



TECHNICAL MANUAL FOR PRISMA PNEUMATIC ACTUATORS.

MODELS PA-P-PP-PI-PG-PH.



Grupo II 2 GD c IP67.
Group II 2 GD c IP67.



ISO 9001-2000 and ISO-TS-29001 / API Q1.(Petroleum, Petrochemical and Gas Natural Industries. Level Certification with Design). Pneumatic Actuators According to PED Directive 97-23-EC, ATEX Directive 94-9-EC, Type Approval (Type Approved Product) , SIL 2 (IEC-61508) , Cryogenic Services and Gost-R-Certification.



1- GENERAL.

- 1.1- Scope.
- 1.2- Essential Limits.
- 1.3- ATEX Instructions.
- 1.4- Air Consumptions.
- 1.5- Operation.
- 1.6- Identification.

2- COMMISSIONING.

- 2.1- Transport and installation.
- 2.2- Mounting onto a valve.
- 2.3- Powering.

3- MAINTENANCE.

- 3.1- Preventive maintenance.
- 3.2- Disassembly.
- 3.3- Assembly.
- 3.4- Recommended spares.

4- WARRANTY.

1- GENERAL.

1.1- Scope.

The Prisma Rotary Pneumatic Actuators are devices, designed and manufactured in accordance to the 97-23-EC and 94-9-EC Directives (Group II category 2 GD c IP 67), that work fed by Group 2 fluids of that Directive 97-23-EC.

Models W to 20 inclusive, constructed in any material. Group 1.

Chart 1- Annex II - Article 3.3 of the Pressure Equipment Directive 97-23-EC. Models 25 to 30 inclusive, constructed in any material. Group 1.

Chart 1- Annex II – Category I Module of A of the Pressure Equipment Directive 97-23-EC.

Models 40 to 50 inclusive . Group 2. Chart 2 - Annex II – Category I , Module A of the Pressure Equipment Directive 97-23-EC.

Model 60 and 70. Group 2. Chart 2 - Annex II – Category II , Module A1 of the Pressure Equipment Directive 97-23-EC

Chiefly clean air without particles in suspension and / or any Non Dangerous or Corrosive Fluid, at maximum pressure of 8 bar (normally at 6 bar) and at a temperature from –32°C to + 90°C, being mainly destined to perform opening and closing valves (cycles of 90° turn).

Like Cryogenics Services option, the work temperature is – 50°C to + 80° C.

Like High Temperature Services option, the work temperature is – 32°C to + 265° C.

All ranges of Prisma rotary pneumatic actuators are manufactured in two versions:

- **Double acting:** *the actuator opens by means of air and also closes (contrary sense of turning) by means of air.*
- **Spring return:** *the actuator opens by means of air and closes by means of the force provided by compressed springs located at each side of the closing chambers.*

Models:

PAW-PAWS	PPW-PPWS		
PA00-PA00S	PP00-PP00S	PI00-PI00S	PH00-PH00S
PA05-PA05S			
PA10-PA10S	PP10-PP10S	PI10-PI10S	PH10-PH10S
PAG10-PAG10S			
PA15-PA15S			
PA20 – PA20S	PP20-PP20S	PI20-PI20S	PH20-PH20S
PAG20 – PAG20S			
PA25 – PA25S			
P30-P30S	PI30-PI30S	PG30-PG30S	
P40-P40S			
P50-P50S			
PA60 – PA60S			
PA70 – PA70S			

Note : Models referred with letter PA-P (manufactured in Aluminium, Cataforesis and Rilsan), also cover those referenced with letter K.

PRISMA pneumatic Actuators, are designed according to ISO5211-VDI/VDE3845 (NAMUR):

PA-P.....Construction In Aluminium Cataforesis Rilsan

PP-..... Construction en Polyamide

PI-..... Construction in Stainless Steel CF8M

PH- Construction in Aluminium P.T.F.E. for high temperatures.

PG-..... Construction en Aluminium Cataforesis Rilsan, turn of 180°.

1.2- Essential Limits.

