SVF FLOW CONTROLS

IOM EZ-Tork

EZ-Tork ACTUATOR - INSTALLATION, OPERATION & MAINTENANCE MANUAL

IMPORTANT SAFETY WARNINGS

A. 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.
B. Never put any part of your body in the opening or port of the controlled valve or device.
C. Special attention and precautions should be observed of the stored energy contained in the spring return pneumatic actuators. Do not disassemble individual spring cartridges. Disassembly may result in personal injury.
D. 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.
E. For correct operation, a pneumatic actuator must be sized adequately and with sufficient safety margin of torque output for the correct operating conditions of the valve.
*Authorized and skilled personnel should only perform maintenance of these actuators.

GENERAL

This instruction manual contains important information regarding the installation, operation, maintenance and storage for rack and pinion pneumatic actuators. Please read these instructions carefully and save them for future reference. It is important that only properly trained personnel disassemble or assemble the actuator.

DESCRIPTION OF EZ-Tork ACTUATORS

The aluminum pneumatic actuator is a Double-Acting or Spring-Return rack and pinion system, which has been designed for the actuation with 90° rotation with stroke adjustment at 0° and 90°±5°. The special finish of the interior surface of the body (Ra 0.4 – 0.6 µm) together with the use of antifriction pads manufactured in material of a very low coefficient of friction, mounted in the pistons, prevent metal on metal contact. SVF Flow Controls actuators enjoy a long and maintenance free life.

Operating Media

- Clean, dry and lubricated compressed air
- Light hydraulic oil
- Natural gas
- Any other inert and non-corrosive gas (consult SVF)

The maximum particle size must not exceed 0.001 µin (30 µm)

Supply Pressure

- Minimum: 40 psig (2.5 bar)
- Maximum: 120 psig (8 bar)

Operating Temperature

- Standard (Buna O-ring): -5°F to 176°F (-15°C to +80°C)
- High temperature (Viton O-ring): -5°F to +300°F (-15°C to +150°C)
- Low temperature (Silastic O-ring): -76°F to +176°F (-60°C to +80°C)

Caution: For low and high temperature service, special grease is required.
High and low temperature will vary the output torque of the actuator.

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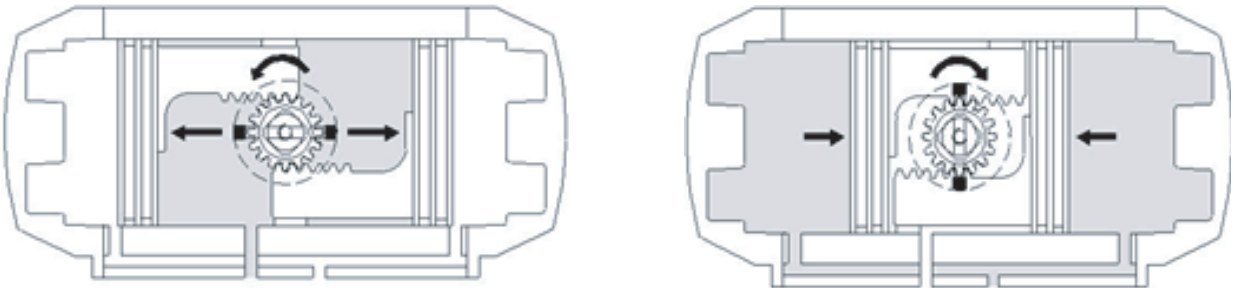
LUBRICATION

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

- Do not operate the actuator by using flammable, oxidizing, corrosive, explosive or instable 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 and to actuator housing.

