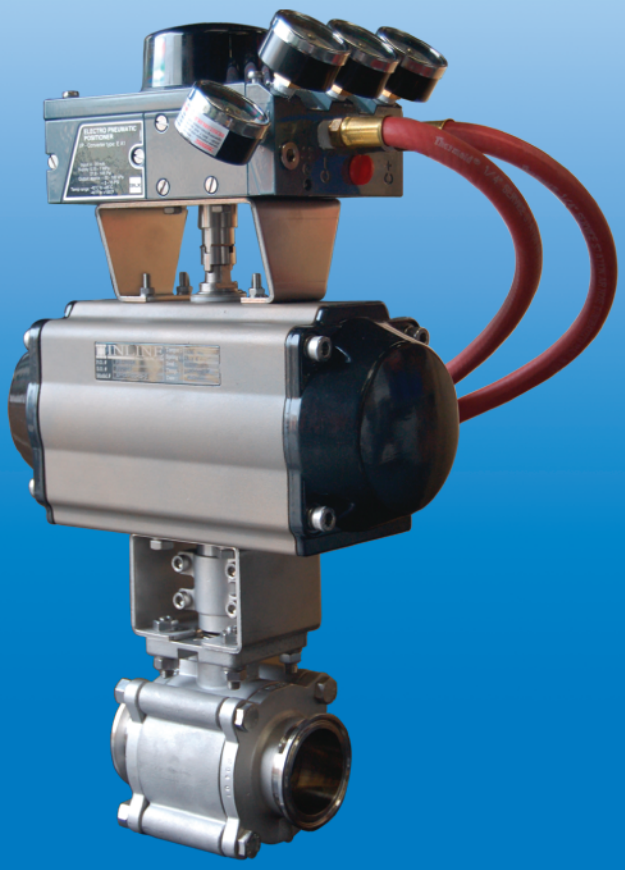
Pneumatic Automation

Dual Piston Actuators

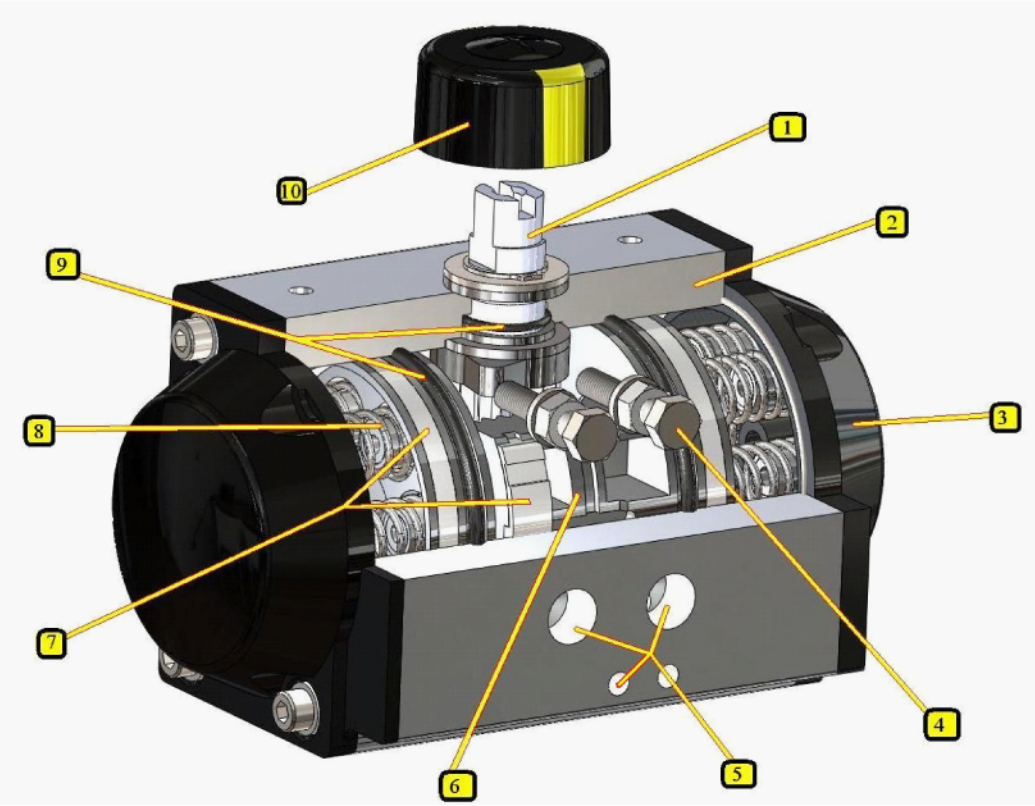


Rack & Pinion
Rotary Actuators

Spring Return &
Double Acting

INLINE
BALLVALVE.COM

Features and Benefits



1. **Pinion**

   Nickel-plated alloy steel for superior strength and corrosion resistance. Machined according to NAMUR, ISO 5211 and DIN 3337 standards. Special materials and drive dimensions available.

2. **Body**

   Hard anodized aluminum alloy extrusion with polished internal surfaces for low friction operation. Other surface treatments available: polyester epoxy coating, PTFE and nickel plating.

3. **End Caps**

   Hard anodized and polyester powder coated die cast aluminum to increase strength and provide two layers of corrosion resistance. Other surface treatments available: PTFE and nickel plating.

4. **Dual Travel Stops***

   Corrosion resistant 304SS independent travel stops can be adjusted +/- 5 degrees in both open and closed positions for easy and precise valve alignment.

