

INSTALLATION, MAINTENANCE AND OPERATION MANUAL OF GLOBE 2 WAY CONTROL VALVES AND DIAPHRAGM ACTUATOR.



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1. GENERAL

The Globe 2 way control valve range is a linear rising stem design which is suitable for a wide range of process control applications. This proven design is manufactured in accordance with international control valve standards and can be supplied with a wide range of trim design options ranging from low capacity types, standard designs through to multi stage severe service options. The Globe 2 way control valve is supplied with the diaphragm actuator spring opposed pneumatic diaphragm actuator along with the various options available.

In addition, the Globe 2 way control valve could be fitted with other actuator types including pneumatic piston, electric, hydraulic and electro hydraulic types. For these types of actuator please refer to the specific product OIM documents, which would be supplied as part of the project documentation package.

This manual provides the guidelines for Globe 2 way control valve and Diaphragm Actuator covering the standard sizes and ratings manufactured. The manual covers the handling, storage, installation, operation and maintenance requirements for these products.

If ancillary equipment is mounted on the valve and actuator eg. Positioner, Airset, Solenoid Valve, Airlock, Volume Booster, I/P Converter, Position Transmitter or Limit Switch a copy of the respective OIM will be provided within the documentation package.

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 instructions 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.

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

2. WARNINGS

- a) In order to avoid possible injury to personnel or damage to any equipment any 'WARNING and CAUTION' notes must be strictly adhered to.
- b) 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.
- c) 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.
- d) 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.
- e) 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.
- f) 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.
- g) 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.
- h) It is not intended that externally applied lever arms will be used on the valve and actuator assembly.
- i) 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. STORAGE AND HANDLING

3.1 Storage

- a. Following receipt of the equipment, it should be inspected for any transit damage. Any damage found should be photographed and a copy of the photograph, together with notification of the damage found sent to Pneucon Valve.
- b. Any flange or valve protectors should be left fitted until immediately prior to installation in the pipework.
- c. If the valve is going to be stored prior to installation (typically up to 2 months) it should be in a clean, dry and heated environment in the crate (or on the pallet) on which it was delivered.
- d. If the valve is going to be stored prior to installation for longer than the above 2 months please contact Pneucon Valve for recommendations based on the planned length of time to be stored.

3.2 HANDLING

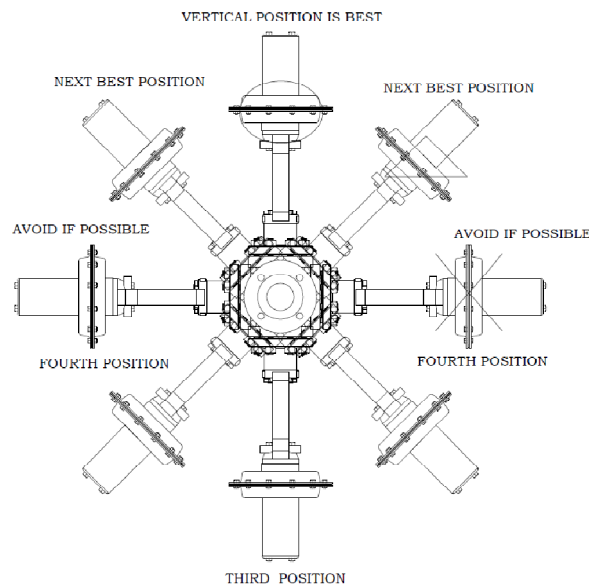
1. The weight of the control valve assembly can cause serious injury if it is not handled correctly, includes using the appropriate lifting equipment and personal protective clothing.
2. The appropriate lifting equipment must be used and properly attached. Where lifting eyes are provided with the equipment these should be used to enable safe handling of the valve, actuator or assembly. All lifting equipment should be used within its defined limitations, applicable codes and safe industrial practices.
3. The recognised safe industrial practices include the following.
 - Slings to be free of kinks
 - Lifting hooks to be positioned directly over the load to avoid any severe movement when lifted
 - The operator shall ensure that the load is safe and well secured
 - 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 assembly

4. PRE - INSTALLATION

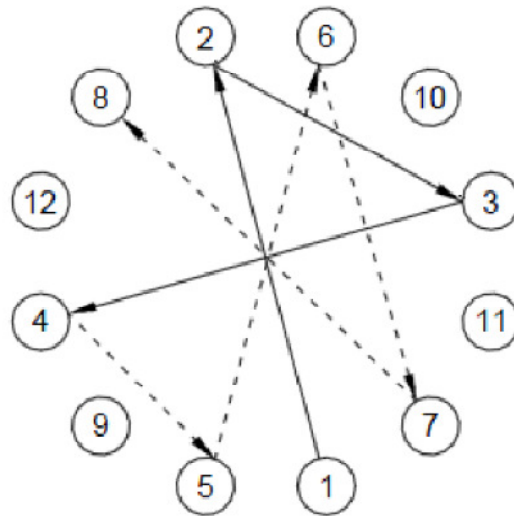
1. In preparation for the installation sufficient clearance above and around the valve and actuator should ideally be provided for access and maintenance purposes.
2. Prior to installation, the space in the pipework in which the control valve is to be installed should be checked to be in accordance with the GA drawing supplied with the valve or to the recognised international standard for face to face dimensions.
3. For control valves using a pneumatic air supply as the power source and fitted with instruments an air supply filter/regulator should be provided to protect the pneumatic actuator from over pressurisation and be within the operating range of the pneumatic actuator to be used.
4. For control valves fitted with a 'smart' electro pneumatic positioner the filter/regulator should be suitable for being filtered to ISO 8573-1 class 2 or better.
5. If the pipework in which the control valve is going to be installed is going to be flushed prior to operation of the valve, consideration of removing the internal trim parts prior to the flushing process should be made, to prevent any subsequent damage or blockage within the trim. For this requirement please contact Pneucon Valve for a more detailed procedure and details of flushing kit to be supplied.
6. Similarly for control valves supplied with butt weld end connections and fitted with PTFE based internal parts eg pressure balance seal the trim parts should be removed to enable the body to be welded into the pipework.
7. 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 photographed and immediately reported to Pneucon Valve.
8. 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.
9. 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.

