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R.S.V.P. Type 1031 Rotary Actuators

Instruction Manual

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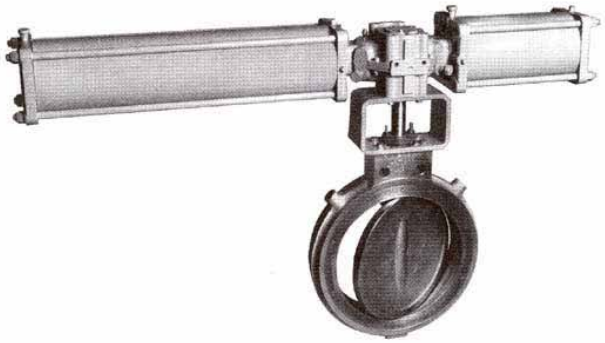

R.S.V.P. Type 1031 Actuator Mounted on a H.P.B.V.

A STOCKTON COMPANY • 5115 ASHBROOK • HOUSTON, TEXAS 77081 • U.S.A.
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Table 1. Specifications

Actuator Sizes and Model Numbers

See figure 2

Operating Pressure

Maximum Allowable: 125 psig (8.6 bar)

Material Temperature Capabilities

Standard: -20° to +200° F (-29° to +93° C)

Optional: 0° to +350° F (-18° to +177° C)

Maximum Valve Shaft Rotation

100 degree maximum rotation can be limited with independent, externally adjustable travel stops. Travel stops are of sufficient size to absorb maximum torque output.

Pressure Port Connections

(See figure 3/page 11) and (figure 4/page 12) for locations.

Stroking Time

Dependent on actuator size, rotation, and positioner if used. If stroking time is critical, consult your R.S.V.P. sales representative.

Approximate Weights

See (table 2/page2) and (table 3/page3)

Introduction

Scope of Manual

This instruction manual includes installation, startup, maintenance, and parts ordering information for the Type 1031 piston rotary actuator sizes 26, 33, 45, 60, and 80.

Only personnel qualified through training or experience should install, operate, and maintain a Type 1031 actuator. If there are any questions about these instructions, contact your R.S.V.P. sales office or sales representative before proceeding.

Description

R.S.V.P Type 1031 piston rotary actuators are rugged, compact, versatile units which provide a reliable method of opening and closing rotary valves. Many different model number combinations of actuator sizes, cylinder diameters, and double-acting or spring-return action are available. These actuators are designed for use over a wide range of pressures and temperatures.

Double-acting actuators (see figure 3/page 11) require pressure to rotate the valve in either direction. Spring-return actuators (see figure 4/page 12) require pressure to rotate the valve in one direction only and can be easily installed so that the spring will open or close the valve on loss of air pressure. Both double-acting and spring-return actuators are available with either one cylinder or with two cylinders for higher torque.

Table 2. Weights for Double-Acting Actuators

ACTUATOR MODEL NUMBER	WEIGHT		ACTUATOR MODEL NUMBER	WEIGHT	
	Pounds	kg		Pounds	kg
26051	120	34	33102	426	193
26061	130	59	45102	628	285
26071	146	66	45171	725	329
26081	155	70	45211	900	408
26062	180	82	80171	1100	499
33081	205	93	60211	1125	510
26082	230	104	80211	1350	612
33101	275	125	80172	1400	635
33082	283	128	80212	1650	748
33121	327	148			
45121	528	239			

Specifications

Specifications are shown in table 1 for the R.S.V.P. Type 1031 actuator.

Installation

When an actuator and valve are shipped together, the actuator is normally mounted on the valve. Follow the valve instructions when installing the valve in the pipeline, and then perform the procedures presented in the Loading Connections portion of this Installation section. If the actuator is shipped separately or if it is necessary to mount the actuator on the valve, perform the procedures presented in the Actuator Mounting portion of this section.

Table 3. Weights for Spring-Return Actuators

ACTUATOR MODEL NUMBER	OPERATING PRESSURE, PSIG (BAR)									
	40 (2.8)		60 (4.1)		80 (5.5)		100 (6.9)		125 (8.6)	
	Weight									
	Pounds	kg	Pounds	kg	Pounds	kg	Pounds	kg	Pounds	kg
26052SR	158	72	162	74	163	74	164	75	170	77
26062SR	252	114	250	113	255	116	243	110	268	122
26072SR	302	137	308	140	326	148	332	151	355	161
33072SR	347	157	355	161	372	169	372	169	402	182
33082SR	402	182	425	193	417	189	432	196	470	213
33102SR	586	266	614	279	678	308	700	318	763	346
45012SR	790	358	816	370	852	386	840	381	973	441
33122SR	903	410	870	395	1032	468	1005	456	---	---
45122SR	1100	499	1065	483	1230	558	1235	560	1387	629
45171SR	1170	531	1215	551	1330	603	1330	603	1425	646
60171SR	1410	640	1500	680	1550	703	1600	726	1760	798
45211SR	1430	649	1500	680	1670	757	1725	782	---	---
60211SR	1700	771	1765	801	1980	898	2090	948	2420	1100
80211SR	2080	943	2500	1130	2575	1170	2725	1240	2815	1280