PRINCIPLE OF OPERATION

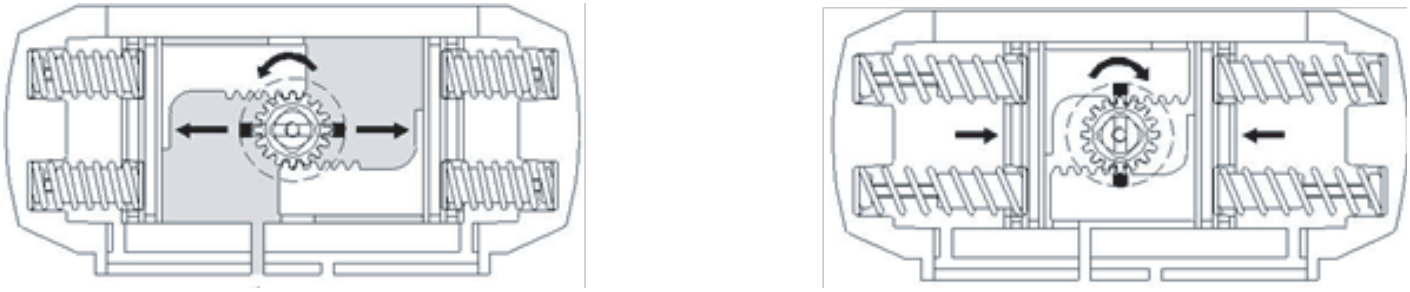
Double acting actuator (Top View)



STANDARD ROTATION:

Air to port A forces the pistons outwards, causing the pinion to turn counterclockwise while the air is being exhausted from port B. Air to port B forces the pistons inwards, causing the pinion to turn clockwise while the air is being exhausted from port A.

Spring return actuator (Top View)



STANDARD ROTATION:

Air to port A forces the pistons outwards, causing the springs to compress, the pinion turns counterclockwise while air is being exhausted from port B. Loss of air pressure on port A, the stored energy in the springs forces the pistons inwards. The pinion turns clockwise while air is being exhausted from port A.

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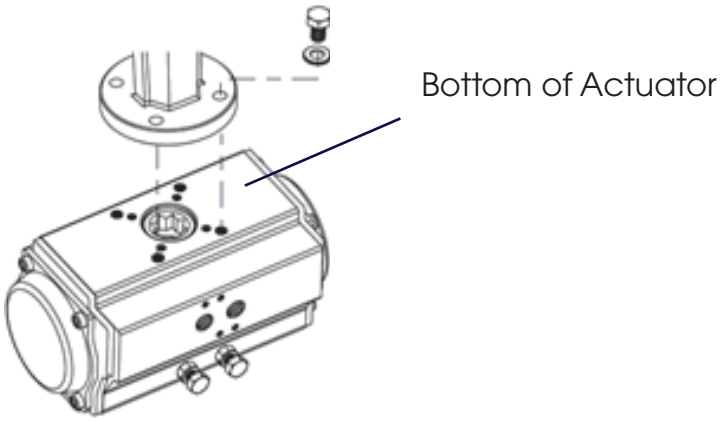
ASSEMBLY TO VALVE:
Pneumatic actuators are fitted with a double square "star" pattern drive shaft and a mounting bolt pattern conforming to ISO Standards. This allows the actuator to be fitted to valves in increments of 90o, allowing mounting alignment either inline or across the line of the pipe work, enabling the most efficient use of space without the position affecting the actuators basic operation.



1. Fit the square of the valve directly into the square of the actuator.
   a. At times an insert will need to be used.
2. Bolt together through the valve ISO pad.

Following should be noted prior to assembly to valves:

- Determine the desired operation of the assembly, Normally closed valve (NC), or Normally open (NO).
- Check that valve and actuator are in the same position (open or closed).
- Check the correct positioning (alignment) of all the elements of the group, valve, coupler, bracket and actuator.
- Use the cross pattern method to ensure an even clamping load.
- Ensure all position indicators are correctly adjusted and show the correct position.

IMPORTANT: When using a spring return actuator for a fail safe operation, ensure that, when air or electricity failure occurs, the direction of rotation is correct for your application.

