



HT PNEUMATIC ACTUATORS

INSTALLATION, MAINTENANCE AND OPERATING INSTRUCTION MANUAL

FOR ACTUATOR MODEL/TYPE:

- HT-032 ~ HT-400
- Double Acting "D" and Spring Return "S"
- 90°→180° Stroke

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1) GENERAL

This instruction manual contains important information regarding the installation, operation, maintenance and storage for OVC 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/assemble the actuator.

2) WARNING

- Do not operate the actuator using inflammable, oxidizing, corrosive, explosive and unstable gases or liquids. For actuators installed in potentially explosive zones, make sure that the internal parts of the actuator can't come into contact with the external atmosphere.
- It is important that the actuator should only be used within pressure limits indicated in our technical specification.
- Operating the actuator over pressure limits will damage internal parts as well as cause damage to the housing.
- Operating the actuator over temperature limits will damage internal and external components (disassembly of spring return actuator may cause dangerous).
- Operating the actuator in corrosive environments with incorrect protection may damage the internal and external parts.
- Do not disassemble individual spring cartridges. Disassembly may result in personal injury. For further information contact OVC.
- Isolate all air lines and make sure that actuator air connection is vented before installation or servicing of the actuator.
- Do not remove end caps or disassemble the actuator while the actuator is pressurized.
- 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.
- If the actuator is incorporated in a system or used within safety devices or circuits, the customer shall ensure that the national and local safety laws and regulations are observed.

3) WORKING CONDITIONS AND TECHNICAL DATA

- Operating media:
Dry or lubricated air or inert/non-corrosive gases provided they are compatible with internal actuator parts and lubricant. The operating media must have a dew point equal to -20°C(14°F) or at least 10°C below the ambient temperature. The maximum particle size must not exceed 30µm.
- Supply pressure:
The maximum supply pressure is 10 bar(145 PSI).
Generally for Double Acting and Spring Return actuator the supply pressure is: from 2 bar(29 PSI) minimum to 10 bar(145 PSI) maximum.
- Operating Temperature:
Standard product form -20°C(-4°F) to +80°C(+176°F).
Low temperature (LT) actuator with silicone O-rings from -40°C(-40°F) to +80°C(+176°F).
High temperature (HT) actuator with VITON O-rings from -15°C(+5°F) to +150°C(+300°F).
Caution: For low and high temperature service special grease is required. Please contact OVC for each application. High and low temperature will vary the output torque of the actuator.
- Operating Time:
See Technical Data sheet.
Caution: The operating speeds depend on several factors such as: supply pressure/supply capacity (i.e.: Pipe diameter/low capacity or pneumatic accessory), valve type, valve torque and characteristics, safety factor is to be applied, frequency of operation and temperature.
- Stroke:
The stroke for OVC actuator is as following (See technical data):
Standard construction: 90° rotation with stroke adjustment at 0° or 90° +/-5°.
Type 120° stroke: 120° rotation with stroke adjustment at 0° or 120° +/-5°.
Type 180° stroke: 180° rotation with stroke adjustment at 0° or 180° +/-5°.
- Lubrication:
The actuators are factory lubricated for the life of the actuator in normal working conditions.
The standard lubricant is suitable for use from -20°C(-4°F) to +80°C(+176°F). For low (LT) and high (HT) temperature service, where special grease are required please contact OVC.
- Recommended OVC actuator lubricants for standard working conditions:

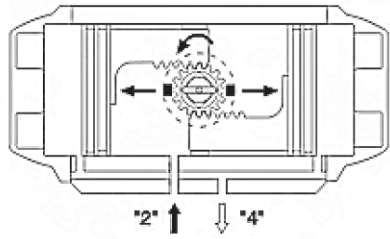
Kluber Unigear LA02	Esso (Exxon) Beacon EP2
Fina Marson EPL2	Shell Alvania EP2
Mobilux EP2	
- Construction:
Actuators design suitable for both indoor and outdoor installation.
- Protection and Corrosion resistance:
Ensure actuators are supplied with corrosion protections for normal environments. For severe duties select the protection required for corrosion protection. See technical data sheet before installing actuators.
- Actuator designation and Marking:
The actuator type, size, operating pressure, output torque, direction of rotation, orientation of the failure mode, operating temperature and drive type are determined by actuator designation.
OVC actuators are supplied with a label showing all of this information: type, model (including protection and if applicable the LT or HT for operating temperature), stroke, maximum permissible supply pressure, direction of rotation, output torque, ancillary attachment, pressure connection, valve actuator attachment and serial number.

