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2 Angle, Inline & Butterfly Valves



Angle & Inline Valves

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Angle & Inline Valves

Introduction



Angle & Inline Valves



Vacuum angle and inline valves are devices that regulate the flow of gases, fluids or materials through a structure or aperture by opening, closing or obstructing a port or passageway. Angle valve assemblies consist of an actuator, a poppet and a valve body. The actuator provides the power to position or transport the valve's poppet which is attached to the valve's body via a circular bonnet flange. The poppet closes or opens one of the valve's body ports. The valve body is a vacuum tight chamber that is screwed, flanged or welded into a larger vacuum vessel or system.

Reliable vacuum valves were not commercially available until the late 1940s with the advent of O-ring elastomer seals. The elastomer O-ring was developed during WWII for use in aircraft hydraulic systems, and was soon thereafter adopted by the vacuum community as the standard means of making vacuum seals. Prior to this it was common practice, even in large research establishments, to upgrade general service valves for vacuum use by winding actuator shaft gaskets from string soaked in an Apiezon grease.

MDC stainless steel vacuum angle and inline valves have been designed for maximum conductance and minimum size for easy installation. These valves are ideally suited for systems requiring high reliability and low outgassing. The valves' low outgassing characteristics can be attributed to a fusion welded 304 stainless steel body, welded AM-350 stainless steel nesting bellows as well as small cross-section elastomers and the elimination of blind internal cavities.
MDC angle and inline valves are offered in various sizes ranging from .25" to 10" port diameters. Standard port mounts include: Del-Seal™ CF metal seal flanges, recommended for ultrahigh vacuum service; ISO Kwik-Flange™ and ISO Large-Flange™ fast-make and fast-break elastomer seal flanges, ideal for high vacuum applications requiring frequent assembly and disassembly.

Standard Features

- UHV and HV series
- Del-Seal™ CF, ISO KF Kwik-Flange™, ISO LF Large-Flange™ and Tube-Weld port connections.
- Manual and Electropneumatic actuators
- 120VAC air control solenoid valve
- OFE copper metal and Viton® elastomer bonnet seals
- Welded bellows actuator seal
- TIG welded internal body joints
- Electropolished interior and exterior surfaces

Optional Features

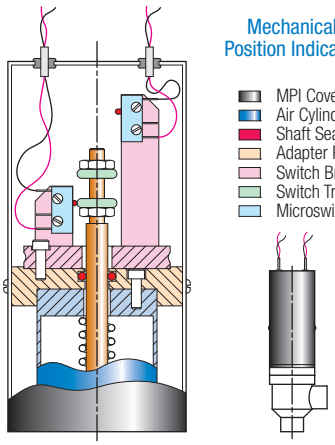
- Electromechanical position indicator
- Magnetic reed switch position indicators
- Air control solenoid valves for 240VAC and 24VDC service
- High temperature 250°C Kalrez® elastomer poppet seal

All dimensions in this catalog are given in inches unless specified otherwise.

Mechanical Position Indicator Option -01



MDC angle and inline valves are available with precision mechanical position indicator (MPI) option. The MPI system consists of two single pole, double-throw micro switches mounted on top of the pneumatic actuator air cylinder. Each micro switch is wired in the normally open position. Wiring in a normally closed position is available on request, and easily modified by reversing standard factory wiring. Precise actuation of each micro switch is factory adjusted by positioning individual switch triggers mounted on the actuator shaft. Field installation of this option is not available. Contact factory for further information.



Magnetic Reed-Switch Position Indicators Option -02

MDC magnetic reed switches consist of four basic components: a glass capsule, a gas filler (the atmosphere inside the glass capsule), electrical contacts and two ferromagnetic reeds.

The reeds are hermetically sealed into the glass capsule in a cantilever fashion so that the ends align and overlap, while maintaining a small gap between them. The floating end of each reed will assume opposite magnetic polarity when brought into the proximity of a magnetic field. When the magnetic flux density is sufficient, the attraction force of the opposing magnetic poles will overcome the reed stiffness causing them to flex towards each other and make electrical contact. Since these switches have no mechanical parts to wear out this operation can be repeated millions of times.

The characteristic life expectancy of these switches is rated at 100 million cycles, provided electrical ratings are not exceeded.

Contacts normally open, 110-120VAC, 0.5 amperes and 10 watts maximum. MDC reed switch position indicators will operate at temperatures ranging from (-) 40°C to (+) 125°C.



Air Control Solenoid Valve Option -03 and -09

Angle and inline valves fitted with standard electropneumatic actuators are equipped with Humphrey 310 or 410 series 120VAC 50/60Hz air control solenoid valves. Air-open / spring-close angle and inline valves use the 310 series solenoids, while the 410 series solenoid is used with the air-open / air-close angle and inline valves. AC/DC power consumption for this solenoid valve is 4.0 watts.

24VDC and 240VAC solenoid valves are optional and available by adding the option numbers to the end of the specific angle or inline valve part number. All solenoid valves are fitted with DIN type connectors that conform to international standards. DIN connectors provide simplicity, convenience and fast, easy electrical installation. Solenoid valves come standard with push button / spring return manual override. The manual override is located at the top of the solenoid and identified by a prominent red push button.

Air control solenoid valves are designed for use with compressed air from 0 to 125psig. Media should be clean and uncontaminated. When in doubt, install a filter with a 40 micron filtering capacity. Periodically remove and clean or replace filter element.



High Temperature Poppet Seal Option -11

Angle and inline valves are supplied standard with Viton® elastomer poppet seals. UHV series valves, which have metal sealed bonnet flanges, can be ordered with the high temperature Kalrez® compound 4079 poppet seal gasket option. Kalrez® compound 4079 elastomers are suitable for vacuum bakeout to 250°C (with poppet in an open position). Kalrez® compound 4079 offers excellent chemical resistance and good mechanical properties. When compared to Viton® elastomers, Kalrez® has lower outgassing characteristics for any given temperature from ambient to 250°C.

As with standard poppet seals, Kalrez® elastomer seals have a small amount of Krytox® LVP vacuum grease applied at the time of installation. Vacuum grease should be applied to elastomer gaskets in order to maximize its sealing properties and extend its cycle life.

Installation of a poppet seal is accomplished by pressing an O-ring into the poppet groove first at the 12 and 6 o'clock positions then at the 3 and 9 o'clock positions, etc. Pressing the O-ring into the groove in this manner avoids twisting the O-ring.

Note that Kalrez® has a much faster permeation rate for helium than does Viton®.







General Guidelines

Installation and Orientation- Angle and inline valves can be installed using one of various port connections as summarized on page 199. Valves up to and including 4" ports can be installed in either a vertical or horizontal orientation. Valves with 6" and larger ports must be installed in a vertical orientation, as shown in the figure below. The bottom port is usually oriented towards the vacuum environment. Mounting in this fashion minimizes the in-vacuum volume and also aids poppet sealing when the side port is vented to air.

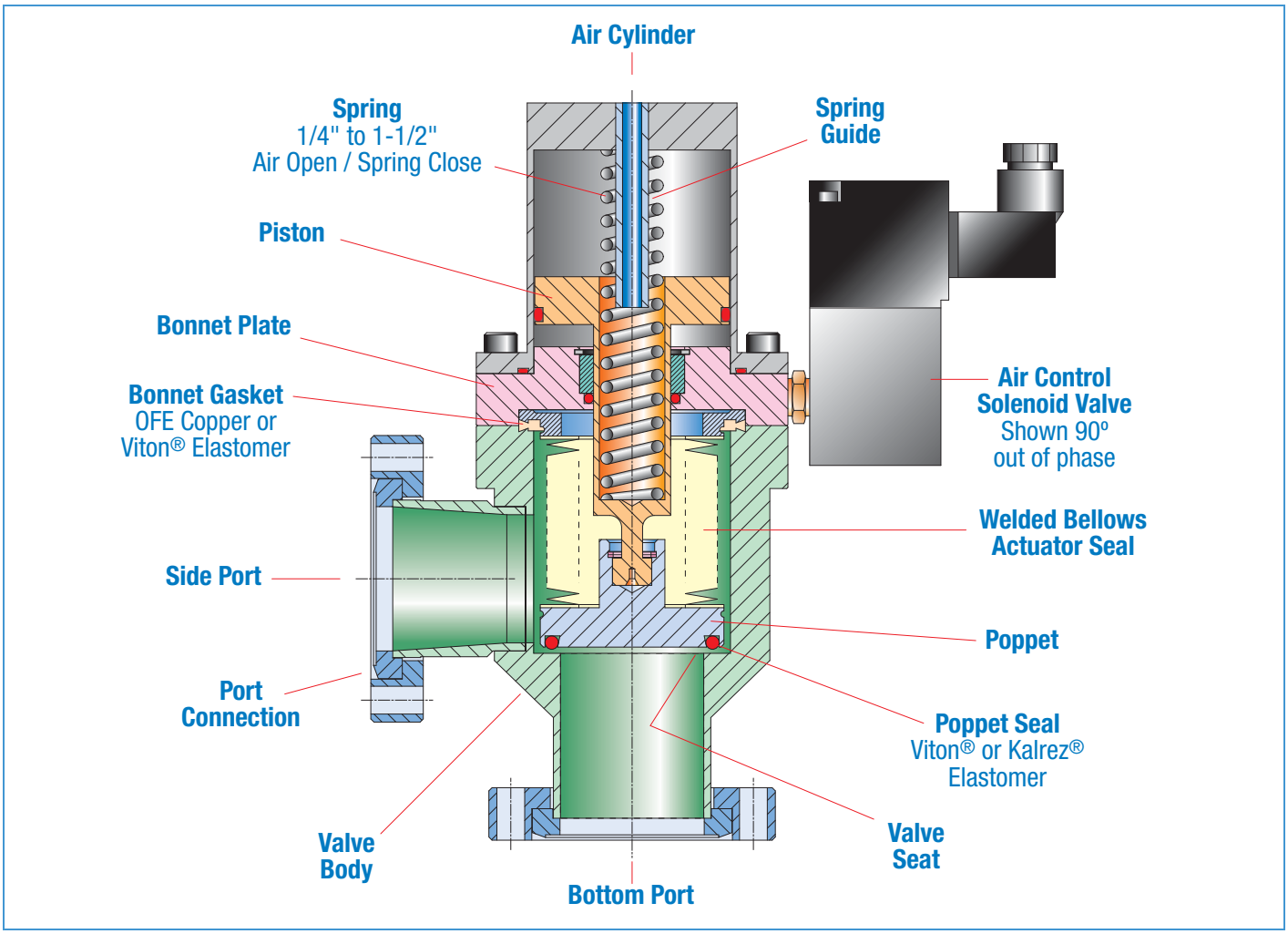
Sealing- Angle and inline valves can be sealed via manual or electropneumatic actuation. All valves up to 3" ports will seal against 15 psi differential atmospheric pressure in either a bottom or side port direction. Those with 4" and larger ports should be installed with vacuum at the valve seat port only, shown as bottom port.

Electropneumatic angle and inline valves with 1/4" to 1-1/2" diameter ports are fitted with air-open / spring-close actuators. Valves with 2" or larger diameter ports employ air-open / air-close pneumatic actuators. Custom actuator designs are available on request.

Bakeout- Air control solenoid valves must be removed or remotely mounted for valve maximum bakeout conditions. The solenoid valve temperature should not exceed 50°C. Pneumatically actuated air cylinder seals are Viton® elastomer O-rings and therefore have a temperature limit of 150°C.

Maintenance- Actuator and poppet mechanism may be removed through the bonnet flange for seal replacement, cleaning or retrofitting without removing the valve body from the system. Refer to instruction manual for details.

Leak Testing- Each valve is tested using a helium mass spectrometer leak detector calibrated for a minimum sensitivity of $2x10^{-10}$ std. cc/sec of Helium. Internal welds are inspected for pits, cracks, and other irregularities which may cause virtual leaks.



Specifications

Material	
Flanges	304ss
Valve Body	304ss
Air Cylinder	Teflon® coated Aluminum
Actuator Seal	AM-350 welded bellows
Gaskets, Bonnet	OFE Copper or Viton® elastomer
Gaskets, Poppet	Viton® or Kalrez® 4079 elastomer
Gaskets, pneumatic actuator	Viton® elastomer
Bolts	300 Series stainless steel

Electropneumatic Actuator	
Air Pressure	70 to 100 psig
Air Control Valve 1/4" to 1-1/2"	310 Series Humphrey solenoid valve
Air Control Valve 2" to 10"	410 Series Humphrey solenoid valve
Solenoid Power	120VAC 50/60Hz, 4Watts
Power Loss	Valve closes
Position Indicators, magnetic	0.5A, 120VAC, 10W maximum
Position Indicators, mechanical	5A, 120/240VAC micro switch

Port Fastening	
Bolt Type	Silver plated 12-point and socket head bolts
Nut Type	Hexagonal nuts

Fastening Torque for Del-Seal™ CF Port Flanges	
8-32 UNC	7 lb-ft
.250-28 UNF	12 lb-ft
.312-24 UNF	15 lb-ft
.375-24 UNF	26 lb-ft

Vacuum	
Range	To $1x10^{-11}$ Torr
Leak Test	$2x10^{-10}$ cc/sec of He

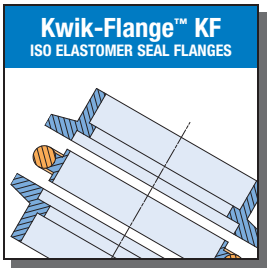
Temperature Range... Bakeability, under vacuum in open / closed positions with the following bonnet / poppet seal combinations

UHV Series with Copper / Viton®	200°C open / 150°C closed
UHV Series with Copper / Kalrez®	250°C open / 200°C closed
HV Series with Viton® / Viton®	150°C open / 150°C closed
Weight and Dimensions	See tables

Port Connection Guide

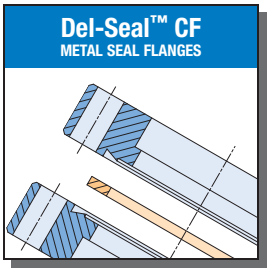
MDC offers five industry standard port connections. The port connections available for each valve size are depicted in the specific two page valve spread. Port connections not shown, are either not available for that specific valve size or only available on request.

The following port connection guide summarizes the five standard connection solutions available. For a detailed discussion of these connections reference Section 1.



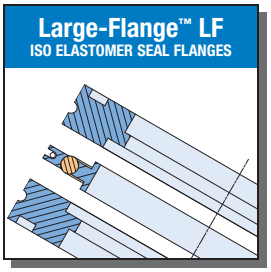
HV Flange **$1x10^{-8}$ Torr / 150°C**

Kwik-Flange™ ISO KF flanges are ideal for vacuum systems requiring frequent assembly and disassembly. Fastening and sealing is achieved by a hinged radial clamp, which provides compression of an elastomer gasket. KF flanges comply with all ISO specifications for vacuum hardware and are available for tube sizes up to 2" in diameter.



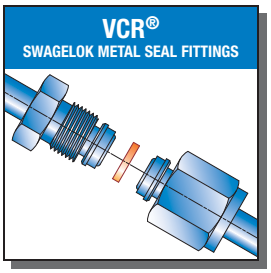
UHV Flange **$1x10^{-13}$ Torr / 450°C**

Del-Seal™ CF flanges employ a Conflat® compatible knife-edge sealing mechanism which produces a cold-flow deformation of a metal copper gasket. Flanges are available for tube sizes from .25" to 14" diameters. They are used in UHV environments where high temperature bakeouts are a must. Both port flanges are rotatable.



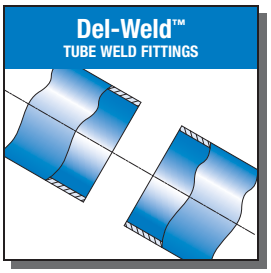
HV Flange **$1x10^{-8}$ Torr / 150°C**

Large-Flange™ LF flanges are a continuation of the Kwik-Flange™ family. They cover the range from 2.5" to 20" tube diameters. The main difference between LF and KF flanges is their method of fastening. LF flanges use multiple claw clamps versus a single hinged radial clamp in KF flanges. They also meet all ISO specifications for vacuum hardware.



UHV Tube Fitting **$1x10^{-13}$ Torr / 450°C**

Swagelok VCR® Tube fittings are designed for rapid make-up in tube, pipe and welded systems. They are zero clearance fittings, ideal for installation in limited space. Sealing is accomplished with the compression of a copper metal gasket. They are typically used for gas admission into UHV systems.



UHV Tube Weld **$1x10^{-13}$ Torr / 450°C**

Del-Weld™ Tube weld connections are intended for use in UHV or HV vacuum systems requiring a minimal amount of gasket joints thus reducing potential leak paths. Future use of a system must be considered when choosing this style of connection. Once welded, they become an integral and permanent part of the vacuum system.

Angle Valves

1/4" & 1/2" Ports





ULTRAHIGH & HIGH VACUUM SERIES
Metal & Elastomer Seal Bonnets

Features

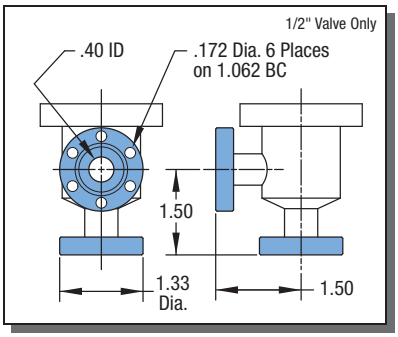
- Stainless steel construction
- Manual or electropneumatic operation
- Air-open / spring-close air cylinder

PORT CONNECTIONS

Del-Seal™ CF



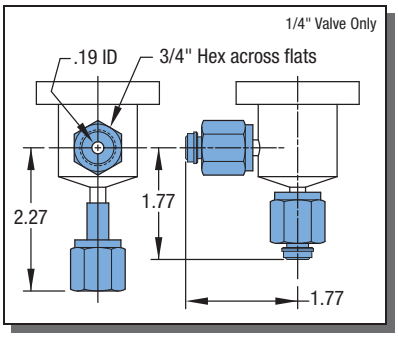
1-1/3" Metal Seal Flange



Female VCR®



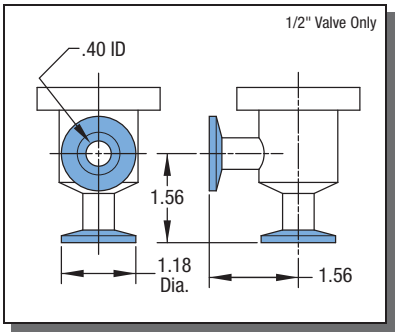
1/4" Swagelok VCR® Fitting



Kwik-Flange™ KF



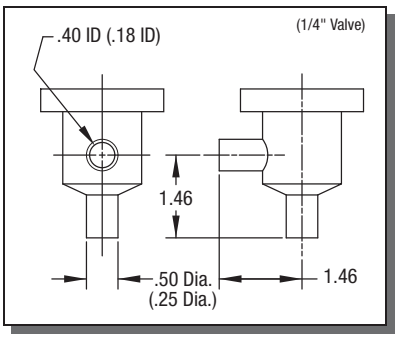
ISO NW16 Elastomer Seal Flange

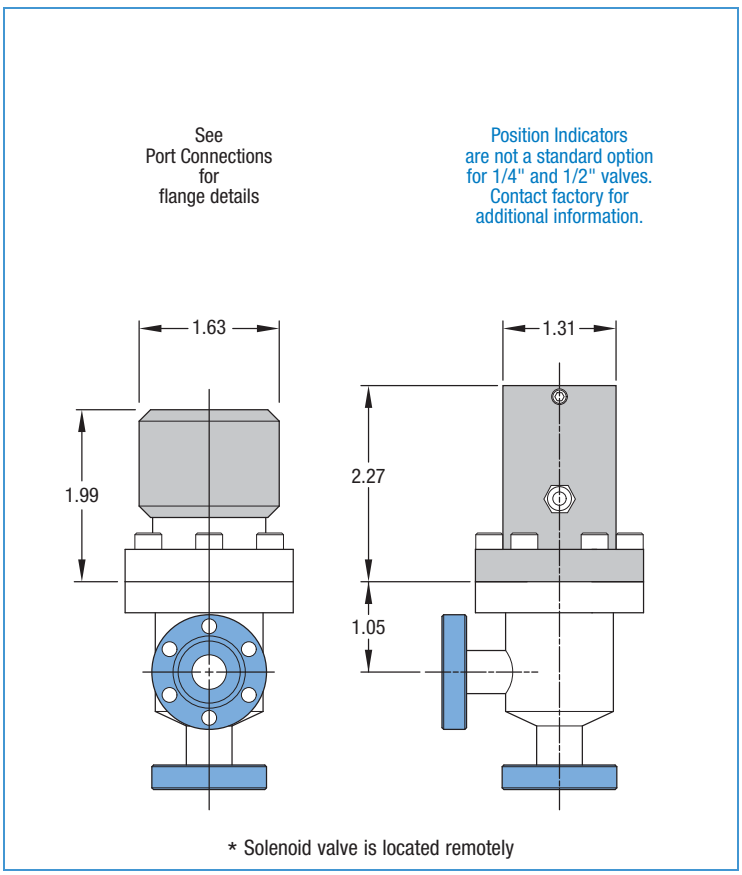


Del-Weld™



1/4" & 1/2" Tube Weld





Angle Valves
1/4" & 1/2" Ports



ULTRAHIGH VACUUM SERIES
Metal Seal Bonnet 250°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
1/4	MANUAL	FEMALE VCR	METAL	1	VAV-025M	312053
1/4	MANUAL	TUBE WELD	METAL	1	AV-023M	312054
1/4	PNEUMATIC	FEMALE VCR	METAL	1	VAV-025M-P	313070
1/4	PNEUMATIC	TUBE WELD	METAL	1	AV-023M-P	313071
1/2	MANUAL	DEL-SEAL	METAL	1	AV-050M	312055
1/2	MANUAL	TUBE WELD	METAL	1	AV-053M	312056
1/2	PNEUMATIC	DEL-SEAL	METAL	1	AV-050M-P	313072
1/2	PNEUMATIC	TUBE WELD	METAL	1	AV-053M-P	313073

HIGH VACUUM SERIES
Elastomer Seal Bonnet 150°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
1/4	MANUAL	FEMALE VCR	VITON	1	VAV-025	310080
1/4	MANUAL	TUBE WELD	VITON	1	AV-023	310081
1/4	PNEUMATIC	FEMALE VCR	VITON	1	VAV-025-P	311087
1/4	PNEUMATIC	TUBE WELD	VITON	1	AV-023-P	311088
1/2	MANUAL	DEL-SEAL	VITON	1	AV-050	310082
1/2	MANUAL	ISO	VITON	1	KAV-050	310083
1/2	MANUAL	TUBE WELD	VITON	1	AV-053	310084
1/2	PNEUMATIC	DEL-SEAL	VITON	1	AV-050-P	311089
1/2	PNEUMATIC	ISO	VITON	1	KAV-050-P	311090
1/2	PNEUMATIC	TUBE WELD	VITON	1	AV-053-P	311091

[1] See page 199 for detailed bakeout specifications

VALVE OPTIONS

OPTION -03 and -09
AIR CONTROL SOLENOID VALVES



OPTION -11
4079 KALREZ 250°C POPPET SEAL



DESCRIPTION	OPTION NUMBER
24 VDC SOLENOID VALVE	-03
240 VAC SOLENOID VALVE	-09
HIGH TEMPERATURE POPPET SEAL	-11

When ordering Angle Valve Options, please add the option number(s) to the end of the desired UHV or HV Series Angle Valve Part Number listed above. For example 313072-**09**. Detailed descriptions of each option begin on page 196.