5. INSTALLATION

- The valve is supplied with a flow direction arrow either cast on to the body, detailed on a separate arrow plate or detailed on the nameplate. It is very important that the valve is installed into the pipework with the correct flow direction.
- Install the valve using accepted piping practises and preferably with suitable lengths of straight pipework both upstream and downstream.
- 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. The following is a diagram showing the preferred options for the installation of control valves fitted with a pneumatic diaphragm.



- If a normalising bonnet is provided for a high or low temperature application and the pipework is thermally lagged the lagging must be terminated at the bonnet to body flange bolting.
- If the control valve is provided with flanged connections the fasteners should be tightened evenly using the 'cross rotation' method illustrated on page no 8 of 23.



- For control valves supplied with butt weld end connections welding into the pipework shall be undertaken by qualified welders and approved weld procedures. Any subsequent local post weld heat treatment should be carried out in accordance with the approved procedure. It is recommended that the valves are in the closed position during the welding process.
- If the trim has been removed for welding the valve into the line or for flushing purposes it should be replaced with new gaskets.
- Following installation of a valve and actuator fitted with a handwheel mechanism the actuator mechanism should be checked to ensure that it is in the 'neutral' position. An input signal should then be applied to the valve actuator in order to check and confirm correct calibration of the assembly.
- All pneumatic air connections should be checked for leaks. During functional testing of a spring return diaphragm actuator, the assembly would have been subject to a pressure test at 3.4 barg.
- 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.

6. MAINTENANCE

6.1 General

The maintenance recommendations for a control valve and actuator assembly are a function of the criticality of the valve as part of the overall control system and also consideration of the severity of the duty. These factors need to be considered in determining when and how frequently a control valve should be inspected and maintained. For further recommendations for specific applications please contact Pneucon Valve.

With regards to the soft parts used within the construction of a control valve and pneumatic diaphragm actuator assembly the following are some general guidelines for periods when these various parts should be replaced.

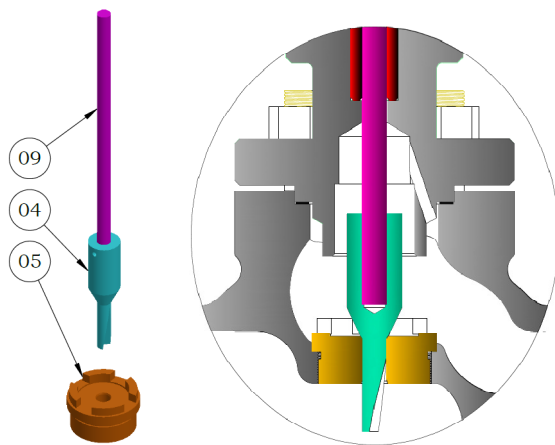
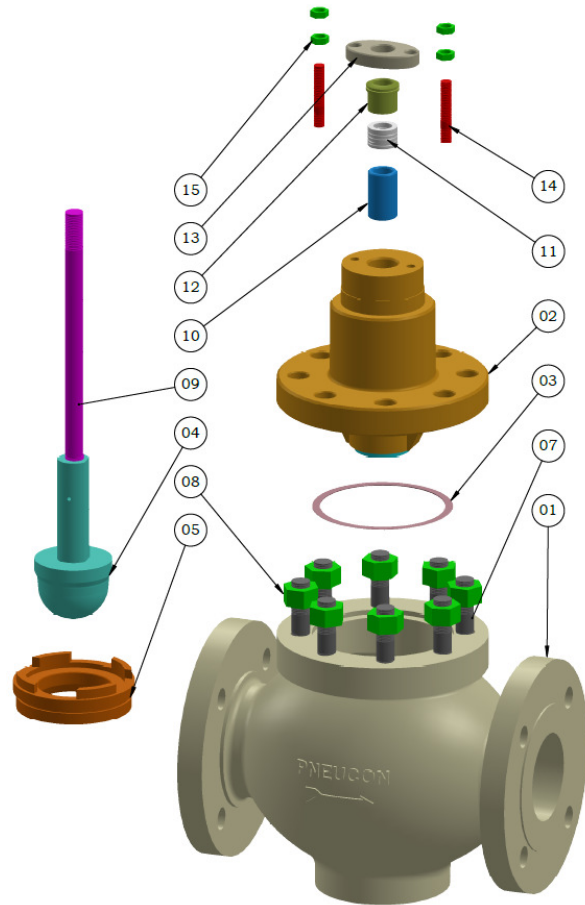
- Valve body, bonnet and seat gaskets (where applicable) – These should be replaced every time the valve is dis-assembled and re-assembled plus every 3 years between installation or replacement.
- Valve gland packing - These again should be replaced every time the valve is dis-assembled and re-assembled plus every 3 years between installation or replacement.
- Valve pressure balance seal (where applicable) – Only needs to be replaced if found to be damaged or worn plus every 4 years between installation or replacement.
- Valve seat soft face (where applicable) – Only needs to be replaced if found to be damaged or worn plus every 4 years between installation or replacement.
- Actuator diaphragm – Only needs to be replaced if found to be damaged or worn plus every 4 years between installation or replacement.
- Actuator O-rings (where applicable) – Only need to be replaced if found to be damaged or worn plus every 4 years between installation or replacement.

