



MODEL APD PNEUMATIC DIAPHRAGM ACTUATOR

FOR API 6A WELLHEAD GATE VALVES
(SINGLE ACTUATOR APPLICATIONS)

GENERAL DESCRIPTION

The Model APD actuator is a diaphragm 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 APD 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 APD 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 accumulation of 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. Disassembly of the actuator or upper housing is not required for seal replacement.

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 on the actuator top case protects personnel from over-pressurization of the actuator assembly. It is located for easy field inspection and replacement.

Confirmation of Bonnet Stem / Back Seat Seal Integrity:

The bonnet is designed with a test fitting below the bonnet seals. This test fitting provides for verification of the bonnet stem metal to metal backseat pressure sealing integrity.

Visual Confirmation of Bonnet Packing Integrity: A tattletale port located above the bonnet packing seals provides visual confirmation of the packing integrity. The Bonnet is provided with a port that can be tubed to a containment vessel to prevent escape of fugitive emissions into the atmosphere.

Modular Design: Tandem boosters (additional diaphragm actuators) can be mounted in the factory or the field to provide higher actuation force.

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
APD 1000	10"	Up to 2 1/16" bore
APD 1200	12"	Up to 3 1/8" bore
APD 1500	15"	Up to 4 1/16" bore
APD 1800	18"	Up to 5 1/8" bore
APD 2000	20"	Up to 7 1/16" bore

