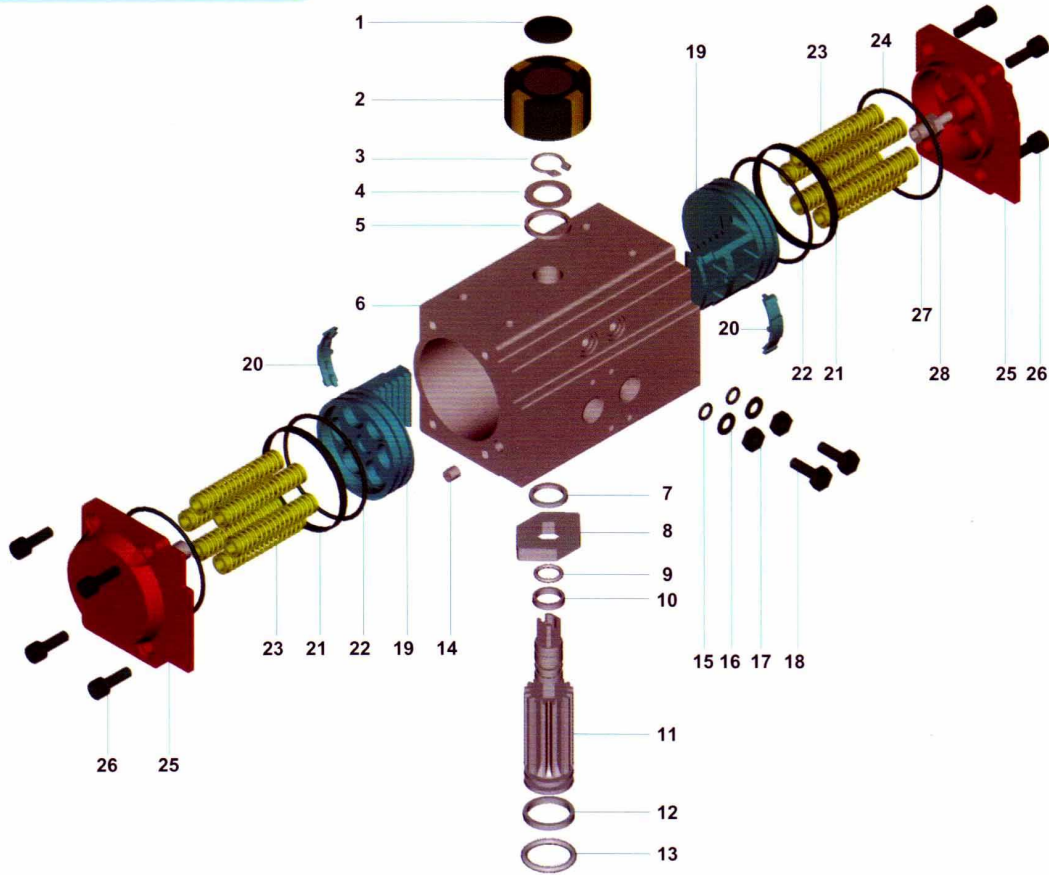


ALPHA C PNEUMATIC ACTUATORS

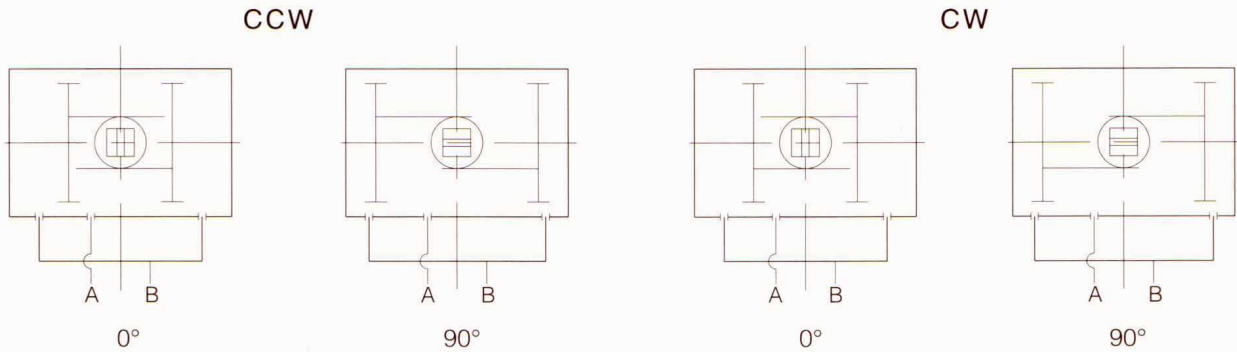
Assemble and Parts



No.	Description	Qty	STANDARD METIERIAL	PROTECTION	OPTIONAL METIERIAL
1	Indicator screw	1	plastic		
2	Indicator	1	plastic		
3	Spring clip	1	Stainless Steel		
4	Metal 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	Travel stop	1	Alloy steel		
9	O-ring (pinion top)	1	NBR		Viton/Silicone
10	Bearing(pinion top)	1	engineering plastics		
11	Pinion	1	Alloy steel	Nickel plated	Stainless Steel
12	O-ring pinion bottom)	1	engineering plastics		
13	Bearing(pinion bottom)	1	NBR		Viton/Silicone
14	Hole sealant	2	NBR		Viton/Silicone
15	O-ring(Adjust screw)	2	NBR		Viton/Silicone
16	Washer(Adjust screw)	2	Stainless Steel		
17	Nut(Adjust screw)	2	Stainless Steel		
18	Adjust screw	2	Stainless Steel		