6.2 Removal of Actuator from Valve

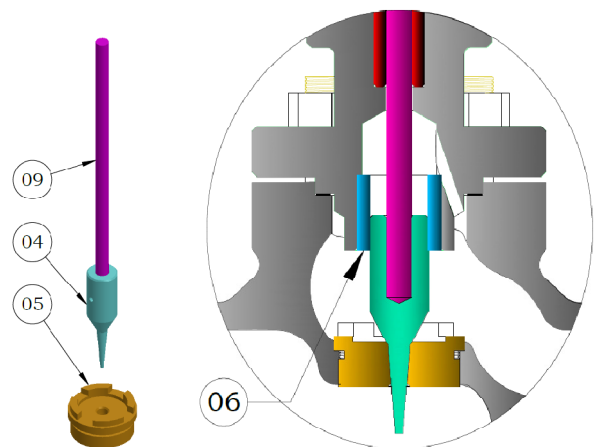
- Ideally this work should be undertaken in a workshop or if not, ensure that the valve is correctly isolated and the pipework de-pressurised.
- If still installed in the pipework remove the instrument signal to the positioner and air supply to the airset. If practical attach a temporary regulated air supply to the airset.
- Disconnect and remove any instrument linkages connected to the valve and actuator interface.
- Lift the valve plug off the seat ring using the temporary airset and remove the stem coupling.
- Unscrew and remove the locking ring from the bonnet threads.
- Check that the handwheel (if fitted) is in the 'neutral' position.
- Remove the actuator from the valve.

6.3 Disassembly Of Globe 2 Way Control Valve with Contoured, Microspline & Multistep Trim (Metal To Metal)

1. Remove the gland Stud Nut (**Part No - 15**), Gland Pusher (**Part No - 13**) & Gland (**Part No - 12**).
2. Remove the Body Bonnet Stud Nut (Part No - **8**) and lift the Bonnet (**Part No - 2**) from the valve body, while holding the plug stem assembly (**Part No - 4 & 9**).
3. Remove the plug stem assembly.
4. Remove Gasket from the body to bonnet (**Part No - 3**).
5. Remove the packing set (**Part No - 11**) and Spacer (**Part No - 10**) from the Bonnet.
6. Removal of the Seat Ring (**Part No - 5**) 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 rings the valve body should be heated to assist removal.
7. For Top Guided Valves, the Plug Guide Bush (**Part No - 6**) 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 - 6**) is not applicable in Microspline trim Design.
8. All the parts should be cleaned and examined for damage.



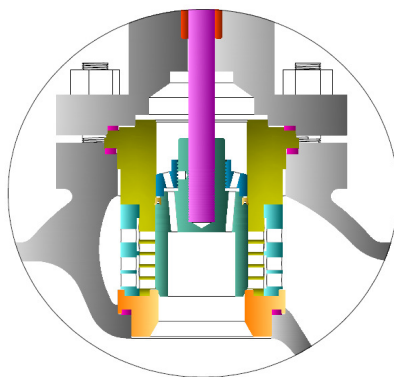
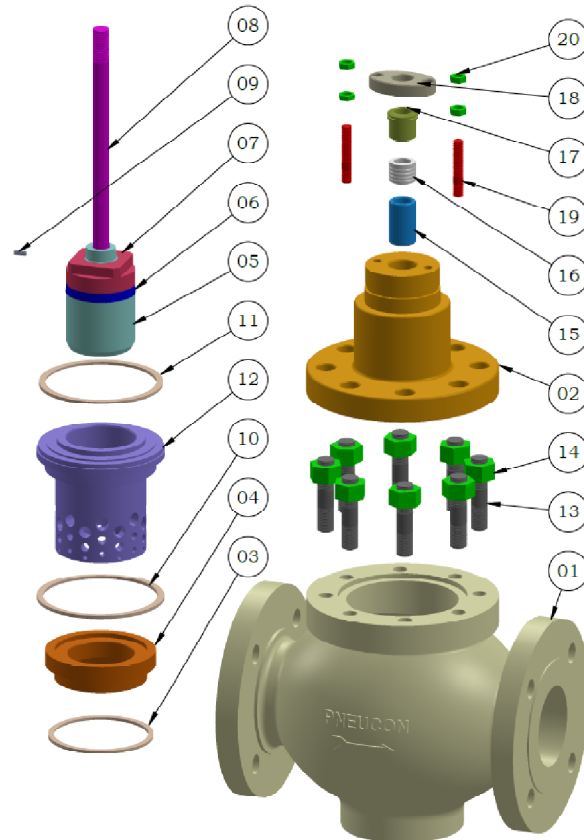
MICROSPLINE TRIM



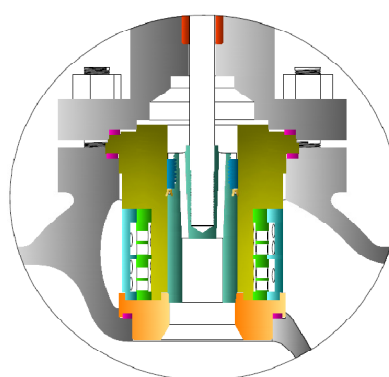
MULTISTEP TRIM

6.4 Disassembly Of Globe 2 Way Control Valve with Cage Guide Trim

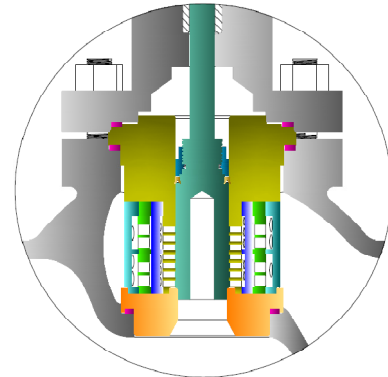
1. Remove the gland stud nut (**Part No - 20**), Gland Pusher (**Part No - 18**) & Gland (**Part No - 17**).
2. Remove the Body Bonnet Stud Nut (**Part No - 14**) and lift the Bonnet (**Part No - 02**) from the valve body, While Holding the plug stem assembly (**Part No - 05,06,07,08 & 09**)
3. Remove the packing set (**Part No - 16**) and Spacer (**Part No - 15**) from Bonnet.
4. Remove the plug stem assembly.
5. Remove Gasket from the bonnet Joint Gasket (**Part No - 11**).
6. Remove Inner Cage (**Part No - 12**)
7. Remove Gasket from Body Joint Gasket (**Part No - 10**).
8. Removal of the Seat Ring (**Part No - 04**) is only necessary for replacement or machining.
9. Above all step are also use in LN2, LN3, & LN4.
10. All the parts should be cleaned and examined for damage



