



ITT

Pure-Flo®

## Advantage® Excel - Series S Actuator



*Engineered for life*

[www.ittpureflo.com](http://www.ittpureflo.com)

# Advantage<sup>®</sup> Excel - Series S Actuator

The Advantage Excel - Series S (AXS) is the latest addition to the process proven Advantage Actuator product line. Designed as a maintenance free actuator, it is engineered to handle the most demanding requirements of the bio-processing and pharmaceutical industries. The stainless steel construction of the AXS is suited for severe duty applications, such as SIP and high cycle applications. It has been subjected to extensive life cycle testing far exceeding industry requirements.

The compact size of the AXS provides the utmost in design flexibility. It allows for space saving process designs further minimizing hold up volumes which are critical to increasing efficiency and in the end saving time and money. Engineering improvements in the AXS offer a cost-effective alternative for clean room use, lab environments and other critical applications. With a stainless steel exterior the AXS is perfect for clean room applications requiring both aesthetics and wash down compatibility.

All of this makes the AXS a versatile, feature packed, cost effective option for the demanding Biopharm industry

**Type:** Piston Actuator

**Size Range:**

Inch	0.25 <sup>1</sup>	0.375 <sup>1</sup>	0.50 <sup>1</sup>	0.75	1.00	1.50	2.00
DN	8	10	15	20	25	40	50

<sup>1</sup> Bio-Pure size. Not available in Bio-Tek size.

**Operating Modes:**

Fail Close, Fail Open, Double Acting

**Max Service Pressure:**

150 psig (10 bar)

See sizing charts on pg. 9-11 for exact shutoff pressures



**Max Service Temperature:**

300°F (150°C)

**Max Autoclave Temperature:**

300°F (150°C)

**Max Actuator Chamber Pressure:**

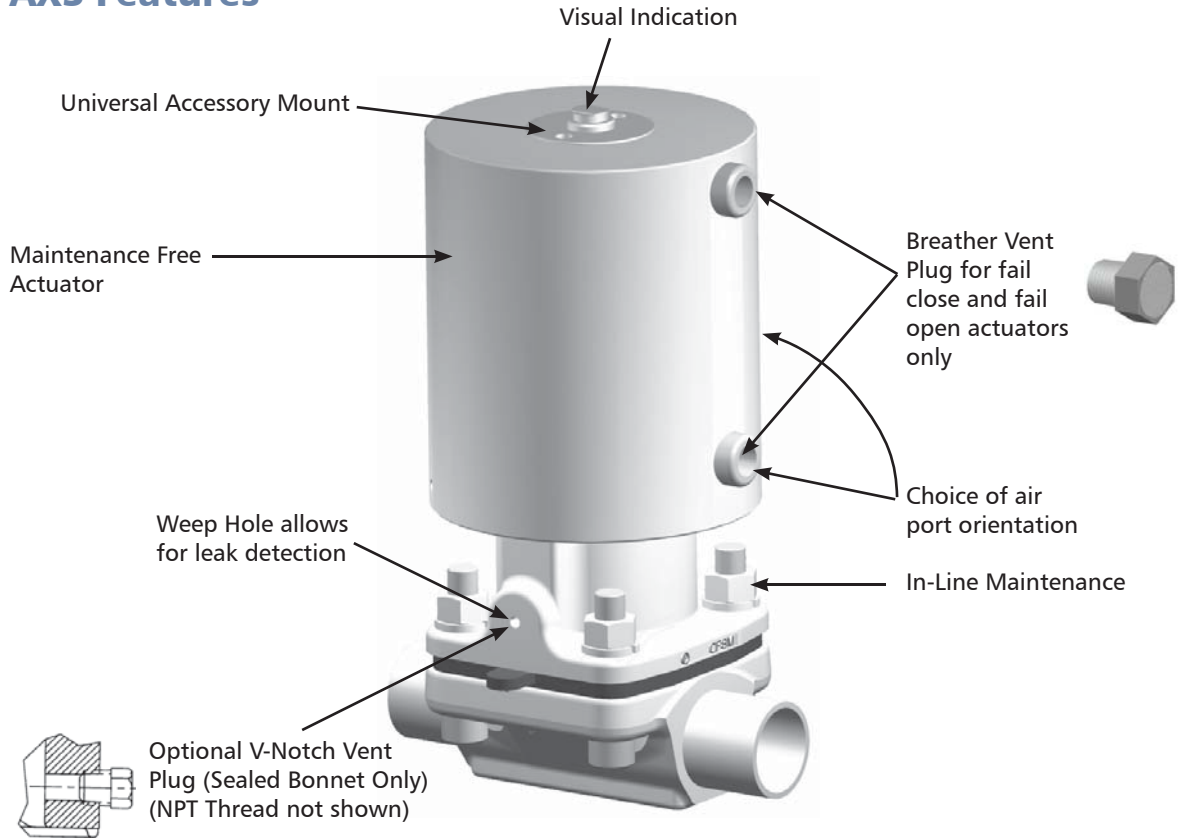
100 psig (7 bar)

