



MODEL APHW HYDRAULIC ACTUATOR FOR API 6A WELLHEAD GATE VALVES

GENERAL DESCRIPTION:

The Model APHW actuator is a piston type, hydraulically-powered gate valve actuator designed to provide fail-safe closure in the event of a wireline accident. It employs a dual coil spring return system that delivers sufficient return force to guarantee severance of standard wireline or slickline, 7/32" logging or 3/16" stainless steel cables.

The Model APHW actuator provides sufficient closing force to shear logging or stainless cable in most standard wellhead applications with zero valve body pressure in typical valves up to 7-1/16" bore.

The Model APHW actuator is powerful, 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 APHW actuator can be adapted for use on any 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 molylthane 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 corrosion 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 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: 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 springs can be easily removed from the compressed position to the relaxed position or free length by hand using a wrench.

MODEL	SIZE	STROKES AVAILABLE
APHW 045	4 1/2"	Up to 6 3/8" bore
APHW 065	6 1/2"	Up to 7 1/16" bore
APHW 095	9 1/2"	Up to 7 1/16" bore



MODEL APHW HYDRAULIC ACTUATOR

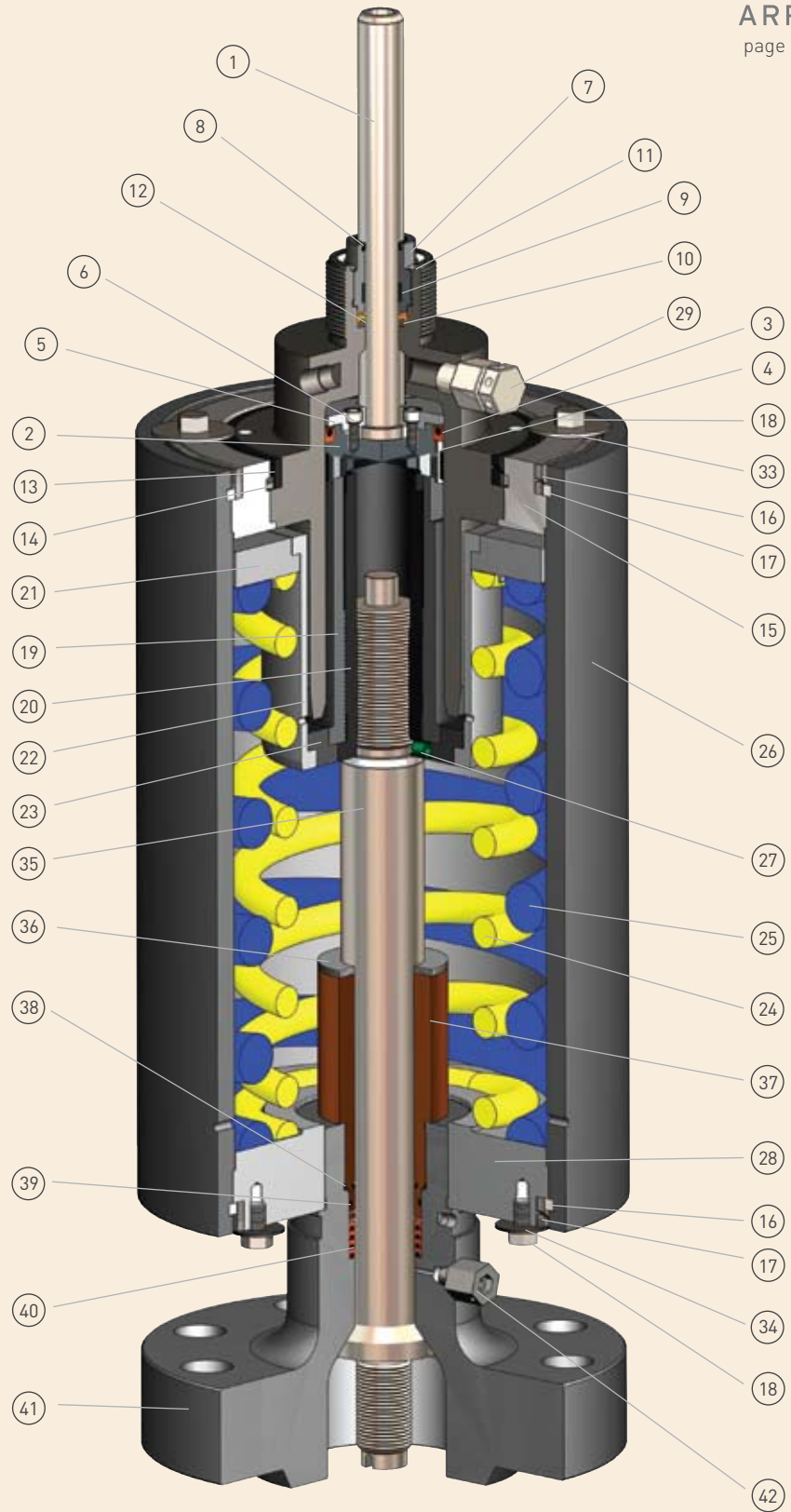
PARTS LIST

#	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 – Inner
14	Housing Shear Ring – Inner
15	Cylinder Adapter Ring
16	Housing Lock Ring – Outer
17	Housing Shear Ring – Outer
18	Hex Head Bolt
19	Spring Adjusting Nut
20	Stem Nut
