

Linear Actuators

Spring-Cylinder Type

05



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Installation, Operation and Maintenance Instructions

1.1 - GENERAL INFORMATION

The following instructions are designed to assist in the installation, operation and maintenance of Valtek Sulamericana's spring-cylinder linear actuators, as necessary.

Users and maintenance personnel should read this bulletin carefully before the installation, operation or servicing of the actuator, positioner or any other accessory installed on the actuator. Separate maintenance instructions cover additional characteristics such as handwheel, stroke limiters, limit switches, etc.

Reading the maintenance bulletin of the valve or equipment where the actuator is installed is also recommended.



WARNING!

If it is necessary to store the products before field installation, Valtek Sulamericana recommends that actuators be stored in dry, fresh, closed places. Do not store actuators in places where relative humidity is higher than 85% or the room temperature is lower than 41°F or higher than 113°F (5 to 45°C). Environments containing excessive UV radiation, acid or alkaline mist or ozone sources must be avoided.

Product storage in non-recommended places may void the manufacturer warranty.

1.2 - UNPACKING

- When removing the actuator from its package, check the packing list or the actuator datasheet, comparing it with the received material. A specification sheet of the actuator and assembled accessories is shipped inside each shipping container.
- When lifting the actuator from shipping container, position the lifting straps properly in order to avoid damages to the tubings and accessories assembled in the actuator. Actuators with sizes 25 and 50 may be lifted by the lifting rings provided on the top of the cylinder. In case there is no lifting ring provided, lift the actuator using straps attached to the yoke legs.
- In case of damages during transport, immediately contact the shipper.
- In case of any problem, call your Valtek Sulamericana representative.



1.3 - SAFETY WARNINGS

To avoid potential injury and/or damage to the actuator parts, **WARNING** and **CAUTION** notes must be strictly observed.

Changing this product characteristics, using non-original spare parts or using maintenance procedures different from those presented herein may affect the performance of the actuator, be hazardous to personnel and equipment and may void the manufacturer warranty.



WARNING!

Standard industry safety practices must be applied when using this equipment. Industry safety standards for personal protection and for equipment handling must also be observed.



CAUTION

When lifting an actuator using straps passed through the yoke legs, take care when the center of gravity is above the lifting point. An adequate support must be provided to prevent the actuator from turning. A failure in this procedure may cause severe injuries, as well as damage to the valve and to the equipment nearby.



CAUTION

Consider the total weight before lifting or transporting the actuator. A failure to observe this warning may result in serious injury.

1.4 - INSTALLATION

Before installing the actuator on a control valve or other equipment make sure there is sufficient height available for the actuator in order to allow its removal from valve body and to provide the adequate maintenance.

Note: If the actuator is attached to a Valtek Sulamericana control valve, consult valve IOM for information regarding the free space (above the actuator) required for maintenance. If the actuator is attached to other equipment, please refer to table I.

Table I: Free space necessary to disassemble the actuator

Actuator Size	Required Clearance	
	inch	mm
15	5.0	127
25	6.0	152
50	8.0	203
100, 200, 300, 400, 500 and 600	10.0	254

- Connect air supply and instrument signal (throttling actuators are generally equipped with positioners). The air ports are identified indicating the air supply and the instrument signal. The actuator can operate with air supply pressure up to 150 psi (10.3 Bar). However, the sticker attached to the cylinder must be checked for maximum pressure allowed. Air filter is recommended, unless the instrument air is clean and dry.

Note: under special circumstances, the maximum air supply pressure must be limited to 80 or 100 psi depending on the actuator size and the positioner installed.



CAUTION

Do not exceed the maximum pressure indicated on sticker: people may be injured and damage to the equipment may occur.



WARNING

For transport reasons, the air filter may be installed out of the vertical position. Before operating the actuator, position the air filter pointing down.

- Using a soap solution, make sure that there are no leakages in all pneumatic fittings.

1.5 - PREVENTIVE MAINTENANCE

Check if the actuator is working properly at least every six months following the preventive maintenance steps indicated below.

This sequence can be performed with the actuator in service and, in some cases, without disturbing operation. In case there is a potential problem inside the actuator, refer to the section "Disassembly and Reassembly":

- Inspect signs of leakage through the pneumatic fittings. Tighten loosen pneumatic fittings and replace leaking ferrules.
- Observe if corrosive vapors or process fluid dripping is damaging the actuator.
- Clean the actuator and repaint areas of severe oxidation.
- If possible, stroke the actuator and check if the actuator stem travels its full stroke in a smooth and uniform way.