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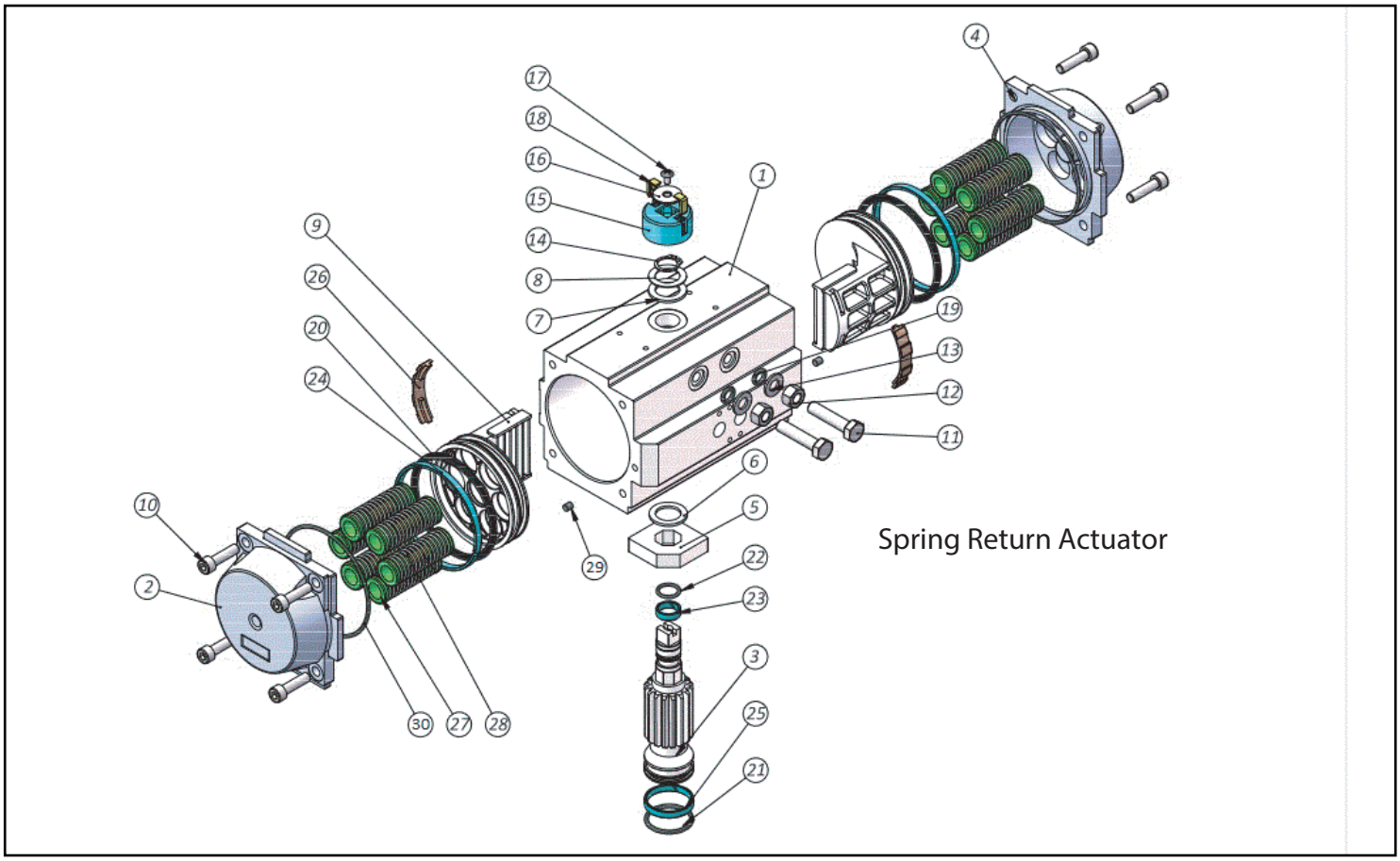
EZ-Tork ACTUATOR - INSTALLATION, OPERATION & MAINTENANCE MANUAL