ACCESSORIES

HARDWARE & GASKETS



GASKET KIT	FOR USE [2] WITH	MATERIAL	QUANTITY PER PACK	REFERENCE	PART NUMBER
POPPET & BONNET SEAL	UHV	Viton & Copper	1[2]	AVG-050M	351016
POPPET & BONNET SEAL	HV	Viton	1[2]	AVG-050	350013

HARDWARE	THREAD LENGTH	FOR USE WITH	QUANTITY PER PACK	REFERENCE	PART NUMBER
SOCKET HEAD	8-32 x 3/4"	DEL-SEAL	25	BA-075-SP	190037
CLAMP	-	ISO	1	K075-C	701000
CENTERING RING	-	ISO	1	K075-CR	710000

[2] Each gasket kit contains one Bonnet and one Poppet seal, and is used for both the 1/4" and 1/2" angle valves

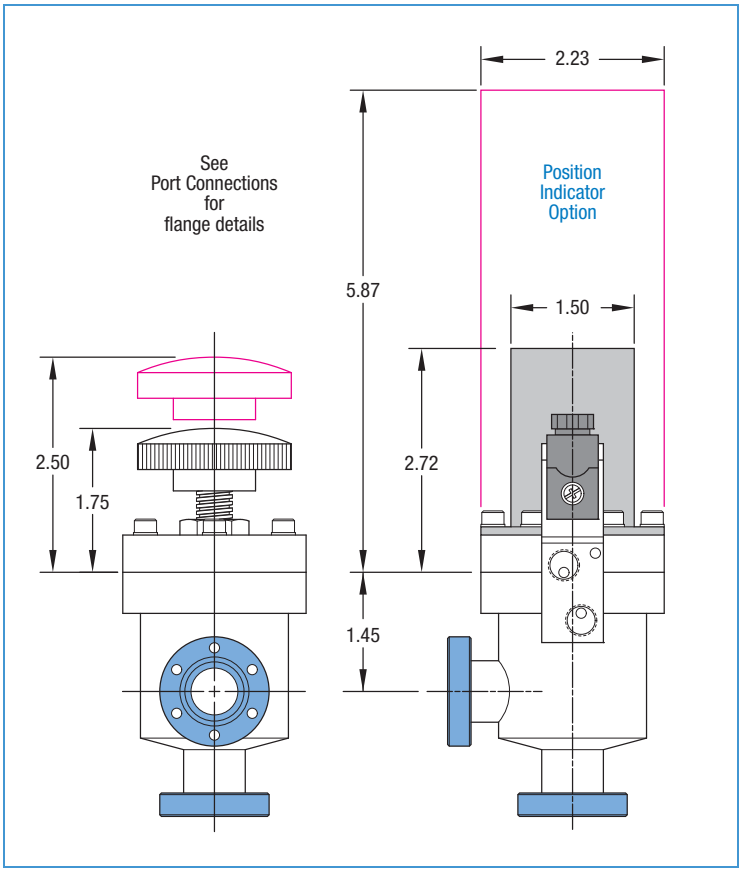
Angle Valves

3/4" Ports





AV-075 AV-075-P



ULTRAHIGH VACUUM SERIES
250°C Metal Sealed Bonnet

HIGH VACUUM SERIES
150°C Elastomer Sealed Bonnets

Features

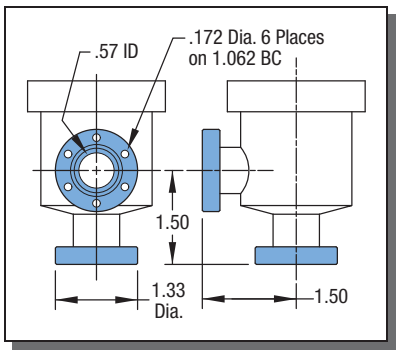
- Poppet elastomer seals made of Viton®
- Stainless steel construction
- Manual or electropneumatic operation
- Air-open / spring-close air cylinder

PORT CONNECTIONS

Del-Seal™ CF



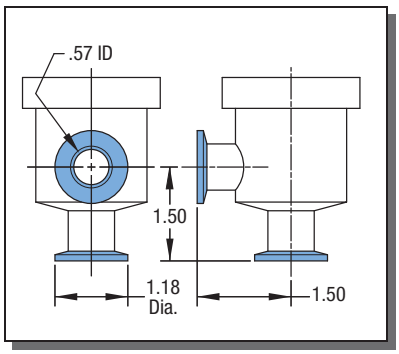
1-1/3"
Metal Seal Flange



Kwik-Flange™ KF



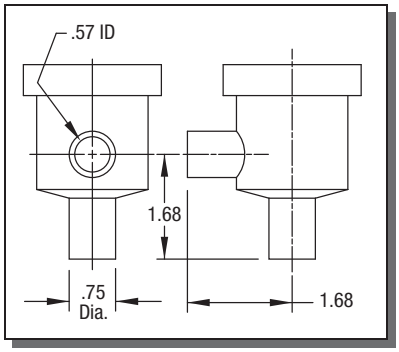
ISO NW16
Elastomer Seal Flange



Del-Weld™



3/4"
Tube Weld



Angle Valves

3/4" Ports



ULTRAHIGH VACUUM SERIES

Metal Seal Bonnet 250°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
3/4	MANUAL	DEL-SEAL	METAL	1	AV-075M	312015
3/4	MANUAL	TUBE WELD	METAL	1	AV-073M	312021
3/4	PNEUMATIC	DEL-SEAL	METAL	2	AV-075M-P	313015
3/4	PNEUMATIC	TUBE WELD	METAL	1	AV-073M-P	313021

HIGH VACUUM SERIES

Elastomer Seal Bonnet 150°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
3/4	MANUAL	DEL-SEAL	Viton	1	AV-075	310015
3/4	MANUAL	ISO	Viton	1	KAV-075	310072
3/4	MANUAL	TUBE WELD	Viton	1	AV-073	310021
3/4	PNEUMATIC	DEL-SEAL	Viton	2	AV-075-P	311015
3/4	PNEUMATIC	ISO	Viton	1	KAV-075-P	311072
3/4	PNEUMATIC	TUBE WELD	Viton	1	AV-073-P	311021

[1] See page 199 for detailed bakeout specifications

VALVE OPTIONS

OPTION -01
MECHANICAL POSITION INDICATOR



OPTION -02
MAGNETIC POSITION INDICATORS



OPTION -03 and -09
AIR CONTROL SOLENOID VALVES



OPTION -11
4079 KALREZ 250°C POPPET SEAL



DESCRIPTION	OPTION NUMBER
MECHANICAL POSITION INDICATOR	-01
MAGNETIC POSITION INDICATORS	-02
24 VDC AIR CONTROL SOLENOID VALVE	-03
240 VAC AIR CONTROL SOLENOID VALVE	-09
HIGH TEMPERATURE POPPET SEAL	-11

When ordering Angle Valve Options, please add the option number(s) to the end of the desired UHV or HV Series Angle Valve Part Number listed above. For example 313015-**02-09-11**. Detailed descriptions of each option begin on page 196.

ACCESSORIES

HARDWARE & GASKETS



GASKET KIT	FOR USE WITH	MATERIAL	QUANTITY PER PACK	REFERENCE	PART NUMBER
POPPET & BONNET SEAL	UHV	Viton & Copper	1[2]	AVG-075M	351004
POPPET & BONNET SEAL	HV	Viton	1[2]	AVG-075	350004

HARDWARE	THREAD LENGTH	FOR USE WITH	QUANTITY PER PACK	REFERENCE	PART NUMBER
SOCKET HEAD	8-32 x 3/4"	DEL-SEAL	25	BA-075-SP	190037
CLAMP	-	ISO	1	K075-C	701000
CENTERING RING	-	ISO	1[3]	K075-CR	710000

[2] Each gasket kit contains one Bonnet and one Poppet seal

[3] Includes one elastomer gasket seal

Angle Valves

1" Ports





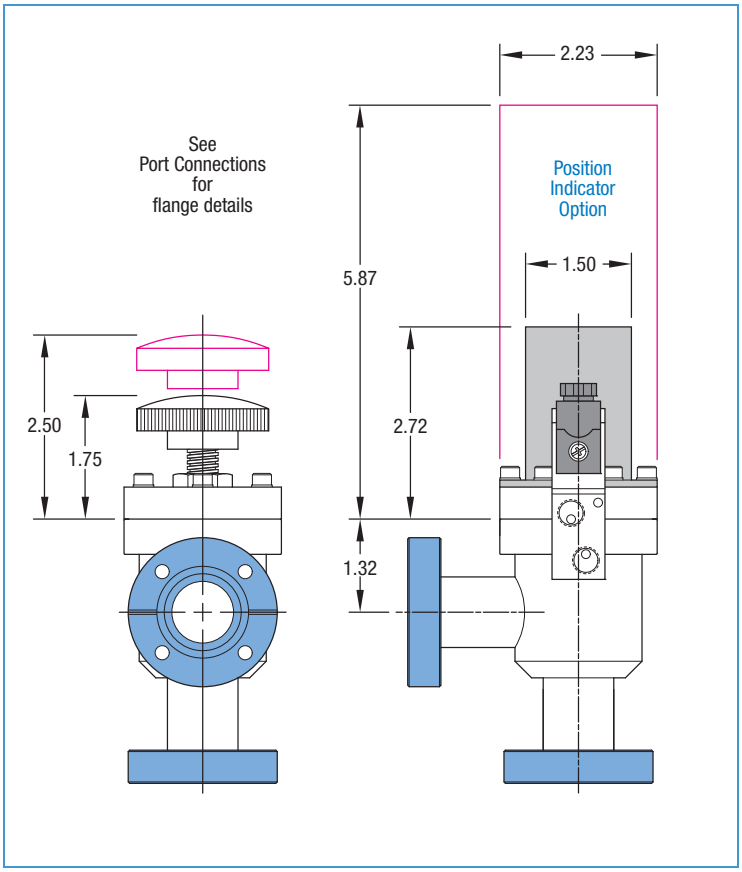
AV-100 AV-100-P

ULTRAHIGH VACUUM SERIES
250°C Metal Sealed Bonnet

HIGH VACUUM SERIES
150°C Elastomer Sealed Bonnets

Features

- Poppet elastomer seals made of Viton®
- Stainless steel construction
- Manual or electropneumatic operation
- Air-open / spring-close air cylinder

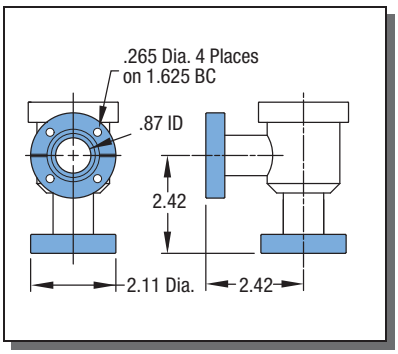


PORT CONNECTIONS

Del-Seal™ CF



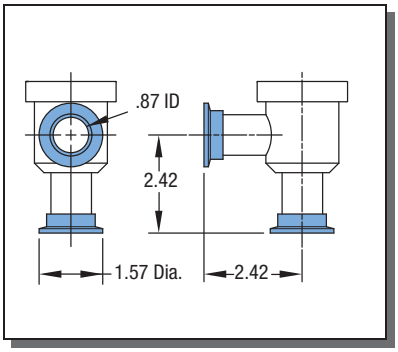
2-1/8"
Metal Seal Flange



Kwik-Flange™ KF



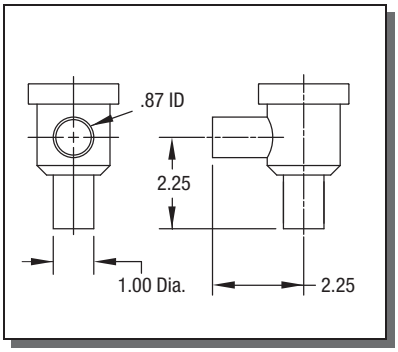
ISO NW25
Elastomer Seal Flange



Del-Weld™



1"
Tube Weld



Angle Valves

1" Ports



ULTRAHIGH VACUUM SERIES

Metal Seal Bonnet 250°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
1	MANUAL	DEL-SEAL	METAL	3	AV-100M	312022
1	MANUAL	TUBE WELD	METAL	2	AV-103M	312028
1	PNEUMATIC	DEL-SEAL	METAL	3	AV-100M-P	313022
1	PNEUMATIC	TUBE WELD	METAL	2	AV-103M-P	313028

HIGH VACUUM SERIES

Elastomer Seal Bonnet 150°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
1	MANUAL	DEL-SEAL	Viton	3	AV-100	310022
1	MANUAL	ISO	Viton	2	KAV-100	310073
1	MANUAL	TUBE WELD	Viton	2	AV-103	310028
1	PNEUMATIC	DEL-SEAL	Viton	3	AV-100-P	311022
1	PNEUMATIC	ISO	Viton	2	KAV-100-P	311073
1	PNEUMATIC	TUBE WELD	Viton	2	AV-103-P	311028

[1] See page 199 for detailed bakeout specifications

VALVE OPTIONS

OPTION -01
MECHANICAL POSITION INDICATOR



OPTION -02
MAGNETIC POSITION INDICATORS



OPTION -03 and -09
AIR CONTROL SOLENOID VALVES



OPTION -11
4079 KALREZ 250°C POPPET SEAL



DESCRIPTION	OPTION NUMBER
MECHANICAL POSITION INDICATOR	-01
MAGNETIC POSITION INDICATORS	-02
24 VDC AIR CONTROL SOLENOID VALVE	-03
240 VAC AIR CONTROL SOLENOID VALVE	-09
HIGH TEMPERATURE POPPET SEAL	-11

When ordering Angle Valve Options, please add the option number(s) to the end of the desired UHV or HV Series Angle Valve Part Number listed above. For example 313022-**02-09-11**. Detailed descriptions of each option begin on page 196.

ACCESSORIES

HARDWARE & GASKETS



GASKET KIT	FOR USE WITH	MATERIAL	QUANTITY PER PACK	REFERENCE	PART NUMBER
POPPET & BONNET SEAL	UHV	Viton & Copper	1[2]	AVG-100M	351004
POPPET & BONNET SEAL	HV	Viton	1[2]	AVG-100	350004

HARDWARE	THREAD LENGTH	FOR USE WITH	QUANTITY PER PACK	REFERENCE	PART NUMBER
12PT HEAD BOLT SET	.250-28 x 1-1/4"	DEL-SEAL	25	BA-150-12-SP	190061
CLAMP	-	ISO	1	K100-C	701001
CENTERING RING	-	ISO	1[3]	K100-CR	710001

[2] Each gasket kit contains one Bonnet and one Poppet seal

[3] Includes one elastomer gasket seal

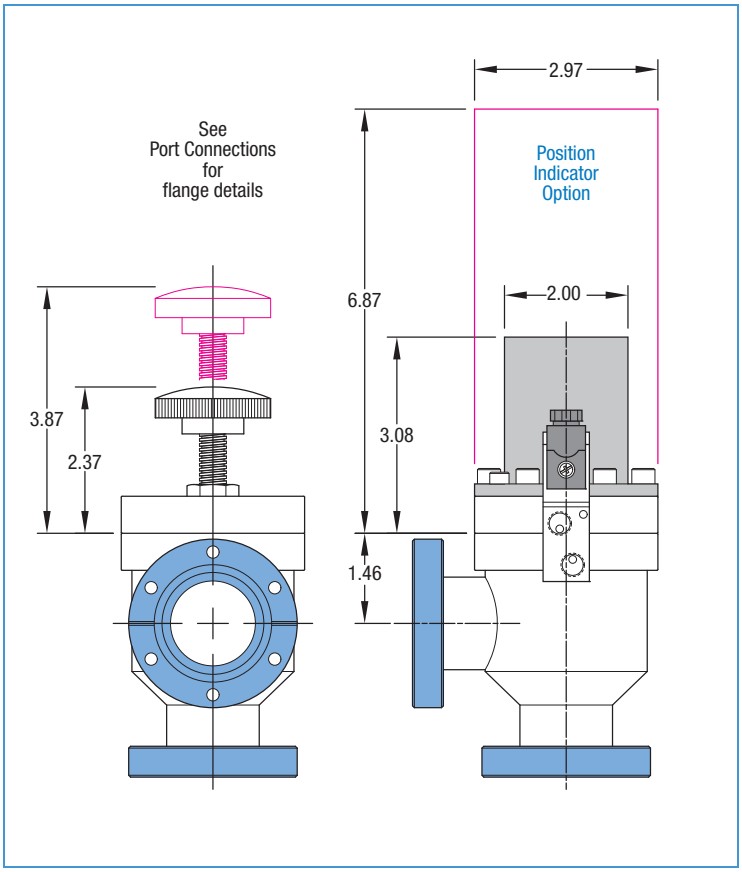
Angle Valves

1-1/2" Ports





AV-150 AV-150-P



ULTRAHIGH VACUUM SERIES
250°C Metal Sealed Bonnet

HIGH VACUUM SERIES
150°C Elastomer Sealed Bonnets

Features

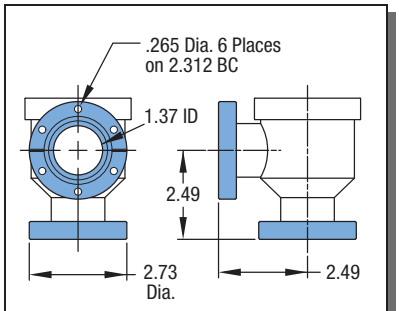
- Poppet elastomer seals made of Viton®
- Stainless steel construction
- Manual or electropneumatic operation
- Air-open / spring-close air cylinder

