Spring Diaphragm Actuators

GENERAL INFORMATION

The following instructions are designed to assist in unpacking, installing and performing maintenance as required on Valtek spring diaphragm actuators. Product users and maintenance personnel should thoroughly review this bulletin prior to installing, operating or maintaining the actuator. Separate installation, operation, maintenance instructions cover additional features (such as fail-safe systems, switches, handwheels, etc.).

To avoid possible injury to personnel or damage to actuator parts, WARNING and CAUTION notes must be strictly adhered to. Modifying this product, using inferior or non-factory parts, or using maintenance procedures other than outlined could drastically affect performance and be hazardous to personnel and equipment.

Spare Parts

Phone **1-800-99 SPARE** for spare parts information.

Unpacking

Before unpacking the actuator, check the packing list against the materials received. Lists describing the actuator and accessories are included in each shipping container.

1. When lifting the actuator from the shipping container, use lifting straps through the yoke legs and position them so as to avoid damage to the tubing and mounted accessories.
2. In the event of shipping damage, contact your shipper immediately.
3. Should any problem arise, call your Valtek representative.

Installation

For proper installation of the actuator, proceed as follows:

1. Make sure at least six inches of overhead clearance above the actuator is provided for proper disassembly and maintenance."
2. Use 1/4-inch tubing when connecting the air supply (or instrument signal) to the actuator and make sure all connections are free of leaks. The actuator is designed to operate with a 3-15 psi instrument signal, although it is suitable for up to 60 psi.
3. An air regulator should be installed if the air supply exceeds 60 psi. An air filter is also recommended unless the air is unusually clean and dry.
4. After installing, check the combined actions (director reverse) of the controller and actuator for proper operation and valve failure direction upon air loss.

ACTUATOR MAINTENANCE

At least once every six months, check for proper operation by following the preventative maintenance steps outlined below. These steps can be performed while the actuator is in service and, in some cases, without interrupting service. If an internal problem is suspected with the actuator, refer to the "Disassembly and Reassembly" section.

1. Examine the actuator for damage caused by corrosive fumes or process drippings.
2. Clean the actuator and repaint any areas of severe oxidation.
3. If possible, stroke the actuator and check for smooth, full-stroke operation.

   WARNING: Keep hands, hair, clothing, etc. away from all moving parts when operating the actuator. Failure to do so can cause serious injury.
4. Make sure the stem clamp is securely fastened.
5. Check all accessories, brackets and bolting to make sure they are securely fastened and functioning properly.
6. Spray a soap solution around the actuator stem and diaphragm case to check for air leaks through the O-rings and gaskets.