4) OPERATING FUNCTION AND DIRECTION OF ROTATION

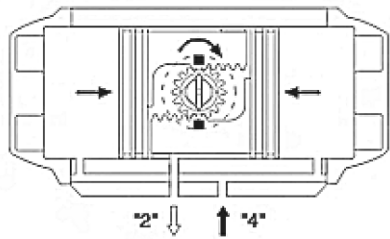
The actuator is a pneumatic operator for remote actuation of valves. The operation (90°-120° or 0°-180° rotation) may be connected by different methods.

- Direct mounting of solenoid valves (5/2 double coil for double acting, 5/2 single coil for spring return) to pressure connections 2 and 4.
- Screwed connection (to pressure connections 2 and 4) with air lines from separate control cabinet. The standard rotation is clockwise to close, counter-clockwise rotation is obtained when port 2 is pressurized. For actuator marked LF the rotation is counter-clockwise to close, clockwise rotation is obtained when port 2 is pressurized.

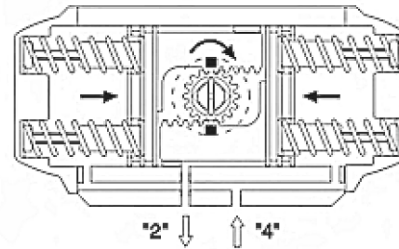
Double acting operation function (standard rotation) top view



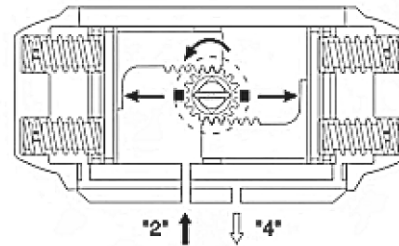
Air supplied to Port 2 forces the pistons apart and toward end positions, with exhaust air exiting at Port 4. A counter-clockwise rotation is obtained.



Single acting operation function (standard rotation) top view



On loss of air pressure (air or electric failure) at Port 2 allow the springs to force the pistons to the centre position with exhaust air exiting at Port 2. A counter-clockwise rotation is obtained.



5) ACTUATOR INSTALLATION INSTRUCTIONS

The HT actuator is pneumatic device for the remote operation of industrial valves. The HT actuator will operate through 90°, the option is available for 120° or 180° of rotation permitting the opening and closing of many types of 1/4 turn valves.

All the necessary technical information to install the actuator correctly and safely onto a valve i.e. Dimensions, Output torque, Air volume, Stroke adjustment, Operating Temperature, Direction of rotation and Weight is stated clearly on the Actuator label, in the catalogue and technical data sheets. Please read this technical information carefully before proceeding with the actuator installation.

5.1) Important Safety Notice:

- The actuator must not be pressurized at any time during installation as injury may result.
- The utmost cleanliness is required during air supply connection to the actuator i.e. the connecting pipe thread, fittings and seals must be clean and dirt-free.
- When fitting accessories onto the actuator assemble them in such a way that the top of the drive shaft is easily accessible should manual operation of the actuator be required.
- Before fitting onto the valve make sure that the actuators/valves are correctly orientated, depending upon which direction of rotation is required.

5.2) Controls and connections: Figure A.

5.3) Assembly of accessories: Solenoid valves and Switchboxes Figure B:

- Solenoid valve mounting:
Before mounting a solenoid valve ensure that the actuator is in its normal position (closed position), pistons together.
- For standard assembly and rotation (Clockwise to close): the groove on the indicator 2 must be diagonal to the longitudinal axis of the actuator in the closed position. Fit the solenoid valve 4 onto the actuator 3 using the screws provided (max. tightening torque see the table below).
- Switchbox mounting:
Fit the switchbox and bracket 1 onto the actuator 3, using four screws provided (max. tightening torque see the table below).

5.4) Assembly of Valve: Figure C.

Before proceeding with the assembly of a valve onto an actuator be sure that the actuator operates in the desired direction of rotation and both actuators/valves are correctly orientated.

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

Fit the valve 5 onto the actuator 3. Ensure that the actuator is in normal position (closed position).

There are two types of valve assembly onto the actuator:

- Direct-mounting: Fit the square of the valve 5 directly into the square of the actuator 3 and bolt together through the valve ISO pad (max tightening torque see the table).
- Bracket-mounting: Mounting with a bracket 6 and coupling 7, the bracket is bolted to the actuator/valve to join them together and the coupling is used to connect the actuator output drive to the valve stem (max tightening torque see the table).

