



CONTROL VALVES

Replacing Diaphragms or Stem Seals in **REVERSE ACTING ACTUATORS**
Size 35R, 55R, 55AR, 85R, 85AR, 135R, 270R and "U" Cup Ring in 270R Actuators

INSTALLATION, OPERATION, AND MAINTENANCE

NOTE MAXIMUM ALLOWABLE ACTUATOR DIAPHRAGM AIR PRESSURE IS 60 PSIG FOR ALL SIZES

Reverse acting actuators are normally used where closing of valves is required on loss of air pressure. The actuator spring(s) preload required to seat valve plug varies according to the valve size and maximum pressure drop. Where "K" Factors are not given or available, count the number of notches spring adjuster is moved when removing compression from actuator spring(s) so that spring(s) can be readjusted to their original compression upon completion of actuator maintenance. The maximum spring compression that can be used is limited by the operating air pressure available to stroke valve throughout its rated travel without exceeding the maximum allowable actuator diaphragm air pressure.

DISASSEMBLY

SIZES 35R, 55R, 55AR, 85R, 85AR & 135R

- 1 Remove compression from actuator spring(s)
 - 2 Insert a lock rod through hole in the yoke and into hole in actuator stem
(Secure actuator stem with wrench if stem has no hole)
 - 3 Dismantle upper diaphragm case and Hand Operating Device (if so fitted) from actuator as described in Instructions
 - 4 Remove the lock nut, diaphragm plate, diaphragm and collar
 - 5 **35R** — Remove 8 cap screws from lower diaphragm case, lift off case and remove stem seal
55R & 85R — Take out screws from seal ring. Remove seal ring, stem seal and stem collar
135R — Remove 6 nuts from lower diaphragm case, lift case from spacer and remove stem seal
 - 6 **55R & 85R** — Loosen cap screws and remove lower diaphragm case on size 55 and 85 actuators. Examine gasket. Replace gasket if necessary to obtain an air-tight seal. Replace gasket, lower diaphragm case and cap screws
- 7 Clean all metal parts. Remove any rust, dirt or sharp edges that might damage stem seal
 - 8 Lubricate spring washer(s), spring adjuster and actuator stem threads with anti-seize compound

REASSEMBLY

- 1 **55R & 85R** — Install the stem collar with the groove upward. Place the new stem seal in position and install the seal ring with the lip upward. Tighten screws.
135R — Install the stem collar with the groove upward. Place new stem seal in position and align holes with spacer stud. Press stem seal down until flush with spacer, install lower diaphragm case and tighten nuts
- 2 When reassembling, place a block under the actuator stem to hold the stem high enough so that clearance between the stem seal bead and the groove is not greater than 1/8 inch. Line up the actuator stem in the center of the opening in the lower diaphragm case so that the stem seal bead will enter the groove in the stem collar when the lock nut is tightened
- 3 Place the collar over the actuator stem followed by the diaphragm and the diaphragm plate. Be sure that the center hole in the diaphragm fits properly over the raised lip of the collar
- 4 Install the lock nut and tighten. REMOVE THE LOCK ROD
- 5 Install the upper diaphragm case and Hand Operating Device (if fitted) to actuator and tighten the nuts and bolts

PRE-SETTING 35R STEM SEAL AND DIAPHRAGM

Install stem collar and position stem seal on yoke. Place lower diaphragm case on yoke. Insert bolts thru holes in case and stem seal and into threads in yoke. Do not tighten bolts. Place collar on stem seal. Assemble self-locking nut on actuator stem. Hold actuator stem with wrench on stem flats and tighten nut. Press actuator stem downward to make seal move to taut position. Tighten bolts and remove self-locking nut.

Position diaphragm over upper stem. Install

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diaphragm disc and self-locking nut. Align holes in diaphragm and lower diaphragm case. Center upper stem. Hold upper stem with wrench on stem flats and tighten self-locking nut. Install upper diaphragm case and finger-tighten bolts and nuts. Compress actuator spring sufficiently to move diaphragm down against stop. Tighten nuts and bolts. This procedure preforms stem seal and diaphragm permitting full rated travel of valve without undue resistance from a taut stem seal or diaphragm.

