES VALVE – 761-07264

REBUILD KIT – HOKE 7100 SERIES SEAT – 761-01229

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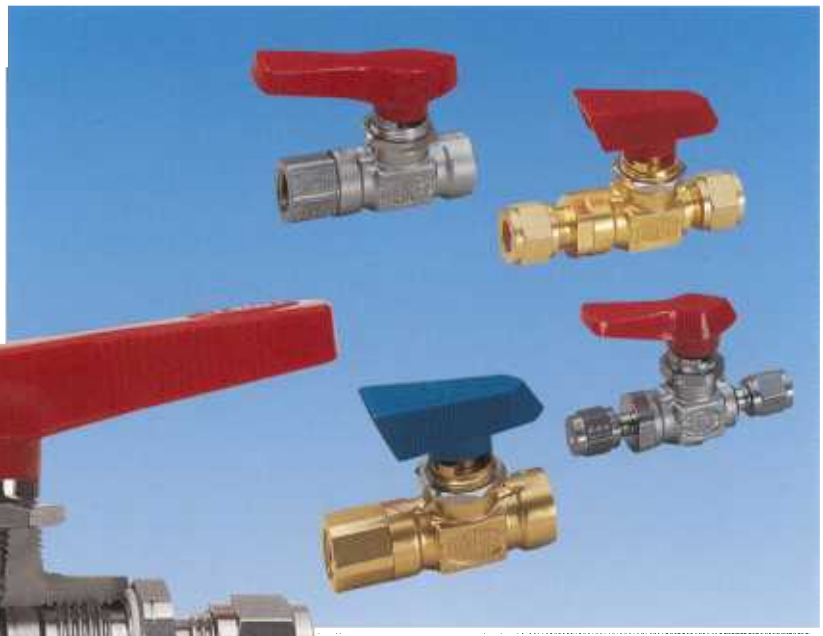
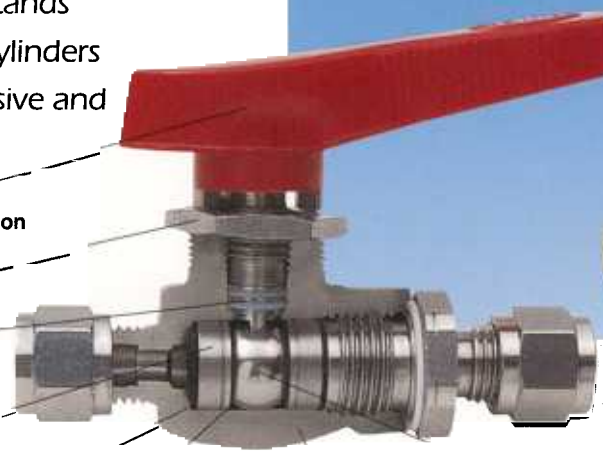
Flomite® 71 Series

2-Way Integral Panel Mount Ball Valves

Typical Applications

- Instrument panels
- High pressure instrument lines
- Gas sampling in pilot plants
- Full flow and shutoff in chromatographs
- Hydraulic test stands
- Gas sampling cylinders
- Handling corrosive and viscous fluids





Used for quick on-off service with a visual indication of flow, Hoke's 2-way ball valves offer an orifice size up to .250 in. Flomite valves feature floating ball design, encapsulated seats and check seals to ensure leak-tight service and extended service life.

HOKE ISO 9002 Certified

Technical Data

Operating Pressure Range:
Moderate vacuum to 6000 PSIG @ 70°F (41.4 MPa @ 21°C)*

Operating Temperature Range:
-20° to 480°F (-29° to 249°C)

Orifice Sizes:
.093 to .250 in. (2.4 to 6.4mm)

Cv Factors:
.23 to 1.40

End Connections:
⅛ to ⅜ in. Gyrolok®
⅛ to ¼ NPT
3 to 10mm Gyrolok

* Moderate vacuum is 10^{-3} to 10^{-6} torr.

Benefits

Visual flow indication
Quarter-turn handle indicates on-off flow.

Bidirectional leak-tight sealing
Dual encapsulated TFE or Kel-F seats and microfinished ball ensure a leak-tight seal.

Helps eliminate fugitive emissions
Dyna-Pak® packing provides a leak-tight seal with low operating torque in vacuum or high pressure applications.

HOKE Exclusive

Long cycle life
Floating ball provides pressure-assisted sealing and temperature and wear compensation.

Compatibility
A variety of body and seat/washer materials are provided.

Installation variety
Select from Hoke Gyrolok tube fittings or pipe-ended models.

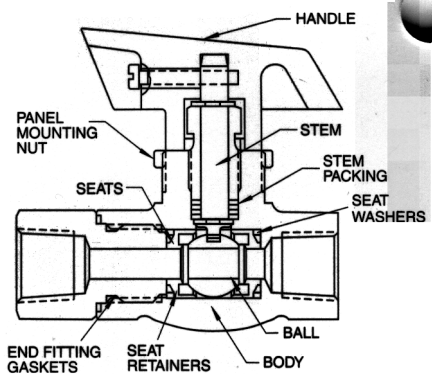
Panel mounting
Panel mounting is standard on all models.

Remote actuation
Electric and pneumatic actuators are available for automated systems.

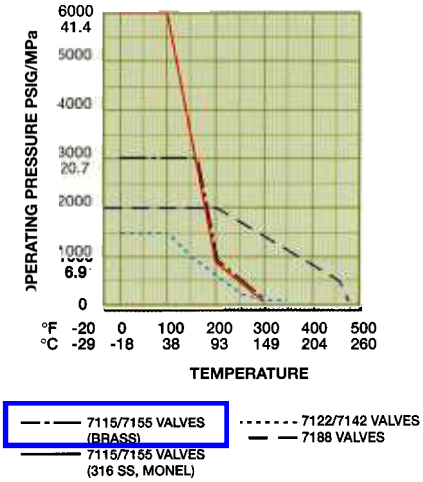
Materials of Construction

Description	Brass Valves	316 SS Valves	Monel® Valves
Body	Brass	316 SS	Monel
Ball	316 SS	316 SS	Monel
Stem	316 SS	316 SS	Monel
Stem Packing			
7188	–	Hostaflon®	–
Other Valves	TFE/316 SS Wafers	TFE/316 SS Wafers	TFE/Monel Wafers
Seats			
7115, 7155	Kel-F®	Kel-F	Kel-F
7122, 7142	TFE	TFE	TFE
7188	–	Filled TFE	–
Seat Retainers	Brass	316 SS	Monel
Seat Washers†			
7115, 7155, 7188	Viton®	Viton	Viton
7122, 7142	TFE	TFE	TFE
End Fitting Gaskets			
7188	–	Hostaflon	–
Other Valves	TFE	TFE	TFE
Handle	Nylon	Nylon	Nylon
Panel Mounting Nut			
7115	Nickel Plated Brass	Nickel Plated Brass	Nickel Plated Brass
Other Valves	Nickel Plated Brass	316 SS	Nickel Plated Brass

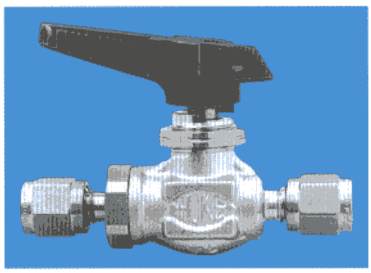
All 6000 PSIG valves come with long red handles for reduced operating force.
All other models have a short blue handle.
† Other elastomers are available upon request; contact your local distributor.



Pressure vs. Temperature Curve



Valve Ordering Charts


7155G2Y

Flomite 7115, 7155
Brass: Pressure to 3000 PSIG; 316 SS/Monel: Pressure to 6000 PSIG
Kel-F Seats—Viton Washers for Service from 0° to 300°F

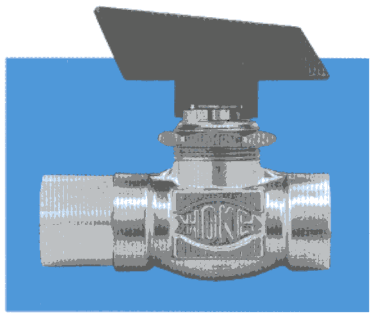
End Connections		Order by Part Number			Orifice	Cv
Inlet	Outlet	Brass	316 SS	Monel		
1/8 Gyrolok	1/8 Gyrolok	7155G2B	7155G2Y	–	.093	.23
1/8 Female NPT	1/8 Female NPT	7155F2B	7155F2Y	–	.125	.40
1/8 Female NPT	1/8 Female NPT	–	7115F2Y	–	.250	1.40
1/4 Gyrolok	1/4 Gyrolok	7155G4B	7155G4Y	–	.125	.40
1/4 Gyrolok	1/4 Gyrolok	7115G4B	7115G4Y	7115G4M	.187	.80
1/4 Male NPT	1/4 Gyrolok	7115H4B	7115H4Y	–	.187	.80
1/4 Male NPT	1/4 Female NPT	7115L4B	7115L4Y	–	.250	1.40
1/4 Female NPT	1/4 Female NPT	7115F4B	7115F4Y	7115F4M	.250	1.40
3/8 Gyrolok	3/8 Gyrolok	7115G6B	7115G6Y	–	.250	1.40
3mm Gyrolok	3mm Gyrolok	–	7155G3Y/MM	–	.093	.23
6mm Gyrolok	6mm Gyrolok	–	7155G6Y/MM	–	.125	.40
6mm Gyrolok	6mm Gyrolok	–	7115G6Y/MM	–	.187	.80
8mm Gyrolok	8mm Gyrolok	–	7115G8Y/MM	–	.250	1.40
10mm Gyrolok	10mm Gyrolok	–	7115G10Y/MM	–	.250	1.40

The following are trademarks of their respective companies:
Monel, International Nickel Company; Kel-F, 3M Co.; Viton, DuPont; Hostaflon, Hoechst.

Flomite 71 Series

Flomite 7122, 7142 **Pressure to 1500 PSIG**
TFE Seats—TFE Washers for Service from 0° to 350°F

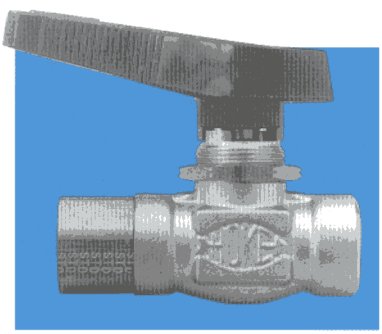
End Connections		Order by Part Number			Orifice	Cv
Inlet	Outlet	Brass	316 SS	Monel		
1/8 Gyrolok	1/8 Gyrolok	7142G2B	7142G2Y	–	.093	.23
1/8 Female NPT	1/8 Female NPT	7142F2B	7142F2Y	–	.125	.40
1/4 Gyrolok	1/4 Gyrolok	7142G4B	7142G4Y	–	.125	.40
1/4 Gyrolok	1/4 Gyrolok	7122G4B	7122G4Y	7122G4M	.187	.80
1/4 Male NPT	1/4 Gyrolok	7122H4B	7122H4Y	–	.187	.80
1/4 Male NPT	3/8 Gyrolok	–	7122H46Y	–	.250	1.40
1/4 Male NPT	1/4 Male NPT	–	7122M4Y	–	.250	1.40
1/4 Male NPT	1/4 Female NPT	7122L4B	7122L4Y	–	.250	1.40
1/4 Female NPT	1/4 Female NPT	7122F4B	7122F4Y	7122F4M	.250	1.40
3/8 Gyrolok	3/8 Gyrolok	7122G6B	7122G6Y	–	.250	1.40
3mm Gyrolok	3mm Gyrolok	–	7142G3Y/MM	–	.093	.23
6mm Gyrolok	6mm Gyrolok	–	7142G6Y/MM	–	.125	.40
6mm Gyrolok	6mm Gyrolok	–	7122G6Y/MM	–	.187	.80
8mm Gyrolok	8mm Gyrolok	–	7122G8Y/MM	–	.250	1.40
10mm Gyrolok	10mm Gyrolok	–	7122G10Y/MM	–	.250	1.40



7122F4B

Flomite 7188 **Pressure to 2000 PSIG**
Filled TFE Seats—Viton Washers for Service from -20° to 480°F

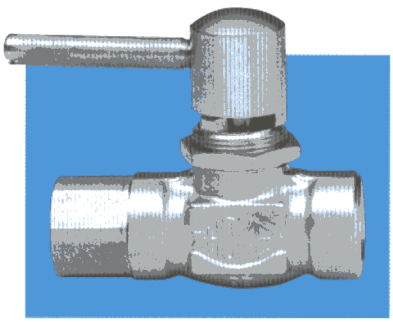
End Connections		Order by Part Number	Orifice	Cv
Inlet	Outlet	316 SS		
1/4 Gyrolok	1/4 Gyrolok	7188G4Y	.187	.80
1/4 Female NPT	1/4 Female NPT	7188F4Y	.250	1.40
3/8 Gyrolok	3/8 Gyrolok	7188G6Y	.187	.80



7188F4Y– Provides Service to 480°F

Ordering Options

Metal Handles
Metal handles can be ordered for Flomite 71 series 2-way valves with an orifice of .187 in. or .250 in. To order, specify kit #7100K13 following the valve number.

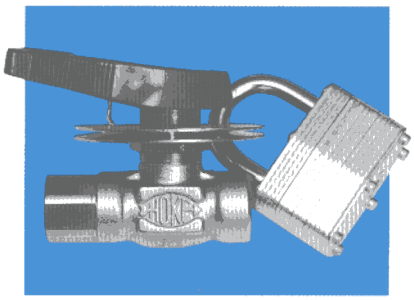


7122F4Y with Metal Handle

Color-Coded Handles
Color-coded handles are available for 7115, 7122 and 7188 valves. Order by the part number listed below. Only black (#95576-032) is available for 7142 and 7155 valves.

#90187-6 #90187-5 #90187-3 #90187-2 #90187-1

Handle Locking Kit
Safety lockout kits are available for applications which must conform to Code of Federal Regulations 29CFR Part 1910, OSHA Safety and Health Act and other worldwide regulations. Valves can be locked in either an opened or closed position with the stainless steel upper and lower locking plates. Lock with readily available padlocks or commercially available multiple lockout devices. Locking kits include the locking plates and assembly instructions. To order a safety lockout kit for 7115, 7122 and 7188 valves, specify kit #7100K18.

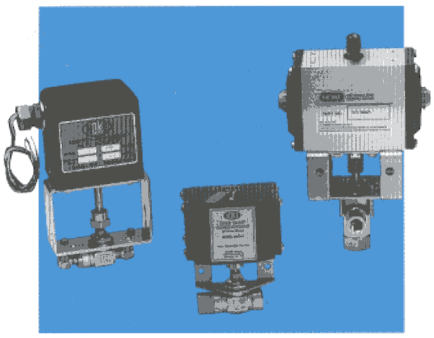


Ball Valve with Handle Lock

Spare Parts
Spare parts and repair kits are available for all ball valves. Please contact your distributor for specific information.

Cleaning and Testing
When ordering, please specify if oxygen cleaning or helium leak testing is required.

Additional Sizes
Additional sizes and options are available on special request. Please consult your local Hoke distributor.



Actuators

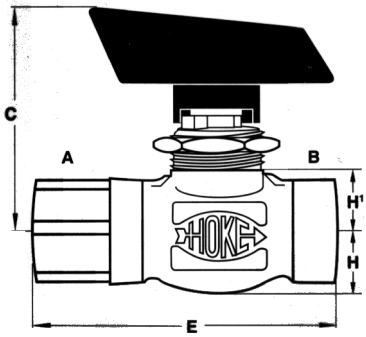
Electric and Pneumatic Actuators

For remote control of Flomite 71 series valves, order an electric or pneumatic actuator. Electric actuators are supplied in either 115 VAC or 24 VDC with weather-proof or explosion-proof housings. Pneumatically actuated ball valves using Hoke's Space Saver® actuator can be used for both 90° and 180° double acting and spring return applications. See Hoke's Actuated Valve Catalog or contact your distributor for details.

Dimensions Chart

Flomite 71 Series

Inlet A	Outlet B		C	E	H	H'	Panel Mounting Max. Thickness	Panel Mounting Hole Size
1/8 Gyrolok	1/8 Gyrolok	inch	1 13/32	2 19/32	13/32	11/32	3/16	19/32
		mm	36	66	10	9	5	15
1/8 Female NPT for .125 orifice	1/8 Female NPT for .125 orifice	inch	1 13/32	1 31/32	13/32	11/32	3/16	19/32
		mm	36	50	10	9	5	15
1/8 Female NPT for .250 orifice	1/8 Female NPT for .250 orifice	inch	1 23/32	2 19/64	1/2	7/16	1/4	49/64
		mm	44	58	13	11	6	19
1/4 Gyrolok for .125 orifice	1/4 Gyrolok for .125 orifice	inch	1 13/32	2 11/16	13/32	11/32	3/16	19/32
		mm	36	68	10	9	5	15
1/4 Gyrolok for .187 orifice	1/4 Gyrolok for .187 orifice	inch	1 23/32	3 3/32	1/2	7/16	1/4	49/64
		mm	44	78	13	11	6	19
1/4 Male NPT	1/4 Gyrolok	inch	1 7/8	2 7/8	1/2	7/16	1/4	49/64
		mm	48	73	13	11	6	19
1/4 Male NPT	3/8 Gyrolok	inch	1 7/8	2 7/8	1/2	7/16	1/4	49/64
		mm	48	73	13	11	6	19
1/4 Male NPT	1/4 Male NPT	inch	1 23/32	2 17/32	1/2	7/16	1/4	49/64
		mm	44	64	13	11	6	19
1/4 Male NPT	1/4 Female NPT	inch	1 7/8	2 17/32	1/2	7/16	1/4	49/64
		mm	48	64	13	11	6	19
1/4 Female NPT	1/4 Female NPT	inch	1 7/8	2 7/16	1/2	7/16	1/4	49/64
		mm	48	62	13	11	6	19
3/8 Gyrolok	3/8 Gyrolok	inch	1 7/8	3 1/4	1/2	7/16	1/4	49/64
		mm	48	83	13	11	6	19
3mm Gyrolok	3mm Gyrolok	inch	1 13/32	2 19/32	13/32	11/32	3/16	19/32
		mm	36	66	10	9	5	15
6mm Gyrolok for .125 orifice	6mm Gyrolok for .125 orifice	inch	1 13/32	2 11/16	13/32	11/32	3/16	19/32
		mm	36	68	10	9	5	15
6mm Gyrolok for .187 orifice	6mm Gyrolok for .187 orifice	inch	1 23/32	3 3/32	1/2	7/16	1/4	49/64
		mm	44	78	13	11	6	19
8mm Gyrolok	8mm Gyrolok	inch	1 7/8	3 1/4	1/2	7/16	1/4	49/64
		mm	48	83	13	11	6	19
10mm Gyrolok	10mm Gyrolok	inch	1 7/8	3 1/8	1/2	7/16	1/4	49/64
		mm	48	79	13	11	6	19



Dimensions for reference only, subject to change.

HOKE Cares About Your Safety

WARNING

IMPROPER SELECTION OR USE OF PRODUCTS DESCRIBED HEREIN CAN CAUSE PERSONAL INJURY OR PROPERTY DAMAGE.

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Always contact your local Hoke Distributor with any questions you may have before pressurizing and operating the product.

SAFETY INSTRUCTIONS

1. Do not tighten or loosen any part of a fitting or valve when the system is pressurized. Make sure the system is unpressurized when tightening or loosening a fitting or valve connection.

2. Do not loosen Hoke Gyrolok nut or any product component in order to relieve or bleed down system pressure.

3. Do not exceed pressure-temperature specifications stated in the appropriate catalog.

4. When the application involves use of a toxic or hazardous fluid, exercise extra caution during operation and maintenance.

5. Before assembling new, unused Hoke Gyrolok tube fitting ends, loosen the Hoke Gyrolok nut before inserting the tube to allow full insertion of the tube to the base of the body bore.

6. Always use tubing that is compatible with the fitting or valve material. Tubing appropriate for use with Hoke products is described in the Hoke Gyrolok catalog. For example, use 316 Stainless Steel fittings with 316 Stainless Steel tubing.

7. Always leave a length of straight tube between the tube bend and the fitting. A tube bent too close to the fitting connection may be a source of leakage.

8. During assembly of the Hoke Gyrolok tube end, always hold the fitting or valve body with one wrench while separately wrench tightening the Hoke Gyrolok nut. Follow the same precaution when disassembling.

9. Always use a Hoke tube insert (basic part number "TI") when assembling a Hoke Gyrolok fitting to soft, pliable plastic tubing.

10. Always use proper thread lubricants or sealants on tapered pipe threads. Note that thread sealants may have lower temperature ratings than the basic fitting.

11. NPT threads should be torqued in accordance with an industry standard, such as Underwriter's Laboratory UL842. Note that previously assembled threads may require additional tightening.

12. When installing an NPT ended valve, hold the valve body near the connection with one wrench, while separately wrench tightening the mating pipe. Turn the pipe, not the valve. Follow the same precaution when disconnecting.

13. Do not hold the valve handle when tightening an end connection.

14. Do not use excessive force to open or close a Ball Valve. e.g., Do not use a handle extension.

15. On initial installation, valves may require an adjustment of the packing nut due to storage variations, systems parameters, and cold flow properties of TFE.

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MV 74

MILWAUKEE VALVE
1 BA – 100

1” FNPT BALL VALVE, 600 PSI BRONZE

ANGI PART NUMBER 334-07264

NO REBUILD KIT AVAILABLE

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BA-100/100S

1/4" - 3"

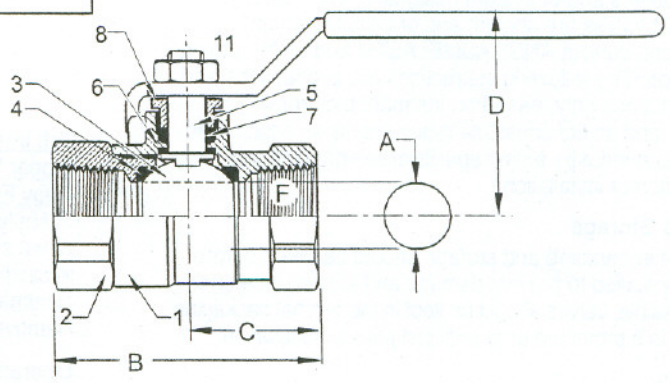
MSS SP-110

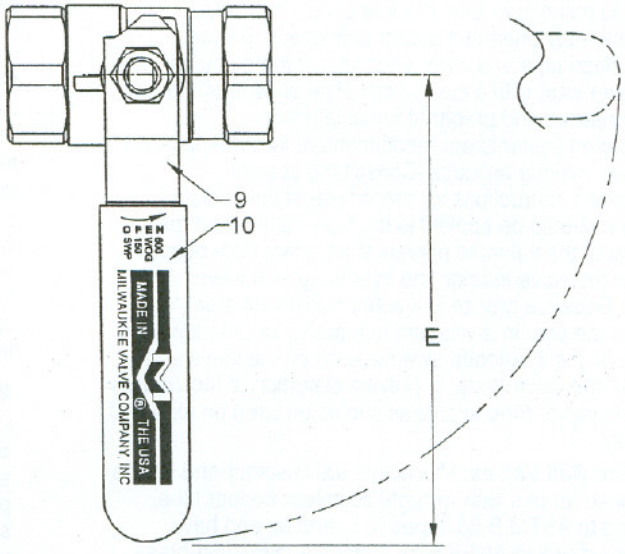
BRONZE BALL VALVE
TWO-PIECE, STANDARD-PORT
600 PSIG WOG / 150 PSIG SWP *
THREADED ENDS

MATERIALS LIST

ITEM	PART	MODEL	MATERIALS	ASTM SPEC.
1	Body	100 & 100S	Cast Bronze	B584
2	Tailpiece	100 & 100S	Brass	B16
			Cast Bronze (1" & up)	B584
3	Ball	100	Brass w/ Hard Chrome Plating	B16
		100S	316 Stainless Steel	A276
4	Seat	100 & 100S	RPTFE, 15% Glass Filled	
5	Stem	100	Brass	B16
		100S	316 Stainless Steel	A276
6	Thrust Washer	100 & 100S	RPTFE, 25% Glass Filled	
7	Packing	100 & 100S	PTFE	
8	Packing Nut	100 & 100S	Brass	B16
9	Handle	100 & 100S	Steel w/ Zinc Plating	B633
10	Hand Grip	100 & 100S	Vinyl	
11	Handle Nut	100 & 100S	Steel w/ Zinc Plating	B633

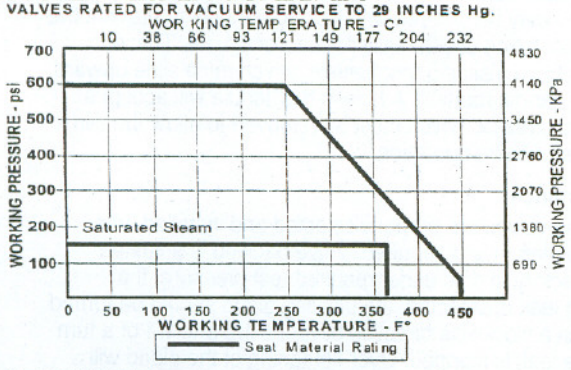
* Milwaukee Valve Company recommends the use of Stainless steel ball and stem for steam applications. Please consult factory for more information.





PRESSURE - TEMPERATURE DATA

VALVES RATED FOR VACUUM SERVICE TO 29 INCHES Hg.

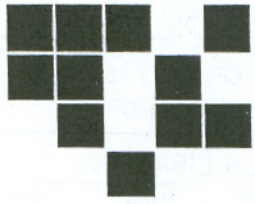


DIMENSIONS

	UNITS	1/4" DN6	3/8" DN10	1/2" DN15	3/4" DN20	1" DN25	1-1/4" DN32	1-1/2" DN40	2" DN20	2-1/2" DN65	3" DN80
A (DIA)	INCHES	0.38	0.38	0.51	0.70	0.88	1.07	1.32	1.57	2.00	2.31
	mm	9.3	9.3	12.5	17.2	21.6	26.2	32.3	38.5	49.0	56.6
B	INCHES	1.86	1.86	2.19	2.64	3.17	3.50	3.96	4.30	5.56	6.20
	mm	45.6	45.6	53.7	64.7	77.7	85.8	97.0	105.4	136.2	151.9
C	INCHES	1.00	1.00	1.10	1.30	1.58	1.74	1.97	2.15	2.79	3.10
	mm	24.5	24.5	27.0	31.9	38.7	42.6	48.3	52.7	68.4	76.0
D	INCHES	1.78	1.81	1.91	2.08	2.25	2.66	2.84	3.00	3.47	3.90
	mm	43.6	44.3	46.8	51.0	55.1	65.2	69.6	73.5	85.0	95.6
E	INCHES	3.81	3.81	3.81	4.56	4.56	6.31	6.31	7.19	7.19	7.19
	mm	93.3	93.3	93.3	111.7	111.7	154.6	154.6	176.2	176.2	176.2
F	THREAD SIZE	1/4" NPT	3/8" NPT	1/2" NPT	3/4" NPT	1" NPT	1-1/4" NPT	1-1/2" NPT	2" NPT	2-1/2" NPT	3" NPT
Cv		7	7	13	25	38	61	87	121	228	305

Note: DN (Diameter Nominal) = Metric equivalent size.

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS



CAUTION!

It is the installer's and/or system designer's responsibility to insure that valves are chosen and/or installed within applicable and current ANSI, ASME, ASTM and/or API piping specifications. The following instructions are suggestions and recommendations only, based on the manufacturer's experience, and do not constitute requirements as established by appropriate industry piping specifications or standards for valve selection or installation.

Handling & Storage

Proper care in handling and storage should be taken before valves are installed to prevent damage and to keep pipe ends clean. If possible, valves should be kept in the original packaging, and stored in a protected area until just prior to installation.

Installation

Threaded-End Ball Valves: Inspect both the valves and pipe ends to make sure they are free of dirt, dust, oil or anything that may prevent a proper connection. Before installing, clean pipe and valve ends with compressed air or water, and wipe with a clean cloth. Pipe ends must be properly threaded and prepared for installation.

PTFE-based sealants are recommended for threaded-end valves when making up joints. Consult the sealant-manufacturer's instructions for proper use of the sealant. The sealant should be applied to the pipe, rather than the female end of the valve, to prevent the sealant from being forced into the valve interior and interfering with valve operation. Because bronze is a softer metal than steel, always put the pipe in a vise and turn the valve onto the pipe end. Always use a smooth-jawed wrench on the valve ends, rather than the valve body, to prevent distortion of the internal parts of the valve. Pipe wrenches should be used on pipe and fittings only.

Solder-End Ball Valves: Milwaukee Valve solder-end valves are designed for use with wrought seamless copper tube, conforming to ASTM B-88, types K, L, and M, and have dimensions meeting ANSE B 16.18 for standard cast-brass solder-joint fittings. The copper tube being installed must meet these specifications. The selection of the solder type being used may be influenced by the application or by local government regulations. Make sure that the solder being used is within these specifications or regulations.

Important: When installing two-piece solder-end ball valves, make sure that the valve is in the partially-open position to allow heat to escape, preventing distortion or damage to the PTFE-seats and seals. When three-piece bolted-body, solder-end ball valves are being installed, the valve's center section, with seats and seals, must be completely removed prior to soldering. Re-assemble the valve after the end-pieces have been installed onto the tubing. Refer to instruction sheet #IS-BA3-01 for recommended reassembly procedures.

The copper tube should be cut square and any burrs should be removed. The tubing and valve-ends should be cleaned to a bright finish with steel wool or emery cloth. Wipe both ends with a clean cloth, and apply a sufficient amount of flux to both the outside of the tube-end and the inside of the valve cup to insure adhesion. Insert the tube end into the valve cup and apply heat uniformly to the valve end and the tubing. Do Not Overheat The Joint. Keep The Flame From Making Direct Contact With The Valve Body, As Damage To The Soft Internal Parts Of The Valve May Occur, Preventing Proper Valve Operation. The Flame Should Be Directed Away From The Stem Centerline Toward The Valve Ends.

Apply solder to the juncture of the valve and the tubing. When sufficiently heated, the solder will flow into the joint due to capillary attraction. When a solder ring forms around the circumference of the juncture, the joint has been completed. Remove all excess solder with a brush or cloth.

Operation

Generally, ball valves are designed to be opened by rotating the handle in a counter-clockwise direction, and closed by rotating the handle in a clockwise direction. The handle direction normally indicates the ball-port position, and whether the valve is opened or closed. However, for some applications, valves may be ordered with a reverse-operating handle where the handle position is perpendicular to the ball-port position. In these cases, the valve will include a warning tag. The warning identification must never be removed from the valve.

Valves may be ordered with locking handles to prevent the valve from being accidentally opened or closed. These handles have a sliding mechanism, which must slide upward to allow handle rotation. A hole in the handle will accept a standard padlock, which must be removed to allow the slider to move for valve operation.

Maintenance

Once the valves are properly selected and installed, very little maintenance is required. Valve packing is adjusted at the factory to seal under required test pressure. If a packing leak is detected, the packing gland should be turned slowly in a clockwise direction between 1/8 and 1/4 of a turn until the leak is stopped. Over-tightening of the gland will reduce packing service-life, and is not recommended.

With two-piece valves, repair or replacement of internal parts is not recommended, as damage may occur to the body and tailpiece during disassembly, making the valve inoperable. Never attempt to disassemble a valve while it is installed or in service. If a valve seems to wear prematurely, check the system requirements and service conditions to make sure the valve has been properly selected and installed for the application. Corrosion, pressure or temperature fluctuations, high velocities, and dirt or grit in the system can contribute to wear, and should be checked and prevented, if possible.

Three-piece valves are designed for applications where frequent disassembly and reassembly for maintenance are required. With these valves, the center section can be removed for replacement of the PTFE ball seats and body seals, while the end caps remain connected to the pipe. Never Attempt To Loosen The Body Bolts Or Packing Gland While The Valve Is In Service. Always Be Sure That The Valve Is Completely Isolated From System Pressure, Temperature Or Line Media Prior To Loosening The Body Bolts Or Packing Gland. Once the valve is isolated, open and close the valve several times to relieve residual pressure from the body cavity.

MV 124

HOKE / HOKE
7223F6YD / DBL-NO / 07L90SR31SO-M31 / LBMK7223-M31 / LTMK7223-M31

(2) 3/8” FNPT BALL VALVE, 5000 PSI, SS
W/ 07L ACTUATOR, NORMALLY OPEN

ANGI PART NUMBER 334-07322

REBUILD KIT - HOKE PKG / SEAT 7223D SERIES – 761-07276

REBUILD KIT - HOKE SEAL KIT 7223D SERIES – 761-07391

REBUILD KIT – ACTUATOR HOKE 07L – 761-07505

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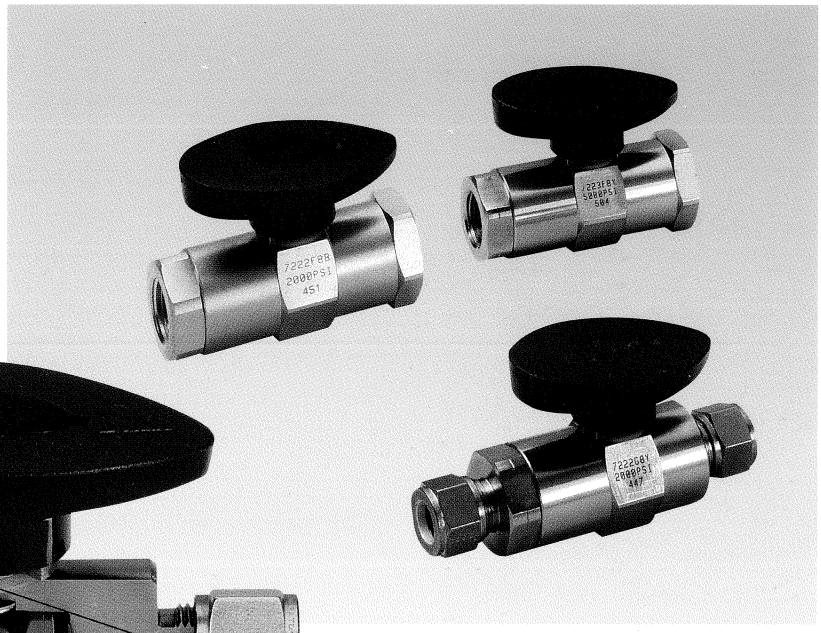
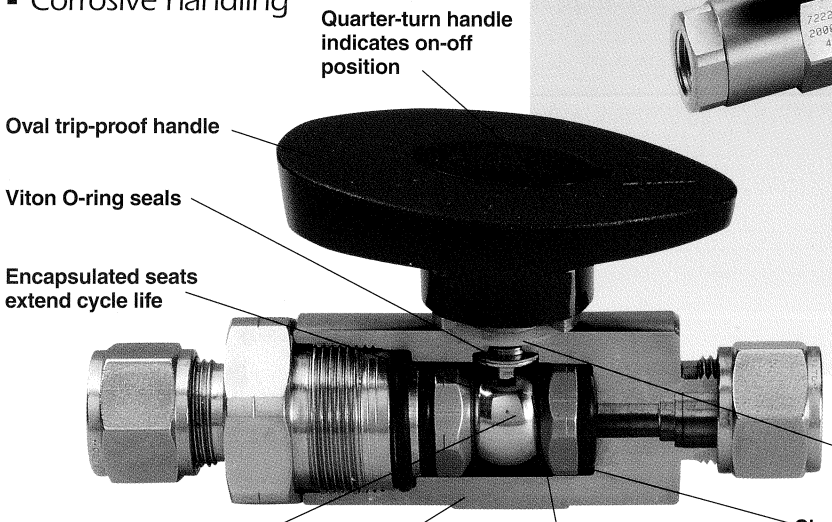
Rotoball® 72 Series
2-Way Low Profile Ball Valves

Typical Applications
- Hydraulic test stands
- Handling slurries
- Refinery pilot plants
- Pneumatic systems
- Corrosive handling





Hoke's bar stock 2-way ball valves offer a .375 in. orifice. Rotoball valves feature floating ball design, encapsulated seats and trip-proof handle for safe, leak-tight service and long service life.

HOKE ISO 9002 Certified

Technical Data

Operating Pressure Range:
Moderate vacuum to 5000 PSIG @ 70°F (34.5 MPa @ 21°C)*

Operating Temperature Range:
-20° to 350°F (-29° to 177°C)

Orifice Size:
.375 in. (9.5mm)

Cv Factor:
3.4

End Connections:
½ in. Gyrolok®
⅜ to ½ Female NPT
12mm Gyrolok

* Moderate vacuum is 10^{-3} to 10^{-5} torr.

Benefits

Safety
Blowout-proof stem.
Oval trip-proof handle helps prevent accidental actuation.

Visual flow indication
Quarter-turn handle indicates on-off.

Bidirectional leak-tight sealing
Dual encapsulated TFE seats and microfinished ball ensure a leak-tight seal.

Long cycle life
Floating ball provides pressure-assisted sealing and temperature wear compensation.

Compatibility
TFE seats with TFE or Viton washers provide excellent corrosion resistance.

Choice of materials
Select from Brass, 316 SS or Monel.

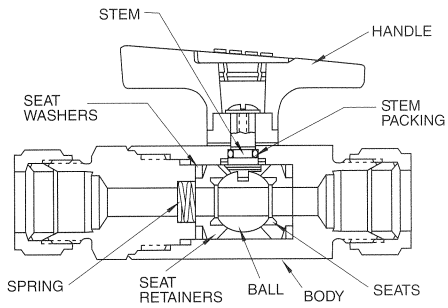
Installation variety
Choose Hoke Gyrolok tube fittings or pipe-ended models.

Remote actuation
Electric and pneumatic actuators are available for automated systems.

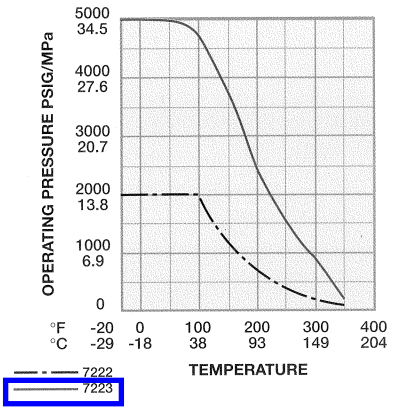
Materials of Construction

Description	Brass Valves	316 SS Valves	Monel® Valves
Body	Brass	316 SS	Monel
Ball	316 SS	316 SS	Monel
Stem	316 SS	316 SS	Monel
Stem Packing†	Viton®	Viton	Viton
Seats	TFE	TFE	TFE
Seat Retainers	316 SS	316 SS	Monel
Seat Washers†			
7222	TFE	TFE	TFE
7223	–	Viton	–
Spring	316 SS	316 SS	Monel
Handle	Nylon	Nylon	Nylon

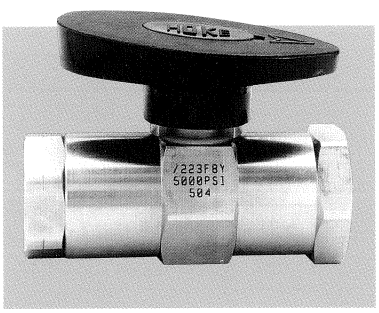
† Other elastomers are available upon request; contact your local distributor.



Pressure vs. Temperature Curve



Valve Ordering Charts



7223F8Y

Rotoball 7222 Pressure to 2000 PSIG TFE Seats—TFE Washer

End Connections	Order by Part Number			Orifice	Cv
Inlet and Outlet	Brass	316 SS	Monel		
⅜ Female NPT	–	7222F6Y	–	.375	3.4
½ Female NPT	7222F8B	7222F8Y	7222F8M	.375	3.4
½ Gyrolok	7222G8B	7222G8Y	7222G8M	.375	3.4
12mm Gyrolok	–	7222G12Y/MM	–	.375	3.4

Rotoball 7223 Pressure to 5000 PSIG TFE Seats—Viton Washers

End Connections	Order by Part Number	Orifice	Cv
Inlet and Outlet	316 SS		
⅜ Female NPT	7223F6Y	.375	3.4
½ Female NPT	7223F8Y	.375	3.4
½ Gyrolok	7223G8Y	.375	3.4
12mm Gyrolok	7223G12Y/MM	.375	3.4

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WARNING

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Always contact your local Hoke Distributor with any questions you may have before pressurizing and operating the product.

SAFETY INSTRUCTIONS

1. Do not tighten or loosen any part of a fitting or valve when the system is pressurized. Make sure the system is unpressurized when tightening or loosening a fitting or valve connection.

2. Do not loosen Hoke Gyrolok nut or any product component in order to relieve or bleed down system pressure.

3. Do not exceed pressure-temperature specifications stated in the appropriate catalog.

4. When the application involves use of a toxic or hazardous fluid, exercise extra caution during operation and maintenance.

5. Before assembling new, unused Hoke Gyrolok tube fitting ends, loosen the Hoke Gyrolok nut before inserting the tube to allow full insertion of the tube to the base of the body bore.

6. Always use tubing that is compatible with the fitting or valve material. Tubing appropriate for use with Hoke products is described in the Hoke Gyrolok catalog. For example, use 316 Stainless Steel fittings with 316 Stainless Steel tubing.

7. Always leave a length of straight tube between the tube bend and the fitting. A tube bent too close to the fitting connection may be a source of leakage.

8. During assembly of the Hoke Gyrolok tube end, always hold the fitting or valve body with one wrench while separately wrench tightening the Hoke Gyrolok nut. Follow the same precaution when disassembling.

9. Always use a Hoke tube insert (basic part number "TI") when assembling a Hoke Gyrolok fitting to soft, pliable plastic tubing.

10. Always use proper thread lubricants or sealants on tapered pipe threads. Note that thread sealants may have lower temperature ratings than the basic fitting.

11. NPT threads should be torqued in accordance with an industry standard, such as Underwriter's Laboratory UL842. Note that previously assembled threads may require additional tightening.

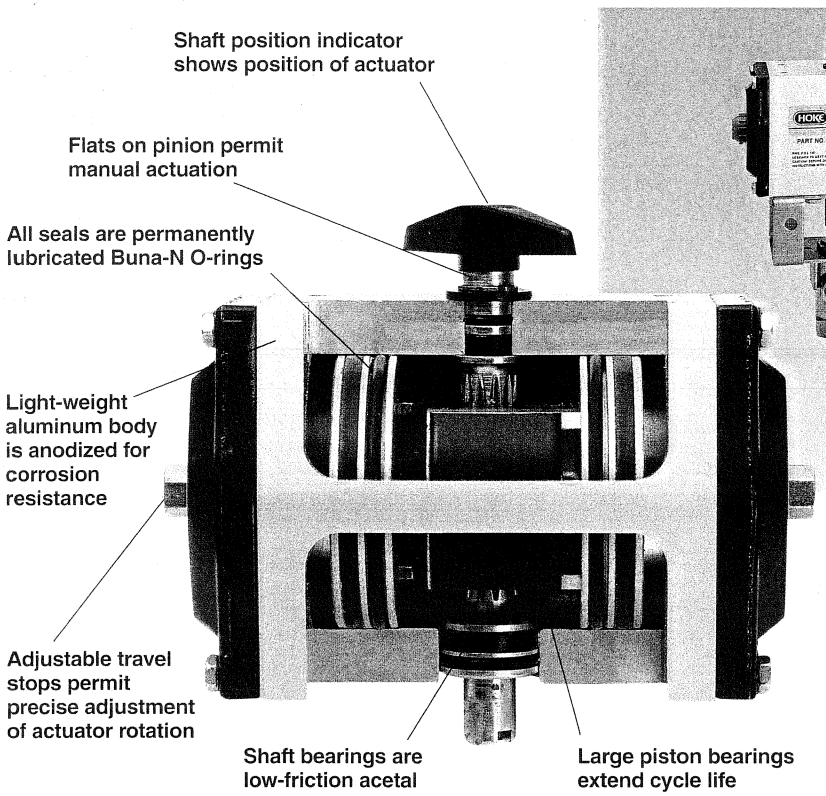
12. When installing an NPT ended valve, hold the valve body near the connection with one wrench, while separately wrench tightening the mating pipe. Turn the pipe, not the valve. Follow the same precaution when disconnecting.

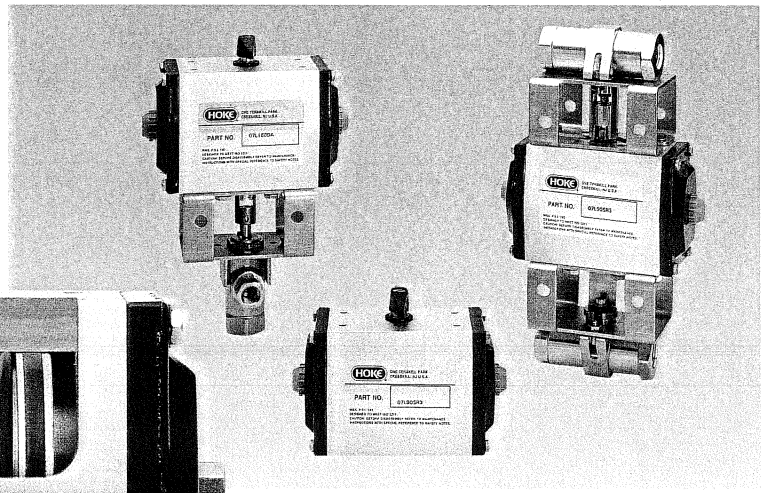
13. Do not hold the valve handle when tightening an end connection.

14. Do not use excessive force to open or close a Ball Valve. e.g., Do not use a handle extension.

15. On initial installation, valves may require an adjustment of the packing nut due to storage variations, systems parameters, and cold flow properties of TFE.

07L Series
Pneumatic Actuators





The 07L series rack and pinion actuator uses a double piston design to generate high torque while maintaining a small envelope. The actuators are available in double acting and spring return versions for both 90° and 180° actuation. A position indicator provides a visual guide to the unit's position and can be removed for manual override. The high cycle life and compact size combine to support the industry trends toward automation and downsizing.

Technical Data

Maximum Operating Pressure:
140 PSIG @ 70°F (960 kPa @ 21°C)

Operating Temperature Range:
-13° to 200°F (-25° to 95°C)

Air Supply Connections:
⅛ Female NPT

Weight:*
3.0 to 3.4 lbs. (1.2 to 1.3 kg)

Cycle Time:†
90°—.25 secs.
180°—.50 secs.

* Weight varies due to number of springs used.
† Based on 80 PSIG air and ¼" supply line.

Benefits

Safety
Shaft position indicator—
- shows position of actuator.
- can be removed to allow manual override.

Fail-safe spring return option.

Compact
Double piston design reduces envelope.
Patented spring return cartridge saves space.
Single unit may be used to actuate one or two valves.

Reliable
Long cycle life.
Acetal piston guides and rings reduce friction.
Internally lubricated seals, bearings and guides require no further lubrication under normal conditions.

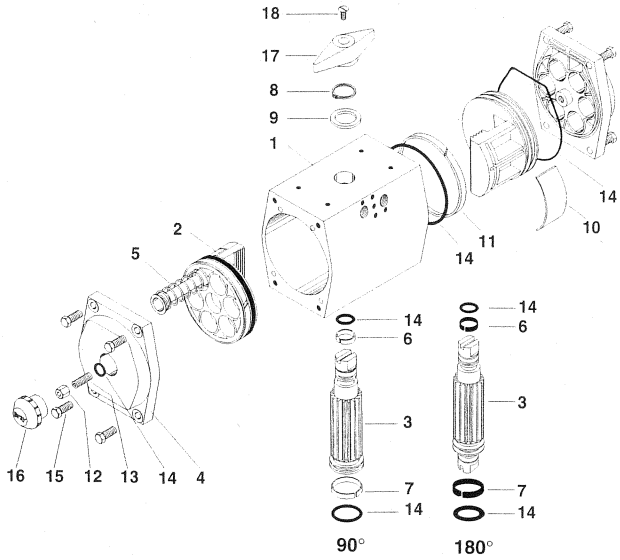
Durable
Anodized body and epoxy-coated end caps provide corrosion protection.
Stainless steel brackets.

Powerful
Actuates larger, high pressure single and multiport valves (7115, 7165, 7200, 7644, 7670, 7900, 7B).

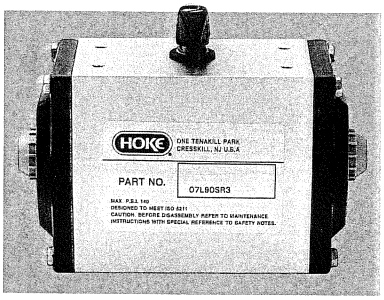
Versatile
90° and 180° operation.
Double acting and spring return.
Uses standard shop air.
Optional position monitor and solenoids—
- allow electronic control,
- are available in weather-proof and explosion-proof enclosures.

Materials of Construction

Item	Qty.	Description	Material
1	1	Body	Anodized Aluminum
2	2	Piston	Aluminum
3	1	Pinion	Zinc Plated Carbon Steel
4	2	End Cap	Coated Aluminum
5	4 max.	Spring Cartridge Assembly	Coated Spring Steel
6	1	Upper Bearing	Acetal
7	1	Lower Bearing	Acetal
8	1	Retaining Ring	Zinc Plated Spring Steel
9	1	Washer	Nylon
10	2	Bearing Pad	Acetal
11	2	Guide Ring	Acetal
12	2	Stop Nut	Zinc Plated Carbon Steel
13	2	Travel Adjusting Screw Stop	Zinc Plated Carbon Steel
14	8	O-ring	Buna-N (Nitrile)
15	8	Hex Head Cap Screw	Zinc Plated Carbon Steel
16	2	Dust Cap	Nylon
17	1	Indicator Pointer	Nylon
18	1	Indicator Pointer Screw	Zinc Plated Carbon Steel



Actuator Ordering Charts



07L90SR3

90° Double Acting Actuators

Actuator Part Number	For Use with One Valve	For Use with Two Valves	Top Mount Kit Number	Bottom Mount Kit Number
07L90DA	7222	7222	LTMK7222	LBMK7222
	7223	7223	LTMK7223	LBMK7223
	7092	7092	LTMK7222	LBMK7222
	7093	7093	LTMK7223	LBMK7223
	7B	–	–	7BK1

90° Spring Return Actuators

Actuator Part Number	For Use with One Valve	For Use with Two Valves	Top Mount Kit Number	Bottom Mount Kit Number
07L90SR3	–‡	7115	LTMK7115	LBMK7115
	–‡	7015	LTMK7115	LBMK7115
	7222	7222	LTMK7222	LBMK7222
	7223	7223	LTMK7223	LBMK7223
	7092	7092	LTMK7222	LBMK7222
	7093	7093	LTMK7223	LBMK7223
	7B	–	–	7BK1
07L90SR4	7911	–	–	LBMK7900
	7921	–	–	LBMK7900

‡ See 0700 Series Actuator catalog.

180° Double Acting Actuators

Actuator Part Number	For Use with One Valve	For Use with Two Valves	Top Mount Kit Number	Bottom Mount Kit Number
07L180DA	7644	7644	LTMK7644	LBMK7644

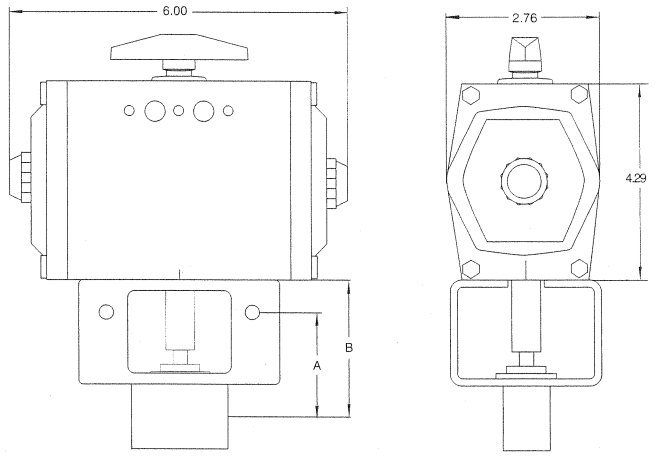
180° Spring Return Actuators

Actuator Part Number	For Use with One Valve	For Use with Two Valves	Top Mount Kit Number	Bottom Mount Kit Number
07L180SR3	7165	7165	LTMK7165	LBMK7165
	7065	7065	LTMK7065	LBMK7065
	7671	7671	LTMK7165	LBMK7165
	7673	7673	LTMK7165	LBMK7165
07L180SR4	7644	–	–	LBMK7644

07L Series

Dimensions Chart

Series		Dim. A	Dim. B
7065	inch	1 21/32	2 13/32
	mm	42	61
7090	inch	1 15/16	2 43/64
	mm	49	68
7015/ 7022/ 7115	inch	1 11/16	2 7/16
	mm	43	62
7165	inch	1 21/32	2 13/32
	mm	42	61
7200	inch	1 15/16	2 43/64
	mm	49	68
7644	inch	2 1/8	2 29/32
	mm	54	74
7670	inch	1 21/32	2 13/32
	mm	42	61
7911/ 7921	inch	2 1/2	3 17/64
	mm	64	83
7B	inch	2 11/32	3 1/16
	mm	59	78

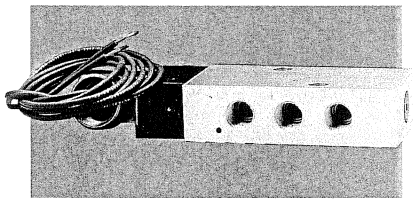


Options

For actuators operated by other media, such as water or hydraulic fluid, contact your local distributor.

Solenoids

Hoke solenoids provide electric on-off control of the Hoke pneumatic actuators. Direct-mount capability through NAMUR interface provides a compact package with no external tubing or fittings. Equipped with a mechanical manual override, these units can be used with either spring return or double acting actuators. They are available in a weather-proof (NEMA 4) or explosion-proof (NEMA 4, 7, 9) housing.



HL-SOL-WP

Solenoid Ordering Chart

Order by Part Number	Description
HL-SOL-EX	solenoid—weather-proof and explosion-proof
HL-SOL-WP	solenoid—weather-proof
HL-SOL-MKIT	solenoid mounting kit

Specifications

Operating Conditions

Temperature Range:
0° to 180°F
(-18° to 82°C)

Maximum Operating Pressure Differentials:
150 PSIG @ 70°F
(1033 kPa @ 21°C)

Leakage Rate:
Bubble tight

Electrical Characteristics

Coil Voltage:
Standard voltage is 120 volts AC

Nominal Power:
AC—5.6 watts

Coil Construction:
Standard, molded and potted with 24" leads

Manual Override:
Manual override lever positioned on the inside of the solenoid block

Operating Speed:
10 cycles per minute

Duty Cycle:
Continuous

Mechanical Characteristics

Materials:
Coil housing—steel and zinc chromated; valve body—anodized aluminum; internal parts—stainless steel with Buna-N seals

Porting:
¼" NPT

Coil Housing:
Weather-proof and explosion-proof: (NEMA 4, 7, 9) ½" conduit connection and a third wire ground
Weather-proof only: (NEMA 4)

Listings:
Weather-proof and explosion-proof: UL listed and CSA certified for hazardous locations: Class I-Groups C & D; Class II-Groups E, F & G
Weather-proof only: listing not applied for

Dimensions for reference only, subject to change.

MV 166

SVF
1/2” HBEV766DTSE
1/2” BALL VALVE FML, FULL PORT, SS, 6000 PSI,
2-PIECE SEAL WELDED W/ LOCKING HANDLE

ANGI PART NUMBER 334-07362

NO REBUILD KIT AVAILABLE

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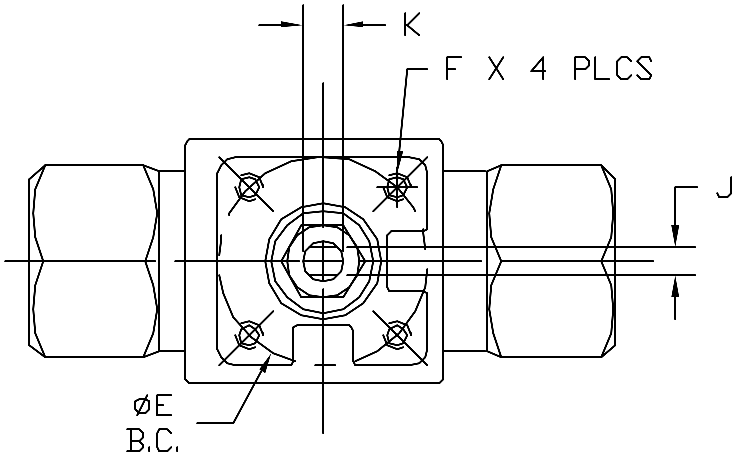
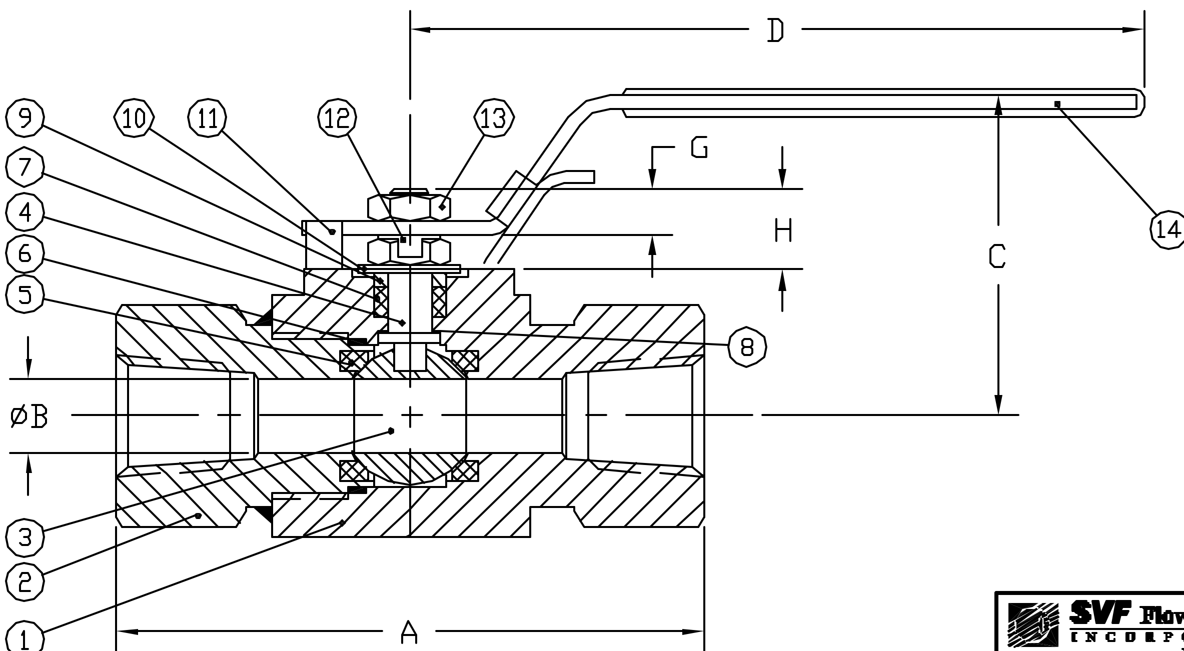
SIZE	A	ØB	C	D	ØE	F	G	H	J	K
1/4"	3.00	0.25	2.20	5.00	1.417	M5 X 0.8P	0.33	0.60	0.217	3/8"
3/8"	3.00	0.38	2.20	5.00	1.417	M5 X 0.8P	0.33	0.60	0.217	3/8"
1/2"	3.99	0.50	2.20	5.00	1.417	M5 X 0.8P	0.33	0.60	0.217	3/8"
3/4"	4.25	0.75	2.70	6.30	1.654	M5 X 0.8P	0.50	0.81	0.299	7/16"
1"	4.50	1.00	3.50	8.25	1.969	M6 X 1.0P	0.51	0.87	0.345	9/16"
1-1/2"	5.25	1.50	4.45	10.20	2.756	M8 X 1.25P	0.64	1.04	0.394	5/8"
2"	6.64	2.00	4.80	10.20	2.756	M8 X 1.25P	0.64	1.04	0.394	5/8"



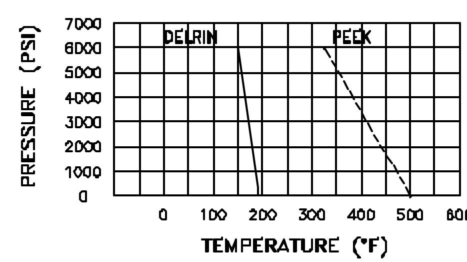
FEATURES:
1. SEAL WELD CONSTRUCTION.
2. BLOW-OUT PROOF STEM.
3. FIRE SAFE TEST CERTIFIED.
4. ISO ACTUATOR MOUNTING PADS.
5. STANDARD LOCKING DEVICE.
6. NACE MR01-75 COMPLIANT.

MATERIALS OF CONSTRUCTION

ITEM	NAME	MATERIAL	STANDARD
1	BODY	STAINLESS STEEL	ASTM A351-CF8M
2	END CONNECTORS	STAINLESS STEEL	ASTM A351-CF8M
3	BALL	STAINLESS STEEL	ASTM A351-CF8M
4	STEM	STAINLESS STEEL	17-4PH
5	SEAT	DELRIN/PEEK	
6	SEAL	PTFE	
7	STEM PACKING	GRAPHITE	
8	THRUST WASHER	PEEK	
9	PACKING GLAND	STAINLESS STEEL	
10	BELLEVILLE WASHER	STAINLESS STEEL	
11	STOP PIN	STAINLESS STEEL	
12	LOCK WASHER	STAINLESS STEEL	
13	HANDLE NUT	STAINLESS STEEL	
14	HANDLE	STAINLESS STEEL	



PRESSURE TEMPERATURE CHART



4. MOUNTING HARDWARES, HANDLE, GEAR OPERATOR, HANDWHEEL, ACTUATOR AND ACCESSORIES ARE MANUFACTURER'S STANDARDS WHERE APPLICABLE.
3. PRESSURE RATING CLASS 6000PSI CWP.
2. VALVES CONFORM TO ASME B16.34.
1. ALL DIMENSIONS ARE MAXIMUM, EXCEPT FACE TO FACE.

NOTE:

SVF Flow Controls INCORPORATED
www.svf.net
13560 Larwin Circle
Santa Fe Springs, CA 90670, U.S.A.
Phone: (562) 761-7836 Fax: (562) 802-5114

NAME: 1/4" TO 2" SERIES HBEV7 BALL VALVES		VALVE MODEL NUMBER: HBEV766	
		REMARK:	
TAG NUMBER: N/A	SALES ORDER NUMBER: N/A	CERTIFIED BY:	DATE:
CUSTOMER NAME: N/A	DRAWN BY: Charles Shen	DATE: 08/31/05	SCALE: N.T.S.	SHEET 1 OF 1
P.O. NUMBER: N/A	CHECKED BY:	DATE:	DRAWING NUMBER: HBEV766-0520	REV. A

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MV 167

MILWAUKEE VALVE
1/2 BA-100

1/2” FNPT BALL VALVE, 600 PSI, BRONZE,
W/ LOK KIT

ANGI PART NUMBER 334-07284

NO REBUILD KIT AVAILABLE

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BA-100/100S

1/4" - 3"

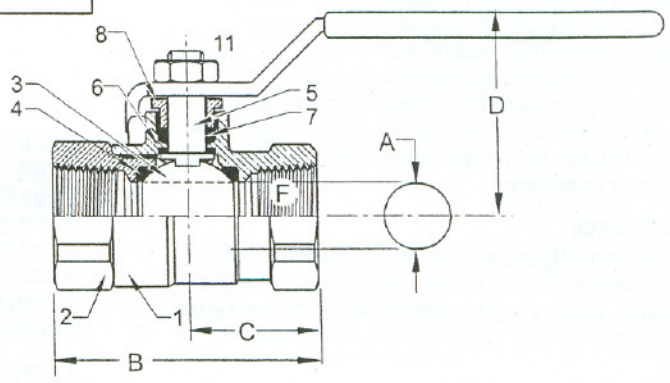
MSS SP-110

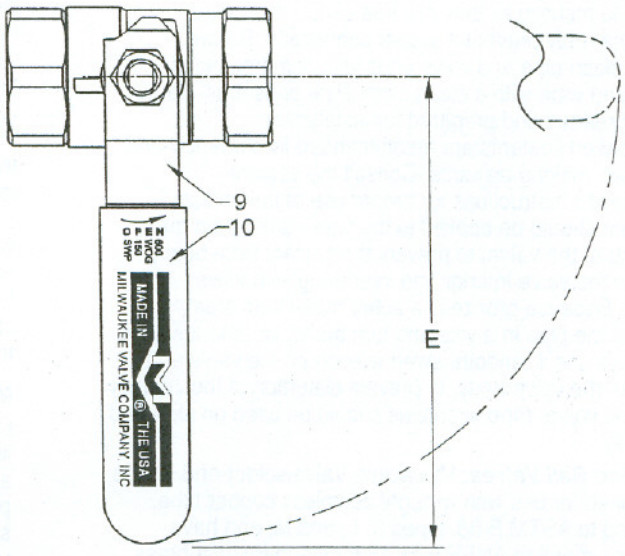
BRONZE BALL VALVE
TWO-PIECE, STANDARD-PORT
600 PSIG WOG / 150 PSIG SWP *
THREADED ENDS

MATERIALS LIST

ITEM	PART	MODEL	MATERIALS	ASTM SPEC.
1	Body	100 & 100S	Cast Bronze	B584
2	Tailpiece	100 & 100S	Brass	B16
			Cast Bronze (1" & up)	B584
3	Ball	100	Brass w/ Hard Chrome Plating	B16
		100S	316 Stainless Steel	A276
4	Seat	100 & 100S	RPTFE, 15% Glass Filled	
5	Stem	100	Brass	B16
		100S	316 Stainless Steel	A276
6	Thrust Washer	100 & 100S	RPTFE, 25% Glass Filled	
7	Packing	100 & 100S	PTFE	
8	Packing Nut	100 & 100S	Brass	B16
9	Handle	100 & 100S	Steel w/ Zinc Plating	B633
10	Hand Grip	100 & 100S	Vinyl	
11	Handle Nut	100 & 100S	Steel w/ Zinc Plating	B633

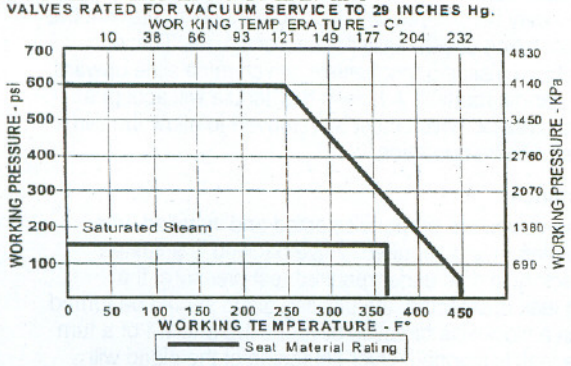
* Milwaukee Valve Company recommends the use of Stainless steel ball and stem for steam applications. Please consult factory for more information.





PRESSURE - TEMPERATURE DATA

VALVES RATED FOR VACUUM SERVICE TO 29 INCHES Hg.

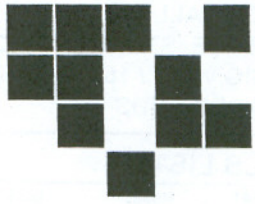


DIMENSIONS

	UNITS	1/4" DN6	3/8" DN10	1/2" DN15	3/4" DN20	1" DN25	1-1/4" DN32	1-1/2" DN40	2" DN20	2-1/2" DN65	3" DN80
A (DIA)	INCHES	0.38	0.38	0.51	0.70	0.88	1.07	1.32	1.57	2.00	2.31
	mm	9.3	9.3	12.5	17.2	21.6	26.2	32.3	38.5	49.0	56.6
B	INCHES	1.86	1.86	2.19	2.64	3.17	3.50	3.96	4.30	5.56	6.20
	mm	45.6	45.6	53.7	64.7	77.7	85.8	97.0	105.4	136.2	151.9
C	INCHES	1.00	1.00	1.10	1.30	1.58	1.74	1.97	2.15	2.79	3.10
	mm	24.5	24.5	27.0	31.9	38.7	42.6	48.3	52.7	68.4	76.0
D	INCHES	1.78	1.81	1.91	2.08	2.25	2.66	2.84	3.00	3.47	3.90
	mm	43.6	44.3	46.8	51.0	55.1	65.2	69.6	73.5	85.0	95.6
E	INCHES	3.81	3.81	3.81	4.56	4.56	6.31	6.31	7.19	7.19	7.19
	mm	93.3	93.3	93.3	111.7	111.7	154.6	154.6	176.2	176.2	176.2
F	THREAD SIZE	1/4" NPT	3/8" NPT	1/2" NPT	3/4" NPT	1" NPT	1-1/4" NPT	1-1/2" NPT	2" NPT	2-1/2" NPT	3" NPT
Cv		7	7	13	25	38	61	87	121	228	305

Note: DN (Diameter Nominal) = Metric equivalent size.

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS



CAUTION!

It is the installer's and/or system designer's responsibility to insure that valves are chosen and/or installed within applicable and current ANSI, ASME, ASTM and/or API piping specifications. The following instructions are suggestions and recommendations only, based on the manufacturer's experience, and do not constitute requirements as established by appropriate industry piping specifications or standards for valve selection or installation.

Handling & Storage

Proper care in handling and storage should be taken before valves are installed to prevent damage and to keep pipe ends clean. If possible, valves should be kept in the original packaging, and stored in a protected area until just prior to installation.

Installation

Threaded-End Ball Valves: Inspect both the valves and pipe ends to make sure they are free of dirt, dust, oil or anything that may prevent a proper connection. Before installing, clean pipe and valve ends with compressed air or water, and wipe with a clean cloth. Pipe ends must be properly threaded and prepared for installation.

PTFE-based sealants are recommended for threaded-end valves when making up joints. Consult the sealant-manufacturer's instructions for proper use of the sealant. The sealant should be applied to the pipe, rather than the female end of the valve, to prevent the sealant from being forced into the valve interior and interfering with valve operation. Because bronze is a softer metal than steel, always put the pipe in a vise and turn the valve onto the pipe end. Always use a smooth-jawed wrench on the valve ends, rather than the valve body, to prevent distortion of the internal parts of the valve. Pipe wrenches should be used on pipe and fittings only.

