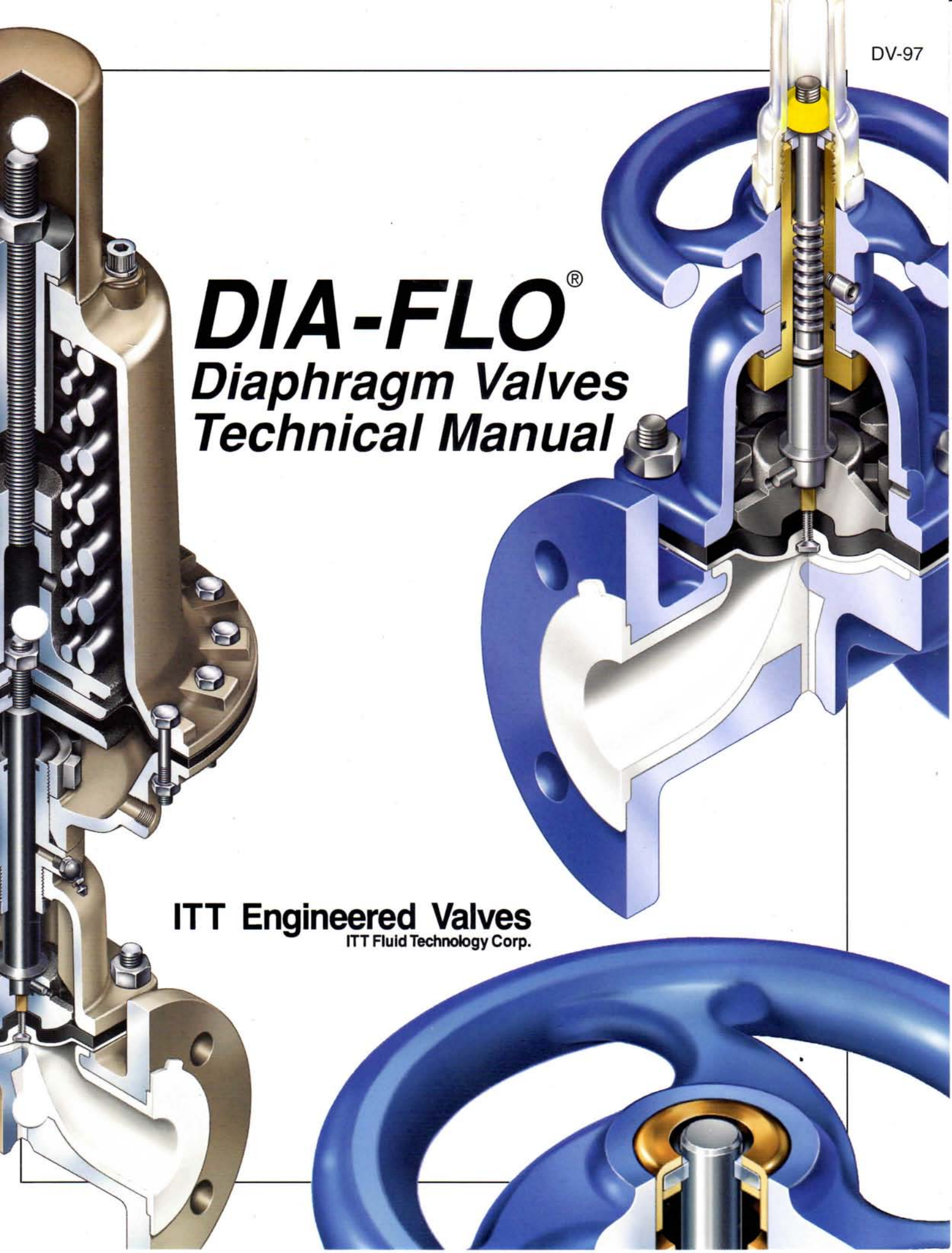
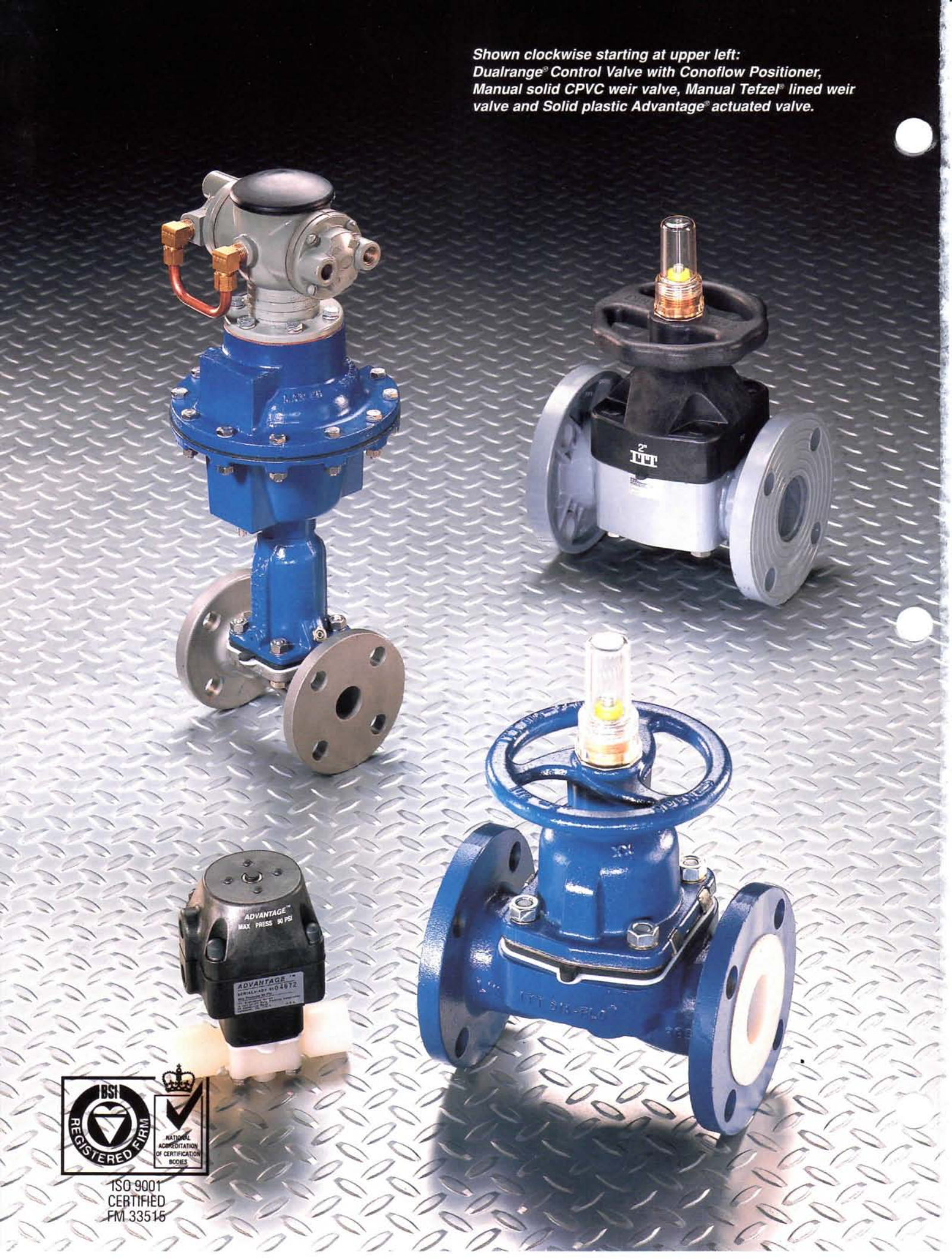
DV-97

DIA-FLO®
Diaphragm Valves Technical Manual



ITT Engineered Valves
ITT Fluid Technology Corp.



Shown clockwise starting at upper left: Dualrange® Control Valve with Conoflow Positioner, Manual solid CPVC weir valve, Manual Tefzel® lined weir valve and Solid plastic Advantage® actuated valve.

BSI REGISTERED FIRM

NATIONAL ACCREDITATION OF CERTIFICATION BODIES

ISO 9001
CERTIFIED
FM 33515

DIA-FLO® Diaphragm Valves

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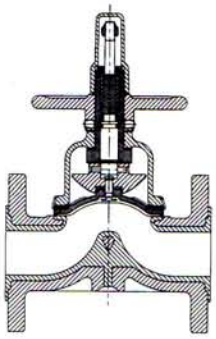
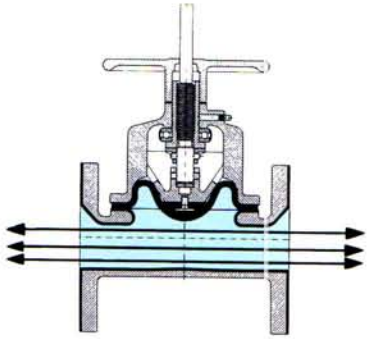
The practical answer to problems of:

Corrosion

The hundreds of combinations of valve body linings and diaphragms offer a practical solution to almost any corrosive fluid. In addition, any combination will provide the basic design features of in-line maintenance, bonnet isolation and positive drop tight closure.



Abrasion



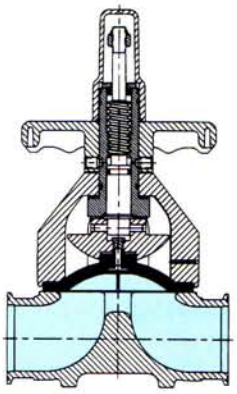
Hundreds of combinations of abrasion resistant diaphragms and body linings are available to solve abrasive problems. Because the Dia-Flo® diaphragm seals the working parts off from the process fluids, the fluid contacts only the abrasion resistant diaphragm and body or lining.

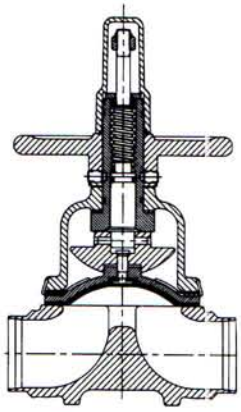
Clogging

Viscous fluids, fibrous slurries and other materials requiring full flow valve characteristics pass directly through the Dia-Flo® Straightway diaphragm valve. The diaphragm lifts high into the bonnet offering negligible resistance to flow in either direction eliminating any possibility of clogging. Conversely, positive closure is assured by the large area of contact between the resilient diaphragm and the body. Diaphragm valves are self-draining and self-cleaning.

Contamination

Pharmaceutical and biotechnology sanitary service requirements are ideally handled by the Dia-Flo® sanitary weir valve. Not only do the materials of construction comply with F.D.A. CFR21 but the valves are cavity free and can be CIP and SIP. Available in a variety of sanitary end connections, diaphragms, bodies and bonnet assemblies.



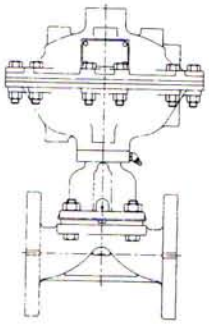


Vacuum and Gas Handling

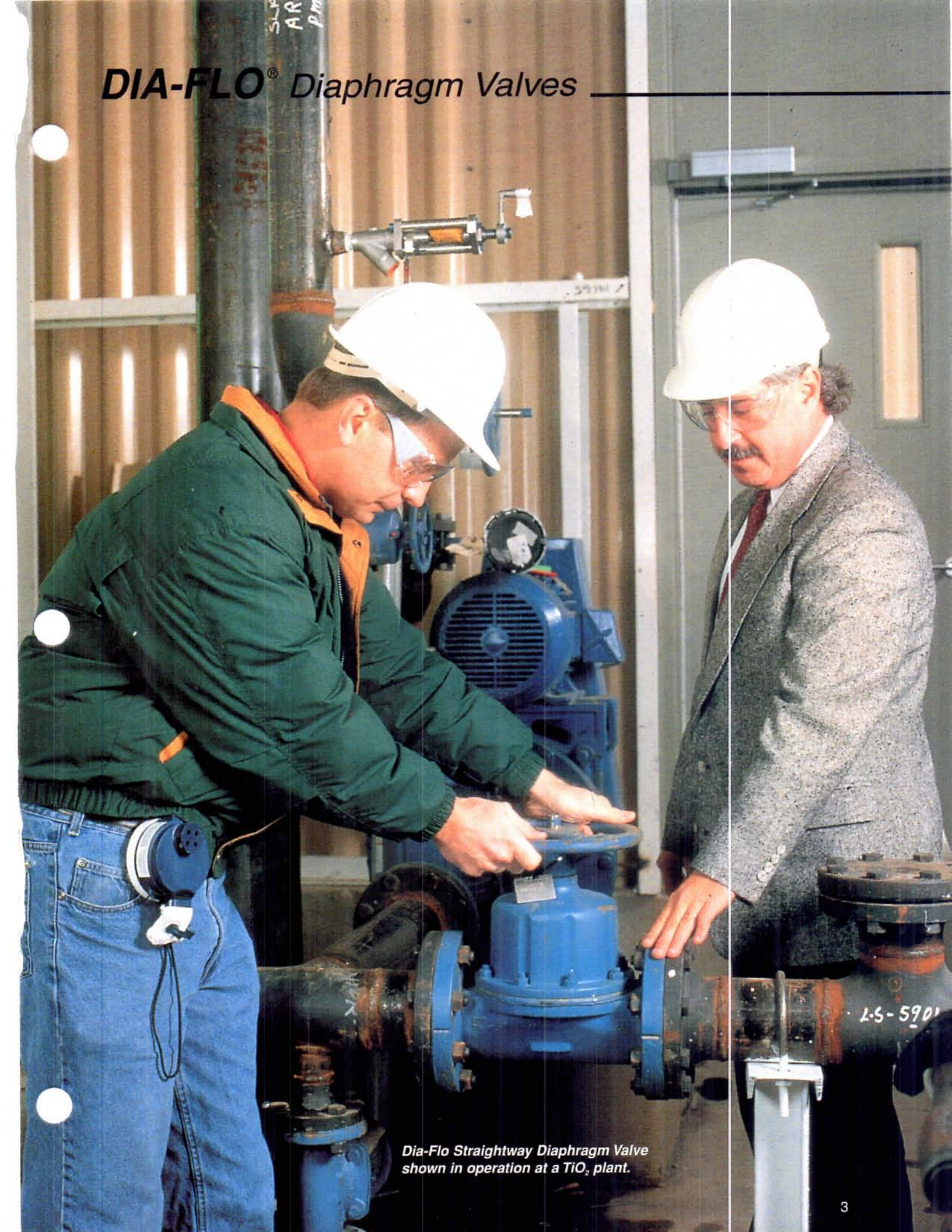
Stem leakage is improbable because the diaphragm completely seals the bonnet off from the gas traveling through the valve body. Furthermore, absolute closure of the valve greatly reduces the possibility of gas leakage when in the closed position. These features combined with low gas permeability, make the Dia-Flo® diaphragm valve especially suitable for gas and/or vacuum services. See page 68 for more information.

Control

Precision throttling of highly corrosive or abrasive materials is provided by the Dualrange® diaphragm valve. A patented double compressor assembly acts as a valve within a valve. At low flow rates, the contoured center of the diaphragm is operated by the inner compressor for accurate control. When the inner compressor is fully opened, both compressors move as a single unit to deliver full flow capacity.

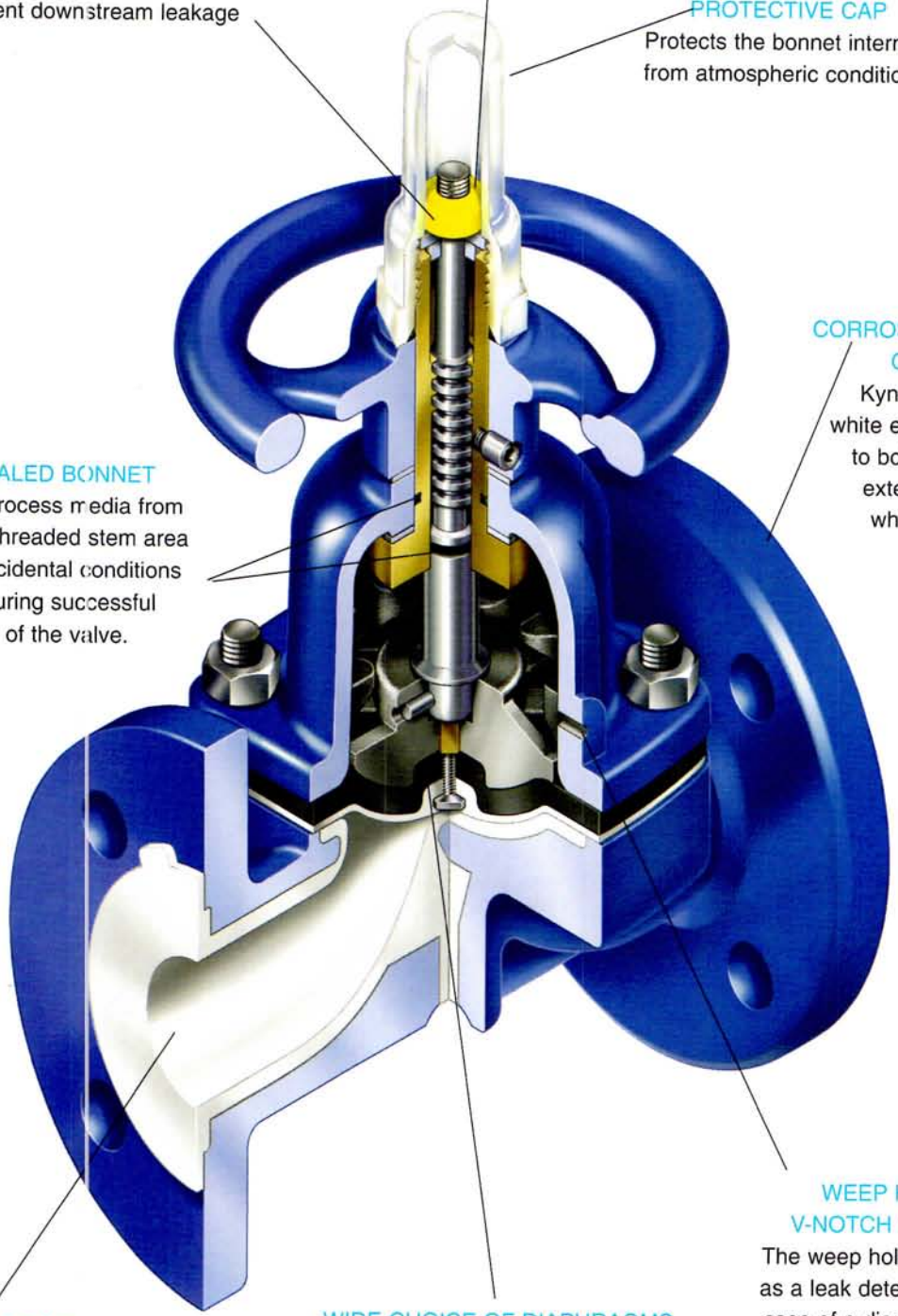


DIA-FLO® Diaphragm Valves



Dia-Flo Straightway Diaphragm Valve shown in operation at a TiO_2 plant.

DIA-FLO® Diaphragm Valves



YELLOW POSITION INDICATOR
Provides visual indication of valve position

ADJUSTABLE TRAVEL STOP
Prevents over closure and subsequent downstream leakage

PROTECTIVE CAP
Protects the bonnet internals from atmospheric conditions.

CORROSION-RESISTENT COATINGS
Kynar® PVDF and white epoxy are applied to both internal and external surfaces when specified.

O-RING SEALED BONNET
Prevents the process media from contacting the threaded stem area even under accidental conditions thereby assuring successful operation of the valve.

BROAD RANGE OF BODY MATERIALS
- Metals
- Plastic Linings
- Rubber Linings
- Glass Lining
- Solid Plastics

WIDE CHOICE OF DIAPHRAGMS
- 10 Elastomers
- 1 Plastics

WEEP HOLE OR V-NOTCH VENT PLUG
The weep hole shown serves as a leak detection port in the case of a diaphragm rupture. The optional v-notch vent plug would provide a secondary containment in this case.

DIA-FLO® Diaphragm Valves

Features & Benefits

Bonnet Isolation
- The diaphragm isolates the working parts of the valve from process fluids.

Streamlined Fluid Passage
- The smooth contoured body has minimal pockets, cavities or dead spaces which prevents accumulation or stagnation of process fluids or contaminants.

No Packing Gland or Packing
- No more packing gland adjustment required or stem packing leakage problems for improved control of fugitive emissions.

Positive Leak Tight Closure
- Bubble tight closure is provided in accordance with MSS SP–88.

In-Line Maintenance
- Easily maintainable when required for reduced cost of ownership.

Line-Lok®
- Unique feature in plastic lined valves that prevents liner flexing over weir which would lead to liner cracking.

Fluorlastic™ PTFE Diaphragm
- Exclusive PTFE molding process which increases flex life, reduces permeation and improves dimensional stability.

Molded Closed 2 Piece PTFE Diaphragm
- Diaphragms are molded to the exact contour of the weir for superior shutoff capabilities.
- 2 piece configuration eliminates delamination of PTFE which is common in 1-piece configurations.

Adjustable Travel Stop
- Prevents overclosure of the valve and prolongs diaphragm life. Also the adjustability feature assures that leak-tight shutoff can be maintained throughout the valve's life.

Bronze Bushing
- Reduces turning torque and enhances cycle life in "dirty" atmospheres.

Sealed Bonnet
- Offers secondary process containment to control fugitive emissions.
- Supplied with leak detection port as standard.

Floating Tube Nut
- Prevents point loading of stud on PTFE diaphragm which enhances life especially in high temperature and high cycle applications.

100% Seat & Shell Testing
- All valves are pressure tested bubble tight prior to shipment. NO leakage is allowed.

Extensive selection of body and diaphragm materials and actuating systems.
- Allows optimum selection of materials for service conditions, often without expensive upgrades.

Major Markets

Chemical Process Industry (CPI)

Dia-Flo® diaphragm valves are used extensively in the CPI. The features of many body linings and body materials, PTFE diaphragm, corrosion resistant coatings, and total actuation capabilities result in improved valve performance and reduced cost of ownership.

Power Generation

Power generation is another major market for Dia-Flo® valves. They are used in demineralizers, condensate polishers, FGD systems, chemical handling, radioactive waste handling, & others.

Mining

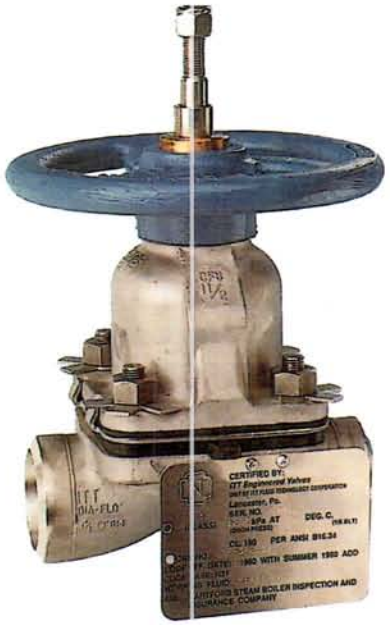
Mining applications can be very demanding from both an abrasion and corrosion resistant standpoint. Dia-Flo® diaphragm valves are well suited because of the variety of rubber and plastic linings for both straightway and weir style valves.

Water Treatment

Because of the versatility and competitive nature of Dia-Flo® diaphragm valves, the water treatment industry has overwhelmingly chosen this valve for softeners, demineralizers, filtration systems, deionizers, and reverse osmosis systems.

DIA-FLO® Diaphragm Valves

Major Markets (Continued)



Nuclear Market

The features of bonnet isolation, no packing glands, secondary containment, and streamlined fluid passages, which means no pockets to entrap materials, result in extensive use of Dia-Flo® diaphragm valves in nuclear power plant applications. ITT Engineered Valves maintains the ASME Section III nuclear power plant components 'N' stamp – class 2 & 3 and complies with ANSI B31.1 power piping code for diaphragm and ball valves.

Pharmaceutical/Biotechnology/ Food Processing

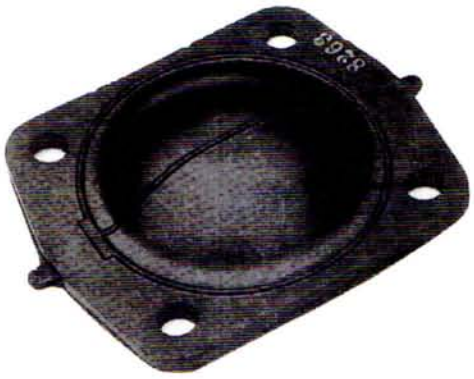
Product purity is assured by the Pure-Flo® hygienic diaphragm valve. The smooth contoured, interior surface greatly reduces the threat of contamination due to particulate or product entrapment. The diaphragm effectively isolates the working parts of the valve from the process media. Process contact surfaces are therefore minimized. Due to the inherent design, the valve can be cleaned in place (C.I.P.) and steamed in place (S.I.P.) without disassembly. The resilient diaphragm in contact with the metal weir also assures positive closure. The Pure-Flo® diaphragm valve is available with butt weld or quick disconnect end connections as well as diaphragms that comply with F.D.A. CFR 21, are accepted by the USDA and conform to 3A standards.

Electronics Industry

The Dia-Flo solid plastic diaphragm valves are successfully utilized in high purity water systems and chemical systems. Available materials are PVC, CPVC, PP and unpigmented Kynar® PVDF grade 720. A variety of end connections are also available: spigot end, socket weld, flanged and threaded. Included in the complete valve assembly are the process proven thermoplastic bonnet assembly, Advantage Actuator, Advantage Switch Package and compatible positioner.

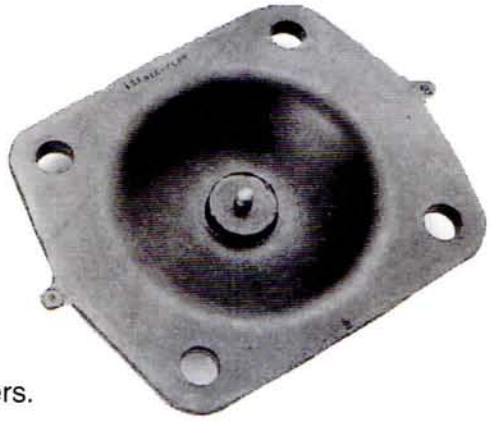
Weir Type Diaphragms

Choice of Diaphragms



Diaphragm life depends not only upon the nature of the material handled – but also upon the temperature, pressure and frequency of operation.

Diaphragms can be molded in a wide variety of compounds in each basic stock. ITT Engineered Valves, however, has selected the one compound in each basic stock that gives the most satisfactory results. This reduces confusion in diaphragm ordering and replacement and permits adequate inventories of spare diaphragms.



Dia-Flo® elastomer diaphragms are marked with the grade designation, valve size and date of manufacture either on tabs or on the back of the diaphragm flange.

To ensure the best possible diaphragms, ITT Engineered Valves tests samples of every production lot, and maintains a continuing development program to utilize new materials and improve old ones.

Complete service data should accompany all inquiries and orders.

Elastomer Diaphragm

Elastomer diaphragms are molded in the closed position. This unique design offers a number of advantages. (1) Longer diaphragm life because the elastomer is molded to fit the weir contour perfectly without stretching or distortion. (2) Lower closing torques – because when closing the diaphragm, it is returned to its natural molded closed position. (3) A constant closing torque for each size regardless of the type elastomer specified. (4) Special elastomer diaphragm construction permits use under full vacuum conditions through 12" size. Refer to Dia-Flo® Service and Engineering Catalog for more specifics at the back of this catalog.

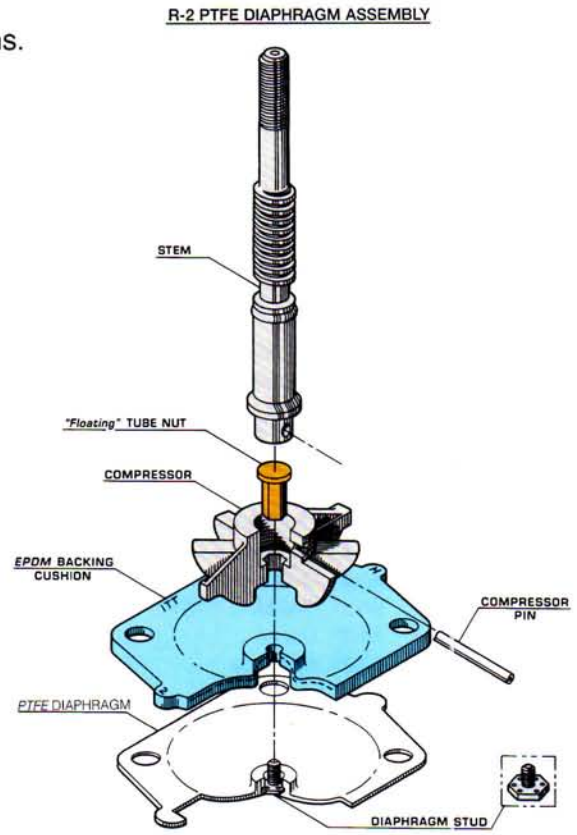
Diaphragm selection[1]

Valve	Grade	Material	Size[5]	Typical Services	Temp. °F[2,4]		Temp. °C[2,4]	
					Min.	Max.	Min.	Max.
Weir Type elastomers	A	Soft Natural Rubber (Faced)	¾"-4"	Abrasives	–20	160	–29	71
	B	Black butyl	½"-12"	Chemicals, gases, stronger acids	–20	250	–29	121
	C	Hypalon	½"-12"	Oxidizing fluids, oil resistant	0	225	–18	107
	M	Ethylene Propylene (EPDM)	½"-12"	Chemicals, acids, hi-temp, abrasives	–30	300	–34	149
	DP	Buna N	½"-3"	For direct load valve	10	180	–12	82
	P	Buna N	½"-12"	Foods, oils	10	180	–12	82
	S	Natural rubber	½"-10"	Water, abrasives	–30	180	–34	82
	T	Neoprene	½"-12"	Weak chemicals, air, oil resistant	–20	200	–29	93
	V	Viton	½"-6"	Specific solvents & chemicals, oils	–20	325	–29	163
	WB	White butyl	½"-6"	Foods beverages pharmaceuticals	0	225	–18	107
Weir Type plastics[3]	R2	Polytetrafluoroethlyene (PTFE)	½"-10"	Severe chemicals, solvents,	–30	350	–34	177

Notes:
[1]To be used as General guide; for complete service guide see Dia-Flo® Service and Engineering Catalog at the back of this catalog.
[2]Diaphragms at maximum temperature cannot be used satisfactorily at maximum pressures. Pressure/temperature charts are provided in Dia-Flo® Service and Engineering Catalog at the back of this catalog.
[3]With ethylene propylene backing cushion.
[4]Cast Iron, Ductile Iron & Carbon Steel should not be used below –20°F (–29°C).
[5]See page 11 for DN equivalent.

TEFLON® PTFE R-2 Diaphragm Assemblies

Dia-Flo®'s two piece PTFE (Tetrafluoroethylene) diaphragms have proven through years of outstanding service, to be the best design available. The two piece construction shown here, eliminates the delamination problems inherent in competitve "Teflon faced" diaphragms. The floating tube nut design, described below, assures that downward closing forces will be absorbed by the elastomer backing cushion and evenly distributed across the closing surface (weir) in the valve body. The result is drop tight closure and longer diaphragm life.

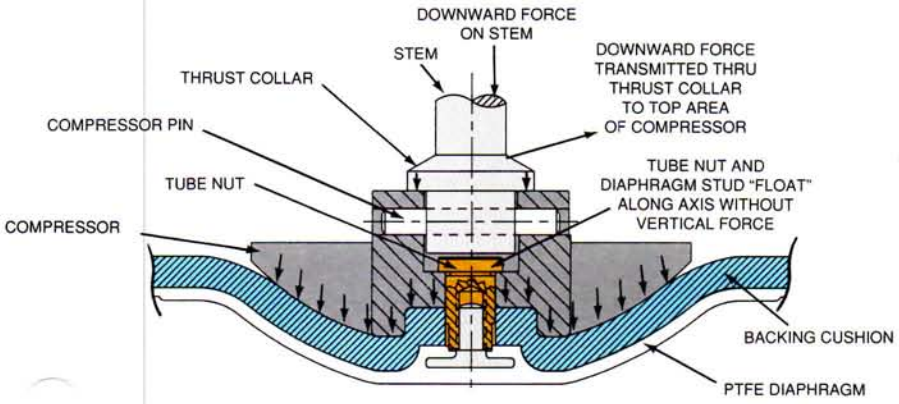


R-2 Assembly

Available in size ½"-10" with maximum temperature rating of 350°F (177°C).

Floating tube nut

The floating tube nut feature contributes largely to the successful operation of plastic diaphragms in Dia-Flo® diaphragm valves. Downward force of stem is transferred to compressor by-passing tube nut. Result is forces are evenly distributed over seating area of PTFE diaphragm reducing cold flow and stud pull out problems. Also used on 6" and larger elastomer diaphragms.



Downward force on top of compressor by-passed by tube nut and transformed to distributed pressure on bottom area of compressor. Compressor presses diaphragm over weir area of valve body.

Specialized Diaphragm Process

The Dia-Flo® PTFE diaphragm is manufactured using a unique process. This process in effect, removes entrained air out of the diaphragm. Standard processed PTFE will have 3-7% entrained air where the Dia-Flo PTFE diaphragm has 0.7%. The benefits are more flexibility with higher cycle life, increased density with reduced permeation, increased dimensional stability, and increased temperature range.

DIA-FLO® Diaphragm Valves

Unlined and lined Diaphragm Valves




Screwed Metal

½"-3"	Iron	2401
½"-3"	Bronze	2402
½"-3"	Stainless Steel (316)	2403
1"-3"	Cast Steel	2405
½"-3"	CN7M	2407
½"-3"	Monel	2408
½"-3"	Hastelloy	2410
1"-3"	Ductile	2412

Flanged Metal[1]

½"-12"	Iron	2431
½"-6"	Bronze	2432
½"-8"	Stainless (316)	2433
½"- 8"	CN7M	2437
½"-8"	Hastelloy	2440
½"-8"	Ductile	2441
½"-8"	Cast Steel	2435
½"-8"	Monel	2438

Raised Face Flanged Metal

½"-8"	Stainless	2433R
½"-8"	Cast Metal	2435R
½"-8"	CN7M	2437R
½"-8"	Monel	2438R
½"-8"	Hastelloy	2440R

Socket Weld Metal

½"-3"	Stainless Steel (316L)	2470
½"-3"	Cast Steel	2472
½"-3"	CN7M	2474

Socket (Solder)

½"-2"	Bronze	2456

Butt Weld Metal

½"-8"	Stainless Steel (316L) Schedule 5	2464
	Schedule 10	2465
	Schedule 40	2466



Flanged Rubber Lined[1]

Cast Iron

½"-12"	Neoprene #7	2501
½"-12"	Soft Rubber #5	2516
½"-12"	Hard Rubber #10	2521
½"-12"	Butyl #16	2522
½"-12"	Hypalon #9	2523
½"-12"	Soft Gum Rubber #11	
½"-12"	Hard Rubber Graphite Impregnated #12	2530

Ductile Iron

½"-8"	Neoprene #7	2550
½"-8"	Soft Rubber #5	2551
½"-8"	Hard Rubber#10	2552

Cast Steel

½"-8"	Hard Rubber #10	2563
½"-8"	Hard Rubber #12	2564

Flanged Plastic Lined[1]

Cast Iron

¾"-8"	Tefzel	2529
¾"-8"	PVC	2536
¾"-8"	Saran	2537
¾"-8"	Polypropylene	2538
¾"-8"	Polypropylene[3]	2539
¾"-8"	PVDF[3]	2575

Ductile Iron

¾"-8"	PVDF[3]	2555
¾"-8"	Saran	2557
¾"-8"	Polypropylene	2558
¾"-8"	Tefzel	2559

Cast Steel

¾"-8"	Tefzel	2545
¾"-8"	Polypropylene	2546
¾"-8"	Saran	2547
¾"-8"	PVDF[3]	2548

Flanged Glass Lined[1]

Cast Iron

½"-8"	Glass	2511

Ductile Iron

½"-8"	Glass	2544

DIA-FLO® Diaphragm Valves

Solid Plastic Diaphragm Valves




Screwed Plastic (solid)

½"-2" PVC	2406
½"-2" Polypropylene[2]	2414
½"-2" CPVC	2416
½"-2" PVDF	2417

Socket Weld Plastic

½"-2" Polypropylene[2]	2424
½"-2" PVDF[2,3]	2427
½"-2" PVC	2451
½"-2" CPVC	2463

Flanged Plastic[2]

½"-4" PVC	2436
½"-2" CPVC	2442
½"-4" Polypropylene	2444
½"-4" PVDF[3]	2447

Spigot Weld Plastic

IPS-Spigot

½"-2" CVPC	2443
½"-2" PVC	2486

DIN-Spigot

½"-2" Polypropylene	2484
½"-2" PVDF[3]	2487

Notes:

[1] All ¾" flanged valves, execpt solid plastic, are actually 1" valves with the end flanges machined and drilled to ¾" dimensions. Bonnets and diaphragms for those valves will therefore be 1" size.

[2] Not available in 1¼" size.

[3] Unpigmented

Angle Body Diaphragm Valves


Flanged Angle

½"-8" Iron	2611
½"-4" Bronze	2612
½"-4" Stainless Steel	2613

Flanged Lined Angle (Iron)

½"-8" Neoprene #7	2621
½"-8" Glass	2622
½"-8" Solt Rubber #5	2623
½"-8" Hard Rubber #10	2624

Hygienic Diaphragm Valves

Sanitary/Hygienic

See Pure-Flo® Brochure

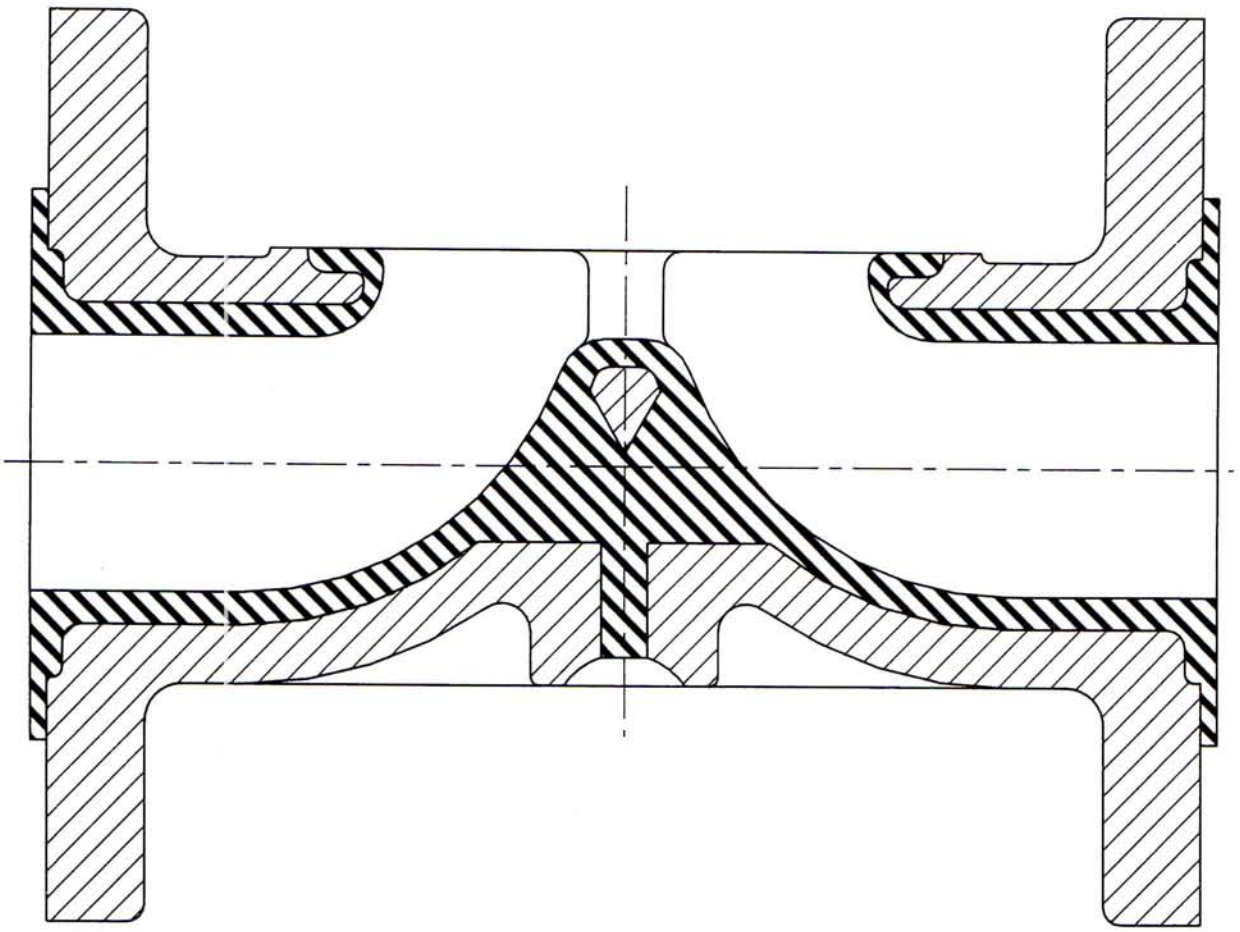
Stem travel (stroke) and turns, for conventional weir type valves

Valve size (in).	¼ – ⅜	½	¾	1	1¼	1½	2	2½	3	4	6	8	10	12
(DN)	8 – 10	15	20	25	32	40	50	65	80	100	150	200	250	300
Stem travel (in).*	¼	¼	⅜	½	13/16	13/16	1⅛	1⅜	1⅝	2⅛	3⅛	4⅝	5⅝	6½
(mm)	6.4	6.4	9.5	12.7	20.6	20.6	28.6	34.9	41.3	54.0	79.4	117.5	142.9	165.1
Turns*	3½	2	3	4	4⅞	4⅞	6¾	6⅞	8⅛	10⅝	15⅝	15⅜	19 11/16	22¾
Threads (per inch on stem)	13	8	8	8	6	6	6	5	5	5	5	3½	3½	3½
(per mm on stem)	.51	.31	.31	.31	.24	.24	.24	.20	.20	.20	.20	.14	.14	.14

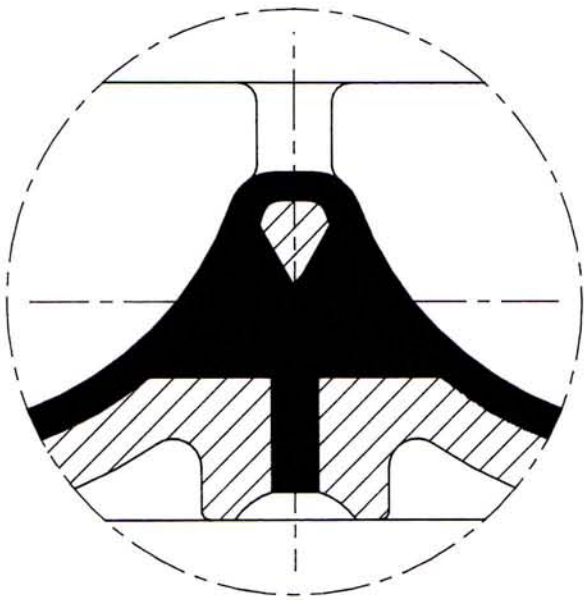
*Between open and closed positions

Weir Type Bodies

Plastic Lined Bodies



- 3/16" Minimum Lining thickness
- Superior Flow Capabilities
- Line-lok*
- Wide Selection of Linings
  - Tefzel® (ETFE)
  - Polypropylene
  - PVDF
  - PVC
  - Saran®

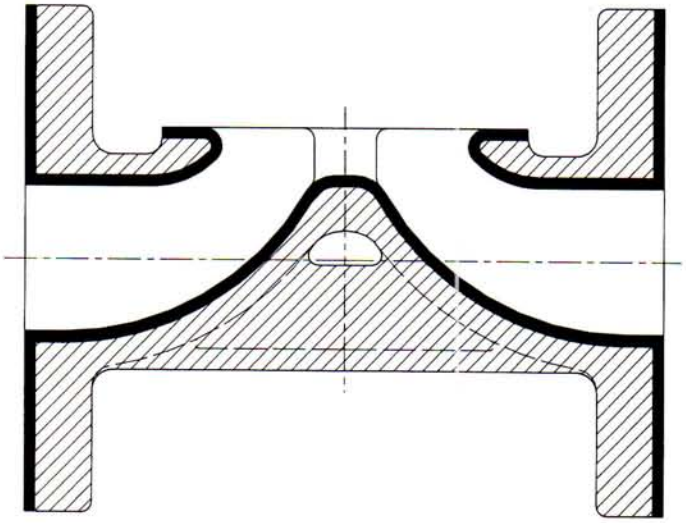


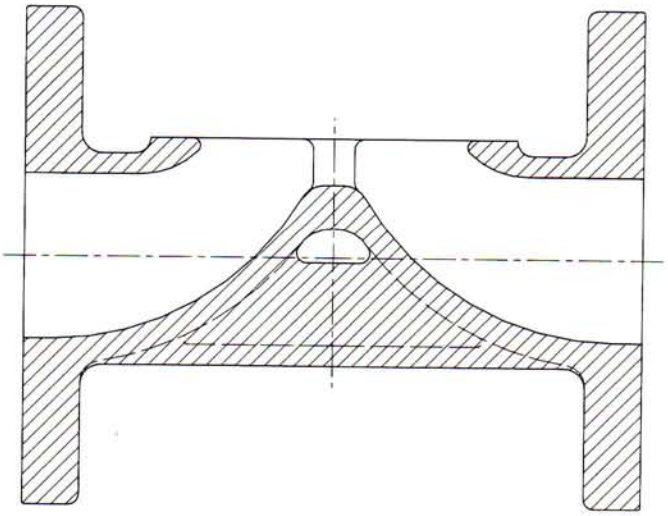
* Line-lok is a unique feature of Dia-Flo® diaphragm valves. As can be seen by picture at right, the weir area is locked firmly to the body eliminating flexing of lining during valve cycling which leads to liner failure.

DIA-FLO® Diaphragm Valves

Rubber Lined Bodies

- 1/8" Minimum Lining thickness
- Ductile Iron or Cast Iron Available
- Full Flat Faced Flange Lining
- Excellent for Abrasive Applications
- Broad Choice of Linings are Available Such as:
  - Neoprene (#7)
  - Soft Rubber (#5)
  - Hard Rubber (#10)
  - Hypalon (#9)
  - Butyl (#16)
  - And More



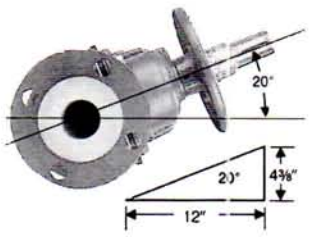


Unlined Metal

- Machine Contoured Weir for improved shut-off
- Excellent Cv's
- Complete Selection of End Connections
- ASTM Materials Include:
  - Cast Iron ASTM A-126 Class B
  - Ductile Iron ASTM A-395 Grade 60-40-18
  - Cast Steel ASTM A-216 Grade WCB
  - 316 Stainless Steel ASTM A-351 Grade CF8M
  - 316L Stainless Steel ASTM A-351 Grade CF3M
  - Bronze ASTM B62 Alloy 836
  - Alloy 20 ASTM A-351 Grade CN7M
  - Hastelloy C ASTM A-494 Grade CW-6M
  - Monel ASTM A-743 Grade M-35-1
  - Aluminum ASTM B26 Alloy 356T6
  - And More

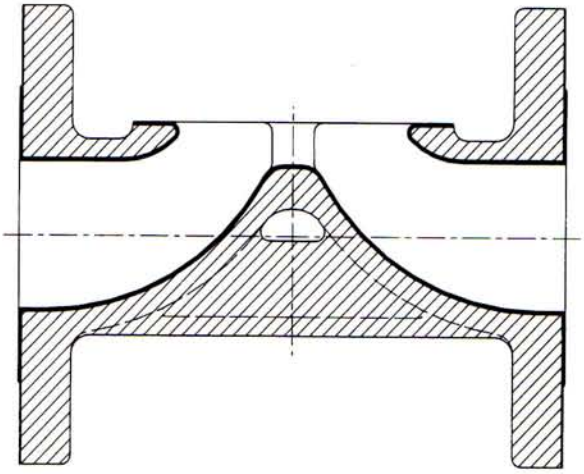
Optimized Drainability

The weir type Dia-Flo® diaphragm valve is optimized for drainability when mounted in a vertical pipe line. When mounted in a horizontal pipe line, the optimum drain position is when the valve stem forms an angle of approximately 20° above horizontal. For applications in which drainability is desirable however not as critical, the valve may be positioned at 0° above horizontal.



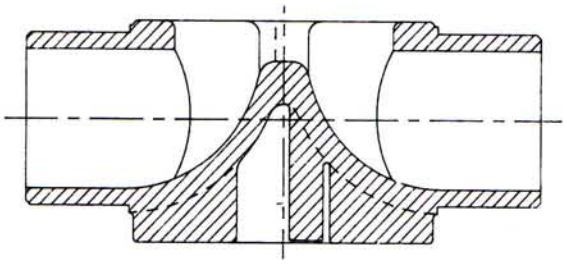
Glass Lined Bodies

- Available in Cast Iron or Ductile Iron
- All linings Spark Tested before and after assembly to assure the highest quality.
- Excellent lining in contaminant free and/or corrosion resistant applications.

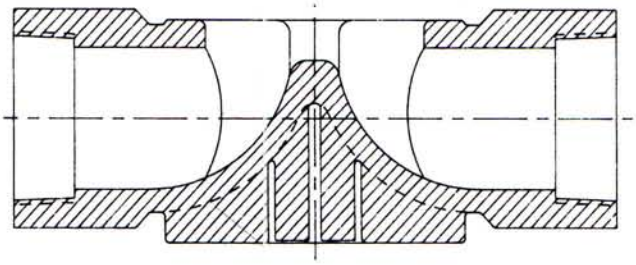


Solid Plastic Bodies

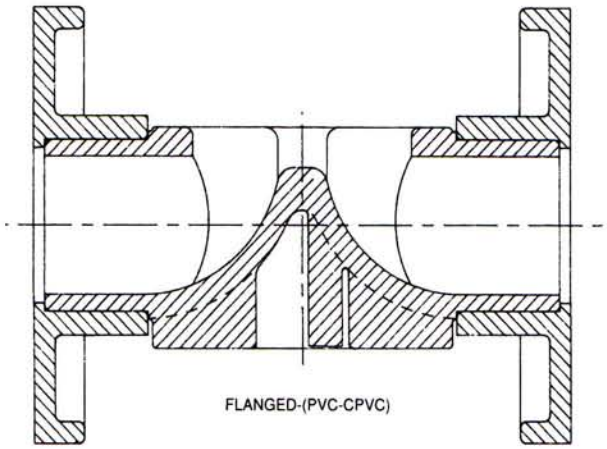
- Lightweight and Economical
- Excellent Internal/External Corrosion Resistance
- Flanged, screwed, solvent weld and thermal weld ends available.
- Materials Include:
  - PVC
  - CPVC
  - PVDF
  - Polypropylene



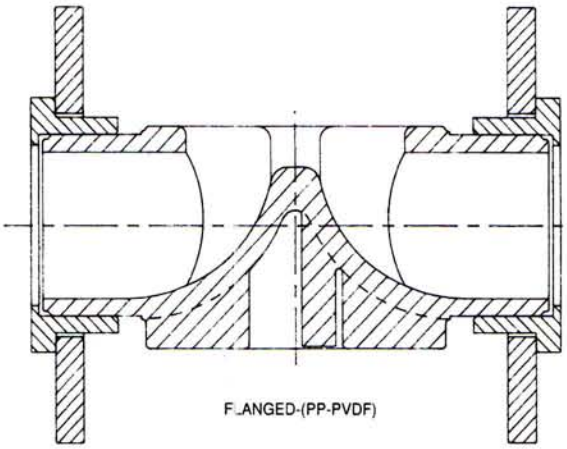
SPIGOT WELD ENDS



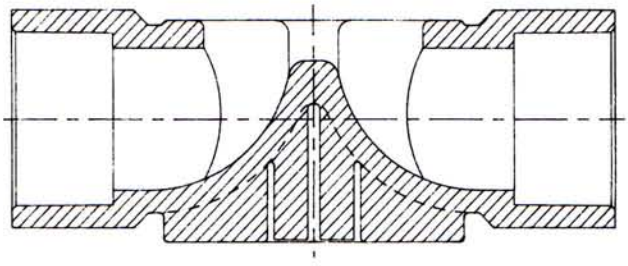
THREADED ENDS



FLANGED-(PVC-CPVC)



FLANGED-(PP-PVDF)



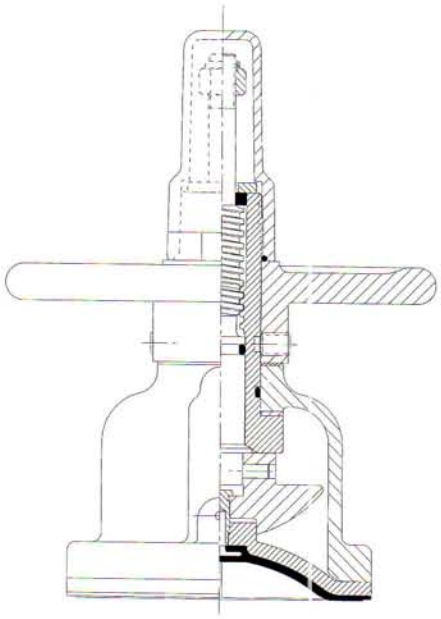
SOCKET WELD ENDS

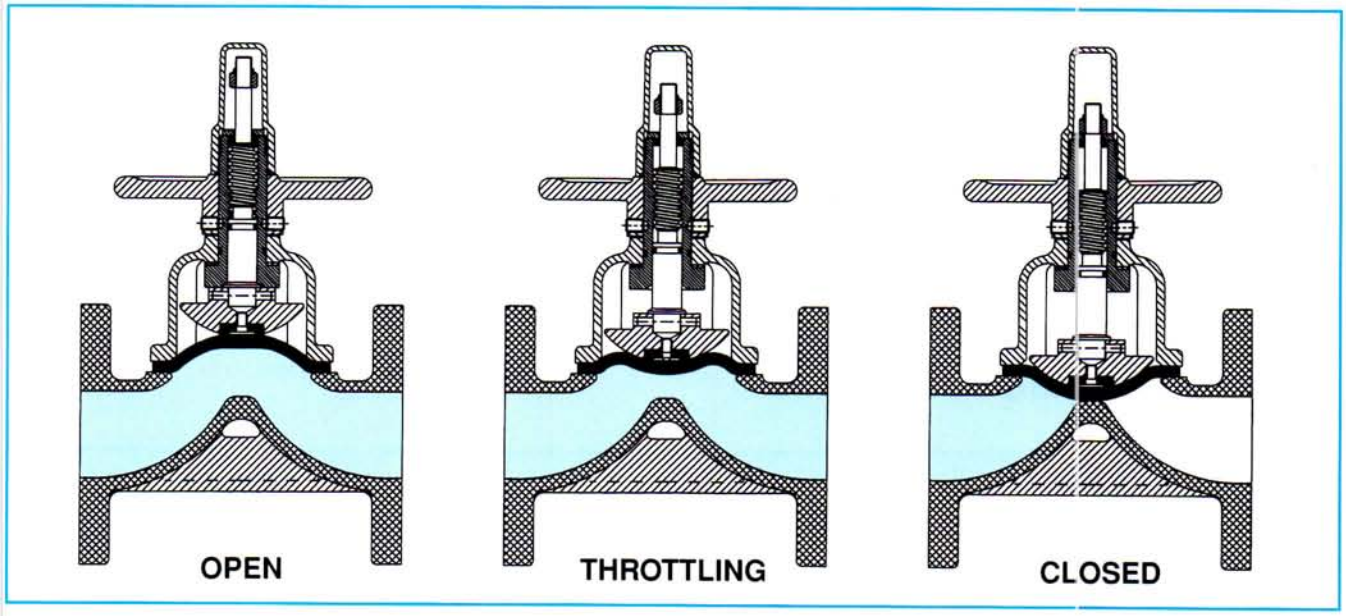
Weir Type Bonnet Assemblies

Bonnet Designed for Dependable Performance

Dia-Flo® diaphragm valves are equipped as standard with:

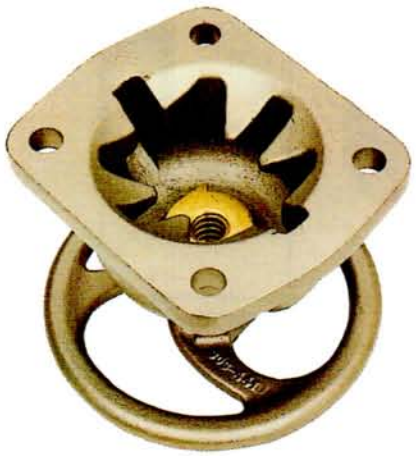
- Bronze stem bushing
- Molded in fingers*
- Grease fitting** (6"-12")
- Thrust bearing
- Visual position indication
- Adjustable Travel Stop (½"-4")
- Permanently Sealed Lubrication (½"-4")
- Clear Stem Cover (½"-4")





* In conjunction with the compressor, the fingers positively support the diaphragm from the closed to open position. The diaphragm is lifted high when the valve is opened and is pressed tightly against the weir when the valve is closed. It is supported in all positions by alternate fingers of the compressor and bonnet. Fingerplates in place of molded in fingers are utilized in 3" through 6" stainless steel bonnet assemblies.

** Not used with sealed bonnet.



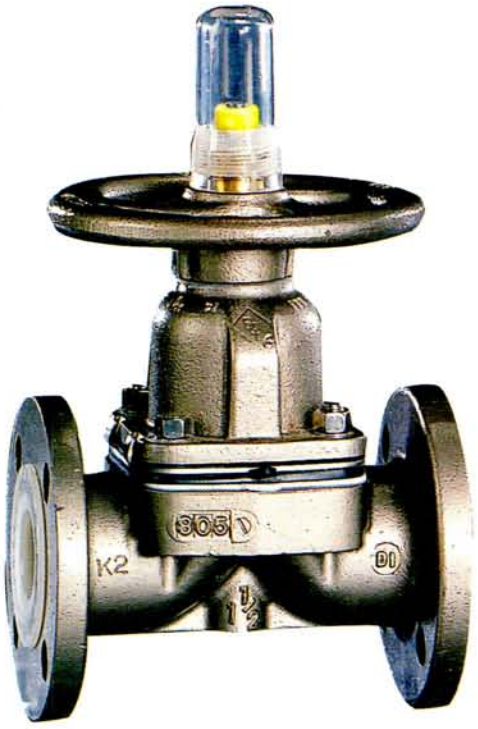
Kynar® PVDF corrosion resistant coated bonnet shows the molded–in fingers utilized to support the diaphragm in the open position.

Bonnet Assembly Options

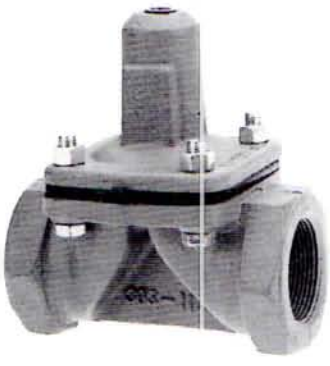
Available Options

- Adjustable Travel Stop – an externally adjustable device which provides a metal to metal stop. This prevents overclosing the valve and prolongs diaphragm life. Recommended where temperatures exceed 175°F (79°C), high cycle applications or where over closing by operators cannot be controlled. (Standard on ½" - 4" weir valves)
- External Coatings – A full line of corrosion resistant and decorative coatings are available for both bonnets and bodies. Available coatings are white epoxy, nylon 11, & PVDF.
- Stem Enclosure Cap – To protect stem & bushing from atmosphere. (Standard on ½" - 4" weir valves). Available only on 6" Weir valves as an option.
- Sealed Bonnet – Provides a secondary seal which retains fluids or gases within the valve bonnet in the event of diaphragm leakage. A standard sealed bonnet is recommended for hazardous materials which will not damage bonnet shell, bushing or spindle (stem). On corrosive fluids or gases either non-sealed bonnets or in the cases where the fluids or gases must be contained, more corrosion resistant materials must be used.

  If a sealed bonnet is used and bonnet assembly cannot handle line media for a prolonged period of time, contact ITT Engineered Valves for recommendations.



- Handwheel Locking Device
- Chainwheel Operator
- Extended Stem
- Direct Loaded Bonnet

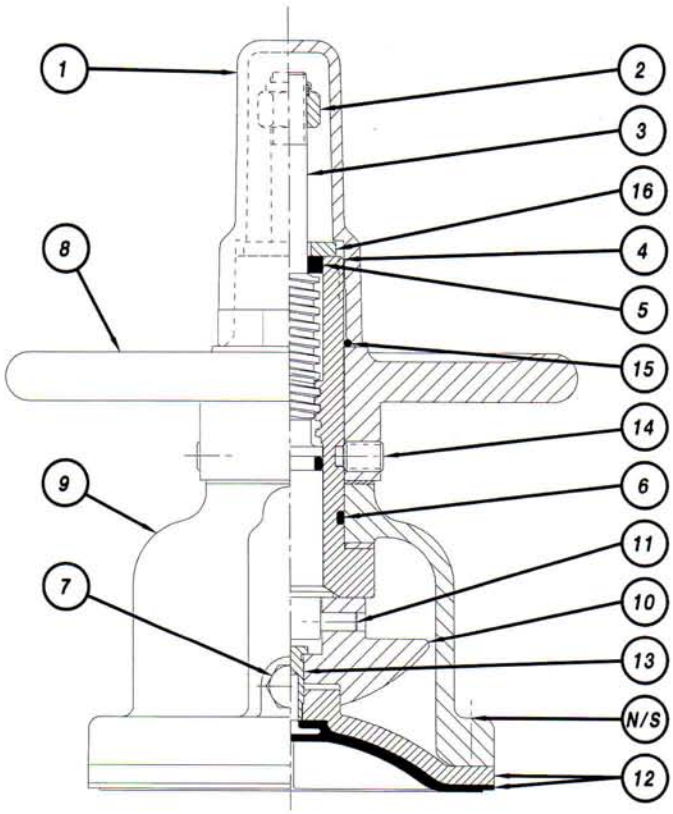


Direct loaded bonnets
Available in sizes ½" through 6" for pressures to 100 psi. Suitable for all standard weir body materials. Refer to page 53 for further information.

Chain wheel operated
Uses standard sprocket rim, guide and chain. Available ½" through 12"

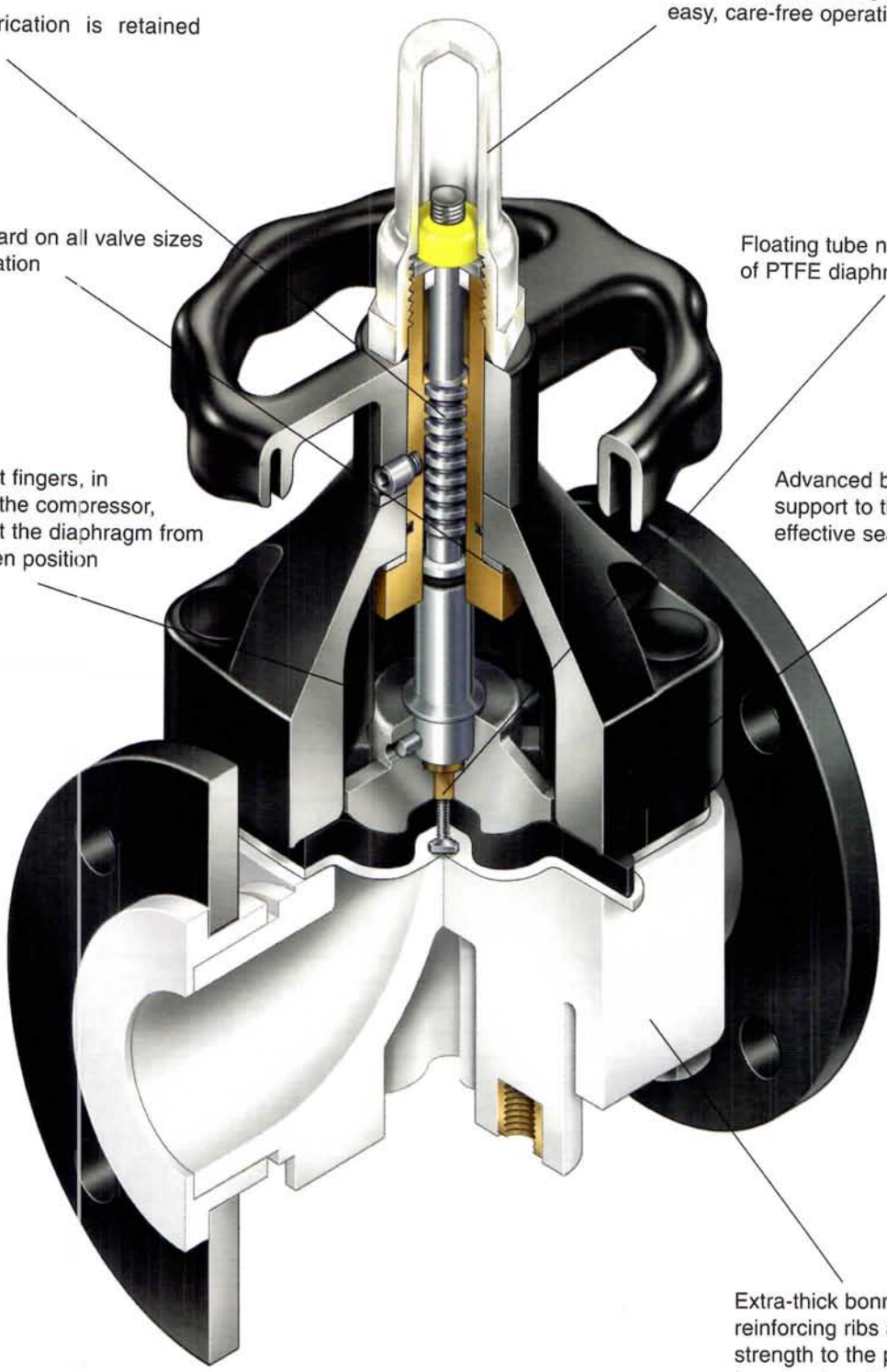
Extended stem
Available in all sizes.

Weir Style Bonnet Assembly, ½" – 4"



ITEM	DESCRIPTION	MATERIAL
1	PROTECTIVE CAP[1]	ACRYLIC, POLYSULFONE*
2	ADJUSTABLE TRAVEL STOP[2]	STEEL, STAINLESS STEEL*
3	STEM	STEEL, STAINLESS STEEL*
4	BUSHING	BRONZE, STAINLESS STEEL*
5	O-RING[1]	BUNA-N, EPDM*, VITON*
6	O-RING[2]	BUNA-N, EPDM*, VITON*
7	V-NOTCH VENT PLUG*	STAINLESS STEEL
8	HANDWHEEL	C.I. OR PAS, PP*, STAINLESS STEEL*, BRONZE*
9	BONNET	C.I., D.I.*, PP*, PAS*, STAINLESS STEEL*, BRONZE*
10	COMPRESSOR	C.I. OR ZINC, BRONZE*STAINLESS STEEL*, ALUMINUM*
11	SPIROL PIN	STAINLESS STEEL, STEEL*
12	DIAPHRAGM	ELASTOMER, VITON*, PTFE*
13	TUBE NUT**	BRASS
14	SET SCREW	STEEL, STAINLESS STEEL*
15	O-RING[1]	BUNA-N, EPDM*, VITON*
16	THRUST WASHER[1]	STEEL, STAINLESS STEEL*
NOT SHOWN	BOLTING & NUTS	STEEL, STAINLESS STEEL*

* OPTIONAL FEATURES AND MATERIALS
** ONLY WITH R2 (PTFE DIAPHRAGM)
[1] NOT AVAILABLE FOR 6" THROUGH 12"
[2] OPTIONAL FOR 6" THRU 12"


Clear stem cover prevents corrosion in the stem and bushing area to ensure easy, care-free operation
Permanent lubrication is retained between seals
Bearing is standard on all valve sizes for ease of operation
Floating tube nut prevents point loading of PTFE diaphragm, increasing cycle life
Molded-in bonnet fingers, in conjunction with the compressor, positively support the diaphragm from the closed to open position
Advanced bonnet design gives extra support to the diaphragm to maintain effective sealing
Extra-thick bonnet flange and reinforcing ribs add mechanical strength to the plastic body, for improved sealing

The Dia-Flo plastic diaphragm valve is available in a wide choice of engineered polymers and elastomers.

The body of the Dia-Flo plastic valve is available in a variety of high-performance engineered polymers including polyvinyl chloride (PVC), chlorinated polyvinyl chloride (CPVC), polypropylene (PP), and natural polyvinylidene fluoride (PVDF).

Body Material Specifications

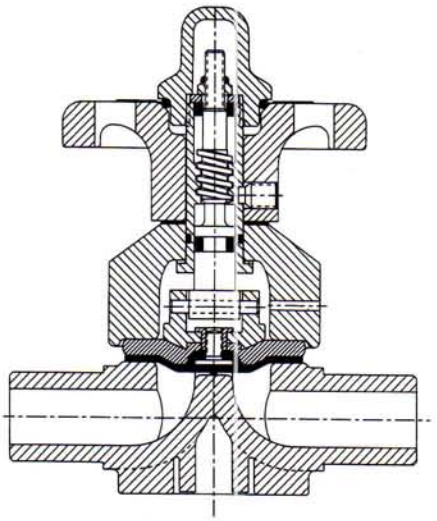
Specifications	PVC	CPVC	PP	PVDF
ASTM	D1784-81	D1784-81	D4101	D3222
Grade	12454A	23547B	Homopolymer	Homopolymer
FDA CFR Title 21	—	—	177.1520	177.2510

The bonnet is manufactured from glass-reinforced polymers: either PP or, for high-temperature service, PAS (polyarylsurlfone). An optional PAS pneumatic actuator is also available.

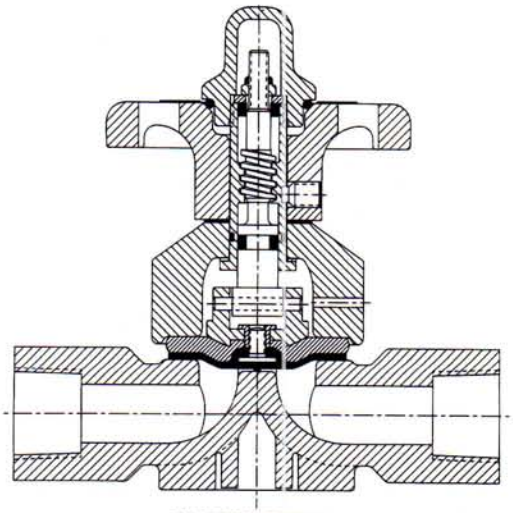
The diaphragm can be made out of a wide range of materials including Fluorlastic™ tetrafluoroethylene (PTFE), Viton®, Hypalon®, EPDM, butyl, Neoprene®, Buna-N, and natural rubber.

Choose the end connection that meets your process requirements.

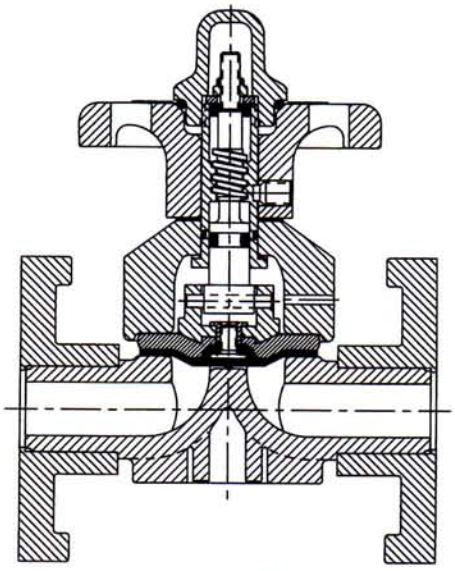
The Dia-Flo plastic diaphragm valve can be equipped with a variety of industry-standard end connections: screwed (NPT), socket-weld, spigot-weld (IPS — schedule 80); and flanged (ANSI 150# dimensions and MSS SP-88 dimensions).



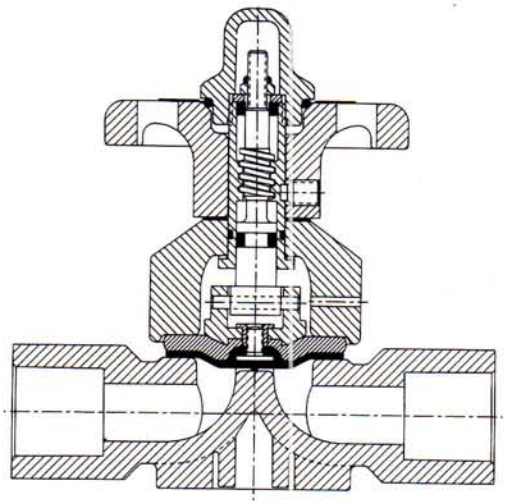
SPIGOT WELD
PVC & CPVC: IPS SCH. 80
PP & PVDF: DIN 11



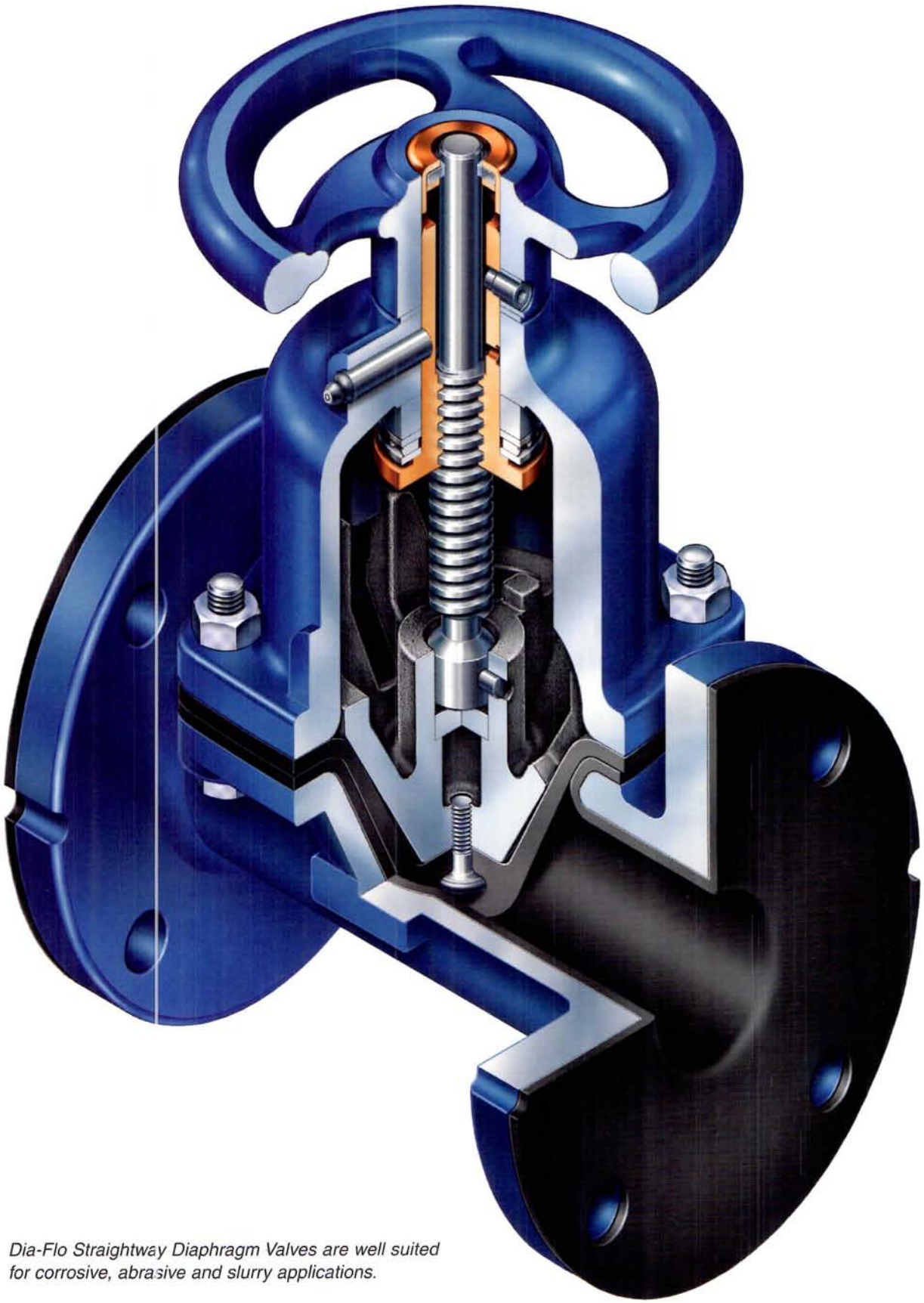
NPT THREADED



FLANGED
PVC & CPVC: SOLID PLASTIC FLANGES
PP & PVDF: PVDF COATED STEEL FLANGES



SOCKET WELD
PVC & CPVC: SCH. 80
PP & PVDF: SCH. 80



Dia-Flo Straightway Diaphragm Valves are well suited for corrosive, abrasive and slurry applications.

DIA-FLO® Diaphragm Valves

Straightway Bodies

Screwed Metal

½"-2"	Iron	2801
½"-2"	Stainless Steel (316)	2803

Flanged Metal

½"-12"	Iron	2811
½"-8"	Stainless (316)	2813
½"-8"	Cast Steel	2815

Raised Face Flanged Metal

½"-8"	Stainless (316)	2813R
½"-8"	Cast Steel	2815R

Flanged Rubber Lined

Cast Iron

1"-12"	Neoprene #7	2831
1"-12"	Soft Rubber #5	2833
1"-12"	Hard Rubber #10	2834
1"-12"	Hypalon #9	2835
1"-12"	Butyl #16	2836

Ductile Iron

1"-12"	Neoprene #7	2840
1"-12"	Soft Rubber #5	2841
1"-12"	Hard Rubber #10	2842

Cast Steel

1"-12"	Hard Rubber #10	2863

Flanged Glass Lined

1"-8"	Glass	2832

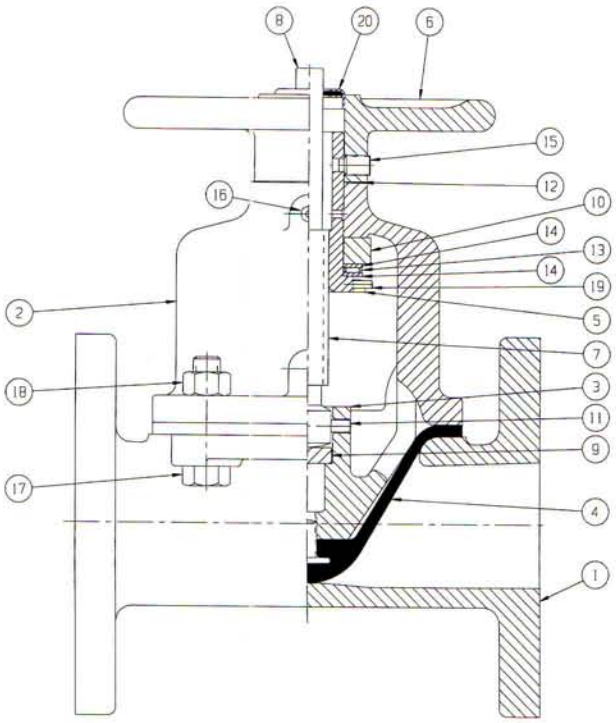
Flanged Plastic Lined

1"-8"	Tetzel	2829
1"-8"	Polypropylene	2838

Valve Size (inches) (DN)	½ 15	1 25	1½ 40	2 50	2½ 65	3 80	4 100	6 150	8 200	10 250	12 300
Stem Travel (Inches)* (mm)	15/32 11.9	15/16 23.8	1¼ 31.8	1⅞ 47.6	2 50.1	2 5/16 58.7	2 13/16 71.4	4¼ 108.0	6¼ 158.8	7½ 190.5	7½ 190.5
Turns*	4	5¾	7¾	11½	10¼	11¾	14¼	21½	22¼	26½	26½

*between open and closed positions

Straightway Bonnet Assemblies



List of Parts			
Item	Description	Material	Qty.
1	Body, Flanged	Cast Iron	1
2	Bonnet	Cast Iron	1
3	Compressor	Cast Iron	1
4	Diaphragm	Elastomer	1
5	Bushing	Brass	1
6	Handwheel	Cast Iron	1
7	Spindle	Steel	1
8	Spindle, Extension (Indicating)	Stainless Steel	1
9	Insert	Steel	1
10	Spacer	Stainless Steel	1
11	Pin, Spirol	Stainless Steel	1
12	Washer, Shim	Polyethylene	AR
13	Bearing, Thrust Needle	Steel, Torrington NTA-1828	1
14	Bearing, Thrust Race	Steel, Torrington TRB-1828	2
15	Screw, Set Hex, Soc.	Steel	2
16	Fitting, Lube	Steel	1
17	Screw, Hex, HD, Cap	Steel	4
18	Nut, Hex	Steel	4
19	Pin, Spirol	Stainless Steel	1
20	Capseal	Brass	1

Standard Features

Straightway Bonnet Assemblies contain the same features found in our Weir design, including:

- Indicating Stem
- Bronze Bushing
- Lubrication Fitting
- Cast Iron Bonnet Shell and Handwheel

Optional Features:

- Adjustable Travel Stop
- Sealed Bonnet
- Chain Wheel Operator
- Extended Stem
- External Coatings:
  White Epoxy
  Kynar® PVDF

Straightway Diaphragm Selection[1]

Valve	Grade	Material	Size[3]	Typical Services	Temp. °F[2]		°C[2]	
					Min.	Max.	Min.	Max.
Straightway Type Elastomers	SB	Black Butyl	½" – 4"	fatty acids	0	200	–18	93
	SS	Natural Rubber	½" – 12"	water	–20	180	–29	82
	ST	Neoprene	½" – 12"	chemical, air, oil	–10	180	–23	82
	SM	EPDM	½" – 12"	high temperature services	–20	225	–29	107
	SC	Hypalon	1" – 4"	oxidizing services	0	200	–18	93
	SP	Buna N*	½" – 6"	oils and gasoline	10	180	–12	107

Notes:

[1] To be used as General guide; for complele service guide see pages 114-155.

