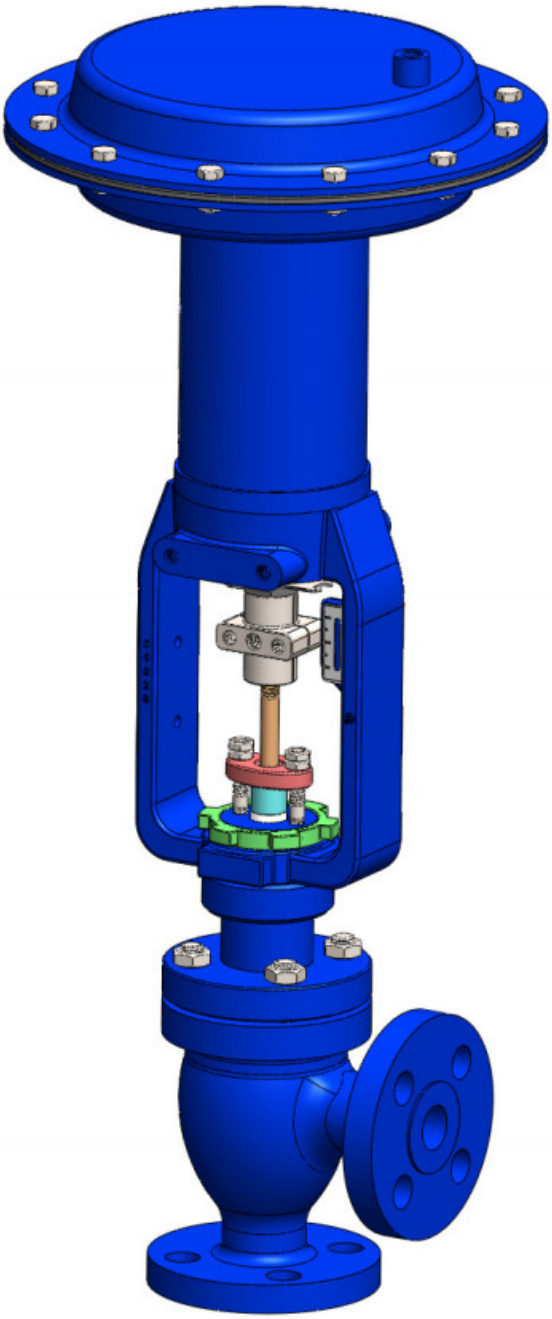
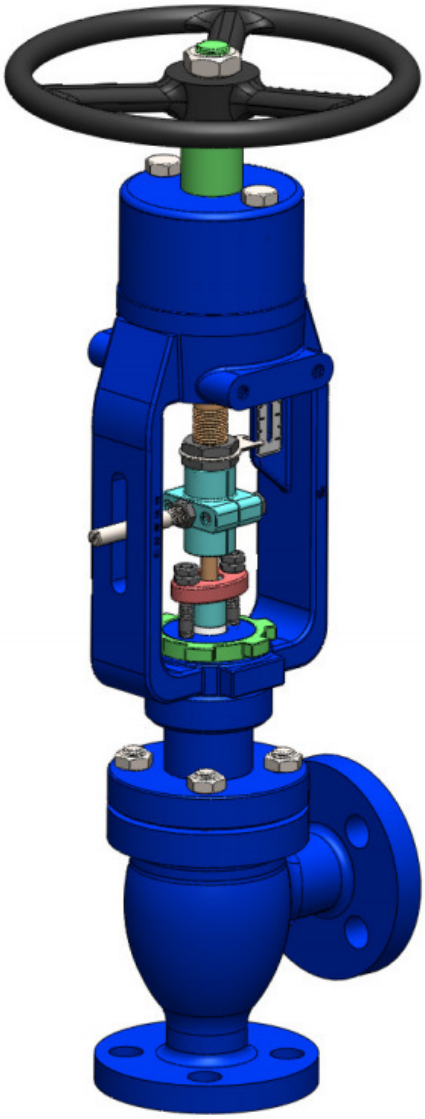
INSTALLATION, OPERATION AND MAINTENANCE MANUAL OF GLOBE ANGLE VALVE (SERIES 170)





INDEX

1. GENERAL

This manual describes the instructions for handling, storage, installation, maintenance, and operation of the Globe Angle valve and spring opposed pneumatic diaphragm actuator.

Instructions not detailed in this document shall be performed in accordance with standard and safe acceptable practices as may be required by local codes, specifications and or regulations.

The instruction contained within this manual must be read before undertaking any work on the equipment supplied and if there are any questions please contact Pneucon Valves Pvt. Ltd. or its agent.

When ordering any spares please specify the unique valve serial number detailed on the equipment nameplate.

If the valve is provided with ancillary equipment e.g. Valve Positioner - Pneumatic , Electro Pneumatic, Smart Positioner, Airset, Solenoid Valve, Air Lock, Volume Booster, I/P Converter, Position Transmitter, Limit – Proximity Switches etc. A copy of the respective ancillary equipment manual will be provided within the data / documentation package supplied with the valve.

