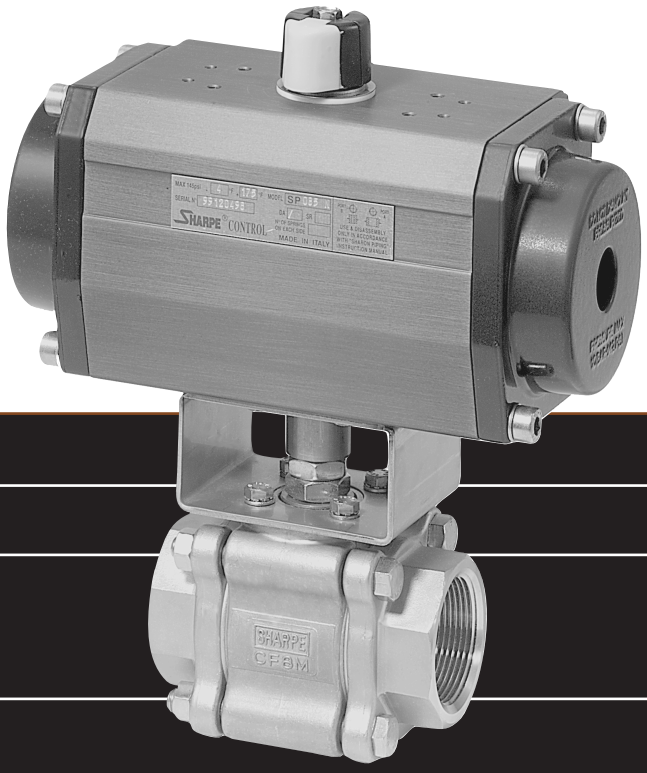
SHARPE® CONTROLS



SP-AIR SERIES
PNEUMATIC ACTUATORS

General Features for SP-Air Series Actuator

*Rack and pinion design.

*The standard actuator configuration has hard anodized aluminum body and epoxy coated end caps. External protection; resistance to corrosion of 500 hours in a salty atmosphere, according to ASTM B 117-73.

*Inside surface finish (Ra 0.4-0.6 um) to minimize friction and to maximize the life of the actuator.

*Standard applications for temperature ranges from -4°F (-20°C) to +180°F (85°C).

*Special options for extreme temperatures (upon request).

*Piston bearing made of material with low friction coefficient (LAT LUB) to avoid metal to metal contact, easily replaceable for maintenance.

*Double lower drilling, for valve mounting, and centering, according to ISO 5211/DIN 3337 standards.

*Top drilling for fastening of the accessories and upper shaft end according to NAMUR standards.

*Direct mounted solenoid connections according to NAMUR standards.

*Independent travel stop adjustment of 4° in both directions.

*Lower female shaft key, according to ISO 5211/ DIN 3337 standards, for assembly on valves with star shaft.

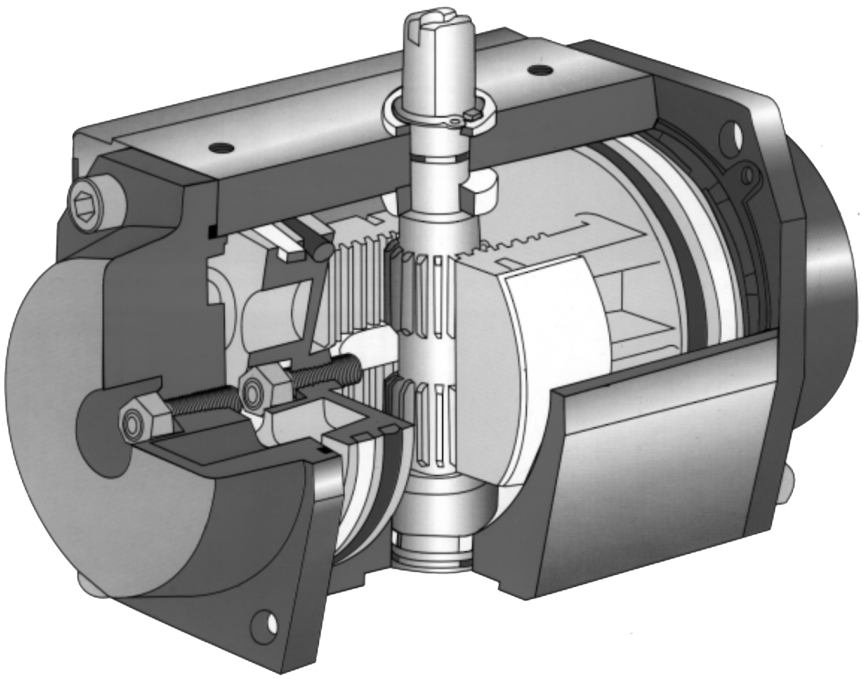
*Same body and end cap for double acting and spring return.