CAUTION

When operating the actuator, keep your hands, hair, clothes, etc. away from moving parts. Failure to follow this warning may result in serious injury.

- If the actuator is equipped with a positioner, check the calibration of assembled unit, comparing the pressure indicated in the positioner gauges against the stroke plate of the actuator. Make sure that the positioner is calibrated within the correct range. Refer to the positioner instructions for information about preventive maintenance.
- If applicable, certify that mechanical linkage with the positioner is connected in a safe way. Check also if the stem clamp is firmly secured and if the pug stem is properly connected to the actuator stem.
- Make sure that all accessories, brackets and bolts are firmly secured.
- If possible, shutoff air supply and observe on stroke plate if specified failsafe position is reached.
- Apply a soap solution around the cylinder retaining ring, the actuator bushings and the adjusting screw and check if there are air leaks through the O-rings and gasket.
- Remove any contaminant or other foreign material from the exposed areas of actuator stem.
- If an air filter is supplied, check and replace cartridge if necessary.

DISASSEMBLY AND REASSEMBLY

1.6 - DISASSEMBLING THE ACTUATOR

In case any internal problem is suspected with the actuator requiring its disassembly, refer to Figures 1, 2 and 3 and proceed as follows:

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- Before disconnecting the actuator from the valve or removing the complete valve from pipeline, observe the note below:



Removing the valve for maintenance: piping must be completely depressurized and process fluid drained. In case of toxic, caustic or hazardous fluid services, the valve must be decontaminated to avoid accidents.

- Shutoff the air supply and cutoff instrument signal and electric devices (if applicable). If the actuator is assembled on a Valtek Sulamericana valve, read also the corresponding valve IOM before removing the actuator from the valve.
- Disconnect all tubings, remove the stem clamp and the stem bellows.
- Following the steps indicated on valve IOM, disconnect the actuator from the valve.
- Using an open wrench, relieve completely the spring compression, removing the adjusting screw. Remove also the adjusting screw gasket.



Do not use a screwdriver, bar, etc. to turn the adjusting screw since this procedure may cause damages to the lifting ring weld. Use an adequate open wrench on flat surfaces of the screw head.



The spring compression must be completely relieved before disassembling the actuator. If this is not done, the cylinder may be ejected out of the yoke when the retaining ring is removed from the cylinder, causing serious injury.

- Remove the retaining ring from the groove at the base of the cylinder using two screwdrivers. Introduce the tip of a screwdriver in the slot on the ring and remove the ring out of its channel. Use another screwdriver to help the operation of removing the ring.

- Pull the cylinder out of the yoke and piston (some O-ring resistance may be felt).



Do not use air pressure to remove cylinder. This may cause the cylinder to be ejected out of the yoke, causing serious injury.

- In the “air-to-retract” configuration, remove the spring(s) and the spring button for cleaning and inspection (see Figures 1 and 2). Remove the locknut and slide the piston and the stem spacer out from the actuator stem. On actuators with dual springs the spring guide must be removed also.
- In the “air-to-extend” configuration (Fig. 3), slowly release and remove the actuator stem locknut, making sure that the piston follows the locknut and is not jammed on the actuator stem. Remove the stem locknut, spring button, piston, spring and stem spacer.
- Remove the O-rings from the piston, the piston stem and from the yoke.



The maintenance step indicated below can only be performed if the actuator has been removed from the valve.

- To inspect the actuator stem O-ring, remove the stem clamp and corresponding rubber bellows. Push the actuator stem through the yoke, taking care not to gall the stem. The O-ring may now be inspected and replaced if necessary.



The upper and lower actuator stem bushings are pressed into the yoke. It is not necessary to remove them to replace the actuator stem O-ring.

- If the bushings are worn out or damaged use a press with appropriate size to extract the used bushings and insert the new ones in the yoke.

