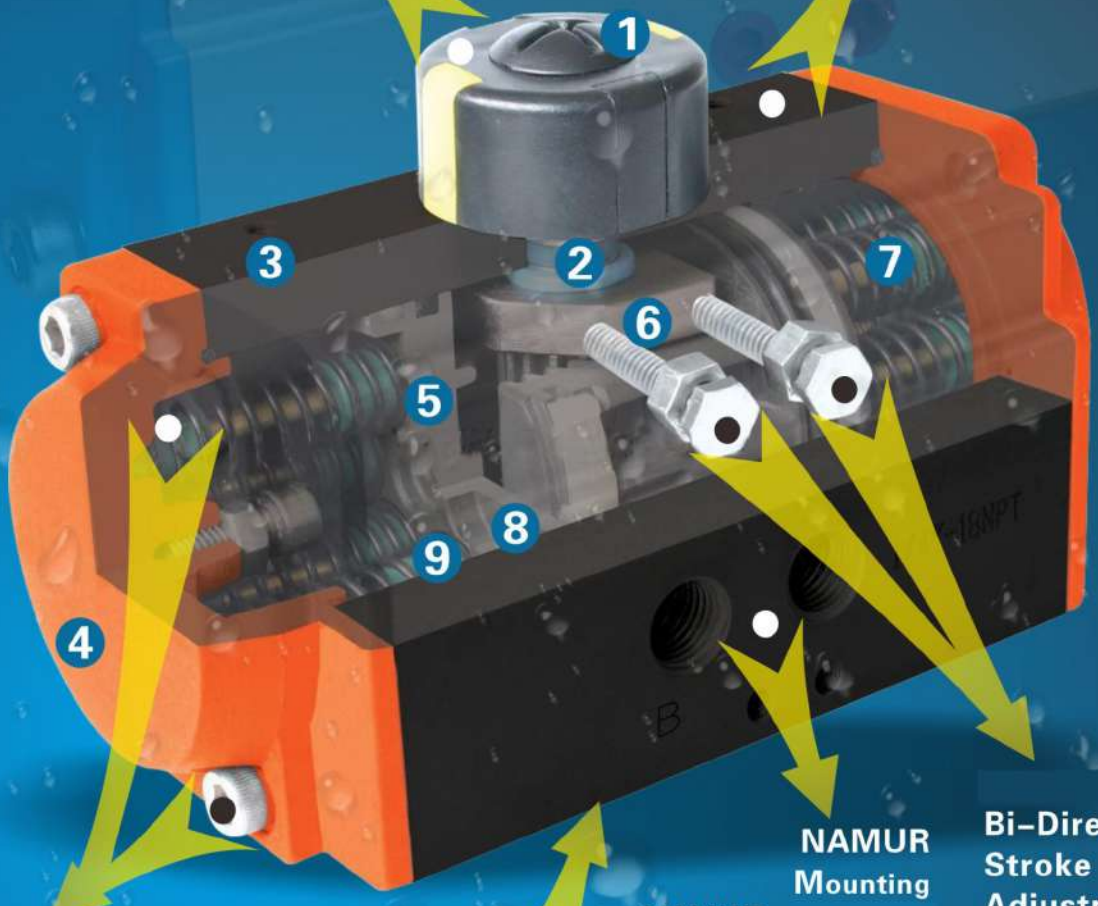
AT

AT SERIES PNEUMATIC ACTUATORS



■ Construction

1、Indicator

Position indicator with NAMUR is convenient for mounting accessories such as Limit Switch box,Positioner and so on. NAMUR

2、Pinion

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

3、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.

4、End caps

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

5、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.

6、Travel adjustment

The two independent external travel stop adjustment bolts can adjust ±5° at both open and close directions easily and precisely.

7、High performance springs

Preloaded coating 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.