19	Piston	2	Cast alluminum/casting	anodized/Zinc galvanized	Stainless Steel
20	Plate(Piston)	2	engineering plastics		
21	Bearing(Piston)	2	engineering plastics		
22	O-ring(Piston)	2	NBR		Viton/Silicone
23	Spring	0~12	Spring steel	dip coating	
24	O-ring(End cap)	2	NBR		Viton/Silicone
25	End cap	2	Cast alluminum	powder polyester painted etc	
26	Cap screw	8	Stainless Steel		
27	Stop screw	2	Stainless Steel		
28	Nut(stop screw)	2	Stainless Steel		

Principle and Torque

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.

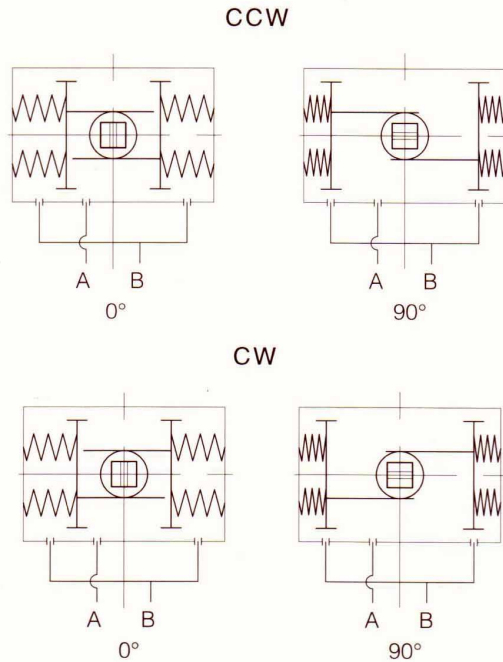
CW : Air to Port A forces the pistons outwards, causing the pinion to turn clockwise while the air is being exhausted from Port B.
 Air to Port B forces the pistons inwards, causing the pinion to turn counterclockwise while the air is being exhausted from Port A.

OUTPUT TORQUE OF DOUBLE ACTING ACTUATORS (Unit: Nm)

