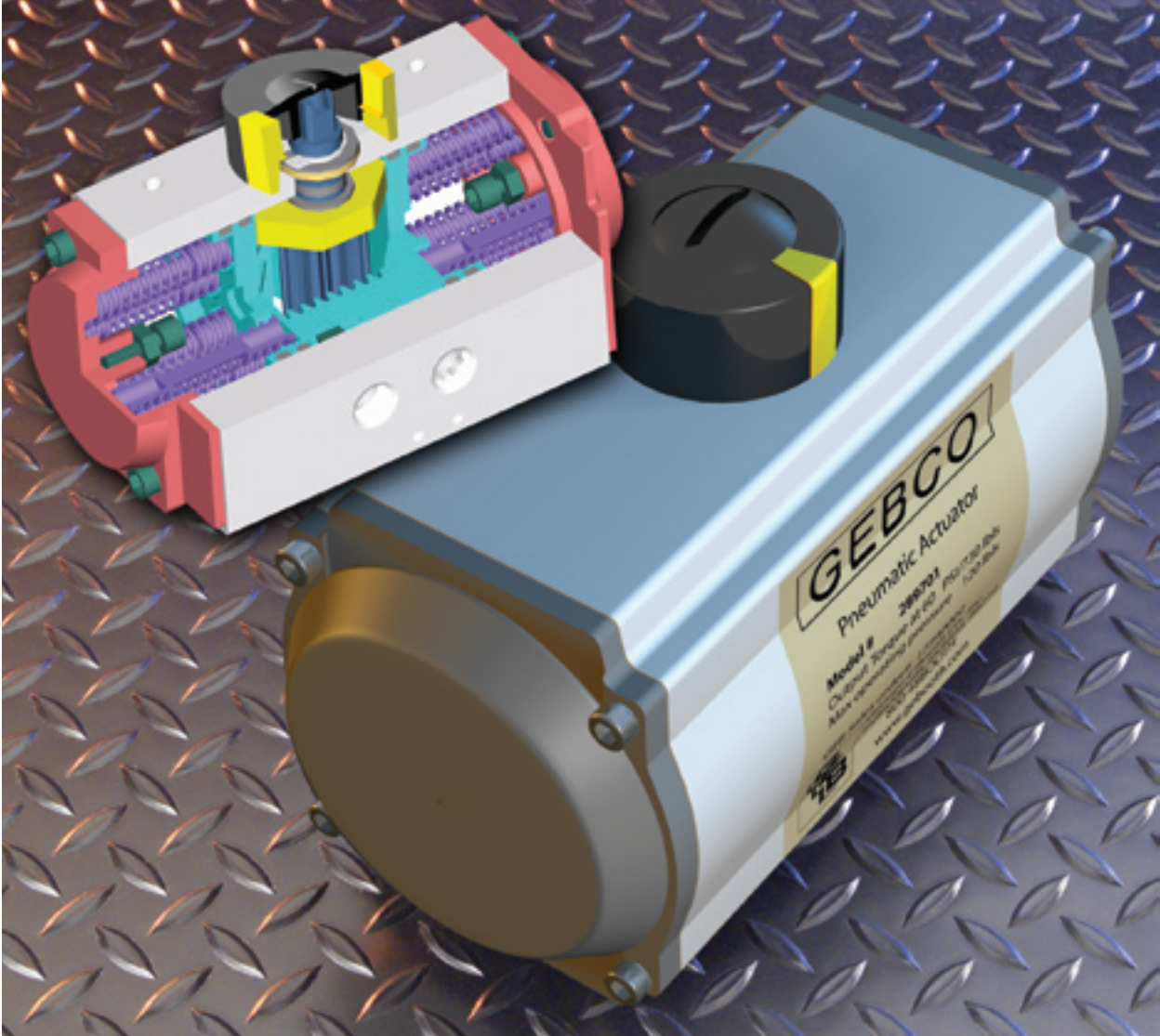


GEBCO

TM

High Performance Compact Pneumatic Actuators



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ISO 9001:2000 Certified

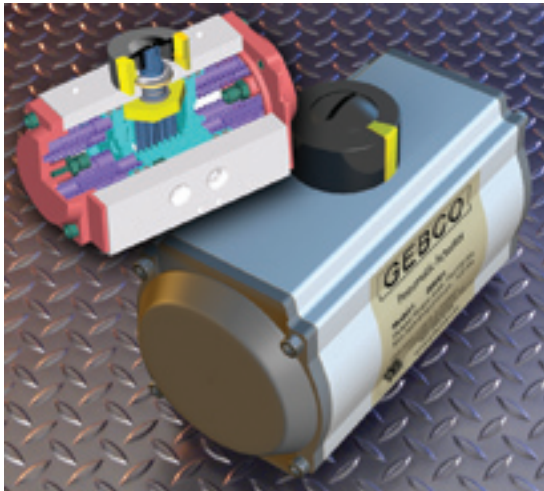


TM

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G E B C O TM

High Performance Compact Pneumatic Actuators



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Why **G E B C O** TM

The **G E B C O** TM pneumatic rack & pinion actuator is manufactured using the latest materials and methods to provide dependable and smooth operation in demanding process control conditions.

