SERVICE INSTRUCTIONS
DISASSEMBLY AND REASSEMBLY
HD731 DOUBLE ACTING
PNEUMATIC SERIES ACTUATORS

NUMBER: SERVICE-033 (SE-033)
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1.0 INTRODUCTION

This service procedure is offered as a guide to enable general maintenance to be performed on GH-Bettis model HD731 Double Acting “Scotch-Yoke" type pneumatic actuators.

2.0 BASIC TOOLS

Large adjustable wrench, screwdriver, chain wrench, torque wrench (up to 2,000 in. lbs.), 1/2" drive socket set, allen wrench set and rubber or leather mallet.

3.0 GH-BETTIS REFERENCE MATERIALS

3.1 GH-Bettis Assembly Drawing part number 036223.

3.2 GH-Bettis Exploded Detail Drawing part number 063360

4.0 LUBRICATION REQUIREMENTS

4.1 Standard and high temperature service (-20º F to +350º F) use Kronaplate 100 lubricant. Reference GH-Bettis ESL-5.

4.2 Low temperature service (-50º F to +150º F) use Kronaplate 50 lubricant. Reference GH-Bettis rd ESL-4.

5.0 GENERAL DISASSEMBLY

5.1 Numbers in parentheses, indicate the bubble number (reference number) used on the GH-Bettis Assembly Drawing and actuator Bill of Material.

5.2 Remove all operating pressure from actuator power cylinder (3).

5.3 Remove all plumbing and accessories on actuator.

5.4 Use a non-hardening thread sealant on all pipe threads. CAUTION: Apply thread sealant per manufactures instructions.

5.5 To help at re-assembly mark or tag all mating surfaces.

5.6 Disassembly of actuator should be done in a clean area on a work bench when possible.

6.0 PRESSURE CYLINDER DISASSEMBLY

6.1 Secure the chain wrench around the cylinder (3) as close to the welded end cap as possible. Using the mallet, break the cylinder loose sufficiently so it can be removed.

NOTE: When setting the cylinder aside, care should be taken to protect the chamfered edge and cylinder threads.

6.2 Unscrew piston nut (2-70) and remove piston (2-20) and piston o-ring seal (6-50).

6.3 Unscrew and remove four cylinder adapter ferry screws (2-90) with gasket seals (6-80).

6.4 Remove cylinder adapter (2-30), taking care not to scratch piston rod (2-10) or disengage rod bushing (2-40).

6.5 Remove rod seal (6-30).

7.0 ROD COVER DIS-ASSEMBLY

7.1 Unscrew four rod cover ferry head screws (2-100) with seal gaskets (6-80).

7.2 Remove rod cover (2-60) taking care not to scratch the piston rod (2-10) or disengage the rod bushing (2-40).

8.0 HOUSING DISASSEMBLY

8.1 Remove four socket cap screws (1-120) from position indicator (1-110)/yoke weather cover (6-110) and remove position indicator/yoke weather cover.

8.2 Remove cover screws (1-30) with gasket seals (6-80).

8.3 Remove housing cover (1-20).

8.4 Remove the upper yoke roller (1-50) and lift out yoke pin (1-40).

8.5 Pull piston rod (2-10) out through rod bushing (2-40) - right side of housing.

8.6 Remove rod bushing (2-40) from housing (1-10).

8.7 Lift yoke (1-140) from housing cavity.

8.8 Remove the lower yoke roller (1-50).

9.0 GENERAL RE-ASSEMBLY

9.1 Remove and discard all old seals and gaskets, taking care not to scratch or damage seal grooves.

9.2 Before starting the re-assembly of an actuator, all parts should be thoroughly cleaned, inspected and de-burred. NOTE: Particular attention should be directed to threads, sealing surfaces and areas that will be subjected to sliding motion.

9.3 After inspection, the parts should be carefully cleaned to remove all dirt, gasket residue and other foreign matter.

9.4 The torque requirement for critical fasteners is specified at the appropriate step of the assembly procedure.

10.0 CENTER HOUSING GROUP RE-ASSEMBLY

NOTE: Orientation: Stop screw side of housing facing worker will be considered front view.

10.1 If removed, install a pipe plug (1-100) into the drain port of housing (1-10).

10.2 Coat one of the o-ring seals (6-20) with grease and install into housing (1-10) lower yoke bore.

10.3 Apply grease to the lower yoke bore in the housing and orient the housing with the yoke bore nearest you.

10.4 Coat the bearing surfaces of yoke (1-140) with grease and install into the housing. The wide yoke arm should be installed toward the top of the housing.

10.5 Coat rod bushing (2-40) with grease and install into right side of the housing.

10.6 Apply a generous amount of grease to the slots of both yoke arms.

10.7 Coat one of the yoke rollers (1-50) with grease and place into the lower yoke arm slot nearest the cylindrical portion of the yoke.

10.8 Apply a light coat of grease to the piston rod (2-10) and install thru the bushing in the housing.

NOTE: For standard actuators the threaded end of piston rod (2-10) will be on right side of the actuator when installed into the housing. Care should be taken not to scratch or damage the piston rod.

10.9 Coat yoke pin (1-40) with grease and install through piston rod (2-10) into the lower yoke roller (1-50).

10.10 Coat the remaining yoke roller (1-50) with grease and install over the yoke pin and into the slot in the upper yoke arm.

