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TOOLS FOR SCIENCE AND MEDICINE

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CATALOG 70

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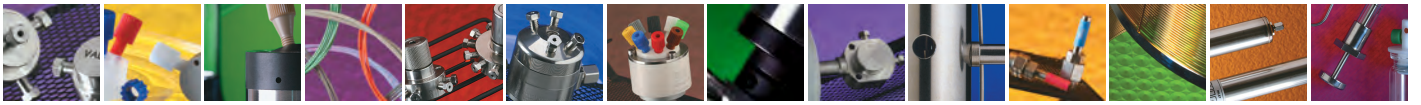

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As a worldwide supplier of products for the analytical instrument market, we strive to make sure those products comply with regulatory requirements around the world.

All machined products (valves, fittings, etc.) are *fully* RoHS/REACH/WEEE compliant. Most of the electrical products we manufacture are also CE tested and certified. Only a few legacy products are not CE certified.

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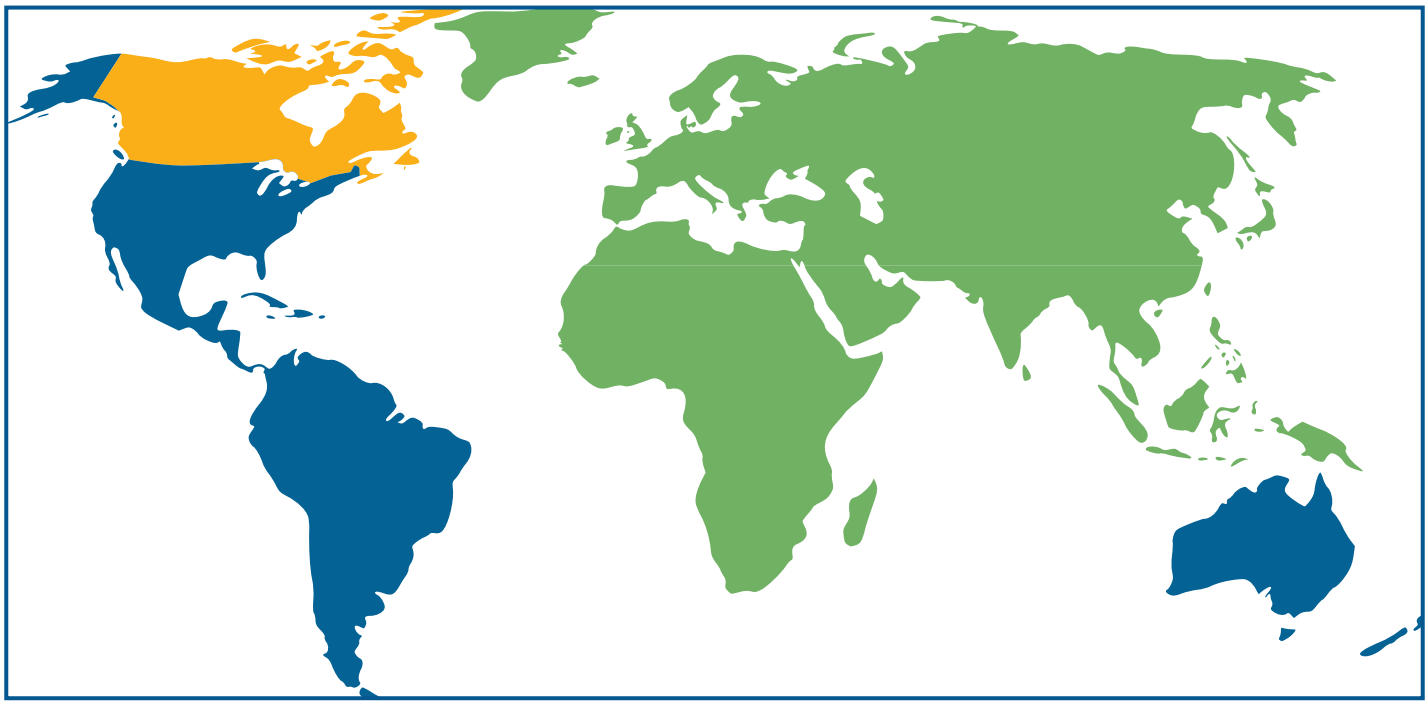

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UHPLC

ULTRA-HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

UHPLC FITTINGS

Valco fittings are available for 1/32", 1/16", and 1/8" tubing.

Product information . . . . . PAGES 8-41

Cheminert Nanovolume® fittings are designed for direct connection of 360 micron tubing (no liners required.)

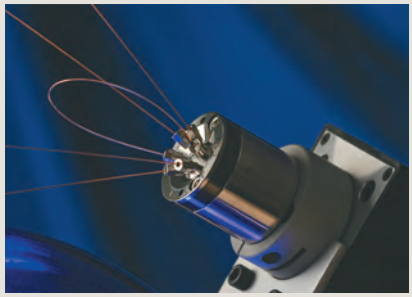
Product information . . . . . PAGES 43-44

10K, 15K, AND 20K PSI INJECTORS AND SELECTORS

Cheminert UHPLC injectors, switching valves, and selectors with 360 micron, 1/32", or 1/16" fittings minimize internal volume and eliminate dead volume. Ideal for high speed, high throughput techniques.

NANOVOLUME® (100-150 µm)

Injectors . . . . . PAGES 127, 134-135
Internal sample injectors. 127, 135
Selectors (150 µm). 127, 154-155



MICROBORE® (250 µm)

Injectors . . . . . PAGES 128, 136
Internal sample injectors. 128, 137
Selectors 128, 155

40,000 PSI ULTRA-HIGH PRESSURE INJECTOR SYSTEM

The VICI 40K UHPLC injector is comprised of six miniature air actuated needle valves, plumbed to simulate the flowpath of a conventional 6 port injector.

Product information . . . . . PAGE 64

TUBING

STAINLESS TUBING

Available in 1/32", 1/16", and 1/8" OD, in custom lengths.

Product information . . . . . PAGES 73-75

ELECTROFORMED NICKEL TUBING

Available in 360 micron, 1/32", and 1/16" ODs, with a range of IDs and lengths.

Product information . . . . . PAGE 67

NEW! TRUE NANO HPLC

The Nanovolume® pump/injector is an all-in-one setup with true nanoscale fittings (360 µm) and extremely low flow rates (down to 1 nl/min), providing split-free injections as close to the detector as possible. The pump is available in isocratic and gradient versions, with flow rate resolution to 1400 steps/µl.