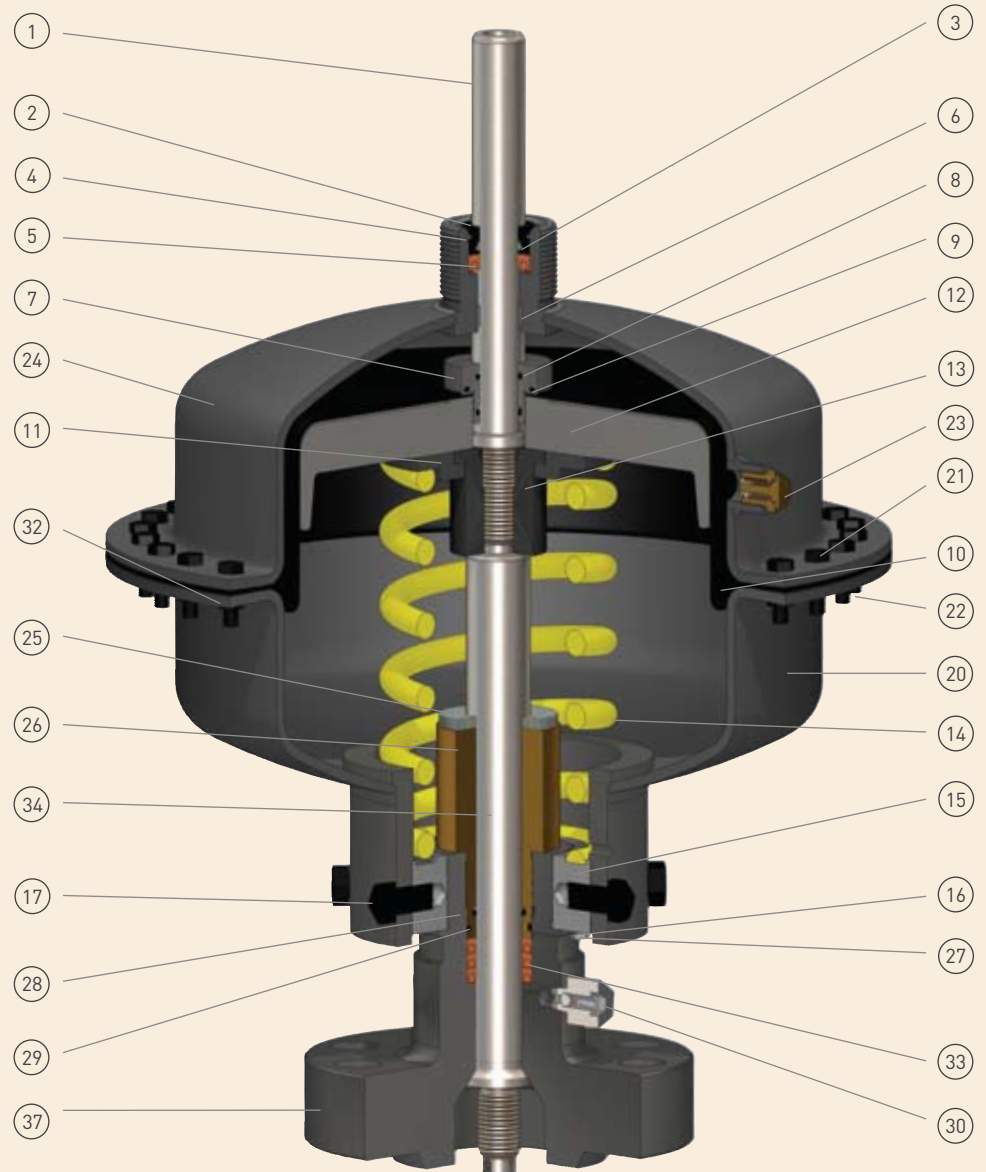




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PARTS LIST

NO.	DESCRIPTION
1	Top Shaft
2	Seal Retainer (AK)
3	Rod Wiper (AK)
4	Retainer Ring (AK)
5	Top Shaft Seal (AK)
6	Wear Bearing (AK)
7	Diaphragm Nut
8	Top Shaft O-ring (AK)
9	O-ring (AK)
10	Diaphragm (AK)
11	Spring Retainer
12	Dia. Retainer Plate
13	Stem Nut
14	Actuator Spring
15	Bonnet Ring
16	Actuator Locking Screw
17	Attachment Bolt
18	Nameplate (NS)
19	Drive Screw (NS)
20	Lower Housing
21	Housing Bolts (AK)
22	Housing Nuts (AK)
23	Pressure Relief Device (AK)
24	Upper Housing
25	Drift Shims
26	Packing Retainer
27	Cam Lock Nut
28	Pkg O-ring (BK)
29	Pkg O-ring (BK)
30	Vent Fitting
31	Bonnet Nameplate (NS)
32	Lock Washer (AK)
33	Polypak™ Seal (BK)
34	Operating Stem
35	Caution Tag (NS, AK)
36	Drive Screws (NS)
37	Bonnet



(NS) = Not Shown

(AK) = Actuator Repair Kit Items

(BK) = Bonnet Repair Kit Items

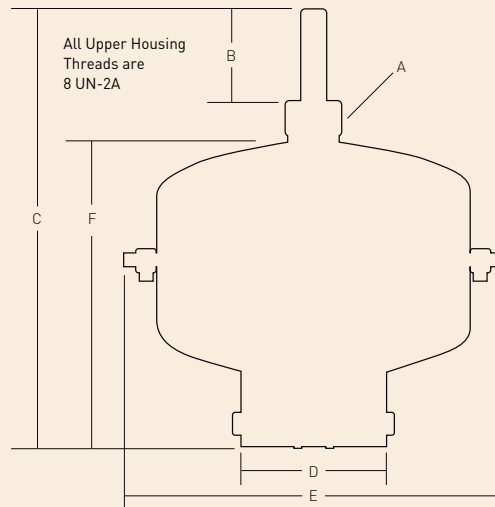
Parts list includes items in a typical bonnet assembly. Some differences may exist in bonnets for valves manufactured by companies other than Array. In those cases the specific differences are usually limited to the design of the bottom of the bonnet and operating stem.



MODEL APD PNEUMATIC DIAPHRAGM ACTUATOR

ACTUATOR SIZES, DIMENSIONS, WEIGHT & VOLUME

MODEL	SIZE	A	B		C		D		E		F	
			in	mm	in	mm	in	mm	in	mm	in	mm
APD 1000 X 020	10"	2½	2.65	67	14.81	376	ø5.65	143	ø13.12	333	10.34	262
APD 1200 X 020	12"	2¾	3.04	77	19.74	501	ø6.93	176	ø15.17	385	14.70	373
APD 1200 X 030	12"	2¾	3.58	90	20.27	515	ø6.93	176	ø15.17	385	14.70	373
APD 1500 X 020	15"	2¾	3.70	94	20.33	516	ø6.97	177	ø18.26	463	14.63	371
APD 1500 X 030	15"	2¾	4.43	112	21.06	534	ø6.97	177	ø18.26	463	14.63	371
APD 1500 X 040	15"	2¾	5.15	131	22.82	579	ø8.15	207	ø18.26	463	15.67	398
APD 1800 X 030	18"	2¾	3.88	98	21.27	540	ø6.93	176	ø21.13	536	15.43	392
APD 1800 X 040	18"	2¾	4.87	123	23.53	597	ø8.11	206	ø21.13	536	16.69	423
APD 1800 X 060	18"	2¾	8.38	212	33.80	858	ø12.28	311	ø21.13	536	23.50	596
APD 2000 X 030	20"	2¾	3.91	99	22.13	562	ø8.15	207	ø23.48	596	16.38	416
APD 2000 X 040	20"	2¾	5.18	131	23.40	594	ø8.15	207	ø23.48	596	16.38	416
APD 2000 X 060	20"	2¾	6.12	155	28.00	711	ø12.12	307	ø23.48	596	22.50	571
APD 2000 X 070	20"	2¾	8.25	209	30.12	765	ø12.12	307	ø23.48	596	22.50	571



