

# 2 Way Electrical / Pneumatic Operated Lined / Unlined Weir / Straight / Pattern Diaphragm Valve

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# 2 Way Electrical / Pneumatic Operated Lined / Unlined, Weir / Straight Pattern **Diaphragm Valve**

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Introduction

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The Diaphragm Type Control Valve is recommended for applications involving slurries, suspended solids, viscous or corrosive substances and other hard to handle mediums or where the tight closure is a prime factor. While primarily designed for on-off service, it will provide a proportional control action when furnished with a range spring or a positioner.

Diaphragm valve is a simple pinch type valve and of low pressure type because larger area of the diaphragm is exposed to the line pressure.

Diaphragm Valves are known for their corrosion and abrasion resistance, offering features of leak tightness and low cost maintenance in severe service applications. The valve based on simple operating principles, are now widely used by process engineers due to the availability of increased range of diaphragms and body lining materials.

Diaphragm valves are mainly used in water treatment plants, fertilizer & petrochemicals industries, chemical industries, refineries, thermal power stations, and other process industries. Equally suited to ON and OFF, or flow control applications, a diaphragm valve will handle positive pressures or high vacuum. Due to the wide range of material options it will handle almost all applications within its temperature and pressure ranges (175° C max. and 10 bar max) and as such is used in almost every industry on both corrosive and abrasive applications. All working parts are isolated from the line media which enhances its reliability. Maintenance is a simple task with the body remaining in the pipe, the valve thus being field serviceable. It has linear flow characteristics which makes it well suited to throttling or modulating duties. ON / OFF and control automation is possible with the use of modern compact actuators and accessories.



## Diaphragm Range

(Table 1)

GRADE	MATERIAL
10	Natural rubber
11	Natural rubber composite
20	EPDM / black rubber
2F	EPDM / food grade
30	Butyl rubber
40	Nitrile rubber
50	Neoprene
60	Hypalon
70	Viton
80	Silicone
93 / 20	PTFE / EPDM backed
93 / 30	PTFE / Butyl backed
93 / 60	PTFE / Hypalon backed
93 / 70	PTFE / Viton backed

Body material of cast iron, or ebonite lined cast iron, is standard. Cast carbon steel and alloy steel body is optional. Neoprene lining or other elastomer lining is optional. The bonnet material is invariably cast iron even with alloy steel body.

### Sizes :

1/2 inch to 12 inches is standard. Standard body in cast iron construction is rated-125 ASA, drilled to BS 10; other tables also can be given.

### End Connections :

Flanged from 1/2 inch to 12 inches; screwed end connections are available up to size 2 inches.

### Diaphragm Material :

Standard body diaphragm material is Neoprene whereas other materials such as Butyl, Hypalon, Teflon, EPDM, Viton, Nitrile, Teflon backed with Neoprene etc. can also be supplied on request refer table 1 and 2

### Operating Temperatures :

Rubber diaphragm will handle majority of flow mediums at temperatures upto 80°C. Other diaphragm materials are available for higher temperatures upto 175°C.

### Operating Line Pressures :

150 psig for valve size upto 4 inches and 125 psig for size 6 inches. For larger sizes operating line pressure will be generally lower.

### Control Action :

Gradually opening and closing (on-off) or proportional control.

### Valve Action:

Air to open (ATO) or air to close (ATC) and stay put in case of Double acting, in case of motorised stayput.

## Lined And Coated Bodies

(Table 2)

CODE	MATERIAL
UL	Unlined
HL	Halar
GL	Glass
SR	Soft natural rubber
HR	Hard natural rubber
BR	Butyl rubber
NR	Neoprene rubber
HY	Hypalon rubber
ETFE	Ethylene Tetrafluoroethylene
PFA	Perfluoroalkoxy
PVDF	Polyvinylidene Fluoride
PP	Polypropylene

### (A) Pneumatic Actuators:

Diaphragm actuators can be direct or reverse in operation with spring or can be spring less. Spring less actuator can be supplied with air reservoirs for fail safe position. Diaphragm actuators are available in various sizes having effective area varying from 9 sq. inches to 300 sq. inches to match any thrust load requirements.

Light springs are generally used for Diaphragm Type Valve for air to close operation in order to achieve tight shut-off against relatively high fluid pressures. Spring range is generally 3-7 psig for air to close valves. For air to open valves, normally heavy duty spring having initial spring tension of 6 to 20 psig is supplied to achieve high shut-off ratings. Equivalent size cylinder actuators type single or double acting, are also available. Cylinder actuators are generally preferred when fail safe position calls for stay put operation in conjunction with air lock relay or for heavy duty operation.

Air supply is normally 35 or 50 psig which is standard for the diaphragm actuators, for cylinder actuators it varies from 60 to 100 psig.

Spring less type actuators can be supplied with 3 psig constant loading.

### Accessories:

Top mounted hand wheel (TMH) and side mounted hand wheel (SMH) are both available. TMH can be furnished with upper limit stop or having a provision for upper and lower limit stop. SMH can be supplied as separate unit integral with the actuator. SMH involving large thrust loads are provided with worm and worm gear reduction. SMH can be locked in open position or closed position as desired. We also supply Valve positioner, Air set, Limit switches, Electro Pneumatic converter, Air lock, Volume booster, Solenoid valves, Position transmitter and I to P convertor.

## Salient Features:

### Type of Pneumatic Valves:

Diaphragm Actuator can be direct, reverse, or double acting in operation with spring or can be spring less.

### Diaphragm Actuator Sizes:

Effective area from 9 Sq. inches to 300 Sq. inches and in case of double diaphragm it can go upto 600 Sq. inches to match any thrust load requirements.

### Cylinder Actuator Sizes:

Equivalent size cylinder actuators, type single or double acting are also available. These are generally preferred wherever air supply pressure available is more. Double acting cylinder actuator is generally preferred when fail safe position calls for stay put operation in conjunction with air lock relay or for heavy duty operation.

### Operating Air Pressure:

50 to 57 psig for diaphragm actuator and 100 psig for cylinder constant loading refer figure 1.

actuator is standard. Springless type actuator can be supplied with 3 psig constant loading refer figure 1.

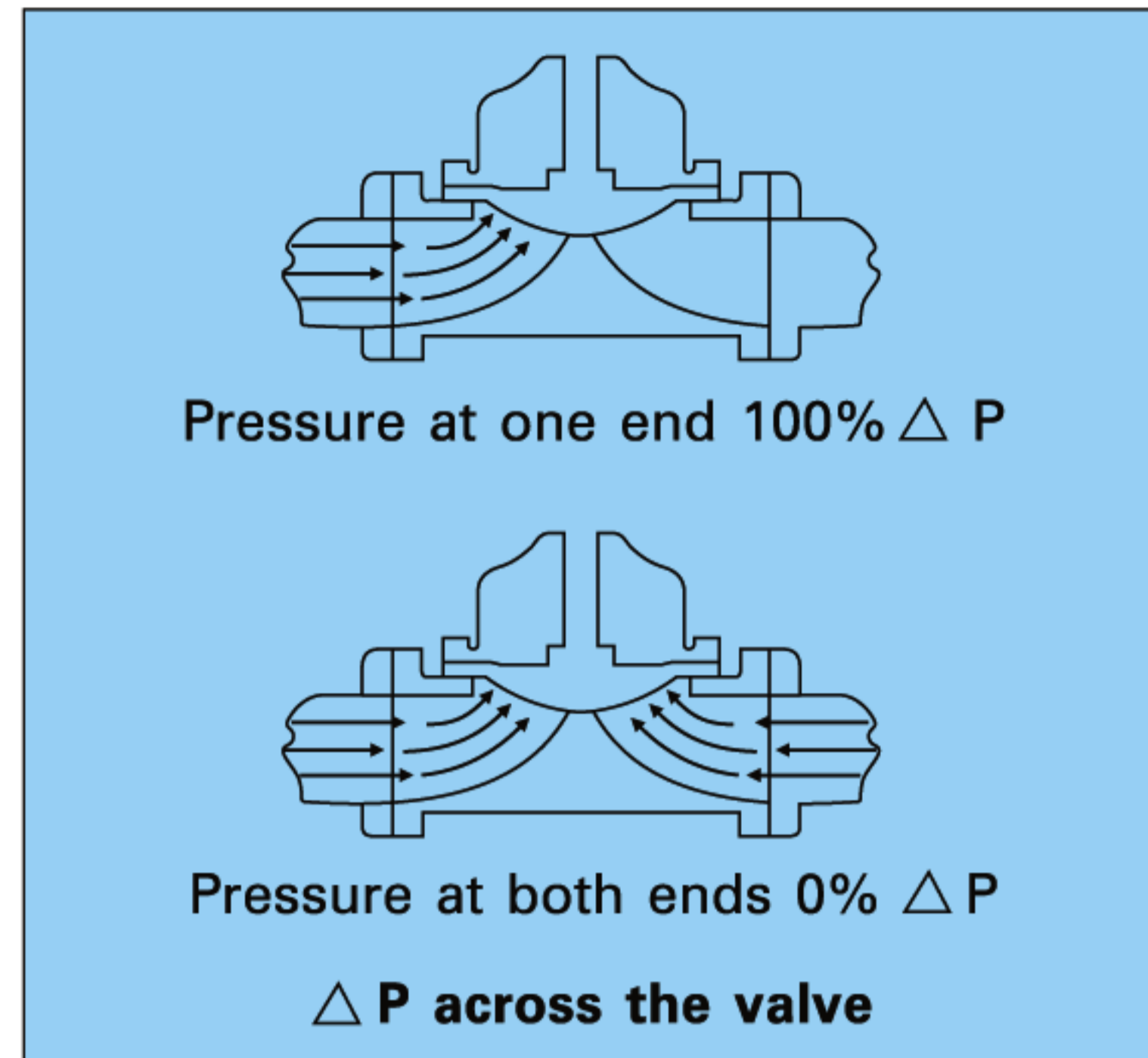
### Control Valve Closing Time:

Approximate 8 to 10 Seconds.

### Control Valve Opening Time:

Approximate 20 to 24 Seconds

Control valve opening and closing time varies according to the size of the actuator and solenoid valve used in conjunction with quick exhaust valves; air boosters and



(Figure 1)

slow closing devices also can be furnished duly mounted and piped. Approximately 8 seconds for closing and 20 seconds opening time is normal. Maximum permissible pressure for diaphragm is 35 psig and for cylinder is 100 psig. Maximum temperature is 70°C.

## (B) Electrical Actuators:

2 Way Lined and Unlined valves in Weir and Straight through pattern assembled with Single phase, 3 phase, under linear/ multi turn construction, supply voltage 230 VAC, 110VAC, 415volts 3phase AC output signal 4-20 mA, input signal 4-20 mA , opening/closing time 40 sec minimum, 160 maximum depends on application and type of valve.

### Lining Hardness:

- 1) Ebonite 95° + 5 Shore A
- 2) Natural New Rubber 55° + 5 Shore A
- 3) Teflon Rochwell / Shore R 100 D78 or D62
- 4) Glass lining & FRP- Parcol & Parcol 40 respectively

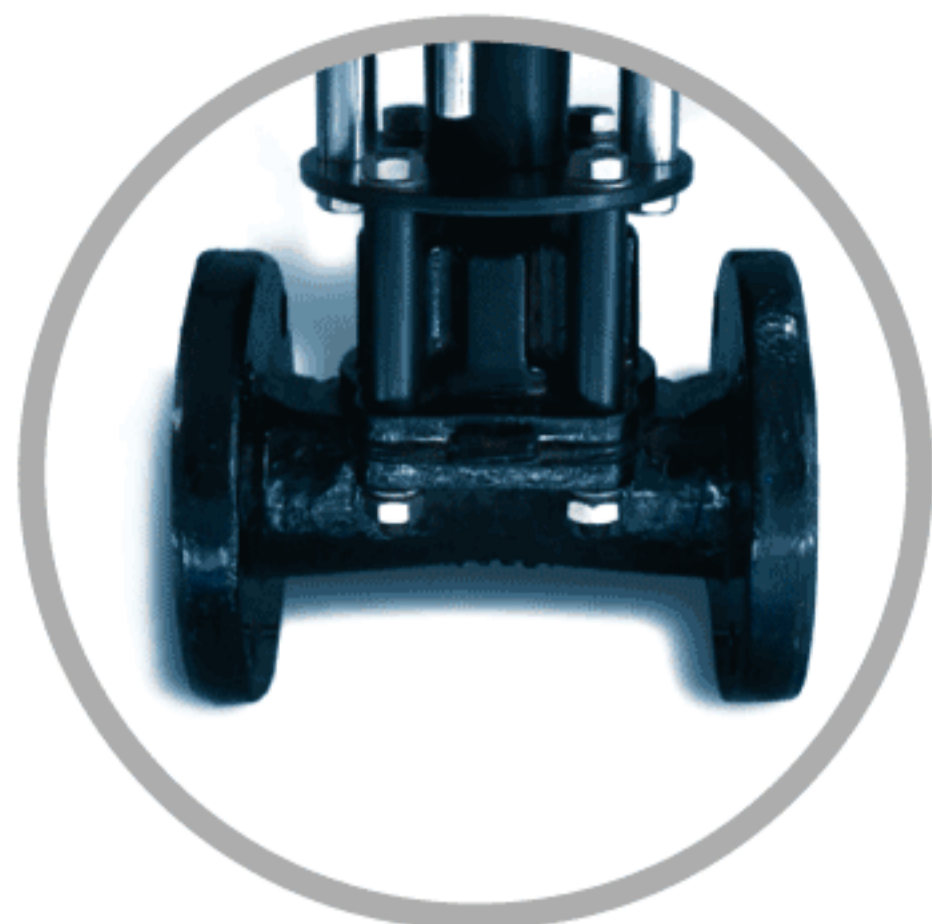
### Lining Thickness:

- 15 to 65 mm Valve, 3 mm
- 80 & 100 mm Valve, 3.5 mm
- 125 & 150 mm Valve, 4.0 mm
- Teflon coating Thickness 800 microns
- Glass lining 1.5 mm

## General Specifications :

TYPE	- Weir / Straight Way
BODY MATERIAL	- Cast iron / Cast steel / 316 ST ST / 304 STST Gunmetal / Alloy 20 Unlined & Lined
LINING MATERIAL	- Neoprene / Natural Rubber / Ebonite / Glass / Teflon / EPDM / FRP
BODY RATING	- ANSI Class 125 / 150 lbs.
SIZES	- 15 mm to 300 mm
END CONNECTIONS	- Conforming to BS-5156 flanged to ANSI B-16.1 Class 125 / 150 lbs.