Model	Air supply pressure (Unit: Bar)									
	2	2.5	3	4	4.5	5	5.5	6	7	8
αC-52DA	8.0	10.0	12.0	16.0	18.0	20.0	21.9	23.9	27.9	31.9
αC-63DA	14.6	18.2	21.9	29.2	32.8	36.5	40.1	43.8	51.1	58.4
αC-75DA	20.1	25.1	30.1	40.1	45.1	50.2	55.2	60.2	70.2	80.3
αC-83DA	31.4	39.2	47.0	62.7	70.5	78.4	86.2	94.1	109.7	125.4
αC-92DA	45.1	56.4	67.7	90.3	101.6	112.9	124.1	135.4	158.0	180.6
αC-105DA	66.1	82.7	99.2	132.2	148.8	165.3	181.8	198.4	231.4	264.5
αC-125DA	100.3	125.4	150.5	200.6	225.7	250.8	275.9	301.0	351.1	401.3
αC-140DA	171.0	213.8	256.5	342.0	384.8	427.5	470.3	513.0	598.5	684.0
αC-160DA	266.0	332.5	399.0	532.0	598.5	665.0	731.5	798.0	931.0	1064.0
αC-190DA	425.6	532.0	638.4	851.2	957.6	1064.0	1170.4	1276.8	1489.6	1702.4
αC-210DA	532.0	665.0	798.0	1064.0	1197.0	1330.0	1463.0	1596.0	1862.0	2128.0
αC-240DA	769.5	961.9	1154.3	1539.0	1731.4	1923.8	2116.1	2308.5	2693.3	3078.0
αC-270DA	1169.6	1462.1	1754.5	2339.3	2631.7	2924.1	3216.5	3508.9	4093.7	4678.6

ALPHA C PNEUMATIC ACTUATORS

SPRING RETURN ACTUATORS



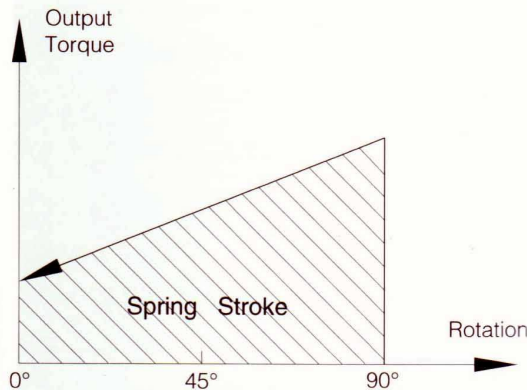
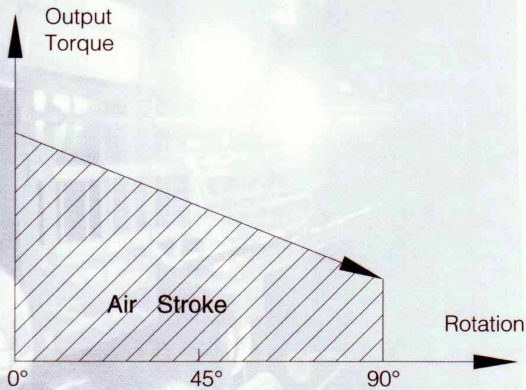
CCW: Air to port A forces the pistons outwards, causing the springs to compress, The pinion turns counterclockwise while air is being exhausted from port B.

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.

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



OUTPUT TORQUE OF SPRING RETURN ACTUATORS (Unit: Nm)

		Output torque of air to springs														Springs' output	
Air pressure		2.5Bar		3Bar		4Bar		5Bar		6Bar		7Bar		8Bar		90°	0°
Model	Spring Q.ty	0° Start	90° End	0° Start	90° End	0° Start	90° End	0° Start	90° End	0° Start	90° End	0° Start	90° End	0° Start	90° End	90° Start	0° End
αC-52SR	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
αC-63SR	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
αC-75SR	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
αC-83SR	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
αC-92SR	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
αC-105SR	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

ALPHA C PNEUMATIC ACTUATORS

OUTPUT TORQUE OF SPRING RETURN ACTUATORS (Unit: Nm)

		Output torque of air to springs																	
Air pressure		2.5Bar		3Bar		4Bar		5Bar		6Bar		7Bar		8Bar		Springs' output			
Model	Spring Q.ty	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		
αC-125SR	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	
	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
	αC-140SR	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	
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
αC-160SR		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	
	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
	αC-190SR	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	
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
αC-210SR		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	
	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
	αC-240SR	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	
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
αC-270SR		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	

Sizing Information

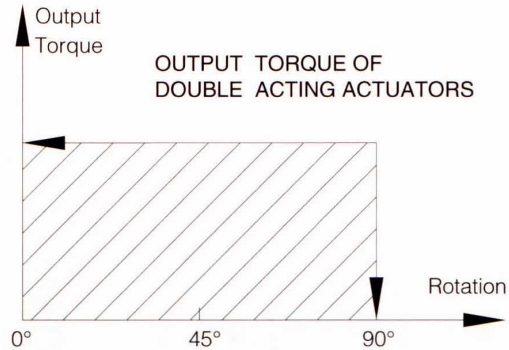
Sizing: Double Acting Actuator

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%)=130N.m
- Air Supply=5Bar

According to the above table, we can choose the minimum model is $\alpha C-105DA$.



