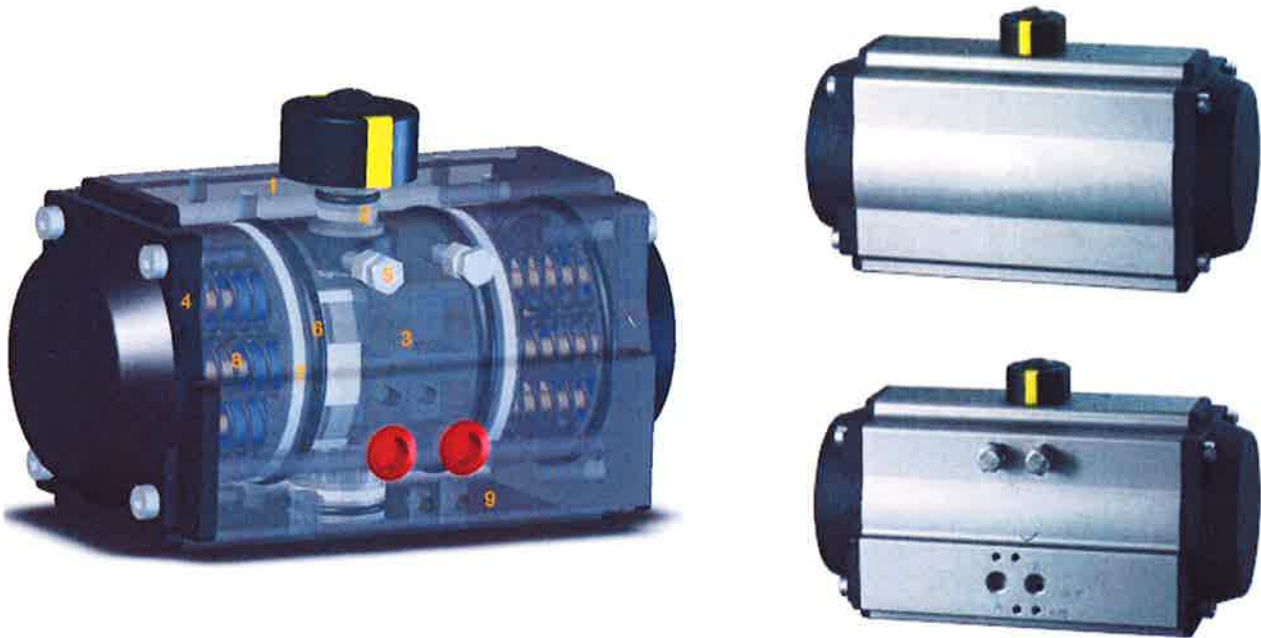


Pneumatic Actuators - A Series

Design & Construction of Pneumatic Actuators



1、 Actuator Body

According to the different requirements, the extruded aluminum alloy ASTM6005 Body can be treated with hard anodized powder polyester painted (different colours is available such as blue, orange, yellow etc.), PTFE or Nickel plated.

2、 Pinion

The pinion is high-precision and integrative, made from nickelled-alloy steel, full conform to the latest standards of ISO5211, DIN3337, NAMUR. The dimensions can be customized and the stainless steel is available.

3、 Pistons

The twin rack pistons are made from Die-casting aluminum treated with Hard anodized or made from Cast steel with galvanization. Symmetric mounting position, long cycle life and fast operation, reversing rotation by simply inverting the pistons.

4、 End caps

Die-casting aluminum powder polyester painted in different colours, PTFE or Nickel plated.

5、 Travel adjustment

The two independent external travel stop adjustment bolts can adjust $\pm 5^\circ$ at both open and close directions easily and precisely.

6、 O-rings

NBR rubber O-rings provide trouble-free operation at standard temperature ranges. For high and low temperature applications Viton or Silicone.

7、 Bearings & Guides

Made from low friction, long-life compound material, to avoid the direct contact between metals. The maintenance and replacement are easy and convenient.

