TRU-TECH VALVE

SIMPLIFY YOUR WORLD.




THE BEST OF THE BEST

MADE IN THE USA
12.2015.a

PRODUCTS
“The Best of the Best”

Compact Diaphragm Valves have a face to face that is interchangeable with most solid wedge double disc and resilient wedge gate valves as well as most short pattern plug and ball valves, using ANSI B16.10 as a standard. These valves are the best for O.E.M.’s and other usage on new projects. Straight thru valves are referred to as Tru-Flow and Enhanced Weir valves are referred to as Tru-Trol.

Standard Diaphragm Valves have a face to face that is interchangeable with most other brands of diaphragm valves, using MSS SP-88 as a standard. These valves are used on replacement projects where existing piping integrity must be maintained. Straight thru valves are referred to as Maxi-Flow and Enhanced Weir valves are referred to as Maxi-Trol.

Tru-Tech Valves are designed in CAD, and incorporated into each and every valve is the latest available state of the art engineering technology. This ensures our customers that valves installed in their system will provide the maximum degree of performance and the longest possible service life.

Tru-Tech valve parts are manufactured on the latest state-of-the-art machining and turning centers. Parts manufactured today are 100% interchangeable with parts manufactured many years ago and far into the future.

Tru-Tech “Diaphragm Valves” are quality checked, assembled, and tested by skilled technicians who take pride in their ability to integrate old world craftsmanship into modern high-tech products.

TYPICAL APPLICATIONS

Industrial/Municipal Water & Wastewater Treatment
Tru-Tech ENHANCED WEIR Diaphragm Valves provide an inexpensive means of fluid control for reverse osmosis, deionization, filtration, chemical feeders, and demineralizers. STRAIGHT THRU valves are used in slurry and/or abrasive applications. Installations include manual, pneumatically, and electrically actuated valves.

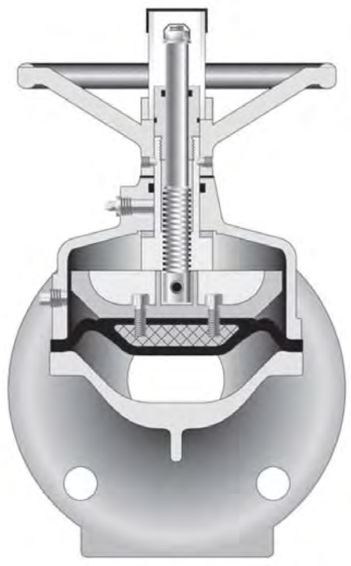
Power
Tru-Tech ENHANCED WEIR Diaphragm Valves are commonly utilized in chemical and demineralizer systems. STRAIGHT THRU rubber lined valves are used for flue gas desulfurization. Installations include both manual and pneumatically actuated valves.

Chemical
Tru-Tech ENHANCED WEIR Diaphragm Valves are available in a wide variety of body linings and diaphragm materials. This versatility makes them suitable for handling a wide variety of acids and other corrosive fluids. Installations include both manual and pneumatically actuated valves.

Mining
Tru-Tech STRAIGHT THRU rubber lined Diaphragm Valves are normally used for handling abrasive and/or slurry applications. ENHANCED WEIR valves are normally utilized in chemical and process feed lines.

Pulp & Paper
Tru-Tech ENHANCED WEIR Diaphragm Valves are normally used in clean fluid servicessuch as bleaching and coating processes, and chemical and water treatment. Tru-Tech STRAIGHT THRU Diaphragm Valves are normally used for slurry services such as lime, mud, and titanium dioxide lines. Installations include both manual and pneumatically actuated valves.

DIAPHRAGM VALVE
STANDARD FEATURES AND ADVANTAGES



Diaphragm valves have unique design features not offered in other types of valves. These unique advantages include in-line maintenance, positive bubble-tight closure, bonnet isolation, streamlined flow passage without recesses or pockets, and no packing glands.

A fully functioning rubber diaphragm seals leak-tight against the valve body, completely isolating all the mechanical working parts of the valve's operating mechanism from the fluid. This total separation between the media passing through the valve and the bonnet also eliminates troublesome stem seal and packing gland problems as well as providing fugitive emission protection.

A wide range of body linings and diaphragm materials provide a cost effective solution to readily handling corrosive and abrasive liquids as well as liquids with suspended solids.

Another advantage of the diaphragm valve is that it does not seize up like eccentric plug valves and is an excellent solution for replacing problem valves.

SELECTING THE PROPER DIAPHRAGM VALVE FOR YOR APPLICATION

1. SERVICE CONDITIONS? What is the fluid being handled? It could be hydrochloric acid, tap water, or something in between. Note also that it could be a combination of two or more things.

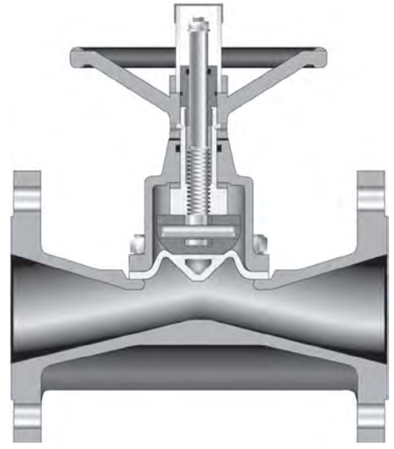
2. CONCENTRATION OF FLOWING FLUID? The concentration affects the proper choice of body lining and diaphragm material.

3. SYSTEM OPERATING TEMPERATURE? Many chemicals are more aggressive at elevated temperatures. Plus, body linings and diaphragm materials are pressure/temperature rated.

4. SYSTEM OPERATING PRESSURE? Most diaphragm valves are pressure limited. Consult manufacturers recomendations for system compatibility.

TRU-TECH DIAPHRAGM VALVE
EXTRA FEATURES AND ADVANTAGES

In addition to many features found in all diaphragm valves, Tru-Tech's valves have several added advantages of their own.



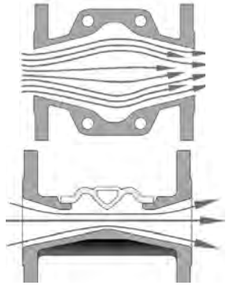
Our diaphragm valves are available in two face to face configurations, MSS and ANSI. Tru-Tech Valve meets MSS SP-88 standards, permitting direct replacement of most other brands of diaphragm valves, allowing our valves to be used where customers are upgrading existing systems utilizing diaphragm valves. Tru-Tech also meets ANSI B16.10 standards, permitting direct replacement of most brands of gate, plug, and ball valves.

Tru-Tech STRAIGHT THRU valves are available with a TFE faced diaphragm which expands the range of applications that can be handled. This feature is not offered by any other brand of diaphragm valves.

Tru-Tech manual valves are furnished standard with travel stops. Pneumatically operated valves are available with optional travel stops, but are furnished as standard where our engineering department feels the operator may be oversized. Travel stops help to prevent the number one cause of failure and reduced life in diaphragm valves; mainly, over-closure by zealous operators.

Other Features and Advantages Include:

- Stud pull out is the number two cause of failure in other brands of diaphragm valves. All Tru-Tech diaphragms are double studded, providing an extra margin of performance, especially in vacuum service.
- Tru-Tech's manual valve operators are supplied with heavy duty acme threads capable of providing heavy thrusts and thousands of operations. Some other brands use limited duty v-threads not recommended for a great number of operations.
- All Tru-Tech valves can be rodded out where clogging occurs.
- Tru-Tech Valve manufactures its own pneumatic actuators, providing our customers with one source responsibility for the total package.
- All Tru-Tech valves are furnished with position indicators showing whether the valve is open, closed, or throttling.
- Unlined valve bodies and all operators are powder coated, inside and out, with a TGIC polyester powder formulated for maximum chemical and weather resistance. Plastic lined valves are furnished with bodies completely encapsulated with the latest state-of-the-art fusion-bonded liner. Each and every valve body lining is spark tested to ensure lining thickness and integrity.



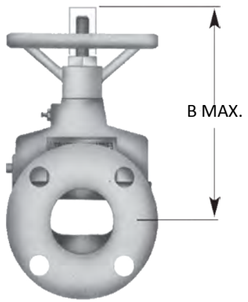
WHY DO TRU-TECH VALVES LAST LONGER?

