maintenance and installation instructions for pneumatic actuators series PA

1 general information

1.1	Please read the following instructions carefully before making any installation of the actuator.
1.2	Damages caused from the non-observance of these instructions are not covered in the warranty.
1.3	This documentation must be kept in dry place and available for use.
1.4	The installation and maintenance of the actuator must be made only by qualified personnel.
1.5	All mentioned position numbers refer to the enclosed part list.

2 technical characteristics

device	pneumatic actuator accordingly ISO 5211 series PAD (double acting) and PAS (single acting)
control medium	filtered and lubricated or non lubricated compressed air
max. operating pressure	8bar
ambient temperature	-20...+85°C -20 ...+150°C - seals FKM -40...+85°C - seals silicone
rotation angle	valves with 90° operation, end position +/-5° adjustable on both sides
lubrication	The internal lubrication is sufficient for the whole life of the actuator

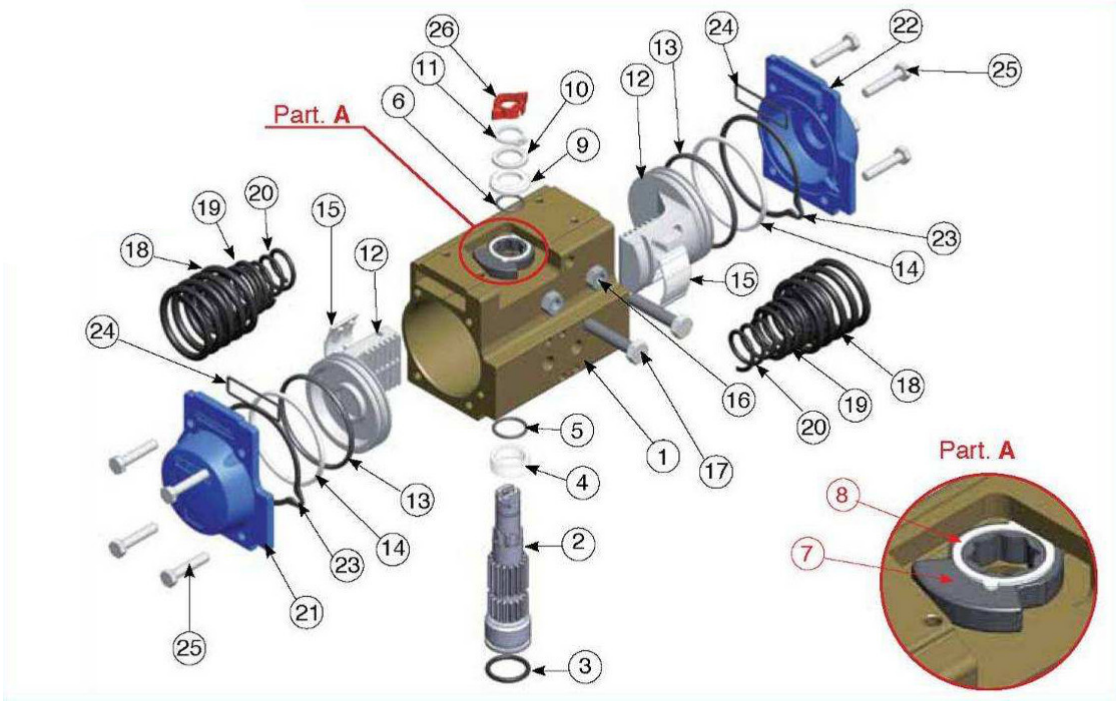
3 stocking

3.1	For applications where the actuator is not put into immediate service, it is recommended that the actuator be kept in clean and dry location with adequate protection from the environments. The original packing box helps in optimizing the storage.
3.2	The actuators have two air ports which should be plugged during storage to avoid any dirt intrusion.
3.3	For a long storage period we recommend to effect periodically a complete cycling, pressurizing the chambers.

4 maintenance

4.1	The internal lubrication is sufficient for the whole life of the actuator.
4.2	The materials used guarantee one million strokes under normal working conditions.
4.3	During abnormal working conditions, where it is intended to proceed in replacing wear parts (seals), we recommend replacing the guides as well, to ensure ideal working conditions.