8、 High performance springs

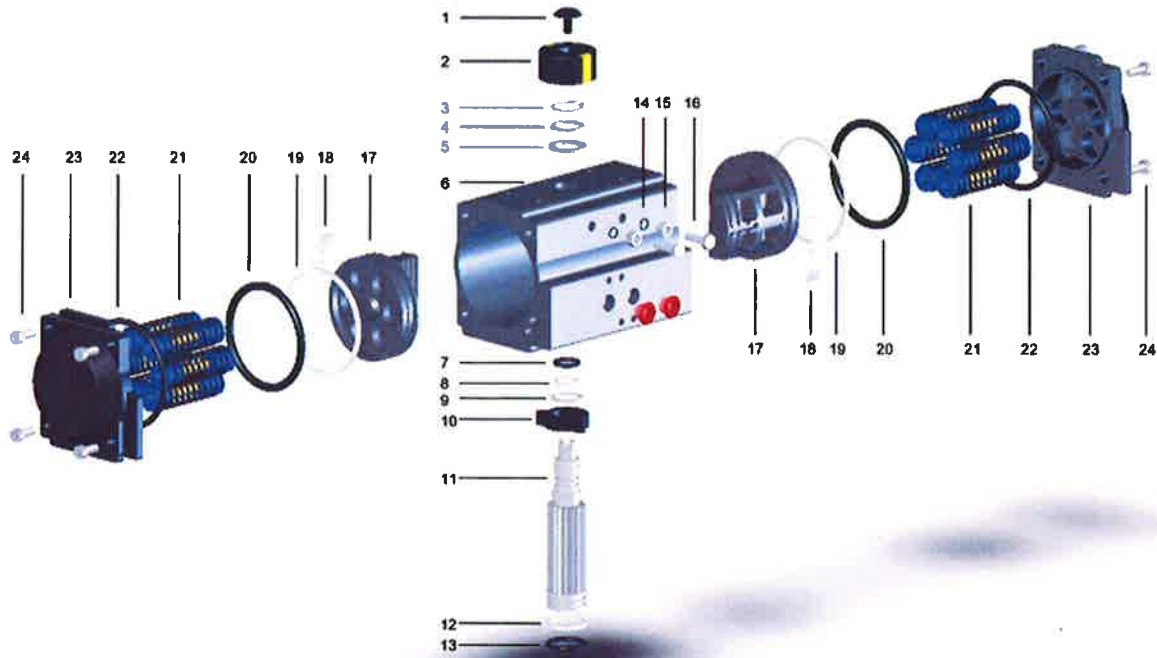
Preloaded coiled springs are made from the high quality material for resistant to corrosion and longer service life, which can be demounted safely and conveniently to satisfy different requirements of torque by changing quantity of springs.

9、 Connection

Air connection, position indicator with NAMUR are convenient for mounting accessories such as solenoid valve, limit switch box, positioner.

Pneumatic Actuators - A Series

Actuators Parts and Material Table

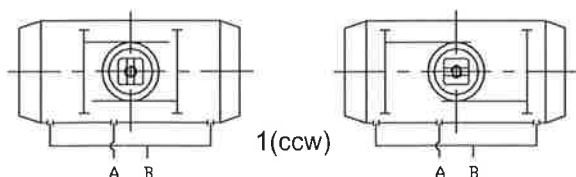


No.	Description	Qty	Standard Material	Protection	Optional Material
1	Indicator screw	1	Plastic		
2	Indicator	1	Plastic		
3	Spring clip	1	Stainless Steel		
4	Thrust washer	1	Stainless Steel		
5	Outside washer	1	PTFE		
6	Body	1	Extruded alluminum alloy	Hard anodized etc	
7	O-ring (pinion top)	1	NBR		
8	Bearing (pinion top)	1	PTFE		
9	Inside washer	1	PTFE		Viton/Silicone
10	Cam	1	Alloy steel		
11	Pinion	1	Alloy steel	Nickel plated	Stainless Steel
12	Bearing (pinion bottom)	1	PTFE		
13	O-ring (pinion bottom)	1	NBR		Viton/Silicone
14	O-ring (Adjust screw)	2	NBR		Viton/Silicone
15	Nut (Adjust screw)	2	Stainless Steel		
16	Adjust screw	2	Stainless Steel		
17	Piston	2	Cast alluminum/casting	Anodized/Zinc galvaniz	Stainless Steel
18	Guide (Piston)	2	Engineering plastics		
19	Bearing (Piston)	2	PTFE		
20	O-ring (Piston)	2	NBR		Viton/Silicone
21	Spring	0-12	Spring steel	Dip coating	
22	O-ring (End cap)	2	NBR		Viton/Silicone
23	End cap	2	Cast alluminum	Powder polyster painted	
24	Cap screw	8	Stainless Steel		

