

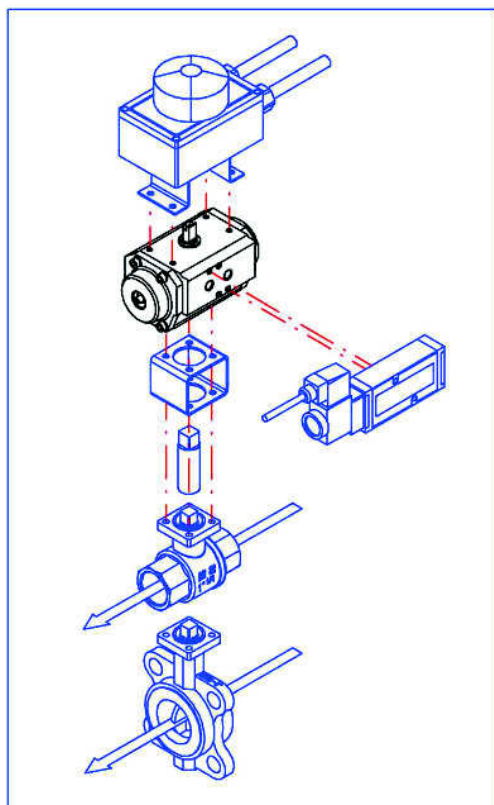


INSTRUCTION MANUAL

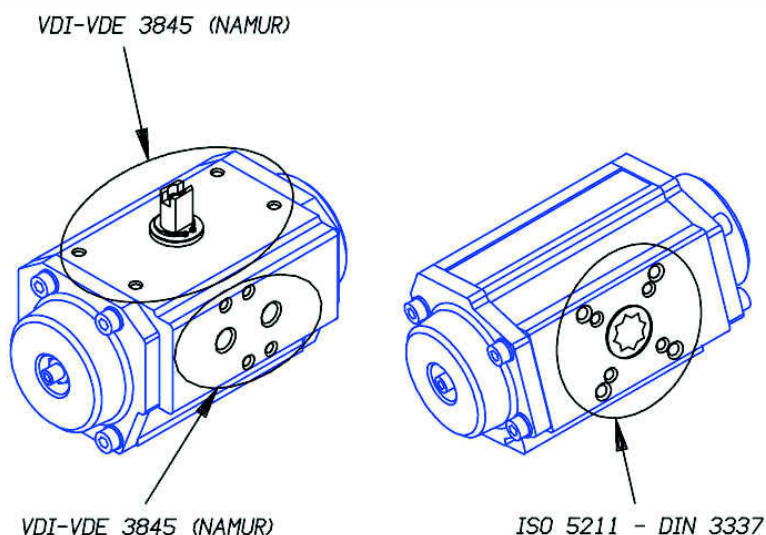
ALUMINIUM

**AISI 316 (A4)
STAINLESS STEEL**

ACTUATOR IDENTIFICATION

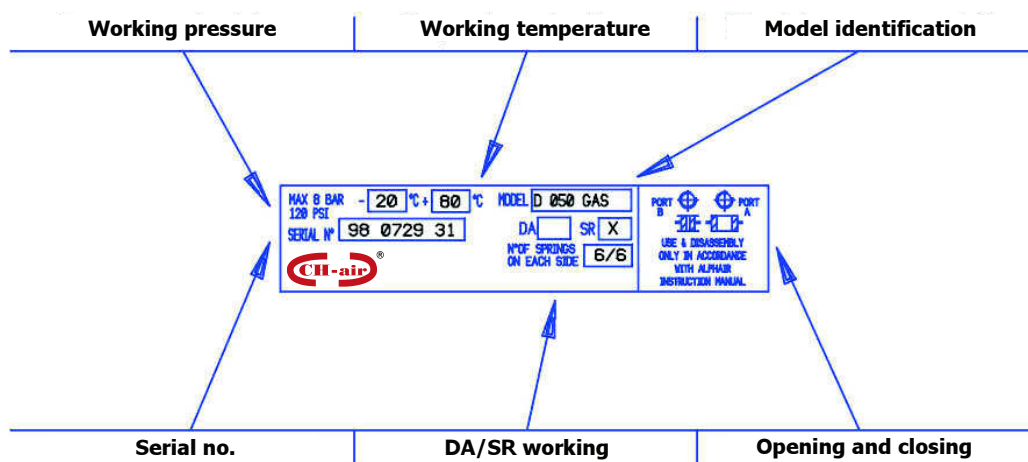


CH-air® Pneumatic rotary actuators are engineered to induce opening and closing of ball and butterfly valves, by means of compressed air feeding. They are provided with interfaces for auxiliary connection according to ISO 5211 standard, DIN 3337 and VDI/VDE 3845 (NAMUR).

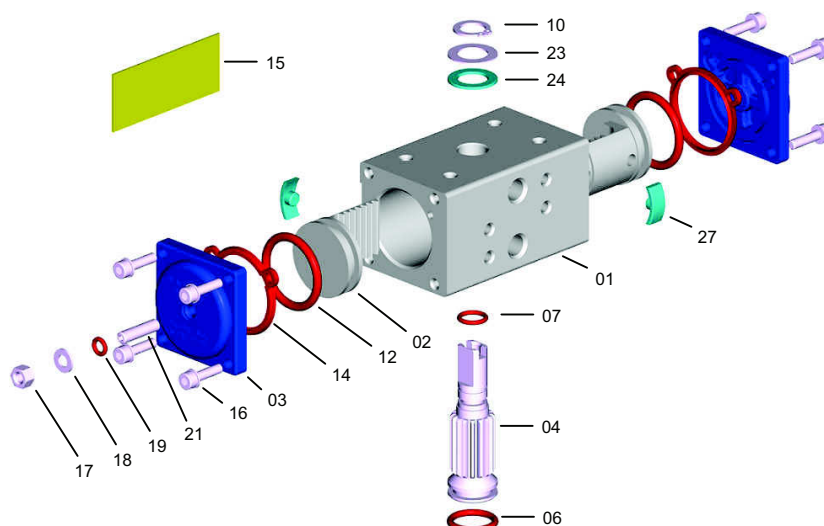


Every actuator bears an identification nameplate (Fig. 03) that shows:

- Working pressure: feeding by dry/lubricated air.
- Working temperature: follow the indicated field of use.
- Model identification.
- Serial number.
- DA/SR working – Type of operation.
- Opening and closing operations, depending on supplied feeding.

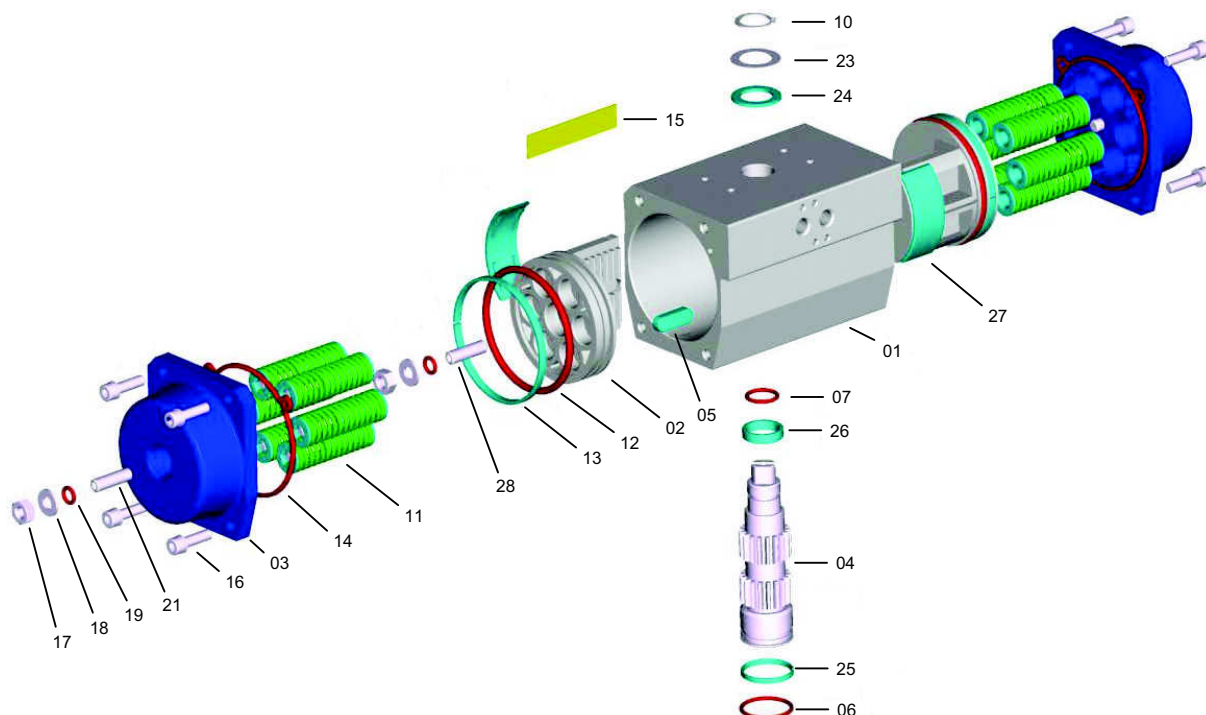


CONSTRUCTION PARTS – SPECIFICATION



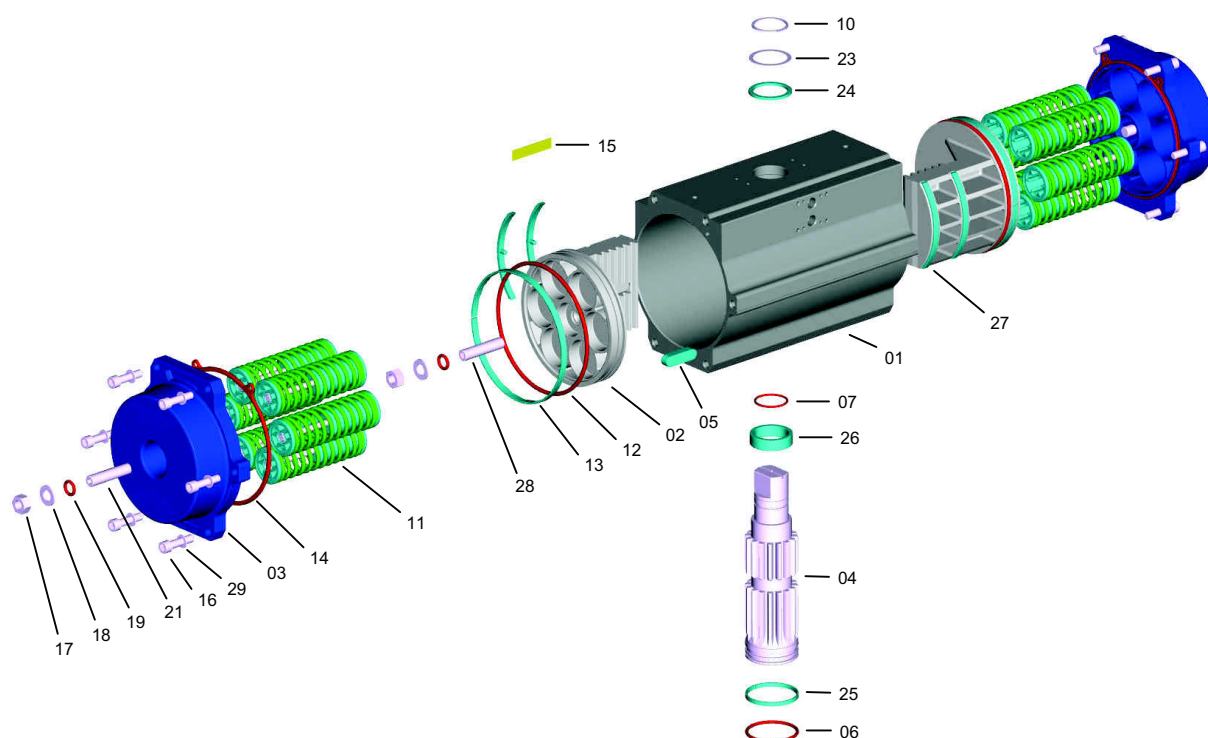
PART	QUANTITY	DESCRIPTION	MATERIAL	SPECIFICATION	PROTECTION
1	1	Body	Extruded aluminium alloy	EN AW 6063 T6	A - N - TF
2	2	Piston	Aluminium alloy	EN AB 46100 T6	A
3	2	Cover	Aluminium alloy	EN AB 46100 T6	N - V - TF
4	1	Shaft	Carbon steel optional S.S. AISI 304 (A2) optional S.S. AISI 316 (A4)	ASTM A105	N
6 *	1	Lower shaft O-Ring	NBR - FPM\FKM - Silicone		
7 *	1	Upper shaft O-Ring	NBR - FPM\FKM - Silicone		
10 *	1	Seeger ring	Carbon steel		N
12 *	2	Piston O-Ring	NBR - FPM\FKM - Silicone		
14 *	2	Cover gasket	NBR - FPM\FKM - Silicone		
15	1	Nameplate	Aluminium		
16	8	Cover fastening screw	Stainless Steel	AISI 304 (A2)	
17	4	Nut	Stainless Steel	AISI 304 (A2)	
18	4	Washer	Stainless Steel	AISI 304 (A2)	
19 *	4	O-Ring	NBR - FPM\FKM - Silicone		
21	2	Cover screw	Stainless Steel	AISI 304 (A2)	
23 *	1	Shaft thrust washer	Stainless Steel	AISI 304 (A2)	
24 *	1	Shaft antifriction washer	Acetalic resin – PA66\PA66 – LEXAN		
27 *	2	Piston bearing	Acetalic resin – PA66\PA66 – LEXAN		
* SPARE PARTS SET: Standard Special HIGH Temperatures Special LOW Temperatures Special VERY-LOW Temperatures					
Protections					
A = Anodizing N = Electroless Nickel-plating V = Painting TF = Anodizing+PTFE					

CONSTRUCTION PARTS – SPECIFICATION



PART	QUANTITY	DESCRIPTION	MATERIAL	SPECIFICATION	PROTECTION
1	1	Body	Extruded aluminium alloy	EN AW 6063 T6	A - N - TF
2	2	Piston	Aluminium alloy	EN AB 46100 T6	A
3	2	Cover	Aluminium alloy	EN AB 46100T6	N - V - TF
4	1	Shaft	Carbon steel optional S.S. AISI 304 (A2) optional S.S. AISI 316 (A4)	ASTM A105	N
5 *	2	Antiejection key	Acetalic resin – PA66\PA66 – LEXAN		
6 *	1	Lower shaft O-Ring	NBR - FPM\FKM - Silicone		
7 *	1	Upper shaft O-Ring	NBR - FPM\FKM - Silicone		
10 *	1	Seeger ring	Carbon steel		N
11	0 - 12	Spring cartridge	Carbon steel, PA 66, S.S.	C-98	V
12 *	2	Piston O-Ring	NBR - FPM\FKM - Silicone		
13 *	2	Piston head bearing	Acetalic resin – PA66\PA66 – LEXAN		
14 *	2	Cover gasket	NBR - FPM\FKM - Silicone		
15	1	Nameplate	Aluminium		
16	8	Cover fastening screw	Stainless Steel	AISI 304 (A2)	
17	4	Nut	Stainless Steel	AISI 304 (A2)	
18	4	Washer	Stainless Steel	AISI 304 (A2)	
19 *	4	O-Ring	NBR - FPM\FKM - Silicone		
21	2	Cover screw	Stainless Steel	AISI 304 (A2)	
23 *	1	Shaft thrust washer	Stainless Steel	AISI 304 (A2)	
24 *	1	Shaft antifriction washer	Acetalic resin – PA66\PA66 – LEXAN		
25 *	1	Lower shaft pilot ring	Acetalic resin – PA66\PA66 – LEXAN		
26 *	1	Upper shaft pilot ring	Acetalic resin – PA66\PA66 – LEXAN		
27 *	2 AP042...145 4 AP160...200	Piston bearing	Acetalic resin – PA66\PA66 – LEXAN		
28	2	Piston screw	Stainless Steel	AISI 304 (A2)	
* SPARE PARTS SET: Standard Special HIGH Temperatures Special LOW Temperatures Special VERY-LOW Temperatures					
Protections					
A = Anodizing N = Electroless Nickel-plating V = Painting TF = Anodizing+PTFE					