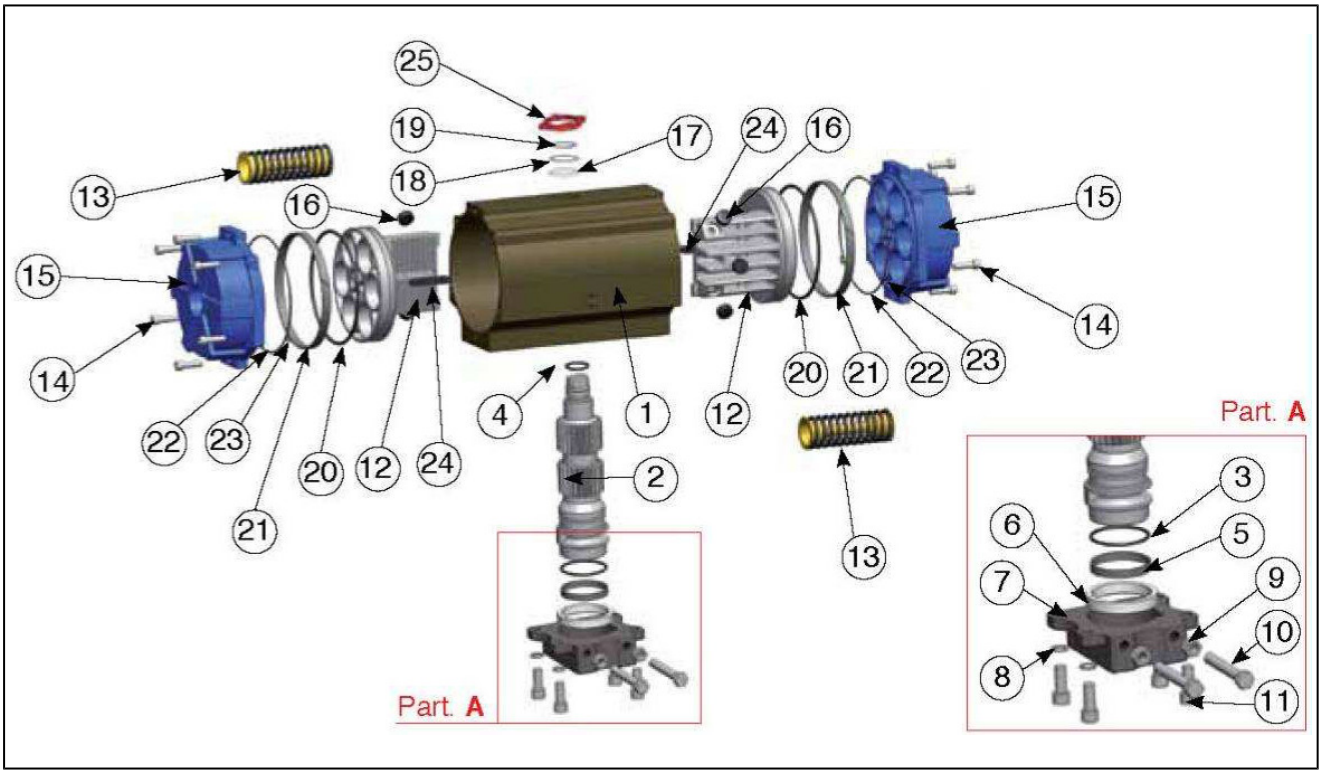
5 parts and part list for model 52...230