[2] Diaphragms at maximum temperature cannot be used satisfactorily at maximum pressures. Pressure/temperature charts are provided on page 67.

[3] See page 21 for DN Equivalent.

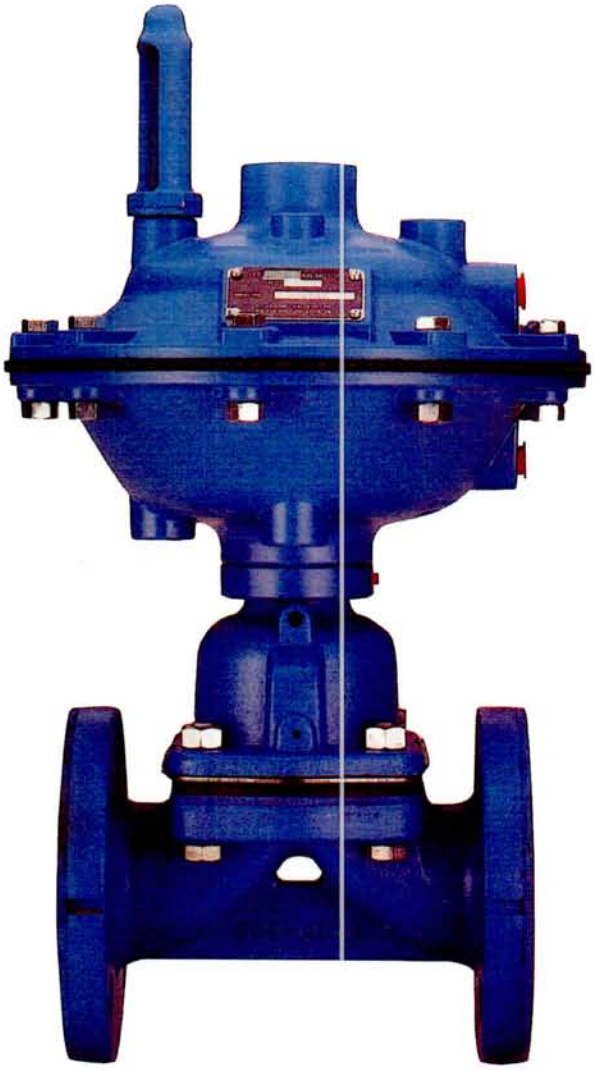
* Not available in 2.5".

Actuation and Control

Dia-Flo Diaphragm Valves are commonly utilized in control and throttling applications. For superior control and rangeability, ask about the Dualrange® bonnet assembly.

Shown here is a 2" weir style valve - with a standard bonnet, fail closed actuator and an ITT Conoflow positioner.

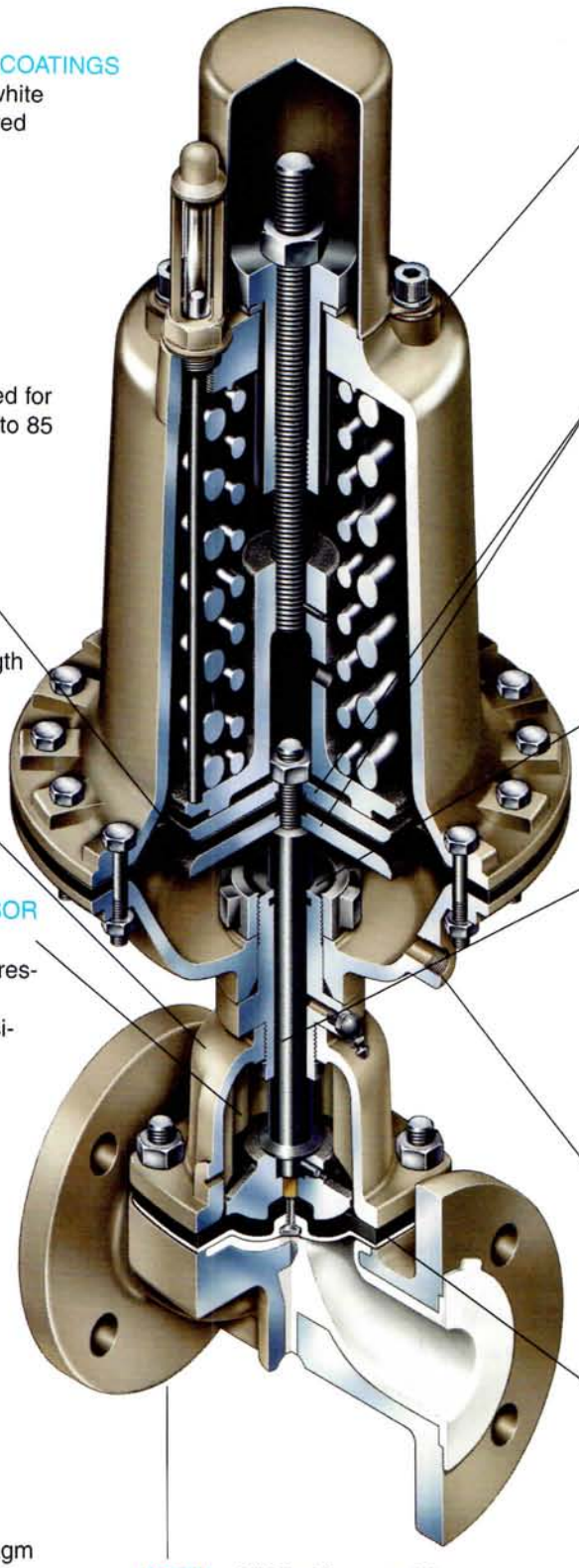
The figure number for this model is:
2" 2444 - M - 34 - 3226 - P1 - HW3 - PR2



Dia-Flo Diaphragm Valves standard actuation is pneumatic, diaphragm driven. However hydraulic and electric actuators are available. The position of the valve can be indicated by using a Position Indicator as shown on this double acting (air to open - air to close) actuator.

The figure number for this model is:
2" 2521 - M - 34 - 3325 - P1

Pneumatic Actuator Features



CORROSION RESISTANT COATINGS
Available coatings include white epoxy and PVDF for improved weather and corrosion resistance.

ACTUATOR DIAPHRAGM
Molded, nylon reinforced oil resistant elastomer. Designed for long life at air pressures up to 85 psi. (586 kPa).

ADAPTOR BONNET
Ductile iron for added strength and non-shattering feature.

FINGER-PLATE AND COMPRESSOR
Finger plates, or fingers cast into the bonnet combine with the compressor to provide metal support to the diaphragm in all positions.

DUALRANGE®
Dualrange® 2-piece compressor assembly available for improved flow control. (See page 54)

VALVE DIAPHRAGM
All standard Dia-Flo diaphragm materials available.

ACTUATOR COVER
Aluminum for light weight and non-rust or ductile iron for extra strength. Most covers have drilled and tapped bosses on top cover so that position indicator and/or limit switches can be field installed if necessary.

ACTUATOR PLATES
Support actuator diaphragm for improved cycle life.

STEM SEAL
A stem seal is fitted to provide smooth operation and long life.

STEM (SPINDLE)
Stainless steel. Unique stem collar controls the opening stroke to prevent stretching the diaphragm and takes the load off the compressor pin on the closing stroke.

AIR SUPPLY PORT
1/4" NPT for actuator sizes 75 and smaller. 1/2" NPT for actuator sizes larger than 75.

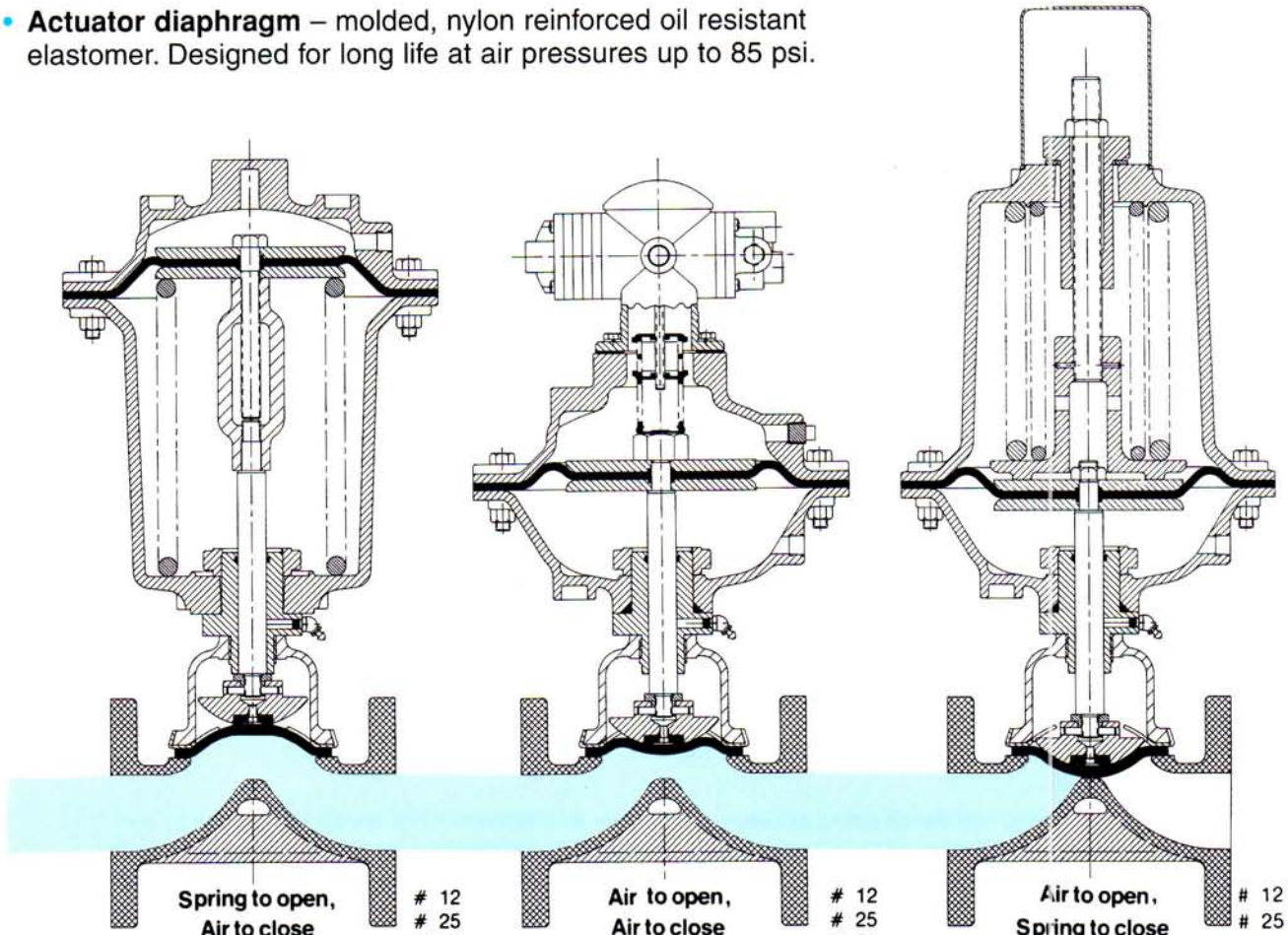
VALVE DIAPHRAGM
Diaphragms are molded closed to reduce required closing forces, give longer life and provide drop tight closure without stretching or distortion.

BODY - All Dia-Flo materials.

DIA-FLO® Diaphragm Valves

Additional Features include:

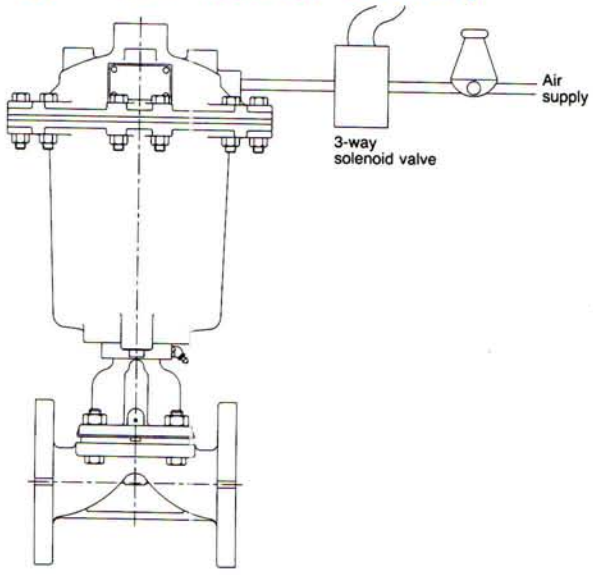
- **Compact** – close-coupled actuators combine minimum space with maximum economy.
- **Rugged** – aluminum or ductile iron motor cases provide maximum strength.
- **Low maintenance** – only diaphragm and "O" rings need occasional replacement.
- **Efficiency** – seven interchangeable actuator sizes allow maximum efficient use of available power.
- **Minimum number of parts** – enclosed and protected from atmospheric conditions.
- **Adaptability** – suitable for pneumatic or hydraulic operation in various pressure ranges.
- **Accessories** – wide variety available, includes: handwheel closing device, positioner, adjustable travel stop, position indicator, adjustable opening stop, limit switches and proximity switches.
- Can be mounted on any manual valve body already in use.
- **Actuator diaphragm** – molded, nylon reinforced oil resistant elastomer. Designed for long life at air pressures up to 85 psi.



Pneumatic Actuator Operation

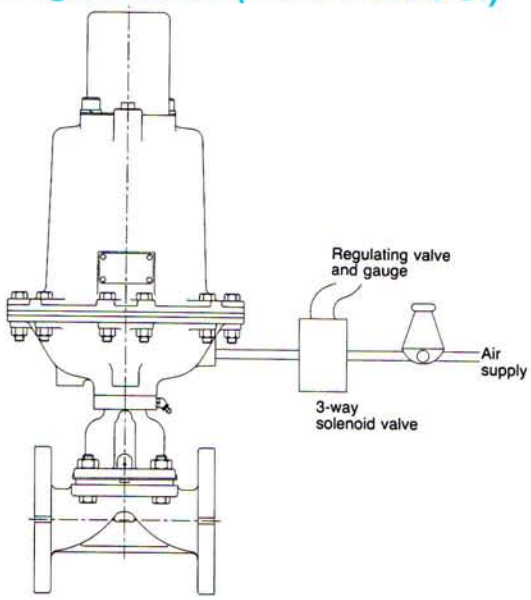
The following schematics show several ways on-off control can be accomplished. More specific information can be supplied for individual requirements. Water pressure may be used in most cases in place of compressed air, except in pre-load or positioner systems.

Spring to open (on-off Control)



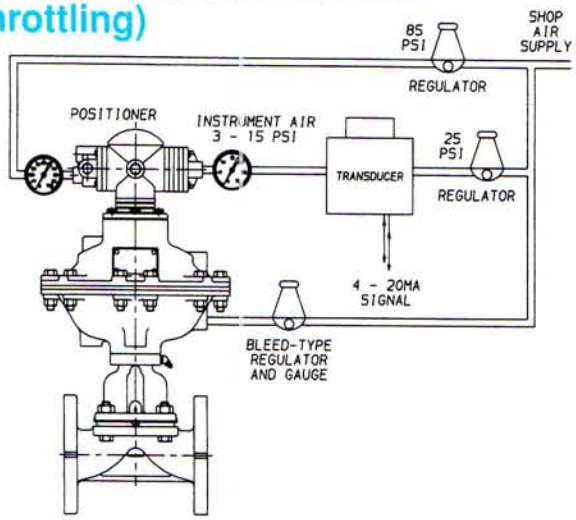
This actuator is designed to operate from a normally open position. The valve is closed when a normally closed, 3-way solenoid operated valve allows air to pass into the motor's upper chamber; the spring will open the valve when the air is released.

Spring to close (on-off control)



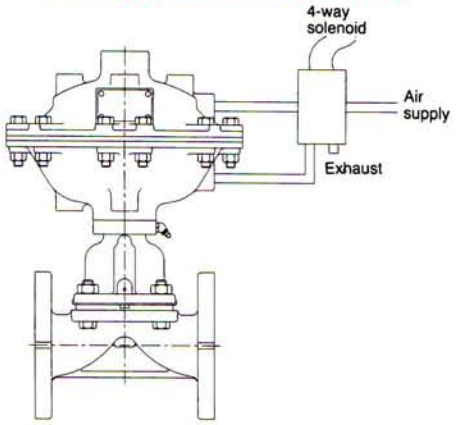
This actuator is designed to operate from a normally closed position. The valve is opened when air passes through a normally closed, 3-way solenoid operated valve into the lower chamber of the air motor. This air pressure will lift and hold the diaphragm valve in a partially or fully open position until the air is released. The spring then closes the valve.

Double acting (automatic throttling)



Dia-Flo® control valves supplied with double acting actuators are normally supplied with single acting positioners such as a Conoflow GC31. To function properly an air cushion of 10 psig is required in the lower chamber. This can be accomplished by the use of a bleed-type regulator, such as a Conoflow GH04, installed as indicated above. The cushion pressure must be added to the pressure required to close which can be determined from graphs on pages 33-36, 40-42 and 43-45.

Double acting (on-off control)



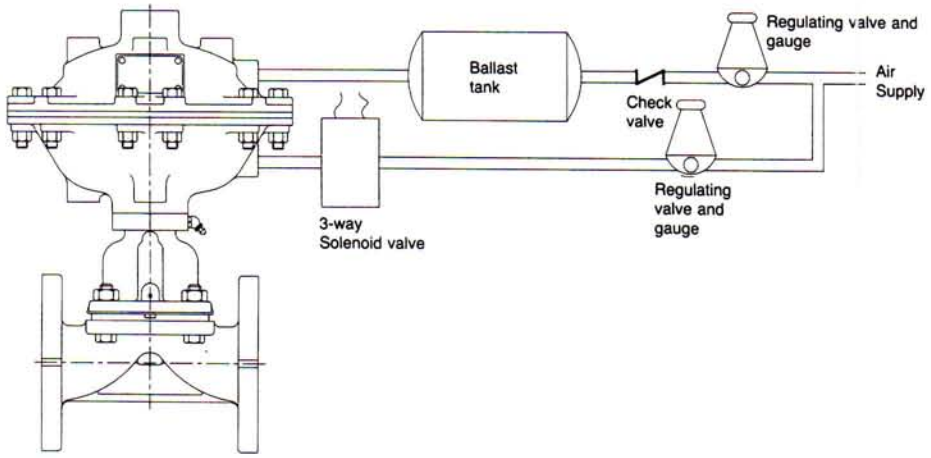
The air chambers in this double-acting actuator are usually controlled by a single 4-way solenoid operated valve which admits air into one chamber while removing air from the other, either opening or closing the valve. A typical arrangement is shown.

Two 3-way solenoid operated valves may be used, operated simultaneously so that each controls a separate air chamber in place of the 4-way.

Double acting (preload to close – on-off control)

Preloading double acting actuator provides an "air spring" which closes the valve in the event of an air or power failure. In these systems sufficient air is admitted into the upper chamber to close the valve against line pressure. This air is trapped by a soft seated check valve. The main valve is opened by admitting air into the lower chamber at a greater pressure than the trapped air. Releasing the air from the lower chamber would allow the trapped air to close the valve.

Additional volume is added to the upper chamber to minimize pressure build-up, requiring less pressure in the lower chamber to open the valve. The additional air volume is provided by an external "ballast" tank. If additional air is required to keep the valve closed after air failure, an air inlet valve similar to that used on automobile tires may be employed. If care is taken when making pipe joints, air pressure will hold up for at least 12 hours.



Preload tank size determination

A preload to close tank size is dependent on the volume of the upper chamber of the actuator, air pressure required to close the valve against known line pressure and available operating air pressures. These values are used in the relationship of Boyles' Law: $P_1 V_1 = P_2 V_2$

In which:

P_1 = absolute pressure required to close from charts pages 29 & 31 (add 14 7 psi to go from gage to absolute.)

V_1 = volume of upper chamber of air motor, valve closed, plus that of tank.

P_2 = gage pressure available plus 14.7 psi less 2 psi (to account for friction losses).

V_2 = volume of upper chamber of air motor, valve open, plus that of tank.

Example:

A 2" Dia-Flo® Diaphragm Valve, Grade M (EPDM) is used to control 100 psig line pressure with a –3325 Air Motor (air to open, air to close). Available operating air pressure is 30 psig. What size preload tank is required for this operation?

Solution:

P_1 = 18 psig (chart C – page 30) + 14.7.

V_1 = 85.1 cu. in. (internal dimension chart page 78) + X (volume of tank).

P_2 = 30 psig (available operating pressure) + 14.7 – 2.

V_2 = 13.4 cu. in. (internal dimension chart page 78) + X (volume of tank).

Substitute into formula:

P_1 = 18 psig + 14.7 = 32.7 psia

V_1 = 85.1 cu. in. + X

P_2 = 30 psig + 14.7 – 2 = 42.7 psia

V_2 = 13.4 cu. in. + X

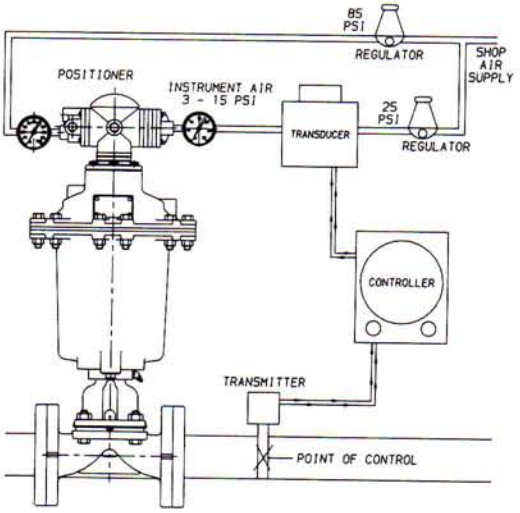
$(32.7)(85.1 + X) = 42.7(13.4 + X)$

$2800 + 32.7X = 570 + 42.7X$

$10X = 2230$

X = 223 cu. in. or 1 gal. tank is needed (one gal. = 231 cu. in.)

Spring to open (automatic throttling)

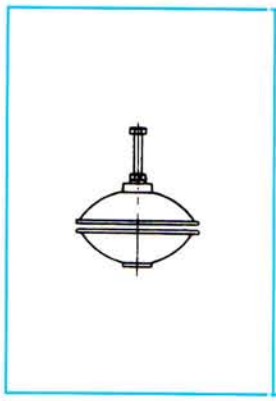


Dia-Flo® Pneumatic Actuators

Dia-Flo pneumatic actuators, when supplied with positioners, maintain accurate throttling of flow, pressure, temperature, liquid level, and various other control requirements. The function of a positioner is to control the position of the valve in accordance with pre-determined requirements set by a control instrument and transmitted to the positioner in the form of an air signal. (Most commonly a 3-15 psi range.)

A transmitter is installed at the point of control. This transmitter senses the requirement within the line and sends an electrical signal to the controller which is set to give required flow. The controller interprets this signal and sends a 4-20 milliamp (ma) signal to the transducer. The transducer converts the ma signal to a comparable air signal of 3-15 psi and sends it to the positioner, allowing supply air in and out of the topworks for throttling the valve according to system requirements.

Actuator Accessories



Adjustable opening stop

The external threaded bolt can be adjusted to limit the opening of the valve. In an emergency the valve can also be closed with this device.

Available on 3100, 3200 & 3300 series actuators

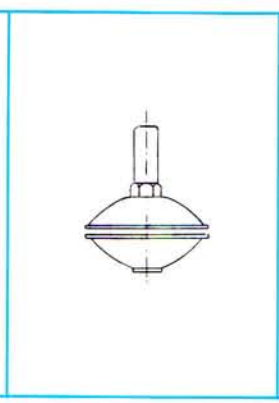
Suffixes:
3116 and smaller: TOHC
3216 and smaller: TOWO
3316 and smaller: TOHC
3X25 and larger: AO
Old Suffix: W

Handwheel closing device

This accessory will limit the opening of the valve and will manually close the valve. A handwheel is used instead of the wrench operated device shown at left.

Available on 3100 & 3300 series actuators

Suffixes:
3116, 3316 and smaller: TOHC
3125, 3325 and larger: HWC
Old Suffix: V



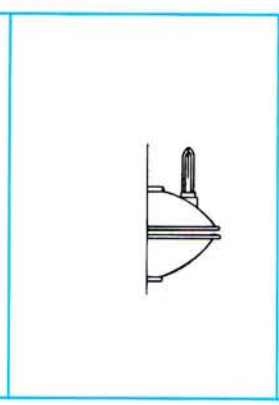
Adjustable travel stop

Field or factory adjustable closing travel stop will prevent over closure of the valve due to the use of excessive air pressure.

Available on 3100 & 3300 series actuators

Standard on 3200 series sizes 25 and up. Optional on 3212 – 3216 model.

Suffix: ATS
Old Suffix: X



Position indicator

Metal rod enclosed in a plastic tube indicates whether the valve is open or closed. Furnished as standard on all valves equipped with positioners. Position indicators can be furnished for field installation if necessary.

Available on all Dia-Flo® air motors.

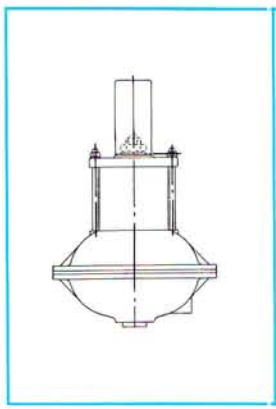
Suffix: P1
Old Suffix: Z

Handwheel opening device

An emergency opening device for spring to close valves.

Available on 3200 series actuators only.

Suffix: HWO
Old Suffix: JH

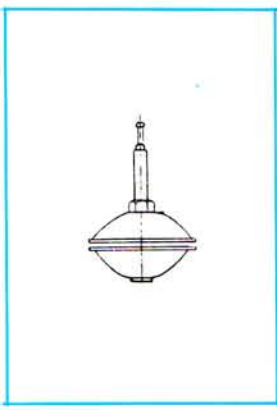


Wrench Opening Device

Identical to the above handwheel opening device except a wrench replaces the handwheel.

Available on 3200 series actuators only.

Suffix: WO
Old Suffix: JW

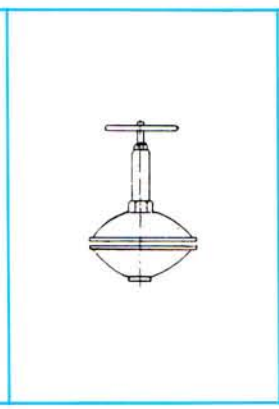


Adjustable opening & adjustable travel stop

Combination device which includes both an opening stop and a closing stop.

Available on 3100, 3200 & 3300 series actuators.

Suffixes:
3116, 3316 and smaller: TOHC
3216 and smaller: TOWO
3125, 3325 and larger: TO
3225 and larger: AO
Old Suffix: Q



Handwheel closing & adjustable travel stop

Similar to the device at the lett except it is adjusted by handwheel rather than by wrench.

Available on 3100 & 3300 series actuators only.

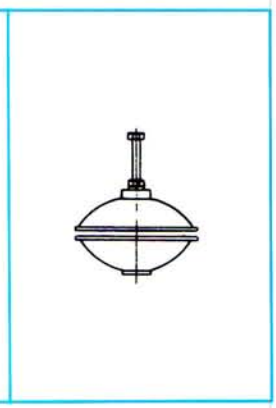
Suffix: TOHC
Old Suffix: VX

Adjustable Opening, Adjustable Travel Stop & Handwheel Closing Device

A combination device which includes an opening stop, closing stop and a handwheel to manually close the valve.

Available on 3100 and 3300 series actuators only.

Suffix: TOHC
Old Suffix: QV



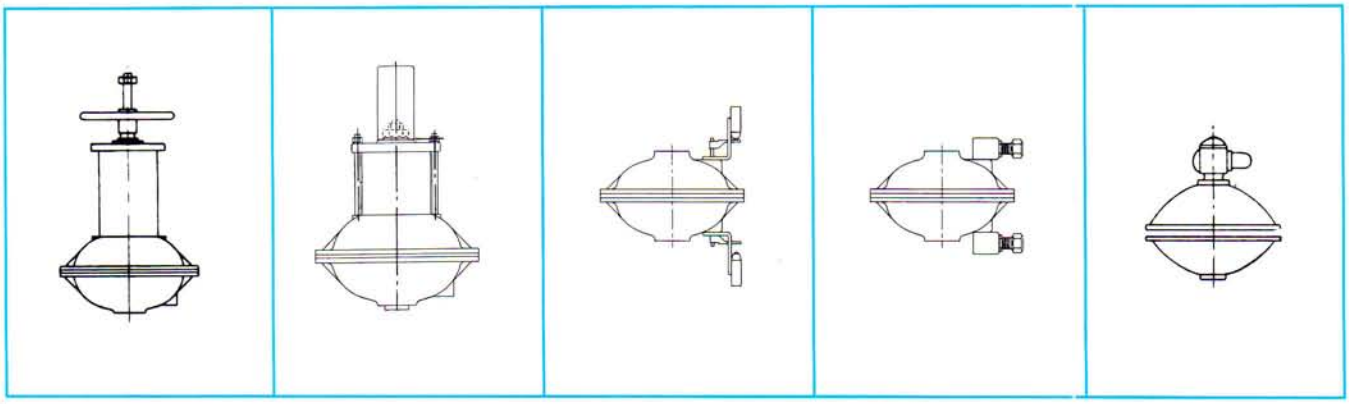
Adjustable Opening Stop & Handwheel Closing Device

A combination device which includes an opening stop and a handwheel to manually close the valve.

Available on 3100 and 3300 series actuators only.

Suffixes:
3116, 3316 and smaller: TOHC
3125, 3325 and larger: HWC
Old Suffix: WV

DIA-FLO® Diaphragm Valves



Adjustable Opening Stop & Handwheel Opening Device

A combination device which includes an opening stop and a handwheel to manually open the valve.

Available on 3200 series actuators only.

Suffix: TOHO
Old Suffix: W-JH

Adjustable Opening Stop & Wrench Opening Device:
Identical to the device at the left above except a wrench is utilized to open the valve instead of a handwheel. Available on 3200 series actuators only.

Suffix: TOWO
Old Suffix: W-JW

Contact limit switches

Available in all NEMA standards. In most cases Limit Switches can be field installed.

Proximity Switches also available.

Suffix:
Choice of 7 switches, LS1-LS7. See Below.
Old Suffix: R, S or T

Proximity limit switches

Available in NEMA enclosures, U/L and CSA approval and with poned leads. In many cases can be field mounted or retrofitted to valves with contact switches.

Suffix:
Choice of 5 switches, LS8-LS12. See Below.
Old Suffix: R, S or T

Positioner (Moore & Conoflow)

For automatic throttling control. Box type positioners for side mounting require a yoke type bonnet.

Suffix: Choice of 4 standard positioners, PR1-PR4
Old Suflix:
*YC (Conoflow)**
YM (Moore)

*Conoflow Positioners to be used with valve sizes 1½" and larger only.

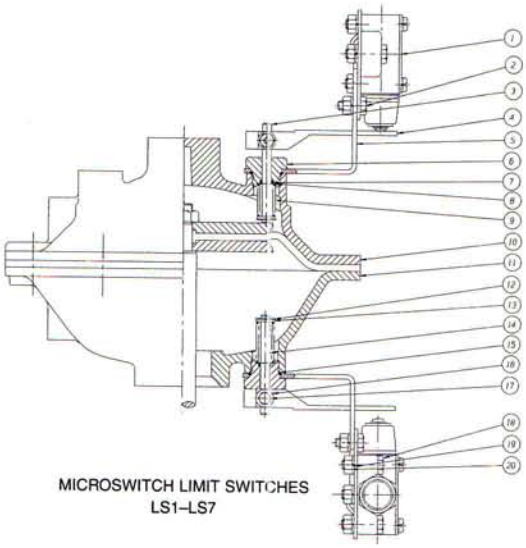
Limit Switches (Block Y)

Code	Description	Contacts	Nema Class
LS1	Micro BZE6-2RN	SPDT	1
LS2	Micro BAF1-2RN	SPDT	3, 4, 13
LS3	Micro DTE6-2RN	DPDT	1
LS4	Micro DTF2-2RN	DPDT	3, 4, 13
LS5	Micro EXQ	SPDT	7 & 9
LS6	Micro EXDQ	DPDT	7 & 9
LS7	Micro LSA1A	SPDT	4
LS8	Westlock 3479 Model 3	SPDT	4, 4X, 7 & 9
LS9	GO 74-13528-A1	SPDT	1, 3, 4
LS10	Namco EA700-80100	DPDT	4
LS11	Westlock E3479 Model 3	SPDT	4, 4X, 7 & 9
LS12	Namco EA170-34100/35100	DPDT	4

Positioners (Block AA)

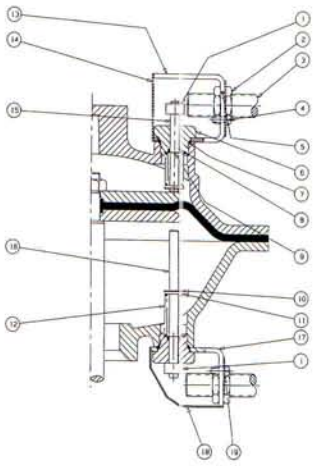
Code	Description	Actuator Model
PR1	Conoflow Model 31*	3100, 3300
PR2	Conoflow Model 33*	3200
PR3	Moore 73NF	3100, 3300
PR4	Moore 73 NB	3200

Limit Switches



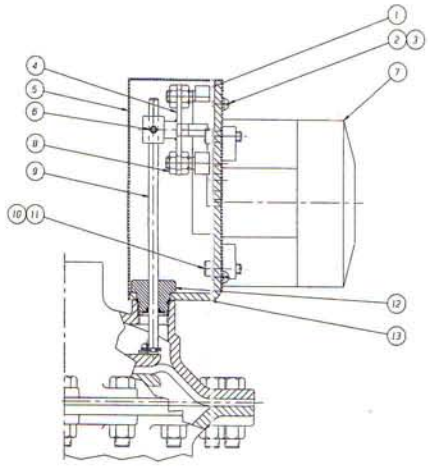
MICROSWITCH LIMIT SWITCHES
LS1–LS7

LIST OF PARTS			
ITEM	DESCRIPTION	MATERIAL	QTY.
1	Switch, Limit – Model #BAF1	–	2
2	Screw, Hex. Hd. Cap	Steel	4
3	Rod, Operating	Stainless Steel	1
4	Switch, Actuator	Steel	2
5	Bracket, Switch Mounting	Steel	2
6	Guide, Rod	Brass	2
7	O-Ring Dash No. 010	Buna-N	2
8	Ring, Retaining	Steel	2
9	Spring #90	Steel	2
10	Cover, (Upper)	Aluminum	1
11	Cover, (Lower)	Aluminum	1
12	Ring, Retaining	Steel	2
13	Washer, Plain	Steel	2
14	Rod, Operating	Stainless Steel	1
15	O-Ring Dash No. 115	Buna-N	2
16	Washer, Plain	Steel	2
17	Screw, Machine Hex. Hd.	Steel	2
18	Screw, Hex. Hd. Cap	Steel	6
19	Washer, Lockspring	Steel	10
20	Nut, Hex.	Steel	10



PROXIMITY LIMIT SWITCHES

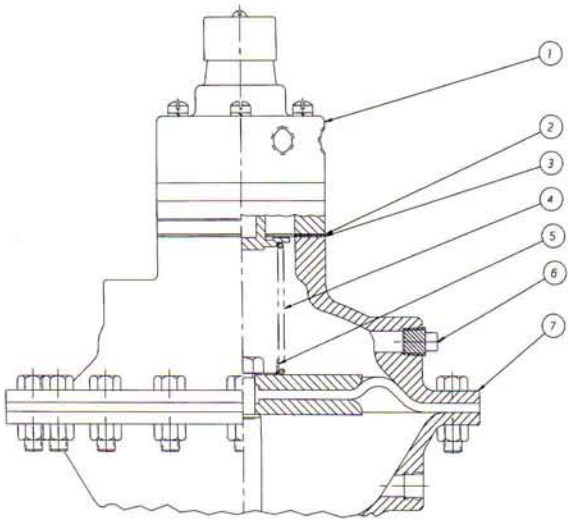
LIST OF PARTS			
ITEM	DESCRIPTION	MATERIAL	QTY.
1	Collar, Set	Steel	2
2	Nut, Hex.	Steel	4
3	Switch, Proximity	–	2
4	Screw, Rd. Hd. Mach.	Steel	4
5	Insert, Switch, Proximity	Steel	2
6	Guide, Rod	Brass	2
7	O-Ring Dash #115	Buna-N	2
8	O-Ring #010	Buna-N	2
9	Ring, Retaining	Steel	2
10	Ring, Retaining	Steel	2
11	Washer, Plain #10	Steel	1
12	Spring #90	Steel	2
13	Bracket, Switch Mounting	Steel	1
14	Cover, Bracket	Steel	1
15	Rod Operating	Stainless Steel	1
16	Rod Operating	Stainless Steel	1
17	Bracket, Switch	Steel	1
18	Cover, Bracket	Steel	1
19	Washer, Springlock	Steel	4



WESTLOCK MODULE 3 PROXIMITY SWITCH
LS8, LS11

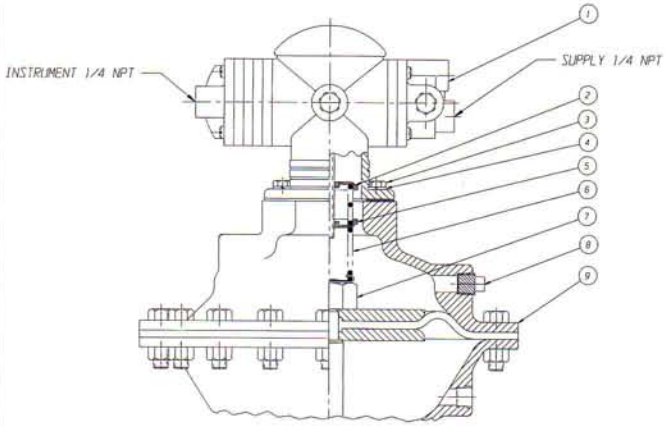
LIST OF PARTS			
ITEM	DESCRIPTION	MATERIAL	QTY.
1	Trigger, Module-3 Hex. Hd.	Steel	2
2	Screw, Rd. Hd. Machine	Steel	4
3	Washer, Springlock	Steel	4
4	Actuator, Switch	Steel	1
5	Cover, Bracket	Steel	1
6	Screw, Set Soc. Hex.	Stainless Steel	1
7	Westlock #3479 Proximity Switch	–	1
8	Nut, Hex. Jam	Stainless Steel	4
9	Rod, Operating	Stainless Steel	1
10	Screw, Hex. Soc. Hd.	Steel	4
11	Washer, Springlock	Steel	4
12	Guide, Rod	Brass	1
13	Bracket, Switch	Steel	1

Positioners



MOORE POSITIONER
PR3 OR PR4
MAY BE USED ON
ALL VALVE SIZES.

LIST OF PARTS			
ITEM	DESCRIPTION	MATERIAL	QTY.
1	Positioner, Moore	–	1
2	Ring, Diaphragm Modification	Brass	1
3	Gasket	Composition	1
4	Spring, Range	Steel	1
5	Spring Centering Device	Brass	1
6	Plug, Pipe Sq. Hd.	Steel	1
7	Cover, Actuator	Aluminum	1



CONOFLOW POSITIONER
PR1 OR PR2
MAY BE USED ON
VALVE SIZES 1.5" AND
LARGER.

LIST OF PARTS			
ITEM	DESCRIPTION	MATERIAL	QTY.
1	Positioner, Conoflow Commandaire	–	1
2	Clip, Upper Spring	Brass	1
3	Screw, Hex. Hd. Cap	Steel	6
4	Washer, Springlock	Steel	6
5	Clip, Lower Spring	Brass	1
6	Spring, Range	Steel	1
7	Assembly, Lock Nut	Steel	1
8	Plug, Pipe	Steel	1
9	Cover, Actuator (Upper)	Aluminum	1

Actuator Sizing for Dia-Flo® Diaphragm Valves

The following information is necessary to properly size Dia-Flo® Diaphragm Valve Actuators.

1) Line Pressure: The fluid pressure in the pipeline against which the actuator must close the valve and remain leaktight.

2) Operating Pressure* or Electrical Requirements: The air or hydraulic pressure or Nema enclosure, amperage, phase and electrical voltage, available to power the actuator.

*When pressure available for actuator exceeds required pressure to close valve, either the actuator should be supplied with a travel stop (closing travel limit) or pressure should be regulated down.

3) Pressure Drop: Two pressure drop conditions are recognized in industry for the purpose of valve selection. These are specified as either 0% or 100% Δ P (delta-P).

The system condition for 0% pressure drop applies when a valve is being closed against a maintained pressure on the inlet and outlet of the valve. (Figure A)

A second condition exists when the valve is closed before line pressure is applied to the inlet of the valve or if the valve has pressure on the inlet and outlet in the open position and as the valve closes, the pressure on the outlet reduces to no or low line pressure. (Figure B)

4) Valve Diaphragm Type: The valve diaphragm material can directly affect the required amount of thrust needed to shut a valve. Sizing charts are provided for both elastomer and PTFE diaphragms at both 100% or 0% Δ P.

5) Actuator Type: Fail closed, fail open or double acting. Available for both weir and straightway types.

6) Valve Size: Usually the same as the bore of the pipeline, in some cases the valve size is intentionally smaller to reduce flow thru the pipeline.

7) Valve Body Style: A choice of weir type or straightway are available.

8) On/Off or Control: The weir type valve is suitable for on/off and throttling applications. If control or throttling is required refer to Pg. 53-56 for the Guide to Selecting a Dualrange® Control Valve.

9) Size Range: With the variety of actuator sizes available, optimum selection can be made to match body style, line pressure, operating pressure and Δ P.

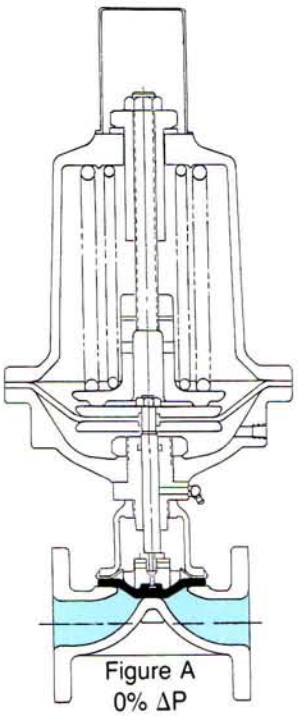


Figure A
0% ΔP

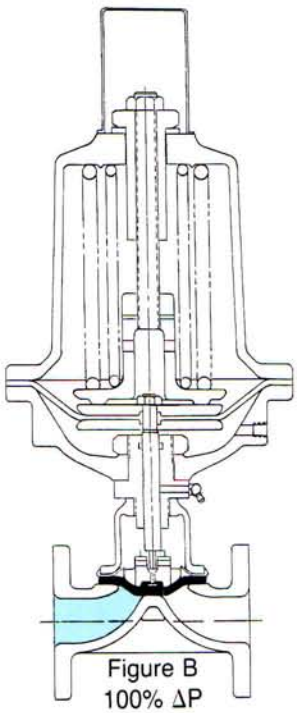


Figure B
100% ΔP

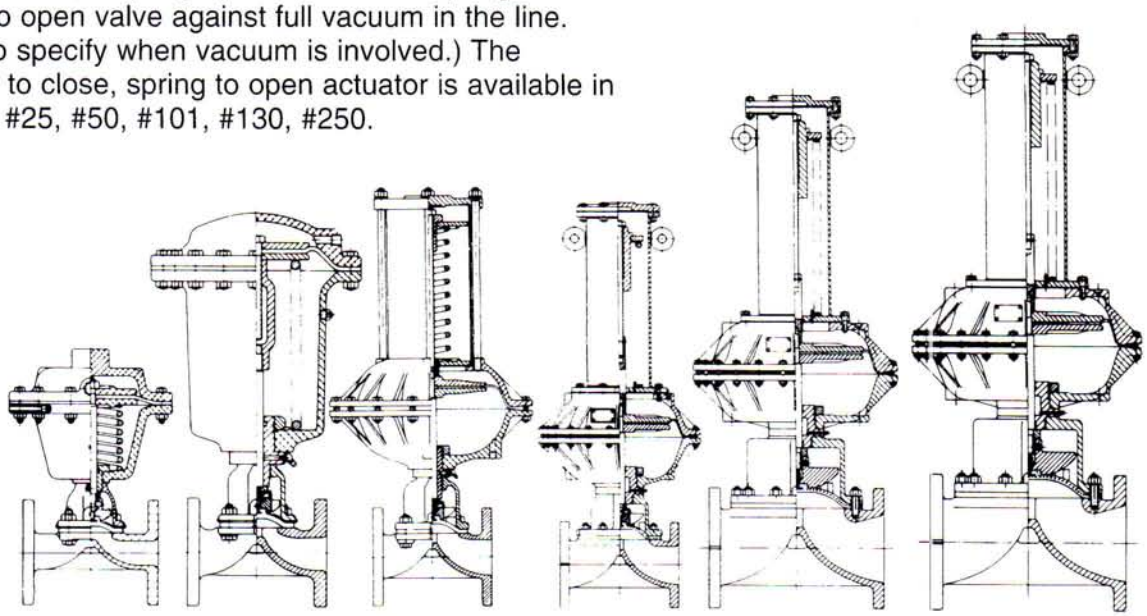
Direct acting actuators

3100 Series

0% Δp

Air to close, spring to open

Air pressure on the top side of the actuator diaphragm closes the valve; a spring opens the valve. Springs are available to open valve against full vacuum in the line. (Be sure to specify when vacuum is involved.) The Dia-Flo air to close, spring to open actuator is available in sizes #12, #25, #50, #101, #130, #250.



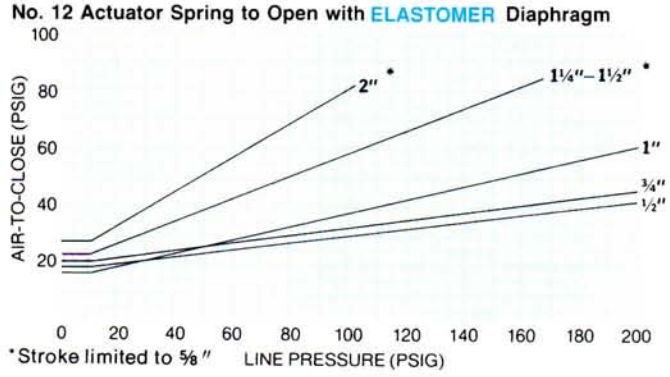
#12 #25 #50 #101 #130 #250

Air requirements for weir type valves

Based on 0% Pressure Drop

Chart A

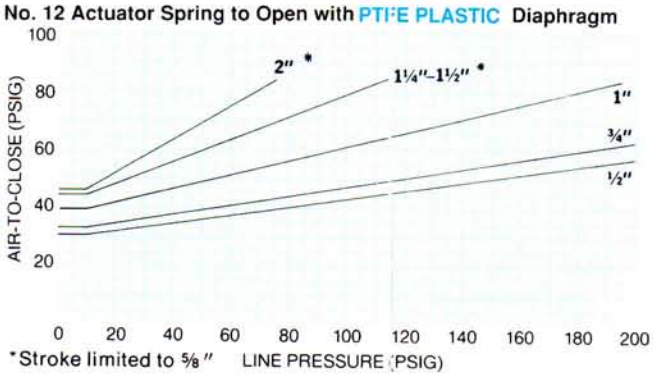
No. 12 Actuator Spring to Open with ELASTOMER Diaphragm



*Stroke limited to ⅝"

Chart B

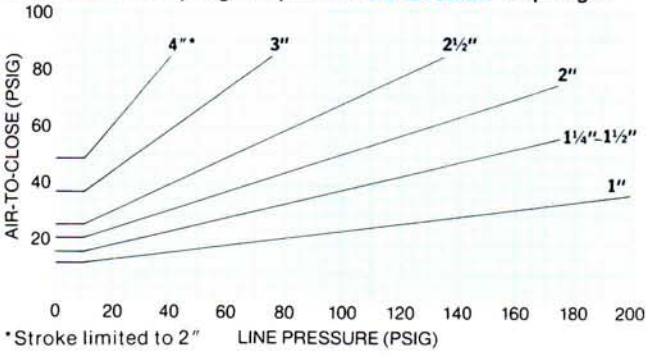
No. 12 Actuator Spring to Open with PTFE PLASTIC Diaphragm



*Stroke limited to ⅝"

Chart C

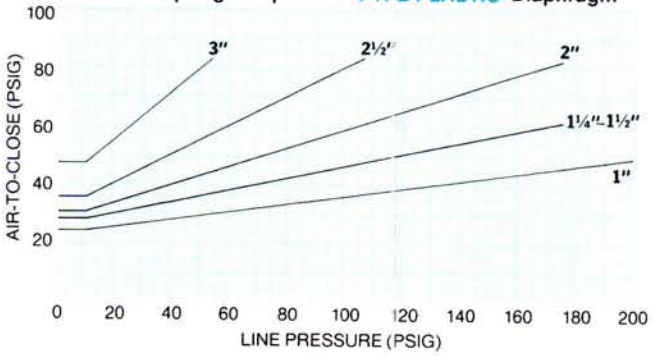
No. 25 Actuator Spring to Open with ELASTOMER Diaphragm



*Stroke limited to 2"

Chart D

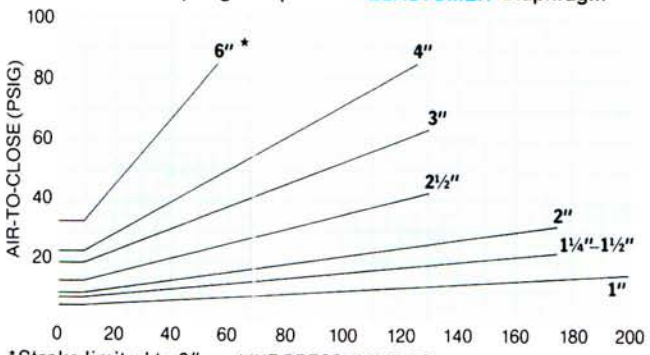
No. 25 Actuator Spring to Open with PTFE PLASTIC Diaphragm



3100 Series

0% Δp

Chart E
No. 50 Actuator Spring to Open with ELASTOMER Diaphragm



*Stroke limited to 3" LINE PRESSURE (PSIG)

Chart F
No. 50 Actuator Spring to Open with PTFE PLASTIC Diaphragm

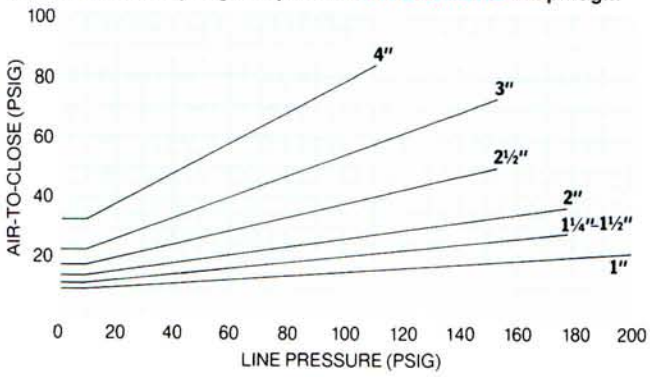
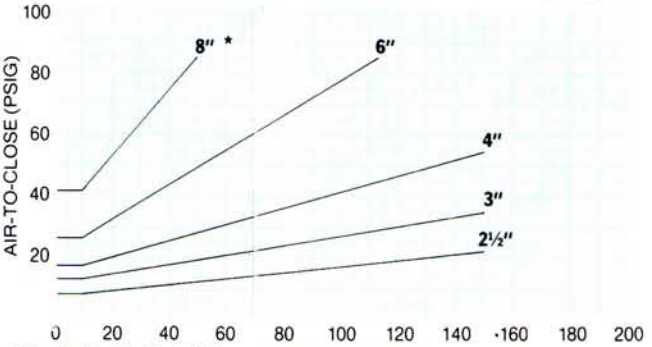
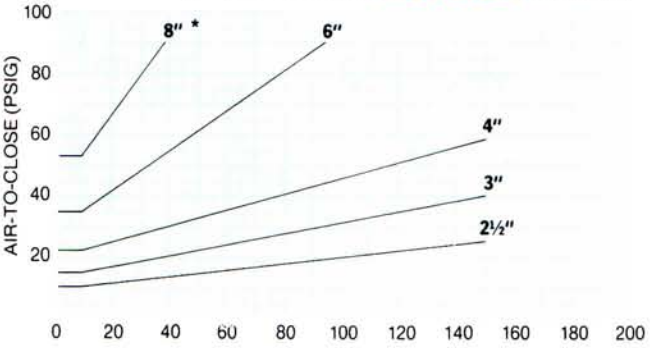


Chart G
No. 101 Actuator Spring to Open with ELASTOMER Diaphragm



*Stroke limited to 3⅛" LINE PRESSURE (PSIG)

Chart H
No. 101 Actuator Spring to Open with PTFE PLASTIC Diaphragm



*Stroke limited to 3⅛" LINE PRESSURE (PSIG)

Chart I
No. 130 Actuator Spring to Open with ELASTOMER Diaphragm

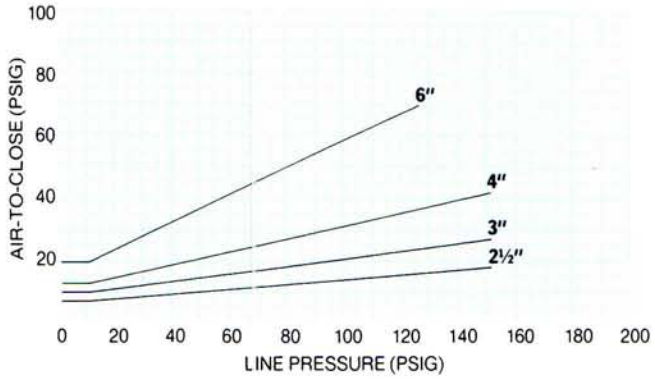


Chart J
No. 130 Actuator Spring to Open with PTFE PLASTIC Diaphragm

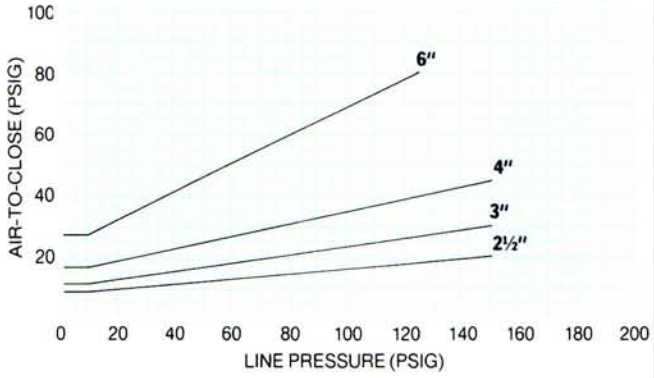
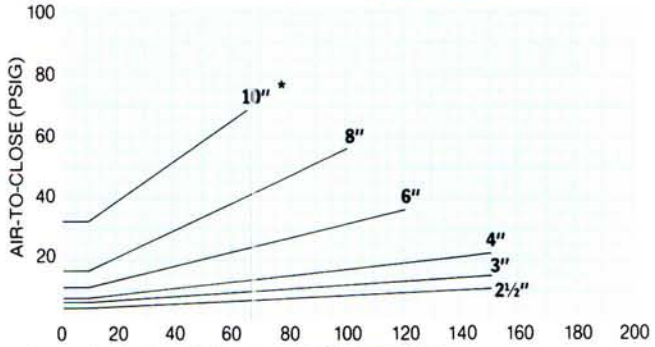
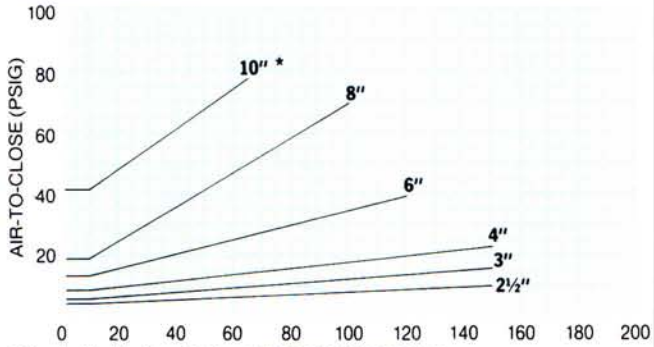


Chart K
No. 250 Actuator Spring to Open with ELASTOMER Diaphragm



*Stroke limited to 4⅝" LINE PRESSURE (PSIG)

Chart L
No. 250 Actuator Spring to Open with PTFE PLASTIC Diaphragm



*Stroke limited to 4⅝" LINE PRESSURE (PSIG)

ACTUATION & CONTROL

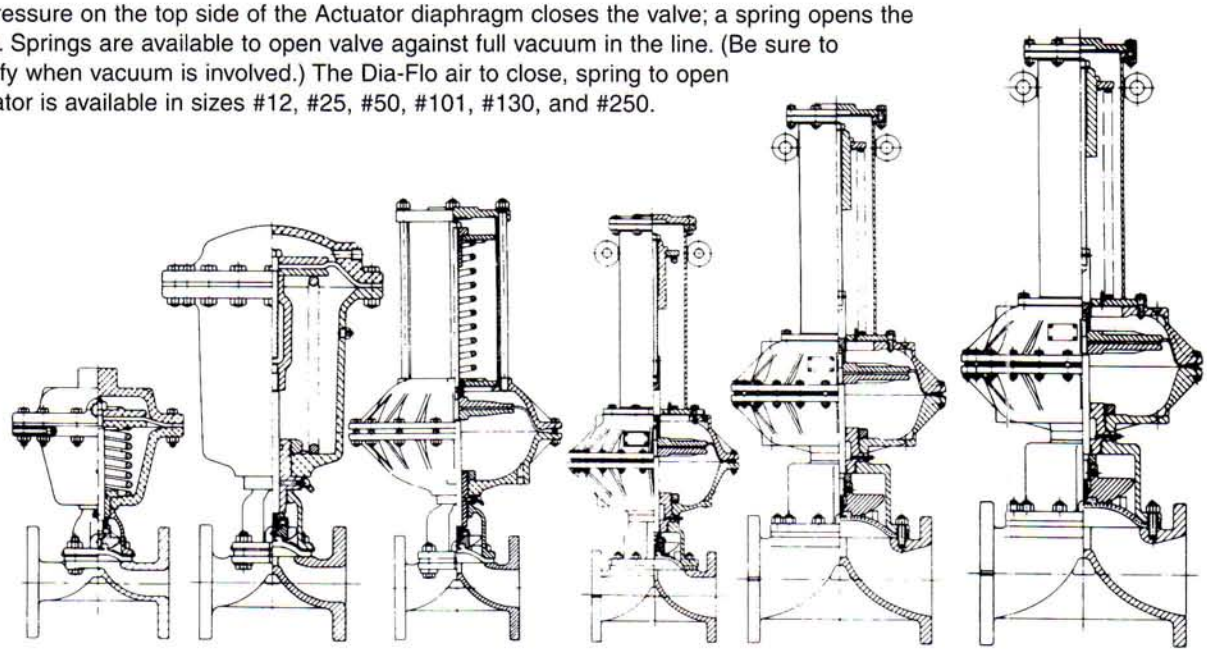
Direct acting actuator

3100 Series

100% Δp

Air to close, spring to open

Air pressure on the top side of the Actuator diaphragm closes the valve; a spring opens the valve. Springs are available to open valve against full vacuum in the line. (Be sure to specify when vacuum is involved.) The Dia-Flo air to close, spring to open Actuator is available in sizes #12, #25, #50, #101, #130, and #250.



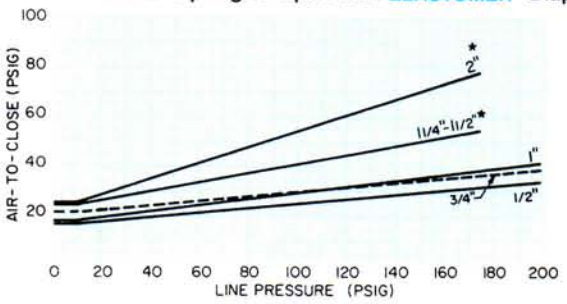
#12 #25 #50 #101 #130 #250

Air requirements for weir type valves

Based on 100% Pressure Drop

Chart A

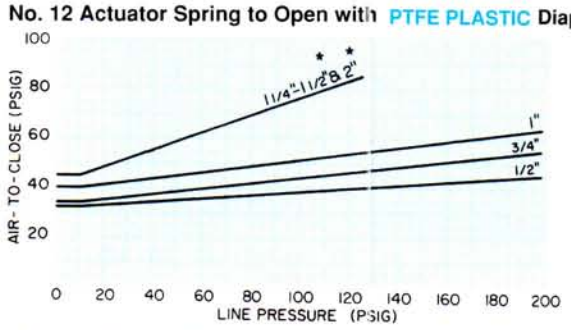
No. 12 Actuator Spring to Open with ELASTOMER Diaphragm



*Stroke limited to 5/8"

Chart B

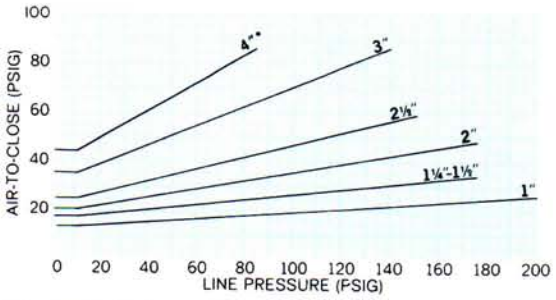
No. 12 Actuator Spring to Open with PTFE PLASTIC Diaphragm



*Stroke limited to 5/8"

Chart C

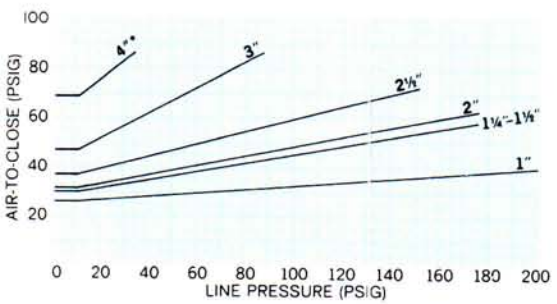
No. 25 Actuator Spring to Open with ELASTOMER Diaphragm



*Stroke limited to 2"

Chart D

No. 25 Actuator Spring to Open with PTFE PLASTIC Diaphragm

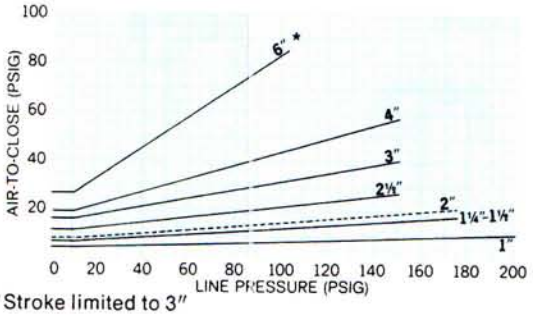


*Stroke limited to 2"

Direct acting actuators
Air to close, spring to open

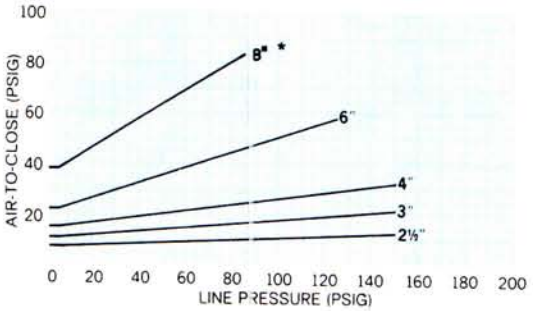
3100 Series
100% Δp

Chart E
No. 50 Actuator Spring to Open with ELASTOMER Diaphragm



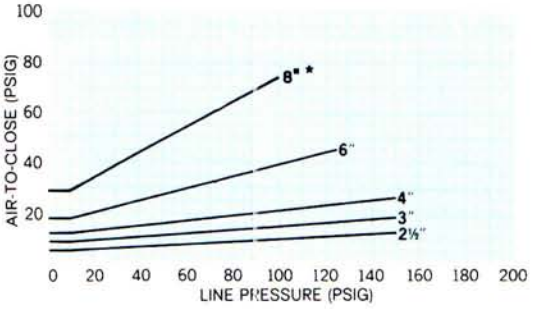
*Stroke limited to 3"

Chart G
No. 101 Actuator Spring to Open with ELASTOMER Diaphragm



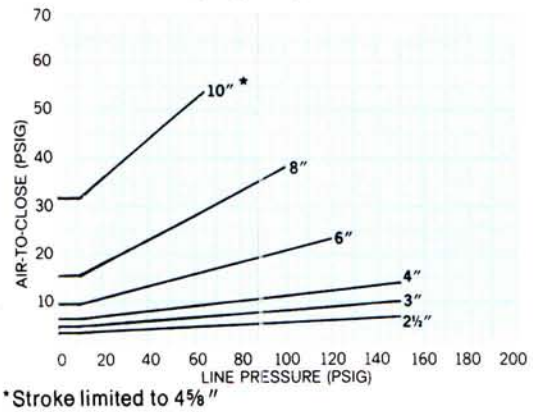
*Stroke limited to 3⅛"

Chart I
No. 130 Actuator Spring to Open with ELASTOMER Diaphragm



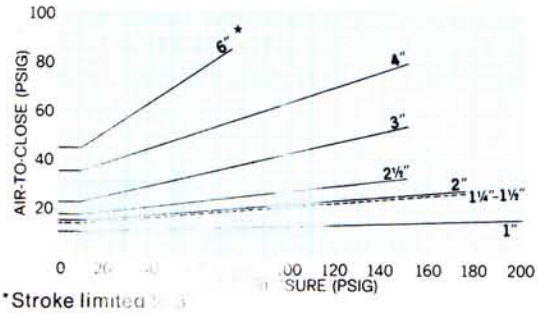
*Stroke limited to 3½"

Chart K
No. 250 Actuator Spring to Open with ELASTOMER Diaphragm



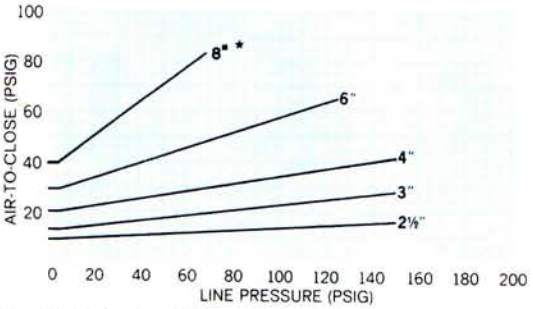
*Stroke limited to 4⅝"

No. 50 Actuator Spring to Open with PTFE PLASTIC Diaphragm



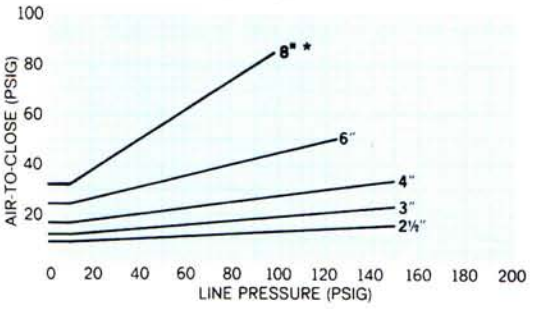
*Stroke limited

Chart H
No. 101 Actuator Spring to Open with PTFE PLASTIC Diaphragm



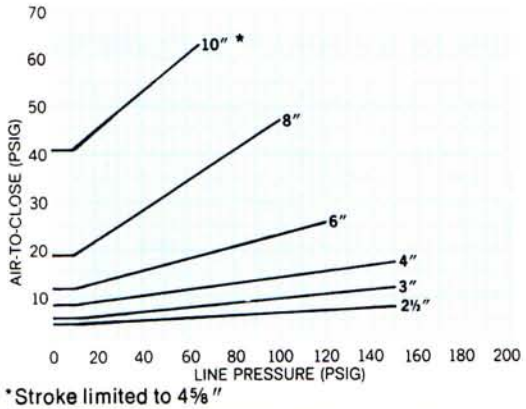
*Stroke limited to 3⅛"

Chart J
No. 130 Actuator Spring to Open with PTFE PLASTIC Diaphragm



*Stroke limited to 3½"

Chart L
No. 250 Actuator Spring to Open with PTFE PLASTIC Diaphragm



*Stroke limited to 4⅝"

For line pressures exceeding the above, consult the ITT Engineered Valves Sales Engineer in your area.

ACTUATION & CONTROL

Reverse acting actuator
Air to open, spring to close

3200 Series
0% Δp

Air pressure on the under side of the actuator diaphragm opens the valve. A spring or set of springs closes the valve. This Dia-Flo air to open – spring to close actuator is available in sizes #12, #25, #50, #75, #101, #130 and #250.

Use chart below to determine size and spring requirements for any application

Diaphragm Material	Actuator Size	Figure Number	Spring Number	Maximum line pressures (psi) @ 0% P.D. (Bubble Tight Shut Off) Weir Type Valves ½"	¾"	1"	1 ¼" & 1 ½"	2"	2 ½"	3"	4"	6"	8"	10"	■ Air Required at Full Stroke @ 0 psi Line
Elastomers	#12	3216	89	25	15	35	10 •								23
		3213	88	160	135	100	35 •	10 •							45
		3214	88 & 89	200	200	145	65 •	30 •							60
	#25	3228	102A	200	200	200	95	40	25						30
		3226	101				165	85	55	20					55
		3227	101 & 102A				175	160	95	45	15				85
	#50	3256	102A			160	70	25	15						17
		3251	101			200	125	60	35						26
		3252	101 & 102A				175	110	65	25					38
	#50L	3253	97			200	170	100	65	30	10				30
		3254	96				175	175	130	70	35	10*			48
		3255	96 & 97						150	120	55	20*			71
	#75	3274	96						125	70	31	12*			29
		3276	96 & 97						150	113	60	22*			42
		3277	97 & 98						150	150	80	30*			47
		3278	96 & 98						150	150	103	39*			63
		3279	96, 97 & 98						150	150	127	44*			76
	#101	32102	96						120	65	35	10			20
		32109	97						55	25	10				10
		32103	98						150	105	55	20			28
		32104	96 & 97						150	110	55	20			30
		32105	96 & 98						150	150	100	35			48
		32106	97 & 98						150	150	80	30			38
		32107	96, 97 & 98						150	150	125	45			58
		32108	130						150	150	150	80	30†		85
	#130	32132	96						120	65	35	10			16
		32131	97						55	25	10				9
		32133	98						150	105	55	20			23
		32134	96 & 97						150	110	55	20			24
		32135	96 & 98						150	150	100	35			39
		32136	97 & 98						150	150	80	30			32
		32137	96, 97 & 98						150	150	125	45			48
		32138	130						150	150	150	80	30**		67
	#250	32253	129						150	150	150	85	26		30
		32252	130						150	150	150	80	22		32
		32251	129 & 130									125	65	25††	62
PTFE (R2)	#12	3213	88	50	20										45
		3214	88 & 89	130	100	45	20•	10•							60
	#25	3228	102A	200	200	105	40	25							30
		3226	101			200	125	70	30						55
		3227	101 & 102A				175	140	70	15					85
	#50	3256	102A			55	15								17
		3251	101			170	60	40	15						26
		3252	101 & 102A			200	170	90	40	10					38
	#50L	3253	97			200	110	80	45	15					30
		3254	96				175	175	105	50	10				48
		3255	96 & 97						150	95	35				71
	#75	3274	96						99	51	11				29
		3276	96 & 97						150	90	40				42
		3277	97 & 98						150	124	62	15*			47
		3278	96 & 98						150	150	86	23*			63
		3279	96, 97 & 98						150	150	111	32*			76
	#101	32102	96						95	45	10				20
		32109	97						35	10					10
		32103	98						150	80	35				28
		32104	96 & 97						150	90	35				30
		32105	96 & 98						150	150	85	20			48
		32106	97 & 98						150	120	60	15			38
		32107	96, 97 & 98						150	150	110	30			58
		32108	130						150	150	150	60	22†		85
	#130	32132	96						95	45	10				16
		32131	97						35	10					9
		32133	98						150	80	35				23
		32134	96 & 97						150	90	35				24
		32135	96 & 98						150	150	85	20			39
		32136	97 & 98						150	120	60	15			32
		32137	96, 97 & 98						150	150	110	30			48
		32138	130						150	150	150	60	22**		67
	#250	32253	129						150	150	150	65	25		30
		32252	130						150	150	150	60	15		32
		32251	129 & 130						150	150	150	125	53	10††	62

•Stroke limited to ⅛"

*Stroke limited to 3"
†Stroke limited to 3⅛"

**Stroke limited to 3½"
††Stroke limited to 4⅛"

■ In vacuum applications additional operating air pressure is required.

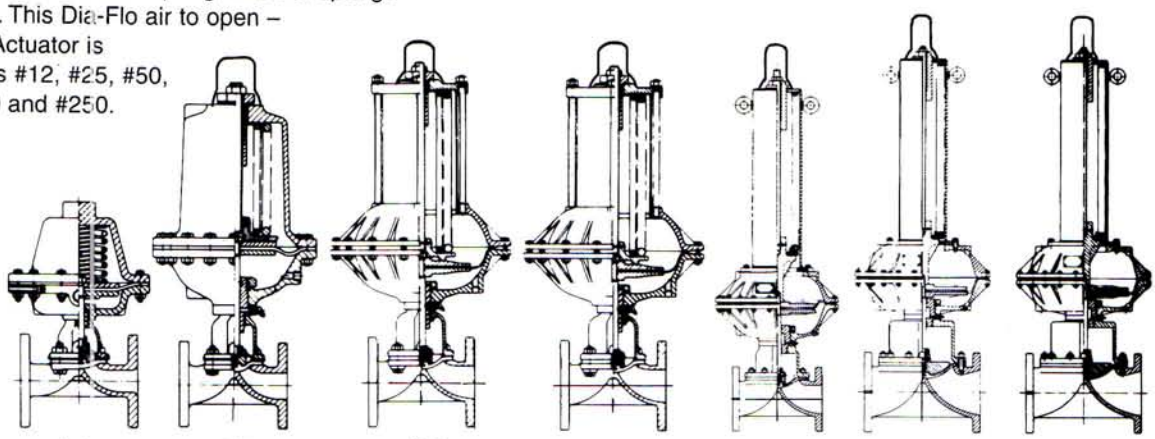
ACTUATION & CONTROL

Reverse acting actuators
Air to open, spring to close

3200 Series

100% Δp

Air pressure on the under side of the actuator diaphragm opens the valve. A spring or set of springs closes the valve. This Dia-Flo air to open – spring to close Actuator is available in sizes #12, #25, #50, #75, #101, #130 and #250.



#12 #25 #50 #75 #101 #130 #250

Use chart below to determine size and spring requirements for any application

Diaphragm Material	Actuator Size	Figure Number	Spring Number	Maximum line pressures (psi) @ 100% P.D. (Bubble Tight Shut Off) Weir Type Valves											Air Required at Full Stroke @ 0 psi Line ■
				½"	¾"	1"	1 ¼" & 1 ½"	2"	2 ½"	3"	4"	6"	8"	10"	
Elastomers (See next page for PTFE diaphragms)	#12	3216	89	60	30	60	25•								23
		3213	88	200	170	165	95•	20•							45
		3214	88 & 89		200	200	150•	55•							60
	#25	3228	102A			200	175	80	50	15					30
		3226	101					165	110	40	10				55
		3227	101 & 102A					175	150	85	35				85
	#50	3256	102A			200	155	45	35						17
		3251	101				175	110	70	20					26
		3252	101 & 102A					175	130	50					38
	#50L	3253	97			200	175	175	130	60	25				30
		3254	96						150	135	70	25††			48
		3255	96 & 97							150	110	40††			71
	#75	3274	96						150	125	70	23††			29
		3276	96 & 97						150	150	120	40††			42
		3277	97 & 98						150	150	150	56††			47
		3278	96 & 98						150	150	150	73††			63
		3279	96, 97 & 98						150	150	150	89††			76
	#101	32102	96						150	125	70	23			20
		32109	97						118	53	22				10
		32103	98						150	150	117	39			28
		32104	96 & 97						150	150	120	40			30
		32105	96 & 98						150	150	150	73			48
		32106	97 & 98						150	150	150	56			38
		32107	96, 97 & 98						150	150	150	89			58
		32108	130						150	150	150	125	46†		85
	#130	32132	96						150	125	70	23			16
		32131	97						118	53	22				9
		32133	98						150	150	117	39			23
		32134	96 & 97						150	150	120	40			24
		32135	96 & 98						150	150	150	73			39
		32136	97 & 98						150	150	150	56			32
		32137	96, 97 & 98						150	150	150	89			48
		32138	130						150	150	150	125	46**		67
	#250	32253	130						150	150	150	125	34		32
		32252	129						150	150	150	125	47		30
		32251	129 & 130						150	150	150	125	100	35*	62

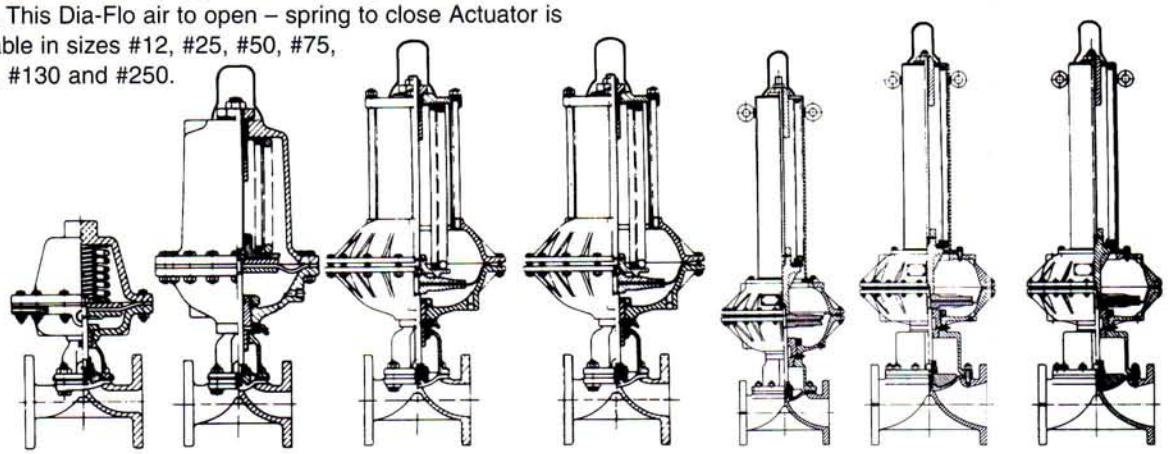
• Stroke limited to 5/16"
* Stroke limited to 4 5/16"
** Stroke limited to 3 1/2"
† Stroke limited to 3 1/4"
†† Stroke limited to 3"

■ In vacuum applications additional operating air pressure is required.

Reverse acting actuators
Air to open, spring to close

3200 Series
100% Δp

Air pressure on the under side of the actuator diaphragm opens the valve. A spring or set of springs closes the valve. This Dia-Flo air to open – spring to close Actuator is available in sizes #12, #25, #50, #75, #101, #130 and #250.



Use chart below to determine size and spring requirements for any applicatIon

Diaphragm Material	Actuator Size	Figure Number	Spring Number	Maximum line pressures (psi) @ 100% P.D. (Bubble Tight Shut Off) Weir Type Valves											■ Air Required at Full Stroke @ 0 psi Line
				½"	¾"	1"	1 ¼" & 1 ½"	2"	2 ½"	3"	4"	6"	8"	10"	
PTFE (R2)	#12	3213	88	50	20										45
		3214	88 & 89	185	115	65	20•	20•							60
	#25	3228	102A	200	200	140	50	30	10						30
		3226	101			200	140	115	60	10					55
		3227	101 & 102A				175	175	130	45					85
	#50	3256	102A			120	25	15							17
		3251	101			200	90	80	30						26
		3252	101 & 102A				175	170	85	20					38
	#50L	3253	97			200	150	135	80	25					30
		3254	96				175	175	150	85	20				48
		3255	96 & 97							150	60	20††			71
	#75	3274	96						150	80	25				29
		3276	96 & 97						150	142	63	17††			42
		3277	97 & 98						150	150	98	33††			47
		3278	96 & 98						150	150	134	48††			63
		3279	96, 97 & 98						150	150	150	65††			76
	#101	32102	96						150	80	25				20
		32109	97						68	21					10
		32103	98						150	133	59	16			28
		32104	96 & 97						150	142	63	17			30
		32105	96 & 98						150	150	134	48			48
		32106	97 & 98						150	150	98	33			38
		32107	96, 97 & 98						150	150	150	65			58
		32108	130						150	150	150	120	38†		85
	#130	32132	96						150	80	25				16
		32131	97						68	21					9
		32133	98						150	133	59	16			23
		32134	96 & 97						150	142	63	17			24
		32135	96 & 98						150	150	134	48			39
		32136	97 & 98						150	150	98	33			32
		32137	96, 97 & 98						150	150	150	65			48
		32138	130						150	150	150	120	38*		67
	#250	32253	130						150	150	150	125	27		32
		32252	129						150	150	150	125	45		30
		32251	129 & 130										88	15**	62

• Stroke limited to ⅝"
† Stroke limited to 3⅛"
* Stroke limited to 3½"
** Stroke limited to 4⅜"
†† Stroke limited to 3"

■ In vacuum applications additional operating air pressure is required.

ACTUATION & CONTROL

Double acting actuators

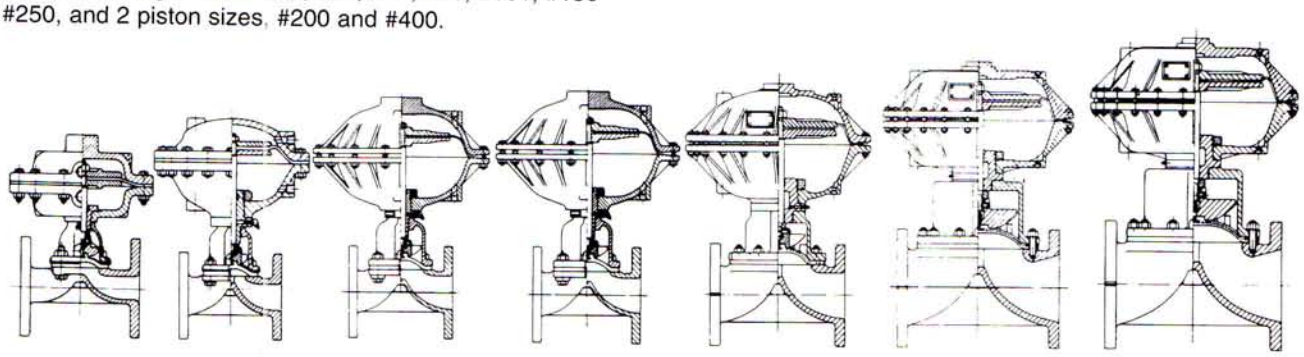
3300 Series

Air to close, air to open

0% Δp

Some processes call for substantial line pressures downstream of the valve, after shut off, from some other pressure source. The extreme condition would be when the downstream pressure is equal to that upstream of the valve. This condition is 0% pressure drop. Double-acting (air to close, air to open) Dia-Flo Actuators are available in seven diaphragm sizes. #12, #25, #50, #75, #101, #130 #250, and 2 piston sizes, #200 and #400.