LN-2



LN-3

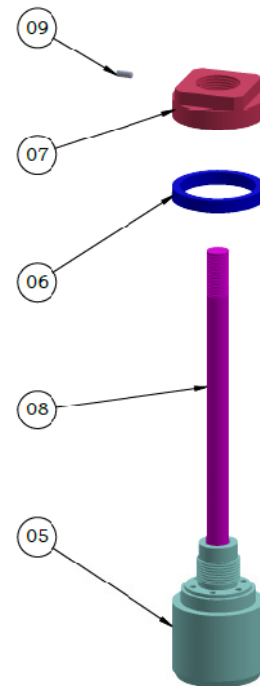


LN-4

6.5 Replacing Pressure Balanced Seal

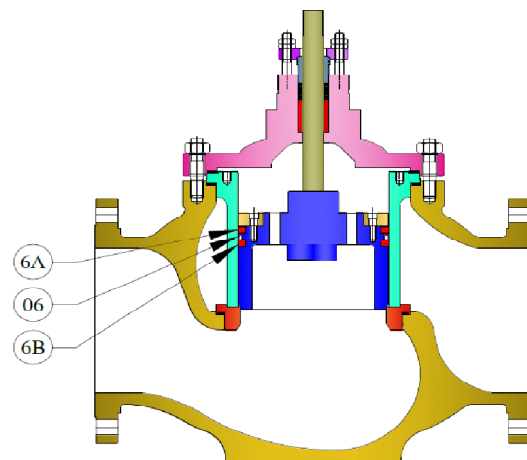
6.5.1 PTFE Seals in Trim Sizes up to 6"

1. Remove the Grub Screw (**Part No - 09**) for the Retainer nut.
2. Remove the Retainer Nut (**Part No - 07**) from the Plug Stem Assembly.
3. Remove the old Balancing Ring (**Part No - 06**) and Replace the new one Balancing Ring.
4. In the Balancing Ring there are Various type of Balancing Ring (**Part No - 06**).
 - a) PTFE = -100°C to 180°C.
 - b) GFT = -50°C To 210°C.
 - c) Carbon Filled PTFE = 0°C to 220°C.
 - d) Carbon Ring = 200°C to 550°C for High Temperature.



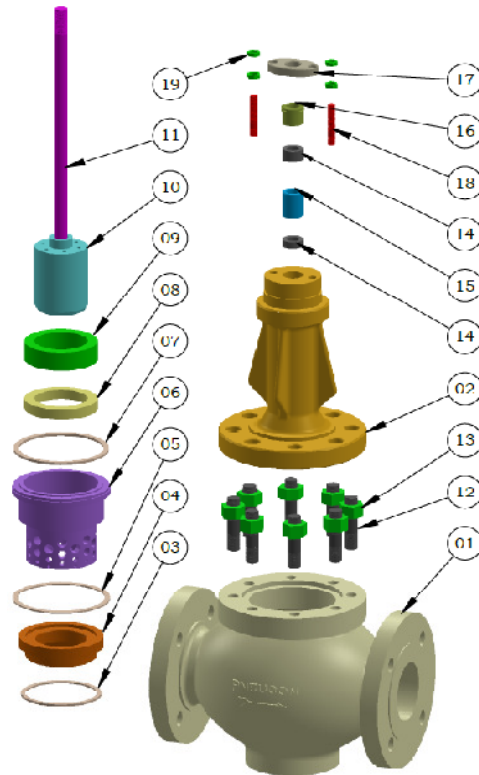
6.5.2 PTFE Seals in Trim Sizes above 6"

- Unscrew cap heads and remove seal retainer plate
- Remove upper anti extrusion ring (6A)
- Remove main pressure balance seal (6)
- Remove lower anti extrusion ring (6B)
- Replace with new pressure balance seal ensuring orientation is correct (spring upwards for 'flow under' and spring downwards for 'flow over')
- Refit anti extrusion rings, seal retainer plate and fit caphead screws



6.5.3 Disassembly Of Globe 2 Way Control Valve with Cage Guided Trim (Grafoil Design)

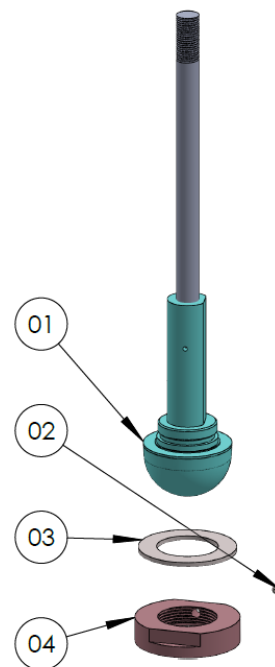
1. Remove the gland stud nut (**Part No - 19**), Gland Pusher (**Part No - 17**) & Gland (**Part No - 16**).
2. Remove the Body Bonnet Stud Nut (**Part No - 13**) and lift the Bonnet (**Part No - 02**) from the valve body, While Holding the plug stem assembly (**Part No - 08,09,10 & 11**)
3. Remove the packing set (**Part No - 14**) and Spacer (**Part No - 15**) from Bonnet.
4. Remove the plug stem assembly.
5. Remove Gasket from the bonnet Joint Gasket (**Part No - 07**).
6. Remove Inner Cage (**Part No -06**)
7. Remove Gasket from Body Joint Gasket (**Part No - 05**).
8. Removal of the Seat Ring (**Part No - 04**) is only necessary for replacement or machining.
9. All the parts should be cleaned and examined for damage