positon number	description	material	treatment	pieces PAD	pieces PAS
1	body	aluminum, extruded	hard-anodised	1	1
2	pinion	steel	nickel-plated	1	1
3*	o-ring	NBR		1	1
4*	distance ring	POM		1	1
5*	o-ring	NBR		1	1
6*	o-ring	NBR		1	1
7	cam	stainless steel		1	1
8	spacer ring	POM		1	1
9*	distance ring	POM		1	1
10	washer	stainless steel		1	1
11	circlip	steel	nickel-plated	1	1
12	piston	aluminum, casted		2	2
13*	o-ring	NBR		2	2
14*	slide ring	POM		2	2
15*	piston guide	POM		2 [4]	2 [4]
16	lock nut	stainless steel		2	2
17	stop bolt	stainless steel		2	2
18	outer spring	steel	coated	0	see data-sheet
19	middle spring	steel	coated	0	
20	inner spring	steel	coated	0	
21	left end cap	aluminum, casted	coated	1	1
22	right end cap	aluminum, casted	coated	1	1
23	seal end cap	NBR		2	2
24	o-ring	NBR		2	2
25	end cap mounting srew	stainless steel		8	8
26	position indicator	thermoplastic elastomer TPE		1	1

[4] only for model 140-160-180-200-230
* wear parts

6 parts and part list for model 270...330



positon number	description	material	treatment	pieces PAD	pieces PAS
1	body	aluminum, extruded	hard-anodised	1	1
2	pinion	steel	nickel-plated	1	1
3*	o-ring	NBR		1	1
4*	o-ring	NBR		1	1
5*	slide ring	PTFE 15% graphite		1	1
6*	slide ring	PTFE		1	1
7	plate	GGG40	coated	1	1
8	washer	stainless steel		4	8
9	lock nut	stainless steel		2	2
10	stop bolt	steel	zinc plated	2	2
11	mounting srew	stainless steel		4 [8]	4 [8]
12	piston	aluminum, casted		2	2
13	precompressed spring	steel	coated	0	see data-sheet
14	end cap mounting srew	stainless steel		12 [16]	12 [16]
15	end cap	aluminum, casted	coated	2	2
16*	piston guide	POM		6 [8]	6 [8]
17*	distance ring	POM		1	1
18	washer	stainless steel		1	1
19	circlip	steel	nickel-plated	1	1
20*	o-ring	NBR		2	2
21*	slide ring	PTFE 15% graphite		2	2
22	o-ring	NBR		2	2
23	o-ring	NBR		4 [2]	4 [2]
24	key	POM		2	2
25	position indicator	thermoplastic elastomer TPE		1	1

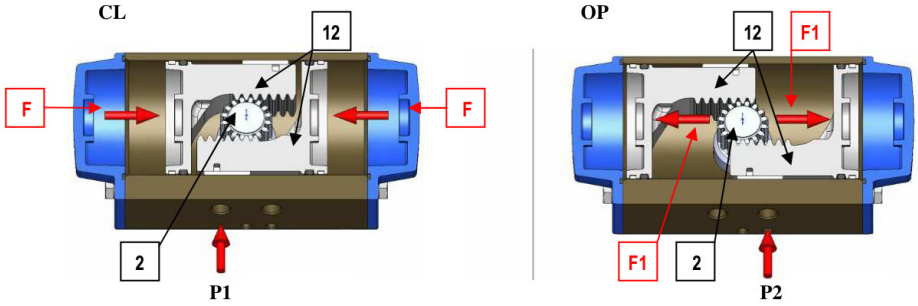
[x] only for model 330
* wear parts

7 functionality

7.1 The actuator transforms the linear motion of the piston (12), due to the thrust effected by the pressure on the surface area to a rotary motion. Therefore the pinion (2) rotates 90°. As a result the pneumatic actuator can be used for remote operation of valves.

7.2 double acting

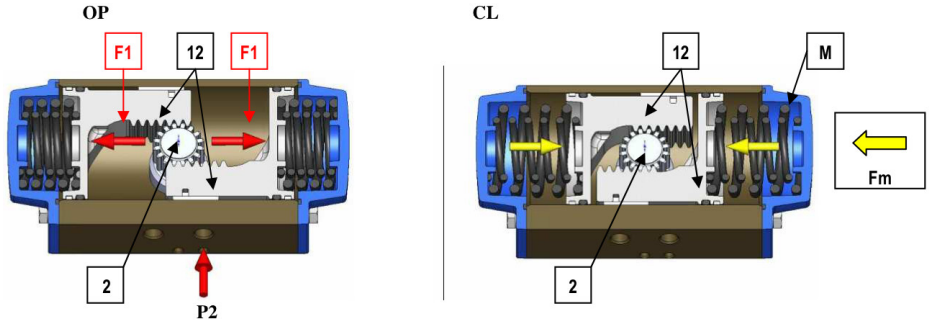
1. By pressurizing port P1, the external chambers fill up with compressed air. The pressure on the surface of the pistons (12) creates a force (F) pushing them close to the pinion (2). This causes a clockwise torque.
2. When the pistons (12) are closed to the pinion, pressurizing air port P2, the internal chamber fill up and the action of the pressure on the pistons surface creates a force (F1) which pushes them closed to the end caps, generating a torque with counterclockwise rotation.



