Masoneilan

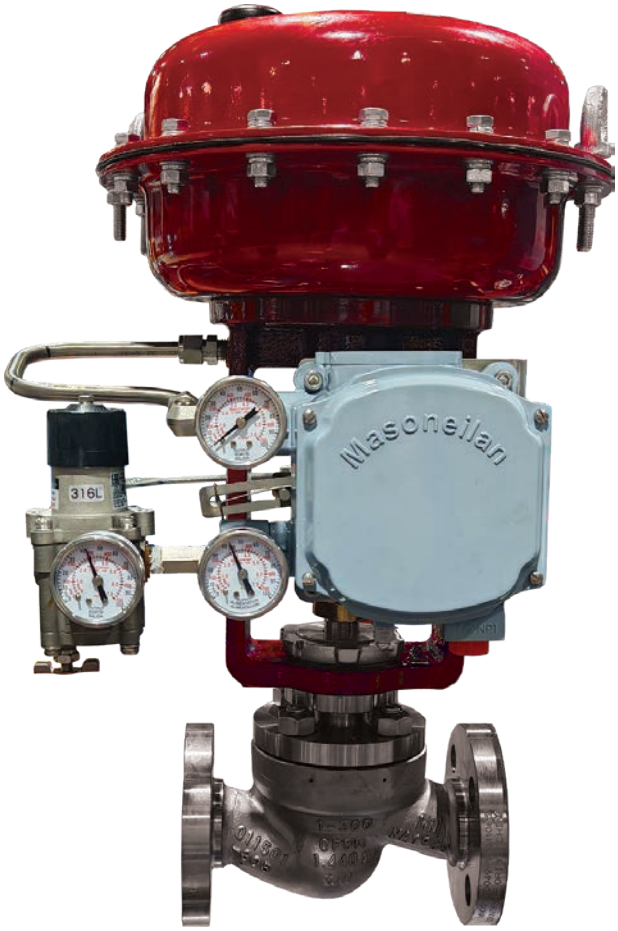
a Baker Hughes business

PXR™ Control Valve

Performance X Reliability

Stem and Port Guided Globe Valve

Instruction Manual (Rev. C)



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Safety Information

Important - Please read before installation

These instructions contain **DANGER**, **WARNING**, and **CAUTION** labels, where necessary, to alert you to safety related or other important information. Read the instructions carefully before installing and maintaining your control valve. DANGER and WARNING hazards are related to personal injury. CAUTION hazards involve equipment or property damage. Operation of damaged equipment can, under certain operational conditions, result in degraded process system performance that can lead to injury or death. Total compliance with all DANGER, WARNING, and CAUTION notices is required for safe operation.

This is the safety alert symbol. It alerts you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

CAUTION

When used without the safety alert symbol, indicates a potentially hazardous situation which, if not avoided, could result in property damage.

Note: Indicates important facts and conditions.

About this Manual

- The information in this manual is subject to change without prior notice.
- The information contained in this manual, in whole or part, shall not be transcribed or copied without Baker Hughes's written permission.
- Please report any errors or questions about the information in this manual to your local supplier.
- These instructions are written specifically for the PXR control valves, and do not apply for other valves outside of this product line.

Useful Life Period

The current estimated useful life period for the PXR control valves is 25+ years. To maximize the useful life of the product, it is essential to conduct annual inspections, routine maintenance and ensure proper installation to avoid any unintended stresses on the product. The specific operating conditions will also impact the useful life of the product. Consult the factory for guidance on specific applications if required prior to installation.

Warranty

Items sold by Baker Hughes are warranted to be free from defects in materials and workmanship for a period of one year from the date of shipment provided said items are used according to Baker Hughes recommended usage. Baker Hughes reserves the right to discontinue manufacture of any product or change product materials, design or specifications without notice.

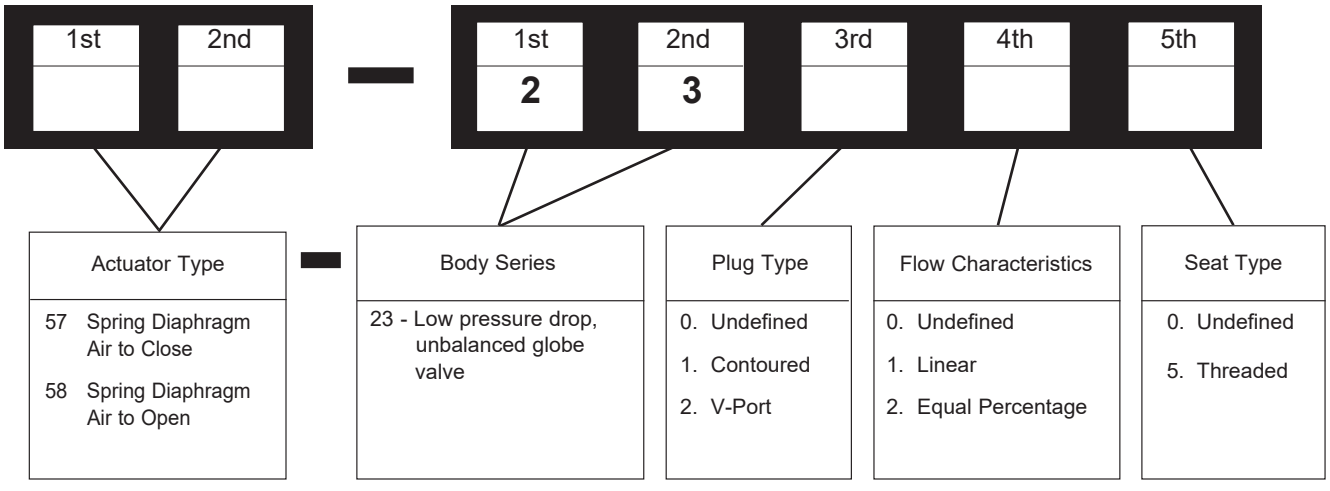
Prior to installation:

- The valve must be installed, put into service and maintained by qualified and competent professionals who have undergone suitable training.
- All surrounding pipe lines must be thoroughly flushed to ensure all entrained debris has been removed from the system.
- Under certain operating conditions, the use of damaged equipment could cause a degradation of the performance of the system which may lead to personal injury or death.
- Changes to specifications, structure, and components used may not lead to the revision of this manual unless such changes affect the function and performance of the product.