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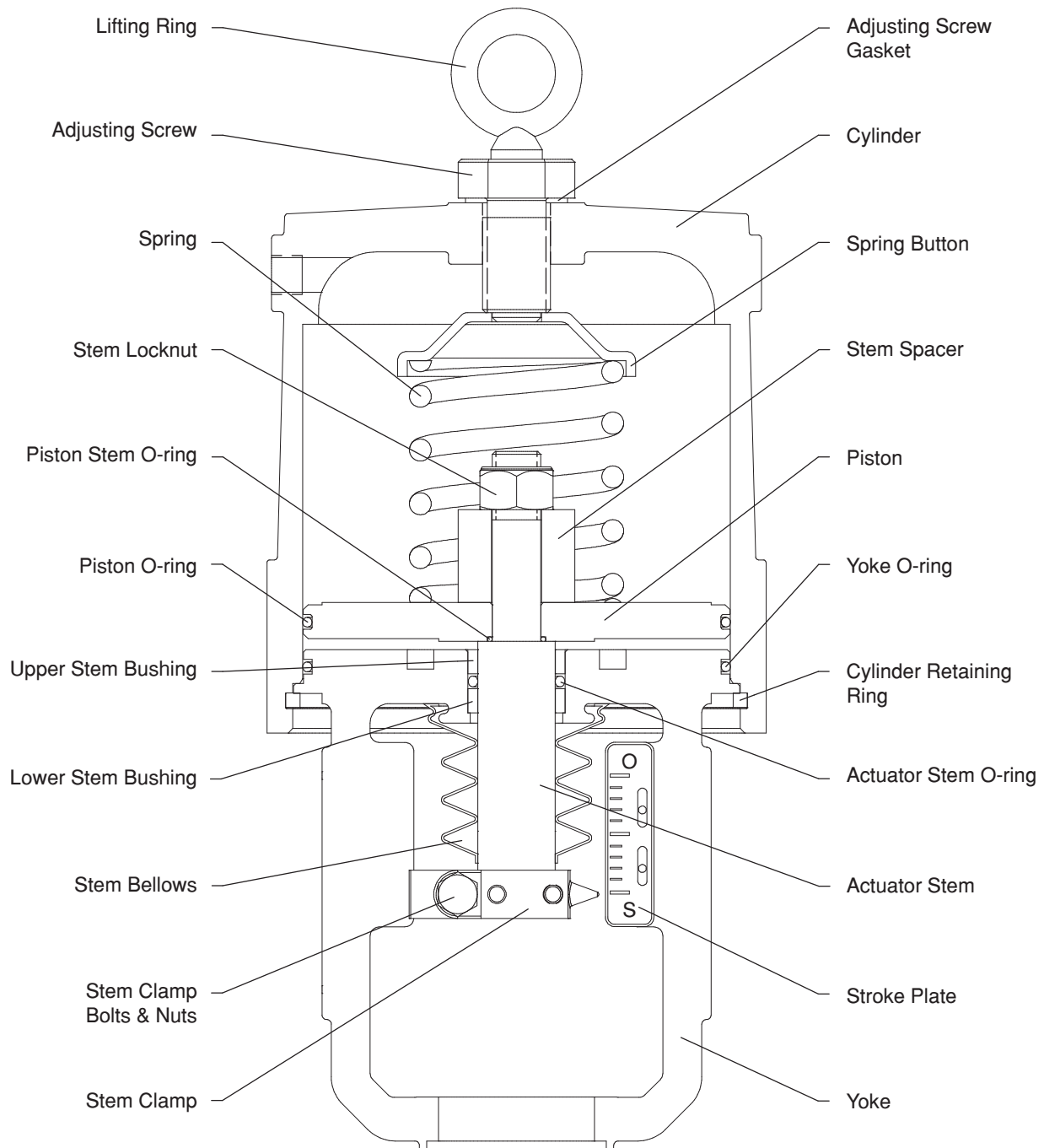


Figure 1 - Spring-Cylinder Actuator (Air-to-Retract)

¹ As standard, the lifting rings are provided just for actuators sizes 25 and 50.