LOWER DEAD VOLUME

- 360 µm fittings provide the perfect connection to higher efficiency columns
- Orders of magnitude increase in theoretical plate height
- Use smaller particles for packing

LOW FLOW RATES

- No need to split before the detector
- Low mobile-phase consumption

Product information . . . . . PAGE 7

HPLC

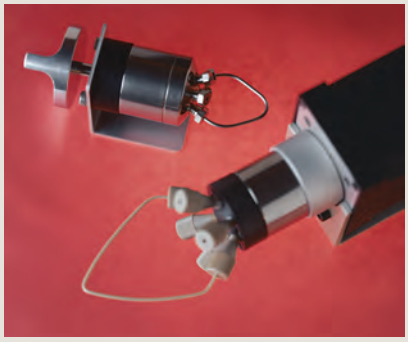
HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

INJECTORS AND SELECTORS

CHEMINERT

Cheminert valves for HPLC operate up to 5,000 psi, and include 4, 6, 8, and 10 port injectors, a through-the-handle front-loading injector, a continuous flow injector, and selectors with 4, 6, 8, and 10 positions. We also offer a submicroliter injector with injection volume as small as 4 nanoliters. Valves feature 1/32" or 1/16" zero dead volume fittings with bore sizes from 0.10 mm (.004") to 0.75 mm (.030").

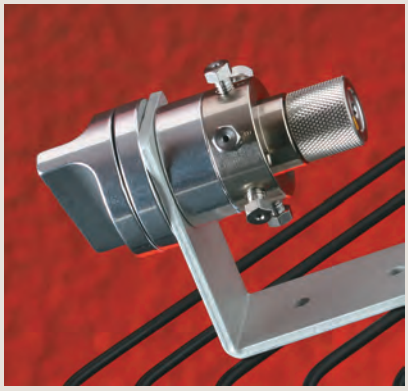
Injectors .....PAGES 129, 138-147
Internal sample injectors...129, 139, 141, 145
Selectors 156-157



VALCO

Valco offers a diverse line in terms of number of ports, fitting sizes, and materials of construction. 3, 4, 6, 8, 10, 12 port versions are offered, with 1/32", 1/16", or 1/8" fittings. The range of alloys and polymer composites for rotors and bodies are capable of meeting virtually any system requirement. However, longest lifetime is provided by our Cheminert coated-stator injectors.

Injectors .....PAGES 96-98
Internal sample injectors.....95
Selectors 114-115



HPLC FITTINGS

VALCO

Valco stainless steel fittings are available for 1/32", 1/16", and 1/8" tubing.

Product information .....PAGES 8-41

CHEMINERT

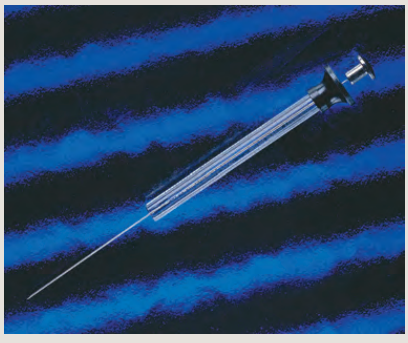
Cheminert high pressure PEEK fittings are rated at 5000 psi with fingertight nuts, well beyond the burst strength of most PEEK tubing.

Product information .....PAGES 48-51

SYRINGES

Syringes for Valco, Cheminert, and Rheodyne HPLC injectors.

Product information ..... PAGE 242



TUBING

STAINLESS TUBING

Available in 1/32", 1/16", and 1/8" OD, in custom lengths.

Product information .....PAGES 73-75

PEEK TUBING

Available in 1/32", 1/16", and 1/8" OD, natural or color-coded.

Product information .....PAGES 69-71

LC

LIQUID CHROMATOGRAPHY / LIQUID HANDLING

LOW PRESSURE VALVES AND SELECTORS

The Cheminert line offers two position valves with 4, 6, 8, 10, 12, or 14 ports, and stream selectors that can pick from as many as 28 streams.

Two position valves are available with 1/16" Valco ZDV fittings or 1/4-28 fittings for 1/16" or 1/8" tubing and 1/2-20 fittings for 1/4" tubing. Selectors include those options plus a version offering 20-28 streams with 6-40 fittings for 1/16" tubing.

Valves . . . . . PAGES 148-149, 151
Internal sample injectors. 150
Selectors 158-161

M SERIES SYRINGE-FREE PUMP

The patented M Series liquid handling pump is a syringe-free pump capable of delivering a bidirectional flow to six orders of magnitude.

Product information . . . . . PAGES 62-63

VALVE CLOSURES FOR VIALS

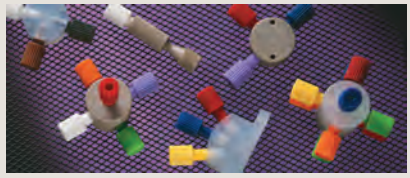
Screw-cap Mininert valves for vials are available in a variety of sizes. The crimp-top valve for 13 mm ID glassware slides into the neck of the vial and features a threaded flange which is turned to provide a leak-tight fit.

Product information . . . . . PAGE 243

LOW PRESSURE FITTINGS

Cheminert low pressure fittings are ideally suited for applications requiring an inert, biocompatible, metal-free flowpath. Wetted materials are PFA, FEP, CTFE, or PEEK, and uniform flow passages minimize mixing. All connections have zero dead volume.

Product information . . . . . PAGES 52-57



SEE ALSO

The **VICI cap** is the most economical way to helium sparge and deliver LC mobile phases. The insert is manufactured from PTFE with an EPDM O-ring and a polypropylene screw cap.

Product information . . . . . PAGE 61

GC

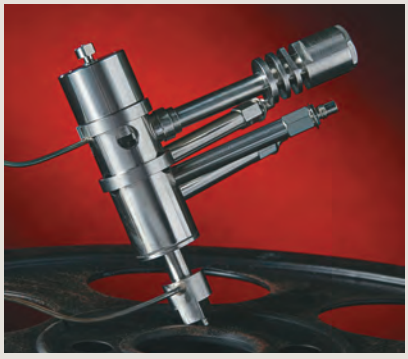
GAS CHROMATOGRAPHY

FAST GC COMPONENTS

For rapid results in the lab or in the field, VICI offers a fast temperature programmer and resistively heated valves, columns, and tubing.

PULSED DISCHARGE DETECTORS

PDDs utilize a stable, low-powered, pulsed CD discharge in helium as the ionization source.



THERMAL CONDUCTIVITY DETECTOR

The newly-updated TCD-3 features full digital control implemented via a user interface or command console.

VALCO INJECTORS AND SELECTORS

Valco GC valves have been in almost all commercially-produced gas chromatographs from the time that valves originally began to replace other injection methods. New designs are smaller and easier to service, but still exhibit the quality and value that made them the industry standard.

DIAPHRAGM VALVES

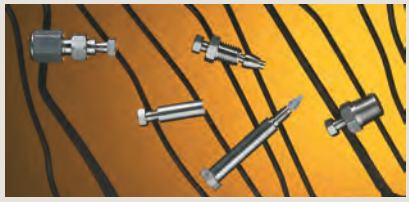
The VICI diaphragm valve is ideal for trouble-free use in applications requiring minimal maintenance and maximum lifetime.

CAPILLARY COLUMNS

ValcoBond and ValcoPLOT columns meet the highest standards for resolution, retention characteristics, inertness, bleed, and reproducibility. The ValcoPLOT line includes our unique HayeSep PLOT columns.