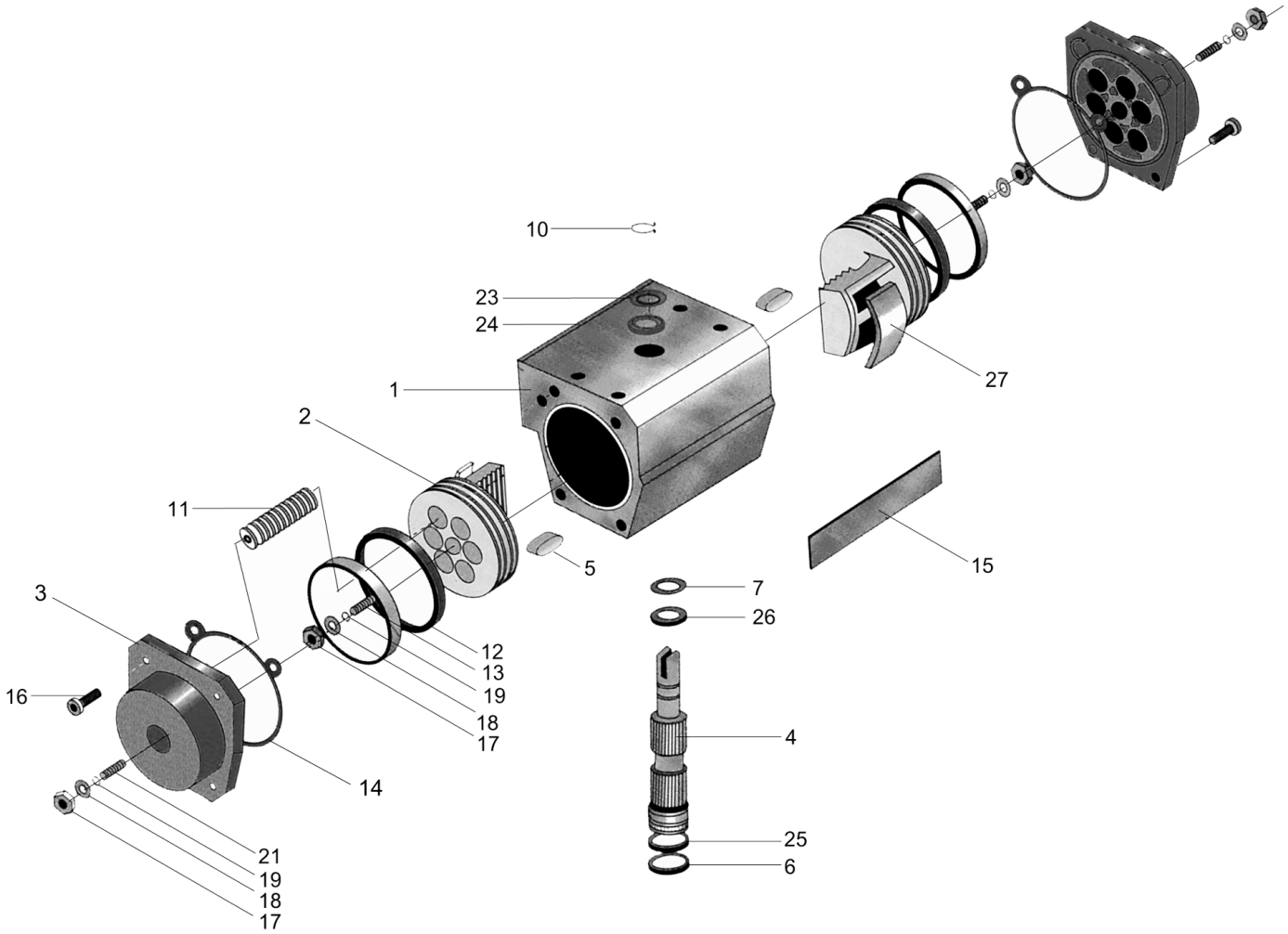
*Air supply: dry or lubricated filtered compressed air; pressure: min. 14.5 PSI - 145 PSI.

*The lubrication carried out by the manufacturer is guaranteed for min. 1,000.000 operations.

Running test and 100% seal test carried out with electronic equipment and certification of each individual product.

*Position indicator.





Parts List

PART NO.	QTY.	DESCRIPTION
1	1	Body
2	2	Piston
3	2	End Cap
4	1	Pinion
5	2	Piston Pilot Key
6	1	Pinion Lower O-Ring
7	1	Pinion Upper O-Ring
10	1	Retaining Ring
11	6-12	Spring Cartridge
12	2	Piston O-Ring
13	2	Piston Bearing
14	2	End Cap Gasket

PART NO.	QTY.	DESCRIPTION
15	1	Name Plate
16	8	End Cap Screw
17	4	Nut
18	4	Washer
19	4	O-Ring
21	2	Travel Stop
23	1	Pinion Thrust Washer
24	1	Thrust Bearing
25	1	Lower Pinion Bearing
26	1	Upper Pinion Bearing
27	2	Piston Bearing
28	2	Piston Screw

Materials of Construction

Body	Aluminum alloy, extruded according to ASTM 6063, anodized according to UNI 4522.
End Cap	Die-Cast in aluminum alloy ASTM B179, painted with epoxy-polyester powder.
Pistons	Die-Cast in aluminum alloy ASTM B179.
Pinion	Nickel-plated steel.
Pinion Bearings	Acetal Resin (LAT LUB 731 320T) + 20% PTFE.
Screws	Stainless Steel AISI 304.
Springs	Precompressed cartridge, painted with epoxy powder.
Seals	Nitrile rubber NBR (VITON or EPDM on request).
Standard Grease	MoS2.
Optional Grease	Molykote.