Solder-End Ball Valves: Milwaukee Valve solder-end valves are designed for use with wrought seamless copper tube, conforming to ASTM B-88, types K, L, and M, and have dimensions meeting ANSE B 16.18 for standard cast-brass solder-joint fittings. The copper tube being installed must meet these specifications. The selection of the solder type being used may be influenced by the application or by local government regulations. Make sure that the solder being used is within these specifications or regulations.

Important: When installing two-piece solder-end ball valves, make sure that the valve is in the partially-open position to allow heat to escape, preventing distortion or damage to the PTFE-seats and seals. When three-piece bolted-body, solder-end ball valves are being installed, the valve's center section, with seats and seals, must be completely removed prior to soldering. Re-assemble the valve after the end-pieces have been installed onto the tubing. Refer to instruction sheet #IS-BA3-01 for recommended reassembly procedures.

The copper tube should be cut square and any burrs should be removed. The tubing and valve-ends should be cleaned to a bright finish with steel wool or emery cloth. Wipe both ends with a clean cloth, and apply a sufficient amount of flux to both the outside of the tube-end and the inside of the valve cup to insure adhesion. Insert the tube end into the valve cup and apply heat uniformly to the valve end and the tubing. Do Not Overheat The Joint. Keep The Flame From Making Direct Contact With The Valve Body, As Damage To The Soft Internal Parts Of The Valve May Occur, Preventing Proper Valve Operation. The Flame Should Be Directed Away From The Stem Centerline Toward The Valve Ends.

Apply solder to the juncture of the valve and the tubing. When sufficiently heated, the solder will flow into the joint due to capillary attraction. When a solder ring forms around the circumference of the juncture, the joint has been completed. Remove all excess solder with a brush or cloth.

Operation

Generally, ball valves are designed to be opened by rotating the handle in a counter-clockwise direction, and closed by rotating the handle in a clockwise direction. The handle direction normally indicates the ball-port position, and whether the valve is opened or closed. However, for some applications, valves may be ordered with a reverse-operating handle where the handle position is perpendicular to the ball-port position. In these cases, the valve will include a warning tag. The warning identification must never be removed from the valve.

Valves may be ordered with locking handles to prevent the valve from being accidentally opened or closed. These handles have a sliding mechanism, which must slide upward to allow handle rotation. A hole in the handle will accept a standard padlock, which must be removed to allow the slider to move for valve operation.

Maintenance

Once the valves are properly selected and installed, very little maintenance is required. Valve packing is adjusted at the factory to seal under required test pressure. If a packing leak is detected, the packing gland should be turned slowly in a clockwise direction between 1/8 and 1/4 of a turn until the leak is stopped. Over-tightening of the gland will reduce packing service-life, and is not recommended.

With two-piece valves, repair or replacement of internal parts is not recommended, as damage may occur to the body and tailpiece during disassembly, making the valve inoperable. Never attempt to disassemble a valve while it is installed or in service. If a valve seems to wear prematurely, check the system requirements and service conditions to make sure the valve has been properly selected and installed for the application. Corrosion, pressure or temperature fluctuations, high velocities, and dirt or grit in the system can contribute to wear, and should be checked and prevented, if possible.

Three-piece valves are designed for applications where frequent disassembly and reassembly for maintenance are required. With these valves, the center section can be removed for replacement of the PTFE ball seats and body seals, while the end caps remain connected to the pipe. Never Attempt To Loosen The Body Bolts Or Packing Gland While The Valve Is In Service. Always Be Sure That The Valve Is Completely Isolated From System Pressure, Temperature Or Line Media Prior To Loosening The Body Bolts Or Packing Gland. Once the valve is isolated, open and close the valve several times to relieve residual pressure from the body cavity.

MV 265

SVF/SVF
EZ966A1712NN10/A2S-035-12-V

1” BALL VALVE, 1000 PSI, FULL PORT, NORMALLY CLOSED, 3-PIECE, SS BODY, SS INTERNALS
W/ A2S-035-12-V ACTUATOR

ANGI PART NUMBER 334-07470

VALVE REBUILD KIT-SVF 1” – RKEZ910AT

ACTUATOR REBUILD KIT-SVF A2S-035-V – 761-07460

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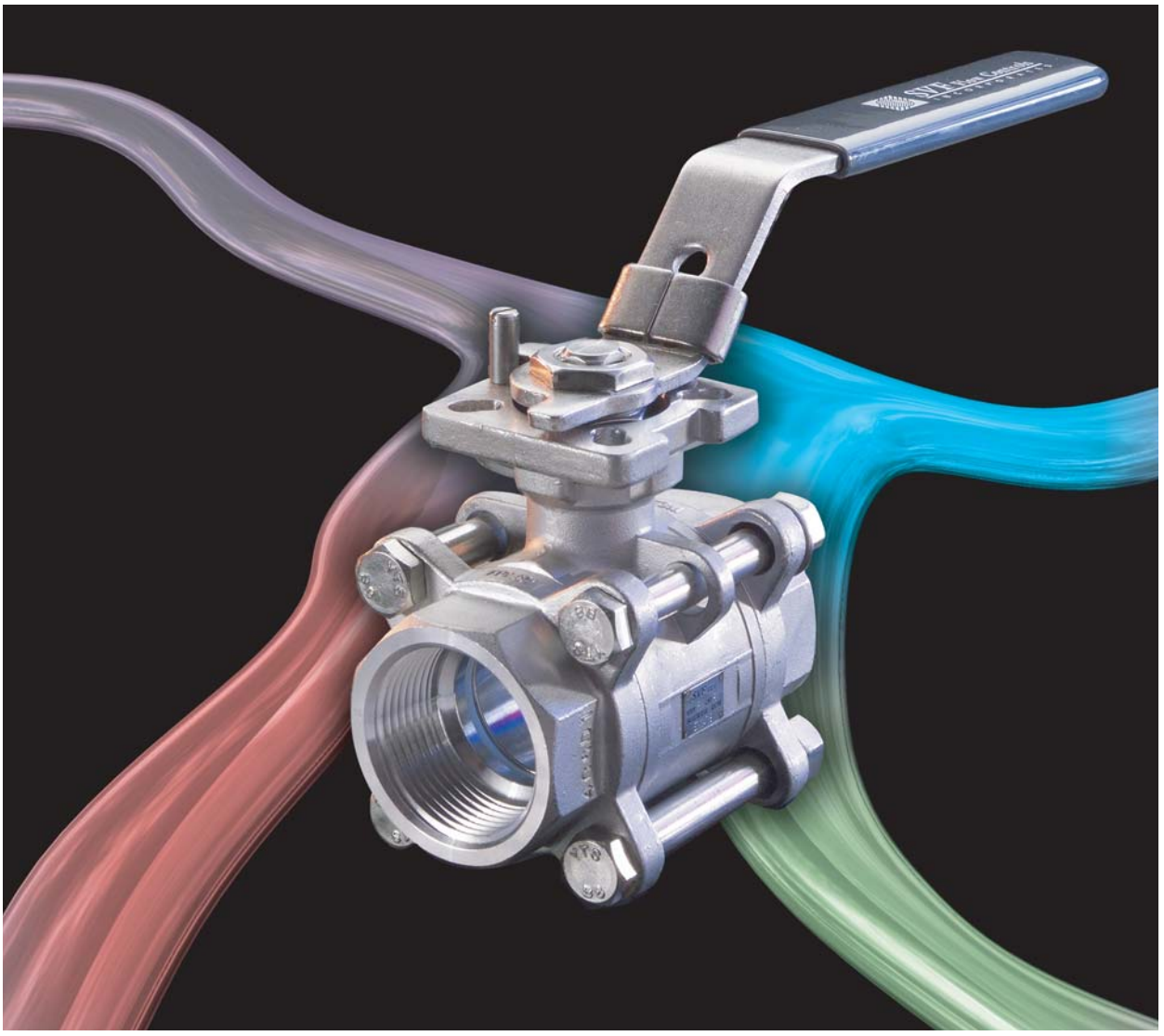
EZ Valve

High Performance Ball Valves



SVF Flow Controls
INCORPORATED

SVF Flow Controls, Inc.

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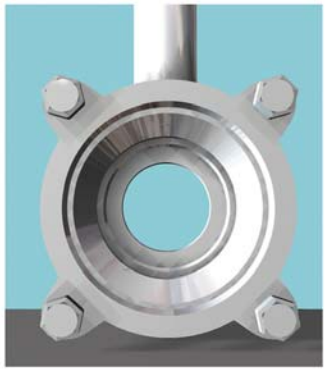
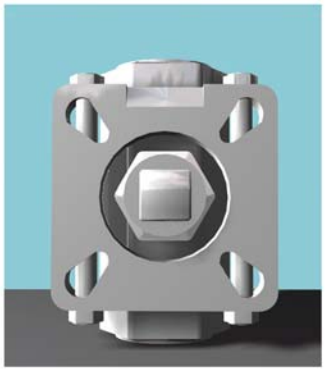
- Dual Pattern ISO-5211 "Direct-Mount" Actuator Attachment
- Live-Loaded Stem Seals
- One-Piece Seat/Seal (TFM)
- Integral Locking Device
- Three-Piece Construction
- End Connections: NPT, SW, BW
- Engineered Stem Seal Design
- Full Port Opening
- 316 Stainless Steel construction. Carbon Steel valves feature a 316 SS Center Section
- Blow Out Proof Stem

Size Range 1/4" to 2" Full Port

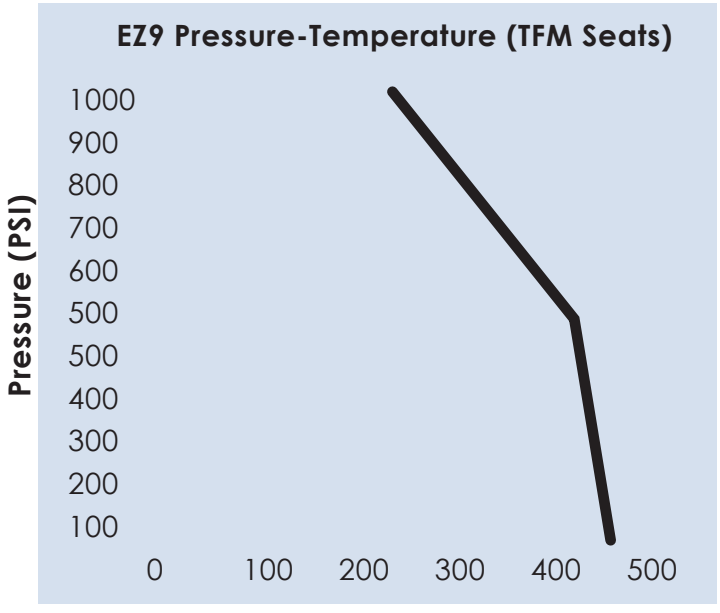


Full Port Opening (NPT, SW, BW)



ISO-5211 for Direct Mount Actuation

Integral Locking Device



PERFORMANCE DATA (Cv)

Valve Size	Approximate Flow (Cv)
1/4-1/2"	12
3/4"	32
1"	57
1.25"	80
1.5"	104
2"	240

All Valves Are Full Ported.

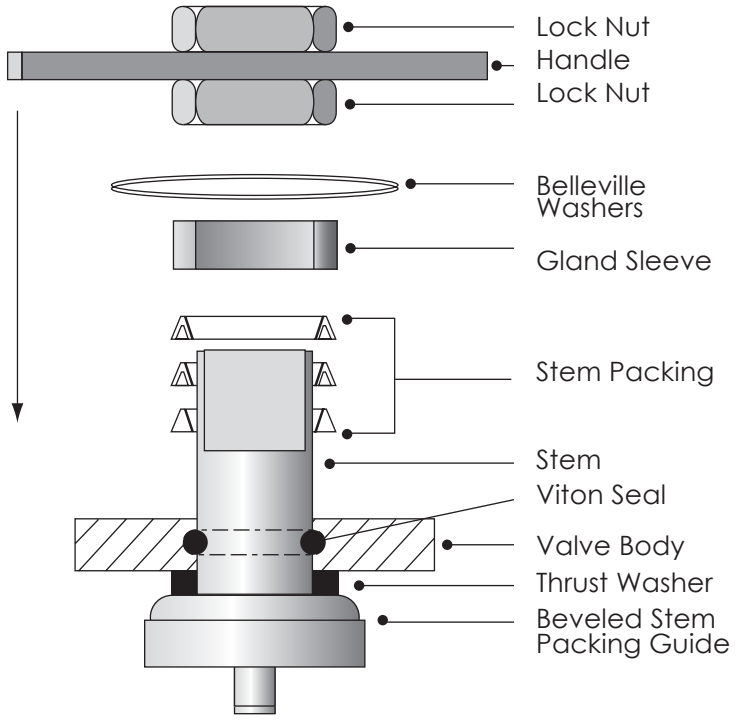
EZ Valve

Quick Reference Data

Valve Size	Approximate Flow (Cv)	Operating Torque (Lbf.in.)	Weight (lbs)	ISO Flange FO4	FO5	FO7
1/4 - 1/2"	12	35	1.5	x	x	
3/4"	32	50	1.8	x	x	
1"	57	80	2.4	x	x	
1.25"	80	120	3.6	x	x	
1.5"	104	250	5.6		x	x
2"	240	300	8.2		x	x

High Performance Stem Seal Design

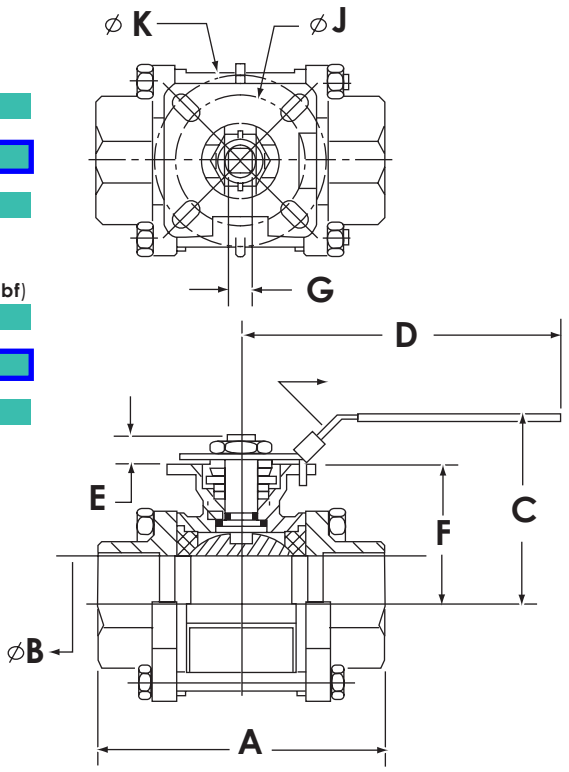
- An adjustable V-Ring design creates a multiple seal between the stem and body.
- Each stem assembly is composed of three V-Rings providing a very high cycle life by resisting creep and cold flow.
- The Thrust Washer adds a secondary seal, reduces torque and prevents galling.
- The beveled stem packing/thrust guide provides an additional level of performance and sealing and completes the High Performance design.



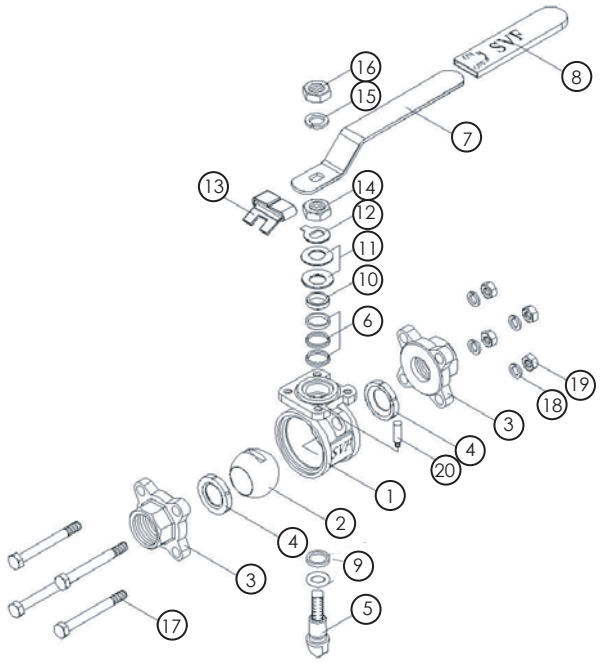
EZ Valve Dimensions

Size	A	B	C	D	E
1/4-1/2"	2.5	0.59	2.88	4.41	0.335
3/4"	2.85	0.79	3.18	4.41	0.335
1"	3.19	1	3.56	5.35	0.449
1-1/4"	3.72	1.25	3.89	7.28	0.449
1-1/2"	4.25	1.5	4.54	7.79	0.551
2"	4.78	2	4.88	7.79	0.54

Size	F	G	ΦJ/ISO 5211	ΦK/ISO 5211	Torque (in-lbf)
1/4-1/2"	1.46	0.354	1.654/F04	1.969/F05	35
3/4"	1.77	0.354	1.654/F04	1.969/F05	50
1"	2.11	0.433	1.654/F04	1.969/F05	80
1-1/4"	2.32	0.433	1.654/F04	1.969/F05	120
1-1/2"	2.95	0.551	1.969/F05	2.756/F07	250
2"	3.29	0.551	1.969/F05	2.756/F07	300



Materials List



No.	Part Name	Material: Stainless Steel / Carbon Steel	Qty.
1	Body	A351 Gr. CF8M	1
2	Ball	SS316	1
3	End Cap	A351 Gr.CF3m or A216 Gr. WCB	2
4	Seat/Seal	TFM	2
5	Stem	SS316	1
6	Stem Packing	RTFE.	1Set
7	Handle	SS304	1
8	Handle Cover	Plastic	1
9	Thrust Washer	RTFE.	1
10	Gland	SS304	1
11	Belleville Washer	SS401	2
12	Tab Washer	SS304	1
13	Locking Device	SS304	1
14	Gland Nut	SS304	1
15	Handle Washer	SS304	1
16	Handle Nut	SS304	1
17	Bolt	SS304	4~6
18	Bolt Washer	SS304	4~6
19	Bolt Nut	SS304	4~6
20	Stop Pin	SS304	1

Important note: For carbon Steel Piping Systems, Stainless steel valves are supplied with carbon steel ends (SW, BW)

Product Specification for Full Ported, 3-Piece Ball Valves (EZ9)

This specification covers the design of full port, three-piece ball valves used in plant-wide applications.

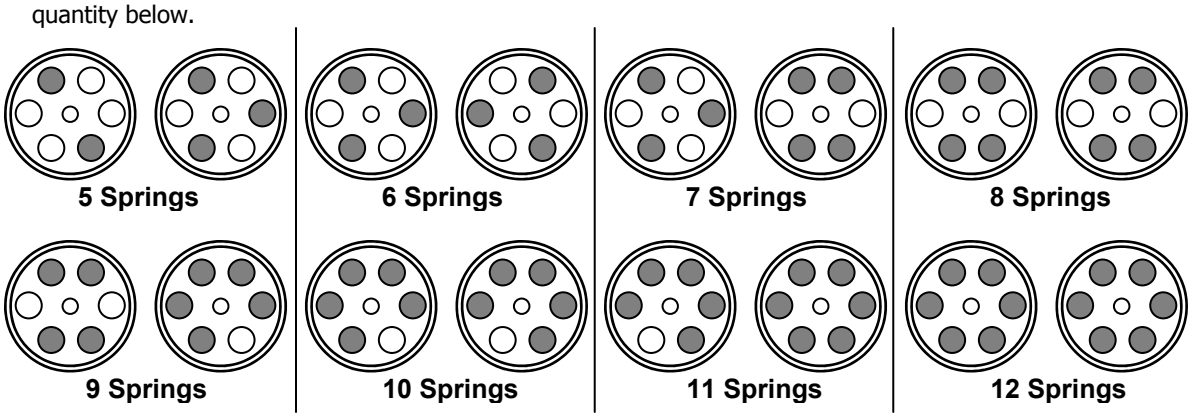
- Valve shall be a three-piece design (1/4" to 2") in full port design and in a selection of body materials (stainless steel, carbon steel), and TFM seats to meet a broad range of fluid types, pressures and temperatures.
- End connection shall be NPT, Socket Weld, Butt Weld or flanged.
- Weld-ends shall be "L" grade 316 stainless steel or carbon steel as required by the application.
- Stem seal shall be live-loaded V-Ring design using high-performance stainless steel disc springs (Belleville Washers). The design shall meet the stem seal testing criteria according to ISA-SP-93.
- Actuator attachment shall be by integral mounting surface as part of the valve center section to eliminate the use of pressure-containing body bolts for actuator mounting. Dimension and design as per ISO-5211.
- Manual lever-handle shall be stainless steel with vinyl grip and locking capabilities.
- Product tagging shall be permanently affixed using spot welding, etching or riveting.
- Ball and stem shall be 316 stainless steel.
- Valves -with weld ends- for carbon steel piping systems shall be supplied with stainless steel center sections.
- Valve shall provide equal-percentage flow characteristics when used in throttling control.
- Valve shall be designed, manufactured and tested to meet applicable industry standards; such as: ANSI, ASME, API, BPE, DIN, ISO (as required)
- Process-quality ball valves shall be SVF Series "EZ9" (full port) or equal.

CAUTION: ALWAYS USE CARE AND COMMON SENSE WHEN WORKING WITH PNEUMATIC ACTUATORS. DE-ENERGIZE THE AIR SUPPLY (AND DE-PREESSURIZE IT) AND SHUTOFF ALL ELECTRICAL POWER TO ANY OF THE ACCESSORIES BEFORE PERFORMING ANY MAINTENANCE OR REPAIR. DISCONNECT THE INLET PRESSURE PIPE OR TUBING TO ENSURE THAT THE ACTUATOR HAS FULLY DE-PRESSURIZED AND, FOR SPRING RETURN ACTUATORS, THAT THE ACTUATOR HAS CYCLED UNDER SPRING LOAD.

SVF- Aero² actuators are designed to operate with dry or lubricated air media, but will function equally well with non-corrosive and inert gas or light hydraulic oil. The actuators are offered in two different configurations: double acting and spring return. Each actuator can be easily converted from double acting to spring return (or vice versa) by insertion (or removal) of spring cartridges.

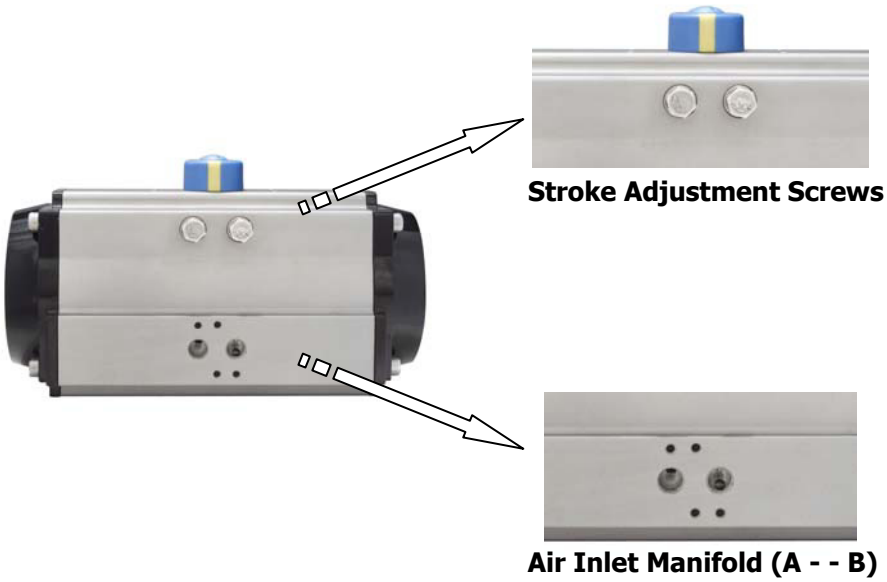
Spring Locations

Each actuator has two pistons. Spring return actuators may be sized/used with an un-even number of springs. The difference between the springs from each piston shall be only one. See locations for each quantity below.



Commissioning the Actuator

For the following sections please note the location (in the graphic below) of the Stroke Adjustment Screws and Air Inlet Manifold.



Operation 1- Inlet Air Pressure

NOTE: The maximum air pressure to all ***aero2*** actuators is 120 psig-regulated/relieved

The standard configuration of the ***aero2*** actuator operates as follows:

Note: throughout this document we will assume that the automated valve is setup such that Counter-Clockwise rotation OPENS the valve and Clockwise rotation CLOSES the valve

Double Acting

Air Inlet Manifold Port

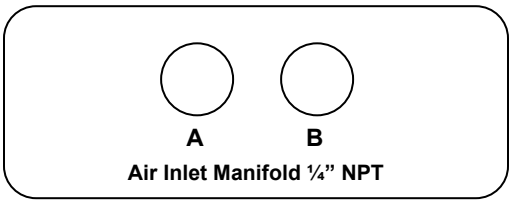
"A" CCW Rotation (When viewed from the top of the actuator) <OPENS the valve>

"B" Clockwise <CLOSES the valve>

Spring Return

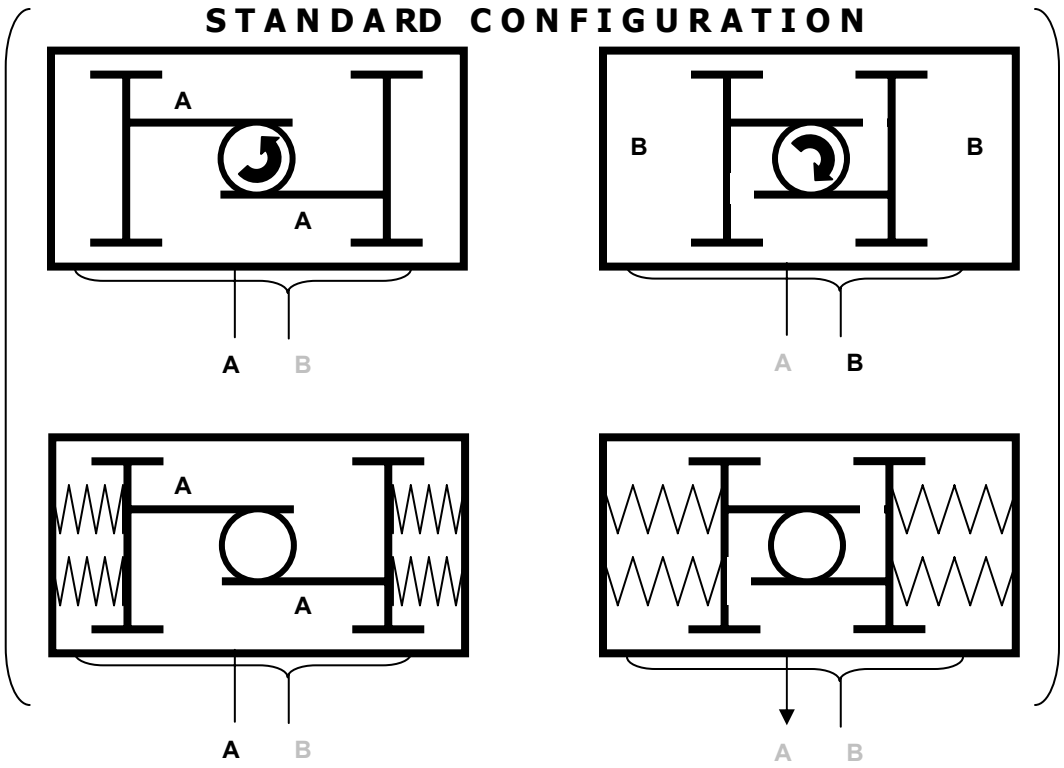
Air Inlet Manifold Port

"A" CCW Rotation (When viewed from the top of the actuator) <OPENS the valve>

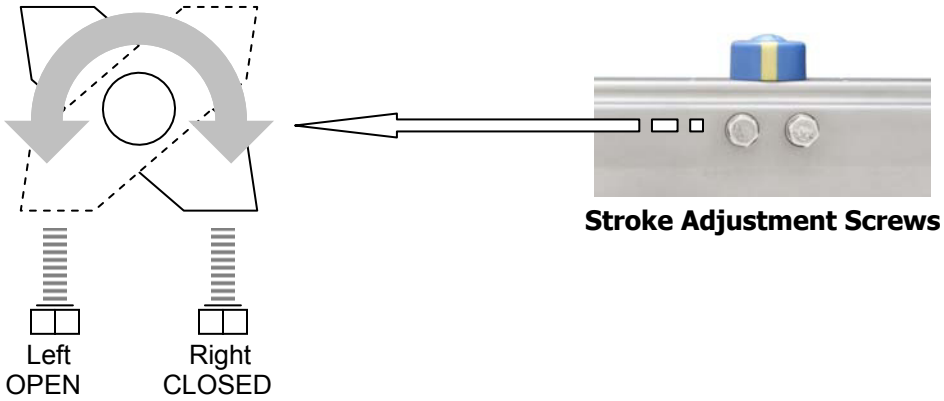


"B" CW (It is not necessary to pressurize this port when using a spring return actuator) Port "B" must remain open and free of any plugs or other obstructions.

For information about changing the orientation of the actuator's stroke direction, please contact the manufacturer.



Operation 2- Stroke Adjustment for aero2 (Standard Rotation)



The ***aero²*** actuator features bi-directional stroke adjustment for the Open and Closed positions. To make adjustments please see the instructions below.

NOTICE: Do Not use the stroke adjustment bolts to over power the actuator against the spring or air pressure or to reverse the action of the valve.

Always thread to the bolt CCW (outward) to allow the actuator to continue motion when setting the final valve position.

If the actuator/valve has over traveled do the following:

Before making adjustments note that each stroke adjustment bolt has a lock nut and o-ring.

- Loosen the lock nut a few turns
- Avoid over tightening; to protect the o-ring

If valve has <u>over-traveled</u> in the OPEN position,

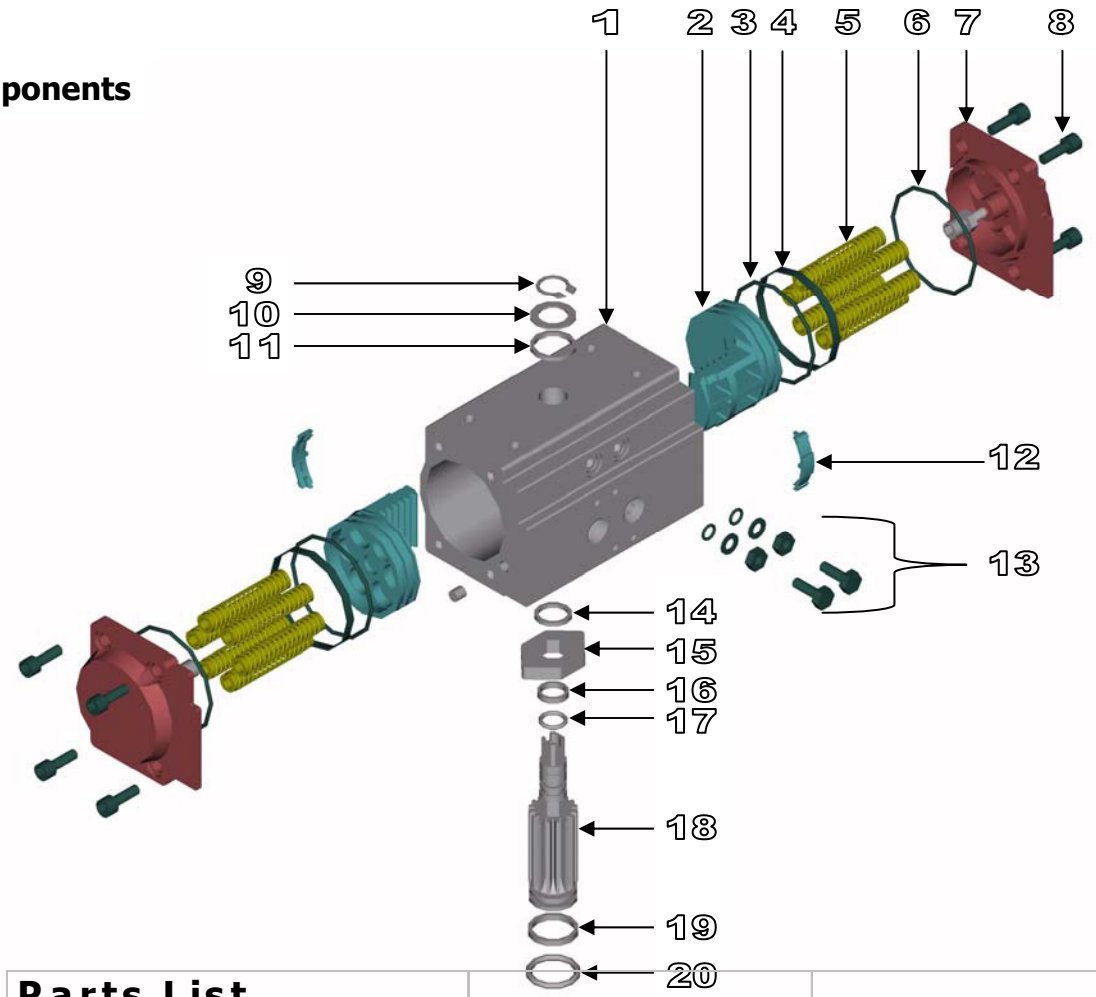
a- Cycle the actuator to the CLOSED position
b- Thread the LEFT stroke adjustment bolt IN-ward a few turns.
c- Cycle the actuator in the OPENING direction then thread the bolt outward to the exact position desired.

If valve has <u>over-traveled</u> in the CLOSED position,

a- Cycle the actuator to the OPEN position
b- Thread the RIGHT stroke adjustment bolt IN-ward a few turns.
c- Cycle the actuator in the CLOSING direction then thread the bolt outward to the exact position desired.

Once you have set the desired position tighten the lock nut. Take care not to damage the o-ring seal under the washer.

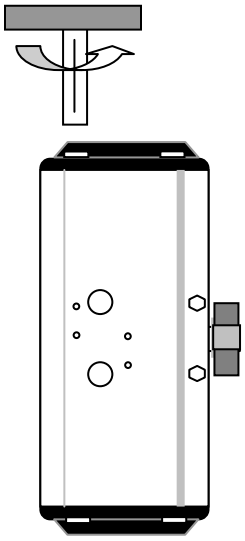
Components

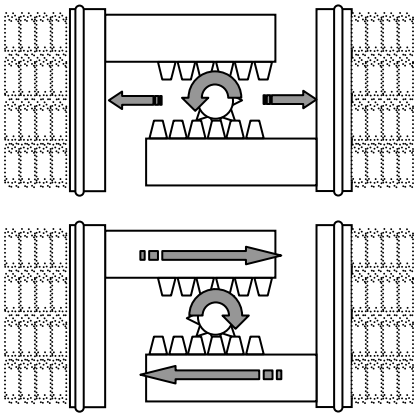


Parts List

No.	Description	Material	Quantity
1	Actuator Housing	Hard Anodized Aluminum	1
2	Pistons	Aluminum	2
3	Piston Seals	Buna	2
4	Piston Bearings	Acetal	2
5	Springs	Spring Steel Corr. Resistant	According to Model
6	End Cap O-ring	Buna	2
7	End Caps	Aluminum Baked Epoxy	2
8	End Cap Bolts	300 Series SS	8
9	C-Clip	300 Series SS	1
10	Thrust Follower	300 Series SS	1
11	Thrust Ring	Acetal	1
12	Wear Bands	Acetal	2
13	Stroke Adj. Set	300 Series SS	1 set
14	Spacer	Acetal	1
15	Stroke Adj. Stop	300 Series SS	1
16	Thrust Ring	Acetal	1
17	Thrust Follower	300 Series SS	1
18	Drive Shaft	304 Series SS	1
19	Shaft Bearing	Acetal	1
20	Shaft Seal	Buna	1

1





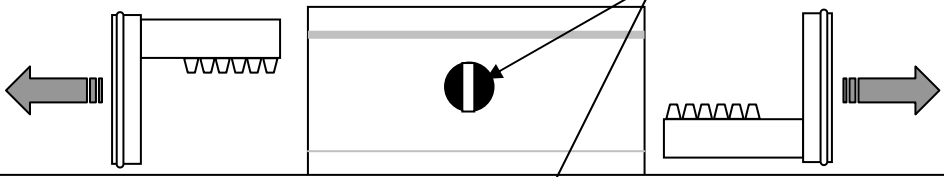
Standard Configuration

1- Air Stroke pushes pistons outward which are engaged with the pinion gear (output shaft) to rotate CCW – OPEN
2- Spring Stroke pushes pistons inward which are engaged with the pinion gear (output shaft) to rotate CW – CLOSED

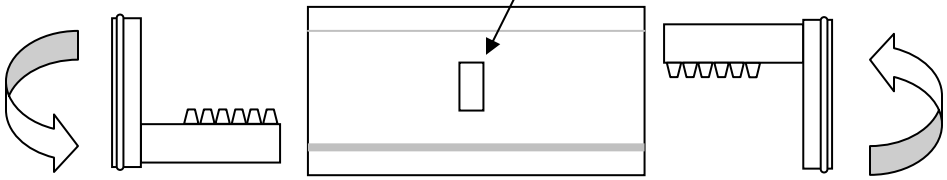
Remove End Caps

2

Remove Indicator Cap and use the wrench flats to assist with removal and replacement of pistons

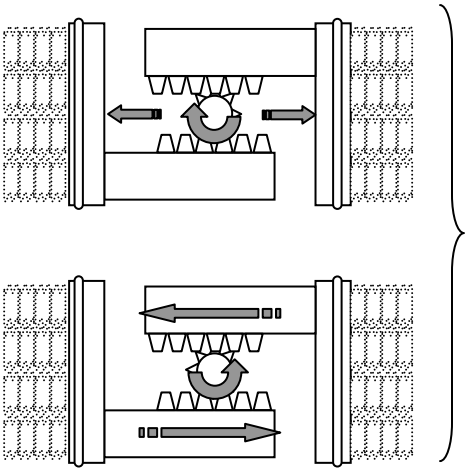


Remove Pistons: A low (3 psi) pressure applied to port "A" will help expose the pistons for removal.



3

Rotate pistons and re-insert. Note: Before engaging the piston (gear rack) with the pinion, "Back Rotate" the pinion gear by one tooth for proper orientation.



Reverse Configuration

1- Air Stroke pushes pistons outward which are engaged with the pinion gear (output shaft) to rotate CW – CLOSED
2- Spring Stroke pushes pistons inward which are engaged with the pinion gear (output shaft) to rotate CCW – OPEN

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MV 283

SVF / SVF
B414AGR3P40/A2S-500-10-V

ACTUATOR VALVE-ASSEMBLY SVF 4 CL150 FULL PORT
W / A2S-500-10-V ACTUATOR NORMALLY CLOSED REV3

ANGI PART NUMBER - 334-07494

VALVE REBUILD KIT - 761-07575

ACTUATOR REBUILD KIT - 761-07523

SVF Flow Controls INCORPORATED

Series B41 Rev3 Flanged Ball Valve

Flanged Ball Valve, ANSI Class 150, Full Port, Sizes 1/2" ~ 8"

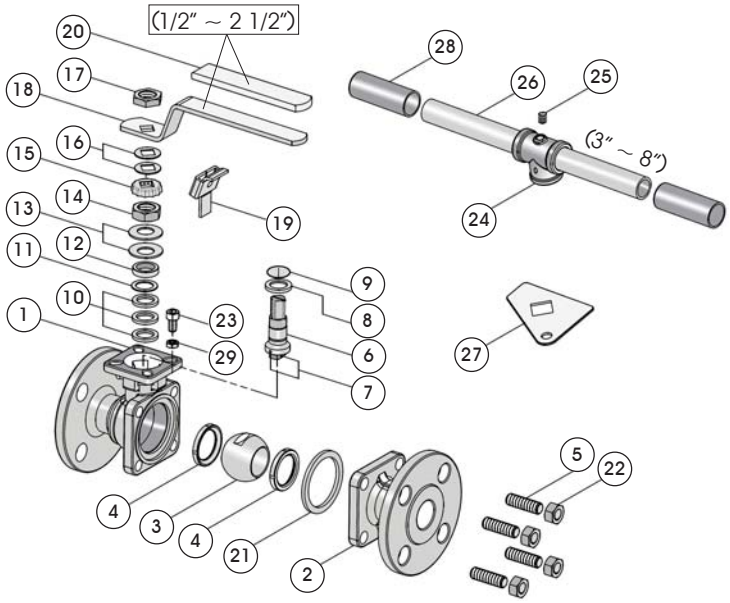
B41 Rev3

The SVF Series B41 Rev3 Flanged Ball Valves are high performance, full ported valves certified to API-607 fire safe design, ISO Top Works for direct mounting of actuator and a selection of seats and seals for a wide range of industrial applications.

SERIES B41 REV3 DESIGN FEATURES

- ✓ Standard Fire Safe Certification to API 607, Anti-Static
- ✓ Standard NACE MR0175
- ✓ Built-In ISO 5211 direct mounting pad for easy automation
- ✓ Standard seat material is TFM1600™
- ✓ Optional SupraLon™ Seats for higher temperature, steam, and thermal fluid applications
- ✓ Latch lock handle fully compatible with OSHA clamp for Lock-Out/Tag-Out
- ✓ Live-loaded stem packing ensures seal-tight pressure containment even under thermal cycling

Contact SVF for Gear Operator information.



MATERIALS OF CONSTRUCTION

ITEM	DESCRIPTION	MATERIALS SPECIFICATIONS (Additional options available)
1	Body	A351 CF8M A216 WCB
2	End Cap	A351 CF8M A216 WCB
3	Ball	A351 CF8M
4	Ball Seat	TFM1600™, SupraLon™
5	Body Bolt	A193 B8
6	Stem	SUS316
7	Anti-Static Device	SUS316
8	Thrust Washer	SupraLon™
9	O-Ring	VITON®
10	V-Ring Packing	GRAFOIL®, PTFE
11	Bushing	SUS304
12	Gland	SUS316
13	Belleville Washer	SUS301
14	Stem Nut	A194-8
15	Lock Tab	SUS304
16	Handle Gland	SUS304
17	Handle Nut	A194-8
18	Handle (1/2"~ 2-1/2")	SUS304
19	Lock Device (1/2"~ 2-1/2")	SUS304
20	Handle Sleeve (1/2"~ 2-1/2")	VINYL PLASTIC
21	Body Gasket	316SS+GRAFOIL®, PTFE
22	Bolt Nut	A194-8
23	Stop Bolt	A193 B8
24	Handle Adapter (3"~ 8")	A351 CF8
25	Set Screw (3"~ 8")	A193 B8
26	Pipe Handle (3"~ 8")	SUS304
27	Triangular Stopper (3"~ 8")	SUS304
28	Pipe Handle Sleeve (3"~ 8")	VINYL PLASTIC
29	Stop Nut	A194-8

SPECIFICATION STANDARDS OF COMPLIANCE

- Design - ASME B16.34, NACE MR0175
- Face to Face: ASME B16.10
- End Flange: ASME B16.5
- Wall Thickness: ASME B16.34
- Inspection & Testing: API 598, and optional API 6D
- Fire Safe: API 607, ISO 10497

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Series B41 Rev3 Flanged Ball Valve

Flanged Ball Valve, ANSI Class 150, Full Port, Sizes 1/2" ~ 8"

B41 Rev3

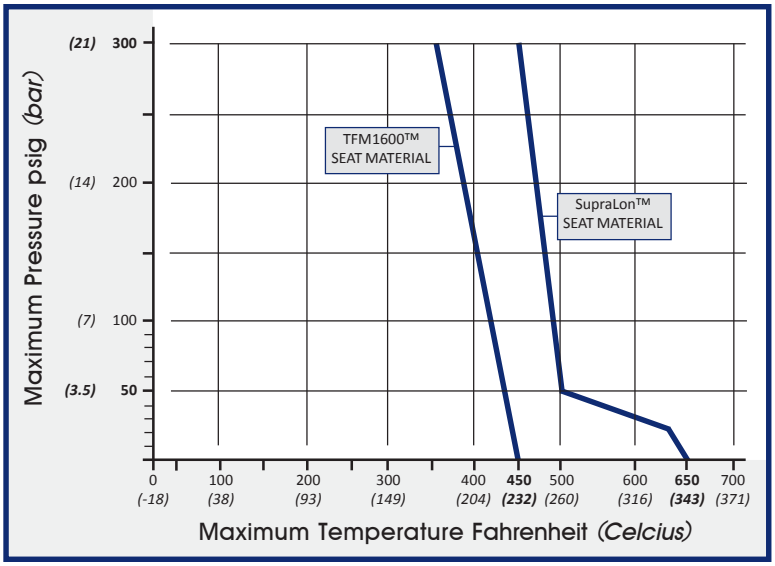
DIMENSIONS, WEIGHT, Cv, TORQUE

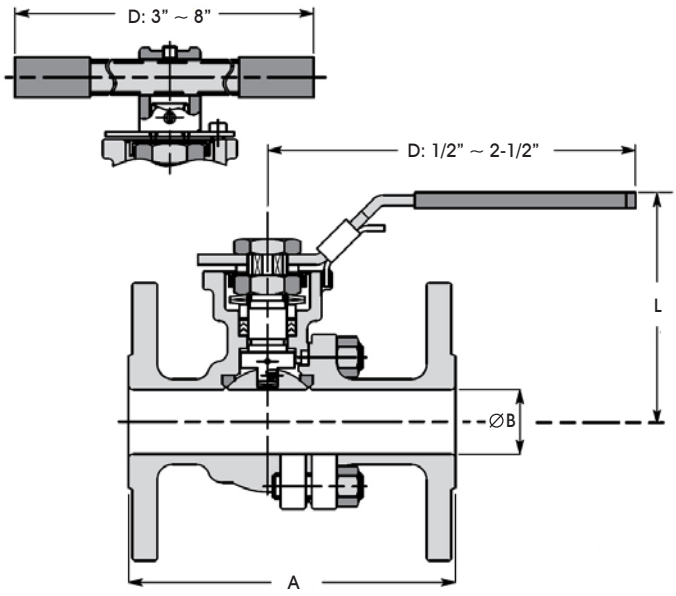
Torque* Tables

Size	A in.	A mm	B in.	B mm	D in.	D mm	L in.	L mm	Weight. lbs	Weight. kg	Cv	TFM1600™ in-lbf	TFM1600™ Nm	SupraLon™ in-lbf	SupraLon™ Nm
1/2"	4.25	108	0.59	15	5.70	145	3.07	78	4	1.8	25	72	8	91	10
3/4"	4.62	117	0.79	20	5.70	145	3.31	84	5	2.2	45	81	9	98	11
1"	5.00	127	0.98	25	6.90	175	3.52	89	6	2.7	85	130	15	172	19
1-1/2"	6.50	165	1.50	38	7.50	190	4.21	107	13	5.9	200	299	34	368	42
2"	7.00	178	1.97	50	7.50	190	4.41	112	24	10.9	320	371	42	460	52
2-1/2"	7.50	190	2.48	63	10.45	265	5.91	150	30	13.6	450	598	68	728	82
3"	8.00	203	2.99	76	11.80	300	6.30	160	38	17.4	600	988	112	1209	137
4"	9.00	229	3.94	100	15.75	400	8.03	204	69	31.5	1100	1508	171	1846	209
6"	15.50	394	5.91	150	31.50	800	10.85	275	161	73.6	2600	4160	470	5200	588
8"	18.00	457	7.87	200	31.50	800	11.00	279	277	126.6	4200	6500	735	8060	911

* At full differential pressure

B41 REV3 - PRESSURE/TEMPERATURE CHART





HOW TO ORDER SERIES B41 REV3 BALL VALVES

SERIES	BODY, BALL & STEM	SEAT	BODY SEAL	REV DESIGNATION	MOUNT	SIZE	
B41 = Full Port ANSI Class 150 Flanged	**4** = Carbon Steel Body A216 WCB with 316 SS Ball A351 CF8M & 316 SS Stem SUS 316	**A** = TFM1600™	**G** = GRAFOIL®	**R3** = Rev3	**P** = Direct Mount	**05**= 1/2"	**25**= 2-1/2"
		S = SupraLon™	**T** = PTFE*			**07**= 3/4"	**30**= 3"
						10= 1"	**40**= 4"
	6 = 316 Stainless Steel Body A351 CF8M with 316 SS Ball A351 CF8M & 316 SS Stem SUS 316		*NOTE: Valves with PTFE Body Seals & Stem Seals are not fire safe			**15**= 1-1/2"	**60**= 6"
						20= 2"	**80**= 8"

Order Example: (B416AGR3P05)

Example Description: Full Port, 316 Stainless Steel Body, Ball & Stem, TFM1600™ Seat, GRAFOIL® Body Seal, Rev3, Direct Mount, ½" Size

B41	6	A	G	R3	P	05

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INSTALLATION, OPERATION AND MAINTENANCE
2-PC FULL PORT FLANGED BALL VALVE (1/2"–10") B41/42 SERIES

GENERAL

SVF Ball valves have been designed and engineered to provide long lasting and trouble free service when used in accordance with the instruction and specifications herein.

The following instructions refer only to SVF STANDARD VALVES as described in the SVF current catalog sheets B41/42 SERIES.

Keep protective cover in place until moment of installation. Valve performance depends upon prevention of damage to ball surface. Upon removal of cover make sure that the valve is completely open and free of obstruction.

When shipped from the factory, the valve contains a silicon based lubricant which aids in the assembly of the valve. This may be removed with a solvent if found objectionable; alternatively valves can be ordered free of lubricants.

Certain ferrous valves are phosphated and oil dipped during the course of manufacture, but the processes used are completely non-toxic and the valves are quite safe to use for edible or potable products.

INSTALLATION

The valve may be installed for flow or vacuum in either direction. Use care to exclude pipe sealants from the valve cavity. When installing, use standard gaskets suitable for the specific service. Tighten flange bolts or studs evenly.

OPERATION

SVF valves provide tight shut off when used under normal conditions and in accordance with SVF's published pressure/temperature chart. If these valves are used in a partially open (throttled) position seat life may be reduced.

SVF valves have ¼ turn operation closing in a counter-clockwise direction. It is possible to see when the valve is open or closed by the position of the wrench handle. When the wrench is across the pipeline, the valve is closed.

Any media which might solidify, crystallize or polymerize should not be allowed to stand in the ball valve cavities unless regular maintenance is provided. If minimal maintenance is performed, SVF offers steam jacketed ball valves.

TORQUE REQUIREMENTS

Torque ratings are subject to variations depending on the length of time between cycles and the media in the system. All values as shown in Catalog Sheet B41/42 SERIES are based on clean tap water after 24 hours.

Breakaway torque is that force which must be exerted to cause the ball to begin to open.

Note: media which contain fine powders (25 microns or less) will significantly raise ball valve torque requirements.

MAINTENANCE

GENERAL

With self-wiping ball/seats, SVF valves have a long, trouble free life, and maintenance is seldom required. But, when necessary, valves may be refurbished, using a small number of components, none of which require machining. SVF valves are designed for easy service and assembly in the field. The following checks will help to extend valve life, or reduce plant problems.

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INSTALLATION, OPERATION AND MAINTENANCE
2-PC FULL PORT FLANGED BALL VALVE (1/2"–10") B41/42 SERIES

STEM LEAKAGE

If gland is in good condition tighten gland bolts (part #12 in catalog).

Note: If Stem leakage is not cured by the simple means described above, it will be necessary to dismantle valve and replace the stem packing *(if there is no stem leakage the stem assembly should not be touched).*

IN-LINE LEAKAGE

Check that valve is fully closed. If it is, leakage will be due to damaged seat or ball sealing surfaces and it will be necessary to dismantle the valve.

REBUILDING

Before rebuilding, check that all the correct components are available and that they are fit for reassembling. When rebuilding, cleanliness is essential to allow long valve life and provide cost effective maintenance. CAUTION: NO BODY OR STEM SEALS ARE REUSABLE. Care must be taken to avoid scratching the seats and seal during installation.

Note: Caution must be taken with valves that have been in hazardous media. They must be decontaminated before disassembly by relieving the line pressure and flushing the line with the valve in the partially open position. Protective clothing and face shields, gloves, etc. MUST BE USED for this operation.

A **Disassembly of Valve:** (After removing from line)

1.) With valve in Open position, undo body bolts (#17) to separate valve body components (#1 & #2).
2.) Remove body seal (#9), ball (#4) and seats (#8) and discard body seal and seats if they shown signs of damage or leakage paths.

B **Removing Stem Assembly**

1.) Remove handle by removing Snap ring (#11).
2.) Undo and remove gland nuts and bolts (See parts #16, 20, 14, 7, 12 & 6).
3.) Push stem (#3) into valve body to remove stem from valve.
4.) Remove stem seals and thrust washers and discard.

C **Inspection**

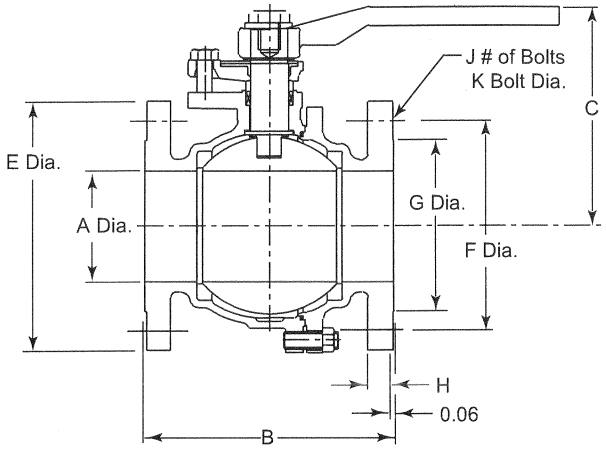
1.) The ball and the surfaces against which the seats wipe and make contact should be free of pit marks and scratches. Light marring from the action of the ball against the seats is normal and will not affect the operation of the valve.
2.) The stem and body surfaces that the thrust bearing and stem seal contact, should be free of pit marks and scratches.

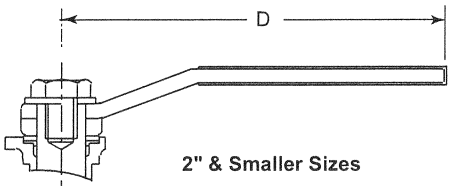
D **Reassembly**

1.) Lightly lubricate the ball, seats, body seal, stem seal and thrust bearing with lubricant compatible with media being handled. White petroleum jelly is a good general-purpose lubricant.
2.) To reassemble stem, disassembly procedure should be followed in reverse order.
3.) When stem assembly is complete, tighten gland nuts and bolts.
4.) Insert seats in body. Make sure seats rest firmly on back surface of each recess.
5.) With stem in the CLOSED position, insert ball into body so that stem slot engages with the tang at the base of the stem.
6.) Make sure body seal rests squarely on center seal surface of body. Insert and tighten body bolts diagonally.

Series B41 Class 150, Full Bore, Sizes 1/2" - 4"

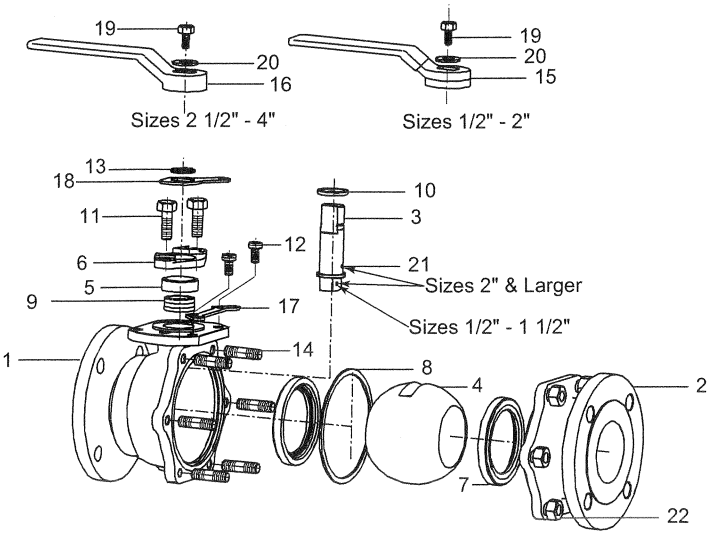
Dimensions & Weights





Size	A	B	C	D	E	F	G	H	J	K	CS Wt.	SS Wt.
1/2	0.51	4.25	3.30	5.10	3.50	2.38	1.38	0.44	4	0.62	4	4
3/4	0.75	4.61	3.46	5.10	3.88	2.75	1.69	0.44	4	0.62	5	5
1	1.00	5.00	4.01	5.10	4.25	3.12	2.00	0.44	4	0.62	7	7
1 1/2	1.50	6.50	5.00	9.10	5.00	3.88	2.88	0.56	4	0.62	15	15
2	2.00	7.00	5.59	9.10	6.00	4.75	3.62	0.62	4	0.75	22	22
2 1/2	2.50	7.50	5.98	13.80	7.00	5.50	4.12	0.69	4	0.75	34	35
3	3.00	8.00	6.69	13.80	7.50	6.00	5.00	0.75	4	0.75	44	45
4	4.00	9.00	8.11	17.70	8.50	7.50	6.19	0.94	8	0.75	75	77

Materials of Construction



▶ Remove for actuator mounting.

		Material	
No.	Description	Carbon Steel	Stainless
1	Body	A216-WCB	A351-CF8M
2	Cap	A216-WCB	A351-CF8M
3	Stem	A276-316	A276-316
4	Ball	A351-CF8M	A351-CF8M
5	Gland	A276-316	A276-316
6	Gland Flange	A351-CF8	A351-CF8
7	Seat	*RTFE	*RTFE
8	Seal	SPW304+Graphite	SPW304+Graphite
9	Gland Packing	**	**
10	Thrust Washer	RTFE 25% C.	RTFE 25% C.
11	Gland Bolt	A193-B8	A193-B8
▶ 12	Locking Bolt	A193-B8	A193-B8
▶ 13	Snap Ring	A686-W1***	A686-W1***
14	Body Bolt	A193-B7	A193-B8
▶ 15	Handle, Vinyl Coat	A108-1020****	A108-1020****
▶ 16	Handle	A536*****	A536*****
▶ 17	Locking Plate	A167-304	A167-304
▶ 18	Stop/Lock	A167-304	A167-304
▶ 19	Handle Bolt	A276-304	A276-304
▶ 20	Washer	A167-304	A167-304
21	Anti-Static Device	316 SS	316 SS
22	Body Nut	A194-2H	A194-8

* 15% Glass Standard, 25% Carbon Optional
** Expanded Graphite + Corrosion Inhibitor
*** Cr Plated
**** 2" & Smaller
***** 2 1/2"-4"

Technical Information

Determining Valve Torque

Valve operating torque is a function of the differential pressure across the valve when it is in the closed position. The torque tables on the opposite page shows operating values for valves in clean, clear, particle-free liquid. For other services it is necessary to apply a Torque Safety Factor as outlined below:

Torque Safety Factors

Media	Factor
Oils, lubricating media	X 0.8
Liquid, clean (particle-free)	X 1.0
Liquid, dirty (slurry), raw water	X 1.8
Gas, clean & wet (saturated steam)	X 1.2
Gas, dry (superheated steam)	X 1.3
Gas, dirty (natural gas)	X 1.5
Oxygen, Chlorine	X 1.5
For other conditions contact SVF.	

C_V Values

41 Series

1 1/2"	2"	2 1/2"	3"	4"	6"
106	153	276	317	449	899

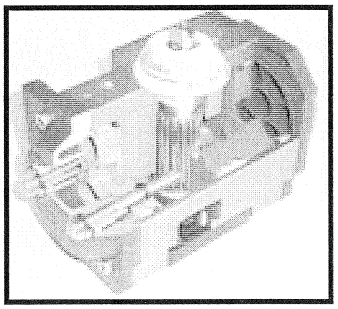
B41 & B42 Series

1/2"	3/4"	1"	1 1/2"	2"	2 1/2"	3"	4"	6"	8"
26	61	113	270	500	800	1,200	2,200	5,300	9,700

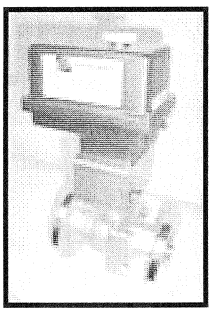
Control Accessories

SVF flanged ball valves are available with a complete selection of control accessories for automation and communication.

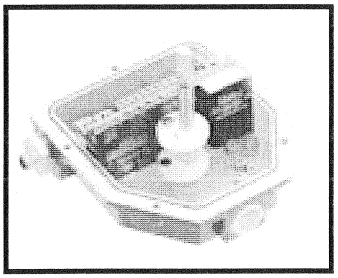
Device	Model	Brochure
Actuators	Aero Rack & Pinion Pneumatic	Aero Actuator
	Electric Actuators	"E" Series
	Compact4 Pneumatic	"Compact4"
Communication	LTD4Limit Switches	"LTD4", Limit Switches
	Pilot/Solenoid valve	"SV"
	Bus-type Network cards	"ASi" & "DeviceNet"



Aero Actuator



Electric Actuator



Network Solutions

Torque Values for Gland Packing and Body Bolts

Valve Size	Gland Bolt 41/B41 Class 150	Gland Bolt B42 Class 300	Body Flange Bolt B41 Class 150	Body Flange Bolt B42 Class 300
1/2"	52		87	87
3/4"	52		87	87
1"	78		191	191
1 1/2"	104		191	339
2"	104		339	868
2 1/2"	174		339	868
3"	174		339	868
4"	174		547	868
6"	347		1701	2300
8"	347		2300	2864

SVF Flow Controls INCORPORATED

aero2 Pneumatic Actuator

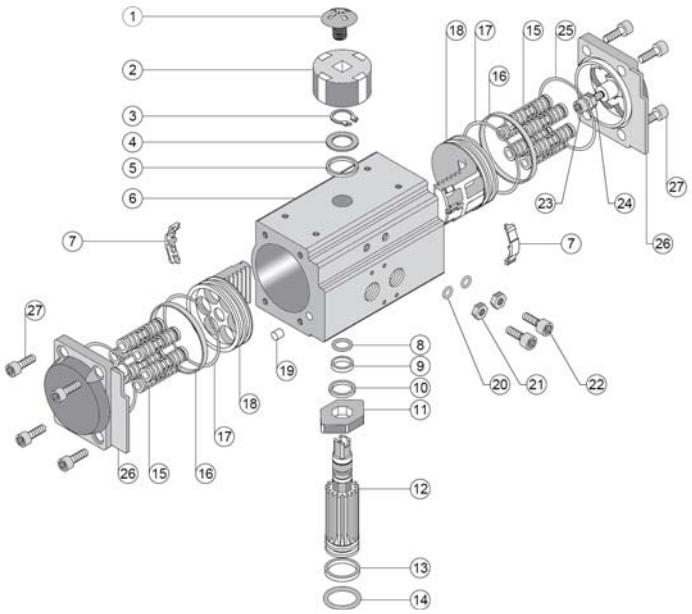
High Performance Compact Pneumatic Actuators

aero2

The pneumatic rack & pinion actuator is manufactured using the latest materials and methods to provide dependable and smooth operation in demanding process control conditions.

aero2 DESIGN FEATURES

- ✓ Hard Anodized aluminum housing
- ✓ "Versa-View" Continuous mechanical position indicator
- ✓ Stainless Steel drive shaft and trim.
- ✓ ISO/NAMUR design for universal mounting and accessory attachment
- ✓ Bi-Directional Stroke Adjustment
- ✓ ¼" NPT air inlet manifold
- ✓ Actuator is designed for 120 psi supply air pressure
- ✓ Optional 304 SS and 316 SS material available - Consult SVF

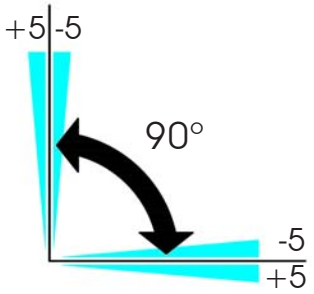


MATERIALS OF CONSTRUCTION

ITEM	DESCRIPTION	MATERIALS SPECIFICATIONS
1	Indicator Cap Screw	Plastic/Stainless Steel
2	Position Indicator	Plastic (ABS)
3	Pinion Snap Ring	Stainless Steel 300 Series
4	Thrust Washer	Stainless Steel 300 Series
5	Thrust Bearing	Polyoxymethylene (Delrin®)
6	Body	Extruded Aluminum Alloy
7	Piston Guide	Polyoxymethylene (Delrin®)
8	O-Ring (Pinion Top)	Viton®
9	Bearing (Pinion Top)	Polyoxymethylene (Delrin®)
10	Inside Washer	Polyoxymethylene (Delrin®)
11	Stroke Adjustment Stop	Alloy Steel
12	Pinion (Drive Shaft)	SS 300 Series/Nickel Plated Alloy
13	Bearing (Pinion Bottom)	Polyoxymethylene (Delrin®)
14	O-Ring (Pinion Bottom)	Viton®
15	Spring (Cartridge)	Spring Steel (Corrosion Resistant)
16	Bearing (Piston)	Polyoxymethylene (Delrin®)
17	O-Ring (Piston)	Viton®
18	Piston	Aluminum
19	Plug	NBR
20	O-Ring (Adjust Screw)	Viton®
21	Stop Nut (Adjust Screw)	Stainless Steel 300 Series
22	Adjust Screw	Stainless Steel 300 Series
23	Stop Screw	Stainless Steel 300 Series
24	Nut (Stop Screw)	Stainless Steel 300 Series
25	O-Ring (End Cap)	Viton®
26	End Cap	Aluminum
27	End Cap Screw	Stainless Steel 300 Series

BI-DIRECTIONAL STROKE ADJUSTMENT

aero² actuators feature bi-directional pinion travel stops. These stops allow for true +/-5° for valve travel adjustment to ensure precise positioning in all flow control services. The *aero²* travel stops are designed to absorb the maximum rated torque of the actuator and the maximum impact loads associated with the recommended stroke speed.



