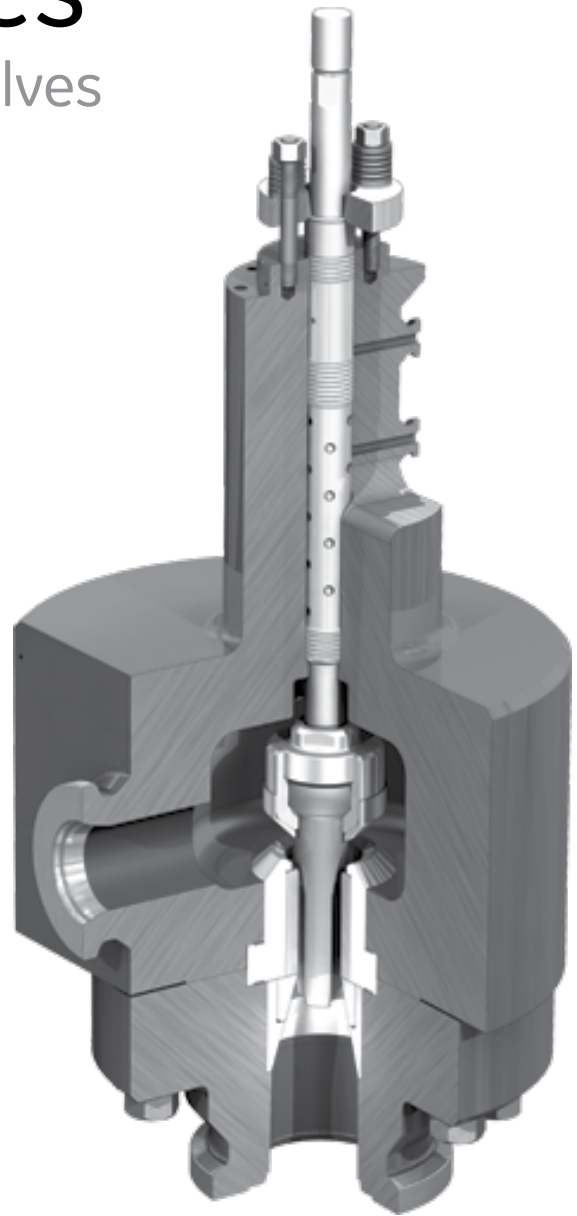


# Masoneilan\*

# 74000 Series

Erosion Resistant Control Valves  
Instruction Manual (Rev.A)



**THESE INSTRUCTIONS PROVIDE THE CUSTOMER/OPERATOR WITH IMPORTANT PROJECT-SPECIFIC REFERENCE INFORMATION IN ADDITION TO THE CUSTOMER/OPERATOR'S NORMAL OPERATION AND MAINTENANCE PROCEDURES. SINCE OPERATION AND MAINTENANCE PHILOSOPHIES VARY, BHGE (BAKER HUGHES, A GE COMPANY AND ITS SUBSIDIARIES AND AFFILIATES) DOES NOT ATTEMPT TO DICTATE SPECIFIC PROCEDURES, BUT TO PROVIDE BASIC LIMITATIONS AND REQUIREMENTS CREATED BY THE TYPE OF EQUIPMENT PROVIDED.**

**THESE INSTRUCTIONS ASSUME THAT OPERATORS ALREADY HAVE A GENERAL UNDERSTANDING OF THE REQUIREMENTS FOR SAFE OPERATION OF MECHANICAL AND ELECTRICAL EQUIPMENT IN POTENTIALLY HAZARDOUS ENVIRONMENTS. THEREFORE, THESE INSTRUCTIONS SHOULD BE INTERPRETED AND APPLIED IN CONJUNCTION WITH THE SAFETY RULES AND REGULATIONS APPLICABLE AT THE SITE AND THE PARTICULAR REQUIREMENTS FOR OPERATION OF OTHER EQUIPMENT AT THE SITE.**

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## Safety Information

### Important - Please Read Before Installation

Masoneilan 74000 Series control valves 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.



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



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



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



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 BHGE'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 74000 Series control valves, and do not apply for other valves outside of this product line.

## Life Period

The current estimated useful life period for the Masoneilan 74000 Series 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 BHGE 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 BHGE recommended usages. BHGE reserves the right to discontinue manufacture of any product or change product materials, design or specifications without notice.

This instruction manual applies to the Masoneilan 74000 Series control valves.

## The Control Valve:

- Must be installed, put into service and maintained by qualified and competent professionals who have undergone suitable training.
- 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.
- All surrounding pipe lines must be thoroughly flushed to ensure all entrained debris has been removed from the system.

## Introduction

### Scope

The following instructions are designed to guide the user through the installation and maintenance of the Masoneilan 74000 Series control valves.

The Masoneilan 74000 Series product is part of BHGE's Engineered Product portfolio, and is custom designed to fit our customer's most difficult applications. This document provides detailed installation and maintenance instructions for all sizes, ratings and trim types used in the 74000 Series product line.

### Serial Plate

The serial plate is usually fixed to the side of the actuator yoke. It indicates information about the valve including size and type, pressure class rating, body/bonnet material, and serial number.

### After Sales Service

BHGE offers After Sales Service comprised of highly qualified technicians to support the installation

operation, maintenance and repair of its equipment. For support contact the local BHGE representative or Masoneilan factory located closest to you.

### Spare Parts

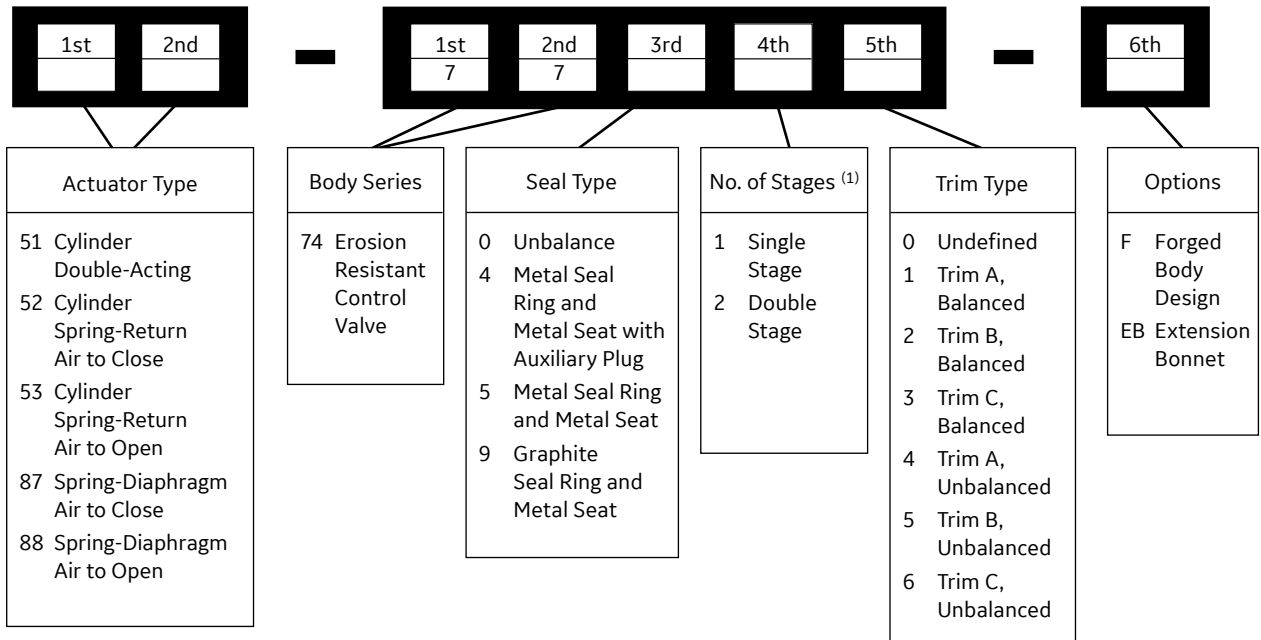
Only Masoneilan replacement parts should be used when carrying out maintenance operations. Obtain replacement parts through local BHGE representatives or Masoneilan Parts Department.

When ordering spare parts, the **MODEL AND SERIAL NUMBERS** indicated on the manufacturer's serial plate **MUST BE GIVEN**. The serial plate is on the side of the actuator yoke.

### Actuator and Accessories

Actuators and other valve accessories have their own instruction manuals, that provide information and details on the assembly and installation. Refer to the appropriate instruction manual for each unique accessory.

