

SKINNER VALVE

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INSTALLATION, OPERATING & MAINTENANCE INSTRUCTIONS 2-WAY N.O. DIRECT LIFT DIAPHRAGM SOLENOID VALVES 3/8", 1/2", AND 3/4" NPT TYPE: 72228



DESCRIPTION

These valves are 2-way, direct lift pilot assist diaphragm valves. They are offered in brass and stainless steel construction. Valves may be ordered with either NEMA 2, 4, 4X integrated coils for ordinary locations or NEMA 4, 4X, 7, and 9 for hazardous locations: Divisions I and II; Class I, Groups A, B, C, and D; Class II, Groups E, F, and G. Additional solenoid coils and enclosures are offered as described in our catalog.

PRINCIPLES OF OPERATION

De-energized: Pressure is connected to Port "P". The retainer/seal assembly is held away from the diaphragm pilot orifice by the return spring. This allows flow through the pilot orifice to the valve outlet and prevents the supply pressure from building up behind the diaphragm.

At zero or very low differential pressure, the upward force of the retainer/seal created by the return spring is transferred through the diaphragm spring. The diaphragm spring is attached to the diaphragm lifting it and opening the main orifice.

At higher differential pressure, the diaphragm spring force is too low to raise the diaphragm off the main orifice. The difference in the size of the pilot orifice and the diaphragm bleed hole results in a great enough pressure imbalance across the diaphragm to lift it off the main orifice permitting flow through the valve. The valve will remain open as long as the coil is de-energized and sufficient pressure differential is maintained.

Energized: The plunger pushes the retainer/seal down against the pilot orifice blocking this flow path. Flow through the diaphragm bleed hole will equalize the pressure on both sides of the diaphragm. The diaphragm assembly will be pressed against the body orifice by the force of the spring on the retainer/seal assembly and the fluid pressure.

FLUID CODES

Listed below are the codes utilized by Underwriters Laboratories (UL) and the Canadian Standards Association (CSA) for various common fluids. The codes for those fluids that are approved or certified by the agencies for use with each valve are printed on the outside of the individual packaging.

CODE

FLUID

A	- Air or nontoxic, nonflammable gases
Ac	- Acetylene
F	- Common refrigerants except ammonia
G	- City gas supplied by public utilities
Ga	- Gasoline
HO	- Petroleum based hydraulic oils having viscosities of 125 to 400 SSU at 100°F (38°C)
O2	- Nos. 1 and 2 fuel oils, oils having viscosities not more than 40 SSU at 100°F (38°C)
O2-06	- No. 2 through No. 6 oil
Ox	- Oxygen
S	- Steam
W	- Water or other aqueous nonflammable liquids

For the maximum fluid temperatures, as well as valve ambient limitations, check the valve part number on the nameplate and refer to the catalog or the outside of the shipping package.

INSTALLATION INSTRUCTIONS

Mounting position and pressure limits: Valves can be mounted directly on piping. The 72228 valves are designed to be multi-poised and so will perform properly when mounted in any position. However, for optimum life and performance the valves should be mounted vertically upright so as to minimize wear and reduce the possibility of foreign matter accumulating inside the sleeve area.

Line pressure must conform to nameplate rating.

Piping: Remove protective closures from the body ports. Connect line pressure to the inlet "P" port. Also an arrow on the body indicates direction of flow. Use of Teflon tape, thread compound or sealants is permissible, but should be applied sparingly to male pipe threads only. Loctite primer #764 and pipe sealant #567 are recommended when using stainless steel fittings with stainless steel valve bodies.

CAUTION: Do not allow foreign particles, Teflon tape, or thread compound to enter valve. Tightening torque should not exceed the following values for each port size: 3/8" NPT - 225 in-lbs., 1/2" NPT - 300 in-lbs., 3/4" NPT - 450 in-lbs. **Only the wrench flats provided on the body ports should be used in applying the torque. Do not use the sleeve or enclosure as a lever when applying torque.**

Connect the outlet line to the opposite port.

Media filtration: Normally filtration is not required, but dirt or foreign material in the media may cause excessive leakage, wear, or in exceptional cases, malfunction. If filtration is used, install the filter on the inlet side as close to the valve as possible. Clean periodically depending on service conditions.

Lubrication: Lubrication is not required although air line lubrication will substantially increase valve life.

CAUTION: *Valves which have seals or other components made from ethylene propylene rubber must not be exposed to petroleum based lubricants or other hydrocarbons.*

Electrical connection: Electrical supply must conform to nameplate rating. Connect coil leads or terminals to the electrical circuit using standard electrical practices in compliance with local authorities and the National Electrical Code.

WARNING: *Valves to be installed in Hazardous Locations, must be outfitted with Hazardous Location coils only. Verify nameplate data and coil part number before installing the valve.*

WARNING: *Turn off electrical power before connecting the valve to the power source.*

If the coil assembly is located in an inconvenient orientation, it may be reoriented to facilitate installation. Loosen coil assembly nut, rotate coil assembly to desired position, then retighten the nut with an input torque of 43-53 in-lbs.