NOTE: ***If ordering Actuator with positioner, an air cushion regulator will be added to provide 10 PSI in the lower chamber. Therefore add 10 PSI to the "Air-to-close" value for minimum air required.***



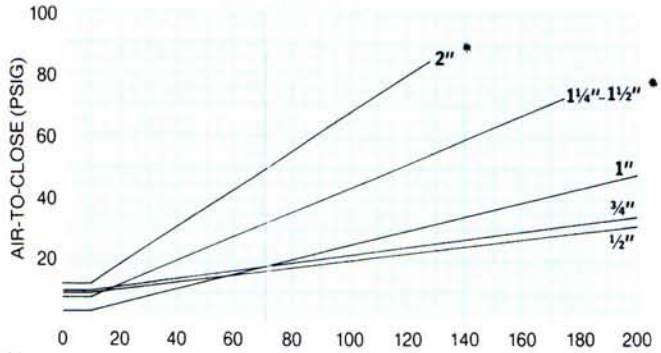
#12 #25 #50 #75 #101 #130 #250

Air requirements for weir type valves

Based on 0% Pressure Drop

Chart A

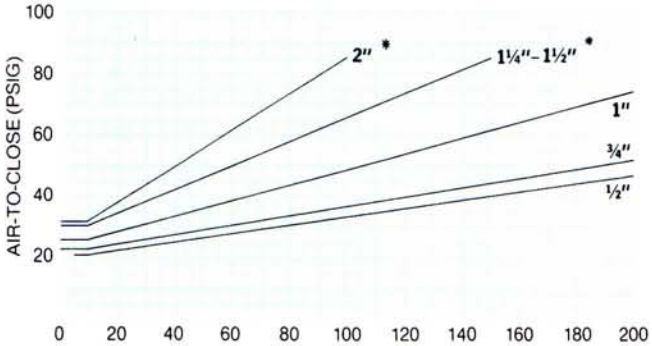
No. 12 Actuator with ELASTOMER Diaphragm



* Stroke limited to ⅝" LINE PRESSURE (PSIG)

Chart B

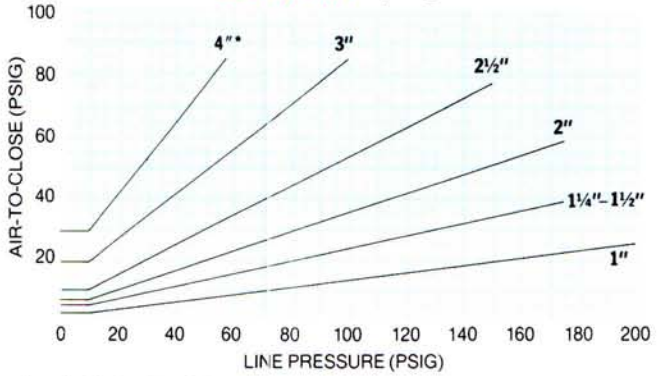
No. 12 Actuator with PTFE PLASTIC Diaphragm



* Stroke limited to ⅝" LINE PRESSURE (PSIG)

Chart C

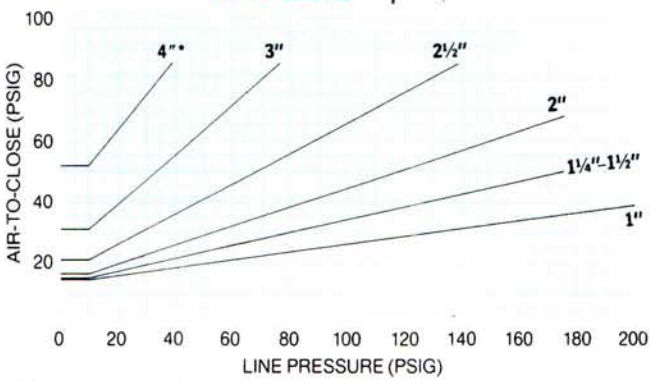
No. 25 Actuator with ELASTOMER Diaphragm



*Stroke limited to 2"

Chart D

No. 25 Actuator with PTFE PLASTIC Diaphragm



*Stroke limited to 2"

Double acting actuators

3300 Series

Air to close, air to open

0% Δp

NOTE: *If ordering Actuator with positioner, an air cushion regulator will be added to provide 10 PSI in the lower chamber. Therefore add 10 PSI to the "Air-to-close" value for minimum air required.*

Chart E
No. 50 Actuator with ELASTOMER Diaphragm

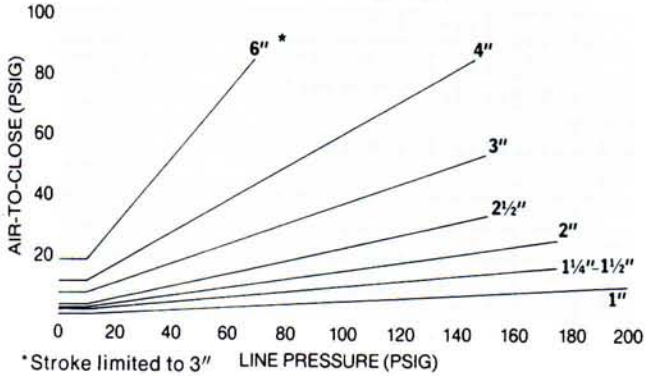


Chart F
No. 50 Actuator with PTFE PLASTIC Diaphragm

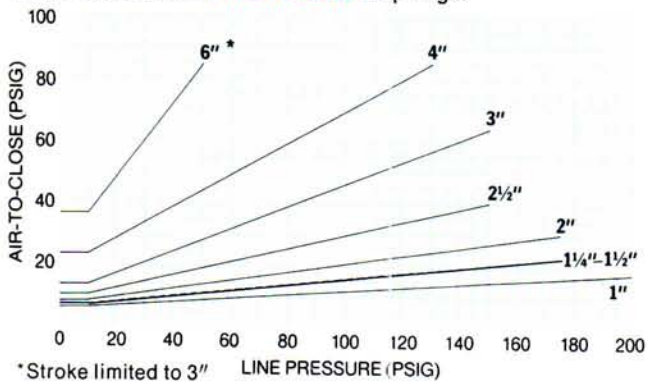


Chart G
No. 75 Actuator with ELASTOMER Diaphragm

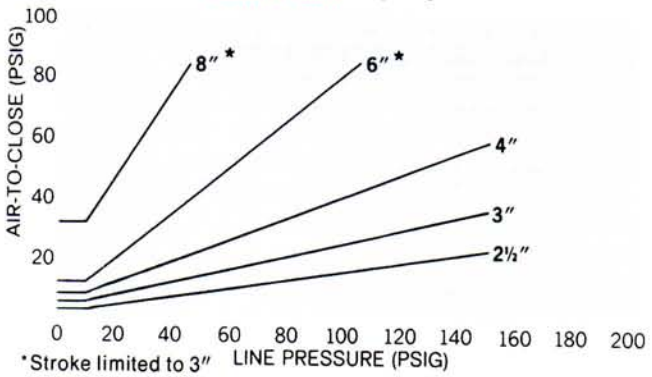


Chart H
No. 75 Actuator with PTFE PLASTIC Diaphragm

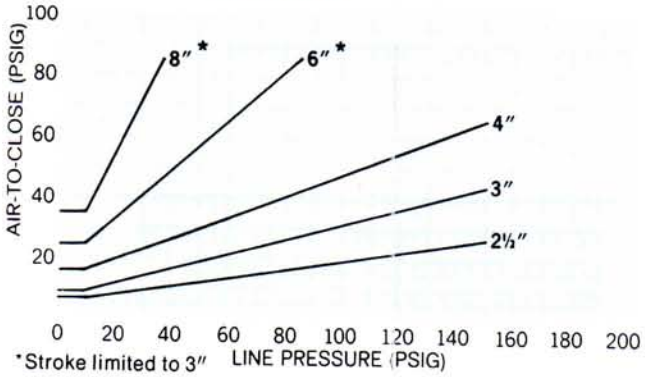


Chart I
No. 101 Actuator with ELASTOMER Diaphragm

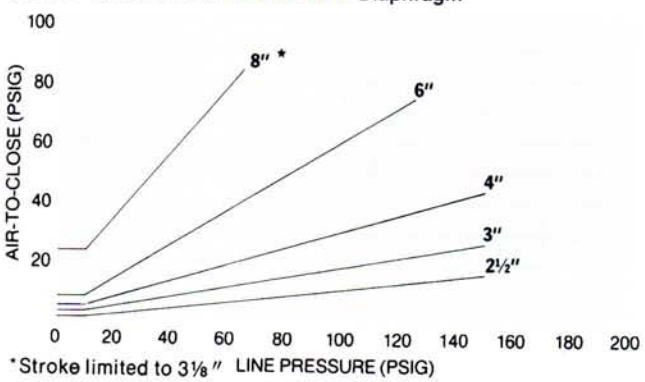
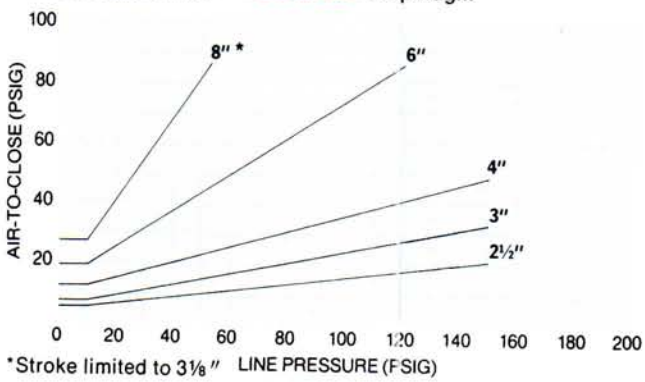


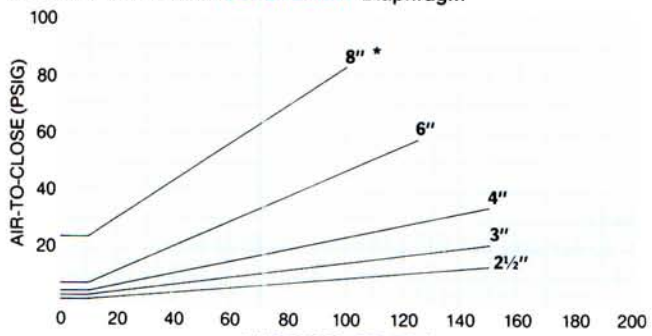
Chart J
No. 101 Actuator with PTFE PLASTIC Diaphragm



Double acting actuators
3300 Series
Air to close, air to open

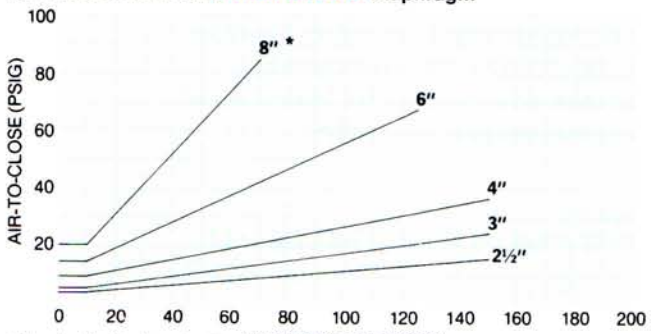
0% Δp

Chart K
No. 130 Actuator with ELASTOMER Diaphragm



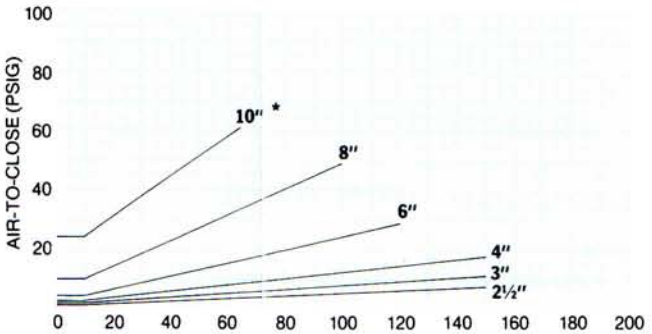
*Stroke limited to 3½" LINE PRESSURE (PSIG)

Chart L
No. 130 Actuator with PTFE PLASTIC Diaphragm



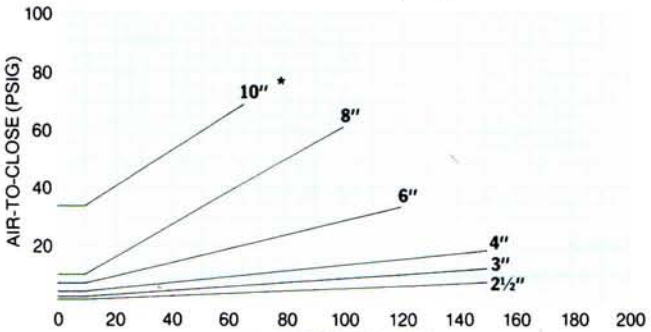
*Stroke limited to 3½" LINE PRESSURE (PSIG)

Chart M
No. 250 Actuator with ELASTOMER Diaphragm



*Stroke limited to 4⅝" LINE PRESSURE (PSIG)

Chart N
No. 250 Actuator with PTFE PLASTIC Diaphragm



*Stroke limited to 4⅝" LINE PRESSURE (PSIG)

NOTE: ***If ordering Actuator with positioner, an air cushion regulator will be added to provide 10 PSI in the lower chamber. Therefore add 10 PSI to the "Air-to-close" value for minimum air required.***

Double acting actuators

3300 Series

Air to close, air to open

100% Δp

Double-acting (air to close, air to open) Dia-Flo Actuators are available in seven diaphragm sizes, #12, #25, #50, #75, #101, #130, and #250; and 2 piston sizes, #200 and #400. The choice of actuator size is determined by the line pressure, the available operating pressure, and the valve stroke. Information provided in this catalog is sufficient for easily determining correct air motor size.
See page 32 for instructions.

Actuator Size	12	25	50	75	101	130	250
Stroke	5/8"	2"	3"	3"	3 1/8"	3 1/2"	4 5/8"

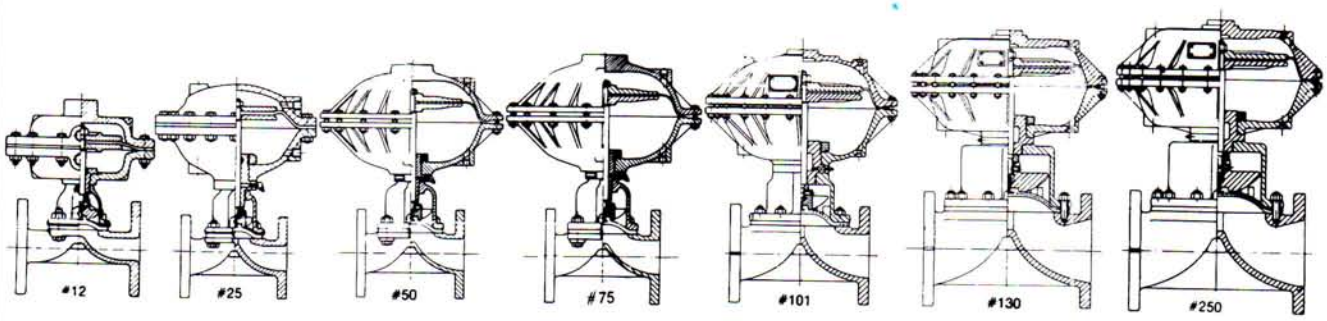
Valve Size	1/2	3/4*	1	1 1/4 & 1 1/2	2	2 1/2	3	4	6	8	10	12
**Stroke	1/4	3/8	1/2	13/16	1 1/8	1 3/8	1 5/8	2 1/8	3 1/8	4 5/8	5 5/8	6 1/2

*Stroke for 3/4" flanged weir valve is 1/2" except solid plastic.

Air pressures to close
Air pressures to close shown in charts A through R indicate the operating pressures required to close weir type valves against various line pressures. These charts are based on 100% pressure drop across the valve.

Operating pressures
Diaphragm actuators are designed to operate with air pressures up to 85 psi. The maximum pressure differential between upper and lower chambers is also 85 psi. Piston actuators are suitable for 100 psi.

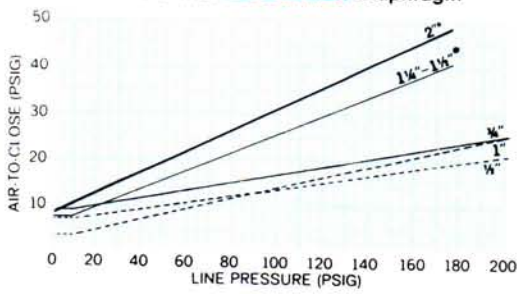
Note:
When pressure available for actuator exceeds required pressure to close valve, either the actuator should be supplied with a travel stop (closing travel limit) or pressure should be regulated down.



Air requirements for weir type valves

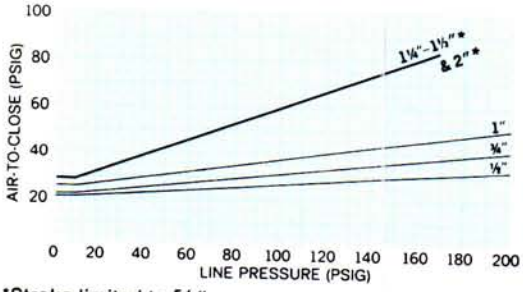
Based on 100% Pressure Drop

Chart A
No. 12 Actuators with ELASTOMER Diaphragm



*Stroke limited to 5/8"

Chart B
No. 12 Actuators with PTFE PLASTIC Diaphragm

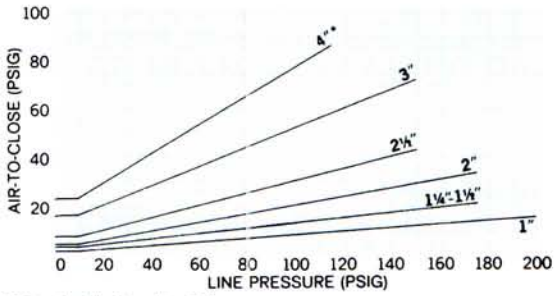


*Stroke limited to 5/8"

Double acting actuators
3300 Series
Air to close, air to open

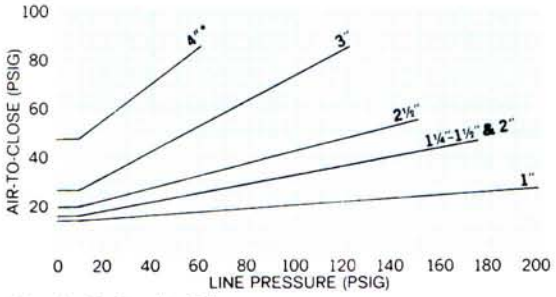
100% Δp

Chart C
No. 25 ACTUATOR with ELASTOMER Diaphragm



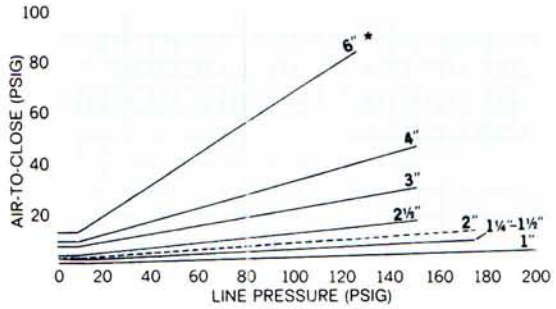
*Stroke limited to 2″

Chart D
No. 25 ACTUATOR with PTFE PLASTIC Diaphragm



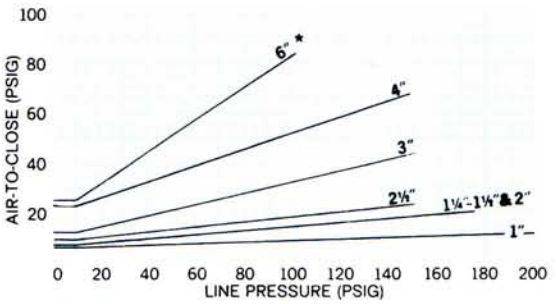
*Stroke limited to 2″

Chart E
No. 50 ACTUATOR with ELASTOMER Diaphragm



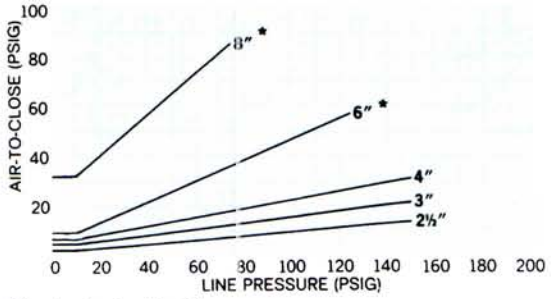
*Stroke limited to 3″

Chart F
No. 50 ACTUATOR with PTFE PLASTIC Diaphragm



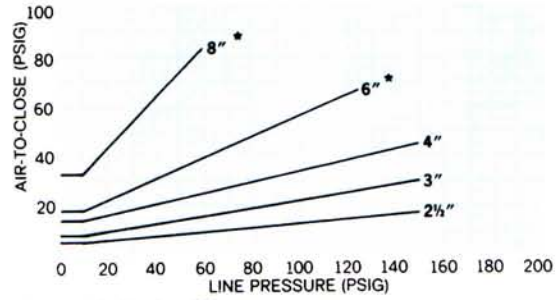
*Stroke limited to 3″

Chart G
No. 75 ACTUATOR with ELASTOMER Diaphragm



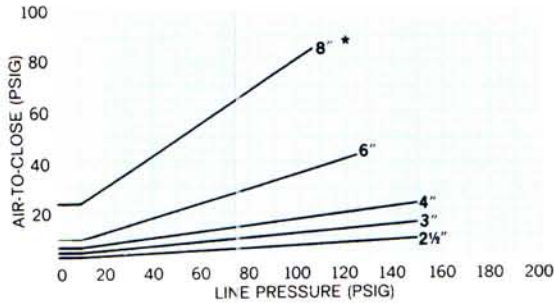
*Stroke limited to 3″

Chart H
No. 75 ACTUATOR with PTFE PLASTIC Diaphragm



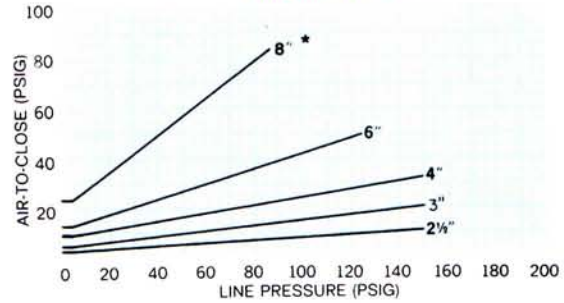
*Stroke limited to 3″

Chart I
No. 101 Actuator with ELASTOMER Diaphragm



*Stroke limited to 3⅛″

Chart J
No. 101 Actuator with PTFE PLASTIC Diaphragm



*Stroke limited to 3⅛″

For line pressures exceeding the above, consult the ITT Engineered Valves Sales Engineer in your area.

Double acting actuators

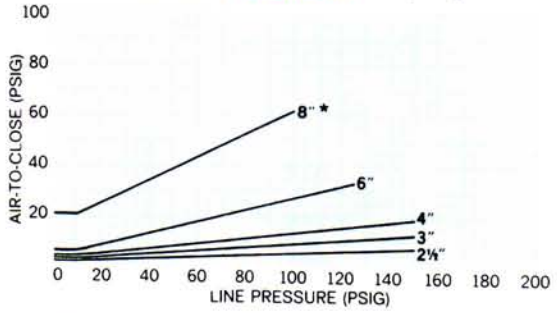
3300 Series

Air to close, air to open

100% Δp

Chart K

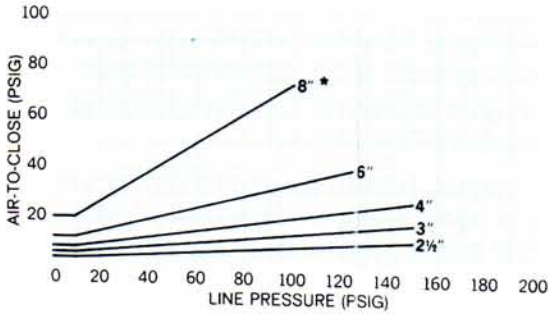
No. 130 Actuator with ELASTOMER Diaphragm



*Stroke limited to 3½"

Chart L

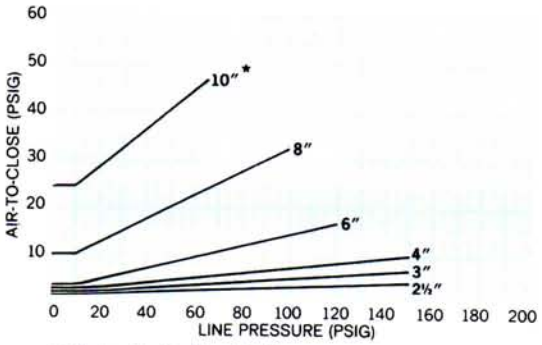
No. 130 Actuator with PTFE PLASTIC Diaphragm



*Stroke limited to 3½"

Chart M

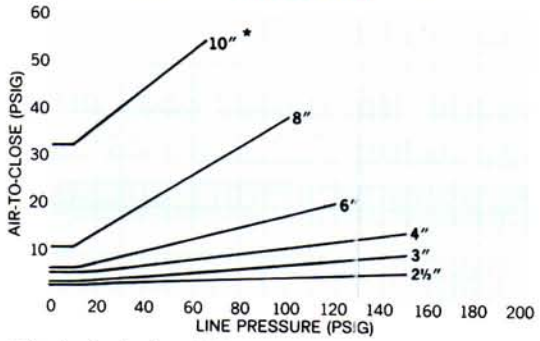
No. 250 Actuator with ELASTOMER Diaphragm



*Stroke limited to 4⅝"

Chart N

No. 250 Actuator with PTFE PLASTIC Diaphragm



*Stroke limited to 4⅝"

NOTE: ***If ordering Actuator with positioner, an air cushion regulator will be added to provide 10 PSI in the lower chamber. Therefore add 10 PSI to the "Air-to-close" value for minimum air required.***

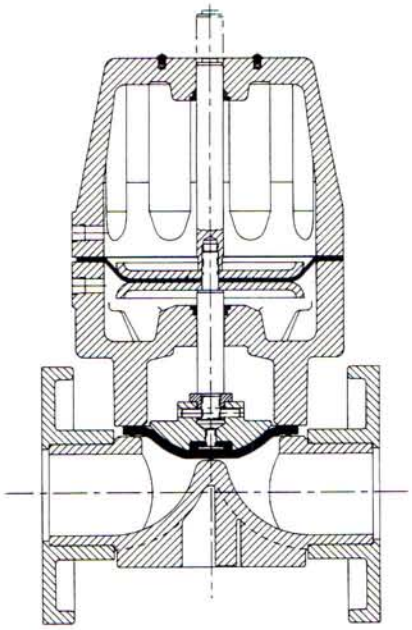
ITT provides an actuation package to meet your needs.

The ITT Advantage® plastic actuator is designed specifically to work as a package with the Dia-Flo plastic valve.

The Advantage is a diaphragm-driven actuator that can withstand harsh chemical atmospheres. The actuator is made from durable PAS resin for increased mechanical strength and to allow trouble-free operation up to the valve's maximum operating temperature of 275°F (135°C).

The compact Advantage actuator can be easily installed in piping systems where space is limited. It operates in one of three modes: normally closed, normally open, or double-acting. The Advantage is available with a position indicator, adjustable opening stop, and position indication switches.

The Dia-Flo plastic valve body can also be equipped with the wide range of Dia-Flo actuators and its accessories available from ITT.



Advantage Actuator

Advantage® (for plastic body only) Reverse Acting Actuators-Air To Open, Spring To Close

A200 Series

Actuator Size Selections

DIAPH. MAT'L.	ACTUATOR MODEL	Maximum Line Pressure (psig)** Valve Size 100% ΔP							0% ΔP							AIR PRESSURE REQUIRED FOR FULL ACTUATOR STROKE AT 0 psi LINE*
	Inches	½"	¾"	1"	1¼"-1½"	2"	3"	4"	½"	¾"	1"	1¼"-1½"	2"	3"	4"	
	DIN	15	20	25	32-40	50	80	100	15	20	25	32-40	50	80	100	
ELASTOMER	A205	110							90							50
	A206	150							150							90
	A208		100							60						45
	A208			150							80					60
	A209		150	150						120	130					90
	A216				100							65				50
	A216					70							30			60
	A217				150	150						130	75			90
	A247						150	130						100	65	60
	A248						150	145						150	100	3" 76 / 4" 82
R2 (PTFE)	A205	135							50							65
	A206	150							150							90
	A208		140							70						60
	A208			100							35					70
	A209		150	150						80	80					90
	A216				125							70				50
	A216					60							45			60
	A217				150	150						125	70			90
	A247						80	70						45	40	62
	A248						150	110						85	70	3" 82 / 4" 90

* In vacuum applications additional operating air pressure is required.

** If line pressure requirements exceed those listed or if available air pressure is below minimum required, use Dia-Flo® actuator

Advantage® Actuators (for plastic body only)
Direct Acting Actuators-Air To Close, Spring To Open

A100 Series

Actuator Size Selections

DIAPH. MAT'L.	Valve Size	Inches	½"		¾"		1"		1¼"-1½"		2"		3"		4"	
		DIN	15		20		25		32-40		50		80		100	
	ACTUATOR		A105		A108		A108		A116		A116		A147		A147	
	Line Pressure (psig)		Air Pressure Required(psig)* ΔP													
			100%	0%	100%	0%	100%	0%	100%	0%	100%	0%	100%	0%	100%	0%
ELASTOMER	20		38	45	38	55	28	40	36	40	40	45	36	37	33	40
	40		40	50	42	60	32	45	38	44	45	50	41	50	43	50
	60		44	55	46	65	36	55	42	48	50	60	47	59	48	66
	80		48	60	50	70	40	60	44	52	56	70	50	66	55	73
	100		50	65	52	75	45	70	48	56	60	75	54	73	64	79
	125		54	70	60	85	50	75	50	60	64	80	63	81	72	90
	150		58	75	68	–	55	85	52	65	68	–	71	90	73	–
R2 (PTFE)	20		46	66	55	55	50	55	45	52	48	50	42	53	46	52
	40		50	68	58	60	55	60	50	56	50	60	45	57	58	66
	60		52	72	60	65	60	65	55	60	56	70	52	68	68	77
	80		56	76	65	70	65	70	60	64	64	80	57	79	76	86
	100		60	82	68	75	70	80	64	68	70	90	60	89	88	–
	125		64	86	74	80	75	–	68	72	76	–	67	–	–	–
	150		68	–	80	85	80	–	72	76	82	–	76	–	–	–

*If available air pressure is below minimum required, use Dia-Flo® actuator

Advantage® Actuators (for plastic body only)
Direct Acting Actuators-Air To Close, Air To Open

A300 Series

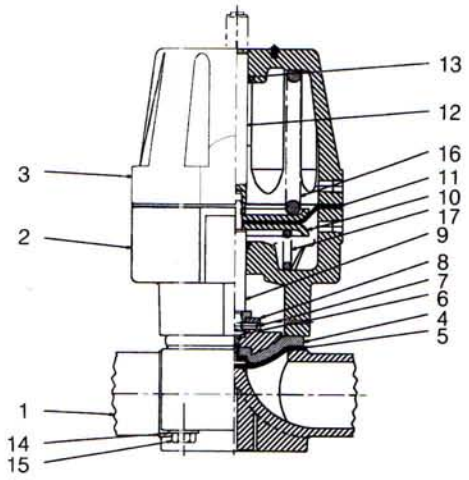
Actuator Size Selections

DIAPH. MAT'L.	Valve Size	Inches	½"		¾"		1"		1¼"-1½"		2"		3"		4"	
		DIN	15		20		25		32-40		50		80		100	
	ACTUATOR		A305		A308		A308		A316		A316		A347		A347	
	Line Pressure (psig)		Air Pressure Required(psig)* ΔP													
			100%	0%	100%	0%	100%	0%	100%	0%	100%	0%	100%	0%	100%	0%
ELASTOMER	20		24	30	18	25	12	20	16	20	22	40	19	27	19	33
	40		26	35	20	30	16	25	20	25	26	45	23	32	24	39
	60		28	40	24	35	20	35	24	30	30	50	27	39	30	46
	80		32	45	26	40	24	40	28	35	35	55	31	45	37	60
	100		34	50	30	50	28	50	32	40	40	60	35	51	44	68
	125		38	55	34	55	36	55	36	45	45	70	40	59	50	76
	150		42	60	38	60	44	65	40	50	50	80	46	67	56	88
R2 (PTFE)	20		34	36	28	30	25	35	25	34	35	40	29	37	32	37
	40		36	40	34	35	35	40	30	38	40	50	34	42	45	53
	60		40	46	38	40	45	50	35	42	50	60	39	53	52	66
	80		42	50	40	45	50	55	40	46	55	70	46	64	59	79
	100		44	54	42	50	55	60	45	50	60	80	52	74	69	89
	125		46	58	55	60	70	50	55	64	68	–	59	84	79	–
	150		48	62	46	60	65	80	55	62	68	–	69	90	84	–

*If available air pressure is below minimum required, use Dia-Flo® actuator

NOTE: *If ordering Actuator with positioner, an air cushion regulator will be added to provide 10 PSI in the lower chamber. Therefore add 10 PSI to the "Air-to-close" value for minimum air required. For A300 Series only.*

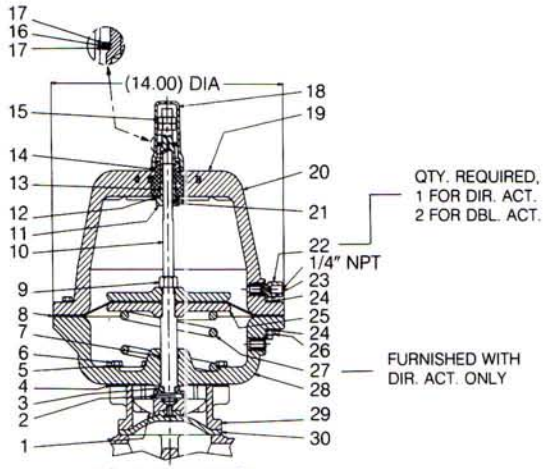
Bill of Materials – ½"-2" Actuators



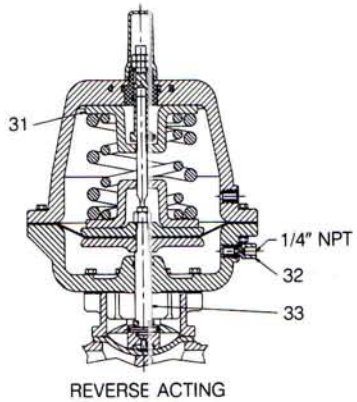
List of Parts

Item	Description	Material
1	Body, Weir	PP, PVDF, CPVC, & PVC
2	Cover, Lower Actuator	PAS
3	Cover, Upper Actuator	PAS
4	Cushion, Backing (w/PTFE Diaphragm Only)	EPDM
5	Diaphragm	As Required
6	Nut, Tube (w/PTEF Diaphragm Only)	Brass
7	Pin, Spirol	Stainless Steel
8	Compressor	Zinc
9	Spindle, Valve	Stainless Steel
10	Plate, Actuator	Steel
11	Diaphragm, Actuator	BUNA-N
12	Spindle, Indicating	Stainless Steel
13	O-Ring	Viton
14	Washer, Plain	Stainless Steel
15	Screw Hex Head Cap	Stainless Steel
16	Spring, Reverse Acting Only	Steel
17	Spring, Direct Acting Only	Steel

Bill of Materials – 3" & 4" Actuators



DOUBLE & DIRECT ACTING



REVERSE ACTING

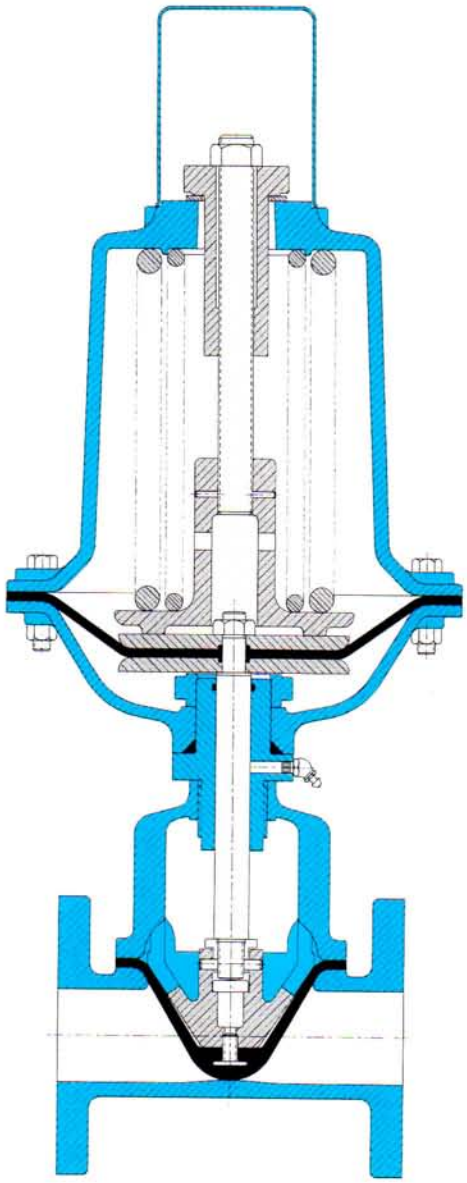
List of Parts

Item	Description	Material	Qty.
1	Compressor	C.I. or Bronze	1
2	Pin	Stainless Steel	1
3	Collar-Stop	Steel	1
4	Gasket	EPDM	1
5	Washer	Stainless Steel	8
6	Cap Screw	Carbon Steel	8
7	O-Ring	BUNA-N	1
8	Diaphragm-Actuator	BUNA-N	1
9	Hex Nut	Carbon Steel	1
10	Spindle (Direct, Double)	Stainless Steel	1
11	Bushing-Adjusting	Stainless Steel	1
12	Washer-Thrust	Nylon	1
13	O-Ring	BUNA-N	1
14	O-Ring	BUNA-N	1
15	Jam Nut	Stainless Steel	2
16	Bearing-Thrust	Steel	1
17	Race-Thrust	Steel	2
18	Cap	Acrylic	1
19	Decal-Label	Mylar	1
20	Cover-Upper	Vinyl-Ester	1
21	Spring Plunger	Stainless Steel	1
22	Adapter	Stainless Steel	AR
23	Cap Screw	Stainless Steel	16
24	Washer	Stainless Steel	32
25	Plate-Actuator	DI	2
26	Hex Nut	Brass	16
27	Spring	Steel	1
28	Cover-Lower	Vinyl-Ester	1
29	Bonnet	DI epoxy coated	1
30	Diaphragm	As Required	1
31	Spring Pack Assembly (Reverse)	—	1
32	Adapter	Stainless Steel	1
33	Spindle (Reverse)	Stainless Steel	1

* Recommended spare parts

Straightway Valve Actuation

Pneumatic Actuator Sizing



Pneumatic actuation for the Dia-Flo® Straightway Diaphragm Valves is the same high quality, rugged actuator used on any weir valves. Use the following charts to select the correct Dia-Flo® actuator for your Straightway application.

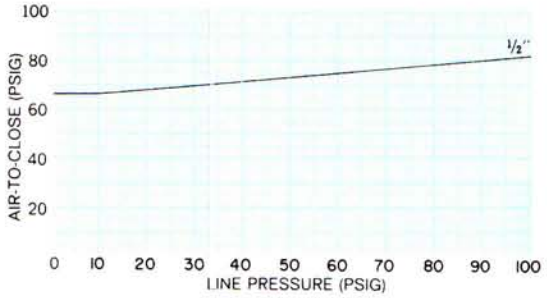
Straightway valve actuators

Direct acting 3100 series

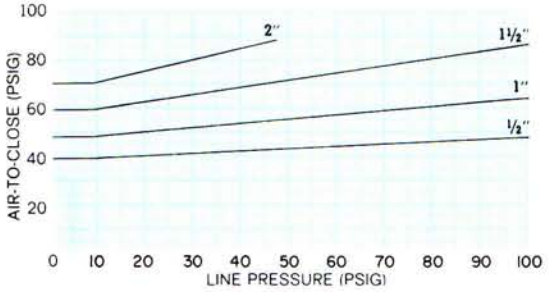
Air to close, spring to open

100% Δp

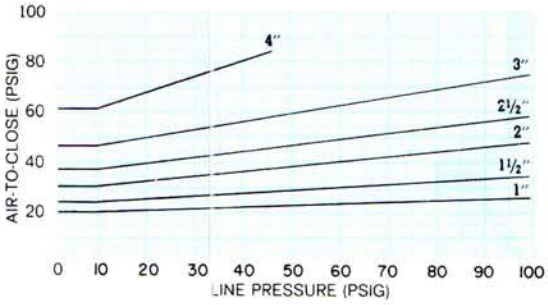
No. 3112 Actuator



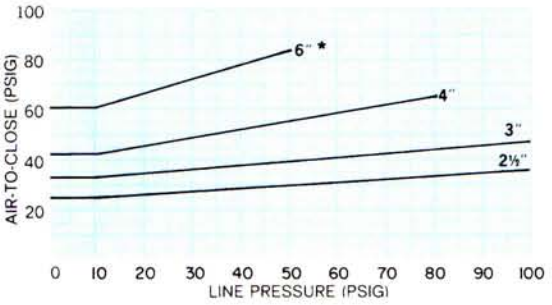
No. 3125 Actuator



No. 3150 Actuator

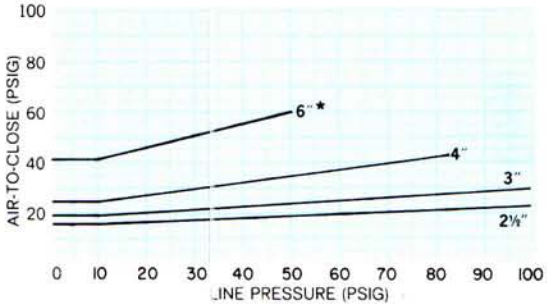


No. 31101 Actuator



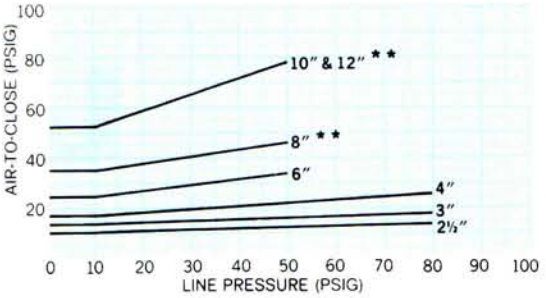
*Stroke limited to 3⅛"

No. 31130 Actuator



*Stroke limited to 3½"

No. 31250 Actuator



**Stroke limited to 4⅝"

ACTUATION & CONTROL

Straightway valve actuator requirements

Reverse acting 3200 series

Spring to close, air to open

100% Δp

Sample Problem

Problem
Determine Actuator size for 1½ valve to close against 75 PSI line pressure with available air supply of 80 PSI.

Study
No. 3225 will close against max. line of 50 PSI.

No. 3250L will close against max. line of 100 PSI.

Solution
No. 3250L with #96 spring best choice. 41 PSI required to open.

Actuator Size	Figure Number	Spring Number	Maximum Line Pressures (PSI) @ 100% P.D. (Bubble Tight Shut Off) Straightway Valves									Air to Open Full Stroke @ 0 PSI Line
			½"	1"	1½"	2"	2½"	3"	4"	6'	8"	
#25	3226	101	100	40								55
	3228	102A	20									30
	3227	101 & 102A	100	100	50							85
#50	3251	101	80									27
	3252	101 & 102A	100	80								44
#50L	3254	96		100	100	35						41
	3253	97		50								24
	3255	96 & 97		100	100	100	70	20				61
#75	3273	98					67	26				34
	3277	97 & 98					100	71	16			47
	3278	96 & 98					100	100	34			63
	3279	96, 97 & 98					100	100	54			76
#101	32102	96					13					20
	32103	98					67	26				28
	32104	96 & 97					100	31				30
	32105	96 & 98					100	100	34			48
	32106	97 & 98					100	71	16			38
	32107	96, 97 & 98					100	100	54			58
	32108	130					100	100	85	17•		85
#130	32132	96					13					16
	32133	98					67	26				23
	32134	96 & 97					100	31				24
	32135	96 & 98					100	100	34			39
	32136	97 & 98					100	71	16			32
	32137	96, 97 & 98					100	100	54			48
	32138	130					100	100	85	17†		67
#250	32252	129					100	100	85	22		30
	32253	130					100	100	85	10		32
	32251	129 & 130					100	100	85	50	35*	62

•Stroke Limited to 3⅛"
†Stroke Limited to 3½"
*Stroke Limited to 4⅝"
NOTE: Dimensions for Straightway Valves with Actuators are in the Engineering Section of this catalog. (pages 81-105).

Straightway valve actuator requirements

Double acting 3300 series

Air to close, air to open

Actuators are designed to operate at air pressures up to 85 psi on diaphragm actuators and 100 psi on piston actuators. The difference in pressure between the upper and lower chambers should not exceed 85 psi on diaphragm actuators and 100 psi on piston actuators.

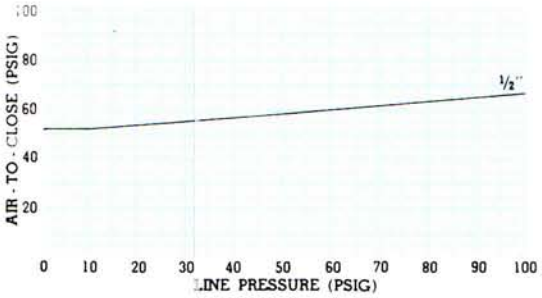
NOTE: *If ordering Actuator with positioner, an air cushion regulator will be added to provide 10 PSI in the lower chamber. Therefore add 10 PSI to the "Air-to-close" value for minimum air required.*

100% Δp

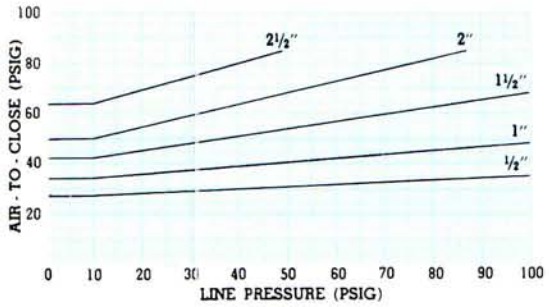
Actuator Size	12	25	50	75	101	130	250
Stroke	5/8"	2"	3"	3"	3 1/8"	3 1/2"	4 5/8"

Valve Size	1/2	1	1 1/2	2	2 1/2	3	4	6	8	10	12
Stroke	15/32	15/16	1 1/4	1 7/8	2	2 5/16	2 13/16	4 1/4	6 1/4	7 1/2	7 1/2

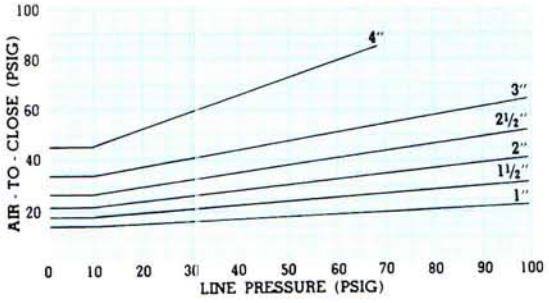
No. 3312 Actuator



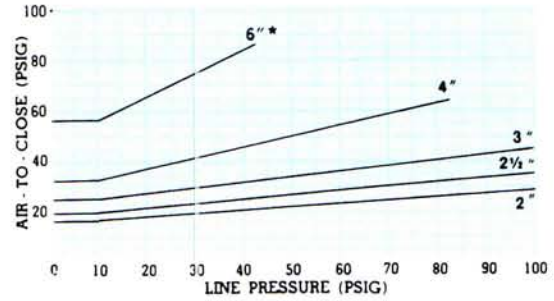
No. 3325 Actuator



No. 3350 Actuator

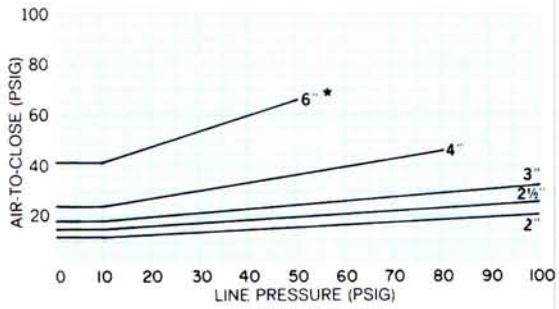


No. 3375 Actuator



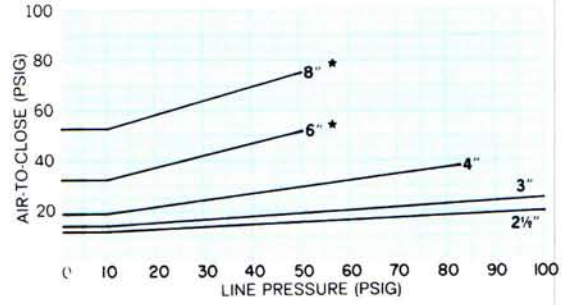
*Stroke limited to 3"

No. 33101 Actuator



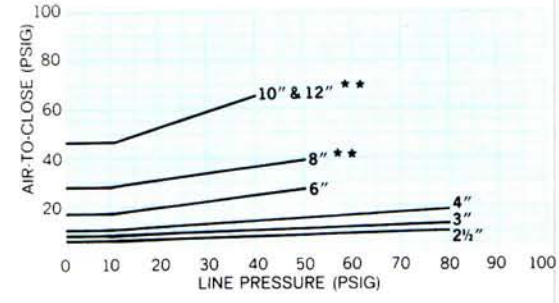
*Stroke limited to 3 1/8"

No. 33130 Actuator



*Stroke limited to 3 1/2"

No. 33250 Actuator

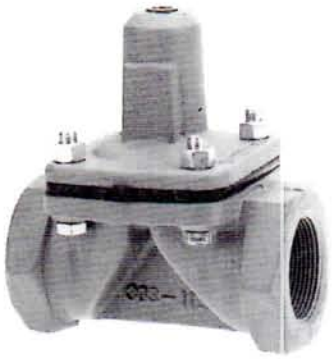


**Stroke limited to 4 5/8"

ACTUATION & CONTROL

Direct loaded valves

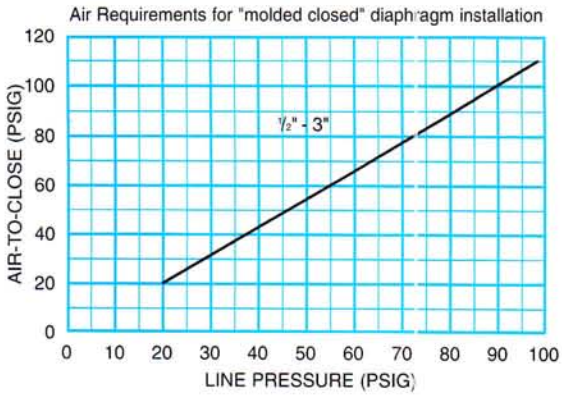
Figure Number: 40

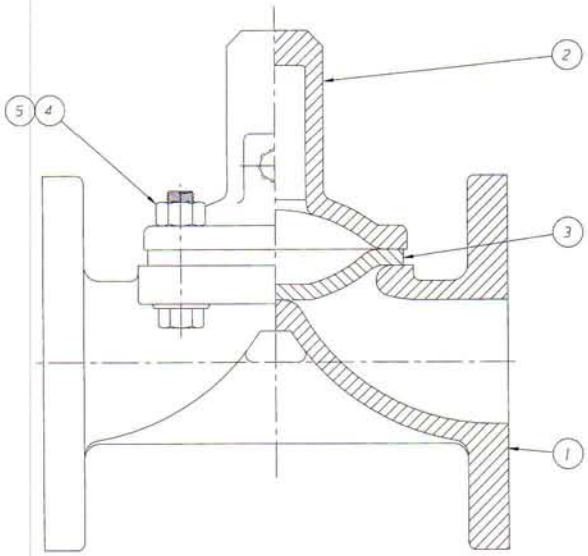


Direct loaded bonnet
An inexpensive approach to automatic on-off operation. Ideal for multi valve panel operation of batching systems, water and waste treatment systems. Furnished with or without pilot solenoid utilizing pneumatic or hydraulic operation.

Special bonnets and diaphragms are available for operation by direct injection of air into bonnet on valves up to 3". Valve opening is dependent on line pressure. Such units are used where less exacting valve performance is acceptable.

A minimum line pressure of 20 PSIG is required to utilized the direct loaded valve.





List of Parts			
Item	Description	Material	Qty.
1	Body, Flanged	Cast Iron	1
2	Bonnet, Adapter	Cast Iron	1
3	Diaphragm	Elastomer, Gr. DP	1
4	Bolt, Bonnet	Steel	4
5	Nut, Hex.	Steel	4

Sliding Stem Bonnet Assembly

ITT Engineered Valves sliding stem bonnet assemblies are designed to accommodate almost every make of power operated topworks. Pneumatic, electro-hydraulic, electric and electronic actuators can all be easily adapted to both weir and straightway Dia-Flo® Diaphragm Valves. Designs incorporate simple mounting and accurate alignment between the actuator and valve stem. A complete range of instrumentation accessories are also available mounted and piped for easy installation.

Dualrange® Control for Fine Throttling Service

Dualrange® Control Valves

Principal of Operation

The superior performance of the Dualrange® Control Valve is the result of a simple but effective innovation in diaphragm valve design: a two-piece compressor.

The two-piece compressor design not only permits greater rangeability in the valve, hence improved flow control, but provides porting which is more conducive to streamlined flow. This type of opening can handle slurries without excessive abrasion, dewatering or wiredrawing. The Dualrange® should be supplied whenever precise throttling is required.

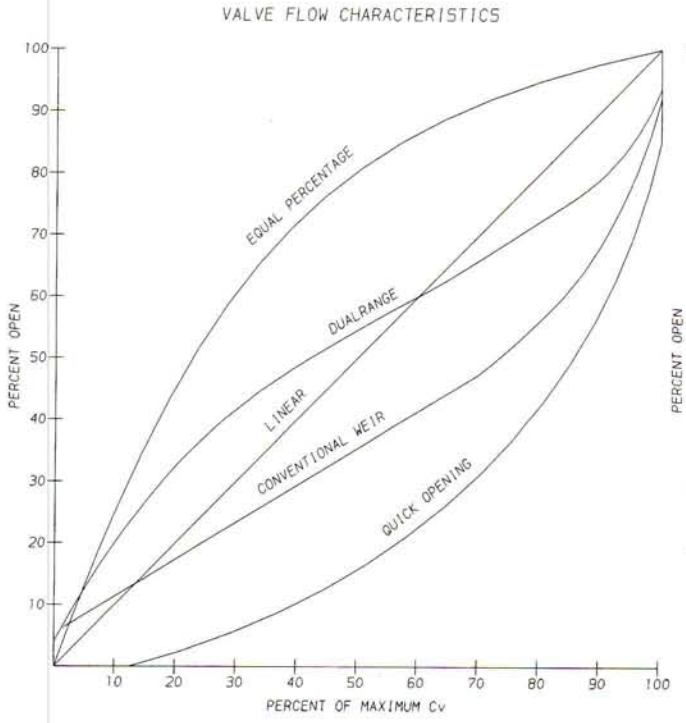
Operation

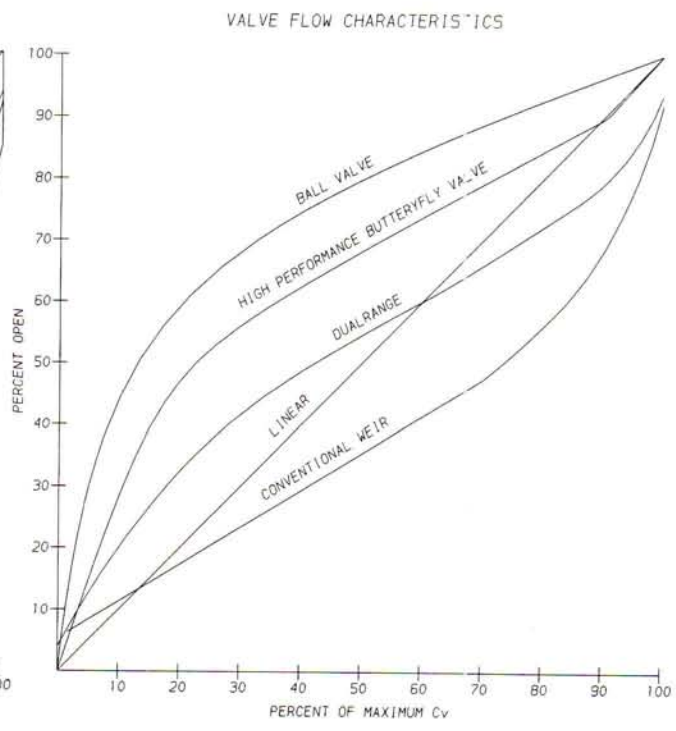
During the initial movement of the valve stem, only the inner compressor moves. This permits smaller increases in flow for the same increase in stroke resulting in better modulation than conventionally designed diaphragm valves. Because the valve can now control within desired parameters more accurately, it is better able to create the desired flow conditions or pressure drop through the valve and avoid control valve hunting.

When the inner compressor is open to its limit, the outer compressor begins to open. From this point on, both compressors move as a unit. When wide open the Dualrange® provides the same full flow capacities as the conventional weir type designs.

The advantages gained in flow control by this design over the conventional diaphragm valve can be seen in the charts below.

Because the Dualrange® Control Valve must be able to position itself in an infinite range of positions from full open to full closed and hold these positions, it must be used in conjunction with a positioner. The positioner is the device that modulates the plant air to the valve operator in relation to the instrument air signal being fed by a control device. Drawing on page 26 shows a typical piping arrangement for a Dia-Flo® Diaphragm Valve in a control situation.

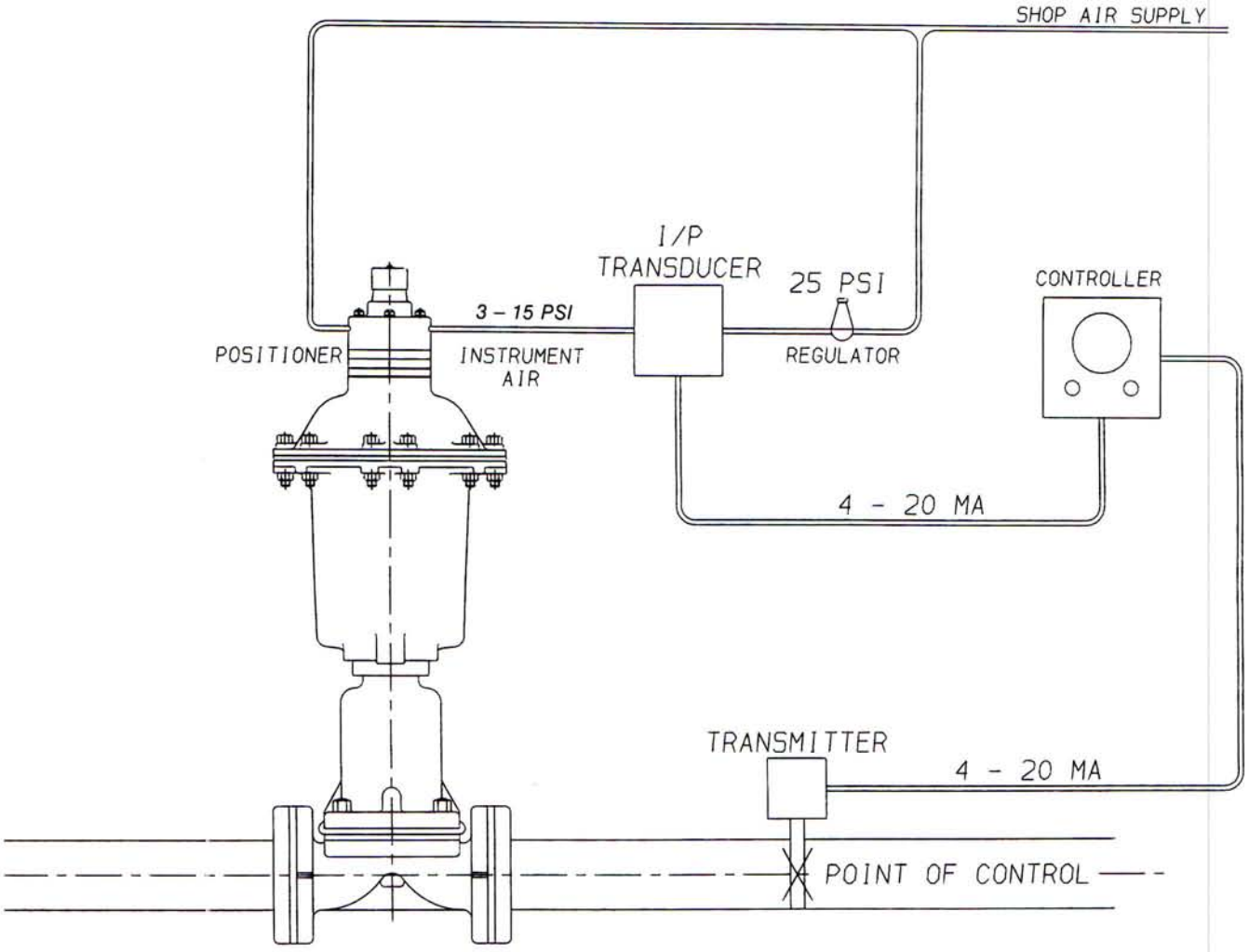




Control Systems

With the Dualrange® Control Valve

Dualrange® Control Valves are used in a variety of throttling applications where fine control is required. Typical applications include flow control, level control, back pressure control and many others. The Dualrange®, however, is merely a single component in a complex system known as the control loop. In order to properly apply the Dualrange® Control Valve it is important to understand not only how the control loop works but what is trying to be accomplished downstream of the valve. The following schematic shows a typical single valve control loop:

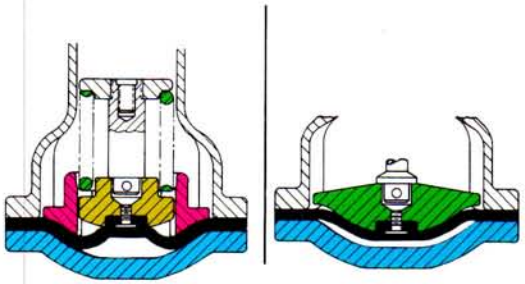


Dualrange®

Applications

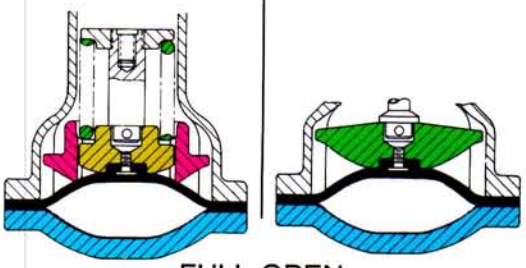
The Dualrange® Control Valve is designed to operate at a maximum line pressure of 100 psi (689 kPa) and is recommended for use with the Dia-Flo® weir type diaphragm valve for applications as follows:

- Where a cost effective control valve is required on corrosive services.
- Where abrasives reduce valve life on throttling applications.
- Wherever positive closure and/or fine throttling are required in a control application.
- Where slurries may clog ordinary diaphragm valves when throttling.
- Where valves large enough to handle normal process flows cannot throttle low enough to control small amounts of flow required during start-up operations.
- Where split-ranging has been necessary to provide rangeability not available in a single diaphragm valve.



FINE THROTTLING

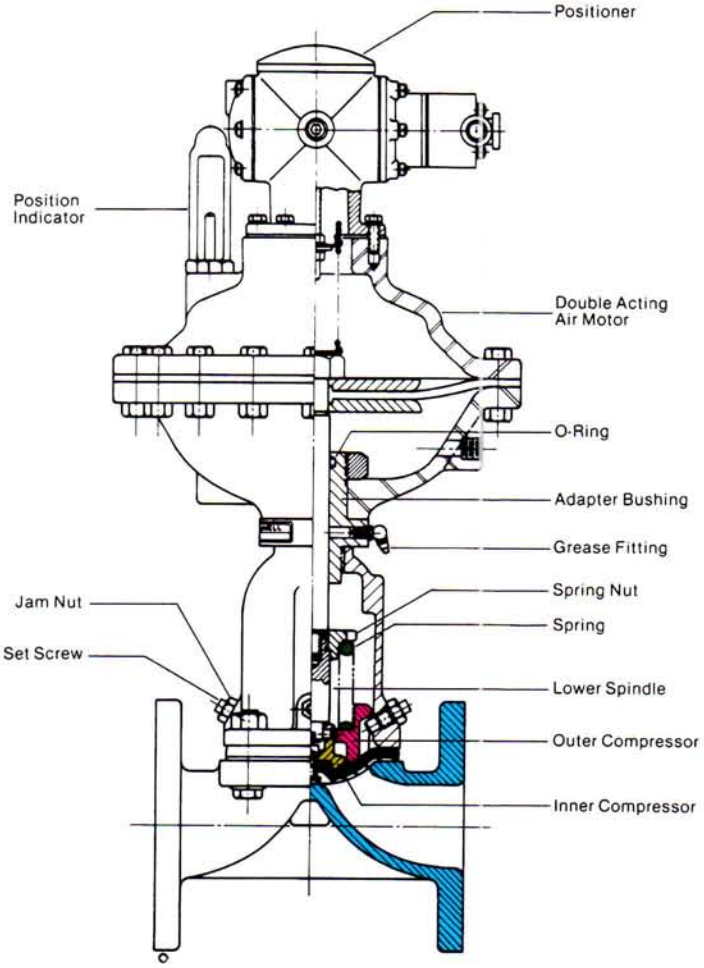
DUALRANGE CONVENTIONAL



FULL OPEN

Dualrange® valves

The Dualrange Valve is designed to operate at a maximum line pressure of 100 p.s.i. (689 kPa). Available only with Weir Type Valves



Sizing a Dualrange® Control Valve

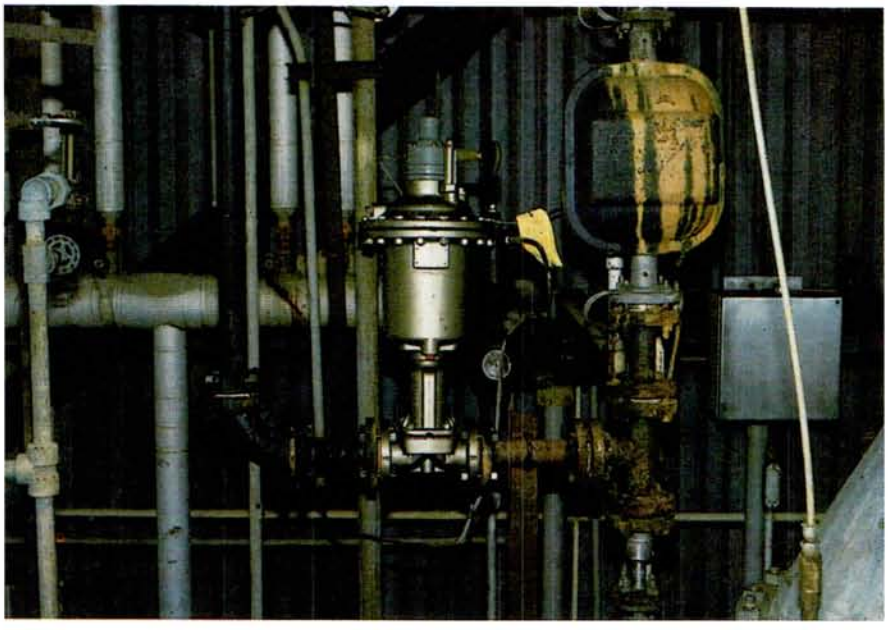
Dia-Flo® Dualrange® valves are modulating *control valves.* As a result precaution must be taken in sizing and selecting the valve versus an on-off valve. The following information must be known:

1. **FLUID** – Description of fluid including type of fluid, solids content, abrasive nature, etc.
2. **CONCENTRATION** – This would include chemical concentration, and solids concentration.
3. **SPECIFIC GRAVITY**
4. **FLOW RATE** – It is important when sizing a control valve to have the *minimum, maximum,* and normal flow rates.
5. **PRESSURE DROP** – To be taken across valve also known as delta-P or Δ P. It's important to have *minimum, maximum,* and *normal* also.
6. **INSTRUMENT SIGNAL OR CONTROL SIGNAL** – This would normally be a 3-15 psi control signal. Other pneumatic signals are available such as 6-30, 3-9, etc. In addition, electronic signals are available such as 4-20 ma (milliamp).
7. **LINE SIZE**

When the above information is available, the proper valve size can be determined. You may use the flow formulas that appear on page 74 or the ITT Engineered Valves Control Valve slide ruler. The slide ruler is available from an ITT Engineered Valves Sales Engineer.

The diaphragm valve is sensitive to two conditions in a throttling situation. After you have determined valve size the following two tests *must* be done:

1. **PRESSURE DROP** (Δ P) Across Valve – The internal flow path of a diaphragm valve closely approximates the design of a high recovery valve. The valve is not designed to withstand large pressure drops. To avoid cavitation, Δ P shall be limited to 25% of P_1 absolute (P_{1a}). P_{1a} = inlet gage pressure plus 14.7.
2. **VELOCITY OVER THE WEIR AREA** – For optimum performance, velocity over the weir should be limited to 15-20 fps (feet per second) for clear fluids and 8-10 fps for light slurries. See page 76 for area over the weir and velocity equation.



Dualrange® Control Valve shown with PVDF corrosion resistant coating.