5. **Air Connection**

   NAMUR pattern for easy solenoid valve mounting.

6. **Pistons**

   Hard anodized die cast aluminum for improved wear resistance. Inverting the position of both pistons reverses the direction of actuator rotation (CCW to CW) when needed.

7. **Piston Bearings and Guides**

   Low friction durable POM and PA6 piston bearings and guides increase output torque and provide for smooth operation and long cycle life.

8. **Springs**

   Epoxy-coated high strength spring steel for superior corrosion resistance and long service life. Interchangeable pre-loaded spring cartridges allow for easy torque adjustments and greater safety during assembly and maintenance.

9. **O-rings**

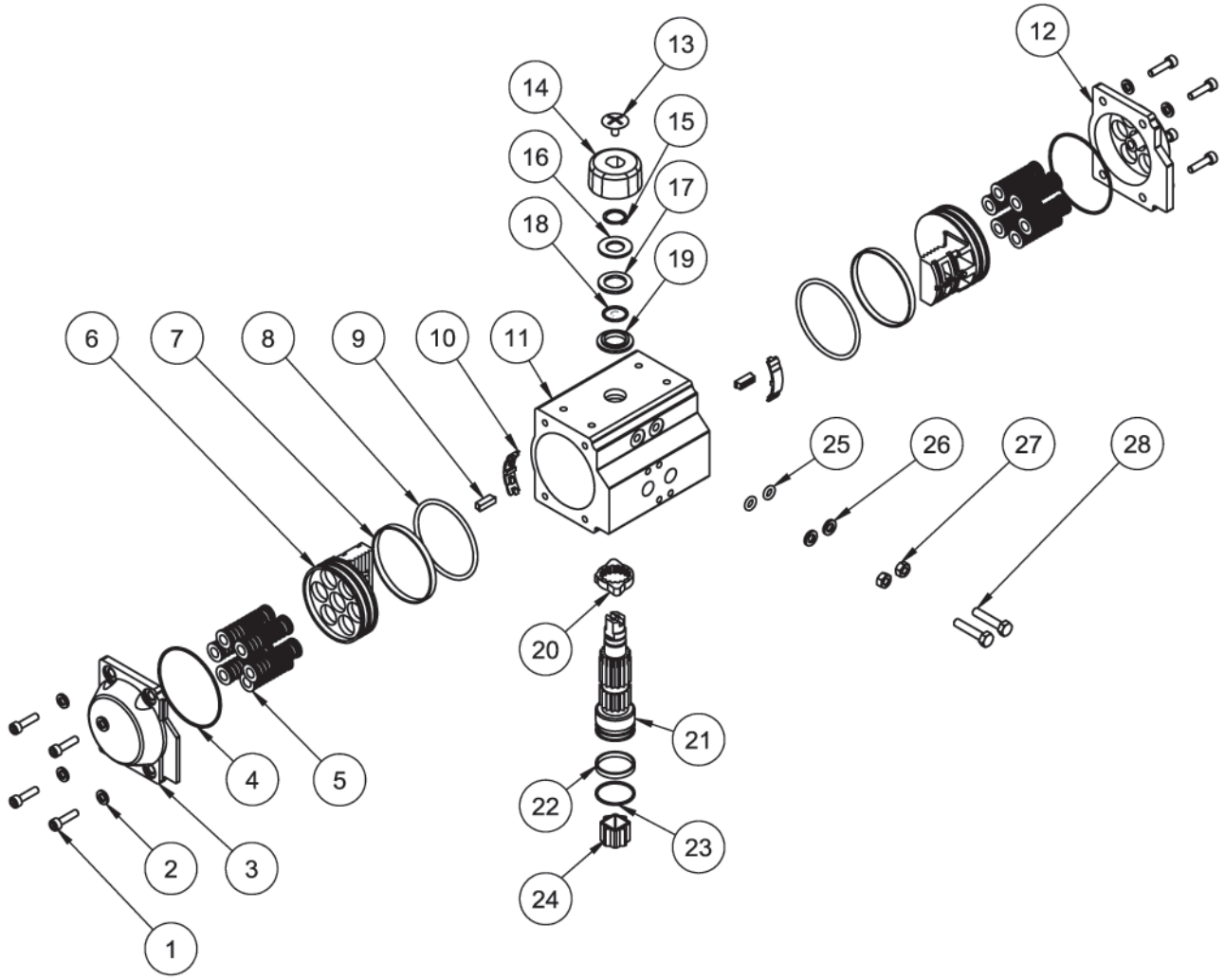
   Standard NBR (Buna) rubber o-rings provide trouble-free operation from -4°F to 175°F (-20°C to 80°C). Other seal options are available for applications from -40°F to 300°F (-40°C to 150°C).

10. **Position Indicator**

    Durable ABS High Visibility Position Indicator.