CONSTRUCTION PARTS – SPECIFICATION



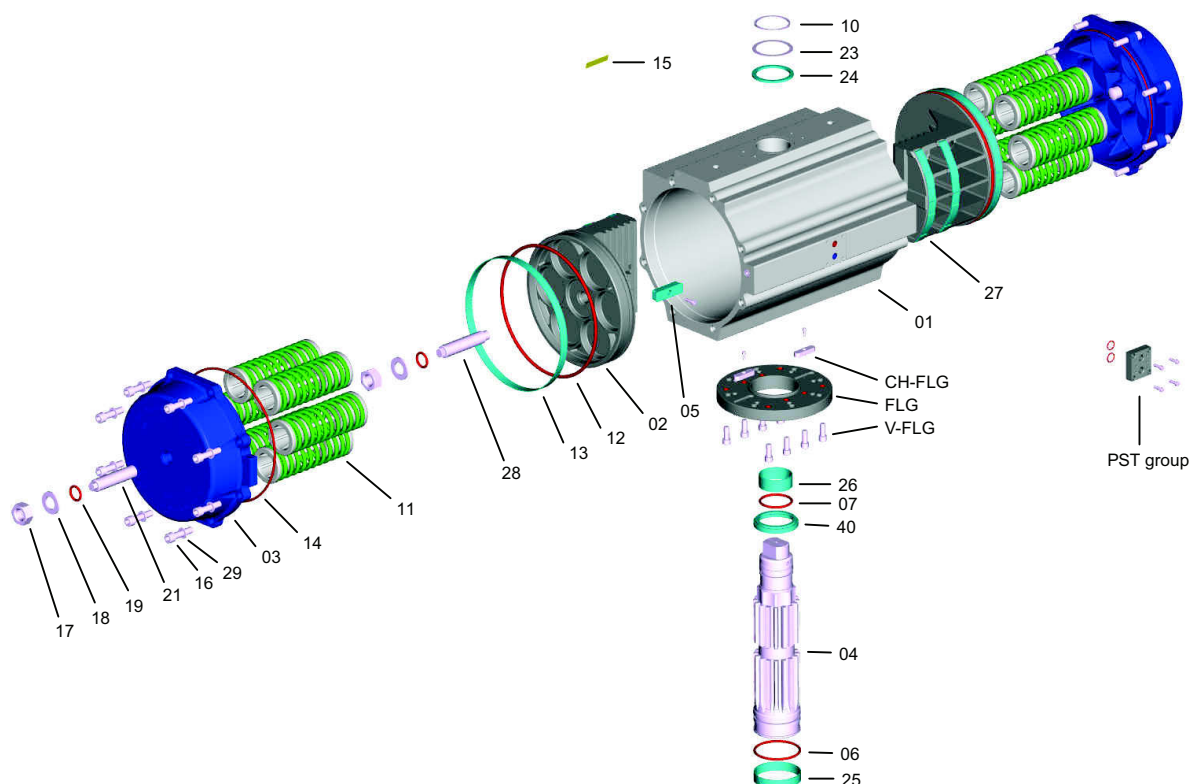
PART	QUANTITY	DESCRIPTION	MATERIAL	SPECIFICATION	PROTECTION
1	1	Body	Extruded aluminium alloy	EN AW 6063 T6	A - N - TF
2	2	Piston	Aluminium alloy	EN AB 46100 T6	A
3	2	Cover	Aluminium alloy	EN AB 46100 T6	N - V - TF
4	1	Shaft	Carbon steel optional S.S. AISI 304 (A2) optional S.S. AISI 316 (A4)	ASTM A105	N
5 *	2	Antiejection key	Acetalic resin – PA66\PA66 – LEXAN		
6 *	1	Lower shaft O-Ring	NBR - FPM\FKM - Silicone		
7 *	1	Upper shaft O-Ring	NBR - FPM\FKM - Silicone		
10 *	1	Seeger ring	Carbon steel		N
11	0 - 12	Spring cartridge	Carbon steel, PA 66, S.S.	C-98	V
12 *	2	Piston O-Ring	NBR - FPM\FKM - Silicone		
13 *	2	Piston head bearing	Acetalic resin – PA66\PA66 – LEXAN		
14 *	2	Cover gasket	NBR - FPM\FKM - Silicone		
15	1	Nameplate	Aluminium		
16	12	Cover fastening screw	Stainless Steel	AISI 304 (A2)	
17	4	Nut	Stainless Steel	AISI 304 (A2)	
18	4	Washer	Stainless Steel	AISI 304 (A2)	
19 *	4	O-Ring	NBR - FPM\FKM - Silicone		
21	2	Cover screw	Stainless Steel	AISI 304 (A2)	
23 *	1	Shaft thrust washer	Stainless Steel	AISI 304 (A2)	
24 *	1	Shaft antifriction washer	Acetalic resin – PA66\PA66 – LEXAN		
25 *	1	Lower shaft pilot ring	Acetalic resin – PA66\PA66 – LEXAN		
26 *	1	Upper shaft pilot ring	Acetalic resin – PA66\PA66 – LEXAN		
27 *	4	Piston bearing	Acetalic resin – PA66\PA66 – LEXAN		
28	2	Piston screw	Stainless Steel	AISI 304 (A2)	
29	12	Washer	Stainless Steel	AISI 304 (A2)	

* **SPARE PARTS SET:** Standard Special HIGH Temperatures Special LOW Temperatures Special VERY-LOW Temperatures

Protections

A = Anodizing **N** = Electroless Nickel-plating **V** = Painting **TF** = Anodizing+PTFE

CONSTRUCTION PARTS – SPECIFICATION



PART	QUANTITY	DESCRIPTION	MATERIAL	SPECIFICATION	PROTECTION
1	1	Body	Extruded aluminium alloy	EN AW 6063 T6	A - N - TF
2	2	Piston	Aluminium alloy	EN AB 46100 T6	A
3	2	Cover	Aluminium alloy	EN AB 46100 T6	N - V - TF
4	1	Shaft	AP330 Carbon steel \ AP420 Ergal optional S.S. AISI 304 (A2) optional S.S. AISI 316 (A4)	ASTM A105 EN AW 7075 T6	N A
5 *	2	Antiejection key	Acetalic resin – PA66\PA66 – LEXAN		
6 *	1	Lower shaft O-Ring	NBR - FPM\FKM - Silicone		
7 *	1	Upper shaft O-Ring	NBR - FPM\FKM - Silicone		
10 *	1	Seeger ring	Carbon steel		N
11	0 - 12	Spring cartridge	Carbon steel, PA 66, S.S.	C-98	V
12 *	2	Piston O-Ring	NBR - FPM\FKM - Silicone		
13 *	2	Piston head bearing	Acetalic resin – PA66\PA66 – LEXAN		
14 *	2	Cover O-Ring	NBR - FPM\FKM - Silicone		
15	1	Nameplate	Aluminium		
16	16	Cover fastening screw	Stainless Steel	AISI 304 (A2)	
17	4	Nut	Stainless Steel	AISI 304 (A2)	
18	4	Washer	Stainless Steel	AISI 304 (A2)	
19 *	4	O-Ring	NBR - FPM\FKM - Silicone		
21	2	Cover screw	Stainless Steel	AISI 304 (A2)	
23 *	1	Shaft thrust washer	Stainless Steel	AISI 304 (A2)	
24 *	1	Shaft antifriction washer	Acetalic resin – PA66\PA66 – LEXAN		
25 *	1	Lower shaft pilot ring	Acetalic resin – PA66\PA66 – LEXAN		
26 *	1	Upper shaft pilot ring	Acetalic resin – PA66\PA66 – LEXAN		
27 *	4 AP 330 8 AP 420	Piston bearing	Acetalic resin – PA66\PA66 – LEXAN		
28	2	Piston screw	Stainless Steel	AISI 304 (A2)	
29	16	Washer	Stainless Steel	AISI 304 (A2)	
40	1	Washer (only AP420)	Acetalic resin – PA66\PA66 – LEXAN		
FLG	1	Flange	Extruded aluminium alloy	EN AW 6063 T6	A - N - TF
V-FLG	8	Flange fastening screw	Stainless Steel	AISI 304 (A2)	
CH-FLG	2	Flange fastening key	Carbon Steel		
PST	1	NAMUR 1½" plate	Extruded aluminium alloy	EN AW 6063 T6	A - N - TF
* SPARE PARTS SET: Standard Special HIGH Temperatures Special LOW Temperatures Special VERY-LOW Temperatures Protections					
A = Anodizing N = Electroless Nickel-plating V = Painting TF = Anodizing+PTFE					

90° SERIES, 120° "Y" SERIES , 180° "X" SERIES

Automation industry mainly exploits two-way quarter turn valves, of ball, butterfly and plug type, which require actuators with 90° drive shaft rotation.

SERIES = 90° actuators (90° shaft rotation) therefore represent standard version.

Anyhow, for automation of three-way deviator valves, two special actuator series are available:

Y SERIES = 120° with 120° drive shaft rotation.

X SERIES = 180° with 180° drive shaft rotation.

For both Y and X series, following sizes are available:

032 - 042 - 050 - 063 - 075 - 085 - 100 - 115 - 125 -145 -160

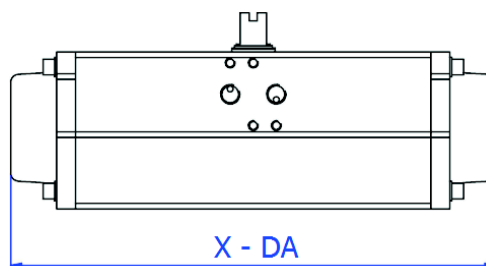
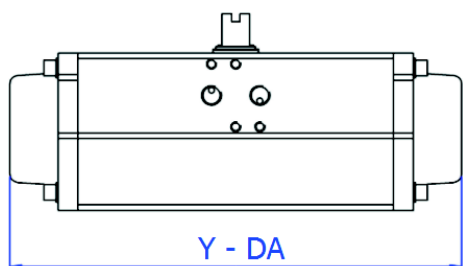
Features, identification, construction parts, materials and relevant protections, high/low temperature spare-part sets and use in hazardous environments, are the same as those of standard **SERIES 90°**.

Also installation, adjustment and maintenance procedures are identical to those of standard **I SERIES = 90°** so, where no special advise is done, all contents of this catalogue refer to the three I, Y and X series.

The manufacture differences on both **Y SERIES = 120°** **X SERIES = 180°** and the standard AP SERIES = 90° are below listed.

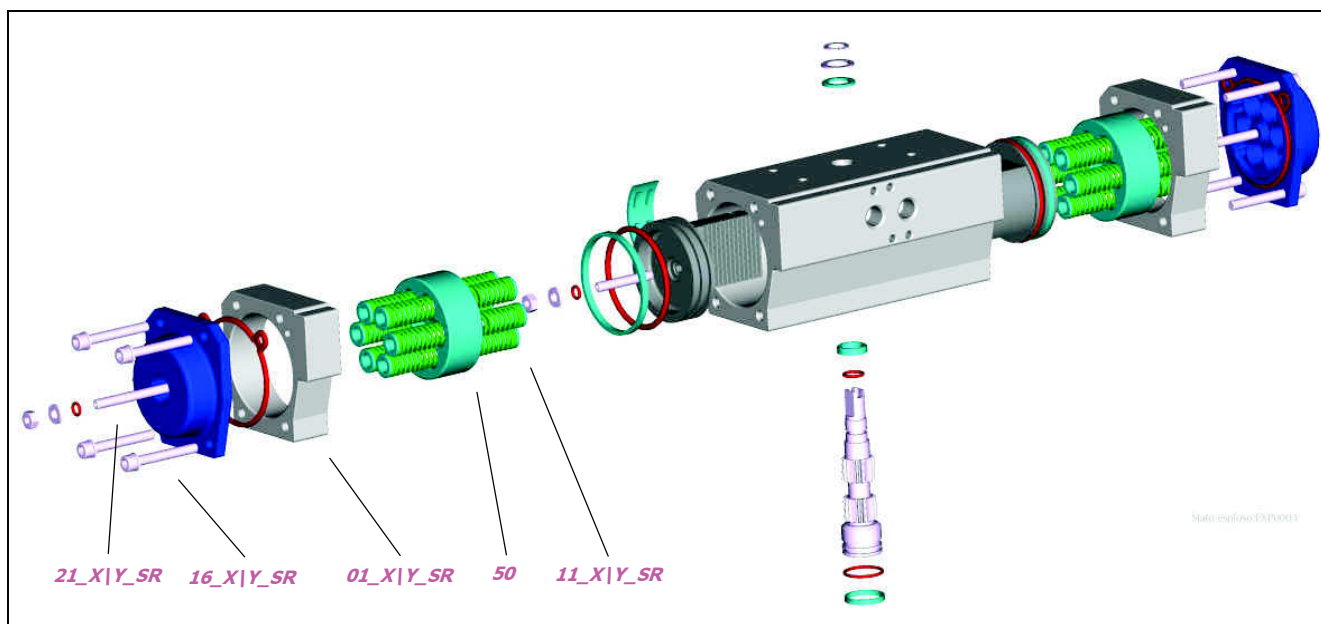
- Shapes and side dimensions are identical, but **the total lenght is bigger.**
- **The internal volumes, and related rotating times are higher.**
- **Weights are higher.**
- **Only "standard in stock" called flanges "F" ISO 5211\ DIN 3337 are available.**
Starlike shafts are available in all drive square dimensions.
- **Spring Return "SR" versioned actuators are available as optional when ordered.**
- **Output torques for Y and X SERIES are the same as those of standard I SERIES = 90°.**

Below tables show the main features of "DA" versioned Y and X series.



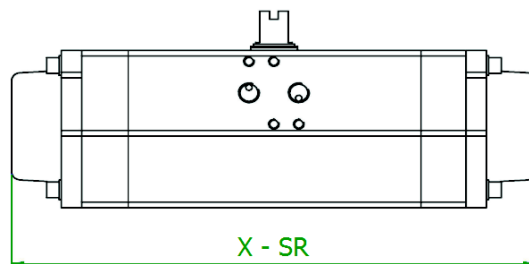
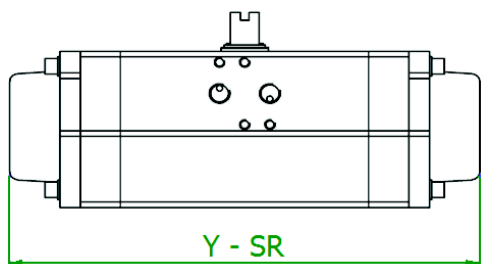
"DA" version Y SERIES = 120°											
	032-Y	042-Y	050-Y	063-Y	075-Y	085-Y	100-Y	115-Y	125-Y	145-Y	160-Y
Y mm	116	154	163	180	239	273	322	363	424	457	540
Volume (Lt)	0,10	0,21	0,27	0,58	0,70	1,15	2,10	3,40	4,60	6,10	10,0
Opening (sec)	0,60	0,60	0,70	0,75	0,75	0,75	1,00	1,10	1,40	1,40	1,70
Closing (sec)	0,60	0,60	0,70	0,85	0,85	1,00	1,10	1,30	1,60	1,80	2,00
Weight (Kg)	0,550	1,000	1,300	1,900	3,300	4,800	6,700	10,600	13,400	17,800	23,600
"DA" version X SERIES = 180°											
	032-X	042-X	050-X	063-X	075-X	085-X	100-X	115-X	125-X	145-X	160-X
X mm	149	190	196	214	297	332	398	451	518	566	652
Volume (Lt)	0,15	0,30	0,39	0,73	1,00	1,50	2,80	4,50	5,90	7,8	12,8
Opening (sec)	0,70	0,80	0,85	0,85	0,85	1,00	1,20	1,40	1,80	1,80	2,10
Closing (sec)	0,70	0,80	0,85	1,00	1,00	1,40	1,50	1,70	2,10	2,30	2,60
Weight (Kg)	0,750	1,200	1,700	2,500	4,700	7,000	10,000	15,500	19,200	24,900	33,000
F	F03	F03\05	F03\05 F 04	F03\05\07 F05\07	F05\07	F05\07	F05\07\10	F07\10	F07\10\12	F10\12	F10\12
Q	9	9-11	9-11	9-11-14	11-14-17	14-17	14-17-22	17-22	17-22-27	22-27	22-27

120° "Y" SERIES , 180° "X" SERIES – SPARE PARTS



PART	QUANTITY	DESCRIPTION	MATERIAL	SPECIFICATION
01_X Y_SR	2	Added body	Extruded aluminium alloy	EN AW 6063 T6
11_X Y_SR	0-12	Spring cartridge	Carbon Steel, PA 66, S.S. Steel	C-98
16_X Y_SR	8	Cover fastening screw	S.S. Steel	AISI 304 (A2)
21_X Y_SR	2	Cover dowel	S.S. Steel	AISI 304 (A2)
50	2	Spring internal guide	Polyamide	

Below tables show the main features of "SR" version Y and X series.



"SR" version Y SERIES = 120°											
	032-Y	042-Y	050-Y	063-Y	075-Y	085-Y	100-Y	115-Y	125-Y	145-Y	160-Y
Y mm	-	192	199	225	299	344	410	477	544	-	-
Volume (Lt)	-	0,230	0,300	0,640	0,770	1,270	2,310	3,740	5,100	-	-
Opening (sec)	-	0,7	0,8	0,8	0,9	1,0	1,1	1,2	1,5	-	-
Closing (sec)	-	0,7	0,8	0,8	0,9	1,0	1,1	1,2	1,5	-	-
Weight (Kg)	-	1,490	2,100	3,140	5,130	7,230	10,590	14,560	19,390	-	-
"SR" version X SERIES = 180°											
	032-X	042-X	050-X	063-X	075-X	085-X	100-X	115-X	125-X	145-X	160-X
X mm	-	228	232	259	357	403	486	565	638	-	-
Volume (Lt)	-	0,330	0,440	0,800	1,100	1,650	3,100	4,950	6,500	-	-
Opening (sec)	-	0,9	1,0	1,0	1,1	1,2	1,3	1,4	1,8	-	-
Closing (sec)	-	0,9	1,0	1,0	1,1	1,2	1,3	1,4	1,8	-	-
Weight (Kg)	-	1,690	2,410	4,330	6,530	9,430	13,890	19,460	25,190	-	-
F	-	F03\05	F03\05 F 04	F03\05\07 F05\07	F05\07	F05\07	F05\07\10	F07\10	F07\10\12	-	-
Q	-	9-11	9-11	9-11-14	11-14-17	14-17	14-17-22	17-22	17-22-27	-	-

A GUIDE TO VALVE/ACTUATOR SIZING

1) GENERAL INFORMATION ON AUTOMATABLE VALVES

Valves in general are devices that, by means of opening and closing various internal components, enable to stop, regulate and vary the flow of a liquid that passes through them.

Pneumatic actuators are devices constructed to manipulate these valves, which come in a variety of types (ball, butterfly, screw valves, membrane, pin, deviator, three-way, clapets etc.) and sizes and can be made of a number of different materials in order to be most suitable to the operating conditions. **The types of valves that can be automated by means of pneumatic actuators are: ball - butterfly - plug - 90°/120°/180° ball options.**

Depending on their size and type, the condition they work in and their state of repair, the type of fluid that circulates inside them etc., valves operate to different degrees of efficiency and will need different manoeuvring forces in order to work.

2) GENERAL INFORMATION ON MATCHING SIZES

On valves technical charts, the forces of manoeuvre or, more correctly, **the manoeuvre torques, are given in Newton per metre (Nm).**

The Newton is a unit of weight corresponding to 103 grams; the metre is the standard unit of length used in Europe: we can hence deduce that, to obtain a torque, we need a force and a length at which that force is applied.

Thus, a Newton per metre is the torque produced when 1 Newton is applied at the end of a 1 metre long lever.

In general, the maximum manoeuvre torque to be applied to a valve is that one needed to pass from the closed position to the opened one. So our actuator must be able to apply more than this, even in the most adverse operating conditions. In fact it is necessary to allow a suitable safety margin that will vary depending on the type of use and the guarantee of correct working that we wish to obtain. This can only be established with practical tests or where prescribed by certain laws that call into effect various technical norms.

It is important to bear in mind that all valve manufacturers issue diagrams or charts containing all technical specifications of the valves, including the manoeuvre torque values and the safety margins for different operating conditions, and it is essential to have this information in order to correctly match the actuator to the valve.