Direct acting actuators with *Dualrange*® valves

84-3100 Series 100% Δp

Air to close, spring to open

Chart M

No. 12 (–84 3112) actuator with ELASTOMER Diaphragm

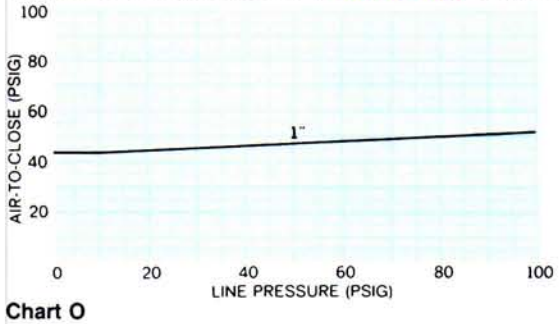


Chart N

No. 12 (–84 3112) actuator with PTFE PLASTIC Diaphragm

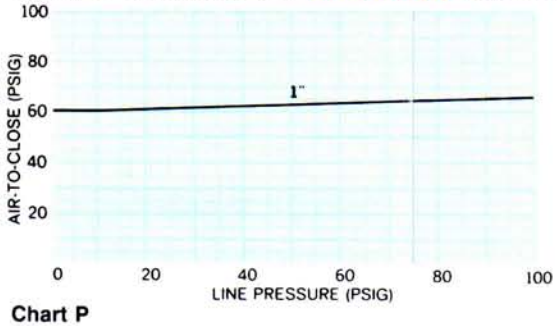


Chart O

No. 25 (–84 3125) actuator with ELASTOMER Diaphragm

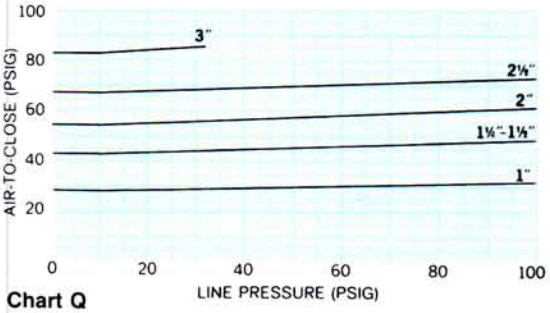


Chart P

No. 25 (–84 3125) actuator with PTFE PLASTIC Diaphragm

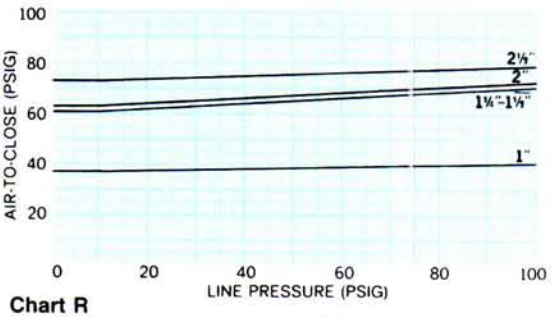


Chart Q

No. 50 (–84 3150) actuator with ELASTOMER Diaphragm

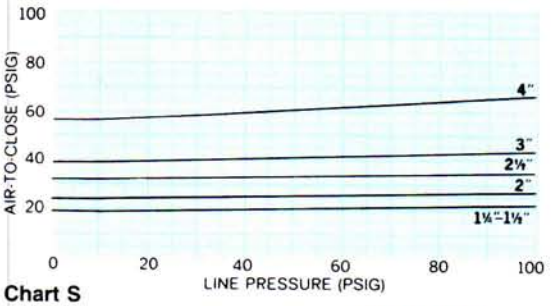


Chart R

No. 50 (–84 3150) actuator with PTFE PLASTIC Diaphragm

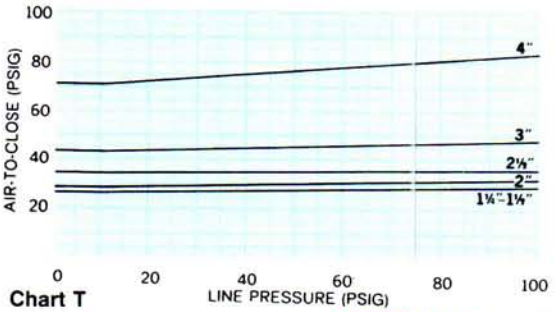


Chart S

No. 101 (–84 31101) actuator with ELASTOMER Diaphragm

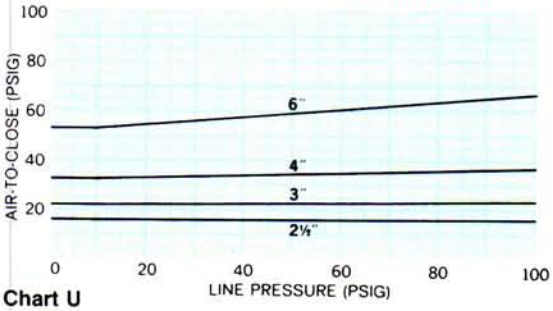


Chart T

No. 101 (–84 31101) actuator with PTFE PLASTIC Diaphragm

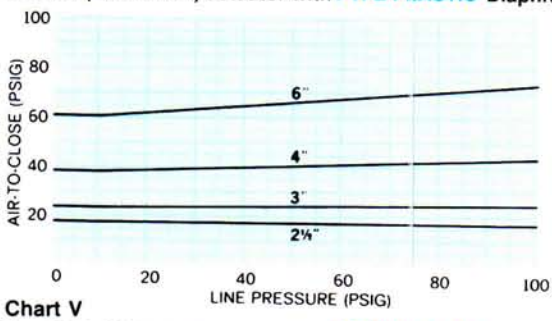


Chart U

No. 130 (–84 31130) actuator with ELASTOMER Diaphragm

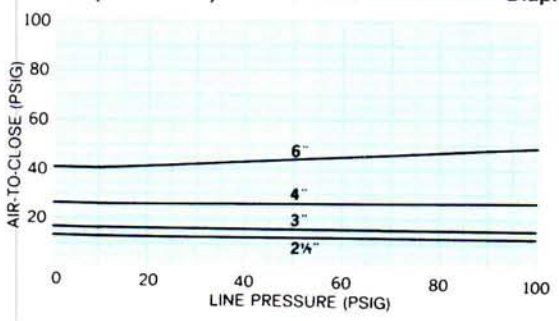
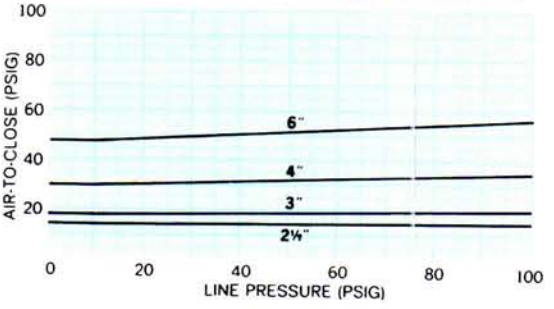


Chart V

No. 130 (–84 31130) actuator with PTFE PLASTIC Diaphragm



Reverse acting actuators with *Dualrange*® valves

84-3200 Series

100% Δp

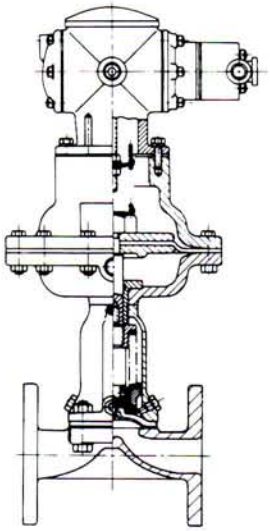
Air to open, spring to close

Diaphragm Model	Actuator Size	Figure Number	Spring Number	Maximum line pressure (psig) Bubble Tight Shut Off Dualrange Valves @ 100% ΔP							Air required to open psig
				1"	1¼"&1½"	2"	2½"	3"	4"	6"	
Elastomer	#12	3214	88 & 89	70							75
	#25	3228	102A	100							30
		3226	101		100						55
		3227	101 & 102A			100	25				85
	#50	3256	102A	100							12
		3251	101		40						19
		3252	101 & 102A		100	55					31
	#50L	3253	97		100	15					30
		3254	96			100	100	20			47
		3255	96 & 97					100			68
	#75	3274	96				100				29
		3277	97 & 98				100	100	52		47
		3278	96 & 98				100	100	100		63
	#101	32102	96				100				20
		32104	96 & 97				100	100			30
		32105	96 & 98				100	100	100		48
		32106	97 & 98				100	100	52		38
		32107	96, 97 & 98				100	100	100		58
		32108	130				100	100	100	83	85
	#130	32132	96				100				16
		32134	96 & 97				100	100			24
		32135	96 & 98				100	100	100		39
		32136	97 & 98				100	100	52		32
		32137	96, 97 & 98				100	100	100		48
		32138	130				100	100	100	83	67
	#250	32252	129							100	30
PTFE (R2)	#25	3228	102A	50							30
		3226	101	100							55
		3227	101 & 102A		100	100					85
	#50	3251	101	100							19
		3252	101 & 102A		40						31
	#50L	3254	96		100	100	100				47
		3255	96 & 97					100			68
	#75	3274	96				100				29
		3277	97 & 98				100	100			47
		3278	96 & 98				100	100	40		63
		3279	96, 97 & 98				100	100	100		76
	#101	32102	96				100				20
		32104	96 & 97				100	100			30
		32105	96 & 98				100	100	40		48
		32106	97 & 98				100	100			38
		32107	96, 97 & 98				100	100	100		58
		32108	130				100	100	100	30	85
	#130	32132	96				100				16
		32133	98				100	100			23
		32134	96 & 97				100	100			24
		32135	96 & 98				100	100	40		39
		32136	97 & 98				100	100			32
		32137	96, 97 & 98				100	100	100		48
		32138	130				100	100	100	30	67
	#250	32251	129 & 130							100	62

Double acting actuators with *Dualrange*® valves

84-3300 Series 100% Δp

Air to open, air to close



NOTE: *If ordering Actuator with positioner, an air cushion regulator will be added to provide 10 PSI in the lower chamber. Therefore add 10 PSI to the "Air-to-close" value for minimum air required.*

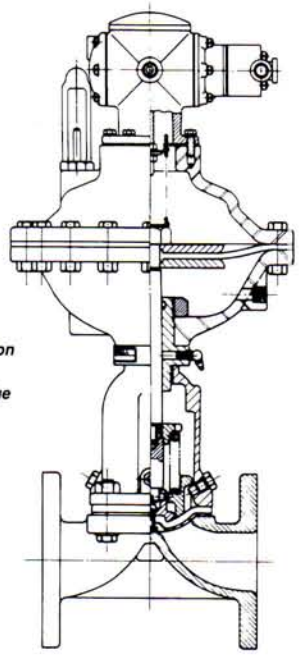


Chart A
No. 12 (–84 3312) actuator with ELASTOMER Diaphragm

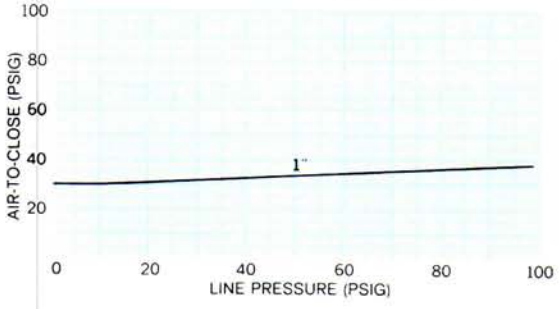


Chart B
No. 12 (–84 3312) actuator with PTFE PLASTIC Diaphragm

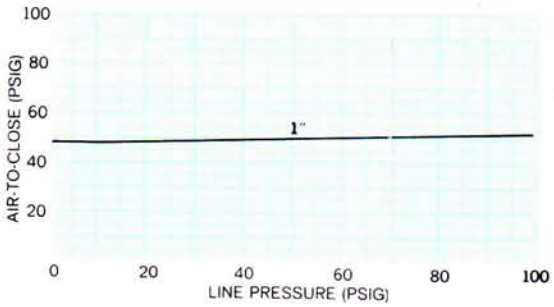


Chart C
No. 25 (–84 3325) actuator with ELASTOMER Diaphragm

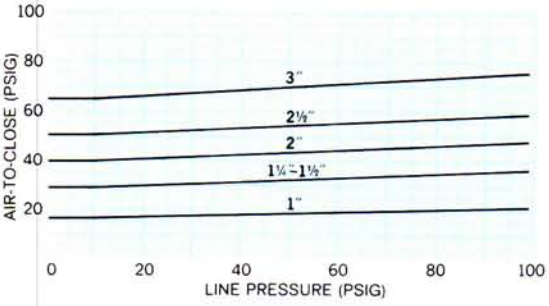
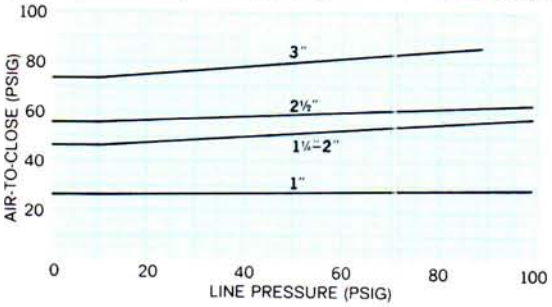


Chart D
No. 25 (–84 3325) actuator with PTFE PLASTIC Diaphragm



Double acting actuators with *Dualrange*® valves

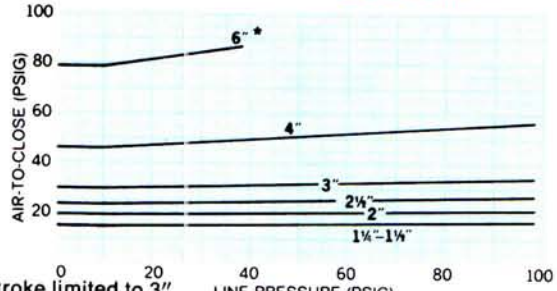
84-3300 Series

100% Δp

Air to open, air to close

NOTE: *If ordering Actuator with positioner, an air cushion regulator will be added to provide 10 PSI in the lower chamber. Therefore add 10 PSI to the "Air-to-close" value for minimum air required.*

Chart E
No. 50 (–84 3350) actuator with ELASTOMER Diaphragm



*Stroke limited to 3"

Chart F
No. 50 (–84 3350) actuator with PTFE PLASTIC Diaphragm

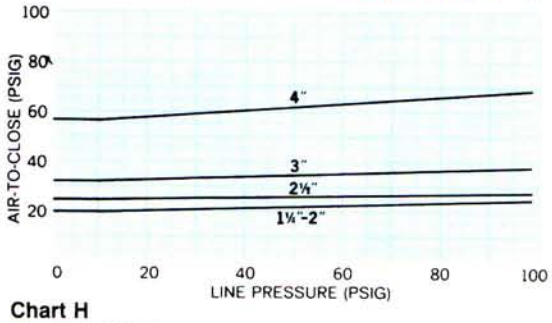
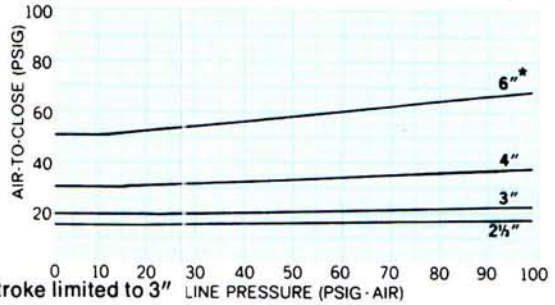


Chart G
No. 75 (–84 3375) actuator with ELASTOMER Diaphragm



*Stroke limited to 3"

Chart H
No. 75 (–84 3375) actuator with PTFE PLASTIC Diaphragm

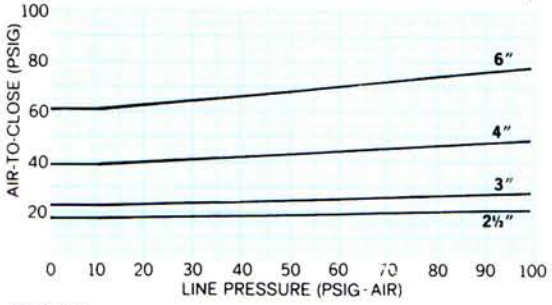


Chart I
No. 101 (–84 33101) actuator with ELASTOMER Diaphragm

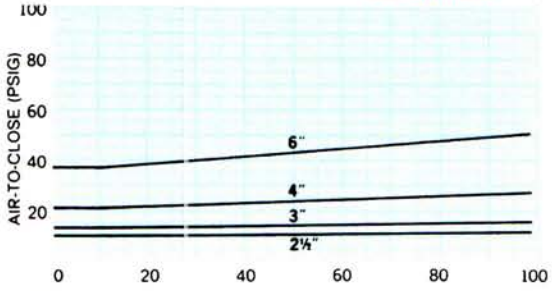


Chart J
No. 101 (–84 33101) actuator with PTFE PLASTIC Diaphragm

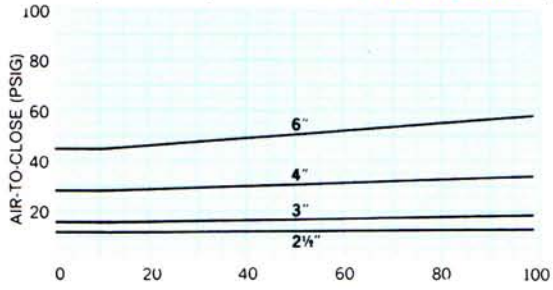


Chart K
No. 130 (–84 33130) actuator with ELASTOMER Diaphragm

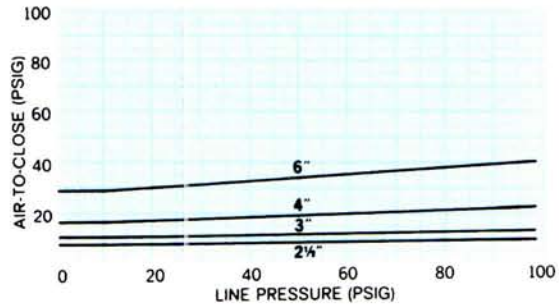
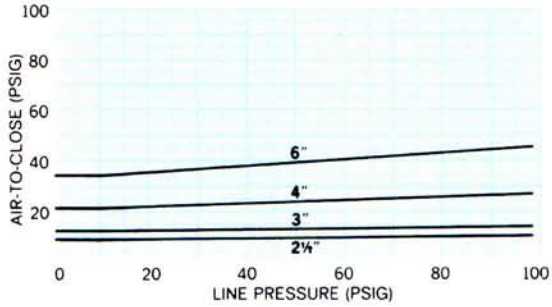


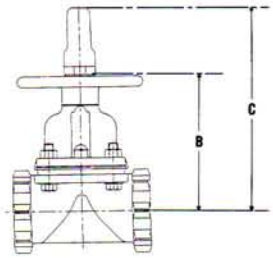
Chart L
No. 130 (–84 33130) actuator with PTFE PLASTIC Diaphragm



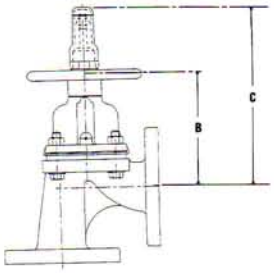
Dimensions - Weir Valves

Handwheel operated valves

Weir body



angle body

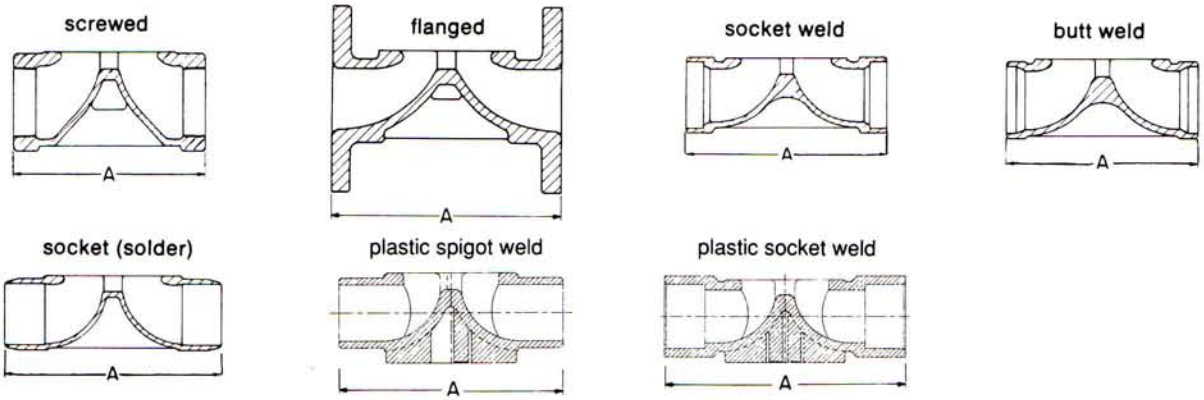


Weir			½	¾	1	1¼ & 1½	2	2½	3	4	6	8	10	12
Screwed		B	3.09	3.78	4.69	6.05	6.31	7.74	7.97	–	–	–	–	–
		C	3.97	4.95	6.02	9.15	9.41	11.82	12.05	–	–	–	–	–
FLANGED	Unlined & Rubber Lined	B	2.47	4.46	4.46	6.08	6.08	7.49	8.04	9.84	14.5	20.25	23.75	27.19
		C	3.35	5.83	5.83	9.18	9.18	11.57	12.12	14.5	17.81	25.06	29.59	33.91
	Plastic Lined & Glass Lined	B	3.35	4.59	4.59	5.92	6.07	7.67	7.91	10.46	14.5	20.25	–	–
		C	4.23	5.96	5.96	9.02	9.17	11.75	11.99	15.12	17.81	25.06	–	–
Weir bodies of solid plastic														
Screwed, Socket weld Spigot weld		B	3.0	3.7	4.3	5.4	6.0	–	–	–	–	–	–	–
		C	4.6	4.6	6.8	9.9	10.9	–	11.82	15.25	–	–	–	–
Angle			½	¾	1	1¼ & 1½	2	2½	3	4	6	8	10	12
FLANGED	Unlined	B	3.09	3.62	4.50	6.06	6.06	7.55	8.04	10.21	14.5	–	–	–
		C	3.97	4.79	5.83	8.89	9.16	11.75	12.12	14.87	17.81	–	–	–
	Lined	B	3.21	3.75	4.62	5.91	6.18	7.67	8.17	10.33	14.62	–	–	–
		C	4.09	4.91	5.95	9.01	9.28	11.87	12.25	14.99	17.93	–	–	–
Handwheel diameter-metal			2½	3¼	3¼	6	6	7¾	7¾	10	14½	19	23	27½
Handwheel diameter-plastic			3.0	3.0	3.0	5.5	5.5	–	7.75	10	–	–	–	–

STANDARD C.I. FLANGE DIMENSIONS (125 #)							
size, in.	diameter of flange, in.	thickness of flange (min.) in.	diameter of bolt circle, in.	number of bolts	diameter of bolt holes, in.	diameter of bolts, in.	length of bolts, in.
½	3½	7/16"	2⅜	4	⅝	½	1¾
¾	3⅞	7/16"	2¾	4	⅝	½	1¾
1	4¼	7/16	3⅛	4	⅝	½	1¾
1¼	5	9/16	3½	4	⅝	½	2
1½	5	9/16	3⅞	4	⅝	½	2
2	6	⅝	4¾	4	¾	⅝	2¼
2½	7	11/16	5½	4	¾	⅝	2½
3	7½	¾	6	4	¾	⅝	2½
4	9	15/16	7½	8	¾	⅝	3
6	11	1	9½	8	⅞	¾	3¼
8	13½	1⅛	11¾	8	⅞	¾	3½
10	16	1 3/16	14¼	12	1	⅞	3¾
12	19	1¼	17	12	1	⅞	3¾

Dimensions – Weir & Angle Valve

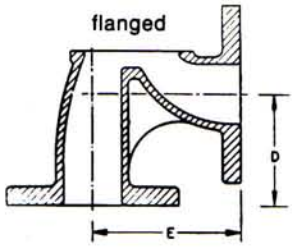
End-to-end dimensions for weir bodies (inches)



Valve size		¼	⅜	½	¾	1	1¼ & 1½	2	2½	3	4	6	8	10	12
Metal bodies															
screwed	A	1¾		2½	3¼	4¼	5½	6½	8	10	–	–	–	–	–
flanged, *unlined*	A	–		4	5½	5½	6½	7½	8½	10	12½	16	20½	25	29½
flanged, *lined:*															
rubber; neoprene	A	–		4¼	5¾	5¾	6¾	7¾	8¾	10¼	12¾	16⅜	20⅞	25⅜	29⅞
glass	A	–		4⅛	5⅝	5⅝	6⅝	7⅝	8⅝	10⅛	12⅝	16⅛	20⅝	–	–
plastic	A	–		–	5¾	5¾	6⅞	7⅞	8⅞	10¼	12⅞	16⅜	20⅞	–	–
butt weld (pipe)	A	–		3½	4	4½	5½	6¼	7⅝	8¾	11½	16	20½	–	–
socket weld pipe	A	–		3½	4	4½	6½	7¼	8⅜	9¾	–	–	–	–	–
socket, solder (copper tube)	A	–		3½	4⅛	5 1/16	5⅞	7⅜	10	11¾	15	20⅝	–	–	–
socket weld (steel tube)	A	–		3½	4	4½	5½	6¼	7⅝	8¾	11½	–	–	–	–
Plastic bodies (Solid)															
Screwed, Socket weld - A		–		4.65	5.51	6.34	8.00	8.94	–	–	–	–	–	–	–
Spigot weld															
DIN - A		–		3.87	5.37	5.37	6.50	7.50	–	–	–	–	–	–	–
IPS - A		–		4.01	5.51	5.51	7.06	7.63	–	–	–	–	–	–	–
Flanged - A		–		4.25	5.75	5.75	6.88	7.88	–	10.25	12.88	–	–	–	–

Body Type	**Tolerances**	
unlined metal	sizes 10" & smaller ± 1/16"	sizes 12" & larger ± ⅛"
lined	sizes 10" & smaller ± ⅛"	sizes 12" & larger ± 3/16"
glass	sizes 10" & smaller ± 3/32"	sizes 12" & larger ± 5/32"
plastic	all sizes ± ⅛	

Center-to-end dimensions for angle bodies (inches)



Valve size		¼, ⅜	½	¾	1	1¼ & 1½	2	2½	3	4	6
flanged, *unlined*	D	–	2⅝	2⅝	2¾	3¼	3¾	4¼	5	6	8
	E	–	2⅞	2⅞	3½	4¼	5 9/64	5⅞	7	8¾	11¾
flanged, *lined:*											
rubber; neoprene	D	–	2¾	2¾	2⅞	3⅞	3⅞	4⅜	5⅛	6⅛	8 3/16
	E	–	3	3	3⅝	4⅜	5 11/64	6	7⅛	8⅞	11 15/16
glass	D	–	2 11/16	2 11/16	2 13/16	3 5/16	3 13/16	4 5/16	5 1/16	6 1/16	8 1/16
	E	–	2 15/16	2 15/16	3 9/16	4 5/16	5 13/64	5 15/16	7 1/16	8 13/16	11 13/16

ENGINEERING DATA

Weir Valve Weights

All weights are approximate, given in pounds and are for manual valve assemblies.

Handwheel operated

Valve size (inches)		¼, ⅜	½	¾	1	1¼ & 1½	2	2½	3	4	6	8	10	12
Weir bodies: of metal														
Screwed:	Iron; St. Steel	¾	1½	3	4	9½	15	26	39	–	–	–	–	–
	Bronze	¾	1¾	3¼	4¼	10¼	15	28	39	–	–	–	–	–
	Aluminum	½	1¼	2½	3	7¼	11	19	25	–	–	–	–	–
Flanged:	Iron; St. Steel	–	3¾	5¾	6¾	14½	21	33	47	81	147	330	510	870
(unlined)	Bronze	–	4½	6½	7¾	16¼	24	37	53	92	164	Δ	Δ	Δ
	Aluminum	–	2	3½	4	9½	13	22	30	51	96	Δ	Δ	Δ
Butt Weld:	Steel; St. Steel	–	2½	2½	4	11	13	23½	34	59	150	–	–	–
Angle bodies: of metal														
Flanged:	Iron; St. Steel	–	4¼	6¼	7¼	15¾	24	37	49	84	178	–	–	–
(unlined)	Bronze	–	5	7	8¼	17½	27	41	55	95	195	–	–	–
	Aluminum	–	2½	4	4½	10¾	16	26	32	54	127	–	–	–

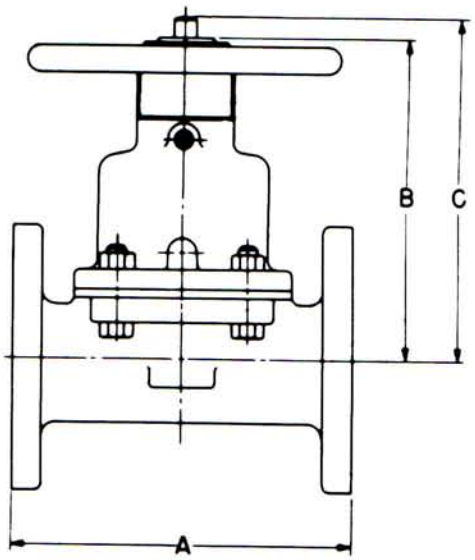
* 18, 20 inch also available. Δ Weights furnished on application

Weir bodies: solid plastic

Screwed	PVC, CPVC	–	0.9	1.3	2.0	5.0	7.0	–	–	–	–	–	–	–
Socket weld	PP	–	0.8	1.1	1.6	4.5	6.0	–	–	–	–	–	–	–
	PVDF	–	0.9	1.3	1.8	5.4	7.4	–	–	–	–	–	–	–
Spigot Weld	PVC, CPVC	–	0.8	1.2	1.8	4.7	6.4	–	–	–	–	–	–	–
	PP	–	0.7	1.0	1.6	4.2	5.7	–	–	–	–	–	–	–
	PVDF	–	0.8	1.2	1.8	4.7	6.5	–	–	–	–	–	–	–
Flanged	PVC, CPVC	–	1.2	1.7	2.5	5.7	8.0	–	18.20	29.00	–	–	–	–
	PP	–	2.0	2.6	3.7	6.8	10.1	–	20.00	31.00	–	–	–	–
	PVDF	–	2.1	2.8	3.8	7.5	11.2	–	22.70	35.50	–	–	–	–

Straightway valve dimensions

Handwheel operated



Body type	½	1	1½	2	2½	3	4	6	8	10	12
Screwed											
A	2½	4¼	5½	6½	–	–	–	–	–	–	–
B	3 3/16	4⅞	6 5/16	7 3/16	–	–	–	–	–	–	–
C	3 11/16	5⅞	7 11/16	9 3/16	–	–	–	–	–	–	–
Flanged, unlined											
A	4	5½	6½	7½	8½	10	12½	16	20½	25	29½
B	3⅛	4¾	6	6⅞	8 9/16	8⅜	10⅝	15½	19⅛	22	22
C	3⅝	5¾	7⅜	8⅞	10 15/16	10 13/16	13⅝	20½	25 1/16	30	30
Flanged, rubber lined											
A	4¼	5¾	6¾	7¾	8¾	10¼	12¾	16⅜	20⅞	25⅜	29⅞
B	3⅛	4¾	6	6⅞	8 9/16	8⅜	10⅝	15½	19⅛	22	22
C	3⅝	5¾	7⅝	8⅞	10 15/16	10 3/16	13⅝	20½	25 1/16	30	30
Flanged, glass lined											
A	4⅛	5⅝	6⅝	7⅝	8⅝	10⅛	12⅝	16⅛	20⅝	–	–
B	3 3/16	4 13/16	6 1/16	6 15/16	8⅝	8 7/16	10 1 1/16	15 9/16	19 3/16	–	–
C	3 1/16	5 13/16	7 7/16	8 15/16	11	10⅞	–	–	–	–	–
Flanged, plastic lined											
A	–	5⅞	6 15/16	7 15/16	–	10⅜	12 15/16	16 7/16	20⅞	–	–
B	–	5½	6	6	–	9	10	14½	19	–	–
C	–	5¾	7⅜	8⅞	–	10 13/16	13⅝	20½	25 1/16	–	–
Handwheel diameter	2½	5½	6	6	9	9	10	14¼	19	23	23

Straightway valve weights (approx. lbs. each)

Body type	½	1	1½	2	2½	3	4	6	8	10	12
Screwed	2	6	12	17	–	–	–	–	–	–	–
Flanged	4	8	17	24	38	49	82	178	340	500	590
Butt-weld	2	7	12	16	28	35	58	142	290	425	490

NOTE: Dimensions for Straightway Valves with actuators are in the Engineering Section of this catalog. (pages 81-105)

Weir Valve Pressure/Temperature Recommendations

1 - To find the maximum reccommended operating temperature, enter the graph on the maximum operating temperature line.

2 - The intersection of temperature line with respective valve size curve determines the maximum recommended operating pressure, read at left of the graph.

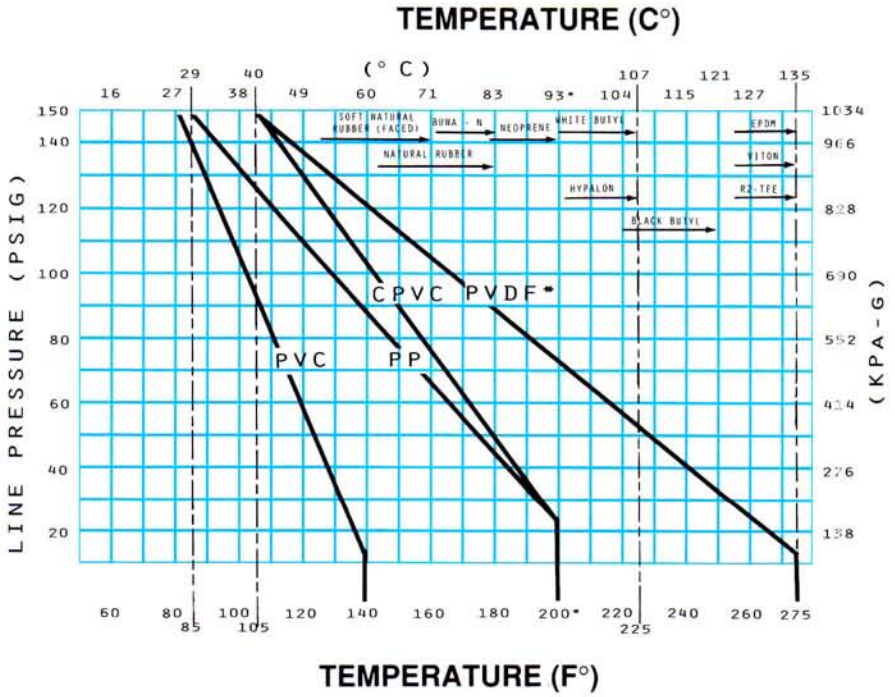
3 - Maximum recommended operating temperature may be determined by knowing the maximum operating pressure and reversing the above procedure.

4 - Operating pressure and temperature combinations above respective valve size curves should be avoided for maximum diaphragm flex-life.

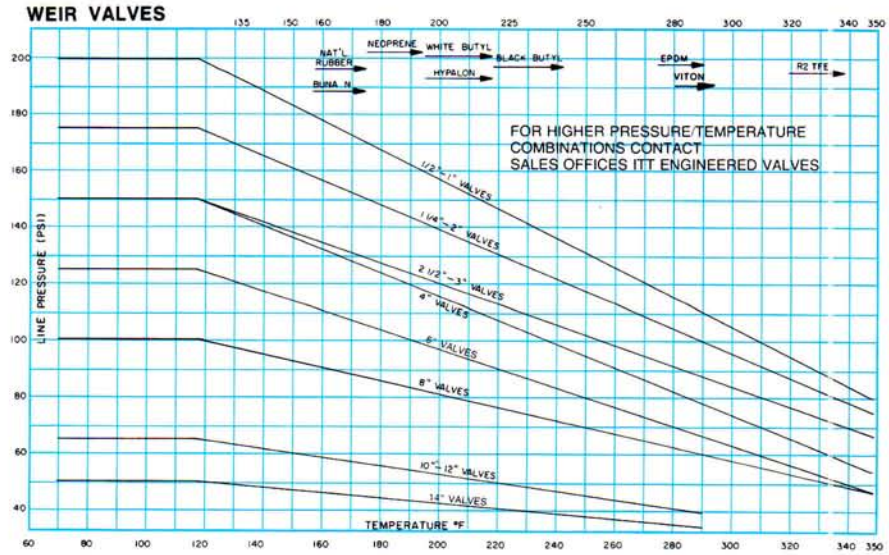
5 - Maximum temperature limitations of various diaphragm materials are also indicated by arrows under diaphragm material.

For services exceeding these pressure/temperature recommendations, consult your local ITT Engineered Valves Sales Engineer.

SOLID PLASTIC



ALL OTHERS



Note: Maximum pressure rating for Dualrange® Control Valves is 100 psi.

*PAS bonnet required above 200° F (93°C)

ENGINEERING DATA

Weir Valve Pressure/Temperature Recommendations (Continued)

Operating Pressures

Handwheel and lever operated valves

The maximum operating pressures listed below have been set to conform with ease of valve operation. Pressure tests indicate that Dia-Flo diaphragm valves withstand pressures far in excess of their rated values. The pressures listed below are applicable up to 120~F. Valves at maximum pressures cannot be used at maximum temperatures.

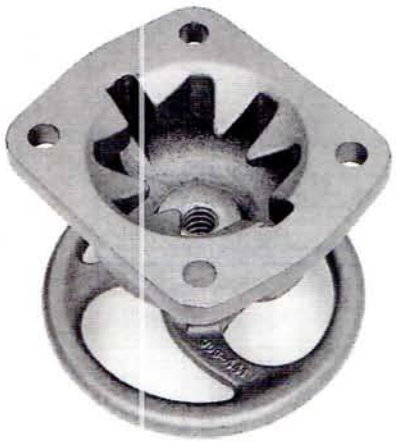
Pressure/Temperature chart is provided on page 67.

Weir-Type valve bodies

Valve size (inches)	Maximum pressure, psi
	Handwheel operated
¼, ⅜	200
½, ¾, 1	200
1¼, 1½, 2	175
2½	150
3	150
4	150
6	125
8	100
10, 12	65

Diaphragm support for high pressures

Tests in ITT Engineered Valves laboratories determined that alternate fingers on the compressor and in the bonnet are advantageous (even in intermediate valve sizes) to assure positive diaphragm support on high line pressures – particularly where there are surges in the pipe line. Experience in the field bears out this conclusion.



Vacuum Service

The standard Dia-Flo diaphragm valve is ideally suited for vacuum service when shipped from the factory. Dependable performance and good service life from atmospheric pressure down to 0.1 microns make this an excellent valve for industrial processing. The diaphragm presents a smooth face with no hidden voids on either side of the valve, whether open, closed or throttling, and is bidirectional. (BE SURE TO SPECIFY WHEN VACUUM IS INVOLVED.)

Elastomer diaphragms for Vacuum Service

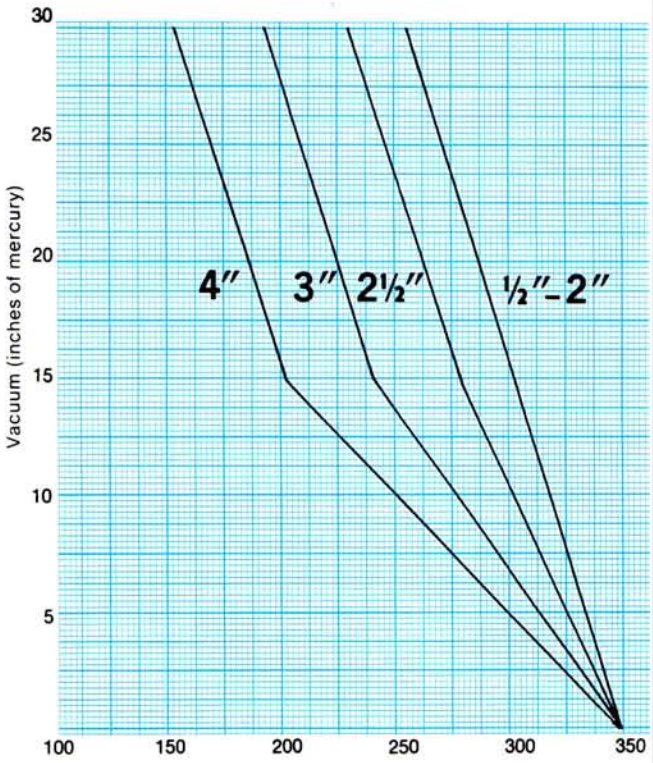
The non-porous diaphragm has a low vapor pressure high resistance to outgassing. The design inherently eliminates any possibility of stem leakage.

In-leakage through the standard valve with elastomer diaphragm is less than 1 x 10-6 atm-cc/sec and on special order it can be furnished with a substantially lower in-leak rate.

The standard *temperature* recommendations shown on the preceding page should be followed when an elastomer diaphragm is used.

The vacuum chart shown below gives temperature and pressure recommendations for PTFE diaphragms.

PTFE diaphragms for Vacuum Service (Temperature °F)



NOTES:

1 – Service conditions falling to the right of these lines will require bonnet evacuation

2 – R2-PTFE-diaphragms 6" size & larger will not withstand full vacuum at any temperature unless bonnets are evacuated

3 – With evacuated bonnets any size R2-PTFE-diaphragms can be used up to 350°F

Straightway valve pressure/temperature recommendations

1. To find the maximum recommended operating pressure enter the graph on the maximum operating temperature line.

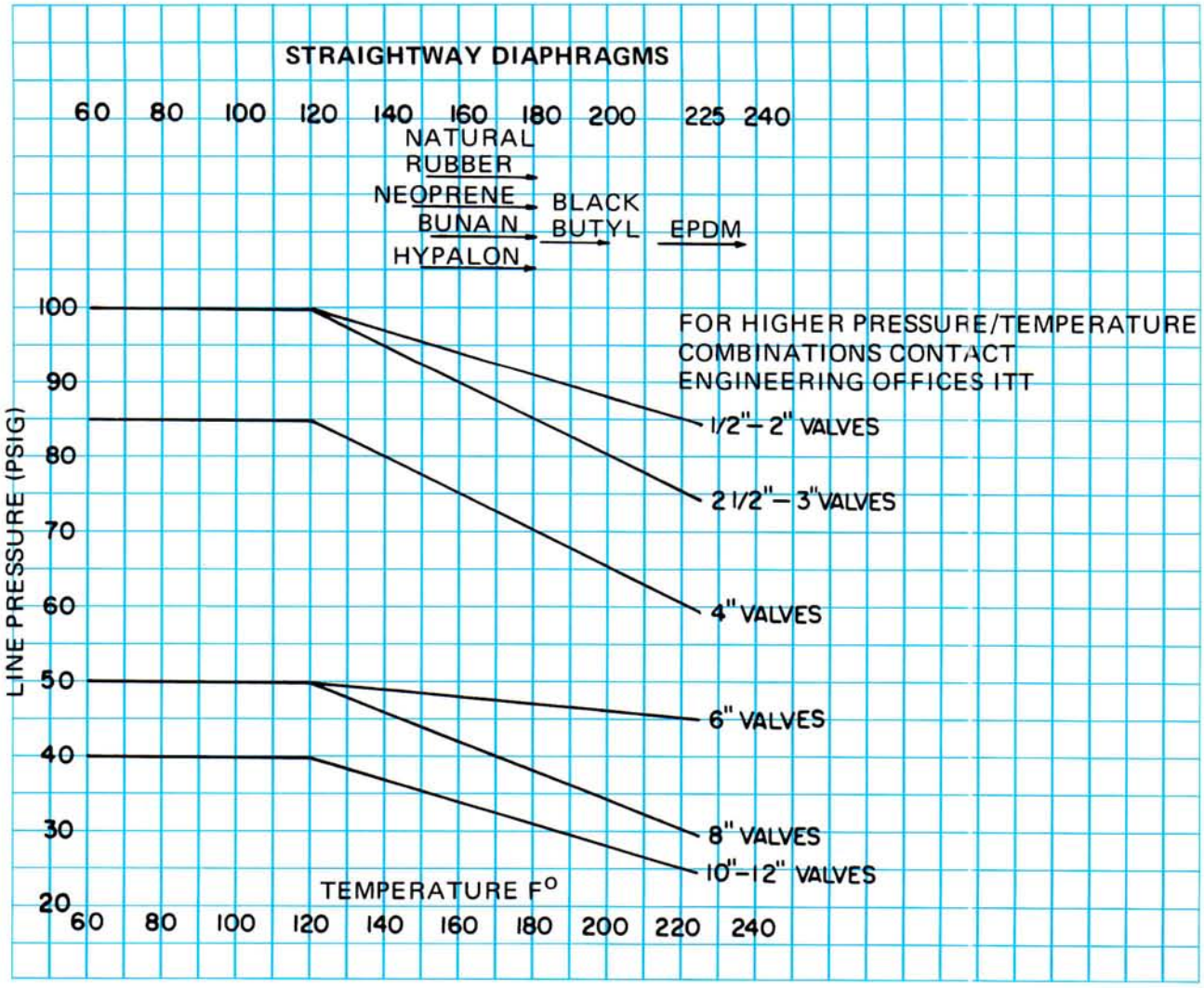
2. The intersection of temperature line with respective valve size curve determines the maximum recommended operating pressure, read at the left of the graph.

3. Maximum recommended operating temperature may be determined by knowing the maximum operating pressure and reversing the above procedure.

4. Operating pressure and temperature combinations above respective valve size curves should be avoided for maximum diaphragm flex-life.

5. Maximum temperature limitations of various diaphragm materials are also indicated by arrows under diaphragm material.

Diaphragm selection is governed by the combination of pressure, temperature and nature of fluids handled. For the majority of services elastomer diaphragms for straightway valves operate in the temperature range of –30° to 225°F. Most standard diaphragm grades will withstand intermittent, low pressure steam cleaning. For services exceeding these pressure/temperature recommendations, consult the ITT Engineered Valves Sales Engineer in your area.



Weir Valve Cv Ratings

%	Flanged End – Unlined										
open	½	¾-1	1¼ & 1½	2	2½	3	4	6	8	10	12
10	0.5	3	11	12	17	30	39	105	200	320	550
20	0.7	7	21	26	41	55	92	210	400	655	950
30	10	11	29	39	68	85	145	315	575	1000	1275
40	1.5	14	36	49	90	115	200	415	750	1300	1600
50	2.0	18	42	56	115	135	265	480	900	1450	1875
60	3.0	20	46	62	140	155	285	520	975	1625	2100
70	3.5	21	50	66	150	165	290	550	1050	1725	2250
80	4.0	22	52	69	155	175	300	570	1125	1775	2375
90	5.0	22	54	70	160	185	305	590	1175	1800	2475
100	5.5	22	56	70	160	190	310	600	1200	1800	2550

%	Flanged End – Plastic Lined							
open	¾-1	1¼ & 1½	2	2½	3	4	6	8
10	3	5	10	17	40	60	105	390
20	5	15	23	40	70	120	265	600
30	7	25	37	61	100	170	400	740
40	8	31	50	82	120	210	505	830
50	9	36	65	94	140	245	585	900
60	10	38	68	98	150	265	630	960
70	11	39	69	99	160	280	670	1000
80	11	40	69	100	170	285	680	1040
90	10	39	69	100	175	290	685	1060
100	10	38	67	100	175	285	690	1070

%	Flanged End – Hard Rubber Lined										
open	½	¾-1	1¼ & 1½	2	2½	3	4	6	8	10	12
10	0.2	2.9	12	15	20	31	46	150	225	320	400
20	0.4	5.4	22	30	35	57	105	275	450	655	750
30	0.7	8.2	26	40	50	75	160	375	650	1000	1125
40	1.2	11	28	45	65	93	210	475	800	1300	1425
50	1.5	13	29	50	80	110	220	550	900	1425	1700
60	2.0	13	29	54	90	130	230	600	975	1550	1900
70	2.4	13	30	60	100	145	245	610	1050	1650	2075
80	2.8	12	30	60	110	155	250	620	1075	1700	2200
90	3.4	11	31	59	115	160	260	625	1125	1750	2300
100	4.0	10	31	55	115	160	260	625	1150	1750	2350

%	Flanged End – Soft Rubber Lined										
open	½	¾-1	1¼ & 1½	2	2½	3	4	6	8	10	12
10	0.5	2.0	12	16	20	27	55	110	225	320	400
20	0.5	3.1	19	26	40	48	105	225	450	655	750
30	0.7	4.5	23	35	55	66	155	330	650	1000	1125
40	1.0	5.5	25	46	70	83	195	430	800	1300	1425
50	1.0	6.2	26	51	85	100	220	465	900	1425	1700
60	1.5	6.9	26	53	95	117	230	480	975	1550	1900
70	2.0	7.1	26	54	105	133	235	495	1050	1650	2075
80	2.0	7.2	26	54	110	144	240	505	1075	1700	2200
90	2.0	7.1	25	52	110	150	245	510	1125	1750	2300
100	2.0	7.0	25	50	110	155	250	515	1150	1750	2350

Cv ratings applying to screwed end metals and flanged unlined valves are based on use of cast iron bodies. For Butt Weld and Socket Weld ends use same Cv ratings as flanged ends in sizes 1" and larger.

Cv rating

Rate of flow depends upon the pressure drop.

The most common method of presenting this information is by Cv. The Cv is the valve coefficient of flow and represents the flow of water in gallons per minute with a 1 psi pressure drop through the valve. Throttling characteristics are shown in the same manner with Cv's at various openings.

Use formula shown below to compute actual flow at various pressure drops.

Actual flow (g.p.m.) = $C_v \sqrt{\frac{\Delta P}{sg}}$

See page 75 for details.

Weir Valve Cv Ratings (Continued)

%	Glass Lined								
open	½	¾-1	1¼ & 1½	2	2½	3	4	6	8
10	0.5	1.4	10	11	17	24	32	160	280
20	0.7	4.4	19	25	41	60	63	315	560
30	1.0	8.0	27	42	72	100	130	455	840
40	1.5	12	36	56	96	140	200	590	1125
50	2.0	15	45	72	120	180	265	685	1350
60	3.0	19	51	80	150	215	320	760	1525
70	3.0	22	54	83	170	235	365	805	1625
80	3.5	22	55	83	175	240	400	835	1675
90	4.5	22	54	82	180	245	415	845	1700
100	5.5	22	53	78	180	250	420	850	1700

%	Screwed End Metal						
open	½	¾	1	1¼ & 1½	2	2½	3
10	0.4	2	3	9	12	20	78
20	0.6	3	6	16	26	37	110
30	1.0	5	8	24	39	52	128
40	1.4	6	10	30	49	65	140
50	1.6	7	12	36	56	75	146
60	2.0	8	14	40	62	83	150
70	2.6	8	16	44	66	89	156
80	3.0	10	17	47	69	94	161
90	3.8	10	18	48	70	96	166
100	4.4	10	19	48	70	95	172

%	Solid Plastic							
open	½	¾	1	1¼	1½	2	3"	4"
10	0.20	0.60	0.80	1.20	1.80	6.0	19	34
20	0.50	2.20	3.40	4.00	9.20	12.20	43	60
30	0.90	4.00	6.20	9.80	16.00	24.50	68	82
40	1.80	5.60	8.20	16.00	21.80	38.50	92	103
50	2.50	7.00	10.50	20.90	27.20	49.50	106	124
60	2.90	7.70	12.80	25.30	31.50	57.00	118	144
70	3.20	8.20	14.30	26.40	31.50	60.00	122	160
80	3.40	8.40	15.20	27.10	31.50	62.60	124	172
90	3.60	8.70	15.80	27.70	31.50	64.00	125	179
100	3.60	8.70	15.80	28.40	31.50	65.50	125	185

%	Butt Weld									
open	½"	¾"	1"	1½"	2"	2½"	3"	4"	6*	8*
10	0.2	2.0	30	9	12	20	30	32	105	200
20	0.4	3.1	6.0	16	26	37	55	70	210	400
30	0.7	4.5	8.0	24	39	52	85	130	315	575
40	1.2	55	10.0	30	49	65	115	200	415	750
50	1.5	6.0	13.0	36	56	75	135	265	480	900
60	2.0	6.4	14.0	40	62	83	155	290	520	975
70	2.4	6.8	16.0	44	66	89	165	320	550	1050
80	2.8	7.0	17.0	47	69	94	170	360	570	1125
90	3.0	7.2	18.0	48	70	95	175	385	590	1175
100	3.5	7.5	18.6	48	70	95	180	400	600	1200

*Data is based on estimates.

Dualrange® Control Valves Cv Ratings

%	Flanged – Unlined						
open	¾-1	1½	2	2½	3	4	6
10	1.0	2.0	4.0	8.0	14	24	65
20	3.2	8.0	9.0	18	27	47	125
30	5.2	14	14	28	42	70	255
40	7.4	21	19	52	68	130	365
50	9.4	33	33	78	97	185	445
60	13	43	50	105	120	245	515
70	18	50	62	130	145	275	550
80	21	52	69	150	160	295	570
90	22	54	70	160	175	305	590
100	22	56	70	160	190	310	600

%	Flanged – Plastic Lined						
open	¾-1	1½	2	2½	3	4	6
10	1.0	3.0	4.5	7.0	16	20	70
20	2.8	8.0	11	17	34	55	145
30	4.7	13	16	28	52	80	280
40	6.6	21	27	50	84	125	430
50	8.2	32	43	75	125	190	540
60	9.5	37	60	88	150	240	610
70	10	38	68	97	160	270	655
80	11	39	69	100	170	285	680
90	10	38	69	100	175	290	690
100	10	38	67	100	175	285	690

%	Flanged – Soft Rubber Lined						
open	¾-1	1½	2	2½	3	4	6
10	0.5	3.0	3.5	6.0	12	22	65
20	1.6	8.0	10	15	26	41	125
30	3.2	14	17	25	39	60	250
40	5.5	20	23	47	55	105	350
50	6.2	29	33	76	77	155	405
60	6.9	28	47	95	99	195	450
70	7.1	26	54	105	120	220	485
80	7.2	26	54	110	135	240	505
90	7.1	25	52	110	145	245	510
100	7.0	25	50	110	155	250	515

%	Flanged – Hd. Rubber Lined						
open	¾-1	1½	2	2½	3	4	6
10	0.5	3.5	6.0	10	12	25	65
20	3.0	10	12	20	26	50	130
30	5.9	16	17	30	40	71	275
40	8.3	26	22	49	57	130	430
50	10	29	37	65	84	190	530
60	11	29	51	84	110	230	570
70	11	30	60	96	125	245	590
80	11	30	60	105	145	250	620
90	10	31	59	110	155	260	625
100	10	31	55	115	160	260	625

%	Flanged – Glass Lined						
open	¾-1	1½	2	2½	3	4	6
10	1.4	3.0	3.0	8.0	12	24	98
20	3.8	9.0	9.0	18	32	50	190
30	6.2	16	17	28	48	77	370
40	8.6	26	25	56	84	145	520
50	12	40	40	85	135	210	640
60	18	51	62	115	185	270	750
70	22	54	75	140	220	335	805
80	22	55	82	155	240	395	835
90	22	54	82	180	245	415	845
100	22	53	78	180	250	420	850

Straightway Valve Cv Ratings

%	Flanged Plastic Lined						
open	1	1½	2	3	4	6	8**
10	0.6	5	9.3	40	80	162	227
20	5.6	21	38	97	167	398	619
30	14	42	76	158	252	587	864
40	17	48	96	200	322	733	1080
50	18	54	116	215	334	818	1245
60	20	58	123	236	372	862	1262
70	23	65	137	270	424	963	1372
80	24	73	156	292	474	1052	1535
90	24	80	180	320	525	1191	1917
100	24	80	209	370	569	1400	2644

Note – 8" C_v data available from Dia-Flo Sales Engineer

%	FLG – #5*		
open	1	1½	2
10	15	16	22
20	24	26	40
30	28	36	90
40	32	48	135
50	34	59	150
60	36	64	150
70	38	66	155
80	40	69	165
90	41	73	190
100	42	79	220

%	FLG – #10*		
open	1	1½	2
10	6.5	15	36
20	15	30	72
30	23	48	130
40	30	62	140
50	35	72	160
60	40	80	180
70	44	90	200
80	47	100	220
90	50	115	240
100	55	130	260

%	Flanged Rubber Lined						
open	2½	3	4	6	8	10	12
10	60	65	90	100	350	550	550
20	110	125	185	275	700	1150	1150
30	155	190	255	550	1050	1700	1700
40	190	235	310	825	1400	2250	2250
50	215	270	350	950	1750	2800	2800
60	235	290	415	1000	2150	3100	3100
70	245	315	525	1050	2500	3200	3200
80	260	350	645	1100	2875	3300	3300
90	285	390	685	1300	3200	3650	3650
100	365	460	700	1800	3500	4850	4850

%	Flanged End Unlined										
open	½	1	1½	2	2½	3	4	6	8	10	12
10	2.0	10	15	30	60	75	85	250	350	450	450
20	4.0	19	30	60	115	135	165	450	700	1050	1050
30	5.0	26	45	90	160	185	240	700	1030	2000	2000
40	6.5	32	60	120	205	230	320	950	1400	2800	2800
50	7.5	38	72	150	240	270	400	1150	1750	3350	3350
60	9.0	44	80	180	265	295	480	1400	2050	3550	3550
70	9.5	48	84	210	285	310	560	1650	2350	3650	3650
80	10	52	87	235	300	335	625	1850	2700	3900	3900
90	11	56	97	260	350	390	670	2050	3300	4300	4300
100	11	60	115	275	450	525	700	2250	4250	5000	5000

* NOTE: Flanged #10 = hard natural rubber lining. Flanged #5 = soft natural rubber, neoprene, hypalon and butyl linings.
** Data is based on estimates.

%	Flanged – Glass Lined							
open	1	1½	2	2½	3	4	6	8
10	7.0	15	25	60	75	80	300	400
20	15	25	55	115	130	150	600	750
30	25	35	80	160	180	210	850	1125
40	35	50	105	200	230	300	1025	1500
50	37	60	130	230	270	400	1150	1800
60	40	70	155	260	300	495	1250	2050
70	43	80	170	285	320	570	1250	2400
80	45	85	185	315	340	625	1300	2800
90	47	95	215	350	390	670	1500	3500
100	48	100	270	425	475	700	1950	4400

%	Screwed End			
open	½	1	1½	2
10	2.0	10	15	30
20	4.0	20	30	55
30	6.0	27	45	90
40	8.0	33	64	130
50	10	36	80	170
60	10	38	92	180
70	11	39	100	190
80	12	39	110	200
90	13	39	115	225
100	15	39	120	265

Flow Computations

The pipe size in the system ordinarily will determine the valve size. However, to assure accurate throttling or positioning, it is advisable to calculate the valve size. Formulas for liquid and gas are as follows:

Liquid Flow Formula*

$$C_v = Q_a\sqrt{\frac{sg}{\Delta P}}$$

$$Q_a = C_v\sqrt{\frac{\Delta P}{sg}}$$

$$\Delta P = sg\left(\frac{Q_a}{C_v}\right)^2$$

Where:

C_v = flow (gpm) at pressure drop of 1 psi
sg = specific gravity
Q_a = actual flow (gpm)
ΔP = actual pressure drop (psi)

Gas Flow Formula*

$$C_v = \frac{Q}{1360}\sqrt{\frac{sg\,(T)}{\Delta P}}\ \sqrt{\frac{2}{P_1 + P_2}}$$

$$Q = 1360\ C_v\sqrt{\frac{\Delta P}{sg\,(T)}}\ \sqrt{\frac{P_1 + P_2}{2}}$$

$$\Delta P = P_1 - \sqrt{P_1^2 - (sg \times T)\left(\frac{Q}{963 \times C_v}\right)^2}$$

Where:

Q = volumetric flow (SCFH)**
sg = specific gravity (air at stp = 1)
T = absolute flowing temperature (°F + 460)
P_1 = inlet pressure (psia)
P_2 = outlet pressure (psia)
ΔP = pressure drop (P_1-P_2)
C_v = valve coefficient from tables

**SCFH (standard cubic foot per hour) of gas is measured at 60°F (519.7R) and 14.696 psia. CFH (cubic foot per hour) is measured at any temperature and pressure.

Conversion of CFH to SCFH is as follows:

$$SCFH = \frac{P_{actual}}{14.696} \times \frac{519.7\ °R}{T_{actual}} \times CFH_{actual}$$

Where:

CFH = standard cubic feet per hour
P_{actual} = pressure of gas in psia
T_{actual} = temperature of gas (°F + 460)

ENGINEERING DATA

Note 1: The design of Straightway Valves is not conducive to good throttling characteristics.

Note 2: Examples on next page.

Important:
In general, any reduction in outlet pressure below one half the absolute inlet pressure will give no further increase in flow. The value of the ratio of pressure at which maximum flow is obtained varies somewhat depending on the actual fluid.

*Fluid Controls Institute Inc. Standard FCI 62-1

Square Root Table

no.	square root	no.	square root	no.	square root
1	1.0000	21	4.5826	41	6.4031
2	1.4142	22	4.6904	42	6.4807
3	1.7321	23	4.7958	43	6.5574
4	2.0000	24	4.8990	44	6.6332
5	2.2361	25	5.0000	45	6.7082
6	2.4495	26	5.0990	46	6.7823
7	2.6458	27	5.1962	47	6.8557
8	2.8284	28	5.2915	48	6.9282
9	3.0000	29	5.3852	49	7.0000
10	3.1623	30	5.4772	50	7.0711
11	3.3166	31	5.5678	51	7.1414
12	3.4641	32	5.6569	52	7.2111
13	3.6056	33	5.7446	53	7.2801
14	3.7417	34	5.8310	54	7.3485
15	3.8730	35	5.9161	55	7.4162
16	4.0000	36	6.0000	56	7.4833
17	4.1231	37	6.0828	57	7.5498
18	4.2426	38	6.1644	58	7.6158
19	4.3589	39	6.2450	59	7.6811
20	4.4721	40	6.3246	60	7.7460

Examples (Flow Computations)

Weir Valves:

Examples:
(flow at pressure drop of 1 psi)

Problem:
To find the rate of flow of water through a 1½" unlined cast iron flanged valve, half open, with a pressure drop of one psi.

Solution:
From table on page 70 the corresponding rate of flow is 42 gpm.

Problem:
To find the valve position of 2½" glass lined valve, with a water flow of 170 gpm and a pressure drop of 1 psi.

Solution:
From table on page 70 the corresponding valve position is 70% open.

Problem:
To determine the flow in cubic feet per hour of air through a wide open 2 inch unlined valve. Inlet pressure at 60 psig, outlet pressure at 40 psig, and temperature at 60°F.

$$Q = (1360)\,(70)\sqrt{\frac{20}{520}}\sqrt{\frac{74.7 + 54.7}{2}}$$

$$Q = 150{,}400 \text{ SCFH}$$

Problem:
To find the rate of flow of water through a 2½" soft rubber lined valve, half open with a pressure drop of 3 psi.

Solution:
From table on page 70

$C_v = 85$ gpm
$Q_a = 85\sqrt{3}$
$Q_a = 147$ gpm

Straightway Valves

Examples
(flow at pressure drop of 1 PSI.)

Problem
find the rate of flow of water through a 1½" unlined flanged valve, half open, with a pressure drop of 1 PSI.

Solution
from Cv table: the corresponding rate of flow is 72 GPM.

Problem
find the valve position of a 2½" glass lined valve, with a water flow of 285 GPM and a pressure drop of 1 PSI.

Solution
from Cv table the corresponding valve position is 70% open.

Problem
find valve size and valve position of an unlined valve, with flow at 200 GPM and an actual pressure drop of 5 PSI for a liquid with a specific gravity of 1.8

Solution

$$Cv = \frac{200}{\sqrt{\frac{1.8}{5}}} = \frac{200}{\sqrt{2.78}} = \frac{200}{1.7} = 118$$

from Cv table: a 2" valve has a Cv of 120 at 40% open

Problem
to determine the flow in cubic feet per hour of air through a wide open 2" unlined valve. Inlet pressure at 60 PSIG, outlet pressure at 40 PSIG, and temperature at 60°F.

Solution
from Cv table: $Cv = 275$

$$Q = 1360\,(275)\sqrt{\frac{20}{(1)(520)}}\sqrt{\frac{74.7 + 54.7}{2}}$$

$= 374{,}000 \quad \sqrt{.04} \quad \sqrt{64.7}$
$= 374{,}000 \times 1.61$
$Q = 602{,}140$ standard cubic feet per hour

Problem
find the rate of flow of water through a 2½" #5 rubber lined valve, full open, with a pressure drop of 3 PSI

Solution
from Cv table: $Cv = 365$
$Qa = 365\sqrt{3}$ or 632 GPM

Problem
find the pressure drop across a 1" glass lined valve 100% open with water flow of 63 GPM

Solution
from Cv table: $Cv = 48$

$$\Delta P = \left(\frac{63}{48}\right)^2$$

$\Delta P = 1.7$ PSI

Fluid velocity is a very important design consideration when selecting diaphragm valves. As mentioned previously velocity should be limited to 25 fps for clean fluids and 8-10 fps for slurries. Velocity through a Dia-Flo® weir type diaphragm valve can be determined by using the following equation:

$$V = .321 \frac{Q}{A}$$

Where
V = Velocity in feet per second
Q = Flow in gallons per minute
A = Area in square inches at the point of greatest restriction (from table below)

AREA OVER THE WEIR FOR STANDARD WEIR VALVES (Square Inches)

Valve Size	% OPEN									
	10	20	30	40	50	60	70	80	90	100
½	.03	.06	.08	.10	.12	.14	.16	.18	.19	.20
¾	.06	.11	.16	.20	.24	.28	.31	.34	.37	.39
1*	.09	.18	.26	.33	.40	.46	.52	.57	.62	.65
1¼,1½	.23	.43	.62	.79	.95	1.11	1.24	1.37	1.48	1.56
2	.38	.73	1.05	1.33	1.61	1.87	2.10	2.31	2.50	2.64
2½	.55	1.05	1.51	1.93	2.33	2.71	3.05	3.35	3.62	3.83
3	.84	1.60	2.30	2.93	3.53	4.11	4.62	5.08	5.50	5.81
4	1.37	2.62	3.76	4.81	5.78	6.73	7.57	8.33	9.01	9.51
6	3.0	5.7	8.1	10.4	12.5	14.5	16.3	18.0	19.5	20.5
8	5.8	11.2	16.1	20.5	24.7	28.7	32.3	35.5	38.4	40.6
10	8.4	16.1	23.1	29.5	35.5	41.3	46.5	51.1	55.3	58.4
12	11.8	22.6	32.4	41.4	49.8	58.0	65.2	71.7	77.5	81.9

AREA OVER THE WEIR FOR DUALRANGE® VALVES (Square Inches)

Valve Size	% OPEN									
	10	20	30	40	50	60	70	80	90	100
1"*	.06	.11	.14	.18	.25	.31	.38	.49	.62	.65
1½"	.10	.21	.28	.34	.44	.59	.80	1.00	1.22	1.56
2"	.14	.22	.37	.63	.98	1.26	1.57	1.91	2.11	2.64
2½"	.14	.39	.63	.88	1.31	1.86	2.27	2.67	3.25	3.83
3"	.30	.65	.98	1.29	1.94	2.51	3.35	3.99	4.65	5.81
4"	.60	1.14	1.62	2.63	4.01	4.92	5.95	6.81	7.85	9.51
6"	1.54	2.30	4.01	6.63	9.43	11.68	13.79	15.84	17.90	20.50

* Includes all ¾" flanged valves except solid plastic

Metallic Materials Specifications & Industry Standards

Bodies (weir/straightway)

- Cast Iron ASTM A-126 Class B
- Ductile Iron ASTM A-395 Grade 60-40-18
- Cast Steel ASTM A-216 Grade WCB
- 316 Stainless Steel ASTM A-351 Grade CF8M
- 316L Stainless Steel ASTM A-351 Grade CF3M
- Bronze ASTM B62 Alloy 836
- Alloy 20 ASTM A-351 Grade CN7M
- Hastelloy C ASTM A-494 Grade CW-6M
- Monel ASTM A-743 Grade M-35-1
- PVC
- CPVC
- PVDF
- Polypropylene
- And more

Bonnets (weir/straightway)

- Cast Iron ASTM A-126 Class B
- Ductile Iron ASTM A-395 Grade 60-40-18
- Stainless Steel ASTM A-351
- Bronze (weir) ASTM B62 Alloy 836
- Polypropylene (weir only ½" - 4") PAS (weir only ½" - 4")

Dia-Flo® Diaphragm Valves are manufactured to the following standards:

ANSI B2.1	Pipe Threads
ANSI B16.5	Flanged Valves
ANSI B16.1	Cast Iron Flanged Fittings
ANSI B16.11	Socketweld Fittings
ANSI B16.15	Bronze Threaded Fittings
ANSI B16.24	Bronze Flanges
ANSI B16.25	Buttweld Ends
ANSI B16.34	Steel Valves
ANSI B16.4	Cast Iron Threaded Fittings
ANSI B31.1	Power Piping
ANSI B31.3	Petro/Chem Piping
MSS SP-88	Diaphragm Valves (Design & Manufacture Standard Practice)

In addition ITT Engineered Valves has complete capabilities for CMTR (Certified Materials Test Reports) and NDE (Non-destructive Examinations) which include dye-penetrant, x-ray, alloy analyzer, etc.

Tefzel® ETFE lined, Kynar® PVDF coated Dia-Flo Diaphragm Valve shown in specialty chemical manufacturing plant on 35% HCl line.

Valve Linings & Solid Plastic Materials Specifications

The economies and conveniences resulting from the use of lined valves are well recognized. More and more engineers concerned with corrosion and abrasion resistant piping systems are specifying valves lined with plastic, rubber or glass. The unique design of the Dia-Flo diaphragm valve lends itself admirably to this concept.

Plastic linings do not bond to the metal castings. To provide a mechanical bond while insuring a full thick (3/16") (4.76 mm) lining, we recess the end flanges, the bonnet flange and the entire casting interior. In addition, we provide a unique Line-Lok feature in the weir area, which locks the plastic lining to the casting thus preventing movement, collapse or flexural stresses.

Below is a listing of our standard lining materials with a brief description of each material.

Tefzel® (ETFE)

Tefzel® (ETFE) is a tough modified copolymer of ethylene and tetrafluoroethylene (TFE). It offers outstanding resistance to chemicals at high temperatures and is especially resistant to solvents when compared to other fluoropolymers. The resin is unaffected by strong and weak acids, gases and solvents and below 392°F (200°C) has no known solvent. Cast Iron, ductile iron or Cast Steel flanged end bodies lined with Tefzel® (3/16" thick) (4.76 mm) are available in weir valve sizes 3/4" through 8" and cast iron lined straightway valve sizes 1" through 8".

Continuous use temperatures 300°F (149°C). Color coded white.

Saran

Saran, a polyvinylidene chloride resin has been in commercial use since 1946 as a valve lining material. It offers a broad range of corrosion resistance, and continuous use temperatures to 175°F (79°C). Flanged cast iron, ductile iron or cast steel valves lined with saran are available weir valves sizes from 3/4" through 8". Color coded black.

Polypropylene (PP)

Polypropylene is an inexpensive thermoplastic with good chemical and temperature resistance. Weir valves sizes 3/4" through 8" are cast iron, ductile iron or cast steel valves and straightway valve sizes 1" through 8" cast iron lined with blue polypropylene. This blue polypropylene complies with FDA requirements for food service. Code of Federal Regulations, GFR 21 Section 1 77.1520.

Because the polypropylene is completely supported by metal, these flanged polypropylene lined valves can be used at temperatures to 200°F (93°C). Color coded blue.

Also available in Solid polvpropylene weir bodies are valve sizes 1/2" through 4". Maximum continuous use temperature is 200°F (93°C).

PVDF

PVDF is a high molecular weight polymer of vinylidene fluoride. It is mechanically strong, thermally stable and resistant to most chemicals and solvents. Valve bodies of solid PVDF are available with threaded ends in sizes 1/2" – 2". Cast iron, ductile iron or cast steel flanged valves lined with PVDF (3/16" thick) which complies with FDA requirements Code of Federal Regulations 177.2510 are available in weir valve sizes 3/4" through 8". Continuous use temperature 285°F (140°C) for lined valves. Also available in solid PVDF weir bodies are valve sizes 1/2" to 4". Maximum continuous use temperature is 275°F (135°C).

PVC (Polyvinyl Chloride) and CPVC (Chlorinated Polyvinyl Chloride)

Rigid unplasticized PVC is a tough, chemically resistant thermoplastic that has gained wide acceptance in handling a broad range of corrosive chemicals. PVC piping systems can be threaded, flanged or solvent welded and Dia-Flo diaphragm valves with solid PVC bodies are available with all three end connections in sizes 1/2" through 2" as well as 3 and 4" flanged end connections. We also furnish cast iron valves lined with PVC in weir valve sizes 3/4" through 6" color coded dark gray. Maximum service temperature for PVC is 140°F (60°C), but solid CPVC valves are available in sizes 1/2" through 2" for temperatures to 200°F (93°C). Color coded light gray.

Valve Linings (Continued)

Glass

Dia-Flo® diaphragm valves are available lined with glass in sizes ½" through 8" with cast iron or ductile iron bodies. Cast iron straightway valves lined with glass are available in sizes 1" through 8". The glass lining is a borosilicate glass containing not less than 60% silicon dioxide which is both acid and alkalil resistant. Cast iron glass lined valves are capable of withstanding a thermal shock of 100°F (38°C) within the range of 0° to 350°F (–17 to 177°C) and ductile iron glass lined valves, a thermal shock of 180°F (82°C) between 0° to 350°F (–17 to 177°C). Glass lined valves are fully resistant to all concentrations of most acids, except hydrofluoric (HF), fluosilicic acid (H_2SiF_6), and related flourine compounds at temperatures to 212°F (100°C). For specific recommendations refer to the Service Guide or contact your local ITT Engineered Valves sales office. At higher temperatures the acid concentration and the water content are important considerations because steam is frequently more corrosive to glass than acids. Color coded blue.

Rubber

Rubber linings can be applied to Dia-Flo diaphragm valves in weir valve sizes ½" through 12" and straightway valve sizes 1" through 12". These linings are ⅛" thick through 4" valves and 3/16" thick in valve sizes over 4". Rubber linings cover the interior of the valve body as well as the bonnet flange and both end flanges. Standard linings include hard and soft rubber, neoprene, butyl, and hypalon. Others can be furnished on special order.

NOTE: Storage Recommendations

Lined piping should be stored away from direct sunlight, heat or outdoor seasonal weathering between the time of delivery and use. Flexible type lining may be stored outdoors, providing the piping is covered with protective tarpaulins and not subjected to extreme temperature conditions, such as below 32°F or above 120°F. Avoid sudden changes in temperature.

Semi-hard and especially bone hard type lined equipment must be protected and stored, preferably indoors, and should never be subjected to extreme cold climatic conditions because thermal stress and expansion may introduce cracking.

Most lined diaphragm valves can be furnished with valve bodies of cast iron, ductile iron or carbon steel. Cast iron is the most economical and is frequently specified for handling low pressure, low temperature corrosive fluids. Ductile iron castings may be specified for more severe conditions or where there is concern about possible breakage of cast iron. Carbon steel may also be specified for more severe operating conditions but ductile iron is normally acceptable as an alternate to carbon steel.

	DUCTILE IRON	CARBON STEEL	CAST IRON
ASTM Designation	A-395	A-216 WCB	A-126
Tensile strength, psi	60,000	70,000	31,000
Tensile yield, psi	40,000	36,000	None
% elongation before fracture	18	22	None
Max. pressure rating, –20 to 100 deg. F. (–28 to 38 deg. C.)			
psi	250	285	200
kPa	1724	1965	1379

Valve Linings (Continued)

Identification	Color	Material	Durometer	Max. Temp. °F	°C
–	Blue	Glass	–	350°	177°
#5	Black	Soft Natural Rubber	A 55-60	180°	82°
#7	Black	Neoprene	A 60-65	200°	93°
#9	Black	Hypalon	A 60-65	200°	93°
#10	Black	Hard Natural Rubber*	D 40-70[Δ]	200°	93°
#11	Black	Soft Gum Rubber	A 35-40	140°	60°
#12	Black	Graphite Loaded Nat. Rubber*	D 72-78[Δ]	200°	93°
#16	Black	Butyl	A 60-65	200°	93°
–	Black	Saran	–	175°	80°
–	White	PVDF (FDA listed)	–	285°	140°
–	Blue	Polypropylene (FDA listed)	–	200°	93°
–	Gray	PVC	–	140°	60°
–	White	Tefzel	–	300°	149°

[Δ]After 10 sec's

Linings shown can be furnished with cast iron, ductile iron, or cast steel bodies.

Lined piping should be stored, between delivery and use, away from direct sunlight, heat or outdoor seasonal weathering. Flexible type lining may be stored outdoors, providing the vessels are covered with protective tarpaulins and are not subjected to extreme temperature conditions.

*Semi hard and especially bone hard type lined equipment must be protected and stored, preferably indoors, and should never be subjected to extreme cold climatic conditions because thermal stress and expansion may introduce cracking.

Diaphragm Selection

Diaphragm selection[1]

Valve	Grade	Material	Temp. °F[2,4] Min.	Max.	Temp. °C Min.	Max.
Weir Type elastomers	A	Gum Rubber (Faced)	–20	160	–29	71
	B	Black butyl	–20	250	–29	121
	C	Hypalon	0	225	–18	107
	M	Ethylene Propylene (EPDM)	–30	300	–34	149
	DP	Buna N – For Direct Load	10	180	–12	82
	P	Buna N	10	180	–12	82
	S	Natural rubber	–30	180	–34	82
	T	Neoprene	–20	200	–29	93
	V	Viton	–20	325	–29	163
	WB	White butyl	0	225	–18	107
Weir Type plastics[3]	R2	Polytetrafluorethylene (PTFE)	–30	350	–34	177
Straightway	SB	Black Butyl	0	200	–18	93
	SC	Hypalon	0	180	–18	82
	SM	Ethylene Propylene (EPDM)	–20	225	–29	107
	SP	Buna N	10	180	–12	82
	SS	Natural Rubber	–20	180	–29	82
	ST	Neoprene	–10	180	–23	82

Notes:
[1]To be used as General guide; for complete service guide see pages 114 - 155
[2]Diaphragms at maximum temperatures cannot be used satisfactorily at maximum pressures. Pressure/temperature charts are provided on page 67 & 69.
[3]With ethylene propylene backing cushion.
[4]Cast iron, ductile iron & carbon steel should not be used below –20°F (–29°C).

DIA-FLO® Actuator Weights

Double acting diaphragm type (including adapter bushing)	
#3312	5½ lbs.
#3325	13½ lbs.
#3350	33½ lbs.
#3375	42 lbs.
#33101	71 lbs.
#33130	88 lbs.
#33250	140 lbs.

Normally closed (including adapter bushing)	
#3213 – 3216	5½ lbs.
#3226 – 3228	32½ lbs.
#3251, 52, 56	55 lbs.
#3253 – 3255	73 lbs.
#3274 – 3279	78 lbs.
#32102 – 32109	186 lbs.
#32101 Special Spring Combination	176 lbs.
#32131 – 32138	207 lbs.
#32130 Special Spring Combination	200 lbs.
#32252 – 32253	270 lbs.
#32251	405 lbs.

Normally open (including adapter bushing)	
#3112	5 lbs.
#3125	24½ lbs.
#3150	42 lbs.
#31101	135 lbs.
#31130	145 lbs.
#31250	220 lbs.

Advantage® Actuator Weights

#A305	1.03
#A308	1.95
#A316	4.90
#A347	51.60
#A205, A206	1.37
#A208, A209	2.62
#A216, A217	9.24
#A247, A248	86.60
#A105	1.12
#A108	2.06
#A116	5.40
#A147	54.90

Actuator Internal dimensions

Dia-Flo

Actuator Size	Stroke	Air Connection	Effective Diaphragm Area (Sq. in.)	Actuator Volume (cu. in.)					
				Bottom Chamber		Upper Chamber			
				Double & Reverse Acting		Double Acting		Direct Acting	
				Open	Closed*	Open	Closed*	Open	Closed*
12 – 16	5/8"	1/4"	11.5	13.25	6.8	6.1	12.5	6.1	12.5
25 – 28	2"	1/4"	22.5	90.3	21.7	13.4	85.1	13.4	85.1
50 – 56	3"	1/4"	50	321.0	63.4	43.8	329.0	364	622
75 – 79	3"	1/4"	75	374.7	128.1	80.9	422.0	–	–
101 – 109	3 1/8"	1/2"	100	528.0	174.0	144.0	498.0	579	933
130 – 138	3 1/2"	1/2"	130	698.7	202.9	212.0	710.9	647	1146
250 – 253	4 5/8"	1/2"	250	1650.0	750.0	675.0	1760.0	1110	2195

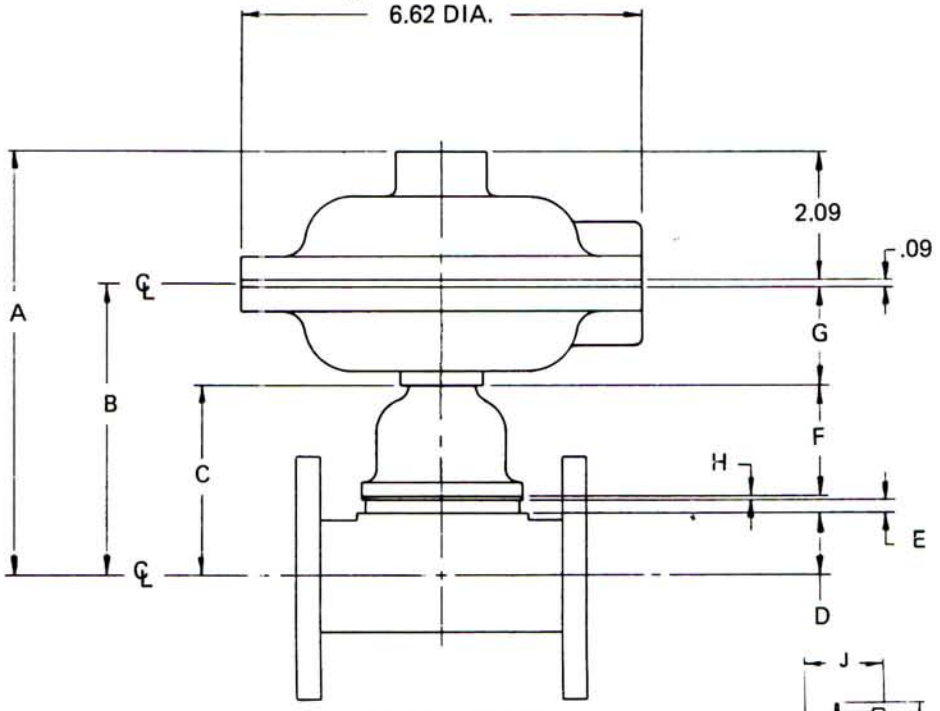
* Using stroke of largest valve for which actuator is suitable

Advantage

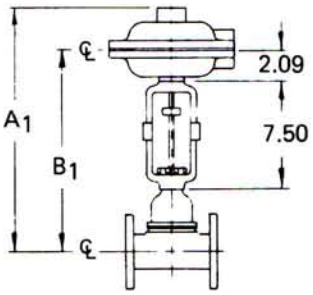
Actuator Size	Stroke	Air Connection	Effective Diaphragm Area (Sq. in.)	Actuator Volume (cu. in.)	
				Bottom Chamber Maximum	Upper Chamber Maximum
5, 6	1/4"	1/8"	5	4.27	5.49
8, 9	1/2"	1/8"	8	7.63	12.51
16, 17	1 1/8"	1/8"	16	38.75	71.00
47, 48	1 5/8"	1/4"	47	250.20	463.80

Dimensional data for valves with actuators

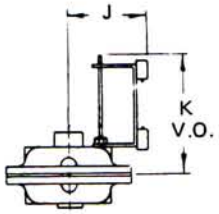
Series 3312 double acting



CLOSE COUPLED

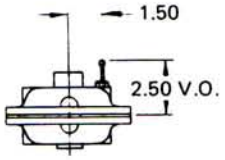


YOKE MOUNTED

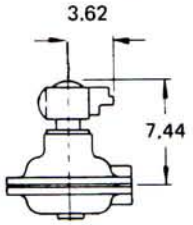


LIMIT SWITCHES

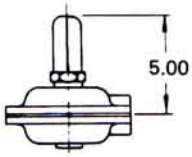
LIMIT SWITCHES	J	K
BZE6-2RN or DTE6-2RN	4.75	9.12
BAF1-2RN-RH or DTF2-2RN-RH	5.00	9.12
EX-Q or EXD-Q	5.75	10.00



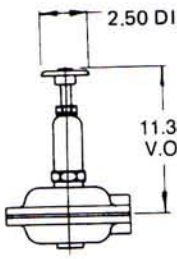
POSITION INDICATOR



POSITIONER (MOORE & CONOFLOW



ADJ. TRAVEL STOP



HDWHL CLOSING & ADJ. OPENING STOP & ADJ. TRAVEL STOP.