* Not included on the 32-C series

Materials of Construction

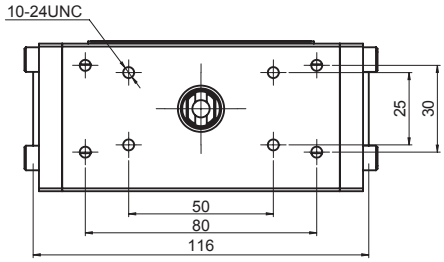


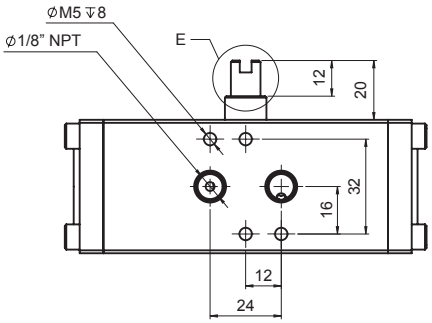
No.	Part Description	Qty.	Material
1	Socket Head Screw	8	SUS 304
2	Split Washer	8	301 SS
3	End Cap (Left)	1	Alum. A380
4	Cylinder Head O-Ring	2	NBR (Buna) Rubber
5	Spring	12	Spring Steel
6	Piston	2	Alum. A380
7	Piston Ring Bearing	2	POM
8	Piston O-Ring	2	NBR (Buna) Rubber
9	Piston Guide Block	2	PA6
10	Piston Rack Bearing	2	PA6
11	Body	1	6063-T6
12	End Cap (Right)	1	Alum. A380
13	Indicator Screw	1	ABS
14	Position Indicator	1	ABS

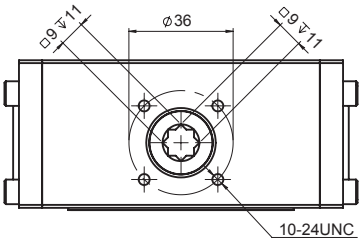
No.	Description	Qty.	Material
15	Snap Ring	1	304 SS
16	Washer	1	SUS 304
17	Top Pinion Bearing	1	POM
18	Top Pinion O-Ring	1	NBR (Buna) Rubber
19	Disc Bearing	1	POM
20	Stroke Adjustment Stop	1	SAE 1020
21	Pinion	1	SAE 1045
22	Bottom Pinion Bearing	1	POM
23	Bottom Pinion O-Ring	1	NBR (Buna) Rubber
24	Actuator Insert	1	Nickel Plated Carbon Steel
25	Adjusting Bolt O-Ring	2	NBR (Buna) Rubber
26	Metal Washer	2	SUS 304
27	Nut	2	SUS 304
28	Adjusting Bolt	2	SUS 304

