

PNEUMATIC ACTUATORS

Installation, Operation & Maintenance manual



Installation, Opération & Maintenance manual

Generality:

Please read these instructions carefully and please keep them for future reference for any maintenance and repair of your actuators. These instructions apply to the actuator models TUNING 0-90°, 0-120° and 0-180°. Please note that it is important that only qualified and trained staff uses and maintains the actuators.

The pneumatic rotary actuators you have purchased are 1/4 turn actuators Rack & Pinion kind. They exist in double acting or spring return versions.

A - Main features

- MAXIMUM WORKING PRESSURE : 145 psi.
- SUPPLY: Dry or lubricated filtered air and non-corrosive gases, compatible with the internal parts and the grease used. The maximum allowable size of particles is 30 µm. The working fluid must have a dew point equal to -68°F or lower at least 50°F to room temperature. Special versions for other fluids.
- TEMPERATURE :
 - 68°F à +185°F for standard version (NBR seals).
 - 68°F à +300°F for high temperature version (VITON seals).
 - 104°F à +185°F for low temperature version (Fluor Silicone seals).Low and high temperatures can affect the actuator output torques.

**Warning ! A special grease is required for actuators with Viton and/or Fluor Silicon seals.
Please contact our technical support at + 33 4 86 30 70 80.**

- ROTATION : 0/90° - 0/120° - 0/180° with adjustment of +/- 5° in standard opening and closing.
- LUBRICATION : During assembly at the factory. Lubrication lifetime warranty the internal parts of the actuator. The lubricants recommended by TUNING for normal service conditions are:
 - Kluber Unigear LA02
 - Exxon beacon EP2
 - Fina Marson EP L2
 - Shell Alvania EP2
 - Mobilux EP2

B - Operational principle

The actuator converts the linear motion of the pistons (19), due to the thrust applied by compressed air on the surface area of the piston, into a rotary motion (0/90°, 0/120° or 0/180°) of the pinion (11).

Double acting:

Due to the compressed air inlet into B, the outer chambers are filled with air. So, the action of the pressure on the surface creates a force which causes piston closure (19), generating a rotation of the pinion in the clockwise direction. When the pistons are closed, the compressed air inlet into A fills the internal chamber. Then, the action of the pressure on the surface creates a force which causes the opening of the pistons (19), generating an anticlockwise rotation of the pinion.



Spring return:

Due to the compressed air inlet A, the internal chamber fills with air. So, the action of the pressure on the piston surface creates a force which causes the opening of the pistons (19), generating an anticlockwise rotation of the pinion (11). At this time, the springs are compressed.

On cutting the air supply in A, the springs begin to relax, thus creating a force which causes the piston closure (19), generating a rotation of the pinion (11) in the clockwise direction.



NOTA BENE:

Do not dismantle spring cartridges as you may be subject to injury. Defective cartridges must be returned to TUNING for repair or replacement.



Pre-compressed Cartridges spring

C - Minimum quality recommended for instrument air

Maximum limit.....5 mg/m³

Contains oil :

Minimum limit.....1 mg/m³

Contains water:

Compressed air must be dry to avoid freezing.

Maximum size of dust particles30 microns

The actuators can be installed in-line or perpendicular. The normal operation of the actuators is closed in the clockwise direction and open in counterclockwise direction. However, this can be easily reversed.

D - Recommended dimensions of air supply tubes

To provide sufficient air flow, it is recommended to dimension the tubes as follows:

Model	Lenght	
	Until 1,5m	>1,5m
8090DA032 to 8090DA105	6x8 mm	6x8 mm
8090DA125 to 8090DA210	6x8 mm	8x10 mm
8090DA240 to 8090DA400	8x10 mm	10x12 mm

E - Storage

In case the actuator is not quickly commissioned, it is recommended to store it in a clean and dry environment. The original packaging of the actuator contributes to optimal preservation. For longer storage periods, it's useful to periodically perform a complete cycle of operation by supplying the actuator with compressed air. We also advise to block the compressed air supply ports to prevent the entry of foreign bodies inside the actuator.