## Straight Through Type 'ST' Diaphragm Valves



## Weir Type 'W' Diaphragm Valves

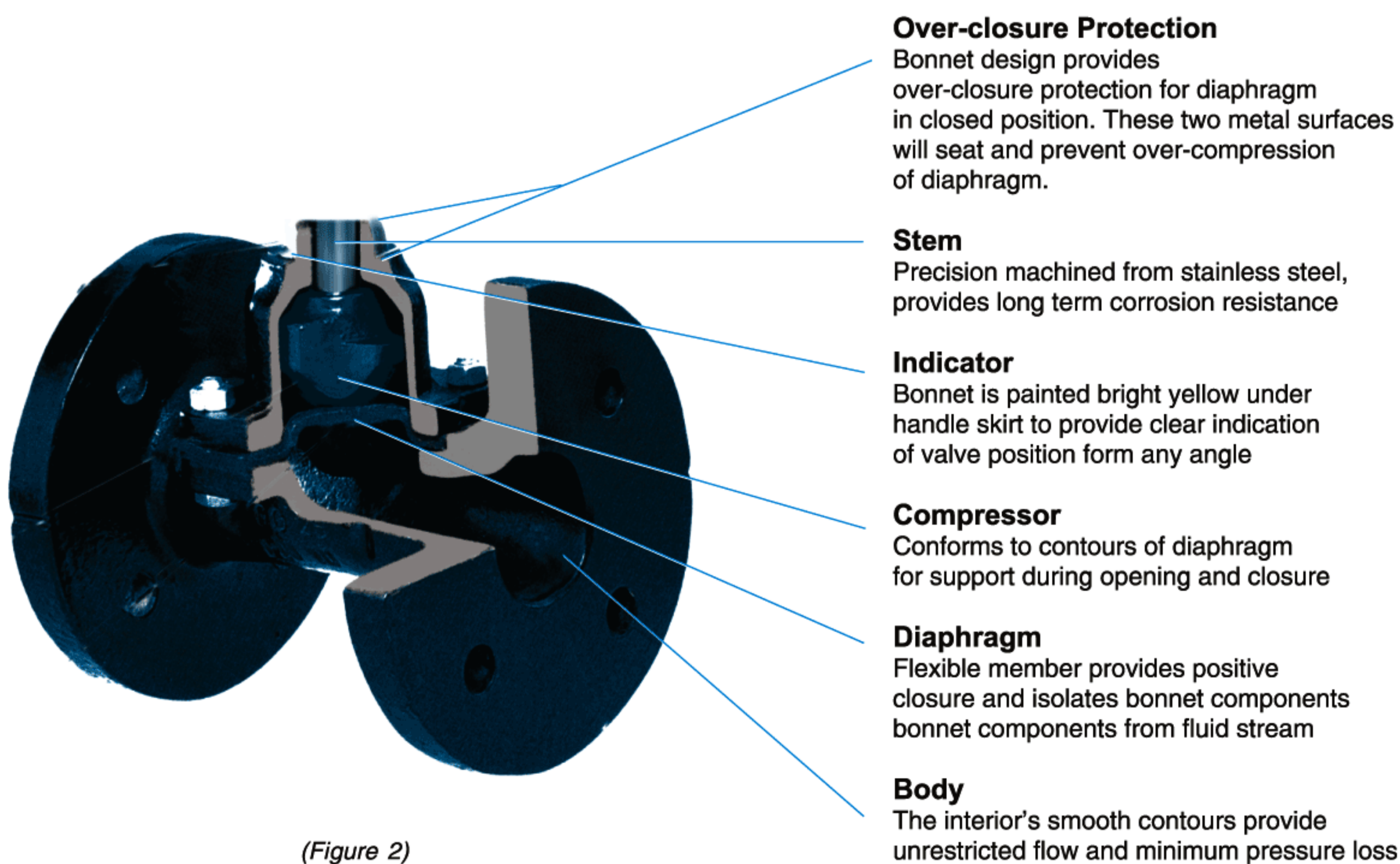


## Straight Through Diaphragm Valves

Offer an unobstructed flow passage to the service media and are therefore ideally suited to handle viscous fluids, Slurries and suspended solids. The straight-line-flow characteristic ensures a long service life when handling abrasive materials that require good flow capacity and leak-tight shut-off.

Straight Through Diaphragm Valve under manual operation has a bonnet assemblies which incorporate position indication, and adjustable temper-proof over-closure protection. Over-closure is the most common cause of diaphragm damage, particularly in temperatures above 80° C (175° F). The valves are suitable for internal cleaning by rodding, brushing or pigging refer figure 2.

Pneumatic operated Straight-Through Diaphragm Valves are available for the automatic control of process plants. The Pneumatic Actuators can be fitted with many forms of electronic positioners, micro and proximity switches and other types of accessories available in on/off and modified characteristic duty application.



(Figure 2)

## Working Pressures :

Maximum permissible working pressures within a temperature range of 10° to 50° C (14° to 122° F) are as follows (refer table 3)

(Table 3)

VALVE SIZE		PRESSURES	
DN (mm)	INCH	BAR	PSI
25 - 100	1 - 4	10	145
120 - 150	5 - 6	6	87
200 - 300	8 - 12	3.5	50

Higher temperatures will lower the physical properties of the various diaphragm materials and require a decrease in working pressures.

## Advantages :

- In line maintenance offers ease of diaphragm changing in plant shut down situations.
- Bonnet and operating parts are completely isolated from line fluid, thus preventing contamination.
- No stem packing is required, thus avoiding one of the most common leak points in other type of valves.
- Resilient diaphragms ensure positive leak-tight closure.
- Choice of coated, lined or unlined bodies and a comprehensive range of diaphragms enable severe service applications.
- Straight type gives more flow as compared to Weir type and more superior than later one when it is used for slurries and solid media application

## Disadvantages :

- Straight type is more expensive than of Weir type
- For same size of Straight type valve the Pneumatic Actuator required is of higher size as compared to Weir type due to its higher traveling length.



## Weir Type - 'W' Diaphragm Valves

Weir Type 'W' Diaphragm Valves : are extremely versatile in their application because of the variety of body materials, linings, coatings and grades of diaphragms available. Weir type diaphragms incorporate the use of PTFE, offering maximum chemical and temperature resistance.

Weir type Diaphragm Valve under manual operation has a bonnet assemblies which incorporate position indication, and adjustable temper- proof over-closure protection. Over-closure is the most common cause of diaphragm damage, particularly in temperatures above 80° C (175° F). The valves are self draining when installed at a certain slight angle on the horizontal plane refer figure 3.

Electrically operated Weir type Diaphragm Valves is available for the automatic control of process plants. The Electrical Actuators can be fitted with many forms of positioners, micro and proximity switches and other types of accessories available in on/off and modified characteristic duty application

## Working Pressures :

Maximum permissible working pressures within a temperature range of 10° to 50° C (14° to 122° F) are as follows (refer table 4.)

(Table 4)

Valve Size		Pressures With Rubber Diaphragm		Pressures With PTFE Diaphragm	
DN (mm)	INCH	BAR	PSI	BAR	PSI
8 - 50	1/4 - 2	16	232	10	145
65 - 125	2 1/2 - 5	10	145	10	145
150 -	6	10	145	7	102
200 - 250	8 - 10	7	102	6	87
300 - 350	12 - 14	6	87	-	-

Higher temperatures will lower the physical properties of the various diaphragm materials and also decreases the working pressure.

**STEM**

Precision machined from stainless steel, provides long term corrosion resistance

**INDICATOR**

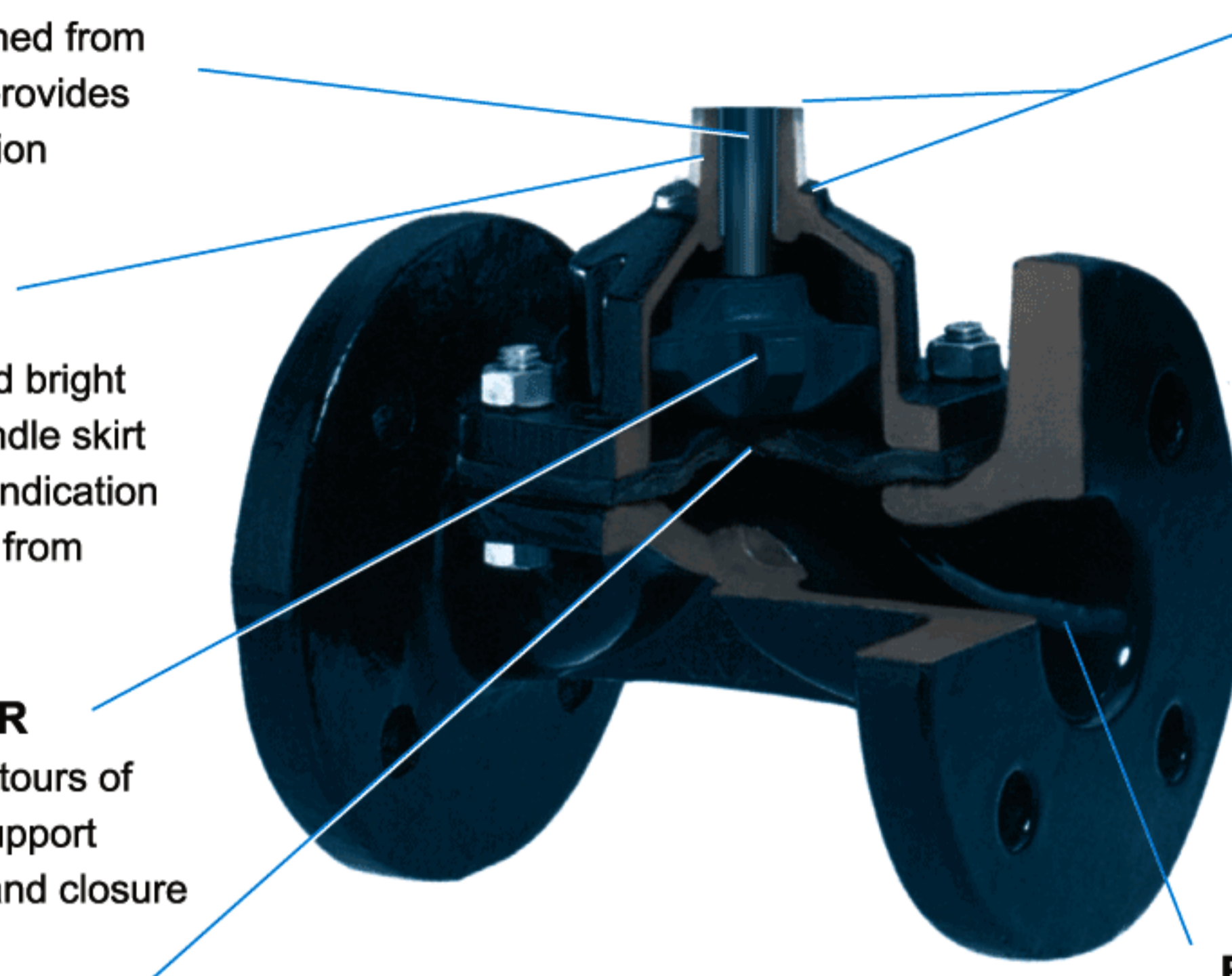
Bonnet is painted bright yellow under handle skirt to provide clear indication of valve position from any angle

**COMPRESSOR**

Conforms to contours of diaphragm for support during opening and closure

**DIAPHRAGM**

Flexible member provides positive closure and isolates bonnet components from fluid stream

**OVER-CLOSURE PROTECTION**

Bonnet design provides over-closure protection for diaphragm in closed position, these two metal surfaces will seat and prevent over-compression of diaphragm.

**BODY**

The interior's smooth contoured provide unrestricted flow and minimum pressure loss

(Figure 3)

### Advantages :

- In line maintenance offers ease of diaphragm changing in plant shut down situations.
- Bonnet and operating parts are completely isolated from line fluid, thus preventing contamination.
- No stem packing is required, thus avoiding one of the most common leak points in other type of valves.
- Resilient diaphragms ensure positive leak-tight closure
- Choice of coated, lined or unlined bodies and a comprehensive range of diaphragms enable the handling of severe service applications.
- The valves are especially suitable for vacuum services (with vacuum-type diaphragm)
- The valves are self-draining when installed at a certain slight angle on the horizontal plane.

### Disadvantages :

- Due to weir type construction when it is subjected to slurries they obstruct the flow resulting in to the blockage of the flow.

Advantages provided by diaphragm valves are many. They are extremely clean, and can form a nearly leak-proof seal for tight shut-off. The diaphragm design provides for easy maintenance and repair as it can be replaced without disturbing the piping line. However, they are limited to moderate temperature (175°C) and pressure service (approximately 150 psi) by the mechanical properties of most common diaphragm materials.

The weir design is best for general use applications or for tough corrosive and abrasive services. The straight through type can be used in situations where the flow direction changes within the system. They are excellent for use with sludge, slurries and other viscous fluids particularly Straight as compared to Weir. Both styles provide a streamlined path for fluid flow that yields minimal pressure drop across the valve.

Where pressure and temperature allow diaphragm valves are the simplest, longest lasting, easiest maintained valves you can buy for the money. These valves have proven their economy in reliable flow control of corrosive and hard-to-handle fluids.

