Bulletin No. 483

CENTURY

Automatic Diaphragm Valves
Series 630 - 730 - 830

For flow control of corrosive and hard to handle fluids, slurries, etc.

CENTURY
INSTRUMENT COMPANY
LIVONIA, MICHIGAN 48150

Automatic Diaphragm Valves

For automatic and remote control of difficult — hard to handle and corrosive services, Century close-coupled actuators on Saunders Type diaphragm valves offer positive, low cost, trouble free operation.

Because the valve body can be lined with glass, rubber or plastic, it can be produced less expensively than the exotic metals normally required in the handling of corrosive materials.

Pneumatic Actuators

Rugged, close-coupled Century actuators are available in all three modes: spring to open, spring to close and springless air to air, with a wide variety of optional accessories such as limit stops, emergency handwheels, limit switches, valve positioners, pilot solenoid valves, etc.

How To Order

First establish the valve size required by using the information on pages 8 & 9.

Next determine the actuator type and size number by using the information provided on Pages 10 thru 21.

The data we require to properly process are:

(1) Valve size.

(2) Body material, lining and end connections — see page 28.

(3) Type of diaphragm — see page 6.

(4) Size number and action of actuator (air to air — spring closed, etc.)

(5) Accessories — see pages 22 thru 25.

(6) Operating air pressure.

(7) Line pressure valve must close against.

(8) Line pressure conditions when valve closes, % P.D.

100% P.D. means that downstream pressure falls to 0 psig.

0% P.D. means that downstream pressure remains at, or returns to essentially the same as the upstream pressure.

Actuator Data

Actuator Size		0	1	2	2A	3	4	5
Outside Diam.		6"	7-3/4"	9-1/2"	12-1/4"	14-7/8"	18-1/8"	22"
Stroke	Air to Air	1-3/8"	1-3/4"	2-3/16"	3-1/4"	3-3/8"	5-3/16"	6-3/8"
	Spring Closed or Spring Opened	1-5/8"	2-1/16"	3"	3-5/8"	3-7/8"	5-3/4"	6-7/8"
Max Air Pressure (PSIG)		200	150	200	130	110	100	95
Air Consumption (Cubic Inches)*		20	32.6	52.5	157	280	390	1800
Effective Area (Sq. Inches)		10	20	33	59	83	134	231

*For one full stroke in one direction.

Efficiency — with seven interchangeable sizes — longer strokes and higher air pressure capability — Century actuators provide for maximum use of available power.

Note that the No. 0 acuator in the double-acting (air to close-air to open) version will fully stroke a 2½" valve — while the air to spring version will fully stroke a 3" valve. This compares with our nearest competitor's smallest actuator which can fully stroke only a 1¼" valve.

Rugged: The high grade — 30,000 lbs. per square inch tensile strength cast iron diaphragm cases — together with the uniquely produced actuator diaphragm and steel diaphragm plates, allow the use of higher operating air pressures, with consequent reduction in the size and cost of the actuator required.

The actuator diaphragm, which is produced and molded under an exclusive process, is batch tested at 125 psig. operating air pressure for 175,000 strokes before the batch is released to the valve assembly departement.

Valve Strokes

Valve Size	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"	6"	8"
Stroke	1/4"	3/8"	1/2"	5/8"	13/16"	1-1/8"	1-3/8"	1-5/8"	2-1/8"	3-1/8"	4-5/8"

Automatic Diaphragm Valves

Compact - Low Profile
With the specially designed flat-top bonnet, the Century actuator provides a strong, totally enclosed unit with extremely low over-all height.

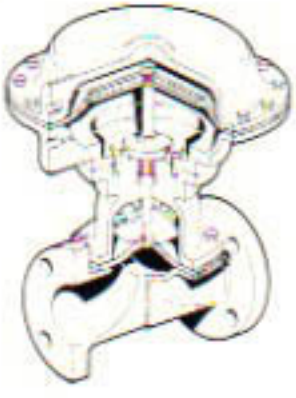
Wide Selection
Actuators furnished in seven sizes to provide more efficient and economical use of available operating air pressures up to 200 psig.

Longer Strokes
Together with higher air pressure capability provides greater flexibility in valve/actuator selection. Example, the No. 0 (smallest actuator) has more than double the stroke of its nearest competitor.

Lower Air Consumption
Because of unique design, air consumption is extremely low — in most instances less than half that of competition.

Adjustability
In the spring-closed actuator, the adjusting screw provides a convenient means of obtaining valve closure when line pressures are higher than expected.

Adaptability
Suitable for either pneumatic or hydraulic operation, the unit can be mounted in vertical, horizontal, or any intermediate position.



Air To Open
Air To Close

Spring To Close
Air To Open

Spring To Open
Air To Close

Automatic Diaphragm Valves

Unlined Metal

Lined Metal

Solid Plastic

Wide Selection — available in a wide variety of body materials, linings and end connections. By utilizing such highly resistant linings as Saran, Polypropylene, Kynar, Tefzel, Glass, Rubber, etc., virtually any chemical service within the pressure/temperature limits of the valve can be handled safely and economically.

No Stem Leakage — since the diaphragm isolates the fluid stream there is no need for a packing gland — no atmospheric contamination, no leakage or waste, no expensive maintenance of stem, seats or stuffing box.

Bubble-Tight Shut Off — results when the downward thrust of the stem and compressor assembly molds the flexible diaphragm against the weir. The diaphragm will accommodate itself to rust, scale, slurry, or fibrous material.

Streamline Flow — with minimum pressure drop because of the absence of grooves, pockets or sharp changes in direction of flow.

Cost Saving — simple in-line maintenance. In less time than it takes to remove and replace a conventional valve, a new body diaphragm can be installed. Thus providing essentially a brand new valve at a tiny faction of the cost of a new or repaired conventional valve — all without removing the valve body from the line.

Flow Control — the automated diaphragm valve provides an excellent means of handling the changing flow requirements in most process installations. By the addition of a positioner to the actuator, even more precise control can be achieved, especially in the handling of slurries, or viscous and fibrous materials.

Body Materials — available in cast iron, ductile iron, carbon steel, stainless steel, Alloy-20, aluminum and bronze — many of which are lined as described in paragraph 1 above.

For more detailed information on the types of valve bodies available, see page 28.

Automatic Diaphragm Valves

Diaphragm Selection

Elastomeric — built like a tire — especially compounded materials — ruggedly reinforced with fabric plies and designed to take a great deal of physical abuse. The sealing bead provides a greater sealing ability by localizing closing forces for bubble-tight shut-off.

Rubber

TFE Faced — over the years, a broad range of elastomeric and plastic diaphragms have been developed which will successfully handle all aggressive fluids, gases and slurries, as well as food, beverage and pharmaceutical products where F.D.A. approval of materials of construction is required. The TFE faced diaphragm is backed with fabric reinforced elastomer to provide the high chemical and temperature resistant qualities of TFE with flexibility for longer life and tighter shut-off.

TFE/Rubber Backed

Diaphragm Materials

CODE	MATERIALS	TEMPERATURE RANGE	SIZE RANGE	TYPICAL APPLICATIONS
R	Natural Rubber	0 to 180F	1/2" - 8"	Wet or Dry Abrasives at moderate temperatures
N	Neoprene	0 to 200F	1/2" - 8"	Acids, Alkalies, Alcohol and Oil
H	Hypalon	-30 to 250F	1/2" - 8"	Acids, Caustics and Oil
E	Ethylene Propylene Rubber	-30 to 300F	1/2" - 8"	Excellent chemical and abrasive resistance at elevated temperatures
V	Viton	-20 to 350F	1/2" - 8"	Aggressive chemicals, acids and oil. High temperature service
T	TFE faced	-30 to 300F	1/2" - 8"	Maximum resistance to aggressive chemicals and solvents at elevated temperatures. Excellent anti-stick properties.
B	Butyl	-15 to 212F	1/2" - 8"	Acids and Alkalies
WE	White EPR	-30 to 300F	1/2" - 8"	Excellent chemical & abrasive resistance at elevated temp. Food Grade - F.D.A. approved
WB	White Butyl	-15 to 212F	1/2" - 8"	Acids and Alkalies. Food Grade

Recommendations on body and diaphragm material for specific applications see pages 29 through 34.

Since 1950, Century has enjoyed the confidence and patronage of thousands of industrial customers in such trade categories as: Petroleum, Petro-Chemicals and Chemicals — Utilities, Electric, Water and Gas — Foods, Beverages and Pharmaceuticals — Water Treating and Filtration — Pulp and Paper, etc.

A few of the plants using Century Automatic Diaphragm Valves are:

American Cyanamid	Hannibal, Mo.	Consolidated Edison	Astoria, N.Y.
American Cyanamid	Palmyra, N.Y.	Consolidated Edison	Staten Island, N.Y.
American Cyanamid	Savannah, Ga.	Dayton Power & Light	Aberdeen, Ohio
American Cyanamid	South River, Mo.	Detroit Edison	Avoca, Mich.
American Cyanamid	Westwego, La.	Detroit Edison	Belle River, Mich.
Ashland Oil Co.	St. Paul Pk., Minn.	Detroit Edison	Monroe, Mich.
Ashland Oil Co.	Canton, Ohio	Detroit Edison	Delray, Mich.
Borden Chemicals	Illiopolis, Ill.	Detroit Edison	Connors Creek, Mich.
Columbia Nitrogen	Augusta, Ga.	Florida Power & Light	Cocoa Beach, Fla.
Diamond Shamrock	Charlotte, N.C.	Florida Power & Light	Florida City, Fla.
Diamond Shamrock	Deer Park, Texas	Florida Power & Light	Fort Meyers, Fla.
Diamond Shamrock	Redwood City, Calif.	Florida Power & Light	Turkey Point, Fla.
Dow Chemical	Midland, Mich.	Florida Power & Light	Fort Pierce, Fla.
Dow Chemical	Ludington, Mich.	Florida Power & Light	Live Oaks, Fla.
Dow Chemical	Pittsburg, Calif.	Florida Power & Light	Red Level, Fla.
Dow Chemical	Freeport, Texas	Georgia Power	Milledgeville, Ga.
Dupont	East Indiana, Ind.	Gulf States Utilities	Beaumont, Texas
Dupont	Fort Madison, Wisc.	Houston Power & Light	Eldon, Texas
Exxon Chemicals	Bayton, Texas	Abbot Laboratories	North Chicago, Ill.
W. R. Grace	Baltimore, Md.	Annheiser-Busch	Jacksonville, Fla.
Gulf Oil Chem.	Orange, Texas	Clinton Corn Prod.	Clinton, Iowa
Hercules, Inc.	Pulaski, Va.	Coors Brewing	Golden, Colo.
Hooker Chemicals	Glen Allen, Va.	Corn Products	Argo, Ill.
Marathon Oil	Detroit, Mich.	Corn Sweeteners	Cedar Rapids, Iowa
Mobay Chemicals	Charleston, S.C.	Cutter Labs.	Clayton, N.C.
Mobil Oil	Inglewood, Calif.	Merck & Co.	Albany, Ga.
Monsanto	Decatur, Ala.	Pfizer, Inc.	Groton, Conn.
Monsanto	Pensacola, Fla.	Quaker Oats	Omaha, Neb.
PPG Industries	Ford City, Pa.	Ralston Purina	Shiremanstown, Pa.
PPG Industries	Lake Charles, La.	A. E. Staley Co.	Lafayette, Ind.
Shell Oil	Gibson, La.	Belco Pollution Cont.	Fairfield, N.J.
Shell Oil	Norco, La.	Gaco-Sternson	Brantford, Ont.
Shell Oil	Ysccloskey, La.	Illinois Water Treat.	Rockford, Ill.
Stauffer Chemical	Edison, N.J.	L.A. Water Treatment	Los Angeles, Calif.
Stauffer Chemical	Weston, Me.	Liquitech	Houston, Texas
Arizona Power	Page, Arizona	Total Water Treat.	Pontiac, Mich.
Baltimore G & E	Baltimore, Md.	Water Saver Systems	Detroit, Mich.
Baltimore G & E	Lusby, Me.	Alabama Kraft	Phoenix, Arizona
Boston Edison	Charlotte, Mass.	Consolidated Paper	Wisc. Rapids, Wisc.
California Edison	Long Beach, Calif.	Georgia Pacific	Plaquemine, La.
Central Illinois	Canton, Ill.	Georgia Pacific	Zachary, La.
Central Illinois	Peoria, Ill.	International Paper	Jay, Me.
Cent. Ill. Pub. Ser.	Coffeen, Ill.	International Paper	Gardiner, Ore.
Cent. Ill. Pub. Ser.	Newton, Ill.	Kimberly-Clark	Munising, Mich.
Commonwealth Ed.	Braidwood, Ill.	Scott Paper	Skowhegan, Me.
Commonwealth Ed.	Kincaid, Ill.	Union Camp	Denver, Colo.
Commonwealth Ed.	Morris, Ill.	Western Kraft Paper	Compti, La.

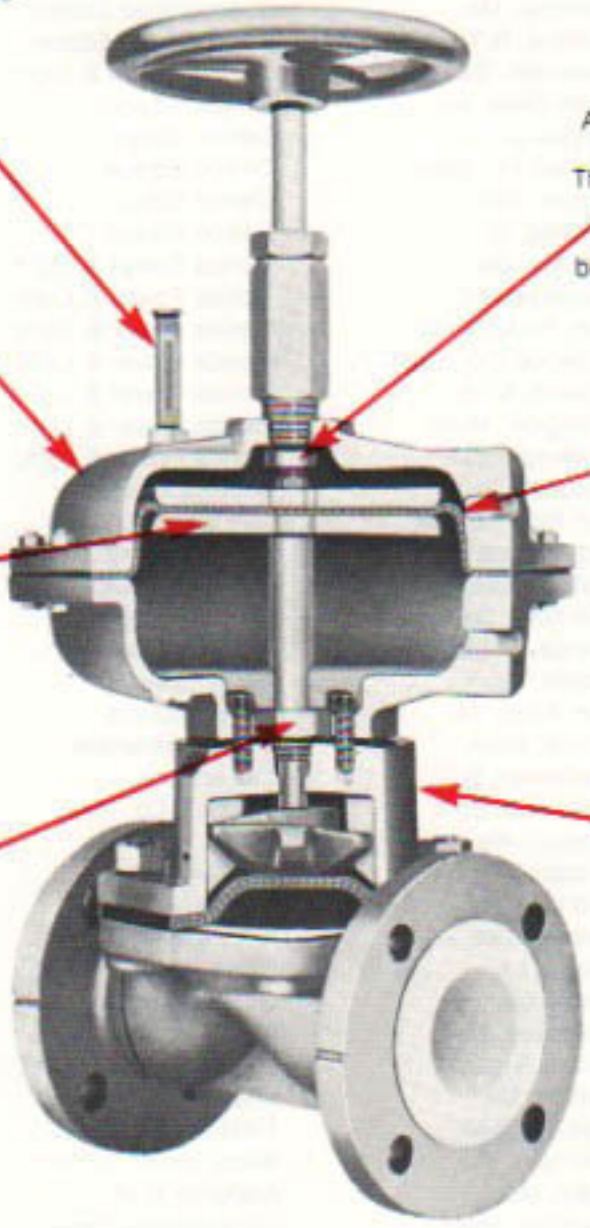
Standard Actuator Features

Position indicator is standard on all actuators

Diaphragm Cases
Rugged high pressure cast iron provided with bosses and pads to facilitate the mounting of accessories such as limit stops, position indicators, limit switches, valve positioners, emergency handwheels, etc.

Diaphragm Plates
Mild steel to withstand high air pressures without distortion or breakage.

Internal Seal Assembly
Provides longer stem guide, furnished with two "O" rings thereby preventing side-ways or lateral movement of sliding stem thus ensuring better alignment and closure.



Captive Handwheel
A positive stop is provided at the "valve open" position. This eliminates any possibility of the wheel and spindle becoming a projectile while being manually "backed off".

Actuator Diaphragm
Nylon reinforced neoprene molded in a unique way to provide long stroke and long life at air pressures up to 150 psig.

Bonnet
Rugged cast iron, flat top, designed especially for automatic valves, thus eliminating the need for adapter bushing with potentially weak "hour glass" profile.

Water as Operating Medium
When water instead of compressed air is to be used in the actuator, all cast iron and steel parts are galvanized and all bolts, nuts and screws are stainless steel.

Automatic Diaphragm Valves
Features of Series 630 Pneumatic Actuators

630-C

630-HRT

630-H

Actuator housing, bonnets and spring cases are made from ASTM 159-70, a high grade pressure type cast iron with 30,000 pounds per square inch tensile strength. Actuator diaphragms are specially reinforced with Nylon and are constructed to offer resistance to ballooning and other forms of deformation. As a result, substantially higher operating air pressures can be used to achieve valve closure than is permissable with competitive actuators of aluminum or pressed steel.

This higher air pressure capability, together with the unusually long stroke of Century actuators, makes it possible to use smaller actuators with a significant saving in both cost and space without short-stroking the valves.

To facilitate parts inventory and to lower maintenance costs, most components such as actuator diaphragms, seal assemblies, push-rods, etc., are interchangeable between the three modes of actuators, viz., spring open, spring closed and air to air.

To meet any present or future OSHA requirements, the powerful springs in the spring-closed actuator can be fully relaxed prior to dismantling for service. This exclusive feature prevents the spring case housing from becoming a deadly projectile during dismantling for service.

The totally enclosed and epoxy coated non-aluminum construction provides complete protection against the effects of caustic atmospheres and cleaning solutions.

A valve position indicator is included as standard equipment on all Century actuators to show the position of the valve in its stroke.

A complete and detailed record is on file at the factory on every valve manufactured during the years since 1950. Keyed to the serial number which appears on the data plate attached to the valve bonnet, this file provides a means of speedily obtaining any information required on every valve we have produced.

Automatic Diaphragm Valves
How To Size Saunders Type Valves

For On-Off Service: The pipe size in the system ordinarily will determine the valve size. End connections are available flanged, screwed, socket weld, butt weld or sanitary ends to match the piping system.

For Throttling Service: If properly sized, the diaphragm valve will exhibit excellent straight line response to an instrument air signal with accurate reproducibility — this capability is especially valuable in services handling viscous, abrasive, or fibrous slurries which would rule out other types of control valves.

For throttling service, best results can be obtained if the valve is sized to deliver the desired normal flow at approximately 40% open.

Flow Computations: Since rate of flow depends upon the pressure drop through the valve, we show on page nine the Cv values for the various types of valves at various stages of opening from 0% to 100%.

The Cv is the valve coefficient of flow and represents the flow of water through the valve with a 1 psig pressure drop. By using the Cv values shown on page nine in the formula for liquid flow or gas flow shown below, the correct valve size can easily be determined.

When using the Cv tables on page nine, use 100% opening for ON-OFF service and 40% opening for THROTTLING service.

Liquid Flow Formula

At pressure drops of other than 1 psig

$$Q = C_v \sqrt{\frac{\Delta P}{G}}$$

Where:

- Q = actual flow in GPM.
- ΔP = actual pressure drop (psig)
- G = specific gravity
- Cv = flow factor from tables on page nine.

Example:
To find the rate of flow of water through a 3" plastic lined valve at the half-open position with a pressure drop of 5 psig.

Solution:

$$Q = Cv \sqrt{\frac{5}{1}}$$

$$Q = 131 \sqrt{5}$$

$$Q = 293 \text{ GPM}$$

Gas Flow Formula

$$Q = 1360\, C_v \sqrt{\frac{\Delta P}{GT}} \sqrt{\frac{P_1 + P_2}{2}}$$

Where:

- Q = Volumetric Flow (SCFH)
- G = Specific Gravity of Gas (air at 0 psig and 60F is 1.0)
- T = Absolute Temperature of Flowing medium (F + 460)
- P_1 = Inlet Pressure (psia)
- P_2 = Outlet Pressure (psia)
- ΔP = ($P_1 - P_2$) Pressure Drop
- Cv = Flow Factor from tables on page nine.

Example:
To find the flow in SCFH of compressed air at 50 psig through a 2" unlined valve vented to atmosphere. Temperature of the inlet air pressure is 100 F. and the valve is wide open.