PORT CONNECTIONS

Del-Seal™ CF



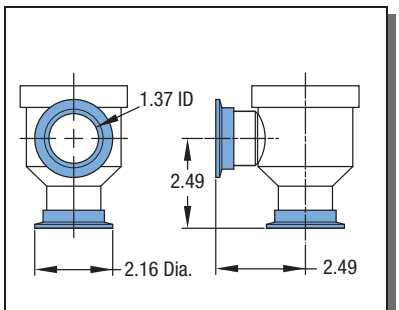
2-3/4"
Metal Seal Flange



Kwik-Flange™ KF



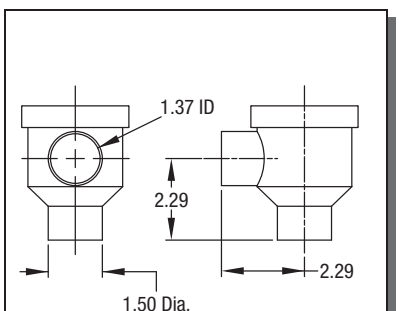
ISO NW40
Elastomer Seal Flange



Del-Weld™



1-1/2"
Tube Weld



Angle Valves

1-1/2" Ports



ULTRAHIGH VACUUM SERIES

Metal Seal Bonnet 250°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
1-1/2	MANUAL	DEL-SEAL	METAL	6	AV-150M	312029
1-1/2	MANUAL	TUBE WELD	METAL	5	AV-153M	312032
1-1/2	PNEUMATIC	DEL-SEAL	METAL	5	AV-150M-P	313029
1-1/2	PNEUMATIC	TUBE WELD	METAL	4	AV-153M-P	313032

HIGH VACUUM SERIES

Elastomer Seal Bonnet 150°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
1-1/2	MANUAL	DEL-SEAL	Viton	4	AV-150	310029
1-1/2	MANUAL	ISO	Viton	4	KAV-150	310074
1-1/2	MANUAL	TUBE WELD	Viton	3	AV-153	310032
1-1/2	PNEUMATIC	DEL-SEAL	Viton	6	AV-150-P	311029
1-1/2	PNEUMATIC	ISO	Viton	5	KAV-150-P	311074
1-1/2	PNEUMATIC	TUBE WELD	Viton	3	AV-153-P	311032

[1] See page 199 for detailed bakeout specifications

VALVE OPTIONS

OPTION -01
MECHANICAL POSITION INDICATOR



OPTION -02
MAGNETIC POSITION INDICATORS



OPTION -03 and -09
AIR CONTROL SOLENOID VALVES



OPTION -11
4079 KALREZ 250°C POPPET SEAL



DESCRIPTION	OPTION NUMBER
MECHANICAL POSITION INDICATOR	-01
MAGNETIC POSITION INDICATORS	-02
24 VDC AIR CONTROL SOLENOID VALVE	-03
240 VAC AIR CONTROL SOLENOID VALVE	-09
HIGH TEMPERATURE POPPET SEAL	-11

When ordering Angle Valve Options, please add the option number(s) to the end of the desired UHV or HV Series Angle Valve Part Number listed above. For example 313029-**02-09-11**. Detailed descriptions of each option begin on page 196.

ACCESSORIES

HARDWARE & GASKETS



GASKET KIT	FOR USE WITH	MATERIAL	QUANTITY PER PACK	REFERENCE	PART NUMBER
POPPET & BONNET SEAL	UHV	Viton & Copper	1[2]	AVG-150M	351005
POPPET & BONNET SEAL	HV	Viton	1[2]	AVG-150	350005

HARDWARE	THREAD LENGTH	FOR USE WITH	QUANTITY PER PACK	REFERENCE	PART NUMBER
12PT HEAD BOLT SET	.250-28 x 1-1/4"	DEL-SEAL	25	BA-150-12-SP	190061
CLAMP	-	ISO	1	K150-C	701002
CENTERING RING	-	ISO	1[3]	K150-CR	710002

[2] Each gasket kit contains one Bonnet and one Poppet seal

[3] Includes one elastomer gasket seal

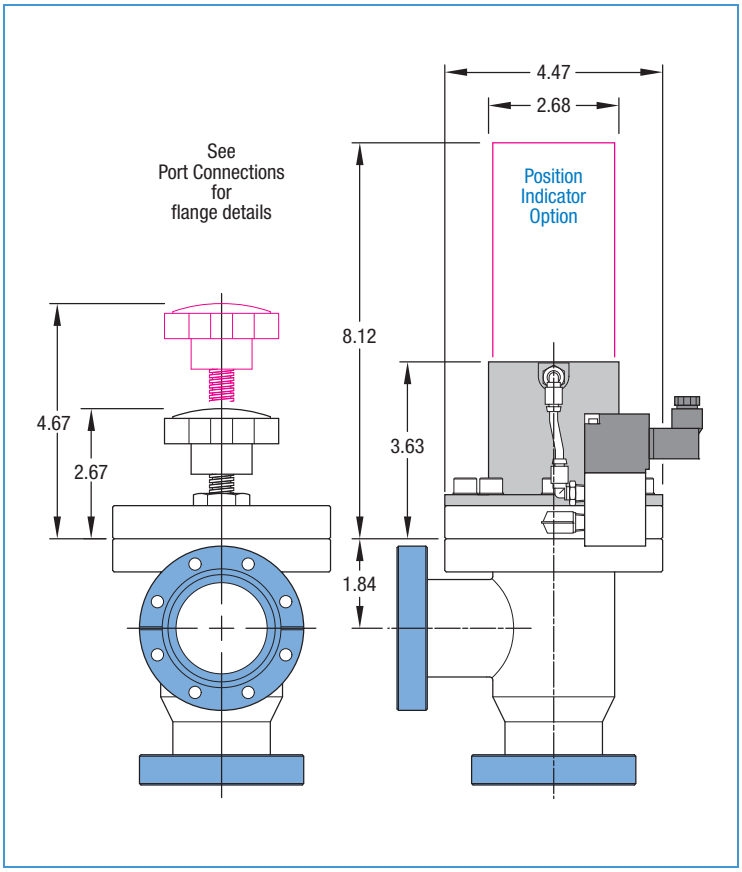
Angle Valves

2" Ports





AV-200 AV-200-PAA



ULTRAHIGH VACUUM SERIES
250°C Metal Sealed Bonnet

HIGH VACUUM SERIES
150°C Elastomer Sealed Bonnets

Features

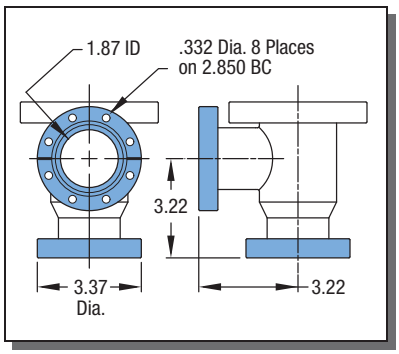
- Poppet elastomer seals made of Viton®
- Stainless steel construction
- Manual or electropneumatic operation
- Air-open / air-close air cylinder

PORT CONNECTIONS

Del-Seal™ CF



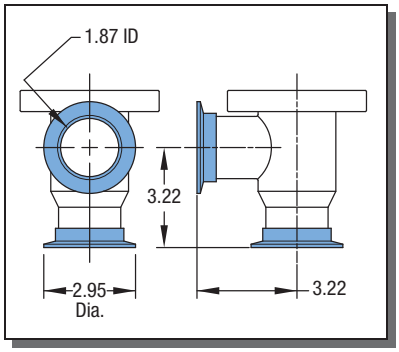
3-3/8"
Metal Seal Flange



Kwik-Flange™ KF



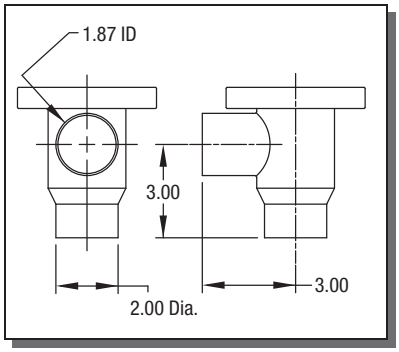
ISO NW50
Elastomer Seal Flange



Del-Weld™



2"
Tube Weld



ULTRAHIGH VACUUM SERIES
Metal Seal Bonnet 250°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
2	MANUAL	DEL-SEAL	METAL	10	AV-200M	312033
2	MANUAL	TUBE WELD	METAL	9	AV-203M	312036
2	PNEUMATIC	DEL-SEAL	METAL	10	AV-200M-PAA	313033
2	PNEUMATIC	TUBE WELD	METAL	9	AV-203M-PAA	313036

HIGH VACUUM SERIES
Elastomer Seal Bonnet 150°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
2	MANUAL	DEL-SEAL	Viton	10	AV-200	310033
2	MANUAL	ISO	Viton	10	KAV-200	310075
2	MANUAL	TUBE WELD	Viton	9	AV-203	310036
2	PNEUMATIC	DEL-SEAL	Viton	10	AV-200-PAA	311033
2	PNEUMATIC	ISO	Viton	10	KAV-200-PAA	311075
2	PNEUMATIC	TUBE WELD	Viton	9	AV-203-PAA	311036

[1] See page 199 for detailed bakeout specifications

VALVE OPTIONS

OPTION -01
MECHANICAL POSITION INDICATOR



OPTION -02
MAGNETIC POSITION INDICATORS



OPTION -03 and -09
AIR CONTROL SOLENOID VALVES



OPTION -11
4079 KALREZ 250°C POPPET SEAL



DESCRIPTION	OPTION NUMBER
MECHANICAL POSITION INDICATOR	-01
MAGNETIC POSITION INDICATORS	-02
24 VDC AIR CONTROL SOLENOID VALVE	-03
240 VAC AIR CONTROL SOLENOID VALVE	-09
HIGH TEMPERATURE POPPET SEAL	-11

When ordering Angle Valve Options, please add the option number(s) to the end of the desired UHV or HV Series Angle Valve Part Number listed above. For example 313033-**02-09-11**. Detailed descriptions of each option begin on page 196.

ACCESSORIES

HARDWARE & GASKETS



GASKET KIT	FOR USE WITH	MATERIAL	QUANTITY PER PACK	REFERENCE	PART NUMBER
POPPET & BONNET SEAL	UHV	Viton & Copper	1[2]	AVG-200M	351006
POPPET & BONNET SEAL	HV	Viton	1[2]	AVG-200	350006

HARDWARE	THREAD LENGTH	FOR USE WITH	QUANTITY PER PACK	REFERENCE	PART NUMBER
12PT HEAD BOLT SET	.312-24 x 1-3/4"	DEL-SEAL	25	BA-180-12-SP	190062
CLAMP	-	ISO	1	K200-C	701003
CENTERING RING	-	ISO	1[3]	K200-CR	710003

[2] Each gasket kit contains one Bonnet and one Poppet seal

[3] Includes one elastomer gasket seal

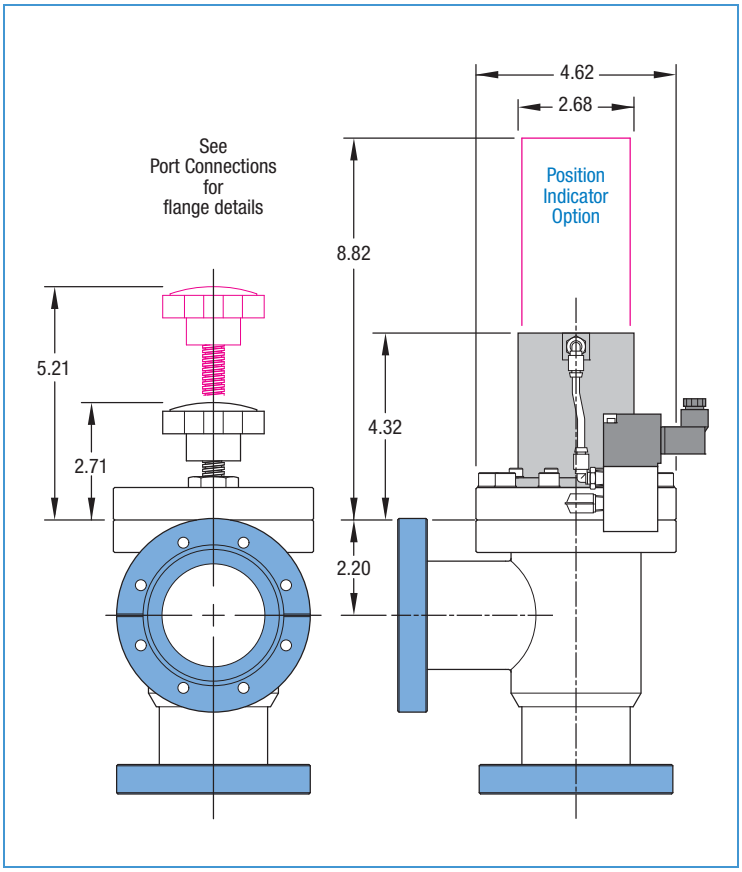
Angle Valves

2-1/2" Ports





AV-250 AV-250-PAA



ULTRAHIGH VACUUM SERIES
250°C Metal Sealed Bonnet

HIGH VACUUM SERIES
150°C Elastomer Sealed Bonnets

Features

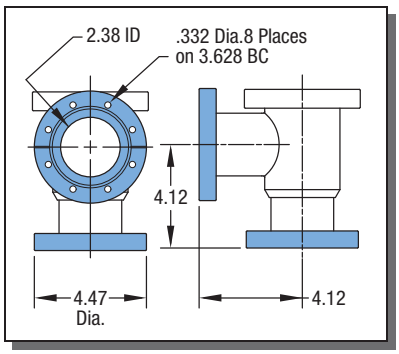
- Poppet elastomer seals made of Viton®
- Stainless steel construction
- Manual or electropneumatic operation
- Air-open / air-close air cylinder

PORT CONNECTIONS

Del-Seal™ CF



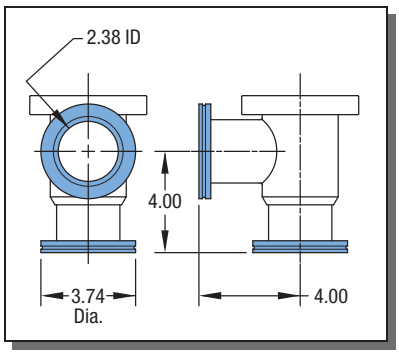
4-1/2" Metal Seal Flange



Large-Flange™ LF



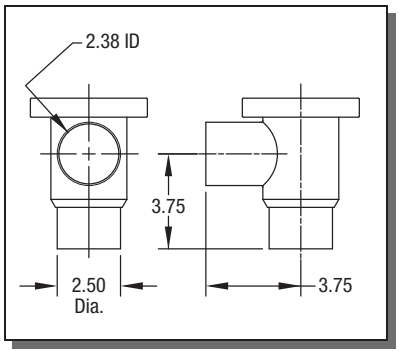
ISO NW63 Elastomer Seal Flange



Del-Weld™



2-1/2" Tube Weld



Angle Valves
2-1/2" Ports



ULTRAHIGH VACUUM SERIES
Metal Seal Bonnet 250°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
2-1/2	MANUAL	DEL-SEAL	METAL	12	AV-250M	312037
2-1/2	MANUAL	TUBE WELD	METAL	10	AV-253M	312040
2-1/2	PNEUMATIC	DEL-SEAL	METAL	12	AV-250M-PAA	313037
2-1/2	PNEUMATIC	TUBE WELD	METAL	10	AV-253M-PAA	313040

HIGH VACUUM SERIES
Elastomer Seal Bonnet 150°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
2-1/2	MANUAL	DEL-SEAL	Viton	12	AV-250	310037
2-1/2	MANUAL	ISO	Viton	12	LAV-250	310076
2-1/2	MANUAL	TUBE WELD	Viton	11	AV-253	310040
2-1/2	PNEUMATIC	DEL-SEAL	Viton	12	AV-250-PAA	311037
2-1/2	PNEUMATIC	ISO	Viton	12	LAV-250-PAA	311078
2-1/2	PNEUMATIC	TUBE WELD	Viton	11	AV-253-PAA	311040

[1] See page 199 for detailed bakeout specifications

VALVE OPTIONS

OPTION -01
MECHANICAL POSITION INDICATOR



OPTION -02
MAGNETIC POSITION INDICATORS



OPTION -03 and -09
AIR CONTROL SOLENOID VALVES



OPTION -11
4079 KALREZ 250°C POPPET SEAL



DESCRIPTION	OPTION NUMBER
MECHANICAL POSITION INDICATOR	-01
MAGNETIC POSITION INDICATORS	-02
24 VDC AIR CONTROL SOLENOID VALVE	-03
240 VAC AIR CONTROL SOLENOID VALVE	-09
HIGH TEMPERATURE POPPET SEAL	-11

When ordering Angle Valve Options, please add the option number(s) to the end of the desired UHV or HV Series Angle Valve Part Number listed above. For example 313037-**02-09-11**. Detailed descriptions of each option begin on page 196.

ACCESSORIES

HARDWARE & GASKETS



GASKET KIT	FOR USE WITH	MATERIAL	QUANTITY PER PACK	REFERENCE	PART NUMBER
POPPET & BONNET SEAL	UHV	Viton & Copper	1[2]	AVG-250M	351007
POPPET & BONNET SEAL	HV	Viton	1[2]	AVG-250	350007

HARDWARE	THREAD LENGTH	FOR USE WITH	QUANTITY PER PACK	REFERENCE	PART NUMBER
12PT HEAD BOLT SET	.312-24 x 2"	DEL-SEAL	25	BA-200-12-SP	190063
DOUBLE CLAW CLAMP	-	ISO	1	DC-8	802000
CENTERING RING	-	ISO	1[3]	L250-CR	810000

[2] Each gasket kit contains one Bonnet and one Poppet seal

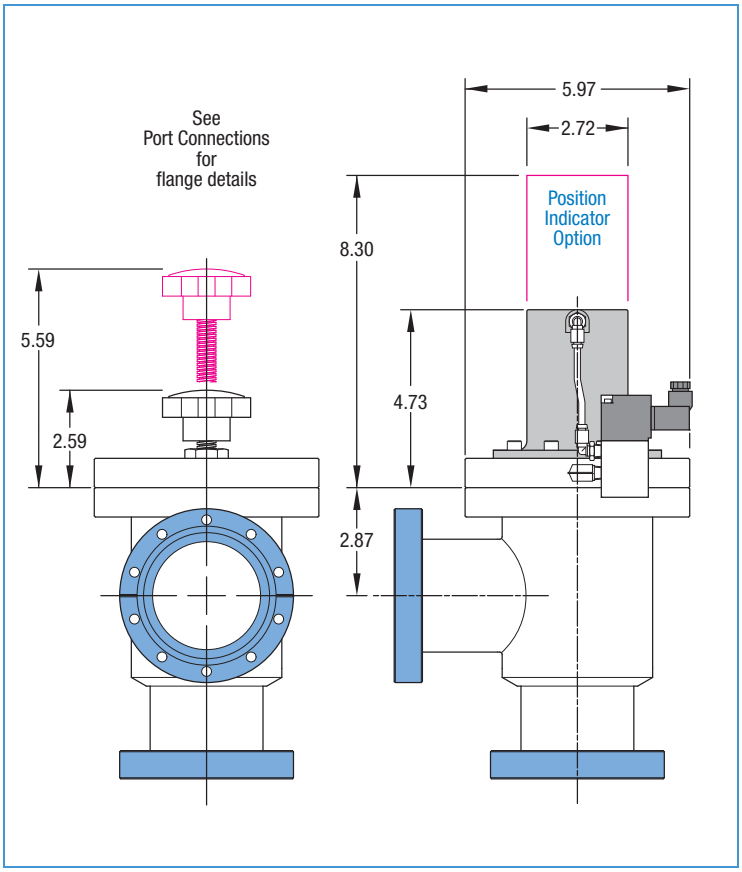
[3] Includes one elastomer gasket seal

Angle Valves

3" Ports







ULTRAHIGH VACUUM SERIES
250°C Metal Sealed Bonnet

HIGH VACUUM SERIES
150°C Elastomer Sealed Bonnets

Features

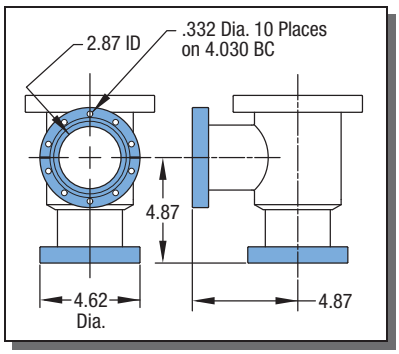
- Poppet elastomer seals made of Viton®
- Stainless steel construction
- Manual or electropneumatic operation
- Air-open / air-close air cylinder