WEIR VALVES

Valve Size	Yoke Mounted A_1	Yoke Mounted B_1	Close Coupled A	Close Coupled B	C	D	E	F	G	H	ENDS
½	13.68 13.62	11.55 11.49	5.65 5.59	3.52 3.46	1.92 1.86	.62 .56	.18	1.12	1.56	–	SCR'D FLG'D
¾	14.30 14.63	12.17 12.50	6.27 6.60	4.14 4.47	2.54 2.87	.78 .81	.20 .22	1.56 1.75	1.56	– .09	SCR'D FLG'D
1	14.82 14.63	12.69 12.50	6.79 6.60	4.66 4.47	3.06 2.87	1.00 .81	.22	1.75	1.56	.09	SCR'D FLG'D
1¼–1½	16.16 15.97	14.03 13.84	8.13 7.94	6.00 5.81	4.40 4.21	1.41 1.22	.28	2.62	1.56	.09	SCR'D FLG'D
2	16.65 16.52	14.52 14.39	8.62 8.49	6.49 6.36	4.89 4.76	1.69 1.56	.30	2.81	1.56	.09	SCR'D FLG'D

STRAIGHTWAY VALVES

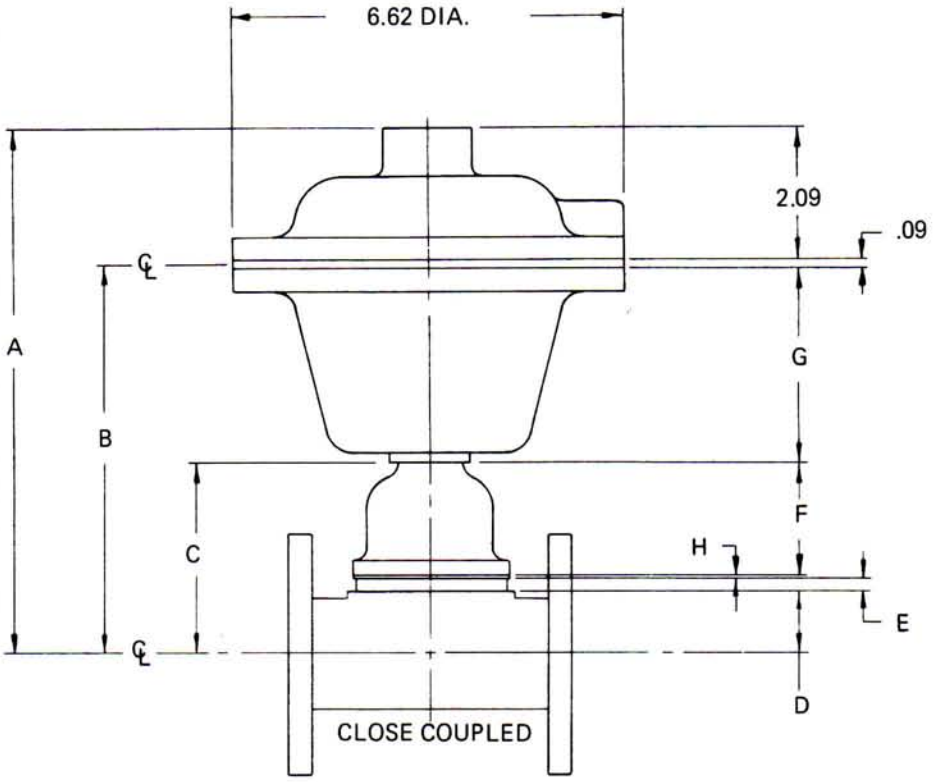
Valve Size	Yoke Mounted A_1	Yoke Mounted B_1	Close Coupled A	Close Coupled B	C	D	E	F	G	H	ENDS
½	14.07 14.01	11.94 11.88	6.04 5.98	3.91 3.85	2.31 2.25	.62 .56	.19	1.50	1.56	–	SCR'D FLG'D

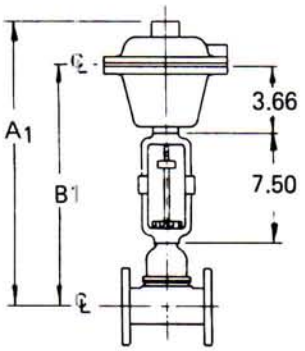
DUALRANGE VALVES

Valve Size	Yoke Mounted A_1	Yoke Mounted B_1	Close Coupled A	Close Coupled B	C	D	E	F	G	H	ENDS
1	16.48 16.29	14.35 14.16	8.98 8.79	6.85 6.66	4.72 4.53	1.00 .81	.22	3.50	2.09	–	SCR'D FLG'D

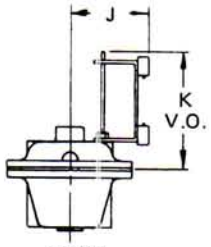
Dimensional data

Series 3112 direct acting



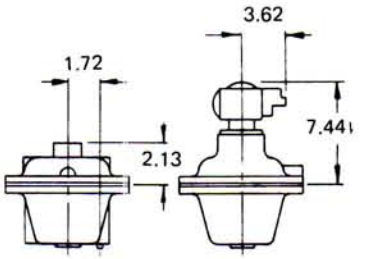


LIMIT SWITCHES	J	K
BZE6-2RN or DTE6-2RN	4.75	9.12
BAF1-2RN-RH or DTF2-2RN-RH	5.00	9.12
EX-Q or EXD-Q	5.75	10.00



WEIR VALVES

Valve Size	Yoke Mounted A_1	Yoke Mounted B_1	Close Coupled A	Close Coupled B	C	D	E	F	G	H	ENDS
½	15.25 15.19	13.12 13.06	7.21 7.15	5.08 5.02	1.92 1.86	.62 .56	.18	1.12	3.12	–	SCR'D FLG'D
¾	15.87 16.20	13.74 14.07	7.83 8.16	5.70 6.03	2.54 2.87	.78 .81	.20 .22	1.56 1.75	3.12	– .09	SCR'D FLG'D
1	16.39 16.20	14.26 14.07	8.35 8.16	6.22 6.03	3.06 2.87	1.00 .81	.22	1.75	3.12	.09	SCR'D FLG'D
1¼-1½	17.73 17.54	15.60 15.41	9.69 9.50	7.56 7.37	4.40 4.21	1.41 1.22	.28	2.62	3.12	.09	SCR'D FLG'D
2	18.22 18.09	16.09 15.96	10.37 10.24	8.24 8.11	4.89 4.76	1.69 1.56	.30	2.81	3.31	.09	SCR'D FLG'D

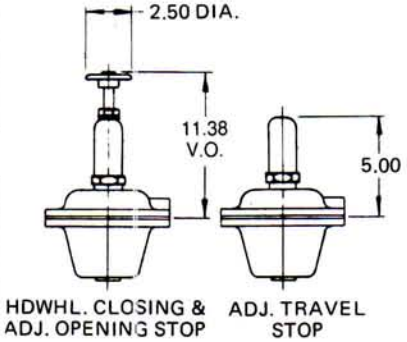


STRAIGHTWAY VALVES

Valve Size	Yoke Mounted A_1	Yoke Mounted B_1	Close Coupled A	Close Coupled B	C	D	E	F	G	H	ENDS
½	15.64 15.58	13.51 13.45	7.60 7.54	5.47 5.41	2.31 2.25	.62 .56	.19	1.50	3.12	–	SCR'D FLG'D

DUALRANGE VALVES

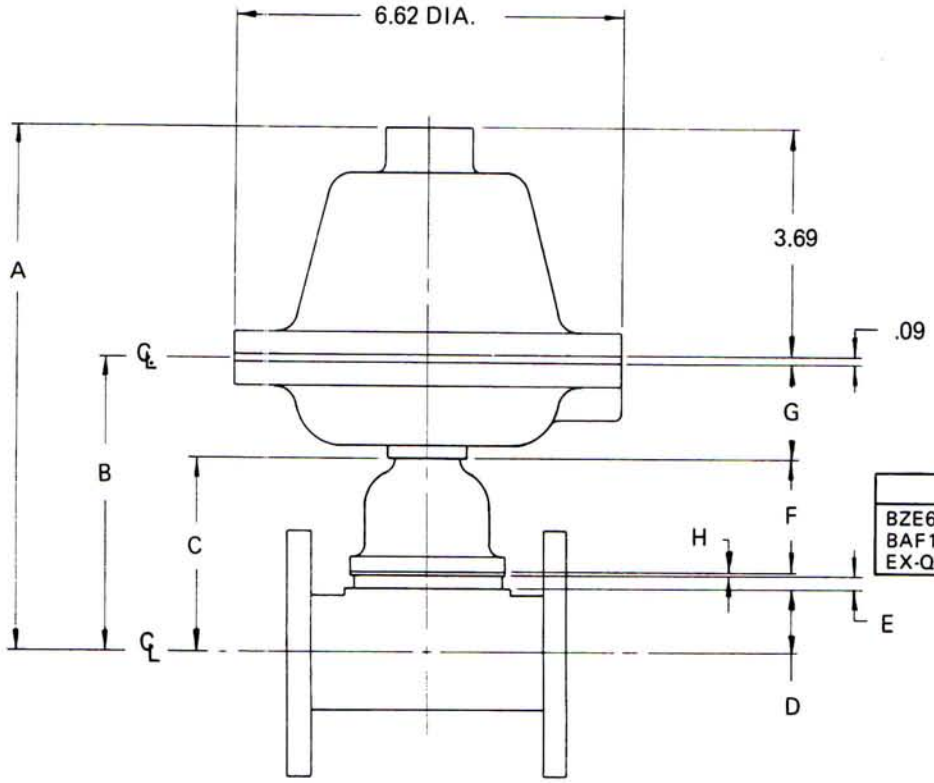
Valve Size	Yoke Mounted A_1	Yoke Mounted B_1	Close Coupled A	Close Coupled B	C	D	E	F	G	H	ENDS
1	18.05 17.86	15.92 15.73	10.55 10.36	8.42 8.23	4.72 4.53	1.00 .81	.22	3.50	3.66	–	SCR'D FLG'D



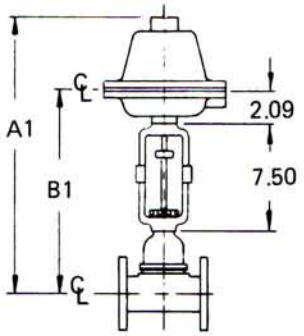
ENGINEERING DATA

Dimensional data

Series 3213–16 reverse acting

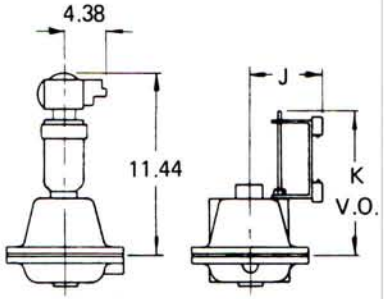


CLOSE COUPLED

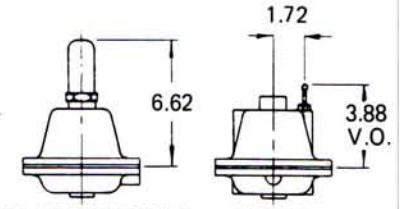


YOKE MOUNTED

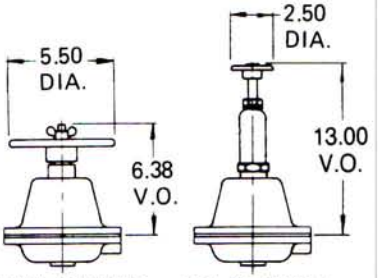
LIMIT SWITCHES	J	K
BZE6-2RN or DTE6-2RN	5.00	10.62
BAF1-2RN-RH or DTF2-2RN-RH	5.00	10.62
EX-Q or EXD-Q	5.75	11.56



POSITIONER (MOORE & CONOFLOW) | LIMIT SWITCHES



ADJ. TRAVEL STOP & WRENCH OPENING DEVICE | POSITION INDICATOR



HDWHL. OPENING DEVICE | ADJ. OPENING & ADJ. TRAVEL STOP

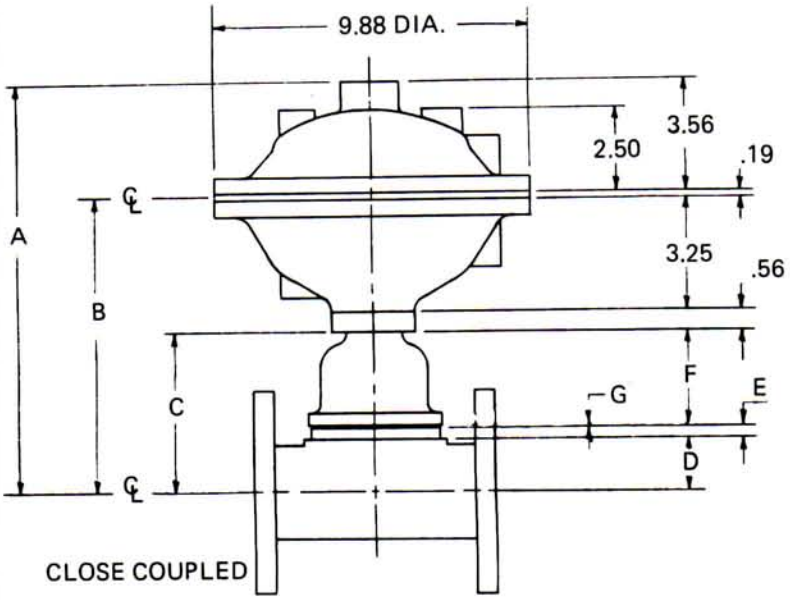
WEIR VALVES											
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	G	H	ENDS
	A_1	B_1	A	B							
½	15.28 15.22	11.55 11.49	7.25 7.19	3.52 3.46	1.92 1.86	.62 .56	.18	1.12	1.56	–	SCR'D FLG'D
¾	15.90 16.23	12.17 12.50	7.87 8.20	4.14 4.47	2.54 2.87	.78 .81	.20 .22	1.56 1.75	1.56	– .09	SCR'D FLG'D
1	16.42 16.23	12.69 12.50	8.39 8.20	4.66 4.47	3.06 2.87	1.00 .81	.22	1.75	1.56	.09	SCR'D FLG'D
1¼ – 1½	17.76 17.57	14.03 13.84	9.73 9.54	6.00 5.81	4.40 4.21	1.41 1.22	.28	2.62	1.56	.09	SCR'D FLG'D
2	18.25 18.12	14.52 14.39	10.22 10.09	6.49 6.36	4.89 4.76	1.69 1.56	.30	2.81	1.56	.09	SCR'D FLG'D

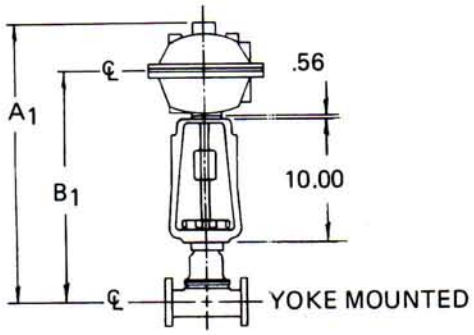
STRAIGHTWAY VALVES											
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	G	H	ENDS
	A_1	B_1	A	B							
½	15.67 15.61	11.94 11.88	7.64 7.58	3.91 3.85	2.31 2.25	.62 .56	.19	1.50	1.56	–	SCR'D FLG'D

DUALRANGE VALVES											
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	G	H	ENDS
	A_1	B_1	A	B							
1	18.08 17.89	14.35 14.16	10.58 10.39	6.85 6.66	4.72 4.53	1.00 .81	.22	3.50	2.09	–	SCR'D FLG'D

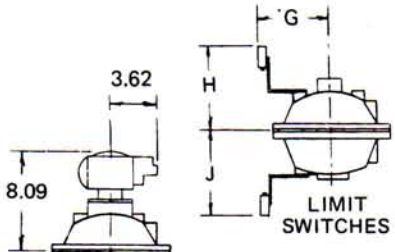
Dimensional data

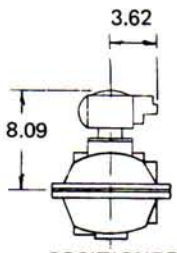
Series 3325 double acting



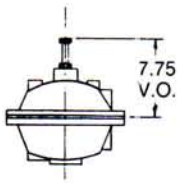


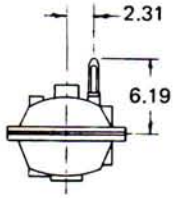
LIMIT SWITCHES	G	H	J
BZE6-2RN/ DTE6-2RN	5.94	6.53	6.94
BAF1-2RN-RH/DTF2-2RN-RH	6.25	7.12	7.50
EX-Q/ EXD-Q	6.94	8.31	8.69



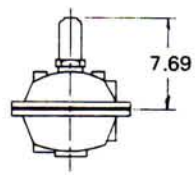


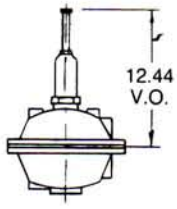
WEIR VALVES										
Valve Size	Yoke Mounted		Close Coupled		C	D	E	G	F	ENDS
	A_1	B_1	A	B						
1	21.04 20.85	17.39 17.20	10.48 10.29	6.83 6.64	2.93 2.74	1.00 .81	.22	.09	1.62	SCR'D FLG'D
1¼–1½	22.51 22.32	18.86 18.67	11.95 11.76	8.30 8.11	4.40 4.21	1.41 1.22	.28	.09	2.62	SCR'D FLG'D
2	23.00 22.87	19.35 19.22	12.44 12.31	8.79 8.66	4.89 4.76	1.69 1.56	.30	.09	2.81	SCR'D FLG'D
2½	24.00 23.81	20.35 20.16	13.44 13.25	9.79 9.60	5.89 5.70	1.88 1.69	.32	–	3.69	SCR'D FLG'D
3	24.56 24.37	20.90 20.72	13.99 13.81	10.34 10.16	6.44 6.26	2.37 2.19	.35	–	3.72	SCR'D FLG'D
4	25.72	22.07	15.16	11.51	7.61	2.68	.40	–	4.53	FLG'D



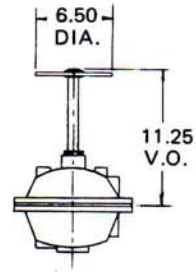


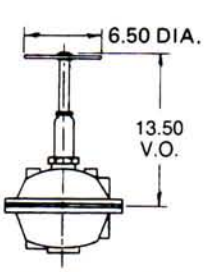
STRAIGHTWAY VALVES										
Valve Size	Yoke Mounted		Close Coupled		C	D	E	G	F	ENDS
	A_1	B_1	A	B						
½	20.08 20.02	16.43 16.37	9.52 9.46	5.87 5.81	1.97 1.91	.62 .56	.19	–	1.16	SCR'D FLG'D
1	21.83 21.71	18.18 18.06	11.27 11.15	7.62 7.50	3.72 3.60	1.00 .88	.19	–	2.53	SCR'D FLG'D
1½	22.90 22.61	19.25 18.96	12.34 12.05	8.69 8.40	4.79 4.50	1.41 1.12	.19	–	3.19	SCR'D FLG'D
2	23.90 23.65	20.25 20.00	13.34 13.09	9.69 9.44	5.79 5.54	1.66 1.41	.25	–	3.88	SCR'D FLG'D
2½	24.82	21.17	14.26	10.61	6.71	1.62	.31	–	4.78	FLG'D
3	24.64	20.99	14.08	10.43	6.53	1.50	.28	–	4.75	FLG'D





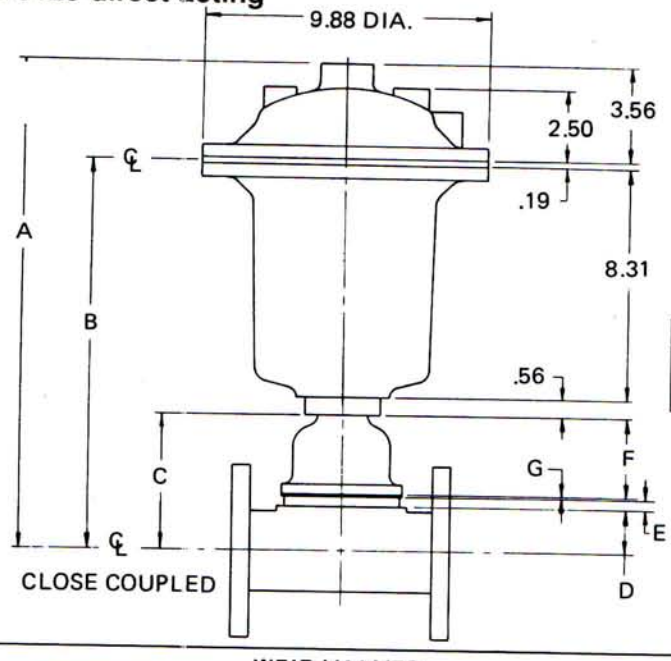
DUALRANGE VALVES										
Valve Size	Yoke Mountad		Close Coupled		C	D	E	G	F	ENDS
	A_1	B_1	A	B						
1	22.83 22.64	19.18 18.99	12.27 12.08	8.62 8.43	4.72 4.53	1.00 .81	.22	–	3.50	SCR'D FLG'D
1½	24.80 24.61	21.15 20.96	14.24 14.05	10.59 10.40	6.69 6.50	1.41 1.22	.28	–	5.00	SCR'D FLG'D
2	24.91 24.78	21.26 21.13	14.35 14.22	10.70 10.57	6.80 6.67	1.69 1.56	.30	–	4.81	SCR'D FLG'D
2½	26.03 25.84	22.38 22.19	15.47 15.28	11.82 11.63	7.92 7.73	1.88 1.69	.32	–	5.72	SCR'D FLG'D
3	27.21 27.03	23.56 23.38	16.65 16.47	13.00 12.82	9.10 8.92	2.37 2.19	.35	–	6.38	SCR'D FLG'D
4	28.57	24.92	18.01	14.36	10.46	2.68	.40	–	7.38	FLG'D

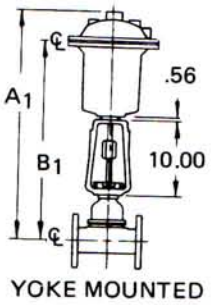




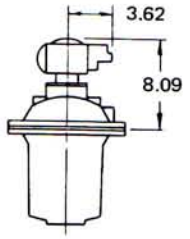
Dimensional data

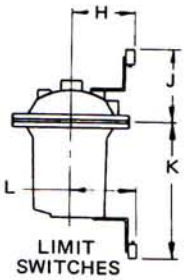
Series 3125 direct acting

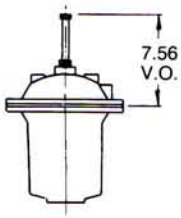


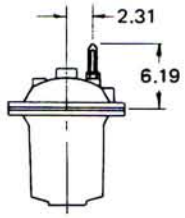


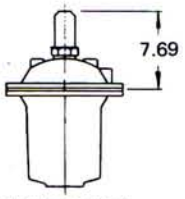
LIMIT SWITCHES	H	J	K	L
BZE6-2RN or DTE6-2RN	5.94	6.56	12.38	6.12
BAF1-2RN-RH or DTF2-2RN-RH	6.25	7.12	12.94	6.44
EX-Q or EXD-Q	6.94	8.31	13.12	7.12

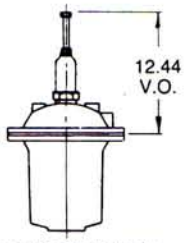


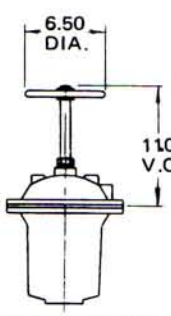


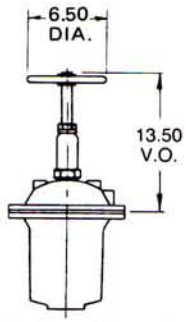












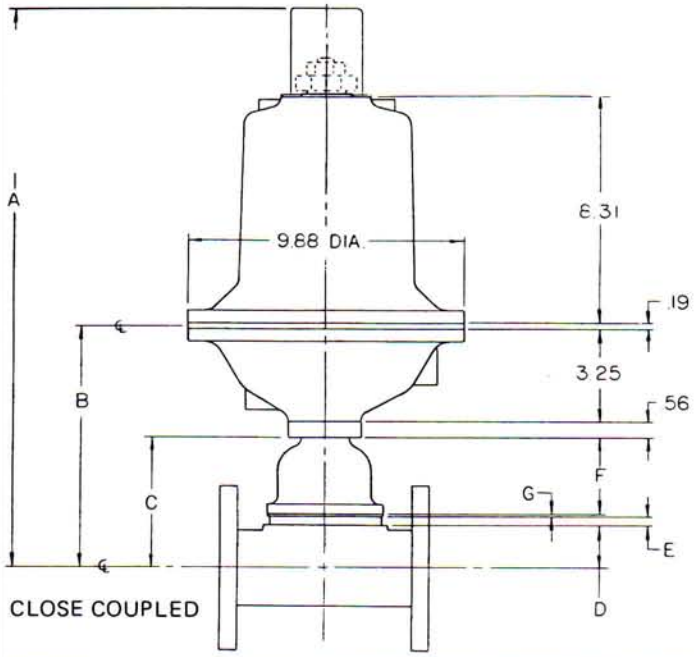
WEIR VALVES										
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	G	ENDS
	A_1	B_1	A	B						
1	26.10 25.91	22.45 22.26	15.54 15.35	11.89 11.70	2.93 2.74	1.00 .81	.22	1.62	.09	SCR'D FLG'D
1¼–1½	27.57 27.38	23.92 23.73	17.01 16.82	13.36 13.17	4.40 4.21	1.41 1.22	.28	2.62	.09	SCR'D FLG'D
2	28.06 27.93	24.41 24.28	17.50 17.37	13.85 13.72	4.89 4.76	1.69 1.56	.30	2.81	.09	SCR'D FLG'D
2½	29.06 28.87	25.41 25.22	18.50 18.31	14.85 14.66	5.89 5.70	1.88 1.69	.32	3.69	–	SCR'D FLG'D
3	29.61 29.43	25.96 25.87	19.05 18.87	15.40 15.22	6.44 6.26	2.37 2.19	.35	3.72	–	SCR'D FLG'D
4	30.78	27.13	20.22	16.57	7.61	2.68	.40	4.53	–	FLG'D

STRAIGHTWAY VALVES										
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	G	ENDS
	A_1	B_1	A	B						
½	25.14 25.08	21.49 21.43	14.58 14.52	10.93 10.87	1.97 1.91	.62 .56	.19	1.16	–	SCR'D FLG'D
1	26.89 26.77	23.24 23.12	16.33 16.21	12.68 12.56	3.72 3.60	1.00 .88	.19	2.53	–	SCR'D FLG'D
1½	27.96 27.67	24.31 24.02	17.40 17.11	13.75 13.46	4.79 4.50	1.41 1.12	.19	3.19	–	SCR'D FLG'D
2	28.96 28.71	25.31 25.06	18.40 18.15	14.75 14.50	5.79 5.54	1.66 1.41	.25	3.88	–	SCR'D FLG'D
2½	29.88	26.23	19.32	15.67	6.71	1.62	.31	4.78	–	FLG'D
3	29.70	26.05	19.14	15.49	6.53	1.50	.28	4.75	–	FLG'D

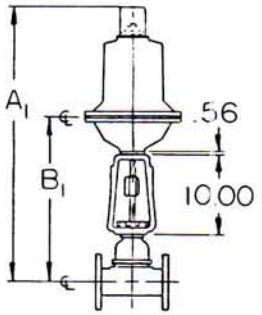
DUALRANGE VALVES										
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	G	ENDS
	A_1	B_1	A	B						
1	27.89 27.70	24.24 24.05	17.33 17.14	13.68 13.49	4.72 4.53	1.00 .81	.22	3.50	–	SCR'D FLG'D
1½	29.86 29.67	26.21 26.02	19.30 19.11	15.65 15.46	6.69 6.50	1.41 1.22	.28	5.00	–	SCR'D FLG'D
2	29.97 29.84	26.32 26.19	19.41 19.28	15.76 15.63	6.80 6.67	1.69 1.56	.30	4.81	–	SCR'D FLG'D
2½	31.09 30.90	27.44 27.25	20.53 20.34	16.88 16.69	7.92 7.73	1.88 1.69	.32	5.72	–	SCR'D FLG'D
3	32.27 32.09	28.62 28.44	21.71 21.53	18.06 17.88	9.10 8.92	2.37 2.19	.35	6.38	–	SCR'D FLG'D
4	33.63	29.98	23.07	19.42	10.46	2.68	.40	7.38	–	FLG'D

Dimensional data

Series 3226–28 reverse acting

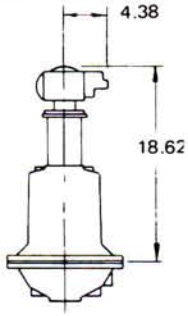


CLOSE COUPLED

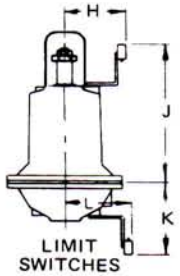


YOKE MOUNTED

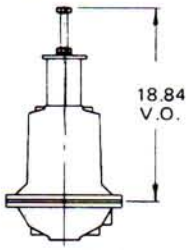
LIMIT SWITCHES	H	J	K	L
BZE6-2RN or DTE6-2RN	6.12	12.38	6.94	5.94
BAF1-2RN-RH or DTF2-2RN-RH	6.38	12.94	7.50	6.25
EX-Q or EXD-Q	7.12	13.12	8.68	6.94



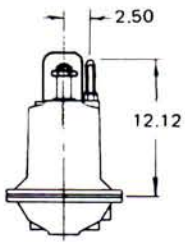
POSITIONER (MOORE & CONOFLOW)



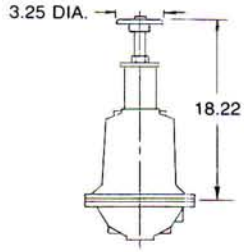
LIMIT SWITCHES



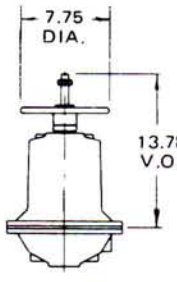
ADJ. OPENING STOP



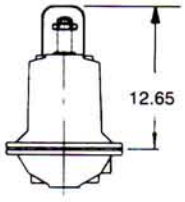
POSITION INDICATOR



ADJ. OPENING STOP W/HDWHL



HDWL. OPENING DEVICE



WRENCH OPENING DEVICE

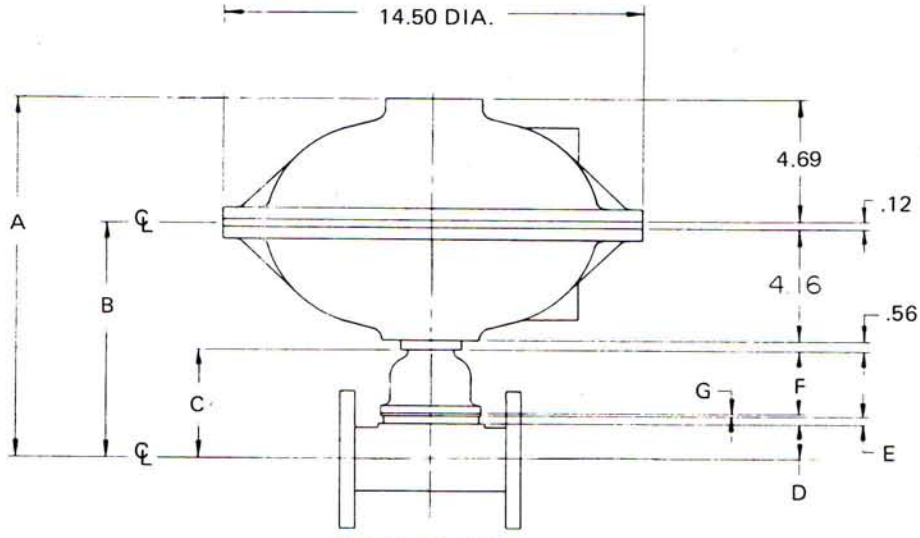
WEIR VALVES										
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	G	ENDS
	A_1	B_1	A	B						
1	30.04 29.85	17.39 17.20	19.48 19.29	6.83 6.64	2.93 2.74	1.00 .81	.22	1.62	.09	SCR'D FLG'D
1¼-1½	31.51 31.32	18.86 18.67	20.95 20.76	8.30 8.11	4.40 4.21	1.41 1.22	.28	2.62	.09	SCR'D FLG'D
2	32.00 31.87	19.35 19.22	21.44 21.31	8.79 8.66	4.89 4.76	1.69 1.56	.30	2.81	.09	SCR'D FLG'D
2½	33.00 32.81	20.35 20.16	22.44 22.25	9.79 9.60	5.89 5.70	1.88 1.69	.32	3.69	–	SCR'D FLG'D
3	33.55 33.37	20.90 20.72	22.99 22.81	10.34 10.16	6.44 6.26	2.37 2.19	.35	3.72	–	SCR'D FLG'D
4	34.72	22.07	24.16	11.51	7.61	2.68	.40	4.53	–	FLG'D

STRAIGHTWAY VALVES										
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	G	ENDS
	A_1	B_1	A	B						
½	29.08 29.02	16.43 16.37	18.52 18.46	5.87 5.81	1.97 1.91	.62 .56	.19	1.16	–	SCR'D FLG'D
1	30.83 30.71	18.18 18.06	20.27 20.15	7.62 7.50	3.72 3.60	1.00 .88	.19	2.53	–	SCR'D FLG'D
1½	31.90 31.61	19.25 18.96	21.34 21.05	8.69 8.40	4.79 4.50	1.41 1.12	.19	3.19	–	SCR'D FLG'D
2	32.90 32.65	20.25 20.00	22.34 22.09	9.69 9.44	5.79 5.54	1.66 1.41	.25	3.88	–	SCR'D FLG'D
2½	33.82	21.17	23.26	10.61	6.71	1.62	.31	4.78	–	FLG'D
3	33.64	20.99	23.08	10.43	6.53	1.50	.28	4.64	–	FLG'D

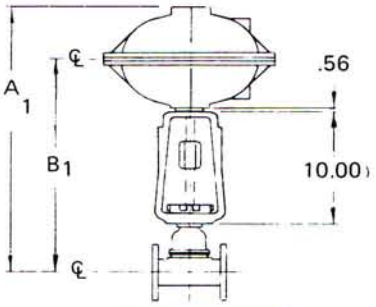
DUALRANGE VALVES										
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	G	ENDS
	A_1	B_1	A	B						
1	31.83 31.64	19.18 18.99	21.27 21.08	8.62 8.43	4.72 4.53	1.00 .81	.22	3.50	–	SCR'D FLG'D
1½	33.80 33.61	21.15 20.96	23.24 23.05	10.59 10.40	6.69 6.50	1.41 1.22	.28	5.00	–	SCR'D FLG'D
2	33.91 33.78	21.26 21.13	23.35 23.22	10.70 10.57	6.80 6.67	1.69 1.56	.30	4.81	–	SCR'D FLG'D
2½	35.03 34.84	22.38 22.19	24.47 24.28	11.82 11.63	7.92 7.73	1.88 1.69	.32	5.72	–	SCR'D FLG'D
3	36.21 36.03	23.56 23.38	25.65 25.47	13.00 12.82	9.10 8.92	2.37 2.19	.35	6.38	–	SCR'D FLG'D
4	37.57	24.92	27.01	14.36	10.46	2.68	.40	7.38	–	FLG'D

Dimensional data

Series 3350 double acting

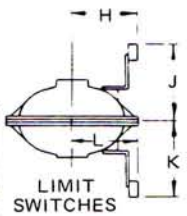


CLOSE COUPLED

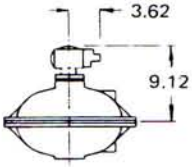


YOKE MOUNTED

LIMIT SWITCHES	H	J	K	L
BZE6-2RN or DTE6-2RN	7.44	7.44	7.44	7.44
BAF1-2RN-RH or DTF2-2RN-RH	7.69	8.00	8.00	7.69
EX-Q or EXD-Q	8.38	9.19	9.19	8.38



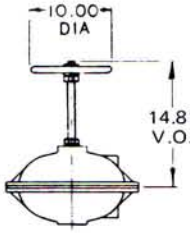
LIMIT SWITCHES



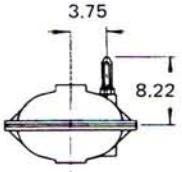
POSITIONER (MOORE & CONOFLOW)

WEIR VALVES

Valve Size	Yoke Mounted A_1	Yoke Mounted B_1	Close Coupled A	Close Coupled B	C	D	E	F	G	ENDS
1	23.02 22.83	18.27 18.08	12.46 12.27	7.71 7.52	2.93 2.74	1.00 .81	.22	1.62	.09	SCR'D FLG'D
1½–1½	24.49 24.30	19.74 19.55	13.93 13.74	9.18 8.99	4.40 4.21	1.41 1.22	.28	2.62	.09	SCR'D FLG'D
2	24.98 24.85	20.23 20.10	14.42 14.29	9.67 9.54	4.89 4.76	1.69 1.56	.30	2.81	.09	SCR'D FLG'D
2½	25.98 25.79	21.23 21.04	15.42 15.23	10.67 10.48	5.89 5.70	1.88 1.69	.32	3.69	–	SCR'D FLG'D
3	26.53 26.35	21.78 21.60	15.97 15.79	11.22 11.04	6.44 6.26	2.37 2.19	.35	3.72	–	SCR'D FLG'D
4	27.70	22.95	17.14	12.39	7.61	2.68	.40	4.53	–	FLG'D
6	31.16	26.41	20.60	15.85	11.07	3.62	.48	6.97	–	FLG'D



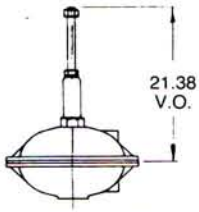
HDWHL. CLOSING DEVICE



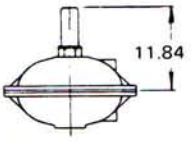
POSITION INDICATOR

STRAIGHTWAY VALVES

Valve Size	Yoke Mounted A_1	Yoke Mounted B_1	Close Coupled A	Close Coupled B	C	D	E	F	G	ENDS
1	23.81 23.69	19.06 18.94	13.25 13.13	8.50 8.38	3.72 3.60	1.00 .88	.19	2.53	–	SCR'D FLG'D
1½	24.88 24.59	20.13 19.84	14.32 14.03	9.57 9.28	4.79 4.50	1.41 1.12	.19	3.19	–	SCR'D FLG'D
2	25.88 25.63	21.13 20.88	15.32 15.07	10.57 10.32	5.79 5.54	1.66 1.41	.25	3.88	–	SCR'D FLG'D
2½	26.80	22.05	16.24	11.49	6.71	1.62	.31	4.78	–	FLG'D
3	26.62	21.87	16.06	11.31	6.53	1.50	.28	4.75	–	FLG'D
4	28.12	23.37	17.56	12.81	8.03	1.62	.38	6.03	–	FLG'D



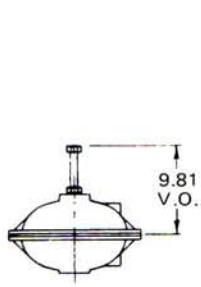
ADJ. OPENING & ADJ. TRAVEL STOP



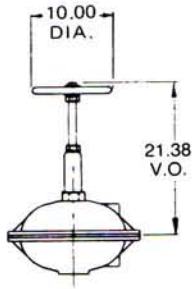
ADJ. TRAVEL STOP

DUALRANGE VALVES

Valve Size	Yoke Mounted A_1	Yoke Mounted B_1	Close Coupled A	Close Coupled B	C	D	E	F	G	ENDS
1½	26.78 26.59	22.03 21.84	16.22 16.03	11.47 11.28	6.69 6.50	1.41 1.22	.28	5.00	–	SCR'D FLG'D
2	26.89 26.76	22.14 22.01	16.33 16.20	11.58 11.45	6.80 6.67	1.69 1.56	.30	4.81	–	SCR'D FLG'D
2½	28.01 27.82	23.26 23.07	17.45 17.26	12.70 12.51	7.92 7.73	1.88 1.69	.32	5.72	–	SCR'D FLG'D
3	29.19 29.01	24.44 24.26	18.63 18.45	13.88 13.70	9.10 8.92	2.37 2.19	.35	6.38	–	SCR'D FLG'D
4	30.55	25.80	19.99	15.24	10.46	2.68	.40	7.38	–	FLG'D
6	34.28	29.53	23.72	18.97	14.19	3.62	.48	10.09	–	FLG'D



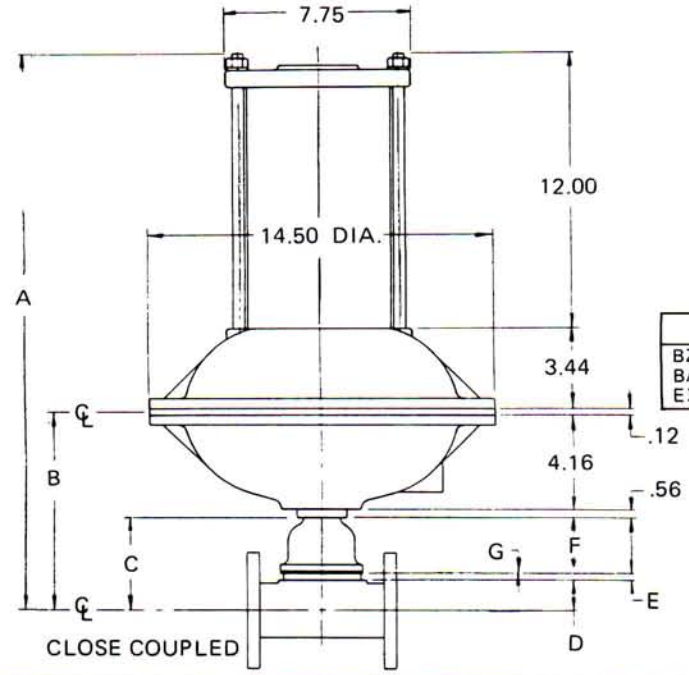
ADJ. OPENING STOP

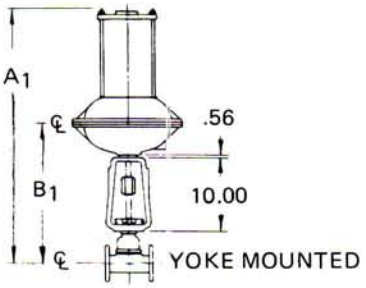


HDWHL. CLOSING & ADJ. TRAVEL STOP

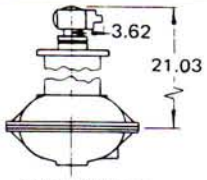
Dimensional data

Series 3150 direct acting

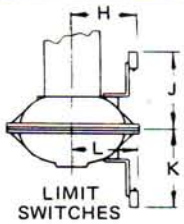




LIMIT SWITCHES	H	J	K	L
BZE6-2RN or DTE6-2RN	7.44	7.44	7.44	7.44
BAF1-2RN-RH or DTF2-2RN-RH	7.69	8.00	8.00	7.69
EX-Q or EXD-Q	8.33	9.19	9.19	8.38

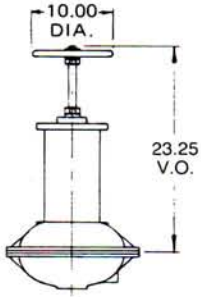


POSITIONER (MOORE & CONOFLOW)

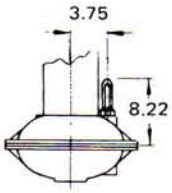


LIMIT SWITCHES

WEIR VALVES										
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	G	ENDS
	A_1	B_1	A	B						
1	33.77 33.58	18.27 18.08	23.21 23.02	7.71 7.52	2.93 2.74	1.00 .81	.22	1.62	.09	SCR'D FLG'D
1¼–1½	35.24 35.05	19.74 19.55	24.68 24.49	9.18 8.99	4.40 4.21	1.41 1.22	.28	2.62	.09	SCR'D FLG'D
2	35.73 35.60	20.23 20.10	25.17 25.04	9.67 9.54	4.89 4.76	1.69 1.56	.30	2.81	.09	SCR'D FLG'D
2½	36.73 36.54	21.23 21.04	26.17 25.98	10.67 10.48	5.89 5.70	1.88 1.69	.32	3.69	–	SCR'D FLG'D
3	37.28 37.10	21.78 21.60	26.72 26.54	11.22 11.04	6.44 6.26	2.37 2.19	.35	3.72	–	SCR'D FLG'D
4	38.45	22.95	27.89	12.39	7.61	2.68	.40	4.53	–	FLG'D
6	41.91	26.41	31.35	15.85	11.07	3.62	.48	6.97	–	FLG'D

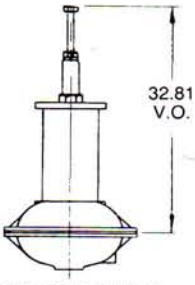


HDWL. CLOSING DEVICE

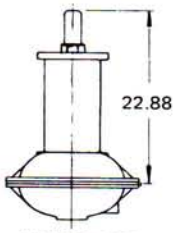


POSITION INDICATOR

STRAIGHTWAY VALVES										
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	G	ENDS
	A_1	B_1	A	B						
1	34.56 34.44	19.06 18.94	24.00 23.88	8.50 8.38	3.72 3.60	1.00 .88	.19	2.53	–	SCR'D FLG'D
1½	35.63 35.34	20.13 19.84	25.07 24.78	9.57 9.28	4.79 4.50	1.41 1.12	.19	3.19	–	SCR'D FLG'D
2	36.63 36.38	21.13 20.88	26.07 25.82	10.57 10.32	5.79 5.54	1.66 1.41	.25	3.88	–	SCR'D FLG'D
2½	37.55	22.05	26.99	11.49	6.71	1.62	.31	4.78	–	FLG'D
3	37.37	21.87	26.81	11.31	6.53	1.50	.28	4.75	–	FLG'D
4	38.87	23.37	28.31	12.81	8.03	1.62	.38	6.03	–	FLG'D

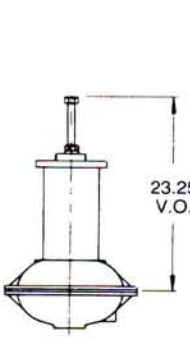


ADJ. OPENING & ADJ. TRAVEL STOP

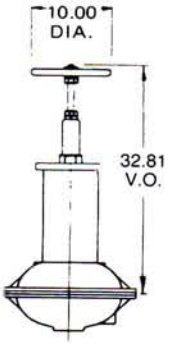


ADJ. TRAVEL STOP

DUALRANGE VALVES										
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	G	ENDS
	A_1	B_1	A	B						
1½	37.53 37.34	22.03 21.84	26.97 26.78	11.47 11.28	6.69 6.50	1.41 1.22	.28	5.00	–	SCR'D FLG'D
2	37.64 37.51	22.14 22.01	27.08 26.95	11.58 11.45	6.80 6.67	1.69 1.56	.30	4.81	–	SCR'D FLG'D
2½	38.76 38.57	23.26 23.07	28.20 28.01	12.70 12.51	7.92 7.73	1.88 1.69	.32	5.72	–	SCR'D FLG'D
3	39.94 39.76	24.44 24.26	29.38 29.20	13.88 13.70	9.10 8.92	2.37 2.19	.35	6.38	–	SCR'D FLG'D
4	41.30	25.80	30.74	15.24	10.46	2.68	.40	7.38	–	FLG'D
6	45.03	29.53	34.47	18.97	14.19	3.62	.48	10.09	–	FLG'D



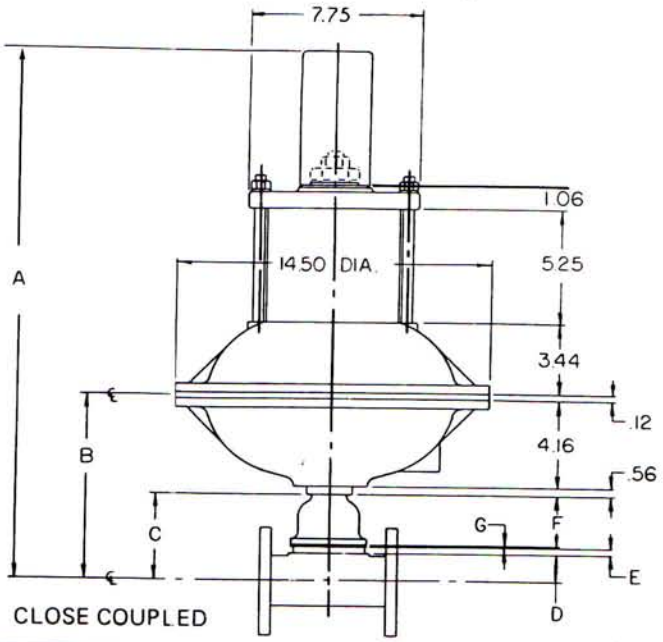
ADJ. OPENING STOP



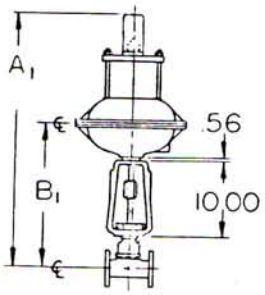
HDWHL. CLOSING & ADJ. TRAVEL STOP

Dimensional data

Series 3251, 3252 & 3256 reverse acting

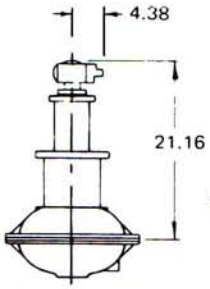


CLOSE COUPLED

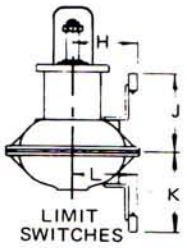


YOKE MOUNTED

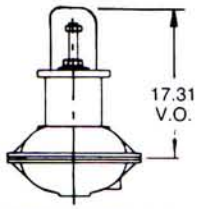
LIMIT SWITCHES	H	J	K	L
BZE6-2RN or DTE6-2RN	7.44	7.44	7.44	7.44
BAF1-2RN-RH or DTF2-2RN-RH	7.69	8.00	8.00	7.69
EX-O or EXD-O	8.38	9.19	9.19	8.38



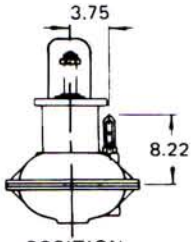
POSITIONER
MOORE & CONOFLOW)



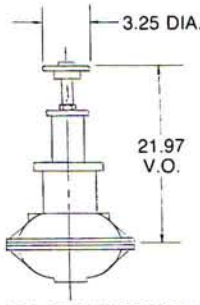
LIMIT
SWITCHES



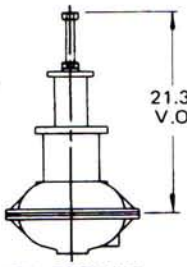
WRENCH OPENING
DEVICE



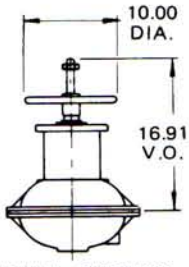
POSITION
INDICATOR



ADJ. OPENING STOP
W/HDWHL



ADJ. OPENING
STOP



HDWHL. OPENING
DEVICE

WEIR VALVES

Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	G	ENDS
	A_1	B_1	A	B						
1	35.38 35.39	18.27 18.08	25.02 24.83	7.71 7.52	2.93 2.74	1.00 .81	.22	1.62	.09	SCR'D FLG'D
1¼-1½	37.05 36.86	19.74 19.55	26.49 26.30	9.18 8.99	4.40 4.21	1.41 1.22	.28	2.62	.09	SCR'D FLG'D
2	37.54 37.41	20.23 20.10	26.98 26.85	9.67 9.54	4.89 4.76	1.69 1.56	.30	2.81	.09	SCR'D FLG'D
2½	38.54 38.35	21.23 21.04	27.98 27.79	10.67 10.48	5.89 5.70	1.88 1.69	.32	3.69	–	SCR'D FLG'D
3	39.09 38.91	21.78 21.60	28.53 28.35	11.22 11.04	6.44 6.26	2.37 2.19	.35	3.72	–	SCR'D FLG'D
4	40.26	22.95	29.70	12.39	7.61	2.68	.40	4.53	–	FLG'D
6	43.72	26.41	33.16	15.85	11.07	3.62	.48	6.97	–	FLG'D

STRAIGHTWAY VALVES

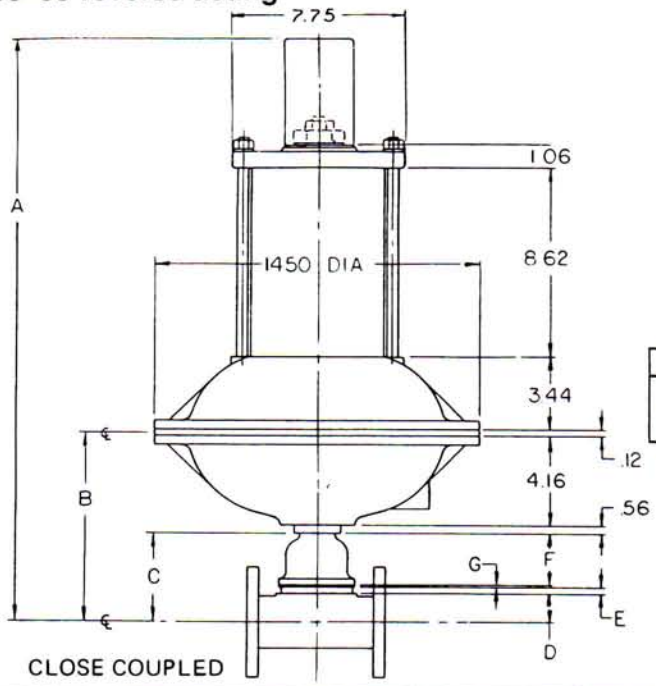
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	G	ENDS
	A_1	B_1	A	B						
1	36.37 36.25	19.06 18.94	25.81 25.69	8.50 8.38	3.72 3.60	1.00 .88	.19	2.53	–	SCR'D FLG'D
1½	37.44 37.15	20.13 19.84	25.88 25.59	9.57 9.28	4.79 4.50	1.41 1.12	.19	3.19	–	SCR'D FLG'D
2	38.44 38.19	21.13 20.88	27.88 27.63	10.57 10.32	5.79 5.54	1.66 1.41	.25	3.88	–	SCR'D FLG'D
2½	39.36	22.05	28.80	11.49	6.71	1.62	.31	4.78	–	FLG'D
3	39.18	21.87	28.62	11.31	6.53	1.50	.28	4.75	–	FLG'D

DUALRANGE VALVES

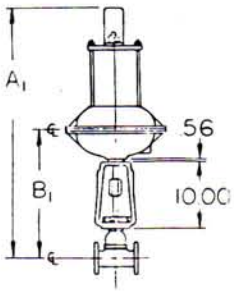
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	G	ENDS
	A_1	B_1	A	B						
1½	39.34 39.15	22.03 21.84	28.78 28.59	11.47 11.28	6.69 6.50	1.41 1.22	.28	5.00	–	SCR'D FLG'D
2	39.45 39.32	22.14 22.01	28.89 28.76	11.58 11.45	6.80 6.67	1.69 1.56	.30	4.81	–	SCR'D FLG'D
2½	40.59 40.38	23.26 23.07	30.01 29.82	12.70 12.51	7.92 7.73	1.88 1.69	.32	5.72	–	SCR'D FLG'D
3	41.75 41.57	24.44 24.26	31.19 31.01	13.88 13.70	9.10 8.92	2.37 2.19	.35	6.38	–	SCR'D FLG'D
4	43.11	25.80	32.55	15.24	10.46	2.68	.40	7.38	–	FLG'D
6	46.84	29.53	36.28	18.97	14.19	3.62	.48	10.09	–	FLG'D

Dimensional data

Series 3253–55 reverse acting

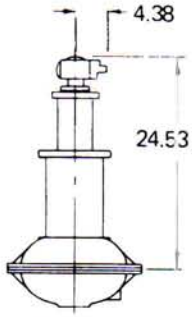


CLOSE COUPLED

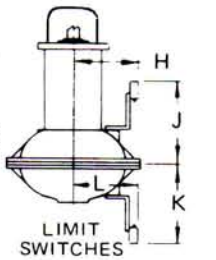


YOKE MOUNTED

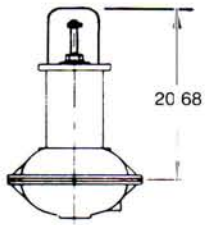
LIMIT SWITCHES	H	J	K	L
BZE6-2RN or DTE6-2RN	7.44	7.44	7.44	7.44
BAF1-2RN-RH or DTF2-2RN-RH	7.59	8.00	8.00	7.69
EX-O or EXD-O	8.38	9.19	9.19	8.38



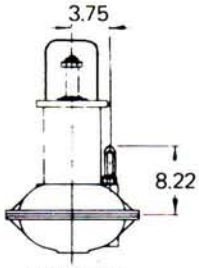
POSITIONER (MOORE & CONOFLOW)



LIMIT SWITCHES



WRENCH OPENING DEVICE

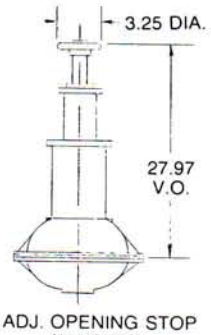


POSITION INDICATOR

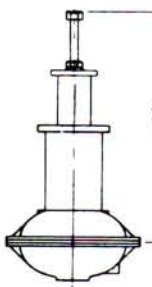
WEIR VALVES										
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	G	ENDS
	A_1	B_1	A	B						
1	38.95 38.75	18.27 18.08	28.39 28.20	7.71 7.52	2.93 2.74	1.00 .81	.22	1.62	.09	SCR'D FLG'D
1¼-1½	40.42 40.23	19.74 19.55	29.86 29.67	9.18 8.99	4.40 4.21	1.41 1.22	.28	2.62	.09	SCR'D FLG'D
2	40.91 40.78	20.23 20.10	30.35 30.22	9.67 9.54	4.89 4.76	1.69 1.56	.30	2.81	.09	SCR'D FLG'D
2½	41.91 41.72	21.23 21.04	31.35 31.16	10.67 10.48	5.89 5.70	1.88 1.69	.32	3.69	–	SCR'D FLG'D
3	42.45 42.28	21.78 21.60	31.90 31.72	11.22 11.04	6.44 6.26	2.37 2.19	.35	3.72	–	SCR'D FLG'D
4	43.63	22.95	33.07	12.39	7.61	2.68	.40	4.53	–	FLG'D
6	47.09	26.41	36.53	15.85	11.07	3.62	.48	6.97	–	FLG'D

STRAIGHTWAY VALVES										
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	G	ENDS
	A_1	B_1	A	B						
1	39.74 39.62	19.06 18.94	29.18 29.06	8.50 8.38	3.72 3.60	1.00 .88	.19	2.53	–	SCR'D FLG'D
1½	40.81 40.52	20.13 19.84	30.25 29.26	9.57 9.28	4.79 4.50	1.41 1.12	.19	3.19	–	SCR'D FLG'D
2	41.81 41.56	21.13 20.88	31.25 31.00	10.57 10.32	5.79 5.54	1.66 1.41	.25	3.88	–	SCR'D FLG'D
2½	42.73	22.05	32.17	11.49	6.71	1.62	.31	4.78	–	FLG'D
3	42.55	21.87	31.99	11.31	6.53	1.50	.28	4.75	–	FLG'D

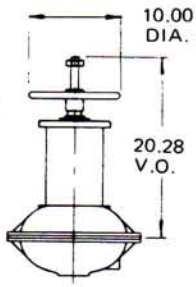
DUALRANGE VALVES										
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	G	ENDS
	A_1	B_1	A	B						
1½	42.71 42.52	22.03 21.84	32.15 31.96	11.47 11.28	6.69 6.50	1.41 1.22	.28	5.00	–	SCR'D FLG'D
2	42.82 42.69	22.14 22.01	32.26 32.13	11.58 11.45	6.80 6.67	1.69 1.56	.30	4.81	–	SCR'D FLG'D
2½	43.94 43.75	23.26 23.07	33.38 33.19	12.70 12.51	7.92 7.73	1.88 1.69	.32	5.72	–	SCR'D FLG'D
3	45.12 44.94	24.44 24.26	34.56 34.38	13.88 13.70	9.10 8.92	2.37 2.19	.35	6.38	–	SCR'D FLG'D
4	46.48	25.80	35.92	15.24	10.46	2.68	.40	7.38	–	FLG'D
6	50.21	29.53	39.65	18.97	14.19	3.62	.48	10.09	–	FLG'D



ADJ. OPENING STOP W.HDWHL



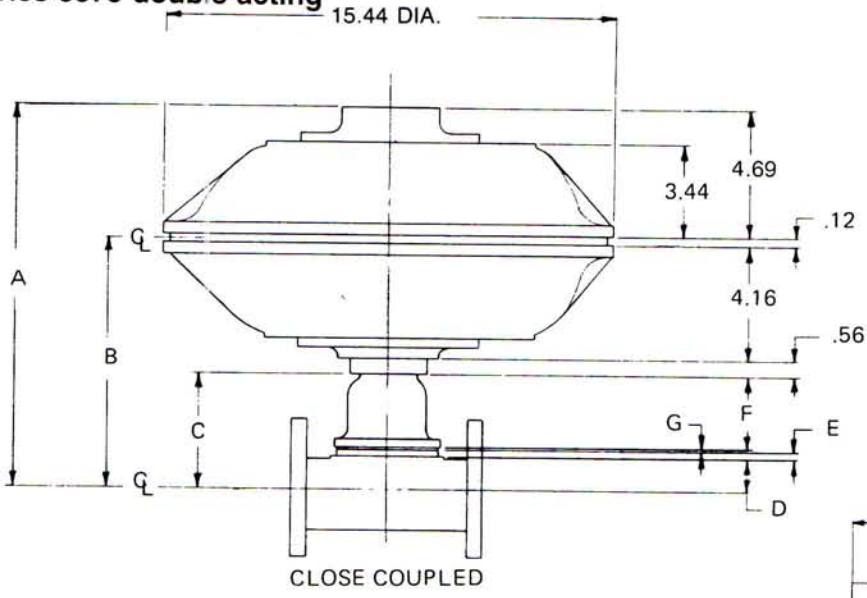
ADJ. OPENING STOP



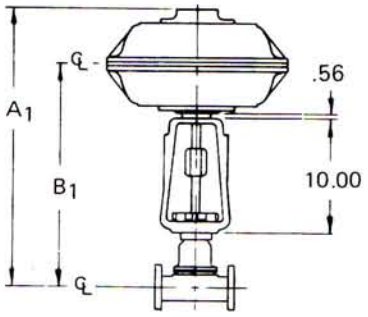
HDWHL. OPENING DEVICE

Dimensional data

Series 3375 double acting

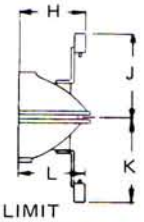


CLOSE COUPLED

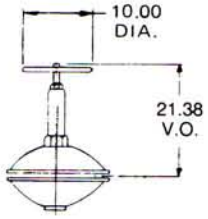


YOKE MOUNTED

LIMIT SWITCHES	H	J	K	L
BZE6-2RN or DTE6-2RN	7.44	7.44	7.44	7.44
BAF1-2RN-RH or DTF2-2RN-RH	7.69	8.00	8.00	7.69
EX-Q or EXD-Q	8.38	9.19	9.19	8.38

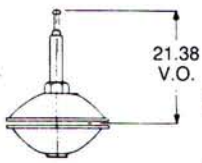


LIMIT SWITCHES

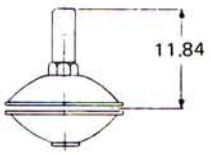


HDWHL. CLOSING & ADJ. TRAVEL STOP

WEIR VALVES										
Valve Size	Yoke Mounted		Close Coupled							ENDS
	A_1	B_1	A	B	C	D	E	F	G	
1½	24.49 24.30	19.74 19.55	13.93 13.74	9.18 8.99	4.40 4.21	1.41 1.22	.28	2.62	.09	SCR'D FLG'D
2	24.98 24.85	20.23 20.10	14.42 14.29	9.67 9.54	4.89 4.76	1.69 1.56	.30	2.81	.09	SCR'D FLG'D
2½	25.98 25.79	21.23 21.04	15.42 15.23	10.67 10.48	5.89 5.70	1.88 1.69	.32	3.69	–	SCR'D FLG'D
3	26.53 26.35	21.78 21.60	15.97 15.79	11.22 11.04	6.44 6.26	2.37 2.19	.35	3.72	–	SCR'D FLG'D
4	27.70	22.95	17.14	12.39	7.61	2.68	.40	4.53	–	FLG'D
6	31.16	26.41	20.60	15.85	11.07	3.62	.48	6.97	–	FLG'D

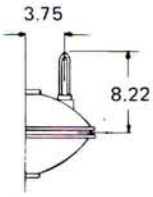


ADJ. OPENING & ADJ. TRAVEL STOP

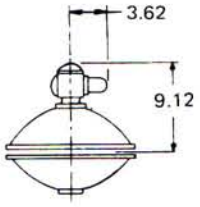


ADJ. TRAVEL STOP

STRAIGHTWAY VALVES										
Valve Size	Yoke Mounted		Close Coupled							ENDS
	A_1	B_1	A	B	C	D	E	F	G	
1	23.81 23.69	19.06 18.94	13.25 13.13	8.50 8.38	3.72 3.60	1.00 .88	.19	2.53	–	SCR'D FLG'D
1½	24.88 24.59	20.13 19.84	14.32 14.03	9.57 9.28	4.79 4.50	1.41 1.12	.19	3.19	–	SCR'D FLG'D
2	25.88 25.63	21.13 20.88	15.32 15.07	10.57 10.32	5.79 5.54	1.66 1.41	.25	3.88	–	SCR'D FLG'D
2½	26.80	22.05	16.24	11.49	6.71	1.62	.31	4.78	–	FLG'D
3	26.62	21.87	16.06	11.31	6.53	1.50	.28	4.75	–	FLG'D
4	28.12	23.37	17.56	12.81	8.03	1.62	.38	6.03	–	FLG'D

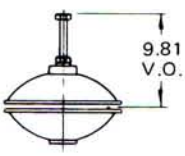


POSITION INDICATOR

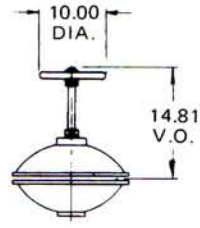


POSITIONER (MOORE & CONOFLOW)

DUALRANGE VALVES										
Valve Size	Yoke Mounted		Close Coupled							ENDS
	A_1	B_1	A	B	C	D	E	F	G	
1½	26.78 26.59	22.03 21.84	16.22 16.03	11.47 11.28	6.69 6.50	1.41 1.22	.28	5.00	–	SCR'D FLG'D
2	26.89 26.76	22.14 22.01	16.33 16.20	11.58 11.45	6.80 6.67	1.69 1.56	.30	4.81	–	SCR'D FLG'D
2½	28.01 27.82	23.26 23.07	17.45 17.26	12.70 12.51	7.92 7.73	1.88 1.69	.32	5.72	–	SCR'D FLG'D
3	29.19 29.01	24.44 24.26	18.63 18.45	13.88 13.70	9.10 8.92	2.37 2.19	.35	6.38	–	SCR'D FLG'D
4	30.55	25.80	19.99	15.24	10.46	2.68	.40	7.38	–	FLG'D
6	34.28	29.53	23.72	18.97	14.19	3.62	.48	10.09	–	FLG'D



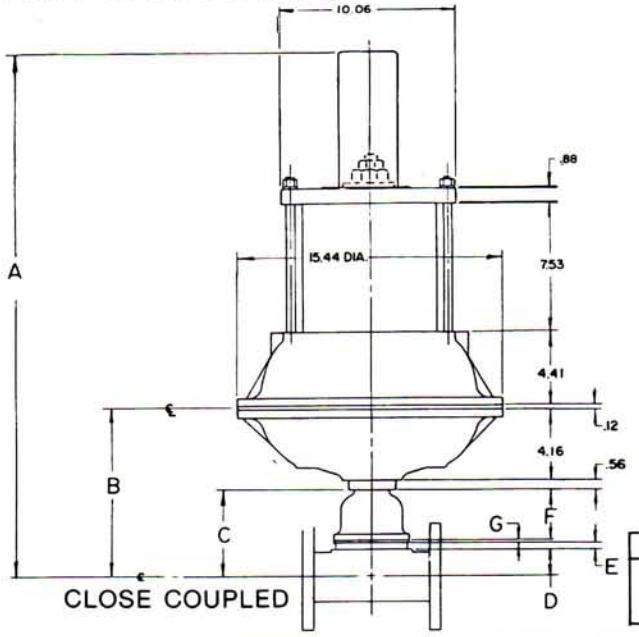
ADJ. OPENING STOP

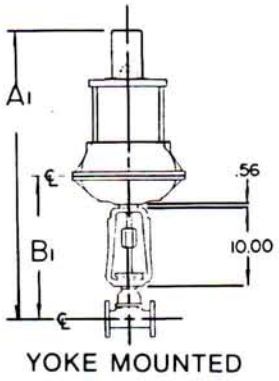


HDWHL. CLOSING DEVICE

Dimensional data

Series 3274–79 reverse acting

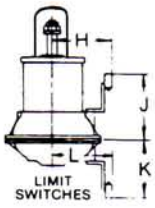




MICRO SWITCH	H	J	K	L
BZE6-2RN OR DTE6-2RN	8.75	8.41	7.44	7.44
BAF1-2RN OR DTF2-2RN-RH	9.00	8.97	8.00	7.69
EX-Q OR EXD-Q	9.69	10.16	9.19	8.38

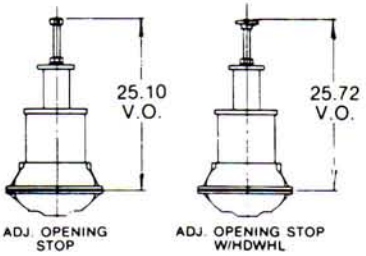
WEIR VALVES

Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	G	ENDS
	A_1	B_1	A	B						
1	38.68 38.49	18.27 18.08	28.12 27.93	7.71 7.52	2.93 2.74	1.00 .81	.22	1.62	.09	SCR'D FLG'D
1¼–1½	40.15 39.96	19.74 19.55	29.59 29.40	9.18 8.99	4.40 4.21	1.41 1.22	.28	2.62	.09	SCR'D FLG'D
2	40.64 40.51	20.23 20.10	30.08 29.95	9.67 9.54	4.89 4.76	1.69 1.56	.30	2.81	.09	SCR'D FLG'D
2½	41.64 41.45	21.23 21.04	31.08 30.89	10.67 10.48	5.89 5.70	1.88 1.69	.32	3.69	–	SCR'D FLG'D
3	42.19 42.01	21.78 21.60	31.63 31.45	11.22 11.04	6.44 6.26	2.37 2.19	.35	3.72	–	SCR'D FLG'D
4	43.36	22.95	32.80	12.39	7.61	2.68	.40	4.53	–	FLG'D
6	46.82	26.41	36.26	15.85	11.07	3.62	.48	6.97	–	FLG'D



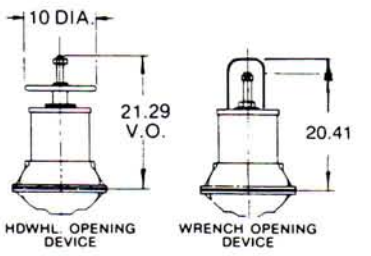
STRAIGHTWAY VALVES

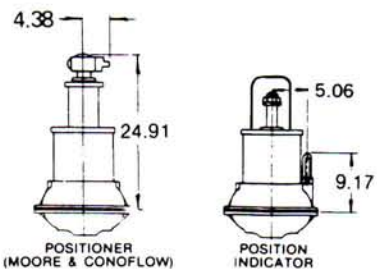
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	G	ENDS
	A_1	B_1	A	B						
1	39.47 39.35	19.06 18.94	28.91 28.79	8.50 8.38	3.72 3.60	1.00 .88	.19	2.53	–	SCR'D FLG'D
1½	40.54 40.25	20.13 19.84	29.98 29.69	9.57 9.28	4.79 4.50	1.41 1.12	.19	3.19	–	SCR'D FLG'D
2	41.54 41.29	21.13 20.88	30.98 30.73	10.57 10.32	5.79 5.54	1.66 1.41	.25	3.88	–	SCR'D FLG'D
2½	42.46	22.05	31.90	11.49	6.71	1.62	.31	4.78	–	FLG'D
3	42.28	21.87	31.72	11.31	6.53	1.50	.28	4.75	–	FLG'D
4	43.78	23.37	33.22	12.81	8.03	1.62	.38	6.03	–	FLG'D



DUALRANGE VALVES

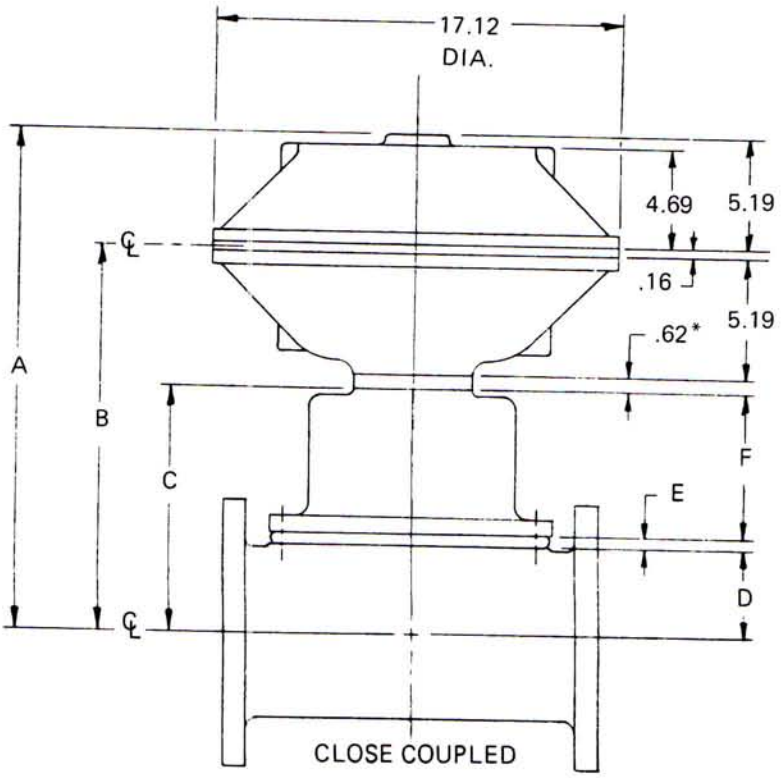
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	G	ENDS
	A_1	B_1	A	B						
1½	42.44 42.25	22.03 21.84	31.88 31.69	11.47 11.28	6.69 6.50	1.41 1.22	.28	5.00	–	SCR'D FLG'D
2	42.55 42.42	22.14 22.01	31.99 31.86	11.58 11.45	6.80 6.67	1.69 1.56	.30	4.81	–	SCR'D FLG'D
2½	43.67 43.48	23.26 23.07	33.11 32.92	12.70 12.51	7.92 7.73	1.88 1.69	.32	5.72	–	SCR'D FLG'D
3	44.85 44.67	24.44 24.26	34.29 34.11	13.88 13.70	9.10 8.92	2.37 2.19	.35	6.38	–	SCR'D FLG'D
4	46.21	25.80	35.65	15.24	10.46	2.68	.40	7.38	–	FLG'D
6	49.94	29.53	39.38	18.97	14.19	3.62	.48	10.09	–	FLG'D

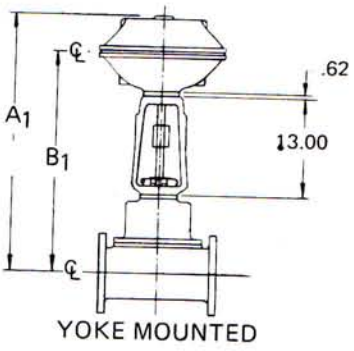




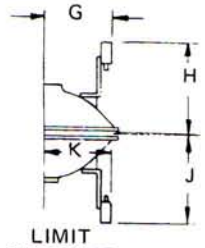
Dimensional data

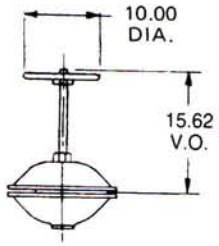
Series 33101 double acting

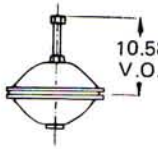


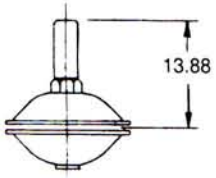


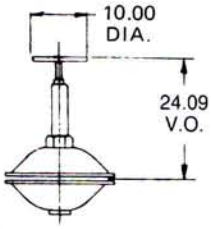
LIMIT SWITCHES	G&K	H&J
BZE6-2RN or DTE6-2RN	8.69	8.38
BAF1-2RN-RH or DTF2-2RN-RH	9.00	8.94
EX-Q or EXD-Q	9.68	10.06

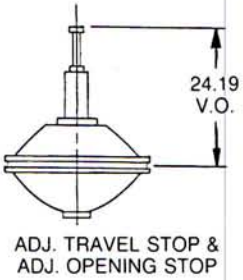


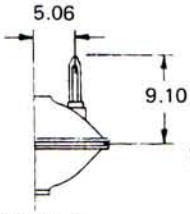


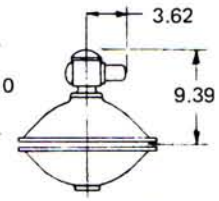












WEIR VALVES									
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	ENDS
	A_1	B_1	A	B					
2½	29.95 30.14	24.68 24.87	16.33 16.52	11.06 11.25	5.17 5.36	1.69 1.88	.32 .32	3.16 3.16	FLG'D SCR'D
3	30.85 31.03	25.58 25.76	17.23 17.41	11.96 12.14	6.07 6.25	2.19 2.37	.35 .35	3.53 3.53	FLG'D SCR'D
4	32.20	26.93	18.58	13.31	7.42	2.68	.40	4.34	FLG'D
6	34.88	29.61	21.26	15.99	10.10	3.62	.48	6.00	FLG'D
8	38.75	33.48	25.13	19.86	13.97	4.93	.54	8.50	FLG'D

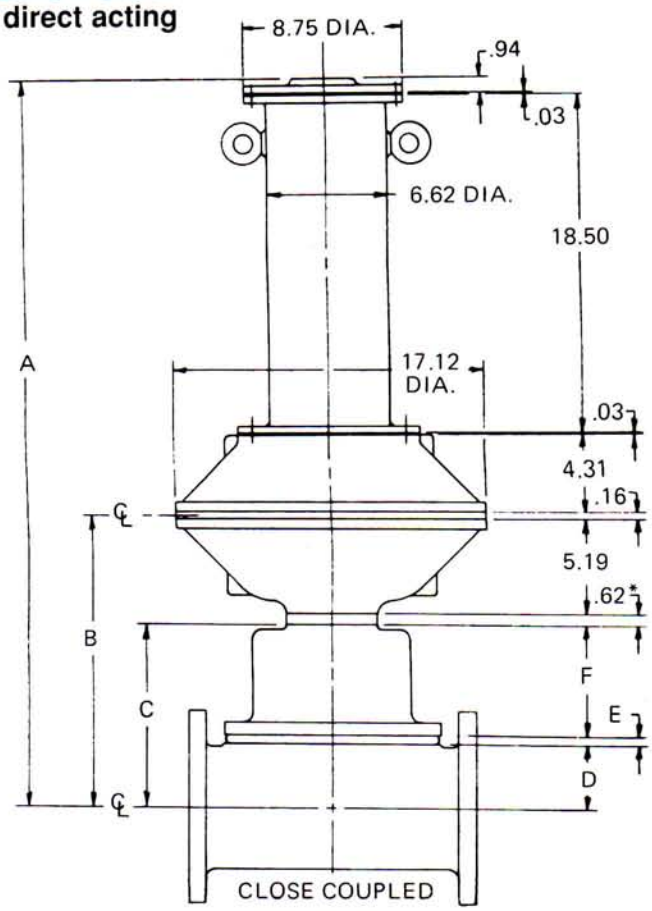
STRAIGHTWAY VALVES									
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	ENDS
	A_1	B_1	A	B					
2½	31.40	26.13	17.78	12.51	6.62	1.62	.31	4.69	FLG'D
3	31.37	26.10	17.75	12.48	6.59	1.50	.28	4.81	FLG'D
4	32.40	27.13	18.78	13.51	7.62	1.62	.38	5.62	FLG'D
6	35.68	30.41	22.06	16.79	10.90	2.62	.40	7.88	FLG'D

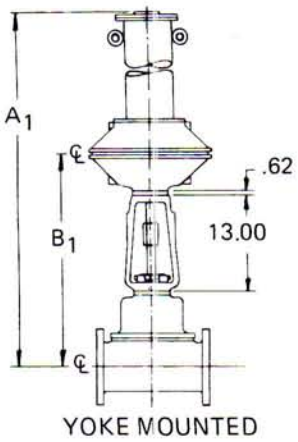
DUALRANGE VALVES									
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	ENDS
	A_1	B_1	A	B					
2½	32.51 32.70	27.24 27.43	18.89 19.08	13.62 13.81	7.73 7.92	1.69 1.88	.32 .32	5.72 5.72	FLG'D SCR'D
3	33.70 33.88	28.43 28.61	20.08 20.26	14.81 14.99	8.92 9.10	2.19 2.37	.35 .35	6.38 6.38	FLG'D SCR'D
4	35.24	29.97	21.62	16.35	10.46	2.68	.40	7.38	FLG'D
6	38.97	33.70	25.35	20.08	14.19	3.62	.48	10.09	FLG'D
8	49.01	43.74	35.39	30.12	21.35	4.93	.54	15.88	FLG'D

* DIM. IS 3.50 FOR 8" DUALRANGE VALVES

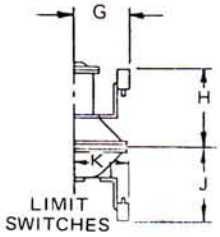
Dimensional data

Series 31101 direct acting



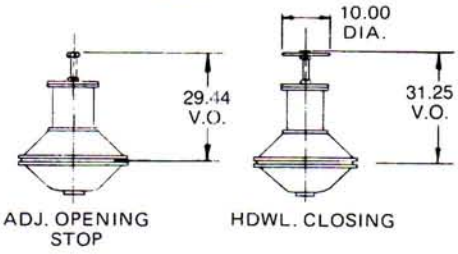


LIMIT SWITCHES	G&K	H&J
BZE6-2RN or DTE6-2RN	8.69	8.38
BAF1-2RN-RH or DTF2-2RN-RH	9.00	8.94
EX-Q or EXD-Q	9.68	10.06



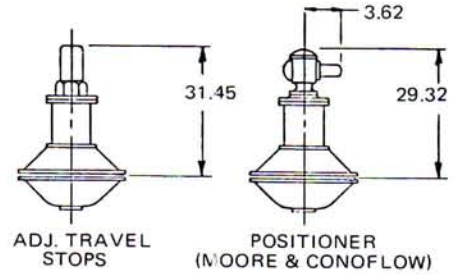
WEIR VALVES

Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	ENDS
	A_1	B_1	A	B					
2½	48.57 48.76	24.68 24.87	34.95 35.14	11.06 11.25	5.17 5.36	1.69 1.88	.32 .32	3.16 3.16	FLG'D SCR'D
3	49.47 49.65	25.58 25.76	35.85 36.03	11.96 12.14	6.07 6.25	2.19 2.37	.35 .35	3.53 3.53	FLG'D SCR'D
4	50.82	26.93	37.20	13.31	7.42	2.68	.40	4.34	FLG'D
6	53.50	29.61	39.88	15.99	10.10	3.62	.48	6.00	FLG'D
8	57.37	33.48	43.75	19.86	13.97	4.93	.54	8.50	FLG'D



STRAIGHTWAY VALVES

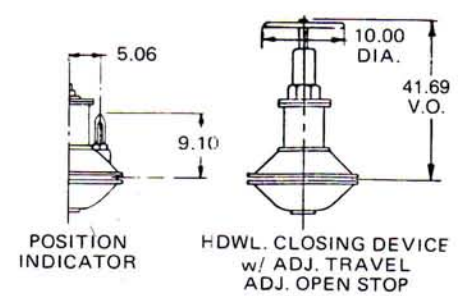
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	ENDS
	A_1	B_1	A	B					
2½	50.02	26.13	36.40	12.51	6.62	1.62	.31	4.69	FLG'D
3	49.99	26.10	36.37	12.48	6.59	1.50	.28	4.81	FLG'D
4	51.02	27.13	37.40	13.51	7.62	1.62	.38	5.62	FLG'D
6	54.30	30.41	40.68	16.79	10.90	2.62	.40	7.88	FLG'D



DUALRANGE VALVES

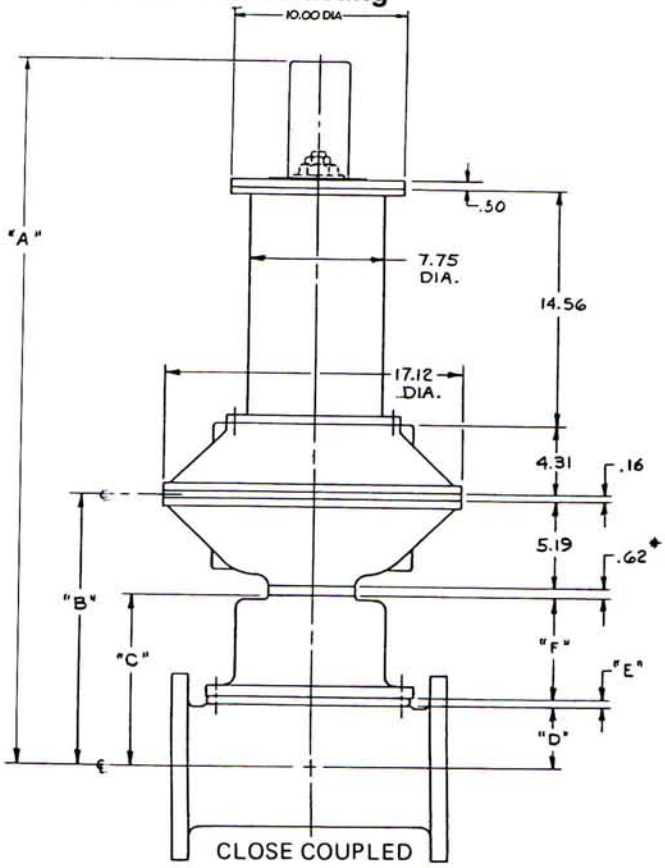
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	ENDS
	A_1	B_1	A	B					
2½	51.13 51.32	27.24 27.43	37.51 37.70	13.62 13.81	7.73 7.92	1.69 1.88	.32 .32	5.72 5.72	FLG'D SCR'D
3	52.32 52.50	28.43 28.61	38.70 38.88	14.81 14.99	8.92 9.10	2.19 2.37	.35 .35	6.38 6.38	FLG'D SCR'D
4	53.86	29.97	40.24	16.35	10.46	2.68	.40	7.38	FLG'D
6	57.59	33.70	43.97	20.08	14.19	3.62	.48	10.09	FLG'D
8	67.63	43.74	54.01	30.12	21.35	4.93	.54	15.88	FLG'D

* DIM. IS 3.50 FOR 8" DUALRANGE VALVES

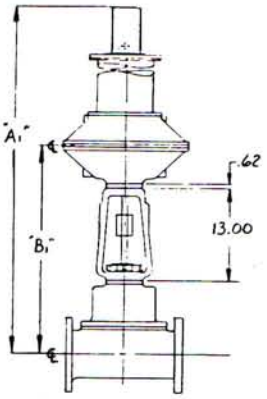


Dimensional data

Series 32102-107 & 109 reverse acting

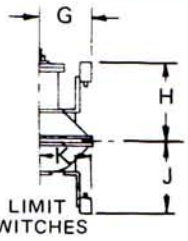


CLOSE COUPLED

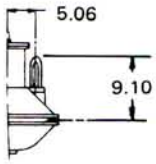


YOKE MOUNTED

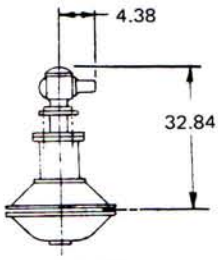
LIMIT SWITCHES	G&K	H&J
BZE6-2RN or DTE6-2RN	8.69	8.38
BAF1-2RN-RH or DTF2-2RN-RH	9.00	8.94
EX-Q or EXD-Q	9.68	10.06



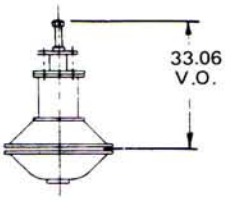
LIMIT SWITCHES



POSITION INDICATOR



POSITIONER (MOORE & CONOFLOW)

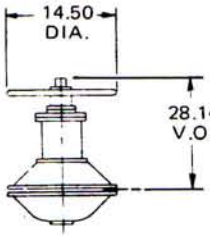


ADJ. OPENING STOP

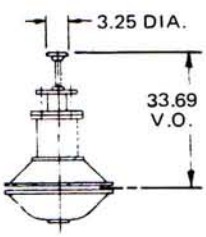
WEIR VALVES									
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	ENDS
	A_1	B_1	A	B					
2½	51.61 51.80	24.68 24.87	37.99 38.18	11.06 11.25	5.17 5.36	1.69 1.88	.32 .32	3.16 3.16	FLG'D SCR'D
3	52.51 52.69	25.58 25.76	38.89 39.07	11.96 12.14	6.07 6.25	2.19 2.37	.35 .35	3.53 3.53	FLG'D SCR'D
4	53.86	26.93	31.24	13.31	7.42	2.68	.40	4.34	FLG'D
6	56.54	29.61	42.92	15.99	10.10	3.62	.48	6.00	FLG'D
8	60.41	33.48	46.79	19.86	13.97	4.93	.54	8.50	FLG'D

STRAIGHTWAY VALVES									
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	ENDS
	A_1	B_1	A	B					
2½	53.06	26.13	39.44	12.51	6.62	1.62	.31	4.69	FLG'D
3	53.03	26.10	39.41	12.48	6.59	1.50	.28	4.81	FLG'D
4	54.06	27.13	40.44	13.51	7.62	1.62	.38	5.62	FLG'D
6	57.34	30.41	43.72	16.79	10.90	2.62	.40	7.88	FLG'D

DUALRANGE VALVES									
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	ENDS
	A_1	B_1	A	B					
2½	54.17 54.36	27.24 27.43	40.55 40.74	13.62 13.81	7.73 7.92	1.69 1.88	.32 .32	5.72 5.72	FLG'D SCR'D
3	55.36 55.54	28.43 28.61	41.74 41.92	14.81 14.99	8.92 9.10	2.19 2.37	.35 .35	6.38 6.38	FLG'D SCR'D
4	56.90	29.97	43.28	16.35	10.46	2.68	.40	7.38	FLG'D
6	60.62	33.70	47.01	20.08	14.19	3.62	.48	10.09	FLG'D
8	70.67	43.74	57.05	30.12	21.35	4.93	.54	15.88	FLG'D



HDWHL. OPENING DEVICE

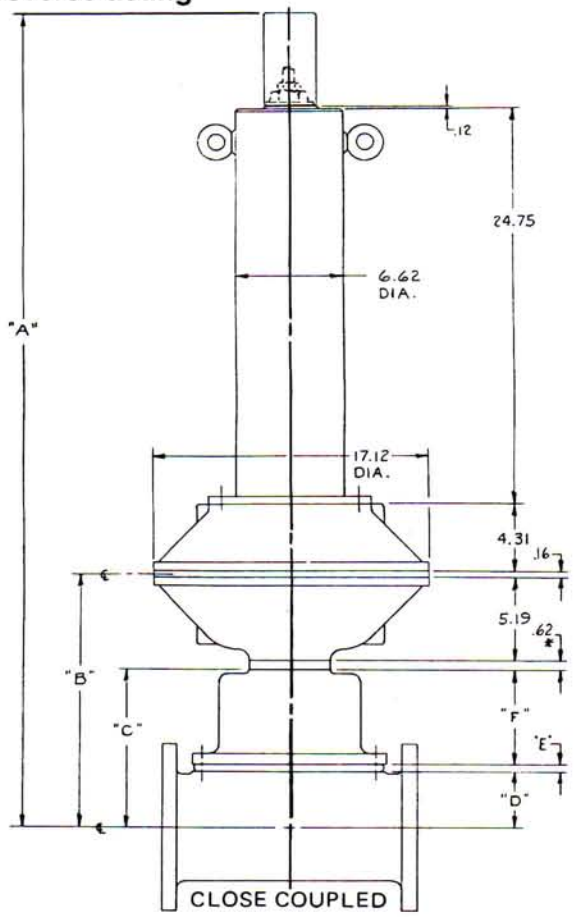


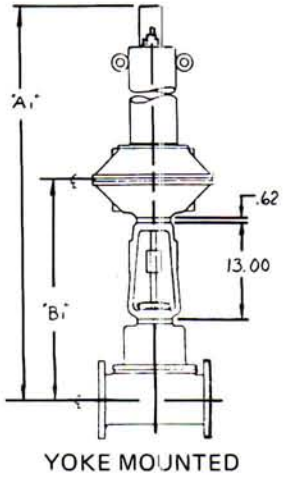
ADJ. OPENING STOP W/ HDWHL.

