

Section 3

Flexible Components

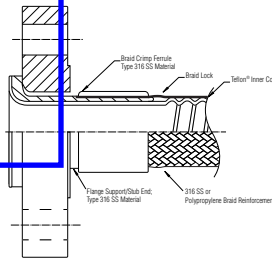
PTFE HOSE BY ST. GOBAIN



TWOB Series PTFE-Lined Stainless Steel Braided Hose

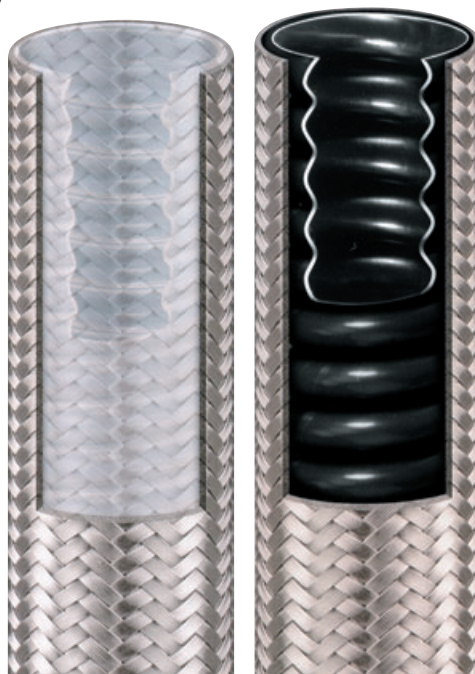
A primary advantage of a thick tube design is its ability to be extended through the fittings and flared over sealing ends. This eliminates joints between fitting and hose; flow is uninterrupted; assembly is completely free of areas where corrosion or bacteria can start.

- Convoluted white PTFE inner core, crush and vacuum resistant.
- 316 stainless steel or polypropylene overbraid.
- 316 stainless steel end connections (over 36 styles and eight materials available).
- Size: 1/2" to 4".
- Temperature range: -100°F to 450°F.
- Non-conductive polypropylene overbraid available.



TBOB Series

- Conductive black inner core.
- Approvals: FDA 21CFR177.1550; U.S. Pharmacopoeia Class VI



WCS Series FEP-Lined Stainless Steel Hose

- Low profile, self-draining, helical-convoluted inner core of white FEP.
- 304 stainless steel or polypropylene braided overwrap.
- 316 stainless steel end connections.
- Size: 3/8" through 2".
- Temperature range: -65°F to 400°F.
- Non-conductive polypropylene braid available in 1/2" through 1".

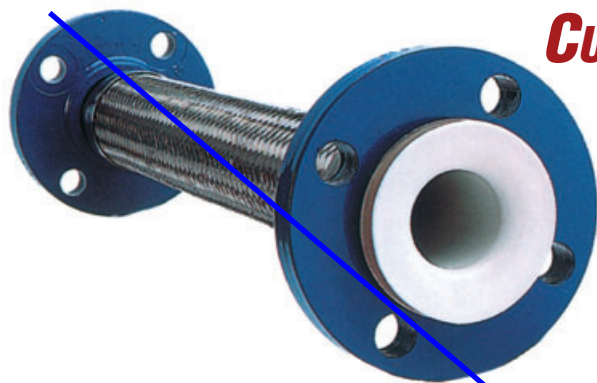
BCS Series

- Same as above with conductive black FEP liner.
- Low profile helical convolution for easy draining.
- Steam, detergent or caustic cleanable.
- Very flexible as compared to other fluoropolymer-lined hose.
- Approvals: FDA 21CFR177.1550; U.S. Pharmacopoeia Class VI.

Flexible Components

PTFE HOSE BY ST. GOBAIN

CUSTOM PRODUCTS INCLUDE:



MTL Series Smooth Tube

Features:

- PTFE extended through the fittings in a smooth, zero-entrapment, easy-clean design.
- Available in 3/4" through 8" I.D.
- Temperature rated -100°F to 400°F.

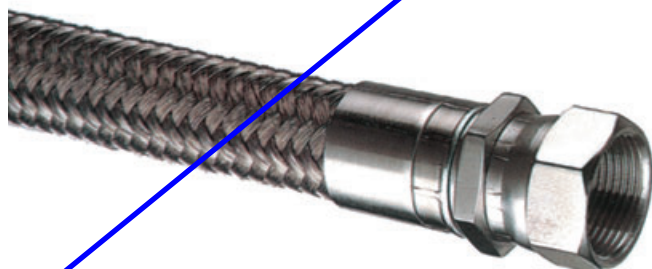
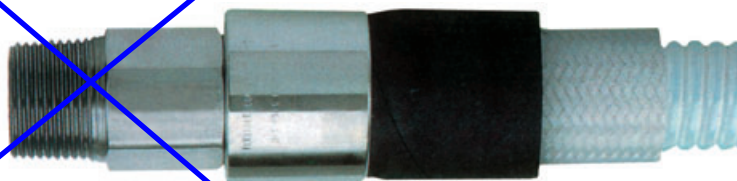
MTL SJ Series

- Lined metal jacket for heating or cooling.

CL Series Chlorine/Bromine Hose

Features:

- Specifically engineered for safe, dependable service in chlorine or bromine transfer.
- Choice of ECTFE or PTFE tube; two PVDF braid reinforcements; Schedule 80 Monel fittings.
- Abrasion-resistant cover.
- Available in sizes 1/2", 1" and 1 1/2" ID.
- End connections are MPT or flanged.



TH Series Smooth Tube

Features:

- High-pressure hose rated at 5,000 psi.
- Anti-static black inner core.
- High tensile, densely packed braid reinforcements.
- Temperature rated -65°F to 400°F.
- Type 316 SS fittings.

	Fitting One End	Fitting Other End
01	Butt Weld Adapter, Pipe	
02	JIC Female	
03	Male Pipe, NPT	
06	Female Pipe, FNPT	
07	JIC/Female Union	
08	JIC/Male Union	
10	Sanitary, Gasket Style	
10U	Sanitary, Step-up	
11	Sanitary, 'Mini' Style	
12*	Flange Retainer, Lap Joint Style	
16*	Cam-lock Coupler ('D')	
17*	Cam-lock Adapter ('E')	
18*	Cam-lock x Flange Adapter	
20	Sanitary, Bevel Seat w/Nut	
31	Compression Connector	
31FN	Compression Connector w/Nuts & Ferrules	
32	Compression Adapter	
32FN	Compression Adapter w/Nuts & Ferrules	
33	O-ring Female Adapter	
38	JIC Male	
40	Sanitary, Bevel Seat, Exposed Thread	
41	Butt Weld Adapter, Tube	
44	O-ring, Male	
50	I-Line Sanitary Male	
51	I-Line, Sanitary Female	
61	NPSH Female Swivel	

* PTFE 'encapsulated' style also available.

Hose Style

TWOB
TBUB
WCS
BCS
MTL
CL
TH

Size (ID)

Given in 1/16"
06
08
12
16
20
24
32

How to order, example:

08 TWOB 03 06 S6 - 10.5

Length Tolerance

1/4" (.250) on assemblies to 24"
1/2" (.500) on assemblies 25" to 60"
1" on assemblies over 60"

Fitting Material

1st letter:	Ferrule Material
2nd letter:	Fitting Material
3rd letter:	Flange Material
	C Steel
	M Monel
6	316 SS
S	Stainless Steel
T	PTFE Encapsulated
P	Polypropylene
V	PVDF (Kynar)
(4)	Flanges Only (304 SS)
(6)	Flanges Only (316 SS)

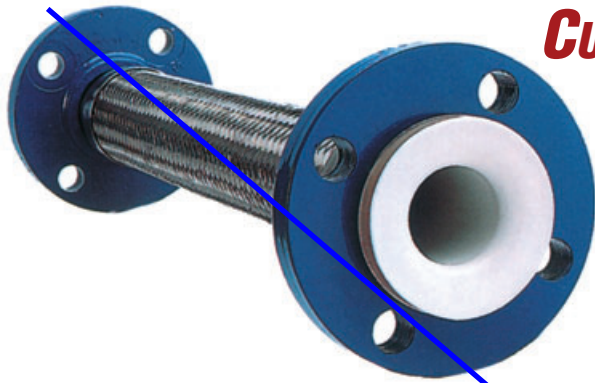
Accessory Code

A	Armor Casing
C	Casing Strain Cuffs
F	Fire sleeve
H	Hydrolon Chafe Sleeve
S	External Spring Guard



Flexible Components

PTFE HOSE BY ST. GOBAIN



CUSTOM PRODUCTS INCLUDE:

MTL Series Smooth Tube

Features:

- PTFE extended through the fittings in a smooth, zero-entrapment, easy-clean design.
- Available in 3/4" through 8" I.D.
- Temperature rated -100°F to 400°F.

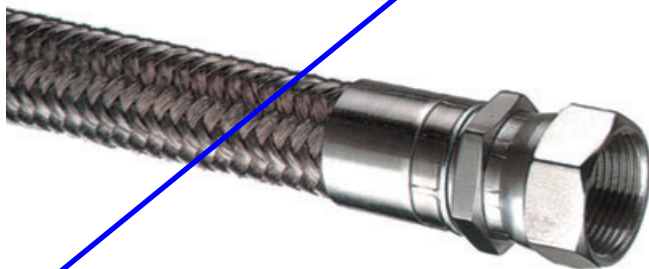
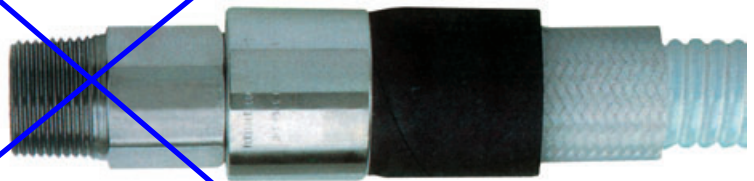
MTL SJ Series

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CL Series Chlorine/Bromine Hose

Features:

- Specifically engineered for safe, dependable service in chlorine or bromine transfer.
- Choice of ECTFE or PTFE tube; two PVDF braid reinforcements; Schedule 80 Monel fittings.
- Abrasion-resistant cover.
- Available in sizes 1/2", 1" and 1 1/2" ID.
- End connections are MPT or flanged.



TH Series Smooth Tube

Features:

- High-pressure hose rated at 5,000 psi.
- Anti-static black inner core.
- High tensile, densely packed braid reinforcements.
- Temperature rated -65°F to 400°F.
- Type 316 SS fittings.

	Fitting One End	Fitting Other End
01	Butt Weld Adapter, Pipe	
02	JIC Female	
03	Male Pipe, NPT	
06	Female Pipe, FNPT	
07	JIC/Female Union	
08	JIC/Male Union	
10	Sanitary, Gasket Style	
10U	Sanitary, Step-up	
11	Sanitary, 'Mini' Style	
12*	Flange Retainer, Lap Joint Style	
16*	Cam-lock Coupler ('D')	
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18*	Cam-lock x Flange Adapter	
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51	I-Line, Sanitary Female	
61	NPSH Female Swivel	

* PTFE 'encapsulated' style also available.

Hose Style

TWOB
TBUB
WCS
BCS
MTL
CL
TH

Size (ID)

Given in 1/16"
06 3/8"
08 1/2"
12 3/4"
16 1"
20 1 1/4"
24 1 1/2"
32 2"

How to order, example:

12 TWOB 03 06 S6 - 8.5

Fitting Material
1st letter: Ferrule Material
2nd letter: Fitting Material
3rd letter: Flange Material
C Steel
M Monel
6 316 SS
S Stainless Steel
T PTFE Encapsulated
P Polypropylene
V PVDF (Kynar)
(4) Flanges Only (304 SS)
(6) Flanges Only (316 SS)

Accessory Code

A	Armor Casing
C	Casing Strain Cuffs
F	Fire sleeve
H	Hydrolon Chafe Sleeve
S	External Spring Guard

Length Tolerance
1/4" (.250) on assemblies to 24"
1/2" (.500) on assemblies 25" to 60"
1" on assemblies over 60"



EXAMPLES OF AVAILABLE FITTINGS.

Instructions on how to order hose and fittings are demonstrated on page 345.



Style 01 Butt Weld Adapter, Pipe



Style 02 JIC Female



Style 03 Male Pipe, NPT



Style 06 Female Pipe, FNPT



Style 07 JIC/Female Union



Style 08 JIC/Male Union



Style 10 Sanitary Gasket Style



Style 12 Flange Retainer, Lap Joint Style



Style 12T Flange Retainer, PTFE 'encapsulated' style



Style 16 Cam-lock Coupler ('D')



Style 17 Cam-lock Adapter ('E')



Style 17T Cam-lock Adapter ('E'), PTFE 'encapsulated' style



Style 18T Cam-lock X Flange Adapter, PTFE 'encapsulated' style



Style 31 Compression Connector



Style 31FN Compression Connector, w/nuts & ferrules



Style 32 Compression Adapter



Style 32FN Compression Adapter, w/nuts & ferrules



Style 38 JIC Male



Style 40 Sanitary, Bevel Seat, Exposed Thread



Style 41 Butt Weld Adapter, Tube



Style 50 I-Line Sanitary Male



76-100 Series

Stainless Steel Ball Valve

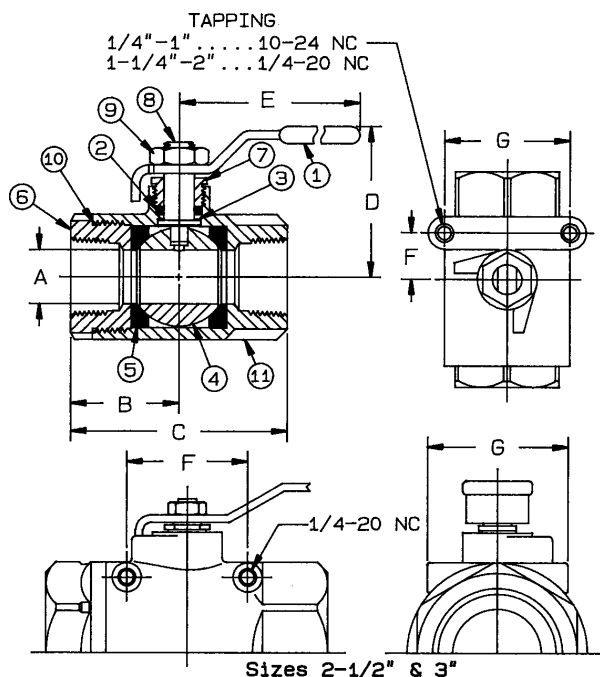
Threaded, 1/4" to 1" 2000 psig WOG, 1-1/4" to 2" 1500 psig WOG, 2-1/2" to 3" 1000 psig WOG. (See referenced P/T chart)
Cold Non-Shock. 150 psig Saturated Steam, Vacuum Service to 29 inches Hg.
Federal Specification: WW-V-35C, Type: II, Composition: SS, Style: 3.
MSS SP-110; Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

FEATURES

- Investment cast components
- RPTFE seats and stuffing box ring
- Mounting pad for easy actuator mounting
- Blow-out-proof stem design
- Adjustable packing gland
- Meets NACE MR-01-75
- SS lever and nut
- (-24) 1/4" to 2" Certified to API 607, 4th Edition, Class 600 burn

STANDARD MATERIAL LIST

1. Lever and grip	304 SS w/vinyl	7. Gland nut	A276-316
2. Stem packing	RPTFE	8. Stem	A276-316
3. Stem bearing	RPTFE	9. Lever nut	18-8 SS
4. Ball	A276-316	10. Body seal	PTFE
5. Seat (2)	RPTFE	11. Body	A351-CF8M
6. Retainer	A351-CF8M		



Sizes 2-1/2" & 3"

STAINLESS STEEL BALL VALVE

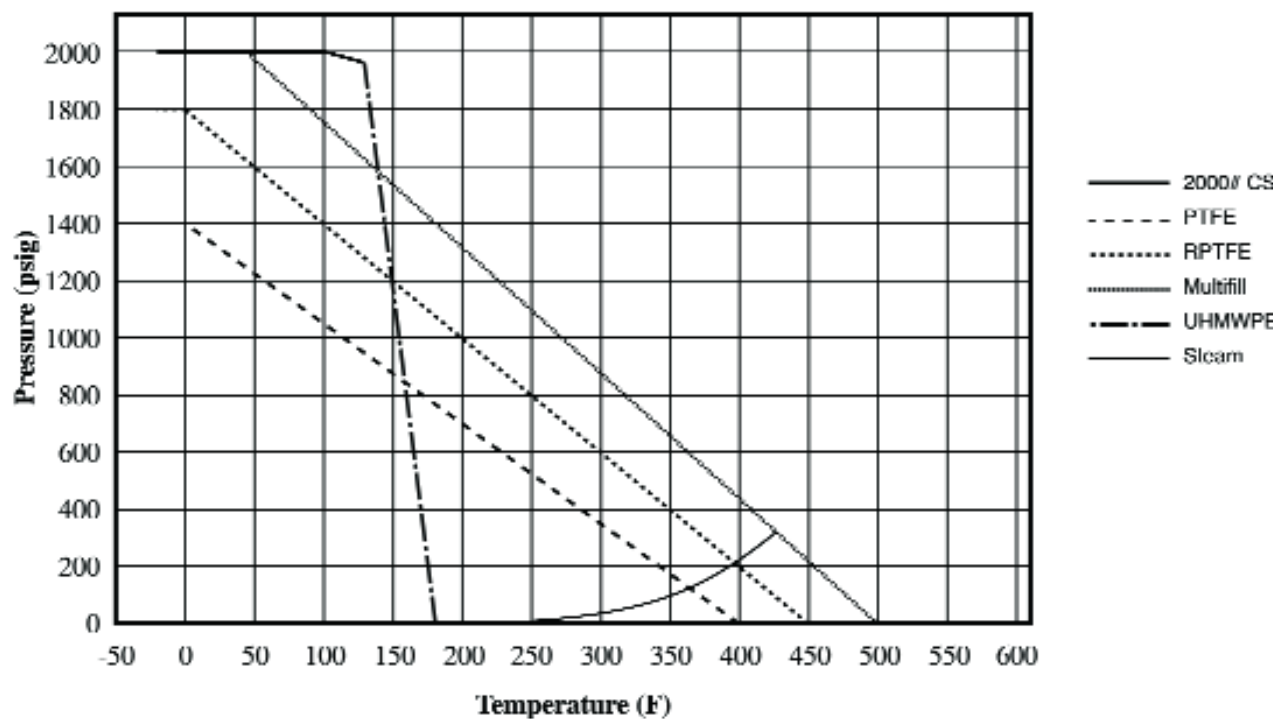
NUMBER	SIZE	A	B	C	D	E	F	G	Wt.
76-101-01A	1/4"	.37	1.03	2.06	1.75	3.87	.50	1.12	.58
76-102-01A	3/8"	.37	1.03	2.06	1.75	3.87	.50	1.12	.54
76-103-01A	1/2"	.50	1.12	2.25	1.81	3.87	.50	1.12	.63
76-104-01A	3/4"	.68	1.50	3.00	2.12	4.87	.87	1.37	1.27
76-105-01A	1"	.87	1.68	3.37	2.25	4.87	.87	1.37	1.63
76-106-01	1-1/4"	1.00	2.00	4.00	2.62	5.50	.93	1.50	3.06
76-107-01	1-1/2"	1.25	2.18	4.37	3.05	8.00	.93	1.50	4.04
76-108-01	2"	1.50	2.75	5.50	3.24	8.00	.93	1.50	6.05
76-109-01	2-1/2"	2.50	3.37	6.75	4.12	8.00	2.75	3.37	15.57
76-100-01	3"	2.50	3.37	6.75	4.12	8.00	2.75	3.37	16.79

OPTIONS AVAILABLE:

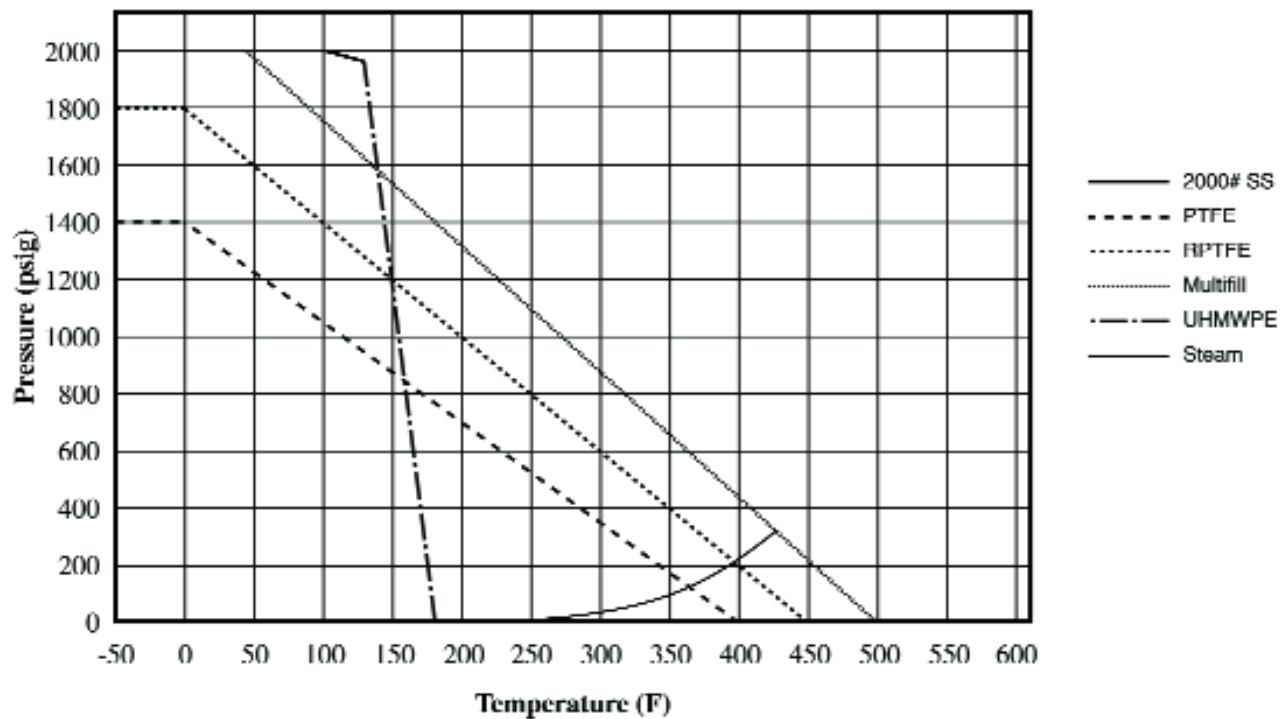
(SUFFIX)	OPTION	SIZES
-02-	Stem Grounded	1/4" to 3"
-03-	1-1/4" CS Stem Extension	1/4" to 3"
-04-	2-1/4" CS Stem Extension	1/4" to 3"
-07-	Steel Tee Handle	1/4" to 2"
-08-	90° Reversed Stem	1/4" to 3"
-14-	Side Vented Ball (Uni-Directional)	1/4" to 2"
-15-	Wheel Handle, Steel	1/4" to 2"
-16-	Chain Lever - Vertical	3/4" to 2"
-19-	Lock Plate	1/4" to 2"
-21-	UHMWPE Trim (Non-PTFE)	1/4" to 3"
-24-	Graphite Packing	1/4" to 3"
-27-	SS Latch-Lock Lever & Nut	1/4" to 3"
-30-	Cam-Lock and Grounded	1/4" to 2"
-32-	SS Tee Handle & Nut	1/4" to 2"
-35-	VTFE Trim	1/4" to 3"
-39-	SS Hi-Rise Locking Wheel Handle, SS Nut	1/4" to 2"
-40-	Cyl-Loc and Grounded	1/4" to 2"
-44-	Seal Welded	1/4" to 2"
-45-	Less Lever & Nut	1/4" to 3"
-46-	Latch Lock Lever - Lock in Closed Position Only	1/4" to 3"
-47-	SS Latch Lock Oval Handle	1/4" to 1"
-48-	SS Oval Handle (No Latch) & Nut	1/4" to 2"
-49-	Assembled Dry	1/4" to 3"
-50-	2-1/4" CS Locking Stem Extension	1/4" to 3"
-57-	Oxygen Cleaned	1/4" to 3"
-58-	Chain Lever - Horizontal	3/4" to 2"
-60-	Static Grounded Ball & Stem	1/4" to 3"
-64-	250# Steam Trim	1/4" to 3"
-P01-	BSPP (Parallel) Thread Connection	1/4" to 3"
-T01-	BSPT (Tapered) Thread Connection	1/4" to 3"

For Pressure/Temperature Ratings,
Refer to Page M-12, Graph No. 14
(1/4" to 1")
Refer to Page M-11, Graph No. 12
(1-1/4" to 2")
Refer to Page M-10, Graph No. 8
(2-1/2" to 3")

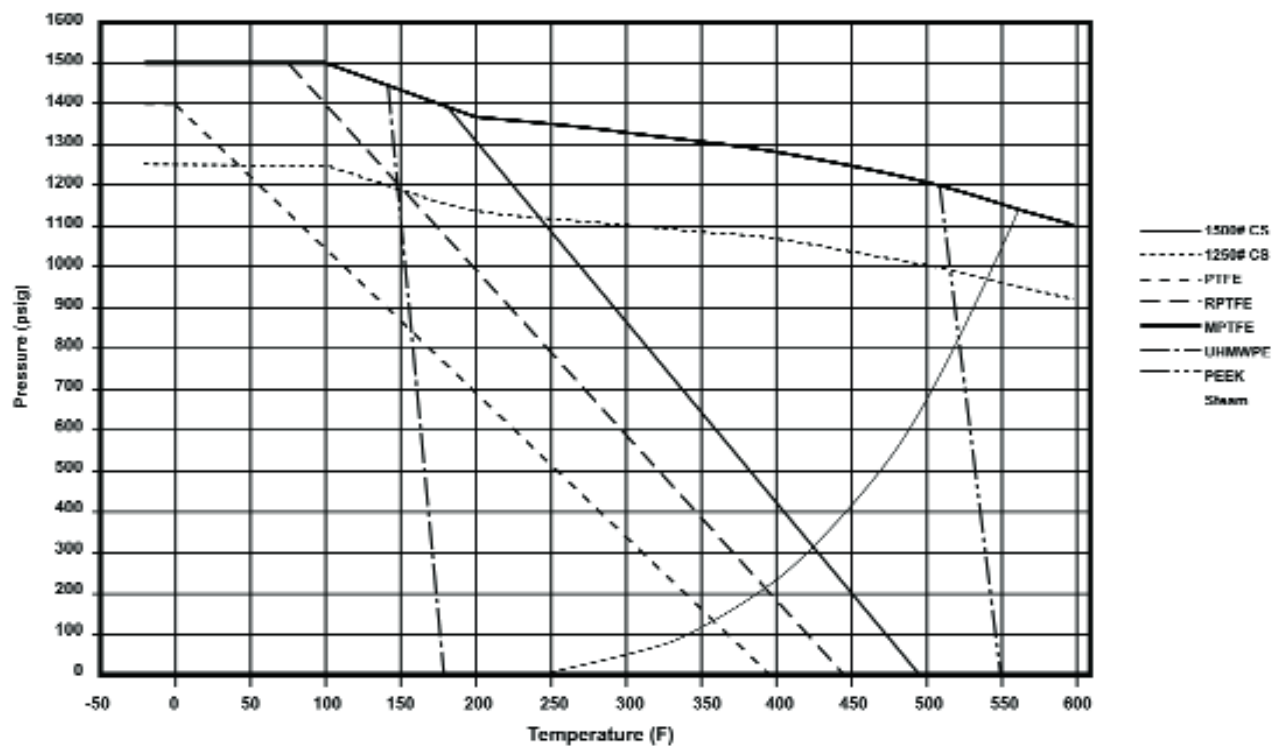
**2000# CS P-T Rating
(Graph 13)**



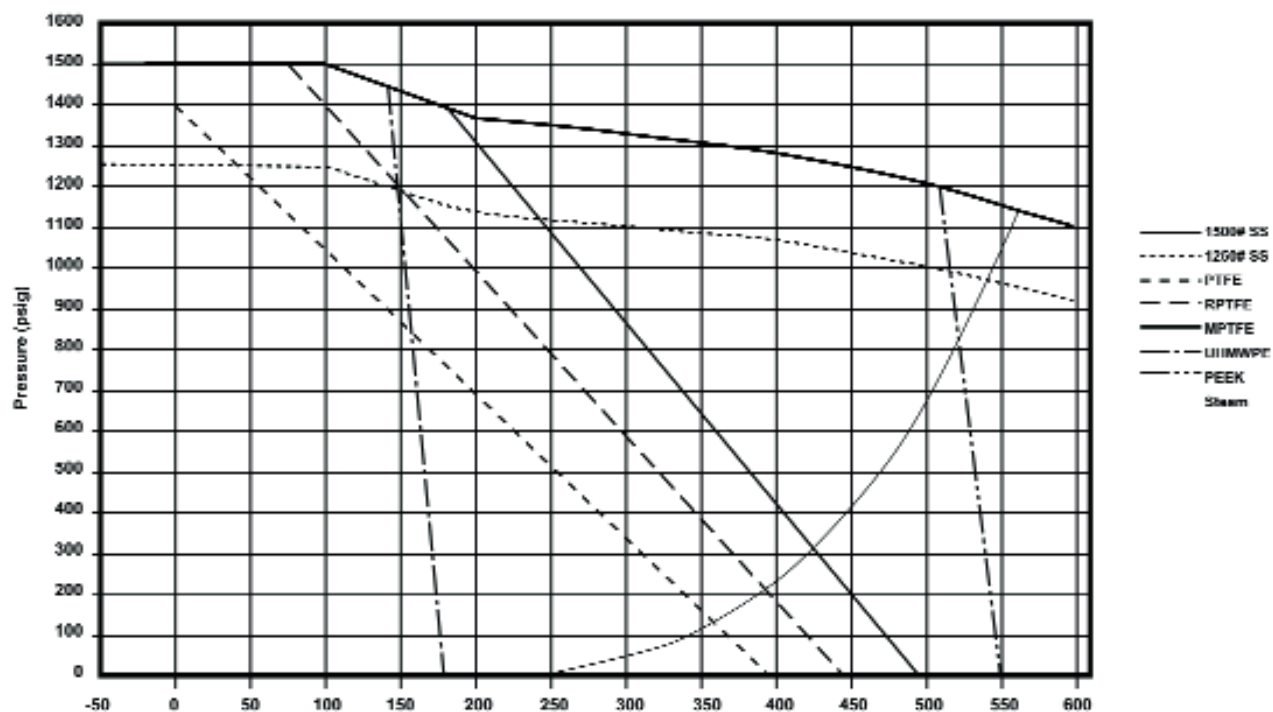
**2000# SS P-T Rating
(Graph 14)**



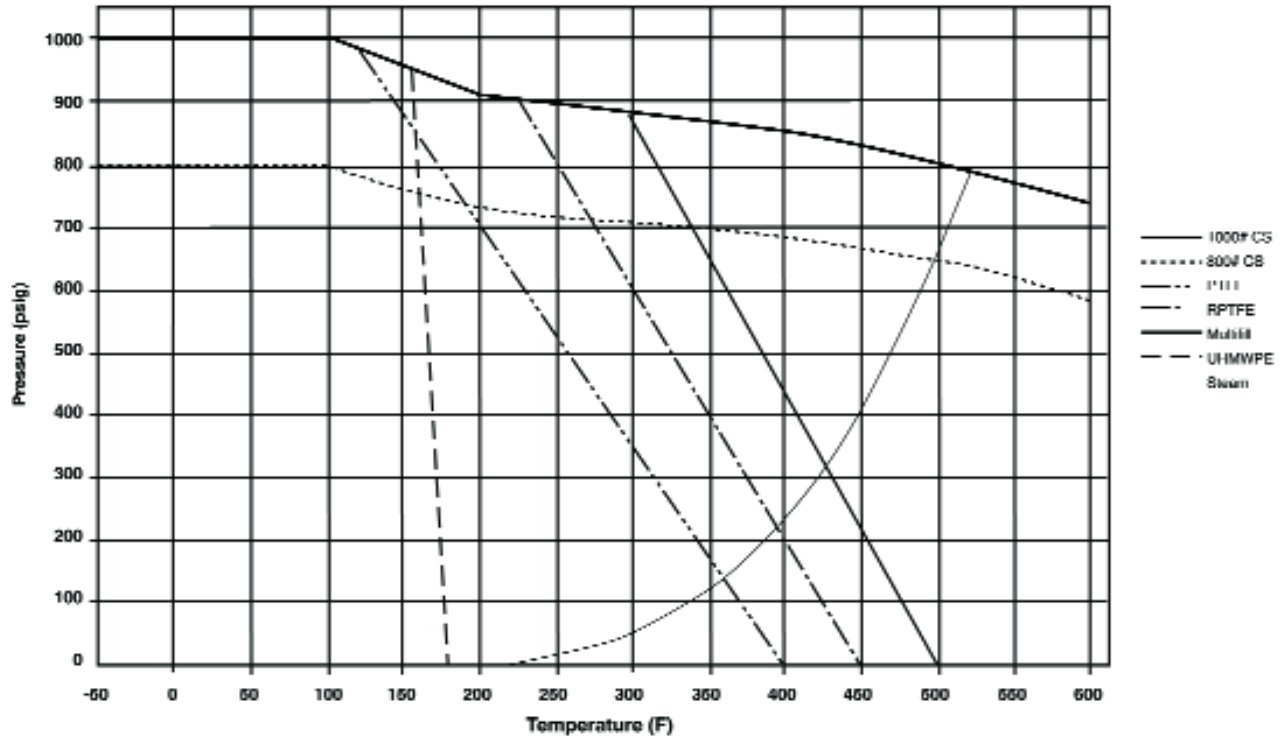
1500# CS P-T Rating (Graph 11)



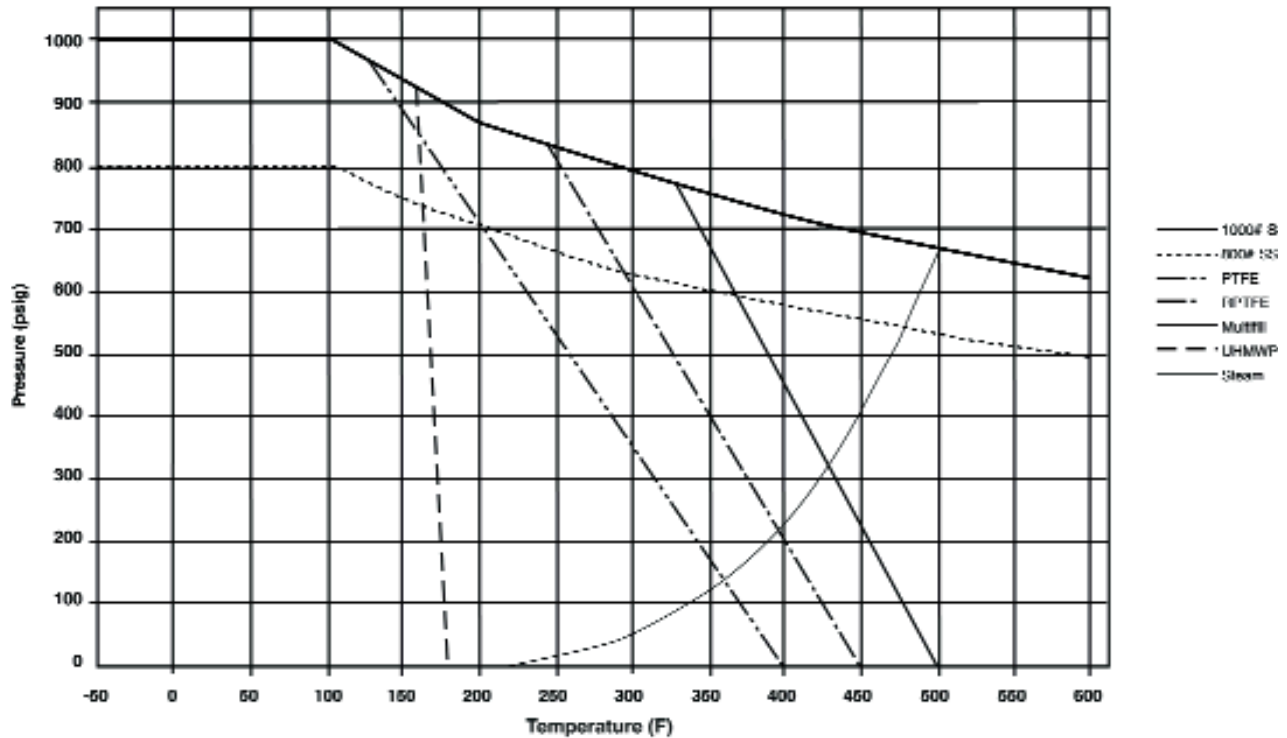
1500# SS P-T Rating (Graph 12)



1000# CS P-T Rating (Graph 7)



1000# SS P-T Rating (Graph 8)



FLOW DATA

For Apollo® and Saturn® Ball Valves

The listed Cv "factors" are derived from actual flow testing, in the Apollo® Ball Valve Division, Conbraco Industries, Inc., Pageland, South Carolina. These tests were completed using standard "off the shelf" valves with no special preparation and utilizing standard schedule 40 pipe. It should be understood that these factors are for the valve only and also include the connection configuration. The flow testing is done utilizing water as a fluid media and is a direct statement of the gallons of water flowed per minute with a 1 psig pressure differential across the valve/connection unit. Line pressure is not a factor. Because the Cv is a factor, the formula can be used to estimate flow of most media for valve sizing.

Flow of Liquid

$$Q = Cv \sqrt{\frac{\Delta P}{SpGr}}$$

Where:
 Q = flow in US gpm
 ΔP = pressure drop (psig)
 SpGr = specific gravity at flowing temperature
 Cv = valve constant

or $\Delta P = \frac{(Q)^2 (SpGr)}{(Cv)^2}$

Flow of Gas

$$Q = 1360 Cv \sqrt{\frac{\Delta P}{(P_1) (SpGr) (T)}}$$

Where:
 Q = flow in SCFH
 ΔP = pressure drop (psi g)
 SpGr = specific gravity (based on air = 1.0)
 P₁ = outlet pressure-psia (psig + 14.7)
 T = (temp. °F + 460)

or $\Delta P = 5.4 \times 10^{-7} (SpGr) T$

Cv FACTORS

SERIES:

70-100, 71-100, 71AR, 73A-100,
 74-100, **76-100**, 80-100
 81-100, 89-100

SIZE	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
OPEN 90°	8.4	7.2	15	30	43	48	84	108	503	370	670

Cv FACTORS

76F,77,77AR,77D SERIES

SIZE	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"
OPEN 90°	8.1	15	15	51	68	125	177	389	503

Cv FACTORS

82-100/200, 83R-100/200/700,86R-100/200/700,83-500/600,86-500/600/900 SERIES

SIZE	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
OPEN 90°	8.1	14	26	51	68	120	170	376	510	996	1893

Cv FACTORS

83A/83B, 86A/86B SERIES

SIZE	1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
OPEN 90°	8.1	14	26	51	68	120	170	376

APOLLO®

Installation, Operation, and Maintenance Guide

For Apollo Series Valves:

2 Piece Threaded
and Solder End
Ball Valves



 **CONBRACO**
Ball Valve Division

INSTALLATION, OPERATION AND MAINTENANCE OF THREADED AND SOLDER END APOLLO BALL VALVES

Valves must be installed in piping systems that comply to the applicable A.N.S.I. B31 Standard. Special considerations must be taken with respect to pipe line expansions and contractions and the media expansions and contractions within the piping system.

THREADED END INSTALLATION

1. Pipe connections to be threaded into these valves should be accurately threaded, clean and free of dirt and metal shavings.
2. Teflon tape is recommended for use as the pipe joint sealant.
3. Use two wrenches when making the pipe joint. Apply one wrench on the hex pads nearest the joint being tightened to prevent breaking the retainer-to-body seal.
4. UNION END VALVES: Remove the union nut from valve and place onto pipe. Thread the tailpiece onto the pipe using a smooth jaw wrench. Thread the union nut onto the valve body and *lightly* torque.

