

ECON PNEUMATIC RACK & PINION ACTUATORS

Spring return: Fig. 7901
Double acting: Fig. 7902



Scan for manual

Installation & Operation Manual for Pneumatic Actuator:
Fig. 7901 and 7902

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1. ERIKS operating companies

ECON pneumatic actuators are being delivered by several ERIKS operating companies on a worldwide basis. In this manual these will be referred to as 'ERIKS', the individual terms of delivery of the ERIKS operating company having executed the order are applicable.

2. Product description

ECON pneumatic actuator models SR/DA 500 and smaller

These ECON pneumatic actuators have been designed and manufactured in accordance with the following European Directives requirements:

- European Pressure Equipment Directive 2014/68/EU: classified according to Article 3, Part 3, Cat. SEP.
Marking: No CE marking.
- Machines Directive 78/392/EEC
- Directive 2014/34/EU ATEX, classification Group II, Cat. 2 for use in explosive atmospheres, Zones 1,2 & 21,22. Conformity evaluation according to Annex VIII.
Marking: CE an UKCA: Ex II 2G Ex h IIC T6 Gb / Ex II 2D Ex h IIIC T80°C Db
- EN 15714-3 Pneumatic Part-Turn Actuators For Industrial Valves

ECON pneumatic actuator models SR/DA 850 up to 1750

These ECON pneumatic actuators have been designed and manufactured in accordance with the following European Directives requirements:

- European Pressure Equipment Directive 2014/68/EU: classified according to Category I, Evaluation Procedure in conformity with module A (Internal Production Control)
Marking: CE and UKCA.
- Machines Directive 89/392/EEC.
- Directive 2014/634/EU ATEX, classification Group II, Cat. 2 for use in explosive atmospheres, Zones 1,2 & 21,22. Conformity evaluation according to Appendix VIII.
Marking: CE an UKCA: Ex II 2G Ex h IIC T6 Gb / Ex II 2D Ex h IIIC T80°C Db
- EN 15714-3 Pneumatic Part-Turn Actuators For Industrial Valves

ECON pneumatic actuator models SR/DA 2100 up to 9000

These ECON pneumatic actuators have been designed and manufactured in accordance with the following European Directives requirements:

- European Pressure Equipment Directive 2014/68/EU: classified according to Category II, Evaluation Procedure in conformity with module D1 (Production Control by Notified Body)
Marking: CE0343 and UKCA0038.
- Machines Directive 89/392/EEC.
- Directive 2014/634/EU ATEX, classification Group II, Cat. 2 for use in explosive atmospheres, Zones 1,2 & 21,22. Conformity evaluation according to Appendix VIII.
Marking: CE an UKCA: Ex II 2G Ex h IIC T6 Gb / Ex II 2D Ex h IIIC T80°C Db
- EN 15714-3 Pneumatic Part-Turn Actuators For Industrial Valves

Applied harmonized and non-harmonized technical Standards:

- See ECON data sheets, technical brochure and assembly & maintenance procedures.
- EN ISO 80079-36, EN ISO 80079-37 constructive security, EN 60079-0, EN 1127-1, Directive 2014/34/EU.

The electrical and mechanical accessories are not covered by this statement and will have to carry their own certificate in order to be assembled with ECON pneumatic actuators.

The suitability of the materials and design of the actuator type in terms of its working conditions are the responsibility of the actuator's end user.

SR & DA models

Material of body and end-caps: Aluminium

Service conditions for standard actuators:

- Maximum Pressure: 8 bar
- Minimum Temperature: -20° C
- Maximum Temperature: +80° C

Technical Standards & applied Specifications:

- Solenoid direct assembly according to Standard NAMUR VDI / VDE 3845
- Accessories assembly according to Standard NAMUR VDI / VDE 3845
- Connections to valves according to Standard EN ISO 5211

The ECON pneumatic actuators are designed according the information as mentioned in our latest catalogue and should be used in accordance with the applicable pressure-temperature rating as stated on in this document. The catalogue can be downloaded from the ERIKS website and webshop.

