

Installation, Operation, and Maintenance Instructions

WARNING:

For your safety and protection it is important that the following precautions be taken prior to working on the actuator.

1. Remove from the actuator all dust that may cause sparks; clean periodically to prevent dusting on the actuator. Do not hit the actuators with metallic objects, as they may give off sparks.
2. The installation and the maintenance of pneumatic actuators must be assigned to trained and qualified personnel.
3. The use of the actuators out of the allowed temperature and pressure ranges may cause damage to the internal and external components.
4. Prior to any installation and maintenance of the actuator, close and disconnect any kind of power or air supply.
5. Disassembling the spring return type actuators (springs inside) may cause severe injuries. The maintenance must be assigned to qualified expert personnel in full observance of the instruction described at paragraph 5, otherwise, the actuator has to be returned to PBM.

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1 Service conditions

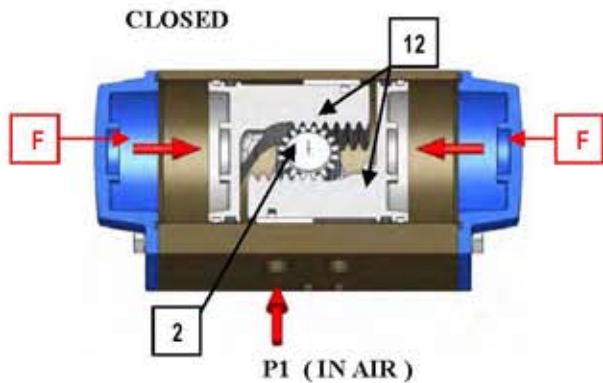
- **AIR SUPPLY:** dehumidified or lubricated air (standard). Other non-corrosive gases or fluids are a possible alternative option, if compatible to the materials of the actuator components (internal parts and lubricant).
- **WORKING PRESSURE:** minimum 2.5 BAR, 36 PSI – maximum 8 BAR, 116 PSI
- **TEMPERATURE:**
 - minimum -20°C to maximum + 85°C - standard execution – NBR gaskets
 - minimum -20°C to maximum + 150°C - HIGH temperature execution – FKM (Viton) gaskets
 - minimum -40°C to maximum + 85°C - LOW temperature execution – silicone gaskets
 - **Warning:** in case of high or low temperature executions a special grease is used as lubricant and such conditions may alter the torque generated by the actuator. For further information please refer to PBM.
- **ROTATION:** half turn, 0° – 90° adjustable ±5° in both end positions (double adjustment)..
- **LUBRICATION:** The actuators are equipped with filled-for-life lubrication for normal service conditions.
- **OPERATING TIME:** Please refer to the technical documentation. The operating time depends on various parameters such as air supply pressure, capacity of the air supply installation (size of piping, control equipment), type of valve and fluid, selected safety factor, temperature, etc.

Note: the numbers in parenthesis refer to the components in the exploded view of page 3 for mod. 42-230 and page 4 for mod 270-330.

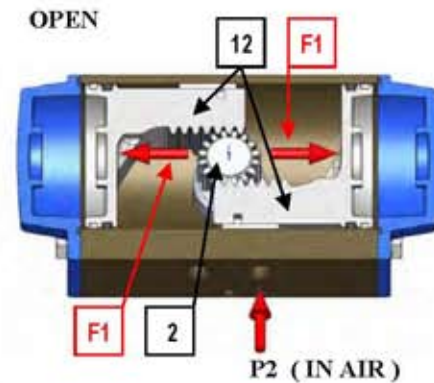
2 Function

The air pressure acts on the surface of the pistons (12) causing their alternate movement, which is converted into rotation (standard 90°) of the pinion (2). As a result the pneumatic actuators can be used for remote operation of valves.

2.1 Double acting

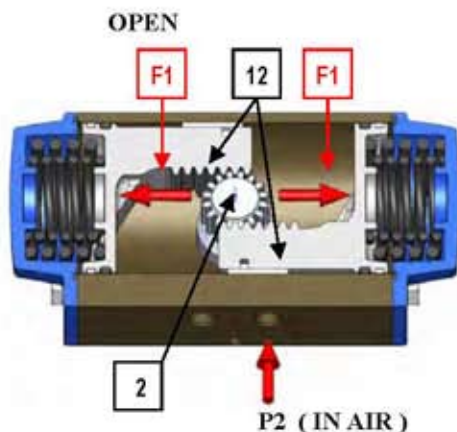


Supplying air through port P1, the external chambers fill up and the pressure on the surface of the pistons (11) creates a force (F) pushing them close to the pinion, generating a torque with **CLOCKWISE** rotation. (top view)

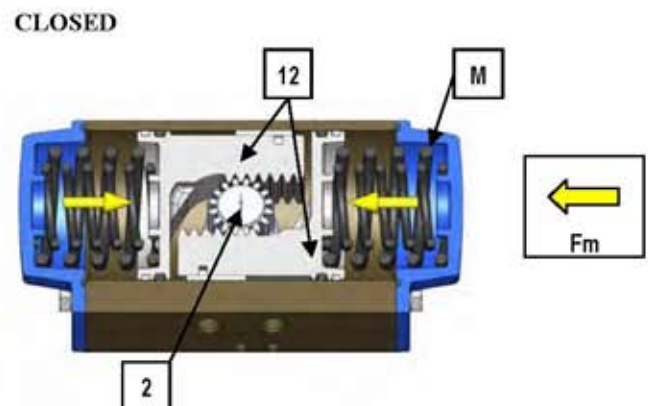


When the pistons (12) are close to the pinion, supplying air through port P2 the internal chamber fills up and the pressure on the surface of the pistons creates a force (F1) pushing them away from each other, generating a torque with **COUNTERCLOCKWISE** rotation. (top view).