PORT CONNECTIONS

Del-Seal™ CF



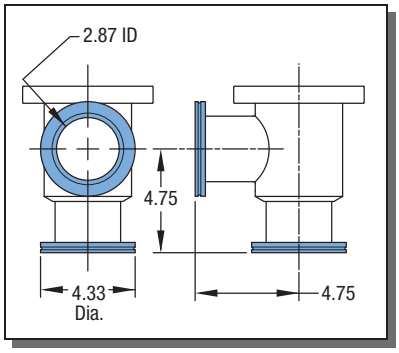
4-5/8"
Metal Seal Flange



Large-Flange™ LF



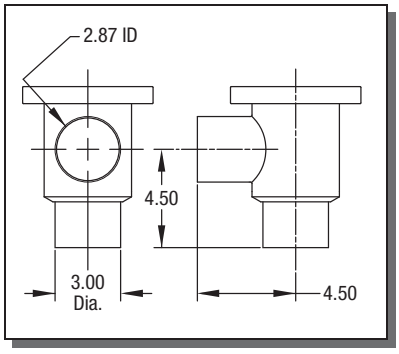
ISO NW80
Elastomer Seal Flange



Del-Weld™



3"
Tube Weld



Angle Valves

3" Ports



ULTRAHIGH VACUUM SERIES

Metal Seal Bonnet 250°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
3	MANUAL	DEL-SEAL	METAL	19	AV-300M	312041
3	MANUAL	TUBE WELD	METAL	18	AV-303M	312044
3	PNEUMATIC	DEL-SEAL	METAL	19	AV-300M-PAA	313041
3	PNEUMATIC	TUBE WELD	METAL	18	AV-303M-PAA	313044

HIGH VACUUM SERIES

Elastomer Seal Bonnet 150°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
3	MANUAL	DEL-SEAL	Viton	19	AV-300	310041
3	MANUAL	ISO	Viton	19	LAV-300	310077
3	MANUAL	TUBE WELD	Viton	18	AV-303	310044
3	PNEUMATIC	DEL-SEAL	Viton	19	AV-300-PAA	311041
3	PNEUMATIC	ISO	Viton	19	LAV-300-PAA	311079
3	PNEUMATIC	TUBE WELD	Viton	18	AV-303-PAA	311044

[1] See page 199 for detailed bakeout specifications

VALVE OPTIONS

OPTION -01
MECHANICAL POSITION INDICATOR



OPTION -02
MAGNETIC POSITION INDICATORS



OPTION -03 and -09
AIR CONTROL SOLENOID VALVES



OPTION -11
4079 KALREZ 250°C POPPET SEAL



DESCRIPTION	OPTION NUMBER
MECHANICAL POSITION INDICATOR	-01
MAGNETIC POSITION INDICATORS	-02
24 VDC AIR CONTROL SOLENOID VALVE	-03
240 VAC AIR CONTROL SOLENOID VALVE	-09
HIGH TEMPERATURE POPPET SEAL	-11

When ordering Angle Valve Options, please add the option number(s) to the end of the desired UHV or HV Series Angle Valve Part Number listed above. For example 313041-**02-09-11**. Detailed descriptions of each option begin on page 196.

ACCESSORIES

HARDWARE & GASKETS



GASKET KIT	FOR USE WITH	MATERIAL	QUANTITY PER PACK	REFERENCE	PART NUMBER
POPPET & BONNET SEAL	UHV	Viton & Copper	1[2]	AVG-300M	351008
POPPET & BONNET SEAL	HV	Viton	1[2]	AVG-300	350008

HARDWARE	THREAD LENGTH	FOR USE WITH	QUANTITY PER PACK	REFERENCE	PART NUMBER
12PT HEAD BOLT SET	.312-24 x 2-1/4"	DEL-SEAL	25	BA-300-12-SP	190064
DOUBLE CLAW CLAMP	-	ISO	1	DC-8	802000
CENTERING RING	-	ISO	1[3]	L300-CR	810008

[2] Each gasket kit contains one Bonnet and one Poppet seal

[3] Includes one elastomer gasket seal

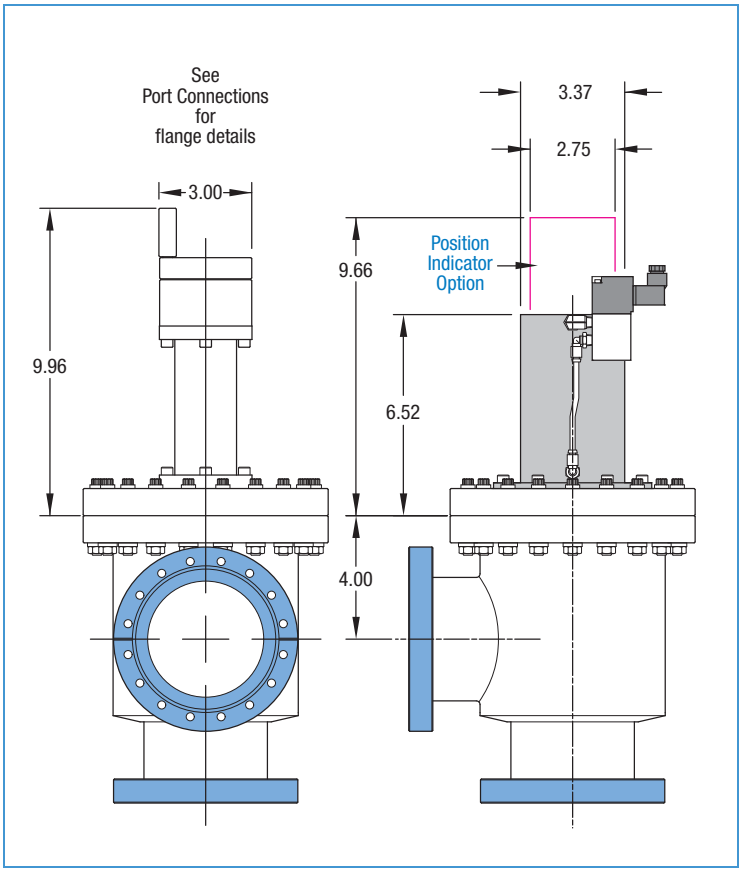
Angle Valves

4" Ports





AV-400 AV-400-PAA



ULTRAHIGH VACUUM SERIES
250°C Metal Sealed Bonnet

HIGH VACUUM SERIES
150°C Elastomer Sealed Bonnets

Features

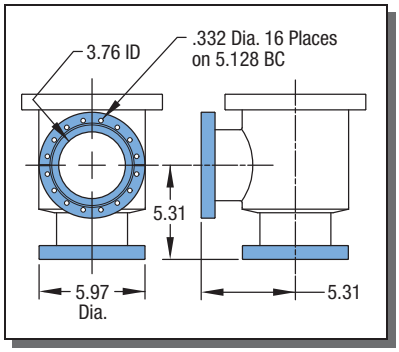
- Poppet elastomer seals made of Viton®
- Stainless steel construction
- Manual or electropneumatic operation
- Air-open / air-close air cylinder

PORT CONNECTIONS

Del-Seal™ CF



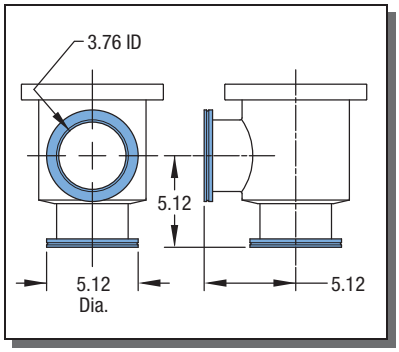
6" Metal Seal Flange



Large-Flange™ LF



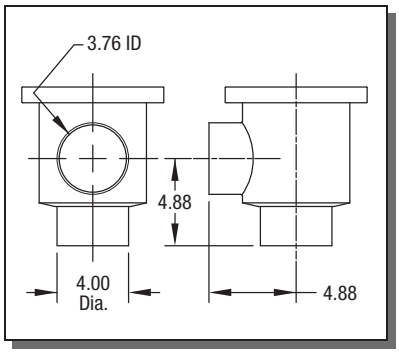
ISO NW100 Elastomer Seal Flange



Del-Weld™



4" Tube Weld



ULTRAHIGH VACUUM SERIES
Metal Seal Bonnet 250°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
4	MANUAL	DEL-SEAL	METAL	37	AV-400M	312045
4	MANUAL	TUBE WELD	METAL	31	AV-403M	312048
4	PNEUMATIC	DEL-SEAL	METAL	37	AV-400M-PAA	313045
4	PNEUMATIC	TUBE WELD	METAL	35	AV-403M-PAA	313048

HIGH VACUUM SERIES
Elastomer Seal Bonnet 150°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
4	MANUAL	DEL-SEAL	Viton	37	AV-400	310045
4	MANUAL	ISO	Viton	37	LAV-400	310078
4	MANUAL	TUBE WELD	Viton	31	AV-403	310048
4	PNEUMATIC	DEL-SEAL	Viton	37	AV-400-PAA	311045
4	PNEUMATIC	ISO	Viton	37	LAV-400-PAA	311080
4	PNEUMATIC	TUBE WELD	Viton	31	AV-403-PAA	311048

[1] See page 199 for detailed bakeout specifications

VALVE OPTIONS

OPTION -01
MECHANICAL POSITION INDICATOR



OPTION -02
MAGNETIC POSITION INDICATORS



OPTION -03 and -09
AIR CONTROL SOLENOID VALVES



OPTION -11
4079 KALREZ 250°C POPPET SEAL



DESCRIPTION	OPTION NUMBER
MECHANICAL POSITION INDICATOR	-01
MAGNETIC POSITION INDICATORS	-02
24 VDC AIR CONTROL SOLENOID VALVE	-03
240 VAC AIR CONTROL SOLENOID VALVE	-09
HIGH TEMPERATURE POPPET SEAL	-11

When ordering Angle Valve Options, please add the option number(s) to the end of the desired UHV or HV Series Angle Valve Part Number listed above. For example 313045-**02-09-11**. Detailed descriptions of each option begin on page 196.

ACCESSORIES

HARDWARE & GASKETS



GASKET KIT	FOR USE WITH	MATERIAL	QUANTITY PER PACK	REFERENCE	PART NUMBER
POPPET & BONNET SEAL	UHV	Viton & Copper	1[2]	AVG-400M	351009
POPPET & BONNET SEAL	HV	Viton	1[2]	AVG-400	350009

HARDWARE	THREAD LENGTH	FOR USE WITH	QUANTITY PER PACK	REFERENCE	PART NUMBER
12PT HEAD BOLT SET	.312-24 x 2-1/4"	DEL-SEAL	25	BA-300-12-SP	190064
DOUBLE CLAW CLAMP	-	ISO	1	DC-8	802000
CENTERING RING	-	ISO	1[3]	L400-CR	810001

[2] Each gasket kit contains one Bonnet and one Poppet seal

[3] Includes one elastomer gasket seal

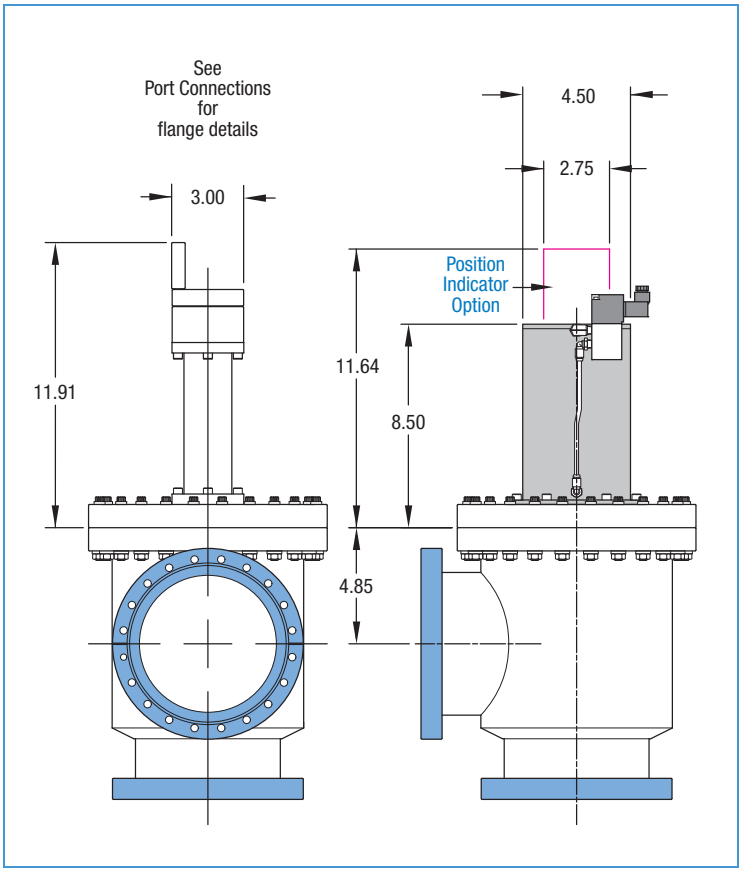
Angle Valves

6" Ports





AV-600 AV-600-PAA



ULTRAHIGH VACUUM SERIES
250°C Metal Sealed Bonnet

HIGH VACUUM SERIES
150°C Elastomer Sealed Bonnets

Features

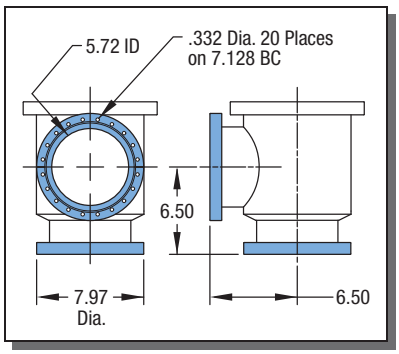
- Poppet elastomer seals made of Viton®
- Stainless steel construction
- Manual or electropneumatic operation
- Air-open / air-close air cylinder

PORT CONNECTIONS

Del-Seal™ CF



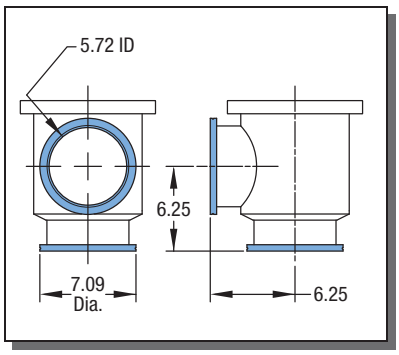
8"
Metal Seal Flange



Large-Flange™ LF



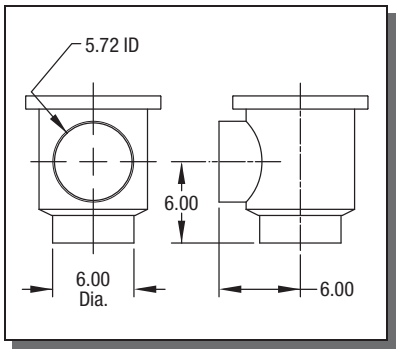
ISO NW160
Elastomer Seal Flange



Del-Weld™



6"
Tube Weld



ULTRAHIGH VACUUM SERIES
Metal Seal Bonnet 250°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
6	MANUAL	DEL-SEAL	METAL	63	AV-600M	312049
6	MANUAL	TUBE WELD	METAL	58	AV-603M	312052
6	PNEUMATIC	DEL-SEAL	METAL	63	AV-600M-PAA	313049
6	PNEUMATIC	TUBE WELD	METAL	58	AV-603M-PAA	313052

HIGH VACUUM SERIES
Elastomer Seal Bonnet 150°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
6	MANUAL	DEL-SEAL	Viton	63	AV-600	310049
6	MANUAL	ISO	Viton	63	LAV-600	310079
6	MANUAL	TUBE WELD	Viton	58	AV-603	310052
6	PNEUMATIC	DEL-SEAL	Viton	63	AV-600-PAA	311049
6	PNEUMATIC	ISO	Viton	63	LAV-600-PAA	311081
6	PNEUMATIC	TUBE WELD	Viton	59	AV-603-PAA	311052

[1] See page 199 for detailed bakeout specifications

VALVE OPTIONS

OPTION -01
MECHANICAL POSITION INDICATOR



OPTION -02
MAGNETIC POSITION INDICATORS



OPTION -03 and -09
AIR CONTROL SOLENOID VALVES



OPTION -11
4079 KALREZ 250°C POPPET SEAL



DESCRIPTION	OPTION NUMBER
MECHANICAL POSITION INDICATOR	-01
MAGNETIC POSITION INDICATORS	-02
24 VDC AIR CONTROL SOLENOID VALVE	-03
240 VAC AIR CONTROL SOLENOID VALVE	-09
HIGH TEMPERATURE POPPET SEAL	-11

When ordering Angle Valve Options, please add the option number(s) to the end of the desired UHV or HV Series Angle Valve Part Number listed above. For example 313049-**02-09-11**. Detailed descriptions of each option begin on page 196.

ACCESSORIES

HARDWARE & GASKETS



GASKET KIT	FOR USE WITH	MATERIAL	QUANTITY PER PACK	REFERENCE	PART NUMBER
POPPET & BONNET SEAL	UHV	Viton & Copper	1[2]	AVG-600M	351010
POPPET & BONNET SEAL	HV	Viton	1[2]	AVG-600	350010

HARDWARE	THREAD LENGTH	FOR USE WITH	QUANTITY PER PACK	REFERENCE	PART NUMBER
12PT HEAD BOLT SET	.312-24 x 2-1/4"	DEL-SEAL	25	BA-300-12-SP	190064
DOUBLE CLAW CLAMP	-	ISO	1	DC-10	802002
CENTERING RING	-	ISO	1[3]	L600-CR	810002

[2] Each gasket kit contains one Bonnet and one Poppet seal

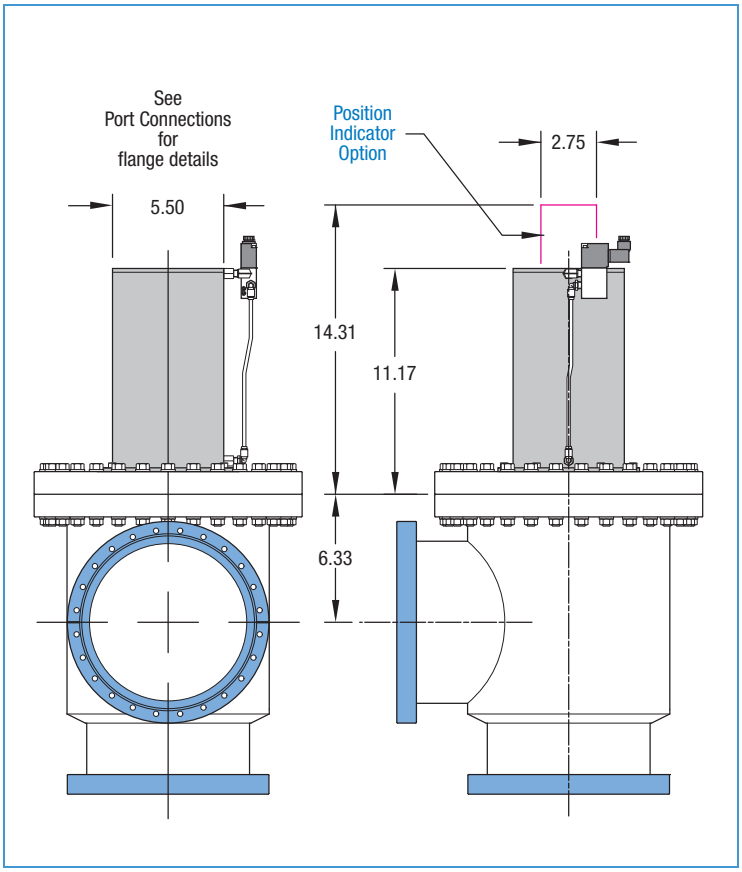
[3] Includes one elastomer gasket seal

Angle Valves

8" Ports







ULTRAHIGH VACUUM SERIES
250°C Metal Sealed Bonnet

HIGH VACUUM SERIES
150°C Elastomer Sealed Bonnets

Features

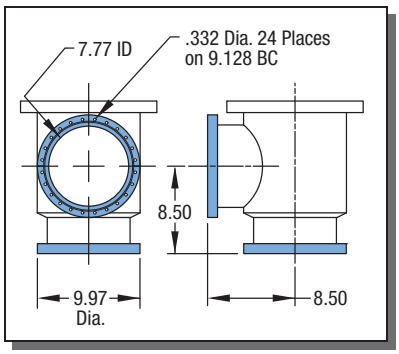
- Poppet elastomer seals made of Viton®
- Stainless steel construction
- Electropneumatic operation
- Air-open / air-close air cylinder

PORT CONNECTIONS

Del-Seal™ CF



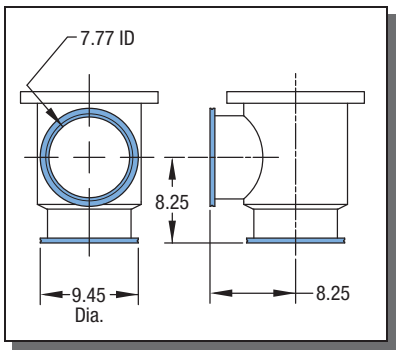
10"
Metal Seal Flange



Large-Flange™ LF



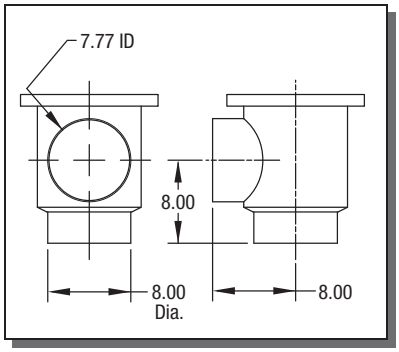
ISO NW200
Elastomer Seal Flange



Del-Weld™



8"
Tube Weld



ULTRAHIGH VACUUM SERIES
Metal Seal Bonnet 250°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
8	PNEUMATIC	DEL-SEAL	METAL	80	AV-800M-PAA	313053
8	PNEUMATIC	TUBE WELD	METAL	70	AV-803M-PAA	313056

HIGH VACUUM SERIES
Elastomer Seal Bonnet 150°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
8	PNEUMATIC	DEL-SEAL	Viton	80	AV-800-PAA	311053
8	PNEUMATIC	ISO	Viton	80	LAV-800-PAA	311082
8	PNEUMATIC	TUBE WELD	Viton	60	AV-803-PAA	311056

[1] See page 199 for detailed bakeout specifications

VALVE OPTIONS

OPTION -01
MECHANICAL POSITION INDICATOR



OPTION -02
MAGNETIC POSITION INDICATORS



OPTION -03 and -09
AIR CONTROL SOLENOID VALVES



OPTION -11
4079 KALREZ 250°C POPPET SEAL



DESCRIPTION	OPTION NUMBER
MECHANICAL POSITION INDICATOR	-01
MAGNETIC POSITION INDICATORS	-02
24 VDC AIR CONTROL SOLENOID VALVE	-03
240 VAC AIR CONTROL SOLENOID VALVE	-09
HIGH TEMPERATURE POPPET SEAL	-11

When ordering Angle Valve Options, please add the option number(s) to the end of the desired UHV or HV Series Angle Valve Part Number listed above. For example 313053-**02-09-11**. Detailed descriptions of each option begin on page 196.

