

Valve

Solutions

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Two-Stage Valves

SOFT START VACUUM VALVES



Features and Benefits

- Provides soft pumpdown and isolation of your vacuum system
- Reduces particulate contamination during early turbulent pumpdown
- Adjustable conductance for variable pumpdown speed
- Eliminates the need for small bypass lines that clog easily
- Bellows-sealed poppet valves
- Bellows are formed for less particle trapping and a longer cycle life
- Angle or inline option
- Available in five port diameters ranging from 1 - 4 inches
- Choice of KF flanges, CF flanges, or weld stubs, as well as ISO-Universal flanges for larger port sizes

Applications

To achieve a soft pumpdown and isolate your vacuum system, MKS recommends its Two-Stage Valve. It integrates a small bypass valve into an isolation valve, significantly simplifying system setup and reducing costs.

The Two-Stage Valve is best suited for high vacuum applications, specifically semiconductor or optical processing for which a cleaner environment is necessary. With the integrated slow pumpdown feature, turbulent flow is diminished preventing contamination buildup and damage to your product.

Description

Traditionally, the method to soft start a vacuum system had been to run a secondary bypass line with a small orifice valve around the main vacuum isolation valve. The use of bypass lines in semiconductor nitride and etch processes requires special engineered designs that are hardware intensive. These lines also clog easily and result in higher costs.

MKS has designed the Two-Stage Valve specifically to accommodate space constraints and soft start the system in two steps. In the first stage, the bypass valve allows slow pumping from atmospheric pressure to a user-specified vacuum pressure. In the second stage, the main valve opens, allowing use of full pumping speed.

The Two-Stage Valve features a removable small orifice within the bypass valve to vary slow pump speeds. The standard bypass orifice diameter is 0.225 inches. See specifications for other available sizes. A normally closed, pneumatically actuated valve at both stages, the Two-Stage Valve is offered with an optional thumbscrew or micrometer head for the bypass valve.

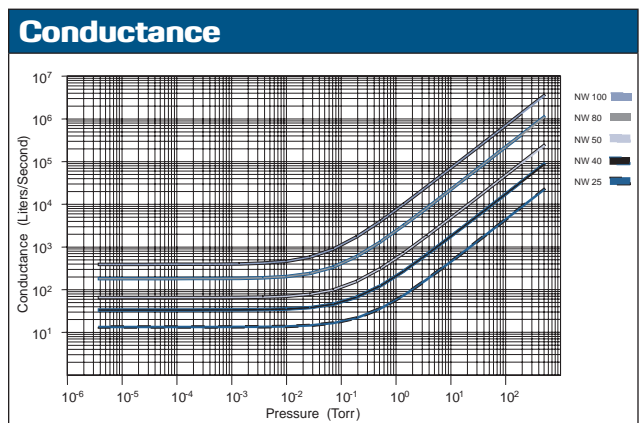
This allows for flow adjustment by limiting the stroke.

The body is made of high grade, corrosion resistant, 304 stainless steel using clean, tungsten inert gas (TIG) welding for significantly fewer entrapment areas, resulting in less contaminant build-up.

A formed 321 stainless steel bellows, not edge-welded, prevents outgassing, virtual leaks, and particle entrapment between bellows convolutions and extends the valve's cycle life. The bellows stroke length is optimized to ensure a longer cycle life while maintaining a high conductance.

Elastomer seal choices include Viton® and Chemraz®, which has a higher chemical resistance. Vacuum exposed parts are clean and free of lubricants.

Options include air solenoids for electropneumatic control and a limit switch for the main valve for remote indication of valve position (open or closed). If a heated Two-Stage Valve is required, please refer to our Jalapeño Valve brochure.



