21700

3-Position Gate Valves

Table of Contents

Introduction

Model Number 21712-0803R
8” ID (DN200) Pneumatic ISO-F

Product Features

- 1,000,000 Cycles
- 3-position pneumatic actuation
- Mechanically preset, remote-controlled intermediate position
- HV and UHV with stainless steel body and internal components
- Sizes from 1.5” ID (DN40) to 20” ID (DN500)
- Stainless steel welded bellows
- Standard KF, ISO, CF, ANSI, JIS or custom flange options
- Roughing, gauge, purge ports available
- High temperature options up to 250°C
- 440C hardened stainless steel drive shaft and pins
- Easily customizable to work with almost any application
- Designed, manufactured and assembled in the USA

Description

The 21700 Series 3-position Gate Valves feature a positive shut off; the valve will maintain its closed status in the event of a power loss followed by a pressure drop. Linear actuation allows the use of a welded bellows to seal the actuator (i.e. no rotary seals). Shock and vibration are reduced to a minimum by a unique air cylinder design. There are no mechanical locks inside the vacuum, which is extremely beneficial for semiconductor and sensitive processes requiring vibration-free operation. All moving joints have hardened shafts, reducing particulate generation and providing smoother actuation.

The HVA stainless steel body offers one of the smallest interior sur-face areas in the vacuum valve industry. The body and all major internal components are vacuum furnace brazed at 1100°C, at $1x10^{-6}$ mbar, ensuring maximum joint integrity. This eliminates the possibility of virtual leaks or entrapment areas and minimizes body distortion found in conventionally welded valves. For maintenance purposes, the carriage assembly can be removed from the body without removing the valve from the system.

Applications

The 21700 Series Pneumatic 3-Position Gate Valves are designed for use in etching, CVD and any other process that requires pressure control. When used in conjunction with upstream mass flow controllers, this series valve will contribute to an exceptional pressure control capability.These valves may also be utilized to smooth the transition from rough to high vacuum.

These valves can be used with cryopumps, turbomolecular pumps, ion pumps, or in any application requiring clean, high cycle, low maintenance and low outgassing valves with positive shut off characteristics. Available in standard CF-F, KF, ISO, or ANSI flange configurations and optional JIS or custom configurations.

Standard Specifications

Materials

Valve body and mechanism	304 stainless steel
Welded bellows shaft seal	AM-350
Drive shaft and pins	440C hardened stainless steel
Bonnet / gate seals	
HV	Viton® elastomer
UHV	OFHC copper / Viton® elastomer

Vacuum

Pressure range	
HV	1×10^{-9} mbar
UHV	1×10^{-10} mbar
Leak rate	$< 2 \times 10^{-9}$ mbar l/s
Differential pressure	1 bar in either direction
Maximum Δ pressure before opening	≤ 30 mbar

Temperature

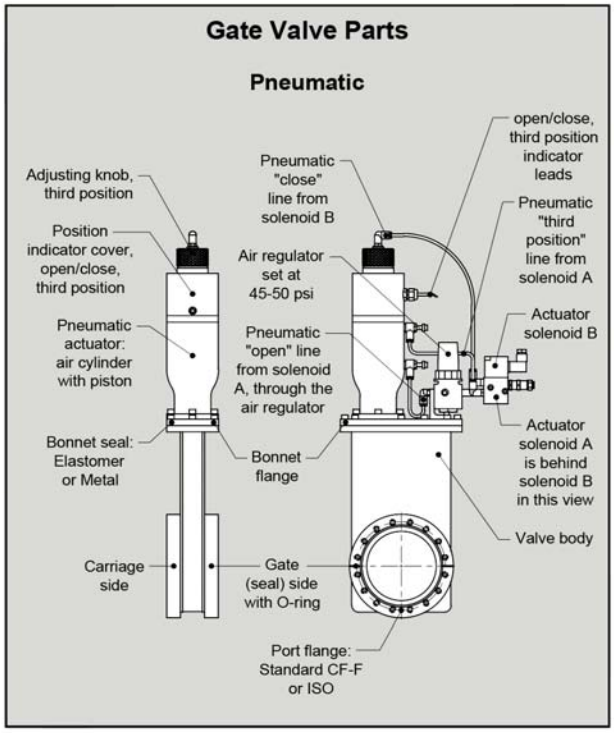
	without solenoid
Elastomer sealed bonnet	150°C
Metal sealed bonnet	
Valve open	200°C
Valve closed	150°C
Actuator	
Pneumatic	60°C

Mechanism

Air service	80 psig (5.5 bar)
Solenoid	4.0 Watts
supplied voltage	120 VAC 50/60 Hz
optional voltage	24, 200, 240 VAC 50/60 Hz or 12, 24 VDC
Position indicator, max.	
Reed switch for open & closed	115 VAC or 28 VDC, 20mA
Microswitch for third position	115 VAC, 5 A
optional voltages	250 VAC, 5A or 28 VDC, 5 A resistive load 28 VDC, 3 A inductive load

Cycles Until Service

Sizes 1.5" to 12" [DN40 to 320]	1,000,000
Sizes 14" to 20" [DN350 to 500] (Application dependent)	> 500,000



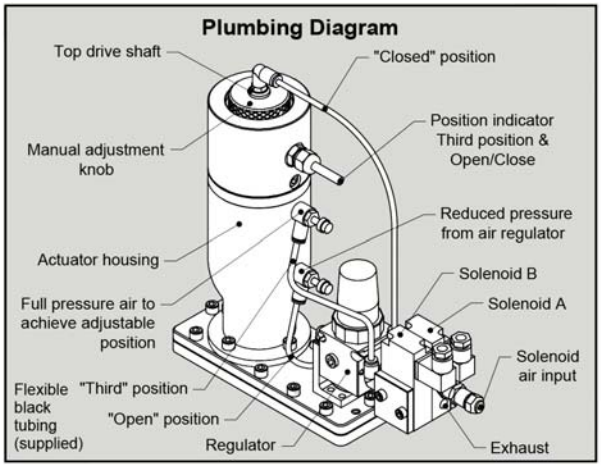
Notes

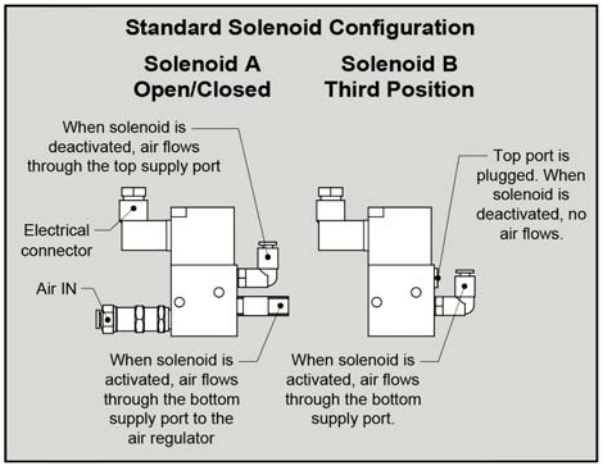
- Dimensions given in U.S. System and [metric]
- Conductance ratings based on air, given in liters per second
- Due to ongoing product development, prices, dimensions and specifications are subject to change without notice

Options

All 21700 Series Valves may be equipped with alternative flanges, solenoids and seals. Contact HVA to discuss your requirements.

- Alternate voltage controls
- JIS configurations
- Custom flange sizes
- Gauge ports, roughing ports and purge ports
- Microswitches for position indicators
- Quick clamp bonnet
- High temperature components, including O-rings, microswitches and actuator
- Water cooled flanges
- Custom materials, such as Inconel® or Kalrez®
- Special solenoid or position indicator connectors





Theory of Operation

The 3-Position Gate Valves employ two pneumatic solenoids and an air pressure regulator to achieve the three positions of:

- *First Position:* fully open
- *Second Position:* fully closed
- *Third Position:* partially open, adjustable

Solenoid A controls the fully open and fully closed positions. Solenoid B controls the partially open position. Standard electro-pneumatic solenoids have air supplied to the input port. When the solenoid is deactivated or at rest, the air flows through the top supply port. When the solenoid is electrically activated, the air stops flowing through the top supply port and flows through the bottom supply port.

Standard Opening and Closing of the Valve

With air supplied to the input of both solenoids, no air is supplied through the top port of Solenoid B because it is plugged. In Solenoid A, air flows through the top port of the solenoid, through the hollow top drive shaft and into the air cylinder to close the valve. This is the standard Normally Closed configuration.

When Solenoid A is electrically activated, air stops flowing through the top supply port and now flows through the bottom supply port, opening the valve. Air that had closed the valve is exhausted back through the hollow top drive shaft.

Optional Opening and Closing of the Valve

Re-plumbing the air lines out of Solenoids A and B results in alternative “Normal” configurations. One such option would be to switch the plug on Solenoid B from its standard top port to the bottom port. In this configuration, the valve is Normally Closed, but when Solenoid A is activated, the valve moves to the partially open position rather than to the fully open position.

Standard Operation of the Partially Open Third Position

With both solenoids in a standard plumbing configuration, air pressure is essentially directed to both the top and the bottom of the gate actuator piston. An air regulator in the open line reduces the air pressure by 15 to 20 psi. This difference in air pressure allows the final position of the gate to be determined by the manual setting of the top adjustment knob.

The gate may also be moved to the partially open position by activating Solenoid B, while the valve is fully open. The full air supply pressure applied to the adjustable piston is sufficient to press down and move the gate piston to the partially open position.

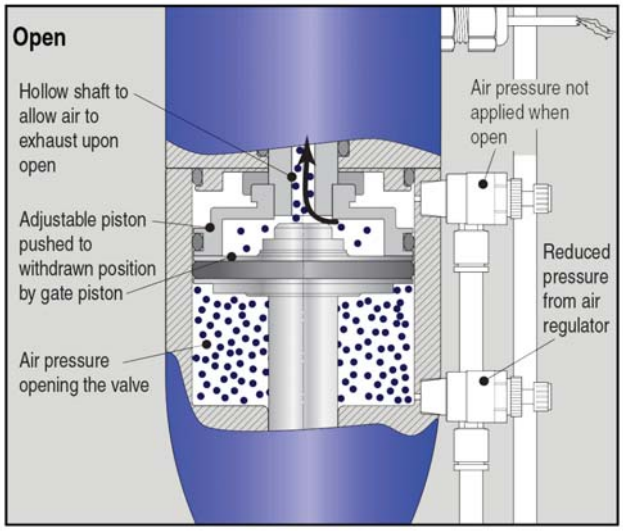
IMPORTANT: It is recommended to bench test the valve to evaluate the true setting of the partially open position prior to installation of the unit in a system.

The next page details standard configuration operation.

1. Open

Solenoid A ON
Solenoid B OFF

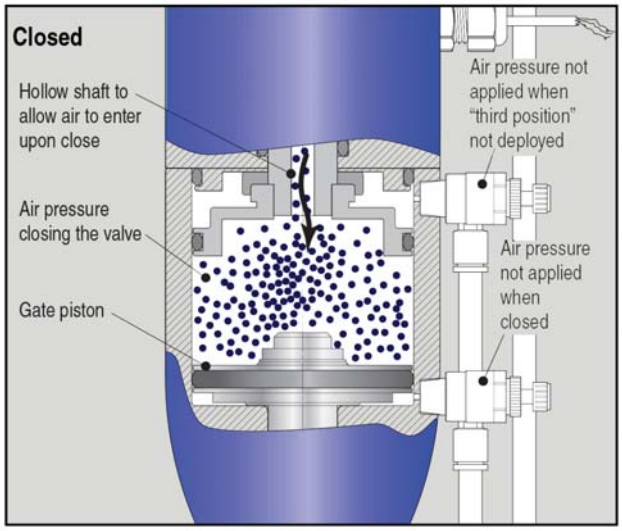
When Solenoid A is electrically activated, air flows through the bot-tom supply port directly into an air pressure regulator. The regulator is adjusted so that its output pressure is approximately 15 to 20 psi less than the input pressure. Even though it is less than full pressure, this output pressure is sufficient to open the valve.



