

# MODEL DX

## Pneumatic Diaphragm Actuator



Pneumatic Actuation



### INTRO

Omni Model DX pneumatic diaphragm actuators are designed to operate surface safety or shutdown valves on oil & gas wellhead, transmission, storage, manifold or other applications where fail-safe capability is required.

Model DX actuators can be used for land or off shore installations and are engineered to provide reliable service in a variety of operating conditions.

Omni can provide Model DX actuators already mounted on valves and ready to deploy, or as actuated bonnet assemblies ready to mount on valves from other manufacturers.

Additionally, Omni offers a full range of accessories including standard & fusible manual overrides, position indicators, and standard & fusible lock open devices.

### FEATURES

#### Flexibility

Model DX actuators can be adapted to operate valves from any manufacturer (interface information is required) and can be assembled in single or tandem (double actuator) configurations if required by field conditions.

#### Over-Pressure Protection

Model DX actuators come equipped with pressure relief devices to protect personnel and guard against damage to the actuator in case of an over pressure condition. The pressure relief device is easily inspected and is field-replaceable.

#### Orientation, Rotation & Ease of Piping

Model DX actuators have pressure inlet and outlet ports located at an angle in the top plug assembly to facilitate proper piping orientation based on field conditions. Once proper orientation has been achieved, the actuator's lower bonnet retaining ring can be locked into place to prevent accidental rotation of the actuator while in service.

#### Backseat & Packing Integrity

Model DX actuators incorporate bonnet assemblies that have an integrated metal-to-metal backseat. A bonnet fitting can also be used to relieve any pressure that might be trapped between the backseat and stem packing after the backseat operation. A tattletale weep port is located above the packing to provide visual confirmation of stem seal integrity during operation. All Model DX ports can be used to pipe fugitive emissions to a containment vessel, if required.

#### Corrosion Protection

Model DX actuator housings are internally and externally coated to prevent corrosion due to environmental conditions. All internal components are either stainless steel or are coated to prevent corrosion due to any contamination that might be present in the control pressure source.

#### Maintenance

Model DX actuators are lightweight and designed for ease of maintenance. All non-metallic seals and other parts are easily replaceable.

### AVAILABLE SIZES

Model	Size	Stroke
DX 10	10"	Up to 2 <sup>1</sup> / <sub>16</sub> " bore
DX 12	12"	Up to 3 <sup>1</sup> / <sub>8</sub> " bore
DX 15	15"	Up to 4 <sup>1</sup> / <sub>16</sub> " bore
DX 18	18"	Up to 5 <sup>1</sup> / <sub>8</sub> " bore
DX 20	20"	Up to 4 <sup>1</sup> / <sub>16</sub> " bore

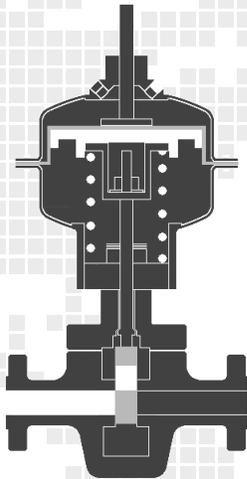
# FAIL-SAFE OPERATION

Fail "closed" operation is depicted

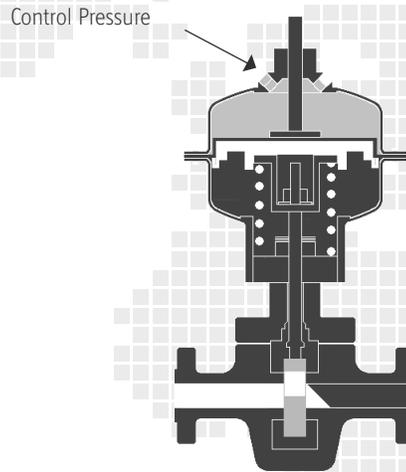
Fail "open" operation is available upon request