ACCESSORIES

HARDWARE & GASKETS



GASKET KIT	FOR USE WITH	MATERIAL	QUANTITY PER PACK	REFERENCE	PART NUMBER
POPPET & BONNET SEAL	UHV	Viton & Copper	1[2]	AVG-800M	351011
POPPET & BONNET SEAL	HV	Viton	1[2]	AVG-800	350011

HARDWARE	THREAD LENGTH	FOR USE WITH	QUANTITY PER PACK	REFERENCE	PART NUMBER
12PT HEAD BOLT SET	.312-24 x 2-1/2"	DEL-SEAL	25	BA-800-12-SP	190067
DOUBLE CLAW CLAMP	-	ISO	1	DC-10	802002
CENTERING RING	-	ISO	1[3]	L800-CR	810003

[2] Each gasket kit contains one Bonnet and one Poppet seal

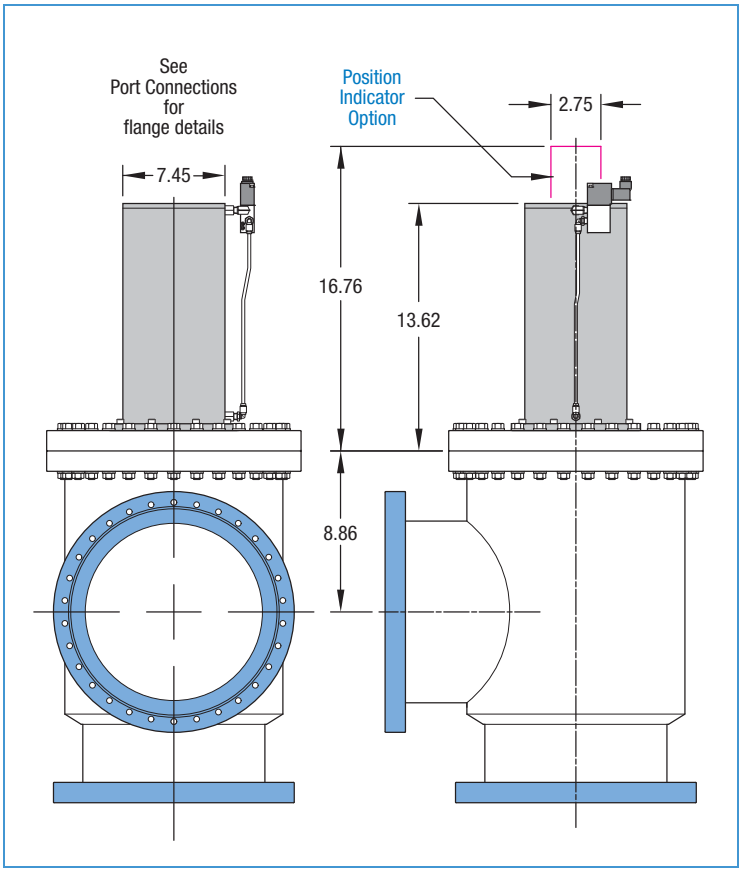
[3] Includes one elastomer gasket seal

Angle Valves

10" Ports







ULTRAHIGH VACUUM SERIES
250°C Metal Sealed Bonnet

HIGH VACUUM SERIES
150°C Elastomer Sealed Bonnets

Features

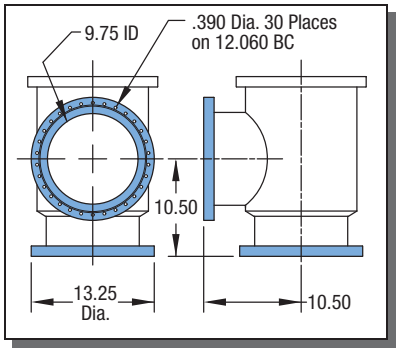
- Poppet elastomer seals made of Viton®
- Stainless steel construction
- Electropneumatic operation
- Air-open / air-close air cylinder

PORT CONNECTIONS

Del-Seal™ CF



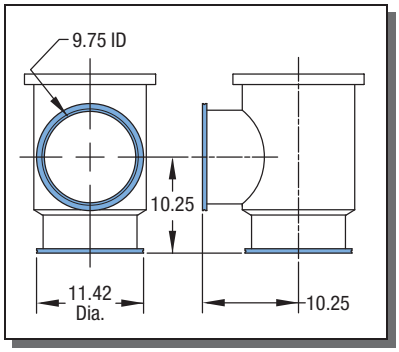
13-1/4"
Metal Seal Flange



Large-Flange™ LF



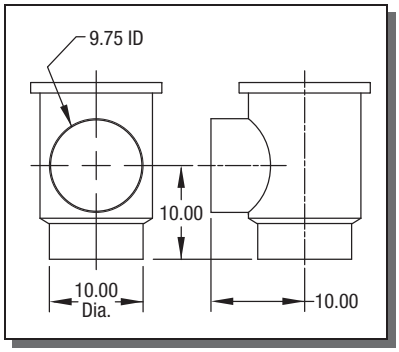
ISO NW250
Elastomer Seal Flange



Del-Weld™



10"
Tube Weld



Angle Valves
10" Ports



ULTRAHIGH VACUUM SERIES
Metal Seal Bonnet 250°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
10	PNEUMATIC	DEL-SEAL	METAL	120	AV-1000M-PAA	313068
10	PNEUMATIC	TUBE WELD	METAL	120	AV-1003M-PAA	313069

HIGH VACUUM SERIES
Elastomer Seal Bonnet 150°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
10	PNEUMATIC	DEL-SEAL	Viton	120	AV-1000-PAA	311083
10	PNEUMATIC	ISO	Viton	120	LAV-1000-PAA	311084
10	PNEUMATIC	TUBE WELD	Viton	120	AV-1003-PAA	311085

[1] See page 199 for detailed bakeout specifications

VALVE OPTIONS

OPTION -01
MECHANICAL POSITION INDICATOR



OPTION -02
MAGNETIC POSITION INDICATORS



OPTION -03 and -09
AIR CONTROL SOLENOID VALVES



OPTION -11
4079 KALREZ 250°C POPPET SEAL



DESCRIPTION	OPTION NUMBER
MECHANICAL POSITION INDICATOR	-01
MAGNETIC POSITION INDICATORS	-02
24 VDC AIR CONTROL SOLENOID VALVE	-03
240 VAC AIR CONTROL SOLENOID VALVE	-09
HIGH TEMPERATURE POPPET SEAL	-11

When ordering Angle Valve Options, please add the option number(s) to the end of the desired UHV or HV Series Angle Valve Part Number listed above. For example 313068-**02-09-11**. Detailed descriptions of each option begin on page 196.

ACCESSORIES

HARDWARE & GASKETS



GASKET KIT	FOR USE WITH	MATERIAL	QUANTITY PER PACK	REFERENCE	PART NUMBER
POPPET & BONNET SEAL	UHV	Viton & Copper	1[2]	AVG-1000M	351012
POPPET & BONNET SEAL	HV	Viton	1[2]	AVG-1000	350012

HARDWARE	THREAD LENGTH	FOR USE WITH	QUANTITY PER PACK	REFERENCE	PART NUMBER
HEX HEAD BOLT SET	.375-24 x 3"	DEL-SEAL	30	BA-1000-SP	190060
DOUBLE CLAW CLAMP	-	ISO	1	DC-10	802002
CENTERING RING	-	ISO	1[3]	L1000-CR	810004

[2] Each gasket kit contains one Bonnet and one Poppet seal

[3] Includes one elastomer gasket seal

Inline Valves

3/4" Ports





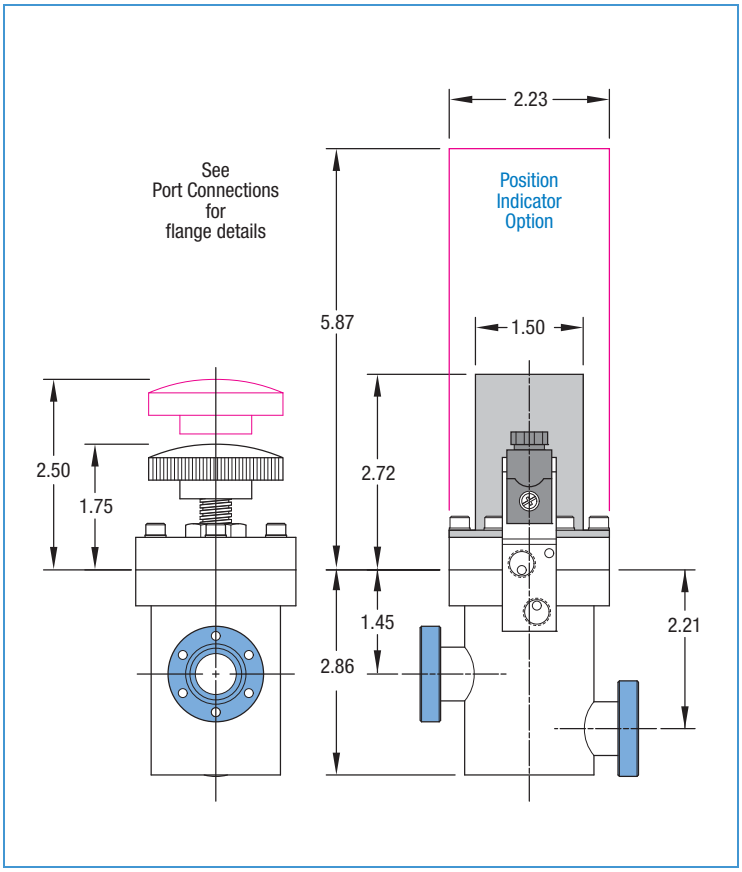
IV-075 IV-075-P

ULTRAHIGH VACUUM SERIES
250°C Metal Sealed Bonnet

HIGH VACUUM SERIES
150°C Elastomer Sealed Bonnets

Features

- Poppet elastomer seals made of Viton®
- Stainless steel construction
- Manual or electropneumatic operation
- Air-open / spring-close air cylinder

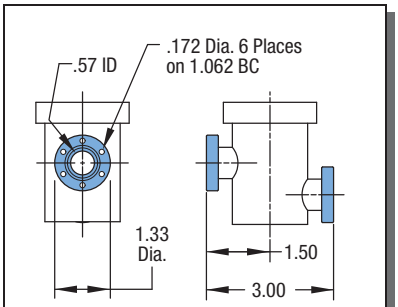


PORT CONNECTIONS

Del-Seal™ CF



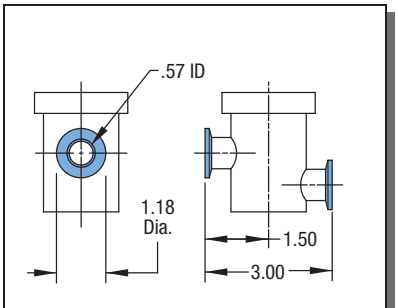
1-1/3"
Metal Seal Flange



Kwik-Flange™ KF



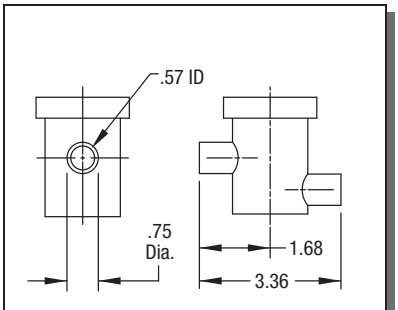
ISO NW16
Elastomer Seal Flange



Del-Weld™



3/4"
Tube Weld



ULTRAHIGH VACUUM SERIES
Metal Seal Bonnet 250°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
3/4	MANUAL	DEL-SEAL	METAL	2	IV-075M	322004
3/4	MANUAL	TUBE WELD	METAL	1	IV-073M	322010
3/4	PNEUMATIC	DEL-SEAL	METAL	2	IV-075M-P	323004
3/4	PNEUMATIC	TUBE WELD	METAL	1	IV-073M-P	323010

HIGH VACUUM SERIES
Elastomer Seal Bonnet 150°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
3/4	MANUAL	DEL-SEAL	Viton	2	IV-075	320004
3/4	MANUAL	ISO	Viton	1	KIV-075	320052
3/4	MANUAL	TUBE WELD	Viton	1	IV-073	320010
3/4	PNEUMATIC	DEL-SEAL	Viton	2	IV-075-P	321004
3/4	PNEUMATIC	ISO	Viton	1	KIV-075-P	321052
3/4	PNEUMATIC	TUBE WELD	Viton	1	IV-073-P	321010

[1] See page 199 for detailed bakeout specifications

VALVE OPTIONS

OPTION -01
MECHANICAL POSITION INDICATOR



OPTION -02
MAGNETIC POSITION INDICATORS



OPTION -03 and -09
AIR CONTROL SOLENOID VALVES



OPTION -11
4079 KALREZ 250°C POPPET SEAL



DESCRIPTION	OPTION NUMBER
MECHANICAL POSITION INDICATOR	-01
MAGNETIC POSITION INDICATORS	-02
24 VDC AIR CONTROL SOLENOID VALVE	-03
240 VAC AIR CONTROL SOLENOID VALVE	-09
HIGH TEMPERATURE POPPET SEAL	-11

When ordering Inline Valve Options, please add the option number(s) to the end of the desired UHV or HV Series Inline Valve Part Number listed above. For example 323004-**02-09-11**. Detailed descriptions of each option begin on page 196.

ACCESSORIES

HARDWARE & GASKETS



GASKET KIT	FOR USE WITH	MATERIAL	QUANTITY PER PACK	REFERENCE	PART NUMBER
POPPET & BONNET SEAL	UHV	Viton & Copper	1[2]	IVG-075M	351004
POPPET & BONNET SEAL	HV	Viton	1[2]	IVG-075	350004

HARDWARE	THREAD LENGTH	FOR USE WITH	QUANTITY PER PACK	REFERENCE	PART NUMBER
SOCKET HEAD	8-32 x 3/4"	DEL-SEAL	25	BA-075-SP	190037
CLAMP	-	ISO	1	K075-C	701000
CENTERING RING	-	ISO	1[3]	K075-CR	710000

[2] Each gasket kit contains one Bonnet and one Poppet seal

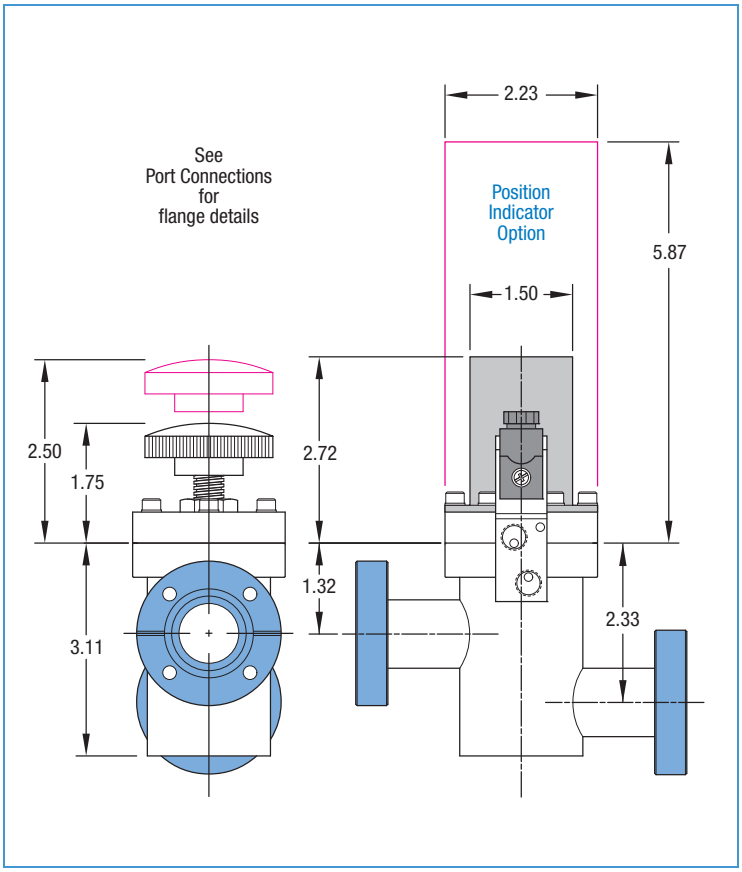
[3] Includes one elastomer gasket seal

Inline Valves

1" Ports







ULTRAHIGH VACUUM SERIES
250°C Metal Sealed Bonnet

HIGH VACUUM SERIES
150°C Elastomer Sealed Bonnets

Features

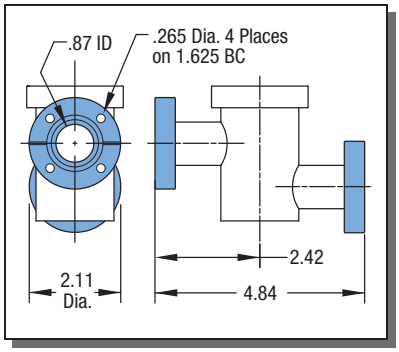
- Poppet elastomer seals made of Viton®
- Stainless steel construction
- Manual or electropneumatic operation
- Air-open / spring-close air cylinder

PORT CONNECTIONS

Del-Seal™ CF



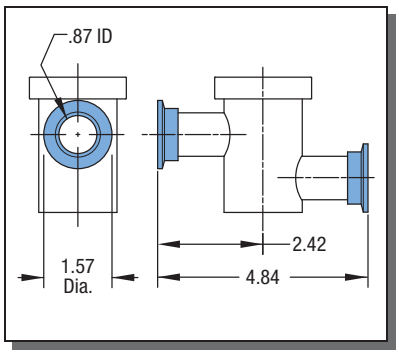
2-1/8"
Metal Seal Flange



Kwik-Flange™ KF



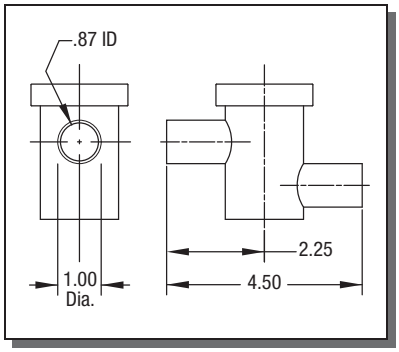
ISO NW25
Elastomer Seal Flange



Del-Weld™



1"
Tube Weld



ULTRAHIGH VACUUM SERIES
Metal Seal Bonnet 250°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
1	MANUAL	DEL-SEAL	METAL	3	IV-100M	322011
1	MANUAL	TUBE WELD	METAL	2	IV-103M	322017
1	PNEUMATIC	DEL-SEAL	METAL	3	IV-100M-P	323011
1	PNEUMATIC	TUBE WELD	METAL	2	IV-103M-P	323017

HIGH VACUUM SERIES
Elastomer Seal Bonnet 150°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
1	MANUAL	DEL-SEAL	Viton	3	IV-100	320011
1	MANUAL	ISO	Viton	2	KIV-100	320053
1	MANUAL	TUBE WELD	Viton	2	IV-103	320017
1	PNEUMATIC	DEL-SEAL	Viton	3	IV-100-P	321011
1	PNEUMATIC	ISO	Viton	2	KIV-100-P	321053
1	PNEUMATIC	TUBE WELD	Viton	2	IV-103-P	321017

[1] See page 199 for detailed bakeout specifications

VALVE OPTIONS

OPTION -01
MECHANICAL POSITION INDICATOR



OPTION -02
MAGNETIC POSITION INDICATORS



OPTION -03 and -09
AIR CONTROL SOLENOID VALVES



OPTION -11
4079 KALREZ 250°C POPPET SEAL



DESCRIPTION	OPTION NUMBER
MECHANICAL POSITION INDICATOR	-01
MAGNETIC POSITION INDICATORS	-02
24 VDC AIR CONTROL SOLENOID VALVE	-03
240 VAC AIR CONTROL SOLENOID VALVE	-09
HIGH TEMPERATURE POPPET SEAL	-11

When ordering Inline Valve Options, please add the option number(s) to the end of the desired UHV or HV Series Inline Valve Part Number listed above. For example 323011-**02-09-11**. Detailed descriptions of each option begin on page 196.