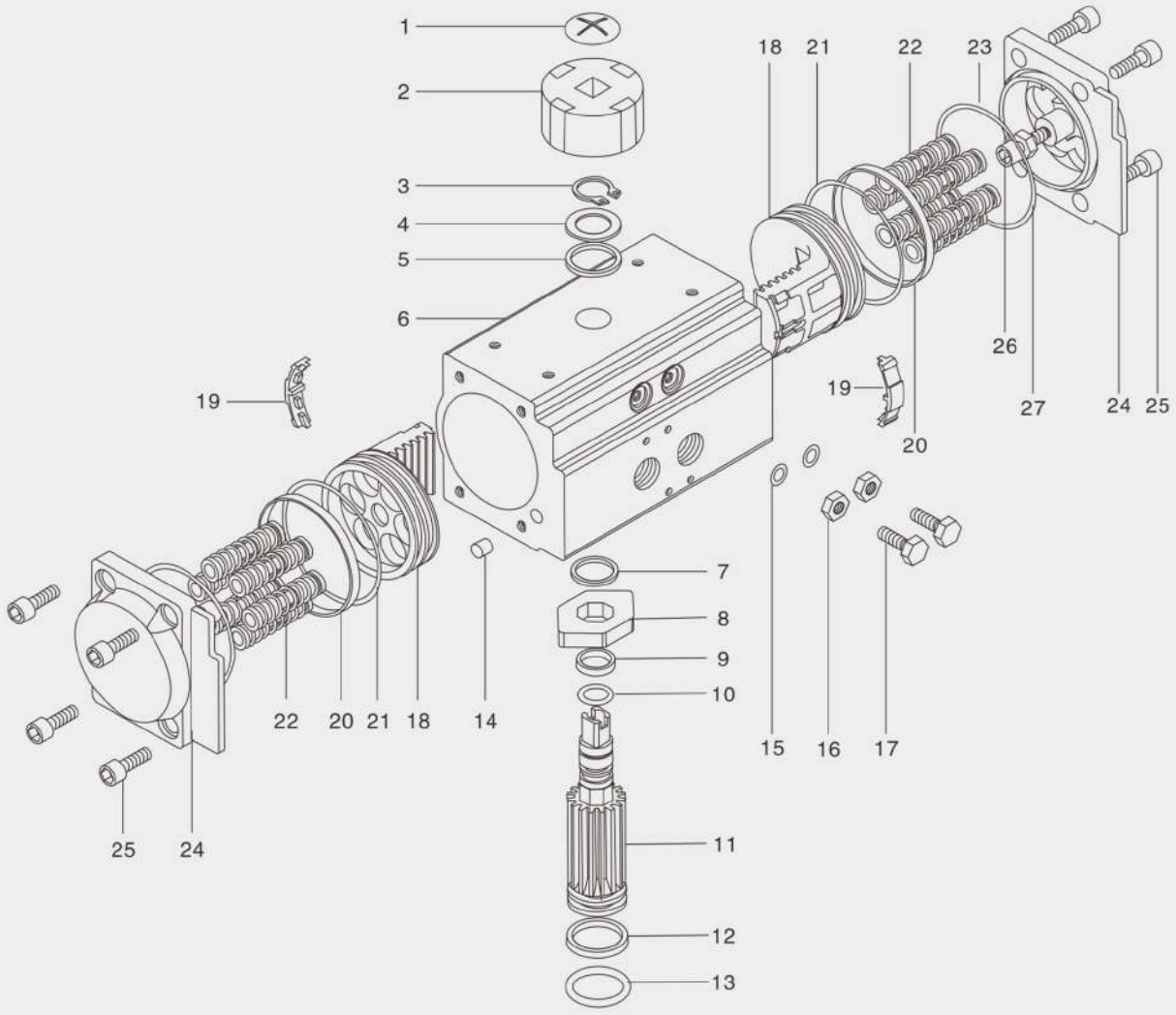
8、Bearings & Guides

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

9、O-rings

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

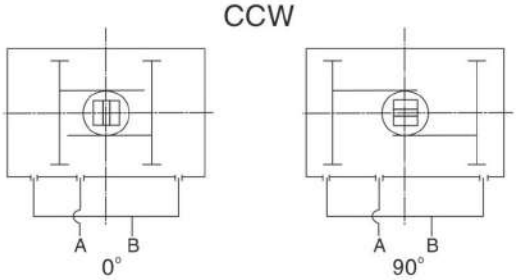
■ Parts and Material



No.	Description	Qty	STANDARD METERIAL	PROTECTION	OPTIONAL METERIAL
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	Engineering plastics		
6	Body	1	Extruded alluminum alloy	Hard anodized etc	
7	Inside washer	1	Engineering plastics		
8	Cam	1	Alloy steel		
9	O-ring (pinion top)	1	NBR		Viton/Silicone
10	Bearing(pinion top)	1	Engineering plastics		Stainless Steel
11	Pinion	1	Alloy steel	Nickel plated	
12	O-ring pinion bottom)	1	Engineering plastics		
13	Bearing(pinion bottom)	1	NBR		Vitoni/Silicone
14	Plug	2	NBR		Viton/Silicone
15	O-ring(Adjust screw)	2	NBR		Viton/Silicone
16	Nut(Adjust screw)	2	Stainless Steel		
17	Adjust screw	2	Stainless Steel		
18	Piston	2	Cast alluminum/casting	Anodized/Zinc galvanized	Stainless Steel
19	Guide(Piston)	2	Engineering plastics		
20	Bearing(Piston)	2	Engineering plastics		
21	O-ring(Piston)	2	NBR		Viton/Silicone
22	Spring	0~12	Spring steel	Dip coating	
23	O-ring(End cap)	2	NBR		Viton/Silicone
24	End cap	2	Cast alluminum	Powder polyster painted etc	
25	Cap screw	8	Stainless Steel		
