

# Masoneilan™ 80000 Series

Three-Way Control Valves  
Combining and Diverting Service

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, BAKER HUGHES 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

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.



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 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 80000 Series Control Valve, and do not apply for other valves outside of this product line.

## Useful Life Period

The current estimated useful life period for the 80000 Series Control Valve 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.

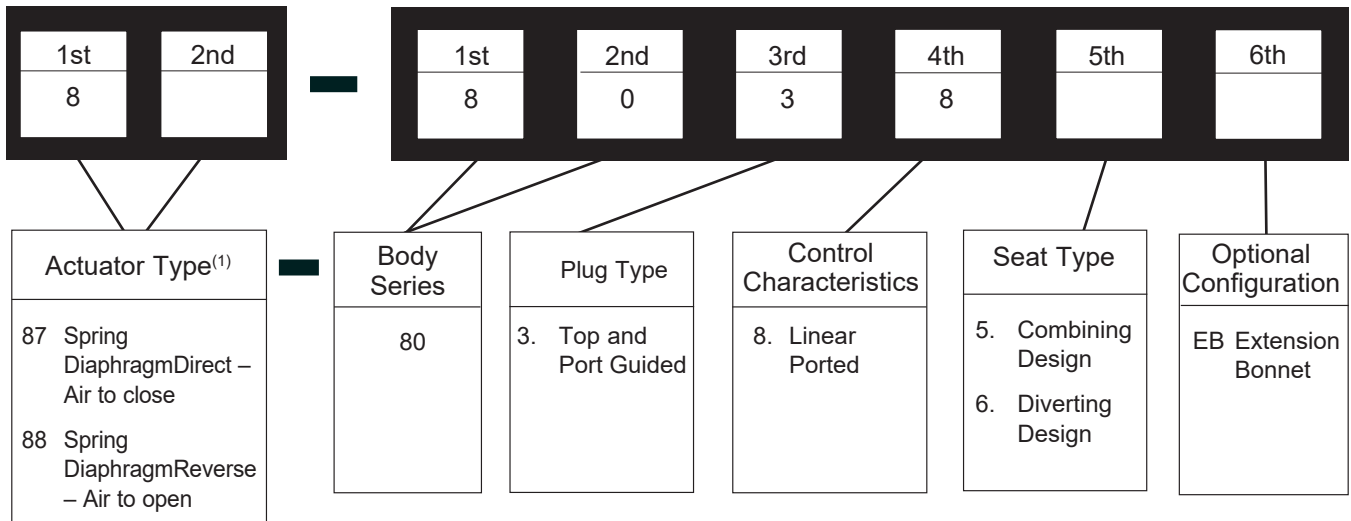
## Warranty

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 usages. Baker Hughes reserves the right to discontinue manufacture of any product or change product materials, design or specifications without notice.

### **Note: 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.

# Numbering System



(1) For valve with travel > 2.5", actuator model 37/38 should be used.

## Installation

Three-way control valves are most commonly used on either combining or diverting service. On combining service, the three-way valve has two inlet ports and one outlet, and is used to combine two fluids in variable proportions. On diverting service, the three-way valve is used to split one inlet stream into two outlets, or the incoming flow can be entirely diverted to one or the other of the two outlet ports. As shown in the illustrations opposite, these valves should be installed with flow tending to open both ports. The principle advantage of this flow direction is inherent stability.

Three-way valve ports are marked “C” for common, “L” for lower and “U” for upper. Each of these letters is stamped on its respective connection to facilitate correct installation.

Before placing the valve in the pipeline, clean the line thoroughly of all dirt, welding chips, scale, oil or grease and other foreign material. If valve connections are smaller than size of pipe, swaged nipples or reducing fittings should be used rather than bushings. If valve has a finned bonnet, do not insulate bonnet.

## Air Piping

Pipe actuating air pressure line to the 1/4" NPT opening: in the upper diaphragm case if an air-to-extend actuator (Type 37), in the yoke if an air-to-retract actuator (Type 38). Use 1/4" O.D. tubing or equivalent for all air lines. If air line exceeds 25 ft. in length or if the valve is equipped with volume boosters, 3/8" tubing is preferred. Air lines must not leak.

For valves equipped with 87/88 actuator, please refer to Manual GEA19530B.