2. WARNINGS / SAFETY PRECAUTION

a) In order to avoid possible injury to personnel or damage to any equipment any 'WARNING and CAUTION' notes must be strictly adhered to. Modification of this product, substitution of non-approved components and use of maintenance procedures other than those detailed within this document could drastically affect the performance, nullify any warranty and be hazardous to personnel and equipment.

b) Personal injury, equipment damage, leakage due to escaping gas or failure of pressure containing component may result if the valve or ancillaries are over pressured or installed where service condition exceed the limits detailed in the manufacturer's specification or on the valve nameplate. To avoid such injury or damage a relief valve for over pressure protection should be provide as required by industry and sound engineering practices or applicable safety codes.

c) Due to the possibility of both elevated and low temperatures occurring on exposed surfaces of the valve assembly during operation, adequate safety precautions must be taken. This may involve insulating the valve assembly or the provision of safety clothing and equipment to avoid personal injury.

d) It is a requirement of PER 1999 that both the maximum working pressure and temperature of the valve are detailed on the nameplate. The stated values must be adhered to separately and in isolation. Attention must be paid to the combined pressure and temperature characteristics of the appropriate valve pressure containment material group as stated in ASME / ANSI B 16.34.

e) When purchased each valve / trim configuration and construction materials are specifically selected to satisfy the particular application, conditions of flow, temperature, pressure drop and controlled fluid conditions for corrosion and erosion. Included within the Pneucon Valve selection process is the consideration of the amount of power conversion allowed to reduce vibration levels within the valve and also the materials of construction are specifically selected for each application. The valve must not be used on any other application, without a review by Pneucon Valve.

f) The valve is not suitable for fire safe service and is not certified for this application or duty. Unless otherwise detailed in the quotation and order documentation the valve will not have been designed to deal with excessive seismic activity or bending moments resulting from misaligned pipe work.

g) It is not intended that externally applied lever arms will be used on the valve and actuator assembly.

h) For cage guided valve, use of strainer is recommended to remove line debris to protect any damage to valve internal so as to have smooth movement of plug in cage.

3. PLANNING & RESPONSIBILITIES
When installing or maintaining valves

a. Conduct a risk assessment and eliminate or reduce hazards to an acceptable level.

b. Work in accordance with health and safety rules of work site.

c. Never use a valve on a application which exceeds its prescribed operating parameters.

d. The valve shall not be subjected to frequently occurring disturbances.

e. End user to ensure there are no external disturbances (e.g. Shocks, Vibrations, Electromagnetic fields etc.)

f. Misuse of valves / valve components shall be avoided.

g. Maximum surface temperature of the equipment will be same as the line media temperature. The end user must take account of the line media temperature.

h. If the process or environment where in the valves are used in are likely to cause temperatures (high or low) that may cause injury to personnel if touched, then adequate insulation / protection must be fitted.

i. All exposed parts shall be cleaned to prevent dust deposit or insulation is needed similar to pipe line.

j. Valves shall be protected by other devices to prevent over-pressurisation. (i.e. caused by temperature, fire etc.)

4. HANDLING

1. The weight of the control valve assembly can cause serious injury if it is not handled correctly, using the necessary protective clothing and safety equipment. Adequate lifting equipment must be used and properly attached. Where lifting eyes are provided with the equipment these should be used to enable safe handling of the valve actuator or assembly. All lifting equipments should be used within its defined limitations., applicable codes and safe industrial practices including (but not limited to) the following :

    - Slings to be free of kinks.
    - Lifting hooks to be positioned directly over the load to avoid any severe swinging when lifted.
    - The operator shall ensure that the load is safe and well secured.

2. When lifting the equipment ensure that any slings or hoists are positioned to avoid any damage to the accessories or tubing mounted on the valve.

3. All eyebolts should have a shoulder, which butts against the tapped hole. Use American Drill Bushing CO ADB2300 series safety hoist rings or equivalent should be used. The following table details the safety hoist thread size and the appropriate safe loading that can be applied.
4.

Safety Hoist Ring	Thread Size UNC	Rated Load lbf
ADB-23004	½” 13 x 0.75	2500
ADB-23002	5/8” 11x1	4000
ADB-23007	¾” 10 x 1	5000
ADB-23101	7/8” 9 x 1	8000
ADB-23105	1” 8 x 1.25	10000

5. LIST OF PART REPLACEMENT CYCLE SHEET

The life of the valve can increase if you replace parts according to there replacement cycle. Refer to the part replacement cycle sheet shown below.

PARTS REPLACEMENT CYCLE SHEET		
Sr. No	**ITEM NAME**	**REPLACEMENT CYCLE**
01	Actuator Diaphragm	5 Year
02	'O'-Ring	2 Year
03	Gland Packing	2 Year
04	Body, Bonnet & Seat Joint Gasket	2 Year
05	Lipseal	2 Year
06	Soft Seat Ring	2 Year (Above 1.1/4" Trim Size)

These are recommended cycle period to avoid sudden failure and disturbances to the process. Depending on the actual usage and severity of the process requirement, these items may need replacement earlier than the indicated cycle period.

6. DRY AIR TO USE E/P & SMART POSITIONER

a. We recommend the use of a good filter (40 micron or less) (filter regulator optional) with all positioner, however the filtering issue becomes more critical when you are dealing with Electropneumatic and Smart positioner. Furthermore, experience has indicated with the use of coalescing filters will improve the effective use and life of the Electropneumatic & Smart positioner.

b. Good coalescing filters will remove particles, moisture and oil.

c. Locating an "inline" filter is also acceptable; just try to locate the unit within 2 feet of the valve assembly While a pneumatic positioner can fail due to poor air quality, the failure rate of P to E/D units due to air quality is very heavily weighted toward the Electropneumatic & Samrt version.

d. The ISA spec "strongly discourages" this practice as it relates to instrument air quality. Any combination of particles moisture, oil (or all three), will greatly increase the probability of early positioner problems or failure.

e. ISA-S7.0.01 is an industry standard that deals specifically with "Quality standard for instrument Air".