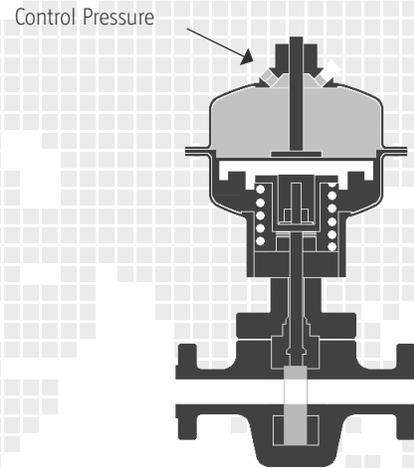
*Pneumatic Actuation*



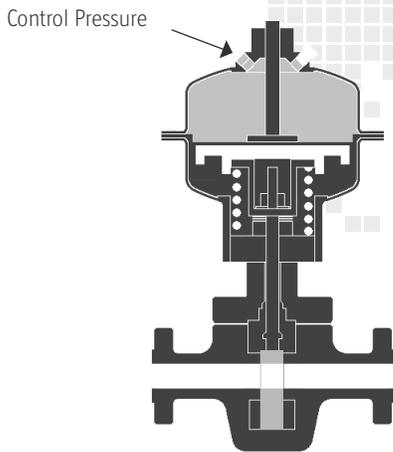
When no control pressure is applied to actuator, valve is in closed position (gate all the way up)



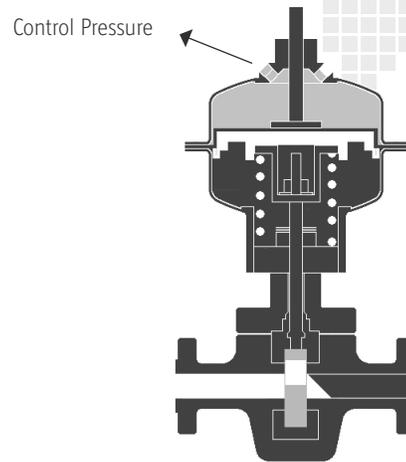
Upon application of adequate control pressure to the actuator, valve begins to open (gate moves down)



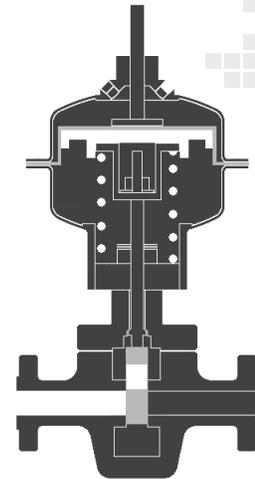
With continued application of adequate control pressure, valve moves to the fully open position (gate all the way down)



Valve remains in fully open position as long as adequate control pressure is present (gate all the way down)



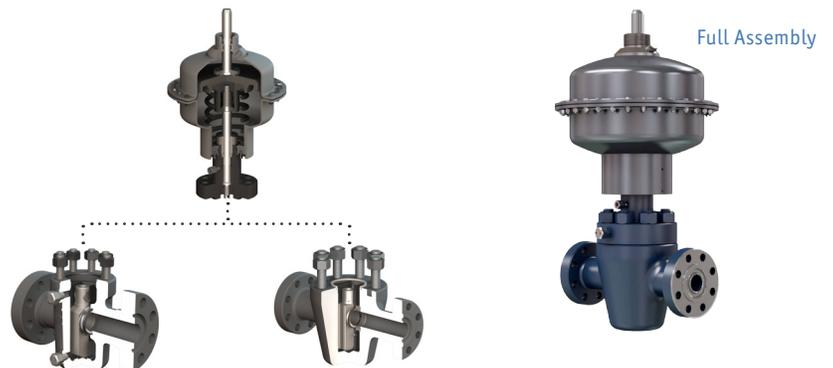
Upon loss of control pressure, valve begins to close (gate moves up)



Valve fully closes and remains closed until application of control pressure to the actuator (gate all the way up)

## OMNI GATE VALVES PREPARED FOR ACTUATOR:

Omni offers a complete line of cast and forged body reverse acting slab gate valves prepared for actuator. All Omni valves prepared for actuator are designed to be used as surface safety valves for oil and natural gas wellhead, manifold or other critical service applications with operating pressures from 2,000 to 15,000 psi.