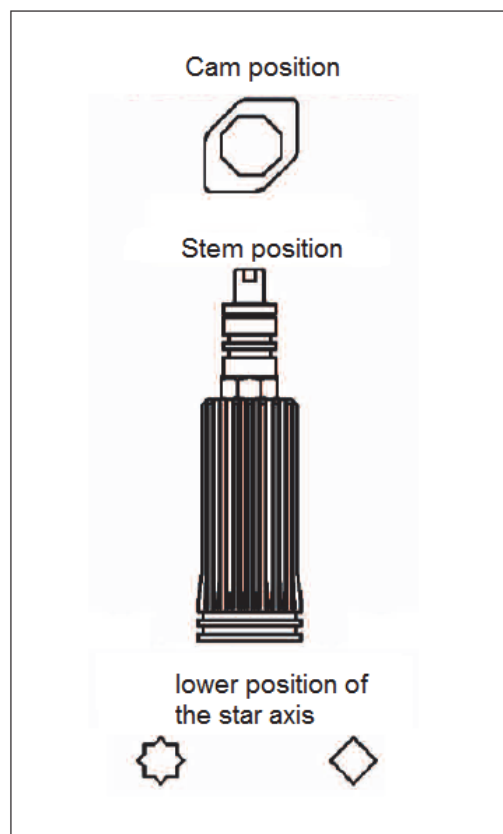
F - Maintenance

Lubrication performed during manufacture and self-lubricating guide rings allow for a lifetime guarantee of 1 000 000 rotations, under normal conditions of use. In the case of abnormal operating conditions, we recommend to replace parts subject to wear (seals) and guide rings in order to restore the ideal conditions of operation .

G - Disassembly

1. Turn off the pneumatic and electric supply of the actuator.
2. Remove any accessories that could hinder the handling and operations on the actuator.
3. Separate the actuator and valve taking notes in order to reassemble the actuator correctly.
4. Place the actuator on a male square bracket equal to the pinon female orifice in order to ease the operations listed below.
5. Before performing disassembly, check the sticker on the actuator body if it is a double acting (DA) or a single return (SR) model. Confirm this marking through the resonance and eventual vibrations of the springs by slightly tapping on the actuator body.
6. Remove the position indicator by unscrewing the screw that holds it on the pinion.
7. Remove the adjustment screws.

8. Dismantle caps by unscrewing the screws in diagonal one by one. Please be especially careful when removing caps on spring return actuators. The 4 cap screws must be unscrewed gradually a few laps at a time in order to relax the springs. The screws of spring return actuators are long enough to allow for completely unwinding the actuator springs before the final cap dismantling. In case you have not managed to unscrew the screw caps after 5 or 6 laps, it may mean that the cartridges springs are damaged. Disassembly should not be pursued. The actuators must be returned to TUNING for maintenance.
9. If it's a spring return actuator, remove the spring cartridges.
10. Remove seal caps.
11. Rotate the actuator anticlockwise, until the pistons are ejected out of actuator body. Never use compressed air to eject the pistons, this could cause serious injury.
12. Remove rings, guides and piston seals and replace with original spare parts only.
13. Remove the retaining ring (3) of the pinion with appropriate snap ring tooling, then remove the outer metal washers (4 & 5).
14. Apply a light thrust on top of the pinion so as to push the pinion inside the actuator body. Remove the cam and push the pinion out of the actuator body. Remove the seals and the pinion washers and replace them with original spare parts only.



H - Reassembly

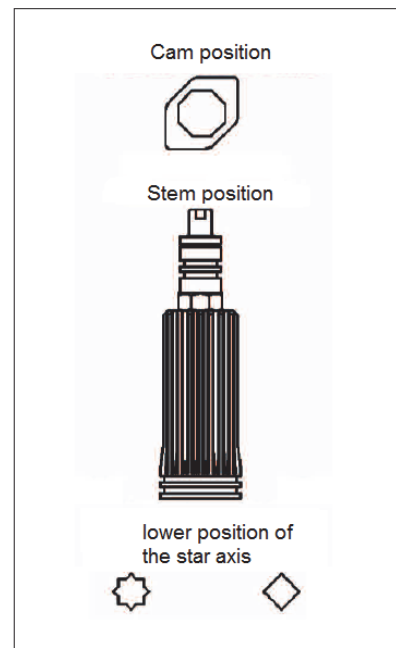
Before actuator reassembly, all components must be cleaned and inspected carefully. Particular attention must be paid to the surface of joints, washers and threads. Seals, seats and rubber washers must be replaced if they are damaged. You should also grease the components before reassembly.