⚠ WARNING

1. It is the end user's responsibility to ensure properly loaded and supported piping to avoid undesired stresses on the product which may result in damage to the product, loss of containment, or loss of functionality and resulting unsafe states or conditions.
2. It is the end user's responsibility to correctly identify end locations and place product in areas that may contain explosive atmospheres. The failure of properly following the test, installation, maintenance and disassembly/assembly instructions may result in a compromised product which in turn could result in an uncontrolled or unexpected loss of containment and release of pressure.
3. It is the end user's responsibility to take appropriate actions to ensure that site personnel who are performing installation, commissioning, and maintenance have been trained in proper site procedures for working with and around Baker Hughes supplied equipment, per Safe Site Work Practices.
4. The failure of properly following the test, installation, maintenance and disassembly/assembly instructions may result in a compromised product which in turn could result in an uncontrolled /unexpected loss of containment and release of pressure. It is the responsibility of the person conducting the tasks listed above to take great care in following such procedures.
5. It is the end user's responsibility to:
   - Recognize and safely contain any leak.
   - Ensure proper Personal Protective Equipment is available and used.
   - Follow Proper lifting techniques and procedures, per Safe Site Work Practices.
6. Proper Lockout/Tagout of energy sources prior to maintenance, per Safe Site Work Practices, is the end user's responsibility. This includes any potential control signals or circuits that may have a remote or automated control function over any product. Instructions to properly release spring stored energy are included in this manual.
7. After installation or maintenance, it is the end user's responsibility to ensure the equipment has been properly inspected and returned to proper condition before being returned to service.

PXR Numbering System



1. Introduction

The following instructions should be thoroughly reviewed and understood prior to installing, operating or performing maintenance on this equipment. Throughout the text, safety and/or caution notes will appear and must be strictly adhered to, otherwise, serious injury or equipment malfunction could result.

Baker Hughes has a highly skilled After Sales Department available for start-up, maintenance and repair of our valves and component parts.

Arrangements for this service can be made through your local Baker Hughes's representative or sales department. When performing maintenance use only **Masoneilan™** replacement parts. Parts are obtainable through your local representative or spare parts department. When ordering parts, always include the model and serial number of the unit being repaired.

2. General

These installation and maintenance instructions apply to all sizes and ratings of the **PXR™ (Performance X Reliability)** control valves regardless of the type of trim used.

PXR single ported top guided control valves are designed with built in versatility making them well-suited to handle a wide variety of process applications.

Standard construction offers a contoured plug with a threaded seat ring. The top guided stem provides maximum support to ensure plug stability for orifice ≤ 25.4mm [1 inch].

A series of reduced area trim is available to provide wide flow range capabilities in all valve sizes.

Tight Shutoff Class IV leakage is standard. Optional constructions meet IEC 534-4 and ANSI/FCI 70.2 Class V requirements.

Replacing the conventional plug with the V-port plug design (23205 Series). The top guided stem and port guided plug provides maximum support to ensure plug stability for orifice > 25.4mm [1 inch].

Recommended spare parts required for maintenance are listed in the Parts Reference table on page 14. The model number, size, rating and serial number of the valve are shown on the identification tag located on the actuator. Refer to page 5 for the PXR numbering system.

3. Unpacking

Care must be exercised when unpacking the valve to prevent damage to the accessories and component parts. Contact the local Baker Hughes Sales office or Service Center with any issues or problems. Be sure to note the valve model number and serial number in all correspondence.

4. Installation

4.1 Piping Cleanliness

Before installing the valve in the line, clean piping and valve of all foreign material such as welding chips, scale, oil, grease or dirt. Gasket surfaces should be thoroughly cleaned to ensure leak-proof joints.

4.2 Isolation Bypass Valve

To allow for in-line inspection, maintenance or removal of the valve without service interruption, provide a manually operated stop valve on each side of the PXR valve with a manually operated throttling valve mounted in the by-pass line - see Figure 1 below.

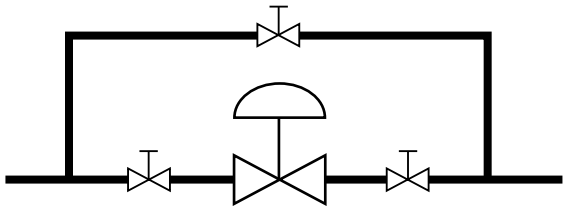


Figure 1 - Typical Installation

4.3 Flow Direction

The valve must be installed so that the process fluid will flow through the valve in the direction indicated by the flow arrow located on the body.

The flow direction of PXR is flow-to-open.

5. Air Piping

The actuators are designed to accept 1/4" NPT air supply piping. Use 1/4" OD tubing (4 x 6 mm) or equivalent for all air lines. If the supply air line exceeds 25 feet in length (7 meters) or if the valve is equipped with volume boosters, then 3/8" tubing (6 x 8 mm) is preferred. All connections must be free of leaks.