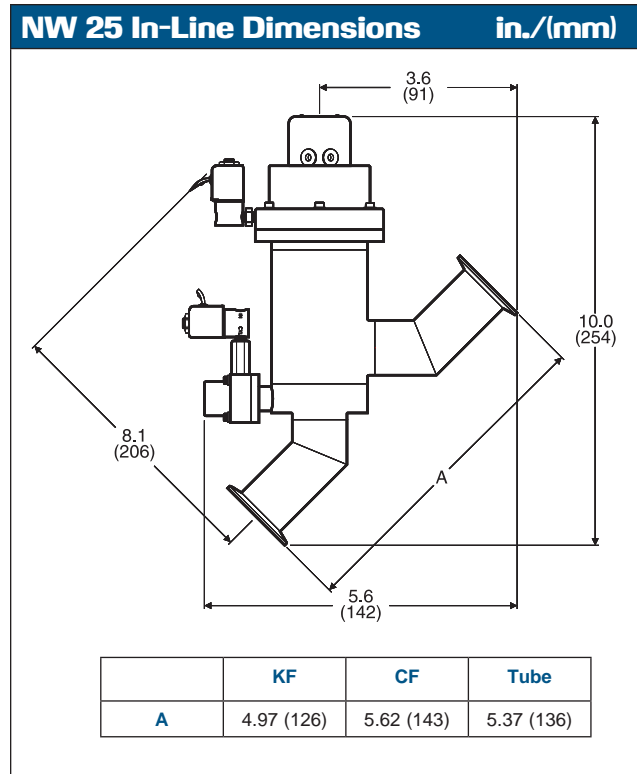
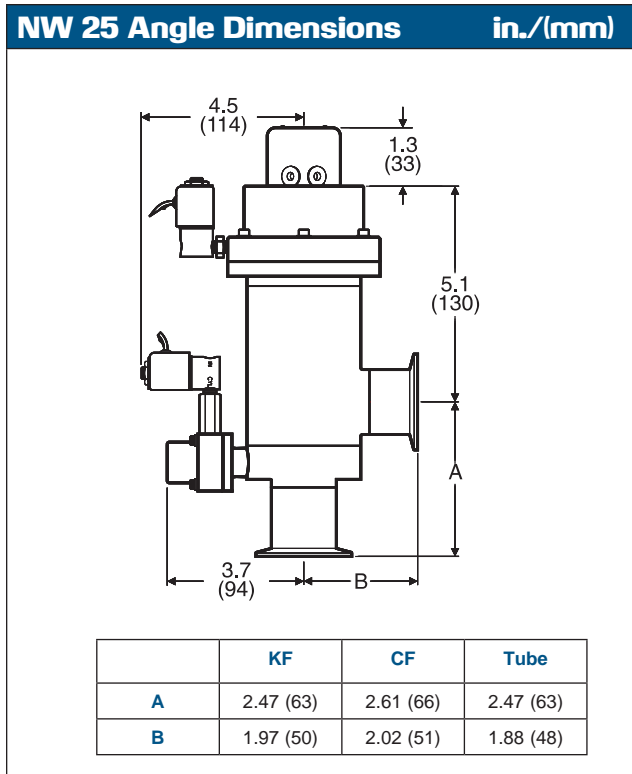
Specifications	
Vacuum Range	Atmosphere to 1.0 x 10 ⁻⁹ Torr
Suggested Nominal Pressure Supply	65 psig
Helium Leak Rate	1.0 x 10 ⁻⁹ std cc/sec
Maximum Bakeout Temperature	150°C - Body
Limit Switch Rating Single Pole, Single Throw	5A - 250 VAC 5A - 30 VDC

Specifications - Bypass	
Bypass Orifice Sizes Available	0.225", 0.063", 0.125", 0.187" and custom
Pneumatic Cylinder Displacement Volume	0.25 in ³ , (4.1 cm ³)
Approximate Pneumatic Closing Time	100 msec
Blow-By Pressure	45 psia
Maximum Internal Spring Closing Pressure	40 psia