- *Feeding fluid : Fluid Group 2 according to 97-23-EC.*
- *Maximum working pressure: 8 bar.*
- *Temperature:*

Models PA, P, PP, PI, y PG: - 32°C to +90°C. Models

PH: -32°C to +265°C

- *Accuracy:*

Models PA, P, PP, PI, PH: 90° with a tolerance at opening and closing up to +2°

Models PAG: 180° with a tolerance at opening and closing up to +2°

- *Pneumatic connection: Two 1/4" BSP threaded inlets (Like option 1/4" NPT)*
- *Air for instrumentation, it must be in accordance to ISO-8573-1.*
- *For appropriate working conditions , the operation medium must have a dew point equal to –20° C or , at least , 10°C below the ambient temperature. The maximum particle size shall not exceed 40 microns.*
- *Pneumatic connection: Two 1/4" BSP threaded inlets (Like option 1/4" NPT)*
- *Air for instrumentation, it must be in accordance to ISO-8573-1.*
- *For appropriate working conditions , the operation medium must have a dew point equal to –20° C or , at least , 10°C below the ambient temperature. The maximum particle size shall not exceed 40 microns.*

1.3- ATEX Instructions.

MODELS PA-P-PI.

Use and security instructions:

Group of devices according to 94-9-EC (ATEX)



○ Group II 2
GD c IP67.



Security instructions for potentially explosive ambiances:

- When the feeding fluid is air for instrumentation, it must be in accordance to ISO-8573-1.
- The feeding air should not go beyond the 85°C and it should be absent of particles in suspension.
- The actuator must not be opened when it is in a potentially explosive atmosphere.
- Check the eventual brush discharge.
- The composite surfaces must be cleaned with a wet rag exclusively.
- Regularly, it's necessary to clean the sediments or dust deposits, which must never exceed 5 mm.
- Adequate arrangements must be set to prevent impacts on the actuator.
- It's necessary that the installer performs the connection, and this must be done evenly for each of the bolts and studs fixed to the valve.
- Personnel in charge of tasks on the actuators must be qualified to work in potentially explosive atmospheres.
- Tooling and necessary working permissions must be in accordance to EN 1127-1.
- 2.
- In this process, the requirements of EN 60079-14, EN-60079-17, EN 50281-1-2, must be taken into consideration.

- The application of these actuators is only for 1 and 21 zones (2GD c IP 67 category), being covered up to speeds of 1m/s.
- Other instruments and/or components which can be mounted onto the actuators must comply with the applicable ATEX requirements under the responsibility of companies that designed and manufactured them.

1.4- Air Consumption.

To calculate the consumption of air, multiply figures on chart by the real working pressure.

AIR CONSUMPTION

MODEL	TO OPEN	TO CLOSE
PAW	0,075	0,11
PA00	0,15	0,18
PA05	0,28	0,37
PA10	0,35	0,45
PA15	0,65	0,82
PA20	0,8	1,15
PA25	1,5	2,02
P30	2,05	1,9
P40	3,98	3,6
P50	10,5	7
PA70	31	30

MODEL	TO OPEN	TO CLOSE
PPW	0,075	0,05
PP00	0,15	0,1
PP10	0,35	0,32
PP20	0,8	0,7

MODEL	TO OPEN	TO CLOSE
PI00	0,15	0,1
PI10	0,35	0,32
PI20	0,8	0,7
PI30	2,05	1,9

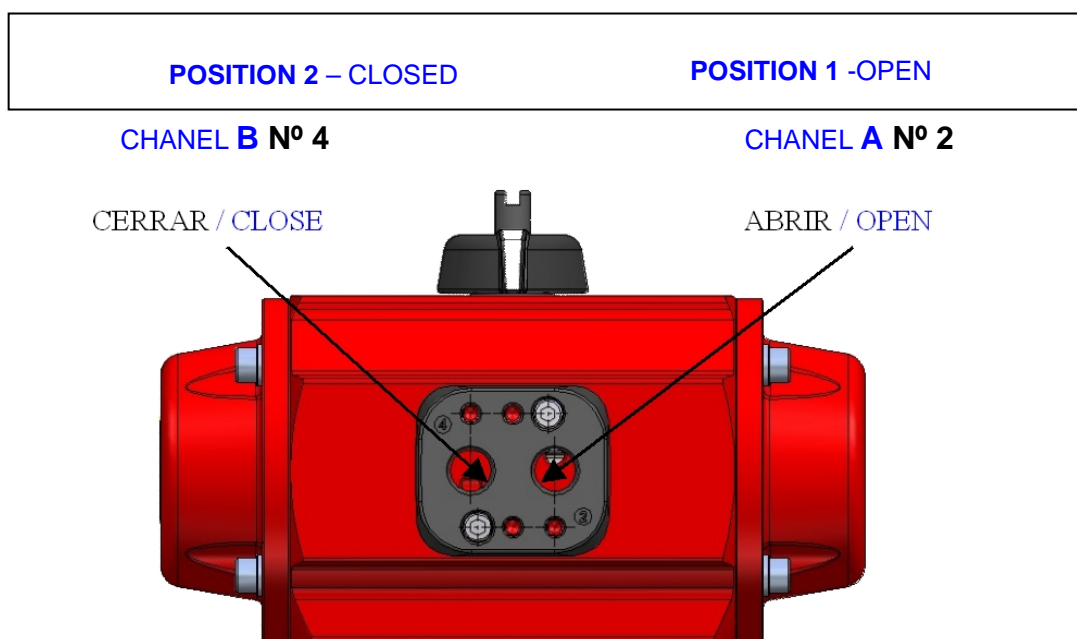
MODEL	TO OPEN
PAWS	0,075
PA00S	0,15
PA05S	0,28
PA10S	0,35
PA15S	0,65
PA20S	0,8
PA25S	1,5
P30S	2,05
P40S	3,98
P50S	10,5
PA70S	31