Even measuring the torque directly on the valve using specific instruments is no guarantee that the torques will remain constant under certain conditions. For example, in case of long periods of disuse, during which the sealing elements tend to stick to the moving parts thus increasing both friction and the manoeuvre torque itself.

3) EXAMPLES OF SIZING

There are fundamentally two ways of applying a movement and its relative inversion on a pneumatic actuator: either by air in both directions or by air one way and by springs during the inversion. In both cases, the feeding air pressure is the one which determines the torque that the actuator can develop. Greater is the pressure, greater is the torque and, as a result, the capacity to manoeuvre larger valves.

The examples of the following pages are just mentioned to illustrate and clarify in general terms the matching of valves to actuators, therefore have to be considered only indicative and not binding to AVS.

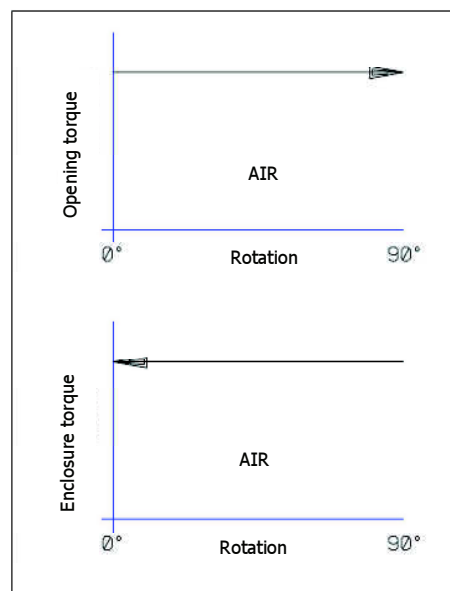
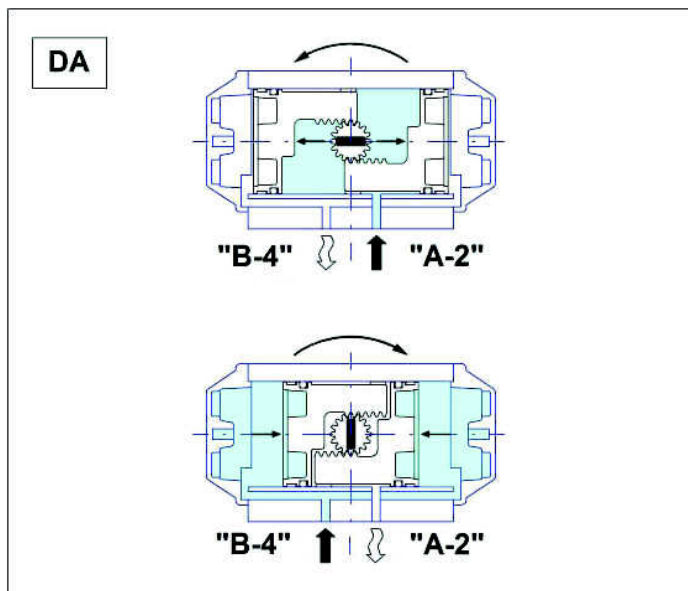
For further informations or specific needs please contact our technical office.

DOUBLE ACTING "DA" ACTUATOR SIZING

Double Acting "DA" operation (air-air), mentioned on actuator's nameplate, indicates:

- Feeding by port "A-2" opens pistons with shaft's rotation.
- Feeding by port "B-4" closes pistons with shaft's counter-rotation.

In case of pneumatic fail: actuators and valves stand still in reached position.



Double Acting "DA" actuator generates **a constant torque through all 90° rotation**. Torque output depends on actuator size (piston's diameter), and pressure feeding: it raises according to their increase.

Under normal working conditions, the suggested safety factor for "DA" valve\actuator sizing must be 30% minimum. It may obviously be increased depending on application requirements.

DOUBLE ACTING "DA" ACTUATOR SIZING

see DOUBLE ACTING "DA" TORQUE RATINGS datasheet

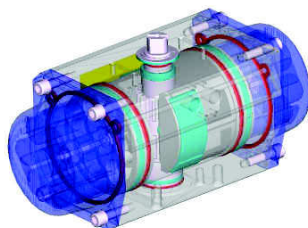
Maximum valve break torque:	50 Nm
Minimum required safety factor:	30%
Output torque required by actuator:	$50 \text{ Nm} + 30\% = 65 \text{ Nm}$
Actuator pressure feeding:	6 BAR

Suggested actuator:

Final safety factor:

075 (constant torque 70.2 Nm) .

$(70.2 - 50) / 50 = 40\%$

DOUBLE ACTING "DA" TORQUE RATINGS IN Nm


Series = 90°
Y Series = 120°
X Series = 180°

TYPE	AIR SUPPLY IN BAR									
	1	2	3	4	5	6	7	8	9	10
032	-	-	-	5,0	6,3	7,6	8,8	10,0	11,4	12,6
042	-	-	6,5	8,7	10,9	13,0	15,2	17,3	19,5	21,7
050	3,0	6,1	9,2	12,3	15,4	18,5	21,5	24,6	27,7	30,8
063	5,5	11,0	16,5	22,0	27,5	33,0	38,5	44,0	49,5	55,0
075	11,7	23,4	35,1	46,8	58,5	70,2	81,9	93,6	105,3	117,0
085	17,8	35,6	53,4	71,2	89,0	106,9	124,7	142,4	160,3	178,1
100	27,7	55,4	83,2	110,9	138,6	166,4	194,1	221,8	249,5	277,3
115	45,7	91,5	137,2	183,0	228,7	274,5	320,2	366,0	411,7	457,5
125	60,1	120,3	180,5	240,7	300,9	361,1	421,2	481,4	541,6	601,8
145	86,7	173,4	260,1	346,8	433,5	520,2	606,9	693,6	780,3	867,0
160	118,3	236,7	355,0	473,4	591,7	710,1	828,4	946,8	1065	1183

Series = 90°

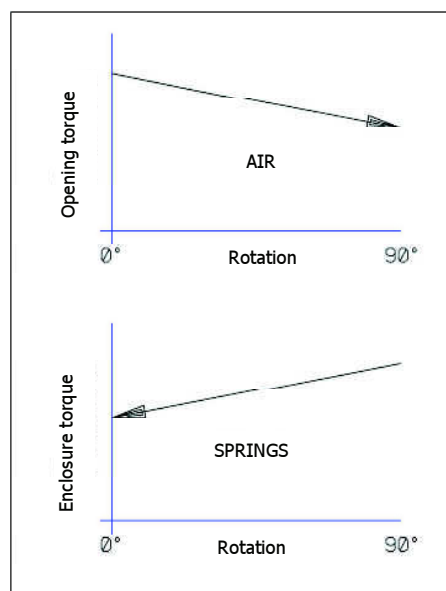
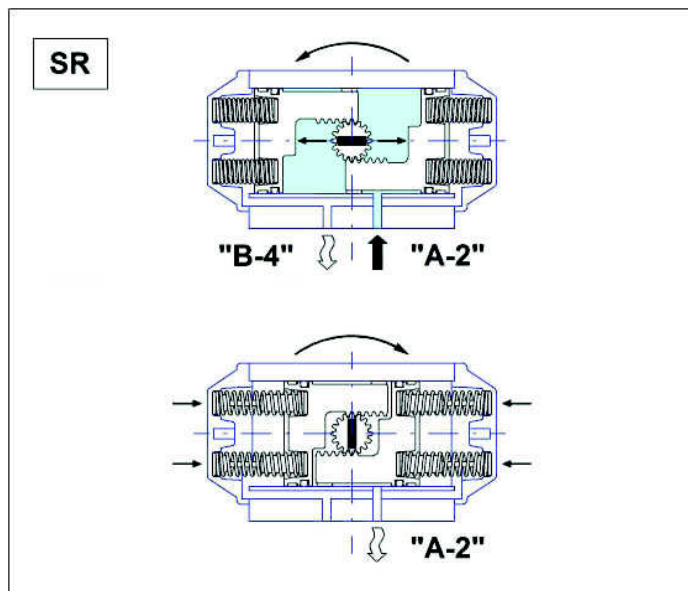
180	159,7	319,4	479,0	638,6	798,3	958,0	1119	1277	1437	1598
200	221,8	443,7	665,6	887,5	1109	1333	1553	1775	1997	2219
240	372,5	745,0	1118	1490	1863	2235	2608	2980	3353	3725
270	539,2	1078	1617	2157	2696	3235	3774	4314	4853	5392
330	911,5	1823	2734	3646	4558	5469	6835	7292	8204	9115
420	1671	3342	5013	6684	8354	10025	11696	13367	-	-

SPRING RETURN "SR" ACTUATOR SIZING

Spring Return "SR" operation (air-springs), mentioned on actuator's nameplate, indicates:

- Feeding by port "A-2" opens pistons with shaft's rotation.
- Fall of feeding pressure by port "A-2" closes pistons with shaft's counter-rotation.

In case of pneumatic fail: springs close actuator and valve (fail safe).



Spring Return "SR" actuator generates **different torques through all 90° rotation**. Torque output does not depend only on actuator size and pressure feeding (raising according to their increase), but also on stroke position and whether it is generated by the air or by the springs.

Actuator opening by air, generates at 0° (break torque) a torque that constantly decreases because of increasing of springs compression; at 90° this torque output reaches its minimum value.

Actuator closing by springs, generates at 90° a torque that constantly decreases until complete springs extension; at 0° this torque output reaches its minimum value (complete valve closing).

Under normal working conditions, the suggested safety factor for "SR" valve/actuator is higher than "DA" suggested safety factor, because of springs construction tolerance and their progressive subsidence (mechanical stress). It must be minimum 50% but it may obviously be increased depending on application requirements.

Safety factor has to be calculated on 90° springs torque (complete valve closing).

SPRING RETURN "SR" ACTUATOR SIZING

see SPRING RETURN "SR" TORQUE RATINGS data sheet

Maximum valve break torque:	50 Nm
Minimum required safety factor:	50%
Output torque required by actuator:	$50 \text{ Nm} + 50\% = 75 \text{ Nm}$
Actuator pressure feeding:	6 BAR

Suggested actuator:

AP 115 SR-6\6 (minimum spring torque 106.0 Nm)

Final safety factor:

$(106 - 50) / 50 = 112\%$

BALANCING OF SPRING TORQUE

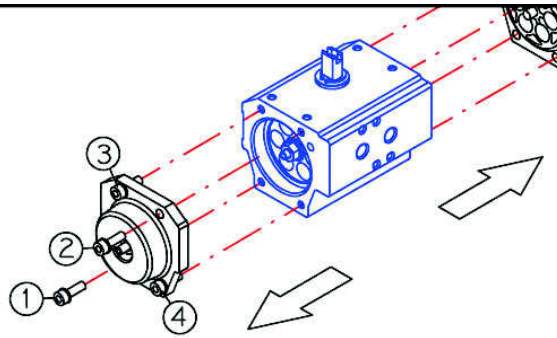
Spring Return "SR" actuators may be originally equipped with springs inside. Their presence and their number are mentioned on identification nameplate.

In case of need, Double Acting "DA" actuators can be converted into Spring Return "SR" actuators just inserting necessary springs.

In any case, attention must be paid to some technical norms for correct sizing.

- 1 – Each spring per side of actuator generates a torque output that balances 1 BAR (14.5 PSI) air pressure.
 - Example 1: for 5 BAR actuator pressure feeding, 5 springs per each side are required.
 - Example 2: for 4.5 BAR actuator pressure feeding, 5 springs on one side and 4 springs on the other side are required.
- 2 – While changing the number of springs, actuator performance varies.
See SPRING RETURN "SR" TORQUE RATINGS datasheet.
- 3 – Some particular applications may require a higher safety factor: if possible one more spring can be added, as higher safety for valve closing.

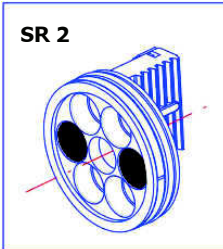
For safe conversion into "SR" spring return actuators, please follow this procedure.



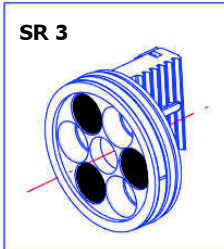
Take off covers loosening screws, as per indicated numeration.

Insert springs in the seats, as per required quantity.

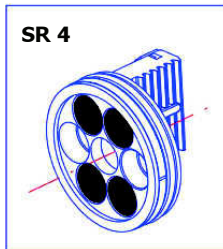
SR 2



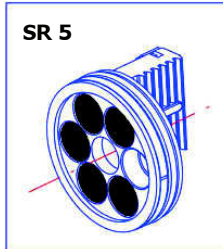
SR 3



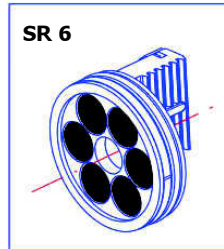
SR 4

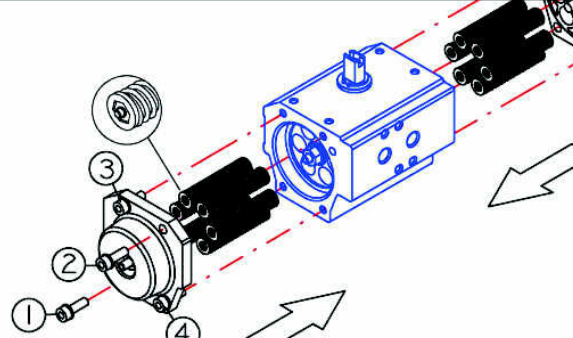


SR 5



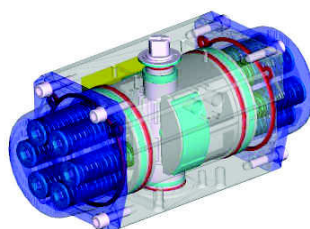
SR 6





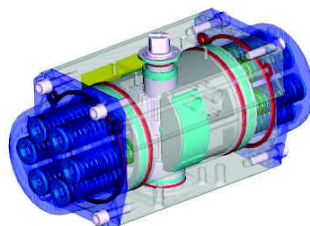
Assembly covers tightening screws, as per indicated numeration.
Tightening screws torques according following label.

M5	M6	M8	M10	M12	M14	M16	M20
4.5 Nm	8 Nm	19 Nm	38 Nm	65 Nm	115 Nm	160 Nm	350 Nm

SPRING RETURN "SR" TORQUE RATINGS IN Nm


AP Series = 90°
Y Series = 120°
X Series = 180°

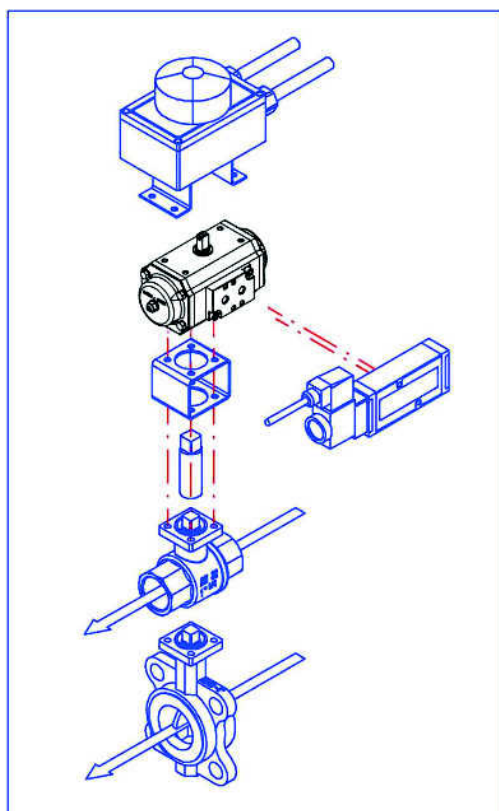
TYPE	SPRINGS FOR EACH SIDE	AIR SUPPLY IN BAR												SPRINGS TORQUE	
		3		4		5		6		7		8			
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	90°	0°
042	3	-	-	-	-	7,1	4,1	9,3	6,3	11,5	8,5	13,7	10,7	6,8	3,8
	4							8,1	4,1	10,2	6,2	12,4	8,4	9,0	5,0
050	3	5,7	3,5	8,9	6,6	12,0	9,6	15,1	12,7	18,1	15,7	21,2	18,8	5,7	3,5
	4			7,7	4,7	10,8	7,7	13,9	10,8	16,9	13,8	20,0	16,9	7,7	4,7
	5					9,6	5,8	12,7	8,9	15,7	11,9	18,8	15,0	9,6	5,8
	6					8,4	3,9	11,5	7,0	14,5	10,0	17,6	13,1	11,5	7,0
063	3	9,4	6,3	14,9	11,7	20,4	17,2	25,9	22,7	31,4	28,2	36,9	33,7	10,2	7,2
	4			12,3	8,3	17,8	13,8	23,3	19,3	28,8	24,8	34,3	30,3	13,7	9,7
	5					15,4	10,4	20,9	15,9	26,4	21,4	31,9	26,9	17,1	12,1
	6					13,0	7,0	18,5	12,5	24,0	18,0	29,5	23,5	20,5	14,5
075	3	22,5	12,6	34,2	24,4	46,0	36,1	57,7	47,8	69,4	59,5	81,1	71,2	22,5	12,6
	4			30,0	16,9	41,8	28,6	53,5	40,3	65,2	52,0	76,9	63,7	30,0	16,9
	5					37,6	21,1	49,3	32,8	61,0	44,5	72,7	56,2	37,6	21,1
	6					33,4	13,6	45,1	25,3	56,8	37,0	68,5	48,7	45,1	25,3
085	3	34,5	18,9	52,4	36,7	70,2	54,5	88,0	72,3	105,8	90,1	123,6	107,9	34,5	18,9
	4			46,1	25,2	63,9	43,0	81,7	60,8	99,5	78,6	117,3	96,4	46,1	25,2
	5					57,6	31,5	75,4	49,3	93,2	67,1	111,0	84,9	57,6	31,5
	6					51,5	20,0	69,1	37,8	86,9	55,6	104,7	73,4	69,1	37,8
100	3	53,2	30,0	80,9	57,7	108,7	85,4	136,4	113,1	164,1	140,8	191,8	168,5	53,2	30,0
	4			70,9	40,0	98,7	67,7	126,4	95,4	154,1	123,1	181,8	150,8	70,9	40,0
	5					88,7	50,0	116,4	77,7	144,1	105,4	171,8	133,1	88,7	50,0
	6					78,7	32,2	106,4	60,0	134,1	87,7	161,8	115,4	106,4	60,0
115	3	84,3	53,0	130,0	98,8	175,8	144,5	221,6	190,3	267,3	236,0	313,0	281,7	84,3	53,0
	4			112,3	70,7	158,1	116,4	203,9	162,2	249,6	207,9	295,3	253,6	112,3	70,7
	5					140,4	88,3	186,2	134,1	231,9	179,8	277,6	225,5	140,4	88,3
	6					122,7	60,2	168,5	106,0	214,2	151,7	259,9	197,4	168,5	106,0
125	3	116,8	63,7	177,0	123,9	237,3	184,1	297,5	244,2	357,6	304,3	417,7	364,4	116,8	63,7
	4			155,7	85,0	216,0	145,2	276,2	205,3	336,3	265,4	396,4	325,5	155,7	85,0
	5					194,7	106,3	254,9	166,4	315,0	226,5	375,1	286,6	194,7	106,3
	6					173,4	67,4	233,6	127,5	293,7	187,6	353,8	247,7	233,6	127,5
145	3	158,0	92,0	245,0	179,0	332,0	265,0	418,0	352,0	505,0	439,0	592,0	526,0	168,0	102,0
	4			211,0	123,0	298,0	210,0	384,0	269,0	471,0	383,0	558,0	470,0	224,0	136,0
	5					264,0	154,0	350,0	240,0	437,0	327,0	524,0	414,0	280,0	170,0
	6					230,0	98,0	316,0	184,0	403,0	271,0	490,0	358,0	336,0	204,0
160	3	222,4	132,6	340,7	251,0	459,1	369,3	577,4	487,6	695,7	605,9	814,0	724,2	222,4	132,6
	4			296,5	176,9	414,9	295,2	533,2	413,5	651,5	531,8	769,8	650,1	296,5	176,9
	5					370,7	221,1	489,0	339,4	607,3	457,7	725,6	576,0	370,7	221,1
	6					326,5	147,0	444,8	265,3	563,1	383,6	681,4	501,9	444,8	265,3
Torques rated by air supply														Torques rated by spring return	