## Maintenance

### Disassembly – 80385

1. Apply sufficient air pressure to the actuator to position the plug just off the upper seat (2).
2. Remove nuts (48), bottom flange (7) and body gasket (49).
3. With smaller valves, loosen stem locknuts (27), turn them down the plug stem (5) and lock them. With a wrench applied over the locknuts, turn the plug stem (5) out of the actuator stem. With larger valves, remove the split stem connector (51).
4. Unscrew drive nut (9) and remove actuator from the valve.
5. Remove locknuts (27) and travel indicator (58). Loosen packing flange nuts (13) and turn plug stem down and out of the packing box.
6. Remove plug from the valve body. Examine plug and seat rings for wear and grind the seating surfaces (see Pages 5 and 6) if necessary.
7. Remove nuts (48), bonnet (8) and gasket (49) from the valve body.
8. Remove old packing (14) with lantern ring (16) from the top of the bonnet.
9. Threaded seat rings are set up tightly when assembled and are usually in service for years before replacement, so that it is often difficult to remove them. To facilitate removal, fabricate a special seat ring wrench to engage the seat ring lugs and attach it to a shock wrench. If rings are exceptionally stubborn, the application of heat or penetrating oil may assist in removal.

# Maintenance

## Reassembly – 80385

1. Before seat rings are installed, the seating surfaces in the body and bottom flange should be cleaned thoroughly. A thread lubricant such as John Crane Insoluble Plastic Lead No. 2 should be applied sparingly to the ring threads. The seat rings (2) should be brought up tight using the seat ring wrench. On ¾"–2" valves, tighten seat rings by hand using a ring wrench with T-handle. Larger seat rings may be tightened with a shock wrench.

### CAUTION

**Avoid overtightening. Excessive torque will distort the seat ring with resulting leakage.**

2. Install gasket (49) in the top of the valve body.
3. With valve sizes ¾"–6", insert new packing in the bonnet, just one ring of packing, then the lantern ring (16), then more packing rings to fill the packing box. Replace packing follower (10), packing flange (11) and packing flange nuts (13). With 8" and 10" valves, install two packing rings, lantern ring, more packing, packing follower, packing flange and packing flange nuts after the bonnet has been assembled to the valve body and the plug stem has been replaced in the bonnet.
4. Install the bonnet (8) on the body and tighten nuts (48). Tighten nuts evenly and in crisscross fashion to assure even gasket compression.
5. Replace the plug and stem assembly in the body pushing the plug stem through the packing box. If an 8" or 10" valve, replace packing at this point.
6. Install gasket (49) and bottom flange (7). Tighten nuts (48) evenly and in crisscross fashion to assure even gasket compression.
7. Replace actuator on the valve and tighten drive nut (9). If an air-to-retract actuator (38), apply air pressure to retract the stem before installing actuator on the valve.

## Disassembly – 80386

1. Apply sufficient air to the actuator to raise the plug so that the bottom plug is just off the seat (2).
2. With smaller valves, loosen stem locknuts (27), turn them down the plug stem (5) and lock them. With a wrench applied over the locknuts, turn the plug stem out of actuator stem. With larger valves, remove the split stem connector. Remove locknuts (27) and travel indicator (58).
3. Unscrew drive nut (9) and remove actuator from the valve.
4. Remove nuts (48), bonnet (8), bottom flange (7) and body gaskets (49).
5. Remove old packing (14) with lantern ring (16) from the top of the bonnet.
6. Apply a wrench to the machined flats located on the upper guide section of the plug to prevent the plug from rotating, then remove plug locknuts (4N). Detach lower skirt (4L) and plug gasket (4G). Remove upper skirt (4U) and shank (4SK) from the valve body.

**Note: The upper skirt (4U) is welded to the shank (4SK). Examine plug and seat rings for wear and grind the seating surfaces (see Pages 7 and 8) if necessary.**

7. For seat ring removal, refer to Step 9 of Disassembly – 80385.

## Reassembly – 80386

1. Install seat rings per Step 1 of Reassembly – 80385.
2. Reassemble the upper skirt (4U) and shank (4SK), gasket (4G), lower skirt (4L), and plug locknuts (4N) in the valve body.
3. Replace gasket (49), bottom flange (7) and tighten nuts (48).
4. To replace packing (14) in the bonnet (8), refer to Step 3 of Reassembly – 80385.
5. Install the bonnet on the body and tighten nuts (48). Tighten nuts evenly and in crisscross fashion to assure even gasket compression.
6. Replace actuator on the valve and tighten drive nut (9). If an air-to-retract actuator (38), apply air pressure to retract the stem before installing actuator on the valve.