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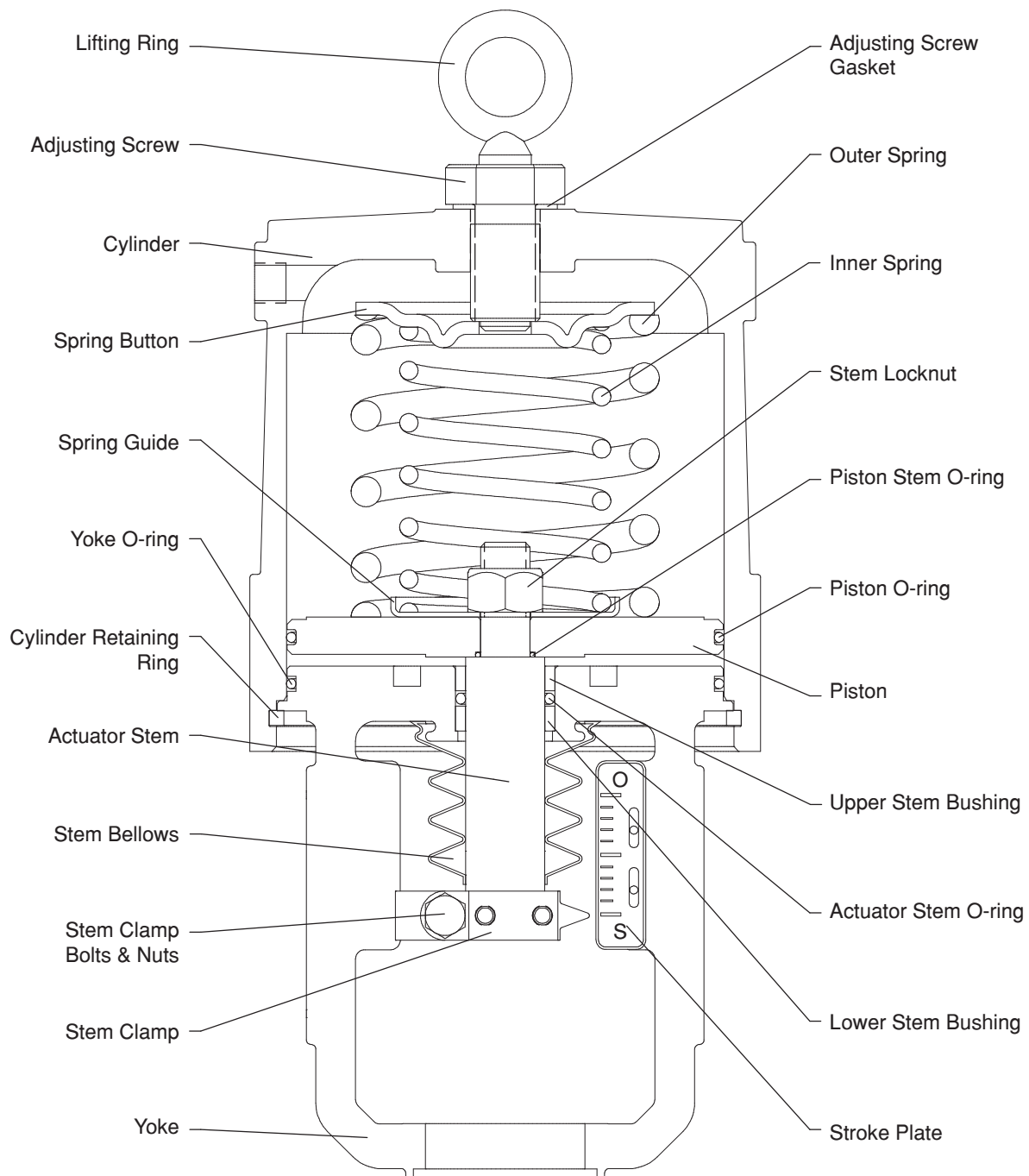


Figure 2 - Spring-Cylinder Actuator with Dual Spring (Air-to-Retract)

¹ As standard, the lifting rings are provided just for actuators sizes 25 and 50.