## **How Diaphragm valves make reliable control of corrosive fluids more economical :**

1. Long trouble-free operation. The diaphragm valves are simple, soft seated valves. Closure is achieved by pressing a flexible, resilient diaphragm against a transverse weir (seating surface). When fully closed, the diaphragm seats against the weir under pressure from the compressor to provide a cushioned, positive drip tight shutoff.
2. Lower initial price. As described earlier the diaphragm keeps the bonnet and its working parts from ever coming in contact with line flow. This permits use of economical cast iron or ductile iron bonnets, even when bodies require exotic metal or lining of rubber, glass, or plastic-to handle media such as sulfuric acid, hydrochloric acid, hydrobromic acid, and wet chlorine. No special alloy working parts are required.
3. Lower operating cost. Where temperature are 175° C or less and pressures are 150 psig or less, diaphragm valves introduce proven operating economics, such as no leakage or product waste no expensive maintenance on stems, seats, or packing and no leakage of toxic, flammable, or explosive substances.
4. Lower maintenance cost. When infrequent maintenance is required, easy-in-line servicing minimizes downtime. Only the bonnet need to be removed to change out a diaphragm.
5. Lower replacement price. A replacement diaphragm typically provides the equivalent of a new valve-at just a fraction of new valve cost.
6. Lower inventory cost. Wide interchangeability of diaphragms and bonnet assemblies minimizes replacement parts inventory and costs.

## Applications :

Acid transfer, Beverage processing, Brine treatment, Chemical Processing, Chemical Transfer, Condensate, CO2 Injection, Flue Gas Desulphurization, Fly Ash, Fuel, Gas Production, Gas Scrubbing, Hydrogen, Lime Circulation, Lubricating Oil, Mineral Processing, Mine Dewatering, Oil Production, oil Transportation, Organic Chemicals, Petroleum Production and Refining, Gasoline, Petroleum Distribution, Sea Water, Sewage, Waste Water.

## Typical Applications Are :

- ♦ Drinking water treatment
- ♦ Sea water desalination
- ♦ Process water for energy production
- ♦ Cooling water circuits
- ♦ Process water for industry
- ♦ Water purification for swimming baths
- ♦ Municipal and industrial drainage water treatment and sewage treatment plant
- ♦ Municipal water supply
- ♦ High purity water production (for the semi-conductor industry)
  
- ♦ Water processing for the pharmaceutical industry, up to WFI (water for injectic)

## Industries :

Acid Transfer, Condensate Systems, Chemical and Liquor, Crude Handling and Treatment, Gas Treatment, Miscellaneous Services, General Industries, Heavy Oil and Upgrading, Waste Processing, Water Handling and Treatment.

## Standards :

ASME (ANSI), ISO

GRADE	POLYMER TYPE	TEMPERATURE RANGE
D10 Natural Rubber	Natural Rubber Polyisoprene/SBR Sulphur cured & carbon black reinforced	-15 to 100°C
D15 White Natural Rubber	Natural Rubber Polyisoprene/SBR Sulphur cured & white reinforced	-10 to 80°C
D20 EPDM	Ethylene Propylene Diene (EPDM) Organic peroxide cured, carbon black reinforced	-40 to 140°C
D30 Butyl Rubber	Isobutylene Isoprene (IIR) Sulphur cured & carbon black reinforced	-30 to 100°C
D40 Nitrile	Butadiene Acrylonitrile	-10 to 100°C
D50 Neoprene	Polychloroprene Non sulphur cured carbon black reinforced	-30 to 100°C
D60 Hypalon	Chlorosuphonated polyethylene Non sulphur cured carbon black reinforced	-15 to 100°C
D70 Viton	Vinylidene fluoride-hexafluoro propyleneco-polymer Carbon black reinforced	-5 to 150°C
D9330 PTFE/EPDM	Virgin PTFE + Ethylene Propylene Diene Two piece Bayonet fitting	-30 to 100°C
D9370 PTFE/Viton	Virgin PTFE + Fluoroelastomer Two piece Bayonet fitting	-5 to 175°C

## Valve Cv for Diaphragm Type Control Valves

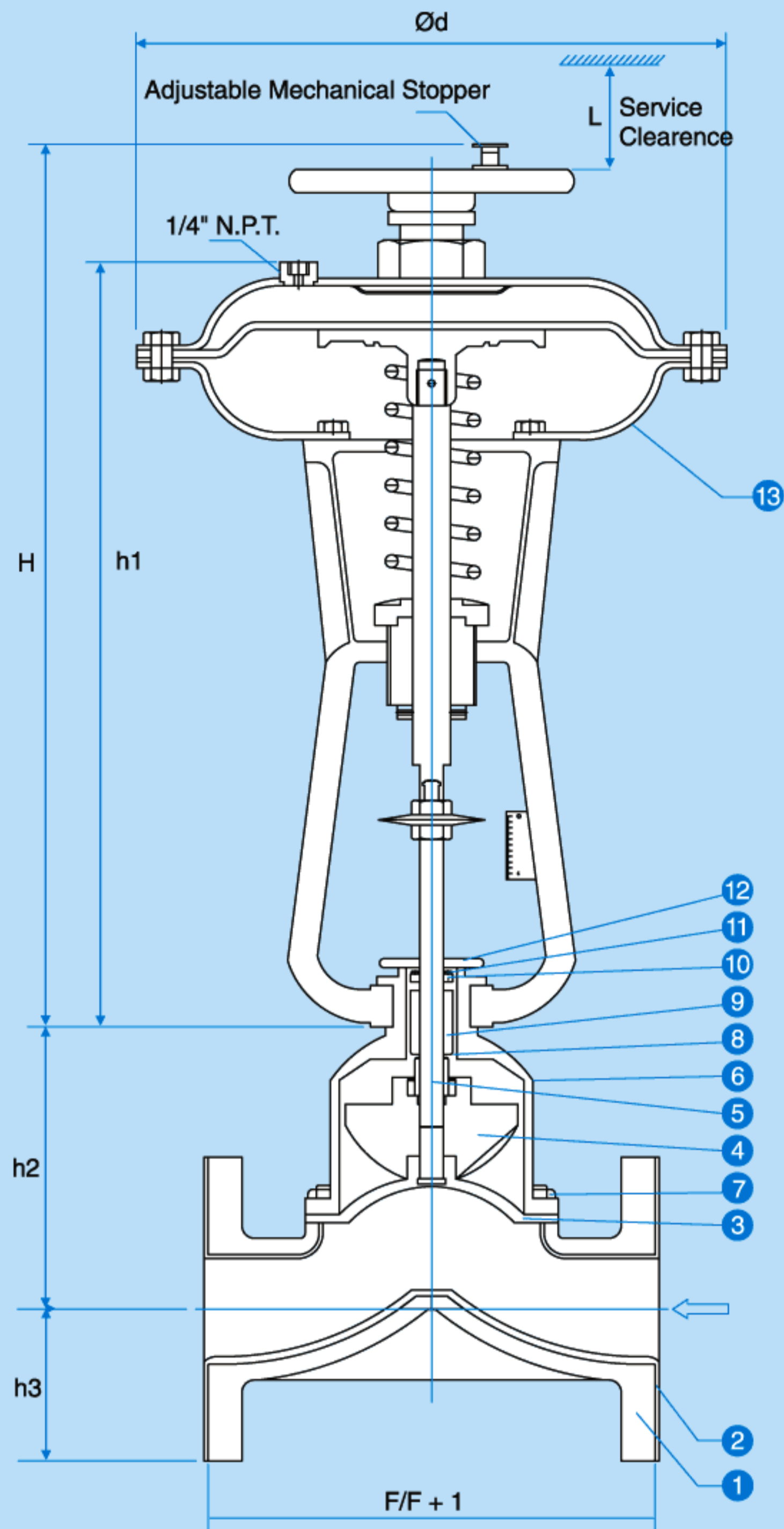
Body Size (Inches)	Travel	Cv			
		Unlined or Glass Lined		Rubber Lined	
		Teflon Diaphragm	Rubber Diaphragm	Teflon Diaphragm	Rubber Diaphragm
½"	5/16"	3	5	3	4
¾"	9/16"	5	10	4	7
1"	9/16"	10	15	9	11
1 ½"	¾"	22	40	20	30
2"	15/16" ¾"	32	55	30	50
2 ½"	1 ¼" - 15/16"	55	85	50	75
3"	1 ½"/1 ¼"	75	120	70	95
4"	45 mm 1 ½"	180	210	165	200
5"	55 mm / 45 mm	210	280	200	270
6"	70mm / 50 mm	280	370	270	350
8"	80 mm / 65 mm	480	650	450	620
10"	3 ½" / 70 mm	690	900	650	850
12"	3 ½" / 70 mm	Under Development			

**Note :** 1) In column 2 Smaller travel applicable for teflon diaphragms.  
2) Actual Cv may vary within ± 5% of above Values.

Grade	Polymer Type	General Application
D10 Natural Rubber	Natural Rubber Polyisoprene/SBR Sulphur cured & carbon black reinforced	Inorganic salt solutions, dilute mineral acids, alkalies & salts Abrasive services Not resistant to Oxidizing media, Oils or most organic solvents will attack it.
D15 White Natural Rubber	Natural Rubber Polyisoprene/SBR Sulphur cured & white reinforced	Food & pharmaceuticals, toothpaste, brewing, dairy
D20 EPDM	Ethylene Propylene Diene (EPDM) Organic peroxide cured, carbon black reinforced	Salts in water, acids & alkies, ozone, intermitten steam. black reinforced Sterilisation
D30 Butyl Rubber	Isobutylene Isoprene (IIR) Sulphur cured & carbon black reinforced	Dilute mineral acids & alkalies, gases, acids slurries, chlorine free hydrochloric acid, resistance to concentrated acids is good with some important exceptions as nitric or sulphuric acids
D40	Butadiene Acrylonitrile	Oily air, lubricating oil, cutting Nitrile oils, animal & vegetable oils, aviation kerosene, LPG Generally resistant to oils & solvents.
D50 Neoprene	Polychloroprene Non sulphur cured carbon black reinforced	Abrasive slurries containing hydrocarbons, oily air, natural gas, resistant to attack by ozone, sunlight, oils, gasoline, & aromatic or halogenated solvents but easily permeated by water
D60 Hypalon	Chlorosuphonated polyethylene Non sulphur cured carbon black reinforced	Outstanding resistance to ozone & oxidizing agents except black reinforced fuming nitric & sulfuric acids. Oil resistance is good. Dilute / Medium acids, sodium hypochlorite, chlorine gas
D70 Viton	Vinylidene fluoride-hexafluoro Propylene co-polymer Carbon black reinforced	Strong sulfuric acid, chlorine gas, oils, certain aromatic solvents
D9330 PTFE / EPDM	Virgin PTFE + Ethylene Propylene Diene Two piece Bayonet fitting	Strong acids, alkalies & salts in water at high temperature, Bio-pharmaceuticals
JD9370 PTFE / Viton	Virgin PTFE + Fluoroelastomer Two piece Bayonet fitting	Strong acids, solvents, chlorine bromine at higher temperature

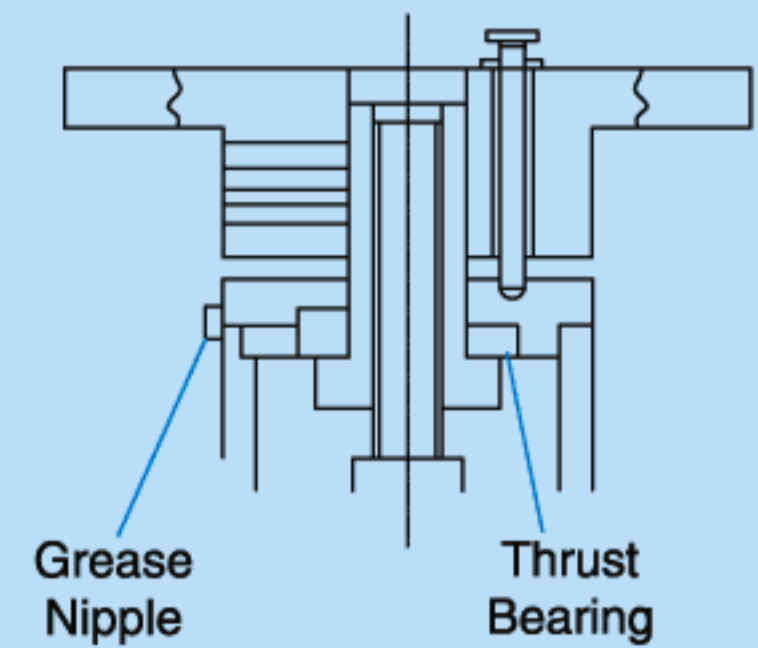
# Direct Acting Actuator

(Action Air to Close, Spring to Open)



(Figure 4)

This actuator is designed to operate from a normally open position. Air pressure on the top side of the actuator diaphragm closes the valve and the spring opens the valve when the air is released from the actuator. (Air failure valve opens). Light springs are generally used in these valves in order to achieve tight shut off against relatively high fluid pressure refer figure 4.



