

# KOSO HAMMEL DAHL

CONTROL VALVES

KOSO AMERICA, INC.  
4 Manley Street  
West Bridgewater, MA 02379

tel: 508.584.1199  
fax: 508.584.2525  
www.hammeldahl.com

## Installation, Maintenance & Operating Instructions

### I. GENERAL

A. In the "normal" position (no air pressure on diaphragm), the Direct Actuator holds its stem in a fully retracted position by means of the spring. Increasing air pressure in the upper diaphragm chamber thrusts the actuator stem downward and compresses the spring; decreasing air pressure allows the spring to return the stem to its normal position.

1. Mounted on Pull-Stem-to-Open valve body assemblies, the Direct Actuator closes the valve upon increasing air pressure to the upper diaphragm chamber.
2. Mounted on Push-Stem-to-Open valves, the Direct Actuator opens the valve upon increasing air pressure to the upper diaphragm chamber.

B. Raised mounting pads on the actuator yoke casting accommodate accessories such as positioner, controller, solenoid valves, limit switches etc. To facilitate disassembly, all accessories should be removed before proceeding as outlined below.

### II ACTUATOR DISASSEMBLY

Remove the actuator from the valve body assembly as outlined in the Basic Instruction Book covering the valve in use.

**CAUTION.** Do not remove diaphragm cap screws without relieving spring compression.

#### A. For Diaphragm Removal

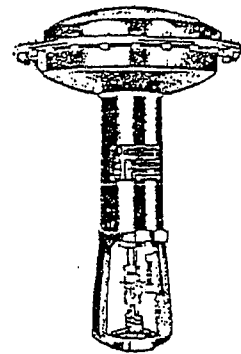
1. Remove the dust cap (16) from the spring barrel case assembly (21).
2. Relieve all spring compression by inserting a screwdriver through the dust cap slot and rotating the spring adjuster (11) counterclockwise.
3. Remove the cap screws and nuts (9 & 10), then lift off the diaphragm case (1).
4. Loosen the travel stop nut set screw (19), and unscrew the travel stop nut (3) from the actuator stem.
5. Withdraw the actuator stem assembly from the spring adjuster screw (32), and remove the upper travel stop (30).
6. Unscrew the actuator stem nut (17) to free the diaphragm washer (18) and diaphragm (15) from actuator stem (20).

NOTE: For reassembly after replacement of the diaphragm only, see Section III, Paragraph B.

#### B. Complete Disassembly

After disassembling the actuator in accordance with Paragraph A, proceed as follows:

### IMO - A46D - 1



1. Remove the spring (29) and spring seat (5) from the spring barrel case (21).
2. Unscrew the spring adjuster (11) from the adjuster screw assembly (32).
3. Remove the spring adjuster screw nut (6) to free the yoke (31) from the spring barrel case (21).
4. Unscrew the spring adjuster screw (32) from the bridge of the spring barrel case.

### III ACTUATOR ASSEMBLY

#### A. If Actuator Completely Disassembled:

1. Examine the bushing in the spring adjuster screw (32), and replace it if necessary.
2. Screw the spring adjuster screw (32) into the bridge of the spring barrel case (21) so that about two inches of the screw (non-bushed end) protrudes below the spring barrel bridge.
3. Guiding the spring adjuster screw (32) into the clearance hole in the top of the yoke (31), seat the spring barrel case (21) on the yoke.
4. Screw the spring adjuster screw (32) upward so that when the spring adjuster screw nut (6) is tightened only one thread of the screw will be visible below the nut (6).
5. Apply the nut (6) to the spring adjuster screw and tighten it securely.
6. Screw the spring adjuster (11) (convex side down) onto the spring adjuster screw (32) so that it is opposite the lower end of the dust cap slot (ref. 16).
7. Place the spring seat (5) and spring (29) on the spring adjuster (11).

The following steps cover final assembly of the actuator after preliminary assembly, as per the immediately preceding Paragraph A — or after the actuator has been partially disassembled for replacement of the diaphragm only.

1. Prepare the actuator stem assembly for insertion into the spring barrel as a unit.
  - a.) Inspect the diaphragm (15) and replace it if necessary.
  - b.) Slide the diaphragm plate (8) (flat side up) over the actuator stem (20) to rest on the shoulder of the stem.
  - c.) Dust the diaphragm thoroughly with talcum to prevent abrasion, then place the diaphragm (convex side up) over the spring stem to rest on the diaphragm plate. The mold of the diaphragm will cause it to drape downward from the edge of the plate.
  - d.) Place the diaphragm washer (18) (rounded corners down) over the actuator stem, then lock the assembly together with the actuator stem nut (17).
  - e.) Invert the actuator stem assembly and slide the upper travel stop (30) over the stem.
2. Holding the travel stop (30) on the stem, lower the actuator stem into the spring adjuster screw (32).