**Corrosion Resistance:**

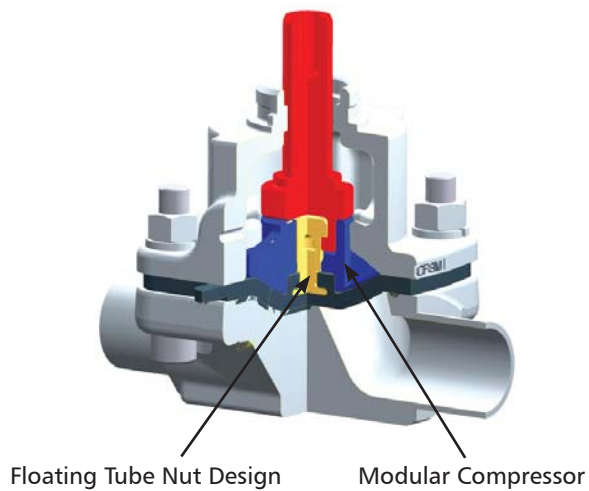
Resists alcohol, chloride and most caustic wash-downs.

# Advantage<sup>®</sup> Excel - Series S Actuator

## AXS Features



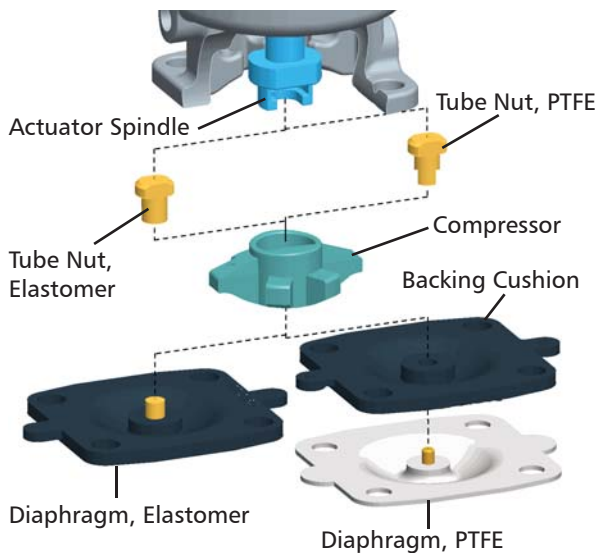
## AXS Internal View



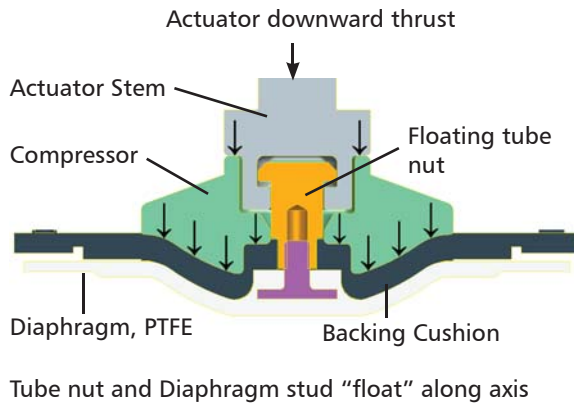
### Diaphragms (0.5-2.0")

Modular compressor design for quick change-over between PTFE and elastomer diaphragms. Changeover kit makes quick diaphragm changes possible.