ITEM	DESCRIPTION	MATERIALS SPECIFICATIONS	ITEM	DESCRIPTION	MATERIALS SPECIFICATIONS
1	Body	Aluminum Alloy Hard Anodized	17	Cap Screw	Stainless Steel
2	Left End Cap	Aluminum Alloy	18	Position indicator	Nylon
3	Drive Shaft	Alloy Steel & Nickel Plated	19	O-Ring (Stop Screw)	NBR
4	Right End Cap	Aluminum Alloy	20	O-Ring (Piston)	NBR
5	Stroke Adjustment Stop	Alloy Steel	21	O-Ring (Pinion Bottom)	NBR
6	Thrust Bearing (Pinion Top)	POM + PTFE	22	O-Ring (Pinion Top)	NBR
7	Thrust Bearing	POM + PTFE	23	Bearing (Pinion Top)	POM + PTFE
8	Thrust Washer	Stainless Steel	24	Bearing (Piston Head)	POM + PTFE
9	Piston	Aluminum Alloy	25	Bearing (Pinion Bottom)	POM + PTFE
10	Cap Screw (End Cap)	Stainless Steel	26	Wear Band	POM + PTFE
11	Stop Top Screw	Stainless Steel	27	Spring Seat	POM + PTFE
12	Nut (Stop Screw)	Stainless Steel	28	Spring	High Carbon Steel
13	Washer (Stop Screw)	Stainless Steel	29	Plug	NBR
14	Spring Clip	Spring Steel	30	O-Ring (End Cap)	NBR
15	Indicator cap	POM + PTFE			
16	Indication Thrust Bearing	Stainless Steel			

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DISASSEMBLY OF THE ACTUATOR

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. Disassemble the actuator off the valve.
4. Remove cap screw (#17), Lift position indicator (#15) off shaft, it may be necessary to pry gently with a screwdriver.

Caution: When the actuator is a spring return unit, make sure that the actuator is in the failed position before disassembling.

5. Remove stop cap screw (#11) together with stop nut (#12), washer (#13) and O-ring (#19).
6. Unscrew the end cap screw (#10). When disassembling a spring return actuator, the end cap should be loose after unscrewing the end cap screw 4-5 turns. If there is still force on the end cap, this may indicate a damaged spring cartridge and any further disassembly should be discontinued. Return actuator to SVF for further maintenance.
7. Remove the end caps (#2 & #4) and O-rings (#30).
8. Rotate the drive shaft (#3) counterclockwise so that the pistons (#9) will exit the body (#1).
9. Remove the piston O-ring (#20), wear band (#26) and piston head bearings (#24).

Caution: Air pressure should not be used to remove the pistons from body.

10. Remove the spring clip (#14) and the thrust washers (#8) and thrust bearings (#7).
11. Remove the drive shaft (#3), Stroke Adjustment Stop (#5) and thrust bearing (#6) from the body of the actuator, with downward force to the top of pinion.
12. Remove the top and bottom pinion bearings (#23) and (#25) and the top and bottom pinion O-rings (#21) and (#22).
13. Clean the components of the actuator thoroughly.

INSPECTION AND MAINTENANCE

14. Inspect the components of the actuator for wear or damage and replace where necessary
15. Replace:
    - On the pinion: Spring Clip (#14) , O-ring (#21) and (#22) , thrust washer (#8), pinion bearing (#23) and (#25)
    - On the end caps : End cap O-ring (#31)
    - On the pistons : O-ring (#20), wear band (#26) and bearing (#24)

All springs where fitted should be replaced during periodic maintenance.

RECOMMENDED REPLACEMENT PARTS (See Page 8 for EZ-Tork Repair Kits)

- Spring Clip (#14)
- Thrust Bearing (#7)
- Wear Band (#26)
- Pinion Top O-Ring (#22)
- Pinion Top Bearing (#23)
- Pinion Bottom Bearing (#25)
- Pinion Bottom O-Ring (#21)
- Spring (#28)
- Piston Head Bearing (#24)
- Piston O-Ring (#20)
- Stop Screw O-Ring (#19)
- End Cap O-Ring (#31)