6.6 Replacing Soft Seat

6.6.1 Replacing Contoured Trim Soft Seat

- Remove plug assembly from control valve as per section 6.3
- Unscrew seal retaining ring (**Part No - 04**).
- Remove soft seat insert (**Part No - 03**)
- Replace soft seat insert
- Screw seal retaining ring on to plug



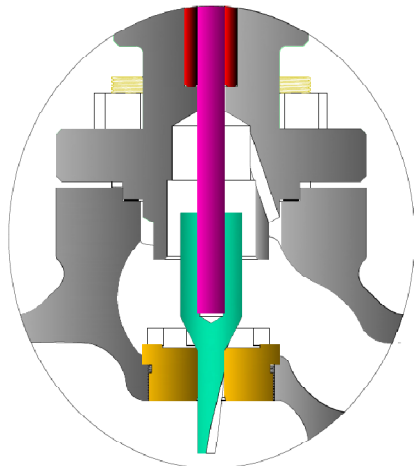
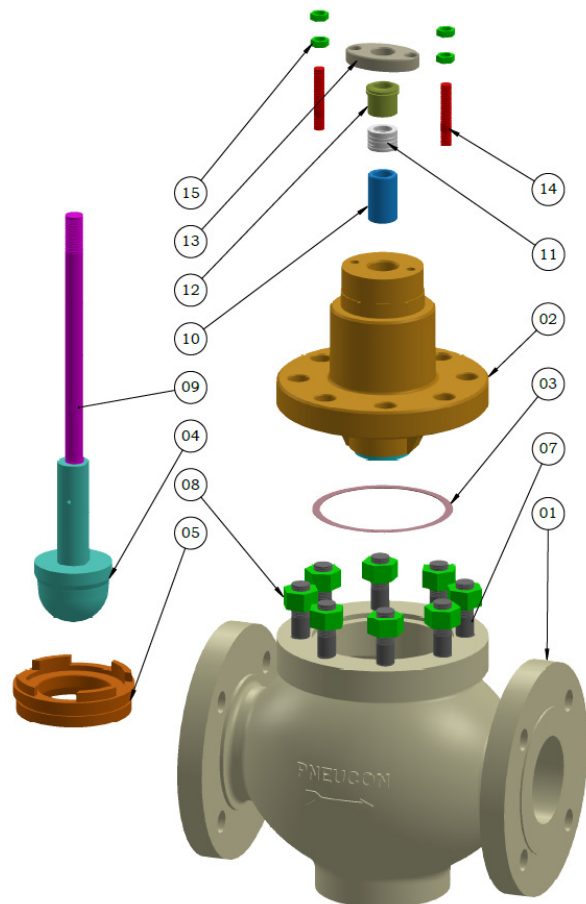
6.7 Valve Assembly

6.7.1 General

- New plugs are normally supplied with stems which are integral or fitted into the plug head. If the parts are separate the stem should be screwed into the plug head and tightened. The plug shank and stem should be drilled and countersunk. The pin is then fitted and pin peened over, before being finally machined flush to the plug shank.
- All the parts of the assembly should be cleaned and free from any debris.

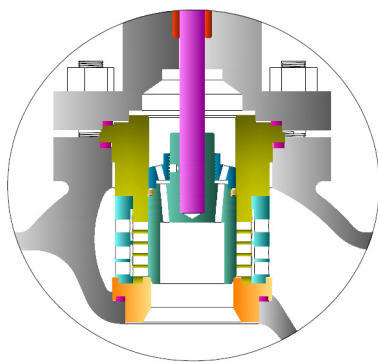
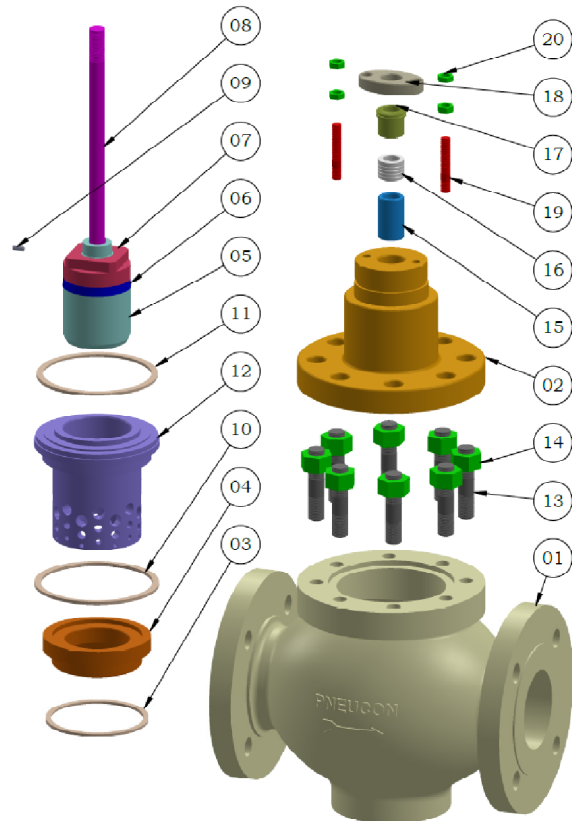
6.7.2 Assembly with Contoured, Spline Micro or Multistep Trims