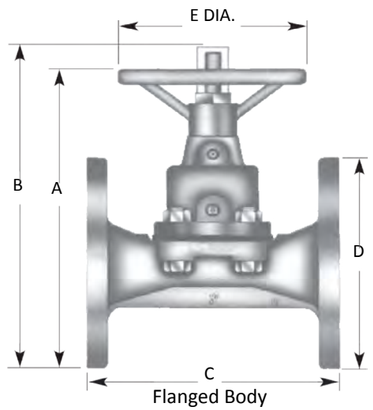
The Tru-Tech valve reduces diaphragm flex by contracting the vertical height of the flow area and expanding the width. The resultant body shape provides the laminar flow characteristics of a venturi, and allows less turbulence to the flow media. In addition, the reduced flex results in a longer diaphragm life.

ENHANCED WEIR DIAPHRAGM VALVES

	MAXI-TROL AND TRU-TROL VALVE GENERAL DIMENSIONS									
	Valve Size	A	B	C MAXI-TROL (MSS Length)			C TRU-TROL (ANSI Length)	Weight (lbs)	D	E	Body Pressure Rating (PSI)
				Plastic Lined	Rubber Lined	Weight (lbs)					
Flanged Ends	½	4.00	4.69	5.75*	5.75*	7.00	5.00	6.50	3.50	3.50	200
	¾	4.00	4.69	5.75	5.75	7.00	5.00	6.50	3.50	3.50	200
	1	4.00	5.75	5.75	5.75	7.00	5.00	6.50	4.25	3.50	200
	1 ¼	5.50	6.13	5.75*	5.75*	14.00	5.00	12.00	5.00	5.00	175
	1 ½	5.50	7.00	7.88*	7.88*	12.00	7.00	14.00	5.00	5.00	175
	2	7.00	8.00	7.88	7.88	25.00	7.00	21.00	6.00	5.00	175
	2 ½	7.25	9.00	10.25*	10.25*	55.00	8.00	35.00	7.00	7.00	150
	3	7.25	9.50	10.25	10.25	55.00	8.00	35.00	7.50	7.00	150
	4	8.38	10.50	12.88	12.75	80.00	9.00	51.50	9.00	9.00	150
	6	11.00	14.50	16.38	16.25	104.00	10.50	80.00	11.00	12.00	125
	8	17.88	17.88	20.88	20.88	231.00	11.50	165.00	13.75	14.00	100
	10	17.88	17.88	25.38	25.75	265.00	NA	NA	16.00	14.00	65

Tolerances: Unlined - 1/16", Lined - 1/8" All dimensions are in inches NA - Not Available
*Valve length does not meet either MSS or ANSI specifications.





Flanged Body

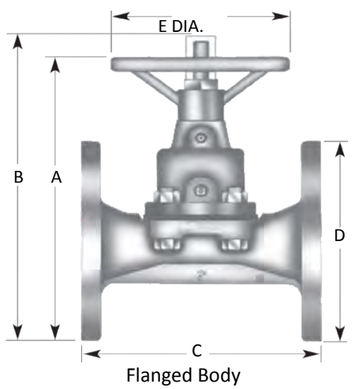
NOTES:
ANSI face to face dimensions does not apply to screwed (NPT) or SW ends. The use of gaskets for plastic lined valves is strongly recommended.
ANSI face to face valves interchange with most gate, plug, and ball valves.
MSS face to face valves interchange with most other brands of diaphram valves.
Valves may have a combination of drilled holes and threaded holes on flanges, contact Tru-Tech Valve for additional information.

STRAIGHT THRU DIAPHRAGM VALVES

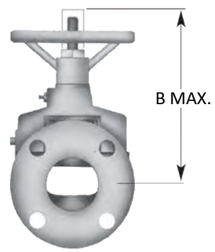
	SCREWED END - VALVE GENERAL DIMENSIONS							
	Valve Size	A	B	C	Weight (lbs)	D	E	Body Pressure Rating (PSI)
Screwed Ends	½	4.00	4.69	7.25	5.00	1.88	3.50	200
	¾	4.00	4.69	7.25	5.00	1.88	3.50	200
	1	4.00	4.69	7.25	5.00	1.88	3.50	200
	1 ½	5.50	6.13	8.50	13.00	3.25	7.00	175
	2	5.50	6.13	8.50	13.00	3.25	7.00	175
	2 ½	8.38	10.50	10.50	35.00	4.50	9.00	150
	3	8.38	10.50	10.50	35.00	4.50	9.00	150

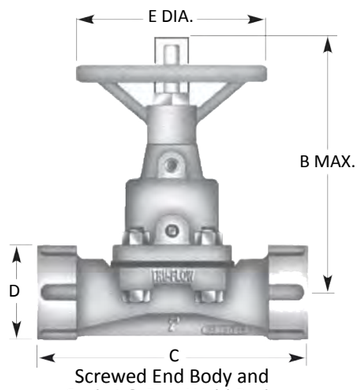
	MAXI-FLOW AND TRU-FLOW VALVE GENERAL DIMENSIONS										
	Valve Size	A	B	C MAXI-FLOW (MSS Length)			C TRU-FLOW (ANSI Length)	Weight (lbs)	D	E	Body Pressure Rating (PSI)
				Plastic Lined	Rubber Lined	Weight (lbs)					
Flanged Ends	½	4.00	4.69	5.75*	5.75*	11.00	5.00	10.00	3.50	3.50	200
	¾	4.00	4.69	5.75	5.75	11.00	5.00	10.00	3.50	3.50	200
	1	4.00	4.69	5.75	5.75	11.00	5.00	10.00	3.50	3.50	200
	1 ¼	4.00	4.69	5.75*	5.75*	11.00	5.00	10.00	3.50	3.50	200
	1 ½	7.25	9.00	7.88*	7.88*	27.00	7.00	25.00	6.00	7.00	175
	2	7.25	9.50	7.88	7.88	27.00	7.00	25.00	6.00	7.00	175
	2 ½	8.38	10.50	10.25*	10.25*	35.00	8.00	45.00	7.00	9.00	150
	3	8.38	10.38	10.25	10.25	52.00	8.00	45.00	7.50	9.00	150
	4	11.25	14.00	12.88	12.75	80.00	9.00	70.00	9.00	12.00	150
	6	17.88	22.00	16.38	16.25	160.00	10.50	125.00	11.13	14.13	125

Tolerances: Unlined - 1/16", Lined - 1/8" All dimensions are in inches NA - Not Available
*Valve length does not meet either MSS or ANSI specifications.
See NOTES on page 6.



Flanged Body





Screwed End Body and
Socket & Butt Weld Body

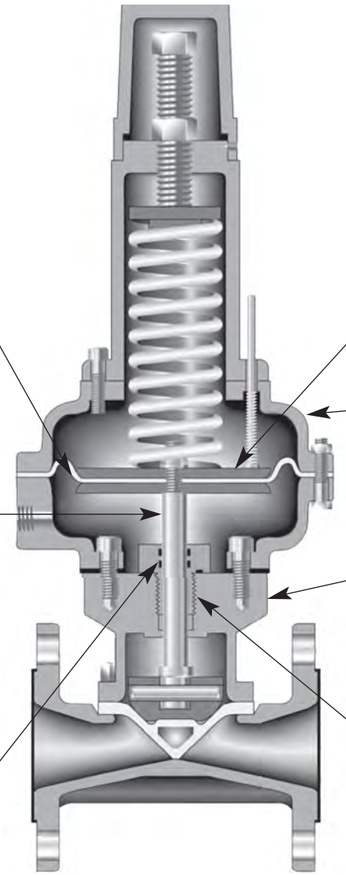
PNEUMATIC ACTUATOR FEATURES

Accessories are easily field mounted.

DIAPHRAGM: Molded of nylon reinforced oil-resistant elastomer to provide longer life and high operating pressures.

SHAFT(Stem): Precision machined from stainless steel for corrosion and wear resistance. Unique collar controls opening stroke and extends cycle life under load.

SHAFT SEAL: Furnished standard with two (2 each) O-rings for longer trouble free performance.



Position Indicator is furnished as standard.

DIAPHRAGM PLATES: Manufactured from heavy section cast iron or steel plate to withstand higher air pressure.

DIAPHRAGM CASE: Rugged high strength cast iron with bosses and pads to facilitate the mounting of accessories.