DIN Coil and Terminal Box Assembly (Coil Code D100, D200 or D300; Option Code DB): Loosen cover screws and swing cover 90° toward the conduit hub in order to access the interior space. Separate the plastic block containing the screw terminals from the metal enclosure using a small flat head screwdriver. Feed the lead wires through the conduit hub and attach them to the appropriate screw terminal. For electrical connection within the terminal box, use field wire that is rated for 90° C or greater. Snap the plastic block back into place inside the metal enclosure. Replace the cover and tighten the cover screws with an input torque of 2 to 4 in-lbs. Place the gasket over the DIN spades on the coil and press the terminal box and coil together. Secure the terminal box to the coil using the mounting screw provided. Apply 4 to 8 in-lbs. torque to the mounting screw.

Screw Terminal Coil and Terminal Box Assembly (Coil Code S100, S200, or S300; Option Code TB): Loosen cover screws and swing cover 90° toward the conduit hub in order to access the interior space. Feed the lead wires through the conduit hub and attach them to the appropriate screw terminal. For electrical connection within the terminal box, use field wire that is rated for 90° C or greater. Replace the cover and tighten the cover screws with an input torque of 2 to 4 in-lbs. Press the terminal box and coil together. Secure the terminal box to the coil using the mounting screw provided. Apply 12 to 20 in-lbs. torque to the mounting screw.

CAUTION: *When the DIN or Screw Terminal coils are used with the Terminal Box Assembly, be sure to apply a wrench to the wrench flats on the conduit hub when installing electrical conduit.*

Coil/enclosure temperature: Standard valves are supplied with coils designed for continuous duty service. Normal free space must be provided for proper ventilation. When the coil is energized continuously for long periods of time, the coil assembly will become hot. The coil is designed to operate permanently under these conditions. Any excessive heating will be indicated by smoking and/or odor of burning coil insulation.

For the maximum valve ambient conditions, as well as the fluid temperatures, check the valve part number on the nameplate and refer to the catalog.

MAINTENANCE

Note: Depending on service conditions, fluid being used, filtration, and lubrication, it may be required to periodically clean and/or replace worn components. See Disassembly Instructions.

CAUTION: *Do not expose plastic or elastomeric materials to any type of commercial cleaning fluid. Parts should be cleaned with a mild soap and water solution.*

DISASSEMBLY INSTRUCTIONS

WARNING: *Depressurize system and turn off electrical power to the valve before attempting repair.*

The valve need not be removed from the line.

To remove the coil assembly:

For both ordinary and hazardous location constructions, unscrew the nut on the top of the coil assembly. The wave washer and coil assembly can now be removed.

To disassemble the pressure vessel:

CAUTION: *If the sleeve assembly does not have a hex style flange, do not use a pipe wrench directly on the sleeve. Instead, use a Skinner U99-011 wrench nut to remove and install the sleeve assembly.*

Slide the Skinner U99-011 wrench nut over the sleeve tube. To unscrew the sleeve assembly, mate the wrench nut to the sleeve flange and turn the wrench nut. The plunger, snubber, flange seal, wave washer and stop may now be removed. With a small screw driver pry the small end of the return spring from the seal retainer. Do not over expand spring.

Unscrew the four (4) cover screws. The diaphragm assembly, O-ring and seal retainer can now be removed. Disassemble the seal retainer from the diaphragm assembly by carefully pulling the diaphragm spring over the lip on the plunger assembly. Do not over expand spring.

Replacement Parts: When ordering replacement parts kits, specify valve number and voltage from nameplate. Parts kits are available for each valve. Parts included in each kit are marked with an asterisk (*). See exploded views.

REASSEMBLY INSTRUCTIONS

WARNING: When replacing coils, valves equipped with **Hazardous Location** coils must use **Hazardous Location** replacement coils only. Verify nameplate data and coil part number before installing the replacement coil.

To reassemble the pressure vessel:

Refer to exploded view drawings. Parts must be replaced in the order shown.

Assemble the O-ring in the body groove.

Assemble the diaphragm spring to the diaphragm assembly. Now assemble this assembly to the seal/retainer. Be sure the diaphragm spring is seated on their spring seats. Avoid damaging the pilot orifice surface when assembling the seal retainer to the diaphragm assembly.

Place the diaphragm/seal retainer assembly onto the body.

The diaphragm bleed hole is oriented 45 degrees from the out port. Place cover onto the diaphragm and body. The diaphragm should be installed as concentric to cover and body as possible and no undue side loads should be applied to the diaphragm when tightening the cover screws. Tighten screws with a torque of 65-85 in-lbs. Avoid damaging the main orifice when placing the diaphragm assembly in the valve.

Attach the return spring to the retainer/seal assembly. Note: position the large end of the return spring down in the cover. Assemble the flange seal, stop, wave washer, plunger, snubber and sleeve assembly to the cover as shown in exploded view. Tighten the sleeve assembly with an input torque of 130-150 in-lbs.

With coil assembly repositioned on the sleeve, slide the wave washer over the sleeve and tighten coil assembly nut with an input torque of 43-53 in-lbs.

Refer to the Installation Instructions for remaining installation procedures.