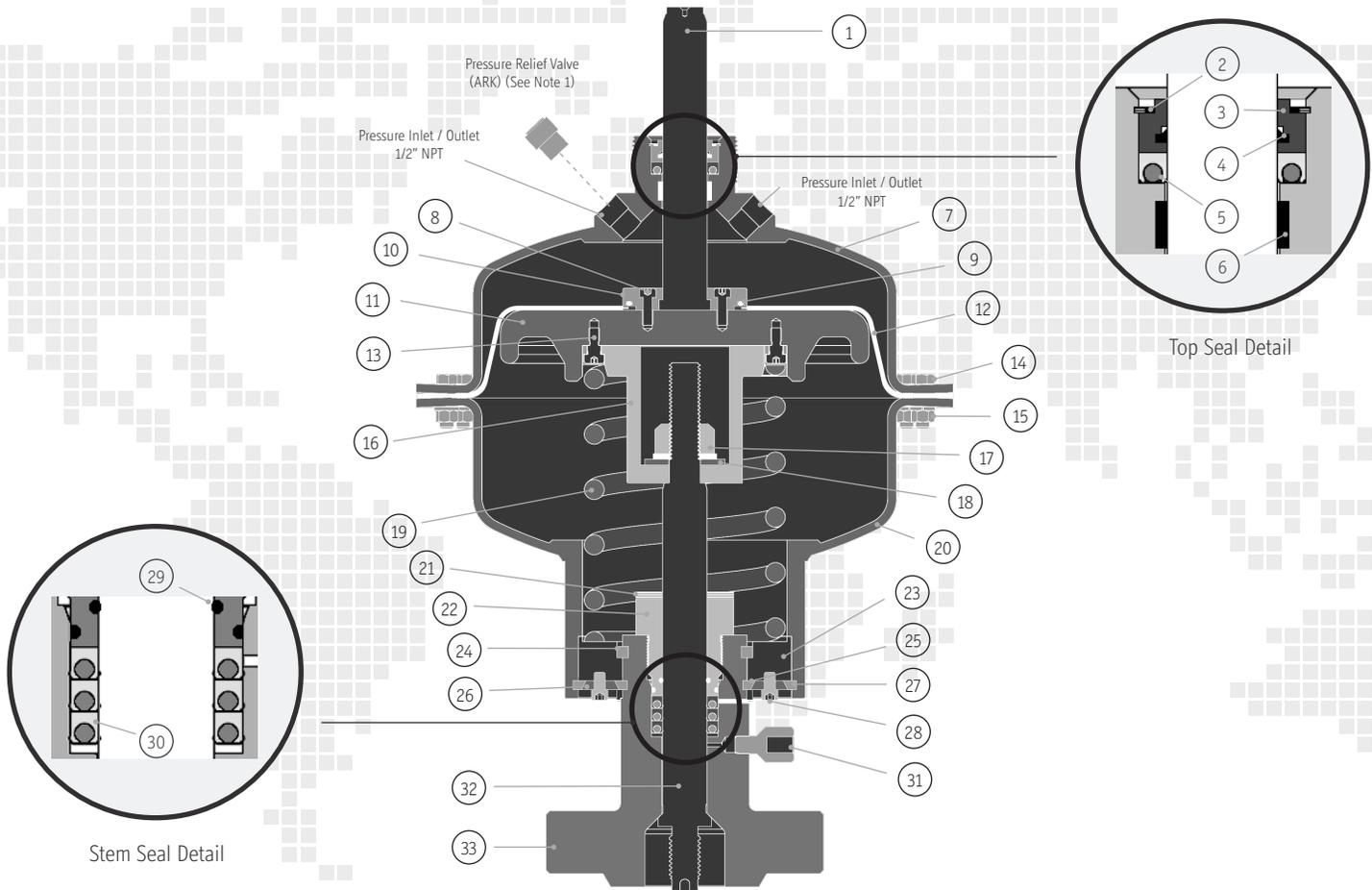
# INTERNAL CONFIGURATION

Actuator depicted with typical 3,000/5,000 psi bonnet

See note 3 below



Pneumatic Actuation



Component	Description	Qty
1	Upper Shaft	1
2	Shaft Seal Retainer Ring	1 (ARK)
3	Shaft Seal Retainer	1 (ARK)
4	Rod Wiper	1 (ARK)
5	Upper Shaft Seal	1 (ARK)
6	Wear Band	1 (ARK)
7	Upper Housing	1
8	Upper Shaft Retainer Bolts	6
9	Upper Shaft Retainer O-Ring	1 (ARK)
10	Upper Shaft Retainer	1
11	Diaphragm Retainer Plate	1
12	Diaphragm	1 (ARK)
13	Spring Retainer Cup Bolt	2
14	Housing Bolts (See Note 2)	Varies (ARK)
15	Housing Washer / Nuts (See Note 2)	Varies (ARK)
16	Spring Retainer Cup	1
17	Stem Nut - Nylock	1

Component	Description	Qty
18	Stem Washer	1
19	Spring	1
20	Lower Housing	1
21	Drift Shims	3
22	Packing Retainer	1
23	Bonnet Ring	1
24	Upper Bonet Retaining Ring	2 (AAK)
25	Lower Bonet Retaining Ring	2 (AAK)
26	Bonnet Clamp Ring	2 (AAK)
27	Spring Retainer Snap Ring	4 (AAK)
28	Bonnet Clamp Ring Bolts	4 (AAK)
29	Packing Retainer O-Ring	2 (BRK)
30	Stem Seals	3 (BRK)
31	Bonnet Vent Fitting	1