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SVF Flow Controls INCORPORATED

aero2 Pneumatic Actuator

High Performance Compact Pneumatic Actuators

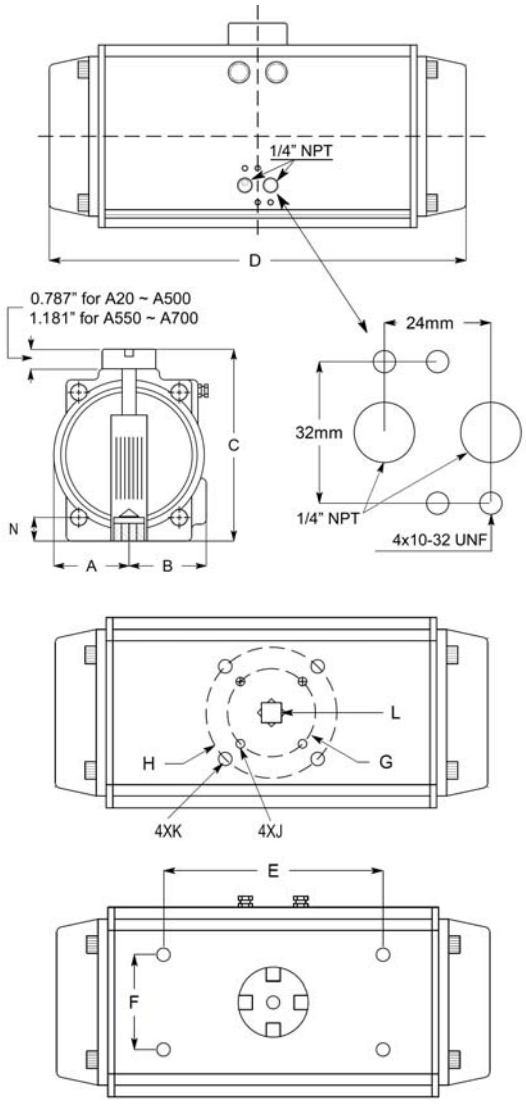
aero2

aero2 DIMENSIONAL TABLE (INCHES)

Model	A	B	C	D	E	F	G	H	J	K	L sq	N (Depth)
20	1.18	1.63	3.62	5.79	3.15	1.18	F03/1.42	F05/1.97	#10-32UNF	1/4"-20UNC	0.43	0.55
35	1.42	1.85	4.23	6.61	3.15	1.18	F05/1.97	F07/2.76	1/4"-20UNC	5/16"-18UNC	0.55	0.71
50	1.65	2.09	4.70	7.24	3.15	1.18	F05/1.97	F07/2.76	1/4"-20UNC	5/16"-18UNC	0.55	0.71
75	1.81	2.24	5.07	10.31	3.15	1.18	F05/1.97	F07/2.76	1/4"-20UNC	5/16"-18UNC	0.67	0.83
110	1.97	2.30	5.39	10.31	3.15	1.18	F05/1.97	F07/2.76	1/4"-20UNC	5/16"-18UNC	0.67	0.83
160	2.26	2.52	6.02	10.55	3.15	1.18	F07/2.75	F10/4.02	5/16"-18UNC	3/8"-16UNC	0.87	1.02
255	2.66	2.93	6.89	11.65	3.15	1.18	F07/2.75	F10/4.02	5/16"-18UNC	3/8"-16UNC	0.87	1.02
400	2.95	3.03	7.54	15.35	3.15	1.18	F10/4.02	F12/4.92	3/8"-16UNC	1/2"-13UNC	1.06	1.22
500	3.43	3.43	8.54	18.03	3.15	1.18	F10/4.02	F12/4.92	3/8"-16UNC	1/2"-13UNC	1.06	1.22
550	4.06	4.06	9.84	20.79	5.12	1.18	-	F14/5.51	-	5/8"-11UNC	1.42	1.57
600	4.45	4.45	11.22	22.20	5.12	1.18	-	F14/5.51	-	5/8"-11UNC	1.42	1.57
650	5.12	5.12	12.55	23.70	5.12	1.18	-	F16/6.49	-	3/4"-10UNC	1.81	1.97
700	5.79	5.79	14.01	27.80	5.12	1.18	-	F16/6.49	-	3/4"-10UNC	1.81	1.97

aero2 - WEIGHTS

Model	A2D lbs	A2D kg	A2S lbs	A2S kg
20	3	1	3	1
35	4	2	4	2
50	6	2	6	2
75	7	3	7	3
110	10	4	12	5
160	13	5	14	6
255	19	9	22	10
400	25	14	29	16
500	36	22	44	26
550	70	31	78	35
600	76	35	85	39
650	106	48	135	61
700	163	74	216	98



HOW TO ORDER aero2 ACTUATORS

Series	Model	Springs	Seals	Options
A2D = Double Acting	20	**Blank** = Double Acting	V = Viton®	**180** = 180° operation (Double Acting Only)
A2S = Spring Return	35	5		
	50	6		
A2DNI = Double Acting with Nickel Infused Aluminum Housing	75	7		
	110	8		
	160	9		
	255	10*		
	400	11		
	500	12		
A2SNI = Spring Return with Nickel Infused Aluminum Housing	550	(*10 Springs are standard)		
	600			
	650			
	700			

Order Example for Model 20 Double Acting, 180° Operation: = A2D-20-V-180

A2D — 20 — V — 180

Order Example for Model 20 Spring Return, with 10 Springs: = A2S-20-10-V

A2S — 20 — 10 — V

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High Performance Compact Pneumatic Actuators

aero2 SPRING RETURN OUTPUT TORQUES

OUTPUT AIR TO SPRING

SUPPLY PRESSURE		40		50		60		70		80		90		100		SPRING OUTPUT	
MODEL	SPRING QTY	0° START	90° END	0° START	90° END	0° START	90° END	0° START	90° END	0° START	90° END	0° START	90° END	0° START	90° END	90° START	0° END
A2S-020	5	55	37	77	58											55	38
	6	48	24	70	46	924	78									66	45
	7	39	13	61	34	90	67	120	89							77	52
	8			53	20	84	55	113	78	140	114					87	60
	9			44	8	76	44	105	67	133	104	160	132			98	67
	10					68	33	98	57	126	94	153	122			109	75
	11					60	21	91	46	119	84	146	113	172	140	120	82
	12							83	36	112	74	139	95	166	130	131	90
A2S-035	5	111	75	153	116	204	137									92	61
	6	98	55	138	95	191	152	242	205							111	72
	7	84	35	127	73	179	133	229	187							129	85
	8			111	52	167	114	218	169	267	220	315	269			148	97
	9					154	95	206	151	255	203	304	253			166	109
	10					13	75	195	133	244	186	293	236	341	286	185	121
	11							184	115	234	169	283	220	330	270	203	133
	12							171	97	222	152	271	204	320	254	222	145
A2S-050	5	141	103	197	158	270	235									128	93
	6	121	74	176	128	251	208	321	280							154	112
	7	101	47	155	99	232	182	303	256							179	131
	8			133	69	211	155	284	231	352	301	418	369			205	149
	9					192	129	266	206	335	278	402	347			231	168
	10					174	102	246	181	318	254	386	324	451	391	256	187
	11							231	157	301	231	369	301	435	369	282	205
	12							213	132	284	207	353	278	419	346	308	224
A2S-075	5	227	157	317	244	428	364									204	140
	6	196	112	285	196	400	321	508	434							244	168
	7	166	67	252	151	371	279	481	395							285	196
	8			221	103	342	237	454	355	560	466	663	572			326	224
	9					313	195	426	316	534	429	638	536			367	252
	10					284	152	400	276	508	391	613	500	715	605	407	280
	11							373	237	483	353	588	464	691	570	448	308
	12							345	198	456	316	563	428	667	536	489	336
A2S-110	5	322	214	450	338	612	511									304	207
	6	277	148	403	269	569	449	725	612							365	248
	7	231	80	355	197	526	385	685	553							426	289
	8			319	128	484	323	646	495	799	655	947	808			487	331
	9					441	260	606	436	761	599	911	755			548	372
	10					399	197	566	377	723	543	874	700	1,022	853	608	413
	11							525	318	685	487	837	647	986	801	669	454
	12							486	260	647	432	800	593	950	749	730	496
A2S-160	5	497	325	687	508	921	760									436	280
	6	435	229	622	407	862	670	1,088	908							523	336
	7	374	133	559	308	805	580	1,035	824							610	392
	8			494	208	747	490	980	740	1,203	974	1,419	1,198			697	448
	9					689	400	927	656	1,152	894	1,370	1,122			784	504
	10					631	306	872	569	1,100	811	1,320	1,041	1,535	1,264	871	560
	11							818	487	1,048	733	1,270	966	1,486	1,191	958	616
	12							764	406	997	656	1,221	892	1,439	1,119	1,045	672
A2S-255	5	712	453	1,000	729	1,358	1,115									698	462
	6	610	305	893	574	1,263	976	1,608	1,340							832	555
	7	509	148	787	410	1,167	828	1,519	1,202							971	647
	8			681	255	1,071	689	1,429	1,072	1,770	1,429	2,100	1,772			1,110	740
	9					976	541	1,340	934	1,685	1,298	2,018	1,645			1,249	832
	10					880	402	1,251	804	1,600	1,174	1,936	1,526	2,264	1,865	1,387	925
	11							1,161	666	1,514	1,043	1,854	1,399	2,184	1,742	1,530	1,017
	12							1,072	536	1,429	919	1,772	1,280	2,105	1,626	1,665	1,110

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aero2 SPRING RETURN OUTPUT TORQUES

OUTPUT AIR TO SPRING

SUPPLY PRESSURE		40		50		60		70		80		90		100		SPRING OUTPUT	
MODEL	SPRING QTY	0° START	90° END	0° START	90° END	0° START	90° END	0° START	90° END	0° START	90° END	0° START	90° END	0° START	90° END	90° START	0° END
A2S-400	5	1,246	823	1,737	1,296	2,346	1,948									1,143	759
	6	1,082	573	1,566	1,035	2,192	1,713	2,778	2,331							1,370	908
	7	916	324	1,392	773	2,035	1,478	2,631	2,112							1,598	1,059
	8			1,218	512	1,878	1,244	2,485	1,892	3,063	2,498	3,624	3,080			1,826	1,211
	9					1,713	1,009	2,331	1,673	2,916	2,290	3,483	2,879			2,054	1,370
	10					1,557	765	2,185	1,446	2,777	2,073	3,348	2,670	3,906	3,247	2,283	1,522
	11							2,039	1,226	2,638	1,864	3,214	2,468	3,776	3,051	2,510	1,673
	12							1,892	1,007	2,498	1,655	3,080	2,267	3,645	2,855	2,741	1,824
A2S-500	5	1,877	1,212	2,640	1,943	3,592	2,966									1,844	1,236
	6	1,609	805	2,359	1,518	3,340	2,583	4,256	3,549							2,212	1,483
	7	1,332	398	2,069	1,093	3,079	2,200	4,012	3,192							2,581	1,730
	8			1,789	667	2,826	1,818	3,777	2,022	4,680	3,782	5,556	4,691			2,949	1,977
	9					2,566	1,435	3,533	2,477	4,448	3,442	5,332	4,363			3,321	2,225
	10					2,313	1,052	3,297	2,120	4,223	3,102	5,116	4,034	5,986	4,935	3,691	2,472
	11							3,062	1,771	3,999	2,769	4,900	3,714	5,776	4,624	4,056	2,719
	12							2,818	1,413	3,767	2,429	4,676	3,386	5,559	4,305	4,422	2,966
A2S-550	5	3,228	2,164	4,457	3,345	5,957	4,957									2,737	1,774
	6	2,839	1,563	4,051	2,717	5,592	4,392	7,041	5,921							3,287	2,127
	7	2,451	962	3,645	2,088	5,227	3,827	6,700	5,393							3,834	2,480
	8			3,239	1,460	4,861	3,261	6,359	4,865	7,789	6,366	9,180	7,808			4,380	2,833
	9					4,496	2,696	6,018	4,337	7,464	5,863	8,867	7,323			4,927	3,186
	10					4,131	2,131	5,677	3,809	7,139	5,360	8,554	6,838	9,936	8,269	5,473	3,540
	11							5,336	3,281	6,814	4,858	8,240	6,354	9,632	7,798	6,020	3,893
	12							4,995	2,753	6,490	4,355	7,927	5,869	9,327	7,327	6,566	4,246
A2S-600	5	3,801	2,774	5,327	4,254	7,227	6,262									3,363	2,430
	6	3,265	2,035	4,767	3,481	6,723	5,566	8,552	7,472							4,036	2,917
	7	2,728	1,295	4,206	2,707	6,218	4,870	8,081	6,822							4,708	3,405
	8			3,645	1,934	5,714	4,174	7,610	6,172	9,413	8,044	11,164	9,844			5,381	3,893
	9					5,209	3,479	7,139	5,523	8,965	7,426	10,731	9,247			6,053	4,380
	10					4,705	2,783	6,668	4,873	8,516	6,807	10,299	8,651	12,038	10,436	6,726	4,868
	11							6,169	4,223	8,068	6,188	9,866	8,054	11,617	9,856	7,399	5,356
	12							5,726	3,574	7,619	5,569	9,434	7,457	11,197	9,276	8,071	5,843
A2S-650	5	5,373	3,977	7,571	6,111	10,332	9,018									4,902	3,632
	6	4,578	2,895	6,739	4,979	9,584	8,001	12,239	10,761							5,885	4,355
	7	3,773	1,822	5,898	3,858	8,827	6,992	11,533	9,819							6,861	5,087
	8			5,066	2,727	8,079	5,975	10,834	8,869	13,451	11,579	15,989	14,184			7,844	5,810
	9					7,323	4,957	10,128	7,919	12,778	10,674	15,340	13,312			8,828	6,541
	10					6,575	3,948	9,429	6,976	12,113	9,777	14,699	12,446	17,220	15,031	9,803	7,264
	11							8,731	6,026	11,448	8,872	14,057	11,574	16,596	14,183	10,787	7,987
	12							8,024	5,076	10,775	7,967	13,408	10,701	15,966	13,335	11,771	8,719
A2S-700	5	8,786	6,576	12,163	9,852	16,289	14,210									6,961	4,952
	6	7,695	5,050	11,022	8,257	15,263	12,775	19,256	16,934							8,349	5,944
	7	6,612	3,514	9,891	6,652	14,245	11,332	18,306	15,585							9,744	6,928
	8			8,750	5,057	13,219	9,897	17,348	14,245	21,286	18,332	25,109	22,260			11,132	7,920
	9					12,193	8,453	16,389	12,897	20,374	17,048	24,229	21,023			12,527	8,912
	10					11,167	7,018	15,431	11,557	19,461	15,771	23,349	19,792	27,156	23,699	13,914	9,904
	11							14,473	10,209	18,548	14,487	22,469	18,554	26,300	22,496	15,310	10,896
	12							13,523	8,869	17,643	13,211	21,597	17,324	25,452	21,300	16,697	11,880

DOUBLE ACTING TORQUE (Lbf.-In.)				
	Supply Pressure (psig)			
ACTUATOR MODEL	40	60	80	100
A2D-020	97	146	195	244
A2D-035	178	267	356	446
A2D-050	245	368	490	613
A2D-075	383	574	766	957
A2D-110	551	827	1,103	1,378
A2D-160	808	1,211	1,615	2,019
A2D-255	1,225	1,833	2,450	3,063

DOUBLE ACTING TORQUE (Lbf.-In.)				
	Supply Pressure (psig)			
ACTUATOR MODEL	40	60	80	100
A2D-400	2,088	3,133	4,177	5,221
A2D-500	3,249	4,873	6,497	8,122
A2D-550	5,198	7,797	10,396	12,995
A2D-600	6,497	9,746	12,995	16,243
A2D-650	9,398	14,097	18,796	23,495
A2D-700	14,282	21,430	28,565	35,712

OC 2

THERMAL
M10

1” FML NPT 8000 BTU/HR OIL COLLER

ANGI PART NUMER 150-07232

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INSTALLATION AND SERVICE RECOMMENDATIONS "M" SERIES AND "MR" SERIES

General Information

1. Air Cooled Mobile Series coolers are built for operation with maximum oil pressures to 300 psi and temperatures to 400°F.
2. Care must be taken to reduce or eliminate dirt and debris from blocking the cooling surface as overheating could result.

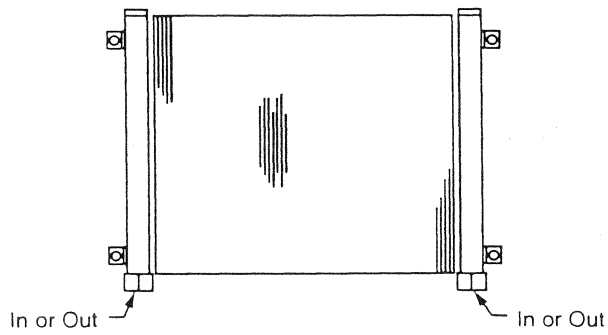
Installation

1. Mobile Series coolers are designed for mounting by "L" shaped brackets attached to the sides of the manifolds.
2. It is recommended that these units be installed with the oil ports positioned, based on oil flow rates.

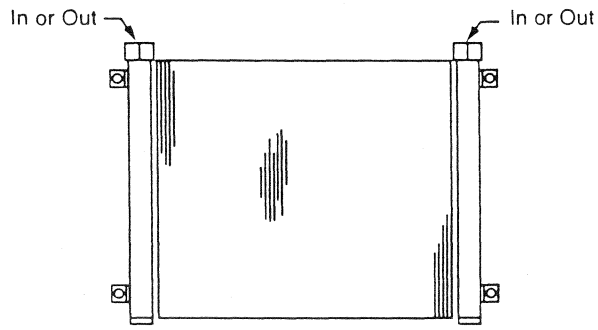
HEAT EXCHANGER PIPING HOOK-UP

"M" Series

Oil Connections Down—High Flow Rates Only.

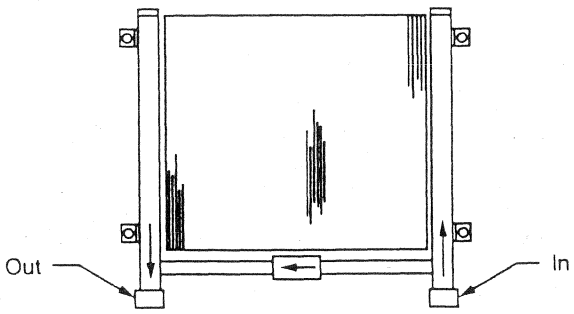


Oil Connections Up—High, Low and Medium Flow Rates

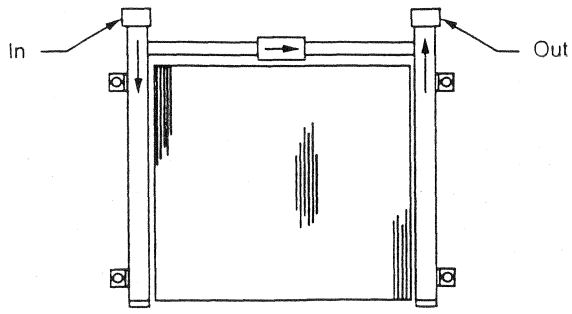


"MR" Series

Oil Connections Down—High Flow Rates Only.



Oil Connections Up—Low to Medium Flow Rates



3. Units should not be located in corrosive atmospheres as rapid deterioration of the cooling coil, and/or manifolds may take place resulting in reduced service life (corrosion resistant coatings available—consult factory).

4. Piping should be sized based on oil flow and pressure drop requirements, not on the oil coolers port sizes. It should also be properly supported to prevent excessive strain to connections, manifolds, etc.

   NOTE: Oil port position is at customer option, however, the cooler must be flooded with oil to take full advantage of cooling potential.

Maintenance

1. The unit should be inspected regularly for corrosion and dirty or clogged heat transfer surface. Dirt and dust can be removed by washing, brushing or blowing out with compressed air. Should the surface be greasy, the fins and tubes can be brushed or sprayed with a non-flammable degreasing fluid which is safe on copper, steel and aluminum. Follow with a hot water rinse and dry thoroughly. A steam cleaner can also be used effectively.

2. Once a year, or as required by the application, piping should be disconnected and a degreasing agent circulated through the unit to remove sludge from turbulators and internal tube surfaces to return the unit to full capacity. A thorough cleaning of the entire system in the same manner is preferable to avoid carry-over from uncleaned piping, pump and accessories. The strainer or any filtering devices should also be serviced following this operation.

3. When ordering replacement parts or inquiring on service, mention the model number, serial number and the original purchase order number.

4. Check valve cartridge (MR Series) is not serviceable. Install oil filter ahead of unit to keep foreign particles from rendering the cartridge ineffective.

PR 13

MECO
5648-9717

125 PSI PRESSURE REGULATOR

ANGI PART NUMBER 500-01674

REBUILD KIT ASSY - MECO PRIMARY REGULATOR – 840-04319

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NGV REGULATORS & ENVIRO-CAP®

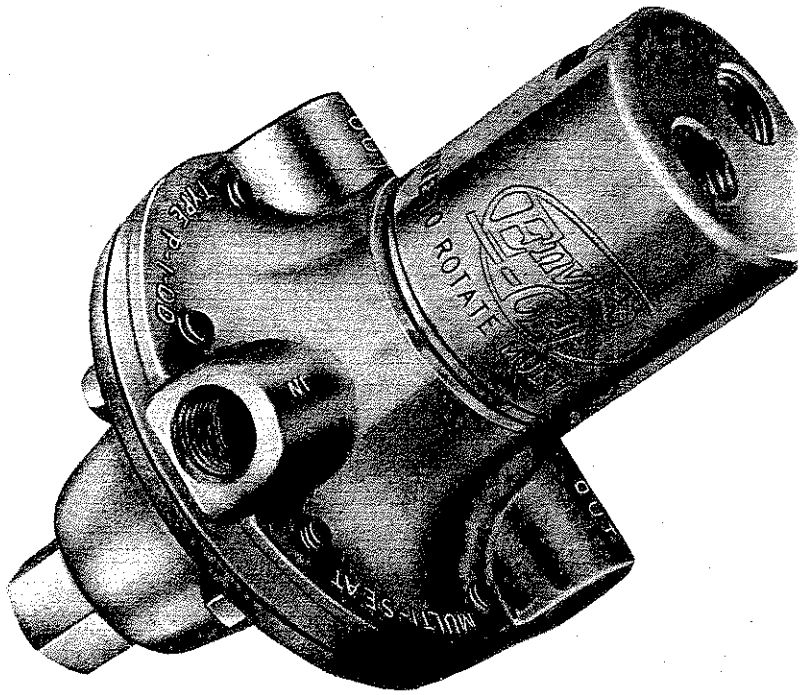
TYPE "P-NGV"

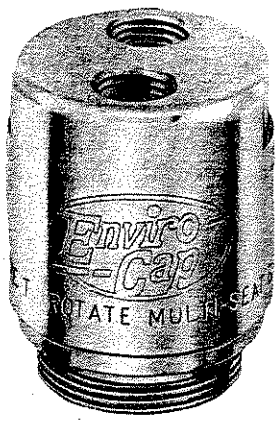
THE DEPENDABILITY OF THE "YOKE" TYPE REGULATOR IS IDEALLY SUITED AS THE HIGH PRESSURE REGULATOR IN POSITIVE PRESSURE NGV SYSTEMS. RATED FOR INLET PRESSURES TO 5,500 PSI, DELIVERY PRESSURES BETWEEN 2 AND 500 PSI ARE RELIABLY ACHIEVED.

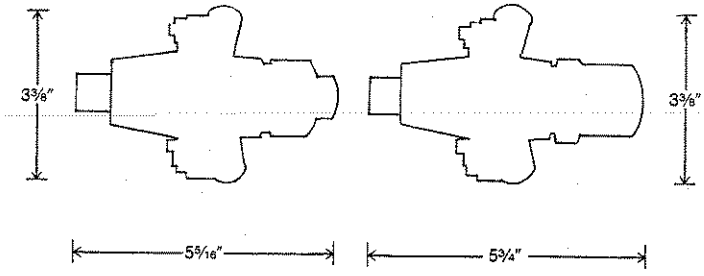
A SPECIAL FEATURE IS THE DIA-BLOK CONSTRUCTION. THE DIAPHRAGM IS CONNECTED TO THE SEAT BLOCK BY MEANS OF A YOKE. THIS ONE PIECE ACTION PROVIDES INSTANT RESPONSE TO VARIATIONS IN DEMAND AND INSURES INSTANTANEOUS AND POSITIVE SHUTOFF.

THE ENVIRO-CAP CAN BE USED TO RETROFIT ANY MECO TYPE "P" REGULATOR WHERE FREEZING AND RESULTING ERRATIC GAS FLOW IS A PROBLEM.

ENGINE COOLANT IS CIRCULATED THROUGH THE BACK CAP TO PREVENT "FREEZE-UP" AND MAINTAIN A UNIFORM GAS FLOW. CONNECTIONS TO THE ENGINE COOLING SYSTEM ARE THROUGH ¼" NPT PORTS.







Standard Type P NGV Regulator

Type P NGV Regulator with ENVIRO-CAP

SPECIFICATIONS:

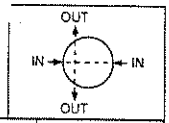
Maximum Inlet Pressure: 5,500 psi
Delivery Pressure Ranges:

Standard	Optional
0–125 psi	0–30 psi
0–150 psi	0–50 psi
0–225 psi	0–500 psi

Ports:
¼" NPT Female
Effective Diaphragm Size:
2³⁄₁₆" diameter
Materials of Construction:
Body.....Forged Brass
Bonnet.....Forged Brass
Diaphragm..Stainless Steel
Seat.....Nylon
Seals.....Teflon & SBR
Nozzle.....Stainless Steel
Inlet Filter...Sintered Bronze
Options: (at extra cost)
Mounting bolts and nuts

Ordering Information

PORTING STYLE P-1-DD



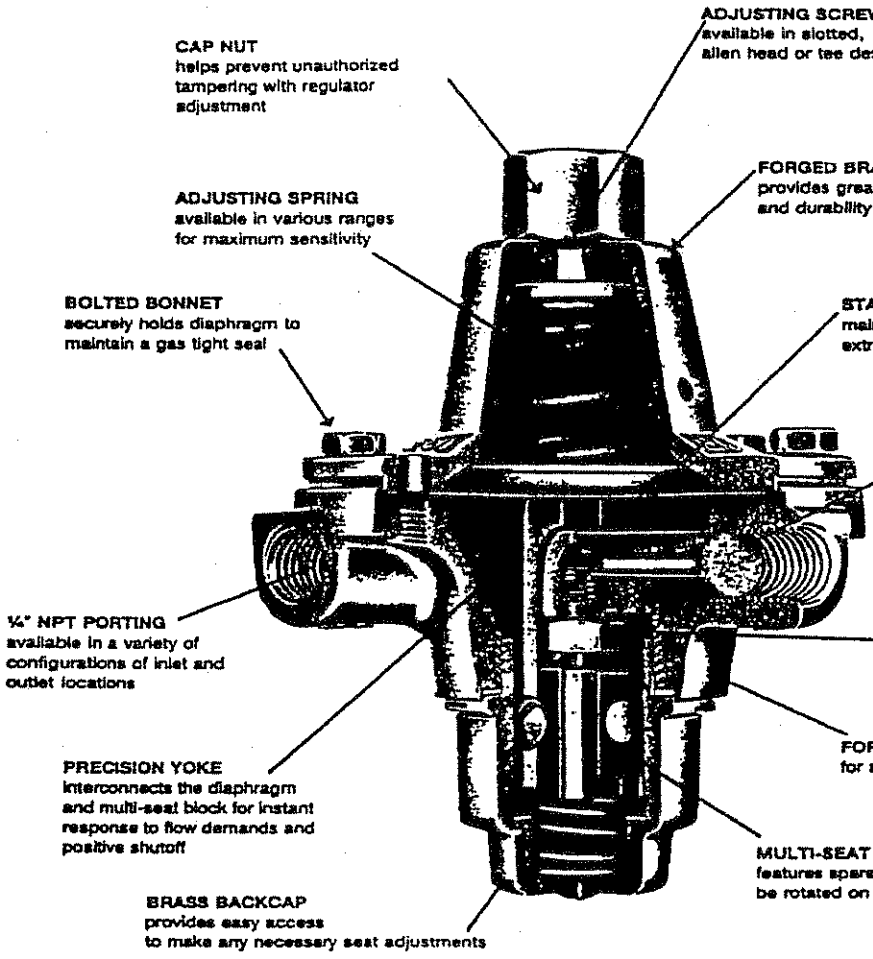
Stock No.	Max. Outlet Pressure	Connections		Enviro-Cap	Wt.
		Inlet	Outlet		
8429 8431 8433	125 psi 150 psi 225 psi	(2)¼"NPTF	(2)¼"NPTF	YES	3½ #
8440 8441 8442	125 psi 150 psi 225 psi	(2)¼"NPTF	(2)¼"NPTF	NO	3¼ #
4534	ENVIRO-CAP, WATER HEATED BACK CAP ONLY				

These are MECO's standard models. Additional models with other outlet pressure ranges, other porting and accessories are also available. Please consult with us on your custom regulator application.

MECO Regulators are included in kits certified by A.G.A. and C.A.R.B. MECO Regulators are approved by the Railroad Commission of Texas and are also available with Underwriters Laboratories (UL) Listing. Additional certifications may be applicable; please consult MECO for current listings.

Control Gas Regulator

YOKE TYPE REGULATORS



THE TYPE P HIGH PRESSURE REGULATORS . . . fill numerous needs throughout industry. Time proven for reliability and service, these regulators are designed around the special DIA-BLOCK feature. The diaphragm and seat block are directly connected by a precision machined YOKE. Any action on the diaphragm is instantly transmitted to the seat. The results being a high degree of sensitivity and accuracy.

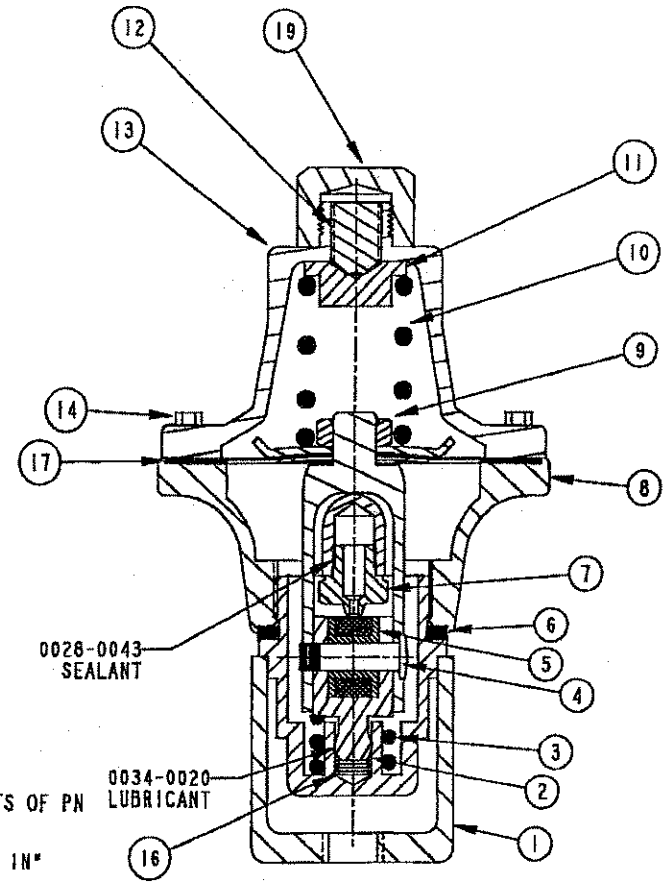
MULTI-SEAT BLOCK . . . contains four seating surfaces which can be easily revolved as needed. No special tools are required to make this change. Various seating materials are available

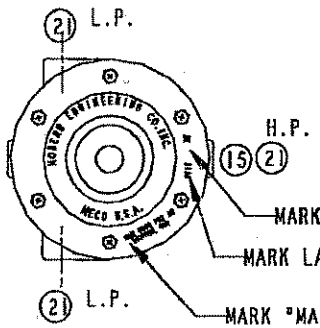
DWG.NO. 5648-8717 SH 1

NOTES
1. TEST REGULATOR PER 0090-0040, SHEET 2 PROCEDURE 11.2.
2. MARK REGULATOR PER DETAIL "A" BELOW.
3. SEE DWG 0093-0416 FOR TORQUE REQUIREMENTS.
4. USE 0034-0020 LUBRICANT AND 0028-0043 SEALANT WHERE SHOWN.

REVISIONS

SYM	REF.	DATE	SYM	REF.	DATE	SYM	REF.	DATE
DWG RELEASE			B	E960	10-00			
EO	E542	11-99	C	F3058	12-01			
A	E675	8-00						





DETAIL A

ITEM NO.	DESCRIPTION	PART NO.	NO. REQ'D
28	LUBRICANT	0034-0020	A/R
27	SEALANT	0028-0043	A/R
26			
C 25	INSTRUCTION MANUAL A	0056-1625	1
24			
23			
22			
21	CAPLUG	1417-0005	3
20			
19	BONNET NUT	5213-5274	1
18			
17	DIAPHRAGM GASKET	5213-5269	1
16	O-RING	5199-2135	4
15	FILTER	5213-5215	1
14	BONNET SCREW	5213-5145	6
B 13	BONNET	5203-5419	1
12	ADJUSTING SCREW	5204-5279	1
11	SPRING BUTTON	5213-5259	1
10	BONNET SPRING (GREY)	5205-5400	1
9	DIAPH-YOKE ASSY	5232-4564	1
8	BODY	5202-5411	1
7	NOZZLE	5213-5161	1
6	BACK CAP GASKET	5213-5429	1
5	SEAT BLOCK ASSEMBLY	5233-4521	1
4	YOKE CLAMPING SCREW	5213-5181	1
3	BACK CAP SPRING	5205-5177	1
2	YOKE GUIDE	5213-5182	1
1	BACK CAP ASSEMBLY	5235-4534	1

BILL OF MATERIALS

VICTOR®
VICTOR EQUIPMENT COMPANY
DENTON TEXAS

REF. DATA 70420	MATERIAL	UNLESS SPECIFIED BREAK ALL EDGES .005-.015 MACHINED SURFACES 125 ALL FEATURES WITH A COMMON AXIS MUST BE COAXIAL WITHIN .003 F.I.M. TOLERANCES .X ±.020 .XX ±.010 .XXX ±.005 ANGLES ±1°	DRAWN B. BRADFORD 11-5-99
	FINISH		CHECKED L.TURNEY 11-99
			APVD L.TURNEY 11-99
		DIMENSIONS ARE IN INCHES UNLESS NOTED	PROJECTION

TITLE: SPECIAL P REGULATOR NVG
PRESET 125 PSI

SIZE B | DWG.NO. 5648-8717 | SCALE NTS | SHEET 1 OF 1

Printed 01/03/02

DWG. NO. 0080-0040 SH 2

NOTES

REVISIONS								
STN	REF.	DATE	STN	REF.	DATE	STN	REF.	DATE
A	E514	9-99	C	E572	12/99			
REV & REDWN			D	E605	01-00			
B	E516	10-99						

A TEST PRESSURE PSIG	H PRESSURE SETTING FOR TESTS	J PRESS. GAUGE FOR TEST	K LEAK TEST	L DROP TEST	M CREEP TEST	N FINAL PRESET	PROC. NUMBER	
3600±200	225 PSIG	400 PSIG	10 SCC	15 PSIG	3 PSIG	225±5 PSIG	11.1	
3600±200	125 PSIG	200 PSIG	10 SCC	10 PSIG	3 PSIG	125±5 PSIG	11.2	
3600±200	50 PSIG	100 PSIG	10 SCC	5 PSIG	3 PSIG	50±3 PSIG	11.3	
3600±200	150 PSIG	200 PSIG	10 SCC	10 PSIG	3 PSIG	150±5 PSIG	11.4	
3600±200	40 PSIG	100 PSIG	10 SCC	5 PSIG	3 PSIG	40 ±5 PSIG	11.5	
3600±200	35 PSIG	100 PSIG	10 SCC	5 PSIG	3 PSIG	35 ±5 PSIG	11.6	C
3600±200	60 PSIG	100 PSIG	10 SCC	5 PSIG	3 PSIG	60 ±3 PSIG	11.7	C

TEST PROCEDURE
MECO PRESET REGULATORS

1. INSTALL A TEST GUN WITH A #52 (.0635) ORIFICE TO REGULATOR OUTLET. USE A J PSIG OUTLET GAUGE FOR TESTS.
2. PRESSURIZE THE REGULATOR WITH A PSIG OF OIL FREE AIR OR DRY NITROGEN.
3. LEAK TEST: ADJUST THE REGULATOR TO DELIVER H PSIG. CLOSE THE INLET VALVE AND TURN THE ADJUSTING SCREW ONE TURN COUNTER CLOCKWISE. OBSERVE BOTH GAUGES FOR 5 MINUTES. NO CHANGE IN EITHER GAUGE READING IS PERMITTED. A LEAK TEST MAY BE PERFORMED BY OTHER MEANS PROVIDED THE LEAK RATE USING AIR DOES NOT EXCEED K PER MINUTE.
4. DROP TEST: ADJUST THE REGULATOR TO DELIVER H PSIG STATIC. OPEN THE TEST GUN. THE DROP ON THE OUTLET TEST GAUGE MUST NOT EXCEED L PSIG.
5. SLOW SHUT-OFF/CREEP TEST: ADJUST THE REGULATOR TO DELIVER H PSIG FLOWING. CLOSE THE TEST GUN AND OBSERVE THE DELIVERY PRESSURE READING FOR 5 MINUTES. AN INITIAL SLOW SHUT-OFF INCREASE OF M PSIG DURING THE FIRST MINUTE IS PERMISSIBLE. NO FURTHER CREEP IS PERMISSIBLE DURING THE NEXT 4 MINUTES.
6. PRESET THE REGULATOR TO N PSIG STATIC.

VICTOR®
VICTOR EQUIPMENT COMPANY
DENTON TEXAS

REF. DATA
70420

MATERIAL

FINISH

UNLESS SPECIFIED
BREAK ALL EDGES .005-.010
MACHINED SURFACES √125
ALL FEATURES WITH A COMMON AXIS MUST BE COAXIAL WITHIN .005 F.I.M.
TOLERANCES .X ±.020
.XX ±.010
.XXX ±.005
ANGLES ±1°

	BY	DATE
DRAWN	E. BRADFORD	10-22-99
CHECKED	L.TURNEY	11-99
APVD	L.TURNEY	11-99

DIMENSIONS ARE IN INCHES UNLESS NOTED

TITLE: TEST PROCEDURE MECO PRESET REGULATORS

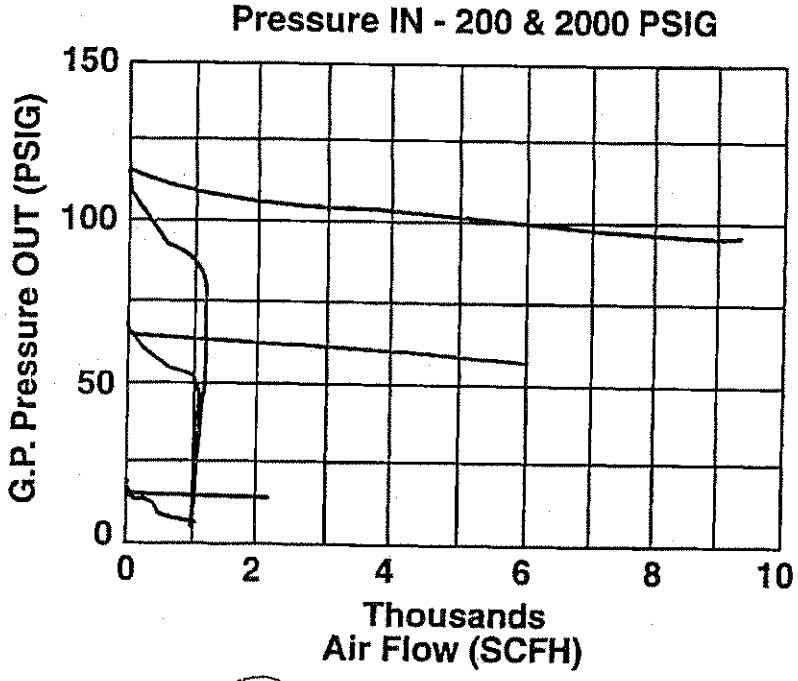
SIZE B | DWG. NO. 0080-0040

PROJECTION | SCALE NTS | SHEET 2 OF 2

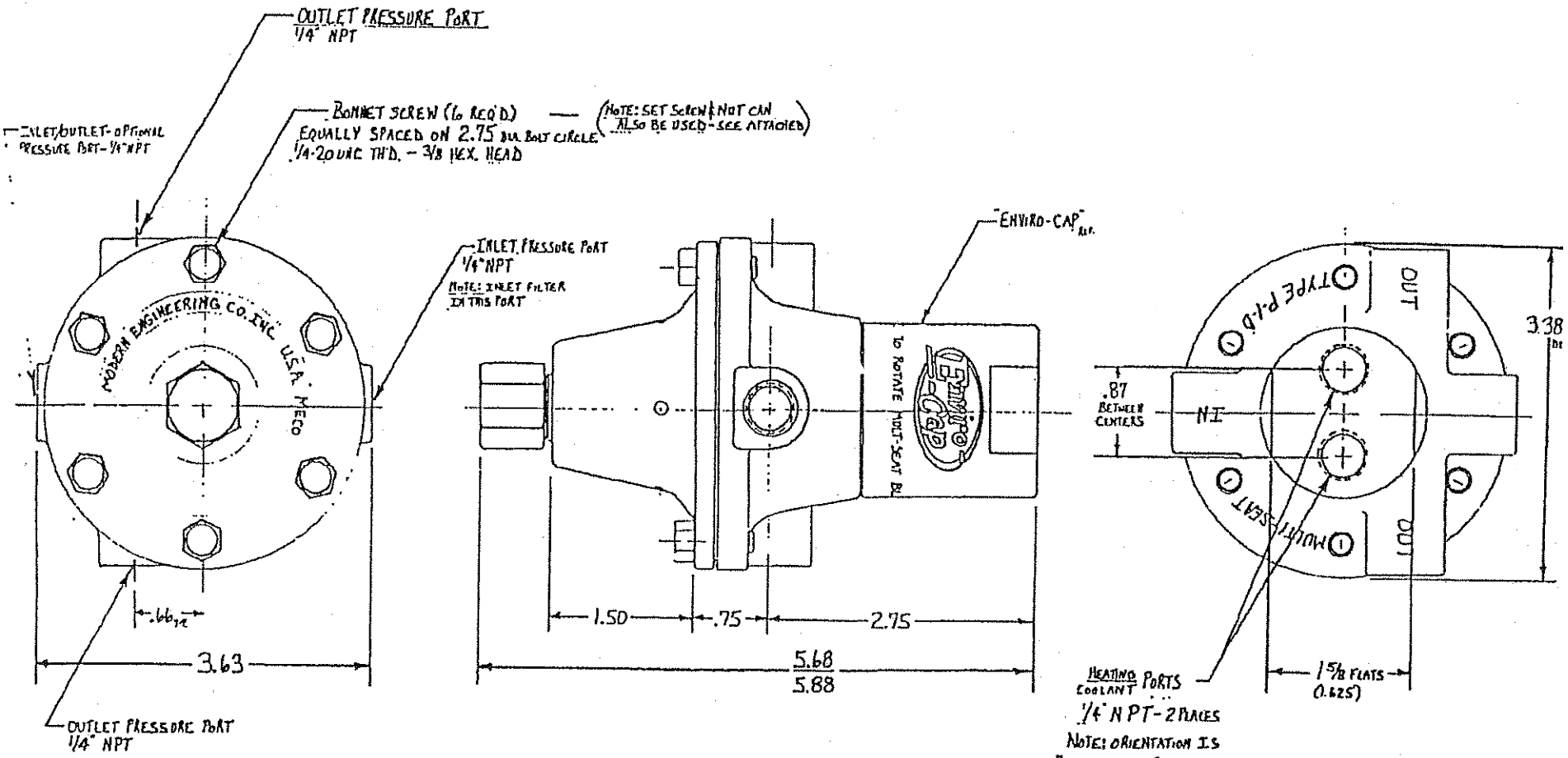
Printed 04/16/01

Flow Data (SCFH)

Meco "P" Series Cylinder Regulator
Single Stage / Heavy Duty



Reference: "P" Regulator Section A, Page 37



WEIGHT - 3.5 LB. APPROX.

3/4 60d

NAME: INSTALLATION DWG. ("P" NGV)
MATERIAL:
DWG. NO. | STOCK NO.

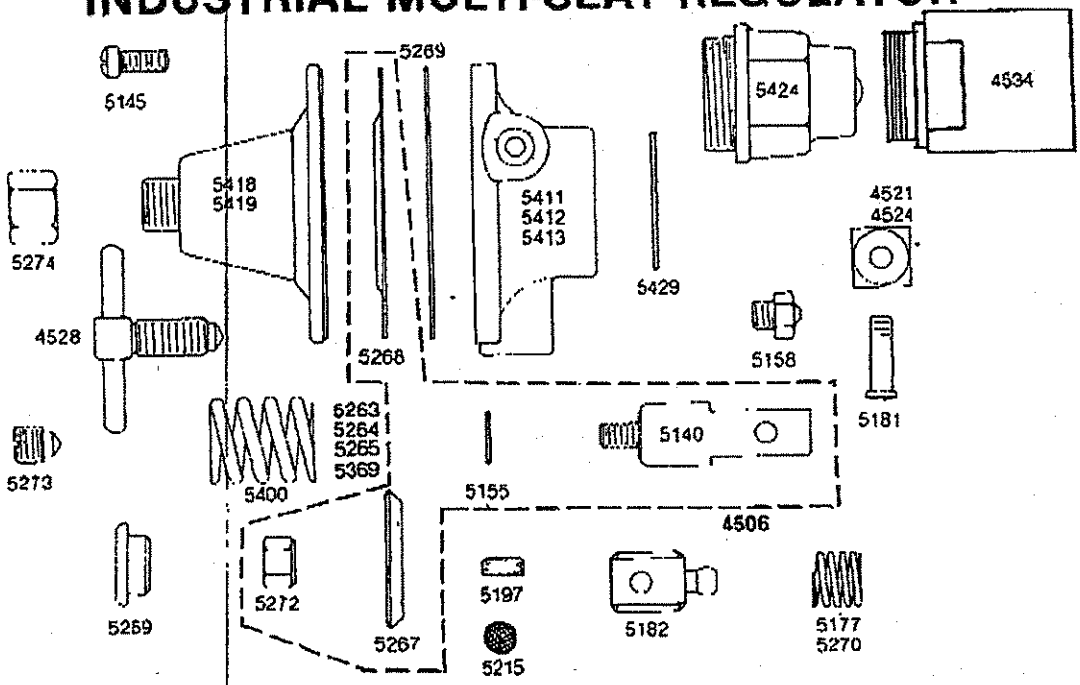
ALL DIMENSIONS IN INCHES
TOLERANCE
2 PLACE DECIMAL AND FRACTIONAL DIMENSIONS ± OR -.03 UNLESS OTHERWISE SPECIFIED
3 PLACE DECIMAL DIMENSIONS ± OR -. UNLESS OTHERWISE SPECIFIED

REVISED

MODERN ENGINEERING COMPANY
GALLMAN, MS • ST. LOUIS, MO U.S.A.

SUBJECT: TYPE "P" NGV REGULATOR
DRAWN: WFF | DATE: 6-25-91
CHK'D BY: | SCALE: FULL (APPROX)

TYPE P-30, P-50, P-125, P-150, & P-225
INDUSTRIAL MULTI-SEAT REGULATOR



Stock No.	Description
4506	Diaphram-Yoke Assembly
4521	Seat Block with White Nylon Seats
4524	Seat Block with Kel-F Seats for CO_2
4528	Adjusting Screw Assembly
4534	ENVIRO-CAP, Water Heated Back Cap Assembly
5140	Yoke (Part of 4506)
5145	Bonnet Screw 6 required, Pkg. 12
5155	Yoke Gasket, Teflon, Pkg. 12 (Part of 4506)
5158	Nozzle with 5/64" Orifice, Pkg. 6
5177	Rear Spring, for over 500 PSI Inlet Pressure, Standard
5181	Yoke Clamping Screw, Pkg. 6
5182	Yoke Guide
5197	Filter Screen, pkg. 6
5215	Sintered Filter, pkg. 12, Standard
5259	Spring Button
5263	Compression Spring for 30 PSI Pressure (Red)
5264	Compression Spring for 125 PSI Pressure (Green)
5265	Compression Spring for 150 PSI pressure (Purple)
5267	Diaphragm Plate (Part of 4506)
5268	Stainless Steel Diaphragm (Part of 4506)
5269	Diaphragm Gasket, Pkg. 6
5272	Diaphragm Plate Nut (Part of 4506)
5273	Slot Type Adjusting Screw
5274	Protection Cap for Slot Adjusting Screw
5369	Compression Spring for 50 PSI pressure (Black)
5400	Compression Spring for 225 PSI pressure (Grey)
5411	Body, 1 inlet, 2 outlets P-1-DA
5412	Body, 1 inlet, 3 outlets P-1-DC
5413	Body, 2 inlets, 2 outlets P-1-DD
5418	Bonnet, for "T" Type Adjusting Screw
5419	Bonnet, for Slotted Type Adjusting Screw
5423	Allen Head Adj. Screw
5424	Back Cap
5429	Back Cap Gasket, Teflon, Pkg. 12

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PR 156

FISHER
627-117

REGULATOR – 1” 15 - 40 PSI SPRING 3/8” ORIFICE

ANGI PART NUMBER – 991-7667

February 2011

627 Series Pressure Reducing Regulators

WARNING

Failure to follow these instructions or to properly install and maintain this equipment could result in an explosion and/or fire causing property damage and personal injury or death.

Fisher® regulators must be installed, operated, and maintained in accordance with federal, state, and local codes, rules and regulations, and Emerson Process Management Regulator Technologies, Inc. instructions.

If the regulator vents gas or a leak develops in the system, service to the unit may be required. Failure to correct trouble could result in a hazardous condition.

Call a gas service person to service the unit. Only a qualified person must install or service the regulator.

W4793

Figure 1. *Typical 627 Direct-Operated Pressure Reducing Regulator*

Introduction

Scope of the Manual

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

Description

The 627 Series direct-operated pressure reducing regulators (Figure 1) are for high and low pressure systems. These regulators can be used with natural gas, air, or a variety of other gases. Performance characteristics vary according to construction.

WARNING

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

To avoid such injury or damage, provide pressure-relieving or pressure-limiting devices (as required by the appropriate code, regulation, or standard) to prevent service conditions from exceeding

D101328X012

Specifications

The Specifications section gives some general specifications for the 627 Series regulators. The nameplates give detailed information for a particular regulator as it comes from the factory.

Available Constructions

Type 627: Direct-operated pressure reducing regulator equipped with a pitot tube for greater regulated capacities (Figure 7).

Type 627R: Type 627 with internal relief and with an open throat (Figure 8).

Type 627LR: Type 627R with light rate relief spring (Figure 9).

Type 627M: Type 627 with a stem seal between the body outlet pressure and diaphragm case. Pressure is measured under the diaphragm through the 1/4 NPT downstream control line connection (Figure 10).

Type 627MR: Type 627M with internal relief (Figure 11).

Type 627H: Type 627 with a diaphragm limiter to deliver a higher outlet pressure (Figure 12).

Type 627HM: Type 627H with a stem seal between the body outlet pressure and diaphragm case. Pressure is measured under the diaphragm through two 1/4 NPT downstream control line connections (Figure 13).

Body Sizes and End Connection Styles

BODY SIZES		END CONNECTION STYLES	CONSTRUCTION AVAILABLE
NPS	DN		
3/4	- - - -	NPT	All
1	25	NPT, CL150 RF, CL300 RF, CL600 RF, and Long Body	
2	50	NPT, CL150 RF, CL300 RF, CL600 RF, and Long Body	

Maximum Inlet Pressure(1) (Body Rating)

NPT Stainless Steel: 2000 psig / 138 bar
Flanged Stainless Steel: 1440 psig / 99,3 bar
NPT Steel: 2000 psig / 138 bar
Flanged Steel: 1500 psig / 103 bar
Ductile Iron: 1000 psig / 69,0 bar

Maximum Valve Disk Inlet Pressure Rating(1)

Nylon (PA) Disk: 2000 psig / 138 bar
Nitrile (NBR) Disk: 1000 psig / 69,0 bar
Fluorocarbon (FKM) Disk: 300 psig / 20,7 bar

Maximum Operating Inlet Pressure, Pressure Differential, and Outlet Pressure Ranges(1)

See Table 1 for pressures by orifice size and spring range

Maximum Spring and Diaphragm Casing Pressure(1)

See Table 2

Maximum Body Outlet Pressure(1)(2) (Types 627M, 627MR, and 627HM Only)

NPT Steel: 2000 psig / 138 bar
Flanged Steel: 1500 psig / 103 bar
Ductile Iron: 1000 psig / 69,0 bar

Orifice Sizes

See Table 1

Internal Relief Performance

Type 627R: See Table 3
Type 627LR: See Table 4
Type 627MR: Limited by field-installed control line piping

Elastomer Temperature Capabilities(1)(3)

MATERIAL	DISK/ DIAPHRAGM	TEMPERATURES	
		°F	°C
Nitrile (NBR)	Disk	-40 to 180	-40 to 82
	Diaphragm		
Fluorocarbon (FKM)	Disk	0 to 180	-18 to 82
	Diaphragm		
Nylon (PA)	Disk	-40 to 180	-40 to 82
Neoprene (CR) for Types 627H and 627HM only	Diaphragm	-40 to 180	-40 to 82

Flow Coefficients

See Table 5

IEC Sizing Coefficients

See Table 6

Pressure Registration

Type 627, 627H, 627R, or 627LR: Internal
Type 627M, 627HM, or 627MR: External through 1/4 NPT control line connection in the diaphragm casing

De-Icer System

See Figure 3 and Type 627M Regulator De-Icer System Application section

Relief Indicator

For Types 627R, 627LR, and 627MR (see Figures 8, 9, and 11)

Spring Case Vent Connection

3/4 NPT with removable screened vent assembly

Approximate Weights

Ductile Iron, Steel, or Stainless Steel Casings: 10 pounds / 4 kg
Aluminum Casings: 6.3 pounds / 3 kg

1. The pressure/temperature limits in this Instruction Manual or any applicable standard limitation should not be exceeded.
2. Types 627, 627H, 627R, and 627LR are limited by maximum diaphragm casing pressure.
3. Stainless steel body is rated to -40°F / -40°C. Steel and Ductile Iron bodies are rated to -20°F / -29°C.

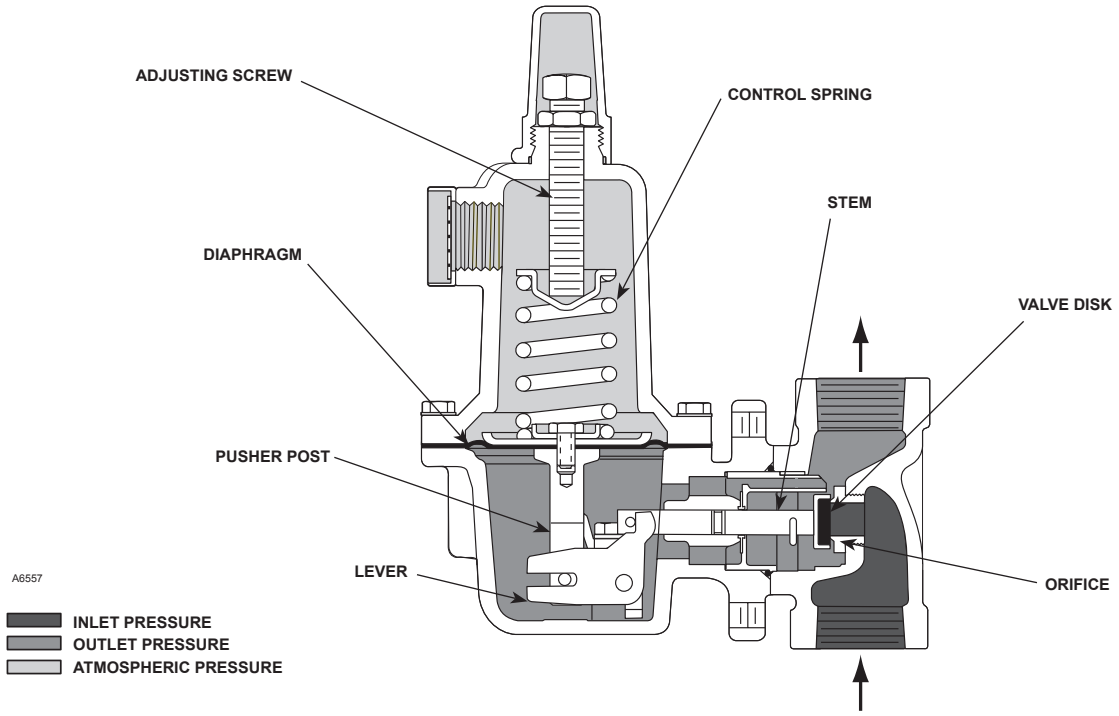


Figure 2. *Type 627 Operational Schematic*

those limits. The Type 627R, 627LR, or 627MR regulator with internal relief will provide downstream overpressure protection within the limits given in the Specifications section, Tables 1, 2, 3, and 4. If these limits are exceeded, additional downstream overpressure protection must be provided by the user.

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

Principle of Operation

Refer to Figure 2. When downstream demand decreases, the pressure under the diaphragm increases. This pressure overcomes the regulator setting (which is set by a spring). Through the action of the pusher post assembly, lever, and valve stem the valve disk moves closer to the orifice and reduces gas flow. If demand downstream increases, pressure under the diaphragm decreases. Spring force pushes the pusher post assembly downward and the valve disk moves away from the orifice.

Product Description

Types 627 and 627H Direct-Operated Pressure Reducing Regulators—The Types 627 and 627H regulators provide economical pressure reducing control for a variety of residential, commercial, and industrial applications. The regulator pitot tube located in a high velocity stream provides dynamic boost that compensates for outlet pressure drop.

Type 627 Long Body—The Type 627 Long Body regulator can be used as a drop-in replacement for existing Type 630 installations without the need to modify piping.

Internal Relief for Type 627R, 627LR, or 627MR Regulator—The Type 627R internal relief performance values were obtained **by removing the disk assembly** from the regulator. For the Type 627R, 627LR, or 627MR regulator, the internal relief across the diaphragm provides overpressure protection in many applications. As outlet pressures build up above the start-to-discharge point, the diaphragm moves off the relief valve seat allowing the excess pressure to bleed out through the screened vent.

For extra protection, should failure conditions exist which would prevent normal operation of the regulator

Table 1. *Maximum Inlet Pressures and Outlet Pressure Ranges*

TYPES	OUTLET PRESSURE RANGE, SPRING PART NUMBER, AND COLOR CODE	ORIFICE SIZE		MAXIMUM INLET PRESSURE[1]					
				Nylon (PA) Disk		Nitrile (NBR) Disk		Fluorocarbon (FKM) Disk	
		Inches	mm	psig	bar	psig	bar	psig	bar
627 and 627M[3]	5[2] to 20 psig / 0,34 to 1,4 bar 10B3076X012 Yellow	3/32	2,4	2000	138	1000	69,0	300	20,7
		1/8	3,2	1000	69,0	1000	69,0	300	20,7
		3/16	4,8	750	51,7	750	51,7	300	20,7
		1/4	6,4	500	34,5	500	34,5	300	20,7
		3/8	9,5	300	20,7	300	20,7	300	20,7
		1/2	13	250	17,2	250	17,2	250	17,2
	15 to 40 psig / 1,0 to 2,8 bar 10B3077X012 Green	3/32	2,4	2000	138	1000	69,0	300	20,7
		1/8	3,2	1500	103	1000	69,0	300	20,7
		3/16	4,8	1000	69,0	1000	69,0	300	20,7
		1/4	6,4	750	51,7	750	51,7	300	20,7
		3/8	9,5	500	34,5	500	34,5	300	20,7
		1/2	13	300	20,7	300	20,7	300	20,7
	35 to 80 psig / 2,4 to 5,5 bar 10B3078X012 Blue	3/32	2,4	2000	138	1000	69,0	300	20,7
		1/8	3,2	2000	138	1000	69,0	300	20,7
		3/16	4,8	1750	121	1000	69,0	300	20,7
		1/4	6,4	1500	103	1000	69,0	300	20,7
		3/8	9,5	1000	69,0	1000	69,0	300	20,7
		1/2	13	750	51,7	750	51,7	300	20,7
	70 to 150 psig / 4,8 to 10,3 bar 10B3079X012 Red	3/32	2,4	2000	138	1000	69,0	300	20,7
		1/8	3,2	2000	138	1000	69,0	300	20,7
		3/16	4,8	2000	138	1000	69,0	300	20,7
		1/4	6,4	1750	121	1000	69,0	300	20,7
		3/8	9,5	1250	86,2	1000	69,0	300	20,7
		1/2	13	750	51,7	750	51,7	300	20,7
627R and 627MR	5[2] to 20 psig / 0,34 to 1,4 bar 10B3076X012 Yellow	3/32	2,4	2000	138	1000	69,0	300	20,7
		1/8	3,2	1000	69,0	1000	69,0	300	20,7
		3/16	4,8	750	51,7	750	51,7	300	20,7
		1/4	6,4	500	34,5	500	34,5	300	20,7
		3/8	9,5	300	20,7	300	20,7	300	20,7
		1/2	13	200	13,8	200	13,8	200	13,8
	15 to 40 psig / 1,0 to 2,8 bar 10B3077X012 Green	3/32	2,4	2000	138	1000	69,0	300	20,7
		1/8	3,2	1500	103	1000	69,0	300	20,7
		3/16	4,8	1000	69,0	1000	69,0	300	20,7
		1/4	6,4	750	51,7	750	51,7	300	20,7
		3/8	9,5	300	20,7	300	20,7	300	20,7
		1/2	13	200	13,8	200	13,8	200	13,8
	35 to 80 psig / 2,4 to 5,5 bar 10B3078X012 Blue	3/32	2,4	2000	138	1000	69,0	300	20,7
		1/8	3,2	1750	121	1000	69,0	300	20,7
		3/16	4,8	1000	69,0	1000	69,0	300	20,7
		1/4	6,4	750	51,7	750	51,7	300	20,7
		3/8	9,5	300	20,7	300	20,7	300	20,7
		1/2	13	200	13,8	200	13,8	200	13,8
	70 to 150 psig / 4,8 to 10,3 bar 10B3079X012 Red	3/32	2,4	2000	138	1000	69,0	300	20,7
		1/8	3,2	1000	69,0	1000	69,0	300	20,7
		3/16	4,8	500	34,5	500	34,5	300	20,7
		1/4	6,4	300	20,7	300	20,7	300	20,7
		3/8	9,5	200	13,8	200	13,8	200	13,8
		1/2	13	200	13,8	200	13,8	200	13,8
627LR	15 to 40 psig / 1,0 to 2,8 bar 10B3077X012 Green	3/32	2,4			1000	69,0	300	20,7
		1/8	3,2			1000	69,0	300	20,7
		3/16	4,8			750	51,7	300	20,7
		1/4	6,4			500	34,5	300	20,7
627H and 627HM[3]	140 to 250 psig / 9,7 to 17,2 bar 10B3078X012 Blue	3/32	2,4	2000	138	1000	69,0		
		1/8	3,2	2000	138	1000	69,0		
		3/16	4,8	1750	121	1000	69,0		
		1/4	6,4	1500	103	1000	69,0		
		3/8	9,5	1000	69,0	300	20,7		
		1/2	13	750	51,7	200	13,8		
	240 to 500 psig / 16,5 to 34,5 bar 10B3079X012 Red	3/32	2,4	2000	138	1000	69,0		
		1/8	3,2	2000	138	1000	69,0		
		3/16	4,8	1750	121	1000	69,0		
		1/4	6,4	1500	103	1000	69,0		
		3/8	9,5	1000	69,0	1000	69,0		
		1/2	13	750	51,7	750	51,7		

1. For inlet pressure in excess of 1000 psig / 69,0 bar, refer to the maximum body and disk pressure ratings in the Specifications section.
2. For pressure settings under 10 psig / 0,69 bar, inlet pressure should be limited to approximately 100 psig / 6,9 bar so the setpoint adjustment can be obtained.
3. The unbalance forces change from the wide-open monitor mode to an active regulator mode such that the Type 627M or 627HM should have a 3/8-inch / 9,5 mm or larger orifice.

▭ - Shaded areas indicate that Fluorocarbon (FKM) and Nylon (PA) disk material are not available.

Table 2. *Maximum Spring and Diaphragm Casing Pressure*[1]

MAXIMUM PRESSURE DESCRIPTION	DIAPHRAGM CASING MATERIAL	TYPE 627		TYPES 627R AND 627LR		TYPE 627M		TYPE 627MR		TYPES 627H AND 627HM	
		psig	bar	psig	bar	psig	bar	psig	bar	psig	bar
Maximum pressure to spring and diaphragm casings to prevent leak to atmosphere other than relief action (internal parts damage may occur)	Die cast aluminum	250	17,2	250	17,2	Not Available		Not Available		Not Available	
	Ductile iron					250	17,2				
	Steel or Stainless steel							250	17,2	800	55,2
Maximum pressure to spring and diaphragm casings to prevent burst of casings during abnormal operation (leak to atmosphere and internal parts damage may occur)	Die cast aluminum	375	25,9	375	25,9	Not Available		Not Available		Not Available	
	Ductile iron	465	32,1	465	32,1	465	32,1	465	32,1		
	Steel or Stainless steel	1500	103	1500	103	1500	103	1500	103	1500	103
Maximum diaphragm casing overpressure (above setpoint) to prevent damage to internal parts	All materials	60	4,1	120	8,3	60	4,1	120	8,3	120	8,3

1. If the spring case is pressurized, a metal adjusting screw cap is required. Contact your local Sales Office for details.

(for example, disk broken off or disk erosion), the pusher post contacts the lever retainer causing the relief valve assembly to open. Since the diaphragm continues to rise as downstream pressure builds, it opens the relief valve; thereby, opening the valve. This internal relief may be adequate for the application.

Downstream Control Line for Type 627M, 627HM, or 627MR Regulator—A Type 627M, 627HM, or 627MR regulator has a blocking throat stem seal with O-rings and a 1/4 NPT control line connection in the diaphragm case. A regulator with a downstream control line is used for monitoring applications or other applications where other equipment is installed between the regulator and the pressure control point. The stem seal separates the body outlet pressure from the diaphragm case.

Installation

Regulator operation within ratings does not preclude the possibility of damage from debris in the lines or from external sources. A regulator should be inspected for damage periodically and after any overpressure condition. Key numbers referenced in this section are shown in Figures 7 through 13. Ensure that the operating temperature capabilities listed in Specifications section are not exceeded.

Note

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

Perform steps 1 through 6 for all types of regulators:

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

WARNING

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

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

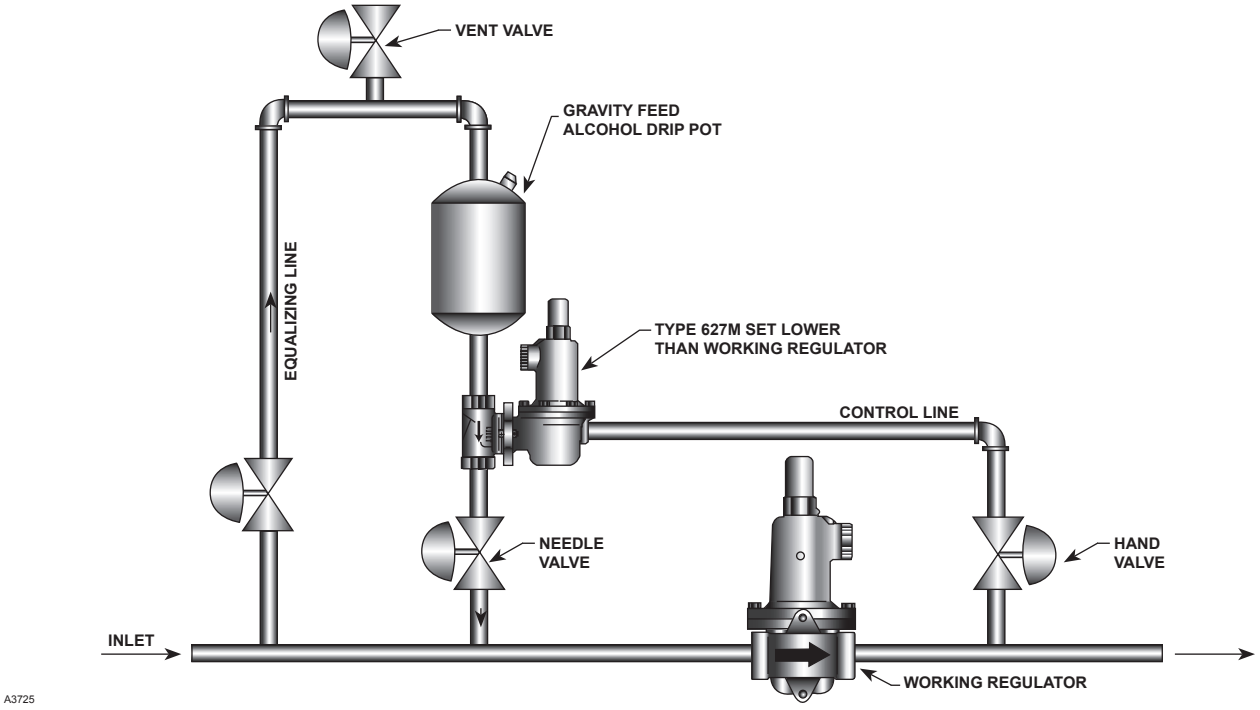


Figure 3. *De-Icer System Operational Schematic*

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

7. A Type 627M, 627HM, or 627MR regulator requires a downstream control line. Install the control line before putting the regulator into operation.
8. Ensure that the downstream control line piping is at least 3/8-inch / 9,5 mm or larger outside diameter tubing and connected to a straight section of outlet piping 10 diameters downstream of the regulator.
9. A hand valve should be installed in the control line. This hand valve can be used to throttle down and dampen outlet pulsations in control pressure which may cause instability or cycling of the regulator.

Remote Vent Line Installation

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

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

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

For the Type 627M or 627HM regulator de-icer system, refer to the application shown in Figure 3. With a large pressure drop across the working regulator, ice can form within this regulator. The formation of ice decreases the size of the orifice, so the regulator is unable to supply enough flow to satisfy the downstream demand. When the downstream pressure falls below the outlet pressure setting of the Type 627M or 627HM regulator, the disk assembly of the Type 627M or 627HM regulator moves off its orifice, permitting alcohol to flow into the main gas line. The alcohol carried to the main regulator by the flowstream prevents additional ice from forming on the orifice. When normal flow resumes, and as pressure in the downstream system is restored, the Type 627M or 627HM regulator shuts off.

Overpressure Protection

627 Series regulators have outlet pressure ratings that are lower than their inlet pressure ratings. A pressure-relieving or pressure-limiting device must be provided

Table 3. *Type 627R Internal Relief Performance*[1]

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

1. The internal relief performance values are obtained by removing the disk assembly.
2. For inlet pressures in excess of 1000 psig / 69,0 bar, refer to the maximum body and disk pressure ratings in the Specifications section.
3. For pressure settings under 10 psig / 0,69 bar, inlet pressure should be limited to approximately 100 psig / 6,9 bar so the setpoint adjustment can be obtained.

▭ - Shaded areas indicate maximum inlet pressures allowed during system malfunction only. Table 1 gives the maximum inlet pressure for normal regulator operation.

- continued -

by the user for the Types 627, 627H, 627M, and 627HM regulators if the inlet pressure can exceed the outlet pressure rating, since these regulators do not have internal relief.

Types 627R and 627LR regulators provide internal relief which limits the total outlet pressure buildup over setpoint. Use Tables 3 and 4 to determine the total outlet pressure. This internal relief may be adequate for the application, if not, provide additional pressure relief or a pressure-limiting device downstream.

Startup and Adjustment

Startup

WARNING

To avoid personal injury or property damage due to explosion or damage to regulator or downstream components

Table 3. *Type 627R Internal Relief Performance[1] (continued)*

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

1. The internal relief performance values are obtained by removing the disk assembly.
2. For inlet pressures in excess of 1000 psig / 69,0 bar, refer to the maximum body and disk pressure ratings in the Specifications section.
3. For pressure settings under 10 psig / 0,69 bar, inlet pressure should be limited to approximately 100 psig / 6,9 bar so the setpoint adjustment can be obtained.

▭ - Shaded areas indicate maximum inlet pressures allowed during system malfunction only. Table 1 gives the maximum inlet pressure for normal regulator operation.

Table 4. *Type 627LR Internal Relief Performance[1]*

OUTLET PRESSURE RANGE, SPRING PART NUMBER, AND COLOR CODE	OUTLET PRESSURE SETTING		MAXIMUM ALLOWABLE DOWNSTREAM SYSTEM PRESSURE		MAXIMUM INLET PRESSURE TO KEEP MAXIMUM ALLOWABLE DOWNSTREAM SYSTEM PRESSURE FROM BEING EXCEEDED[2]							
					Orifice Size, Inches / mm							
					3/32 / 2,4		1/8 / 3,2		3/16 / 4,8		1/4 / 6,4	
	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar	psig	bar
15 to 40 psig / 1,03 to 2,8 bar 10B3077X012 Green	30	2,1	55	3,8	500	34,5	270	18,6	110	7,6	80	5,5
			60	4,1	850	58,6	480	33,1	200	13,8	120	8,3
			66	4,5	1000	69,0	660	45,5	290	20,0	175	12,1
	40	2,8	66	4,5	380	26,2	190	13,1	85	5,9	80	5,5
			70	4,8	700	48,3	370	25,5	150	10,3	115	7,9
			75	5,2	1000	69,0	560	38,6	240	16,5	160	11,0

1. The internal relief performance values are obtained by removing the disk assembly.
2. For inlet pressures in excess of 1000 psig / 69,0 bar, refer to the maximum body and disk pressure ratings in the Specifications section.