SPRING RETURN "SR" TORQUE RATINGS IN Nm

Series = 90°

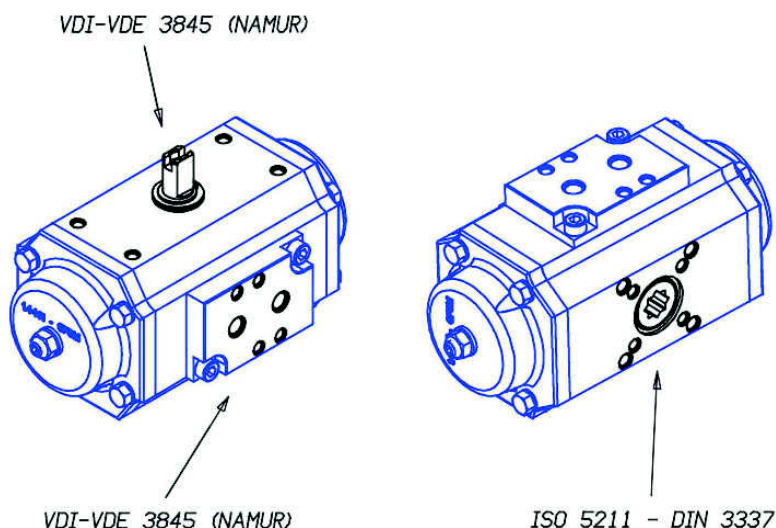
TYPE	SPRINGS FOR EACH SIDE	AIR SUPPLY IN BAR												SPRINGS TORQUE	
		3		4		5		6		7		8			
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	90°	0°
180	3	287,9	191,0	447,6	350,7	607,3	510,4	766,9	670,0	926,6	829,7	1068	989,1	287,9	191,0
	4			383,9	254,7	543,6	414,4	703,3	574,0	862,9	733,7	1022	893,1	383,9	254,7
	5					479,9	318,4	639,6	478,1	792,2	637,7	958,6	797,1	479,9	318,4
	6					416,2	222,4	575,9	382,1	735,6	541,8	894,9	701,1	575,9	382,1
200	3	423,6	242,0	644,7	463,8	867,4	685,8	1089	907,7	1311	1130	1533	1351	423,6	242,0
	4			564,8	322,6	786,7	544,6	1008	766,5	1230	988,4	1452	1209	564,8	322,6
	5					706,0	403,4	927,9	625,3	1150	847,2	1372	1068	706,0	403,4
	6					625,3	262,2	847,2	484,1	1069	706,0	1291	927,0	847,2	484,1
240	3	664,0	453,6	1037	826,2	1409	1199	1782	1571	2154	1944	2527	2316	664,0	453,6
	4			885,4	604,8	1258	977,4	1630	1350	2003	1722	2376	2095	885,4	604,8
	5					1107	756,0	1479	1129	1852	1501	2224	1874	1107	756,0
	6					955,5	534,7	1328	907,2	1701	1280	2073	1653	1328	907,2
270	3	912,5	705,1	1452	1244	1991	1783	2530	2323	3069	2862	3608	3401	912,5	705,1
	4			1216	940,2	1756	1479	2295	2019	2834	2558	3373	3097	1217	940,1
	5					1521	1175	2060	1714	2599	2144	3138	2793	1521	1175
	6					1286	871,0	1825	1410	2364	1954	2903	2489	1825	1410
330	3	1626	1108	2538	2020	3450	2931	4361	3843	5273	4755	6184	5666	1626	1108
	4			2168	1477	3080	2389	3992	3301	4903	4212	5815	5123	2168	1477
	5					2711	1847	3622	2759	4534	3670	5445	4582	2711	1847
	6					2341	1305	3253	2216	4165	3128	5076	4040	3253	2216
420	3	2999	2014	4670	3685	6340	5356	8011	7026	9682	8697	11353	10368	2999	2014
	4			3998	2685	5669	4356	7340	6027	9011	7698	10682	9369	3998	2685
	5					4998	3356	6669	5027	8340	6698	10010	8369	4998	3356
	6					4327	2357	5997	4028	7668	5698	9339	7369	5997	4028
Torques rated by air supply														Torques rated by spring return	

AISI 316 (A4) STAINLESS STEEL "AP-A" SERIES ACTUATORS

ACTUATOR IDENTIFICATION

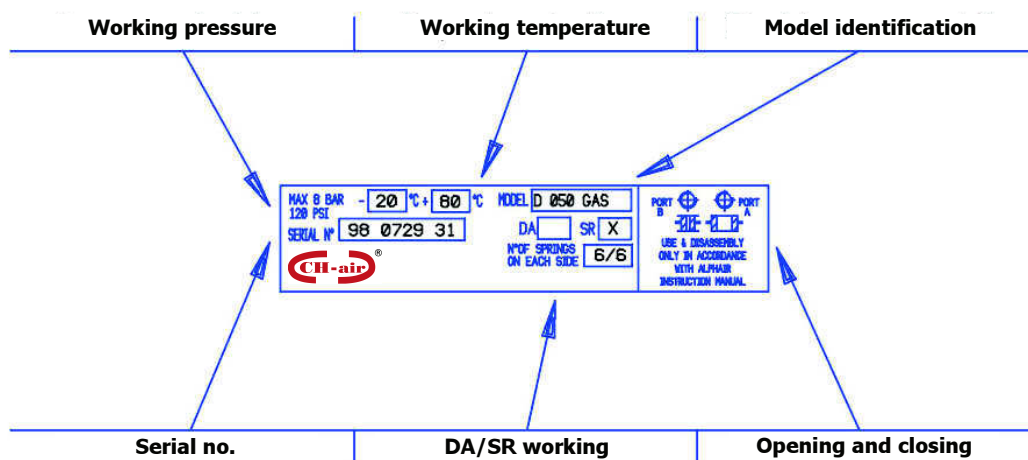


AISI 316 (A4) Stainless Steel pneumatic actuators are engineered to induce opening and closing of ball and butterfly valves, by means of compressed air feeding. They are provided with interfaces for auxiliary connection according to ISO 5211 standard, DIN 3337 and VDI/VDE 3845 (NAMUR).

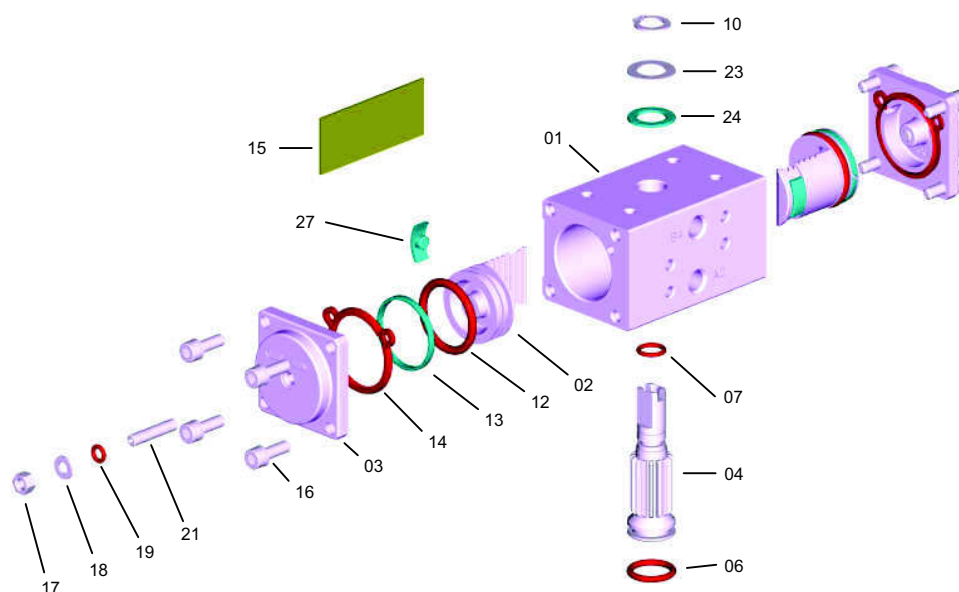


Every actuator bears an identification nameplate (Fig. 03) that shows:

- Working pressure, air feeding by dry/lubricated air MAX 8 BAR/120 PSI.
- Working temperature: follow the indicated field of use.
- Model identification.
- Serial number.
- DA/SR working – TYPE OF OPERATION
- Opening and closing operations, depending on supplied feeding.

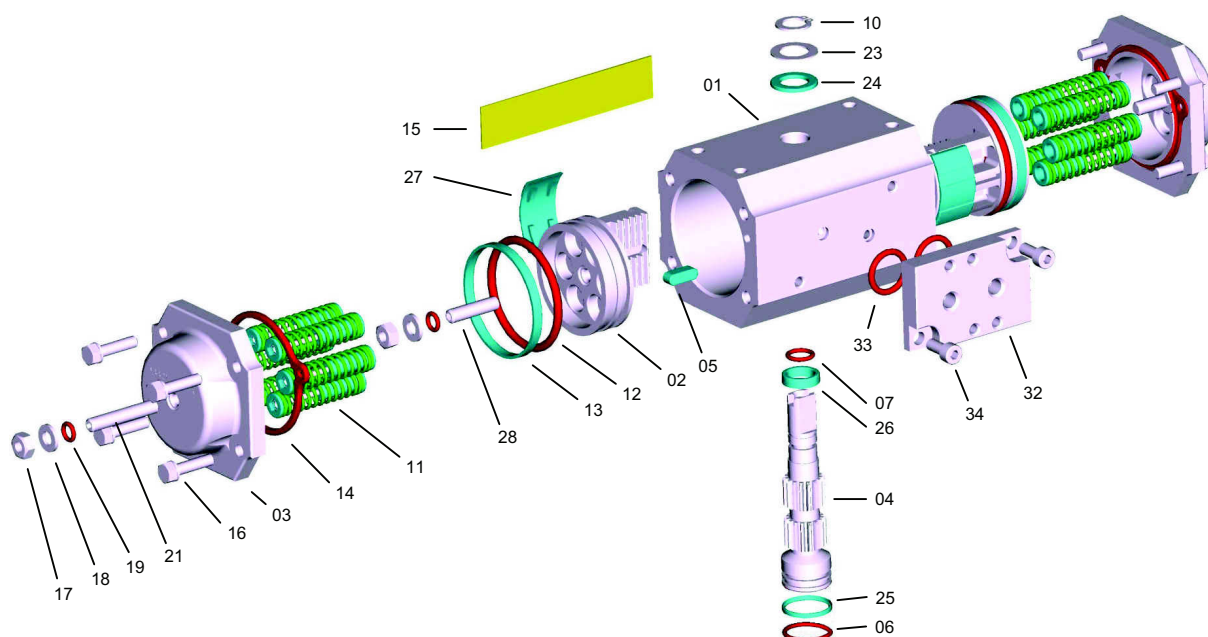


AISI 316 (A4) STAINLESS STEEL "A" SERIES ACTUATORS - CONSTRUCTION PARTS – SPECIFICATIONS



PART	QUANTITY	DESCRIPTION	MATERIAL	SPECIFICATION	PROTECTION
1	1	Body	Extruded Stainless Steel	AISI 316 (A4)	EL - MP
2	2	Piston	Aluminium alloy optional Stainless Steel	EN AB 46100 T6 AISI 316 (A4)	A
3	2	Cover	Microcasted Stainless Steel	AISI 316 (A4)	EL - MP
4	1	Shaft	Stainless Steel	AISI 316 (A4)	
6 *	1	Lower shaft O-Ring	NBR - FPM\FKM - Silicone		
7 *	1	Upper shaft O-Ring	NBR - FPM\FKM - Silicone		
10 *	1	Seeger ring	AISI 420		
12 *	2	Piston O-Ring	NBR - FPM\FKM - Silicone		
13 *	2	Piston head bearing	Acetalic resin – PA66\PA66 – LEXAN	Only with Sainless Steel pistons	
14 *	2	Cover gasket	NBR - FPM\FKM - Silicone		
15	1	Nameplate	Aluminium		
16	8	Cover fastening screw	Stainless Steel	AISI 316 (A4)	
17	2	Nut	Stainless Steel	AISI 316 (A4)	
18	2	Washer	Stainless Steel	AISI 316 (A4)	
19 *	2	O-Ring	NBR - FPM\FKM - Silicone		
21	2	Cover adjustment screw	Stainless Steel	AISI 316 (A4)	
23 *	1	Shaft thrust washer	Stainless Steel	AISI 316 (A4)	
24 *	1	Shaft antifriction washer	Acetalic resin – PA66\PA66 – LEXAN		
27 *	2	Piston bearing	Acetalic resin – PA66\PA66 – LEXAN		
* SPARE PARTS SET: Standard Special HIGH Temperatures Special LOW Temperatures Special VERY-LOW Temperatures					
Potections					
A = Anodizing N = Electroless Nickel plating V = Painting EL = Electropolishing MP = Mirror Polishing					

AISI 316 (A4) STAINLESS STEEL "A" SERIES ACTUATORS - CONSTRUCTION PARTS – SPECIFICATIONS



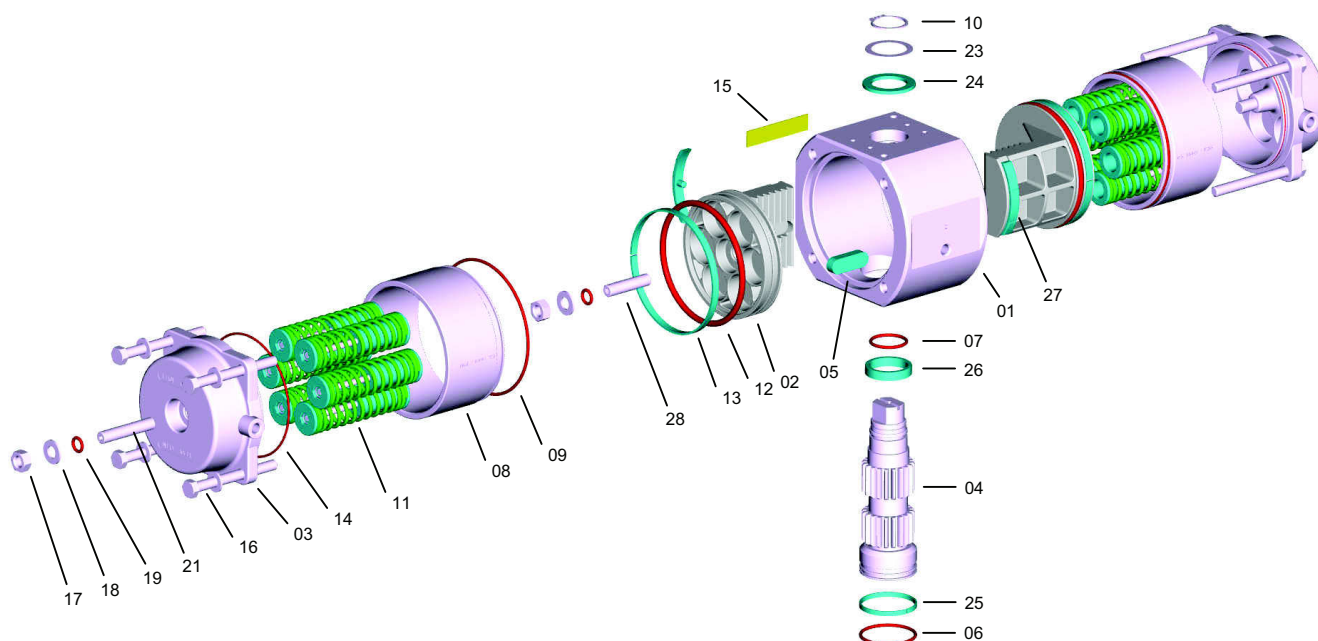
PART	QUANTITY	DESCRIPTION	MATERIAL	SPECIFICATION	PROTECTION
1	1	Body	Extruded Stainless Steel	AISI 316 (A4)	EL - MP
2	2	Piston	Aluminium alloy optional Stainless Steel	EN AB 46100 T6 AISI 316 (A4)	A
3	2	Cover	Microcasted Stainless Steel	AISI 316 (A4)	EL - MP
4	1	Shaft	Stainless Steel	AISI 316 (A4)	
5 *	2	Antiejection key	Acetalic resin – PA66\PA66 – LEXAN		
6 *	1	Lower shaft O-Ring	NBR - FPM\FKM - Silicone		
7 *	1	Upper shaft O-Ring	NBR - FPM\FKM - Silicone		
10 *	1	Seeger ring	AISI 420		
11	0 - 12	Spring cartridge	Carbon steel, PA 66, S.S.	C-98	V
12 *	2	Piston O-Ring	NBR - FPM\FKM - Silicone		
13 *	2	Piston head bearing	Acetalic resin – PA66\PA66 – LEXAN		
14 *	2	Cover gasket	NBR - FPM\FKM - Silicone		
15	1	Nameplate	Aluminium		
16	8	Cover fastening screw	Stainless Steel	AISI 316 (A4)	
17	2	Nut	Stainless Steel	AISI 316 (A4)	
18	2	Washer	Stainless Steel	AISI 316 (A4)	
19 *	2	O-Ring	NBR - FPM\FKM - Silicone		
21	2	Cover adjustment screw	Stainless Steel	AISI 316 (A4)	
23 *	1	Shaft thrust washer	Stainless Steel	AISI 316 (A4)	
24 *	1	Shaft antifriction washer	Acetalic resin – PA66\PA66 – LEXAN		
25 *	1	Lower shaft pilot ring	Acetalic resin – PA66\PA66 – LEXAN		
26 *	1	Upper shaft pilot ring	Acetalic resin – PA66\PA66 – LEXAN		
27 *	2	Piston bearing	Acetalic resin – PA66\PA66 – LEXAN		
28	2	Piston adjustment screw	Stainless Steel	AISI 316 (A4)	
32	1	NAMUR plate	Stainless Steel	AISI 316 (A4)	
33	2	O-Ring for NAMUR plate	Acetalic resin – PA66\PA66 – LEXAN		
34	2	NAMUR plate screw	Stainless Steel	AISI 316 (A4)	

