

GH-BETTIS

SERVICE INSTRUCTIONS

DISASSEMBLY AND REASSEMBLY

FOR THE MODELS

KT5XX-SRX

SPRING RETURN SERIES

K-MASS COATED

PNEUMATIC ACTUATORS

PART NUMBER: 074977

REVISION: "A"

RELEASE DATE: August, 1992

1.0 INTRODUCTION

- 1.1 This service procedure is offered as a guide to enable general maintenance to be performed on GH-Bettis KT5XX-SRX "Scotch-Yoke" type pneumatic series actuators. When the actuator model number has "S" as a suffix then the actuator is special and may have some differences that are not included in this procedure.
- 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 the actuator has been removed from the valve, the air or power gas has been removed from the power cylinders and all piping and accessories 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 Kit, two each 1-8 UNC hex nuts, commercial leak testing solution, and non-hardening thread sealant.
- 2.2 Tools - All tools are American Standard inch. Two each medium standard screwdriver, small standard screwdriver with corners rounded, putty knife, rubber or leather mallet and a torque wrench (up to 5,000 in.lbs.). For recommended tool list refer last page of this procedure.

3.0 REFERENCE GH-BETTIS MATERIALS

- 3.1 Assembly Drawing 036846 * for T5XX-SR (CW) actuator failing closed.
- 3.2 Assembly Drawing 048026 * for T5XX-SR (CCW) actuator failing open.
- 3.3 Exploded Detail Drawing Part Number 063415 *. (Supplied in GH-Bettis Service Kit).

* **These drawings will not show the K-Mass coating and it related covers and hardware.**

4.0 GENERAL

- 4.1 Numbers in parentheses, (), indicate the bubble number (reference number) used on the GH-Bettis Assembly Drawing and actuator parts lists.
- 4.2 This procedure is written using the stop screw side of the housing (1-10) as a reference and this side will be considered the front side of the actuator.
- 4.3 Mating parts should be marked for ease of reassembly, i.e. spring cartridge to housing and cylinder to housing.

4.4 When removing seals from seal groove, use a small standard screwdriver with the sharp edges rounded off or use a commercial seal removing tool.

4.5 Use a non-hardening thread sealant on all pipe threads.

CAUTION: Apply the thread sealant per the manufacture's instructions.

4.6 Disassembly should be done in a clean area on a work bench.

4.7 Lubrication Requirements - Standard and high temperature service (-20°F to 350°F) use ESL-5 (Kronaplate 100). ESL-5 is contained in the GH-Bettis Service Kit.

4.8 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. Also note if the actuators spring rotates back to the full fail position. NOTE: Pressure is not to exceed the maximum operating pressure rating listed on the name tag.

5.0 GENERAL DISASSEMBLY

5.1 If not already removed disconnect all operating pressure from actuator power cylinder (2-10), allowing the spring to stroke. The spring will rotate the yoke to the fail position.

5.2 Mark the stop screws (1-60) left and right. The setting of the stop screw (1-60) should be checked and setting recorded before stop screws are loosened or removed.

5.3 Remove the latex caulking that covers all the hardware on the housing cover. Cut through the latex caulking that seals all joints where the actuator parts are disassembled.

5.4 Remove socket cap screws (1-180) from position indicator (1-170) /yoke weather cover (3-130) and remove position indicator/yoke weather cover.

6.0 SPRING CARTRIDGE REMOVAL

WARNING: Under no circumstances should the spring cartridge be cut open as the spring is pre-loaded with the end caps and cylinder welded around the loaded spring.

CAUTION: Due to the weight and size of the spring cartridge, support equipment will be required when removing the spring cartridge from the actuator housing.

6.1 When the spring cartridge is installed on the actuator the spring is under compression. **DO NOT** remove the spring cartridge until the actuator has the "pre-load" removed.

