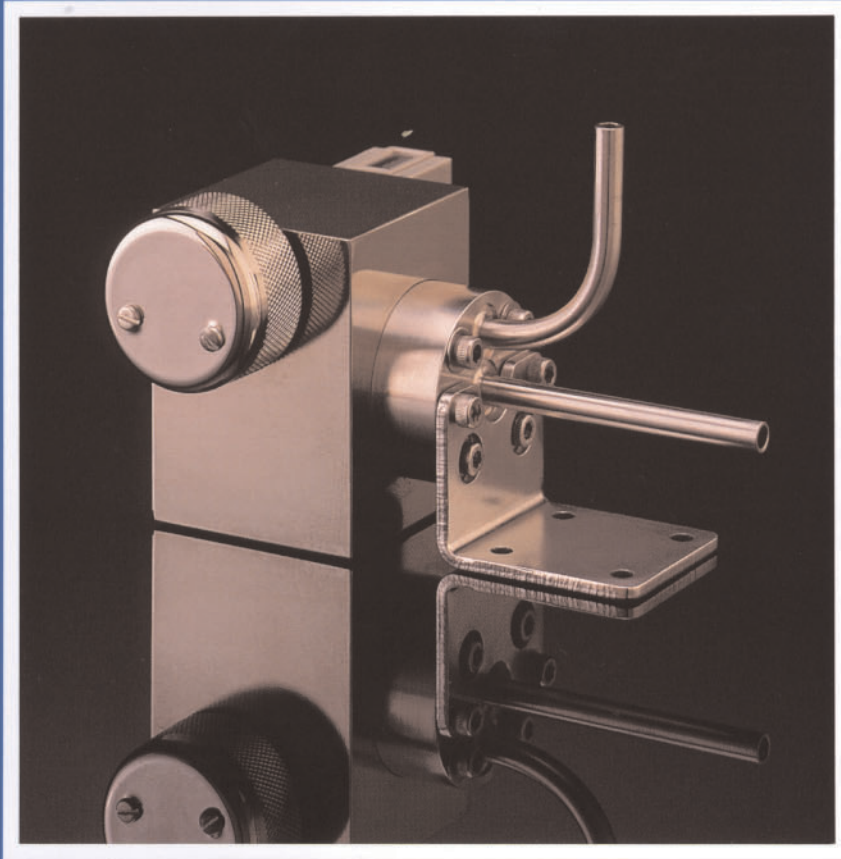


203 VARIABLE LEAK VALVE



Gas flow continuously variable from above 300 Torr
liters/sec to below 10^{-10} Torr liter/sec

Seals mass spectrometer leak tight

Bakeable to 450°C

Constructed entirely of low vapor pressure metals,
insuring minimum contamination

Useful with inlet pressures above 200 psi and below
 10^{-10} Torr

GRANVILLE-PHILLIPS
HELIX TECHNOLOGY CORPORATION

Advanced Vacuum Measurement Solutions

Applications

The Series 203 Variable Leak is specifically designed to fill the need for an extremely wide range, low-torque, manually operated, variable conductance device capable of providing precise pressure control. This leak provides a means of regulating gas pressure in a dynamic system by controlling gas flow to compensate for gas which is removed at a constant or varying rate by pumping, adsorption or other means.

The Variable Leak is well suited for use in systems which require components that contribute a minimum of contamination. It is particularly recommended for application in mass spectrometry, high energy particle accelerators, space simulation, process control, plasma physics, pure gas handling systems, and ultra-high vacuum systems where manual pressure control is required. For automatic pressure control information see the Granville-Phillips data sheet on the Series 216 Automatic Pressure Controller.

Unique design and construction, a careful choice of materials and precision manufacturing techniques have been combined to produce this versatile leak. The elimination of all organic materials in its construction

avoids the usual problems resulting from outgassing and contamination.

Conductance

Conductance of the Series 203 Variable Leak is continuously variable from 0.4 liter/sec to 10^{-11} liter/sec. When closed, the leakage conductance is less than 10^{-13} liter/sec. Twenty-seven full turns of the driver handle provide precise pressure control from a fully open position to mass spectrometer leak tight, thereby allowing system pressures to be accurately maintained at any level.

A counter, mounted on the driver, is helpful in setting an approximate conductance. The Variable Leak is not a reproducible conductance device and reproduction of conductances below about 10^{-9} liter/sec should not be expected due to the inherent quality of hysteresis found in all devices having metal-to-metal seals. If reproducible gas flows are required, a Granville-Phillips Automatic Pressure Controller should be used.