This feature-rich design uses a minimum number of seals, low friction technologies, maximum gear face engagement and corrosion resistant components for trouble-free, high performance valve automation.

Applications and Solutions

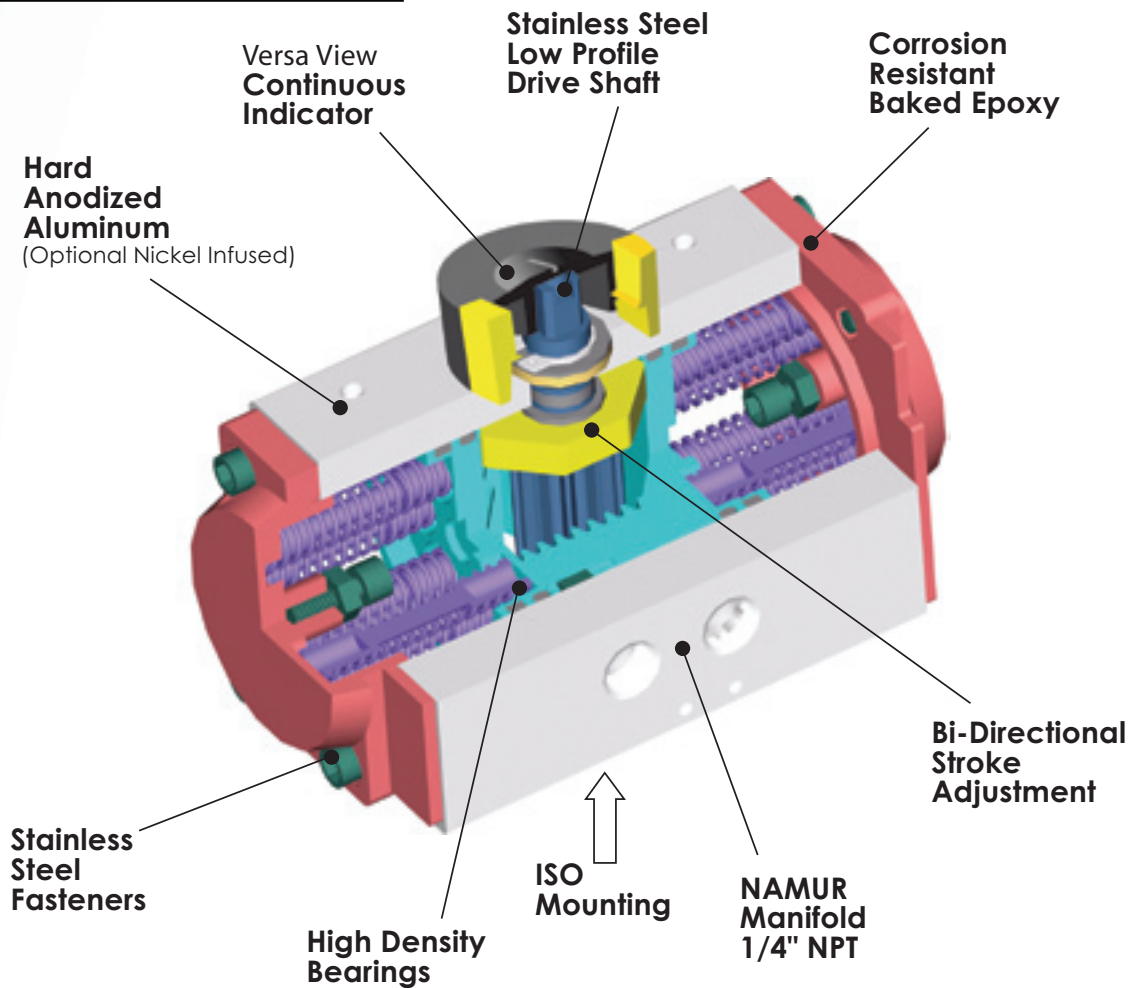
Dependable valve control is a critical function in today's demanding process schemes. The **G E B C O** TM actuator is designed for universal operation of all quarter-turn (ball, plug, butterfly) valves and comes with a full array of control options for On/Off and modulating service.

