

DIAPHRAGM CONTROL VALVE

INTRODUCTION

The Diaphragm Valve is essentially a simple pinch clamp, closed by pressing a flexible diaphragm against transverse weir, when fully closed, the diaphragm seats against the weir providing a leak tight closure.

The diaphragm valves are recommended for handling sticky and viscous fluids, slurries and highly corrosive and hazardous substances and other hard to handle mediums or where tight closure is prime factor. It is the most ideal valve to handle fluids that require high purity and should remain free from contamination.

The Diaphragm Valve is a simple pinch type valve and of low pressure type because of large area of diaphragm and is extensively used for both On/Off and throttling services and finds its application in Waste & Water Treatment Plants, Filtration Plants, Chlorination Plants etc

SPECIFICATIONS

| | |
|------------------------------|--|
| DESIGN | : Confirm to BS - 5156 |
| BODY TYPE | : Weir (Rubber Lined - Series 410) (Unlined - Series 430) (PFA Lined - Series 440) |
| VALVE SIZE | : 15mm to 200mm (1/ 2" to 8") |
| END CONNECTION | : ANSI B 16.1 Class 150 |
| BODY MATERIAL | : Cast Iron (IS 210 grade FG 200) Cast Steel, Other alloys on request. |
| LINING MATERIAL | : Ebonite, PVDF, PFA, PP, EPDM, Glass etc. |
| LINING HARDNESS | : Ebonite-95° ± 5 Shore A Natural/Neo Rubber-55° ± 5 Shore A PTFE-Rockwell/Shore R100 D78 or D62 Glasslining & FRP-Parcol Parcol 40 Respectively. |
| LINING THICKNESS | : 15 to 65 mm Valve - 3.0 mm 80 to 100 mm Valve - 3.5 mm 125 to 150 mm Valve - 4.0 mm 200 to 300 mm Valve - 5.0 mm PTFE Coating Thickness – 800 micron, Glass Lining – 1.5 m. |
| BODY DIAPHRAGM | : Neoprene, PTFE Backed with Neoprene Butyl, Viton, Hyplon, Nitrile, EPDM. |
| LEAKAGE RATE | : As per ANSI B 16.104 Class VI (100% Leak tight.) |
| TEMPERATURE | : - 30°C to 80°C |
| FLOW CHARACTERISTICS. | : On/Off, Throttling. |
| TESTING STANDARD | : BS 6755 Part - I |
| ACTUATOR TYPE | : Diaphragm or Motorised or Cylinder |
| ACTUATOR ACTION | : Direct Acting - Normally Open (Air to Close) Reverse Acting - Normally Close (Air to Open) |
| SPRING RANGE | : 3 – 6 Psig Direct Actuator 18 – 30 Psig Reverse Actuator |
| AIR SUPPLY | : 40-50 PSIG (2.8-3.5 Kg/cm ²) |
| AIR CONNECTION | : 1/ 4" or 1/ 2" NPT |
| ACCESSORIES | : Top or Side Mounted Handwheel, Limit Switches |
| OPTIONAL | : Airset, Valve Positioner etc. |

DESIGN AND PERFORMANCE FEATURES

- >> It is a full bore straight through, give high flow performance with minimum turbulence, while giving 100% leak tight closure.
- >> Perfect sealing and longer diaphragm life due to weir design.
- >> Valve is self cleaning with no pockets, recesses, corners, grooves or sharp edges in the direction of flow.



**DIAPHRAGM VALVE WITH
REVERSE ACTUATOR**



**DIAPHRAGM VALVE WITH
DIRECT ACTUATOR**

BUILT IN RELIABILITY

VALVE SIZING CO-EFFICIENT Cv RATINGS

| VALVE SIZE (in) | TRAVEL(in) | | RUBBER LINED | | UNLINED OR GLASS LINED | |
|-----------------|------------------|----------------|------------------|----------------|------------------------|----------------|
| | RUBBER DIAPHRAGM | PTFE DIAPHRAGM | RUBBER DIAPHRAGM | PTFE DIAPHRAGM | RUBBER DIAPHRAGM | PTFE DIAPHRAGM |
| 1/2" | 1/4" | 1/4" | 6 | 4 | 6 | 4 |
| 3/4" | 3/8" | 3/8" | 12 | 6 | 9 | 6 |
| 1" | 3/8" | 9/16" | 15 | 12 | 12 | 10 |
| 1.1/2" | 3/4" | 3/4" | 40 | 25 | 30 | 20 |
| 2" | 1" | 3/4" | 55 | 35 | 50 | 30 |
| 2.1/2" | 1.1/8" | 15/16" | 85 | 55 | 75 | 50 |
| 3" | 1.1/2" | 1.1/4" | 120 | 75 | 95 | 70 |
| 4" | 1.3/4" | 1.1/2" | 210 | 180 | 200 | 160 |
| 5" | 2" | -- | -- | -- | -- | -- |
| 6" | 2.1/4" | -- | 375 | 275 | 350 | 270 |
| 8" | 3.1/2" | -- | 650 | 475 | 625 | 450 |