Solution:

$$Q = 1360 \times 80 \sqrt{\frac{50}{560}} \sqrt{\frac{64.7 + 14.7}{2}}$$

$$Q = 204260 \text{ SCFH}$$

Valve Sizing Constants – Cv

The tables below show the Cv — valve coefficient of flow — for the various types of valve bodies both lined and unlined.

Screwed/Socket End Metal

% Open	½	¾	1	1¼	1½	2	2½	3
10	0.1	0.3	0.5	1.1	1.7	2.8	4	6.8	10	16
20	0.3	0.8	1.2	2.7	4.1	6.8	10	22	26	45
30	0.6	1	2	4.5	6.8	11.3	17	38	43	75
40	0.7	1.4	2.8	6.8	9	15	22	48	57	100
50	0.8	1.7	3.7	7.3	11	18.3	27	58	69	122
60	0.9	1.9	3.7	8.3	12.5	20.8	31	65	79	139
70	1	2.1	4	9.1	13.7	22.8	34	73	86	152
80	1.1	2.2	4.2	9.6	14.4	24	35.5	77	91	160
90	1.1	2.3	4.3	9.8	14.7	24.5	36.3	78	93	164
100	1.1	2.3	4.4	10	15	25	37	80	95	167

Flanged End—Rubber Lined

% Open	½"	1"	1½"	2½"	2"	2½"	3"	4"	6"	8"	10"	12"	14"
10	1	1.5	2.6	3.5	7	11	16	28	33	114	174	221	325
20	2.1	3.8	5.9	9.5	17	28	40	68	131	281	429	532	799
30	4.1	6.3	9.9	16	29	46	67	113	218	468	715	890	1332
40	5.1	8.4	13.2	21	38	61	89	151	290	624	953	1226	1776
50	6.7	10.2	16.1	26	47	74	108	184	353	759	1156	1482	2161
60	7.7	11.6	18.3	29	53	85	123	209	402	863	1315	1687	2457
70	8.4	12.7	20	32	58	93	135	229	440	946	1441	1850	2694
80	8.8	13.4	21	33.6	61	98	142	242	465	998	1521	1952	2842
90	9	13.7	21.6	34	63	100	145	247	474	1019	1552	2003	2901
100	9.2	14	22	35	64	102	148	252	484	1040	1584	2044	2960

Flanged End—Plastic Lined

% Open	½	1"	1½	1½	2"	2½	3"	4"	6"
10	0.3	1.4	2.4	4.2	7.8	11	15.8	34	78	112
20	2.1	3.5	5.9	10.3	19.2	27	39	82	190	273
30	3.5	5.8	9.6	17.1	32	45	81	137	321	459
40	4.7	7.8	13.2	22.8	43	62	108	183	428	612
50	5.7	9.5	16.1	27.7	52	73	131	223	520	745
60	6.5	10.8	18.3	31.5	59	83	149	253	592	847
70	7.1	11.8	20	34.5	65	91	164	278	649	929
80	7.5	12.5	21.1	36.5	68	96	173	293	684	979
90	7.8	12.7	21.6	37	70	98	176	299	699	1000
100	7.8	13	22	38	71	100	180	305	713	1020

Flanged End—Unlined

% Open	½"	¾"	1"	1¼"	1½"	2"	2½"	3"	4"	6"	8"	10"	12"	14"
10	0.6	1.3	1.9	3	4.8	8	14	20	31	67	143	218	281	407
20	1.5	3.1	4.7	7.4	12	22	34	50	85	183	351	525	666	996
30	2.5	5.2	7.9	12.4	19	36	57	83	142	272	585	867	1110	1665
40	3.3	6.5	10.6	16.5	26	48	76	111	189	363	780	1168	1503	2220
50	4	8.4	12.8	20	32	58	93	135	230	442	949	1445	1855	2701
60	4.6	9.5	14.6	22.8	36	66	105	154	261	502	1079	1642	2121	3071
70	5	10.5	16	25	39	73	116	168	287	551	1183	1802	2321	3367
80	5.3	11	16.9	26.4	41	77	122	178	302	581	1248	1901	2453	3552
90	5.4	11.3	17.2	26.9	42	78	124	181	309	593	1274	1940	2504	3625
100	5.5	11.3	17.6	27.3	43.2	80	127	185	315	605	1300	1980	2555	3700

Flanged End—Glass/Halar Lined

% Open	½"	¾"	1"	1¼"	1½"	2"	2½"	3"	4"	6"	8"	10"	12"	14"
10	0.6	1.3	2	3.2	5	8.2	14.6	21	36	76	135	225	290	427
20	1.6	3.2	5	7.8	12.3	22.7	36	52	89	171	367	561	724	1040
30	2.6	5.4	8.3	13.1	20.4	38	60	87	149	286	612	935	1207	1746
40	3.5	7.2	11.1	17.4	27.2	50	80	116	199	381	816	1247	1612	2331
50	4.2	8.8	13.5	21.2	33.1	61	97	142	242	464	993	1518	1353	2836
60	4.8	10	15.4	24.1	37.7	70	110	161	275	527	1129	1726	2227	3225
70	5.3	10.9	16.8	26.4	41.3	76	121	177	301	578	1238	1892	2442	3535
80	5.6	11.5	17.8	27.8	43.6	81	128	186	318	610	1306	1996	2576	3730
90	5.7	11.8	18.1	28.4	44.3	82	130	190	324	622	1333	2037	2629	3807
100	5.8	12	18.5	29	45.4	84	133	194	331	635	1360	2079	2683	3885

Fluid Velocity: Fluid velocity is a very important design consideration; and in order to assure maximum life of body and diaphragm when handling abrasives, it is recommended that velocity be kept to a maximum of 35 feet per second. Higher velocity can be tolerated when handling non-abrasives, however, consideration should be given to the possibility of hydraulic shock.

Fluid velocity formula:

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

where V = Velocity-ft./sec.
Q = Flow-GPM
A = Area over weir

Area Over Weir

AREA OVER THE WEIR-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	.10	.15	.19	.24	.27	.30	.34	.37	.39
1	.10	.18	.25	.32	.39	.45	.51	.56	.61	.64
1¼	.15	.28	.38	.49	.60	.70	.77	.85	.93	.97
1½	.23	.42	.61	.80	.98	1.10	1.25	1.38	1.50	1.58
2	.40	.72	1.06	1.32	1.63	1.88	2.10	2.32	2.52	2.66
2½	.56	1.06	1.53	1.96	2.36	2.74	3.08	3.40	3.63	3.88
3	.86	1.62	2.32	2.95	3.56	4.18	4.66	5.12	5.58	5.90
4	1.40	2.66	3.78	4.84	5.80	6.80	7.62	8.40	9.09	9.60
6	3.20	5.90	8.20	10.50	12.60	14.62	16.41	18.25	19.72	21.00
8	5.92	11.41	16.25	20.62	25.00	29.00	32.60	36.00	38.80	41.00

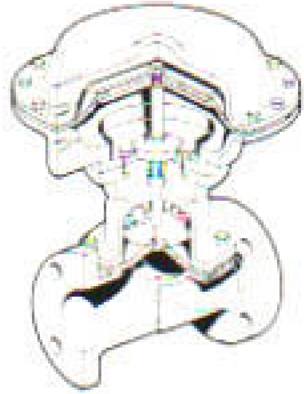
Square Root Table

No	Square Root	No	Square Root	No	Square Root
1	1.0000	21	4.5826	41	6.4031
2	1.4142	22	4.6940	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

Actuator Sizing

Type "C" Actuators

100% Δp

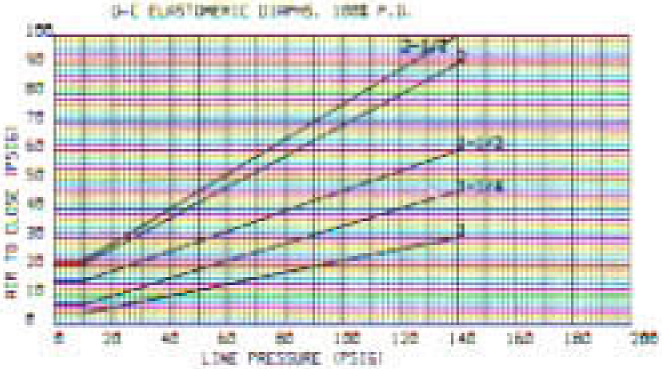


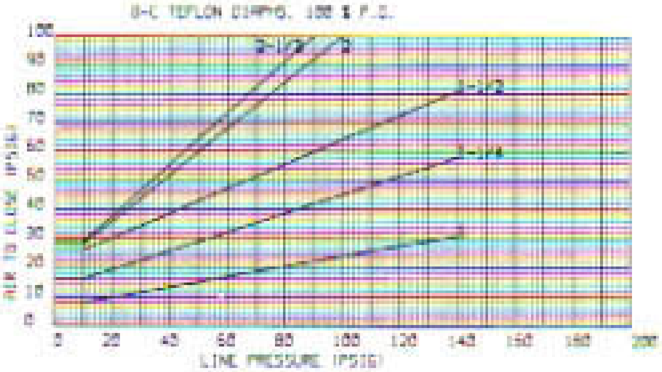
Air to close, air to open

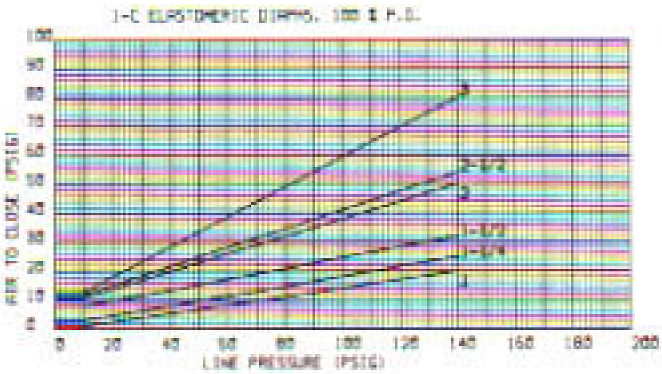
The choice of actuator size is determined by the line pressure through the valve and the available operating air pressure. Some operating conditions call for substantial line pressures downstream when the valve closes.

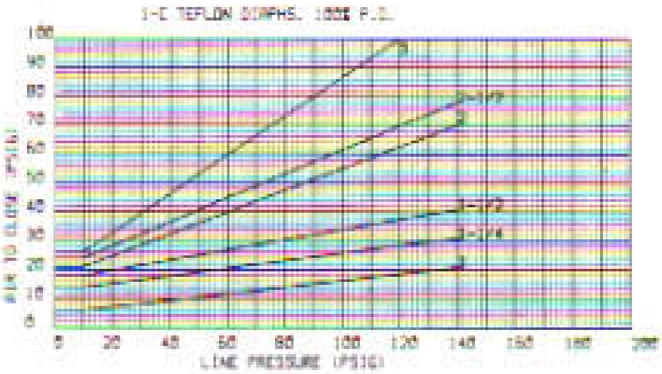
After the valve closes, if the downstream pressure is less than 30% of the upstream pressure — this condition is 100% Δ P. If the downstream pressure is 30% or more of the upstream pressure — the condition is 0% Δ P.

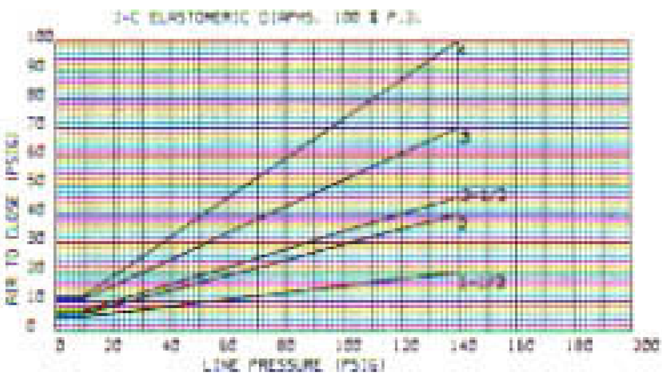
The charts shown below are for 100% Δ P condition and show the air pressure required to close the valve against various line pressures. All valves will be fully stroked.

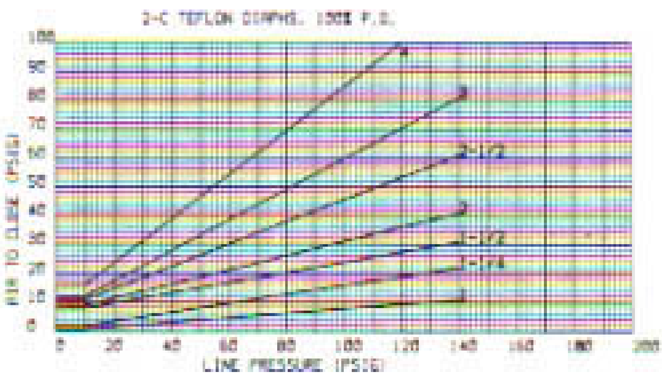








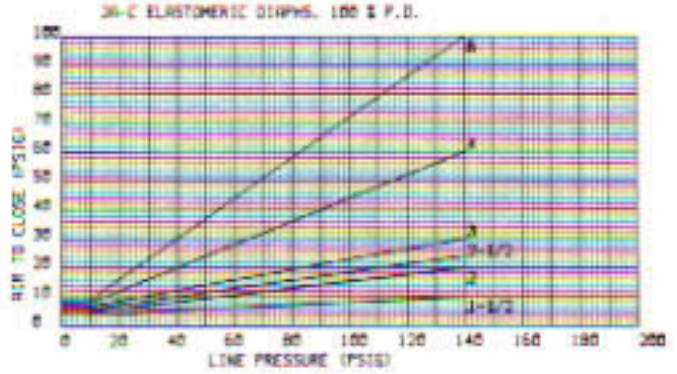


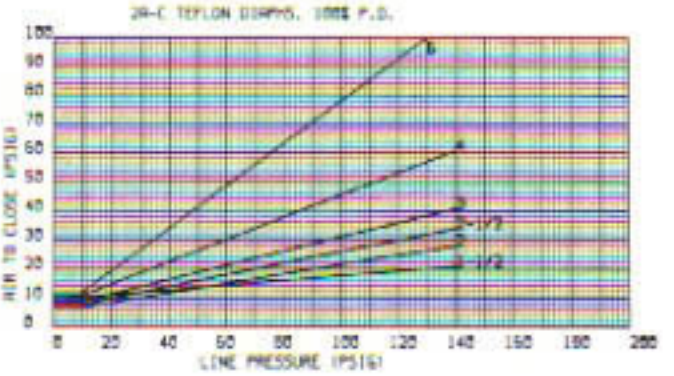


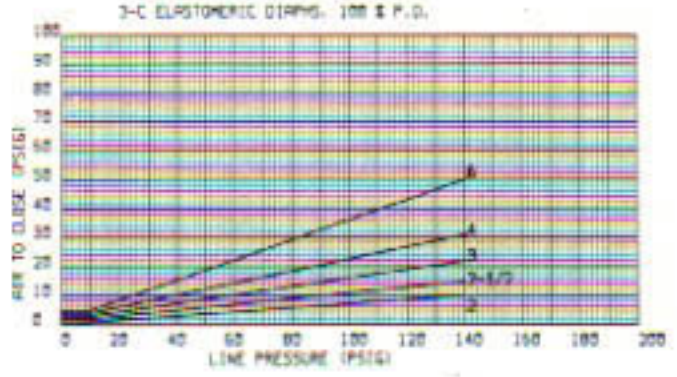
Type "C" Actuators

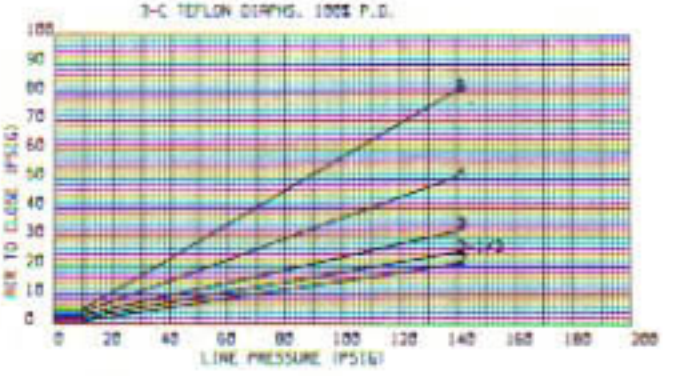
Air to close, air to open

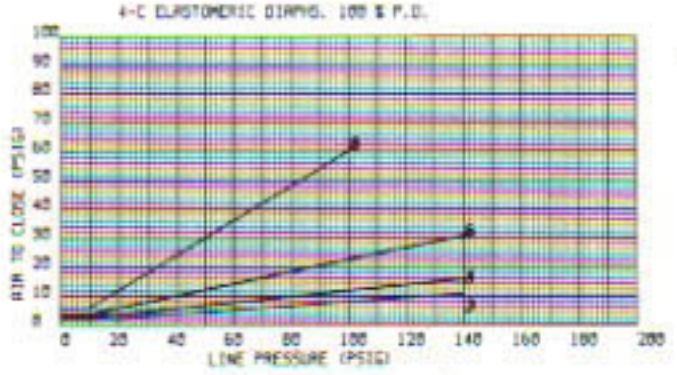
100% Δp

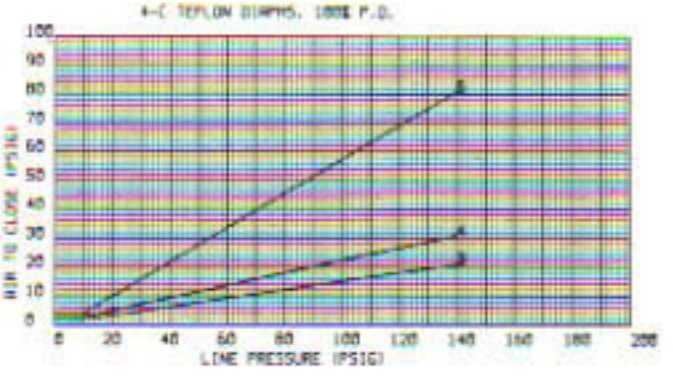


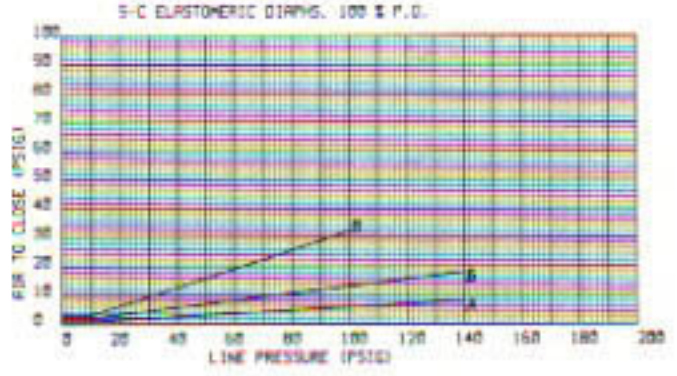


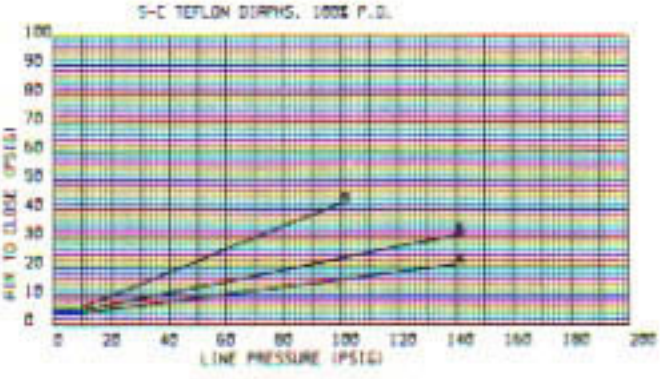








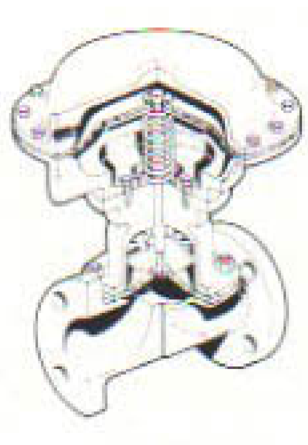




Type "H" Actuators

100% Δp

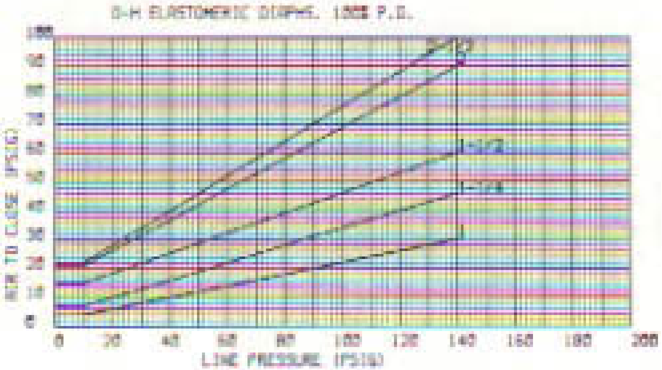
Air to close, spring to open

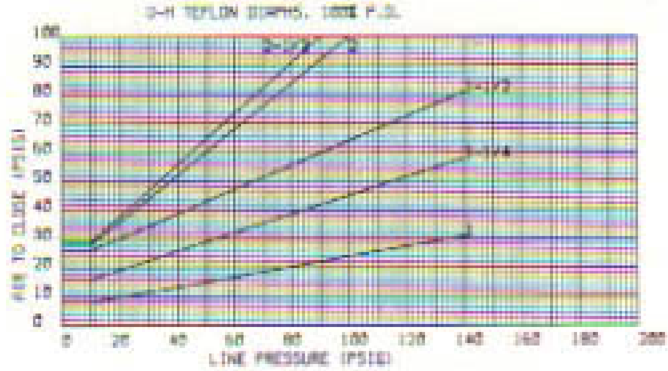


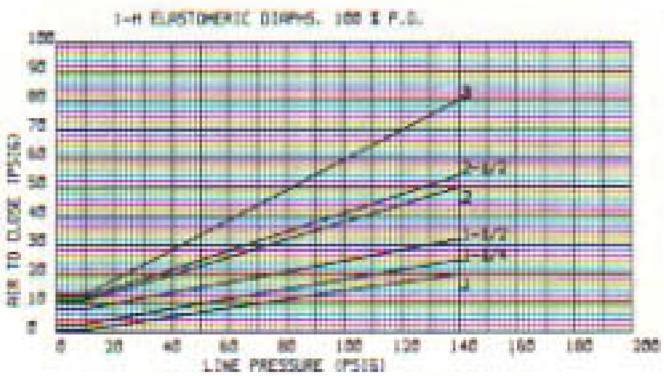
The choice of actuator size is determined by the line pressure through the valve and the available operating air pressure. Some operating conditions call for substantial line pressure downstream when the valve closes.