TROUBLE SHOOTING	
PROBLEM	PROCEDURE
Valve fails to operate	<ol style="list-style-type: none"> 1. Check electrical supply with voltmeter. Voltage must agree with nameplate rating. 2. Check coil with ohmmeter for shorted or open coil. 3. Make sure that pressure complies with nameplate rating.
Valve is sluggish or inoperative - electrical supply and pressure check out	<ol style="list-style-type: none"> 1. Disassemble valve as per the Disassembly Instructions. Clean out extraneous matter. The plunger/seal retainer must be free to move without binding. 2. Check diaphragm for tears and for clogged or obstructed bleed hole or pilot orifice. Torn diaphragm must be replaced. 3. Check all springs. If broken, replace. 4. Check that the seal retainer is attached to the diaphragm assembly.
External leakage at sleeve flange to body joint	<ol style="list-style-type: none"> 1. Check that sleeve is torqued to 130 - 150 in-lbs. If leakage persists, remove sleeve and check flange seal for damage. Replace if defective.
External leakage at flange joint between body and cover	<ol style="list-style-type: none"> 1. Check that cover screws are torqued with an input of 65-85 in-lbs. If leakage persists replacement of the diaphragm assembly or body O-ring may be required. Bodies or covers with damaged sealing surfaces may have to be replaced.
Internal leakage	<ol style="list-style-type: none"> 1. Disassemble valve. See Disassembly for instructions. Examine seal retainer, pilot orifice, main orifice and diaphragm sealing surface in contact with main orifice. Remove all dirt. Inspect orifices for nicks. Damaged parts must be repaired or replaced. 2. Check all springs. Replace if broken.

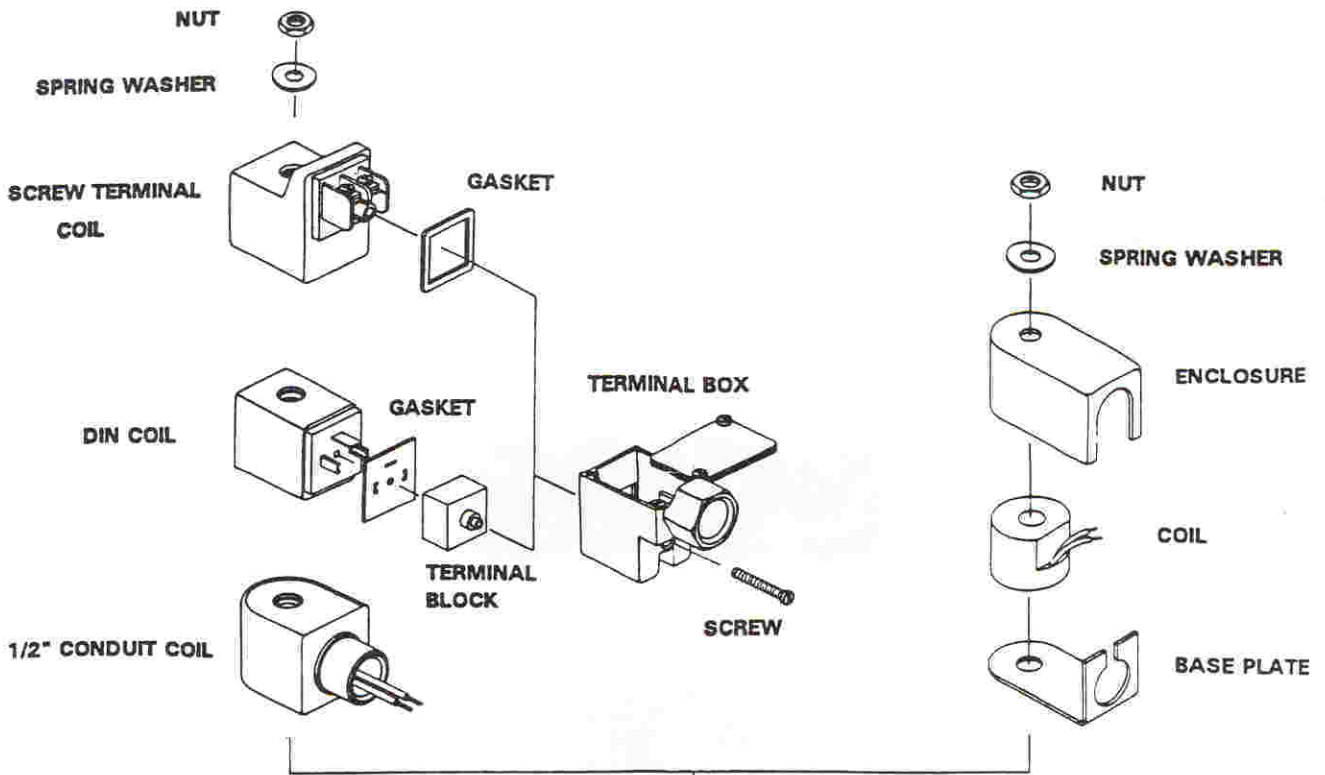
DECLARATION

Parker's Skinner Valve Division certifies its valve appliance products complies with the essential requirements of the applicable European Community Directives. We hereby confirm that the appliance has been manufactured in compliance with the applicable standards and is intended for installation in a machine or application where commissioning is prohibited until evidence has been provided that the machine or application is also in compliance with EC directives.