Specifications - Main						
Port Size in. (NW)	Weight lb (kg)		Cylinder Volume in ³ (cm ³)	Actuation Time (msec) Opening (closing)	Blow-By Pressure psia	Max. Internal Spring Closing Pressure psia
	Angle	Inline				
1.0 (25)	3.0 (1.4)	3.0 (1.4)	3.6 (59)	500 (1,000)	60	43
1.5 (40)	6.0 (2.7)	6.6 (3.0)	4.8 (79)	1,000 (2,000)	50	60
2.0 (50)	13.8 (6.3)	17.5 (8.0)	13.3 (218)	1,000 (2,000)	45	38
3.0 (80)	20.4 (9.3)	28.5 (13.0)	27.6 (453)	2,000 (2,000)	38	40
4.0 (100)	26.3 (11.9)	38.5 (17.5)	27.6 (453)	2,000 (2,000)	30	30



Ordering Information



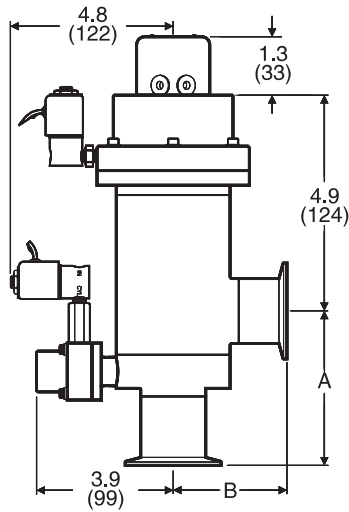
NW 25 Two-Stage Valve Ordering Information

Body Configuration	Bypass Orifice Size -XXX	Bypass Actuator Type -X	Limit Switch	Seal Type	Temperature Configuration XX	Pneumatic Solenoid Voltage* -XXX
V2-XXX-XX			X	X		
Select 1	Select 1	Select 1	Select 1	Select 1	Select 1	Select 1 or leave blank
V2-025-AK KF 25 Angle	225 0.225"	C Normally Closed	L w/ Limit Switch	V Viton®	NH Regular	24A 24 VAC 50/60 Hz
V2-025-IK KF 25 Inline		V Thumb Screw	N w/o Limit Switch	Z Chemraz®		24D 24 VDC
V2-025-AT 1" Tube Angle		M Micrometer Head				120 120 VAC 50/60 Hz
V2-025-IT 1" Tube Inline						208 208 VAC 50/60 Hz
V2-025-AC CF 2 1/2" Angle						240 220 VAC 50/60 Hz
V2-025-IC CF 2 1/2" Inline						None Main: 1/2" NPT-F Bypass: 10-32 UNF-F

Add the price of the options to the price of the body. Sample part number: V2-025-AK-225-CLVNH-120.
 * Price includes one solenoid each for the bypass and main valve.

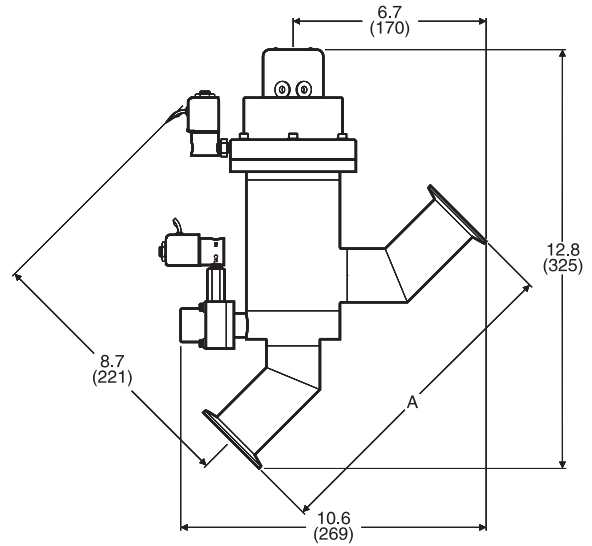


NW 40 Angle Dimensions in./(mm)