**NOTE:**

1. H= Height with top mounted handwheel
2. h1= Height without top mounted handwheel
3. AMS= Adjustable Mechanical opening stopper
4. The overall dimensions will vary + 50mm in all valve sizes
5. Dimensions for h3 as per ANSI 125 flanges.
6. F/F= Face to Face
7. Lining thickness 6 mm to 10 mm.
8. Open tolerance + 3 mm all over

Item No.	Parts	Material
1	Body	C.I.IS.210, GR. FG - 200
2	Lining	NEOPRENE / HYPALON
3	Diaphragm	NEOPRENE / HYPALON
4	Compressor	C.I.IS.210, GR. FG - 200
5	Stem	S.S AISI. 304, S.S AISI. 410
6	Bonnet	C.I.IS.210, GR. FG - 200
7	Bolts nuts	IS. 1363

Item No.	Parts	Material
8	Gland	M.S. IS. 2062
9	Gland Packing	ASBESTORS
10	Gland Bush	S.S. AISI - 304
11	Yoke Nut	M.S. IS - 2062
12	Gland Nut	M.S. IS - 2062
13	Actuator	PNEUMATIC DIAPHRAGM

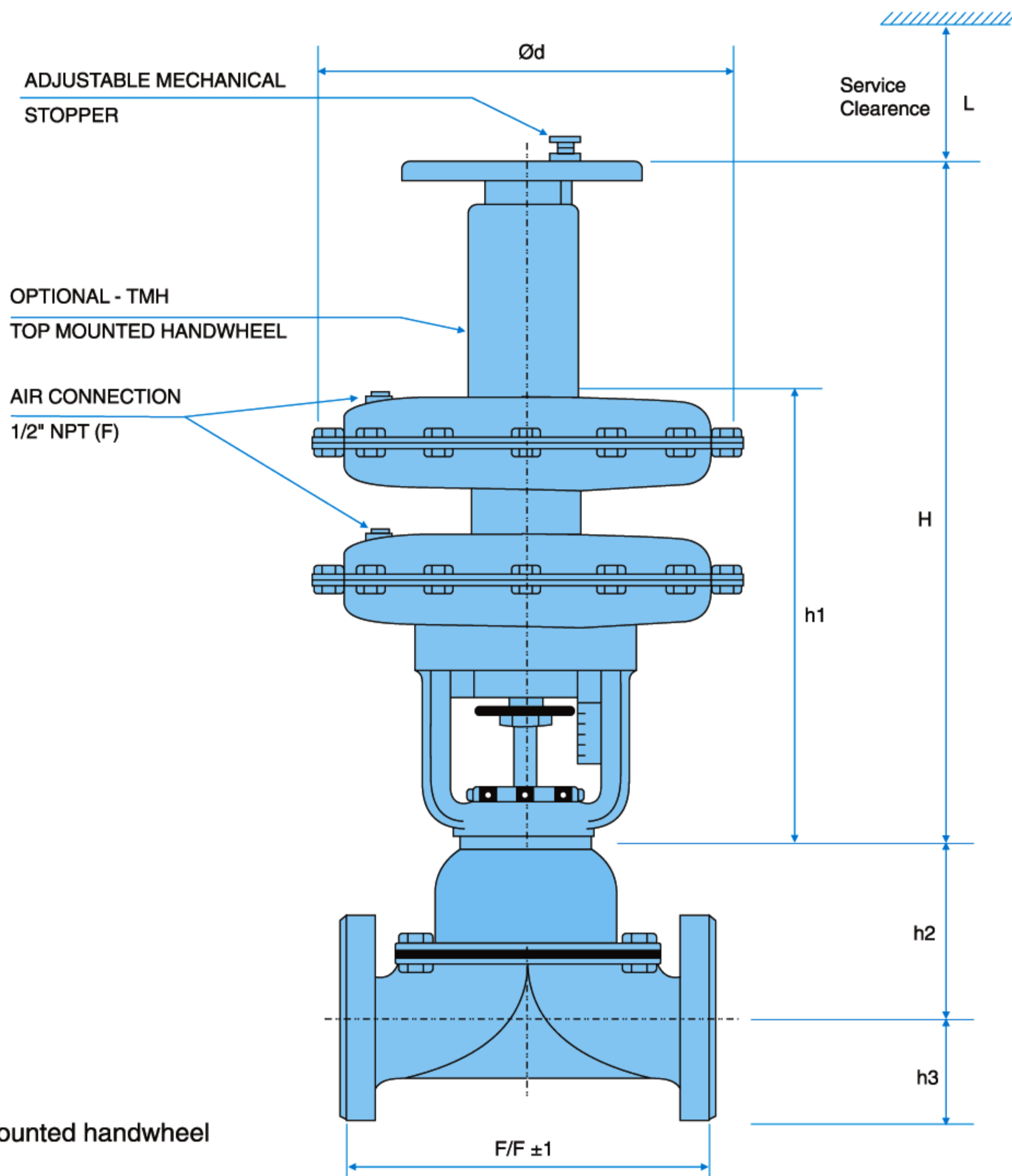
(Table 5)

Body Size		Model No.	Face to Face		h1	h2	h3	H	Ød	L	APPT 'WT'
MM	Inch		Unlined	Lined							
15	1/2	1862W/15/ATC/TMH	108	114	170	60	45	280	110	200	30
20	3/4	1862W/20/ATC/TMH	117	123	170	76	49	280	110	200	34
25	1	1862W/25/ATC/TMH	127	133	170	81	54	280	110	200	38
40	1.1/2	1862W/40/ATC/TMH	159	165	295	101	64	430	185	200	48
50	2	1862W/50/ATC/TMH	190	196	295	124	76	430	185	200	57
65	2.1/2	1862W/65/ATC/TMH	216	222	300	141	89	440	235	200	90
80	3	1862W/80/ATC/TMH	254	261	295	190	95	515	276	250	120
100	4	1862W/100/ATC/TMH	305	312	315	205	115	540	330	250	145
125	5	1862W/125/ATC/TMH	356	364	317	234	127	600	330	250	204
150	6	1862W/150/ATC/TMH	406	414	415	285	140	740	450	300	204
200	8	1862W/200/ATC/TMH	521	531	470	404	172	810	600	300	329
250	10	1862W/250/ATC/TMH	635	645	470	450	203	840	600	300	418
300	12	1862W/300/ATC/TMH	749	759	485	605	242	890	616	350	495
350	14	1862W/350/ATC/TMH	749	759	485	695	267	920	616	350	585

# Direct Acting Actuator

(Action Air to Close, Spring to Open)

Particularly used on larger valve sizes and where fluid pressure acts on both ends (i.e. 0%). Larger size Diaphragm Valves requires tremendous amount of thrust to close the valve. Actuator as large as 300 sq. in., effective area might not be adequate. Battery of two or three actuators are combined to achieve the desired thrust.



TMH = Top mounted handwheel

(Figure 5)

**NOTE:**

- AMS = Adjustable mechanical opening stopper.
- The overall dimensions will vary  $\pm 50\text{mm}$  in all valve sizes
- Dimensions for h3 as per ANSI 125 flanges.
- F/F = Face to Face

(Table 6)

Body Size		Model No.	Face to Face		h1	h2	h3	H	Ød	L	APPT 'WT'
MM	Inch		Unlined	Lined							
200	8	1862W/200/ATC/DD/TMH	521	531	690	405	172	1010	600	350	335
200	8	1862W/200/ATC/DD/TMH	521	531	705	405	172	1025	616	350	335
250	10	1862W/250/ATC/DD/TMH	635	645	690	450	203	1030	600	350	422
250	10	1862W/250/ATC/DD/TMH	635	645	705	450	203	1045	616	400	422
300	12	1862W/300/ATC/DD/TMH	749	759	705	605	242	1065	616	400	502
350	14	1862W/350/ATC/DD/TMH	749	759	735	695	267	1095	616	400	590

Dimensions for Double Diaphragm Actuator (TMH), (Action: Air to close).

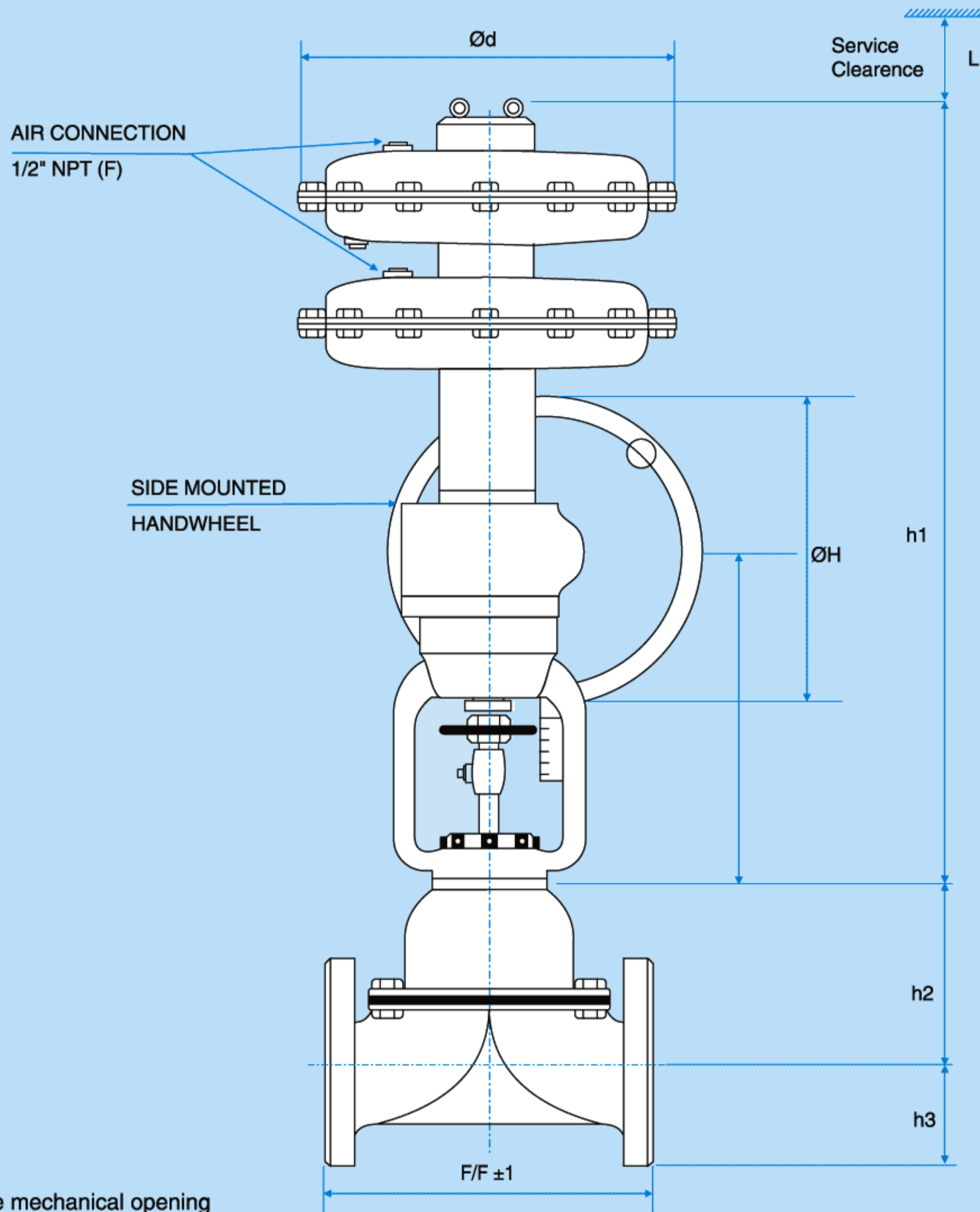
# Double Diaphragm Actuator (SMH)

(Action Air to Close, Spring to Open)

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Side mounted hand wheel (SMH) can be supplied as separate unit integral with the actuator. SMH involving large thrust loads are provided with worm and worm gear reduction. SMH can be locked in open position or closed as desired. These valves can be easily operated and maintained by the operator standing on the ground refer



(Figure 6)

**NOTE:**

1. AMS = Adjustable mechanical opening stopper.
2. The overall dimensions will vary  $\pm 50\text{mm}$  in all valve sizes
3. Dimensions for h3 as per ANSI 125 flanges.
4. F/F = Face to Face

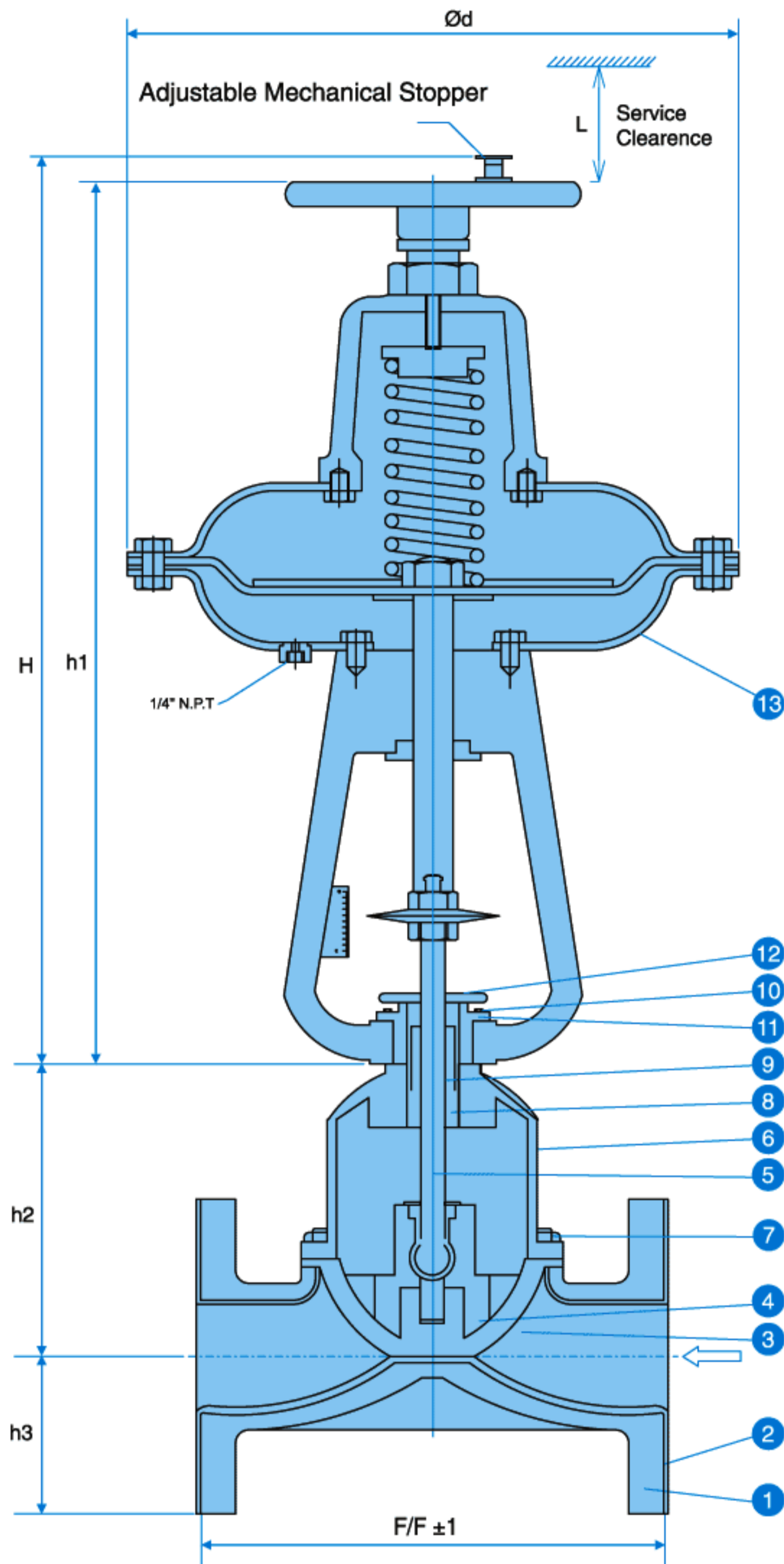
(Table 7)

Body Size		Model No.	Face to Face		h1	h2	h3	h4	ØH	Ød	L	APPT 'WT'
MM	Inch		Unlined	Lined								
200	8	1862W/200/ATC/DD/SMH	521	531	1050	405	172	410	380	600	300	335
200	8	1862W/200/ATC/DD/SMH	521	531	1115	405	172	410	380	616	300	335
250	10	1862W/250/ATC/DD/SMH	635	645	1050	450	203	410	380	600	300	422
250	10	1862W/250/ATC/DD/SMH	635	645	1115	450	203	410	380	616	300	422
300	12	1862W/300/ATC/DD/SMH	749	759	1115	605	242	410	380	616	300	502
350	14	1862W/350/ATC/DD/SMH	749	759	1115	695	267	410	380	616	300	590

Dimensions for Double Diaphragm Actuator (SMH), (Action: Air to close).