TORQUE SCREW:

During the actuator reassembly, we recommend to respect the following torques:

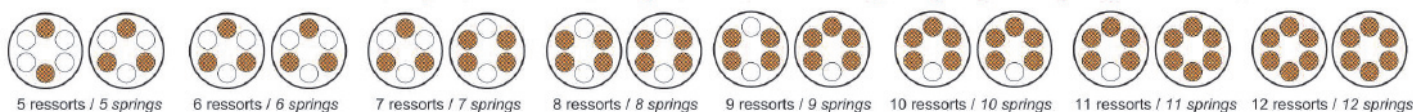
Thread	Recommended torque (Nm)
M5	5
M6	10
M8	25
M10	50
M12	85
M14	130
M16	200
M20	390
M22	450
M24	650

1. Install the upper bearing (9), upper o-ring (10), lower bearing (13) and lower o-ring (12) on the pinion and grease all parts.
2. Insert the pinion (11) in the body (6) partially, then, install the adjustment cam (8) as shown in the diagram No. 1. Next, install the internal bearing (7) and fully insert the pinion into the body.
3. Grease the inside of the body completely and in a regular pattern.
4. Install the outside bearing (5), washer (4) and retaining ring (3).
5. Install the guides (20), gaskets (21) and O-rings (22) on the pistons. Then insert the piston into the body by pushing them inside the body simultaneously on both sides of the pinion. While gently pushing the pistons, rotate the pinion in a clockwise fashion until the piston teeth engage with the pinion teeth. Both pistons should then begin to move simultaneously toward the center of the body. Once the pinion and the pistons are properly engaged, please ensure that rotation 0-90 ° can operate without ejecting the pistons out of the body.
6. If the actuator is spring return, please replace the spring cartridges (23) in the locations of the cap where they were in before the dismantling. Below the different spring configuration are explained.



Pre-compressed Cartridges spring

Positionnement des ressorts pour actionneur simple effet / Positioning of springs for spring return actuator



7. Place the cap O-ring (24) in the groove provided for this purpose on the cap (25) and make sure the O-ring remains well in position. It is advisable to lightly grease the O-rings so that they remain in the desired position.
8. Replace the caps (25) on the body (6) using 4 screws (26) and screwing them partially. Please then tighten the screws diagonally crosswise respecting the tightening torque table above.
9. Replace the adjustment screws (18) and nuts (17). Adjust the stroke of the screws by rotating the pinion by means of a wrench from 0 to 90°. Move the gear in the 0° position (closing) and adjust the adjustment screw (right side) until the desired position is reached. Once reached, please tighten the nut (17) to lock this position. Repeat with the screw and nut left for the 90 ° position (open).
10. Insert the position indicator (2) on the shaft and tighten it in position with the screw (1).

I - Sealing test

All areas prone to air leaks should be checked with a soap and water solution. Before starting the leak test, one should run several operating cycles so that the actuator seals find their proper position.

Pressure the outer chambers of the actuator and let the actuator rest while monitoring the potential formation of air bubbles. Then release the pressure in the external chambers and pressurize the internal chamber to check there are no air bubbles appearances at the pinion.

In case of leakage, one should re-dismantle the actuator to identify the source of the leak and change the damaged seals

J - Error searches

Before removing the actuator, see the instructions below:

Actuator with solenoid valve

A - If the actuator does not work, check that:

1. The valve can rotate freely.
2. The size of the actuator is correct.
3. The speed control screws, if fitted, are loosened (if the screws are tightened, the actuator will not work).
4. The correct voltage is supplied to the solenoid valve (the correct voltage is listed on the coil).
5. The sufficient supply of compressed air is provided to the solenoid valve.