2. Closed

Solenoid A OFF
Solenoid B OFF

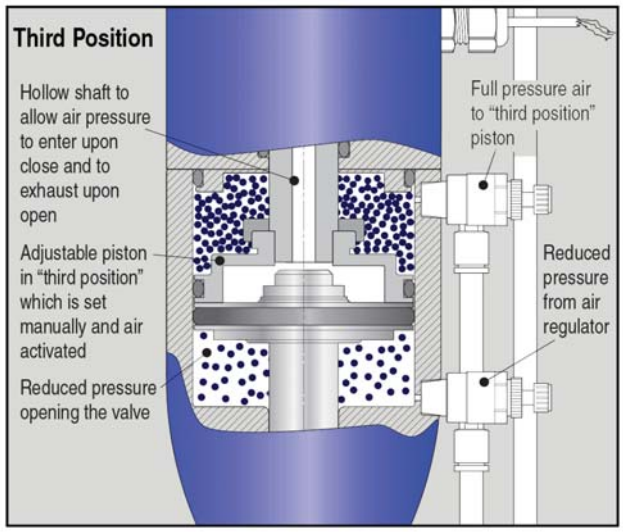
With both Solenoids deactivated, air pressure is directed to the top ports. The top port of Solenoid B is plugged, so no air flows. The top port of Solenoid A is directed to the hollow top drive shaft and into the air cylinder to close the valves. This is the standard Normally Closed configuration.



3. Third Position

Solenoid A ON
Solenoid B ON

Solenoid B does not have an air pressure regulator along its supply line, so when Solenoid B is activated, full air supply pressure is applied to the top of a separate, additional piston within the air cylinder. This adjustable piston moves down to a stop set manually by adjusting the knob at the top of the valve. The full air pressure is 15 to 20 psi more than the Solenoid A pressure, so when the valve tries to open, its actuator piston meets the adjustable piston and is held at that "third position."



Model Key Guide

Example: 21712-0404R = 21700 Series gate valve, pneumatic actuator, Viton gate & bonnet seals, 120VAC solenoid, 4” ID CF (6” OD) flanges with Metric thread, reed switch position indicator

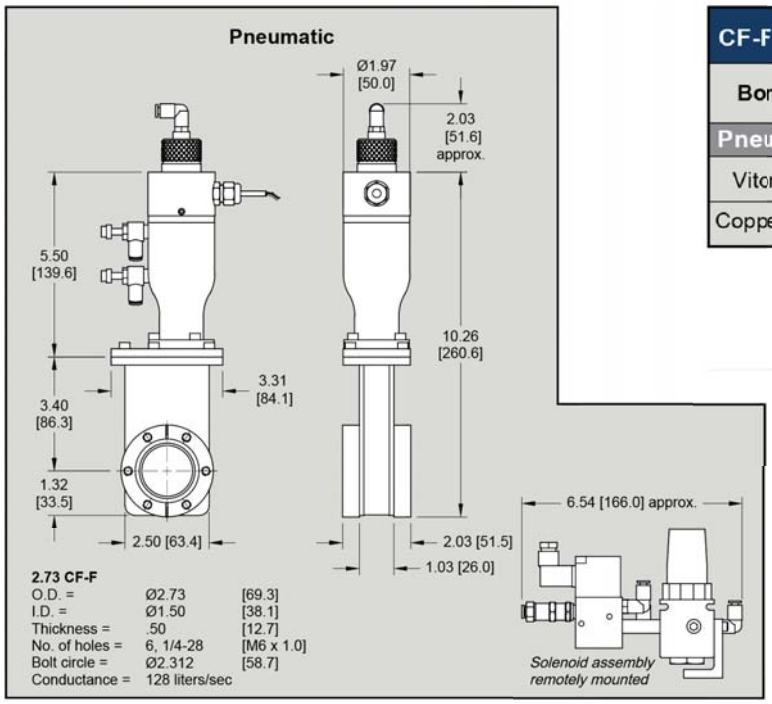
2 1 7 1 2 - 0 4 0 4 R

- **Position Indicator:** R = Reed Switch open/close & microswitch for 3rd / M = Microswitch for open/close & 3rd / X or Blank = No position Indicator
- **Flange Type:** 0 = CF (UNF) / 1 = ANSI, small OD / 2 = ANSI, large OD / 3 = KF/ISO-F / 4 = CF (Metric) / 5 = JIS / 6 = ISO-K
- **Valve Port Size ID (inch):** 015 = 1.5” / 020 = 2” / 025 = 2.5” / 030 = 3” / 040 = 4” / 060 = 6” / 080 = 8” / 100 = 10” / 107 = 10.75” / 120 = 12” / 140 = 14” / 160 = 16” / 200 = 20”
- **Solenoid Voltage:** 1 = 24VDC / 2 = 120VAC / 3 = 220VAC / 4 = 24VAC
- **Gate & Bonnet Seals:** 1 = Viton® gate & bonnet / 2 = Viton® gate / copper bonnet / 3 = Kalrez® gate / copper bonnet / 6 = Kalrez® gate & bonnet
- **Series:** 217 = 21700

Note

- A suffix of -001 to -999 at the end of or a ‘9’ or ‘S’ within a Model Number indicates a valve with custom configuration.
- If a roughing/gauge/purge port is needed add the following after the position indicator:

A = KF 25
B = KF 40
C = 1.33” OD CF fixed with thru holes
D = 2.75” OD CF fixed with thru holes
S = special/custom or other



CF-F 2.73 Flanges			40-mm 1.5-inch
Bonnet-Gate	**Flange Type**	**Ship Wt. lbs [Kg]**	**Model Number ***
Pneumatic			
Viton-Viton (HV)	U.S. Bolt	10 [5]	21712-0150R
Copper-Viton (UHV)	U.S. Bolt	10 [5]	21722-0250R

* For metric flanges, replace last 0 in model number with 4

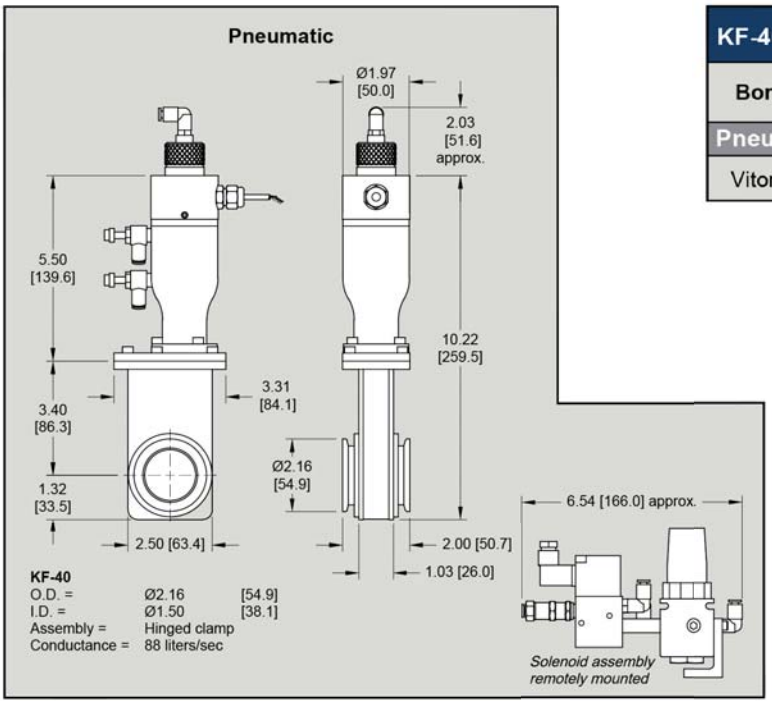
For pneumatic valves,
R = standard
Reed switch, open/close
Microswitch, third position
M = optional
Microswitch, all positions

Specifications

HV Pressure Range: 1 x 10^{-9} mbar
UHV Pressure Range: 1 x 10^{-10} mbar
Helium Leak Rate: Materials: < 2 x 10^{-9} mbar l/s
Maximum Δ Pressure Before Opening: ≤ 30 mbar
Materials:
Body = 304 Stainless Steel
Gate = 304 Stainless Steel
Drive shaft and pins = 440C hardened stainless steel
Bellows = AM-350
Actuator = 6061-T6 Aluminum

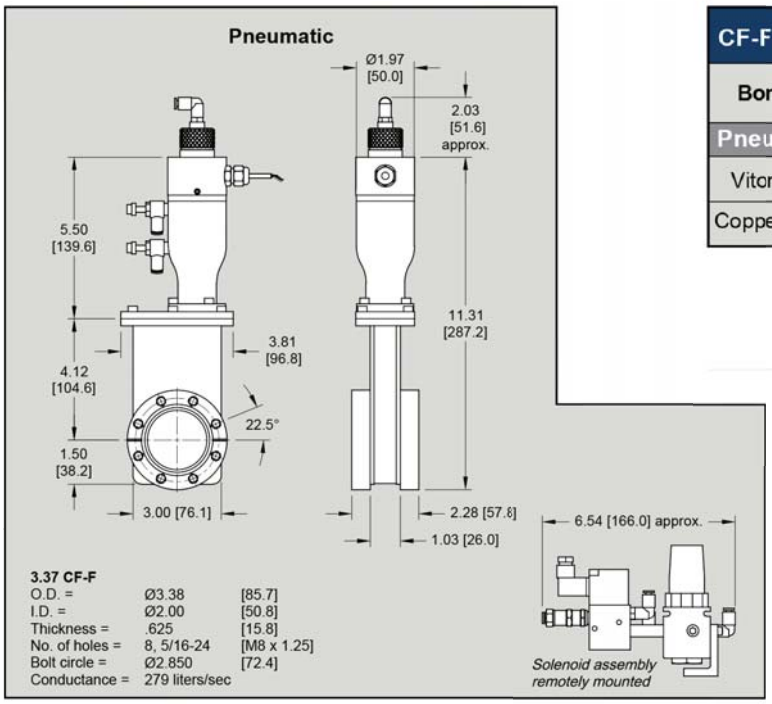
Operating Temperature:
Body, Gate Open (Viton® / Copper bonnet) = 150°C / 200°C*
Body, Gate Closed (Viton® / Copper bonnet) = 150°C / 150°C*
Actuator w/out solenoid (Viton® / Copper bonnet) = 60°C / 60°C*
Position Indicator (Viton® / Copper bonnet) = 150°C / 150°C*

*250°C options available on request.



KF-40 Flanges			40-mm 1.5-inch
Bonnet-Gate	**Flange Type**	**Ship Wt. lbs [Kg]**	**Model Number ***
Pneumatic			
Viton-Viton (HV)	Hinged clamp	10 [5]	21712-0153R

* For pneumatic valves,
R = standard
Reed switch, open/close
Microswitch, third position
M = optional
Microswitch, all positions



CF-F 3.37 Flanges			50-mm 2.0-inch
Bonnet-Gate	**Flange Type**	**Ship Wt. lbs [Kg]**	**Model Number ***
Pneumatic			
Viton-Viton (HV)	U.S. Bolt	10 [5]	21712-0200R
Copper-Viton (UHV)	U.S. Bolt	10 [5]	21722-0200R

* For metric flanges, replace last 0 in model number with 4

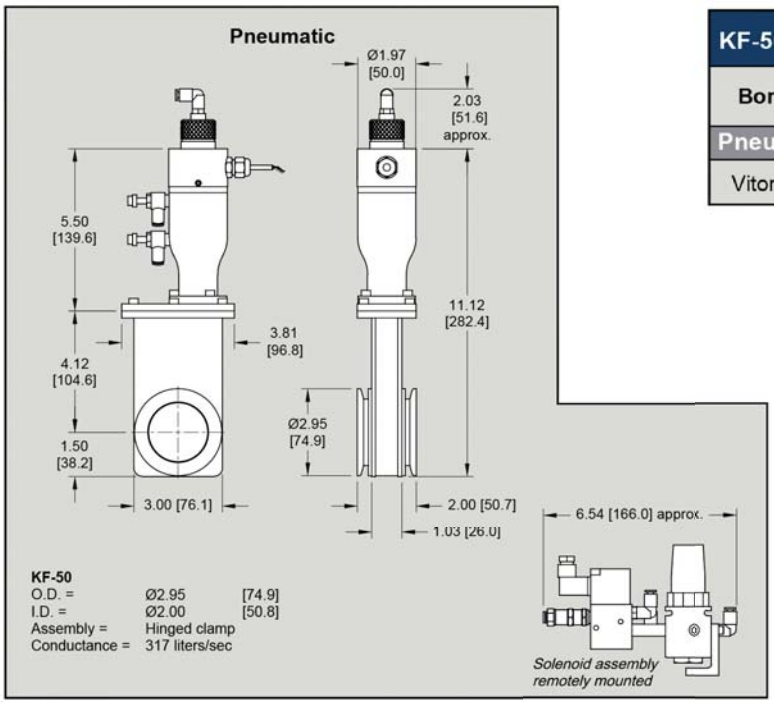
For pneumatic valves,
R = standard
Reed switch, open/closed
Microswitch, third position
M = optional
Microswitch, all positions