# Direct Acting Actuator

(Action Air to Open, Spring to Close)



(Figure 7)

Particularly used on larger valve sizes and where fluid pressure acts on both ends (i.e.0%). Larger size Diaphragm Valves requires tremendous amount of thrust to close the valve. Actuator as large as 300 sq. in., effective area might not be adequate. Battery of two or three actuators are combined to achieve the desired thrust.



**NOTE:**

1. H= Height with top mounted handwheel
2. h1= Height without top mounted handwheel
3. AMS= Adjustable Mechanical opening stopper
4. The overall dimensions will vary ±50mm in all valve sizes
5. Dimensions for h3 as per ANSI 125 flanges.
6. F/F= Face to Face
7. Lining thickness 6 mm to 10 mm.
8. Open tolerance + 3 mm all over

Item No.	Parts	Material
1	Body	C.I.IS.210, GR. FG - 200
2	Lining	NEOPRENE / HYPALON
3	Diaphragm	NEOPRENE / HYPALON
4	Compressor	C.I.IS.210, GR. FG - 200
5	Stem	S.S AISI. 304, S.S AISI. 410
6	Bonnet	C.I.IS.210, GR. FG - 200
7	Bolts Nuts	IS. 1363

Item No.	Parts	Material
8	Gland	M.S. IS. 2062
9	Gland Packing	ASBESTORS
10	Gland Bush	S.S. AISI - 304
11	Yoke Nut	M.S. IS - 2062
12	Gland Nut	M.S. IS - 2062
13	Actuator	PNEUMATIC DIAPHRAGM

(Table 8)

Body Size		Model No.	Face to Face		h1	h2	h3	H	Ød	L	APPT 'WT'
MM	Inch		Unlined	Lined							
15	1/2	1862W/15/ATO/TMH	108	114	430	70	45	470	185	200	39
20	3/4	1862W/20/ATO/TMH	117	123	430	86	49	470	185	200	44.2
25	1	1862W/25/ATO/TMH	127	133	430	96	54	470	185	200	49.4
40	1.1/2	1862W/40/ATO/TMH	159	165	430	101	64	470	185	200	62.4
50	2	1862W/50/ATO/TMH	190	196	450	124	76	490	235	200	74.1
65	2.1/2	1862W/65/ATO/TMH	216	222	450	141	89	490	235	250	117
80	3	1862W/80/ATO/TMH	254	261	530	190	96	580	276	250	156
100	4	1862W/1 00/ATO/TMH	305	312	620	205	115	670	330	6300	188.5
125	5	1862W/1 25/ATO/TMH	356	364	680	234	127	730	330	300	265.2
150	6	1862W/1 50/ATO/TMH	406	414	910	285	140	990	450	300	265.2
200	8	1862W/200/ATO/TMH	521	531	1010	404	172	1120	600	350	427.7
250	10	1862W/250/ATO/TMH	635	645	1150	450	203	1300	616	350	543.4

Dimensions for Reverse Acting Actuator (Action: Air to open).

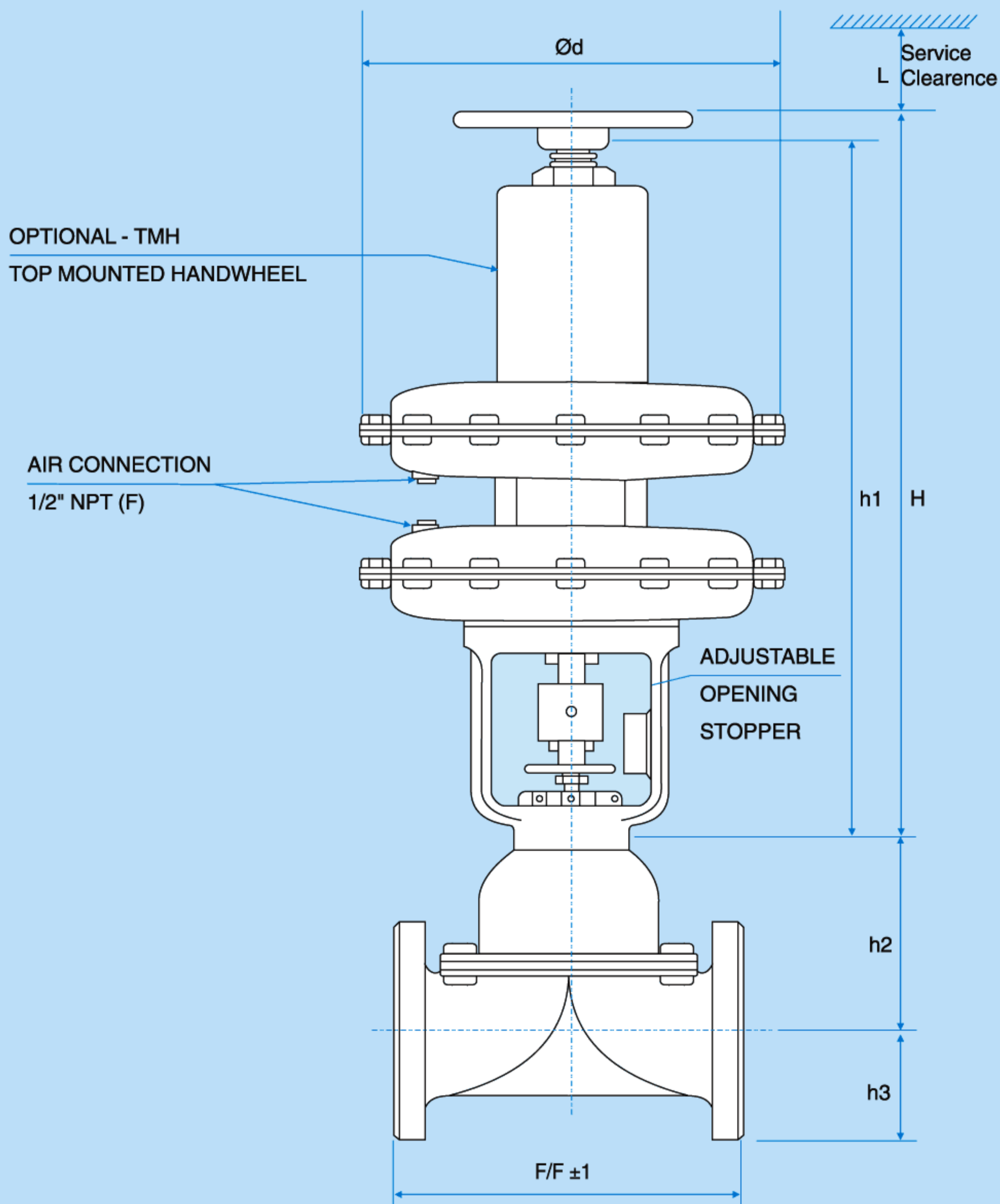
# Double Diaphragm Actuator

(Action Air to Open, Spring to Close)

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1860SERIES

Particularly used where fluid pressure acts at both ends (i.e. 0%). The larger size Diaphragm Valves requires tremendous amount of thrust to close the valve. Actuator as large as 300 sq. in. effective area might not be adequate. Battery of two or three actuators are combined to achieve the desired thrust



(Figure 8)

(Table 9)

Body Size		Model No.	Face to Face		h1	h2	h3	H	Ød	L	APPT 'WT'
MM	Inch		Unlined	Lined							
200	8	1862W/200/ATO/DD/TMH	521	531	1180	405	172	1290	600	500	335
200	8	1862W/200/ATO/DD/TMH	521	531	1190	405	172	1300	616	500	335
250	10	1862W/250/ATO/DD/TMH	635	645	1200	450	203	1320	600	500	422
250	10	1862W/250/ATO/DD/TMH	635	645	1215	450	203	1335	616	500	422
300	12	1862W/300/ATO/DD/TMH	749	759	1250	605	242	1360	616	500	502
350	14	1862W/350/ATO/DD/TMH	749	759	1270	695	267	1380	616	500	590

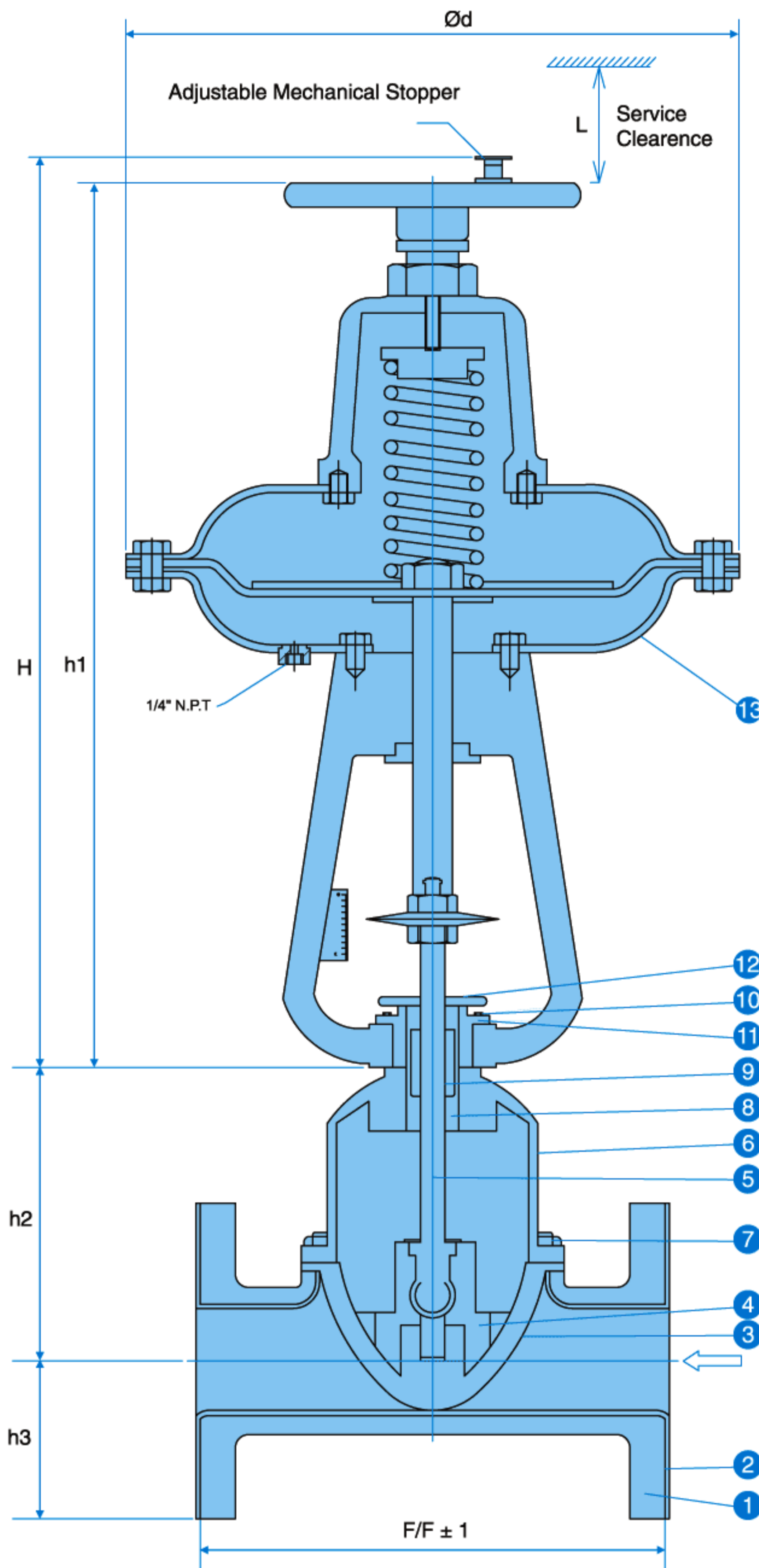
Dimensions for Double Diaphragm Actuator (Action: Air to open)

# Straight Through 'ST' Type Diaphragm Valve

## Normally Close

SUDE

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(Figure 10)

Item No.	Parts	Material
1	BODY	C.I.IS.210, GR. FG - 200
2	LINING	NEOPRENE / HYPALON
3	DIAPHRAGM	NEOPRENE / HYPALON
4	COMPRESSOR	C.I.IS.210, GR. FG - 200
5	STEM	S.S AISI. 304, S.S AISI. 410
6	BONNET	C.I.IS.210, GR. FG - 200
7	BOLTS NUTS	IS. 1363
8	GLAND	M.S. IS. 2062
9	GLAND PACKING	ASBESTORS
10	GLAND BUSH	S.S. AISI - 304
11	YOKE NUT	M.S. IS - 2062
12	GLAND NUT	M.S. IS - 2062
13	ACTUATOR	PNEUMATIC DIAPHRAGM

