

KOSO HAMMEL DAHL

CONTROL VALVES

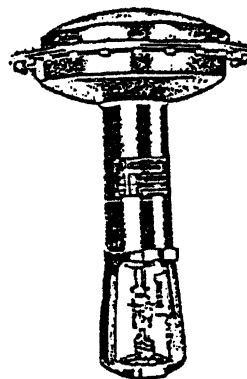
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Installation, Maintenance & Operating Instructions

IMO - A47R - 1

PNEUMATIC DIAPHRAGM TYPE A47 REVERSE ACTUATOR



WARNING

READ THESE INSTRUCTIONS COMPLETELY. FOR YOUR SAFETY, IT IS IMPORTANT THAT THE FOLLOWING PRECAUTIONS BE TAKEN PRIOR TO REMOVAL OF THE UNIT FROM THE LINE OR BEFORE ANY DISASSEMBLY.

1. WEAR ANY PROTECTIVE EQUIPMENT NORMALLY REQUIRED WHEN WORKING WITH THE FLUID INVOLVED DURING REMOVAL AND DISASSEMBLY.
2. BEFORE REMOVING THE SERVICE LINE CONNECTORS FROM THE ACTUATOR, SHUT OFF THE SERVICE PRESSURE AND BLEED THE SERVICE LINES.
3. IF THE VALVE/ACTUATOR ASSEMBLY IS REMOVED FROM THE LINE AS A UNIT, MAKE SURE BOTH UPSTREAM AND DOWNSTREAM SIDES OF THE LINE ARE DEPRESSURIZED BEFORE REMOVAL.
4. FOLLOW PRECISELY, THE INSTRUCTIONS UNDER "DISASSEMBLY," PARAGRAPH A, TO MAKE SURE THE SPRING IS DECOMPRESSED BEFORE FURTHER DISASSEMBLY.
5. IN VIEW OF THE POWERFUL SPRING OPERATION OF THESE ACTUATORS, DO NOT, AT ANY TIME, PLACE ONE'S HAND IN THE VALVE PORT WHEN THE UNITS ARE ASSEMBLED TOGETHER.

DESCRIPTION

In the "normal" position, (no air pressure on diaphragm), the Reverse Actuator holds its stem in a fully extended position by means of the spring. Increasing air pressure in the lower diaphragm chamber thrusts the actuator stem upward 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 Reverse Actuator opens the valve upon increasing air pressure to the lower diaphragm chamber.
2. Mounted on Push-Stem-to-Open valves, the Reverse Actuator closes the valve upon increasing air pressure to the lower diaphragm chamber.

Four raised bosses on the actuator yoke casting (two on each side), accommodate accessories such as positioner, controller, solenoid valves, limit switches, etc. To facilitate disassembly, all accessories should be removed before proceeding as outlined below.

DISASSEMBLY

Remove the actuator from the valve body assembly as outlined in the IMO covering the valve in use.

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). **DO NOT PROCEED FURTHER WITH DISASSEMBLY WITHOUT CLEARLY DETERMINING THAT THE SPRING IS FULLY DECOMPRESSED AND LOOSE.**
3. Remove the cap screws and nuts (9 & 10), then lift off the diaphragm case assembly (1).
4. Unscrew the actuator stem nut (17), and remove the diaphragm plate (8), diaphragm (15), and diaphragm washer (18).

NOTE: For reassembly after replacement of the diaphragm only, see "Final Assembly," under ASSEMBLY section.

B. Complete Disassembly:

After disassembling the actuator in accordance with instructions above (A), proceed as follows:

1. Lift the travel stop (30) over the actuator stem (20).
2. Unscrew the spring barrel case assembly (21) from the lower bridge (24) and lift it over the actuator stem and spring (29).
3. Unscrew the packing box screws (14) and remove the packing box (2) from the upper bridge of the spring barrel case assembly (21).
4. Lift the spring (29) and spring seat (5) over the actuator stem.

TABLE I
STANDARD SPECIFICATIONS

MAXIMUM PRESSURE RATING:	65 psig
ACTUATOR TEMP. RATING	-20°F to +180°F
ACTION:	Air-to-open on down-seated valves
INPUT SIGNAL:	Normally up to 20 psig with 12 psi span springs, and up to 35 psig with 24 psi span springs
AIR CONNECTION:	¼" NPT

5. Loosen the travel stop nut set screw (19), remove the travel stop nut (3) from the actuator stem, then withdraw the actuator stem, then withdraw the actuator stem from the lower bridge (24).