NOTE: After the stem has been started into the adjuster screw, drop the travel stop (30) to rest on the adjuster screw top, then guide the diaphragm plate boss into the spring.

3. Line up the holes in the diaphragm with the cap screw holes in the spring barrel case (21).

NOTE: To facilitate assembly, the spring adjuster (11) can be turned upward or downward (to reposition the spring) so that the diaphragm drapes smoothly onto the cap screw flange.

4. Place the diaphragm case (1) on the diaphragm, positioning the air connection and aligning the cap screw holes with those in the diaphragm and lower case.
5. Insert the cap screws and nuts (9 & 10), and tighten all nuts evenly and securely to ensure a tight diaphragm seal.

continued on next page

#### A. Adjusting Actuator Stroke

1. Determine the valve travel from the nameplate, add 1/16", and call this dimension "D."
2. Apply about 30 PSIG air pressure to the chamber above the diaphragm in order to extend the stem as far as it will go. NOTE: Ensure that stem travel has been stopped by the upper travel stop (30) by turning the spring adjuster (11) downward (with a screwdriver inserted through the dust cap slot) to relieve any spring compression.
3. Screw the travel stop nut (3) onto the actuator stem (20) and position the nut so that its top surface is below the end of the spring adjuster screw (32) by a distance equal to "D." (See 1. above.) Tighten the travel stop nut set screw (19) securely.
4. Exhaust all air pressure from the chamber above the diaphragm.

#### B. Setting the Inherent Diaphragm Pressure Range

This adjustment consists of compressing the spring (with the stem fully retracted) just enough to counter-balance the downward thrust of the diaphragm when air pressure in the upper chamber is at the lower value of the range. Once this starting point for actuator stem movement has been established, the spring design ensures that the stem will be fully extended (in accordance with "D," see 3. above) when air pressure reaches the upper range value.

1. Connect an air gauge and a 0-60 PSI regulator to an air line leading to the chamber above the diaphragm.
2. Insert a screwdriver through the dust cap slot and turn the spring adjuster (11) upward until there is definite indication of spring compression.
3. Determine the lower value of the diaphragm pressure range from the nameplate.
4. Gradually increase air pressure to the upper diaphragm chamber, and determine at what pressure the actuator stem starts to move downward.

NOTE: Use one hand to regulate air pressure and the other to touch both the actuator stem and the end of the spring adjuster screw (32).

6. Replace the dust cap (16), and the actuator is ready for mounting on the valve body. (See Basic Instruction Book.)

C. Setting the Installed Diaphragm Pressure Range (Single Seated Valve Actuation)

1. As standard factory procedure, single seated valves are tested for shutoff against the maximum inlet pressure stated on the order. The actuator furnished provides ample power to handle the specified flow conditions at the diaphragm pressure range stamped on the nameplate.

2. Under actual operating conditions, line pressure differentials may differ from the calculated figures. This may require a change in the diaphragm pressure range in order to obtain full valve travel and shutoff.

- a.) On Pull-Stem-to-Open valves, the Direct Actuator usually requires only an increase of the air pressure range values to compensate for pressure drops slightly greater than calculated.

- b.) On Push-Stem-to-Open valves, the Direct Actuator may require increased initial spring compression to ensure shutoff. (Accomplished by turning the spring adjuster (11) with a screwdriver). Diaphragm pressure range values must consequently be increased to counterbalance the greater spring force.

NOTE: Spring design limits the amount of possible "jack-up" compression. Too much initial compression leaves insufficient spring deflection for full actuator stroke.

5. Adjust spring compression, by moving the spring adjuster (11), and again increase air pressure gradually. Repeat this testing and adjusting procedure until the actuator stem just starts to move as the increasing air pressure passes the lower value of the pressure range. The inherent diaphragm pressure range has now been established.

PARTS LIST

1. Diaphragm Case
3. Travel Stop Nut
4. Name Plate
5. Spring Seat
6. Spring Adjuster Screw Nut
7. Name Plate Screw
8. Diaphragm Plate
9. Cap Screw
10. Cap Screw Nut
11. Spring Adjuster
12. Travel Indicator Scale
13. Travel Indicator Scale Screw
- \*15. Diaphragm
16. Dust Cap
17. Actuator Stem Nut
18. Diaphragm Washer
19. Travel Stop Nut Set Screw
20. Actuator Stem
21. Spring Barrel Case
27. Stem Connector
28. Travel Indicator
29. Spring
30. Upper Travel Stop
31. Yoke
32. Spring Adjuster Screw

\* Recommended Spare Part

