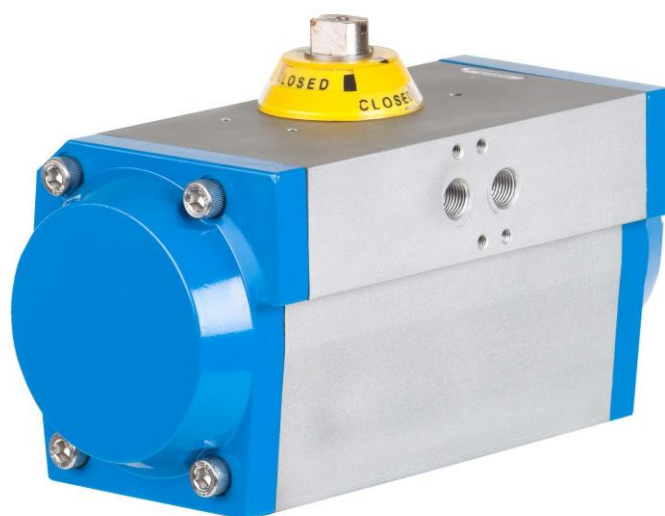


INSTALLATION, OPERATION & MAINTENANCE MANUAL



Gen-Air Rack & Pinion Pneumatic Actuators

Ref. GENE BRE: 5800

INSTRUCTIONS FOR INSTALLATION, OPERATION & MAINTENANCE MANUAL

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1. Product Description.

1.1) General

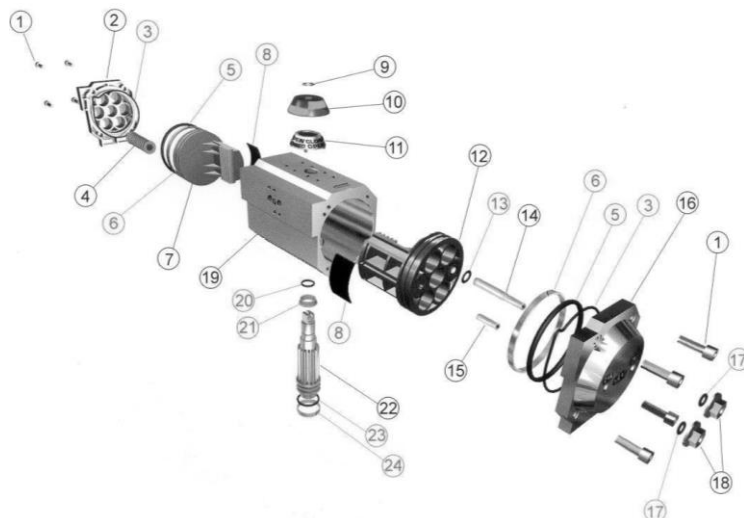
Genebre, S.A. offers a broad range of pneumatic rack & pinion actuators.

Gen Air actuators are designed to operate with dry or lubricated air media, but will function equally well with non-corrosive and inert gas or light hydraulic oil. The actuators are offered in two different configurations: double acting and spring return. Each actuator can be easily converted from double acting to spring return (or vice versa) by insertion (or removal) of spring cartridges.

Gen Air actuators are equipped in the standard configurations with the following unique features:

- Double travel stops
- External open/closed indication
- Pre – loader springs of non – metallic material
- Stainless steel pinion up to GN20, carbon steel electroless nickel coated for larger sizes.
- Shaft bearings isolate the pinion gear from the housing and support the shaft for high cycle application.
- All bodies are internally lapped.
- All internal and external surfaces are anodized for corrosion resistance.
- End caps and pistons are epoxy powder coated for corrosion resistance.
- Angle of rotation: 90° (180° on request).
- All air line connections are ¼" GAS.
- "NAMUR" VDI/VDE 3845 and ISO 5211 dimensions on all sizes.

