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Section 1: General

1. Bettis ninety-degree rotary actuators are designed for use with quarter-turn devices of a broad range of sizes and types, and are applicable over a wide range of pressures, temperatures, and environments.

2. This service procedure is offered as a general guide for the following Bettis Double-Acting and Spring-Return Series Pneumatic Actuators: RP, RPB, RPBQ, RPC, D, 2301, 2701, 3701, 301, 701, 733, 742, 744, 746, 748, 1074, 2732, 2744, CB, CBA, CR, HD, HDG, F, FH, G, GC, GH, GHC, GTD, T, ST, TR10, STR10, TRQ10 and STRQ10.

NOTE:
The listed actuator series include M2, M3, M4, M7, M9 and M11 Overrides plus the previous Bettis model numbers that have an alpha character following the basic model letters and numbers (that is HD732A, 301B, T402.0A and others).
Section 2: Storage

1. For applications where a pneumatic actuator is not put into immediate service, it is recommended the actuator be cycled (that is two complete strokes – one clockwise, one counterclockwise) a minimum of 5 times with regulated clean/dry pneumatic pressure once a month. Care should be taken to plug all open ports on the actuator and all controls to keep out foreign contaminants. Some plugged pressure ports need to be unplugged during each month’s cycling procedure to enable unpressurized areas to vent to atmosphere. After each cycling procedure is complete, care should be taken to replace any removed plugs to keep out foreign contaminants during storage.

2. Indoor storage, if available, is recommended. Actuators should not be stored in an atmosphere harmful to resilient seals.

3. After long term storage, the actuator may require the installation of a service kit before being placed into service.
Section 3: Installation

1. Since there are many valve and actuator combinations, it is not practical to include detailed instructions for each type. Mountings are designed to be as simple as possible to keep guesswork out of installation.

2. Actuators are shipped from the factory with the travel stops adjusted for approximately ninety-degree rotation. Generally, it is necessary to make slight travel stop adjustments once the actuator is installed on the valve. Refer to the valve manufacturer’s recommendations for specific requirements. When the valve has internal stops, the actuator should be adjusted at the same points.

   **NOTE:**
   The actual “stopping” should be done by the actuator. If the valve does not have internal stops, adjust the actuator to the full-open position. Using this as a reference point, rotate the valve closed and adjust to the valve manufacturer’s specifications for total rotation.

3. Good instrument practices are also recommended. Clean/dry regulated pneumatic pressure is essential for long service life and satisfactory operation. It should be noted that new pneumatic lines often have scale and other debris in them and these lines should be purged of all foreign material.

   **NOTE:**
   Scale and debris can damage control valves, solenoids, seals, and others.
Section 4: Start-up

1. When actuator is first put into service, it should be cycled with regulated pneumatic pressure. This is necessary because the seals have been stationary, causing them to take a "set". Therefore, the actuator should be operated through several cycles, exercising the seals, resulting in a service ready condition.

2. The actuator speed of operation is determined by a number of factors including:
   a. Power supply line length
   b. Power supply line size
   c. Power supply line pressure
   d. Control valve and fitting orifice size
   e. Torque requirements of the valve
   f. Size of the actuator
   g. Setting of speed controls
   h. Hydraulic Manual Override

3. Due to the interaction of these variables, it is difficult to specify a "normal" operating time. Faster operating times may be obtained by using one or more of the following:
   a. Larger supply lines
   b. Larger control valve
   c. Higher supply pressure *
   d. Quick exhaust valves

* Not to exceed maximum operating pressure of actuator or control components.
Section 5: Operation

5.1 Controlled Operation

Controlled operation is accomplished by pressurizing and/or depressurizing the appropriate cylinder inlet(s) of a double-acting or spring-return unit by means of an appropriate control valve. Do not exceed pressures indicated on actuator nameplate.

5.2 Manual Operation

All pressure must be vented or equalized on both sides of the pneumatic piston prior to manual operation.
Section 6: Maintenance

6.1 Service Interval

6.1.1 Routine maintenance is generally unnecessary. Normal recommended service interval for Bettis actuators is five years or maximum actuator life cycle, which ever occurs first.

NOTE:
Storage time is considered as part of the Service Interval.

6.1.2 It is recommended that Service Kits be ordered approximately three (3) months prior to scheduled maintenance to assure availability.

NOTE:
This product is only intended for use in large-scale fixed installations excluded from the scope of Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS 2).

6.2 Lubrication Requirements

For use in all areas of the actuator.

NOTE:
Lubricant, other than listed in step 6.2.1, should not be used without prior written approval of Bettis Product Engineering.

6.2.1 All temperature services (-40°F to +350°F)/(-40°C to +176.6°C) use Bettis ESL-5 lubricant. ESL-5 lubricant is contained in the Bettis Module Service Kit in tubes and the tube is marked ESL-4, 5, & 10 lubricant.

6.3 Hydraulic Fluid For Actuator M2, M4, M7, M9, and M11 Override Systems

Hydraulic fluids, other than those listed in steps 6.3.1 and 6.3.2, should not be used without prior written approval of Bettis Product Engineering.

6.3.1 Standard temperature and High temperature service (-20°F to +350°F)/(-28.9°C to +176.6°C) use Dexron II Automatic Transmission Fluid or Shell Tellus T-32 Fluid.

6.3.2 Low temperature service (-40°F to +150°F)/(-40°C to +65.6°C) use Exxon Univis J13 Hydraulic Fluid.
Section 7: Spare Parts

1. For availability of replacement parts, contact Bettis or nearest Bettis authorized representative. Assembly drawings are available that identify each individual part by a generic number applicable to each actuator series.

   **NOTE:**
   When ordering spare Service Kits for shelf storage, note that the seals are made of resilient material and have a limited shelf life.

2. When ordering replacement parts, it is important to include the Actuator Serial Number and if Serial Number is not available, then the complete actuator model number and part number. This information is on the actuator name tag.

3. More detailed information may be obtained by contacting any of the following locations located at the back page of this manual.
Section 8: Document Revision

Table 1. Revision Overview

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