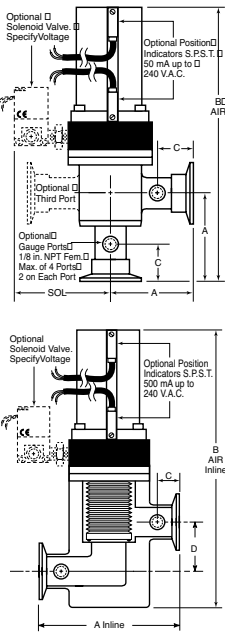




- Less Outgassing Than Stainless, See Page 40
- Aluminum or 304 Stainless Steel Bodies
- Leak Tested to Better Than  $5 \times 10^{-10}$  scc/s
- Select Welded Bellows or O-Ring Stem Seals
- Viton® Seat And Bonnet Seal Are Standard
- Kalrez® Seat & Bonnet Seals Also Available
- Gauge Fittings Available On Either Port
- Failsafe; Choose Spring Close Or Air Close
- All Valves (RoHS) 2015/863/EU Compliant

Aluminum and Stainless Steel Pneumatic or Manual Actuators, Angle or Inline Style with Port Sizes from NW-16 To NW-50

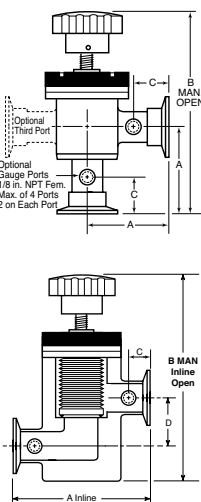


## Air To Open/Spring To Close

(See "Optional Features" on next page for Air Open/Air Close or Spring to Open)

	Part Number For Inline Style replace "ANG" with "INL"	Description	Angle Style			Inline Style				
			Price	A	B Air	C	Price	A	B Air	D
<b>Bellows Stem Seal</b> 1,000,000 Cycles	SS-BEL-ANG-75-AIR	No Flanges, 0.75 O.D.	\$472	2.1	6.2	.85	\$385	4.2	5.9	1.1
	SS-BEL-ANG-133-AIR	1.33 CF on Both Ports	\$522	2.1	6.2	.85	\$429	4.2	5.9	1.1
	SS-BEL-ANG-16-AIR	NW-16 on Both Ports	\$589	2.1	6.2	.85	\$477	4.2	5.9	1.1
	ALUM-BEL-ANG-16-AIR	Aluminum Body, NW-16	\$444	2.1	6.2	.85	\$386	4.2	5.9	1.1
	SS-BEL-ANG-1.0-AIR	No Flanges, 1.00 O.D.	\$561	2.0	5.9	.82	\$434	4.0	6.1	1.4
	SS-BEL-ANG-212-AIR	2.12 CF on Both Ports	\$589	2.0	5.9	.82	\$477	4.0	6.1	1.4
	SS-BEL-ANG-25-AIR	NW-25 on Both Ports	\$589	2.0	5.9	.82	\$477	4.0	6.1	1.4
	ALUM-BEL-ANG-25-AIR	Aluminum Body, NW-25	\$504	2.0	5.9	.82	\$401	4.0	6.1	1.4
	SS-BEL-ANG-1.5-AIR	No Flanges, 1.50 O.D.	\$630	2.4	7.8	.90	\$534	4.8	8.4	1.9
	SS-BEL-ANG-275-AIR	2.75 CF on Both Ports	\$647	2.4	7.8	.90	\$477	4.8	8.4	1.9
<b>O-Ring Stem Seal</b> 250,000 Cycles	ALUM-O-ANG-16-AIR	Aluminum NW-16	\$424	1.6	5.6	.85	\$339	4.2	5.9	1.1
	ALUM-O-ANG-25-AIR	Body with NW-25	\$444	2.0	5.9	.82	\$364	4.0	6.1	1.4
	ALUM-O-ANG-40-AIR	O-Ring NW-40	\$574	2.6	7.8	.90	\$473	4.8	8.4	1.9
	ALUM-O-ANG-50-AIR	Shaft Seal NW-50	\$704	2.8	9.7	1.14	\$576	6.8	11.0	2.6