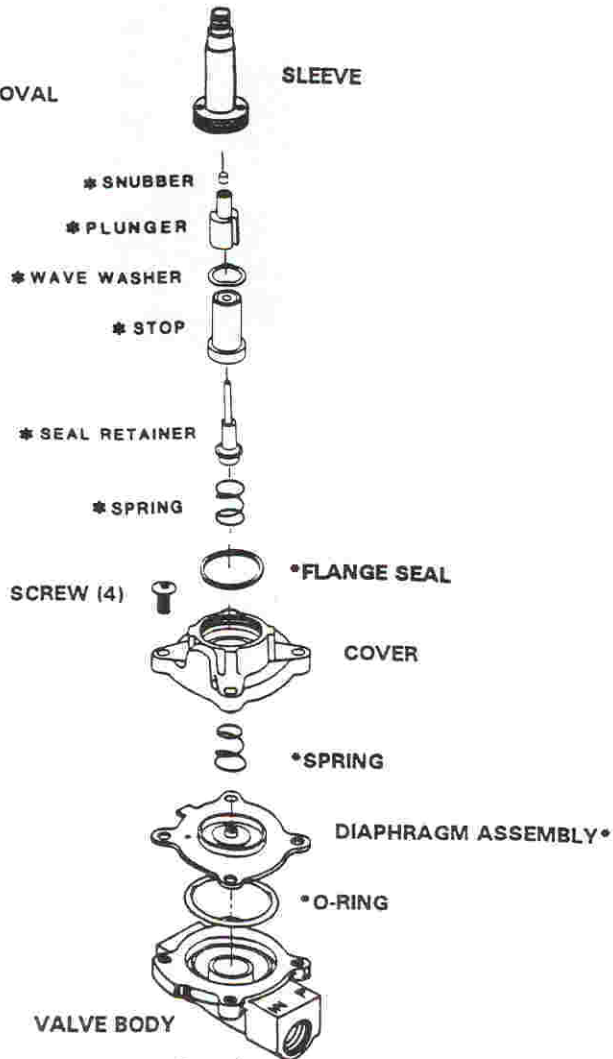
The data supplied in the Skinner valve catalogs and general Installation, Operating & Maintenance Instructions are to be

consulted and pertinent accident prevention regulations followed during product installation and use. Any unauthorized work performed on the product by the purchaser or by third parties can impair its function and relieves Parker of all warranty claims and liability for any misuse and resulting damage.

A separate Declaration of Conformity or Manufacturer's declaration is available upon request. Please provide valve identification numbers and order serial numbers of products concerned.




 *WRENCH NUT U99-011
 REQUIRED FOR SLEEVE REMOVAL





PNEUMATIC ACTUATORS

Installation & Maintenance Instructions

(Including Parts List) MI 0998

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INTRODUCTION

RC Compact Pneumatic Actuators are intended for on-off and proportional control on quarter-turn valves. The design features a modern Scotch Yoke. This instruction covers the following actuators:

RC 210, 230, 250, and 270 (one piston)

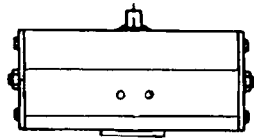
RC 220, 240, 260, and 280 (two pistons)

Type DA (Double Acting)

Type SR Single Acting-Spring Return

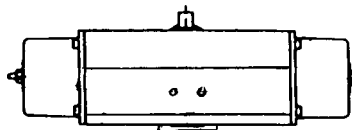
Type SR actuators can be arranged for valves to "Fail Close" (CW rotation) or "Fail Open" (CCW rotation)

DOUBLE ACTING (DA) ACTUATOR



For clockwise to close valves, pressure to the left port closes the valve, pressure to the right port opens the valve.

SPRING RETURN (SR) ACTUATOR



For clockwise to close valves, pressure to the left port opens the valve. The right port is an exhaust port from the spring chamber(s).

STANDARD SPECIFICATIONS

Ambient Temperature Limits: -4 to +175°F

Operating Medium: Filtered dry air or inert gas

Maximum Working Pressure: 150 PSI

Pneumatic piping to the actuator and associated accessories should follow the best practices for instrument pneumatic piping systems, ie: lines free of all water, oil or other contaminants, etc.

The operating medium is to be filtered dry air or inert gas which is filtered to 30 micron particle size or less. It is extremely important that the actuator be powered with an adequate air supply. Inadequate air could cause the valve to fail to operate.

The Spring housings on SR actuators, if not piped, will breath through the right hand port, see sketch (above). It's important that it not be exposed to a corrosive atmosphere. Please contact Remote Control for possible solutions if this condition exists.

INSTALLATION OF ACTUATOR

RC actuators are adapted to the valve by means of an intermediate bracket and coupler. The coupler adapts the ISO or DIN/ISO female output of the actuator to the valve shaft.