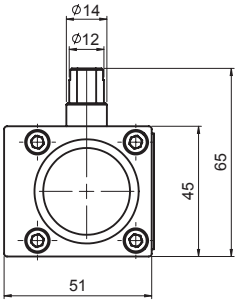
Dimensions

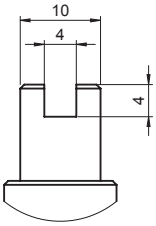
32-C





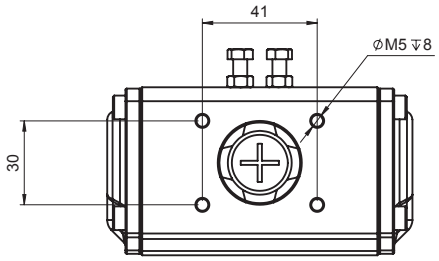


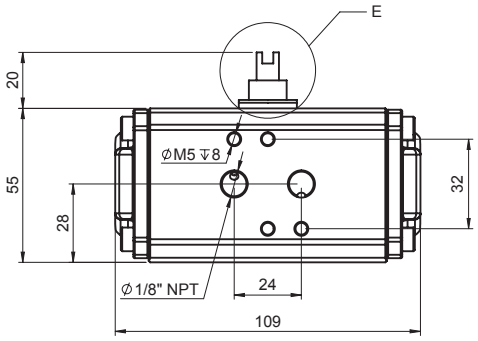


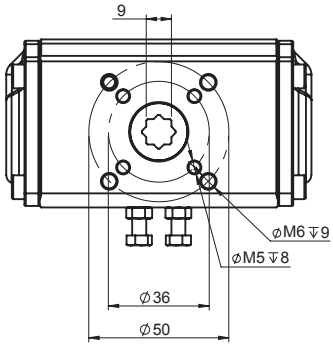


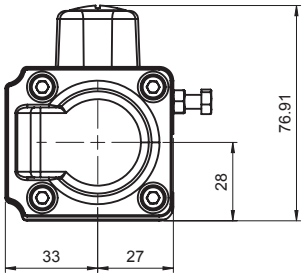
DETAIL E

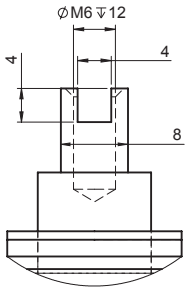
40-D









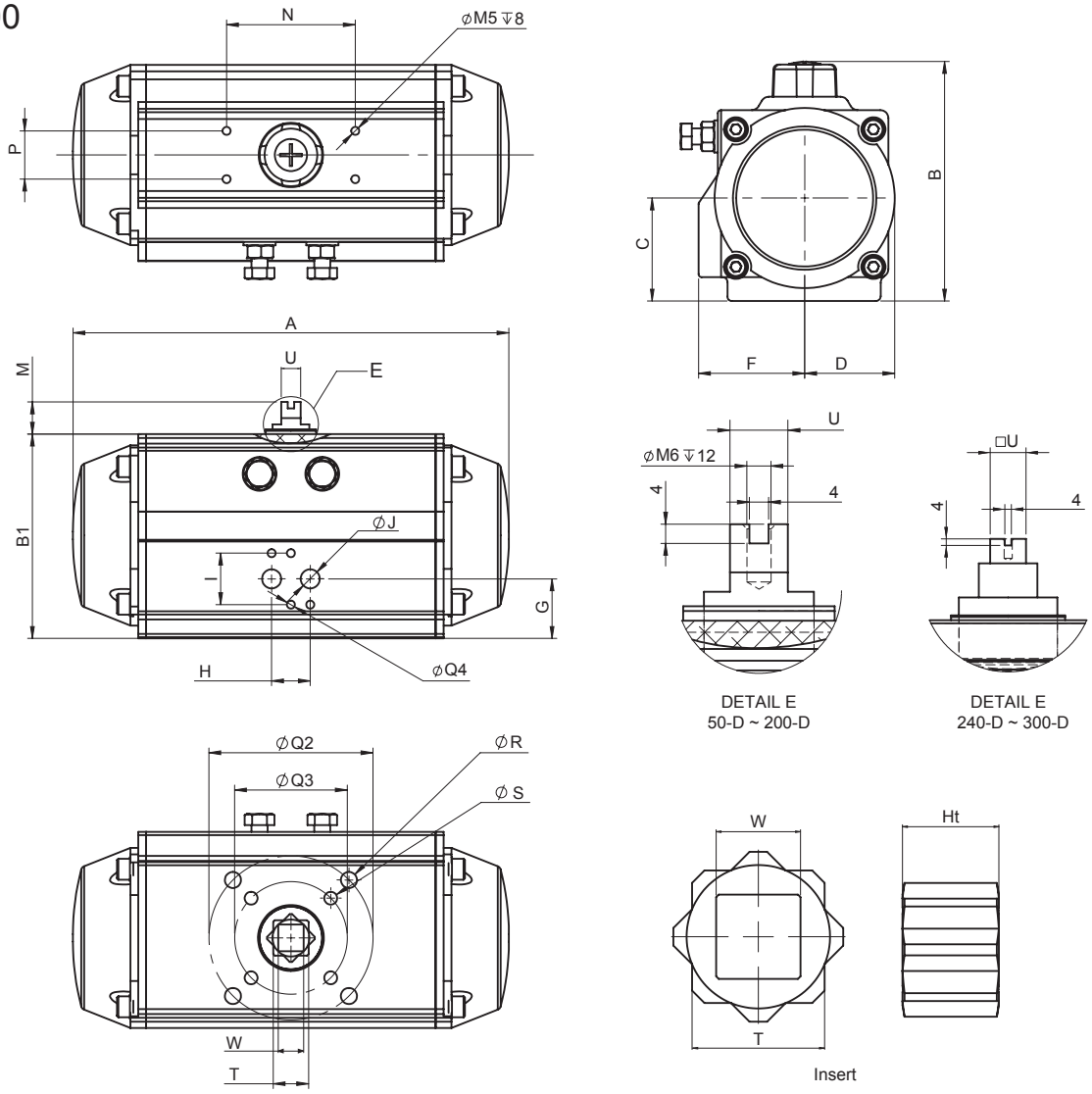


DETAIL E

Unit: mm

Dimensions

Model 50 to 300



Actuator Dimension																						Insert Dimension	
Model	A	B	B_1	C	D	F	G	H	I	J	M	N	P	Q_2	Q_3	Q_4	R	S	ISO 5211	T	U	W	Ht.
50-D	148	91	69	34.3	28.5	40.5	26	24	32	NPT 1/4”	20	80	30	50	36	M5*8	M6*9	M5*8	F05/F03	11	12	—	—
63-D	159	107	85	42.4	36	46	28.5	24	32	NPT 1/4”	20	80	30	—	50	M5*8	—	M6*9	F05	17	12	9/11/14	16
75-D	213	124	102	51	43.5	52.5	29.5	24	32	NPT 1/4”	20	80	30	70	50	M5*8	M8*12	M6*9	F07/F05	22	12	14/17	18
85-D	249	138	115	58	48.6	56.5	32	24	32	NPT 1/4”	20	80	30	70	50	M5*8	M8*12	M6*9	F07/F05	22	12	14/17	18