* SPARE PARTS SET: Standard Special HIGH Temperatures Special LOW Temperatures Special VERY-LOW Temperatures

Potectons

A = Anodizing N = Electroless Nickel plating V = Painting EL = Electropolishing MP = Mirror Polishing

AISI 316 (A4) STAINLESS STEEL "A" SERIES ACTUATORS - CONSTRUCTION PARTS – SPECIFICATIONS



PART	QUANTITY	DESCRIPTION	MATERIAL	SPECIFICATION	PROTECTION
1	1	Body	Extruded Stainless Steel	AISI 316 (A4)	EL - MP
2	2	Piston	Aluminium alloy optional Stainless Steel	EN AB 46100 T6 AISI 316 (A4)	A
3	2	Cover	Microcasted Stainless Steel	AISI 316 (A4)	EL - MP
4	1	Shaft	Stainless Steel	AISI 316 (A4)	
5 *	2	Antiejection key	Acetalic resin – PA66\PA66 – LEXAN		
6 *	1	Lower shaft O-Ring	NBR - FPM\FKM - Silicone		
7 *	1	Upper shaft O-Ring	NBR - FPM\FKM - Silicone		
08	2	Body extension	Extruded Stainless Steel	AISI 316 (A4)	EL - MP
09 *	2	O-Ring	NBR - FPM\FKM - Silicone		
10 *	1	Seeger ring	AISI 420		
11	0 - 12	Spring cartridge	Carbon steel, PA 66, S.S.	C-98	V
12 *	2	Piston O-Ring	NBR - FPM\FKM - Silicone		
13 *	2	Piston head bearing	Acetalic resin – PA66\PA66 – LEXAN		
14 *	2	Cover gasket	NBR - FPM\FKM - Silicone		
15	1	Nameplate	Aluminium		
16	8	Cover fastening screw	Stainless Steel	AISI 316 (A4)	
17	2	Nut	Stainless Steel	AISI 316 (A4)	
18	2	Washer	Stainless Steel	AISI 316 (A4)	
19 *	2	O-Ring	NBR - FPM\FKM - Silicone		
21	2	Cover adjustment screw	Stainless Steel	AISI 316 (A4)	
23 *	1	Shaft thrust washer	Stainless Steel	AISI 316 (A4)	
24 *	1	Shaft antifriction washer	Acetalic resin – PA66\PA66 – LEXAN		
25 *	1	Lower shaft pilot ring	Acetalic resin – PA66\PA66 – LEXAN		
26 *	1	Upper shaft pilot ring	Acetalic resin – PA66\PA66 – LEXAN		
27 *	2-4	Piston bearing	Acetalic resin – PA66\PA66 – LEXAN		
28	2	Piston adjustment screw	Stainless Steel	AISI 316 (A4)	
* SPARE PARTS SET: Standard Special HIGH Temperatures Special LOW Temperatures Special VERY-LOW Temperatures					
Potections					
A = Anodizing N = Electroless Nickel plating V = Painting EL = Electropolishing MP = Mirror Polishing					

AISI 316 (A4) STAINLESS STEEL "A" SERIES ACTUATORS

"A" SERIES=90°, "Y" SERIES=120°, "X" SERIES=180°

Automation industry mainly exploits two-way quarter turn valves, of ball, butterfly and conic plug type, which require actuators with 90° drive shaft rotation.

A SERIES = 90° AISI 316 (A4) Stainless Steel actuators (shaft rotation 90°), therefore represent ALPHAIR standard version.

Anyhow, for automation of three-way diverting valves, two special actuator series are available:

Y SERIES = 120° AISI 316 (A4) Stainless Steel with 120° drive shaft rotation.

X SERIES = 180° AISI 316 (A4) Stainless Steel with 180° drive shaft rotation.

For both AISI 316 (A4) Stainless Steel A-Y (120°) and A-X (180°) series, following sizes are available:

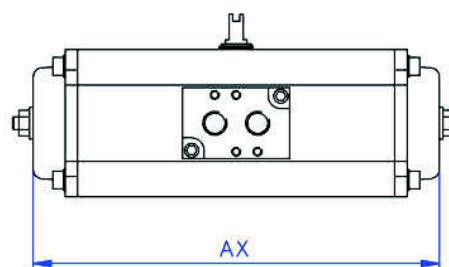
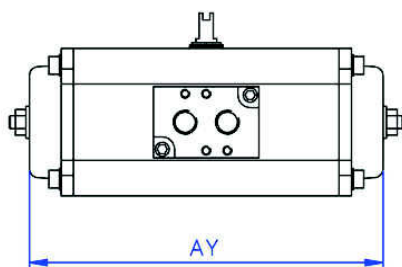
AP-A 032, 042, 050, 063, 075, 085, 100, 115, 125, 145

Features, identification, construction parts, materials and relevant protections, high\low temperature spare-part sets and use in hazardous environments, are the same as those of standard **A SERIES = 90°**. Also installation, adjustment and maintenance procedures are identical to those of standard **A SERIES = 90°** so, where no special advise is done, all contents of this catalogue refer to the three I, Y and X series.

Some manufacture differences obviously exist on **Y SERIES = 120°** and **X SERIES = 180°** with respect to AISI 316 (A4) Stainless Steel I SERIES = 90°.

- Shapes and side dimensions are identical, but **the total lenght is bigger.**
- **The internal volumes, and related rotating times are higer.**
- **Weights are higher.**
- **Only the below listed flanges "F" ISO 5211\DIN 3337 are available.**
- **Only the below listed "starlike" shaft force intakes are available.**
- **Only Double Acting "DA" actuators are available.** The output torques are the same as those of standard I SERIES = 90°.
- **Spring Return "SR" actuators are not available.**

Below labels show the main features of Y and X series:



Y SERIES = 120°									
DA	032-Y	042-Y	050-Y	063-Y	075-Y	085-Y	100-Y	115-Y	125-Y
AY mm	116	175	163	180	239	273	322	363	424
Volume (L)	0,10	0,21	0,27	0,58	0,70	1,15	2,10	3,40	4,60
Opening (sec)	0,60	0,60	0,70	0,75	0,75	0,75	1,00	1,10	1,40
Closing (sec)	0,60	0,60	0,70	0,85	0,85	1,00	1,10	1,30	1,60
Weight (Kg)	1,650	2,200	3,300	4,180	7,610	10,560	14,750	22,240	29,800
X SERIES = 180°									
DA	032-X	042-X	050-X	063-X	075-X	085-X	100-X	115-X	125-X
AX mm	149	211	196	214	297	332	398	451	518
Volume (L)	0,15	0,30	0,39	0,73	1,00	1,50	2,80	4,50	5,90
Opening (sec)	0,70	0,80	0,85	0,85	0,85	1,00	1,20	1,40	1,80
Closing (sec)	0,70	0,80	0,85	1,00	1,00	1,40	1,50	1,70	2,10
Weight (Kg)	1,850	2,650	4,150	5,500	10,700	15,400	22,200	27,450	37,350
F	F03\05	F03\05	F03\05	F03\05\07	F05\07	F05\07	F05\07\10	F07\10	F07\10\12
Q	09	11	11	14	17	17	22	22	27

DIRECTIONS FOR ACTUATOR INSTALLATION

Valid for both, aluminium and AISI 316 (A4) Stainless Steel Series actuators.

Duration and safety use of actuators and plants, for all operators within their range of action, also depends on the attention paid to the following directions.

- Installation, placing in service, use and maintenance of the actuators must be performed by skilled, experienced and informed personnel. We recommend observing the safety law requirements for accident's prevention, and to adopt appropriate safety devices: risk of serious personal injury!
- CAUTION: actuators must be used within working limits indicated in the technical data. Especially, do not exceed maximum allowed operating pressure and temperature: risk of serious personal injury!
- Move carefully, without crashes.
- Stock in warehouse between 0° C and + 40° C., even for long periods.
- Keep actuators in their original packaging, with the relevant contents slips.
- Construction materials, surface treatments and paintings are physically steady and chemically inactive only under the conditions which are indicated on the identification nameplate. Do not use actuators with inadequate protection in corrosive environments: damages may occur to external and internal components and to pneumatic seals: risk of serious personal injury!
- During operations, possible arising of oily fogs inside the device: filtrate exhaust feeding air or recycle through specific electro-valves.
- Actuator's lubrication is made by the manufacturer. Its operation warranty, identified as number of movements before main metallic part's substitution, is guaranteed for 1.000.000 manoeuvres (opening and closing). It is referred to standard models only.
- Antifriction plastic parts and rubber seals operation is guaranteed for 300.000 manoeuvres (opening and closing) before it has to be checked: they must be substituted in case of wear. If it is necessary, please substitute the complete spare-parts set.
- Springs operation is guaranteed for 100.000 manoeuvres (opening and closing) before it has to be checked: they must be substituted in case of corrosion marks, wear or side yield. CAUTION: do not remove covers if the actuator is not in rest position (see shaft top position): risk of serious personal injury!
- On model AP 032, all 120° and 180° models, in presence of air feeding and without valve, shaft ejection may occur, owing to the absence of anti-ejection key (part n. 05). For these models, anti-ejection is only obtained through seeger ring (part. n. 10).
- To move and install models starting to 160 and over (total weight over Kg 25), use lifting devices and the special eyebolts provided.
- Installation of the actuator is forbidden before the plant is declared in accordance to CE norms or to eventual technical norms that must regulate the plant's working.

In case of need, about correct operation, call please our Technical Office.

ALUMINIUM A SERIES ACTUATORS**NOTICE AND NOTES FOR ACTUATORS USE IN EXPLOSIVE ENVIRONMENTS
"ATEX" 2014\34\UE DIRECTIVE**

"A" Series Rack & Pinion Actuators in aluminium alloy are carefully engineered and manufactured according to the relevant technical norms and safety european directives.

They can be used in "ATEX" 2014\34\UE Directive dangerous zones, according to the following manufacturer classification.

Device Group II (surface) - Category 2 - G (gas) and D (dust) use

- | | | |
|------------------------|------------------------|---------------------------------------|
| • Very Low Temperature | -60 +80°C (-76 +176°F) | Ex II 2GD c Tmax=95°C (203°F) |
| • Low Temperature | -40 +80°C (-40 +176°F) | Ex II 2GD c Tmax=95°C (203°F) |
| • Standard | -20 +80°C (-4 +176°F) | Ex II 2GD c Tmax=95°C (203°F) |
| • High Temperature | -20 +150°C (-4 +302°F) | Ex II 2GD c Tmax=165°C (329°F) |

**Due to the relevant safe condiction needs,
for applications in that particular environment,
carefully read please the above notices.**

- Before installation, please read our "Instruction manual for use and maintenance" carefully.
- Follow the use expected for actuators.
- Follow the indications of maximum temperature-environment of use, punched on identification nameplate.
- Don't let the actuator be fed by flammable, explosive or burning fluids (oxygen, acetylene etc...).
- Avoid the penetration of explosive atmospheres inside actuators.
- Do not hit the external parts of actuators (both aluminium and steel parts) through metallic objects (it may cause sparkles).
- Do not manually force actuators over the maximum output torque.
- Avoid accumulation of combustibile dusts on actuator surfaces.
- Avoid accumulation of electrostatic charges on insulating surfaces of APR, by providing suitable "grounding", using for example the valve fixing screws.
- All components and accessories installed on APR for drive and control purposes, must be suitable for those uses in accordance to the danger classification of the area.
- Maintenance operations on actuators must be made according to the norms in force, (for example EN 50281, EN 60079 etc...) and to the danger classification of the area.
- Do not make maintenance operations in places with explosive atmosphere.
- Verify springs functioning every 100.000 (one hundred thousand) cycles: substitute complete spring cartridges when necessary, but do not try to disassembly them.
- Verify all rubber sealing elements (o-ring s and plane gaskets) and all plastic anti-friction pads every 300.000 (three hundred thousand) cycles: substitute the complete spare-parts set when necessary.
- Use and operation not in accordance to a.m. notes, may cause danger or damage to people and things, and let every legal responsibility lose from Manufacturer side.

In case of need, about correct operation, call please our Technical Office.

AISI 316 (A4) STAINLESS STEEL A SERIES ACTUATORS**NOTICE AND NOTES FOR ACTUATORS USE IN EXPLOSIVE ENVIRONMENTS
"ATEX" 2014\34\UE DIRECTIVE**

"A" Series Rack & Pinion Actuators in AISI 316 (A4) Stainless Steel are carefully engineered and manufactured according to the relevant technical norms and safety european directives.

They can be used in "ATEX" 2014\34\UE Directive dangerous zones, according to the following manufacturer classification.

**Device Group I (mines) - Category M2 - G (gas) and D (dust) use
and**

Device Group II (surface) - Category 2 - G (gas) and D (dust) use

- | | | |
|------------------------|------------------------|--|
| • Very Low Temperature | -60 +80°C (-76 +176°F) | Ex I M2 - II 2GD c Tmax=95°C (203°F) |
| • Low Temperature | -40 +80°C (-40 +176°F) | Ex I M2 - II 2GD c Tmax=95°C (203°F) |
| • Standard | -20 +80°C (-4 +176°F) | Ex I M2 - II 2GD c Tmax=95°C (203°F) |
| • High Temperature | -20 +150°C (-4 +302°F) | Ex I M2 - II 2GD c Tmax=165°C (329°F) |

**Due to the relevant safe condiction needs,
for applications in that particular environment,
carefully read please the above notices.**

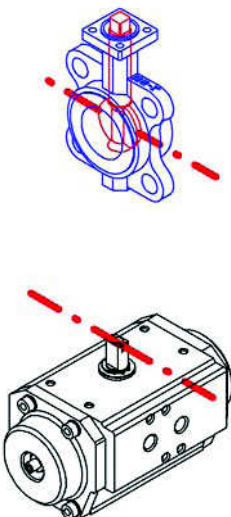
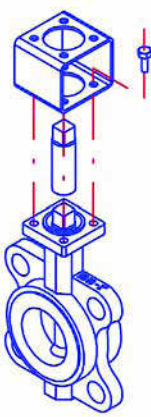
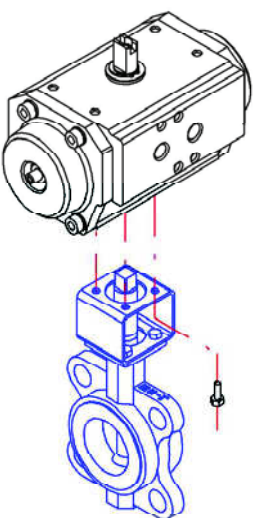
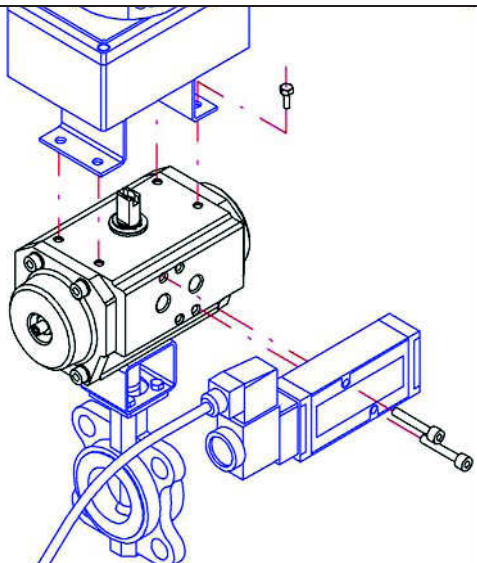
- Before installation, please read our "Instruction manual for use and maintenance" carefully.
- Follow the use expected for actuators.
- Follow the indications of maximum temperature-environment of use, punched on identification nameplate.
- Don't let the actuator be fed by flammable, explosive or burning fluids (oxygen, acetylene etc...).
- Avoid the penetration of explosive atmospheres inside actuators.
- Do not hit the external parts of actuators (both aluminium and steel parts) through metallic objects (it may cause sparkles).
- Do not manually force actuators over the maximum output torque.
- Avoid accumulation of combustibile dusts on actuator surfaces.
- Avoid accumulation of electrostatic charges on insulating surfaces of APR, by providing suitable "grounding", using for example the valve fixing screws.
- All components and accessories installed on APR for drive and control purposes, must be suitable for those uses in accordance to the danger classification of the area.
- Maintenance operations on actuators must be made according to the norms in force, (for example EN 50281, EN 60079 etc...) and to the danger classification of the area.
- Do not make maintenance operations in places with explosive atmosphere.
- Verify springs functioning every 100.000 (one hundred thousand) cycles: substitute complete spring cartridges when necessary, but do not try to disassembly them.
- Verify all rubber sealing elements (o-ring s and plane gaskets) and all plastic anti-friction pads every 300.000 (three hundred thousand) cycles: substitute the complete spare-parts set when necessary.
- Use and operation not in accordance to a.m. notes, may cause danger or damage to people and things, and let every legal responsibility lose from Manufacturer side.

