



# MODEL APH HYDRAULIC ACTUATOR FOR API 6A WELLHEAD GATE VALVES

## GENERAL DESCRIPTION:

The Model APH actuator is a piston type, hydraulically-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 APH actuator is compact, 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 APH 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:** The top shaft seals are Polypak™ seals designed for dynamic sealing applications. The top shaft seals are protected from dirt and debris by a molythane rod wiper. The two design features guarantee a longer seal life requiring minimal maintenance.

**Non-Pressurized Spring Housing:** The non-pressurized housing is designed as a structural protective member for the actuator cylinder, piston and springs. This prevents any injury to personnel or equipment in the event of debris or tools impacting the housing.

**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 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.

**Permanent and Tamper Proof Drift Setting:** The valve drift is provided with 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:** Actuator can be completely removed and disassembled using simple hand tools. The cylinder module can be removed from the housing without removing the actuator from bonnet. The spring can be easily removed from the compressed position to the relaxed position or free length by hand using a wrench.

MODEL	SIZE	STROKES AVAILABLE
APH 025	2½"	Up to 2 9/16" bore
APH 035	3½"	Up to 4 1/16" bore
APH 045	4½"	Up to 6 3/8" bore
APH 065	6½"	Up to 7 1/16" bore
APH 095	9½"	Up to 7 1/16" bore