6.2 Remove spring cartridge "pre-load" as follows: Apply nominal operating pressure to the pressure inlet port located in the cylinder end cap (2-30). Located the stop screw (1-60) that is on the opposite side of the housing from the spring cylinder (4-10). Loosen jam nut (1-120). Unscrew the stop screw (1-60) until it runs into the inner end cap (2-40). Remove the pressure from the pressure inlet port.

- 6.3 Remove the hex nuts (10-200) from the back side of the spring brace (10-240). The remaining hex nuts (10-200) may be left on the brace rods (4-80). The brace rods (4-80) will not be removed from the spring cartridge (4-10).
- 6.4 Remove socket head screw, lockwasher, and nut retainer between large hex nut on outboard end of the spring cartridge (4-10).
- 6.5 Alternately loosen the two large hex nuts on the outboard end of the spring cartridge (4-10). These nuts are welded to the tie bars that extend through the spring cartridge and screw into the spacer (10-250). Unscrew the tie bars until the spring cartridge is free from the spacer. Care should be taken so that the tie bars are not pulled back into the spring cartridge.
- 6.6 To keep from inadvertently pulling the tie bars back into the spring cartridge use two each one inch -8 UNC hex nuts and thread them on to the spring cartridge tie bars. Place the spring cartridge (4-10) to one side.
- 6.7 The removal of ferry cap screws (10-220) and spacer (10-250) is not required to service actuator.

7.0 PRESSURE CYLINDER DISASSEMBLY

- 7.1 Remove breather assembly (610) from inner end cap (2-40).
- 7.2 Remove socket cap screw (2-120), washer (2-110) and nut retainer (2-100) from the end of the outer end cap (2-30).
- 7.3 Remove hex nuts (2-90) from tie bars (2-60).
- 7.4 Remove outer end cap (2-30). The fit between the cylinder (2-10) and the outer end cap is very tight. Break the outer end cap free by tapping with a breaker bar on the lip provided on the end cap.
- 7.5 Pry inner end cap (2-40) away from the housing (1-10). Break the inner end cap free from the cylinder (2-10) by tapping with a breaker bar on the lip provided on the end cap.
- 7.6 Remove the cylinder (2-10). When sliding the cylinder off of the piston, tilt the cylinder 15° to 30° degrees to the piston rod.
- 7.7 Unscrew the tie bars (2-60) from the housing (1-10). Flats are provided on the outboard end of the tie bars for wrench placement.

CAUTION: DO NOT use a pipe wrench on the tie bars as it will mark the bar and cause seal leakage.

- 7.8 Remove the split ring retainer (2-80) and the split ring (2-70) from the outboard side of the piston (2-20).

CAUTION: Keep the split rings in matched sets.

- 7.9 Remove the piston (2-20) from the piston rod (2-170). The piston will slide off of the piston rod and tie bars (2-60).

- 7.10 Remove the piston rod o-ring seal (3-40) from the piston rod (2-170).
- 7.11 Remove split ring retainer (2-80) and split ring halves (2-70) from the inboard side of the piston.

CAUTION: Keep the split rings in matched sets.

- 7.12 Slide the inner end cap (2-40) off the tie bars (2-60) and piston rod (2-170).
- 7.13 Remove rod bushing (2-50) and rod seal (3-70). The bushing will slide off of the end of the piston rod.

8.0 HOUSING GROUP DISASSEMBLY

- 8.1 Unscrew push rod (4-20) from yoke pin nut (1-30) and remove from housing.
- 8.2 Unscrew piston rod (2-170) from yoke pin nut (1-30) and remove. Flats are provided on the outboard end of the piston rod for wrench placement.

CAUTION: DO NOT use a pipe wrench on the piston rod as it will mark the rod and cause seal leakage.