- Apply sealing compound to the seat (5) and screw into body (1). The seat ring should be tightened using a seat tool (contact Pneucon Valve for further details)
- Install the plug (4) and stem (9) assembly
- Place body joint (3) in body recess
- Carefully lower the bonnet (2) over the plug stem and also over the body studs (7). The bonnet should be centred to ensure that the plug and stem assembly move freely
- Fit the body nuts (8) and tighten evenly using the 'star logic' sequence. The valve should be moved in a linear direction only, to ensure free movement of the stem
- Refer to 6.8 for assembly of gland packing options

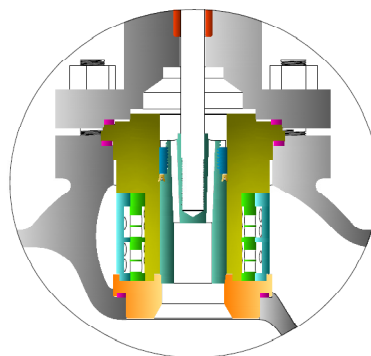


6.7.3 Assembly with Cage Guided Trim

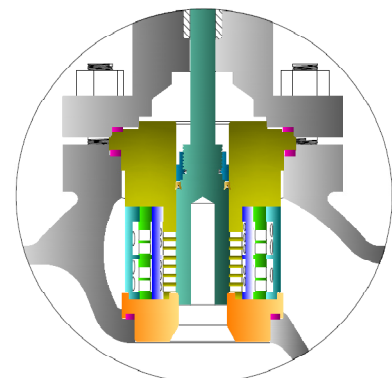
- Place seat gasket (3) in body and install seat (4)
- Place cage gasket (10) in body(1) and place cage (12) in body
- Install the plug and stem assembly
- Place body joint (11) in body recess
- Carefully lower the bonnet (2) over the plug stem and also over the body studs. The bonnet should be centred to ensure that the plug and stem assembly move freely
- Fit the body nuts (14) and tighten evenly using the 'star logic' sequence. The valve should be moved in a linear direction only, to ensure free movement of the stem
- Refer to 6.8 for assembly of gland packing



LN-2



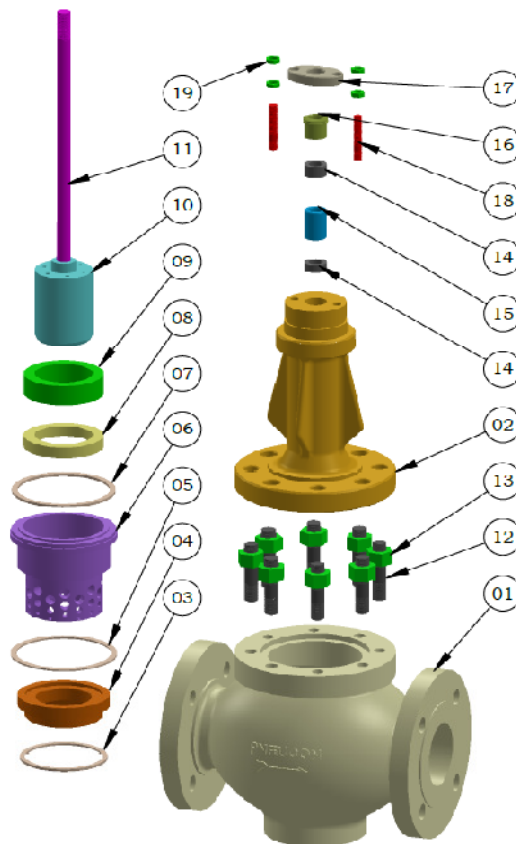
LN-3



LN-4

6.7.4 Assembly with Cage Guided Trim and Graphite Pressure Balance Seal

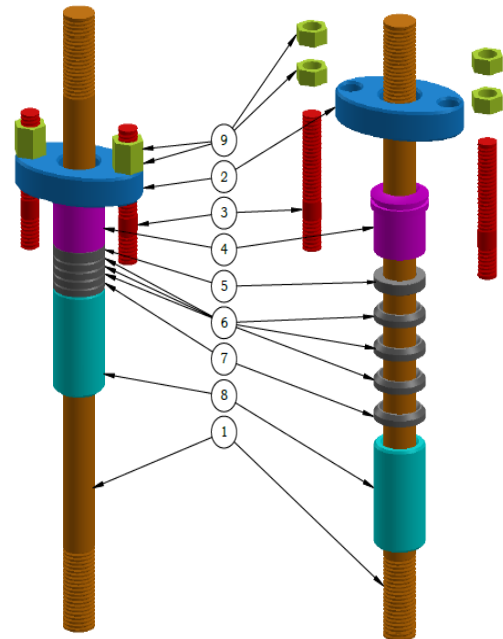
- Place seat gasket (5) in body and fit seat (4)
- Place cage gasket (10) in body (1) and place cage (6) in body
- Install graphite seal (8)
- Install seal retainer (9)
- Install the plug and stem assembly (10 + 11)
- Place body joint (7) in body recess
- Carefully lower the bonnet (2) over the plug stem and also over the body studs. The bonnet should be centred to ensure that the plug and stem assembly move freely
- Fit the body nuts (13) and tighten evenly using the 'star logic' sequence. The valve should be moved in a linear direction only, to ensure free movement of the stem
- Refer to 6.8 for assembly of gland packing