26	Stop screw	2	Stainless Steel		
27	Nut(stop screw)	2	Stainless Steel		

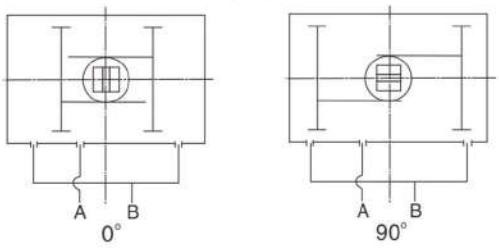
Double Acting Actuators

CCW



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.

CW



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.

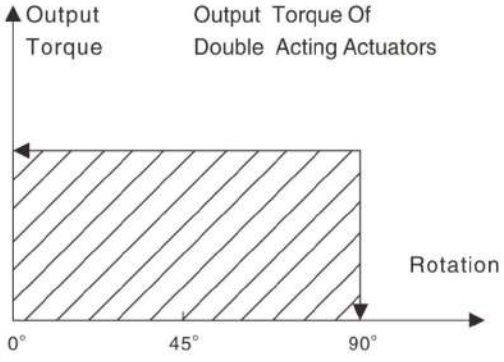
Output Torque Of Double Acting Actuators (Unit:N.m)

Model	Air supply pressure (Unit: Bar)									
	2	2.5	3	4	4.5	5	5.5	6	7	8
AT52DA	8.0	10.0	12.0	16.0	18.0	20.0	21.9	23.9	27.9	31.9
AT65DA	14.6	18.2	21.9	29.2	32.8	36.5	40.1	43.8	51.1	58.4
AT75DA	20.1	25.1	30.1	40.1	45.1	50.2	55.2	60.2	70.2	80.3
AT85DA	31.4	39.2	47.0	62.7	70.5	78.4	86.2	94.1	109.7	125.4
AT92DA	45.1	56.4	67.7	90.3	101.6	112.9	124.1	135.4	158.0	180.6
AT105DA	66.1	82.7	99.2	132.2	148.8	165.3	181.8	198.4	231.4	264.5
AT125DA	100.3	125.4	150.5	200.6	225.7	250.8	275.9	301.0	351.1	401.3
AT140DA	171.0	213.8	256.5	342.0	384.8	427.5	470.3	513.0	598.5	684.0
AT160DA	266.0	332.5	399.0	532.0	598.5	665.0	731.5	798.0	931.0	1064.0
AT190DA	425.6	532.0	638.4	851.2	957.6	1064.0	1170.4	1276.8	1489.6	1702.4
AT210DA	532.0	665.0	798.0	1064.0	1197.0	1330.0	1463.0	1596.0	1862.0	2128.0
AT240DA	769.5	961.9	1154.3	1539.0	1731.4	1923.8	2116.1	2308.5	2693.3	3078.0
AT270DA	1169.6	1462.1	1754.5	2339.3	2631.7	2924.1	3216.5	3508.9	4093.7	4678.6