**DISASSEMBLY
SIZE 270R ACTUATOR**

- 1 Remove compression from actuator spring(s) by screwing spring adjustor downward.
- 2 Line up hole in spring adjustor and actuator stem and insert lock rod thru yoke and into holes of stem and spring adjustor.
- 3 Remove bolts and nuts from upper diaphragm case. Take off case and connecting tubing.
- 4 Remove lock nut, diaphragm plate, diaphragm and diaphragm support.
- 5 Remove nuts and bolts from spacer housing. Lift spacer housing straight up until housing clears end of upper stem threads being careful not to damage "U" cup ring.
- 6 Using a wrench on lower hex end of upper stem, unscrew upper stem from actuator stem. Lift off diaphragm plate. Do not remove key from actuator stem keyway unless necessary. Remove diaphragm.
- 7 Remove collar. Loosen and remove cap screws and washers holding lower diaphragm case to spring chamber. Lift off lower case, stem seal and stem seal collar.

NOTE: If needle thrust bearing needs replacement, remove cap screws holding top spring chamber to yoke. Remove adjusting springs, bottom spring seat and spring adjustor with thrust bearing. Clean spring adjustor and actuator stem threads. Lubricate threads with anti-seize compound. Place one thrust race on spring adjustor followed by

needle bearing and another thrust race. Oil bearing with a few drops of light lubricating oil. Replace parts in reverse order and tighten top spring chamber cap screws.

REASSEMBLY

- 1 Clean and replace stem collar with groove side upward.
- 2 Install new stem seal. Place lower diaphragm case on top spring chamber and line up holes in stem seal and case. Replace cap screws and washers and tighten securely.
- 3 Place a block of wood under actuator stem to hold the stem high enough so that clearance between stem seal bead and groove in stem collar is not greater than 1/8 inch. Center stem and place collar over stem followed by lower diaphragm and diaphragm plate with flat face of plate toward diaphragm.
- 4 With parts centered, screw upper stem onto threads of actuator stem. Tighten securely. **LOCK ROD MUST BE IN PLACE BEFORE TIGHTENING STEMS.**

**REPLACEMENT OF "U" CUP RING IN
SPACER HOUSING GUIDE BUSHING**

- 1 Remove guide bushing from spacer housing using a socket wrench. Take out "O" ring.
- 2 Remove "U" cup ring from bushing. Clean bushing and groove. Clean and polish all parts.
- 3 Replace Nylon liner in guide bushing if worn or damaged.
- 4 Insert new "U" cup ring in bushing groove with lips of ring downward toward threaded section of bushing.
- 5 Lubricate "O" ring with Silicon grease and place ring in spacer housing recess.
- 6 Replace guide bushing and tighten securely.
- 7 Carefully lower spacer housing over upper stem, keeping housing bushing centered so as not to damage guide bushing "U" cup ring. Install nuts.

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and bolts and tighten until outer edges of lower case and spacer housing touch

- 8 Replace 'O' ring in groove of upper stem. Lubricate with Silicon grease. Slide diaphragm support over end of stem with serrated side upward
- 9 Install upper diaphragm, diaphragm plate and lock nut. Hold stem with wrench on stem flats and tighten lock nut securely
- 10 Replace upper diaphragm case and connecting tubing. Tighten nuts and bolts until outer edges of upper case and spacer housing touch
- 11 REMOVE LOCK ROD FROM ACTUATOR STEM

INSTALLATION OF ACTUATOR

- 1 Replace actuator on bonnet. Insert and tighten capscrews. Apply air pressure to diaphragm of actuator if it is necessary to raise actuator stem
- 2 Assemble stem nut and travel indicator disc on valve plug stem
- 3 Lift valve plug and screw plug stem threads into actuator stem about one stem diameter. Screw stem nut upward until it contacts travel indicator disc
- 4 Compress actuator spring(s) sufficiently to move valve plug down until plug rests against seat ring
- 5 Install and align travel indicator plate. Plate scale indicates rated travel of valve

ADJUSTMENT OF TRAVEL

Apply sufficient air to diaphragm(s) of actuator to stroke valve. If travel is LESS than that shown on travel indicator scale, screw valve plug stem upward into actuator stem. If the travel is MORE than that shown on the travel indicator scale, screw valve plug stem downward out of actuator stem. **DO NOT TURN THE PLUG STEM WHEN PLUG IS ON SEAT.** Apply enough air to diaphragm(s) to move plug off seat before turning the plug.