1.2) Assembly drawing



1.3) Parts list

Nº	Name	Material	Spare Part Code
1	End cap screw	Stainless steel AISI 304	-----
2*	Left end cap	Aluminium UNI 5076	TGN xxI
3*	End cap o-ring	NBR	KGXxx
4*	Spring cartridge	Spring steel	C5800 xx
5*	Piston o-ring	NBR	KGXxx
6	Guide ring	Techno - polymer	-----
7*	Left piston	Aluminium UNI 5076	EMBxx
8	Piston Skate	Techno - polymer	-----
9	Indicator snap ring	Stainless steel AISI 304	-----
10	Indicator (rotating part)	Techno - polymer	-----
11	Indicator (fix part)	Techno - polymer	-----
12*	Right piston	Aluminium UNI 5076	EMBxx
13*	Stem regulation o - ring	NBR	KGXxx
14	Regulation screw	Stainless steel AISI 304	-----
15	Stop bolt	Stainless steel AISI 304	-----
16*	Right end cap	Aluminium UNI 5076	TGN xxD
17*	Stop bolt nut o'ring	NBR	KGXxx
18	Stop bolt nut	Stainless steel AISI 304	-----
19	Actuator body	Aluminium ASTM B 210 (6063)	-----
20*	Upper pinion o'ring	NBR	KGXxx
21	Upper pinion bearing	Techno - polymer	-----
22	Pinion	Steel ASTM B 733	-----
23*	Lower pinion o'ring	NBR	KGXxx
24	Lower pinion bearing	Techno - polymer	-----

* Available spare parts

2. Transport and Storage Conditions



The transport and storage of this type of product must be performed in its original packaging!

VISUAL INSPECTION

Check that the products have not been damaged during transportation, unloading and placement on site.

During storage it is recommended that the protective packaging not be removed to prevent any blows or the accumulation of dirt in the interior of the valve. This packaging should not be removed unless the valve is going to be installed.

Where possible, the actuators must be stored in a dry clean place.



If during any anomaly is noticed during the observance of these guidelines for receipt , contact GENE BRE urgently in order to resolve the liability for these anomalies.

IMPORTANT NOTE:

Before installing and/or handling these elements, **CAREFULLY READ** these instructions for use and **OBSERVE** all information contained herein. In the event of not understanding any of this information, please contact GENE BRE, S.A.



The responsibility for the safe use of these products is that of the user in accordance with the contents of these instructions for use as well as the specific technical documentation of the device supplied.