CL = close, OP = opening, 12 = piston, 2 = pinion, P1 = pressure connection "close", P2 = pressure connection "opening"

7.3 single acting

1. By pressurizing port P2, the internal chamber of the actuator fill up. The pressure on the surface of the pistons (12) creates a force (F1) pushing them away from each other. This causes a counterclockwise torque.
2. In this position the springs are compressed. By de-pressurizing air port P2, the springs (M) start the unfolding phase creating a force (Fm) which pushes the pistons (12) closed to the pinion. At the pinion a torque will be generated in clockwise direction.



CL = close, OP = opening, 12 = piston, 2 = pinion, P2 = pressure connection, M = springs

8 Disassembly for model 52...230

warning: It is recommended to use suitable safety equipment during maintenance, due to the heavy and / or bulky parts!

8.1 Before disassemble the actuator remove all pneumatic and electrical supplies.

8.2 Remove any accessory which could be damaged.

8.3 During the removal of the actuator from the valve should be made notes. These support the user during subsequent assembly.

8.4 Place the actuator on a support with a square of the same size of the pinion (2), in order to execute easily the following steps. (figure 1)

8.5 Before starting the disassembly, verify by the stamps on the body if the actuator is double acting (PAD) or spring return (PAS). This is relevant to the fact that a spring returned actuator has compressed springs under the end caps.

8.6 For double acting actuator: Remove slowly and diagonally the end cap screws (25) from each end cap (21-22). (figure 2)

8.7 For spring return actuator: Remove slowly, piece wise and diagonally the screws (25) from each end cap (21-22). (figure 2)
attention: Loosening the screws of the end cap releases the springs. When unscrewing the length of the screws permit the springs to be fully de-compressed!

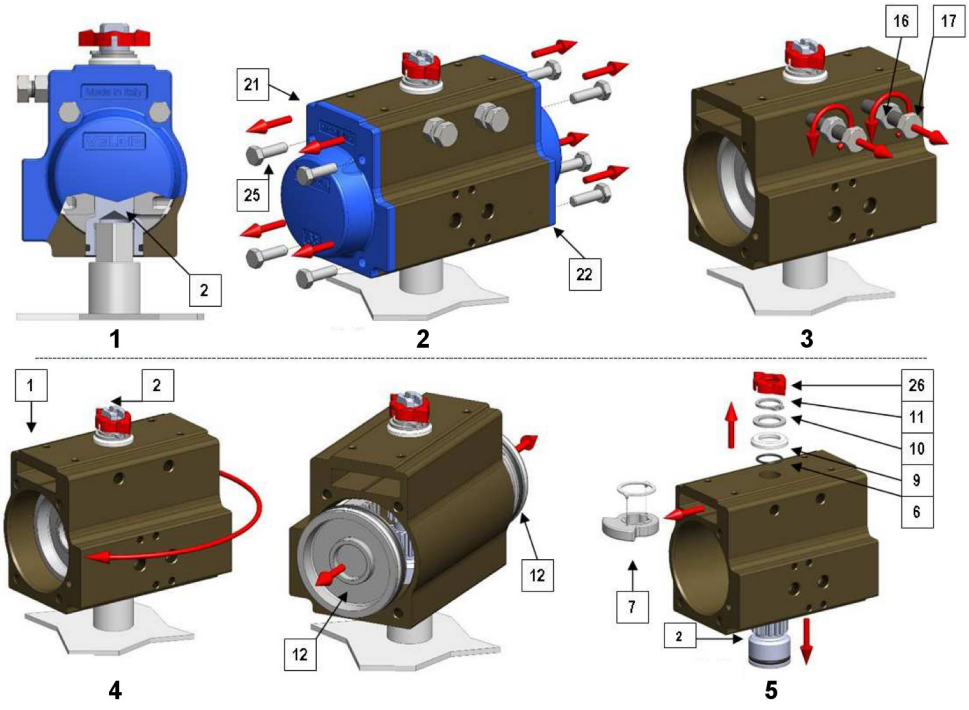
8.8 Loosen nuts (16) and unscrew completely screws (17). (figure 3)

