



# MODEL APP PISTON PNEUMATIC ACTUATOR FOR API 6A WELLHEAD GATE VALVES

## GENERAL DESCRIPTION:

The Model APP actuator is a piston type, pneumatically-powered gate valve actuator designed to operate a “fail-closed” or “fail-open” safety valve. It is ideally suited for wellhead safety valve applications, flow lines, header valves and gathering lines. It can also be used for casing relief valve and storage valve applications.

The Model APP actuator is lightweight, easy to maintain and engineered to ensure years of trouble-free service in the harshest of environments and operating conditions on land or off-shore.

The Model APP actuator can be delivered as an actuated valve assembly ready to be placed in service or as an actuated bonnet assembly ready to mount on another manufacturer’s valve.



(Shown with typical bonnet assembly)

## FEATURES AND BENEFITS:

**Longer Top Shaft Seal Life:** Polypak™ seals are used for top shaft dynamic sealing applications. These seals are protected from accumulated dirt and debris by a durable wiper ring. These two features provide long seal life and minimal maintenance.

**Ease of Maintenance:** Top Shaft seals are easily replaced in the field by simply removing a retainer ring. Replacement of the piston seal is accomplished by removing the top plate from the cylinder. There is no need to disassemble the cylinder from the lower plate housing.

**Control Port Positioning:** The retainer ring connection of the top head plate to the cylinder housing permits the control pressure port to be placed in any position. This self cleaning feature adds service life to the actuator by reducing internal corrosion caused by accumulated fluid build-up in the cylinder.

**Improved Corrosion Control:** All non-stainless components are coated with Xylan and Polyester TGIC providing resistance against the corrosive effect of harsh environments.

**Over-Pressurization Protection:** A pressure relief device protects the piston and cylinder assembly from over-pressurization and protects personnel from injury. It is located externally for easy field inspection and replacement.

**Confirmation of Bonnet Stem / Back Seat Seal Integrity:** The bonnet is provided with a test fitting installed below the bonnet seals that provides for verification of the bonnet stem metal to metal back seat pressure sealing integrity.

**Permanent and Tamper Proof Drift Setting:** The valve drift is provided by stainless steel drift shims that are located on the top of the packing retainer. The location of the shims inside the spring housing ensures that the valve drift is tamper proof.

**Multiple Safeguards Against Well Fluids Contamination:** The bonnet incorporates multiple safeguards against the invasion of well fluids into the actuator housing. These safeguards are:

- Metal to metal back seat/stem seal
- Multiple Polypak™ bonnet stem seals
- Packing integrity port
- Secondary backup seals utilize o-rings

**Personnel Safety:** Locking screws below the bonnet ring prevent free rotation of the actuator. This guards against personnel injury should the actuator be used as a step during field service operations.

MODEL	SIZE	STROKES AVAILABLE
APP 1300	13"	Up to 5 1/8" bore
APP 1800	18"	Up to 7 1/8" bore
APP 2000	20"	Up to 11" bore