Optional Corrosion Protections

Coating with Chemical Nickel Having High Phosphorous Content

Nickel deposits without electricity are produced by the chemical reduction of nickel in metallic substrate, without using electricity. Dead holes, threads, grooves, recesses or inside surfaces receive the same plating quantity as the sharp angles, the corners or the flat surface (20-30 um). The standard degree is approximately 45-55 Rockwell C and offers a good resistance to corrosion in salty fog. Please take care not to damage the surface by scraping, since this exposes the basic material to corrosion. (On request, the pistons may also be nickel-protected.)

Strong Anodized Protection

The electrical process produces a thick anodized coating up to 50 microns. The resulting part resists corrosion from dipping and sprays of sodium and chlorine and also corrosive cracking stress. The oxide coating is perfectly adherent and will not chip, even after sudden temperature changes or at temperatures equal to the aluminum melting point. Aluminum oxide is one of the hardest known materials: 45-65 Rockwell C.

Epoxy-Polyester Coating

Epoxy-coating is a deposit of powders on clean and sandblasted pieces. The chemical process is easily kept under control and after coating, the pieces must be subjected to heat treatment. Epoxy painting of actuators is advised where environment is strongly aggressive. With a normal thickness of 200/250 microns of epoxy coating, resistance to salty fog exceeds 1,000 hours. With the exception of certain solvents, epoxy coating resists acids and alkali, and also has a good resistance to UV rays. In order to retain its properties, the coating must not be scratched. (Springs have this standard coating.)

Actuation Sizing Guide

The seat material used, media, temperature, frequency of operation and criticality of the valve's operation are all important factors in calculating the actuation needs of a given valve. The information provided below should be considered as a guide only and must be adjusted according to experience and judgement. Proper actuator selection is required to prevent valve or process equipment damage as well as proper valve operation.

In general, we can say that valve torque results from the friction between the ball and seats as well as the stem and stem seals.

Valve Torque

The torque requirements of Sharpe® Ball Valves will vary depending on several factors.

- **Seat design and material**
  Sharpe® seats are designed to ensure consistent sealing and low torque. The seat friction force depends on the seat material and the applicable **service factor** multipliers shown in the chart below.

- **Stem Seal**
  Torque results from the stem contact with stem seals. Packing materials affect torque. Stem seal torque is a high percentage of overall torque especially in small valve sizes.

Service Conditions

- **Differential Pressure** Minimum and maximum pressures
- **Frequency of Operation** Stuck valve torque
- **Media Influence** Slurries, dry gases, oils
- **Temperatures** Minimum and maximums
- **Cycle Time** Line hammer, process requirements
- **Instrument Air Supply** Peak demand pressure availability

Media and Service Factors

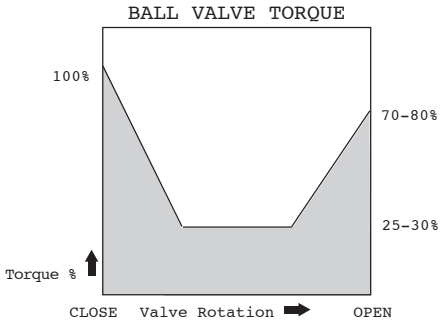
To establish minimum torque requirements, multiply valve torque by the following application media and service factors.

Media Factors	Multiplier
Clean particle free, non-lubricating (water, alcohol or solvents)	1.00
Clean particle free, lubricating oil	0.80
Slurries or heavily corroded and contaminated systems	1.30 to 2.00
Gas or saturated steam, clean and wet	1.00
Gas or superheated steam, clean and dry	1.30
Gas, dirty unfiltered e.g. natural gas, Chlorine	1.20 to 1.50

Service Factors	Multiplier
Simple On and Off Operations	1.00
Throttling	1.20
Positioner Control	1.50
Once per day session	1.20
Once every two days or more or plant critical	1.50

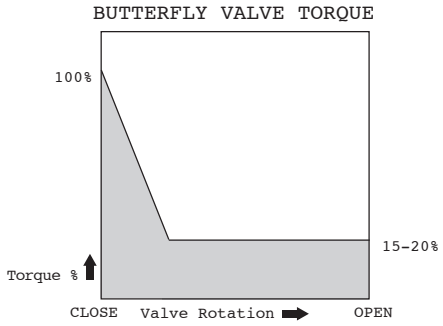
Ball Valve

Ball valve construction concept is based essentially on a polished ball (including a through port) contained in two seats (upstream and downstream). The ball rotation allows the flow or stops the flow through the valve. Differential pressure between upstream and downstream pressure forces the ball against the downstream seat (floating ball). In this case, the valve torque is generated by the friction between ball and seat and also between stem and packing. As shown in the diagram to the right the highest torque point is when, in presence of pressure, the valve is in the closed position, and passes to the open position (breakaway torque).



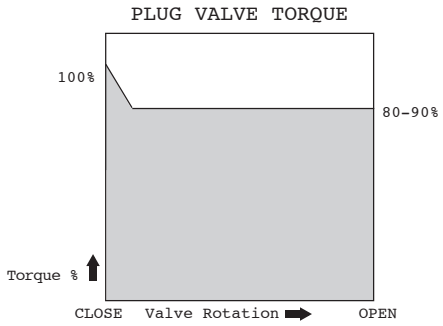
Butterfly Valve

Butterfly valve construction concept is based essentially on a disc fixed on an axis, which in the closed position, is completely contained by the seat. The open position is obtained when, with a rotation, the disc (through its stem) becomes parallel to the flow. On the contrary, the closed position is obtained when the disc is perpendicular to the flow. In the case of the butterfly valve, the torque is generated by the friction between the disc and the seat, by the stem packing and also by the differential pressure that forces on the disc. The highest torque point, as shown in the diagram, is in the closed position, and only after a small rotation it is considerably reduced.