MODEL	SIZE	SWEPT VOLUME		WEIGHT	
		in ³	cm ³	lbs	kg
APD 1000 X 020	10"	240	3,933	75	34
APD 1200 X 020	12"	336	5,506	135	61
APD 1200 X 030	12"	447	7,325	140	63
APD 1500 X 020	15"	675	11,061	160	72
APD 1500 X 030	15"	775	12,699	170	77
APD 1500 X 040	15"	900	14,747	180	81
APD 1800 X 030	18"	1150	18,844	195	88
APD 1800 X 040	18"	1295	21,220	215	97
APD 1800 X 060	18"	1942	31,824	216	98
APD 2000 X 030	20"	1410	23,104	260	118
APD 2000 X 040	20"	1600	26,218	270	122
APD 2000 X 060	20"	2000	32,794	370	168
APD 2000 X 070	20"	2800	45,884	385	175

Note: Swept volumes represent the maximum actuator stroke.



MODEL APD PNEUMATIC DIAPHRAGM ACTUATOR

CONTROL PRESSURE EQUATIONS

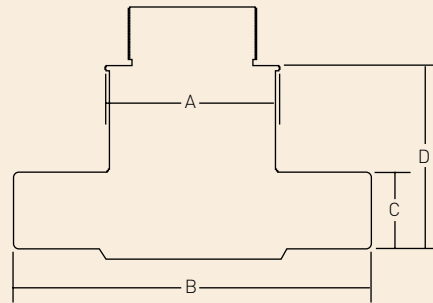
VALVE WORKING PRESSURE

VALVE BORE SIZE	3,000 PSI	5,000 PSI	10,000 PSI	15,000 PSI
1 13/16			APD 1500 x 030 113 psi .011 x wp + 3 psi APD 1800 x 030 82 psi .008 x wp + 2 psi	APD 1800 x 030 122 psi .008 x wp + 2 psi APD 2000 x 030 92 psi .006 x wp + 2 psi
2 1/16	APD 1000 x 020 83 psi .025 x wp + 8 psi APD 1200 x 020 57 psi .017 x wp + 6 psi	APD 1000 x 020 133 psi .025 x wp + 8 psi APD 1200 x 020 91 psi .017 x wp + 6 psi	APD 1500 x 030 123 psi .012 x wp + 3 psi APD 1800 x 030 92 psi .009 x wp + 2 psi APD 2000 x 030 72 psi .007 x wp + 2 psi	APD 1800 x 030 137 psi .009 x wp + 3 psi APD 2000 x 030 107 psi .007 x wp + 2 psi
2 5/16	APD 1200 x 030 78 psi .024 x wp + 6 psi APD 1500 x 030 45 psi .014 x wp + 3 psi	APD 1200 x 030 126 psi .024 x wp + 6 psi APD 1500 x 030 73 psi .014 x wp + 3 psi	APD 1500 x 030 143 psi .014 x wp + 3 psi APD 1800 x 030 102 psi .010 x wp + 2 psi APD 2000 x 030 82 psi .008 x wp + 2 psi	APD 1800 x 030 152 psi .010 x wp + 2 psi APD 2000 x 030 122 psi .008 x wp + 2 psi
3 1/8 3 1/16	APD 1200 x 030 108 psi .034 x wp + 6 psi	APD 1200 x 030 176 psi .024 x wp + 6 psi APD 1500 x 030 108 psi .021 x wp + 3 psi APD 1800 x 030 72 psi .014 x wp + 2 psi	APD 1800 x 030 142 psi .014 x wp + 2 psi APD 2000 x 030 112 psi .011 x wp + 2 psi	APD 2000 x 030 167 psi .011 x wp + 2 psi
4 1/16	APD 1500 x 040 96 psi .031 x wp + 3 psi	APD 1500 x 040 158 psi .031 x wp + 3 psi APD 1800 x 040 107 psi .021 x wp + 2 psi	APD 2000 x 040 172 psi .017 x wp + 2 psi	
5 1/8	APD 1800 x 060 104 psi .034 x wp + 2 psi APD 2000 x 060 86 psi .028 x wp + 2 psi	APD 1800 x 060 172 psi .034 x wp + 2 psi APD 2000 x 060 142 psi .028 x wp + 2 psi		
7 1/16	APD 2000 x 070 149 psi .049 x wp + 2 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 3/16"	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 APD PNEUMATIC DIAPHRAGM ACTUATOR

ACTUATOR SPECIFICATIONS

Maximum Operating Pressure:	170 PSI
Test Pressure:	255 PSI
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 ³ / ₁₆ through 7 ¹ / ₁₆ "
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

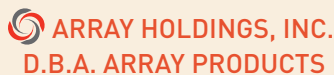
The following warranty is exclusive and in lieu of all other warranties whether expressed, implied or statutory, including, but not by way of limitation, any warranty or merchantability or fitness for any particular purpose.

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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