GH-BETTIS

SERVICE INSTRUCTIONS

DISASSEMBLY & REASSEMBLY

FOR THE FOLLOWING MODELS

KCB315, KCB415, KCB420,

KCB520, KCB525 AND KCB725

DOUBLE ACTING SERIES

K-MASS ACTUATORS

PART NUMBER: 074963

REVISION: "A"

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1.0 INTRODUCTION

1.1 This service procedure is offered as a guide to enable general maintenance to be performed on GH-BETTIS KCB Double acting Series K-Mass coated actuators.

1.2 The maximum recommended service interval for this series of actuator is five years. Storage time is counted as part of the service interval.

1.3 This procedure is written with the understanding that all operating power has been removed from the actuator. Also it is understood that the actuator has been removed from the valve as well as all piping and accessories that are mounted on the actuator have been removed.

COMPLETE ACTUATOR REFURBISHMENT REQUIRES THAT THE ACTUATOR BE DISMOUNTED FROM THE VALVE

2.0 SUPPORT ITEMS AND TOOLS

2.1 Support Items - Service/Seal Kit, commercial leak testing solution, Latex window caulking and non-hardening thread sealant.

2.2 Tools - All tools are American Standard inch. Two adjustable wenches, Allen Wrench set, small standard screwdriver with sharp edges rounded off, medium size standard screwdriver, external snap ring pliers, ½" drive ratchet and deepwell socket set and a torque wrench (up to 2,000 in.lbs.).

3.0 REFERENCE GH-BETTIS MATERIALS

3.1 CB315, CB420 and CB525 Assembly Drawing Part No. 041005.
3.2 CB315, CB420 and CB525 Exploded Detail Part No. 062907.
3.3 CB415, CB520 and CB725 Assembly Drawing Part No. 035053.
3.4 CB415, CB520 and CB725 Exploded Detail Part No. 062909.

4.0 GENERAL

4.1 Numbers in parentheses, ( ) indicate the bubble number (reference number) used on the GH-BETTIS Assembly Drawing, Exploded Detail Drawings, and actuator parts lists.

4.2 When removing seals from seal grooves, use a small screwdriver with sharp edges rounded off or a commercial seal removing tool.

4.3 Use a non-hardening thread sealant on all pipe threads. **CAUTION: Apply the thread sealant per the manufacture's instructions.**

4.4 Disassembly of actuator should be done in a clean area on a work bench.

4.5 LUBRICATION REQUIREMENTS: Standard and high temperature service (-20^{0}F to 350^{0}F) use, GH-BETTIS, ESL-5, Kronaplate 100. This lubricant is provided in the GH-Bettis Service/Seal Kit.

4.6 It is a good practice to operate the actuator with the nominal operating pressure (NOP), as listed on the actuator nametag or the pressure used by the customer to operate the actuator during normal operation, before starting the general disassembly of the actuator. Notate and record any abnormal symptoms such as jerky or erratic operation. **NOTE: Pressure is not to exceed the maximum operating pressure rating listed on the name tag.**

5.0 GENERAL DISASSEMBLY

5.1 Cut through the latex caulking that seals the cover cap on the outer end of the cylinder (2-10) and the cover cap that covers the housing stop screw (2-80).

5.2 Remove a hex nut from the pipe extensions located on both ends of the actuator.

5.3 Remove both of the cover caps from the actuator. The cover cap covers the stop screw (2-80).

5.4 The setting of both stop screws (2-80) should be checked and setting recorded before stop screws are loosened or removed.

5.5 Loosen and remove hex nut (2-90) from cylinder stop screw (2-80). Remove washer seal (3-80) and thread seal (3-70) from stop screw. Remove cylinder stop screw (2-80).

5.6 Loosen and remove hex nut (2-90) from housing stop screw (2-80). Remove washer seal (3-80) and thread seal (3-70) from stop screw. Remove housing stop screw (2-80).

6.0 CYLINDER DISASSEMBLY

6.1 Hold housing side acorn nut (2-110), loosen and remove cylinder side acorn nut (2-110) from center bar (2-50).

6.2 Remove seal gasket (3-10) from center bar. Diagonal cutters may be used to cut seal gasket.

6.3 **CYLINDER REMOVAL -**

6.3.1 On models CB315, CB420 and CB525 remove outer end cap (2-20) and cylinder gasket (3-30). On models CB415, CB520 and CB725 remove outer end cap (2-20) and cylinder gasket (3-20).