MODEL	TO OPEN
PPWS	0,075
PP00S	0,15
PP10S	0,35
PP20S	0,8

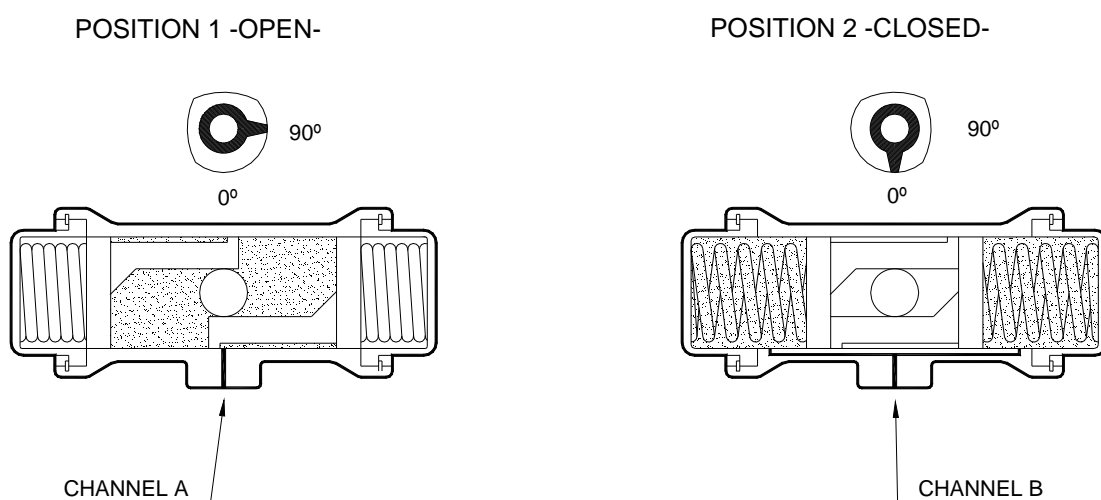
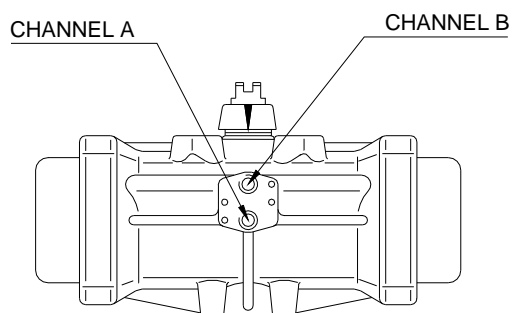
MODEL	TO OPEN
PI00S	0,15
PI10S	0,35
PI20S	0,8
PI20S	2,05

Figures in litres. Same consumptions that PP, PI for models PH, PG.