Selection of Double Acting Actuator:
The suggested safety factor for double acting actuators under normal working conditions is 20%–30%.
Example:

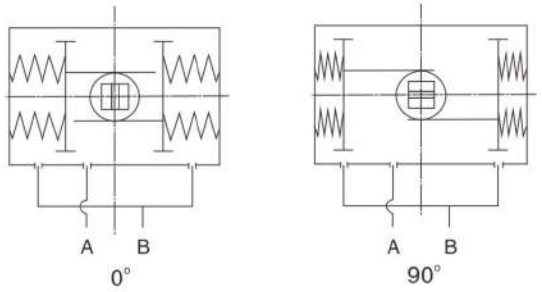
- The torque needed by valve=100N.m
- The torque considered safety factor (1+30%)=130N.m
- Air Supply=5Bar

According to the above table, we can choose the minimum model is AT160DA.



Spring Acting Actuators

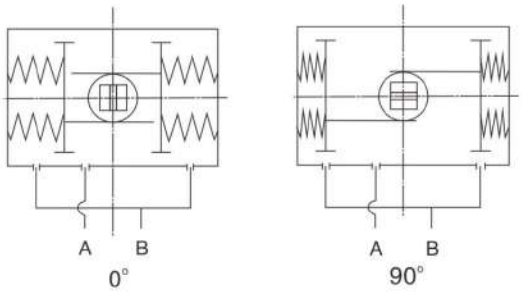
CCW



Air to port A forces the pistons outwards, causing the springs to compress, The pinion turns counter clockwise while 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.

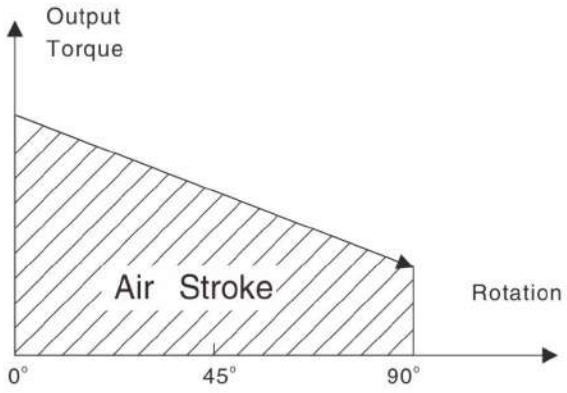
CW

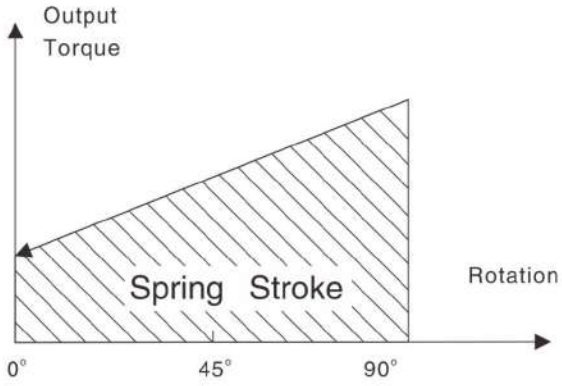


Air to port B forces the pistons outwards, causing the springs to compress, The pinion turns counterclockwise while air is being exhausted from port B.