ACTUATOR SELECTION GUIDE FOR RUBBER LINED DIAPHRAGM VALVE

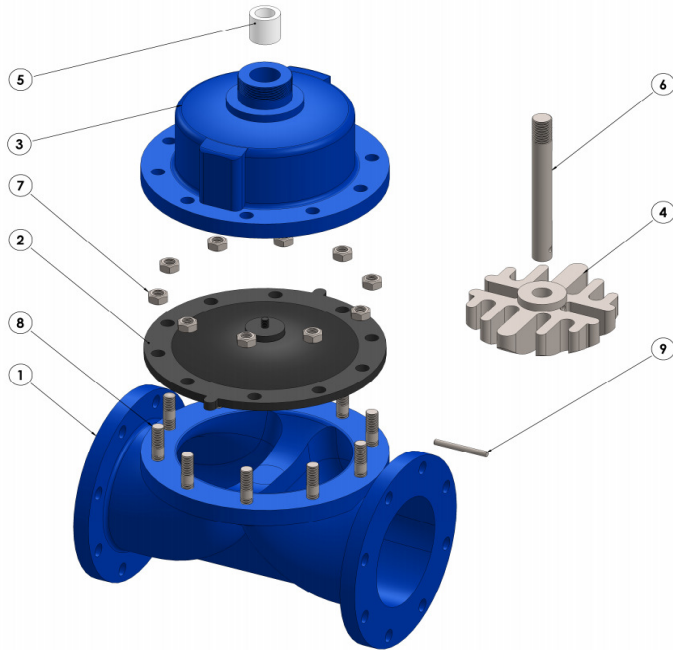
| VALVE CHARACTERISTIC/ACTION | | | On/Off Control Duty Air to Close | On/Off Control Duty Air to Close | | | Control Duty Air to Close | |
|-------------------------------|--|---------------|--------------------------------------|--------------------------------------|------|------|--------------------------------------|------|
| Air supply to Actuator (Psig) | | | 35 | 1s | 2s | 3s | 2s | 3s |
| Spring Range | | | 18-30 | 3-6 | | | 3-15 | |
| Valve Size | | Actuator size | Shut Off pressure Kg/Cm ² | Shut Off Pressure Kg/Cm ² | | | Shut Off Pressure Kg/Cm ² | |
| Upto 1" | | 12 | 6.0 | - | 6.0 | 12.0 | - | 6.0 |
| | | 80 | 22.0 | 7.0 | 22.0 | 38.0 | 7.0 | 22.0 |
| 1.1/2" | | 30 | 8.0 | - | 8.0 | 15.0 | - | 8.0 |
| | | 55 | 18.0 | 5.5 | 18.0 | 32.0 | 5.5 | 18.0 |
| 2" | | 55 | 8.0 | - | 8.0 | 17.0 | - | 8.0 |
| | | 95 | 18.0 | 5.0 | 18.0 | 33.0 | 5.0 | 18.0 |
| 2.1/2" | | 55 | 7.5 | - | 7.5 | 14.0 | - | 7.5 |
| | | 95 | 16.0 | 4.0 | 16.0 | 28.0 | 4.0 | 16.0 |
| 3" | | 95 | 7.5 | - | 7.5 | 15.0 | - | 7.5 |
| | | 140 | 13.5 | 3.5 | 13.5 | 24.0 | 3.5 | 13.5 |
| 4" | | 95 | 4.0 | - | 4.0 | 8.0 | - | 4.0 |
| | | 140 | 7.0 | - | 7.0 | 14.0 | - | 7.0 |
| 5" | | 300 | 20.0 | 7.0 | 20.0 | 35.0 | 7.0 | 20.0 |
| | | 140 | - | - | 7.0 | 14.0 | - | 7.0 |
| 6" | | 300 | 12.0 | 7.0 | 20.0 | 35.0 | 7.0 | 20.0 |
| | | 600 | 12.0 | 1.5 | 2.0 | 5.0 | - | 2.0 |
| 8" | | | | - | 8.0 | 16.0 | 1.5 | 8.0 |
| | | 300 | 9.0 | - | 3.0 | 6.0 | - | 3.0 |
| | | | | 2.5 | 9.0 | 16.0 | 2.5 | 9.0 |