VALCO FITTINGS

Valco fittings are compression fittings, in which a ferrule is compressed onto the tube as a nut is tightened. They offer the best stability and reliability for GC applications.



MORE FOR GC

NEW FROM VICI

MULTICHANNEL FAST TEMPERATURE PROGRAMMER

(page 204)

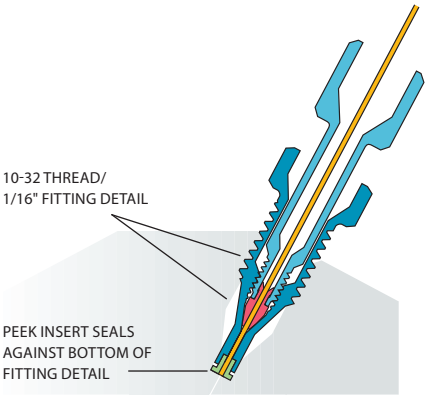
- Up to four independently programmable zones with eight states of rapid heating and cooling
- For use with nickel-wire-wrapped resistively-heated columns
- User friendly interface and control/monitor program on Windows

The VICI FTP-200 has up to four channels, with multiple temperature inputs for unparalleled precision heating at ramp rates up to 2,000°C/minute. Independently heat four GC components using up to eight temperature states, eliminating the need for a conventional oven and making portable GC possible at lower cost. With 10X faster data point collection, the FTP-200 will boost your lab efficiency—complex analyses are performed in seconds.

COLUMN/FAN MODULES

(page 205)

- For use with our FTP-200 multichannel temperature programmer
- Includes column, fan, transfer lines, sensors, and connections in one unit
- Wide selection of column types, sizes, and phases
- Choice of high-flow fans for fast cooling
- Resistively-heated transfer lines with a low mass 40 gauge "K" thermocouple



DIRECT-CONNECT FITTING – 360 µm FUSED SILICA TUBING TO 1/16" FITTING DETAIL

- Fingertight to 25,000 psi
- Eliminates dead volume present in competing designs
- For use in valves with port size of 150 microns or smaller

Our new fitting connects a 360 µm FS tube directly into a 1/16" fitting detail, with the bore of the FS tube precisely aligning with the bore of the valve. To ensure zero dead volume, the FS tube end must be prepped with the tools in the kit below. Call for more information.

FUSED SILICA TUBE END PREP KIT

- Produces square cut, polished tube end
- Eliminates dead volume caused by the high point left by typical FS tubing cuts
- Clean flow path—particulates are removed with pressurized food-grade CO_2

Normal methods of cutting fused silica leave a high spot, sabotaging efforts to minimize dead volume with fittings that make up on the face of the tube (like the direct connect fitting above). This kit includes everything needed for a simple lapping procedure which polishes the burred end into a clean, perfectly square-cut surface. Call for more information.

THERMAL CONDUCTIVITY DETECTOR – TCD-3
Detector housing and controller

THERMAL CONDUCTIVITY DETECTOR

(page 217)

- Now with serial control or user-friendly interface and control/monitor program on Windows
- Digital auto-zero feature
- Enhanced thermal stability
- Smaller, compact controller housing

Like our venerable TCD-2, our new TCD-3 is a dual filament unit consisting of the detector housing and separate controller. However, the analog controls of the TCD-2 are replaced with full digital control implemented via a user interface or command console commands. Thermal stability is maintained in the detector to within 0.010°C, producing a stable, low-noise signal.

INTEGRATED NANOPUMP/INJECTOR

WORLD'S FIRST TRUE NANO HPLC

- Operates to 1500 bar (22,000 psi)
- Includes everything but the detector
- 360 micron fittings and tubing throughout for higher efficiency
- Flow rates down to 1 nl/minute for low mobile phase consumption
- Sample volume as low as 5 nl
- No long transfer lines to detector

The integrated nanopump/injector comprises an entire chromatographic system in a small footprint weighing a few pounds. With true nanoscale 360 µm fittings and extremely low flow rates, this system provides split-free injections as close to the detector as possible.

The 360 µm fittings allow use of higher efficiency columns, packed with smaller particles for an orders-of-magnitude increase in theoretical plate height.

The nanopump can be employed in a variety of other single and multipump configurations, isocratic or gradient, with or without integrated injector and selector valves. The gradient version features integral pressure transducers to monitor and adjust for the differing compressibility of the two solvents.

Call us to discuss your requirements.

PUMP SPECIFICATIONS

Maximum pressure	Up to 1500 bar
Maximum capacity*	35 µl
Minimum flow rate	1 nl/min
Flow rate resolution	340 steps/µl

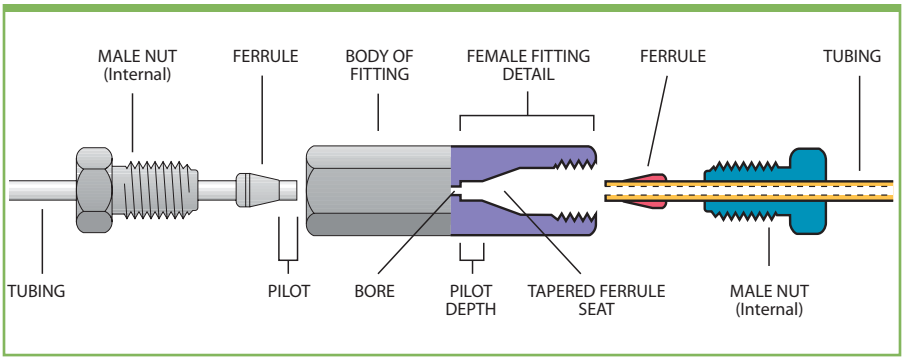
*Maximum capacity of smallest model.
Higher capacity models available.

VALCO FITTINGS

THE INDUSTRY STANDARD

The compression fitting (**FIGURE 1**), in which a one- or two-piece ferrule is compressed onto the tube as a nut is tightened, offers reliability in high pressure situations and in connecting metal tubing. Valco excels in all critical areas of the design and manufacture of such fittings. Quality considerations, which cannot be ignored if an analytical system is to reach and maintain optimum performance levels, include interchangeability, counterbore tolerances, ID/OD concentricity, mixing potential, cleaning procedures, and the method employed to "make up" the ferrule on the tube.

FIGURE 1. VALCO COMPRESSION FITTING



CAUTION

The analytical devices market has attracted numerous companies which copy Valco/ Cheminert designs. Please exercise caution in the use of copies, which may not be compatible with the original versions in this catalog.

Because of VICI's high volume production and dedicated machinery, our fittings are often less expensive and of consistently higher quality than competing copies.

TECH TIP

For optimal zero dead volume connections, make sure your tubing meets the best industry standards – OD tolerance should be nominal dimension ± .002".