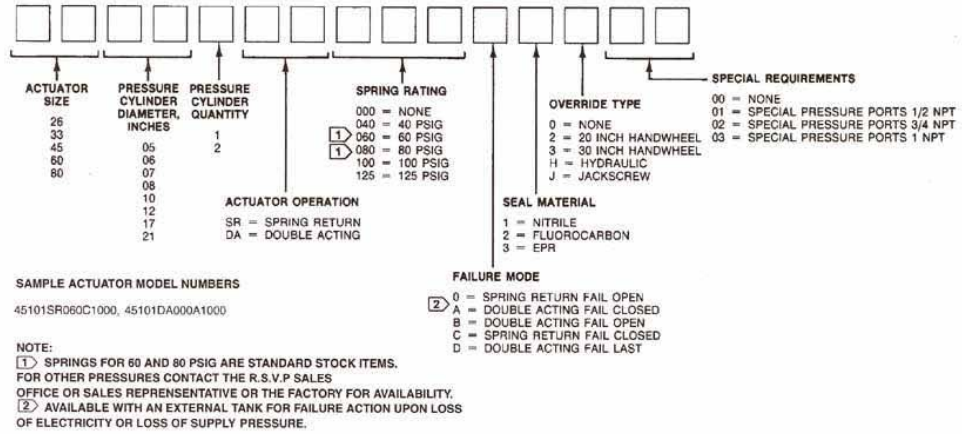


Figure 2. Size and Material Selection Codes Used for Determining Actuator Model Numbers

⚠ WARNING

To avoid personal injury or property damage caused by bursting of pressure-retaining parts, be certain the cylinder pressure does not exceed the pressure limits listed in table 1. Use pressure-limiting or pressure-relieving devices to prevent the cylinder pressure from exceeding these limits.

If hoisting the valve and actuator assembly or the actuator by itself, take precautions to prevent personnel from being injured in case the hoist or sling slips unexpectedly. Refer to tables 2 and 3 for actuator weights. Carefully position the sling to prevent damage to tubing or any accessories.

Actuator Mounting

Use the following steps to connect a valve and actuator that have been ordered separately. Valves with Type 1031 actuators are shipped from the factory in the open position, with the exception of spring-return

actuators that are assembled spring-to-close unless otherwise specified.

1. Place the actuator and valve in the same position (both open or closed).

2. Check the valve and actuator mounting surfaces, stem adaptor and valve shaft for possible discrepancies and for proper orientation. If the valve is equipped with a lubricator fitting, remove this fitting and install the lubrication extension nipple furnished with the actuator, and install the lubricator fitting in the extension nipple.

3. Position the stem adaptor bushing (if furnished loose) on the valve shaft and place the actuator over the bushing. The actuator is usually mounted parallel with the run of pipe.

4. Tighten all bolts and nuts evenly, taking care to center the actuator on the valve shaft. Cycle the actuator while the mounting bolts are somewhat loose. This will allow the unit to center itself.

Because there are many valve and actuator combinations, it is not practical to include detailed instructions on each combination. Mountings are designed as simple as possible to keep installations easy to perform.

Travel Stop Adjustments

Type 1031 actuators are shipped from the factory with the travel stops adjusted for approximately 90 degrees rotation. Generally, it is necessary to make slight stop adjustments once the actuator is installed on the valve.

If the valve has internal stops, refer to (figure 3/page 11) and (figure 4/page 12) for the actuator travel stops.

Loading Connection

1. Connect the supply pressure to the pressure port in the pressure cylinder. If the actuator is double-acting, connect the supply pressure to both pressure ports.

2. Keep the length of pipe or tubing as short as possible to avoid transmission lag in the air signal. If an accessory (such as a volume booster or a valve positioner) is used, be sure that the accessory is properly connected to the actuator. If a valve positioner is part of the assembly, the pressure connection to the actuator will normally be made at the factory.

3. When the valve and actuator assembly is completely installed, check for correct action (air-to-open or air-to-close) on spring-return actuators. For successful operation, the actuator yoke and valve shaft must move smoothly in response to supply pressure changes in the pressure cylinder.

Startup

When the valve and actuator assembly are first put into service, slight leakage past the piston and/or rod seals might be detected. This is due to the seals having been held in one position tending to cause a `set in the seal'. In such cases, operate the actuator through several cycles, thereby energizing the seals and resulting in a `re-seating' of the seals.

The stroking speed will be determined by a number of factors, including the distance from the pressure source, supply line size, supply line pressure, accessories, torque requirement of the valve, and size of the actuator. Due to the interaction of these variables, it is difficult to specify a `normal' stroking speed. Faster operation can be obtained by using larger air lines, larger ports on accessories, higher supply pressure and/or quick exhaust valves. Longer operating times can be obtained by using flow valves to meter the exhaust. However, the incoming supply air should not be metered or the exhaust flow metered excessively because this can cause unstable operation.

Maintenance

Actuator parts are subject to normal wear and must be inspected and replaced as necessary. The frequency of inspection and replacement depends upon the severity of service conditions. Instructions are given in subsequent sections for disassembly and assembly of the actuator and for inspecting the handwheel assembly.

⚠ WARNING

Avoid personal injury or property damage from sudden release of pressure or uncontrolled process fluid. Before starting disassembly:

Isolate the valve from the process,

Release process pressure, and

Vent the actuator supply pressure.

Disassembly

The following procedure describes how the actuator can be completely disassembled. When inspection or

repairs are required, perform only those steps necessary to accomplish the procedure. Key numbers referenced in the following steps are shown in figure 3 for double-acting actuators and in figure 4 for spring-return actuators.

1. Bypass the control valve, and relieve all loading pressure.

2. Disconnect the supply pressure and remove all tubing and accessories.

3. If the actuator is oil-filled, drain the oil from the body cavity by removing the drain plug (key 52).

4. Unscrew the cap screws (key 20), and remove the position indicator plate (key 21).

5. Remove the actuator from the valve. In some cases it is necessary to remove the valve mounting bracket from the actuator.

Disassembling The Pressure Cylinder

Instructions are provided for disassembling one pressure cylinder. If the actuator has two pressure cylinders, perform the same steps on the second cylinder. Key numbers referenced in the following steps are shown in (figure 3/page 11) for double-acting actuators and in (figure 4/page 12 for spring-return actuators.