## Manual Valves



	Part Number For Inline Style replace "ANG" with "INL"	Description	Angle Style			Inline Style				
			Price	A	B Man	C	Price	A	B Man	D
<b>Bellows Stem Seal</b> 1,000,000 Cycles	SS-BEL-ANG-75-MAN	No Flanges, 0.75 O.D.	\$439	2.1	6.2	.85	\$398	4.2	5.9	1.1
	SS-BEL-ANG-133-MAN	1.33 CF on Both Ports	\$462	2.1	6.2	.85	\$400	4.2	5.9	1.1
	SS-BEL-ANG-16-MAN	NW-16 on Both Ports	\$462	2.1	6.2	.85	\$400	4.2	5.9	1.1
	ALUM-BEL-ANG-16-MAN	Aluminum Body, NW-16	\$424	2.1	6.2	.85	\$368	4.2	5.9	1.1
	SS-BEL-ANG-1.0-MAN	No Flanges, 1.00 O.D.	\$439	2.0	5.9	.82	\$408	4.0	6.0	1.3
	SS-BEL-ANG-212-MAN	2.12 CF on Both Ports	\$482	2.0	5.9	.82	\$415	4.0	6.0	1.3
	SS-BEL-ANG-25-MAN	NW-25 on Both Ports	\$482	2.0	5.9	.82	\$415	4.0	6.0	1.3
	ALUM-BEL-ANG-25-MAN	Aluminum Body, NW-25	\$455	2.0	5.9	.82	\$408	4.0	6.0	1.3
	SS-BEL-ANG-1.5-MAN	No Flanges, 1.50 O.D.	\$655	2.4	7.8	.90	\$524	4.8	8.4	2.6
	SS-BEL-ANG-275-MAN	2.75 CF on Both Ports	\$482	2.4	7.8	.90	\$415	4.8	8.4	1.9
<b>O-Ring Stem Seal</b> 250,000 Cycles	ALUM-O-ANG-16-MAN	Aluminum NW-16	\$394	1.6	5.6	.85	\$341	4.2	5.9	1.1
	ALUM-O-ANG-25-MAN	Body with NW-25	\$432	2.0	5.8	.82	\$370	4.0	6.0	1.3
	ALUM-O-ANG-40-MAN	O-Ring NW-40	\$574	2.6	7.8	.90	\$473	4.8	8.4	1.9
	ALUM-O-ANG-50-MAN	Shaft Seal NW-50	\$666	2.8	9.3	1.14	\$502	6.8	10.6	2.6

## 3 Way Valves, Manual or Air Operated



Photo shows an NW-40 valve with optional position indicators on one side and one optional gauge port. Up to 3 gauge ports available at \$28. each.

Aluminum bodies with bellows shaft seal. The standard pneumatic actuator is air to open, spring to close. Other options such as gauge ports and position indicators are available. Two 3-way solenoids required. See below for cost of solenoids.

- NW-16, P/N: 3W-ALUM-BEL-16AIR.....\$991
- NW-25, P/N: 3W-ALUM-BEL-25AIR.....\$1,024
- NW-40, P/N: 3W-ALUM-BEL-40AIR.....\$1,130
- NW-50, P/N: 3W-ALUM-BEL-50AIR.....\$1,275
- NW-16, P/N: 3W-ALUM-BEL-16AIR..... \$935
- NW-25, P/N: 3W-ALUM-BEL-25AIR.....\$961
- NW-40, P/N: 3W-ALUM-BEL-40AIR.....\$1,063
- NW-50, P/N: 3W-ALUM-BEL-50AIR.....\$1,184
- 1/8" NPT GAUGE PORTS, Specify Location.....\$48

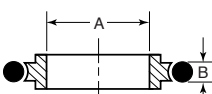
### VCR or 1/8 Inch NPT Ports For Gauge Tubes

VCR-4 or 1/8 inch NPT female ports can be provided on the end or side valve ports. Any number of these ports in any combination can be specified by adding the appropriate suffix to the part number. For example, 1/8 RS suffix would specify a 1/8 inch NPT port on the right of the side port.