5.5) Mounting alternatives:

- Valve mounting with Actuator Type STANDARD (Clockwise to close) Figure D
- Valve mounting with Actuator Type LF (Clockwise to open) Figure E

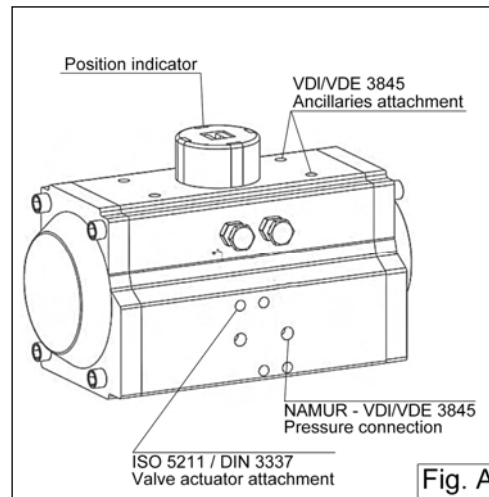


Fig. A

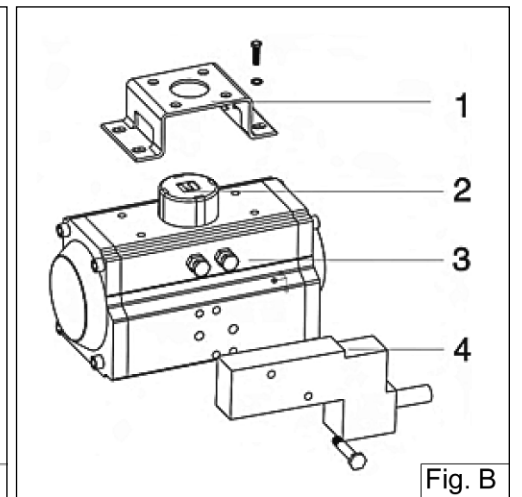


Fig. B

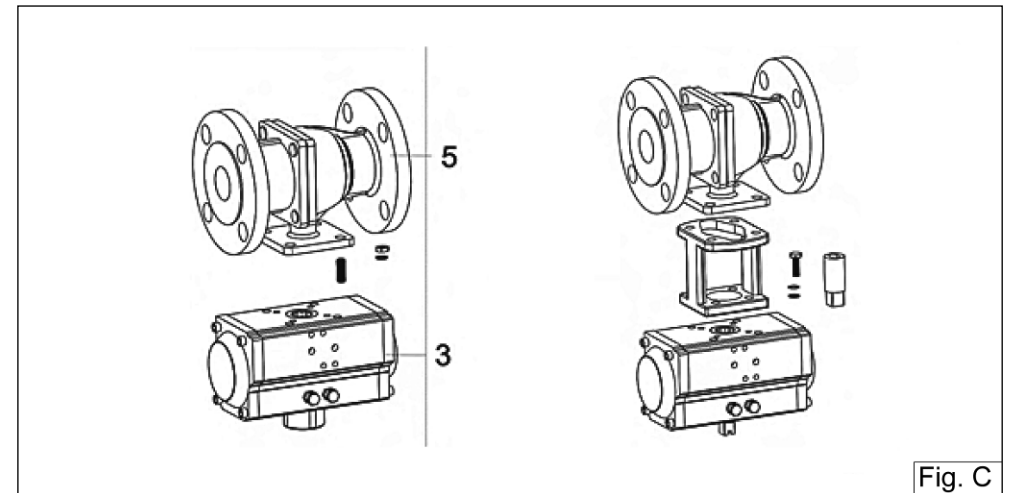


Fig. C

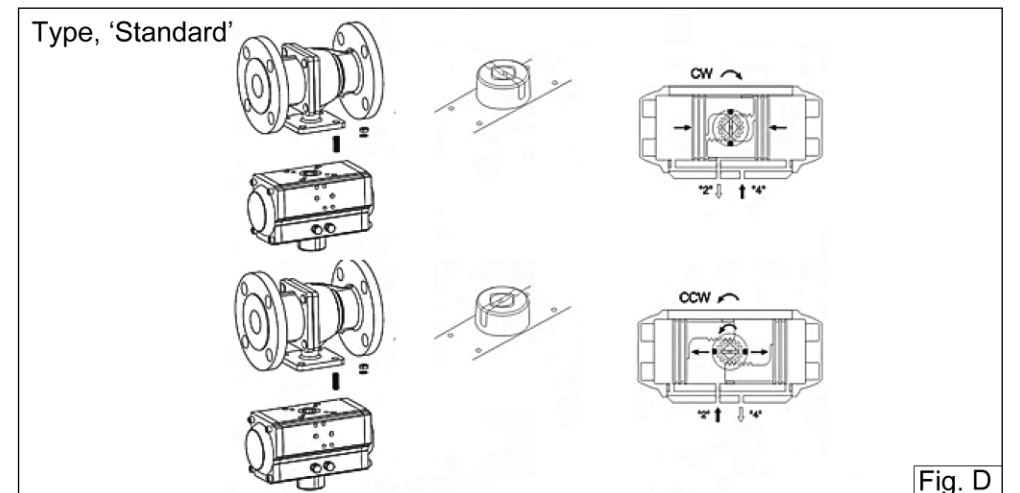