32	Operating Stem (See Note 3)	1
33	Bonnet (See Note 3)	1

(AAK = Actuator Attachment Kit Item)  
 (ARK = Actuator Redress Kit Item)  
 (BRK = Bonnet Redress Kit Item)

**Note 1:** Pressure relief valve is set at 170 psi. Valve will relieve any pressure above 170 psi inside the upper housing and then automatically reset.

**Note 2:** The number of housing bolts, washers and nuts depends on actuator model. DX-10 (24) / DX-12 (24) / DX-15 (32) / DX-18 (48) / DX-20 (60)

**Note 3:** Represents the number of bonnet clamp ring bolts in standard configurations of Omni's Model DX Actuator. Tandem applications or custom configurations of Model DX Actuators could contain different quantities of this item. In these cases, the number of bonnet clamp ring bolts will be identified in the data book provided with the order.

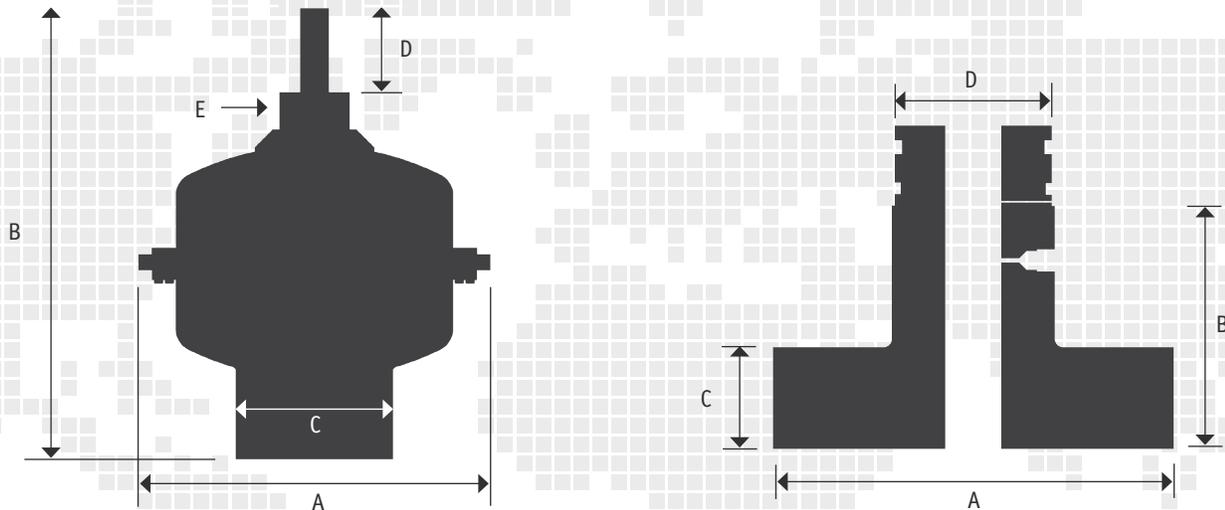
**Note 4:** The specific configuration of bonnet and operating stem is dependent on valve design. Omni Model DX actuators can be adapted to operate valves from any valve manufacturer.