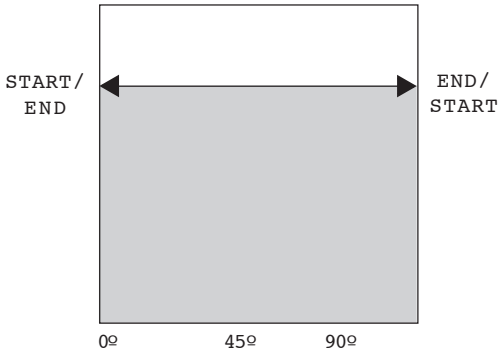
Plug Valve

Plug valve construction concept is based essentially on a male (plug) contained in a female cone (seat). The plug provides a through port in one direction and with its rotation into the seat the opening and closure of the valve is obtained. The torque is usually not influenced by the flow pressure, but is generated essentially by the friction between the seat and the plug, during the opening + closing cycle. As shown in the diagram to the right, the highest torque point is in the closed position and remains high for the rest of the operation, because the torque is not influenced by pressure.



Double Acting Actuator (DA)

In the double acting actuators, the control pinion rotation and its reversal are obtained by reversing the supply to the two input ports. The output torques obtainable mainly depend on the cylinder diameter and the supply pressure; by increasing one or both factors, the available torque also increases. The friction should usually be neglible. As shown in diagram A, the torque of a DA actuator is constant throughout the entire rotation and relevant reversal. The advised safety factor, in addition to the valve maneuvre torque, is approximately 20%.

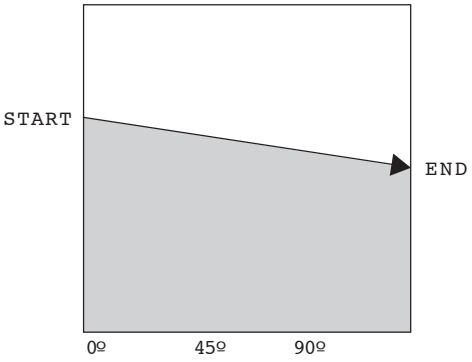


Diag. A

*Select the actuator size whose torque output at given pressure exceeds the valve torque and application factor.

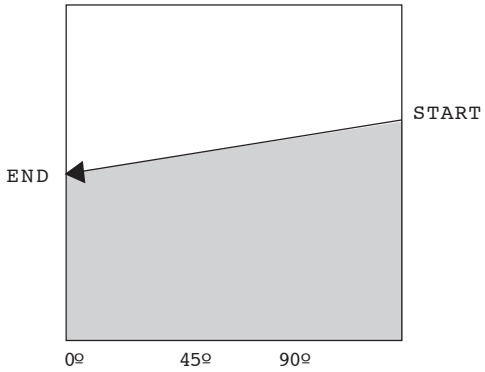
Spring Return Actuator (SR)

In these type of actuators, which utilize springs for reversing the rotation of the control pinion, the output torque depends not only on the cylinder diameter and the supply pressure, but also on the presence of the springs, which should be compressed to guarantee the return. As shown in diagram C, the available torque at 0º progressively reduces during the rotation due to the springs' compression. On the contrary, as shown in diagram D, the torque starting from the 90º position constantly decreases until 0º because of spring extension. Owing to the higher friction present, the safety coefficient advised in this case is approximately 25%.



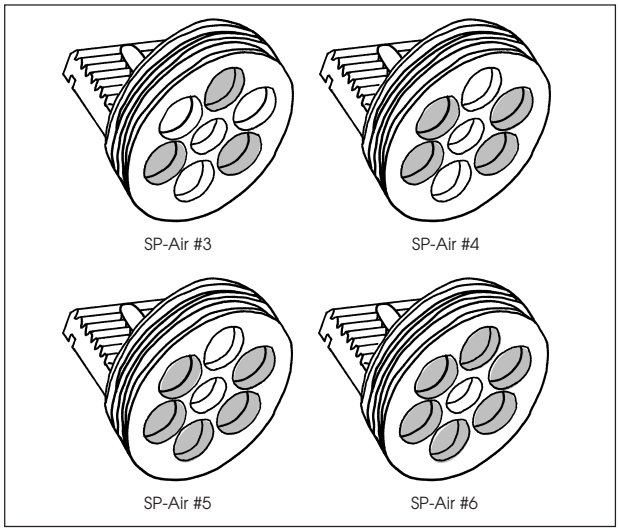
Diag. C

*Select the actuator whose torque ouput at 0º and 90º at a given air pressure exceeds the valve torque.