Pneumatic actuators are provided with markings according to EN 19. These markings make the identification of the pneumatic actuators easier and contains the following:

- CE and UKCA marking if applicable
- ECON logo
- Direction of rotation
- Maximum permissible supply pressure
- Type of actuator (spring return or double acting actuator)
- Model / size of actuator
- Number of springs for single acting versions
- Serial number
- Year and month of manufacturing (as part of the serial number)
- EN-ISO 5211 flange connection and double square dimensions

3. Requirements for maintenance staff

The staff assigned to assembly, operating and maintenance tasks should be qualified to carry out such jobs and in any circumstance, ensure personal safety.

4. Transport and storage

Transport and storage should always be protected against external forces, influence and destruction of the painting layer as well. The purpose of the painting layer is to protect the actuator against rust, during transport and storage. The actuator should be stored in an unpolluted space and should also be protected against all atmospheric circumstances. In order to prevent condensation formation, care should be taken to control temperature and humidity of storage. All actuators must be examined upon delivery to ensure that they have not suffered any damage during transport. Inform your supplier immediately in case there is any damage.

As standard, actuators are leaving the factory in closed position. An open position configuration must be specially requested.

WARNING!!

Actuators must be stored under a cover and protected from inclement weather conditions and dampness with air conducts properly covered.

Actuators should not be unpacked until their definitive installation, except for inspection purposes.

5. Function

ECON pneumatic actuators are designed to open and close quarter-turn valves by air.

5.1 APPLICABLE RANGE

The Pneumatic Actuators ECON uses a rack and pinion sliding system that creates a linear torque with a quarter turn operation. The range is the following:

Fig. 7901 Spring Return	Spring combinations										Fig. 7902 Double Acting
	S4	S5	S6	S7	S8	S9	S10	S11	S12		
SR-15	A	A	S	-	-	-	-	-	-	-	DA-10
SR-20	A	A	A	A	A	A	A	A	A	S	DA-15
SR-40	A	A	A	A	A	A	A	S	A	A	DA-20
SR-80	A	A	A	A	A	A	A	A	A	S	DA-40
SR-100	A	A	A	A	A	A	A	A	A	S	DA-80
SR-130	A	A	A	A	A	A	A	A	A	S	DA-100
SR-200	A	A	A	A	A	A	A	A	A	S	DA-130
SR-300	A	A	A	A	A	A	A	A	A	S	DA-200
SR-500	A	A	A	A	A	A	A	A	A	S	DA-300
SR-850	A	A	A	A	A	A	A	A	A	S	DA-500
SR-1200	A	A	A	A	A	A	A	A	A	S	DA-850
SR-1750	A	A	A	A	A	A	A	A	A	S	DA-1200
SR-2100	A	A	A	A	A	A	A	A	A	S	DA-1750
SR-2500	A	A	A	A	A	A	A	A	A	S	DA-2100
SR-4000	A	A	A	A	A	A	A	A	A	S	DA-2500
SR-6000	A	A	A	A	A	A	A	A	A	S	DA-4000
SR-9000	A	A	A	A	A	A	A	A	A	S	DA-6000
											DA-9000

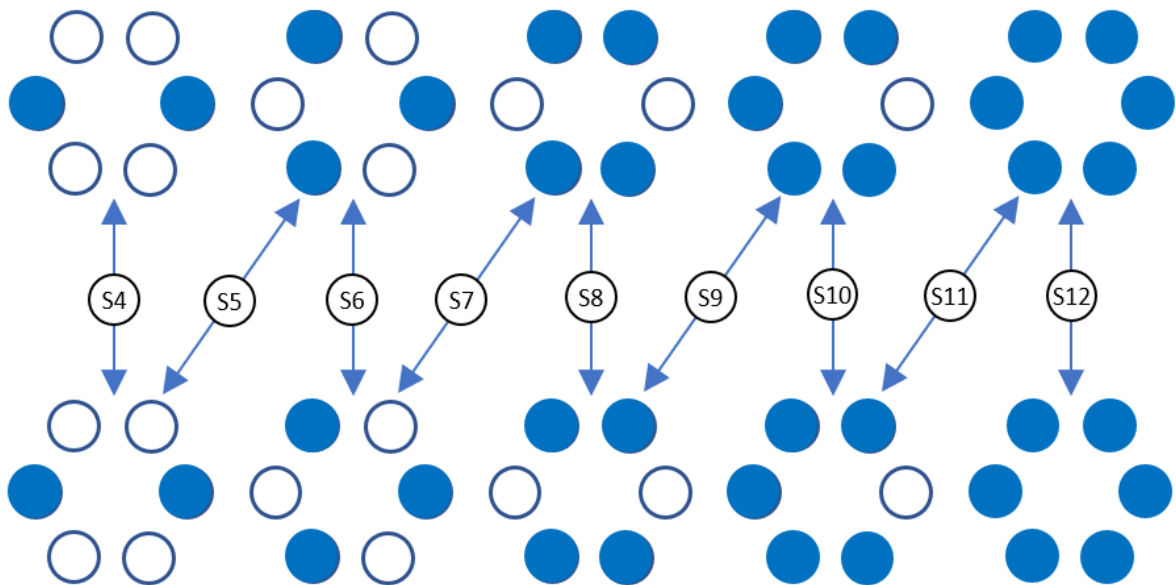
S - Standard combinator A - Available combination