Fig. D

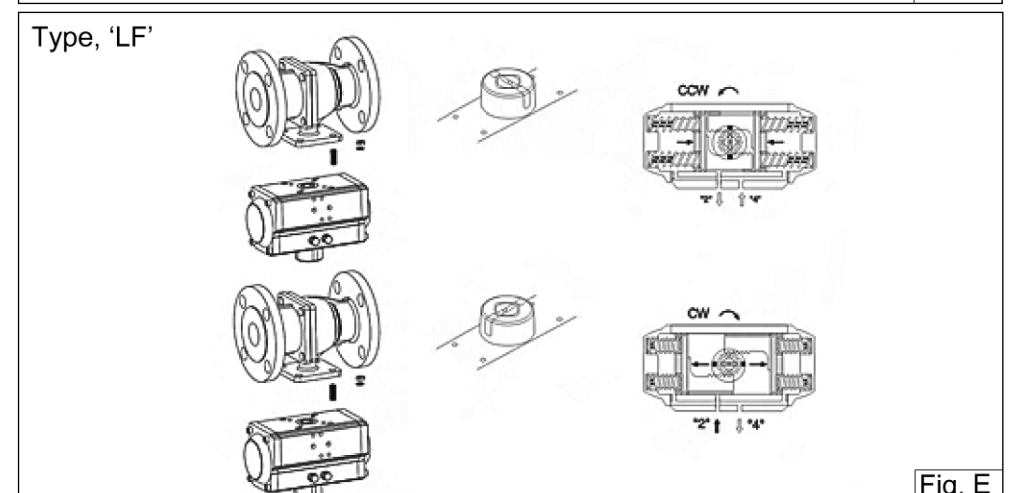


Fig. E

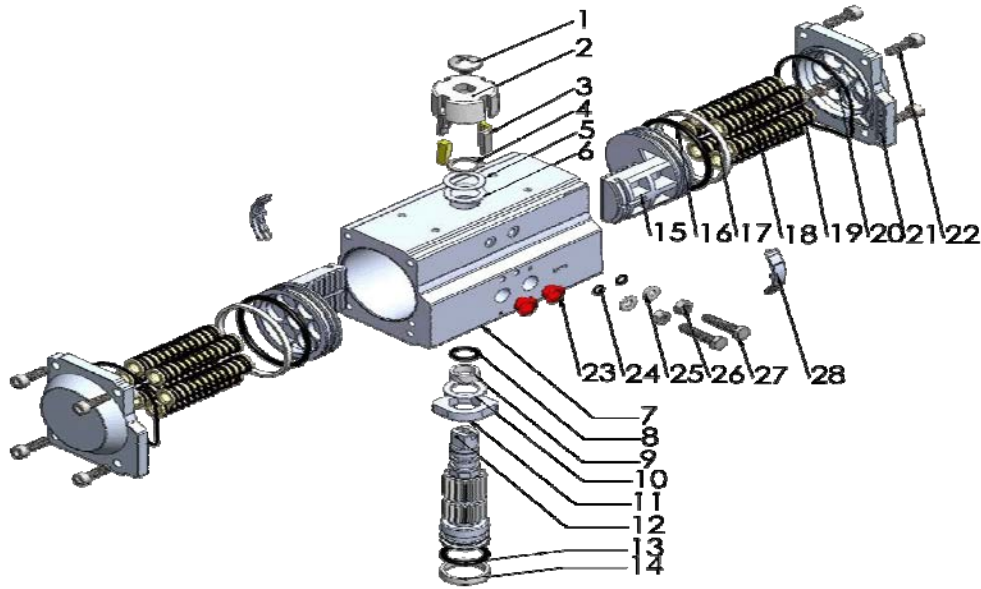
6) MAINTENANCE INSTRUCTION

With the information given below, OVC provides the end user with all the required information necessary for maintenance. Under normal operating conditions the actuator requires only periodic observation to ensure proper adjustment.