# DIMENSIONAL DATA

## Specifications



Pneumatic Actuation



### ACTUATOR DATA

Actuator Model	Stroke Identifier	Size	Max Valve Stroke	A		B		C		D		E Thread	Swept Volume		Weight	
				in	mm	in	mm	in	mm	in	mm		in <sup>3</sup>	cm <sup>3</sup>	lb	kg
DX-10	-2	10"	2 1/16"	13.1	333	16.08	408	5.6	142	2.82	72	2.5" - 8 UNC 2A	158	2,587	67	30
DX-12	-2	12"	2 1/16"	15.1	384	19.05	484	6.75	171	3.24	82	3.0" - 8 UNC 2A	236	3,864	110	50
DX-12	-3	12"	3 1/8"	15.1	384	19.43	494	6.75	171	3.61	92	3.0" - 8 UNC 2A	300	5,000	108	49
DX-15	-2	15"	2 1/16"	18.2	462	20.7	526	7.9	201	2.92	74	3.0" - 8 UNC 2A	369	6,040	152	69
DX-15	-3	15"	3 1/8"	18.2	462	22.2	564	7.9	201	4.42	112	3.0" - 8 UNC 2A	446	7,303	153	69
DX-15	-4	15"	4 1/16"	18.2	462	22.85	580	7.9	201	5.07	129	3.0" - 8 UNC 2A	725	11,882	157	71
DX-18	-2	18"	2 1/16"	21.1	536	20.55	522	7.9	201	2.89	73	3.0" - 8 UNC 2A	530	8,677	188	85
DX-18	-3	18"	3 1/8"	21.1	536	21.73	552	7.9	201	4.07	103	3.0" - 8 UNC 2A	642	10,527	189	86
DX-18	-4	18"	4 1/16"	21.1	536	23.11	587	7.9	201	5.45	138	3.0" - 8 UNC 2A	1,042	17,070	194	88
DX-18	-6	18"	5 1/8"	21.1	536	27.11	689	7.9	201	7.45	189	3.0" - 8 UNC 2A	1,465	24,005	232	105
DX-20	-2	20"	2 1/16"	23.46	596	21.56	548	7.9	201	2.83	72	3.0" - 8 UNC 2A	659	10,799	262	119
DX-20	-3	20"	3 1/8"	23.46	596	22.73	577	7.9	201	4	102	3.0" - 8 UNC 2A	799	13,101	263	119
DX-20	-4	20"	4 1/16"	23.46	596	23.95	608	7.9	201	5.22	133	3.0" - 8 UNC 2A	1,234	20,227	268	122
DX-20	-6	20"	5 1/8"	23.46	596	27.95	710	7.9	201	7.22	183	3.0" - 8 UNC 2A	1,823	29,875	321	146
DX-20	-7	20"	7 1/16"	23.46	596	28.95	735	7.9	201	8.22	209	3.0" - 8 UNC 2A	2,093	34,298	385	175