**NOTE:**

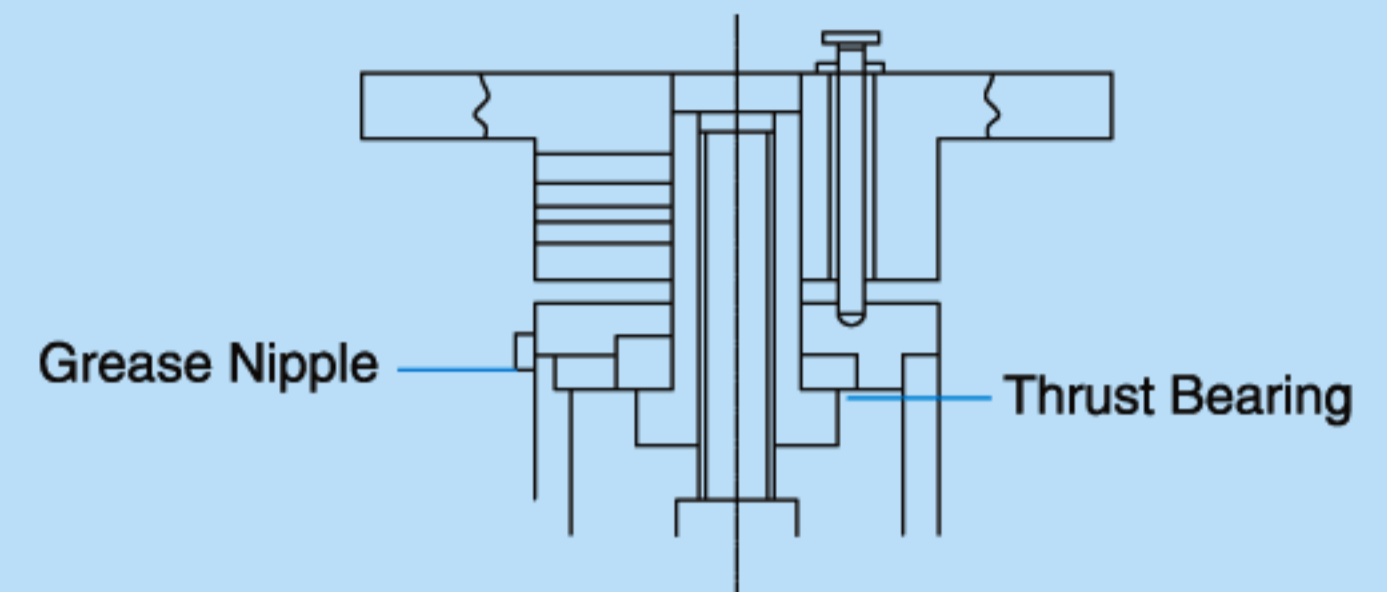
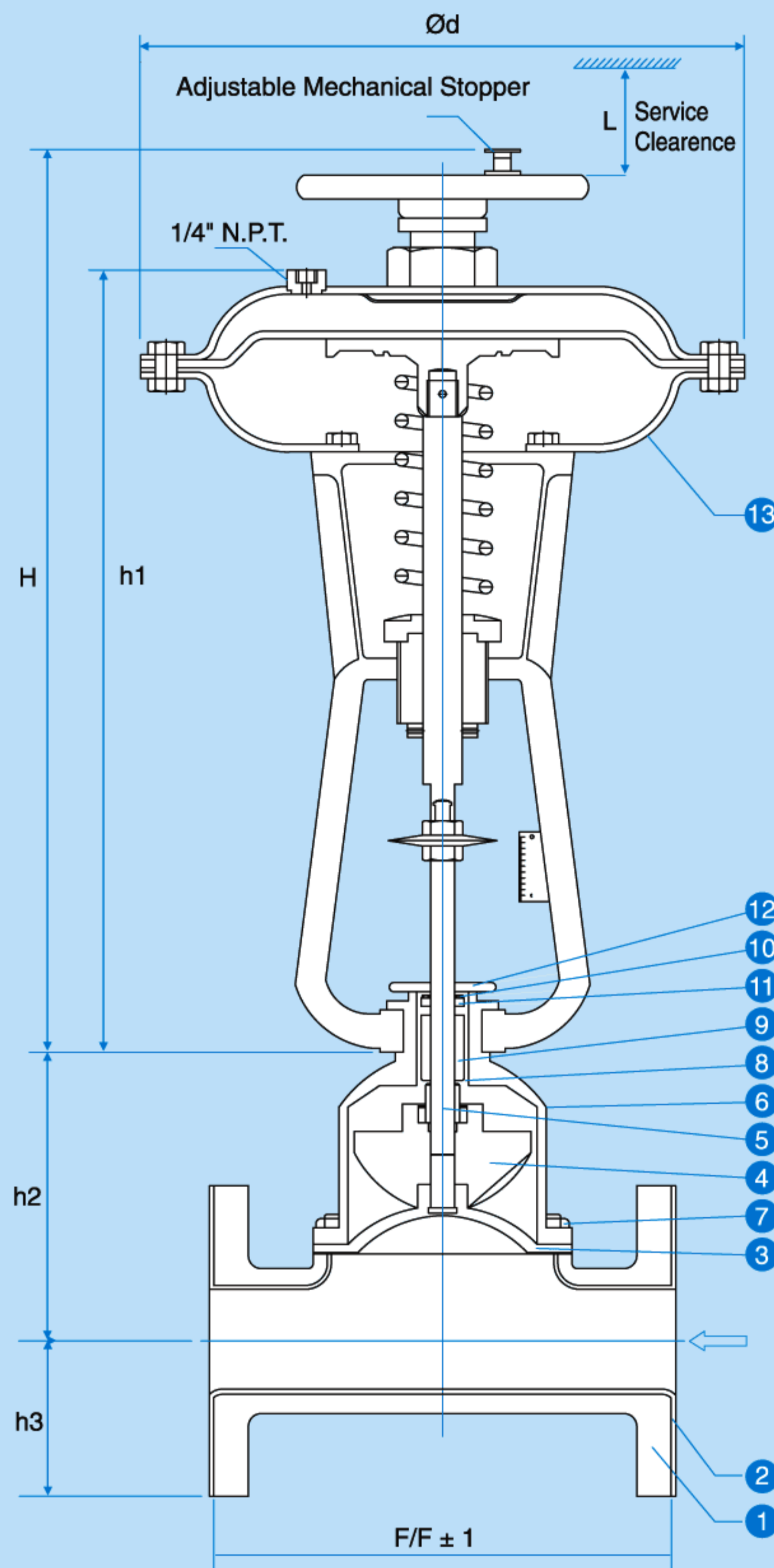
- H= Height with top mounted handwheel
- h1= Height without top mounted handwheel
- AMS= Adjustable Mechanical opening stopper
- The overall dimensions will vary + 50mm in all valve sizes
- Dimensions for h3 as per ANSI 125 flanges.
- F/F= Face to Face
- Lining thickness 6 mm to 10 mm.
- Open tolerance + 3 mm all over

(Table 11)

Body Size		Model No.	Face to Face		h1	h2	h3	H	Ød	L	APPT 'WT'
MM	Inch		Unlined	Lined							
15	1/2	1862S/15/ATC/TMH	108	114	430	70	45	470	185	200	50.7
20	3/4	1862S/20/ATC/TMH	117	123	430	86	49	470	185	200	57.4
25	1	1862S/25/ATC/TMH	127	133	430	96	54	470	185	200	64.2
40	1.1/2	1862S/40/ATC/TMH	159	165	430	101	64	470	185	200	81.1
50	2	1862S/50/ATC/TMH	190	196	450	124	76	490	235	200	96.3
65	2.1/2	1862S/65/ATC/TMH	216	222	450	141	89	490	235	250	152.1
80	3	1862S/80/ATC/TMH	254	261	530	190	95	580	276	250	202.8
100	4	1862S/100/ATC/TMH	305	312	620	205	115	670	330	300	245
125	5	1862S/125/ATC/TMH	356	364	680	234	127	730	330	300	344.7
150	6	1862S/150/ATC/TMH	406	414	910	285	140	990	450	300	344.7
200	8	1862S/200/ATC/TMH	521	531	1010	404	172	1120	600	350	556
250	10	1862S/250/ATC/TMH	635	645	1150	450	203	1300	616	350	706.4

Dimensions for Straight through Type Diaphragm Actuator ( Air to Open)

# Straight Through 'ST' Type Diaphragm Valve Normally Open



Item No.	Parts	Material
1	BODY	C.I.IS.210, GR. FG - 200
2	LINING	NEOPRENE / HYPALON
3	DIAPHRAGM	NEOPRENE / HYPALON
4	COMPRESSOR	C.I.IS.210, GR. FG - 200
5	STEM	S.S AISI. 304, S.S AISI. 410
6	BONNET	C.I.IS.210, GR. FG - 200
7	BOLTS NUTS	IS. 1363
8	GLAND	M.S. IS. 2062
9	GLAND PACKING	ASBESTORS
10	GLAND BUSH	S.S. AISI - 304
11	YOKE NUT	M.S. IS - 2062
12	GLAND NUT	M.S. IS - 2062
13	ACTUATOR	PNEUMATIC DIAPHRAGM

**NOTE:**

- H= Height with top mounted handwheel
- h1= Height without top mounted handwheel
- AMS= Adjustable Mechanical opening stopper
- The overall dimensions will vary + 50mm in all valve sizes
- Dimensions for h3 as per ANSI 125 flanges.
- F/F= Face to Face
- Lining thickness 6 mm to 10 mm.
- Open tolerance + 3 mm all over

(Figure 11)

(Table 12)

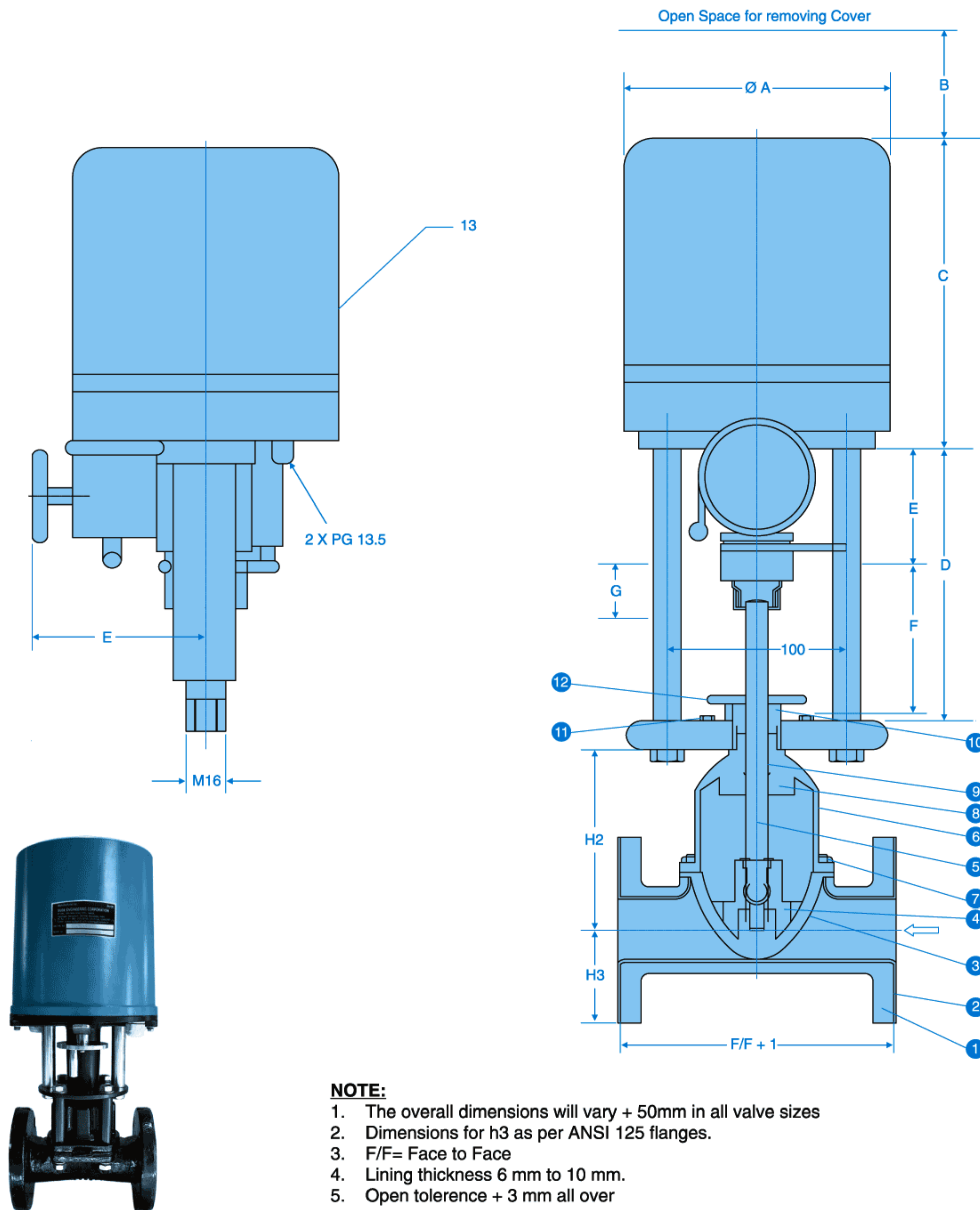
Body Size		Model No.	Face to Face		h1	h2	h3	H	Ød	L	APPT 'WT'
MM	Inch		Unlined	Lined							
15	1/2	1862W/15/ATO/TMH	108	114	170	60	45	280	110	200	39
20	3/4	1862W/20/ATO/TMH	117	123	170	76	49	280	110	200	44.2
25	1	1862W/25/ATO/TMH	127	133	170	81	54	280	110	200	49.4
40	1.1/2	1862W/40/ATO/TMH	159	165	295	101	64	430	185	200	62.4
50	2	1862W/50/ATO/TMH	190	196	295	124	76	430	185	200	74.1
65	2.1/2	1862W/65/ATO/TMH	216	222	300	141	89	440	235	200	117
80	3	1862W/80/ATO/TMH	254	261	295	190	95	515	276	250	156
100	4	1862W/100/ATO/TMH	305	312	315	205	115	540	330	250	188.5
125	5	1862W/125/ATO/TMH	356	364	317	234	127	600	330	250	265.2
150	6	1862W/150/ATO/TMH	406	414	415	285	140	740	450	300	265.2
200	8	1862W/200/ATO/TMH	521	531	470	404	172	810	600	300	427.7
250	10	1862W/250/ATO/TMH	635	645	470	450	203	840	600	300	543.4
300	12	1862W/300/ATO/TMH	749	759	485	605	242	890	616	350	643.5
350	14	1862W/350/ATO/TMH	749	759	485	695	267	920	616	350	760.5