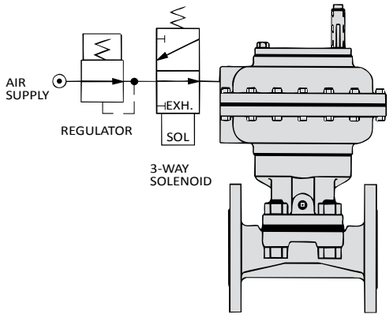
BONNET: Designed of high strength cast iron with generous area flat top for precision/super high strength coupling between actuator and valve.

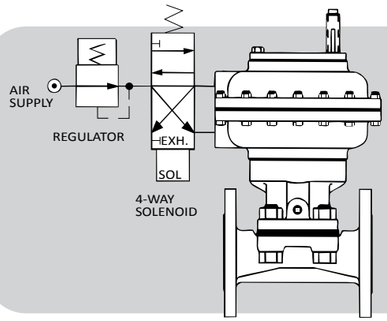
SHAFT BEARING: Precision machined from non-metallic self-lubricating material.

PNEUMATIC ACTUATOR OPERATION

"SO" SPRING TO OPEN
(ON - OFF CONTROL)

This actuator/accessory package is designed to normally position the valve open. The valve will close when compressed air is admitted into the upper actuator chamber, and the actuator spring will open the valve when the air is exhausted.



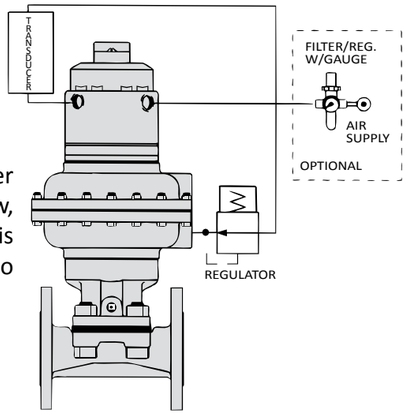


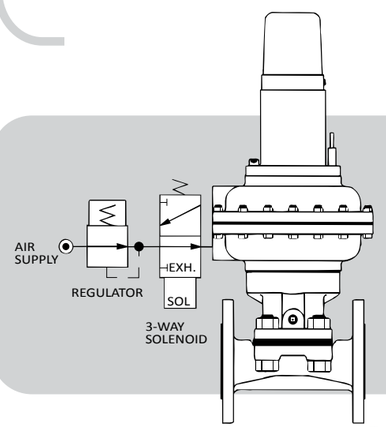
"AA" AIR-AIR, DOUBLE ACTING
(ON - OFF CONTROL)

This actuator/accessory package is designed to open the valve when compressed air is admitted into the lower chamber, and closes the valve when compressed air is admitted into the upper chamber.

"AA" AIR-AIR, DOUBLE ACTING
(AUTOMATIC THROTTLING)

This actuator/accessory package is provided with a positioner to accurately throttle the valve for pressure, liquid level, flow, temperature, and other control requirements. A transducer is generally supplied to provide valve modulation proportional to an electric signal (most often 4-20 ma).

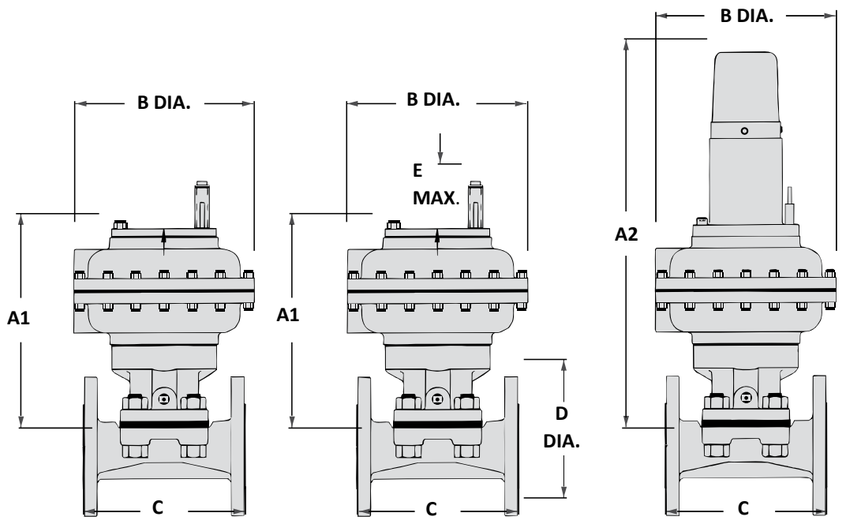




"SC" SPRING TO CLOSE
(ON - OFF CONTROL or AUTOMATIC THROTTLING-not shown)

This actuator/accessory package is designed to normally position the valve closed. The valve will open when compressed air is admitted into the lower actuator chamber, and the actuator spring will close the valve when the air is exhausted.

ACTUATOR SIZES 10 - 20 - 35

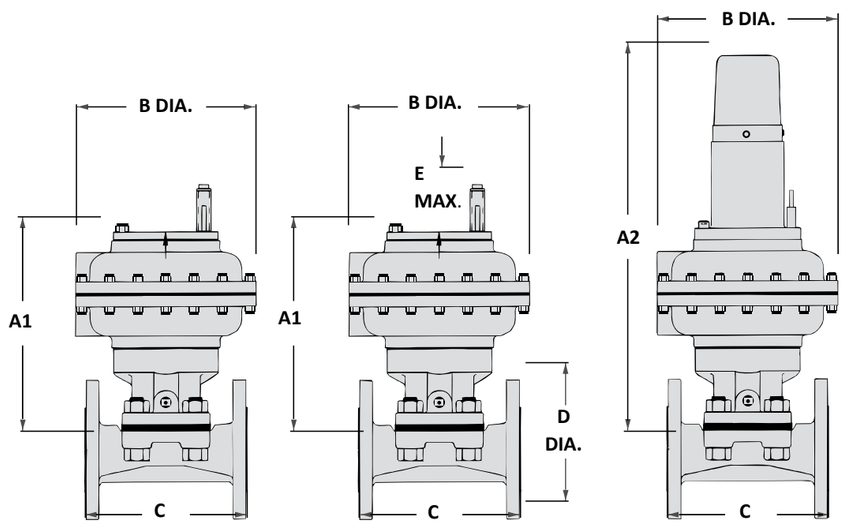


Pneumatic Actuator Dimensions and Technical Data														
Valve Size	C	D	E	#10 Actuator			#20 Actuator			#30 Actuator			Valve Stroke	
				A1	A2	B	A1	A2	B	A1	A2	B	TF	TT
½	5.0	2.6	2.8	9.3	19.1	6.3	9.4	19.2	7.8	11.1	20.9	9.5	0.33	0.33
¾	5.0	2.6	2.8	9.3	19.1	6.3	9.4	19.2	7.8	11.1	20.9	9.5	0.33	0.33
1	5.0	2.6	2.8	9.3	19.1	6.3	10.1	19.9	7.8	11.8	21.7	9.5	0.47	0.33
1 ¼	7.0	2.6	2.8	10.1	19.8	6.3	10.2	24.6	7.8	11.4	26.4	9.5	0.75	0.47
1 ½	7.0	2.6	2.8	10.1	19.8	6.3	10.2	24.6	7.8	11.4	26.4	9.5	0.75	0.47
2	7.0	2.6	2.8	10.1	19.8	6.3	10.2	24.6	7.8	11.4	26.4	9.5	0.75	0.47
2 ½	8.0	3.3	3.5	NA	NA	NA	10.6	25.6	7.8	12.4	27.3	9.5	1.19	0.75
3	8.0	3.3	3.5	NA	NA	NA	10.6	25.6	7.8	12.4	27.3	9.5	1.19	0.75
4	9.0	3.3	3.5	NA	NA	NA	NA	NA	NA	13.9	28.9	9.5	1.78	1.19
Actuator Stroke (in.)				1.75			2.25			2.75				
Effective Area (sq. in.)				14			19			34				
Maximum Air Pressure (PSI)				100										

Dimensions are approximate only.
Valves may have a combination of drilled and threaded holes on flanges.
Contact Tru-Tech Valve for additional information.