# MODEL APH HYDRAULIC ACTUATOR

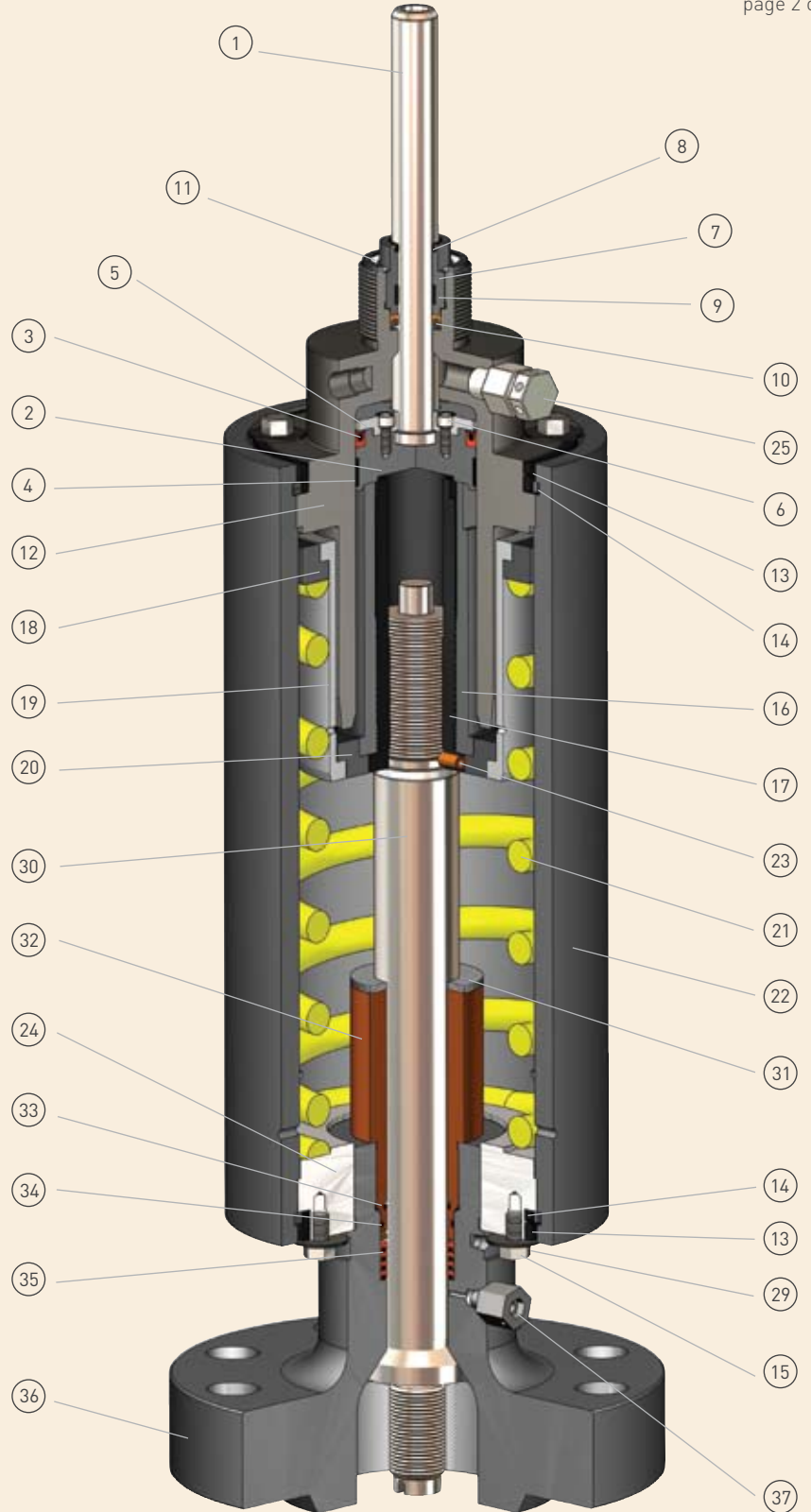
## PARTS LIST

#	DESCRIPTION
1	Top Shaft
2	Piston
3	Polypak™ Seal (AK)
4	Wear Bearing (AK)
5	Top Shaft Retainer Plate
6	Socket Head Cap Screw
7	Top Shaft Packing Retainer
8	Rod Wiper (AK)
9	Wear Bearing (AK)
10	Polypak™ Seal (AK)
11	Retainer Ring (AK)
12	Cylinder
13	Housing Lock Ring
14	Housing Shear Ring
15	Bolt
16	Spring Adjusting Nut
17	Stem Nut
18	Upper Spring Plate
19	Spring Guide Tube
20	Lower Spring Plate
21	Inner Spring
22	Housing
23	Socket Head Set Screw
24	Bonnet Ring
25	Burst Disc (AK)
26	Caution Tag (NS, AK)
27	Nameplate (NS)
28	Drive Screw (NS)
29	Washers
<b>BONNET</b>	
30	Bonnet Stem
31	Shim
32	Packing Retainer
33	O-Ring (BK)
34	O-Ring (BK)
35	Polypak™ Seal (BK)
36	Bonnet
37	Test Fitting
38	Nameplate (NS)
39	Drive Screws (NS)

(NS) = Not Shown

(AK) = Actuator Redress Kit Items

(BK) = Bonnet Redress Kit Items



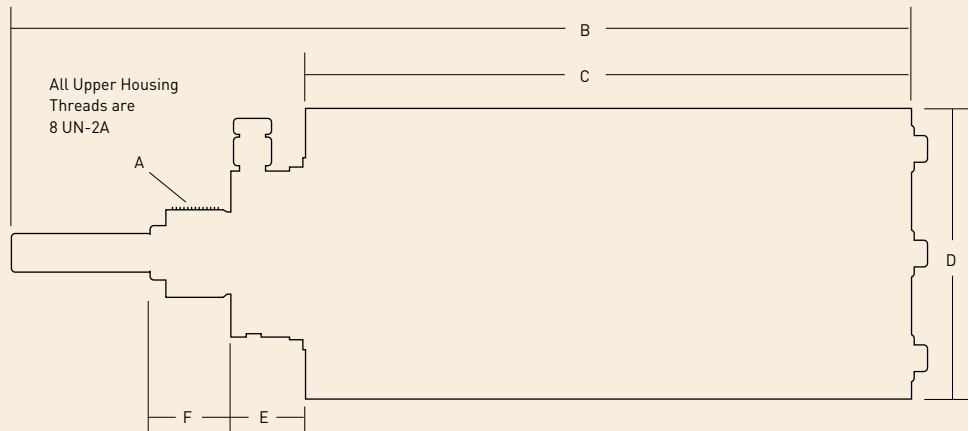
Parts list includes items in a typical bonnet assembly. Some differences may exist in bonnets for valves manufactured by companies other than Array. In those cases the specific differences are usually limited to the design of the bottom of the bonnet and operating stem.



