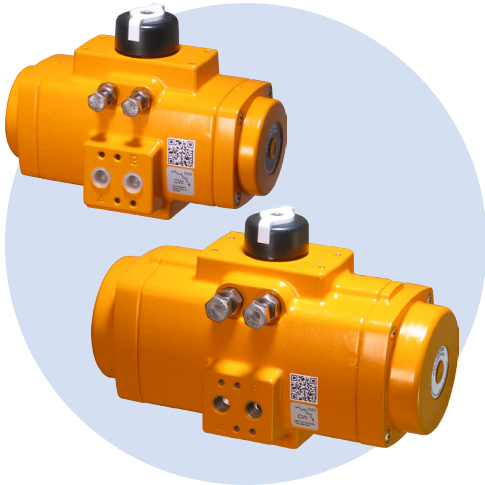


# F Series

## Pneumatic Actuators



The Assured Automation F Series pneumatic actuators offer a simple and cost effective solution for your valve automation needs. For use on quarter turn (90 degree) ball valves, plug valves, dampers, and resilient seated butterfly valves.

### FEATURES

- Compact rack and pinion design
- Up to 1 Million Cycles
- Double Acting and Spring Return models
- Direct mounting to ball and butterfly valves
- Multiple ISO drillings on each actuator: NAMUR DVI/DVE 3845, DIN 3337, ISO 5211
- Namur Solenoid and Limit Switch Mounting
- Removable drive insert for diamond or square configuration
- Dual travel adjustment bolts
- Visual Position Indicator (Open/Closed)

### MATERIALS OF CONSTRUCTION

#### Housing:

Chromated aluminum with dual component polyurethane coating

#### Mounting and Shaft:

High grade aluminum

### ACCESSORIES

#### Solenoids:

NAMUR mount (voltages of 12 to 24 VDC, 24 to 220 VAC), NEMA-4, NEMA-7, intrinsically safe

#### Limit Switches:

Mechanical, proximity, ASI, fieldbus; visual open and closed indication

#### Positioners:

Pneumatic (3 to 15 PSI control);  
electropneumatic (4 to 20 mA control)

### F SERIES MODEL NUMBERING

Model Number

Series: \_\_\_\_\_  
F = F series rack & pinion  
pneumatic actuator

Type: \_\_\_\_\_  
SA = Spring Return  
DA = Direct Acting

Size: \_\_\_\_\_  
ISO valve mounting patterns and  
stem size in mm shown here.  
see torque charts on following pages

**12** = F04; 11mm  
**25** = F03 & F05; 11mm  
**40** = F05 & F07; 14mm  
**65** = F05 & F07; 14mm  
**100** = F05 & F07; 17mm  
**150** = F07 & F10; 17mm  
**200** = F07 & F10; 22mm  
**350** = F07 & F10; 22mm  
**600** = F10 & F12; 27mm  
**950** = F10 & F14; 36mm  
**1600** = F16 & F25; 46mm

Spring Set: \_\_\_\_\_  
*omit for FDA models*

**1** = 1 spring  
**2** = 2 springs  
**3** = 3 springs  
**4** = 4 springs  
**5** = 5 springs  
**6** = 6 springs

### SPECIFICATIONS

#### Temperature Range:

-4 °F to +175°F

#### Supply Pressure:

Spring Return: 40 to 120 psi  
Direct Acting: 20 to 120 psi

#### Torque Output:

up to 40,000 in-lbs.  
(at 80 psi supply pressure)  
see torque charts on pages 2 & 3