ACTUATOR SELECTION GUIDE FOR PFA LINED DIAPHRAGM VALVE

| VALVE CHARACTERISTICS | | | On/Off Air to Open | On/Off Duty Air to Close | | | Control Duty Air to Close | |
|-------------------------------|------------|---------------|--------------------------------------|--------------------------------------|--|------|--------------------------------------|------|
| Air Supply to Actuator (Psig) | | | UPTO 35 | UPTO 35 | | | 30 | 40 |
| Spring Range (Psig) | | | 18-30 | 3-6 | | | 3-15 | |
| Valve size | Max Travel | Actuator Size | Shut Off pressure Kg/cm ² | Shut Off Pressure Kg/Cm ² | | | Shut Off Pressure kg/Cm ² | |
| 1/2" | 1/4" | 30 | 12.0 | | | 15.5 | 9.5 | 15.5 |
| | | 55 | NA | | | NA | 15.5 | NA |
| 3/4" | 3/8" | 30 | 12.0 | | | 15.5 | 9.5 | 15.5 |
| | | 55 | NA | | | NA | 15.5 | NA |
| 1" | 9/16" | 30 | 7.5 | | | 11.5 | 2.5 | 11.5 |
| | | 55 | 13.5 | | | NA | 14.0 | NA |
| 1.1/4" | 9/16" | 30 | 4.0 | | | 7.5 | 2.5 | 7.5 |
| | | 55 | 13.5 | | | NA | 9.5 | NA |
| 1.1/2" | 3/4" | 30 | 3.5 | | | 4.5 | 1 | 4.5 |
| | | 55 | 13.5 | | | 15.5 | 5.5 | 15.5 |
| 2" | 3/4" | 55 | 9.0 | | | 15.5 | 5.5 | 15.5 |
| | | 95 | 13.5 | | | NA | 7.5 | NA |
| | | 140 | NA | | | NA | NA | NA |
| 2.1/2" | 15/16" | 55 | 6.0 | | | 15.5 | 2.0 | 15.5 |
| | | 95 | 13.5 | | | 15.5 | 5.5 | 15.5 |
| | | 140 | NA | | | NA | 15.5 | NA |
| 3" | 11/4" | 95 | 4.0 | | | 6.5 | 1 | 6.5 |
| | | 140 | 12.0 | | | 15.5 | 8 | 15.5 |
| 4" | 11/2" | 140 | 6.5 | | | 11.0 | 3.5 | 11.0 |
| | | 300 | 13.5 | | | NA | 8.5 | NA |
| 6" | 2" | 300 | 7.0 | | | 11.0 | 4.5 | 11.0 |
| | | | | | | 3.5 | 1 | 3.5 |
| 8" | 2.1/4" | 300 | 3.0 | | | | | |

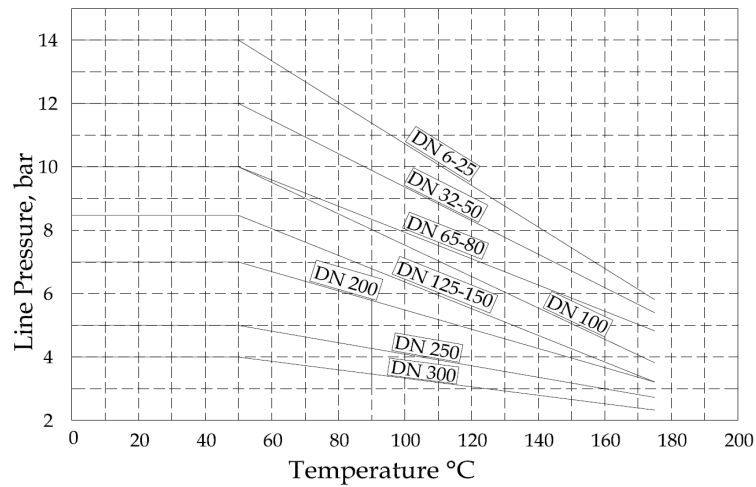
BUILT IN RELIABILITY

Exploded View

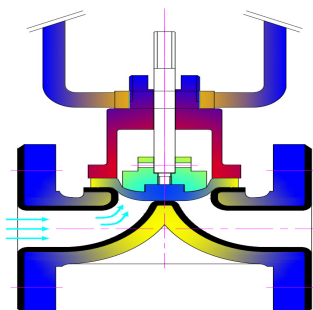


| SR NO | PART NAME |
|-------|------------|
| 1 | BODY |
| 2 | DIAPHRAM |
| 3 | BONNET |
| 4 | COMPRESSOR |
| 5 | P.P BUSH |
| 6 | STEM |
| 7 | STUD NUT |
| 8 | BODY STUD |
| 9 | DOWEL PIN |