CAUTION

Do not exceed supply pressure indicated on serial plate located on the yoke of the actuator.

6. Body Disassembly

Access to the internal components of the body can be accomplished with the actuator removed. To remove the 57/58 spring diaphragm actuators from the body, refer to the 51/52/53 Series Cylinder Actuators Installation, Operation and Maintenance Manual that is applicable for type 57/58 spring diaphragm actuators due to their similarity.

CAUTION

Prior to performing maintenance on the valve, isolate the valve and vent the process pressure. Shut off the supply air line and the pneumatic or electric signal line.

6.1 Threaded Trim - Orifice ≤ 25.4mm [1 inch] (Figure 6 on page 14)

After removing the actuator, disassemble the body using the following procedure :

A. Remove body stud nuts (10).

B. Remove bonnet (8), and single piece plug and stem (16) sub-assembly together as one unit.

C. Remove threaded seat ring (14) from the body (18).

Note: Spiral wound body gasket (11) is standard in the PXR design and it is imperative that a new gasket be installed each time the valve is disassembled.

D. Remove packing flange stud nuts (3), packing flange (4) and packing follower (5).

E. Remove single piece plug and stem (16) from the bonnet (8).

CAUTION

Care must be taken not to let the integral stem/plug slip down when performing step B as it tends to slip out. Care must be taken to avoid damage to the plug stem and guide bushing.

F. Remove old packing (6) and guide bushing (12) from the bonnet. Refer to Figure 4 on page 12.

G. All components may now be inspected for wear and service damage. After determining the maintenance required, proceed to the appropriate Section of this instruction manual.

6.2 Threaded Trim - Orifice > 25.4mm [1 inch] (Figure 7 on page 14)

After removing the actuator, disassemble the body using the following procedure:

A. Remove body stud nuts (10).

B. Remove bonnet (8) and plug stem (1) and plug (16) sub-assembly together as one unit.

C. Remove threaded seat ring (14) from the body (18).

Note: Spiral wound gasket (11) is standard in the PXR design, and it is imperative that new gasket be installed each time the valve is disassembled.

D. Remove packing flange stud nuts (3), packing flange (4) and packing follower (5).

E. Remove plug (16) and plug stem (1) sub-assembly from the bonnet (8).

CAUTION

Care must be taken to avoid damage to the plug stem and guide bushing.

F. Remove old packing (6) and guide bushing (12) from the bonnet. Refer to Figure 4 - Plug Stem Pinning on page 12.

G. All components may now be inspected for wear and service damage. After determining the maintenance required, proceed to the appropriate Section of this instruction manual.

7. Maintenance and Repair

The purpose of this section is to provide recommended maintenance and repair procedures. These procedures assume the availability of standard shop tools and equipment.

7.1 Threaded Seat Ring Removal (Figure 6 on page 14)

Threaded seat rings (14) are installed tightly by the manufacturer, and after years of service they may be difficult to remove.

To facilitate removal, seat ring wrenches can be fabricated to engage the seat ring lugs and adapted to a standard wrench. If the seat ring is exceptionally resistant to removal, the application of heat or penetrating oil should be helpful.

CAUTION

When using heating devices, ensure that proper safety practices are observed. Flammability and toxicity of the process fluid must be considered and proper precautions taken.

7.2 Lapping Seats

Lapping is the process of working the valve plug against the seat ring with an abrasive to produce a close fit. If valve leakage is excessive, lapping becomes necessary. The plug and seat ring seating surfaces should be free of large scratches or other defects, and the contact surfaces of the seats should be as narrow as possible. This may require dressing both parts in a lathe. The seating surface angle of the plug is 28 degrees and the seat ring is 30 degrees (relative to the centerline axis). A good grade of fine grinding compound is required for the lapping operation.

The compound should be mixed with a small quantity of lubricant such as graphite. This will slow the cutting rate and prevent tearing of the seating surfaces. The amount of lapping required depends on the materials, condition of seating surfaces, and accuracy of machining. If a short period of lapping does not visibly improve seating, there is usually no advantage in continuing as excessive lapping may result in rough seats. The only remedy is replacement or re-machining of one or both parts. When lapping new plugs and seat rings, begin with a medium fine (240 grit) and finish with a finer grade (600 grit).

Note: Lapping should produce a line contact area, not the entire surface, due to the difference in seat angles.

CAUTION

Before lapping, the plug and stem sub-assembly must be concentric for orifice > 25.4mm [1 inch]. (See pinning operation, section 7.3).

7.2.1 Threaded Trim - Orifice ≤ 25.4mm [1 inch]

(Figure 6 on page 14)

1. Clean body gasket surface areas.
2. When seat has been removed, ensure that the sealing surface in the body bridge and the threads are thoroughly cleaned.

Note: A lubricant compatible with the process should be applied sparingly to the seat ring threads and sealing shoulder.

3. Install and tighten seat ring using fabricated wrench used for removal.

CAUTION

Do not overtighten. Do not strike seat ring lugs directly. This could distort the seat ring resulting in seat leakage.

4. Apply lapping compound on the plug at several spots equally spaced around the seating area.
5. Insert the single piece (orifice ≤ 25.4mm [1 inch]) plug and stem or plug and stem pinned > 25.4mm [1 inch] sub-assembly carefully into the body until it is seated.
6. Place bonnet (8) on the body and fasten the bonnet to the body using four body stud nuts (10) spaced equally apart. Apply slight pressure and tighten evenly.