1. Unscrew the elastic stop nuts (key 18), and remove the end cap (key 24).

2. Slide the cylinder (key 26) off the piston (key 15).

3. Unscrew the tie rods (key 19).

4. Unscrew the cap screw (key 17) taking care to hold the piston (key 15) in place. Remove the piston, cap screw and lockwasher (key 16).

5. Unscrew the cap screws (key 11).

6. Remove the seals (key 10) and cylinder adaptor (key 9) while being careful not to scratch the piston rod (key 12).

Removing The Piston Rod Cover (Actuators With Single Cylinder)

Key numbers referenced are shown in (figure 3/ page 11) for double-acting actuators and in (figure 4/ page 12) for spring-return actuators.

Unscrew the cap screws (key 34), and remove the rod cover (key 35). Remove the rod seal (key 33) from the rod cover.

Disassembling The Spring Cylinder

Key numbers referenced in the following steps are shown in figure 4 for spring-return actuators. The spring cylinder is used on spring-return actuators only.

1. Loosen the jam nuts (key 5) and then remove any load on the stop bolts (key 4).

2. Unscrew the elastic stop nuts (key 18), and remove the end cap (key 24).

3. Pull the spring cartridge assembly (key 41) out of the spring cylinder (key 40).

⚠ WARNING

To prevent personal injury or property damage from the sudden release of spring force, do not drop or try to disassemble the preloaded spring cartridge. Use care in handling.

4. Slide the cylinder (key 40) off the spring pusher (key 15).

5. Unscrew the tie rods (key 39).

6. Unscrew the cap screw (key 17) taking care to hold the piston (key 15) in place. Remove the piston or pusher (key 15), cap screw and lockwasher (key 16).

7. Unscrew the cap screws (key 11).

8. Remove the cylinder adaptor (key 9) being careful not to scratch the piston rod (key 12).

Disassembling The Body For Actuator Sizes 26, 33, and 45

Key numbers referenced in the following steps are shown in (figure 3/page 11) for double-acting actuators and in (figure 4/page 12) for spring-return actuators.

1. Remove the jam nuts (key 29) and cap screws (key 30).

2. Insert a screwdriver in the notch between the body halves (key 1). Tap the screwdriver with a hammer until the body halves separate.

3. Lift off the top body half.

4. Remove the top roller (key 28), and lift out the thrust pin (key 27).

5. Remove the piston rod (key 12), two rod bearings (key 32), and rod seals (key 33).

6. Lift the yoke (key 2) out of the bottom body half and remove the lower roller (key 28).

7. Remove the yoke bearings (key 60) from each body half.

8. O-rings (keys 3 and 13), U-ring(s) (key 14), and rod seals (key 33) are installed in machined grooves. A

good tool for removing these seals is a standard 1/4-inch blade screwdriver. Round and smooth the edges of the screwdriver blade to prevent damage to the seals and machined grooves.

If the seals have not been previously removed, remove them by inserting the screwdriver blade between the base of the seal and the machined groove, and lift them out.

9. Clean the internal metal parts with cleaning solvent.

10. Check all machined bearing and sealing surfaces for nicks, scratches, and excessive wear. Replace worn or damaged parts as necessary. Completely lubricate these surfaces with R.S.V.P. 4400 grease that is compatible with the seal materials.

Standard seal materials might vary for special applications; that is, SO_2 (sulfur dioxide) service, CO_2 (carbon dioxide) service, etc. Check (tables 5 and 6/ page 10), for Parts Description and Material Information, for seal materials.

Disassembling The Body For Actuator Sizes 60 and 80

Key numbers referenced in the following steps are shown in (figure 3/page 11) for double-acting actuators and in (figure 4/page 12) for spring-return actuators.

1. Remove the self-tapping screws (key 64), access plate (key 63), and access plate gasket (key 65) from the body.

2. Remove the cap screws (key 30) and lockwashers (key 66).

3. Insert a screwdriver in the notch between the cover (key 67) and the body (key 1). If necessary, tap the screwdriver with a hammer until the cover and body separate.

4. Lift off the cover (key 67).

5. Remove the upper retaining ring (key 62) from the thrust pin (key 27), and remove the top roller (key 28) and support washer (key 61).

6. Align the thrust pin with the access hole by moving the piston rod (key 12). Remove the thrust pin (key 27), support washer (key 61), and lower roller (key 28) through the access hole.

7. Remove the piston rod (key 12), two rod bearings (key 32), and rod seals (key 33) .

8. Lift the yoke (key 2) out of the body (key 1).

9. Remove the yoke bearings (key 60) from the body (key 1) and from the cover (key 67).

10. O-rings (keys 3 and 13), U-ring(s) (key 14), and rod seals (key 33) are installed in machined grooves. A good tool for removing these seals is a standard 1/4-inch blade screwdriver. Round and smooth the edges of the screwdriver blade to prevent damage to the seals and machined grooves.

If the seals have not been previously removed, remove them by inserting the screwdriver blade between the base of the seal and the machined groove, and lift them out.

11. Clean the internal metal parts with cleaning solvent.

12. Check all machined bearing and sealing surfaces for nicks, scratches, and excessive wear. Replace worn or damaged parts as necessary. Completely lubricate these surfaces with R.S.V.P. 400 grease that is compatible with the seal materials.

Standard seal materials might vary for special applications; that is, SO_2 service, CO_2 service, etc. Check tables 5 and 6, Parts Description and Material Information, for seal materials.

Assembly

This procedure assumes that the actuator was completely disassembled. If the actuator was not completely disassembled, start the assembly instructions at the appropriate step.

Assembling The Body For Actuator Sizes 26, 33, and 45

Key numbers referenced in the following steps are shown in figure 3 for double-acting actuators and in figure 4 for spring-return actuators.