PNEUMATIC ACTUATOR DIMENSIONS
AND TECHNICAL DATA

ACTUATOR SIZES 60 - 90 - 140 - 280

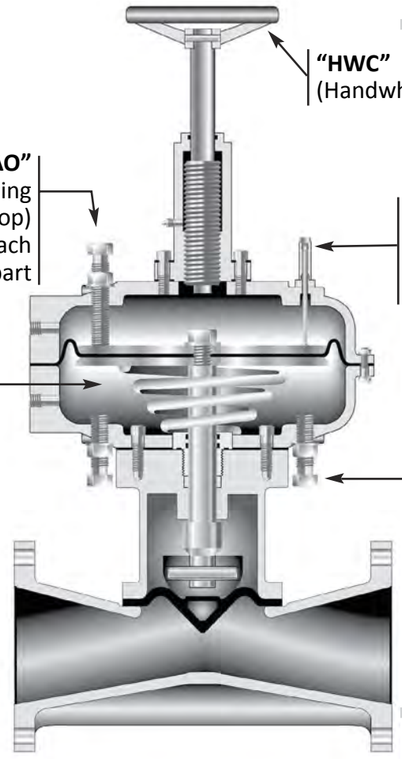


Pneumatic Actuator Dimensions and Technical Data																		
Valve Size	C	D	E	#60 Actuator			#90 Actuator			#140 Actuator			#280 Actuator			Valve Stroke	
				A1	A2	B	A1	A2	B	A1	A2	B	A1	A2	B	TF	TT
1 ½	7.0	2.6	2.8	12.1	27.1	12.3	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.75	0.47
2	7.0	2.6	2.8	12.1	27.1	12.3	12.1	41.5	15.0	NA	NA	NA	NA	NA	NA	0.75	0.47
2 ½	8.0	3.3	3.5	13.1	28.1	12.3	13.1	42.5	15.0	14.2	43.8	18.0	NA	NA	NA	1.19	0.75
3	8.0	3.3	3.5	13.1	28.1	12.3	13.1	42.5	15.0	14.2	43.8	18.0	NA	NA	NA	1.19	0.75
4	9.0	3.3	3.5	14.7	29.7	12.3	14.8	44.0	15.0	15.8	45.8	18.0	27.2	57.3	18.0	1.78	1.19
5	10.5	4.8	5.0	18.2	33.2	12.3	18.3	47.6	15.0	19.3	48.9	18.0	31.2	60.8	18.0	2.63	1.78
6	10.5	4.8	5.0	18.2	33.2	12.3	18.3	47.6	15.0	19.3	48.9	18.0	31.2	60.8	18.0	2.63	1.78
8	11.5	4.8	5.0	18.2	33.2	12.3	18.3	47.6	15.0	19.3	48.9	18.0	31.2	60.8	18.0	-	2.63
Actuator Stroke (in.)				3.13			4.10			5.00			5.00				
Effective Area (sq. in.)				59			85			141			281				
Maximum Air Pressure (PSI)				100													

Dimensions are approximate only.
Valves may have a combination of drilled and threaded holes on flanges.
Contact Tru-Tech Valve for additional information.

PNEUMATIC ACTUATOR VALVE OPTIONS

TO =	**ATS + AO**
THC =	**ATS + HWC**
TOHC =	**ATS + AO + HWC**



"HWC"
(Handwheel Close)

"AO"
(Adjustable Opening Stop)
2 - each
180 deg. apart

"PI"
(Position Indicator)
Standard on all
Pneumatic Actuators

Spring for **"SO"**
(Spring to Open)
Delete on "AA"
(Air to Air) Units

"ATS"
(Adjustable Travel Stop-Closed)
2 - each
180 deg. apart

PNEUMATIC ACTUATOR VALVE OPTIONS

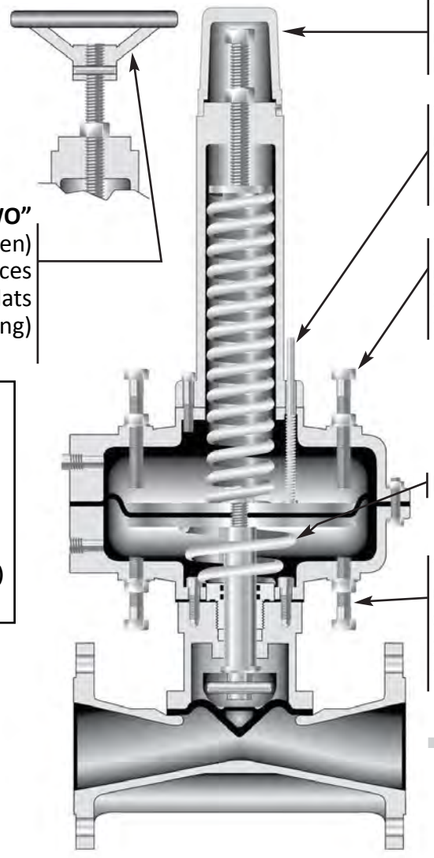
"WO"
(Wrench Open)
Requires Lower Spring

"PI"
(Position Indicator)
Standard on all
Pneumatic Actuators

"HWO"
(Hand Wheel Open)
A Handwheel Replaces
Wrench Flats
(Requires Lower Spring)

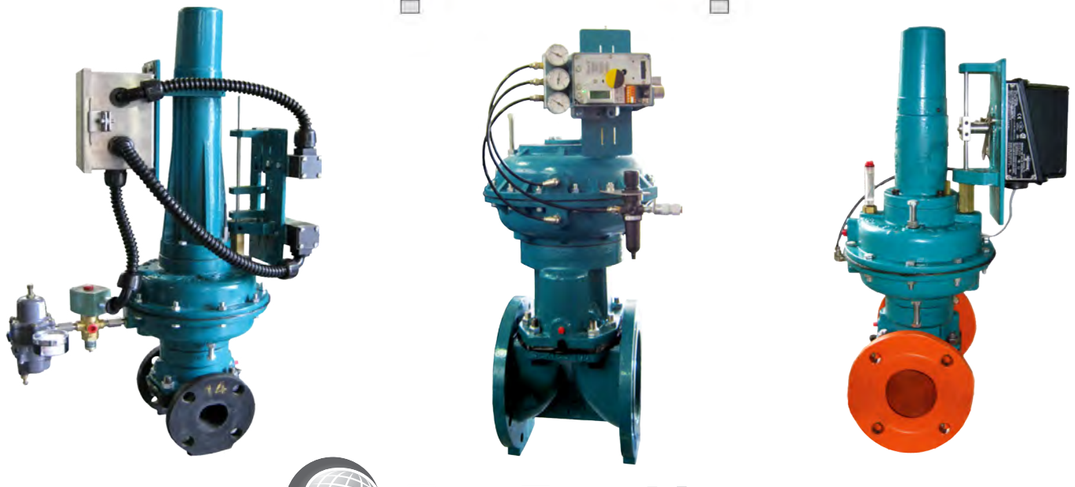
"AO"
(Adjustable Open Stop)
2 - each
180 deg. apart

TOWO =	**Adjustable Open Stop ("AO") + Wrench Open ("WO") (Requires Lower Spring)**
TOHO =	**Adjustable Open Stop ("AO") + Handwheel Open ("HWO") (Requires Lower Spring)**



Lower Spring

"ATS"
(Adjustable Travel Stop - Closed)
2 - each
180 deg. apart



TTV DIAPHRAGM VALVE AND PNEUMATIC OPERATOR SIZING

TO SELECT CORRECT OPERATOR:

1. Select valve and topworks size (see Chart B)
2. Determine diaphragm type
3. Determine maximum fluid line pressure (PSIG)
4. Determine minimum air supply pressure (PSI)
5. Select operator action (AA, SO, SC)
   - **AA** - Air to Open, Air to Close
   - **SO** - Spring to Open, Air to Clost
   - **SC** - Spring to Close, Air to Open
6. From Chart A, determine the smallest suitable operator

NUMBER 35 OPERATOR

SC ACTION

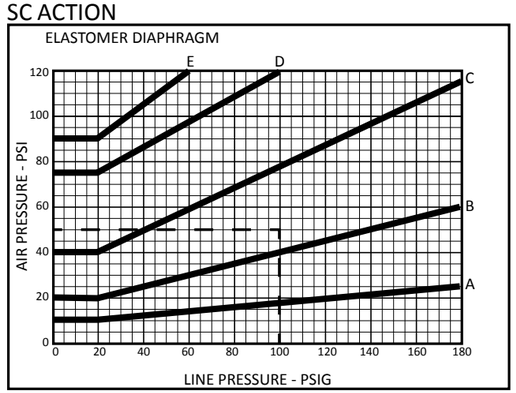


CHART A

EXAMPLE:
Given a 2” WEIR type valve, elastomer diaphragm with a maximum fluid pressure of 100 PSI, a minimum available air pressure of 50 PSI, and an operator action SC, select #35 Pneumatic Operator.
NOTE: Unit will function at 40 PSI.

