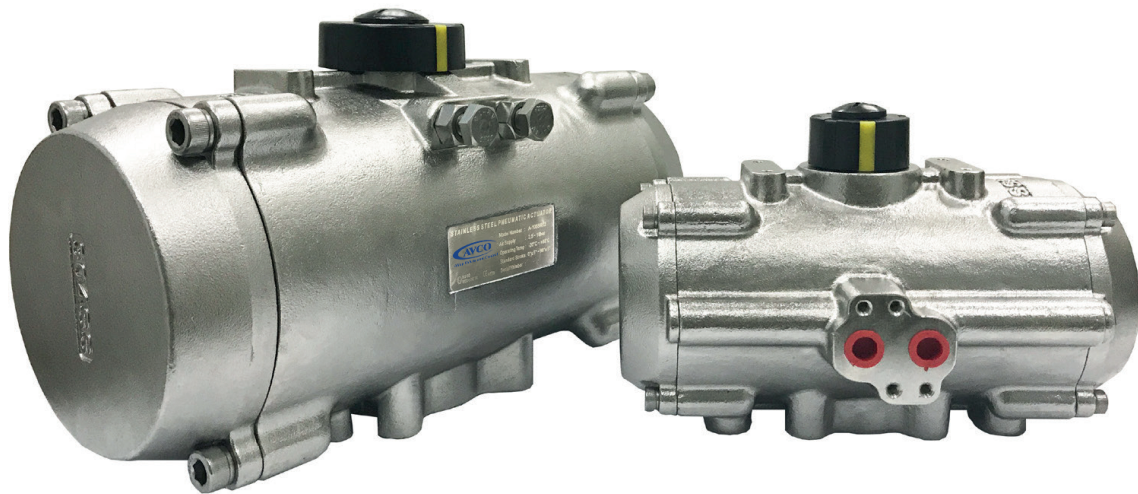


AVCO

ACTUATORS PNEUMATIC - TYPE AA

Alloy Valves and Control



Torque Rating at 75 psig

Double Acting
138 - 34,927 in-lbs

Spring Return
32 - 12,921 in-lbs

Features

Stainless Steel Body
Stainless Steel End Caps
Position Indicator with NAMUR slot
Blow-Out Proof Pinion
Dual Opposed Rack Pistons
Linear Torque Output (DA Actuator)
Adjustable Travel Stops
NAMUR Solenoid Mount Design

Temperature Range

Standard (NBR O-Ring)
-4 °F to 175 °F

Low Temperature (LNBR O-Ring)
-30 °F to 175 °F

High Temperature (Viton O-Ring)
5 °F to 300 °F

Supply Pressure

30 psig Minimum
145 psig Maximum

Operation Speed

Between 0.55 & 24.9 seconds
Depending Upon Model Size/Type

Industries

Chemical
Food Processing
Hydraulic
Oil/Gas
Pharmaceutical
Steam

Applicable Standards

ISO 5211
NAMUR

Alloy Valves and Control

About the AA Series Actuator

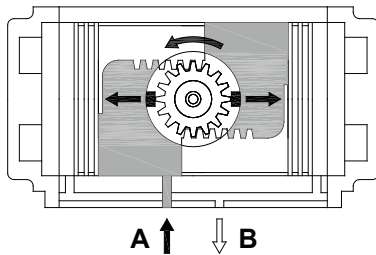
The AVCO AA Series rack and pinion actuators are stainless steel actuators suitable for use in corrosive environments. This design has been proven with long cycle life for the most demanding applications such as marine and offshore, chemical processing, pulp and paper, food and beverage, as well as petrochemical industries.

Design

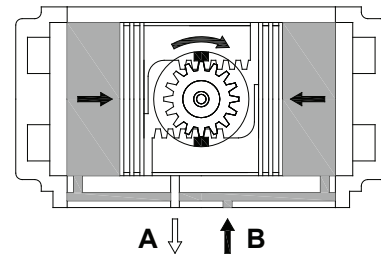
- The body and end caps are investment cast in CF8 (SS 304) or CF8M (SS 316) upon request.
- Rack and pinion design for lasting durability.
- 10 different models to cover a wide range of torque output.
- Customizable top indicator for various valve patterns.
- The actuator has fully adjustable end stops.
- ISO 5211 mount and drive shaft. Suits many direct mount valves.
- Top NAMUR mount for limit switches and positioners.
- Side NAMUR mount for direct mount solenoid valves.

ACTUATOR OPERATION

Double Acting

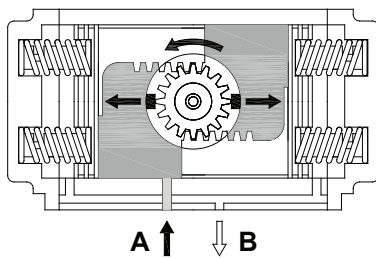


By supplying air to Port A, pressure is applied to the center chamber forcing the pistons outward. Linear piston force is transferred via gear racks to the pinion gear, causing the pinion to rotate counter-clockwise whilst air is exhausted from Port B.