### BONNET DATA

Valve Size	Working Pressure	A		B		C		D		Weight		Valve Size	Working Pressure	A		B		C		D		Weight	
		in	mm	in	mm	in	mm	in	mm	lb	kg			in	mm	in	mm	in	mm	in	mm	lb	kg
2 1/16"	2,000	6.38	161	4.45	114	1.2	30	3	76	17	7	1 13/16"	10,000	8.94	227	5.48	139	2.3	58	3.5	89	41	19
2 9/16"	2,000	7.28	184	4.96	125	1.4	36	3.5	89	30	14	2 1/16"	10,000	9	229	5.49	139	3	76	3.5	89	50	23
3 1/8"	2,000	8.5	215	5.13	130	2	51	3.5	89	36	16	2 9/16"	10,000	9.38	238	6.23	158	3.2	81	3.5	89	59	27
4 1/16"	2,000	11	279	5.44	138	2.14	54	4.25	108	70	32	3 1/16"	10,000	10.12	257	7.2	183	3.72	94	3.5	89	75	34
5 1/8"	2,000	13.07	331	6.54	166	2.68	68	5.2	132	99	44	4 1/16"	10,000	12.69	322	7.5	191	4.19	106	4.25	108	137	62
7 1/16"	2,000	15.53	394	7.2	183	3	76	7.2	183	204	92	5 1/16"	10,000	15	381	8	203	5.5	139	9	228	190	86
3 1/8"	3,000	9.03	229	4.23	107	1.58	40	3	76	41	19	7 1/16"	10,000	18	457	10	254	5.75	146	10.1	257	235	106
4 1/16"	3,000	11.9	302	5.31	135	2.14	54	4.25	108	75	14	1 13/16"	15,000	9.53	242	6.21	158	3.23	82	3.5	89	61	28
5 1/8"	3,000	13.07	331	6.54	166	2.68	68	5.2	132	106	48	2 1/16"	15,000	9.53	242	6.43	163	3.29	84	3.5	89	61	28
7 1/16"	3,000	15.53	394	7.2	183	3	76	7.2	183	210	95	2 9/16"	15,000	11.25	286	7.23	184	3.75	95	3.5	89	95	43
2 1/16"	3/5,000	7.16	182	4.23	107	1.58	40	3	76	19	8	3 1/16"	15,000	13.38	340	8.41	214	4.13	105	3.5	89	153	69
2 9/16"	3/5,000	7.8	198	5.31	135	2.14	54	3.5	89	30	14	4 1/16"	15,000	13.75	349	9	228	5	127	6.5	165	160	72
3 1/8"	5,000	9.03	229	5.48	139	2.43	62	3.5	89	41	19	5 1/8"	15,000	16.5	419	8	203	6.1	155	9	228	220	99
4 1/16"	5,000	11.9	302	5.5	140	2.59	66	4.25	108	80	36	7 1/16"	15,000	19.8	503	10	254	6.75	171	10.1	257	253	114
5 1/8"	5,000	13.07	331	6.88	174	2.68	68	5.2	132	109	49												
7 1/16"	5,000	15.53	394	7.2	183	3	76	7.2	183	210	95												

NOTE: Bonnet dimensions provided are for Omni standard actuated bonnets. Dimensions for other manufacturers' bonnets could vary from those provided. In cases where Omni will provide actuators on valves provided by other manufacturers, Omni will supply complete dimensional drawings as part of the documentation package associated with the order.