CHART B

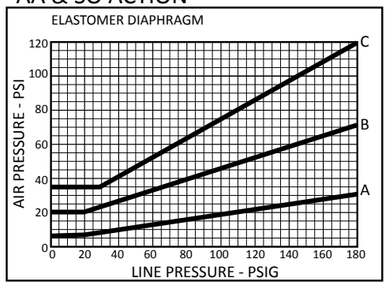
WEIR TYPE	½	¾	1	1½	2	2½	3	4	6	8	10
TOP WORKS SIZE	A	A	A	B	B	C	C	D	E	F	F

STRAIGHT THRU TYPE	½	¾	1	1½	2	2½	3	4	6	8	10
TOP WORKS SIZE	A	A	A	C	C	D	D	E	F	-	-

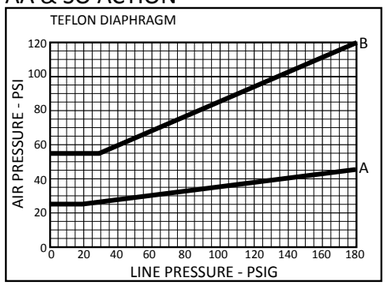
TTV DIAPHRAGM VALVE AND PNEUMATIC OPERATOR SIZING

NUMBER 10 OPERATORS

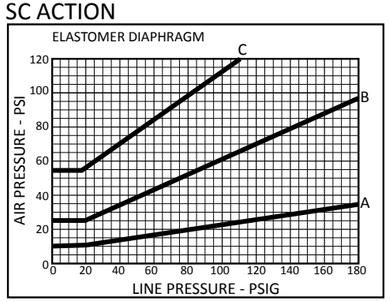
AA & SO ACTION



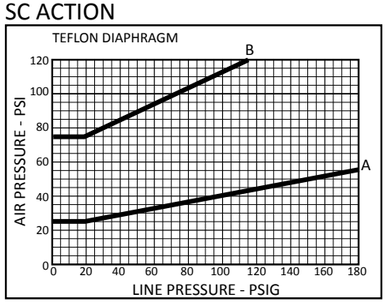
AA & SO ACTION



SC ACTION

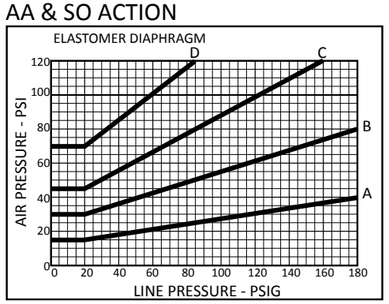


SC ACTION

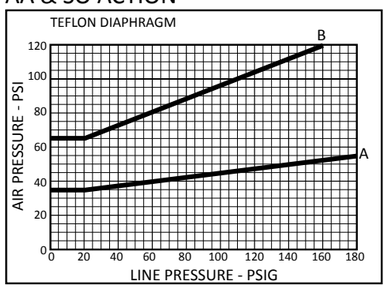


NUMBER 20 OPERATORS

AA & SO ACTION



AA & SO ACTION



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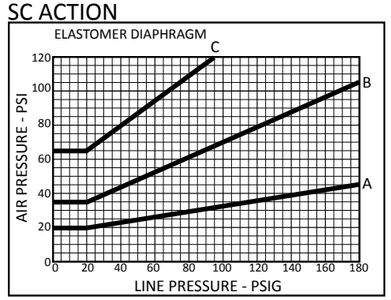

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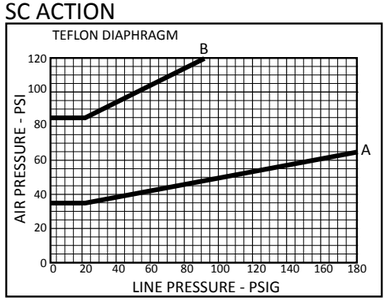
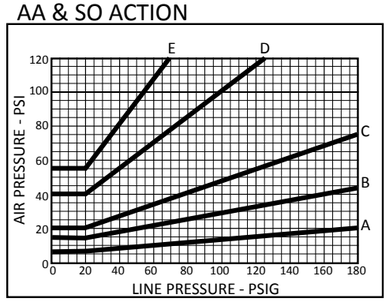


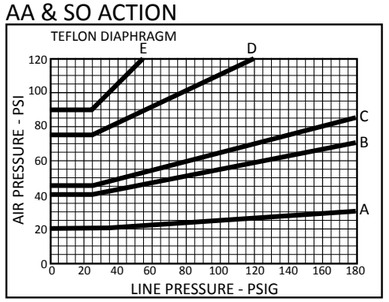
TTV DIAPHRAGM VALVE AND PNEUMATIC OPERATOR SIZING

NUMBER 35 OPERATORS

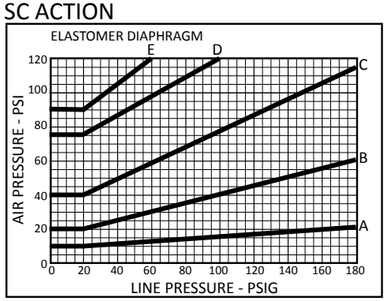
AA & SO ACTION



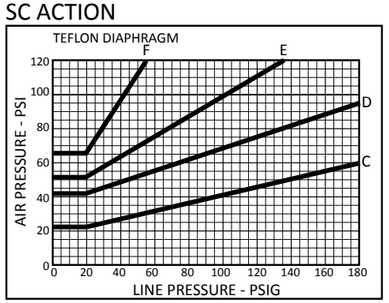
AA & SO ACTION



SC ACTION

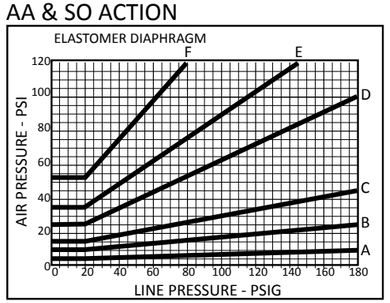


SC ACTION

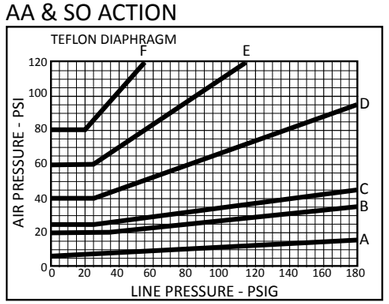


NUMBER 60 OPERATORS

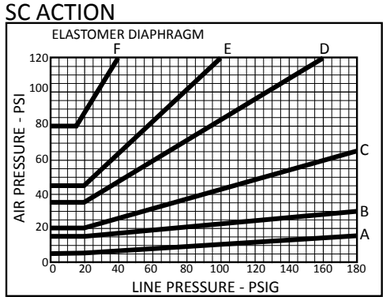
AA & SO ACTION



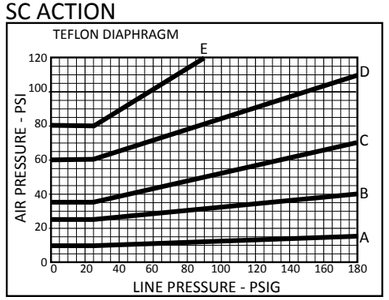
AA & SO ACTION



SC ACTION



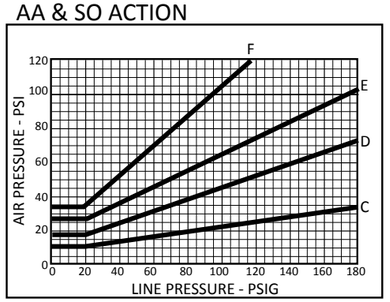
SC ACTION



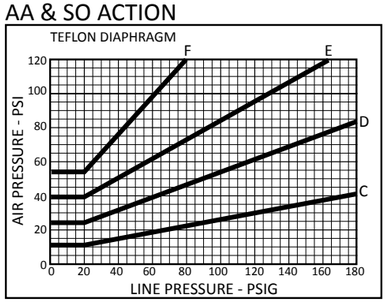
TTV DIAPHRAGM VALVE AND PNEUMATIC OPERATOR SIZING