SOLDER END INSTALLATION

1. Piping connections to be soldered into these valves should be cut square and then cleaned with an appropriate cleaner or flux.
2. These valves are designed to be soft soldered. Apply heat with the flame directed away from the center of the valve body. Excessive heat can harm the Teflon seats. Solder valves only in the fully open position.
3. UNION END VALVES: Remove the union nut from valve and place onto pipe. Solder the tailpiece onto pipe, thread union nut onto valve body and *lightly* torque.

OPERATION

The valve is marked showing proper rotation direction for “ON” and “OFF” positions. Rotation is clockwise for “OFF” and counterclockwise for “ON”.

MAINTENANCE

Normal stem packing wear can be compensated for by tightening the packing gland screw clockwise. If all of the adjustment to the packing gland screw has been made, remove the lever and packing gland nut and add one or two replacement bearings on top of the old packing. Reassemble the lever and packing gland nut.

CAUTION: Do not disassemble Valve while under pressure nor with entrapped hazardous fluids therein.

General repair of the valve can be made by:

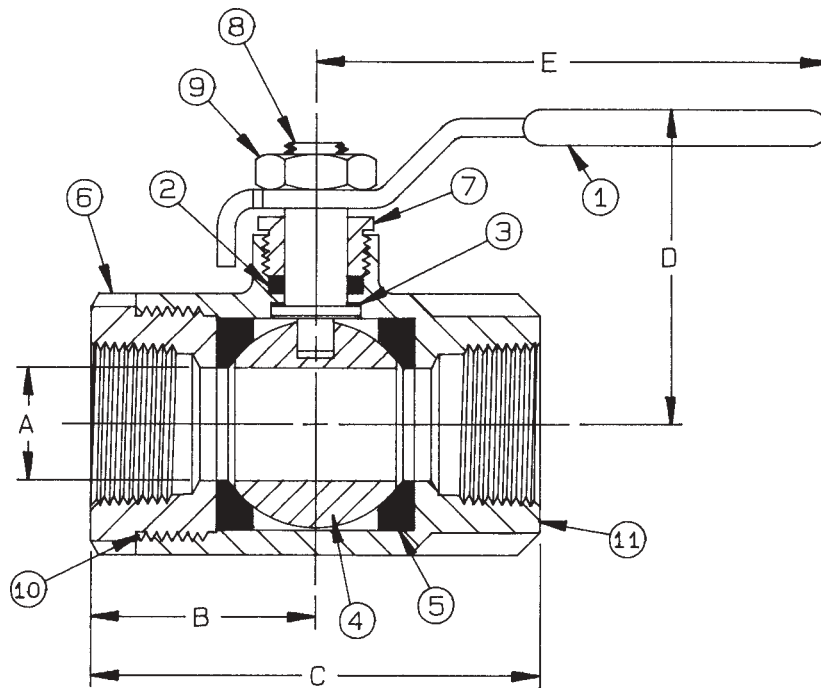
1. Close valve.
2. Remove retainer from body center section by turning counterclockwise
3. 1/4" thru 1" valves only; pry out the top seat being careful not to damage the ball. 1-1/4" thru 3" valves; the top seat will come out with the retainer.
4. Push ball out of body with finger.
5. Remove packing gland nut by turning counterclockwise and push stem down into body to remove.
6. Remove all seats and seals. To facilitate removal of the stem packing, cut with knife.
7. Replace all seats and seals as furnished in the Service Kit. Inspect the ball and stem for excessive wear or damage and replace if necessary.
8. Reverse the above procedure to reassemble using a sealant on the retainer threads equivalent to Loctite Hydraulic Sealant. **NOTE: VALVES IN OXYGEN SERVICE CAN ONLY BE SEALED WITH AN OXYGEN COMPATIBLE THREAD SEALANT.**

Union End Valves cannot be easily field repaired, therefore it is recommended that the main valve section be replaced.

NOTE: ALWAYS TEST VALVE AND SYSTEM BEFORE PUTTING THE SYSTEM INTO SERVICE.

Bronze Valves: **WARNING:** This product is made from Bronze Alloys which contain lead; a chemical known to the State of California to cause cancer and birth defects and other reproductive harm.

General 2-PC. BALL VALVE Identification



- 1. Lever and grip
- 2. Stem packing
- 3. Stem bearing
- 4. Ball
- 5. Seat (2)

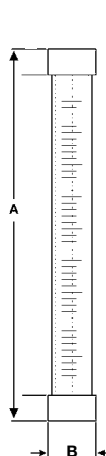
- 6. Retainer
- 8. Stem
- 9. Lever nut
- 10. Body seal
- 11. Body

Pump & Systems Accessories

Calibration Columns

Calibration columns

Clear PVC calibration columns

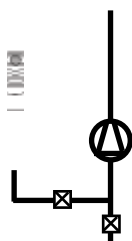


Cylinder size	Fitting size	Dimension (inches)		Threaded base, removable top	Threaded both ends
		A	B		
100 mL	1/2" NPT	10.75	1.39	7500137	7500127
250 mL	1/2" NPT	11.51	1.89	7350138	7500128
500 mL	1/2" NPT	12.75	2.39	7350139	7500129
1000 mL	1/2" NPT	16.75	2.77	7350130	7500135
2000 mL	1" FNPT	20.67	3.52	7500140	7500131
4000 mL	1" FNPT	22.66	4.52	7500141	7500132
10,000 mL	2" FNPT	23.16	6.91	7500134	7500133
20,000 mL	2" FNPT	42.69	6.91	7500142	7500136

Typical Application of Calibration Columns

Column w/removable top

Note: Top must be removed during calibration



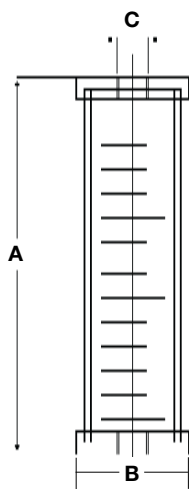
Column threaded both ends

Note: If plumbed as shown, a vent hole must be drilled into the top of the calibration column



Borosilicate Glass calibration columns with Viton® o-rings for Sulfuric Acid Applications

Glass cylinder with acrylic outer shield and 1/2" (316 SS) or 3/4" (PVDF, PVC) thick end flanges. All cylinders are bolted together using stainless steel rods with Viton O-rings for the glass seal and Buna N O-rings for the acrylic seal.

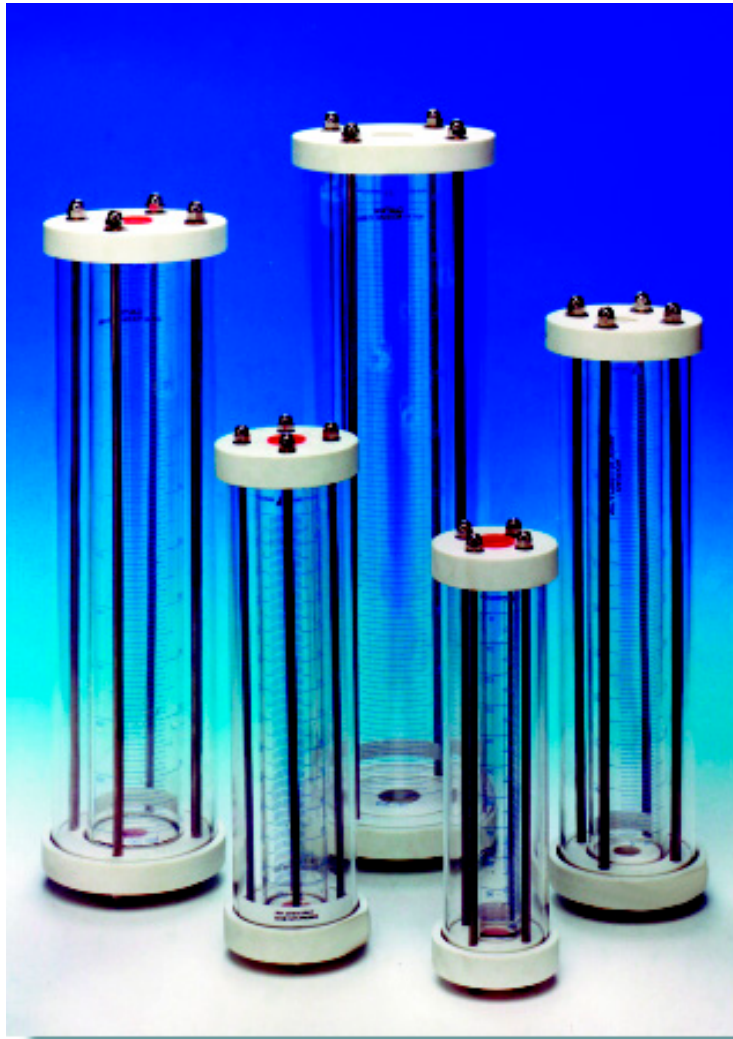


Cylinder size	Fitting size	Dimensions (inches)			Part No.
		A	B	C	
100 mL	1/2" CPVC	10.0	3.0	1/2	7500151
100 mL	1/2" PVDF	10.0	3.0	1/2	7500152
100 mL	1/2" SS	9.5	3.0	1/2	7500153
250 mL	1/2" CPVC	12.5	3.5	1/2	7500154
250 mL	1/2" PVDF	12.5	3.5	1/2	7500155
250 mL	1/2" SS	12.0	3.5	1/2	7500156
500 mL	1/2" CPVC	14.5	4.0	1/2	7500157
500 mL	1/2" PVDF	14.5	4.0	1/2	7500158
500 mL	1/2" SS	14.0	4.0	1/2	7500159
1000 mL	1/2" CPVC	16.75	4.75	1/2	7500160
1000 mL	1/2" PVDF	16.75	4.75	1/2	7500161
1000 mL	1/2" SS	16.25	4.75	1/2	7500162
2000 mL	1" CPVC	18.75	5.5	1	7500163
2000 mL	1" PVDF	18.75	5.5	1	7500164
2000 mL	1" SS	18.25	5.5	1	7500165
4000 mL	1" CPVC	22.5	6.5	1	7500166
4000 mL	1" PVDF	22.5	6.5	1	7500167
4000 mL	1" SS	22.0	6.5	1	7500168



ACCUDRAW®

Glass Calibration Cylinders



ACCUDRAW® Glass Calibration Cylinders *are ideal for the calibration of metering pumps, batch systems and for handling hazardous chemicals.*

- volumes calibrated in mls and US gallons
- construction materials available include TFE, PVDF, CPVC and 316 stainless steel
- sealing "O" rings are Viton and Buna N
- outer shield of acrylic construction
- port connections in NPT, metric or flanged
- custom designs available to your specifications
- standard sizes 100 - 10000 ml



ACCUDRAW® Glass Calibration Cylinders

Sizing and Ordering Information

Glass Construction

Size	Conn.	Model # For TFE End Flgs	Model # For 316 S/S End Flgs	Model # For PVDF End Flgs	Model # For CPVC End Flgs
100 ml	1/2" NPT	ACS#2-100-GTV	ACS#2-100-GSV	ACS#2-100-GKV	ACS#2-100-GCV
250 ml	1/2" NPT	ACS#2-250-GTV	ACS#2-250-GSV	ACS#2-250-GKV	ACS#2-250-GCV
500 ml	1/2" NPT	ACS#2-500-GTV	ACS#2-500-GSV	ACS#2-500-GKV	ACS#2-500-GCV
1000 ml	1/2" NPT	ACS#2-1000-GTV	ACS#2-1000-GSV	ACS#2-1000-GKV	ACS#2-1000-GCV
2000 ml	1" NPT	ACS#2-2000-GTV	ACS#2-2000-GSV	ACS#2-2000-GKV	ACS#2-2000-GCV
4000 ml	1" NPT	ACS#2-4000-GTV	ACS#2-4000-GSV	ACS#2-4000-GKV	ACS#2-4000-GCV
6000 ml	1" NPT	ACS#2-6000-GTV	ACS#2-6000-GSV	ACS#2-6000-GKV	ACS#2-6000-GCV
8000 ml	2" NPT	ACS#2-8000-GTV	ACS#2-8000-GSV	ACS#2-8000-GKV	ACS#2-8000-GCV
10000 ml	2" NPT	ACS#2-10000-GTV	ACS#2-10000-GSV	ACS#2-10000-GKV	ACS#2-10000-GCV

Descriptions:

TFE, PVDF and CPVC End Flanges:

Glass cylinder with acrylic outer shield and 3/4" thick (TFE, PVDF or CPVC) end flanges

316 S/S End Flanges:

Glass cylinder with acrylic outer shield and 1/2" thick 316 Stainless Steel end flanges

All cylinders are bolted together using stainless steel rods with Viton "O" rings for the glass seal and Buna N "O" rings for the acrylic seal.

Note: Cylinders are not pressure vessels.

Options available: (may affect price and delivery)

- different type or size of thread connection, different "O" ring material, different flange material

Dimensional Information

Note: Cylinders are not pressure vessels.

Conversion Factors

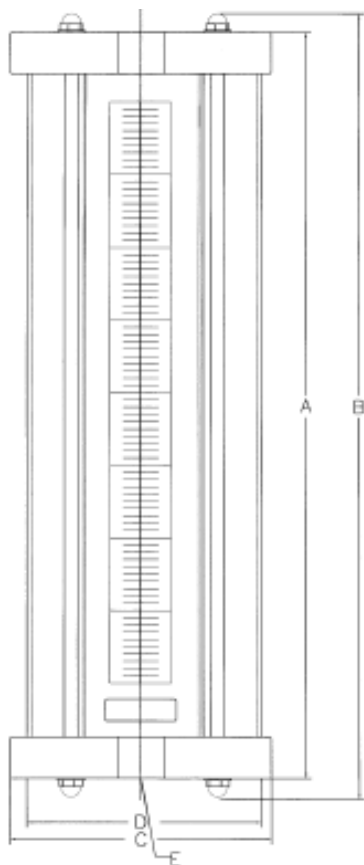
1 ml = 1 cc
1000 ml = 1 liter
ml/sec X 60 = ml/min
1 US gal/min X 0.063 = liters/sec
1 US gal = 3.786 liters

Glass cylinders with TFE, PVDF or CPVC End Flanges

Size ml	DIV ml	A inches	B inches	C inches	D inches	E thread
100	1.00	10.00	11.00	3.00	2.50	1/2" FNPT
250	2.00	12.50	13.50	3.50	3.00	1/2" FNPT
500	5.00	14.50	15.50	4.00	3.50	1/2" FNPT
1000	10.00	16.75	17.75	4.75	4.25	1/2" FNPT
2000	20.00	18.75	19.75	5.50	5.00	1" FNPT
4000	25.00	22.50	23.50	6.50	6.00	1" FNPT
6000	50.00	20.128	21.16	8.00	7.50	1" FNPT
8000	50.00	24.628	25.66	8.00	7.50	2" FNPT
10000	50.00	30.128	31.16	8.00	7.50	2" FNPT

Glass cylinders with 316 Stainless Steel End Flanges

Size ml	DIV ml	A inches	B inches	C inches	D inches	E thread
100	1.00	9.50	10.50	3.00	2.50	1/2" FNPT
250	2.00	12.00	13.00	3.50	3.00	1/2" FNPT
500	5.00	14.00	15.00	4.00	3.50	1/2" FNPT
1000	10.00	16.25	17.25	4.75	4.25	1/2" FNPT
2000	20.00	18.25	19.25	5.50	5.00	1" FNPT
4000	25.00	22.00	23.00	6.50	6.00	1" FNPT
6000	50.00	19.628	20.66	8.00	7.50	1" FNPT
8000	50.00	24.128	25.16	8.00	7.50	2" FNPT
10000	50.00	29.628	30.66	8.00	7.50	2" FNPT



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▲ ACCUDRAW® Glass Cylinder Calibration Instructions

Note: Before starting the calibration procedure below, ensure that the pump is primed and void of any trapped air.

Using the ml scale: (scale is based on volume pumped, over any given time)

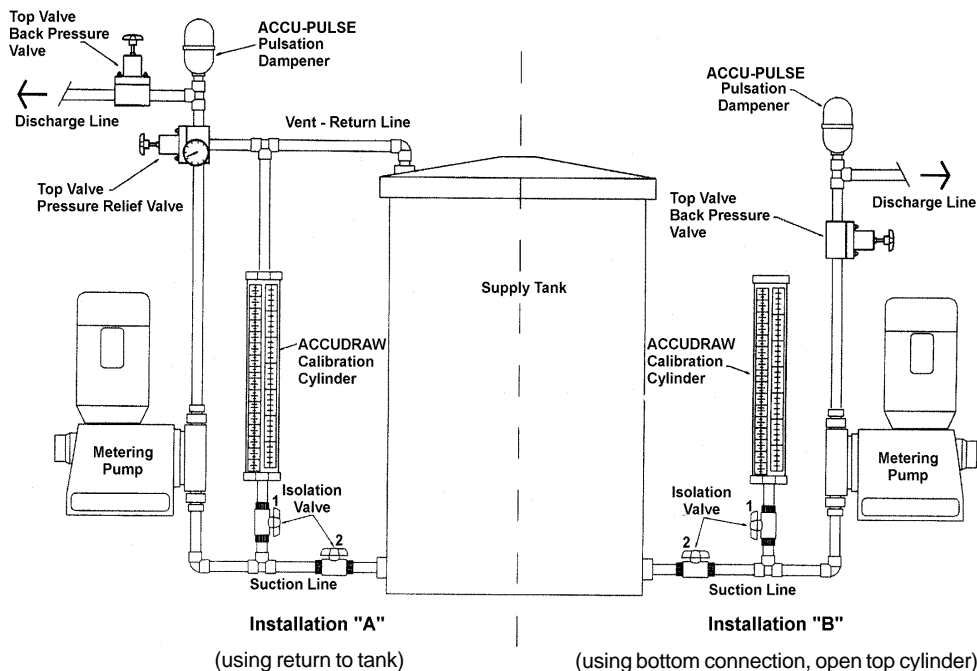
1. Fill the calibration cylinder to the top mark with the liquid to be dispensed. This can be accomplished by manually filling the cylinder, or, if the the feed tank level is higher than the cylinder, by opening the isolation valve below the cylinder and back filling the cylinder.
2. With the calibration cylinder full of the liquid to be dispensed, start the metering pump and operate at 100% output until all air is removed from both suction lines and pump head.
3. Shut pump "OFF".
4. With calibration cylinder full, close isolation valve (#2) from supply tank, and open isolation valve (#1) below cylinder.
5. Start the pump.
6. Using a stop watch, measure the volume dispensed in 60 seconds.
7. Multiply the measured volume by 60 to find your ml per hour volume.
8. Adjust the pump volume control, higher or lower to meet with your desired output.
9. Repeat above steps 4 through 8 until your desired output is met.

Caution: Never leave unattended when back filling the cylinder.

If you wish to shorten the time of dispensing for calibration by one half (1/2) or one quarter (1/4), you must multiply the volume by the same number used to divide the time by to determine ml per minute or hour.

e.g. 100 ml in 60 seconds equals
50 ml X 2 in 30 seconds or
25 ml X 4 in 15 seconds

Typical Installations ("A" and "B")



Conversion Factors
1 ml = 1 cc
1000 ml = 1 liter
ml/sec X 60 = ml/min
1 US gal/min X 0.063 = liters/sec
1 US gal = 3.786 liters

Caution:
Do not use as a pressure vessel

Pump & Systems Accessories

Pulsation Dampeners

Pulsation dampeners operate on the principle that gas is compressible and fluid is not. The pulsation dampener consists of an air chamber containing compressed air, a fluid chamber connected to the pump's suction or discharge line, and a bladder or bellows which separates the air and fluid.

Some models are flow-through design, with two ports so they can be mounted directly on the pump suction or discharge line. Other models are single port design, to be teed off of the pump suction or discharge line. Flow-through models may also be used in a tee if one port is capped.

All models feature a Schrader (bicycle) valve and pressure gauge for charging the air chamber on-site.