Table 5. *Flow Coefficients*

ORIFICE		3/4 NPT			NPS 1 / DN 25 BODY			NPS 2 / DN 50 BODY		
Inch	mm	Wide-Open C_g for External Relief Sizing	Wide-Open C_v for External Relief Sizing	C_1	Wide-Open C_g for External Relief Sizing	Wide-Open C_v for External Relief Sizing	C_1	Wide-Open C_g for External Relief Sizing	Wide-Open C_v for External Relief Sizing	C_1
3/32	2,4	6.9	0.24	29.2	6.9	0.24	28.5	6.9	0.23	29.7
1/8	3,2	12.5	0.43	29.1	12.5	0.43	29.4	12.5	0.42	29.5
3/16	4,8	29	1.01	28.6	29	0.93	31.2	29	1.02	28.5
1/4	6,4	50	1.63	30.6	50	1.71	29.3	52	1.66	31.3
3/8	9,5	108	2.99	36.1	108	3.42	31.6	115	3.39	33.9
1/2	13	190	4.87	39.0	190	5.29	35.9	200	5.01	39.9

Table 6. *IEC Sizing Coefficients*

ORIFICE SIZE		X_T			F_D	F_L
Inch	mm	3/4 NPT Body	NPS 1 / DN 25 Body	NPS 2 / DN 50 Body		
3/32	2,4	0.539	0.514	0.558	0.50	0.85
1/8	3,2	0.536	0.547	0.539		0.79
3/16	4,8	0.517	0.616	0.514		0.85
1/4	6,4	0.592	0.543	0.620		0.87
3/8	9,5	0.824	0.632	0.727		0.89
1/2	13	0.962	0.815	1.01		0.86

Table 7. *Maximum Torque Values*

KEY NUMBER(1)	DESCRIPTION	MAXIMUM TORQUE	
		FOOT-POUNDS	N•m
2	Orifice	25	34
3	Cap screw (with aluminum diaphragm casing)	16	22
	Cap screw (with ductile iron or steel/stainless steel diaphragm casing)	25	34
18	Lever cap screw	7	9,5
22	Diaphragm connector nut	17	23
26	Guide retainer (for Types 627R, 627LR, and 627MR only)	3	4,1
37	Spring case cap screw (with aluminum or ductile iron diaphragm casing)	7	9,5
	Spring case cap screw (with steel/stainless steel diaphragm casing)	35	47
46	Diaphragm cap screw (with Type 627 or 627M)	7	9,5
	Diaphragm cap screw (with Type 627H or 627HM)	14	19

1. Refer to Figures 7 through 13 for key number locations.

during startup, release downstream pressure to prevent an overpressure condition on the diaphragm of the regulator.

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

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

Adjustment

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

Before increasing the setting, refer to Table 1, 2, 3, or 4. Review the pressure limits for the control spring range being used and be certain that the new pressure setting will not result in an overpressure condition.

Note

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

Refer to Figures 7 through 13 for key number locations.

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

Shutdown

WARNING

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

1. Close the nearest upstream shut-off valve.
2. Close the nearest downstream shut-off valve.
3. Open the vent valve between the regulator and the downstream shut-off valve nearest to it.
4. For a Type 627, 627H, 627R, or 627LR regulator, the regulator will open to release pressure between the upstream shut-off valve and the regulator.
5. A Type 627M, 627HM, or 627MR regulator requires venting the control line and downstream pressure from the regulator before maintenance. The pressure between these shut-off valves is released through the open regulator because the disk assembly remains open in response to the decrease in control line pressure.

Maintenance

Unless otherwise specified, the following maintenance procedures apply to all types of regulators. For a summary of maximum torque values required for all types of regulators, refer to Table 7.

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

Figure 4. *Relief Indicator*

Problem Indication for Types 627R, 627LR, and 627MR Regulators

WARNING

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

The vent assembly is equipped with a relief indicator (key 49, Figure 4). The cap for the relief indicator snaps over the vent assembly opening. If the relief valve opens wide, exhaust gas pops the cap off the screen vent assembly opening indicating a problem with the regulator. If the cap pops off, refer to the shutdown and to the Body Area Maintenance Procedures to inspect the disk assembly and orifice.

If the disk assembly and orifice are not damaged, refer to the Diaphragm and Spring Case Area Maintenance Procedures in this section.

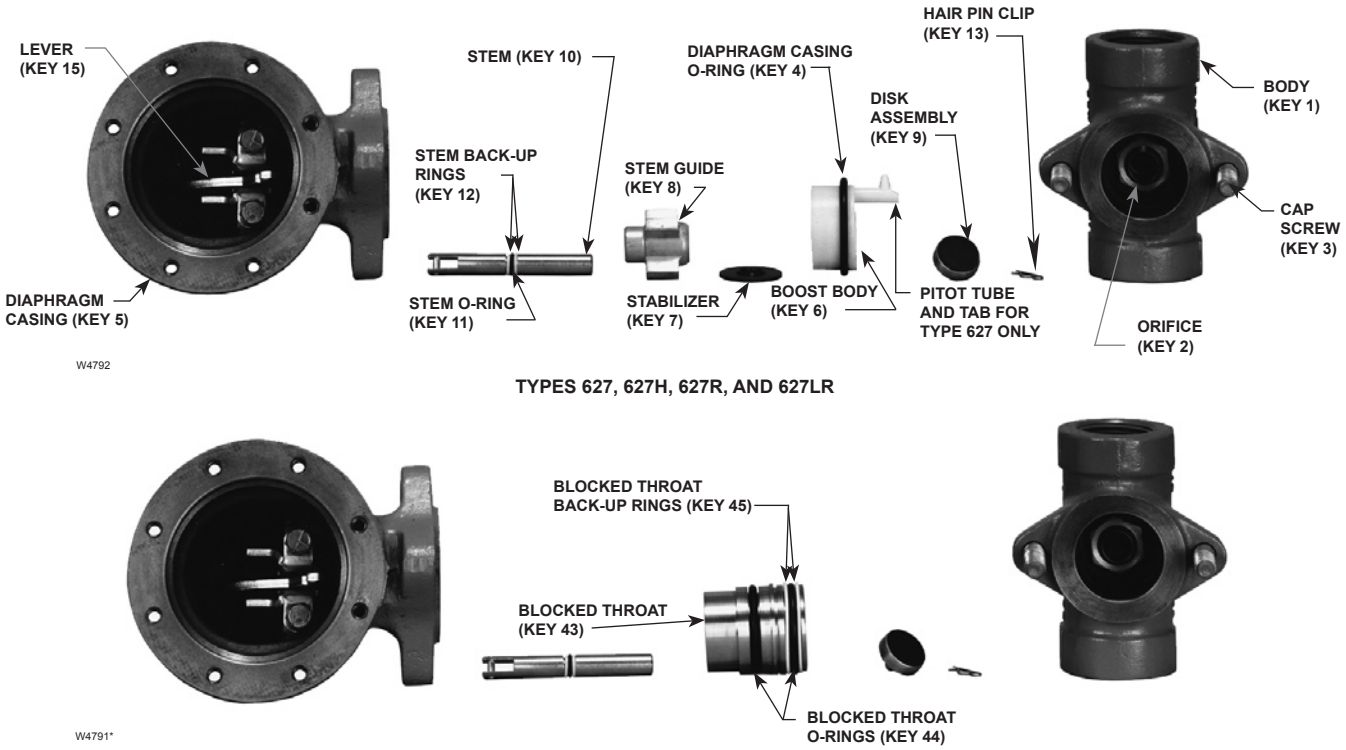


Figure 5. *Stem Assemblies*

The disk assembly and orifice can be inspected, removed, and replaced without removing the regulator body from the line connections. Refer to the Body Area Maintenance Procedures.

Body Area Maintenance Procedures

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

While using the following procedures, refer to Figures 7 through 13 for key number locations.

Replacing the Disk Assembly or Orifice

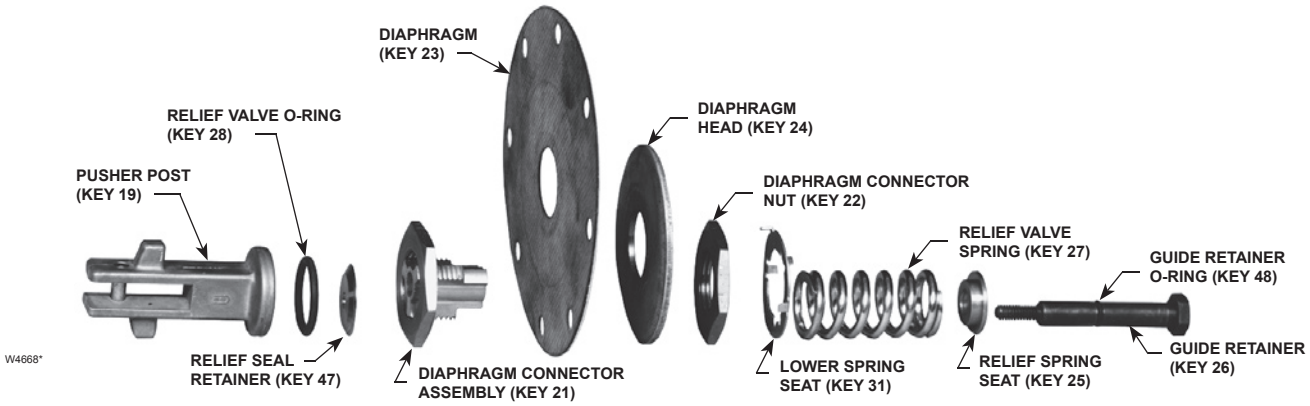
1. To inspect and replace the disk assembly (key 9) or orifice (key 2), remove the cap screws (key 3, Figure 5), and separate the diaphragm casing (key 5) from the body (key 1).
2. Inspect and, if necessary, remove the orifice (key 2). If removed, coat the threads of the replacement orifice with lubricant and torque to 25 foot-pounds / 34 N•m.
3. Inspect the disk assembly (key 9) and, if necessary, remove the hair pin clip (key 13) that holds the disk assembly (key 9) in place. If replacing the disk assembly is the only maintenance required, skip to step 16.

Replacing the Stem Assembly

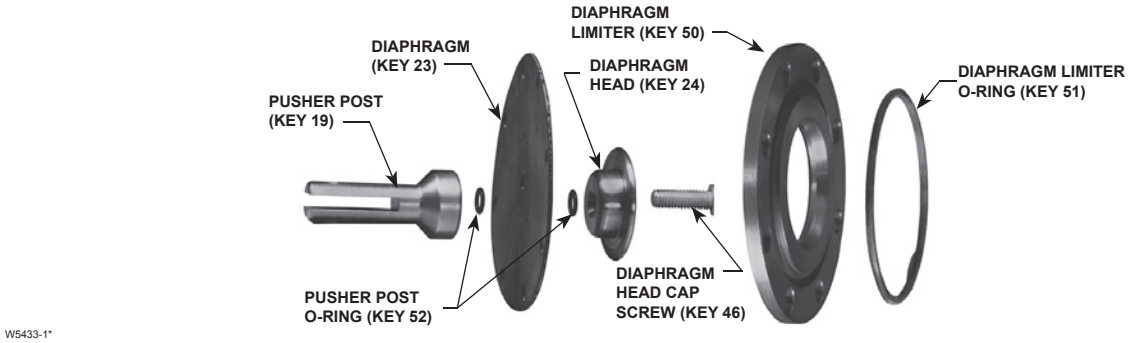
If it is necessary to perform maintenance on the stem assembly, continue with steps 4 through 8 and 15 through 19 for Types 627, 627H, 627R, and 627LR regulators, or steps 9 through 19 for Types 627M, 627HM, and 627MR regulators.

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

4. Use steps 5 through 8 to remove and replace the stem assembly.
5. Remove the boost body (key 6), stabilizer (key 7), and stem guide (key 8) from the diaphragm casing (key 5). Unhook and remove the stem (key 10) from the diaphragm casing (key 5).
6. Remove and inspect the diaphragm casing O-ring (key 4, Figure 7, 8, 9, or 12) and replace it if necessary.



TYPE 627, 627R, 627LR, 627M, OR 627MR



TYPES 627H AND 627HM

Figure 6. *Diaphragm Assemblies*

7. Apply lubricant to a replacement diaphragm casing O-ring (key 4, Figure 7, 8, 9, or 12) and install it onto the boost body (key 6). Skip to step 14.

8. For the Type 627 or 627H regulators, be sure to insert the pitot tube (tab) into the outlet side of the body (see Figure 7 or 12). Skip to step 14.

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

9. Use steps 10 through 14 to remove and replace the stem assembly.

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

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

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

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

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

15. Lubricate the contact points of the lever (key 15).

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

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

18. Position the diaphragm casing (key5) plus attached parts in relation to the body (key 1) so that they are correct for the application.

19. Secure the diaphragm casing (key5) to the body with the cap screws (key 3, Figure 5). For an aluminum diaphragm casing, torque the cap screws (key 3) to 16 foot-pounds / 22 N•m. For ductile iron or steel diaphragm casings, torque the cap screws (key 3) to 25 foot-pounds / 34 N•m.

20. It may be necessary to reposition the diaphragm spring case to prevent rain, ice, and foreign debris from entering the spring case. Refer to the Diaphragm and Spring Case Area Maintenance Procedures, steps 1, 2, and 21 through 25.

Diaphragm and Spring Case Area Maintenance Procedures

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

While using the following procedures, refer to Figures 7 through 13 for key number locations.

1. Remove the adjusting screw cap (key 36), loosen the lock nut (key 34), and turn the adjusting screw (key 35) counterclockwise until all compression is removed from the control spring (key 32).

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

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

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

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

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

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

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

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

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

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

10. Unhook the pusher post from the lever (key 15) and torque the diaphragm head cap screw (key 46) to 7 foot-pounds / 9,5 N•m for the Type 627 or 627M. On the Type 627H or 627HM, torque the diaphragm head cap screw to 14 foot-pounds / 19 N•m.

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

Perform steps 12 through 19 for Types 627R, 627LR, and 627MR Regulators only:

12. For Types 627R, 627LR, and 627MR regulators (Figure 6), use steps 13 through 19 to disassemble and reassemble the diaphragm assembly.

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

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

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

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

17. On the pusher post (key 19) install the relief seal O-ring (key 28) and apply lubricant. Also, install the relief seal retainer (key 47), diaphragm connector assembly (key 21, with attached parts) relief spring (key 27), upper relief spring seat (key 33), and guide retainer (key 26). Torque the guide retainer (key 26) to 3 foot-pounds / 4,1 N•m.

18. Hook the pusher post (key 19) (with attached parts) on the lever (key 15) to check the alignment of the holes in the diaphragm with the holes in the spring casing. If the holes do not line up, unhook the pusher post from the lever, hold the pusher post, and rotate the diaphragm to the correct position.

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

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

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

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

23. Screw in the adjusting screw (key 35) to put slack into the diaphragm (key 23).

24. Using a crisscross pattern, finish tightening the spring case cap screws (key 37) to 7 foot-pounds / 9,5 N•m of torque.

25. If necessary, refer to the installation and/or the Startup and Adjustment procedures.

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

Parts Ordering

When corresponding with your local Sales Office about this equipment, always reference the equipment serial number or FS number that can be found on the nameplate.

When ordering replacement parts, reference the key number of each needed part as found in the following parts list. Separate kits containing all recommended spare parts are available.

Parts List

Note

In this parts list, parts marked NACE are intended for corrosion-resistant service as detailed in the NACE International Standard MR0175.

Key	Description	Part Number
	Type 627 Parts Kit with Aluminum/Nitrile (NBR) trim (includes keys 4, 9, 11, 12, and 23)	R627X000A12
	Type 627 Parts Kit with Stainless steel/ Nitrile (NBR) trim (includes keys 4, 9, 11, 12, and 23)	R627X000S12
	Type 627H Parts Kit with SST/Nylon (PA) trim	R627HX00S12
	Type 627R Parts Kit with Aluminum/ Nitrile (NBR) trim (includes keys 4, 9, 11, 12, 23, 28, and 48)	R627RX00A12
	Type 627R Parts Kit with Stainless steel/ Nitrile (NBR) trim (includes keys 4, 9, 11, 12, 23, 28, and 48)	R627RX00S12
1	Body	
	Ductile iron	
	1000 psig / 69,0 bar maximum inlet pressure	
	3/4 NPT	30B3046X012
	1 NPT	30B3048X012
	2 NPT	30B3096X012
	Ductile iron (NACE)	
	1000 psig / 69,0 bar maximum inlet pressure	
	1 NPT	39B2451X012
	2 NPT	39B0414X012
	Steel	
	2000 psig / 138 bar maximum inlet pressure	
	3/4 NPT	30B3050X012
	1 NPT	30B3051X012
	2 NPT	30B7452X012
	Steel (NACE)	
	2000 psig / 138 bar maximum inlet pressure	
	1 NPT	39B0412X012
	2 NPT	39B0415X012

Key	Description	Part Number
1	Body (continued)	
	Steel, CL600 RF flanged	
	1500 psig / 103 bar maximum inlet pressure	
	NPS 1 / DN 25	40B6754X012
	NPS 2 / DN 50	40B6756X012
	Steel, CL300 RF flanged	
	750 psig / 51,7 bar maximum inlet pressure	
	NPS 1 / DN 25	41B8978X012
	NPS 2 / DN 50	41B8080X012
	Steel, CL150 RF flanged	
	290 psig / 20,0 bar maximum inlet pressure	
	NPS 1 / DN 25	43B8656X022
	NPS 2 / DN 50	44B0666X012
	Steel, BWE	
	1000 psig / 69,0 bar maximum inlet pressure	
	NPS 1 / DN 25	33B6723X012
	NPS 2 / DN 50	38B1688X012
	Steel, PN 16/25/40 RF	
	580 psig / 40,0 bar maximum inlet pressure	
	NPS 1 / DN 25	44B0386X012
	NPS 2 / DN 50	44B3342X012
	Stainless Steel†, NPT	
	2000 psig / 138 bar maximum inlet pressure	
	3/4 NPT	30B3050X062
	1 NPT	30B3051X092
	2 NPT	30B7452X052
	Stainless Steel†, CL150 RF flanged	
	275 psig / 18,9 bar maximum inlet pressure	
	NPS 1 / DN 25	43B8656X052
	NPS 2 / DN 50	44B0666X022
	Stainless Steel†, CL300 RF flanged	
	720 psig / 49,6 bar maximum inlet pressure	
	NPS 1 / DN 25	41B8978X072
	NPS 2 / DN 50	41B8080X072
	Stainless Steel†, CL600 RF flanged	
	1440 psig / 99,2 bar maximum inlet pressure	
	NPS 1 / DN 25	40B6754X102
	NPS 2 / DN 50	40B6756X062
	Stainless Steel†, PN 16/25/40 RF	
	580 psig / 40,0 bar maximum inlet pressure	
	NPS 1 / DN 25	44B0386X032
	NPS 2 / DN 50	44B3342X032
2*	Orifice	
	Aluminum	
	3/32-inch / 2,4 mm size	0R044109022
	1/8-inch / 3,2 mm size	1A936709012
	3/16-inch / 4,8 mm size	00991209012
	1/4-inch / 6,4 mm size	0B042009012
	3/8-inch / 9,5 mm size	0B042209012
	1/2-inch / 13 mm size	1A928809012
	303 Stainless steel	
	3/32-inch / 2,4 mm size	0R044135032
	1/8-inch / 3,2 mm size	1A936735032
	3/16-inch / 4,8 mm size	00991235032
	1/4-inch / 6,4 mm size	0B042035032
	3/8-inch / 9,5 mm size	0B042235032
	1/2-inch / 13 mm size	1A928835032
	316 Stainless steel, NACE construction only	
	3/32-inch / 2,4 mm size	0R0441X0012
	1/8-inch / 3,2 mm size	1A9367X0022
	3/16-inch / 4,8 mm size	009912X0012
	1/4-inch / 6,4 mm size	0B0420X0012
	3/8-inch / 9,5 mm size	0B0422X0012
	1/2-inch / 13 mm size	1A9288X0012

Key	Description	Part Number
3	Cap Screw (not shown), (2 required)	
	627 Series	
	For Ductile iron/Steel diaphragm case	1A560724052
	For Aluminum diaphragm case (not applicable for Types 627H and 627HM)	1A352524052
	Type 627 Only	
	For Ductile iron/Steel diaphragm case	1A5607X0052
	For Aluminum case with Steel diaphragm case	10A3869X012
	For SST Case and body	1A5607X0052
	For Aluminum Case and SST body	10A3869X022
4*	Diaphragm Case O-ring	
	Nitrile (NBR) For Type 627, 627H, or 627R only	17A2325X022
	Fluorocarbon (FKM)	
	For Types 627, 627R, and 627LR only	10A0037X012
5	Diaphragm Case	
	For Type 627, 627R, or 627LR	
	Aluminum without 1/8-inch / 3,2 mm gauge tap	40B3084X012
	Aluminum with 1/8-inch / 3,2 mm gauge tap for 627 Series (except Types 627H and 627HM)	11B5380X012
	Ductile iron without 1/8-inch / 3,2 mm gauge tap	30B3053X012
	Ductile iron with 1/8-inch / 3,2 mm gauge tap for 627 Series (except Types 627H and 627HM)	31B0641X012
	For Type 627, 627R, or 627LR	
	Steel	30B3104X012
	Ductile iron with 1/4 NPT gauge tap for 627 Series (except Types 627H and 627HM)	39A5987X012
	Steel with 1/4 NPT gauge tap for 627 Series (except Type 627H)	30B8734X012
	For Type 627M or 627MR	
	Ductile iron	39A5987X012
	Steel	30B8734X012
	For Type 627H, Steel	30B3104X012
	For Type 627, Stainless Steel	30B3104X082
	For Type 627HM, Steel	30B8734X012
6	Boost Body (not for Type 627M, 627HM, or 627MR), Delrin®	
	For Type 627 or 627H	30B3056X012
	For Type 627R or 627LR	30B3057X012
7	Stabilizer	
	Nitrile (NBR)	
	For Types 627, 627H, 627R, and 627LR only	10B3060X012
	Fluorocarbon (FKM)	
	For Types 627, 627R, and 627LR only	10B3060X022
8	Stem Guide (for Types 627, 627H, 627R, and 627LR only), Powdered metal	20B3061X012
9*	Disk Assembly (for all Orifice Size)	
	Aluminum holder and Nitrile (NBR) disk	1C4248X0212
	303 Stainless steel holder and Nitrile (NBR) disk	1C4248X0202
	Aluminum holder and Nylon (PA) disk	1C4248X00A2
	303 Stainless steel holder and Nylon (PA) disk	1C4248X0062
	316 Stainless steel holder and Nylon (PA) disk	1C4248X0262
	316 Stainless steel holder and Nitrile (NBR) disk	1C4248X0252
	303 Stainless steel holder and Fluorocarbon (FKM) disk	1C4248X0052
	Aluminum holder and Fluorocarbon (FKM) disk	1C4248X0182
	316 Stainless steel holder and Fluorocarbon (FKM) disk	1C4248X0192
10	Stem	
	303 Stainless steel	10B3059X012
	316 Stainless steel (NACE)	10B3059X022
11*	Stem O-ring	
	Nitrile (NBR)	1D687506992
	Fluorocarbon (FKM) For Types 627, 627R, 627LR, 627M, and 627MR only	1N430406382

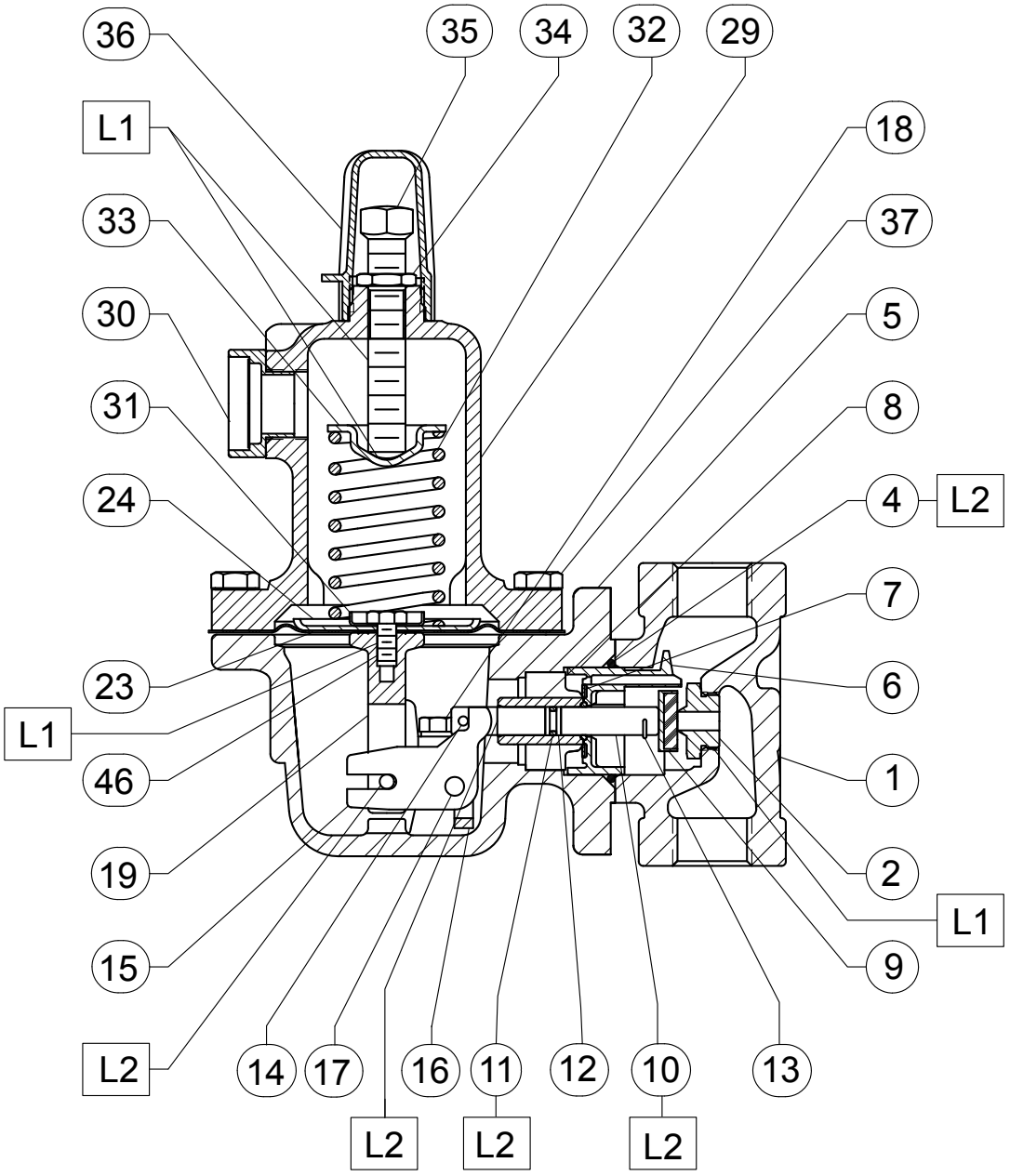
*Recommended spare part.
† Stainless steel body material can be used for applications in temperature ranges down to -40°F / -40°C and are only available for Types 627, 627R, and 627H.
Delrin® is a mark owned by E.I. du Pont de Nemours and Co.

627 Series

Key	Description	Part Number
12*	Stem Back-up Ring, Polytetrafluoroethylene (PTFE) (2 required)	1K786806992
13	Hair Pin Clip, Stainless steel	10B3058X012
14	Drive Pin, Plated steel	1H3671X0012
15	Lever, Plated steel	20B3063X012
16	Lever Retainer, Plated steel	30B3097X012
17	Lever Pin	
	Stainless steel	10B3083X012
	316 Stainless steel (NACE)	10B3083X022
18	Lever Cap Screw (2 required)	
	Plated steel	10B7454X012
	316 Stainless steel (NACE)	1B2905X0012
19	Pusher Post, Aluminum	
	For Type 627 or 627M	10B3098X012
	For Type 627R, 627LR or 627MR	10B3098X022
	For Type 627H or 627HM,	
	416 Stainless steel	10B3098X032
	Stainless steel (NACE)	10B3098X102
21	Diaphragm Connector (for Type 627R, 627LR or 627MR only), Stainless steel	28B8832X012
22	Diaphragm Connector Nut (for Type 627R, 627LR or 627MR only), Stainless steel	10B7449X012
23*	Diaphragm	
	Nitrile (NBR)	
	For Type 627 or 627M with Aluminum or Ductile iron diaphragm case	10B3069X012
	For Type 627 or 627M with Steel diaphragm case	10B8735X012
	For Type 627R, 627LR, or 627MR with Aluminum or Ductile iron diaphragm case	10B3068X012
	For Type 627R, 627LR, or 627MR with Steel diaphragm case	10B8736X012
	For Type 627H or 627HM with Steel diaphragm case (diaphragm is Neoprene (CR) with Nylon (PA) fabric)	12B0178X012
	Fluorocarbon (FKM)	
	For Types 627R, 627LR, and 627MR with Steel case	10B8736X022
	For Types 627 and 627M with Steel case	10B8735X042
	For Types 627R, 627LR, and 627MR with Ductile Iron and Aluminum Casing	10B3068X022
	For Types 627 and 627M with Ductile Iron and Aluminum Casing	10B3069X032
24	Diaphragm Head, Plated steel	
	For Type 627 or 627M, Plated steel	1D666428982
	For Type 627R, 627LR or 627MR, Plated steel	10B3071X012
	For Type 627H or 627HM, 416 Stainless steel	12B0175X012
25	Relief Spring Seat (For Type 627R or 627MR only), Steel	10B7446X012
26	Guide Retainer (For Type 627R, 627LR or 627MR only), Stainless steel	10B7450X012
27	Relief Spring (For Type 627R or 627MR only), Plated steel	10B6757X012
	For Type 627LR	1B541327022
28*	Relief Seal O-ring	
	Nitrile (NBR)	
	For Type 627R, 627LR, or 627MR only	1J108506992
	Fluorocarbon (FKM)	
	For Types 627R, 627LR, and 627MR only	1J1085X0042
29	Spring Case	
	For Type 627, 627R, or 627LR	
	Aluminum	40B3086X012
	Ductile iron	30B3055X012
	Steel	30B3102X012
	Stainless Steel (Types 627 and 627R only)	30B3102X092

Key	Description	Part Number
29	Spring Case (continued)	
	For Type 627M or 627MR	
	Ductile iron	30B3055X012
	Steel	30B3102X012
	For Type 627H or 627HM	
	Steel	30B3102X012
	Stainless steel (Type 627H only)	30B3102X092
30	Screened Vent Assembly, Plastic	10B3093X012
31	Lower Spring Seat, Plated steel	
	For Type 627 or 627M	1D666625072
	For Type 627R, 627LR or 627MR	20B3073X012
32	Control Spring, Plated steel	
	5 to 20 psig / 0,34 to 1,4 bar, Yellow	10B3076X012
	15 to 40 psig / 1,0 to 2,8 bar, Green	10B3077X012
	35 to 80 psig / 2,4 to 5,5 bar, Blue	10B3078X012
	70 to 150 psig / 4,8 to 10,3 bar, Red	10B3079X012
	140 to 250 psig range / 9,7 to 17,2 bar, Blue, used for Type 627H or 627HM	10B3078X012
	240 to 500 psig range / 16,5 to 34,5 bar, Red, used for Type 627H or 627HM	10B3079X012
33	Upper Spring Seat, Plated steel	1D667125072
34	Locknut, Plated steel	1D667728982
35	Adjusting Screw, Plated steel	
	For Type 627, 627M, 627H, or 627HM	10B3081X012
	For Type 627R, 627LR, or 627MR	10B3080X012
36	Adjusting Screw Cap, Plastic	20B3082X012
37	Spring Case Cap Screw, Plated steel (8 required)	
	For Aluminum or ductile iron diaphragm case	1A391724052
	For Steel diaphragm case	1A368324052
	For Stainless steel case and body	1A3683X0062
	For Aluminum case and SST body	1A3917X0062
	For Type 627H/HM, steel diaphragm case	1A346424052
	For Type 627H, Stainless steel case and body	1A3464X0022
43	Blocked Throat (For Type 627M, 627HM, or 627MR only), Stainless steel	10B3085X012
44*	Blocked Throat O-ring	
	Nitrile (NBR) For Type 627M, 627HM, or 627MR only (2 required)	1E264306992
	Fluorocarbon (FKM)	
	For Types 627M and 627MR only	1E2643X0022
45*	Blocked Throat Back-up Ring (For Type 627M, 627HM, or 627MR only), PTFE (2 required)	10B3106X012
46	Diaphragm Head Cap Screw, Steel	
	For Type 627 or 627M	1B290524052
	For Type 627H or 627HM	1C379124052
47	Relief Seal Retainer (For Type 627R, 627LR or 627MR only), Stainless steel	10B7445X012
48*	Guide Retainer O-ring	
	Nitrile (NBR)	
	For Type 627R, 627LR, or 627MR only	1D682506992
	Fluorocarbon (FKM)	
	For Types 627R, 627LR, and 627MR only	1N423906382
49	Relief Indicator (For Type 627R, 627LR or 627MR only), Rubber (not shown)	30B3100X012
50	Diaphragm Limiter (For Types 627H and 627HM only)	22B0176X012
51*	Diaphragm Limiter O-ring	
	For Types 627H and 627HM only	1K877606992
52*	Pusher Post O-ring (2 required)	
	For Types 627H and 627HM only	1C853806992
58	Pipe Plug, Zinc	1D8293T0022
67	Drive Screw, 18-8 Stainless steel	1A368228982
72	Pipe Plug, Zinc-plated steel	1A767524662

*Recommended spare part.

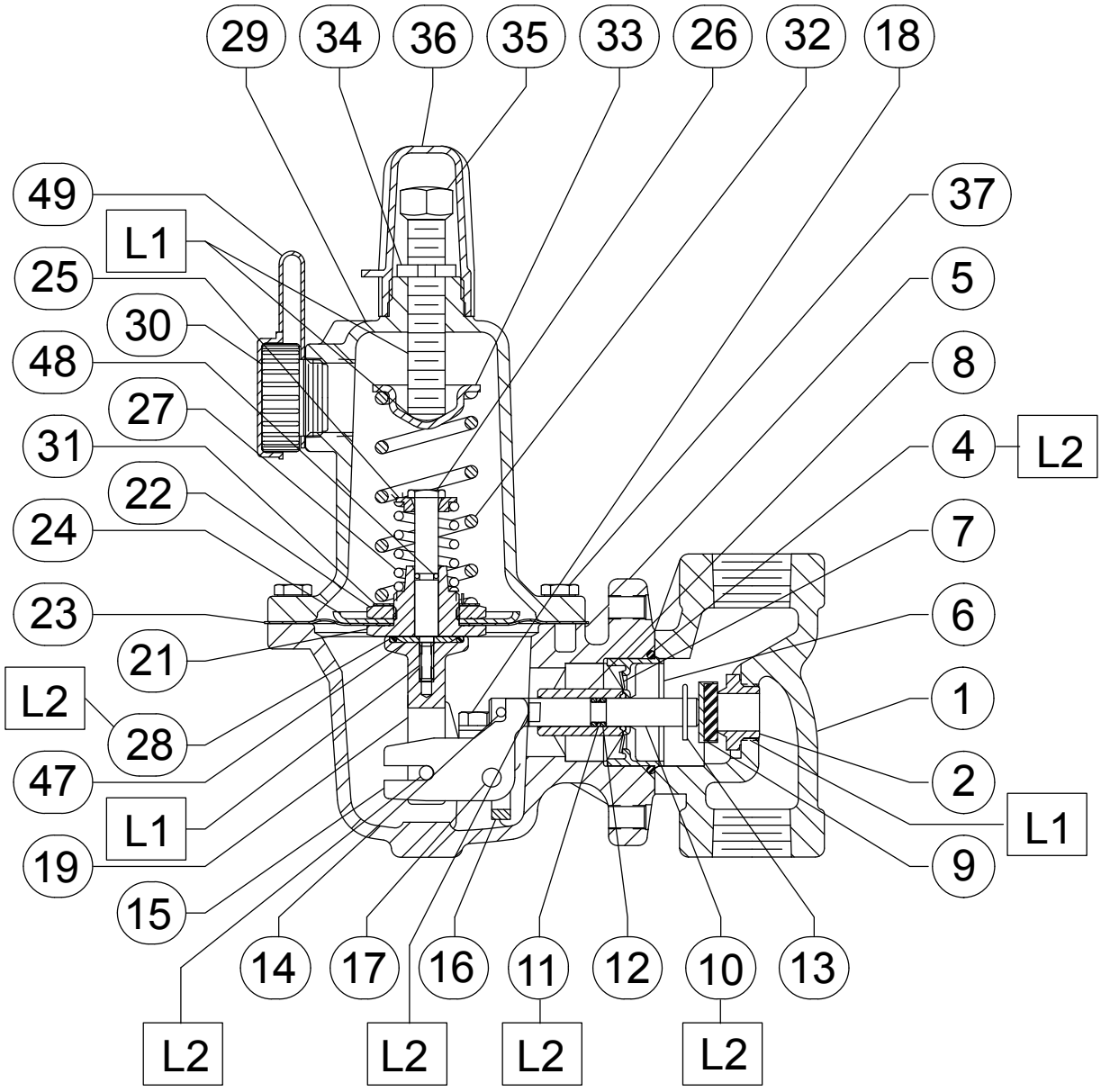


30B3092_G

□ **APPLY LUBRICANT(1)**
L1 = MULTI-PURPOSE LITHIUM POLYMER TYPE GREASE
L2 = EXTREME LOW-TEMPERATURE BEARING GREASE
PARTS NOT SHOWN: 3

1. Lubricants must be selected such that they meet the temperature requirements.

Figure 7. *Type 627 Regulator Assembly*



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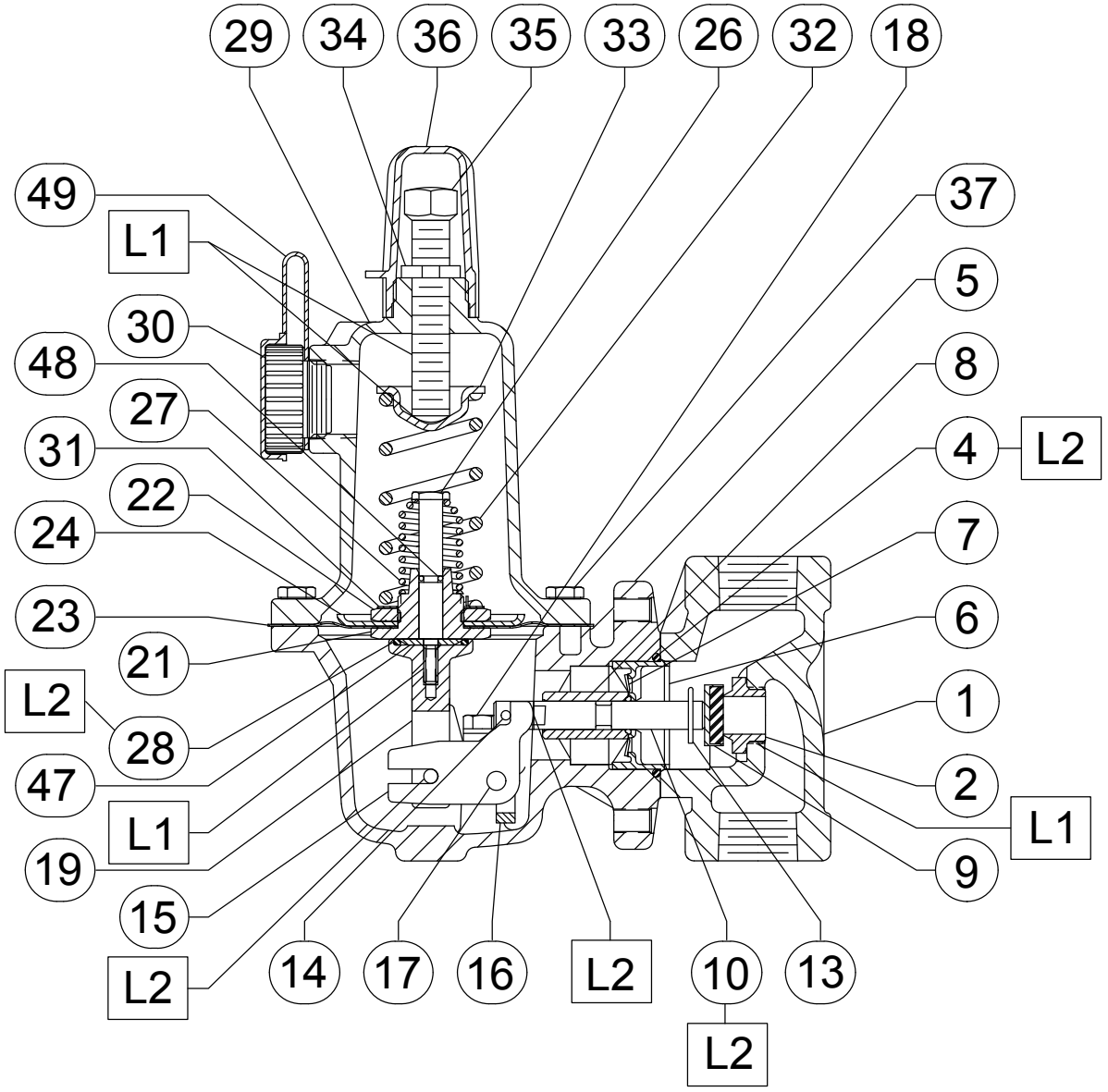
□ **APPLY LUBRICANT(1)**
L1 = MULTI-PURPOSE LITHIUM POLYMER TYPE GREASE
L2 = EXTREME LOW-TEMPERATURE BEARING GREASE
PARTS NOT SHOWN: 3

1. Lubricants must be selected such that they meet the temperature requirements.

Figure 8. *Type 627R Regulator Assembly*

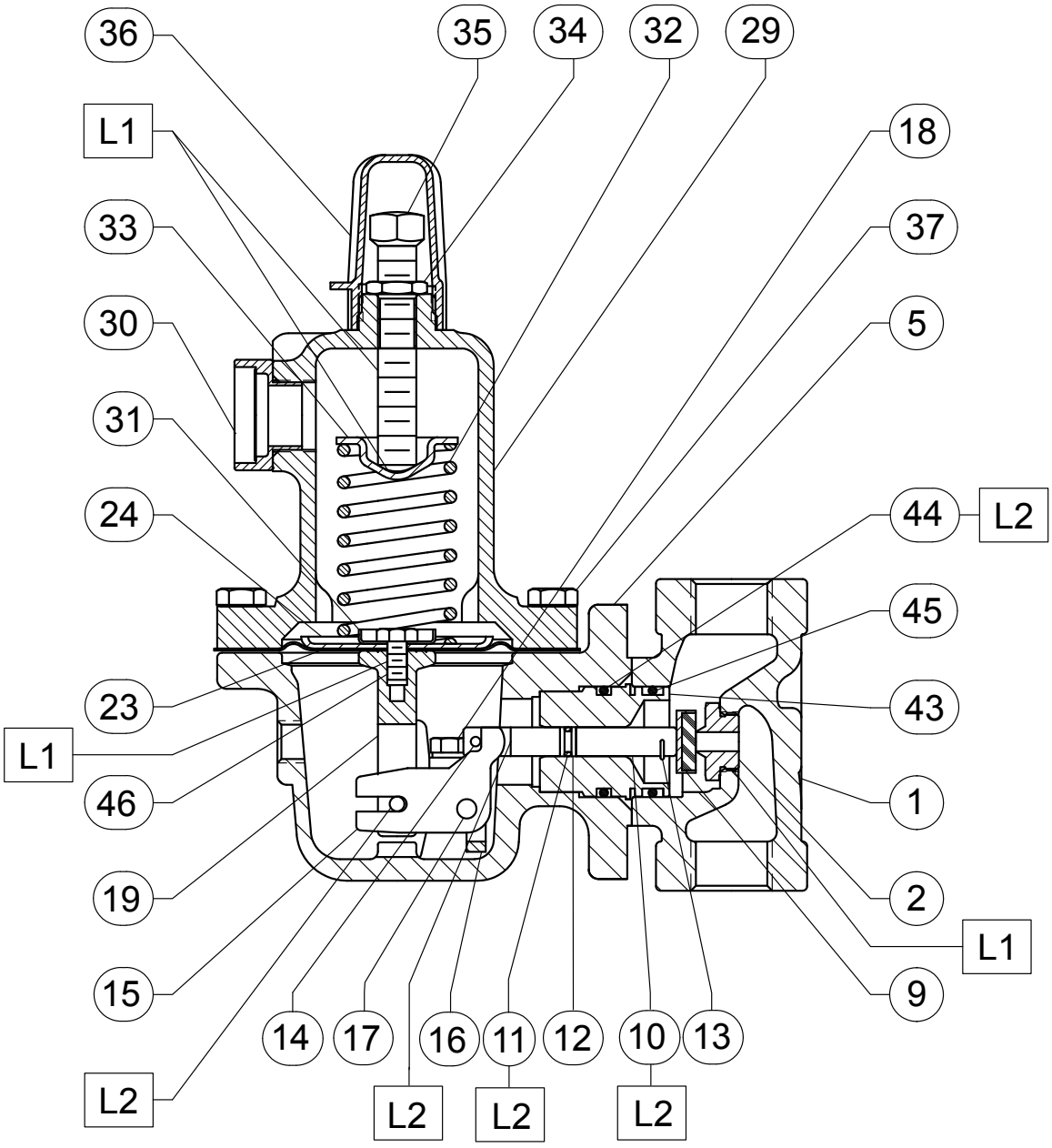


38B4843_C

□ **APPLY LUBRICANT(1)**
L1 = MULTI-PURPOSE LITHIUM POLYMER TYPE GREASE
L2 = EXTREME LOW-TEMPERATURE BEARING GREASE
PARTS NOT SHOWN: 3

1. Lubricants must be selected such that they meet the temperature requirements.

Figure 9. *Type 627LR Regulator Assembly*

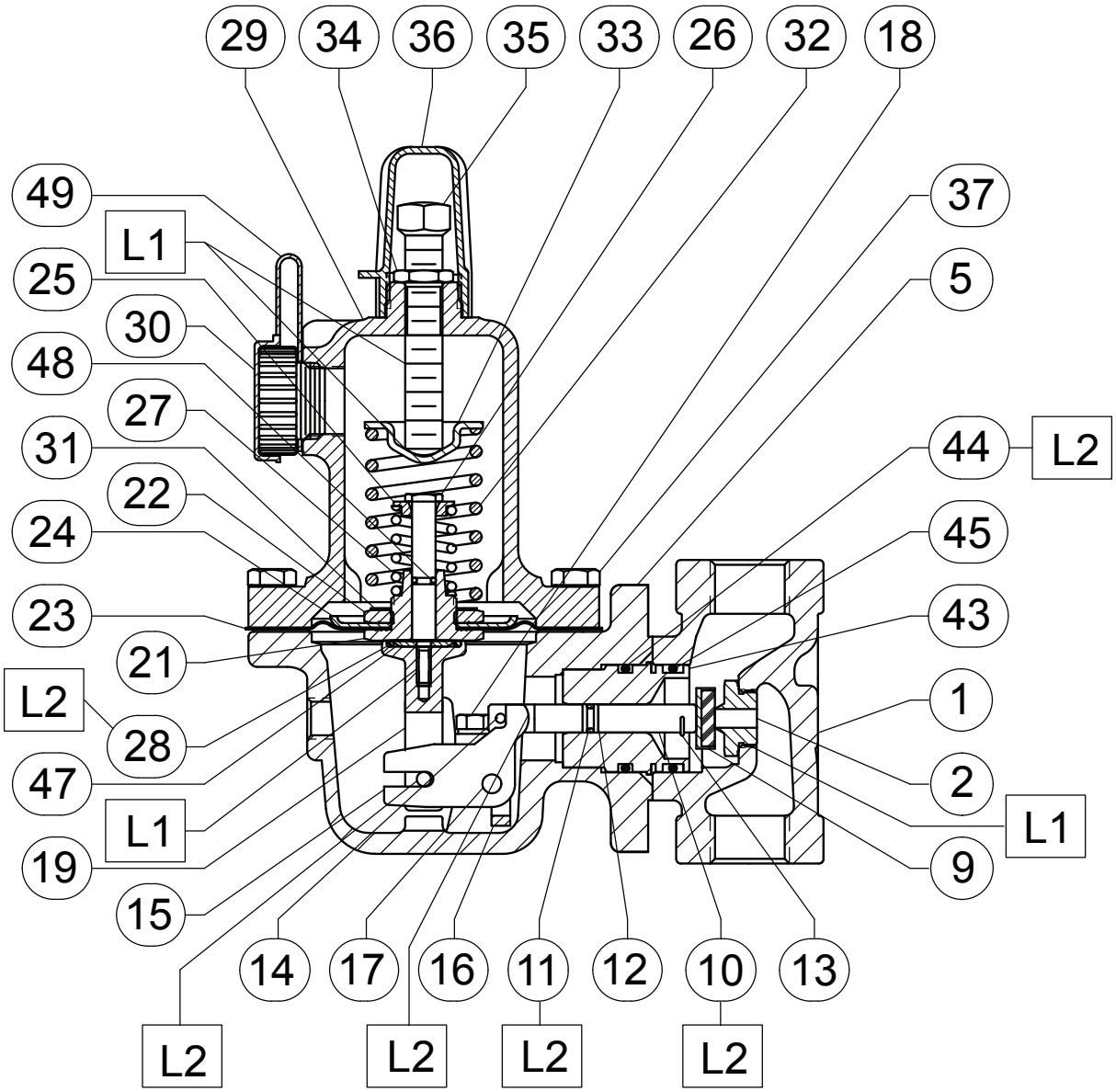


30B6433_E

☐ **APPLY LUBRICANT(1)**
L1 = MULTI-PURPOSE LITHIUM POLYMER TYPE GREASE
L2 = EXTREME LOW-TEMPERATURE BEARING GREASE
PARTS NOT SHOWN: 3

1. Lubricants must be selected such that they meet the temperature requirements.

Figure 10. *Type 627M Regulator Assembly*

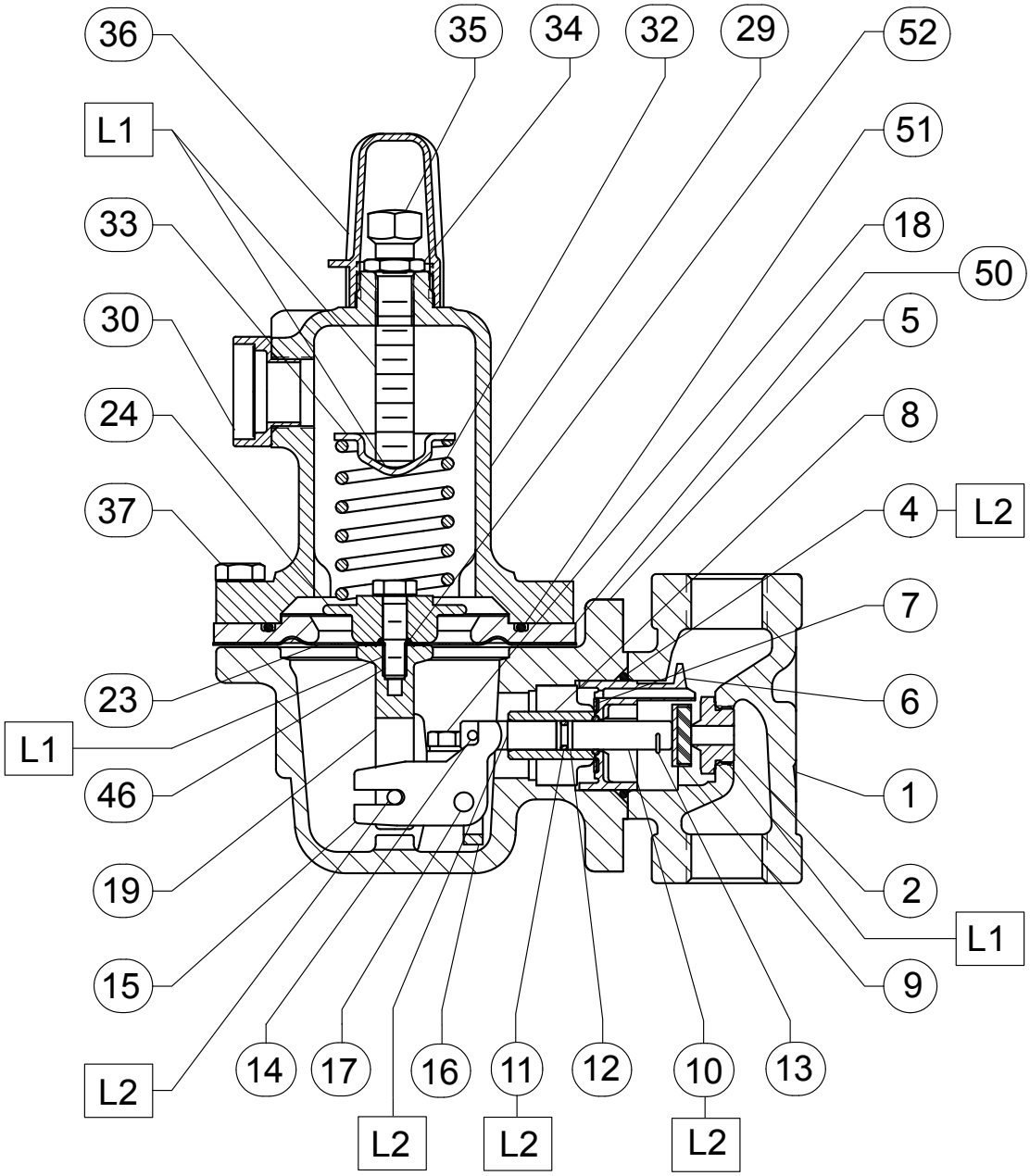


30B6434_E

☐ **APPLY LUBRICANT(1)**
L1 = MULTI-PURPOSE LITHIUM POLYMER TYPE GREASE
L2 = EXTREME LOW-TEMPERATURE BEARING GREASE
PARTS NOT SHOWN: 3

1. Lubricants must be selected such that they meet the temperature requirements.

Figure 11. *Type 627MR Regulator Assembly*

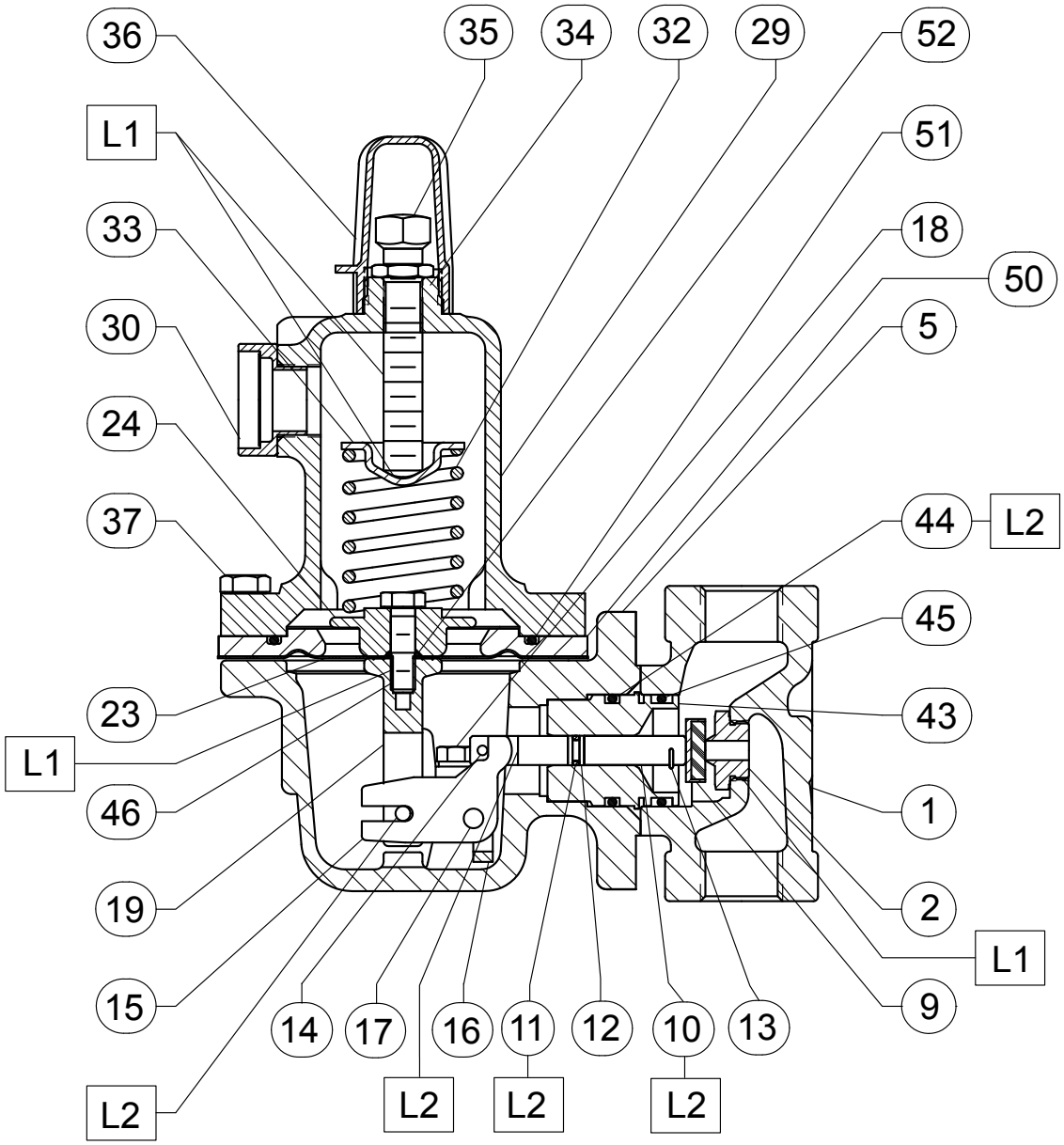


31B5374_D

☐ **APPLY LUBRICANT(1)**
L1 = MULTI-PURPOSE LITHIUM POLYMER TYPE GREASE
L2 = EXTREME LOW-TEMPERATURE BEARING GREASE
PARTS NOT SHOWN: 3

1. Lubricants must be selected such that they meet the temperature requirements.

Figure 12. *Type 627H Regulator Assembly*



31B9872_D

□ **APPLY LUBRICANT(1)**
L1 = MULTI-PURPOSE LITHIUM POLYMER TYPE GREASE
L2 = EXTREME LOW-TEMPERATURE BEARING GREASE
PARTS NOT SHOWN: 3

1. Lubricants must be selected such that they meet the temperature requirements.

Figure 13. *Type 627HM Regulator Assembly*

Industrial Regulators

Emerson Process Management
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Outside U.S. +1 972 548 3574

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Middle East and Africa
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Natural Gas Technologies

Emerson Process Management
Regulator Technologies, Inc.

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TESCOM

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Tel: +86 21 2892 9499

For further information visit www.fisherregulators.com

PT 44

AMERICAN SENSOR TECHNOLOGIES (AST)
AST4400A00100P4E0437

0-100 PSI PRESSURE TRANSDUCER, IS/UL
CL1 DIV2 , GROUP C&D, 4-20mA ,1/4MNPT SS

ANGI PART NUMBER 410-07276

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AST4400 *Stainless Steel Media Isolated Pressure Sensor*

CSA Approved For Hazardous Locations with Approved Barrier

RoHS COMPLIANT LEAD FREE

Overview

The AST4400 is a media isolated stainless steel pressure sensor with a wide variety of options. In addition to its rugged construction and best price-to-performance ratio in the industry, the AST4400 is the solution for pressure measurement in Intrinsically Safe areas.

NOW APPROVED SINGLE SEAL ANSI / ISA 12.27.01-2003

Benefits

- **ANSI/ISA - 12.27.01.2003 Certified "Single Seal"** (No need for expensive secondary seal)
- **CSA 157** Class 1 Groups C, D IS with approved Barrier (page 2)
- **CAN/CSA-C22.2 No. 157.92** - Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations
- High Strength Stainless Steel Construction
- No Oil, Welds or Internal O-rings
- Wide Operating Temperature Range
- Ranges up to 10,000 PSI
- Low Static and Thermal Errors
- Unparalleled Price and Performance
- Compatible with Wide Range of Liquids and Gases
- EMI/RFI Protection
- 500VAC Isolation

Applications

- Industrial OEM Equipment
- Water Management
- Pneumatics
- Hydrogen Storage (316L SS)
- HVAC/R Equipment
- Control Panels
- Hydraulic Systems
- Data Loggers

Performance @25°C (77°F)

Accuracy*	< ±0.25% BFSL
Stability (1 year)	±0.25%FS, typical
Over range Protection	2X Rated Pressure
Burst Pressure	5X or 20,000 PSI (whichever is less)
Pressure Cycles	> 100 Million

* Accuracy includes non-linearity, hysteresis & non-repeatability

Environmental Data

Temperature	
Operating	-40 to 85°C (-40 to 185°F)
Storage	-40 to 100°C (-40 to 212°F)
Thermal Limits	
Compensated Range	0 to 55°C (30 to 130°F)
TC Zero	<±1.5% of FS
TC Span	<±1.5% of FS
Other	
Shock	100G, 11 msec, 1/2 sine
Vibration	10G peak, 20 to 2000 Hz.
EMI/RFI Protection	Yes
Rating	IP-66

Electrical Data

Output	**4-20mA**	**1-5VDC, 1-6VDC**	**0-50mV (10mV/V)**	**0.5-4.5V Ratiometric**
Excitation	10-28VDC	10-28VDC	5VDC, typical	5VDC, regulated
Output Impedance	>10k Ohms	<100 Ohms, Nominal	1100 Ohms, Nominal	<100 Ohms, Nominal
Current Consumption	20mA, typical	<10mA	<5mA	<10mA
Bandwidth	(-3dB): DC to 250 Hz	(-3dB): DC to 1kHz	(-3dB): DC to 5kHz, min	(-3dB): DC to 1kHz
Output Noise	-	<2mV RMS	-	<2mV RMS
Zero Offset:	<±1% of FS	<±1% of FS	< ±2% of FS	<±1% of FS
Span Tolerance	<±2% of FS	<±1.5% of FS	< ±2% of FS	<±1.5% of FS
Output Load	0-800 Ohms@10-28VDC	10k Ohms, Min.	>1M Ohms	10K Ohms, Min.
Reverse Polarity Protection	Yes	Yes	-	No

Ordering Information

AST4400 **A** **00500** **P** **4** **E** **0** **000** **-SS**

Series Type

Process Connection
A=1/4" NPT Male
B=1/8" NPT Male
C=1/4" BSPP Male
F=7/16" - 20 UNF Male
I= 1/4" NPT Female

Pressure Range
Insert pressure range from chart

Pressure Unit
B= Bar
K= kg/cm2
P= PSI

Outputs
1= 0.5-4.5V ratiometric
3= 1-5V
4= 4-20mA (2 wire loop powered)
6= 1-6V
A= 0-50mV (10mV/V)

Electrical
A= 2 ft. (0.6 m)
B= 4 ft. (1.2 m)
C= 6 ft. (1.8 m)
D= 10 ft. (3.0 m)
E= Mini DIN 43650
F= Packard Metripack 150 3-Pin Conn.
I= DIN 43650A
L= Conduit fitting, Cable 2 ft.
M= Conduit fitting, Cable 4 ft.
N= Conduit fitting, Cable 6 ft.
P= Conduit fitting, Cable 10 ft.

Now With DIN43650A!

Wetted Material
0=17-4PH
1=316 L

Options
000 -No special options

Single Seal

Pressure Ranges*

PSIG Measurement Range	Pressure Range Code	BARG Measurement Range	Pressure Range Code
-14.7 to 25**	V0025**	-1 to 2**	V0002**
0-25	00025	0-2	00002
0-50	00050	0-5	00005
0-100	00100	0-10	00010
0-200	00200	0-20	00020
0-500	00500	0-50	00050
0-1,000	01000	0-100	00100
0-2,500	02500	0-250	00250
0-5,000	05000	0-350	00350
0-7,500	07500	0-500	00500
0-10,000	10000	0-700	00700

*Typical ranges. All ranges between 0-25 PSI and 0-10,000 PSI available.
**Compound ranges up to -14.7 to 2500 PSI available. Please consult factory.

Barrier Installation

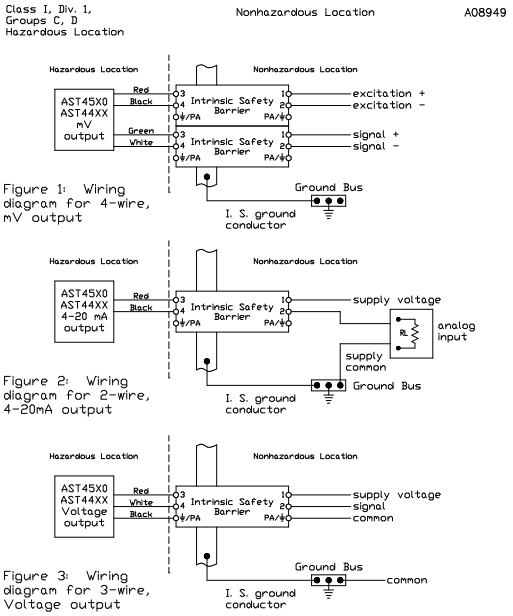


Figure 1: Wiring diagram for 4-wire, mV output

Figure 2: Wiring diagram for 2-wire, 4-20mA output

Figure 3: Wiring diagram for 3-wire, Voltage output

Entity Parameters

Models AST4400, AST4410 and AST44LP	Models AST4400, AST4410 and AST44P with integral cable	Models AST4500, AST4510 and AST4520
Vmax = 28 Vdc Imax = 175 mA Ci = 0.45 uF Li = 0	Vmax = 28 Vdc Imax = 175 mA Ci = 0.45 uF Li = 1.32 uH	Vmax = 28 Vdc Imax = 175 mA Ci = 0.46 uF Li = 16.5 uH

1. For installation in accordance with Fig 2, barrier must be a CSA Certified, Single Channel grounded Shunt-Diode Zener Barrier or a Single Channel Isolating Barrier.

Barrier parameters must meet the following requirements:

Voc or Uo <= Vmax
Isc or Io <= Imax
Po <= Pi (if applicable)
Ca or Co >= Ci + Ccable
La or Lo >= Li + Lcable

2. For installations in accordance with Figs. 1 and 3, one dual-channel or two single-channel barriers may be used, where in either case, both channels have been Certified for use together with combined entity parameters.

The following conditions must be satisfied:

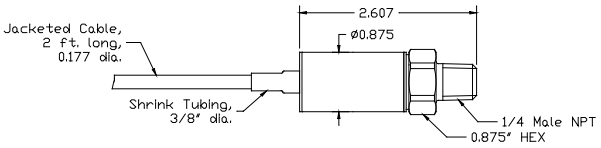
Voc or Uo <= Vmax
Isc or Io <= I max
Po <= Pi (if applicable)
Ca or Co >= Ci + Ccable
La or Lo >= Li + Lcable

3. Maximum non-hazardous area voltage must not exceed 250 V.

4. Installation should be in accordance with Canadian Electrical Code, Part I.

5. A grounding method is not provided by the manufacturer as part of the integral design of the Transducer. For units which are connected through a grounded shunt diode safety barrier, ensure that the transducer is mounted to a surface which is at the same potential as the barrier ground.

Dimensional Data

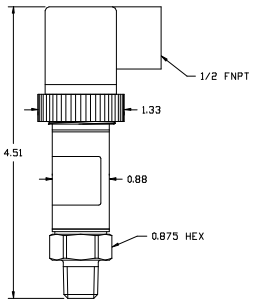


DIN43650A

Output	Pin 1	Pin 2	Pin 3	Wide Pin
4-20mA	+V Supply	Ground	Case GND	N/C
3W Voltage	+V Supply	Ground	+ Signal	Case GND

CABLE

Output	Red	Black	White	Green
4-20mA	+V Supply	Ground	N/C	Case GND
3W Voltage	+V Supply	Ground	+ Signal	Case GND



Warranty

Workmanship - AST, Inc. pressure transmitters have a limited one-year warranty to the original purchaser. AST, Inc. will replace or repair, free of charge, any defective transmitter. This warranty does not apply to any units that have been modified; misused, neglected or installed where the application exceeds published ratings. AST's sensors are made with pride in New Jersey, USA. If in the area please feel free to stop by for a visit!

Installation/Applications - The purchaser is responsible for media compatibility, functional adequacy, and correct installation of the transmitter.

PT 45

AMERICAN SENSOR TECHNOLOGIES
AST4400A00300P4E0444

TRANSD-AST 0-300 PSI IS / UL CL1 DIV2
GRPC&D 4-20mA ¼ MNPT SS

ANGI PART NUMBER 410-07277

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AST4400 *Stainless Steel Media Isolated Pressure Sensor*

CSA Approved For Hazardous Locations with Approved Barrier

RoHS COMPLIANT LEAD FREE

Overview

The AST4400 is a media isolated stainless steel pressure sensor with a wide variety of options. In addition to its rugged construction and best price-to-performance ratio in the industry, the AST4400 is the solution for pressure measurement in Intrinsically Safe areas.

NOW APPROVED SINGLE SEAL ANSI / ISA 12.27.01-2003

Benefits

- **ANSI/ISA - 12.27.01.2003 Certified "Single Seal"** (No need for expensive secondary seal)
- **CSA 157** Class 1 Groups C, D IS with approved Barrier (page 2)
- **CAN/CSA-C22.2 No. 157.92** - Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations
- High Strength Stainless Steel Construction
- No Oil, Welds or Internal O-rings
- Wide Operating Temperature Range
- Ranges up to 10,000 PSI
- Low Static and Thermal Errors
- Unparalleled Price and Performance
- Compatible with Wide Range of Liquids and Gases
- EMI/RFI Protection
- 500VAC Isolation

Applications

- Industrial OEM Equipment
- Water Management
- Pneumatics
- Hydrogen Storage (316L SS)
- HVAC/R Equipment
- Control Panels
- Hydraulic Systems
- Data Loggers

Performance @25°C (77°F)

Accuracy*	< ±0.25% BFSL
Stability (1 year)	±0.25%FS, typical
Over range Protection	2X Rated Pressure
Burst Pressure	5X or 20,000 PSI (whichever is less)
Pressure Cycles	> 100 Million

* Accuracy includes non-linearity, hysteresis & non-repeatability

Environmental Data

Temperature	
Operating	-40 to 85°C (-40 to 185°F)
Storage	-40 to 100°C (-40 to 212°F)
Thermal Limits	
Compensated Range	0 to 55°C (30 to 130°F)
TC Zero	<±1.5% of FS
TC Span	<±1.5% of FS
Other	
Shock	100G, 11 msec, 1/2 sine
Vibration	10G peak, 20 to 2000 Hz.
EMI/RFI Protection	Yes
Rating	IP-66

Electrical Data

Output	**4-20mA**	**1-5VDC, 1-6VDC**	**0-50mV (10mV/V)**	**0.5-4.5V Ratiometric**
Excitation	10-28VDC	10-28VDC	5VDC, typical	5VDC, regulated
Output Impedance	>10k Ohms	<100 Ohms, Nominal	1100 Ohms, Nominal	<100 Ohms, Nominal
Current Consumption	20mA, typical	<10mA	<5mA	<10mA
Bandwidth	(-3dB): DC to 250 Hz	(-3dB): DC to 1kHz	(-3dB): DC to 5kHz, min	(-3dB): DC to 1kHz
Output Noise	-	<2mV RMS	-	<2mV RMS
Zero Offset:	<±1% of FS	<±1% of FS	< ±2% of FS	<±1% of FS
Span Tolerance	<±2% of FS	<±1.5% of FS	< ±2% of FS	<±1.5% of FS
Output Load	0-800 Ohms@10-28VDC	10k Ohms, Min.	>1M Ohms	10K Ohms, Min.
Reverse Polarity Protection	Yes	Yes	-	No

Ordering Information

AST4400 **A** **00500** **P** **4** **E** **0** **000** **-SS**

Series Type

Process Connection
A=1/4" NPT Male
B=1/8" NPT Male
C=1/4" BSPP Male
F=7/16" - 20 UNF Male
I= 1/4" NPT Female

Pressure Range
Insert pressure range from chart

Pressure Unit
B= Bar
K= kg/cm2
P= PSI

Outputs
1= 0.5-4.5V ratiometric
3= 1-5V
4= 4-20mA (2 wire loop powered)
6= 1-6V
A= 0-50mV (10mV/V)

Electrical
A= 2 ft. (0.6 m)
B= 4 ft. (1.2 m)
C= 6 ft. (1.8 m)
D= 10 ft. (3.0 m)
E= Mini DIN 43650
F= Packard Metripack 150 3-Pin Conn.
I= DIN 43650A
L= Conduit fitting, Cable 2 ft.
M= Conduit fitting, Cable 4 ft.
N= Conduit fitting, Cable 6 ft.
P= Conduit fitting, Cable 10 ft.