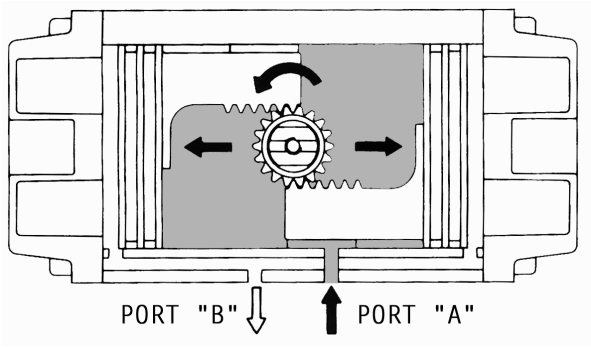
Diag. D

Recommended Spring Positioning

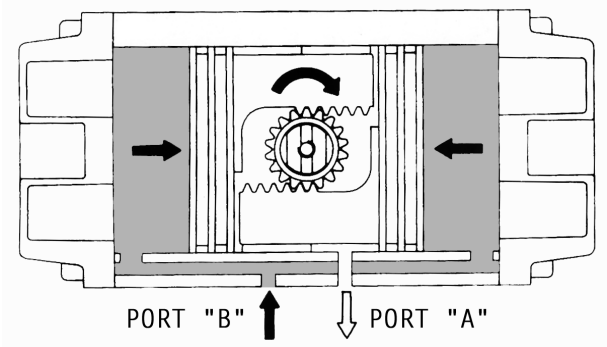


Operation

DOUBLE ACTING
(TOP VIEW)

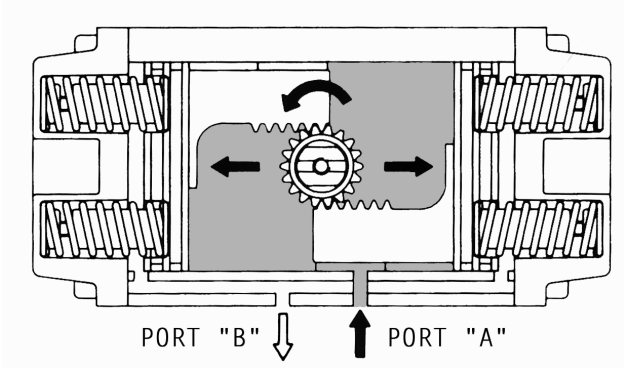


Air supplied to Port A moves pistons apart and toward end positions with exhaust air exiting at Port B (a counterclockwise rotation is obtained).

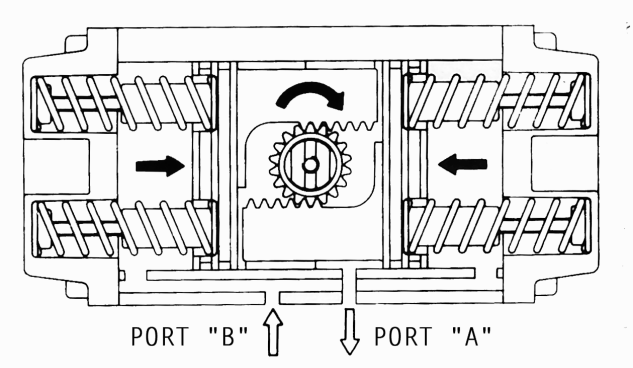


Air supplied to Port B forces pistons toward center with exhaust air exiting at Port A (a clockwise rotation is obtained).

SPRING RETURN
(TOP VIEW)



Air supplied to Port A forces pistons apart and toward end position, compressing springs. Exhaust air exits at Port B (a counterclockwise rotation is obtained).



Air or electric failure allows springs to force pistons toward center position with exhaust air exiting at Port A (a clockwise rotation is obtained).

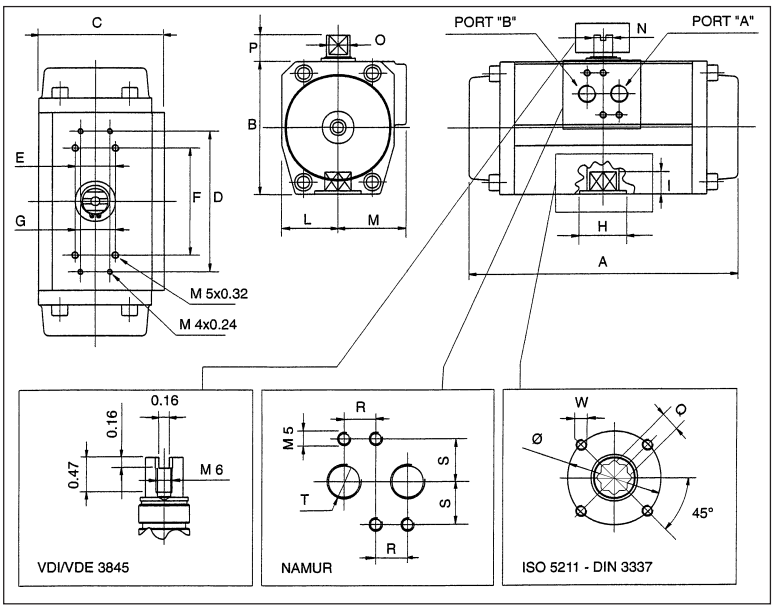
Reverse Rotation

Upon request, the pistons can be inverted in order to obtain a clockwise rotation when the air pressure is applied to Port A. Other types of assembly are possible: for any information, please contact SHARPE.

Quick Operation Actuators

Upon request, SP-Air Series actuators can be specially prepared for fast response operations.