SMART POSITIONER

Free of oil, water and dust to DIN/ISO 8573-1. Pollution and oil content according to class 3 (purity: max particle size=5 mg/m3; oil content: max concentration = 1 mg/m3, pressure dew point=10k below operating temperature

7. PRE – INSTALLATION

a) The assembly should be inspected on receipt to ensure that it has not been damaged during transit. This inspection should be undertaken in a safe and controlled manner as valve equipment can be heavy and have sharp edges. Any damage found should be immediately reported.

b) If a valve assembly is required to be stored for a significant period prior to installation it must be stored in a fire resistant, clean, dry and ventilated environment to avoid damage to the valve, actuator or accessories.

c) The end caps or other protection devices should not be removed from the equipment until the time of installation, in order to help avoid any damage to the flanges and also prevent the ingress of dirt or foreign particles.

d) The adjacent pipework must be free of dirt, pipe scale, welding slag and all other foreign objects. Safe operation of the valve could be impaired by the ingress of line debris or foreign matter. It may be necessary to remove the valve or internals if the pipework is to be flushed prior to or during the commissioning period.

e) Sufficient clearance above and around the valve and actuator should be provided for access and maintenance purposes.

f) An air supply pressure filter / regulator should be fitted upstream of any instruments mounted on the valve to provide a regulated correct quality air supply pressure as detailed on the valve nameplate.

8. INSTALLATION

a) The valve is supplied with a flow direction arrow either cast on to the body or detailed on the nameplate. It is very important that the valve is installed into the pipework with the correct flow direction.

b) Install the valve using accepted piping practices and preferably with suitable lengths of straight pipework both upstream and downstream.

c) The preferred orientation is for the actuator to be vertically upright. If a valve is required to be installed in any other orientation the valve and actuator must be adequately supported.

d) If a normalising bonnet is provided for a high temperature application and the pipework is thermally lagged the lagging must be terminated at the bonnet to body flange interface.

e) Prior to installing any valve with butt weld end connections all components containing or manufactured from PTFE should be removed.

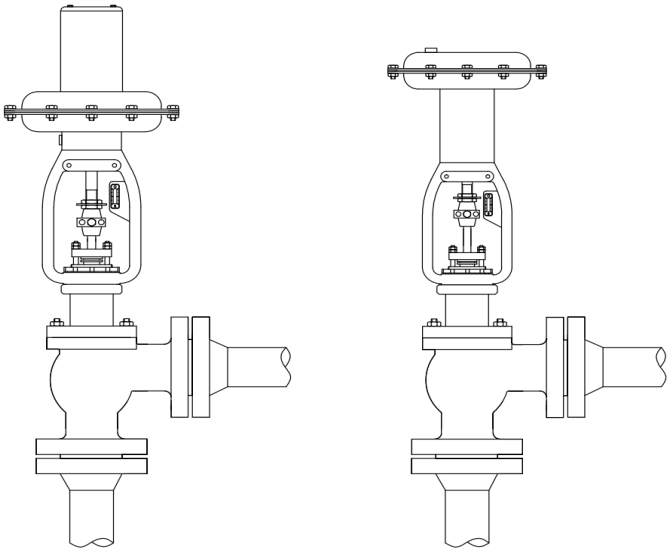
f) Following installation of the valve an input signal should be applied to the valve actuator in order to check and confirm correct calibration of the assembly.

g) All pneumatic air connections should be checked for leaks. During functional testing of the actuator, the assembly would be subject to a pressure test at 3.4 barg.

h) The gland nuts are factory adjusted and following commissioning further adjustment could be required to stop any stem leakage. It should be pointed out that excessive tightening of the gland studs could result in packing wear or excessive friction.

9. HOW TO FIT THE VALVE ON LINE

Globe Angle Valve should be mounted in vertical upright position. Installation of a Globe Angle Valve in any other than vertical upright position may adversely affect its operation. For any other mounting position should be consulted to manufacturer, since mounting in other position may cause a shift in the set pressure and reduction in the degree of seat tightness.



CAUTIONS

- **Avoid horizontal piping if possible because it may adversely affect the function and performance of valves during operation.**
- **The valve trim part (port) may be deflected downward and affect the stability of operation.**

10. FLANGED ENDS

a) Refer (**Page No - 07**) for applicable standards.

b) Clean valve flanges and companion flanges and remove protective grease from the valve flanges. Clean the valve interiors adjacent piping priors to mounting of the valve pipe joint.

c) Align the bolt holes of the valve end flanges and pipe flanges.

d) Fasteners shall be well lubricated for ease of installation.

e) Insert the gasket (not supplied with valve) and tighten the fasteners. Flange fasteners shall be tightened evenly, using suitable device in cross rotation to prevent damage to the flange.

f) For sequence of tightening fasteners, refer (**Page No - 09**).
If valve is not cleaned or if cleaning is done after valve installing, cavities may from a natural trap in the piping system. Any impurity not dissolved or washed out by the flushing fluid/line fluid may settle in such cavities and adversely affect valve performace.

11. BUTT-WELDING ENDS

a) The valves provided with butt-welding ends preparation are as standard ASME B16.25 or as per customer requirements. Please refer to the general assembly drawings for the exact butt-welding ends dimensions.

b) The welding of valves onto the pipeline shall be performed by qualified welders using qualified procedures.

c) Valves shall be kept in the closed position during welding.

d) Care shall be taken to avoid weld spatter from falling onto the seating surfaces to prvent damage and maintain sealing effect between the metallic contacts.

e) Local post weld heat treatment (PWHT) on the weld and heat affected zone (HAZ) shall be carried out if required by the procedure.

f) It is recommended that the pipeline be flushed again welding to avoid damage to wedge/disc and seat. The valve shall be kept fully open during flusing.

g) After flushing is completed, operate the valve three times and ensure that it is smooth. It is recommended to carry out pressure testing of the weld joints.

12. TECHNICAL INFORMATION

Face to Face Dimensions
ASME B16.10 Face-to-Face and End-to-End Dimension pf valves.