## Numbering System



<sup>(1)</sup> Additional stages are available to meet specific operating conditions. Please consult BHGE.

Trim A, High  $C_v$ , Low  $\Delta P$   
 Trim B, Moderate  $C_v$  and  $\Delta P$   
 Trim C, Low  $C_v$ , High  $\Delta P$

## Unpacking

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

## Installation

### CAUTION

The 74000 Series control valve must always be installed with the flow tending to close the valve plug. For applications where insulation of the valve body is required, do not insulate the valve bonnet.

## 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 mating surfaces must be thoroughly cleaned to ensure leak-free joints. Sacrificial start-up fixtures can be purchased from BHGE to protect the operational trim during the installation and line flushing phases.

### WARNING

If major system or piping modifications (or repairs) are performed, thorough flushing and blowdown of the system will be required prior to reinstalling the 74000 Series trim. Sacrificial flushing trim should be installed in this valve to protect the integrity of the flow passages. Failure to follow this warning will violate the valve warranty agreement and could result in control instability, excessive noise levels, and valve leakage.

## Isolation Bypass Valve

To allow for in-line inspection, maintenance and removal of the valve without service interruption, provide a manually operated shutoff valve on each side of the control valve and a manually operated throttling valve in the bypass line.

## Heat Insulation

In case of a heat-insulated installation, do not insulate the valve bonnet and take protective measures relative to personal safety.

## Hydrostatic Testing and Line Cleaning

During this operation, the control valve must not be used as an isolating valve. This means that the valve must always be opened before carrying out pressure tests in the process line, cleaning of pipes, etc. Otherwise

equipment damage or failure of the seal rings could result. Flushing and hydrostatic test equipment can be purchased from the Masoneilan factory.

## 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.

## Welded Connections

### CAUTION

Carefully review the information in this section prior to welding any valves inline. Refer any additional questions to the local BHGE Sales Office or Service Center.

### Pre-Weld Preparation

Carefully follow the installation steps defined in the sections noted above prior to performing weld procedures.

### Welding Process

Perform welding process in accordance with the standard requirements for the materials and weld construction of the specific valve. Apply post weld heat treatment if required.

### CAUTION

Internal valve components should be removed prior to performing any post weld heat treatment in order to prevent damage. If unable to remove the elastomeric components, then other methods must be employed to prevent the local temperature around the seals from exceeding the maximum material limits (typically 450°F/232°C for teflon-based materials).

### Post Weld Cleaning & Assembly

Inspect the body, bonnet, and trim components for cleanliness and surface condition. Remove any foreign materials, such as weld chips, slag or scale. Make sure there are no nicks, scratches, burrs or sharp corners on sealing and sliding surfaces. Clean all gasket interface surfaces and reassemble using new gaskets to ensure sealing integrity.

## Actuator Assembly

Assemble the actuator onto the control valve using the appropriate instructions for the specific actuator model and type. Connect air pressure lines to the actuator ports to meet intended operating mode (i.e., air-to-extend, air-to-retract, or double-acting).

## Disassembly

### **CAUTION**

Prior to performing any maintenance on the valve, isolate the valve and vent the process pressure.

### Valve Actuation

Access to the internal components of the valve should be accomplished with the actuator removed. Follow the detailed instructions below and refer to the appropriate actuator instruction manuals.

### **WARNING**

Actuator may be pre-loaded with tension from air pressure or springs. Prior to disconnecting instrumentation read all instructions for the specific actuator.

### Disconnect Instrumentation

Disconnect all mechanical connections between the positioner and the other instruments. Disassemble the valve stem and actuator stem coupling as described in the following sections.

### Air-to-Retract Actuators

Apply sufficient air pressure to the actuator to retract the stem completely. Disconnect the plug stem from the actuator stem depending on the connection type as described below.

#### Threaded Connection

Unscrew the plug stem from the actuator stem, making sure the plug never contacts the seating area (liner or seat ring) at any time during disassembly.

### **CAUTION**

Contact between the plug and seating area during this disassembly process may cause damage to the seating surfaces. It may be necessary to disassemble the actuator yoke from the valve bonnet and lifting the actuator off the valve to avoid plug to seating surface contact.

#### Stem Connector

Remove the screws and disassemble the stem connector from the valve and actuator stems.

### Air-to-Extend Actuators

For this actuator configuration, the valve plug is already in the fully retracted position without any air pressure applied.

Disconnect the plug stem and actuator stem as described in the threaded connection and stem connector sections above depending on the connection type.

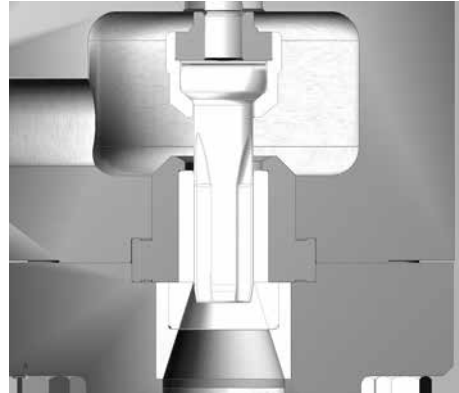
### Actuator Removal

Disconnect all electrical and air connections to and from the actuator. Disassemble yoke nut or yoke attachment screws, and lift the actuator off of the valve being careful not to damage the bonnet threads.

### Valve Disassembly

**The valve must always be reassembled with new packing set and gaskets.** Before disassembly, make sure the recommended spare parts are available for reassembly.

1. Disconnect the piping to the leak detector connection on the bonnet (if applicable).
2. Remove the body stud nuts (8) from the bottom flange (1) of the valve body. Refer to Figure 1 for reference to valve assembly.



**Figure 1: 74000 Series Trim Configuration**

### **CAUTION**

Valve plug and stem S/A (3), seat ring S/A (4), and venturi S/A (5) are all made from hard materials and have brittle properties. Extreme care should be used while removing these parts to prevent chipping and breaking.

3. Disassemble the bottom flange (1), including the venturi S/A (5) from the valve body as a single unit. Inspect the venturi S/A (5) to ensure it is free from defects including early signs of erosion, such as scratches and wear.

**Note: the venturi S/A (5) is a two-piece assembly made up of an outer piece and an inner liner.**

**This assembly should be purchased as a**

### complete assembly.

4. Remove the first body gasket (6), the seat ring S/A (4), and the second body gasket (6) from the valve body (2). Inspect the seat ring S/A inner liner to ensure it is free from defects including early signs of erosion, such as scratches and wear.

## CAUTION

Prior to removing the seat ring S/A (4), lift the plug and stem S/A (3) off the seat and use caution to avoid unnecessary contact to prevent chipping and breaking.

**Note: The seat ring S/A (4) is a two-piece assembly made up of an outer piece and an inner liner. This assembly should be purchased as a complete assembly.**

5. Remove the packing flange nuts (18), packing flange washers (17), and packing flange disc springs (15). Next remove the packing flange (14) and the packing follower (13).
6. Remove the plug and stem S/A (3) from the valve body (2) by pulling downward through the valve seat. Inspect the plug and stem S/A to ensure it is free from defects including early signs of erosion, such as scratches and wear.

## CAUTION

Valve plug and stem S/A (3) is made from hard materials and has brittle properties. Extreme care should be used while removing this part to prevent chipping and breaking.

7. Remove the old packing set (19), anti-extrusion packing rings (11 and 12), packing spacer (10), and lantern ring (9).

**Note: Lantern ring (9) is only available for units with the leak detector bonnet option.**

8. Thoroughly inspect the body (2), plug and stem S/A (3), seat ring S/A (4), venturi S/A (5), and bottom flange (1) for any visual defects or damage. Carefully inspect the dynamic sliding surfaces and the seal interface areas.

## Maintenance & 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.

## Packing Box

Packing box maintenance is one of the principal tasks during routine servicing. Tightness of the packing (19) is maintained by proper compression. Compression is achieved by evenly tightening the packing flange nuts (18) against the packing flange (14). Periodic re-tightening of the packing flange nuts may be required to maintain proper sealing.

## CAUTION

Care must be taken not to over tighten, as this could create unnecessary friction preventing smooth valve operation. If packing leakage persists after applying maximum compression, then the packing needs to be replaced.

## CAUTION

The valve must be isolated and the process pressure vented prior to performing any packing box maintenance.

## PTFE Packing

Kevlar®/PTFE, carbon/PTFE and pure PTFE packing rings are cut in such a way that they can be replaced without having to separate the valve plug stem from the actuator stem.