6.3.2 Pull cylinder (2-10) away from the housing (1-10).

6.3.3 Slide cylinder (2-10) over piston (2-30) and remove.

6.4 Pull piston (2-30) out of housing (1-10) and carefully slide piston off center bar (2-50). Roll pin (1-60) and yoke pin (1-40) are removed as part of the piston assembly (2-30).

6.5 Remove piston cylinder seal (3-60) and piston center bar o-ring seal (3-50).

7.0 HOUSING DISASSEMBLY

7.1 Slide center bar (2-50) out thru back of housing and remove acorn nut (2-110) and seal gasket (3-10) from center bar.

7.2 Remove both retaining rings (1-80) from torque shaft (1-30).

7.3 Cut through the latex caulking that seals the cover to the mounting flange on the non valve mounting side of the housing. **NOTE: On some actuators there will be a cover cap over the torque**

shaft and on other actuators there may be a box in this location. What ever is in this location it is to be removed.

7.4 Remove the screws that retain the cover over the torque shaft (1-30).

7.5 The following steps may need to be taken before disassembly can continue.

7.5.1 If torque shaft has any raised burrs or sharp edges they should be filed off, removing as little metal as possible.

7.5.2 If there is excessive paint build-up on torque shaft it should be removed.

7.6 Push the torque shaft (1-30) out one side of housing (1-10) until torque shaft o-ring seal (3-40) is clear of housing. Remove o-ring seal (3-40) from torque shaft.

7.7 Push torque shaft (1-30) back thru housing. Pull torque shaft completely out of housing while holding yoke key (1-50) in with your fingers.

7.8 Remove yoke key (1-50) and yoke key spring (1-70) from torque shaft.

7.9 Remove yoke (1-20) from housing (1-10).

8.0 PRE-ASSEMBLY NOTES

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

8.2 All parts should be cleaned to remove all dirt and other foreign material prior to inspection.

8.3 All parts should be thoroughly inspected. Particular attention should be directed to threads, sealing surfaces and areas that will be subjected to sliding motion. Sealing surfaces must be free of deep scratches, pitting, corrosion and blistering or flaking coating.

8.4 All K-Mass coated parts should be inspected for damage to the K-Mass coating. Replace all K-Mass parts that are damaged.

8.5 Before installing coat all surfaces of actuators moving parts with lubricant.

8.6 Coat all seals with lubricant before installing into the seal grooves.

9.0 GENERAL RE-ASSEMBLY

9.1 Apply a coating of lubricant to the housing (1-10) torque shaft holes.

9.2 Coat the yoke (1-20) with lubricant and insert into housing (1-10).

9.3 Insert the yoke spring (1-70), with the ends pointing down, into the slot in the torque shaft (1-30). **CAUTION: Place the yoke key (1-50) on top of the spring with the tapered side outward. Refer to the assembly drawings for correct key orientation.** Drawing for correct key orientation).

9.4 Hold the yoke key (1-50) down with your thumb and insert the torque shaft (1-30) into and thru the housing and yoke. **NOTE: Rotate the torque shaft until the yoke key snaps into the keyway in the yoke.**

9.5 Push the torque shaft out of one side of the housing until the o-ring groove is clear of the housing.

9.6 Install one of the torque shaft seals (3-40) in the o-ring groove of the torque shaft (1-30).

9.7 Carefully push the torque shaft back into the housing until the o-ring groove on the opposite end of the torque shaft is just clear of the hosing.

9.8 Install the remaining torque shaft o-ring seal (3-40) in the o-ring groove of the torque shaft (1-30).

9.9 Install one of the torque shaft retaining rings (1-80) onto the torque shaft, making certain it is properly seated in the torque shaft groove.

9.10 Push the torque shaft back into the housing and install the remaining retaining ring (1-80) on the torque shaft.

9.11 Rotate the torque shaft so that the yoke arms point outward.

9.12 Apply a generous amount of lubricant to the slots in the yoke arms.

9.13 Slip the gasket seal (3-10) on one end of the center bar (2-50) and screw the acorn nut (2-110) onto the end of the center bar.

9.14 Insert the center bar (2-50) into the center hole in back of housing (1-10) and slide center bar thru housing until gasket seal (3-10) and acorn nut (2-110) are flush against the housing. **CAUTION: Care should be taken during installation of the center bar so as to not scratch it.**

9.15 Install cylinder gasket (3-30) on housing flange. On actuators equipped with a cylinder adapter (2-140) CB415, CB520 and CB725, install the cylinder adapter (2-140) onto the housing flange, with the stepped outer diameter facing away from the housing, and place a cylinder gasket (3-20) onto the stepped diameter on the cylinder adapter (2-140).