## Plug Stem Adjustment

### Size 9, 11 and 13 Actuators

1. Push plug stem (5) down until the plug seats and replace locknuts (27) and travel indicator (58) (and locking plate (55) on Size 13 actuators).
2. Air-to-extend actuator: Turn plug stem (5) into actuator stem until seating occurs. Apply sufficient air pressure to move the plug slightly. Turn plug stem one additional turn into the actuator stem and tighten stem locknuts (27).

**Note: Do not turn the plug when it is in contact with the seat or scoring will result. If necessary, adjust travel indicator scale (56).**

3. Air-to-retract actuator: Turn plug stem (5) into actuator stem as far as it will go and release air pressure to the diaphragm. Turn plug stem out of actuator stem until plug is seated.

**Note: Do not turn the plug when it is in contact with the seat or scoring will result. Apply sufficient air pressure to move the plug up. Turn the plug stem out of the actuator stem one full turn and tighten locknuts. If necessary, adjust travel indicator scale (56).**

## Plug Stem Adjustment

### Size 15 and 18 Actuators

1. Push plug stem (5) down until the plug seats.
2. If an air-to-extend actuator (37), apply air pressure to extend the actuator stem to rated stroke. If an air-to-retract actuator, apply air pressure to retract the actuator stem approximately 1/16".
3. Install stem clamp (51) and travel indicator pointer (58A). Tighten clamp nut (53). It may be necessary to raise or lower the actuator stem slightly to mate the threads of the actuator and plug stems with the clamp. The amount of thread engagement of both stems should be approximately equal. If necessary, adjust travel indicator scale (56).



# Maintenance

## Lapping Seats

If, after long service, valve leakage becomes excessive, a hand operation called lapping is necessary. In order to facilitate this operation, the plug and seat ring seating surfaces should be free of large scratches or dents and the contact surfaces of the seats should be as narrow as possible. This may require dressing both parts in a lathe. The seating surfaces make an angle of 60° with the axis of the plug.

For the lapping operation, a good grade of fine grinding compound is required. The compound is applied at several spots equally spaced around the periphery of the ring. Assemble the entire valve body including the packing for the lapping operation (excluding the bottom flange of the diverting valve). The bonnet (and bottom flange of the combining valve) fastened temporarily to the body, less gasket, serves as a guide during the lapping operation. To facilitate lapping, screw a drilled and tapped rod with a T-handle onto the top of the valve stem and secure with a locknut. As an alternative, drill a hole through a small flat piece of steel and fasten to the plug stem with two locknuts. Before lapping, plug and stem must be “true” (see pinning operation). Lapping is accomplished by rotating the plug in short oscillating strokes. After 8 or 10 strokes, the plug should be lifted and turned 90° before repeating the operation. This intermittent lifting is important to keep the plug and seat ring concentric during lapping.

It is advisable to mix a small quantity of lubricant such as graphite with the grinding compound. This will slow the cutting rate and avoid tearing the seating surface.

The amount of lapping required depends on the materials of construction, condition of the 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 too much lapping may result in rough seats or small ridges on the plug or seat ring. The only remedy is replacement of one of both parts. When lapping a new plug and rings, begin with coarse compound and finish with fine. Old (used) parts should only be lapped with a fine grade of compound.

## Packing Box

Packing box maintenance is one of the principal chores of routine servicing. For smooth valve operation, the packing should be compressed just enough to affect a seal and no more. Tightness of the packing box is maintained by the packing compression alone or in combination with a lubricant. Little by little it is necessary to take up on the packing until all available compression is used up.

To add packing, it is necessary only to back off the packing follower and flange and insert one or two rings of split ring packing.