1. Unscrew and remove the packing flange nuts (18) and packing bolt springs (15).
2. Lift the packing flange (14) and packing follower (13) up along the valve stem.
3. By means of a puller, remove the packing set (19), antiextrusion packing rings (11,12), packing spacer (10), and lantern ring (9), being careful not to damage the sealing surface of the packing box or the valve plug stem.
4. Replace the packing rings, placing the cut in each ring about 120° apart from the adjacent ring. Press rings in one at a time.
5. Reassemble the packing follower (13) and the packing flange (14).
6. Tighten the packing flange nuts (18) without over compressing the packing rings.
7. Put the valve back into service and check for leakage. Tighten packing flange nuts (18) as required.



## Valve with Graphite Packing

To replace Graphite packing, it is necessary to separate the valve plug stem from the actuator stem.

1. Remove the packing flange nuts (18) and packing bolt springs (15).
2. Lift the packing flange (14) and packing follower (13) up along the valve stem.
3. By means of a puller, remove the packing set (19), antiextrusion packing rings (11,12), packing spacer (10), and lantern ring (9), being careful not to damage the sealing surface of the packing box or the valve plug stem.
4. Replace the packing set (19). Press a back-up ring (carbon/graphite/Inconel braided ring) into the bonnet (2). Next press the expanded graphite rings into the packing area one at a time. Press an additional back-up ring into packing area.
5. Reassemble the packing follower (13) and the packing flange (14).
6. Tighten the packing flange nuts (18) without overcompressing the packing rings.
7. Open and close the valve several times then retighten the packing as required.
8. Put the valve back into service and check for leakage. Tighten packing flange nuts (18) as required.

## Parts Repair

Carefully examine parts for any scratches, unusual wear, or other visual damage prior to re-assembly.

## Seating Surfaces

The seat ring S/A (4) and valve plug S/A (3) seating surfaces must be completely free of dents, scratches, wear, or other visual damage. Any seating surfaces showing signs of minor deterioration must be replaced with OEM parts from the factory.

## Gaskets

Gasket seating surfaces must be free of dents, scratches, corrosion, or other types of damage. Clean mating surfaces as required and replace any non-conforming parts. Spiral wound gaskets (4) must always be replaced after disassembly.

## Valve Plug and Stem S/A

The valve plug and stem assembly are closely set under tight tolerances to prevent damage to the hardened (and extremely brittle) parts. For this reason, the plug and stem assembly must always be replaced together as a complete assembly with factory OEM parts.

## Seat Ring S/A and Venturi S/A

These sub-assemblies are each fit together using a heat shrinking process. The seat and liner of each of these assemblies should never be separated. The assemblies must always be replaced as complete assemblies using factory OEM parts.

## Valve Reassembly

Make sure the valve body and gasket surfaces are clean and free of any damage.

### CAUTION

Make sure any recommended lubricants or sealing compounds are compatible with the process fluid. Use acceptable substitutes as required.

### CAUTION

Valve plug and stem S/A (3), seat ring S/A (4), and venturi S/A (5) are all made from hard materials and have brittle properties. Extreme care should be used while removing these parts to prevent chipping and breaking.

1. Apply a light film of fully synthetic motor oil around the valve stem.
2. Install the plug and stem S/A (3) into the valve body through the valve seat. Slide the plug and stem into the body guiding area until it reaches a full stop. Care should be taken not to scratch or damage the surface of the stem.
3. Assemble the first body gasket (6) into the valve body (2).
4. With the plug in the full lift position, carefully insert the seat ring S/A (4) into the valve body ensuring the plug is properly aligned with the center of the seating area.
5. Slide the bottom anti-extrusion ring (11) onto the valve stem through the upper extension area of the valve body. Using a piece of soft material (such as a plastic or cardboard cylinder), press the ring down along the stem using caution to ensure the part remains perpendicular to the bore axis. If the ring doesn't slide easily, wobble the stem slightly to adjust for any misalignment.
6. Line the inner diameter of the packing set with a light coat of lubricant, such as Nikal Nuclear Grade anti-seize or equivalent, and slide the lower packing set into the valve body along the stem. Periodically slide the plug S/A (3) and seat ring S/A (4) to confirm they move freely.

# CAUTION

The body flange (1) and packing flange (14) should never be tightened if the binding exists. Tightening of these components could add stress to the trim parts and result in fracturing or chipping.

7. Tighten the packing flange (14) only sufficiently to prevent leakage of the process fluid.

**Note: Do not over tighten the packing flange (14) or friction may negatively impact the control response of the valve.**

8. Assemble the second body gasket (6) on top of the seat ring S/A (4).
9. Insert the venturi S/A (5) into the bottom flange (1).
10. Assemble the bottom flange (1) over the valve body (2) and align the bolt holes with the body studs (7).

## Body Bolting

1. Grease the threads of the valve body studs (7) and the bearing surfaces of the body nuts (8).
2. Assemble the body nuts (8) onto the body studs (7) manually, and hand tighten evenly so that the internal parts are held in place. The face of the body flange (1) should be parallel to the top surface of the valve body.
3. Tighten the body nuts (8) evenly by applying the torque in the increments and the sequences as defined on the factory assembly drawing.
4. Check plug and stem assembly in between various tightening steps to make sure they are not binding due to misalignment.

**Note: Tighten the body nuts (8) in increments of 25%, 50%, 75% and 100% of the total torque requirements. Go through each sequence as specified in Figure 2 below until the final torque values are reached.**

Visually inspect the assembly for proper stud and nut installation by checking the number of exposed threads. If less than one stud thread or more than 2-1/2 threads are extended above the body nut after final tightening, then double check assembly for proper installation and alignment.

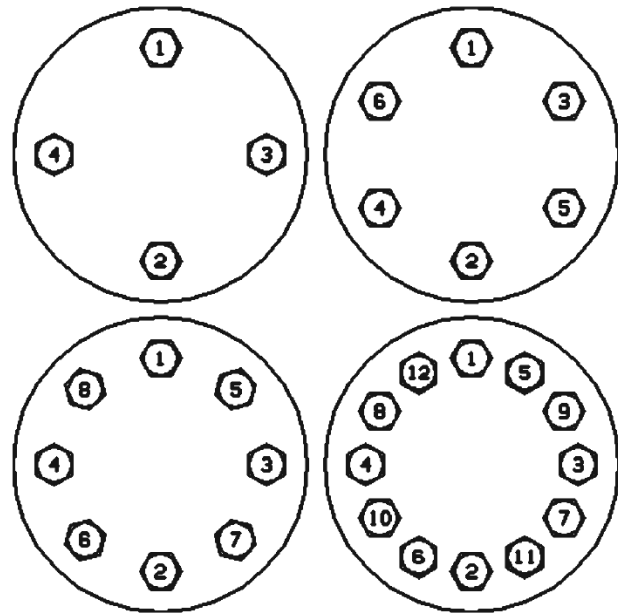
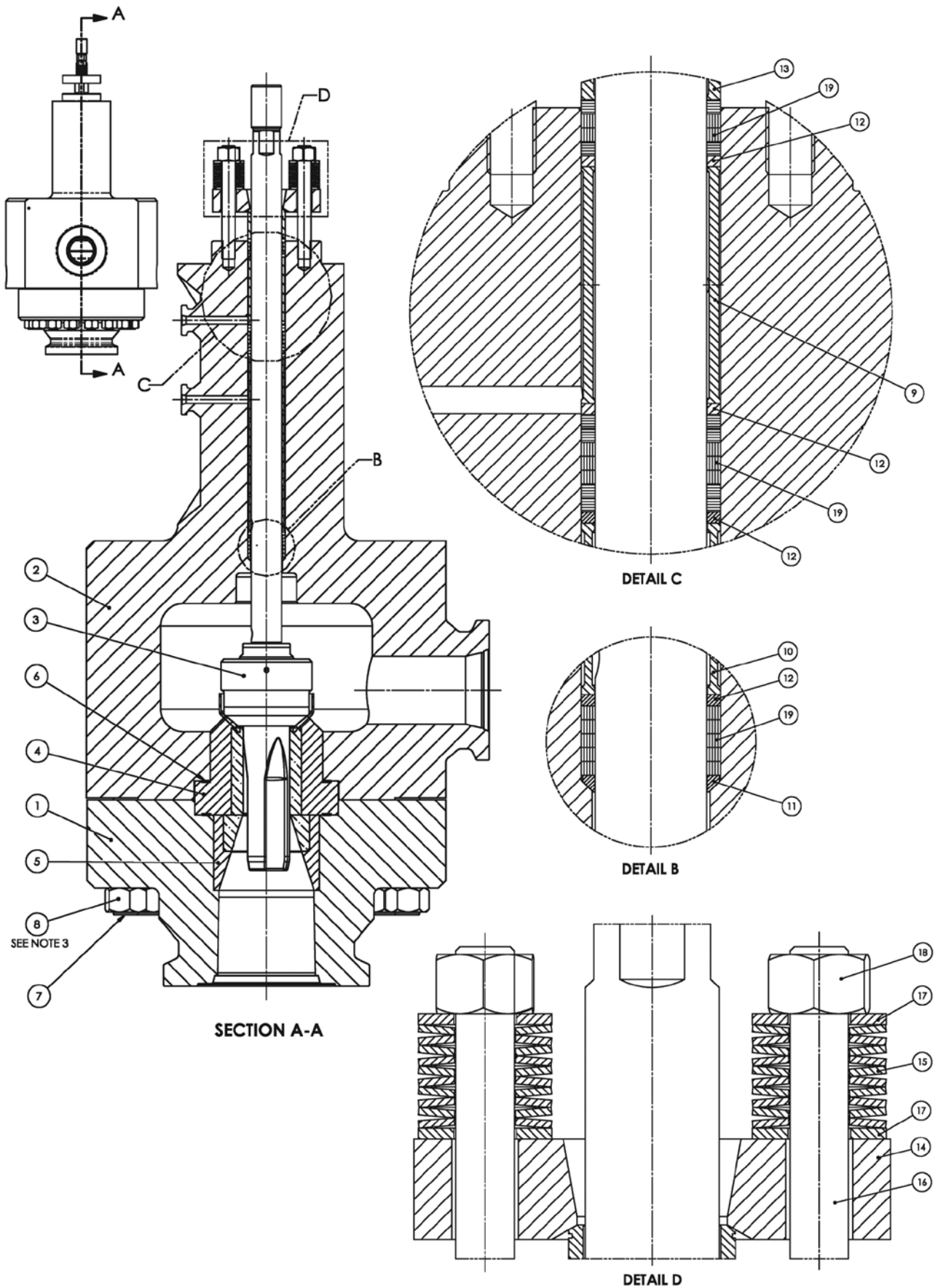