Standard mounting kits provide for mounting the actuator body in the direction of the pipe. Pipelines can be horizontal, vertical, or other positions. When mounting on a valve, the axis of the actuator drive shaft and valve shaft must be in line. Intermediate couplings must allow for axial clearance of .020" to .040", depending on actuator size, between valve shaft and bottom of drive socket. This axial clearance must be added to any valve stem rise which may be applicable. After mounting, it may be necessary to adjust the end of travel limit stop (yoke turning angle).

LUBRICATION

RC actuators are permanently lubricated and additional lubrication is not normally required. However, for actuators performing 100,000 cycles or more under a very heavy load, an oil mist lubrication is recommended. Oil mist lubrication requires a mineral oil type ISO VG32 class 1 for useage in temperature range 15 to 158°F. Oil mist lubricator must be set at the lowest possible value. Once begun, the oil mist lubrication cannot be discontinued.

CAUTION: If the actuator is equipped with a pneumatic or electro pneumatic positioner or pneumatic controller, oil mist lubricated air cannot be used unless the instrument manufacturer indicates that the instrument is compatible with lubricated air.

RECOMMENDED LUBRICATION GREASE

Cylinder bore and drive shaft with shaft seals and bearings	Grease
RC 200 standard and high temp	Cargo White Grease Klüber Isoflex Topas NCA 52
RC 200 low temp	Klüber Isoflex Topas NCA 52
Piston Roller (21)	Grease
All RC 200	Cargo Red Grease Klüber Unimoly GL 82

ORIENTATION OF PISTONS

Type DA

The pistons of standard Type DA Actuators are mounted as shown in figure 1. This provides for the highest torque at the "closed" (CW) valve position for valves that rotate clockwise to close. The pistons are then in their outermost position and the end of travel stop (yoke turning angle) can be fine adjusted $\pm 3^\circ$. To enable this adjustment to be done in the "open" (CCW) valve position, turn the pistons 180° about their axis as shown in Figure 3.

Type SR

The pistons of standard Type SR Actuators are mounted as shown in Figure 3. Although spring force is diminished, the geometry of the mechanism provides a greater torque at the end of the spring stroke than at mid stroke. When the actuator is in the "Open" valve position (Springs fully compressed), the end of travel stop, (turning angle), can be fine adjusted $\pm 3^\circ$.

Changing from "SPRING CLOSES" to "SPRING OPENS" (or Vice Versa)

CAUTION!! - STORED ENERGY - This procedure MUST be followed for safe removal of pretensioned spring housings. Serious injury or damage could result from failure to follow these instructions.

Refer to Figures 2 & 3

1. Shut off pneumatic (or hydraulic) supply and vent actuator.
2. Remove actuator from valve.
3. Disconnect any electrical power.

4. Confirm that the springs are fully extended as shown in figure 3. This can be confirmed by observing that the flats on the top drive shaft are 90° to the actuator axis on a "Fail Close" (fails CW) when viewed from the top of the actuator and parallel to the axis on a "Fail Open" (fails CCW) when viewed from the top of the actuator.
 5. Loosen Locknut (29).
 6. Rotate tensioning screw (26) counterclockwise until resistance is felt, then turn one more full turn.
 7. Remove screws (4).
 8. Remove spring pack(s) from actuator.
 9. Rotate drive shaft (15) until the pistons are at the end of the cylinder. This can be done by turning the drive shaft with a wrench on the flats or by clamping the shaft between soft jaws in a vise and turning the actuator. Insert two close fitting rods in the holes on the end of the piston and, squeezing them, pull the piston(s) from the cylinder.
 10. Rotate drive shaft 90°.
 11. Grease cylinder surface (see table above)
 12. Rotate piston(s) 180° about their axis and reinstall them as shown in figure 1.
 13. Ensure that pistons are lined up so that roller bearing (21) engages scotch yoke correctly. Once pistons are in, rotate shaft 90° to draw pistons in and confirm proper engagement. Pistons should now be in their innermost position. On sizes RC 230 through RC 280, align spring assembly so that one of three support points falls between the bosses on the piston and pins engage holes in the piston.
 14. Install screws (4).
 15. Rotate tensioning screw clockwise until resistance abates and turn one more full turn.
 16. Tighten locknut (29).
- The adjustment will then take place at the air end position.

ADJUSTMENT OF THE TURNING ANGLE

The $\pm 3^\circ$ adjustment of the end of travel stop described in the section on Orientation of Pistons is accomplished by loosening the lock nut on the end plate and turning the adjusting screw clockwise for reduced and counterclockwise for increased rotary motion. RC 220, 240, 260, and 280 actuators have two adjustment screws. It is important that both screws are in contact with their respective pistons.

MANUAL OPERATION

All actuators have a drive shaft with two flats for manual operation. However, because of the potential for stored energy in the actuator and the possibility of injury, it is strongly recommended that actuators size RC 230 and larger be equipped with M1 Manual Handwheel Override for manual operation.

CAUTION: Actuators must be vented before attempting manual operation.

MAINTENANCE

CAUTION: Before removing any components of the actuator, ensure that all pneumatic (or hydraulic) and electrical power supplies are disconnected.