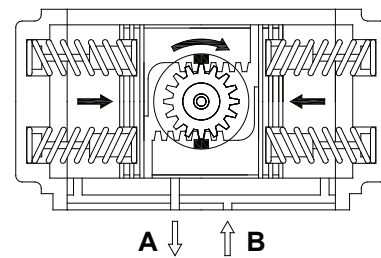


By supplying air to Port B, pressure is applied to the outside chamber and drives the dual pistons inwards, causing the pinion to turn clockwise whilst air is exhausted from Port A.

Spring Return (Fail-Safe)



By supplying air to Port A, pressure is applied to the center chamber forcing the pistons outward and compressing the springs in the outside chambers resulting in a counter-clockwise rotation. Exhaust air exits Port B.



Upon loss of air pressure, the stored energy in the compressed springs forces the pistons inwards to give a clockwise rotation with exhaust air exiting Port A. This 'fail-safe' position is held by spring force until air pressure is reapplied to Port A.

ACTUATOR SIZING GUIDE

Double Acting Actuators

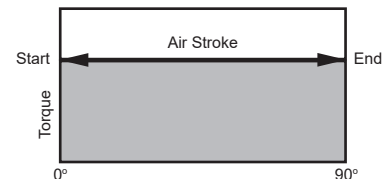
The output torque of a double acting actuator is constant in both clockwise and counter-clockwise rotation. The actuator should be sized as follows:

- Obtain the published maximum valve torque.
- Add a safety factor (margin) to the published torque to give the final torque requirement. We suggest a safety factor in normal operating conditions of at least 20%.
- Determine the required or available air pressure.
- Refer to the double acting actuator torque table in this literature and work down the appropriate air pressure column until you see a torque which just exceeds the final torque requirement.
- Work across the torque output row to find the actuator model number.

Example

- A published seating/unseating torque for an 8" high performance butterfly valve is 2600 in-lbs and the hydrodynamic torque for a 2 psi pressure drop is 500 in-lbs. Therefore the maximum valve torque is $2600 + 500 = 3100$ in-lbs.
- Applying a safety factor of 20% equals $3100 + (3100 \times 20/100) = 3720$ in-lbs. final torque requirement.
- The available air pressure is 75 psig.
- Therefore the first torque that just exceeds the final torque requirement of 3720 in-lbs is 3913.8 in-lbs.
- The actuator model meeting 3913.8 in-lbs @ 75 psig is a AADA140.

DOUBLE ACTING TORQUE CURVE



Spring Return Actuators

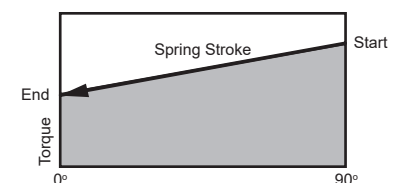
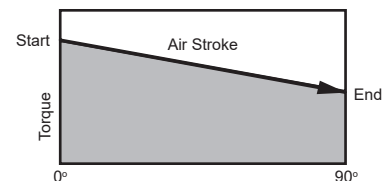
The output torque of a spring return actuator is determined by two factors - air stroke and spring stroke. Each clockwise or counter-clockwise stroke gives different torque values at start and end, four in total, as shown in the figures to the left. These four values are used for sizing the actuator.

- Obtain the published maximum valve torque.
- Add a safety factor (margin) to the published torque to give the final torque requirement. We suggest a safety factor in normal operating conditions of at least 10%.
- Determine the required or available air pressure.
- Refer to the spring actuator torque table in this literature and work down the appropriate air pressure column until you see a torque which just exceeds the final torque requirement in the 'END' column.
- Move across to the spring return 'END' column and check that this value also exceeds the final torque requirement. Both values must exceed the final torque requirement.
- Working left from this point determine the actuator model and number of springs.

Example

- A published seating/unseating torque for a 2" ball valve in full differential pressure is 400 in-lbs.
- Applying a safety factor of 10% equals $400 + (400 \times 10/100) = 440$ in-lbs final torque requirement.
- The available air pressure is 75 psig.
- Therefore the first torque that just exceeds the final torque requirement of 440 in-lbs is 792 in-lbs. (air end) @ 75 psig and 448 in-lbs (spring end).
- The actuator model meeting this requirement is a AASR105 with 8 springs.

SPRING RETURN TORQUE CURVES



Alloy Valves and Control

Spring Return Actuator Torque Output (in-lbs)