6.8 Gland Packing Assembly

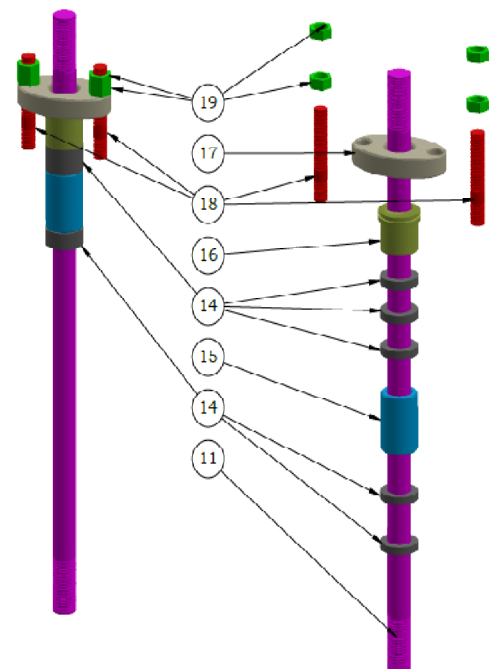
6.8.1 PTFE Gland Packing Assembly

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**)



6.8.2 Graphite Gland Packing 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**)



6.9 SEAT AND PLUG LAPPING PROCESS.

- Lapping of the plug to the seat (if required) is normally carried out during the control valve assembly and without the actuator fitted
- The valve bonnet should be fitted with the gland parts and the stem installed with a light oil applied to assist the lapping process
- Apply a lapping compound to either the seat or plug seating face (not both) and fit the bonnet assembly on to the body and loosely tighten a number of the bonnet nuts ensuring the bonnet is centralised
- Lap the plug and seat using short oscillating movements, raising the plug occasionally and lowering it to another position to ensure lapping of the entire plug and seat seating faces
- The plug and seat should show evidence of the lapping continuously around the seating faces
- Prior to final assembly of the bonnet to the body both the plug and seat parts should be cleaned