In case of need, about correct operation, call please our Technical Office.

INSTALLATION OPERATION

Valid for both, aluminium A Series and AISI 316 (A4) Stainless Steel A Series actuators.

For a safe install operation, follow please the above procedure.

 <div data-bbox="177 824 225 880" style="border: 1px solid black; padding: 2px; width: 20px; text-align: center;">1</div>	 <div data-bbox="841 824 888 880" style="border: 1px solid black; padding: 2px; width: 20px; text-align: center;">2</div>
<p>Make sure that both valve and actuator are closed.</p> <ul style="list-style-type: none"> • Standard SR models normally closed. • Standard DA models, feed by port "B-4" in order to reach the correct positioning. 	<p>Assembly through screws, bracket and adapter.</p> <p>N.B. Not for valve\actuator direct assembly.</p>
 <div data-bbox="177 1552 225 1608" style="border: 1px solid black; padding: 2px; width: 20px; text-align: center;">3</div>	 <div data-bbox="841 1552 888 1608" style="border: 1px solid black; padding: 2px; width: 20px; text-align: center;">4</div>
<p>Insert actuator on top of adapter and assembly it through screws.</p>	<p>Connect accessories, making sure of the real position of the valve.</p> <p>Connect pneumatic/electrical feeding and verify correct operation.</p>

Disassembly is made following all described operations, backwards.

Pay attention to safety rules.

In case of difficulty, do not force the elements, but verify clearances, axis position, supplied feeding and correct torque dimensioning of valve and actuator.

In case of need, about correct operation, call please our Technical Office.

ALUMINIUM "A" = 90° ACTUATORS
ALUMINIUM "Y" = 120° ACTUATORS
ALUMINIUM "X" = 180° ACTUATORS

AISI 316 STAINLESS STEEL "A" = 90° ACTUATORS
AISI 316 STAINLESS STEEL "Y" = 120° ACTUATORS
AISI 316 STAINLESS STEEL "X" = 180° ACTUATORS

-

SPARE-PART SETS AND SPRINGS

Please note that, depending on working conditions of the actuator, it may be necessary to make a "spare-part set" periodic substitution.

Anti-friction plastic parts and rubber seals operation is guaranteed for 300,000 manoeuvres (opening and closing) before it has to be checked: they must be substituted in case of wear. If it is necessary, please substitute the complete spare-parts set.

Springs operation is guaranteed for 100,000 manoeuvres (opening and closing) before it has to be checked: they must be substituted in case of corrosion marks, wear or side yield. If it is necessary, please substitute the complete spring-cartridges, do not disassembly it under any reason. CAUTION: do not remove covers if the actuator is not in rest position (see shaft top position): risk of serious personal injury!

It may be also necessary to substitute a "spare-part set" for use at a different working temperature. In this case, please verify that both "spare-part set" and lubricant are suitable for the new environmental conditions (see "Actuator working temperatures" data sheet).

List of the spare-parts and assembly scheme: please refer to B Section (Aluminium Series) and H Section (AISI 316 Stainless Steel A Series).

ROTATION ADJUSTMENT

Valid for both, aluminium and AISI 316 (A4) Stainless Steel actuators.

Rotation adjustment of 90°-120°-180° actuators, is made by high precision electronic device, and normally not require further adjustment operation.

In event of need, by mean cover and piston travel-stop screw, you can adjust $\pm 5^\circ$ the actuator rotation in both opening and closing directions.

The below figures shows the rotation adjustment operations, as also described in every actuator handbook.

ADJUSTMENT IN CLOSING - 0°

Warning!

Installation, adjustment and maintenance must be effected under safety conditions. Do not connect pneumatic/electrical feeding until all operations are terminated.

1 Take off covers loosening screws as per indicated numeration; pull out springs, if any, from pistons seats, Fig. 11.

2 Unscrew counter-bolt and dowel for regulation of the piston's travel from both sides of actuator, Fig. 12

3 Keep the stem slightly in tension, (by fix key for ball valves and by special dynamometrical key for butterfly valves) and regulate rotation of the actuator in closing (0°) on one side, adjusting piston's travel through the regulation dowel, Fig. 13.

4 When reaching the wanted point of enclosure, keep the regulation dowel in position and tighten the counter-bolt. Repeat this operation on the other side of the actuator, Fig. 14.

- Re-assembly springs, if any, and covers tightening screws a little at a time following the numeration, Fig. 11.

- Connect pneumatic/electrical feeding and verify correct operation.

0° Adjusting
Einstellung 0°
Reglage 0°
Ajuste 0°
Regolazione 0°

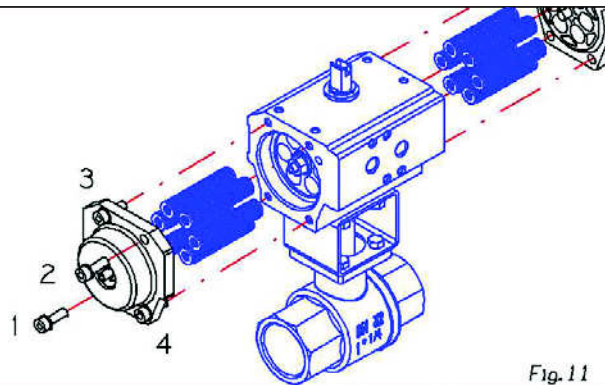


Fig. 11

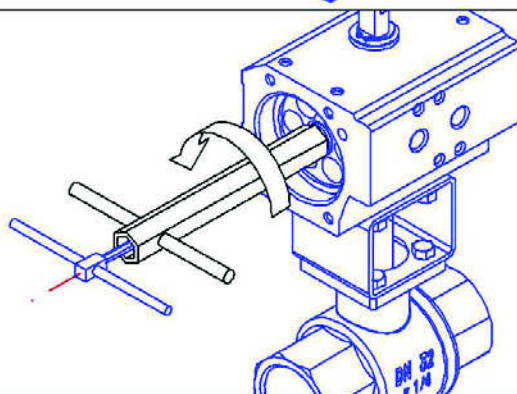


Fig. 12

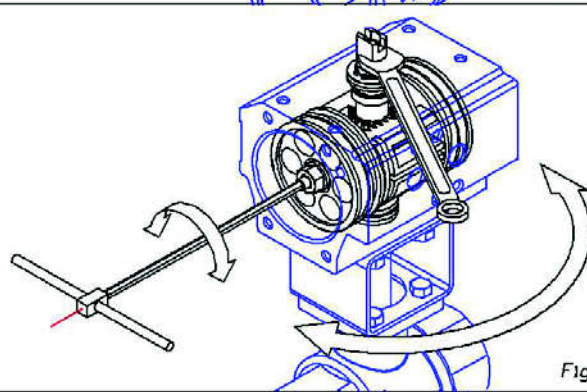


Fig. 13

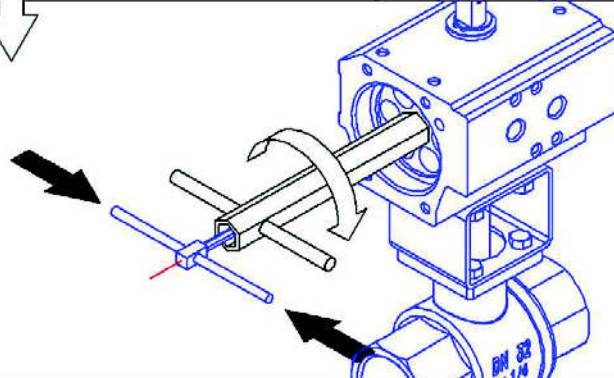


Fig. 14

ROTATION ADJUSTMENT

Valid for both, aluminium and AISI 316 (A4) Stainless Steel actuators.

ADJUSTMENT IN OPENING - 90°

Warning!
Installation, adjustment and maintenance must be effected under safety conditions. Do not connect pneumatic/electrical feeding until all operations are terminated.

1 Unscrew counter-bolt and regulation dowel on both covers, Fig. 15.

90° Adjusting
Einstellung 90°
Reglage 90°
Ajuste 90°
Regolazione 90°

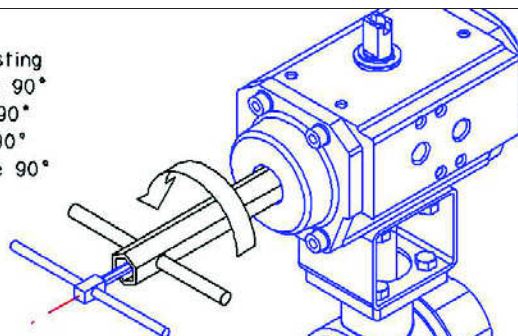


Fig. 15

2 Connect air feeding into port "A-2" to have actuator's opening, Fig. 16.

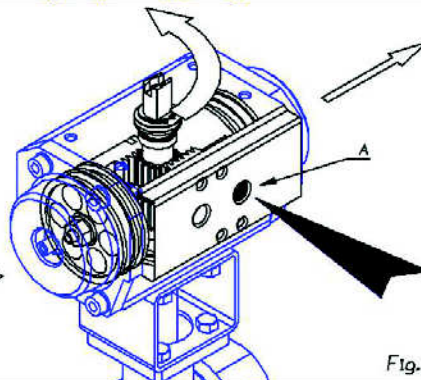


Fig. 16

3 Regulate the rotation of the actuator in opening (90°) on one side, by adjusting piston's travel through its regulation dowel, Fig. 17.

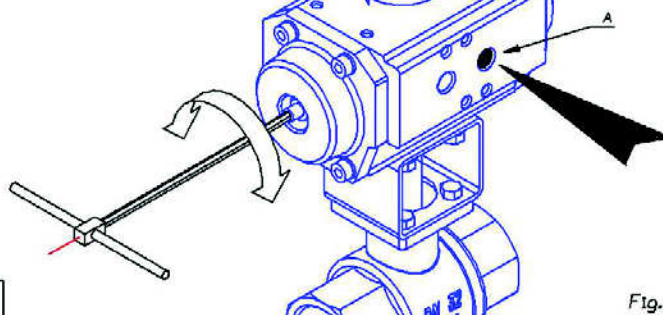


Fig. 17

4 When reaching the wanted point of opening, keep regulation dowel in position and tighten counter-bolt. Repeat this operation on the other side of the actuator, Fig. 18.

- Connect pneumatic/electrical feeding and verify correct operation.

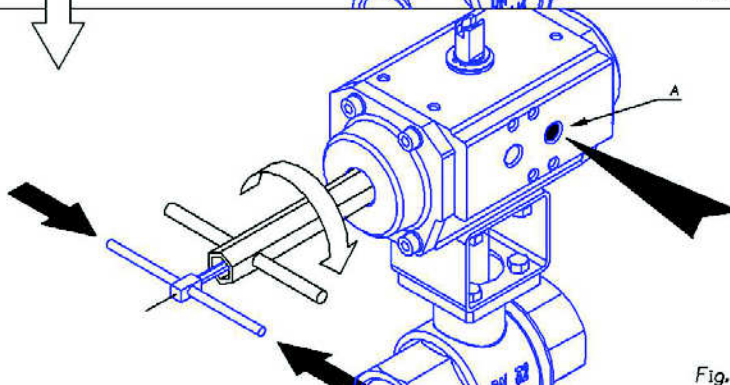


Fig. 18



MAINTENANCE, SPARE-PART SET AND SPRINGS SUBSTITUTION

Valid for both, aluminium and AISI 316 (A4) Stainless Steel actuators.

In event of "spare-part set" and/or spring substitution, follow please the above procedure also listed on actuator handbook (held inside every actuator box).

MAINTENANCE, SPARE PARTS SET AND SPRING SUBSTITUTION

Actuator must be absolutely taken off from the plant where it is installed, disconnected from pneumatic and electrical feeding, and from possible accessories, see Fig.19.

Warning!

Installation, adjustment and maintenance must be effected under safety conditions. Do not connect pneumatic/electrical feeding until all operations are terminated. For all numbered parts, only complete spare-part sets are available.

TAKE OFF!
ZERLEGEN!
DEMONTIER!
DESMONTAR!
DISINSTALLARE!

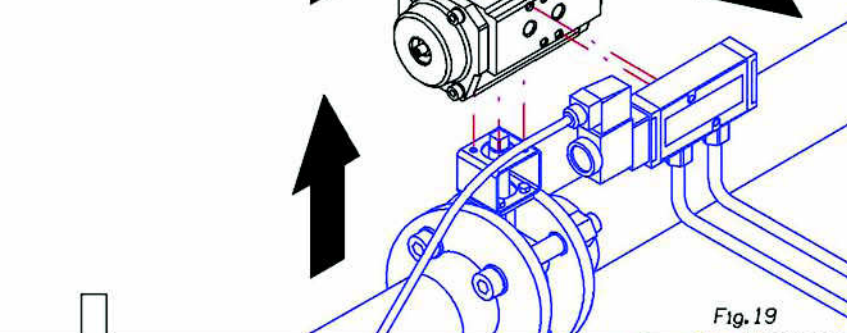


Fig. 19

DISASSEMBLY
ENTFERNEN
DEMONTIER
DESMONTAR
SMONTARE

1 Take off covers loosening screws as per indicated numeration; pull out springs, if any, from pistons seats, Fig.20.

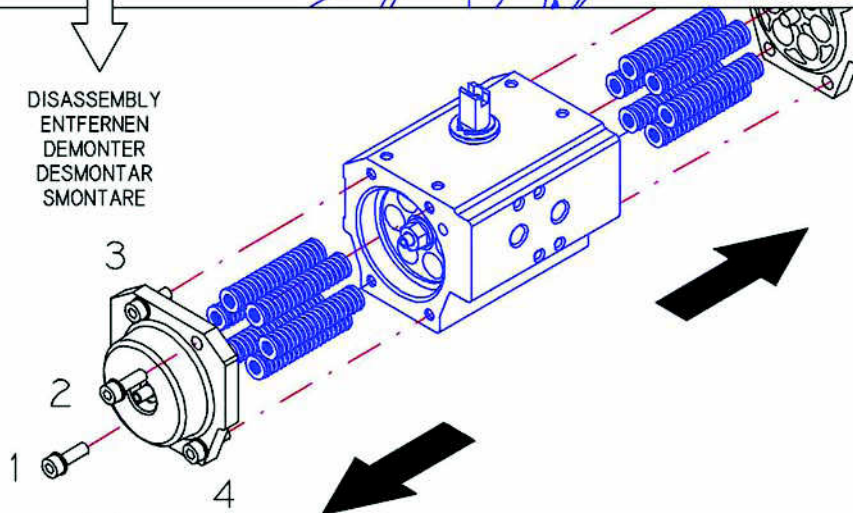


Fig. 20

TAKE OUT
AUSZIEHEN
EXTRAIRE
EXTRAER
ESTRARRE

2 Rotate stem in order to release pistons from shaft's rack. Take off pistons through a pair of pincers, Fig.21.

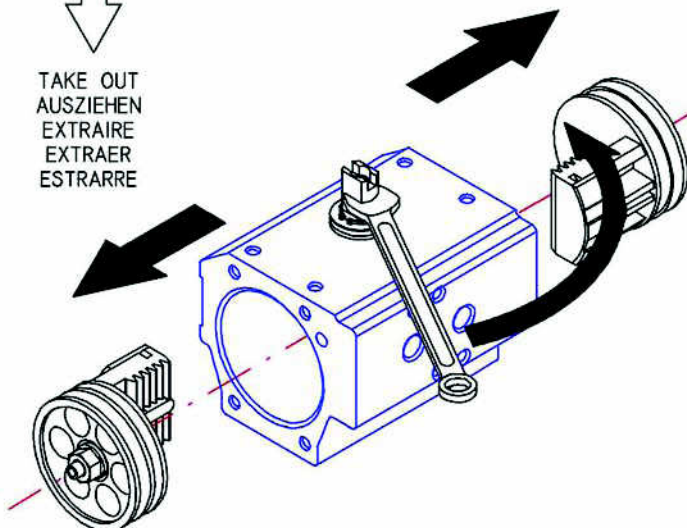


Fig. 21

3 Release seeger ring (part 10) from stem and take away: pinion thrust washer (part 23) and anti-friction washer (part. 24), Fig.22.

4 Extract shaft from actuator's body and take off: upper pilot ring for shaft (part 26), O-rings (part 06-07), lower pilot ring for shaft (part 25), Fig.23.

5 From both pistons take off: piston bearing (part 27), anti-ejection key (part 05), O-rings (part 12-19), piston head bearing (part 13), Fig.24.

* Take note of the regulation dowel projection before disassembly.