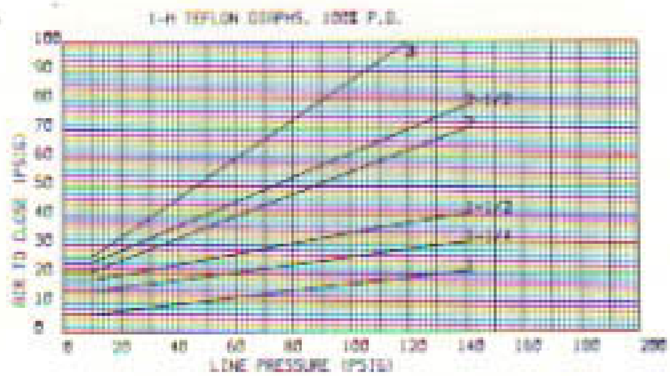
After the valve closes, if the downstream pressure is less than 30% of the upstream pressure — this condition is 100% Δ P. If the downstream pressure is 30% or more of the upstream pressure — the condition is 0% Δ P.

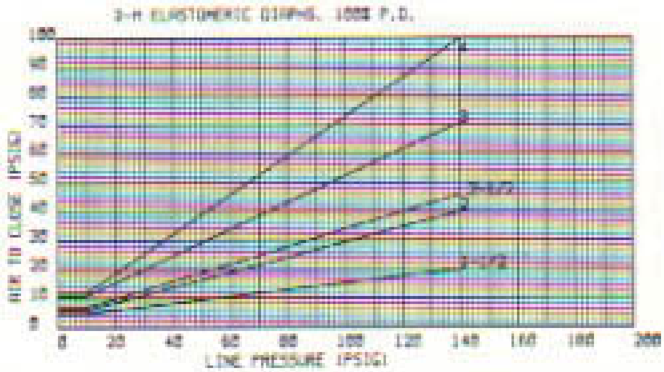
The charts shown below are for 100% Δ P condition and show the air pressure required to close the valve against various line pressures. All valves will be fully stroked.

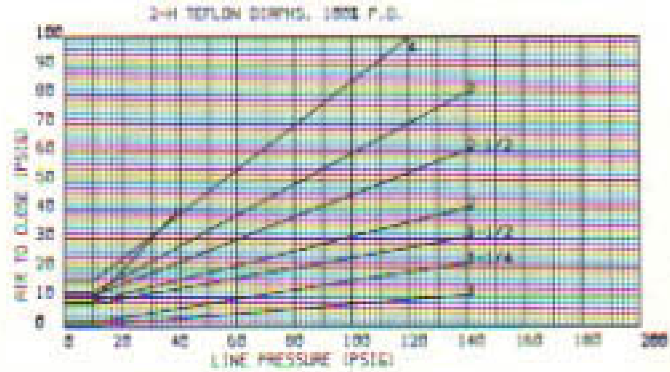








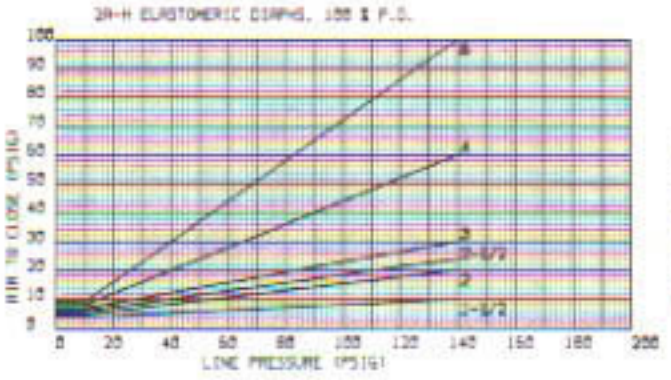


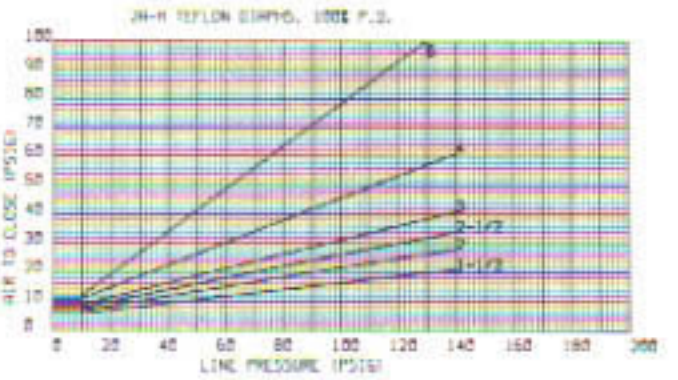


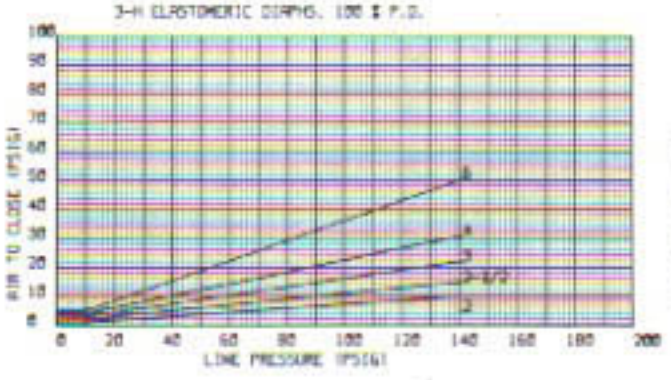
Type "H" Actuators

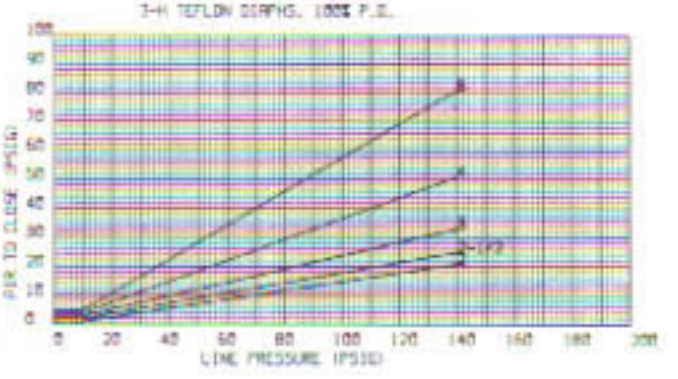
Air to close, spring to open

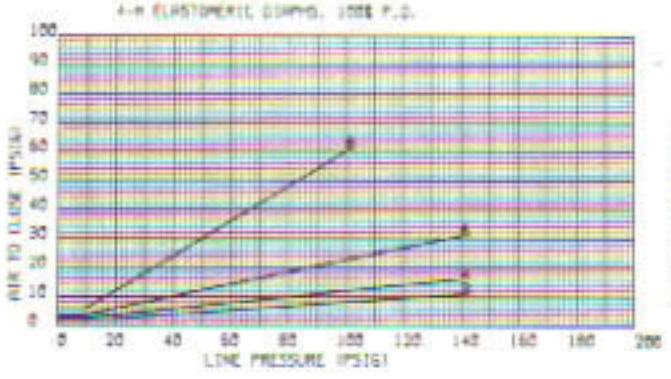
100% Δp

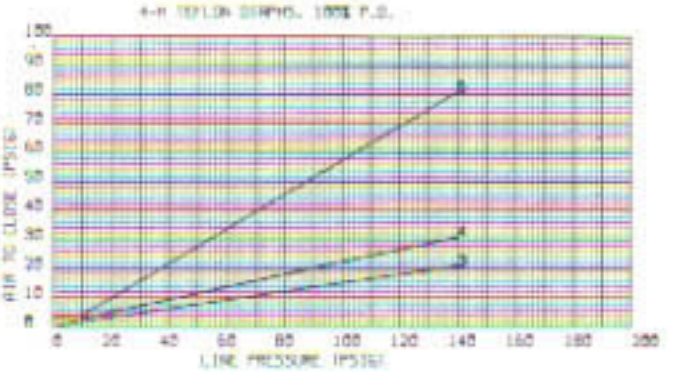


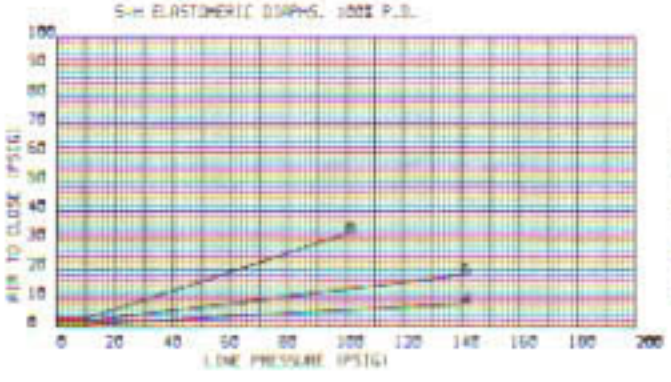


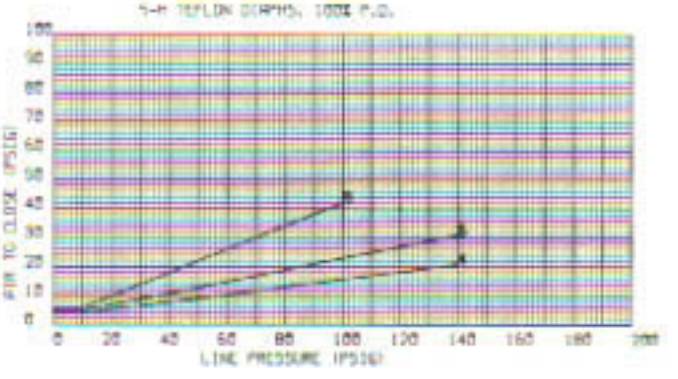










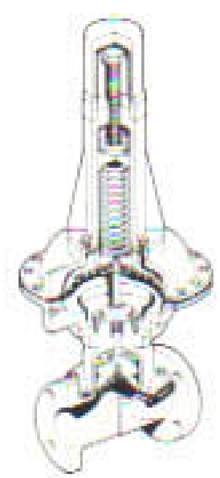


Actuator Sizing

Type "HRT" Actuators

100% Δp

Air to open, spring to close

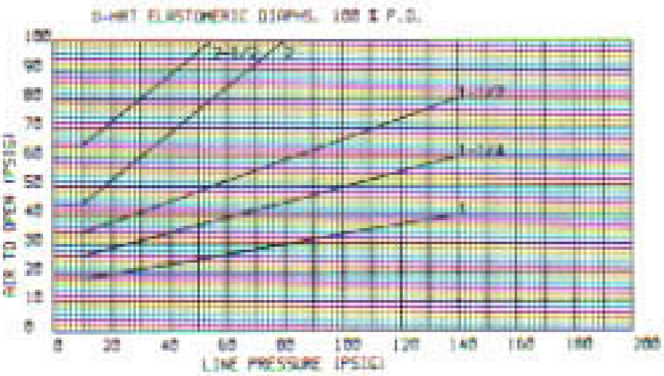


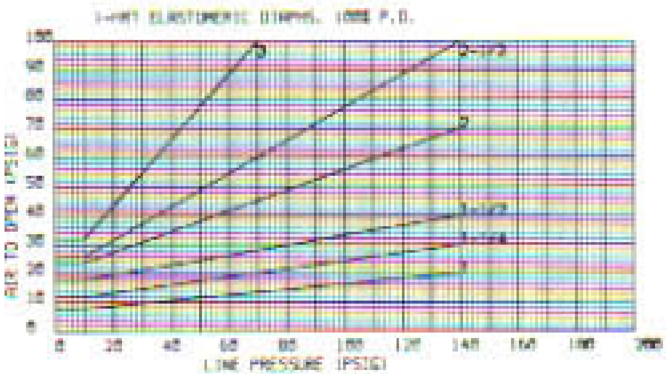
The choice of actuator size is determined by the line pressure through the valve and the available operating air pressure. Some operating conditions call for substantial line pressure downstream when the valve closes.

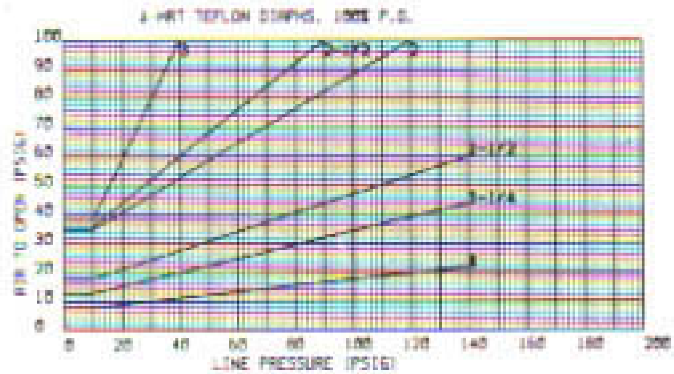
After the valve closes, if the downstream pressure is less than 30% of the upstream pressure — this condition is 100% Δ P. If the downstream pressure is 30% or more of the upstream pressure — the condition is 0% Δ P.

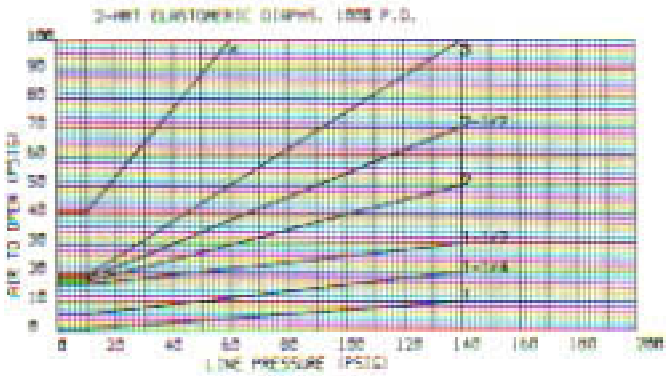
Air pressure on the underside of the actuator diaphragm opens the valve. A spring or set of springs closes the valve.

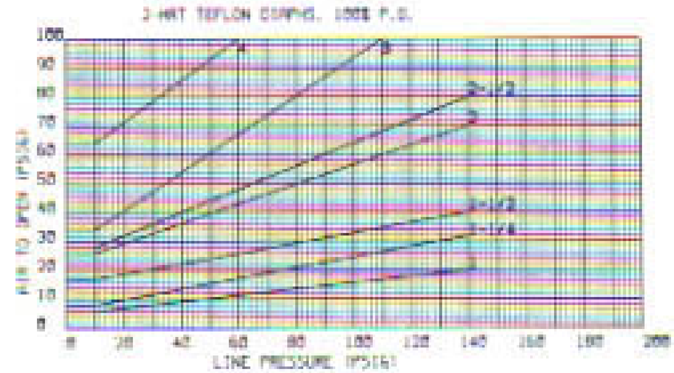
The charts shown below are for 100% Δ P condition and show the air pressure required to fully open the valve against the spring thrust necessary to close the valve against various line pressures.