**Note: In an emergency, string packing may be inserted without removing old packing, after first taking the valve out of service. If the packing is solid ring, it will be necessary to disassemble the valve and remove the old packing. To repack the packing box, refer to Reassembly – 80385 (Step 3).**

## Lubrication

For some applications, packing boxes are designed for use with a lubricator. The lubricator (66) is provided with a ball check valve to prevent back flow of the process fluid. On steel valves, an isolating valve (67) is added for positive protection against back flow. The lubricator should be kept filled with the specified lubricant and turned in firmly but not tightly. One or two turns of the lubricator once every two weeks should suffice to provide the desired seal. Lubricants are stocked in our Norwood plant and may be ordered through your local Masoneilan International Representative or District Office.

## Plug Stem Pinning

Valve plug and stem assemblies are normally furnished as a complete assembly in which case the installation involves no problems. It is necessary only to lap the seats and assemble the valve.

If necessary to assemble plug and plug stem, it is better to use a new stem as the original pin hole in an old stem prevents satisfactory results an might seriously impair the strength of the assembly. If an old stem must be used, the plug end of the stem should be cut off just above the old pin hold and the stem rethreaded the original amount. This will shorten the stem but there is usually enough adjustment in the actuator stem to compensate. If, however, the thread engagement in the actuator stem is less than the diameter of the plug stem, the plug stem should be discarded.

### CAUTION

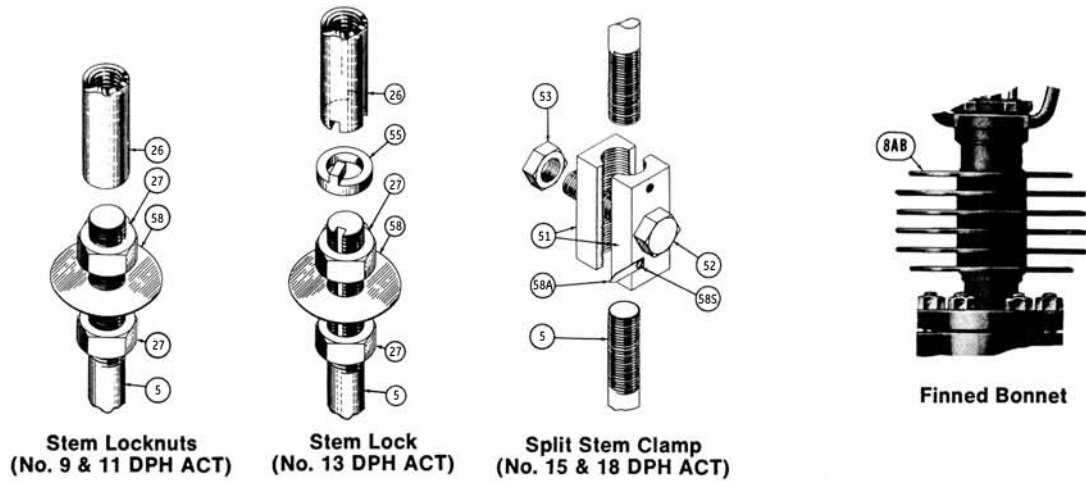
**While pinning is being performed, the seating surface and plug guide of the plug must not be damaged!**

The old pin may usually be removed by driving it out with a punch. If necessary to drill it out, a drill somewhat smaller than the pin should be used and then the remainder of the pin driven out.