PVDF/Nordel pulsation dampeners are recommended for sodium hydroxide (caustic) applications. Viton® pulsation dampeners are recommended for sodium hypochlorite applications.

Sizing Pulsation Dampeners

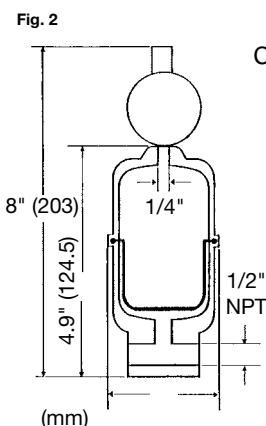
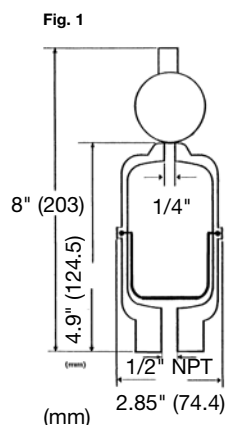
Multiply the pump's displacement per stroke (mL) times 26 to get minimum pulsation dampener volume (mL) to achieve 90% reduction in pulsation.

Safety Note: We recommend using pressure relief valves with the pulsation dampeners.

General Specifications

Maximum pressure:	150 psig (polypro, PVDF and PTFE), 300 psig (SS)
Temperature range:	
Nordel bladder:	-60°F to 280°F (-51°C to 138°C)
Viton® bladder:	30°F to 350°F (-1°C to 177°C)
HYPALON® bladder:	-20°F to 275°F (-29°C to 135°C)
PTFE bellows:	40°F to 220°F (4°C to 104°C)
Polypro housing :	32°F to 175°F (0°C to 79°C)
PVC housing:	32°F to 140°F (0°C to 60°C)
PVDF housing:	10°F to 250°F (-12°C to 121°C)
PTFE housing:	-20°F to 125°F (-29°C to 52°C)
SS housing:	32°F to 200°F (0°C to 93°C)

*Teflon bellows are smaller in volume



131 mL (8 cu. in.) Models

SS housing: 3/8" FNPT, 1 port (not illustrated)				
PTFE bellows	3 (1.4)	CTS1020 T	III	7253205
PVDF housing: 1/2" FNPT, 1 port (Fig. 1)				
PTFE bellows	1 (0.9)	CTK1005 T 5	III	7744101

164 mL (10 cu. in.) Models

CPVC housing: 1/2" FNPT, 1 port (Fig. 1)				
Nordel bladder (EPDM)	1 (0.9)	RC-10X-E50	III	7744096
Viton® bladder	1 (0.9)	RC-10X-V50	III	7744097
HYPALON® bladder	1 (0.9)	RC-10X-H50	III	7744098
Polypro housing: 1/2" FNPT, 1 port (Fig. 1)				
Nordel bladder (EPDM)	1 (0.9)	CTP1005 ND 5	III	7744102
PVDF housing: 1/2" FNPT, 1 port (Fig. 1)				
Nordel bladder (EPDM)	1 (0.9)	CTK1005 ND 5	III	7744100
Viton® bladder	1 (0.9)	CTK1005 V 5	III	7744099

Shipping Weight
lbs (kg)

Model

Size

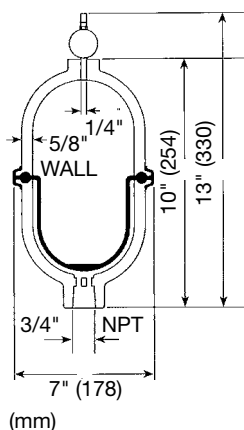
Part No.

Pump & Systems Accessories

Pulsation Dampeners

Pulsation dampeners (cont.)

Fig. 3



Shipping
Weight
lbs (kg) Model Size Part No.

262 mL (16 cu. in.) Models

PVC housing: 3/4" FNPT, 1 port (Fig. 3)				
PTFE bellows	7 (3.2)	CT1311 T	II	7744211
PVDF housing: 3/4" FNPT, 1 port (Fig. 3)				
PTFE bellows	7 (3.2)	CT1401 T	II	7253234
SS housing: 3/4" FNPT, 1 port (Fig. 3)				
PTFE bellows	11 (5.0)	CT3120 T	II	7253237

600 mL (36 cu. in.) Models (cont. from pg.15)

PVC housing: 3/4" FNPT, 1 port (Fig. 3)				
Nordel bladder	7 (3.2)	CT1311 ND	II	7253232
Viton® bladder	7 (3.2)	CT1311 V	II	7253233
HYPALON® bladder	7 (3.2)	CT1311 H	II	7740946
Polypro housing: 3/4" FNPT, 1 port (Fig. 3)				
Nordel bladder	6 (2.7)	CT1301 ND	II	7253230
Viton® bladder	6 (2.7)	CT1301 V	II	7253231
PVDF housing: 3/4" FNPT, 1 port (Fig. 3)				
Nordel bladder	7 (3.2)	CT1401 ND	II	7253236
Viton® bladder	7 (3.2)	CT1401 V	II	7253235

SS housing: 3/4" FNPT, 1 port (Fig. 3)				
Viton® bladder PTFE BLADDER	11 (5.0)	CT3120 T	II	7253236 7253237

1147 mL (70 cu. in.) Models

PVC housing: 3/4" FNPT, 1 port (Fig. 3)				
PTFE bellows	10 (4.5)	CT311 T	II	7253229
SS housing: 3/4" FNPT, 1 port (Fig. 3)				
PTFE bellows	14 (6.4)	CT3020 T	II	7253206
PVDF housing: 3/4" FNPT, 1 port (Fig. 3)				
PTFE bellows	8 (3.6)	CT401 T	II	7253219

1393 mL (85 cu. in.) Models

PVC housing: 3/4" FNPT, 1 port (Fig. 3)				
Nordel bladder	6 (2.7)	CT311 ND	II	7253221
Viton® bladder	6 (2.7)	CT311 V	II	7253220
HYPALON® bladder	6 (2.7)	CT311 H	II	7740947
Polypro housing: 3/4" FNPT, 1 port (Fig. 3)				
Nordel bladder (EPDM)	6 (2.7)	CT301 ND	II	7253207
Viton® bladder	6 (2.7)	CT301 V	II	7253208
PVDF housing: 3/4" FNPT, 1 port (Fig. 3)				
Nordel bladder (EPDM)	7 (3.2)	CT401 ND	II	7253209
Viton® bladder	8 (3.6)	CT401 V	II	7253210

1998 mL (122 cu. in.) Models

PVC housing: 2" FNPT, 1 port				
PTFE bellows	16 (7.3)	CT911 T	I	7253228
PVDF housing: 2" FNPT, 1 port				
PTFE bellows	15 (6.8)	CT1201 T	I	7253225
SS housing: 2" FNPT, 1 port				
PTFE bellows	30 (13.6)	CT2520 T	I	7253226

2867 mL (175 cu. in.) Models

Polypro housing: 2" FNPT, 1 port				
Nordel bladder	13 (5.9)	CT901 ND	I	7253223
PVC housing: 2" FNPT, 1 port				
Viton® bladder	13 (5.9)	CT911 V	I	7253224
HYPALON® bladder	13 (5.9)	CT911 H	I	7740948

SENTRY PULSATION DAMPENERS



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SENTRY PULSATION DAMPENERS

BENEFITS & FEATURES

Positive Displacement (PD) pumps create pulsation and hydraulic shock due to the reciprocating nature of their stroking action, potentially damaging the entire pumping system. Blacoh's SENTRY® Pulsation Dampeners remove virtually all hydraulic shock, enhancing all-around performance and reliability of fluid handling equipment in industrial and chemical transfer applications.

SENTRY BENEFITS:

- Produces a near steady fluid flow up to 99%* pulsation and vibration free.
- Protects pipes, valves, fittings, meters, and in-line instrumentation from destructive pulsations, vibrations, surges, cavitation, thermal expansion, & water hammer
- Creates steady and continuous flow when dosing, blending or proportioning additives
- Insures accuracy, longevity, and repeatability of in-line meters
- Enables uniform application of material in spraying and coating systems
- Reduces product agitation, foaming, splashing and degradation of product
- Provides liquid energy storage for emergency valve closure and equipment shutdown
- Reduces overall energy cost with continuous linear flow, rather than start/ stop turbulent flow
- Operates as a reservoir for make-up fluid

SENTRY FEATURES:

- Sizes available for all positive displacement pumps with discharge sizes from 1/8" (3.18mm) to 6" (152.4mm)
- Simple, reliable design and quick installation
- Easy in-line maintenance
- Pressure ranges up to 4000 PSI (276 BAR) available from stock
- Temperature ranges from -60°F to +400°F (-51°C to +205°C) available from stock
- Custom models available up to 100 gallons (378L) and 25,000 PSI (1724 BAR)
- Bodies available in a full range of chemically resistant materials
- Bladders available for even the most corrosive application

***Let SENTRY Stand Guard Over Your System.
Increase productivity, safety, reliability and efficiency.
Decrease maintenance and operating costs.***

PROCESSES

- | | | | | |
|-------------------|--------------------|-------------------|--------------------|------------------|
| • TRANSFER | • FILTERING | • PRINTING | • DOSING | • FILLING |
| • METERING | • SPRAYING | • COATING | • INJECTING | • MIXING |

INDUSTRIES SERVED



Chemical Process



Water Treatment



Food & Beverage



Pulp, Paper & Textile



Paint & Coating



**Biotech/
Pharmaceutical**



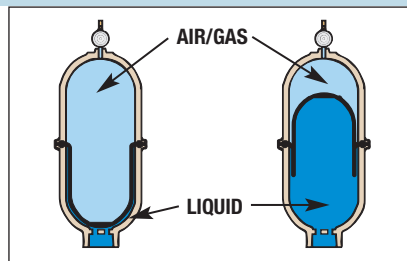
Gas, Oil, & Petrochemical



Consumer Products

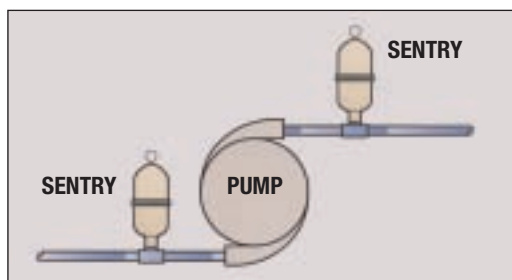
PRINCIPLES OF OPERATION

SENTRY operates on the principle that volume is inversely proportional to pressure. Compressed air or gas is introduced into the air chamber of the SENTRY Pulsation Dampener to a specified pressure. The gas is entrapped by the elastomeric bladder, which prevents contact between the process fluid and compressed gas. (Without the bladder, the gas would dissolve into the fluid and cause product contamination). During pump discharge, fluid enters the wetted chamber of the SENTRY Pulsation Dampener, displacing the bladder, compressing the gas and absorbing the shock. During pump shift, liquid pressure decreases, the dampener gas expands, pushing fluid back into the process line, eliminating up to 99% of system shock and pulsation.

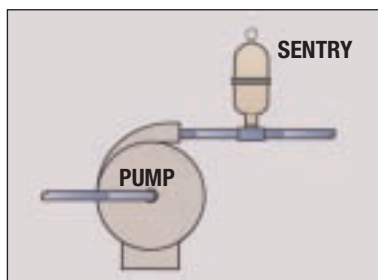


TYPICAL INSTALLATIONS

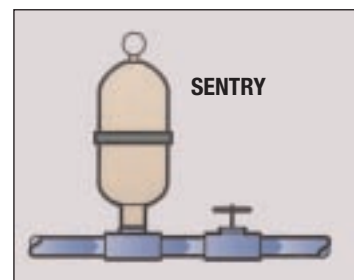
ADD, METERING, PERISTALTIC, & PISTON PUMPS



PUMP STARTUP & SHUTDOWN



QUICK CLOSING VALVES



*Requires proper sizing.

SENTRY TECHNICAL SPECIFICATIONS



SENTRY PLASTIC

Pressure Rating*:	Up to 150 PSI (10 BAR)	Temperature Range**:	-20°F to +250°F (-29°C to +121°C)
Capacities:	4 cubic inches to 5 gallons (.066 – 18L)	Inlet Ports:	Threaded: FNPT and BSP Flanged: ANSI and DIN
Shell Materials:	Polypropylene Conductive Polypropylene PVC and CPVC PVDF Conductive Acetal		



SENTRY METAL

Pressure Rating*:	Up to 4000 PSI (276 BAR)	Temperature Range**:	-60°F to + 400° F (-51°C to +204°C)
Capacities:	4 cubic inches to 100 gallons (.066 - 378L)	Inlet Ports:	Threaded: FNPT and BSP Flanged: ANSI and DIN
Shell Materials:	Aluminum Carbon Steel 316L Stainless Steel Alloy 20 Hastelloy C Epoxy, PVDF and PTFE coated steel		



SENTRY SANITARY

Pressure Rating*:	Up to 1000 PSI (69 BAR)	Temperature Range**:	-20° F to +350° F (-28°C to +176° C)
Capacities:	4 cubic inches to 10 gallons (.066 - 37L)	Inlet Ports:	Tri-clamp type sanitary fitting
Shell Materials:	30 RA Polished 316L Stainless Steel Bead Blasted 316L Stainless Steel		



SENTRY PTFE

Pressure Rating*:	Up to 100 PSI (6 BAR)	Temperature Range**:	+40°F to + 220°F (+4°C to +104°C)
Capacities:	4 to 370 cubic inches (.066 - 6L)	Inlet Ports:	Threaded: FNPT and BSP Flanged: ANSI and DIN Metric Flare Type
Shell Materials:	Machined PTFE		



SENTRY XP HIGH PRESSURE

Pressure Rating*:	Up to 4000 PSI (276 BAR)	Temperature Range**:	-60°F to +225°F (-51°C to +107°C)
Capacities:	8 to 24 cubic inches (.13 - .39L)	Inlet Ports:	Threaded: FNPT Flanged: ANSI
Shell Materials:	316L Stainless Steel		



SENTRY TEF-GUARD HP II

Pressure Rating*:	Up to 2000 PSI (137 BAR)	Temperature Range**:	+40°F to + 220°F (+4°C to +104°C)
Capacities:	12 cubic inches (.20L)	Inlet Ports:	Threaded: FNPT Flanged: ANSI
Shell Materials:	316L Stainless Steel Carbon Steel Alloy 20 Hastelloy C		

BLADDER OPTIONS

COMPOUND	TEMPERATURE LIMITS	APPLICATIONS
Neoprene	0°F to +200°F (-18°C to +93°C)	Good abrasion resistance and flex; use with moderate chemicals.
Buna	+10°F to +180°F (+12°C to +82°C)	Good flex life; use with petroleum, solvents and oil-based fluids.
EPDM	-60°F to +280°F (-51°C to +137°C)	Use in extreme cold; good chemical resistance with ketones, caustics.
Hypalon	-20°F to +275°F (-29°C to +135°C)	Excellent abrasion resistance; good in aggressive acid applications.
Viton	-10°F to +350°F (-23°C to +176°C)	Use in hot & aggressive fluids; good with aromatics, solvents, acids & oils.
Aflas	0°F to +400°F (-18°C to +204°C)	High temperature, petroleum based chemicals, strong acids and bases.
FDA Silicone	-20°F to +300°F (-29°C to +149°C)	FDA-approved food grade material; for use in food and pharmaceutical processing.
FDA Buna	+10°F to +180°F (-12°C to +82°C)	FDA-approved food grade. Similar characteristics of Silicone.
FDA Fluorel	-10°F to +350°F (-23°C to +176°C)	Fluorel is a fluorelastomer comparable to Viton.
PTFE	+40°F to +220°F (+4°C to +104°C)	Bellows design; excellent flex life; use with highly aggressive fluids.

* Maximum PSI rated for ambient temperatures.

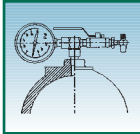
** Reflects entire temperature range for all available materials. Consult Blacoh on specific materials.

AIR CONTROL OPTIONS



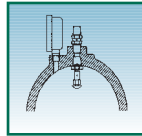
CHARGEABLE

The chargeable model has a Schrader type charging valve that allows for a predetermined pressure charge to be applied and held in the dampener. No permanent source of compressed gas is required to be attached to the unit. The chargeable models are used primarily with metering, piston and peristaltic pumps for pulsation dampening. Chargeable models are also used for surge suppression to prevent water hammer from quick closing valves, for make-up fluid to prevent pump cycling and for suppression of pump start up or shut down pressure spikes.



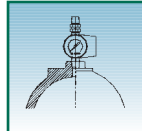
INLET STABILIZER

The patented inlet stabilizer air control (U.S. Patent No. 6,089,837) consists of a compound pressure gauge, a pressure/vacuum tight ball valve and a venturi valve. When compressed air is passed through the venturi valve at high speed, a low pressure area is created which is used to evacuate the air from the stabilizer, creating a vacuum internally. Conversely, when the flow of air through the venturi valve is diverted into the stabilizer, a pressure charge is obtained. When pump inlet conditions are optimized, pump efficiency is maximized.



AUTOMATIC

An automatic poppet type valve located in the non-wetted section of the dampener allows for an increase in compressed air pressure to balance an increase in system liquid pressure. As liquid system pressure increases, the bladder is pushed further up into the dampener until it contacts the internal automatic valve. This contact opens the valve and allows an increase of compressed air to enter the dampener. When the air pressure inside the dampener equals the system liquid pressure, the dampener is in balance and pulsations are minimized. If a change in pressure occurs this process is repeated. Automatic units are designed for use on air operated diaphragm pumps in systems with a varying discharge pressure.



ADJUSTABLE

The adjustable model uses a self-relieving regulator to set dampener pressure. A compressed air line must be permanently attached to the regulator. The regulator allows for an easy, convenient method for readjusting the dampener pressure if the system fluid pressure changes. Adjustable units are designed for use on air operated diaphragm pumps in systems with a constant discharge pressure.

APPLICATION STORIES

APPLICATION: PULSATION DAMPENING

PROBLEM: A major pulp & paper mill in the Northwest used AODD unloading pumps. The reciprocating action of these air-operated pumps created violent pulsations that caused both pipe stress and mounting fatigue. In fact, these pulsations often caused the pumps to be pulled from their cement foundations. This created significant downtime, costly foundation repair, environmental hazards, and a dangerous working environment.



SOLUTION: A Blacoh SENTRY IV Pulsation Dampener was installed in the common discharge of the pumps to dampen these pulsations.

RESULT: Pipe stress and mounting fatigue have been eliminated. Not only have the pumps not been ripped from their cement foundations, but the mill has experienced longer life from pump components such as diaphragms and ball valves.

APPLICATION: WATER HAMMER

PROBLEM: A major producer of water treatment chemicals accessed their local water supply through a 3" PVC pipe with quick-closing valves. When the desired quantity had been measured and the valve shut, a water hammer effect with pressure spikes that exceeded the PVC pipe's burst strength was created. The PVC repeatedly broke, causing the entire plant to be shut down for repair. In addition, since pipe failure occurred under a nearby highway, it also had to be closed.



SOLUTION: A Blacoh SENTRY 10 gallon Surge Suppressor was installed on the pressure side of each quick closing valve to reduce water hammer pressure spikes.

RESULT: The damaging water hammer pressure spikes are now absorbed, no pipes have ruptured, and the plant (and nearby highway) have had no downtime due to water hammer.

APPLICATION: METERING

PROBLEM: A 300 megawatt power plant required a chemical feed system to supply hydrazine to a boiler. The hydrazine acts as an oxygen scavenger, and must be delivered in a precise and consistent quantity. While metering pumps can deliver chemicals in precise amounts, their reciprocating action will not allow delivery in a smooth and consistent flow.

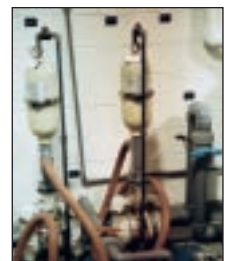


SOLUTION: A Blacoh SENTRY III Pulsation Dampener was installed in the common discharge of two metering pumps to create smooth and consistent flow.