ACCESSORIES

HARDWARE & GASKETS



GASKET KIT	FOR USE WITH	MATERIAL	QUANTITY PER PACK	REFERENCE	PART NUMBER
POPPET & BONNET SEAL	UHV	Viton & Copper	1[2]	IVG-100M	351004
POPPET & BONNET SEAL	HV	Viton	1[2]	IVG-100	350004

HARDWARE	THREAD LENGTH	FOR USE WITH	QUANTITY PER PACK	REFERENCE	PART NUMBER
12PT HEAD BOLT SET	.250-28 x 1-1/4"	DEL-SEAL	25	BA-150-12-SP	190061
CLAMP	-	ISO	1	K100-C	701001
CENTERING RING	-	ISO	1[3]	K100-CR	710001

[2] Each gasket kit contains one Bonnet and one Poppet seal

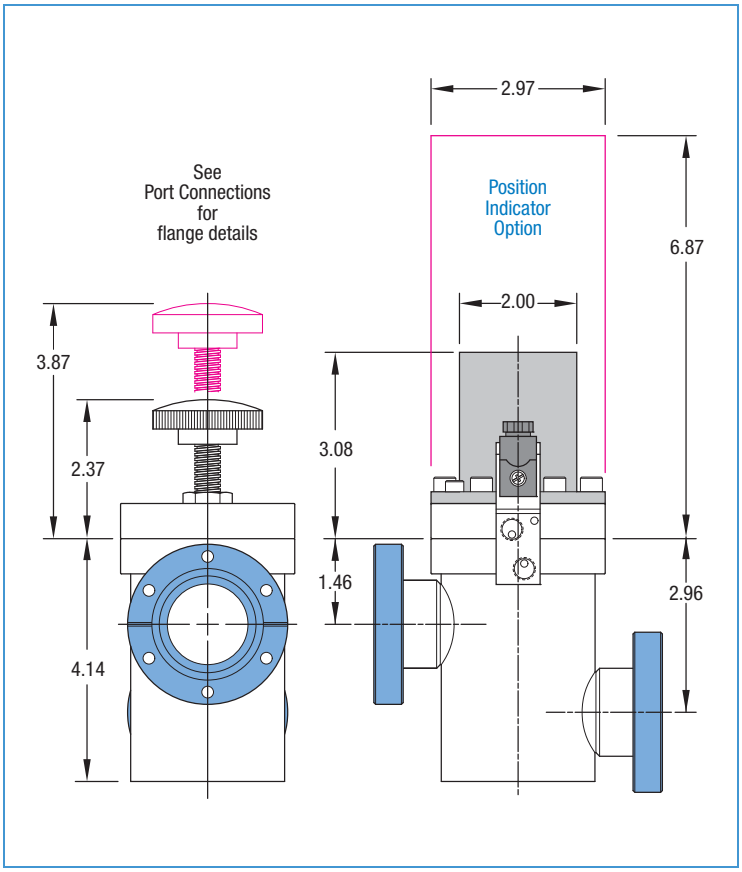
[3] Includes one elastomer gasket seal

Inline Valves

1-1/2" Ports







ULTRAHIGH VACUUM SERIES
250°C Metal Sealed Bonnet

HIGH VACUUM SERIES
150°C Elastomer Sealed Bonnets

Features

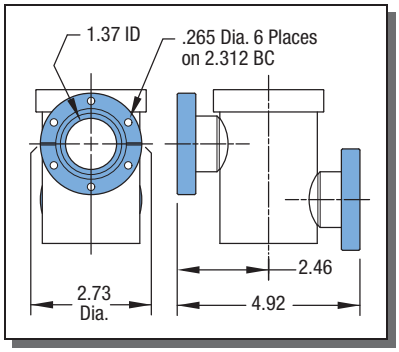
- Poppet elastomer seals made of Viton®
- Stainless steel construction
- Manual or electropneumatic operation
- Air-open / spring-close air cylinder

PORT CONNECTIONS

Del-Seal™ CF



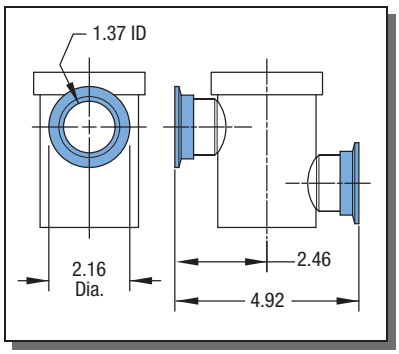
2-3/4"
Metal Seal Flange



Kwik-Flange™ KF



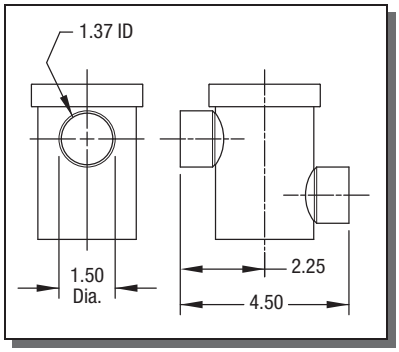
ISO NW40
Elastomer Seal Flange



Del-Weld™



1-1/2"
Tube Weld



Inline Valves

1-1/2" Ports



ULTRAHIGH VACUUM SERIES

Metal Seal Bonnet 250°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
1-1/2	MANUAL	DEL-SEAL	METAL	5	IV-150M	322018
1-1/2	MANUAL	TUBE WELD	METAL	4	IV-153M	322021
1-1/2	PNEUMATIC	DEL-SEAL	METAL	5	IV-150M-P	323018
1-1/2	PNEUMATIC	TUBE WELD	METAL	4	IV-153M-P	323021

HIGH VACUUM SERIES

Elastomer Seal Bonnet 150°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
1-1/2	MANUAL	DEL-SEAL	Viton	5	IV-150	320018
1-1/2	MANUAL	ISO	Viton	4	KIV-150	320054
1-1/2	MANUAL	TUBE WELD	Viton	3	IV-153	320021
1-1/2	PNEUMATIC	DEL-SEAL	Viton	5	IV-150-P	321018
1-1/2	PNEUMATIC	ISO	Viton	4	KIV-150-P	321054
1-1/2	PNEUMATIC	TUBE WELD	Viton	3	IV-153-P	321021

[1] See page 199 for detailed bakeout specifications

VALVE OPTIONS

OPTION -01
MECHANICAL POSITION INDICATOR



OPTION -02
MAGNETIC POSITION INDICATORS



OPTION -03 and -09
AIR CONTROL SOLENOID VALVES



OPTION -11
4079 KALREZ 250°C POPPET SEAL



DESCRIPTION	OPTION NUMBER
MECHANICAL POSITION INDICATOR	-01
MAGNETIC POSITION INDICATORS	-02
24 VDC AIR CONTROL SOLENOID VALVE	-03
240 VAC AIR CONTROL SOLENOID VALVE	-09
HIGH TEMPERATURE POPPET SEAL	-11

When ordering Inline Valve Options, please add the option number(s) to the end of the desired UHV or HV Series Inline Valve Part Number listed above. For example 323018-**02-09-11**. Detailed descriptions of each option begin on page 196.

ACCESSORIES

HARDWARE & GASKETS



GASKET KIT	FOR USE WITH	MATERIAL	QUANTITY PER PACK	REFERENCE	PART NUMBER
POPPET & BONNET SEAL	UHV	Viton & Copper	1[2]	IVG-150M	351005
POPPET & BONNET SEAL	HV	Viton	1[2]	IVG-150	350005

HARDWARE	THREAD LENGTH	FOR USE WITH	QUANTITY PER PACK	REFERENCE	PART NUMBER
12PT HEAD BOLT SET	.250-28 x 1-1/4"	DEL-SEAL	25	BA-150-12-SP	190061
CLAMP	-	ISO	1	K150-C	701002
CENTERING RING	-	ISO	1[3]	K150-CR	710002

[2] Each gasket kit contains one Bonnet and one Poppet seal

[3] Includes one elastomer gasket seal



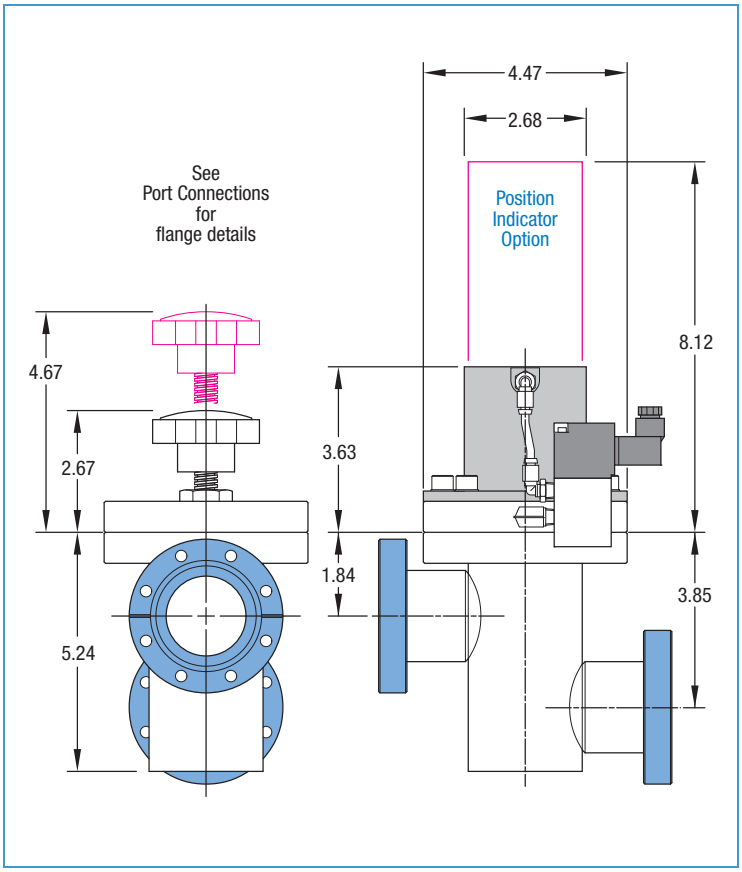


ULTRAHIGH VACUUM SERIES
250°C Metal Sealed Bonnet

HIGH VACUUM SERIES
150°C Elastomer Sealed Bonnets

Features

- Poppet elastomer seals made of Viton®
- Stainless steel construction
- Manual or electropneumatic operation
- Air-open / air-close air cylinder

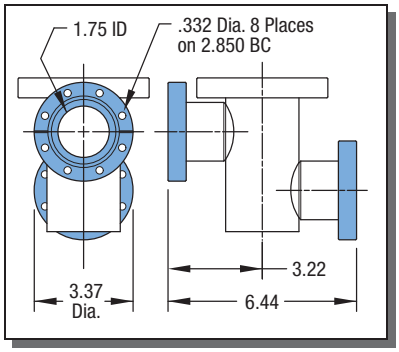


PORT CONNECTIONS

Del-Seal™ CF



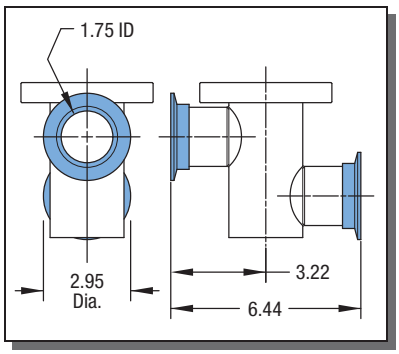
3-3/8"
Metal Seal Flange



Kwik-Flange™ KF



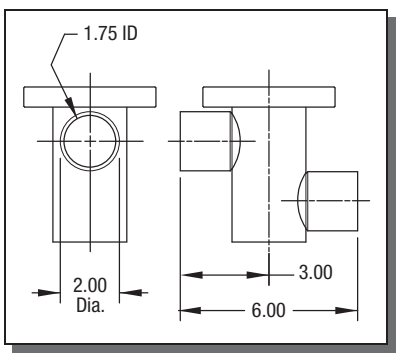
ISO NW50
Elastomer Seal Flange



Del-Weld™



2"
Tube Weld



ULTRAHIGH VACUUM SERIES
Metal Seal Bonnet 250°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
2	MANUAL	DEL-SEAL	METAL	10	IV-200M	322022
2	MANUAL	TUBE WELD	METAL	9	IV-203M	322025
2	PNEUMATIC	DEL-SEAL	METAL	10	IV-200M-PAA	323022
2	PNEUMATIC	TUBE WELD	METAL	9	IV-203M-PAA	323025

HIGH VACUUM SERIES
Elastomer Seal Bonnet 150°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
2	MANUAL	DEL-SEAL	Viton	10	IV-200	320022
2	MANUAL	ISO	Viton	10	KIV-200	320055
2	MANUAL	TUBE WELD	Viton	9	IV-203	320025
2	PNEUMATIC	DEL-SEAL	Viton	10	IV-200-PAA	321022
2	PNEUMATIC	ISO	Viton	10	KIV-200-PAA	321055
2	PNEUMATIC	TUBE WELD	Viton	9	IV-203-PAA	321025

[1] See page 199 for detailed bakeout specifications

VALVE OPTIONS

OPTION -01
MECHANICAL POSITION INDICATOR



OPTION -02
MAGNETIC POSITION INDICATORS



OPTION -03 and -09
AIR CONTROL SOLENOID VALVES



OPTION -11
4079 KALREZ 250°C POPPET SEAL



DESCRIPTION	OPTION NUMBER
MECHANICAL POSITION INDICATOR	-01
MAGNETIC POSITION INDICATORS	-02
24 VDC AIR CONTROL SOLENOID VALVE	-03
240 VAC AIR CONTROL SOLENOID VALVE	-09
HIGH TEMPERATURE POPPET SEAL	-11

When ordering Inline Valve Options, please add the option number(s) to the end of the desired UHV or HV Series Inline Valve Part Number listed above. For example 323022-**02-09-11**. Detailed descriptions of each option begin on page 196.

ACCESSORIES

HARDWARE & GASKETS



GASKET KIT	FOR USE WITH	MATERIAL	QUANTITY PER PACK	REFERENCE	PART NUMBER
POPPET & BONNET SEAL	UHV	Viton & Copper	1[2]	IVG-200M	351006
POPPET & BONNET SEAL	HV	Viton	1[2]	IVG-200	350006

HARDWARE	THREAD LENGTH	FOR USE WITH	QUANTITY PER PACK	REFERENCE	PART NUMBER
12PT HEAD BOLT SET	.312-24 x 1-3/4"	DEL-SEAL	25	BA-180-12-SP	190062
CLAMP	-	ISO	1	K200-C	701003
CENTERING RING	-	ISO	1[3]	K200-CR	710003

[2] Each gasket kit contains one Bonnet and one Poppet seal

[3] Includes one elastomer gasket seal





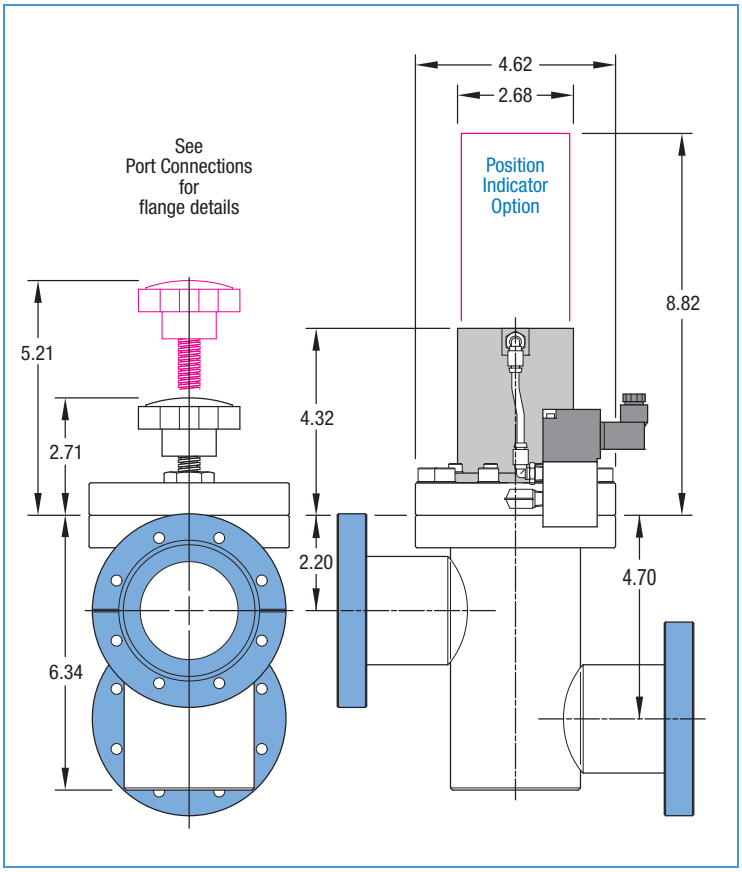
IV-250 IV-250-PAA

ULTRAHIGH VACUUM SERIES
250°C Metal Sealed Bonnet

HIGH VACUUM SERIES
150°C Elastomer Sealed Bonnets

Features

- Poppet elastomer seals made of Viton®
- Stainless steel construction
- Manual or electropneumatic operation
- Air-open / air-close air cylinder

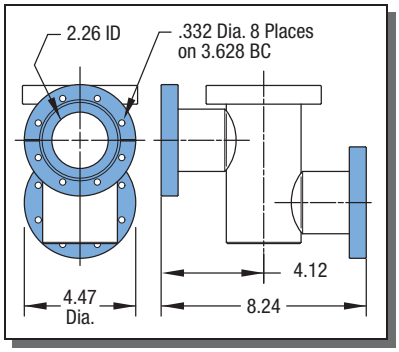


PORT CONNECTIONS

Del-Seal™ CF



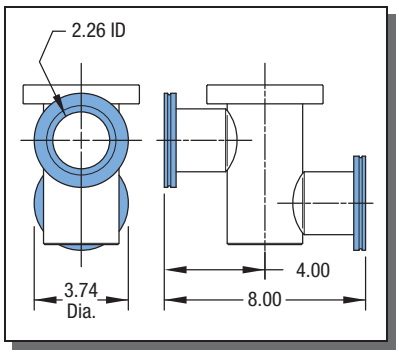
4-1/2"
Metal Seal Flange



Large-Flange™ LF



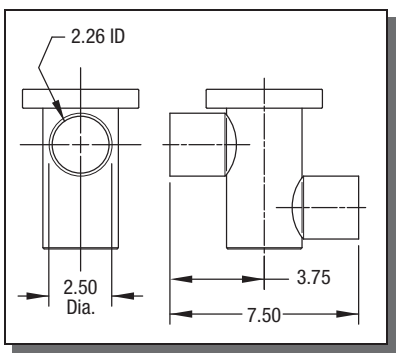
ISO NW63
Elastomer Seal Flange



Del-Weld™



2-1/2"
Tube Weld



ULTRAHIGH VACUUM SERIES

Metal Seal Bonnet 250°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
2-1/2	MANUAL	DEL-SEAL	METAL	12	IV-250M	322026
2-1/2	MANUAL	TUBE WELD	METAL	10	IV-253M	322029
2-1/2	PNEUMATIC	DEL-SEAL	METAL	12	IV-250M-PAA	323026
2-1/2	PNEUMATIC	TUBE WELD	METAL	10	IV-253M-PAA	323029

HIGH VACUUM SERIES

Elastomer Seal Bonnet 150°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
2-1/2	MANUAL	DEL-SEAL	Viton	12	IV-250	320026
2-1/2	MANUAL	ISO	Viton	12	LIV-250	320056
2-1/2	MANUAL	TUBE WELD	Viton	11	IV-253	320029
2-1/2	PNEUMATIC	DEL-SEAL	Viton	12	IV-250-PAA	321026
2-1/2	PNEUMATIC	ISO	Viton	12	LIV-250-PAA	321056
2-1/2	PNEUMATIC	TUBE WELD	Viton	11	IV-253-PAA	321029

[1] See page 199 for detailed bakeout specifications

VALVE OPTIONS

OPTION -01
MECHANICAL POSITION INDICATOR



OPTION -02
MAGNETIC POSITION INDICATORS



OPTION -03 and -09
AIR CONTROL SOLENOID VALVES



OPTION -11
4079 KALREZ 250°C POPPET SEAL



DESCRIPTION	OPTION NUMBER
MECHANICAL POSITION INDICATOR	-01
MAGNETIC POSITION INDICATORS	-02
24 VDC AIR CONTROL SOLENOID VALVE	-03
240 VAC AIR CONTROL SOLENOID VALVE	-09
HIGH TEMPERATURE POPPET SEAL	-11

When ordering Inline Valve Options, please add the option number(s) to the end of the desired UHV or HV Series Inline Valve Part Number listed above. For example 323026-**02-09-11**. Detailed descriptions of each option begin on page 196.