Now With DIN43650A!

Wetted Material
0=17-4PH
1=316 L

Options
000 -No special options

Single Seal

Pressure Ranges*

PSIG Measurement Range	Pressure Range Code	BARG Measurement Range	Pressure Range Code
-14.7 to 25**	V0025**	-1 to 2**	V0002**
0-25	00025	0-2	00002
0-50	00050	0-5	00005
0-100	00100	0-10	00010
0-200	00200	0-20	00020
0-500	00500	0-50	00050
0-1,000	01000	0-100	00100
0-2,500	02500	0-250	00250
0-5,000	05000	0-350	00350
0-7,500	07500	0-500	00500
0-10,000	10000	0-700	00700

*Typical ranges. All ranges between 0-25 PSI and 0-10,000 PSI available.
**Compound ranges up to -14.7 to 2500 PSI available. Please consult factory.

Barrier Installation

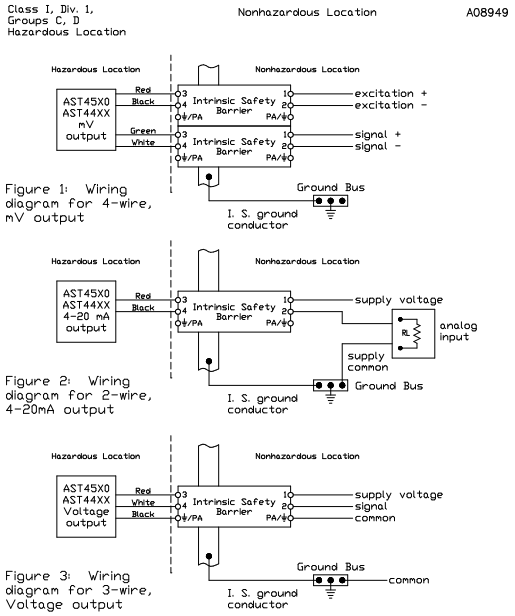


Figure 1: Wiring diagram for 4-wire, mV output

Figure 2: Wiring diagram for 2-wire, 4-20mA output

Figure 3: Wiring diagram for 3-wire, Voltage output

Entity Parameters

Models AST4400, AST4410 and AST44LP	Models AST4400, AST4410 and AST44P with integral cable	Models AST4500, AST4510 and AST4520
Vmax = 28 Vdc Imax = 175 mA Ci = 0.45 uF Li = 0	Vmax = 28 Vdc Imax = 175 mA Ci = 0.45 uF Li = 1.32 uH	Vmax = 28 Vdc Imax = 175 mA Ci = 0.46 uF Li = 16.5 uH

1. For installation in accordance with Fig 2, barrier must be a CSA Certified, Single Channel grounded Shunt-Diode Zener Barrier or a Single Channel Isolating Barrier.

Barrier parameters must meet the following requirements:

Voc or Uo <= Vmax
Isc or Io <= Imax
Po <= Pi (if applicable)
Ca or Co >= Ci + Ccable
La or Lo >= Li + Lcable

2. For installations in accordance with Figs. 1 and 3, one dual-channel or two single-channel barriers may be used, where in either case, both channels have been Certified for use together with combined entity parameters.

The following conditions must be satisfied:

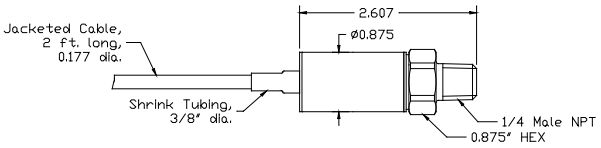
Voc or Uo <= Vmax
Isc or Io <= I max
Po <= Pi (if applicable)
Ca or Co >= Ci + Ccable
La or Lo >= Li + Lcable

3. Maximum non-hazardous area voltage must not exceed 250 V.

4. Installation should be in accordance with Canadian Electrical Code, Part I.

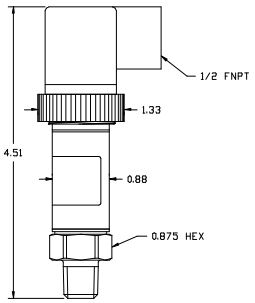
5. A grounding method is not provided by the manufacturer as part of the integral design of the Transducer. For units which are connected through a grounded shunt diode safety barrier, ensure that the transducer is mounted to a surface which is at the same potential as the barrier ground.

Dimensional Data



DIN43650A

Output	Pin 1	Pin 2	Pin 3	Wide Pin
4-20mA	+V Supply	Ground	Case GND	N/C
3W Voltage	+V Supply	Ground	+ Signal	Case GND



CABLE

Output	Red	Black	White	Green
4-20mA	+V Supply	Ground	N/C	Case GND
3W Voltage	+V Supply	Ground	+ Signal	Case GND

Warranty

Workmanship - AST, Inc. pressure transmitters have a limited one-year warranty to the original purchaser. AST, Inc. will replace or repair, free of charge, any defective transmitter. This warranty does not apply to any units that have been modified; misused, neglected or installed where the application exceeds published ratings. AST's sensors are made with pride in New Jersey, USA. If in the area please feel free to stop by for a visit!

Installation/Applications - The purchaser is responsible for media compatibility, functional adequacy, and correct installation of the transmitter.

PT 46

AMERICAN SENSOR TECHNOLOGIES
AST4400A00600P4E0444

TRANSD-AST 0-600PSI IS / UL CL1 DIV2
GRPC&D 4-20mA ¼ MNPT SS

ANGI PART NUMBER 410-07278

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AST4400 *Stainless Steel Media Isolated Pressure Sensor*

CSA Approved For Hazardous Locations with Approved Barrier

RoHS COMPLIANT LEAD FREE

Overview

The AST4400 is a media isolated stainless steel pressure sensor with a wide variety of options. In addition to its rugged construction and best price-to-performance ratio in the industry, the AST4400 is the solution for pressure measurement in Intrinsically Safe areas.

NOW APPROVED SINGLE SEAL ANSI / ISA 12.27.01-2003

Benefits

- **ANSI/ISA - 12.27.01.2003 Certified "Single Seal"** (No need for expensive secondary seal)
- **CSA 157** Class 1 Groups C, D IS with approved Barrier (page 2)
- **CAN/CSA-C22.2 No. 157.92** - Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations
- High Strength Stainless Steel Construction
- No Oil, Welds or Internal O-rings
- Wide Operating Temperature Range
- Ranges up to 10,000 PSI
- Low Static and Thermal Errors
- Unparalleled Price and Performance
- Compatible with Wide Range of Liquids and Gases
- EMI/RFI Protection
- 500VAC Isolation

Applications

- Industrial OEM Equipment
- Water Management
- Pneumatics
- Hydrogen Storage (316L SS)
- HVAC/R Equipment
- Control Panels
- Hydraulic Systems
- Data Loggers

Performance @25°C (77°F)

Accuracy*	< ±0.25% BFSL
Stability (1 year)	±0.25%FS, typical
Over range Protection	2X Rated Pressure
Burst Pressure	5X or 20,000 PSI (whichever is less)
Pressure Cycles	> 100 Million

* Accuracy includes non-linearity, hysteresis & non-repeatability

Environmental Data

Temperature	
Operating	-40 to 85°C (-40 to 185°F)
Storage	-40 to 100°C (-40 to 212°F)
Thermal Limits	
Compensated Range	0 to 55°C (30 to 130°F)
TC Zero	<±1.5% of FS
TC Span	<±1.5% of FS
Other	
Shock	100G, 11 msec, 1/2 sine
Vibration	10G peak, 20 to 2000 Hz.
EMI/RFI Protection	Yes
Rating	IP-66

Electrical Data

Output	**4-20mA**	**1-5VDC, 1-6VDC**	**0-50mV (10mV/V)**	**0.5-4.5V Ratiometric**
Excitation	10-28VDC	10-28VDC	5VDC, typical	5VDC, regulated
Output Impedance	>10k Ohms	<100 Ohms, Nominal	1100 Ohms, Nominal	<100 Ohms, Nominal
Current Consumption	20mA, typical	<10mA	<5mA	<10mA
Bandwidth	(-3dB): DC to 250 Hz	(-3dB): DC to 1kHz	(-3dB): DC to 5kHz, min	(-3dB): DC to 1kHz
Output Noise	-	<2mV RMS	-	<2mV RMS
Zero Offset:	<±1% of FS	<±1% of FS	< ±2% of FS	<±1% of FS
Span Tolerance	<±2% of FS	<±1.5% of FS	< ±2% of FS	<±1.5% of FS
Output Load	0-800 Ohms@10-28VDC	10k Ohms, Min.	>1M Ohms	10K Ohms, Min.
Reverse Polarity Protection	Yes	Yes	-	No

Ordering Information

AST4400 **A** **00500** **P** **4** **E** **0** **000** **-SS**

Series Type

Process Connection
A=1/4" NPT Male
B=1/8" NPT Male
C=1/4" BSPP Male
F=7/16" - 20 UNF Male
I= 1/4" NPT Female

Pressure Range
Insert pressure range from chart

Pressure Unit
B= Bar
K= kg/cm2
P= PSI

Outputs
1= 0.5-4.5V ratiometric
3= 1-5V
4= 4-20mA (2 wire loop powered)
6= 1-6V
A= 0-50mV (10mV/V)

Electrical
A= 2 ft. (0.6 m)
B= 4 ft. (1.2 m)
C= 6 ft. (1.8 m)
D= 10 ft. (3.0 m)
E= Mini DIN 43650
F= Packard Metripack 150 3-Pin Conn.
I= DIN 43650A
L= Conduit fitting, Cable 2 ft.
M= Conduit fitting, Cable 4 ft.
N= Conduit fitting, Cable 6 ft.
P= Conduit fitting, Cable 10 ft.

Now With DIN43650A!

Wetted Material
0=17-4PH
1=316 L

Options
000 -No special options

Single Seal

Pressure Ranges*

PSIG Measurement Range	Pressure Range Code	BARG Measurement Range	Pressure Range Code
-14.7 to 25**	V0025**	-1 to 2**	V0002**
0-25	00025	0-2	00002
0-50	00050	0-5	00005
0-100	00100	0-10	00010
0-200	00200	0-20	00020
0-500	00500	0-50	00050
0-1,000	01000	0-100	00100
0-2,500	02500	0-250	00250
0-5,000	05000	0-350	00350
0-7,500	07500	0-500	00500
0-10,000	10000	0-700	00700

*Typical ranges. All ranges between 0-25 PSI and 0-10,000 PSI available.
**Compound ranges up to -14.7 to 2500 PSI available. Please consult factory.

Barrier Installation

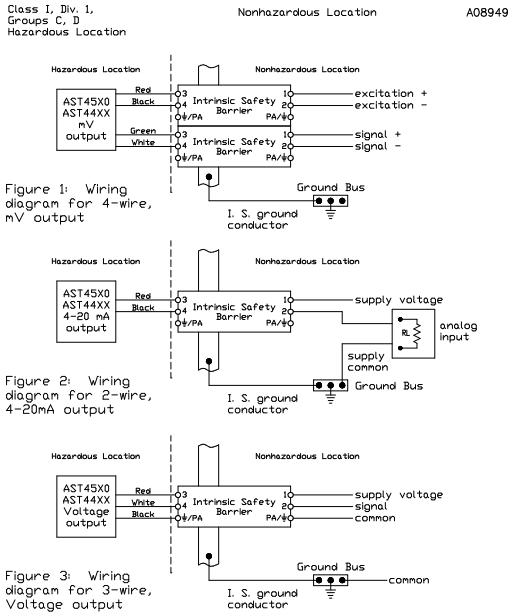


Figure 1: Wiring diagram for 4-wire, mV output

Figure 2: Wiring diagram for 2-wire, 4-20mA output

Figure 3: Wiring diagram for 3-wire, Voltage output

Entity Parameters

Models AST4400, AST4410 and AST44LP	Models AST4400, AST4410 and AST44P with integral cable	Models AST4500, AST4510 and AST4520
Vmax = 28 Vdc Imax = 175 mA Ci = 0.45 uF Li = 0	Vmax = 28 Vdc Imax = 175 mA Ci = 0.45 uF Li = 1.32 uH	Vmax = 28 Vdc Imax = 175 mA Ci = 0.46 uF Li = 16.5 uH

1. For installation in accordance with Fig 2, barrier must be a CSA Certified, Single Channel grounded Shunt-Diode Zener Barrier or a Single Channel Isolating Barrier.

Barrier parameters must meet the following requirements:

Voc or Uo <= Vmax
Isc or Io <= Imax
Po <= Pi (if applicable)
Ca or Co >= Ci + Ccable
La or Lo >= Li + Lcable

2. For installations in accordance with Figs. 1 and 3, one dual-channel or two single-channel barriers may be used, where in either case, both channels have been Certified for use together with combined entity parameters.

The following conditions must be satisfied:

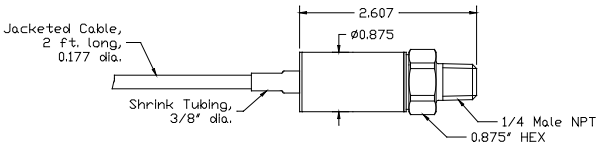
Voc or Uo <= Vmax
Isc or Io <= I max
Po <= Pi (if applicable)
Ca or Co >= Ci + Ccable
La or Lo >= Li + Lcable

3. Maximum non-hazardous area voltage must not exceed 250 V.

4. Installation should be in accordance with Canadian Electrical Code, Part I.

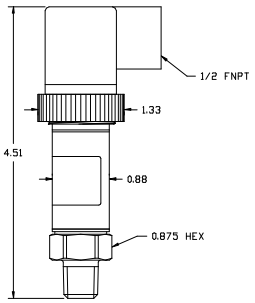
5. A grounding method is not provided by the manufacturer as part of the integral design of the Transducer. For units which are connected through a grounded shunt diode safety barrier, ensure that the transducer is mounted to a surface which is at the same potential as the barrier ground.

Dimensional Data



DIN43650A

Output	Pin 1	Pin 2	Pin 3	Wide Pin
4-20mA	+V Supply	Ground	Case GND	N/C
3W Voltage	+V Supply	Ground	+ Signal	Case GND



CABLE

Output	Red	Black	White	Green
4-20mA	+V Supply	Ground	N/C	Case GND
3W Voltage	+V Supply	Ground	+ Signal	Case GND

Warranty

Workmanship - AST, Inc. pressure transmitters have a limited one-year warranty to the original purchaser. AST, Inc. will replace or repair, free of charge, any defective transmitter. This warranty does not apply to any units that have been modified; misused, neglected or installed where the application exceeds published ratings. AST's sensors are made with pride in New Jersey, USA. If in the area please feel free to stop by for a visit!

Installation/Applications - The purchaser is responsible for media compatibility, functional adequacy, and correct installation of the transmitter.

PT 47

AMERICAN SENSOR TECHNOLOGIES
AST4400A0100P4E044

TRANSD-AST 0 – 100 # IS /UL
CL 1 DIV2 GRPC & D 4-20MA ¼ MNPT SS

ANGI PART NUMBER 991-07663

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AST4400 *Stainless Steel Media Isolated Pressure Sensor*

CSA Approved For Hazardous Locations with Approved Barrier

RoHS COMPLIANT LEAD FREE

Overview

The AST4400 is a media isolated stainless steel pressure sensor with a wide variety of options. In addition to its rugged construction and best price-to-performance ratio in the industry, the AST4400 is the solution for pressure measurement in Intrinsically Safe areas.

NOW APPROVED SINGLE SEAL ANSI / ISA 12.27.01-2003

Benefits

- **ANSI/ISA - 12.27.01.2003 Certified "Single Seal"** (No need for expensive secondary seal)
- **CSA 157** Class 1 Groups C, D IS with approved Barrier (page 2)
- **CAN/CSA-C22.2 No. 157.92** - Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations
- High Strength Stainless Steel Construction
- No Oil, Welds or Internal O-rings
- Wide Operating Temperature Range
- Ranges up to 10,000 PSI
- Low Static and Thermal Errors
- Unparalleled Price and Performance
- Compatible with Wide Range of Liquids and Gases
- EMI/RFI Protection
- 500VAC Isolation

Applications

- Industrial OEM Equipment
- Water Management
- Pneumatics
- Hydrogen Storage (316L SS)
- HVAC/R Equipment
- Control Panels
- Hydraulic Systems
- Data Loggers

Performance @25°C (77°F)

Accuracy*	< ±0.25% BFSL
Stability (1 year)	±0.25%FS, typical
Over range Protection	2X Rated Pressure
Burst Pressure	5X or 20,000 PSI (whichever is less)
Pressure Cycles	> 100 Million

* Accuracy includes non-linearity, hysteresis & non-repeatability

Environmental Data

Temperature	
Operating	-40 to 85°C (-40 to 185°F)
Storage	-40 to 100°C (-40 to 212°F)
Thermal Limits	
Compensated Range	0 to 55°C (30 to 130°F)
TC Zero	<±1.5% of FS
TC Span	<±1.5% of FS
Other	
Shock	100G, 11 msec, 1/2 sine
Vibration	10G peak, 20 to 2000 Hz.
EMI/RFI Protection	Yes
Rating	IP-66

Electrical Data

Output	**4-20mA**	**1-5VDC, 1-6VDC**	**0-50mV (10mV/V)**	**0.5-4.5V Ratiometric**
Excitation	10-28VDC	10-28VDC	5VDC, typical	5VDC, regulated
Output Impedance	>10k Ohms	<100 Ohms, Nominal	1100 Ohms, Nominal	<100 Ohms, Nominal
Current Consumption	20mA, typical	<10mA	<5mA	<10mA
Bandwidth	(-3dB): DC to 250 Hz	(-3dB): DC to 1kHz	(-3dB): DC to 5kHz, min	(-3dB): DC to 1kHz
Output Noise	-	<2mV RMS	-	<2mV RMS
Zero Offset:	<±1% of FS	<±1% of FS	< ±2% of FS	<±1% of FS
Span Tolerance	<±2% of FS	<±1.5% of FS	< ±2% of FS	<±1.5% of FS
Output Load	0-800 Ohms@10-28VDC	10k Ohms, Min.	>1M Ohms	10K Ohms, Min.
Reverse Polarity Protection	Yes	Yes	-	No

Ordering Information

AST4400 **A** **00500** **P** **4** **E** **0** **000** **-SS**

Series Type

Process Connection
A=1/4" NPT Male
B=1/8" NPT Male
C=1/4" BSPP Male
F=7/16" - 20 UNF Male
I= 1/4" NPT Female

Pressure Range
Insert pressure range from chart

Pressure Unit
B= Bar
K= kg/cm2
P= PSI

Outputs
1= 0.5-4.5V ratiometric
3= 1-5V
4= 4-20mA (2 wire loop powered)
6= 1-6V
A= 0-50mV (10mV/V)

Electrical
A= 2 ft. (0.6 m)
B= 4 ft. (1.2 m)
C= 6 ft. (1.8 m)
D= 10 ft. (3.0 m)
E= Mini DIN 43650
F= Packard Metripack 150 3-Pin Conn.
I= DIN 43650A
L= Conduit fitting, Cable 2 ft.
M= Conduit fitting, Cable 4 ft.
N= Conduit fitting, Cable 6 ft.
P= Conduit fitting, Cable 10 ft.

Now With DIN43650A!

Wetted Material
0=17-4PH
1=316 L

Options
000 -No special options

Single Seal

Pressure Ranges*

PSIG Measurement Range	Pressure Range Code	BARG Measurement Range	Pressure Range Code
-14.7 to 25**	V0025**	-1 to 2**	V0002**
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0-50	00050	0-5	00005
0-100	00100	0-10	00010
0-200	00200	0-20	00020
0-500	00500	0-50	00050
0-1,000	01000	0-100	00100
0-2,500	02500	0-250	00250
0-5,000	05000	0-350	00350
0-7,500	07500	0-500	00500
0-10,000	10000	0-700	00700

*Typical ranges. All ranges between 0-25 PSI and 0-10,000 PSI available.
**Compound ranges up to -14.7 to 2500 PSI available. Please consult factory.

Barrier Installation

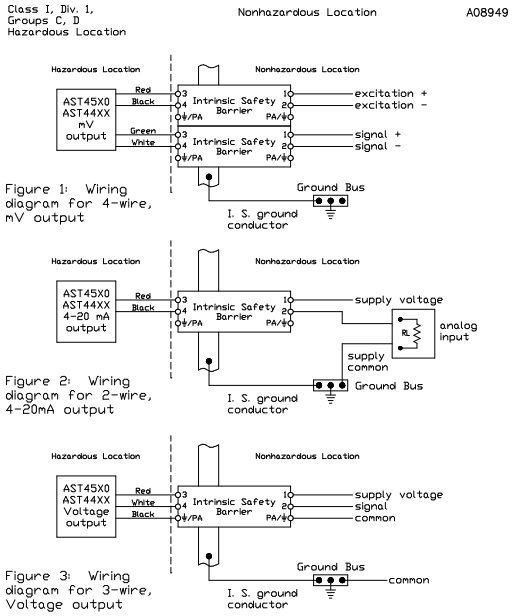


Figure 1: Wiring diagram for 4-wire, mV output

Figure 2: Wiring diagram for 2-wire, 4-20mA output

Figure 3: Wiring diagram for 3-wire, Voltage output

Entity Parameters

Models AST4400, AST4410 and AST44LP	Models AST4400, AST4410 and AST44P with integral cable	Models AST4500, AST4510 and AST4520
Vmax = 28 Vdc Imax = 175 mA Ci = 0.45 uF Li = 0	Vmax = 28 Vdc Imax = 175 mA Ci = 0.45 uF Li = 1.32 uH	Vmax = 28 Vdc Imax = 175 mA Ci = 0.46 uF Li = 16.5 uH

1. For installation in accordance with Fig 2, barrier must be a CSA Certified, Single Channel grounded Shunt-Diode Zener Barrier or a Single Channel Isolating Barrier.

Barrier parameters must meet the following requirements:

Voc or Uo <= Vmax
Isc or Io <= Imax
Po <= Pi (if applicable)
Ca or Co >= Ci + Ccable
La or Lo >= Li + Lcable

2. For installations in accordance with Figs. 1 and 3, one dual-channel or two single-channel barriers may be used, where in either case, both channels have been Certified for use together with combined entity parameters.

The following conditions must be satisfied:

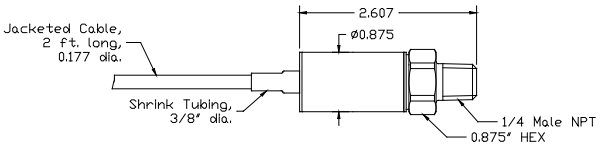
Voc or Uo <= Vmax
Isc or Io <= I max
Po <= Pi (if applicable)
Ca or Co >= Ci + Ccable
La or Lo >= Li + Lcable

3. Maximum non-hazardous area voltage must not exceed 250 V.

4. Installation should be in accordance with Canadian Electrical Code, Part I.

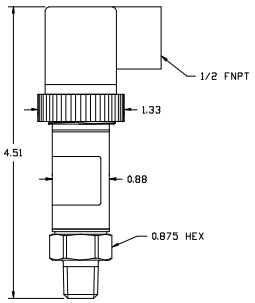
5. A grounding method is not provided by the manufacturer as part of the integral design of the Transducer. For units which are connected through a grounded shunt diode safety barrier, ensure that the transducer is mounted to a surface which is at the same potential as the barrier ground.

Dimensional Data



DIN43650A

Output	Pin 1	Pin 2	Pin 3	Wide Pin
4-20mA	+V Supply	Ground	Case GND	N/C
3W Voltage	+V Supply	Ground	+ Signal	Case GND



CABLE

Output	Red	Black	White	Green
4-20mA	+V Supply	Ground	N/C	Case GND
3W Voltage	+V Supply	Ground	+ Signal	Case GND

Warranty

Workmanship - AST, Inc. pressure transmitters have a limited one-year warranty to the original purchaser. AST, Inc. will replace or repair, free of charge, any defective transmitter. This warranty does not apply to any units that have been modified; misused, neglected or installed where the application exceeds published ratings. AST's sensors are made with pride in New Jersey, USA. If in the area please feel free to stop by for a visit!

Installation/Applications - The purchaser is responsible for media compatibility, functional adequacy, and correct installation of the transmitter.

PT 49

AMERICAN SENSOR TECHNOLOGIES
AST4400A03000P4E0444

TRANSD-AST 0-3000 PSI IS / UL CL1 DIV2
GRPC&D 4-20mA ¼ MNPT SS

ANGI PART NUMBER 410-07281

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AST4400 *Stainless Steel Media Isolated Pressure Sensor*

CSA Approved For Hazardous Locations with Approved Barrier

RoHS COMPLIANT LEAD FREE

Overview

The AST4400 is a media isolated stainless steel pressure sensor with a wide variety of options. In addition to its rugged construction and best price-to-performance ratio in the industry, the AST4400 is the solution for pressure measurement in Intrinsically Safe areas.

NOW APPROVED SINGLE SEAL ANSI / ISA 12.27.01-2003

Benefits

- **ANSI/ISA - 12.27.01.2003 Certified "Single Seal"** (No need for expensive secondary seal)
- **CSA 157** Class 1 Groups C, D IS with approved Barrier (page 2)
- **CAN/CSA-C22.2 No. 157.92** - Intrinsically Safe and Non-Incendive Equipment for Use in Hazardous Locations
- High Strength Stainless Steel Construction
- No Oil, Welds or Internal O-rings
- Wide Operating Temperature Range
- Ranges up to 10,000 PSI
- Low Static and Thermal Errors
- Unparalleled Price and Performance
- Compatible with Wide Range of Liquids and Gases
- EMI/RFI Protection
- 500VAC Isolation

Applications

- Industrial OEM Equipment
- Water Management
- Pneumatics
- Hydrogen Storage (316L SS)
- HVAC/R Equipment
- Control Panels
- Hydraulic Systems
- Data Loggers

Performance @25°C (77°F)

Accuracy*	< ±0.25% BFSL
Stability (1 year)	±0.25%FS, typical
Over range Protection	2X Rated Pressure
Burst Pressure	5X or 20,000 PSI (whichever is less)
Pressure Cycles	> 100 Million

* Accuracy includes non-linearity, hysteresis & non-repeatability

Environmental Data

Temperature	
Operating	-40 to 85°C (-40 to 185°F)
Storage	-40 to 100°C (-40 to 212°F)
Thermal Limits	
Compensated Range	0 to 55°C (30 to 130°F)
TC Zero	<±1.5% of FS
TC Span	<±1.5% of FS
Other	
Shock	100G, 11 msec, 1/2 sine
Vibration	10G peak, 20 to 2000 Hz.
EMI/RFI Protection	Yes
Rating	IP-66

Electrical Data

Output	**4-20mA**	**1-5VDC, 1-6VDC**	**0-50mV (10mV/V)**	**0.5-4.5V Ratiometric**
Excitation	10-28VDC	10-28VDC	5VDC, typical	5VDC, regulated
Output Impedance	>10k Ohms	<100 Ohms, Nominal	1100 Ohms, Nominal	<100 Ohms, Nominal
Current Consumption	20mA, typical	<10mA	<5mA	<10mA
Bandwidth	(-3dB): DC to 250 Hz	(-3dB): DC to 1kHz	(-3dB): DC to 5kHz, min	(-3dB): DC to 1kHz
Output Noise	-	<2mV RMS	-	<2mV RMS
Zero Offset:	<±1% of FS	<±1% of FS	< ±2% of FS	<±1% of FS
Span Tolerance	<±2% of FS	<±1.5% of FS	< ±2% of FS	<±1.5% of FS
Output Load	0-800 Ohms@10-28VDC	10k Ohms, Min.	>1M Ohms	10K Ohms, Min.
Reverse Polarity Protection	Yes	Yes	-	No

Ordering Information

AST4400 **A** **00500** **P** **4** **E** **0** **000** **-SS**

Series Type

Process Connection
A=1/4" NPT Male
B=1/8" NPT Male
C=1/4" BSPP Male
F=7/16" - 20 UNF Male
I= 1/4" NPT Female

Pressure Range
Insert pressure range from chart

Pressure Unit
B= Bar
K= kg/cm2
P= PSI

Outputs
1= 0.5-4.5V ratiometric
3= 1-5V
4= 4-20mA (2 wire loop powered)
6= 1-6V
A= 0-50mV (10mV/V)

Electrical
A= 2 ft. (0.6 m)
B= 4 ft. (1.2 m)
C= 6 ft. (1.8 m)
D= 10 ft. (3.0 m)
E= Mini DIN 43650
F= Packard Metripack 150 3-Pin Conn.
I= DIN 43650A
L= Conduit fitting, Cable 2 ft.
M= Conduit fitting, Cable 4 ft.
N= Conduit fitting, Cable 6 ft.
P= Conduit fitting, Cable 10 ft.

Now With DIN43650A!

Wetted Material
0=17-4PH
1=316 L

Options
000 -No special options

Single Seal

Pressure Ranges*

PSIG Measurement Range	Pressure Range Code	BARG Measurement Range	Pressure Range Code
-14.7 to 25**	V0025**	-1 to 2**	V0002**
0-25	00025	0-2	00002
0-50	00050	0-5	00005
0-100	00100	0-10	00010
0-200	00200	0-20	00020
0-500	00500	0-50	00050
0-1,000	01000	0-100	00100
0-2,500	02500	0-250	00250
0-5,000	05000	0-350	00350
0-7,500	07500	0-500	00500
0-10,000	10000	0-700	00700

*Typical ranges. All ranges between 0-25 PSI and 0-10,000 PSI available.
**Compound ranges up to -14.7 to 2500 PSI available. Please consult factory.

Barrier Installation

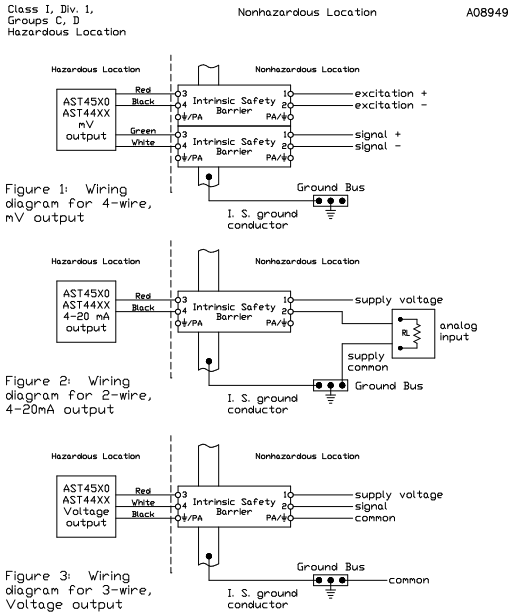


Figure 1: Wiring diagram for 4-wire, mV output

Figure 2: Wiring diagram for 2-wire, 4-20mA output

Figure 3: Wiring diagram for 3-wire, Voltage output

Entity Parameters

Models AST4400, AST4410 and AST44LP	Models AST4400, AST4410 and AST44P with integral cable	Models AST4500, AST4510 and AST4520
Vmax = 28 Vdc Imax = 175 mA Ci = 0.45 uF Li = 0	Vmax = 28 Vdc Imax = 175 mA Ci = 0.45 uF Li = 1.32 uH	Vmax = 28 Vdc Imax = 175 mA Ci = 0.46 uF Li = 16.5 uH

1. For installation in accordance with Fig 2, barrier must be a CSA Certified, Single Channel grounded Shunt-Diode Zener Barrier or a Single Channel Isolating Barrier.

Barrier parameters must meet the following requirements:

Voc or Uo <= Vmax
Isc or Io <= Imax
Po <= Pi (if applicable)
Ca or Co >= Ci + Ccable
La or Lo >= Li + Lcable

2. For installations in accordance with Figs. 1 and 3, one dual-channel or two single-channel barriers may be used, where in either case, both channels have been Certified for use together with combined entity parameters.

The following conditions must be satisfied:

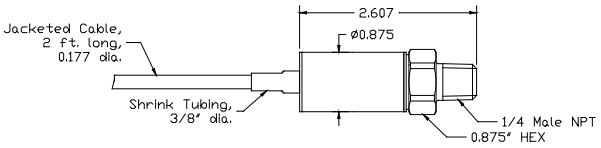
Voc or Uo <= Vmax
Isc or Io <= I max
Po <= Pi (if applicable)
Ca or Co >= Ci + Ccable
La or Lo >= Li + Lcable

3. Maximum non-hazardous area voltage must not exceed 250 V.

4. Installation should be in accordance with Canadian Electrical Code, Part I.

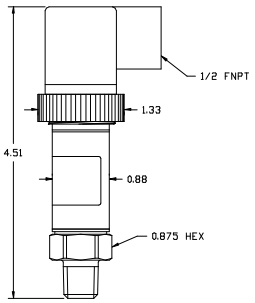
5. A grounding method is not provided by the manufacturer as part of the integral design of the Transducer. For units which are connected through a grounded shunt diode safety barrier, ensure that the transducer is mounted to a surface which is at the same potential as the barrier ground.

Dimensional Data



DIN43650A

Output	Pin 1	Pin 2	Pin 3	Wide Pin
4-20mA	+V Supply	Ground	Case GND	N/C
3W Voltage	+V Supply	Ground	+ Signal	Case GND



CABLE

Output	Red	Black	White	Green
4-20mA	+V Supply	Ground	N/C	Case GND
3W Voltage	+V Supply	Ground	+ Signal	Case GND

Warranty

Workmanship - AST, Inc. pressure transmitters have a limited one-year warranty to the original purchaser. AST, Inc. will replace or repair, free of charge, any defective transmitter. This warranty does not apply to any units that have been modified; misused, neglected or installed where the application exceeds published ratings. AST's sensors are made with pride in New Jersey, USA. If in the area please feel free to stop by for a visit!

Installation/Applications - The purchaser is responsible for media compatibility, functional adequacy, and correct installation of the transmitter.

PT 50

AMERICAN SENSOR TECHNOLOGIES (AST)
AST4400A06000P4E0437
0-6000 PSI PRESSURE TRANSDUCER, IS/UL
CL1 DIV2, GROUPC&D, 4-20Ma, 1/4MNPT, SS

ANGI PART NUMBER 410-07282

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Temperature	
Operating	-40 to 85°C (-40 to 185°F)
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EMI/RFI Protection	Yes
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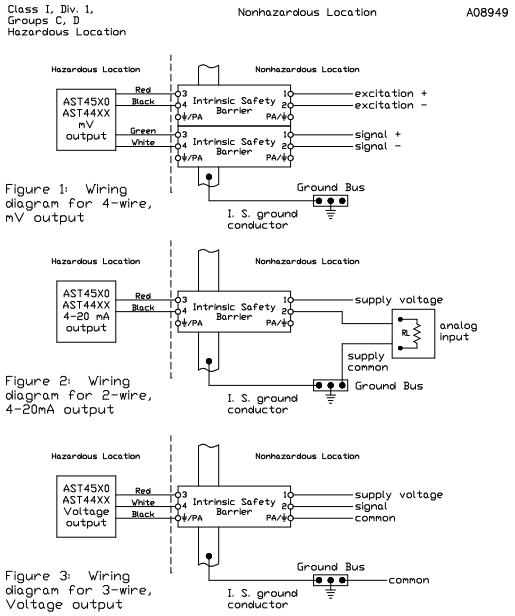

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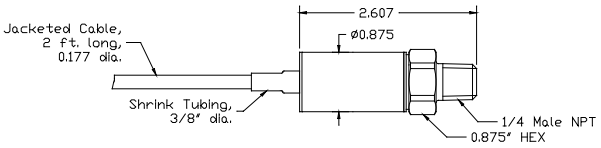
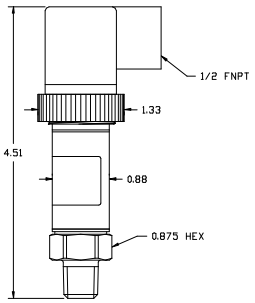
Dimensional Data



DIN43650A

Output	Pin 1	Pin 2	Pin 3	Wide Pin
4-20mA	+V Supply	Ground	Case GND	N/C
3W Voltage	+V Supply	Ground	+ Signal	Case GND



CABLE

Output	Red	Black	White	Green
4-20mA	+V Supply	Ground	N/C	Case GND
3W Voltage	+V Supply	Ground	+ Signal	Case GND

Warranty

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Installation/Applications - The purchaser is responsible for media compatibility, functional adequacy, and correct installation of the transmitter.

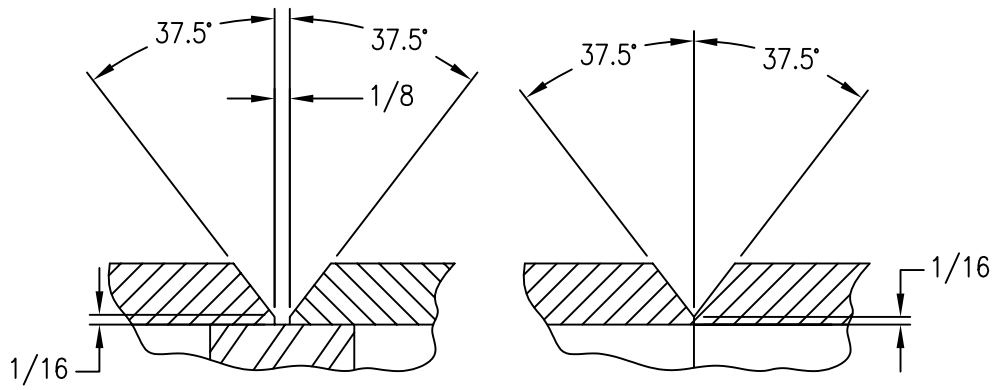
PV 80

SILVAN
135-022 (27-24-120-600)

TANK-VERT 100GAL 600# 24’’OD
64 ½’’ OAL ASME VESSEL RING BASE

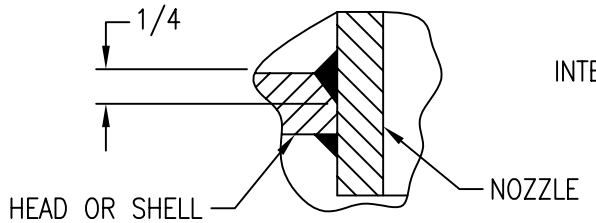
ANGI PART NUMBER 944-07263

NO.	QTY.	PART NUMBER	DESCRIPTION	LENGTH
1	1		SHELL	
2	1		HEAD– ELL. 24" DIA	
3	1		HEAD– ELL. 24" DIA	
4	1		BACK UP STRIP	
5	1		BASE RING ASS'Y	
6	1		1/4" NPT 3000# FULL CPLG.	
7	2		1/2" NPT 3000# FULL CPLG.	
8	1		3/4" NPT 3000# FULL CPLG.	
9	1		1" NPT 3000# HALF CPLG.	
10	3		1 1/2" NPT 3000# HALF CPLG.	
11	3		2" NPT 3000# HALF CPLG.	
12	2		2" NPT SQ. HD. FORGED PLUG	
13	2		LIFTING LUG	
14	1		ASME DATA PLATE	



DETAIL A

DETAIL B



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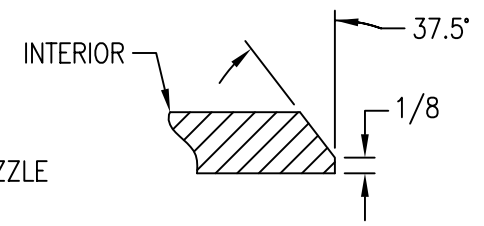

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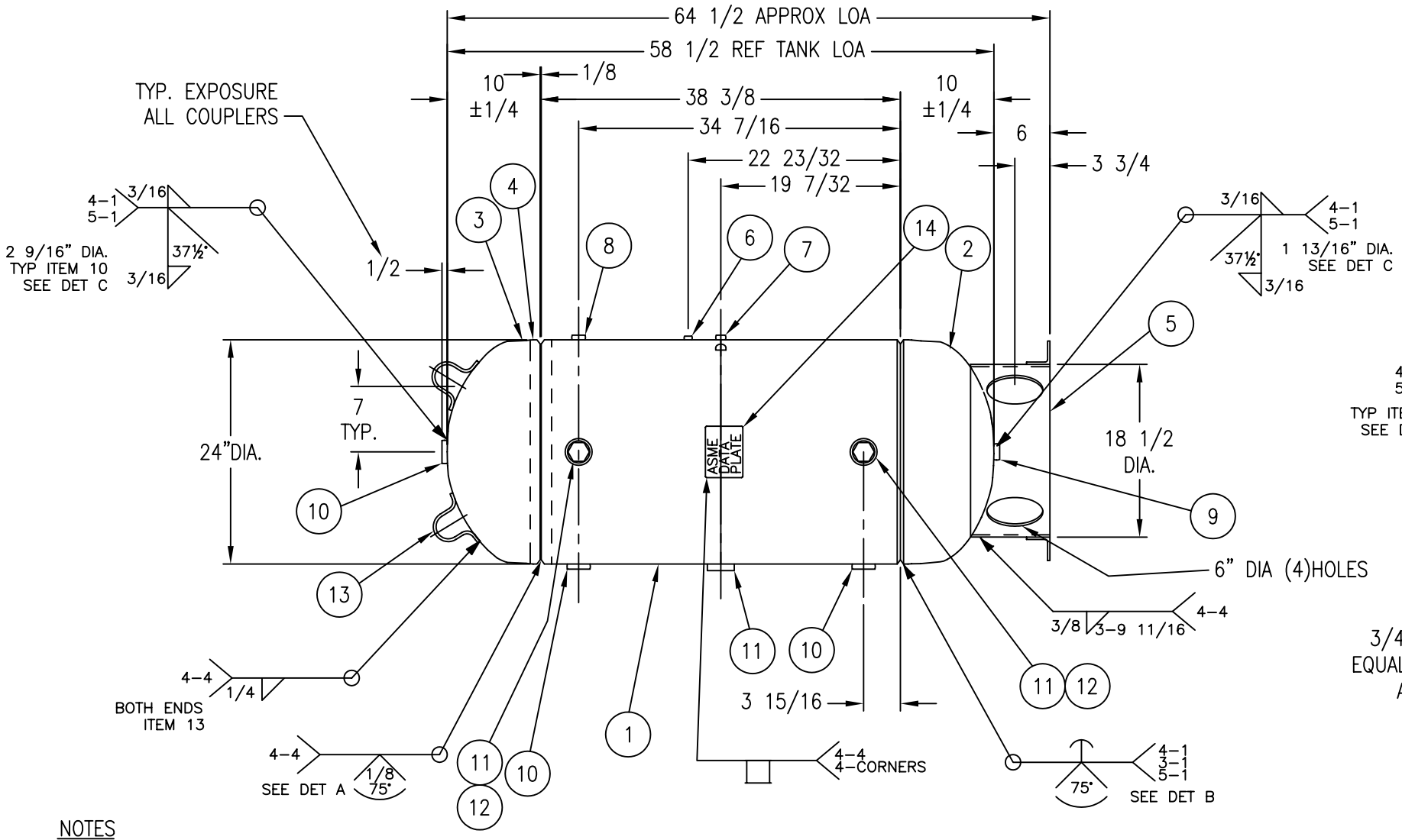

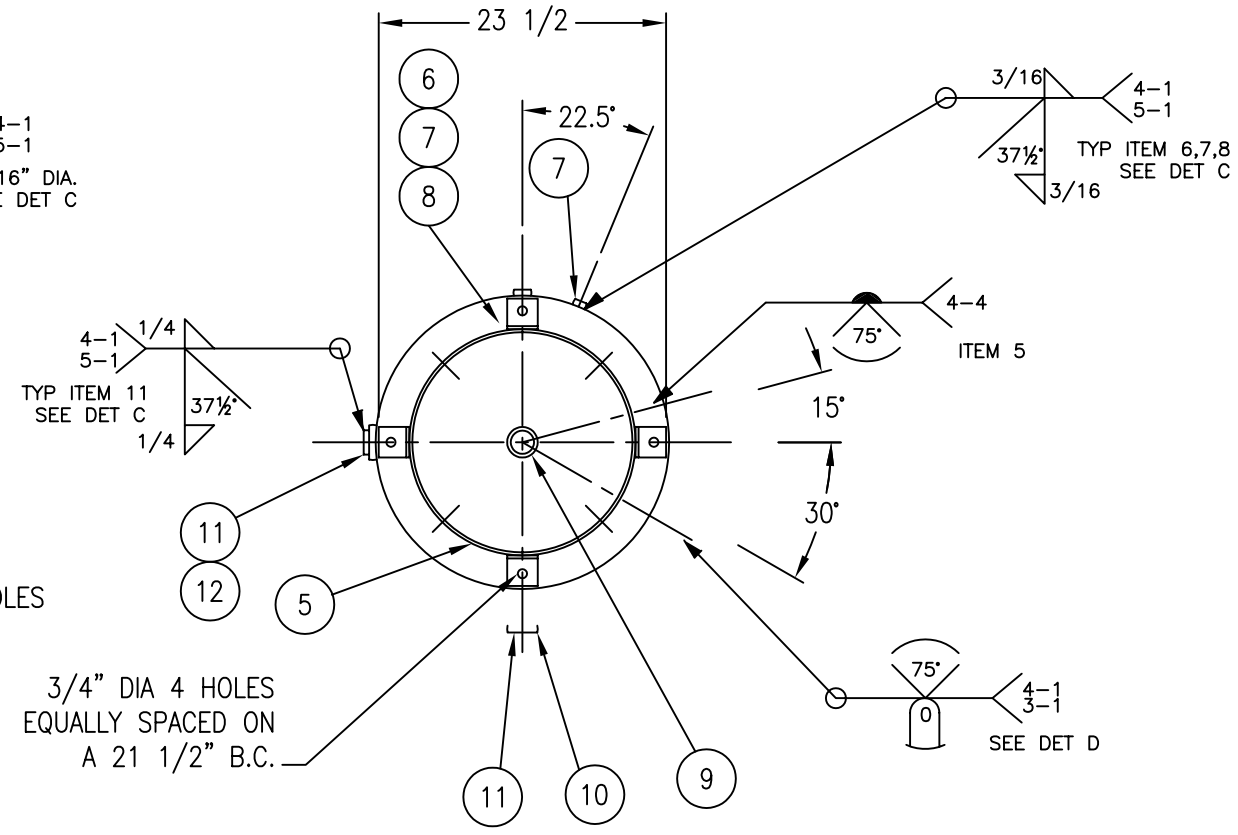

NOTES

1. SHELL .500 NOM. SA–455 GR. " " P.V.Q.
   DES. THK. .434 E=100%
   HEADS .500 NOM. SA–516 GR. "70" P.V.Q.
   DES. THK. .438 S=100%
2. WORKING PRESSURE 600PSI
3. TEST PRESSURE HYDRO. 796PSI
4. TEMPERATURE MIN. –20°F MAN. 450°F
5. ALL WELDED FITTINGS MUST BE HELD PERPENDICULAR TO CL WITHIN 3/8" IN 12"
6. IMPACT TEST EXEMPT PER PAR. UG–20(F)
7. SPECIFICATIONS:
   CALCULATED WEIGHT 779 LBS.
   CALCULATED CAPACITY 100 GALS.
8. CRN– NONE
9. N.D.T. – RT–4 FULL X–RAY STAKE SEAM. SPOT X–RAY GIRTH SEAM
10. FINISH – GREY URETHANE PRIMER

(BUILT IN ACCORDANCE WITH THE LATEST ADDITION OF SECTION VIII DIV 1 ASME CODE)

REV	DATE/BY	DESCRIPTION	REV	DATE/BY	DESCRIPTION
A	2/24/09 ADM	MOVED CONNECTION 6, 7, 11			

ANGI international
ANGI INTERNATIONAL
P.O. BOX 39
15 PLUMB STREET
MILTON, WI 53563
PH: 608–868–4626
FX: 608–868–2723

UNLESS OTHERWISE SPECIFIED

BREAK SHARP EDGES

ALL DIMENSIONS IN INCHES

FRACTIONAL	±.125
TWO PLACE DECIMAL	±.010
THREE PLACE DECIMAL	±.005
ANGLES	±1°

TITLE	100 GAL 600 PSI RECIEVER TANK NARROW BODY		
CUSTOMER			PROJECT NO.
SHEET 1/1	SCALE 1:16		DRAWING NO. 944–07263
DRAWN BY ADM	DATE 2/7/09		

J:ENG/DRWG/ASSY/944

RTD 14

PYROMATION
PM26409-ANGI

1/2-14NPT PORT RTD ASSEMBLY, 400˚F MAX, 5700 PSI,
72” SST FLEX ARMOR CABLE,
PT100 2-WIRE W/ THERMOWELL 2.5x1/2NPT,
THERMAL GREASE IN PROBE TIP,

ANGI PART NUMBER 700-08041

REPLACEMENT ELEMENT - 400-07897

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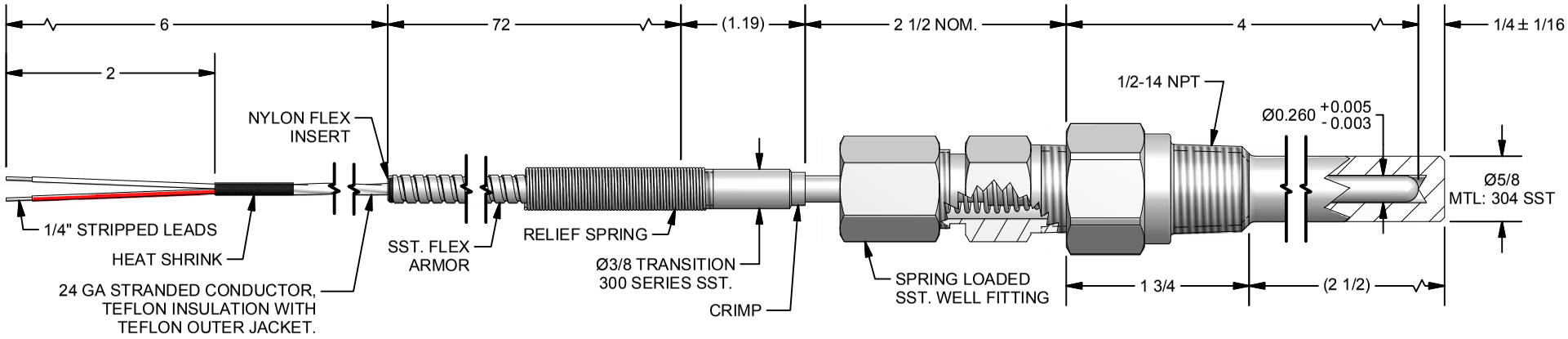

ELEMENT IS A 2-WIRE 100 OHM RTD ASSEMBLY, 400°F (204°C) MAXIMUM TEMPERATURE.
INITIAL ACCURACY: ± 0.12% @ 0°C, 0.00385 Ω/Ω/°C NOMINAL TEMPERATURE COEFFICIENT.
ELEMENT IS EMBEDDED IN THERMALLY CONDUCTIVE EPOXY AND ENCASED IN A Ø1/4 316 SST SHEATH AND INSERTED IN A HEAVY DUTY THREADED THERMOWELL.

PYROMATION P/N: RBF185L482Z-H4C0409-19C-15-T3A072-2 (Z521)

REV	DESCRIPTION	BY	DATE
A	UPDATED PART NUMBER FROM 3 TO 2 WIRE & S4C TO H4C	JB	02/19/2010

SPEC NO:

TOLERANCES

FRACTION DIM =
DECIMAL DIM .XX =
DECIMAL DIM .XXX =
ANGULAR DIM =

FOR: PYROMATION, INC.

TITLE: 100 OHM RTD, W/ WELL AND 19C

SIZE: A | DWG. NO. & SHEET NO: B075201 | REV. A

DRAWN BY: C. STRAUB | DATE: 4/22/2009

Pyromation, Inc.
FORT WAYNE, INDIANA 260-484-2580

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SRV 37

CIRCLE SEAL
D559N-2M-125 ASME

125 PSI 1/4" ASME, SAFETY RELIEF VALVE

ANGI PART NUMBER 991-07663

NO REBUILD KIT AVAILABLE

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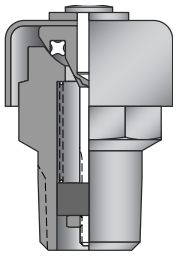
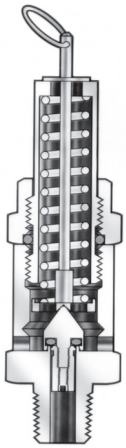




CIRCLE SEAL CONTROLS, INC.
A division of CIRCOR International, Inc.

D500 Series 15 to 150 PSIG
M5100 Series 20 to 1200 PSIG
ASME Safety Relief Valves

Features

- D500 Features Cap Design
- M5100 Offered with Ring or Lift Handle
- MD500 Features Cup Design with Manual Override Ring.

Technical Data

ASME	• American Society of Mechanical Engineers
Body Construction Materials:	• D500 – Naval Brass or 316 Stainless Steel • M5100 – Naval Brass or 316 Stainless Steel
O-ring Materials:	• M5100 – Buna N, Neoprene, Teflon®, Viton®, and EPDM • D500 – Buna N, Neoprene, Teflon®, Viton®, EPDM, and silicone
Set Pressure:	• D500 – 15 to 150 PSIG 1/4″ • M5100 – 20 to 1,200 PSIG 1/8″, 3/4″, 1″ 50 to 1,200 PSIG 1/4″, 3/8″, 1/2″
Temperature Range:	• -100° F to +400° F (-73° C to 204° C) Based on o-ring material, see “How to Order”
Connection Sizes:	• D500 – 1/4″ Male Pipe • M5100 – 1/8″ to 1″ Male Pipe

NOTE: Proper filtration is recommended to prevent damage to sealing surfaces.

Terminology For ASME Safety Relief Valves

SAFETY RELIEF VALVES
An automatic pressure relieving device actuated by the static pressure upstream of the valve, which ones in proportion to the increase in pressure over the opening pressure.

START-TO-LEAK PRESSURE
The pressure at the valve inlet where the relieved fluid is first detected (on the down-stream side of the seat) before normal relieving action takes place.

OPENING PRESSURE (SET PRESSURE)
The valve inlet pop point pressure at which there is a measurable lift or discharge becomes continuous as determined by seeing, hearing or feeling. In the pop type of safety valve, it is the inlet pressure at which the valve opens, allowing a larger amount of fluid as compared with corresponding valve movements at higher or lower pressures.
NOTE: A safety relief valve is not considered to open when it is simmering at a pressure just below the popping point even though the simmering may be audible. This set pressure distinguishes our ASME relief valves from our standard relief valves whose cracking pressure indicates initial flow.

RELIEVING PRESSURE
(Opening Pressure plus Overpressure) The pressure measured at the valve inlet at which the relieving capacity is determined.

CLOSING PRESSURE
(Reset Pressure) The pressure measured at the valve inlet, at which the valve closes, flow is substantially shut off, and there is no measurable lift.

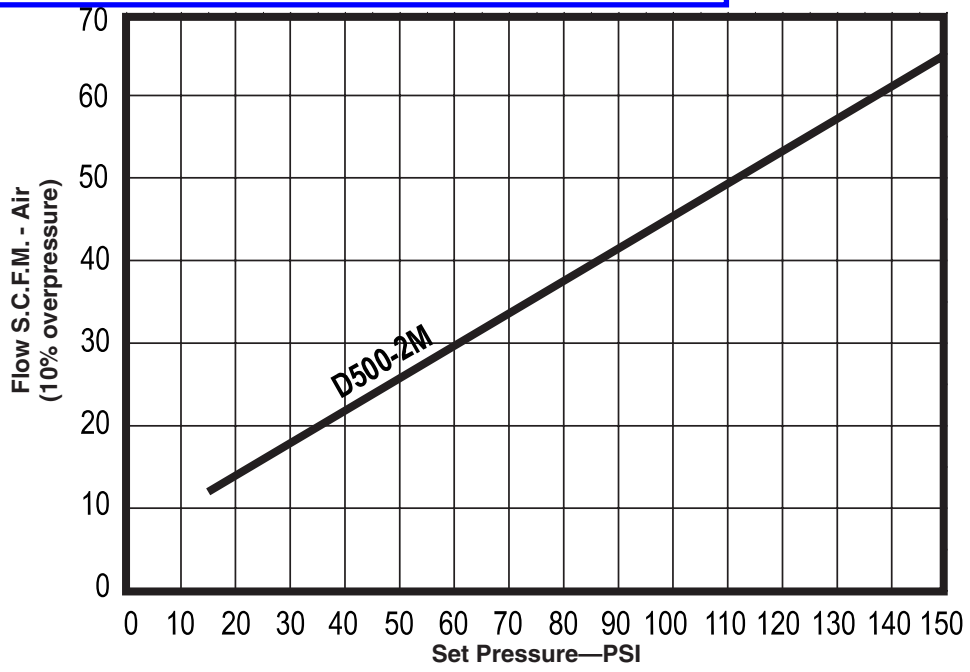
SEAL-OFF PRESSURE
The pressure (measured at the valve inlet) after closing at which no further gas is detected at the down-stream side of the seat.

OPERATING PRESSURE
The actual pressure at which a vessel is maintained in normal operation.

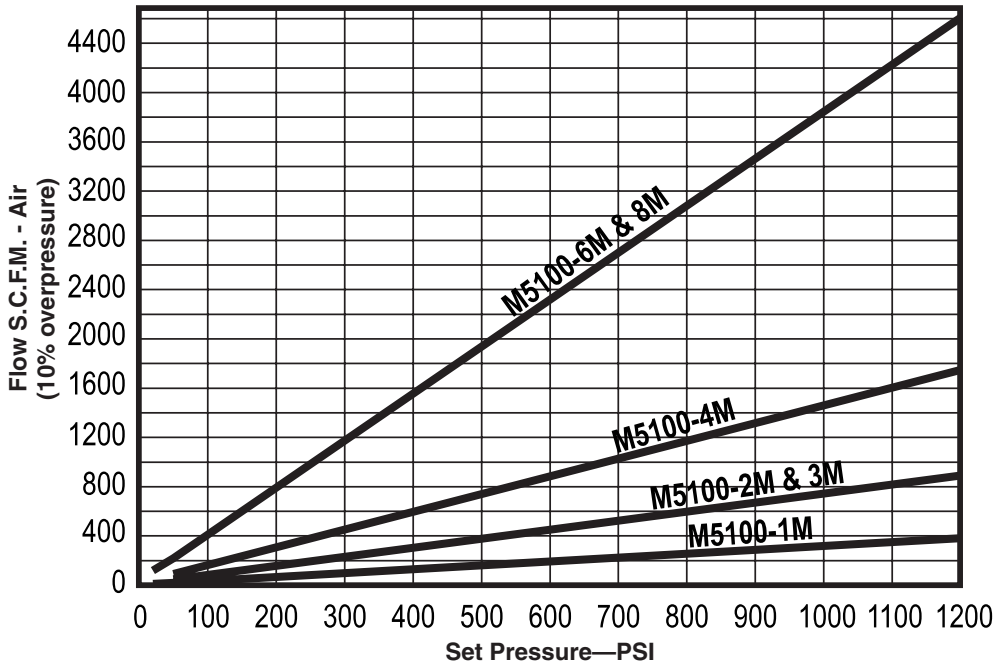
ACCUMULATION
Pressure build-up or overpressure beyond the set pressure of a safety relief valve, at which capacity flow is rated. Capacities are usually based on 10% accumulation.

D500 Series 15 to 150 PSIG
M5100 Series 20 to 1200 PSIG
ASME Safety Relief Valves

Flow Curve D500 Series ASME Safety Relief Valve



Flow Curve M5100 Series ASME Safety Relief Valve



D500 Series 15 to 150 PSIG
M5100 Series 20 to 1200 PSIG
ASME Safety Relief Valves

How to Order
D500 Series ASME Safety Relief Valve—15 to 150 PSI

M D5 32 T1 – 2 M – 20

MANUAL OVERRIDE OPTION

BASIC MODEL NUMBER
D500 Series

O-RING MATERIAL & TEMPERATURE

59 - Buna N	-40° F to +250° F
62 - Ethylene Propylene	-20° F to +250° F
33 - Neoprene	-20° F to +240° F
24 - Silicone	-65° F to +150° F
20 - Teflon®	-100° F to +400° F
32 - Viton®	-20° F to +350° F

MATERIAL & OTHER PRESSURE BOUNDRY COMPONENTS
N - Naval Brass
T1 - 316 Stainless Steel

VALVE SIZE
2 - 1/4″

CONNECTIONS - Inlet
M - Male Pipe

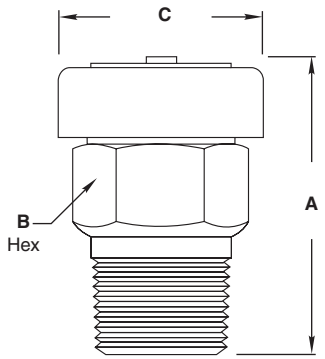
CRACKING PRESSURE
Specify set pressure in PSIG
20 - 20 PSIG

Notes:
Teflon® is a registered trademark of DuPont.
Viton® is a registered trademark of DuPont Dow Elastomers.

Please consult your Circle Seal Controls Distributor or our factory for information on special connections, lubricants, operating pressures and temperature ranges.

Dimensions (Inches)

Dash No.	Size	A	B Hex	C Dia
2M	1/4"	1.375	.625	.90



Recommended Installation

1 Before installing a new safety relief valve, we recommend that a pipe tap be used to assure clean-cut and uniform threads in the vessel opening and to allow for normal hand engagement followed by a half to one turn by wrench.
2 Avoid over-tightening as this can distort the valve seat.
3 Avoid excess “popping” of the valve. Safety relief valves should only be operated often enough to assure they are in good working order.
4 Apply only a moderate amount of pipe compound or tape to the threads, leaving the first thread clean parts.
5 Don’t oversize the valve, as this may cause chatter resulting in rapid wear of the moving parts.
6 Avoid wire, cable or chain pulls for attachments to levers that do not allow a vertical pull. The weight of these devices should not be applied to the safety relief valve.
7 Avoid having the operation pressure too near the valve set pressure. A minimum differential of 10% is recommended.

For Your Safety
It is the sole responsibility of the system designer and user to select products suitable for their specific application requirements and to ensure proper installation, operation and maintenance of these products. Material compatibility product ratings and application details should be considered in the selection. Improper selection or use of products described here in can cause personal injury or property damage.

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SRV 107

MERCER
91-12E51T11I1/200

RELIEF VALVE - 200 PSI E-ORF
¾ MNPT IN x 1 FNPT OUT 700 SCFM

ANGI PART NUMBER – 331-08007

REBUILT KIT- 761-07541 (1E1T1I2)

MERCER VALVE CO., INC.

AUTO SEAT TECHNOLOGY ®

9100 SERIES
Threaded

THINK...MERCER FIRST™

MERCER VALVE

9100 Series Threaded Product Overview

The Mercer Valve 9100 Series Pressure Relief Valve is "State of the Art" in soft seat, high flow rate, pressure relieving devices. The 9100 Series is a continuation of the 8100 Series, incorporating our patented **Auto Seat Technology®** into its design. Mercer Valve's **Auto Seat Technology®** has made the 9100 Series an industry leader with its reliable, repeatable set pressures. The patented soft seat design and fully guided disk allow the valve to continually outlast the competition. The soft seat 9100 Series has a field-proven lip seal design, which allows for a tighter seal up to set pressure. This tight seal reduces leaks and limits product loss.

The 9100 Series is manufactured in accordance with the requirements of ASME Boiler and Pressure Vessel Code, Section VIII, Division 1 for Air/Gas and Liquid service. The 9100 Series is well suited for specialty gases, compressors, separators, transmission, gathering lines and other production processes.

9100 Series Threaded Features

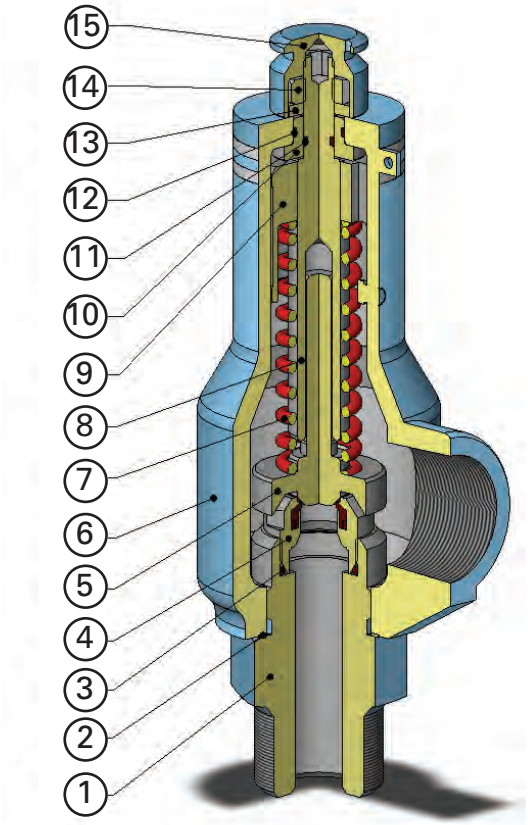
- **Designed with Auto Seat Technology®.**
- **Consistent Set Pressures allowing repeatable uses without repair or resetting.**
- **Open, Close, Seat and Seal™.**
- **Fully guided disk keeps the disk properly alligned, opening and closing, helping to reseat the valve.**
- **Mechanical Stop prevents wear on parts and controls valve lift.**
- **Low rated and fully guided spring allows for more consistent set pressures from pop to pop.**
- **Pop Action relief allows valve to go to full lift at set pressure. Helps with DOT regulated applications.**
- **Built in accordance with the requirements of ASME Boiler and Pressure Vessel Code. Sec. VIII Div 1.**
- **Non-rising stems allowing valves to be installed in small areas.**

9100 Series Threaded Specifications

Orifice Letter	C	D	E	F	G	H	J	K
Standard Inlet Sizes	1/2", 3/4", 1"	3/4", 1"	3/4", 1"	1 1/2", 2"	1 1/2", 2"	1 1/2", 2"	2", 3"	3"
Inlet and Outlet Connection Types Available	Male NPT x Female NPT or Female NPT x Female NPT							
Actual Orifice Diameter (in)	.281	.394	.520	.655	.775	1.050	1.350	1.625
Actual Orifice Area (in^2)	.062	.122	.212	.337	.472	.865	1.430	2.074
API Orifice Area (in^2)	- - -	.110	.196	.307	.503	.785	1.287	1.838
Pressure Ranges (psi)	15 to 2999	15 to 2999	15 to 2400	15 to 2400	15 to 2000	15 to 2000	15 to 800	15 to 750
Standard Temperature Range (°F)	-20 to 400	-20 to 400	-20 to 400	-20 to 400	-20 to 400	-20 to 400	-20 to 400	-20 to 400
ASME Flow Coefficient, K_d (Gas)	.818	.818	.818	.818	.818	.818	.818	.818
ASME Flow Coefficient, K_d (Liquid)	.707	.707	.707	.707	.707	.707	.707	.707

NOTE: Mercer Valve reserves the right to change product designs and specifications without notice.

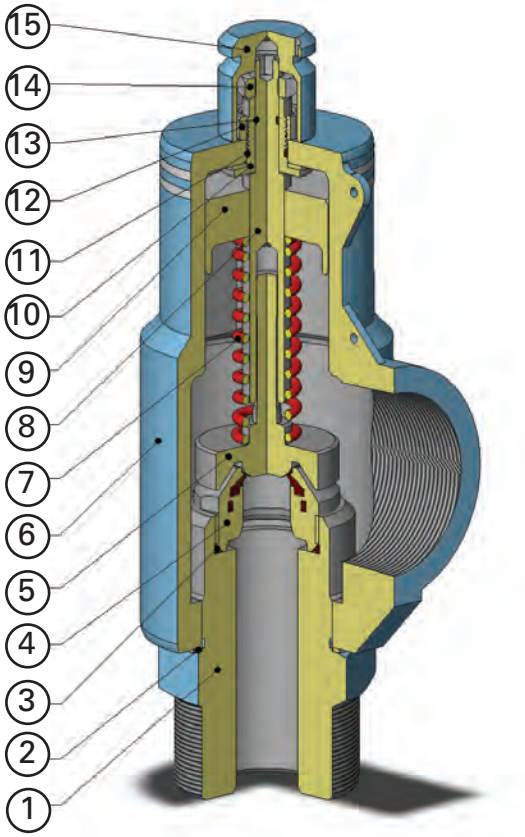
9100 Series Threaded Parts and Materials



9100 SERIES THREADED C , D , & E ORIFICES

ITEM NO	PART NAME	STANDARD MATERIALS
1	INLET BASE	CARBON STEEL
2	BASE SEAL	SOFT STEEL
3	NOZZLE O-RING	VITON
4	NOZZLE SUBASSEMBLY	STAINLESS STEEL WITH SOFT SEAT
5	DISK SUBASSEMBLY	STAINLESS STEEL
6	BODY SUBASSEMBLY	CARBON STEEL
7	SET SPRING	STAINLESS STEEL
8	ADJUSTMENT SCREW	STAINLESS STEEL
9	ADJUSTMENT BUSHING	STAINLESS STEEL
10	CENTER BUSHING	STAINLESS STEEL
11	ADJUSTMENT SCREW O-RING	BUNA N
12	CENTER BUSHING O-RING	BUNA N
13	WASHER	CARBON STEEL
14	LOCKNUT	CARBON STEEL
15	CLOSED CAP	ALUMINUM ALLOY

NOTE: Mercer Valve reserves the right to change product designs and specifications without notice.