3. Technical Features & Data

3.1) Method of Operation

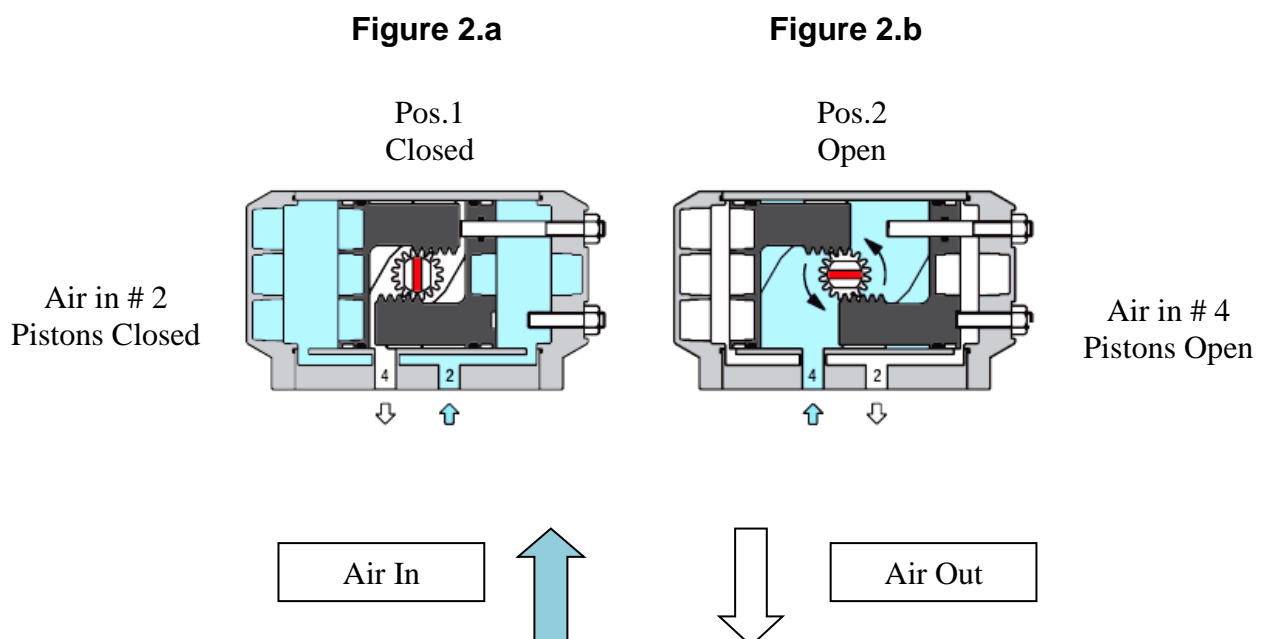
DOUBLE ACTING

Note: The bracketed numbers refer to the actuator exploded view – page 4.

Rotation occurs when compressed air is supplied to the actuator through Port 4, connected to the interior cavity between the pistons (ref. 7 & 12), or through Port 2, connected to the end cap area (ref. 2 & 16).

- As shown in **Figure 2.a**, pressure to Port 2 fills the outboard cavities pushing both pistons (ref. 7 & 12) inward and exhausting air through Port 4. As the pistons retract they rotate the pinion (ref. 22) clockwise (when viewed from the top of the actuator).

- Pressure to Port 4, as shown in **Figure 2.b**, fills the inboard cavity pushing both pistons (ref. 7 & 12) outward and exhausting air through Port 2. As the pistons extend they rotate the pinion (ref. 22) counter clockwise (when viewed from the top of the actuator).



SPRING RETURN

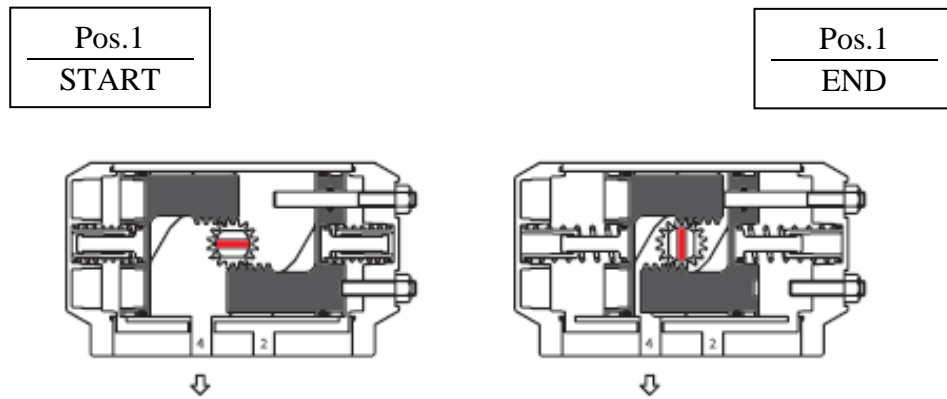
Note: The bracketed numbers refer to the actuator exploded view – page 4.

In this configuration the closed position occurs with spring cartridges (ref. 4), which are located between the pistons and end caps.

- Relieving pressure from the inboard cavity through Port 4, as shown in **Figure 2.c**, allows the spring cartridges (ref. 4) to push both pistons (ref. 7 & 12) inward. As the pistons retract they rotate the pinion (ref. 22) clockwise (when viewed from the top of the actuator).

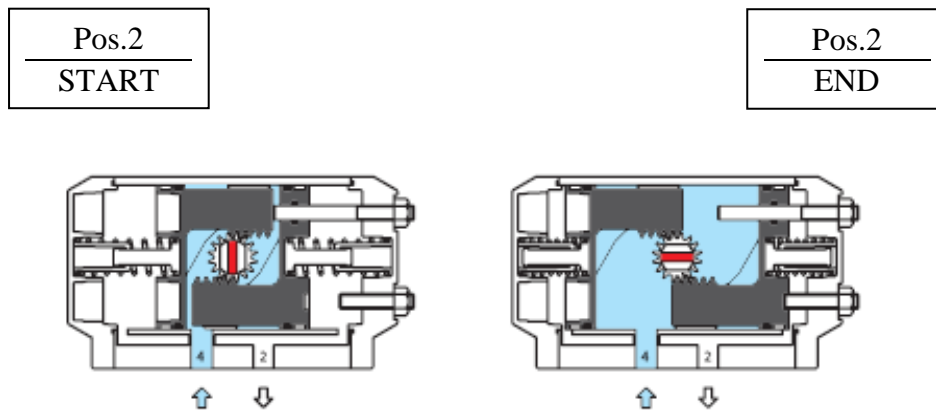
- Pressure to Port 4, see **Figure 2.d**, fills the inboard cavity pushing both pistons outward and exhausting air through Port 2. As the pistons (ref. 7 & 12) extend they rotate the pinion (ref. 22) counter clockwise (when viewed from the top of the actuator) and compress all the spring cartridges (ref. 4).