RESULT: Hydrazine is now delivered to the boiler in a precise and consistent quantity. In addition, pipe vibration has been eliminated, gauge accuracy has been maximized, and pump component stress has been reduced.

APPLICATION: SPRAYING/ COATING

PROBLEM: A decontamination facility pumped acids and water through a series of 15° spray nozzles to rinse radiation from contaminated metals. However, the pulsating action of their reciprocating pumps caused uneven spray into the rinse tanks, and the metals were not rinsed completely.



SOLUTION: A Blacoh SENTRY 1 Pulsation Dampener was installed at each pump discharge manifold to eliminate the surging flow of the pumps and ensure complete coverage and thorough cleaning.

RESULT: The even flow ensures that the metal product is completely rinsed of radiation. Furthermore, both process time and the amount of acid required have been reduced, which increased productivity and profit.

UNDERSTANDING PULSATION AND WATER HAMMER CONTROL

PULSATION DAMPENING

Positive displacement pumps create pulsation and hydraulic shock purely by the reciprocating nature of the pump's stroking action. During the discharge stroke of a pump, fluid pressure takes the line of least resistance, displacing the bladder in the dampener, and compressing the trapped gas. As the pump begins its next cycle, fluid flow stops momentarily allowing the compressed gas to expand, forcing the bladder to push the accumulated

fluid back into the discharge line. This fills the void created in the pipeline by the pump's cycle shift. Whether a piston, plunger, air diaphragm, peristaltic, gear, or diaphragm metering pump, a SENTRY Pulsation Dampener placed at the pump's discharge will produce a steady fluid flow up to 99% pulsation free; protecting the entire pumping system from the damaging effects of shock.

SURGE SUPPRESSION & WATER HAMMER

When fluid in motion is abruptly stopped, a hydraulic surge is created in the system. Hydraulic surge is often referred to as "water hammer". The kinetic energy, released as pressure, can spike up to six times the system's operating pressure, destroying system instrumentation, pumps, pipes, fittings, and valves. Without a suppression device, the shock wave travels the length of the pipe back to the pump, then reverses again, oscillating back and forth until friction dissipates the pressure spike or a system component fails.

There are several major culprits that produce water hammer; quick closing valves, back surge, pump start up and pump shut down. Quick closing valves can be defined as valves that close within one and one-half seconds. Quick closing valves have the potential of stopping large volumes of energized fluid, producing violent water hammer. The pump start up also stops fluid in motion. During pump start up, fluid in a pipe is static and must be accelerated. The pumped fluid is abruptly stopped when it contacts the static fluid in the pipe, again creating a shock wave. A SENTRY Surge

Suppressor installed at the pump's discharge will provide the accumulation capacity to absorb the rapid fluid acceleration and prevent a pressure spike from occurring. As the surge enters the Suppressor, the gas inside is compressed, the fluid is accumulated and the shock wave is absorbed. When steady system flow rate is achieved, pressure and fluid are slowly released back into the system by the compressed gas.

At pump shut-down, either planned or failure, fluid flow will momentarily continue away from the pump due to momentum. As the flow continues, a void, called column separation can occur at the pump's discharge. When fluid momentum is stopped due to pipe friction, the liquid will usually reverse toward the void area of the pump discharge. The reversing fluid will slam into the check valve usually located at the pump discharge and a water hammer pressure spike will occur. Depending upon the design of the piping system and the fluid involved, the voided area can actually become sub-atmospheric which can significantly increase the pressure spike.

INLET (SUCTION) STABILIZATION

Without a sufficient supply of fluid a pump will not perform efficiently. Fluid "starvation" is caused by unbalanced hydraulics from friction, acceleration, and head. A reciprocating pump further complicates the issue by emitting high-frequency pressure waves created by the inlet valves opening and closing. In high inlet pressure situations, a pump's inlet valves create water hammer by their opening and closing action; increasing pipe and pump damage, and draining system efficiency.

In suction lift and horizontal suction applications, the pumps' inlet valve action actually decreases inlet fluid pressure. A "starved" or cavitating

pump will be unable to produce specified flow rates due to the incomplete filling of cylinders and liquid chambers. In addition, cavitation will result in the premature failure of pump parts. A SENTRY Suction Stabilizer at the pump's inlet will act as an accumulator, reducing pressure fluctuations and aid in filling the pump head with fluid during each inlet stroke. In high suction lift applications it is also important not to lose the acceleration of the fluid created with each suction stroke of the pump. A Suction Stabilizer will momentarily maintain the flow of the accelerated fluid. The fluid flows into the stabilizer as the pump shifts, and then out as the inlet valve re-opens, maintaining even pressure and steady flow, minimizing cavitation.

THERMAL EXPANSION

Many fluids change volume due to temperature changes. As the temperature of a fluid rises, the fluid expands. In a closed or loop system a volumetric increase in fluid can create a rise in pressure beyond the limits of safety. The increase in pressure can result in ruptured pipes and fittings,

destroyed in-line instrumentation, burst pressure relief valves and contaminated surroundings. A SENTRY Thermal Expansion Chamber installed in the pipeline will accumulate the expanded fluid, eliminating a dangerous rise in pressure.

ACCUMULATORS, AUXILIARY ENERGY, FLUID MAKE-UP & TRANSFER BARRIER

Fluids flowing in a system can be accumulated during one part of the process cycle, and then released when needed during another part of the cycle. The release can be based upon the pressure of the system or by the opening/closing of a valve. The SENTRY Accumulator can be used to maintain process line pressure and store fluid for other uses, such as to back flush filters or to draw off sample fluid.

Accumulators can be used as a Transfer Barrier where pressure on one side of a system needs to be transferred to another side without the mixing of the fluids. The accumulator is installed in-line with the two fluids entering at opposite ends, separated by the bladder. As the pressure of one fluid increases, it pushes the bladder against the other fluid, transferring the increase in pressure.

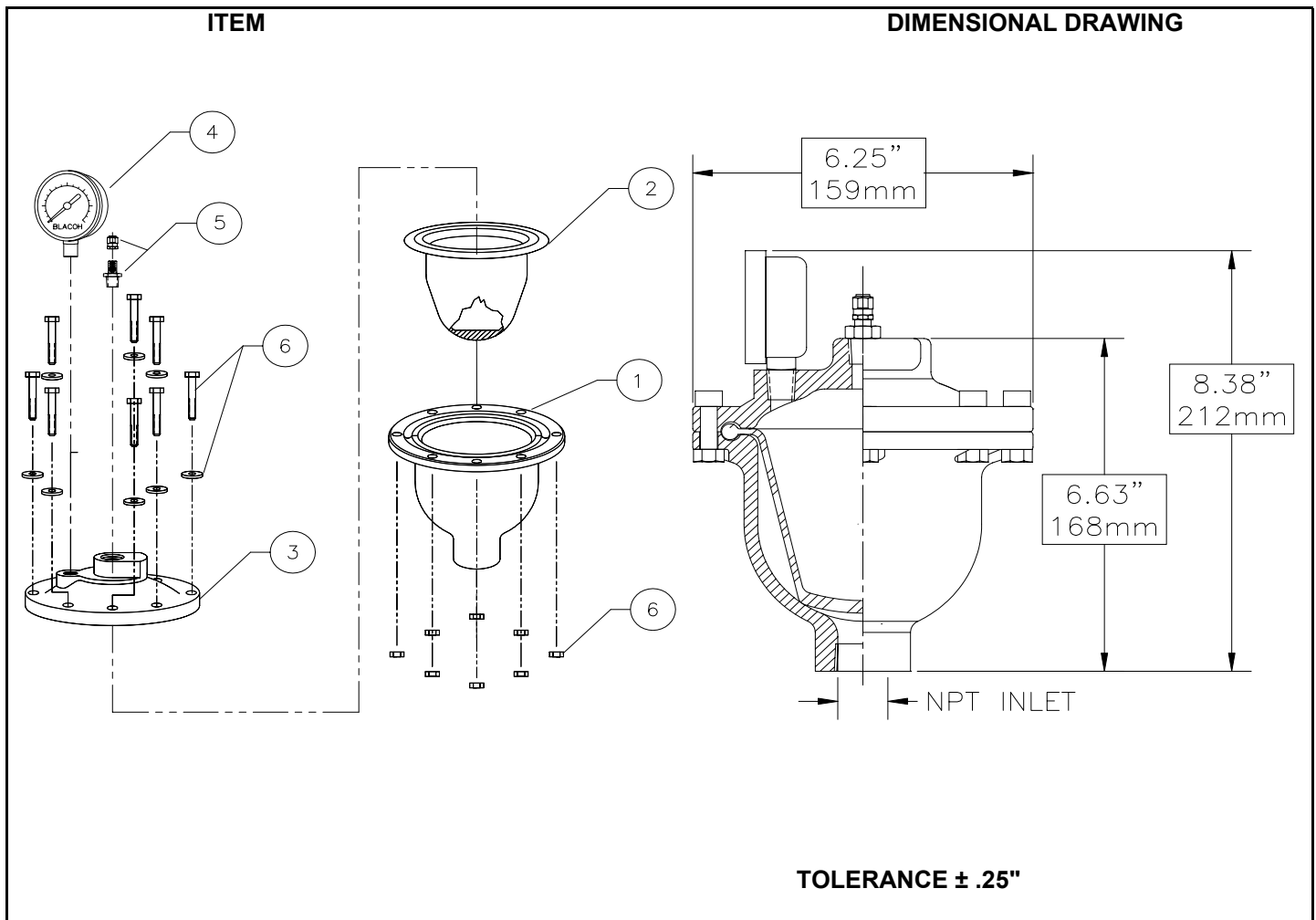
Please call your local distributor:



601 Columbia Ave, Bldg. D, Riverside, CA 92507 • USA
Tel: (800) 603-7867 or (951) 342-3100 • Fax: (951) 342-3101
E-mail: sales@blacoh.com • Website: www.blacoh.com

SENTRY MODEL #:	CT3120T
MAXIMUM PRESSURE:	300 PSI/20.5 BAR
CAPACITY:	36 CUBIC INCHES/0.589 LITERS
WETTED HOUSING:	STAINLESS STEEL
NONWETTED HOUSING:	STAINLESS STEEL
BLADDER:	PTFE
INLET:	3/4" NPTF
AIR CONTROL:	CHARGEABLE

DESCRIPTION				
ITEM	PART #	QTY	Component	Material
1	2901-27	1	Wetted Housing	Stainless Steel
2	402-25	1	Bladder	PTFE
3	2901-33	1	Nonwetted Housing	Stainless Steel
4	G40	1	Gauge	SS/Brass/Bronze
5	101-71	1	Fill Valve	Stainless Steel
6	2924-00	1	Fastener Assy	Stainless Steel



BLACOH FLUID CONTROL, INC

RIVERSIDE, CALIFORNIA USA

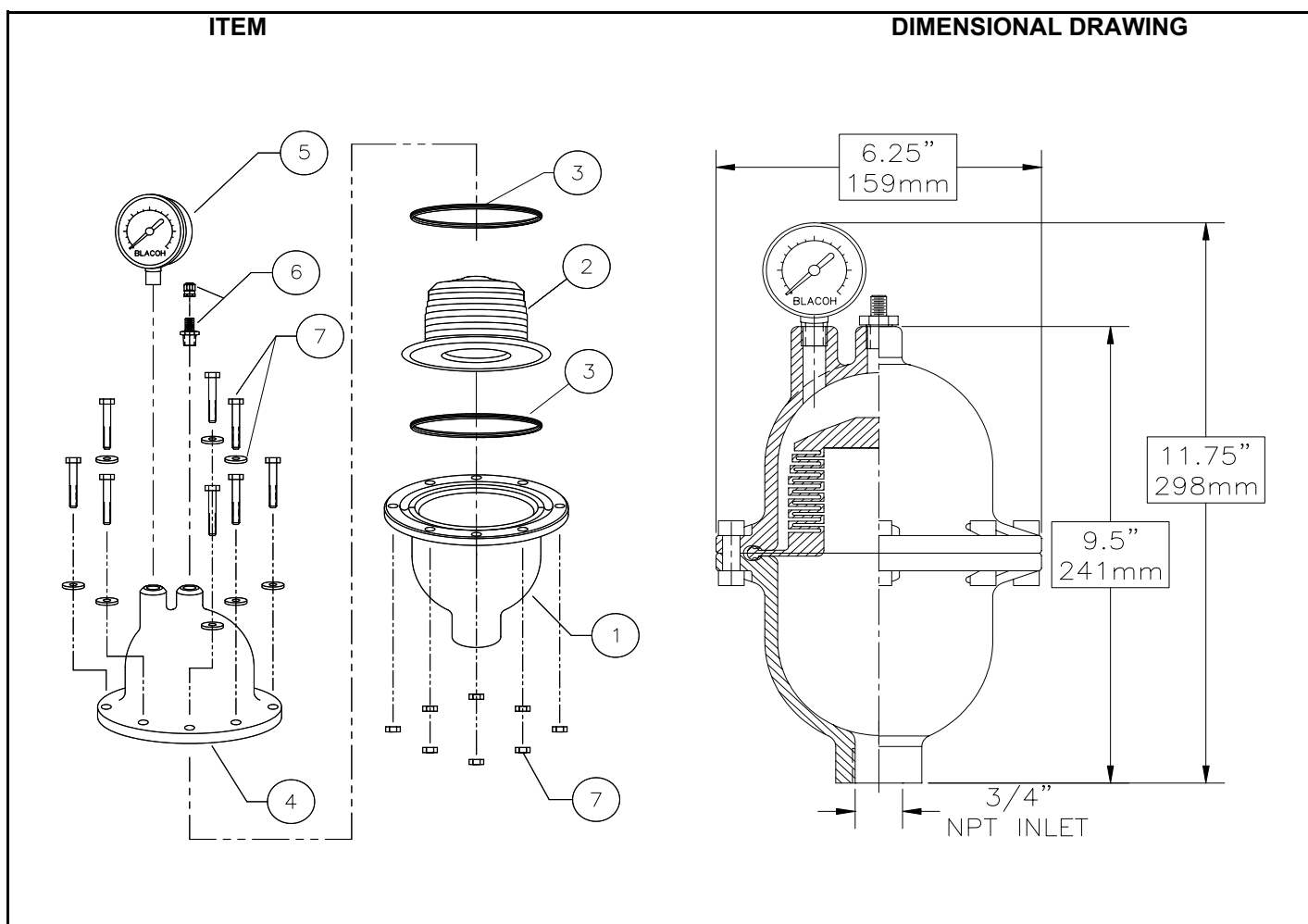
TEL: 800.603.7867 or 909.342.3100 Fax: 909.342.3101

E-mail: sales@blacoh.com web site: www.blacoh.com

SENTRY MODEL #:	CT3020T
MAXIMUM PRESSURE:	150 PSI/10 BAR
CAPACITY:	85 CUBIC INCHES/1.39 LITERS
WETTED HOUSING:	316 STAINLESS STEEL
NONWETTED HOUSING:	316 STAINLESS STEEL
BELLOWS:	PTFE
INLET:	3/4" FNPT
AIR CONTROL:	CHARGEABLE

DESCRIPTION				
ITEM	PART #	QTY	Component	Material
1	2901-27	1	Wetted Housing	316 Stainless Steel
2	301-10	1	Bellows	PTFE (Includes O-Ring Assy)
3	301-G	1	O-Ring Assy	TFE Encapsulated Viton & Viton
4	2901-24	1	Nonwetted Housing	316 Stainless Steel
5	101-33	1	Gauge	Plastic/Brass/Bronze
6	101-71	1	Fill Valve	Stainless Steel
7	2924-00	1	Fastener Assy	Stainless Steel

6/11/2003



BLACOH FLUID CONTROL, INC

RIVERSIDE, CALIFORNIA USA

TEL: 800.603.7867 or 909.342.3100 Fax: 909.342.3101

E-mail: sales@blacoh.com web site: www.blacoh.com

S/N:_____	MODEL #:_____	DATE OF PURCHASE_____
MATERIALS OF CONSTRUCTION: BODY_____BLADDER_____		
PUMP AREA & NUMBER_____		
SUPPLIER: COMPANY_____	CONTACT_____	
PHONE_____	FAX_____	E-MAIL_____

INSTALLATION NOTES**READ BEFORE INSTALLATION**

- To prevent pre-charge loss through the fill valve, **always** replace the cap after charging unit.
- If a **system pressure test is to be performed**, SENTRY must be charged with 80% of the system test pressure prior to test. This will avoid possible bladder damage.
- Blacoh recommends installing a pressure relief valve in all pump systems to ensure compliance with pressure limits on system equipment.
- Mount SENTRY as close to pump discharge, inlet and/or quick closing valve as possible, but within 10 pipe diameters.
- Temperature and pressure affect the strength and chemical resistance of plastic and rubber. Please consult factory for additional information.
- Remove all pressure from SENTRY unit **AND** pumping system before attempting maintenance.
- Do not exceed 150 PSI with plastic models; up to 300 PSI with CT units (all metal models excluding units with plastic non-wetted parts). **Check pressure rating shown on serial tag.**
- Always wear safety glasses when installing, charging or repairing SENTRY units.
- Do not operate a SENTRY that is leaking, damaged, corroded or unable to hold internal fluid, air or gas pressure.
- Pre-charge SENTRY with compressed air or nitrogen only. **DO NOT USE OXYGEN**
- **DANGER OF STATIC SPARK: GROUNDING PRECAUTIONS MUST BE CONSIDERED WHEN USED IN FLAMMABLE OR EXPLOSIVE ENVIRONMENTS.**

INSTALLATION FOR PUMP DISCHARGE PULSATION**READ BEFORE INSTALLATION****Step 1 – Installation Position**

Install the dampener in-line, as close to the pump discharge as possible to absorb the pulse at its source. Install ahead of any downstream equipment such as risers, valves, elbows, meters, or filters. Dampener installation should be no more than ten pipe diameters from pump discharge. If using a flexible connector from pump to system piping, dampener should be installed at the pump discharge manifold. The flexible connector should be attached to the dampener's tee and system piping (see Figure 1). Since pressure is equal in all directions, SENTRY can be installed in a vertical, horizontal, or upside-down position. Blacoh recommends a vertical installation for better draining of the unit. Limitations for horizontal and upside-down mounting include high specific gravity, high viscosity, settling of solid material, or possible air entrapment, which could result in shortened bladder life and/or poor dampening performance.

Step 2 – Air Line Connection

Chargeable models do not require an air line connection. Units must be pre-charged with compressed air or Nitrogen, using a hand pump, tank/bottle or compressor. **DO NOT USE OXYGEN.** Charging hose kits are available – part number 701-00.

Step 3 – Charging and Start Up – see PRE-CHARGE NOTES on next page.

Prior to starting the pump, pre-charge SENTRY with compressed air or Nitrogen to approximately 80% of expected system pressure and replace fill valve cap. **DO NOT USE OXYGEN.** The gas pre-charge must always be lower than pump discharge pressure. Generally, pulsation is most effectively minimized when the gas charge is 80% of system pressure. Start the pump to generate system pressure.

NOTE: Once system pressure is in contact with the bladder, the gas charge will be compressed to the system pressure and the dampener gauge will read the system pressure, not the initial charge pressure. Once working pressure is achieved, adjustment may be necessary. Gradually increase or decrease the gas charge in the dampener by bleeding or filling through the gas valve. Allow the system to respond to each adjustment (this may take a minute or two) before making further adjustments.

INSTALLATION FOR PUMP INLET

READ BEFORE INSTALLATION

Step 1 – Installation Position

Install SENTRY as close to the pump inlet as possible. Install after any upstream equipment such as risers, valves, elbows, meters, or filters. If using a flexible connector from system piping to pump, SENTRY should be installed to the pump inlet manifold. The flexible connector should be attached to the SENTRY tee and system piping (see Figure 1).