Replacement of Shaft O-Rings

The shaft O-rings (18) & (38) and the support washers (33) & (39) can easily be replaced. Refer to figure 2.

1. Vent actuator.
2. Remove circlip locking rings (31) & (40).
3. Replace O-rings and support rings.

Note: Use a high quality grease when installing new parts. (See table on page 1.)

4. Replace circlip locking rings. The rounded inner edge is to be toward the center of the actuator. Do not spread more than necessary to get it over the shaft. It should fit tightly in the groove with no play.

REPLACEMENT OF O-RING AND SUPPORT BAND FOR DA ACTUATORS

Replacement of the piston O-ring is required if the O-ring is not holding air pressure.

1. Vent actuator.
2. Remove end plate(s) (5).
3. Rotate drive shaft (15) until the pistons are at the end of the cylinder. This can be done by turning the drive shaft with a wrench on the flats or by clamping the shaft between soft jaws in a vise and turning the actuator. Insert two close fitting rods in the holes on the end of the piston and, squeezing them, pull the piston(s) from the cylinder.
4. Replace O-ring (12).
5. Replace wear band (14).
6. Replace the support element (9). It should "pop" off with minimal effort.
7. Grease cylinder surface before reassembling. See table on page 1.
8. Install piston. Ensure that pistons are lined up so that roller bearing (21) engages scotch yoke correctly. Once pistons are in place, turn the drive shaft to draw pistons in and confirm proper engagement.
9. Mount end plates.
10. Replace O-ring (3) under lock nut (2).
11. Turn drive shaft to extend pistons and fine adjust end of travel stop (1).
12. Tighten lock nut (2)

NOTE: For two piston actuators (RC 220DA, RC 240DA, RC 260DA, RC 280DA), it is important that both travel stops contact pistons equally.

REPLACEMENT OF O-RING AND SUPPORT BAND FOR SR ACTUATORS

Refer to figures 2 & 3

1. Loosen lock nut (29).
2. Rotate tensioning screw (26) counterclockwise until you feel resistance and turn one more full turn.
3. Remove screws (4).
4. Remove spring pack from actuator.
5. Follow steps 3 through 8 for DA actuators.

Assembling

6. Replace O-Ring on spring cartridge(s) and end plate, if applicable.
7. Mount spring assembly with pistons in their innermost position. On sizes RC 230 through RC 280, turn spring assembly so that one of three support points lies between bosses on piston and pins engage holes in piston.
8. Install screws (4).
9. Rotate tensioning screw clockwise until resistance abates, and turn one more full turn.
10. Tighten locknut (29).

CHANGING DA TO SR ACTUATORS

All DA actuators can be changed to SR actuators by adding spring conversion kits as follows:

1. Pretension spring assembly using item (26). Refer to Table 1 and Figure 4.
2. Vent actuator.
3. Remove end plates.
4. Follow instructions above for removing piston(s) (10).
5. Rotate shaft 90°.
6. Grease cylinder surface see table on page 1.
7. Turn pistons 180° about their axis and reinstall them per figure 3.
8. Follow instructions above for reinstalling pistons.

Note: Refer to instruction on assembling SR actuators above for installation of spring packs.