2.2 Spring return



Supplying air through port P2, the internal chamber fills up and the action of the pressure on the surface of the pistons (12) creates a force (F1) pushing them away from each other, generating a torque with **COUNTERCLOCKWISE** rotation. (top view)



The springs (M) are now compressed. Terminating the supply of air through port P2 the **springs (M) start extending** and apply a force (Fm) pushing the pistons (12) close to the pinion, generating a torque with **CLOCKWISE** rotation. (top view).

3 Storage

It is recommended that the actuator be kept in a clean and dry place. The state of preservation during the storage time is improved if the actuator is preserved in the original packing box.

For a **long storage period** we recommend to effect periodically one complete cycling by pressurizing the chambers.

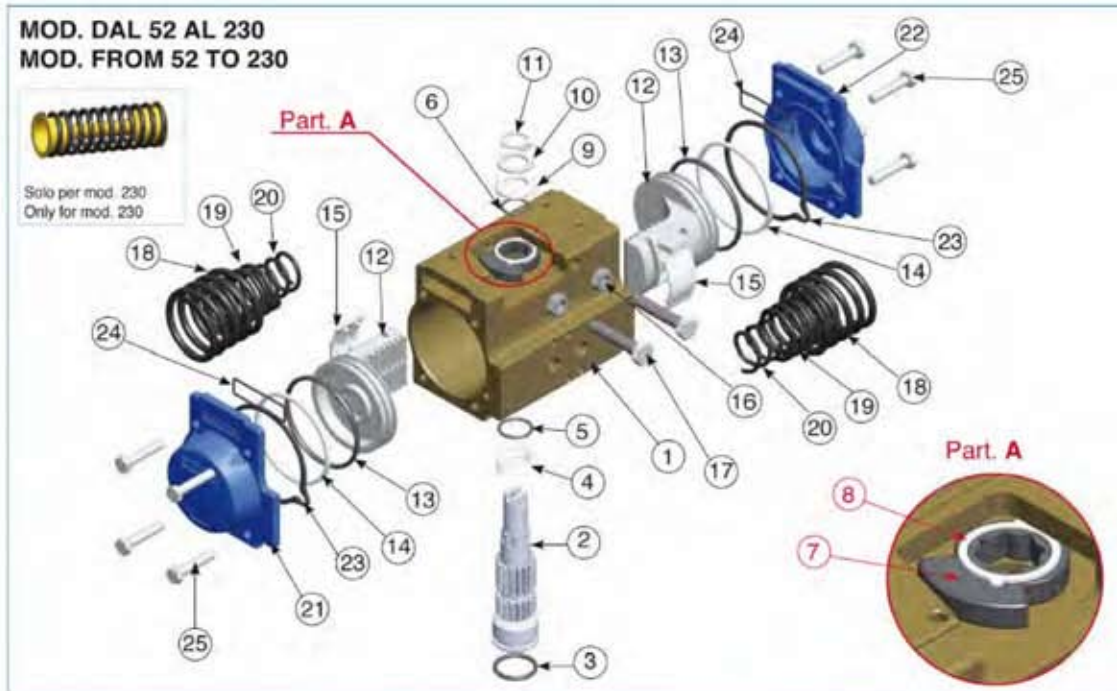
The actuators have two air ports which should be plugged during storage to avoid any intrusion.

4 Maintenance

The maintenance of the actuator is permitted to Valbia personnel or to properly trained personnel. Valbia supplies the spare parts (gaskets, guide elements) in appropriate kits (except for lubricating grease). The maintenance may become necessary between 500,000 and 1,000,000 cycles, according to the local service conditions.