Pneumatic Actuators - A Series

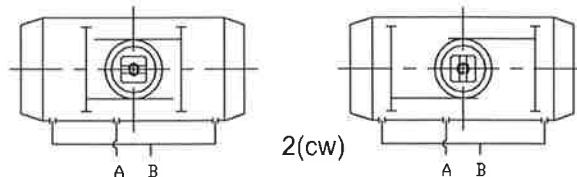
Operating Principle

Double Acting Actuators



1(ccw)

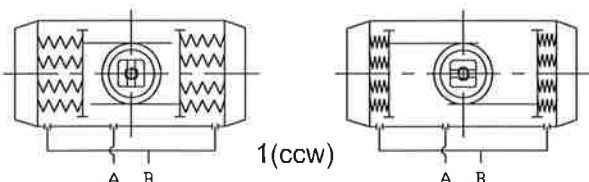
1. Air to Port A forces the pistons outwards, causing the pinion to turn counterclockwise while the air is being exhausted from Port B.
Air to Port B forces the pistons inwards, causing the pinion to turn clockwise while the air is being exhausted from Port A.



2(cw)

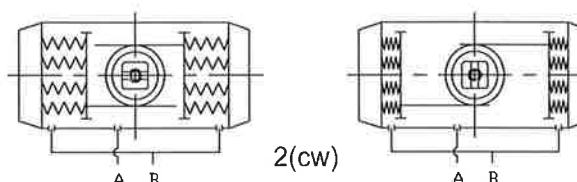
2. Air to Port A forces the pistons outwards, causing the pinion to turn clockwise while the air is being exhausted from Port B.
Air to Port B forces the pistons inwards, causing the pinion to turn counterclockwise while the air is being exhausted from Port A.

Spring Return Actuators



1(ccw)

1. Air to Port A forces the pistons outwards, causing the springs to compress, the pinion turns counterclockwise while the air is being exhausted from Port B.
Loss of air pressure on port A, the stored energy in the springs forces the pistons inwards. The pinion turns clockwise while air is being exhausted from port A.



2(cw)

2. Air to Port A forces the pistons outwards, causing the springs to compress, the pinion turns clockwise while the air is being exhausted from Port B.
Loss of air pressure on port A, the stored energy in the springs forces the pistons inwards. The pinion turns counterclockwise while air is being exhausted from port A.

OUTPUT TORQUE OF DOUBLE ACTING ACTUATORS (Unit:Nm)

Model	Air supply pressure (Unit: Bar)									
	2	2.5	3	4	4.5	5	5.5	6	7	8
A052D	7.7	9.8	11.9	16.0	18.1	20.2	22.3	24.4	28.5	32.7
A063D	13.6	17.2	20.9	28.2	31.9	35.6	39.2	42.9	50.2	57.6
A075D	19.2	24.4	29.6	40.0	45.2	50.4	55.6	60.8	71.2	81.6
A083D	29.4	37.4	45.3	61.2	69.2	77.2	85.1	93.1	109.0	124.9
A092D	43.4	55.1	66.8	90.3	102.0	113.7	125.5	137.2	160.7	184.1
A105D	62.8	79.8	96.7	130.7	147.7	164.6	181.6	198.6	232.5	266.5
A125D	97.9	124.4	150.8	203.7	230.2	256.6	283.1	309.6	362.5	415.4
A140D	167.5	212.7	258.0	348.5	393.7	439.0	484.3	529.5	620.0	710.5
A160D	255.2	324.1	393.1	531.0	600.0	669.0	737.9	806.9	944.8	1082.7
A190D	411.2	522.4	633.5	855.8	966.9	1078.1	1189.2	1300.4	1522.7	1745.0
A210D	502.4	638.1	773.9	1045.5	1181.2	1317.0	1452.8	1588.6	1860.1	2131.6
A240D	738.2	937.7	1137.2	1536.2	1735.7	1935.2	2134.7	2334.2	2733.2	3132.2
A270D	1121.1	1424.1	1727.1	2333.1	2636.1	2939.1	3242.1	3545.1	4151.1	4757.1

Pneumatic Actuators - A Series

OUTPUT TORQUE OF SPRING RETURN ACTUATORS (Unit: Nm)