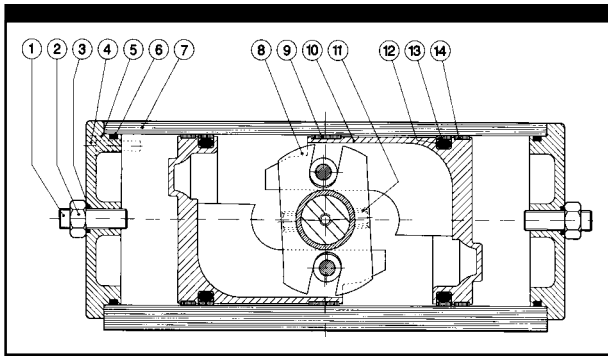


Figure 1 - RC 200-DA from above

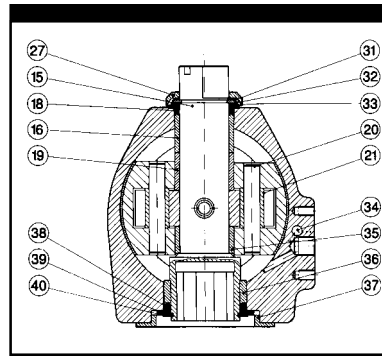


Figure 2 - Top Side

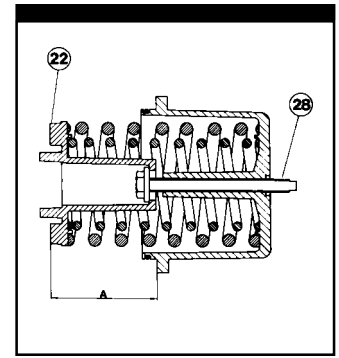


Figure 4 - Spring Pack Pretensioning

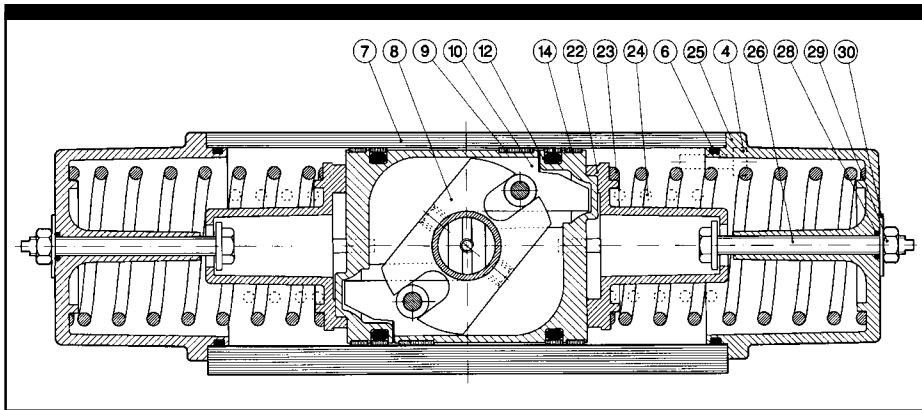


Figure 3- RC 200-SR from above

Actuator	Dimension "A" inches (mm)
210-220	1.61 (41)
230-240	2.44 (62)
250-260	3.43 (87)
270-280	5.39 (137)

Table 1 - Pretensioning
Dimension "A"

INSTRUCTIONS FOR DISMANTLING OF RC 200-SR ACTUATORS WITH MANUAL OPERATION UNIT TYPE M1

CAUTION

Do not remove the protective tube (50) and handwheel from the spring housing as long as the springs are under tension. This procedure must be followed for safe removal of pretensioned spring housings.

DISASSEMBLY MUST BE PERFORMED EXACTLY AS FOLLOWS. SERIOUS INJURY OR DAMAGE COULD RESULT FROM FAILURE TO FOLLOW THESE INSTRUCTIONS. CONTACT REMOTE CONTROL IF AT ALL UNCERTAIN.

1. Shut off pneumatic (or hydraulic) supply and vent actuator.
2. Confirm that the springs are fully extended as shown in figure 5. This can be confirmed by observing that the flats on the top drive shaft are 90° to the actuator axis on a "Fail Close" (fails CW) when viewed from the top of the actuator and parallel to the axis on a "Fail Open" (fails CCW) when viewed from the top of the actuator.
3. Turn the handwheel so that the threaded stem (51) moves toward the actuator until it stops and the stem can just barely be seen in the plastic tube (49).
4. For sizes RC 220, 240, 260 and 280 (i.e. actuators with two pistons): adjust the tensioning screw (26) in the opposite spring housing counter clockwise until it contacts the spring guide (22). Remove the spring housing by removing the screws (4).
5. Turn the handwheel until there is resistance and the threaded stem (51) can be seen slightly to the right of neutral position "N" (see figure 5).
6. Remove the spring housing of the manual override by removing the retaining screws (4) and turn the handwheel several turns in the direction which gives the least resistance.