Closing Phase (**Figure 2.c**)

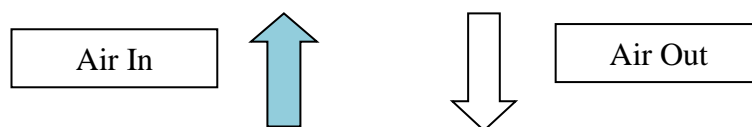


Without Air = Pistons Closed (Spring Release)

Opening Phase (**Figure 2.d**)



Air in # 4 = Pistons Open



3.2) Technical Data & Working Conditions

- Operating Media – Dry or lubricated air, non-corrosive and inert gas or light hydraulic oil.
- Air supply: 2 Bar (30 PSIG) to 10 Bar (150 PSIG) maximum. *A safety valve is normally recommended.*
- Temperature: Standard from -20°C a $+100^{\circ}\text{C}$ (-10°F to $+176^{\circ}\text{F}$) and -50°C $+150^{\circ}\text{C}$ available on request.
- Lubrication: Factory lubricated for life under normal working conditions with **Exxon CAZAR K2** or equivalent
- Application: Suitable for both indoor and/or outdoor applications.

3.3) Special Conditions

- Operating the actuator beyond its designed temperature limitations may damage internal and external components and, therefore, could prove potentially dangerous for operating and maintenance personnel.
- Operating the actuator beyond its designated pressure limitations may result in either an actuator malfunction or an actuator explosion and, therefore, could prove potentially dangerous for operating and maintenance personnel.
- **Note:** Do not disassemble the actuator end caps when air pressure is applied to the actuator.

4. Actuators Installation

Gen - Air actuators can be fitted on many styles of quarter-turn valves, including ball, butterfly and plug and dampers in accordance with the instructions contained in this chapter.

Gen - Air actuators are designed to be easy to install, according to ISO 5211 standard (see **Table a** and **Figure 3.a**).

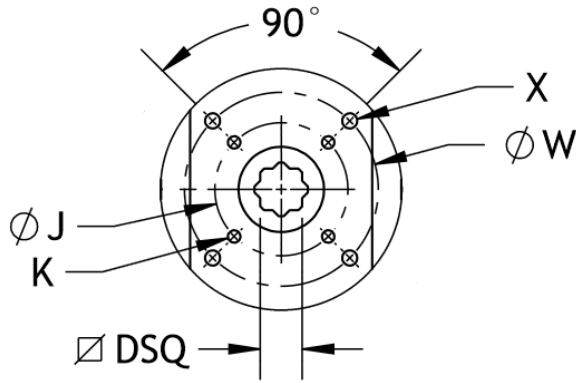


Figure 3.a

Modelo	DSQ	ISO 5211 Ø J / Ø W	K / X
GN 05	11	F03 / F05	M5 / M6
GN 15	14	F05 / F07	M6 / M8
GN 17	14	F05 / F07	M6 / M8
GN 20	17	F05 / F07	M6 / M8
GN 25	17	F05 / F07	M6 / M8
GN 30	17	F05 / F07	M6 / M8
GN 35	22	F07 / F10	M8 / M10
GN 40	22	F07 / F10	M8 / M10
GN 45	22	F07 / F10	M8 / M10
GN 50	27	F10 / F12	M10 / M12
GN 55	27	F10 / F12	M10 / M12
GN 60	36	F12 ó F14	M12 ó M16
GN 65	36	F12 ó F14	M12 ó M16
GN 70	46	F16	M20
GN 75	46	F16	M20

Table a

On the top face of **Gen - Air** actuators there is a NAMUR standard mounting pattern for easy installation of accessories for position survey and/or control devices, Micro Switch Boxes, Positioners, ect. **(Figure 3.b)**.