AIR PRESSURE (psi)		OUTPUT AIR TO SPRING														SPRING RETURN	
MODEL No.	SPRING Qty.	30		45		60		75		90		105		120		OUTPUT	
		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	0° End	90° Start
AASR045	2			39	12	66	39	93	67							41	65
	3					55	22	82	49	110	77	137	104	166	133	51	87
	4							71	32	99	60	126	87	155	115	62	98
AASR052	4	42	27	79	64											30	44
	5			70	52											38	55
	6			63	41	100	78									44	65
	7			55	30	90	67	128	95							52	76
	8			48	18	84	55	121	83	157	129					59	88
	9			39	7	76	44	113	72	149	117	186	154			67	98
	10					68	33	105	61	142	106	179	143			75	110
	11					60	21	97	49	134	95	170	131	207	168	82	120
	12							89	38	126	83	163	112	200	157	90	131
	AASR063	4	84	58	151	125	218	191									48
5				137	104	204	136									60	92
6				125	85	191	152									73	111
7				114	66	179	133									85	129
8				100	56	167	114	233	181							96	148
9						154	95	221	162	287	228					109	166
10						142	75	209	143	275	209	341	276	409	342	121	185
11								197	124	263	190	330	256	396	323	133	203
AASR083	4	171	119	314	262	458	406									112	163
	5			285	220	428	347									140	204
	6			256	177	400	321									168	244
	7			227	135	371	279									196	285
	8			199	92	342	236	486	380							224	326
	9					313	195	457	339	601	482					252	366
	10					284	152	428	296	571	439	715	583	859	726	280	407
	11							399	254	543	397	687	541	829	685	308	448
	12							370	212	514	356	656	499	800	643	336	489
AASR105	4	374	244	671	547	979	850									224	349
	5			618	457	921	760									280	435
	6			559	366	862	670	1165	972							336	523
	7			503	277	805	580	1108	883							392	610
	8			444	187	747	490	1050	792	1352	1095	1655	1398			448	696
	9					689	400	992	703	1295	1005	1598	1308			504	784
	10					631	306	934	609	1237	912	1540	1214	1842	1517	560	871
	11							876	522	1178	825	1481	1127	1783	1430	616	958
	12							818	435	1122	738	1424	1040	1727	1343	672	1045

Alloy Valves and Control

Spring Return Actuator Torque Output (in-lbs) (continued)

AIR PRESSURE (psi)		OUTPUT AIR TO SPRING														SPRING RETURN		
AIR PRESSURE (psi)		30		45		60		75		90		105		120		OUTPUT		
MODEL No.	SPRING Qty.	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	End	Start	
AASR125	4	540	339	998	797	1456	1254										372	558
	5			897	659	1355	1117										460	699
	6			806	513	1263	980	1721	1437								558	832
	7			705	366	1163	824	1630	1291								646	974
	8			613	229	1071	687	1529	1144	1987	1611	2454	2069				743	1106
	9					980	540	1437	998	1895	1456	2353	1923				832	1248
	10					879	403	1337	861	1794	1318	2261	1776	2719	2243	929	1389	
	11							1245	714	1703	1172	2161	1630	2618	2087	1018	1531	
	12							1144	577	1611	1035	2069	1492	2527	1950	1106	1664	
AASR140	4	934	623	1721	1401	2499	2188										611	912
	5			1566	1163	2344	1950										761	1142
	6			1410	934	2188	1712	2975	2499								912	1372
	7			1254	696	2032	1483	2820	2261								1062	1602
	8			1099	458	1877	1245	2664	2023	3442	2811	4230	3589				1212	1823
	9					1712	1007	2499	1794	3278	2573	4065	3360				1372	2053
	10					1556	769	2344	1547	3122	2335	3909	3113	4687	3900	1522	2283	
	11							2179	1309	2966	2097	3744	2875	4532	3662	1673	2513	
	12							2023	1080	2811	1859	3589	2646	4376	3424	1823	2744	
AASR160	4	1410	916	2545	2133	3845	3351										991	1469
	5			2371	1749	3589	2966										1239	1841
	6			2124	1364	3342	2582	4559	3799								1487	2213
	7			1859	64	3076	2197	4294	3415								1735	2584
	8			1611	604	2829	1822	4047	3040	5264	4257	6482	5475				1974	2947
	9					2563	1437	3781	2655	4999	3873	6216	5090				2221	3319
	10					2316	1053	3534	2270	4752	3488	5969	4706	7187	5923	2469	3690	
	11							3278	1895	4495	3113	5713	4330	6930	5548	2717	4053	
	12							3021	1511	4239	2728	5456	3946	6674	5164	2965	4425	
AASR210	4	2856	2087	5292	4523	7727	6958										1947	2690
	5			4788	3827	7223	6262										2434	3363
	6			4285	3131	6720	5566	9155	8002								2921	4036
	7			3781	2435	6216	4871	8652	7306								3407	4708
	8			3278	1739	5713	4175	8148	6610	10583	9045	13019	11481				3894	5381
	9					5209	3479	7645	5914	10080	8350	12515	10785				4381	6053
	10					4706	2783	7141	5218	9576	7654	12012	10089	14447	12524	4868	6726	
	11							6638	4523	9073	6958	11508	9393	13943	11828	5354	7399	
	12							6134	3827	8569	6262	11005	8697	13440	11133	5841	8071	

Alloy Valves and Control

Spring Return Actuator Torque Output (in-lbs) (continued)