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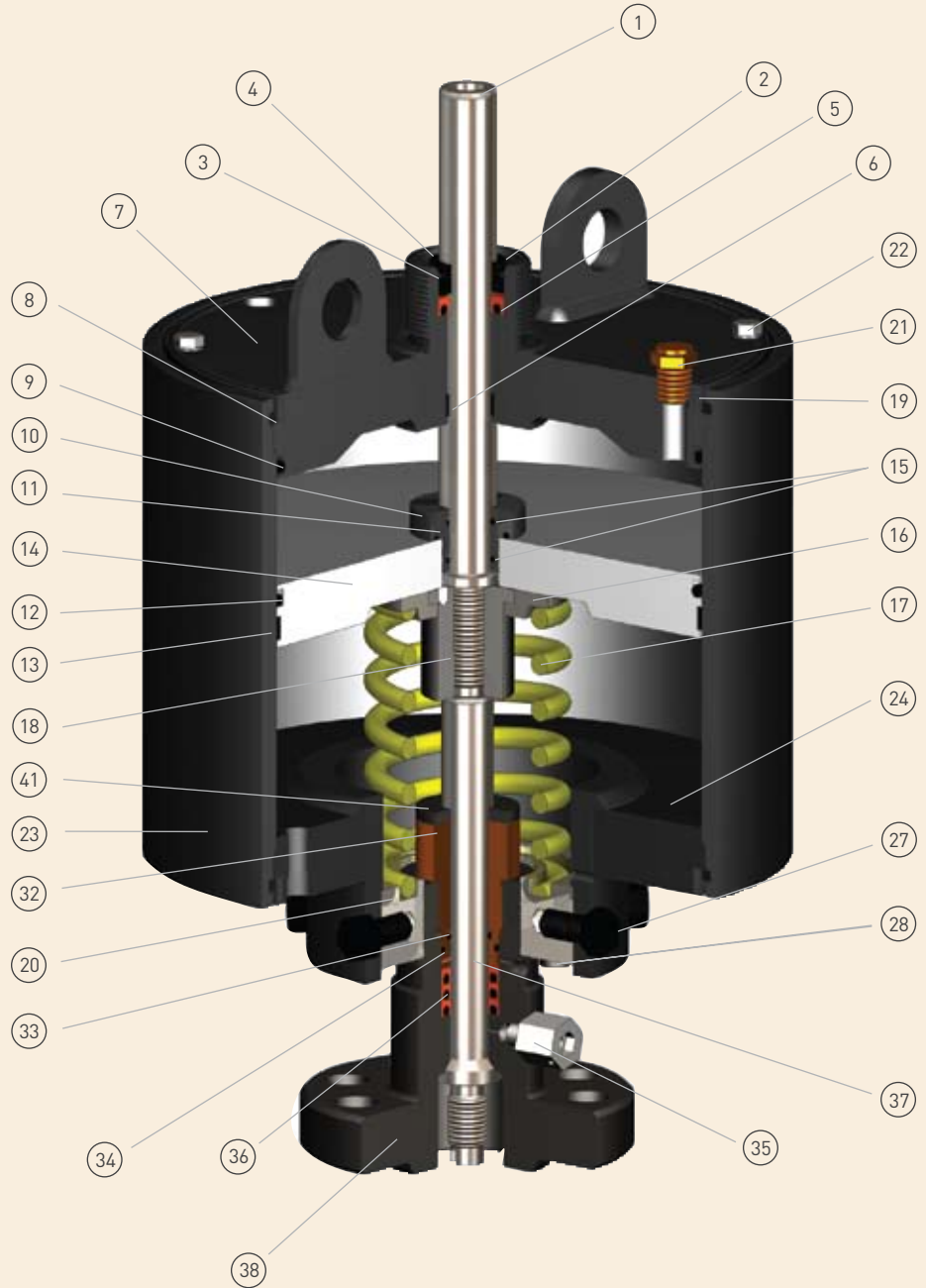
## PART LIST

#	DESCRIPTION
1	Top Shaft
2	Seal Retainer (AK)
3	Retainer Ring (AK)
4	Rod Wiper (AK)
5	Polypak™ Seal (AK)
6	Wear Bearing (AK)
7	Top Plate Assembly
8	Shear Ring
9	O-Ring (AK)
10	Retainer Nut
11	O-Ring (AK)
12	O-Ring (AK)
13	Wear Bearing (AK)
14	Piston Assembly
15	O-Ring (AK)
16	Spring Retainer Plate
17	Spring
18	Down Stop
19	Lock Ring
20	Bonnet Ring
21	Pressure Relief Device (AK)
22	Housing Bolts (AK)
23	Cylinder
24	Lower Plate Assembly
25	Actuator Assy ID Tag (NS)
26	Drive Screw (NS)
27	Attachment Bolt
28	Locking Screws (AK)
29	Caution Tag (NS, AK)
<b>BONNET</b>	
32	Packing Retainer
33	O-Ring (Inner) (BK)
34	O-Ring (Outer) (BK)
35	Test Fitting
36	Polypak™ Seal (BK)
37	Bonnet Stem
38	Bonnet
39	Bonnet Assembly ID Tag (NS)
40	Drive Screw (NS)
41	Drift Shims