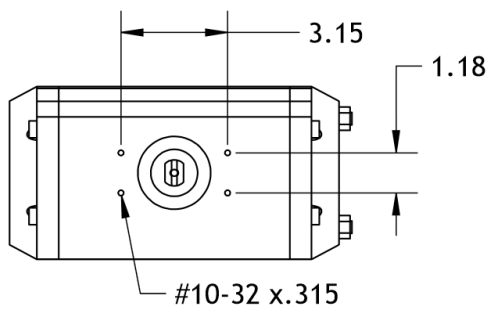
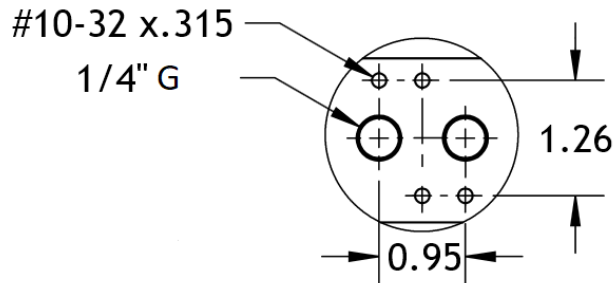


Figure 3.b

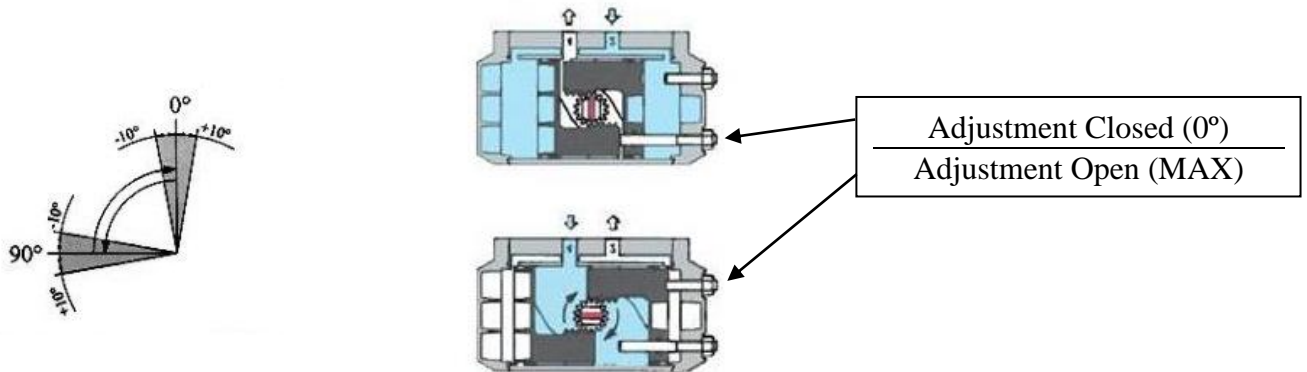
Figure 3.b shows an actuator in the normal position (closed) with the pinion flats and the indicator - drive milling perpendicular to the body

The Ports are NAMUR standard for easy solenoid valve connection



Installation procedure.

1. Check the coupling female pinion drive – valve stem.
2. Make sure that the valve and the actuator are both in the **closed** position before proceeding.
3. Install mounting bracket on the valve and hand tighten all fasteners; be sure not to fully torque bolts until entire assembly is correctly aligned and installed.
4.
 - a) **Mounting with brackets:** Place coupling on valve stem and the actuator on mounting bracket. Align valve and actuator in order to eliminate forces on the system; tighten all the assembly fasteners.
 - b) **Direct mounting:** Position the actuator on valve; use caution while inserting the valve stem into the double square female pinion drive. Insert the screws from the bottom side of flange and manually tighten them and align the assembly in order to eliminate the forces on the system; tighten all assembly fasteners.
5. Actuate the unit several times to ensure that it works properly. If the unit does not work properly, disassemble the unit and repeat steps 1 – 4. If the problem persists, contact with Genebre, S.A.
6. After the completion of the mounting operations, it is necessary to set the actuator stroke through the travel stops to ensure that the valve works properly. **Gen - Air** actuators have a regulation range from -10° to $+10^{\circ}$ and from 80° to 100° ($\pm 10^{\circ}$ in both open and close directions).