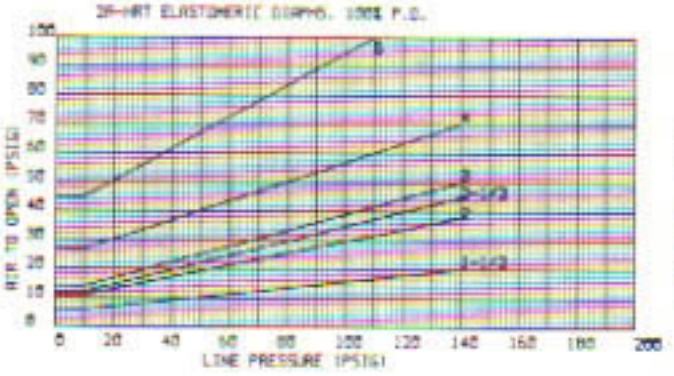


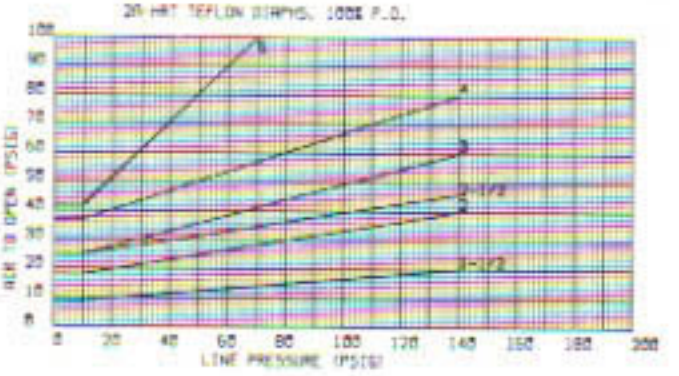


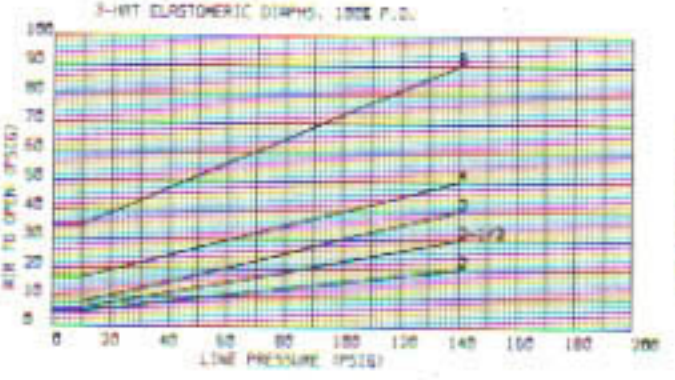
Type "HRT" Actuators

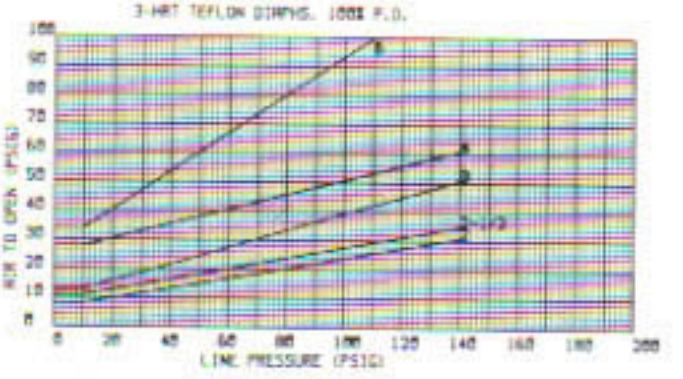
Air to open, spring to close

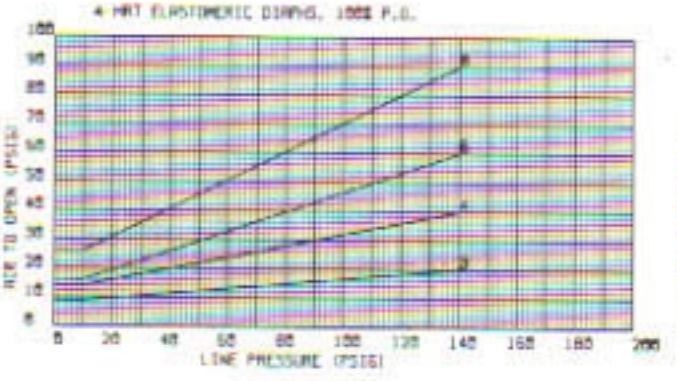
100% Δp

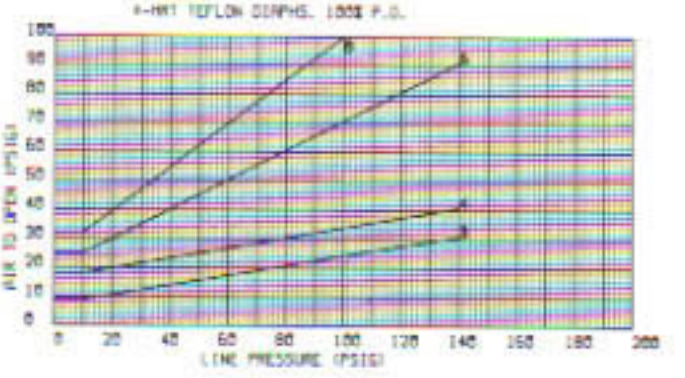


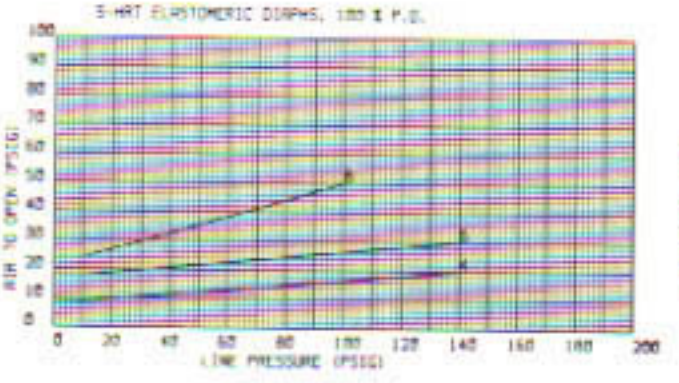


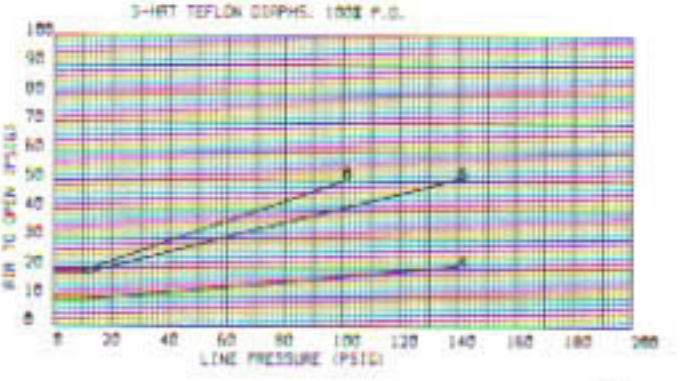












Type "C" Actuators

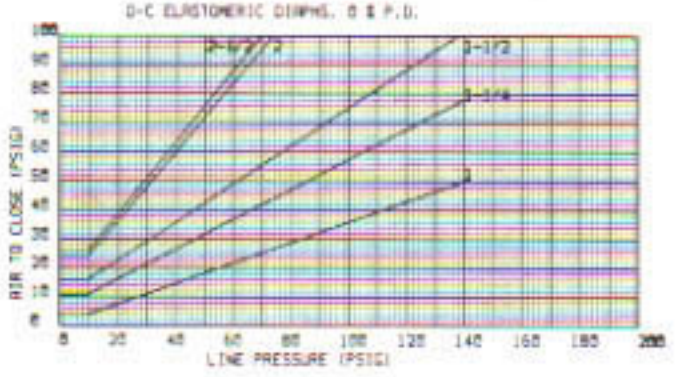
0% Δp

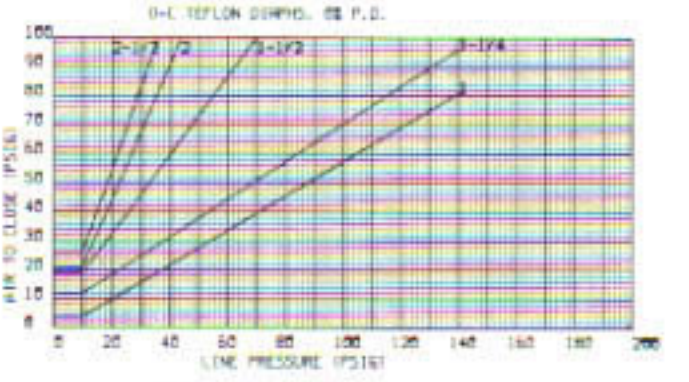
Air to close, air to open

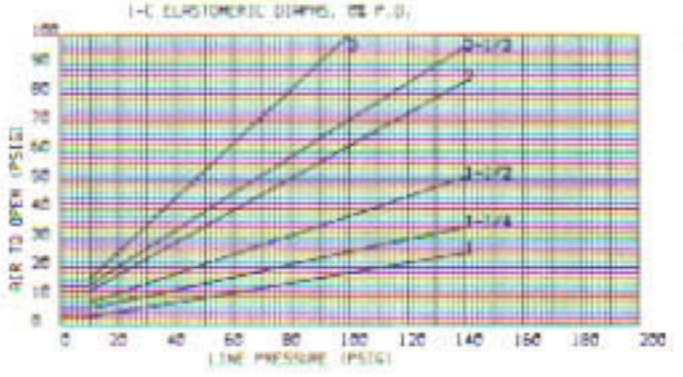
The choice of actuator size is determined by the line pressure through the valve and the available operating air pressure. Some operating conditions call for substantial line pressures downstream when the valve closes.

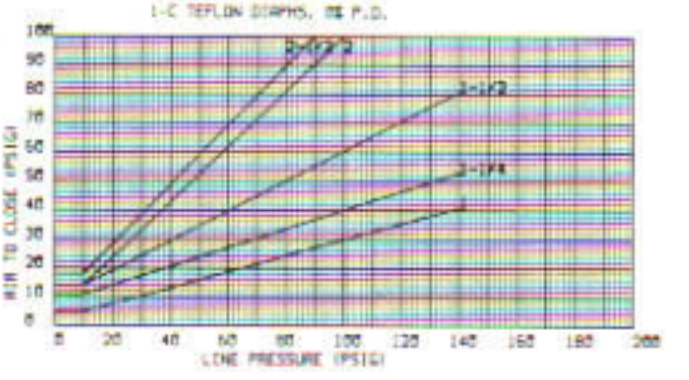
After the valve closes, if the downstream pressure is less than 30% of the upstream pressure — this condition is 100% Δ P. If the downstream pressure is 30% or more of the upstream pressure — the condition is 0% Δ P.

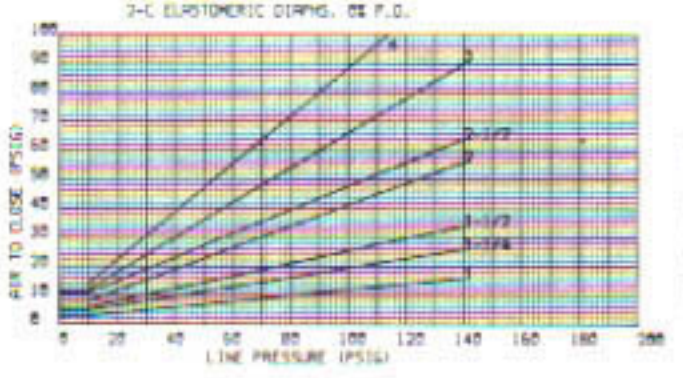
The charts shown below are for 0% Δ P condition and show the air pressure required to close the valve against various line pressures. All valves will be fully stroked.

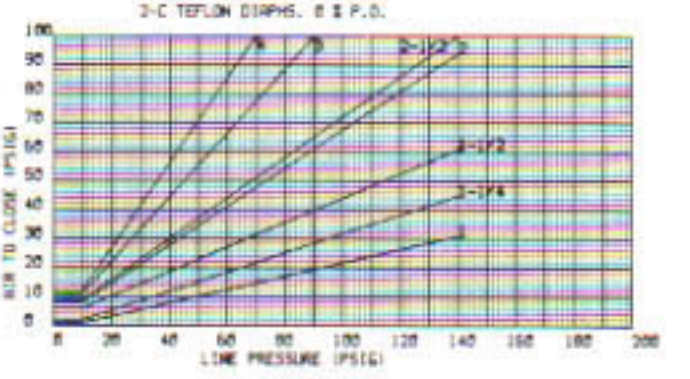








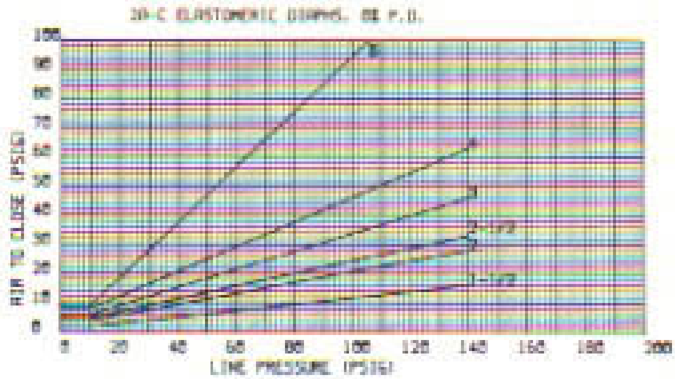


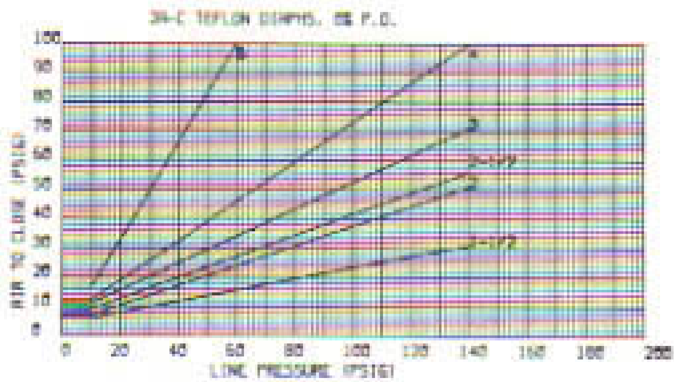


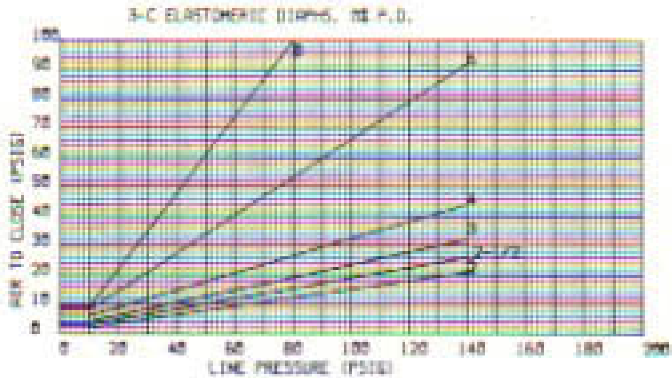
Type "C" Actuators

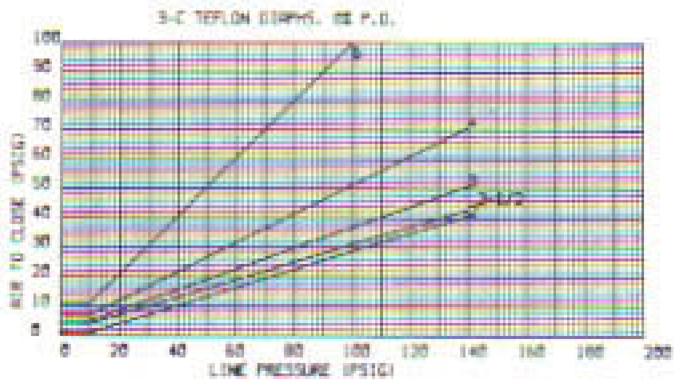
Air to close, air to open

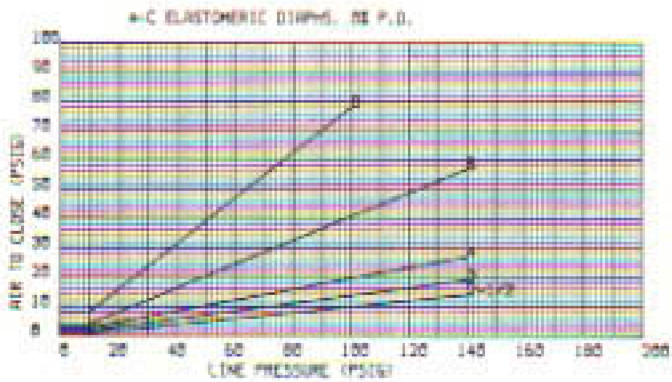
0% Δp

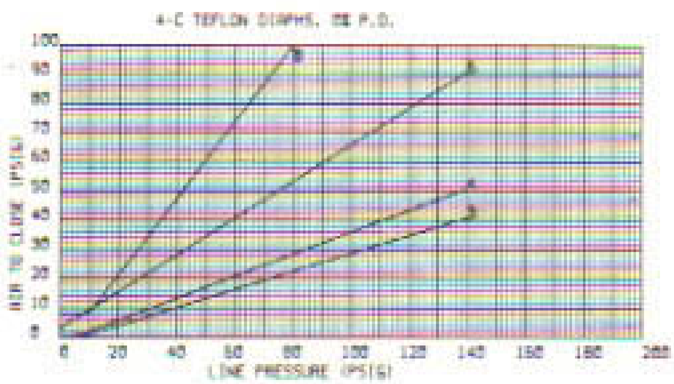


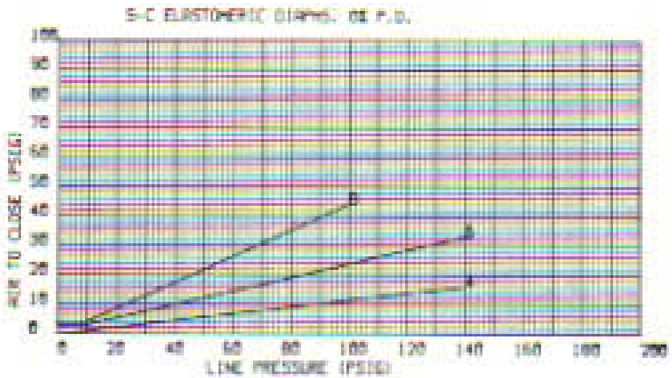


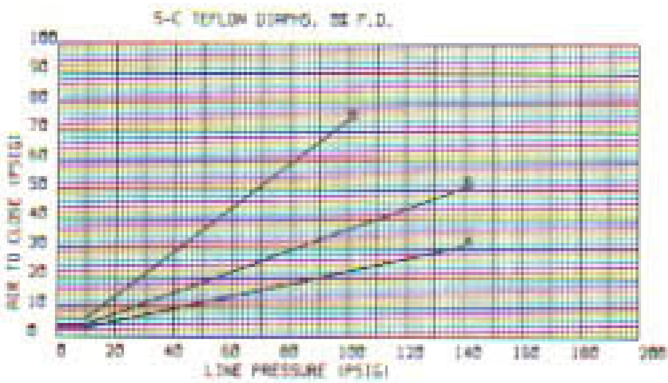










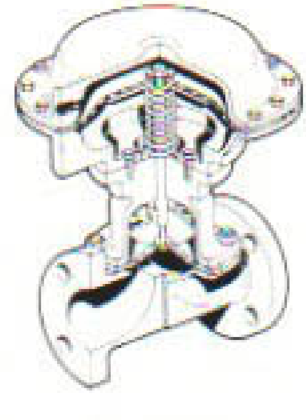


Actuator Sizing

Type "H" Actuators

0% Δp

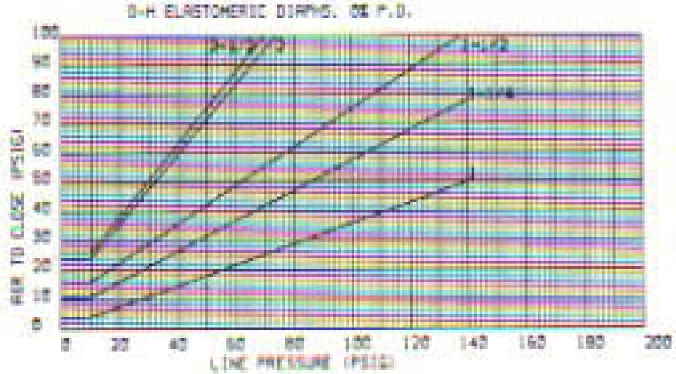
Air to close, spring to open

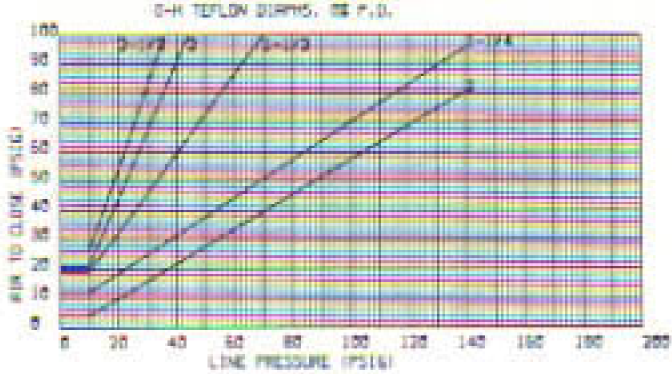


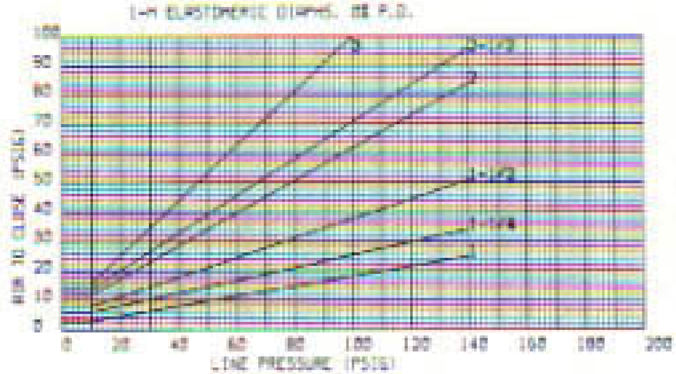
The choice of actuator size is determined by the line pressure through the valve and the available operating air pressure. Some operating conditions call for substantial line pressures downstream when the valve closes.