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 N.m

Air Supply=5Bar

According to the table of spring return actuators' output, we find output torque of $\alpha C-140SR K7$ is:

Air stroke $0^\circ=308N.m$

Air stroke $90^\circ=247N.m$

Spring stroke $90^\circ=181N.m$

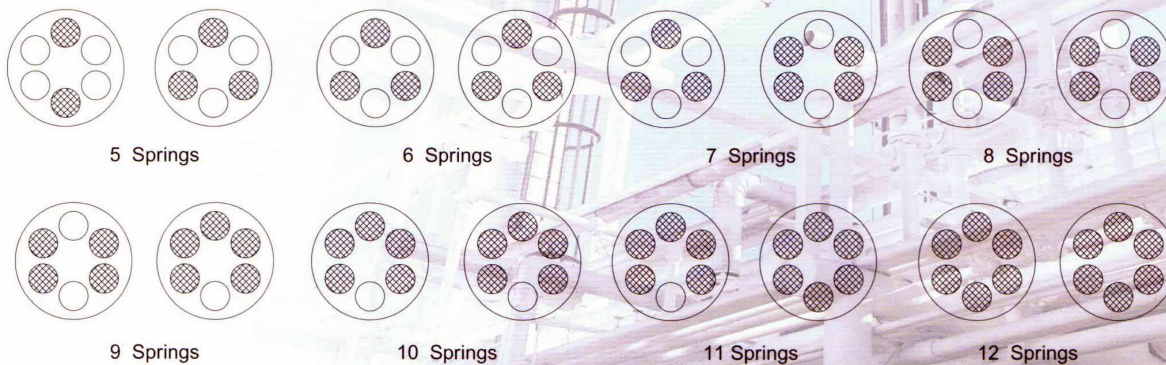
Spring stroke $0^\circ=120N.m$

All the output torque is larger than we needed.

Attention:

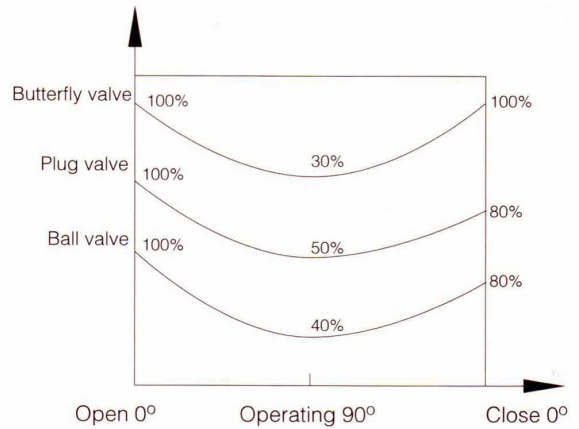
During the restoration, the spring return actuators' output torque will not be affected by the inputing air from the port B. On the contrary, it will help the restoration of springs.

Springs mounting form for spring return actuators



ALPHA C PNEUMATIC 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.



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 $\alpha C-125\text{SR K11}$

output torque is:

- Air stroke $0^\circ = 136\text{N.m} > 104\text{N.m}$
- Air stroke $90^\circ = 78\text{N.m} > 32\text{N.m}$
- Spring stroke $90^\circ = 173\text{N.m} > 32\text{N.m}$
- Spring stroke $0^\circ = 115\text{N.m} > 104\text{N.m}$