5. Maintenance Instructions

The maintenance frequency, place and method will be defined by the user, bearing in mind the use of this product. However, where necessary, the following checks will aid in prolonging the useful life and reduce problems on the installation.

CAUTION – PLEASE READ CAREFULLY:

- **BEFORE CARRYING OUT ANY MAINTENANCE ON GEN - AIR ACTUATORS, IT IS ESSENTIAL THAT THE ACTUATOR IS NOT UNDER PRESSURE AND IS FREE OF ANY ACCESSORIES.**
- **FOR YOUR SAFETY, IT IS ABSOLUTELY NECESSARY, BEFORE DISASSEMBLING A SPRING RETURN ACTUATOR, THAT THE UNIT IS IN THE FAILSAFE POSITION (SPRINGS EXTENDED AND NOT COMPRESSED).**

6. Repair Instructions

6.1) Disassembling Procedure

1. Disconnect all electrical and air supplies from the actuator.
2. Remove the actuator from the mounting bracket and place in a clean environment.
3. After removing the end cap screws (ref.1), remove the end caps (ref.2 and 16).
4. Remove O-Rings (ref.3) from the end caps and inspect their wear and lubrication.

5. Remove the internal regulation screw (ref.14) and the stop bolt (ref.15), located in the right end cap.
6. Using a wrench on the appropriate mill on the upper part of pinion (ref. 22), turn the pinion counter-clockwise until the pistons (ref.7 & 12) protrude further out from the cylinder to be removed.
7. Remove the pistons by hand or with pliers, taking the pistons from the spring grooves and using caution not to damage the pistons' surfaces. **Note:** If actuator is fail counter-clockwise (**mounting B**), pinion must be rotated in the opposite direction.
8. Remove O-Rings (ref.5), guide ring (ref.6) and thrust block (ref.8) from the left and right pistons.
9. Remove the snap ring and indicator (ref.9,10 and 11). Firmly tap the upper part of the pinion (ref.22).
10. Remove the pinion from the flange.
11. Remove the O-Rings and the bearings (ref. 20, 21, 23 and 24) from the pinion.
12. Inspect and replace the following wearing parts as necessary.

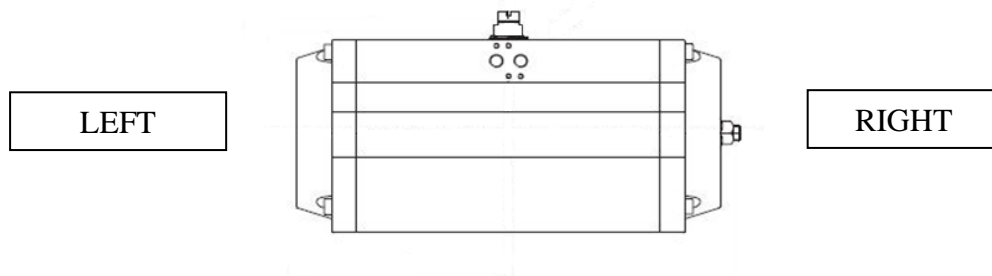
6.2) Assembly Procedure

1. Insert O-Rings (ref. 20 & 23) and bearings (ref. 21 & 24) on pinion (ref. 22).
2. Insert the pinion (ref.22) into the actuator body (ref. 19) and place the seeger for hold.
5. Tighten the flange screws (ref. 28).
3. **Intermediate test:** using a wrench and acting on the appropriate mill on the upper part of the pinion. Manually rotate the pinion to make sure it freely rotates.
4. Insert the O-Rings (ref. 5), the guide ring (ref. 6) and the thrust block (ref. 8) on the left and right pistons (ref. 7 & 12).
5. **Piston insertion:** This operation can be performed in two different ways in order to obtain either a fail clockwise actuator (**mounting A - FCW**) or a fail counter clockwise actuator (**mounting B - FCCW**).

"Right Piston" is the one with a through hole in its head.