8.9 Rotate the actuator body (1) in a clockwise direction respect to the pinion (2) so that the pistons move towards body ends. In this way both pistons can be removed. (figure 4)
attention: Do not use compressed air to remove the pistons from the cylinder.

8.10 Remove the position indicator (26), the circlip (11), the washer (10), the spacer ring (9) and the o-ring (6) from the pinion (2). (figure 5)

8.11 Remove the pinion (2) from the cylinder (1) with special caution for all seals. (If necessary with the use of a rubber hammer) (figure 5)

8.12 Remove the cam (7) by tilting the cylinder (1). (figure 5)



9 Disassembly for model 270...330

warning: It is recommended to use suitable safety equipment during maintenance, due to the heavy and / or bulky parts!

9.1 Before disassemble the actuator remove all pneumatic and electrical supplies.

9.2 Remove any accessory which could be damaged.

9.3 During the removal of the actuator from the valve should be made notes. These support the user during subsequent assembly.

9.4 Place the actuator on a support with a square of the same size of the pinion (2), in order to execute easily the following steps. (figure 6)

9.5 Before starting the disassembly, verify by the stamps on the body if the actuator is double acting (PAD) or spring return (PAS). This is relevant to the fact that a spring returned actuator has compressed springs under the end caps.

9.6 For double acting actuator: Remove slowly and diagonally the end cap screws (14) from each end cap (15). (figure 7)

9.7 For spring return actuator: Remove slowly, piece wise and diagonally the end cap screws from each end cap (15). (figure 7) attention: Loosening the screws of the end cap releases the springs. When unscrewing the length of the screws permit the springs to be fully de-compressed!

9.8 Loosen nuts (9) and unscrew completely screws (10). (figure 8)

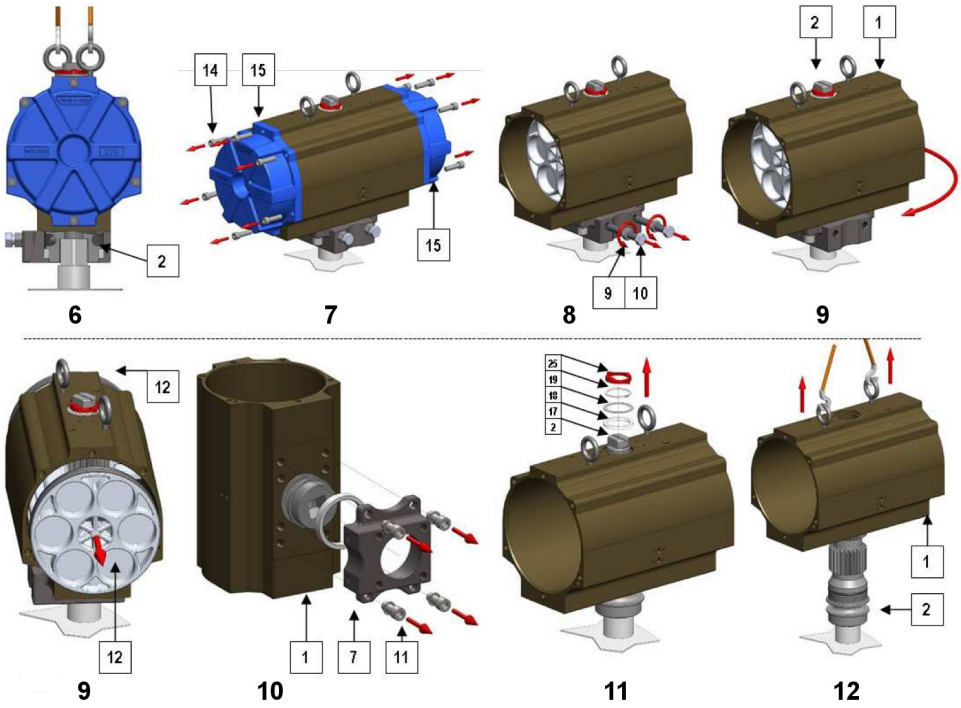
9.9 Rotate the actuator body (1) in a clockwise direction respect to the pinion (2) so that the pistons move towards body ends. In this way both pistons can be removed. (figure 9) attention: Do not use compressed air to remove the pistons from the cylinder.