100-D	271	149	127	64	56	66	37	24	32	NPT 1/4”	20	80	30	102	70	M5*8	M10*15	M8*12	F10/F07	22	12	14/17	23
115-D	315	179	146	72.5	64	77	42.5	24	32	NPT 1/4”	30	80	30	102	70	M5*8	M10*15	M8*12	F10/F07	22	12	14/17	23
125-D	346	190	157	79	69	82	45.7	24	32	NPT 1/4”	30	80	30	—	102	M5*8	—	M10*15	F10	36	12	22/27	29
145-D	412	210	176	88	80	90	55	24	32	NPT 1/4”	30	80	30	125	102	M5*8	M12*18	M10*15	F12/F10	36	12	22/27	29
160-D	443	230	195	98.3	88	98.3	51.7	24	32	NPT 1/4”	30	80	30	125	102	M5*8	M12*18	M10*15	F12/F10	36	12	22/27	29
180-D	490	254	220	110	98.5	105.2	60.2	24	32	NPT 1/4”	30	130	30	140	102	M5*8	M16*24	M10*15	F14/F10	36	12	28	42
200-D	542	277	243	122	109	112	66	24	32	NPT 1/4”	30	130	30	140	102	M5*8	M16*24	M10*15	F14/F10	36	12	28	42
240-D	610	346	292	146	130.5	131	70	40	45	NPT 3/8”	50	130	30	165	125	M6*9	M20*30	M12*18	F16/F12	36	22	36	47.5
265-D	725	388	333	166.8	147	146.8	90	40	45	NPT 3/8”	50	130	30	165	—	M6*9	M20*30	—	F16	46	22	36	47.5
300-D	839	412	357	177.5	162	173	85	40	45	NPT 1/2”	50	130	30	165	—	M6*9	M20*30	—	F16	46	22	36	47.5