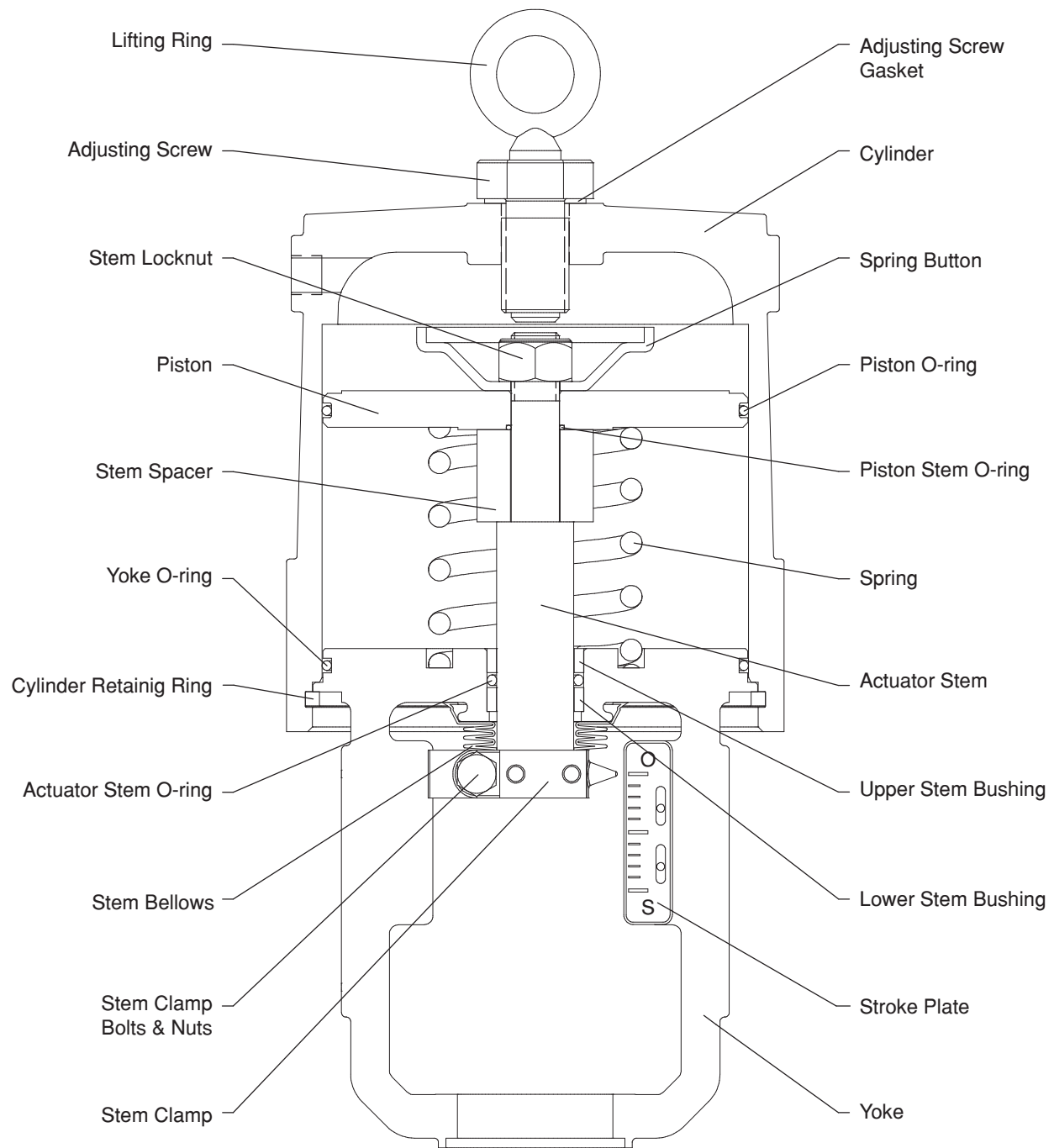


Figure 3 - Spring-Cylinder Actuator (Air-to-Extend)

¹ As standard, the lifting rings are provided just for actuators sizes 25 and 50.

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1.7 – REASSEMBLING THE ACTUATOR

To reassemble the actuator refer to the Figures 1, 2 e 3 and proceed as follows:

- All the O-Rings must be replaced and the new ones must be lubricated. The majority of the O-rings can be lubricated with silicone lubricant (Dow Corning 55M or equivalent). Silicone O-rings must be lubricated with Magnalube-G or equivalent (do not use a silicone lubricant on silicone O-rings).
- Assure that all internal parts are completely clean before starting to assemble. Apply the proper lubricant to the cylinder wall. If the bushings have been removed, lubricate the external side of the replacement bushings. Press the new lower stem bushing into the yoke until it touches the bottom shoulder. Press the upper stem bushing until it is aligned with the top of the yoke (see Figure 4).