* DIM. IS 3.50 FOR 8" DUALRANGE VALVES

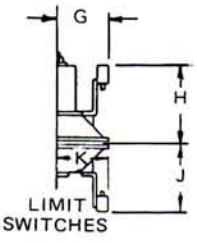
Dimensional data

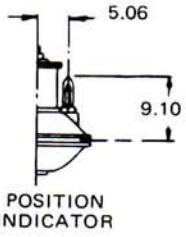
Series 32108 reverse acting

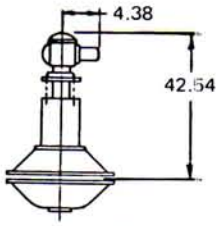


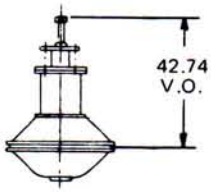


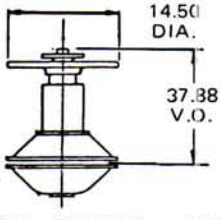
LIMIT SWITCHES	G&K	H&J
BZE6-2RN or DTE6-2RN	8.69	8.38
BAF1-2RN-RH or DTF2-2RN-RH	9.00	8.94
EX-Q or EXD-Q	9.68	10.06

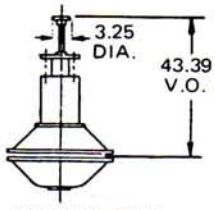












WEIR VALVES									
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	ENDS
	A_1	B_1	A	B					
2½	61.30 61.49	24.68 24.87	47.68 47.87	11.06 11.25	5.17 5.36	1.69 1.88	.32 .32	3.16 3.16	FLG'D SCR'D
3	62.20 62.38	25.58 25.76	48.58 48.76	11.96 12.14	6.07 6.25	2.19 2.37	.35 .35	3.53 3.53	FLG'D SCR'D
4	63.55	26.93	49.93	13.31	7.42	2.68	.40	4.34	FLG'D
6	66.23	29.61	52.61	15.99	10.10	3.62	.48	6.00	FLG'D
8	70.10	33.48	56.48	19.86	13.97	4.93	.54	8.50	FLG'D

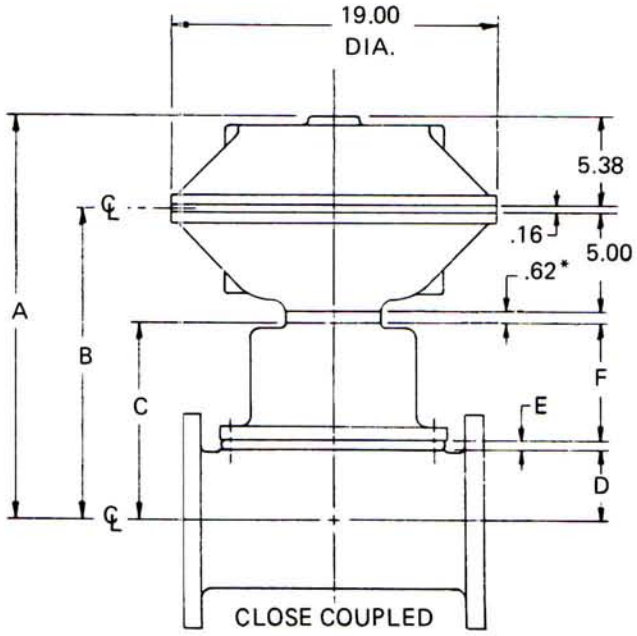
STRAIGHTWAY VALVES									
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	ENDS
	A_1	B_1	A	B					
2½	62.75	26.13	49.13	12.51	6.62	1.62	.31	4.69	FLG'D
3	62.72	26.10	49.10	12.48	6.59	1.50	.28	4.81	FLG'D
4	63.75	27.13	50.13	13.51	7.62	1.62	.38	5.62	FLG'D
6	67.03	30.41	53.41	16.79	10.90	2.62	.40	7.88	FLG'D

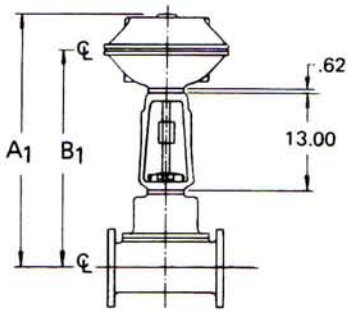
DUALRANGE VALVES									
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	ENDS
	A_1	B_1	A	B					
2½	63.36 64.05	27 24 27.43	50.24 50.43	13.62 13.81	7.73 7.92	1.69 1.88	.32 .32	5.72 5.72	FLG'D SCR'D
3	65.05 65.23	28.43 28.61	51.43 51.61	14.81 14.99	8.92 9.10	2.19 2.37	.35 .35	6.38 6.38	FLG'D SCR'D
4	66.59	29.97	52.97	16.35	10.46	2.68	.40	7.38	FLG'D
6	70.32	33.70	56.70	20.08	14.19	3.62	.48	10.09	FLG'D
8	80.36	43.74	66.74	30.12	21.35	4.93	.54	15.88	FLG'D

* DIM. IS 3.50 FOR 8" DUALRANGE VALVES

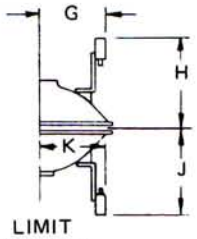
Dimensional data

Series 33130 double acting





LIMIT SWITCHES	G&K	H&J
BZE6-2RN or DTE6-2RN	9.50	8.44
BAF1-2RN-RH or DTF2-2RN-RH	9.81	9.00
EX-Q or EXD-Q	10.50	10.19



WEIR VALVES

Valve Size	Yoke Mounted A_1	Yoke Mounted B_1	Close Coupled A	Close Coupled B	C	D	E	F	ENDS
2½	29.95	24.49	16.33	10.87	5.17	1.69	.32	3.16	FLG'D
	30.14	24.68	16.52	11.06	5.36	1.88	.32	3.16	SCR'D
3	30.85	25.39	17.23	11.77	6.07	2.19	.35	3.53	FLG'D
	31.03	25.57	17.41	11.95	6.25	2.37	.35	3.53	SCR'D
4	32.20	26.74	18.58	13.12	7.42	2.68	.40	4.34	FLG'D
6	34.88	29.42	21.26	15.80	10.10	3.62	.48	6.00	FLG'D
8	38.75	33.29	25.13	19.67	13.97	4.93	.54	8.50	FLG'D

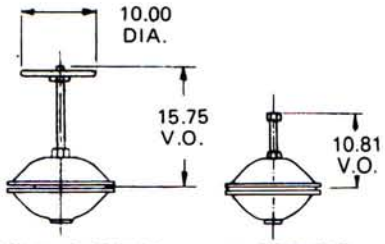
STRAIGHTWAY VALVES

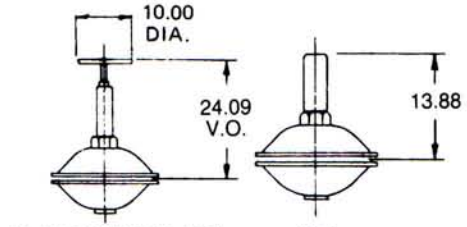
Valve Size	Yoke Mounted A_1	Yoke Mounted B_1	Close Coupled A	Close Coupled B	C	D	E	F	ENDS
2½	31.40	25.94	17.78	12.32	6.62	1.62	.31	4.69	FLG'D
3	31.37	25.91	17.75	12.29	6.59	1.50	.28	4.81	FLG'D
4	32.40	26.94	18.78	13.32	7.62	1.62	.38	5.62	FLG'D
6	35.68	30.22	22.06	16.60	10.90	2.62	.40	7.88	FLG'D

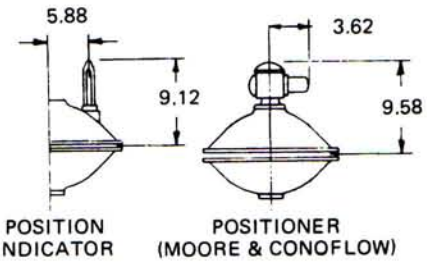
DUALRANGE VALVES

Valve Size	Yoke Mounted A_1	Yoke Mounted B_1	Close Coupled A	Close Coupled B	C	D	E	F	ENDS
2½	32.51	27.05	18.89	13.43	7.73	1.69	.32	5.72	FLG'D
	32.70	27.24	19.08	13.62	7.92	1.88	.32	5.72	SCR'D
3	33.70	28.24	20.08	14.62	8.92	2.19	.35	6.38	FLG'D
	33.88	28.42	20.26	14.80	9.10	2.37	.35	6.38	SCR'D
4	35.24	29.78	21.62	16.16	10.46	2.68	.40	7.38	FLG'D
6	38.97	33.51	25.35	19.89	14.19	3.62	.48	10.09	FLG'D
8	49.01	43.55	35.39	29.93	21.35	4.93	.54	15.88	FLG'D

*DIM. IS 3.50 FOR 8" DUALRANGE VALVES



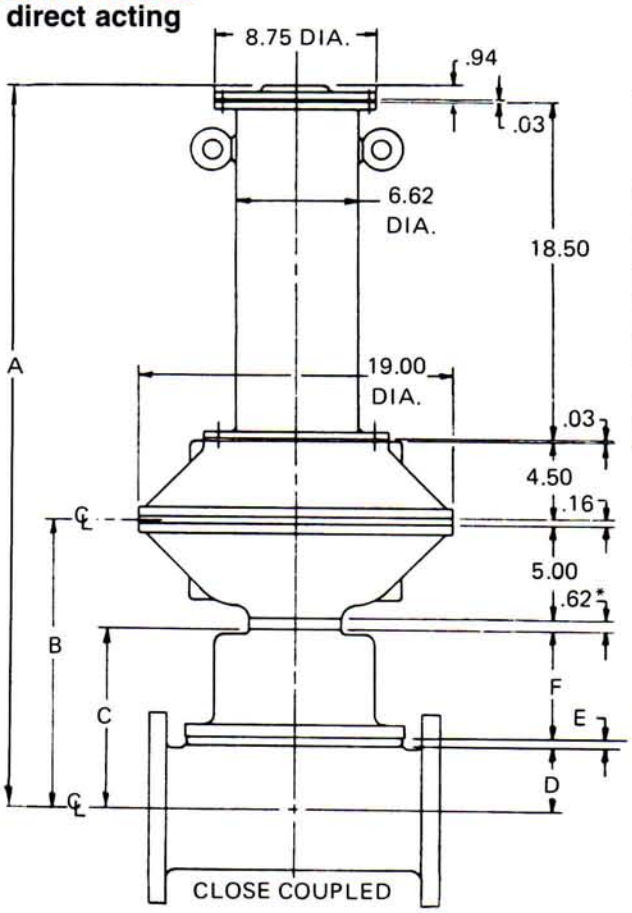


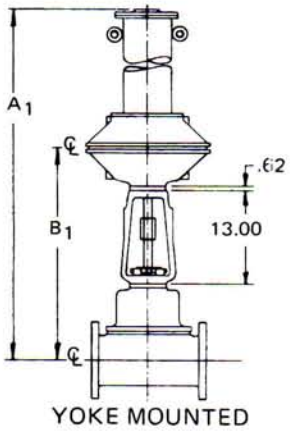


ENGINEERING DATA

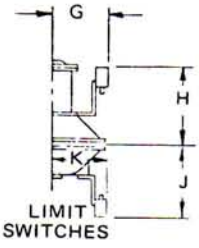
Dimensional data

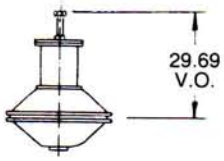
Series 31130 direct acting

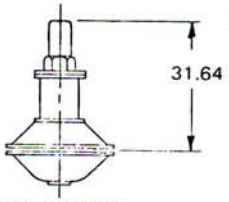


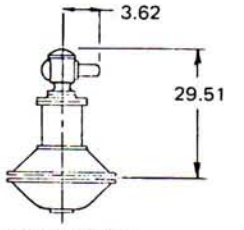


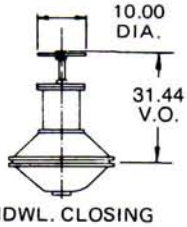
LIMIT SWITCHES	G & K	H & J
BZE6-2RN or DTE6-2RN	9.50	8.44
BAF1-2RN-RH or DTF2-2RN-RH	9.81	9.00
EX-Q or EXD-Q	10.50	10.19

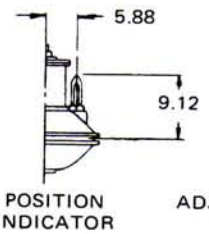


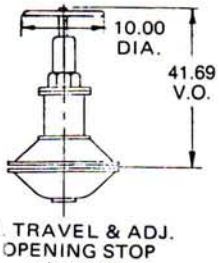












WEIR VALVES									
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	ENDS
	A_1	B_1	A	B					
2½	48.57 48.76	24.49 24.68	34.95 35.14	10.87 11.06	5.17 5.36	1.69 1.88	.32 .32	3.16 3.16	FLG'D SCR'D
3	49.47 49.65	25.39 25.57	35.85 36.03	11.77 11.95	6.07 6.25	2.19 2.37	.35 .35	3.53 3.53	FLG'D SCR'D
4	50.82	26.74	37.20	13.12	7.42	2.68	.40	4.34	FLG'D
6	53.50	29.42	39.88	15.80	10.10	3.62	.48	6.00	FLG'D
8	57.37	33.29	43.75	19.67	13.97	4.93	.54	8.50	FLG'D

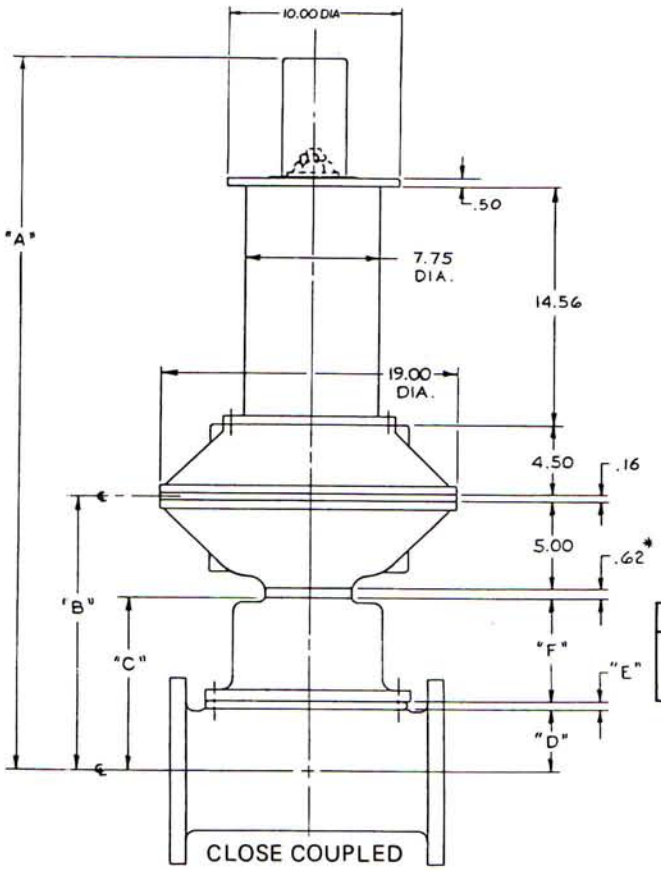
STRAIGHTWAY VALVES									
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	ENDS
	A_1	B_1	A	B					
2½	50.02	25.94	36.40	12.32	6.62	1.62	.31	4.69	FLG'D
3	49.99	25.91	36.37	12.29	6.59	1.50	.28	4.81	FLG'D
4	51.02	26.94	37.40	13.32	7.62	1.62	.38	5.62	FLG'D
6	54.30	30.22	40.68	16.60	10.90	2.62	.40	7.88	FLG'D

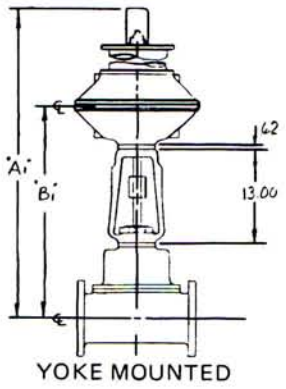
DUALRANGE VALVES									
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	ENDS
	A_1	B_1	A	B					
2½	51.13 51.32	27.05 27.24	37.51 37.70	13.43 13.62	7.73 7.92	1.69 1.88	.32 .32	5.72 5.72	FLG'D SCR'D
3	52.32 52.50	28.24 28.42	38.70 38.88	14.62 14.80	8.92 9.10	2.19 2.37	.35 .35	6.38 6.38	FLG'D SCR'D
4	53.86	29.78	40.24	16.16	10.46	2.68	.40	7.38	FLG'D
6	57.59	33.51	43.97	19.89	14.19	3.62	.48	10.09	FLG'D
8	67.63	43.55	54.01	29.93	21.35	4.93	.54	15.88	FLG'D

*DIM. IS 3.50 FOR 8" DUALRANGE VALVES

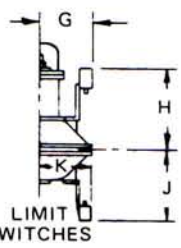
Dimensional data

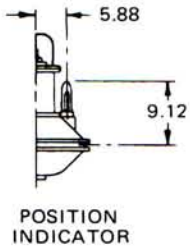
Series 32131-137 reverse acting

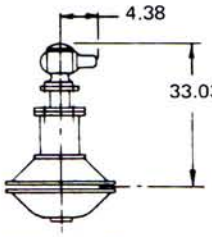


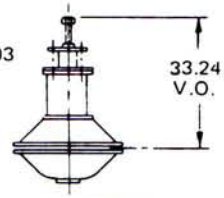


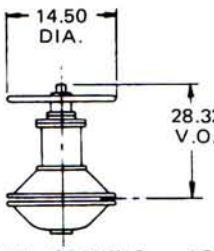
LIMIT SWITCHES	G&K	H&J
BZE6-2RN or DTE6-2RN	9.50	8.44
BAF1-2RN-RH or DTF2-2RN-RH	9.81	9.00
EX-Q or EXD-Q	10.50	10.19

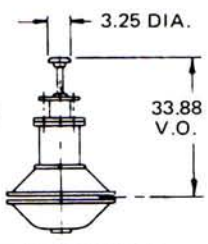












WEIR VALVES									
Valve Size	Yoke Mounted		Close Coupled						
	A_1	B_1	A	B	C	D	E	F	ENDS
2½	51.61	24.49	37.99	10.87	5.17	1.69	.32	3.16	FLG'D
	51.80	24.68	38.18	11.06	5.36	1.88	.32	3.16	SCR'D
3	52.51	25.39	38.89	11.77	6.07	2.19	.35	3.53	FLG'D
	52.69	25.57	39.07	11.95	6.25	2.37	.35	3.53	SCR'D
4	53.86	26.74	40.24	13.12	7.42	2.68	.40	4.34	FLG'D
6	56.54	29.42	42.92	15.80	10.10	3.62	.48	6.00	FLG'D
8	60.41	33.29	46.79	19.67	13.97	4.93	.54	8.50	FLG'D

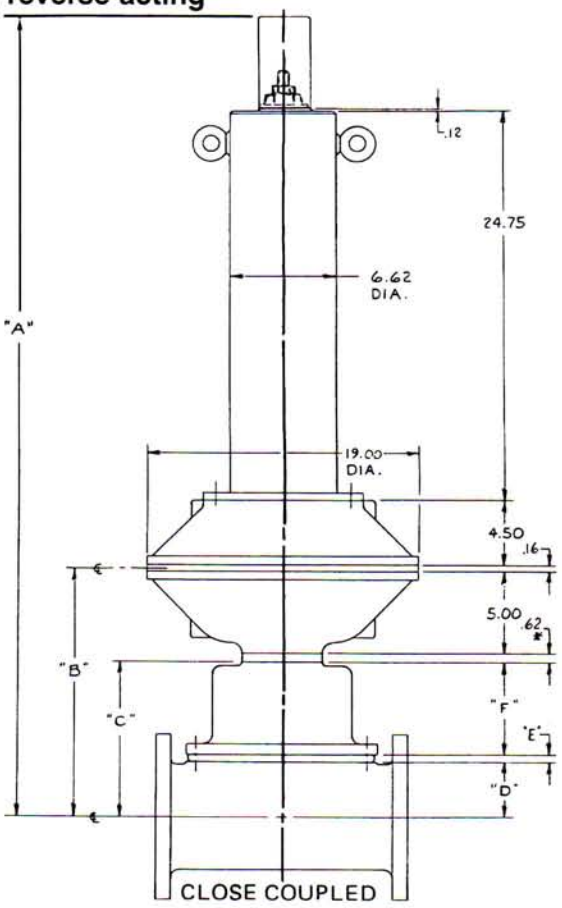
STRAIGHTWAY VALVES									
Valve Size	Yoke Mounted		Close Coupled						
	A_1	B_1	A	B	C	D	E	F	ENDS
2½	53.06	25.94	39.44	12.32	6.62	1.62	.31	4.69	FLG'D
3	53.03	25.91	39.41	12.29	6.59	1.50	.28	4.81	FLG'D
4	54.06	26.94	40.44	13.32	7.62	1.62	.38	5.62	FLG'D
6	57.34	30.22	43.72	16.60	10.90	2.62	.40	7.88	FLG'D

DUALRANGE VALVES									
Valve Size	Yoke Mounted		Close Coupled						
	A_1	B_1	A	B	C	D	E	F	ENDS
2½	54.17	27.05	40.55	13.43	7.73	1.69	.32	5.72	FLG'D
	54.36	27.24	40.74	13.62	7.92	1.88	.32	5.72	SCR'D
3	55.36	28.42	41.74	14.62	8.92	2.19	.35	6.38	FLG'D
	55.54	28.42	41.92	14.80	9.10	2.37	.35	6.38	SCR'D
4	56.90	29.78	43.28	16.16	10.46	2.68	.40	7.38	FLG'D
6	60.63	33.51	47.01	19.89	14.19	3.62	.48	10.09	FLG'D
8	70.67	43.55	57.05	29.93	21.35	4.93	.54	15.88	FLG'D

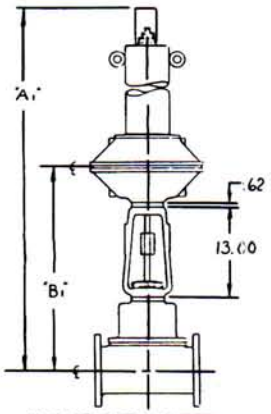
*DIM. IS 3.50 FOR 8" DUALRANGE VALVES

Dimensional data

Series 32138 reverse acting

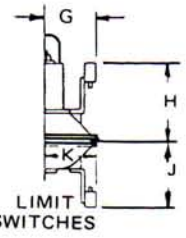


CLOSE COUPLED

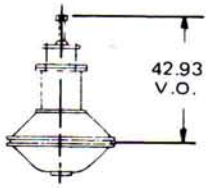


YOKE MOUNTED

LIMIT SWITCHES	G&K	H&J
BZE6-2RN or DTE6-2RN	9.50	8.44
BAF1-2RN-RH or DTF2-2RN-RH	9.81	9.00
EX-Q or EXD-Q	10.50	10.19



LIMIT SWITCHES



ADJ. OPENING STOP

WEIR VALVES

Valve Size	Yoke Mounted A_1	Yoke Mounted B_1	Close Coupled A	Close Coupled B	C	D	E	F	ENDS
2½	61.30	24.49	47.68	10.87	5.17	1.69	.32	3.16	FLG'D
	61.49	24.68	47.87	11.06	5.36	1.88	.32	3.16	SCR'D
3	62.20	25.39	48.58	11.77	6.07	2.19	.35	3.53	FLG'D
	62.38	25.57	48.76	11.95	6.25	2.37	.35	3.53	SCR'D
4	63.55	26.74	49.93	13.12	7.42	2.68	.40	4.34	FLG'D
6	66.23	29.42	52.61	15.80	10.10	3.62	.48	6.00	FLG'D
8	70.10	33.29	56.48	19.67	13.97	4.93	.54	8.50	FLG'D

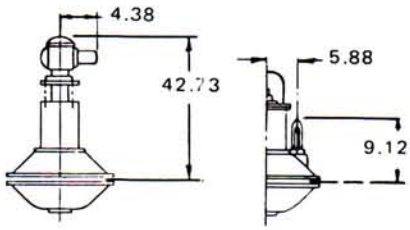
STRAIGHTWAY VALVES

Valve Size	Yoke Mounted A_1	Yoke Mounted B_1	Close Coupled A	Close Coupled B	C	D	E	F	ENDS
2½	62.75	25.94	49.13	12.32	6.62	1.62	.31	4.69	FLG'D
3	62.72	25.91	49.10	12.29	6.59	1.50	.28	4.81	FLG'D
4	63.75	26.94	50.13	13.32	7.62	1.62	.38	5.62	FLG'D
6	67.03	30.22	53.41	16.60	10.90	2.62	.40	7.88	FLG'D

DUALRANGE VALVES

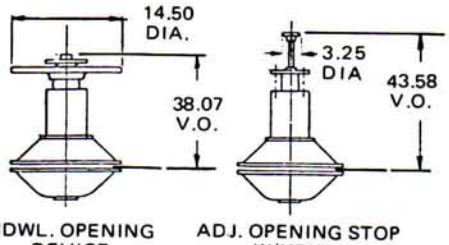
Valve Size	Yoke Mounted A_1	Yoke Mounted B_1	Close Coupled A	Close Coupled B	C	D	E	F	ENDS
2½	63.86	27.05	50.24	13.43	7.73	1.69	.32	5.72	FLG'D
	64.05	27.24	50.43	13.62	7.92	1.88	.32	5.72	SCR'D
3	65.05	28.42	51.43	14.62	8.92	2.19	.35	6.38	FLG'D
	65.23	28.42	51.61	14.80	9.10	2.37	.35	6.38	SCR'D
4	66.59	29.78	52.97	16.16	10.46	2.68	.40	7.38	FLG'D
6	70.32	33.51	56.70	19.89	14.19	3.62	.48	10.09	FLG'D
8	80.36	43.55	66.74	29.93	21.35	4.93	.54	15.88	FLG'D

*DIM. IS 3.50 FOR 8" DUALRANGE VALVES



POSITIONER (MOORE & CONOFLOW)

POSITION INDICATOR



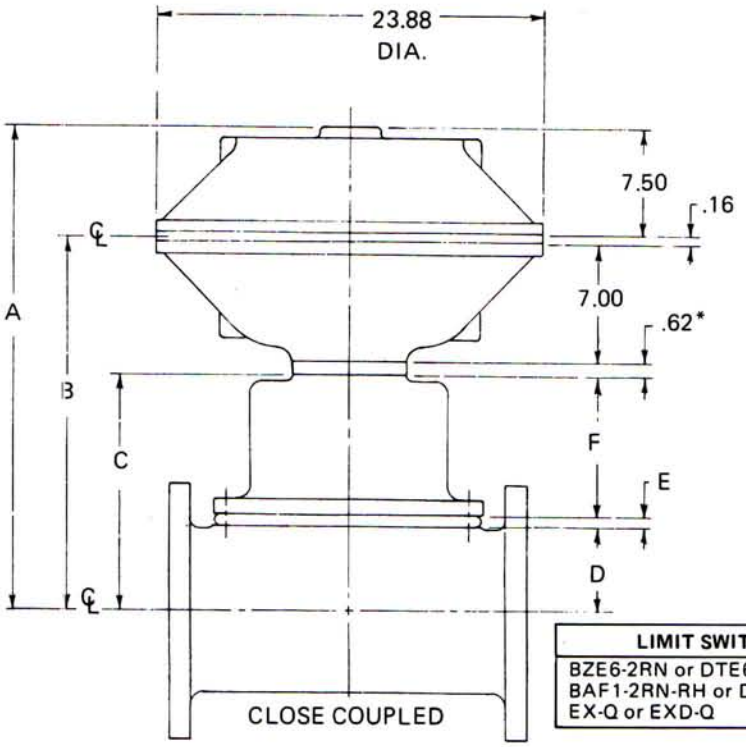
HDWL. OPENING DEVICE

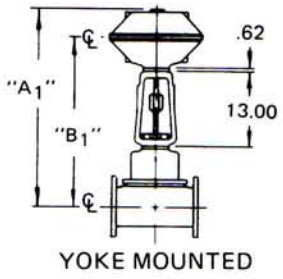
ADJ. OPENING STOP W/HDWL.

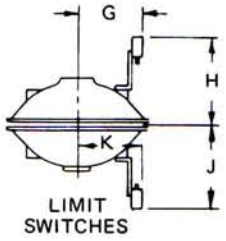
ENGINEERING DATA

Dimensional data

Series 33250 double acting

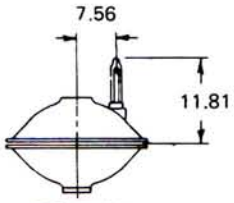


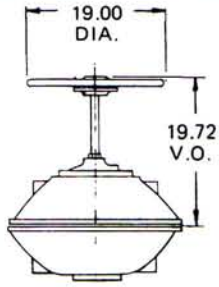




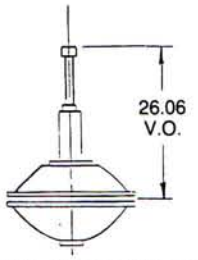
LIMIT SWITCHES	G	H	J	K
BZE6-2RN or DTE6-2RN	11.19	9.94	9.94	11.19
BAF1-2RN-RH or DTF2-2RN-RH	11.50	10.50	10.50	11.50
EX-Q or EXD-Q	12.19	11.62	11.62	12.19

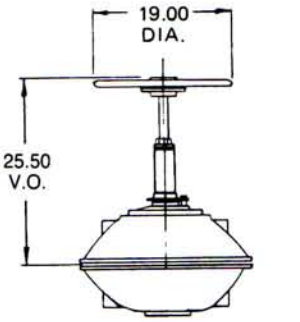
WEIR VALVES									
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	ENDS
	A_1	B_1	A	B					
4	36.32	28.74	22.70	15.12	7.42	2.68	.40	4.34	FLG'D
6	39.00	31.42	25.38	17.80	10.10	3.62	.48	6.00	FLG'D
8	42.87	35.29	29.25	21.67	13.97	4.93	.54	8.50	FLG'D
10	45.51	37.93	31.89	24.31	16.61	6.06	.61	9.94	FLG'D
12	47.93	40.35	34.31	26.73	19.03	7.25	.66	11.12	FLG'D



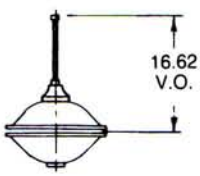


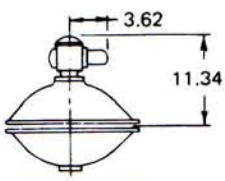
STRAIGHTWAY VALVES									
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	ENDS
	A_1	B_1	A	B					
2½	35.52	27.94	21.90	14.32	6.62	1.62	.31	4.69	FLG'D
3	35.49	27.91	21.87	14.29	6.59	1.50	.28	4.81	FLG'D
4	36.52	28.94	22.90	15.32	7.62	1.62	.38	5.62	FLG'D
6	39.80	32.22	26.18	18.60	10.90	2.62	.40	7.88	FLG'D
8	44.56	36.98	30.94	23.36	15.66	3.44	.47	11.75	FLG'D
10 12	48.06	40.48	34.44	26.86	19.16	4.38	.53	14.25	FLG'D





DUALRANGE VALVES									
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	ENDS
	A_1	B_1	A	B					
2½	36.82 36.63	29.24 29.05	23.20 23.01	15.62 15.43	7.92 7.73	1.88 1.69	.32	5.72	SCR'D FLG'D
3	38.00 37.82	30.42 30.24	24.38 24.20	16.80 16.62	9.10 8.92	2.37 2.19	.35	6.38	SCR'D FLG'D
4	39.36	31.78	25.74	18.16	10.46	2.68	.40	7.38	FLG'D
6	43.09	35.51	29.47	21.89	14.19	3.62	.48	10.09	FLG'D
8	53.13	45.55	39.51	31.93	21.35	4.93	.54	15.88	FLG'D

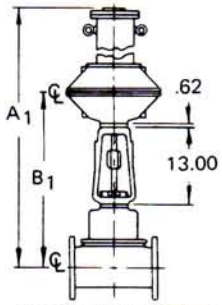




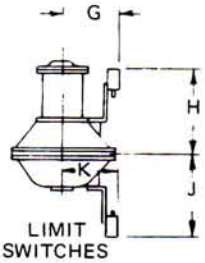
* DIM. IS 3.50 FOR 8" DUALRANGE VALVE

Dimensional data

Series 31250 direct acting

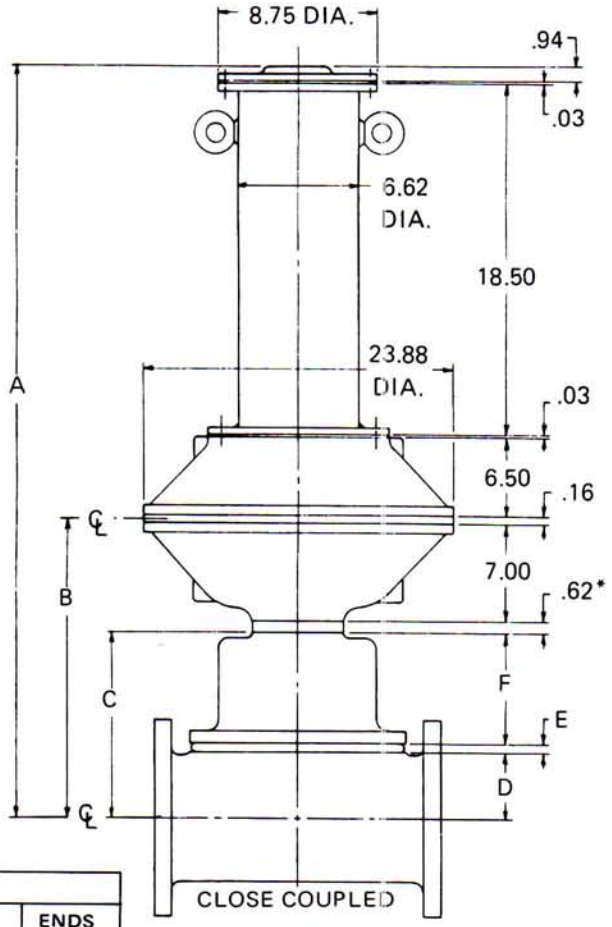


YOKE MOUNTED



LIMIT SWITCHES

LIMIT SWITCHES	G	H	J	K
BZE6-2RN or DTE6-2RN	11.19	9.94	9.94	11.19
BAF1-2RN-RH or DTF2-2RN-RH	11.50	10.50	10.50	11.50
EX-Q or EXD-Q	12.19	11.62	11.62	12.19



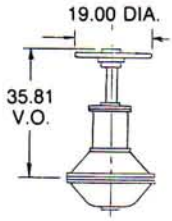
CLOSE COUPLED

WEIR VALVES									
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	ENDS
	A_1	B_1	A	B					
4	54.82	28.74	41.20	15.12	7.42	2.68	.40	4.34	FLG'D
6	57.50	31.42	43.88	17.80	10.10	3.62	.48	6.00	FLG'D
8	61.37	35.29	47.75	21.67	13.97	4.93	.54	8.50	FLG'D
10	64.01	37.93	50.39	24.31	16.61	6.06	.61	9.94	FLG'D
12	66.43	40.35	52.81	26.73	19.03	7.25	.66	11.12	FLG'D

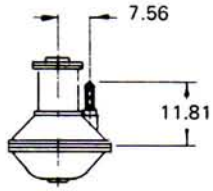
STRAIGHTWAY VALVES									
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	ENDS
	A_1	B_1	A	B					
2½	54.02	27.94	40.40	14.32	6.62	1.62	.31	4.69	FLG'D
3	53.99	27.91	40.37	14.29	6.59	1.50	.28	4.81	FLG'D
4	55.02	28.94	41.40	15.32	7.62	1.62	.38	5.62	FLG'D
6	58.30	32.22	44.68	18.60	10.90	2.62	.40	7.88	FLG'D
8	63.06	36.98	49.44	23.36	15.66	3.44	.47	11.75	FLG'D
10 12	66.56	40.48	52.94	26.86	19.16	4.38	.53	14.25	FLG'D

DUALRANGE VALVES									
Valve Size	Yoke Mounted		Close Coupled		C	D	E	F	ENDS
	A_1	B_1	A	B					
2½	55.32 55.13	29.24 29.05	41.70 41.51	15.62 15.43	7.92 7.73	1.88 1.69	.32	5.72	SCR'D FLG'D
3	56.50 56.32	30.42 30.24	42.88 42.70	16.80 16.62	9.10 8.92	2.37 2.19	.35	6.38	SCR'D FLG'D
4	57.86	31.78	44.24	18.16	10.46	2.68	.40	7.38	FLG'D
6	61.59	35.51	47.97	21.89	14.19	3.62	.48	10.09	FLG'D
8	71.63	45.55	58.01	31.93	21.35	4.93	.54	15.88	FLG'D

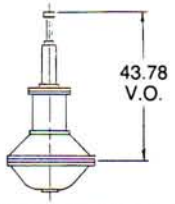
* DIM. IS 3.50 FOR 8" DUALRANGE VALVES.



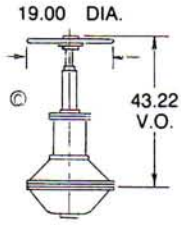
HDWL. CLOSING



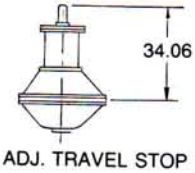
POSITION INDICATOR



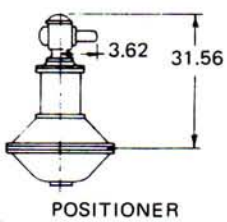
ADJ. TRAVEL STOP, ADJ. OPENING STOP



HWC/ADJ.T TRAVEL STOP



ADJ. TRAVEL STOP

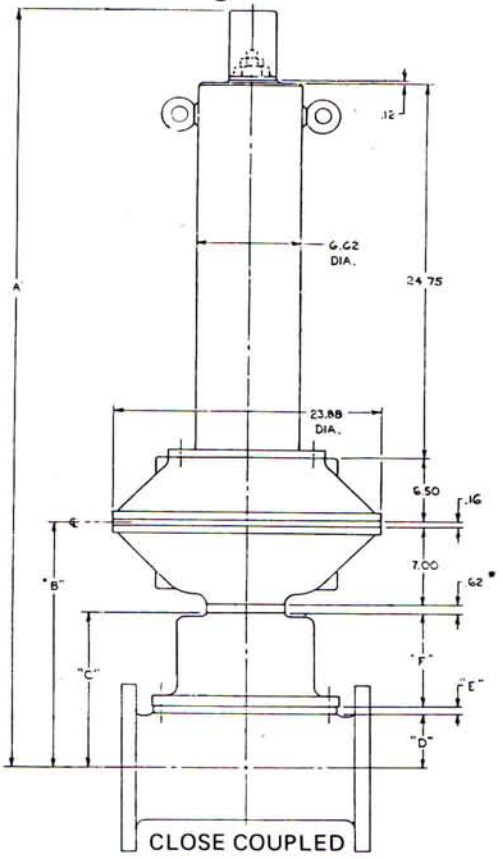


POSITIONER (MOORE & CONOFLOW)

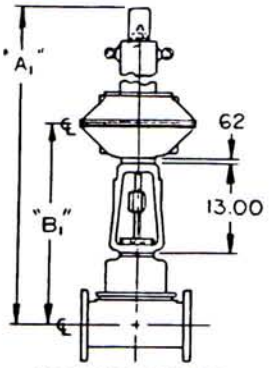
ENGINEERING DATA

Dimensional data

Series 32253 reverse acting



CLOSE COUPLED



YOKE MOUNTED

LIMIT SWITCHES	G	H	J	K
BZE6-2RN or DTE6-2RN	11.19	9.94	9.94	11.19
BAF1-2RN-RH or DTF2-2RN-RH	11.50	10.50	10.50	11.50
EX-Q or EXD-Q	12.19	11.62	11.62	12.19

WEIR VALVES

Valve Size	Yoke Mounted A_1	Yoke Mounted B_1	Close Coupled A	Close Coupled B	C	D	E	F	ENDS
4	67.55	28.74	53.93	15.12	7.42	2.68	.40	4.34	FLG'D
6	70.23	31.42	56.61	17.80	10.10	3.62	.48	6.00	FLG'D
8	74.09	35.29	60.48	21.67	13.97	4.93	.54	8.50	FLG'D
10	76.74	37.93	63.12	24.31	16.61	6.06	.61	9.94	FLG'D
12	79.16	40.35	65.54	26.73	19.03	7.25	.66	11.12	FLG'D

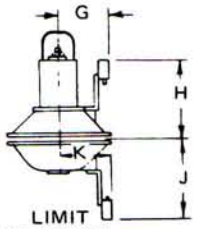
STRAIGHTWAY VALVES

Valve Size	Yoke Mounted A_1	Yoke Mounted B_1	Close Coupled A	Close Coupled B	C	D	E	F	ENDS
2½	66.75	27.94	53.13	14.32	6.62	1.62	.31	4.69	FLG'D
3	66.72	27.91	53.10	14.29	6.59	1.50	.28	4.81	FLG'D
4	67.75	28.94	54.13	15.32	7.62	1.62	.38	5.62	FLG'D
6	71.03	32.22	57.41	18.60	10.90	2.62	.40	7.88	FLG'D
8	75.79	36.98	62.17	23.36	15.66	3.44	.47	11.75	FLG'D
10 12	79.29	40.48	65.67	26.86	19.16	4.38	.53	14.25	FLG'D

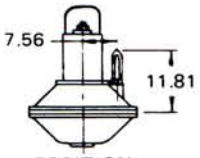
DUALRANGE VALVES

Valve Size	Yoke Mounted A_1	Yoke Mounted B_1	Close Coupled A	Close Coupled B	C	D	E	F	ENDS
2½	68.05 67.86	29.24 29.05	54.43 54.24	15.62 15.43	7.92 7.73	1.88 1.69	.32	5.72	SCR'D FLG'D
3	69.23 69.05	30.42 30.24	55.61 55.43	16.80 16.62	9.10 8.92	2.37 2.19	.35	6.38	SCR'D FLG'D
4	70.59	31.78	56.97	18.16	10.46	2.68	.40	7.38	FLG'D
6	74.32	35.51	60.70	21.89	14.19	3.62	.48	10.09	FLG'D
8	84.36	45.55	70.74	31.93	21.35	4.93	.54	15.88	FLG'D

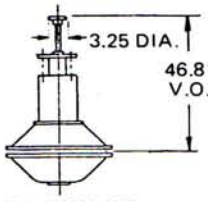
* DIM. IS 3.50 FOR 8" DUALRANGE VALVE



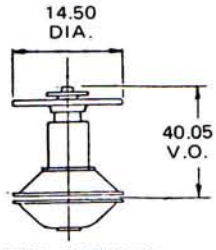
LIMIT SWITCHES



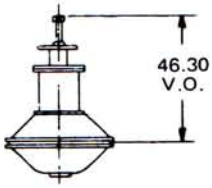
POSITION INDICATOR



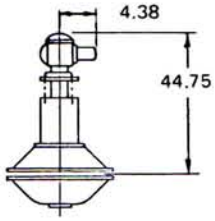
ADJ. OPENING STOP W/HDWHL



HDWL. OPENING DEVICE



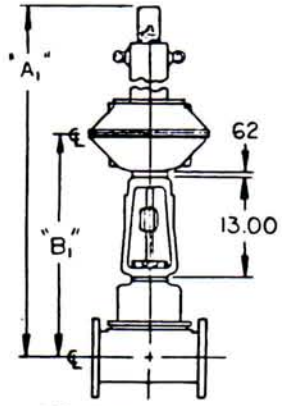
ADJ. OPENING STOP



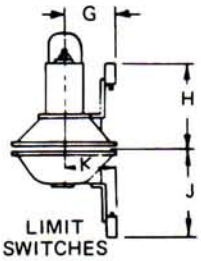
POSITIONER (MOORE & CONOFLOW)

Dimensional data

Series 32251-252 reverse acting

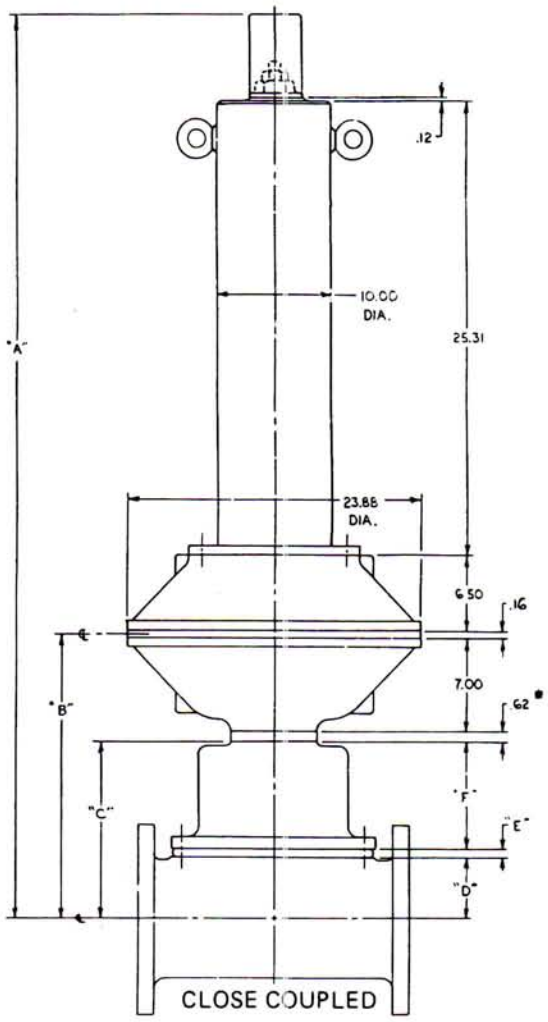


YOKE MOUNTED



LIMIT SWITCHES

LIMIT SWITCHES	G	H	J	K
BZE6-2RN or DTE6-2RN	11.19	9.94	9.94	11.19
BAF1-2RN-RH or DTF2-2RN-RH	11.50	10.50	10.50	11.50
EX-Q or EXD-Q	12.19	11.62	11.62	12.19



CLOSE COUPLED

WEIR VALVES

Valve Size	Yoke Mounted A_1	Yoke Mounted B_1	Close Coupled A	Close Coupled B	C	D	E	F	ENDS
4	68.11	28.74	54.49	15.12	7.42	2.68	.40	4.34	FLG'D
6	70.79	31.42	57.17	17.80	10.10	3.62	.48	6.00	FLG'D
8	74.66	35.29	61.04	21.67	13.97	4.93	.54	8.50	FLG'D
10	77.30	37.93	63.68	24.31	16.61	6.06	.61	9.94	FLG'D
12	79.72	40.35	66.09	26.73	19.03	7.25	.66	11.12	FLG'D

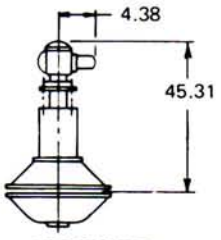
STRAIGHTWAY VALVES

Valve Size	Yoke Mounted A_1	Yoke Mounted B_1	Close Coupled A	Close Coupled B	C	D	E	F	ENDS
2½	67.31	27.94	53.69	14.32	6.62	1.62	.31	4.69	FLG'D
3	67.28	27.91	53.66	14.29	6.59	1.50	.28	4.81	FLG'D
4	68.31	28.94	54.69	15.32	7.62	1.62	.38	5.62	FLG'D
6	71.59	32.22	57.97	18.60	10.90	2.62	.40	7.88	FLG'D
8	76.35	36.98	62.73	23.36	15.66	3.44	.47	11.75	FLG'D
10 12	79.85	40.48	66.23	26.86	19.16	4.38	.53	14.25	FLG'D

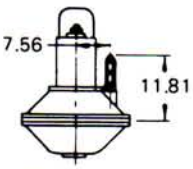
DUALRANGE VALVES

Valve Size	Yoke Mounted A_1	Yoke Mounted B_1	Close Coupled A	Close Coupled B	C	D	E	F	ENDS
2½	68.61 68.42	29.24 29.05	54.99 54.80	15.62 15.43	7.92 7.73	1.88 1.69	.32	5.72	SCR'D FLG'D
3	69.79 69.61	30.42 30.24	56.17 55.99	16.80 16.62	9.10 8.92	2.37 2.19	.35	6.38	SCR'D FLG'D
4	71.15	31.78	57.53	18.16	10.46	2.68	.40	7.38	FLG'D
6	74.88	35.51	61.26	21.89	14.19	3.62	.48	10.09	FLG'D
8	84.92	45.55	71.30	31.93	21.35	4.93	.54	15.88	FLG'D

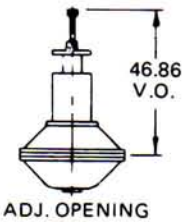
* DIM. IS 3.50 FOR 8" DUALRANGE VALVES.



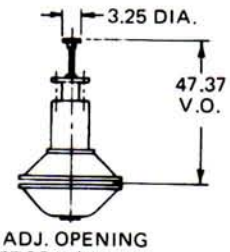
POSITIONER (MOORE & CONOFLOW)



POSITION INDICATOR



ADJ. OPENING STOP



ADJ. OPENING STOP W/HDWHL

CONVERSION FACTORS

Multiply	by	To Obtain
Absolute viscosity (poise)	1	Gram/second centimeter
Absolute viscosity (centipoise)	0.01	Poise
Acceleration due to gravity (*g*)	32.174	Feet/second²
	980.6	Centimeters/second²
Acres	0.4047	Hectares
	10	Square Chains
	43,560	Square Feet
	4047	Square Meters
	0.001562	Square Miles
	4840	Square Yards
	160	Square Rods
Acre-feet	43,560	Cubic Feet
	325,851	Gallons (US)
	1233.49	Cubic Meters
	1,233,490	Liters
Acre-feet/hour	726	Cubic feet/Minute
	5430.86	Gallons/Minute
Angstroms	10—10	Meters
Ares	0.01	Hectares
	1076.39	Square Feet
	0.02471	Acres
Atmospheres	76.0	Cms of Hg at 32° F
	29.921	Inches of Hg at 32° F
	33.94	Feet of Water at 62° F
	10,333	Kgs/Square meter
	14.6963	Pounds/Square inch
	1.058	Tons/Square foot
	1013.15	Millibars
	235.1408	Ounces/Square inch
Bags of cement	94	Pounds of cement
Bar	14.5	Pounds/square inch
Barrels of oil	42	Gallons of oil (US)
Barrels of cement	376	Pounds of cement
Barrels (not legal)	31	Gallons (US)
or	31.5	Gallons (US)
Board feet	144 X 1 in.*	Cubic inches
Boiler horse power	33,479	BTU/hour
	9.803	Kilowatts
	34.5	Pounds of water evaporated/hour at 212° F
BTU	252.016	Calories (gm)
	0.252	Calories (Kg)
	777.54	Foot pounds
	0.0003927	Horse power hours
	1054.2	Joules
	107.5	Kilogram meters
	0.0002928	Kilowatt hours
BTU/Cu foot	8.89	Calories (Kg)/Cu meter at 32° F
BTU/Hr/ft²/°F/ft	0.00413	Cal (gm)/Sec/cm²/°C/cm
	1.49	Cal (Kg)/Hr/M2/°C/Meter
BTU/minute	12.96	Foot pounds/second
0.02356	Horse power	
0.01757	Kilowatts	
BTU/minute	17.57	Watts
BTU/pound	0.556	Calories (Kg)/Kilogram
Bushels	2150.4	Cubic inches
	35.24	Liters
	4	Pecks
	32	Quarts (dry)
Cables	120	Fathoms
Calories (gm)	0.003968	BTU
	0.001	Calories (Kg)
	3.088	Foot pounds
	1.558 X 10^{-6}	Horse power hours
	4.185	Joules
	0.4265	Kilogram meters
	1.1628 X 10^{-6}	Kilowatt hours
	0.0011628	Watt hours
Cal (gm)/sec/cm²/°C/cm	242.13	BTU/Hr/ft²/°F/ft
Calories (Kg)	3.968	BTU
	1000	Calories (gm)
	3088	Foot pounds
	0.001558	Horse power hours
	4185	Joules
	426.5	Kilogram meters
	0.0011628	Kilowatt hours
	1.1628	Watt hours
Calories (Kg)/Cu meter	0.1124	BTU/Cu foot at 0°C
Cal(Kg)/Hr/M²/°C/M	0.671	BTU/Hr/ft²/°F/foot
Calories (Kg)/Kg	1.8	BTU/pound
Calories(Kg)/minute	51.43	Foot pounds/second
	0.09351	Horse power
	0.06972	Kilowatts
Carats (diamond)	200	Milligram
Centares (Centiares)	1	Square meters
Centigram	0.01	Grams
Centiliters	0.01	Liters
Centimeters	0.3937	Inches
	0.032808	Feet
	0.01	Meters
	10	Millimeters
Centimeters of Hg at 32° F	0.01316	Atmospheres
	0.4461	Feet of water at 62°F
	136	Kgs/Square meter
	27.85	Pounds/Square foot
	0.1934	Pounds/Square inch
Centimeters/second	1.969	Feet/minute
	0.03281	Feet/second
	0.036	Kilometers/hour
	0.6	Meters/minute
	0 02237	Miles/hour
	0.0003728	Miles/minute
Centimeters/second²	0.03281	Feet/second2
Centipoise	0.000672	Pounds/sec foot
	2.42	Pounds/hour foot
	0.01	Poise
Chains (Gunter's)	4	Rods
	66	Feet
	100	Links

*For thickness less than 1 in. use actual thickness in decimals of an inch.

CONVERSION FACTORS (Continued)

Multiply	by	To Obtain
Cheval-vapeur	1	Metric horse power
	75	Kilogram meters/second
	0.98632	Horse power
Circular inches	10^6	Circular mils
	0.7854	Square inches
	785,400	Square mils
Circular mils	0.7854	Square mils
	10^{-6}	Circular inches
	7.854×10^{-5}	Square inches
Cubic centimeters	3.531×10^{-5}	Cubic feet
	0.06102	Cubic inches
	10^{-6}	Cubic meters
	1.308×10^{-6}	Cubic yards
	0.0002642	Gallons (US)
	0.001	Liters
	0.002113	Pints (liq. US)
	0.001057	Quarts (liq. US)
	0.0391	Ounces (fluid)
Cubic feet	28,320	Cubic centimeters
	1728	Cubic inches
	0.02832	Cubic meters
	0.03704	Cubic yards
	7.48052	Gallons (US)
	28.32	Liters
	59.84	Pints (liq. US)
	29.92	Quarts (liq. US)
	2.296×10^{-5}	Acre feet
	0.803564	Bushels
Cubic feet of water	62.4266	Pounds at 39.2°F
	62.3554	Pounds at 62°F
Cubic feet/minute	472	Cubic centimeters/sec
	0.1247	Gallons (US)/second
	0.472	Liters/second
	62.36	Pounds water/min at 62°F
	7.4805	Gallons (US)/minute
	10,772	Gallons/24 hours
	0.033058	Acre feet/24 hours
Cubic feet/second	646,317	Gallons (US)/24 hours
	448.831	Gallons/minute
	1.98347	Acre feet/24 hours
Cubic inches	16.387	Cubic centimeters
	0.0005787	Cubic feet
	1.639×10^{-5}	Cubic meters
	2.143×10^{-5}	Cubic yards
	0.004329	Gallons (US)
	0.01639	Liters
	0.03463	Pints (liq. US)
	0.01732	Quarts (liq. US)
Cubic meters	10^6	Cubic centimeters
	35.31	Cubic feet
	61,023	Cubic inches
	1.308	Cubic yards
	264.2	Gallons (US)
	1000	Liters
	2113	Pints (liq. US)
	1057	Quarts (liq. US)
Cubic meters/hour	4.40	Gallons (US)/minute
Cubic yards	764,600	Cubic centimeters
	27	Cubic feet
	46,656	Cubic inches
	0.7646	Cubic meters
	202	Gallons (US)
	764.6	Liters
	1616	Pints (liq. US)
	807.9	Quarts (liq . US)

Multiply	by	To Obtain
Cubic yards/minute	0.45	Cubic feet/second
	3.367	Gallons (US)/second
	12.74	Liters/second
Cubit	18	Inches
Days (mean)	1440	Minutes
	24	Hours
	86,400	Seconds
Days (sidereal)	86,164.1	Solar seconds
Decigrams	0.1	Grams
Deciliters	0.1	Liters
Decimeters	0.1	Meters
Degrees (angle)	60	Minutes
	0.01745	Radians
	3600	Seconds
Degrees F (less 32)	0.5556	Degrees C
Degrees F	1 (plus 460)	Degrees F above absolute 0
Degrees C	1.8 (plus 32)	Degrees F
	1 (plus 273)	Degrees C above absolute 0
Degrees/second	0.01745	Radians/second
	0.1667	Revolutions/minute
	0.002778	Revolutions/second
Dekagrams	10	Grams
Dekaliters	10	Liters
Dekameters	10	Meters
Diameter (circle)	3.14159265359	Circumference
(approx)	3.1416	
(approx)	3.14	
(approx)	$^{22}/_{7}$	
Diameter (circle)	0.88623	Side of equal square
	0.7071	Side of inscribed square
Diameter^3 (sphere)	0.5236	Volume (sphere)
Diam (major) X diam (minor)	0.7854	Area of ellipse
Diameter^2 (circle)	0.7854	Area (circle)
Diameter^2 (sphere)	3.1416	Surface (sphere)
Diam (inches) X RPM	0.262	Belt speed ft/minute
Digits	0.75	Inches
Drams (avoirdupois)	27.34375	Grains
	0.0625	Ounces (avoir.)
	1.771845	Grams
Fathoms	6	Feet
Feet	30.48	Centimeters
	12	Inches
	0.3048	Meters
	$^1/_3$	Yards
	.06061	Rods
Feet of water at 62	0.029465	Atmospheres
	0.88162	Inches of Hg at 32°F
	62.3554	Pounds/square foot
	0.43302	Pounds/square inch
	304.44	Kilogram/sq meter
Feet/minute	0.5080	Centimeters/second
	0.01667	Feet/second
	0.01829	Kilometers/hour
	0.3048	Meters/minute
	0.01136	Miles/hour
Feet/second	30.48	Centimeters/second
	1.097	Kilometers/hour
	0.5921	Knots
	18.29	Meters/minute

CONVERSION FACTORS (Continued)

Multiply	by	To Obtain
Feet/second	0.6818	Miles/hour
	0.01136	Miles/minute
Feet/second^2	30.48	Centimeters/second^2
	0.3048	Meters/second^2
Flat of a hexagon	1.155	Distance across corners
Flat of a square	1.414	Distance across corners
Foot pounds	0.0012861	BTU
	0.32412	Calories (gm)
	0.0003241	Calories (Kg)
	5.05×10^{-7}	Horse power hours
	1.3558	Joules
	0.13826	Kilogram meters
	3.766×10^{-7}	Kilowatt hours
	0.0003766	Watt hours
Foot pounds/minute	0.001286	BTU/minute
	0.01667	Foot pounds/second
	3.03×10^{-5}	Horse power
	0.0003241	Calories (Kg)/minute
	2.26×10^{-5}	Kilowatts
Foot pounds/second	0.07717	BTU/minute
	0.001818	Horse power
	0.01945	Calories (Kg)/minute
	0.001356	Kilowatts
Furlong	40	Rods
	220	Yards
	660	Feet
	0.125	Miles
	0.2042	Kilometers
Gallons (Imperial)	277.42	Cubic inches
	4.543	Liters
	1.20095	Gallons (US)
Gallons (US)	3785	Cubic centimeters
	0.13368	Cubic feet
	231	Cubic inches
	0.003785	Cubic meters
	0.004951	Cubic yards
	3.785	Liters
	8	Pints (liq. US)
	4	Quarts (liq. US)
	0.83267	Gallons (Imperial)
	3.069×10^{-6}	Acre feet
Gallons (US) of water at 62° F	8.3357	Pounds of water
Gallons (US) of water/minute	6.0086	Tons of water/24 hours
Gallons (US)/minute	0.002228	Cubic feet/second
	0.13368	Cubic feet/minute
	8.0208	Cubic feet/hour
	0.06309	Liters/second
	3.78533	Liters/minute
	0.0044192	Acre feet/24 hours
	0.227	Cubic meters/hour
Grains	1	Grains (avoirdupois)
	1	Grains (apothecary)
	1	Grains (troy)
	0.0648	Grams
	0.0020833	Ounces (troy)
	0.0022857	Ounces (avoir.)
Grains/gallon (US)	17.118	Parts/million
	142.86	Pounds/million gallons (US)
Grams	980.7	Dynes
	15.43	Grains
	0.001	Kilograms
Grams	1000	Milligrams
	0.03527	Ounces (avoir.)
	0.03215	Ounces (troy)
	0.002205	Pounds
Grams/centimeter	0.0056	Pounds/inch
Grams/cubic centimeter	62.43	Pounds/cubic foot
	0.03613	Pounds/cubic inch
	4.37	Grains/100 cubic ft.
Grams/liter	58.417	Grains/gallon (US)
	8.345	Pounds/100 gallons (US)
	0.062427	Pounds/cubic foot
	1000	Parts/million
Gravity (g)	32.174	Feet/second^2
	980.6	Centimeters/second^2
Hand	4	Inches
	10.16	Centimeters
Hectares	2.471	Acres
	107,639	Square Feet
	100	Ares
Hectograms	100	Grams
Hectoliters	100	Liters
Hectometers	100	Meters
Hectowatts	100	Watts
Hogshead	63	Gallons (US)
	238.4759	Liters
Horse power	42.44	BTU/minute
	33,000	Foot pounds/minute
	550	Foot pounds/second
	1.014	Metric horse power (Cheval vapeur)
	10.7	Calories (Kg)/min
	0.7457	Kilowatts
	745.7	Watts
Horse power(boiler)	33,479	BTU/hour
	9.803	Kilowatts
	34.5	Pounds of water evaporated/hour at 212° F
Horse power hours	2546.5	BTU
	641,700	Calories (gm)
	641.7	Calories (Kg)
	1,980p00	Foot pounds
	2,684,500	Joules
	273,740	Kilogram meters
	0.7455	Kilowatt hours
	745.5	Watt hours
Inches	2.54	Centimeters
	0.08333	Feet
	1000	Mils
	12	Lines
	72	Points
	25.4	Millimeters (mm)
Inches of Hg at 32° F	0.03342	Atmospheres
	345.3	Kilograms/square meter
	70.73	Pounds/square foot
	0.49117	Pounds/square inch
	1.1343	Feet of water at 62° F.
	13.6114	Inches of water at 62° F
	7.85872	Ounces/square inch
Inches of water at 62° F	0.002455	Atmospheres
	25.37	Kilograms/square meter

CONVERSION FACTORS (Continued)

Multiply	by	To Obtain
Inches of water at 62° F	0.5771	Ounces/square inch
	5.1963	Pounds/square foot
	0.03609	Pounds/square inch
	0.07347	Inches of Hg at 32° F
Joules,	0.00094869	BTU
	0.239	Calories (gm)
Joules,	0.000239	Calories (Kg)
	0.73756	Foot pounds
	3.72×10^{-7}	Horse power hours
	0.10197	Kilogram meters
	2.778×10^{-7}	Kilowatt hours
	0.0002778	Watt hours
	1	Watt second
Kilograms	980,665	Dynes
	2.205	Pounds
	0.001102	Tons (short)
	1000	Grams
	35.274	Ounces (avoir.)
	32.1507	Ounces (troy)
Kilogram meters	0.009302	BTU
	2.344	Calories (gm)
	0.002344	Calories (Kg)
	7.233	Foot pounds
	3.653×10^{-6}	Horse power hours
	9.806	Joules
	2.724×10^{-6}	Kilowatt hours
	0.002724	Watt hours
Kilopascals (kPa)	0.1450377	lb./in² (Psi)
Kilograms/ cubic meter	0.06243	Pounds/cubic foot
Kilograms/hour	4.4/density (kg/m³)	GPM
Kilograms/meter	0.6720	Pounds/ foot
Kilograms/square centimeter	14.223	Pounds/sq. inch
Kilogram/sq meter	9.678×10^{-5}	Atmospheres
	0.003285	Feet of water at 62° F
	0.002896	Inches of Hg at 32° F
	0.2048	Pounds/square foot
	0.001422	Pounds/square inch
	0.007356	Centimeters of Hg at 32° F
Kiloliters	1000	Liters
Kilometers	100,000	Centimeters
	1000	Meters
	3281	Feet
	0.6214	Miles
	1094	Yards
Kilometers/hour	27.78	Centimeters/second
	54.68	Feet/minute
	0.9113	Feet/second
	16.67	Meters/minute
	0.6214	Miles/hour
	0.5396	Knots
Kilometers/hr/sec	27.78	Centimeters/sec/sec
	0.9113	Feet/sec/sec
	0.2778	Meters/sec/sec
Kilowatts	56.92	BTU/minute
	44,250	Foot pounds/minute
	737.6	Foot pounds/second
	1.341	Horse power
	14.34	Calories (Kg)/min
	1000	Watts
Kilowatt hours	3413	BTU

Multiply	by	To Obtain
Kilowatt hours	860,500	Calories (gm)
	860.5	Calories (Kg
	2,655,200	Foot pounds)
	1.341	Horse power hours
	3,600,000	Joules
	367,100	Kilogram meters
	1000	Watt hours
Knots	1	Nautical miles/hour
	1.1516	Miles/hour
	1.8532	Kilometers/hour
Leagues	3	Miles
Lines	0.08333	Inches
Links	7.92	Inches
Liters	1000	Cubic centimeters
	0.03531	Cubic feet
	61.02	Cubic inches
	0.001	Cubic meters
	0.001308	Cubic yards
	0.2642	Gallons (US)
	0.22	Gallons (Imp)
	2.113	Pints (liq. US)
	1.057	Quarts (liq. US)
	8.107×10^{-7}	Acre Feet
	2.2018	Pounds of water at 62° F
Liters/minute	0.0005886	Cubic feet/second
	0.004403	Gallons (US)/second
	0.26418	Gallons (US)/minute
Meters	100	Centimeters
	3.281	Feet
	39.37	Inches
	1.094	Yards
	0.001	Kilometers
	1000	Millimeters
Meters/minute	1.667	Centimeters/second
	3.281	Feet/minute
	0.05468	Feet/second
	0.06	Kilometers/hour
	0.03728	Miles/hour
Meters/second	196.8	Feet/minute
	3.281	Feet/second
	3.6	Kilometers/hour
	0.06	Kilometers/minute
	2.237	Miles/hour
	0.03728	Miles/minute
Microns	10^{-6}	Meters
	0.001	Millimeters
	0.03937	Mils
Microns Hg	0.001	Torr
Mils	0.001	Inches
	0.0254	Millimeters
	25.4	Microns
Miles	160,934	Centimeters
	5280	Feet
	63,360	Inches
	1.609	Kilometers
	1760	Yards
	80	Chains
	320	Rods
	0.8684	Nautical miles
Miles/hour	44.70	Centimeters/second
	88	Feet/minute
	1.467	Feet/second
	1.609	Kilometers/hour
	0.8684	Knots

CONVERSION FACTORS (Continued)

Multiply	by	To Obtain
Miles/hour	26.82	Meters/minute
Miles/minute	2682	Centimeters/second
	88	Feet/second
	1.609	Kilometers/minute
	60	Miles/hour
Millibars	0.000987	Atmosphere
Milliers	1000	Kilograms
Milligrams	0.001	Grams
	0.01543	Grains
Milligrams/liter	1	Parts/million
Milliliters	0.001	Liters
Million gals/24 hrs.	1.54723	Cubic feet/second
Millimeters	0.1	Centimeters
	0.03937	Inches
	39.37	Mils
	1000	Microns
Millimeters Hg	0.019	Pounds/square inch absolute
Miner's inches	1.5	Cubic feet/minute
Minutes (angle)	0.0002909	Radians
Nautical miles	6080.2	Feet
	1.1516	Miles
Ounces (avoirdupois)	16	Drams (avoir.)
	437.5	Grains
	0.0625	Pounds (avoir.)
	28.349527	Grams
	0.9115	Ounces (troy)
Ounces (fluid)	1.805	Cubic inches
	0.02957	Liters
	29.57	Cubic centimeters
	0.25	Gills
Ounces (troy)	480	Grains
	20	Pennyweights (troy)
	0.08333	Pounds (troy)
	31.103481	Grams
	1.09714	Ounces (avoir.)
Ounces/square inch	0.0625	Pounds/square inch
	1.732	Inches of water at 62° F
	4.39	Centimeters of water at 62° F
	0.12725	Inches of Hg at 32° F
	0.004253	Atmospheres
Palms	3	Inches
Parts/million	0.0584	Grains/gallon (US)
	0.07016	Grains/gallon (Imp)
	8.345	Pounds/million gal (US)
Pennyweights (troy)	24	Grains
	1.55517	Grams
	0.05	Ounces (troy)
	0.0041667	Pounds (troy)
Pints (liq.US)	4	Gills
	16	Ounces (fluid)
	0.5	Quarts (liq. US)
	28.875	Cubic inches
	473.1	Cubic centimeters
Pipe	126	Gallons (US)
Points	0.01389	Inches
Poise	0.0672	Pounds/sec foot
	242	Pounds/hour foot
	100	Centipoise
Poncelots	100	Kilogram meters/second
	1.315	Horse power

Multiply	by	To Obtain
Pounds (avoirdupois)	16	Ounces (avoir.
	256	Drams (avoir.)
	7000	Grains
	0.0005	Tons (short)
	453.5924	Grams
	1.21528	Pounds (troy)
	14.5833	Ounces (troy)
Pounds (troy)	5760	Grains
	240	Pennyweights (troy)
	12	Ounces (troy)
	373.24177	Grams
	0.822857	Pounds (avoir.)
	13.1657	Ounces (avoir.)
	0.00036735	Tons (long)
	0.00041143	Tons (short)
	0.00037324	Tons (metric)
Pounds of water at 62° F	0.01604	Cubic feet
	27.72	Cubic inches
	0.120	Gallons (US)
Pounds of water/min at 62°	0.0002673	Cubic feet/second
Pounds/cubic foot	0.01602	Grams/cubic centimeter
	16.02	Kilograms/cubic meter
	0.0005787	Pounds/cubic inch
Pounds/cubic inch	27.68	Grams/cubic centimeter
	27,680	Kilograms/cubic meter
	1728	Pounds/cubic foot
Pounds/foot	1.488	Kilograms/meter
Pounds/inch	178.6	Grams/centimeter
Pounds/hour foot	0.4132	Centipoise
	0.004132	Poise grams/sec cm
Pounds/sec foot	14.881	Poise grams/sec cm
	1488.1	Centipoise
Pounds/square foot	0.016037	Feet of water at 62° F
	4.882	Kilograms/square meter
	0.006944	Pounds/square inch
	0.014139	Inches of Hg at 32° F
	0.0004725	Atmospheres
Pounds/square inch	6.894759	Kilopascals (kPa)
	0.068044	Atmospheres
	2.30934	Feet of water at 62°F
	2.0360	Inches of Hg at 32°F
	703.067	Kilograms/square meter
	27.912	Inches of water at 62°F
	0.06894757	Bar
	52.16	Millimeters Hg
Quadrants (angular)	90	Degrees
	5400	Minutes
	324,000	Seconds
	1.751	Radians
Quarts (dry)	67.20	Cubic inches
Quarts (liq. US)	2	Pints (liq. US)
	0.9463	Liters
	32	O unces (fluid)
	57.75	Cubic inches
	946.3	Cubic centimeters
Quintal, Argentine	101.28	Pounds
Brazil	129.54	Pounds
Castile, Peru	101.43	Pounds
Chile	101.41	Pounds
Metric	220.46	Pounds
Mexico	101.47	Pounds
Quires	25	Sheets

CONVERSION FACTORS (Continued)

Multiply	by	To Obtain
Radians	57.30	Degrees
	3438	Minutes
	206,625	Seconds
	0.637	Quadrants
Radians/second	57.30	Degreeslsecond
	0.1592	Revolutions/second
	9.549	Revolutions/minute
Radians/second^2	573.0	Revolutions/minute^2
	0.1592	Revolutions/second^2
Reams	500	Sheets
Revolutions	360	Degrees
	4	Quadrants
	6.283	Radians
Revolutions/minute	6	Degrees/second
	0.1047	Rad ians/second
	0.01667	Revolutions/second
Revolutions/minute^2	0.001745	Radians/second^2
	0.0002778	Revolutions/second^2
Revolutions/second	360	Degrees/second
	6.283	Radians/second
	60	Revolutions/minute
Revolutions/second^2	6.283	Radians/second^2
	3600	Revolutions/minute^2
Rods	16.5	Feet
	5.5	Yards
Seconds (angle)	4.848×10^{-6}	Radians
Sections	1	Square miles
Side of a square	1.4142	Diameter of inscribed circle
	1.1284	Diameter of circle with equal area
Span	9	Inches
Square centimeters	0.001076	Square feet
	0.1550	Square inches
	0.001	Square meters
	100	Square, millimeters
Square feet	2.296×10^{-5}	Acres
	929.0	Square centimeters
	144	Square inches
	0.0929	Square meters
	3.587×10^{-8}	Square miles
	0.1111	Square yards
Square inches	6.452	Square centimeters
	0.006944	Square feet
	645.2	Square millimeters
	1.27324	Circular inches
	1,273,239	Circular mils
	1,000,000	Square mils
Square kilometers	247.1	Acres
	10,760,000	Square feet
	1,000,000	Square meters
	0.3861	Square miles
	1,196,000	Square yards
Square meters	0.0002471	Acres
	10.764	Square feet
	1.196	Square yards
	1	Centares
Square miles	640	Acres
	27,878,400	Square feet
	2.590	Square kilometers
	259	Hectares
	3,097,600	Square yards
	102,400	Square rods

Multiply	by	To Obtain
Square miles	1	Sections
Square millimeters	0.01	Square centimeters
	0.00155	Square inches
	1550	Square mils
	1973	Circular mils
Square mils	1.27324	Circular mils
	0.0006452	Square millimeters
	10^{-6}	Square inches
Square yards	0.0002066	Acres
	9	Square feet
	0.8361	Square meters
	3.228×10^{-7}	Square miles
Stere	1	Cubic meters
Stone	14	Pounds
	6.35029	Kilograms
Tons (long)	1016	Kilograms
	2240	Pounds
	1.12	Tons (short)
Tons (metric)	1000	Kilograms
	2205	Pounds
	1.1023	Tons (short)
Tons (short)	2000	Pounds
	32,000	Ounces
	907.185	Kilograms
	0.90718	Tons (metric)
	0.89286	Tons (long)
Tons of refrig-eration	12,000	BTU/hour
	288,000	BTU/24 hours
Tons of water/24 hours at 62° F	83.33	Poundsof water/hour
	0.16510	Gallons (US)/minute
	1.3263	Cubic feet/hour
Torr	.0013158	ATMOS
Torr	133.32	N/M^2
Torr	.99999986	MMHG
Watts	0.05692	BTU/minute
	44.26	Foot pounds/minute
	0.7376	Foot pounds/second
	0.001341	Horse power
	0.01434	Calories (Kg)/minute
	0.001	Kilowatts
	1	Joule/second
Watt hours	3.413	BTU
	860.5	Calories (gm)
	0.8605	Calories (Kg)
	2655	Foot pounds
	0.001341	Horse power hours
	3600	Joules
	367.1	Kilogram meters
	0.001	Kilowatt hours
Watts/square inch	8.2	BTU/square foot/ minute
	6373	Foot pounds/square ft/ minute
	0.1931	Horse power/square foot
Yards	91.44	Centimeters
	3	Feet
	36	Inches
	0.9144	Meters
	0.1818	Rods
Year (365 days)	8760	Hours

METRIC CONVERSION TABLE

Inch	Millimeters
0	0.0000
1/128	0.1984
1/64	0.3969
3/128	0.5953
1/32	0.7937
5/128	0.9921
3/64	1.1906
7/128	1.3890

Convert 3.7643 meters to feet, inches and fractions

3.7643 meters
3.6556 = 12 ft
108.70 mm
107.95 = 4¼ in.
.75 = 1/32"
3.7643 meters = 12'—4-9/32"

Convert 15'—6-7/16" to meters

15' = 4.5720 meters
6-7/16" = .163513 meters
15'—6-7116" = 4.735513 meters

INCHES AND FRACTIONS – MILLIMETERS

Inches	Millimeters	Inches	Millimeters	Inches	Millimeters	Inches	Millimeters	Inches	Millimeters	Inches	Millimeters
1/16	1.5875	2-1/16	52.3876	4-1/16	103.188	6-1/16	153.988	8-1/16	204.788	10-1/16	255.588
1/8	3.1750	2-1/8	53.9751	4-1/8	104.775	6-1/8	155.575	8-1/8	206.375	10-1/8	257.176
3/16	4.7625	2-3/16	55.5626	4-3/16	106.363	6-3/16	157.163	8-3/16	207.963	10-3/16	258.763
1/4	6.3500	2-1/4	57.1501	4-1/4	107.950	6-1/4	158.750	8-1/4	209.550	10-1/4	260.351
5/16	7.9375	2-5/16	58.7376	4-5/16	109.538	6-5/16	160.338	8-5/16	211.138	10-5/16	261.938
3/8	9.5250	2-3/8	60.3251	4-3/8	111.125	6-3/8	161.925	8-3/8	212.725	10-3/8	263.526
7/16	11.1125	2-7/16	61.9126	4-7/16	112.713	6-7/16	163.513	8-7/16	214.313	10-7/16	265.113
1/2	12.7000	2-1/2	63.5001	41/2	114.300	6-1/2	165.100	8-1/2	215.900	10-1/2	266.701
9/16	14.2875	2-9/16	65.0876	4-9/16	115.888	6-9/16	166.688	8-9/16	217.488	10-9/16	268.288
5/8	15.8750	2-5/8	66.6751	4-5/8	117.475	6-5/8	168.275	8-5/8	219.075	10-5/8	269.876
11/16	17.4625	2-11/16	68.2626	4-11/16	119.063	6-11/16	169.863	8-11/16	220.663	10-11/16	271.463
3/4	19.0500	2-3/4	69.8501	4-3/4	120.650	6-3/4	171.450	8-3/4	222.250	10-3/4	273.051
13/16	20.6375	2-13/16	71.4376	4-13/16	122.238	6-13/16	173.038	8-13/16	223.838	10-13/16	274.638
7/8	22.2250	2-7/8	73.0251	4-7/8	123.825	6-7/8	174.625	8-7/8	225.425	10-7/8	276.226
15/16	23.8125	2-15/16	74.6126	4-15/16	125.413	6-15/16	176.213	8-15/16	227.013	10-15/16	277.813
1	25.4001	3	76.2002	5	127.000	7	177.800	9	228.600	11	279.401
1-1/16	26.9876	3-1/16	77.7877	5-1/16	128.588	7-1/16	179.388	9-1/16	230.188	11-1/16	280.988
1-1/8	28.5751	3-1/8	79.3752	5-1/8	130.175	7-1/8	180.975	9-1/8	231.775	11-1/8	282.576
1-3/16	30.1626	3-3/16	80.9627	5-3/16	131.763	7-3/16	182.563	9-3/16	233.363	11-3/16	284.163
1-1/4	31.7501	3-1/4	82.5502	5-1/4	133.350	7-1/4	184.150	9-1/4	234.950	11-1/4	285.751
1-5/16	33.3376	3-5/16	84.1377	5-5/16	134.938	7-5/16	185.738	9-5/16	236.538	11-5/16	287.338
1-3/8	34.9251	3-3/8	85.7252	5-3/8	136.525	7-3/8	187.325	9-3/8	238.125	11-3/8	288.926
1-7/16	36.5126	3-7/16	87.3127	5-7/16	138.113	7-7/16	188.913	9-7/16	239.713	11-7/16	290.513
1-1/2	38.1001	3-1/2	88.9002	5-1/2	139.700	7-1/2	190.500	9-1/2	241.300	11-1/2	292.101
1-9/16	39.6876	3-9/16	90.4877	5-9/16	141.288	7-9/16	192.088	9-9/16	242.888	11-9/16	293.688
1-5/8	41.2751	3-5/8	92.0752	5-5/8	142.875	7-5/8	193.675	9-518	244.475	11-5/8	295.276
1-11/16	42.8626	3-11/16	93.6627	5-11/16	144.463	7-11/16	195.263	9-11/16	246.063	11-11/16	296.863
1-3/4	44.4501	3-3/4	95.2502	5-3/4	146.051	7-3/4	196.850	9-3/4	247.650	11-3/4	298.451
1-13/16	46.0376	3-13/16	96.8377	5-13/16	147.638	7-13/16	198.438	9-13/16	249.238	11-13/16	300.038
1-7/8	47.6251	3-7/8	98.4252	5-7/8	149.225	7-7/8	200.025	9-7/8	250.825	11-7/8	301.626
1-15/16	49.2126	3-15/16	100.013	5-15/16	150.813	7-15/16	201.613	9-15/16	252.413	11-15/16	303.213
2	50.8001	4	101.600	6	152.400	8	203.200	10	254.001	12	304.801

SPECIFIC GRAVITY *s* OF GASES RELATED TO FREE AIR

(Free air = Air at 1 atmosphere and 60° F)

Gas	Specific Gravity *s* (Air = 1)	Gas	Specific Gravity *s* (Air = 1)
Acetylene	0.899	Hydrogen Sulphide	1.190
Air	1.000	Methane	0.544
Ammonia	0.590	Methyl Chloride	1.744
Argon	1.378	Natural Gas	0.57—0.71
Blast-Furnace Gas	1.000	Neon	0.696
Blue Water Gas	0.530	Nitric Oxide	1.038
Carbon Dioxide	1.530	Nitrogen	0.970
Carbon Monoxide	0.967	Nitrous Oxide	1.522
Carbureted Water Gas	0.640	Oil Gas	0.480
Chlorine	2.486	Oxygen	1.105
Coal – Retort Gas	0.420	Pintsch Gas	0.840
Coke – Oven Gas	0.380	Producer Gas, Coal	0.870
Dichlorodifloromethane F-12	4.250	Propane	1.560
Ethylene	0.969	Refinery Gas:	
Ethyl Chloride	2.260	Dubbs	0.960
Helium	0.138	Houdrie	1.510
Hydrochloric Acid	1.260	Sulphur Dioxide	2.213
Hydrogen	0.0696		

Table 1

(Specific Gravities of various Solutions at 15°C.)