5 Exploded view

5.1 Exploded view for actuators from mod. 52 to mod. 230



ITEM	DESCRIPTION	MATERIAL	TREATMENT	QUANTITY DA	QUANTITY SR
1	BODY	EXTRUDED ALUMINUM	HARD ANODIZED	1	1
2	ANTI-BLOWOUT PINION	STEEL	NICKEL PLATED	1	1
3*	O-RING	NBR		1	1
4*	SPACER RING	POM		1	1
5*	O-RING	NBR		1	1
6*	O-RING	NBR		1	1
7	CAM	STAINLESS STEEL		1	1
8	SPACER	POM		1	1
9*	SPACER	POM		1	1
10	WASHER	STAINLESS STEEL		1	1
11**	SNAP RING	STEEL	NICKEL PLATED	1	1
12	PISTON	DIE CAST ALUMINUM		2	2
13*	O-RING	NBR		2	2
14*	ANTIFRICTION RING	POM		2	2
15*	THRUST BLOCK	POM		2 [4]	2 [4]
16	STOP BOLT RETAINING NUT	STAINLESS STEEL		2	2
17	STOP BOLT	STAINLESS STEEL		2	2
18	EXTERNAL SPRING	STEEL	ZINC-PHOSPHATE	0	SEE SPRING SETTING AT PAGE 15
19***	CENTRAL SPRING	STEEL	ZINC-PHOSPHATE	0	
20	INTERNAL SPRING	STEEL	ZINC-PHOSPHATE	0	
21	LEFT END CAP	DIE CAST ALUMINUM	PAINTED	1	1
22	RIGHT END CAP	DIE CAST ALUMINUM	PAINTED	1	1
23	END CAP SEATS	NBR		2	2
24	O-RING	NBR		2	2
25	END CAP FIXING SCREW	STAINLESS STEEL		8	8

[x] mod. 140-160-180-200-230

* Part subject to wear

** Reinforced series DIN471 - UNI 7436

*** mod. 160-180-200

VALIDO DA MOD. 52 A MOD. 140
VALIDO FROM MOD. 52 TO MOD. 140

SET DI MOLLE
SPRING SETTING

SET STANDARD-00

SET	NUMERO MOLLE EXTERNAL SPRING	NUMERO MOLLE INTERNAL SPRING
01	1	1
02	2	-
03	1	2
04	2	1
05	2	2

VALIDO PER MOD. 160 A MOD. 200
VALIDO FOR MOD. 160 FROM MOD. 200

SET DI MOLLE
SPRING SETTING

SET STANDARD-00

SET	NUMERO MOLLE EXTERNAL SPRING	NUMERO MOLLE INTERNAL SPRING	NUMERO MOLLE INTERNAL SPRING
01	-	2	-
02	2	-	-
03	1	2	-
04	2	-	2
05	2	2	-
06	2	2	2

VALIDO PER MOD. 230
VALIDO FOR MOD. 230

SET DI MOLLE
SPRING SETTING

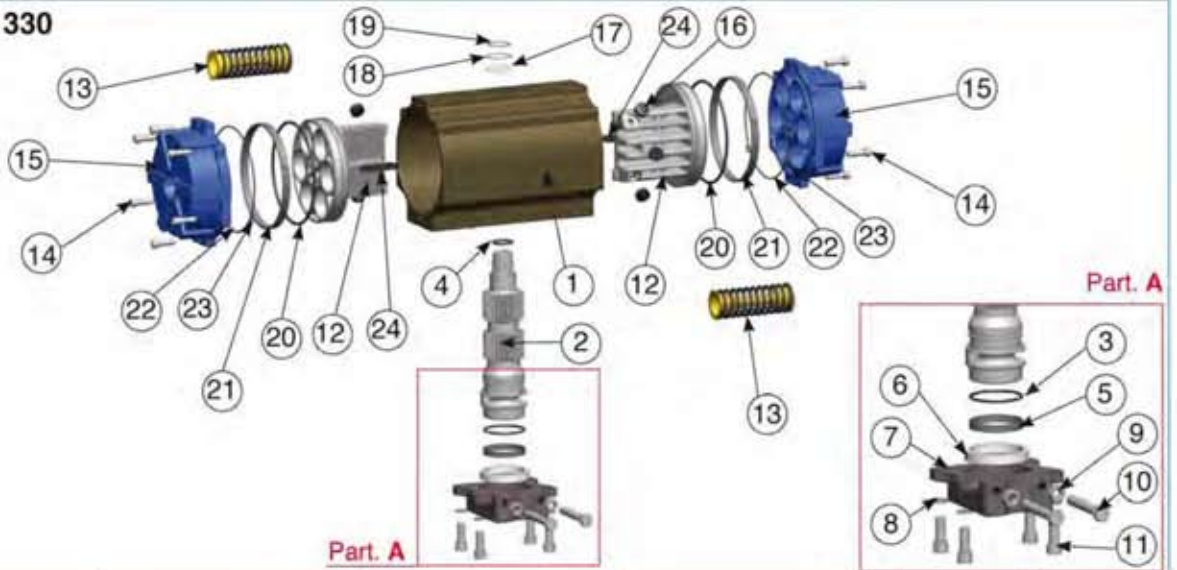
MOLLA UNICA PRECOMPRESSA
PRE-TENSIONED SPRING