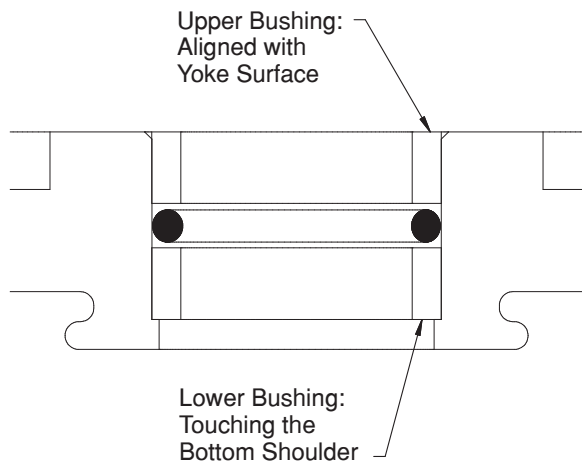


Figure 4 – Assembling the Stem Bushings

- Replace the O-rings on the actuator stem and on the yoke. Reassemble the actuator stem.
- Reassemble the piston, the piston stem O-ring and the stem spacer in the actuator stem, according to the desired air action (see figures 1, 2 and 3). Replace the piston O-ring. The air-to-extend configuration requires that the spring button be fixed by the actuator stem locknut. Tighten the nut firmly.
- In the air-to-extend configuration, place the spring

below the piston and insert the actuator stem through the yoke, taking care not to strike (and scratch) the stem or bushings. For air-to-retract configurations insert the actuator stem through the yoke and place the spring(s) and the spring button on the top of the piston.

- Assemble the cylinder in the yoke, assuring that these parts are correctly positioned to allow the installation of the cylinder retaining ring. Care must be taken to avoid scratching or cutting the O-rings on the piston and on the yoke.
- Insert the retaining ring into the cylinder groove, by steps, until it is fitted in place. Using a hammer and a drift rod, tap gently on the retaining ring, already fitted in place, to confirm that it is securely installed.



CAUTION

The cylinder retaining ring must be securely fixed into the groove so that the cylinder does not escape when pressurized, causing personal injury. During installation, avoid damaging or deforming the edge of the retaining ring square section.

- Reinstall the adjusting screw, using a new adjusting screw gasket.



WARNING

In the air-to-retract configurations make sure that the hole in the spring button is centered directly under the adjusting screw hole.

- Tighten the adjusting screw sufficiently so that the gasket provides a leak proof sealing. Do not over-tighten it.



WARNING

Do not use a screwdriver, bar, etc. to turn the adjusting screw since this procedure may cause damages to the lifting ring weld. Use an adequate open wrench on flat surfaces of the screw head.

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- Replace the stem bellows and reinstall the stem clamp.
- Apply air on top of the piston. With the stem clamp adjusted indicating the “closed position” on the stroke plate, tighten the stem clamp bolt.



WARNING

When installing the stem clamp, make sure that the bolt of the clamp is square to one of the flat faces machined on the actuator stem. This assures a more rigid connection.

1.8 – REVERSING THE AIR ACTION

Changing to Air-to-Retract

To reverse the configuration from “air-to-extend” to “air-to-retract”, refer to Figure 6 and proceed as follows:

- Disassemble the actuator according to the section “Disassembling the Actuator”.
- Reassemble the actuator with the stem spacer, the spring and the spring button over the piston (make sure that the hole in the spring button is centered directly under the adjusting screw hole).
- If the actuator is equipped with a positioner, the positioner must be reversed too (refer to positioner IOM prior to proceed).

Changing to Air-to-Extend

To reverse the configuration from “air-to-retract” to “air-to-extend”, refer to Figure 6 and proceed as follows:

- Disassemble the actuator according to the section “Disassembling the Actuator”.
- Reassemble the actuator with the stem spacer and the spring underneath the piston. The spring must be seated on the groove existing on the top of the yoke and the spring button must be stored above the piston (secured by the stem locknut).
- If the actuator is equipped with a positioner, the positioner must be reversed too (refer to positioner IOM prior to proceed).

1.9 – SEALING OF THE RETAINING RING

If the actuator is installed in environments with extremely high relative humidity or potentially very corrosive, the sealing of the cylinder retaining ring (made from zinc plated carbon steel) is recommended to avoid permanent contact with the aggressive atmosphere. In cases like this, RTV silicone sealant must be applied between the yoke and the cylinder as indicated on Figure 5 below.