**1/8 NPT Port Add: SS valves \$104**

**VCR Port Add: Stainless Steel Only ..... \$188**

Position Reference		P/N for 1/8 NPT Port	PN for VCR Port
RS	Right Side Port	H700020	H700033
LS	Left Side Port	H700021	H700034
RB	Right Bottom Port	H700022	H700035
LB	Left Bottom Port	H700023	H700036



### Centering Rings

304 Stainless Steel With Viton O-Rings  
(Buna-N O-Rings Available)

Flange Size	A	B	Part No	Price
NW-16	0.63 (16)	0.21 (5.3)	CTR-RING 16	\$8.00
NW-25	0.984 (25)	0.21 (5.3)	CTR-RING 25	\$9.00
NW-40	1.575 (40)	0.21 (5.3)	CTR-RING 40	\$13.00
NW-50	1.969 (50)	0.21 (5.3)	CTR-RING 50	\$15.00

## Position Indicators

Pneumatically activated valves can be equipped with a pair of SPST switches to indicate valve open and closed. These unpowered switches have contacts rated for up to 500 mA at up to 240 VAC, non-inductive.

**Add the suffix 'PI'. (Open & Closed). . . Add \$166/pair**

### Optional Third Port for Angle or Inline Valves



Standard angle valves have two ports: one bottom and one side. To add an additional side port for vacuum gauge tube installation, specify the optional third port by simply adding the suffix "3-Port" to any valve part number and add the cost shown below:

- NW-16.....add \$164
- NW40.....add \$243
- NW-25.....add \$213
- NW40.....add \$313

### Spring to Open/Air to Close

For this option, add "SO" to the P/N & add cost below:

- NW-16 ..... add \$81
- NW-25 ..... add \$81
- NW-40 ..... add \$152
- NW-50 ..... add \$165

### Air to Open/Air To Close

Standard valves use air to open and spring to close but as an option the valves can be built for air to open and close. Add the suffix 'AC' to the part number. Note that with this option a 4 way solenoid is required.

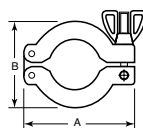
**Air To Close and Open P/N: H700024.....Add \$100**

**1/8 NPT/ISO Adapter Fitting for Air P/N: H700032. N/C**

### Solenoids For Pneumatic Valves

Because many customers use central air manifolds to activate valves we offer these solenoids as an optional rather than standard feature. Solenoids are specified by adding a suffix to Valve part number below.

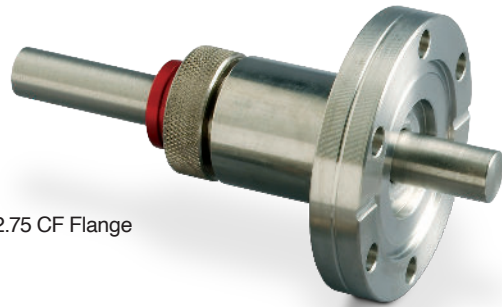
3 Way for Standard, Spring to Close Valves.....\$84		4 Way for Air Open/Air Close Valves.....\$121	
SOL-120 VAC	X134003	SOL-120 VAC	X703005
SOL-230 VAC	X134013	SOL-230 VAC	X134010
SOL-24 VDC	X-134032	SOL-24 VAC	X703041