CAUTION

Do not tighten nuts to final torque specifications at this time. The bonnet is used temporarily for guiding purposes only.

7. Insert two or three pieces of packing (6) into the packing box to assist in guiding the stem and plug during lapping.
8. Screw a drilled and tapped rod with a T-handle onto the plug stem and secure with a locknut - see Figure 2 on page 6.
9. Apply slight pressure on the stem, and rotate the stem in short oscillating strokes (around 8 to 10 times). Repeat this step as necessary.

Note: As an alternative, drill a hole through a flat steel plate and fasten to the plug stem using two locknuts.

Note: The plug should be lifted and turned 90° each time before repeating Step (9). This intermittent lifting is required to keep the plug and seat ring concentric during lapping.

CAUTION

Avoid over-lapping as this can cause damage to the seating surface that can further degrade leakage performance.

10. After completion of the lapping operation, remove bonnet and plug. The seating area of the seat ring and the plug must be cleaned of all lapping compound in preparation for reassembly. Do not remove seat ring.

7.3 Plug Stem Pinning - (Orifice > 25.4mm [1 inch])

Plug stem pinning in the field may be required for the following:

- Replacing existing plug and stem, or
- Replacing existing stem only

Replacing Plug and Stem

If it is necessary to replace the plug, then the plug stem must be replaced at the same time. The original pin hole in an existing stem will not provide the necessary fit, and might seriously impair the strength of the assembly.

Note: While pinning is being performed, care must be taken not to damage the seating surface or plug shank. Always use a soft metal or plastic vise jaws with cylindrical features to hold the plug shank area - see Figure 4 on page 12.

A. Screwing Stem to Plug

- Hold the plug (with vise jaw assembly) in a vise.
- Lock two nuts against each other on the end of the new plug stem, and screw the stem solidly into the plug using a wrench on the upper nut.

  When properly assembled, the thread in the stem should be completely engaged in the plug shank..

B. Drilling the New Parts

- **If the plug shank area has a center mark**:

  PIace the plug shank on a V-block and use a suitable drill size to either:

- Match the hole size in the plug, or
- Match Diameter C - see Figure 4 on page 12.

Drill through the plug-stem assembly.

- **If the plug shank area does not have any hole or any center mark:**
  - Measure dimension D based on the plug shank diameter and stem diameter - see Figure 4 on page 12.
  - PIace the plug shank on a V-block, and make a center mark on the plug shank area using a center punch.
  - Drill through the plug-stem assembly using a suitable size drill bit. Make sure the hole is drilled parallel -not perpendicular -to the flat on the plug shank.

In all cases after drilling: Remove any burrs from the plug shank hole by making a slight chamfer.

C. Pinning the Plug-Stem Assembly

1. Select the correct size pin based on the plug shank diameter and stem diameter - see Figure 4 on page 12. Apply a small amount of grease on the pin and hand assemble it into the hole in the plug.
2. Press fit the pin into the hole using a hammer. Complete the pinning operation by taking care to ensure that the pin is recessed by the same amount at both sides - see Figure 4 on page 12.
3. After the plug has been pinned, it should be placed in a lathe to ensure it is concentric with the stem.

If the assembly is not running true, then the stem should be placed in a collet with the plug shank against it and the plug should be adjusted. Alignment of plug stem can be performed by means of a soft faced mallet.

Replacing Existing Stem Only

A. Removing Existing Pin and Stem

1. Place the plug shank on a V-block and use a drift punch to drive out the old pin.

Note: If it is necessary to drill out the pin, use a drill bit slightly smaller than the pin diameter.

2. Hold the plug shank in a vise.
3. Lock one nut against another at the end of the plug stem. Using a wrench on the lower nut, unscrew the stem from the plug. The stem is removed by turning it counter-clockwise.

B. Screwing Stem to Plug

- Hold the plug (with vise jaw assembly) in a vise.
- Lock two nuts against each other on the end of the new plug stem, and screw the stem solidly into the plug using a wrench on the upper nut.

  When properly assembled, the reference mark (see Section A above) should be flush with the end of the plug shank.

C. Drilling the New Stem

PIace the plug shank on a V-block and use a suitable size drill bit to drill the stem (use the hole in the plug as a guide).

Note: If the hole in the plug shank has been slightly damaged while removing the old pin, choose a drill bit and a pin with a slightly larger diameter than the normal pin.

D. Pinning

Select the correct size pin based on the plug shank diameter and pin hole diameter. Proceed as described in part D of the previous section, taking care not to damage the plug shank area.

Ensure plug stem alignment following the pinning operation.

7.4 Packing Box (Figures 6 and 7)

Packing box maintenance is one of the principle action items of routine servicing. Tightness of the packing is maintained by packing compression. Compression is achieved by evenly tightening the packing flange nuts (3) against the packing flange (4). Care must be taken not to over tighten as this could prevent smooth operation of the valve. If all compression is used up and the valve leaks, then new packing is required.

CAUTION

Valve must be isolated and the pressure vented before performing packing box maintenance.

7.4.1 Braided PTFE with Carbon or Aramid Core (Standard) (Figures 6 and 7)

Note: The Braided PTFE/Carbon or Aramid packing rings have a skive cut allowing packing replacement without disconnecting the plug stem from the actuator connector or actuator stem.

A. Loosen and remove packing flange nuts (3).

B. Lift the packing flange (4) and packing follower (5) up the valve stem.

C. By means of a hooked instrument, remove packing rings (6) ensuring not to damage the sealing surfaces of the packing box or plug stem.