Unit: mm

Technical Data

Air Consumption, Cycle Time & Weight

		50-D	63-D	75-D	85-D	100-D	115-D	125-D
Body Diameter	In.	1.97	2.48	2.95	3.46	3.94	4.53	4.92
Air Consumption Per Stroke Actual Volume (Liter)	CCW	0.08	0.15	0.30	0.50	0.75	1.19	1.55
	CW	0.13	0.25	0.48	0.73	1.08	1.80	2.18
Opening Time DA	Sec.	0.17	0.19	0.23	0.33	0.42	0.72	0.84
Closing Time DA	Sec.	0.19	0.22	0.27	0.35	0.48	0.93	1.09
Approximate Wt.	Lb.	2.38	3.42	6.06	8.33	11.68	18.5	21.89

		145-D	160-D	180-D	200-D	240-D	265-D	300-D
Body Diameter	In.	5.71	6.30	7.09	7.87	9.45	10.63	11.81
Air Consumption Per Stroke Actual Volume (Liter)	CCW	2.40	3.20	4.30	5.87	10	15	21.10
	CW	3.55	4.72	6.80	9.53	15	23	30.50
Opening Time DA	Sec.	1.32	1.60	2.00	2.70	3.50	4.50	8.80
Closing Time DA	Sec.	1.42	2.00	2.40	3.50	4.50	5.00	12.70
Approximate Wt.	Lb.	31.08	40.45	55.12	77.16	103.89	174.16	299.39

Pressure

Maximum Working Pressure: 120 psi (8 bar)

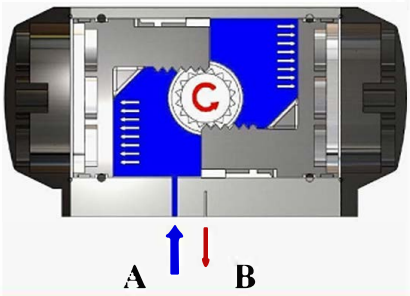
Temperature

Standard Range: -4°F to 175°F, NBR (Buna) (-20°C to 80°C)

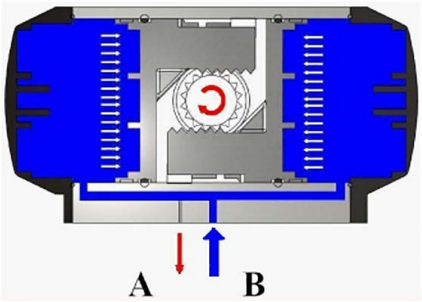
Option High Temp: 5°F to 300°F, Viton (-15°C to 150°C)

Option Low Temp: -40°F to 175°F, HNBR (-40°C to 80°C)

Double Acting

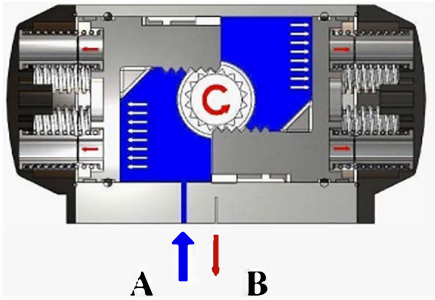


Air supplied to Port A drives the piston outward, turning the pinion counterclockwise. Exhaust air exits at Port B.

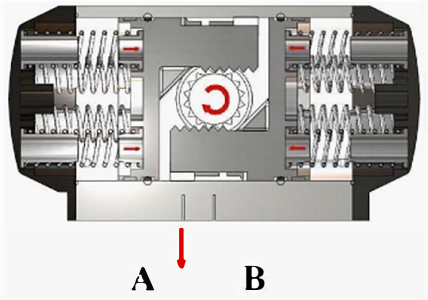


Air supplied to Port B drives the piston inward, turning the pinion clockwise. Exhaust air exits at Port A.

Spring Return



Air supplied to Port A drives the pistons outward and compresses the springs, turning the pinion counterclockwise. Exhaust air exits at Port B.

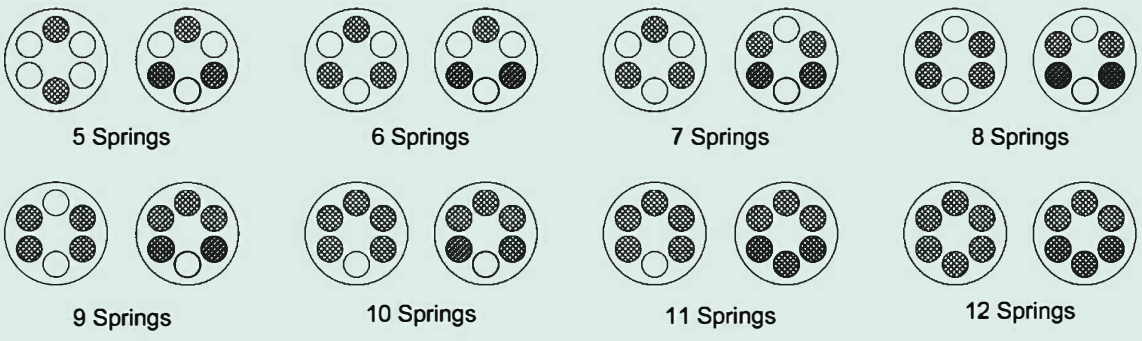


Loss of air pressure allows the springs to drive the pistons inward, turning the pinion clockwise. Exhaust air exits at Port A.