- Diaphragm changeover kits contain a compressor nut that receives either elastomer or PTFE diaphragm types. Kits for 0.5" (DN 15) and 0.75" (DN 20) include compressors for PTFE and elastomer diaphragms.
- No need to disassemble the actuator.

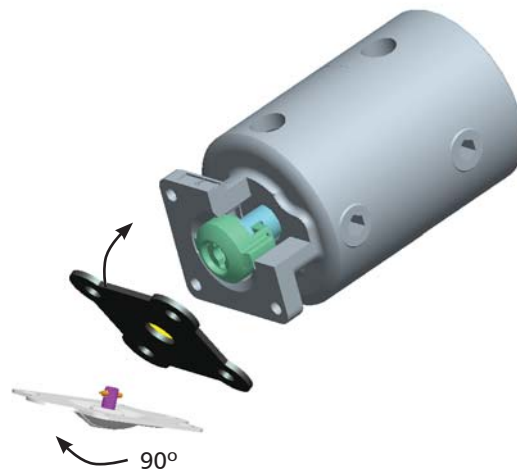


Downward force is applied to compressor by the actuator stem and it bypasses the tube nut to eliminate point load. Compressor, in turn presses diaphragm over weir area of valve body. Compatible with all Pure-Flo diaphragm types. See PFDIA brochure for diaphragm types.



### Bio-Pure Diaphragm Installation

Bio-Pure diaphragm installation is simplified by utilizing the bayonet diaphragm connection. The diaphragm is inserted into the compressor and turned 90°. The bayonet design provides float to eliminate point loading on PTFE diaphragms.



## Automation and Control

The Advantage Excel actuator is complimented by all currently available Pure-Flo switch packages and positioners. This actuator will accept all ITT switch packages as well as third party switch packages.<sup>1</sup>

Value Switch Package (VSP) is shown mounted to a stainless steel actuator for reference.

Adjustable opening stop (AOS) as a stand alone accessory or used in conjunction with a switch package, are available options on the stainless steel actuator.

<sup>1</sup> SP2 not available for Bio-Pure sizes.  
Note: Switch packages are not autoclavable.



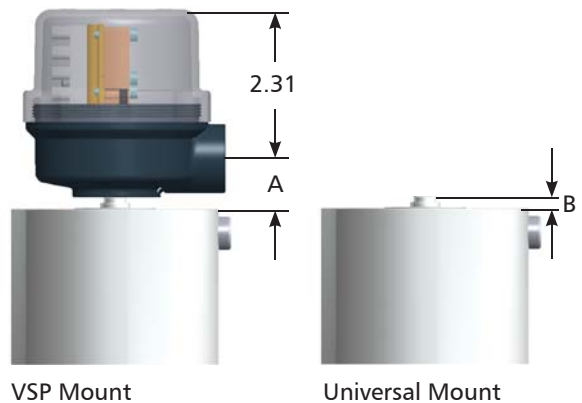
Actuator with VSP Switch Pack

### Switch Pack Options

- No exposed threads
- All currently available Pure-Flo switch packages can be mounted to AOS
- All AOS and switch package options can be added or removed in the field