Figure 2: Torque Sequence



**Figure 3: 74000 Series Control Valve**

## 74000 Series Parts References

Item No.	Description
1	Bottom Flange
2	Body
3	Plug and Stem S/A
4	Seat Ring S/A
5	Venturi S/A
• 6	Gasket
7	Body Stud
8	Body Nut
9	Lantern Ring if Applicable
10	Packing Spacer
• 11	Anti-Extrusion Packing
• 12	Anti-Extrusion Packing
13	Packing Follower
14	Packing Flange
15	Packing Disc Spring
16	Packing Flange Stud
17	Packing Flange Washer
18	Packing Flange Nut
• 19	Packing S/A

• Recommended spare parts for each maintenance interval

**Table 1: 74000 Series Valve Parts List**

### Actuation Type 87/88 Multi-Spring Diaphragm Actuators

#### Connecting Type 87 (Air to Extend) No. 6 Actuator (Figure 4)

1. Tightly assemble the hex nuts (1) onto the plug stem.
2. Push down the actuator, and screw on the yoke nut (33) at the same time. Then assemble the bottom stem connector (2). As soon as it becomes possible, insert the valve stem into the actuator stem (10). The stem must be inserted far enough so that when there is no air in the actuator, the valve plug does not touch the seat.
3. Tighten the yoke nut (33).
4. Supply air to the actuator at the final pressure.
5. Use the pointer (7) to set the travel scale (9) to the valve open position.
6. Supply the actuator with air at a sufficiently high pressure to obtain a travel equal to the nominal

travel of the valve.

7. Unscrew the plug stem until the valve plug is in contact with the seat. Do not turn the valve plug on the seat as this could damage the sealing surfaces.
8. Screw the hex nuts (1) as far as they will go and check that operation is correct.

#### Connecting Type 88 (Air to Retract) No. 6 Actuator (Figure 4)

1. Tightly assemble the hex nuts (1) onto the plug stem.
2. Push down the actuator, and screw on the yoke nut (33) at the same time. Then assemble the bottom stem connector (2). As soon as it becomes possible, insert the valve stem into the actuator stem (10). The stem must be inserted far enough so that when there is no air in the actuator, the valve plug does not touch the seat.
3. Tighten the yoke nut (33).
4. Unscrew the valve plug stem until the valve plug comes into contact with the seat. Do not turn the valve plug on the seat as this could damage the sealing surfaces.
5. Supply air to the actuator until the stem has travelled at least .40 inches (10 mm).
6. Unscrew the plug stem by the number of turns N1 specified in Table 2.
7. Screw the hex nuts (1) as far as they will go and check that operation is correct.
8. Use the pointer (7) to set the travel scale (9) to the valve closed position.

Plug Stem Diameter	N1 (turn)	in	mm
1"	1.25	0.09	2.3
3/4"	1.25	0.08	2.0
5/8"	1.5	0.08	2.0
1/2"	1.5	0.075	1.9

**Table 2: Type 88 Actuator, Air to Open - Valve Seating**

#### Connecting Type 87 (Air to Extend) No. 10, 16 and 23 Actuators (Figure 4)

1. Tightly assemble hex nut (1) onto the plug stem.
2. Screw the top stem connector (4) assembly tightly onto the actuator stem (10).
3. Push down the actuator, and screw on the yoke nut (33) at the same time. Then assemble the bottom stem connector (2) assembly by screwing until it

comes into contact with the hex nut (1).

4. Push down the actuator and tighten the yoke nut (33).
5. Supply the actuator with air at the initial pressure indicated on the spring scale.
6. Position the stem connector assembly at distance "X" indicated in Table 3.
7. Use the pointer (7) to set the travel scale (9) to the valve open position.
8. Supply the actuator with air at a high enough pressure to obtain a travel equal to the nominal travel of the valve.
9. With the plug correctly positioned on the seat, unscrew the bottom stem connector (2) assembly until it comes into contact with the top stem connector (4). Tighten the socket head cap screws (5), hex nut (1) and lock nut (32) and check that the operation is correct.

#### Connecting Type 88 (Air to Retract) No. 10, 16 and 23 Actuator (Figure 4)

1. Supply the actuator with air to retract stem.
2. Unscrew the top stem connector (4) in accordance with dimension "X" in Table 3.
3. Tightly assemble hex nut (1) onto the plug stem.
4. Tightly screw the top stem connector (4) assembly onto the actuator stem (10).
5. Push down the actuator, and screw on the yoke nut (33) at the same time. Then assemble the bottom stem connector (2) assembly by screwing until it comes into contact with the hex nut (1).
6. Push down the actuator and tighten the yoke nut (33).
7. With the plug correctly positioned on the seat, unscrew the bottom stem connector (2) assembly to bring it into contact with the top stem connector (4).
8. Supply air to the actuator until the stem has travelled at least 0.40 inches (10 mm).
9. Unscrew the top stem connector (4) by the number of turns N1 specified in Table 2 then lock manually with hex nut (1).
10. Release the pressure in the actuator. Use pointer (7) to set the travel scale (9) to the actuator supply pressure so that the two stem connectors come into contact. Then tighten the socket head cap screws (5), hex nut (1), and lock nut (32).
11. Shut off the closed valve pressure and check that operation is correct.