5.2 SPRING COMBINATION BY TYPE OF ACTUATOR

ECON actuators use a maximum of six springs on each side of the actuator, always using the same type of spring independently of the amount of springs that will be used. The quantity of springs is identified as follows:

e.g.: S12 S = springs and 12 is the total number of springs assembled in the actuator. 6 springs on each side.

The following spring configurations are available:



6. Application

ECON pneumatic actuators are widely used for operation of quarter turn-valves. The pneumatic actuators are designed for standard operating conditions. For use in extreme conditions e.g. aggressive or corrosive environments, it is recommended to mention this at the ordering stage, in order to verify if the actuator is suitable. The installation designer is responsible for the pneumatic actuator selection and must determine if the actuator is suitable for the working conditions.

7. Installation

7.1 HANDLING AND INSTALLATION

Handling and transportation of actuators must be carried out with extreme precautions by using necessary and adequate means, in order to avoid injury to the operators handling them.

WARNING!!

Check the physical condition of actuators in order to detect any damage incurred during transport and/or handling.

Actuators should be installed in such a way that they are easy to access in order to do periodic inspections and corresponding maintenance operations, necessary to guarantee the performance qualities that they have been designed for.

WARNING!!

Actuators must not support unexpected stress. It is important to do the assembly of the actuator with a correct alignment and parallelism to guarantee that it is not submitted to unexpected stresses.

IMPORTANT!!

After the installation has been carried out, a final function test must be performed by making several full opening and closing strokes in order to ensure proper functioning of the actuator. The use of dry air increases the lifetime of the actuators, as well as the lifetime of their accessories, solenoids and other pneumatic accessories.

7.2 RECOMMENDED MINIMUM AIR QUALITY

For best possible service life and trouble-free operation, ISO 8573-1 quality class 5.4.4 should be used. This means a 40 µm (1570 µin) filter, dew point +3 °C (37.4 °F) for indoor operation (a lower dew point should be selected for outdoor operation, Quality class 3) and oil concentration 5 mg/m³ (3.92 ppm)

Quality class	Pollution		Water	Oil
	Particle size	Max. concentration	Max. press. dew point	Max. concentration
	µm	mg/m ³	°C	mg/m ³
1	0,1	0,1	-70,0	0,0
2	1,0	1,0	-40,0	0,1
3	5,0	5,0	-20,0	1,0
4	15,0	8,0	3,0	5,0
5	40,0	10,0	7,0	25,0
6	-	-	10,0	-

7.3 LUBRICATION

Actuators are factory lubricated for their lifetime in normal working conditions. Standard lubricant is suitable for use from -20°C up to 80°C.

For low and high temperature versions special lubricants are required. Please contact your distributor.

For standard versions we recommend to use Molykote B2.2 Plus or similar lubricants.

WARNING!!

Actuators are lubricated during assembly and do not require any further lubrication.

7.4 ACTUATOR MOUNTING

- Before mounting the actuator on the valve, make sure that they are in the same position, open or closed.
- When mounting the actuator on the valve, check the alignment between the valve stem and the actuator coupling (double square connection) and make sure they are fully aligned.
- In most cases ECON actuators can be mounted directly on the valve and in some cases a bracket and coupler is required. In both cases the coupling bolts must be tightened proportionally, distributing the stress, before tightening them completely.
- The standard direction of rotation is clockwise for closing and counter-clockwise for opening the valve. Upon request the direction of rotation can be inverted.
- ECON pneumatic actuators are provided with bi-directional pinion travel stops.