## Switch Pack Mounting Dimensions

Valve Size		A		B	
		Direct VSP Mount		Universal Switch Pack Mount	
Inch	DN	Inch	mm	Inch	mm
BP	BP	1.01	25,7	-	-
0.50	15	1.01	25,7	0.77	19,6
0.75	20	1.01	25,7	0.77	19,6
1.00	25	1.01	25,7	0.77	19,6
1.50	40	1.51	38,4	0.77	19,6
2.00	50	1.51	38,4	0.77	19,6



## Adjustable Opening Stop

- Adjustable Opening Stop Sealed with Indicator (XAO)
  - Field retrofitable - can be installed on standard actuator
  - Fully sealed, no exposed threads
  - Adjustable by hand
  - Locked with set screw
- Adjustable Opening Stop with Switch Mount (XAOL)
  - No exposed threads
  - No pinch points
  - Field retrofitable - can be installed on standard actuator
  - Accepts VSP, SP3, SP2, and most third party switch offerings
- Adjustable Opening Stop - Bolt Assembly (XOB)
  - Field retrofitable - can be installed on standard actuator
  - Locking nut
  - Economical version

Note: AOS not available for Bio-Pure



Actuator with XAO (Sealed Version)

## Adjustable Opening Stop Options

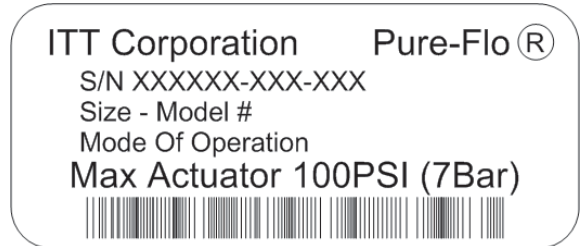
Adjustable Opening Stop Type	Extension from Top of Actuator	
	Inch	mm
XAO	2.28 to 3.10	57,9 to 78,7
XAOL	3.89	98,8
XOB	2.63 to 3.45	66,8 to 87,6



## Identification

Identification label adhered to actuator and contains the following:

- Serial number
- Valve size
- Model number
- Mode of operation
- Maximum actuator chamber pressure rating



Separate label adhered to actuator indicates the mode of operation.

- Fail Close (60#)
- Fail Close (90#)
- Fail Open
- Double Acting



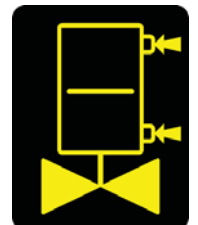
Fail Close (60#)



Fail Close (90#)



Fail Open



Double Acting

# Advantage® Excel - Series S Actuator

## Approximate Maximum Chamber Volume

Valve Size		Fail Close				Fail Open				Double Acting			
		Upper Chamber		Lower Chamber		Upper Chamber		Lower Chamber		Upper Chamber		Lower Chamber	
Inch	DN	in <sup>3</sup>	cm <sup>3</sup>	in <sup>3</sup>	cm <sup>3</sup>	in <sup>3</sup>	cm <sup>3</sup>	in <sup>3</sup>	cm <sup>3</sup>	in <sup>3</sup>	cm <sup>3</sup>	in <sup>3</sup>	cm <sup>3</sup>
BP	BP	See BP-10											
0.50	15	4.2	68,7	1.9	31,8	2.8	46,0	3.8	61,6	3.8	62,1	2.4	39,4
0.75	20	12.1	197,8	4.0	65,7	6.4	104,9	10.1	166,1	13.1	214,8	4.7	76,3
1.00	25	12.8	209,0	4.7	76,6	7.1	116,2	10.8	177,0	13.8	226,0	5.3	87,2
1.50	40	30.1	493,5	11.0	179,8	19.6	321,2	24.5	401,3	36.2	593,0	11.7	191,3
2.00	50	48.5	794,7	20.8	340,7	37.5	614,1	39.1	641,0	59.2	970,3	21.6	354,8