End Connections
ASME B16.5 Pipe Flanges and Flanges Fittings (NPS 1/2 through NPS 24)
ASME B16.25 Butt-Welding Ends.

Testing standard
API 598 Valve inspection and testing
EN12266 PART-1 Industrial Valves - Testing of valve.

13. TIGHTENING SEQUENCE

The tightening sequence for all possible number of bolting, the star logic to be followed is explained below:

1. Tighten the first four nuts in the sequence shown Fig. 01. This helps in correct location of the mating parts.
2. Tighten the other bolts in the sequence shown Fig. 02.
3. The sequence gors clockwise around the bolt.

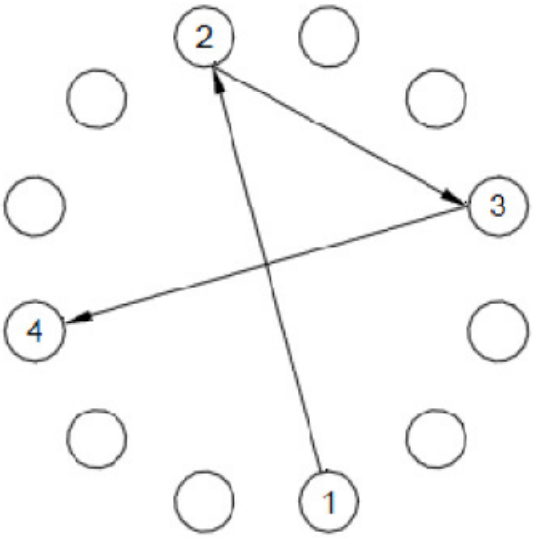


Fig.01 Initial Tightening

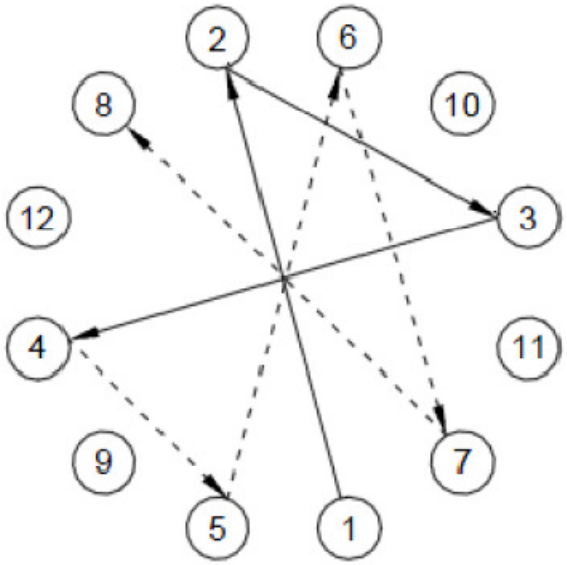


Fig.02 Sequence of Tightening

14. Do's and Don'ts

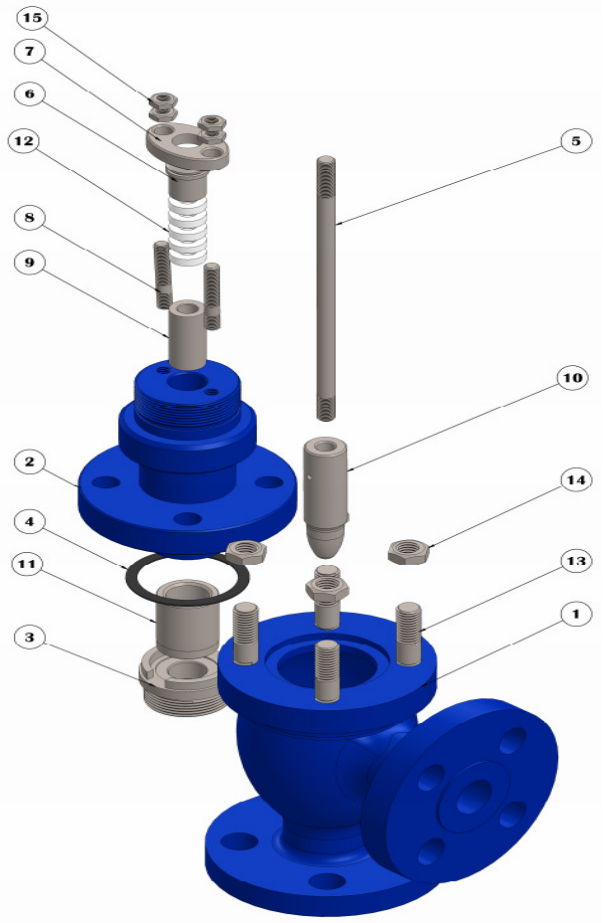
Do's	Don'ts
Before taking valve for erection, make sure that is cleaned properly from inside and outside and there are no foregin particles or metallic chips sticking on to sealing element.	DO NOT lift the valve by the Pneumatic/Motorised/Hydraulic Actuator, hand wheel, gear box or bypass arrangment.
While installing the operator, make sure that the valve is in fully closed position.	DO NOT use the lifting points located on the Actuator / Gear unit, if any, to lift the valve. These lifting points are for the Actuator / Gear unit only.
Make sure to remove the entire rust preventive on the machined surface in the flow area before a valve is put in the pipe line.	DO NOT over-tighten packing gland nuts. Over-tightening will increase the torque required to operate the valve.
Carefully read the identification plate details and install the valve in the right place and for the correct duty conditions for which it is designed and manufactured. Globe Angle Valves have preferred sealing direction marked by an arrow on the valve body beneath the identification palte.	DO NOT use impacting device to tighten up the bolting on the body/bonnet. Use suitable mechanical device for tightening.
Make sure to supply rated voltage and frequency to the electrical actuator	DO NOT tighten the body/bonnet nuts when the wedge/disc is in the fully closed position.
Globe Angle Valves shall also be installed in vertical pipe line with flow in upwards direction.	DO NOT keep the Globe Angle Valve in partial open condition to regulate flow.