- Side located stop bolts allow a full $\pm 4^\circ$ travel adjustment between 86° and 94° . Adjustment of the counter-clockwise and clockwise rotation limitation is accomplished these bolts. A $1/3$ turn of the stop bolts equals 1° of rotation.

IMPORTANT!!

It is advisable to operate the actuator twice before fully tightening the coupling bolts in order to ensure a good centring.

8 Maintenance

8.1 PREVENTIVE MAINTENANCE

- This basically consists in a periodic inspection to check the functioning of the actuator.
- Actuators must be operated at least once every six months.
- It is the end user's responsibility to establish preventive maintenance plans and it is depending on the working conditions and influences of the environment.
- It is recommended to replace O-rings, guides and washers in case a full revision of the installation is made.

WARNING!!

Never leave the actuators opened or closed during a long period of time.

8.2 MAINTENANCE OPERATIONS - PRECATIONS

- Disconnect the actuator and its accessories from the air and electrical power supply.
- Check if the air supply and power supply have been disconnected correctly.
- Disassemble the solenoid or air connection from the actuator.
- Disassemble the actuator from the valve and/or from its couplings.

WARNING!!

- Always wear adequate protective clothing (Follow the safety guidelines established by your company!)
- Actuator parts may only be replaced by genuine ECON spare parts! The manufacturer cannot be held responsible in case genuine ECON parts have not been used.

8.3 REASONS FOR PARTS REPAIR AND REPLACEMENT

Parts of the actuator will have to be repaired or replaced as soon as leakage is detected through the upper O-ring (22) or lower O-ring (21) of the pinion, through the O-ring (20) of the piston or through the O-rings (31) of the end-caps.

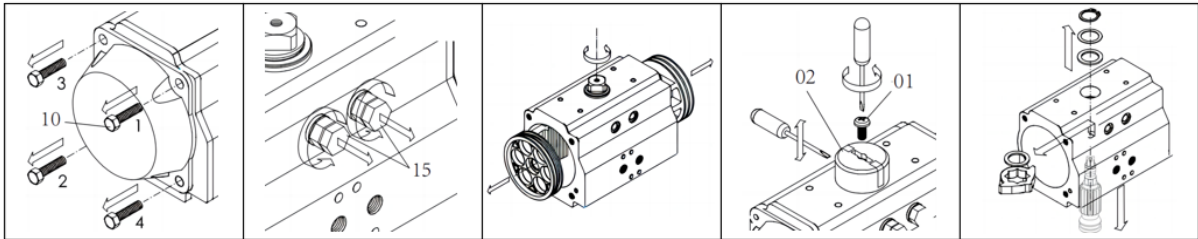
As soon as this happens, disassemble the actuator and replace all the O-rings, bushings, slide guides and washers as listed in the spares parts. These are available as repair kits.

8.4 DISASSEMBLY OF THE ACTUATOR

Once precautions prior to the disassembly have been taken, follow the next steps:

- Disassemble the end-caps (2) of the actuator by un-tightening the external bolts (10). The bolts of the spring return actuators have been designed in such way, that the springs will be completely unloaded before the bolts can be removed.
- Unfasten the nuts (12) in order to remove the travel stop bolts (11).
- Turn the pinion (3) counter-clockwise to disengage the pistons (4) for normally closed actuators and clockwise for normally open versions. Remove the pistons from the cylinder.

- Disassemble the position indicator (15), by removing the top cross head bolt (17) and washer (16).
- Remove circlip (14), washer (8) and bearing (7) and then remove the pinion (3) at the bottom side of the actuator body (1). The stroke adjustment device (6) will be left behind in the actuator body with this action. Remove it from the body.
- Clean all actuator parts.
- Examine all parts in order to check if there is any wear due to over-use.
- If everything is in good conditions, replace the O-rings, bushings, slide guides which are included in the ECON repair kit, before reassembling the actuator.
- Lubricate the parts of the actuator with Molykote B 2-2 plus grease or similar lubricant. Apply a thin layer of grease on the O-rings (20, 21, 22 and 31).