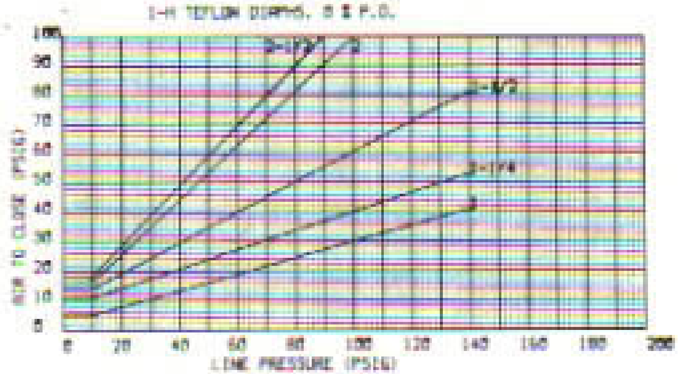
After the valve closes, if the downstream pressure is less than 30% of the upstream pressure — this condition is 100% △ P. If the downstream pressure is 30% or more of the upstream pressure — the condition is 0% △ P.

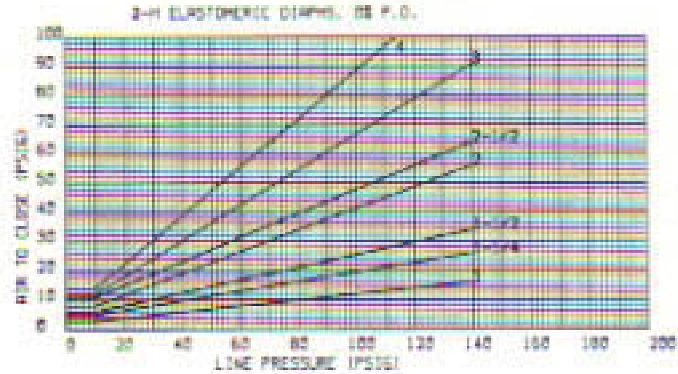
The charts shown below are for 0% △ P condition and show the air pressure required to close the valve against various line pressures. All valves will be fully stroked.

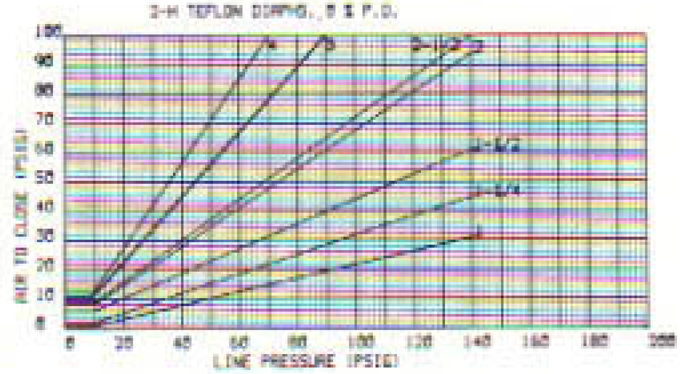








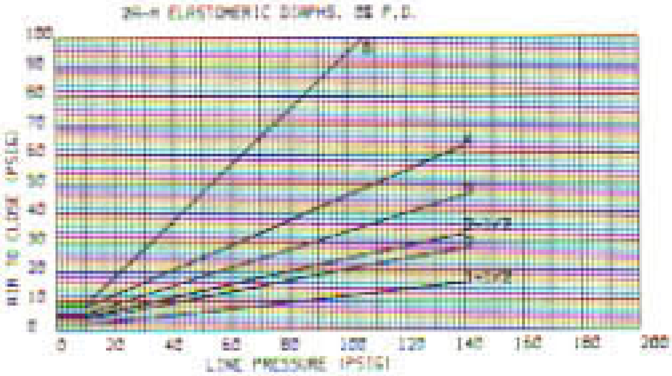


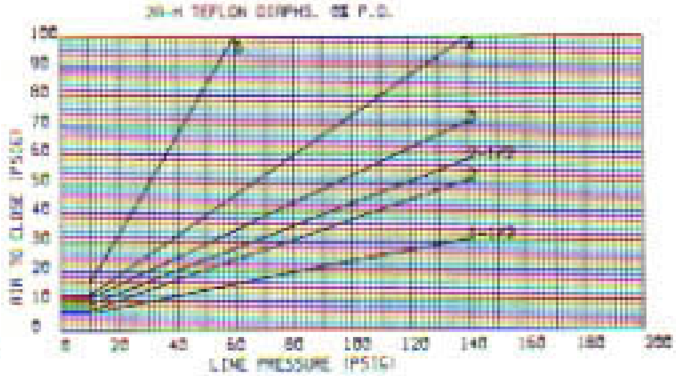


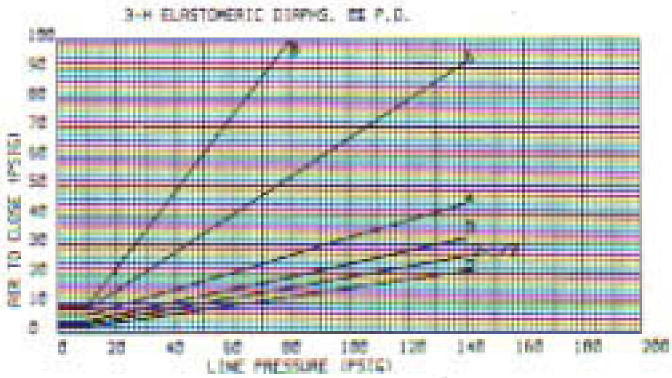
Type "H" Actuators

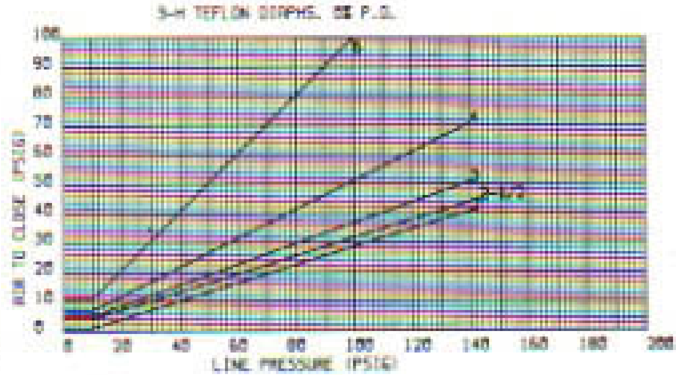
Air to close, spring to open

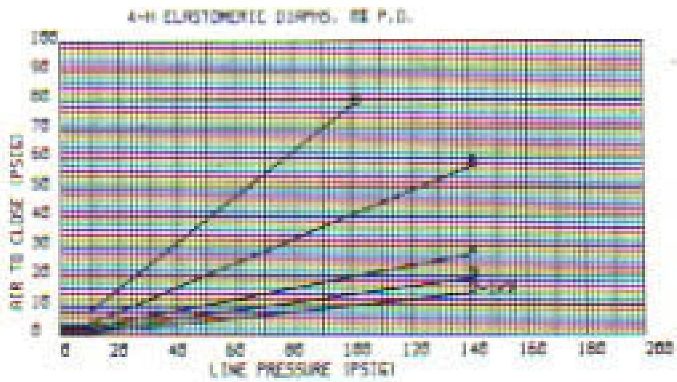
0% Δp

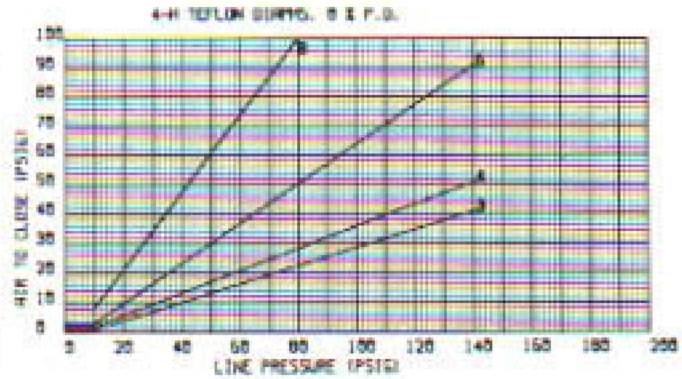


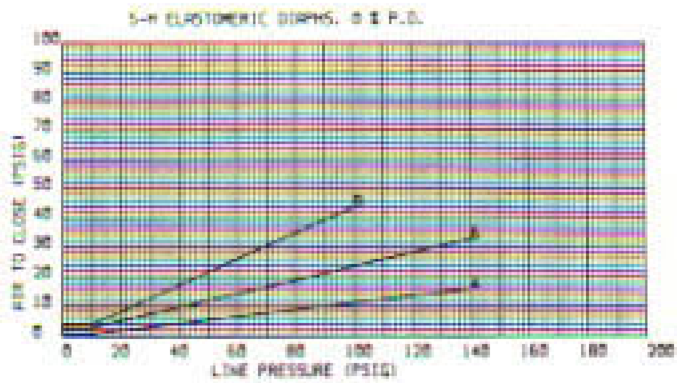


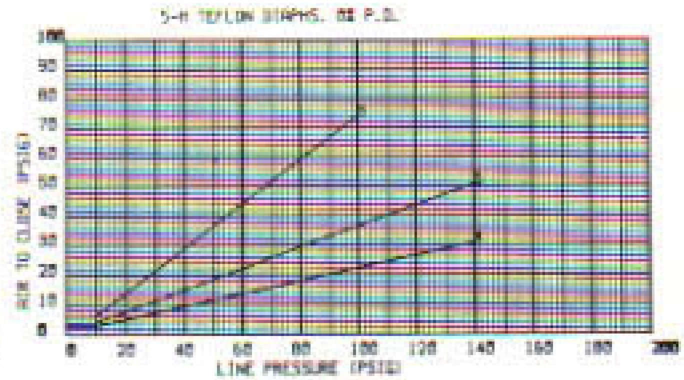










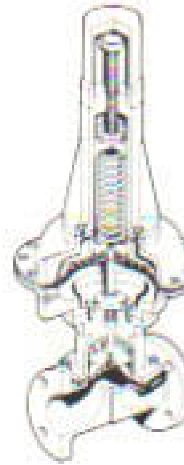


Actuator Sizing

Type "HRT" Actuators

Air to open, spring to close

0% Δp

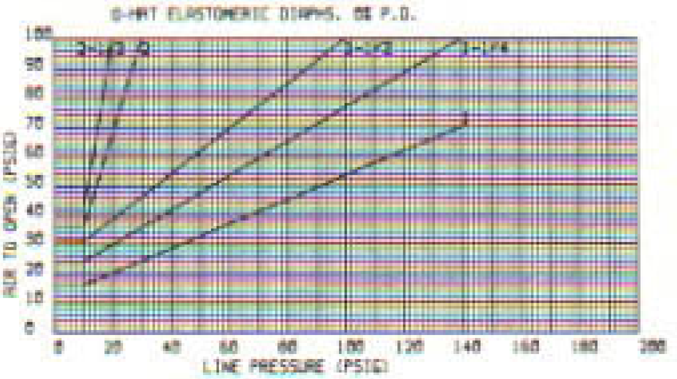


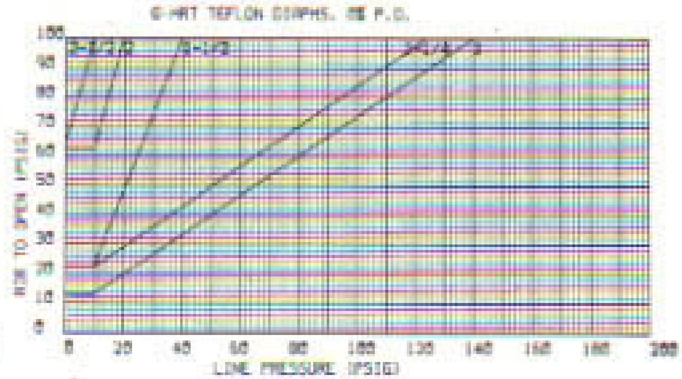
The choice of actuator size is determined by the line pressure through the valve and the available operating air pressure. Some operating conditions call for substantial line pressure downstream when the valve closes.

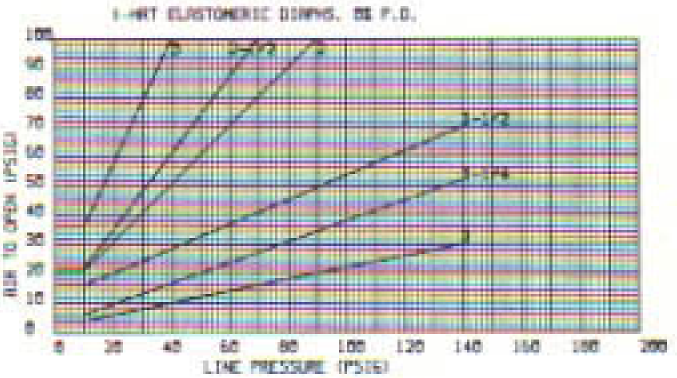
After the valve closes, if the downstream pressure is less than 30% of the upstream pressure — this condition is 100% △ P. If the downstream pressure is 30% or more of the upstream pressure — the condition is 0% △ P.

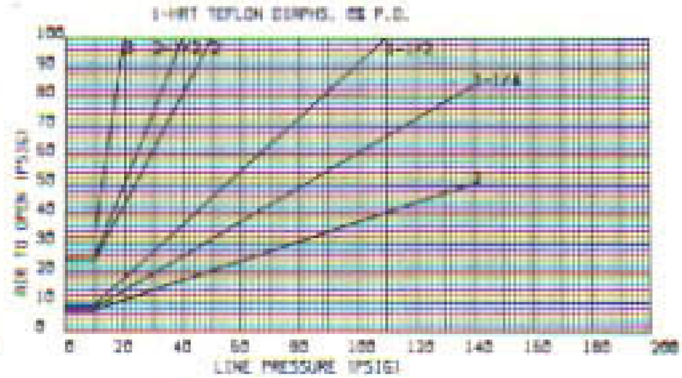
Air pressure on the underside of the actuator diaphragm opens the valve. A spring or set of springs closes the valve.

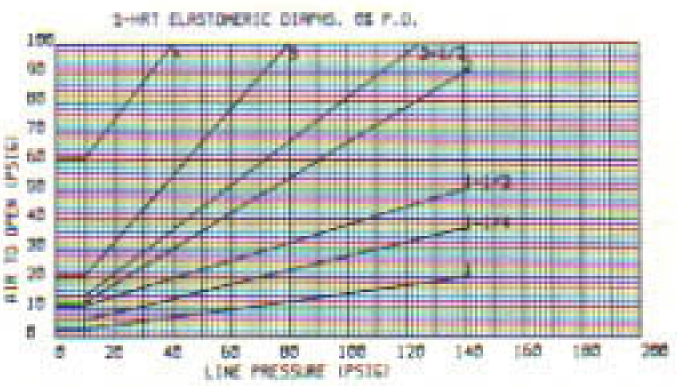
The charts shown below are for 0% △ P condition and show the air pressure required to fully open the valve against the spring thrust necessary to close the valve against various line pressures.