9.10 Lay the actuator on one base of its cylinder (1). Then the screws (11) can be loosen diagonally to remove the plate (7). (figure 10)

9.11 Then mount the actuator on the support again.

9.12 Remove the position indicator (26), the circlip (19), the washer (18) and the spacer ring (17) from the pinion (2). (figure 11)

9.13 Slowly lifting of the body (1). Remove the pinion (2) from the cylinder (1) with special caution for all seals. (If necessary with the use of a rubber hammer) (figure 12)



10 Assembly for model 52...230

warning: It is recommended to use suitable safety equipment during maintenance, due to the heavy and / or bulky parts!

10.1 Clean the components before proceeding with the assembly.

10.2 To facilitate assembly place the pinion (2) on a support. The pinion (2) is fitted with the lower o-ring (3), the spacer ring (4) and the upper o-ring (5) before inserting. The O-rings must be lubricated. It is recommended the usage of "Klüber TRIBO STAR 1EP". (figure 13)

10.3 Screw in one stop bolt (17) with nut (16) in the right adjustment hole of the cylinder (1). Then let the cam (7) with the spacer ring (8) slide down on the guiding on the cylinder until it stops against the screw. (figure 14)

10.4 Now lower the cylinder (1) onto the pinion (2). Rotate the body (1) by approx. 50° to the upper slot of the pinion. (figure 15)

10.5 Fit on the pinion (2) the o-ring (6), the distance ring (9), the washer (10), the circlip (11) and the position indicator (26). (figure 16)

10.6 Grease the internal chamber of the cylinder (1) and both pistons (12) provided with o-ring (13), sliding ring (14) and piston guide (15). It is recommended the usage of "Klüber TRIBO STAR 1EP".

10.7 Push the pistons (12) into the body (1) until the pistons teeth are stopped by the teeth of the pinion (2).

10.8 Keeping a soft pressure with the hands on the pistons (12), rotate the body (1) in clockwise rotation to lock the pistons in place. when the pinion (2) is properly seated then feeling two easy snaps in. (figure 17)

10.9 Now rotate the body (1) in clockwise rotation. At the same time the pistons (12) are pulled into the cylinder. (figure 17)
information: By measuring their equal distance from each end face of the body the pistons can be checked for a correct fit. Correct assembly gives symmetric stroke of the pistons, verifiable by equal distances and eventually correcting the distance by executing previous mentioned steps.

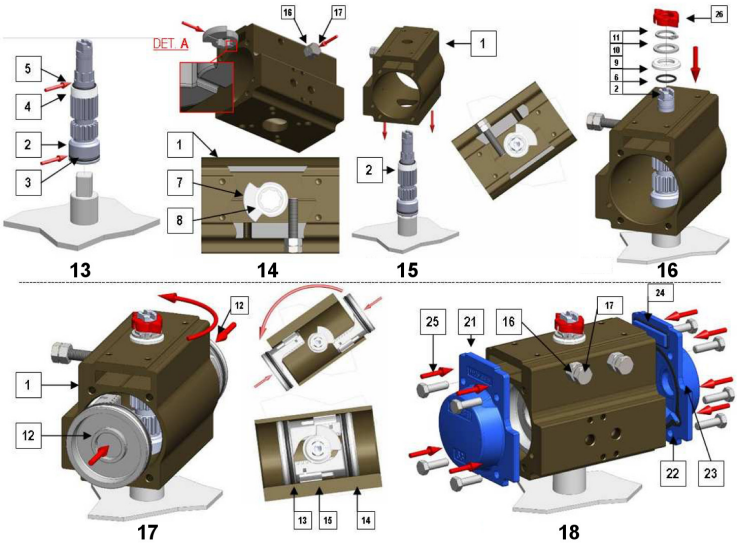
10.10 Screw in second stop bolt (17) with nut (16) in the left adjustment hole of the cylinder (1).