- 8.3 Remove four cover/spring brace hex cap screws (10-210) and gasket seals (3-100).
- 8.4 Remove cover hex cap screws (1-90) and gasket seals (3-100).
- 8.5 Remove the housing cover (1-20). Spring brace (10-240) will come off with cover as over pins (10-230) fit securely. NOTE: The cover will have a very tight fit. It is not necessary to remove cover pins (10-230) and (1-130) or separate housing from spring brace (10-140).
- 8.6 Remove the top two yoke rollers (1-50) and roller spacer (1-110) from the top of the yoke pin (1-40).
- 8.7 Remove the yoke pin (1-40).
- 8.8 Remove the yoke pin nut (1-30).
- 8.9 Remove the lower two yoke rollers (1-50) and roller spacers (1-110) from the bottom of the yoke and housing.
- 8.10 The yoke (1-160) can now be removed by lifting it from the housing.
- 8.11 Remove the stop screws (1-60), stop nuts (1-120), and gaskets (3-110).
- 8.12 It is not necessary to remove the pipe plug (1-80), snubber valve (1-190), ferry cap screws (10-220), spacer (10-250), or the final end cap gasket (3-10), to service actuator.

9.0 GENERAL RE-ASSEMBLY

- 9.1 Remove and discard all old seals and gaskets.
- 9.2 All parts should be cleaned to remove all dirt and other foreign material prior to inspection.

- 9.3 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.
- 9.4 All K-Mass coated parts should be inspected for damage to the coating. Replace or repair all K-Mass parts that are damaged.
- 9.5 Before installation coat all moving parts with lubricant. Coat all seals with lubricant, before installing into seal grooves.
- 9.6 T-seal set installation - The T-seal is composed of one rubber seal and two split skive-cut back-up rings.
 - 9.6.1 Install the T-seal into the seal groove.
 - 9.6.2 Install a back-up ring on each side of the T-seal.
 - 9.6.3 When installing the back-up rings, do not align the skive-cuts.
 - 9.6.4 If the back-up rings are too long and the rings overlap beyond the skive-cuts, then the rings must be trimmed with a razor sharp instrument.

10.0 CENTER HOUSING GROUP RE-ASSEMBLY

- 10.1 If removed install drain plug (1-80) in actuator housing (1-10).
- 10.2 Coat one of the yoke o-ring seal (3-50) with lubricant and install into the housing (1-10).
- 10.3 Inside the housing (1-10) apply lubricant to the tracks and yoke bore and arrange the housing with the yoke bore nearest you.
- 10.4 Apply lubricant to the slots in the upper/lower yoke arms and the lower bearing surface.
- 10.5 Install the yoke (1-160) into the housing (1-10) as follows: Arrange the yoke arms to approximately a 45° degree position in either direction and lower into the housing. NOTE: The hub with tapped holes faces up. Rotate the yoke back to approximately the mid-stroke (center) position.
- 10.6 Apply lubricant to all surfaces of two of the yoke rollers (1-50) and two roller spacers (1-110). Place one yoke roller in the track in the bottom of the housing and position it under the slot in the yoke arms. Place a roller spacer (1-110) on top of the bottom yoke roller (1-50). Place a second yoke roller on top of the roller spacer in the slot in the lower yoke arm. Place another roller spacer (1-110) on top of the second yoke roller (1-50) and align the holes in the roller spacer and the yoke rollers.
- 10.7 Coat the upper and lower surfaces of the yoke pin nut (1-30) with lubricant and insert into position between the yoke arms, parallel to the track in the housing. Align the yoke pin hole with the yoke rollers and roller spacers.
- 10.8 Lubricate the yoke pin (1-40) and insert through the yoke pin nut (1-30), the two yoke rollers (1-50) and the two roller spacers (1-110).

- 10.9 Apply lubricant to all the surfaces of the two remaining yoke rollers (1-50) and two remaining roller spacers (1-110). Place one roller spacer on top of the yoke pin nut (1-30) then install the third yoke roller (1-50). Place the last roller spacer on top of the third yoke roller (1-50). Place the fourth and final yoke roller on to the yoke pin. The top roller will remain above the yoke arm and will engage the cover track when the cover is installed.
- 10.10 Lubricate piston rod (2-170) and slide into the right side of the housing for fail close (CW) actuators or into the left side of the housing for fail open (CCW) actuators. Screw the piston rod into yoke pin nut (1-30). **(DO NOT TIGHTEN)** Flats are provided on the outboard end of the piston rod. These flats should be used to put a wrench on to tighten the piston rod.