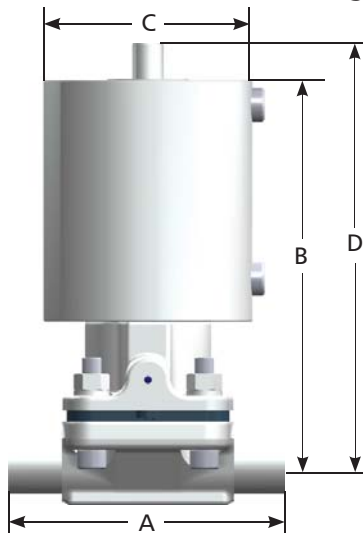
## Actuator Weights (Including Actuator and Forged Body)

Valve Size		Fail Close		Fail Open		Double Acting	
Inch	DN	Lbs.	Kg	Lbs.	Kg	Lbs.	Kg
BP	BP	See BP-10					
0.50	15	4.0	1,8	3.9	1,8	3.9	1,8
0.75	20	7.3	3,3	7.1	3,2	6.6	3,0
1.00	25	8.4	3,8	8.2	3,7	7.7	3,5
1.50	40	16.6	7,5	15.5	7,0	14.4	6,5
2.00	50	24.7	11,2	22.4	10,2	21.0	9,5

## Actuator Weights (Less Body and Diaphragm)

Valve Size		Fail Close		Fail Open		Double Acting	
Inch	DN	Lbs.	Kg	Lbs.	Kg	Lbs.	Kg
BP	BP	See BP-10					
0.50	15	3.5	1,6	3.4	1,5	3.4	1,5
0.75	20	6.4	2,9	6.2	2,8	5.7	2,6
1.00	25	6.8	3,1	6.6	3,0	6.1	2,8
1.50	40	13.3	6,0	12.2	5,5	11.1	5,0
2.00	50	19.3	8,7	16.9	7,7	15.5	7,0

## Dimensional Data with Forged Body



## Valve Stroke

Valve Size	Approx. Stroke
BP	0.16"
BP	4,1 mm
0.50"	0.25"
DN 15	6,3 mm
0.75"	0.30"
DN 20	7,6 mm
1.00"	0.40"
DN 25	10,1 mm
1.50"	0.56"
DN 40	14,2 mm
2.00"	0.78"
DN 50	19,8 mm

Valve Size		A		B		C		D (open)	
Inch	DN	Inch	mm	Inch	mm	Inch	mm	Inch	mm
BP	BP	See BP-10							
0.50	15	3.50	88,9	4.43	112,5	2.61	66,3	4.80	121,8
0.75	20	4.00	101,6	5.62	142,6	3.36	85,3	6.01	152,8
1.00	25	4.50	114,3	6.26	159,0	3.36	85,3	6.78	172,2
1.50	40	5.50	139,7	8.49	215,5	4.15	105,4	9.18	233,1
2.00	50	6.25	158,8	9.39	238,6	4.90	124,5	10.30	261,7

## Advantage® Excel Actuator Sizing - Fail Close

Fail Close Actuators - Air-To-Open, Spring-To-Close (Reverse Acting)														
	Spring Package	Maximum Line Pressure (psig)											Air pressure required to open for full stroke at 0 psi line pressure	
		Valve Size												
		100 % ΔP					0% ΔP							
		BP <sup>2</sup>	.5"	.75"	1"	1.5"	2"	BP <sup>2</sup>	.5"	.75"	1"	1.5"	2"	
Elastomer Diaphragm	60#	See						See						See BP-10
	90#	BP-10						BP-10						
	60#		120					50						65
	90#		150					105						80
	60#			150					80					69
	90#			150					110					74
	60#				150						110			71
	90#				150						130			77
	60#					135						90		61
	90#					150						110		76
	60#						80						55	59
	90#						150						90	77
PTFE Diaphragm <sup>1</sup>	60#	See						See						See BP-10
	90#	BP-10						BP-10						
	60#		60					30						70
	90#		120					50						89
	60#			150					90					69
	90#			150					130					82
	60#				80						50			69
	90#				130						70			80
	60#					50						15		67
	90#					105						60		80
	60#						55						30	62
	90#						100						45	80