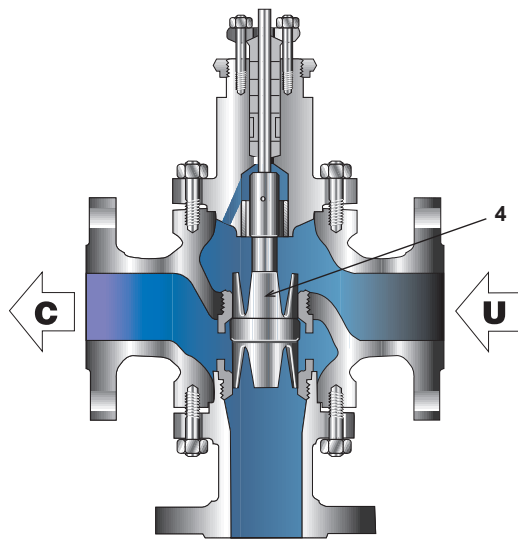
### CAUTION

**Do not mar the guide section of the plug by gripping in the jaws of a vise.**

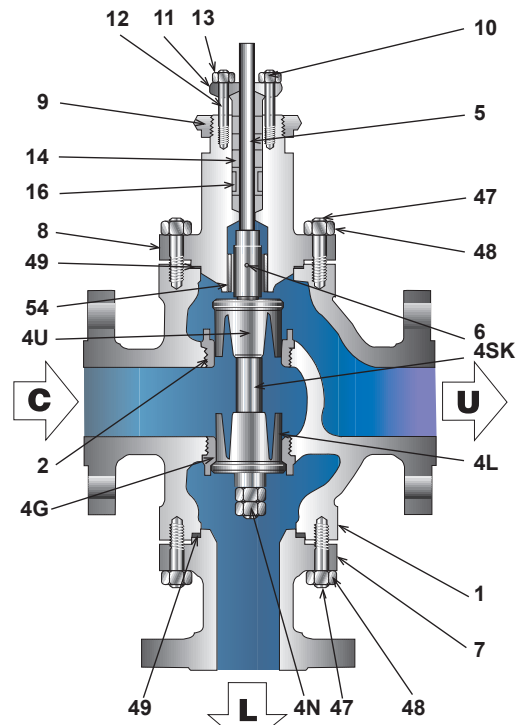
For drilling, the plug should be placed with the guide section resting on a vee block. The stem must be screwed into the plug solidly before starting to drill. This can be checked by measuring the depth of the pilot recess in the plug (X in figure on page 8) and making a reference mark on the stem the same distance from the thread. When properly assembled, the reference mark should be flush with the end of the guide section. The stem can then be redrilled through the old hole in the guide section, using first a pilot drill of suitable size and then a reamer drill to bring the hole to required size for the pin. After all burrs and sharp corners are removed from the edge of the hole, a small amount of grease should be applied before inserting the pin. The hole should be of such diameter that the pilot end of the pin can be pushed in by hand about 1/8” to 3/16”. The easiest method of driving the pin is to press it in the jaws of a vise. Be sure the pin is recessed about 1/16” below the plug guide surface. After plug has been pinned, it should be placed in a lathe to see if it is running “true”. If it is not, tap the plug with a mallet to straighten. Stem should be placed in “chuck” and plug should be tapped.



**Stem Connector Types**  
(ACT STM included in 77D, 77R)



**80385 Combining**



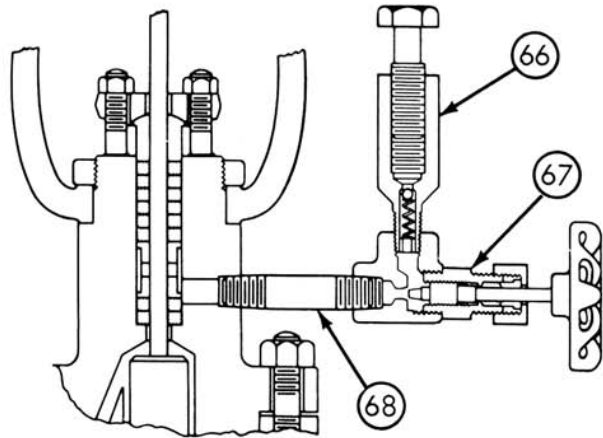
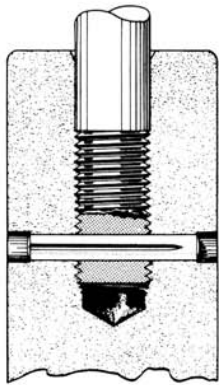
**80385 Diverting**