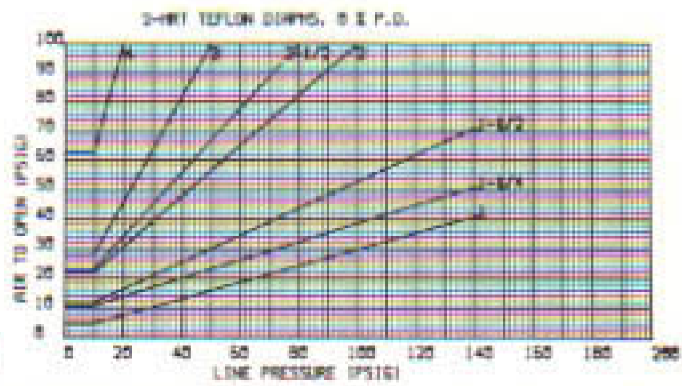








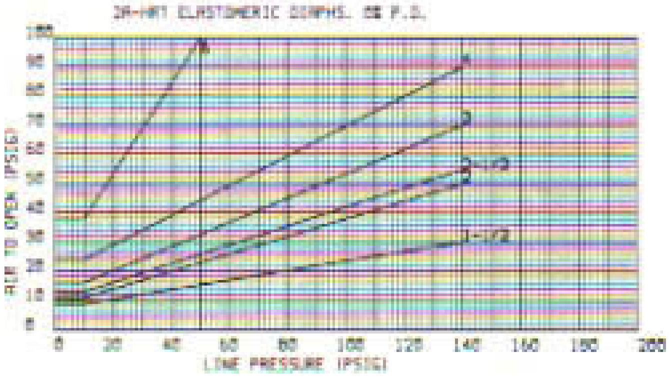


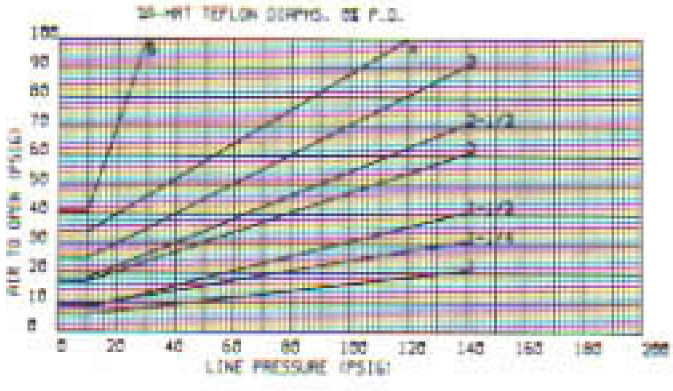


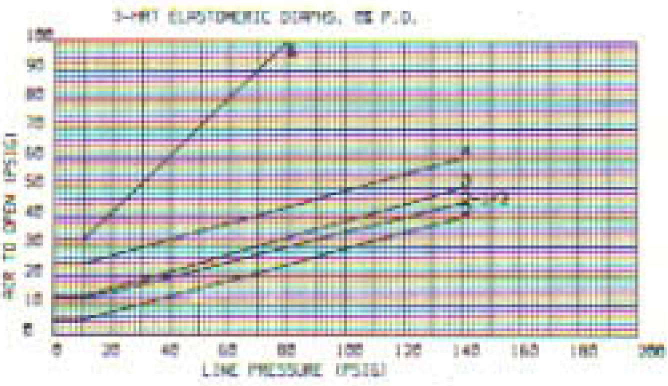
Type "HRT" Actuators

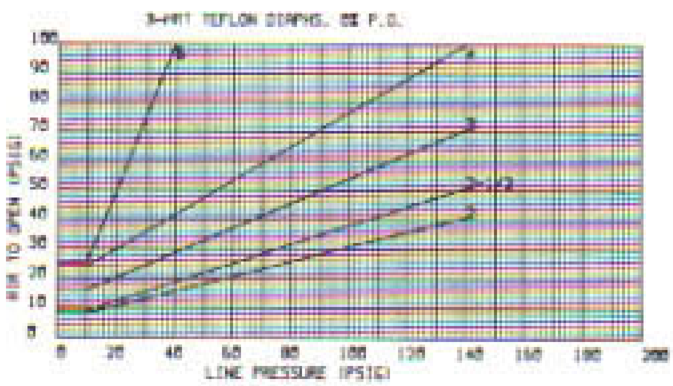
Air to open, spring to close

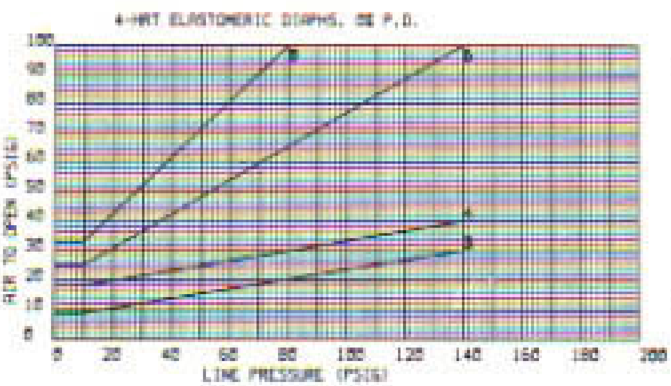
0% Δp

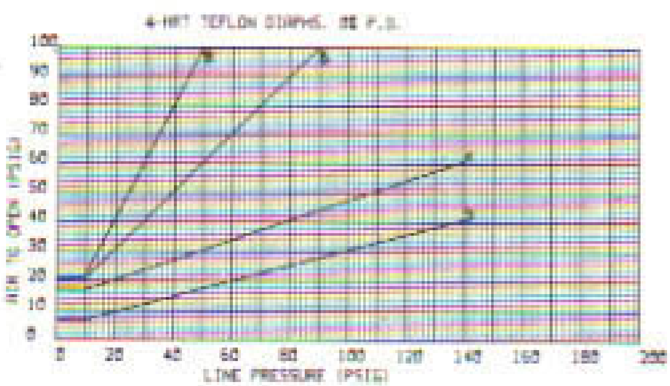


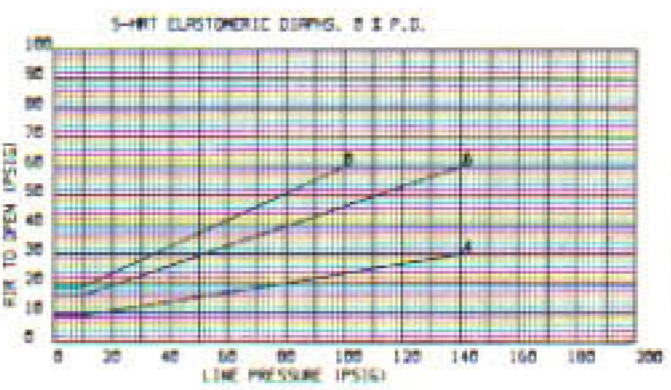


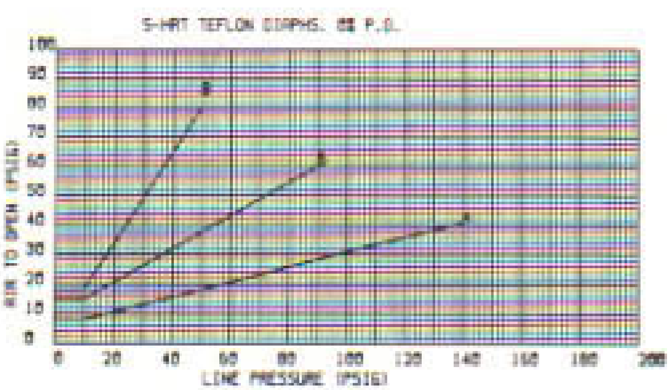








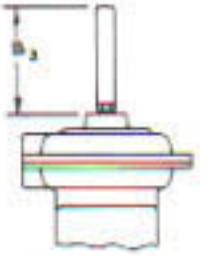




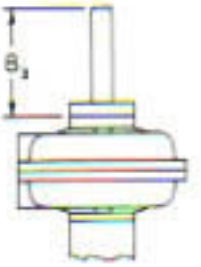
Actuator Accessories

Adjustable Opening Limit Stops

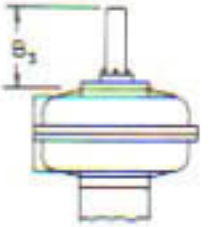
In an emergency, the valve can be closed with this device.



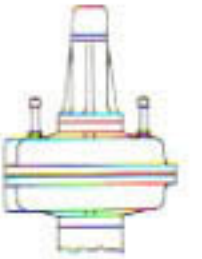
No. 635 Limit Stop for type "C" & "H" actuators 0, 1 & 2.



No. MH-200 Limit Stop for type "C" & "H" actuators 2A, 3 & 4.



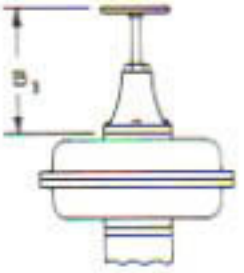
No. C-10 Limit Stop for "C" & "H" actuator 5.



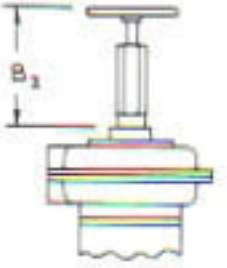
No. DLS Stops for type "HRT" actuators — all sizes.

Opening limit stops are used to limit the opening stroke of the valve and are frequently referred to as "rate sets". The proper setting for limited valve opening is obtained by first removing the cover cap from the top of the unit and then turning the limit screw in a clockwise direction while observing the valve position indicator. The cover cap is then re-installed to prevent air leakage.

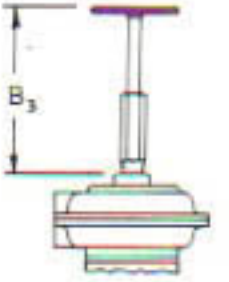
Emergency Handwheel Closing Device



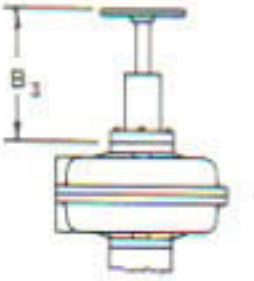
No. L-1101 for type "C" & "H" actuators No. 0, 1, 2 & 2A.



No. SH-100S for type "C" & "H" actuators No. 0, 1, 2 & 2A without switches.



No. SH-100L for type "C" & "H" actuators No. 0, 1, 2 & 2A with limit switches.

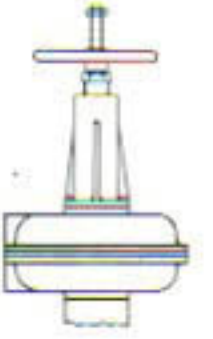


No. C-1500 for type "C" & "H" actuators No. 3 & 4.

No. TMH Handwheel Opening Device for Spring to Close Valves.

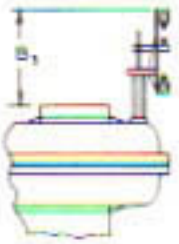
In the event of loss of operating air pressure on a spring to close valve, the valve can be manually opened by turning the handwheel in a clockwise direction.

Upon resumption of operating air service, the handwheel is turned in a counter-clockwise direction until it turns free from the top of the spring case. The valve will then be ready to resume automatic operation.



Actuator Accessories

Limit Switches

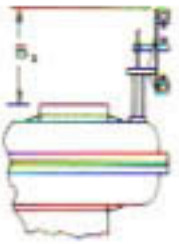


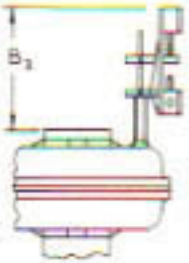
BZE6-2RN and **DTE6-2RN** switches are NEMA-1 general purpose enclosure Micro-switches in cast aluminum housings. BZE6 is SPDT and rated at 15 amps at 125, 250 and 480 vac, ½ amp at 125 vdc, and ¼ amp at 250 vdc.

DTE6 is DPDT rated at 10 amps at 125 or 250 vac, 0.3 amps at 125 vdc and 0.15 amps at 250 vdc.

BAF1-2RN and **DTF2-2RN** swtiches are NEMA-4 waterproof Micro-switches in cast aluminum housings. BAF1 is SPDT rated at 20 amps at 125, 250 or 480 vac, ½ amp at 125 vdc, ¼ amp at 250 vdc.

DTF2 is DPDT rated at 10 amps at 125 or 250 vac, 0.3 amps at 125 vdc, 0.15 amps at 250 vdc.

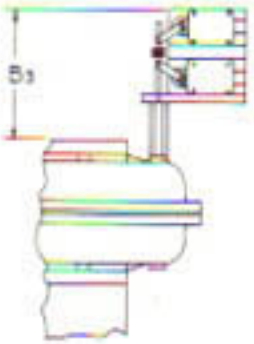


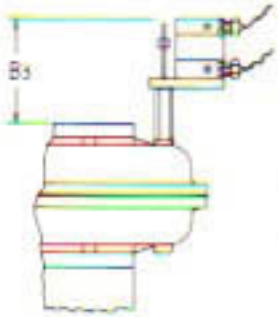


EXQ and **EXDQ** switches are NEMA-7 explosion-proof Micro-switches in cast aluminum housings. EXQ is SPDT rated at 15 amps at 125, 250 or 480 vac, ½ amp at 124 vdc, ¼ amp at 250 vdc.

EXDQ is DPDT rated at 10 amps at 125 or 250 vac, 0.3 amps at 125 vdc, 0.15 amps at 250 vdc.

SL-3, D2400-X and **D1200-X** switches are NEMA-4 water-proof National Acme snap-lock switches in die-cast aluminum housings. All are DPDT rated at 20 amps at 125 vac, 10 amps at 480 vac, 5 amps at 125 vdc, 1.5 amps at 250 vdc.





Proximity switches are available with any NEMA and volt/current rating to meet any specification requirement. For additional information please contact the factory or your nearest representative.

For information on the many other types of limit switches available as standard equipment, please contact the factory or your nearest representative.

Limit Switch Settings

At time of shipment from the factory, the limit switches are set to give a signal at full valve open and closed positions. On "rate-set" valves, that is valves on which the limit stops are set to limit the valve opening so as to regulate flow, the resetting of the "valve open" swtich is extremely simple.

After the limited valve open positions has been established, it is simply necessary to loosen the lock-nut on the switch actuator arm — move the adjusting screw upward until the upper swtich trips, then re-tighten the lock-nut.

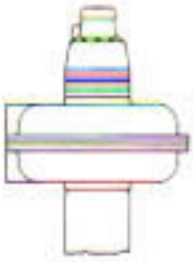
Actuator Accessories

Valve Positioners

For automatic throttling control a valve positioner is required.

The positioner accepts a 3 - 15 psig. or 6 - 30 psig. variable signal from a control instrument or D/P cell and positions the valve in its stroke to maintain a constant and stable condition of pressure or flow in accordance with a varying demand or load.

Built-in Positioner for Type "C" (air to air) and type "H" (air close-spring open)



73N12F built-in top-loading with no output gauge

73N12FG built-in top-loading with output gauge

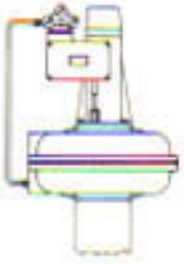
73NB built-in bottom-loading no output gauge

73NBG built-in bottom-loading with output gauge

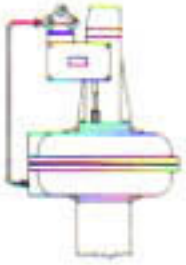
No. 73N12F and **73N12FG** are top-loading positioners, therefore on a rising instrument air signal the valve will close.

No. 73NB and **73NBG** are bottom-loading positioners which means that on a rising instrument air signal the valve will open.

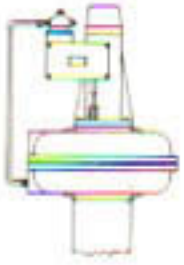
Side Mounted Positioners for Air to Open-Spring closed Valves



72P315 side-mounted with bypass & gauges



72G315 side-mounted with gauges less bypass



72N315 side-mounted without gauges or bypass

Side mounted positioners can be adjusted so that on a rising instrument air signal the valve will open or close as required. All the above positioners are suitable for operating air pressures of 100 psig.

For information on Electro-pneumatic positioners to accept a milli-amp signal and convert it to a pneumatic signal contact the factory or your nearest sales representative.

Actuator Accessories

No. 626-G combination filter-regulator is designed to filter and then reduce air or gas pressure in order to deliver a clean and constant supply of operating medium to pilot controllers or valve positioners. Available only in ¼" female inlet and outlet connections, the regulator body is aluminum and is suitable for a maximum inlet pressure of 150 psig. and 0 to 125F. Reduced pressure ranges are 0 to 50 psig. and 0 to 100 psig. The unit is furnished with an output pressure gauge.

No. 700 is a pressure regulator only and does not filter or clean the compressed air. It is a relieving type regulator which means that any pressure build-up on the outlet side, beyond that for which the regulator is set, will be relieved to atmosphere.

Recommended for use as a preload regulator on air to open air to close actuators — rated for a maximum inlet pressure of 300 psig. at 175 F. with outlet pressure adjustment range of 50 to 125 psig. ¼" female inlet and outlet connections.

No. 1616 speed control is a poppet type check valve which opens to permit free flow of compressed air in one direction. Flow in the opposite directions closes the check valve and air is "metered" through the adjustable opening. A fine thread metering screw provides easy adjustment.

Highly recommended as a means of slowing down the closing stroke of air operated valves to prevent water-hammer and slamming or hydraulic shock.

The RC-50 manual remote control panel is a simple, yet highly accurate instrument for remote positioning of air operated valves and other pneumatic control equipment from a central point. It is extremely stable and will maintain a set pressure regardless of vibration or other normal disturbances.

The unit consists of a Century model 700 regulator and a dial type pressure gauge, completely piped and mounted on a sturdy cast aluminum panel. Pressure gauge ranges are 15, 30, 60, 100 and 160 psig.

The unit is quickly and easily mounted on an existing panel board by tightening four metal clamps over the corners of the panel cutout.

Model 730-RV Diaphragm Control Valve

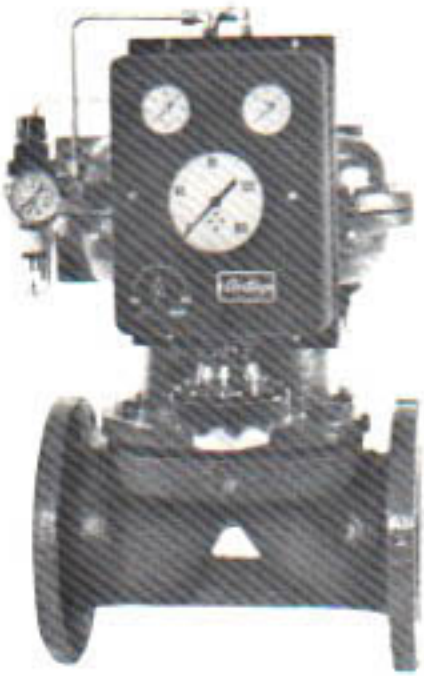
Pilot Operated

For pressure reducing service, back pressure control or pressure relief on application handling de-ionized water, slurries, corrosive or abrasive liquids, or any service which requires a diaphragm type valve.

The assembly consists of a No. 630 air-operated diaphragm valve either normally open or normally closed as desired, a No. 60-P pressure pilot and optional No. 1725 chemical attachment, valve positioner and single or dual limit switches.

For back pressure control or pressure relief service a pressure sensing line is connected to the chemical attachment on the pressure pilot from a point upstream from the main valve.

For pressure reducing service the pressure sensing line must be from a point downstream from the main valve.



No. 730-RV normally open-opens on air failure

No. 730-RV normally closed-closes on air failure

Both normally open (spring open) and normally closed (spring closed) are available with or without valve positioner and limit switches. Positioners are recommended for installations where large fluctuations in flow and/or pressure are encountered, particularly on pressure reducing applications.

The chemical attachment is furnished when the valve is to be used on slurries and corrosive or abrasive liquids to isolate the pressure measuring element in the 60-P pressure pilot.

For applications where close modulating control is required, the pressure pilot is provided with an adjustable proportioning mechanism.

Because of the mechanism in the No. 60-P pneumatic pressure pilot, all Series 730 control valves must be installed in an upright position.

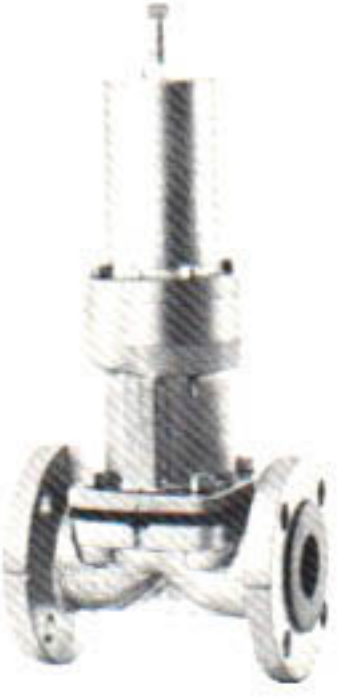
Model 830-RV Diaphragm Relief Valve

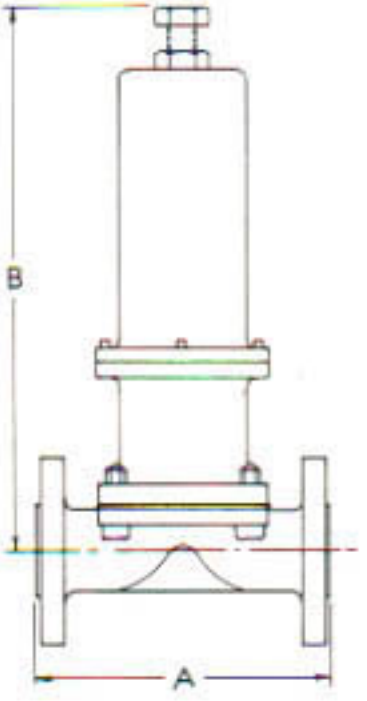
This self-contained, spring loaded diaphragm pressure relief valve is self-operated and requires no air pressure or other outside power source to function. Available in sizes ½" through 8" in a wide variety of body materials, linings and diaphragms and with pressure relief settings from 10 to 150 psig.

Ideal for applications such as the protection of piping systems of plastic or glass against over-pressure, pipe line surges and water hammer, to isolate equipment which might be damaged by vacuum conditions, to maintain a liquid head in a pump discharge line or to replace or protect rupture discs in hazardous or corrosive processes.

The valve will relieve at a preset pressure, then reseat itself automatically when safe working pressure is restored. Adjustment from the original pressure setting is provided within the following limits: plus or minus 20 psig if the original setting is 30 psig or higher. If the original setting is 10 psig, the adjustment available is plus 20 psig, minus 0 psig.

The 830-RV is not a pop-safety valve and therefore it does not provide full pop-open action but will gradually open on a rising pressure and gradually close on a falling pressure. Upon reseating, bubble-tight closure usually results at 3 to 10 psig lower than the relieving set pressure depending on whether the set point is extremely high or low.





DIMENSIONS

VALVE SIZE	½	¾	1	1¼	1½	2	2½	3	4	6
DIMENSION A	4⅛	4⅞	5¾	6	6½	7¾	8¾	10¼	12¾	16¼
DIMENSION B	10	10	10	10	10¾	17⅝	17¾	18¼	24¼	38

Body Materials And Linings

The following list shows the wide variety of bodies and linings available

Body Material	Lining	Code	Screwed Ends	Flanged Ends
Cast Iron	Unlined	01	1/2" - 3"	1/2" - 10"
Cast Iron	Hard Rubber	02	-	3/4" - 10"
Cast Iron	Soft Rubber	03	-	3/4" - 10"
Cast Iron	Neoprene	04	-	3/4" - 10"
Cast Iron	Butyl	05	-	3/4" - 10"
Cast Iron	Hypalon	06	-	3/4" - 10"
Cast Iron	Glass	07	-	1/2" - 10"
Cast Iron	Saran	10	-	3/4" - 10"
Cast Iron	Polypro.	11	-	3/4" - 8"
Cast Iron	Tefzel	13	-	3/4" - 8"
Cast Iron	Kynar	14	-	3/4" - 8"
Ductile Iron	Unlined	17	1/2" - 3"	1/2" - 8"
Ductile Iron	Hard Rubber	18	-	1" - 8"
Ductile Iron	Soft Rubber	19	-	1" - 8"
Ductile Iron	Neoprene	20	-	1" - 8"
Ductile Iron	Glass	21	-	1/2" - 6"
Ductile Iron	Saran	24	-	3/4" - 8"
Ductile Iron	Polypro.	25	-	3/4" - 8"
Ductile Iron	Tefzel	26	-	3/4" - 8"
Ductile Iron	Kynar	27	-	3/4" - 8"
Ductile Iron	PFA	28	-	3/4" - 8"
Cast Steel	Saran	30	-	1" - 8"
Cast Steel	Polypro.	31	-	1" - 8"
Cast Steel	Kynar	32	-	1" - 8"
Cast Steel	Teflon	33	-	1" - 8"
Stainless Steel	Unlined	41	# *1/2" - 3"	1/2" - 8"
Alloy 20	Unlined	42	# *1/2" - 2"	1/2" - 2"
Saran (solid)	Unlined	43	*1/2" - 2"	-
Polypro. (solid)	Unlined	44	*1/2" - 2"	-
Kynar (solid)	Unlined	45	*1/2" - 2"	-
PVC (solid)	Unlined	46	*1/2" - 2"	1/2" - 2"
CPVC (solid)	Unlined	49	*1/2" - 2"	1/2" - 2"
Bronze	Unlined	47	1/2" - 2-1/2"	1/2" - 4"
Aluminum	Unlined	48	1/2" - 2"	-

*Available with socket weld ends.