B - If the voltage and air pressure were checked and the valve rotates freely, proceed as follows:

1. Apply the proper tension to the solenoid valve. Check the sound of a click.
2. If no sound is detected:
 - Carefully unscrew the valve and the stem of the coil from the SV body.
 - Reapply tension and observe the piston of the valve. If he does not retract, replace the solenoid valve.
3. If the coil works, remove everything and the SV body and place everything on a workbench. Connect an air supply of 44 psi and a minimum tension. Connect and disconnect and then check the air flow. The air must flow through a single outlet when the coil is energized. (A slight back pressure may be required to remove the core. This can be achieved by closing the outlet).

C - If the actuator works but shows leakage or loss of voltage, proceed as follows:

1. Check the voltage. It should be close to 10% of the specified voltage.
2. Check the air supply. Ensure no pressure loss occurs during operation of the device. A pressure drop may cause an incomplete evacuation of the core in the block, or on one of the seals of the actuator piston. A piston seal leaking should be leaking during all cycles. On spring return actuators, a seal leakage appears on port B on the flange air manifold. If the core is leaking, replace the valve. A leakage at the piston level can be solved by using new O-rings.

Actuator without solenoid valve

For actuators without solenoid (or actuators with solenoid valve and mounting block working properly), remove the actuator from the valve, disassemble and check the following:

1. Ensure that all inlet ports are not blocked.
2. Ensure that the actuator is lubricated and no solidified fat does creep between the pinion and the piston racks. If this is the case, then clean, dry, regrease and reassemble the actuator.
3. Check that the actuator pinion and / or the pistons are not retained. If this is the case, reassemble the actuator according to the instructions in paragraph 5.5.3.
4. If the unit is running loosely, check the teeth of the piston racks.
5. With spring return actuators, check misplaced or broken springs. If they are broken, check for marks or residues in the body.
6. If the actuator and valve are clean of any defect, reassemble the actuator and retest. If the device still does not work, contact TUNING service department.

K - Health and safety :

These devices within the Group II, Category 2, comply with the Directive ATEX 94/9 / EC for use in potentially explosive atmospheres caused by a mixture of air, gas, vapor, mist or of suspended particles.



The safe operation of these products can only be guaranteed if they are properly installed, commissioned, operated, maintained by qualified personnel and in accordance with the instructions. The general guidelines for installation and safety for your pipeline and plant construction, as well as those relating to the proper use of tools and safety equipment must also use the following instructions..

WARNING !

Do not put the actuator into operation without having previously read the installation instructions and maintenance. Indeed, the caps contain springs that are compressed and can cause risk of injury to personnel. The actuator must be purged before disassembly.

WARNING !

If the valve is to be used in a partially open position, the actuator springs are still partially compressed and therefore will risk causing injury to personnel if released suddenly. If this is the case, follow the instructions below.

WARNING !

Air supply pressure in the actuator and the solenoid valve is a maximum of 116 psi.

WARNING !

If the valve can not be used in a partially open position, removing the valve as follows to avoid the sudden release of spring:

- Keep the actuator / valve in a vice.
- Remove all solenoid valve.
- Connect the compressed air connection (0 - 87 psi) to the air inlet port 'A'.
- Gradually increase the pressure until the valve stem starts to rotate.
- Unscrew and remove the bolts holding the bracket to the valve body and remove the actuator / support.
- Place the actuator on the workbench and gradually reduce the pressure. The valve body is now ready to be disassembled.

1.1 Usage conditions

Referring to the installation and maintenance instructions, to the label and technical Information sheet, check that the device complies with the application and intended use. These devices comply with the requirements of the European Directive 97/23 / EC on pressure equipment (PED - Pressure Equipment Directive) and bear the CE marking if required. Note that the devices included in the category of 'Art. 3.3 ' are covered by the Directive but do not have the mark.

- I. These devices are specifically designed for use with compressed air or high purity applications. These fluids are in Group 2 of the Directive on pressure devices mentioned above.
- II. Check the material compatibility, pressure and temperature and their maximum and minimum values. If the maximum operating limits of the device are below the limits of the system in which it is mounted, or if a device malfunction may result from pressure or dangerous overheating, make sure the system has the safety equipment to prevent such over limit.
- III. Define the correct installation of the product and the orientation of the valve
- IV. The TUNING actuators are not designed to withstand external stresses generated by the systems they are connected directly or indirectly. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimize them

1.2 Access

Ensuring a safe access and provide, if necessary, a safe working platform before starting work on the device. If necessary, provide suitable lifting equipment.