**C = Common    L = Low    U = Upper**

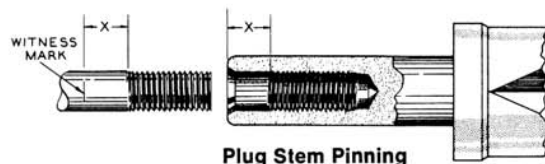
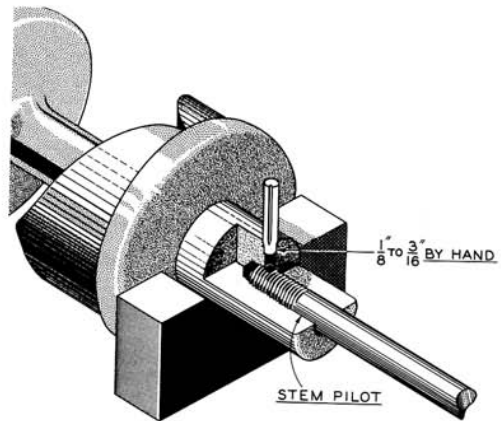
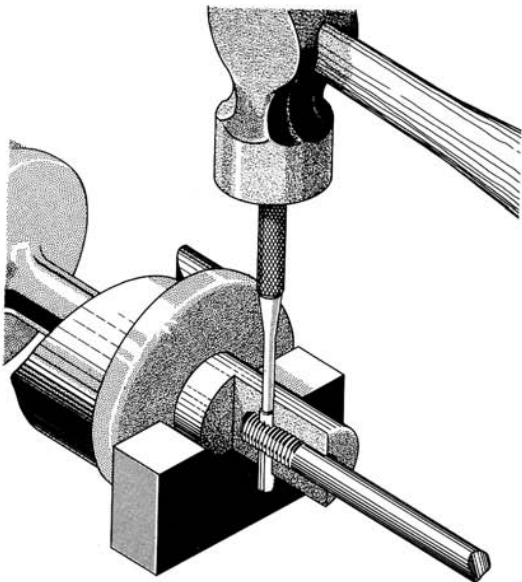
## Parts Reference

Ref. No.	Part Number	Computer Abbrev.	Ref. No.	Part Number	Computer Abbrev.	Ref. No.	Part Number	Computer Abbrev.
1	Valve Body	YLV BDY	9	Drive Nut	DRV NUT	53	Clamp (screw) Nut	CLP NUT
•2	Seat Ring	SEATRNG	10	Packing Follower	PKG FLR	54	Guide Bushing	GDE BSH
•4	Valve Plug	VLV PLG	11	Packing Flange	PKG FLG	55	Locking Plate	LCK PLT
4U	Upper Skirt (plug)	UPR SKT	12	Packing Flange Studs	P F STD	58	Travel Indicator (disc)	TVL IND
4L	Lower Skirt (plug)	LWR SKT	13	Packing Flange Stud Nuts	P F NUT	58A	Travel Pointer	TVL PTR
4G	Plug Gasket	PLG GKT	•14	Packing	PACKING	58S	Travel Pointer Screw	SCREW
4N	Plug Locknut	PLG L/N	16	Lantern Ring	LNTNRNG	66	Lubricator	LUBRCTR
4SK	Plug Shank	PLG SHK	27	Locknuts (stem)	LOCKNUT	67	Isolating Valve	ISL VLV
•5	Valve Plug Stem	PLG STM	47	Body Studs	BDY STD	68	Nipple	NIPPLE
•6	Plug Pin	PLG PIN	47A	Cap Screws (body)	CAP SCR	77D	Diaphragm Actuator (direct)	DPH ACT
7	Bottom Flange	BTM FLG	48	Nuts (body stud)	NUT	77R	Diaphragm Actuator (re-verse)	DPH ACT
8	Bonnet Assembly	BONNET	•49	Body Gasket	BDY GKT			
8AB	Radiation Finned Bonnet Assembly	FIN BNT	51	Stem Connector (clamp)	STM CLP			
			52	Clamp Screw	CLP SCR			

• Recommended spare part.