	KF	CF	Tube
A	4.00 (102)	4.03 (102)	3.85 (98)
B	3.00 (76)	3.03 (76)	3.85 (98)

NW 40 In-Line Dimensions in./(mm)



	KF	CF	Tube
A	12.00 (305)	12.07 (307)	11.70 (297)

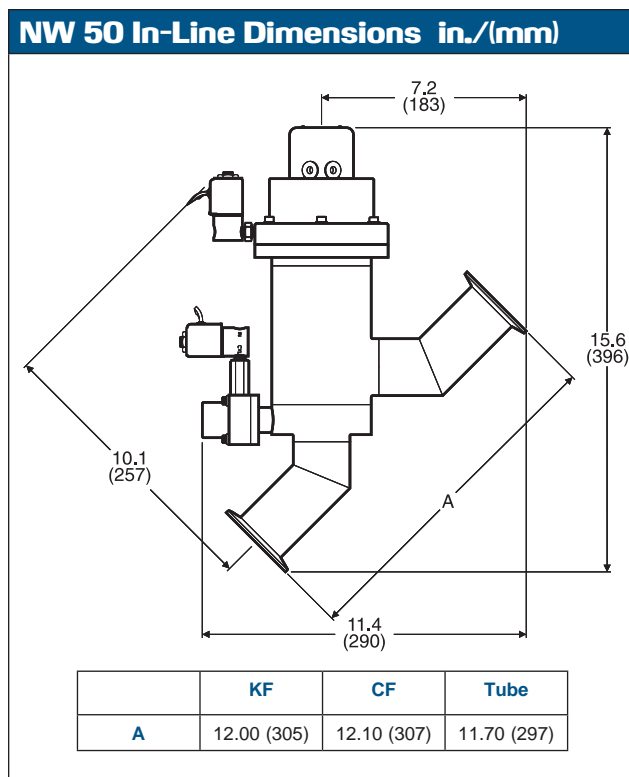
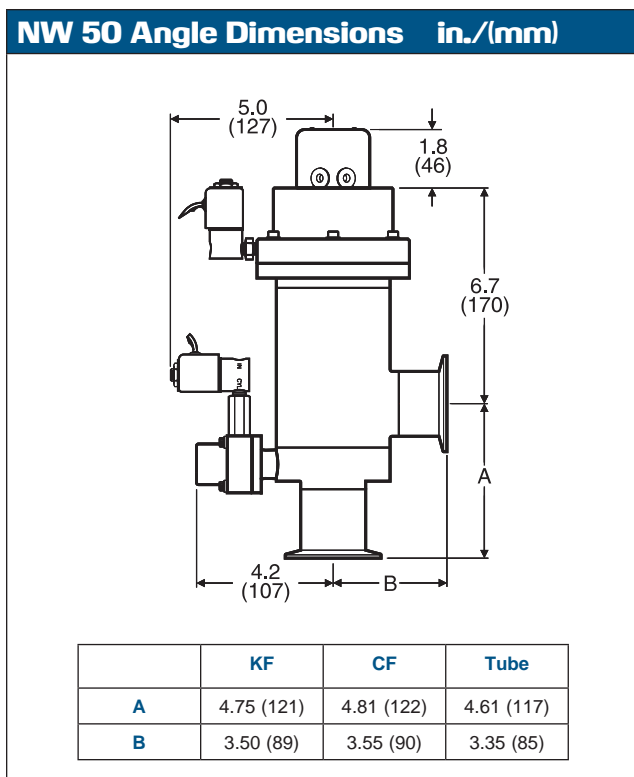
NW 40 Two-Stage Valve Ordering Information