21	Upper Spring Plate
22	Spring Guide Tube
23	Lower Spring Plate
24	Spring, Helical – Inner
25	Spring, Helical – Outer
26	Housing
27	Socket Head Set Screw
28	Bonnet Ring
29	Pressure Relief Device (AK)
30	Caution Tag (NS, AK)
31	Nameplate (NS)
32	Drive Screws (NS)
33	Washer
34	Washer
BONNET	
35	Stem
36	Drift Shim
37	Packing Retainer
38	O-Ring (BK)
39	O-Ring (BK)
40	Polypak™ Seal (BK)
41	Bonnet
42	Vent Fitting
43	Nameplate (NS)
44	Drive Screws (NS)

(NS) = Not Shown

(AK) = Actuator Redress Kit Items

(BK) = Bonnet Redress Kit Items



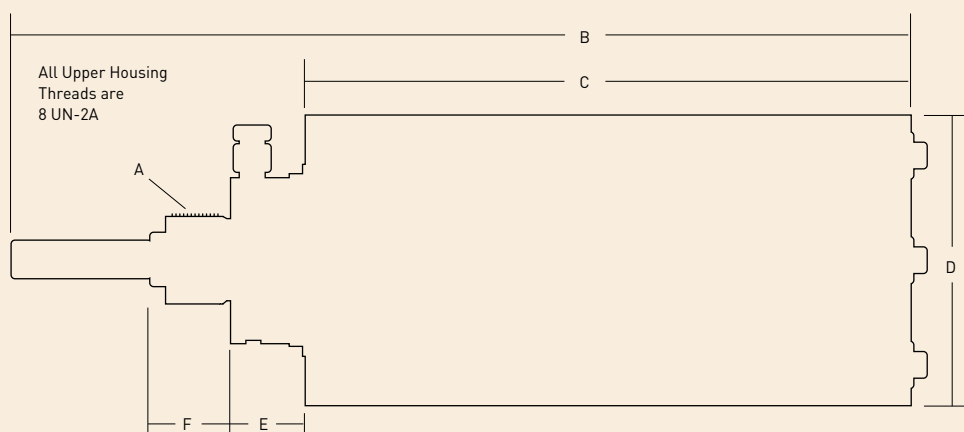
Parts list includes items in a typical bonnet assembly. Some differences may exist in bonnets for valves manufactured by companies other than Array. In those cases the specific differences are usually limited to the design of the bottom of the bonnet and operating stem.

MODEL APHW HYDRAULIC ACTUATOR

ACTUATOR SIZES, DIMENSIONS, WEIGHT & VOLUME



MODEL	A	B		C		D		E		F	
		in	mm	in	mm	in	mm	in	mm	in	mm
APHW 045 x 020	3"	29.50	749	21.14	536	13.25	336	2.25	57	2.50	63
APHW 045 x 030	3"	30.50	774	21.14	536	13.25	336	2.25	57	2.50	63
APHW 045 x 040	3"	31.50	800	21.14	536	13.25	336	2.25	57	2.50	63
APHW 045 x 050	3"	32.50	825	21.14	536	13.25	336	2.25	57	2.50	63
APHW 045 x 060	3"	33.50	850	21.14	536	13.25	336	2.25	57	2.50	63
APHW 065 x 040	3"	34.50	876	27.10	688	16.96	430	2.25	57	2.75	69
APHW 065 x 050	3"	35.50	901	27.10	688	16.96	430	2.25	57	2.75	69
APHW 065 x 060	3"	36.50	927	27.10	688	16.96	430	2.25	57	2.75	69
APHW 065 x 070	3"	37.50	952	27.10	688	16.96	430	2.25	57	2.75	69
APHW 095 x 070	3"	41.00	1039	27.10	688	20.00	508	2.75	69	2.75	69