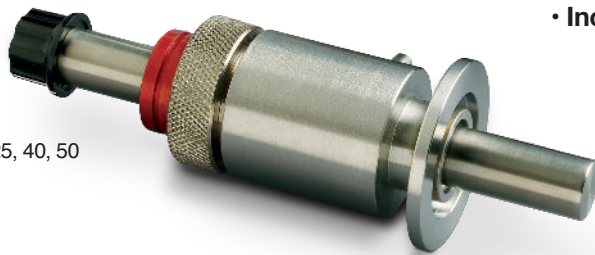
### Clamps

Aluminum Clamps With Wing Nut & Screw Fastener

Flange Size	A	B	Thickness	Part No	Price
NW-16	2.24 (57)	1.69 (43)	0.63 (16)	AL-Clamp 16	\$6.00
NW-25	2.76 (70)	2.17 (55)	0.63 (16)	AL-Clamp 25	\$7.00
NW-40	3.39 (88)	3.39 (88)	0.63 (16)	AL-Clamp 40	\$8.00
NW-50	4.33 (110)	4.33 (110)	0.79 (20)	AL-Clamp 50	\$12.00



2.75 CF Flange



NW-16, 25, 40, 50



For 1" Base Plate Hole



Pipe Thread

- Rotary and Push/Pull in the Same Feedthrough
- High Torque. Use Either Solid or Hollow Shafts
- High Speeds. Tested at 1100 RPM, 24/7 for 90 Days
- Leak Rate Better Than  $5 \times 10^{-10}$  Standard cc/sec
- All Feedthroughs (RoHS) 2015/863/EU Compliant
- 300 Series Stainless Steel or Nickel Plated Brass
- Easy to Replace Viton®, Buna-N, or Kalrez® Seals
- Conflat®, NW or Pipe Thread Connection to System
- Available in Four Shaft Diameters: 1/4", 3/8", 1/2", 5/8"
- Includes Frelon® Bushing on Atmosphere Side

## Test Results

These very rugged and reliable seals have been in production for 50 years and have been tested extensively.

- **800,000 Reciprocal Motions**

Leak rate less than  $5 \times 10^{-10}$  scc/sec after 800,000 reciprocal motions of 1 inch.

- **90 Days at 1,100 RPM**

Feedthrough operated at 1100 RPM for 90 days, 24/7. Leak rate was also less than  $5 \times 10^{-10}$  scc/sec.

- **15 Years on Test Chamber**

Feedthrough on a chamber testing ion thrusters was left under vacuum and unmoved for 15 years.

Feedthrough still did not leak when finally used.

Shaft finish and hardness should be 4 to 12 RMS with a minimum surface hardness of RC 50 for best results. Softer shafting can be used, but both bearing and shafting may wear at accelerated rates. For any given RMS value radiused or polished peaks will provide best rate of wear so electropolished shafts give best results.

Lubrication with a vacuum grease or oil can reduce friction and improve the seal life. Silicone and fluoro-carbon lubricants are not recommended as these lubricant types can inhibit heat flow, increase the seal temperature, and shorten seal life. You may want to consider the products of TorrLube: [www.torrilube.com](http://www.torrilube.com)