#### Service Life:

Up to 1 Million Cycles

#### Mounting/Shaft:

ISO 5211/Female



## Torque FSA Spring Return Actuators - (lbf.in)

Actuator Size	Spring set nr.	Spring Stroke Torque (lbf.in)		Air Stroke Torque (lbf.in)															
				SUPPLY PRESSURE															
				40 psig		50 psig		60 psig		70 psig		80 psig		90 psig		100 psig		120 psig	
Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End	Start	End		
FSA12	2	64	41	15	-	31	5	47	21	63	37	79	53	95	69	111	84	142	116
FSA25	1	31	20	93	80	123	109	152	139	181	168	211	198	240	227	270	257	329	316
	2	63	39	70	44	100	73	129	103	159	132	188	162	218	191	247	221	306	280
	3	94	59	48	8	77	37	107	67	136	96	166	126	195	155	225	185	283	244
	4	125	79	-	-	-	-	84	31	113	60	143	90	172	119	202	149	261	208
	5	156	99	-	-	-	-	-	-	91	24	120	54	150	83	179	113	238	172
	6	188	118	-	-	-	-	-	-	-	-	98	18	127	47	157	77	216	136
FSA40	1	58	37	175	150	230	206	285	261	341	316	396	371	451	427	506	482	617	592
	2	116	73	133	84	188	139	243	195	299	250	354	305	409	360	464	415	575	526
	3	174	110	91	18	146	73	201	128	257	183	312	239	367	294	422	349	533	459
	4	231	146	-	-	-	-	159	62	214	117	270	172	325	227	380	283	491	393
	5	289	183	-	-	-	-	-	-	172	50	228	106	283	161	338	216	449	327
	6	347	220	-	-	-	-	-	-	-	-	186	39	241	94	296	150	407	260
FSA65	1	90	57	265	227	349	311	434	395	518	479	602	564	686	648	770	732	939	900
	2	181	114	200	123	284	207	368	291	452	376	537	460	621	544	705	628	873	796
	3	271	171	134	19	219	103	303	188	387	272	471	356	555	440	639	524	808	693
	4	361	228	-	-	-	-	237	84	322	168	406	252	490	336	574	420	742	589
	5	452	285	-	-	-	-	-	-	256	64	340	148	424	232	509	317	677	485
	6	542	341	-	-	-	-	-	-	-	-	275	44	359	129	443	213	612	381
FSA100	1	131	83	394	339	518	463	643	588	767	712	892	836	1016	961	1141	1085	1390	1334
	2	262	166	299	188	423	313	548	437	672	562	797	686	921	811	1046	935	1295	1184
	3	392	248	203	38	328	162	452	287	577	411	701	536	826	660	950	785	1199	1034
	4	523	331	-	-	-	-	357	136	482	261	606	385	731	510	855	634	1104	883
	5	654	414	-	-	-	-	-	-	387	110	511	235	636	359	760	484	1009	733
	6	785	497	-	-	-	-	-	-	-	-	416	85	540	209	665	334	914	583
FSA150	1	208	131	633	544	832	743	1031	942	1231	1142	1430	1341	1629	1540	1829	1740	2227	2138
	2	416	262	482	304	681	504	881	703	1080	902	1279	1102	1479	1301	1678	1500	2077	1899
	3	625	393	332	65	531	264	730	464	930	663	1129	862	1328	1062	1528	1261	1926	1660
	4	833	524	-	-	-	-	580	224	779	424	979	623	1178	823	1377	1022	1776	1421
	5	1041	654	-	-	-	-	-	-	629	185	828	384	1027	583	1227	783	1626	1181
	6	1249	785	-	-	-	-	-	-	-	-	678	145	877	344	1076	543	1475	942
FSA200	1	289	182	862	739	1135	1012	1408	1285	1681	1558	1954	1831	2226	2104	2499	2376	3045	2922
	2	578	364	653	407	926	680	1198	953	1471	1226	1744	1499	2017	1771	2290	2044	2836	2590
	3	867	547	443	75	716	348	989	621	1262	894	1535	1166	1808	1439	2080	1712	2626	2258
	4	1156	729	-	-	-	-	780	289	1052	561	1325	834	1598	1107	1871	1380	2417	1926
	5	1445	911	-	-	-	-	-	-	843	229	1116	502	1389	775	1662	1048	2207	1593
	6	1734	1093	-	-	-	-	-	-	-	-	906	170	1179	443	1452	716	1998	1261
FSA350	1	495	312	1503	1293	1978	1767	2452	2241	2926	2716	3400	3190	3874	3664	4348	4138	5296	5086
	2	990	624	1145	724	1619	1199	2093	1673	2567	2147	3041	2621	3515	3095	3990	3569	4938	4517
	3	1485	936	786	156	1261	630	1735	1104	2209	1578	2683	2052	3157	2526	3631	3000	4579	3948
	4	1979	1248	-	-	-	-	1376	535	1850	1009	2324	1483	2798	1957	3272	2431	4221	3380
	5	2474	1560	-	-	-	-	-	-	1492	440	1966	914	2440	1388	2914	1863	3862	2811
	6	2969	1872	-	-	-	-	-	-	-	-	1607	346	2081	820	2555	1294	3504	2242
FSA600	1	848	534	2551	2190	3356	2996	4162	3801	4968	4607	5773	5413	6579	6218	7385	7024	8996	8635
	2	1695	1068	1937	1216	2743	2021	3548	2827	4354	3633	5160	4438	5965	5244	6771	6050	8382	7661
	3	2543	1601	1324	241	2129	1047	2935	1853	3741	2658	4546	3464	5352	4270	6158	5075	7769	6687
	4	3391	2135	-	-	-	-	2321	878	3127	1684	3933	2490	4738	3295	5544	4101	7155	5712
	5	4238	2669	-	-	-	-	-	-	2513	710	3319	1515	4125	2321	4930	3127	6542	4738
	6	5086	3203	-	-	-	-	-	-	-	-	2706	541	3511	1346	4317	2152	5928	3763