1. Install the O-rings (key 3) on each end of the yoke (key 2). Lubricate the exposed surface of the O-rings with R.S.V.P. 4400 or equivalent.

2. Install the yoke bearings (key 60) in the upper and lower body halves.

3. Install the yoke (key 2) into the bottom body half. When installing the yoke, be sure to insert the end with the valve stem adaptor through first. Then, to facilitate yoke installation, rotate it while pushing downward on the its top. Take care to avoid damaging the yoke bearing (key 60).

4. Install the bottom roller (key 28) into the lower machined slot of the yoke, taking care to align the centerline of the roller with the centerline of the piston rod (key 12) location.

5. Install the two rod bearings (key 32).

6. Slide the piston rod (key 12) into the rod bearings (key 32), aligning the hole through the piston rod with the hole through the bottom roller (key 28).

7. Generously coat all yoke slot surfaces, thrust pin (key 27), and rollers (key 28) with R.S.V.P. NM 91001 paste or equivalent.

8. Install the thrust pin (key 27) into the hole in the piston rod and bottom roller.

9. Install the top roller (key 28) over the thrust pin (key 27) and into the machined slot of the yoke (key 2). Recoat these parts with R.S.V.P. NM 91001 paste.

10. Coat the machined surfaces of the body half flanges with a thin coat of R.S.V.P. Selastic number 732, RTV adhesive sealant, or equivalent.

11. Install the top body half over the yoke (key 2). Rotate the body slightly while pushing down until the yoke O-ring (key 3) slides past the yoke bearing (key 60). Take care to avoid damaging the yoke bearing.

12. Align the two body halves and press them together. Install the cap screws (key 30) and tighten the jam nuts (key 29).

13. Grasp the piston rod, and then push and pull the rod through several complete strokes to insure smooth operation.

Assembling The Body For Actuator Sizes 60 and 80

Key numbers referenced in the following steps are shown in figure 3 for double-acting actuators and in figure 4 for spring-return actuators.

1. Install the O-rings (key 3) on each end of the yoke (key 2). Lubricate the exposed surface of the O-rings with R.S.V.P. 4400 or equivalent.

2. Install the yoke bearings (key 60) in the cover (key 67) and the body (key 1).

3. Install the yoke (key 2) into the body. When installing the yoke, be sure to insert the end with the valve stem adaptor through first. To facilitate yoke installation, rotate it while pushing downward on the its top. Take care to avoid damaging the yoke bearing (key 60).

4. Install the two rod bearings (key 32).

5. Slide the piston rod (key 12) into the rod bearings (key 32) while aligning the hole in the piston rod with the access hole in the body.

6. Rotate the yoke (key 2) in order to align its slots with the hole in the piston rod (key 12).

7. Install the retaining ring (key 62), support washer (key 61), and roller (key 28) onto the thrust pin (key 27).

8. Generously coat all yoke slot surfaces, thrust pin (key 27), and rollers (key 28) with R.S.V.P. NM 91001 paste or equivalent.

9. Install the thrust pin (key 27) through the access hole, the hole in the piston rod, and the machined slots in the yoke.

10. Install the roller (key 28) over the thrust pin (key 27) and into the machined slots of the yoke (key 2).

11. Install the support washer (key 61), and retaining ring (key 62) onto the thrust pin. Recoat these parts with R.S.V.P. NM 91001 paste.

12. Replace the access plate gasket (key 65), access plate (key 63), and self-tapping screws (key 64).

13. Coat the machined surfaces of the cover and the body with a thin coat of R.S.V.P. Selastic number 732, RTV adhesive sealant, or equivalent.

14. Install the cover (key 67) over the yoke (key 2). Rotate the cover slightly while pushing down until the yoke O-ring (key 3) slides past the yoke bearing (key 60). Take care to avoid damaging the yoke bearing.

15. Align the cover (key 67) with the body (key 1), and press them together. Install the lockwashers (key 66), and cap screws (key 30) and tighten the cap screws.

16. Grasp the piston rod, and then push and pull the rod through several complete strokes to ensure smooth operation.

Installing The Piston Rod Cover (Actuators With Single Cylinder)

Note

On the following assembly instructions, the right and left hand sides of the body will be referred to as if you were looking at the top of body with the stop adjusting bolts facing you.

On standard double-acting actuators, the piston rod cover is installed on the left-hand side of the body. Key numbers referenced in the following steps are shown in (figure 3/page 11) for double-acting actuators and in (figure 4/page 12) for spring-return actuators.

1. Install the body adaptor gasket (key 8) over the piston rod (key 12) and rod bearing (key 32). Align the holes in the gasket with the holes in the body.

2. Install the rod seal (key 33) into the rod cover (key 35) with the lips of the seal facing the cavity of the rod cover.

3. Lubricate the exposed surface of the rod seal with R.S.V.P. 4400 or equivalent. Slide the rod cover (key 35) over the piston rod (key 12) until it mates with the body.

4. Align the bolt holes in the rod cover (key 35) with the bolt holes in the body adaptor gasket (key 8) and body. Install and tighten the rod cover bolts (key 34).

Assembling The Pressure Cylinder

Note

On the following assembly instructions, the right and left hand sides of the body will be referred to as if you were looking at the top of body with the stop adjusting bolts facing you.

On standard double-acting single cylinder and spring-to-close actuators, the pressure cylinder is installed on the right-hand side of the body. On spring-to-open actuators, the pressure cylinder is installed on the left-hand side of the body. Key numbers referenced in the following steps are shown in (figure 3/page 11) for double-acting actuators and in (figure 4/page 12) for spring-return actuators.

Instructions are provided for assembling one pressure cylinder. If the actuator has two pressure cylinders, perform the same steps on the second cylinder.

1. Install the body adaptor gasket (key 8) over the piston rod (key 12) and rod bearing (key 32). Align the holes in the gasket with the holes in the body.