# ACTUATOR CONTROL PRESSURES

## Model DX



### Pneumatic Actuation

Bore Size	Working Pressure	Actuator Model									
		DX-10		DX-12		DX-15		DX-18		DX-20	
		Equation	PSI	Equation	PSI	Equation	PSI	Equation	PSI	Equation	PSI
2 1/16"	2,000	0.028 x WP + 6 psi =	62	0.018 x WP + 4 psi =	40						
2 9/16"	2,000			0.025 x WP + 5 psi =	55	0.015 x WP + 3 psi =	33				
3 1/8"	2,000			0.035 x WP + 5 psi =	75	0.021 x WP + 3 psi =	45	0.015 x WP + 2 psi =	32		
4 1/16"	2,000					0.031 x WP + 4 psi =	66	0.021 x WP + 3 psi =	45	0.017 x WP + 2 psi =	36
5 1/8"	2,000									0.027 x WP + 3 psi =	57
7 1/16"	2,000									0.048 x WP + 3 psi =	99
2 1/16"	3,000	0.028 x WP + 6 psi =	91	0.018 x WP + 4 psi =	58						
2 9/16"	3,000			0.025 x WP + 5 psi =	80	0.015 x WP + 3 psi =	48				
3 1/8"	3,000			0.035 x WP + 5 psi =	110	0.021 x WP + 3 psi =	63	0.015 x WP + 2 psi =	47		
4 1/16"	3,000					0.031 x WP + 4 psi =	97	0.021 x WP + 3 psi =	66	0.017 x WP + 2 psi =	53
5 1/8"	3,000									0.027 x WP + 3 psi =	84
7 1/16"	3,000									0.048 x WP + 3 psi =	147
2 1/16"	5,000	0.028 x WP + 6 psi =	147	0.018 x WP + 4 psi =	94						
2 9/16"	5,000			0.025 x WP + 5 psi =	130	0.015 x WP + 3 psi =	78				
3 1/8"	5,000			0.035 x WP + 5 psi =	180	0.021 x WP + 3 psi =	105	0.015 x WP + 2 psi =	77		
4 1/16"	5,000					0.031 x WP + 4 psi =	159	0.021 x WP + 3 psi =	108	0.017 x WP + 2 psi =	87
5 1/8"	5,000									0.027 x WP + 3 psi =	138
7 1/16"	5,000	Under most circumstances a single DX actuator will not be sufficient - please contact Omni for options									
1 13/16"	10,000					0.013 x WP + 3 psi =	133	0.009 x WP + 2 psi =	92	0.007 x WP + 2 psi =	72
2 1/16"	10,000					0.014 x WP + 3 psi =	143	0.010 x WP + 2 psi =	102	0.008 x WP + 2 psi =	82
2 9/16"	10,000					0.016 x WP + 3 psi =	163	0.011 x WP + 2 psi =	112	0.009 x WP + 2 psi =	92
3 1/8"	10,000							0.015 x WP + 2 psi =	152	0.012 x WP + 2 psi =	122
4 1/16"	10,000	Under most circumstances a single DX actuator will not be sufficient - please contact Omni for options									
5 1/8"	10,000	Under most circumstances a single DX actuator will not be sufficient - please contact Omni for options									
7 1/16"	10,000	Under most circumstances a single DX actuator will not be sufficient - please contact Omni for options									
1 13/16"	15,000							0.009 x WP + 2 psi =	137	0.007 x WP + 2 psi =	107
2 1/16"	15,000							0.010 x WP + 2 psi =	152	0.008 x WP + 2 psi =	122
2 9/16"	15,000									0.011 x WP + 2 psi =	167
3 1/8"	15,000	Under most circumstances a single DX actuator will not be sufficient - please contact Omni for options									
4 1/16"	15,000	Under most circumstances a single DX actuator will not be sufficient - please contact Omni for options									
5 1/8"	15,000	Under most circumstances a single DX actuator will not be sufficient - please contact Omni for options									
7 1/16"	15,000	Under most circumstances a single DX actuator will not be sufficient - please contact Omni for options									

### STANDARD ACTUATOR SPECIFICATIONS

Maximum Operating Pressure (See Note 1)	170 PSI	Pressure relief device on actuator is set at 170 PSI
Upper Housing Test Pressure	255 PSI	Upper housings are subjected to pressure test
API Material Class	AA / BB / CC	Not appropriate if control source contains H2S (is sour)
API Temperature Rating	P (-20 F to 180 F)	(-29 C to 82 C)

### STANDARD BONNET SPECIFICATIONS

Adaptable to Following Valve Brands	Model DX actuator can be adapted to fit valves from any manufacturer that can supply accurate valve interface information.	
Available Sizes (See Note 4)	API 6A 1 13/16" to 7 1/16"	API 6D / ANSI 2" to 10"
Available Pressure Ratings	API 6A 2,000 to 15,000 PSI	API 6D / ANSI Class 150 to 2500
Available API Material Classes (See Note 2)	AA BB CC	For Non-Sour (Non-NACE) Service
	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-0,5 HH-1,5 HH-NL
Available API Product Specification Level (PSL)	PSL-1, 2, or 3	
Available API Temperature Ratings (See Note 5)	L (-50 F) to X (350 F)	(-46 C) to (177 C)

Note 1: All specifications listed on this technical bulletin are subject to change without notice.

Note 2: Specific materials of construction for all material classes and temperature ratings can be changed upon customer request; however, Omni reserves the right to monogram Actuators and Bonnets with material class "ZZ" as per API requirements if the materials of construction requested by the customer do not meet the current requirements of NACE MR 0175 / ISO 15156.

Note 3: Maximum Operating Pressure refers to the control pressure source.

Note 4: Omni will develop actuated solutions for other valve sizes upon request.