D. Replace packing rings (6).

Note: Assemble and compress rings one at a time into packing box. The skive cut of each packing ring must be placed about 120 degrees apart.

E. Assemble packing follower (5) and packing flange (4).

F. Assemble and tighten packing stud nuts (3).

CAUTION

Do not overtighten.

G. Place valve back in service and only tighten packing as necessary to stop external leakage.

Note: In an emergency, string packing may be used as a temporary repair only. It must be replaced with the correct packing as soon as possible.

8. Valve Body Reassembly

After completion of the required maintenance, the valve should be reassembled using the following procedures:

Note: If any of the following steps were completed during maintenance, then proceed to the next step.

A. Clean all gasket mating surfaces.

B. Lubricate seat ring threads with Never-Seez (or equivalent).

C. Install and tighten seat ring using the same wrench used for removal.

CAUTION

Do not overtighten. Do not strike seat ring lugs directly. This could distort the seat ring resulting in unwarranted seat leakage. Refer to Figure 5 on page 13 for proper seat ring torque

D. Carefully install the single piece plug and stem or plug and stem assembly based on orifice size.

Note: Valve should be lapped before final assembly. See Section 7.2.

E. Install body gasket (11).

Note: Spiral wound body gaskets (11) are standard in the PXR design. It is imperative that a new gasket be installed each time the valve is disassembled.

F. Assemble bonnet (8) and body stud nuts (10). Bonnet must be positioned so the packing flange studs are at 90° to the flow center line.

CAUTION

Tighten nuts (10) until metal-to-metal contact is obtained with proper bolt torque. Refer to Figure 5 and torque tables 2 and 3 on page 13 for proper bolt torque and tightening sequence specifications.

G. Insert guide bushing (12) and packing (6). Refer to Section 7.4 for proper packing assembly procedure for standard designs.

H. Install packing follower (5) and packing flange (4).

I. Install packing flange stud nuts (3)

CAUTION

Do not overtighten
(See Section “7.4. Packing Box”).

J. Refer to the below section 9 for 57/58 actuator mounting onto the valve and plug stem adjustment.

9. Actuators

9.1 57/58 Actuator Mounting

Assemble the pneumatic actuator with the valve using the following procedures:

Note: Check the following before mounting, then proceed to the next step.

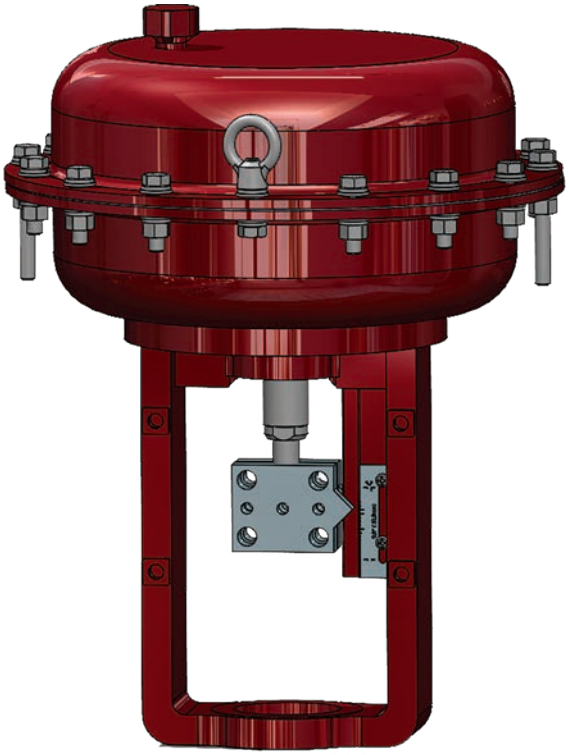
A. The spring scale

B. The actuator stroke

C. Check that the valve plug is in contact with the seat ring.

D. Position the actuator vertically on the valve bonnet spud.

E. Orient correctly the actuator and fasten it with drive nut.



CAUTION

Take care not to damage the bonnet spud nut threads when lowering the yoke onto the valve.

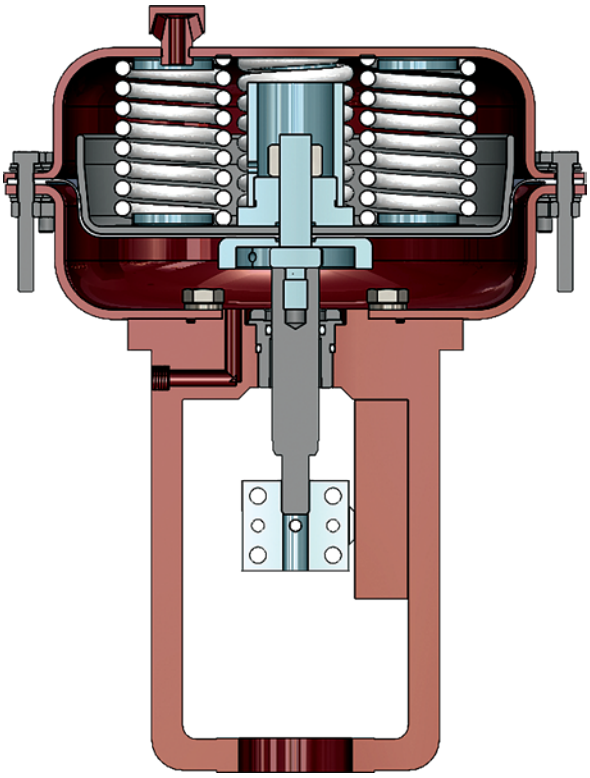
9.1.1 Air to extend (57 Actuator)

A. Apply air pressure to specified stroke of the valve.

B. Position the split clamp to engage the thread on both plug stem and actuator stem. If the split clamp does not engage with both stems, extend the actuator stem until alignment and engagement is achieved.