Throughput for a given opening of the Variable Leak Valve is dependent upon the inlet and outlet pressures. Gas flows from 300 Torr liters/sec to less than 10^{-7} Torr liter/sec can be controlled with one atmosphere on the inlet. Higher throughputs can be

controlled by using higher inlet pressures. The family of curves shown in Fig. 1 shows the throughput for a variety of inlet pressures exhausting to atmospheric pressure. Fig. 2 shows the Variable Leak Valve throughput with one atmosphere on the inlet and exhausting to vacuum. The maximum inlet pressures for the Variable Leak Valve are 25 psig for Port A and 200 psig for Port B.

For optimum control in the ultra-high vacuum region, reduced inlet pressures are recommended. For gas inlet pressures below 25 psig, either Variable Leak Valve port may be connected to the system and the other port to the gas source. To obtain the minimum volume and surface area in the system, connect the center port, Port B, to the system.

To prevent damaging the Variable Leak Valve diaphragm with gas inlet pressures over 25 psig, the gas source must be connected to Port B and Port A maintained below 25 psig. For use with higher inlet pressures, contact the Granville-Phillips Customer Service Department.

Gases Controlled

All dry gases non-corrosive to Variable Leak materials can be controlled. Materials include silver and 304 Stainless Steel.

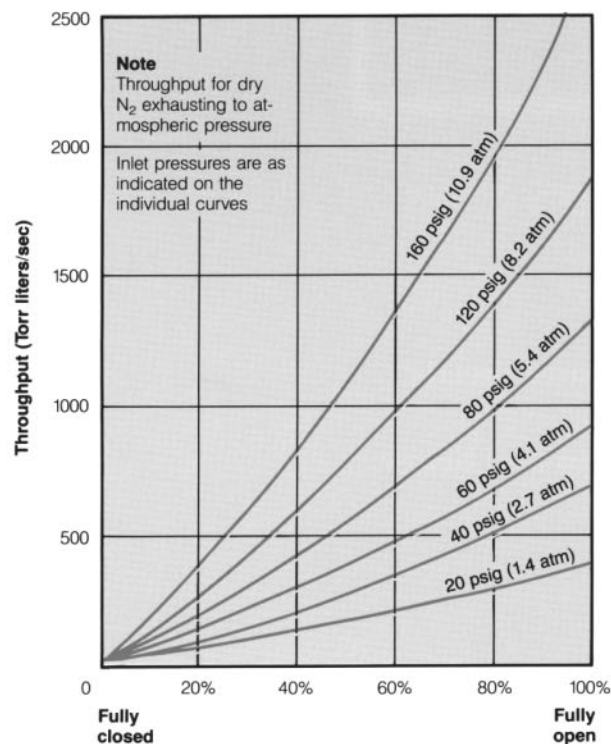


Figure 1. Throughput for a Series 203 Variable Leak at various high inlet pressures.

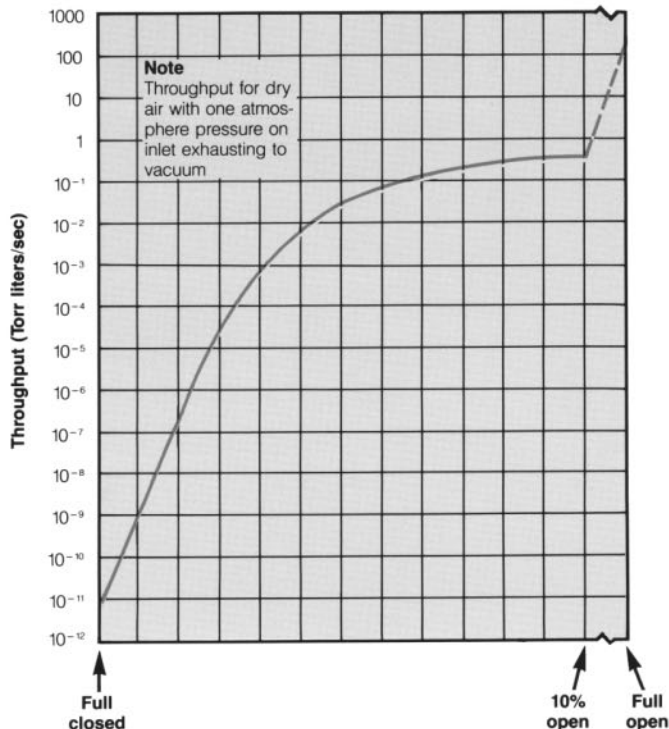


Figure 2. Operating characteristics for a typical Series 203 Variable Leak.