Note 5: In cases where the bonnet carries a temperature rating above P (U or X for example), mating the bonnet to an actuator will not cause the actuator's temperature rating to be increased. In these cases, it is appropriate to consider the actuator and bonnet assembly to have a temperature rating equivalent to the lower rating of the bonnet or actuator.

# ACTUATOR REDRESS KITS AND ACCESSORIES

## Product Warranty



### Pneumatic Actuation

Omni stocks redress kits for all of its actuator models. Kit contents are listed below for the three different redress kits available for the Model DX Actuator. Contact an Omni sales representative to order.

#### (ARK) Actuator Redress Kit Contents

#	Description	Qty
1	Pressure Relief Valve (See Note 1)	1
2	Shaft Seal Retainer Ring	1
3	Shaft Seal Retainer	1
4	Rod Wiper	1
5	Upper Shaft Seal	1
6	Wear Band	1
7	Upper Shaft Retainer Bolt	6
8	Upper Shaft Retainer O-Ring	1
9	Diaphragm	1
10	Housing Bolts (See Note 2)	*
11	Housing Washers / Nuts (See Note 2)	*

#### (AAK) Actuator Attachment Kit Contents

#	Description	Qty
1	Upper Bonnet Retaining Ring <sup>3</sup>	2
2	Lower Bonnet Retaining Ring	2
3	Bonnet Clamp Ring (See Note 3)	*
4	Spring Tube Retaining Ring	4
5	Bonnet Clamp Ring Bolts	4

**Note 1:** Pressure relief valve is set at 170 psi. Valve will relieve any pressure above 170 psi inside the upper housing and then automatically reset.

**Note 2:** The number of housing bolts, washers and nuts depends on actuator model DX-10 (24) / DX-12 (24) / DX-15 (32) / DX-18 (48) / DX-20 (60)

#### (BRK) Bonnet Redress Kit Contents

#	Description	Qty
1	Packing Retainer O-Ring	2
2	Stem Seals	3

**Note 3:** Represents the number of bonnet clamp ring bolts in standard configurations of Omni's Model DX Actuator. Tandem applications or custom configurations of Model DX Actuators could contain different quantities of this item. In these cases, the number of bonnet clamp ring bolts will be identified in the data book provided with the order.

#### LIMITED PRODUCT WARRANTY

All products manufactured or sold by Omni are warranted against defects of material and workmanship for a period of twelve (12) months from the date of installation or eighteen (18) months from date of shipment, whichever period first expires, when all such products are used in the service and within the pressure range for which they were manufactured.

In the case of products or parts not wholly of Omni's manufacture, Omni's liability shall be limited to the extent of Omni's recovery from the original manufacturer of such products or parts under its warranty or liability to Omni.

Any repair work performed by Omni is warranted for one year from completion of such repairs and applies only to work performed. If, within these specified periods, Omni receives notice from Buyer of any alleged defect in or nonconformance of any product or repair and if in Omni's sole judgment the product or repair does not conform or is found to be defective in material or workmanship, then, Buyer shall, at Omni's request, return the part or product F.O.B. to Omni's designated plant or service location.

Omni has no liability for removal or reinstallation of products or equipment. Omni, at its option and expense, shall repair or replace the defective part or product, or repay to Buyer the full price paid by Buyer for such defective part, repair or product. Any repayment of purchase price shall be without interest.

Omni's warranty liability, including defects caused by Omni's negligence, shall be limited to such repair, replacement or refund, and shall not include claims for labor costs, expenses of Buyer resulting from such defects, recovery under general tort law or strict liability or for damages resulting from delays, loss of use, or other direct, indirect, incidental or consequential damages of any kind.

Omni will not be responsible for failures of products which have been in any way tampered with or altered by anyone other than an authorized representative of Omni, failures due to lack of compliance with recommended maintenance procedures or products which have been repaired or altered in such a way (in Omni's judgment) as to affect the products adversely.

THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS, STATUTORY OR IMPLIED, INCLUDING THE WARRANTY OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE WHICH EXCEED THE FOREGOING WARRANTY.

If you have questions regarding this warranty or if you would like information about other Omni products and services please contact us at the address and phone numbers below.

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#### API Certified 6A-1344



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