C. Install and tighten indicator arm, spring lock washers and hexagon screws.

D. Fix the stroke scale on the yoke to the right position in alignment with the indicator.



9.1.2 Air to retract (58 Actuator)

A. Apply air pressure to retract the actuator stem until a metal-to-metal touch has been made with the diaphragm case.

B. Carefully reduce air pressure extend the actuator stem to the specified stroke of the valve.

C. Position the split clamp to engage the thread on both plug stem and actuator stem. If the split clamp does not engage with both stems, extend the actuator stem until alignment and engagement is achieved.

D. Install and tighten indicator arm, spring lock washers and hexagon screws.

E. Fix the stroke scale on the yoke to the right position in alignment with the indicator.

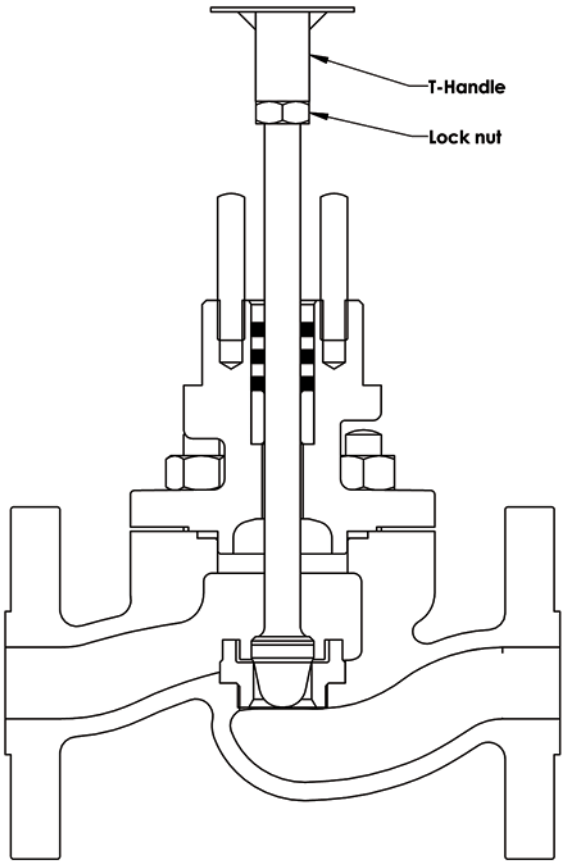


Figure 2 - Seat Lapping Device

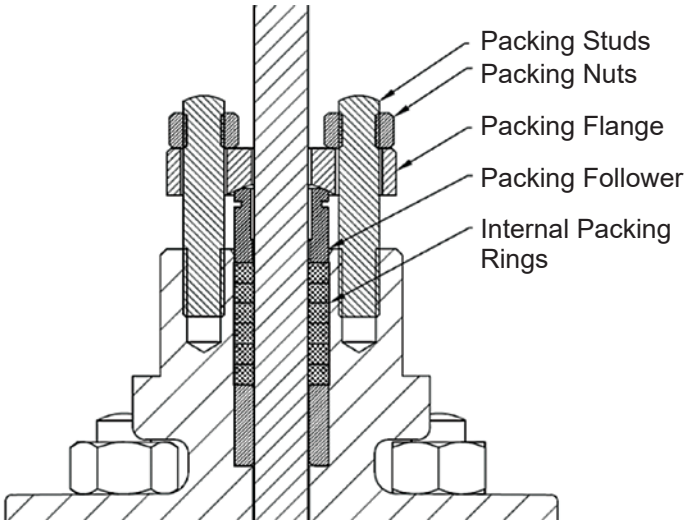


Figure 3 - Standard Packings

Note: Actual quantity of packing rings may defer from the representation depending on the stem size and supplier.

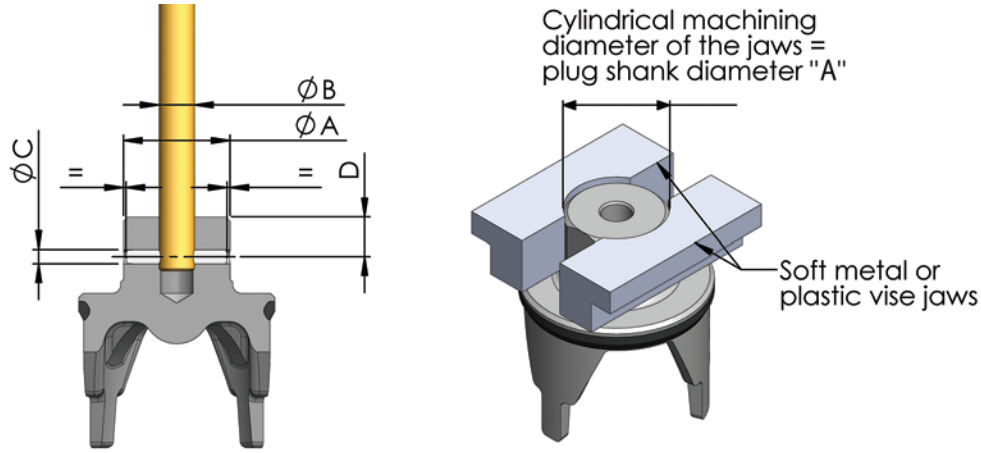


Figure 4 - Plug Stem Pinning

Table 1 - Plug Stem Pinning

Valve Size		Plug Shank Diameter A		Plug Stem Diameter B		Pin Hole Diameter C		D	
NPS	DN	in.	mm	in.	mm	in.	mm	in.	mm
1.5	40	0.89	22.5	0.5	12.70	0.188	4.78	0.551	14
3 - 4	80 - 100	1.5	38.1	0.5	12.70	0.188	4.78	0.551	14
6	150	1.57	40	0.75	19.05	0.250	6.35	0.827	21