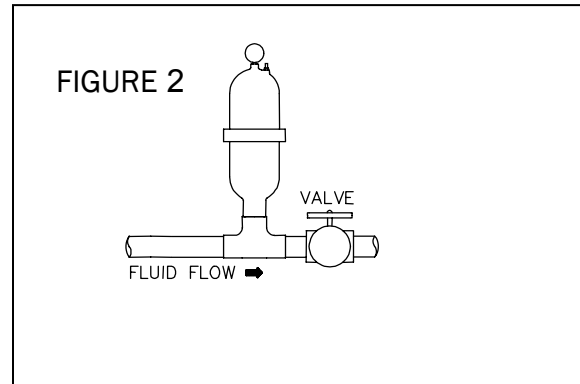
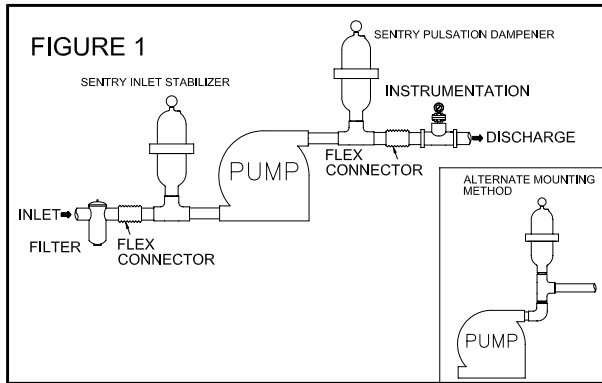
Step 2 – Air Line Connection

Chargeable models do not require an air line connection. Units must be pre-charged with compressed air or Nitrogen, using a hand pump, tank/bottle or compressor. **DO NOT USE OXYGEN.** Charging hose kits are available – part number 701-00.

Step 3 – Charging and Start Up – see PRE-CHARGE NOTES.

A. Suctions Lift/Accumulator: No pre-charge is required in a lift/accumulator installation. Start the pump to generate working pressure. As system pressure and vacuum is created, the acceleration head created with each suction stroke will compress the air trapped in the bladder. For better inlet stabilization, a SENTRY “J” Model is recommended.

B. Positive Inlet Pressure: Pre-charge SENTRY with 50% of the static pressure realized at the pump inlet. Start the pump to generate working pressure. Minor pressure adjustments may be required. Allow the system to respond to each adjustment (this may take a minute or two) before making further adjustments.



INSTALLATION FOR WATER HAMMER / SURGE

READ BEFORE INSTALLATION

Step 1 – Installation Position

Install SENTRY up stream from valve, as close as possible but no more than ten pipe diameters from the valve. (See Figure 2)

Step 2 – Air Line Connection

Chargeable models do not require an air line connection. Units must be pre-charged with compressed air or Nitrogen, using a hand pump, tank/bottle or compressor. **DO NOT USE OXYGEN.** Charging hose kits are available – part number 701-00.

Step 3 – Charging and Start Up – see PRE-CHARGE NOTES

Prior to operating system, pre-charge SENTRY to 90% of system pressure and replace fill valve cap. Start the system.

PRE-CHARGE NOTES

READ BEFORE INSTALLATION

Gas molecules will diffuse through elastomer membranes, the speed of which depends on elastomer material, temperature and pressure. As a rule of thumb, the pre-charge pressure should be checked every month. Checks must occur when no system pressure is present or inaccurate readings will be recorded. If temperature is above ambient and/or pressure is over 300 PSI, checks should be performed more frequently. **Also, to prevent pre-charge loss through the fill valve, always replace the cap after charging.** A proper gas charge is the key to dampener effectiveness and bladder life.

IMPORTANT: AFTER MAINTENANCE OR RE-ASSEMBLY, TORQUE FASTENERS ACCORDING TO SPECIFICATION ON THE UNIT TAG.

Standard Product Warranty: Blacoh Fluid Control warrants its products to be free of defective material and workmanship under normal use and service for two years from date of shipment. The remedy for any product defect covered under this warranty shall be limited to the replacement or repair of the defective part or parts and Blacoh will not be responsible for damages or injury caused to other products, machinery, buildings, property or person. This warranty shall be null and void if the product has been altered, misapplied, misused, or neglected of maintenance. Damage or loss resulting from over-pressurization of a product, whether from gas or fluid does not constitute a defect covered under this warranty nor will Blacoh be responsible in any way for any such damage or loss. Because Blacoh cannot anticipate or control the many different conditions under which its products may be used, Blacoh does not guarantee the applicability or suitability of its products for any particular use or purpose. Each user of Blacoh products should conduct its own tests to determine the suitability of each product for its intended uses or purposes. Blacoh products are sold with this limited warranty and each buyer assumes all responsibility for loss or damage, including consequential damage, arising from the handling and use of Blacoh products whether used in accordance with Blacoh's directions or otherwise. Statements concerning the possible use of Blacoh products are not intended as recommendations for any specific use of such products. This Standard Product Warranty shall be governed by and construed in accordance with the laws of the State of California.



BLACOH FLUID CONTROL, INC.
601 COLUMBIA AVE. BLDG. D, RIVERSIDE, CA 92507 USA
TEL: 800.603.7867 or 951.342.3100 Fax: 951.342.3101
e-mail: sales@blacoh.com web site: www.blacoh.com
L-180 REV 11/09/04

Duragauge® Pressure Gauge Type 1279, ASME B 40.1 Grade 2A ($\pm 0.5\%$ of span)

- 4½" full-size bourdon tube
- Patented Duratube™ with as-welded-tube construction controls stress for longer life
- "Round Cap Tip" construction lowers stresses for longer life
- Easily adjustable, self-locking micrometer pointer
- Burn-resistant phenol turret case
- Exclusive Teflon coated 400 series stainless steel rotary movement for longer life
- New PLUS™ Performance Option:
 - Liquid-filled performance in a dry gauge
 - Fights vibration and pulsations without liquid-filled headaches

- See pages 6-7 for details
- Order as option XLL
- Epoxy-coated system for superior corrosion resistance

Type 1279 Duragauge® pressure gauge is offered in 4½" phenolic case for superior chemical and heat resistance. Solid-front case design with blow-out back for safety. Dry, liquid-filled, hermetically sealed, weatherproof or **PLUS!** options available. Field convertible to liquid-fill with conversion kit (detailed on page 243). All case styles provide full temperature compensation.



BOURDON SYSTEM SELECTION

Ordering Code	Bourdon Tube & Tip Material ⁽¹⁾ (all joints TIG welded except "A")	Socket Material	Tube Type	Range Selection Limits (psi)	NPT Conn. ⁽²⁾
A	Phosphor Bronze Tube-Brass Tip, Silver Braze	Brass	C-Tube	12/1000	¼, ½
R	316L stainless steel	1019 steel	C-Tube	12/1500	¼, ½
			Helical	2000/20,000	¼, ½
S	316L stainless steel	316L stainless steel	C-Tube	12/1500	¼, ½
			Helical	2000/20,000	¼, ½
P ⁽³⁾	K Monel	Monel 400	C-Tube	15/1500	¼, ½
			Helical	2000/30,000	¼, ½ ⁽⁴⁾

(1) For selection of the correct bourdon system material, see the media application table on page 243.

(2) Other connections available on application.

(3) Use for applications where NACE standard MR-01-75 is specified.

(4) 30,000 psi range supplied with ¼ high pressure connection, ½ NPT optional.

STANDARD RANGES

Pressure psi	Compound psi
0/15	30 in.Hg/15 psi
0/30	30 in.Hg/30 psi
0/60	30 in.Hg/60 psi
0/100	30 in.Hg/100 psi
0/160	30 in.Hg/150 psi
0/200	30 in.Hg/300 psi
0/300	
0/400	Vacuum
0/600	30/0 in.Hg
0/800	34/0 ftH ₂ O
0/1000	
0/1500	
0/2000	
0/3000	
0/5000	
0/10,000	
0/20,000	
0/30,000	

NOTE:
Equivalent standard
kg/cm², and kPa metric
ranges are available.

TO ORDER THIS 1279 DURAGAUGE:

Select:

1. Dial size—4½" _____
2. Case type—1279 _____
Ring-threaded reinforced polypropylene
3. Bourdon system selection ordering code 316ss Tube / Glycerin Filled Gauge
4. Connection—¼ NPT (02), ½ NPT (04), Lower (L), Back (B) _____
5. Optional features—see page 239 _____
6. Standard pressure range _____
7. Accessories—see pages 233-238 _____

45 1279 SSL 04L - 100 PSI

(*) "S" denotes solid front case design

Consult factory for guidance in product selection
Phone (203) 385-0217, Fax (203) 385-0602 or
visit our web site at www.ashcroft.com

MADE IN U.S.A.

DRESSER
Instruments

SELECTION

Pressure Ranges – Select a gauge with a full scale pressure range of approximately twice the normal operating pressure. The maximum operating pressure should not exceed approximately 75% of the full scale range. Failure to select a gauge range within this criteria may ultimately result in fatigue failure of the Bourdon tube component.

INSTALLATION

Always use a wrench on the flats of the gauge socket to screw the gauge in place. When a fitting is being screwed to the gauge, hold a wrench on the socket flats instead of twisting against the gauge socket screws which are intended to hold the gauge mechanism in the case.

When gauges are mounted on the wall or panel, make sure they are connected free from piping strains. Also see that the mounting surface is flat, or insert washers under the flange of the gauge case to obtain three-point suspension. Preferably, the last length of piping leading up to the gauge should be flexible tubing. This will ensure that the gauge is free from strain.

Install gauges where they will be free from the effects of mechanical vibrations as this will wear out any gauge quickly. Try to mount the gauge on a wall nearby and connect the gauge to the machine which vibrates badly by means of flexible line assembly.

Protect gauges from frequent pressure pulsations by using liquid-filled or Duragauge Plus® with a throttle screw in the socket of the gauge, needle valves, pulsation dampeners or pressure snubbers.

When any gauge is used for steam pressures, a siphon filled with water must be installed between the gauge and the line. When the system is subject to occasional vacuum, provide a leg of piping which cannot be emptied by the vacuum effect. A drain cock or plug should be installed at the bottom of this leg to enable occasional cleaning out of the sediment. The head effect of this piping leg should be compensated for by resetting the pointer of the gauge.

OPERATING CONDITIONS

The operating conditions to which a gauge will be subjected must be considered. If the gauge will be subjected to severe vibration or pressure pulsations, liquid filling the gauge may be necessary to obtain normal product life. Other than discoloration of the dial and hardening of the gasketing that will occur as ambient temperatures exceed 150°F, metal case Duragauges (that are not liquid filled) can withstand continuous ambient temperatures as high as 250°F. Liquid filled gauges can withstand 200°F but glycerin fill and acrylic window will tend to yellow. Accuracy will be affected by approximately 1.5% per 100°F. Gauges with welded joints will withstand 750°F (450°F with silver brazed joints) for short times without rupture, although other parts of the gauge will be destroyed and calibration will be lost. For temperature limits on other gauges see the appropriate bulletin.

PROPER USE

Apply pressure slowly. do not open gauge cock or valve too quickly – this imparts a severe strain on the Bourdon tube which may rupture it, or result in shortened life. When the service itself is subject to sudden pressure applications, use a needle valve or the Ashcroft Gauge Saver.

Avoid overpressure. See that the apparatus is provided with a relief valve and that the range of the gauge is higher than the set pressure of the relief valve.

Sudden pressure release has the same detrimental effect and should be compensated for in the same manner as for the pressure applications mentioned above. On hydraulic presses, Catalog Number 1056 or 1009DH Gauges with slotted link should be specified. See Special Service Bulletin SG-1.

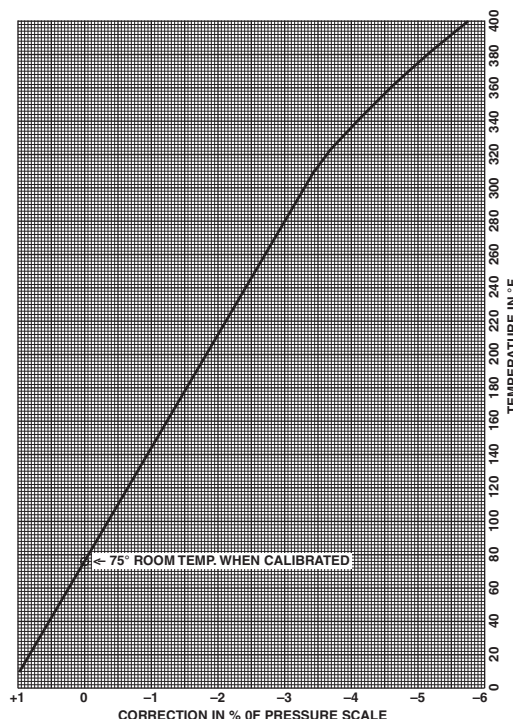
MAINTENANCE

Replace broken glasses and thus keep dirt out of the working bearings and teeth of the movement mechanism.

Never oil gauge movements or linkages except with high grade instrument oil. Regular oil attracts dirt and becomes gummy, thus causing the gauge to act sluggish and inaccurate.

HEAT AFFECTS GAUGE ACCURACY

Approximate error or change in calibration of a Bourdon tube type pressure gauge caused by changes in temperature.



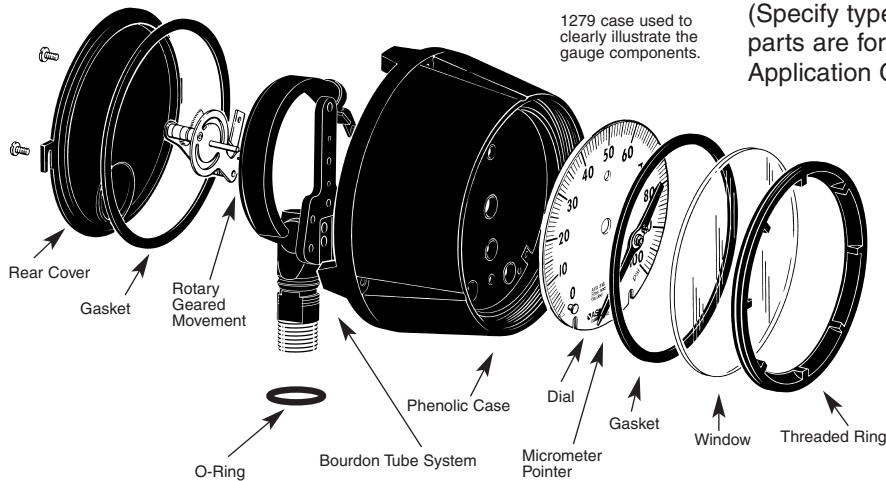
Example: Gauge working at 500 psi pressure at 280°F. temperature would have a -3% correction and would read 3% or 15 psi fast.

Installation and Maintenance Instructions for ASHCROFT® Pressure Gauges, Gauge Parts and Ring Designs, Engineering Data



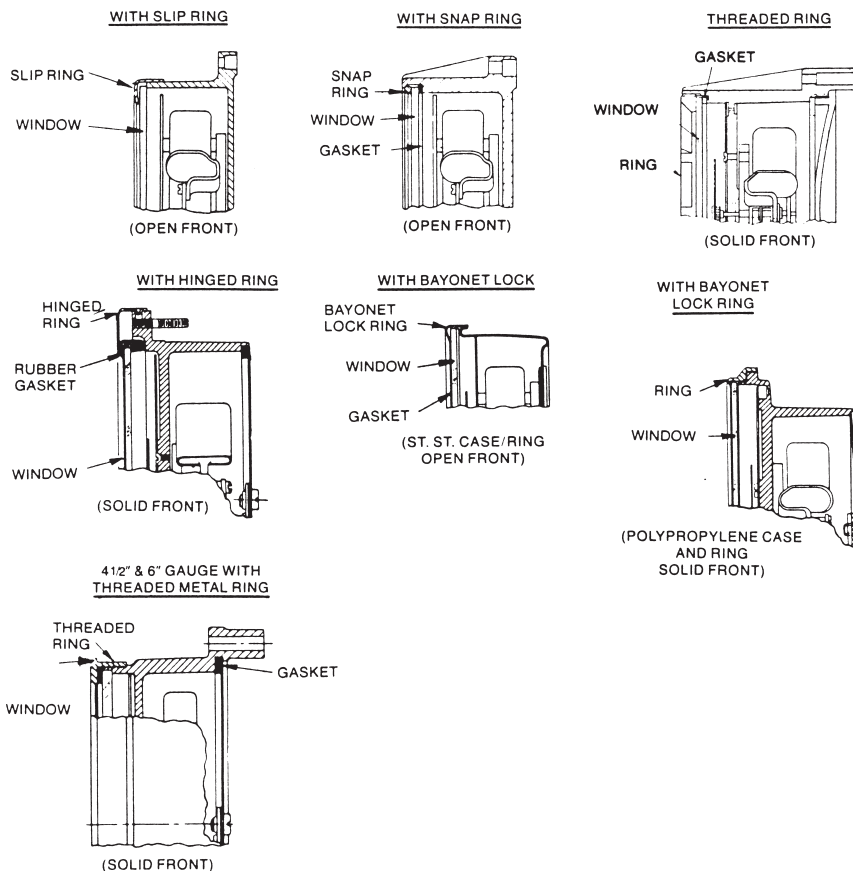
The drawing below shows a typical solid front, lower connection Duragauge with all of the parts designated by their standard names. The use of these names will facilitate the ordering of parts and eliminate any misunderstanding in describing gauge construction.

When ordering parts – specify as much of the following data as possible: *Size* (Dial Diameter); *Case Material* (Stainless Steel, Polypropylene, Aluminum or Phenol); *Case Type* (Open Front or Solid Front); *Ring Design* (Slip, Internal Threaded, External Threaded, Bayonet, Snap or Hinged); *Connection Location* (Lower or Back); *Connection Size* ($\frac{1}{4}$ " or $\frac{1}{2}$ ""); *Bourdon Tube/Socket* (Material Indicated on Dial); *Dial Range* (Specify type number if possible; otherwise, mention whether parts are for Duragauge, General Service Gauge, Special Application Gauge, Receiver Gauge or Test Gauge.)



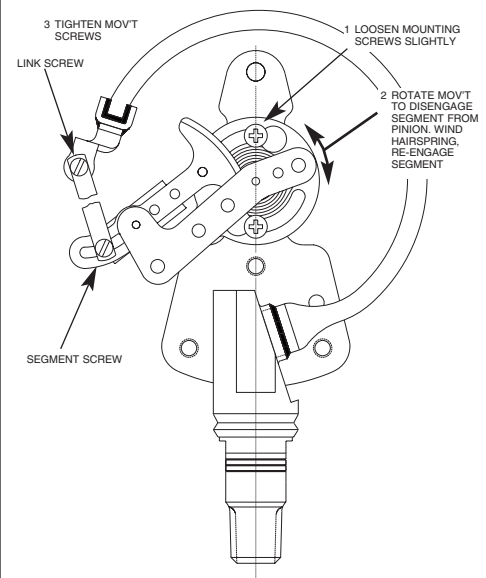
Note: The socket, tube and tip assembly is furnished as one integral unit. The movement is supplied complete.

TYPICAL CONSTRUCTION DETAILS



CALIBRATION PROCEDURE

1. Preliminary Gauge Calibration Setting – (SOLID FRONT GAUGE SHOWN)



2. Calibration –

- At zero pressure (or at full vacuum for compound or vacuum gauges), assemble pointer to pinion shaft in the horizontal position.
- Apply pressure equal to full range and adjust the slide in the segment slot until the pointer has rotated 270° (vertical position).
- Reduce pressure to zero and reset pointer, if necessary, to horizontal position. If pointer adjustment was required, repeat step (b) above.
- Apply pressure equal to mid-scale and drive pointer firmly onto pinion.
- Recheck calibration at the lower and upper ends of the scale.

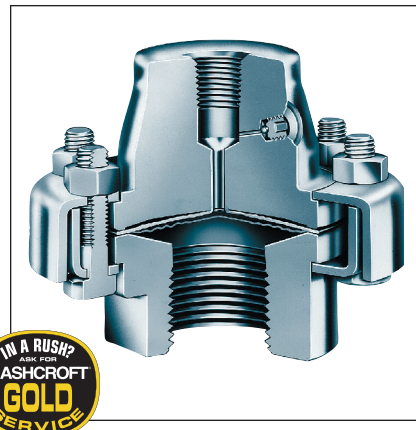
3. Linearity Adjustment –Although the procedure outlined above should produce a correctly calibrated gauge, linearity adjustment may be required. If the pointer reads correctly at the bottom of the scale and low at the top of the scale, rotate the movement to increase the angle between the link and the segment. If the pointer reads high, rotate the movement in the opposite direction.