The compact, high performance design is ideal for high-density installations and can be supplied with extended rotation (180°), nickel-infused corrosion protection and all of the common control accessories and "bus" devices.



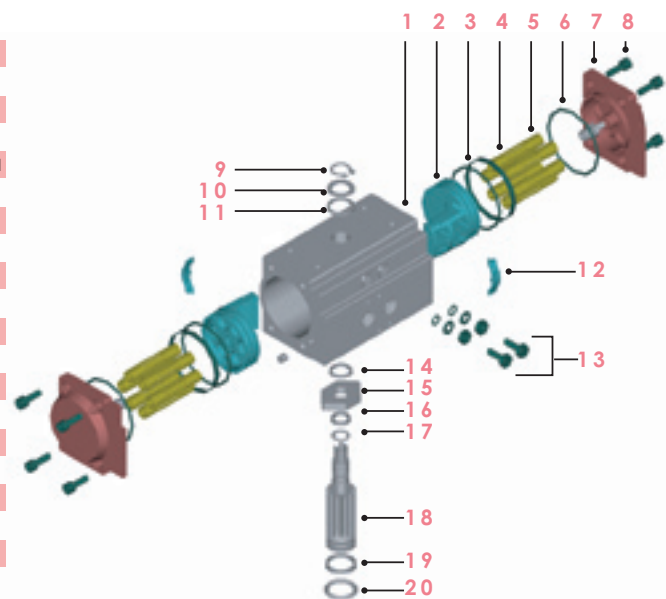
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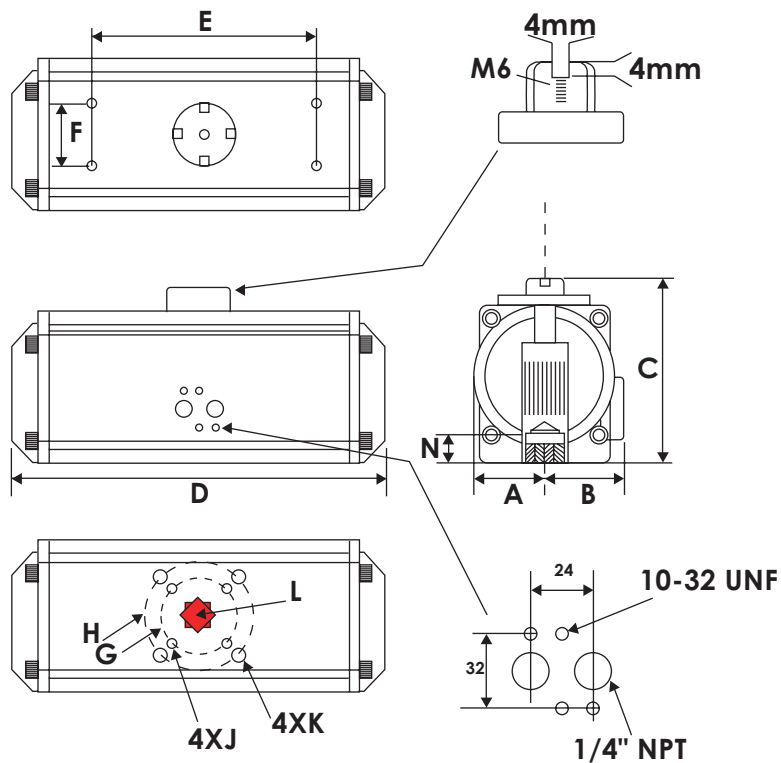


Parts & Quantity List

No.	Description	Material	Quantity
1	Actuator Housing	Hard Anodized Aluminum	1
2	Pistons	Aluminum	2
3	Piston Seals	Buna	2
4	Piston Bearings	Acetal	2
5	Springs	Spring Steel Corr. Resistant	According to Model
6	End Cap O-ring	Buna	2
7	End Caps	Aluminum Baked Epoxy	2
8	End Cap Bolts	300 Series SS	8
9	C-Clip	300 Series SS	1
10	Thrust Follower	300 Series SS	1
11	Thrust Ring	Acetal	1
12	Wear Bands	Acetal	2
13	Stroke Adj. Set	300 Series SS	1 set
14	Shaft Seal	Buna	1
15	Stroke Adj. Stop	300 Series SS	1
16	Bearing	Acetal	1
17	Thrust Follower	300 Series SS	1
18	Drive Shaft	300 Series SS	1
19	Shaft Bearing	Acetal	1
20	Shaft Seal	Buna	1