NUMBER 90 OPERATORS

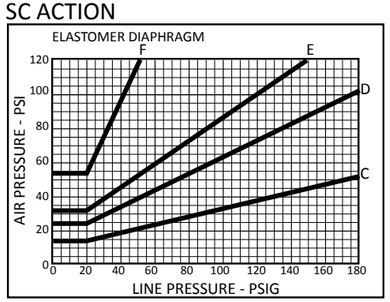
AA & SO ACTION



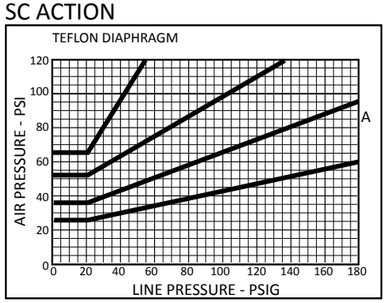
AA & SO ACTION



SC ACTION

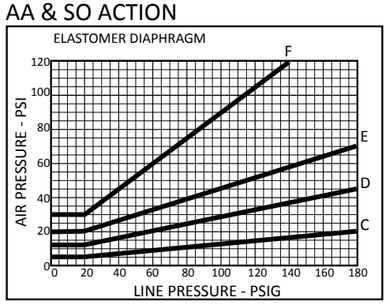


SC ACTION

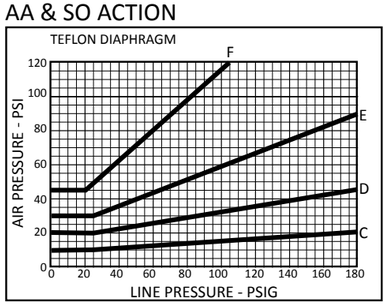


NUMBER 140 OPERATORS

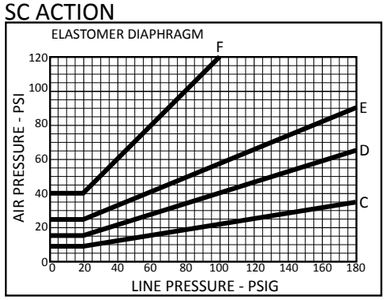
AA & SO ACTION



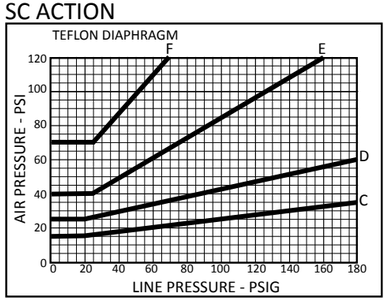
AA & SO ACTION



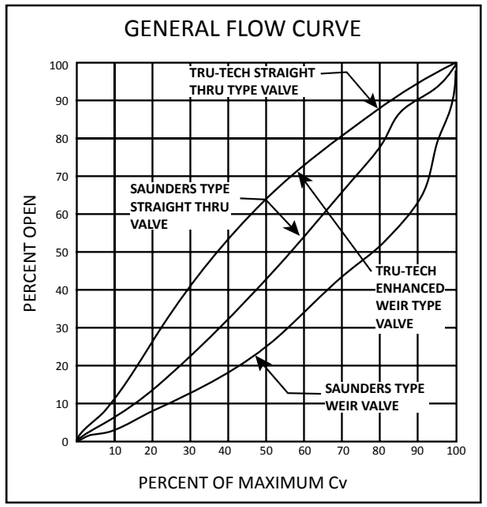
SC ACTION

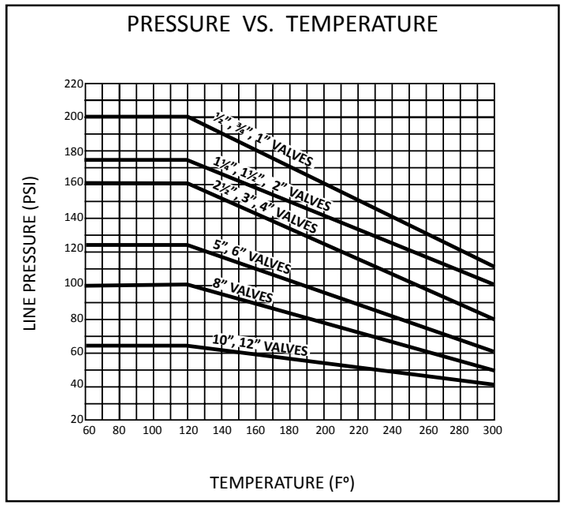


SC ACTION



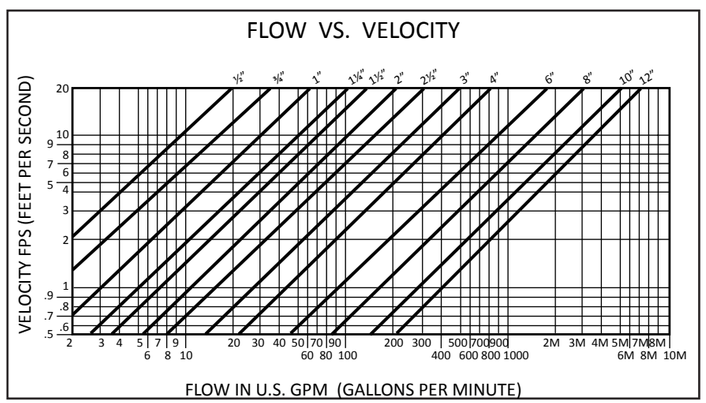
ENGINEERING DATA





The effects of temperature/pressure on diaphragms and on linings in valve bodies should be considered in the selection process. The tensile properties of all materials decrease as the temperature increases. This reduction in strength can be compensated for by reducing the allowable operating pressure as fluid temperature increases.

The chemical activity of the fluid also increases as temperatures rise. This may be a consideration for choosing materials that are more corrosion-resistant.



FLOW VS. VELOCITY

When selecting diaphragm valves, fluid velocity is a very important design consideration. Velocity through the valve should be limited to 15-20 ft/sec for clean fluids, and 8-12 ft/sec for slurries.

Tru-Tech Valve WARRANTY

This Tru-Tech Valve product is made of the finest available suitable materials. Every precaution has been taken to assure premium workmanship, consistent with established quality control. Valves or parts which are proved faulty due to defective materials or poor workmanship will be replaced free of charge; F.O.B. our plant upon presentation of such proof. This warranty shall not cover the cost of installation and is valid for a period of one (1) year from date of shipment. Specifications are subject to change; certified drawings are available upon request.

VALVE Cv RATINGS

Tru-Tech Diaphragm Valves, in both WEIR and STRAIGHT THRU configurations, have approximate linear values. Therefore, at 10% open, the Cv equals 10% of the full open Cv. At 25% open, the Cv equals 25% of the full open Cv and so on.

WEIR - DIAPHRAGM VALVE Cv RATINGS
(FLANGED ENDS) Cv FIGURES @ 100% OPEN)

VALVE SIZE		¾, 1	1½	2	2½	3	4	6	8	10
MSS MAXI-TROL (LONG BODY)	UNLINED	50	100	100	205	205	360	625	1640	1640
	PLASTIC LINED	45	94	94	200	200	350	615	1600	1600
	RUBBER LINED	37	73	73	167	167	299	580	1390	1390
COMPACT TRU-TROL (ANSI)	UNLINED	42	96	96	195	195	318	570	1250	NA
	PLASITC LINED	38	90	90	190	190	310	560	1220	NA
	RUBBER LINED	32	70	70	159	159	265	525	1060	NA

STRAIGHT THRU - DIAPHRAGM VALVE Cv RATINGS
(FLANGED ENDS) Cv FIGURES @ 100% OPEN)

VALVE SIZE		¾, 1	1½	2	2½	3	4	6	8	10
MSS MAXI-FLOW (LONG BODY)	UNLINED	50	275	275	425	425	740	1775	NA	NA
	PLASTIC LINED	45	267	267	415	415	722	1735	NA	NA
	RUBBER LINED	37	224	224	354	354	618	1511	NA	NA
COMPACT TRU-FLOW (ANSI)	UNLINED	42	267	267	410	410	718	1690	NA	NA
	PLASITC LINED	38	260	260	400	400	700	1650	NA	NA
	RUBBER LINED	32	217	217	340	340	596	1436	NA	NA

VALVE SIZING AND FLOW CALCULATION GUIDE

Valve size is usually determined by the system pipe size. However, with the low pressure drop of the Tru-Tech valves it may be advantageous to design the system with a smaller pipe. It may also be desirable to calculate valve sizing in order to assure adequate and accurate throttling or flow control.