10.11 Now the adjustment of the stroke is made by turning the stop bolts (17) and secure their position by means of locknuts (16). The stroke adjustment is explained in more detail in section 12.

10.12 For double acting actuator: Attaching the end caps (21-22) with o-ring (24) and seal (23) and diagonally mounting of the screws (25). (figure 18)

10.13 For spring return actuator: Insert the spring set (18-19-20) in the body (1), putting them in the piston recess (12), then assemble the end cap (21-22) with o-ring (24) and seal (23) on the springs, centering it in the recess.
information: Pistons must be in "closed" position.
Now the screws (25) diagonally and tightened against the same to move the springs evenly till the end caps (21-22) are connected fixed to the housing.

10.14 Finally the actuator should be checked for leaks and run tested before it is eventually rebuilt on the valve.



11 Assembly for model 270...330

warning: It is recommended to use suitable safety equipment during maintenance, due to the heavy and / or bulky parts!

11.1 Clean the components before proceeding with the assembly.

11.2 To facilitate assembly place the pinion (2) on a support. The pinion (2) is fitted with the lower o-ring (3), the spacer ring (5) and the upper o-ring (4) before inserting. The O-rings must be lubricated. It is recommended the usage of "Klüber TRIBO STAR 1EP". (figure 19)

11.3 Now lower the cylinder (1) onto the pinion (2). (figure 20)

11.4 Fit on the pinion the distance ring (17), the washer (18), the circlip (19) and the position indicator (26). (figure 21)

11.5 Remove the actuator from the support. Lay the actuator on one base of its clylinder (1) to mount the plate (7) with the slide ring (6). (Holes for the stop bolts on the same side as the NAMUR attachments) Fix the plate with the mounting screws (11) and washers (8) in crossed sequence.Then mount the actuator on the support again. (figure 22)

11.6 Grease the internal chamber of the cylinder (1) and both pistons (12) provided with o-ring (20), sliding ring (21), key (24) and piston guide (16). It is recommended the usage of "Klüber TRIBO STAR 1EP".

11.7 Rotate the body (1) by approx. 50° to the upper slot of the pinion. (figure 23)

11.8 Push the pistons (12) into the body (1) until the pistons teeth are stopped by the teeth of the pinion (2).

11.9 Keeping a soft pressure with the hands on the pistons (12), rotate the body (1) in clockwise rotation to lock the pistons in place. when the pinion (2) is properly seated then feeling two easy snaps in.

11.10 Now rotate the body (1) in clockwise rotation. At the same time the pistons (12) are pulled into the cylinder. (figure 24) information: By measuring their equal distance from each end face of the body the pistons can be checked for a correct fit. Correct assembly gives symmetric stroke of the pistons, verifiable by equal distances and eventually correcting the distance by executing previous mentioned steps.