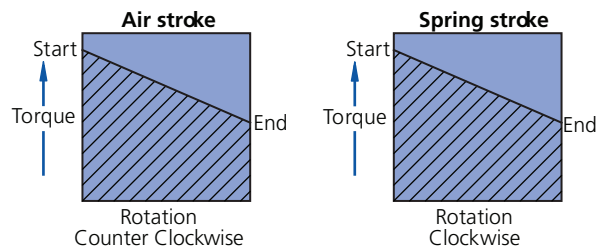
## Torque FSA Spring Return Actuators - (lbf.in) *continued*

Actuator Size	Spring set nr.	Spring Stroke Torque (lbf.in)		Air Stroke Torque (lbf.in)															
				SUPPLY PRESSURE															
		Start	End	40 psig		50 psig		60 psig		70 psig		80 psig		90 psig		100 psig		120 psig	
FSA950	1	1328	837	3950	3385	5200	4635	6451	5886	7701	7136	8952	8387	10202	9637	11453	10888	13954	13389
	2	2656	1673	2988	1859	4239	3109	5489	4360	6740	5610	7990	6861	9241	8111	10491	9362	12992	11863
	3	3983	2510	2027	333	3277	1583	4528	2834	5778	4084	7029	5334	8279	6585	9530	7835	12030	10336
	4	5311	3346	-	-	-	-	3566	1307	4817	2558	6067	3808	7318	5059	8568	6309	11069	8810
	5	6639	4183	-	-	-	-	-	-	3855	1032	5106	2282	6356	3532	7606	4783	10107	7284
	6	7967	5019	-	-	-	-	-	-	-	-	4144	756	5394	2006	6645	3257	9146	5758
FSA1600	1	2173	1369	6464	5540	8510	7586	10557	9633	12603	11679	14650	13726	16696	15772	18743	17819	22836	21911
	2	4346	2738	4890	3042	6937	5088	8983	7135	11030	9181	13076	11228	15123	13274	17169	15321	21262	19414
	3	6519	4107	3317	544	5363	2591	7410	4637	9456	6684	11503	8730	13549	10776	15595	12823	19688	16916
	4	8692	5476	-	-	-	-	5836	2139	7882	4186	9929	6232	11975	8279	14022	10325	18115	14418
	5	10865	6845	-	-	-	-	-	-	6309	1688	8355	3734	10402	5781	12448	7827	16541	11920
	6	13038	8214	-	-	-	-	-	-	-	-	6782	1237	8828	3283	10875	5330	14968	9423
FSA2500	1	3503	2207	10420	8930	13719	12229	17018	15528	20317	18827	23616	22126	26915	25425	30214	28724	36812	35322
	2	7006	4414	7883	4904	11182	8203	14481	11502	17780	14801	21079	18100	24378	21399	27678	24698	34276	31296
	3	10509	6621	5347	877	8646	4176	11945	7475	15244	10774	18543	14073	21842	17372	25141	20671	31739	27269
	4	14012	8828	-	-	-	-	9408	3449	12707	6748	16006	10047	19305	13346	22604	16645	29202	23243
	5	17515	11035	-	-	-	-	-	-	10170	2721	13469	6020	16768	9319	20067	12618	26665	19216
	6	21018	13242	-	-	-	-	-	-	-	-	10933	1994	14232	5293	17531	8592	24129	15190
FSA4000	1	5605	3531	16673	14289	21952	19568	27230	24847	32509	30125	37788	35404	43066	40683	48345	45961	58903	56519
	2	11210	7063	12614	7846	17893	13125	23171	18404	28450	23683	33729	28961	39008	34240	44286	39519	54844	50076
	3	16816	10594	8555	1404	13834	6682	19112	11961	24391	17240	29670	22518	34949	27797	40227	33076	50785	43633
	4	22421	14125	-	-	-	-	15054	5518	20332	10797	25611	16076	30890	21354	36168	26633	46726	37190
	5	28026	17656	-	-	-	-	-	-	16273	4354	21552	9633	26831	14912	32109	20190	42667	30748
	6	33631	21188	-	-	-	-	-	-	-	-	17493	3190	22772	8469	28050	13747	38608	24305