CAUTION: Do not use a pipe wrench on the piston rod, as it will cause seal leakage.

- 10.11 Apply lubricant to the rod bushing (2-50), install it over the piston rod and slide it up into the housing.
- 10.12 Lubricate the push rod (4-20) and slide into the other side of the housing and screw into the yoke pin nut (1-30).
- 10.13 Do this step only if you have removed the housing stop screws (1-60). Place gaskets (3-110) and jam nuts (1-120) on the stop screws (1-60). Install both assemblies into the housing.
- 10.14 Place the housing cover gasket (3-20) on the housing (1-10).
- 10.15 Coat the remaining yoke o-ring seal (3-50) with lubricant and install into the housing cover (1-20).
- 10.16 Apply lubricant to the yoke bore and the track in the housing cover (1-20).
- 10.17 Apply lubricant to the yoke bore and the track in the housing cover (1-20).
- 10.18 Apply lubricant to the yoke upper bearing surface.
- 10.19 Install the housing cover (1-20) and spring brace (10-240) being careful not to damage the gasket (3-20) or yoke o-ring seal (3-50).
- 10.20 Install the cover screws (1-90) and seal gasket (3-100). LEAVE FINGER TIGHT - DO NOT TIGHTEN.
- 10.21 Do this step only if you have pulled the cover pins (1-130) or if you are replacing the cover pins. Drive the two pins (1-130) thru the cover (1-20) and into the housing (1-10) until the pin is flush with the cover. NOTE: The pins are deeply grooved at one end, tapering to a smooth diameter at the other end. The pin should be installed smooth end first.
- 10.22 Do this step only if you have pulled the spring brace/cover pins (10-230) and separated the cover and spring brace. Place the spring brace (10-240) into position and drive the two (2) pins (10-230) thru the brace and cover, into the housing.
- 10.23 Install brace cover screws (10-210) and seal gaskets (3-100). Torque to 21.5 foot pounds or 3.0 kilograms-meters.

- 10.24 Tighten the cover screws (1-90) and brace cover screws (10-210), torque to 21.5 foot pounds or 3.0 kilograms-meters.

CAUTION: Do not use a pipe wrench or similar tool to tighten piston rod.

- 10.25 Tighten the piston rod (2-170) to a torque of approximately 150 foot pounds or 20.7 kilogram-meters. Flats are provided on the outer end for wrenching purposes.
- 10.26 Tighten the push rod (4-20) securely with a strap wrench.
- 10.27 Rotate the yoke to a position that will leave a minimum of the piston rod (2-170) protruding from the actuator housing.

11.0 PRESSURE CYLINDER RE-ASSEMBLY

- 11.1 Coat the rod seal (3-70) with lubricant and install, lip first, into the recess provided in the inner end cap ((2-40).
- 11.2 Install one end cap gasket (3-10) over the piston rod (2-70) and rod bushing (2-50).
- 11.3 Coat two tie bar o-ring seals (3-30) with lubricant and install into the inner end cap (2-40).
- 11.4 Slide the inner end cap (2-40) over the piston rod (2-170) and the rod bushing (2-50), protruding from the housing. Install with the large raised boss toward the housing (flat side outward). The pressure inlet port should be toward the top of the actuator.
- 11.5 Apply lubricant to the end cap o-ring seal (3-60) and install on the inner end cap (2-40).
- 11.6 Apply lubricant to two sets of piston tie bar T-seal components (3-80) and install into the piston internal seal groove. Refer to step 9.6 for proper installation instructions.
- 11.7 Coat the ends of the piston rod (2-170) with lubricant.
- 11.8 Apply lubricant to the piston o-ring (3-40) and place onto the piston rod (2-170).
- 11.9 Install a matched set of split rings (2-70) into the inner most groove in the piston rod and retain with one of the split ring retainers (2-80) retaining ring groove away from piston.
- 11.10 Slide the piston (2-20) onto the piston rod against the split ring (2-70). Ribbed section of piston must face away from housing.
- 11.11 Install a matched set of split rings (2-70) into the piston rod and retain with the split ring retainer (2-80). Split ring retainer groove to face away from the piston.
- 11.12 Coat the piston T seal components (3-90) with lubricant and install into the piston external seal groove. Refer to step 9.6 for proper "T" seal installation.
- 11.13 Apply lubricant to the threads and end of the tie bars (2-60), (end without wrench flat), and install by carefully inserting the tie bars through the piston (2-20) and then through the inner end cap (2-40) and screwing into the housing (1-10). Lubricate all exposed surfaces of piston rod and tie bars.