Type 200 Welded

- Teflon gasketed, continuous-duty diaphragm capsule is welded to the top housing, which is then clamped to a bottom housing.
- Fill/bleed connection is standard.
- Top housing and pressure instrument are removable.
- Available in same process connections, materials, types and sizes as the Type 100 capsule design.
- Top housing is interchangeable with all standard Ashcroft® bottom housings.

Type 200 Bonded Viton, Kalrez and Teflon

Similar in construction, materials, and product features to the Type 300 clamped diaphragm seal on page 142, the diaphragm in the Type 200 seal is bonded permanently to the top housing – and is the removable type.


SELECTION TABLES
Table A – Process Connection/Type Number

	Process Connection Size/Code—Inches											Type Number
	Size	1/4	1/2	3/4	1	1 1/2	2	3	4	6	8	
Process Connection	Code	25	50	75	10	15	20	30	40	60	80	Welded & Bonded ⁽³⁾
Threaded—female NPT		*	*	*	*	*						200
Threaded—female NPT (with flushing connection)		*	*	*	*	*						201
Flanged ⁽¹⁾			*	*	*	*	*	*				202
Flanged (with flushing connection)			*	*	*	*	*	*				203
In-line—threaded NPT		*	*	*	*							204
Saddle								*	AND LARGER			205
In-line—butt weld		*	*	*	*	*	*	*				208
In-line—flanged ⁽²⁾			*	*	*	*	*	*	*	*	*	206
In-line—socket weld		*	*	*	*	*	*	*				207

Pressure Ratings—All 2500 psi except flanged seals are per ASME B 16.5, temperature limit determined by diaphragm, bottom housing and/or filling fluid.

**Table B
Diaphragm Material**

Material	Code
316L stainless steel	S
304 stainless steel	C
K-Monel ⁽⁸⁾	P
Nickel	N
Carpenter 20	D
Tantalum	U
Hastelloy B	G
Hastelloy C 22 ⁽⁷⁾	J
Hastelloy C 276 ⁽⁷⁾	H
Teflon ⁽⁹⁾	T
Viton ⁽⁶⁾	Y
Kalrez ⁽¹²⁾	K
Titanium	TI

**Table C
Bottom Housing Materials**

Material	Code
Steel	B
304L stainless steel	C
316L stainless steel	S
Hastelloy B	G
Hastelloy C 22 ⁽⁷⁾	J
Hastelloy C 276 ⁽⁷⁾	H
Carpenter 20	D
Monel “400” ⁽⁷⁾	M
Inconel “600”	W
Nickel	N
PVC ⁽⁸⁾	V
Tantalum clad stainless steel ⁽⁹⁾	SU
Halar coated stainless steel ⁽¹⁰⁾	BH
Teflon flanged steel ⁽¹¹⁾	T
Kynar ⁽¹³⁾⁽¹⁴⁾	KY
Titanium ⁽¹³⁾	TI

**Table D
Instrument Connection**

Size – NPT	Code
1/4	02T
1/2	04T

NOTES:

- (1) 150, 300, 600, 900, 1500 & 2500 class flanges.
- (2) 1” 150 thru 8” 300 class flanges only.
- (3) Metal diaphragms welded; Teflon, Kalrez & Viton diaphragms bonded.
- (5) Temp. Limits: –40/400°F.
- (6) Max. Pressure: 500 psi. Temp. Limits: –40/350°F.
- (7) Use on applications where NACE standard MR-01-75 2003 is specified.
- (8) Maximum Press./Temp.
Threaded: 200 psi/74°F, 125 psi/125°F, 80 psi/150°F.
Flanged: 75 psi/100°F.
- (9) Type 202 only.
- (10) Temp. Limits: –40/300°F.
- (11) Only available in 1”, 1 1/2”, & 2” 150 class, Type 202.
Max. Press./Temp. – 270 psi and 150°F.
Consult factory for conditions beyond these limits.
- (12) Max. Pressure: 500 psi
Temp. Limits: 30/212°F.
- (13) On application.
- (14) Maximum Pressure/Temp.: 200 psi and 180°F.

Table E – Filling Fluid

Filling	Service	Connection to Instrument	Temperature Range °F	Code
Glycerin	Pressure	Direct Only	0/400	CG
Silicone	Pressure/Vacuum	Direct or Flexible Line	–40/600	CK
Halocarbon	Pressure/Vacuum in presence of strong oxidizing agent	Direct or Flexible Line	–70/300	CF
Syltherm	Pressure/Vacuum	Direct or Flexible Line	–40/750	HA

TO ORDER THIS TYPE 200 DIAPHRAGM SEAL:

1. From Table A...select TYPE NUMBER based on process connection, process connection size and diaphragm type/construction. (e.g., Threaded/1”/welded—code-10-200)
2. From Table B...select DIAPHRAGM MATERIAL. (e.g., 316L stainless steel—code S)
3. From Table C...select BOTTOM HOUSING MATERIAL. (e.g., 316 stainless steel—code S)
4. From Table D...select INSTRUMENT CONNECTION size. (e.g., 1/4 NPT—code 02T)
5. From Table E...select FILLING FLUID. if diaphragm seal will be attached to instrument. (e.g., Glycerin—code CG)

Coded order: 50-200SS-04T-XCG

Consult factory for guidance in product selection
 Phone (203) 385-0217, Fax (203) 385-0602 or
 visit our web site at www.ashcroft.com

Pump & Systems Accessories

Backpressure Valves

Pressure Relief Valves

Backpressure, antisiphon and pressure relief valves



In-line pressure relief valve (3 port)



Backpressure valve (2 port)



Backpressure valve on tee for pressure relief

Backpressure (2-port) valves may be used in-line to provide a constant discharge pressure for protection from siphoning, or they may be teed off of the discharge line for pressure relief, discharging back to the source tank or to the pump suction line to create a bypass.

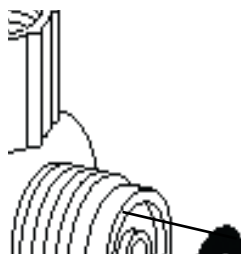
Pressure relief (3-port) valves are mounted in the discharge line, featuring a separate relief port which discharges back to the source tank or to the pump suction line to create a bypass.

Backpressure valves provide several functions: they improve repeatability by providing a constant discharge pressure; they provide antisiphon protection for discharge into pressurized water lines or vacuums, or where suction head exceeds discharge head; and they minimize pulsation when used in conjunction with a pulsation dampener.

In-line backpressure/antisiphon and pressure relief valves

These adjustable backpressure (2-port) and pressure relief (3-port) valves have FNPT ports and require tubing adapters for use with flexible tubing.

Can be adjusted with screwdriver.



DIMENSIONS: 1/4" to 1/2" valves

D	A (in)	B (in)	C (in)
1/4"	4.90	2.6	1.2
*1/4"	*3.5	*2.375	*0.75
1/2"	4.9	2.6	1.2
*1/2"	*5.5	*3.5	*1.125
3/4"	5.4	3.5	1.1
1"	5.7	3.9	1.4
1-1/2"	8.5	4.6	2.2
2"	8.5	4.6	2.2v

*Note: Dimensions apply to SS and PTFE valves only.

DIMENSIONS (for replacement valves only): 1/4" to 1/2" valves - SEE PG. 8

D	A (in)	B (in)	C (in)
1/4"	3.9	2.375	0.75
*1/4"	*3.5	*2.375	*0.75
1/2"	4.6	2.375	1.125
*1/2"	*5.5	*3.5	*1.125
3/4"	5.5	3.5	1.125
1"	5.8	3.5	1.25
1-1/2"	9.0	4.5	2.1
2"	9.0	5.0	2.1

*Note: Dimensions apply to SS, PVDF and PTFE valves only.

Technical data

Size:

1/2"

Diaphragm

Materials:

PTFE-faced EPDM

Liquid Handling

Materials:

PP, PVC, PTFE, PVDF

316 Stainless Steel

Pressure Adjustment:

0-150 psig (0-10.3 bar)

Flow rates @ 45 psig (3.1 bar):

1/4" - 132 U.S. gph (500 L/h)

1/2" - 132 U.S. gph (500 L/h)

Flow rates @ 150 psig:

1/2" (PP, PVC) - 200 U.S. gph (757 L/h)

1/2" (PVDF, TT, SS) - 300 U.S. gph

(1135 L/h)

3/4" - 300 U.S. gph (1135 L/h)

1" - 500 U.S. gph (1893 L/h)

1-1/2" - 900 U.S. gph (3407 L/h)

2" - 1200 U.S. gph (4542 L/h)

Max. Temperature:

PP - 195°F (90°C)

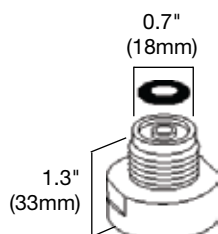
PVC - 140°F (60°C)

PTFE - 250°F (121°C)

PVDF - 250°F (121°C)

316 Stainless - 250°F (121°C)

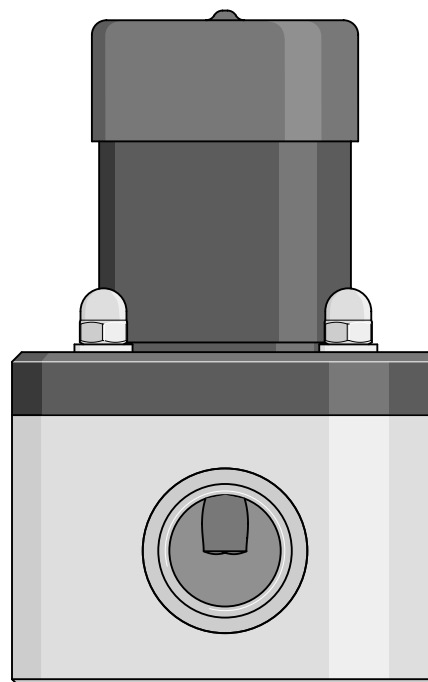
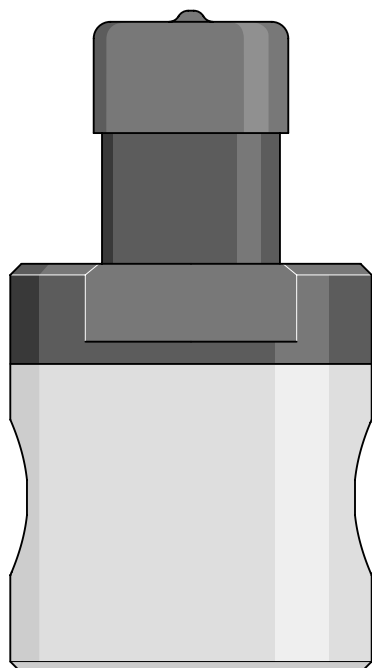
Max. Pressure Rating 170 psig @ 120°F



Adapter included with all back-pressure/pressure relief valves. Optional use in the event of diaphragm failure.

Operating Instructions

ProMinent® Backpressure and Pressure Relief Valves



<i>Contents</i>	<i>Page</i>	<i>Contents</i>	<i>Page</i>
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Helpful Tips	5	Troubleshooting	7
Specifications	5	Dimensions	11

Read the operating instructions before installation and use. The warranty does not cover damages due to faulty operation. Keep for reference and replacement information.

BA B/PRVI 01 1/04 NA

Order no.7750089

ProMinent Fluid Controls, Inc.

136 Industry Drive, Pittsburgh, PA 15275-1014

ProMinent Fluid Controls Ltd.

490 Southgate Drive, Guelph, Ontario N1G 4P5

e-mail: sales@prominent.cc

Phone: 412/787-2484 Telefax: 412/787-0704

e-mail: sales@prominent.ca

Phone: 519/836-5692 Telefax: 519/836-5226

Operating Instructions for ProMinent® Backpressure and Pressure Relief Valves

General Safety Considerations

Safety Operating Procedures

SAFETY INSTRUCTIONS

- Wear protective clothing and glasses when working with or near chemicals.
- Refer to the MSDS for all chemicals being used.
- Use only ProMinent® parts. Use of other parts may result in damage to equipment or injury.
- Flush all components that are in contact with chemicals prior to servicing.
- Secure all chemicals and equipment making them inaccessible to children and pets.
- Dispose of all chemicals and waste according to all local, state and federal regulations.
- Stop the flow of sample through the system prior to working on the pump.
- Do not exceed the maximum operating pressure.

UNPACKING

CHECK ALL EQUIPMENT FOR DAMAGE AND FOR COMPLETENESS AGAINST THE ORDER. REPORT INCORRECT ORDERS OR DAMAGES TO THE SELLER IMMEDIATELY.

The carton should contain:

1 Backpressure or Pressure Relief Valve as ordered
Accessories as ordered

INTRODUCTION

ProMinent® diaphragm pressure relief valves are designed to protect chemical feed systems from overpressure caused by defective equipment or by blockage in the chemical line. Chemical flows through the valve via an internal chamber. When the pressure in the chemical line exceeds the preset pressure of the valve, the diaphragm lifts off the seat and the chemical then flows out the bottom port back into the chemical tank. The relief pressure is adjustable from 0-150 psig by the adjuster in the top of the valve.

ProMinent® diaphragm backpressure valves are used to enhance the performance of the chemical feed pumps by providing a constant head pressure. These valves can also be used as an antisiphon valve. The diaphragm is held against the seat by an internal spring. The backpressure is adjustable from 0-150 psig. When the inlet pressure exceeds the preset pressure, the diaphragm lifts off the seat and the chemical flows to the injection point.



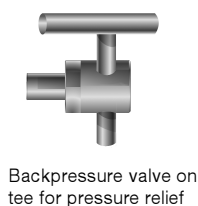
FUNCTION AND DESCRIPTION

The ProMinent® backpressure and pressure relief valves have been modified to include an optional diaphragm safety port to route the chemical in the event of a diaphragm failure. The optional diaphragm safety port fitting must be removed to adjust the backpressure screw. **NOTE: If the optional diaphragm safety port tubing adapter is not installed, upon diaphragm failure, chemical will come out thru the screwdriver adjustment slot.**

INSTALLATION

Pressure Relief Valve

Install as close to the chemical pump discharge valve as possible, without any other equipment, especially shut-off valves, between the pressure relief valve and the pump.



The relief port in the bottom of the valve should be vented back to the chemical tank or directly to the drain. No backpressure can be applied to the outlet of the valve. This will impair the valve's ability to relieve at the preset pressure. The valve should not be installed across the pump. That is, the valve should not be connected from the discharge of the pump to the suction side of the pump if there is a check valve in the suction line that could prevent pressure relief.

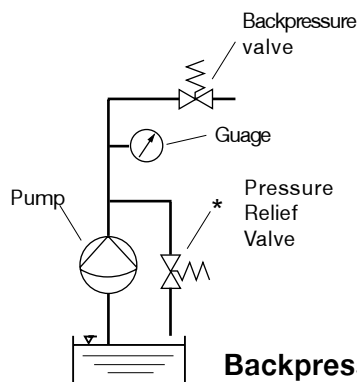
Back Pressure Valve

The backpressure valve can be installed anywhere in the discharge line, provided there is some downstream pressure at the dosage point via an injection valve or line pressure. If there is no downstream pressure, the backpressure valve should be installed at the dosage point to prevent drainage of the chemical line. The chemical must flow across the valve, in the direction of the arrow.

The performance of the backpressure valve will be enhanced with the installation of a pulsation dampener to smooth out the discharge/ suction cycles of the pump.

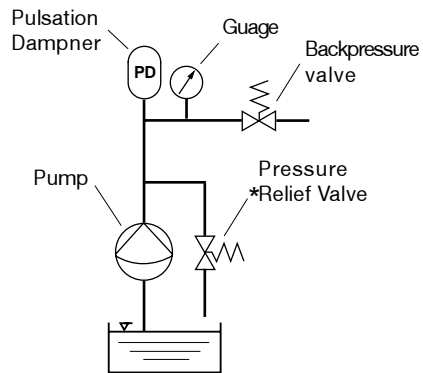
The pulsation dampener should be sized for the dosage volume of the pump head. For most applications, dampeners without diaphragms are acceptable. However some applications require dampeners with diaphragms.

Typical Installation

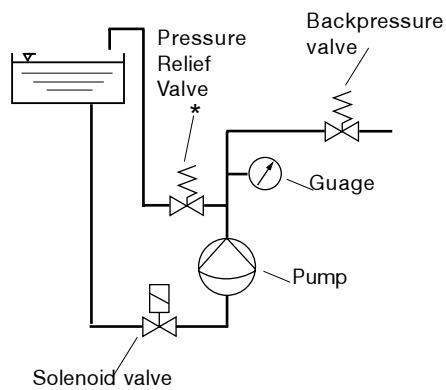


Backpressure valve to produce a constant pressure to pump against.

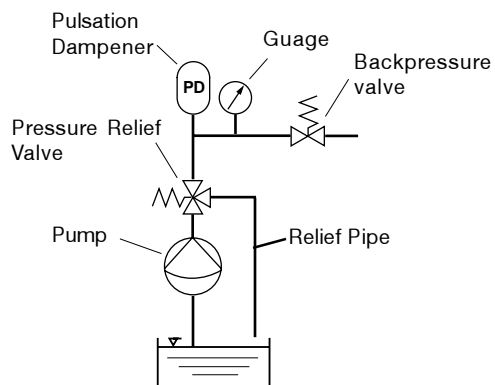
Backpressure valve in conjunction with a pulsation dampener.



Backpressure valve used when the suction pressure is high.



Pressure relief valve to protect pump from overpressure





DESCRIPTION OF CONTROLS AND OPERATION

Adjust the backpressure and the pressure relief valves by turning the pressure adjuster on the valves to the desired pressure. The valves have a screwdriver slot to adjust the pressure. Turning clockwise increases the pressure and counterclockwise decreases the pressure.

OR:

ADJUSTING THE PRESSURE ON THE VALVES

Remove the optional diaphragm safety port from the top of the valve by unscrewing it from the backpressure/pressure relief valve. The valves have a screwdriver slot to adjust the pressure. Turning clockwise increases the pressure and counterclockwise decreases the pressure. Replace the relief assembly by screwing it onto the backpressure/pressure relief valve.