Fractional dimension	Nominal dimension
1/32"	.031"
1/16"	.062"
1/8"	.125"
1/4"	.250"
3/8"	.375"
1/2"	.500"

NO TUBING DEFORMATION

The basic concept of compression fittings carries the inherent danger of tube deformation (**FIGURE 2**). While some manufacturers emphasize this positively as a method of ensuring that the tubing doesn't blow out of the ferrule, the flow anomalies introduced by the restricted ID make these fittings a poor choice for many instrument applications.

Valco metal ferrules cut a ring near the end of the tube (**FIGURE 3**), which prevents tube release at high pressures without significantly deforming and restricting the tube interior. Because our ferrules have a sharp edge at the ID near the nose, this usually takes only about 1/4 turn beyond the point where the ferrule first starts to grab the tubing. There is so little tube distortion that they are routinely used with glass-lined tubing! Only Valco's polymer fittings rely on friction to hold a tube.

INTERCHANGEABILITY

Valco fitting details are designed with a consistent pilot depth, permitting reliable interchangeability as connections are revised or fittings are replaced. This interchangeability extends throughout the Valco and Cheminert fitting and valve product lines. Indeed, the Valco standard has been so widely copied that Valco and Cheminert fittings are, in general, fully interchangeable with those of our major competitors.* In initial installations, Valco ferrules will often improve other manufacturers' fitting connections.

Because of variations in tubing OD and in pilot and taper designs from manufacturer to manufacturer, the amount of tubing extending beyond the made up ferrule can vary. (The most radical variation is in the fittings manufactured by Waters. Based on the old Swagelok design, they have a pilot depth considerably longer than standard.) **FIGURE 4A** shows a properly made up fitting. If that same fitting is installed in a detail which was designed for a slightly longer tube extension (as in **FIGURE 4B**), dead volume will be introduced. In the opposite case, with the pilot shorter than the pilot depth (**FIGURE 4C**), the tube will bottom out before the ferrule has sealed. However, our tests prove that except in the most extreme cases, a Valco ferrule will "creep" on the tubing until it reaches the bottom of the ferrule taper, making a proper seal.

RELIABLY CLEAN

Most of our state of the art CNC machines use water-based lubricants. After each part comes off the machine, it is cleaned with water-soluble detergents and then rinsed in hot deionized water. Finally, every metal fitting that we make is given a thorough cleaning with steam from deionized water at 140°C. Any critical parts processed with oil-based lubricants are baked to remove all traces. The practical result of the extra effort is this: you don't have to be concerned about solvent residues.

* An exception is the longer pilot depth on Cheminert high pressure valves with polymeric stators.

FIGURE 2.
COMMON COMPRESSION FITTING – ID RESTRICTION

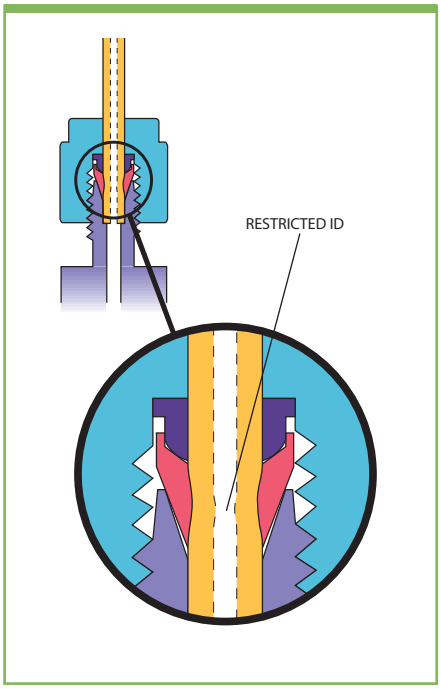


FIGURE 3.
VALCO COMPRESSION FITTING – NO ID RESTRICTION

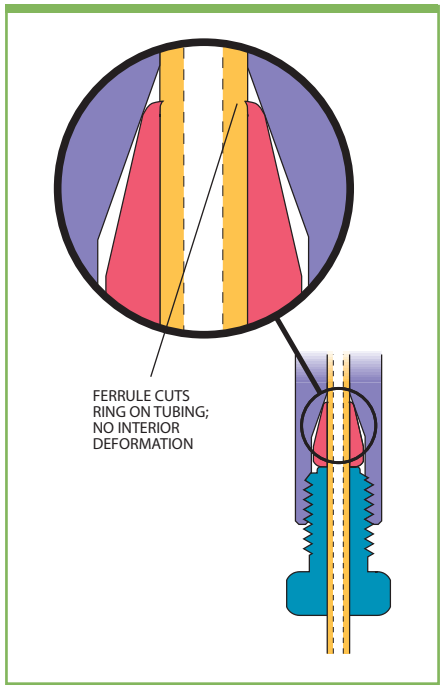
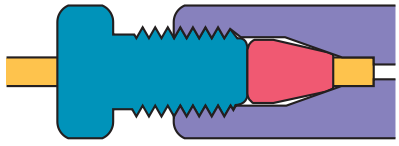
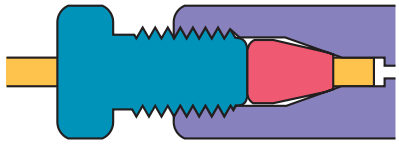


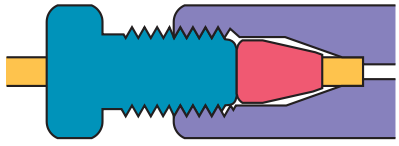
FIGURE 4.
CORRECT AND INCORRECT SEATING OF TUBING IN A FITTING DETAIL



4A Tubing seats correctly at bottom of detail



4B Incorrect: Tubing doesn't reach bottom of detail, introducing dead volume



4C Incorrect: Tubing reaches bottom of detail before ferrule seats

VALCO FITTINGS

PRECISION MACHINING, FINISHING, AND TOLERANCES

The machining methods used by different manufacturers to finish the detail of compression fittings vary in several ways that affect performance, as shown below. The fitting in **FIGURE 5** is the best choice for high performance fittings, as the tube fits squarely into the bottom of the detail. This is the detail used in Valco and Cheminert high pressure fittings.

Some fitting manufacturers omit a critical finishing operation which makes the bottom of the detail square, leaving the shape of the typical tapered drill bit instead. This results in the fitting shown in **FIGURE 6**, which introduces extra volume and mixing potential. VICI uses proprietary tooling specifically designed to produce the same high precision detail in every Valco and Cheminert fitting.

Although sometimes the tube end may seal in the bottom of the detail, the intent is for the seal to be made at the ferrule. This leaves the possibility of seepage up around the tube and into the minute cavities between the end of the ferrule and the bottom of the ferrule seat. The probability of this seepage increases when there is an excessive variance between the tubing OD and the diameter of the counterbored pilot in which it sits, and between the ferrule OD and the ferrule ID at the point where it "bites" or crimps the tubing. The possibility is virtually eliminated in VICI's fittings, which are manufactured with the precise dimensions that chromatographic applications demand. Use of VICI precut tubing, which is manufactured to quality standards in excess of most commercial tubing, further assures the best fitting connection.