Actuator Size	Travel		"X" Actuator 87		"X" Actuator 88	
	in	mm	in	mm	in	mm
10	0.8	20	5.12	130.0	4.62	117.3
10	1.5	38	5.44	138.2		
16	0.8	20	8.00	203.2	7.02	178.3
16	1.5	38	8.50	228.6		
16	2.0	51	9.28	235.7		
16	2.5	63.5	9.50	241.3		
23	0.8	20	8.25	209.5		
23	1.5	38	8.62	218.9		
23	2.0	51	9.12	231.6		
23	2.5	63.5	9.59	243.6		

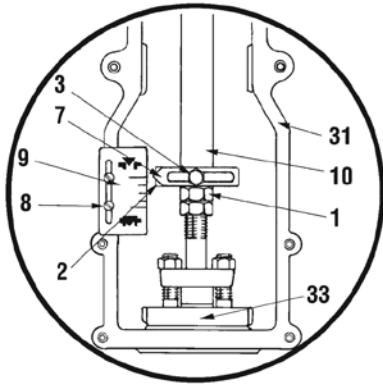
**Table 3: Position of Top Stem Connector**

### Parts Reference For Spring Diaphragm Actuators - Type 87/88 Multispring

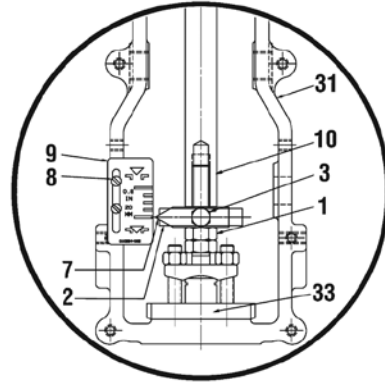
Item No.	Description
1	Hex Nut
2	Stem Connector, Bottom
3	Cap Screw, Hex Head
• 4	Stem Connector, Top
• 5	Cap Screw, Socket Head
• 6	Connector Insert
7	Pointer
8	Screw, Pan Head
9	Scale, Travel
10	Actuator Stem
31	Yoke, Machining
• 32	Lock Nut
33	Yoke Nut

• Not provided for Size 6 Actuator

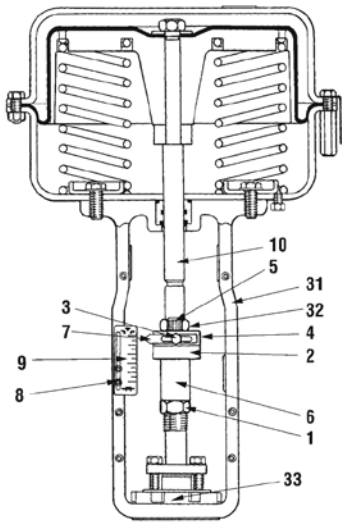
**Table 4: 87/88 Actuator Parts List**



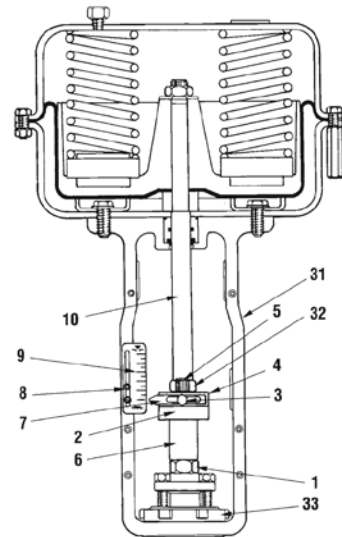
**Type 87 Air to Close  
No. 6**



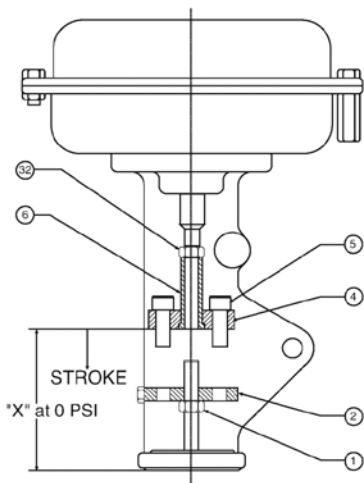
**Type 88 Air to Open  
No. 6**



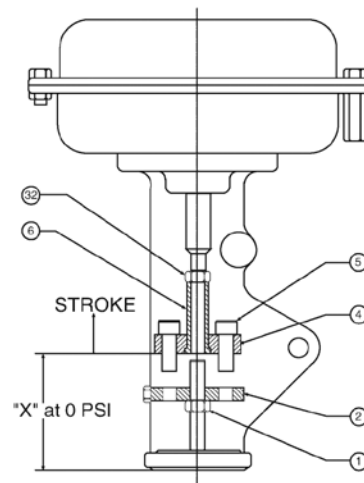
**Type 87 Air to Close  
No. 10-16-23**



**Type 88 Air to Open  
No. 10-16-23**



**Model 87 Actuator  
Air to Extend (Close)**



**Model 88 Actuator  
Air to Retract (Open)**

**Figure 4: 87/88 Actuators**

## Type 51/52/53 Cylinder Actuators

Connecting Double Acting (Model 51) (Figures 7 & 8)

1. Install actuator on the valve body with drive nut.
2. Connect manual loading panel tubing to the Top Plate (17).
3. Apply required air pressure through the manual loading panel to completely extend the actuator stem.
4. Reconnect manual loading panel tubing from the Top Plate (17) to the Yoke (1), which is integrated into the bottom plate connection.
5. Retract the actuator stem either pneumatically or with a handwheel approximately .1" (2mm) using the visual stroke scale as shown in Figure 5.

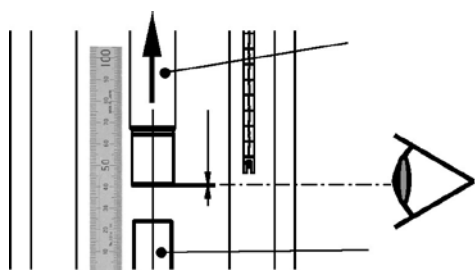


Figure 5

6. Assemble the Split Clamp (22).

**Note: If the split clamp does not engage with both stems, then retract the actuator stem until alignment and engagement is achieved.**

## CAUTION

Make sure the valve is fully extended.

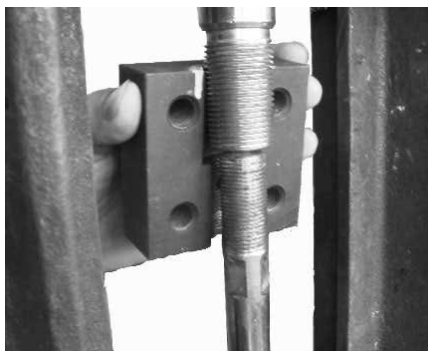


Figure 6

7. Assemble and tighten Indicator Arm (23), Spring Lock Washers (25), and Hexagon Bolts (24).
8. Line up the indicator plate (26), with Indicator arm (23) and check actuator for proper operation.

## Connecting Air to Extend (Model 52) (Figure 9)

1. Install actuator on the valve body with drive nut.
2. Connect manual loading panel tubing to the top plate (17).
3. Apply required air pressure through the manual loading panel to completely extend the actuator stem.
4. Extend the actuator stem either pneumatically or with a handwheel approximately .1" (2mm) using the visual stroke scale as shown in Figure 5.
5. Assemble the Split Clamp (22).

**Note: If the split clamp does not engage with both stems, then extend the actuator stem until alignment and engagement is achieved.**

## CAUTION

Make sure the valve is fully extended.

6. Assemble and tighten Indicator Arm (23), Spring Lock Washers (25), and Hexagon Bolts (24).
7. Line up the indicator plate (26), with Indicator arm (23) and check actuator for proper operation.

## Connecting Air to Retract (Model 53) (Figure 10)

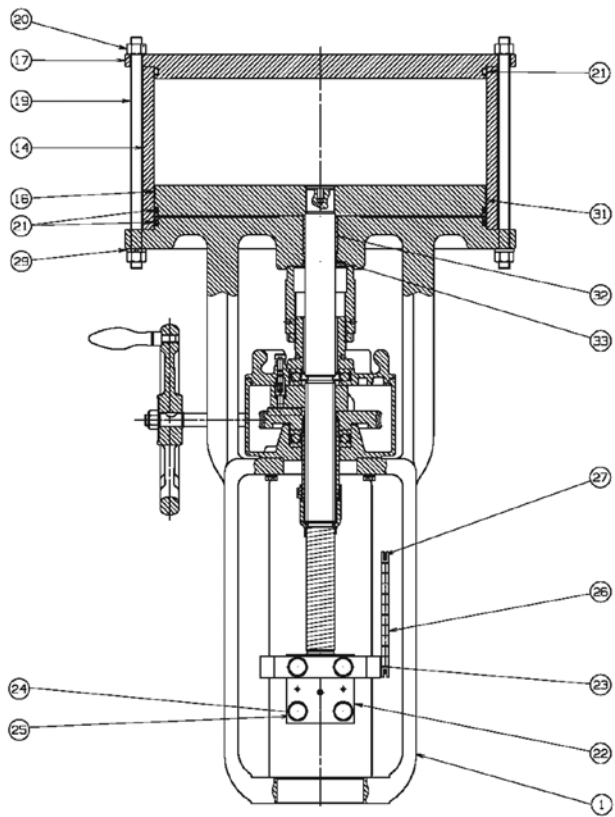
1. Install actuator on the valve body with drive nut.
2. Connect manual loading panel tubing to the yoke (1), which is integrated into the bottom plate connection.
3. Retract the actuator stem either pneumatically or with a handwheel approximately .1" (2mm) using the visual stroke scale as shown in Figure 5.
4. Assemble the Split Clamp (22).