Envelope Dimensions & Weights



Model	A	B	C	D	E	F	G	H	J	K	L sq	N (Depth)
020	1.18	1.63	3.62	5.79	3.15	1.18	F03/1.417	F05/1.969	#10-32UNF	1/4"-20UNC	0.43	0.55
035	1.42	1.85	4.23	6.61	3.15	1.18	F05/1.969	F07/2.756	1/4"-20UNC	5/16"-18UNC	0.55	0.71
050	1.65	2.09	4.70	7.24	3.15	1.18	F05/1.969	F07/2.756	1/4"-20UNC	5/16"-18UNC	0.55	0.71
075	1.81	2.24	5.07	8.03	3.15	1.18	F05/1.969	F07/2.756	1/4"-20UNC	5/16"-18UNC	0.67	0.83
110	1.97	2.30	5.39	10.31	3.15	1.18	F05/1.969	F07/2.756	1/4"-20UNC	5/16"-18UNC	0.67	0.83
160	2.26	2.52	6.02	10.55	3.15	1.18	F07/2.756	F10/4.016	5/16"-18UNC	3/8"-16UNC	0.87	1.02
255	2.66	2.93	6.89	11.65	3.15	1.18	F07/2.756	F10/4.016	5/16"-18UNC	3/8"-16UNC	0.87	1.02
400	2.95	3.03	7.54	15.35	3.15	1.18	F10/4.016	F12/4.921	3/8"-16UNC	1/2"-13UNC	1.06	1.22
500	3.43	3.43	8.54	18.03	3.15	1.18	F10/4.016	F12/4.921	3/8"-16UNC	1/2"-13UNC	1.06	1.22
550	4.06	4.06	9.84	20.79	5.12	1.18		F14/5.512		5/8"-11UNC	1.42	1.57
600	4.45	4.45	10.83	22.20	5.12	1.18		F14/5.512		5/8"-11UNC	1.42	1.57
650	5.12	5.12	12.13	23.70	5.12	1.18		F16/6.496		3/4"-10UNC	1.81	1.97
700	5.79	5.79	13.62	27.80	5.12	1.18		F16/6.496		3/4"-10UNC	1.81	1.97

Product Weights

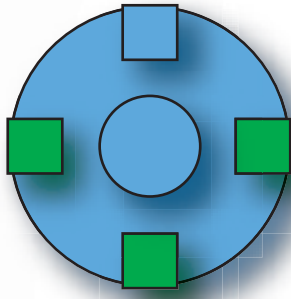
Model	A2D		A2S	
	Pounds		Pounds	
	Kg		Kg	
020	3	3	1	1
035	4	4	2	2
050	6	6	2	2
075	7	7	3	3
110	10	12	4	5
160	13	14	5	6
255	19	22	9	10
400	25	29	14	16
500	36	44	22	26
550	70	78	31	35
600	76	85	35	39
650	106	135	48	61
700	163	216	74	98



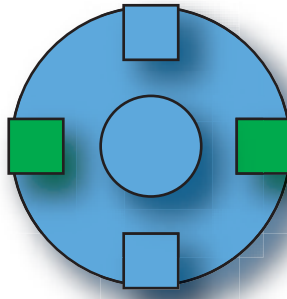
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Versa-View Indicator

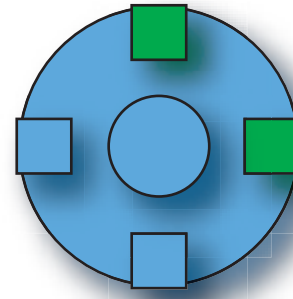
GEBCO™ actuators are supplied with our exclusive Versa-View high visibility position indicator. This versatile device may be setup to indicate for simple two-way on/off valves or for multi-ported valves in "T" or "L" port configurations. The Versa-View is also designed to remain on the actuator for continuous indication even when a limit switch is being used.



"T"



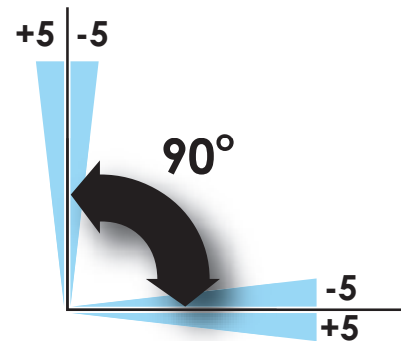
On/Off



"L"

Bi-Directional Stroke Adjustment

GEBCO™ actuators feature bi-directional pinion travel stops. Located on the side of the actuator, these stops allow for true $\pm 5^\circ$ for valve travel adjustment to ensure precise positioning in all flow control services. The GEBCO™ travel stops are designed to absorb the maximum rated torque of the actuator and the maximum impact loads associated with the recommended stroke speed.



GEBCO™ NiEX Nickel Infused Actuators

The GEBCO™ NiEX is a unique nickel infused actuator that employs an autocatalytic nickel infusion process to deliver a uniquely effective corrosion resistant actuator for use in aggressive environments, under high humidity and in application areas where an attractive, long lasting surface finish is desirable.