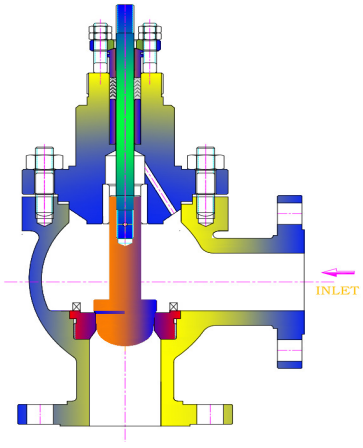
15. MAINTENANCE

Maintenance such as gland packing or trim replacement can be done without removing the valve from the line.

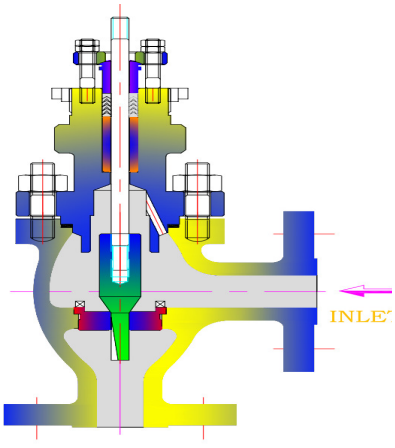
A. Disassembly Of Globe Angle Valve with Contoured, Microspline & Multistep Trim

1. Remove the gland stud nut **(Part No - 15)**, Gland Pusher **(Part No - 07)** & Gland **(Part No - 6)**.
2. Remove the Body Bonnet Stud Nut **(Part No - 14)** and lift the bonnet **(Part No - 02)** From the Valve body , while holding the plug stem assembly **(Part No - 5 & 10)**.
3. Remove the plug stem assembly.
4. Remove gasket from the body to bonnet **(Part No - 04)**.
5. Remove the packing Set **(Part No - 12)** and spacer **(Part No - 09)** from the bonnet.
6. Removal of the Seat Ring **(Part No - 03)** is only necessary for replacement or machining. where necessary the seat ring is screwed out of the body and a lathe or boring mill can be used for seat ring that are difficult to remove. For extremely tight seat ring the valve body should be heated to assist removal.
7. For top guided valves, the plug guide Bush **(Part No -11)** is pressed into the bonnet and does not normally require removal. When removal of the guide is essential it should be machine. Plug Guide Bush **(Part No - 11)** is not applicable in microspline trim Design.
8. All the parts Should be cleaned and examined for damage.

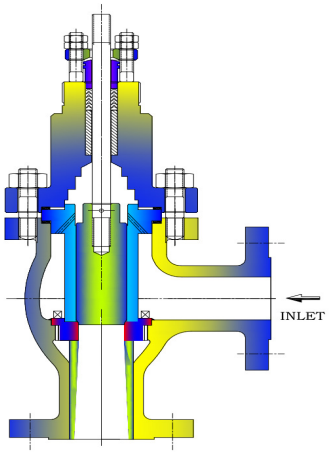




Contoured Trim



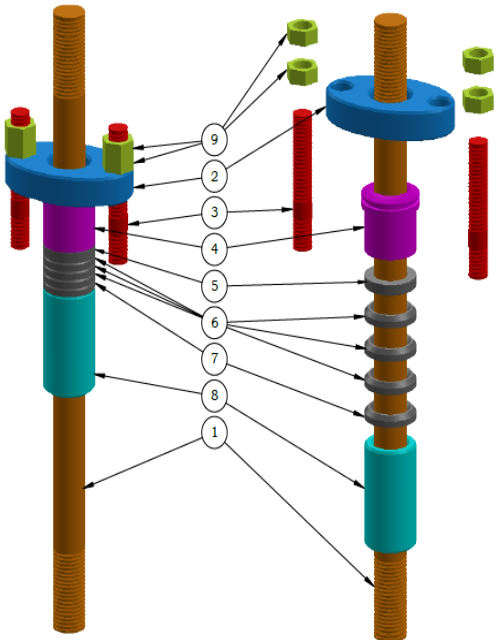
Microspline Trim



Low Noise Trim

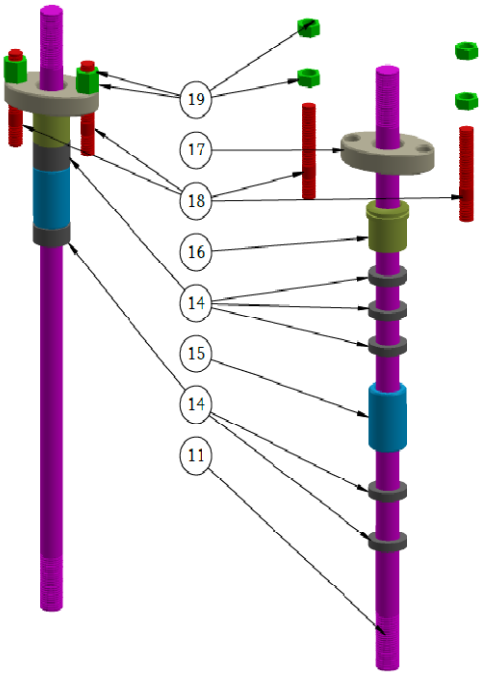
B. Gland Packing Ptfe Packing Box Assembly

1. All the parts should be cleaned and examined for damage before the packing box assembly.
2. Insert first Packing Spacer (**Part No - 08**).
3. Insert Gland Packing PTFE (**Part No - 05,06 & 07**) Total set of ring should be fully installed.
4. Insert Gland (**Part No - 04**).
5. Insert Gland Pusher (**Part No - 02**)and tight with Gland Stud & Gland Stud Nut (**Part No - 03 & 09**).