Rebuilding of OVC actuator is allowed only to the personnel of OVC or to personnel who are properly instructed. By contravention the guarantees expires! Spare kits for maintenance are available to replace all seals and bearings.

6.1) Drawing with itemized components and recommended spare parts:

*Note: Recommended spare parts for maintenance.



Item	Description	Material	Protection	Q'ty	Optional
1	Screw	ABS+304		1	
2	Indicator	Plastic		1	
3	Indicator Pin	ABS		4	
4	Spring Clip	Stainless Steel		1	
5	Thrust Washer (Pinion)	Stainless Steel		1	
6*	Thrust Bearing (Pinion)	POM		1	
7	Actuator Body	Extruded Aluminum Alloy	Hard Anodized (over 30µm)	1	
8*	O-Ring (Top Pinion)	NBR		1	Viton/Silicone
9*	Bearing (Top Pinion)	POM		1	
10*	Thrust Bearing (Pinion)	POM		1	
11	Stroke Cam	Stainless Steel		1	
12	Pinion	Alloy Steel	Nickel Plated (over 25µm)	1	
13*	Bearing (Lower Pinion)	POM		1	
14*	O-Ring (Lower Pinion)	NBR		1	Viton/Silicone
15	Piston	Die Cast Aluminum Alloy	Hard Anodized (over 30µm)	2	
16*	Piston Seal	NBR		2	Viton/Silicone
17*	Piston Bearing	POM		2	
18	Spring (Cartridge)	High Performance Spring Steel	Zinc Phosphate Coated	0-12	
19*	End Cap Seals	NBR		2	Viton/Silicone
20	Stroke Bolt	Stainless Steel		1	
21	End Cap	Die Cast Aluminum	Epoxy Coated (over 200µm)	2	
22	End Cap Bolts	Stainless Steel		8	
23	Plug	PE		2	
24*	Stroke Bolt O-Ring	NBR		2	Viton/Silicone
25	Stroke Bolt Washer	Stainless Steel		2	
26	Stroke Bolt Retaining Nut	Stainless Steel		2	
27	Stroke Bolt	Stainless Steel		2	
28*	Piston Guide	POM		2	

*Note: Recommended spare parts for maintenance.

6.2) Disassembly:

When disassembly of actuator is required for maintenance, firstly remove the actuator from the valve. Before performing and disassembly operations it is important to verify that the actuator is not pressurized. Always use caution and double check that the ports 2 and 4 are vented and are free from any accessory and/or device. When the actuator is a spring return unit, make sure that the actuator is in the failed position before disassembly.

A) Removal of stroke bolt (27), figure 01:

- Remove both stroke bolt together with nut (26) and washer (25).
- Remove stroke bolt O-rings (24) and discard if replacing all soft parts.

B) End Caps disassembly (21), figure 02:

- Remove end cap bolts (22) in the sequence shown in the figure 02. Caution: when disassembling a spring return actuator, the end cap (21) should be loose after unscrewing end cap bolts (22) 4-5 turns. If there is still force on the end cap after 4-5 turns of the end cap bolts, this may indicate a damaged spring cartridge (18) and any further disassembly should be discontinued. Further disassembly of the end caps (21) may result in injury. Return actuator to OVC for further maintenance.
- For spring return actuators always remove spring cartridge (18).
- Remove end cap seals (19) and discard if replacing all soft components.