Dimensions for Straight through type Diaphragm Actuator (Air to Close)

# 2 Way **Straight Through 'ST' Type Diaphragm Valve** Fitted with Single Phase Linear **Electric Actuator**

SUDE

**1825SERIES**



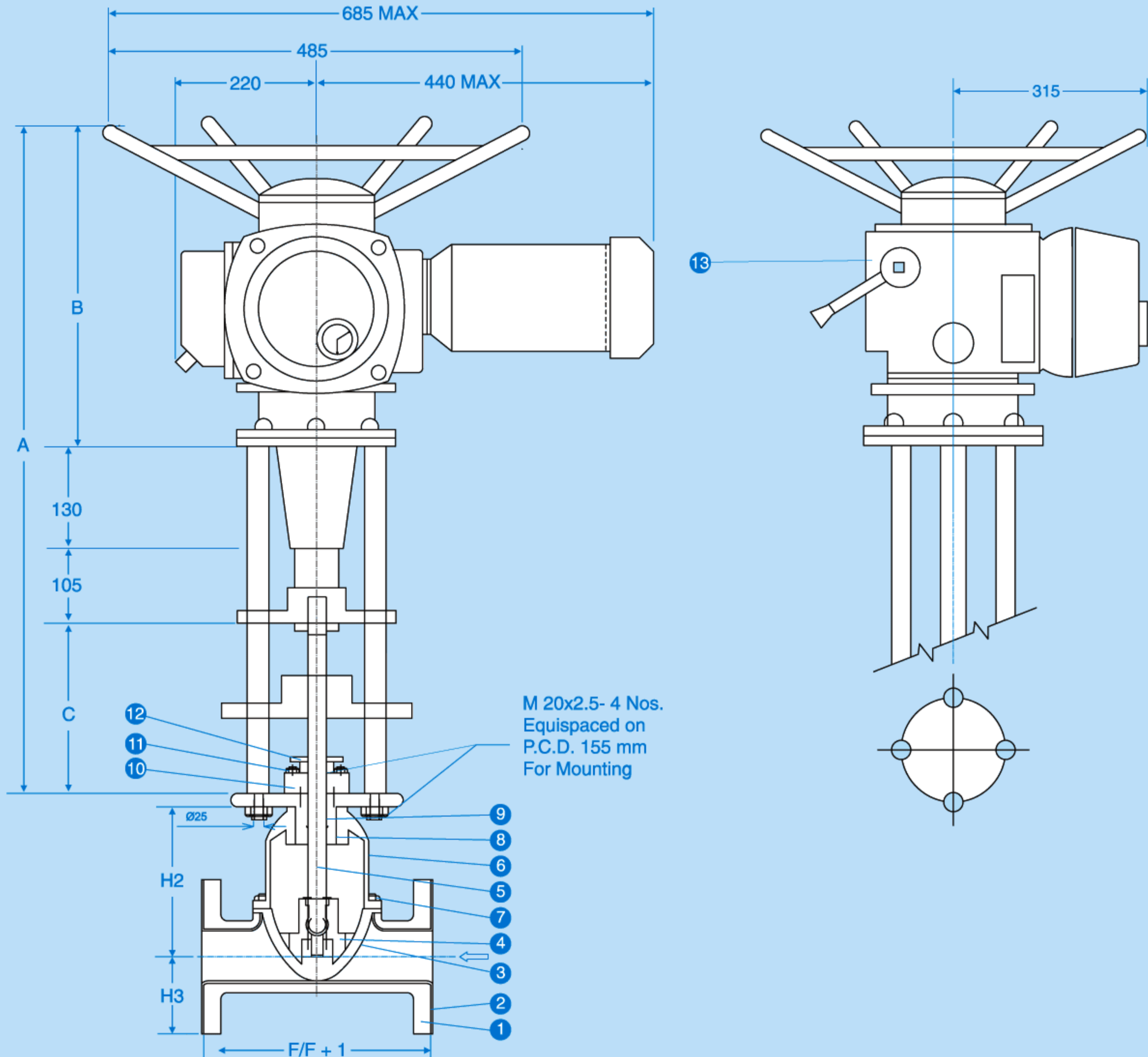
Item No.	Parts	Material
1	Body	C.I.IS.210, GR.FG - 200
2	Lining	NEOPRENE / HYPALON
3	Diaphragm	NEOPRENE / HYPALON
4	Compressor	C.I.IS.210, GR.FG - 200
5	Stem	S.S. AISI.304, S.S. AISI. 410
6	Bonnet	C.I.IS.210, GR.FG - 200
7	Bolts Nuts	IS. 1363

Item No.	Parts	Material
8	Gland	M.S.IS.2062
9	Gland Packing	ASBESTORS
10	Gland Bush	S.S.AISI - 304
11	Yoke Nut	M.S.IS - 2062
12	Gland Nut	M.S.IS - 2062
13	Linear Type Single Phase Electric Actuator	

Body Size	Model No.	A	B	C	D	E	F	G	H	Face to Face		H2	H3	Appt. 'Wt'	Operating Time in mm/sec.				
										Unlined	Lined								
15	1852S/15/2000-200	165	160	200	245	115	130	40/60	100	108	114	70	45	10	0.26 - 0.52				
20	1852S/20/2000-200									117	123					86	49	10.5	
25	1852S/25/2000-200	210	200	250	245	115	130	60/75	133	127	133	96	54	17.5	0.26 - 0.52				
40	1852S/40/2000-200									159	165					101	64	23	0.8 - 0.45
50	1852S/50/2000-200									190	196					124	76	26.5	0.8 - 0.45

# 2 Way **Straight Through 'ST' Type Diaphragm Valve** Fitted With **Three Phase Linear Electric Actuator**

SUDE **1825SERIES**



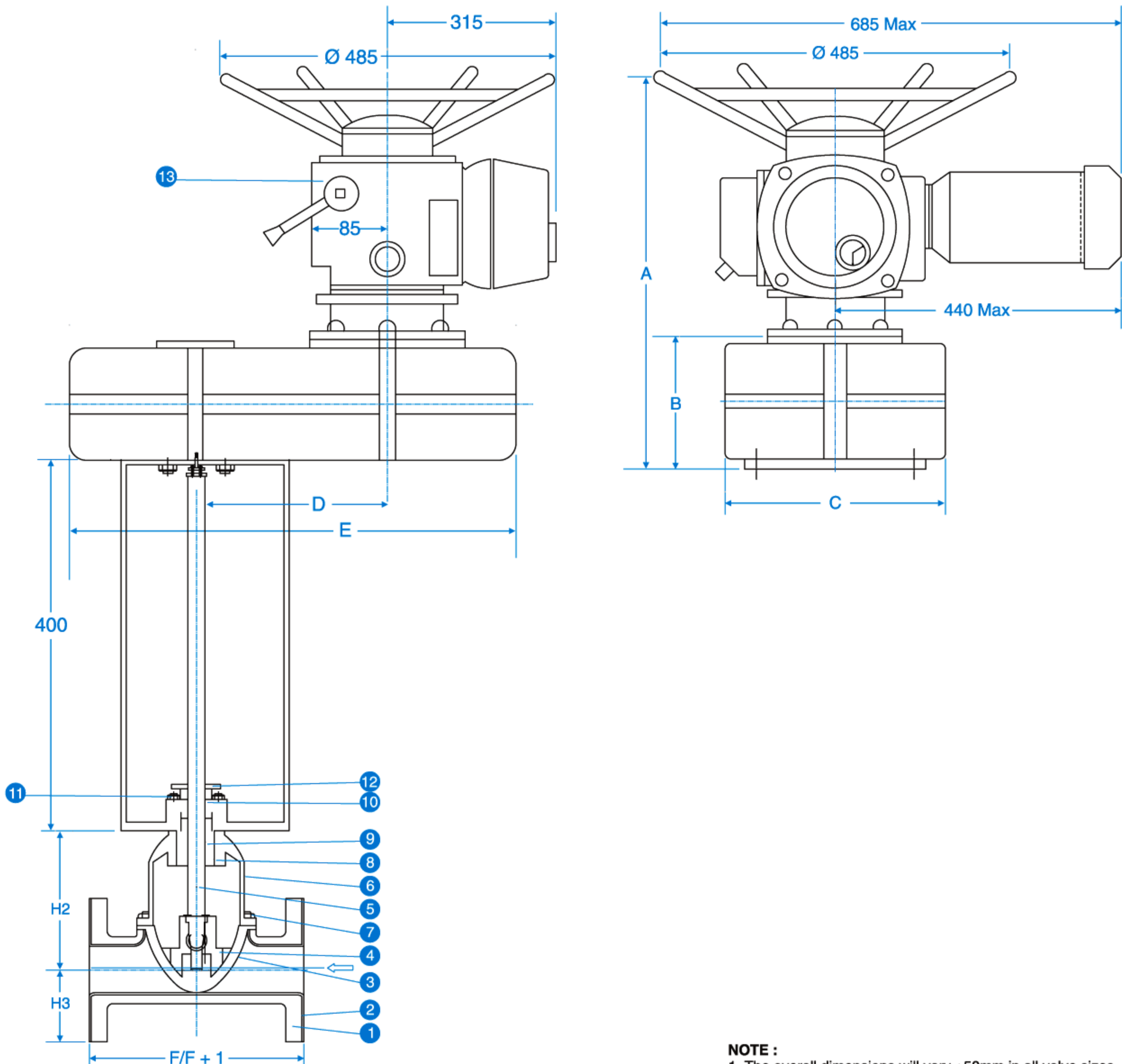
Item No.	Parts	Material
1	Body	C.I.IS.210, GR.FG - 200
2	Lining	NEOPRENE / HYPALON
3	Diaphragm	NEOPRENE / HYPALON
4	Compressor	C.I.IS.210, GR.FG - 200
5	Stem	S.S. AISI.304, S.S. AISI. 410
6	Bonnet	C.I.IS.210, GR.FG - 200
7	Bolts Nuts	IS. 1363

Item No.	Parts	Material
8	Gland	M.S.IS.2062
9	Gland Packing	ASBESTORS
10	Gland Bush	S.S.AISI - 304
11	Yoke Nut	M.S.IS - 2062
12	Gland Nut	M.S.IS - 2062
13	Linear Type Three Phase Electric Actuator	

Body Size		Model No.	A	B	C	Face to Face		H2	H3	Appt. 'Wt'	Operating Time in mm/sec.
MM	Inch					Unlined	Lined				
65	2 1/2	1852S/65/6000-3000	790	340	165	216	222	141	89	101	1.0-36.5
80	3	1852S/80/6000-3000				254	261	190	96	108	1.0-36.5
100	4	1852S/100/6000-3000	923	448	190	305	312	205	115	137	1.0-12.0

# 2 Way **Straight Through 'ST' Type Diaphragm Valve** Fitted with Three Phase Linear **Electric Actuator**

**SUDE** **1825SERIES**



**NOTE :**

1. The overall dimensions will vary +50mm in all valve sizes
2. Dimensions for H3 as per ANSI 125 flanges.
3. F/F = Face to Face
4. Lining thickness 6 mm to 10 mm.
5. Open tolerance +3mm all over

Item No.	Parts	Material
1	Body	C.I.IS.210, GR.FG - 200
2	Lining	NEOPRENE / HYPALON
3	Diaphragm	NEOPRENE / HYPALON
4	Compressor	C.I.IS.210, GR.FG - 200
5	Stem	S.S. AISI.304, S.S. AISI. 410
6	Bonnet	C.I.IS.210, GR.FG - 200
7	Bolts Nuts	IS. 1363