Fail Close Actuators - Air-To-Open, Spring-To-Close (Reverse Acting)														
	Spring Package	Maximum Line Pressure (bar)											Air pressure required to open for full stroke at 0 psi line pressure	
		Valve Size												
		100 % ΔP					0% ΔP							
		BP <sup>2</sup>	DN15	DN20	DN25	DN40	DN50	BP <sup>2</sup>	DN15	DN20	DN25	DN40	DN50	
Elastomer Diaphragm	4 bar	See						See						See BP-10
	6 bar	BP-10						BP-10						
	4 bar		7,58					4,83						3,79
	6 bar		10,34					7,24						4,96
	4 bar			10,34					6,89					4,14
	6 bar			10,34					7,58					5,17
	4 bar				10,34					7,58				4,41
	6 bar				10,34					8,96				5,31
	4 bar					7,58						6,21		4,21
	6 bar					10,34						7,58		5,24
	4 bar						5,52						3,79	4,07
	6 bar						10,34						6,55	5,31
PTFE Diaphragm <sup>1</sup>	4 bar	See						See						See BP-10
	6 bar	BP-10						BP-10						
	4 bar		4,14					2,76						4,83
	6 bar		8,27					3,45						6,14
	4 bar			10,34					6,21					4,76
	6 bar			10,34					8,96					5,52
	4 bar				5,52						3,45			4,76
	6 bar				10,34						5,52			5,72
	4 bar					3,45						1,03		4,62
	6 bar					7,24						4,48		5,58
	4 bar						3,79						2,07	4,14
	6 bar						6,89						3,10	5,38

<sup>1</sup> The exposure of the diaphragm to steam may increase the air requirements to close by as much as 30%.  
<sup>2</sup> Bio-Pure includes size .25" (DN8), .375" (DN10), and .5" (DN15).

Note: See PFTOP brochure for ΔP Pressure Drop definition. [www.ittpureflo.com](http://www.ittpureflo.com)

## Advantage<sup>®</sup> Excel Actuator Sizing - Fail Open

Fail Open Actuators - Air-To-Close, Spring-To-Open (Direct Acting)													
	Line Pressure	Air Pressure Required to Close (psig)											
		Bio-Pure <sup>2</sup>		.5"		.75"		1"		1.5"		2"	
		100	0	100	0	100	0	100	0	100	0	100	0
Elastomer Diaphragm	20	See BP-10		49	49	55	56	41	48	31	38	47	59
	40	See BP-10		52	56	58	63	46	56	36	47	52	67
	60	See BP-10		54	63	61	69	50	64	41	55	57	75
	80	See BP-10		56	69	64	75	54	71	46	63	62	83
	100	See BP-10		59	76	67	82	59	79	51	72	67	90
	125	See BP-10		62	84	70	90	64	88	57	82	73	100
	150	See BP-10		64	92	73	97	69	97	62	92	78	-
PTFE Diaphragm <sup>1</sup>	20	See BP-10		61	62	79	67	79	82	64	64	55	66
	40	See BP-10		65	67	83	73	84	90	68	74	60	83
	60	See BP-10		69	72	87	79	89	98	71	83	64	100
	80	See BP-10		72	76	91	84	94	-	74	92	65	-
	100	See BP-10		76	81	95	90	99	-	77	-	73	-
	125	See BP-10		80	87	100	97	-	-	81	-	78	-
	150	See BP-10		84	92	-	-	-	-	84	-	83	-