Actuators for Extended Rotation

The GEBCO™ actuator is available in a full range of model sizes for 180° of operation. These actuators have all of the design features of the standard GEBCO™ with the advantage of extended rotation for multiported valves.



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The GEBCO™ Stainless Steel actuator features a cast housing of 300 SS that offers the user excellent corrosion protection. This series of actuators has ISO mounting, NAMUR topworks and all SS construction including the housing, end caps, shaft and fasteners.



Device-ID two wire "bus" protocol



The Device-ID accessory program includes a range of top-mounted devices that are available for AS-I and Device Net protocols for simple two-wire control. HART and Foundation fieldbus devices are also available for specific control schemes and system requirements.

Application Questions for Pneumatic Actuators

The following questions should be asked when determining the correct actuator for an application:

- Air-to-Air (Double Acting) or Air-to-Spring (Spring Return)? If Spring Return, Fail-Open or Fail-Closed?
- Supply air pressure available?
- On/Off or Modulating Service?
- Area Rating (NEMAIV or VII) for electrical accessories?
- Special environmental considerations: High or Low Temperature? Corrosive Area?
- If for Modulating Service: Control signal (3-15psig or 4-20mA)?
- Is the application for 90° or 180° valve operation?



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Spring Return Output Torque

MODEL	Supply Pressure (PSI) SPRING QTY	60			80		
		AIR START	AIR END	AIR START	AIR END	SPRING START	SPRING END
A2S-020	8	84	55	140	114	87	60
	9	76	44	133	104	98	67
	10	68	33	126	94	109	75
	11	60	21	119	84	120	82
	12			112	74	131	90
A2S-035	8	167	114	267	220	148	97
	9	154	95	255	203	166	109
	10	13	75	244	186	185	121
	11			234	169	203	133
	12			222	152	222	145
A2S-050	8	211	155	352	301	205	149
	9	192	129	335	278	231	168
	10	174	102	318	254	256	187
	11			301	231	282	205
	12			284	207	308	224
A2S-075	7	371	279			285	196
	8	342	237	560	466	326	224
	9	313	195	534	429	367	252
	10	284	152	508	391	407	280
	11			483	353	448	308
	12			456	316	489	336
A2S-110	7	526	385			426	289
	8	484	323	799	655	487	331
	9	441	260	761	599	548	372
	10	399	197	723	543	608	413
	11			685	487	669	454
	12			647	432	730	496
A2S-160	7	805	580			610	392
	8	747	490	1,203	974	697	448
	9	689	400	1,152	894	784	504
	10	631	306	1,100	811	871	560
	11			1,048	733	958	616
	12			997	656	1,045	672
A2S-255	7	1,167	828			971	647
	8	1,071	689	1,770	1,429	1,110	740
	9	976	541	1,685	1,298	1,249	832
	10	880	402	1,600	1,174	1,387	925
	11			1,514	1,043	1,530	1,017
	12			1,429	919	1,665	1,110
A2S-400	7	2,035	1,478			1,598	1,059
	8	1,878	1,244	3,063	2,498	1,826	1,211
	9	1,713	1,009	2,916	2,290	2,054	1,370
	10	1,557	765	2,777	2,073	2,283	1,522
	11			2,638	1,864	2,510	1,673
	12			2,498	1,655	2,741	1,824
A2S-500	7	3,079	2,200			2,581	1,730
	8	2,826	1,818	4,680	3,782	2,949	1,977
	9	2,566	1,435	4,448	3,442	3,321	2,225
	10	2,313	1,052	4,223	3,102	3,691	2,472
	11			3,999	2,769	4,056	2,719
	12			3,767	2,429	4,422	2,966

MODEL	Supply Pressure (PSI) SPRING QTY	60			80		
		AIR START	AIR END	AIR START	AIR END	SPRING START	SPRING END
A2S-550	8	4,861	3,261	7,789	6,366	4,380	2,833
	9	4,496	2,696	7,464	5,863	4,927	3,186
	10	4,131	2,131	7,139	5,360	5,473	3,540
	11			6,814	4,858	6,020	3,893
	12			6,490	4,355	6,566	4,246
A2S-600	8	5,714	4,174	9,413	8,044	5,381	3,893
	9	5,209	3,479	8,965	7,426	6,053	4,380
	10	4,705	2,783	8,516	6,807	6,726	4,868
	11			8,068	6,188	7,399	5,356
	12			7,619	5,569	8,071	5,843
A2S-650	8	8,079	5,975	13,451	11,579	7,844	5,810
	9	7,323	4,957	12,778	10,674	8,828	6,541
	10	6,575	3,948	12,113	9,777	9,803	7,264
	11			11,448	8,872	10,787	7,987
	12			10,775	7,967	11,771	8,719
A2S-700	8	13,219	9,897	21,286	18,332	11,132	7,920
	9	12,193	8,453	20,374	17,048	12,527	8,912
	10	11,167	7,018	19,461	15,771	13,914	9,904
	11			18,548	14,487	15,310	10,896
	12			17,643	13,211	16,697	11,880