Once correct travel of valve has been obtained, turn the plug 1/2 turn out of the upper stem toward the

seat to assure POSITIVE SEATING of the valve plug. Tighten stem nut

DDBOY(S)-1 AND DDBOS-1 Reverse Acting Actuators

ADJUSTMENT OF ACTUATOR SPRING(S) PRELOAD

For all valves where "K" factors are not given or available, compress actuator adjusting spring(s) to their initial setting. Stroke valve with air to assure full rated travel.

Follow procedure outlined in 'FIELD ADJUSTMENT OF ACTUATOR SPRING(S)' below to determine "Ps" value WITH NO PRESSURE IN VALVE BODY. adjust actuator spring(s) compression so that valve plug JUST STARTS TO MOVE when "Ps" value is applied to diaphragm(s) of valve actuator.

Field Adjustment of Actuator Spring(s) 150-600 lb. Classes DDBOY(S)-1 & DDBOS-1

EXAMPLE

3" DDBOY-1 with size 55R actuator
 $P = 600 \text{ psig}$ $P_2 = 250 \text{ psig}$
 $P_s = \frac{600 - 250}{56} = 6.25 \text{ psig}$

NOTE

If P_s is less than 3 psig use 3 psig

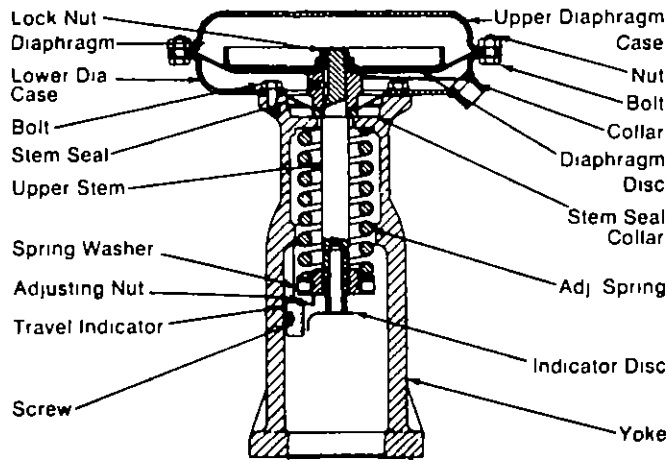
TABLE I — "K" FACTORS

VALVE SIZE	ACTUATOR SIZE				
	35R	55R 55AR	85R 85AR	135R	270R
2	70	115	—	—	—
2-1/2	—	78	121	—	—
3	—	56	88	—	—
4	—	33	52	83	—
6	—	—	25	39	78
8	—	—	—	23	45