1.3 Lighting

Provide adequate lighting, particularly where detailed or intricate work is required.

1.4 Dangerous environment around the product

Always consider the potential risk of explosion, lack of oxygen (eg tanks, pits), presence of dangerous gases, extreme temperatures, hot surfaces, fire hazard (welding for example), of excessive noise, moving machinery.

1.5 The system

Consider the effect of an intervention on the complete system. Does the operation scheduled (the closing of a stop valve or the electricity inter-ruption for example) constitute a risk to another part of the system or for the staff?

Here after is a non-exhaustive list of possible types of risk: - closing vents, shut alarms or security or control equipment service. Also, please avoid the generation of hammering by gradually stopping the valves.

1.6 System under pressure

Ensure the device insulation and depressurize it safely by venting it to atmosphere. If possible provide double insulation and make sure the stop valves are fitted with a locking system in the closed position. Also make sure to use a specific labeling. Never assume that the system is depressurised based on the pressure gauge indicating "zero pressure".

1.7 Temperature

Wait for the appliance to cool before servicing, to avoid any risk of burns. Valves with Viton seals should not be subject to temperatures above 392°F. Beyond this temperature, toxic fumes may be released. Avoid inhalation of these fumes and contact with skin.

1.8 Tooling and spare parts

Ensure the availability of tools and spare parts required before starting the procedure. Use only original TUNING spare parts.

1.9 Protection equipment

Check if there is no requirements for protective equipment against risks such as: chemicals, high or low temperatures, noise, falling objects, and against injuries to eyes or other.

1.10 Permits to work

All work must be performed by or under the supervision of a competent person. The staff in charge of the installation and use of the device is to be trained in accordance with the installation instructions and maintenance guidelines. Always follow the formal regulation of plant access and labor laws. In case no such system exists, it is advised that the authority responsible for the work be informed so that it may judge whether or not the presence of a person responsible for security is necessary. Post 'warning notices' if necessary.

1.11 Handling

Handling of large or heavy products may be the cause of accidents. Lift, push, carry or move heavy pieces by bodily force can cause injury to the spine. You must assess the risks associated with certain tasks based on individuals, the workload and environment, and use the appropriate handling method depending on those criterias.

1.12 Residual hazards

In general, the outer surface of the product is very hot. If used at the maximum operating conditions, the surface temperature can reach 392°F. Some devices are not self-draining. Consequently, every precaution must be taken when removing or replacing the devices (refer to the mounting and operating instructions).

1.13 Safety Information

Installers and users should refer to section 'Information Security' of the Installation and maintenance of ball valve which is connected to the actuator.

1.14 Freezing

Precautions must be taken against damage caused by freezing to protect products which are not self-draining.

1.15 Recycling

Unless otherwise stated in the installation and maintenance instructions, this product is recyclable and does not constitute an ecological hazard. However, if the valve is fitted with Viton O-rings, special care must be taken to avoid any health problems during the decomposition / destruction of this material.

Viton:

- It can be buried in accordance with National and Local regulations.
- It can only be cremated in an incinerator with scrubber in accordance with national or local regulations and able to prevent the release of hydrogen fluoride released during the combustion product.
- It is insoluble in an aquatic environment.

1.16 Sending the device back

For reasons of health, safety and environmental protection, customers and custodians must provide all necessary information on the return of the unit. This concerns the precautions to be followed if it had been contaminated by residues or damaged mechanically. This information must be provided in writing including the health risks and indicating the specifications to any substances identified as hazardous or potentially hazardous.

2.00 Use in ATEX area

An actuator is not intended to contain a potentially explosive fluid.

Only non-corrosive, non-explosive, clean and filtered fluid should be used for the control of the actuator.

2.10 Lubrication :

The TUNING actuator is lubricated for life during manufacturing. When used in extreme conditions, it may be necessary to re-lubricate the actuator. In this case, be sure to use substances that do not "carbonize" or are not likely to become explosive.