ACCESSORIES

HARDWARE & GASKETS



GASKET KIT	FOR USE WITH	MATERIAL	QUANTITY PER PACK	REFERENCE	PART NUMBER
POPPET & BONNET SEAL	UHV	Viton & Copper	1[2]	IVG-250M	351007
POPPET & BONNET SEAL	HV	Viton	1[2]	IVG-250	350007

HARDWARE	THREAD LENGTH	FOR USE WITH	QUANTITY PER PACK	REFERENCE	PART NUMBER
12PT HEAD BOLT SET	.312-24 x 2"	DEL-SEAL	25	BA-200-12-SP	190063
DOUBLE CLAW CLAMP	-	ISO	1	DC-8	802000
CENTERING RING	-	ISO	1[3]	L250-CR	810000

[2] Each gasket kit contains one Bonnet and one Poppet seal

[3] Includes one elastomer gasket seal

Inline Valves

3" Ports



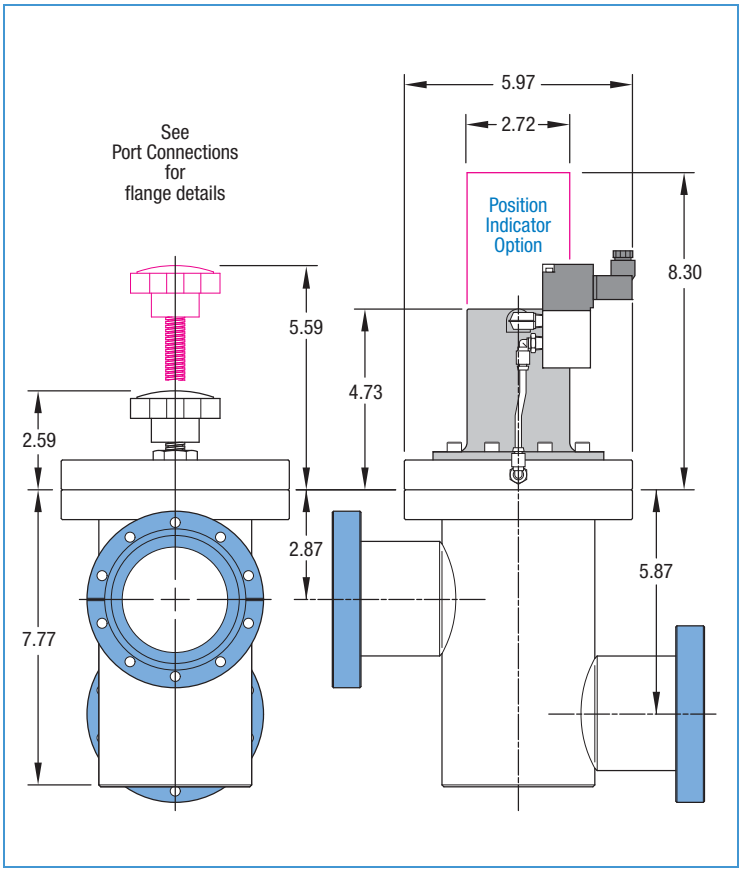


ULTRAHIGH VACUUM SERIES
250°C Metal Sealed Bonnet

HIGH VACUUM SERIES
150°C Elastomer Sealed Bonnets

Features

- Poppet elastomer seals made of Viton®
- Stainless steel construction
- Manual or electropneumatic operation
- Air-open / air-close air cylinder

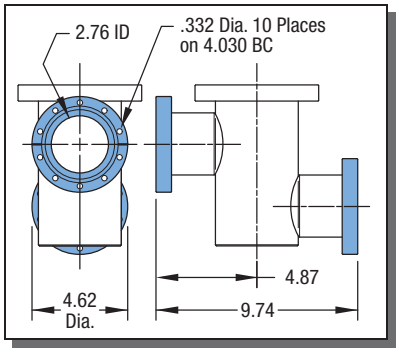


PORT CONNECTIONS

Del-Seal™ CF



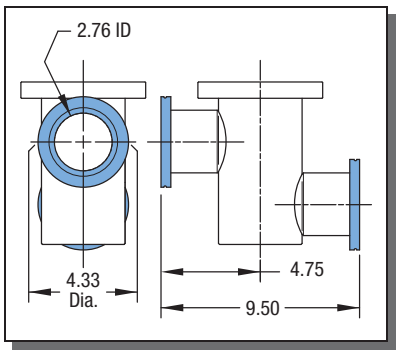
4-5/8"
Metal Seal Flange



Large-Flange™ LF



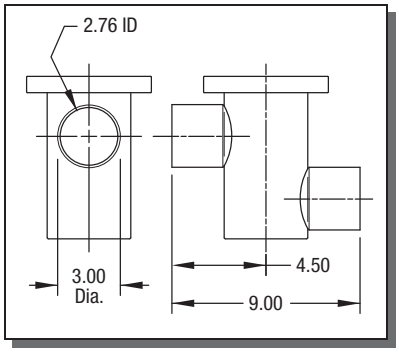
ISO NW80
Elastomer Seal Flange



Del-Weld™



3"
Tube Weld



ULTRAHIGH VACUUM SERIES
Metal Seal Bonnet 250°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
3	MANUAL	DEL-SEAL	METAL	19	IV-300M	322030
3	MANUAL	TUBE WELD	METAL	18	IV-303M	322033
3	PNEUMATIC	DEL-SEAL	METAL	19	IV-300M-PAA	323030
3	PNEUMATIC	TUBE WELD	METAL	18	IV-303M-PAA	323033

HIGH VACUUM SERIES
Elastomer Seal Bonnet 150°C[1]

VALVE SIZE	ACTUATOR	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
3	MANUAL	DEL-SEAL	Viton	19	IV-300	320030
3	MANUAL	ISO	Viton	19	LIV-300	320057
3	MANUAL	TUBE WELD	Viton	18	IV-303	320033
3	PNEUMATIC	DEL-SEAL	Viton	19	IV-300-PAA	321030
3	PNEUMATIC	ISO	Viton	19	LIV-300-PAA	321057
3	PNEUMATIC	TUBE WELD	Viton	18	IV-303-PAA	321033

[1] See page 199 for detailed bakeout specifications

VALVE OPTIONS

OPTION -01
MECHANICAL POSITION INDICATOR



OPTION -02
MAGNETIC POSITION INDICATORS



OPTION -03 and -09
AIR CONTROL SOLENOID VALVES



OPTION -11
4079 KALREZ 250°C POPPET SEAL



DESCRIPTION	OPTION NUMBER
MECHANICAL POSITION INDICATOR	-01
MAGNETIC POSITION INDICATORS	-02
24 VDC AIR CONTROL SOLENOID VALVE	-03
240 VAC AIR CONTROL SOLENOID VALVE	-09
HIGH TEMPERATURE POPPET SEAL	-11

When ordering Inline Valve Options, please add the option number(s) to the end of the desired UHV or HV Series Inline Valve Part Number listed above. For example 323030-**02-09-11**. Detailed descriptions of each option begin on page 196.

ACCESSORIES

HARDWARE & GASKETS



GASKET KIT	FOR USE WITH	MATERIAL	QUANTITY PER PACK	REFERENCE	PART NUMBER
POPPET & BONNET SEAL	UHV	Viton & Copper	1[2]	IVG-300M	351008
POPPET & BONNET SEAL	HV	Viton	1[2]	IVG-300	350008

HARDWARE	THREAD LENGTH	FOR USE WITH	QUANTITY PER PACK	REFERENCE	PART NUMBER
12PT HEAD BOLT SET	.312-24 x 2-1/4"	DEL-SEAL	25	BA-300-12-SP	190064
DOUBLE CLAW CLAMP	-	ISO	1	DC-8	802000
CENTERING RING	-	ISO	1[3]	L300-CR	810008

[2] Each gasket kit contains one Bonnet and one Poppet seal

[3] Includes one elastomer gasket seal





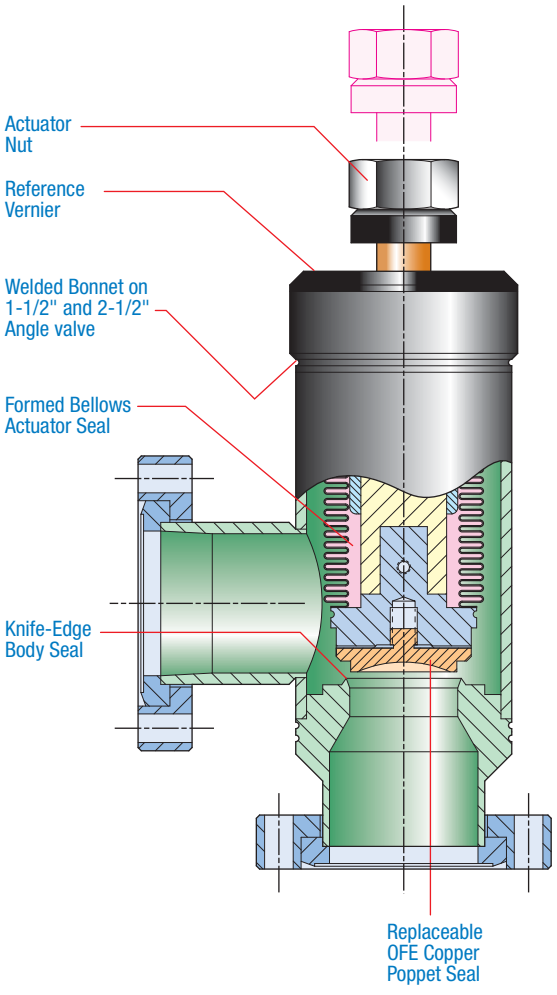
MAV-150 MIV-150

ULTRAHIGH VACUUM SERIES
450°C Metal Sealed Bonnet & Poppet

Features

- UHV compatible to $1x10^{-11}$ Torr
- Manual actuation
- Hundreds of seal cycles per gasket
- Replaceable OFE copper poppet gasket
- High temperature service to 450°C
- 300 Series stainless steel construction
- Stainless steel bellows sealed actuator
- High conductance design

1-1/2" All-Metal Angle Valve Cross Section



Specifications

Material	
Flanges	304ss
Valve Body	304ss
Bolts	300ss
Gaskets, Poppet and Bonnet	OFE Copper
Port Fastening	
Bolt Type	Silver plated 12-point and socket head bolts
Nut Type	Hexagonal nuts
Vacuum	
Range	$1x10^{-11}$ Torr
Leak Test	$2x10^{-10}$ cc/sec of He
Poppet Sealing Torque	
3/4" Valve, First / Subsequent Seals	7-10 / 6-7 lb-ft
1-1/2" Valve, First / Subsequent Seals	4-8 / 4-7 lb-ft
2-1/2" Valve, First / Subsequent Seals	7-10 / 6-7 lb-ft
Temperature Range	
Closed / Open	300°C / 450°C
Weight and Dimensions	See tables

MDC bakeable all-metal angle and inline valves are designed for use in ultrahigh vacuum environments where elevated temperatures preclude the use of elastomers and low temperature gasket metals. These valves provide reliable high temperature seals from atmospheric pressures to below 10^{-11} Torr.

Wherever possible, bonnet gasket seals have been eliminated in an effort to minimize the number of potential leak paths. Valves fitted with bonnet seals have been so designed to facilitate gasket replacement. The size and orientation of the valve body ports on bonnet fitted valves precludes gasket removal through its ports.

When operated at ambient temperatures, all-metal valves provide hundreds of leak free cycles between routine poppet gasket replacements. In high temperature applications, life cycles are inversely proportional to the bakeout temperatures. When operated at the maximum bakeout temperature of 450°C, the poppet seal gasket life is reduced to approximately 50 open/close cycles.

Seal Design

A vacuum seal is made by pressing the poppet OFE copper gasket onto a conical stainless steel knife edge seat as depicted in the diagram at top-right. The sealing pressure deforms the copper gasket, which conforms to the conical knife-edge seat. During thermal cycling the valve's loading mechanism counteracts component differential expansion to maintain a uniform pressure necessary for seal integrity.

Poppet Gasket Replacement

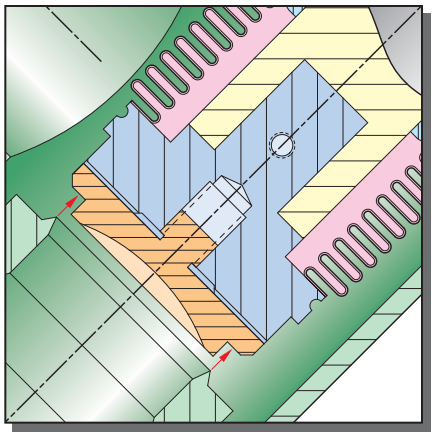
Poppet gasket replacement for the 1-1/2" and 2-1/2" all-metal angle valves must be done by removing the valve from the system, as these two valves have welded bonnets. Once detached from the system, gasket replacement is easily accomplished by inserting a standard blade screw driver into the bottom port and unscrewing the copper gasket, which is then extracted through the side port of the valve. The 3/4" angle valve and all inline valves are fitted with bonnet seals and do not require complete removal from the system for gasket replacement. Gasket removal and replacement is performed by detaching the bonnet flange from the valve body. Once the bonnet has been opened the gasket is easily detached by unscrewing with a standard blade screw driver.

Seal Torque

The first seal or closure in an all-metal valve causes plastic deformation of a virgin copper gasket leaving a permanent impression. This first closure is made at the factory and shipped to the customer in a ready to install sealed condition. Upon breaking this seal, resealing can be accomplished by torquing the valve according to the "Poppet Sealing Torque" data found in the specifications chart shown on page 234. To aid in the process of subsequent seal cycles the top of each valve body is fitted with a radially graduated vernier plate. The vernier plate provides a visual cue for previous and subsequent cycle or torque positions.

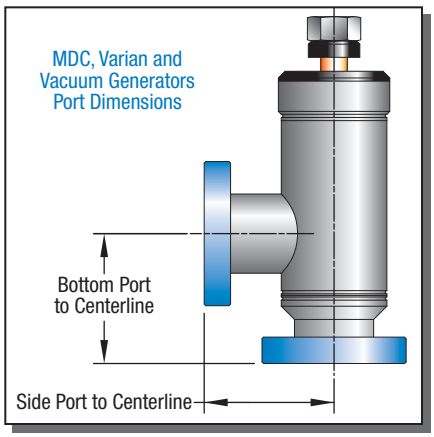
Valve Compatibility

MDC offers Varian and Vacuum Generators (VG) compatible all-metal angle and inline valves. The Varian compatible valves have been labeled as "V" in the *valve type* column found in each product table. Vacuum Generators compatible valves are identified by a "VG" designation in the *valve type* column. Compatibility is defined herein as the ability to replace or interchange Varian and/or Vacuum Generators valves with MDC all-metal valves. Compatibility is limited to valves fitted with Del-Seal™ CF port flanges and exclusively to the port to port dimensional characteristics. In other words, the dimensions from any valves' flanged port centerline to the opposite ports' flange face are direct equivalents to Varian and VG valves. Other MDC all-metal valve dimensions may vary from those found on Varian and Vacuum Generators products. The "T" designation in the *valve type* column pertains to valves designed for either tube weld installation or custom flange attachment.





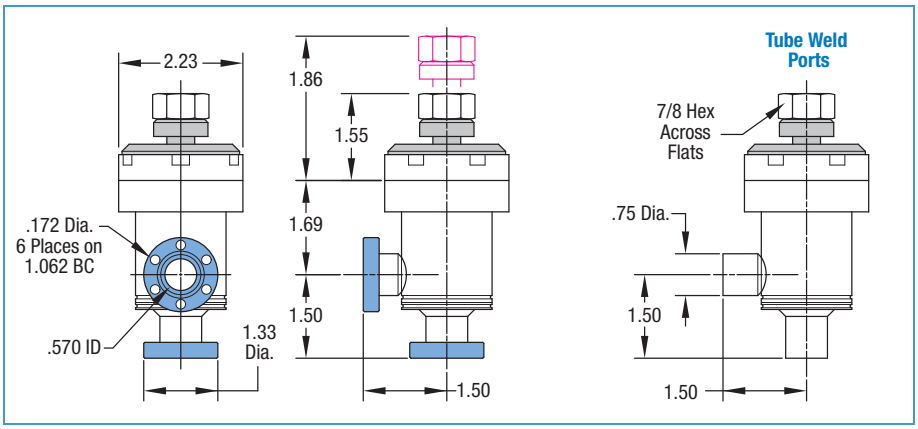






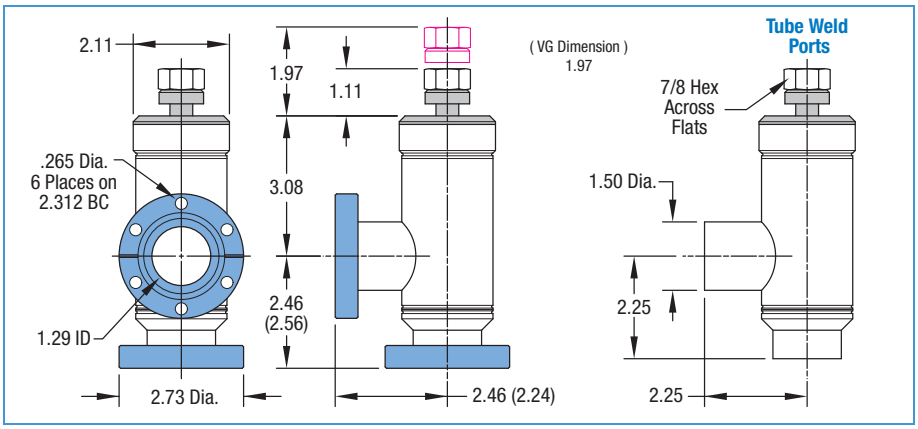
3/4" ANGLE VALVE





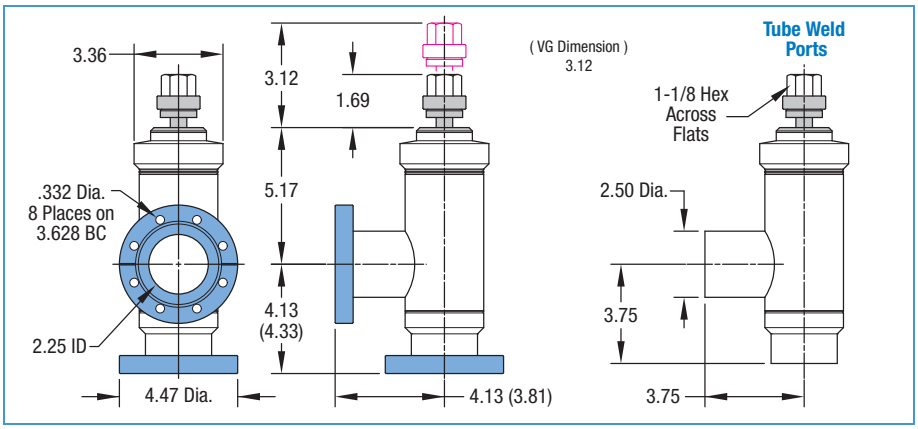
1-1/2" ANGLE VALVE





2-1/2" ANGLE VALVE





ANGLE VALVES

UHV All-Metal Series 450°C[1]

MDC all-metal angle valves designated as type "V" will interface in systems currently fitted with Varian all-metal angle valves. They have port to port dimensions which are compatible with Varian products. All-metal angle valves designated as type "VG" will interface in systems currently fitted with Vacuum Generators all-metal angle valves. They have port to port dimensions which are compatible with Vacuum Generators products.