**Note: If the split clamp does not engage with both stems, retract the actuator stem until alignment and engagement is achieved.**

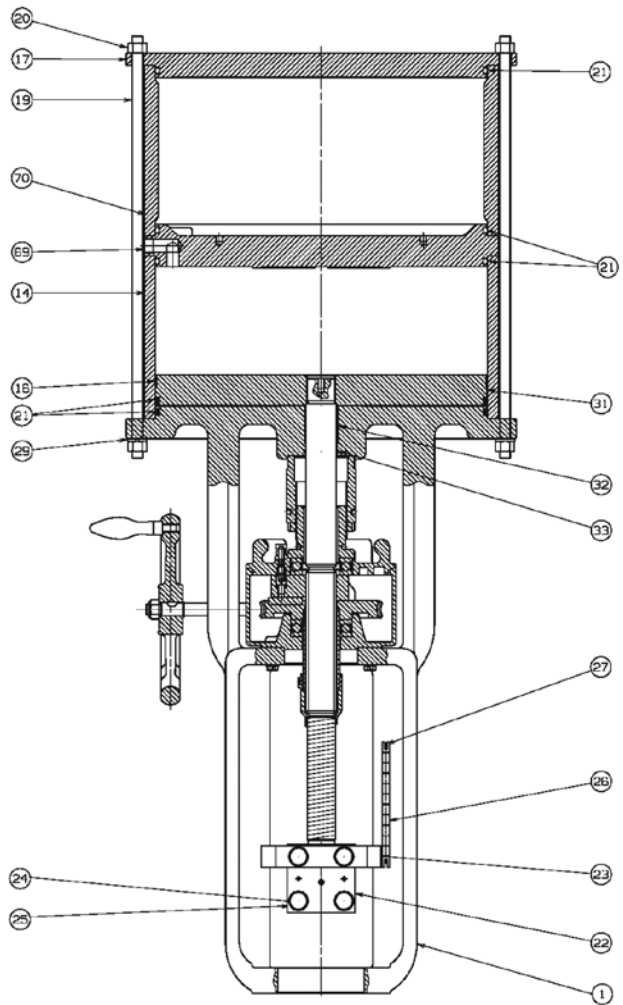
## CAUTION

Make sure the valve is fully retracted.

5. Assemble and tighten Indicator Arm (23), Spring Lock Washers (25), and Hexagon Bolts (24).
6. Line up the indicator plate (26), with Indicator arm (23) and check actuator for proper operation.



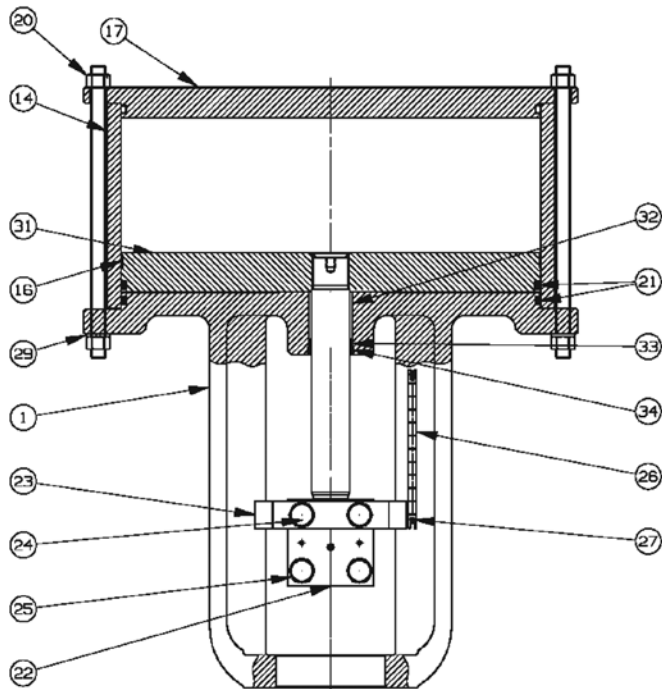
**Model 51 Double Acting  
With handwheel without volume chamber**



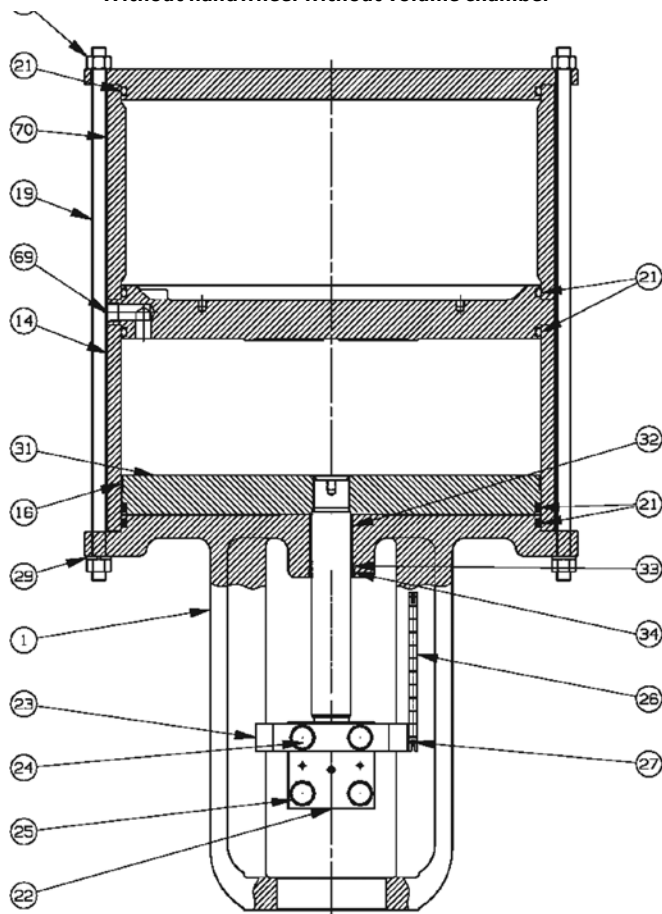
**Model 51 Double Acting  
With handwheel with volume chamber**