(NS) = Not Shown

(AK) = Actuator Repair Kit Items

(BK) = Bonnet Repair Kit Items



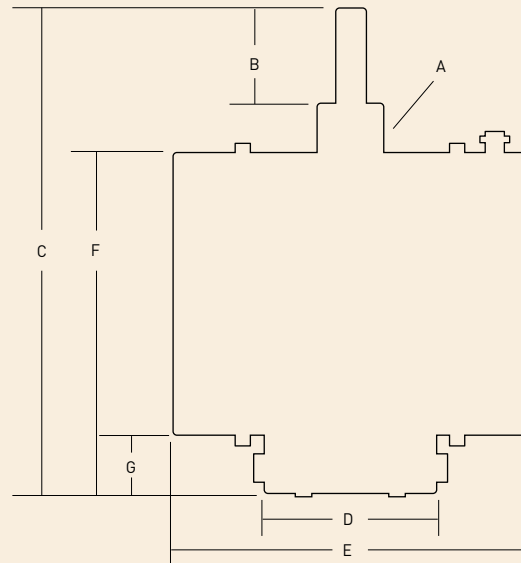
Parts list includes items in a typical bonnet assembly. Some differences may exist in bonnets for valves manufactured by companies other than Array. In those cases the specific differences are usually limited to the design of the bottom of the bonnet and operating stem.



# MODEL APP PISTON PNEUMATIC ACTUATOR

## ACTUATOR SIZES, DIMENSIONS, WEIGHT & VOLUME

	A	B		C		D		E		F		G	
		in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
1300 X 020	2¾ - 8	3.75	95	19.25	488	6.93	176	13.99	355	13.64	346	2.34	59
1300 X 030	2¾ - 8	4.37	111	19.87	504	6.97	177	13.99	355	13.64	346	2.34	59
1300 X 040	2¾ - 8	5.04	128	23.52	597	8.15	207	13.99	355	16.61	422	5.29	134
1300 X 050	2¾ - 8	6.82	173	33.84	859	8.89	225	13.99	355	23.72	602	8.74	221
1300 X 060	2¾ - 8	7.82	198	34.84	885	8.89	225	13.99	355	23.72	602	8.74	221
1800 X 030	3" - 8	4.82	122	28.70	729	8.89	225	19.27	489	21.01	533	8.24	209
1800 X 040	3" - 8	5.82	147	29.70	754	8.89	225	19.27	489	21.01	533	8.24	209
1800 X 050	3" - 8	6.75	171	30.64	778	8.89	225	19.27	489	24.01	609	8.24	209
1800 X 060	3" - 8	7.98	202	34.60	878	8.89	225	19.27	489	24.01	609	8.24	209
1800 X 070	3" - 8	8.04	204	34.60	878	12.19	309	19.27	489	24.02	610	7.88	200
2000 X 030	3" - 8	4.37	111	33.22	843	12.18	309	21.53	546	25.57	649	7.03	178
2000 X 040	3" - 8	5.25	133	34.10	866	12.19	309	21.53	546	25.57	649	7.03	178
2000 X 050	3" - 8	6.37	161	37.22	945	12.18	309	21.53	546	25.57	649	7.03	178
2000 X 070	3" - 8	7.91	200	38.76	984	12.18	309	21.53	546	25.57	649	7.03	178



ACTUATOR SIZE	SWEPT VOLUME		WEIGHT	
	in <sup>3</sup>	cm <sup>3</sup>	lbs	kgs
APP 1300 x 020	460	7539	258	117
APP 1300 x 030	526	8621	276	126
APP 1300 x 040	658	10,785	284	130
APP 1300 x 050	790	12,948	306	139
APP 1300 x 060	982	16,095	335	152
APP 1800 x 030	1210	19,832	525	239
APP 1800 x 040	1442	23,634	550	250
APP 1800 x 050	1637	26,830	579	263
APP 1800 x 060	1895	31,060	625	284
APP 1800 x 070	2002	33,140	640	291
APP 2000 x 030	1471	24,110	688	313
APP 2000 x 040	1784	29,240	718	327
APP 2000 X 050	2097	34,370	793	361
APP 2000 X 070	2723	44,630	839	513

Note: Swept volumes represent the maximum actuator stroke.