SET	NUMERO MOLLE PER LATO N° OF SPRINGS PER EACH SIDE
01	3/3
02	3/3
03	3/4
04	4/3
05	4/5
06	5/5

MOD.230

5.2 Exploded view mod. 270 and 330

MOD. 270 - 330



ITEM	DESCRIPTION	MATERIAL	TREATMENT	QUANTITY DA	QUANTITY SR
1	BODY	EXTRUDED ALUMINUM	HARD ANODIZED	1	1
2	ANTI-BLOWOUT PINION	STEEL	NICKEL PLATED	1	1
3*	O-RING	NBR		1	1
4*	O-RING	NBR		1	1
5*	ANTIFRICTION RING	PTFE 15% GRAPHITE		1	1
6*	ANTIFRICTION RING	PTFE		1	1
7	PLATE	GGG40	PAINTED	1	1
8	WASHER	STAINLESS STEEL		4	8
9	STOP BOLT RETAINING NUT	STAINLESS STEEL		2	2
10	STOP SCREW	STEEL	ZINC PLATED	2	2
11	FIXING SCREWS	STAINLESS STEEL		4	4
12	PISTON	DIE CAST ALUMINUM	ZINC-PHOSPHATE	2	2
13	PRECOMPRESSED SPRING	STEEL		0	See spring setting at page 15
14	END CAP FIXING SCREW	STAINLESS STEEL		12	12
15	END CAP	DIE CAST ALUMINUM	PAINTED	2	2
16*	THRUST BLOCK	POM		6	6
17*	SPACER RING	POM		1	1
18	PINION WASHER	STAINLESS STEEL		1	1
19	SNAP RING	STEEL	NICKEL PLATED	1	1
20*	O-RING	NBR		2	2
21*	ANTIFRICTION RING	PTFE 15% GRAPHITE		2	2
22	O-RING	NBR		2	2
23	O-RING	NBR		4	4
24	ANTI BLOWOUT KEY	POM		2	2

[x] only for mod. 330
* Part subject to wear

SET DI MOLLE SPRING SETTING	
MOLLA UNICA PRECOMPRESSA PRETENSIONED SPRING	
SET	N° MOLLE PER LATO N° OF SPRINGS FOR EACH SIDE
01	2/3
02	3/3
03	3/4
04	4/4
05	4/5
06	5/5
07	5/6
08	6/6

MOD.270 e 330

6.2 Disassembling mod. 270 and mod. 330

CAUTION : It is recommended to use suitable safety equipment during the handling for maintenance because of heavy and/or bulky parts.

1. Disconnect pneumatic and electric supplies from the actuator;
2. After having disconnected the air power supply, remove carefully any accessory attached to the actuator, preventing any damage during the handling;
3. Detach the actuator from the valve taking carefully note of all references that may be helpful for the attachment after maintenance;
4. Place the actuator on a support with a square of the same size of the pinion (2) so as to easily execute the below listed operation (see Fig. 6);
5. Before disassembling the actuator **check** from the label on the body whether it is a double acting (DA) or spring return (SR) type;
6. For **DOUBLE ACTING ACTUATOR** : Unscrew in crossed sequence the screws (14) for fastening the end caps (15), see Fig. 7 ;
For **SPRING RETURN ACTUATOR** : Unscrew **GRADUALLY** in crossed sequence the screws (14) for fastening the end caps (15), see Fig. 7 ;
Note: the screws are long enough to hold the pre-compressed springs (13) even if extended;
7. Loosen nuts (9) and unscrew completely screws (10) see Fig. 8;
8. Rotate the cylinder (1) in clockwise direction (top view) holding the pinion (2) so as to release the rack of the pistons (12) from the pinion (2) and to push the pistons towards the cylinder ends. Now both pistons (12) can be removed, see Fig. 9.
NOTE: Do not use compressed air to remove the pistons (12) from the cylinder (1)
9. Lay the actuator on one base of its cylinder (1) and unscrew the screws (11) in crossed sequence to remove the plate (7) see Fig. 10 ;
10. Place the actuator on the support again;
11. remove the snap ring (19) from the pinion (2), the washer (18), the spacer (17) see Fig. 11 ;
12. Gradually raise the cylinder (1), make sure that the pinion (2) gets extracted with special caution for all seatings (if necessary use a rubber hammer), see Fig. 12 ;