Note: Rotation of the actuator may be reversed by simply inverting the position of the pistons.

Spring Options for Single Acting Actuators

Pneumatic actuators come standard with 12 springs. Air supply pressure will determine the actual number of springs needed in operation. The following spring configurations are available:



Even number of springs is recommended for high cycle applications.

Sizing and Torque Data

Actuator Sizing

1. Determine the maximum torque that will be required to actuate the valve.
2. Apply an appropriate safety factor, based on the process conditions, to determine the sizing torque.
3. For ***Double Acting*** actuators, use the Double Acting Output Torque table below to find the column that matches the air supply available. Move down the column to find the lowest value that is greater than the calculated sizing torque. Select the actuator size listed to the far left of this row.

   For ***Spring Return (single acting)*** actuators, use the Spring Return Output Torque table on pages 8-9 to find the correct actuator. Move down the Spring Torque End column on the far right of this table until reaching the lowest value that is greater than the calculated sizing torque. Move left along this row until reaching the column that corresponds with the air supply. If the air end value also exceeds the sizing torque, the actuator and spring set to the far left should be be selected. If not, the next larger actuator is needed.

Double Acting Output Torque (in-lbs)

Output Air to Air							
Air Pressure (PSI)	40	60	70	80	90	100	120
Size							
32-C	26	41	51	59	67	76	92
40-D	41	64	77	89	101	113	137
50-D	77	110	135	155	174	201	243
63-D	130	197	245	275	311	340	421
75-D	277	430	500	559	632	702	833
85-D	431	641	752	870	970	1081	1328
100-D	623	952	1085	1261	1419	1604	1959
115-D	1050	1556	1837	2095	2362	2625	3149
125-D	1327	1923	2289	2664	3003	3357	4047
145-D	1872	2884	3588	4102	4614	5145	6317
160-D	2849	4120	4784	5549	6180	6871	8331
180-D	3622	5557	6492	7529	8331	9278	11325
200-D	5087	7690	9037	10344	11536	12748	15390
240-D	8709	13138	15248	17492	19684	21869	26230
265-D	14203	21240	24772	28413	32044	35577	42755
300-D	17865	26798	31443	35738	40201	44663	53595

Spring Return Output Torque (in-lbs)

Air Torque																Spring Torque	
Air Pressure (PSI)		40		60		70		80		90		100		120			
Size	Spring No.	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
50-D	5	53	39	82	67	109	95	129	114	146	131	174	160	215	200	42	27
	6	46	31	75	58	103	86	122	105	139	122	167	151	208	190	50	34
	7	41	23	69	49	97	78	115	96	133	113	161	142	201	181	59	40
	8			61	38	90	68	108	86	125	103	154	133	194	171	69	47
	9			55	30	84	61	102	78	119	94	148	125	188	163	77	53
	10					78	53	96	70	113	86	142	117	181	155	85	59
	11					71	44	89	60	105	76	135	107	174	145	95	66
	12					64	34	82	51	98	66	128	98	167	135	104	73
63-D	5	84	60	145	118	197	172	225	199	259	233	290	265	369	342	76	50
	6	75	46	135	102	187	156	215	183	249	216	281	249	359	326	92	60
	7	66	31	125	85	178	141	205	167	239	200	271	234	349	309	108	70
	8			114	70	167	127	194	153	228	185	261	220	338	295	122	81
	9			103	54	157	112	184	137	217	168	250	204	327	278	138	91
	10			92	38	147	97	173	121	206	152	240	188	316	262	154	102
	11					138	81	163	105	196	135	230	173	306	245	170	112
	12					128	67	154	90	186	120	221	158	296	230	185	121
75-D	5	183	130	325	266	402	346	457	399	526	467	602	545	728	668	159	102
	6	167	102	307	233	385	316	439	368	508	435	584	514	710	636	190	119
	7	149	73	287	201	366	286	420	337	488	403	565	484	689	604	221	139
	8			266	169	346	256	399	306	467	371	545	453	668	572	252	159
	9			246	137	328	226	381	275	448	339	527	423	649	540	283	178
	10			226	105	309	197	361	244	428	307	507	392	629	508	314	197
	11					291	167	342	213	407	275	488	362	609	476	345	217
	12					272	137	322	182	387	243	469	331	589	444	376	236
85-D	5	278	187	469	366	591	496	703	604	798	696	917	820	1155	1053	266	166
	6	248	140	435	313	560	446	670	552	764	643	885	769	1122	1000	317	199
	7	218	93	401	260	528	396	637	501	731	590	853	718	1088	947	368	232
	8			368	207	497	347	605	449	698	536	821	668	1055	894	419	264
	9			335	154	467	297	574	398	665	483	790	617	1022	840	471	296
	10			301	101	435	248	541	346	631	430	758	567	988	787	522	328
	11					403	198	508	295	597	377	725	516	954	734	573	361
	12					372	149	475	243	563	324	693	466	920	681	625	394
100-D	5	418	305	722	595	871	752	1038	914	1189	1062	1385	1264	1729	1602	345	222
	6	377	241	676	523	827	684	993	844	1143	990	1341	1195	1683	1530	415	267
	7	335	177	629	450	784	617	947	774	1096	917	1297	1127	1636	1458	485	312
	8			582	378	740	549	902	704	1049	845	1252	1058	1589	1385	555	358
	9			536	306	696	482	857	634	1002	773	1208	989	1543	1313	625	403
	10			490	234	654	415	812	565	957	701	1164	921	1497	1241	694	447
	11					610	348	767	494	910	629	1120	852	1450	1169	764	492
	12					566	280	721	424	862	557	1074	783	1403	1097	834	538
115-D	5	716	513	1199	970	1487	1273	1731	1509	1987	1758	2267	2049	2774	2554	584	363
	6	651	407	1126	851	1418	1162	1660	1403	1913	1648	2197	1936	2701	2435	699	434
	7	586	301	1053	732	1350	1051	1589	1287	1831	1520	2127	1822	2628	2307	814	504
	8			970	613	1273	940	1518	1172	1758	1401	2049	1709	2554	2188	929	584
	9			897	494	1205	829	1447	1048	1685	1282	1979	1596	2472	2069	1044	655
	10					1136	718	1367	932	1611	1163	1910	1482	2399	1950	1159	726
	11					1068	607	1296	817	1538	1044	1840	1369	2325	1831	1274	797
	12							1225	701	1456	925	1761	1256	2243	1712	1389	867
125-D	5	911	667	1456	1181	1854	1598	2211	1944	2536	2261	2912	2651	3580	3305	717	451
	6	826	529	1360	1025	1765	1453	2117	1793	2440	2106	2821	2502	3484	3149	867	544
	7	741	399	1263	879	1675	1316	2024	1651	2344	1959	2729	2363	3387	3003	1009	637
	8			1163	723	1581	1171	1926	1500	2243	1804	2633	2215	3287	2847	1159	735
	9			1067	568	1491	1025	1833	1349	2147	1648	2542	2066	3191	2692	1310	827
	10					1401	880	1740	1198	2051	1492	2450	1918	3094	2536	1460	920
	11					1312	743	1647	1056	1955	1346	2359	1779	2998	2390	1602	1013
	12					1218	598	1549	906	1854	1190	2263	1630	2898	2234	1752	1111