**Note:**

- Emerson Process Management recommends that the valve manufacturer supply the maximum required torque values (Including any adjustments or suggested safety factors for valve service conditions or application).
- Additionally, the valve manufacturer must identify at which position(s) and direction(s) of rotation (Counterclockwise or Clockwise) these maximum requirements occur.
- If in doubt, or you require any assistance with sizing actuators, do not hesitate to contact your nearest Emerson's Valve Automation representative.

**Figure 1. Spring-return torque diagram**



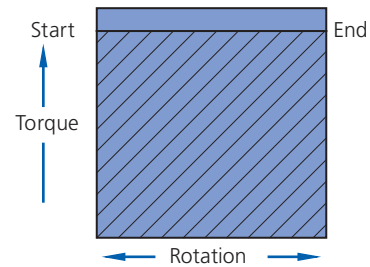
## Torque FDA Double Acting Actuators - (lbf.in)

Actuator Size	Torque in lbf.in Supply pressure (psig)												
	30	35	40	45	50	55	60	70	75	80	90	100	120
FDA12	44	51	59	66	74	81	89	104	112	119	134	149	179
FDA25	81	95	109	123	137	151	165	193	207	220	248	276	332
FDA40	153	179	205	231	257	283	309	361	387	413	466	518	622
FDA65	233	272	312	352	392	431	471	550	590	630	709	789	948
FDA100	344	403	461	520	579	638	696	814	873	931	1049	1166	1401
FDA150	551	645	739	833	927	1021	1115	1304	1398	1492	1680	1868	2244
FDA200	754	883	1011	1140	1269	1398	1527	1784	1913	2042	2299	2557	3072
FDA350	1310	1534	1758	1981	2205	2429	2653	3100	3324	3547	3995	4442	5337
FDA600	2226	2606	2987	3367	3747	4127	4508	5268	5648	6028	6789	7549	9070
FDA950	3455	4045	4636	5226	5816	6406	6996	8177	8767	9357	10537	11717	14078
FDA1600	5655	6621	7586	8552	9518	10484	11450	13381	14347	15313	17244	19176	23039
FDA2500	9116	10673	12230	13787	15344	16900	18457	21571	23128	24685	27799	30913	37141
FDA4000	14586	17077	19568	22060	24551	27042	29533	34516	37007	39498	44481	49463	59428