2. Install the rod seal (key 33) into the cylinder adaptor (key 9) with the lips of the seal facing the pressure cylinder. Lubricate the exposed surface of the seal with R.S.V.P. 4400 or equivalent.

3. Slide the cylinder adaptor (key 9) over the piston rod (key 12) until it mates with the body. Take care to position the pressure port on the opposite side of the body from the stop bolts (key 4).

4. Align the bolt holes in the cylinder adaptor (key 9) with the bolt holes in the body adaptor gasket (key 8) and body. Install new bolt seals (key 10).

5. Install the cap screws (key 11) through the holes in the cylinder adaptor (key 9) and tighten the cap screws to the torque indicated in table 4.

6. Install the gasket (key 25) over the machined guide on the cylinder adaptor (key 9).

Note

On double-acting actuators there are two U-rings per piston. On spring-return actuators there is one U-ring per piston.

7. On double-acting actuators, install the two new U-rings (key 14) in the machined grooves of the piston (key 15), taking care that the lips of the two seals are facing opposite each other.

8. Install the piston rod O-ring (key 13) in the seal groove on the face of the piston hub.

Table 4. Torque Guidelines

ACTUATOR SIZE	CAP SCREW (KEY 11) TORQUE	CAP SCREW (KEY 17) TORQUE
	lbf ft	
26	50 ± 2.5	50 ± 2.5
33	90 ± 2.5	90 ± 2.5
45	190 ± 10	550 ± 25
60	220 ± 10	550 ± 25
80	220 ± 10	550 ± 25
	n m	
26	68 ± 3	68 ± 3
33	122 ± 3	122 ± 3
45	258 ± 14	746 ± 34
60	298 ± 14	746 ± 34
80	298 ± 14	746 ± 34

9. Lubricate the exposed surface of the O-ring (key 13) with R.S.V.P. 4400 or equivalent. Install the lockwasher (key 16) over the cap screw (key 17). Place the piston (key 15) on the end of the piston rod (key 12), with the O-ring facing the piston rod. Install the cap screw through the hole in the piston and then tighten the cap screw to the torque indicated in table 4.

10. Lubricate the exposed surface of the U-rings (key 14) with R.S.V.P. 4400 or equivalent. Install the short length of threads on the tie rods (key 19) into the threaded holes of the cylinder adaptor (key 9).

11. Install the pressure cylinder (key 26) over the piston, taking care not to damage the U-rings. Slide the cylinder up to and over the machined guide on the cylinder adaptor (key 9).

12. Install the gasket (key 25) over the machined guide on the end cap (key 24).

13. Install the end cap (key 24) over the tie rods (key 19), taking care to align the pressure port in the end cap with the pressure port in the cylinder adaptor (key 9). Slide the end cap on until it mates with the cylinder (key 26).

14. Install the elastic stop nuts (key 18) on the tie rods (key 19). Tighten each nut one full turn in a criss-cross manner. Apply approximately 50 lbf ft (68 N m) of torque to each nut.

Assembling The Spring Cylinder

Note

On the following assembly instructions, the right and left hand sides of the body will be referred to as if you were looking at the top of body with the stop adjusting bolts facing you.

On spring-to-close actuators, the spring cylinder is installed on the left-hand side of the body. On spring-to-open actuators, the spring cylinder is installed on the right-hand side of the body. Key numbers refer-

enced in the following steps are shown in (figure 4/ page 12) for spring-return actuators.

1. Install the body adaptor gasket (key 8) over the piston rod (key 12) and rod bearing (key 32).

2. Align the holes in the body adaptor gasket (key 8) with the holes in the body. Install the rod seal (key 33) into the cylinder adaptor (key 9) with the lips of the seal facing away from the body.

3. Lubricate the exposed surface of the rod seal (key 33) with R.S.V.P. 4400 or equivalent. Slide the cylinder adaptor (key 9) over the piston rod (key 12) until it mates with the body.

4. Align the bolt holes in the cylinder adaptor (key 9) with the bolt holes in the body adaptor gasket (key 8) and body. Install new bolt seals (key 10).

5. Install the cap screws (key 11) through the holes in the cylinder adaptor (key 9) and tighten the cap screws to the torque indicated in table 4.

6. Install the gasket (key 42) over the machined guide on the cylinder adaptor (key 9).

7. **For size 26 single-cylinder actuators and all other double-cylinder actuators:** Install a new U-ring (key 14) in the machined groove of the piston (key 15) nearest the groove for the O-ring (key 13), taking care that the lips of the U-ring face the same direction as the O-ring.

8. Lubricate the exposed surface of the U-ring (key 14) with R.S.V.P. 4400 or equivalent. Install the lock washer (key 16) over the cap screw (key 17).

9. Place the piston (key 15) on the end of the piston rod (key 12), with the O-ring seal (key 13) facing the piston rod. Install the cap screw through the hole in the piston and tighten the cap screw to the torque indicated in table 4.

10. Push the piston towards the body as far as possible.

11. Install the short length of threads on the tie rods (key 39) into the threaded holes of the cylinder adaptor (key 9).

12. Install the spring cylinder (key 40) over the piston (key 15), taking care not to damage the U-ring. Slide the spring cylinder over the machined guide on the cylinder adaptor (key 9).

13. Insert the spring cartridge assembly (key 41), male chamfer end first, into the cylinder until the spring cartridge assembly mates up to the piston (key 15).

14. Install the spring cylinder gasket (key 42) over the machined guide on the end cap (key 24).

15. Install the end cap (key 24) over the tie rods (key 39). Slide the end cap on until it mates with the spring cylinder (key 40).

16. Install the lock nuts (key 18) on the tie rods (key 39). Tighten each nut one full turn in a crisscross manner. Apply approximately 50 ft/lb (68 N m) of torque to each nut.