Technical Features of SP-Air Series Actuators



Dimensions in Inches

POSITION	ACTUATOR TYPE											
	SP032	SP050	SP063	SP075	SP085	SP100	SP115	SP125	SP145	SP160	SP200	SP270
A	4.61	5.43	6.12	8.27	8.97	11.04	12.20	14.25	15.35	18.19	22.63	26.97
B	1.77	2.63	3.27	3.94	4.33	4.92	5.60	6.10	6.89	7.72	9.45	13.07
C	1.77	2.68	3.38	3.70	4.90	4.72	5.27	5.55	6.41	6.93	8.66	13.86
D	- - -	- - -	- - -	4.13	4.13	4.13	5.47	5.47	5.47	5.47	5.47	- - -
E	- - -	- - -	- - -	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	- - -
F	1.97	3.15	3.15	3.15	3.15	3.15	5.12	5.12	5.12	5.12	5.12	5.12
G	0.98	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18	1.18
H	- - -	1.18	1.38	1.38	1.57	2.16	2.16	2.16	2.75	2.95	3.94	4.09
I	0.39	0.51	0.63	0.79	0.79	0.98	0.98	1.18	1.18	1.18	1.45	1.45
L	0.88	1.32	1.50	1.67	1.93	2.16	2.50	2.74	3.14	3.46	4.33	6.53
M	0.88	1.63	1.89	2.03	2.16	2.56	2.77	2.81	3.26	3.46	4.33	6.53
T-DIN 259	1/8"	1/8"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	1/4"	1/2"
N	0.31	0.31	0.31	0.55	0.55	0.55	1.06	1.06	1.06	1.06	1.26	2.16
O	0.47	0.47	0.47	0.71	0.71	0.71	1.42	1.42	1.42	1.42	1.65	3.15
P	0.79	0.79	0.79	0.79	0.79	0.79	1.18	1.18	1.18	1.97	1.97	1.97
R	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	- - -
S	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	0.63	- - -
DIAM. Ø	1.42	1.65	1.97	1.97/2.76	1.97/2.76	2.76/4.02	2.76/4.02	2.76/4.02	2.76/4.02	4.02/4.92	5.51	5.51
Q	0.35	0.43	0.55	0.67	0.67	0.87	0.87	1.06	1.06	1.06	1.42	1.42
W	M5	M5	M6	M6-M8	M6-M8	M8-M10	M8-M10	M8-M10	M10-M12	M10-M12	M16	M16
ISO 5211	F03	F04	F05	F05-F07	F05/F07	F07/F10	F07/F10	F07-F10	F10-F12	F10/F12	F12-F14	F14-F16

VALUE		ACTUATOR TYPE																					
		SP032		SP050		SP063		SP075		SP085		SP100		SP115		SP125		SP145		SP160		SP200		SP270	
		DA	SR	DA	SR	DA	SR	DA	SR	DA	SR	DA	SR	DA	SR	DA	SR	DA	SR	DA	SR	DA	SR	DA	SR
VOLUME	LT.	0.07	- - -	0.23	- - -	0.45	- - -	0.61	- - -	0.98	- - -	1.80	- - -	2.80	- - -	3.70	- - -	4.90	- - -	8.00	- - -	14.20	- - -	22.20	- - -
OPEN	SEC.	0.50	- - -	0.60	0.60	0.60	0.70	0.60	0.70	0.60	0.70	0.80	1.10	0.90	1.20	1.10	1.30	1.10	1.40	1.30	2.10	3.60	4.60	4.50	6.00
CLOSED	SEC.	0.50	- - -	0.60	0.60	0.70	0.90	0.70	1.00	0.90	1.30	0.90	1.30	1.10	1.60	1.10	2.10	1.40	2.00	1.60	2.60	4.60	6.10	4.50	6.00
WEIGHT	LBS.	0.92	- - -	2.30	2.64	3.50	4.00	6.40	7.50	9.25	10.60	12.75	15.00	20.25	22.60	26.20	31.25	34.00	41.80	45.10	54.80	94.60	116.60	260.80	248.60

Internal "DA" Volume is intended as approximate; "SR" Volume is changeable according to the number of springs. Opening and closing times are intended as approximate with "SR" 12 springs. "SR" weight calculated with 12 springs.