Liquid Flow: In order to simplify and standardize flow computations, valves are given a Cv rating (Fluid Controls Institute-Standard FC1 62-1) or flow coefficient. The Cv equals the flow through the valve (GPM water at 60°F) at a 1 PSI pressure drop. Flows at any other set of conditions can readily be determined from the following equations.

To Determine Flow in GPM

$$Q = Cv \sqrt{\frac{P_1 - P_2}{G}}$$

To Determine Required Cv

$$Cv = \frac{Q}{\sqrt{\frac{P_1 - P_2}{G}}}$$

Q = Actual flow - gallons/min.
Cv = Valve flow coefficient

P_1 = Pressure (PSI) immediately upstream of the valve
P_2 = Pressure (PSI) immediately downstream of the valve
G = Specific gravity of the liquid (water @ 60° F = 1)

To Determine Headloss

$$\triangle h = \frac{Kv^2}{2g}$$

Another popular calculation procedure utilizes what is known as the valves resistance coefficient or "K" factor. The "K" factor is reasonably constant for any specific valve design.

Δh = Headloss in feet of fluid
V = Fluid velocity (ft/sec)
g = Acceleration of gravity (32.2 ft/sec²)
K = Approx. 0.5 STRAIGHT THRU Valves, Approx. 2.5 WEIR Valves

NOTE: 1 ft. water = .433 PSI

Gas Flow: Gas Flow relationships may be calculated in a manner similar to fluids except that since gasses are compressible absolute pressure and temperature values must be used. (Also $P_1 - P_2$ cannot exceed 0.5 of P_1. Use 0.5 if number appears to be less.)

To Determine Flow

$$Q = 1360\ Cv \sqrt{\frac{\triangle P \times P_1}{G \times T}}$$

To Determine Required Cv

$$Cv = \frac{Q}{1360} \sqrt{\frac{G \times T}{\triangle P \times P_1}}$$

Q = Flow = ft³/HR (SCFH) @ 60° F and 14.7 PSIA gallons/min.
Cv = Valve flow coefficient
P_1= Pressure (PSI) immediately upstream of the valve
$\triangle P = P_1 - P_2$
P_2 = Absolute Pressure (PSIA) immediately downstream of valve
G = Specific gravity of the liquid (water @ 60° F = 1)
T = Absolute Temperature of gas (460° + F)

SQUARE ROOT TABLE

NO.	SQUARE ROOT	NO.	SQUARE ROOT	NO.	SQUARE ROOT	NO.	SQUARE ROOT
1	1.0000	26	5.0990	51	7.1414	76	8.7178
2	1.4142	27	5.1962	52	7.2111	77	8.7750
3	1.7321	28	5.2915	53	7.2801	78	8.8318
4	2.0000	29	5.3852	54	7.3485	79	8.8882
5	2.2361	30	5.4772	55	7.4162	80	8.9443
6	2.4495	31	5.5678	56	7.4833	81	9.0000
7	2.6458	32	5.6569	57	7.5498	82	9.0554
8	2.8284	33	5.7446	58	7.6158	83	9.1104
9	3.0000	34	5.8310	59	7.6811	84	9.1652
10	3.1623	35	5.9161	60	7.7460	85	9.2195
11	3.3166	36	6.0000	61	7.8102	86	9.2736
12	3.4641	37	6.0828	62	7.8740	87	9.3274
13	3.6056	38	6.1644	63	7.9373	88	9.3808
14	3.7417	39	6.2450	64	8.0000	89	9.4340
15	3.8730	40	6.3246	65	8.0623	90	9.4868
16	4.0000	41	6.4031	66	8.1240	91	9.5394
17	4.1231	42	6.4807	67	8.1854	92	9.5917
18	4.2426	43	6.5574	68	8.2462	93	9.6437
19	4.3589	44	6.6332	69	8.3066	94	9.6954
20	4.4721	45	6.7082	70	8.3666	95	9.7468
21	4.5826	46	6.7823	71	8.4261	96	9.7980
22	4.6904	47	6.8557	72	8.4853	97	9.8489
23	4.7958	48	6.9282	73	8.5440	98	9.8995
24	4.8990	49	7.0000	74	8.6023	99	9.9499
25	5.0000	50	7.0711	75	8.6603	100	10.000

DIAPHRAGM VALVE BODY PATTERN AND MATERIAL OPTIONS

STRAIGHT THRU DESIGN

ENHANCED WEIR		½	¾	1	1½	2	2½	3	4	6	8	10
ANSI FLANGE BODIES	Ductile Iron	A	A	✓	A	✓	A	✓	✓	✓	✓	NA
	Cast Steel	A	A	✓	A	✓	SO	SO	SO	SO	SO	NA
	316 STST	A	A	✓	A	✓	SO	SO	SO	SO	SO	NA
	Alloy 20	A	A	✓	A	✓	SO	SO	SO	SO	SO	NA
	Bronze	A	A	✓	A	✓	SO	SO	SO	SO	SO	NA
	Cast Iron	A	A	✓	A	✓	A	✓	✓	✓	✓	NA
MSS FLANGE BODIES	Cast Iron	NA	✓	✓	✓	✓	A	✓	✓	✓	✓	✓
	Ductile Iron	NA	✓	✓	✓	✓	A	✓	✓	✓	✓	NA
SCREWED END BODIES	316 STST	A	A	A	A	A	SO	SO	NA	NA	NA	NA
	Cast Steel	A	A	A	A	A	SO	SO	NA	NA	NA	NA
	Alloy 20	A	A	A	A	A	SO	SO	NA	NA	NA	NA
	Bronze	A	A	A	A	A	SO	SO	NA	NA	NA	NA
SOCKET WELD BODIES	316 STST	A	A	A	A	A	SO	SO	NA	NA	NA	NA
	Cast Steel	A	A	A	A	A	SO	SO	NA	NA	NA	NA
	Alloy 20	A	A	A	A	A	SO	SO	NA	NA	NA	NA
	Bronze	A	A	A	A	A	SO	SO	NA	NA	NA	NA

A = Available; does not meet std. face to face
NA=Not Available
SO=Special Order
✓=Bodies available; meets standards

WEIR DESIGN

STRAIGHT THRU		½	¾	1	1½	2	2½	3	4	6	8
ANSI FLANGE BODIES	Ductile Iron	A	A	✓	A	✓	A	✓	✓	✓	✓
	Cast Steel	A	A	✓	A	✓	A	✓	SO	SO	SO
	316 STST	A	A	✓	A	✓	A	✓	SO	SO	SO
	Alloy 20	A	A	✓	A	✓	A	✓	SO	SO	SO
	Bronze	A	A	✓	A	✓	AA	✓	SO	SO	SO
	Cast Iron	A	A	✓	A	✓	✓	✓	✓	✓	✓
MSS FLANGE BODIES	Cast Iron	A	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Ductile Iron	A	✓	✓	✓	✓	✓	✓	✓	✓	✓
SCREWED END BODIES	316 STST	A	A	A	A	A	A	A	NA	NA	NA
	Cast Steel	A	A	A	A	A	A	A	NA	NA	NA
	Alloy 20	A	A	A	A	A	A	A	NA	NA	NA
	Bronze	A	A	A	A	A	A	A	NA	NA	NA
SOCKET WELD BODIES	316 STST	A	A	A	A	A	A	A	NA	NA	NA
	Cast Steel	A	A	A	A	A	A	A	NA	NA	NA
	Alloy 20	A	A	A	A	A	A	A	NA	NA	NA
	Bronze	A	A	A	A	A	A	A	NA	NA	NA

A = Available; does not meet std. face to face
NA=Not Available
SO=Special Order
✓=Bodies available; meets standards

VALVE BODY MATERIALS

CAST IRON **ASTM A-126**
Cast Iron is a general purpose material suitable for water, air, petroleum products, most solvents, dry powders, and a wide variety of chemicals when used in the unlined state. Cast iron can be lined with a wide variety of rubbers and plastics to handle almost any process media.

DUCTILE IRON **ASTM A-536-GR 65-45-12**
Ductile Iron is a general purpose material with usage similar to cast iron. However, it is much stronger and more capable where there may be high pipeline stresses, danger from impact, or concern from leakage upon line or valve fracture. Normally ductile iron can be used as a direct replacement for steel valves. It can be lined with a wide variety of rubbers and/or plastics to handle almost any process media.