# MODEL APH HYDRAULIC ACTUATOR

## ACTUATOR SIZES, DIMENSIONS, WEIGHT & VOLUME

MODEL	A	B		C		D		E		F	
		in	mm	in	mm	in	mm	in	mm	in	mm
APH 025 x 020	3"	18.00	457	10.36	263	5.40	137	2.00	50	2.75	69
APH 035 x 020	3"	23.78	604	15.50	393	7.40	187	2.50	63	2.75	69
APH 035 x 030	3"	24.78	629	15.50	393	7.40	187	2.50	63	2.75	69
APH 035 x 040	3"	25.41	645	15.50	393	7.40	187	2.50	63	2.75	69
APH 045 x 020	3"	29.50	749	21.14	536	10.12	257	2.50	63	2.75	69
APH 045 x 030	3"	30.50	774	21.14	536	10.12	257	2.50	63	2.75	69
APH 045 x 040	3"	31.50	800	21.14	536	10.12	257	2.50	63	2.75	69
APH 045 x 050	3"	32.50	825	21.14	536	10.12	257	2.50	63	2.75	69
APH 045 x 060	3"	33.50	850	21.14	536	10.12	257	2.50	63	2.75	69
APH 065 x 040	3"	37.65	956	27.10	688	12.96	329	2.75	69	2.75	69
APH 065 x 050	3"	38.65	981	27.10	688	12.96	329	2.75	69	2.75	69
APH 065 x 060	3"	39.65	1007	27.10	688	12.96	329	2.75	69	2.75	69
APH 065 x 070	3"	40.65	1032	27.10	688	12.96	329	2.75	69	2.75	69
APH 095 x 070	3"	40.90	1039	27.10	688	16.96	430	2.75	69	2.75	69



MODEL	SWEPT VOLUME		CLOSING TIMES		WEIGHT	
	in <sup>3</sup>	cm <sup>3</sup>	seconds		lbs	kg
APH 025 x 020	11	180	3-5		46	21
APH 035 x 020	22	361	3-5		112	51
APH 035 x 030	31	508	5-7		117	53
APH 035 x 040	39	639	7-9		129	59
APH 045 x 020	40	587	3-5		279	127
APH 045 x 030	54	793	5-7		284	129
APH 045 x 040	69	1013	7-9		285	130
APH 045 x 050	84	1233	9-11		276	125
APH 045 x 060	98	1439	10-12		281	128
APH 065 x 040	150	2459	7-9		549	249
APH 065 x 050	186	3049	9-11		552	251
APH 065 x 060	218	3573	10-12		560	254
APH 065 x 070	253	4147	11-13		562	255
APH 095 x 070	682	11176	13-15		1005	455

Note: Swept volumes and closing times represent the maximum actuator stroke.