Specifications

HV Pressure Range: 1 x 10^{-9} mbar
UHV Pressure Range: 1 x 10^{-10} mbar
Helium Leak Rate: Materials: < 2 x 10^{-9} mbar l/s
Maximum Δ Pressure Before Opening: ≤ 30 mbar
Materials:
Body = 304 Stainless Steel
Gate = 304 Stainless Steel
Drive shaft and pins = 440C hardened stainless steel
Bellows = AM-350
Actuator = 6061-T6 Aluminum

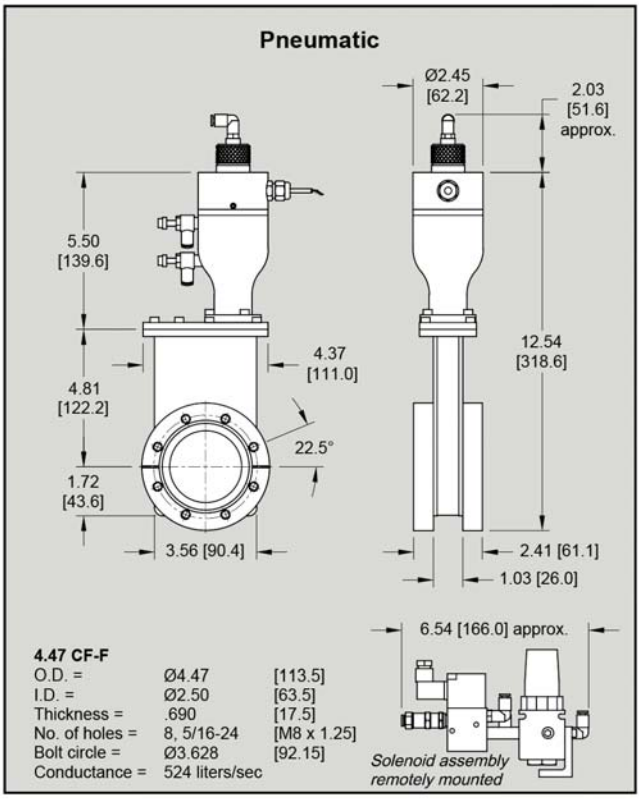
Operating Temperature:
Body, Gate Open (Viton® / Copper bonnet) = 150°C / 200°C*
Body, Gate Closed (Viton® / Copper bonnet) = 150°C / 150°C*
Actuator w/out solenoid (Viton® / Copper bonnet) = 60°C / 60°C*
Position Indicator (Viton® / Copper bonnet) = 150°C / 150°C*

**250°C options available on request.*



KF-50 Flanges			50-mm 2.0-inch
Bonnet-Gate	**Flange Type**	**Ship Wt. lbs [Kg]**	**Model Number ***
Pneumatic			
Viton-Viton (HV)	Hinged clamp	13 [6]	21712-0203R

* For pneumatic valves,
R = standard
Reed switch, open/closed
Microswitch, third position
M = optional
Microswitch, all positions



CF-F 4.47 Flanges			63-mm 2.5-inch
Bonnet-Gate	**Flange Type**	**Ship Wt. lbs [Kg]**	**Model Number ***
Pneumatic			
Viton-Viton (HV)	U.S. Bolt	10 [5]	21712-0250R
Copper-Viton (UHV)	U.S. Bolt	10 [5]	21722-0250R

* For metric flanges, replace last 0 in model number with 4

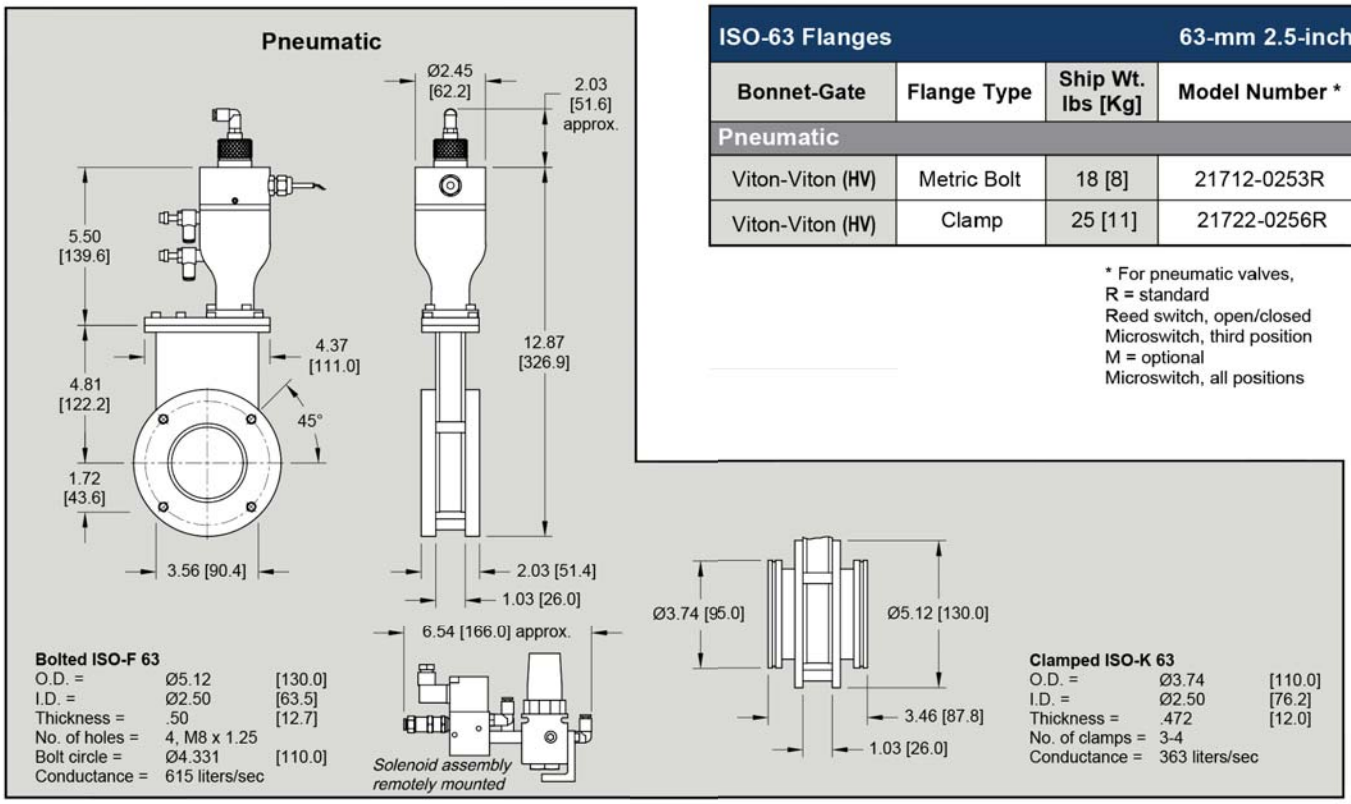
For pneumatic valves,
R = standard
Reed switch, open/closed
Microswitch, third position
M = optional
Microswitch, all positions

21700

Specifications

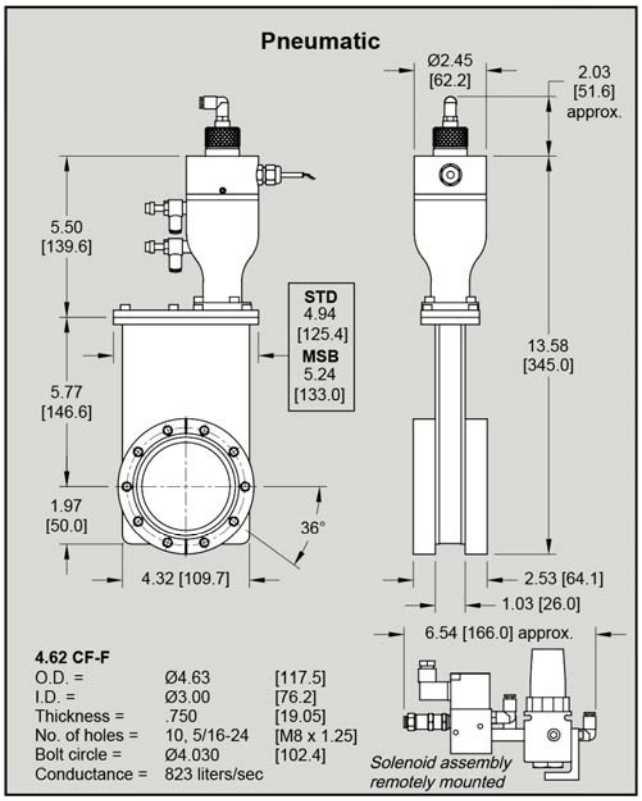
HV Pressure Range: 1 x 10^{-9} mbar
UHV Pressure Range: 1 x 10^{-10} mbar
Helium Leak Rate: Materials: < 2 x 10^{-9} mbar l/s
Maximum Δ Pressure Before Opening: ≤ 30 mbar
Materials:
Body = 304 Stainless Steel
Gate = 304 Stainless Steel
Drive shaft and pins = 440C hardened stainless steel
Bellows = AM-350
Actuator = 6061-T6 Aluminum
Operating Temperature:
Body, Gate Open (Viton® / Copper bonnet) = 150°C / 200°C*
Body, Gate Closed (Viton® / Copper bonnet) = 150°C / 150°C*
Actuator w/out solenoid (Viton® / Copper bonnet) = 60°C / 60°C*
Position Indicator (Viton® / Copper bonnet) = 150°C / 150°C*

*250°C options available on request.