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.

Output Torque Of Spring Return Actuators





NOTE:

Make sure that the torque necessary to operate the valve is compatible with the actuator torque (It depens on both actuator type and air supply).

Please note that the requested torque depends not only on the valve, but on the working conditions and the safety margins of the plant in question,too.

Output Torque of Spring Return Actuators (Unit: N.m)

Model	Spring Q.ty	Output torque of air to springs														Springs' output	
Air pressure		2.5Bar		3Bar		4Bar		5Bar		6Bar		7Bar		8Bar			
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°
		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
AT52SR	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	5.0
	7	4.0	1.3	6.0	3.3	9.8	7.3	14.0	10.4							8.6	5.9
	8			5.2	2.0	9.2	6.0	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
AT65SR	5	11.4	7.7	15.0	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	27.0	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	30.0	22.8	37.3	30.1	44.7	37.4	20.9	13.7
	11							21.5	13.5	28.7	20.7	36.0	28.0	43.3	35.3	22.9	15.0
	12							20.0	11.4	27.3	18.6	34.6	25.9	41.9	33.3	25.0	16.4
AT75SR	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	27.0	43.2	37.0	53.3	47.0			23.2	16.9
	9					21.0	14.1	31.2	24.1	41.1	34.1	51.2	44.2			26.1	19.0
	10					19.0	11.1	28.8	21.2	39.0	31.2	49.1	41.2	59.1	51.2	29.0	21.1
	11							27.0	18.3	37.0	28.3	47.0	38.4	57.0	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
AT85SR	5	23.3	16.1	31.1	24.0	46.8	39.7									23.0	15.8
	6	20.1	11.5	28.0	19.3	43.7	35.1	59.4	50.7							27.6	19.0
	7	17.0	6.9	24.8	14.8	40.5	30.5	56.2	46.2							32.2	22.1
	8			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	37.0	65.6	52.6	81.2	68.3			41.4	28.5
	10					31.0	16.6	46.7	32.3	62.4	48.0	78.1	63.7	93.8	79.3	46.0	31.6
	11							43.6	27.7	59.3	43.4	75.0	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	38.0
AT92SR	5	33.1	22.0	44.2	33.2	66.8	55.9									34.4	23.3
	6	28.4	15.2	39.6	26.4	62.2	49.0	84.8	71.6							41.2	28.0
	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	103.0			55.0	37.3
	9					48.2	28.4	70.9	51.0	93.5	73.6	116.0	96.1			61.9	42.0
	10					43.6	21.5	66.2	44.1	88.8	66.7	111.3	89.2	134.0	111.8	68.7	46.7
	11							61.5	37.2	84.1	59.9	106.6	82.4	129.2	105.0	75.6	51.4
	12							56.8	30.4	79.4	53.0	101.9	75.5	124.5	98.1	82.5	56.0
AT105SR	5	51.0	33.4	67.5	49.9	100.6	83.0									49.2	31.6
	6	44.7	23.5	61.1	40.0	94.2	73.2	127.3	106.2							59.1	38.0
	7	38.4	13.7	54.9	30.3	87.9	63.4	121.0	96.4							68.9	44.3
	8			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	102.0	66.5	135.1	99.6	168.2	132.6	201.2	165.7	98.4	63.3
	11							95.7	57.0	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

Output Torque of Spring Return Actuators (Unit: N.m)

Model	Spring Q.ty	Output torque of air to springs														Springs' output	
Air pressure		2.5Bar		3Bar		4Bar		5Bar		6Bar		7Bar		8Bar			
		0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	0°	90°	90°	0°
		Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End
AT125SR	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
AT140SR	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
AT160SR	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	237	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
AT190SR	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
AT210SR	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
AT240SR	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
AT270SR	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

Selection of Single Acting Actuator

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=80(1+30%)=104N.m
Air Supply=5Bar
According to the table of spring return actuators' output,we find output torque of AT140SR K7 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.