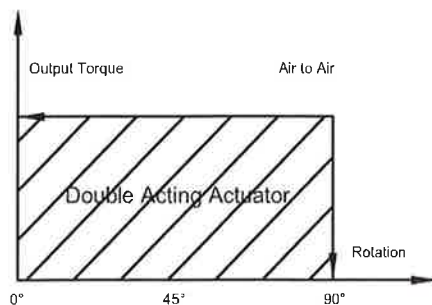
Air pressure		2.5Bar		3Bar		4Bar		5Bar		6Bar		7Bar		8Bar		Springs' output	
Model	Spring	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	90°	0°
	Q.ty	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
A052S	5	5.7	3.8	7.6	5.7											6.2	4.3
	6	4.9	2.5	6.9	4.5	10.9	8.5									7.4	5
	7	4	1.3	6	3.3	9.8	7.3	14	10.4							8.6	5.9
	8			5.2	2	9.2	6	13.2	9.1	17.2	14.1					9.9	6.7
	9			4.3	0.8	8.3	4.8	12.3	7.9	16.3	12.8	20.3	16.8			11.1	7.6
	10					7.4	3.6	11.5	6.7	15.5	11.6	19.5	15.6			12.4	8.5
	11					6.6	2.3	10.6	5.4	14.6	10.4	18.6	14.3	22.6	18.3	13.6	9.3
	12							9.7	4.2	13.8	9.1	17.8	12.2	21.8	17.1	14.8	10.2
A063S	5	11.4	7.7	15	11.4	22.3	14.9									10.4	6.8
	6	10.1	5.7	13.6	9.3	20.9	16.6	28.3	23.9							12.5	8.2
	7	8.6	3.6	12.5	7.2	19.5	14.5	26.8	21.9							14.6	9.6
	8			10.9	5.1	18.2	12.4	25.5	19.8	32.8	27	40.1	34.3			16.7	10.9
	9					16.8	10.4	24.1	17.7	31.4	24.9	38.7	32.2			18.8	12.3
	10					1.4	8.2	22.8	15.6	30	22.8	37.3	30.1	44.7	37.4	20.9	13.7
	11							21.5	13.5	28.7	20.7	36	28	43.3	35.3	22.9	15
	12							20	11.4	27.3	18.6	34.6	25.9	41.9	33.3	25	16.4
A075S	5	14.5	10.6	19.4	15.5	29.5	25.7									14.5	10.5
	6	12.4	7.6	17.3	12.6	27.4	22.7	37.5	32.8							17.4	12.7
	7	10.4	4.8	15.2	9.7	25.3	19.9	35.4	29.9							20.3	14.8
	8			13.1	6.8	23.1	16.9	33.3	27	43.2	37	53.3	47			23.2	16.9
	9					21	14.1	31.2	24.1	41.1	34.1	51.2	44.2			26.1	19
	10					19	11.1	28.8	21.2	39	31.2	49.1	41.2	59.1	51.2	29	21.1
	11							27	18.3	37	28.3	47	38.4	57	48.4	31.9	23.2
	12							24.9	15.4	34.9	25.4	44.9	35.4	54.9	45.4	34.7	25.3
A083S	5	23.3	16.1	31.1	24	46.8	39.7									23	15.8
	6	20.1	11.5	28	19.3	43.7	35.1	59.4	50.7							27.6	19
	7	17	6.9	24.8	14.8	40.5	30.5	56.2	46.2							32.2	22.1
	S			21.7	10.1	37.4	25.8	53.1	41.5	68.8	57.2	84.5	72.9			36.8	25.3
	9					34.2	21.3	49.9	37	65.6	52.6	81.2	68.3			41.4	28.5
	10					31	16.6	46.7	32.3	62.4	48	78.1	63.7	93.8	79.3	46	31.6
	11							43.6	27.7	59.3	43.4	75	59.1	90.6	74.8	50.6	34.8
	12							40.4	23.2	56.1	38.9	71.7	54.5	87.4	70.2	55.2	38
A092S	5	33.1	22	44.2	33.2	66.8	55.9									34.4	23.3
	6	28.4	15.2	39.6	26.4	62.2	49	84.8	71.6							41.2	28
	7	23.8	8.2	34.9	19.4	57.5	42.1	80.2	64.7							48.1	32.7
	8			31.3	12.6	52.9	35.2	75.5	57.9	98.1	80.5	120.7	103			55	37.3
	9					48.2	28.4	70.9	51	93.5	73.6	116	96.1			61.9	42
	10					43.6	21.5	66.2	44.1	88.8	66.7	111.3	89.2	134	111.8	68.7	46.7
	11							61.5	37.2	84.1	59.9	106.6	82.4	129.2	105	75.6	51.4
	12							56.8	30.4	79.4	53	101.9	75.5	124.5	98.1	82.5	56
A105S	5	51	33.4	67.5	49.9	100.6	83									49.2	31.6
	6	44.7	23.5	61.1	40	94.2	73.2	127.3	106.2							59.1	38
	7	38.4	13.7	54.9	30.3	87.9	63.4	121	96.4							68.9	44.3
	S			48.5	20.4	81.6	53.5	114.7	86.5	147.7	119.6	180.8	152.7			78.7	50.6
	9					75.3	43.7	108.4	76.8	141.5	109.8	174.5	142.9			88.6	56.9
	10					68.9	33.4	102	66.5	135.1	99.6	168.2	132.6	201.2	165.7	98.4	63.3
	11							95.7	57	128.7	90.1	161.8	123.1	194.8	156.2	108.3	69.6
	12							89.4	47.5	122.5	80.6	155.5	113.6	188.6	146.7	118.1	75.9