10. Assembly Torque Requirements

Table 2 - Seat Ring Torque

Valve Size		Seat ring Thread Diameter	Torque	
NPS	DN	(in.)	(FT-LBS)	(m.daN)
0.75	20	1.25	60	8
1	25	1.25	60	8
1.5	40	2.125	200	27
2	50	2.125	200	27
3	80	3.25	720	98
4	100	4.25	1080	146
6	150	5.75	2750	373

Table 3 - Body and Bonnet Bolting

Valve Size		ASME Class	Stud Size	Stud Qty	Body/Bonnet: All Material Bolt Materials: ASME A193 Gr B7 ASTM A194 Gr 2H	
					Torque	
NPS	DN				(FT-LBS)	(m.daN)
0.75 - 1	20 - 25	150 - 300	1/2 - 13	4	20.7	2.8
1.5 - 2	40 - 50		1/2 - 13	4	27.3	3.7
3	80		5/8 - 11	6	53.1	7.2
4	100		5/8 - 11	8	57.5	7.8
6	150		5/8 - 11	12	57.5	7.8

Notes:

1. Do not exceed maximum torque values listed.
2. Tighten in increments until required torque levels are reached.
3. Reject assembly if metal-to-metal contact is not achieved after reaching maximum torque.
4. Torque requirements shown are for standard B7 studs and 2H nuts.

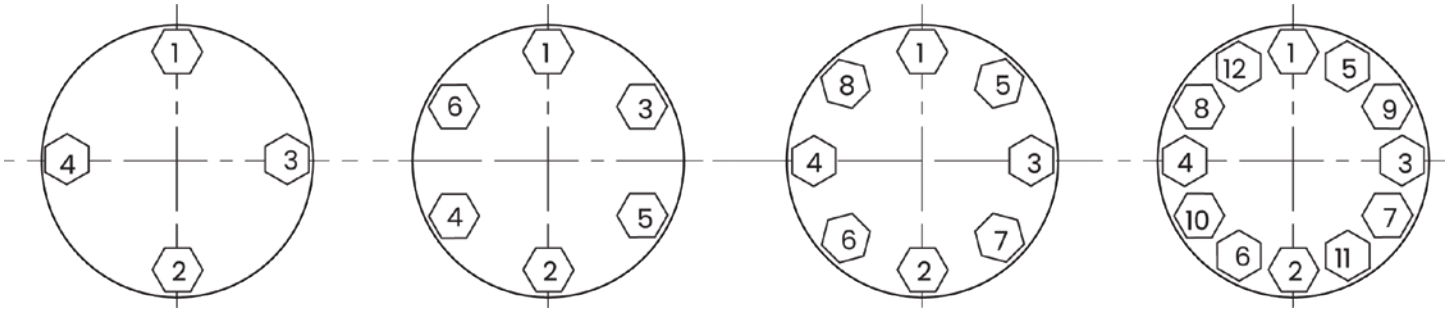


Figure 5 - Bolting Torques and Tightening Sequence

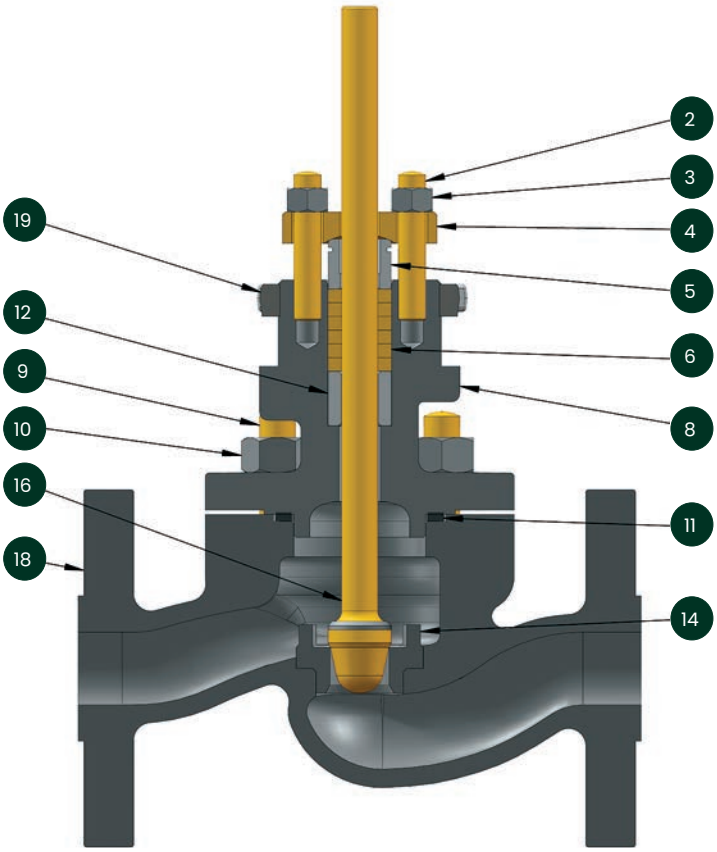


Figure 6 - Threaded Seat Ring Contoured Plug

NPS 0.75” to 3” (when orifice ≤ 25.4mm [1 inch])