17. Remove the stop bolts (key 4) from the body (key 1). The jam nut (key 5), seal (key 6), and flat washer (key 7) will stay on the stop bolt when it is removed from the body. Install new stop bolt seals (key 6), and then replace the flat washers.

18. Screw the stop bolts (key 4) into the body.

19. Replace the position indicator plate (key 21) and tighten the cap screws (key 20).

20. If the drain plug (key 52) was removed, install it in the lower body half. If the actuator body was oil-filled, refill it with a low viscosity petroleum-base oil that is compatible with the nitrile or fluorocarbon seals.

21. Install the tubing and accessories. Pressurize the actuator and test for leaks.

22. Refer to the Installation section for mounting of actuator on valve, for making travel stop adjustments, and for making the loading pressure connections.

Inspecting the Handwheel Assembly

Key numbers referenced in the following steps are shown in (figure 3/page 11) for double-acting actuators and in (figure 4/page 12) for spring-return actuators.

1. Loosen the locknut (key 56).

2. Back out the handwheel assembly (key 55) from the jackscrew housing (key 59) or from the jackscrew end cap (key 58).

3. If the handwheel assembly (key 55) was removed from the jackscrew end cap (key 58), check the locknut seal (key 57) and replace if worn or damaged.

4. Thread the handwheel assembly (key 55) into the the jackscrew housing (key 59) or into the jackscrew end cap (key 58).

5. Tighten the locknut (key 56).

Parts Ordering

When replacement parts are required, always use genuine R.S.V.P. parts. Recommended spare parts are identified with an asterisk in (tables 5 and 6/ page 10).

When corresponding with the R.S.V.P. sales office or sales representative about this equipment, always mention the actuator model number, serial number, and seal kit number which are stamped on a metal tag secured to the unit.

When ordering replacement parts, always refer to this model number, serial number, and seal kit number. Also, refer to the part key number shown in (figure 3/ page 11) and (figure 4/page 12) and listed in (tables 5 and 6/page 10).

Table 5. Parts Description and Material Identification for Double-Acting Actuators

Key Number	Description	Material
1	Body	Ductile Iron
2	Yoke	Ductile Iron
3 *	O-Ring (yoke)	Nitrile(1)
4	Stop Bolt	Steel
5	Jam Nut (stop bolt)	Steel
6 *	Seal (stop bolt)	Steel & Nitrile
7	Flat Washer (stop bolt)	Steel
8 *	Body Adaptor Gasket	Commercial Grade Fiber
9	Cylinder Adaptor	Ductile Iron
10 *	Seal (cylinder adaptor cap screw)	Steel & Nitrile(1)
11	Cap Screw (cylinder adaptor)	Steel or Stainless Steel
12	Piston Rod	Steel
13 *	O-Ring (piston rod)	Nitrile(1)
14 *	U-Ring (piston)	Nitrile(1)
15	Piston	Ductile Iron
16	Lockwasher	Steel
17	Cap Screw	Steel
18	Elastic Stop Nut	Steel & Plastic
19	Tie Rod (pressure side)	Steel
20	Cap Screw	Steel
21	Indicating Plate	Steel
22	Relief Vent	Steel
23	Reducing Bushing	Steel
24	End Cap	Ductile Iron
25 *	Gasket (pressure cylinder)	Commercial Grade Fiber
26	Cylinder	Steel
27	Thrust Pin	Steel
28	Roller	Steel
29	Jam Nut	Steel
30	Screw	Steel
31	Dowel Pin	Steel
32	Rod Bearing	Bronze
33 *	Rod Seal (polypac)	Molythane (1)(2)
34	Cap Screw (rod cover for size 26 only)	Steel
35	Rod Cover (for size 26 only)	Ductile Iron
36	Cover Vent	Plastic
37	Reducing Bushing (for size 26 only)	Steel
50	Nameplate	Aluminum
51	Drive Screw	Steel
52	Pipe Plug (drain plug)	Steel
53	Pipe Plug	Steel
55	Handwheel with Jackscrew	Steel
56	Locknut	Steel
57	Locknut Seal	Plastic
58	Jackscrew End Cap	Ductile Iron
59	Jackscrew Housing (for size 26 only)	Ductile Iron
60 *	Yoke Bearing	Plastic, UHMW Polyethylene
61	Support Washer	PI Steel
62	Retaining Ring	PI Spring Steel
63	Access Plate	Stainless Steel
64	Self-Tapping Screw	Stainless Steel
65 *	Gasket (60 & 80 Bodies Only)	Commercial Grade Fiber
66	Lockwasher	PI Steel
67	Cover	Ductile Iron
68	Cap Screw	Steel
69 *	RSVP 4400	Soft Grease
70 *	RSVP NM 91001	Assembly Grease
71 *	RSVP 732	RTV Sealant