In case of exceptionally aggressive atmospheres, cylinder retaining rings made from stainless steel are available as optional item.

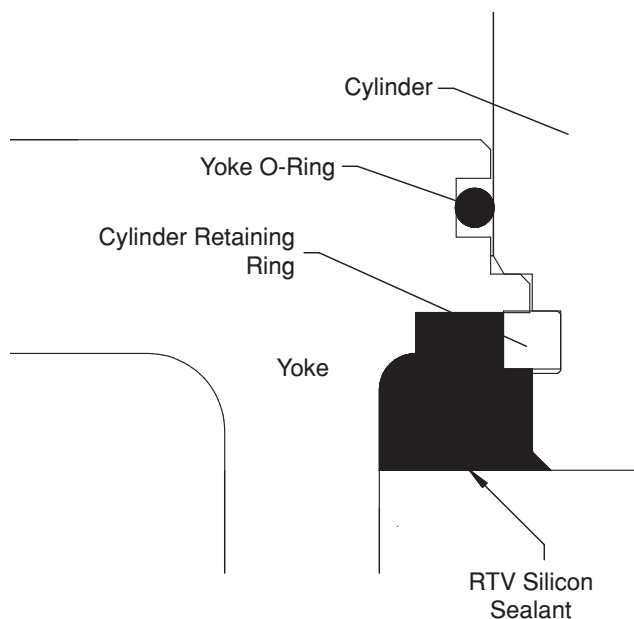


Figure 5 – Sealing of the Retaining Ring

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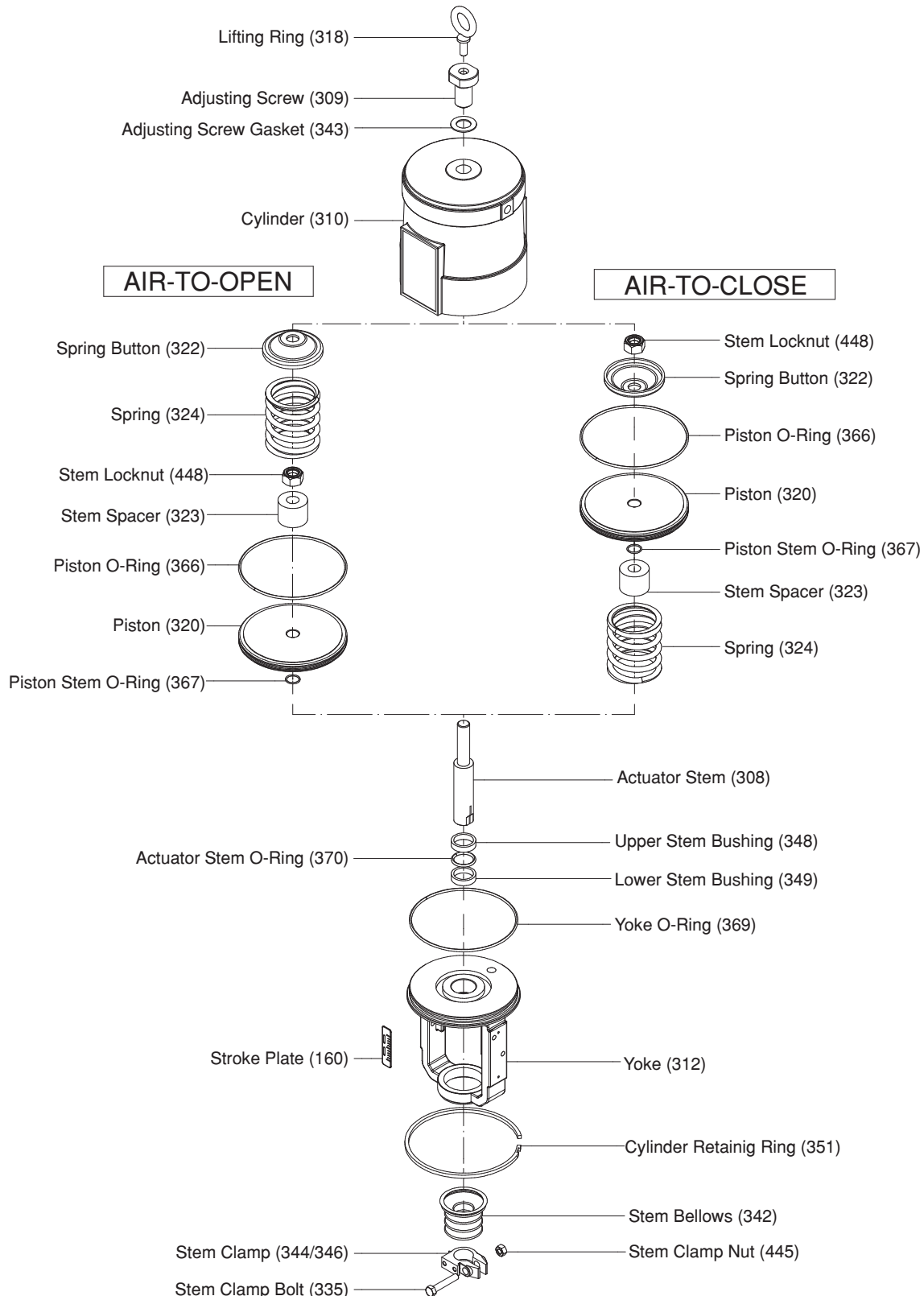