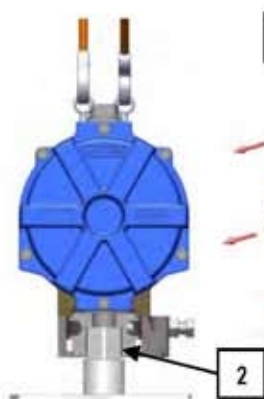


Fig.6

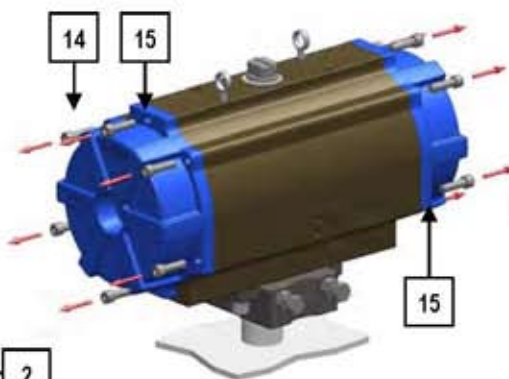


Fig.7



Fig.8

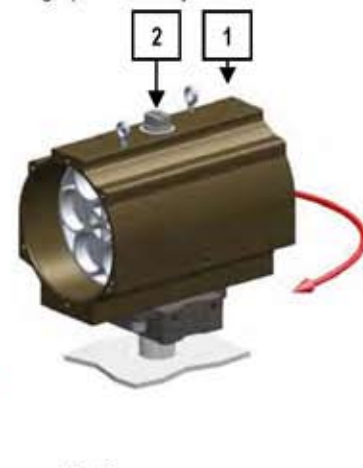


Fig.9



Fig.9

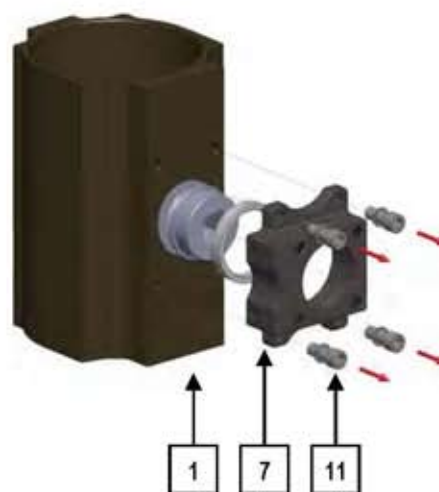


Fig.10



Fig.11



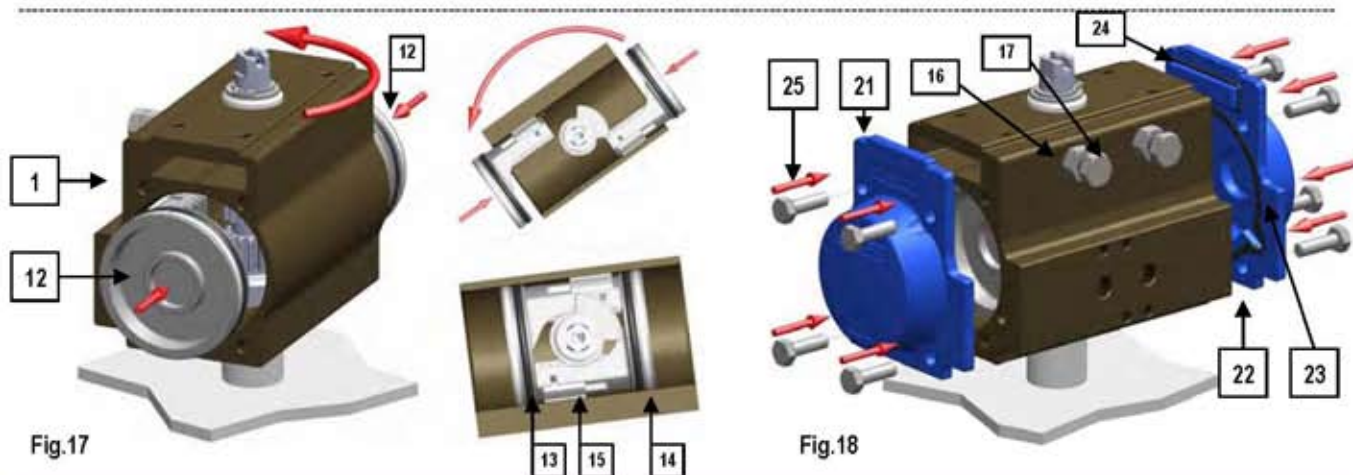
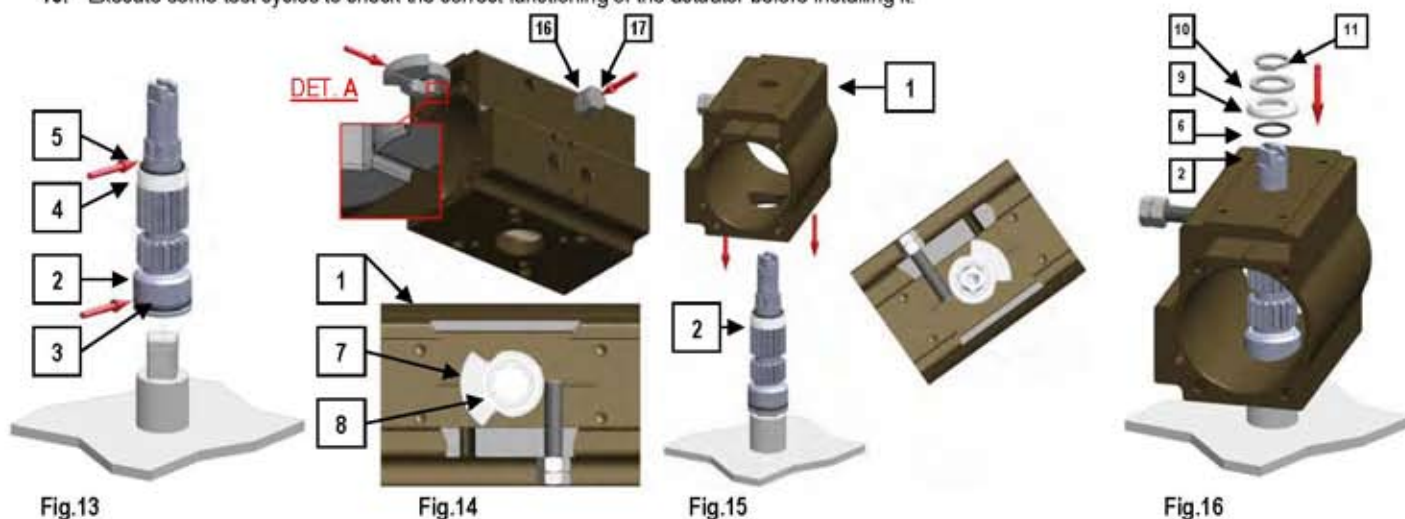
Fig.12