9100 SERIES THREADED F & G ORIFICES

ITEM NO	PART NAME	STANDARD MATERIALS
1	INLET BASE	CARBON STEEL
2	BASE SEAL	SOFT STEEL
3	NOZZLE O-RING	VITON
4	NOZZLE SUBASSEMBLY	STAINLESS STEEL WITH SOFT SEAT
5	DISK SUBASSEMBLY	STAINLESS STEEL
6	BODY SUBASSEMBLY	CARBON STEEL
7	SET SPRING	STAINLESS STEEL
8	ADJUSTMENT SCREW	STAINLESS STEEL
9	ADJUSTMENT BUSHING	STAINLESS STEEL
10	CENTER BUSHING	STAINLESS STEEL
11	CENTER BUSHING O-RING	BUNA N
12	CENTERNUT	CARBON STEEL
13	ADJUSTMENT SCREW O-RING	BUNA N
14	LOCKNUT	CARBON STEEL
15	CLOSED CAP	ALUMINUM ALLOY

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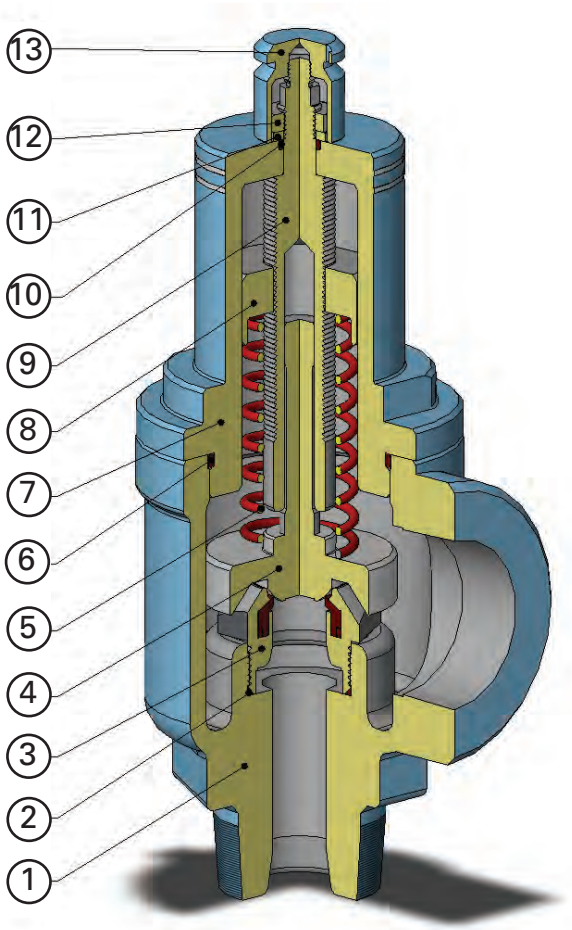
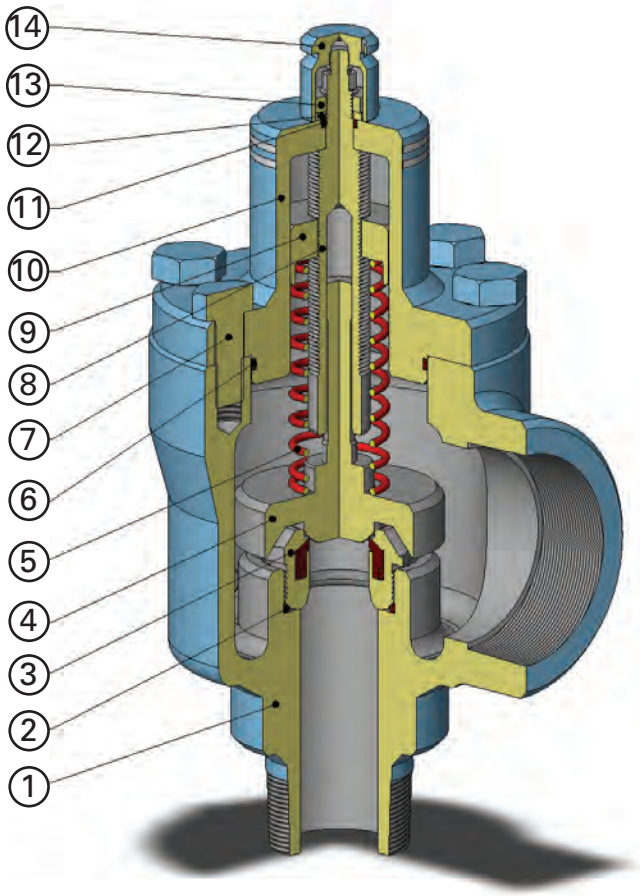


9100 SERIES THREADED H ORIFICE

ITEM NO	PART NAME	STANDARD MATERIALS
1	BODY SUBASSEMBLY	CARBON STEEL
2	NOZZLE O-RING	VITON
3	NOZZLE SUBASSEMBLY	STAINLESS STEEL WITH SOFT SEAT
4	DISK SUBASSEMBLY	STAINLESS STEEL
5	SET SPRING	STAINLESS STEEL
6	BONNET O-RING	BUNA N
7	BONNET	CARBON STEEL
8	ADJUSTMENT BUSHING	STAINLESS STEEL
9	ADJUSTMENT SCREW	STAINLESS STEEL
10	ADJUSTMENT SCREW O-RING	BUNA N
11	WASHER	CARBON STEEL
12	LOCKNUT	CARBON STEEL
13	CLOSED CAP	ALUMINUM ALLOY

NOTE: Mercer Valve reserves the right to change product designs and specifications without notice.



9100 SERIES THREADED J & K ORIFICES

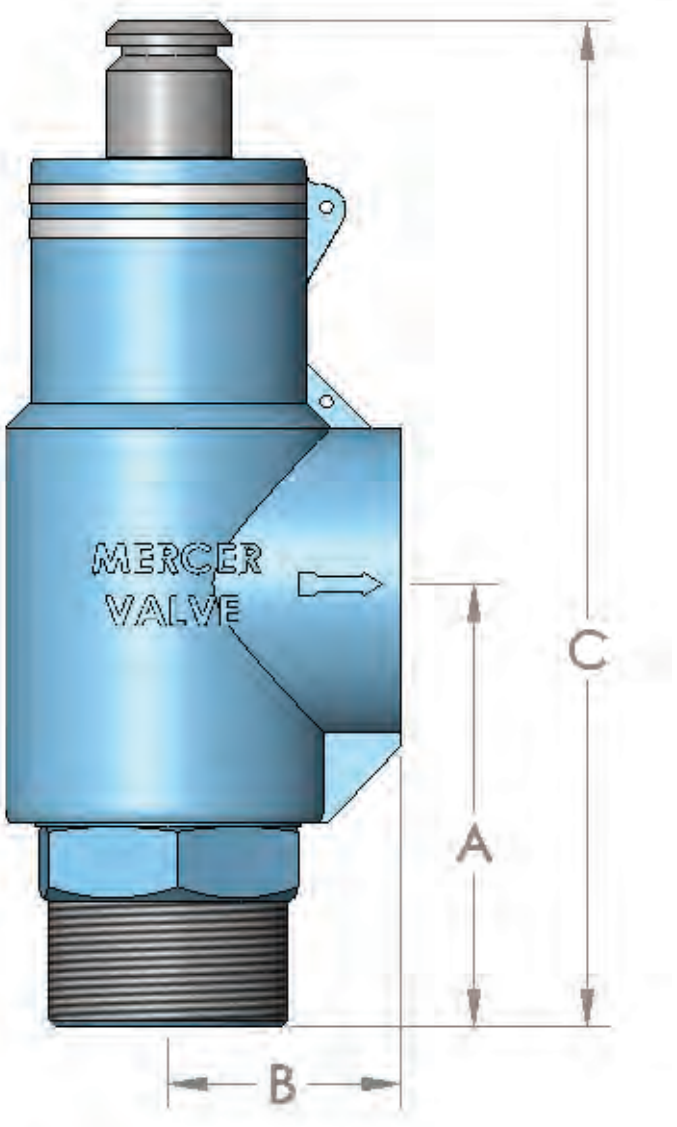
ITEM NO	PART NAME	STANDARD MATERIALS
1	BODY SUBASSEMBLY	CARBON STEEL
2	NOZZLE O-RING	VITON
3	NOZZLE SUBASSEMBLY	STAINLESS STEEL WITH SOFT SEAT
4	DISK SUBASSEMBLY	STAINLESS STEEL
5	SET SPRING	STAINLESS STEEL
6	BONNET O-RING	BUNA N
7	BONNET BOLTS	ALLOY STEEL
8	ADJUSTMENT SCREW	STAINLESS STEEL
9	ADJUSTMENT BUSHING	STAINLESS STEEL
10	BONNET SUBASSEMBLY	CARBON STEEL
11	ADJUSTMENT SCREW O-RING	BUNA N
12	WASHER	CARBON STEEL
13	LOCKNUT	CARBON STEEL
14	CLOSED CAP	ALUMINUM ALLOY

NOTE: Mercer Valve reserves the right to change product designs and specifications without notice.

INLET AND OUTLET CODE	INLET AND OUTLET SIZE	ORIFICE AVAILABLE	PRESSURE LIMIT (psi)	DIMENSIONS "A" X "B" X "C" (IN.) + 1/16	APPROX. WEIGHT (lbs.)
05	1/2" FNPT x 1" FNPT	C	15 - 2999	2-1/4 x 1-7/8 x 7-1/16	4.5
06	1/2" MNPT x 1" FNPT	C	15 - 2999	3-1/4 x 1-7/8 x 8	4.5
11	3/4" FNPT x 1" FNPT	C , D	15 - 2999	2-1/4 x 1-7/8 x 7-1/16	4.5
11	3/4" FNPT x 1" FNPT	E	15 - 2400	2-1/4 x 1-7/8 x 7-1/16	4.5
12	3/4" MNPT x 1" FNPT	C , D	15 - 2999	3-1/4 x 1-7/8 x 8	4.5
12	3/4" MNPT x 1" FNPT	E	15 - 2400	3-1/4 x 1-7/8 x 8	4.5
16	1" FNPT x 1" FNPT	C , D	15 - 2999	3-1/4 x 1-7/8 x 8	4.5
16	1" FNPT x 1" FNPT	E	15 - 2400	3-1/4 x 1-7/8 x 8	4.5
17	1" MNPT x 1" FNPT	C , D	15 - 2999	3-1/4 x 1-7/8 x 8	4.5
17	1" MNPT x 1" FNPT	E	15 - 2400	3-1/4 x 1-7/8 x 8	4.5
22	1" FNPT x 1 1/2" FNPT	C , D	15 - 2999	3-3/8 x 2-3/8 x 9	10.5
22	1" FNPT x 1 1/2" FNPT	E	15 - 2400	3-3/8 x 2-3/8 x 9	10.5
23	1" MNPT x 1 1/2" FNPT	C , D	15 - 2999	4-1/2 x 2-3/8 x 9-5/8	11
23	1" MNPT x 1 1/2" FNPT	E	15 - 2400	4-1/2 x 2-3/8 x 9-5/8	11
27	1" FNPT x 2" FNPT	C , D	15 - 2999	3-3/8 x 2-3/8 x 9	10.5
27	1" FNPT x 2" FNPT	E	15 - 2400	3-3/8 x 2-3/8 x 9	10.5
28	1" MNPT x 2" FNPT	C , D	15 - 2999	4-1/2 x 2-3/8 x 9-5/8	11
28	1" MNPT x 2" FNPT	E	15 - 2400	4-1/2 x 2-3/8 x 9-5/8	11
33	1 1/2" FNPT x 2" FNPT	F	15 - 2400	4-5/8 x 2-3/8 x 10-5/16	11.5
33	1 1/2" FNPT x 2" FNPT	G	15 - 2000	4-5/8 x 2-3/8 x 10-5/16	11.5
34	1 1/2" MNPT x 2" FNPT	F	15 - 2400	4-7/16 x 2-3/8 x 10-1/16	11
34	1 1/2" MNPT x 2" FNPT	G	15 - 2000	4-7/16 x 2-3/8 x 10-1/16	11
33	1 1/2" FNPT x 2" FNPT	H	15 - 850	3 x 3 x 10-3/4	22
34	1 1/2" MNPT x 2" FNPT	H	15 - 850	4-1/4 x 3 x 12	22.5
42	2" FNPT x 2" FNPT	F	15 - 2400	4-5/8 x 2-3/8 x 10-5/16	12
42	2" FNPT x 2" FNPT	G	15 - 2000	4-5/8 x 2-3/8 x 10-5/16	12
43	2" MNPT x 2" FNPT	F	15 - 2400	4-7/16 x 2-3/8 x 10-1/16	12
43	2" MNPT x 2" FNPT	G	15 - 2000	4-7/16 x 2-3/8 x 10-1/16	12
42	2" FNPT x 2" FNPT	H	15 - 850	3 x 3 x 10-3/4	22
43	2" MNPT x 2" FNPT	H	15 - 850	4-1/4 x 3 x 12	23
46	2" FNPT x 2 1/2" FNPT	H	15 - 850	3 x 3 x 10-3/4	22
46	2" FNPT x 2 1/2" FNPT	H	851 - 2000	3 x 3 x 13-1/8	28
47	2" MNPT x 2 1/2" FNPT	H	15 - 850	4-1/4 x 3 x 12	23
47	2" MNPT x 2 1/2" FNPT	H	851 – 2000	4-1/4 x 3 x 14-1/2	29

INLET AND OUTLET CODE	INLET AND OUTLET SIZE	ORIFICE AVAILABLE	PRESSURE LIMIT (psi)	DIMENSIONS "A" X "B" X "C" (IN.) + 1/16	APPROX. WEIGHT (lbs.)
51	2" FNPT x 3" FNPT	J	15 – 450	3-3/4 x 4-1/4 x 11-3/4	41
51	2" FNPT x 3" FNPT	J	451 – 800	3-3/4 x 4-1/4 x 15-5/16	52
52	2" MNPT x 3" FNPT	J	15 – 450	5-1/2 x 4-1/4 x 13-3/8	42
52	2" MNPT x 3" FNPT	J	451 – 800	5-1/2 x 4-1/4 x 17-1/16	53
61	3" MNPT x 3" FNPT	J	15 – 450	5-1/2 x 4-1/4 x 13-1/2	44
61	3" MNPT x 3" FNPT	J	451 – 800	5-1/2 x 4-1/4 x 17-1/4	55
61	3" MNPT x 3" FNPT	K	15 – 285	5-1/2 x 4-1/4 x 13-1/2	46
61	3" MNPT x 3" FNPT	K	286 - 750	5-1/2 x 4-1/4 x 17-1/4	57

NOTE: Mercer Valve reserves the right to change product designs and specifications without notice.



CAPACITY IN SCFM OF AIR AT 60°F AND STD ATMOSPHERIC CONDITIONS

Set Pressure (psi)	C 0.062	D 0.122	E 0.212	F 0.337	G 0.472	H 0.865	J 1.43	K 2.074
15	30	60	104	165	231	424	701	1017
20	35	69	120	191	267	489	808	1172
25	40	78	136	216	302	554	916	1328
30	44	87	152	241	338	619	1023	1483
50	65	128	222	352	493	904	1495	2168
75	90	178	309	491	688	1261	2084	3023
100	116	228	396	630	883	1617	2674	3878
125	141	278	484	769	1077	1974	3264	4733
150	167	329	571	908	1272	2331	3853	5589
200	218	429	746	1186	1661	3044	5033	7299
300	320	631	1096	1742	2440	4471	7391	10720
400	423	832	1445	2298	3218	5898	9750	14141
500	525	1033	1795	2854	3997	7324	12109	17562
600	627	1234	2145	3409	4775	8751	14467	20983
700	730	1435	2494	3965	5554	10178	16826	24403
800	832	1637	2844	4521	6332	11605	19185	
900	934	1838	3194	5077	7111	13031		
1000	1036	2039	3544	5633	7889	14458		
1100	1139	2240	3893	6189	8668	15885		
1250	1292	2542	4418	7022	9836	18025		
1500	1548	3045	5292	8412	11782	21592		
2000	2059	4051	7040	11191	15675	28726		
2400	2468	4856	8439	13415				
2600	2673	5259						
2800	2877	5661						
2999	3081	6062						

CAPACITY IN SCFM OF 0.6 SG NATURAL GAS AT 60°F AND STD ATMOSPHERIC CONDITIONS

Set Pressure (psi)	C 0.062	D 0.122	E 0.212	F 0.337	G 0.472	H 0.865	J 1.43	K 2.074
15	38	75	130	206	289	529	875	1269
20	44	86	150	238	333	610	1008	1463
25	50	97	169	269	377	691	1142	1657
30	55	109	189	301	421	772	1276	1851
50	81	159	276	439	615	1128	1864	2704
75	113	222	385	613	858	1573	2600	3771
100	145	285	495	786	1101	2018	3336	4838
125	177	347	604	959	1344	2463	4071	5905
150	208	410	713	1133	1587	2908	4807	6972
200	272	536	931	1480	2072	3798	6278	9105
300	400	787	1367	2173	3043	5577	9220	13373
400	527	1038	1803	2866	4015	7357	12163	17640
500	655	1289	2239	3560	4986	9137	15105	21908
600	782	1540	2676	4253	5957	10917	18048	26175
700	910	1791	3112	4947	6928	12697	20990	30443
800	1038	2042	3548	5640	7899	14477	23932	
900	1165	2293	3984	6333	8871	16256		
1000	1293	2544	4420	7027	9842	18036		
1100	1420	2795	4857	7720	10813	19816		
1250	1612	3171	5511	8760	12270	22486		
1500	1931	3799	6602	10494	14698	26935		
2000	2568	5054	8783	13961	19554	35835		
2400	3079	6058	10527	16735				
2600	3334	6560						
2800	3589	7062						
2999	3843	7562						

CAPACITY IN MMSCFD OF 0.6 SG NATURAL GAS AT 60°F AND STD ATMOSPHERIC CONDITIONS

Set Pressure (psi)	C 0.062	D 0.122	E 0.212	F 0.337	G 0.472	H 0.865	J 1.43	K 2.074
15	0.05	0.11	0.19	.030	0.42	0.76	1.26	1.83
20	0.06	0.12	0.22	0.34	0.48	0.88	1.45	2.11
25	0.07	0.14	0.24	0.39	0.54	0.99	1.64	2.39
30	0.08	0.16	0.27	0.43	0.61	1.11	1.84	2.66
50	0.12	0.23	0.40	0.63	0.89	1.62	2.68	3.89
75	0.16	0.32	0.56	0.88	1.24	2.26	3.74	5.43
100	0.21	0.41	0.71	1.13	1.59	2.91	4.80	6.97
125	0.25	0.50	0.87	1.38	1.94	3.55	5.86	8.50
150	0.30	0.59	1.03	1.63	2.28	4.19	6.92	10.04
200	0.39	0.77	1.34	2.13	2.98	5.47	9.04	13.11
300	0.58	1.13	1.97	3.13	4.38	8.03	13.28	19.26
400	0.76	1.49	2.60	4.13	5.78	10.59	17.51	25.40
500	0.94	1.86	3.22	5.13	7.18	13.16	21.75	31.55
600	1.13	2.22	3.85	6.12	8.58	15.72	25.99	37.69
700	1.31	2.58	4.48	7.12	9.98	18.28	30.23	43.84
800	1.49	2.94	5.11	8.12	11.38	20.85	34.46	
900	1.68	3.30	5.74	9.12	12.77	23.41		
1000	1.86	3.66	6.37	10.12	14.17	25.97		
1100	2.05	4.02	6.99	11.12	15.57	28.54		
1250	2.32	4.57	7.94	12.62	17.67	32.38		
1500	2.78	5.47	9.51	15.11	21.17	38.79		
2000	3.70	7.28	12.65	20.10	28.16	51.60		
2400	4.43	8.72	15.16	24.10				
2600	4.80	9.45						
2800	5.17	10.17						
2999	5.53	10.89						

CAPACITY IN GPM WATER AT 60°F AND STD ATMOSPHERIC CONDITIONS

Set Pressure (psi)	C 0.062	D 0.122	E 0.212	F 0.337	G 0.472	H 0.865	J 1.43	K 2.074
15	7	14	24	38	54	99	163	236
20	8	16	27	43	61	111	184	267
25	9	17	30	48	67	123	203	295
30	10	19	33	52	73	133	221	320
50	12	24	42	67	94	172	285	413
75	15	30	52	82	115	211	349	506
100	17	34	60	95	133	244	403	584
125	20	38	67	106	149	272	450	653
150	21	42	73	116	163	299	493	716
200	25	49	84	134	188	345	570	826
300	30	60	103	164	230	422	698	1012
400	35	69	119	190	266	487	806	1169
500	39	77	134	212	297	545	901	1307
600	43	84	146	233	326	597	987	1431
700	46	91	158	251	352	645	1066	1546
800	49	97	169	269	376	689	1140	
900	52	103	179	285	399	731		
1000	55	109	189	300	421	771		
1100	58	114	198	315	441	808		
1250	62	122	211	336	470	862		
1500	68	133	231	368	515	944		
2000	78	154	267	425	595	1090		
2400	86	168	293	465				
2600	89	175						
2800	92	182						
2999	96	188						

9100 Series Threaded Product Numbering System

91 - 17 D 5 1

VALVE SERIES

91 – 9100 Series

INLET & OUTLET COMBINATION

(See Selection Table on pages 8 & 9)

ORIFICE SIZE

C to K

INLET BASE & BODY MATERIAL

5 – CARBON STEEL/WCB CARBON STEEL

6 – 316 STNLS STL/WCB CARBON STEEL

7 – 316 STNLS STL/CF3M STAINLESS STEEL

CAP TYPE

1 – CLOSED CAP

2 – OPEN LIFT LEVER

3 – CLOSED LIFT LEVER

4 – CLOSED CAP W/STAINLESS STEEL BONNET (H - K ORIFICE)

5 – OPEN LIFT LEVER W/STAINLESS STEEL BONNET (H - K ORIFICE)

6 – CLOSED LIFT LEVER W/STAINLESS STEEL BONNET (H - K ORIFICE)

CONSULT FACTORY FOR ADDITIONAL INFORMATION AND OPTIONS

NOTE: Mercer Valve reserves the right to change product designs and specifications without notice.

V 06 I 1 ___ ___

2 – DIGIT "SPECIAL" CODE
(IF APPLICABLE ASSIGNED BY MERCER)

O-RING MATERIAL

1 – STANDARD O-RINGS
(VITON & BUNA-N)

TRIM CODES

U – 316 S.S. DISK & NOZZLE (STD GAS SERVICE F,G,H,J,&K ORIFICES)*

I – 17-4 S.S. DISK & NOZZLE (STD GAS SERVICE D&E ORIFICES)

C – 440C S.S. DISK, 17-4 S.S. NOZZLE (STD GAS SERVICE C ORIFICE AND HIGH PRESSURE F,G,H,)*

L – LIQUID SERVICE 316 S.S. DISK & NOZZLE

N – SOUR GAS SERVICE 316 S.S. DISK & NOZZLE

B – SOUR LIQUID SERVICE 316 S.S. DISK & NOZZLE

SPRING CODE
(ASSIGNED BY MERCER)

SEAT MATERIAL

V – VITON 90 DURO

T – 15% GLASS FILLED TEFLON

P – VIRGIN PEEK

* = U TRIM CODE CHANGES TO C TRIM CODE AT F > 1399psi, G > 1199psi, H > 1049psi

9100 SERIES CATALOG

CORPORATE HEADQUARTERS
9609 NW 4th STREET
OKLAHOMA CITY, OK 73127
1-800-833-6402
PHONE: (405) 495-6533, FAX: (405) 495-8728
SALES@MERCERVALVE.NET

HOUSTON BRANCH OFFICE
6218 LONG DRIVE
HOUSTON, TX 77087
1-866-833-6402
PHONE: (713) 242-6960, FAX: (713) 242-6963
HOUSTON@MERCERVALVE.NET

CALGARY BRANCH OFFICE
#203, 2835 23rd St. NE
CALGARY, ALBERTA T2E 7A4
PHONE: (403) 250-5557, FAX: (403) 250-5661
CANADA@MERCERVALVE.NET

BRIDGEPORT, TX BRANCH OFFICE
5758 US Highway 380
BRIDGEPORT, TX 76426-6421
1-866-683-9002
PHONE: (940) 683-9002, FAX: (940) 683-9004
BRIDGEPORT@MERCERVALVE.NET

CHICAGO BRANCH OFFICE
CUSTOMER RELATIONS DEPARTMENT
P.O. Box 597
Libertyville, IL 60048
1-800-833-6402
CHICAGO@MERCERVALVE.NET

WWW.MERCERVALVE.NET

SRV 119

MERCER
91-12E51T13I1/500
VALVE-RELIEF 500# MERCER E-ORF
¾ MNPT IN x 1 FNPT OUT 1750 SCFM

ANGI PART NUMBER 331-08019

REBUILT KIT- 761-07541 (1E1T1I2)

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MERCER VALVE CO., INC.
"Auto Seat Technology"®

Post Office Box 270970
Oklahoma City, Oklahoma 73137
FAX # (405) 495-8728

MERCER VALVE COMPANY, INC.
9100 SERIES THREADED SAFETY RELIEF VALVES

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

INSTALLATION

The safety relief valve should always be installed on a tank or piping run in the vertical position with the valve outlet pointing in a horizontal direction. When screwing the valve into the inlet piping, always use the wrench flats on the inlet connection. Never put a wrench on the relief valve body.

One of the most common causes of early failure of relief valves is dirt trapped on the valve seat. Welding slag and/or piping Teflon tape are among the more common items that cause difficulty. It is recommended that all piping and tank systems be cleaned prior to installation of the relief valve.

A relief valve should be connected with the minimum amount of piping between the tank and valve. Further, all piping used must be equal or larger than the inlet pipe size of the relief valve, never smaller. Any restriction of the inlet to a relief valve may cause unusual valve chatter, which could result in serious damage to the valve. Piping restrictions can also can also cause the valve to not relieve its full capacity causing the valve not to be able to reduce the pressure increase. Outlet piping from the relief valve should be less than four (4) feet in length and never of a pipe size smaller than the outlet pipe size of the relief valve. Long runs of small diameter pipe on the outlet side of a relief valve will create valve chatter and a capacity reduction that can cause the system to not be protected.

Extreme caution is required in the outlet piping if installed where liquids, if present, could form an ice block in the piping of the relief valve body in below freezing conditions. Discharge lines must be "weathered capped" and provided with a drain hole to prevent any liquid collection in the relief valve body or outlet piping. This liquid can freeze and cause the valve to not open or reduce the capacity of the valve. If these precautions are not taken the valves will not protect the system.

Additional, important installation information is contained in Paragraph UG-135, Section VIII of the ASME Code.

OPERATION

For best performance in process work is usually obtained by setting the safety relief valve to open at least 15% above the operating pressure where possible. A greater margin is desirable. However, this setting must not exceed the maximum working pressure of the vessel. All Mercer 9100 Series Safety Relief Valves are checked for bubble-tight per API 527.

In Addition to checking the set pressure versus the maximum allowable working pressure of the vessel, also check to insure that back pressure and temperature limitations of the process are consistent with valve ratings. The fluid state, capacity, temperature, set pressure, and back pressure can all be found on the tag of the valve. Pressures and Temperatures outside the normal ranges require special materials. Further, carefully check the process fluid input capacities to insure that the relief valve capacity is greater than the process capacities.

DO NOT BREAK THE SEAL WIRE Breaking the seal wire invalidates the manufacture's warranty to repair or replace the valve. If resetting is required in a field emergency situation a qualified personnel with calibrated instrumentation should perform it. With a broken seal wire this valve will be considered a non ASME code valve until it has been repaired by a VR certified repair shop.

DISASSEMBLY: **The following general procedure is recommended in disassembly inspection and cleaning of the relief valve:**

1. **Cut the wire seal and unscrew the cap to expose the adjustment screw.**
2. **Loosen the lock nut and relieve the tension on the spring by turning the adjustment screw counter clockwise. This will relieve the spring tension.**
3. **Secure the valve body so that it will not move**
   For orifice sizes C to G, unscrew and remove the inlet base
   For orifice size of H, unscrew and remove the bonnet
   For orifice sizes J and K, unbolt and remove the bonnet
4. **Inspect the replaceable seat for cuts and abrasions. If there are only minor scratches or abrasions on the seat, polish the seat area lightly with Scotch-Brite #7447. Be careful not to damage the soft seat. If the seat is damaged with deep abrasions and cuts, replace the nozzle/seat subassembly.**
5. **Refer to Figure 1 and measure the diameter of Ds with a precision caliper. This diameter must be in the range of values listed in Table 1. If this is not the case, replace the nozzle/seat subassembly.**

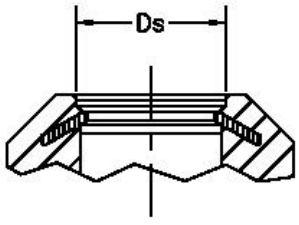


FIGURE 1

TABLE 1

ORIFICE SIZE	DIAMETER Ds (INCHES)	
	MINIMUM	MAXIMUM
"C"	.335	.337
"D"	.480	.482
"E"	.620	.622
"F"	.778	.780
"G"	.914	.916
"H"	1.242	1.2465
"J"	1.599	1.6025
"K"	1.899	1.903

6. **Remove and inspect the disk subassembly, especially the spherical surface portion that engages the seat. This surface must be clean and smooth. Polishing this surface with Scotch-Brite #7447 may restore the disk if it has only minor imperfections. If the spherical surface is damaged or scratched, replace the disk subassembly**

7. **Refer to Figure 2 and measure the diameter of Dd with a precision caliper. This diameter must be within the range of values listed in Table 2. If this is not the case, replace the disk subassembly.**

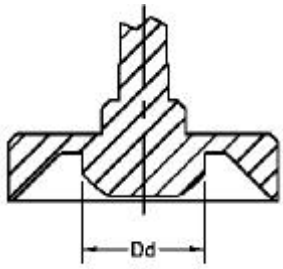


FIGURE 2

TABLE 2

ORIFICE SIZE	DIAMETER Dd (INCHES)	
	MINIMUM	MAXIMUM
"C"	.331	.333
"D"	.474	.477
"E"	.614	.616
"F"	.768	.771
"G"	.904	.906
"H"	1.228	1.231
"J"	1.580	1.583
"K"	1.876	1.880

8. **Check the disk stem of the disk subassembly to insure that the surface is smooth. Polish the stem if necessary with Scotch-Brite or fine emery. If the stem is galled, replace the disk subassembly.**
9. **Remove the spring and inspect for wear or damage. Clean and replace the spring if necessary. Be sure the spring is straight and square. If not replace the spring.**
10. **Remove the adjustment screw and guide bushing by tapping on the top of the adjustment screw with a "soft" drive rod. The guide bushing is designed to "slip fit" into the internal machined bore of the body. This "slip fit" must be maintained by cleaning the outside diameter of the guide bushing and internal bore of the valve body.**
11. **Replace the o-ring found on the adjustment screw stem.**
12. **DO NOT REMOVE THE CENTER NUT OR INDEX BRACKET SUBASSEMBLY. They are permanently installed at the factory. The purpose of the index bracket subassembly is to prevent rotation of the guide bushing. A body side pin is used in the 9100 "C" AND "D" orifices in place of the index bracket.**
13. **Lubricate the outside diameter of the adjustment screw thread, outside diameter of the guide bushing, the adjustment screw o-ring and the internal upper machined bore of the valve body with a good lubricating grease.**

REASSEMBLY: **The following general procedure is recommended in reassembly and setting of the valve:**

1. **Before reinstalling the adjustment screw and guide bushing, position the adjustment screw with the upper end of the thread protruding 1/8" from the end of the guide bushing. Carefully "slip fit" this assembly into the body, fitting the index bracket leg or body side pin into the slotted portion of the guide bushing. Note that the guide bushing must slip into the valve bore freely but with little radial play. Remove and reclean parts if the parts do not easy fit in. DO NOT FORCE THE GUIDE BUSHING INTO THE VALVE BODY. Forcing the parts may restrict valve lift and cause serious malfunction.**
2. **Swab out the internal bore of the adjustment screw to insure that is is clean and free from obstructions like dirt and grease.**
3. **Before reinstalling the spring, insert the disk subassembly into the bore of the adjustment screw and simulate the valve opening operation. The disk stem must slide freely within the bore of the adjustment screw.**
4. **Reinstall the spring and the disk subassembly. The spring should slide over the disk freely without sticking. Make sure the correct spring is installed.**
5. **Install the nozzle subassembly into the inlet base or body, for whichever applies.**
6. **For bottom entry valves reinstall the inlet base subassembly using a new base seal. Caution, the inlet base must be tight against the base seal and body.**
   For top entry valves reinstall the bonnet subassembly.
   Make sure the disk and nozzle are aligned.
7. **Check the lift of the valve by inhering a properly shaped drive rod in an arbor press into the internal bore of the inlet base and pressing on the nose of the disk subassembly. Apply a slight spring tension to the valve disk. Measure the "lift" of the valve with a dial indicator. The minimum lift can be found in NB-18 on the National Board website www.nationalboard.org.**
8. **Reinstall the lock nut and the valve is ready for setting. Valve setting at all pressures is dangerous. All eye and ear safety precautions should be observed.**
9. **Resetting should be performed on an air/gas test stand or a liquid test stand depending on the service of the valve. The test stand should have a volume under the valve of at least one (1) cubic foot capacity of the type recommended by the National Board. Test gauges should be a minimum of 6" dial with .25% accuracy. The gages should be dead weight verified for accuracy.**

10. **Repeated "popping" at set pressure is recommended. The valve should be popped approximately five (5) to ten (10) times during the setting process allowing full blowdowns.**
11. **A slight audible warning action is to be expected, starting approximately 5% below the set pressure.**
12. **All valves should be bubble tight at 10% below set pressure in accordance with API 527.**
13. **When the valve is set, tighten the lock nut securely so at least 1/4" of the stem is exposed above the lock nut. The adjustment screw must not turn when the lock nut is tightened. This will affect the set pressure. Pop the valve once more after the lock nut is tightened to verify the set pressure.**
14. **Reinstall the cap and a new lockwire. Close the lockwire and crimp the lead seal.**

BACK PRESSURE TESTING **The purpose of back pressure testing Mercer Safety Relief Valves is to check for leaks in the secondary pressure zone (the outlet side of the relief valve). This includes the body, bonnet, outlet flange and all parts included in the upper valve assembly. This is best performed before the valve seal wire has been attached.**

The back pressure test is performed after the valve has been assembled and set to the correct set pressure. The test is performed by attaching a pressure source to the outlet of the valve and submerging the valve in a solution of water treated with rust inhibitor. The pressure in the secondary pressure zone is then brought to 30 psig or to what the back pressure the valve will see. This is the pressure required by the ASME BOILER AND PRESSURE VESSEL CODE, SECTION VIII. PART UG-136(d) "Production Testing by Manufacturers and Assemblers". The valve is then visually inspected for any leaks by checking for bubbles coming from any part of the valve. If any part of the valve is producing bubbles, the valve is disassembled, repaired and the valve is reassembled and retested. If no leaks are detected, the valve is stamped with the appropriate set pressure, the valve then goes to the finishing department to be painted, tagged, and prepared for shipping.

MERCER VALVE COMPANY, INC.
9100 SERIES THREADED SAFETY RELIEF VALVES

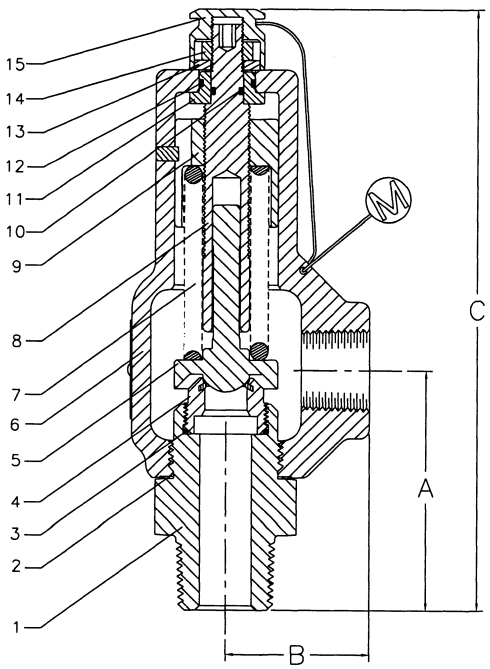
INSTALLATION, OPERATION AND MAINTENANCE MANUAL

"C", "D", AND "E" ORIFICE STANDARD BILL OF MATERIALS

"C" ORIFICE DIAMETER: .281 In.
"C" ORIFICE AREA: .062 Sq.In.
SET PRESSURE RANGE: 15-2999 PSI

"D" ORIFICE DIAMETER: .394 In.
"D" ORIFICE AREA: .122 Sq.In.
SET PRESSURE RANGE: 15-2999 PSI

"E" ORIFICE DIAMETER: .520 In.
"E" ORIFICE AREA: .212 Sq.In.
SET PRESSURE RANGE: 15-2400 PSI



"C", "D", and "E" Orifice

"C", "D", AND "E" ORIFICE				
ITEM NO.	PART NAME	"C" ORIFICE STD MTRLS "C" TRIM CODE	"D" & "E" STD MTRLS "I" TRIM CODE	"C", "D", "E" OPTIONS "U", "L", "N", OR "B" CODE
1	Inlet Base	Carbon Steel or 316 Stainless Steel	Carbon Steel or 316 Stainless Steel	Carbon Steel or 316 Stainless Steel
2	Base Seal	Carbon Steel or 316 Stainless Steel	Carbon Steel or 316 Stainless Steel	Carbon Steel or 316 Stainless Steel
3	O'Ring	Viton	Viton	Viton
4	Nozzle Subassy	17-4 Stainless Steel with Soft Seat	17-4 Stainless Steel with Soft Seat	316 Stainless Steel with Soft Seat
5	Disk Subassy	440C Stainless Steel	17-4 Stainless Steel	316 Stainless Steel
6	Body	WCB Carbon Steel or CF3M Stainless Steel	WCB Carbon Steel or CF3M Stainless Steel	WCB Carbon Steel or CF3M Stainless Steel
7	Spring	17-7 Stainless Steel	17-7 Stainless Steel	17-7 Stainless Steel or Inconel X-750 (NACE)
8	Adjustment Screw	300 Series Stainless Steel	300 Series Stainless Steel	300 Series Stainless Steel
9	Adjustment Bushing	300 Series Stainless Steel	300 Series Stainless Steel	300 Series Stainless Steel
10	O'Ring	Buna N	Buna N	Buna N
11	Center Bushing	300 Series Stainless Steel	300 Series Stainless Steel	300 Series Stainless Steel
12	O'Ring	Buna N	Buna N	Buna N
13	Washer	Carbon Steel	Carbon Steel	Carbon Steel
14	Lock Nut	Carbon Steel	Carbon Steel	Carbon Steel
15	Cap	Anodized Aluminum	Anodized Aluminum	Anodized Aluminum

SRV 140

MERCER
91-12C61P13C1 / 2000

RELIEF VALVE – 2000 PSI C-ORF
¾ MNPT IN x 1 FNPT OUT 4020 SCFM

ANGI PART NUMBER - 331-08040

REBUILD KIT - 1C1P1C2

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MERCER VALVE CO., INC.
"Auto Seat Technology"®

Post Office Box 270970
Oklahoma City, Oklahoma 73137
FAX # (405) 495-8728

MERCER VALVE COMPANY, INC.
9100 SERIES THREADED SAFETY RELIEF VALVES

INSTALLATION, OPERATION AND MAINTENANCE MANUAL

INSTALLATION

The safety relief valve should always be installed on a tank or piping run in the vertical position with the valve outlet pointing in a horizontal direction. When screwing the valve into the inlet piping, always use the wrench flats on the inlet connection. Never put a wrench on the relief valve body.

One of the most common causes of early failure of relief valves is dirt trapped on the valve seat. Welding slag and/or piping Teflon tape are among the more common items that cause difficulty. It is recommended that all piping and tank systems be cleaned prior to installation of the relief valve.

A relief valve should be connected with the minimum amount of piping between the tank and valve. Further, all piping used must be equal or larger than the inlet pipe size of the relief valve, never smaller. Any restriction of the inlet to a relief valve may cause unusual valve chatter, which could result in serious damage to the valve. Piping restrictions can also can also cause the valve to not relieve its full capacity causing the valve not to be able to reduce the pressure increase. Outlet piping from the relief valve should be less than four (4) feet in length and never of a pipe size smaller than the outlet pipe size of the relief valve. Long runs of small diameter pipe on the outlet side of a relief valve will create valve chatter and a capacity reduction that can cause the system to not be protected.

Extreme caution is required in the outlet piping if installed where liquids, if present, could form an ice block in the piping of the relief valve body in below freezing conditions. Discharge lines must be "weathered capped" and provided with a drain hole to prevent any liquid collection in the relief valve body or outlet piping. This liquid can freeze and cause the valve to not open or reduce the capacity of the valve. If these precautions are not taken the valves will not protect the system.

Additional, important installation information is contained in Paragraph UG-135, Section VIII of the ASME Code.

OPERATION

For best performance in process work is usually obtained by setting the safety relief valve to open at least 15% above the operating pressure where possible. A greater margin is desirable. However, this setting must not exceed the maximum working pressure of the vessel. All Mercer 9100 Series Safety Relief Valves are checked for bubble-tight per API 527.

In Addition to checking the set pressure versus the maximum allowable working pressure of the vessel, also check to insure that back pressure and temperature limitations of the process are consistent with valve ratings. The fluid state, capacity, temperature, set pressure, and back pressure can all be found on the tag of the valve. Pressures and Temperatures outside the normal ranges require special materials. Further, carefully check the process fluid input capacities to insure that the relief valve capacity is greater than the process capacities.

DO NOT BREAK THE SEAL WIRE Breaking the seal wire invalidates the manufacture's warranty to repair or replace the valve. If resetting is required in a field emergency situation a qualified personnel with calibrated instrumentation should perform it. With a broken seal wire this valve will be considered a non ASME code valve until it has been repaired by a VR certified repair shop.

DISASSEMBLY: **The following general procedure is recommended in disassembly inspection and cleaning of the relief valve:**

1. **Cut the wire seal and unscrew the cap to expose the adjustment screw.**
2. **Loosen the lock nut and relieve the tension on the spring by turning the adjustment screw counter clockwise. This will relieve the spring tension.**
3. **Secure the valve body so that it will not move**
   For orifice sizes C to G, unscrew and remove the inlet base
   For orifice size of H, unscrew and remove the bonnet
   For orifice sizes J and K, unbolt and remove the bonnet
4. **Inspect the replaceable seat for cuts and abrasions. If there are only minor scratches or abrasions on the seat, polish the seat area lightly with Scotch-Brite #7447. Be careful not to damage the soft seat. If the seat is damaged with deep abrasions and cuts, replace the nozzle/seat subassembly.**
5. **Refer to Figure 1 and measure the diameter of Ds with a precision caliper. This diameter must be in the range of values listed in Table 1. If this is not the case, replace the nozzle/seat subassembly.**

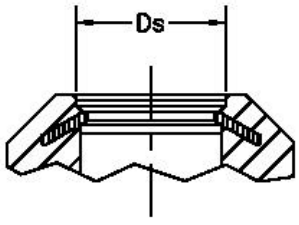


FIGURE 1

TABLE 1

ORIFICE SIZE	DIAMETER Ds (INCHES)	
	MINIMUM	MAXIMUM
"C"	.335	.337
"D"	.480	.482
"E"	.620	.622
"F"	.778	.780
"G"	.914	.916
"H"	1.242	1.2465
"J"	1.599	1.6025
"K"	1.899	1.903

6. **Remove and inspect the disk subassembly, especially the spherical surface portion that engages the seat. This surface must be clean and smooth. Polishing this surface with Scotch-Brite #7447 may restore the disk if it has only minor imperfections. If the spherical surface is damaged or scratched, replace the disk subassembly**

7. **Refer to Figure 2 and measure the diameter of Dd with a precision caliper. This diameter must be within the range of values listed in Table 2. If this is not the case, replace the disk subassembly.**

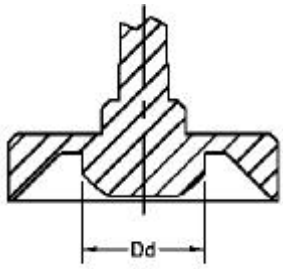


FIGURE 2

TABLE 2

ORIFICE SIZE	DIAMETER Dd (INCHES)	
	MINIMUM	MAXIMUM
"C"	.331	.333
"D"	.474	.477
"E"	.614	.616
"F"	.768	.771
"G"	.904	.906
"H"	1.228	1.231
"J"	1.580	1.583
"K"	1.876	1.880

8. **Check the disk stem of the disk subassembly to insure that the surface is smooth. Polish the stem if necessary with Scotch-Brite or fine emery. If the stem is galled, replace the disk subassembly.**
9. **Remove the spring and inspect for wear or damage. Clean and replace the spring if necessary. Be sure the spring is straight and square. If not replace the spring.**
10. **Remove the adjustment screw and guide bushing by tapping on the top of the adjustment screw with a "soft" drive rod. The guide bushing is designed to "slip fit" into the internal machined bore of the body. This "slip fit" must be maintained by cleaning the outside diameter of the guide bushing and internal bore of the valve body.**
11. **Replace the o-ring found on the adjustment screw stem.**
12. **DO NOT REMOVE THE CENTER NUT OR INDEX BRACKET SUBASSEMBLY. They are permanently installed at the factory. The purpose of the index bracket subassembly is to prevent rotation of the guide bushing. A body side pin is used in the 9100 "C" AND "D" orifices in place of the index bracket.**
13. **Lubricate the outside diameter of the adjustment screw thread, outside diameter of the guide bushing, the adjustment screw o-ring and the internal upper machined bore of the valve body with a good lubricating grease.**

REASSEMBLY: **The following general procedure is recommended in reassembly and setting of the valve:**

1. **Before reinstalling the adjustment screw and guide bushing, position the adjustment screw with the upper end of the thread protruding 1/8" from the end of the guide bushing. Carefully "slip fit" this assembly into the body, fitting the index bracket leg or body side pin into the slotted portion of the guide bushing. Note that the guide bushing must slip into the valve bore freely but with little radial play. Remove and reclean parts if the parts do not easy fit in. DO NOT FORCE THE GUIDE BUSHING INTO THE VALVE BODY. Forcing the parts may restrict valve lift and cause serious malfunction.**
2. **Swab out the internal bore of the adjustment screw to insure that is is clean and free from obstructions like dirt and grease.**
3. **Before reinstalling the spring, insert the disk subassembly into the bore of the adjustment screw and simulate the valve opening operation. The disk stem must slide freely within the bore of the adjustment screw.**
4. **Reinstall the spring and the disk subassembly. The spring should slide over the disk freely without sticking. Make sure the correct spring is installed.**
5. **Install the nozzle subassembly into the inlet base or body, for whichever applies.**
6. **For bottom entry valves reinstall the inlet base subassembly using a new base seal. Caution, the inlet base must be tight against the base seal and body.**
   For top entry valves reinstall the bonnet subassembly.
   Make sure the disk and nozzle are aligned.
7. **Check the lift of the valve by inhering a properly shaped drive rod in an arbor press into the internal bore of the inlet base and pressing on the nose of the disk subassembly. Apply a slight spring tension to the valve disk. Measure the "lift" of the valve with a dial indicator. The minimum lift can be found in NB-18 on the National Board website www.nationalboard.org.**
8. **Reinstall the lock nut and the valve is ready for setting. Valve setting at all pressures is dangerous. All eye and ear safety precautions should be observed.**
9. **Resetting should be performed on an air/gas test stand or a liquid test stand depending on the service of the valve. The test stand should have a volume under the valve of at least one (1) cubic foot capacity of the type recommended by the National Board. Test gauges should be a minimum of 6" dial with .25% accuracy. The gages should be dead weight verified for accuracy.**

10. **Repeated "popping" at set pressure is recommended. The valve should be popped approximately five (5) to ten (10) times during the setting process allowing full blowdowns.**
11. **A slight audible warning action is to be expected, starting approximately 5% below the set pressure.**
12. **All valves should be bubble tight at 10% below set pressure in accordance with API 527.**
13. **When the valve is set, tighten the lock nut securely so at least 1/4" of the stem is exposed above the lock nut. The adjustment screw must not turn when the lock nut is tightened. This will affect the set pressure. Pop the valve once more after the lock nut is tightened to verify the set pressure.**
14. **Reinstall the cap and a new lockwire. Close the lockwire and crimp the lead seal.**

BACK PRESSURE TESTING **The purpose of back pressure testing Mercer Safety Relief Valves is to check for leaks in the secondary pressure zone (the outlet side of the relief valve). This includes the body, bonnet, outlet flange and all parts included in the upper valve assembly. This is best performed before the valve seal wire has been attached.**

The back pressure test is performed after the valve has been assembled and set to the correct set pressure. The test is performed by attaching a pressure source to the outlet of the valve and submerging the valve in a solution of water treated with rust inhibitor. The pressure in the secondary pressure zone is then brought to 30 psig or to what the back pressure the valve will see. This is the pressure required by the ASME BOILER AND PRESSURE VESSEL CODE, SECTION VIII. PART UG-136(d) "Production Testing by Manufacturers and Assemblers". The valve is then visually inspected for any leaks by checking for bubbles coming from any part of the valve. If any part of the valve is producing bubbles, the valve is disassembled, repaired and the valve is reassembled and retested. If no leaks are detected, the valve is stamped with the appropriate set pressure, the valve then goes to the finishing department to be painted, tagged, and prepared for shipping.

MERCER VALVE COMPANY, INC.
9100 SERIES THREADED SAFETY RELIEF VALVES

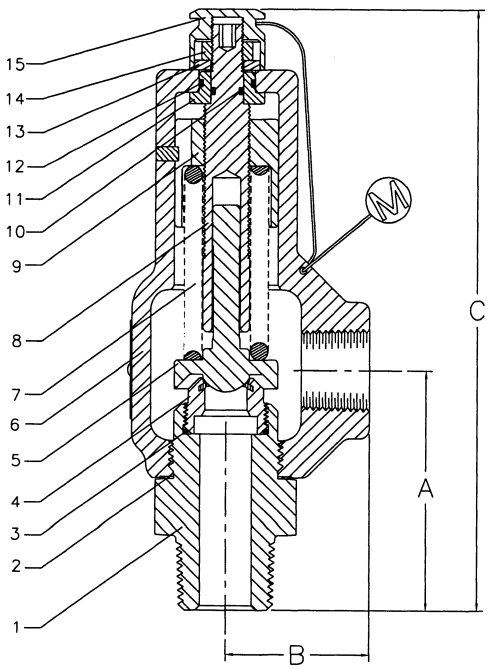
INSTALLATION, OPERATION AND MAINTENANCE MANUAL

"C", "D", AND "E" ORIFICE STANDARD BILL OF MATERIALS

"C" ORIFICE DIAMETER: .281 In.
"C" ORIFICE AREA: .062 Sq.In.
SET PRESSURE RANGE: 15-2999 PSI

"D" ORIFICE DIAMETER: .394 In.
"D" ORIFICE AREA: .122 Sq.In.
SET PRESSURE RANGE: 15-2999 PSI

"E" ORIFICE DIAMETER: .520 In.
"E" ORIFICE AREA: .212 Sq.In.
SET PRESSURE RANGE: 15-2400 PSI



"C", "D", and "E" Orifice

"C", "D", AND "E" ORIFICE				
ITEM NO.	PART NAME	"C" ORIFICE STD MTRLS "C" TRIM CODE	"D" & "E" STD MTRLS "I" TRIM CODE	"C", "D", "E" OPTIONS "U", "L", "N", OR "B" CODE
1	Inlet Base	Carbon Steel or 316 Stainless Steel	Carbon Steel or 316 Stainless Steel	Carbon Steel or 316 Stainless Steel
2	Base Seal	Carbon Steel or 316 Stainless Steel	Carbon Steel or 316 Stainless Steel	Carbon Steel or 316 Stainless Steel
3	O'Ring	Viton	Viton	Viton
4	Nozzle Subassy	17-4 Stainless Steel with Soft Seat	17-4 Stainless Steel with Soft Seat	316 Stainless Steel with Soft Seat
5	Disk Subassy	440C Stainless Steel	17-4 Stainless Steel	316 Stainless Steel
6	Body	WCB Carbon Steel or CF3M Stainless Steel	WCB Carbon Steel or CF3M Stainless Steel	WCB Carbon Steel or CF3M Stainless Steel
7	Spring	17-7 Stainless Steel	17-7 Stainless Steel	17-7 Stainless Steel or Inconel X-750 (NACE)
8	Adjustment Screw	300 Series Stainless Steel	300 Series Stainless Steel	300 Series Stainless Steel
9	Adjustment Bushing	300 Series Stainless Steel	300 Series Stainless Steel	300 Series Stainless Steel
10	O'Ring	Buna N	Buna N	Buna N
11	Center Bushing	300 Series Stainless Steel	300 Series Stainless Steel	300 Series Stainless Steel
12	O'Ring	Buna N	Buna N	Buna N
13	Washer	Carbon Steel	Carbon Steel	Carbon Steel
14	Lock Nut	Carbon Steel	Carbon Steel	Carbon Steel
15	Cap	Anodized Aluminum	Anodized Aluminum	Anodized Aluminum

SRV152

MERCER
91-M2C61P5641/5200

5200 PSI C-ORIFICE, ¾” MNPT IN, 1” FNPT OUT,
5300SCFM, SAFETY RELIEF VALVE

ANGI PART NUMBER 331-08052

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MERCER VALVE CO., INC.
AUTO SEAT TECHNOLOGY ®

9100 SERIES
Model 20

THINK...MERCER FIRST™

MERCER VALVE

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9100 Series Model 20 Product Overview

The 9100 Series Model 20 is a high pressure safety relief valve designed for CNG and other high pressure applications. The 9100 Series Model 20 unique design coupled with our patented **Auto Seat Technology®** allows for a longer life, less leakage and more consistent set pressures in high pressure applications. The 9100 Series Model 20 is designed for applications from 3000 psi up to 8700 psi. The patented soft seat design and fully guided disk allow the valve to continually outlast the competition. The soft seat 9100 Series has a field-proven lip seal design, which allows for a tighter seal up to set pressure. This tight seal reduces leaks and limits product loss.

9100 Series Model 20 Features

- **Designed with Auto Seat Technology®.**
- **Consistent Set Pressures allowing repeatable uses without repair or resetting.**
- **Open, Close, Seat and Seal™.**
- **Fully guided disk keeps the disk properly alligned, opening and closing, helping to reseat the valve.**
- **Mechanical Stop prevents wear on parts and controls valve lift.**
- **Low rated and fully guided spring allows for more consistent set pressures from pop to pop.**
- **Pop Action relief allows valve to go to full lift at set pressure. Helps with DOT regulated applications.**
- **Built in accordance with the requirements of ASME Boiler and Pressure Vessel Code. Sec. VIII Div 1.**
- **Non-rising stems allowing valves to be installed in small areas.**

9100 Series Model 20 Specifications

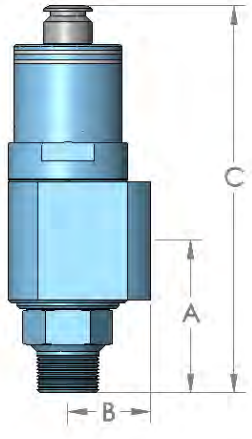
Orifice Letter	C	D
Threaded Connections	3/4″ x 1″, 1″ x 1″	1″ x 1 1/4″
Flanged Connectors	1″ x 1 1/2″	1″ x 1 1/2″, 1″ x 2″
Actual Orifice Diameter (in)	.281	.394
Actual Orifice Area (in^2)	.062	.122
API Orifice Area (in^2)	- - -	.110
Threaded Pressure Ranges (psi)	3000 to 8700	3000 to 7500
Flanged Pressure Ranges (psi)	3000 to 6170	3000 to 6170
Standard Temperature Range (ºF)	-20 to 400	-20 to 400
ASME Flow Coefficient, K_d (Gas)	.818	.818
ASME Flow Coefficient, K_d (Liquid)	.707	.707

NOTE: Mercer Valve reserves the right to change product designs and specifications without notice.

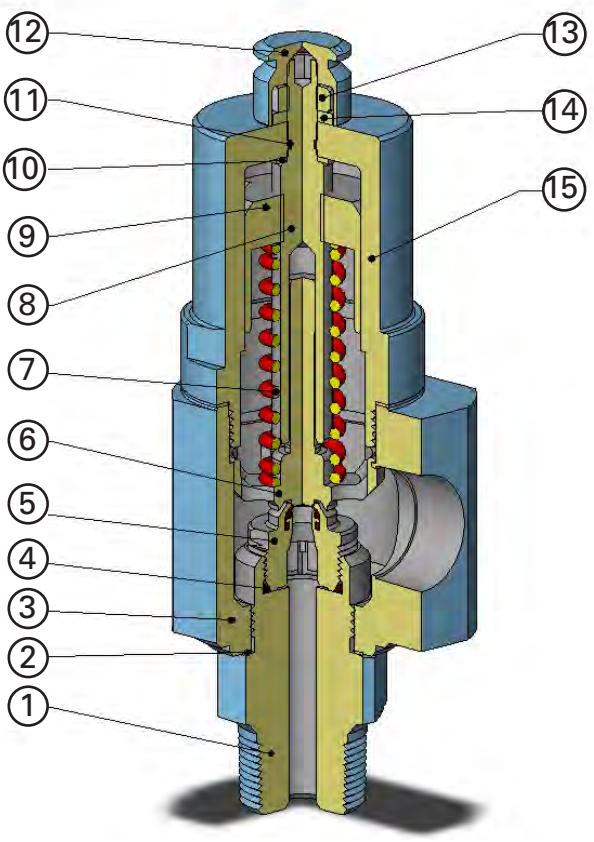
9100 Series Model 20 Dimensions and Weights

INLET AND OUTLET CODE	INLET AND OUTLET SIZE	PRESSURE LIMIT (psi)	DIMENSIONS "A" X "B" X "C" (IN.) + 1/16	APPROX. WEIGHT (lbs.)
	C ORIFICE			
M2	**3/4" MNPT x 1" FNPT**	3000 - 8700	3-1/4 x 1-13/16 x 8-1/8	4.5
M7	**1" MPT x 1" FNPT**	3000 - 8700	3-1/4 x 1-13/16 x 8-1/8	4.5
26	**1" 1500# x 1 1/2" 300#**	3000 - 3705	5 X 5-1/4 X 10	19
76	**1" 2500# x 1 1/2" 300#**	3000 - 6170	5 X 5-1/4 X 10	21
	D ORIFICE			
M7	**1" MPT x 1 1/4" FNPT**	3000 - 7500	3-1/4 x 1-13/16 x 9-1/4	5
26	**1" 1500# x 1 1/2" 300#**	3000 - 3705	5 X 5-1/4 X 11	19
76	**1" 2500# x 1 1/2" 300#**	3000 - 6170	5 X 5-1/4 X 11	21
32	**1" 1500# x 2" 300#**	3000 - 3705	5 X 5-1/4 X 11	24
77	**1" 2500# x 2" 300#**	3000 - 6170	5 X 5-1/4 X 11	21

NOTE: Mercer valve reserves the right to change product designs and specifications without notice.



9100 Series Model 20 Parts and Materials



9100 SERIES MODEL 20 C & D ORIFICES

ITEM NO	PART NAME	STANDARD MATERIALS
1	INLET BASE	STAINLESS STEEL
2	BASE SEAL	SOFT STEEL
3	BODY SUBASSEMBLY	CARBON STEEL
4	NOZZLE O-RING	VITON
5	NOZZLE SUBASSEMBLY	STAINLESS STEEL WITH SOFT SEAT
6	DISK SUBASSEMBLY	STAINLESS STEEL
7	SET SPRING	STAINLESS STEEL
8	ADJUSTMENT SCREW	STAINLESS STEEL
9	ADJUSTMENT BUSHING	CARBON STEEL
10	THRUST WASHER	STAINLESS STEEL
11	ADJUSTMENT SCREW O-RING	BUNA N
12	CLOSED CAP	ALUMINUM ALLOY
13	LOCKNUT	CARBON STEEL
14	WASHER	CARBON STEEL
15	BONNET SUBASSEMBLY	CARBON STEEL

NOTE: Mercer Valve reserves the right to change product designs and specifications without notice.

9100 Series Model 20 Capacity Charts

AIR CAPACITY AT 60°F AND STD ATMOSPHERIC CONDITIONS

Set Pressure (psi)	C 0.062 SCFM	D 0.122 SCFM
3000	3082	6064
3100	3184	6265
3200	3286	6466
3300	3388	6667
3400	3491	6869
3600	3695	7271
3800	3900	7674
4000	4104	8076
4200	4309	8479
4400	4513	8881
4600	4718	9283
4800	4922	9686
5000	5127	10088
5200	5331	10491
5400	5536	10893
5600	5740	11296
5800	5945	11698
6000	6150	12101
6200	6354	12503
6400	6559	12906
6600	6763	13308
6800	6968	13711
7000	7172	14113
7200	7377	14515
7400	7581	14918
7500	7683	15119
7600	7786	
7800	7990	
8000	8195	
8200	8399	
8400	8604	
8600	8808	
8700	8911	

NATURAL GAS CAPACITY AT 60°F AND STD ATMOSPHERIC CONDITIONS

Set Pressure (psi)	C 0.062 SCFM	D 0.122 SCFM
3000	3844	7564
3100	3972	7815
3200	4099	8067
3300	4227	8318
3400	4355	8569
3600	4610	9071
3800	4865	9573
4000	5120	10075
4200	5375	10577
4400	5630	11079
4600	5885	11581
4800	6141	12083
5000	6396	12585
5200	6651	13087
5400	6906	13589
5600	7161	14091
5800	7416	14593
6000	7671	14091
6200	7927	15597
6400	8182	16099
6600	8437	16602
6800	8692	17104
7000	8947	17606
7200	9202	18108
7400	9457	18610
7500	9585	18861
7600	9713	
7800	9968	
8000	10223	
8200	10478	
8400	10733	
8600	10988	
8700	11116	

NATURAL GAS CAPACITY AT 60°F AND STD ATMOSPHERIC CONDITIONS

Set Pressure (psi)	C 0.062 MMSCFD	D 0.122 MMSCFD
3000	5.54	10.89
3100	5.72	11.25
3200	5.90	11.62
3300	6.09	11.98
3400	6.27	12.34
3600	6.64	13.06
3800	7.01	13.78
4000	7.37	14.51
4200	7.74	15.23
4400	8.11	15.95
4600	8.47	16.68
4800	8.84	17.40
5000	9.21	18.12
5200	9.58	18.85
5400	9.94	19.57
5600	10.31	20.29
5800	10.68	21.01
6000	11.05	21.74
6200	11.41	22.46
6400	11.78	23.18
6600	12.15	23.91
6800	12.52	24.63
7000	12.88	25.35
7200	13.25	26.08
7400	13.62	26.80
7500	13.80	27.16
7600	13.99	
7800	14.35	
8000	14.72	
8200	15.09	
8400	15.46	
8600	15.82	
8700	16.01	

CAPACITY IN GPM WATER AT 60°F AND STD ATMOSPHERIC CONDITIONS

Set Pressure (psi)	C 0.062 GPM	D 0.122 GPM
3000	96	188
3100	97	191
3200	99	194
3300	100	197
3400	102	200
3600	105	206
3800	108	212
4000	110	217
4200	113	223
4400	116	228
4600	118	233
4800	121	238
5000	124	243
5200	126	248
5400	128	253
5600	131	257
5800	133	262
6000	135	266
6200	138	271
6400	140	275
6600	142	279
6800	144	283
7000	146	288
7200	148	292
7400	150	296
7500	151	298
7600	152	300
7800	154	304
8000	156	307
8200	158	311
8400	160	315
8600	162	319
8700	163	

9100 Series Model 20 Product Numbering System

91 - M2 D 6 1

VALVE SERIES

91 – 9100 Series

INLET & OUTLET COMBINATION

(See Selection Table Page 4)

ORIFICE SIZE

C or D

INLET BASE & BODY MATERIAL

FLANGED

1 – RF x RF / CARBON STEEL

2 – RF x RF / STAINLESS STEEL

3 – RTJ x RF / CARBON STEEL

4 – RTJ x RF / STAINLESS STEEL

A – RTJ x RTJ / CARBON STEEL

B – RTJ x RTJ / STAINLESS STEEL

THREADED

6 – 316 STNLS STL/WCB CARBON STEEL

7 – 316 STNLS STL/CF3M STAINLESS STEEL

CAP TYPE

1 – CLOSED CAP

2 – OPEN LIFT LEVER

3 – CLOSED LIFT LEVER

CONSULT FACTORY FOR ADDITIONAL INFORMATION AND OPTIONS

NOTE: Mercer Valve reserves the right to change product designs and specifications without notice.

P 14 4 1 ___ ___

2 – DIGIT "SPECIAL" CODE
(IF APPLICABLE ASSIGNED BY MERCER)

O-RING MATERIAL

1 – STANDARD O-RINGS (VITON & BUNA-N)

TRIM CODES

4 – 440C DISK & NOZZLE (STD GAS SERVICE)

L – LIQUID SERVICE 316 S.S. DISK & NOZZLE

N – SOUR GAS SERVICE 316 S.S. DISK & NOZZLE

B – SOUR LIQUID SERVICE 316 S.S. DISK & NOZZLE

U – GAS SERVICE 316 S.S. DISK & NOZZLE

X – ALL 316 S.S. INTERNALS

SPRING CODE
(ASSIGNED BY MERCER)

SEAT MATERIAL

P – VIRGIN PEEK

Y – VESPEL

SRV 251

MERCER
9112E51T09I1/180

3/4”MNPT IN, 1” FNPT OUT, 180 PSI, E-ORIFICE
710 SCFM SAFETY RELIEF VALVE

ANGI PART NUMBER 331-08159

REPAIR KIT – 1E1T1I1

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MERCER VALVE CO., INC.

AUTO SEAT TECHNOLOGY ®

9100 SERIES
Threaded

THINK...MERCER FIRST™

MERCER VALVE

9100 Series Threaded Product Overview

The Mercer Valve 9100 Series Pressure Relief Valve is "State of the Art" in soft seat, high flow rate, pressure relieving devices. The 9100 Series is a continuation of the 8100 Series, incorporating our patented **Auto Seat Technology®** into its design. Mercer Valve's **Auto Seat Technology®** has made the 9100 Series an industry leader with its reliable, repeatable set pressures. The patented soft seat design and fully guided disk allow the valve to continually outlast the competition. The soft seat 9100 Series has a field-proven lip seal design, which allows for a tighter seal up to set pressure. This tight seal reduces leaks and limits product loss.

The 9100 Series is manufactured in accordance with the requirements of ASME Boiler and Pressure Vessel Code, Section VIII, Division 1 for Air/Gas and Liquid service. The 9100 Series is well suited for specialty gases, compressors, separators, transmission, gathering lines and other production processes.

9100 Series Threaded Features

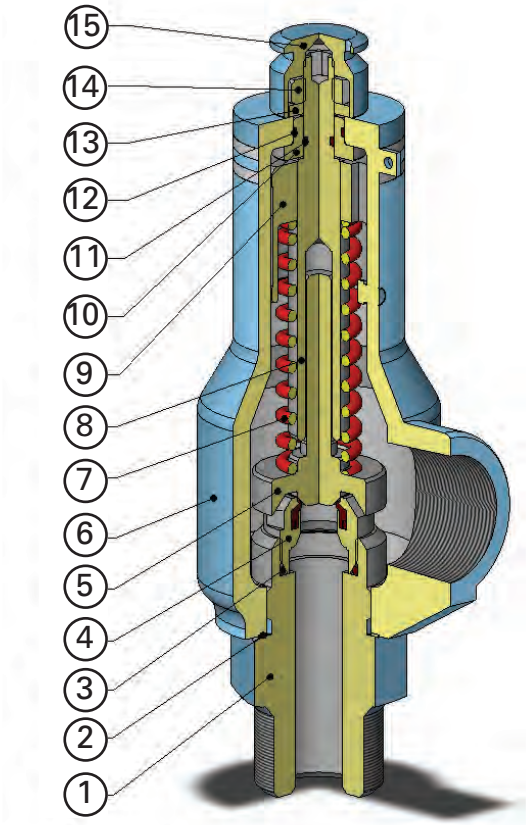
- **Designed with Auto Seat Technology®.**
- **Consistent Set Pressures allowing repeatable uses without repair or resetting.**
- **Open, Close, Seat and Seal™.**
- **Fully guided disk keeps the disk properly alligned, opening and closing, helping to reseat the valve.**
- **Mechanical Stop prevents wear on parts and controls valve lift.**
- **Low rated and fully guided spring allows for more consistent set pressures from pop to pop.**
- **Pop Action relief allows valve to go to full lift at set pressure. Helps with DOT regulated applications.**
- **Built in accordance with the requirements of ASME Boiler and Pressure Vessel Code. Sec. VIII Div 1.**
- **Non-rising stems allowing valves to be installed in small areas.**

9100 Series Threaded Specifications

Orifice Letter	C	D	E	F	G	H	J	K
Standard Inlet Sizes	1/2", 3/4", 1"	3/4", 1"	3/4", 1"	1 1/2", 2"	1 1/2", 2"	1 1/2", 2"	2", 3"	3"
Inlet and Outlet Connection Types Available	Male NPT x Female NPT or Female NPT x Female NPT							
Actual Orifice Diameter (in)	.281	.394	.520	.655	.775	1.050	1.350	1.625
Actual Orifice Area (in²)	.062	.122	.212	.337	.472	.865	1.430	2.074
API Orifice Area (in²)	- - -	.110	.196	.307	.503	.785	1.287	1.838
Pressure Ranges (psi)	15 to 2999	15 to 2999	15 to 2400	15 to 2400	15 to 2000	15 to 2000	15 to 800	15 to 750
Standard Temperature Range (°F)	-20 to 400	-20 to 400	-20 to 400	-20 to 400	-20 to 400	-20 to 400	-20 to 400	-20 to 400
ASME Flow Coefficient, K_d (Gas)	.818	.818	.818	.818	.818	.818	.818	.818
ASME Flow Coefficient, K_d (Liquid)	.707	.707	.707	.707	.707	.707	.707	.707

NOTE: Mercer Valve reserves the right to change product designs and specifications without notice.