CAUTION: Tighten the tie bars until the threads bottom out, then back out each tie bar one half-turn.

11.14 Apply a light coat of lubricant to the bore of the cylinder (2-10).

11.15 Slide the lubricated cylinder (2-10) over the piston (2-20) and onto the inner end cap (2-40). When sliding the cylinder over the piston seal tilt the cylinder 15° to 30° degrees to the piston rod.

CAUTION: Hammer on the end of the cylinder only with a non metallic object.

CAUTION: Make certain the back-up rings (components of the piston seal) are seated into the seal groove. Should the back-up rings or seal member be pinched between the piston and cylinder, the component could be damaged, becoming a potential source of leakage.

11.16 Apply lubricant to two end cap tie bars o-ring seals (3-30) and install into the outer end cap (2-30).

11.17 Apply lubricant to the outer end cap cylinder o-ring seal (3-60) and install onto outer end cap (2-30).

11.18 Install the outer end cap (2-30) onto the tie bars and into the end of the end of the cylinder (2-10). The pressure inlet port should be toward the top of the actuator.

11.19 Install the two tie bar nuts (2-90) on the tie bars (2-60), using them to draw all of the cylinder components into position. Torque alternately, in 50 foot pounds increments until a final torque of 90 ± 9 foot pounds has been achieved.

CAUTION: While the tie bar nuts are being tightened, do not allow the tie bars to turn.

11.20 Install the nut retainer (2-100), securing in place with the retainer screw (2-120) and lockwasher (2-110). It is necessary that the flats on the hex nuts (2-90) be aligned and parallel before the nut retainer can be installed.

11.21 Apply ten psig pneumatic pressure to the breather port in the inner end cap (2-40) and stroke the actuator. Remove the air pressure from the breather port.

12.0 SPRING CARTRIDGE INSTALLATION

12.1 If removed, install end cap gasket (3-10), spacer (10-250), ferry cap screws (10-220) and tighten screws.

12.2 Remove the nuts, installed at step 6.6, from the spring cartridge tie bars.

12.3 Install the gasket (4-70) onto the spring cartridge (4-10).

12.4 Place the spring cartridge (4-10) on to the push rod (4-20) and align the spring cartridge tie bars with the holes in the spacer (1-250). Also align the brace rods (4-80) with holes in the spring brace (10-240).

- 12.5 Screw the tie bars into the spacer (10-250). Alternately tighten tie bar nuts in 50 foot pounds increments until the spring cartridge is firmly against the spacer and tighten to 90 ±9 foot pounds.
- 12.6 Install nut retainer, lockwasher, and socket head cap screw. It is necessary that the flats on the hex nuts be aligned and parallel before the nut retainer can be installed.
- 12.7 Install the hex nuts (10-200) onto the brace rods (4-80) and tighten.
- 12.8 POSITION INDICATOR ORIENTATION
- 12.8.1 For spring to close actuators (clockwise) rotate the yoke to the full clockwise (CW) position (as shown on the clockwise assembly drawings) position the yoke weather cover (3-130)/position indicator (1-170) on the yoke with the pointer facing the front and perpendicular with the piston rod (2-170), secure with the socket head cap screws (1-180).
- 12.8.2 For spring to open actuators (counterclockwise), rotate the yoke to the full counterclockwise (CCW) position (as shown on the counterclockwise assembly drawings), position the yoke weather cover (3-130)/position indicator (1-170) on the yoke with the pointer facing the right and parallel with the piston rod (2-170), secure with the socket head cap screws (1-180).