# MODEL APH HYDRAULIC ACTUATOR

## CONTROL PRESSURE EQUATIONS

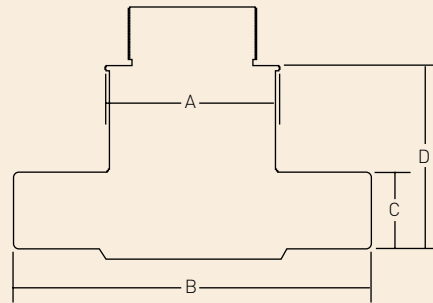
### VALVE WORKING PRESSURE

VALVE BORE SIZE	3,000 PSI	5,000 PSI	10,000 PSI	15,000 PSI
1 <sup>3</sup> / <sub>16</sub>			<b>APH 025 x 020</b> 4329 psi .418 x wp + 149 psi <b>APH 035 x 020</b> 2109 psi .205 x wp + 59 psi <b>APH 045 x 020</b> 1279 psi .116 x wp + 119 psi	<b>APH 035 x 020</b> 3134 psi .205 x wp + 59 psi <b>APH 045 x 020</b> 1859 psi .116 x wp + 119 psi
2 <sup>1</sup> / <sub>16</sub>	<b>APH 025 x 020</b> 1334 psi .395 x wp + 149 psi	<b>APH 025 x 020</b> 2124 psi .395 x wp + 149 psi	<b>APH 035 x 020</b> 2329 psi .227 x wp + 59 psi <b>APH 045 x 020</b> 1419 psi .130 x wp + 119 psi	<b>APH 035 x 020</b> 3464 psi .227 x wp + 59 psi <b>APH 045 x 020</b> 2069 psi .130 x wp + 119 psi
2 <sup>3</sup> / <sub>16</sub>	<b>APH 025 x 020</b> 1757 psi .536 x wp + 149 psi <b>APH 035 x 030</b> 851 psi .264 x wp + 59 psi	<b>APH 025 x 020</b> 2829 psi .536 x wp + 149 psi <b>APH 035 x 030</b> 1379 psi .264 x wp + 59 psi	<b>APH 035 x 030</b> 2699 psi .264 x wp + 59 psi <b>APH 045 x 030</b> 1629 psi .151 x wp + 119 psi	<b>APH 035 x 030</b> 4019 psi .264 x wp + 59 psi <b>APH 045 x 030</b> 2384 psi .151 x wp + 119 psi
3 <sup>1</sup> / <sub>8</sub> – 3 <sup>1</sup> / <sub>16</sub>	<b>APH 035 x 030</b> 1193 psi .378 x wp + 59 psi <b>APH 045 x 030</b> 767 psi .216 x wp + 119 psi	<b>APH 035 x 030</b> 1949 psi .378 x wp + 59 psi <b>APH 045 x 030</b> 1199 psi .216 x wp + 119 psi	<b>APH 035 x 030</b> 3839 psi .378 x wp + 59 psi <b>APH 045 x 030</b> 2249 psi .213 x wp + 119 psi	<b>APH 045 x 030</b> 3314 psi .213 x wp + 119 psi
4 <sup>1</sup> / <sub>16</sub>	<b>APH 035 x 040</b> 1751 psi .564 x wp + 59 psi <b>APH 045 x 040</b> 1085 psi .322 x wp + 119 psi	<b>APH 035 x 040</b> 2879 psi .564 x wp + 59 psi <b>APH 045 x 040</b> 1729 psi .322 x wp + 119 psi	<b>APH 045 x 040</b> 3339 psi .322 x wp + 119 psi <b>APH 065 x 040</b> 1543 psi .148 x wp + 63 psi	<b>APH 045 x 040</b> 4949 psi .322 x wp + 119 psi <b>APH 065 x 040</b> 2283 psi .148 x wp + 63 psi
5 <sup>1</sup> / <sub>8</sub>	<b>APH 045 x 050</b> 1682 psi .521 x wp + 119 psi <b>APH 065 x 050</b> 780 psi .239 x wp + 63 psi	<b>APH 045 x 050</b> 2724 psi .521 x wp + 119 psi <b>APH 065 x 050</b> 1258 psi 239 x wp + 63 psi	<b>APH 045 x 050</b> 5329 psi .521 x wp + 119 psi <b>APH 065 x 050</b> 2453 psi .239 x wp + 63 psi	<b>APH 065 x 050</b> 3648 psi .239 x wp + 63 psi
6 <sup>3</sup> / <sub>16</sub>	<b>APH 045 x 060</b> 2429 psi .770 x wp + 119 psi <b>APH 065 x 060</b> 1230 psi .389 x wp + 63 psi	<b>APH 045 x 060</b> 3939 psi .770 x wp + 119 psi <b>APH 065 x 060</b> 2008 psi .389 x wp + 63 psi	<b>APH 065 x 060</b> 3953 psi .389 x wp + 63 psi	<b>APH 065 x 060</b> 5898 psi .389 x wp + 63 psi
7 <sup>1</sup> / <sub>16</sub>	<b>APH 065 x 070</b> 1348 psi .428 x wp + 63 psi	<b>APH 065 x 070</b> 2203 psi .428 x wp + 63 psi <b>APH 095 x 070</b> 1026 psi 0.197 x wp + 43 psi	<b>APH 065 x 070</b> 4343 psi .428 x wp + 63 psi <b>APH 095 x 070</b> 2008 psi 0.197 x wp + 43 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 3/16"	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 APH HYDRAULIC ACTUATOR

## ACTUATOR SPECIFICATIONS

Maximum Operating Pressure:	5,000 psi / 345 bars
Test Pressure:	7,500 psi / 518 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

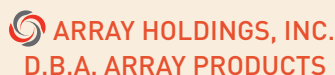
The following warranty is exclusive and in lieu of all other warranties whether expressed, implied or statutory, including, but not by way of limitation, any warranty or merchantability or fitness for any particular purpose.

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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