FIGURE 5.
VALCO/CHEMINERT
HIGH PRESSURE COMPRESSION FITTING

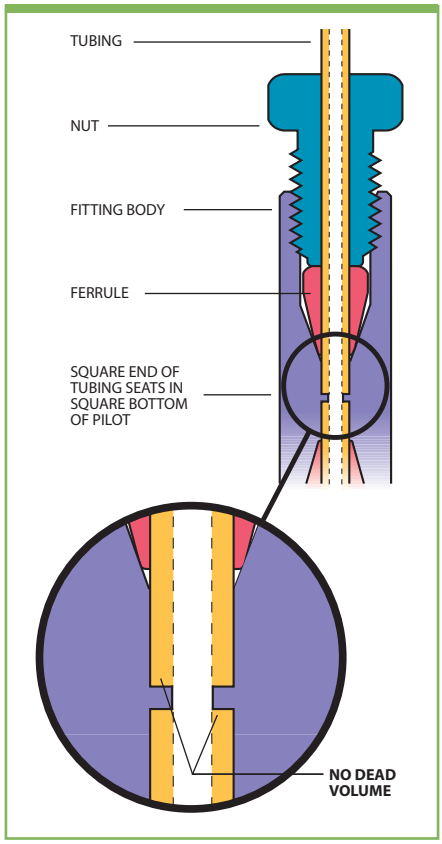
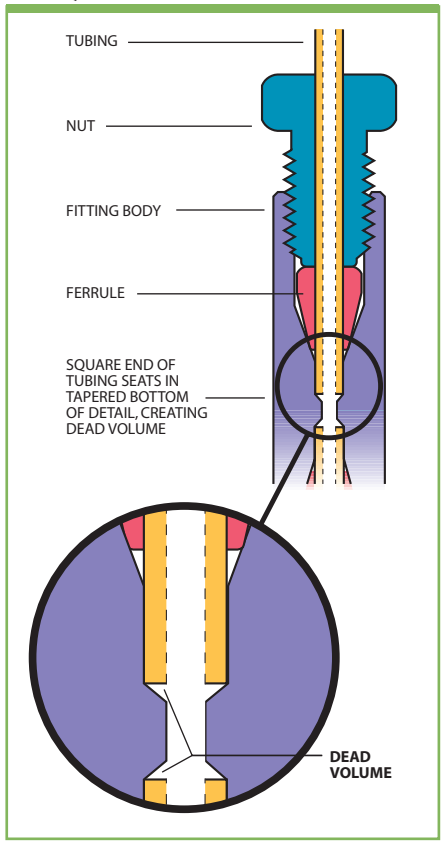


FIGURE 6.
POOR QUALITY COMPRESSION FITTING



COMPARISON OF COMPRESSION FITTING DESIGNS

The potential for dead volume and mixing is a consideration in other aspects of fitting design as well, and varies considerably among manufacturers. For example, the **common gas distribution reducing union** in **FIGURE 7** illustrates two problems for instrumentation: a large connecting volume, and various steps and restrictions which cause mixing. While there are many uses for these fittings upstream of the analytical system (such as bulk gas distribution), they cause problems when used downstream in critical applications.

FIGURE 7.
COMMERCIAL REDUCING UNION

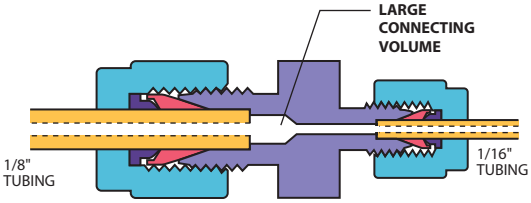


FIGURE 8.
VALCO ZDV REDUCING UNION

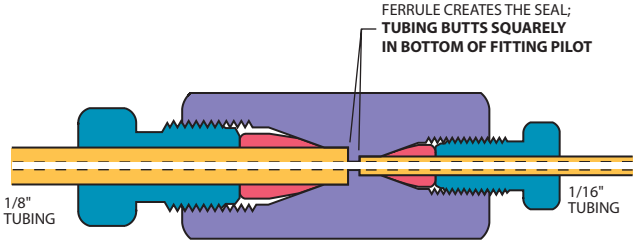
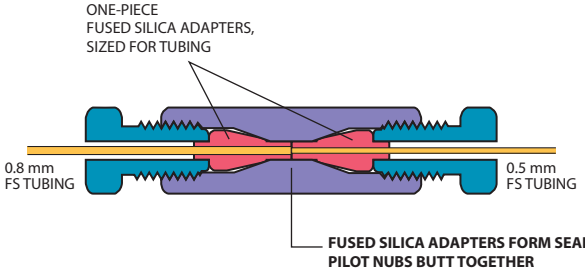


FIGURE 9.
VALCO ZDV THROUGH-BORE UNION



Additional difficulties arise if this type of fitting is loosened and retightened repeatedly. The male threaded part can become flared to the point where it is impossible to get the nut on, and the tube end often flares out in the fitting detail so that it's difficult to remove the tube.

The **Valco internal union** (**FIGURE 8**) has a larger mass surrounding the ferrule, so that even with repeated remakes or overtightening, it's impossible to flare the fitting as in the external design. When a union is selected with a bore to match the ID of the connecting tubing, mixing and dead volume are virtually eliminated.

For connection of fused silica tubing of the same or differing sizes, the **through-bore union** shown in **FIGURE 9** is recommended. This fitting permits the use of our one-piece fused silica adapters to effect a true zero dead volume connection. The ferrule features an integrated pilot which adapts to the ID of the unions, resulting in an inert, zero volume connection.

Every Valco and Cheminert fitting is manufactured to exacting specifications. Fitting concentricity – the relationship of the center of one fitting to another – is held to within 10% of the bore size (0.05 mm in a typical 1/16" union with 0.5 mm bore), which is better than that of commonly used *tubing*. This results in fittings which contribute no "extra column effects" or loss of efficiency to the chromatographic system.

Valco metal compression fittings can be used safely at UHPLC and SFC pressures when the fitting size is 1/16" or smaller. Our fittings of this type have been tested at pressures exceeding 50,000 psi. The pressure limitation with these is generally the safe working pressure of the tubing, and not the fitting itself.

VALCO FITTINGS

Internal nuts

STAINLESS STEEL

Nuts with product numbers starting with Z are for use with all standard Valco internal fittings and most valves. They may be used with fittings from other manufacturers as well. The L (long) and XL (extra-long) types are for situations where the fitting head may be otherwise inaccessible or where interference between fittings exists, as on many Valco multiposition valves. Standard material is 300 series stainless.

		Stainless nuts (Package/10)	
	Length	*Prod No*	*Price*
1/32" nut	.30"	ZN.5-10	$32.50
	.45"	LZN.5-10	37.50
1/16" nut	.43"	ZN1-10	18.00
	.50"	MZN1-10	27.50
	.625"	IZN1-10	30.00
	.75"	LZN1-10	30.00
	1.00"	XLZN1-10	32.50
1/8" nut	.57"	ZN2-10	25.00
	.82"	LZN2-10	
	1.07"	XLZN2-10	35.00

Call for a quote. Also available in 1/4".