		OUTPUT AIR TO SPRING														SPRING RETURN		
AIR PRESSURE (psi)		30		45		60		75		90		105		120		OUTPUT		
MODEL No.	SPRING Qty.	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	End	Start	
AASR300	4	8624	5594														5168	7514
	5			12470	9750	20100	16390										6461	9390
	6			12048	8011												7753	11266
	7			10556	5850	17541	12836										9045	13142
	8			9073	3690	16058	10675	23044	17660								10337	15018
	9					14575	8514	21560	15500	28546	22485						11629	16895
	10					13092	6363	20077	13348	27063	20334	34048	27319	41033	34304	12921	18780	
	11							18585	11188	25570	18173	32556	25158	39541	32144	14213	20656	
	12							17102	9027	24087	16012	31073	22998	38058	29983	15505	22532	

Double Acting Actuator Torque (in-lbs)

MODEL	AIR PRESSURE (psig)						
	30	45	60	75	90	105	120
AADA045	54.9	83.3	110.8	138.2	165.7	193.2	220.6
AADA052	73.2	109.9	146.5	183.1	218.8	255.4	292.1
AADA063	133.7	200.5	267.3	334.2	401.0	467.8	534.7
AADA083	287.5	430.3	574.0	717.8	861.5	1004.3	1148.1
AADA105	605.2	908.2	1210.3	1513.4	1816.4	2118.5	2421.5
AADA125	918.3	1377.9	1836.5	2296.1	2755.7	3214.4	3674.0
AADA140	1565.5	2348.3	3131.1	3913.8	4696.6	5479.4	6262.1
AADA160	2435.3	3652.9	4870.6	6088.2	7305.8	8523.5	9741.1
AADA210	4870.6	7305.8	9741.1	12176.4	14611.7	17046.9	19482.2
AADA300	13970.8	24453.5	27941.6	34927.0	41912.4	48897.8	55883.2

Operating Conditions

Operating Media

Dry and lubricated air or non-corrosive gas.
Maximum particle size to be less than 40 µm.

Air Supply Pressure

Minimum supply pressure is 30 psig
Maximum supply pressure is 145 psig

Operating Temperature

Standard (NBR O-ring): -4 °F to 175 °F
Low temperature (LNBR O-ring): -30 °F to 175 °F
High temperature (Viton O-ring): 5 °F to 300 °F

Stroke Adjustment

±5° from 0° & 90° position

Location

Indoor and outdoor

Interface Specification

Main Drive Interface (Bottom)

Meets ISO 5211 for direct mount to a suitable valve or connection with standardized mounting hardware.

Secondary Drive Interface (Top)

Meets NAMUR specification for direct installation of accessories such as a limit switch or positioner.

Air Supply Connection (Side)

Meets NAMUR specification for direct mount of suitable solenoid valves.

Alloy Valves and Control

Weight (lbs)

MODEL	045	052	063	083	105	125	140	160	210	300
AADA	4.0	5.5	8.3	14.3	22.0	29.7	34.1	61.6	157.3	375.1
AASR	4.6	5.8	8.7	15.0	23.8	30.7	41.0	69.7	176.0	435.8

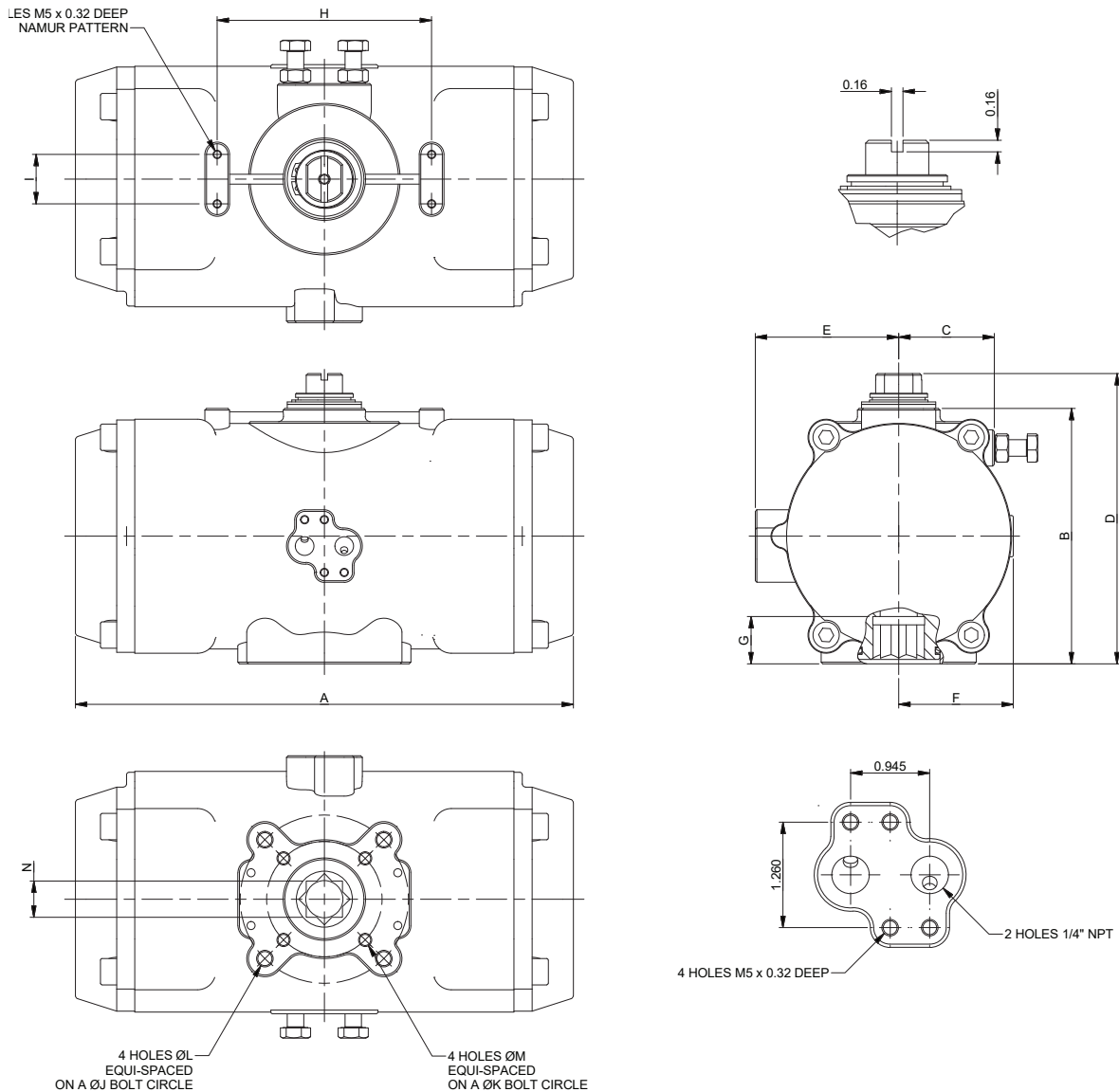
Maximum Air Consumption Per Stroke (cubic inches)