7 Assembling

7.1 Assembling mod.52 to mod.230

CAUTION : It is recommended to use suitable safety equipment during the handling for maintenance because of heavy and/or bulky parts.

- Before assembling clean all components preferably with degreaser.
- Place the pinion (2) on a support with a square of the same size of the female attachment. Make sure that the pinion is provided with lower O-ring (3), spacer (4) and upper O-ring (5). Lubricate the O-rings (see arrows fig. 13) ;
The recommended lubricating grease is "KLUBER" TRIBO STAR 1EP"
- Screw down one adjustment screw (17) with nut (16) in the right adjustment hole of the cylinder (1) and let the cam (7) with ring (8) slide down on the guiding rail on the cylinder (1) (see detail. A Fig.14) until it stops against the screw;
- Lay the cylinder (1) down on the pinion (2) holding it with the NAMUR surface rotated by approx. 50° to the upper slot of the pinion, see fig. 15 ;
- Fit on the pinion (2) the O-ring (6), the spacer (9), the washer (10), the snap ring (11), see Fig. 16 ;
- Grease the internal chamber of the cylinder (1) and both pistons (12) provided with O-ring (13) antifriction ring (14) and thrust block (15) -
The recommended lubricating grease is "KLUBER" TRIBO STAR 1EP".
- For the standard execution (clockwise rotation opens) press the pistons (12) into the cylinder (1) while turning the cylinder (1) in counterclockwise direction (top view) until the pistons come into contact, see fig. 17 ;
- Screw down the second adjustment screw (17) with nut (16) in the cylinder (1) and adjust the travel stop, see paragraph 8;
- For **DOUBLE ACTING ACTUATOR**: Mount the end cap (21-22) with O-ring (24) and gasket (23) on the cylinder and screw down in crossed sequence the screws (25), see fig. 18. Repeat the operation on the opposite side.
- For **SPRING RETURN ACTUATOR**: Introduce the spring set (18-19-20) into the cylinder (1) and center them on the piston (12), then mount the caps (21-22) with O-ring (24) and gaskets (23) centred on the springs (18-19-20). **Note: the pistons have to be in CLOSED position.** Screw partially down the screws (25) in crossed sequence compressing the springs uniformly until the cap is completely closed, see fig. 18. Repeat the operation on the opposite side;
- Execute some test cycles to check the correct functioning of the actuator before installing it.



7.2 Assembling mod. 270 and mod. 330

CAUTION : It is recommended to use suitable safety equipment during the handling for maintenance because of heavy and/or bulky parts.

1. Before assembling clean all components preferably with degreaser.
2. Place the pinion (2) on a support with a square of the same size of the female attachment. Make sure that the pinion is provided with lower O-ring (3), spacer (5) and upper O-ring (4). Lubricate the O-rings (see arrows fig. 19);
The recommended lubricating grease is "KLUBER" TRIBO STAR 1EP"
3. Lay the cylinder (1) down on the pinion (2), see fig. 20 ;
4. Fit on the pinion (2) the spacer (17), the washer (18), the snap ring (19), see Fig. 21 ;
5. Remove the cylinder with pinion from the support and lay it on one base to mount the plate (7) with antifriction ring (6), (holes for adjusting screws on the same side as the NAMUR attachments) then screw down the fastening screws (11) with washer (8) in crossed sequence, see Fig. 22, and place the cylinder on the support again;
6. Grease the internal chamber of the cylinder (1) and both pistons (12) provided with O-ring (20) antifriction ring (21) anti blowout key (24) and thrust block (16)- The recommended lubricating grease is "KLUBER" TRIBO STAR 1EP".
7. Rotate the cylinder (1) by approx. 50° to the upper slot of the pinion, see fig. 23;
8. For the standard execution (clockwise rotation opens) press the pistons (12) into the cylinder (1) while turning the cylinder (1) in counterclockwise direction (top view) until the pistons come into contact, see fig. 23, 24;
9. Introduce the adjustment screws (10) with nut (9) into the plate (7) to adjust the travel stop, see Fig. 25 and paragraph 8 ;
10. For **DOUBLE ACTING ACTUATOR**: Mount the end cap (15) with O- ring (22-23) and gasket (23) on the cylinder and screw down in crossed sequence the screws (25), see fig. 18. Repeat the operation on the opposite side.
For **SPRING RETURN ACTUATOR**: Introduce the spring set (13) into the cylinder (1) and center them on the piston (12), then mount the caps (15) with O-ring (22-23) centred on the springs (13). **Note: the pistons have to be in CLOSED position.** Screw partially down the screws (14) in crossed sequence compressing the springs uniformly until the cap (15) is completely closed, see fig. 26. Repeat the operation on the opposite side;
11. Execute some test cycles to check the correct functioning of the actuator before installing it.