Available with butt weld ends through 6"

Note: Code number for end connections are: Flgd - 1, Screwed - 2
Socket - 3, Butt Weld - 4.

Applications — Service Guide

For diaphragm code see page 6 — For body code see page 28

The recommendations for valve body and diaphragm materials shown below are based on actual field experience, or on the best recommendation of manufacturers of the particular material listed.

Because of the possible synergistic effects of mixing of chemicals, or the occurence of unanticipated temperature and pressure conditions, Century Instrument Company offers the following recommendations only as a guide. Actual selection of materials should be tempered with the customer's own knowledge of his operating conditions, and requirements of mating equipment.

Under the "Remarks" column a number of services are shown as "Hazardous, use sealed bonnet". Obviously all acids and strong bases, as well as many other services can be recognized as potentially hazardous. However, we have indicated a few applications which might be overlooked.

A sealed bonnet is intended to protect personnel and adjacent equipment from pressurized leaking from the bonnet in the event of diaphragm failure.

Sealed bonnets are provided with a pipe-tapped hole to furnish a means of leading material entering the bonnet cavity to a point of safe disposal. This disposal line can be used in connection with a pressure switch to give remote indication of a diaphragm failure.

SERVICE	DIAPH. CODE	BODY CODE	REMARKS
Abrasives	E, R	01, 03, 07	Specify temp. & △P
Acetaldehyde	H, T	07, 14, 41	
Acetic Acid (to 60%)	E, H, T	07, 11, 44	
Acetic Acid (Glacial)	H, T	07, 11, 41	
Acetic Anhydride	T	21, 26, 41	Hazardous — sealed bonnet
Acetone	E, T	01, 11, 41	
Acetylene	E, H, N	17, 41	Hazardous — sealed bonnet
Acrylonitrile	T	07, 26	Hazardous — sealed bonnet
Air, compressed	E, H, N	01, 17, 47	
Air, sterile	E, T	30, 47	
Alcohol, Butyl	E, N, H, T	01, 11, 46, 47	
Alcohol , Ethyl	E, N, H, T	01, 11, 46, 47	
Alcohol, Furfuryl	T, V	01, 11, 46, 47	
Alcohol, Isopropyl	E, N, H, T	01, 11, 46, 47	
Alcohol, Methyl	E, N, H, T	01, 11, 46, 47	
Aluminum Chloride	E, H, T	07, 11, 45, 46	
Aluminum Nitrate	E, H, T	07, 11, 14, 44	

Tables of Valve Diaphragm and Valve Body Selection Data

SERVICE	DIAPH. CODE	BODY CODE	REMARKS
Aluminum Sulfate	E, H, T	07, 11, 14, 42	(Alum)
Amino Acid	E, T	07, 11, 41	
Ammonia, Aqu.	E, H	01, 14, 44	
Ammonia, Anhyd.	E, N, T	17, 25, 27, 41	Hazardous — sealed bonnet
Ammonium Bicarb.	R, E	01, 07, 11	
Ammonium Bromide	E, T	07, 11, 14, 44	
Ammonium Hydroxide	E, H	01, 48	
Ammonium Nitrate	E, N, T	01, 07, 11	
Ammonium Phosphate	E, H	02, 07, 11	
Analine	T	01, 14, 41	
Antibiotic Broth	E, T	21, 26, 41	Steam out to 50 psig.
Aqua Regia	T	21, 26, 27	Hazardous — sealed bonnet
Argon	E, N	17, 47	
Aromatic Solvents	T	01, 26, 47	(Benzene, toluene & mixtures)
Ash Slurry	R	03, 07	Avoid high △P
Battery Acid	T, V	07, 13, 42	
Beer	WB, WE, T	41, 47	
Benzene	T, V	01, 13, 14	
Black Liquor	H, T	01, 11, 13	Advise Concentration
Bleached Pulps (8%)	E, H	02, 07, 11	
Boric Acid	E, R, T	02, 03, 11, 41	Use R & 03 on Slurry
Brine (Alkaline)	E, H, T	01, 02, 11	
Brine (Chlorinated)	H, T, V	06, 07, 14	
Brine (Pickling)	WB, WE, T	07, 14, 45	
Bromine, Gas	T, V	07, 26, 27	Hazardous — sealed bonnet
Bromine, solution	T, V	07, 13, 46	
Brown Liquor	E, H	01, 11	(Pulp and Paper)
Butyl Cellosolve	E, H	01, 47	
Cad. Plating Sol.	E, H, T	01, 02, 11	
Calcium Carbonate	E, R	01, 03	Slurry — avoid high △P
Calcium Hypoclorite	E, H, T	02, 07, 11, 44	
Calcium Sulfite	E, H, T	02, 11, 14	
Cane Sugar - Sol.	E, T	01, 11, 46, 47	
Cane Sugar - Refined	WE, T	07, 13, 41	Steam out to 50 psig.
Carbon Black	E, R	03, 07	Avoid high △P
Carbon Dioxide Gas	E, T	11, 17, 47	
Carbon Tetrachloride	T, V	07, 13	
Carbonated Beverages	WB, WE, T	07, 14, 41, 46	

Tables of Valve Diaphragm and Valve Body Selection Data

SERVICE	DIAPH. CODE	BODY CODE	REMARKS
Carbonic Acid	E, WE, T	02, 07, 11, 41	
Casein Water Paint	E, T	01, 07, 11, 41	
Cement, Dry	R	03	Max. △P 15 psig
Chlorinated Hydrocarb.	T, V	01, 07, 26	
Chlorine Dioxide	T	18, 21, 25	Hazardous — sealed bonnet
Chlorine Gas, Wet	H, T	02, 11, 14	
Chlorine Solutions	H, T	02, 11, 14	
Chromic Acid	T, V	07, 13, 14	
Citric Acid	B, E, T	07, 11, 14	Use WE or WB for food service
Citrus Concentrate	WE, WB, T	07, 13, 41	
Coal Slurry	R	01, 03	Avoid high △P
Copper Chloride	E, H, T	07, 11, 14	
Copper Plating	E, H, T	07, 11, 14	
Corn Oil	WB, WE, T	07, 13, 41	
Corn Syrup	WE, T	07, 13, 41	Steam out to 50 psig
Deionized Water	E	02, 11, 44	
Diatomaceous Earth	E, H, R	01, 02, 07	
Distilled Water	E, T	07, 11, 41	Potable use WE, WB
Edible Oils	WB, T	07, 11, 41	
Ethylene-Dry Gas	H, T, V	17, 41, 47	Hazardous — sealed bonnet
Ethylene Dibromide	T, V	07, 14, 41	
Ethylene Dichloride	T, V	07, 14, 41	
Ethylene Glycol	E, H, T, V	07, 14, 41	
Ethylene Oxide	T	26, 41	
Fatty Acids	T, V	07, 11, 14, 41	
Ferric Chloride	E, H, T	02, 07, 11, 14	
Ferric Nitrate	E, H, T	02, 07, 11, 14	
Formaldehyde - 40%	E, H, T, V	02, 07, 11, 14	
Formic Acid - 85%	E, H, T	02, 07, 11, 14	
Freon Gas - 11 & 12	N, T	17, 47	Use 41 if temp. below −20F
Freon Gas - 21	T	17, 47	Use 41 if temp. below −20F
Freon Gas - 22	H, T	17, 47	Use 41 if temp. below −20F
Fuel Oil	H, T	17, 26, 41	Use 01 at customer's risk
Gasoline	T, V	17, 26, 41	Use 01 at customer's risk
Gelatine - Edible	WE, T	13, 41	Steam out to 50 psig
Green Liquor	E, H, T	01, 11, 14	(Pulp & Paper)
Gypsum	E, R	01, 03	Avoid high △P
Helium Gas	E, N	01, 17	

Tables of Valve Diaphragm and Valve Body Selection Data

SERVICE	DIAPH. CODE	BODY CODE	REMARKS
Hydrazine	T	21, 26, 41, 48	Hazardous — sealed bonnet
Hydrobromic Acid	T	07, 14, 44	
Hydrochloric Acid	E, H, T, V	07, 14, 44	If organics present — avoid E
Hydrofluoric Acid	H, T, V	13, 14	02 & 04 useful under 50%
Hydrogen	E, N, T	17, 47	Hazardous — sealed bonnet
Hydrogen Bromide	T, V	07, 13, 14	
Hydrogen Chloride	T	07, 13, 14	
Hydrogen Cyanide	E, N, T	21, 26, 27	Hazardous — sealed bonnet
Hydrogen Fluoride	T	11, 14	
Hydrogen Peroxide (30%)	E, H, T	07, 11, 14, 48	
Hydrogen Peroxide (90%)	T, V	07, 13, 48	
Hydrogen Sulfide (Dry)	E, N, T	11, 14, 41	Hazardous — sealed bonnet
Hypochlorite	(see Calcium, Sodium, etc.)		
Ice Cream Mix	WB, WE, T	13, 41, 46	
Ion Exchange	E	02, 11, 46	
Kerosene	H, T, V	17, 26, 47	01 at customer's risk
Lactic Acid	WE, T	07, 13, 41	Steam out to 50 psig
Latex	E, H, T	07, 13	If unreacted ABS use T
Lead Oxide	E, H, R	01, 03	Avoid high $\triangle P$
Lime - Slaked	E, R	01, 03	Avoid high $\triangle P$
Lithium Bromide	E, H, N	01, 11, 41, 46	
Magnesium Hydroxide	E, R	01, 03	If food grade use WE & 7
Maleic Anhydride	T, V	14, 41	
Mercaptans	T	07, 13, 41,	Gas Odorant — sealed bonnet
Methylethyl Ketone	T	01, 13, 17	
Methyl Isobutyl Ketone	T	01, 13, 17	
Milk	WB, WE, T	07, 13, 41	
Muriatic Acid	E, H, T, V	07, 14, 46	
Naptha	B, T	17, 47	01 at customer's risk
Neoprene Latex	T	07, 13	
Nitric Acid - to 20%	E, H, T	07, 13, 42	
Nitric Acid - to 70%	T, V	07, 13, 42	
Nitrogen Gas	E, H	01, 17	
Nitroglycerine	T	21, 26, 41	
Oxygen	E, H	17, 47	Specify "for oxygen"
Paint	H, T	07, 13, 41	
Paint Thinner	T	01, 13, 47	

Tables of Valve Diaphragm and Valve Body Selection Data

SERVICE	DIAPH. CODE	BODY CODE	REMARKS
Paper Pulp	E, R	01, 03, 11	
Paper Pulp - Chlorin.	E, H	02, 07, 14	
Perchlorethylene	T, V	01, 14	
Persulfuric Acid	T	07, 11, 42	
Phenol	T, V	07, 11, 41	
Phosphoric Acid	E, H	02, 06, 14, 41	
Photographic Solutions	WE, T	07, 14, 41, 46	
Picric Acid	E, H, T	07, 14, 42	Use 42 if steam jacketed
Plasma	WE, T	07, 13, 41	Steam out to 50 psig.
Plating Solutions			
All except Chrome	E, H, T	02, 11, 44	
Chromium	T, V	07, 10, 14	
Polyvinyl Chloride	E, H	07, 14, 41	
Potassium Carbonate	E, H	01, 02, 11	
Potassium Hydroxide	E, H	01, 02, 11	
Potassium Nitrate	E, H	01, 07, 11	
Potassium Perchlorate	T	07, 11, 41, 44	If conc. — sealed bonnet
Propylene Glycol	E, H, T	01, 07, 14	
Rayon Spin Bath	T	02, 07, 14	
River Water	E, R	01, 03	
Salt Brine	E, H, T	02, 07, 11, 44	
Sea Water	E, H, T	02, 07, 11, 44	
Sewage	E, H	01, 02, 11	With fats or oils use H
Silicon Tetrachloride	T	21, 25, 27	Hazardous — sealed bonnet
Silver Nitrate	WB, WE, T	07, 11, 41, 44	
Soap Solution	E, H	01, 11, 47	
Sodium Acetate	E, T	02, 11, 41, 44	
Sodium Chloride	E, H, T	02, 07, 11, 44	
Sodium Hydroxide	E, H	01, 02, 11, 44	
Sodium Hypochloride	E, H	02, 07, 11, 44	
Sodium Nitrate	E, T	07, 11, 41	If free nitric use T
Sodium Perchlorate	H, T	02, 07, 11	If conc. — sealed bonnet
Sodium Peroxide	E, H	02, 07, 11	
Sodium Sulfate	E, H	01, 02, 11	
Soft Drink Syrups	WE, T	07, 13, 47	Steam out to 50 psig.
Steam to 50 psig	E, T	17, 47	01 at customer's risk
Styrene - Dry Gas	T, V	17, 47	Hazardous — sealed bonnet
Sugar	WE, T	07, 13, 41	Steam out to 50 psig.

Tables of Valve Diaphragm and Valve Body Selection Data

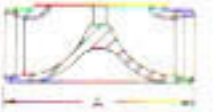
SERVICE	DIAPH. CODE	BODY CODE	REMARKS
Sulfur Dioxide - Dry	T	17, 25, 41	Toxic — sealed bonnet
Sulfur Dioxide Solution	E, H	02, 07, 11, 42	
Sulfur Dioxide Wet Gas	E, H	02, 07, 11, 42	
Sulfuric Acid - to 50%	E, H, T	02, 07, 11, 42	
Sulfuric Acid 50 to 79%	E, H, T	07, 11, 14, 42	
Sulfuric Acid 79 to 98%	T, V	17, 21, 26, 42	01 at customer's risk
Sulfuric Acid Fuming	T	21, 26, 42	Hazardous — sealed bonnet
Tall Oil	H, T, V	01, 13, 47	
Titanium Dioxide	E, R	03, 07, 14	
Titanium Tetrachloride	T, V	17, 21, 26	Hazardous — sealed bonnet
T.N.T. Slurry	E, T	17, 21, 41	
Toluene - Dry Gas	T, V	01, 14, 17, 47	
Tomato Juice	WE, T	07, 13, 41	Steam out to 50 psig
Trichloro-ethylene	T, V	01, 07, 13	TFE may stress crack
Tung Oil	H, T	01, 47	
Turpentine	T, V	01, 13, 47	
Urea Ammonia Liquor	E, H	01, 11, 44	
Vacuum to 25 mm. Hg.	E, H, T	01, 07, 47	Evacuate bonnet over 4"
Vacuum below 25 mm, Hg.	E, H, T	07, 41, 47	Evacuate bonnet over 4"
Varnish	T	01, 07, 13	
Vegetable Juice	WE, T	07, 13, 41	Steam out to 50 psig
Vinegar	WE, T	07, 13, 41	Steam out to 50 psig
Water - Acid	E, H	02, 07, 11, 44	
Water - Alkaline	E, H	01, 02, 11	
Water - Boiling	E, H	01, 11, 47	
Water - Deionized	E, T	02, 11, 44	
Water - Potable	WB, WE, T	07, 13, 41	
Water - River	E, H	01, 03, 07	
Water - Sea	E, H	02, 11, 47	
Water - Sterile	WE, T	07, 13, 41	Steam out to 50 psig
Whiskey/Wine	WE, T	07, 13, 41	Steam out to 50 psig
White Liquor	E, T	01, 02, 11, 44	(Pulp & Paper)
Yeast	WE, T	07, 13, 41	Steam out to 50 psig
Zinc Chloride	E, H	02, 07, 11, 44	
Zinc Oxide-In Water	E, R	03, 07, 41	
Zinc Oxide-In Oil	H	01, 04, 41	
Zinc Sulfate	E, H	02, 07, 11, 41	

Dimensional Data Dimension "A"

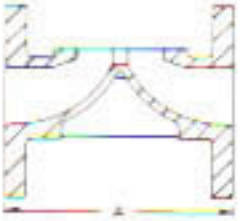
End to end dimensions for valve bodies

Metal-Screwed

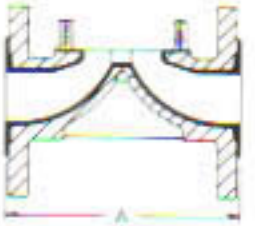
Metal-Socket Weld



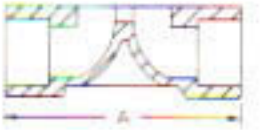
Metal-Butt Weld



Flanged-Unlined



Flanged-Lined



Solid Plastic

Valve Size	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"	6"	8"
Screwed-metal	2-1/2	3-1/4	4-1/4	4-7/8	5 3/4	6-1/2	8-1/8	10-1/8	–	–	–
Socketweld-metal	2-1/2	3-1/4	4-1/4	4-7/8	5-3/4	6-1/2	8 1/8	10-1/8	–	–	–
Buttweld-metal	2-1/2	3-1/4	4-1/4	4-7/8	5-3/4	6-1/2	*	*	*	*	*
Flanged-unlined	4	4-5/8	5	5-3/4	6-1/4	7-1/2	8-1/2	10	12-1/2	16	20 1/2
Flanged-lined Hard rubber	–	4-7/8	5-1/4	6	6-1/2	7-3/4	8-3/4	10-1/4	12-3/4	16-3/8	20-7/8
Soft rubber	–	4-7/8	5-1/4	6	6-1/2	7-3/4	8-3/4	10-1/4	12-3/4	16-3/8	20-7/8
Neoprene	–	4-7/8	5-1/4	6	6-1/2	7-3/4	8-3/4	10-1/4	12-3/4	16-3/8	20-7/8
Butyl	–	4-7/8	5-1/4	6	6-1/2	7-3/4	8-3/4	10-1/4	12-3/4	16-3/8	20-7/8
Hypalon	–	4-7/8	5-1/4	6	6-1/2	7-3/4	8-3/4	10-1/4	12-3/4	16-3/8	20-7/8
Glass	4-1/8	4-3/4	5-1/8	5-7/8	6-3/8	7-5/8	8-5/8	10-1/8	12-5/8	16-1/8	20-5/8
Saran	–	5-3/4	5-3/4	6-1/4	6-3/4	7-3/4	8-3/4	10-1/4	12-3/4	16-1/4	20-3/4
Polypro	–	5-3/4	5-3/4	6-1/4	6-3/4	7-3/4	8-3/4	10-1/4	12-3/4	16-1/4	20-3/4
Halar	–	5-3/4	5-3/4	6-1/4	6-3/4	7-3/4	8-3/4	10-1/4	12-3/4	16-1/4	20-3/4
Tefzel	–	5-3/4	5-3/4	6-1/4	6-3/4	7-3/4	8-3/4	10-1/4	12-3/4	16-1/4	20-3/4
Kynar	–	5-3/4	5-3/4	6-1/4	6-3/4	7-3/4	8-3/4	10-1/4	12-3/4	16-1/4	20-3/4
Plastic bodies-screwed	*	*	*	*	*	*	–	–	–	–	–
Solvent ends	*	*	*	*	*	*	–	–	–	–	–

Tolerances: Unlined metal ± 1/16". Lined ± 1/16" Glass ± 3/32"

* Please contact the factory or your nearest representative for dimensions

Dimensional Data Dimension "B"

Centerline of pipe to extreme top of actuator and/or accessories

For type "C" air open-air closed and type "H" air close-spring open.

As shown in figure 1 — dimension "B" is compiled by adding B_1 (bottom-works) B_2 (actuator) and B_3 (accessories such as handwheel-limit stop-switches, etc.)

Bottom-works dimensions (B_1) and actuator dimensions (B_2) are shown on this page. For accessory dimensions (B_3) such as handwheels, limit stops, positioners, switches, etc., see page 40.

For dimension "B" without accessories but with valve position indicator, add B_1, B_2, and I shown on this page.