1.5- **Operation. PA, PI, PAG**

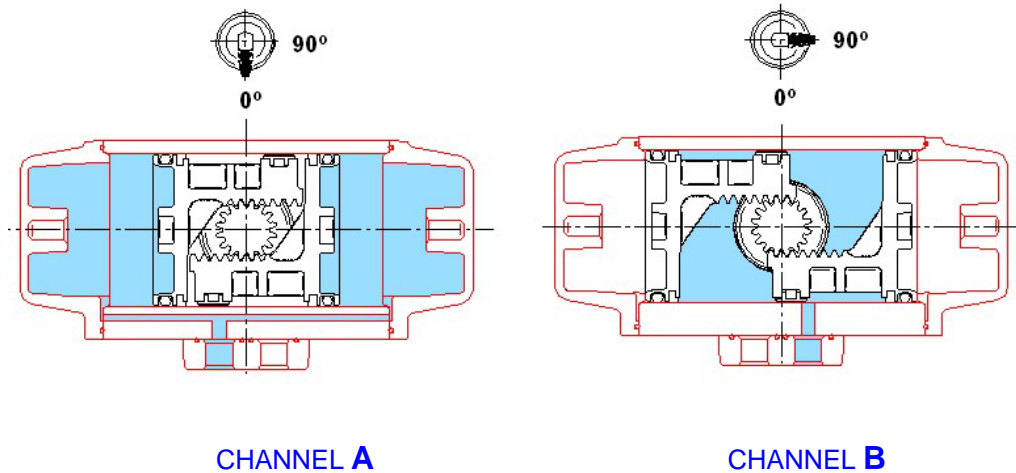


P, PP, PH, PG



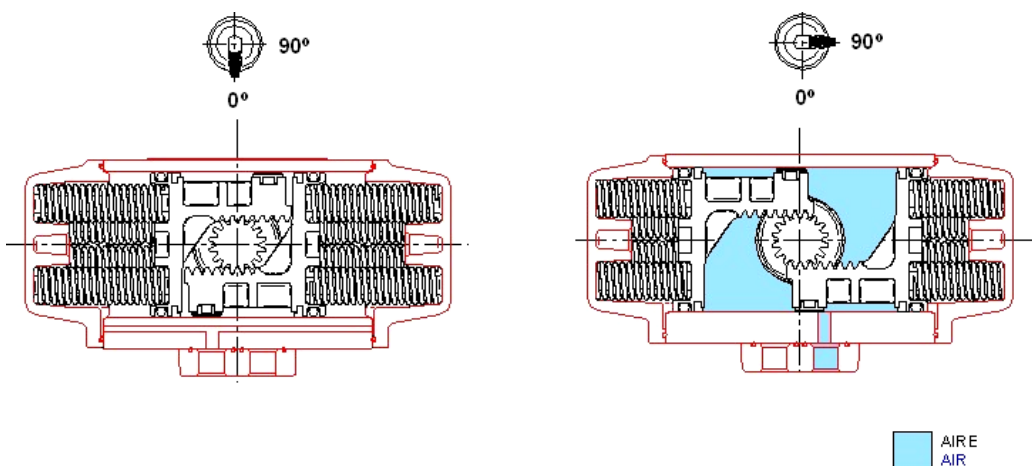
- Double acting:

Air pressure through channel "A" (n° 2, acc. ISO-5559-2 , POSITION 1) displaces two opposite pistons to the end of the cylinder, transmitting by the RACK – PINION system a 90° turn to the shaft of the actuator, provoking its OPENING. Air pressure introduced through channel "B" (n° 4, acc. ISO-5559-2 , POSITION 2) reverses the movement of the two pistons, placing them to their initial position (CLOSING).



- Spring return:

These models contain compressed springs, situated between the caps and the pistons. The pressure made by these springs keep the pistons in POSITION 2 (CLOSED). Introduction of air to channel "A" (n° 2 , acc. ISO-5559-2) displaces the two pistons to the ends, pressing the springs even further to POSITION 1. When the air pressure ceases, springs push the pistons to their initial position (CLOSED).