**Note:**

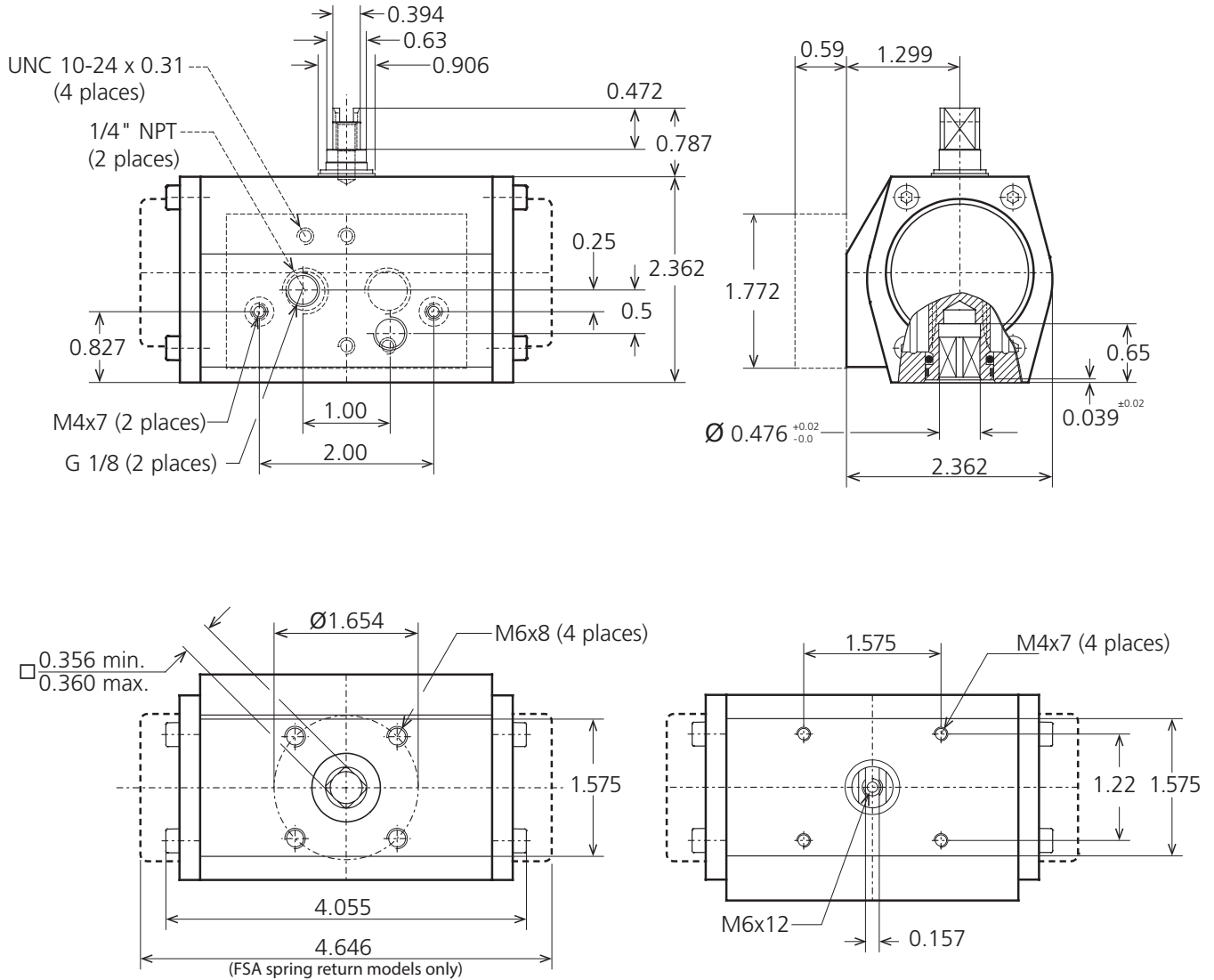
1. Emerson Process Management recommends that the valve manufacturer supply the maximum required torque values (Including any adjustments or suggested safety factors for valve service conditions or application).
2. Additionally, the valve manufacturer must identify at which position(s) and direction(s) of rotation (Counterclockwise or Clockwise) these maximum requirements occur.
3. If in doubt, or you require any assistance with sizing actuators, do not hesitate to contact your nearest Emerson's Valve Automation representative.