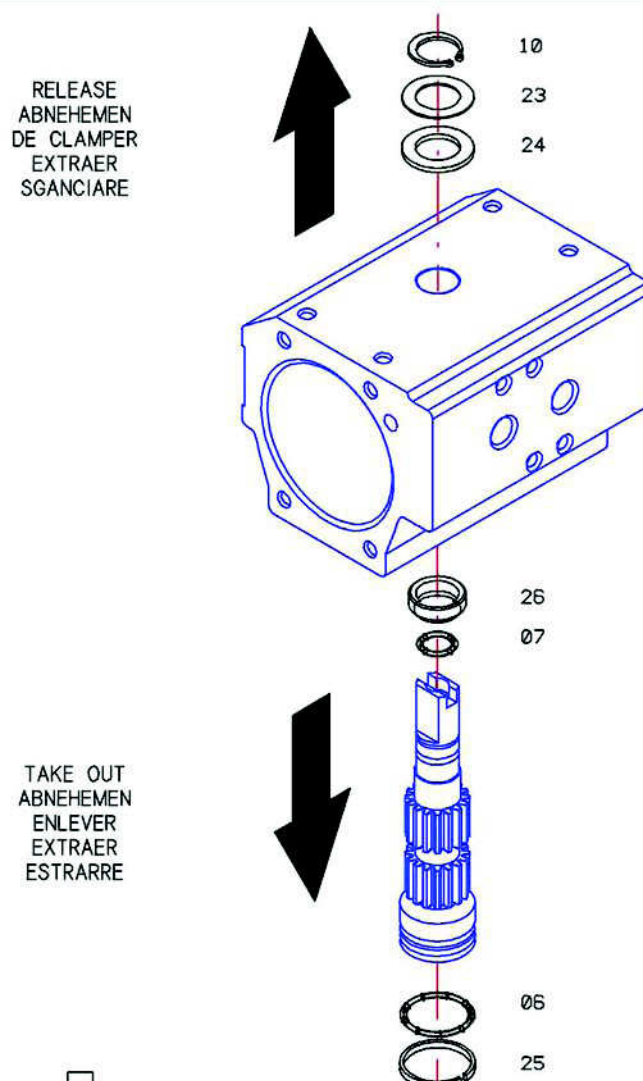


Fig.22

Fig.23

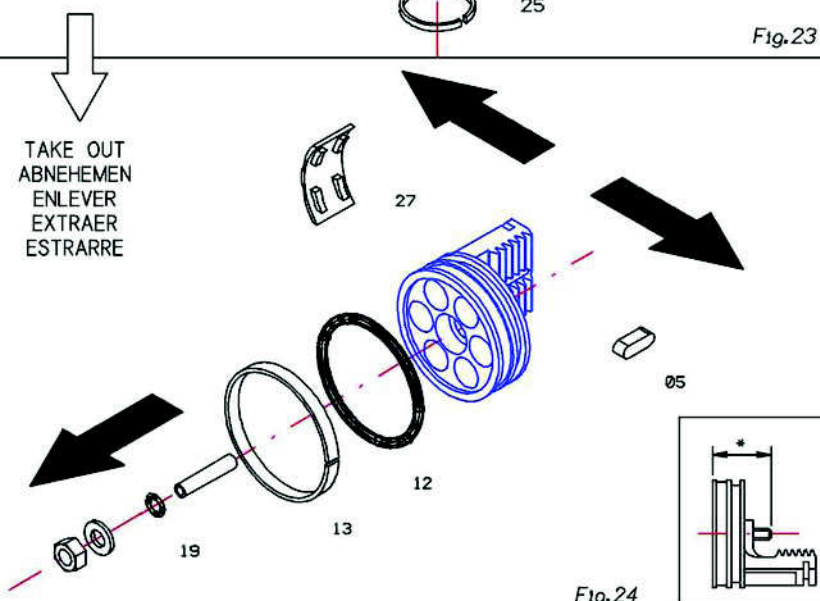
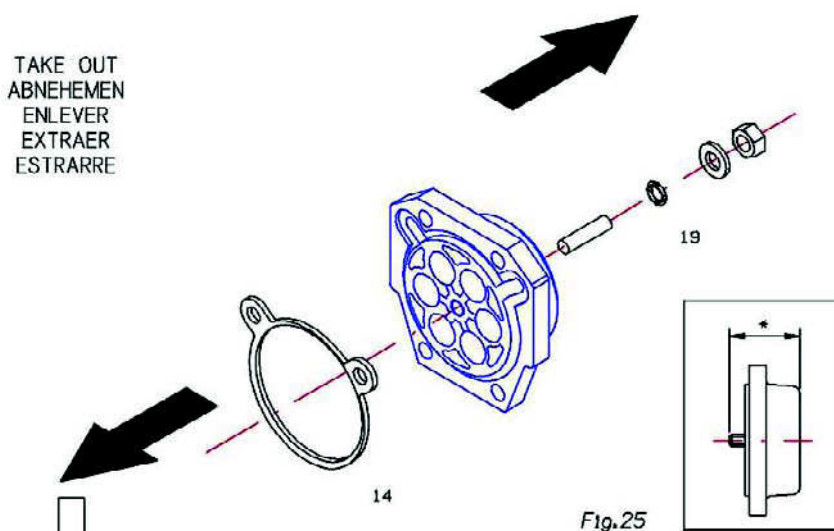


Fig.24

6 From both covers take off:
cover gasket (part 14), O-ring (part 19),
Fig. 25

* Take note of regulation dowel
projection before disassembly.



LUBRICATE
EINSCHMIEREN
LUBRIEFIER
ENGRASAR
LUBRIFICARE

WARNING!

After disassembly all
particulars to be substituted, and
before proceeding with their
replacement, carefully clean all
components. Lubricating by
molybdenum bisulphide grease
ESSO MOLY EP-2, AGIP SM2 SE or
by High Performances Syntetic
Grease NYE SINTHY 355 or similar,
fig. 26.

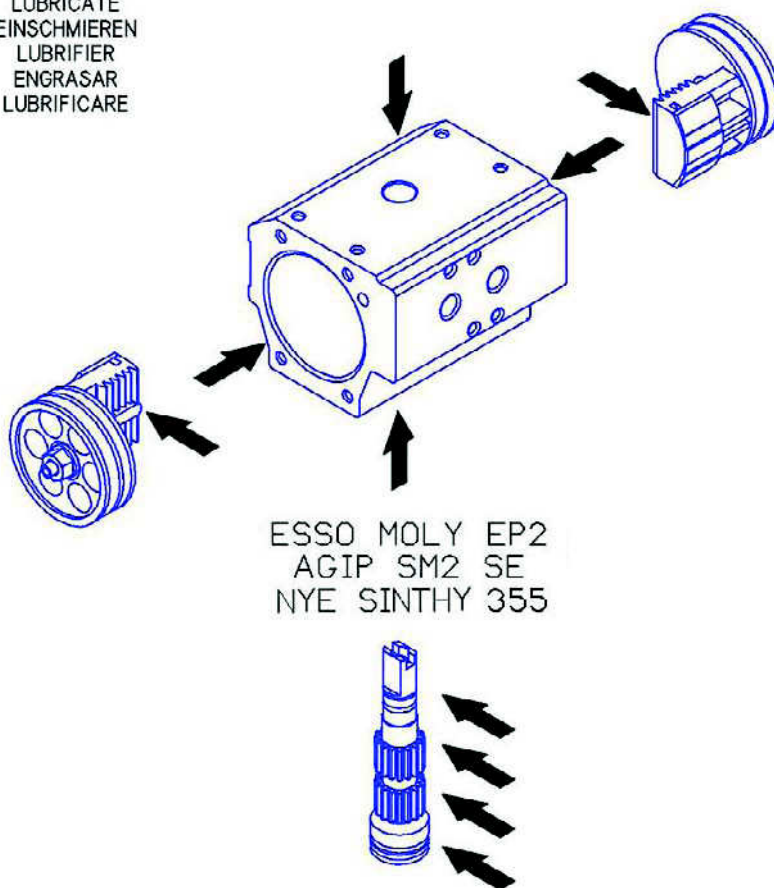


Fig. 26

7 Assembly new spare-parts on shaft:
upper pilot ring for shaft (part 26),
O-rings (part 06-07), lower pilot ring for
shaft (part 25), and replace shaft into
actuator's body, Fig. 27.

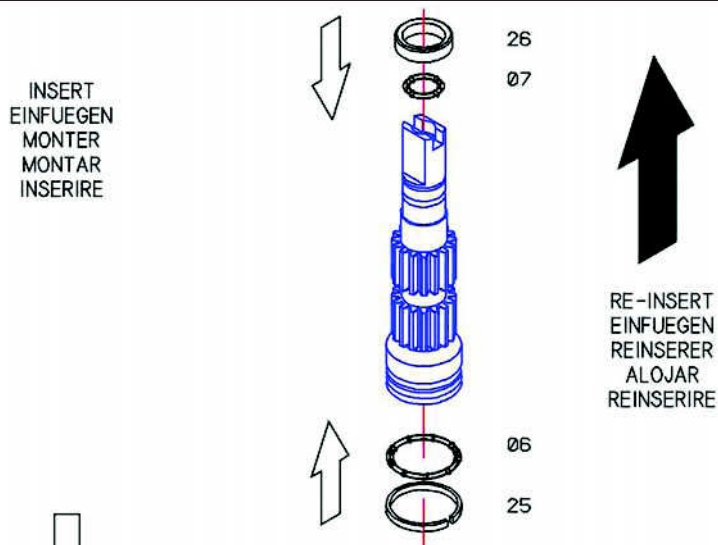


Fig.27

8 Slip new spare-parts on stem:
pinion thrust washer (part 23),
anti-friction washer (part 24), then
replace seeger-ring (part 10) in its
special seat, Fig.28.

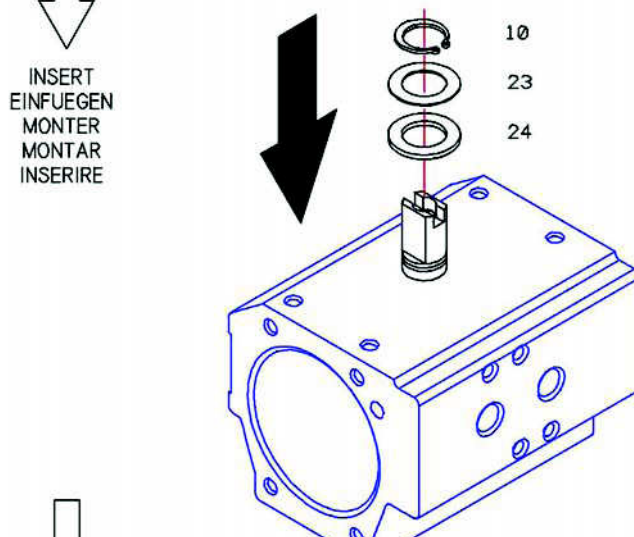


Fig.28

9 Assembly new spare-parts on
pistons:
piston bearing (part 27), anti-ejection
key (part 05), O-rings (part 12-19),
piston head bearing (part 13), Fig.29.

* P.N. Previous dowel projection.

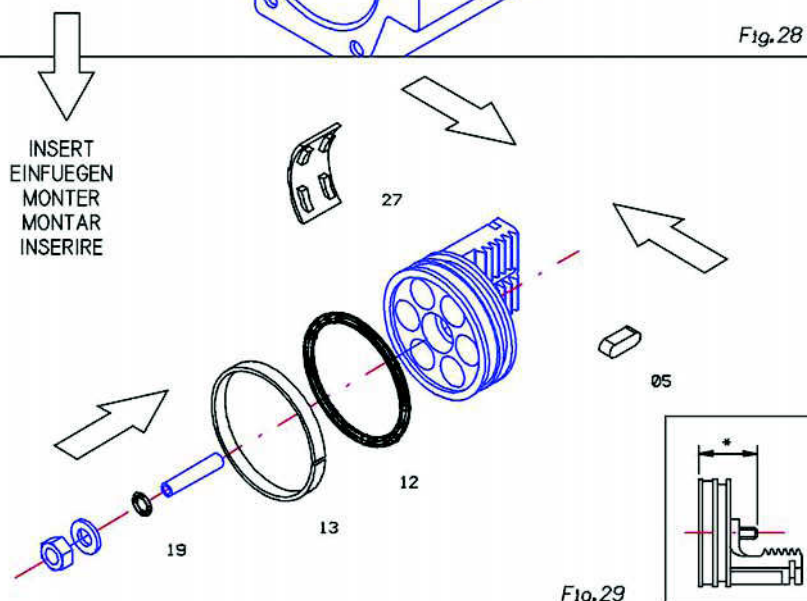
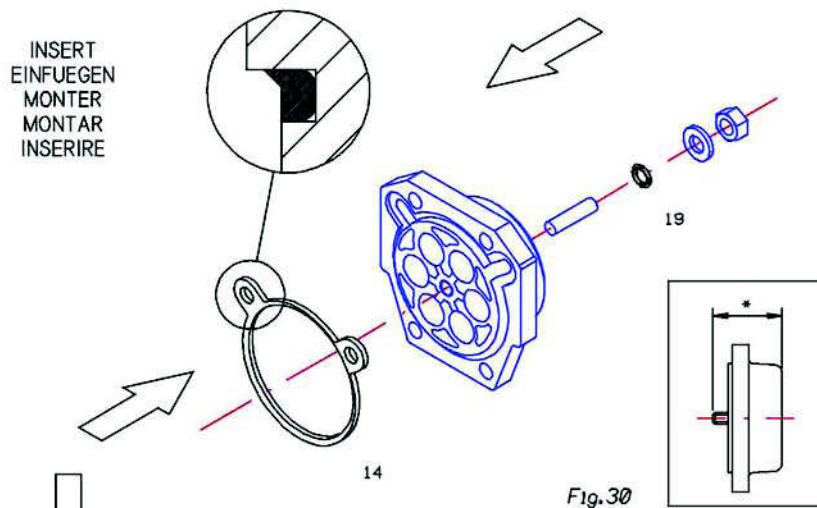


Fig.29

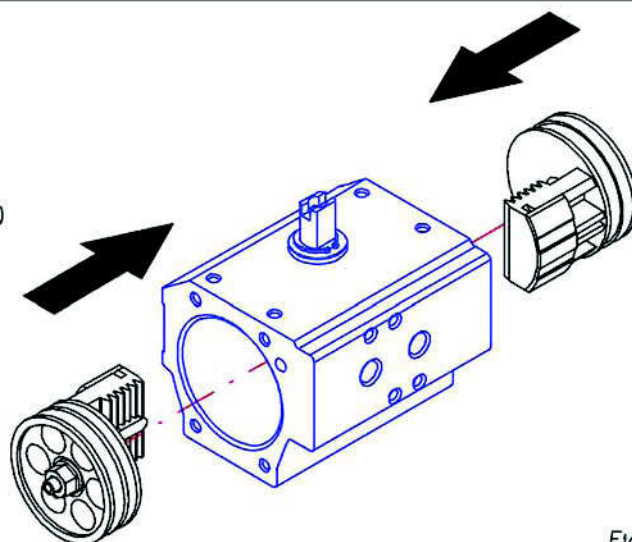
10 Assembly new spare-parts on covers:
cover gasket (part 14), O-ring (part 19), Fig. 30.

* P.N. Previous dowel projection.



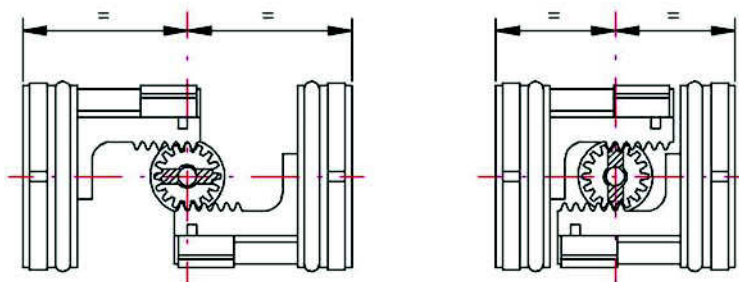
11 Replace pistons in the body in accordance to the required assembly variation, see Fig. 31 and TAB. A-B-C-D.

RE-INSERT
EINFUEGEN
REINSERER
ALOJAR
REINSERIRE
(TAB A-B-C-D)



12a Make sure the pistons are "in right phase", this means they are engaged with the same tooth on shaft, and verify rotation, see Fig. 32-A and 32-B.

PAY ATTENTION!
ACHTUNG!
S'ASSURER!
ASEGURARSE!
ASSICURARSI!



12b Make sure the pistons are "in right phase", this means they are engaged with the same tooth on shaft, and verify rotation, see Fig. 32-A and 32-B.

PAY ATTENTION!
ACHTUNG!
S'ASSURER!
ASEGURARSE!
ASSICURARSI!

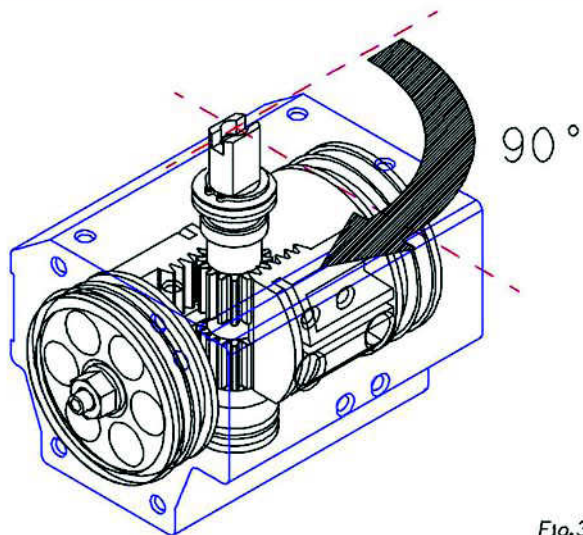
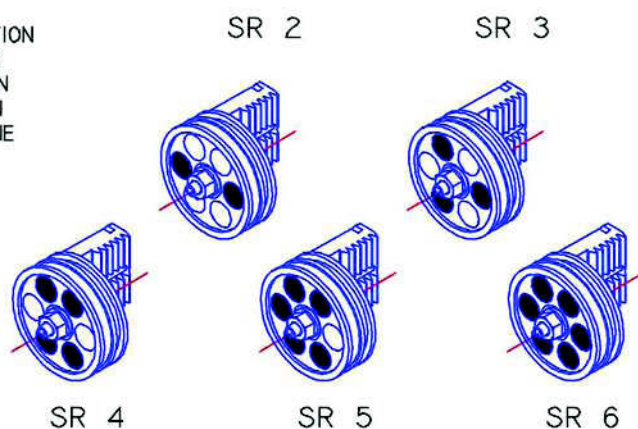