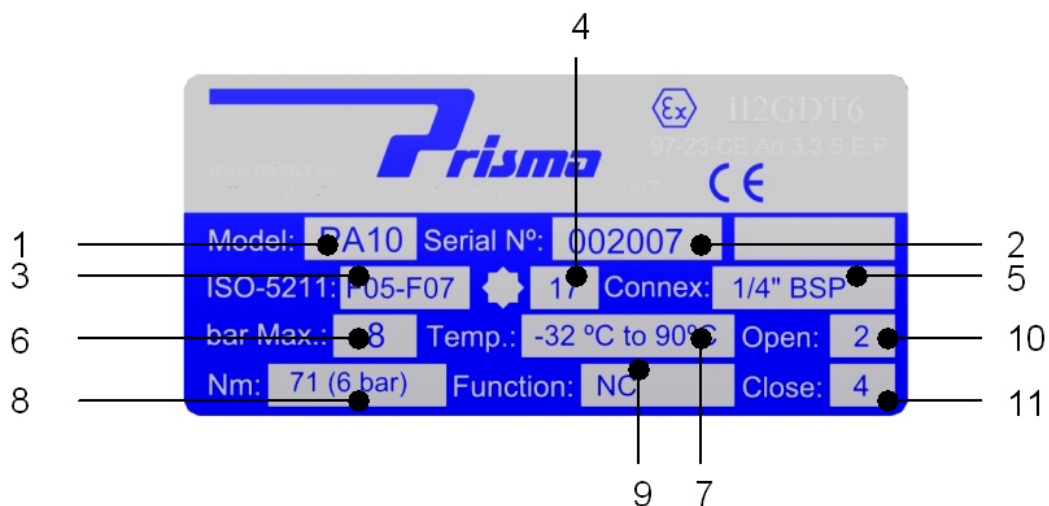


- Depending on the position which the actuator is mounted onto the valve, we will obtain that it works **NORMALLY OPEN (N.O.)** or **NORMALLY CLOSED (N.C.)**.

MOUNTING POSITION		OPERATION
ACTUATOR	VALVE	
CLOSED	CLOSED	N.C.
OPEN	CLOSED	
CLOSED	CLOSED	N.O.
OPEN	CLOSED	

1.6- Identification

- All Prisma pneumatic actuators carry on the rear side an identification label with the following description:
 - o PA-P- PP- PI models:



1- *Model identification:*

PA-P Aluminium actuator

PP Polyamide actuador

PI Stainless Steel actuator

2- *Serial number*

3- *ISO-5211 base*

4- *Star*

5- *Pneumatic connection*

6- *Maximum pressure*

7- *Temperature service*

8- *Actuator torque*

9- *Function normally closed (N.C.) or normally open (N.O.).*

10- *Channel A (2) - Open*

11- *Channel B (4) - Close*

In addition, the models of spring return take a label of ATTENTION in each one of covers (except PA 'S' models)

Models without preload springs



Models with preloaded springs



2- BEGINING

- 2.1- Transport an installation.

- *In the case of spring return actuators, do not remove the adapter installed in the upper air inlet if a Namur solenoid valve should not be installed.*
- *In case of operating the actuator manually, please disconnect the feeding pressure.*
- *It is necessary to take notice of the identification label.*
- *We recommend to mount a security valve in the air supply line in order to avoid air pressures higher than 8 bar.*
- *At the time of transportation and handling pay attention and care as any damage in the external coatings in models could reduce the resistance of the pneumatic actuator against the external agents.*
- *Do not remove the obstructers which protect the threads of connection until the moment of operation.*
- *Be sure that the air supply is sufficiently clean and free of solid particles in suspension which in the long run could damage the internal parts of the device.*
- *Check "on site" that the air supply pressure is the necessary (normally 6 bar).*
- *Even though it is not strictly necessary, a slight lubrication of the air fed prolongs the life of the pneumatic actuator.*

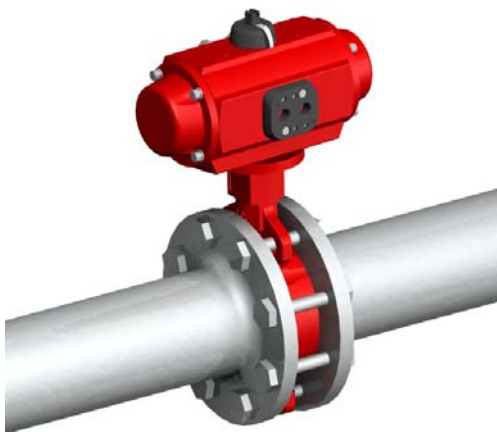
2.2- Mounting on to the valve :

Make sure that the working position of the actuator regarding the valve is the correct one N.O. (normally open) or N.C (normally closed).

