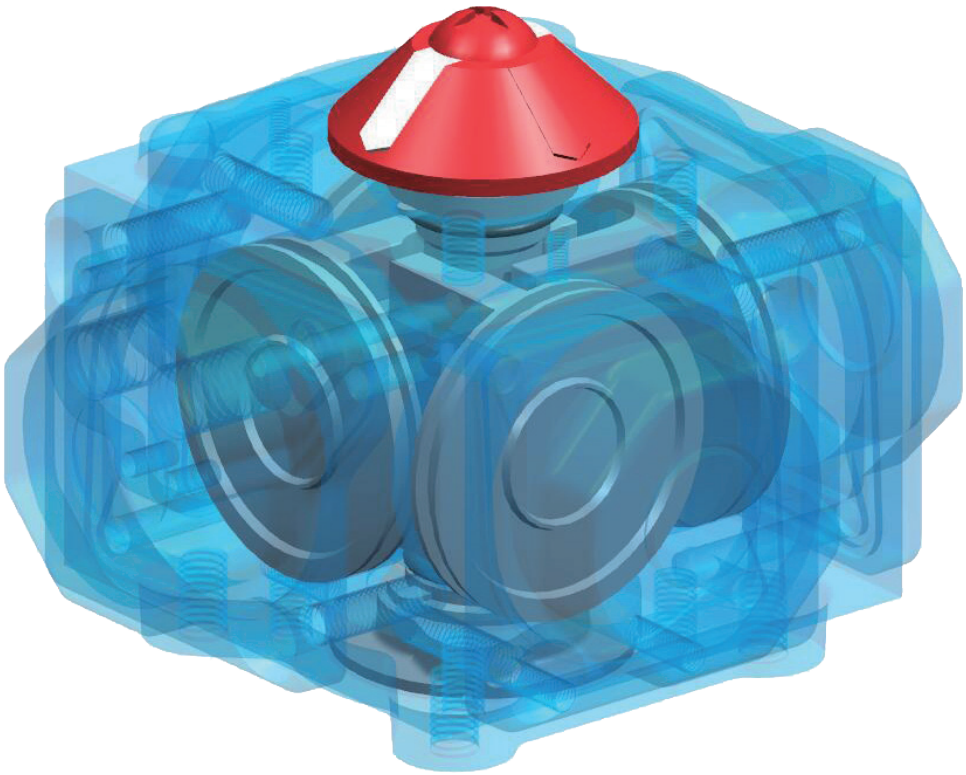
FOUR PISITIONS INSTALLATION, OPERATION & MAINTENANCE MANUAL



ACTUATORS & CONTROLS

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PRINCIPLE OF OPERATION:

The four piston actuator is a pneumatic quarter-turn Rack & Pinion actuator. Air pressure applied to the piston surface area generates thrust which transforms linear motion to rotary motion of the pinion. The four piston has four pistons centrally located around one pinion.

OPERATING MEDIA:

- Clean, dry and lubricated compressed air
- Light hydraulic oil
- Any other inert and non corrosive gas

SUPPLY PRESSURE:

- Minimum: 40 psig (3 bar)
- Maximum: 120 psig (8 bar)

OPERATING TEMPERATURE:

- Standard (NBR O-rings) -5°F~+175°F (-20°C~+80°C)
- High Temp. (Viton O-rings) -4°F~+250°F (-15°C~+120°C)
- Low Temp. (LNBR O-rings) -40°F~+175°F (-40°C~+80°C)

LUBRICATION:

The actuator is supplied ready-lubricated. No further lubrication is required.

- Do not operate the actuator by using flammable, oxidizing, corrosive, explosive or unstable gases.
- Operating the actuator beyond its stated maximum operating limits of temperature,pressure or recommended operating media, can cause personal safety risks, including death or injury, and/or damage to internal components

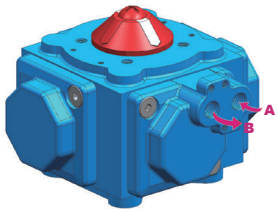
Safety Precautions

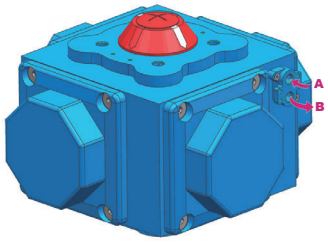
- Before carrying out any repair or maintenance on the actuator, make sure that the pressure supply lines and electrical connections have been safely isolated, removed or disconnected by authorized personnel. The actuator must not be pressurized at any time during installation as injury may result.
- Never put any part of your body in the opening or port of the controlled valve or device.
- Special attention and precautions should be observed of the stored energy contained in the spring return pneumatic actuators.
- Before installing onto a valve make sure that the rotation of the valve and the actuator are the same and that the position indicator orientation is also correct.
- For correct operation, a pneumatic actuator must be sized adequately and with sufficient safety margins of torque output for the correct operating conditions of the valve.