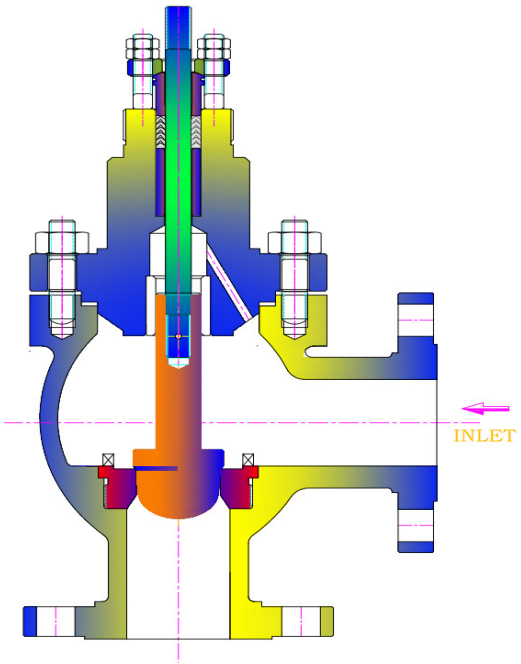
C. Gland Packing Grafoil Packing Box Assembly

1. All the parts should be cleaned and examined for damage before the packing box assembly.
2. Insert first two Nos of Gland Packing Grafoil one by one and ensure the each ring should be fully installed (**Part No - 14**).
3. Insert Packing Spacer (**Part No - 15**).
4. Insert Gland Packing Grafoil (**Part No - 14**) one by one and ensure the each ring should be fully installed.
5. Insert Gland (**Part No - 16**).
6. Insert Gland Pusher (**Part No - 17**)and tight with Gland Stud & Gland Stud Nut (**Part No - 18 & 19**)



D. Valve Assembly

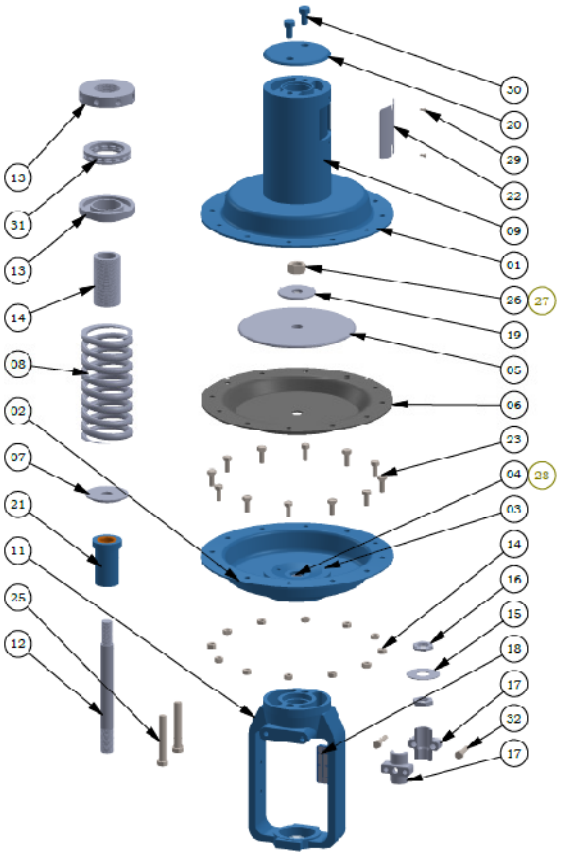
1. New plugs are normally supplied complete with stems already fitted. If the replacement parts are separate the stem should be screwed into the plug. Drill the plug and stem, countersink the drilled hole, fit the pin and peen. The pin should then be machined flush to the plug.
2. Apply sealing compound to the seat ring and install the seat ring into the body. The seat ring should be tightened.
3. Place a new gasket on the body and install the cage for cage guided valves.
4. Install the plug and stem assembly.
5. For cage guided valves place a new gasket on the cage.
6. Lower the bonnet carefully over the plug stem and also over the body studs. The bonnet should be centered to ensure that the plug and stem assembly moves freely.
7. Fit the body stud nuts and tighten evenly. The plug and stem assembly should be moved in a linear direction only to ensure that it moves freely.



Contoured Trim

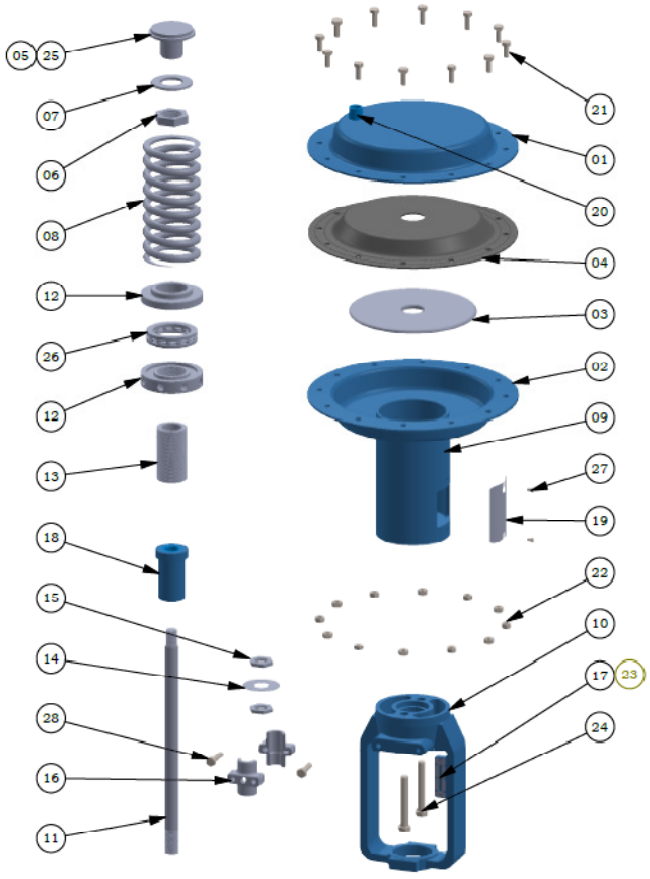
E. Disassembly of PDC Actuator. (Replacement of Diaphragm)