ISO-63 Flanges			63-mm 2.5-inch
Bonnet-Gate	**Flange Type**	**Ship Wt. lbs [Kg]**	**Model Number ***
Pneumatic			
Viton-Viton (HV)	Metric Bolt	18 [8]	21712-0253R
Viton-Viton (HV)	Clamp	25 [11]	21722-0256R

* For pneumatic valves,
R = standard
Reed switch, open/closed
Microswitch, third position
M = optional
Microswitch, all positions



CF-F 4.62 Flanges			75-mm 3.0-inch
Bonnet-Gate	**Flange Type**	**Ship Wt. lbs [Kg]**	**Model Number ***
Pneumatic			
Viton-Viton (HV)	U.S. Bolt	22 [10]	21712-0300R
Copper-Viton (UHV)	U.S. Bolt	35 [15]	21722-0300R

* For metric flanges, replace last 0 in model number with 4

For pneumatic valves,
R = standard
- Reed switch, open/closed
- Microswitch, third position

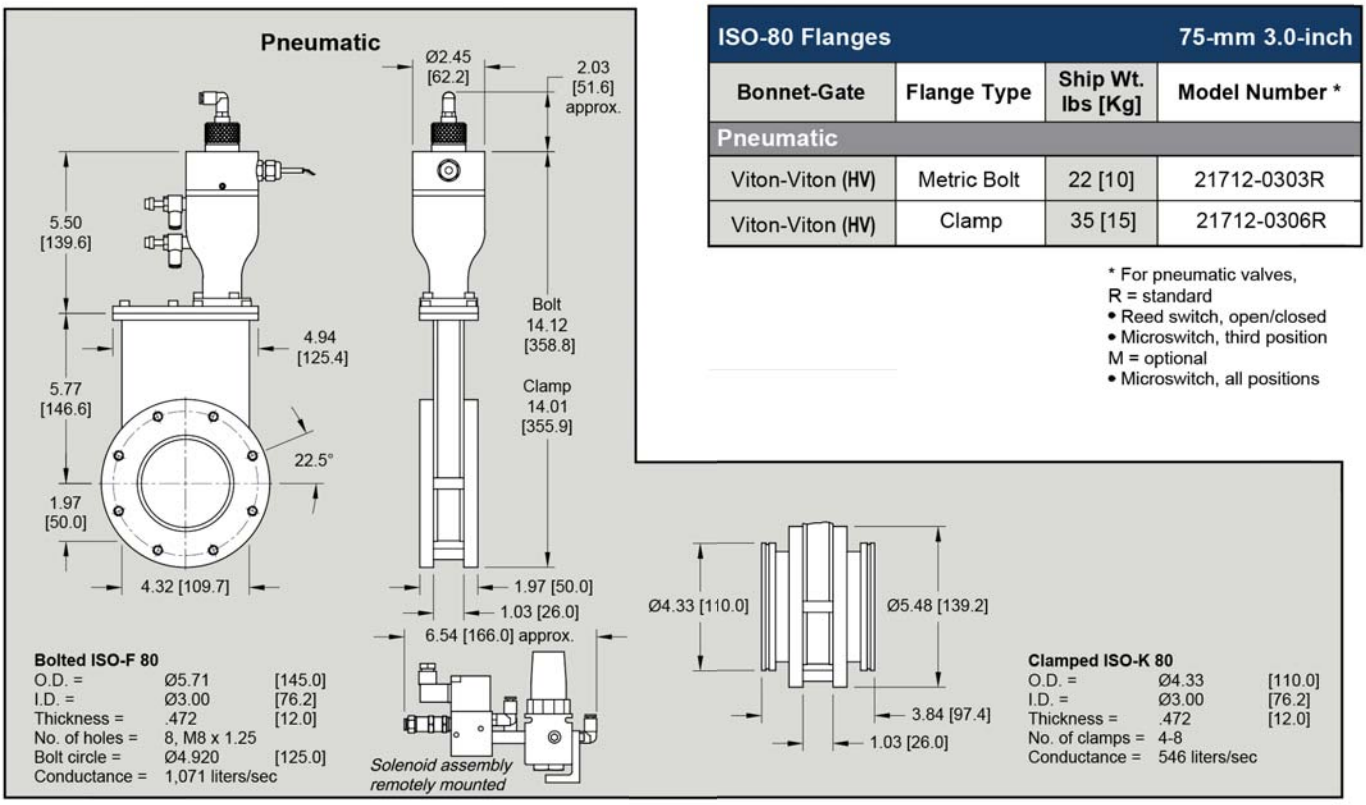
M = optional
- Microswitch, all positions

Specifications

HV Pressure Range: 1 x 10^{-9} mbar
UHV Pressure Range: 1 x 10^{-10} mbar
Helium Leak Rate: Materials: < 2 x 10^{-9} mbar l/s
Maximum Δ Pressure Before Opening: ≤ 30 mbar
Materials:
Body = 304 Stainless Steel
Gate = 304 Stainless Steel
Drive shaft and pins = 440C hardened stainless steel
Bellows = AM-350
Actuator = 6061-T6 Aluminum

Operating Temperature:
Body, Gate Open (Viton® / Copper bonnet) = 150°C / 200°C*
Body, Gate Closed (Viton® / Copper bonnet) = 150°C / 150°C*
Actuator w/out solenoid (Viton® / Copper bonnet) = 60°C / 60°C*
Position Indicator (Viton® / Copper bonnet) = 150°C / 150°C*

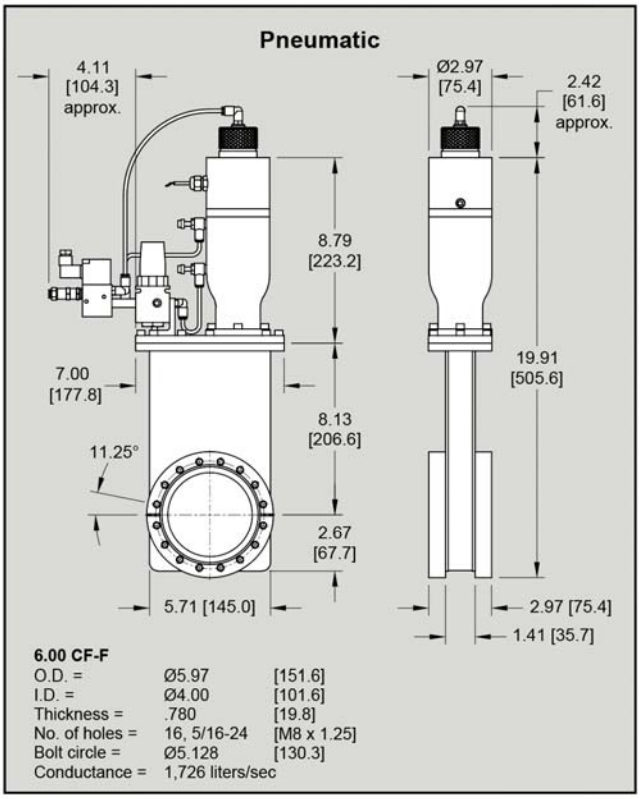
**250°C options available on request.*



ISO-80 Flanges			75-mm 3.0-inch
Bonnet-Gate	**Flange Type**	**Ship Wt. lbs [Kg]**	**Model Number ***
Pneumatic			
Viton-Viton (HV)	Metric Bolt	22 [10]	21712-0303R
Viton-Viton (HV)	Clamp	35 [15]	21712-0306R

* For pneumatic valves,
R = standard
- Reed switch, open/closed
- Microswitch, third position

M = optional
- Microswitch, all positions



CF-F 6.00 Flanges			100-mm 4.0-inch
Bonnet-Gate	**Flange Type**	**Ship Wt. lbs [Kg]**	**Model Number ***
Pneumatic			
Viton-Viton (HV)	U.S. Bolt	33 [15]	21712-0400R
Copper-Viton (UHV)	U.S. Bolt	33 [15]	21722-0400R

* For metric flanges, replace last 0 in model number with 4

For pneumatic valves,
R = standard
- Reed switch, open/closed
- MIcroswitch, third position

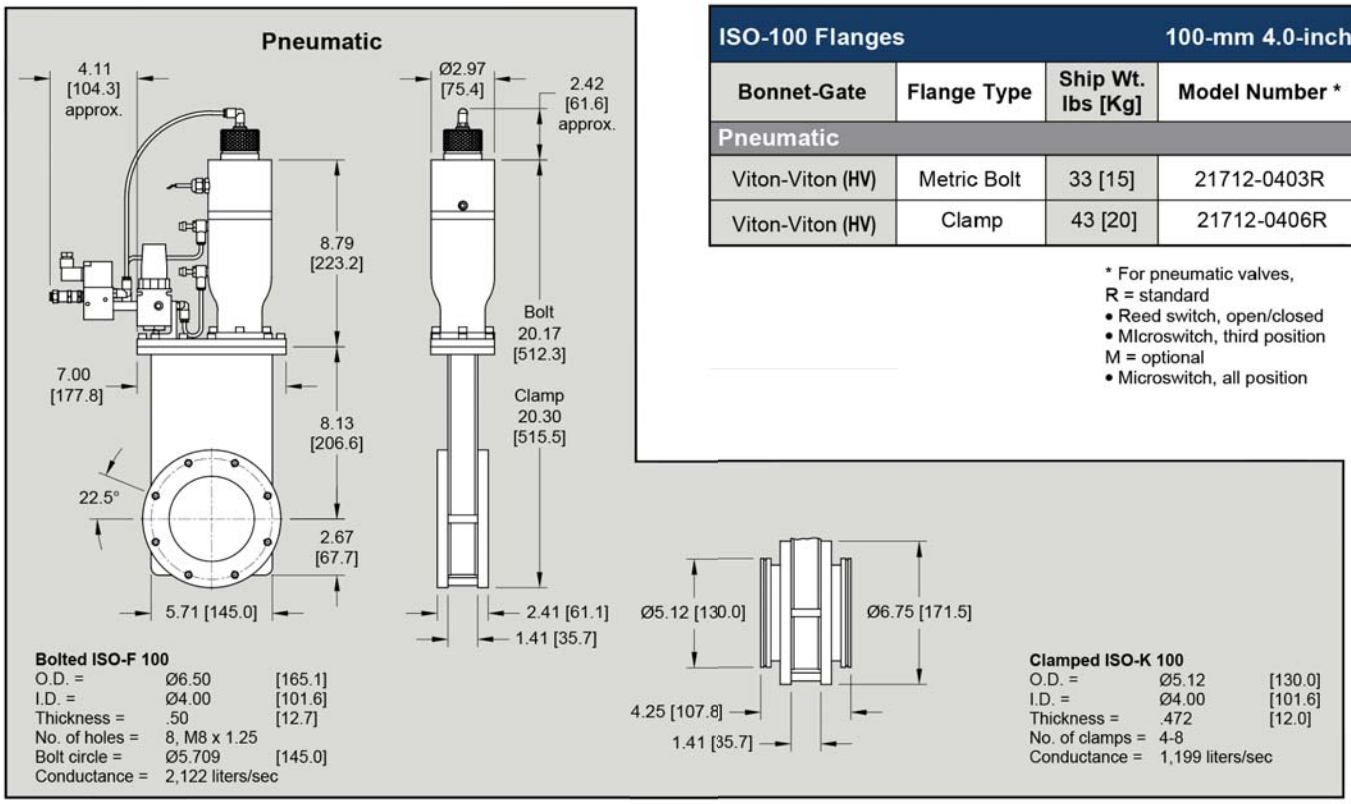
M = optional
- Microswitch, all position

21700

Specifications

HV Pressure Range: 1 x 10^{-9} mbar
UHV Pressure Range: 1 x 10^{-10} mbar
Helium Leak Rate: Materials: < 2 x 10^{-9} mbar l/s
Maximum Δ Pressure Before Opening: ≤ 30 mbar
Materials:
Body = 304 Stainless Steel
Gate = 304 Stainless Steel
Drive shaft and pins = 440C hardened stainless steel
Bellows = AM-350
Actuator = 6061-T6 Aluminum
Operating Temperature:
Body, Gate Open (Viton® / Copper bonnet) = 150°C / 200°C*
Body, Gate Closed (Viton® / Copper bonnet) = 150°C / 150°C*
Actuator w/out solenoid (Viton® / Copper bonnet) = 60°C / 60°C*
Position Indicator (Viton® / Copper bonnet) = 150°C / 150°C*

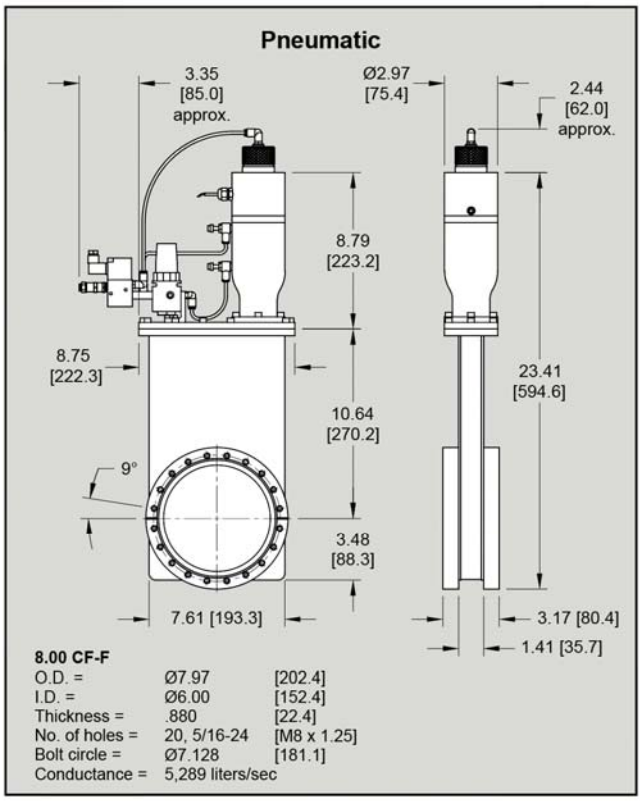
**250°C options available on request.*



ISO-100 Flanges			100-mm 4.0-inch
Bonnet-Gate	**Flange Type**	**Ship Wt. lbs [Kg]**	**Model Number ***
Pneumatic			
Viton-Viton (HV)	Metric Bolt	33 [15]	21712-0403R
Viton-Viton (HV)	Clamp	43 [20]	21712-0406R