Pneumatic Actuators - A Series

OUTPUT TORQUE OF SPRING RETURN ACTUATORS (Unit: Nm)

Air pressure		2.5Bar		3Bar		4Bar		5Bar		6Bar		7Bar		8Bar		Springs' output	
Model	Spring	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	90°	0°
	Q.ty	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
A125S	5	73	47	98	72	148	122									79	52
	6	63	31	88	56	138	107	188	157							94	63
	7	52	15	77	40	127	90	178	141							110	73
	8			67	25	117	75	167	125	217	176	268	226			125	84
	9					107	59	157	109	207	159	257	210			141	94
	10					96	44	146	94	196	144	247	194	297	245	157	105
	11							136	78	186	128	236	178	286	228	173	115
	12							125	63	176	113	226	163	276	213	188	125
A140S	5	128	85	171	127	256	213									129	86
	6	111	59	154	102	239	187	325	273							155	103
	7	94	33	137	76	222	162	308	247							181	120
	8			120	50	205	136	291	221	376	307	462	392			206	137
	9					187	110	273	196	358	281	444	367			232	155
	10					170	84	256	169	341	255	427	340	512	426	258	172
	11							238	143	324	229	409	314	495	400	284	189
	12							221	118	307	203	392	289	478	374	310	206
A160S	5	193	124	259	191	392	324									208	140
	6	165	83	232	149	365	282	498	415							250	168
	7	137	41	203	107	336	240	469	373							292	196
	8			176	66	309	199	442	337	575	465	708	598			333	223
	9					280	157	413	290	546	423	679	556			375	251
	10					253	115	386	248	519	381	652	514	785	647	417	279
	11							358	207	491	340	624	473	757	606	458	307
	12							330	165	463	298	596	431	729	564	500	335
A190S	5	332	222	438	329	651	542									309	200
	6	292	161	398	267	611	480	824	693							371	240
	7	252	99	358	205	571	418	784	631							433	280
	8			318	143	531	356	744	569	957	782	1169	995			495	320
	9					491	295	704	507	917	720	1130	933			557	360
	10					451	233	664	446	877	658	1090	871	1302	1084	618	400
	11							624	384	837	597	1050	809	1263	1022	680	440
	12							584	322	797	535	1010	748	1223	960	742	480
A210S	5	390	285	523	418	789	684									380	275
	6	335	209	468	342	734	608	1000	874							456	330
	7	280	133	413	266	679	532	945	798							532	385
	8			358	190	624	456	890	722	1156	988	1422	1254			608	440
	9					569	380	835	646	1101	912	1367	1178			684	495
	10					514	304	780	570	1046	836	1312	1102	1578	1368	760	550
	11							725	494	991	760	1257	1026	1523	1292	836	605
	12							670	418	936	684	1202	950	1468	1216	912	660
A240S	5	552	409	744	600	1129	985									554	410
	6	470	297	662	489	1047	874	1432	1259							665	492
	7	388	187	580	379	964	764	1349	1149							775	575
	8			498	268	883	653	1267	1037	1652	1422	2037	1807			886	656
	9					800	542	1185	926	1569	1311	1954	1696			998	739
	10					718	431	1103	816	1488	1201	1872	1586	2257	1970	1108	821
	11							1021	705	1406	1090	1791	1474	2176	1859	1219	903
	12							939	594	1323	979	1708	1363	2093	1748	1330	985
A270S	5	903	675	1195	968	1779	1552									787	560
	6	790	519	1083	811	1667	1396	2252	1981							943	672
	7	679	361	972	654	1556	1238	2141	1823							1101	783
	8			860	497	1444	1081	2029	1666	2614	2252	3199	2836			1258	895
	9					1332	923	1917	1509	2502	2094	3087	2678			1416	1007
	10					1220	767	1805	1352	2390	1937	2974	2521	3560	3107	1572	1119
	11							1693	1194	2278	1779	2862	2364	3448	2949	1730	1231
	12							1582	1037	2167	1623	2751	2207	3336	2792	1887	1342