Strength % by Weight	SPECIFIC GRAVITIES					Strength % by Weight
	HCl. Hydrochloric Acid	HNO_3 Nitric Acid	H_2SO_4 Sulphuric Acid	KOH Caustic Potash	NaOH Caustic Soda	
5	1.0251	1.0270	1.0332	1.041	1.058	5
10	1.0503	1.0561	1.0681	1.083	1.115	10
15	1.0754	1.0865	1.1045	1.128	1.170	15
20	1.1005	1.1178	1.1424	1.177	1.225	20
25	1.1257	1.1503	1.1816	1.230	1.279	25
30	1.1508	1.1838	1.2220	1.288	1.332	30
35	1.1759	1.2183	1.2636	1.349	1.384	35
40	1.2000	1.2511	1.3065	1.411	1.437	40
45	–	1.2836	1.3515	1.472	1.488	45
50	–	1.3157	1.3990	1.539	1.540	50
60	–	1.3734	1.5024	–	–	60
70	–	1.4210	1.6151	–	–	70
80	–	1.4601	1.7323	–	–	80
90	–	1.4941	1.8198	–	–	90

Table 2

(Showing relation between Sp. Gr. and readings of Twaddell & Baumé Hydrometers

°Twaddell	Specific	°Baumé	°Twaddell	Specific	°Baumé	°Twaddell	Specific	°Baumé
5.0	1.025	3.64	65.0	1.325	35.49	125.0	1.625	55.5
7.2	1.036	5.0	66.4	1.332	36.0	126.8	1.634	56.0
10.0	1.050	6.99	70.0	1.350	37.5	130.0	1.650	56.9
11.8	1.059	8.0	71.4	1.357	38.0	132.4	1.662	57.5
15.0	1.075	10.18	75.0	1.375	39.45	135.0	1.675	58.1
18.2	1.091	12.0	76.6	1.383	40.0	138.4	1.692	59.0
20.0	1.100	13.23	80.0	1.400	41.32	140.0	1.700	59.49
21.4	1.107	14.0	82.0	1.410	42.0	142.4	1.712	60.0
25.0	1.125	16.15	85.0	1.425	43.0	145.0	1.725	60.6
26.8	1.134	17.0	87.8	1.439	44.0	148.6	1.743	61.5
30.0	1.150	18.93	90.0	1.450	44.9	150.0	1.750	61.9
32.2	1.161	20.0	93.6	1.468	46.0	152.8	1.764	62.5
35.0	1.175	21.6	95.0	1.475	46.5	155.0	1.775	63.0
37.0	1.185	22.5	96.6	1.483	47.0	156.8	1.784	63.5
40.0	1.200	24.16	100.0	1.500	48.18	160.0	1.800	64.2
42.0	1.210	25.0	102.8	1.514	49.0	163.8	1.819	65.0
45.0	1.225	26.6	105.0	1.525	49.7	165.0	1.825	65.3
47.0	1.235	27.5	109.4	1.547	51.0	168.6	1.843	66.0
50.0	1.250	29.0	110.0	1.550	51.3	170.0	1.850	66.4
52.4	1.262	30.0	112.6	1.563	52.0	173.4	1.867	67.0
55.0	1.275	31.2	115.0	1.575	52.7	175.0	1.875	67.3
58.2	1.291	32.5	117.8	1.589	53.5	178.2	1.891	68.0
60.0	1.300	33.4	120.0	1.600	54.19	180.0	1.900	68.4
61.6	1.308	34.0	123.2	1.616	55.0	183.2	1.916	69.0

Service Guide

Introduction

Data, recommendations, and suggestions contained herein are based on experiences in actual field applications as well as common corrosion data. However, because of so many possible variances in practices from plant to plant, these recommendations are intended for use only as a guide and should not be interpreted as a guarantee.

Selections in the following pages have been made with safety and serviceability as the foremost considerations.

Many variables enter into the question of serviceability. Factors such as concentration, temperature, pressure, velocity, percent solids, temperature cycling, vacuum, cleaning practices, etc. are all important in determining whether or not a particular material will give satisfactory service.

Of the endless number of chemical compounds many are insoluble in water and would consequently cause no corrosion problems when in water. However, some of these simple services can become difficult when it is necessary to make such materials soluble through use of some other solvent. For example, sulfuric acid is commonly used as a solvent for silver chloride. Then the recommendation must take into account both silver chloride and sulfuric acid.

Body Material Selection

As a general rule, it is recommended that pipeline or tank material be used for the valve body whenever possible. This is particularly important when using metal screwed end valve bodies because of galvanic corrosion. Also, because of diaphragm valve design, whatever is suitable for the pipeline or tank is also usually suitable for the valve body. However, certain throttling or control valves may require a more sophisticated material for the valve body than the pipe due to velocity or pressure drop conditions being more severe in the valves.

In cases when more than one material is satisfactory for the particular service, it is usually best for the user to make a selection based on previous experience and possible variances in individual plant practices.

Notes:

1. Generally where cast iron is recommended for a service ductile iron and cast steel will also be satisfactory.
2. For similar compounds such as Potassium and Sodium, normally the same material is suitable for either service. (This is generally true of compounds of other metals on the upper end of the electromotive series.)
3. Where abrasion resistant materials or linings are required, a *soft* resistant lining similar to a soft natural rubber should be used on abrasive mixtures of sand, silt and/or mineral particulate matter; where abrasive fluids contain sharp jagged particles such as iron filings or glass, it may be more desirable to use *hard* resistant materials including stainless steel, iron or tough linings such as Tefzel or PVDF. Plastic diaphragms, especially PTFE, are not generally recommended for abrasive services.

Diaphragms

Selection of the diaphragm material is the most important consideration in specifying a diaphragm valve. Basically, the most important qualities are –

1. Capable of withstanding more than maximum valve pressure rating
2. Capable of giving good service life at maximum temperatures
3. Long economical flex life at maximum pressure and temperature
4. Ability to withstand the compression of thousands of valve closures
5. Chemical resistance
6. Non-contaminating to the pipeline fluid

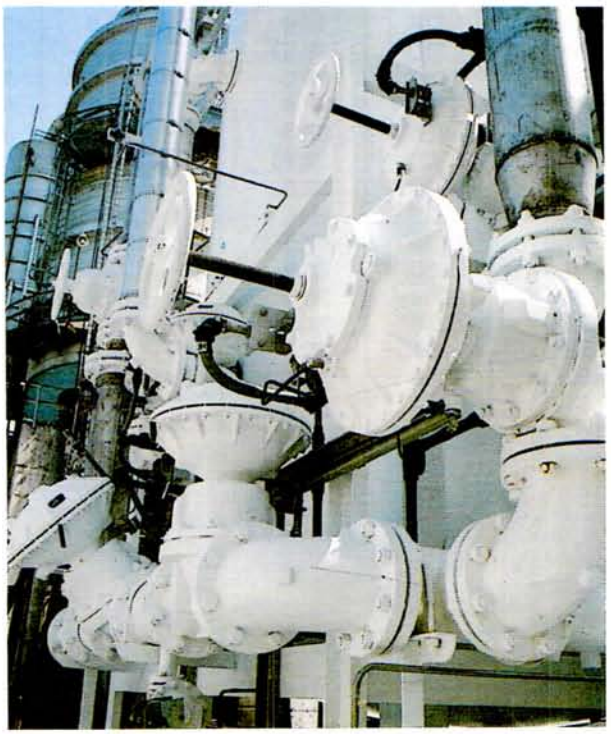
Diaphragm valves are extremely versatile and are used on thousands of services, each differing: material, temperature, velocity, concentration, percent solids, pressure, etc.

As new developments in chemical applications and elastomer and plastic materials occur, continuing research and development results in substantial product improvements and increased service life for Diaphragm valves.

Rigid standards enforced by tests conducted on every batch of diaphragms produced, ensure consistently high quality.

This close control has produced diaphragms which in many services last years – important years of savings because of maintenance free operation.

For any services not listed or combination of services requiring consideration of more than one medium, consult the nearest ITT Engineered Valves diaphragm valve Sales engineer.



Chlorine (Cl_2)

Dry or anhydrous chlorine can be either a gas or a liquid. Diaphragm valves are not recommended for dry chlorine. Only Chlorine Institute approved valves such as ITT Cam-Tite Ball Valve should be used for handling dry chlorine. Diaphragm valves are not Chlorine Institute approved.

Wet Chlorine Gas

Wet chlorine gas is extremely corrosive and will eventually permeate even PTFE diaphragms. Valve bodies are usually PDVF lined, Tefzel lined, or hard rubber lined (#12) with grade R-2(PTFE) diaphragms. Sealed bonnets are recommended as well as a continuing maintenance and inspection program.

Chlorine Water Solutions

These chlorine solutions are formed when low pressure chlorine gas is bubbled into water. Diaphragm valves are widely used on these solutions. A surface film of rubber hydrochloride will form on soft rubber on exposure to wet chlorine gas or chlorine water solutions. This film stops further attack but repeated flexing of a soft rubber diaphragm will continue to crack the film eventually destroying the diaphragm. PTFE diaphragms are usually preferred for strong solutions and frequent flexing.

Sulfuric Acid ($H_2 SO_4$)

Sulfuric acid is an inorganic mineral acid very widely used in industry. It is dense, oily and very corrosive.
Since the rate of chemical attack of sulfuric acid is directly related to its concentration and temperature, it is vital that both of these factors be considered when specifying valves for sulfuric acid service.
Diaphragm valves lined with Tefzel (ETFE) and with PTFE diaphragms will withstand any concentration of sulphuric acid at temperatures up to and exceeding 200°F. Many other materials can also be recommended for sulfuric acid depending on temperature and concentration. The best elastomer diaphragm is Grade C (Hypalon).

Hydrochloric Acid (HCL)

Hydrochloric acid, also called muriatic acid, is an inorganic mineral and widely used in industry. When in contact with most metals, HCL causes the evolution of hydrogen gas which can form explosive mixtures with air. As a result hydrochloric acid is seldom used with metals other than special alloys such as Hastelloy B and Tantalum.

The best and most widely used piping materials for handling hydrochloric acid include various rubbers, plastics and glass. As with most corrosive agents, temperature and concentration are very important considerations. Dia-Flo diaphragm valves offer a very broad range of body linings and diaphragms and can handle all concentrations of hydrochloric acid at temperatures up to 300°F.

Sodium Hydroxide (Na OH)

Sodium hydroxide, also called caustic soda, is widely used in industry dissolved in water to form liquid caustic soda.

Valves with *stem packings* are usually avoided in sodium hydroxide service because the solutions aggressively attack conventional stem packing materials. Ball valves and plug valves on caustic soda service should be steam traced, otherwise the solution may crystallize within the ball or plug, expand and overstress the valve. Diaphragm valves do not present this problem.
Dia-Flo diaphragm valves are widely used in sodium hydroxide service. Cast iron or ductile iron valves with neoprene diaphragms give excellent service under ambient temperature conditions. Where it is important to avoid rust and iron contamination stainless steel or plastic lined valves should be specified.

Phosphoric Acid (H_3PO_4)

Phosphoric acid is an inorganic acid, widely used in fertilizers, food preparation, pharmaceuticals and other industrial services. The concentration of phosphoric acid is normally expressed as % P_2O_5 (percent phosphoric anhydride) rather than % H_3PO_4 (percent phosphoric acid). Percent phosphoric acid (% H_3PO_4) equals 1.38 times % P_2O_5. Therefore 75% phosphoric acid = 54.3% P_2O_5. Aqueous solutions of phosphoric acid have crystallizing points and therefore temperatures must be maintained to keep the solutions fluid.

Materials of construction include stainless steel (316), rubber and plastic linings and diaphragms of Hypalon, Butyl, EPDM and Neoprene. Neoprene lined straightway valves with Hypalon, Neoprene or EPDM diaphragms are widely used in handling highly abrasive phosphoric acid slurries.

Hydrofluoric Acid (HF)

Anhydrous (dry) hydrogen fluoride (HF) is a gas at room temperature and pressure. When dissolved in water it yields hydrofluoric acid. Aqueous HF is produced in concentrations of 30 – 80%. The boiling point varies with the concentration, being 230°F for 30% HF and 119°F for 80% HF.

DO NOT USE GLASS OR CERAMICS in handling HF. At concentrations above 48% valves lined with Tefzel or PVDF are recommended and diaphragms of R-2(PTFE) should be used.

INDEX
By Chemical Formula

H_3BO_3 . . . . . .Boric Acid
$HBrO_3$ . . . . . .Bromic Acid
HCl . . . . . .Hydrochloric Acid
HCl + HNO_3 . . . . . .Aqua Regia
HCN . . . . . .Hydrocyanic Acid (Prussic)
HCOOH . . . . . .Formic Acid
H_2CrO_4 . . . . . .Chromic Acid
HF . . . . . .Hydrofluoric Acid
HNO_3 . . . . . .Nitric Acid
H_2NNH_2 . . . . . .Hydrazine
H_2O . . . . . .Water
H_2O_2 . . . . . .Hydrogen Peroxide
HOCl . . . . . .Hypochlorous Acid
H_3PO_4 . . . . . .Phosphoric Acid
H_2SiF_6 . . . . . .Fluosilicic Acid (Hydro)
H_2SO_3 . . . . . .Sulfurous Acid
H_2SO_4 . . . . . .Sulfuric Acid
HSO_3NH_2 . . . . . .Sulfamic Acid
$KClO_4$ . . . . . .Potassium Perchlorate
K_2CrO_4 . . . . . .Potassium Chromate
$K_2Cr_2O_7$ . . . . . .Potassium Di Chromate
$KClO_4$ . . . . . .Potassium Perchlorate
KH_2PO_4 . . . . . .Potassium Phosphate (Mono)
KI . . . . . .Potassium Iodide
$KMnO_4$ . . . . . .Potassium Permanganate
KNO_3 . . . . . .Potassium Nitrate
KOCl . . . . . .Potassium Hypochlorite
KOH . . . . . .Potassium Hydroxide (Potash)
K_2SO_4 . . . . . .Potassium Sulfate
LiBr . . . . . .Lithium Bromide
$MgCl_2 \cdot 6H_2O$ . . . . . .Magnesium Chloride
$MgCO_3$ . . . . . .Magnesium Carbonate
MgO . . . . . .Magnesium Oxide
$Mg(OH)_2$ . . . . . .Magnesium Hydroxide
$MgSO_4$ . . . . . .Magnesium Sulfate
$Mg_3S_{14}O_{10}(OH)_2$ . . . . . .Talc Slurry
N_2 . . . . . .Nitrogen
$Na_2B_40_7 \cdot 10H_2O$ . . . . . .Borax, Sodium Borate
$NaBO_2 \cdot H_2O_2 \cdot 10H_2O$ . . . . . .Sodium Perborate
NaCl . . . . . .Sodium Chloride
$Na_2Cr_2O_7 \cdot 2H_2O$ . . . . . .Sodium Bichromate
Na_2CrO_4 $10H_2O$ . . . . . .Sodium Chromate
NaCN . . . . . .Sodium Cyanide
$NaClO_3$ . . . . . .Sodium Chlorate
Na_2CO_3 . . . . . .Sodium Carbonate

NaF . . . . . .Sodium Fluoride
$NaHCO_3$ . . . . . .Sodium Bicarbonate
NaH_2PO_4 . . . . . .Sodium Phosphate (Mono)
$NaHSO_3$ . . . . . .Sodium Bisulfite
$NaNO_3$ . . . . . .Sodium Nitrate
Na_2O_2 . . . . . .Sodium Peroxide
Na(OCl) . . . . . .Sodium Hypochlorite
NaOH . . . . . .Sodium Hydroxide (Caustic)
NaS . . . . . .Sodium Sulfide
Na_2SO_3 . . . . . .Sodium Sulfite
Na_2SO_4 . . . . . .Sodium Sulfate
$Na_2S_2O_8$ . . . . . .Sodium Persulfate
$Na_2S_2O_3 \cdot 5H_2O$ . . . . . .Sodium Thiosulfate (Hypo)
Na_2SiF_6 . . . . . .Sodium Silicofluoride
Na_2SiO_3 . . . . . .Sodium Metasilicate
NH_3 . . . . . .Ammonia
NH_4Cl . . . . . .Ammonium Chloride
$(NH_4)_2HPO_4$ . . . . . .Ammonium Phosphate, (DI)
NH_4NO_3 . . . . . .Ammonium Nitrate
NH_4OH . . . . . .Ammonium Hydroxide
$(NH_4)_2S_2O_8$ . . . . . .Ammonium Persulfate
$(NH_4)_2SO_4$ . . . . . .Ammonium Sulfate
$NiCl_2$ . . . . . .Nickel Chloride
$NiSO_4$ . . . . . .Nickel Sulfate
O_2 . . . . . .Oxygen
O_3 . . . . . .Ozone
$Pb_3(AsO_4)_2$ . . . . . .Lead Arsenate
$Pb(C_2H_5)_4$ . . . . . .Lead Tetraethyl
$Pb(C_2H_3O_2)_2 \cdot 3H_2O$ . . . . . .Lead Acetate
Pb_3O_4(ALSO PbO) . . . . . .Lead Oxide Litharge
PCl_3 . . . . . .Phosphorous Trichloride
$POCl_3$ . . . . . .Phosphorous Oxychloride
S . . . . . .Sulfur
$SiCl_4$ . . . . . .Silcon Tetrachloride
SiO_2 . . . . . .Silica
$SnCl_2$ . . . . . .Stannic Chloride
SnF_2 . . . . . .Stannous Fluorlde
SO_2 . . . . . .Sulfur Dioxide
SO_2ClOH . . . . . .Chlorosulfonic Acid
TiO_2 . . . . . .Titanium Dioxide
$ZnCl_2$ . . . . . .Zinc Chloride
ZnO . . . . . .Zinc Oxide
ZnS . . . . . .Zinc Sulfide
$ZnSO_4 \cdot 7H_2O$ . . . . . .Zinc Sulfate

KEY INFORMATION REQUIRED

1. **Fluid Being Handled**
2. **Concentration**
3. **Temperature**
4. **Pressure**
5. **Line Size**
6. **Type of Piping**
7. **Previous Type of Valve Used**
8. **How previous Valve Failed**

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
ABRASIVE FLUIDS	C. I.	ALL	275	M	ALL	275	Materials depend on nature of abrasive. Generally best to use Straightways for on-off and Dualrange or Weir Type for Throttling.
	GLASS	ALL	275	C	ALL	225	
	ST. ST.	ALL	275	T	ALL	180	
	#5	ALL	150	S	ALL	180	
	#11	ALL	150	A	ALL	160	
	#7	ALL	150				
ACETALDEHYDE CH_3 CHO	ST. ST.	ALL	300	R-2	ALL	300	
	TEFZEL	ALL	300				
ACETAL RESIN SLURRY $(—CH_2—O—)_n$	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	ST. ST.	ALL	350				
	TEFZEL	ALL	300	M	ALL	275	
ACETAMIDE CH_3 CON H_2	GLASS	ALL	350*	R-2	ALL	350	Check if solvent present. "M" has limited solvent application. *Use Glass lined D.I. above 325°F.
	TEFZEL	ALL	300				
	POLYPROP	80	200	M	ALL	275	
	PVC	80	125	V	ALL	212	
ACETIC ACID CH_3 COOH B.P. 245°F	GLASS	ALL	245	R-2	ALL	245	
	TEFZEL	ALL	245				
	POLYPROP	80	125	C	30	125	
	PVDF	50	150				
	PVC	80	125				
ACETIC ANHYDRIDE $(CH_3 CO)_2$ O B.P. 284°F	GLASS	ALL	284	R-2	ALL	284	
	ST. ST.	ALL	284				
	HASTELLOY-C	ALL	284				
	TEFZEL	ALL	284				
ACETONE $CH_3 COCH_3$ B.P. 133°F	GLASS	ALL	133	R-2	ALL	133	
	ST. ST.	ALL	133				
	C. I.	ALL	133	M	ALL	133	
	TEFZEL	ALL	133	B	ALL	133	
	POLYPROP	ALL	75				
ACETYLENE C_2 H_2	D. I.	ALL	350	R-2	ALL	350	Avoid copper alloys.
	C. ST.	ALL	350				
	ST. ST.	ALL	350	T	ALL	150	
	C. I.	ALL	350				
	PVDF	ALL	250				
ACRYLONITRILE CH_2 CH CN	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325° F. Hazardous
	ST. ST.	ALL	350				
	ALUMINUM	ALL	350				
	TEFZEL	ALL	150				
	PVDF	ALL	100				
ADIPIC ACID COOH $(CH_2)_4$ COOH	GLASS	ALL	300	R-2	ALL	300	Melting point 305° F., check solvent.
	ST. ST.	ALL	300				
	TEFZEL	ALL	250				
	PVDF	ALL	200				
	CPVC	ALL	190				
	SARAN	ALL	150				
	PVC	ALL	140				
AIR (dry)	ANY METAL	ALL	350	R-2	ALL	350	"B" is least permeable of elastomer diaphragms. Do not use "M" if oil is present.
	CPVC	ALL	190				
	PVC	ALL	140	M	ALL	275	
	PVDF	ALL	285	B	ALL	250	
				T	ALL	200	
AIR (moist)	BRONZE	ALL	350	R-2	ALL	350	Do not use "M" if oil is present.
	ST. ST.	ALL	350	M	ALL	300	
	CPVC	ALL	190				
	PVC	ALL	140	B	ALL	250	
	PVDF	ALL	285	T	ALL	200	

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
AIR (oily)	ANY METAL	ALL	350	R-2	ALL	350	
	POLYPROP	ALL	200				
	CPVC	ALL	190	P	ALL	180	
	PVDF	ALL	285	T	ALL	150	
				C	ALL	150	
ALBUMEN	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325 ° F.
	BRONZE	ALL	350				
	TEFZEL	ALL	300	B	ALL	225	
	POLYPROP	ALL	200	WB	ALL	225	
	PVC	ALL	140				
ALCOHOL, ALLYL CH_2 CH CH_2 OH B.P. 207°F	C. I.	ALL	207	R-2	ALL	207	C. I. will rust if moisture present.
	ST. ST.	ALL	207				
	GLASS	ALL	207	M	ALL	207	
	TEFZEL	ALL	207	C	ALL	207	
	POLYPROP	ALL	200	B	ALL	175	
	PVDF	ALL	120	T	ALL	160	
ALCOHOL, AMYL CH_3 $(CH_2)_4$ OH B.P. 280°F	C. I.	ALL	280	R-2	ALL	280	
	ST. ST.	ALL	280				
	GLASS	ALL	280	M	ALL	200	
	TEFZEL	ALL	280	C	ALL	200	
	PVDF	ALL	275	B	ALL	175	
	POLYPROP	ALL	200	T	ALL	160	
ALCOHOL, BENZYL C_6H_5 CH_2 OH B.P. 402°F	ST. ST.	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*				
	TEFZEL	ALL	300	V	ALL	250	
	PVDF	ALL	250				
ALCOHOL, BUTYL $CH_3(CH_2)_3OH$ B.P. 242°F	ANY METAL	ALL	242	R-2	ALL	242	C. I. will rust if moisture present.
	TEFZEL	ALL	242				
	PVDF	ALL	242	M	ALL	242	
	GLASS	ALL	242	B	ALL	225	
	POLYPROP	ALL	200	C	ALL	225	
				T	ALL	200	
ALCOHOL, ETHYL (Denatured Alcohol) C_2 H_5 OH B.P. 172°F	C. I.	ALL	172	R-2	ALL	172	C. I. will rust if moisture present.
	BRONZE	ALL	172				
	TEFZEL	ALL	172	M	ALL	172	
	PVDF	ALL	172	B	ALL	172	
	POLYPROP	ALL	172	C	ALL	172	
	ST. ST.	ALL	172				
	SARAN	ALL	150				
ALCOHOL, ETHYLENE CH_2 $OHCH_2$ OH							See "GLYCOL."
ALCOHOL, FURFURYL C_4 H_3 OCH_2 OH B.P. 338°F	ANY METAL	ALL	338	R-2	ALL	338	*Use Glass lined D.I. above 325° F.
	GLASS	ALL	338*				
	TEFZEL	ALL	212				
ALCOHOL, METHYL CH_3 OH B.P. 148°F	ANY METAL	ALL	148	R-2	ALL	148	C. I. will rust if moisture present.
	GLASS	ALL	148				
	TEFZEL	ALL	148	M	ALL	148	
	PVDF	ALL	148	B	ALL	148	
	SARAN	ALL	148	C	ALL	148	
	POLYPROP	ALL	148	P	ALL	148	
	CPVC	ALL	148				
	PVC	ALL	140				

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
ALCOHOL, PROPYL $CH_3 CH_2 CH_2 OH$ B.P. 207°F	ANY METAL	ALL	207	R-2	ALL	207	C. I. will rust if moisture present.
	GLASS	ALL	207				
	TEFZEL	ALL	207	M	ALL	207	
	PVDF	ALL	207	B	ALL	200	
	POLYPROP	ALL	200	C	ALL	200	
	#10	ALL	150	P	ALL	150	
	CPVC	ALL	150				
	SARAN	ALL	150				
	PVC	ALL	140				
ALKALI							See specific hydroxide.
ALUM, AMMONIUM $AINH_4 (SO_4)_2 \cdot 12 H_2O$	TEFZEL	ALL	250	M	ALL	250	
	ST. ST.	ALL	250	B	ALL	225	
	PVDF	ALL	250	C	ALL	225	
	POLYPROP	ALL	200	T	ALL	200	
	#10	ALL	200				
	SARAN	ALL	175				
	PVC	ALL	140				
ALUM, POTASSIUM $AIK (SO_4)_2 \cdot 12 H_2O$	ST. ST.	ALL	350	R-2	ALL	350	
	TEFZEL	ALL	300				
	PVDF	ALL	275	M	ALL	275	
	POLYPROP	ALL	200	B	ALL	225	
	#10	ALL	200	C	ALL	225	
	CPVC	ALL	190	T	ALL	180	
	SARAN	ALL	175				
	PVC	ALL	140				
ALUMINA TRIHYDRATE $Al_2O_3 \cdot 3H_2O$	C. I.	ALL	225	C	ALL	225	Use of C. I. depends on velocity, as service is abrasive.
	#5	ALL	150	M	ALL	200	
	#11	ALL	150	T	ALL	180	
				S	ALL	180	
ALUMINUM CHLORIDE $AICl_3$	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
	TEFZEL	ALL	300				
	PVDF	ALL	275	M	ALL	275	
	POLYPROP	ALL	200	B	ALL	200	
	#10	ALL	200	T	ALL	200	
	CPVC	ALL	190				
	SARAN	ALL	150				
	PVC	ALL	140				
ALUMINUM SULFATE $Al_2(SO_4)_3 \cdot 18H_2O$	TEFZEL	ALL	300	R-2	ALL	300	
	PVDF	ALL	275				
	POLYPROP	ALL	200	M	ALL	275	
	#10	ALL	200	B	ALL	225	
	CPVC	ALL	190	C	ALL	225	
	SARAN	ALL	175	T	ALL	180	
	PVC	ALL	140				
AMINO ACIDS	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	ST. ST.	ALL	350				
	TEFZEL	ALL	280	M	ALL	250	
				B	ALL	225	

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM CONC. BY WT.	MAXIMUM TEMP. °F	CODE	MAXIMUM CONC. BY WT.	MAXIMUM TEMP. °F	
AMMONIUM HYDROXIDE NH_4OH (AQUEOUS AMMONIA)	C. I. ST. ST. D. I. TEFZEL PVDF POLYPROP PVC	ALL ALL ALL ALL ALL ALL ALL	350 350 350 300 225 200 140	R-2 M B T	ALL ALL ALL ALL	350 275 225 180	No copper-sealed bonnet recommended.
AMMONIUM CHLORIDE NH_4 Cl	GLASS TEFZEL PVDF CPVC #10 SARAN POLYPROP PVC	ALL ALL ALL ALL ALL ALL ALL ALL	350* 300 275 190 180 175 150 140	R-2 M B C	ALL ALL ALL ALL	350 250 250 200	*Use Glass lined D.I. above 325°F.
AMMONIUM NITRATE $NH_4 NO_3$	C. I. C. ST. ALUMINUM POLYPROP CPVC #10 SARAN PVC PVDF	ALL ALL ALL ALL ALL 70 ALL ALL ALL	350 350 200 200 190 180 150 140 275	R-2 M B C T P	ALL ALL ALL ALL ALL ALL	350 275 225 200 200 180	*Use Glass lined D.I. above 325° F.
AMMONIUM PERSULFATE $(NH_4)_2 S_2 O_8$	ALUMINUM GLASS TEFZEL #10 POLYPROP PVC	ALL ALL ALL ALL ALL ALL	350 350* 275 200 150 140	R-2 M B C P	ALL ALL ALL ALL ALL	350 250 225 200 180	*Use Glass lined D.I. above 325° F.
(DI) AMMONIUM PHOSPHATE $(NH_4)_2 HPO_4$	GLASS ST. ST. (316) TEFZEL PVDF POLYPROP PVC ALUMINUM	ALL ALL ALL ALL ALL ALL ALL	350* 350 300 275 200 140 100	R-2 M B C T	ALL ALL ALL ALL ALL	350 275 250 200 200	*Use Glass lined D.I. above 325° F. Steam out lines use grade M.
AMMONIUM SULFATE $(NH_4)_2 SO_4$	TEFZEL PVDF POLYPROP #10 #7 PVC ALUMINUM	ALL ALL ALL ALL ALL ALL ALL	300 275 200 180 180 140 120	R-2 M B C T	ALL ALL ALL ALL ALL	300 275 250 225 200	

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM CONC. BY WT.	MAXIMUM TEMP. °F	CODE	MAXIMUM CONC. BY WT.	MAXIMUM TEMP. °F	
AMYL ACETATE $CH_3 COOC_5 H_{11}$	C. I. BRONZE GLASS TEFZEL PVDF	ALL ALL ALL ALL ALL	350 350 350* 250 125	R-2	ALL	350	Kynar and Polyprop may be used to 125° F. Avoid elastomer diaphragms. *Use Glass lined D.I. above 325 ° F.
ANILINE $C_6 H_5 NH_2$	C. I. BRONZE GLASS TEFZEL	ALL ALL ALL ALL	350 350 350* 230	R-2 B	ALL ALL	350 150	*Use Glass lined D.I. above 325° F.
ANTIBIOTICS	GLASS ST. ST.	ALL ALL	350* 350	R-2 B WB	ALL ALL ALL	350 250 225	Check carrier. *Use Glass lined D.I. above 325° F.
ANTIMONY SALTS	GLASS TEFZEL POLYPROP #10 PVC PVDF	ALL ALL ALL ALL ALL ALL	350* 300 150 150 140 275	R-2 M B C	ALL ALL ALL ALL	350 275 250 200	Check solvent. *Use Glass lined D.I. above 325°F.
AQUA REGIA HCl + HNO_3	GLASS TEFZEL	ALL ALL	350* 212	R-2 V	ALL ALL	350 180	*Use Glass lined D.I. above 325° F.
ARSENIC ACID $H_3AsO_4 \cdot 1/2 H_2O$	ST. ST. TEFZEL PVDF #10 POLYPROP PVC	ALL ALL ALL ALL ALL ALL	350 300 275 200 200 140	R-2 M B C P	ALL ALL ALL ALL ALL	350 250 225 225 180	
ASPHALT	C. I. TEFZEL PVDF	ALL ALL ALL	350 300 250	R-2	ALL	350	If in solution solvent may allow use of "P", check first.
BAGASSE	C. I. #5 #11	ALL ALL ALL	350 150 150	M C S A	ALL ALL ALL ALL	300 225 180 160	Check carrier.
BARIUM SALTS	GLASS ST. ST. TEFZEL PVDF #10 POLYPROP PVC	ALL ALL ALL ALL ALL ALL ALL	350* 350 300 275 200 200 140	R-2 M C T	ALL ALL ALL ALL	350 300 225 200	C.I. sometimes used. Check carrier. *Use Glass lined D.I. above 325° F.
BARIUM SULFATE Ba SO_4	GLASS TEFZEL SARAN #5 #11 PVC PVDF	ALL ALL ALL ALL ALL ALL ALL	275 275 175 150 150 140 275	M C T S A	ALL ALL ALL ALL ALL	275 225 200 180 160	Check carrier. Can be very abrasive. PVC not good choice when abrasive.
BATTERY ACID (See Sulfuric Acid)	GLASS TEFZEL PVDF #10 POLYPROP PVC	37 37 37 37 37 37	350* 300 250 150 150 140	R-2 M C B	37 37 37 37	350 150 150 150	Maximum 37% sulfuric acid. *Use Glass lined D.I. above 325°F.

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
BEER	ST. ST.	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
	BRONZE	ALL	350				
	GLASS	ALL	350*	B	ALL	250	
	PVDF	ALL	225	WB	ALL	225	
				A	ALL	140	
BENZENE C_6H_6 B.P. 176°F	C.I.	ALL	176	R-2	ALL	176	
	BRONZE	ALL	176				
	GLASS	ALL	176				
	TEFZEL	ALL	176				
	PVDF	ALL	170				
BENZOIC ACID C_6H_5COOH	ST. ST.	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
	GLASS	ALL	350*				
	TEFZEL	ALL	300	B	ALL	250	
	ALUMINUM	ALL	300	C	ALL	200	
	PVDF	ALL	225				
	PVC	ALL	150				
BILGE LINES	C. I.	ALL	350	R-2	ALL	350	*If oils are present, use "T" or "P" with travel stops.
	BRONZE	ALL	350				
	TEFZEL	ALL	300	M*	ALL	275	
	PVDF	ALL	275	C*	ALL	200	
	POLYPROP	ALL	200	T	ALL	200	
	PVC	ALL	140	P	ALL	180	
BLACK LIQUOR (SULFATE)	C. I .	ALL	300	R-2	ALL	300	
	TEFZEL	ALL	300				
	PVDF	ALL	175	C	ALL	200	
	#10	ALL	200	T	ALL	200	
	CPVC	ALL	190	P	ALL	180	
	SARAN	ALL	150				
BLEACH							See specific type such as hypochlorite peroxide, etc.
BLOOD, ANIMAL	ST. ST.	ALL	350	R-2	ALL	350	*If fats are present, use "P" with travel stops.
	BRONZE	ALL	350				
	C. I .	ALL	350	WB*	ALL	225	
	TEFZEL	ALL	300	M*	ALL	225	
	PVC	ALL	140	P	ALL	180	
	PVDF	ALL	275				
BLOOD, HUMAN	ST. ST.	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325°F. **If fats are present, use "P" with travel stops.
	GLASS	ALL	350*				
	PVDF	ALL	275	WB**	ALL	225	
				M**	ALL	225	
				P	ALL	180	
BONDERITE	TEFZEL	ALL	300	R-2	ALL	300	C. I. also used.
	#10	ALL	200	M	ALL	275	
	ST. ST.	ALL	180	B	ALL	250	
	PVC	ALL	140	C	ALL	225	
				T	ALL	200	
BORAX $Na_2B_4O_7 \cdot 10\ H_2O$	C. I.	ALL	350	R-2	ALL	350	
	TEFZEL	ALL	300				
	PVDF	ALL	275	M	ALL	275	
	#10	ALL	200	C	ALL	225	
	#5, #11	ALL	150	B	ALL	225	
	PVC	ALL	140	T	ALL	200	
				S	ALL	180	

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM CONC. BY WT.	MAXIMUM TEMP. °F	CODE	MAXIMUM CONC. BY WT.	MAXIMUM TEMP. °F	
BORIC ACID $H_3 BO_3$	ALUMINUM	ALL	350	R-2	ALL	350	
	BRONZE	ALL	350				
	ST. ST.	ALL	350	M	ALL	275	
	TEFZEL	ALL	300	B	ALL	250	
	PVDF	ALL	275	C	ALL	225	
	POLYPROP	ALL	200	T	ALL	200	
	SARAN	ALL	175				
	#10	ALL	175				
	PVC	ALL	140				
BRINE (SODIUM CHLORIDE) NaCl	TEFZEL	ALL	300	R-2	ALL	300	Recommendation based on no free chlorine.
	PVDF	ALL	285				
	#10	ALL	200	M	ALL	275	
	POLYPROP	ALL	200	B	ALL	250	
	SARAN	ALL	175	C	ALL	225	
	#11	ALL	150	T	ALL	180	
	PVC	ALL	140				
BROMIC ACID $HBr O_3$	GLASS	50	350*	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	TEFZEL	ALL	250				
	PVDF	ALL	275	C	40	150	
	CPVC	50	190	B	50	100	
	PVC	50	140				
BROMINE WATER $Br + H_2O$	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	TEFZEL	ALL	230				
	PVDF	ALL	210				
	PVC	ALL	140				
BUTADIENE $C_4 H_6$	D. I.	ALL	350	R-2	ALL	350	
	ST. ST.	ALL	350				
	TEFZEL	ALL	250				
	PVDF	ALL	250				
BUTANE $C_4 H_{10}$	ANY METAL	ALL	350	R-2	ALL	350	Avoid C. I. if danger of explosion.
	TEFZEL	ALL	300				
	PVDF	ALL	285	P	ALL	180	
BUTYL ACETATE $CH_3 COOC_4 H_9$	ANY METAL	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*				
	TEFZEL	ALL	230				
	POLYPROP	ALL	75				
BUTYRIC ACID $CH_3 (CH_2)_2 COOH$	ST. ST.	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*				
	TEFZEL	ALL	250	M	ALL	100	
	PVDF	ALL	230				
	POLYPROP	ALL	150				
	SARAN	ALL	75				
CALCIUM BISULFITE $Ca (HSO_3)_2$	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
	ST. ST.	ALL	350				
	TEFZEL	ALL	300	M	ALL	275	
	PVDF	ALL	275	B	ALL	225	
	POLYPROP	ALL	200	C	ALL	200	
	CPVC	ALL	190				
	#7	ALL	150				
	PVC	ALL	140				
	SARAN	ALL	75				

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
CALCIUM CARBONATE $Ca\ CO_3$	C. I.	ALL	350	R-2	ALL	350	C. I. will rust if moisture present.
	TEFZEL	ALL	300	M	ALL	275	
	PVDF	ALL	285	B	ALL	250	
	POLYPROP	ALL	200	C	ALL	225	
	CPVC	ALL	190	T	ALL	200	
	#7	ALL	180	S	ALL	180	
	SARAN	ALL	175				
	#5, #11	ALL	150				
	PVC	ALL	140				
CALCIUM CHLORIDE $Ca\ Cl_2$	GLASS	ALL	350*	R-2	ALL	350	C. I. possible. *Use Glass lined D.I. above 325° F.
	TEFZEL	ALL	300	M	ALL	250	
	PVDF	ALL	285	B	ALL	225	
	#10	ALL	200	C	ALL	200	
	SARAN	ALL	175	T	ALL	200	
	POLYPROP	ALL	150				
	PVC	ALL	140				
CALCIUM HYDROXIDE $Ca\ (OH)_2$	ANY METAL*	ALL	350	R-2	ALL	350	*Aluminum not suitable.
	TEFZEL	ALL	300	M	ALL	250	
	PVDF	ALL	275	B	ALL	212	
	POLYPROP	ALL	200	C	ALL	200	
	CPVC	ALL	190	T	ALL	200	
	#5, #11	ALL	150	S	ALL	180	
	PVC	A LL	140				
	SARAN	ALL	125				
CALCIUM HYPOCHLORITE $Ca\ (OCl)_2$	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
	TEFZEL	ALL	300				
	PVDF	ALL	200	C	20	180	
	#10	ALL	150	M	20	125	
	PVC	ALL	140				
	SARAN	ALL	125				
	POLYPROP	ALL	120				
CALCIUM OXIDE $Ca\ O$							See "CALCIUM HYDROXIDE"
CALCIUM SULFATE $Ca\ SO_4$	C. I.	ALL	350	M	ALL	275	Check carrier, may be abrasive
	TEFZEL	ALL	300	C	ALL	225	
	PVDF	ALL	285	T	ALL	200	
	POLYPROP	ALL	200	S	ALL	180	
	SARAN	ALL	175				
	ALUMINUM	ALL	150				
	#5, #11	ALL	150				
CARBOLIC ACID OR PHENOL $C_6\ H_5\ OH$	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
	ST. ST.	ALL	350				
	ALUMINUM	ALL	350	V	ALL	200	
	BRONZE	ALL	350	C	ALL	100	
	TEFZEL	ALL	230	M	ALL	75	
	PVDF	ALL	210				
CARBONATED BEVERAGES	ST. ST.	ALL	250	B	ALL	250	
	BRONZE	ALL	250	WB	ALL	225	
	POLYPROP	ALL	200	A	ALL	150	
	PVDF	ALL	250	H	ALL	250	
CARBON BLACK SLURRY	GLASS	ALL	350*	M	ALL	300	Check carrier. *Use Glass lined D.I. above 325°F.
	C. I.	ALL	350	B	ALL	250	
	C. S. T.	ALL	350	C	ALL	225	
	#5, #11	ALL	150	T	ALL	180	
				S	ALL	180	
				A	ALL	100	

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
CARBON BISULFIDE CS_2	GLASS	ALL	350*	R-2	ALL	*350	*Use Glass lined D.I. above 325°F.
	ANY METAL	ALL	350				
	TEFZEL	ALL	150	V	ALL	175	
CARBON DIOXIDE CO_2	ANY METAL	ALL	350	R-2	ALL	350	
	TEFZEL	ALL	300	M	ALL	300	
	PVDF	ALL	285	B	ALL	250	
	CPVC	ALL	190	C	ALL	225	
	SARAN	ALL	175	T	ALL	200	
	POLYPROP	ALL	150				
	PVC	ALL	140				
CARBONIC ACID $CO_2 + H_2O$	BRONZE	ALL	350	R-2	ALL	350	
	ST. ST.	ALL	350	M	ALL	250	
	POLYPROP	ALL	200	B	ALL	250	
	#10	ALL	200	C	ALL	225	
	SARAN	ALL	175	T	ALL	200	
	PVC	ALL	140				
	PVDF	ALL	275				
CARBON TETRACHLORIDE CCl_4	GLASS	ALL	350*	R-2	ALL	350	Aluminum suitable for moisture free service only.
	MONEL	ALL	350				
	TEFZEL	ALL	250	V	ALL	150	*Use Glass lined D.I. above 325°F.
	PVDF	ALL	250				
CASEIN	C. I.	ALL	350	R-2	ALL	350	Check carrier.
	BRONZE	ALL	350	M	ALL	275	
	ST. ST.	ALL	350	B	ALL	250	
	TEFZEL	ALL	300	C	ALL	225	
	#10, #7	ALL	200	T	ALL	200	
	PVDF	ALL	250				
CAUSTIC SODA							See Sodium Hydroxide.
CEMENT SLURRY	C. I.	ALL	250	M	ALL	250	
	#5, #11	ALL	150	C	ALL	225	
				S	ALL	180	
CERAMIC SLURRY	C. I.	ALL	250	M	ALL	250	C. I. use depends on velocity, as service is abrasive.
	#5, #11	ALL	150	C	ALL	225	
				S	ALL	180	
CEREAL	ST. ST.	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
	ALUMINUM	ALL	350				
	BRONZE	ALL	350	B	ALL	250	
	GLASS	ALL	350*	WB	ALL	225	
	TEFZEL	ALL	300				
	PVDF	ALL	285				
CHEMICAL PULP (SODA PROCESS)	C. I.	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	ST. ST.	ALL	350	M	ALL	275	
	GLASS	ALL	350*	C	ALL	225	
	TEFZEL	ALL	300	T	ALL	200	
	#10	ALL	200				
CHEMICAL PULP (SULFATE PROCESS)	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	TEFZEL	ALL	300				
	#10	ALL	200	M	ALL	250	
				B	ALL	225	
				C	ALL	225	
				T	ALL	200	
CHEMICAL PULP (SULFITE PROCESS)	ST. ST.	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
	GLASS	ALL	350*	M	ALL	275	
	TEFZEL	ALL	300	B	ALL	250	
	#10	ALL	200	C	ALL	225	
	PVC	ALL	140				
CHLORINATED BRINE	GLASS	ALL	350*	R-2	ALL	350	TEFZEL or Kynar best choice when abrasion present.
	TEFZEL	ALL	300				
	PVDF	ALL	275	V	ALL	150	
	#10	ALL	200				*Use Glass lined D.I. above 325°F.
	PVC	ALL	140	I			

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM CONC. BY WT.	MAXIMUM TEMP. °F	CODE	MAXIMUM CONC. BY WT.	MAXIMUM TEMP. °F	
CHLORINATED HYDROCARBONS	GLASS TEFZEL PVDF	ALL ALL ALL	300 250 250	R-2 V	ALL ALL	350 150	May be some HCL released at high temp.
CHLORINE DIOXIDE SOLUTION $Cl O_2 + H_2O$	GLASS TEFZEL PVDF #10 PVC	ALL ALL ALL ALL ALL	350* 250 210 200 140	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
CHLORINE (DRY) Cl_2 LIQUID OR GAS	Recommended Valve – ITT Cam-Tite Consult your local ITT Engineered Valves Sales Engineer						Use Chlorine Institute approved valves. See page 114
CHLORINE $Cl_2 + H_2O$ GAS (WET)	GLASS TEFZEL PVDF #12	ALL ALL ALL ALL	225 225 212 180	R-2	ALL	225	Recommended sealed bonnets. See page 114
CHLORINE WATER $Cl_2 + H_2O$	GLASS TEFZEL PVDF #10 CPVC POLYPROP SARAN PVC	ALL ALL ALL ALL ALL ALL ALL ALL	350* 250 225 200 190 150 150 140	R-2 V S** C** M A**	ALL ALL	350 180 150 150 150 100	*Use Glass lined D.I. above 325°F. **Use elastomer diaphragm for infrequent flexing only. See page 114
CHLOROFORM $CHCl_3$	GLASS TEFZEL PVDF ST. ST. ALUMINUM	ALL ALL ALL ALL ALL	350* 230 200 80 80	R-2 V	ALL ALL	350 180	C. I. suitable if no free chlorine. *Use Glass lined D.I. above 325°F.
CHLOROSULFONIC ACID $Cl SO_2 OH$	GLASS TEFZEL #10	ALL ALL 50	350* 75 150	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
CHOCOLATE PASTE	ALUMINUM ST. ST. GLASS TEFZEL PVDF PVC	ALL ALL ALL ALL ALL ALL	350 350 350* 300 285 140	R-2 B WB	ALL ALL ALL	350 250 225	*Use Glass lined D.I. above 325°F.
CHROMIC ACID $H_2 Cr O_4$	GLASS ST. ST. TEFZEL CPVC PVDF SARAN PVC	ALL ALL 50 50 50 40 30	350* 350 200 190 125 150 80	R-2 C B C	ALL 10 10 30	350 130 110 80	GLASS & "R-2" Preferred. *Use Glass lined D.I. above 325° F.
CHROMIC CHLORIDE $Cr Cl_3$	GLASS TEFZEL PVDF	ALL ALL ALL	350* 230 120	R-2 M C	ALL ALL ALL	350 200 150	*Use Glass lined D.I. above 325° F.

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
CHROMIUM SULFATE $Cr_2 (SO_4)_3$	GLASS TEFZEL PVDF ST. ST.	ALL ALL ALL 30	350* 300 200 212	R-2 M B C	ALL ALL ALL ALL	350 250 225 200	*Use Glass lined D.I. above 325°F.
CITRIC ACID & JUICES $C_6 H_8 O_7 \cdot H_2O$	ALUMINUM ST. ST. GLASS TEFZEL PVDF POLYPROP SARAN	ALL ALL ALL ALL ALL ALL ALL	350 350 350* 300 275 200 175	R-2 C** T B WB	ALL ALL ALL ALL ALL	350 200 200 212 200	*Use Glass lined D.I. above 325° F. **Swells in citrus oils.
CLAY SLIP							See ceramic slurry.
COAL SLURRY (OR AIR BORNE)	C. I. #5, #11	ALL ALL	250 150	S A	ALL ALL	180 160	Use of C. I. depends on velocity, as service is abrasive.
COAL TAR	ANY METAL GLASS	ALL ALL	350 350*	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
COCONUT OIL							See "OIL, COCONUT"
COPPER CHLORIDE $Cu Cl_2$	GLASS TEFZEL PVDF CPVC SARAN PVC POLYPROP	ALL ALL ALL ALL ALL ALL ALL	350* 300 285 190 150 140 120	R-2 M B T	ALL ALL ALL ALL	350 225 200 150	Copper attacks natural rubber. *Use Glass lined D.I. above 325° F.
COPPER CYANIDE $Cu (CN)_2$	ST. ST. GLASS TEFZEL PVDF POLYPROP PVC SARAN	ALL ALL ALL ALL 10 10 10	350 350* 300 275 200 140 125	R-2 M B P	ALL ALL ALL ALL	350 275 250 175	Copper attacks natural rubber. Check solvent. *Use Glass lined D.I. above 325°F.
COPPER NITRATE $Cu (NO_3)_2 \cdot 3 H_2O$	ST. ST. GLASS TEFZEL PVDF SARAN PVC POLYPROP	ALL ALL ALL ALL ALL ALL ALL	350 350* 300 275 175 140 120	R-2 M B P	ALL ALL ALL ALL	350 275 250 180	Copper attacks natural rubber. *Use Glass lined D.I. above 325°F.
COPPER SULFATE $CU SO_4 \cdot 5 H_2O$ (BLUE VITRIOL)	GLASS TEFZEL PVDF ST. ST. CPVC SARAN POLYPROP PVC	ALL ALL ALL ALL ALL ALL ALL ALL	350* 300 285 200 190 150 150 140	R-2 M B P	ALL ALL ALL ALL	350 275 250 180	Copper attacks natural rubber. *Use Glass lined D.I. above 325°F.
COPPER SULFIDE Cu S	ANY METAL TEFZEL	ALL ALL	350 250	R-2 M B C	ALL ALL ALL ALL	350 200 200 200	Check solvent first.
CREOSOTE	ANY METAL	ALL	350	R-2 V	ALL ALL	350 210	

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
CRUDE OIL							See "OIL, CRUDE."
CYANIDE SOLUTIONS	C. I. ST. ST. TEFZEL POLYPROP PVC	ALL ALL ALL ALL ALL	350 350 250 150 140	R-2 M B T	ALL ALL ALL ALL	350 250 225 200	
DDT $(Cl\ C_6\ H_4)_2\ CHCCl_3$	GLASS TEFZEL POLYPROP	ALL ALL ALL	350* 300 75	R-2	ALL	350	Acidic, check solvent. *Use Glass lined D.I. above 325° F.
DENATURED ALCOHOL (ETHYL ALCOHOL) C_2H_5OH							See "ALCOHOL, ETHYL."
DETERGENTS	C. I. BRONZE ST. ST. TEFZEL CPVC POLYPROP PVC	ALL ALL ALL ALL ALL ALL ALL	350 350 350 300 190 150 140	R-2 M C P	ALL Dilute ALL ALL	350 250 200 180	Avoid neoprene.
DEVELOPING SOLUTIONS	ST. ST. GLASS TEFZEL CPVC POLYPROP SARAN PVC	ALL ALL ALL ALL ALL ALL ALL	350 350* 300 190 150 150 140	R-2	ALL	350	Sulphur bearing compounds not allowed *Use Glass lined D.I. above 325 ° F.
DIATOMACEOUS EARTH	GLASS C. I. #5, #11	ALL ALL ALL	350* 350 150	R-2 M C S A	ALL ALL ALL ALL ALL	350 250 225 180 160	Use of C. I. depends on velocity, as service is abrasive. *Use Glass lined D.I. above 325° F.
DIBUTYL PHTHALATE $C_6\ H_4\ (COOC_4\ H_9)_2$	ANY METAL	ALL	350	R-2 M B	ALL ALL ALL	350 200 200	
DYES	ALUMINUM ST. ST. GLASS TEFZEL	ALL ALL ALL ALL	350 350 350* 300	R-2 M B P	ALL ALL ALL ALL	350 250 225 180	Choice depends on solvent. *Use Glass lined D.I. above 325°F.
EDIBLE OILS							See "OIL, EDIBLE."
EMULSIFIED OILS (AQUEOUS)							See "OIL, EMULSIFIED."
EPICHLORHYDRIN $CH_2\ OCHCH_2\ Cl$	ST. ST. GLASS TEFZEL	ALL ALL ALL	350 350* 200	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
ESSENTIAL OILS							See "OIL, ESSENTIAL."
ESTERS, ORGANIC (IN GENERAL)	ANY METAL TEFZEL	ALL ALL	350 250	R-2	ALL	350	Elastomers possible, check ester.
ETHER (IN GENERAL) $(C_2H_5)_2O$	ANY METAL GLASS TEFZEL POLYPROP	ALL ALL ALL ALL	350 350* 212 75	R-2	ALL	350	If moisture present use ST. ST. or BRONZE. *Use Glass lined D.I. above 325°F.

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
ETHYL ACETATE $CH_3 COOC_2 H_5$	ANY METAL TEFZEL	ALL ALL	350 150	R-2	ALL	350	
ETHYLAMINE $CH_3 CH_2 NH_2$	ANY METAL GLASS	ALL ALL	350 350*	R-2 M B C	ALL ALL ALL ALL	350 200 200 200	*Use Glass lined D.I. above 325° F.
ETHYL BROMIDE $C_2 H_5 Br$	ST. ST. GLASS TEFZEL	ALL ALL ALL	350 350* 300	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
ETHYL CELLOSOLVE $C_4 H_{10} O_2$	ANY METAL	ALL	350	R-2	ALL	350	
ETHYLENEDIAMINE $C_2 H_4 (NH_2)_2$	ANY METAL	ALL	350	R-2 M B	ALL ALL ALL ALL	350 200 200 180	
ETHYLENE DICHLORIDE $C_2 H_4 CL_2$	ST. ST. GLASS TEFZEL PVDF	ALL ALL ALL ALL	350 350* 300 275	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
ETHYLENE GLYCOL (ANTIFREEZE) $C_2 H_4 (OH)_2$	ANY METAL TEFZEL PVDF POLYPROP CPVC SARAN	ALL ALL ALL ALL ALL ALL	350 300 285 200 190 175	R-2 M C P	ALL ALL ALL ALL	350 275 200 180	
ETHYLENE OXIDE $C_2 H_4 O$	ST. ST. TEFZEL PVDF	ALL ALL 5	350 230 200	R-2	ALL	350	
FATTY ACIDS (in General) $C_nH_{2n+1}COOH$	ST. ST. GLASS TEFZEL PVDF CPVC POLYPROP SARAN PVC	ALL ALL ALL ALL ALL ALL ALL ALL	350 350* 300 285 190 150 150 140	R-2 P B	ALL ALL ALL	350 180 125	Aluminum satisfactory only if moisture present. "B" best for low molecularweight. *Use Glass lined D.I. above 325° F.
FERRIC CHLORIDE $Fe Cl_3$	GLASS TEFZEL PVDF #10 POLYPROP CPVC PVC SARAN	ALL 50 50 ALL 50 ALL ALL ALL	350* 300 285 200 200 190 140 125	R-2 M B C T	ALL ALL ALL ALL ALL	350 250 225 200 200	*Use Glass lined D.I. above 325°F.
FERROUS SALTS	GLASS TEFZEL PVDF POLYPROP #10 CPVC PVC	ALL ALL ALL ALL ALL ALL ALL	350* 300 275 200 200 190 140	R-2 M B C T	ALL ALL ALL ALL ALL	350 275 250 200 180	*UseGlasslinedD.I. above 325° F.

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
FERTILIZER SOLUTIONS	C. I.	ALL	350	R-2	ALL	350	Avoid C.I. if pH is lower than 7.
	ST. ST.	ALL	350				
	TEFZEL	ALL	250	M	ALL	250	
	ALUMINUM	ALL	200	B	ALL	225	
	PVC	ALL	140	C	ALL	200	
				T	ALL	200	
FLOTATION SOLUTIONS	ANY METAL	ALL	350	R-2	ALL	350	
				P	ALL	180	
FLUOBORIC ACID HBF_4	TEFZEL	ALL	250	R-2	ALL	250	Aluminum satisfactory only for dry service.
	#10	ALL	200				
	CPVC	ALL	190	M	ALL	250	
	PVC	ALL	140	B	ALL	225	
	SARAN	ALL	125				
	PVDF	ALL	250				
FLUORIDE SALTS	TEFZEL	ALL	250	M	ALL	250	
	#10	ALL	200	B	ALL	225	
	PVC	ALL	140	C	ALL	200	
				T	ALL	200	
FLUOSILICIC ACID $H_2 Si F_6$	TEFZEL	ALL	250	R-2	ALL	250	
	#10	ALL	200				
	POLYPROP	ALL	200	C	ALL	225	
	CPVC	25	190	B	ALL	200	
	SARAN	ALL	175	M	ALL	200	
	PVC	ALL	140				
	PVDF	ALL	250				
FLY ASH	#5	ALL	150	M	ALL	150	Use straightway valve above 25% solids
	C. I.	ALL	150	S	ALL	150	
FORMALDEHYDE HCHO	BRONZE	ALL	350	R-2	ALL	350	*Use Glass lined D.I above 325° F.
	ST. ST.	ALL	350				
	GLASS	ALL	350*	V	37	175	
	TEFZEL	37	230	B	37	150	
	#10	40	180	C	37	80	
	CPVC	ALL	140	T	37	80	
	POLYPROP	35	75				
	PVDF	37	125				
FORMIC ACID HCOOH	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
	TEFZEL	ALL	250				
	PVDF	ALL	250	B	ALL	200	
	ST. ST.	90	160	P	ALL	100	
	SARAN	ALL	150	C	ALL	100	
	PVC	50	140				
	POLYPROP	85	75				
FREON #11, #12, #113	ST. ST.	ALL	350	R-2	ALL	350	Body material recommendations are in descending order of resistance.
	C.ST.	ALL	350				
	D.I.	ALL	122	C	ALL	150	
	ALUMINUM	ALL	350	P	ALL	130	
	BRONZE	ALL	350				
	PVDF	ALL	200				
FREON #13, #114, #115 #C318	ST. ST.	ALL	350	R-2	ALL	350	Body material recommendations are In descending order of resistance.
	C.ST.	ALL	350				
	D.I.	ALL	350	P	ALL	130	
	ALUMINUM	ALL	350	T	ALL	130	
	BRONZE	ALL	350	B	ALL	130	
	PVDF	ALL	200				

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
FREON #21	ST. ST. C.ST. D.I. ALUMINUM BRONZE PVDF	ALL ALL ALL ALL ALL ALL	350 350 350 350 350 200	R-2	ALL	350	Body material recommendations are in descending order of resistance.
FREON #22	ST. ST. C.ST. D.I. ALUMINUM BRONZE PVDF	ALL ALL ALL ALL ALL ALL	350 350 350 350 350 200	R-2 T	ALL ALL	350 130	Body material recommendations are in descending order of resistance.
FUEL OIL (ACID FREE)	ANY METAL TEFZEL PVDF	ALL ALL ALL	350 300 285	R-2 P T	ALL ALL ALL	350 180 160	Use travel stops with elastomer diaphragms. "P" and "T" not suitable if aromatics present.
FURFURAL $C_4 H_3 OCHO$	ANY METAL GLASS TEFZEL	ALL ALL ALL	350 350* 212	R-2 C	ALL ALL	350 100	*Use Glass lined D.I. above 325° F.
GALLIC ACID $C_6H_2(OH)_3CO_2H \cdot H_2O$	ST. ST. GLASS TEFZEL POLYPROP SARAN PVC	ALL ALL ALL ALL ALL ALL	350 350* 210 150 150 140	R-2 M B	ALL ALL ALL	350 150 150	Check solvent. *Use Glass lined D.I. above 325°F.
GASOLINE (ACID FREE)	ANY METAL TEFZEL PVDF CPVC	ALL ALL ALL ALL	350 300 285 80	R-2 P V	ALL ALL ALL	350 180 150	Use travel stops with elastomer diaphragms. If aromatics present, use Viton or R-2 (PTFE).
GASOLINE, SOUR	ST. ST. GLASS TEFZEL PVDF	ALL ALL ALL ALL	350 350* 300 285	R-2 P V	ALL ALL ALL	350 180 150	Use travel stops with elastomer diaphragms. If aromatics present, use Viton or R-2 (PTFE).
GELATIN	ALUMINUM BRONZE ST. ST. TEFZEL POLYPROP PVC PVDF	ALL ALL ALL ALL ALL ALL ALL	350 350 350 300 150 140 250	R-2 B M WB	ALL ALL ALL ALL	350 250 250 225	

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM CONC. BY WT.	MAXIMUM TEMP. °F	CODE	MAXIMUM CONC. BY WT.	MAXIMUM TEMP. °F	
GLUE	ANY METAL GLASS PVDF	ALL ALL ALL	350 350* 250	R-2 **	ALL ALL	350 **	Glass & "R-2" preferred if lines are not cleaned regularly. Check solvent used to clean lines. *Use Glass lined D.I. above 325° F. **For use of any elastomer diaphragm, see temp. limit and check solvent.
GLUTAMIC ACID $C_5H_9NO_4$	ALUMINUM ST. ST. GLASS TEFZEL PVC PVDF	ALL ALL ALL ALL ALL ALL	350 350 350* 300 140 200	R-2 B M P	ALL ALL ALL ALL	350 225 150 180	Check solvent. *Use Glass lined D.I. above 325°F.
GLYCERIN $C_3H_5(OH)_3$	ANY METAL GLASS PVDF CPVC SARAN PVC POLYPROP	ALL ALL ALL ALL ALL ALL ALL	350 350* 285 190 150 140 130	R-2 M B P S	ALL ALL ALL ALL ALL	350 300 250 180 180	C.I. MAY RUST. *Use Glass lined D.I. above 325° F.
GLYCOL CH_2OHCH_2OH	ANY METAL GLASS TEFZEL PVDF #10 POLYPROP	ALL ALL ALL ALL ALL ALL	350 350* 300 285 200 150	R-2 M B C P	ALL ALL ALL ALL ALL	350 275 200 200 150	C.I. will rust if moisture present. *Use Glass lined D.I. above 325° F.
GYPSUM $Ca\ SO_4 \cdot 2\ H_2O$	GLASS #11 #5	ALL ALL ALL	275 150 150	M C S A	ALL ALL ALL ALL	150 150 150 100	Very abrasive.
HELIUM He	D.I.	ALL	250	B	ALL	250	See "INERT GASES"
HEXANE C_6H_{14}	ANY METAL TEFZEL PVDF SARAN PVC	ALL ALL ALL ALL ALL	350 300 285 150 140	R-2 P	ALL ALL	350 150	Use travel stops with "P."
HYDRAZINE H_2NNH_2	ALUMINUM ST. ST. GLASS TEFZEL	ALL ALL ALL ALL	350 350 350* 100	R-2 M	ALL ALL	350 75	*Use Glass lined D.I. above 325° F. U.D.M.H. — check under "U."
HYDROCHLORIC ACID HCl	GLASS* TEFZEL** PVDF** #10 POLYPROP SARAN PVC CPVC	ALL 37 37 37 30 35 35 35	300 300 285 180 170 150 140 200	R-2** V C B M	ALL 37 37 37 37	350 150 125 100 100	**If contaminated with hydrocarbons.

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
HYDROCYANIC ACID HCN	GLASS	ALL	350*	R-2	ALL	350	*Use Glass D.I. above 325° F.
	ST. ST.	ALL	350				
	TEFZEL	ALL	300	B	ALL	150	
	PVDF	ALL	275	M	ALL	150	
	#10	ALL	180	V	ALL	150	
	SARAN	ALL	150	C	ALL	100	
	POLYPROP	ALL	150	T	ALL	100	
	PVC	ALL	140				
HYDROFLUORIC ACID HF	TEFZEL	ALL	250	R-2	ALL	250	See page 114
	PVDF	ALL	200				
	POLYPROP	40	150	C	50	160	
	MONEL	48	176	B	50	100	
	SARAN	37	175	M	50	100	
	PVC	50	75	V	75	150	
HYDROGEN CHLORIDE GAS (DRY) HCl	GLASS	ALL	350*	R-2	ALL	350	
	TEFZEL	ALL	275				
	PVDF	ALL	275				
	POLYPROP	ALL	150				
HYDROGEN PEROXIDE H_2O_2	GLASS	ALL	350*	R-2	ALL	350	Vapor pressure depends on temperature.
	ALUMINUM	ALL	350				
	ST. ST.	ALL	350	C	30	80	
	TEFZEL	90	150	M	30	80	*Use Glass lined D.I. above 325°F.
	POLYPROP	28	75				
	PVDF	30	200				
HYDROGEN SULFIDE (AQUEOUS) $H_2S + H_2O$	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
	TEFZEL	ALL	300				
	PVDF	ALL	275	V	ALL	200	
	POLYPROP	ALL	175	B	ALL	100	
	SARAN	ALL	150	M	ALL	100	
	#10	ALL	150	C	ALL	100	
	PVC	ALL	140				
HYPOCHLORITE (BLEACH)							See individual type such as sodium hypochlorite.
HYPO (PHOTOGRAPHY)							Sodium Thiosulphate. See developing solutions
HYPOCHLOROUS ACID HOCl	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
	TEFZEL	ALL	250				
	PVDF	ALL	70	C	ALL	100	
	#10	ALL	180				
	SARAN	ALL	125				
	POLYPROP	ALL	75				
ICE CREAM	BRONZE	ALL	250	B	ALL	250	
	ST. ST.	ALL	250	WB	ALL	225	
	PVC	ALL	140				
	PVDF	ALL	250				

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM CONC. BY WT.	MAXIMUM TEMP. °F	CODE	MAXIMUM CONC. BY WT.	MAXIMUM TEMP. °F	
INERT GASES (ARGON, HELIUM, KRYPTON, NEON, RADON, XENON)	D.I. BRONZE C.ST. TEFZEL PVC PVDF	ALL ALL ALL ALL ALL ALL	350 350 350 300 140 285	R-2 M B	ALL ALL ALL	350 300 250	Avoid porous metals.
INK	BRONZE ST. ST. GLASS PVDF	ALL ALL ALL ALL	350 350 350* 285	R-2 M B	ALL ALL ALL	350 250 250	Check solvent. *Use Glass lined D.I. above 325°F.
INSECTICIDE	GLASS TEFZEL PVDF	ALL ALL ALL	350* 275 200	R-2	ALL	350	Use of "P" possible, check solvent first. Metals possible, check with Lancaster office. *Use Glass lined D.I. above 325°F.
IODINE I_2	GLASS ST. ST. TEFZFEL PVDF POLYPROP	ALL ALL ALL ALL ALL	350* 350 230 150 75	R-2 M B	ALL ALL ALL	350 250 225	Check carrier. *Use Glass lined D.I. above 325°F.
IRON OXIDE $Fe_2 O_3$	#5 #11	ALL ALL	150 150	M C S A	ALL ALL ALL ALL	150 150 150 150	Check carrier, can be very abrasive.
JAMS & JELLIES	ST. ST. GLASS TEFZEL PVC PVDF	ALL ALL ALL ALL ALL	350 350* 300 140 285	R-2 H B WB P	ALL ALL ALL ALL ALL	350 250 250 225 100	*Use Glass lined D.I. above 325°F.
JET FUELS	ANY METAL TEFZEL PVDF CPVC	ALL ALL ALL ALL	350 230 200 140	R-2 V P	ALL ALL ALL	350 250 180	Use travel stops with elastomer diaphragms.
JUICE (FRUIT & VEGETABLE)	ST. ST. GLASS TEFZEL PVC PVDF	ALL ALL ALL ALL ALL	350 350* 275 140 275	R-2 B WB	ALL ALL ALL	350 250 225	*Use Glass lined D.I. above 325°F.
JUICE, CITRIC							See "CITRIC ACID."
KAOLIN	TEFZEL #5 #11 PVC	ALL ALL ALL	275 150 140	M C S A	ALL ALL ALL ALL	275 225 180 160	Check carrier.
KEROSENE	ANY METAL TEFZEL PVDF CPVC PVC	ALL ALL ALL ALL ALL	350 300 285 190 140	R-2 V P	ALL ALL ALL	350 150 180	Use travel stops with elastomer diaphragms.

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
LACTIC ACID $CH_3CHOHCOOH$	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D I above 325°F.
	TEFZEL	ALL	250				
	#10	ALL	180	V	ALL	200	
	ST. ST.	ALL	160	M	ALL	150	
	POLYPROP	ALL	150	C	80	150	
	PVDF	ALL	100	T	80	150	
	SARAN	ALL	125				
LARD	ANY METAL	ALL	350	R-2	ALL	350	Use travel stops with elastomer diaphragms.
	TEFZEL	ALL	300				
	PVDF	ALL	285	P	ALL	180	
	CPVC	ALL	190				
	POLYPROP	ALL	175				
	PVC	ALL	140				
LATEX	C. I.	ALL	350	R-2	ALL	350	Smooth bodies and diaphragms preferrred to eliminate sticking. *Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*				
	ST. ST.	ALL	350	M	ALL	200	
	TEFZEL	ALL	300	T	ALL	150	
	#10	ALL	200				
LAUNDRY WASH WATER	ANY METAL	ALL	250	M	ALL	250	
	TEFZEL	ALL	250	C	ALL	225	
	PVDF	ALL	250	B	ALL	225	
	POLYPROP	ALL	200	P	ALL	180	
LEAD ACETATE $Pb\ (C_2\ H_3\ O_2)_2 \bullet 3H_2\ O$	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
	ST. ST.	ALL	350				
	TEFZEL	ALL	300	M	ALL	150	
	POLYPROP	ALL	175	B	ALL	100	
	SARAN	ALL	150				
	PVDF	ALL	275				
LEAD ARSENATE $Pb_3\ (AsO_4)_2$	C.I.	ALL	250	M	ALL	250	Check carrier.
	TEFZEL	ALL	250	C	ALL	225	
	#7	ALL	200	T	ALL	200	
	#5, #11	ALL	150				
LEAD OXIDE $Pb_3\ O_4$	C.I.	ALL	250	M	ALL	250	Check carrier.
	TEFZEL	ALL	250	C	ALL	225	
	#7	ALL	200	T	ALL	200	
	#5, #11	ALL	150				
	PVDF	ALL	200				
LEAD TETRAETHYL $Pb\ (C_2H_5)_4$	GLASS	ALL	350*	R-2	ALL	350	Extremely poisonous. *Use Glass lined D.I. above 325° F.
	TEFZEL	ALL	300				
	PVDF	ALL	285				
LIME Ca O	C. I .	ALL	250	M	ALL	250	May be abrasive.
	TEFZEL	ALL	250	C	ALL	225	
	#7	ALL	200	T	ALL	200	
	#5, #11	ALL	150				
	PVDF	ALL	250				
LITHIUM SALTS	ANY METAL	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*	M	ALL	300	
	TEFZEL	ALL	300				
	#10	ALL	200	B	ALL	225	
	#7	ALL	200	C	ALL	200	
	PVC	ALL	140	T	ALL	180	
	PVDF	ALL	220				

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
MAGNESIUM CARBONATE $MgCO_3$	ANY METAL	ALL	350	R-2	ALL	350	If in solution check acid before using metal.
	TEFZEL	ALL	300				
	PVDF	ALL	285	M	ALL	250	
	POLYPROP	ALL	200	B	ALL	225	
	SARAN	ALL	175	C	ALL	225	
	#11	ALL	150				
	PVC	ALL	140				
MAGNESIUM CHLORIDE $MgCl_2 \cdot 6H_2O$	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
	TEFZEL	ALL	300				
	PVDF	ALL	285	M	ALL	250	
	POLYPROP	ALL	200	B	ALL	225	
	CPVC	ALL	190	C	ALL	200	
	#10	ALL	150	T	ALL	160	
MAGNESIUM HYDROXIDE $Mg(OH)_2$	ANY METAL	ALL	350	R-2	ALL	350	
	TEFZEL	ALL	300				
	PVDF	ALL	275	M	ALL	275	
	POLYPROP	ALL	200	B	ALL	250	
	SARAN	ALL	175	C	ALL	200	
	PVC	ALL	140	T	ALL	160	
MAGNESIUM OXIDE	ANY METAL	ALL	350	R-2	ALL	350	Check carrier.
	#7	ALL	200	M	ALL	300	
	#5, #11	ALL	150				
	PVC	ALL	150	B	ALL	250	
				A	ALL	150	
MAGNESIUM SULFATE $MgSO_4$	ALUMINUM	ALL	350	R-2	ALL	350	
	ST. ST.	ALL	350				
	TEFZEL	ALL	300	M	ALL	275	
	PVDF	ALL	275	B	ALL	250	
	#10	ALL	200	C	ALL	225	
	POLYPROP	ALL	200	T	ALL	200	
	SARAN	ALL	175				
MALEIC ACID HOOCCHCHCOOH	ST. ST.	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
	GLASS	ALL	350*				
	TEFZEL	ALL	275	M	ALL	150	
	PVDF	ALL	250	B	ALL	150	
	POLYPROP	10	150	C	ALL	150	
	SARAN	10	125				
MERCURY SALTS	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
	TEFZEL	ALL	275				
	PVDF	ALL	250	M	ALL	250	
	#10	ALL	200	B	ALL	225	
	CPVC	ALL	190	C	ALL	200	
	PVC	ALL	140				
METHANOL							See alcohol, methyl.
METHYL ETHYL KETONE (MEK) $CH_3COC_2H_5$	ANY METAL	ALL	350	R-2	ALL	350	
	TEFZEL	ALL	230				
				M	ALL	200	
METHYL ISOBUTYL KETONE (MIBK) $(CH_3)_2CHCH_2COCH_3$	ANY METAL	ALL	350	R-2	ALL	350	
	TEFZEL	ALL	230				
				M	ALL	200	
METHYL METHACRYLATE SLURRY $C_4H_6O_2$	GLASS	ALL	350*	R-2	ALL	350	#11 if free of raw materials and catalysts after polymerization. *Use Glass lined D.I. above 325° F.
	TEFZEL	ALL	220				
	POLYPROP	ALL	150				
	#11	ALL	150				
	PVC	ALL	140				
	PVDF	ALL	125				

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
METHYLENE CHLORIDE $CH_2 Cl_2$	ST. ST.	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*				
	TEFZEL	ALL	212				
	PVDF	ALL	125				
MILK	ST. ST.	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*				
	PVDF	ALL	250	WB	ALL	225	
MIXED ACID							Advise Acids, Concentrations & Temp.
MOLASSES	ALUMINUM	ALL	350	R-2	ALL	350	
	ST. ST.	ALL	350				
	POLYPROP	ALL	200	B	ALL	250	
	PVDF	ALL	175	WB	ALL	225	
MONOCHLORO-ACETIC ACID CH_2 Cl COOH	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	HASTELLOY-C	ALL	350				
	TEFZEL	ALL	230	M	50	150	
	POLYPROP	ALL	175	C	50	150	
	#10	ALL	150				
	PVC	ALL	140				
MUD	C. I.	ALL	250	M*	ALL	250	*No oil present.
	#5, #11	ALL	150	C	ALL	225	
				S	ALL	180	
MURIATIC ACID							See "HYDROCHLORIC ACID."
MUSTARD (FOOD)	ALUMINUM	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	ST. ST.	ALL	350				
	GLASS	ALL	350*	B	ALL	250	
	TEFZEL	ALL	300	WB	ALL	225	
	PVDF	ALL	275				
NAPHTHA	ANY METAL	ALL	350	R-2	ALL	350	Use travel stops with "P". "P" for use with aliphatics only. *Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*				
	TEFZEL	ALL	300	P	ALL	120	
	PVDF	ALL	275	V	ALL	160	
	SARAN	ALL	150				
	CPVC	ALL	140				
NICKEL CHLORIDE (AQUEOUS) $Ni Cl_2$	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	MONEL	ALL	350				
	TEFZEL	ALL	300	M	ALL	250	
	PVDF	ALL	285	C	ALL	200	
	#10	ALL	200	B	ALL	150	
	POLYPROP	ALL	150				
	SARAN	ALL	150				
NICKEL PLATING SOLUTIONS	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	MONEL	ALL	350				
	TEFZEL	ALL	300	C	ALL	200	
	PVDF	ALL	285	M	ALL	175	
	#10	ALL	150	B	ALL	150	
	POLYPROP	ALL	150				
NICKEL SALTS	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	ST. ST.	ALL	350				
	TEFZEL	ALL	300	M	ALL	250	
	PVDF	ALL	275	B	ALL	200	
	#10	ALL	200	C	ALL	200	
	POLYPROP	ALL	150	T	ALL	150	

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
NICKEL SULFATE $Ni SO_4$	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
	ST. ST.	ALL	350				
	TEFZEL	ALL	300	M	ALL	250	
	PVDF	ALL	285	B	ALL	225	
	#10	ALL	200	C	ALL	200	
	POLYPROP	ALL	200				
	SARAN	ALL	150				
NITRIC ACID HNO_3 B.P. 187°F	GLASS	ALL	187	R-2	ALL	187	
	TEFZEL	TO 50	212				
	PVDF	TO 50	150	V	60	80	
	CN7M	TO 70	187				
	ST. ST.	TO 50	150				
	TEFZEL	TO 70	140				
	POLYPROP	TO 10	140				
	ALUMINUM	82-100	100				
	PVC	TO 10	70				
	SARAN	TO 10	70				
NITROCELLULOSE $C_6 H_7 O_5 (NO_2)_3$	ANY METAL	ALL	350	R-2	ALL	350	Aluminum preferred. For elastomer diaphragms check solvent. *Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*				
	TEFZEL		210				
NITROGEN GAS N_2	D.I.	ALL	350	R-2	ALL	350	Avoid porous metals.
	C.ST.	ALL	350				
	BRONZE	ALL	350	B	ALL	225	
	TEFZEL	ALL	250	T	ALL	200	
	PVC	ALL	140				
	PVDF	ALL	285				
NITROGEN SOLUTIONS	C. I.	ALL	350	R-2	ALL	350	
	D. I.	ALL	350				
	ST. ST.	ALL	350	M	ALL	250	
	TEFZEL	ALL	250	B	ALL	225	
	ALUMINUM	ALL	200	C	ALL	225	
	#10	ALL	200	T	ALL	200	
	PVC	ALL	140				
NITROGLYCERIN $CH_2NO_3CHNO_3CH_2NO_3$	ALUMINUM	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F. Use at customer's risk.
	ST. ST.	ALL	350				
	GLASS	ALL	350*				
	TEFZEL	ALL	250				
	PVDF	ALL	125				
NITROPARAFFINS	ANY METAL	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*				
	TEFZEL	ALL	250				
OAKITE	C. I.	ALL	350	R-2	ALL	350	*Due to numerous compounds obtain specific data or number. **Use Glass lined D.I. above 325°F.
	GLASS	ALL	350**				
	ST. ST.	ALL	350	M	ALL	250	
	RUBBER*	*	*	B	ALL	225	
	PLASTIC*	*	*	C	ALL	225	
				P	ALL	180	
OIL, CASTOR	BRONZE	ALL	350	R-2	ALL	350	Use travel stops with elastomer diaphragms.
	ST. ST.	ALL	350				
	TEFZEL	ALL	300	P	ALL	180	
	PVDF	ALL	285				
	CPVC	ALL	190				
	POLYPROP	ALL	150				

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
OIL, COCONUT	BRONZE	ALL	350	R-2	ALL	350	Use travel stops with elastomer diaphragms.
	ST. ST.	ALL	350				
	TEFZEL	ALL	300	P	ALL	180	
	PVDF	ALL	285				
	POLYPROP	ALL	150				
OIL CRUDE	BRONZE	ALL	350	R-2	ALL	350	Use travel stop with elastomer diaphragms.
	ST. ST.	ALL	350	P	ALL	150	
	ALUMINUM	ALL	200	T	ALL	180	
	TEFZEL	ALL	300	V	ALL	200	
	PVDF	ALL	285	C	ALL	180	
	PVC	ALL	140				
OILS, EDIBLE	ST. ST.	ALL	350	R-2	ALL	350	Use travel stops with elastomer diaphragms. *UseGlass lined D.I. above 325° F.
	GLASS	ALL	350*				
	TEFZEL	ALL	300				
	POLYPROP	ALL	150				
	PVC	ALL	140				
	PVDF	ALL	285				
OIL, EMULSIFIED	ANY METAL	ALL	350	R-2	ALL	350	Use travel stops with elastomer diaphragms.
	TEFZEL	ALL	300				
	PVDF	ALL	285	V	ALL	250	
	CPVC	ALL	190	P	ALL	180	
	PVC	ALL	140				
OIL, LINSEED	ANY METAL	ALL	350	R-2	ALL	350	Use travel stops with elastomer dlaphragms.
	TEFZEL	ALL	300				
	PVDF	ALL	285	P	ALL	150	
	PVC	ALL	140	V	ALL	150	
OIL, LUBRICATING	ANY METAL	ALL	350	R-2	ALL	350	Use travel stops with elastomer dlaphragms.
	TEFZEL	ALL	300				
	PVDF	ALL	285	V	ALL	200	
	PVC	ALL	140	P	ALL	150	
OIL, MINERAL	ANY METAL	ALL	350	R-2	ALL	350	Use travel stops with elastomer dlaphragms. *Use Glass lined D.I. above 325°F.
	GLASS	ALL	350*				
	TEFZEL	ALL	300	P	ALL	180	
	PVDF	ALL	285				
	PVC	ALL	140				
OIL, OLIVE	ALUMINUM	ALL	350	R-2	ALL	350	Use travel stops with elastomer dlaphragms.
	BRONZE	ALL	350				
	TEFZEL	ALL	300	P	ALL	180	
	PVDF	ALL	250				
	CPVC	ALL	190				
	PVC	ALL	140				
OIL, SOYBEAN	ANY METAL	ALL	350	R-2	ALL	350	Use travel stops with elastomer dlaphragms.
	TEFZEL	ALL	300				
	PVC	ALL	140	V	ALL	250	
	PVDF	ALL	275	P	ALL	180	
OIL, VEGETABLE	ALUMINUM	ALL	350	R-2	ALL	350	Use travel stops with elastomer dlaphragms. *Use Glass lined D.I. above 325°F.
	BRONZE	ALL	350				
	ST. ST.	ALL	350	P	ALL	180	
	GLASS	ALL	350*				
	TEFZEL	ALL	300				
	PVDF	ALL	285				
OLEIC ACID C_{17} H_{33} COOH	ALUMINUM	ALL	350	R-2	ALL	350	
	ST. ST.	ALL	350				
	MONEL	ALL	350	B	ALL	200	
	TEFZEL	ALL	275	P	ALL	150	
	PVDF	ALL	250				
	SARAN	ALL	150				
	PVC	ALL	140				

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM CONC. BY WT.	MAXIMUM TEMP. °F	CODE	MAXIMUM CONC. BY WT.	MAXIMUM TEMP. °F	
OLEUM							See SULFURIC ACID, FUMING.
OXALIC ACID $C_2 H_2 O_4 \cdot 2H_2O$	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	TEFZEL	ALL	250				
	CN7M	ALL	250	M	50	200	
	CPVC	ALL	190	B	50	200	
	POLYPROP	ALL	150				
	#10	ALL	150				
	PVC	ALL	140				
	PVDF	ALL	125				
OXYGEN (GAS) O_2	SARAN	ALL	100	R-2	ALL	100	*Avoid porous metals. Special lubricant required. Must specify for O_2 service
	ANY METAL*	ALL	100				
	TEFZEL	ALL	100				
	PVDF	ALL	100	T	ALL	100	
	POLYPROP	ALL	100	B	ALL	100	
	PVC	ALL	100				
OZONE O_3	D. I.	ALL	250	R-2	ALL	250	
	BRONZE	ALL	250				
	ST. ST.	ALL	250	M	3	150	
	TEFZEL	ALL	250	C	10	150	
	PVDF	ALL	225				
	PVC	ALL	140				
PAINT (LINSEED BASE)	ANY METAL	ALL	350	R-2	ALL	350	For "P" check solvent first and recommend travel stops. *Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*				
	TEFZEL	ALL	275	P	ALL	100	
PAINT (WATER BASE)	ALUMINUM	ALL	350	R-2	ALL	350	
	BRONZE	ALL	350				
	ST. ST.	ALL	350	M	ALL	250	
	TEFZEL	ALL	300	P	ALL	180	
	PVC	ALL	140				
PAPER CLAY	ALUMINUM	ALL	350	R-2	ALL	350	
	BRONZE	ALL	350	M	ALL	275	
	ST. ST.	ALL	350	C	ALL	220	
	#5, #11	ALL	150				
	PVC	ALL	140				
PAPER PULP (NO CHLORINE)	ST. ST.	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*	M	ALL	275	
	TEFZEL	ALL	300	C	ALL	225	
	#5, #11	ALL	150				
PAPER PULP (CHLORINATED)	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	ST. ST.	ALL	350				
	TEFZEL	ALL	275	C	ALL	225	
	#10	ALL	200	M	ALL	200	
PARAFFIN	ANY METAL	ALL	350	R-2	ALL	350	Use travel stops with elastomer diaphragms. *Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*				
	POLYPROP	ALL	140	P	ALL	160	
	PVDF	ALL	250				
PERCHLORO-ETHYLENE $C_2 Cl_4$	ANY METAL	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*				
	TEFZEL	ALL	300	V	ALL	200	
	PVDF	ALL	275				

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
PERFUMES	GLASS ST. ST. TEFZEL	ALL ALL ALL	350* 350 275	R-2	ALL	350	For elastomer diaphragm use check ingredients. *Use Glass lined D.I. above 325º F.
PEROXIDE BLEACH	ALUMINUM ST. ST. GLASS TEFZEL PVC PVDF	ALL ALL ALL ALL ALL ALL	350 350 350* 250 140 175	R-2 M C	ALL 30 30	350 80 80	Also see HYDROGEN PEROXIDE. *Use Glass lined D.I. above 325º F
PETROLEUM	ANY METAL TEFZEL PVDF SARAN PVC	ALL ALL ALL ALL ALL	350 300 285 125 100	R-2 C V P	ALL ALL ALL ALL	350 180 200 150	Use travel stops with elastomer diaphragms.
PETROLEUM ETHER (BENZINE, NAPHTHA)	ANY METAL TEFZEL	ALL ALL	350 225	R-2 V	ALL ALL	350 100	
PHARMACEUTICALS	GLASS ST. ST. TEFZEL	ALL ALL ALL	350* 350 300	R-2 M B WB	ALL ALL ALL ALL	350 275 250 225	Check carrier. Use of Plastic (TEFZEL) based on customer acceptance. *Use Glass lined D.I. above 325º F.
PHENOL $C_6 H_5 OH$	GLASS ST. ST. TEFZEL ALUMINUM PVDF CPVC POLPROP	ALL ALL ALL ALL ALL ALL ALL	350* 350 250 240 158 140 140	R-2 V	ALL ALL	350 200	*Use Glass lined D.I. above 325º F.
PHOSPHORIC ACID $H_3 PO_4$	GLASS* CN7M TEFZEL PVDF #10 CPVC #7 ST. ST. PVC POLYPROP	ALL 85 ALL 85 ALL 85 85 85 50 85	250 350 275 225 200 190 180 160 140 140	R-2 M B C	ALL ALL ALL ALL	350 225 200 200	"R-2" if no discoloration permissible. *Check for fluorides.
PHOSPHOROUS OXYCHLORIDE $POCl_3$	GLASS TEFZEL	ALL ALL	350* 230	R-2	ALL	350	*Use Glass lined D.I. above 325º F
PHOSPHOROUS TRICHLORIDE PCl_3	GLASS MONEL TEFZEL PVDF	ALL ALL ALL ALL	350* 350 250 200	R-2	ALL	350	*Use Glass lined D.I. above 325º F.
PHTHALIC ANHYDRIDE $C_8 H_4 O_3$	ALUMINUM ST. ST. GLASS TEFZEL PVDF	ALL ALL ALL ALL ALL	350 350 350* 250 200	R-2 P M	ALL ALL ALL	350 180 180	Check carrier. *Use Glass lined D.I. above 325º F

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
PICKLING SOLUTIONS							Advise Acids, Concentrations & Temp.
PICRIC ACID $C_6 H_2 (NO_2)_3 OH$	ST. ST. GLASS TEFZEL PVDF	ALL ALL ALL ALL	350 350* 250 75	R-2 M B P T	ALL 10 10 10 10	350 80 80 80 80	Recommendations for water or alcohol solution. *Use Glass lined D.I. above 325° F.
PLATING SOLUTIONS (OTHER THAN CHROMIUM)	GLASS TEFZEL #10 POLYPROP PVC PVDF	ALL ALL ALL ALL ALL ALL	350* 250 200 150 140 200	R-2 B C M T	ALL ALL ALL ALL ALL	350 200 200 200 175	*Use Glass lined D.I. above 325° F.
PLATING SOLUTION, CHROMIUM	GLASS TEFZEL SARAN PVDF	ALL ALL ALL ALL	350* 225 175 200	R-2 C	ALL ALL	350 100	*Use Glass lined D.I. above 325° F.
POLIO VACCINE	GLASS ST. ST.	ALL ALL	350* 350	R-2	ALL	350	Elastomer diaphragms possible depending on customer. *Use Glass lined D.I. above 325° F.
POLYVINYL CHLORIDE SLURRY $(H_2 CCHCL) n$	GLASS ST. ST. TEFZEL	ALL ALL ALL	350* 350 225	R-2 T	ALL ALL	350 180	Limited service life on "T" diaphragms. *Use Glass lined D.I. above 325° F.
POTASH, CAUSTIC KOH	C. I. BRONZE ST. ST. ANY PLASTIC ANY RUBBER	ALL ALL ALL ALL ALL	350 350 350 * *	R-2 M C B T	ALL ALL ALL ALL ALL	350 250 225 212 200	*Select materials by temperature limitations.
POTASSIUM CHROMATE $K_2 Cr O_4$	ST. ST. GLASS TEFZEL PVDF #7 POLYPROP SARAN PVC	ALL ALL ALL ALL ALL ALL ALL ALL	350 350* 300 285 200 175 150 140	R-2 M B C	ALL ALL ALL ALL	350 250 225 200	*Use Glass lined D.I. above 325° F.
POTASSIUM DICHROMATE $K_2 Cr_2 O_7$							See "POTASSIUM CHROMATE."
POTASSIUM HYDROXIDE KOH							See "POTASH, CAUSTIC."
POTASSIUM HYPOCHLORITE KOCI	GLASS TEFZEL PVDF #10 POLYPROP PVC SARAN	ALL ALL ALL ALL ALL ALL ALL	350* 300 200 200 175 140 125	R-2 M C	ALL ALL ALL	350 125 125	*Use Glass lined D.I. above 325° F.
POTASSIUM IODIDE KI	ANY METAL GLASS TEFZEL PVDF POLYPROP PVC	ALL ALL ALL ALL ALL ALL	350 350* 300 250 200 150	R-2 M B S	ALL ALL ALL ALL	350 300 250 180	*Use Glass lined D.I. above 325° F.