"Left Piston" is that it does not have a hole in its head.

To define the position, place the lateral holes of the body (NANUR) towards the front.



5a. Mounting A:

Left piston insertion.

- Place the actuator in a stand up position on its right side with the flange facing you and the supply holes on your right.
- To obtain the counter clockwise rotation (mounting A) it is necessary to insert the rack of the piston to the left of the pinion.
- Insert the left piston applying pressure with hands until the piston is completely in the body.

Right piston insertion.

- Place the actuator in a stand up position on its left side with the flange facing you.
- Insert the rack of the piston to the left of the pinion.
- Insert the right piston applying pressure with hands until the piston is completely in the body.

5b. Mounting B: follow the same steps as above, but inserting the rack of both pistons on the right of the pinion

6. Actuator positioning phase:

6a. Place the actuator in a stand up position on a flat surface with the upper part of the pinion on the right side.

6b. Manually apply pressure to the piston, as this will assist to compress the opposite piston.

6c. While continuing to apply pressure, use a wrench on the appropriate mill of the upper portion of the pinion and rotate the pinion counter clockwise. At this point there must be clicking sound due to the interlocking between the piston rack and the pinion tooth. Make sure to create an individual sound per tooth.

6d. After each individual sound, rotate the pinion clockwise; verify that the pinion Namur mill is about 10° beyond the perpendicular to the body axis. If problematic, repeat step 6c.

6e. Double check the correct assembly of the actuator, confirming that the open position pistons are of equal distance from the cylinder border.

7. End cap mounting:

7a. Insert the end cap O-Rings (ref. 3) into their grooves by following the shape of the grooves with a finger to ensure that the O-Rings are properly seated.

7b. Insert the stop bolt (ref. 15) and the internal regulation screw (ref.14) into the right end cap (ref. 16) from the external side of the end cap. Screw clockwise until they appear inside the end cap.

7c. Insert the O-Rings (ref. 13), the washer (ref. 17) and the nuts (ref. 18).

7d. Insert the end cap screws (ref. 1) and tighten them in an alternating order to the factory torque standard:

Actuator Model	Torque Nm
GN05 – GN17	8
GN20 – GN25	12
GN30 – GN45	15
GN50 – GN75	22

8. Adjustment:

8a. Supply low pressure compressed air to Port 2 (see Figure 2.a). Using a hex key wrench, turn the internal regulation screw until the pinion shaft is perpendicular to the actuator axis (0° position); tighten the nut to the respective.

8b. Next, supply low pressure compressed air to Port 4 to open the actuator (see Figure 2.b). The pinion shaft must be at a 90° position (with respect to the 0° position), aligned with the actuator axis. If it is not aligned, act on the stop bolt and tighten the nut to the respective.

9. Indicator:

Place the indicator (ref. 10 and 11) and place the seeger ring (ref. 9).

6.3) Spring Cartridge Insertion

Gen - Air actuators can be easily converted from Double Acting to Spring Return by changing the spring number and configuration inside the end cap. **Gen -Air** actuators can accept up to **5 springs in the right end cap** and **7 in the left end cap**. We advise the insertion of at least two spring cartridges in each end cap in order to have a uniform distribution of forces on the pistons. The number of the springs loaded affects the torque value the actuator will be able to generate during its working cycle. See Chapter 5 and the **Genebre, S.A.** data sheet to properly size a spring return actuator.

Springs Installation Procedure:

1. Remove the four end cap screws (ref. 1) from the right and left end caps;
2. Remove the end caps;
3. Insert the correct number of spring cartridges into **each** end cap (i.e. GN15-S4 = 4 + 4 springs). It is strongly advised to insert the plastic part of the cartridge containing the deep hole into the appropriate end cap seat.

Colocación de Muelles en Pistón derecho / *Spring Assembly Right Piston*



Colocación de Muelles en Pistón Izquierdo / *Spring Assembly Left Piston*



7. Safety Instructions

When operating any kind of element, you must follow the security instructions and it is recommended to use personal protection gadgets:

- 1) Protect your eyes.
- 2) Wear gloves and appropriate working clothes.
- 3) Wear safety footwear.
- 4) Wear a helmet.
- 5) Have running water at hand.