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 $30 \mu\text{m}$

2. Air supply pressure

The minimum supply pressure is 2.5 Bar

The maximum supply pressure is 8 Bar

3. Operating temperature

Standard: $-20^\circ\text{C} \sim +80^\circ\text{C}$

Low temperature: $-35^\circ\text{C} \sim +80^\circ\text{C}$

High temperature: $-15^\circ\text{C} \sim +150^\circ\text{C}$

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

Air Consumption

Air volume opening & closing						Unit: L
Model	Air volume opening	Air volume closing	Model	Air volume opening	Air volume closing	
αC-52	0.12	0.16	αC-140	2.5	2.2	
αC-63	0.21	0.23	αC-160	3.7	3.2	
αC-75	0.3	0.34	αC-190	5.9	5.4	
αC-83	0.43	0.47	αC-210	7.5	7.5	
αC-92	0.64	0.73	αC-240	11	9	
αC-105	0.95	0.88	αC-270	17	14	
αC-125	1.6	1.4				

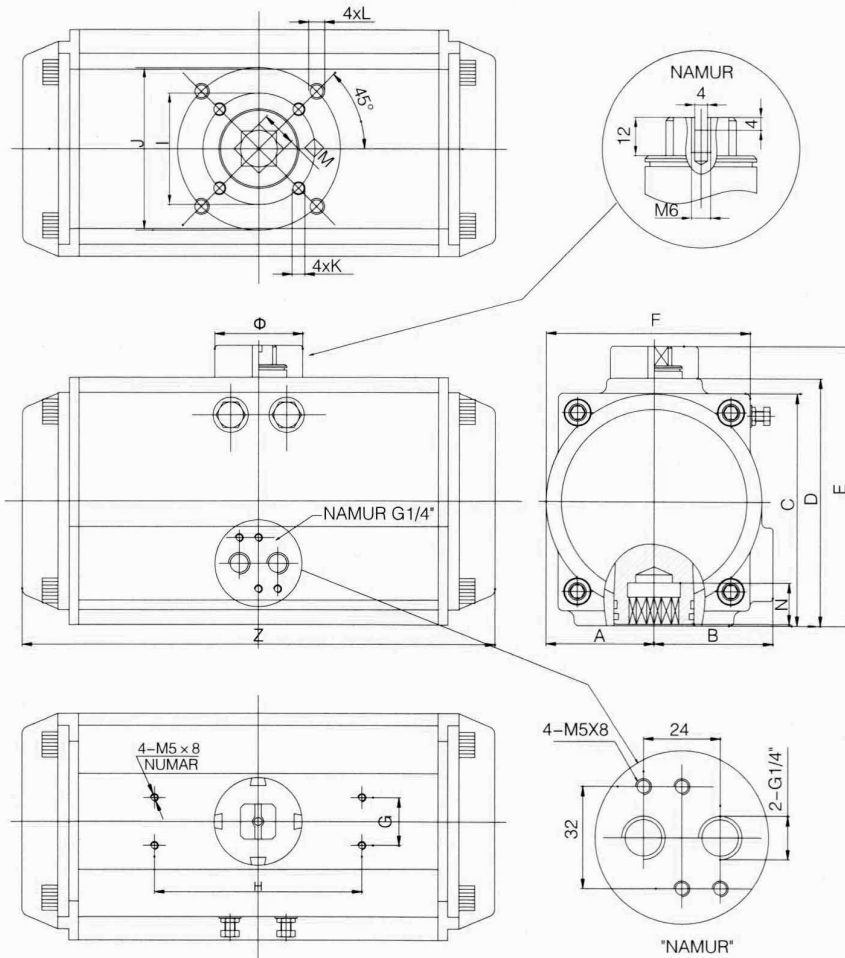
Air consumption depends on Air Supply. Air volume and Action cycle times, the calculating as follows:

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

Model	Acting type	Spring Q.ty	Connection	Temperature	Accessory		
αC-52	DA=Double acting, counter clockwise to open	K5	□11	Low Temperature	Solenoid valve	Switch box	Ball valve
αC-63			□14		ASCO	YTC	
αC-75			□17		SMC	HKC	
αC-83	DOA=Double acting, clockwise to open	K6	□19	Normal Temperature	ARITAC	ASCO	Butterfly valve
αC-92			□22		CKD	OMRON	
αC-105			□27		FESTO	ALPHA	
αC-125	SR=Spring return acting, counter clockwise to open	K7	□36	Normal Temperature	Nass	P+F	Butterfly valve
αC-140			□46		MAC	TRUCK	
αC-160			F03		PARKER	YAMATAKE	
αC-190	SOR=Spring return acting, clockwise to open	K8	F04	High Temperature	HONEYWELL	Postioner	Plug valve
αC-210			F05		Air treatment	YTC	
αC-240			F07		BELLOFRAM	SIEMENS	
αC-270		K9	F10		YAMATAKE	SAMSON	
		K10	F12		ARITEC	YAMATAKE	
		K11	F14			ABB	
		K12	F16				