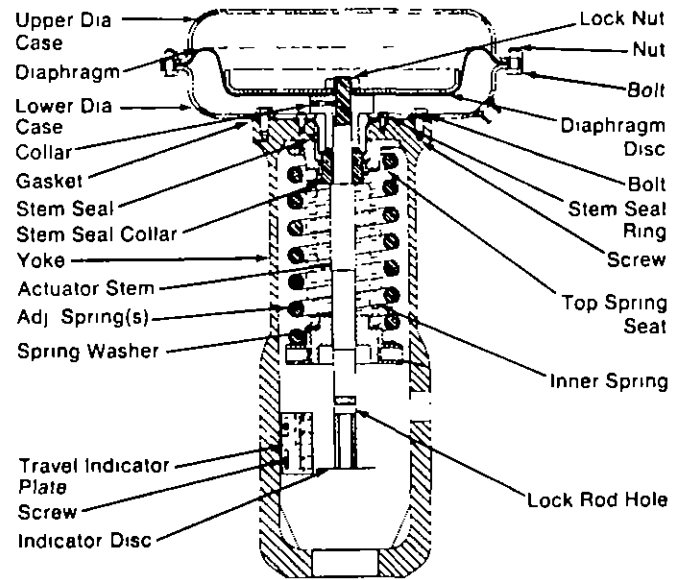


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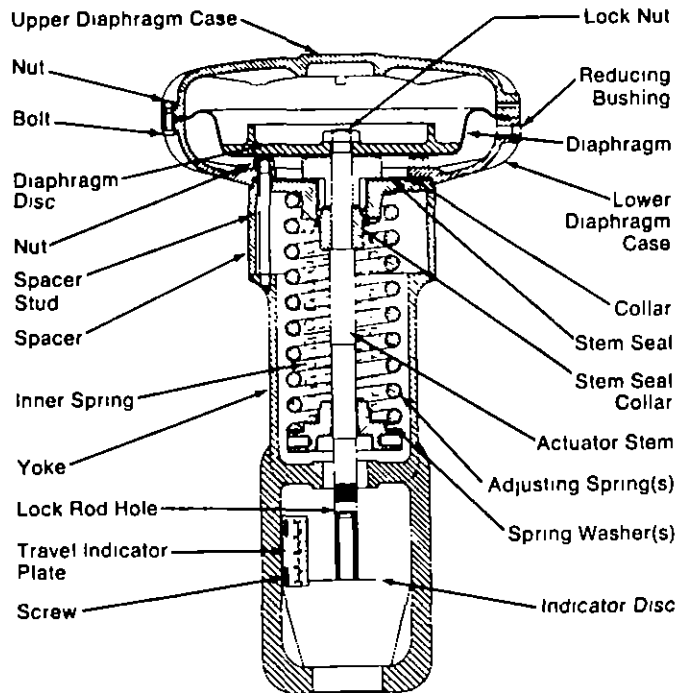
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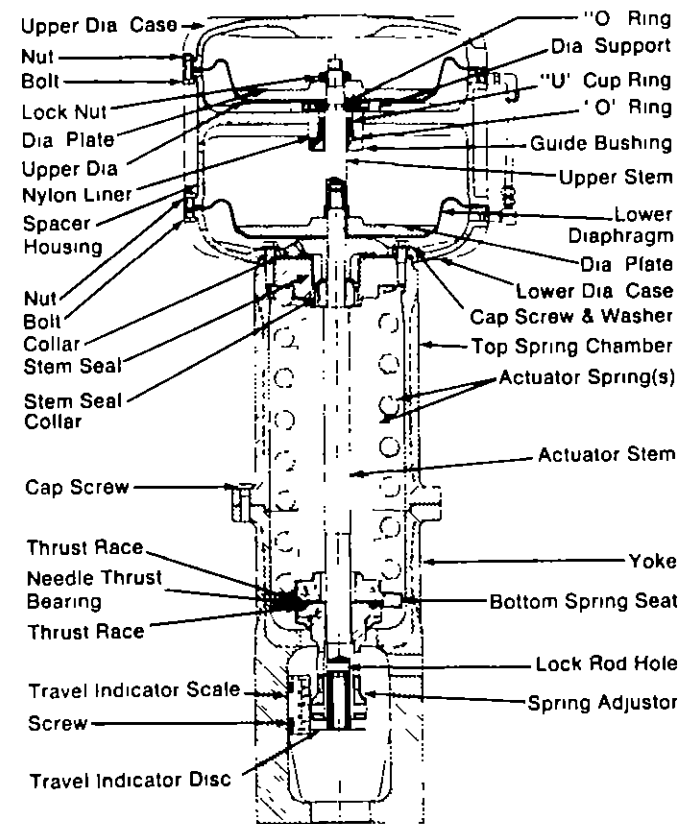
35R Actuator



55R(AR) 85R(AR) Actuators



135R Actuator



Size 270R Actuator

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DISASSEMBLY REVERSE ACTING ACTUATORS

- 1 Remove nut lockwasher and handwheel
- 2 Screw handscrew into the bonnet as far as it will go
- 3 Remove nuts and bolts from upper diaphragm case
- 4 Lift diaphragm case while moving the case to one side so that handscrew disc assembly can be disengaged from diaphragm nut by passing it through the slot in the diaphragm nut See Sketch