***Authorized and skilled personnel should only perform maintenance of these actuators.**

AIR CONNECTIONS:

The actuator air connections are 1/4” NPT located on a NAMUR manifold and are marked A & B
Sizes 15 to 45 air connections are horizontal:
Port A is to the right and Port B to the left.
Sizes 60 to 75 air connections are vertical:
Port A is above Port B.





Pressure entering port A into the center chamber pushes the pistons outward and rotates the pinion counter clockwise (CCW), normally the opening direction for valves.

Pressure entering port B into the outer chambers pushes the pistons inward and rotates the pinion clockwise (CW).

DOUBLE ACTING MODELS

Pressure entering Port A to open:
Center chamber pressurized. Pistons move outward and the pinion rotates CCW.
Pressure entering Port B to close:
Outside chambers pressurized. Pistons move inward and the pinion rotates CW.

SPRING RETURN MODELS

Pressure entering Port A to open:
Center chamber pressurized. Pistons move outward and the pinion rotates CCW. Springs are compressed.
Pressure exiting Port A to close:
Air is released from center chamber. Springs drive pistons inward. Pinion rotates CW.

NAMUR SOLENOID MOUNTING:

Air supply connection is done by mounting a solenoid directly onto the NAMUR cover which has a mounting pad conforming to the NAMUR standards.

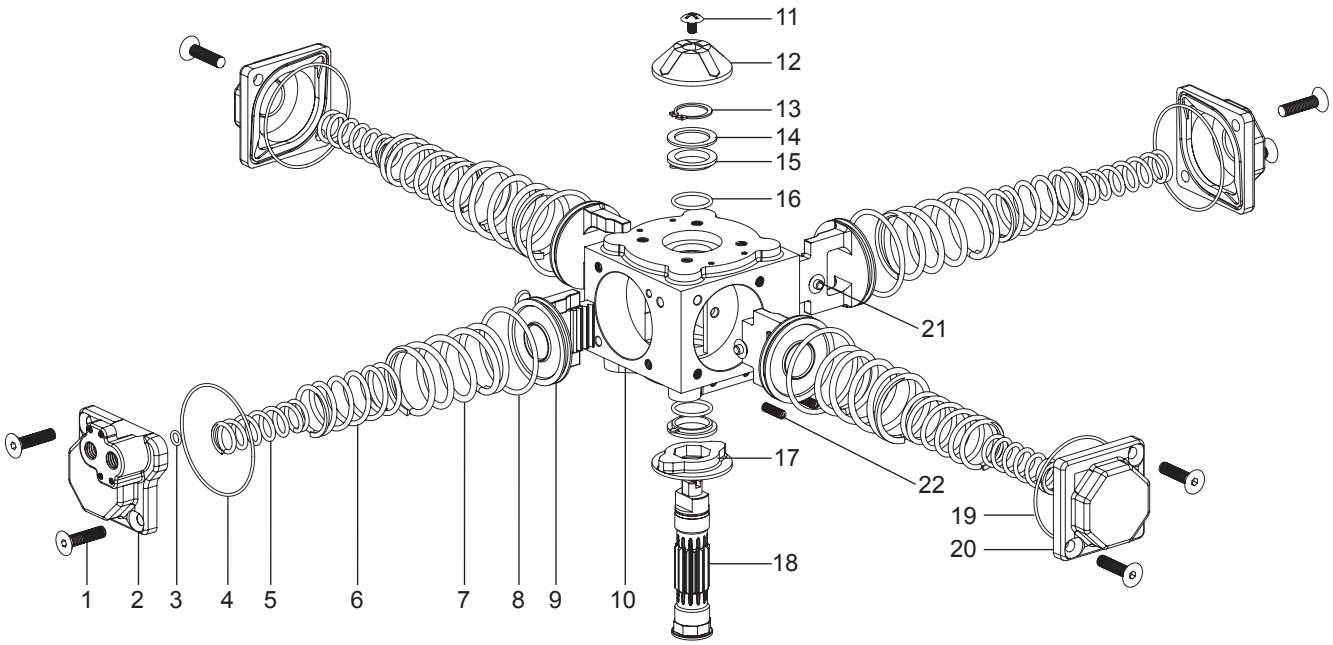
BI-DIRECTIONAL STROKE ADJUSTMENT:

Four pistons actuators feature bi-directional pinion travel stops. These stops allow for true ±5 ° for valve travel adjustment to ensure precise positioning with all types of valves.
The four pistons travel stops are designed to absorb the maximum rated torque of the actuator and the maximum impact loads associated with the recommended stroke speed.