Body Configuration	Bypass Orifice Size -XXX	Bypass Actuator Type -X	Limit Switch	Seal Type	Temperature Configuration XX	Pneumatic Solenoid Voltage* -XXX
V2-XXX-XX	-XXX	-X	X	X	XX	-XXX
Select 1	Select 1	Select 1	Select 1	Select 1	Select 1	Select 1 or leave blank
V2-040-AK KF 40 Angle	225 0.225"	C Normally Closed	L w/ Limit Switch	V Viton®	NH Regular	24A 24 VAC 50/60 Hz
V2-040-IK KF 40 Inline		V Thumb Screw	N w/o Limit Switch	Z Chemraz®		24D 24 VDC
V2-040-AT 1½" Tube Angle		M Micrometer Head				120 120 VAC 50/60 Hz
V2-040-IT 1½" Tube Inline						208 208 VAC 50/60 Hz
V2-040-AC CF 2½" Angle						240 220 VAC 50/60 Hz
V2-040-IC CF 2½" Inline						None Main: ½" NPT-F Bypass: 10-32 UNF-F

Add the price of the options to the price of the body. Sample part number: V2-040-AK-225-CLVNH-120.
* Price includes one solenoid each for the bypass and main valve.



Ordering Information



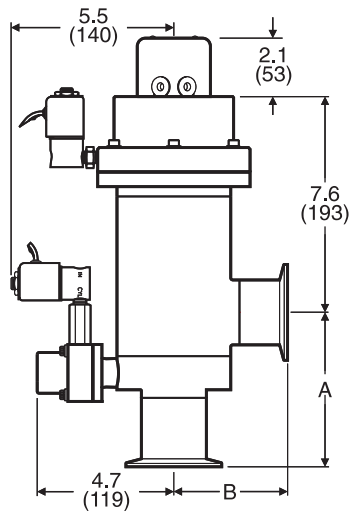
NW 50 Two-Stage Valve Ordering Information

Body Configuration	Bypass Orifice Size	Bypass Actuator Type	Limit Switch	Seal Type	Temperature Configuration	Pneumatic Solenoid Voltage*
V2-XXX-XX	-XXX	-X	X	X	XX	-XXX
Select 1	Select 1	Select 1	Select 1	Select 1	Select 1	Select 1 or leave blank
V2-050-AK KF 50 Angle	225 0.225"	C Normally Closed	L w/ Limit Switch	V Viton®	NH Regular	24A 24 VAC 50/60 Hz
V2-050-IK KF 50 Inline		V Thumb Screw	N w/o Limit Switch	Z Chemraz®		24D 24 VDC
V2-050-AT 2" Tube Angle		M Micrometer Head				120 120 VAC 50/60 Hz
V2-050-IT 2" Tube Inline						208 208 VAC 50/60 Hz
V2-050-AC CF 3/4" Angle						240 220 VAC 50/60 Hz
V2-050-IC CF 3/4" Inline						None Main: 1/2" NPT-F Bypass: 10-32 UNF-F

Add the price of the options to the price of the body. Sample part number: V2-050-AK-225-CLVNH-120.
 * Price includes one solenoid each for the bypass and main valve.

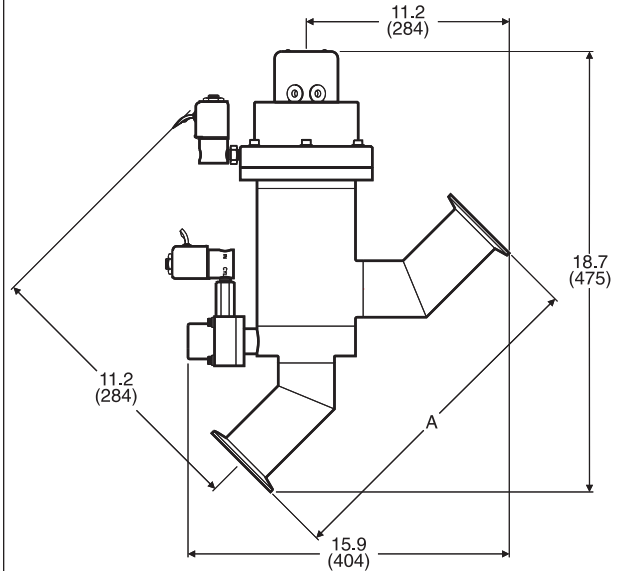


NW 80 Angle Dimensions in./(mm)