2.11 Recycling of the pilot fluid: :

In the case of use in ATEX area, we recommend using Solenoid Valves to recycle the pilot fluid to the opposite chambers and to keep the actuator chambers always slightly under pressure (2,9/4,4 psi). This is useful in order to keep the actuator from « breathing » ambient air. It is the responsibility of the user to wire and connect the actuator chambers correctly to avoid the entry of substances / explosive gases in the actuator. The frequency of maintenance of the actuators (seals change) is even more important when they are used in hazardous and / or ATEX area.

2.12 Operating speed:

Norm EN 1127-1 defines that to be considered a source of spark, moving parts should exceed a speed of 1m / sec. The table below shows the rotational speeds of TUNING pneumatic actuators. It must be noted that our actuators are well below the authorized limits, making the risk of sparks almost nonexistent.

2.13 Valve/actuator assembly :

It is important that the connection between the valve and the actuator allows a possible leakage of the valve at the axis not to be trapped.

To avoid any risk of explosion, leakage must be removed without the possibility of entering the actuator chambers.

In ATEX area, the TUNING actuators must be used exclusively with valves with antistatic shaft. It is important that exists a full, permanent and secure contact between the metal parts of the valve and those of the actuator. A check must be performed every 6 months at least. Also, be sure that the valve is properly grounded through equipotential braid.

Rotation speed (sec for 6 bar) - 90°series					
TYPE	OPENING	CLOSING	TYPE	OPENING	CLOSING
32 DA	0,03	0,03	-	-	-
52 DA	0,07	0,05	52 SR	0,07	0,07
63 DA	0,11	0,10	63 SR	0,13	0,13
75 DA	0,18	0,15	75 SR	0,32	0,22
83 DA	0,36	0,25	83 SR	0,31	0,28
92 DA	0,37	0,33	92 SR	0,48	0,41
105 DA	0,50	0,44	105 SR	0,59	0,51
125 DA	0,80	0,70	125 SR	1,20	0,94
140 DA	1,13	0,94	140 SR	1,64	1,25
160 DA	1,43	1,25	160 SR	2,27	1,60
190 DA	2,00	1,85	190 SR	2,33	2,50
210 DA	3,10	2,44	210 SR	3,65	2,86
240 DA	4,20	3,95	240 SR	6,30	5,60
270 DA	6,16	5,47	270 SR	8,98	7,45
300 DA	8,98	7,45	300 SR	9,45	8,78
350 DA	9,45	8,78	350 SR	11,60	10,51
400 DA	11,60	10,51	400 SR	12,31	11,65

2.14 Dusty environments:

Norm EN 13463-1 art. 5.2.6 identifies the accumulation of dust in narrow spaces between the moving parts as a potential source of sparks. If the area is not very dusty, it is relatively simple and sufficient to check the top of the actuator. However, in dusty environments where cleaning actuator is difficult, it is recommended to cover actuators and valves with a protective cover.

2.15 Accessories :

Before fitting actuators with electrical or non-electrical accessories, it is essential to verify that these accessories are in accordance with the ATEX Directive 94/9 / EC and adapted to the area and category in which your installation operates.

DECLARATION OF CONFORMITY ACCORDING TO ANNEXE A VIII I I OF THE DIRECTIVE 94/9/EC**DECLARATION OF CONFORMITY**
Déclaration de conformité

Equipments of Protective Systems Intended for use in Potential Explosive Atmosphere
Directive 94/9/CE

*Equipements des systèmes de protection conçus pour un usage en zone potentiellement explosive
selon la Directive 94/9/CE*

Name and address of manufacturer

Nom et adresse du fabricant

TUNING

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Product description :

Description des produits :

Spring return and double acting pneumatic actuators

Actionneurs pneumatiques version simple et double effet

declares :

déclare :

that the above mentioned equipment, after having been evaluated, is in accordance with the
que l'équipement ci-dessous, après avoir été contrôlé est conforme à la Directive

94/9/CE - ATEX**Group/Groupe II Category/Catégories 2**

Eventually Applied Rules and Technical Specifications :

Normes et spécifications techniques additionnelles également appliquées :

ISO 5211 - VDI/VDE 3845

David Bismuth/General manager

15.12.2012

Rognac / France



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