Connection to System	Description	Price with Viton® Seals (For Kalrez® add the cost of a pair of Kalrez seals)	Description	Price with Viton® Seals (For Kalrez® add the cost of a pair of Kalrez seals)	Description	Price with Viton® Seals (For Kalrez® add the cost of a pair of Kalrez seals)	Price with Viton® Seals (For Kalrez® add the cost of a pair of Kalrez seals)
<b>Optimum Shaft Specification</b>	1/4 inch* .2495, (-.0000, +.0005)	<b>1/4"</b>	3/8 inch* .3745 (-.0000, +.0005)	<b>3/8"</b>	1/2 inch* .4995 (-.0000, +.0005) 5/8 inch* .6245 (-.0000, +.0005)	<b>1/2"</b>	<b>5/8"</b>
<b>2.75" Conflat®</b>	Model No. 2.75-B01-SS 300 Series Stainless Steel	\$655	Model No. 2.75-B02-SS 300 Series Stainless Steel	\$699	Model No. 2.75-B03-SS 300 Series Stainless Steel	\$734	\$759
<b>NW-16</b>	Model No. 16-B01-SS 300 Series Stainless Steel	\$647	Model No. 16-B02-SS 300 Series Stainless Steel	\$706	Model No. 16-B03-SS 300 Series Stainless Steel	\$706	\$731
<b>NW-25</b>	Model No. 25-B01-SS 300 Series Stainless Steel	\$706	Model No. 25-B02-SS 300 Series Stainless Steel	\$706	Model No. 25-B03-SS 300 Series Stainless Steel	\$706	\$731
<b>NW-40</b>	Model No. 40-B01-SS 300 Series Stainless Steel	\$776	Model No. 40-B02-SS 300 Series Stainless Steel	\$775	Model No. 40-B03-SS 300 Series Stainless Steel	\$771	\$809
<b>NW-50</b>	Model No. 50-B01-SS 300 Series Stainless Steel	\$845	Model No. 50-B02-SS 300 Series Stainless Steel	\$836	Model No. 50-B03-SS 300 Series Stainless Steel	\$884	\$885
<b>Pipe Thread</b>	Model No. P-B01-NB Nickle Plated Brass	\$337	Model No. P-B02-NB Nickle Plated Brass	\$364	Model No. P-B03-NB Nickle Plated Brass	\$380	\$475
	Model No. P-B01-SS 300 Series Stainless Steel	\$706	Model No. P-B02-SS 300 Series Stainless Steel	\$734	Model No. P-B03-SS 300 Series Stainless Steel	\$777	\$749
<b>For 1" Baseplate Through Hole</b>	Model No. 1in-B01-SS, 1/4 in. Shaft Dia.	\$1,052	Model No. 1in-B02-SS 3/8 in. Shaft Dia.	\$1,077	Model No. 1in-B03-SS 1/2 in. Shaft Dia.	\$1,146	
					Model No. 1in-B0-SS 5/8 in. Shaft Dia.	\$1,146	
<b>Replacement Seal Washers (2 required)</b>	Bruna-N, P/N X701101-B	\$8/pair	Bruna-N, P/N X701102-B	\$8/pair	Bruna-N, P/N X701103-B	\$14/pair	
	Viton®, P/N X701101-V	\$14/pair	Viton®, P/N X701102-V	\$14/pair	Viton®, P/N X701103-V	\$23/pair	
	Kalrez®, P/N X701101-K	\$94/pair	Kalrez®, P/N X701102-K	\$140/pair	Kalrez®, P/N X701103-K	\$229/pair	

\***Shaft Diameter:** Shaft is not included. Best performance will result when your shaft diameter is held to these diameters, but smaller diameters are acceptable. See below for optional shaft material.

Shaft Diameter	NW-16			NW-25			NW-50			PIPE THREAD		
	A	B	C	A	B	C	A	B	C	A	B	C
1/4" shaft	2.35	1.00	1.00	2.26	.09	1.00	2.26	.09	1.0	1/4" NPT		
										2.73	1.39	1.00 Across Flats
3/8" shaft	2.35	1.00	1.13	2.35	1.00	1.13	2.80	1.50	1.13	3/8" NPT		
										2.75	1.38	1.125 Across Flats
1/2" & 5/8" shaft	2.38	1.00	1.25	2.38	1.00	1.25	2.50	1.13	1.25	1/2" NPT		
										2.76	1.38	1.25 Across Flats

### Optional Precision Shaft Material\*

Size	Part Number	Price
1/4" O.D. X 18" (457mm) long	P/N: SHFT-.25-18-316	\$55 ea
3/8" O.D. X 18" (457mm) long	P/N: SHFT-.37-18-316	\$114 ea
1/2" O.D. X 18" (457mm) long	P/N: SHFT-.50-18-316	\$133 ea

\*The shaft is not included with the feedthrough. Most customers provide their own shaft but we offer this material as a convenience.