**Figure 7: Model 51 Actuator**



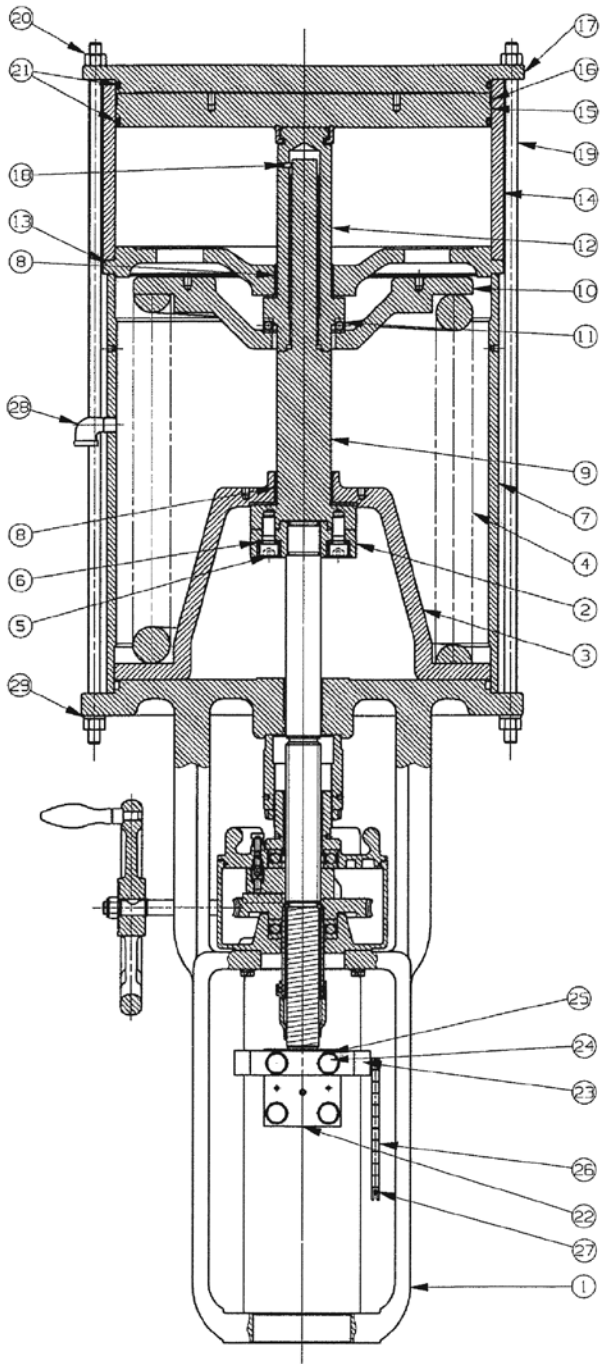


**Model 51 Double Acting  
Without handwheel without volume chamber**

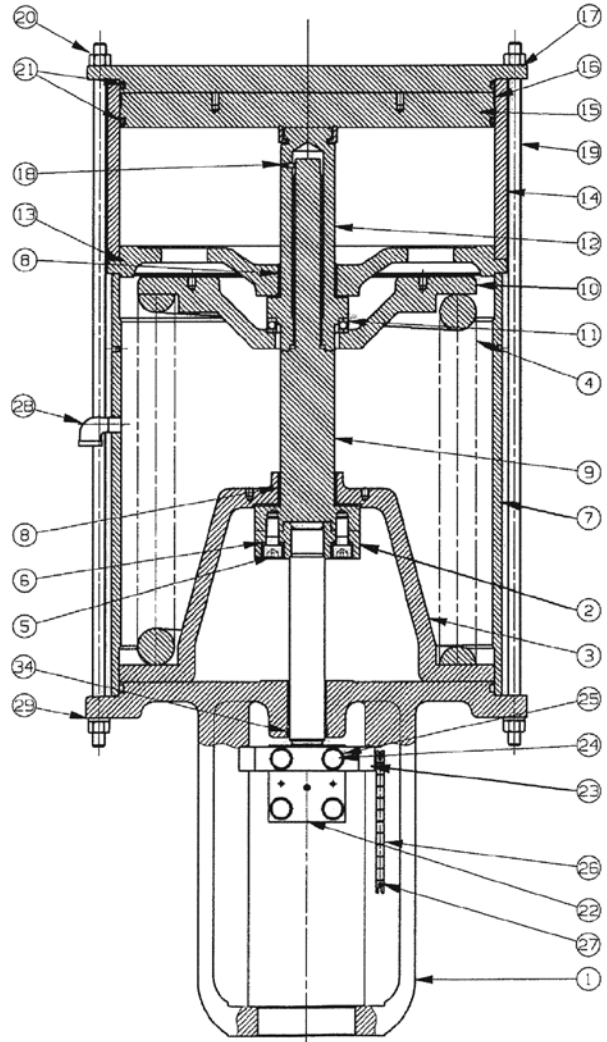


**Model 51 Double Acting  
Without handwheel with volume chamber**

**Figure 8: Model 51 Actuator**

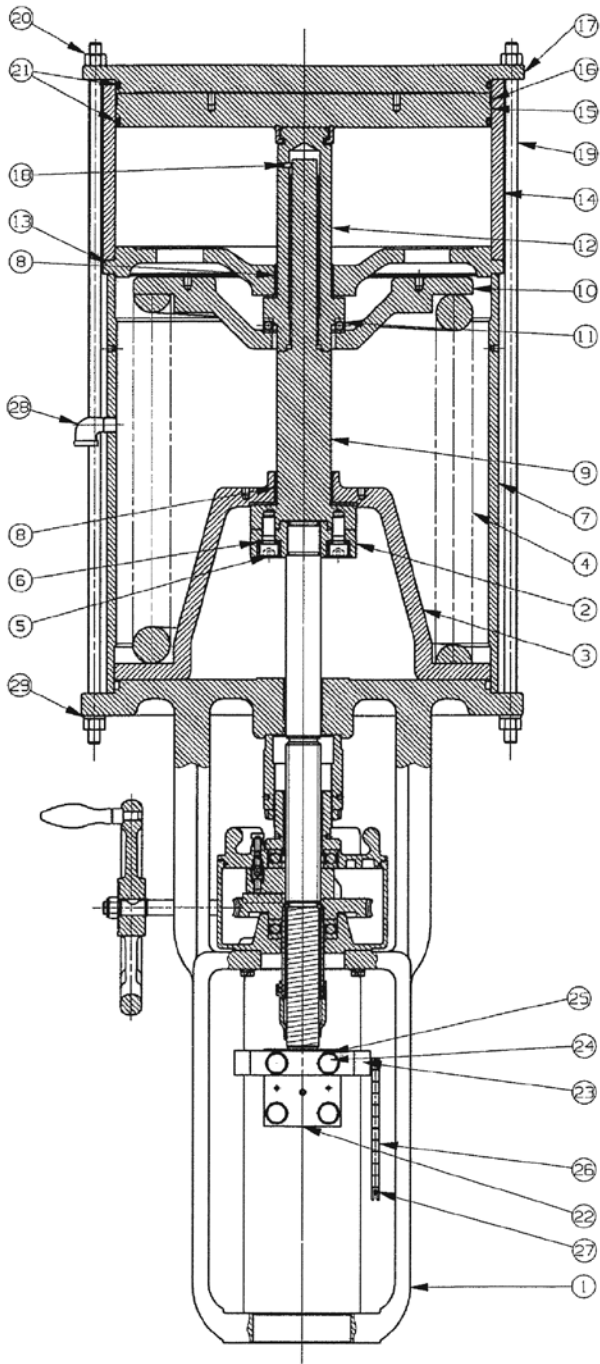


**Model 52**  
Air to extend with handwheel

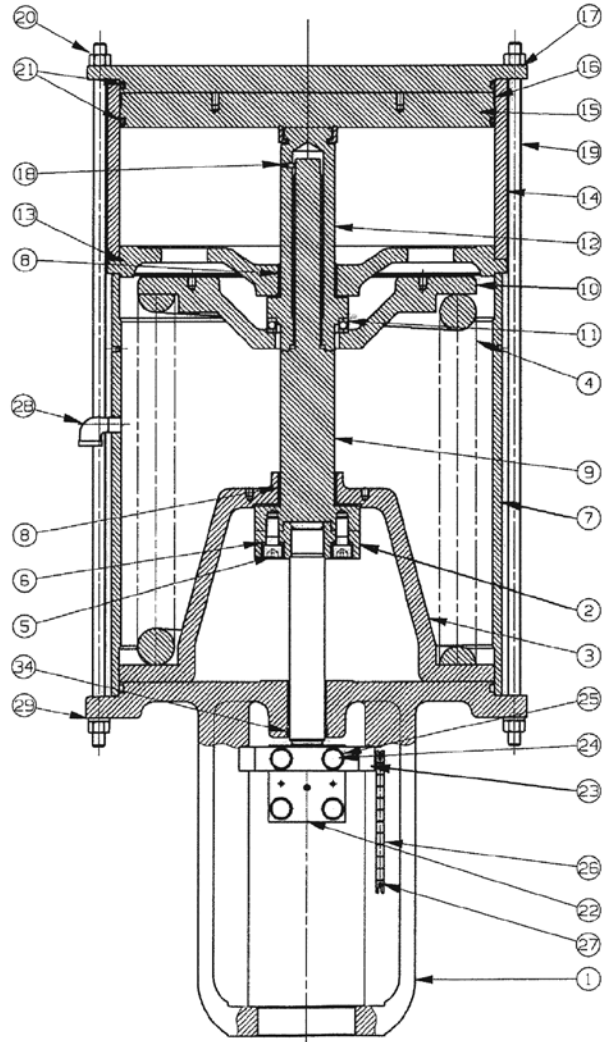


**Model 52**  
Air to retract without handwheel

**Figure 9: Model 52 Actuator**



**Model 53**  
Air to extend with handwheel



**Model 53**  
Air to retract without handwheel

**Figure 10: Model 53 Actuator**

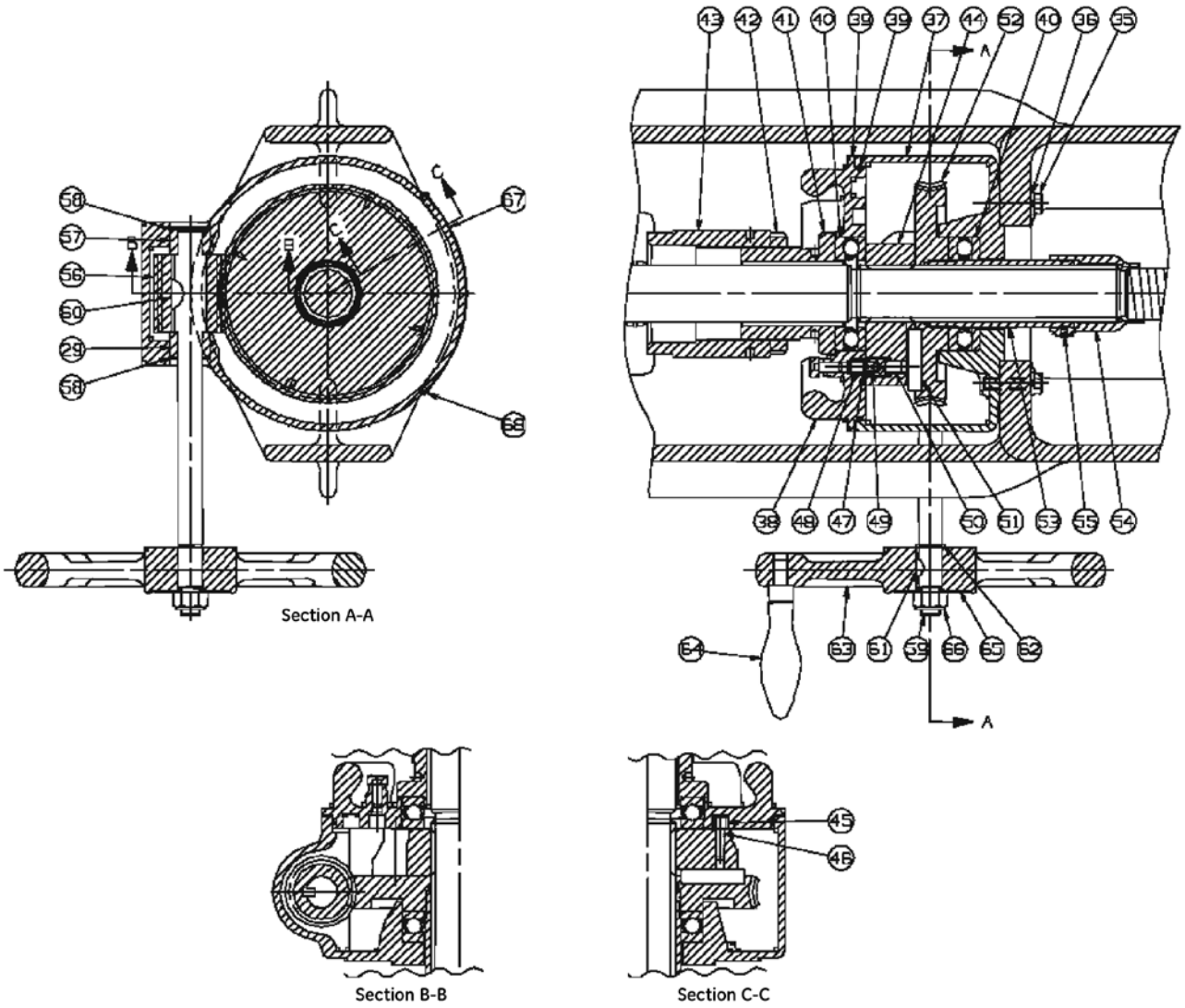


Figure 11: CM, DM handwheel - Typical for models 51/52/53

## Parts Reference Table for Models 51/52/53 Actuators

Ref No.	Description	Ref No.	Description	Ref No.	Description
1	Yoke	24	Hexagon bolt	47	Locking pin case
2	Piston rod S/A	25	Spring lock washer	48	Pin
3	Lower spring button	26	Indicator plate	49	Spring
4	Spring	27	Cross recessed head screw	50	Hexagon socket set screw
5	Hexagon socket head cap screw	28	Exhaust pipe	51	Guide key
6	Spring lock washer	29	Spring lock washer	52	Worm gear
7	Spring tube	30	Plug	53	Spacer tube
• 8	Guide bushing 3	31	Piston S/A	54	Adapter
9	Compression bolt	• 32	Guide bushing	55	Set screw
10	Upper spring button	• 33	O ring (Piston rod)	56	Worm
11	Thrust bearing	• 34	Rod scraper	• 57	Bearing
12	Compression nut	35	Hexagon bolt	58	Retaining ring
13	Separator plate Model 52/53	36	Spring lock washer	59	Hand wheel shaft
14	Cylinder tube	37	Gear box	60	Key (Worm)
15	Cylinder tube	38	Gear box cover S/A	61	Key (Handwheel)
• 16	Guide ring	• 39	O ring	62	Retaining ring
17	Top plate	• 40	Thrust bearing	63	Handwheel
18	Set screw	41	Adjustment screw	64	Grip
19	Center bolt	42	Locking nut	65	Directional plate
20	Hexagon nut	43	Adjustment nut	66	Self locking nut
• 21	O ring (Piston, Top plate)	44	Piston rod engagement	67	Operating information plate
22	Split clamp	• 45	Bearing	68	Drive screw