- 5 Remove handscrew from bonnet

Clean all parts and replace any that are worn or damaged

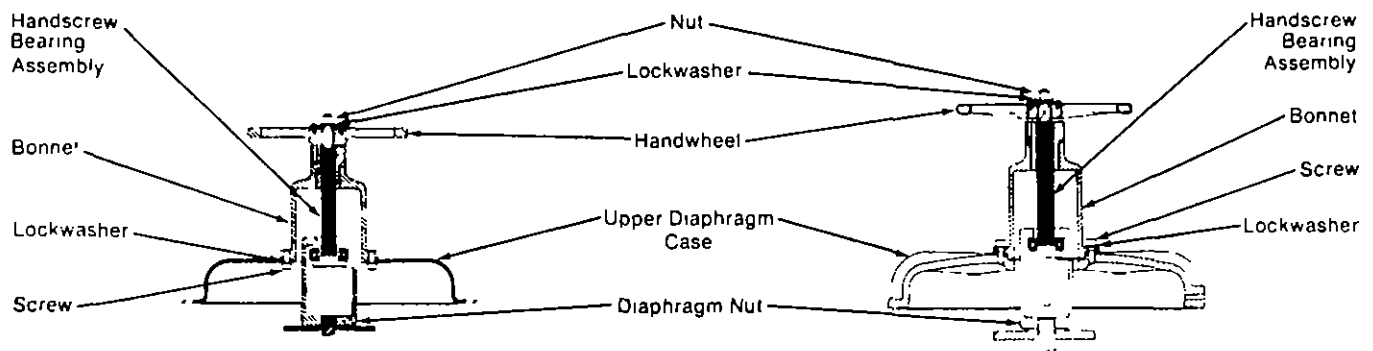
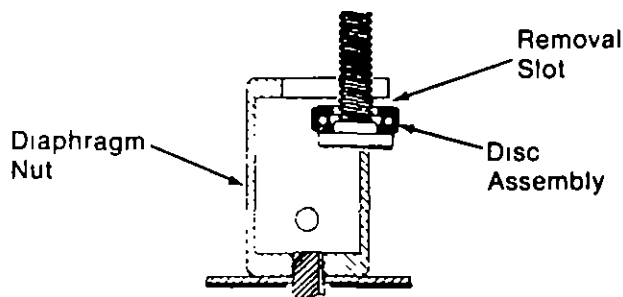
NOTE Handscrew and bearing must be replaced as an assembly on all sizes except 270R

Size 270R Only — To inspect or replace needle thrust bearing remove retaining ring thrust washer upper race, needle bearing and lower race. Parts for this size may be ordered separately

Lubrication of Parts Handscrew — coat with a good grade of anti-sieze compound Needle Bearing — lubricate with a few drops of light machine oil

REASSEMBLY

Install parts in reverse order



Sizes 35R, 55R and 85R Reverse Acting

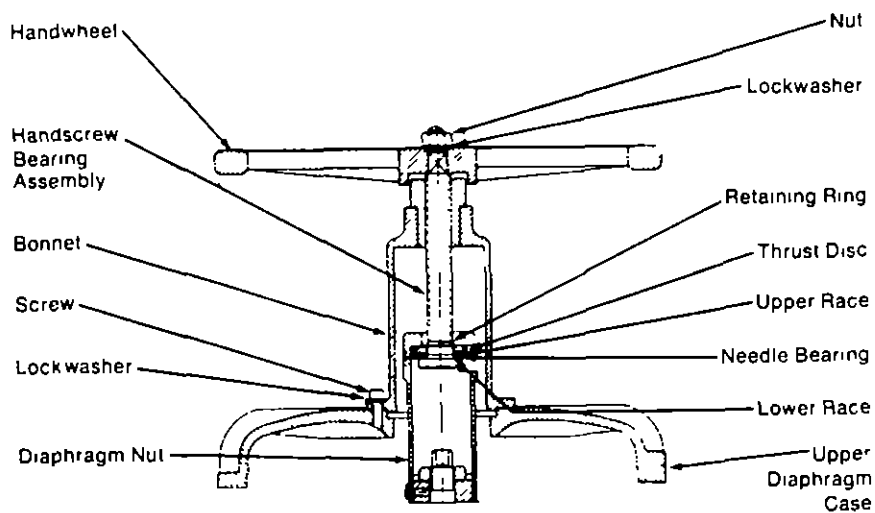
Size 135R Reverse Acting

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Size 270R Reverse Acting

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