1. Open the Window Cover (**Part No - 22**).
2. Using the Spring Adjuster (**Part No - 12**) to release the Spring Compression (**Part No -08**).
3. Remove the Casing Bolt and Nut (**Part No - 23 & 14**).
4. Remove the Top Casing (**Part No - 01**).
5. Remove the Hex Bolt from coupling (**Part No - 32**) and separate the coupling (**Part No - 17**).
6. Remove the Indicator lock nut (**Part No - 16**) and Travel indicator (**Part No - 15**) from stem.
7. Unscrew the stem Lock Nut (**Part No - 26**) and remove the Spring Washer (**Part No - 27**) and remove Spring Guide (**Part No - 19**) and remove the Area Plate (**Part No - 05**).
8. Remove the Diaphragm from the actuator (**Part No - 06**).
9. Clean all the internal parts and examine for any damage. Any significantly damaged parts should be replaced.
10. For PDC actuator the two 'O' Ring (**Part No - 28**) in Seal Box (**Part No - 04**) should be replaced.
11. After replacing the diaphragm Re-assemble the actuator.
12. Using the spring adjuster (**Part No - 12**) to compress the spring (**Part No - 08**) until the actuator start to operate at the bench set figure detailed on the nameplate.



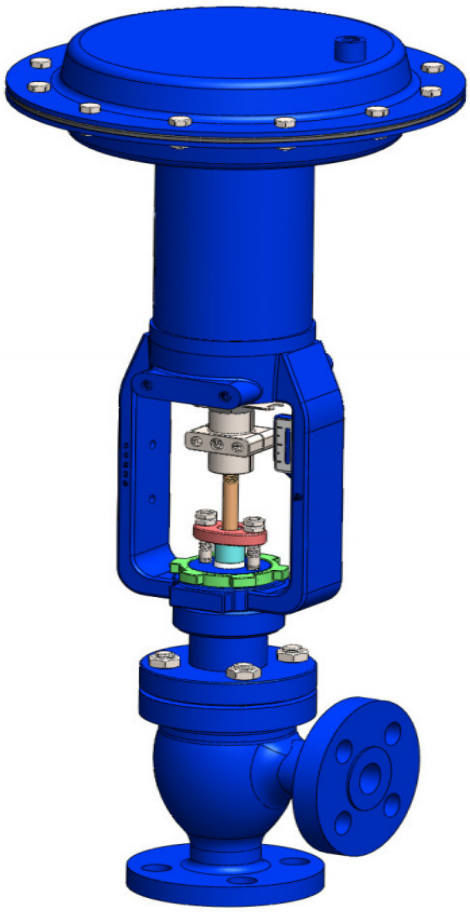
F. Disassembly of PDO Actuator. (Replacement of Diaphragm)

1. Open the Window Cover (**Part No - 19**).
2. Using the Spring Adjuster (**Part No - 12**) to release the Spring Compression (**Part No -08**).
3. Remove the Casing Bolt and Nut (**Part No - 21 & 22**).
4. Remove the Top Casing (**Part No - 01**).
5. Remove the Hex Bolt from coupling (**Part No - 28**) and separate the coupling (**Part No - 16**).
6. Remove the Indicator lock nut (**Part No - 16**) and Travel indicator (**Part No - 14**) from stem.
7. Unscrew the Diaphragm Collar Nut (**Part No - 06**) and Remove the Spring Guide (**Part No - 07**) and Remove the Area Plate (**Part No - 03**).
8. Remove the Diaphragm from the actuator (**Part No - 04**).
9. Clean all the internal parts and examine for any damage. Any significantly damaged parts should be replaced.
10. After replacing the diaphragm Re-assemble the actuator.
11. Using the spring adjuster (**Part No - 12**) to compress the spring (**Part No - 08**) until the actuator start to operate at the bench set figure detailed on the nameplate.