23	Indicator arm	46	Retaining pin	69	Separator plate (Model 51)
				70	Volume chamber tube

• Recommended Spare Parts

**Table 5: Models 51/52/53 Actuators Parts List**

# DIRECT SALES OFFICE LOCATIONS

## AUSTRALIA

Brisbane:  
Phone: +61-7-3001-4319  
Fax: +61-7-3001-4399

Perth:  
Phone: +61-8-6595-7018  
Fax: +61 8 6595-7299

Melbourne:  
Phone: +61-3-8807-6002  
Fax: +61-3-8807-6577

BELGIUM  
Phone: +32-2-344-0970  
Fax: +32-2-344-1123

BRAZIL  
Phone: +55-19-2104-6900

CHINA  
Phone: +86-10-5738-8888  
Fax: +86-10-5918-9707

FRANCE  
Courbevoie  
Phone: +33-1-4904-9000  
Fax: +33-1-4904-9010

GERMANY  
Ratingen  
Phone: +49-2102-108-0  
Fax: +49-2102-108-111

INDIA  
Mumbai  
Phone: +91-22-8354790  
Fax: +91-22-8354791

New Delhi  
Phone: +91-11-2-6164175  
Fax: +91-11-5-1659635

## ITALY

Phone: +39-081-7892-111  
Fax: +39-081-7892-208

## JAPAN

Tokyo  
Phone: +81-03-6871-9008  
Fax: +81-03-6890-4620

## KOREA

Phone: +82-2-2274-0748  
Fax: +82-2-2274-0794

## MALAYSIA

Phone: +60-3-2161-0322  
Fax: +60-3-2163-6312

## MEXICO

Phone: +52-55-3640-5060

## THE NETHERLANDS

Phone: +31-15-3808666

## RUSSIA

Veliky Novgorod  
Phone: +7-8162-55-7898  
Fax: +7-8162-55-7921

## Moscow

Phone: +7 495-585-1276  
Fax: +7 495-585-1279

## SAUDI ARABIA

Phone: +966-3-341-0278  
Fax: +966-3-341-7624

## SINGAPORE

Phone: +65-6861-6100  
Fax: +65-6861-7172

## SOUTH AFRICA

Phone: +27-11-452-1550  
Fax: +27-11-452-6542

## SOUTH & CENTRAL

AMERICA AND THE CARIBBEAN  
Phone: +55-12-2134-1201  
Fax: +55-12-2134-1238

## SPAIN

Phone: +34-93-652-6430  
Fax: +34-93-652-6444

## UNITED ARAB EMIRATES

Phone: +971-4-8991-777  
Fax: +971-4-8991-778

## UNITED KINGDOM

Bracknell  
Phone: +44-1344-460-500  
Fax: +44-1344-460-537

## Skelmersdale

Phone: +44-1695-526-00  
Fax: +44-1695-526-01

## UNITED STATES

Jacksonville, Florida  
Phone: +1-904-570-3409

## Deer Park, Texas

Phone: +1-281-884-1000  
Fax: +1-281-884-1010

## Houston, Texas

Phone: +1-281-671-1640  
Fax: +1-281-671-1735

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