IDENTIFICATION:

Four pistons actuators are supplied with a nameplate which is located on the side of the body. The information includes actuator model, type (Spring Return or Double Acting), spring set, serial number, CE mark, pressure and temperature.

Assemble,Parts and Material

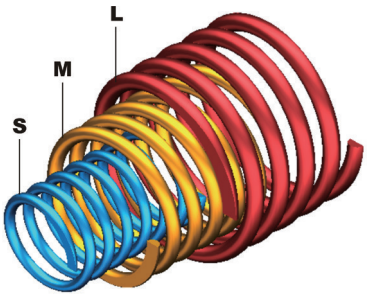
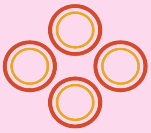


No.	Name	Qty.	Material
1	Cover Screw	8	Stainless Steel
2	Namur Cover	1	Die-casting Aluminum 356
3	Air Supply O-ring	1	NBR / Viton / L NBR
4	Namur Cover O-ring	1	NBR / Viton / L NBR
5	Small Spring	4	Spring Steel
6	Middle Spring	4	Spring Steel
7	Large Spring	4	Spring Steel
8	Piston O-ring	4	NBR / Viton / L NBR
9	Piston	4	Die-casting Aluminum 356
10	Body	1	Gravity Casting Aluminum 356-T6
11	Indicator Screw	1	Stainless Steel
12	Indicator	1	Plastic (ABS)
13	Snap Ring	1	Stainless Steel
14	Thrust Washer	1	POM
15	Bearing	2	POM
16	Pinion O-ring	2	NBR / Viton / L NBR
17	Travel Stop	1	Stainless Steel
18	Pinion	1	Alloy Steel With Nickel Chemical Coating
19	Cover O-ring	3	NBR / Viton / L NBR
20	Cover	3	Die-casting Aluminum 356
21	Position Pad	4	POM
22	Stroke Adjustment Screw	4	Stainless Steel

Part Number Example

ALF	15	DA	S4M4L4
Product Code	Size Code	Acting Type	Spring Code
	15 20 25 30 35 45 60 75	DA-Double Acting SR-Spring Return	S4 M4 S2M4 S4M4 S4M2L2 S4L4 S4M4L2 M4L4 S2M4L4 S4M4L4

Spring Configuration

S4	M4	S2M4**	S4M4	S4M2L2	Springs
					
S4L4	**S4M4L2**	**M4L4***	**S2M4L4**	**S4M4L4**	
					

S-small size spring; M-middle size springs; L-large size springs.

* Default spring setting for ALF20SR - ALF75SR;

**Default spring setting for ALF15SR.

If the actuator is a Spring Return unit, make sure pressurized air is completely exhausted.

1. Safely disconnect all electric power and supply lines connected to the actuator and or accessories.
2. Disassemble all the accessories of the actuator (solenoid, limit switch box, etc.).
3. Remove the actuator from the valve.
4. Remove indicator screw (#11), lift position indicator (#12) off shaft.

DISASSEMBLY OF SPRING RETURN COVERS:

1. Mark the covers with the body before disassembly.
2. Remove the cover screws (#1).
3. Remove the covers making sure not to damage the Cover O-Rings (#19). When removing the NAMUR cover (#2) make sure the Air Supply O-Ring (#3) connecting to the inner chamber is secure in its slot.

DISASSEMBLY OF SPRING RETURN COVERS:

1. Prior to disassembly, mark each of the covers with the body.
2. Remove the cover screws in sequence by turning each opposing screw two rotations at a time. When there are 4 screws in the cover (sizes 60, 75), remove the two opposing screws first and then on the second set.
3. Remove the covers making sure not to damage the Cover O-Rings (#19).
4. Remove the springs (#5, #6, #7) from the cylinder and place them together in their covers.
5. Follow the same procedure on all four cylinder covers.