Pneumatic Actuators - A Series



Sizing: Double Acting Actuator

The suggested safety factor for double acting actuators under normal working conditions is 20%-30%.

Example:

The torque needed by valve=100N.m

The torque considered safety factor $(1+30\%)=130\text{N.m}$

Air Supply=5Bar

According to the above table, we can choose the minimum model is A105D

Sizing: Spring Return Actuators

The suggested safety factor for spring return actuator under normal working conditions is 30-50%

Example:

The torque needed by valve=80N.m

The torque consider safety factor $(1+30\%)=104\text{ N.m}$ Air Supply=5Bar

According to the table of spring return actuators' output, we find output torque of A140SR7 is:

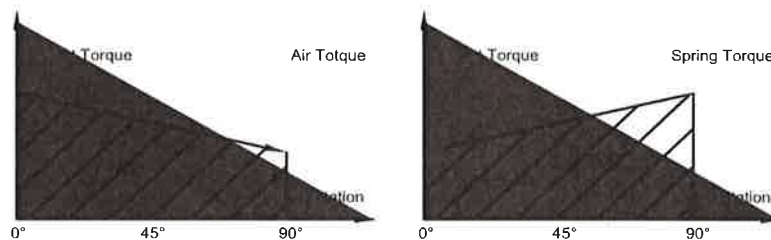
Air stroke 0°=308N.m

Air stroke 90°=247N.m

Spring stroke 90°=181N.m

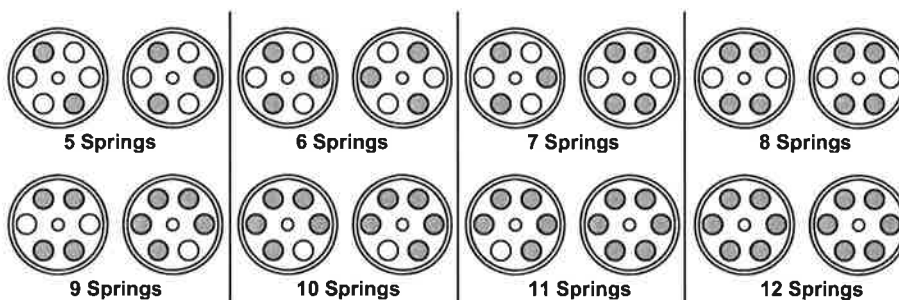
Spring stroke 0°=120N.m

All the output torque is larger than we needed.



Attention:

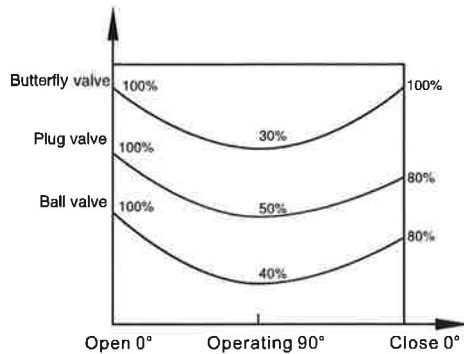
During the restoration, the spring return actuators' output torque will not be affected by the inputting air from the port B. On the contrary, it will help the restoration of springs.



Springs mounting form for spring return actuators

During selecting the spring return actuators, we can choose the more reasonable and more economical actuators, if we know the different torque needed by the valve working at opening, operating and closing.

Pneumatic Actuators - A Series



Example:

The max torque needed by the butterfly valve=104N.m

The torque after opened (operating) $104 \times 30\% = 32\text{N.m}$

Air Supply=5Bar

We can select the A125S11

output torque is:

Air stroke 0°=136N.m > 104N.m

Air stroke 90°=78N.m > 32N.m

Spring stroke 90°=173N.m > 32N.m

Spring stroke 0°=115N.m > 104N.m

The above datas show the actuator's torque can satisfy the requirement of the butterfly valve.