10.11 Coat the remaining o-ring seal (6-20) with grease and install into the housing cover (1-20).

10.12 Coat the yoke bore in the cover and the upper yoke trunion with grease.

10.13 Place cover gasket (6-60) onto the housing (1-10).

10.14 Install housing cover (1-20) onto housing (1-10) with cover gasket (6-60).

10.15 Install four cover screws (1-30) with gasket seals (6-100) through housing cover (1-20) and into housing (1-10).

10.16 If removed, install stop screw (1-60) with jam nut (1-70) and gasket seal (6-90) - 2 places.

10.17 Replace software components of snubber valve (1-130) and then install snubber valve (1-130) into housing (1-10).

11.0 PRESSURE CYLINDER RE-ASSEMBLY

11.1. Install a cylinder adapter gasket (6-70), lightly greased - both sides, over the piston rod bushing on the right side of the housing.

11.2 Coat the piston rod seal (6-30) with grease and install, lip first, into the cylinder adapter (2-30).

11.3 Install the cylinder adapter (2-30) over the right end of the piston rod and retain with the cylinder adapter ferry head screws (2-90) and gasket seals (6-80). Orient the cylinder adapter with the single cast stiffening rib on the stop screw side and pointing up at 45º degrees.

11.4 If removed, install a pipe plug (2-110) into the cylinder adapter pressure ports on back side pointing away from the yoke bore and down at 45º. Use Rectorseal #5 or equivalent (refer to GH-Bettis Engineering Specification ESMA 4601).

11.5 Coat the cylinder adapter o-ring seal (6-40) with grease and install into the cylinder adapter in the groove at the inner end of the threads.

11.6 Coat the piston head o-ring seal (6-50) with grease and install onto the piston rod.

11.7 Install the piston (2-20) onto the piston rod and retain with hex nut (2-70). One side of the piston has a raised boss in the center that is counterbored to accept and o-ring. This side should be installed against the shoulder of the piston rod. Torque piston rod hex nut 1,750 in. lbs. (146 ft. lbs.).

NOTE: Teflon seal inside will rest against piston.

11.8 Piston Seal Installation:

11.8.1 Standard and High Temp Actuators: Coat the u-cup seals (6-10) with grease and install onto the piston. NOTE: Lips of the u-cup seals should point outward toward the sides of the piston.

11.8.2 Low Temp Actuators:

11.8.2.1 Apply grease to T-seal (6-10). NOTE: Seal is composed of rubber seal and two back-up rings. The rings serve as anti-extrusion back-ups.

11.8.2.2 Install T-seal (6-10) into piston seal groove - outboard end of piston.

11.9 Apply a thin coating of grease to the entire bore of the cylinder (3).

11.10 Install cylinder (3) over the piston, and into the cylinder adapter. Tighten with a chain wrench. CAUTION: Exercise caution to prevent pinching of the piston cup seal lip during installation. It is necessary to depress the seal lip while working the cylinder over it.

12.0 ROD COVER RE-ASSEMBLY

12.1 Install the remaining gasket (6-70) onto the left side of housing (1-10).

12.2 Install rod cover (2-60) over left end of piston rod.

12.3 Install gasket seals (6-80) onto ferry cap screws (2-100).

12.4 Install and tighten ferry cap screws (2-100), with gasket seals (6-80), through rod cover (2-60) and into housing (1-10).

12.5 Install yoke weather cover (6-110) and position indicator (1-110) with socket cap screws (1-120). NOTE: When yoke is in full clockwise position, pointer (on indicator) will be facing away and perpendicular to piston rod.

12.6 If removed, install pipe plug (2-110) into rod cover.

13.0 TESTING ACTUATORS

13.1 Leakage Test: All areas, where leakage to atmosphere may occur, are to be checked using a soapy solution.

13.2 Procedure:

13.2.1 Apply air pressure (65 psig) to one side of the piston and allow the unit to stabilize. If any leakage to atmosphere is noted, the actuator must be disassembled and the cause of leakage must be determined and corrected.

13.2.2 If excessive leakage across the piston is noted, generally a bubble which breaks three (3) seconds or less after starting to form, cycle the actuator five (5)times to allow the seals to seek their proper working attitude and retest. if excessive leakage across the piston remains, the unit must be disassembled and the cause of leakage must be determined and corrected.

13.2.3 Repeat the above procedure for the opposite side of the piston.

13.2.4 If an actuator was dissassembled and repaired, the above leakage test must be performed again.

13.3 Operational (Functional) Test: This test is used to verify proper function of the actuator and its' related system (accessories).

13.4 Procedure:

13.4.1 Cycle the actuator at 10% of the maximum operating pressure. Any jumpy or jerky operation, not attributed to seal drag or limited flow capacity, must be corrected.

13.4.2 All accessories, including solenoid valves, positioners, pressure switches, etc., must be hooked up and tested for proper operations and replaced if found defective.

PRESSURE REQUIREMENTS AND LIMITATIONS FOR MODEL HD731 DOUBLE ACTING ACTUATORS

ACTUATOR MODEL	NOMINAL OPERATING PRESSURE (NOP)	MAXIMUM OPERATING PRESSURE (MOP)	MAXIMUM ALLOWABLE WORKING PRESSURE (MAWP)
HD731	(1)	250	300

(1) Customer Specified or N.A.

14.0 RETURN TO SERVICE

14.1 Actuator is now ready to return to service.