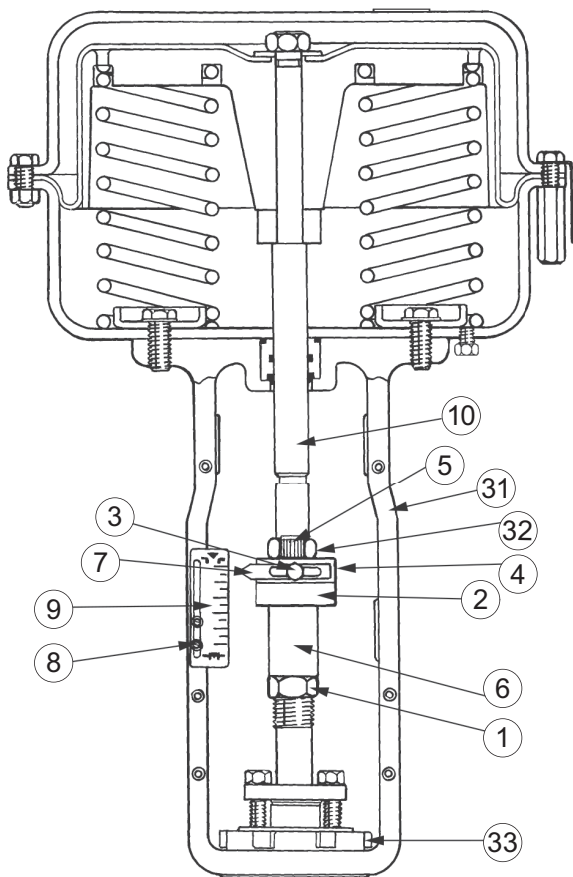
**Packing Lubricator**



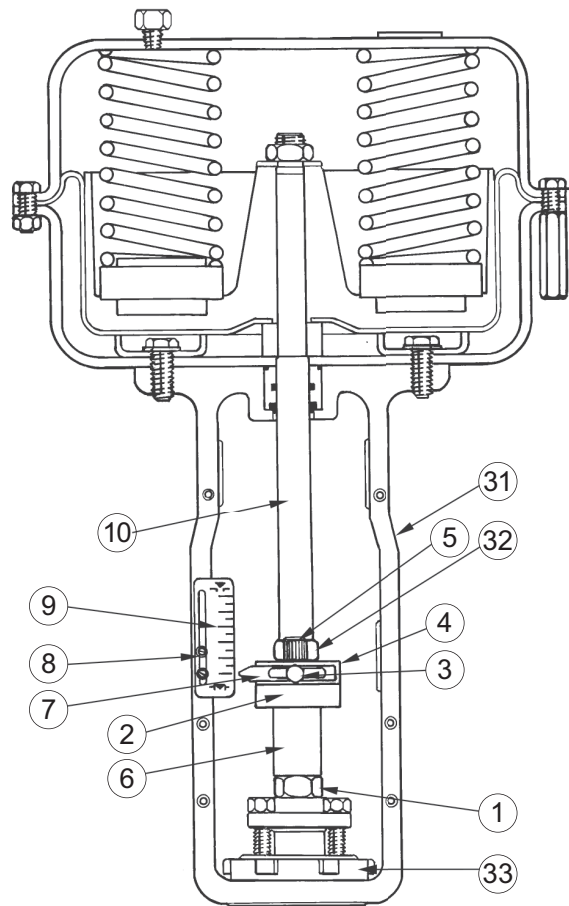
**Plug Stem Pinning**



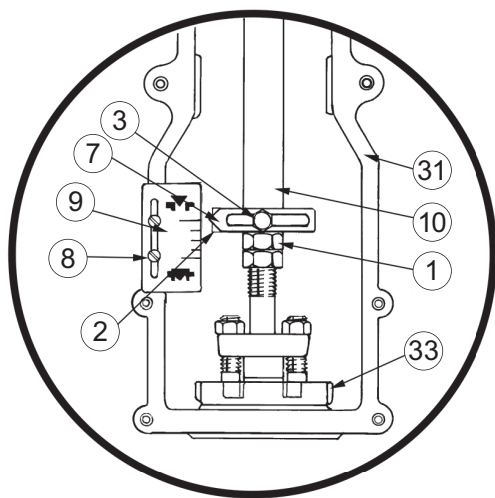
# Spring Diaphragm Actuators - Models 87/88 multispring