Fail Open Actuators - Air-To-Close, Spring-To-Open (Direct Acting)													
	Line Pressure	Air Pressure Required to Close (bar)											
		Bio-Pure <sup>2</sup>		DN15		DN20		DN25		DN40		DN50	
		100	0	100	0	100	0	100	0	100	0	100	0
Elastomer Diaphragm	1,38	See BP-10		3,17	3,10	3,72	3,79	2,76	3,10	2,00	2,48	3,03	3,38
	2,76	See BP-10		3,38	3,59	3,93	4,21	3,03	3,65	2,34	3,10	3,45	4,00
	4,14	See BP-10		3,59	4,00	4,07	4,62	3,31	4,21	2,69	3,65	3,79	4,62
	5,52	See BP-10		3,79	4,41	4,21	5,03	3,59	4,76	3,03	4,21	4,14	5,17
	6,89	See BP-10		4,00	4,90	4,41	5,38	3,86	5,31	3,38	4,83	4,48	5,79
	8,62	See BP-10		4,21	5,45	4,62	5,86	4,21	6,00	3,79	5,52	4,96	6,55
	10,34	See BP-10		4,41	5,93	4,76	6,34	4,48	6,48	4,21	6,21	5,38	-
PTFE Diaphragm <sup>1</sup>	1,38	See BP-10		4,76	5,17	4,83	4,55	5,24	5,10	3,93	3,72	3,72	5,17
	2,76	See BP-10		4,96	5,52	5,10	4,90	5,58	5,65	4,21	4,27	4,07	5,86
	4,14	See BP-10		5,17	5,79	5,31	5,24	5,86	6,14	4,41	4,83	4,34	6,55
	5,52	See BP-10		5,38	6,07	5,52	5,58	6,21	6,69	4,62	5,38	4,62	-
	6,89	See BP-10		5,58	6,34	5,72	5,93	6,48	-	4,83	5,93	4,96	-
	8,62	See BP-10		5,79	6,69	6,00	6,34	6,89	-	5,10	6,62	5,31	-
	10,34	See BP-10		6,00	-	6,27	6,69	-	-	5,31	-	5,65	-

Note: See PFTOP brochure for  $\Delta P$  Pressure Drop definition.

<sup>1</sup> The exposure of the diaphragm to steam may increase the air requirements to close by as much as 30%.

<sup>2</sup> Bio-Pure includes size .25" (DN8), .375" (DN10), and .5" (DN15).

## Advantage® Excel Actuator Sizing - Double Acting

Double Acting Actuators - Air-To-Close, Air-To-Open													
	Line Pressure	Air Pressure Required to Close (psig)											
		Bio-Pure <sup>2</sup>		.5"		.75"		1"		1.5"		2"	
		100	0	100	0	100	0	100	0	100	0	100	0
Elastomer Diaphragm	20	See BP-10		27	36	27	30	19	20	18	20	21	23
	40	See BP-10		30	43	30	36	23	27	23	29	27	33
	60	See BP-10		33	50	32	42	26	33	28	37	33	42
	80	See BP-10		36	58	34	48	29	39	32	45	39	54
	100	See BP-10		39	63	37	54	32	45	37	53	44	60
	125	See BP-10		43	71	40	61	36	53	43	63	51	72
	150	See BP-10		46	79	42	68	40	60	48	73	58	83
PTFE Diaphragm <sup>1</sup>	20	See BP-10		52	58	38	36	39	37	47	48	28	34
	40	See BP-10		55	65	42	41	45	46	51	57	34	47
	60	See BP-10		58	71	46	45	50	54	54	65	39	60
	80	See BP-10		60	77	49	49	55	62	57	74	44	73
	100	See BP-10		63	83	53	54	60	71	60	82	49	86
	125	See BP-10		66	91	57	59	67	81	64	93	56	-
	150	See BP-10		69	98	61	64	73	91	68	-	62	-