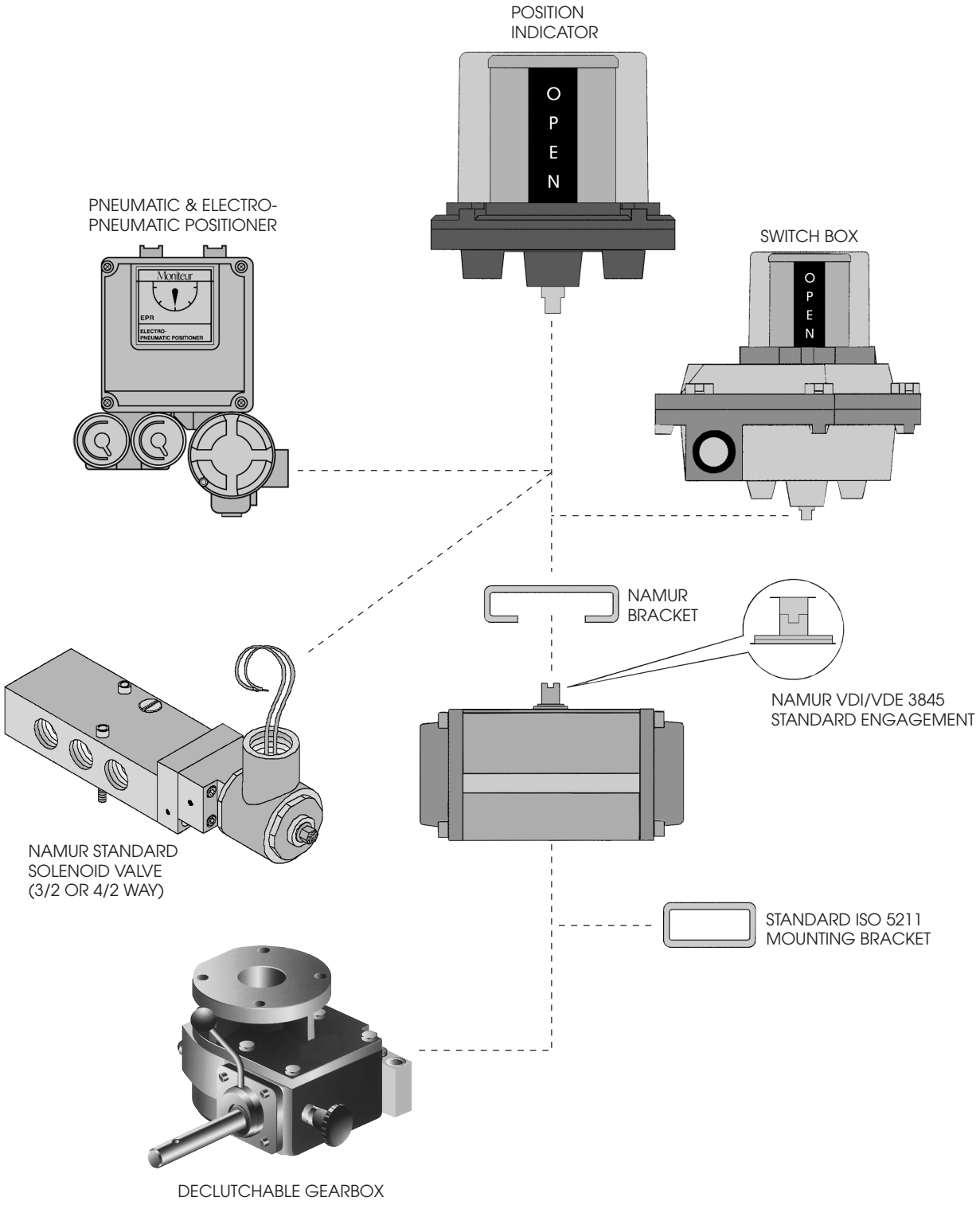
DOUBLE ACTING TORQUE RATINGS (lb.-in.)

ACTUATOR MODEL	AIR SUPPLY IN P.S.I.						
	40 P.S.I.	50 P.S.I.	60 P.S.I.	70 P.S.I.	80 P.S.I.	90 P.S.I.	100 P.S.I.
SP 032 DA	- - -	- - -	45	53	61	69	77
SP 050 DA	74	93	112	131	150	169	187
SP 063 DA	134	168	202	235	267	300	333
SP 075 DA	285	357	428	499	570	642	714
SP 085 DA	433	543	653	760	867	978	1088
SP 100 DA	661	839	1016	1184	1351	1523	1694
SP 115 DA	1114	1241	1368	1799	2229	2512	2794
SP 125 DA	1465	1950	2435	2684	2932	3304	3676
SP 145 DA	2128	2666	3204	3731	4257	4798	5338
SP 160 DA	2883	3613	4343	5055	5766	6499	7231
SP 200 DA	5405	6772	8138	9475	10812	12184	13556
SP 270 DA	13239	16585	19930	23204	26478	29839	33200

SPRING RETURN TORQUE RATINGS (lb.-in.)