***Recommended Spare Part**

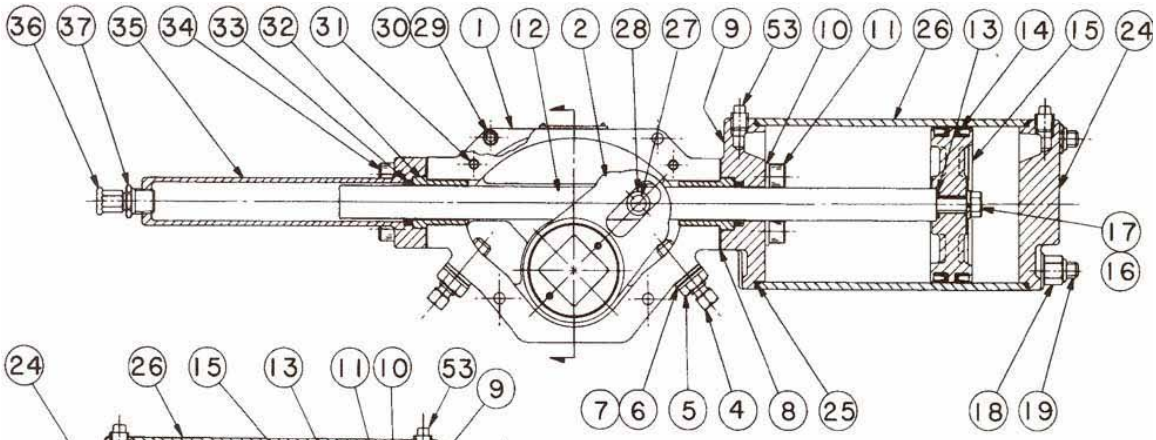
1. Also available in fluorocarbon and EPR.
2. Trademark of Parker Seals Packing Division.

Table 6. Parts Description and Material Identification for Spring-Return Actuators

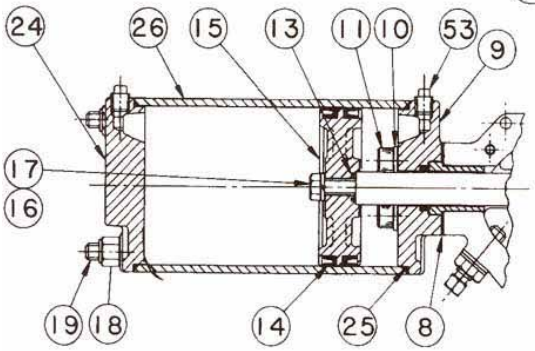
Key Number	Description	Material
1	Body	Ductile Iron
2	Yoke	Ductile Iron
3 *	O-Ring (Yoke)	Nitrile(1)
4	Stop Bolt	Steel
5	Jam Nut (stop bolt)	Steel
6 *	Seal (stop bolt)	Steel & Nitrile
7	Flat Washer (stop bolt)	Steel
8	Body Adaptor Gasket	Commercial Grade Fiber
9	Cylinder Adaptor	Ductile Iron
10 *	Seal (cylinder adaptor cap screw)	Steel & Nitrile(1)
11	Cap Screw (cylinder adaptor)	Steel or Stainless Steel
12	Piston Rod	Steel
13 *	O-Ring (piston rod)	Nitrile(1)
14 *	U-Ring (piston)	Nitrile(1)
15	Piston	Ductile Iron
15	Spring Pusher	Ductile Iron
16	Lockwasher	Steel
17	Cap Screw	Steel
18	Elastic Stop Nut	Steel & Plastic
19	Tie Rod (pressure side)	Steel
20	Cap Screw	Steel
21	Indicating Plate	Steel
22	Relief Vent	Steel
23	Reducing Bushing	Steel
24	End Cap	Ductile Iron
25 *	Gasket (pressure cylinder)	Commercial Grade Fiber
26	Cylinder	Steel
27	Thrust Pin	Steel
28	Roller	Steel
29	Jam Nut	Steel
30	Screw	Steel
31	Dowel Pin	Steel
32	Rod Bearing	Bronze
33 *	Rod Seal (polypac)	Molythane(1)(2)
34	Cap Screw (rod cover for size 26 only)	Steel
35	Rod Cover (for size 26 only)	Ductile Iron
36	Cover Vent	Plastic
37	Reducing Bushing (for size 26 only)	Steel
39	Tie Rod (spring side)	Steel
40	Spring Cylinder	Steel
41	Spring Cartridge Assembly	Steel
42 *	Spring Cylinder Gasket	Commercial Grade Fiber
50	Nameplate	Aluminum
51	Drive Screw	Steel
52	Pipe Plug (drain plug)	Steel
53	Pipe Plug	Steel
55	Handwheel with Jackscrew	Steel
56	Locknut	Steel
57	Locknut Seal	Plastic
58	Jackscrew End Cap	Ductile Iron
59	Jackscrew Housing (size 26 only)	Ductile Iron
60 *	Yoke Bearing	Plastic, UHMW Polyethylene
61	Support Washer	PI Steel
62	Retaining Ring	PI Spring Steel
63	Access Plate	Stainless Steel
64	Self-Tapping Screw	Stainless Steel
65 *	Gasket (60 & 80 Bodies Only)	Commercial Grade Fiber
66	Lockwasher	PI Steel
67	Cover	Ductile Iron
68	Cap Screw	Steel
69 *	RSVP 4400	Soft Grease
70 *	RSVP NM 91001	Assembly Grease
71 *	RSVP 732	RTV Sealant

***Recommended Spare Part**

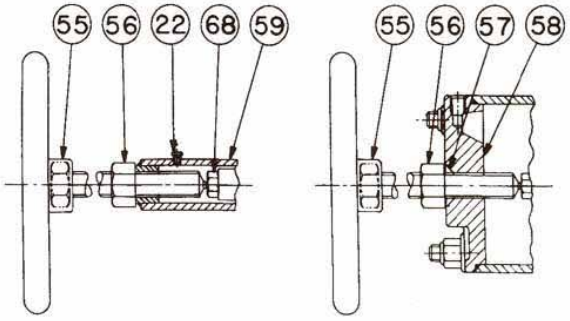
1. Also available in fluorocarbon and EPR.
2. Trademark of Parker Seals Packing Division.