Torque Data

Spring Return Output Torque (in-lbs)

		Air Torque														Spring Torque	
Air Pressure (PSI)		40		60		70		80		90		100		120			
Size	Spring No.	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
145-D	5	1213	838	2142	1721	2897	2504	3382	2974	3897	3490	4438	4037	5576	5154	1124	717
	6	1074	627	1987	1483	2751	2281	3231	2743	3747	3260	4290	3810	5420	4916	1354	867
	7	936	415	1831	1245	2606	2059	3081	2512	3597	3030	4142	3584	5264	4678	1584	1018
	8			1685	1007	2469	1837	2939	2282	3455	2800	4002	3357	5118	4440	1814	1159
	9			1529	778	2324	1624	2788	2060	3304	2579	3854	3139	4962	4211	2036	1310
	10			1373	540	2179	1401	2637	1829	3154	2349	3706	2912	4806	3973	2266	1460
	11					2042	1179	2495	1598	3012	2119	3566	2686	4660	3735	2496	1602
	12					1905	957	2353	1367	2871	1888	3427	2459	4514	3497	2726	1743
160-D	5	1953	1506	3113	2609	3845	3375	4572	4084	5173	4669	5912	5432	7324	6821	1460	974
	6	1766	1237	2902	2307	3649	3093	4368	3791	4962	4367	5711	5144	7114	6518	1752	1177
	7	1579	960	2692	1996	3452	2803	4164	3489	4752	4056	5511	4848	6903	6207	2053	1381
	8			2481	1694	3256	2521	3959	3196	4541	3754	5310	4560	6692	5905	2345	1584
	9			2280	1382	3068	2230	3764	2894	4340	3442	5118	4264	6491	5594	2646	1779
	10			2069	1080	2871	1948	3560	2601	4129	3140	4918	3976	6280	5292	2938	1982
	11					2675	1658	3356	2299	3918	2829	4717	3680	6070	4980	3239	2186
	12					2487	1376	3160	2006	3717	2527	4525	3392	5868	4678	3531	2381
180-D	5	2352	1676	4129	3369	5161	4452	6143	5407	6903	6143	7917	7193	9897	9137	2115	1381
	6	2091	1294	3836	2939	4888	4050	5859	4989	6610	5713	7638	6784	9604	8707	2531	1664
	7	1831	911	3543	2509	4614	3649	5575	4572	6317	5283	7359	6374	9311	8276	2947	1947
	8			3250	2069	4341	3238	5291	4146	6024	4843	7080	5955	9018	7837	3372	2230
	9			2966	1639	4076	2837	5016	3729	5740	4413	6810	5545	8734	7407	3788	2505
	10			2673	1208	3802	2435	4732	3311	5447	3983	6531	5136	8441	6976	4204	2788
	11					3538	2034	4457	2894	5164	3552	6260	4726	8157	6546	4620	3062
	12					3264	1632	4173	2477	4871	3122	5981	4316	7864	6116	5036	3345
200-D	5	3328	2498	5713	4779	7195	6323	8425	7519	9558	8624	10864	9975	13412	12479	2814	1912
	6	2987	1986	5328	4202	6836	5785	8052	6960	9173	8047	10498	9425	13028	11902	3372	2283
	7	2645	1473	4944	3625	6477	5247	7679	6401	8789	7471	10132	8876	12643	11325	3929	2655
	8			4559	3058	6118	4717	7306	5850	8404	6903	9766	8336	12259	10757	4478	3027
	9			4166	2490	5751	4187	6925	5300	8011	6335	9391	7795	11865	10190	5027	3407
	10			3772	1913	5383	3649	6543	4741	7617	5759	9016	7246	11471	9613	5584	3788
	11					5024	3119	6170	4190	7233	5191	8649	6705	11087	9045	6133	4160
	12					4657	2581	5788	3631	6839	4614	8275	6156	10693	8469	6691	4540
240-D	5	5737	4419	9796	8313	12134	10749	14249	12811	16342	14859	18685	17273	22888	21405	4664	3230
	6	5135	3564	9119	7352	11501	9852	13592	11878	15665	13898	18040	16357	22210	20444	5593	3885
	7	4541	2694	8450	6372	10878	8938	12944	10929	14996	12936	17395	15450	21524	19482	6540	4531
	8			7736	5402	10245	8032	12287	9987	14319	11975	16758	14535	20846	18521	7478	5186
	9			7123	4449	9639	7143	11656	9064	13669	11014	16113	13628	20160	17560	8399	5814
	10			6445	3506	9006	6263	11000	8150	12991	10052	15459	12713	19491	16589	9310	6469
	11					8374	5358	10343	7209	12314	9100	14823	11788	18814	15637	10248	7124
	12					7742	4426	9686	6241	11636	8148	14169	10882	18127	14667	11213	7779
265-D	5	9790	7690	16278	13916	20149	17944	23597	21307	27081	24719	30849	28599	37793	35431	7080	4797
	6	8887	6429	15298	12479	19217	16577	22629	19886	26083	23254	29898	27204	36795	33966	8452	5779
	7	8016	5119	14319	11041	18286	15210	21742	18466	22613	21789	28948	25809	35797	32501	9877	6726
	8			13339	9567	17355	13843	20685	17045	24087	20324	27997	24414	34799	31036	11284	7655
	9			12359	8111	16423	12475	19726	15625	23089	18860	27047	23019	33709	29571	12744	8673
	10			11297	6628	15492	11108	18759	14204	22091	17395	26097	21624	32803	28106	14125	9611
	11					14560	9741	17791	12784	21094	15930	25146	20229	31805	26642	15523	10558
	12					13672	8459	16823	11364	20096	14465	24196	18833	30807	25177	16904	11505
300-D	5	11857	8854	20041	16662	25147	21994	29181	25905	33444	30066	38225	35008	46838	43460	9797	6531
	6	10661	7064	18695	14648	23891	20115	27876	23952	32098	28051	36943	33089	45492	41445	11744	7832
	7	9464	5265	17349	12625	22635	18226	26571	21990	30752	26028	35662	31162	44146	39422	13700	9133
	8			16003	10602	21379	16338	25266	20028	29406	24005	34380	29236	42800	37399	15656	10434
	9			14648	8578	20115	14449	23952	18066	28051	21982	33089	27309	41445	35376	17612	11744
	10			13302	6555	18858	12561	22647	16104	26706	19958	31808	25382	40100	33352	19567	13045
	11					17602	10672	21342	14142	25360	17935	30526	23455	38754	31329	21523	14346
	12							20071	12247	24525	16701	28993	21169	37912	30088	23481	15657

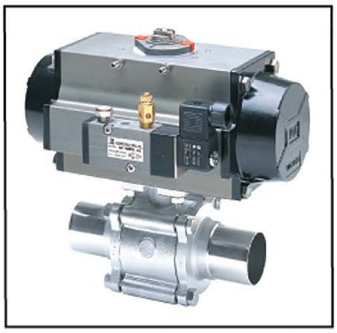
Ordering Information

AP	SR	63	12	D	
Series	**Type**	**Size**	**Spring Set**	**Model**	**Seal Option**
AP - Actuator Pneumatic	**SR** - Spring Return **DA** - Double Acting	**32** **40** **50** **63** **75** **85** **100** **115** **125** **145** **160** **180** **200** **240** **265** **300**	**05** **06** **07** **08** **09** **10** **11** **12***	**C**** **D**	**None** - **NBR (Buna N)*** **H** - **HNBR** **V** - **Viton**

Due to continuous product development, information may change without notice.

* Standard
** DA-32 only

Accessories



Direct Mount NAMUR Solenoid

Direct Mount Proximity Switch

Positioner

Limit Switch

Direct Mount Valves

Inline's Direct Mount Valves eliminate the need for costly mounting brackets and drive couplings and allow for a very low profile valve package. The direct drive improves actuator positioning, eliminates play, and prevents unwanted side-loading of the stem packing.

Electric Actuators

Inline also offers electric actuators. For a brochure, please visit our website or contact your local distributor.

Certifications and Quality Assurance

- All actuators are manufactured in an ISO 9001:2015 qualified factory
- All actuators are 100% inspected and tested in factory prior to shipment
- Each actuator is marked with a unique serial number for complete traceability
- Actuators are qualified for CE and use up to SIL 3 as a single device per IEC 61508

ISO 9001:2015 CE BPE-2002

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