NOTE: It is usually unnecessary to separate the lower bridge (24) from the yoke (31).

ASSEMBLY

1. Insert the neck of the lower bridge (24) into the clearance hole in the top of the yoke (31) so that the pin (25) enters the slot in the rim of the clearance hole.

2. Screw the spring adjuster screw nut (6) onto the end of the lower bridge protruding into the yoke (31), and tighten it securely.

3. Locate the spring adjuster (11) at the midpoint of the actuator stem threads, then insert the stem into the lower bridge.

4. Lower the spring seat (5) and spring (29) over the stem to rest on the spring adjuster (11).

5. Carefully lower the spring barrel case (21) over the stem and spring and screw it tightly onto the lower bridge (24).

6. Fit three new "O"-rings (22 & 23) into the grooves in the packing box (2).

7. Apply a light coating of silicone grease to the stem then slip the packing box over the stem and into the recess of the upper spring barrel bridge. Insert and tighten the packing box screws.

8. Slip the upper travel stop (30) over the top of the actuator stem to rest on the packing box.

9. Screw the travel stop nut (3), flat side up, several turns onto the lower end of the actuator stem.

Final Assembly

The following steps cover final assembly of the actuator after preliminary assembly, (reference above instructions), or, after the actuator has been partially disassembled for examination or replacement of the diaphragm only.

1. Check the diaphragm (15) for cuts, abrasions, or indication of porosity. Replace if necessary.

2. Place the diaphragm washer (18) (rounded corners up), over the actuator stem, then lock the assembly together with the actuator stem nut (17).

3. Dust the diaphragm thoroughly with talcum to prevent abrasion, then place the diaphragm (convex side down) over the spring stem to rest on the diaphragm washer.

4. Place the diaphragm plate (8) (rounded corners down), over the actuator stem, then lock the assembly together with the actuator stem nut (17).

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

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

6. Place the diaphragm case (1) on the diaphragm and align the cap screw holes with those in the diaphragm and lower case.

7. Insert the cap screws and nuts (9 & 10), and tighten all nuts evenly and securely to ensure a tight diaphragm seal.

ADJUSTMENTS

A. Adjusting Actuator Stroke

1. Determine the valve travel from the name plate, add 1/16th", and call this dimension "D."

2. Turn the spring adjuster (11) upward to apply spring force to the stem and ensure that the diaphragm washer (18) is against the upper travel stop (30).

3. Position the travel stop nut (3) on the actuator stem (20) so that its top surface is below the end of the lower bridge (24) by a distance equal to "D." (See Step 1, above.) Tighten the travel stop nut set screw (19) securely.

4. Rotate the spring adjuster (11) to relieve all spring compression.

B. Setting the Inherent Diaphragm Pressure Range

This adjustment consists of compressing the spring (with the stem fully extended) just enough to counterbalance the upward thrust of the diaphragm when air pressure in the lower 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 retracted (in accordance with valve travel) when air pressure reaches the upper value of the range.

1. Connect an air gauge and a 0-60 psi regulator to an air line leading to the chamber below 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 name plate.

4. Gradually increase air pressure to the lower diaphragm chamber and determine at what pressure the actuator stem starts to move upward.

NOTE: Use one hand to regulate air pressure and the other to touch both the actuator stem and the end of the lower bridge (24).

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 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.