Figure 6 - Exploded View, Spring-Cylinder Actuator

¹ Item numbers above correspond directly to the actuator's bill of material.

² As standard, the lifting rings (item no. 318) are provided just for actuators sizes 25 and 50.

1.10 - LINEAR ACTUATOR TROUBLESHOOTING CHART

Problem	Probable Cause	Corrective Action
Excessive air consumption	<ul style="list-style-type: none"> Leaks in air supply or instrument signal system Malfunctioning positioner Leaks through O-rings or adjusting screw gasket 	<ul style="list-style-type: none"> Tighten the fittings and replace any leaking ferrule See positioner IOM Replace O-rings and/or gasket
Actuator does not fail in correct position	<ul style="list-style-type: none"> Air pressure in cylinder not venting because of malfunctioning positioner Spring failure Internal valve problem 	<ul style="list-style-type: none"> See positioner IOM Replace spring See valve IOM
Stem moves slowly or does not move	<ul style="list-style-type: none"> Insufficient air supply Unlubricated cylinder wall Worn or damaged stem bushings Improperly assembled spring Internal valve problem 	<ul style="list-style-type: none"> Check for leaks in air supply or instrument signal system; tighten loose fittings and replace any leaking ferrule Lubricate cylinder wall with the proper lubricant Check actuator stem for damages; replace actuator stem, O-ring and stem bushings, if necessary Disassemble actuator and check cylinder and piston for damages; reassemble actuator correctly See valve IOM

1.11 - SPARE PARTS

For the supply of spare parts it is necessary to inform Valtek Sulamericana the name and the part number of the required item and/or the name of the required component and the actuator serial number. To facilitate this task, lists containing all actuator components part numbers are provided inside each transport packaging. In case the actuator is disassembled the user may also check the component part number marked in a permanent way in all metallic components of the actuator.

1.12 - RECYCLING INFORMATION

Linear actuators supplied by Valtek Sulamericana may present a very long operational life depending on the application they are provided for and the proper maintenance care.

However, at the end of their operational life the part number marked on all metallic components may help the user to adopt the best procedure for disposal of the materials that may be recycled.

In case of doubt, please contact your Valtek Sulamericana representative.

Although Valtek Sulamericana provides precise and detailed installation, operation and maintenance instructions, in accordance with their design reviews, the customer/user shall be responsible for the information provided to generate product specifications, shall understand precisely the operation and maintenance instructions provided with the products and shall provide training for their employees and contracted personnel regarding the safe use of Valtek Sulamericana products, in accordance with the specific applications they were designed for. The information herein shall not be considered as a certificate for assurance of satisfactory results. Valtek Sulamericana products are continuously improved and upgraded and the specification, dimensions and information contained herein are subject to change without notice. For further information or to confirm these presented here, consult Valtek Sulamericana at Rua Goiás, 345, Diadema, São Paulo, Brasil, CEP 09941-690, Phone: 55-11 4072-8600, Fax: 55-11 4075-2477.

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Certificate No. 311001 QM

Printed in Brazil

www.valteksulamericana.com.br

IOM 05 Linear Actuators Rev. 0 10/2010E PN-9880011 (Copyright 2010 Valtek Sulamericana)