Operating conditions

1. Operating media

Dry or lubricated air, or the non-corrosive gases

The maximum particle diameter must less than 30μm

2. Air supply pressure

The minimum supply pressure is 2.5 Bar

The maximum supply pressure is 8 Bar

3. Operating temperature

Standard:-20℃~+80℃

Low temperature:-35℃~+80℃

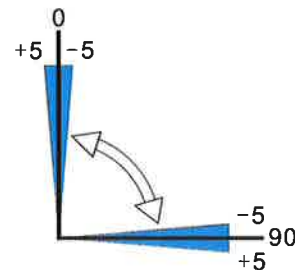
High temperature:-15℃~+150℃

4. Travel adjustment

Have adjustment range of $\pm 5^\circ$ for the rotation at 0° and 90°

5. Application

Either indoor or outdoor



Operating type

Double acting and spring return

1. Air supply connection is designed in accordance with NAMUR Standard to install solenoid valves.

2. The Namur drive pinion and the Namur top mounting connection permit direct installation of accessories such as limit switch box and positioner.

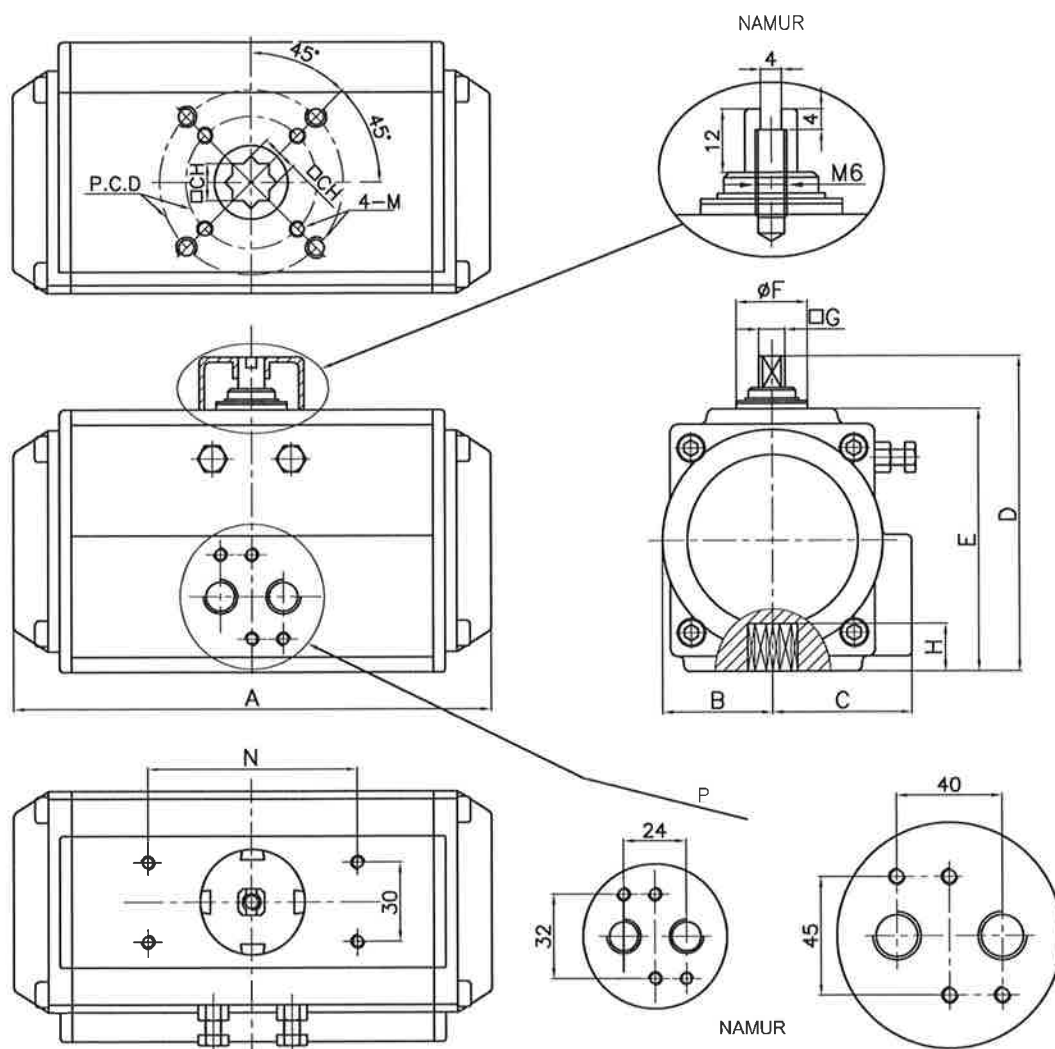
3. Bottom mounting connection is designed in accordance with ISO5211 and DIN3337 standards for direct mounting with valve gear boxes or mounting brackets.