9100 Series Threaded Parts and Materials



9100 SERIES THREADED C , D , & E ORIFICES

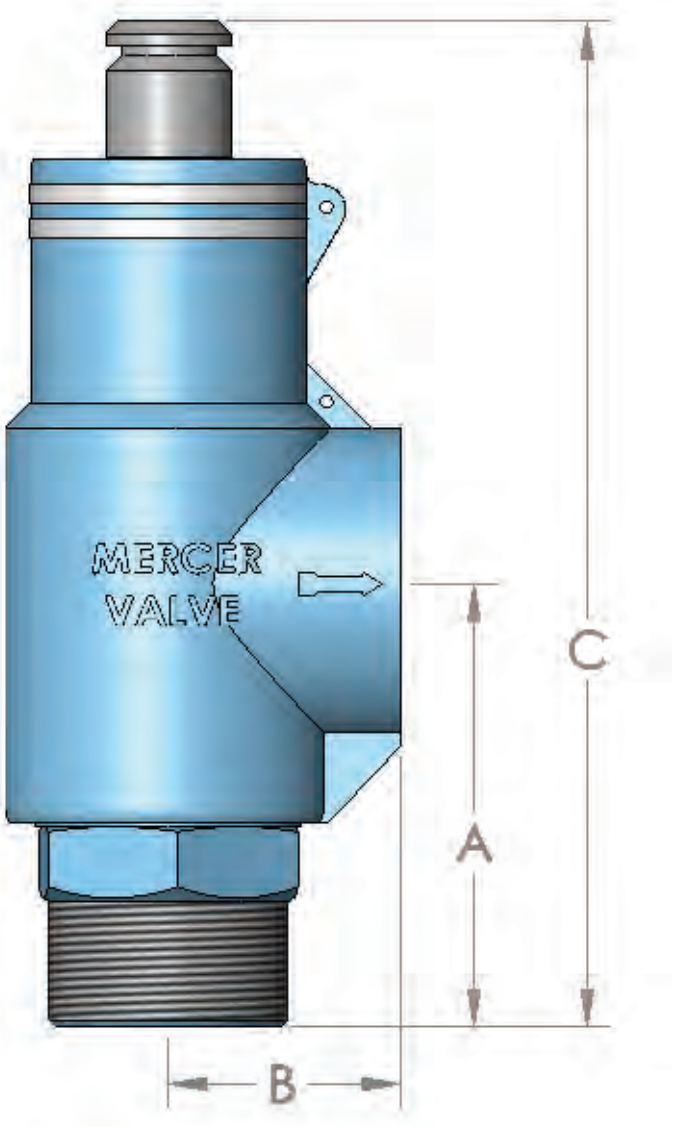
ITEM NO	PART NAME	STANDARD MATERIALS
1	INLET BASE	CARBON STEEL
2	BASE SEAL	SOFT STEEL
3	NOZZLE O-RING	VITON
4	NOZZLE SUBASSEMBLY	STAINLESS STEEL WITH SOFT SEAT
5	DISK SUBASSEMBLY	STAINLESS STEEL
6	BODY SUBASSEMBLY	CARBON STEEL
7	SET SPRING	STAINLESS STEEL
8	ADJUSTMENT SCREW	STAINLESS STEEL
9	ADJUSTMENT BUSHING	STAINLESS STEEL
10	CENTER BUSHING	STAINLESS STEEL
11	ADJUSTMENT SCREW O-RING	BUNA N
12	CENTER BUSHING O-RING	BUNA N
13	WASHER	CARBON STEEL
14	LOCKNUT	CARBON STEEL
15	CLOSED CAP	ALUMINUM ALLOY

NOTE: Mercer Valve reserves the right to change product designs and specifications without notice.

INLET AND OUTLET CODE	INLET AND OUTLET SIZE	ORIFICE AVAILABLE	PRESSURE LIMIT (psi)	DIMENSIONS "A" X "B" X "C" (IN.) + 1/16	APPROX. WEIGHT (lbs.)
05	1/2" FNPT x 1" FNPT	C	15 - 2999	2-1/4 x 1-7/8 x 7-1/16	4.5
06	1/2" MNPT x 1" FNPT	C	15 - 2999	3-1/4 x 1-7/8 x 8	4.5
11	3/4" FNPT x 1" FNPT	C , D	15 - 2999	2-1/4 x 1-7/8 x 7-1/16	4.5
11	3/4" FNPT x 1" FNPT	E	15 - 2400	2-1/4 x 1-7/8 x 7-1/16	4.5
12	3/4" MNPT x 1" FNPT	C , D	15 - 2999	3-1/4 x 1-7/8 x 8	4.5
12	3/4" MNPT x 1" FNPT	E	15 - 2400	3-1/4 x 1-7/8 x 8	4.5
16	1" FNPT x 1" FNPT	C , D	15 - 2999	3-1/4 x 1-7/8 x 8	4.5
16	1" FNPT x 1" FNPT	E	15 - 2400	3-1/4 x 1-7/8 x 8	4.5
17	1" MNPT x 1" FNPT	C , D	15 - 2999	3-1/4 x 1-7/8 x 8	4.5
17	1" MNPT x 1" FNPT	E	15 - 2400	3-1/4 x 1-7/8 x 8	4.5
22	1" FNPT x 1 1/2" FNPT	C , D	15 - 2999	3-3/8 x 2-3/8 x 9	10.5
22	1" FNPT x 1 1/2" FNPT	E	15 - 2400	3-3/8 x 2-3/8 x 9	10.5
23	1" MNPT x 1 1/2" FNPT	C , D	15 - 2999	4-1/2 x 2-3/8 x 9-5/8	11
23	1" MNPT x 1 1/2" FNPT	E	15 - 2400	4-1/2 x 2-3/8 x 9-5/8	11
27	1" FNPT x 2" FNPT	C , D	15 - 2999	3-3/8 x 2-3/8 x 9	10.5
27	1" FNPT x 2" FNPT	E	15 - 2400	3-3/8 x 2-3/8 x 9	10.5
28	1" MNPT x 2" FNPT	C , D	15 - 2999	4-1/2 x 2-3/8 x 9-5/8	11
28	1" MNPT x 2" FNPT	E	15 - 2400	4-1/2 x 2-3/8 x 9-5/8	11
33	1 1/2" FNPT x 2" FNPT	F	15 - 2400	4-5/8 x 2-3/8 x 10-5/16	11.5
33	1 1/2" FNPT x 2" FNPT	G	15 - 2000	4-5/8 x 2-3/8 x 10-5/16	11.5
34	1 1/2" MNPT x 2" FNPT	F	15 - 2400	4-7/16 x 2-3/8 x 10-1/16	11
34	1 1/2" MNPT x 2" FNPT	G	15 - 2000	4-7/16 x 2-3/8 x 10-1/16	11
33	1 1/2" FNPT x 2" FNPT	H	15 - 850	3 x 3 x 10-3/4	22
34	1 1/2" MNPT x 2" FNPT	H	15 - 850	4-1/4 x 3 x 12	22.5
42	2" FNPT x 2" FNPT	F	15 - 2400	4-5/8 x 2-3/8 x 10-5/16	12
42	2" FNPT x 2" FNPT	G	15 - 2000	4-5/8 x 2-3/8 x 10-5/16	12
43	2" MNPT x 2" FNPT	F	15 - 2400	4-7/16 x 2-3/8 x 10-1/16	12
43	2" MNPT x 2" FNPT	G	15 - 2000	4-7/16 x 2-3/8 x 10-1/16	12
42	2" FNPT x 2" FNPT	H	15 - 850	3 x 3 x 10-3/4	22
43	2" MNPT x 2" FNPT	H	15 - 850	4-1/4 x 3 x 12	23
46	2" FNPT x 2 1/2" FNPT	H	15 - 850	3 x 3 x 10-3/4	22
46	2" FNPT x 2 1/2" FNPT	H	851 - 2000	3 x 3 x 13-1/8	28
47	2" MNPT x 2 1/2" FNPT	H	15 - 850	4-1/4 x 3 x 12	23
47	2" MNPT x 2 1/2" FNPT	H	851 – 2000	4-1/4 x 3 x 14-1/2	29

INLET AND OUTLET CODE	INLET AND OUTLET SIZE	ORIFICE AVAILABLE	PRESSURE LIMIT (psi)	DIMENSIONS "A" X "B" X "C" (IN.) + 1/16	APPROX. WEIGHT (lbs.)
51	2" FNPT x 3" FNPT	J	15 – 450	3-3/4 x 4-1/4 x 11-3/4	41
51	2" FNPT x 3" FNPT	J	451 – 800	3-3/4 x 4-1/4 x 15-5/16	52
52	2" MNPT x 3" FNPT	J	15 – 450	5-1/2 x 4-1/4 x 13-3/8	42
52	2" MNPT x 3" FNPT	J	451 – 800	5-1/2 x 4-1/4 x 17-1/16	53
61	3" MNPT x 3" FNPT	J	15 – 450	5-1/2 x 4-1/4 x 13-1/2	44
61	3" MNPT x 3" FNPT	J	451 – 800	5-1/2 x 4-1/4 x 17-1/4	55
61	3" MNPT x 3" FNPT	K	15 – 285	5-1/2 x 4-1/4 x 13-1/2	46
61	3" MNPT x 3" FNPT	K	286 - 750	5-1/2 x 4-1/4 x 17-1/4	57

NOTE: Mercer Valve reserves the right to change product designs and specifications without notice.



CAPACITY IN SCFM OF AIR AT 60°F AND STD ATMOSPHERIC CONDITIONS

Set Pressure (psi)	C 0.062	D 0.122	E 0.212	F 0.337	G 0.472	H 0.865	J 1.43	K 2.074
15	30	60	104	165	231	424	701	1017
20	35	69	120	191	267	489	808	1172
25	40	78	136	216	302	554	916	1328
30	44	87	152	241	338	619	1023	1483
50	65	128	222	352	493	904	1495	2168
75	90	178	309	491	688	1261	2084	3023
100	116	228	396	630	883	1617	2674	3878
125	141	278	484	769	1077	1974	3264	4733
150	167	329	571	908	1272	2331	3853	5589
200	218	429	746	1186	1661	3044	5033	7299
300	320	631	1096	1742	2440	4471	7391	10720
400	423	832	1445	2298	3218	5898	9750	14141
500	525	1033	1795	2854	3997	7324	12109	17562
600	627	1234	2145	3409	4775	8751	14467	20983
700	730	1435	2494	3965	5554	10178	16826	24403
800	832	1637	2844	4521	6332	11605	19185	
900	934	1838	3194	5077	7111	13031		
1000	1036	2039	3544	5633	7889	14458		
1100	1139	2240	3893	6189	8668	15885		
1250	1292	2542	4418	7022	9836	18025		
1500	1548	3045	5292	8412	11782	21592		
2000	2059	4051	7040	11191	15675	28726		
2400	2468	4856	8439	13415				
2600	2673	5259						
2800	2877	5661						
2999	3081	6062						

CAPACITY IN SCFM OF 0.6 SG NATURAL GAS AT 60°F AND STD ATMOSPHERIC CONDITIONS

Set Pressure (psi)	C 0.062	D 0.122	E 0.212	F 0.337	G 0.472	H 0.865	J 1.43	K 2.074
15	38	75	130	206	289	529	875	1269
20	44	86	150	238	333	610	1008	1463
25	50	97	169	269	377	691	1142	1657
30	55	109	189	301	421	772	1276	1851
50	81	159	276	439	615	1128	1864	2704
75	113	222	385	613	858	1573	2600	3771
100	145	285	495	786	1101	2018	3336	4838
125	177	347	604	959	1344	2463	4071	5905
150	208	410	713	1133	1587	2908	4807	6972
200	272	536	931	1480	2072	3798	6278	9105
300	400	787	1367	2173	3043	5577	9220	13373
400	527	1038	1803	2866	4015	7357	12163	17640
500	655	1289	2239	3560	4986	9137	15105	21908
600	782	1540	2676	4253	5957	10917	18048	26175
700	910	1791	3112	4947	6928	12697	20990	30443
800	1038	2042	3548	5640	7899	14477	23932	
900	1165	2293	3984	6333	8871	16256		
1000	1293	2544	4420	7027	9842	18036		
1100	1420	2795	4857	7720	10813	19816		
1250	1612	3171	5511	8760	12270	22486		
1500	1931	3799	6602	10494	14698	26935		
2000	2568	5054	8783	13961	19554	35835		
2400	3079	6058	10527	16735				
2600	3334	6560						
2800	3589	7062						
2999	3843	7562						

CAPACITY IN MMSCFD OF 0.6 SG NATURAL GAS AT 60°F AND STD ATMOSPHERIC CONDITIONS

Set Pressure (psi)	C 0.062	D 0.122	E 0.212	F 0.337	G 0.472	H 0.865	J 1.43	K 2.074
15	0.05	0.11	0.19	.030	0.42	0.76	1.26	1.83
20	0.06	0.12	0.22	0.34	0.48	0.88	1.45	2.11
25	0.07	0.14	0.24	0.39	0.54	0.99	1.64	2.39
30	0.08	0.16	0.27	0.43	0.61	1.11	1.84	2.66
50	0.12	0.23	0.40	0.63	0.89	1.62	2.68	3.89
75	0.16	0.32	0.56	0.88	1.24	2.26	3.74	5.43
100	0.21	0.41	0.71	1.13	1.59	2.91	4.80	6.97
125	0.25	0.50	0.87	1.38	1.94	3.55	5.86	8.50
150	0.30	0.59	1.03	1.63	2.28	4.19	6.92	10.04
200	0.39	0.77	1.34	2.13	2.98	5.47	9.04	13.11
300	0.58	1.13	1.97	3.13	4.38	8.03	13.28	19.26
400	0.76	1.49	2.60	4.13	5.78	10.59	17.51	25.40
500	0.94	1.86	3.22	5.13	7.18	13.16	21.75	31.55
600	1.13	2.22	3.85	6.12	8.58	15.72	25.99	37.69
700	1.31	2.58	4.48	7.12	9.98	18.28	30.23	43.84
800	1.49	2.94	5.11	8.12	11.38	20.85	34.46	
900	1.68	3.30	5.74	9.12	12.77	23.41		
1000	1.86	3.66	6.37	10.12	14.17	25.97		
1100	2.05	4.02	6.99	11.12	15.57	28.54		
1250	2.32	4.57	7.94	12.62	17.67	32.38		
1500	2.78	5.47	9.51	15.11	21.17	38.79		
2000	3.70	7.28	12.65	20.10	28.16	51.60		
2400	4.43	8.72	15.16	24.10				
2600	4.80	9.45						
2800	5.17	10.17						
2999	5.53	10.89						

CAPACITY IN GPM WATER AT 60°F AND STD ATMOSPHERIC CONDITIONS

Set Pressure (psi)	C 0.062	D 0.122	E 0.212	F 0.337	G 0.472	H 0.865	J 1.43	K 2.074
15	7	14	24	38	54	99	163	236
20	8	16	27	43	61	111	184	267
25	9	17	30	48	67	123	203	295
30	10	19	33	52	73	133	221	320
50	12	24	42	67	94	172	285	413
75	15	30	52	82	115	211	349	506
100	17	34	60	95	133	244	403	584
125	20	38	67	106	149	272	450	653
150	21	42	73	116	163	299	493	716
200	25	49	84	134	188	345	570	826
300	30	60	103	164	230	422	698	1012
400	35	69	119	190	266	487	806	1169
500	39	77	134	212	297	545	901	1307
600	43	84	146	233	326	597	987	1431
700	46	91	158	251	352	645	1066	1546
800	49	97	169	269	376	689	1140	
900	52	103	179	285	399	731		
1000	55	109	189	300	421	771		
1100	58	114	198	315	441	808		
1250	62	122	211	336	470	862		
1500	68	133	231	368	515	944		
2000	78	154	267	425	595	1090		
2400	86	168	293	465				
2600	89	175						
2800	92	182						
2999	96	188						

9100 Series Threaded Product Numbering System

91 - 17 D 5 1

VALVE SERIES

91 – 9100 Series

INLET & OUTLET COMBINATION

(See Selection Table on pages 8 & 9)

ORIFICE SIZE

C to K

INLET BASE & BODY MATERIAL

5 – CARBON STEEL/WCB CARBON STEEL

6 – 316 STNLS STL/WCB CARBON STEEL

7 – 316 STNLS STL/CF3M STAINLESS STEEL

CAP TYPE

1 – CLOSED CAP

2 – OPEN LIFT LEVER

3 – CLOSED LIFT LEVER

4 – CLOSED CAP W/STAINLESS STEEL BONNET (H - K ORIFICE)

5 – OPEN LIFT LEVER W/STAINLESS STEEL BONNET (H - K ORIFICE)

6 – CLOSED LIFT LEVER W/STAINLESS STEEL BONNET (H - K ORIFICE)

CONSULT FACTORY FOR ADDITIONAL INFORMATION AND OPTIONS

NOTE: Mercer Valve reserves the right to change product designs and specifications without notice.

V 06 I 1 ___ ___

2 – DIGIT "SPECIAL" CODE
(IF APPLICABLE ASSIGNED BY MERCER)

O-RING MATERIAL

1 – STANDARD O-RINGS (VITON & BUNA-N)

TRIM CODES

U – 316 S.S. DISK & NOZZLE (STD GAS SERVICE F,G,H,J,&K ORIFICES)*

I – 17-4 S.S. DISK & NOZZLE (STD GAS SERVICE D&E ORIFICES)

C – 440C S.S. DISK, 17-4 S.S. NOZZLE (STD GAS SERVICE C ORIFICE AND HIGH PRESSURE F,G,H,)*

L – LIQUID SERVICE 316 S.S. DISK & NOZZLE

N – SOUR GAS SERVICE 316 S.S. DISK & NOZZLE

B – SOUR LIQUID SERVICE 316 S.S. DISK & NOZZLE

SPRING CODE
(ASSIGNED BY MERCER)

SEAT MATERIAL

V – VITON 90 DURO

T – 15% GLASS FILLED TEFLON

P – VIRGIN PEEK

* = U TRIM CODE CHANGES TO C TRIM CODE AT F > 1399psi, G > 1199psi, H > 1049psi

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SV 9

ASCO
EF8320G184-120/60

1/4’’ 3-WAY, 120V, 150 PSI SOLENOID VALVE

ANGI PART NUMBER 330-07243

REBUILD KIT- ASCO 3-WAY SOLENOID 120V 150 PSI – 761-07358

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Direct Acting

General Service Solenoid Valves

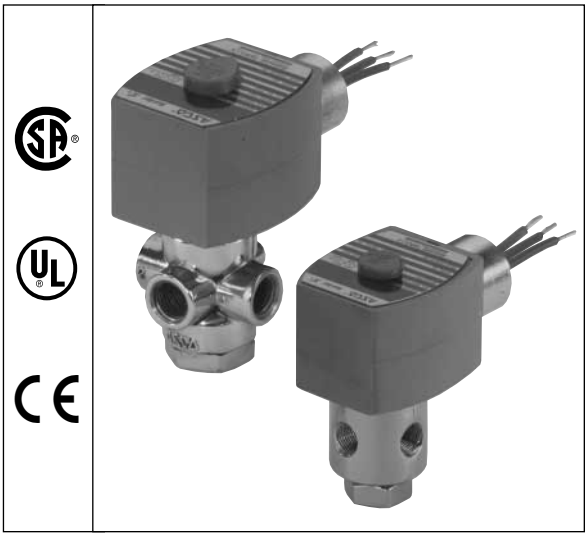
Brass or Stainless Steel Bodies
1/8" to 1/4" NPT

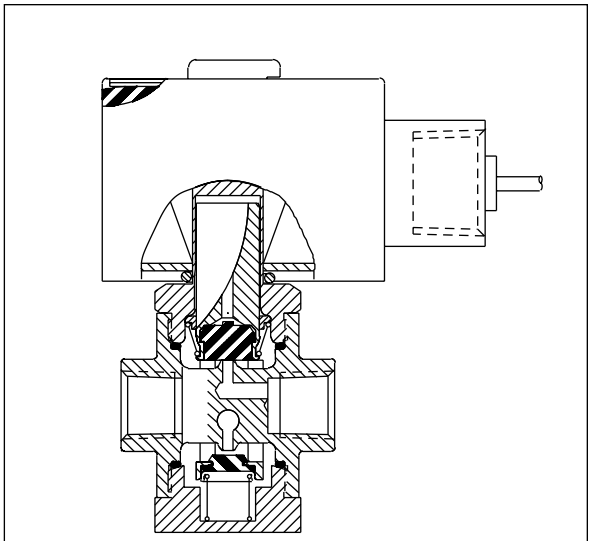
NC U NO

3/2
SERIES
8320

Features

- All NPT connections are in the valve body to allow in-line piping.
- No Minimum Operating Pressure Differential required.
- Sturdy design for long years of reliable service.
- Broadest range of applications.
- Mountable in any position.





8320 1/4" NPT

Construction

Valve Parts in Contact with Fluids		
Body	Brass	303 Stainless Steel
Seals and Discs	NBR or Cast UR, as Listed	
Core Tube	305 Stainless Steel	
Core and Plugnut	430F Stainless Steel	
Core Springs	302 Stainless Steel	
Shading Coil	Copper	Silver
Disc-Holder	CA	
Core Guide	CA (10.1 and 17.1 Watt only)	

Electrical

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.			
		AC			General Purpose		Explosionproof	
	DC Watts	Watts	VA Holding	VA Inrush	AC	DC	AC	DC
F	10.6	6.1	16	30	238210	238310	238214	238314
F	-	9.1	25	40	238210	-	238214	-
F	11.6	10.1	25	50	238610	238710	238614	238714
F	-	17.1	40	70	238610	-	238614	-

Standard Voltages: 24, 120, 240, 480 volts AC, 60 Hz (or 110, 220, volts AC, 50 Hz). 6, 12, 24, 120, 240 volts DC. Must be specified when ordering. Other voltages are available when required.

Solenoid Enclosures

Standard: Watertight, Types 1, 2, 3, 3S, 4, and 4X.

Optional: Explosionproof and Watertight, Types 3, 3S, 4, 4X, 6, 6P, 7, and 9. (To order, add prefix "EF" to the catalog number.)
See Optional Features Section for other available options.

Nominal Ambient Temperature Ranges:

AC: 32˚F to 125˚F (0˚C to 52˚C)
DC: 32˚F to 104˚F (0˚C to 40˚C)
Refer to Engineering Section for details.

Approvals:

CSA certified. UL listed General Purpose Valves.
Meets applicable CE directives.
Refer to Engineering Section for details.

Specifications (English units)

Pipe Size (ins.)	Orifice Size (ins.)	Cv Flow Factor	Operating Pressure Differential (psi) Max. AC: Air-Inert Gas	Max. AC: Water	Max. AC: Lt. Oil @ 300 SSU	Max. DC: Air-Inert Gas	Max. DC: Water	Max. DC: Lt. Oil @ 300 SSU	Max. Fluid Temp. ˚F: AC	Max. Fluid Temp. ˚F: DC	Brass Body: Catalog Number	Brass Body: Constr. Ref. No.	Stainless Steel Body: Catalog Number	Stainless Steel Body: Constr. Ref. No.	Watt Rating/ Class of Coil Insulation ②: AC	Watt Rating/ Class of Coil Insulation ②: DC
UNIVERSAL OPERATION (Pressure at any port)																
1/8	3/64	.06	175	175	175	125	125	125	140	120	8320G130 ①	1	8320G140 ①	1	9.1/F	10.6/F
1/8	1/16	.09	100	100	100	65	65	65	180	120	8320G1	1	8320G41	1	9.1/F	10.6/F
1/8	3/32	.12	50	50	50	50	50	50	180	120	8320G83	1	8320G87	1	6.1/F	10.6/F
1/8	1/8	.21	30	30	30	20	20	20	180	120	8320G3	1	8320G43	1	9.1/F	10.6/F
1/4	1/16	.09	125	130	130	75	75	75	200	150	8320G172	2	--	--	10.1/F	11.6/F
1/4	3/32	.12	100	100	100	60	60	60	200	150	8320G174	2	8320G200	3	17.1/F	11.6/F
1/4	1/8	.25	50	50	50	25	25	25	200	150	8320G176	2	8320G201	3	17.1/F	11.6/F
1/4	11/64	.35	20	20	20	12	12	12	200	150	8320G178	2	--	--	10.1/F	11.6/F
NORMALLY CLOSED (Closed when de-energized)																
1/8	3/64	.06	200	200	200	200	200	200	180	120	8320G132	1	8320G142	1	6.1/F	10.6/F
1/8	1/16	.09	150	125	125	125	125	125	180	120	8320G13	1	8320G45	1	6.1/F	10.6/F
1/8	3/32	.12	100	100	100	100	100	100	180	120	8320G15	1	8320G47	1	6.1/F	10.6/F
1/8	1/8	.21	40	40	40	40	40	40	180	120	8320G17	1	8320G49	1	6.1/F	10.6/F
1/4	1/16	.09	210	225	225	160	160	160	200	150	8320G182	2	--	--	17.1/F	11.6/F
1/4	3/32	.12	150	150	150	115	115	115	200	150	8320G184	2	8320G202	3	10.1/F	11.6/F
1/4	1/8	.25	85	85	85	60	60	60	200	150	8320G186	2	8320G203	3	10.1/F	11.6/F
1/4	11/64	.35	45	45	45	25	25	25	200	150	8320G188	2	--	--	10.1/F	11.6/F
NORMALLY OPEN (Open when de-energized)																
1/8	3/64	.06	200	200	200	200	200	200	180	120	8320G136	1	8320G146	1	6.1/F	10.6/F
1/8	1/16	.09	150	125	125	125	125	125	180	120	8320G27	1	8320G51	1	6.1/F	10.6/F
1/8	3/32	.12	100	100	100	100	100	100	180	120	8320G29	1	8320G53	1	6.1/F	10.6/F
1/8	1/8	.21	40	40	40	40	40	40	180	120	8320G31	1	8320G55	1	6.1/F	10.6/F
1/4	1/16	.09	250	250	250	160	160	160	200	150	8320G192	2	--	--	17.1/F	11.6/F
1/4	3/32	.12	150	140	140	100	100	100	200	150	8320G194	2	8320G204	3	10.1./F	11.6/F
1/4	1/8	.25	70	70	70	55	55	55	200	150	8320G196	2	8320G205	3	10.1/F	11.6/F
1/4	11/64	.35	40	40	40	30	30	30	200	150	8320G198	2	--	--	10.1/F	11.6/F

Notes: ① Supplied with cast UR disc.
② On 50 hertz service, the watt rating for the 6.1/F solenoid is 8.1 watts; the watt rating for the 9.1/F solenoid is 11.1 watts.

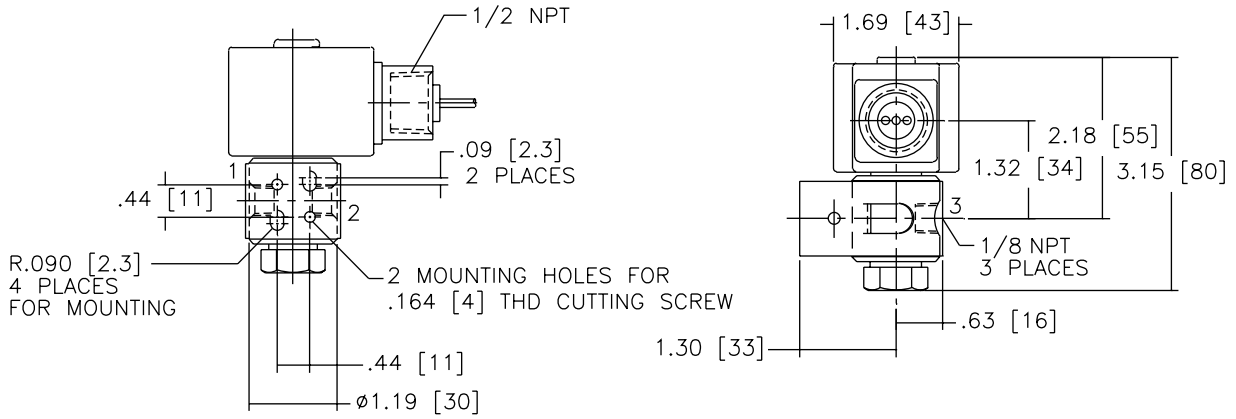
Specifications (Metric units)

Pipe Size (ins.)	Orifice Size (mm)	Kv Flow Factor (m3/h)	Operating Pressure Differential (bar)						Max. Fluid Temp. ˚C		Brass Body		Stainless Steel Body		Watt Rating/ Class of Coil Insulation ②	
			Max. AC			Max. DC										
			Air-Inert Gas	Water	Lt. Oil @ 300 SSU	Air-Inert Gas	Water	Lt. Oil @ 300 SSU	AC	DC	Catalog Number	Constr. Ref. No.	Catalog Number	Constr. Ref. No.	AC	DC
UNIVERSAL OPERATION (Pressure at any port)																
1/8	1.2	.05	12	12	12	9	9	9	59	48.4	8320G130 ①	1	8320G140 ①	1	9.1/F	10.6/F
1/8	1.6	.08	7	7	7	4	4	4	81	48.4	8320G1	1	8320G41	1	9.1/F	10.6/F
1/8	2.4	.10	3	3	3	3	3	3	81	48.4	8320G83	1	8320G87	1	6.1/F	10.6/F
1/8	3.2	.18	2	2	2	1	1	1	81	48.4	8320G3	1	8320G43	1	9.1/F	10.6/F
1/4	1.6	.08	9	9	9	5	5	5	92	64.9	8320G172	2	--	--	10.1/F	11.6/F
1/4	2.4	.10	7	7	7	4	4	4	92	64.9	8320G174	2	8320G200	3	17.1/F	11.6/F
1/4	3.2	.21	3	3	3	2	2	2	92	64.9	8320G176	2	8320G201	3	17.1/F	11.6/F
1/4	4.4	.30	1	1	1	1	1	1	92	64.9	8320G178	2	--	--	10.1/F	11.6/F
NORMALLY CLOSED (Closed when de-energized)																
1/8	1.2	.05	14	14	14	14	14	14	81	48.4	8320G132	1	8320G142	1	6.1/F	10.6/F
1/8	1.6	.08	10	9	9	9	9	9	81	48.4	8320G13	1	8320G45	1	6.1/F	10.6/F
1/8	2.4	.10	7	7	7	7	7	7	81	48.4	8320G15	1	8320G47	1	6.1/F	10.6/F
1/8	3.2	.18	3	3	3	3	3	3	81	48.4	8320G17	1	8320G49	1	6.1/F	10.6/F
1/4	1.6	.08	14	16	16	11	11	11	92	64.9	8320G182	2	--	--	17.1/F	11.6/F
1/4	2.4	.10	10	10	10	8	8	8	92	64.9	8320G184	2	8320G202	3	10.1/F	11.6/F
1/4	3.2	.21	6	6	6	4	4	4	92	64.9	8320G186	2	8320G203	3	10.1/F	11.6/F
1/4	4.4	.30	3	3	3	2	2	2	92	64.9	8320G188	2	--	--	10.1/F	11.6/F
NORMALLY OPEN (Open when de-energized)																
1/8	1.2	.05	14	14	14	14	14	14	81	48	8320G136	1	8320G146	1	6.1/F	10.6/F
1/8	1.6	.08	10	9	9	9	9	9	81	48	8320G27	1	8320G51	1	6.1/F	10.6/F
1/8	2.4	.01	7	7	7	7	7	7	81	48	8320G29	1	8320G53	1	6.1/F	10.6/F
1/8	3.2	.18	3	3	3	3	3	3	81	48	8320G31	1	8320G55	1	6.1/F	10.6/F
1/4	1.6	.08	17	17	17	11	11	11	92	65	8320G192	2	--	--	17.1/F	11.6/F
1/4	2.4	.10	10	10	10	7	7	7	92	65	8320G194	2	8320G204	3	10.1./F	11.6/F
1/4	3.2	.21	5	5	5	4	4	4	92	65	8320G196	2	8320G205	3	10.1/F	11.6/F
1/4	4.4	.30	3	3	3	2	2	2	92	65	8320G198	2	--	--	10.1/F	11.6/F

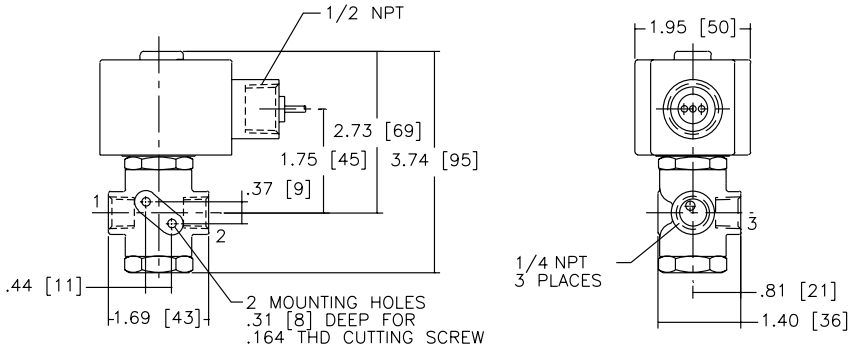
Notes: ① Supplied with cast UR disc.
② On 50 hertz service, the watt rating for the 6.1/F solenoid is 8.1 watts; the watt rating for the 9.1/F solenoid is 11.1 watts.

Dimensions: inches (mm)

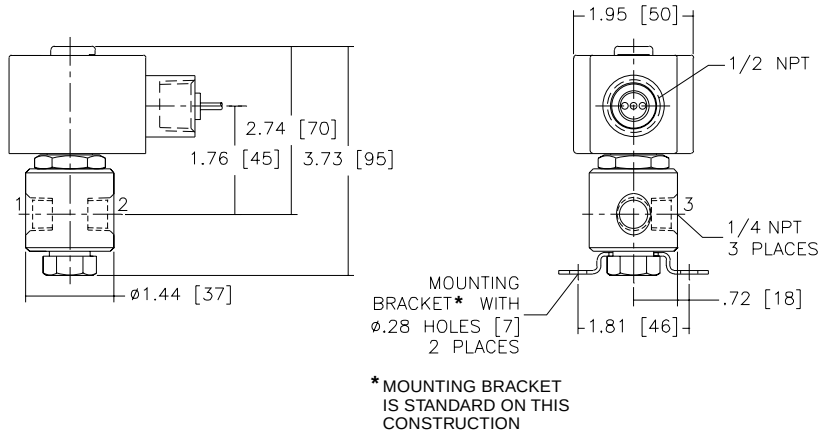
Constr. Ref. 1



Constr. Ref. 2

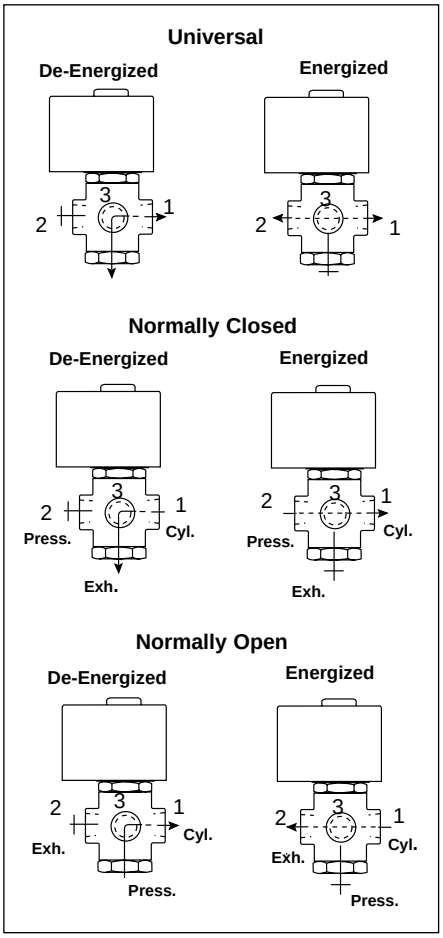


Constr. Ref. 3



*MOUNTING BRACKET IS STANDARD ON THIS CONSTRUCTION

FLOW DIAGRAMS



NOTE:
Bulletin 8320 is for General Purpose Solenoid Enclosure

For Explosion Proof Solenoid Enclosure -
See Form No. V5380

Installation & Maintenance Instructions

GENERAL PURPOSE AND EXPLOSIONPROOF SOLENOIDS

SERIES 8003

Form No.V5380R9

IMPORTANT: See separate valve installation and maintenance instructions for information on: Operation, Positioning, Mounting, Cleaning, Preventive Maintenance, Causes of Improper Operation, Disassembly, and Reassembly of basic valve.

DESCRIPTION

Catalog numbers 80031 and 80032 solenoids have a Type 1, General Purpose Solenoid Enclosure. Catalog numbers EF80031, EF80032, 80033, and 80034 solenoids have an explosionproof solenoid enclosure designed to meet Enclosure Type 3–Raintight, Type 7 (C & D) Explosionproof Class I, Division 1, Groups C & D and Type 9 (E, F, & G) – Dust Ignitionproof Class II, Division 1, Groups E, F, & G, and have a temperature range code of TC3. Series 8003 solenoids (when installed as a solenoid and not as part of an ASCO valve), are supplied with a core which has a 0.250–28 UNF–2B tapped hole with 0.38 or 0.63 minimum full thread.

OPERATION

When the solenoid is energized, the core is drawn into the solenoid base sub–assembly.

IMPORTANT: When the solenoid is de–energized, the initial return force for the core, whether developed by spring, pressure, or weight must exert a minimum force to overcome residual magnetism created by the solenoid. Minimum return force for AC construction is 1 lb. 5 oz. and 5 oz. for DC construction.

INSTALLATION

Check nameplate for correct catalog no., voltage, frequency, wattage, and service.

Enclosure Types 3, 4, 7, and 9

⚠ CAUTION: To prevent fire or explosion, do not install solenoid enclosure where ignition temperature of hazardous atmosphere is less than 160° C. On valves used for steam service or when a class "H" solenoid is used, do not install in hazardous atmosphere where ignition temperature is less than 180°C. See nameplate for service. Open circuit before disassembling. Reassemble before operating.

When used in –40°C Ambient Temperature Applications

⚠ WARNING: To prevent fire or explosion, use only conduit runs ½″ in size with a sealing fitting connected within 5 feet of the solenoid enclosure.

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

Positioning

This solenoid is designed to perform properly when mounted in any position. However, for optimum life and performance, the solenoid should be mounted vertically and upright to reduce the possibility of foreign matter accumulating in the solenoid base sub–assembly area.

Wiring

Wiring must comply with local codes and the National Electrical Code. The general purpose solenoid housing has a 7/8″ diameter hole to accommodate 1/2″ conduit. To facilitate wiring, the general purpose solenoid enclosure may be rotated 360° by removing the retaining cap or clip.

⚠ CAUTION: When metal retaining clip disengages, it will spring upward.

Rotate solenoid enclosure to desired position. Then replace retaining cap or clip before operating. On some solenoids, a grounding wire which is green or green with yellow stripes is provided. Use rigid metallic conduit to ground all enclosures not provided with a green grounding wire. For the explosionproof solenoid enclosure, electrical fittings must be approved for use in hazardous locations. The explosionproof solenoid enclosure has a 1/2″ conduit connection and may be rotated 360° to facilitate wiring.

⚠ WARNING: To prevent the possibility of death, serious injury or property damage, from accidental disengagement of solenoid from valve body, hold housing securely by wrenching flats while removing or replacing housing cover.

To rotate enclosure, loosen housing cover using a 1″ socket wrench. Two wrenching flats are provided on the housing to hold it securely in place while the cover is being loosened or tightened. Rotate housing to desired position and replace cover before operating. Torque housing cover to 135 ± 15 in–lbs [15,3 ± 1,7 Nm].

NOTE: Alternating current (AC) and direct current (DC) solenoids are built differently. To convert from one to the other, it is necessary to change the complete solenoid including the core and solenoid base sub–assembly, not just the coil. Consult ASCO.

Solenoid Enclosure Assembly

Catalog 80031 and 80032 solenoids may be assembled as a complete unit. Tightening is accomplished by means of a hex flange at the base of the solenoid enclosure.

Catalog EF80031, EF80032, 80033, and 80034 solenoids may be assembled as a complete unit. Tightening is accomplished by means of two milled slots (wrenching flats) above the threaded area of the solenoid base sub–assembly. Use special ASCO wrench supplied (order No. K168146–1). An alternate type wrench adapter is also available which tightens the assembly by means of four (4) pin holes in the solenoid base sub–assembly. If this alternate wrench is used the solenoid must be completely disassembled, see ***Coil Replacement*** section.

Solenoid Temperature

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

MAINTENANCE

⚠ WARNING: To prevent the possibility of death, serious injury or property damage, turn off electrical power, depressurize solenoid operator or valve, and vent fluid to a safe area before servicing.

Cleaning

All solenoid operators and valves should be cleaned periodically. The time between cleaning will vary depending on 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. Clean strainer or filter when cleaning the valve.

Preventive Maintenance

- Keep the medium flowing through the solenoid operator or valve as free from dirt and foreign material as possible.
- While in service, the solenoid operator or valve should be operated at least once a month to ensure proper opening and closing.
- Depending on the medium and service conditions, periodic inspection of internal valve parts for damage or excessive wear is recommended. Thoroughly clean all parts. Replace any parts that are worn or damaged.

Causes of Improper Operation

- **Faulty Control Circuit:** Check the electrical system by energizing the solenoid. A metallic *click* indicates loss of power supply. Check for loose or blown fuses, open–circuited or grounded coil, broken lead wires or splice connections.
- **Burned–Out Coil:** Check for open–circuited coil. Replace if necessary. Check supply voltage; it must be the same as specified on nameplate and as marked on the coil.
- **Low Voltage:** Check voltage across the coil leads. Voltage must be at least 85% of nameplate rating.

Coil Replacement

Solenoid Catalog Numbers 80031 and 80032 General Purpose Enclosure (Refer to Figure 1 below)

1. Disconnect coil lead wires and grounding wire if present.
2. Remove retaining cap or clip, nameplate (if present), and housing or housing with nameplate (alternate construction).

⚠ CAUTION: When metal retaining clip disengages, it will spring upward.

3. Slip spring washer, insulating washer, and coil off the solenoid base sub–assembly. Insulating washers are omitted when a molded coil is used.
4. Coil is now accessible for replacement
5. Torque housing cover to 135 ± 15 in–lbs [15,3 ± 1,7 Nm].

Catalog Numbers EF80031, EF80032, 80033 and 80034 Explosionproof Solenoid Enclosure

NOTE: This solenoid has two constructions, refer to Figure 2 on page 3 for the first construction and Figure 3 on page 4 for the alternate construction.

1. Disconnect coil lead wires and grounding wire if present.

⚠ WARNING: To prevent the possibility of death, serious injury or property damage from accidental disengagement of solenoid from valve body, hold housing securely by wrenching flats while removing or replacing housing cover.

2. Unscrew housing cover using 1″ socket wrench. Two wrenching flats are provided to hold the housing securely in place while the cover is being removed or replaced.
3. Remove take–up spring, flux washer, insulating washer, coil and insulating washer. For the alternate construction, slide retaining cup sideways to disengage it from the top of the solenoid base sub–assembly. Then remove yoke, spring washer, insulating washer, coil and insulating washer. Insulating washers are omitted when a molded coil is used.
4. Reassemble solenoid according to exploded view. Before reassembly, refer to NOTE following for cleaning and greasing requirements.
5. Torque housing cover to 135 ± 15 in–lbs [15,3 ± 1,7 Nm].

⚠ CAUTION: Solenoid must be fully reassembled because the housing and internal parts complete the magnetic circuit. Be sure to replace an insulating washer at each end of non–molded coil.

NOTE: Solenoid Catalog Nos. EF80031, EF80032, 80033, and 80034, —Installation and maintenance of explosionproof equipment requires more than ordinary care to ensure safe performance. All finished surfaces of the solenoid are constructed to provide flame–proof seal. Be sure that the surfaces are wiped clean before reassembling. Grease the explosionproof solenoid enclosure with DOW CORNING® 111 Compound lubricant or an equivalent high–grade silicone grease. Grease all joints thoroughly including the underside of the solenoid base sub–assembly flange and internal threads of the housing cover.

Part Name	Torque Value in Inch–Pounds	Torque Value in Newton–Meters
Solenoid Base Sub–Assembly	175 ± 25	19,8 ± 2,8

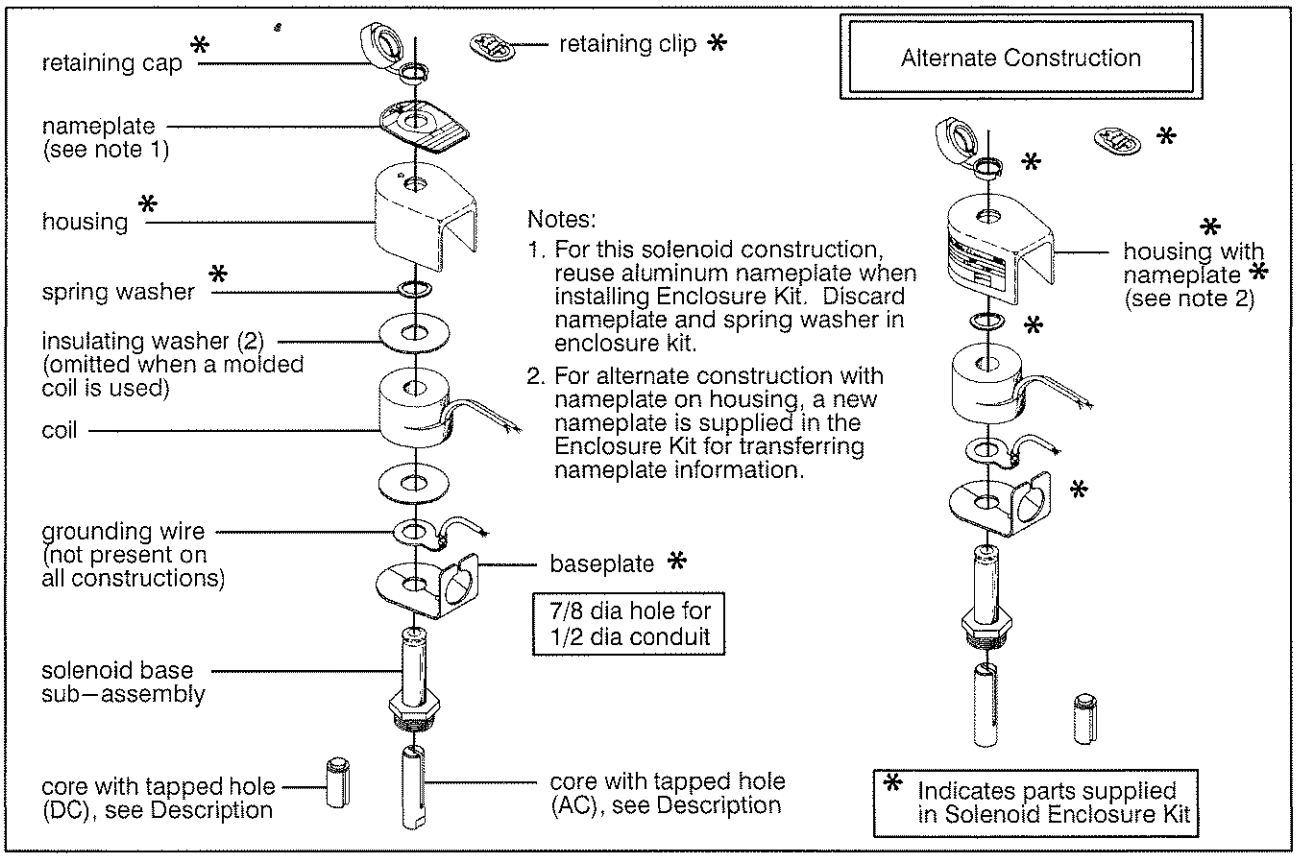


Figure 1, Catalog Nos. 80031 and 80032 General Purpose Solenoid Enclosure.

ASCO®

Torque Chart

Part Name	Torque Value in Inch–Pounds	Torque Value in Newton–Meters
Solenoid Base Sub–Assembly	175 ± 25	19,8 ± 2,8
Housing Cover	135 ± 15	15,3 ± 1,7

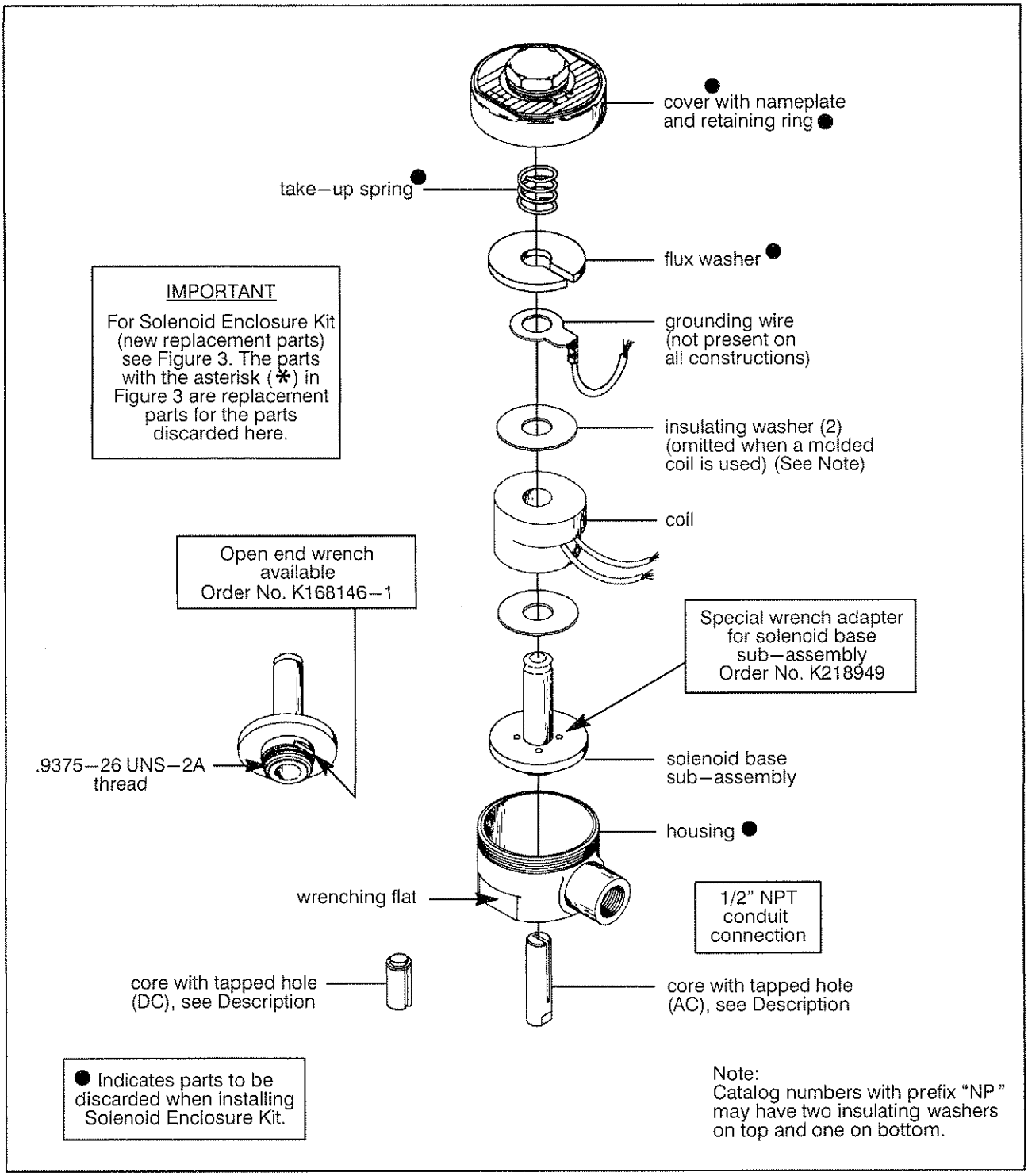


Figure 2. Catalog Nos. EF80031, EF80032 80033 and 80034 Explosionproof Solenoid Enclosure.

ASCO®

Torque Chart

Part Name	Torque Value in Inch–Pounds	Torque Value in Newton–Meters
Solenoid Base Sub–Assembly	175 ± 25	19,8 ± 2,8
Housing Cover	135 ± 15	15,3 ± 1,7

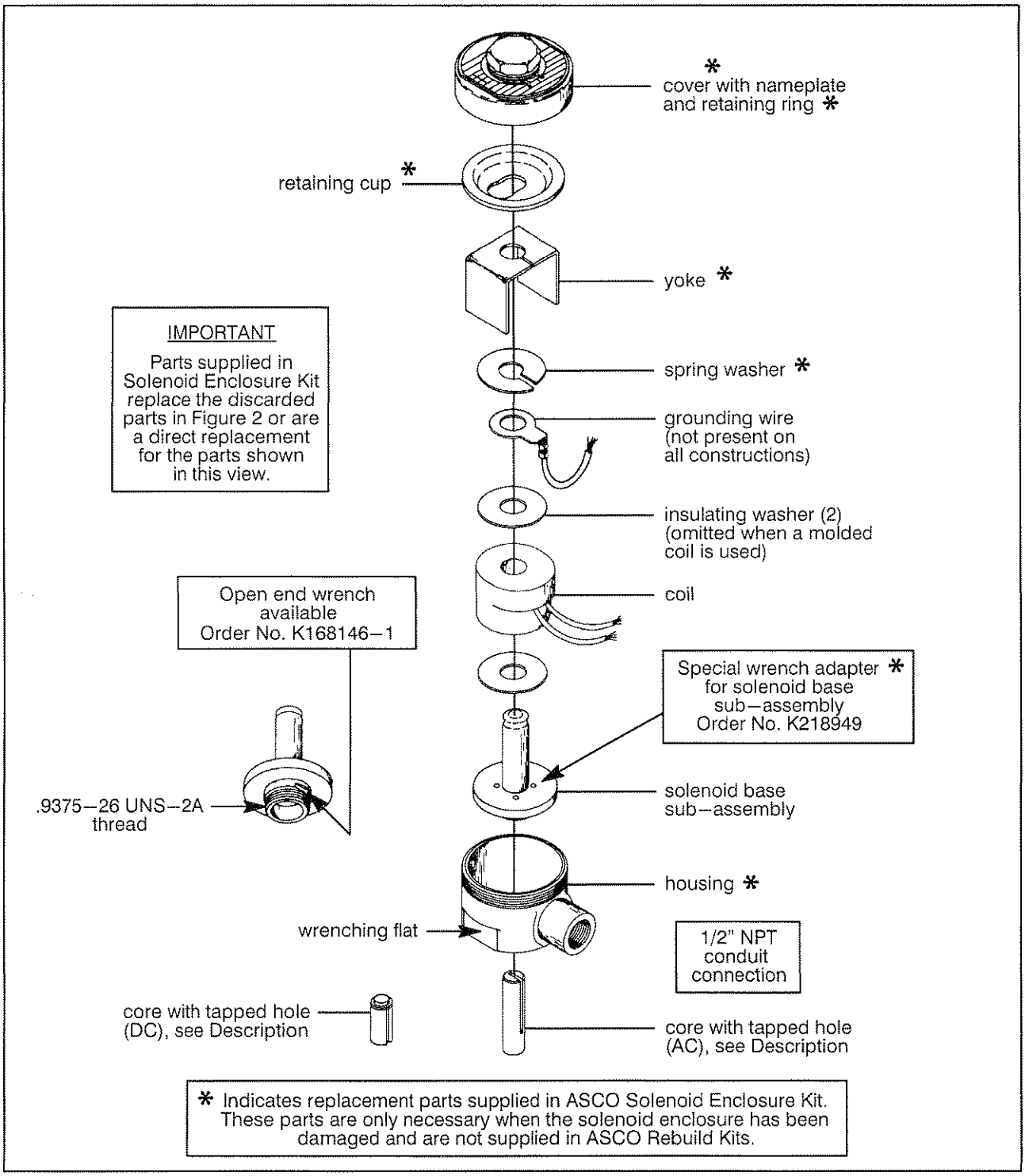


Figure 3. Catalog Nos. EF80031, EF80032, 80033 and 80034 Alternate Construction Explosionproof Solenoid Enclosure.

ASCO®

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TS 8

THERMTROL CORPORATION
TC-100-A1-190 DEGREE F

½'' NPT 190ºF TEMPERATURE SWITCH
NORMALLY CLOSED

ANGI PART NUMBER 480-07245

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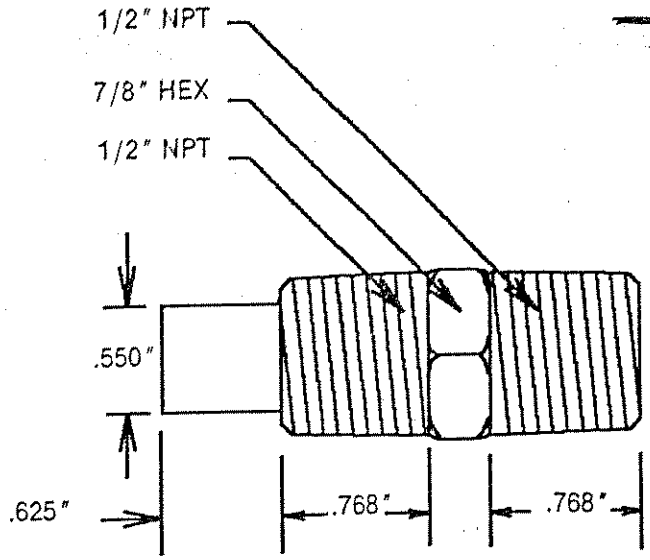
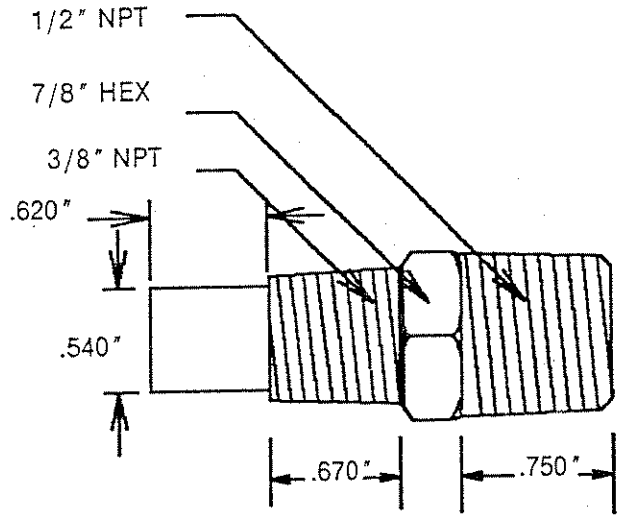
STYLE 100



MODEL	CONTACT RATING	CONTACTS	SWITCHING ACTION
TC-100	14 Amps 120VAC 10 Amps 240VAC	N.C.	Snap
TCC-100	6 Amps 120VAC 4 Amps 240VAC	N.C.	Creep
TCCR-100	6 Amps 120VAC 4 Amps 240VAC	N.O.	Creep
TCB-100	8 Amps 120VAC 4 Amps 240VAC	N.C.	Creep

- ONE-PIECE BRASS CONSTRUCTION
- 7000 PSI PRESSURE RATING
- TERMINATION CODE A, B, C, D, E, F

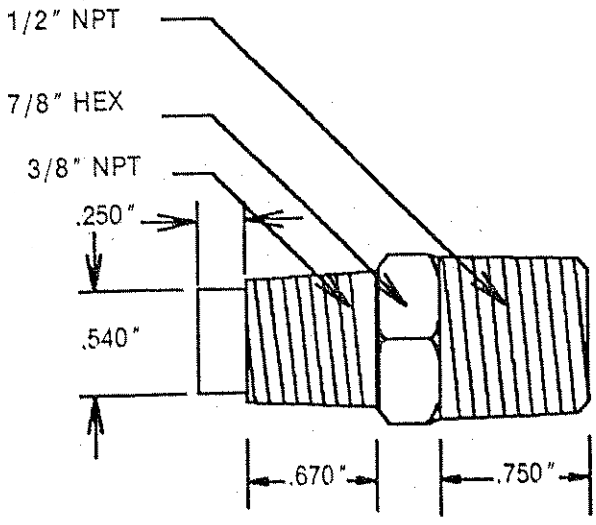
STYLE 102



MODEL	CONTACT RATING	CONTACTS	SWITCHING ACTION
TC-102	14 Amps 120VAC 10 Amps 240VAC	N.C.	Snap
TCC-102	6 Amps 120VAC 4 Amps 240VAC	N.C.	Creep
TCCR-102	6 Amps 120VAC 4 Amps 240VAC	N.O.	Creep
TCB-102	8 Amps 120VAC 4 Amps 240VAC	N.C.	Creep

- ONE-PIECE BRASS CONSTRUCTION
- 7000 PSI PRESSURE RATING
- TERMINATION CODE A, B, C, D, E, F

STYLE 103



MODEL	CONTACT RATING	CONTACTS	SWITCHING ACTION
TC-103	14 Amps 120VAC 10 Amps 240VAC	N.C.	Snap
TCC-103	6 Amps 120VAC 4 Amps 240VAC	N.C.	Creep
TCCR-103	6 Amps 120VAC 4 Amps 240VAC	N.O.	Creep
TCB-103	8 Amps 120VAC 4 Amps 240VAC	N.C.	Creep

- ONE-PIECE BRASS CONSTRUCTION
- 7000 PSI PRESSURE RATING
- TERMINATION CODE A, B, C, D, E, F

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TV 3

FLUID POWER ENERGY
A1010-100

1’’ 3-WAY THERMOSTIC VALVE

ANGI PART NUMBER 330-07232

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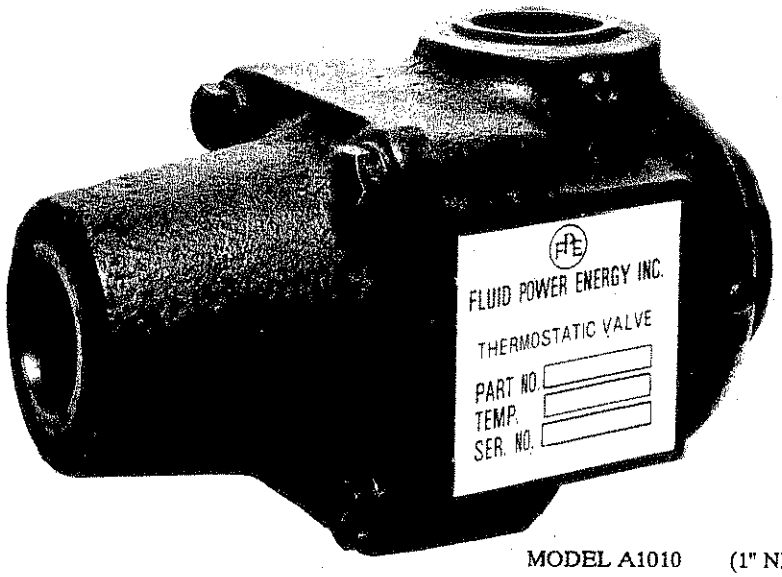
1/2" 3/4" 1" THREE-WAY THERMOSTATIC VALVE



MODEL A1010 (1" NPT)
A1110 (3/4" NPT)
A1210 (1/2"NPT)
A1010J8 (SAE #8)
A1010J12 (SAE #12)
A1010J16 (SAE #16)

FEATURES

SELF-CONTAINED • NON-ADJUSTABLE • TAMPER-PROOF • COMPACT

WIDE RANGE OF TEMPERATURES • HEAVY-DUTY • REPLACEABLE ELEMENT

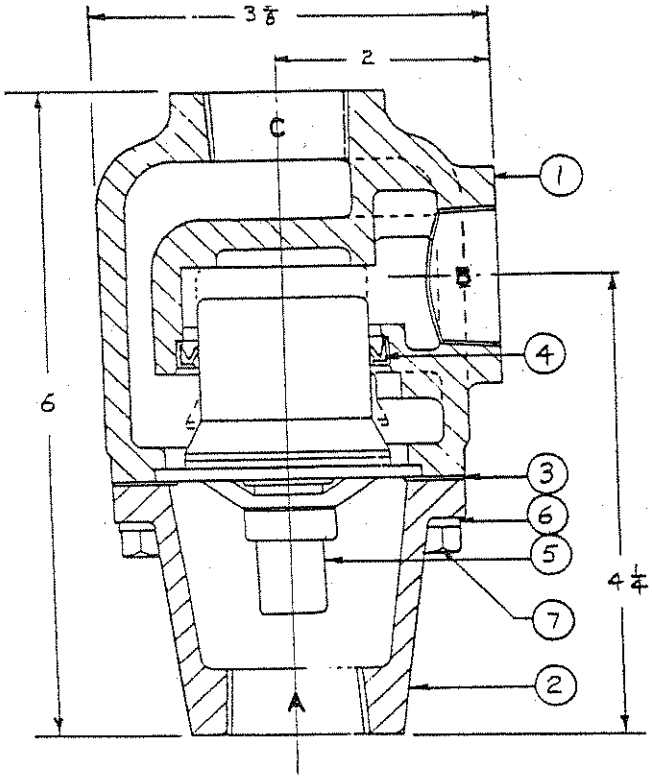
RUGGED CONSTRUCTION • OPERATE IN ANY POSITION

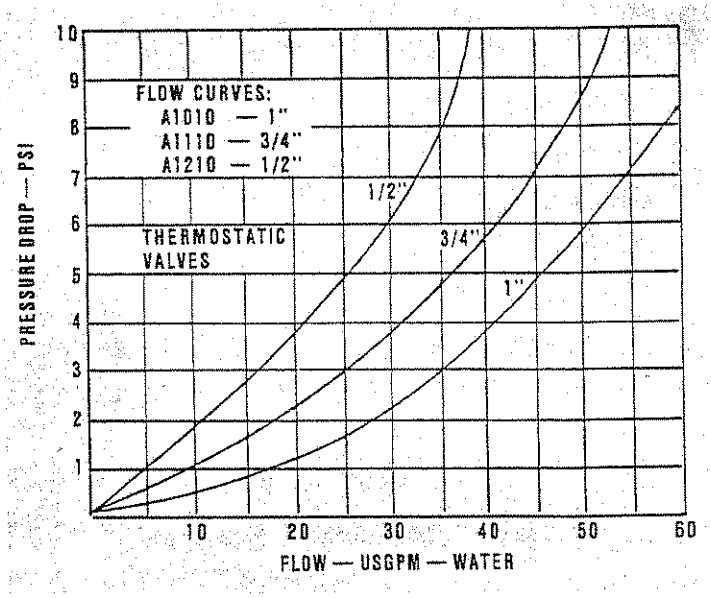
DESCRIPTION

FPE thermostatic valves utilize the principle of expanding wax, which in the semi-liquid state undergoes large expansion rates within a relatively narrow temperature range. The self-contained power element activates a stainless steel sliding sleeve which provides positive three-way valve action. All FPE thermostatic valves are factory set at predetermined temperatures; no further adjustments are necessary. A wide range of temperatures are available for water and oil temperature control applications.

On starting, the total fluid flow is in a by-pass mode. As fluid temperature rises to the control range, some fluid is diverted to the cooling system. As fluid temperature continues to increase, more flow is diverted, and when in a fully stroked condition, all fluid flow is positively directed to the cooling system. FPE thermostatic valves may be used for either mixing or diverting applications. In normal operation, fluid temperatures are controlled to within a few degrees.

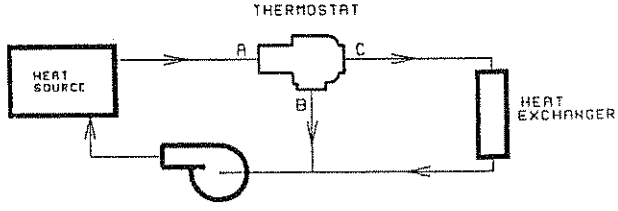
Standard FPE thermostatic valve housings are made from high quality grey iron castings; however, steel and bronze housings are available.



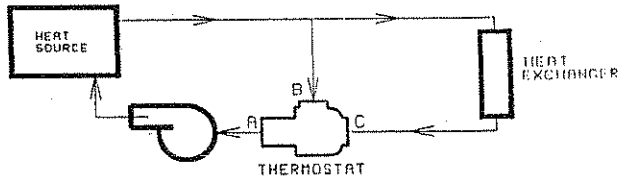


ITEM	NO.	P/N	DESCRIPTION
1	1	1010	VALVE BODY (1" NPT)
2	1	1020	VALVE COVER (1" NPT)
3	1	1572	O-RING
4	1	1071	LIP SEAL (TEFLON)
*5	1	1060	ELEMENT
6	4	1603	LOCKWASHER 5/16
7	4	1602	CAPSCREW 5/16 - 18 x 7/8
8	1	1590	NAME PLATE

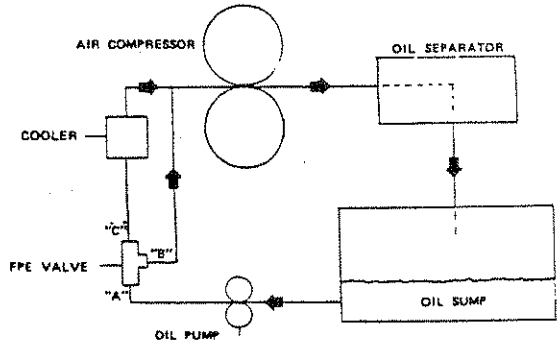
* PART NO. 1060 - CARRIES A DASH NUMBER INDICATING THE NOMINAL TEMPERATURE



DIVERTING APPLICATION



MIXING APPLICATION



AIR COMPRESSOR APPLICATION

PRESSURE RATINGS

MATERIAL	PRESSURE RATING	MODEL NUMBER
CAST IRON	150 PSI	A1010
STEEL	500 PSI	S1010
ALUMINUM	150 PSI	AL1010
BRONZE	150 PSI	B1010
DUCTILE IRON	250 PSI	D1010
STAINLESS STEEL	500 PSI	SS1010

PRESSURE RATINGS

MATERIAL	PRESSURE RATING	MODEL NUMBER
CAST IRON	150 PSI	A2010
STEEL	500 PSI	S2010
BRONZE	150 PSI	B2010
STAINLESS STEEL	500 PSI	SS2010

HOW TO ORDER: **Specify Model Number, nominal temperature desired, and housing material.**

FPE FLUID POWER ENERGY, INC.