Model 87No. 10-16-23



Model 88No. 10-16-23

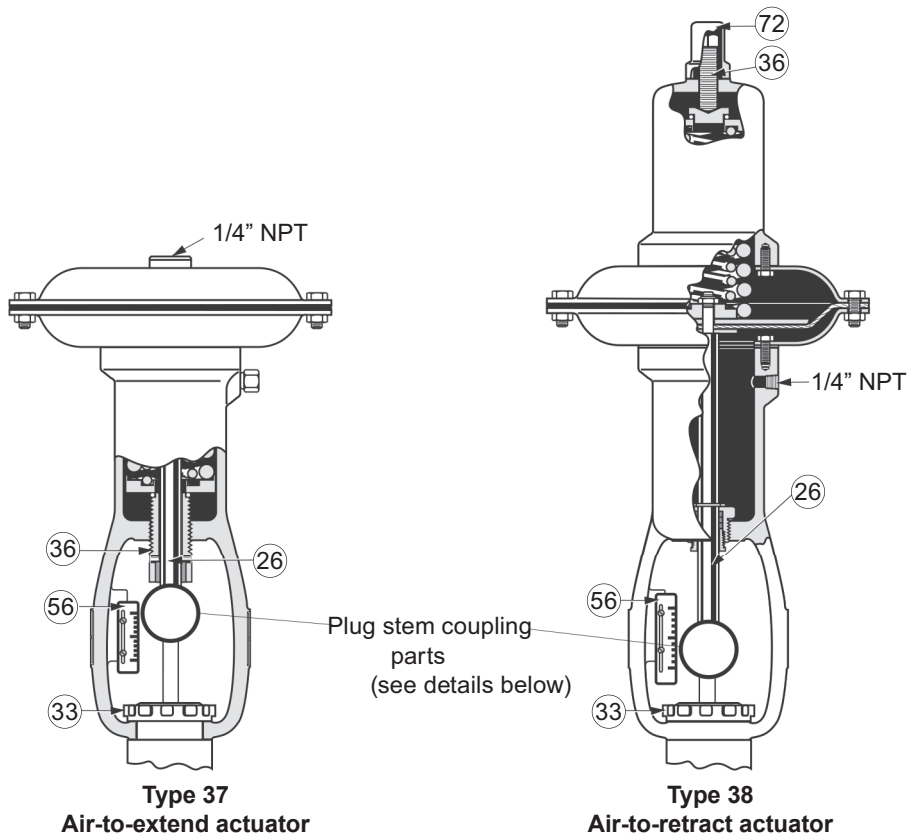


Detail of 87/88 ModelNo. 6

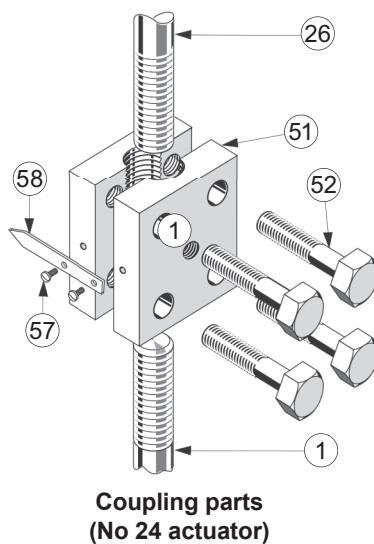
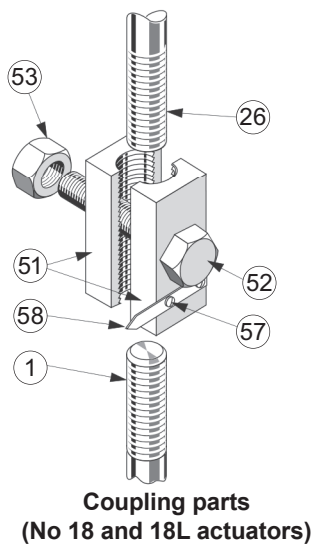
Parts Reference	
Ref.	Designation
1	Hex nut
2	Bottom stem connector
3	Pointer screw
★ 4	Top stem connector
★ 5	Cap screw, soc, head
★ 6	Connector Insert
7	Pointer
8	Screw, Pan head (travel scale)
9	Travel scale
10	Actuator stem
31	Yoke
★ 32	Lock nut
33	Drive nut

★ Not provided for size 6 actuator

# Spring Diaphragm Actuator - Models 37/38



Parts Reference	
Ref.	Designation
1	Valve Plug Stem
26	Actuator stem
27	Stem nut
33	Drive nut
36	Spring adjustor
51	Coupling
52	Coupling screw
53	Coupling nut
55	Frein de tige
56	Travel indicator scale
57	Machine screw
58	Travel indicator
72	Spring barrel cap



## Detail of coupling types of plug stem

## Notes

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