MODEL/ ACTION	045	052	063	083	105	125	140	160	210	300
Open	4.9	7.3	12.8	26.2	58.0	97.6	152.5	225.7	457.5	1451.8
Closed	6.7	9.8	14.0	28.7	53.7	85.4	134.2	195.2	457.5	1811.7

Actuator Cycle Speed Based Upon 75 psi Air Pressure (seconds)

Double Acting			Spring Return														
Size	0°-90°	90°-0°	Size	Spring Quantity													
				3+3		3+4		4+4		4+5		5+5		5+6		6+6	
				0°-90°	90°-0°	0°-90°	90°-0°	0°-90°	90°-0°	0°-90°	90°-0°	0°-90°	90°-0°	0°-90°	90°-0°	0°-90°	90°-0°
DA045	0.55	0.47	SR45	2.35	0.37	2.37	0.36	2.39	0.35	2.41	0.33	2.43	0.31	2.45	0.29	2.47	0.27
DA052	0.6	0.53	SR52	2.46	0.48	2.48	0.46	2.5	0.44	2.52	0.42	2.54	0.4	2.56	0.38	2.58	0.36
DA063	0.66	0.58	SR63	2.54	0.56	2.56	0.54	2.58	0.52	2.6	0.5	2.62	0.48	2.64	0.46	2.66	0.44
DA083	0.83	0.73	SR83	2.71	0.73	2.73	0.71	2.75	0.69	2.77	0.67	2.79	0.65	2.81	0.63	2.83	0.61
DA105	1.35	1.3	SR105	3.14	0.91	3.16	0.89	3.18	0.87	3.2	0.85	3.22	0.83	3.24	0.81	3.26	0.79
DA125	2.4	1.79	SR125	4.24	1.2	4.26	1.18	4.28	1.16	4.3	1.14	4.32	1.12	4.34	1.1	4.36	1.08
DA140	2.5	2.1	SR140	4.4	1.35	4.4	1.33	4.62	1.31	4.64	1.29	4.66	1.27	4.68	1.25	4.68	1.22
DA160	3.93	2.6	SR160	4.74	1.77	4.76	1.75	4.78	1.73	4.8	1.71	4.82	1.69	4.82	1.67	4.84	1.65
DA210	5.5	4.35	SR210	8.25	4.8	8.4	4.6	8.42	4.58	8.44	4.56	8.46	4.54	8.48	4.52	8.5	4.5
DA300	15	14.9	SR300	24	13.2	24.5	13	24.4	12.8	24.3	12.6	24.5	12.58	24.7	12.56	24.9	12.54