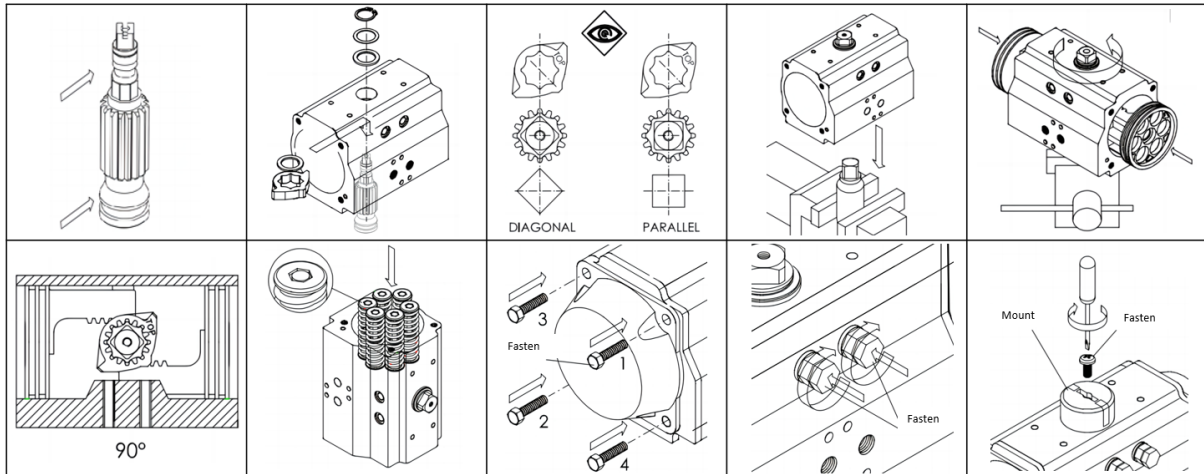
WARNING: Carefully examine the inside of the cylinder.

8.5 ASSEMBLY OF THE ACTUATOR

After the disassembly, the inspection and lubrication of the different parts proceed with the assembly, following the sequence below:

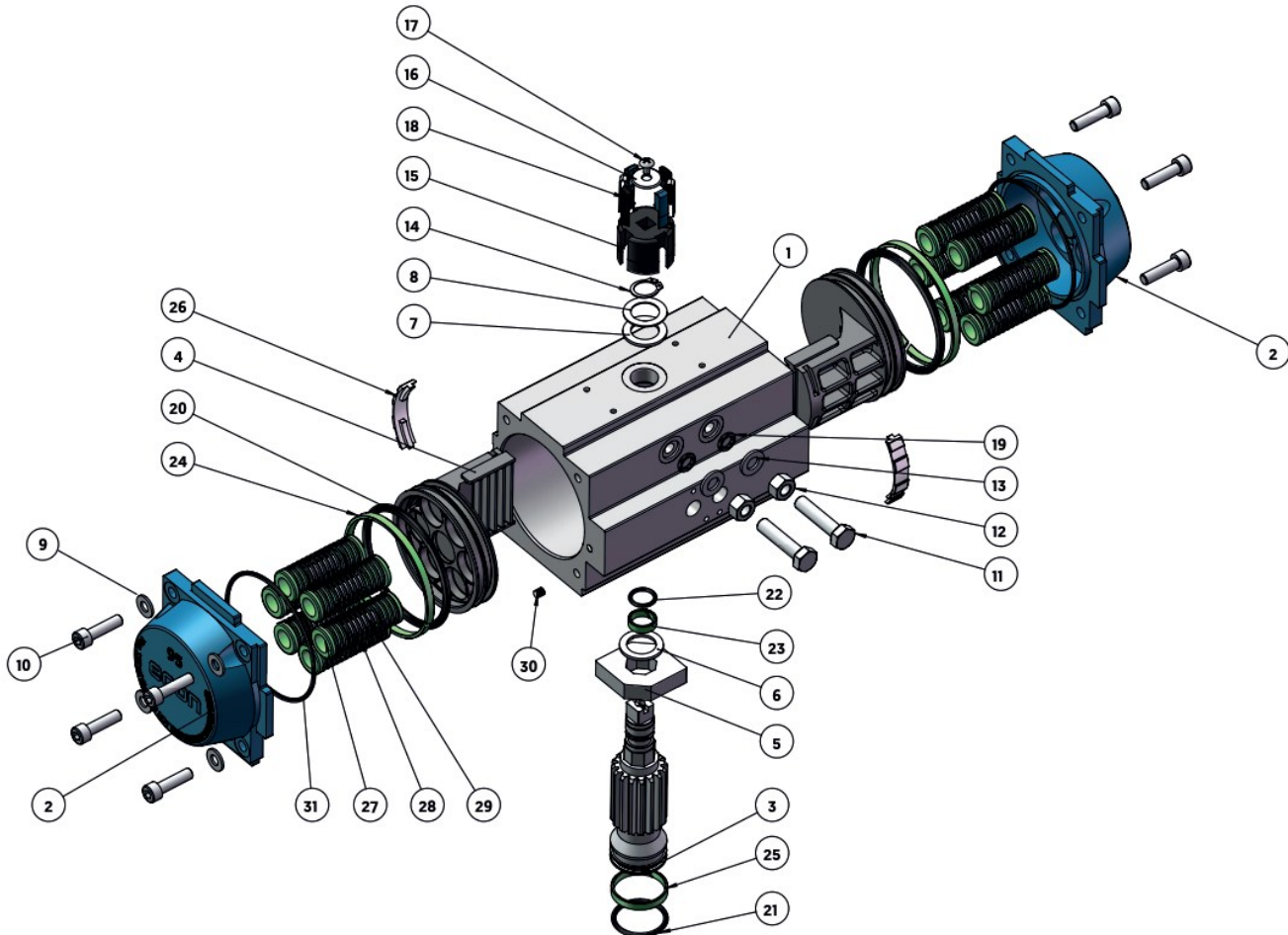
- Correctly assemble all parts included in ECON repair kit and pre-lubricate them.
- Place the pinion (3) in the actuator body (1) from the bottom side. Once the pinion appears through the inside of the body, assemble the stroke adjustment device (5) in its correct position and put the thrust bearing (6) on top. Slide the pinion into place, put thrust bearing (7) and washer (8) on the pinion and secure the pinion by mounting the circlip (14).
- Assemble both pistons (4) and check if they engage at the same time when turning the pinion (3). Clockwise for normally closed actuators and counter-clockwise for normally open actuators. Make sure the position indicating slot on the top side of the pinion is showing the correct position (open / closed)!
Hint: Mounting the pinions by using a vise and stem coupler. Put the actuator body with the pinion on the coupler. Use both hands to push the pistons in the actuator body and rotate the actuator body counter-clockwise at the same time. For Normally-open actuators the pistons must be turned 180 degrees and the actuator body must be turned clockwise.
- Mount the travel stop bolts (11).
- For double acting actuators: Mount both end-caps (2) and tighten the bolts (10) equally, crosswise.
- For spring return actuators: Put the springs (27 up to 29) in and mount the end-cap (2) on one side of the actuator. Tighten the bolts (10) equally, crosswise. Do the same for the other side. For the correct spring configuration please check paragraph 5.2.
- Check again if the open and closed positions coincide with the position indicating slot on top of the pinion. Mount the position indicator by using washer (16) and cross head bolt (17). Make sure the indicator is mounted in the correct position and is fully aligned with the position indicating slot on top of the pinion.

IMPORTANT!! Once the assembly is done, operate the actuator a few times.