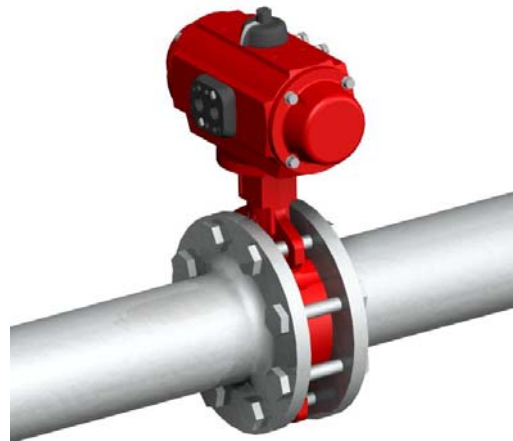
Prisma pneumatic actuator can be mounted indistinctly parallel or perpendicular regarding the position of the pipe,in both cases (N.C. or N.O operation).

Make sure that the position is the desired

PARALLEL



PERPENDICULAR



- *In case of Spring Return actuators, do not remove the FITTING – FILTER fixed in the upper air feeding connection, except if a Namur solenoid valve should be installed as it avoids the entry of external elements (dust, water, etc.) in the springs chamber.*

2.3- Feeding

- *Prisma pneumatic actuators can normally operate between 3 and 8 bar according to models. Their standard operation is at 6 bar, for pressures lower than 6 bar, please consult.*

3. MAINTENANCE

3.1. Preventive maintenance

To assure the right operation of the equipment ACTUATOR – VALVE, we recommend:

3.1.1- Every year

- *Check that the air feeding is clean and at the necessary pressure;*
- *Depending on the nature of fluid flowing through the valve and with the appropriate frequency, it will be necessary to clean the interior of the valves of eventual incrustations which would increase the resistant torque.*

3.1.2- Every two years

- *Depending on the number of cycles performed by the equipment, it will be convenient to replace all the o-rings in order to avoid any loss of torque of the pneumatic actuator.*
- *In internal tests carried out on our test bench, the correct operation of the device is maintained after more than 1.000.000 complete cycles (open –close) under the following conditions:*

- *Frequency* *Mod. PAW a PA20, 500 cycles / h. Mod. PA25 a P50, 120 cycles / h. Mod. PA70, 80 cycles / h.*

- *Supply* *Clean air at 6 bar.*

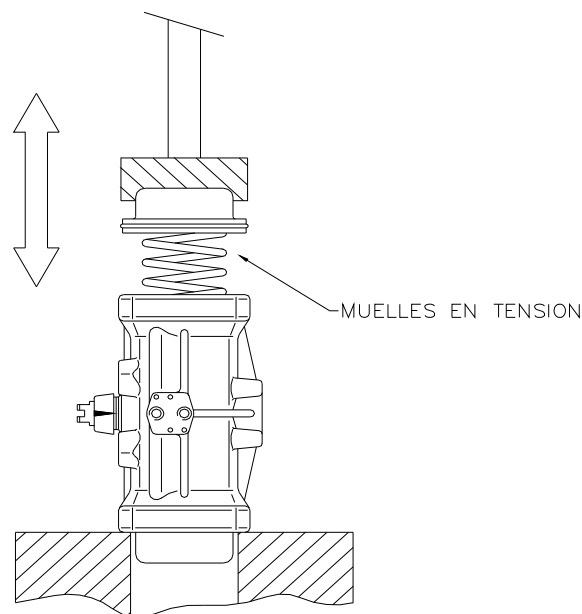
- *Ambiance Temperature* *Between 0°C and 50°C.*

3.2- Dissassembly

NEVER manipulate the pneumatic actuator under air pressure or connected to any accessory.

- Caps:

- Double acting models: Remove the fixation screws, taking into account the cap position. It's important to know that the cap incorporates 2 o-rings, one in the center, and other smaller for the air connection to the closing chambers.
- Spring return models: Unscrew diagonally opposite the fixation screws until the pre-tensioned springs set do not make pressure against the end cap. (when the end cap has 3 mm distance to the body). Then, remove the screws. Take into account the cap position. These end caps incorporate 2 o-rings, like the double acting caps.



- ONLY for caps contain SRINGS IN TENSION. (Superseded, no longer in production)

To remove a cap is necessary to keep it tighten to the cylinder by some mechanic device (a foot drilling machine and hydraulic press for instance etc.) before taking off the retaining ring (models PP_S to PH_S) or the fixing bolts of those caps (models P30-PG30, P40, P50) proceeding then to rise the cap by the mechanic device until the springs lose their tension completely. This operation CAN NEVER BE DONE MANUALLY. As in double acting models P30-PG30, P40, P50 the position of the caps and bolts.