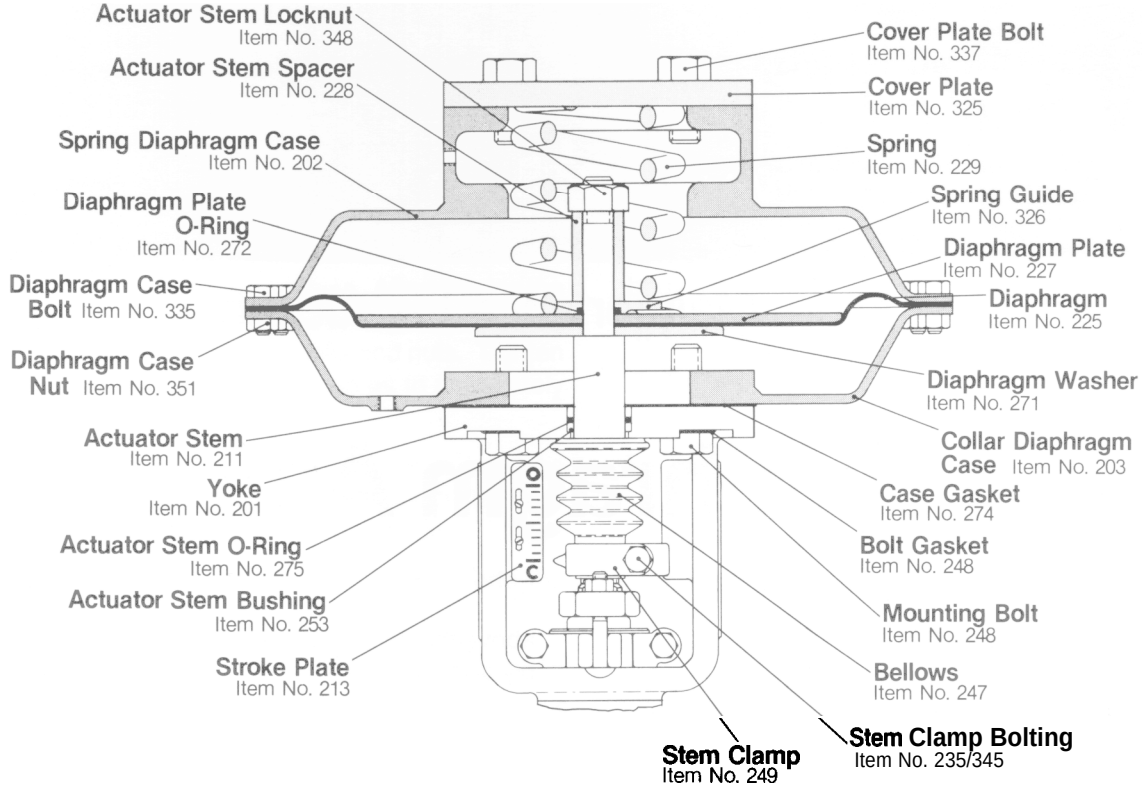

Figure 1: Air-to-Retract Configuration

NOTE: Item numbers correspond directly to the bill of material. Refer to the bill of material for specific part numbers.

7. If possible, remove the air supply and observe the actuator for correct fail-safe action.
8. Check the rubber bellows for wear.
9. Clean any dirl or foreign material from the actuator stem.
10. If any air filter is supplied, check and replace cartridge as necessary.

ACTUATOR DISASSEMBLY AND REASSEMBLY

Disassembling the Actuator (Air-to-Retract Configuration)

To disassemble the air-to-retract spring diaphragm actuator, remove the actuator from the valve body using the appropriate maintenance bulletin. Referto Figure 1 and proceed as follows:

1. Disconnect all tubing.
2. Release the spring compression by carefully removing the cover plate bolts and cover plate.
3. Loosen the stem clamp bolting and slide the stem clamp and rubber bellows off the actuator stem.
4. Remove the diaphragm case nuts and bolts. Remove the spring diaphragm case and spring.
5. In the following order, remove the actuator stem nut, actuator stem spacer, spring guide, diaphragm plate O-ring, diaphragm plate, diaphragm, and diaphragm washer from the actuator stem.
6. To remove the actuator stem O-ring, carefully pull the actuator stem up through the yoke. The actuator stem O-ring can then be removed.

   NOTE: *The actuator stem bushings are pressed into the yoke; it is not necessary to remove the bushings to replace the O-ring.*
7. To remove the collar diaphragm case and case gasket from the yoke, remove the mounting bolts and bolt gaskets.

Reassembling the Actuator (Air-to-Retract Configuration)

To reassemble the air-to-retract spring diaphragm actuator, refer to Figure 1 and proceed as follows:

1. Use only new O-rings and gaskets during reassembly. All O-rings should be lubricated with a silicone lubricant (Dow Corning 55M or equivalent). Carefully inspect the diaphragm for wear and, if necessary, replace it. All internal parts should be thoroughly cleaned before beginning reassembly.
2. With a new case gasket and bolt gaskets, reinstall the collar diaphragm case and mounting bolts. Tighten the mounting bolts to adequately seal the gaskets.
3. Replace the actuator stem O-ring and carefully push the actuator stem down through the yoke.
4. In the following order, replace the diaphragm washer, diaphragm, diaphragm plate, diaphragm plate O-ring, spring guide, actuator stem spacer, and actuator stem nut. Tighten the actuator locknut securely without rotating the actuator stem.