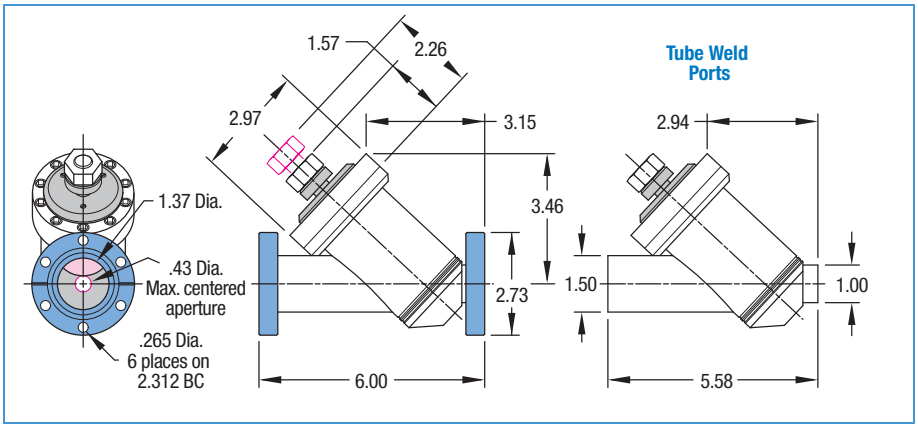
VALVE SIZE	VALVE TYPE	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
3/4	T	TUBE WELD	METAL	1	MAV-075-T	314000
3/4	V	DEL-SEAL	METAL	2	MAV-075-V	314001
1-1/2	T	TUBE WELD	WELDED	3	MAV-150-T	314002
1-1/2	V	DEL-SEAL	WELDED	4	MAV-150-V	314003
1-1/2	VG	DEL-SEAL	WELDED	4	MAV-150-VG	314004
2-1/2	T	TUBE WELD	WELDED	15	MAV-250-T	314005
2-1/2	V	DEL-SEAL	WELDED	16	MAV-250-V	314006
2-1/2	VG	DEL-SEAL	WELDED	16	MAV-250-VG	314007

[1] See page 234 for detailed bakeout specifications

All-metal series angle & inline valve accessories are detailed at bottom of page 237

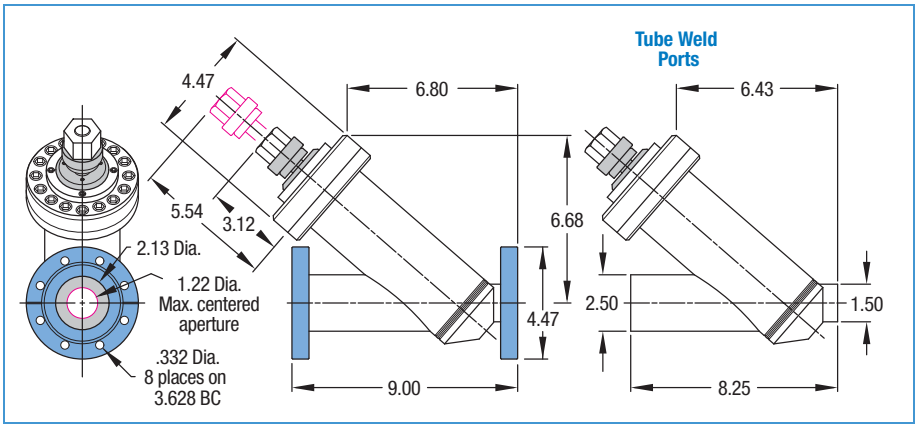
1-1/2" INLINE VALVE





2-1/2" INLINE VALVE





INLINE VALVES

UHV All-Metal Series 450°C[1]

MDC all-metal inline valves designated as type "V" will interface in systems currently fitted with Varian all-metal inline valves. They have port to port dimensions which are compatible with Varian products.

VALVE SIZE	VALVE TYPE	PORT FLANGE	BONNET SEAL	WEIGHT POUNDS	REFERENCE	PART NUMBER
1-1/2	T	TUBE WELD	METAL	5	MIV-150-T	316000
1-1/2	V	DEL-SEAL	METAL	6	MIV-150-V	316001
2-1/2	T	TUBE WELD	METAL	17	MIV-250-T	316002
2-1/2	V	DEL-SEAL	METAL	18	MIV-250-V	316003

[1] See page 234 for detailed bakeout specifications

ACCESSORIES

HARDWARE & GASKETS



GASKET KIT USED WITH	GASKET TOTAL	Poppet	Bonnet	Port	MATERIAL	REFERENCE	PART NUMBER
3/4 ANGLE	2	1	1	-	OFE Copper	MAVG-075	351013
1-1/2 ANGLE	4	1	1[2]	2	OFE Copper	MAVG-150	351014
2-1/2 ANGLE	3	1	-	2	OFE Copper	MAVG-250	351015
1-1/2 INLINE	4	1	1	2	OFE Copper	MIVG-150	351014
2-1/2 INLINE	3	1	2	-	OFE Copper	MIVG-250	351015

HARDWARE	THREAD LENGTH	FOR USE WITH	QUANTITY PER PACK	REFERENCE	PART NUMBER
SOCKET HEAD SET	8-32 x 3/4"	1-1/3 CF	25	BA-075-SP	190037
12PT HEAD BOLT SET	.250-28 x 1-1/4"	2-3/4 CF	25	BA-150-12-SP	190061
12PT HEAD BOLT SET	.312-24 x 2"	4-1/2 CF	25	BA-200-12-SP	190063

[2] Used with Inline valve only





MLV-22

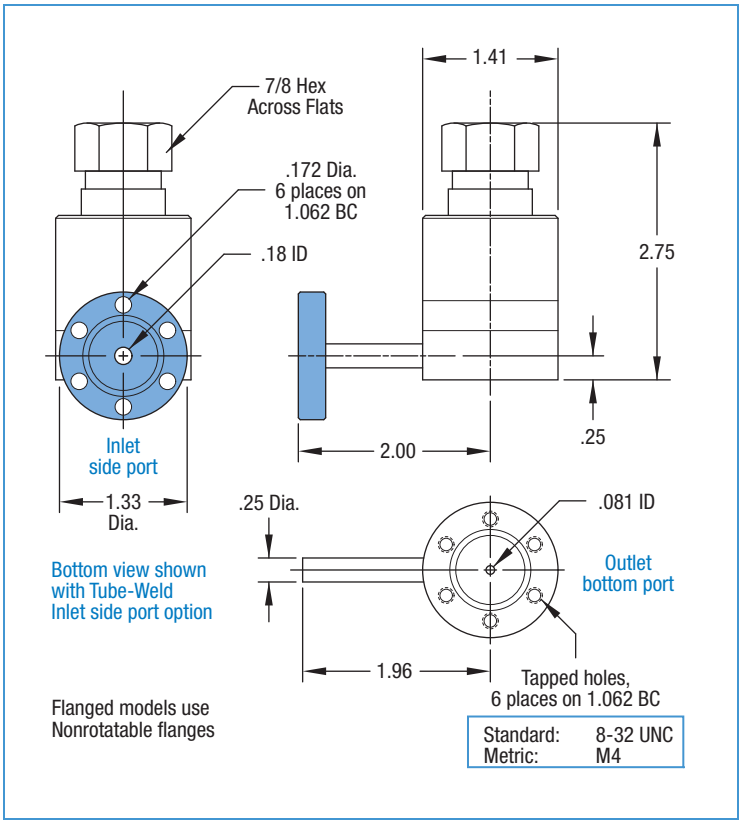
ULTRAHIGH VACUUM SERIES
450°C Metal Sealed Bonnet

Features

- Adjustable leaks to $7.5x10^{-8}$ Torr l/sec
- High temperature service to 450°C
- Durable stellite superalloy seat
- Replaceable nickel diaphragm seal
- Manual actuator
- Stainless steel construction
- Dry film lubricated actuator
- Del-Seal™ CF ports

Specifications

Material	
Flanges	304ss
Valve Body / Seat	304ss / Stellite
Bolts	300ss
Gaskets, Poppet and Bonnet	Nickel
Port Fastening	
Bolt Type	Socket head and silver plated screws
Nut Type	Hexagonal nuts
Leak Rate	$7.5x10^{-3}$ to $7.5x10^{-8}$ Torr l/sec
Inlet Pressure	≤ 750 Torr maximum
Temperature Rating	450°C
Weight	1Lb



All-metal MLV series leak valves are specifically designed to control gas admission into ultrahigh vacuum systems. They are manually actuated and ideally suited for handling hot or corrosive gases commonly used in demanding research environments. The valve body is constructed of type 304 stainless steel and fitted with a knife-edge seat made of a durable stellite superalloy. MDC ultrahigh vacuum leak valves are shipped in a leak-tight condition. Valve leak rates can be adjusted down to a minimum leak of $7.5x10^{-8}$ Torr l/sec. Leak rate is controlled by relieving the pressure applied to a replaceable nickel diaphragm. Although these valves can be fully closed and rendered leak tight, doing so repeatedly will reduce the life of the nickel diaphragm and require periodic replacement.

DESCRIPTION	WT LB	REFERENCE	PART NUMBER
VALVE, 1-1/3 CF	1	MLV-22	315002
VALVE, TUBE WELD	1	MLV-21	315003
VALVE, METRIC, 1-1/3 CF	1	E-MLV-22	315000
VALVE, METRIC, TUBE WELD	1	E-MLV-21	315001
NICKEL DIAPHRAGM	1	MLV-ND	931585



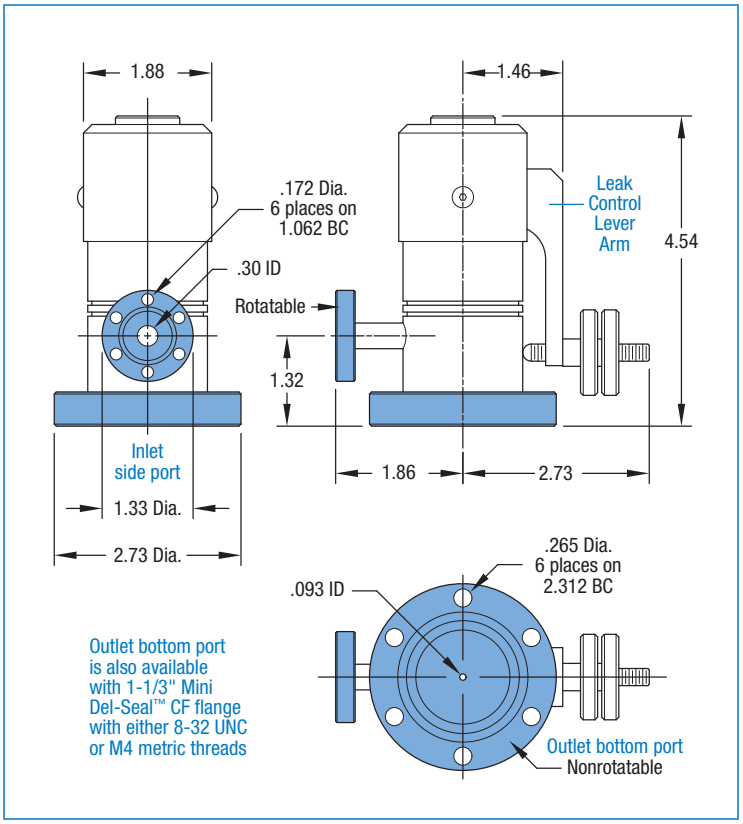
ULTRAHIGH VACUUM SERIES
450°C Welded Bonnet

Features

- Adjustable leaks to $1x10^{-10}$ Torr l/sec
- High temperature service to 450°C
- Replaceable sapphire poppet
- Replaceable OFE copper seat
- Manual cantilever actuator
- Stainless steel construction
- Dry film lubricated actuator
- Del-Seal™ CF ports

Specifications

Material	
Flanges	304ss
Valve Body / Seat	304ss / OFE Copper
Poppet	Sapphire
Bolts	300ss
Port Fastening	
Bolt Type	Silver plated 12-point and socket head bolts
Nut Type	Hexagonal nuts
Leak Rate	$1x10^{-10}$ Torr l/sec
Inlet Pressure	≤ 750 Torr maximum
Temperature Rating	450°C
Weight	1Lb



All-metal ULV series precision ultrahigh vacuum leak valves are designed to control gas admission into high and ultra-high vacuum systems. They are manually actuated via a cantilever arm fitted with extra-fine pitch threads for precise adjustment. They are ideally suited for handling hot and corrosive gases commonly used in demanding research environments. The valve body is constructed of type 304 stainless steel and a replaceable OFE copper seat. The valve poppet is made of high purity sapphire and is also replaceable. ULV series precision leak valves are shipped in a leak-tight condition. Leak rates are controlled by relieving the pressure applied to the replaceable copper seat. Leak rates are adjustable down to a minimum of $1x10^{-10}$ Torr l/sec.

DESCRIPTION	WT LB	REFERENCE	PART NUMBER
VALVE, 1-1/3 CF	3	ULV-075	315012
VALVE, METRIC, 1-1/3 CF	3	E-ULV-075	315013
VALVE, 2-3/4 CF	4	ULV-150	315010
SAPPHIRE SPARE KIT	1	ULV-SA	315011

Butterfly Valves

3/4" to 2" Ports





ULTRAHIGH & HIGH VACUUM SERIES

Features

- Quick open / Quick close with positive locks
- Positive Viton® O-ring vacuum seal
- Type 304 stainless steel valve body
- High conductance
- Choice of Del-Seal™ CF or Kwik-Flange™

Description

MDC Butterfly valves require only one-quarter turn rotation of the handle to go from fully open to the fully closed position. In the 1–1/3" Mini Del-Seal™ CF flange series, a spring loaded ball bearing becomes seated in an indent providing a positive mechanical stop. All other size valves employ a roll pin stop method.

These quick-acting Butterfly Valves feature an improved sealing action. The opening in the body of the valve has been machined at a slight angle to the plane of the flapper. The flapper is set to rotate slightly off-center. On closure, this causes the sealing pressure to be applied more uniformly all around the O-ring. A reliable, positive seal is made and the tendency of previous designs to roughen the surface of the O-ring and eject it from its groove is eliminated.

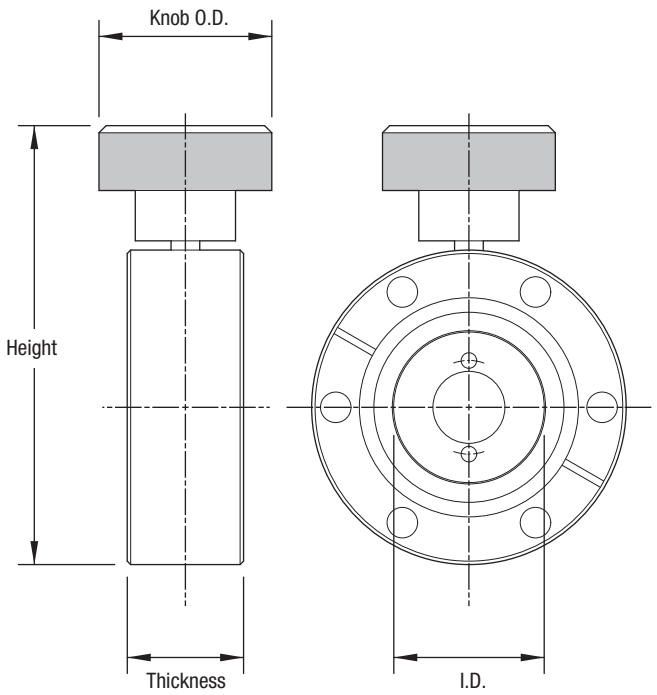
MDC Butterfly Valves are low outgassing. All internal surfaces are machined from solid stainless steel bar stock. The handle is made of aluminum. A small O-ring on the stem prevents shaft leakage.

The valves are offered with a choice of Del-Seal™ CF ultrahigh vacuum metal-seal flanges or ISO Kwik-Flange™ O-ring seal flanges.

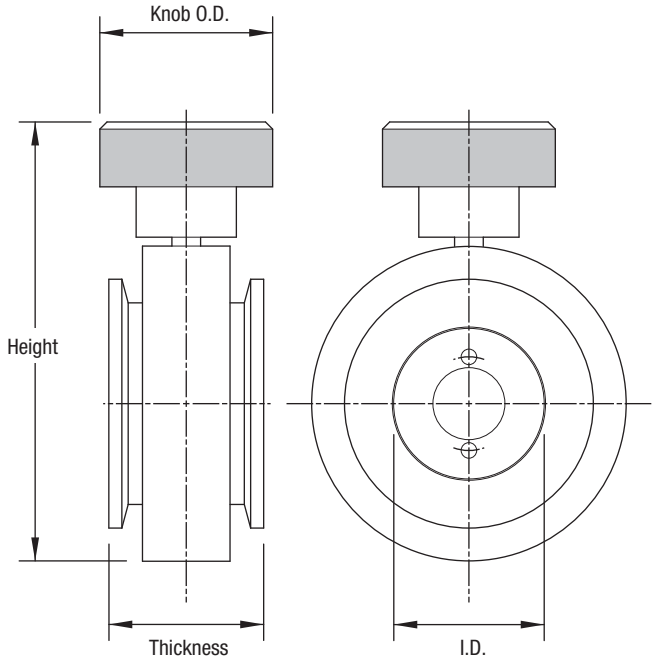
Specifications

Material	
Flanges and body	304ss
Knob	Aluminum
O-rings	Viton® elastomer
Vacuum Range	$1x10^{-8}$ Torr
Temperature Rating	150°C open / 125°C closed
Weight and Dimensions	See table

Del-Seal™ CF



Kwik-Flange™



All valves have identical flanges both sides

Del-Seal™ CF



NOM. SIZE	DEL-SEAL FLANGE	FLANGE O.D.	HEIGHT	THROUGH I.D.	THICKNESS	KNOB DIA.	WT LB	REFERENCE	PART NUMBER
3/4	1-1/3	1.33	1.96	.60	.75	.75	1	BFV-075	360000
1-1/2	2-3/4	2.73	3.81	1.33	1.00	1.50	1	BFV-150	360001
2	3-3/8	3.37	4.46	1.84	1.00	1.50	2-1/2	BFV-200	360002

Kwik-Flange™ KF



NOM. SIZE	ISO REF	FLANGE O.D.	HEIGHT	THROUGH I.D.	THICKNESS	KNOB DIA.	WT LB	REFERENCE	PART NUMBER
3/4	NW16	1.18	1.81	.60	1.25	.75	1	KBFV-075	360010
1	NW25	1.57	2.32	.87	1.25	.75	1	KBFV-100	360011
1-1/2	NW40	2.16	3.81	1.31	1.34	1.50	1	KBFV-150	360012
2	NW50	2.95	4.46	1.87	1.68	1.50	2-1/2	KBFV-200	360013

Accessories



DESCRIPTION [1]	NOMINAL SIZE	WT LB	REFERENCE	PART NUMBER
SEAL KIT	3/4	1/4	BFVG-075	360500
SEAL KIT	1	1/4	BFVG-100	360501
SEAL KIT	1-1/2	1/4	BFVG-150	360502
SEAL KIT	2	1/4	BFVG-200	360503

[1] Includes one stem seal and one flapper seal.
For port hardware, see Double Sided flanges for Del-Seal™ CF valves, and standard KF flanges for Kwik-Flange™ KF valves, Sections 1.1 and 1.2

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