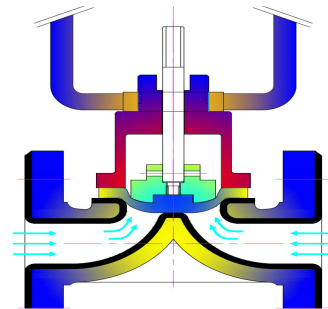
LINE PRESSURE AT ONE END ONLY
 (FOR LINE PRESSURE FROM BOTH SIDES MULTIPLY ΔP VALUES BY 0.5)



PRESSURE - TEMPERATURE RATING

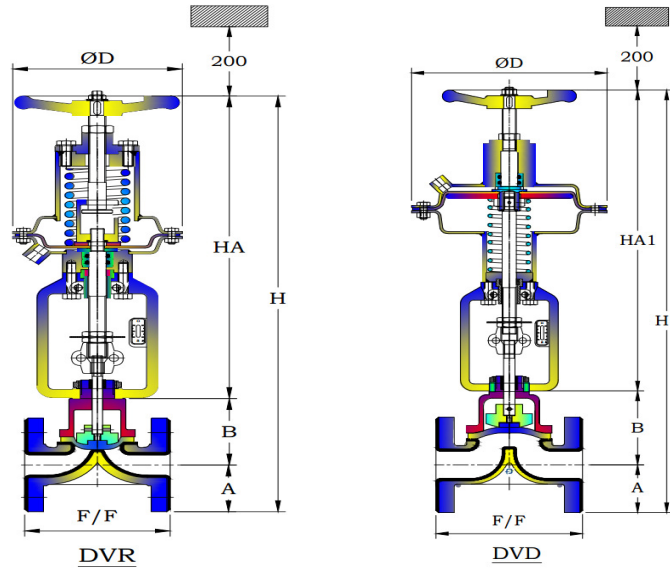


PRESSURE AT ONE END 100% ΔP



PRESSURE AT BOTH END 0% ΔP

BUILT IN RELIABILITY



MOUNTING DIMENSION OF DIAPHRAGM VALVE WITH REVERSE & DIRECT ACTUATOR

| VALVE SIZE | TRAVEL | | ACTUATOR MODEL DVR | ACTUATOR MODEL DVD | F / F | | A | B | HA | HA1 | H | H1 | ØD | ØD | Weight (Kg) | Weight (Kg) | | | | |
|------------|--------|----|--------------------|--------------------|-------|----------|-----|-----|------|-----|------|------|-----|-----|-------------|-------------|-----|-----|-----|-----|
| | INCH | MM | | | LINED | UN LINED | | | DVR | DVD | DVR | DVD | DVR | DVD | DVR | DVD | DVR | DVD | DVR | DVD |
| | | | | | | | | | DVR | DVD | DVR | DVD | DVR | DVD | DVR | DVD | DVR | DVD | | |
| 1/2" | 3/8" | 06 | 012 | 012 | 114 | 110 | 45 | 57 | 376 | 403 | 478 | 505 | 155 | 155 | 7 | 11 | | | | |
| | | | 030 | | | | | | 387 | | 489 | | 220 | | | | | | | |
| 3/4" | 3/8" | 06 | 012 | 012 | 123 | 117 | 50 | 66 | 376 | 403 | 492 | 518 | 155 | 155 | 7 | 11 | | | | |
| | | | 030 | | | | | | 387 | | 503 | | 220 | | | | | | | |
| 1" | 3/8" | 09 | 012 | 012 | 133 | 127 | 55 | 77 | 376 | 403 | 508 | 535 | 155 | 155 | 10 | 12 | | | | |
| | | | 030 | | | | | | 387 | | 519 | | 220 | | | | | | | |
| 1.1/2" | 3/4" | 20 | 030 | 030 | 165 | 159 | 67 | 102 | 387 | 426 | 555 | 595 | 220 | 220 | 12 | 14 | | | | |
| | | | 055 | | | | | | 468 | | 640 | | 288 | | | | | | | |
| 2" | 1" | 25 | 055 | 055 | 196 | 190 | 75 | 108 | 546 | 561 | 729 | 744 | 288 | 288 | 20 | 22 | | | | |
| | | | 095 | | | | | | 568 | | 751 | | 371 | | | | | | | |
| 2.1/2" | 1.1/8" | 28 | 055 | 055 | 222 | 216 | 90 | 127 | 546 | 561 | 763 | 778 | 288 | 288 | 26 | 26 | | | | |
| | | | 095 | | | | | | 568 | | 785 | | 371 | | | | | | | |
| 3" | 1.1/2" | 38 | 095 | 095 | 261 | 254 | 95 | 182 | 568 | 578 | 845 | 855 | 371 | 371 | 35 | 44 | | | | |
| | | | 140 | | | | | | 645 | | 923 | | 443 | | | | | | | |
| 4" | 1.3/4" | 45 | 095 | 095 | 312 | 305 | 115 | 171 | 576 | 578 | 862 | 864 | 371 | 371 | 45 | 45 | | | | |
| | | | 140 | | | | | | 645 | | 722 | | 931 | | 1008 | | 443 | 443 | 48 | 50 |
| 5" | 2" | 51 | 140 | 140 | 358 | 350 | 127 | 212 | 704 | 756 | 1044 | 1095 | 443 | 443 | 75 | 80 | | | | |
| | | | 300 | | | | | | 922 | | 1259 | | 616 | | 616 | | 80 | | | |
| 6" | 2.1/4" | 57 | 300 | 300 | 414 | 406 | 140 | 252 | 922 | 860 | 1314 | 1252 | 616 | 616 | 98 | 120 | | | | |
| | | | 600S | | | | | | 1456 | | 1848 | | 616 | | 616 | | 125 | | | |
| 8" | 2.1/4" | 57 | 600S | 300 | 532 | 522 | 171 | 346 | 1456 | 860 | 1977 | 1381 | 616 | 616 | 135 | 130 | | | | |