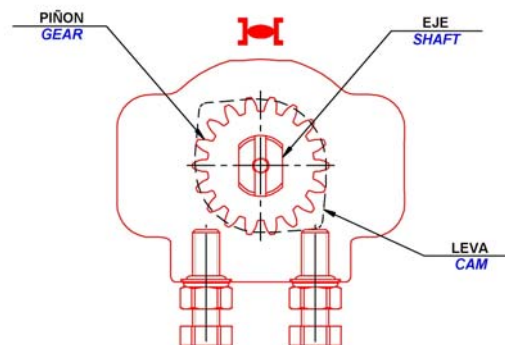
- **Pistons:**
 - Dissassemble the caps, unfix the travel stops nuts, remove the travel stops screws (it's important to take into account the washers o-rings). Then, the actuator must be manually operated, (NEVER UNDER AIR PRESSURE) towards the opening, until the pistons get out of the cylinder.

- **Shaft:**
 - Unfix the travel stops nuts and remove the travel stops screws. Then turn the shaft to one of their limit positions (open or close) paying attention to label are the two upper flats on the shaft pointing to (opening or closing position) in order to mount it back again in the same position. Proceed then to remove the visual indicator, shaft retaining seeger ring and washer, and drive out the shaft by the bottom. Notice the position of the pinion and the travel stops cam respect the two upper flats of the shaft.

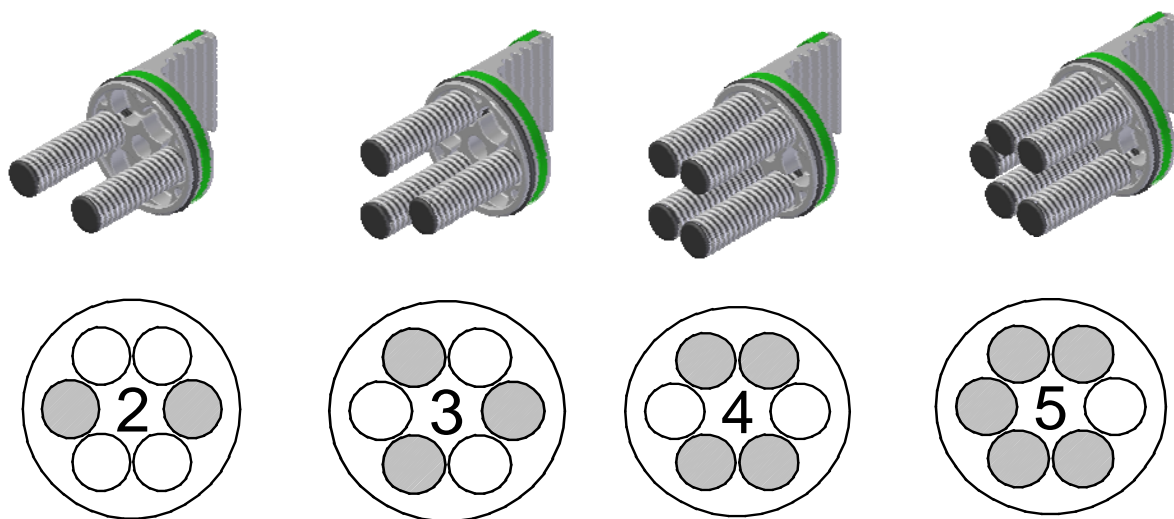
3.3- Assembly

Shaft:

- Introduce the shaft in the cylinder from the bottom, taking care that the gear is centered respect of the hole where the pistons move. It's important also to take care that the gear and the travel stops cam position regarding to the shaft upper flats is according to attached scheme.



- **Pistons:**
 - o When the travel stops crews are removed, enter the pistons simultaneously in a way that they are always equidistant to the shaft. In their final position (in contact one to the other), the shaft two upper flats must remain aiming at the close symbol. Assembly the two travel stops screws (with the nuts, washes and o-rings) and, actioning manually the shaft, adjust the stroke of the actuator.
- **Caps:** To reassemble the caps, please read the point “Dissassembling – Caps”
- **Springs (PA_S pneumatic actuator models) :**
 - o Spring positioning: From 2 to 6 springs each side, distributed as indicated in the following drawing:



Remarks: When dissassembling any part of a Prisma actuator, is advisable to change the o-rings and to grease all the internals. Prisma uses Brugarolas Beslux+PTFE grease, silicone free.