Operating Temperatures

High temperature vacuum bakeout is a practical method of rapidly obtaining very low pressures and ultra-clean environments. The Series 203 Variable Leak is designed to withstand repeated vacuum bakeouts at temperatures up to 450°C for prolonged periods of time when baked in the open position with the bakeout clamp installed and at vacuums of 10^{-4} Torr or lower. Maximum operating temperature with the driver attached to the valve is 75°C.

Materials

Silver and 304 Stainless Steel are in contact with the vacuum. Fabrication is by Heliarc welding. This choice of materials and manufacturing techniques makes the Variable Leak ideally suited for use in systems where contamination must be at an absolute minimum.

Design and Construction Details

The complete Variable Leak Valve Assembly consists of a bakeable valve body with specified tubulation, a nonbakeable driver, a mounting bracket and a bakeout clamp.

The leak valve body has a precision machined Stainless Steel nose piece which is Heliarc welded in the center of a thin Stainless Steel diaphragm. This diaphragm is, in turn, welded to the Stainless Steel valve body. The valve seal is produced by seating the nose piece against a carefully proportioned pure silver gasket in the valve body. This unique metal-to-metal seal, if kept free from contamination, will provide long and dependable service.

The valve driver houses the drive mechanism consisting of a fine drive screw and precision worm gear. Control of the leak is accomplished by manually turning the driver handle. No special wrenches or adapters are required to seal the leak as the closing torque is only 50 in. oz. A preset clutch is incorporated in the drive train to prevent excessive closing torque from being exerted against the seal.

Connections

A variety of connections are available to make the Variable Leak adaptable to both new and existing systems. Plain metal tubulation, flanged connections, or Cajon® type couplings may be ordered. Type and style of connections must be specified when ordering.

Metal Tubulation is available in type 304 Stainless Steel with a 1/4 in. o.d. and a 0.035 in. wall thickness. Stainless Steel tubulation can be welded directly to another Series 300 Stainless Steel except the free machining grades.

Cajon® VCR® Type Couplings provide an all metal, mass spectrometer leak tight seal and allow rapid connection and disconnection of the valve. Cajon® VCO® type couplings provide an O-ring type seal for less critical applications. A Stainless Steel gland with female nut is Heliarc welded to Type 304 Stainless Steel tubulation.

The 2-3/4 in. o.d. ConFlat®-type Flange and the 1-5/16 in. o.d. mini-ConFlat®-type flange are both manufactured from Type 304 Stainless Steel. Heliarc welding is used to attach these flanges to Type 304 Stainless Steel tubulation.

Installation

The Series 203 Variable Leak may be mounted to operate in any desired position. A mounting bracket is provided to rigidly attach the leak to a firm base. Fig. 3 provides mounting dimensions.