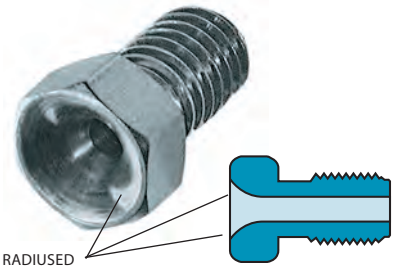
Controlled radius nuts

STAINLESS STEEL AND PEEK

These patented* special purpose nuts facilitate a tight bend as the tube exits the fitting, and can also help prevent kinks in very thin wall tubing. Controlled radius nuts are available in a range of sizes. Note that the short version (ZSN1R) can *only* be used in certain applications. Call for more information.

			Length	*Prod No*	*Price*	
Stainless steel						
1/16"	Standard		.43"	ZN1R	$1.85	
	Short		.30"	ZSN1R	4.25	
1/8"	Standard		.57"	ZN2R		
PEEK						
1/16"	Hex		.45"	ZN1RPK		
	Fingertight		.88"	ZN1RFPK	9.75	

Call for a quote.



CONTROLLED RADIUS NUT
Standard length

*U.S. patent number 6,247,731

TECH TIP

Fittings for **360 micron** tubing are available on pages 43-44.

MORE INFO

PEEK nuts ..... page 48
HPLC column end fittings 32-34
Reducing unions
Internal.....24
External.....25
External/internal.....25
Internal/external.....25
Unions
Internal.....22
External.....23
External/internal.....23

CONVERSIONS

0.25 mm = .010"
0.50 mm = .020"
0.75 mm = .030"

1.0 mm = .040"
1.5 mm = .060"
2.0 mm = .080"

4.6 mm = .180"
6.0 mm = .236"
6.4 mm = .253"

7.0 mm = .275"
10.0 mm = .400"

27.0 mm = 1.08"

1/32" = 0.8 mm
1/16" = 1.6 mm
1/8" = 3.2 mm

1/4" = 6.4 mm
3/8" = 9.5 mm
1/2" = 12.7 mm

External nuts

STAINLESS STEEL

External nuts are used with external fittings, such as our column end fittings (ECEF series) and external unions (EZU and EZRU series). They may also be used with Valco ferrules on Parker CPI and Swagelok type fittings. Standard material is 300 series stainless.

		Stainless nuts	
	Thread	*Prod No*	*Price*
1/32"	8-32	EN.5	$5.00
1/32", knurled	8-32	EN.5KN	4.75
1/16"	10-32	EN1	2.75
1/8"	5/16-20	EN2	2.75
1/4"	7/16-20	EN4 *	2.75

* PTFE-coated threads standard.

Call for a quote on 3/8", 1/2", and 1" external nuts.

Plugs

STAINLESS STEEL AND HIGH PRESSURE

Stainless plugs consist of a zero volume nut with a ferrule made up on a solid rod. For high pressure applications such as UHPLC, SFE, and SFC (>7000 psi), we recommend the special high pressure plugs with the ferrule and rod machined as a single, solid piece.

		Stainless plugs		High pressure Stainless plugs	
	*Length of plug**	*Prod No*	*Price*	*Prod No*	*Price*
1/32"	.49"	ZP.5	$8.40	ZP.5H	$13.00
1/16"	.75"	ZP1	6.30	ZP1H	9.50
	1.13"	LZP1	7.40	LZP1H	11.00
1/8"	1.00"	ZP2	6.30	ZP2H	9.50
	1.40"	LZP2	7.40	LZP2H	

Call for a quote. Also available in 1/4" stainless.

Caps

STAINLESS STEEL

A cap is a piece of hex stock with a zero volume fitting detail machined into it, but with no through-hole.

		Stainless caps	
	*Length of cap**	*Prod No*	*Price*
1/32"	.55"	ZC.5	$11.00
1/16"	.77"	ZC1	9.50
1/8"	1.01"	ZC2	9.50
1/4"	1.24"	ZC4	

Call for a quote.

MORE INFO

PEEK plugs . . . . . page 50
PEEK plugs for high pressure Cheminert valves 50
PEEK caps 50

VALCO FITTINGS

FERRULES

Valco metal ferrules cut a ring near the end of the tube, preventing tube release at high pressures without significantly deforming and restricting the tube interior. (However, if the hardness of the tubing is equal to or greater than that of the ferrule, deformation of the tube rather than a cut ring is likely.) Make up usually takes only about a 1/4 turn beyond the point where the ferrule first starts to grab the tubing. Polymeric ferrules seal by the increased friction from compression.

Valco zero volume ferrules may be used with all Valco fittings and with those of most other manufacturers. The maximum pressure limit is generally determined by the yield strength of the tubing. The maximum pressure for softer materials (such as brass and polymers) is lower, and depends on the tubing used. If in doubt about a particular combination, consult our technical staff.

For trace gas analysis, use gold-plated ferrules to achieve sealing with $<10^{-9}$ cc/atm/sec leakage.

Metal ferrules

Larger sizes and/or specific materials may be available on special order.

	Stainless, Type 303 (Package/10)		Stainless, Type 316 (Package/10)		Stainless, Gold-plated (Package/10)	
	Prod No	Price	Prod No	Price	Prod No	Price
1/32"	–	–	ZF.5S6-10	$32.50	ZF.5GP-10	$63.00
1/16"	ZF1-10	20.00	ZF1S6-10	32.50	ZF1GP-10	37.50
1/8"	ZF2-10	20.00	ZF2S6-10	25.00	ZF2GP-10	48.00
1/4"	–	–	ZF4S6-10	20.00	ZF4GP-10	✆

	Hastelloy C (Sold individually)		Nickel (Sold individually)		Titanium (Sold individually)	
	Prod No	Price	Prod No	Price	Prod No	Price
1/32"	ZF.5HC	$19.00	ZF.5NI	✆	ZF.5TI	✆
1/16"	ZF1HC	8.50	ZF1NI	$8.50	ZF1TI	$9.50
1/8"	ZF2HC	8.50	ZF2NI	✆	ZF2TI	✆

	Brass (Package/10)	
	Prod No	Price
1/32"	ZF.5B-10	$20.00
1/16"	ZF1B-10	15.00
1/8"	ZF2B-10	16.00

✆ Call for a quote.
Also available in 1/4". Call for quotes.

FERRULE IDENTIFICATION

To differentiate among the most commonly ordered metal ferrues, ring(s) are engraved on the non-sealing surfaces. The 1/16" Hastelloy C ferrule has a different shape.

METALS AT A GLANCE

Hastelloy C®.....HC
Resistant to pitting; Resists oxidizing atmospheres

Nickel..... NI
Resistant to caustics, high temp halogens, and hydrogen halides

Stainless steel, Gold-plated .....GP
More inert. Improved sealing for gas applications

Stainless steel, Type 303
GC, gas lines, general purpose

Stainless steel, Type 316 ..... S6
Improved corrosion resistance over SS 303

Titanium .....TI
Outstanding resistance to most media except hydrofluoric acids

Brass ..... B
Not recommended for most chromatographic applications

For more detailed information on metals, refer to the discussion on pages 246-247.