HELPFUL TIPS

1L = 0.264 gallon

1000 mL = 1 L

1 bar = 14.5 psig

SPECIFICATIONS

Size:	1/4", 1/2", 3/4", 1", 1 1/2", 2" NPT or Socket
Diaphragm material:	PTFE-faced EPDM
Liquid handling materials:	PP, PVC, PTFE, PVDF, 316 Stainless Steel
Pressure adjustments:	0-150 psig
Flow rates at 45 psig:	1/4" - 132 gph 1/2" - 132 gph 3/4" - 235 gph 1" - 345 gph 1-1/2" - 740 gph 2" - 740 gph
Max. Temperature:	PP - 122°F PVC - 100°F PTFE - 250°F PVDF - 250°F 316 Stainless - 250°F

ATTACHING TUBING TO THE OPTIONAL DIAPHRAGM SAFETY PORT

Connector sets connect flexible tubing of different sizes to optional diaphragm safety port fitting. A connector set consists of hose nozzle, grip ring, union nut and gasket. All connector sets fit on optional diaphragm safety port with M20 X 1.5 threads. Part number includes two connector sets. One of the following connector sets are required to attach the tubing to the relief port:

PART NUMBERS

PP/VITON® for tubing size 1/4" x 3/16"	790872
PP/VITON® for tubing size 1/2" x 3/8"	740133
PP/EPDM for tubing size 1/4" x 3/16"	790885
PP/EPDM for tubing size 1/2" x 3/8"	740132
PP/EPDM for tubing size 1/4" x 1/2"	817163
PVC/VITON® for tubing size 1/4" x 3/16"	817050
PVC/VITON® for tubing size 1/2" x 3/8"	817055
PVC/VITON® for tubing size 1/4" x 1/2"	817068
PVC/EPDM for tubing size 1/4" x 3/16"	790871
PVC/EPDM for tubing size 1/2" x 3/8"	740160
PTFE for tubing size 1/4" x 3/16"	817201
PTFE for tubing size 1/2" x 3/8"	791199

Cut hose ends straight across

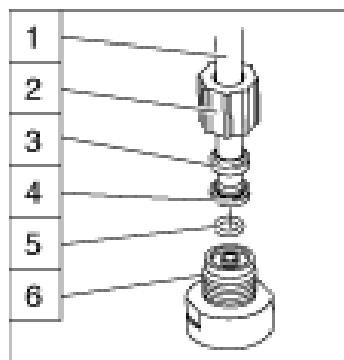
Push Union Nut (2) and clamping ring (3) onto tubing (1)

Push the tubing end (1) over the nozzle (4) to the stop.
Widen if necessary

Place the hose (1) with the nozzle (4) onto the optional diaphragm safety port fitting (6)

Tighten the union nut (2) while pressing in the tubing (1)

Pull the tubing connected to the optional diaphragm safety port fitting (6); then retighten the union nut



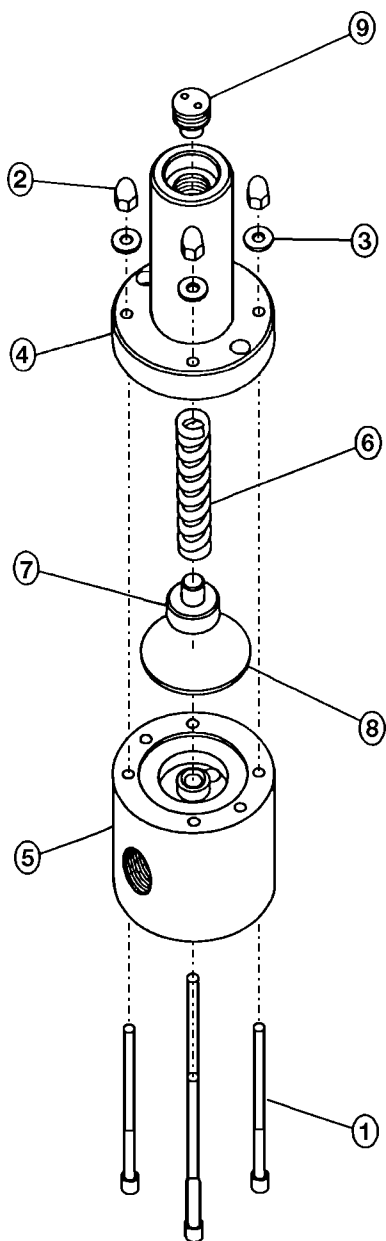
- | | |
|---|---|
| 1 | Tubing |
| 2 | Union Nut |
| 3 | Clamping Ring |
| 4 | Nozzle |
| 5 | O-ring |
| 6 | Optional diaphragm safety port fitting |

MAINTENANCE

Routinely look for leaks that could indicate a diaphragm rupture. Replacement of the diaphragm can be done without taking the valve out of the chemical line.

Replacing the diaphragm

- Relieve the pressure from the system.
- Flush the chemical lines prior to disassembling the valve.
- Unscrew the pressure adjuster to relieve the pressure from the diaphragm.
- Unscrew the valve top from the valve bottom **or** Remove the 4 bolts from the top of the valve.
- Lift off the top of the valve.
- Inspect the diaphragm and replace as necessary.
- Inspect the adjustment spring for rust or corrosion and replace if necessary.
- Replace the spring and the spring bumper into the top of the valve.
- Slide the top of the valve back over the bolts and Tighten the screws **or** Screw the valve top to the valve bottom and tighten.
- Screw in the pressure adjuster to approximately the same position it was prior to disassembly.
- Use a pressure gauge to adjust the valve to the desired pressure setting.



Example of a backpressure valve

SPARE PARTS

1. Bolts
2. Hex Nut
3. 1/4" Flat Washer
4. Valve Lid
5. Valve Body
6. Pressure Spring
7. Spring Plate
8. Diaphragm
9. Pressure Adjustment Screw

REPAIR SERVICE

Repairs must be done by ProMinent® Fluid Controls. Call your distributor or ProMinent® at (412) 787-2484 for a return goods authorization. DO NOT return any goods without authorization. All items must be free of hazardous chemicals and clean when returned.

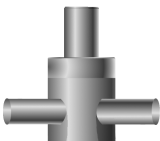
TROUBLESHOOTING

Leaking: Check for clogs, diaphragm ruptures or corrosion of the spring.

Part Numbers and Accessories

1/4" FNPT Valves

<u>Material</u>	<u>Backpressure Valve (2-port)</u>	<u>Pressure Relief Valve (3-port)</u>
PP	1009444	1009452
PVC	1009445	1009453
PVDF	1009446	1009454
316 SS	1009447	1009455

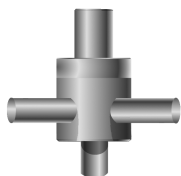
Backpressure
Valve (2 port)Tubing Adapters

(1 required per valve port): 1/4" x 3/16" tubing x 1/4" MNPT

PP/EPDM (PP1)	7358222
PP/Viton (PP2)	7358226
PVC/Viton (NP6)	7358223
PTFE (TT1)	7358224

1/2" FNPT Valves

<u>Material</u>	<u>Backpressure Valve (2-port)</u>	<u>Pressure Relief Valve (3-port)</u>
PP	1006846	1006858
PVC	1006850	1006862
PVDF	1006854	1006866
316 SS	1008796	1008800

Pressure Relief
Valve (3 port)Tubing Adapters

(1 required per valve port): 1/2" x 3/8" tubing x 1/2" MNPT

PP/EPDM (PP1)	7358220
PP/Viton (PP2)	7358227
PVC/Viton (NP6)	7358221
PTFE (TT1)	7358225

3/4" FNPT Valves

<u>Material</u>	<u>Backpressure Valve (2-port)</u>	<u>Pressure Relief Valve (3-port)</u>
PP	1006847	1006959
PVC	1006851	1006863
PVDF	1006855	1006867
316 SS	1008797	1008801

Part Numbers and Accessories (CONT.)

1" FNPT Valves

Material	Backpressure Valve (2-port)	Pressure Relief Valve (3-port)
PP	1006848	1006860
PVC	1006852	1006864
PVDF	1006856	1006868
316 SS	1008798	1008802

1-1/2" FNPT Valves

Material	Backpressure Valve (2-port)	Pressure Relief Valve (2-port)
PP	1006849	1006865
PVC	1006853	1006865
PVDF	1006857	1006869
316 SS	1008799	1008803

2" FNPT Valves

Material	Backpressure Valve (2-port)	Pressure Relief Valve (2-port)
PP	1009448	1009456
PVC	1009449	1009457
PVDF	1009450	1009458
316 SS	1009451	1009459

Spare Diaphragms

1/4" - 1/2" valve PTFE/EPDM	1006813	1006813
3/4" - 1" valve PTFE/EPDM	1006814	1006814
1-1/2"-2" valve PTFE/EPDM	1006815	1006815

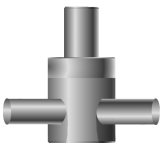
Part Numbers and Accessories

1/4" Socket Valves

<u>Material</u>	<u>Backpressure Valve (2-port)</u>	<u>Pressure Relief Valve (3-port)</u>
PVC	1019891	1019892
PVDF	1019893	1019894

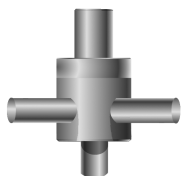
1/2" Socket Valves

<u>Material</u>	<u>Backpressure Valve (2-port)</u>	<u>Pressure Relief Valve (3-port)</u>
PVC	1019883	1019884
PVDF	1019895	1019896

Backpressure
Valve (2 port)

3/4" Socket Valves

<u>Material</u>	<u>Backpressure Valve (2-port)</u>	<u>Pressure Relief Valve (3-port)</u>
PVC	1019885	1019886
PVDF	1019897	1019898

Pressure Relief
Valve (3 port)

1" Socket Valves

<u>Material</u>	<u>Backpressure Valve (2-port)</u>	<u>Pressure Relief Valve (3-port)</u>
PVC	1019887	1019888
PVDF	1019899	1019900

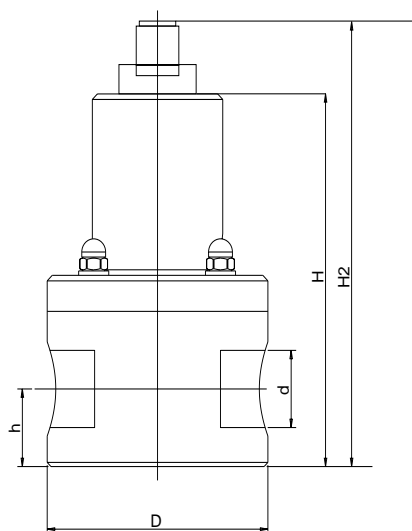
1-1/2" Socket Valves

<u>Material</u>	<u>Backpressure Valve (2-port)</u>	<u>Pressure Relief Valve (2-port)</u>
PVC	1019889	1019889
PVDF	1019901	1019901

2" Socket Valves

<u>Material</u>	<u>Backpressure Valve (2-port)</u>	<u>Pressure Relief Valve (2-port)</u>
PVC	1019891	1019891
PVDF	1019905	1019905

Dimensions



Valve size d [inches]	Thread type	h [mm]	h (in.)	D [mm]	D (in.)	H [mm]	H (in.)	H2 (mm)	H2 (in.)
1/4	NPT	31	1.2	65	2.6	125	4.9	158	6.2
1/2	NPT	31	1.2	65	2.6	125	4.9	158	6.2
3/4	NPT	28	1.1	88	3.5	136	5.4	169	6.7
1	NPT	36	1.4	98	3.9	145	5.7	178	7.0
1-1/2	NPT	56	2.2	118	4.6	229.5	9.0	260.5	10.3
2	NPT	56	2.2	118	4.6	229.5	9.0	260.5	10.3

Models: 125-CS, 125-SS

Cast Carbon or Stainless Steel Screwed Ends Simplex Basket Strainers

Sizes: $\frac{3}{8}$ " – 3" (10 – 80mm)

Pressure / Temperature – Non-Shock

Model	Material	Rating
125-CS	Carbon Steel	285psi @ -20°F to 100°F 19.65 bar @ 37.78°C 150psi @ 565°F 10.34 bar @ 296.11°C
125-SS	Stainless Steel	275psi @ -20°F to 100°F 18.96 bar @ 37.78°C 150psi @ 565°F 10.34 bar @ 296.11°C

Max. temp. can be limited by O-ring material. Consult factory. All units with knob type closure are rated 200psi.

125-CS Carbon Steel Class 150

125-SS Stainless Steel Class 150



Model 125-CS

Strainers provide economical protection for costly pumps, meters, valves, and other similar mechanical equipment by straining foreign matter from the connected piping system. Installation of a strainer before mechanical equipment can ensure trouble free service and avoid costly shutdowns for repair or replacement of equipment damaged by foreign matter. The size of the perforation or mesh in the basket screen will determine the smallest particles captured. See Strainer Information section in the Mueller Steam Specialty Engineering binder for detailed information including sizes and materials available.

Typical Service

- These strainers can be specified for many applications in chemical processes, including brine, paint, fuel oil, organic and inorganic chemicals, as well as condensers and heat exchangers, and more.

Features

- Designed for large capacity straining and ease of maintenance.
- Cover is secured with quick-opening knobs to minimize service time.
- O-ring seals on both the cover and baskets can usually be re-used after service, no need to clean gasket residue and replace costly gaskets.
- Machined basket seat eliminates particle bypass.

Construction

- Standard cover has O-ring seal and quick release knob fasteners
- Bolted cover available, consult factory.
- Swing clamp covers are available, consult factory
- Plugged NPT connection is provided at location D. See next page.

Capacity

- Minimum 6 to 1 ratio

Special Coatings and Treatments

- Epoxy and other corrosion resistant coatings are available on Carbon Steel, consult factory
- Pickling and passivation are available on Stainless Steel, consult factory.

Steam Jacketing

- Available on request, consult factory.

Baskets

MODEL	SIZES	STANDARD (WATER)		STEAM RECOMENDATION	
		MATERIAL	OPENING	MATERIAL	OPENING
125-CS	$\frac{3}{8}$ " - 3"	304SS	.062 perf	304SS	.045 perf
125-SS	$\frac{3}{8}$ " - 3"	304SS	.062 perf	304SS	.045 perf

Materials

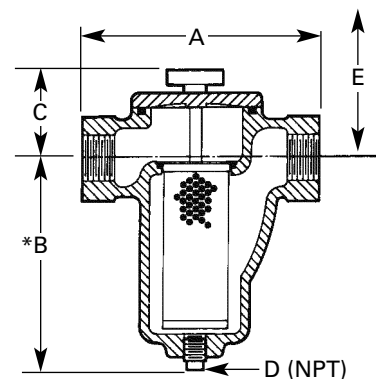
	125-CS	125-SS
Body	Carbon Steel ASTM A216 Grade WCB	Stainless Steel ASTM A351 Grade CF8M
Cover	Carbon Steel ASTM A216 Grade WCB	Stainless Steel ASTM A351 Grade CF8M
O-Ring	Buna-N	Viton®

Pressure Drop

See Pressure Drop Charts in Technical Data section of Mueller Steam Specialty Engineering binder.

Dimensions and Weights

SIZE		DIMENSIONS										WEIGHT	
		A		B		C		D (NPT)		E Screen Removal		Carbon Steel & SS	
in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	lbs.	kgs.
3⁄8	10	4⁹⁄₁₆	116	4	102	2½	64	3⁄8	10	4¹³⁄₁₆	106	4.8	2.1
½	15	4⁹⁄₁₆	116	4	102	2½	64	3⁄8	10	4¹³⁄₁₆	106	4.8	2.1
¾	20	4⁹⁄₁₆	116	4	102	2½	64	3⁄8	10	4¹³⁄₁₆	106	5	2.2
1	25	5¹⁄₁₆	135	4¹¹⁄₁₆	119	2¾	70	¾	10	5⁷⁄₈	149	6.5	2.9
1¼	32	6¹⁄₁₆	160	6½	165	3	76	½	13	8⁷⁄₈	206	11.5	5.2
1½	40	6¹⁄₁₆	160	6½	165	3	76	½	13	8⁷⁄₈	206	11.5	5.2
2	50	8¼	210	7⁷⁄₈	200	3⅝	92	¾	20	10⅛	257	22.8	10
2½	65	9⅝	244	8¾	222	4	102	1	25	11⁷⁄₁₆	297	33.8	15
3	80	11¼	286	11⅜	289	4½	114	1	25	14¹³⁄₁₆	376	51	23



Model 125

*"B" dimension includes the floor supports on 4" size and larger.

Mueller Steam Specialty product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact Mueller Steam Specialty Technical Service. Mueller Steam Specialty reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligation to make such changes and modifications on Mueller Steam Specialty products previously or subsequently sold.



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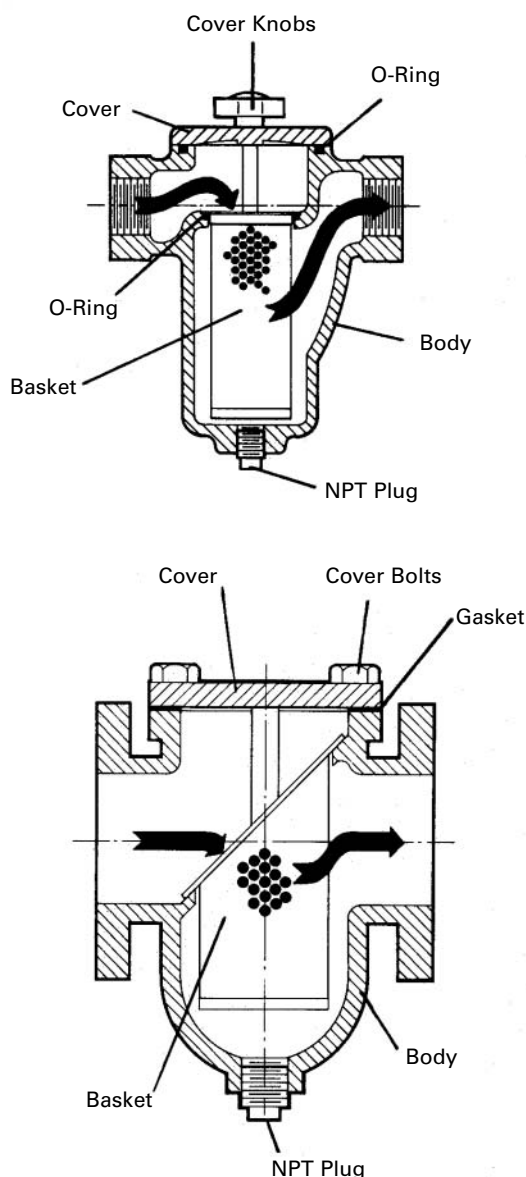
USA: 1491 NC Hwy 20 West St. Pauls, NC 28384; www.muellersteam.com

Tel: 910-865-8241 Fax: 910-865-6220

Toll Free Phone 1-800-334-6259 Toll Free Fax: 1-800-421-6772

Installation, Operation and Maintenance

Simplex Basket Strainers



SIMPLEX BASKET STRAINERS SHOULD BE INSTALLED IN THE POSITION SHOWN IN THE ILLUSTRATIONS ABOVE

Warning

Individuals performing removal and disassembly should be provided with suitable protection from possibly hazardous liquids.

Knob and clamp type quick opening covers should not be used for high temperature service. Consult factory for recommendations.

Installation

Before installing the simplex basket strainer, be sure its pressure rating is correct for the system. If the end connections are threaded, be sure the piping is straight and not at an angle or offset. If the strainer has flanged ends, be sure the flanges of the connecting piping are square with the pipe so that no undue stresses are put on the strainer or piping when tightening flange bolts. Tighten bolts in sequence crossing to opposites.

Maintenance

For maximum efficiency, a differential pressure gauge installed across the inlet and outlet will indicate pressure loss due to clogging and may be used, as a guide to determine when cleaning is required. If the strainer is not set up for backwash cleaning, remove the cover access to the basket. After cleaning, replace the basket in the same position as before and tighten cover. Replace the gasket or O-ring if necessary.

Keeping a spare, clean basket will minimize shut down time.

Spare Parts

To order replacement baskets or gaskets and O-rings, which are the only items normally required, specify the following.

- A. Size and model number of strainer or casting number as it appears on the body of the strainer.
- B. Specify service. For example: water, steam, gas, air, oil. The working pressure and temperature of the system and particle size to be strained out should also be specified.

CALIFORNIA PROPOSITION 65 WARNING

WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. (California law requires this warning to be given to customers in the State of California.)

For more information: www.watts.com/prop65

Limited Warranty: Mueller Steam Specialty warrants each product to be free from defects in material and workmanship under normal usage for a period of one year from the date of original shipment. In the event of such defects within the warranty period, the Company will, at its option, replace or recondition the product without charge. This shall constitute the sole and exclusive remedy for breach of warranty, and the Company shall not be responsible for any incidental, special or consequential damages, including without limitation, lost profits or the cost of repairing or replacing other property which is damaged if this product does not work properly, other costs resulting from labor charges, delays, vandalism, negligence, fouling caused by foreign material, damage from adverse water conditions, chemical, or any other circumstances over which the Company has no control. This warranty shall be invalidated by any abuse, misuse, misapplication or improper installation of the product. **THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.** Any implied warranties that are imposed by law are limited in duration to one year.

Some States do not allow limitations on how long an implied warranty lasts, and some States do not allow the exclusion or limitation of incidental or consequential damages. Therefore the above limitations may not apply to you. This Limited Warranty gives you specific legal rights, and you may have other rights that vary from State to State. You should consult applicable state laws to determine your rights.

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A Division of Watts Water Technologies, Inc.

USA: 1491 NC Hwy 20 West St.; Pauls, NC 28384; www.muellersteam.com
Tel: 910-865-8241 Fax: 910-865-6220
Toll Free Phone 1-800-334-6259 Toll Free Fax: 1-800-421-6772