PISTON DISASSEMBLY:

1. Remove the left of each Adjustment Screws (#22) 1/4" (6-10mm) outward
   This will allow the stop to rotate pass the 90° limit so the pistons can come out.
2. Hold the actuator body with both hands and rotate it in the CW direction to eject the pistons.
3. Carefully remove the Piston O-Rings (#8). Do not use a sharp object to pry them out.

PINION DISASSEMBLY:

Note - The pinion is removed through the bottom of the actuator - opposite of the indicator.

1. Remove the Indicator Screw (#11), Indicator (#12). Slide a smooth flat tool between the bottom of the indicator and the top of the actuator and carefully pry up the indicator, working your way around the indicator.
2. Remove the Circlip/Snap-ring (#13).
3. Push the pinion (#18) down and remove it from the body.
4. The Stroke Adjustment Stop (#17), Thrust Washer (#14) and Pinion O-ring (#16) will drop out with the pinion. The Stop and the Pinion should remain assembled.

ASSEMBLY :

1. If you have removed the pads (#2), push them back into theirholes.
2. If the Stroke Adjustment Stop (#17) has been removed from the Pinion (#18), insert it back into place. Make sure the Stop Protrusions are at 45° to the NAMUR slot. There are two grooves on the bottom of the Stop which will help identify the stop orientation.
3. Once the Stroke Adjustment Stop (#17) is in place, fit the Thrust Washer (#14) and Pinion O-Ring (#16) on the Pinion (#18).
4. Insert the Pinion assembly into the body, from the bottom. Confirm that the tongue of the Thrust Washer (#14) engages into the groove in the body.
5. Insert the Pinion into the body by bringing the grooves of the Stroke Adjustment Stop (#17) perpendicular to the Adjustment Screws (#22) to ensure correct angle of rotation .Next, rotate the Pinion CCW until the protrusion flats contact the Adjustment Screws and the grooves in the Stroke Adjustment Stop are aligned with the threaded holes.
6. Fit the top Pinion O-Ring (#16), Thrust Washer (#14), Bearing (#15) over the top of the Pinion. Confirm that the tongue of the Thrust Washer (#14) engages into the groove in the actuator body.

7. Insert a NEW Circlip/Snap-Ring (#13) on the Pinion. (NOTE: Always use a new Circlip/Snap-Ring!).
8. Slide the Indicator (#12) on the top of the Pinion and tighten with the Indicator Screw (#11).
9. Place the assembled actuator body on the coupler in the vice.
10. Rotate the body of the actuator 90° CW plus another 35° to 40° to bring it to the proper position for inserting the Pistons (#9).
11. Fit the Piston O-Rings (#8) on the Pistons (#9).
12. Apply Type B grease to the grooves and rack on the Pistons, the Piston O-Rings and inside the body cylinders.
13. Insert the four Pistons into the cylinders. The teeth of the racks must engage with the grooves on the Pinion. The Pistons will protrude slightly outside the actuator body.
14. Grasp the body of the actuator firmly with both hands and rotate the body CCW until it stops against the Adjustment Screws (#22) and all four pistons are drawn inside. Confirm that all four pistons are in the same position inside the cylinder.
15. Rotate the body back 90° CW to the open position so the outside face of the Pistons are almost flush with actuator body.
16. Using the Stroke Adjustment Screws (#22), adjust them until the Pinion flats are parallel with the outside plane of the actuator body.
17. Rotate the body freely back and forth to get the Pistons running smoothly.
18. Rotate the body to get the Pistons back in to the closed (drawin inside) position and once again apply. Type B grease inside the cylinders, behind the pistons.
19. Apply grease to all of the Springs (#5, #6, #7 as applicable to your Four pistons Model).
20. Insert the three Cover O-Rings (#19) into the groove on the inside of the three Covers (#20) and the NAMUR Cover O-Ring (#4) into the groove on the inside of the NAMUR Cover (#2).
    NOTE: If the O-Rings are damaged, replace them with a new set.
22. Insert the Air Supply O-Ring (#3) into the groove on the inside of the NAMUR Cover (#2).
23. Apply Type B grease to Cover Screws (#1).
24. Install the NAMUR Cover (#2) first. If this is a Spring Return actuator, place the Spring Set(s) in the NAMUR Cover (#2) and then install the NAMUR Cover.
25. Place the Spring Set(s) in the three remaining Covers (#20) and install them, matching their original location prior to disassembly.
26. Tighten the Screws (#1) - NOTE: Always tighten in sequence and only two turns at a time!
27. Torque the Screws to the to the torque values listed in the table to the right .