FLUID POWER ENERGY

MODEL CODE SYSTEM

AL — 1010 — N — 160

BODY MATERIAL

A	CAST IRON
AF	CAST IRON FLG. (STD. VALVE IS NPT)
B	BRONZE
D	DUCTILE
AL	ALUMINUM
S	STEEL
SF	STEEL, FLANGED (STD. VALVE IS NPT)
SS	STAINLESS STEEL

VALVE SIZE

0750	3/4" NPT
1210	1/2" NPT (1210 BODY SIZE)
1110	3/4" NPT (1210 BODY SIZE)
1010	1" NPT (1210 BODY SIZE)
1010J8	SAE #8 THREADS (1210 BODY SIZE)
1010J12	SAE #12 THREADS (1210 BODY SIZE)
1010J16	SAE #16 THREADS (1210 BODY SIZE)
1011	1" NPT (TWO WAY 1211)
1411	1 1/4" NPT (TWO WAY 1211)
1511	1 1/2" NPT (TWO WAY 1211)
1530	1 1/2" NPT (THREE WAY)
1530J18	SAE #18 (THREE WAY)
1530J20	SAE #20 (THREE WAY)
1530J24	SAE #24 (THREE WAY)
2010-1	1 1/2" NPT (2010 BODY)
2010	2" NPT (2010 BODY)
2010J24	SAE #24 THREADS
2010J32	SAE J32 THREADS
2510	2 1/2" FF FLG.
3010	3" FF FLG.
4010	4" FF FLG.
5010	5" FF FLG.
6010	6" FF FLG.

SPECIAL DESIGNATION

C	NO COVER
E	NEOPRENE O-RING
G	PRIVATE LABEL
K	BLACK PAINT FINISH
L	SS CHANNEL
M	MANUAL OVERRIDE
N	NO NAME PLATE
P	NICKEL PLATED ELEMENT
S	STUDS
T	PRESSURE TEST *
	T20 = 200 W. PRESS.
	T22 = 220 W. PRESS.
	T24 = 240 W. PRESS.
	ETC...
V	VITON O-RING
W	WEEP HOLE FOLLOWED BY SIZE IN 32NDS OF AN INCH
	W1 = 1/32" WEEP HOLE
	W2 = 2/32" WEEP HOLE
	W3 = 3/32" WEEP HOLE
	ETC...
X	SPECIAL DESIGNATION

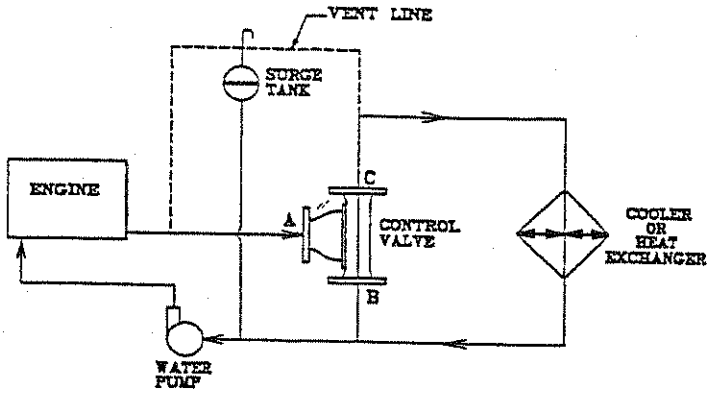
TEMPERATURE SETTING

USED IN MODEL NOS	ELEMENT ASSEMBLY P / N 0760	1060	1560	2050	2096
	0750	1010	1011	2010	AMOT EQUIVALENTS
		1110	1511	2010-1	
		1210	1530	2510	
				3010	
				4010	
				5010	
				6010	

NOMINAL (DEG F)	ELEMENT ASSEMBLY NUMBER 0760	1060	1560	2050	2096
45				32-50	32-50
55				47-68	47-68
65				55-75	55-75
75				68-86	68-86
80		70-90	70-90		
90		80-100	80-100	80-95	80-95
95				86-104	86-104
100	90-110	90-110	90-110	93-108	93-108
105				95-113	95-113
110	100-120	100-120	100-120	100-117	100-117
115				104-122	104-122
120	110-130	110-130	110-130	110-130	110-130
130		120-140	120-140	124-140	124-140
135		125-145	125-145	129-145	129-145
140	127-152	130-150	130-150	135-151	135-151
150		140-160	140-160	146-162	146-162
155				150-165	150-165
160	150-170	150-170	150-170	155-172	155-172
165				160-175	160-175
170	160-180	160-180	160-180	165-180	165-180
175			170-185	170-185	170-185
180	175-190	170-190	175-190	175-190	175-190
185				180-196	180-196
190		180-195	185-200	185-200	185-200
195		185-200		188-208	188-208
200	190-210	190-210	190-210		
205			198-218	195-215	195-215
210		198-218		200-215	200-215
220			212-225	209-225	209-225
230		220-235	220-240	219-239	219-239
240	230-250			226-252	226-252
250	240-265			240-260	240-260
260				250-270	250-270

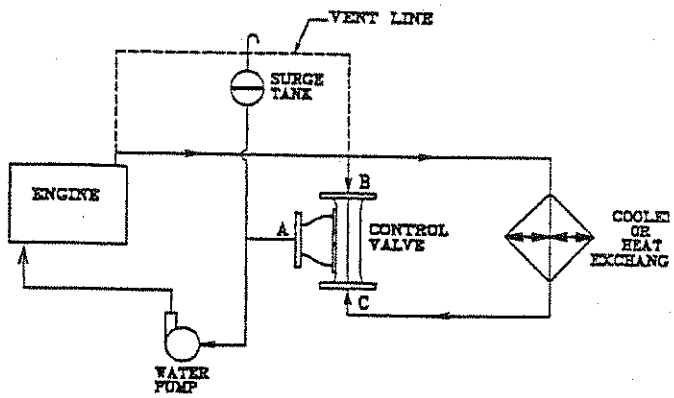
FORM: J:\DCAD\FPE\MODEL-PN.DWG (R14)
REV. 00 (3/93)
REV. 01 (6/94)
REV. 02 (11/94)
REV. 03 (1/95) ECN #011995
REV. 04 (10/96) ECN #1029
REV. 05 (07/99) ECN #1058
REV. 06 (03/01)

APPLICATION CHARTS



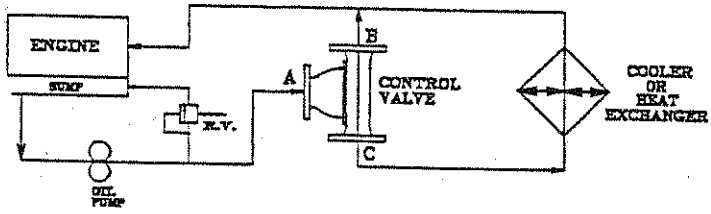
COOLING WATER DIVERTING SYSTEM

FIGURE (1)



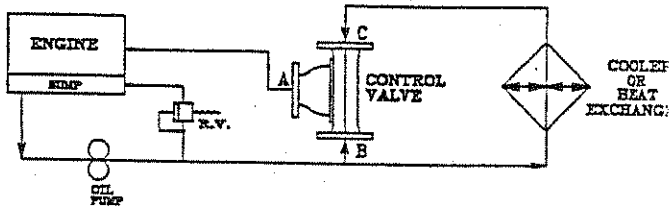
COOLING WATER MIXING SYSTEM

FIGURE (2)



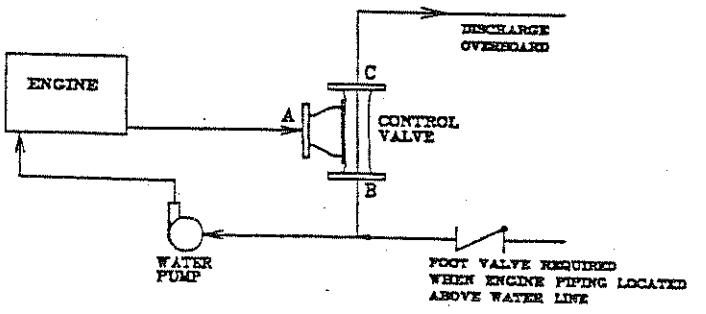
LUBE OIL TEMPERATURE CONTROL DIVERTING SYSTEM

FIGURE (3)



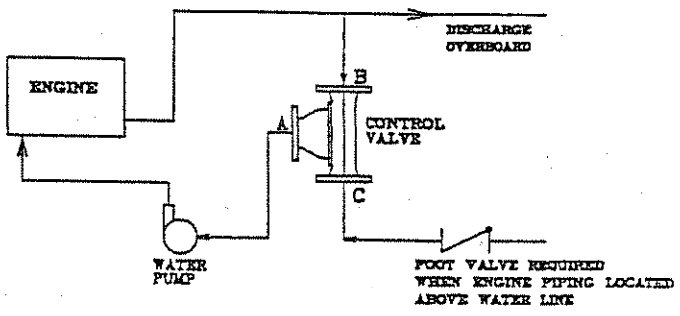
LUBE OIL TEMPERATURE CONTROL MIXING SYSTEM

FIGURE (4)



DIRECT COOLING DIVERTING SYSTEM USING WATER (140 F OR LESS)

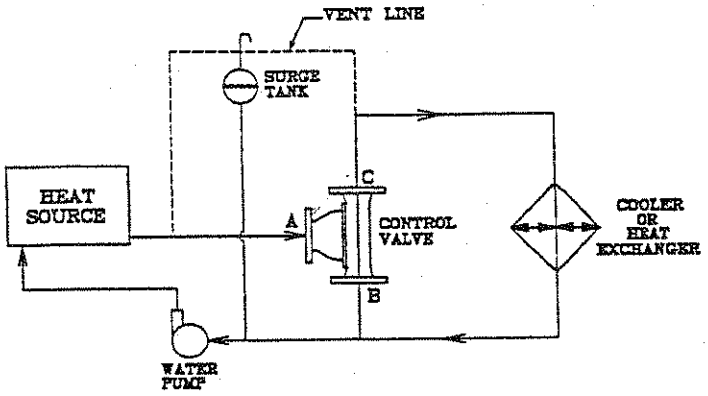
FIGURE (5)



DIRECT COOLING MIXING SYSTEM USING WATER (140 F OR LESS)

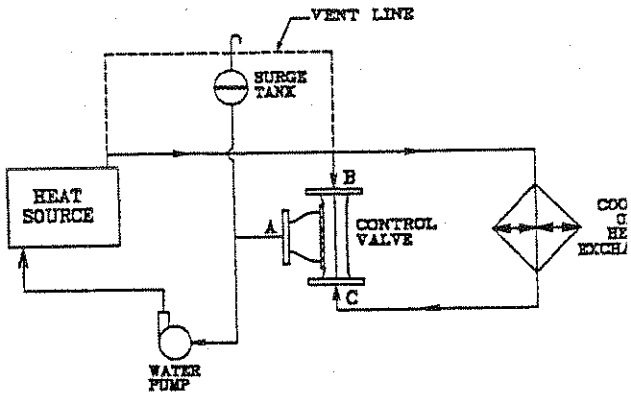
FIGURE (6)

APPLICATION CHARTS



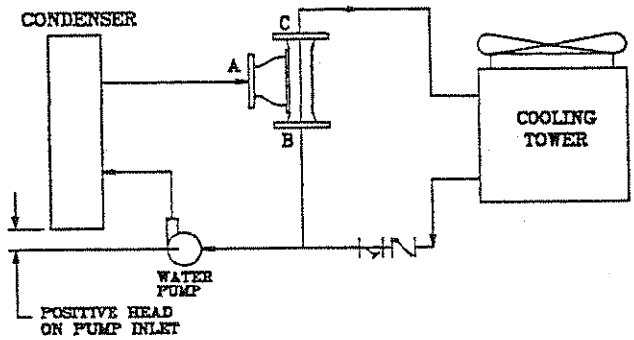
COOLING – ELECTRIC SYSTEM – DIVERTING MODE

FIGURE (7)



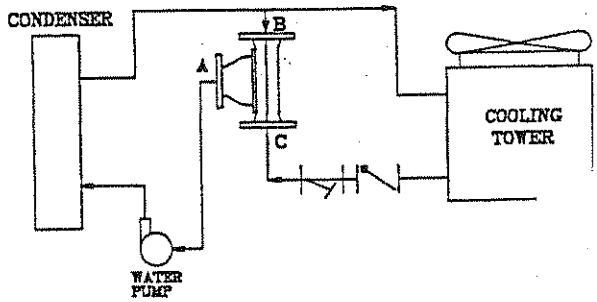
COOLING – ELECTRIC SYSTEM – MIXING MODE

FIGURE (8)



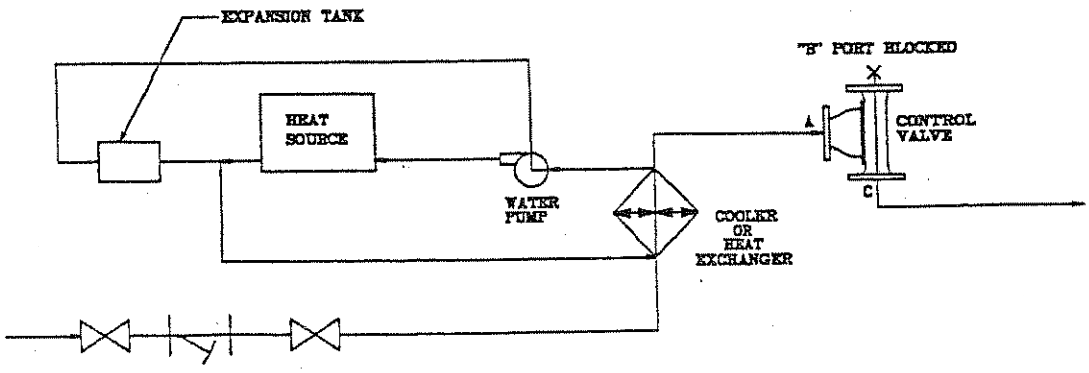
DIVERTING SYSTEM – AIR CONDITIONING

FIGURE (9)



MIXING SYSTEM – AIR CONDITIONING

FIGURE (10)



WATER SAVING APPLICATIONS

FIGURE (11)

FLUID POWER ENERGY, INC.

REPAIR INSTRUCTIONS

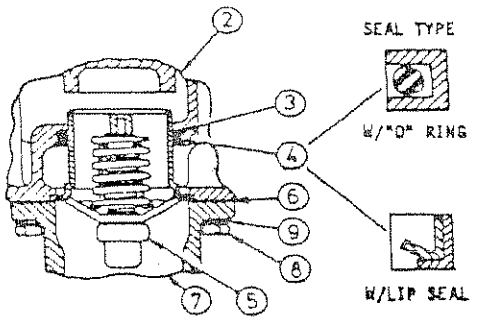
THERMOSTATIC VALVE MAINTENANCE KITS

ELEMENT TESTING

Place element in water at a temperature 15 deg. F. to 20 deg. F. above its nominal setting and stir water vigorously with the element for five minutes. The temperature stamped on the sleeve of the element is the nominal temperature. The cracking temperature and the fully open temperature are stamped on the pill of the thermostat. After stirring vigorously immediately place the element in the housing. If the element is fully stroked, the seating and over-travel spring can be felt as it is pushed down. To determine if the element will close at a specific temperature, place the element in a bath of water approximately 5 deg. F below the start to open temperature. This is the number stamped on the element. Due to the effect of hysteresys the element will close 5 deg. F. below the start to open temperature.

ELEMENT REPLACING

Remove four capscrews (8), lockwashers (9) and separate housings (2) and (7). Remove element assembly (5) and seal (4). Remove housing gasket or O-ring (6). Clean housing sections; remove any scale or foreign material from seal faces. Lubricate new element seal (4), lip seal is pressed into upper housing (2), O-ring is inserted into sleeve (3). Place the new housing gasket (6) in recess of upper housing (2). Insert element (5) into upper housing (2) to position shown in section view. Place lower housing (7) over exposed section of element (5) against face of upper housing (2). Secure housings with capscrews (8) and lockwashers (9).



Ref. No.	Description
2	Upper Housing
3	Sleeve
4	"O" Ring or Lip Seal
5	Element Assembly
6	Gasket or O-ring
7	Lower Housing
8	Cap-screw
9	Lock-washer

g) Outlet temperature is not maintained due to insufficient heat rejected to coolant.

3) ADDITIONAL ITEMS THAT MAY BE CHECKED:
   a) System thermometers should be regularly checked to make sure that they are operational
   b) Thermometers should be located on the side of horizontal pipe runs whenever possible and particularly on oil systems.
   c) Thermometers should be as far as possible downstream from the valve in a mixing application.
   d) The system should not have any bypasses or "sneak circuits" which prevent proper operation of thermostatic control valve.
   e) Cracked or broken valves may be caused by:
      i) Piping too short, and therefore, over-tightening bolts
      ii) Lack of expansion isolation between piping and valve.
      iii) Misalignment of piping.
      iv) Excessive weight
      v) Allowing untreated water to freeze in the system.

FLUID POWER ENERGY, INC.

Trouble Shooting

1) SYSTEM TEMPERATURE RUNNING TOO HOT
   a) Presence of foreign objects, dirt and solid buildup inside the valve (e.g. sliding piston, piston's seat, and lip seal area) may prevent proper operation of the valve. Example: By-pass port will not close.
   b) Valve's by-pass and cooler ports (port B & C) installed backward. As port B closes due to temperature increase, flow is greatly restricted to cooler.
   c) Valve is undersized, causing increase in pressure drop and possibly cavitation.
   d) Thermostatic wax element may have been exposed to temperature higher than the recommended maximum temperature.
   e) Excessive pressure drop (in excess of 25 psi) may cause one or more of the following conditions:
      i) Thermostatic wax element failure
      ii) Lip seal dislocation
      iii) O-ring damage
      iv) Improper piston movement.
   f) Improper system cooling capacity.
   g) Improper sizing of the valve in a mixing application. If the valve is sized too large for the application it could result in poor mixing, which could cause the temperature to run either too hot or too cold.

2) SYSTEM TEMPERATURE RUNNNG TOO COLD
   a) Incorrect selection of valve's nominal temperature.
   b) Valve's by-pass and cooler ports (port B & C) installed backward. This condition forces fluid to cooler at lower temperature.
   c) Worn Teflon lip seal.
   d) Presence of foreign object, dirt and solid buildup inside of valve (e.g. sliding piston, piston's seat, and lip seal area) may prevent proper operation of the valve.
   e) Excessive pressure drop. Refer to part 1, item E above.
   f) Thermostatic control valve is oversized.

FLUID POWER ENERGY, INC.

Maintenance

PFE thermostatic valves probably require less maintenance than any other type of similar use. Elements in normal service should be good for 6 to 10 years. Excessive temperatures, chemical, electrolytic or cavitation attack will of course shorten the life of the elements and seats which are replaceable. Carbonates, scale and other solids must not be permitted to build up on sliding valve or sensing cup surfaces. FPE does not recommend that a large stock of spare parts be maintained at the valve installation. Most commonly used elements and seals are immediately available from FPE's stocking area representatives or from the factory direct. Seals and composition gaskets are rated for a shelf life of one year from date of shipment. If adequately sealed from air, they may be good for longer periods. The shelf life of an FPE element is from one to two years, depending on storage conditions.

Operation

After installation of the valve has been completed into the system, and operating of the valve has been started, system temperatures should be monitored so that the circuit is performing satisfactorily. Water cooling systems generally operate at a temperature at or slightly below the nominal temperature of the valve. Oil systems or more viscous fluids operate at temperatures at or slightly above the nominal temperature. To check an elements temperature, place the element in a water bath at a temperature of 5 degrees below the opening temperature of the element. Make sure you stir the water vigorously with the element for at least five minutes. Check the sliding valve to make sure it is not off its seat. Next, place the element in the same water bath at 25 degrees above the full open temperature reading and again stir vigorously for five minutes. Check the element and it should now by fully stroked. This can be determined by placing the element back into the FPE valve housing and pushing the element's spider fully into the counter bore. FPE valves have an over travel spring which can be felt by pushing the element down into the counter bore. If this resistance is felt, the element is now fully stroked. Since the element has a tendency to cool quickly, you must do this last step before the element has cooled. Do not use oil as a test bath. On every high temperature elements you may use glycol solution or water.

FLUID POWER ENERGY, INC.

Installation

FPE valve dimensions are given on an attached sheet, a copy of which is supplied with each valve order and which should be checked against the actual valve on receipt of the order. If special engineered drawings have been prepared, these drawings and FPE standard instructions should be resolved before the valve is put into service. At The end of this bulletin, there are recommended methods of applying FPE valves. Figure 1 illustrates a cooling water diverting system using a radiator. Figure 2 is a cooling water mixing system using a heat exchanger. Please note the difference between a diverting system and a mixing system. In the diverting system the three-way thermostatic control valve diverts part of the fluid out of the C port into the cooler, and part of the fluid out of the B port to bypass the cooler. In a mixing situation part of the flow comes from the cooler or heat exchanger into the C port, the other part of the fluid comes form the B port or by-pass, mixes in the valve and comes out the A port at the desired temperature. In comparing these two systems, diverting and mixing, it has been found that the diverting system will provide a better and more even temperature control than the mixing system. This is because the diverting system has introduced a more temperature-even homogeneous fluid to the sensing element. On the other hand a mixing system requires two different fluid temperatures to mix in a small volume of the valve in order to exit through the temperature-sensing unit. You will note that in all of the piping diagrams, a mixing system controls the temperature of the fluid going into the engine or the compressor. The diverting system controls the temperature coming out of the engine or compressor.

FLUID POWER ENERGY, INC.

THERMOSTATIC VALVES

Instruction and Application Guidelines

Your FPE Thermostatic Valve has been manufactured with extreme care and tested to insure that it had no detectable defects at the time it left the factory. If the valve is correctly applied and installed it will give years of service under reasonable operating conditions. This instruction manual will give you service information for nearly all normal operating conditions, but for the unusual situations it may be necessary to contact your FPE representative or the FPE factory. All FPE valves use the "Expanding Wax" type of temperature sensing element set to their normal rating under closely controlled conditions, and cannot be altered once they are set. If it is ever necessary to change the nominal rating of the valve, a different set of elements must be used.

Inspecting the Valve Upon Receipt

Immediately upon receipt of your valve, check it over carefully for damage received in shipping, and be sure you have received the proper unit. In checking the model number of the valve against your order you may find that the nominal temperature rating is stamped below the part number, which is not how it was ordered. This numbering system merely allows us to identify the construction and thermostat setting on a more exact basis. If you have any questions do not hesitate to call the factory or your representative.

Materials

FPE valves are available in cast iron, steel, ductile iron, aluminum and bronze. For information concerning these different materials, please contact your factory representative. Sometimes electrolysis may be encountered in a system. If this is the case, a zinc or magnesium waste plug can be installed in the valve at port A. If the valve is installed in seawater, cast iron housings are not generally satisfactory. In this type of installation, bronze valves must be used. In mounting the valve in a system, the valve must be properly vented so that the possibility of trapping air in the valve or around the elements is eliminated. A good rule to follow on systems is to place air vents so that air can be bled from the systems to a single collection point. Please note the vent lines in the different piping diagrams.

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VS 2

MURPHY
VS2

VIBRATION SWITCH NON-EXP

ANGI PART NUMBER 480-07246

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March 19, 2011

Sensitivity Adjustment

WARNING: REMOVE ALL POWER BEFORE OPENING THE ENCLOSURE. IT IS YOUR RESPONSIBILITY TO HAVE A QUALIFIED PERSON PERFORM ADJUSTMENTS, AND MAKE SURE IT CONFORMS TO NEC AND LOCAL CODES. DO NOT ADJUST SENSITIVITY WHILE THE MACHINE IS RUNNING. STAND CLEAR OF THE MACHINE AT ALL TIMES WHEN IT IS OPERATING.

All models of the VS2 and VS94 Series cover a wide range of sensitivity. Each model is adjusted to the specific piece of machinery on which it is installed in a satisfactory location.

The sensitivity adjustment will be increased or decreased so that the switch does not trip during start-up or under normal operating conditions. Some machinery experiences a shock on start-up. Remote reset versions are available to hold the switch in reset during equipment start-up. This allows a more sensitive setting of the switch; however, it is not always practical.

Instructions are given for adjusting sensitivity to not trip on start-up. This is typically done as follows:

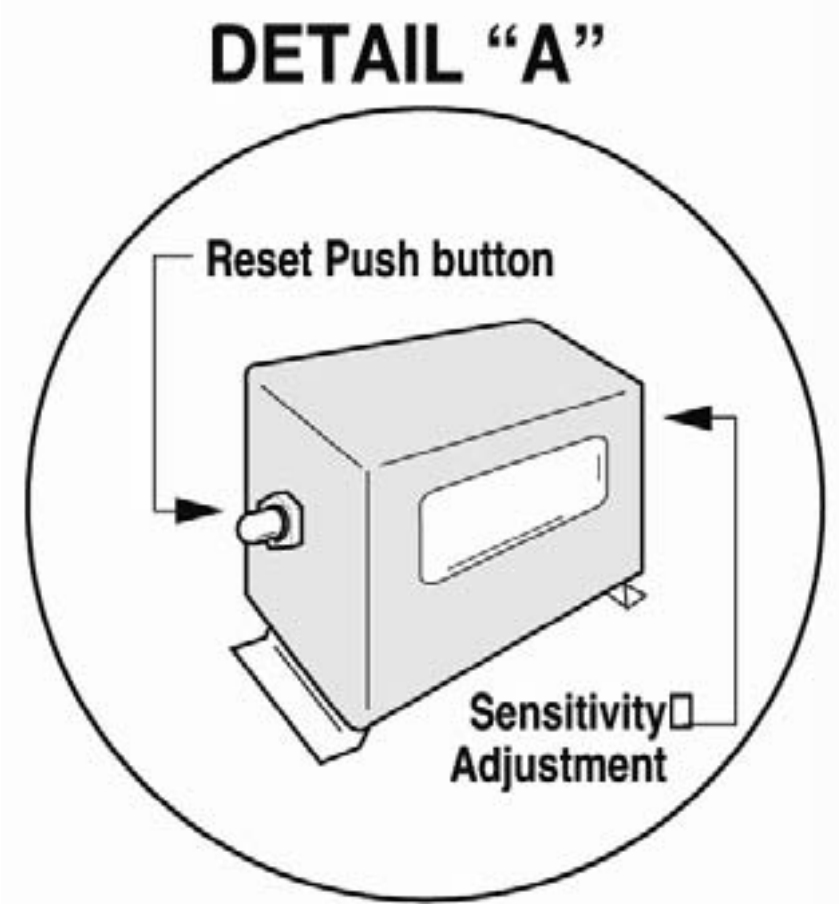
1. REPLACE ALL COVERS, LIDS AND ELECTRICAL ENCLOSURES.
2. Press the reset pushbutton to engage the magnetic latch. To be sure the magnetic latch has engaged, observe latch through the window on the VS2 and VS2C (see **DETAIL A**). On the VS2EX, VS94 Series the reset button remains depressed meaning the magnetic latch has engaged.
3. Start the machine.
4. If the instrument trips on start-up, allow the machine to stop. Turn the sensitivity adjustment ¼ turn clockwise, (adjustment for VS94 and VS2EXRB models is located within the box, see **DETAIL B**).

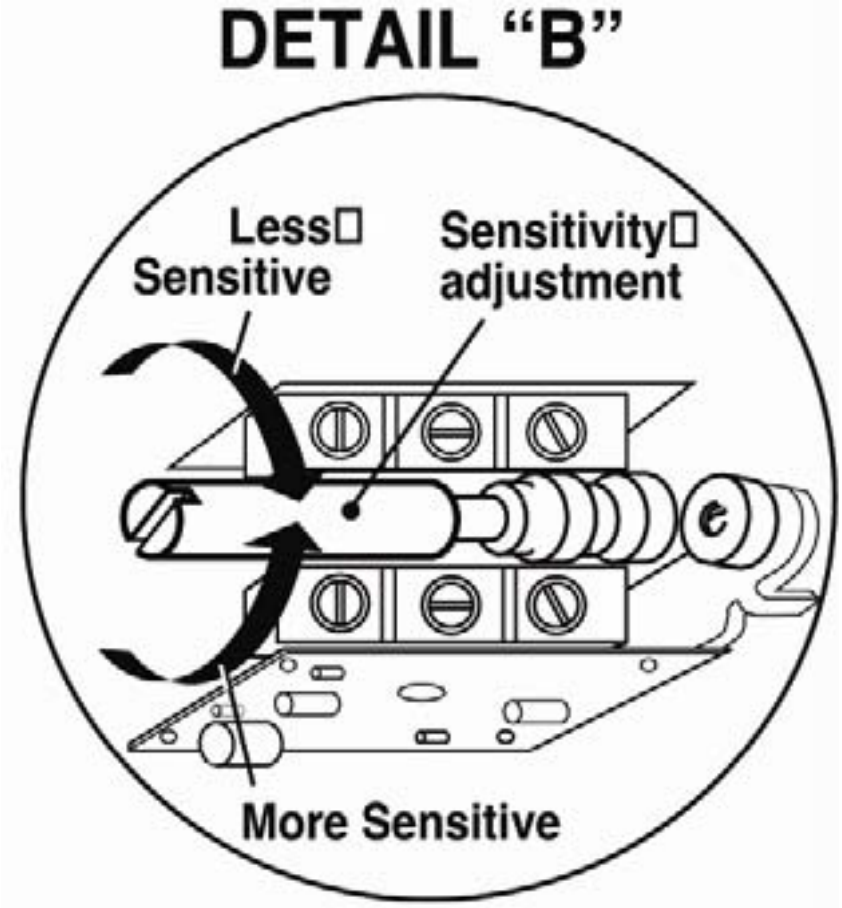
WARNING: MAKE THE AREA NON-HAZARDOUS OR DE-ENERGIZE ALL CIRCUITS BEFORE OPENING THE EXPLOSION-PROOF (-EX) ENCLOSURES.

Depress the reset button and restart the machine. Repeat this process until the unit does not trip on start-up.

5. If the instrument does NOT trip on start-up, stop the machine. Turn the sensitivity adjustment ¼ turn counterclockwise. Repeat the start-up/stop process until the instrument trips on start-up. Turn the sensitivity adjustment

¼ turn clockwise (less sensitive). Restart the machine to verify the instrument will not trip on start-up.
6. Verify that the unit will trip when abnormal shock/vibration exists.




DETAIL "B"
Less
Sensitive
Sensitivity
adjustment
More Sensitive

Shock/Vibration Control Switches Installation Instructions

Models: VS2, VS2C, VS2EX, VS2EXR, VS2EXRB and VS94

Please read the following instructions before installing. A visual inspection of this product for damage during shipping is recommended before mounting. It is your responsibility to have a qualified person install the unit, and make sure installation conforms with NEC and local codes.

GENERAL INFORMATION

WARNING

BEFORE BEGINNING INSTALLATION OF THIS MURPHY PRODUCT

- ✔ Disconnect all electrical power to the machine.
- ✔ Make sure the machine cannot operate during installation.
- ✔ Follow all safety warnings of the machine manufacturer.
- ✔ Read and follow all installation instructions.

LISTED*

Model VS2EX

Description

The Murphy shock and vibration switches are available in a variety of models for applications on machinery or equipment where excessive vibration or shock can damage the equipment or otherwise poses a threat to safe operation. A set of contacts is held in a latched position through a mechanical latch and magnet mechanism. As the level of vibration or shock increases an inertia mass exerts force against the latch arm and forces it away from the magnetic latch causing the latch arm to operate the contacts. Sensitivity is obtained by adjusting the amount of the air gap between the magnet and the latch arm plate.

Applications include all types of rotating or reciprocating machinery such as cooling fans, engines, pumps, compressors, pump jacks, etc.

Models

VS2: Base mount; non hazardous locations.

VS2C: C-clamp mount; non hazardous locations.

VS2EX: Explosion-proof; Class I, Div. 1, Groups C and D.

VS2EXR: Explosion-proof with remote reset.

VS2EXRB: Explosion-proof; Class I, Div. 1, Group B; with remote reset.

VS94: Base mount; non hazardous locations, NEMA 4X/IP66.

Remote Reset Feature (VS2EXR, VS2EXRB and VS94 only)

Includes built-in electric solenoid which allows reset of tripped unit from a remote location. Standard on VS2EXR and VS2EXRB. Optional on VS94 (options listed below).

-R15: Remote reset for 115 VAC

-R24: Remote reset for 24 VDC

Time Delay Option (VS94 only)

Overrides trip operation on start-up. For VS94 series models, the delay time is field-adjustable from 5 seconds up to 6-1/2 minutes with a 20-turn potentiometer (15 seconds per turn approximately). Options listed below:

-T15: Time delay for 115 VAC

-T24: Time delay for 24 VDC

Space Heater Options (VS94 only)

This optional space heater board prevents moisture from condensing inside the VS94 Series case. Options listed below:

-H15: Space heater for 115 VAC

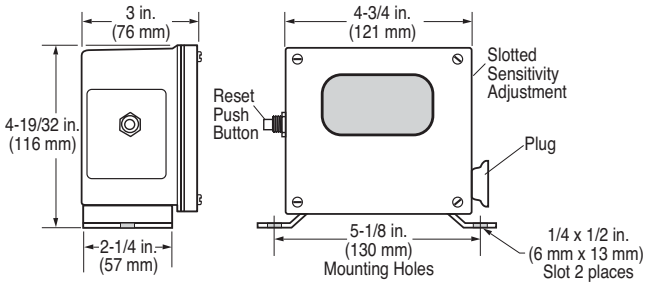
-H24: Space heater for 24 VDC

Warranty

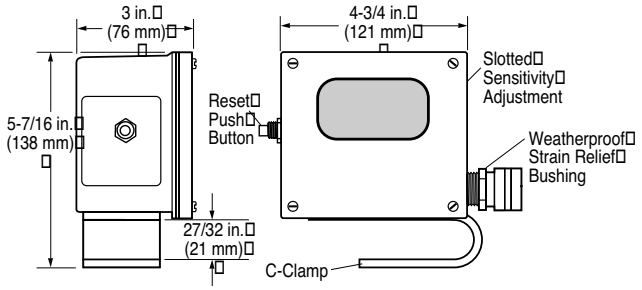
A limited warranty on materials and workmanship is given with this FW Murphy product. A copy of the warranty may be viewed or printed by going to www.fwmurphy.com/support/warranty.htm

DIMENSIONS

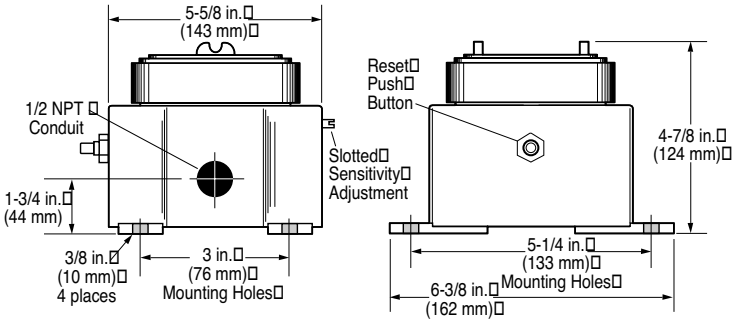
VS2



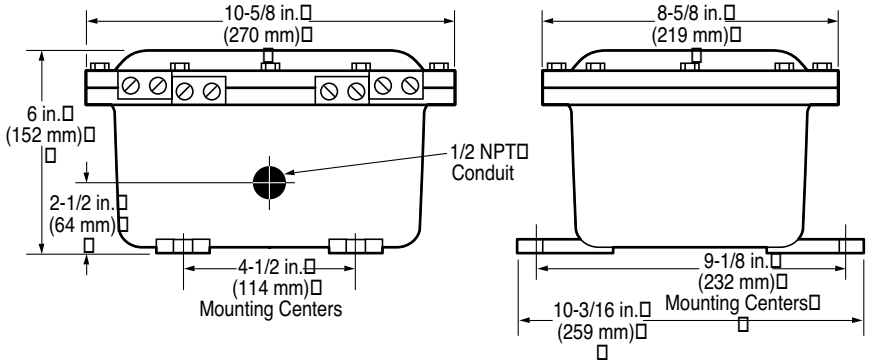
VS2C



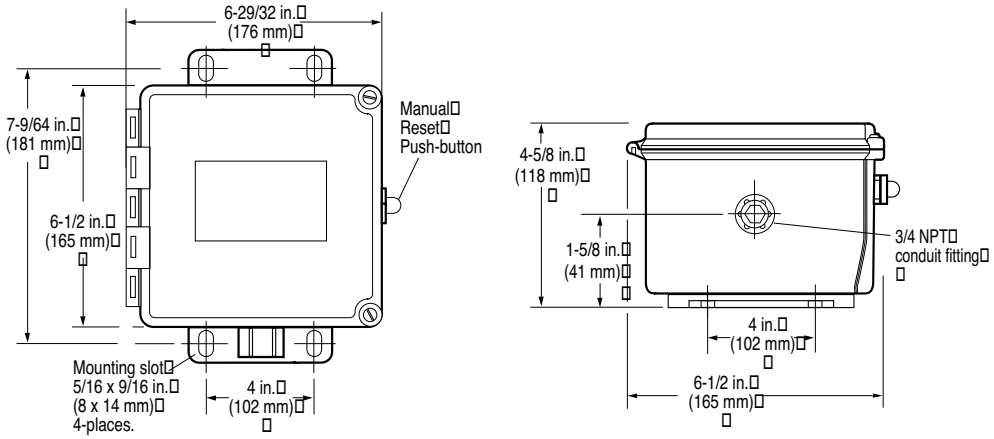
VS2EX and VS2EXR



VS2EXRB



VS94



SPECIFICATIONS

VS2 and VS2C

- **Case:** Weatherproof (equal to NEMA 3R) suitable for non-hazardous areas.
  VS2: *Base mount*
  VS2C: *C-clamp mount. Includes 45 feet (13.7 meters), 2-conductor 16 AWG, 30 strands/0.25 mm strand dia. (1.5 mm²) cable, and five cable hold down clamps.*
- **Contacts:** SPDT double make leaf contacts, 5A @ 480 VAC.
- **Range adjustment:** 0 - 7 G's; 0 - 100 Hz /0.100 in. displacement.

VS2EX

- **Case:** Explosion-proof and weatherproof aluminum alloy housing; meets NEMA 7/IP50 specifications; Class I, Division 1, Groups C & D; UL and CSA listed*
  VS2EX: *base mount.*
- **Snap-switches:** 2-SPDT snap-switches; 5A @ 480 VAC;* 2A resistive, 1A inductive, up to 30 VDC.
- **Range adjustment:** 0 - 7 G's; 0 - 100 Hz /0.100 in. displacement.
- **Normal Operating Temperature:** -40 to 140°F (-40 to 60°C).

VS2EXR

- **Case:** Same as VS2EX.
- **Snap-switch:** 1-SPDT snap-switch and reset coil; 5A @ 480 VAC;* 2A resistive, 1A inductive, up to 30 VDC.
- **Remote Reset (optional):**

Option	*Operating Current*
-R15:	*350 mA @ 115 VAC*
-R24:	*350 mA @ 24 VDC*

- **Range adjustment:** 0 - 7 G's; 0 - 100 Hz /0.100 in. displacement.
- **Normal Operating Temperature:** -40 to 140°F (-40 to 60°C).

VS2EXRB

- **Case:** Explosion-proof aluminum alloy housing; rated Class I, Division 1, Group B hazardous areas.
- **Snap-switch:** 1-SPDT snap-switch with reset coil (option available for additional SPDT switch); 5A @ 480 VAC; 2A resistive, 1A inductive, up to 30 VDC.
- **Remote Reset:**

Option	*Operating Current*
-R15:	*350 mA @ 115 VAC*
-R24:	*350 mA @ 24 VDC*

- **Range adjustment:** 0 - 7 G's; 0 - 100 Hz /0.100 in. displacement.

VS94

- **Case:** Polyester fiberglass reinforced; NEMA type 4 and 4X; IP66; CSA types 4 and 12.
- **Conduit Fitting:** 3/4 NPT conduit fitting connection.
- **Normal Operating Ambient Temperature:** 0 to 140°F (-18 to 60°C).
- **Snap-switches:** 2-SPDT snap acting switches; 5A @ 480 VAC; 2A resistive, 1A inductive, up to 30 VDC.
- **Range adjustment:** 0 - 7 G's; 0 - 100 Hz /0.100 in. displacement.
- **Heater (optional):**

Option	*Operating Current*
H15	*.023 A @ 115 VAC*
H24	*.12 A @ 24 VDC*

- **Remote Reset (optional):**

Option	*Operating Current*
R15	*.17 A @ 115 VAC*
R24	*.36 A @ 24 VDC*

- **Time Delay (optional):**

Option	*Operating Current*	*Standby Current*
T15	*.360 A @ 115 VAC*	*.01 A @ 115 VAC*
T24	*1.15 A @ 24 VDC*	*.01 A @ 24 VDC*

- **Time Delay/Remote Reset:** Adjustable 20-turn potentiometer from 5 seconds to 6-1/2 minutes (15 seconds per turn approximately).

*CSA and UL listed with 480 VAC rating.

INSTALLATION

WARNING: STOP THE MACHINE AND DISCONNECT ALL ELECTRICAL POWER BEFORE BEGINNING INSTALLATION.

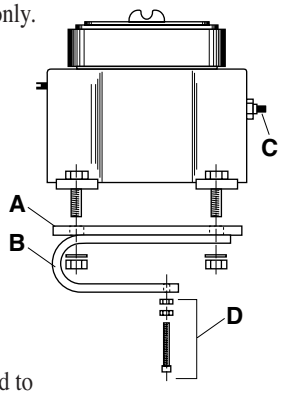
The VS2 and VS94 series shock switches are sensitive to shock and vibration in all three planes of motion - up/down, front/back and side/side. Front/back is the most sensitive (The reset pushbutton is located on the "front" of the unit). For maximum sensitivity mount the unit so that the front faces into the direction of rotation of the machine. (See Dimensions on page 2 for sensitivity adjustment location).

The VS2 and VS94 Series must be firmly attached/mounted to the machine so that all mounting surfaces are in rigid contact with the mounting surface of the machine. For best results, mount the instrument in-line with the direction of rotating shafts and/or near bearings. In other words, the reset push button should be mounted pointing into the direction of shaft rotation (see page 5). It may be necessary to provide a mounting plate or bracket to attach the VS2 and VS94 Series to the machine. The mounting bracket should be thick enough to prevent induced acceleration/vibration upon the VS2 or VS94 Series. Typically 1/2 in. (13mm) thick plate is sufficient. See illustrations on page 5 for typical mounting locations.

CAUTION: A dust boot is provided on the reset pushbutton for all series to prevent moisture or dust intrusion. The sensitivity adjustment for model VS2EX is not sealed; therefore, mounting orientation should be on a horizontal plane or with the sensitivity adjustment pointing down. Sensitivity adjustment for model VS2 is covered by a plug. The plug must be in place and tight to prevent moisture or dust intrusion.

C-Clamp Installation (VS2C model only)

A C-Clamp is supplied with the VS2C model only. The C-Clamp is shipped installed on the VS2C but must be installed on the VS2EX and VS2EXR switches.



1. The C-Clamp **(B)** will already be installed on a 1/4 in. (6 mm) thick steel mounting plate **(A)**. Bolt the VS2 switch to the mounting plate as illustrated — with four 5/16 in. bolts, nuts, and washers.
2. The mounting location should provide convenient access to the TATTLETALE® push button **(C)**.
3. The hardened set screw and nuts **(D)** are used to tighten the switch to an I-Beam or cross member such as a Sampson post of an oilwell pumpjack.

Continued on next page.

All Models

WARNING: STOP THE MACHINE AND DISCONNECT ALL ELECTRICAL POWER BEFORE BEGINNING INSTALLATION.

1. Firmly secure the unit to the equipment using the base foot mount or C-Clamp if applicable. See ***C-Clamp Installation*** page 3.

For oilwell pumpjacks attach the VS2 and VS94 Series to the Sampson post or walking beam. See ***Typical Mounting Locations*** page 5.

2. Make the necessary electrical connections to the vibration switch. See ***Internal Switches,*** page 6 for electrical terminal locations and page 7 for typical wiring diagrams. **DO NOT EXCEED VOLTAGE OR CURRENT RATINGS OF THE CONTACTS.** Follow appropriate electrical codes/methods when making electrical connections. Be sure that the run of electrical cable is secured to the machine and is well insulated from electrical shorting. Use of conduit is recommended.

NOTE: If the electrical cable crosses a pivot point such as at the pivot of the walking beam, be sure to allow enough slack in the cable so that no stress is placed on the cable when the beam moves.

If conduit is not used for the entire length of wiring, conduit should be used from the electrical supply box to a height above ground level that prevents damage to the exposed cable from the elements, rodents, etc. or as otherwise required by applicable electrical codes. If conduit is not attached directly to the VS2 and VS94 Series switch, use a strain relief bushing and a weatherproof cap on the exposed end of the conduit. A "drip loop" should be provided in the cable to prevent moisture from draining down the cable into the conduit should the weathercap fail.

Sensitivity Adjustment

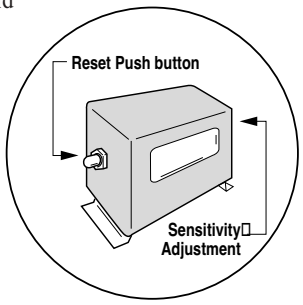
WARNING: REMOVE ALL POWER BEFORE OPENING THE ENCLOSURE. IT IS YOUR RESPONSIBILITY TO HAVE A QUALIFIED PERSON PERFORM ADJUSTMENTS, AND MAKE SURE IT CONFORMS WITH NEC AND LOCAL CODES. DO NOT ADJUST SENSITIVITY WHILE THE MACHINE IS RUNNING. STAND CLEAR OF THE MACHINE AT ALL TIMES WHEN IT IS OPERATING.

All models of the VS2 and VS94 Series cover a wide range of sensitivity. Each model is adjusted to the specific piece of machinery on which it is installed. After the switch has been installed in a satisfactory location (see page 5) the sensitivity adjustment will be increased or decreased so that the switch does not trip during start-up or under normal operating conditions. This is typically done as follows:

1. REPLACE ALL COVERS, LIDS, AND ELECTRICAL ENCLOSURES.

2. Press the reset push button to engage the magnetic latch. To be sure the magnetic latch has engaged, observe latch through the window on the VS2 and VS2C (see DETAIL "A"). On the VS2EX, VS94 series the reset button will remain depressed meaning the magnetic latch has engaged.

DETAIL "A"



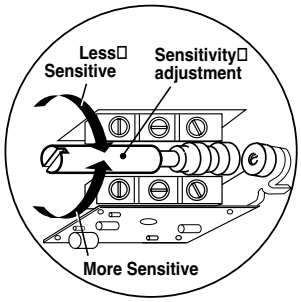
3. Start the machine.

4. If the instrument trips on start-up, allow the machine to stop. Turn the sensitivity adjustment 1/4 turn clockwise, (adjustment for VS94 and VS2EXRB models is located within the box, see DETAIL "B").

WARNING: MAKE THE AREA NON-HAZARDOUS BEFORE OPENING THE EXPLOSION-PROOF (-EX) ENCLOSURES.

Depress the reset button and restart the machine. Repeat this process until the unit does not trip on start-up.

DETAIL "B"



5. If the instrument does NOT trip on start-up, stop the machine. Turn the sensitivity adjustment 1/4 turn counter-clockwise. Repeat the start-up/stop process until the instrument trips on start-up. Turn the sensitivity adjustment 1/4 turn clockwise (less sensitive). Restart the machine to verify that the instrument will not trip on start-up.

6. Verify that the unit will trip when abnormal shock/vibration exists.

VS94 Time Delay Adjustment

1. Apply power to the time delay circuit. (see page 7 for time delay circuit). The time delay function will be initiated.

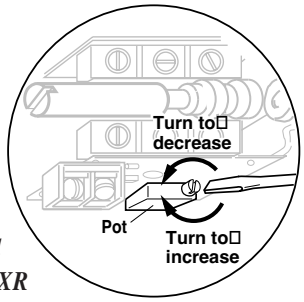
2. Time the length of the delay with a watch. Let time delay expire. After it expires, the override circuit will de-energize the solenoid, allowing the latch arm to trip. A clicking noise is heard.

WARNING: REMOVE ALL POWER BEFORE OPENING ACCESS DOOR. IT IS YOUR RESPONSIBILITY TO HAVE A QUALIFIED PERSON ADJUST THE UNIT, AND MAKE SURE IT CONFORMS WITH NEC AND LOCAL CODES.

3. TURN THE POWER OFF TO RESET THE TIME DELAY CIRCUIT.

NOTE: Allow 30 seconds bleed-time between turning the power "OFF" and "ON".

DETAIL "C"



4. Locate the time adjustment pot (DETAIL "C"). The time is factory-set at the lowest setting (5 seconds approximately). To increase time, rotate the 20-turn pot clockwise as needed (15 seconds per turn approximately).

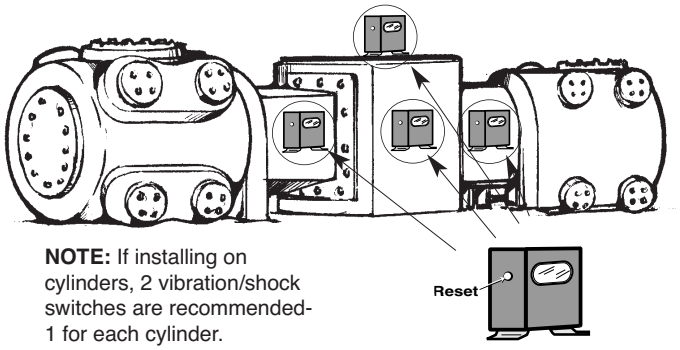
5. Repeat the above steps as necessary to obtain desired time delay.

NOTE: An external time delay can be used with the remote reset feature of the VS2EXR series to provide a remote reset and override of the trip operation on start-up. Time delay must automatically disconnect after equipment start-up.

TYPICAL MOUNTING LOCATIONS

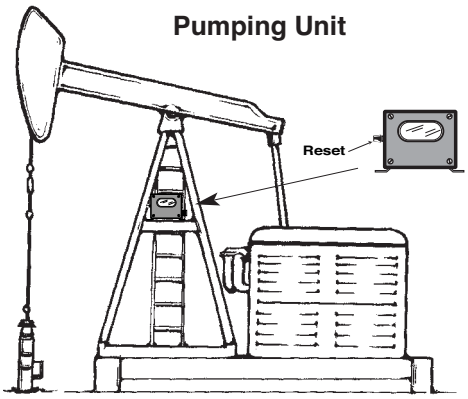
NOTE: These are typical mounting locations for best operation. Other mountings are possible. See *Installation* section on page 3.

2-Throw Balance-Opposed Compressor

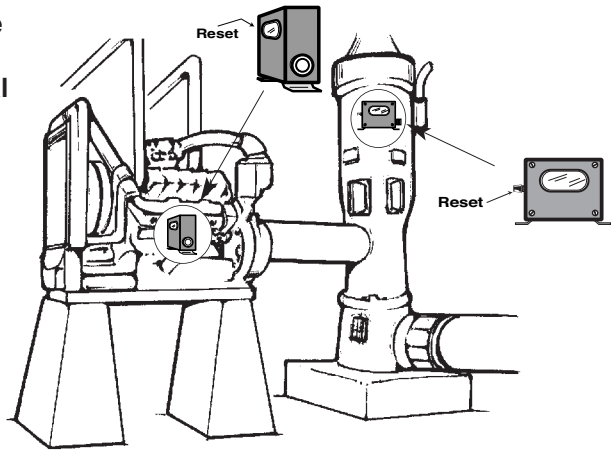


NOTE: If installing on cylinders, 2 vibration/shock switches are recommended- 1 for each cylinder.

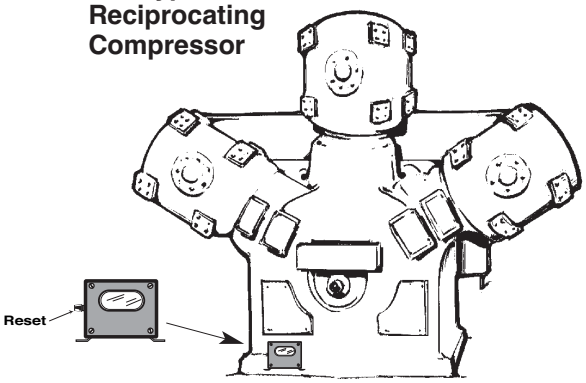
Pumping Unit



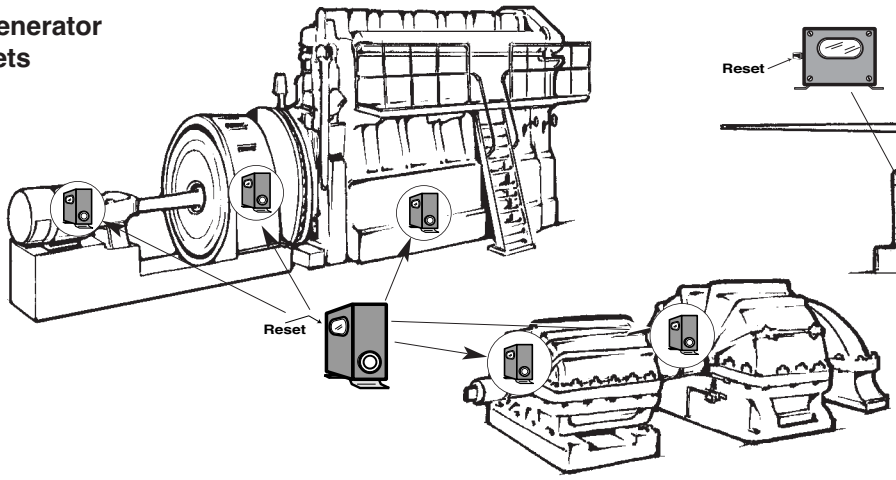
Engine and Vertical Shaft Pump



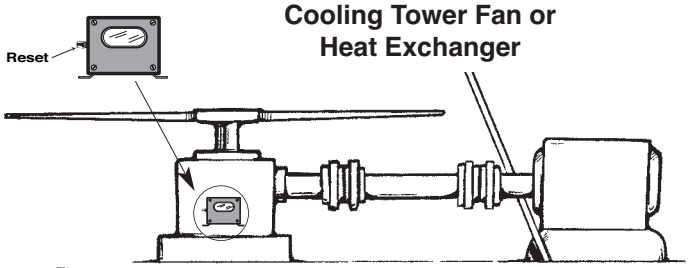
"Y" Type Reciprocating Compressor



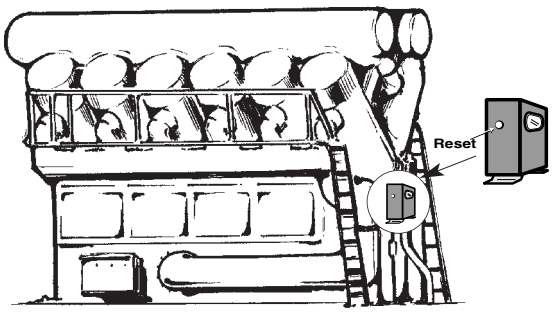
Generator Sets



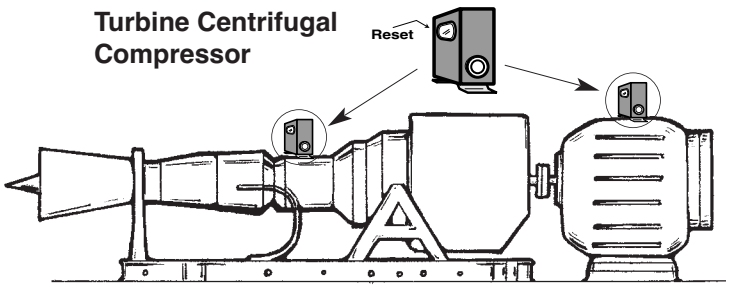
Cooling Tower Fan or Heat Exchanger



Engine Compressor

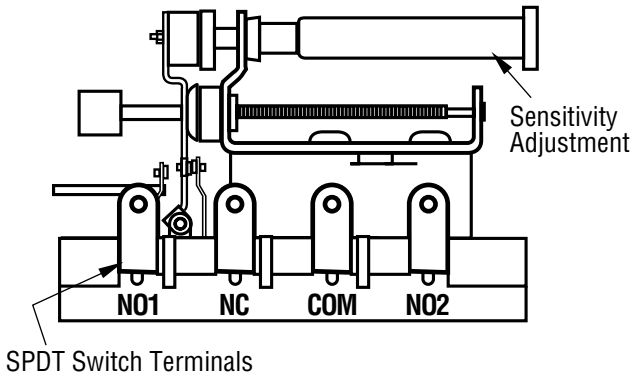


Turbine Centrifugal Compressor

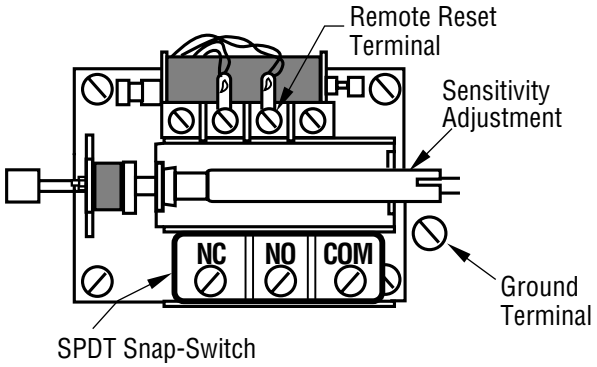


INTERNAL SWITCHES

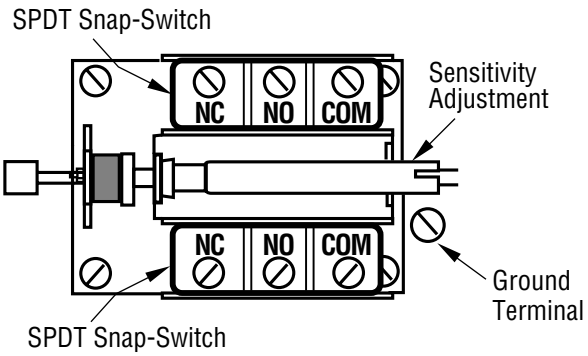
VS2 and VS2C



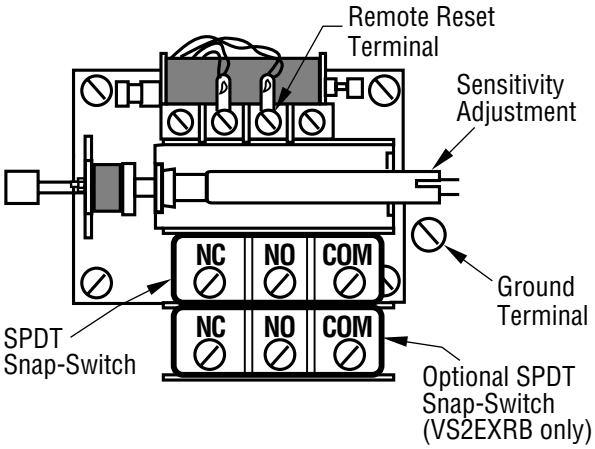
VS2EXR



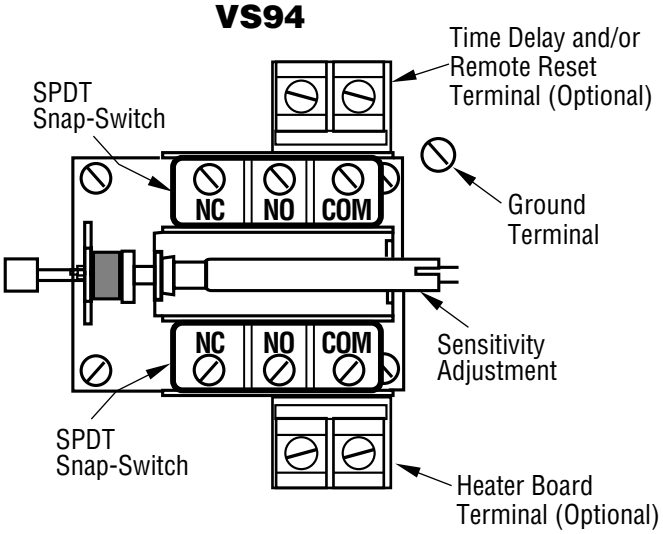
VS2EX



VS2EXB and VS2EXRB



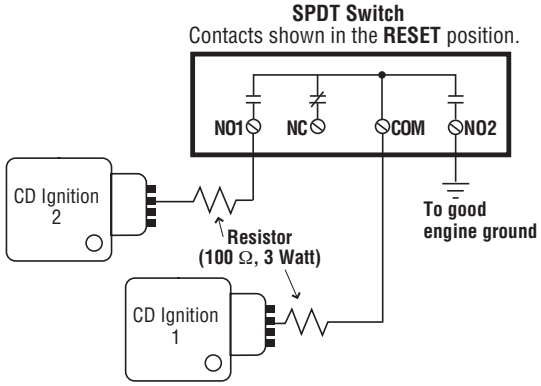
VS94



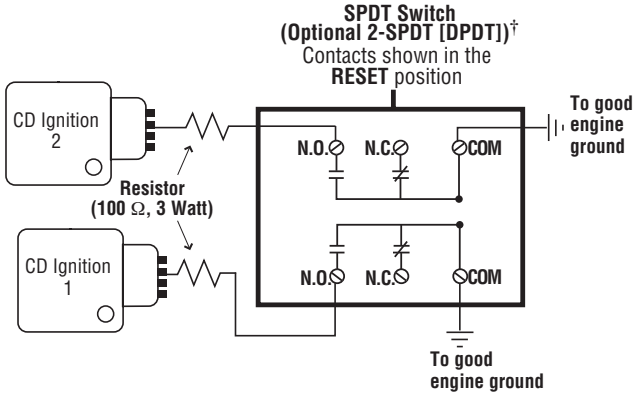
ELECTRICAL

WARNING: REMOVE POWER BEFORE OPENING THE UNIT (ACCESS DOOR). STOP THE MACHINE AND DISCONNECT ALL ELECTRICAL POWER BEFORE BEGINNING THE WIRING OPERATION. IT IS YOUR RESPONSIBILITY TO HAVE A QUALIFIED PERSON INSTALL AND WIRE THE UNIT, AND MAKE SURE IT CONFORMS WITH NEC AND APPLICABLE CODES.

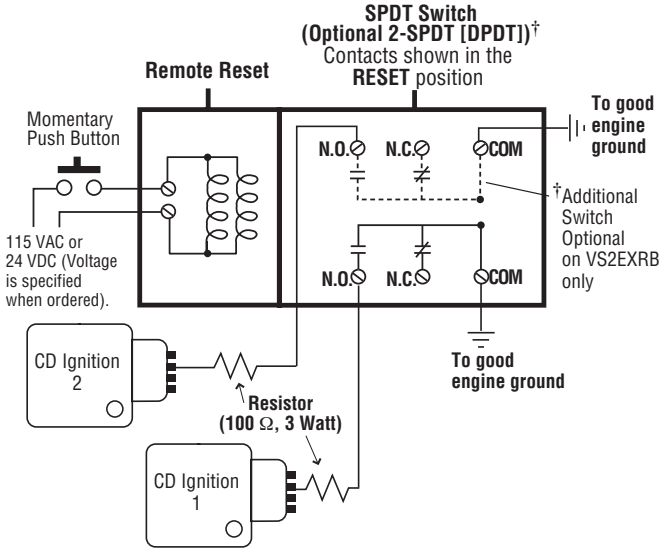
VS2 and VS2C
Typical Wiring Diagram for Single or Dual CD Ignition



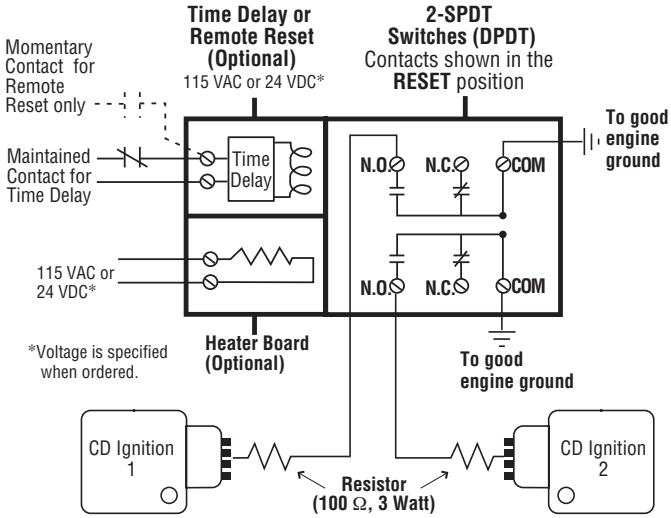
VS2EX
Typical Wiring Diagram for Single or Dual CD Ignitions



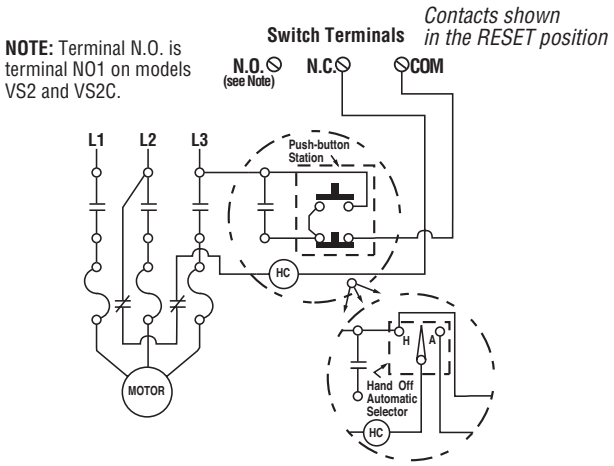
VS2EXR and VS2EXRB
Typical Wiring Diagram for Single or Dual CD Ignitions



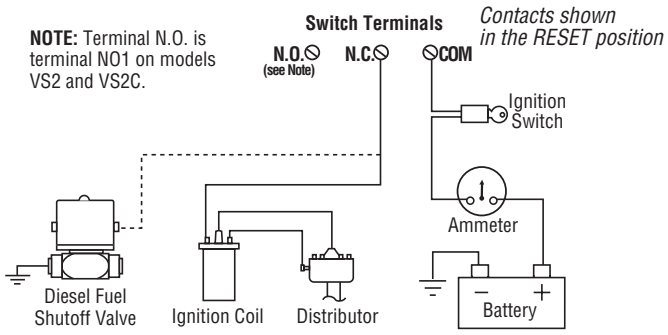
VS94
Typical Wiring Diagram for Single or Dual CD Ignitions



VS2, VS2C, VS2EX, VS2EXR, VS2EXRB and VS94
Typical Wiring Diagram for Electric Motors



VS2, VS2C, VS2EX, VS2EXR, VS2EXRB and VS94
Typical Wiring Diagram for Distributor Ignition or Diesel



SERVICE PARTS

PART NO.	DESCRIPTION
VS2	
20000030	Movement assembly
20000031	Glass and gasket assembly
20000032	Reset push button assembly
VS2C	
20000030	Movement assembly
20000031	Glass and gasket assembly
20000032	Reset push button assembly
20050021	Mounting clamp
20000185	VS2C 5-clamp hardware package assembly.
20050465	2-Conductor electrical cable, 45 feet (13.7 meters)
VS2EX	
20010091	Movement assembly
20050087	Cover
00000309	Cover gasket
20010090	Snap-switch and insulator kit (1 switch per kit) **prior to September 1, 1995.***
20000288	**Snap-switch and insulator kit (1 switch per kit) for models manufactured on September 1, 1995 or later.***
20000289	C-clamp conversion mounting kit
VS2EXR	
20000262	Movement assembly
20050087	Cover
00000309	Cover gasket
20010090	Snap-switch and insulator kit (1 switch per kit) **prior to September 1, 1995.***
20000288	**Snap-switch and insulator kit (1 switch per kit) for models manufactured on September 1, 1995 or later.***
20000049	Reset solenoid assembly (115 VAC)
20000234	Reset solenoid assembly (24 VDC)
20000289	C-clamp conversion mounting kit

PART NO.	DESCRIPTION
VS2EXRB	
20010090	Snap-switch and insulator kit (1 switch per kit) **prior to September 1, 1995.***
20000288	**Snap-switch and insulator kit (1 switch per kit) for models manufactured on September 1, 1995 or later.***
20000057	*Inside* snap-switch and insulator kit (1 switch per kit) for model VS2EXRB-D **prior to September 1, 1995.***
20000058	*Outside* snap-switch and insulator kit (1 switch per kit) for model VS2EXRB-D **prior to September 1, 1995.***
20000287	***Outside* snap-switch and insulator kit (1 switch per kit) for model VS2EXRB-D manufactured on September 1, 1995 or later.***
20000290	***Inside* snap-switch and insulator kit (1 switch per kit) for model VS2EXRB-D manufactured on September 1, 1995 or later.***
20050077	Adjustment shaft
20000262	Movement assembly
20000049	Reset solenoid assembly (115 VAC)
20000234	Reset solenoid assembly (24 VDC)
VS94 Series	
25050506	Dust boot
00000232	Conduit fitting
20010090	Snap-switch and insulator kit (1 switch per assembly) **prior to September 1, 1995.****
20000288	**Snap-switch and insulator kit (1 switch per assembly) for models manufactured on September 1, 1995 or later.*****

* If no date code is found, refer to the old switch. Models with date 0895 and before use old switch. Dated 0995 after, use straight snap-switch arm, no rollers.

** Models dated Q1 thru Q8 (formed snap-switch arm and rollers).

***Models date coded Q9 thru Q12 and R1 thru R12 (straight snap-switch arm, no rollers).

MURPHY

USA–ISO 9001:2000 FM 28221
UK–ISO 9001:2000 FM 29422

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