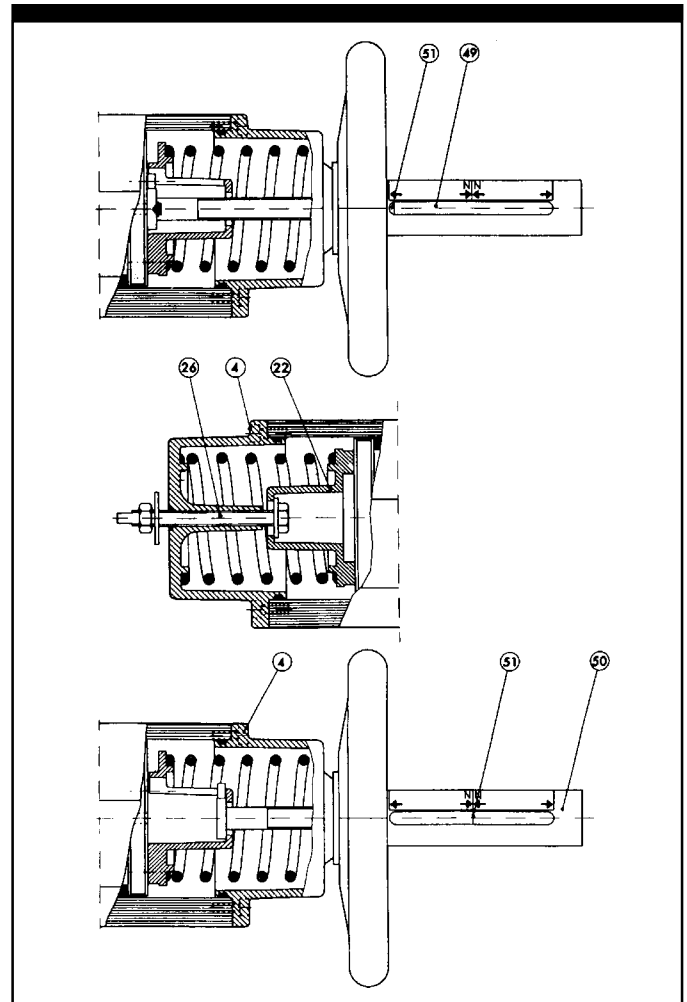


Figure 5

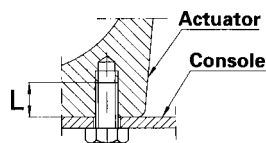
MATERIAL TABLE FOR RC 210-280

Item Number	Description	Quantity		Material	Surface Treatment
		RC 200DA	RC 200-SR		
1	Adjusting screw ¹	1	--	Sizes 210-260: Stainless steel	Zinc plated
2	Lock nut ¹	1	--	270, 280: Steel	
3	O-ring ¹	1	--	Sizes 210-260: Stainless steel	Zinc plated
4	Screw	8-16	8-16	270, 280: Steel	
5	End plate with center hole ¹	1	--	Nitrile	Zinc plated
6	O-ring	2	2	Aluminum	
7	Cylinder	1	1	Nitrile	Anodized
8	Scotch yoke	1	1	Aluminum	
9	Support element ¹	1	1	Steel	Anodized
10	Piston ¹	1	1	POM/PTFE	
11	Roll pin, double ^{2,3}	1	1	Aluminum	Anodized
12	O-ring ¹	1	1	Spring steel	
14	Support band ¹	1	1	Nitrile	Anodized
15	Drive shaft	1	1	PTFE filled	
16	Bearing, upper	1	1	Sizes 210-260: Stainless steel	Yellow chromated
17	End plate without center hole ⁴	1	1	270, 280: Steel	
18	O-ring, upper	1	1	Polymer material	Anodized
19	Support ring, upper	1	1	Aluminum	
20	Piston pin ¹	1	1	Nitrile	Anodized
21	Piston roller ¹	1	1	Polymer material	
22	Spring guide ¹	--	1	Steel	Anodized
23	Spring external ¹	--	1	Aluminum	
24	Spring internal ^{1,5}	--	1	Sizes 210-260: Alloyed spring steel	Corrosion protected
25	Spring housing ¹	--	1	270, 280 Spring steel	
26	Pre-tensioning screw ¹	--	1	Alloyed spring steel	Corrosion protected
27	Indicator	1	1	Aluminum	
28	O-ring ¹	--	1	Sizes 210-260: Stainless steel	Zinc plated
29	Lock nut ¹	--	1	270, 280: Steel	
30	Marking washer ¹	--	1	Polymer material	Zinc plated
31	Circlip, upper	1	1	Nitrile	
32	Middle Washer	1	1	Sizes 210-260: Stainless spring steel	Anodized
33	Support washer, upper	1	1	270, 280: Spring steel	
34	Seal ¹	1	1	Sizes 210-260: Stainless steel	Corrosion protected
35	Support ring, lower	1	1	270, 280: Steel	
36	Bearing, lower	1	1	Polymer material, chemically resistant	Corrosion protected
37	Guide ring	1	1	270, 280: Nitrile	
38	O-ring, lower	1	1	Polymer material	Anodized
39	Support washer, lower	1	1	Nitrile	
40	Circlip	1	1	Polymer material, chemically resistant	Anodized
				Sizes 210-260: Stainless spring steel	
				270, 280: Spring steel	Corrosion protected

1. For actuators sizes 220, 240, 260 and 280: double the quantity. 2. RC 240 has triple roll pins.
 3. RC 270-280 have steel pin. 4. Not shown. Does not exist for sizes 220, 240, 260 and 280.
 5. Only for sizes 270 and 280.

TIGHTENING TORQUES FOR SCREWS AND LOCK NUTS

The actuators must be screwed onto the mounting brackets with the correct torque in order to be stable during operation. Use maximum screw length possible without the threads bottoming. Tightening torque values are expressed in in.-lb.



Actuator	End Plate Screw	Locknut	
		DA	SR
	(4)	(2)	(29)
RC 210-220	49	177	80
RC 230-240	49	354	159
RC 250-260	204	797	310
RC 270-280	673	1062	708

Actuator	DIN Flange	Thread	Lmax (mm)	Screw Length (mm)										
				32 (8)	.39 (10)	.47 (12)	.55 (14)	.63 (16)	.71 (18)	.79 (20)	.94 (24)	1.10 (28)	1.26 (32)	
RC 210	F05	1/4"	.43 (11)	88	91									
RC 220	F05	1/4"	.43 (11)	88	91									
RC 230-240	F07	5/16"	.55 (14)		168	186	186							
	F10	3/8"	.67 (17)			283	319	319						
RC 250-260	F10	3/8"	.67 (17)			283	319	319						
	F12	1/2"	.83 (21)				611	708	761	761				
RC 270	F14	5/8"	.98 (25)					1018	1151	1274	1522			
	170 X 110	5/8"	.98 (25)					1018	1151	1274	1522			
RC 280	F12	1/2"	.98 (25)					708	761	761	761			
	F16	3/4"	1.26 (32)								2080	2451	2682	
	F25	5/8"	.98 (25)					1018	1151	1274	1522			