6. Replace the dust cap (16). The actuator is now ready for mounting on the valve body. (See IMO).

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

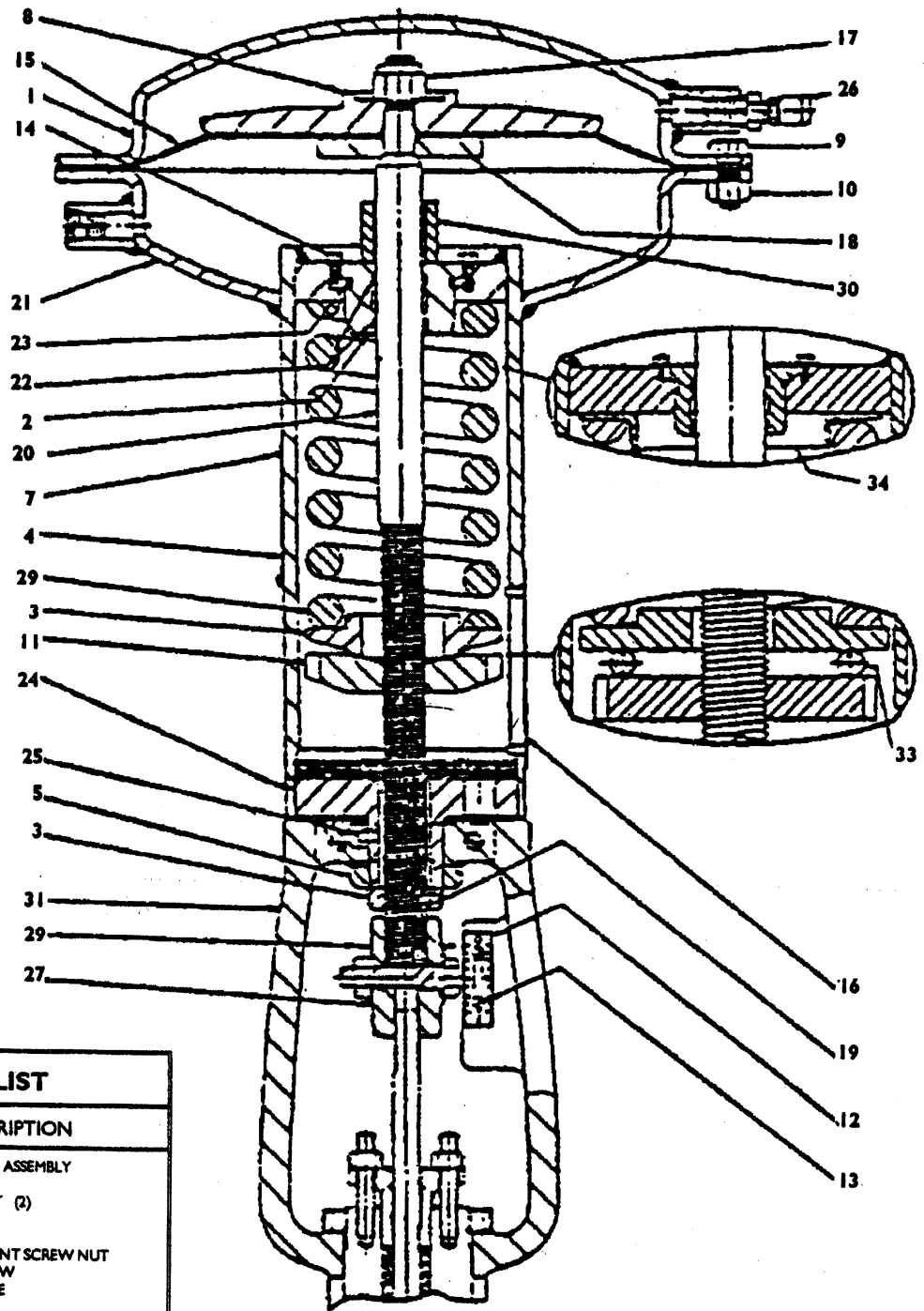
1. As standard factory procedure, single-seated valves are tested for shutoff against the maximum inlet pressure stated on the order. The actuator furnished provides ample power to handle the specified flow conditions at the diaphragm pressure range stamped on the name plate.

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 Reverse Actuator may require increased initial spring compression to ensure shutoff. (This is 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.

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



PARTS LIST	
ITEM	DESCRIPTION
1	DIAPHRAGM CASE ASSEMBLY
2	PACKING BOX
3	TRAVEL STOP NUT (2)
4	NAME PLATE
5	SPRING SEAT
6	SPRING ADJUSTMENT 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
14	PACKING BOX SCREW
15*	DIAPHRAGM
16	DUST CAP ASSEMBLY
17	ACTUATOR STEM NUT
18	DIAPHRAGM WASHER
19	TRAVEL STOP NUT SET SCREW
20	ACTUATOR STEM
21	SPRING BARREL CASE ASSEMBLY
22*	PACKING BOX "O" RING
23*	PACKING BOX "O" RING
24	LOWER BRIDGE
25	LOWER BRIDGE PIN
26	VENT
27	STEM CONNECTOR
28	TRAVEL INDICATOR
29	SPRING
30	UPPER TRAVEL STOP
31	YOKE
33**	BALL THRUST RETAINER
34**	SPRING GUIDE

* RECOMMENDED SPARE PARTS
 ** WHEN DESIGN REQUIRES

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