**Figure 2. Double-acting torque diagram**

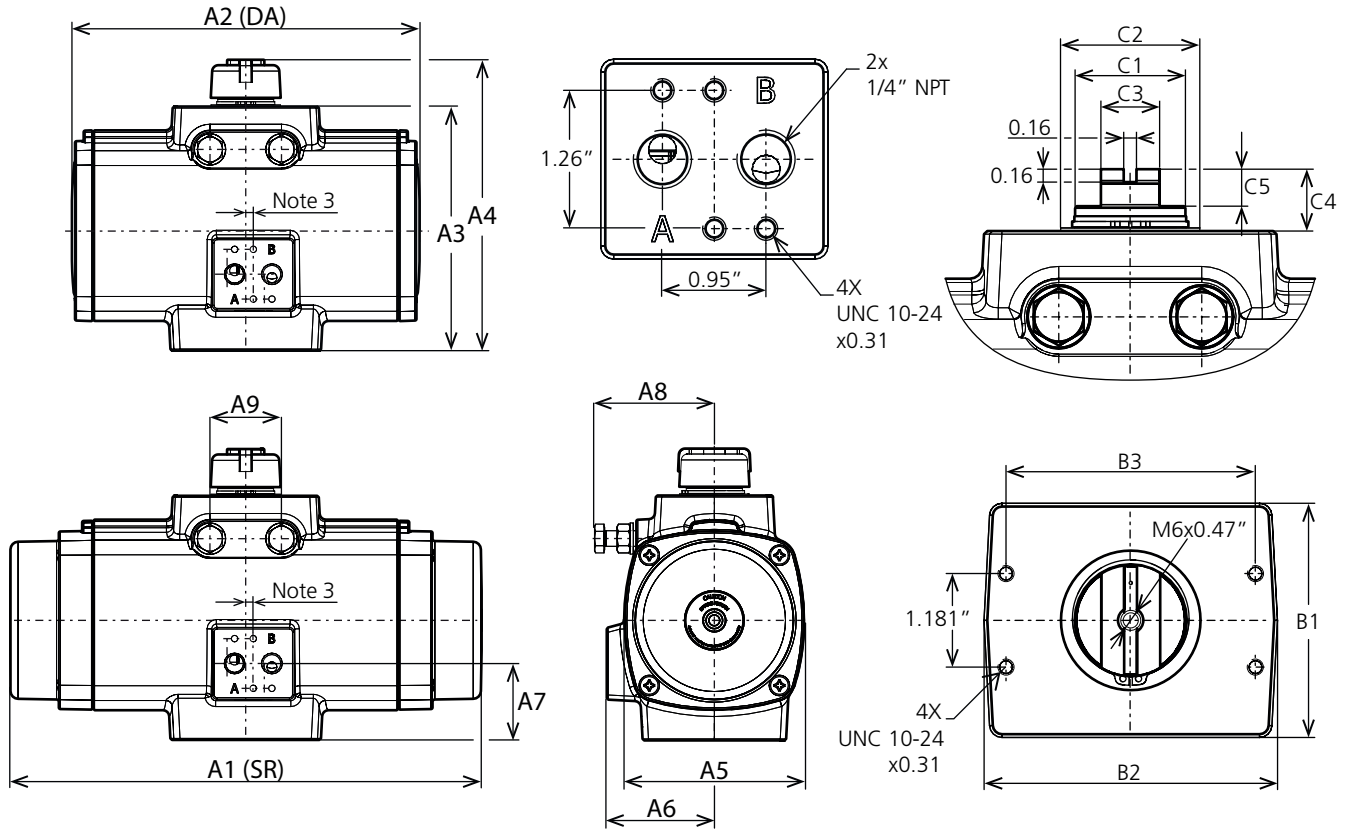


## Dimensions (Actuator Body, Solenoid Interface, Top Mounting Interface)

### FSA12 and FDA12



## Dimensions (Actuator Body, Solenoid Interface, Top Mounting Interface)



**Note:**

1. DA = Double-Acting, SR = Spring-Return
2. Solenoid interface and top mounting interface according to VDI/VDE3845 (NAMUR)
3. The solenoid drilling pattern is shifted 0.16" for size 0025 and 0.08" for size 0040 vs. the centerline of the actuator.

Tolerance limits unless otherwise specified:

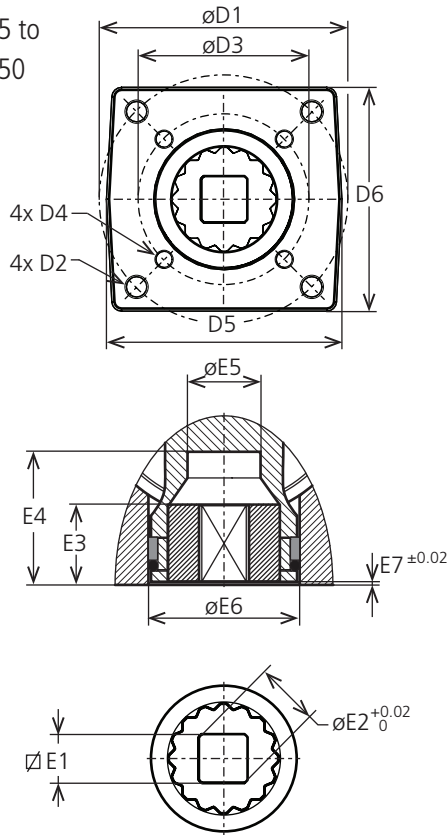
X.X = ± 0.02"

X.XX = ± 0.01"