	KF/MF	CF	Tube
A	5.50 (140)	5.59 (142)	5.25 (134)
B	4.00 (102)	4.09 (104)	3.75 (95)

NW 80 In-Line Dimensions in./(mm)



	KF/MF	CF	Tube
A	18.00 (457)	18.19 (462)	17.49 (444)

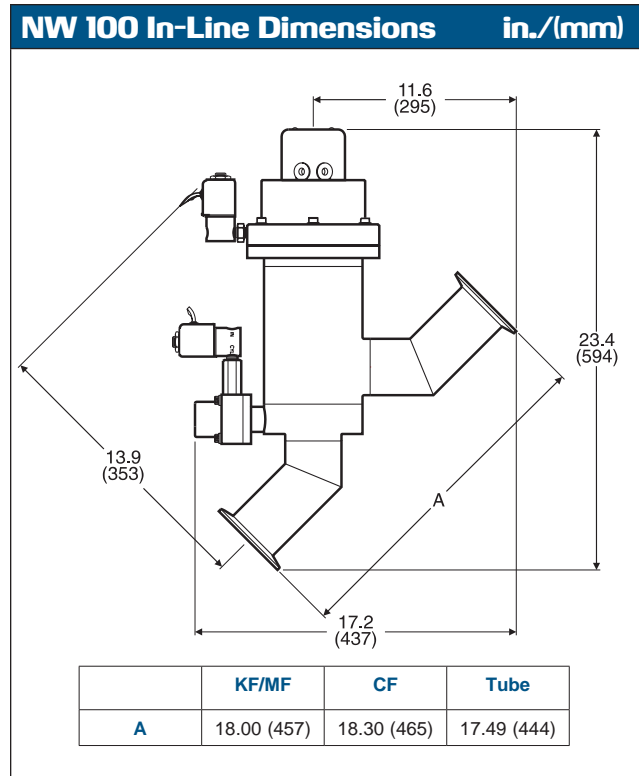
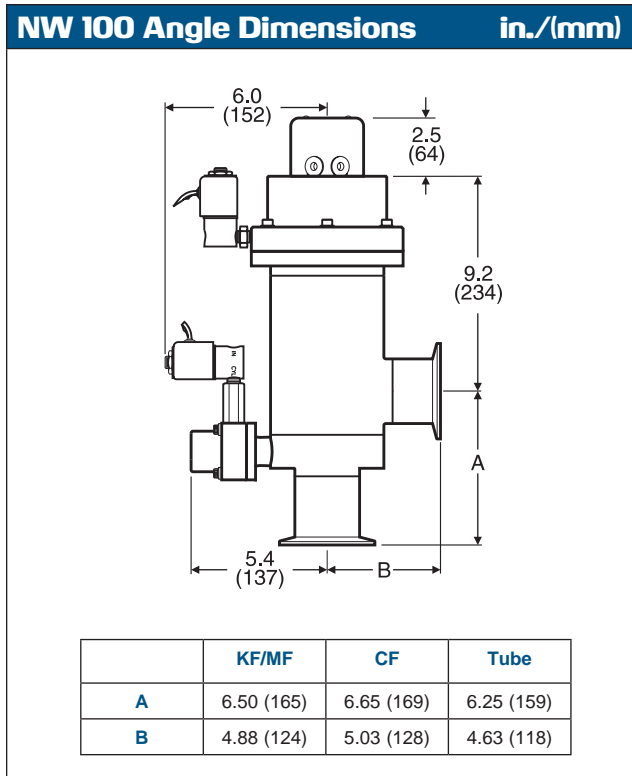
NW 80 Two-Stage Valve Ordering Information