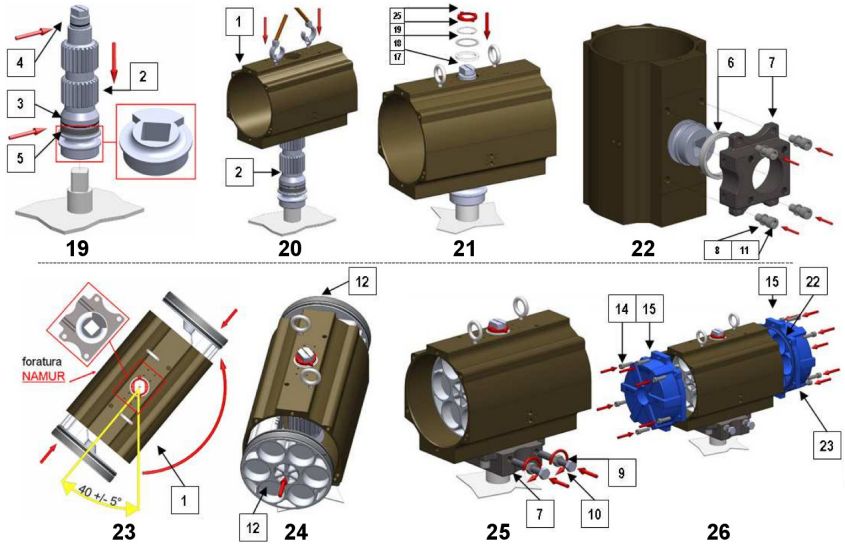
11.11 Screw in the stop bolts (10) with nuts (9) in the plate. (figure 25)

11.12 Now the adjustment of the stroke is made by turning the stop bolts (17) and secure their position by means of locknuts (16). The stroke adjustment is explained in more detail in section 12.

11.13 For double acting actuator: Attaching the end caps (15) with o-ring (22-23) and seal (23) and diagonally mounting of the screws (25). Repeat the operation on the opposite side. (figure 26)

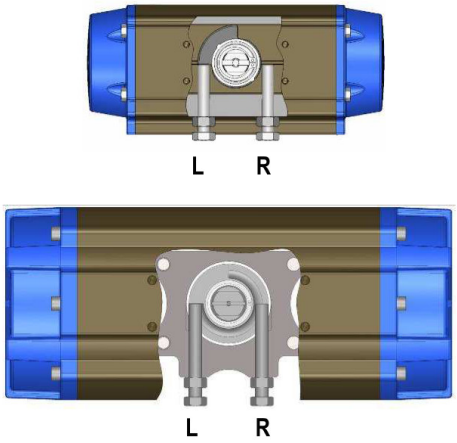
11.14 For spring return actuator: Insert the spring set (13) in the body (1), putting them in the piston recess (12), then assemble the end caps (15) with o-ring (22-23) on the springs, centering it in the recess. information: Pistons must be in "closed" position. Now the screws (14) diagonally and tightened against the same to move the springs evenly till the end caps (15) are connected fixed to the housing. Repeat the operation on the opposite side. (figure 26)

11.15 Finally the actuator should be checked for leaks and run tested before it is eventually rebuilt on the valve.

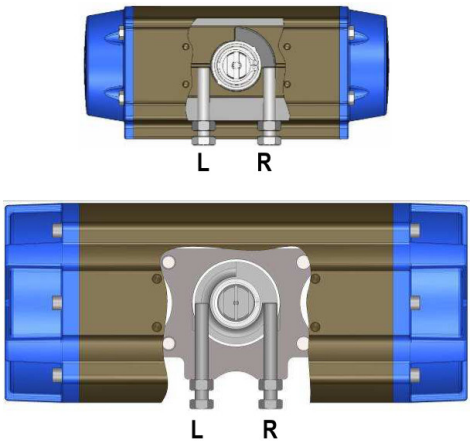


12 stroke adjustment

12.1 By adjusting left stop bolt the open position (Standard version) will be changed, closed position (reversed pistons version) respectively.



12.2 By adjusting right stop bolt the closed position (Standard version) will be changed, open position (reversed pistons version) respectively.



information: During the adjustment the pinion must not be mounted on a support.

12.3 Stroke adjustment of the piston for open position

1. Before disassemble the actuator remove all pneumatic and electrical supplies. This can be done by manually pushing the pistons to the closed position.
2. Adjust the corresponding stop bolt.
3. Move the pistons to the open position and verify the new adjustment.
4. Repeat this operation until desired adjustment is achieved.

12.4 Stroke adjustment of the piston for closed position

1. Before disassemble the actuator remove all pneumatic and electrical supplies. This can be done by manually pushing the pistons to the open position.
2. Adjust the corresponding stop bolt.
3. Move the pistons to the closed position and verify the new adjustment.
4. Repeat this operation until desired adjustment is achieved.

The latest manuals can be found at www.stasto.eu.