Pneumatic Actuators - A Series

Dimension

Connection dimensions to standard
ISO5211, DIN3337 and VDI/VDE3845.



Unit:mm

MODEL	A	B	C	D	E	F	G	H	CH	ISO	P.C.D	4-M	N	P Air Connection
A052D/S	148	30	41	92	72	20	10	14	11	F03-F05	36-50	M5x8-M6x10	80	G1/4"
A063D/S	169	36	47	107.7	87.7	27	10	18	14	F05-F07	50-70	M6x10-M8x13	80	G1/4"
A075D/S	185	42	52.4	119.4	99.4	27	10	18	14	F05-F07	50-70	M6x10-M8x13	80	G1/4"
A083D/S	205	46.2	54.4	128.6	108.6	27	10	21	17	F05-F07	50-70	M6x10-M8x13	80	G1/4"
A092D/S	263	50	58	137	117	34	14	21	17	F05-F07	50-70	M6x10-M8x13	80	G1/4"
A105D/S	269	57.5	63.8	152.8	132.8	34	14	26	22	F07-F10	70-102	M8x13-M10x16	80	G1/4"
A125D/S	301	67.7	74	184.7	154.7	45	22	26	22	F07-F10	70-102	M8x13-M10x16	130	G1/4"
A140D/S	392	75	75	202	172	50	22	31	27	F10-F12	102-125	M10x13-M12x20	130	G1/4"
A160D/S	460	87.5	87.5	226	196	50	22	31	27	F10-F12	102-125	M10x13-M12x20	130	G1/4"
A190D/S	527	103	103	260	230	72	32	40	36	F14	140	M16x25	130	G1/4"
A210D/S	534	113	113	285	255	72	32	40	36	F14	140	M16x25	130	G1/4"
A240D/S	605	130	130	320	290	72	32	50	46	F16	165	M20x25	130	G1/4"
A270D/S	725	146.5	146.5	364	334	72	32	50	46	F16	165	M20x25	130	G1/4" G1/2"

Pneumatic Actuators - A Series

Air consumption

Model	Air volume opening	Air volume closing	Model	Air volume opening	Air volume closing
A052D	0.12	0.16	A140D	2.5	3.4
A063D	0.21	0.25	A160D	3.7	5.3
A075D	0.3	0.42	A190D	5.9	8.6
A083D	0.43	0.6	A210D	7.5	11.5
A092D	0.64	0.99	A240D	11	15.5
A105D	0.95	1.27	A270D	17	23.8
A125D	1.6	1.94			

Air consumption rest with Air Supply. Air volume and Action cycle times, expressions:

$L/Min = \text{Air volume} \times (\text{Air volume Opening} + \text{Air volume closing}) \times [(\text{Air Supply (Kpa)} + 101.3) / 101.3] \times \text{Action cycle times (}/min)$

Weight Table

Model	A052	A063	A075	A083	A092	A105	A125
(DA)	1.38kg	2.03kg	2.7kg	3.13kg	4.6kg	6.77kg	8.9kg
(SR)	1.45kg	2.05kg	2.9kg	3.6kg	5.22kg	6.85kg	10.11kg
Model	A140	A160	A190	A210	A240	A270	
(DA)	13.25kg	20.14kg	31.3kg	46.80kg	67.28kg	96.9kg	
(SR)	15.55kg	24kg	35.25kg	54.8kg	80.2kg	118kg	

Ordering Symbols

A 052 D - 90 1 S 1

A	A Series pneumatic actuator	
052	Size	052, 063, 075...
D	Type	D: Double Acting
I		S10: S-Spring Return&10-springs Qty.
90	Rotation	90° 120° 135° 180°
1	Configuration	1: CCW(normally close) 2: CW(normally open)
S	Temperature	S: Standard L: Low temp. H: High temp.
1	Shaft bottom connction	1: Double Square(star)--Standard 2: Double D--Option 3: Bore with keyway--Option



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