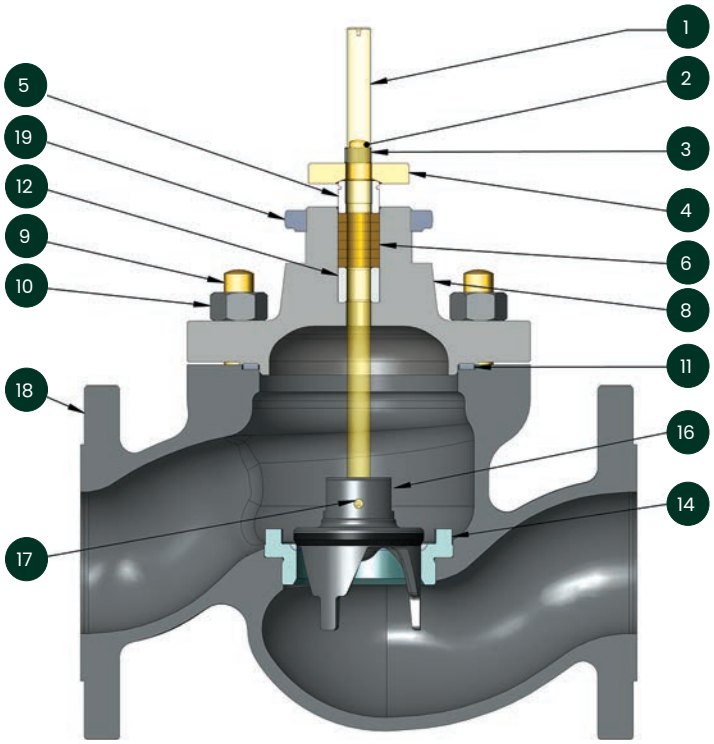


Figure 7 - Threaded Seat Ring V-Port Plug

NPS 1.5” to 6” (when orifice > 25.4mm [1 inch])

Parts Reference

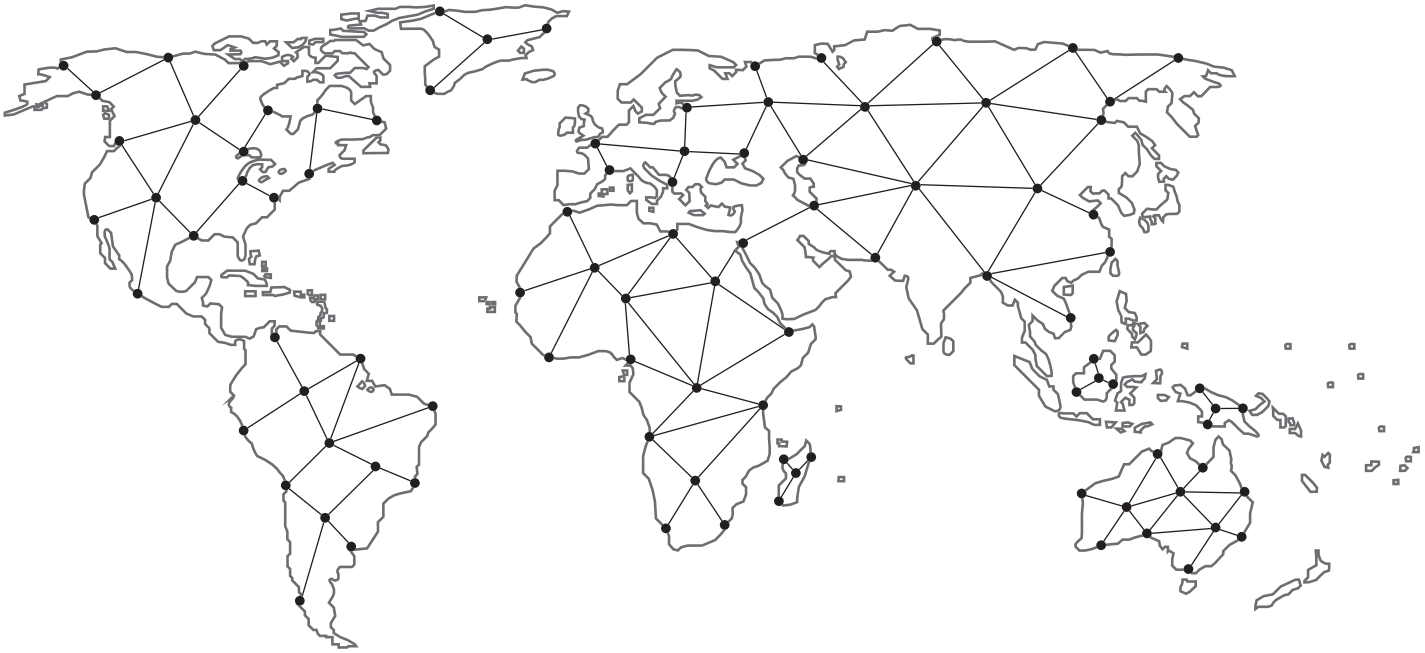
Ref.	Part Name	Ref.	Part Name
● 1	Plug Stem	10	Body Stud Nut
2	Packing Flange Stud	● 11	Body Gasket
3	Packing Flange Stud Nut	12	Guide Bushing
4	Packing Flange	● 14	Seat Ring
5	Packing Follower	● 16	Plug
● 6	Packing	● 17	Plug Pin
8	Bonnet	18	Body
9	Body Stud	19	Drive Nut

● Recommended spare parts

Notes:

Find the nearest local Channel Partner in your area:

valves.bakerhughes.com/contact-us



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