ACTUATOR MODEL	# Springs Each Side	AIR SUPPLY IN P.S.I.														Spring Stroke	
		40 P.S.I.		50 P.S.I.		60 P.S.I.		70 P.S.I.		80 P.S.I.		90 P.S.I.		100 P.S.I.			
		Air Start	Air End	Air Start	Air End	Air Start	Air End	Air Start	Air End	Air Start	Air End	Air Start	Air End	Air Start	Air End	Spring Start	Spring End
SP050 SR	3 4 5 6	46	28	68 58	50 35	81 70	60 42	102 92 82 71	82 65 49 33	120 109 98 88	98 82 65 48	138 127 116 105	116 98 81 64	158 147 137 117	136 120 103 86	50 68 85 101	31 41 51 62
SP063 SR	3 4 5 6	76	51	113 94	89 63	136 118	107 76	174 152 131 111	147 118 88 59	229 206 185 164	176 146 116 68	288 264 242 220	208 176 145 114	329 299 278 251	246 216 186 157	90 121 141 181	63 86 107 128
SP075 SR	3 4 5 6	183	107	261 229	186 129	313 274	223 154	393 357 321 285	308 244 180 116	459 422 385 347	371 305 238 172	528 490 451 413	438 337 300 231	605 569 533 495	486 410 334 257	199 265 333 393	111 149 186 224
SP085 SR	3 4 5 6	281	154	400 351	280 192	480 422	336 230	600 546 492 440	466 367 269 171	700 615 589 534	561 459 358 256	806 748 691 633	662 557 451 346	925 865 815 755	786 686 585 485	305 408 510 612	167 223 279 334
SP100 SR	3 4 5 6	433	244	617 541	440 305	740 640	528 366	929 844 758 673	730 579 427 276	1086 997 908 820	879 722 565 408	1249 1158 1066 975	1036 874 711 549	1432 1341 1263 1170	1228 1074 919 765	471 628 785 942	265 354 443 532
SP115 SR	3 4 5 6	686	431	993 857	754 539	1181 1029	905 647	1504 1352 1201 1049	1235 995 755 515	1761 1604 1447 1290	1483 1234 985 736	2030 1868 1706 1544	1744 1486 1228 971	2333 2178 2024 1869	2060 1814 1569 1324	746 995 1244 1493	469 626 782 939
SP125 SR	3 4 5 6	951	518	1351 1187	946 649	1622 1424	1135 779	2029 1847 1665 1483	1574 1241 909 576	2369 2181 1992 1803	1898 1544 1208 863	2726 2531 2335 2141	2238 1881 1524 1168	3121 2935 2749 2563	2656 2316 1977 1637	1035 1377 1725 2070	564 753 941 1130
SP145 SR	3 4 5 6	1297	755	1885 1624	1377 946	2262 1948	1653 1135	2861 2569 2275 1983	2284 1810 1327 844	3346 3043 2739 2435	2754 2138 1759 1259	3860 3547 3232 2918	3251 2484 2216 1699	4442 4142 3844 3544	3862 3369 2876 2456	1500 2000 2500 3000	910 1219 1518 1871
SP160 SR	3 4 5 6	1811	1080	2602 2264	1917 1350	3123 2717	2300 1621	3927 3549 3170 2793	3159 2524 1891 1257	4592 4200 3909 3417	3796 3140 2483 1827	5292 4886 4482 4076	4468 3790 3110 2432	6072 5686 5301 4915	5288 4642 3995 3348	1970 2627 3284 3941	1175 1567 1959 2351
SP200 SR	3 4 5 6	3451	2225	4924 4313	3542 2463	5908 5116	4250 2956	7419 6729 6039 5348	5866 4658 3450 2242	8667 7951 7237 6523	7059 5808 4557 3306	9981 9238 8502 7764	8319 7025 5731 4436	11413 10716 10038 9331	9864 8627 7395 6162	3753 5001 6255 7506	2420 2858 3574 4289
SP270 SR	3 4 5 6	7491	5788	10896 9441	9574 7236	13075 11329	11489 8683	17163 15137 13110 11084	15374 12753 10130 7508	20182 18084 15986 13887	18331 15526 12899 10183	23368 21198 19028 16856	21453 18644 15834 13025	26999 24982 22865 20717	25174 22499 18863 17185	8147 10952 13579 16295	6295 8394 10492 12591

The above values are the end torque output that remains available to operate the valve when the air supply is put in Port A, after compressing the springs.
0° = Extended spring / 90° = Compressed spring.


POSITION
INDICATOR
O
P
E
N
PNEUMATIC & ELECTRO-
PNEUMATIC POSITIONER
Moniteur
EPR
ELECTRO-
PNEUMATIC POSITIONER
SWITCH BOX
O
P
E
N
NAMUR
BRACKET
NAMUR VDI/VDE 3845
STANDARD ENGAGEMENT
NAMUR STANDARD
SOLENOID VALVE
(3/2 OR 4/2 WAY)
STANDARD ISO 5211
MOUNTING BRACKET
DECLUTCHABLE GEARBOX

Installation

- Make sure that actuator, when fitted on the valve, is well aligned with the valve stem. When actuator is directly fitted with bracket and coupling, all parts must be precisely machined.
- In spring return applications, the exhaust air port must be very well vented.
- Accessories, if any, must be mounted in a proper manner to allow unobstructed operation of the actuator.

Maintenance

A. Remove the end cap screws (16) of the end cap (03).
B. Take off the end cap (03).
C. Turn the pinion (04) in clockwise direction so that the pistons (02) come out of the body (01).
D. Remove the retaining ring (10).
E. Take the pinion (04) out from the lower part of the body by simply pressing it with your fingers.
F. Replace the following parts:

On the pistons:
2 O-Rings (12); 2 bearings (27); 2 keys (05); 2 piston bearings (13); 2 O-Rings (19).
On the heads:
2 gaskets (14); 2 O-Rings (19).
On the pinion:
2 O-Rings (06) (07); 1 bearing (24); 1 lower bearing (25); 1 upper bearing (26);
1 pinion thrust washer (23).

HOW TO ORDER

ACTUATOR MODEL	DOUBLE ACTING	SPRING RETURN	NO. OF SPRINGS PER SIDE OF PISTON	OPTIONS
SP032 SP050 SP063 SP075 SP085 SP100 SP115 SP125 SP145 SP160 SP200 SP270	DA	SR	3 4 5 6	1 = High Temperature Actuator 2 = Coating with Chemical Nickel 3 = Strong Anodized 4 = Epoxy Coatings

SP050 SR 6 3

SHARPE® VALVES
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