*** TOTAL HEIGHT & WEIGHT ARE APPROXIMATE**
DVR - REVERSE ACTUATOR - Normally Close (Air to Open)
DVD - DIRECT ACTUATOR - Normally Open (Air to Close)

INSTALLATION

The valve should be installed preferably in a straight run of the pipe, a few diameters away from the bends. The preferred position is with actuator vertically above or below the valve body. It may also be installed in a horizontal or angled position provided the diaphragm actuator is supported. Necessary clearance should be provided above the actuator to permit removal for servicing or for inspection of the valve internals. The supply pressure to the actuator be either 20 psig or 35 psig or as per rating indicated on the name plate. For control applications, positioner mounted are piped and adjusted at the factory.

FINAL CHECK

After the valve has been installed, check the operations for full stroke travel as indicated on the name plate. Check for air leaks in air line connection. Open and Close the valve two or three times to ensure proper operation. Before commissioning the process flow, it would be advisable to use conical filter or other temporary devices to avoid damage to the rubber lining or body diaphragm as the fluid is likely to carry foreign solid material during testing or commissioning of the plant. This care is particularly important with neoprene or other soft elastomer lining. Special care has to be exercised with glass lining construction. It is generally not desirable to use excessive air pressure to the actuator than specified as it would reduce the life of the body diaphragm and also cause undue forces on the actuator diaphragm. Valves having manual hand wheels should be preferably operated with air pressure, particularly during the start of the plant when any foreign material is likely to damage the internals.

ATTENTION

Diaphragm type Control Valve require minimum attention for its operation, except applying a few drops of oil on the exposed guides and bushings. Manual hand wheels must be occasionally greased. Actuator diaphragm generally last for a long period, it should be necessary to replace the diaphragm, actuator casing can be opened without removal of the actuator form the valve body. In case, body diaphragm has to be replaced, body bonnet can be opened for replacement of the body diaphragm

REMOVAL OF ACTUATOR FROM VALVE BODY

- 1) To separate actuator, remove the stem coupling. It would be convenient to undo stem coupling while body diaphragm is off the weir seat. If necessary, apply air to the actuator and remove the coupling.
- 2) Disconnect air supply and any electrical connections to the actuator.
- 3) Unscrew the locking ring from bonnet threads.
- 4) Lift or hoist the actuator unit off the valve body.

DISASSEMBLY OF VALVE BODY

- 1) Remove the bonnet/body stud nuts and lift the bonnet.
- 2) Lift the body diaphragm carefully to avoid damage to the diaphragm.



**Diaphragm Valve with
Double Diaphragm
Actuator - DVR-600S**

VALVE POSITIONER

If positioner is provided, refer to the separated leaflet for the positioner.

The Company's policy is one of continuous product improvement and the right is reserved to modify the specification contained herein without notice.



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BUILT IN RELIABILITY