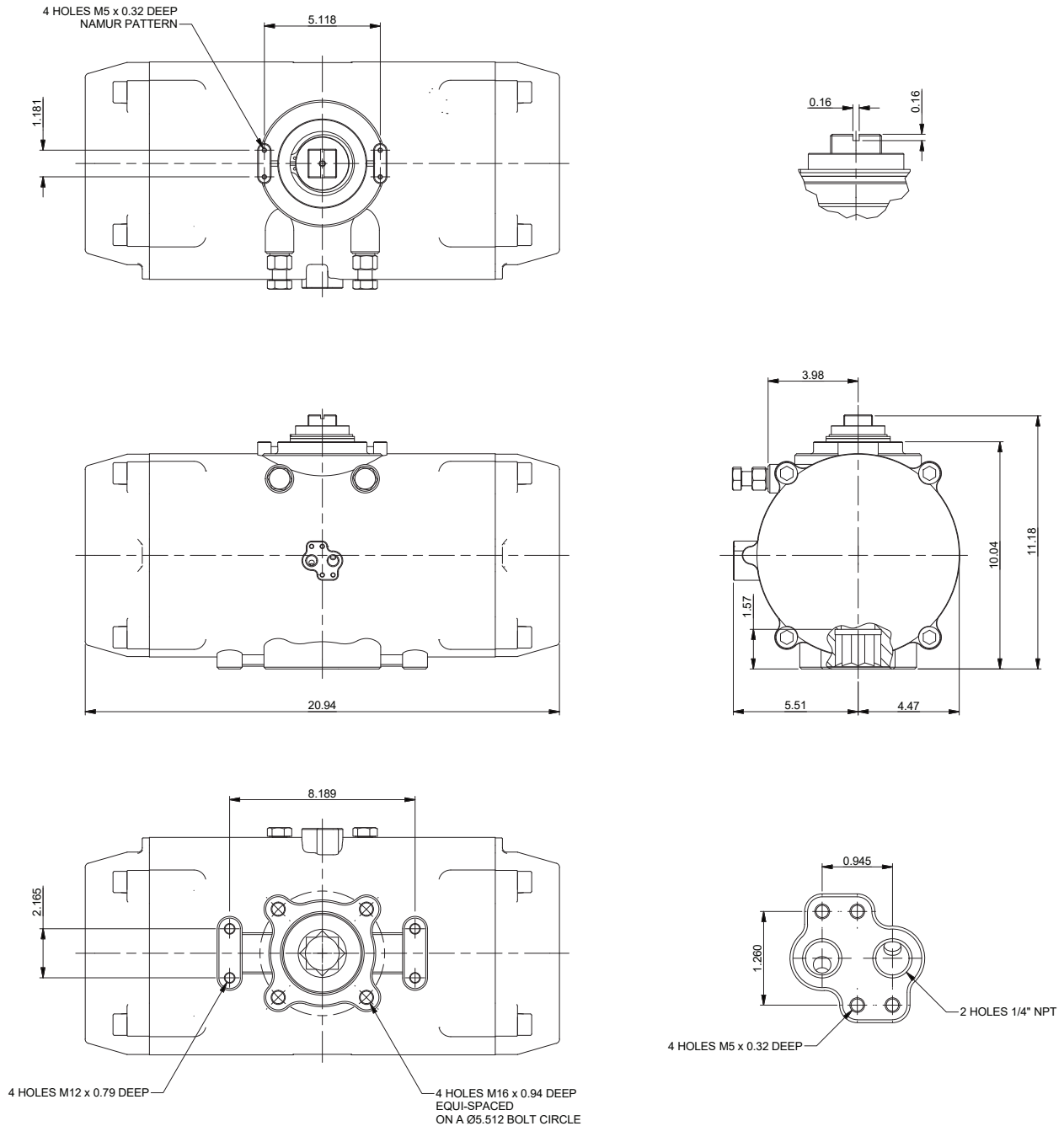
Alloy Valves and Control



DIMENSIONAL DATA (SIZES 045 THRU 160)