13.0 ACTUATOR TESTING

- 13.1 Leak Test - General - All areas, where leakage to atmosphere may occur, are to be checked using a leak testing solution.
- 13.2 All leak testing will use the nominal operating pressure (NOP) as listed on the actuator nametag or from Chart number 1 of this procedure.
- 13.3 Before testing for leaks, alternately apply and release NOP pressure to the pressure side of the pistons to stroke the actuator fully. Repeat this cycle approximately five times. This will allow the new seals to seek their proper working attitude.
- 13.4 Leakage Test-Procedure Apply NOP pressure to the pressure port in outer end cap (2-30).
- 13.5 Apply a leak testing solution to the following areas:
- 13.5.1 Joint between the outer end cap (2-30) and the cylinder (2-10). Checks cylinder to end cap o-ring seals.
- 13.5.2 Around the tie bar nuts on the cylinder end cap (2-30). Checks tie bars to end cap o-ring seals.
- 13.5.3 The breather port hole in the inner end cap (2-40). Checks piston to cylinder, piston to tie bar, and piston to piston rod seals.
- 13.6 Remove pressure from pressure inlet port in the outer end cap.

- 13.7 If excessive leakage across the piston is noted (generally a bubble which breaks three seconds or less after starting to form), the actuator must be disassembled and the cause of leakage must be determined and corrected.
- 13.8 If an actuator was disassembled and repaired, the above leakage test must be performed again.
- 13.9 Operational (Functional) Test - This test is used to verify proper function of the actuator and is to be done off of the valve or when the valve stem is not coupled to the actuator yoke.
- 13.10 Adjust the pressure regulator to the pressure rating indicated in Column "B" of Chart 1 for the model actuator being tested.
- 13.11 Apply the above pressure to the actuator pressure inlet ports and allow the actuator to stabilize. The actuator should stroke a full 90° travel.
- 13.12 Any jumpy or jerky operation, not attributed to seal drag or limited flow capacity, must be corrected and above test performed again.
- 13.13 Remove pressure from the pressure inlet ports(s).

14.0 RETURN TO SERVICE

- 14.1 Install breather assembly (610) in the inner end cap (2-40).
- 14.2 If supplied in the service kit, replace the software components of the snubber (1-90) and then install the snubber in the housing cover port.
- 14.3 Adjust both stop screws (1-60) back to settings recorded in step 5.3.
- 14.4 Tighten both stop nuts (1-120) securely, while holding stop screw (1-60).
- 14.5 All accessories, including solenoid valves, positioners, pressure switches, etc., should be hooked up and tested for proper operations and replaced, if found defective.
- 14.6 Using a tube of latex window caulk seal all joints that were removed or cut through or removed during disassembly.

CHART 1 - PRESSURE REQUIREMENTS & LIMITATIONS

<u>ACTUATOR MODEL</u>	<u>NOMINAL OPERATING PRESSURE (NOP)</u>	<u>MAXIMUM OPERATING PRESSURE (MOP)</u>	<u>MAXIMUM HYDROSTATIC TEST PRESSURE</u>	<u>MAXIMUM AIR ASSIST PRESSURE (MAAP)</u>	<u>COLUMN B SPRING SELECTION PRESSURE</u>
KT516-SR1	187	240	250	32	117
KT516-SR2	135	220	250	85	85
KT516-SR3	78	180	250	108	49
KT516-SR4	66	175	250	114	43
KT520-SR1	118	150	150	20	75
KT520-SR2	85	135	150	53	55
KT520-SR3	49	135	150	53	55
KT520-SR4	42	115	150	71	28