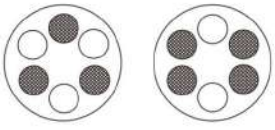
Attention:

During the spring reset of the single acting actuator, the actuator B port ventilation does not affect the actuator output torque, instead, it helps the spring reset.

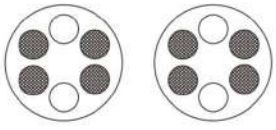
Single Acting Actuator Spring Installation

5 Springs

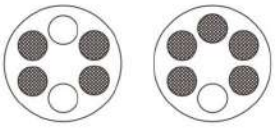
6 Springs



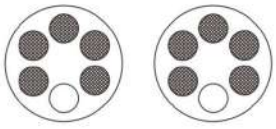
7 Springs



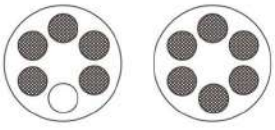
8 Springs



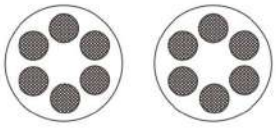
9 Springs



10 Springs



11 Springs



12 Springs

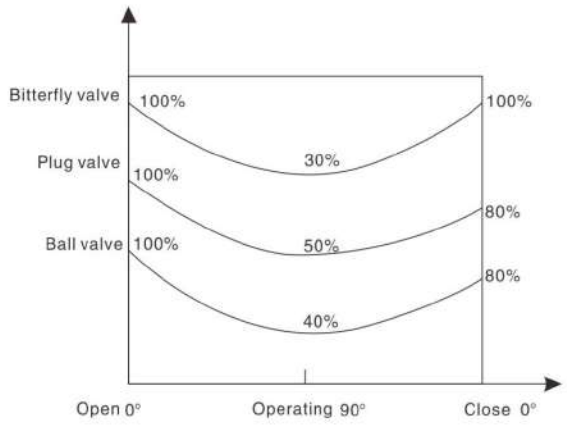
During selecting the spring return actuators, we can choose the more reasonable and more economical actuators, if we konw the different torque needed by the valve working at opening, operating and closing.

Example:

The max torque needed by the butterfly valve=104N.m
The torque after opened (operating)104x30%=32N.m
Air Supply=5Bar
We can select the AT125SR K11 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

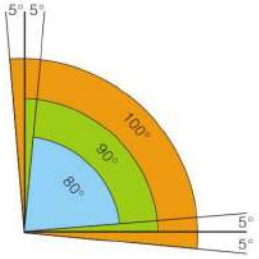
1.Operating media
Dry or lubricated air, or the non–corrosive gases the maximum particle diameter must less than 30 μ m.

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 ±5° for the rotation at 0° and 90° .

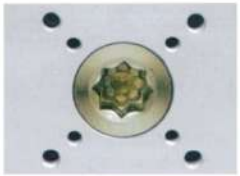
5.Application
Either indoor or outdoor.



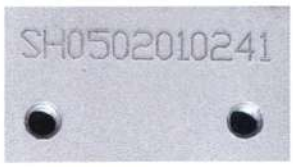
Operating type(Single action and double action)

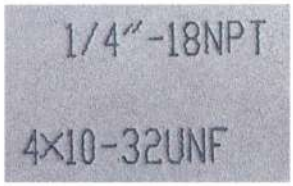
Air supply connection is designed in accordance with NAMUR Standard to install solenoid valves.