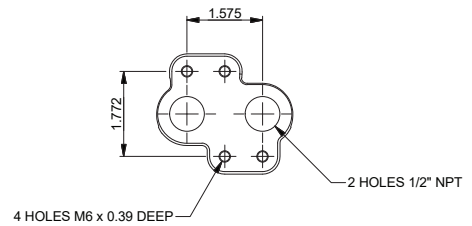
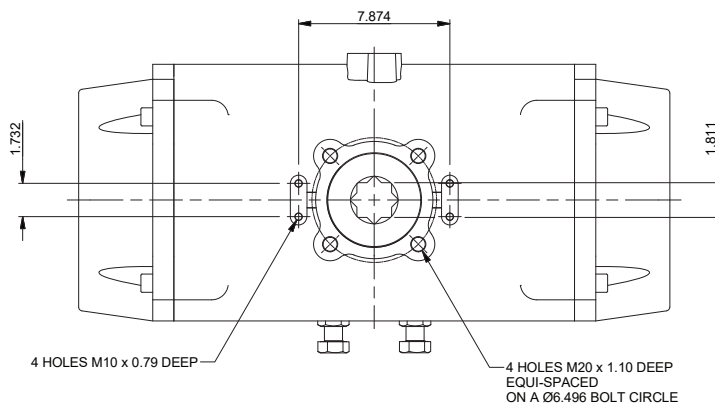
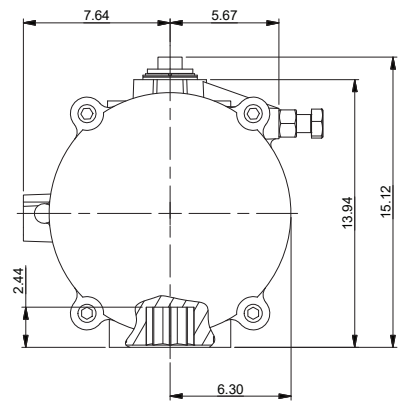
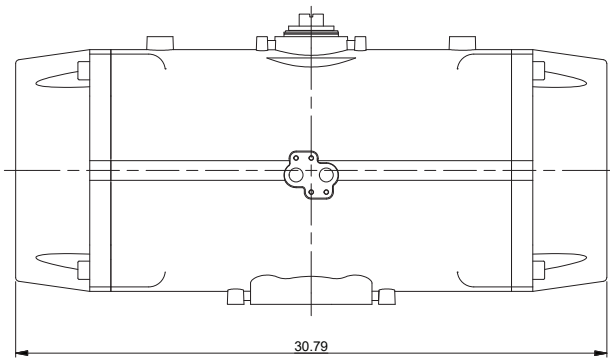
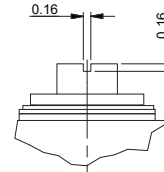
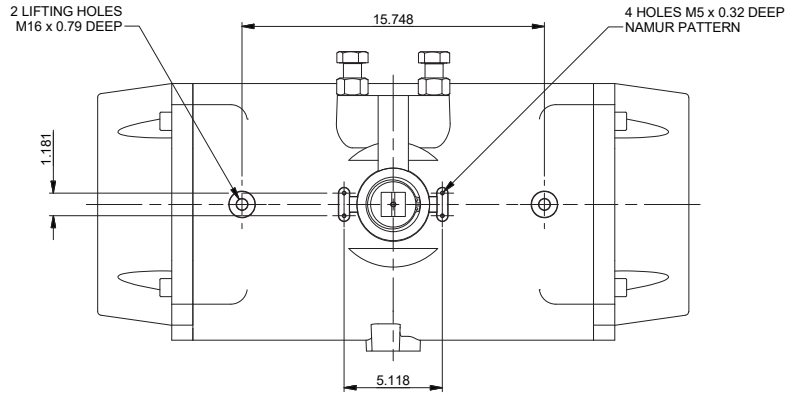
MODEL	A (in.)	B (in.)	C (in.)	D (in.)	E (in.)	F (in.)	G (in.)	H (in.)	I (in.)	J (in.)	K (in.)	L (mm)	M (mm)	N (in.)	ISO 5211
AAxx045	5.24	2.52	1.10	3.31	1.81	0.98	0.55	3.150	1.181	1.969	1.417	M6x10 DP	M5x7.5 DP	0.433	F03/F05
AAxx052	5.75	2.83	1.18	3.62	1.85	1.26	0.55	3.150	1.181	1.969	1.417	M6x10 DP	M5x7.5 DP	0.433	F03/F05
AAxx063	6.81	3.46	1.42	4.25	2.13	1.50	0.71	3.150	1.181	2.756	1.969	M8x13 DP	M6x10 DP	0.551	F05/F07
AAxx083	8.03	4.25	1.89	5.04	2.58	1.89	0.83	3.150	1.181	2.756	1.969	M8x13 DP	M6x10 DP	0.669	F05/F07
AAxx105	10.63	5.24	1.97	6.02	3.03	2.36	1.02	3.150	1.181	4.016	2.756	M10x16 DP	M8x13 DP	0.866	F07/F10
AAxx125	11.89	6.10	2.28	6.89	3.43	2.74	1.08	3.150	1.181	4.016	2.756	M10x16 DP	M8x13 DP	0.866	F07/F10
AAxx140	15.51	6.77	2.72	7.56	3.76	3.03	1.26	3.150	1.181	4.921	4.016	M12x20 DP	M10x16 DP	1.063	F10/F12
AAxx160	17.95	7.80	2.95	8.58	4.17	3.43	1.34	3.150	1.181	4.921	4.016	M12x20 DP	M10x16 DP	1.063	F12/F12