WEIGHT TABLE (kg)

Model	αC-52	αC-63	αC-75	αC-83	αC-92	αC-105	αC-125	αC-140	αC-160	αC-190	αC-210	αC-240	αC-270
Weight(SR)	1.5	2.2	2.9	3.6	5.5	6.7	10.4	14.4	23.3	46.1	53.2	73.3	115.9
Weight(DA)	1.4	2.1	2.7	3.3	5.0	5.9	9.0	12.0	19.0	39.1	44.1	59.0	93.6



DIMENSION TABLE

Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	Z	Φ	Air connection
$\alpha C-52$	30	41.5	65.5	72	92	65	30	80	$\Phi 36$	$\Phi 50$	M5 x 8	M6 x 10	11	14	147	$\Phi 40$	NAMUR G1/4"
$\alpha C-63$	36	47	81	87.5	107.5	72	30	80	$\Phi 50$	$\Phi 70$	M6 x 10	M8 x 13	14	18	168	$\Phi 40$	NAMUR G1/4"
$\alpha C-75$	42	53	94	99.5	119.5	81	30	80	$\Phi 50$	$\Phi 70$	M6 x 10	M8 x 13	14	18	184	$\Phi 40$	NAMUR G1/4"
$\alpha C-83$	46	57	98.5	108.7	128.7	92	30	80	$\Phi 50$	$\Phi 70$	M6 x 10	M8 x 13	17	21	204	$\Phi 40$	NAMUR G1/4"
$\alpha C-92$	50	58.5	111	116.8	136.8	98	30	80	$\Phi 50$	$\Phi 70$	M6 x 10	M8 x 13	17	21	262	$\Phi 40$	NAMUR G1/4"
$\alpha C-105$	57.5	64	122.5	133	153	109.5	30	80	$\Phi 70$	$\Phi 102$	M8 x 13	M10 x 16	22	26	268	$\Phi 40$	NAMUR G1/4"
$\alpha C-125$	67.5	74.5	145.5	155	175	127.5	30	130	$\Phi 70$	$\Phi 102$	M8 x 13	M10 x 16	22	26	296	$\Phi 55$	NAMUR G1/4"
$\alpha C-140$	75	77	160.75	171.5	191.5	137.5	30	130	$\Phi 102$	$\Phi 125$	M10 x 16	M12 x 20	27	31	390	$\Phi 55$	NAMUR G1/4"
$\alpha C-160$	87	87	184	197	217	158	30	130	$\Phi 102$	$\Phi 125$	M10 x 16	M12 x 20	27	31	454	$\Phi 55$	NAMUR G1/4"
$\alpha C-190$	103	103	216	230	260	189	30	130		$\Phi 140$		M16 x 25	36	40	525	$\Phi 80$	NAMUR G1/4"
$\alpha C-210$	113	113	235.5	255	285	210	30	130		$\Phi 140$		M16 x 25	36	40	532	$\Phi 80$	NAMUR G1/4"
$\alpha C-240$	130	130	264	288	318	245	30	130		$\Phi 165$		M20 x 25	46	50	610	$\Phi 80$	NAMUR G1/4"
$\alpha C-270$	147	147	299	326	356	273	30	130		$\Phi 165$		M20 x 25	46	50	722	$\Phi 80$	NAMUR G1/2" (NAMUR G1/4")

ACTUATOR SQUARE SIZES AND AVAILABLE ADAPTORS

Size	F PCD	Square	Reducers
45	F03 / F05	11mm	9mm
52	F03 / F05	11mm	9mm
63	F05 / F07	14mm	9mm/11mm
75	F05 / F07	14mm	9mm/11mm
83	F05 / F07	17mm	11mm/14mm
105	F07 / F10	22mm	14mm/17mm
140	F10 / F12	27mm	22mm/17mm
160	F10 / F12	27mm	22mm/17mm