* For pneumatic valves,
R = standard
- Reed switch, open/closed
- MIcroswitch, third position

M = optional
- Microswitch, all position



CF-F 8.00 Flanges			150-mm 6.0-inch
Bonnet-Gate	**Flange Type**	**Ship Wt. lbs [Kg]**	**Model Number ***
Pneumatic			
Viton-Viton (HV)	U.S. Bolt	50 [23]	21712-0600R
Copper-Viton (UHV)	U.S. Bolt	50 [23]	21722-0600R

* For metric flanges, replace last 0 in model number with 4

For pneumatic valves,
R = standard
- Reed switch, open/closed
- Microswitch, third position

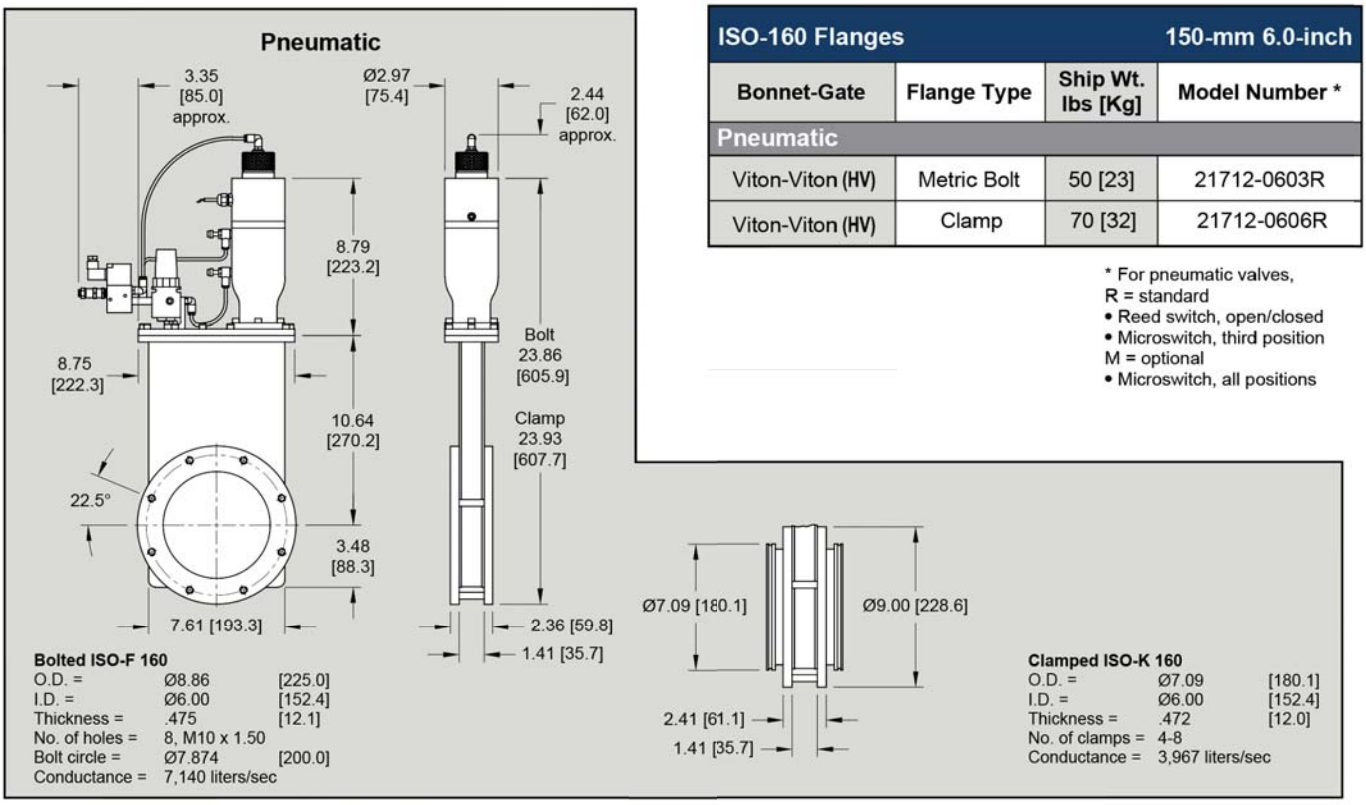
M = optional
- Microswitch, all positions

Specifications

HV Pressure Range: 1 x 10^{-9} mbar
UHV Pressure Range: 1 x 10^{-10} mbar
Helium Leak Rate: Materials: < 2 x 10^{-9} mbar l/s
Maximum Δ Pressure Before Opening: ≤ 30 mbar
Materials:
Body = 304 Stainless Steel
Gate = 304 Stainless Steel
Drive shaft and pins = 440C hardened stainless steel
Bellows = AM-350
Actuator = 6061-T6 Aluminum

Operating Temperature:
Body, Gate Open (Viton® / Copper bonnet) = 150°C / 200°C*
Body, Gate Closed (Viton® / Copper bonnet) = 150°C / 150°C*
Actuator w/out solenoid (Viton® / Copper bonnet) = 60°C / 60°C*
Position Indicator (Viton® / Copper bonnet) = 150°C / 150°C*

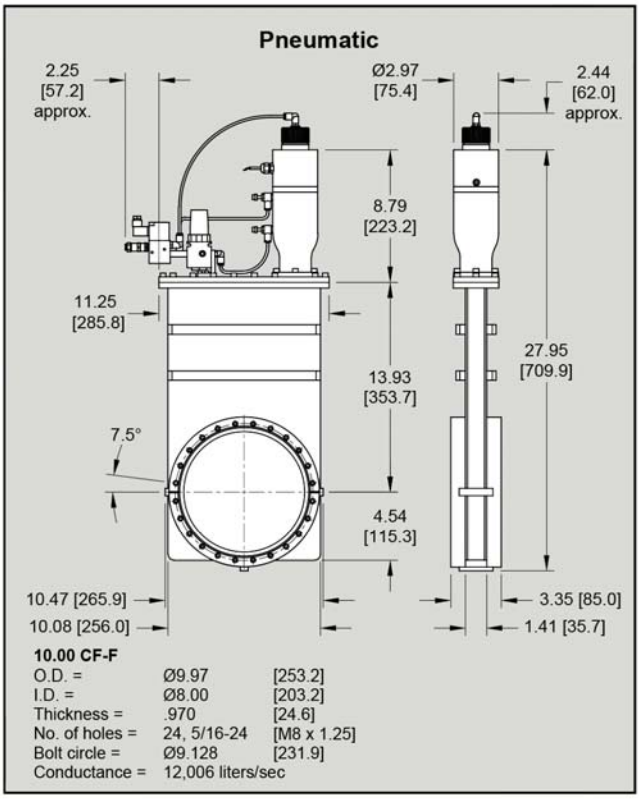
**250°C options available on request.*



ISO-160 Flanges			150-mm 6.0-inch
Bonnet-Gate	**Flange Type**	**Ship Wt. lbs [Kg]**	**Model Number ***
Pneumatic			
Viton-Viton (HV)	Metric Bolt	50 [23]	21712-0603R
Viton-Viton (HV)	Clamp	70 [32]	21712-0606R

* For pneumatic valves,
R = standard
- Reed switch, open/closed
- Microswitch, third position

M = optional
- Microswitch, all positions



CF-F 10.00 Flanges			200-mm 8.0-inch
Bonnet-Gate	**Flange Type**	**Ship Wt. lbs [Kg]**	**Model Number ***
Pneumatic			
Viton-Viton (HV)	U.S. Bolt	75 [34]	21712-0800R
Copper-Viton (UHV)	U.S. Bolt	75 [34]	21722-0800R

* For metric flanges, replace last 0 in model number with 4

For pneumatic valves,
R = standard
- Reed switch, open/closed
- Microswitch, third position

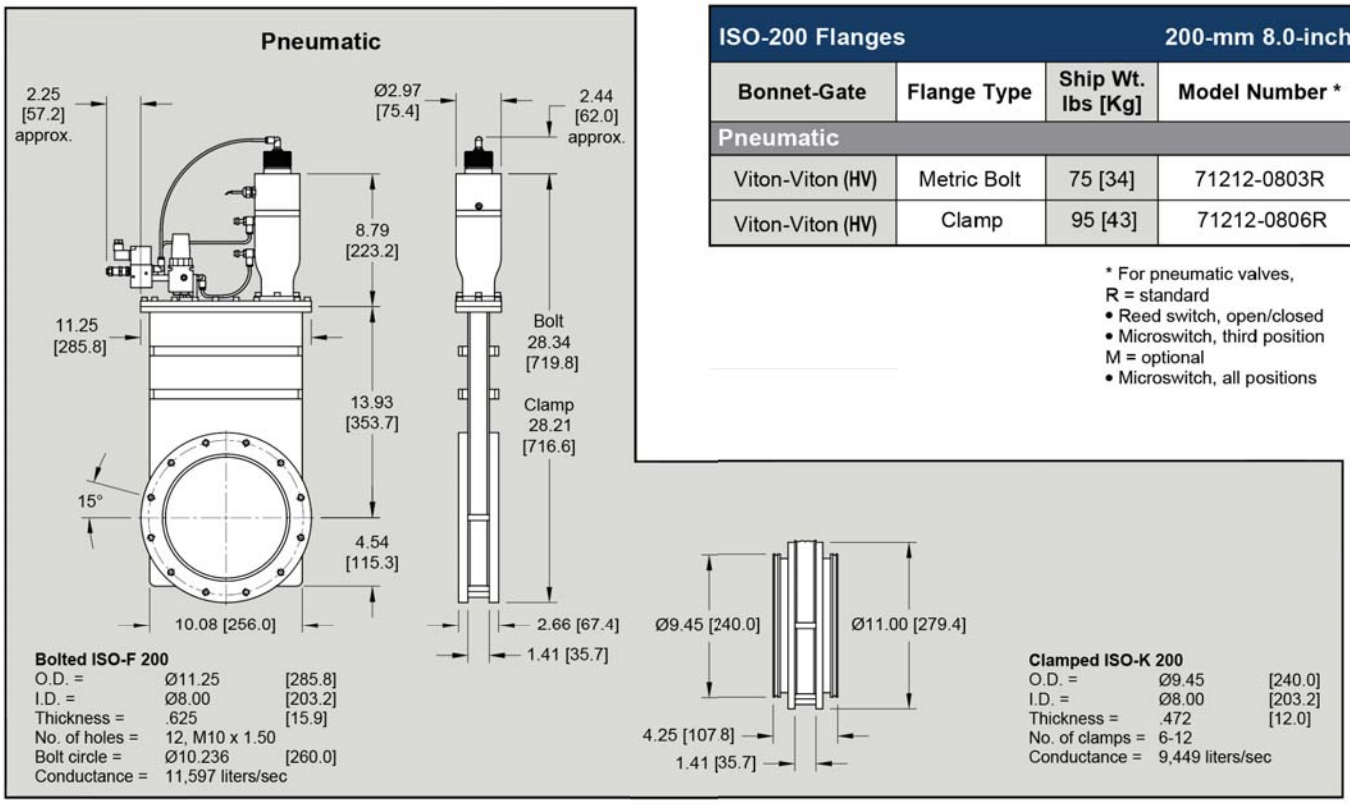
M = optional
- Microswitch, all positions

21700

Specifications

HV Pressure Range: 1 x 10^{-9} mbar
UHV Pressure Range: 1 x 10^{-10} mbar
Helium Leak Rate: Materials: < 2 x 10^{-9} mbar l/s
Maximum Δ Pressure Before Opening: ≤ 30 mbar
Materials:
Body = 304 Stainless Steel
Gate = 304 Stainless Steel
Drive shaft and pins = 440C hardened stainless steel
Bellows = AM-350
Actuator = 6061-T6 Aluminum
Operating Temperature:
Body, Gate Open (Viton® / Copper bonnet) = 150°C / 200°C*
Body, Gate Closed (Viton® / Copper bonnet) = 150°C / 150°C*
Actuator w/out solenoid (Viton® / Copper bonnet) = 60°C / 60°C*
Position Indicator (Viton® / Copper bonnet) = 150°C / 150°C*