9 Actuator parts

9.1 EXPLODED VIEW ECON ACTUATOR



Item	Description	Material	Item	Description	Material
1	Body	Hard anodized aluminium	17	Position indicator cross head bolt	Stainless steel/PA66
2	End-cap	Powder coated aluminium	18	Position indicator inserts	PA66 and stainless steel
3	Pinion	C45 / 1.1191, nickel plated	19	O-ring (stroke adjustment bolts) ¹	NBR
4	Piston	Aluminium	20	O-ring (piston) ¹	NBR
5	Stroke adjustment device	C45 / 1.1191	21	O-ring (pinion bottom side) ¹	NBR
6	Lower thrust bearing (pinion)	POM + PTFE	22	O-ring (pinion top side) ¹	NBR
7	Upper thrust bearing (pinion)	POM + PTFE	23	Upper bearing (pinion)	POM + PTFE
8	Thrust washer	Stainless steel	24	Sliding bearing (piston)	POM + PTFE
9	End-cap washer	Stainless steel	25	Lower bearing (pinion)	POM + PTFE
10	End-cap bolt	Stainless steel	26	Sliding side bearing (piston)	PA66
11	Stroke adjustment bolts	Stainless steel	27	Spring cartridge seat	PA66
12	Stroke adjustment lock-nut	Stainless steel	28	Spring	Spring steel
13	Stroke adjustment washer	Stainless steel	29	Spring cartridge centre piece	Copper
14	Pinion retainer (circlip)	Stainless steel	30	Air channel plug ¹	NBR
15	Position indicator/activator	PA66	31	O-ring (end-cap) ¹	NBR
16	Position indicator washer	Stainless steel			

REMARK: Part No. 27, 28 and 29, only for spring return actuators!

9.2 RECOMMENDED SPARE PARTS

The spare parts kit of the Fig.7901 and 7902 actuators consists of the following parts and are available from stock:

Item	Description	Material
19	O-ring (stroke adjustment bolts) ¹	NBR
20	O-ring (piston) ¹	NBR
21	O-ring (pinion bottom side) ¹	NBR
22	O-ring (pinion top side) ¹	NBR
23	Upper bearing (pinion)	POM + PTFE
24	Sliding bearing (piston)	POM + PTFE
25	Lower bearing (pinion)	POM + PTFE
26	Sliding side bearing (piston)	PA66
31	O-ring (end-cap) ¹	NBR

10 Troubleshooting

It is essential that the safety regulations are observed when identifying the fault.

WARNING!!

Before disassembling the actuator, follow the instructions given below:

10.1 ACTUATOR WITH SOLENOID VALVE

- A. If the actuator does not function check the following:
1. The valve is free to rotate. There are no obstructions.
 2. The actuator has the correct size (can supply sufficient torque).
 3. The correct voltage is supplied to the solenoid (the valve coil is tagged with the correct voltage).
 4. Sufficient compressed air is supplied to the solenoid valve.
- B. If the proper voltage and air pressure have been verified and the valve is free to move proceed as follows:
1. Apply the correct voltage to the solenoid valve. Check for a clicking sound.
 2. If sound is not detected:
 - I) Carefully unscrew the solenoid and solenoid stem from the block.
 - II) Re-apply voltage and observe the solenoid plunger. If it does not retract replace the solenoid valve.
 3. If the solenoid functions, remove both the solenoid and the mounting block for testing. Connect with a minimum of 3 barg air supply and correct voltage. Switch it on off and check the air flow. Air should flow out of only one outlet port when the solenoid is energised.
- C. If the actuator functions but exhibits leak or power loss accompanied by leakage proceed as follows:
1. Check the voltage of the solenoid. It must be within 10% of the specified voltage.
 2. Check compressed air supply. Ensure that no intense pressure drops occur as the unit is cycled. Loss of pressure can cause incomplete shifting of the spool valve in the block or at one of the piston seals of the actuator. A leaking piston seal will usually leak on either cycle, on spring return actuators, piston seal leakage will show at port B on the air manifold flange. A leaking spool valve will require replacing. Leaking piston seals can be restored by replacing the "O" rings with new ones.

10.2 ACTUATOR WITHOUT SOLENOID VALVE

For actuators without solenoid valve, (or those where the solenoid valve and mounting block are working correctly), remove the actuator from the valve, disassemble and check the following:

1. Make sure all air ports are clear of obstructions.
2. Make sure that the actuator is lubricated and that there is no solidified grease between the pinion and piston racks. If solidified grease is present, clean, dry, re-lubricate and reassemble.
3. Verify that the actuator pinion shaft and / or pistons are not seized. If seized, reassemble as per instructions in section 8.
4. If the unit exhibits excessive backlash, check the teeth on the piston racks for wear.
5. With spring return actuators, check for misplaced or broken springs. If spring is broken check the body for scoring.
6. If the actuator and valve are free reassemble the actuator and retest. If the unit still fails to operate, contact your distributor.

11 Removal

All dismantled and rejected actuators cannot be disposed with household waste. The valves are made of materials which can be re-used and should be delivered to designated recycling centres.