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

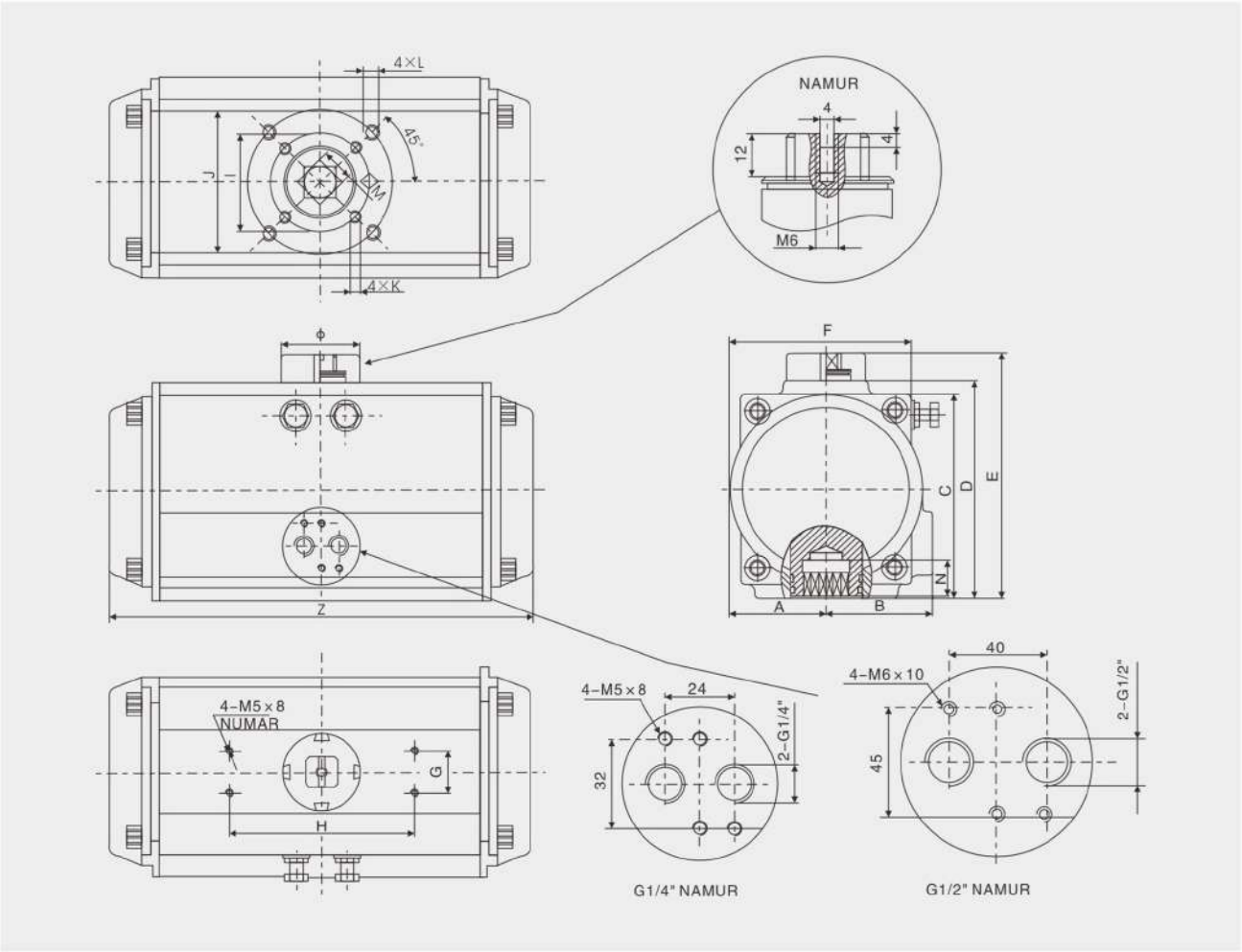


Bottom mounting connection is designed in accordance with ISO5211 and DIN3337 standards for direct mounting with valve gear boxes or mounting brackets.





Each actuator is marked with a serial number,air connection and bottom mounting holes are marked for easy track and distinction.