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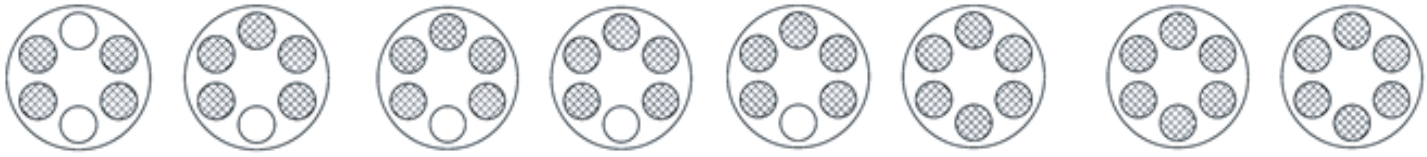
ASSEMBLY OF THE ACTUATOR

VERY IMPORTANT before beginning the assembly always check that all the O-rings and gaskets that are compatible with Buna and Viton rubbers are in their proper position, and all the components are greased correctly using a standard commercial grease.

1. Install the top and bottom pinion bearings (#23) and (#25) and the top and bottom pinion O-rings (#21) and (#22) onto the drive shaft.
2. Insert drive shaft partially to the body (#1) install Stroke Adjustment Stop (#5) ensuring it is correctly fit during assembly and install thrust bearing (#6). Insert drive shaft completely into the body.
3. Fit the thrust bearing (#7), thrust washer (#8) and spring clip (#14) to the top of pinion.
4. Install piston O-rings (#20), wear band (#26), piston (#9) and bearings (#24).
5. Hold the body (#1) in a horizontal position by inserting the top of the shaft into a vice or the bottom of the shaft connection into a male drive fitted in a vice.
6. Ensure that the Stroke Adjustment Stop is in the right position.
7. For standard rotation assembly (clockwise to close) rotate the body about 0-90°.
8. Press the two pistons simultaneously inside the body until the pistons are engaged and rotate the body clockwise (bottom view) or counter-clockwise (top view) until the stroke is complete.
9. Ensure that when the pistons are inserted, they both mesh at the same time. Check fully closed and fully open positions.
   Note: Obtaining the correct gear tooth and piston alignment could require more than one attempt.
10. Mount the end cap (#2) to the body and tighten the end cap screws (#10) distributing the force evenly until the end cap is securely home. Caution should be taken not to "pinch" the o-rings during this assembly procedure. In spring return actuators, it will be necessary to insert the spring cartridges appropriately in their correct location in the end caps according to the quantity of the springs you use (see detail).

5 Springs | 6 Springs | 7 Springs | 8 Springs



9 Springs | 10 Springs | 11 Springs | 12 Springs

11. Fit the stop cap screw (#11), nut (#12), washer (#13) and O-ring (#19) into body.

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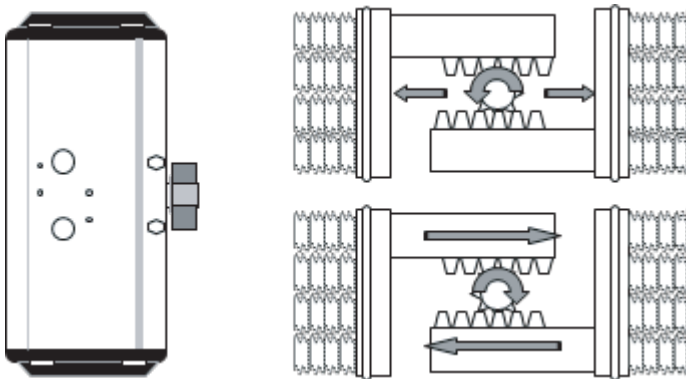
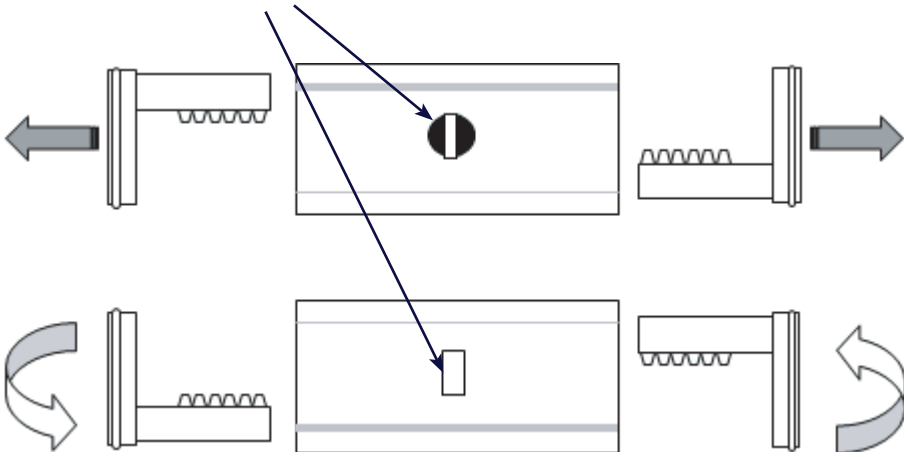
Reverse Rotation on EZ-Tork2 Actuators