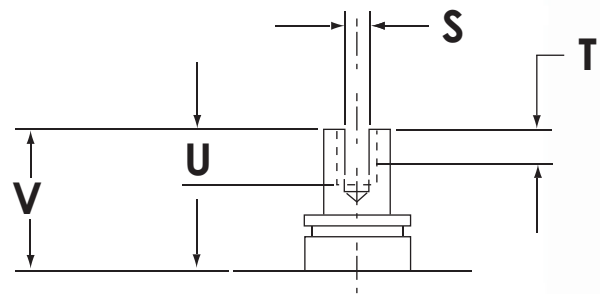
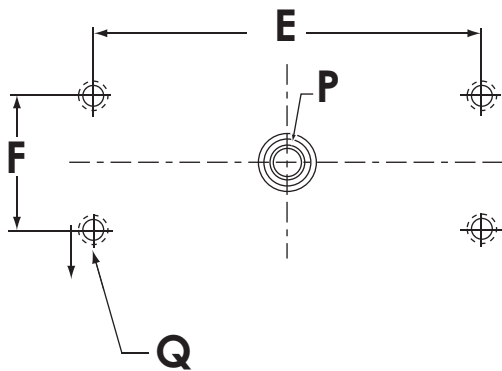
Double Acting Torque Table

Model	60	80
Torque (Lbf. In)		
A2D-020	146	195
A2D-035	267	356
A2D-050	368	490
A2D-075	574	766
A2D-110	827	1,103
A2D-160	1,211	1,615
A2D-255	1,833	2,450
A2D-400	3,133	4,177
A2D-500	4,878	6,497
A2D-550	7,797	10,396
A2D-600	9,746	12,995
A2D-650	14,097	18,796
A2D-700	21,430	28,565



Top Mount Interface Dimensions (NAMUR)

Model	E	F	P	Q	S	T	U	V
Inches								
A2D/S-020	3.15	1.181	M6	4x#10-32 UNF	0.157	0.157	0.472	0.787
A2D/S-035	3.15	1.181	M6	4x#10-32 UNF	0.157	0.157	0.472	0.787
A2D/S-050	3.15	1.181	M6	4x#10-32 UNF	0.157	0.157	0.472	0.787
A2D/S-075	3.15	1.181	M6	4x#10-32 UNF	0.157	0.157	0.472	0.787
A2D/S-110	3.15	1.181	M6	4x#10-32 UNF	0.157	0.157	0.472	0.787
A2D/S-160	3.15	1.181	M6	4x#10-32 UNF	0.157	0.157	0.472	0.787
A2D/S-255	3.15	1.181	M6	4x#10-32 UNF	0.157	0.157	0.472	0.787
A2D/S-400	3.15	1.181	M6	4x#10-32 UNF	0.157	0.157	0.472	0.787
A2D/S-500	3.15	1.181	M6	4x#10-32 UNF	0.157	0.157	0.472	0.787
A2D/S-550	5.118	1.181	M6	4x#10-32 UNF	0.157	0.157	0.472	1.181
A2D/S-600	5.118	1.181	M6	4x#10-32 UNF	0.157	0.157	0.472	1.181
A2D/S-650	5.118	1.181	M6	4x#10-32 UNF	0.157	0.157	0.472	1.181
A2D/S-700	5.118	1.181	M6	4x#10-32 UNF	0.157	0.157	0.472	1.181



Model	Air Volume Opening (L)	Air Volume Closing (L)	Air Volume Opening (Cu.In.)	Air Volume Closing (Cu.In.)
020	0.12	0.16	7	10
035	0.21	0.23	13	14
050	0.3	0.34	18	21
075	0.43	0.47	26	29
110	0.64	0.73	39	45
160	0.95	0.88	58	54
255	1	1.4	61	85
400	2.5	2.2	153	134
500	3.7	3.2	226	195
550	5.9	5.4	360	329
600	7.5	7.5	458	458
650	11	9	671	549
700	17	14	1037	854