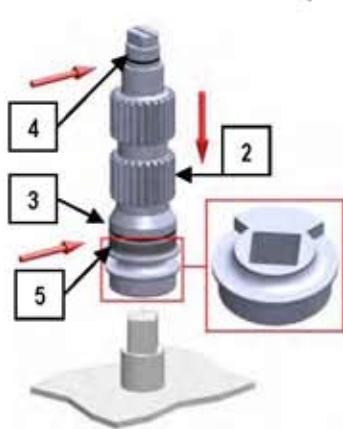


Fig.19



Fig.20

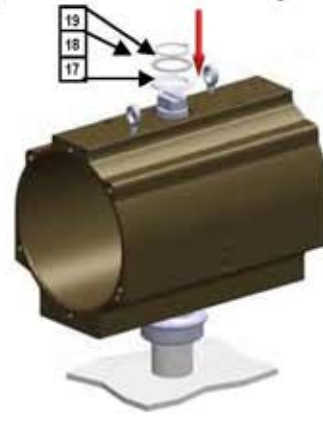


Fig.21



Fig.22

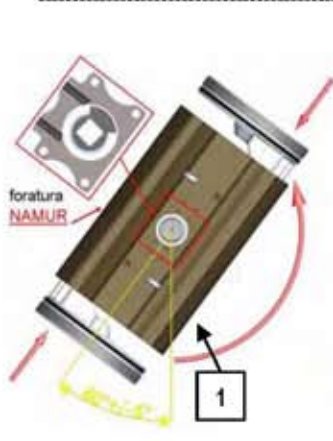


Fig.23

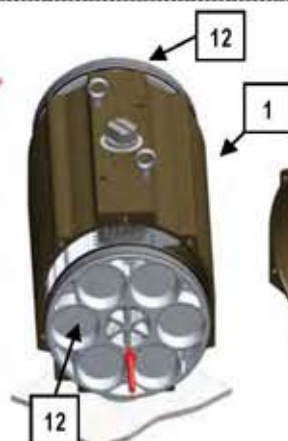


Fig.24



Fig.25

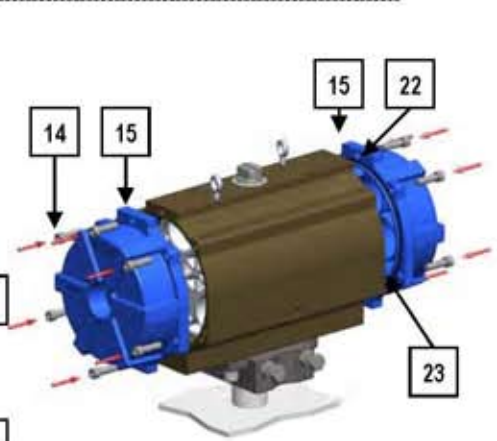


Fig.26

8 Adjustment

By means of the left screw the 90° end position (open) can be adjusted, see Fig. 27, of the right screw the 0° end position (closed), see Fig. 28.

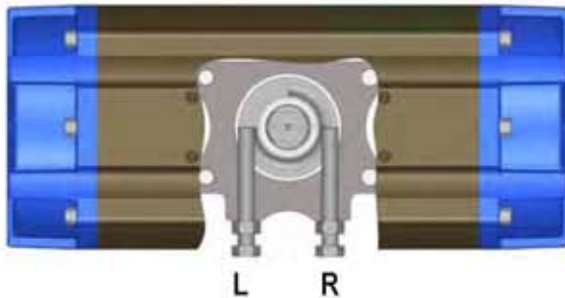
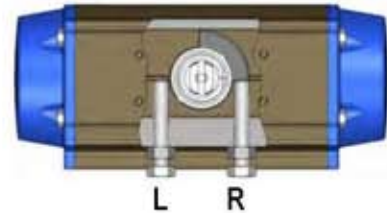
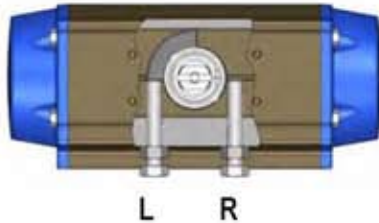


Fig.27

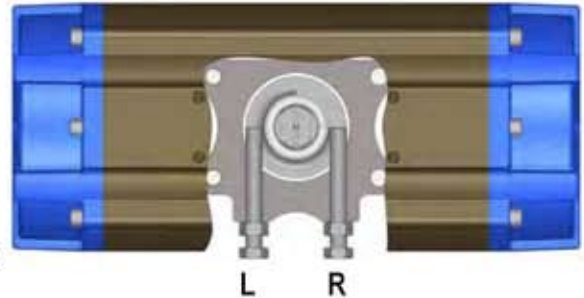


Fig.28

NOTE : During the adjustment the pinion must not be blocked on the support.