Body Configuration	Bypass Orifice Size -XXX	Bypass Actuator Type -X	Limit Switch	Seal Type	Temperature Configuration XX	Pneumatic Solenoid Voltage* -XXX
V2-XXX-XX			X	X		
Select 1	Select 1	Select 1	Select 1	Select 1	Select 1	Select 1 or leave blank
V2-080-AM MF 80 Angle	225 0.225"	C Normally Closed	L w/ Limit Switch	V Viton®	NH Regular	24A 24 VAC 50/60 Hz
V2-080-IM MF 80 Inline		V Thumb Screw	N w/o Limit Switch	Z Chemraz®		24D 24 VDC
V2-080-AK KF 80 Angle		M Micrometer Head				120 120 VAC 50/60 Hz
V2-080-IK KF 80 Inline						208 208 VAC 50/60 Hz
V2-080-AT 3" Tube Angle						240 220 VAC 50/60 Hz
V2-080-IT 3" Tube Inline						None Main: 1/2" NPT-F Bypass: 10-32 UNF-F
V2-080-AC CF 4 1/2" Angle						
V2-080-IC CF 4 1/2" Inline						

Add the price of the options to the price of the body. Sample part number: V2-080-AK-225-CLVNH-120.
* Price includes one solenoid each for the bypass and main valve.



Ordering Information



NW 100 Two-Stage Valve Ordering Information

Body Configuration	Bypass Orifice Size -XXX	Bypass Actuator Type -X	Limit Switch	Seal Type	Temperature Configuration XX	Pneumatic Solenoid Voltage* -XXX
V2-XXX-XX			X	X		
Select 1	Select 1	Select 1	Select 1	Select 1	Select 1	Select 1 or leave blank
V2-100-AM MF 100 Angle	225 0.225"	C Normally Closed	L w/ Limit Switch	V Viton®	NH Regular	24A 24 VAC 50/60 Hz
V2-100-IM MF 100 Inline		V Thumb Screw	N w/o Limit Switch	Z Chemraz®		24D 24 VDC
V2-100-AK KF 100 Angle		M Micrometer Head				120 120 VAC 50/60 Hz
V2-100-IK KF 100 Inline						208 208 VAC 50/60 Hz
V2-100-AT 4" Tube Angle						240 220 VAC 50/60 Hz
V2-100-IT 4" Tube Inline						None Main: 1/2" NPT-F Bypass: 10-32 UNF-F
V2-100-AC 6" CF Angle						
V2-100-IC 6" CF Inline						

Add the price of the options to the price of the body. Sample part number: V2-100-AK-225-CLVNH-120.
 * Price includes one solenoid each for the bypass and main valve.



Ordering Information

Spare Parts

Port Size in (mm)	Main Valve Internals, Viton Seals	Limit Switch	Viton Seal Set *	Chemraz Seal Set *
	Part Number	Part Number	Part Number	Part Number
1.0 (25)	100004918	100001520	100004915	100004916
1.5 (40)	100007131	100001520	100004913	100004914
2.0 (50)	100007132	100001683	100004911	100004912
3.0 (80)	100007133	100001684	100004909	100004910
4.0 (100)	100004917	100003663	100004907	100004908

* In each set, the bonnet and nosepiece seals are of the material specified, and all other seals are of their original material.

Replacement Solenoid Valves

Voltage and Frequency	Watts	Part Number
24 VAC 50/60 Hz	6.0	100008164
24 VDC	7.0	100008163
12 VDC	7.0	100008539
120 VAC 50/60 Hz	7.5	100008165
208 VAC 50/60 Hz	7.5	100008166
220 VAC 50/60 Hz	7.5	100008167

Bypass Valve Spare Parts, Viton Seals

Actuator Type	Internal Rebuild Kits	Conversion Kits **
	Part Number	Part Number
Normally Closed	100004937	100004919
Thumb Screw	100004938	100004920
Micrometer	100004939	100004921

** Conversion kits are for converting one bypass actuator type to another (i.e. thumbscrew to micrometer head).



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