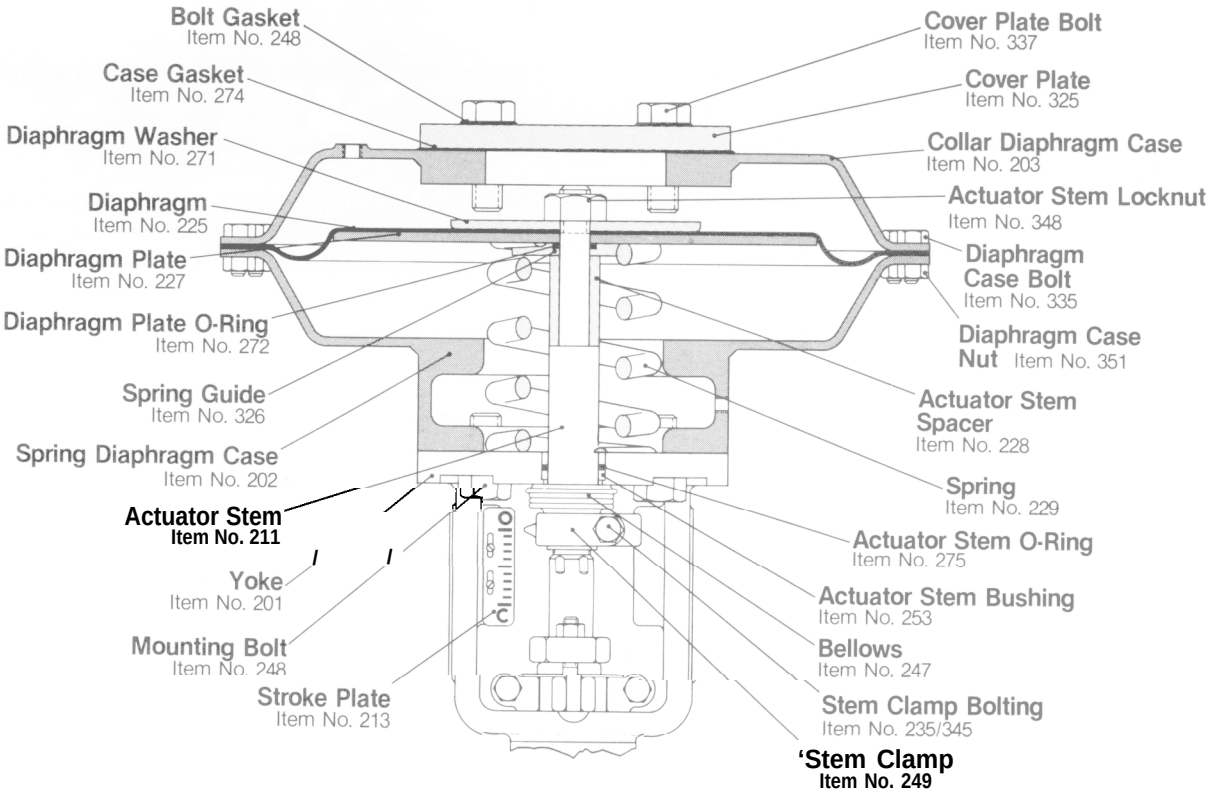

Figure 2: Air-to-Extend Configuration

NOTE: Item numbers correspond directly to the bill of material. Refer to the bill of material for specific part numbers.

NOTE: *When replacing the diaphragm, be certain the fabric side of the diaphragm is facing toward the diaphragm plate.*

5 Replace the spring and spring diaphragm case. After aligning the holes in the diaphragm and both diaphragm cases, reinstall the diaphragm case bolts and nuts. Tighten each bolt evenly and securely, so as to adequately seal the diaphragm.

6. Replace the cover plate and cover plate bolts.
7. Reinstall the rubber bellows (replace if worn or cracked) and stem clamp.
8. Reinstall the actuator on the valve body using the appropriate maintenance bulletin.

Disassembling the Actuator (Air-to-Extend Configuration)

To disassemble the air-to-extend spring diaphragm actuator, remove the actuator from the valve body using the appropriate maintenance bulletin. Refer to Figure **2** and proceed as follows:

1. Disconnect all tubing.
2. Loosen the stem clamp bolting and slide the stem clamp and rubber bellows off the actuator stem.
3. Remove the spring compression by removing the mounting bolts.
4. Remove cover plate bolts and bolt gaskets. Remove the cover plate and case gasket.
5. Remove the diaphragm case nuts and bolts. Remove the collar diaphragm case.
6. In the following order, remove the actuator stem nut, diaphragm washer, diaphragm, diaphragm plate, diaphragm plate O-ring, spring guide, spring, and stem spacer.
7. Remove the spring diaphragm case from the yoke.
8. To remove the actuator stem O-ring, carefully pull the actuator stem up through the yoke. The 'actuator stem O-ring can then be removed.