8.1 Adjustment procedure, actuator in open position

- Put the actuator in closed position;
- Adjust by means of the left adjustment screw (L);
- Put the actuator in open position and check the adjustment
- Repeat until the desired adjustment is achieved;
- Hold the screw in the correct position and tighten the nut.

8.2 Adjustment procedure, actuator in closed position

- Put the actuator in open position (supply compressed air for mod SR);
- Adjust by means of the right adjustment screw (R);
- Put the actuator in closed position and check the adjustment (interrupt the air supply for mod. SR);
- Repeat until the desired adjustment is achieved;
- Hold the screw in the correct position and tighten the nut.

Installation, Operation, and Maintenance Instructions

Torque Ratings Double Acting Actuators

Weights & Operation Volumes

Actuator Model	Air pressure at actuator (psig)	
	60 psig	80 psig
	Constant Torque Output (in-lbs)	
PAVCL453D -- 0052	133	179
PAVCL453D -- 0063	238	321
PAVCL453D -- 0075	435	586
PAVCL453D -- 0085	629	851
PAVCL453D -- 0100	991	1,336
PAVCL453D -- 0115	1,640	2,210
PAVCL453D -- 0125	2,157	2,906
PAVCL453D -- 0140	3,013	4,018
PAVCL453D -- 0160	4,394	5,859
PAVCL453D -- 0200	8,239	10,981
PAVCL453D -- 0270	19,097	25,469

Actuator Model	Rotate CCW	Rotate CW	PAVC series
	Volume (cu.in.)	Volume (cu.in.)	Approx. wgt (lbs)
PAVCL453D -- 0052	6.1	7.9	3.0
PAVCL453S -- 0052	6.1	6.7	3.5
PAVCL453D -- 0063	12	14	4.4
PAVCL453S -- 0063	12	11.6	5.3
PAVCL453D -- 0075	22	27	7.7
PAVCL453S -- 0075	22	22	9.1
PAVCL453D -- 0085	31	39	10.4
PAVCL453S -- 0085	31	32	12.9
PAVCL453D -- 0100	48	61	14.7
PAVCL453S -- 0100	48	49	18.8
PAVCL453D -- 0115	79	104	23.7
PAVCL453S -- 0115	79	84	30.7
PAVCL453D -- 0125	99	135	28.9
PAVCL453S -- 0125	99	109	37.7
PAVCL453D -- 0140	138	193	43.7
PAVCL453S -- 0140	138	146	57.6
PAVCL453D -- 0160	220	290	58.3
PAVCL453S -- 0160	220	215	79.0
PAVCL453D -- 0200	350	600	99.1
PAVCL453S -- 0200	348	463	147
PAVCL453D -- 0270	915	1,086	222

Torque Ratings - Spring Return Actuators

Actuator Model	Spring Set	Spring Torque Output (in-lbs)		Air Pressure at Actuator (psig)					
				60		80			
		Torque Output from Pressure (in-lbs)							
		Start	End	Start	End	Start	End		
PAVCL253S - -0052	03	66	38	80	47	N/A	N/A		
PAVCL453S - -0052	05	88	60	N/A	N/A	101	55		
PAVCL253S - -0063	03	128	71	149	79	N/A	N/A		
PAVCL453S - -0063	05	196	111	N/A	N/A	193	95		
PAVCL253S - -0075	03	234	125	275	137	N/A	N/A		
PAVCL453S - -0075	05	358	193	N/A	N/A	354	157		
PAVCL253S - -0085	03	307	183	387	211	N/A	N/A		
PAVCL453S - -0085	05	456	273	N/A	N/A	503	257		
PAVCL253S - -0100	03	495	279	628	329	N/A	N/A		
PAVCL453S - -0100	05	733	417	N/A	N/A	802	378		
PAVCL253S - -0115	03	786	442	1,044	541	N/A	N/A		
PAVCL453S - -0115	05	1,176	657	N/A	N/A	1,352	637		
PAVCL253S - -0125	03	969	611	1,351	640	N/A	N/A		
PAVCL453S - -0125	05	1,412	900	N/A	N/A	1,762	789		
PAVCL253S - -0140	03	1,617	853	1,910	856	N/A	N/A		
PAVCL453S - -0140	05	2,251	1,200	N/A	N/A	2,481	1,017		
PAVCL253S - -0160	04	2,443	1,522	2,447	1,350	N/A	N/A		
PAVCL453S - -0160	05	2,860	1,917	N/A	N/A	3,452	2,240		
PAVCL253S - -0200	04	4,040	2,686	4,788	3,080	N/A	N/A		
PAVCL453S - -0200	06	5,900	4,009	N/A	N/A	5,893	3,539		
PAVCL253S - -0270	05	10,788	6,915	11,495	6,884	N/A	N/A		
PAVCL453S - -0270	08	14,387	9,230	N/A	N/A	15,360	9,220		