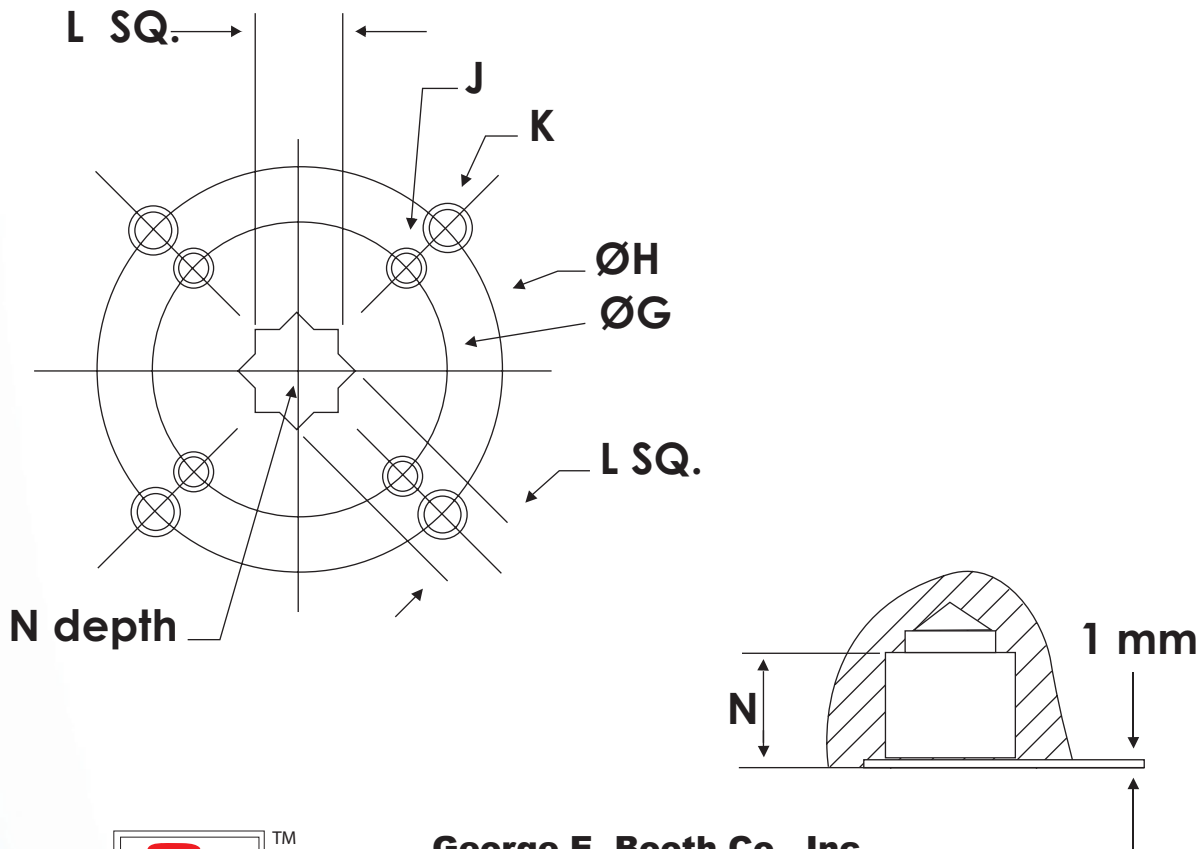


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Drive and Flange Dimensions (ISO-5211)

Model	dia. ØG	dia. ØH	N	L Sq.	J	K
Inches						
A2D/S-020	1.417/F03	1.969/F05	0.551	0.434-0.438	#10-32UNF	1/4"-20UNC
A2D/S-035	1.969/F05	2.75/F07	0.709	0.552-0.556	1/4"-20UNC	5/16"-18UNC
A2D/S-050	1.969/F05	2.75/F07	0.709	0.552-0.556	1/4"-20UNC	5/16"-18UNC
A2D/S-075	1.969/F05	2.75/F07	0.827	0.670-0.674	1/4"-20UNC	5/16"-18UNC
A2D/S-110	1.969/F05	2.75/F07	0.827	0.670-0.674	1/4"-20UNC	5/16"-18UNC
A2D/S-160	2.75/F07	4.016/F10	1.023	0.867-0.871	5/16"-18UNC	3/8"-16UNC
A2D/S-255	2.75/F07	4.016/F10	1.023	0.867-0.871	5/16"-18UNC	3/8"-16UNC
A2D/S-400	4.016/F10	4.921/F12	1.220	1.064-1.068	3/8"-16UNC	1/2"-13UNC
A2D/S-500	4.016/F10	4.921/F12	1.220	1.064-1.068	3/8"-16UNC	1/2"-13UNC
A2D/S-550		5.512/F14	1.574	1.418-1.422		5/8"-11UNC
A2D/S-600		5.512/F14	1.574	1.418-1.422		5/8"-11UNC
A2D/S-650		6.496/F16	1.969	1.811-1.815		3/4"-10UNC
A2D/S-700		6.496/F16	1.969	1.811-1.815		3/4"-10UNC

Drive and Flange Dimensions



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This specification covers the design of rack and pinion pneumatic actuators used in plant-wide valve automation applications.