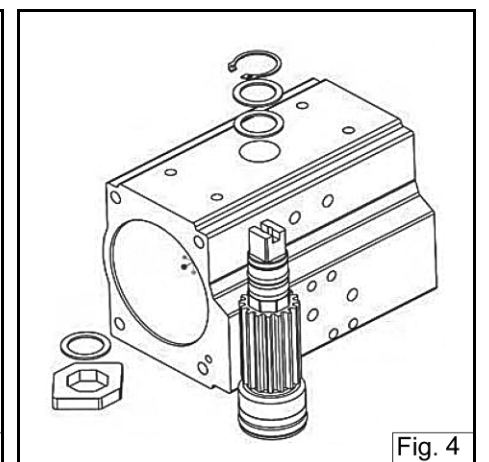
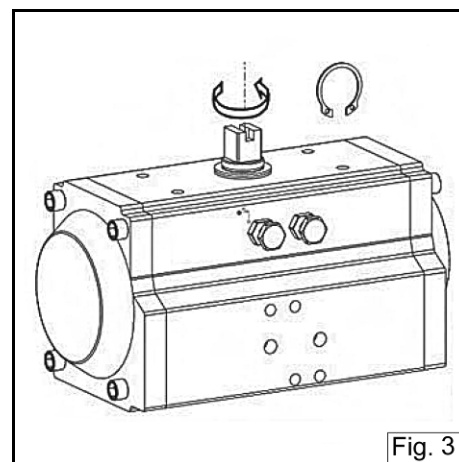
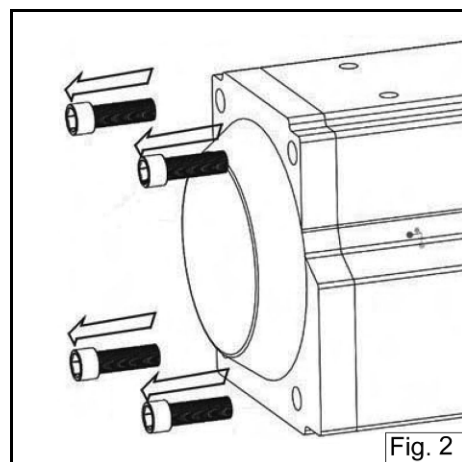
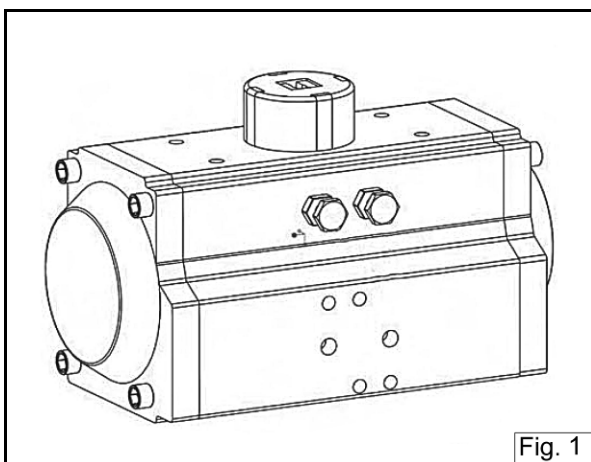
C) Pistons disassembly (15), figure 03:

- Holding the body (7) in a vice or similar device, rotate the pinion (12) until the pistons (15) are released.
Caution: Air pressure should not be used to remove the pistons from the body.
- Remove piston seals (16) using a small screwdriver; remove the piston guides (28) and piston bearings (17). Discard bearings when replacing all soft components.

D) Pinion disassembling (12), figure 04:

- Remove spring clip (4) carefully, using nap-ring pliers, remove external thrust bearing (6) and thrust washer (5).
- Apply downward force to top of pinion (12) until it is partially out of the bottom of the body when it is possible to remove the stroke cam (11) and internal thrust bearing (6), then push the pinion (12) completely out of the bottom of the body. If pinion does not remove freely gently tap, the top of the pinion with a plastic mallet.
- Remove top and bottom pinion bearings (9) and (13) and top and bottom pinion O-rings (8) and (14).
- Discard bearings (9) and (13), internal and external thrust washer (5) and O-rings (8) and (14) if replacing all soft components.

When all components are disassembled, those not being replaced should be properly cleaned and inspected for wear prior to being greased and re-assembled.