Alloy Valves and Control



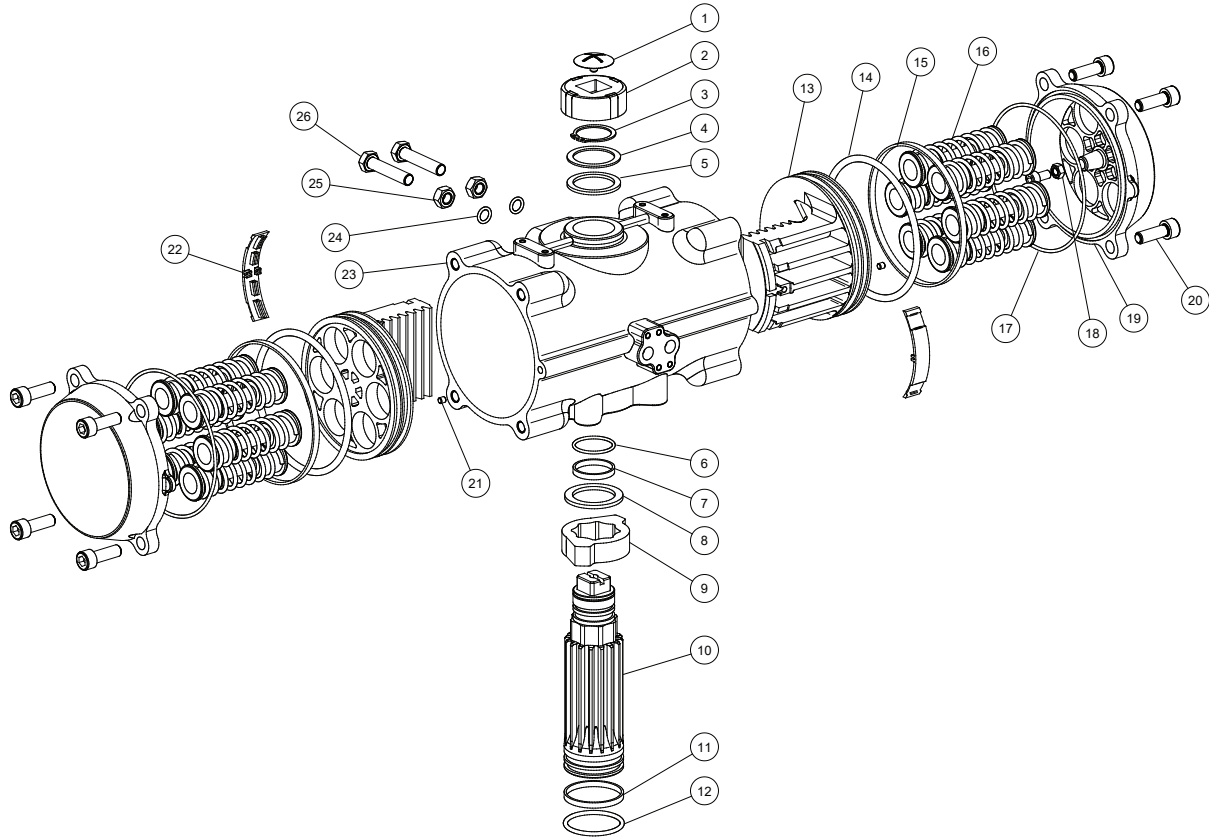
DIMENSIONAL DATA (SIZE 210)

Alloy Valves and Control



DIMENSIONAL DATA (SIZE 300)

Alloy Valves and Control



Item	Parts	Material	Qty.
1	Indicator Cap Screw	Plastic	1
2	Position Indicator	Plastic	1
3	Pinion Snap Ring	Stainless Steel	1
4	Washer	Stainless Steel	1
5	Outside Washer	Delrin	1
6	O-ring (Pinion Top)	NBR/LNBR/Viton	1
7	Bearing (Pinion Top)	Delrin	1
8	Inside Washer	Delrin	1
9	Cam	Stainless Steel (304 or 316)	1
10	Pinion	Stainless Steel (304 or 316)	1
11	Bearing (Pinion Bottom)	Delrin	1
12	O-ring (Pinion Bottom)	NBR/LNBR/Viton	1
13	Piston	Stainless Steel (304 or 316) or Aluminum	2
14	O-Ring (Piston)	NBR/LNBR/Viton	2

Item	Parts	Material	Qty.
15	Bearing (Piston)	Delrin	2
16a	Spring	Spring Steel	0-12
16b	Spring Retainer (L + R)	Nylon 66	0-24
16c	Retainer Connector	Stainless Steel/Brass	0-24
17	O-Ring (End Cap)	NBR/LNBR/Viton	2
18	Stop Screw	Stainless Steel	2
19	End Cap	Stainless Steel (304 or 316)	2
20	End Cap Screw	Stainless Steel	8
21	Plug	NBR/LNBR/Viton	2
22	Guide Piston	Nylon 66	2
23	Body	Stainless Steel (304 or 316)	1
24	O-Ring (Adjusting Screw)	NBR/LNBR/Viton	2
25	Nut (Adjusting Screw)	Stainless Steel	2
26	Adjusting Screw	Stainless Steel	2

HOW TO ORDER

AADA	083	-	-	-
Series	Size	Number of Springs (AASR Models only)	Seals	Options (AASR Models only)
AADA - Double Acting	045	Blank - 12 springs	Blanks - NBR	Blank - CW Fail close
AASR - Spring Return	052	2 - 2 springs (AASR045 only)	L - LNBR	CCW - CCW Fail close
	063	3 - 3 springs (AASR045 only)	V - Viton	316 - CF8M
	083	4 - 4 springs		
	105	5 - 5 springs		
	125	6 - 6 springs		
	140	7 - 7 springs		
	160	8 - 8 springs		
	210	9 - 9 springs		
	300	10 - 10 springs		
		11 - 11 springs		
		AASR045 can only have spring options 2, 3 & 4		

Example ordering codes:

AADA083 = 083 double acting pneumatic actuator with NBR seals
AADA083 = 083 spring return CW fail close pneumatic actuator with NBR seals & 12 springs
AADA105-V = 105 double acting pneumatic actuator with Viton seals