Fig.32-B

PAY ATTENTION
ACHTUNG
ATTENTION
ATENCIÓN
ATTENZIONE



13 Replace eventual springs, following Fig. 33.

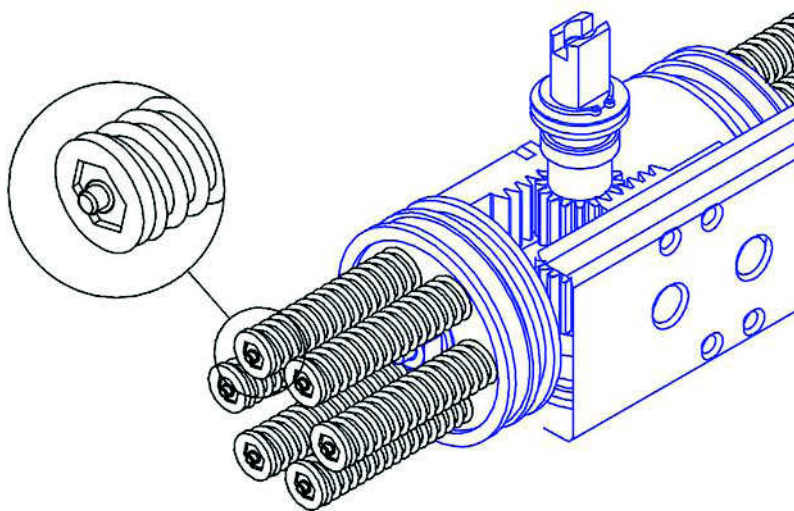
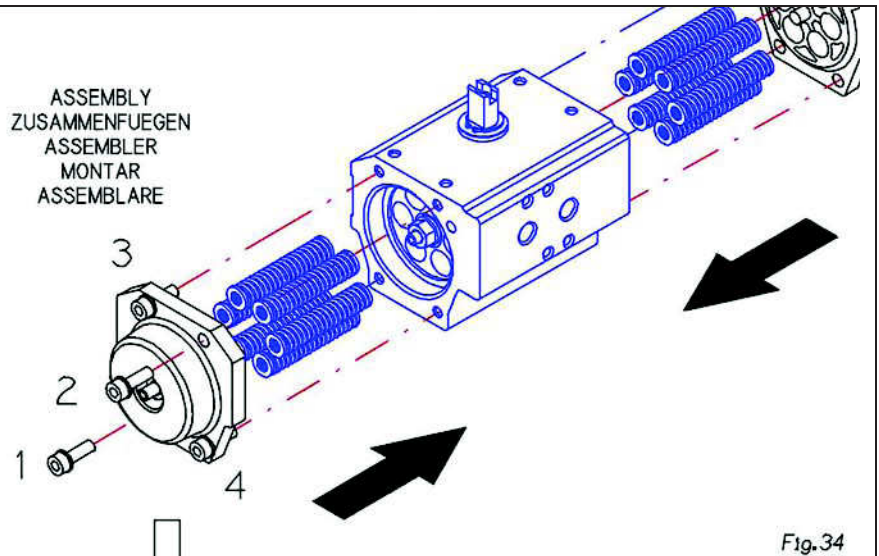


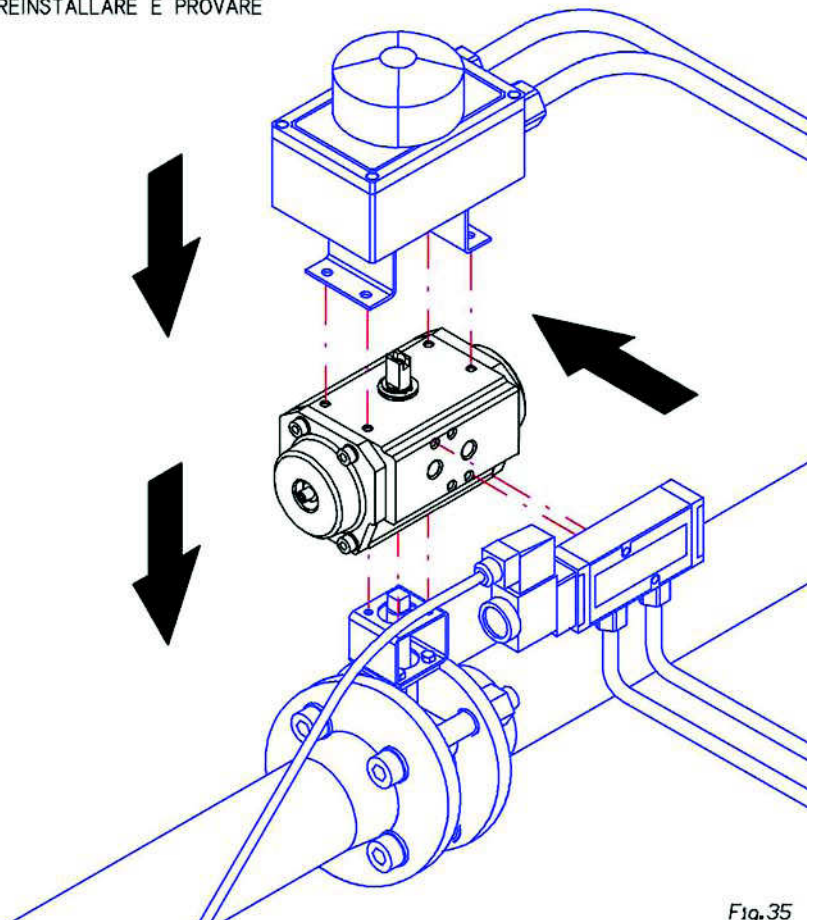
Fig.33

14 Assembly covers tightening screws following stated numeration, Fig.34.



15 Connect pneumatic/electrical feeding and verify correct operation, Fig.35.

RE-INSTALL AND CHECK
INSTALLIEREN UND UEBERPRUFEN
INSTALLER ET ESSAIER
REINSTALAR Y COMPROBAR
REINSTALLARE E PROVARE

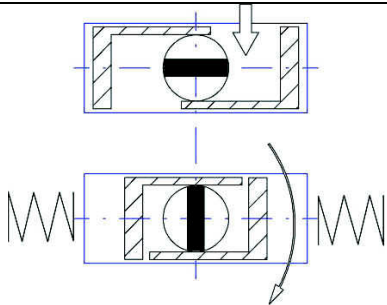
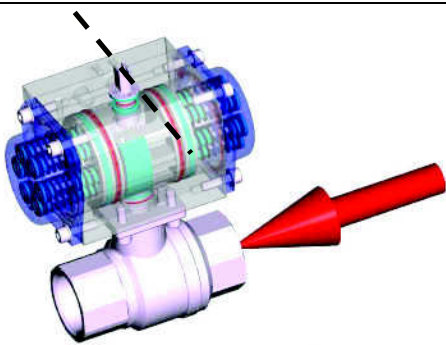
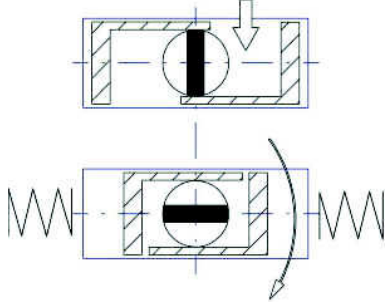
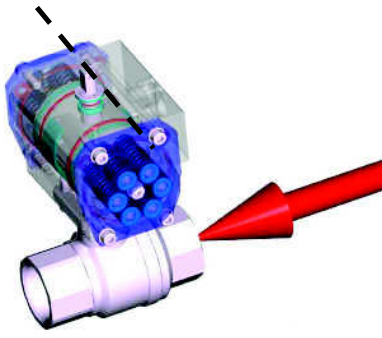
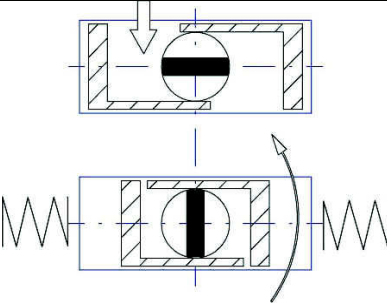
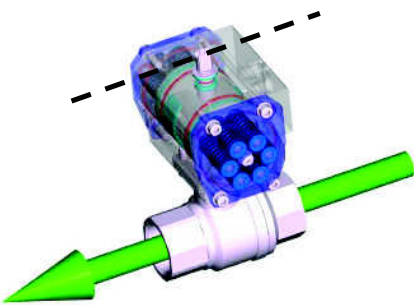
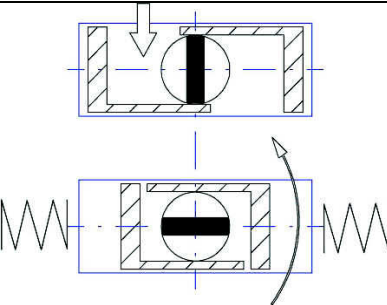
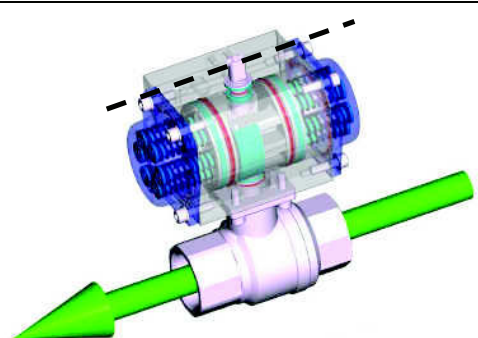


ASSEMBLY VARIATIONS – ROTATION = 90°

Valid for both aluminium "AP" and AISI 316 (A4) Stainless Steel actuators. There are four different assembly variations that are able to solve every need of valve/actuator placing combined with fail occurrence (fail-safe). They are mainly used for Spring Return/"SR" operation.

The position of the upper part of actuator's shaft has to indicate the position of the valve. **ALPHAIR's standard assembly variation is: "A".**

P.N. According to ISO 5211 – DIN 3337, closing rotation of the valve has to be clockwise.

TYPE	ASSEMBLY SCHEME	TYPICAL APPLICATION	UTILITY
A			SPRINGS CLOSE THE VALVE In event of fail, the valve is closed (fail-safe).
B			SPRINGS CLOSE THE VALVE In event of fail, the valve is closed (fail-safe).
C			SPRINGS OPEN THE VALVE In event of fail, the valve is opened.
D			SPRINGS OPEN THE VALVE In event of fail, the valve is opened.

ASSEMBLY VARIATIONS – Y SERIES = 120° ROTATION

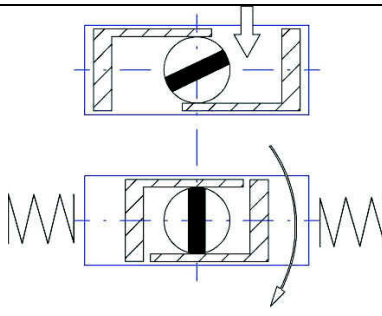
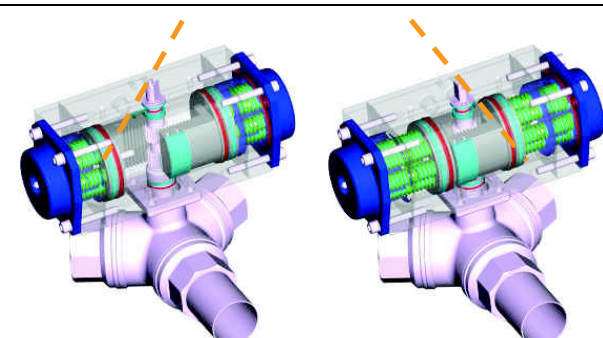
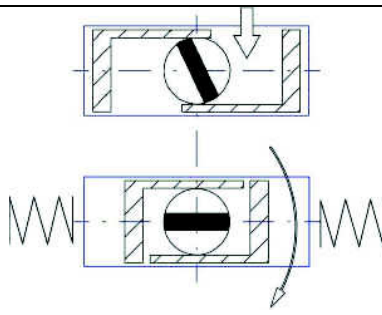
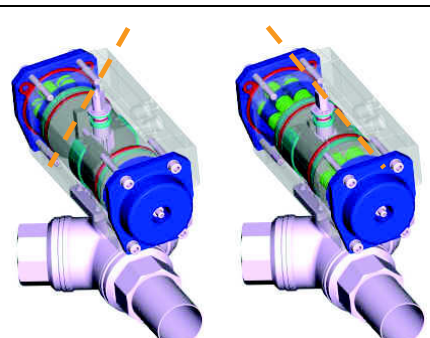
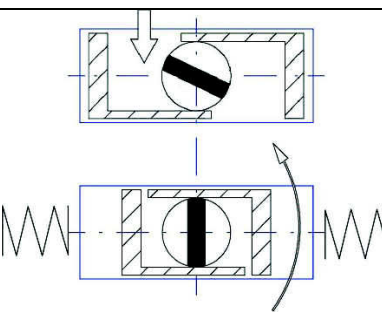
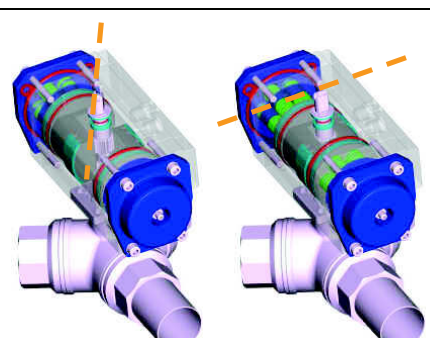
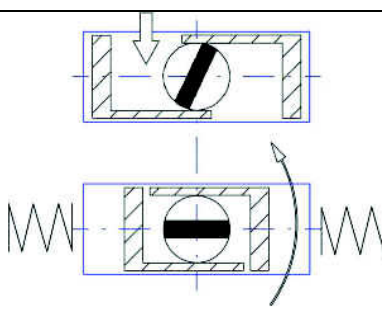
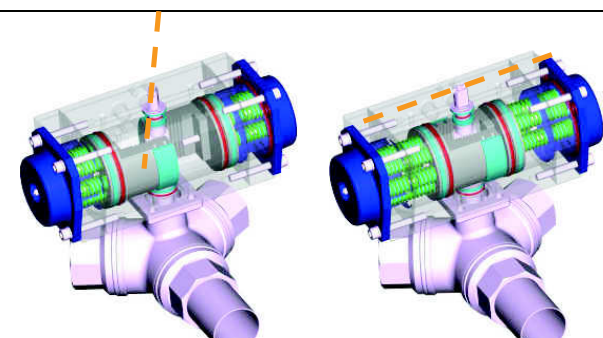
Valid for both aluminium and AISI 316 (A4) Stainless Steel actuators.

There are four different assembly variations that are able to solve every need of valve/actuator placing combined with fail occurrence (fail-safe). They are mainly used for Spring Return/"SR" operation.

The position of the stem cutting (upper shaft's part) has to indicate the position of the valve.

AVS's standard assembly variation is: "A".

P.N. According to ISO 5211 – DIN 3337, closing rotation of the valve has to be clockwise.

TYPE	ASSEMBLY SCHEME	OPEN PISTONS – CLOSED PISTONS
A		
B		
C		
D		

ASSEMBLY VARIATIONS – X SERIES = 180° ROTATION

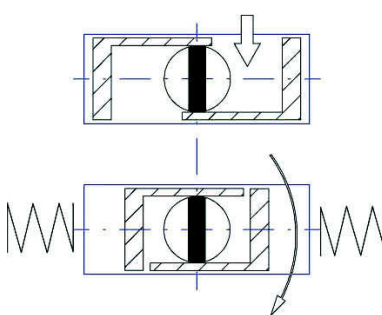
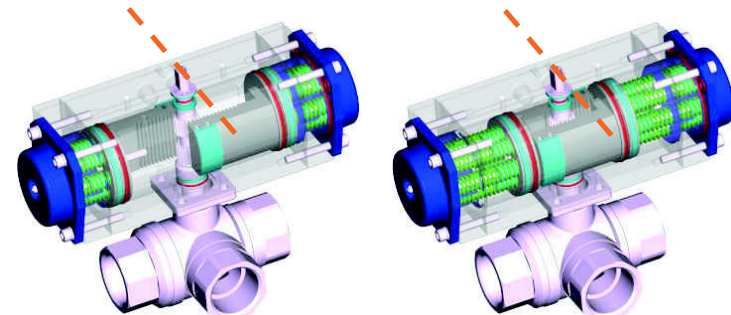
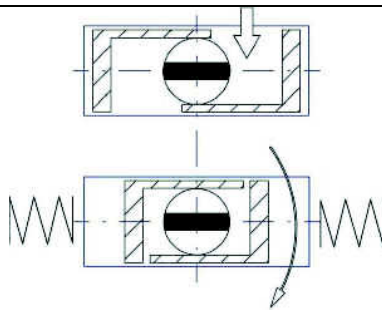
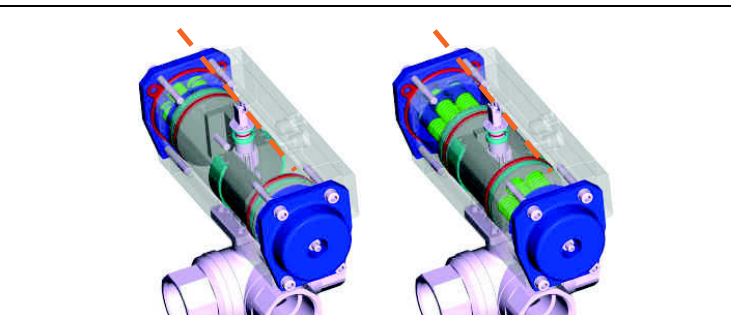
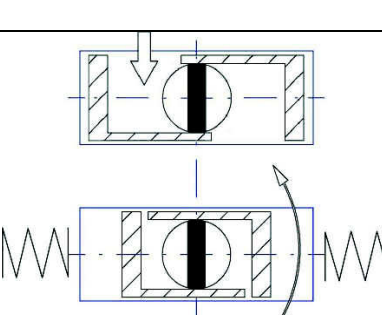
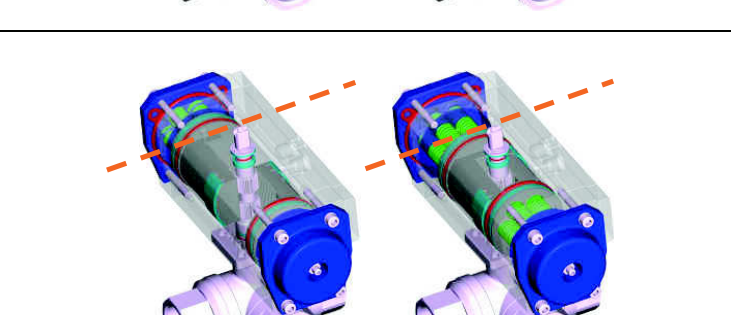
Valid for both aluminium and AISI 316 (A4) Stainless Steel actuators.

There are four different assembly variations that are able to solve every need of valve/actuator placing combined with fail occurrence (fail-safe). They are mainly used for Spring Return/"SR" operation.

The position of the stem cutting (upper shaft's part) has to indicate the position of the valve.

AVS's standard assembly variation is: "A".

P.N. According to ISO 5211 – DIN 3337, closing rotation of the valve has to be clockwise.

TYPE	ASSEMBLY SCHEME	OPEN PISTONS – CLOSED PISTONS
A		
B		
C		
D	