Double Acting Actuators - Air-To-Close, Air-To-Open													
	Line Pressure	Air Pressure Required to Close (bar)											
		Bio-Pure <sup>2</sup>		DN15		DN20		DN25		DN40		DN50	
		100	0	100	0	100	0	100	0	100	0	100	0
Elastomer Diaphragm	1,38	See BP-10		1,79	2,62	1,86	1,93	1,10	1,38	1,10	1,03	1,03	1,31
	2,76	See BP-10		2,07	2,96	2,07	2,34	1,38	1,86	1,45	1,65	1,45	2,07
	4,14	See BP-10		2,28	3,31	2,21	2,76	1,65	2,28	1,79	2,21	1,79	2,76
	5,52	See BP-10		2,48	3,65	2,34	3,10	1,93	2,69	2,07	2,76	2,14	3,45
	6,89	See BP-10		2,69	4,00	2,48	3,52	2,21	3,17	2,41	3,38	2,48	4,14
	8,62	See BP-10		2,96	4,41	2,69	4,00	2,55	3,72	2,83	4,07	2,96	5,03
	10,34	See BP-10		3,17	4,76	2,83	4,41	2,83	4,21	3,17	4,76	3,38	5,86
PTFE Diaphragm <sup>1</sup>	1,38	See BP-10		3,59	4,00	2,28	2,14	3,38	4,00	2,69	2,83	1,93	2,14
	2,76	See BP-10		3,86	4,48	2,55	2,55	3,65	4,55	2,96	3,38	2,07	3,10
	4,14	See BP-10		4,07	4,90	2,76	2,90	3,93	5,03	3,17	3,93	2,34	4,00
	5,52	See BP-10		4,34	5,38	2,96	3,24	4,21	5,52	3,38	4,48	2,62	4,90
	6,89	See BP-10		4,55	5,79	3,17	3,59	4,48	6,00	3,59	5,03	2,90	5,93
	8,62	See BP-10		4,83	6,34	3,45	4,07	4,83	6,62	3,86	5,72	3,24	-
	10,34	See BP-10		5,10	6,89	3,65	4,48	5,17	-	4,14	6,34	3,52	-

Note: See PFTOP brochure for  $\Delta P$  Pressure Drop definition.

<sup>1</sup> The exposure of the diaphragm to steam may increase the air requirements to close by as much as 30%.

<sup>2</sup> Bio-Pure includes size .25" (DN8), .375" (DN10), and .5" (DN15).

## How to Order

### Actuated Bonnets

Code	Description
AXS1	Fail Open
AXS26	Fail Close with 60# Spring
AXS29	Fail Close with 90# Spring
AXS3	Double Acting
AXS1S	Fail Open (Sealed Bonnet)
AXS26S	Fail Close with 60# Spring (Sealed Bonnet)
AXS29S	Fail Close with 90# Spring (Sealed Bonnet)
AXS3S	Double Acting (Sealed Bonnet)

### Adjustable Opening Stop

Code	Description
XAO	Adjustable Opening Stop Sealed with Indicator
XAOL	Adjustable Opening Stop with Switch Mount
XOB	Adjustable Opening Stop - Bolt Assembly

Note: See PFORD brochure for complete figure number definitions.

### AXS Example with Valve

.5" body with Tri-clamp ends 25  $\mu$ -in. ID, electropolish ID and OD, modified PTFE diaphragm with EPDM backing cushion, Advantage Excel - Series S actuator.

AXS with Valve Figure Number: .5-F-419-6-0-3-TM17-AXS29

Main Valve	Configuration Example	.5	F	419	6	0	3	TM17	AXS29
	Valve Size	.5							
	Body Type		F						
	Body Ends			419					
	Mechanical Polish - Interior				6				
	Mechanical Polish - Exterior					0			
	Electropolish						3		
	Diaphragm							TM17	
	Actuator								AXS29

### AXS Example without Valve

.5" Advatange Excel - Series S actuator with no valve and no diaphragm

AXS Figure Number without Valve: .5-N-PN-AXS29

Main Valve	Configuration Example	.5	N	PN	AXS29
	Valve Size	.5			
	Body Type		N		
	Diaphragm			PN	
	Actuator				AXS29

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