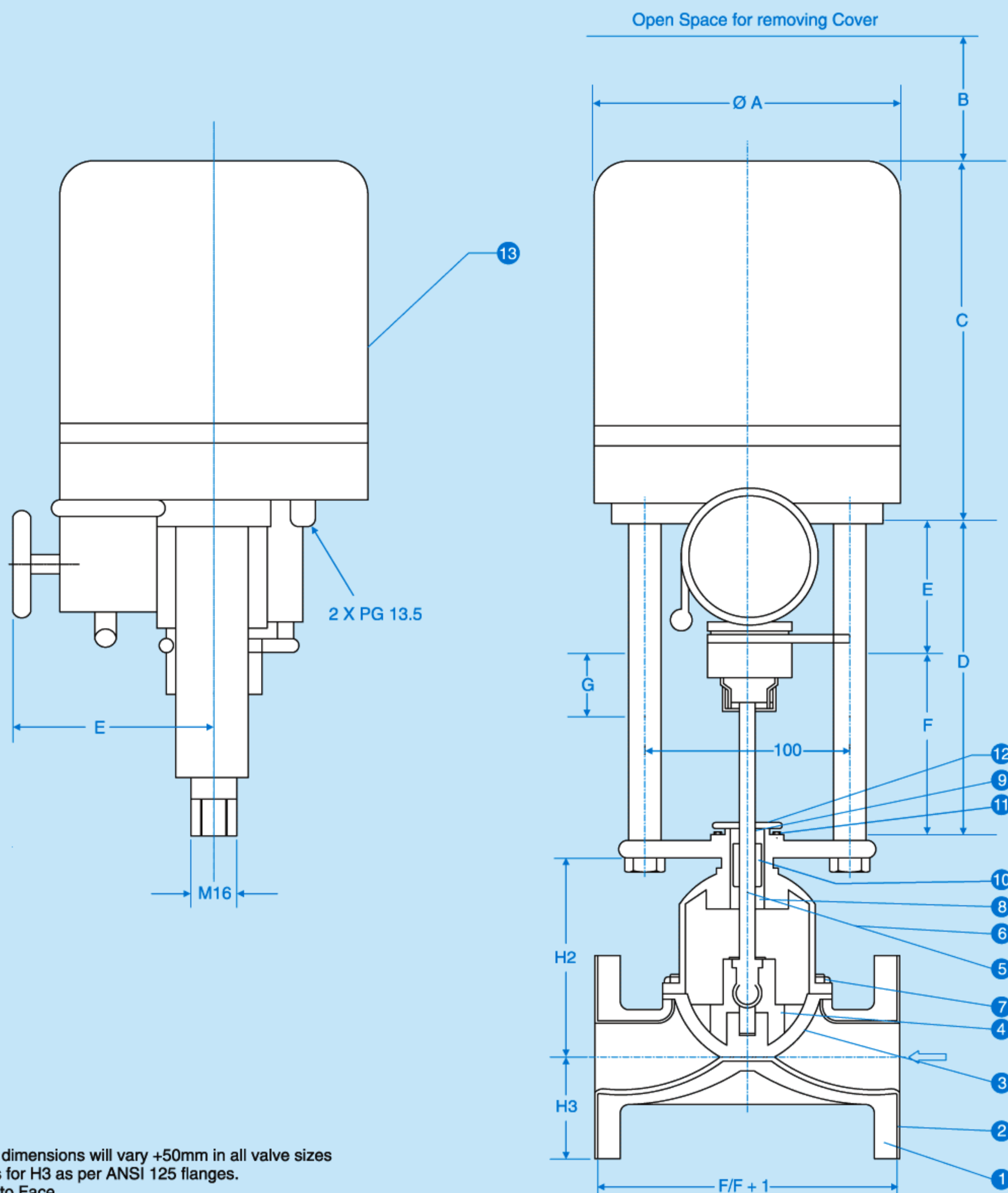
Item No.	Parts	Material
8	Gland	M.S.IS.2062
9	Gland Packing	ASBESTORS
10	Gland Bush	S.S.AISI - 304
11	Yoke Nut	M.S.IS - 2062
12	Gland Nut	M.S.IS - 2062
13	Linear Type Single Phase Electric Actuator	

Body Size		Model No.	A	B	C	E	Face to Face		H2	H3	Appt. 'Wt'	Operating Time in mm/sec.	
MM	Inch						Unlined	Lined				O/P Speed of Basic Actuator	Effective O/P Speed with SG
150	6	1852S/150/3000-20SG04	670	142	258	530	406	414	285	140	251	10 - 120	2.5 - 30
200	8	1852S/200/3000-20SG06	695	165	380	610	521	531	404	172	350	10 - 120	1.66 - 20
250	10	1852S/250/3000-20SG08	695	165	380	604	635	645	450	203	-	10 - 120	1.25 - 15

# 2 Way Weir 'W' Type Diaphragm Valve

## Fitted with Single Phase Linear Electric Actuator

SUDE 1825SERIES



**NOTE :**

1. The overall dimensions will vary +50mm in all valve sizes
2. Dimensions for H3 as per ANSI 125 flanges.
3. F/F = Face to Face
4. Lining thickness 6 mm to 10 mm.
5. Open tolerance +3mm all over

Item No.	Parts	Material
1	Body	C.I.IS.210, GR.FG - 200
2	Lining	NEOPRENE / HYPALON
3	Diaphragm	NEOPRENE / HYPALON
4	Compressor	C.I.IS.210, GR.FG - 200
5	Stem	S.S. AISI.304, S.S. AISI. 410
6	Bonnet	C.I.IS.210, GR.FG - 200
7	Bolts Nuts	IS. 1363

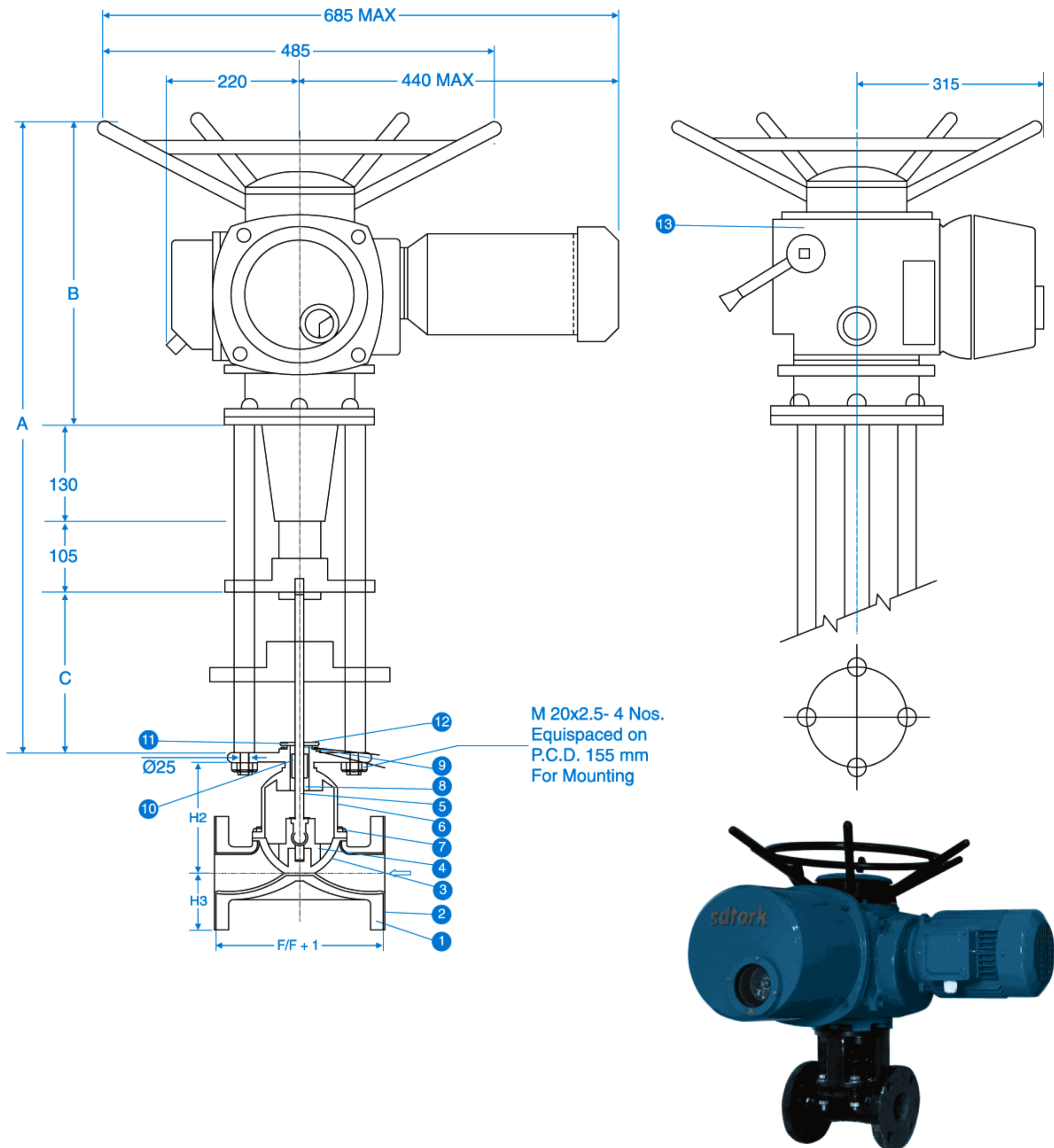
Item No.	Parts	Material
8	Gland	M.S.IS.2062
9	Gland Packing	ASBESTORS
10	Gland Bush	S.S.AISI - 304
11	Yoke Nut	M.S.IS - 2062
12	Gland Nut	M.S.IS - 2062
13	Linear Type Single Phase Electric Actuator	

Body Size	Model No.	A	B	C	D	E	F	G	H	Face to Face		H2	H3	Appt. 'Wt'	Operating Time in mm/sec.
										Unlined	Lined				
15	1852W/15/2000-200	165	160	200	245	115	130	40/60	100	108	114	70	45	10	0.26 - 0.52
20	1852W/20/2000-200									117	123				
25	1852W/25/2000-200									127	133				
40	1852W/40/2000-600	210	200	250	245	115	130	60/75	133	159	165	101	64	23	0.8 - 0.45
50	1852W/50/2000-600									190	196				
65	1852W/65/2000-600									216	222				
80	1852W/80/2000-600									254	261				

# 2 Way Weir 'W' Type Diaphragm Valve

Fitted With Three Phase Linear Electric Actuator

SUDE 1825SERIES



Item No.	Parts	Material
1	Body	C.I.IS.210, GR.FG - 200
2	Lining	NEOPRENE / HYPALON
3	Diaphragm	NEOPRENE / HYPALON
4	Compressor	C.I.IS.210, GR.FG - 200
5	Stem	S.S. AISI.304, S.S. AISI. 410
6	Bonnet	C.I.IS.210, GR.FG - 200
7	Bolts Nuts	IS. 1363

Item No.	Parts	Material
8	Gland	M.S.IS.2062
9	Gland Packing	ASBESTORS
10	Gland Bush	S.S.AISI - 304
11	Yoke Nut	M.S.IS - 2062
12	Gland Nut	M.S.IS - 2062
13	Linear Type Three Phase Electric Actuator	

Body Size		Model No.	A	B	C	Face to Face		H2	H3	Appt. 'Wt'	Operating Time in mm/sec.
MM	Inch					Unlined	Lined				
100	4	1852W/100/6000-3000	790	340	165	305	312	205	115	127	1.0-36.5
150	6	1852W/150/6000-3000				406	414	285	140	134	1.0-36.5
200	8	1852W/200/6000-4000	923	448	190	406	414	285	140	142	1.0-12.0
250	10	1852W/250/6000-4000				406	414	285	140	147	1.0-12.0

## Cylinder operated Diaphragm Valve:

Cylinder actuators are either single or double acting type and are generally used wherever air supply pressure available is more. Double acting cylinder is generally preferred when fail safe position calls for stay put operation with air lock relay or for heavy duty operation refer figure 12.



Figure 12



Figure 13

## Diaphragm Actuator for Throttling Application:

The actuator can be equipped with Valve Positioner and actuator spring with standard spring range to achieve positioner Accuracy refer figure 13.

## Various types of lining for Weir type Diaphragm Valves

### 1. Ebonite-Hard rubber lining :

Natural rubber Ebonite, Sulphur cured. Highly suitable for inorganic bases, salts, hydrochloric acid, metal plating solutions, photographic developers, and water chlorinated moist chlorine refer figure 14.

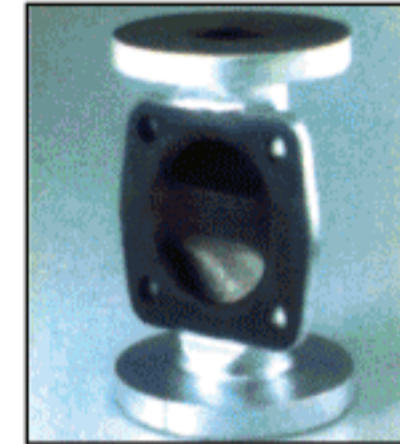


Fig 14. Ebonite rubber lined



Figure 15. Halar Lining

### 2. Halar Lining: (Ethylene chlorotrifluoroethylene)

Resists many industrial chemicals and additionally protects the exposed parts of valve bodies to cut-out painting. Excellent resistance to mineral and oxidizing acids, inorganic basis, salts refer figure 15.

### 3. Glass Lining:

Purity, smooth flow (specially on viscous fluids) with great strength and resistance to chemical attack. Excellent for strong mineral acids, halogens refer figure 16.



Figure 16. Glass Lining



Figure17. PVDF Line

### 4. PVDF (Polyvinylidene fluoride):

PVDF is high molecular weight polymer of vinylidene fluoride. It is mechanically strong, thermally stable and resistant to most inorganic acids and bases-for high performance without exotic material costs refer figure 17.

### 5. PFA lining (Perfluoro Alkoxy):

High performance fluorocarbon lining is resistant to heat and stress cracking and its moisture absorption is negligible. Combines strength and abrasion resistance for long service. PFA has good mechanical and physical properties at high temperatures. It is capable of resisting strong acid attack and can operate at 200°C refer figure 18.



Figure18. PFA lining



Figure 19. Polypropylene Lined

### 6. Polypropylene lining (PP):

PP is a general purpose lining with particular applications for water treatment, effluent lines, especially hot effluent from dyestuffs, chemical processing etc. This material has an ultra high heat stable copolymer refer figure 19.

### 7. Unlined Valves:

are used basically for high Temperature application and some time even For food grade application in those cases SS316 L body is preferred in combination with EPDM diaphragm refer figure 20.



Figure 20. Unlined Valves:



Figure 21. General Rubber lined valves:

### 8. General Rubber lined valves:

Based on the Application some of the lining as explained Above may not be suitable technically or Commercially too, in such cases we apply the lining of valve with soft natural rubber, hard natural rubber, butyl rubber, neoprene rubber and hypalon rubber refer figure 21.



## OUR OTHER PRODUCTS:

- Solenoid Valves.
- Pneumatically operated control Valves.
- Motorised Valves.
- Pneumatic & Electric Operated Ball / Butterfly valves.
- Pneumatic & Motorised Dampers.
- Pneumatic & Motorised VIV Dampers.
- Heavy duty – Single Phase & Three Phase actuators for operating Gates & chutes.
- Motorised Rising & Non-rising Sluice valve.
- Pneumatic & Motorised pinch valve.
- Pneumatic & Motorised Flush Bottom valve.
- Entire range of Electrical Actuator.
- And Instrumentation Product likes Pressure Transmitter, PID Controller, Flow meter etc., for System Integration.

**NOTE :** TECHNICAL SPECIFICATIONS, DETAILS & DIMENSIONS ARE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE. DIMENSIONS IN THE TABLE ARE APPROXIMATE SUBJECT TO FINAL CONFIRMATION BY SUDE.

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**SUDE**  
An ISO 9001:2008 Certified Company

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