TOOL STYLE AND WRENCH SIZE TABLE

<u>ITEM NO.</u>	<u>ITEM QTY.</u>	<u>WRENCH SIZE</u>	<u>DESCRIPTION OR LOCATION</u>	<u>RECOMMENDED WRENCH STYLE</u>
1-60	2	15/16"	Stop Screws	Open End or Adjustable
1-80	1	7/16"	Housing Drain Plug	Open End or Adjustable
1-90	10	9/16"	Cover Screws	Socket
1-120	2	1-7/8"	Stop Screw Nut	Box End (1)
1-180	4	3/16"	Weather Cover Screws	Allen
1-190	1	7/8"	Snubber Valve	Deep Socket
2-60	2	5/8"	Tie Bar Flats	Open End or Adjustable
2-90	2	1-5/8"	Tie Bar Nuts	Crows Foot (1)
2-120	1	3/16"	Nut Retainer Screw	Allen
2-170	1	1-3/8"	Piston Rod Flat	Crows Foot (1)
4-20	1	(1)	Push Rod	Strap Wrench
4-30	1	11/16"	Breather	Open End
4-60	1	3/16"	Nut Retainer	Allen
10-200	8	1-5/8"	SR Brace Rod Nuts	Open end or Adjustable
10-210	4	9/16"	Cover/Brace Screws	Socket
None	2	1-5/8"	SR Tie Bar Nuts	Deep Socket (2)

(1) No alternate style tool recommended or wrench placement not provided.

(2) Some actuators used heavy hex nuts in this location - wrench size will change to 1-7/16".

<u>ECN</u>	<u>DATE</u>	<u>REV</u>	<u>BY *</u>	<u>DATE</u>
Released	August 18, 1992	A	COMPILED	BC
			CHECKED	BC
			APPROVED	RMM
				18 August 1992
				18 August 1992
				18 August 1992

World Area Configuration Centers (WACC) offer sales support, service, inventory and commissioning to our global customers. Choose the WACC or sales office nearest you:

NORTH & SOUTH AMERICA

19200 Northwest Freeway
Houston, TX 77065
USA
T +1 281 477 4100
F +1 281 477 2809

Av. Hollingsworth,
325, Iporanga Sorocaba
SP 18087-105
Brazil
T +55 15 3238 3788
F +55 15 3228 3300

ASIA PACIFIC

No. 9 Gul Road
#01-02 Singapore 629361
T +65 6501 4600
F +65 6268 0028

No.1 Lai Yuan Road
Wuqing Development Area
Tianjin 301700
P.R.China
T +86 22 8212 3300
F +86 22 8212 3308

MIDDLE EAST & AFRICA

P. O. Box 17033
Dubai
United Arab Emirates
T +971 4 811 8100
F +971 4 886 5465

P. O. Box 10305
Jubail 31961
Saudi Arabia
T +966 3 340 8650
F +966 3 340 8790

24 Angus Crescent
Longmeadow Business Estate
East P.O. Box 6908; Greenstone
1616 Modderfontein, Extension 5
South Africa
T +27 11 451 3700
F +27 11 451 3800

EUROPE

Berenyi u. 72- 100
Videoton Industry Park,
Building #230
Székesfehérvár 8000
Hungary
T +36 22 530 950
F +36 22 543 700

For complete list of sales and manufacturing sites, please visit
www.emersonprocess.com/valveautomationlocations
Or contact us at info.valveautomation@emerson.com

www.emersonprocess.com/bettis

©2016 Emerson Process Management. All rights reserved.

The Emerson logo is a trademark and service mark of Emerson Electric Co. Bettis is a mark of one of the Emerson Process Management family of companies. All other marks are property of their respective owners.

The contents of this publication are presented for information purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. All sales are governed by our terms and conditions, which are available on request. We reserve the right to modify or improve the designs or specifications of our products at any time without notice.

BETTIS™



EMERSON™
Process Management