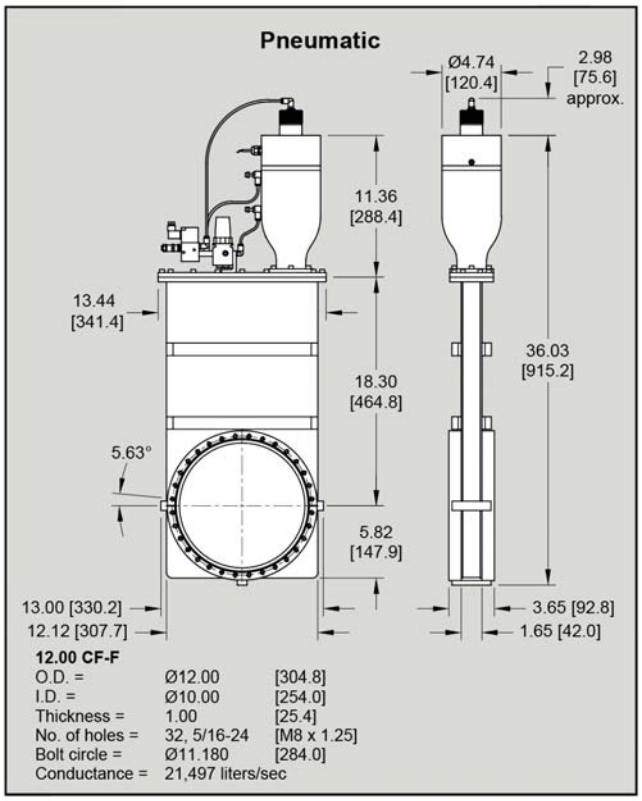
*250°C options available on request.



ISO-200 Flanges			200-mm 8.0-inch
Bonnet-Gate	**Flange Type**	**Ship Wt. lbs [Kg]**	**Model Number ***
Pneumatic			
Viton-Viton (HV)	Metric Bolt	75 [34]	71212-0803R
Viton-Viton (HV)	Clamp	95 [43]	71212-0806R

* For pneumatic valves,
R = standard
- Reed switch, open/closed
- Microswitch, third position

M = optional
- Microswitch, all positions



CF-F 12.00 Flanges			250-mm 10.0-inch
Bonnet-Gate	**Flange Type**	**Ship Wt. lbs [Kg]**	**Model Number ***
Pneumatic			
Viton-Viton (HV)	U.S. Bolt	147 [67]	21712-1000R
Copper-Viton (UHV)	U.S. Bolt	147 [67]	21722-1000R

* For metric flanges, replace last 0 in model number with 4

For pneumatic valves,
R = standard
- Reed switch, open/closed
- Microswitch, third position

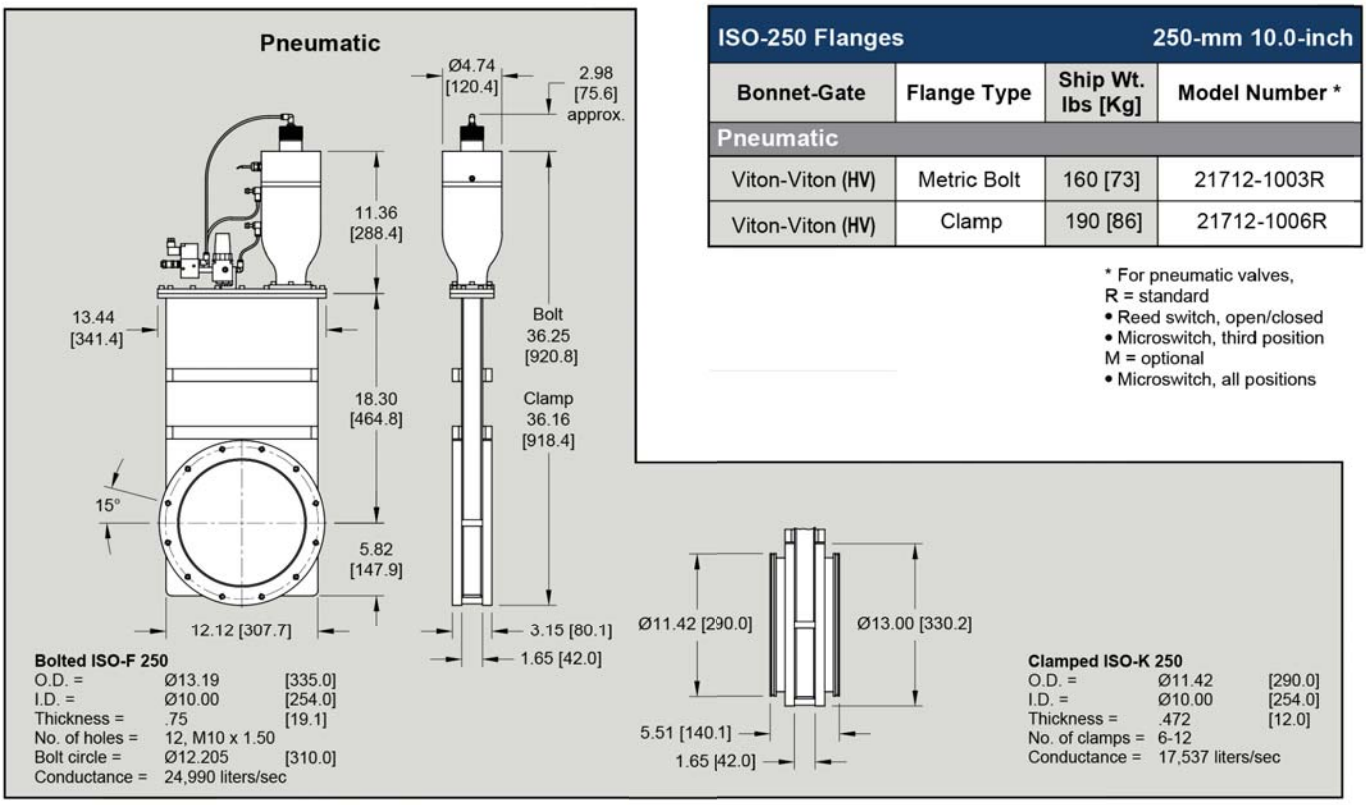
M = optional
- Microswitch, all positions

Specifications

HV Pressure Range: 1 x 10^{-9} mbar
UHV Pressure Range: 1 x 10^{-10} mbar
Helium Leak Rate: Materials: < 2 x 10^{-9} mbar l/s
Maximum Δ Pressure Before Opening: ≤ 30 mbar
Materials:
Body = 304 Stainless Steel
Gate = 304 Stainless Steel
Drive shaft and pins = 440C hardened stainless steel
Bellows = AM-350
Actuator = 6061-T6 Aluminum

Operating Temperature:
Body, Gate Open (Viton® / Copper bonnet) = 150°C / 200°C*
Body, Gate Closed (Viton® / Copper bonnet) = 150°C / 150°C*
Actuator w/out solenoid (Viton® / Copper bonnet) = 60°C / 60°C*
Position Indicator (Viton® / Copper bonnet) = 150°C / 150°C*

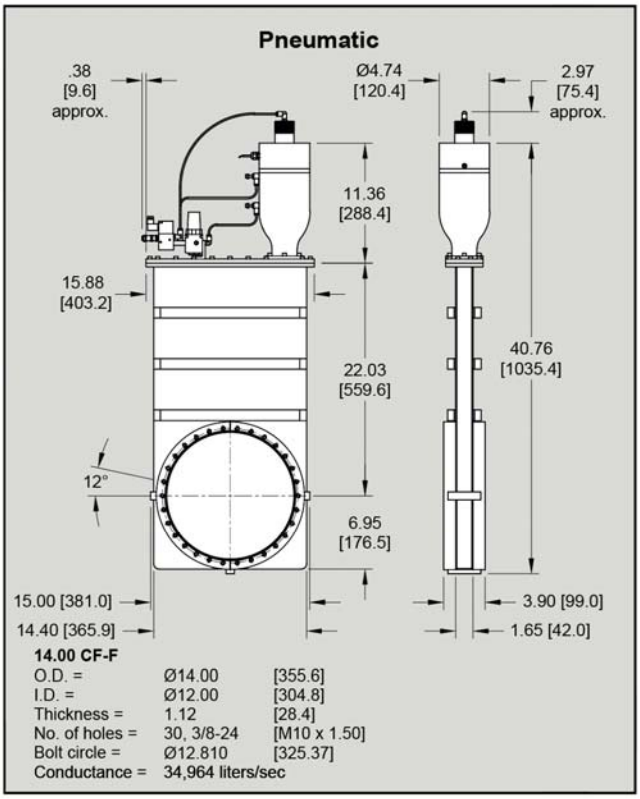
**250°C options available on request.*



ISO-250 Flanges			250-mm 10.0-inch
Bonnet-Gate	**Flange Type**	**Ship Wt. lbs [Kg]**	**Model Number ***
Pneumatic			
Viton-Viton (HV)	Metric Bolt	160 [73]	21712-1003R
Viton-Viton (HV)	Clamp	190 [86]	21712-1006R

* For pneumatic valves,
R = standard
- Reed switch, open/closed
- Microswitch, third position

M = optional
- Microswitch, all positions



CF-F 14.00 Flanges			300-mm 12.0-inch
Bonnet-Gate	**Flange Type**	**Ship Wt. lbs [Kg]**	**Model Number ***
Pneumatic			
Viton-Viton (HV)	U.S. Bolt	170 [77]	21712-1200R
Copper-Viton (UHV)	U.S. Bolt	170 [77]	21722-1200R

* For metric flanges, replace last 0 in model number with 4

For pneumatic valves,
R = standard
- Reed switch, open/closed
- Microswitch, third position

M = optional
- Microswitch, all positions

21700

Specifications

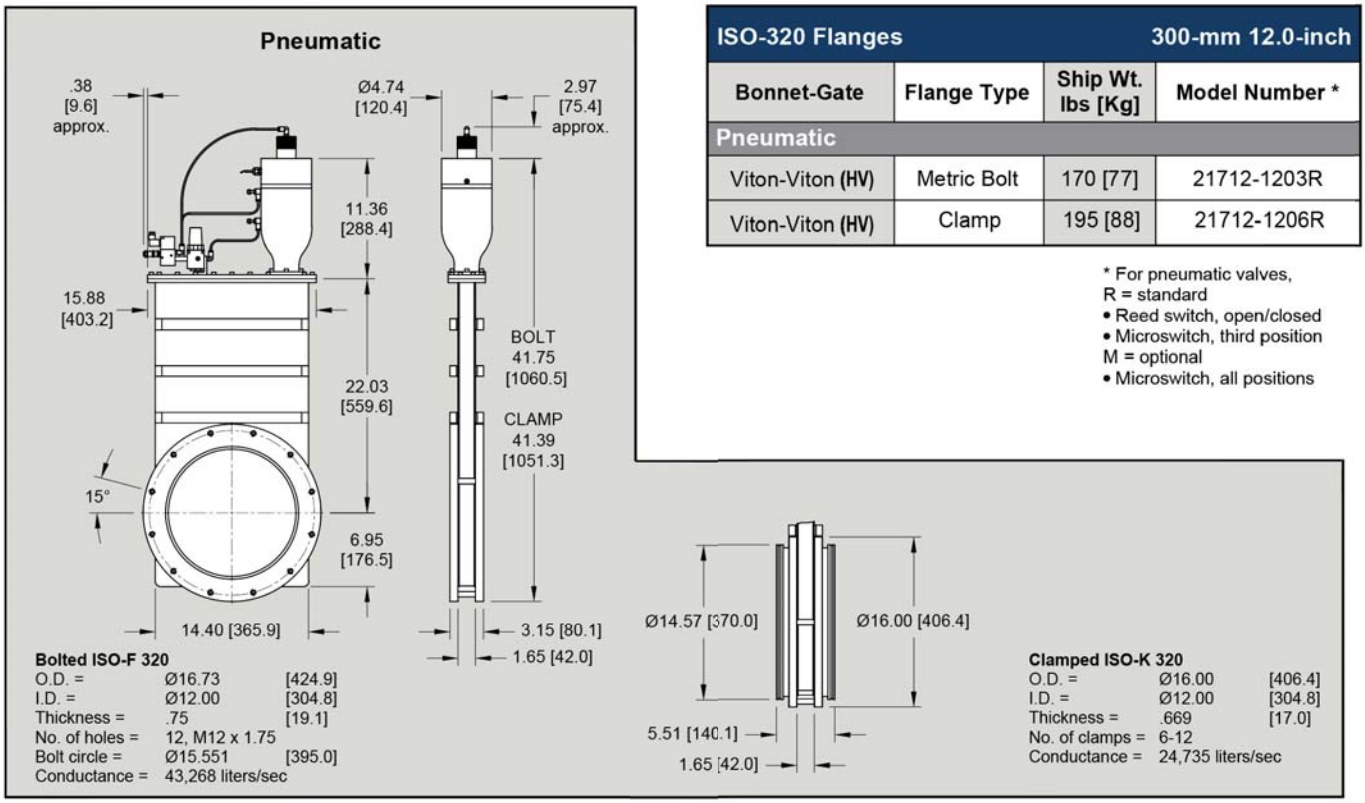
HV Pressure Range: 1 x 10^{-9} mbar
UHV Pressure Range: 1 x 10^{-10} mbar
Helium Leak Rate: Materials: < 2 x 10^{-9} mbar l/s
Maximum Δ Pressure Before Opening: ≤ 30 mbar
Materials:

Body =	304 Stainless Steel
Gate =	304 Stainless Steel
Drive shaft and pins =	440C hardened stainless steel
Bellows =	AM-350
Actuator =	6061-T6 Aluminum

Operating Temperature:

Body, Gate Open (Viton® / Copper bonnet) =	150°C / 200°C*
Body, Gate Closed (Viton® / Copper bonnet) =	150°C / 150°C*
Actuator w/out solenoid (Viton® / Copper bonnet) =	60°C / 60°C*
Position Indicator (Viton® / Copper bonnet) =	150°C / 150°C*

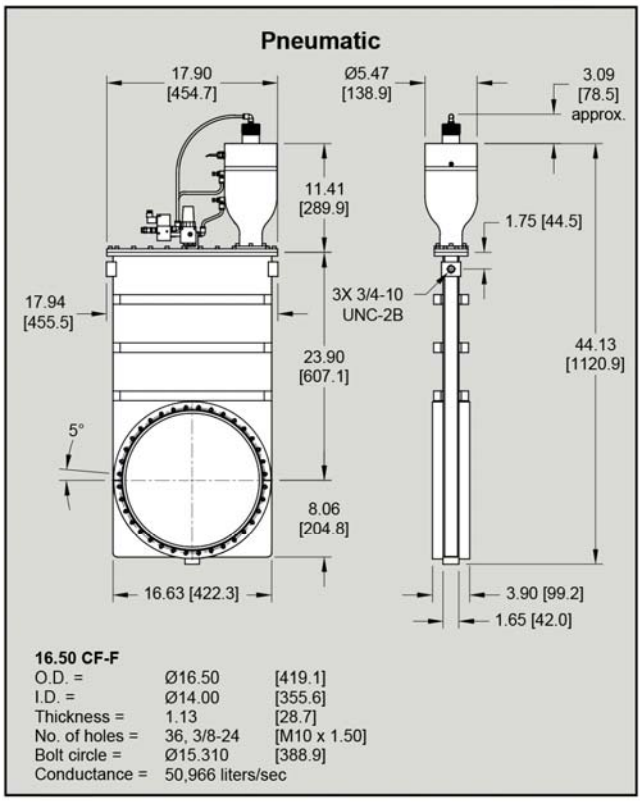
*250°C options available on request.



ISO-320 Flanges			300-mm 12.0-inch
Bonnet-Gate	**Flange Type**	**Ship Wt. lbs [Kg]**	**Model Number ***
Pneumatic			
Viton-Viton (HV)	Metric Bolt	170 [77]	21712-1203R
Viton-Viton (HV)	Clamp	195 [88]	21712-1206R

* For pneumatic valves,
R = standard
- Reed switch, open/closed
- Microswitch, third position

M = optional
- Microswitch, all positions



CF-F 16.50 Flanges			350-mm 14.0-inch
Bonnet-Gate	**Flange Type**	**Ship Wt. lbs [Kg]**	**Model Number ***
Pneumatic			
Viton-Viton (HV)	U.S. Bolt	315 [143]	21712-1400R
Copper-Viton (UHV)	U.S. Bolt	315 [143]	21722-1400R

* For metric flanges, replace last 0 in model number with 4

For pneumatic valves,
R = standard
- Reed switch, open/closed
- Microswitch, third position

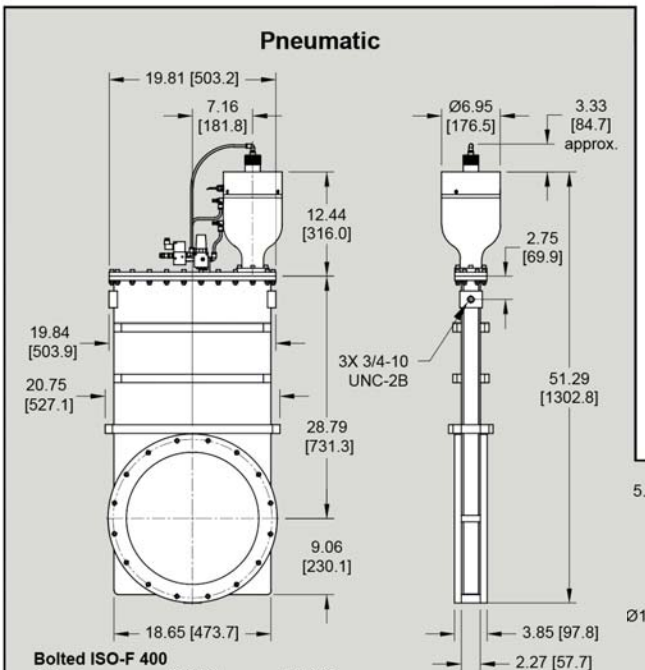
M = optional
- Microswitch, all positions

Specifications

HV Pressure Range: 1 x 10^{-9} mbar
UHV Pressure Range: 1 x 10^{-10} mbar
Helium Leak Rate: Materials: < 2 x 10^{-9} mbar l/s
Maximum Δ Pressure Before Opening: ≤ 30 mbar
Materials:
Body = 304 Stainless Steel
Gate = 304 Stainless Steel
Drive shaft and pins = 440C hardened stainless steel
Bellows = AM-350
Actuator = 6061-T6 Aluminum

Operating Temperature:
Body, Gate Open (Viton® / Copper bonnet) = 150°C / 200°C*
Body, Gate Closed (Viton® / Copper bonnet) = 150°C / 150°C*
Actuator w/out solenoid (Viton® / Copper bonnet) = 60°C / 60°C*
Position Indicator (Viton® / Copper bonnet) = 150°C / 150°C*

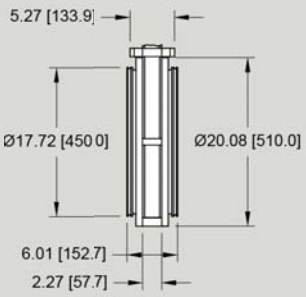
*250°C options available on request.



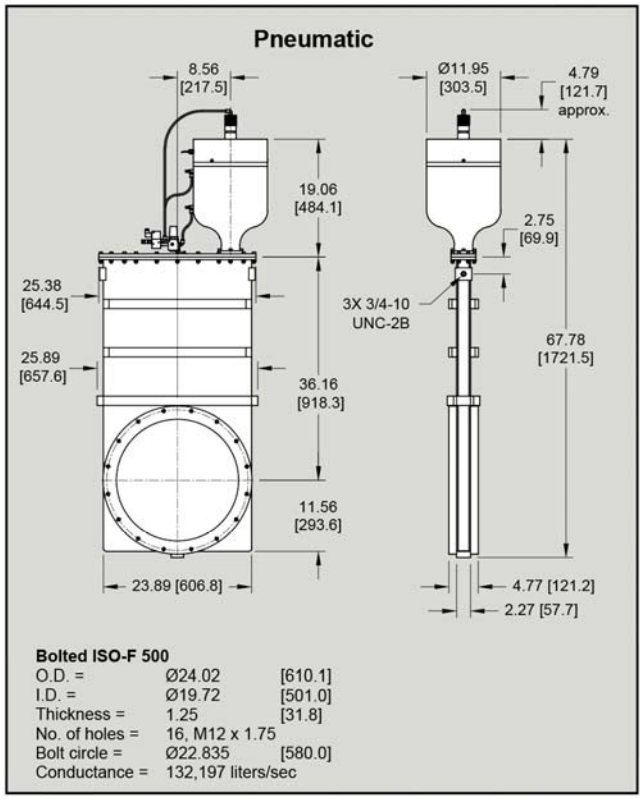
ISO-400 Flanges			400-mm 16.0-inch
Bonnet-Gate	**Flange Type**	**Ship Wt. lbs [Kg]**	**Model Number ***
Pneumatic			
Viton-Viton (HV)	Metric Bolt	415 [189]	21712-1603R
Viton-Viton (HV)	Clamp	475 [216]	21712-1606R

* For pneumatic valves,
R = standard
- Reed switch, open/closed
- Microswitch, third position

M = optional
- Microswitch, all positions



Clamped ISO-K 400
O.D. = Ø17.72 [450.0]
I.D. = Ø15.75 [400.0]
Thickness = .669 [17.0]
No. of clamps = 8-16
Conductance = 46,700 liters/sec



ISO-500 Flanges			500-mm 20.0-inch
Bonnet-Gate	**Flange Type**	**Ship Wt. lbs [Kg]**	**Model Number ***
Pneumatic			
Viton-Viton (HV)	Metric Bolt	680 [309]	21712-2003R

* For pneumatic valves,
R = standard
• Reed switch, open/closed
• Microswitch, third position
M = optional
• MIcroswitch, all positions

21700

Specifications

HV Pressure Range: 1 x 10^{-9} mbar
UHV Pressure Range: 1 x 10^{-10} mbar
Helium Leak Rate: Materials: < 2 x 10^{-9} mbar l/s
Maximum Δ Pressure Before Opening: ≤ 30 mbar
Materials:
Body = 304 Stainless Steel
Gate = 304 Stainless Steel
Drive shaft and pins = 440C hardened stainless steel
Bellows = AM-350
Actuator = 6061-T6 Aluminum
Operating Temperature:
Body, Gate Open (Viton® / Copper bonnet) = 150°C / 200°C*
Body, Gate Closed (Viton® / Copper bonnet) = 150°C / 150°C*
Actuator w/out solenoid (Viton® / Copper bonnet) = 60°C / 60°C*
Position Indicator (Viton® / Copper bonnet) = 150°C / 150°C*

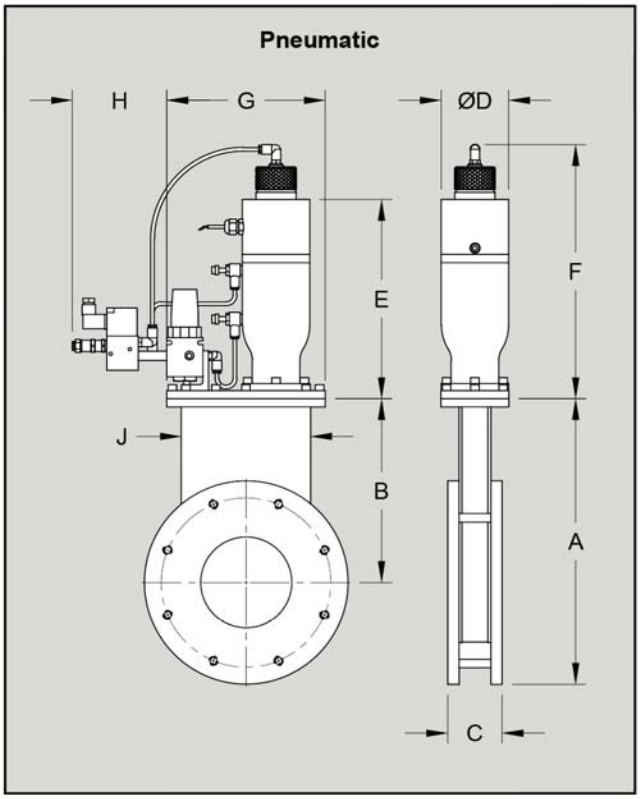
**250°C options available on request.*

ANSI Flange Models

ANSI Flange Models are designed for high vacuum applications, specifically when pressure ranges approximate $1x10^{-9}$ mbar and bakeout temperatures do not exceed 200ºC. The bonnet comes standard with a Viton® elastomer O-ring. These valves provide valving for cryopumps, turbomolecular pumps, ion pumps and other applications requiring clean, low outgassing valves. Pneumatic valves are supplied with a 120 VAC solenoid and a Reed switch position indicator. Standard flanges are smooth faced, non-rotatable and threaded. When O-ring grooves are required on flanges, please specify one of the following options:

- O-ring groove on gate side only
- O-ring groove on carriage side only
- O-ring grooves on both gate side and carriage side

O-ring groove I.D. is 0.250-inch larger than the valve I.D. Flange O-rings are not included with the valve, and may be purchased separately.