Dimension Table

Mode	A	B	C	D	E	F	G	H	I	J	K	L	M	N	Z	ϕ	Air connection
AT52	30	41.5	65.5	72	92	65	30	80	ϕ36	ϕ50	4-M5×8	4-M6×10	11	14	147	ϕ40	NAMUR G1/4"
AT65	37.5	46	81	89	109	73.5	30	80	ϕ50	ϕ70	4-M6×10	4-M8×13	14	18	170	ϕ40	NAMUR G1/4"
AT75	42	53	94	100	120	81	30	80	ϕ50	ϕ70	4-M6×10	4-M8×13	14	18	184	ϕ40	NAMUR G1/4"
AT85	46	57	98.5	108.5	128.5	92	30	80	ϕ50	ϕ70	4-M6×10	4-M8×13	17	21	206	ϕ40	NAMUR G1/4"
AT92	50	58.5	111	116.5	136.5	98	30	80	ϕ50	ϕ70	4-M6×10	4-M8×13	17	21	262	ϕ40	NAMUR G1/4"
AT105	57.5	64	122.5	134	154	109.5	30	80	ϕ70	ϕ102	4-M8×13	4-M10×16	22	26	282	ϕ40	NAMUR G1/4"
AT125	71	74.5	150	160	180	133.5	30	80	ϕ70	ϕ102	4-M8×13	4-M10×16	22	26	304	ϕ55	NAMUR G1/4"
AT140	75	77	162	174	194	137.5	30	80	ϕ102	ϕ125	4-M10×16	4-M12×20	27	31	396	ϕ55	NAMUR G1/4"
AT160	87	87	185	198.5	218.5	158.5	30	80	ϕ102	ϕ125	4-M10×16	4-M12×20	27	31	445	ϕ55	NAMUR G1/4"
AT190	103	103	216	232	262	189	30	130		ϕ140		4-M16×25	36	50	532	ϕ80	NAMUR G1/4"
AT210	113	113	235.5	257	287	210	30	130		ϕ140		4-M16×25	36	50	536	ϕ80	NAMUR G1/4"
AT240	130	130	264.5	292	322	245	30	130		ϕ165		4-M20×25	46	60	602	ϕ80	NAMUR G1/4"
AT270	147	147	299	332	362	273	30	130		ϕ165		4-M20×25	46	60	722	ϕ80	NAMUR G1/2"

Air Consumption

Air volume opening & closing

Unit:L

Model	Air volume opening	Air volume closing	Model	Air volume opening	Air volume closing
AT52	0.12	0.16	AT140	2.5	2.2
AT65	0.21	0.23	AT160	3.7	3.2
AT75	0.3	0.34	AT190	5.9	5.4
AT85	0.43	0.47	AT210	7.5	7.5
AT92	0.64	0.73	AT240	11	9
AT105	0.95	0.88	AT270	17	14
AT125	1.6	1.4			

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

L/Min=Air volume(Air volume Opening+Air volume closing)

$$\times \left[\frac{\text{Air Supply (Kpa)}+101.3}{101.3}\right] \times \text{Action cycle times(/min)}$$

Series	Model	Spring Q.ty	Options
AT □ DA AT □ SR □ AT □ □ Ni	52 65 75 85 92 105 125	K5 K6 K7 K8 K9 K10 K11 K12	120°,140°,180° for special degree operation SS Stainless Steel Pinion

Series	Model	Spring Q.ty	Options
AT □ DA AT □ SR □ AT □ □ Ni	140 160 190 210 240 270	K5 K6 K7 K8 K9 K10 K11 K12	120°,140°,180° for special degree operation SS Stainless Steel Pinion

Weight Table

Model	AT52(Φ52)	AT65(Φ65)	AT75(Φ75)	AT85(Φ85)	AT92(Φ92)	AT105(Φ105)	AT125(Φ125)
(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	AT140(Φ140)	AT160(Φ160)	AT190(Φ190)	AT210(Φ210)	AT240(Φ240)	AT270(Φ270)
(DA)	13.25kg	20.14kg	31.3kg	46.80kg	67.28kg	96.9kg
(SR)	15.55kg	24kg	35.25kg	54.8kg	80.2kg	118kg

Note: 1. SR is 12 springs; 2. Weight is net weight.