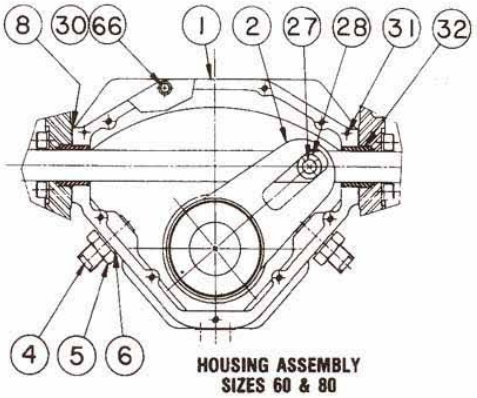
ONE PRESSURE CYLINDER



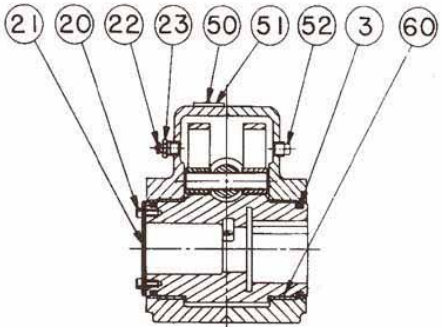
TWO PRESSURE CYLINDERS

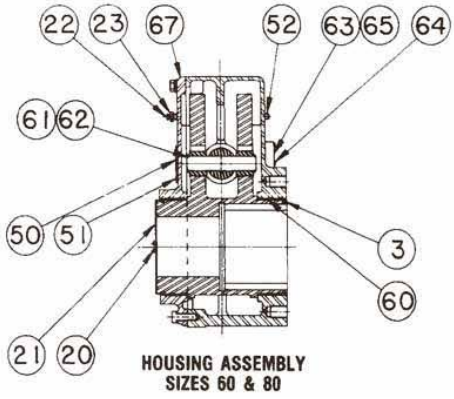


OVERRIDE VERSIONS
SIZES 26, 33, & 45 ACTUATORS ONLY
BOTH ENDS



HOUSING ASSEMBLY
SIZES 60 & 80





HOUSING ASSEMBLY
SIZES 60 & 80

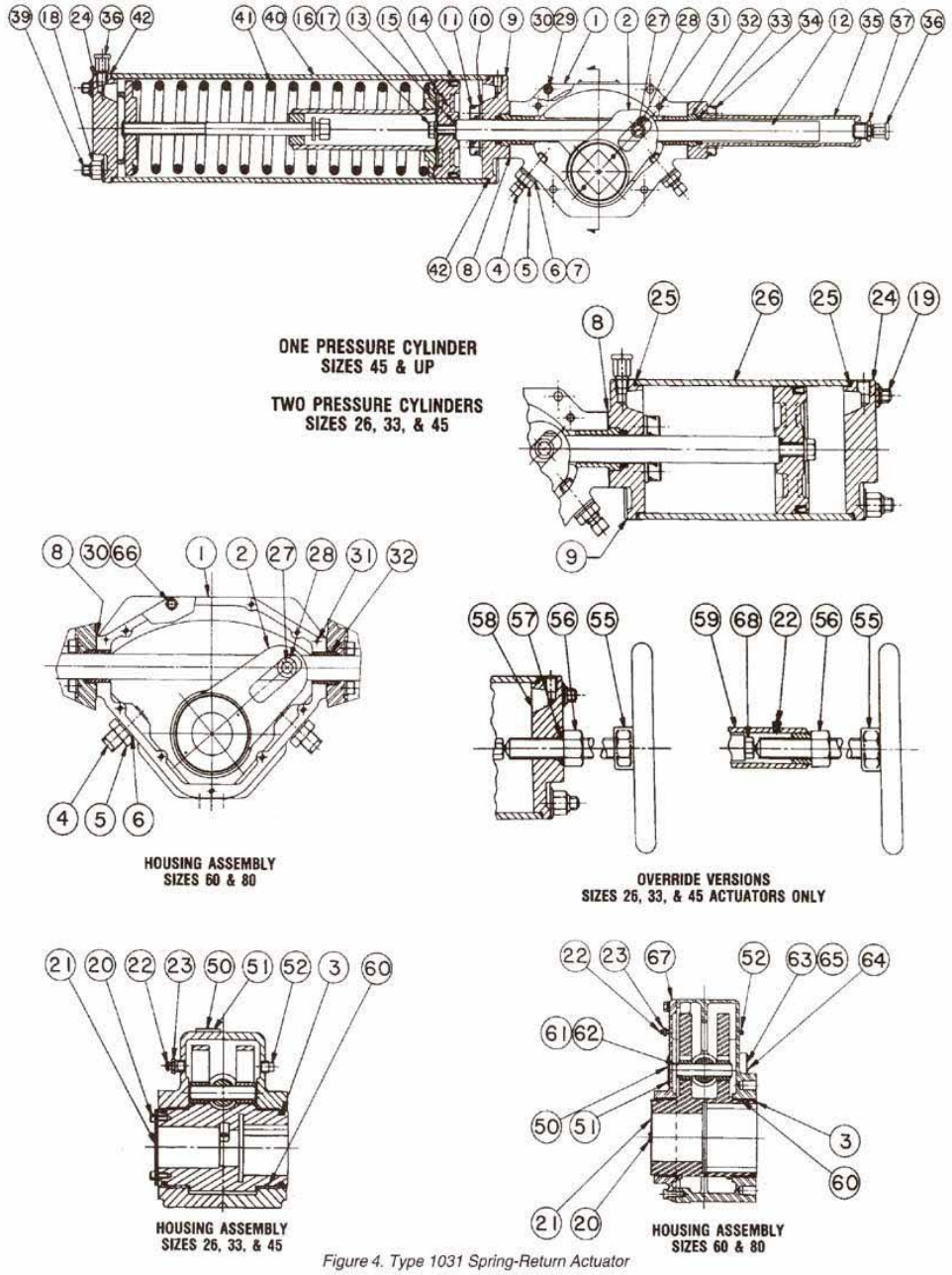


Figure 4. Type 1031 Spring-Return Actuator