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
POTASSIUM NITRATE (SALTPETER) KNO_3							See "POTASSIUM SALTS."
POTASSIUM PERCHLORATE $KCl O_4$	ST. ST.	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*				
	TEFZEL	ALL	300	M	ALL	125	
	PVDF	ALL	200	B	ALL	100	
	POLYPROP	ALL	175	C	ALL	100	
	SARAN	ALL	150				
	PVC	ALL	140				
POTASSIUM PERMANGANATE $KMn O_4$	ST. ST.	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*				
	TEFZEL	ALL	300	M	25	200	
	PVDF	ALL	250	B	25	200	
	PVC	ALL	140	C	25	150	
POTASSIUM SALTS (OTHER THAN ABOVE)	C. I.	ALL	350	R-2	ALL	350	
	ALUMINUM	ALL	350				
	ST. ST.	ALL	350	M	ALL	275	
	TEFZEL	ALL	300	B	ALL	250	
	PVDF	ALL	275	C	ALL	225	
	#7 & #10	ALL	200	T	ALL	200	
	POLYPROP	ALL	150				
	PVC	ALL	140				
PROPANE GAS $C_3 H_5$							See "GAS, PROPANE."
PROPIONIC ACID $CH_3 CH_2 CO_2 H$							See "ACETIC ACID."
PROPYLENE GLYCOL $C_3 H_8 O_2$	C.I.	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	ST. ST.	ALL	350				
	GLASS	ALL	350*	M	ALL	275	
	TEFZEL	ALL	275	B	ALL	225	
	POLYPROP	ALL	200	C	ALL	200	
	PVC	ALL	140	P	ALL	180	
	PVDF	ALL	150				
PROTEINS	ALUMINUM	ALL	350	R-2	ALL	350	Check carrier. *Use Glass lined D.I. above 325° F.
	BRONZE	ALL	350				
	ST. ST.	ALL	350	M	ALL	275	
	GLASS	ALL	350*	B	ALL	250	
	TEFZEL	ALL	275	WB	ALL	225	
	PVDF	ALL	200				
PYRIDINE $C_5 H_5 N$	C. I.	ALL	350	R-2	ALL	350	Use C.I. if contamination is no problem. *Use Glass lined D.I. above 325° F.
	ALUMINUM	ALL	350				
	ST. ST.	ALL	350	M	ALL	150	
	GLASS	ALL	350*				
	TEFZEL	ALL	150				
	POLYPROP	ALL	75				
QUATENARY AMMONIUM COMPOUNDS	ST. ST.	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*				
	TEFZEL	ALL	275	M	ALL	275	
	#10	ALL	200	C	ALL	225	
	PVC	ALL	140				
RADIOACTIVE MATERIALS	ST. ST.	ALL	300	M**	*	300	*Depends on radiation exposure expressed in Rads or Roentgens per hour Contact Lancaster *Do not use if hydrocarbons are present
	GLASS	ALL	300	C		250	
	TEFZEL	*	300				
	PVDF	*	285				

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM CONC. BY WT.	MAXIMUM TEMP. °F	CODE	MAXIMUM CONC. BY WT.	MAXIMUM TEMP. °F	
RAG STOCK	ST. ST. TEFZEL #10 PVC	ALL ALL ALL ALL	350 300 200 140	R-2 M C T	ALL ALL ALL ALL	350 225 200 200	Recommendations based on no free chlorine.
RAYON SPIN BATH	GLASS TEFZEL #10	ALL ALL ALL	350* 250 200	R-2	ALL	350	Usually contains carbon bisulfide and hydrogen sulfide. *Use Glass lined D.I. above 325º F.
RIVER WATER							See "WATER, RIVER."
RUM	ALUMINUM BRONZE ST. ST. PVDF	ALL ALL ALL ALL	350 350 350 225	R-2 B WB	ALL ALL ALL	350 250 225	
SALAD DRESSING	BRONZE ALUMINUM ST. ST. TEFZEL PVDF PVC	ALL ALL ALL ALL ALL ALL	350 350 350 300 285 140	R-2 P	ALL ALL	350 180	Use travel stops with elastomer diaphragms.
SALT BRINE	ALUMINUM TEFZEL PVDF #10 #5, #11 POLYPROP PVC	ALL ALL ALL ALL ALL ALL ALL	350 300 285 200 150 150 140	R-2 M C B P	ALL ALL ALL ALL ALL	350 250 225 225 180	Recommendations based on no free chlorine
SALT BRINE, CHLORINATED	GLASS TEFZEL PVDF #12 SARAN	ALL ALL ALL ALL ALL	350* 300 285 175 120	R-2 M C	ALL ALL ALL	350 125 125	*Use Glass lined D.I. above 325º F.
SAND	#7 #5, #11	ALL ALL	200 150	T P S A	ALL ALL ALL ALL	150 150 150 150	#7 and "T" or "P" where oils are present.
SEA WATER	MONEL GLASS BRONZE POLYPROP #10 PVDF	ALL ALL ALL ALL ALL ALL	350 350 350 180 180 285	R-2 M C S	ALL ALL ALL ALL	350 300 250 180	CI, D.I. will rust and pit.
SEWAGE	C.I. TEFZEL #7, #5 PVC GLASS PVDF	ALL ALL ALL ALL ALL ALL	350 300 150 140 200 250	R-2 M T P	ALL ALL ALL ALL	350 275 200 180	If sewage contains fats or oils, use "P" or "T" with travel stops. Glass can be used to prevent accumulation of scum and grease.
SHELLAC (ALCOHOL SOLUTION)	ANY METAL GLASS	ALL ALL	350 350*	R-2 M C	ALL ALL ALL	350 275 225	If valve is allowed to dry out, use "R-2". *Use Glass lined D.I. above 325º F.
SILICA SLURRY SiO_2	#5 #11	ALL ALL	150 150	M C S A	ALL ALL ALL ALL	150 150 150 120	
SILICON TETRACHLORIDE $Si Cl_4$	GLASS TEFZEL MONEL PVDF	ALL ALL ALL ALL	350* 250 200 125	R-2	ALL	350	*Use Glass lined D.I. above 325º F.

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
SILVER CHLORIDE Ag Cl	GLASS TEFZEL PVDF #10 PVC	ALL ALL ALL ALL ALL	350* 300 285 200 140	R-2 M B T	ALL ALL ALL ALL	350 250 225 200	If hydrochloric acid solution, check hydrochloric acid recommendations. *Use Glass lined D.I. above 325° F.
SILVER CYANIDE Ag CN	GLASS TEFZEL PVDF POLYPROP #10 PVC	ALL ALL ALL ALL ALL ALL	350* 300 285 200 200 140	R-2 M B T	ALL ALL ALL ALL	350 250 225 200	If nitric acid solution, check nitric acid recommendations. *Use Glass lined D.I. above 325°F.
SILVER IODIDE Ag I	GLASS TEFZEL PVDF #10 PVC	ALL ALL ALL ALL ALL	350* 275 250 150 140	R-2 M B T	ALL ALL ALL ALL	350 250 225 200	Check Solvent for elastomer diaphragm recommendation. *Use Glass lined D.I. above 325° F.
SILVER NITRATE Ag NO_3	GLASS ST. ST. POLYPROP SARAN PVC PVDF	ALL ALL ALL ALL ALL ALL	350* 350 250 150 140 285	R-2 M B C	ALL ALL ALL ALL	350 275 250 225	*Use Glass lined D.I. above 325° F.
SIZE	ALUMINUM ST. ST. GLASS TEFZEL PVC	ALL ALL ALL ALL ALL	350 350 350* 300 140	R-2 M B P T	ALL ALL ALL ALL ALL	350 275 225 180 180	Check carrier. *Use Glass lined D.I. above 325° F.
SLUDGE, ACID	GLASS TEFZEL PVDF #10 POLYPROP	ALL ALL ALL ALL ALL	350* 275 250 200 200	R-2 M	ALL ALL	350 250	If acid is known, check acid recommendations. *Use Glass lined D.I. above 325° F.
SOAP SOLUTION	C. I. TEFZEL #10 CPVC POLYPROP PVC	ALL ALL ALL ALL ALL ALL	350 275 200 190 150 140	R-2 M C P	ALL ALL ALL ALL	350 250 225 180	
SODA ASH							See Sodium Carbonate.
SODIUM ACETATE Na C_2 H_3 O_2	C.I. GLASS TEFZEL PVDF #10 POLYPROP SARAN PVC	ALL ALL ALL ALL ALL ALL ALL ALL	350 350* 300 285 180 175 150 140	R-2 M C B T	ALL ALL ALL ALL ALL	350 250 225 225 200	*Use Glass lined D.I. above 325° F.
SODIUM BENZENE-SULFONATE Na C_6 H_5 SO_3	ST. ST. GLASS TEFZEL PVDF	ALL ALL ALL ALL	350 350* 275 225	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
SODIUM BICHROMATE $Na_2Cr_2O_7 \cdot 2H_2O$	ST. ST. GLASS TEFZEL PVDF POLYPROP	ALL ALL ALL ALL ALL	300 300 300 275 200	R-2 M B C	ALL ALL ALL ALL	300 250 225 200	

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
SODIUM BISULFITE $NaHSO_3$	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
	ST. ST.	ALL	350				
	TEFZEL	ALL	300	M	ALL	250	
	PVDF	ALL	285	B	ALL	225	
	POLYPROP	ALL	200	C	ALL	200	
	#10	ALL	180				
	PVC	ALL	140				
SODIUM CARBONATE Na_2CO_3	C.I.	ALL	350	R-2	ALL	350	
	ST. ST.	ALL	350				
	POLYPROP	ALL	200	M	ALL	250	
	#10	ALL	180	C	ALL	200	
	PVDF	ALL	285				
SODIUM CHROMATE $Na_2CrO_4 \cdot 4H_2O$	ALUMINUM	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
	ST. ST.	ALL	350				
	GLASS	ALL	350*	M	ALL	250	
	TEFZEL	ALL	300	B	ALL	225	
	PVDF	ALL	200	C	ALL	200	
	POLYPROP	ALL	150				
	PVC	ALL	140				
SODIUM CHLORATE $NaClO_3$	ST. ST.	ALL	300	R-2	ALL	300	
	GLASS	ALL	300				
	TEFZEL	ALL	250				
	PVDF	ALL	250				
SODIUM CYANIDE NaCN	ST. ST.	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
	C. I.	ALL	350	M	ALL	300	
	GLASS	ALL	350*				
	TEFZEL	ALL	300	B	ALL	250	
	PVDF	ALL	275	P	ALL	180	
	POLYPROP	ALL	200				
SODIUM GLUTAMATE $C_5H_6(NH_2)O_4Na$	ST. ST.	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
	GLASS	ALL	350*				
	TEFZEL	ALL	300	M	ALL	250	
	PVDF	ALL	275	B	ALL	225	
	PVC	ALL	140	C	ALL	225	
SODIUM HYDROXIDE Na OH	TEFZEL	50	250	R-2	50	350	*Subject to caustic embrittlernent above 40%.
	C. I.*	50	200				
	PVDF*	10	125	M	50	212	
	ST. ST.*	50	180	B	50	212	
	#10	50	180	C	50	200	
	#7	50	180	T	50	160	
	POLYPROP	50	175				
	PVC	ALL	140				
SODIUM HYPOCHLORITE Na OCI	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325°F. **For neutral or alkaline sclutions.
	TEFZEL	ALL	300				
	PVDF	ALL	150	C**	20	150	
	#10	ALL	200	M	20	150	
	CPVC	ALL	185				
	PVC	ALL	75				
SODIUM LIGNOSULFONATE	GLASS	ALL	350*	R-2	ALL	350	*Use Glass lined D.I. above 325°F.
	TEFZEL	ALL	300				
	PVDF	17%	200	M	ALL	250	
	#10	ALL	200	B	ALL	225	
	PVC	ALL	140	C	ALL	225	
SODIUM METASILICATE Na_2SiO_3	C. I.	ALL	350	R-2	ALL	350	
	ST. ST.	ALL	350				
	TEFZEL	ALL	300	M	ALL	250	
	PVDF	ALL	275	B	ALL	225	
	PVC	ALL	140	C	ALL	225	
				T	ALL	200	

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
SODIUM PERBORATE $NaBO_2 \cdot H_2O_2 \cdot 3\ H_2O$	ALUMINUM	ALL	175	R-2	ALL	175	C. I. may be used. Sodium perborate is unstable above 175°F.
	ST. ST.	ALL	175				
	TEFZEL	ALL	175	M	ALL	175	
	PVDF	ALL	175	B	ALL	175	
	GLASS	ALL	175	C	ALL	175	
	PVC	ALL	140				
SODIUM PERCHLORATE $Na\ ClO_4 \cdot H_2O$	ST. ST.	ALL	125	R-2	ALL	125	Sodium perchlorate is unstable above 125°F.
	TEFZEL	ALL	125				
	PVDF	ALL	125				
	GLASS	ALL	125				
	PVC	ALL	125				
SODIUM PEROXIDE Na_2O_2	ALUMINUM	ALL	125	R-2	ALL	125	Sodium peroxide is unstable above 125°F.
	ST. ST.	ALL	125				
	TEFZEL	ALL	125	C	ALL	125	
	PVDF	ALL	125	M	ALL	125	
	GLASS	ALL	125				
	PVC	ALL	125				
SODIUM PERSULFATE $Na_2S_2O_8$	ST. ST.	ALL	150	R-2	ALL	150	Sodium persulfate is unstable above 150º F.
	TEFZEL	ALL	150				
	PVDF	ALL	150	M	ALL	150	
	GLASS	ALL	150	B	ALL	150	
	PVC	ALL	140	C	ALL	150	
SODIUM SALTS OTHER THAN THOSE LISTED HERE	C. I.	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*				
	TEFZEL	ALL	300	M	ALL	275	
	PVDF	ALL	285	B	ALL	250	
	CPVC	ALL	190	C	ALL	225	
	#10	ALL	180	T	ALL	200	
	POLYPROP	ALL	175				
	PVC	ALL	140				
SODIUM SILICOFLUORIDE $Na_2\ Si\ F_6$	ST. ST.	ALL	350	R-2	ALL	350	
	TEFZEL	ALL	300				
	PVDF	ALL	275	M	ALL	250	
	#10	ALL	200	C	ALL	225	
	PVC	ALL	140	T	ALL	200	
SODIUM STEARATE $C_{17}H_{35}\ COONa$	ANY METAL	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*	M	ALL	300	
	TEFZEL	ALL	300				
	PVDF	ALL	280	B	ALL	250	
	POLYPROP	ALL	200	C	ALL	200	
				P	ALL	180	
SODIUM SULFATE (GLAUBER'S SALT) $Na_2\ SO_4$							See "SODIUM SALTS."
SODIUM SULFIDE Na_2S	C. I.	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	ST. ST.	ALL	350	M	ALL	300	
	GLASS	ALL	350*				
	TEFZEL	ALL	300	B	ALL	250	
	PVDF	ALL	280				
	POLYPROP	ALL	200				
SODIUM SULFITE $Na_2\ SO_3$	ST. ST.	ALL	350	R-2	ALL	350	
	C. I.	ALL	350				
	TEFZEL	ALL	300	M	ALL	250	
	PVDF	ALL	275	B	ALL	225	
	#10	ALL	200	C	ALL	225	
	POLYPROP	ALL	150	T	ALL	200	
	PVC	ALL	140				

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
SODIUM THIOSULFATE $Na_2S_2O_3 \cdot 5H_2O$ M.P.118°F.	ANY METAL GLASS TEFZEL PVDF POLYPROP PVC	ALL ALL ALL ALL ALL ALL	350 350* 300 275 200 150	R-2 M B T WB	ALL ALL ALL ALL ALL	350 300 250 200 200	*Use Glass lined D.I. above 325° F.
SOFT DRINKS	BRONZE ST. ST. PVDF PVC	ALL ALL ALL ALL	350 350 285 140	R-2 H B WB	ALL ALL ALL ALL	350 250 250 225	
SORBIC ACID $C_6 H_8 O_2$	ST. ST. GLASS TEFZEL PVC	ALL ALL ALL ALL	350 350* 300 140	R-2 M B T	ALL ALL ALL ALL	350 225 225 200	Check solvent for correct elastomer diaphragm. *Use Glass lined D.I. above 325° F.
SOUP	ALUMINUM ST. ST. GLASS PVDF	ALL ALL ALL ALL	350 350 350* 285	R-2 H B WB	ALL ALL ALL ALL	350 250 250 175	*Use Glass lined D.I. above 325° F.
SOY BEAN OIL							See "OIL, SOY BEAN."
SPIRITS (ALCOHOLIC BEVERAGES)	BRONZE ST. ST. TEFZEL PVC PVDF	ALL ALL ALL ALL ALL	350 350 300 140 200	R-2 B WB	ALL ALL ALL	350 250 225	
STANNIC CHLORIDE $Sn Cl_4$	GLASS TEFZEL PVDF #10 PVC POLYPROP	ALL ALL ALL ALL ALL ALL	350* 300 285 200 140 175	R-2 M	ALL ALL	350 200	Decomposes in hot water. *Use Glass lined D.I. above 325° F.
STANNOUS FLUORIDE $Sn F_2$	ST. ST. TEFZEL #10 PVC	ALL ALL ALL ALL	350 212 200 140	R-2 M B C	ALL ALL ALL ALL	350 150 150 100	
STARCH SOLUTIONS $(C_6 H_{10} O_5)x$	ANY METAL GLASS TEFZEL #10 POLYPROP PVDF	ALL ALL ALL ALL ALL ALL	350 350* 300 200 200 200	R-2 M B C T	ALL ALL ALL ALL ALL	350 275 250 225 200	C. I. will rust. Usually a hot service. *Use glass lined D.I. above 325° F.
STEAM STERILIZATION					* * * *		Consult Factory
STEARIC ACID $CH_3(CH_2)_{16}CO_2H$	ALUMINUM ST. ST. GLASS TEFZEL PVDF CPVC PVC POLYPROP	ALL ALL ALL ALL ALL ALL ALL ALL	350 350 350* 300 285 190 140 150	R-2 P	ALL ALL	350 180	If in solution check solvent. *Use Glass lined D.I. above 325° F.

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
STYRENE $C_6H_5CHCH_2$	C. I. ALUMINUM BRONZE ST. ST. PVDF	ALL ALL ALL ALL ALL	350 350 350 350 180	R-2	ALL	350	
SUGAR SLURRY	C. I. ST. ST. #5, #11	ALL ALL ALL	250 250 150	B C S	ALL ALL ALL	200 200 160	Use of C. I. or ST. ST. depends on velocity, as service is abrasive.
SUGAR SOLUTION	C.I. ALUMINUM BRONZE ST. ST. GLASS TEFZEL PVDF	ALL ALL ALL ALL ALL ALL ALL	350 350 350 350 350* 300 285	R-2 H B M WB	ALL ALL ALL ALL ALL	350 200 200 200 180	*Use Glass lined D.I. above 325° F.
SULFAMIC ACID $HSO_3 NH_2$	GLASS TEFZEL POLYPROP #10 PVC	30 30 30 30 30	350* 250 200 200 140	R-2 M B C	30 30 30 30	350 225 212 212	*Use Glass lined D.I. above 325° F.
SULFATE LIQUOR	ST. ST. TEFZEL #10 POLYPROP PVC	ALL ALL ALL ALL ALL	350 300 200 175 140	R-2 M B C	ALL ALL ALL ALL	350 250 225 225	
SULFONATED DETERGENTS	C. I. BRONZE ST. ST. TEFZEL PVC	ALL ALL ALL ALL ALL	350 350 350 275 140	R-2 M C P	ALL Dilute ALL ALL	350 275 225 180	
SULFUR DIOXIDE GAS (WET) SO_2	GLASS ST. ST. TEFZEL PVDF #10 CPVC	ALL ALL ALL ALL ALL ALL	350* 350 250 175 180 140	R-2 C	ALL 10	350 80	*Use Glass lined D.I. above 325° F.
SULFUR DIOXIDE SOLUTION $SO_2 + H_2O$	GLASS ST. ST. TEFZEL PVDF #10 CPVC	ALL ALL ALL ALL ALL ALL	350* 350 250 200 180 140	R-2 M B C	ALL ALL ALL 10	350 100 100 100	*Use Glass lined D.I. above 325° F.
SULFUR SLURRY	C. I. D. I. ST. ST. (316)	ALL ALL ALL	350 350 350	M B C	ALL ALL ALL	250 225 225	Molten sulfur, check with Lancaster.
SULFURIC ACID $H_2 SO_4$	GLASS TEFZEL PVDF CN7M #10 POLYPROΔ CPVC PVC	ALL ALL 93 ALL 50 80 93 93	325*†† 300 200 175 170 100 73 73	R-2 V C B M	ALL 95 80 60 25	350 158 150 150 150	66° Baume is 93%. *Use Glass lined D.I. above 325° F. ΔPolyprop can be used at higher temperatures at lower concentrations. ††If concentration 50% or more, max. temp. 350°F

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
SULFURIC ACID FUMING (OLEUM) $H_2SO_4 + SO_3$	GLASS CN7M TEFZEL	ALL ALL ALL	325 150 150	R-2 V	ALL 20	325 130	Sometimes expressed as sulfuric acid over 100%.
SULFUROUS ACID H_2SO_3	GLASS TEFZEL CN7M ST. ST. PVDF POLYPROP	ALL ALL ALL ALL ALL ALL	325 230 200 150 200 150	R-2 B	ALL 50	325 150	Do not use soft rubber or neoprene.
SYNTHETIC DETERGENTS	C. I. BRONZE ST. ST. TEFZEL PVC	ALL ALL ALL ALL ALL	350 350 350 250 140	R-2 M C P	ALL Dilute ALL ALL	350 250 225 180	
SYRUP	BRONZE ST. ST. GLASS TEFZEL PVC PVDF	ALL ALL ALL ALL ALL ALL	350 350 350* 300 140 275	R-2 B WB	ALL ALL ALL	350 250 225	*Use Glass lined D.I. above 325° F.
TALC SLURRY $Mg_3S_{14}O_{10}(OH)_2$	GLASS #5, #11	ALL ALL	350* 150	R-2 M C	ALL ALL ALL	350 275 225	*Use Glass lined D.I. above 325° F.
TALLOW	C.I. ALUMINUM BRONZE TEFZEL PVDF	ALL ALL ALL ALL ALL	350 350 350 300 285	R-2 V P	ALL ALL ALL	350 200 150	Use travel stops with elastomer diaphragms.
TANNIC ACID $C_{14}H_{10}O_9$	ST. ST. GLASS TEFZEL PVDF CPVC POLYPROP PVC	ALL ALL ALL ALL ALL ALL ALL	350 350* 275 225 190 150 140	R-2 M C P	ALL ALL ALL ALL	350 275 225 180	Check solvent for elastomer diaphragm recommendation. *Use Glass lined D.I. above 325° F.
TARTARIC ACID $[CH(OH)COOH]_2$	ST. ST. GLASS TEFZEL PVDF #10 POLYPROP PVC	ALL ALL ALL ALL ALL ALL ALL	350 350* 275 250 200 150 140	R-2 M B C P	ALL ALL ALL ALL ALL	350 225 200 200 180	*Use Glass lined D.I. above 325° F.
TEXTILE DYES	ALUMINUM GLASS ST. ST. TEFZEL PVC	ALL ALL ALL ALL ALL	350 350* 350 250 140	R-2 M B C T	ALL ALL ALL ALL ALL	350 250 225 225 200	Aluminum suitable for all dyes except those which require high alkalinity. Check carrier. *Use Glass lined D.I. above 325° F.
THIOGLYCOLIC ACID $HSCH_2COOH$	ALUMINUM ST. ST. GLASS TEFZEL PVDF PVC	ALL ALL ALL ALL ALL ALL	350 350 350* 250 175 140	R-2 M B	ALL ALL ALL	350 250 225	*Use Glass lined D.I. above 325° F.
TIN TETRACHLORIDE $SnCl_4$							See "STANNIC CHLORIDE".
TIN PLATING SOLUTION	GLASS TEFZEL #10 PVC PVDF	ALL ALL ALL ALL ALL	350* 250 200 140 200	R-2 M B C	ALL ALL ALL ALL	350 250 225 225	*Use Glass lined D.I. above 325° F.

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
TITANIUM DIOXIDE SLURRY TiO_2	TEFZEL	ALL	250	M	ALL	250	Check carrier. TEFZEL also recommended if high temperature present.
	#5	ALL	150	C	ALL	225	
	#11	ALL	150	T	ALL	180	
	#7	ALL	150	S	ALL	150	
				A	ALL	120	
T. N. T. SLURRY $CH_3C_6H_2(NO_2)_3$ M. P.178° F	ST. ST.	ALL	350	R-2	ALL	350	TEFZEL and R-2 for hot service. Check carrier. *Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*				
	TEFZEL	ALL	275	M	ALL	125	
	D. I.	ALL	125	T	ALL	125	
	C. I.	ALL	125	P	ALL	125	
TOLUENE $CH_3C_6H_5$	ANY METAL	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*				
	TEFZEL	ALL	250	V	ALL	100	
	PVDF	ALL	170				
TOMATO PASTE	ST. ST.	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*				
	TEFZEL	ALL	275	P	ALL	180	
	PVDF	ALL	212	B	ALL	100	
TOOTH PASTE	ALUMINUM	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	BRONZE	ALL	350				
	ST. ST.	ALL	350	B	ALL	250	
	GLASS	ALL	350*	WB	ALL	225	
	TEFZEL	ALL	300				
	POLYPROP	ALL	200				
	PVDF	ALL	250				
TRICHLORO-ETHYLENE $CHCICCl_2$	ANY METAL	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*				
	TEFZEL	ALL	275				
	PVDF	ALL	150				
TRIETHANOLAMINE $(CH_2OHCH_2)_3N$	C. I.	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	D. I.	ALL	350				
	GLASS	ALL	350*	M	ALL	250	
	TEFZEL	ALL	250	C	ALL	150	
				T	ALL	150	
TRIETHYLENE GLYCOL $C_6H_{14}O_4$	ANY METAL	ALL	350	R-2	ALL	350	
				M	ALL	250	
				B	ALL	225	
				C	ALL	225	
				P	ALL	180	
TRINITROTOLUENE							See "T.N.T. SLURRY"
TURPENTINE	ANY METAL	ALL	350	R-2	ALL	350	Use travel stops with elastomer diaphragms.
	TEFZEL	ALL	275				
	PVDF	ALL	285	P	ALL	160	
				V		160	
U. D. M. H.* $(CH_3)_2NNH_2$	ST. ST.	ALL	350	R-2	ALL	350	*Unsymmetrical dimethylhydrazine. **Use Glass lined D.I. above 325° F.
	GLASS	ALL	350**				
	TEFZEL	ALL	200				
URANIUM ORES	#7	ALL	200	M	ALL	200	
	#5, #11	ALL	150	C	ALL	200	
				S	ALL	150	
URANIUM SALTS	ST. ST.	ALL	350	R-2	ALL	350	TEFZEL and KYNAR may also be used when plastics are desired. *Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*				
	#10	ALL	200	M	ALL	250	
	#7	ALL	200	C	ALL	200	
	#5, #11	ALL	150	T	ALL	180	

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM CONC. BY WT.	MAXIMUM TEMP. °F	CODE	MAXIMUM CONC. BY WT.	MAXIMUM TEMP. °F	
UREA $CO(NH_2)_2$	ANY METAL TEFZEL PVDF POLYPROP CPVC PVC	ALL ALL ALL 50 ALL ALL	350 275 200 200 190 140	R-2 M C T P	ALL ALL ALL ALL ALL	350 250 225 200 180	
UREA AMMONIA SOLUTIONS	C. I. D .I. ALUMINUM	ALL ALL ALL	200 200 200	M T	ALL ALL	200 150	C.I. or D.I. may corrode
VACUUM	To 0.1 micron – any standard body is suitable, and any elastomer weir type diaphragm to 12 inches and to 200°F (check temp. limit) is suitable. For R-2 (TFE) diaphragms and higher vacuum consult the factory. Specify "VACUUM" when ordering.						
VARNISH	GLASS PVDF	ALL ALL	350* 250	R-2	ALL	350	Any smooth metal body is satisfactory if pipeline is not allowed to dry out. *Use Glass lined D.I. above 325° F.
VASELINE	ALUMINUM BRONZE ST. ST. GLASS PVDF	ALL ALL ALL ALL ALL	350 350 350 350* 285	R-2 P	ALL ALL	350 180	Use travel stops with elastomer diaphragms. *Use Glass lined D.I. above 325° F.
VEGETABLE OILS							See "OIL, VEGETABLE."
VINEGAR	ST. ST. GLASS TEFZEL CPVC POLYPROP PVC PVDF	ALL ALL ALL ALL ALL ALL ALL	350 350* 275 190 175 140 225	R-2 H M B C	ALL ALL ALL ALL ALL	350 200 200 150 125	*Use Glass lined D.I. above 325° F.
VINYL CHLORIDE MONOMER CH_2 CHCI	ST. ST. GLASS TEFZEL PVDF	ALL ALL ALL ALL	350 350* 225 200	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
VINYL LATEX	GLASS TEFZEL PVDF	ALL ALL ALL	350* 250 200	R-2	ALL	350	Glass and "R-2" best choice because of sticking when lines dry out. *Use Glass lined D.I. above 325° F.
WATER, ACID	TEFZEL PVDF POLYPROP #7, #10 PVC	ALL ALL ALL ALL ALL	300 275 200 200 140	R-2 M C B P	ALL ALL ALL ALL ALL	300 275 225 200 180	Check type of acid and concentration.
WATER, ALKALINE	TEFZEL PVDF POLYPROP #7, #10 #5 PVC	ALL ALL ALL ALL ALL ALL	300 250 200 200 150 140	R-2 M C P	ALL ALL ALL ALL	300 275 225 180	C. I. if high alkaline.

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
WATER, DEIONIZED	ST. ST.	ALL	300	R-2	ALL	300	
	TEFZEL	ALL	300	H	ALL	300	
	POLYPROP	ALL	200	M	ALL	300	
	SARAN	ALL	150	B	ALL	250	
	PVC	ALL	150	C	ALL	225	
	PVDF	ALL	250	S	ALL	180	
WATER, DISTILLED	ST. ST.	ALL	350	R-2	ALL	350	Check amount of impurities allowed.
	TEFZEL	ALL	300	H	ALL	275	
	POLYPROP	ALL	200	M	ALL	275	
	PVC	ALL	140	B	ALL	250	
	PVDF	ALL	285	C	ALL	225	
WATER, GENERAL	C. I.	ALL	350	R-2	ALL	350	
	BRONZE	ALL	350	H	ALL	250	
	ALUMINUM	ALL	350	M	ALL	250	
	TEFZEL	ALL	300	B	ALL	225	
	PVDF	ALL	285	C	ALL	225	
	POLYPROP	ALL	200	P	ALL	180	
	PVC	ALL	140				
WATER, HEAVY D_2O	ST. ST.	ALL	350	R-2	ALL	350	Elastomer diaphragms may contaminate. "M" possible, let user decide. *Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*				
	ALUMINUM	ALL	350	M	ALL	300	
	PVDF	ALL	225	C	ALL	225	
WATER, RIVER	C.I.	ALL	350	R-2	ALL	350	*If laden with silt or sand use #5 #11.
	D.I.	ALL	350	M	ALL	275	
	TEFZEL	ALL	300	B	ALL	250	
	#10*	ALL	200	C	ALL	225	
	PVC	ALL	140	P	ALL	180	
	PVDF	ALL	285				
WATER, SEA							See Sea Water.
WAX	ANY METAL	ALL	350	R-2	ALL	350	Use travel stops with elastomer diaphragms. *Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*				
				P	ALL	180	
WHISKEY	ALUMINUM	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	BRONZE	ALL	350				
	ST. ST.	ALL	350	B	ALL	250	
	GLASS	ALL	350*	WB	ALL	225	
	CPVC	ALL	190				
	PVDF	ALL	200				
WHITE WATER (SULFATE LIQUOR)	C. I.	ALL	350	R-2	ALL	350	
	ST. ST.	ALL	350				
	TEFZEL	ALL	275	M	ALL	275	
	#10	ALL	200	C	ALL	225	
				B	ALL	200	
WORT	BRONZE	ALL	350	R-2	ALL	350	
	ST. ST.	ALL	350				
				B	ALL	250	
				WB	ALL	225	
XYLENE C_8H_{10}	ANY METAL	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	GLASS	ALL	350*				
	TEFZEL	ALL	230*	V	ALL	100	
	PVDF	ALL	175				
YEAST	ALUMINUM	ALL	350	R-2	ALL	350	*Use Glass lined D.I. above 325° F.
	BRONZE	ALL	350				
	ST. ST.	ALL	350	B	ALL	250	
	GLASS	ALL	350*	WB	ALL	200	
	TEFZEL	ALL	300				

SERVICE	BODY			DIAPHRAGM			REMARKS
	MATERIAL	MAXIMUM		CODE	MAXIMUM		
		CONC. BY WT.	TEMP. °F		CONC. BY WT.	TEMP. °F	
ZINC ACETATE $Zn(C_2H_3O_2)_2 \cdot 2H_2O$	ST. ST. GLASS TEFZEL #10 PVC PVDF	ALL ALL ALL ALL ALL ALL	350 350* 300 200 140 250	R-2 M B	ALL ALL ALL	350 200 200	*Use Glass lined D.I. above 325° F.
ZINC CHLORIDE $ZnCl_2$	ST. ST. GLASS TEFZEL PVDF #10 PVC	ALL ALL ALL ALL ALL ALL	350 350* 300 285 200 140	R-2 M B C T	ALL ALL ALL ALL ALL	350 200 200 180 150	Check carrier. *Use Glass lined D.I. above 325° F.
ZINC OXIDE ZnO	TEFZEL #5 #11 PVDF	ALL ALL ALL ALL	250 150 150 250	M C S	ALL ALL ALL	250 225 180	Slurry
ZINC PLATING SOLUTION	TEFZEL #10 PVC PVDF	ALL ALL ALL ALL	300 200 140 210	R-2 M B C	ALL ALL ALL ALL	300 180 180 180	
ZINC SULFIDE ZnS	ST. ST. GLASS TEFZEL PVDF #10	ALL ALL ALL ALL ALL	350 350* 300 285 200	R-2 M B	ALL ALL ALL	350 275 250	*Use Glass lined D.I. above 325° F.
ZINC SULFATE $ZnSO_4 \cdot 7H_2O$	ST. ST. GLASS TEFZEL PVDF #10 POLYPROP CPVC PVC	ALL ALL ALL ALL ALL ALL ALL ALL	350 350* 300 285 200 200 190 140	R-2 M B C T	ALL ALL ALL ALL ALL	350 250 225 225 200	*Use Glass lined D.I. above 325° F.

Fax to: Customer Service, ITT Engineered Valves **Fax:** 717-291-2025

From: _____ Date: _____

Company: _____ Page: _____ of _____

Phone: _____ P.O.#: _____

WEIR DIAPHRAGM VALVE

FEATURES (BLOCK)	CODE
SIZE (A)	
BODY (B)	
DIAPHRAGM (D)	
BONNET (E)	
BONNET SEAL MATERIAL (F)	
OPTIONAL BONNET INTERNALS (H)	
OPTIONAL BOLTING (G)	
YOKE (K)	
LOCKING DEVICE (L)	
EXTENDED STEM (M)	
CHAIN (CH)	
OPTIONAL COATINGS (N)	
ADAPTED FOR BUT LESS ITT AIRMOTOR (P2)	
NON ITT ACTUATION (R)	
ACTUATOR (S)	
AIR MOTOR (P)	
OPTIONAL AIRMOTOR COVERS (P1)	
ADVANTAGE ACTUATOR (Q)	
POSITION INDICATOR (T)	
MECHANICAL ACCESSORIES FOR ACTUATORS (V)	
ACT. HARDWARE OPTIONS (U)	
SOLENOID VALVE (W)	
SOLENOID VOLTAGE (X)	
ADAPTED FOR BUT LESS SWITCHES (Y3)	
LIMIT SWITCHES (Y)	
OPTIONAL LIMIT SWITCH POSITION (Y1)	
LIMIT SWITCHES, YOKE MOUNTED (Y2)	
ADV. SWITCH PACK SP-2 (Z)	
ADV. SWITCH PACK SP-2.5 (Z5)	
ADV. SWITCH PACK SP-3 (Z3)	
POSITIONER (AA)	
SIGNAL RANGE (AB)	
FILTER REGULATOR (AC)	
TRANSDUCER (AD)	
SPEED CONTROL (AE)	
JUNCTION BOX (AF)	
SPECIAL END PREPARATION (BB)	
DRAINS PORTS (C)	
CUSTOMER HOLD POINTS (CHP)	
SPECIAL QUALITY DOCUMENTATION (SQD)	
SPECIAL SERVICE/PREPARATION (SPSERV)	

STRAIGHTWAY DIAPHRAGM VALVE

FEATURES (BLOCK)	CODE
SIZE (A)	
BODY (B)	
SPECIAL END PREPARATION (BB)	
DIAPHRAGM (D)	
BONNET (E)	
OPTIONAL BONNET SEALS (F)	
CHAIN (CH)	
OPTIONAL BONNET INTERNALS (H)	
OPTIONAL BOLTING (G)	
YOKE (K)	
LOCKING DEVICE (L)	
EXTENDED STEM (M)	
OPTIONAL COATINGS (N)	
ADAPTED FOR BUT LESS ITT AIRMOTOR (P2)	
NON ITT ACTUATION (R)	
ACTUATOR (S)	
AIR MOTOR (P)	
OPTIONAL AIRMOTOR COVERS (P1)	
POSITION INDICATOR (T)	
MECHANICAL ACCESSORIES FOR ACTUATORS (V)	
ACT. HARDWARE OPTIONS (U)	
SOLENOID VALVE (W)	
SOLENOID VOLTAGE (X)	
ADAPTED FOR BUT LESS SWITCHES (Y3)	
LIMIT SWITCHES (Y)	
OPTIONAL LIMIT SWITCH POSITION (Y1)	
LIMIT SWITCHES, YOKE MOUNTED (Y2)	
POSITIONER (AA)	
SIGNAL RANGE (AB)	
FILTER REGULATOR (AC)	
TRANSDUCER (AD)	
SPEED CONTROL (AE)	
JUNCTION BOX (AF)	
CUSTOMER HOLD POINTS (CHP)	
SPECIAL QUALITY DOCUMENTATION (SQD)	
SPECIAL SERVICE/PREPARATION (SPSERV)	

For features not detailed on the following pages, contact the ITT Engineered Valves Customer Service Department at 800-366-1111 or (717) 291-1901.

WEIR DIAPHRAGM VALVES

Weir Bodies, Unlined (Block B)

Code	Body Material	Size
SCREWED		
2401	Iron	1/2-3"
2402	Bronze	1/2-3"
2403	Stainless Steel (316L)	1/2-3"
2405	Steel (WCB)	1-3"
2406	PVC	1/2-3"
2407	CN7M	1/2-3"
2408	Monel	1/2-3"
2410	Hastelloy	1/2-3"
2412	Ductile iron	1-3"
2414	PP (FDA)	1/2-3"
2416	CPVC	1/2-2"
2417**	PVDF (FDA)	1/2-2"
FLANGED		
2431	Cast Iron	1/2-12"
2432	Bronze	1/2-6"
2433	Stainless Steel (316)	1/2-8"
2433R	Stainless Steel (316)	1/2-8"
2435	Cast Steel	1/2-8"
2435R	Cast Steel	1/2-8"
2436	Solid PVC	1/2-4"
2437	CN7M	1/2-8"
2437R	CN7M	1/2-8"
2438	Monel	1/2-8"
2438R	Monel	1/2-8"
2440	Hastelloy	1/2-8"
2440R	Hastelloy	1/2-8"
2441	Ductile Iron	1/2-8"
2442	Solid CPVC	1/2-2"
2444	Solid PP (FDA)	1/2-4"
2447**	Solid PVDF (FDA)	1/2-4"
SOCKET SOLDER		
2456	Bronze	1/2-2"
SOCKETWELD		
2424	Solid PP (FDA)	1/2-2"
2427**	Solid PVDF (FDA)	1/2-2"
2451	Solid PVC	1/2-2"
2463	Solid CPVC	1/2-2"
2470	Stainless Steel (316L)	1/2-3"
2472	Cast Steel	1/2-3"
2474	CN7M	1/2-3"
BUTTWELD (316L)		
2464	Stainless Steel Sch. 5	1/2-8"
2465	Stainless Steel Sch. 10	1/2-8"
2466	Stainless Steel Sch. 40	1/2-8"
SPIGOTWELD		
2443	CPVC (IPS)	1/2-2"
2484	Solid PP (FDA, DIN)	1/2-2"
2486	PVC (IPS)	1/2-2"
2487**	Solid PVDF (FDA, DIN)	1/2-2"

Weir Bodies, Lined (Block B)

Code	Lining Material	Size
FLANGED	CAST IRON	
2501	Neoprene No. 7	1/2-12"
2511	Glass Lined (FDA)	1/2-8"
2516	Soft Rubber No. 5	1/2-12"
2521	Hard Rubber No. 10	1/2-12"
2522	Butyl Lined No. 16	1/2-12"
2523	Hypalon Lined No. 9	1/2-12"
2536	PVC Lined	3/4-6"
2537	Saran Lined	3/4-8"
2538	PP Lined (FDA)	3/4-8"
2539**	PP Lined (FDA)	3/4-8"
2529	Tefzel Lined	3/4-8"
2530	Hard Rubber No. 12	1/2-12"
2575**	PVDF Lined (FDA)	3/4-8"
FLANGED	DUCTILE IRON	
2544	Glass Lined (FDA)	1/2-8"
2550	Neoprene No. 7	1/2-8"
2551	Soft Rubber No. 5	1/2-8"
2552	Hard Rubber No. 10	1/2-8"
2555**	PVDF Lined (FDA)	3/4-8"
2557	Saran Lined	3/4-8"
2558	PP Lined (FDA)	3/4-8"
2559	Tefzel Lined	3/4-8"
FLANGED	CAST STEEL	
2545	Tefzel Lined	3/4-8"
2546	PP Lined (FDA)	3/4-8"
2547	Saran Lined	3/4-8"
2548	PVDF Lined (FDA)	3/4-8"
2563	Hard Rubber No. 10	1/2-8"
2564	Hard Rubber No. 12	1/2-8"

Angle Bodies, Unlined (Block B)

Code	Body Material	Size
FLANGED		
2611	Cast Iron	1/2-8"
2612	Bronze	1/2-4"
2613	Stainless Steel (316)	1/2-4"

Angle Bodies, Lined (Block B)

Code	Lining Material	Size
FLANGED		
2621	Neoprene No. 7	1/2-8"
2622	Glass Lined (FDA)	1/2-8"
2623	Soft Rubber No. 5	1/2-8"
2624	Hard Rubber No. 10	1/2-8"

Diaphragms (Block D) WEIR TYPE

Code	Material	Size
A	Soft Natural Rubber (FDA)	3/4-4"
B	Black Butyl (FDA)	1/2-12"
C	Hypalon	1/2-12"
M	EPDM	1/2-12"
P	BUNA N (FDA)	1/2-12"
S	Natural Rubber	1/2-12"
T	Neoprene	1/2-12"
WB	White Butyl (FDA)	1/2-6"
DP	BUNA N Direct Loaded (FDA)	1/2-3"
V	Viton	1/2-6"
R2	PTFE (FDA)	1/2-10"

Bonnets, Handwheel (Block E)

Code	Bonnet Description
CAST IRON	
902	Indicating (6" - 12")
902S	Indicating - Sealed (6" - 12")
903	Indicating with Travel Stop (1/2" - 12")
903S	Indicating with Travel Stop - Sealed (1/2" - 12")
STAINLESS STEEL (316)	
912	Indicating (6" - 12")
912S	Indicating - Sealed (6" - 12")
913	Indicating with Travel Stop (1/2" - 12")
913S	Indicating with Travel Stop - Sealed (1/2" - 12")
POLYPROPYLENE (PP)	
923	Indicating with Travel Stop (1/2" - 4")
923S	Indicating with Travel Stop - Sealed (1/2" - 4")
BRONZE	
933	Indicating with Travel Stop (1/2" - 4")
933S	Indicating with Travel Stop - Sealed (1/2" - 4")
DUCTILE IRON	
942	Indicating (6" - 8")
942S	Indicating - Sealed (6" - 8")
943	Indicating with Travel Stop (1/2" - 8)
943S	Indicating with Travel Stop - Sealed (1/2" - 8")
POLYARYLSULFONE (PAS)	
963	Indicating with Travel Stop (1/2" - 4")
963S	Indicating with Travel Stop - Sealed (1/2" - 4")

Bonnets, Chainwheel (Block E)

Code	Bonnet Description
CAST IRON	
905	Indicating with Travel Stop (1/2" - 12")
905S	Indicating with Travel Stop - Sealed (1/2" - 12")
STAINLESS STEEL (316)	
915	Indicating with Travel Stop (1/2" - 12")
915S	Indicating with Travel Stop - Sealed (1/2" - 12")
BRONZE	
935	Indicating with Travel Stop (1/2" - 4")
935S	Indicating with Travel Stop - Sealed (1/2" - 4")
DUCTILE IRON	
945	Indicating with Travel Stop (1/2" - 6")
945S	Indicating with Travel Stop - Sealed (1/2" - 6")

* R - Raised Face
** Unpigmented

WEIR DIAPHRAGM VALVES

Actuated Bonnets (Block E)

Code	Bonnet Description
STAINLESS STEEL	
(Option for Dia-Flo® Actuator & Non-ITT Actuator)	
31	Actuated
31S	Actuated - Sealed
BRONZE	
(Option for Dia-Flo® Actuator & Non-ITT Actuator)	
33	Actuated
33S	Actuated - Sealed
DUCTILE IRON	
(Standard for Dia-Flo® Actuator, Non-ITT Actuator and 3" - 4" Advantage® Actuator)	
34	Actuated (1/2" - 10")
34S	Actuated - Sealed (1/2" - 10")
PLASTIC PAS	
(Standard for Advantage® Actuator)	
36	Actuated (1/2" - 2")
36S	Actuated - Sealed (1/2" - 2")
CAST IRON	
40	Direct Load (1/2" - 3")
DUALRANGE® CONTROL	
(Option for Dia-Flo® Actuator)	
84	Dualrange (1" - 6")
84S	Dualrange - Sealed (1" - 6")

Bonnet Seal Materials (Block F)

Code	Seal Material
S1	EPDM
S2	FKM

Optional Bonnet Internals (Block H)

Code	Description
M5	Stainless Steel Stem
M6	Cast Iron Compressor
M7	Bronze Compressor
M8	PVDF Coated Cast Iron Compressor
M9	Stainless Steel Bushing
M10	Stainless Steel Tube Nut
M14	Clear Cap (6" only)

Optional Bolting (Block G)

Code	Description
B1	Stainless Steel
B316	Stainless Steel (316)

Yoke (Block K)

Code	Description
Y	Yoke Supplied

Locking Device (Block L)

Code	Description
LD	Locking Device

Extended Stem (Block M)

Code	Description
EXTSTEM	Extended Stem*

Optional Coatings (Block N)

Code	Description
C1	PVDF Coated Topworks
C2	PVDF Coated Body
C3	PVDF Coated Body & Topworks
C4	White Epoxy Coated Topworks
C5	White Epoxy Coated Body
C6	White Epoxy Coated Body & Topworks
C7	Nylon Coated Topworks**
C10	Black Epoxy**

Adapted for but less ITT Actuation (Block P2)

Code	Description
Y	Adapted for but less ITT Actuator

Non ITT Actuation (Block R & S)

Code	Description
POF	Mounted Non-ITT Customer Supplied Actuator
POA	Adapted For But Less Customer Supplied Actuator
POM	Mounted Non-ITT Actuator Supplied by ITT

Dia-Flo® Actuators Fail Open (Block P) (Spring-to-Open - Air-to-Close)

Code	Actuator Size
3112	#12
3125	#25
3150	#50
3175	#75
31101	#101
31130	#130
31250	#250

Dia-Flo® Actuators Fail Closed (Block P) (Air-to-Open - Spring-to-Close)

Code	Spring Description
SIZE #12	
3213	88 Spring
3214	88 & 89 Springs
3215	88 & Raymond Springs
3216	89 Spring
SIZE #25	
3226	101 Spring
3227	101 & 102A Springs
3228	102A Spring
SIZE #50	
3251	101 Spring
3252	101 & 102A Springs
3253	97 Spring
3254	96 Spring
3255	96 & 97 Springs
3256	102A Spring
SIZE #75	
3274	96 Spring
3276	96 & 97 Springs
3277	97 & 98 Springs
3278	96 & 98 Springs
3279	96, 97 & 98 Springs
SIZE #101	
32102	96 Spring
32103	98 Spring
32104	96 & 97 Springs
32105	96 & 98 Springs
32106	97& 98 Springs
32107	96, 97, & 98 Springs
32108	130 Spring
32109	97 Spring
SIZE #130	
32131	97 Spring
32132	96 Spring
32133	98 Spring
32134	96 & 97 Springs
32135	96 & 98 Springs
32136	97 & 98 Springs
32137	96, 97, & 98 Springs
32138	130 Spring
SIZE #250	
32251	129 & 130 Springs
32252	129 Spring
32253	130 Spring

Dia-Flo® Actuators Double Acting (Block P) (Air-to-Open - Air-to-Close)

Code	Actuator Size
3312	#12
3325	#25
3350	#50
3375	#75
33101	#101
33130	#130
33250	#250

Optional Air Motor Covers (Block P1)

Code	Description
DICVR	Ductile Iron

Advantage® Actuators Fail Open (Block Q)

Code	Actuator Size	Valve Size
A105	# 5	1/2"
A108	# 8	3/4", 1"
A116	# 16	1 1/4", 1 1/2", 2"
A133	# 33	3", 4"
A147	# 47	3", 4"

* Specify valve centerline to top of handwheel distance

** Available on bonnet for 3" & 4" Advantage® only

WEIR DIAPHRAGM VALVES

Advantage® Actuators Fail Closed (Block Q)

Code	Actuator Size/Spring	Valve Size
A205	# 5 with 60# Spring	1/2"
A206	# 5 with 90# Spring	1/2"
A208	# 8 with 60# Spring	3/4", 1"
A209	# 8 with 90# Spring	3/4", 1"
A216	# 16 with 60# Spring	11/4", 11/2", 2"
A217	# 16 with 90# Spring	11/4", 11/2", 2"
A233	# 33 with 60# Spring	3", 4"
A234	# 34 with 90# Spring	3", 4"
A247	# 47 with 60# Spring	3", 4"
A248	# 47 with 80# Spring	3", 4"

Advantage® Actuators Double Acting (Block Q)

Code	Actuator Size	Valve Size
A305	# 5	1/2"
A308	# 8	3/4", 1"
A316	# 16	11/4", 11/2", 2"
A333	# 33	3", 4"
A347	# 47	3", 4"

Dia-Flo® Actuator Accessories Position Indicator (Block T)

Code	Description
P1	Position Indicator

Mechanical Accessories (Block V)

Code	Description
	See Cross Reference Table on page 20

Actuator Hardware Options (Block U)

Code	Description
HW1	SS Airmotor Bolts
HW2	SS Accessory Brackets
HW3	SS Tubing and Fittings
HW4	Plastic Tubing / Brass Fittings
HW5	PVC Coated Tubing / Brass Fittings
HW6	PVC Coated Tubing / SS Fittings

Solenoid Valve (Block W)

Code	Description
SV1	Asco 8320G184, 3 Way
SV2	Asco EF8320G184, 3 Way
SV3	Asco 8345G1, 4 Way
SV4	Asco EF8345G1, 4 Way
SV5	Burkert 300-C-1/16-F-R-1/8-VOL (Recommended for Advantage)
SV6	Burkert 311-C-5/64-F-BR-1/8-VOL (Recommended for Advantage)
SV7	Asco 8320G202
SV8	Asco 8320G174

Solenoid Voltage (Block X)

Code	Description
V1	120V / 60HZ
V2	24VDC
V3	240V / 60HZ

Dia-Flo® Actuator Limit Switches (Block Y)

Code	Description
LS1	Micro BZE6 - 2RN
LS2	Micro BAF1 - 2RN
LS3	Micro DTE6 - 2RN
LS4	Micro DTF2 - 2RN
LS5	Micro EXQ
LS6	Micro EXDQ
LS7	Micro LSA1A
LS8	Westlock 3479 Model 3
LS9	GO 74-13528-A1
LS10	Namco EA700-80100
LS11	Westlock E3479 Model 3
LS12	Namco EA170-34100 / 35100

Optional Limit Switch Position (Block Y1)

Code	Desription
LSO	Limit Switch - Open Only
LSC	Limit Switch - Closed Only

Advantage® Actuator Switch Pack SP-2 (Block Z)

Code	Description	1/2" - 4"
SP2S	Silver Contacts	
SP2G	Gold Contacts	
SP2Z	2-Wire Proximity	
SP2N	NAMUR Proximity	
SP2P	3-Wire PNP Proximity	
SP2NP	3 Wire NPN Proximity	

Adv. Switch Pack SP-2.5 (Block Z5)

Code	Description	1/2" - 1"
SP5S	Silver Contacts	
SP5G	Gold Contacts	
SP5Z	2-Wire Proximity	
SP5N	NAMUR Proximity	
SP5P	3-Wire PNP Proximity	
SP5NP	3 Wire NPN Proximity	

Adv. Switch Pack SP-3 (Block Z3)

Code	Description	1/2" - 2"
SP3S48	Silver Contacts 48V	
SP3S110	Silver Contacts 110V	
SP3G48	Gold Contacts 30V	
SP3Z	2-Wire Proximity	
SP3N	NAMUR Proximity	
SP3P	3-Wire PNP Proximity	
SP3NP	3 Wire NPN Proximity	

Positioners (Block AA)

Code	Description	Size
PR1[1]	Conoflow Model 31	11/2" - 12"
PR2[2]	Conoflow Model 33	11/2" - 12"
PR3[1]	Moore 73 NF	1/2" - 6"
PR4[2]	Moore 73 NB	1/2" - 6"
PR5	Moore 73 NR	1/2" - 6"
PR6[3]	Conoflow P50	11/2" - 12"
PR7[3]	Conoflow P51	11/2" - 12"
PR8[3]	Conoflow P52	11/2" - 12"

Only PR3-5 are available on the Advantage®.

Signal Ranges (Block AB)

Code	Description
SR1	3-15 PSI
SR2	6-30 PSI
SR3	3-9 PSI
SR4	9-15 PSI

Filter Regulators (Block AC)

Code	Description
FR1	Conoflow GFH60XTKEG3G
FR2	Fisher 67FR

Transducer (Block AD)

Code	Description
TR1	Conoflow GT2108ED

Speed Controllers (Block AE)

Code	Description
SC	Schrader 337-1001

Drain Ports (Block C)

Code	Description Unlined Bodies Only
D1	1/4" NPT Drain Port
D2	Two 1/4" NPT Drain Ports
D3	3/8" NPT Drain Port
D4	Two 3/8" NPT Drain Ports

Special Service/Preparation (Block SPSERV)

Code	Description
SPEC	Special Service per Cust. Spec.
VAC	Vacuum
OXY	Oxygen
TOB	Tobacco
WCL2	Wet Chlorine

1 Fail Open and Double Acting Actuators
2 Fail Closed Actuators
3 Requires yoke mounted actuator

STRAIGHTWAY DIAPHRAGM VALVES

Straightway Bodies, Unlined (Block B)

Code	Body Material	Size
SCREWED		
2801	Iron	1/2-2"
2803	Stainless Steel (316)	1/2-2"
FLANGED *		
2811	Iron	1/2-12"
2813	Stainless Steel (316)	1/2-8"
2813R	Stainless Steel (316)	1/2-8"
2815	Cast Steel	1/2-8"
2815R	Cast Steel	1/2-8"

Straightway Bodies, Lined (Block B)

Code	Lining Material	Size
FLANGED	CAST IRON	
2829	Tefzel	1-8"
2831	Neoprene No.7	1-12"
2832	Glass	1-8"
2833	Soft Rubber No. 5	1-12"
2834	Hard Rubber No.10	1-12"
2835	Hypalon No. 9	1-12"
2836	Butyl No. 16	1-12"
2838	Polypropylene (FDA)	1-8"
FLANGED	CAST STEEL	
2863	Hard Rubber No. 10	
FLANGED	DUCTILE IRON	
2840	Neoprene No. 7	1-12"
2841	Soft Rubber No. 5	1-12"
2842	Hard Rubber No 10	1-12"
2859	Tefzel	1-12"

Diaphragms (Block D) Straightway Type

Code	Material	Size
SB	Black Butyl (FDA)	1/2-4"
SS	Natural Rubber	1/2-12"
ST	Neoprene	1/2-12"
SM	EPDM	1/2-12"
SC	Hypalon	1-4"
SP*	BUNA - N (FDA)	1/2-6"

*2.5 not available.

Bonnets, Handwheel (Block E)

Code	Bonnet Description
CAST IRON	
902	Indicating
902S	Indicating - Sealed
903	Indicating with Travel Stop
903S	Indicating with Travel Stop - Sealed
DUCTILE IRON	
942	Indicating
942S	Indicating - Sealed
943	Indicating with Travel Stop
943S	Indicating with Travel Stop - Sealed

Bonnets, Chainwheel (Block E)

Code	Bonnet Description
CAST IRON	
905	Indicating with Travel Stop
905S	Indicating with Travel Stop - Sealed

Bonnets, Actuated (Block E)

Code	Bonnet Description
DUCTILE IRON	
34	Actuated
34S	Actuated - Sealed

Optional Bonnet Seal Material (Block F)

Code	Seal Material
S1	EPDM
S2	Viton

Optional Bonnet Internals (Block H)

Code	Description
M5	Stainless Steel Stem
M8	PVDF Coated Cast Iron Compressor
M9	Stainless Steel Bushing

Optional Bolting (Block G)

Code	Description
B1	Stainless Steel

Yoke (Block K)

Code	Description
Y	Yoke Supplied

Locking Device (Block L)

Code	Description
LD	Locking Device

Extended Stem (Block M)

Code	Description
EXTSTEM	Extended Stem

Optional Coatings (Block N)

Code	Description
C1	PVDF Coated Topworks
C2	PVDF Coated Body
C3	PVDF Coated Body & Topworks
C4	White Epoxy Coated Topworks
C5	White Epoxy Coated Body
C6	White Epoxy Coated Body & Topworks

Adapted for but less ITT Actuation (Block P2)

Code	Description
Y	Adapted for but less ITT Actuator

Non ITT Actuation (Block R & S)

Code	Description
POF	Mounted Non-ITT Customer Supplied Actuator
POA	Adapted For But Less Customer Supplied Actuator
POM	Mounted Non-ITT Actuator Supplied by ITT

Dia-Flo® Actuators Fail Open (Block P) (Spring-to-Open - Air-to-Close)

Code	Actuator Size
3112	#12
3125	#25
3150	#50
3175	#75
31101	#101
31130	#130
31250	#250

* R - Raised Face

STRAIGHTWAY DIAPHRAGM VALVES

Dia-Flo® Actuators Fail Closed (Block P) (Air-to-Open - Spring-to-Close)

Code	Spring Description
SIZE #25	
3226	101 Spring
3227	101 & 102A Springs
3228	102A Spring
SIZE #50	
3251	101 Spring
3252	101 & 102A Springs
3253	97 Spring
3254	96 Spring
3255	96 & 97 Springs
3256	102A Spring
SIZE #75	
3273	98 Spring
3274	96 Spring
3276	96 & 97 Springs
3277	97 & 98 Springs
3278	96 & 98 Springs
3279	96, 97 & 98 Springs
SIZE #101	
32102	96 Spring
32103	98 Spring
32104	96 & 97 Springs
32105	96 & 98 Springs
32106	97& 98 Springs
32107	96, 97, & 98 Springs
32108	130 Spring
32109	97 Spring
SIZE #130	
32131	97 Spring
32132	96 Spring
32133	98 Spring
32134	96 & 97 Springs
32135	96 & 98 Springs
32136	97 & 98 Springs
32137	96, 97, & 98 Springs
32138	130 Spring
SIZE #250	
32251	129 & 130 Springs
32252	129 Spring
32253	130 Spring

Dia-Flo® Actuators Double Acting (Block P) (Air-to-Open - Air-to-Close)

Code	Actuator Size
3312	#12
3325	#25
3350	#50
3375	#75
33101	#101
33130	#130
33250	#250

Optional Air Motor Covers (Block P1)

Code	Description
DICVR	Ductile Iron

Actuator Accessories Position Indicator (Block T)

Code	Description
PI	Position Indicator

Mechanical Accessories (Block V)

Code	Description
See Cross Reference Table on page 20	

Actuator Hardware Options (Block U)

Code	Description
HW1	SS Airmotor Bolts
HW2	SS Accessory Brackets
HW3	SS Tubing and Fittings
HW4	Plastic Tubing / Brass Fittings
HW5	PVC Coated Tubing / Brass Fittings
HW6	PVC Coated Tubing / SS Fittings

Solenoid Valve (Block W)

Code	Description
SV1	Asco 8320G184
SV2	Asco EF8320G184
SV3	Asco 8345G1
SV4	Asco EF8345G1

Solenoid Voltage (Block X)

Code	Description
V1	120V / 60HZ
V2	24VDC
V3	240V / 60HZ

Limit Switches (Block Y)

Code	Description
LS1	Micro BZE6 - 2RN
LS2	Micro BAF1 - 2RN
LS3	Micro DTE6 - 2RN
LS4	Micro DTF2 - 2RN
LS5	Micro EXQ
LS6	Micro EXDQ
LS7	Micro LSA1A
LS8	Westlock 3479 Model 3
LS9	GO 74-13528-A1
LS10	Namco EA700-80100
LS12	Namco EA170-34100 / 35100

Positioners (Block AA)

Code	Description
PR1[1]	Conoflow Model 31
PR2[2]	Conoflow Model 33
PR3[1]	Moore 73NF
PR4[2]	Moore 73 NB
PR5	Moore 73 NR
PR6	Conoflow P50
PR7	Conoflow P51
PR8	Conoflow P52

Signal Range (Block AB)

Code	Description
SR1	3-15 PSI
SR2	6-30 PSI
SR3	3-9 PSI
SR4	9-15 PSI

Filter Regulator (Block AC)

Code	Description
FR1	Conoflow GFH60XTKEG3G
FR2	Fisher 67FR

Transducer (Block AD)

Code	Description
TR1	Conoflow GT2108ED

Speed Control (Block AE)

Code	Description
SC	Schrader 337-1001

[1] Fail Open and Double Acting Actuators
[2] Fail Closed Actuators

CROSS REFERENCE CHART - BODIES, BONNETS & ACTUATORS

Only those figure numbers that have changed are listed below.

Bodies	
Old	New
4250	2464
4260	2465
4270	2466

Bonnets	
Old	New
2	902
3	903
4	905
6	932
7	933
9	912
10	913
25	942
26	943
30	POA
854	902 - C4
855	902S - C4
872	902S - C1
873	903S - C1
874	903S - C1
903	903
904	903S
907	933
910	913
913	913S
923	923
924	923S
926	943
927	943S
955	903 - C4
956	903S- C4

Bonnets (cont.)	
Old	New
963	963
964	963S
974	903S-C1

DIA-FLO Actuators	
Old (spring#)	New
3112	3112
3212 (88)	3213
3212 (88&89)	3214
3212 (88&Raymond)	3215
3212 (89)	3216
3312	3312
3125	3125
3225 (101)	3226
3225 (101&102A)	3227
3225 (102A)	3228
3325	3325
3150	3150
3250 (101)	3251
3250 (101&102A)	3252
3250 (97)	3253
3250 (96)	3254
3250 (96&97)	3255
3250 (102A)	3256
3350	3350
3175	3175
3275 (96)	3274
3275 (96&97)	3276
3275 (97&98)	3277
3275 (96&98)	3278
3275 (96, 97&98)	3279
3375	3375
31101	31101
32101 (96)	32102
32101 (98)	32103
32101 (96&97)	32104
32101 (96&98)	32105
32101 (97&98)	32106
32101 (96, 97&98)	32107
32101 (130)	32108
32101 (97)	32109
33101	33101
31130	31130
32130 (97)	32131
32130 (96)	32132
32130 (98)	32133
32130 (96&97)	32134
32130 (96&98)	32135
32130 (97&98)	32136
32130 (96, 97&98)	32137
32130 (130)	32138
33130	33130
31250	31250
32250 (129&130)	32251
32250 (129)	32252
32250 (130)	32253
33250	33250

Switches	
Old	New
R, S, T	LS1-LS10

Positioners		
Old		New
YC	Conoflow	PR1-PR2
YM	Moore	PR3-PR4

CROSS REFERENCE TABLE FOR DIA-FLO ACTUATOR ACCESSORIES:

Description	Old Code	New Code Size #12 Actuators		New Code Size #25-250 Actuators	
		Fail Open & Double Acting 3100 & 3300	Fail Closed 3200	Fail Open & Double Acting 3100 & 3300	Fail Closed 3200
Position Indicator	Z	P1	P1	P1	P1
Adjustable Travel Stop	X	ATS	ATS	ATS	Standard
Adjustable Opening Stop	W	TOHC	TOWO	AO	AO
Adjustable Opening & Travel Stop	Q	TOHC	TOWO	TO	AO
Handwheel Closing Device	V	TOHC	Not Available	HWC	Not Available
Handwheel Opening Device	JH	Not Available	HWO	Not Available	HWO
Wrench Opening Device	JW	Not Availalble	WO	Not Available	WO
Adjustable Opening & Travel Stop + Handwheel Closing Device	Q + V	TOHC	Not Available	THC	Not Availalble
Adjustable Travel Stop + Handwheel Closing Device	X + V	TOHC	Not Available	THC	Not Available
Adjustable Opening Stop + Handwheel Closing Device	W + V	TOHC	Not Available	HWC	Not Available
Adjustable Opening Stop + Handwheel Opening Device	W + JH	Not Available	TOHO	Not Available	TOHO
Adjustable Opening Stop + Handwheel Opening Device	W + JW	Not Available	TOWO	Not Available	TOWO

CONDITIONS AND TERMS OF SALE OF ITT ENGINEERED VALVES (Hereinafter referred to as Seller)

1. CONTROLLING PROVISIONS: These terms and conditions shall control with respect to any purchase order or sale of Seller's products. No waiver, alteration or modification of these terms and conditions whether on Buyer's purchase order or otherwise shall be valid unless the waiver, alteration or modification is specifically accepted in writing and signed by an authorized representative of Seller.
2. DELIVERY: Seller will make every effort to complete delivery of products as indicated on Seller's acceptance of an order, but Seller assumes no responsibility or liability, and will accept no backcharge for loss or damage due to delay or inability to deliver caused by acts of God, war, labor difficulties, accident, delays of carriers, by contractors or suppliers, inability to obtain materials, shortages of fuel and energy or any other causes of any kind whatever beyond the control of Seller. Seller may terminate any contract of sale of its products without liability of any nature, by written notice to Buyer, in the event that the delay in delivery or performance resulting from any of the aforesaid causes shall continue for a period of sixty (60) days. Under no circumstances shall Seller be liable for any special or consequential damages or for loss, damage or expense (whether or not based on negligence) directly or indirectly arising from delays or failure to give notice of delay.
3. WARRANTY: Seller warrants for one year from the date of shipment Seller's manufactured products to the extent that Seller will replace those having defects in material or workmanship when used for the purpose and in the manner which Seller recommends. If Seller's examination shall disclose to its satisfaction that the products are defective, and an adjustment is required the amount of such adjustment shall not exceed the net sales price of the defective products only and no allowance will be made for labor or expense of repairing or replacing defective products or workmanship or damage resulting from the same. Seller warrants the products which it sells of other manufacturers to the extent of the warranties of their respective makers. Where engineering design or fabrication work is supplied, Buyer's acceptance of Seller's design or of delivery of work shall relieve Seller of all further obligation other than as expressed in Seller's product warranty. THIS IS SELLER'S SOLE WARRANTY. SELLER MAKES NO OTHER WARRANTY OF ANY KIND, EXPRESSED OR IMPLIED. AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEED SELLER'S AFORESTATED OBLIGATION ARE HEREBY DISCLAIMED BY SELLER AND EXCLUDED FROM THIS WARRANTY. Seller neither assumes, nor authorizes any person to assume for it, any other obligation in connection with the sale of its engineering designs or products. This warranty shall not apply to any products or parts of products which (a) have been repaired or altered outside of Seller's factory, in any manner; or (b) have been subjected to misuse, negligence or accidents; or (c) have been used in a manner contrary to Seller's instructions or recommendations. Seller shall not be responsible for design errors due to inaccurate or incomplete information supplied by Buyer or its representatives.
4. SELLER'S LIABILITY: Seller will not be liable for any loss, damage, cost of repairs, incidental or consequential damages of any kind, whether based upon warranty (except for the obligation accepted by Seller under "Warranty" above), contractor negligence, arising in connection with the design, manufacture, sale, use or repair of the products or of the engineering designs supplied to Buyer.
5. RETURNS: Seller cannot accept return of any products unless its written permission has been first obtained, in which case same will be credited subject to the following: (a) All material returned must, on its arrival at Seller's plant, be found to be in first-class condition; if not, cost of putting in saleable condition will be deducted from credit memoranda; (b) A handling charge will be made from all credit memoranda issued for material returned; (c) Transportation charges, if not prepaid, will be deducted from credit memoranda.
6. SHIPMENTS: All products sent out will be carefully examined, counted and packed. The cost of any special packing or special handling caused by Buyer's requirements or requests shall be added to the amount of the order. No claim for shortages will be allowed unless made in writing within ten (10 days of receipt of a shipment. Claims for products damaged or lost in transit should be made on the carrier, as Seller's responsibility ceases, and title passes, on delivery to the camer.
7. SPECIAL PRODUCTS: Orders covering special or non-standard products are not subject to cancellation except on such terms as Seller may specify on application.
8. PRICES AND DESIGNS: Prices and designs are subject to change without notice. All prices are F.O.B. Point of Shipment, unless otherwise stated.
9. TAXES: The amount of any sales, excise or other taxes, if any, applicable to the products covered by this order, shall be added to the purchase price and shall be paid by Buyer unless Buyer provides Seller with an exemption certificate acceptable to the taxing authorities.
10. MINIMUM INVOICE: $200.00 plus transportation on complete valve assemblies. $100 plus transportation on replacement parts.
11. TERMS: Cash, net 30 days unless otherwise specified.

WARNING

ITT ENGINEERED VALVES AND VALVE ACTUATORS ARE DESIGNED AND MANUFACTURED USING GOOD WORKMANSHIP AND MATERIALS, AND THEY MEET ALL APPLICABLE INDUSTRY STANDARDS. THESE VALVES ARE AVAILABLE WITH COMPONENTS OF VARIOUS MATERIALS, AND THEY SHOULD BE USED ONLY IN SERVICES RECOMMENDED IN THIS PRODUCT CATALOG OR BY A COMPANY VALVE ENGINEER.

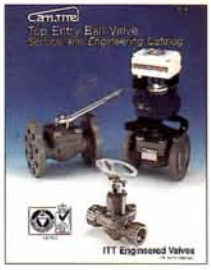
MISAPPLICATION OF THE PRODUCT MAY RESULT IN INJURIES (INCLUDING DEATH) OR PROPERTY DAMAGE. A SELECTION OF VALVE COMPONENTS OF THE PROPER MATERIAL CONSISTENT WITH THE PARTICULAR PERFORMANCE REQUIREMENT, IT IS IMPORTANT FOR PROPER APPLICATION.

EXAMPLES OF THE MISAPPLICATION OR MISUSE OF A DIA-FLO VALVE INCLUDE USE IN AN APPLICATION IN WHICH THE PRESSURE/TEMPERATURE RATING IS EXCEEDED OR FAILURE TO MAINTAIN VALVES AS RECOMMENDED.

IF VALVE EXHIBITS ANY INDICATION OF LEAKAGE, DO NOT OPERATE. ISOLATE VALVE AND EITHER REPAIR OR REPLACE.

ITT ENGINEERED VALVES

For additional information on ITT ENGINEERED VALVES products as referenced, call 1-800-2ITT-FTC, (1-800-248-8382) or contact the nearest regional office listed below.
Or visit us on the Web at www.engvalves.com



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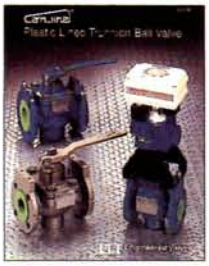

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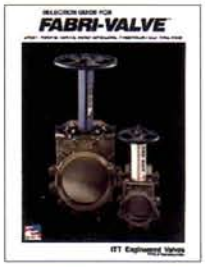

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