MODEL	SWEPT VOLUME		CLOSING TIMES	WEIGHT	
	in ³	cm ³		seconds	lbs
APHW 045 x 020	40	587	3-4	432	196
APHW 045 x 030	54	793	6-7	465	211
APHW 045 x 040	69	1013	8-9	450	204
APHW 045 x 050	84	1233	10-11	455	206
APHW 045 x 060	98	1439	11-12	465	211
APHW 065 x 040	150	2459	9-10	881	400
APHW 065 x 050	186	3049	11-12	898	408
APHW 065 x 060	218	3573	13-14	898	408
APHW 065 x 070	253	4147	14-15	907	412
APHW 095 x 070	682	11176	14-16	1608	729

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



MODEL APHW HYDRAULIC ACTUATOR

CONTROL PRESSURE EQUATIONS

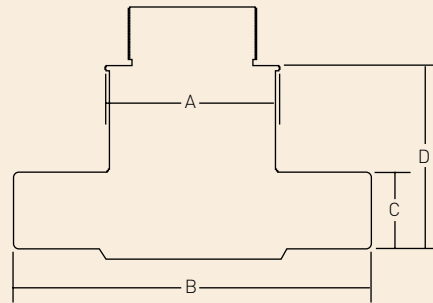
VALVE WORKING PRESSURE

VALVE BORE SIZE	3,000 PSI	5,000 PSI	10,000 PSI	15,000 PSI
1 13/16			APHW 045 x 020 1705 psi .116 x wp + 545 psi	APHW 045 x 020 2285 psi .116 x wp + 545 psi
2 1/16			APHW 045 x 020 1845 psi .130 x wp + 545 psi	APHW 045 x 020 2495 psi .130 x wp + 545 psi
2 3/16			APHW 045 x 030 2055 psi .151 x wp + 545 psi	APHW 045 x 030 2810 psi .151 x wp + 545 psi
3 1/8 3 1/16	APHW 045 x 030 1193 psi .216 x wp + 545 psi	APHW 045 x 030 1625 psi .216 x wp + 545 psi	APHW 045 x 030 2675 psi .213 x wp + 545 psi	APHW 045 x 030 3740 psi .213 x wp + 545 psi
4 1/16	APHW 045 x 040 1511 psi .322 x wp + 545 psi	APHW 045 x 040 2155 psi .322 x wp + 545 psi	APHW 045 x 040 3765 psi .322 x wp + 545 psi APHW 065 x 040 1730 psi .148 x wp + 250 psi	APHW 045 x 040 5375 psi .322 x wp + 545 psi APHW 065 x 040 2470 psi .148 x wp + 250 psi
5 1/8	APHW 045 x 050 2108 psi .521 x wp + 545 psi	APHW 045 x 050 3150 psi .521 x wp + 545 psi	APHW 045 x 050 5755 psi .521 x wp + 545 psi APHW 065 x 050 2640 psi .239 x wp + 250 psi	APHW 065 x 050 3835 psi .239 x wp + 250 psi
6 3/8	APHW 045 x 060 2855 psi .770 x wp + 545 psi APHW 065 x 060 1417 psi .389 x wp + 250 psi	APHW 045 x 060 4395 psi .770 x wp + 545 psi APHW 065 x 060 2195 psi .389 x wp + 250 psi	APHW 065 x 060 4140 psi .389 x wp + 250 psi	APHW 065 x 060 6085 psi .389 x wp + 250 psi
7 1/16	APHW 065 x 070 1534 psi .428 x wp + 250 psi	APHW 065 x 070 2390 psi .428 x wp + 250 psi APHW 095 x 070 1097 psi .197 x wp + 115 psi	APHW 065 x 070 4530 psi .428 x wp + 250 psi APHW 095 x 070 2080 psi .197 x wp + 115 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.



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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 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

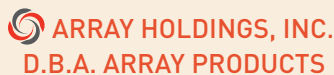
The following warranty is exclusive and in lieu of all other warranties whether expressed, implied or statutory, including, but not by way of limitation, any warranty or merchantability or fitness for any particular purpose.

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 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.



4520 E. Chandler Road, Muskogee, Oklahoma 74403

Toll Free: 866.445.1837 • Phone: 918.682.7952 • Fax: 918.682.7904 • www.array.com