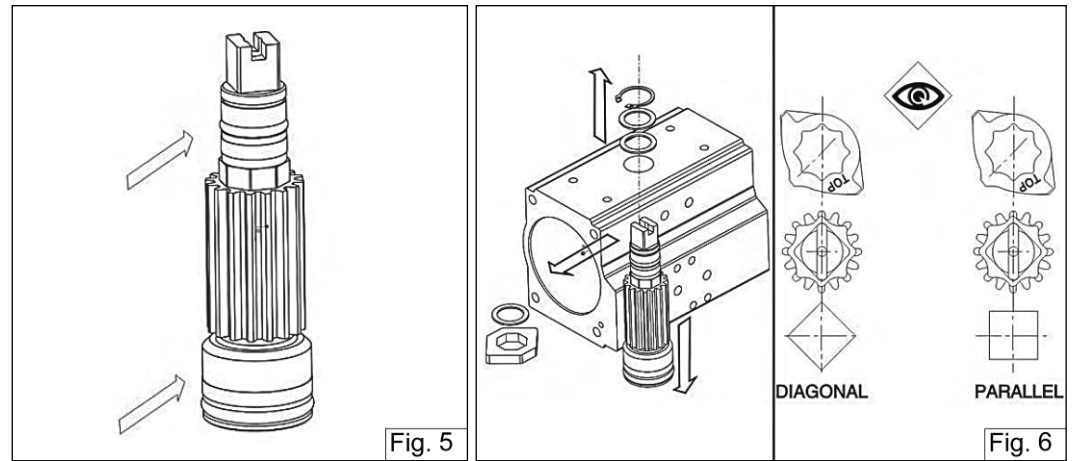


6.3) Assembly:

Prior to assembly, ensure all components are perfectly clean and free from damage.

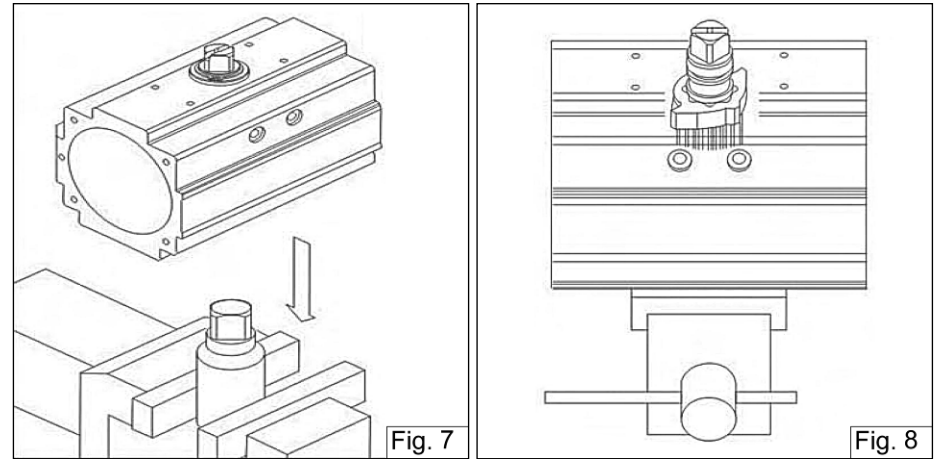
A) Pinion assembly (12), figures 05 and 06:

- Install top and bottom pinion bearings (9) and (13) and top and bottom pinion O-rings (8) and (14) onto pinion.
- Grease the outside surface of the pinion on top and bottom as shown in figure 04.
- Insert partially the pinion (12) in the body (7), install stroke cam (11) in the correct position as shown in figure 06 related to the bottom and top of the pinion and the rotation of the actuator when energized and install internal thrust bearing (6). Insert completely the pinion in the body.
- Fit external thrust bearing (6), thrust washer (5) and then external spring clip (4) using snap ring pliers.



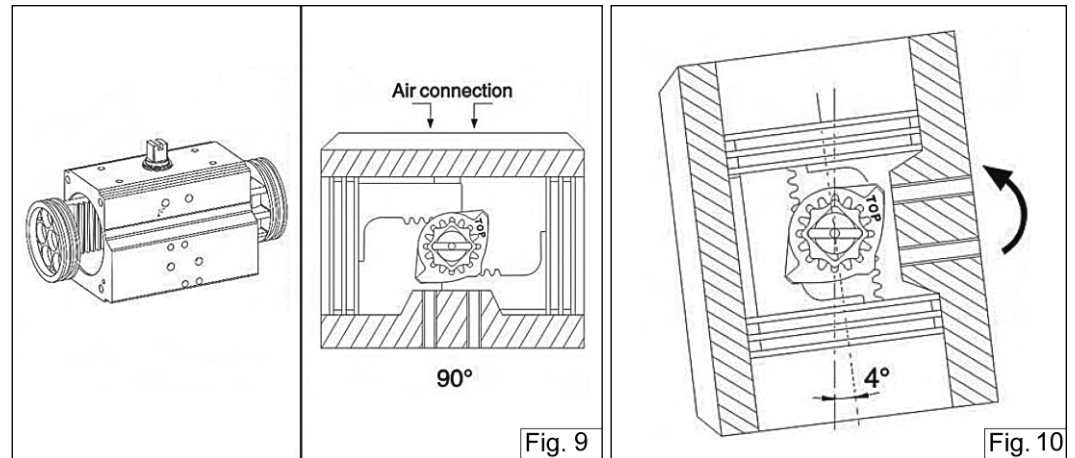
B) Pistons assembly (15), figure 07, 08, 09 and 10:

- Install piston seals (16), the piston guide (28) and piston bearings (17).
- Grease the internal surface of the body (7) and the piston (15) rack teeth.
- Hold the body (7) in a horizontal position by inserting the top of the pinion into a vice or the bottom of the pinion connection into a male pinion fitted in a vice as shown in figure 07.
- Ensure that the stroke cam is in the right position as shown in figure 08.
- For standard rotation assembly (clockwise to close) rotate the body (7) about 40-45° counter-clockwise from bottom view or clockwise from top view depending on which way the pinion has been linked as shown in figure 09.
- Press the two pistons (15) simultaneously inside the body (7) until the pistons are engaged and rotate the body clockwise from bottom view or counter clockwise from top view until the stroke is completed.
- Ensure that when the pistons are inserted that they both mesh at the same time. Check fully closed and open position as shown in figure 10.



C) End cap (21) and spring cartridge (18) assembly, figure 11, 12 and 13:

- Lubricate the body.
- For spring return actuator insert the proper quantity of spring cartridge (18) according to the pattern shown in figure 11 (referring to the total number of springs).
- Insert spring cartridge (18) as shown in figure 12.
- Fit end cap O-ring seal (19) into the groove in the end cap, on both end caps.
- Fit end caps onto the body (7), verifying that the O-ring remains in the groove.
- Insert all the cap bolts (21) and tighten each only partially. Complete tightening by following the sequence indicated in figure 13.

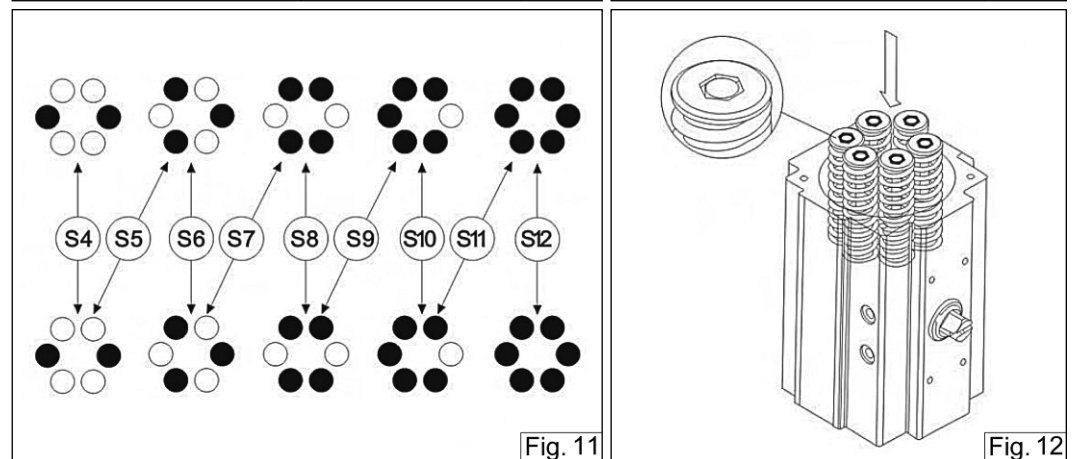


D) Assembly of stroke bolts (27), and stroke adjustment, figure 14:

- Insert on the stop cap bolts (27), the nut (26), the washer (25), and the O-ring (24).
- Fit the stroke bolts (27) in the body.

Stroke adjustment for standard rotation actuator (Clockwise to close):

- 0° (close) position stroke adjustment with actuator in close position, screw or unscrew the right (from top view) stroke bolts (27) until the desired stop position is achieved. Then tighten the stop adjustment nut (26) to lock it in place.
- 90° (open) position stroke adjustment with actuator in open position, screw or unscrew the left (from top view) stroke bolts (27) until the desired stop position is achieved. Then tighten the stop adjustment nut (26) and lock it in place.



7) STORAGE INSTRUCTIONS

If the actuators are not for immediate use, the following precaution must be taken for storage:

- Store in a dry environment and ambient temperature.
- It is recommended that the actuator be stored in its original box.
- Do not remove the plastic plugs on air supply ports.