1.0 GEBCO™ PNEUMATIC RACK AND PINION ACTUATORS

- 1.1 The pneumatic actuator shall be quarter-turn, opposed piston rack and pinion type of a totally enclosed design with no external moving linkages.
- 1.2 The actuator shall be capable of 100° rotation and shall include open and closed position stops with minimum 10° total travel adjustment in each direction.
- 1.3 Trims shall be available for temperature ranges from -40°F to +350°F (-40°C to +177°C).

2.0 CONSTRUCTION

- 2.1 Actuator body shall be precision extruded aluminum alloy, hard anodized inside and out after finished machining. Optional versions of the actuator shall be with Nickel Infused housing (NiEX) or complete stainless steel construction as indicated in the final specification.
- 2.2 All metal fasteners shall be 300 series stainless steel.
- 2.3 The output shaft/pinion shall be one piece stainless steel (see Brochure for model selection), bottom loaded, blowout proof secured by a non-exposed, redundant stainless steel retaining ring for safety.
- 2.4 End caps shall be cast aluminum, UV and chip resistant polyester powder coated.
- 2.5 Actuator shall incorporate internal porting to permit use of either NAMUR direct mount or remote controls
- 2.6 Actuator shall be provided with a mechanical indexable visual position indicator and NAMUR accessory drive.

3.0 DESIGN

- 3.1 Double-acting and spring-return models shall be field convertible without the use of special tools.
- 3.2 All spring assemblies shall be of self contained and service safe design.
- 3.3 All actuators shall be designed and manufactured in accordance with ISO 9001 quality standards to meet NAMUR and ISO/DIN dimensional standards.
- 3.4 Actuator shall include side located bi-directional pinion travel stops which provide a guaranteed $\pm 5^\circ$ of valve travel adjustment between 80° and 100° of actuator travel.
- 3.5 Full tooth engagement, at the pitch line shall be maintained throughout full range of travel.
- 3.6 Attachment of shaft driven accessories shall not require removal of the visual position indicator.

Pneumatic rack & pinion actuator shall be as manufactured by GEBCO™



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Actuator Sizing Guide

Selecting the Correct Actuator (Sizing)

The output torques for each actuator model are listed in the Torque Tables. These values do not include a safety factor. For best results we recommend selecting an actuator model with a minimum output torque that is greater than the highest operating torque of the valve to be automated plus 10%.

Example for Double Acting Actuator Sizing

Published Valve Torque: 300 Lbf-In (plus 10% = 330)
 Air Supply: 80psig
 aero2 Model: A2D-035

Example for Spring Return Actuator Sizing

Published Valve Torque: 300 Lbf-In (10% = 330)
 Air Supply: 80psig
 aero2 Model: A2S-110-10

The A2S-110-10 has the following output torque values

Air End: 655 Lbf-In
 Spring End: 372 Lbf-In

Sizing Safety Factors

Media and other conditions can effect the operating torque of a valve. Following is a list of common Safety Factors.

MEDIA	SAFETY FACTOR
Oils, Lubricants	0.8
Liquid, clean (particle free)	1.0
Liquid, dirty (slurry), raw water	1.8
Gas, clean and wet (sat. steam)	1.0
Gas, dry (superheated steam)	1.3
Gas, dirty (natural gas)	1.5
Oxygen, Chlorine	1.5

How To Order

Series	Model	Springs	Options
A2D Double Acting	020	5	180
	035	6	for 180 degree operation
	050	7	
	075	8	
A2S Spring Return	110	9	
	160	10	
A2DNI Double Acting Nickel Housing	255	11	
	400	12	
	500	Blank if Double Acting	SS Stainless Steel
A2SNI Spring Return Nickel Housing	550		
	600		
	650		
	700		

Part numbers are represented as follows: series-model-springs-options



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Engineered Products for Process Measurement and Control

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Telephone: (317) 247-0100

Fax: (317) 271-6225

Sales Offices:

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- * Northwest Indiana (877-943-1079)
- * Evansville, IN (888-633-0050)

KENTUCKY LOCATIONS

Stocking Branch:

625 N. Main Street, Calvert City, KY 42029

Telephone: (270) 395-5116

Fax: (270) 395-4232

Sales Offices:

- * Louisville, KY (877-943-1078)
- * Central KY (888-777-3018)

OHIO LOCATIONS

Sales Offices:

- * Cincinnati, OH (888-777-3018)
- * Central OH (888-777-3018)



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