BEFORE LAPPING

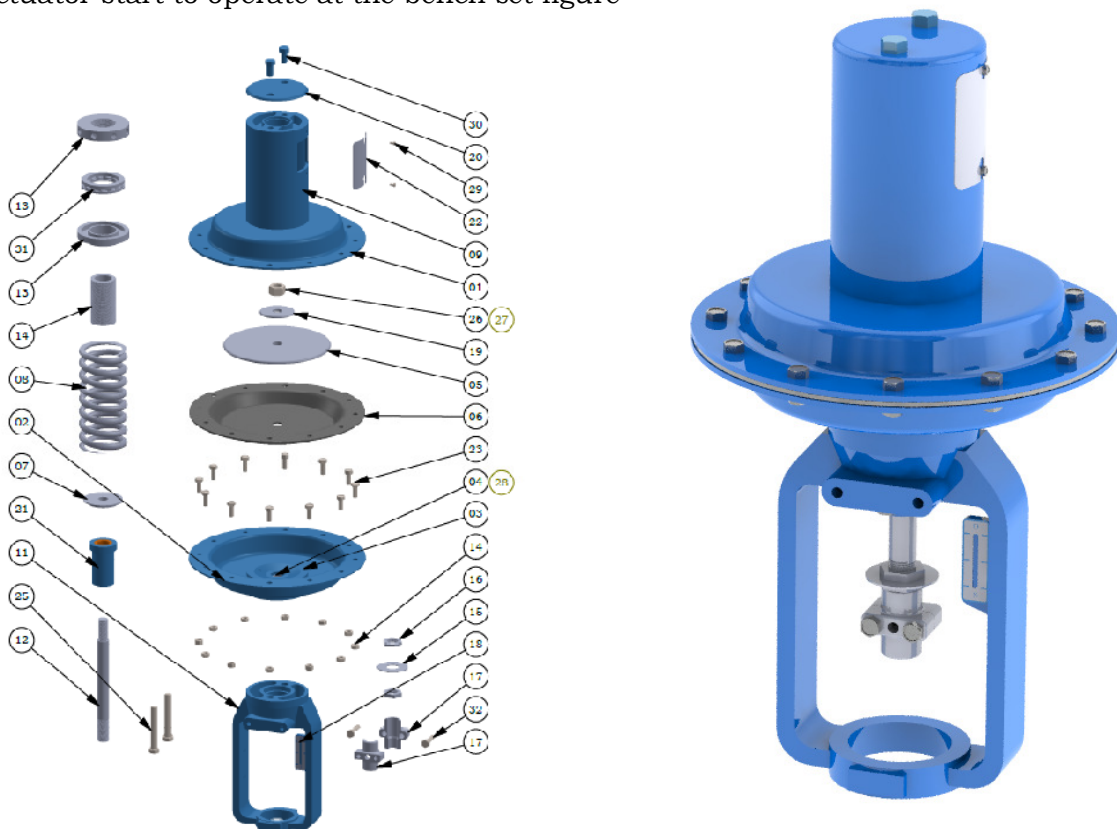


AFTER LAPPING

7 Actuator Maintenance

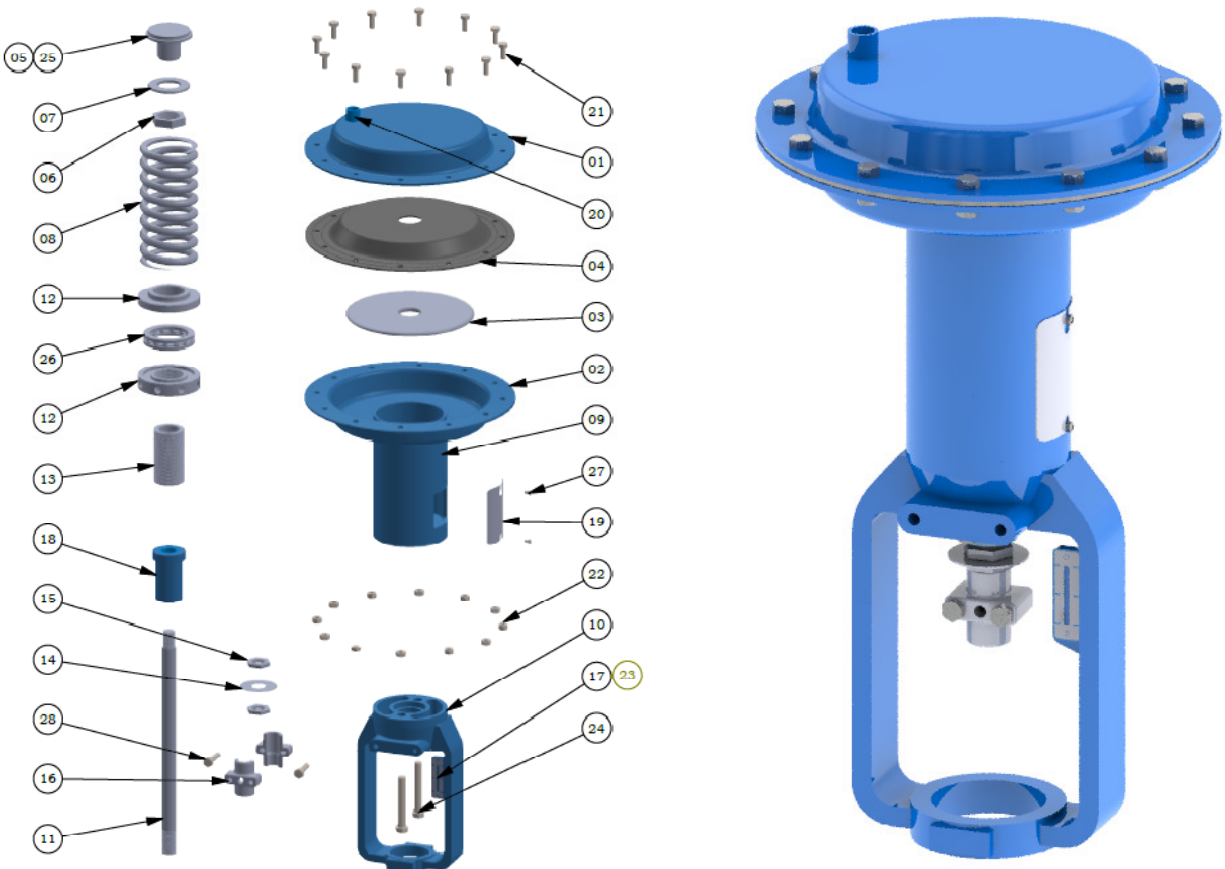
7.1 PDC Actuator Disassembly and Assembly

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



7.2 PDO Actuator Disassembly and Assembly

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.



8 Actuator to Control Valve Assembly

8.1 Fitting Actuator to Valve

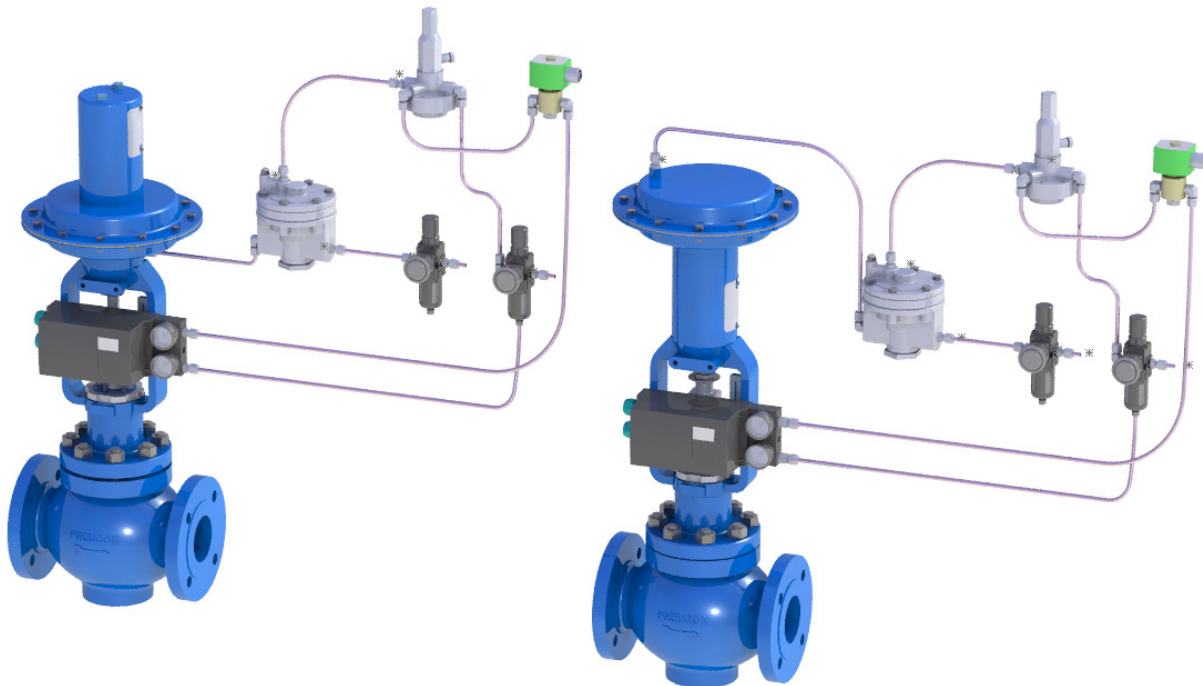
1. Ensure that the actuator is correctly assembled and calibrated.
2. Lower the actuator over the plug stem and gland flange to seat squarely on the valve bonnet.
3. Rotate the actuator to the required position, screw the locking ring onto the bonnet and securely tighten.
4. To connect the actuator to 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.



8.2 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.
4. The pneumatic supply pressure should not exceed the limits detailed for each of the respective instruments.

SCHEMATIC LINE DIAGRAM OF ACCESSORIES



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 accessories Shown in the dottedlined can be bypassed.

9. 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 corresponding 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