CONVERSIONS

0.25 mm = .010"
0.50 mm = .020"
0.75 mm = .030"

1.0 mm = .040"
1.5 mm = .060"
2.0 mm = .080"

4.6 mm = .180"
6.0 mm = .236"
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7.0 mm = .275"
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27.0 mm = 1.08"

1/32" = 0.8 mm
1/16" = 1.6 mm
1/8" = 3.2 mm

1/4" = 6.4 mm
3/8" = 9.5 mm
1/2" = 12.7 mm

Polymeric ferrules

	PEEK (Package/10)		PTFE, Glass-filled (Package/10)		PTFE, Virgin (Package/10)	
	Prod No	*Price*	Prod No	*Price*	Prod No	*Price*
1/32"	ZF.5PK-10	$35.00	ZF.5TFG-10	$32.50	ZF.5TF-10	
1/16"	ZF1PK-10	35.00	ZF1TFG-10	20.00	ZF1TF-10	$20.00
1/8"	ZF2PK-10	35.00	ZF2TFG-10	25.00	ZF2TF-10	25.00
1/4"	ZF4PK-10	32.50	ZF4TFG-10	25.00	ZF4TF-10	25.00
3/8"	ZF6PK-10		ZF6TFG-10		ZF6TF-10	32.50
1/2"	ZF8PK-10		ZF8TFG-10		ZF8TF-10	47.50

Call for a quote.

	FEP (Package/10)		PFA (Package/10)		CTFE (Package/10)	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
1/32"	ZF.5FEP-10	$32.50	ZF.5PFA-10		ZF.5KF-10	
1/16"	ZF1FEP-10		ZF1PFA-10	$37.50	ZF1KF-10	$37.50
1/8"	ZF2FEP-10	25.00	ZF2PFA-10		ZF2KF-10	37.50

Call for a quote. Also available in 1/4", 3/8", and 1/2".

	Polyimide, Valcon (Package/5)		Polyimide, Graphite (Package/5)		Polyimide, Virgin (Package/5)	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
1/32"	ZF.5V-5	$31.25	ZF.5GV-5	$36.25	ZF.5V1-5	
1/16"	ZF1V-5	26.25	ZF1GV-5	23.75	ZF1V1-5	
1/8"	ZF2V-5	37.50	ZF2GV-5		ZF2V1-5	
1/4"	ZF4V-5	47.50	ZF4GV-5		ZF4V1-5	

Call for a quote. Also available in 3/8" and 1/2".

POLYMERS AT A GLANCE

CTFE . . . . . KF
Resists all inorganic corrosives. Produced as Kel-F ®

FEP . . . . . FEP
Chemical resistance equals PTFE, but lower creep and higher friction

PEEK . . . . . PK
Chemical resistance; up to 225°C

PTFE, Glass-filled . . . . . TFG
Inert, mechanically stable

PTFE, Virgin. . . . . TF
Inert; very soft, easily cold flows. Produced as Teflon ®

Polyimide, Graphite. . . . GV
Soft, easy to form ferrules

Polyimide, Valcon. V
High temp, graphite reinforced

Polyimide, Virgin V1
High temp, electrical insulator

For more detailed information on polymers, refer to the discussion on page 248.

MORE INFO

Grooved PEEK ferrules. . . . . page 48

VALCO FITTINGS

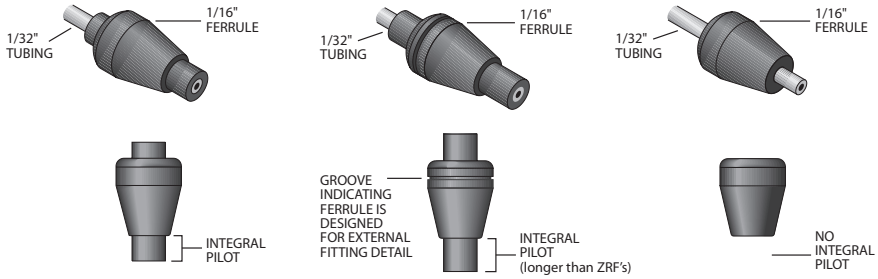
REDUCING FERRULES

Reducing ferrules are an inexpensive way to connect small lines to valves or fittings designed for larger tubing. For long term use, we recommend our reducing unions or internal reducers (IZRs).

Internal ZDV (zero dead volume) reducing ferrules are used with standard Valco internal fittings, which have a male nut and a female fitting detail. The ferrule's integral pilot fills the pilot cavity between the end of the ferrule and the bottom of the detail, yielding a zero dead volume fitting.

External ZDV reducing ferrules are used with all standard external style fittings, which have a female nut and a male fitting detail. This ferrule has a slightly longer pilot than the internal version to accommodate the longer external detail, resulting in a zero dead volume fitting. A single groove indicates that the ferrule is for use in an external detail.

Standard reducing ferrules can be used where mixing is not a problem, such as with liquid or gas delivery. A 1/16" to 1/32" ferrule of this style is simply a 1/16" ferrule with a 1/32" hole.



Internal reducing ferrules

Use these ferrules in internal type fitting details, with nuts that have external threads. Not for use in Cheminert HPLC PAEK valves (C1-C5 series) since the fitting detail in these valves has an extended pilot length.

	PEEK (Package/5)		Glass-filled PTFE (Package/5)		Valcon Polyimide (Package/5)	
	Prod No	Price	Prod No	Price	Prod No	Price
1/16" to 1/32"	ZRF1.5PK-5	$23.75	ZRF1.5TFG-5	$23.75	ZRF1.5V-5	$37.50

Also available in other sizes, and in CTFE and virgin polyimide.

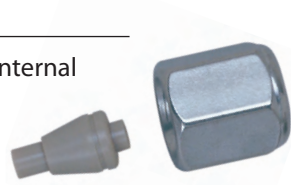
PEEK REDUCING FERRULE WITH INTERNAL NUT
(Nut sold separately.)

External reducing ferrules

Use these ferrules in external type fitting details, with nuts that have internal threads.

	PEEK (Package/5)	
	Prod No	Price
1/8" to 1/16"	EZRF21PK-5	$23.75
1/4" to 1/8"	EZRF42PK-5	31.25

Also available in other sizes, and in glass-filled PTFE, CTFE, Valcon polyimide, and virgin polyimide.



PEEK REDUCING FERRULE WITH EXTERNAL NUT
(Nut sold separately.)

Standard reducing ferrules

Use these ferrules for bulk distribution only, since the resulting connection will not be zero dead volume. These ferrules can be used in either internal or external type fitting details.

	PEEK (Package/5)		Valcon Polyimide (Package/5)	
	Prod No	Price	Prod No	Price
1/8" to 1/16"	RF21PK-5	$17.50	RF21V-5	$31.25

Also available in other sizes, and in glass-filled PTFE, CTFE, and Valcon polyimide.