# MODEL APP PISTON PNEUMATIC ACTUATOR

## CONTROL PRESSURE EQUATIONS



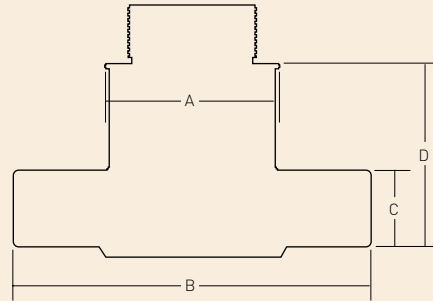
### VALVE WORKING PRESSURE

VALVE BORE SIZE	3,000 PSI	5,000 PSI	10,000 PSI	15,000 PSI
1 <sup>13</sup> / <sub>16</sub>			<b>APP 1300 x 030</b> 134 psi .013 x wp + 3 psi <b>APP 1800 x 030</b> 72 psi .007 x wp + 2 psi	<b>APP 1300 x 030</b> 198 psi .013 x wp + 3 psi <b>APP 1800 x 030</b> 107 psi .007 x wp + 2 psi
2 <sup>1</sup> / <sub>16</sub>	<b>APP 1300 x 030</b> 39 psi .012 x wp + 3 psi	<b>APP 1300 x 030</b> 63 psi .012 x wp + 3 psi	<b>APP 1300 x 030</b> 143 psi .014 x wp + 3 psi <b>APP 1800 x 030</b> 82 psi .008 x wp + 2 psi	<b>APP 1800 x 030</b> 122 psi .008 x wp + 2 psi
2 <sup>2</sup> / <sub>16</sub>	<b>APP 1300 x 030</b> 54 psi .017 x wp + 3 psi	<b>APP 1300 x 030</b> 88 psi .017 x wp + 3 psi	<b>APP 1300 x 030</b> 173 psi .017 x wp + 3 psi <b>APP 1800 x 030</b> 92 psi .009 x wp + 2 psi	<b>APP 1800 x 030</b> 137 psi .009 x wp + 2 psi <b>APP 2000 x 030</b> 107 psi .007 x wp + 2 psi
3 <sup>1</sup> / <sub>8</sub> 3 <sup>1</sup> / <sub>16</sub>	<b>APP 1300 x 030</b> 76 psi .024 x wp + 4 psi	<b>APP 1300 x 030</b> 124 psi .024 x wp + 4 psi <b>APP 1800 x 040</b> 63 psi .012 x wp + 3 psi	<b>APP 1800 x 030</b> 122 psi .012 x wp + 3 psi <b>APP 2000 x 030</b> 103 psi .010 x wp + 2 psi	<b>APP 2000 x 030</b> 153 psi .010 x wp + 3 psi
4 <sup>1</sup> / <sub>16</sub>	<b>APP 1300 x 040</b> 112 psi .036 x wp + 4 psi	<b>APP 1300 x 040</b> 184 psi .036 x wp + 4 psi <b>APP 1800 x 040</b> 97 psi .019 x wp + 2 psi <b>APP 2000 x 040</b> 78 psi .015 x wp + 2 psi	<b>APP 2000 x 040</b> 153 psi .015 x wp + 3 psi	
5 <sup>1</sup> / <sub>8</sub>	<b>APP 1300 x 050</b> 178 psi .058 x wp + 4 psi <b>APP 1800 x 050</b> 93 psi .030 x wp + 2 psi	<b>APP 1800 x 050</b> 152 psi .030 x wp + 2 psi <b>APP 2000 x 050</b> 123 psi .024 x wp + 3 psi		
7 <sup>1</sup> / <sub>16</sub> or 7 <sup>1</sup> / <sub>16</sub> x 6 <sup>3</sup> / <sub>8</sub> bore	<b>APP 1800 x 070</b> 164 psi .054 x wp + 2 psi <b>APP 2000 x 070</b> 135 psi .044 x wp + 3 psi	<b>APP 2000 x 070</b> 223 psi .044 x wp + 3 psi		

Note: The designed values provided above only apply to actuators manufactured for Array gate valves and are provided for reference only.