®Cajon, VCR, VCO-Cajon Company, Macedonia, OH

®ConFlat-Varian/Vacuum Products Division, Lexington, MA

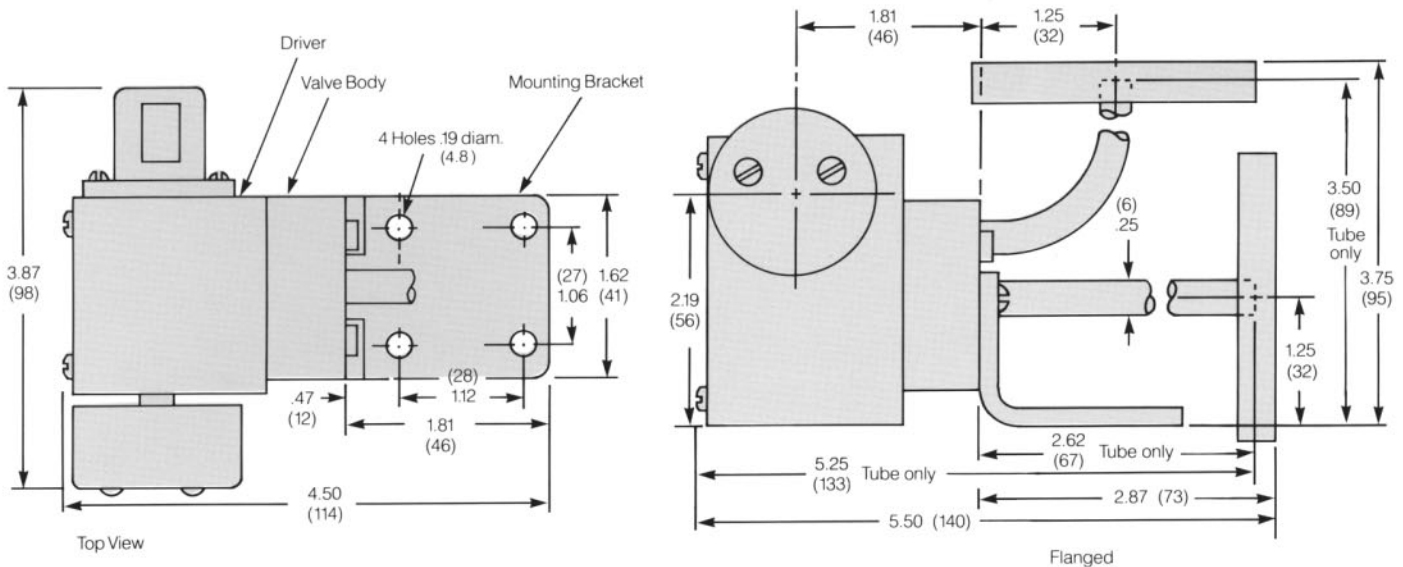


Figure 3. Mounting dimensions for Series 203 Variable Leak. All dimensions shown in inches (millimeters)

Information regarding order placement, technical assistance, or the location of the sales office nearest you is available through our corporate office.

Limited Warranty

This equipment is warranted for a period of one year to be free of defects in materials and workmanship subject to certain exceptions and limitations which are expressly stated in our Limited Warranty for this equipment, a copy of which is included in each instruction manual or which will be mailed to you upon request.

Ordering Information

Please order all components by complete Catalog Number. The desired Bend Style (see Fig. 4) should be specified as a suffix to the Catalog Number. For example, part number 203017 02 describes the Variable Leak Valve Assembly with 2¾ in. o.d. ConFlat® type flanges on both ports in Bend Style 02.

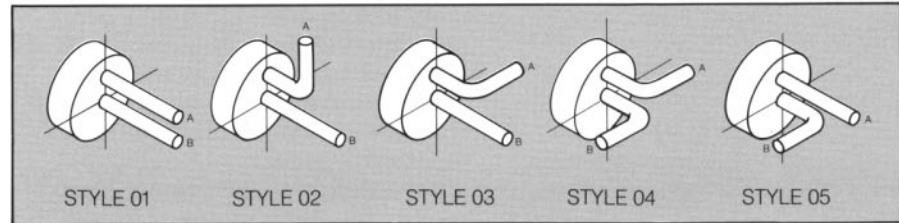


Figure 4. Bend Styles

Variable Leak Valves

	Catalog Number				
	Complete Valve Assembly	Valve Body Only	Available Bend Styles		
Vacuum System Connections			01	02	03 04 05
1/4 in. 304 S.S. tubulation	203019	203014	X	X	X X X
2¾ in. o.d. rotatable ConFlat®-type flange ..	203017	203018	-	X	X X X
1-5/16 in. o.d. rotatable mini-ConFlat®-type flange	203021	203022	-	X	X X X
Cajon® SS-4-VCR®-3 Gland and SS-4-VCR®-1 Female nut	203036	203037	-	X	X X X
Cajon® SS-4-VCO®-3 Gland and SS-4-VCO®-4 Female nut	203041	203042	-	X	X X X

Please specify tubulation bend style when ordering complete valve assemblies or replacement valve bodies (refer to Figure 4 above)

Accessories

Description	Catalog Number
Blank 2¾ in. o.d. ConFlat®-type non-rotatable flange	203030
Blank 1-5/16 in. o.d. mini-ConFlat®-type non-rotatable flange	203032
Blank 1-5/16 in. o.d. mini-ConFlat®-type rotatable flange	203033
Gasket for 2¾ in. o.d. ConFlat®-type flange, OFHC Copper, Box of 10 ..	203027
Gasket for 1-5/16 in. o.d. mini-ConFlat®-type flange, OFHC Copper, Box of 10	203034
Bolt, nut and washer set for 2¾ in. o.d. ConFlat®-type flange, Box of 25	203028
Bolt, nut and washer set for 1-5/16 in. o.d. mini-ConFlat®-type flange, Box of 25	203035

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