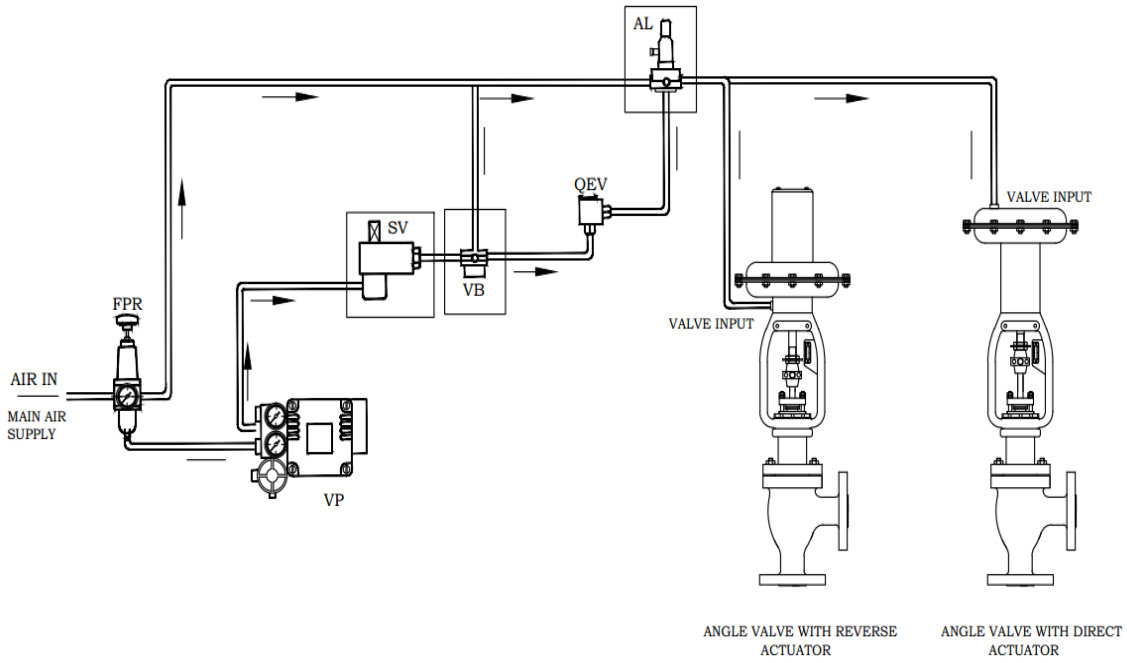
G. Fitting Actuator To Valve

1. Ensure that the actuator is correctly assembled and calibrated.
2. Lower the actuator over the plug stem and gland flange to seat squarely on the valve bonnet.
3. Rotate the actuator to the required position, screw the locking ring onto the bonnet and securely tighten.
4. To connect the actuator to the valve stem the valve plug must be on its seat and the actuator in the lowest travel position. Apply one half of the stem coupling to both the valve and actuator stem. Apply the second half of the coupling carefully engaging the threads, then insert the coupling cap screws and hand tighten.Move the plug off the seat by changing the air pressure on the diaphragm then unscrew the plug stem an additional turn out of the coupling to ensure positive seating. Securely tighten the coupling cap screws.
5. Position the valve in the closed position and adjust the travel indicator plate so that the 'Shut' mark is opposite the travel plate.



H. Mounting Accessories

1. Control valve assemblies generally comprise of a valve, actuator and instrumentation. The instrumentation normally includes a positioner and airset but can also include other accessories e.g. volume booster, solenoid valve, air lock, quick exhaust valve and limit switches.
2. Each instrument fitted would have a separate operating and instruction manual and this would be included in the data book. This would detail any specific requirements for the instrument. For operator safety and reliability the following care should be taken.
3. Ensure that a suitable air filter is provided for the equipment in accordance with each instrument.



VP	**-**	**Valve Positioner-Pneumatic E/P & Smart**	**VB**	**-**	**Volume Booster**
FPR	**-**	**Filter Pressure Regulator**	**QEV**	**-**	**Quick Exhaust Valve**
SV	**-**	**Solenoid Valve**	**AL**	**-**	**Air Lock**

General arrangement of accessories is shown in the schematic diagram. The accessesories Shown in the dottedlined can be bypassed.

I. Troubleshooting

Control valve normally require seldom attendance, except for routine check on the control valve response in respect of the input signals received from the controller. The following details some of the problems associated with the control valve operation:

PROBLEMS	REASON	CORRECTIVE ACTION
Excessive leakage when valve closed	Worn or damaged seat ring or plug	Disassemble and replace damaged part as detailed in maintenance manual
	Inadequate actuator thrust	Check actuator spring adjustment and air supply Reconfirm service conditions and contact factory
	Actuator leakage	Check for air leaks with soapy water. Tighten or replace connection / seals.
	Improper handwheel adjustment (acting as a limitstop)	Check travel against travel plate. Adjust handwheel to neutral position
Valve operation not smooth	Gland flange over tightened	Loosen gland flange nuts and retighten to finger tight
	Inadequate air supply	Check air supply pressure
	Alignment of valve and actuator stem	Check actuator is square and tight on bonnet mounting
	Actuator faulty	Service actuator as detailed in maintenance manual
Inadequate flow	Improper plug adjustment	Refer 'Valve Assembly' section of the manual
	Malfunctioning valve positioner	Bypass positioner and check valve operation with direct signal
	Service conditions exceeds trim design capacity	Reconfirm service conditions and contact factory
Control valve hunting	Input signal fluctuations	Provide steady signal through controller
	Backlash error in moving parts	Remove backlash
	Moisture in air line	Provide dry air supply
	Improper tuning of controller	Adjust the controller settings
Excessive noise	Flashing or cavitations	Check that trim is suitable for the application. Refer to factory
	Loose supports	Tighten the supports sufficiently
	Damaged trim assembly	Replace the trim parts
Valve travel range less than correspondi ng input signal range	Malfunctioning valve positioner	Bypass positioner and check valve operation with direct signal
	Leakage through diaphragm chamber	Tighten casing bolts and replace diaphragm if necessary
	Excessive tightness of gland packing	Loosen the gland packing slightly
	Line pressure may have increased	Compression spring should be readjusted

In order to avoid possible injury to personnel or damage to valve parts< WARNING and CAUTION notes must be strictly adhered to. Modifying this product, substitution non-factory inferior parts, or using maintenance procedure other than outlined could drastically affect performance, void product warranties and be hazardous to personnel and equipment.

While ordering spares,please indicate `Valve Serial No.'appearing on Name Plate'fixed on the Actuator.

The Company's policy is one of Continuous product improvement and the right is reserved to modify the specifications contained here in Without notice

PNEUCON VALVES PVT LTD

Plot No: A-35, Road No. 10,Wagle Industrial Estate,
Thane – 400 604, India.
Phone: +9122 2583 8371/72, Fax : +9122 2583 8373
E-Mail: info@pneuconvalves.com
Web: www. pneuconvalves.com