3.4 Recommended spares:

Depending on the frequency of cycles, it is recommended to have two spare kits for any ten actuators of the same model. Every kit include:

- O-rings set
- Pistons friction bands
- Gear
- Shaft washer.

Recommendations :

Disassemble the actuator every 10.000 cycles and check the conditions of the internal components and the correct operation, using the instructions included in this document.

In order to choose the suitable actuator for each type of valve, we recommend to apply the following safety factors :

- *Ball valves : Increase a 50% the catalogue torque value.*
- *Butterfly valves : Increase a 30% the catalogue torque value.*

4- WARRANTY

Prisma in this Quality of Pneumatic Actuators Manufacturer , guarantees their products for two years period, against any fault of manufacturing which could affect its proper operation. The warranty period starts on the date when the actuators are delivered to the customer, provided that this operation is made according the following conditions:

Actuator air supply: Clean air without solid particles in suspension (according to ISO-8573-1) or Fluid Group 2 (according to 97-23-EC).

For appropriate working conditions, the operation medium must have a dew point equal to -20°C or , at least, 10°C below the ambient temperature. The maximum particle size shall not exceed 40 microns.

Maximum Pressure: 8 bar.

Assembly: Onto ball , butterfly and plug valves.

Valve resistant torque: 75 % of the torque developed by the actuator , maximun to 6 bar.

Ambient temperature: Between -32°C at $+90^{\circ}\text{C}$.

For ATEX potentially explosive ambiances, according to Group II category 2 GD c IP 67.

For Cryogenic Services from -50°C to $+80^{\circ}\text{C}$.

For High Temperature Services from -32°C to $+265^{\circ}\text{C}$.

This warranty includes the reparation cost in our workshop or the reposition of the faulty material. provide that this material has been sent previously to our facilities and the study of the fault reasons has been made.

4- **WARRANTY**

4- WARRANTY

Prisma in this Quality of Pneumatic Actuators Manufacturer , guarantees their products for two years period, against any fault of manufacturing which could affect its proper operation. The warranty period starts on the date when the actuators are delivered to the customer, provided that this operation is made according the following conditions:

Actuator air supply: Clean air without solid particles in suspension (according to ISO-8573-1) or Fluid Group 2 (according to 97-23-EC).

For appropriate working conditions, the operation medium must have a dew point equal to -20°C or , at least, 10°C below the ambient temperature. The maximum particle size shall not exceed 40 microns.

Maximum Pressure: 8 bar.

Assembly: Onto ball , butterfly and plug valves.

Valve resistant torque: 75 % of the torque developed by the actuator , maximum to 6 bar.

Ambient temperature: Between -32°C at $+90^{\circ}\text{C}$.

For ATEX potentially explosive ambiances, according to Group II category 2 GD c IP 67.

For Cryogenic Services from -50°C to $+80^{\circ}\text{C}$.

For High Temperature Services from -32°C to $+265^{\circ}\text{C}$.

This warranty includes the reparation cost in our workshop or the reposition of the faulty material. provide that this material has been sent previously to our facilities and the study of the fault reasons has been made.

4- WARRANTY

Prisma in this Quality of Pneumatic Actuators Manufacturer , guarantees their products for two years period, against any fault of manufacturing which could affect its proper operation. The warranty period starts on the date when the actuators are delivered to the customer, provided that this operation is made according the following conditions:

Actuator air supply: Clean air without solid particles in suspension (according to ISO-8573-1) or Fluid Group 2 (according to 97-23-EC).

For appropriate working conditions, the operation medium must have a dew point equal to -20°C or , at least, 10°C below the ambient temperature. The maximum particle size shall not exceed 40 microns.

Maximum Pressure: 8 bar.

Assembly: Onto ball , butterfly and plug valves.

Valve resistant torque: 75 % of the torque developed by the actuator , maximum to 6 bar.

Ambient temperature: Between -32°C at $+90^{\circ}\text{C}$.

For ATEX potentially explosive ambiances, according to Group II category 2 GD c IP 67.

For Cryogenic Services from -50°C to $+80^{\circ}\text{C}$.

For High Temperature Services from -32°C to $+265^{\circ}\text{C}$.

This warranty includes the reparation cost in our workshop or the reposiotion of the faulty material. provide that this material has been sent previously to our facilities and the study of the fault reasons has been made.