10.0 CYLINDER RE-ASSEMBLY

10.1 Coat the center bar (2-50) with lubricant, being sure to coat the exposed threads.

10.2 Install coat the piston center bar o-ring (3-50) in the internal groove in the head of piston (2-30).

10.3 Coat the piston cylinder seal (3-60) with lubricant and install onto the piston.

10.4 Coat the head of the piston along with the exposed ends of yoke pin (1-40) with lubricant.

10.5 With the piston head facing away from the housing (1-10) and with the yoke pin (1-40) up, carefully slide the piston (2-30) onto the center bar (2-50).

10.6 Slide the piston (2-30) along the center bar (2-50) until the yoke pin (1-40) engages the yoke slots. Push the piston into the housing as far it will go, while holding the center bar flush against the housing.

10.7 Apply a thin coating of lubricant to the cylinder bore of cylinder (2-10).

10.8 Slip the lubricated cylinder (2-10) over the piston and onto the cylinder flange of housing (1-10).

10.9 Install gasket (3-30) onto the flange of outer end cap (2-20).

10.10 Slip the outer end cap (2-20) over the center bar (2-50) and into the cylinder (2-10).

10.11 Position the outer end cap (2-20) so that the pressure inlet port is at the bottom and the stop screw hole is at the top.

10.12 Place the remaining seal gasket (3-10) on the exposed end of the center bar (2-50) and screw the acorn nut (2-110) on the center bar hand tight.

10.13 Hold the cylinder side acorn nut (2-110) with a wrench and tighten the housing side acorn nut (2-110) to the proper torque as specified in Chart 1.

10.14 Insert the stop screw (2-80) into end cap (2-20) and screw approximately half way.

10.15 Thread the stop screw thread seal (3-70) onto the stop screw until it is flush with the end (2-20).

10.16 Slip the seal washer (3-80) onto the stop screw with the chamfer facing the thread seal (3-70).

10.17 Thread the stop screw nut (2-90) onto the cylinder stop screw (2-80) until hand tight.

10.18 Repeat steps 10.14 thru 10.17 for the housing stop screw.

10.19 Adjust both stop screws back to settings recorded in Step 5.4 under General Disassembly. Tighten both stop screw hex nuts (2-90) securely, while holding stop screws (2-80).

11.0 ACTUATOR TESTING

11.1 All areas where leakage to atmosphere may occur are to be checked using a commercial leak testing solution.

11.2 Cycle the actuator five times at 65 psig air pressure. This will allow the seals to seek their proper service condition. If excessive leakage across the piston is noted, generally a bubble which breaks three seconds or less starting to form, the unit must be disassembled and the cause of leakage must be determined and corrected.

11.3 Apply 65 psig air pressure to the housing pressure inlet port.

11.4 Apply a leak testing solution to the following areas:

11.4.1 Cylinder to housing joint.

11.4.2 Center bar gasket seal and acorn nut to housing

11.4.3 Housing stop screw and stop screw thread seal.

11.4.4 Torque shaft seals.

11.4.5 End Cap inlet pressure port.

11.5 Apply 65 psig pressure to the cylinder pressure inlet port.

11.6 Apply a leak testing solution to the following areas:

11.6.1 Cylinder to end cap joint.

11.6.2 Center bar gasket seal and acorn nut to end cap.

11.6.3 End cap stop screw and stop screw thread seal.

11.6.4 Body pressure inlet port.

11.7 If an actuator was disassembled and repaired as a result of this procedure, the above leakage test must be performed again.

12.0 K-MASS COVER INSTALLATION

12.1 Install the cover cap on the end cap (2-20). and retain with a hex nut.

12.2 Install the cover cap over the stop screw (2-80) and retain with a hex nut.

12.3 Install the cover over the torque shaft (1-30) and retain with the retaining screws removed in step 7.4.

12.4 Using a tube of Latex window caulk seal all joints that where cut thru during disassembly.

13.0 RETURN TO SERVICE

13.1 Re-install any piping and accessories that were removed.

13.2 All accessories, including solenoid valves, positioners, pressure switches, etc., should be hooked up at this point and tested for proper operations and replaced if found defective.

CHART 1

TORQUE REQUIREMENTS

FOR KCB DOUBLE ACTING SERIES CENTER BARS

ACTUATOR MODEL	MAXIMUM TORQUE IN. LBS.	FT. LBS.
CB315	660	(55)
CB415	660	(55)
CB420	1,200	(100)
CB520	1,200	(100)
CB525	1,560	(130)
CB725	1,560	(130)

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