CAST STEEL **ASTM A-126 GR WCB**
Cast Steel is another general purpose material somewhat less resistant to corrosion than cast iron, especially where water is the media. It is much stronger, and like ductile iron, much more capable where there may be high pipeline stresses, danger from impact, or concern from leakage upon line or valve fracture. Cast steel valves are expensive and are normally only used where specified by the end user. Cast steel valves can be lined with a wide variety of rubbers and/or plastics to handle almost any process media.

316 STAINLESS STEEL **ASTM A-351 GR CF8M**
316 Stainless Steel is an alloy of iron, carbon, nickel, and chromium. It is suitable for most foods, beverages, pharmaceuticals, solvents, sea water, oils, and some acids and alkalis.

ALLOY 20 STST **ASTM A-351 GRADE CN-7M**
Alloy 20 Stainless Steel has higher amounts of nickel and chromium than the 300 Series Stainless Steel. It is more resistant to sulfuric acid and is widely used in chemical processing and water treatment.

NOTE: Additional body materials are available, contact Tru-Tech Valve for details.

DIAPHRAGM MATERIALS AND ACCESSORIES

DIAPHRAGM MATERIALS

ETHYLENE PROPYLENE (EPDM) -30° F to 300° F
EPDM is the most popular general purpose material. It possesses excellent chemical resistance to a wide variety of corrosive elements including acids, caustics, and hot water. EPDM is abrasion resistant, good for high temperature service, and is satisfactory for intermittent steam sterilization, but has poor oil resistance.

NEOPRENE (CR) -20° F to 200° F
Neoprene is widely used in wastewater applications. It is a good choice for general purpose chemical resistance where the media contains entrained oils. It is abrasion resistant, and also resists aldehydes, certain alcohols, fertilizers, explosives, petroleum, air, acids, and alkalis.

SOFT NATURAL RUBBER (NR) -30° F to 180° F
Soft Natural Rubber is good in either wet or dry abrasive services, water, and some acids and alkalis. It has one of the best abrasion resistances when strong chemicals are not present.

VITON® (FKM) -20° F to 300° F
Viton offers exceptional resistance to oils, most chemicals, and many solvents at elevated temperatures. It can be used in most applications involving mineral acids, salt solutions, and chlorinated hydrocarbons. Viton is not recommended for ammonia, its derivatives, or polar solvents, e.g. acetone.

TEFLON® TFE/EPDM -30° F to 300° F
TFE is the most chemical resistant of all the diaphragm materials. It is good for handling strong acids, alkalies (caustics), and solvents. Because of its greater stiffness, it significantly increases required closing/sealing forces. TFE has a shorter working life than elastomer diaphragms and may require a larger actuator size on automatic valves.

BUTYL -20° F to 250° F
Butyl is a good choice for gases because it has very low vapor and gas permeability. It is also good for many acids, alkalis, and applications involving steam sterilization.

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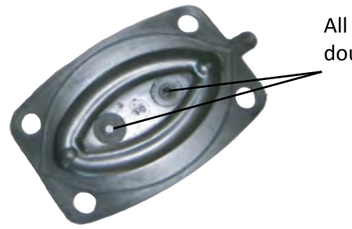
NOTE: Additional diaphragm materials are available, contact Tru-Tech Valve for details

ACCESSORIES

Tru-Tech Valve offers a wide range of accessories. To find out more, contact our Sales Department for details.

P/P Positioners
I/P Positioners
Limit Switches
Proximity Switches
Regulators
Solenoids
Travel Stops



All diaphragms are double studded.

Teflon face (PTFE) diaphragm, the most chemical resistant.

DIAPHRAGM VALVE BODY
BODY LININGS

SOFT NATURAL RUBBER: Soft Natural Rubber is good in either wet or dry abrasive services, water, and some acids and alkalis. It has one of the best abrasion resistances when strong chemicals are not present. Temperature range is from -30° F to 180° F.

HARD RUBBER: Hard Rubber is a good general chemical resistant lining that can be used in higher temperatures than its soft counterpart. Temperature range is from -30° F to 200° F.

GRAPHITE BASED HARD RUBBER: Graphite Based Hard Rubber has a good chemical resistance at higher temperatures than the normal hard and soft natural rubbers. Maximum use temperature is 250° F.

EPDM: (Ethylene Propylene Diene Monomer) EPDM is the most popular general-purpose material. It possesses excellent chemical resistance to a wide variety of corrosive elements including acids, caustics, and hot water. EPDM is abrasion resistant, good for high temperature services, and is satisfactory for intermittent steam sterilization, but has poor oil resistance. Temperature range is from -30° F to 300° F.

NEOPRENE: Neoprene is widely used in wastewater applications and is a good choice for general-purpose chemical resistance where the media contains entrained oils. It resists aldehydes, certain alcohols, fertilizers, explosives, petroleum, air, acids, and alkalis, and is abrasion resistant. In most cases, Neoprene is interchangeable with Buna-N (Nitrile) Rubber. Temperature range is from -30° F to 200° F.

BUNA-N: (Nitrile Butadiene Rubber) Buna-N is a general-purpose oil resistant polymer known as Nitrile Rubber. It is a copolymer of butadiene and acrylonitrile. Buna-N has good resistance to solvents, oil, water, and hydraulic fluid. It displays good compression set, abrasion resistance, and tensile strength. Buna-N should not be used in highly polar solvents such as acetone and methyl ethyl ketone, nor should it be used in chlorinated hydrocarbons, ozone, or nitro hydrocarbons. In most cases it is interchangeable with Neoprene. Maximum use temperature is 275° F.

BUTYL: Butyl is a good choice for gases because it has very low vapor and gas permeability. It is also good for many acids, alkalis, and applications involving steam sterilization. Temperature range is -20° F to 250° F.

CHLOROBUTYL: Chlorobutyl has excellent abrasion and corrosion resistant properties. Maximum recommended temperature is 180° F.

POLYPROPYLENE: Polypropylene is a general purpose lining with good chemical and temperature resistance. It is utilized for water treatment, chemical processing, most plating fluids, steel mill pickling lines, food stuff, and drinking water. Temperature range is from -10° F to 200° F.

ECTFE (HALAR): (Ethylene Chlorotrifluoroethylene) ECTFE has excellent wear and abrasion qualities, excellent corrosion resistance, excellent electrical properties, and low coefficient of friction. Maximum use temperature is 350° F.

ETFE (TEFZEL): (Ethylene Tetrafluoroethylene) ETFE has outstanding resistance to chemicals and strong acids. It also has high abrasion resistance for tough services. ETFE has no known solvent below 350° F.

DIAPHRAGM VALVE
BODY LININGS

PTFE (XYLAN): (Polytetrafluoroethylene) PTFE has good wear resistance, fair corrosion resistance, and low coefficient of friction. Temperature range is from 450° F to 500° F.

PFA: (Perfluoroalkoxy) PFA has good wear and abrasion qualities, excellent corrosion resistance, excellent release capabilities, and low coefficient of friction. Maximum us temperature is 525° F.

PVDF (KYNAR): (Polyvinylidene Fluoride) PVDF offers very low permeability. It is a strong, tough, abrasion resistant fluorocarbon material, resistant to most acids, bases, and organic solvents. PVDF is ideally suited to handling wet or dry chlorine, bromine, and other halogens. Temperature range is from -10° F to 275° F.

FEB: (Fluorinated Ethylene Propylene) FEB has good wear and abrasion qualities, excellent corrosion resistance, excellent release characteristics, and low coefficient of friction. Maximum use temperature is 400° F.

BLUE GLASS (CHEM): Blue Glass is intended for strong chemical applications such as acids and caustics where a non-porous lining is necessary.

GREEN GLASS (NON-CHEM): Green Glass is intended for non-chemical applications such as wastewaters where a smooth lining is necessary to prevent viscous fluids from sticking to the walls.

POLYURETHANE: Polyurethane has excellent abrasion resistance. Temperature range is from -30° F to 150° F.

FDA EPOXY: FDA Epoxy has good wear and abrasion qualities, and good corrosion resistance. Maximum use temperature is 212° F.

PVC: PVC has resistance to a variety of chemicals, including oxidizing acids, and provides excellent abrasion resistance. Maximum use temperature is 160° F.

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Note: Other body materials are available as an option; call our Sales Department for details.

TRU-TECH VALVE

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TRU-TECH VALVE

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