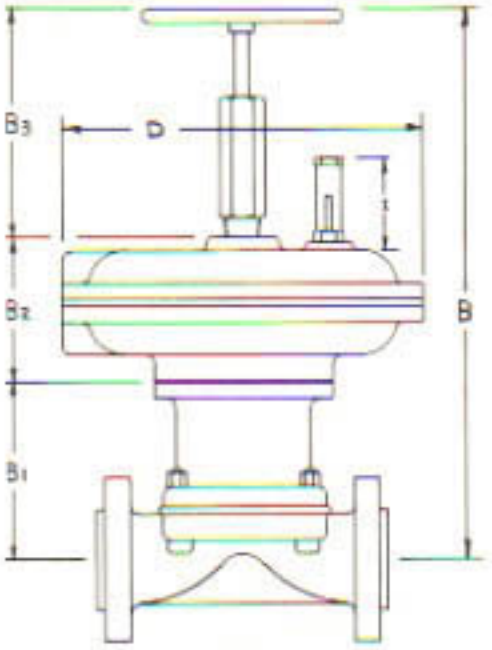


Fig. 1

B_1 bottom-works height

Valve Size	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"	6"	8"
Dimension B_1	4-7/8"	4-7/8"	4-7/8"	4-3/16"	4-9/16"	6-1/8"	5-13/16"	5-15/16"	7-1/8"	10-9/16"	23-9/16"

B_2 actuator height

Type "C" air open-air close, Type "H" air close-spring open

Actuator No.	0	1	2	2A	3	4	5
Dimension B_2	4-1/16"	5-1/32"	5-7/8"	6-3/4"	7-3/8"	9"	10-3/4"

I - position indicator height

Actuator No.	0	1	2	2A	3	4	5
Dimension I	2-1/2"	2-1/2"	2-3/4"	3-7/8"	3-7/8"	6"	6-1/2"

Maximum diameter of actuator - Dimension "D"

Actuator No.	0	1	2	2A	3	4	5
Dimension D	6"	7-3/4"	9-1/2"	12-1/4"	14-7/8"	18-1/8"	22"

Tolerance: All dimensions are ± 1/8"

Dimensional Data Dimension "B"

Type "HRT" air open-spring closed

As shown in figure 2, dimension "B" is compiled by adding B_1 (bottom-works) B_2 (actuator) and SC (spring case).

Note that all accessories fall within the overall height of the spring case and therefore need not be added.

B_1 (bottom-works) and B_2 (actuator) dimensions are shown on page 36. For SC (spring case) dimensions refer to the step charts shown on this and the following pages.

Select the step chart covering the valve size required and with the correct diaphragm (elastomer or TFE faced), locate the line pressure on the bottom line, run up to the horizontal lines (full line for 0% P.D. broken line for 100% P.D. and read the spring case dimension on the left side of the chart).

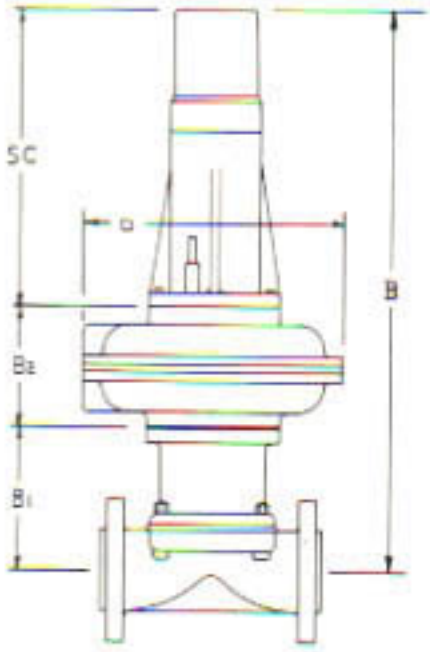
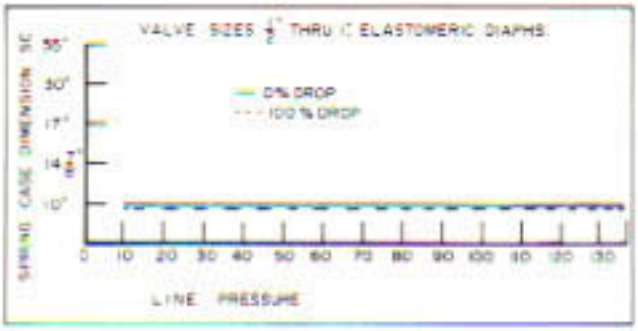
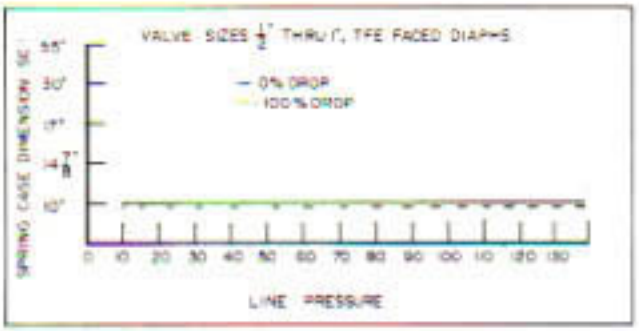
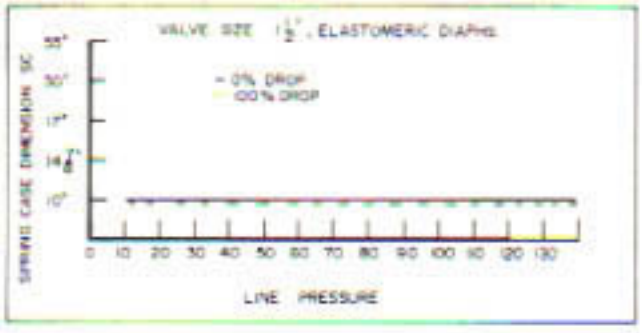


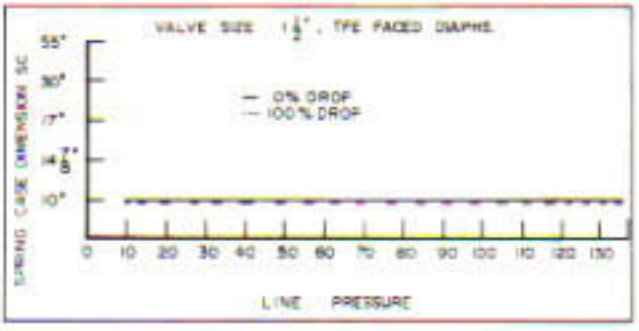
Fig. 2

Spring case dimensions — versus — line pressure — HRT actuators



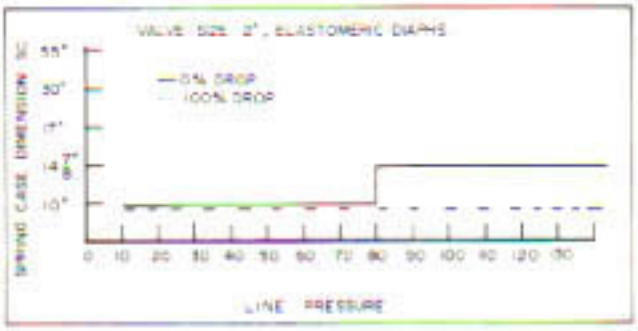


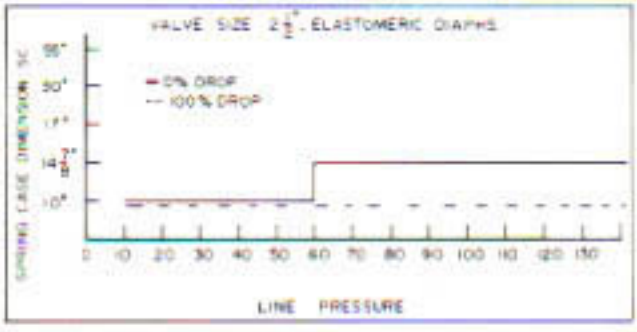


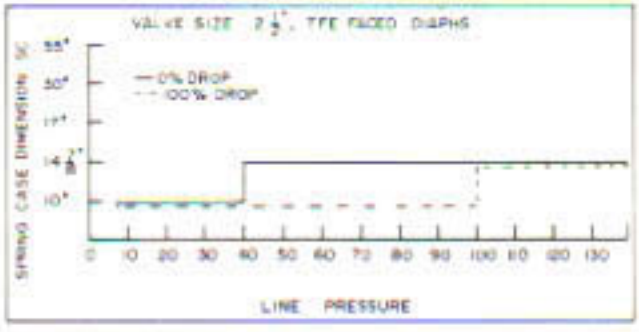


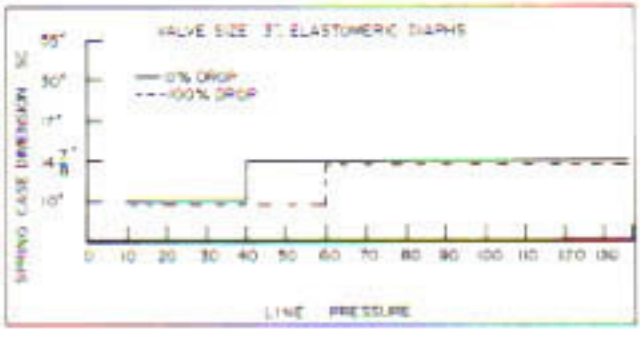
Dimensional Data SC — Spring case

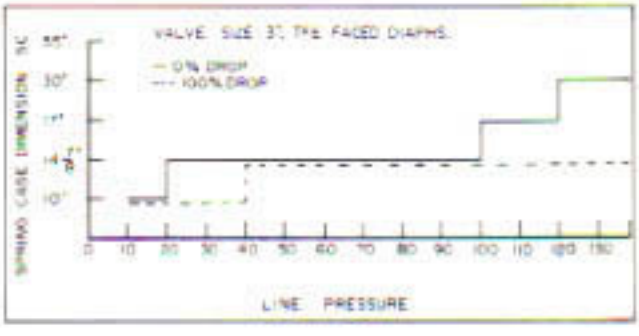
Spring case dimensions — versus — line pressure — HRT actuators





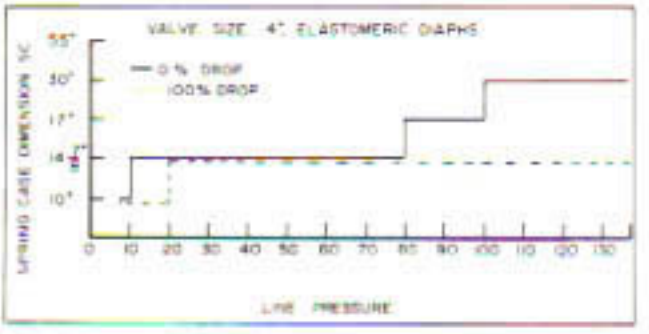


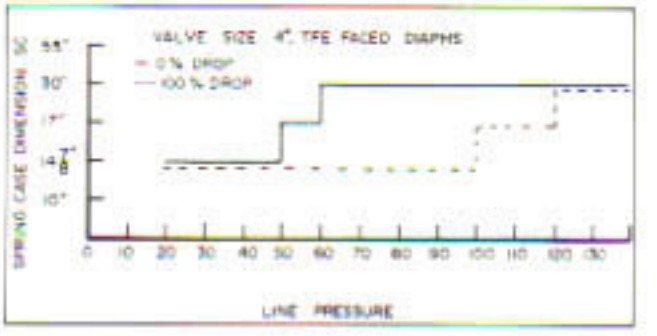


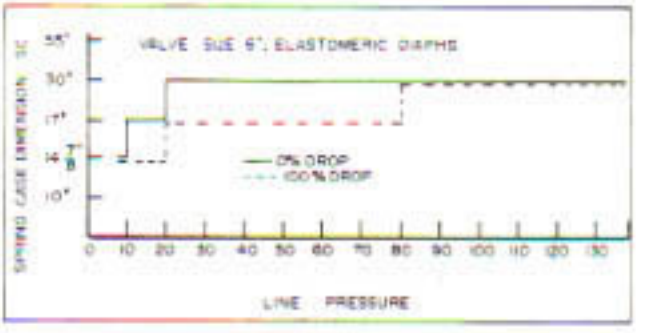


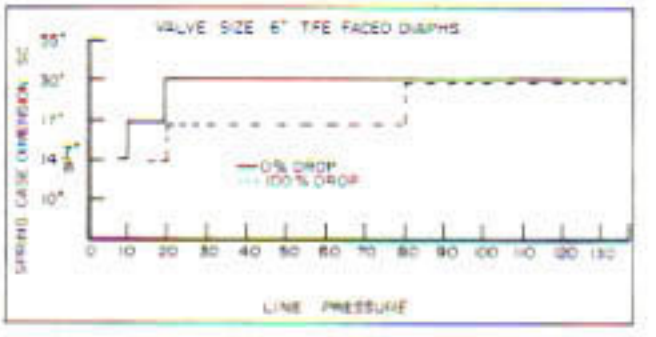
Dimensional Data SC — Spring case

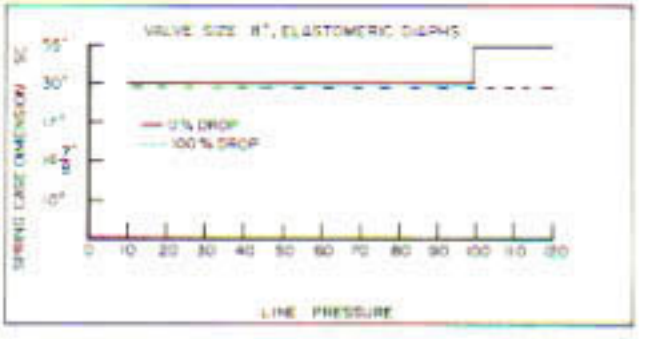
Spring case dimensions — versus — line pressure — HRT actuators

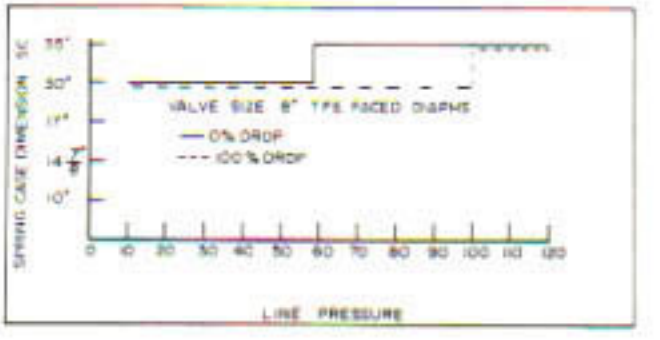






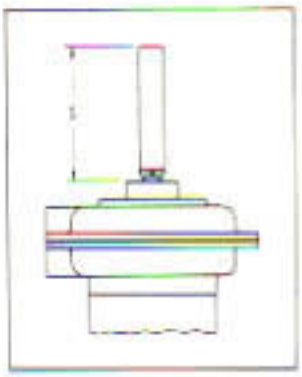




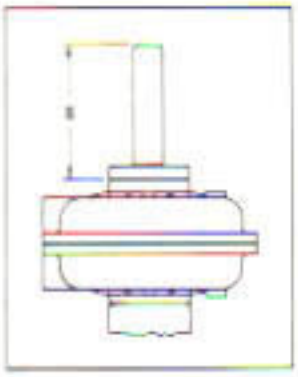


Dimensional Data — accessories B_3

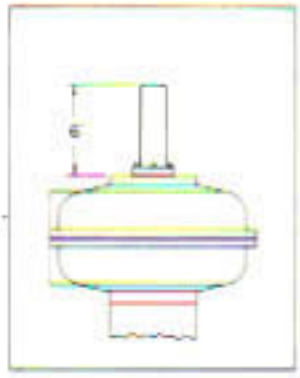
To be added to B_1 and B_2 to obtain "B" dimension for type "C" and "H" valves



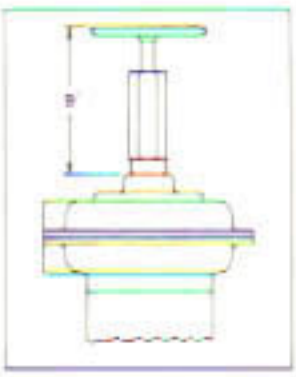
No. 635 adjustable opening stop for actuators 0, 1 & 2. Types "C" & "H".



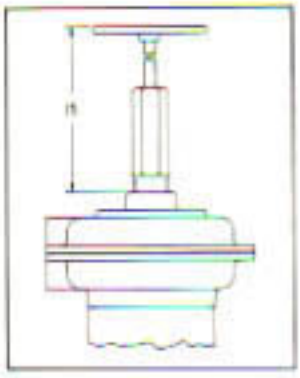
No. MH-200 stop for actuators 2A, 3 & 4. Types "C" and "H".



No. C-10 stop for actuator No. 5. Types "C" & "H".

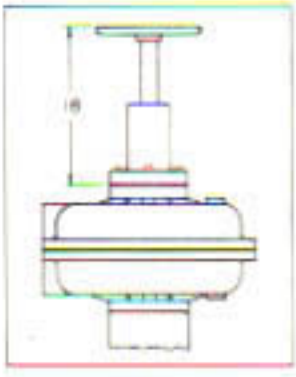


SH-100S short handwheel for C & H actuators without switches.



SH-100L long handwheel for C & H actuators with limit switches.

L-1101 handwheel for actuators 0, 1, 2 & 2A. Types "C" & "H".



C-1500 handwheel for actuator No. 5. Types "C" and "H".

Built-in valve positioner for C & H actuators **73N12F & 73NB**

Dual switch assemblies for "C" & "H" actuators using **BZE6, DTE6, BAF1** and **DTF2** switches.

Valve sizes 1/2" - 2"

Valve sizes 2-1/2" - 4"

Valve size 6" - 8"

EX-Q & EXD-Q explosion proof switches.

For dimensions on switches **D2400X, SL-3, EA-510** and **EE-520**, consult the factory.

Weights

Weights of Type "C" (air open-air close) and Type "H" (air close-spring open) automatic valves are the same and are compiled by adding the weights of the bottom-works, top-works and accessories.

Weights — lbs. of bottom-works — body, diaphragm, compressor and bonnet.

Valve Size	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"	6"	8"
Metal Scrwd	5	6	7	8	10	18	25	37	—	—	—
Metal Flgd.	8	9	11	14	16	24	36	49	78	176	354

Actuator weights — lbs. for Type "C" and Type "H"

Actuator No.	0	1	2	2A	3	4	5
Weight - lbs.	7	16	25	52	98	160	280

In compiling the weight of a Type "HRT" (air open-spring closed) valve it is necessary to add the weight of the spring and spring-case assembly to the bottom-works, actuator and accessory weights shown on this page.

Weight - lbs. of spring and spring-case assembly for air open-spring close valves

Actuator No.	0	1	2	2A	3	4	5
Weight - lbs.	12	14	20	30	48	82	134

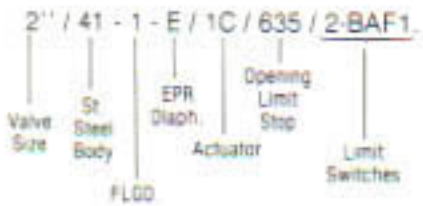
Accessory weights - lbs.

Accessory	Limit Stop	Handwheel	Positioner	Dual switches	Filter-reg.
Weight	3	10	8	5	4

How to specify a Century air-operated diaphragm valve and accessories

(1) Determine valve size by using data shown on page 8.
(2) Select valve body and end connections code from page 28.
(3) Add body diaphragm code from page 6.
(4) Add size and type of actuator from pages 10 through 21.
(5) Add accessories as required from pages 22 through 25.

Example: A 2" stainless steel flanged valve with EPR diaphragm, No. 1-C air open-air close actuator with No. 635 opening limit stop and two SPDT NEMA-4 limit switches, would be:



Manufacturers of

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Self-operated temperature
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CENTURY
INSTRUMENT COMPANY
11865 MAYFIELD, LIVONIA, MI 48150
PH 734.427.0340 FAX 734.427.5950
www.centuryinstrument.com