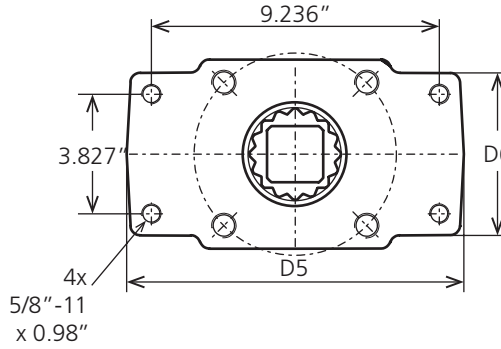
Dim in Inches	Actuator size											
	0025	0040	0065	0100	0150	0200	0350	0600	0950	1600	2500	4000
A1	6.54	7.55	8.53	9.72	11.97	14.23	15.15	18.73	xx.xx	xx.xx	xx.xx	xx.xx
A2	6.54	7.55	8.53	9.72	8.80	10.07	10.58	13.21	xx.xx	xx.xx	xx.xx	xx.xx
A3	3.59	4.39	4.86	5.14	6.19	6.42	7.92	9.77	xx.xx	xx.xx	xx.xx	xx.xx
A4	4.69	5.47	5.94	6.22	7.28	7.52	9.06	11.50	xx.xx	xx.xx	xx.xx	xx.xx
A5	3.23	3.74	4.09	4.53	5.00	5.28	6.50	7.83	xx.xx	xx.xx	xx.xx	xx.xx
A6	1.91	2.15	2.28	2.50	2.72	2.83	3.35	4.02	xx.xx	xx.xx	xx.xx	xx.xx
A7	1.16	1.34	1.48	1.50	1.93	1.92	1.65	2.64	xx.xx	xx.xx	xx.xx	xx.xx
A8	1.89	2.28	2.72	2.72	2.95	3.43	4.29	5.20	xx.xx	xx.xx	xx.xx	xx.xx
A9	0.71	0.98	1.06	1.10	1.81	1.81	1.81	2.36	xx.xx	xx.xx	xx.xx	xx.xx
B1	1.69	1.77	1.97	2.36	2.95	2.95	3.35	3.86	xx.xx	xx.xx	xx.xx	xx.xx
B2	3.70	3.70	3.70	3.82	3.70	3.70	3.94	5.83	xx.xx	xx.xx	xx.xx	xx.xx
B3	3.15	3.15	3.15	3.15	3.15	3.15	3.15	5.12	5.12	5.12	5.12	5.12
C1	0.63	0.87	0.87	0.87	1.34	1.42	1.42	2.17	2.17	2.52	2.17	2.52
C2	0.91	1.18	1.18	1.18	1.77	1.77	1.77	2.56	2.56	2.95	2.56	3.15
C3	0.39	0.55	0.55	0.55	0.75	0.75	0.75	1.42	1.42	1.42	1.42	1.42
C4	0.79	0.79	0.79	0.79	0.79	0.79	0.79	1.18	1.18	1.18	1.18	1.18
C5	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.39	0.39	0.39	0.39	0.39

## Dimensions (Valve Flange Mounting Interface and Stem Drive Details)

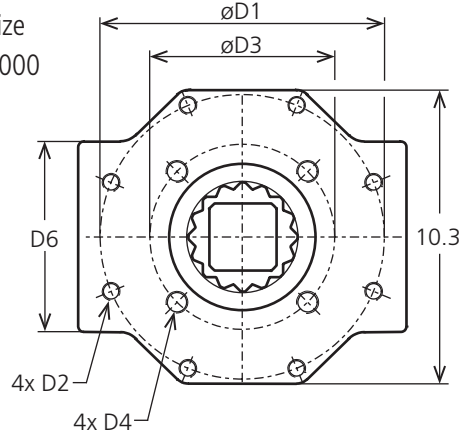
Size  
25 to  
950



Size 1600  
& 2500



Size  
4000



Note:

1. Flange and square drive according to DIN 3337
2. Drilling pattern DIN 1 is default. Drilling pattern DIN 2 is optional.

Tolerance limits unless otherwise specified:

X.X =  $\pm 0.02''$   
X.XX =  $\pm 0.01''$

Dim in Inches	Actuator size											
	0025	0040	0065	0100	0150	0200	0350	0600	0950	1600	2500	4000
ISO 1	F05	F07	F07	F07	F10	F10	F10	F12	F14	F16	F16	F25
D1	1.969	2.756	2.756	2.756	4.016	4.016	4.016	4.921	4.921	6.496	6.496	10.000
D2	"1/4""-20 x0.39"	"5/16""-18 x0.39"	"5/16""-18 x0.39"	"5/16""-18 x0.39"	"3/8""-16 x0.63"	"3/8""-16 x0.63"	"3/8""-16 x0.63"	"1/2""-13 x0.79"	"5/8""-11 x0.98"	-/-	-/-	"5/8""-11 x0.98"
ISO 2	F03	F05	F05	F05	F07	F07	F07	F10	F10	F25*	F25*	F16
D3	1.417	1.969	1.969	1.969	2.756	2.756	2.756	4.016	4.016	-/-	-/-	6.496
D4	"10-24 x0.31"	"1/4""-20 x0.39"	"1/4""-20 x0.39"	"1/4""-20 x0.39"	"5/16""-18 x0.39"	"5/16""-18 x0.39"	"5/16""-18 x0.39"	"3/8""-16 x0.63"	"3/8""-16 x0.63"	-/-	-/-	"3/4""-10 x1.14"
D5	1.97	2.68	2.68	2.62	3.82	3.7	3.7	4.65	xx.x	xx.x	xx.x	xx.x
D6	1.89	2.56	2.56	2.48	3.62	3.54	3.7	4.45	xx.x	xx.x	xx.x	xx.x
E1 Max	0.436	0.554	0.554	0.751	0.751	0.87	1.067	1.067	1.424	1.817	1.817	2.175
E1 Min	0.433	0.551	0.551	0.748	0.748	0.866	1.063	1.063	1.417	1.811	1.811	2.165
E2	0.555	0.713	0.713	0.992	1.004	1.11	1.425	1.426	2.291	2.37	2.37	2.843
E3	0.591	0.591	0.591	0.709	1.083	1.083	1.083	1.083	xx.x	xx.x	xx.x	xx.x
E4	1.34	1.34	1.34	1.34	1.97	1.97	1.97	1.97	xx.x	xx.x	xx.x	xx.x
E5	0.56	0.71	0.83	0.93	1.12	1.26	1.26	1.44	xx.x	xx.x	xx.x	xx.x
E6	0.96	1.36	1.36	1.5	2.22	2.22	2.22	2.66	x.xxx	x.xxx	x.xxx	x.xxx
E7	0.02	0.04	0.04	0.04	0.05	0.05	0.05	0.05	x.xx	x.xx	x.xx	x.xx

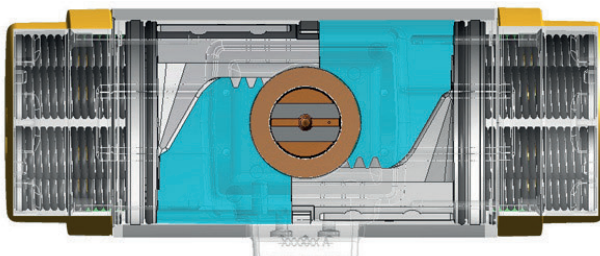
## Weights, Speed, and Air Consumption

Size	Weight (lbs.)		Speed (Sec.)			
	FDA... Double Acting	FSA... Spring Return*	FDA... Double Acting		FSA... Spring Return	
			A Port Pressurized	B Port Pressurized	A Port Pressurized	Spring Stroke
F 25	3.1	3.5	0.5	0.4	0.5	0.4
F 40	4.6	5.1	0.6	0.5	0.6	0.5
F 65	6.2	7.3	0.6	0.6	0.7	0.5
F 100	7.7	9.5	0.8	0.7	0.8	0.6
F 150	10.8	14.6	0.9	0.8	1.0	0.8
F 200	13.2	18.3	1.0	1.0	1.3	0.9
F 350	22	32	1.4	1.5	1.9	1.3
F 600	44	62	2.2	2.2	3.2	1.9
F 950	60	86	3.9	3.6	4.6	3.2
F 1600	95	146	5.9	4.8	6.9	4.8
F 2500	126	194	7.8	7.9	9.0	6.3
F 4000	192	291	13.3	13.0	15.4	10.8

\*Weights given for Spring Return models is with the 6 spring set

Size	Maximum Air Volume (cubic inches)			Air Consumption (cubic inches)					
	Central Chamber (with pistons outward)	End Cap Chamber (Double Acting Only)	Displaced Volume	Outward Stroke			Inward Stroke		
				29 psi	58 psi	116 psi	29 psi	58 psi	116 psi
F 25	6.4	11.8	4.7	23	40	58	37	70	102
F 40	10.0	22	8.9	36	64	92	70	131	192
F 65	22	34	13.5	74	134	194	107	200	293
F 100	22	50	19.9	80	140	200	158	295	433
F 150	48	43	32	163	295	427	151	270	389
F 200	50	59	44	182	320	458	207	369	532
F 350	118	103	76	402	729	1055	359	642	925
F 600	189	174	129	650	1171	1692	610	1091	1571
F 950	310	260	193	1049	1905	2760	910	1628	2346
F 1600	477	430	319	1635	2951	4267	1505	2691	3877
F 2500	638	676	501	2259	4018	5776	2367	4232	6097
F 4000	1122	1151	853	3946	7040	10134	4027	7202	10377

**Central Chamber** (for spring return and double acting models)



**End Cap Chambers** (for double acting models only)