   NOTE: *The actuator stem bushings arepressedinto the yoke; it is not necessary to remove the bushings to remove the O-ring.*

Reassembling the Actuator (Air-to-Extend Configuration)

To reassemble the air-to-extend actuator, refer to Figure 2 and proceed as follows:

1. Use only new O-rings and gaskets during reassembly. All O-rings should be lubricated with a silicone lubricant (Dow Corning 55M or equivalent). Carefully inspect the diaphragm for wear and, if necessary, replace it. All internal parts should be thoroughly cleaned before reassembly.
2. Reinstall the spring diaphragm case. Loosely engage the mounting bolts at this point (they will be tightened later to provide spring compression).
3. Replace the actuator stem O-ring and carefully push the actuator stem down through the yoke.
4. Replace the stem spacer, spring, spring guide,

diaphragm plate O-ring, diaphragm plate, diaphragm, diaphragm washer, and actuator stem locknut. Tighten the locknut securely.

NOTE: When replacing the diaphragm be certain the fabric side of the diaphragm is facing toward the diaphragm plate.

5. Replace the collar diaphragm case. Afteraligningthe holes in the diaphragm and both diaphragm cases, reinstall the diaphragm case bolts and nuts. Tighten each bolt evenly and securely, so as to adequately seal the diaphragm.
6. With a new case gasket and bolt gaskets, reinstall the cover plate and cover plate bolts. Tighten the cover plate bolts to adequately seal the gaskets.
7. Securely tighten the mounting bolts to provide the initial spring compression.
8. Reinstall the rubber bellows (replace if worn or cracked) and stem clamp.
9. Reinstall the actuator on the valve body using the appropriate maintenance bulletin.

REVERSING THE AIR ACTION

To change the air-action from air-to-extend to air-to-retract or vice versa, disassemble the actuator according to the applicable portion of the "Disassembly and Reassembly" section and reconstruct the actuator to the desired air-action.

ADJUSTING THE SPRING COMPRESSION

The initial spring compression on spring diaphragm actuators is adjusted by changing the engagement between the actuator stem and the plug stem in the valve body assembly. Proceed as follows:

1. Loosen the stem clamp on the actuator stem.
2. On air-to-retract actuators (or air-to-open valves), screw the plug stem out of the actuator stem far enough to permit the plug to seat on the lowend of the signal (3 psi on 3-15 psi signal). If necessary, the low end may be adjusted up to 5 psi to keep the plug seated against higher upstream pressure.

   CAUTION: **When turning the plug stem in the actuator stem, make sure the plug is in mid-stroke so as to avoid galling the plug on the seat or on the bonnet.**
3. On air-to-extend actuators (or air-to-close valves), screw the plug stem into the actuator stem far enough to permit the plug to seat on the high end of the signal (15 psi on 3-15 psi signal).
4. Position the stem clamp so that it points to the appropriate postion on the stroke indicator plate and tighten securely.

Troubleshooting Chart

Problem	Probable Cause	Corrective Action
High air consumption or leakage	1. Leaks through the O-rings or gaskets 2. Leaks in air supplyor instrument signal system	1. Replace any faulty O-ring or gasket 2. Tighten connections and replace any leaking lines
Actuator does not operate, no excessive air exhausting from actuator	1. Spring failure 2. Internal valve problem	1. Replace spring 2. Refer to valve maintenance bulletin
Actuator does not operate, excessive air exhausting from actuator	1. Burst diaphragm	1. Replace diaphragm
Jerky or sticking stem travel	1. Actuator stem O-ring is worn and actuator stem is galling on bushings 2. Internal valve problem	1. Replace O-ring; if galling has occurred on actuator stem, replace it 2. Refer to valve maintenance bulletin

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