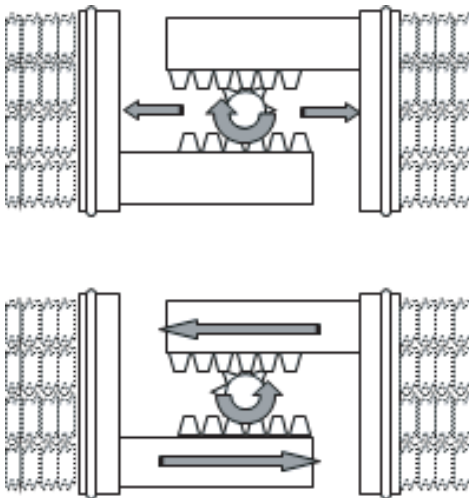
Standard Configuration

1. Air Stroke pushes pistons outward which are engaged with the pinion gear (output shaft) to rotate CCW – OPEN
2. Spring Stroke pushes pistons inward which are engaged with the pinion gear (output shaft) to rotate CW – CLOSED

Remove Indicator Cap and use the wrench flats to assist with removal and replacement of pistons



Rotate pistons and re-insert. Note: Before engaging the piston (gear rack) with the pinion, "Back Rotate" the pinion gear by one tooth for proper orientation.



Reverse Configuration

1. Air Stroke pushes pistons outward which are engaged with the pinion gear (output shaft) to rotate CW – CLOSED
2. Spring Stroke pushes pistons inward which are engaged with the pinion gear (output shaft) to rotate CxW – OPEN

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0° CLOSE POSITION STROKE ADJUSTMENT:
(Right Adjusting screw)

- Loosen the security nut (#12) of the right hand stop top screw.
- Tighten or loosen the adjustment screw (#11) until reaching the required position.
- Tighten the security nut (#12) of the right hand stop top screw.

90° OPEN POSITION STROKE ADJUSTMENT:
(Left Adjusting screw)

- Loosen the security nut (#12) of the left hand stop top screw.
- Tighten or loosen the adjustment screw (#11) until reaching the required position.
- Tighten the security nut (#12) of the left hand stop top screw.

PRESSURE TEST:
Pressure test the actuator with 90 psig (6 bar) compressed air and inspect for leaks using a soap and water solution sprayed on to all joints and rotating shafts.

STORAGE:
To store the pneumatic actuators the following precautions are recommended:

- Ensure the actuator is completely dry and water free.
- Maintain the entrances of air passages by fitting the original or replacement plastic corks.
- Protect from dust, dirt and damage by packing in box or plastic bag.

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EZ-Tork Repair Kit Components		
	ITEM	**QUANTITY**
When ordering a repair kit for an EZ-Tork Actuator, specify the actuator model # RKB-EZ-50-***XXX***	Spring Clip	1
	Thrust Washer	1
	Thrust bBearing	1
	Wear Band	1
	O-ring (Pinion Top)	1
	Bearing (Pinion Bottom)	1
	Thrust Bearing	1
	Bearing (Pinion Bottom)	1
	O-Ring (Pinion Bottom)	1
	Bearing (Piston Head)	2
	O-Ring (Piston)	2
	Plug	2
	O-Ring (Stop Screw	2
	P-Ring (End Cap)	2

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