# ARRAY STANDARD BONNET

## DIMENSIONS AND WEIGHTS



SIZE	PRESS	A		B		C		D		WT.	
		in	mm	in	mm	in	mm	in	mm	lbs	kgs
2 1/16"	2000	3.30	83	6.38	161	1.18	29	4.45	114	17	7
2 3/16"	2000	3.62	91	7.28	184	1.38	35	4.96	125	31	14
3 1/8"	2000	4.00	101	8.50	215	1.35	34	5.13	130	32	14
4 1/16"	2000	4.75	120	11.06	280	1.58	40	5.44	138	58	26
6 1/8"	2000	5.20	132	13.07	331	2.68	68	6.88	174	109	49
7 1/16"	2000	7.59	192	15.53	394	2.95	74	7.41	188	204	92
3 1/8"	3000	4.00	101	9.06	230	2.00	50	5.13	130	42	19
4 1/16"	3000	4.75	120	11.93	303	2.25	57	5.44	138	75	34
5 1/8"	3000	5.20	132	13.07	331	2.68	68	6.88	174	109	49
7 1/16"	3000	7.59	192	15.53	394	2.95	74	7.41	188	204	92
2 1/16"	5000	3.30	83	7.19	182	1.28	32	4.45	113	19	8
2 3/16"	5000	3.62	91	7.83	198	1.77	44	4.96	125	31	14
3 1/8"	5000	4.00	101	9.06	230	2.00	50	5.13	130	42	19
4 1/16"	5000	4.75	120	11.93	303	2.25	57	5.44	138	75	34
5 1/8"	5000	5.20	132	13.07	331	2.68	68	6.88	174	109	49
7 1/16"	5000	7.59	192	15.53	394	2.95	74	7.41	188	204	92
1 13/16"	10000	3.59	91	7.68	195	1.93	49	5.12	129	30	13
2 1/16"	10000	3.90	99	8.65	219	1.93	49	4.87	123	36	16
2 3/16"	10000	4.75	120	9.75	247	2.31	58	5.56	141	54	24
3 1/16"	10000	5.00	127	11.56	293	2.50	63	6.83	173	82	37
4 1/16"	10000	6.00	152	13.00	330	3.80	96	6.94	176	145	65
5 1/8"	10000	9.00	228	15.00	381	5.50	139	8.00	203	190	86
7 1/16"	10000	7.10	180	18.00	457	5.75	146	10.00	254	235	106
1 13/16"	15000	4.00	101	10.00	254	3.00	76	6.00	152	61	27
2 1/16"	15000	4.00	101	10.00	254	3.00	76	6.00	152	58	26
2 3/16"	15000	5.00	127	11.00	279	4.00	101	7.00	177	98	44
3 1/16"	15000	4.38	111	11.38	288	4.50	114	7.65	194	125	56
4 1/16"	15000	6.50	165	13.75	349	5.00	127	8.00	203	160	72

Note: Dimensions and weights provided above only apply to bonnets manufactured for Array gate valves and are provided for reference. Bonnets made for other manufactures' valves will likely have different key dimensions and weights.



# MODEL APP PISTON PNEUMATIC ACTUATOR

## ACTUATOR SPECIFICATIONS

Maximum Operating Pressure:	250 psi / (17 Bars)
Test Pressure:	375 psi / (26 Bars)
API Material Class:	BB
API Temperature Rating:	P -20° F to 180° F (-29° C to -82° C)

## BONNET SPECIFICATIONS

Bonnets Available for Valve Brands:	Any Manufacturer (with Current Interface Drawing)
Size Range Available:	API 6A 1 <sup>3</sup> / <sub>16</sub> " through 7 <sup>1</sup> / <sub>16</sub> "
Pressure Ranges Available:	See Control Pressure Chart
API Material Classes Available:	AA, BB, CC (non-NACE) DD-0,5 / DD-1,5 / DD-NL EE-0,5 / EE-1,5 / EE-NL FF-0,5 / FF-1,5 / FF-NL HH-NL
API Product Specification Levels Available:	PSL-1, 2 or 3
API Temperature Ratings Available:	L through X

## LIMITED PRODUCT WARRANTY

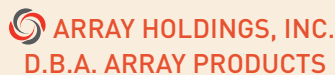
The following warranty is exclusive and in lieu of all other warranties whether expressed, implied or statutory, including, but not by way of limitation, any warranty or merchantability or fitness for any particular purpose.

Array warrants to each original buyer of products manufactured by Array that such products are free from defects in material and workmanship under normal use and service for a period of one (1) year from the date of shipment provided that no warranty is made in respect to: 1) any product which has been repaired or altered in such a way in Array's judgement,

as to effect the product adversely, 2) any product which has in Array's judgement, been subject to negligence, accident or improper storage, 3) any product which has not been operated or maintained in accordance with normal practice and in conformity with recommendations and public specifications of Array.

Array's obligation under this warranty is limited to use reasonable efforts to repair, replace or at its option, refunding the purchase price. The cost of labor for installing a repaired or replacement product shall be borne by the purchaser. Replacement parts provided under the terms of this warranty are warranted for the remainder of the warranty period of the products upon which they were installed to the same extent as if such parts were original components thereof. Warranty serviced provided hereunder do not assume any liability for damages caused by any delays involving warranty service.

For complete specification information, prices and name, address and telephone number of the Array representative nearest you, call or write to us at the address below.



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