JIS and Custom Flange Models

Valves requiring JIS flanges may be obtained through HVA (see page 195). Additionally, other specialty flanges for non-standard installations may be custom ordered through HVA. Contact HVA Technical Services to discuss your requirements.

ANSI Flange Dimensions

MM	Inch	Flange Size	Conductance liter/sec air	No. Holes	Thread	B.C. mm	B.C. inch	O.D. mm	O.D. inch	I.D. mm	I.D. inch
50	2.0	2.0 ANSI	311	4	3/8-16	Ø121	Ø4.75	Ø152	Ø5.97	Ø51	Ø2.00
63	2.5	2.0 ANSI	615	4	3/8-16	Ø121	Ø4.75	Ø152	Ø5.97	Ø64	Ø2.50
75	3.0	2.0 ANSI	1,029	4	3/8-16	Ø121	Ø4.75	Ø152	Ø5.97	Ø76	Ø3.00
75	3.0	3.0 ANSI	1,029	4	3/8-16	Ø152	Ø6.00	Ø190	Ø7.49	Ø76	Ø3.00
100	4.0	4.0 ANSI	2,122	8	3/8-16	Ø190	Ø7.50	Ø229	Ø8.99	Ø102	Ø4.00
150	6.0	6.0 ANSI	7,023	8	3/4-10	Ø241	Ø9.50	Ø279	Ø11.00	Ø152	Ø6.00
200	8.0	6.0 ANSI	14,374	8	3/4-10	Ø241	Ø9.50	Ø279	Ø11.00	Ø203	Ø8.00
200	8.0	8.0 ANSI	14,374	8	3/4-10	Ø298	Ø11.75	Ø343	Ø13.50	Ø203	Ø8.00
250	10.0	10.0 ANSI	24,990	12	3/4-10	Ø362	Ø14.25	Ø406	Ø16.00	Ø254	Ø10.00
300	12.0	10.0 ANSI	43,268	12	3/4-10	Ø362	Ø14.25	Ø406	Ø16.00	Ø305	Ø12.00
300	12.0	12.0 ANSI	43,268	12	3/4-10	Ø432	Ø17.00	Ø483	Ø19.00	Ø305	Ø12.00
350	14.0	14.0 ANSI	68,804	12	3/4-10	Ø476	Ø18.75	Ø533	Ø21.00	Ø356	Ø14.00
400	16.0	14.0 ANSI	74,905	12	3/4-10	Ø476	Ø18.75	Ø533	Ø21.00	Ø406	Ø16.00
400	16.0	16.0 ANSI	74,905	16	3/4-10	Ø540	Ø21.25	Ø597	Ø23.50	Ø406	Ø16.00
450	18.0	16.0 ANSI	106,827	16	3/4-10	Ø540	Ø21.25	Ø597	Ø23.50	Ø457	Ø18.00
450	18.0	18.0 ANSI	106,827	16	3/4-10	Ø578	Ø22.75	Ø635	Ø25.00	Ø457	Ø18.00
500	20.0	20.0 ANSI	130,030	20	1-8	Ø635	Ø25.00	Ø698	Ø27.50	Ø508	Ø20.00
525	21.0	20.0 ANSI	150,188	20	1-8	Ø635	Ø25.00	Ø698	Ø27.50	Ø533	Ø21.00

ANSI Valve Dimensions

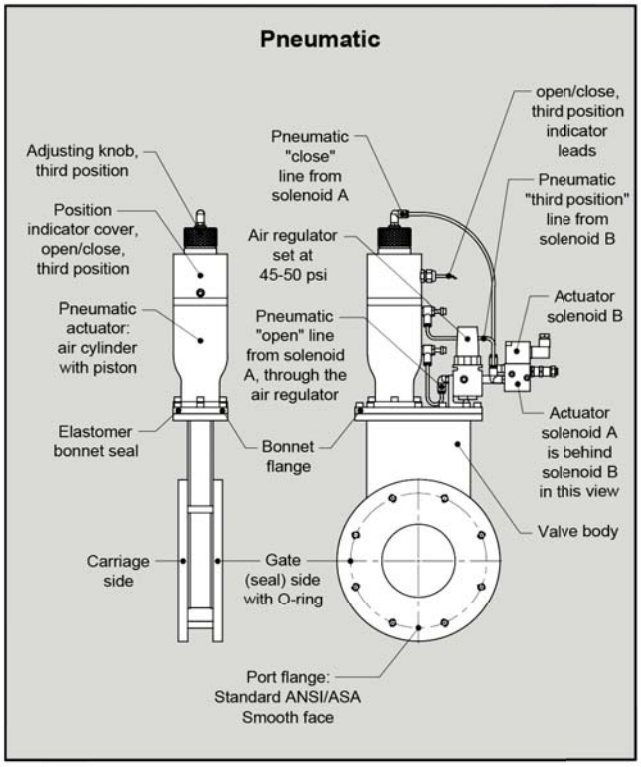
Nom. I.D.	A	B	C	D	E	F	G	H	J
50 mm	180	105	52	Ø50	140	191	97	-	76
2.0 in	7.10	4.12	2.03	Ø1.97	5.50	7.53	3.81	-	3.00
63 mm	198	122	52	Ø62	140	191	111	-	90
2.5 in	7.80	4.81	2.03	Ø2.45	5.50	7.53	4.37	-	3.56
75 mm	222	147	52	Ø62	140	191	125	-	110
3.0 in	8.76	5.77	2.03	Ø2.45	5.50	7.53	4.94	-	4.32
75 mm	242	147	52	Ø62	140	191	125	-	110
3.0 in	9.52	5.77	2.03	Ø2.45	5.50	7.53	4.94	-	4.32
100 mm	321	207	61	Ø75	223	285	178	104	145
4.0 in	12.63	8.13	2.41	Ø2.97	8.79	11.21	7.00	4.11	5.71
150 mm	410	270	61	Ø75	223	285	222	85	193
6.0 in	16.14	10.64	2.41	Ø2.97	8.79	11.21	8.75	3.35	7.61
200 mm	494	354	70	Ø75	223	285	286	57	255
8.0 in	19.43	13.93	2.76	Ø2.97	8.79	11.21	11.25	2.25	10.08
200 mm	525	354	71	Ø75	223	285	286	57	255
8.0 in	20.68	13.93	2.78	Ø2.97	8.79	11.21	11.25	2.25	10.08
250 mm	668	465	80	Ø120	288	364	341	-	308
10.0 in	26.30	18.30	3.15	Ø4.74	11.36	14.33	13.44	-	12.12
300 mm	763	560	80	Ø120	288	364	403	10	363
12.0 in	30.03	22.03	3.15	Ø4.74	11.36	14.33	15.88	.38	14.40
300 mm	801	560	80	Ø120	288	364	403	10	363
12.0 in	31.53	22.03	3.15	Ø4.74	11.36	14.33	15.88	.38	14.40
350 mm	874	607	93	139	290	368	455	-	419
14.0 in	34.40	23.90	3.65	Ø5.47	11.41	14.50	17.90	-	16.63
400 mm	998	731	108	Ø177	316	401	503	-	474
16.0 in	39.29	28.79	4.27	Ø6.95	12.44	15.77	19.81	-	18.65
400 mm	1030	731	108	Ø177	316	401	503	-	474
16.0 in	40.54	28.79	4.27	Ø6.95	12.44	15.77	19.81	-	18.65
450 mm	1105	806	108	Ø304	484	606	559	-	524
18.0 in	43.49	31.74	4.27	Ø11.95	19.06	23.85	22.00	-	20.62
450 mm	1124	806	108	Ø304	484	606	559	-	524
18.0 in	44.24	31.74	4.27	Ø11.95	19.06	23.85	22.0	-	20.62
500 mm	1268	918	121	Ø304	484	606	645	-	604
20.0 in	49.91	36.16	4.77	Ø11.95	19.06	23.85	25.38	-	23.89
525 mm	1268	918	121	Ø304	484	606	645	-	604
21.0 in	49.91	36.16	4.77	Ø11.95	19.06	23.85	25.38	-	23.89

ANSI Valves

ANSI Flanges			Viton Bonnet and Gate
Size inch [mm]	**Flange Size**	**Ship Wt. lbs [Kg]**	**Model Number ***
Pneumatic			
2.0 [50]	2.0 ANSI	13 [6]	21712-0201R
2.5 [63]	2.0 ANSI	18 [8]	21712-0251R
3.0 [75]	2.0 ANSI	22 [10]	21712-0301R
3.0 [75]	3.0 ANSI	22 [10]	21712-0302R
4.0 [100]	4.0 ANSI	33 [15]	21712-0401R
6.0 [150]	6.0 ANSI	50 [23]	21712-0601R
8.0 [200]	6.0 ANSI	75 [34]	21712-0801R
8.0 [200]	8.0 ANSI	75 [34]	21712-0802R
10.0 [250]	10.0 ANSI	160 [73]	21712-1001R
12.0 [300]	10.0 ANSI	170 [77]	21712-1201R
12.0 [300]	12.0 ANSI	180 [82]	21712-1202R
14.0 [350]	14.0 ANSI	315 [143]	21712-1401R
16.0 [400]	14.0 ANSI	415 [189]	21712-1601R
16.0 [400]	16.0 ANSI	435 [198]	21712-1602R
18.0 [450]	16.0 ANSI	520 [234]	21712-1801R
18.0 [450]	18.0 ANSI	530 [241]	21712-1802R
20.0 [500]	20.0 ANSI	680 [309]	21712-2001R
21.0 [525]	20.0 ANSI	680 [309]	21712-2101R

* For pneumatic valves,
R = standard
- Reed switch, open/closed
- Microswitch, third position

M = optional
- Microswitch, all positions



Specifications

HV Pressure Range: 1×10^{-9} mbar
UHV Pressure Range: 1×10^{-10} mbar
Helium Leak Rate: Materials: $< 2 \times 10^{-9}$ mbar l/s
Maximum Δ Pressure Before Opening: ≤ 30 mbar
Materials:

Body =	304 Stainless Steel
Gate =	304 Stainless Steel
Drive shaft and pins =	440C hardened stainless steel
Bellows =	AM-350
Actuator =	6061-T6 Aluminum

Operating Temperature:

Body, Gate Open (Viton® / Copper bonnet) =	150°C / 200°C*
Body, Gate Closed (Viton® / Copper bonnet) =	150°C / 150°C*
Actuator w/out solenoid (Viton® / Copper bonnet) =	60°C / 60°C*
Position Indicator (Viton® / Copper bonnet) =	150°C / 150°C*

**250°C options available on request.*