TECH TIP

Fittings for **360 micron** tubing are available on pages 43-44.

TECH TIP

If you are doing resistive heating of traps or columns, our virgin polyimide reducing ferrules are effective electrical insulators.

Virgin polyimide is produced as Vespel ®.

MORE INFO

Internal reducers (IZR). . . . . page 27
Ferrule removal kits. . . . 41

For 1/16" and 1/32" reducing ferrules with smaller ODs for use with fused silica, see the FS and FSR adapters on the facing page.

CONVERSIONS

0.25 mm = .010"
0.50 mm = .020"
0.75 mm = .030"

1.0 mm = .040"
1.5 mm = .060"
2.0 mm = .080"

4.6 mm = .180"
6.0 mm = .236"
6.4 mm = .253"

7.0 mm = .275"
10.0 mm = .400"

27.0 mm = 1.08"

1/32" = 0.8 mm
1/16" = 1.6 mm
1/8" = 3.2 mm

FUSED SILICA ADAPTERS

Fused silica adapters are available in Valcon polyimide for use up to 350°C and in PEEK for lower temperature applications (up to 175°C). Valcon polyimide is a unique graphite-reinforced composite, specially prepared to maximize mechanical stability at high temperatures. Small blocks are subjected to extreme loads by a process known as hot isostatic pressing, with individual ferrules subsequently machined from these blocks. The result of this two-step process is a fused silica adapter with high temperature stability which far exceeds that of parts produced by conventional molding.

360 MICRON FITTINGS

Our PEEK or stainless 360 micron fittings provide direct connection of 360 µm tubing with no adapter required.

TEMPERATURE RATINGS

Polyimide adapters can be used at temperatures up to 350°C.

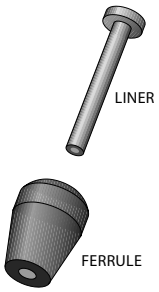
PEEK adapters are not recommended for use above 175°C.

TECH TIP

Virgin polyimide adapters are effective electrical insulators, making them the ideal choice for capillary electrophoresis.

Virgin polyimide is produced as Vespel®.

MORE INFO



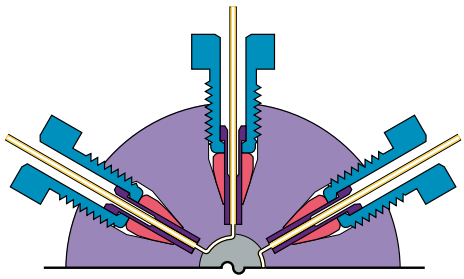
REMOVABLE FSR ADAPTER
Exploded view

Removable fused silica adapters (FSR)

The FSR adapter is the only adapter recommended for use in valves. It consists of a liner which slides over the fused silica tubing and a ferrule which makes up on the liner. The liner has an enlarged diameter at one end which is captured by the nut, so the liner and the tube within it are removed as the nut is unscrewed from the valve. The 1/16" FSR adapter includes a special counter-bored 1/16" nut.

	Valcon Polyimide (Package/5) Prod No	Price
1/16" removable adapter assembly		
0.20 ≤ 0.40 mm OD	FS1R.4-5	$90.00
0.40 ≤ 0.50 mm OD	FS1R.5-5	90.00
0.50 ≤ 0.80 mm OD	FS1R.8-5	90.00
1/16" replacement liners		
0.20 ≤ 0.40 mm OD	FS1L.4-5	$55.00
0.40 ≤ 0.50 mm OD	FS1L.5-5	55.00
0.50 ≤ 0.80 mm OD	FS1L.8-5	55.00

Also available in other sizes.



REMOVABLE FSR ADAPTERS IN A VALVE

One piece fused silica adapter (FS)

The one piece FS adapter, essentially a reducing ferrule, is recommended for use in fittings where the polyimide ferrule will not be removed. Connections are made and disconnected by loosening the fitting nut and sliding the tube out.

	Valcon Polyimide (Package/5) Prod No	Price
1/32" Adapters		
0.20 ≤ 0.25 mm OD	FS.25-5	$25.00
0.25 ≤ 0.36 mm OD	FS.36-5	25.00
0.36 ≤ 0.40 mm OD	FS.4-5	25.00
0.40 ≤ 0.50 mm OD	FS.5-5	25.00
0.50 ≤ 0.80 mm OD	ZF.5V-5	25.00
1/16" Adapters		
< 0.20 mm OD	FS1.2-5	$25.00
0.20 ≤ 0.25 mm OD	FS1.25-5	25.00
0.25 ≤ 0.30 mm OD	FS1.3-5	25.00
0.30 ≤ 0.40 mm OD	FS1.4-5	25.00
0.40 ≤ 0.50 mm OD	FS1.5-5	25.00
0.50 ≤ 0.80 mm OD	FS1.8-5	25.00
0.90 ≤ 1.0 mm OD	FS11.0-5	25.00

	PEEK (Package/5) Prod No	Price
1/32" Adapters		
0.36 ≤ 0.40 mm OD	FS.4PK-5	$25.00
0.40 ≤ 0.50 mm OD	FS.5PK-5	25.00
0.50 ≤ 0.80 mm OD	ZF.5PK-5	17.50

Also available in other sizes.

	Virgin Polyimide (Package/5) Prod No	Price
1/16" Adapters		
0.90 ≤ 1.0 mm OD	FS11.0V1-5	$47.50

Also available in other sizes.

REPLACEMENT PARTS

Ferrules	*(package of 5)*	
1/32" Polyimide	ZF.5V-5	$31.25
1/16" Polyimide	ZF1V-5	26.25
	(package of 10)	
1/16" PEEK	ZF1PK-10	$35.00
Nuts	*(package of 10)*	
1/32" SS	ZN.5-10	$32.50
Special nuts for FSRs:		
1/16" SS	ZCN1-10	32.50
1/16" SS long	LZCN1-10	

Call for a quote.

VALCO FITTINGS

Internal to external reducer/adapters

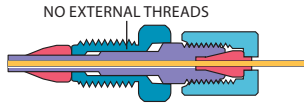
Internal fittings provide the smallest possible fitting volume. But there are situations, such as when you're using graphite ferrules which tend to become lodged in internal details, when an external fitting might be more desirable. A typical situation of that nature is the connection of a fused silica capillary to a valve. Our unique design permits the 1/32" nut to be tightened or loosened without affecting the 1/16" connection.

Note: Order 1/32" fused silica adapter ferrules separately *(see box below)*.

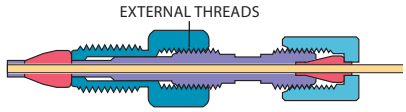
	Bore	*Prod No*	*Price*
1/16" to 1/32"	0.25 mm	IZERA1.5C	$55.00
	0.5 mm	IZERA1.5M	48.00
	1.0 mm	IZERA1.5	46.00

IZERA DESIGNS

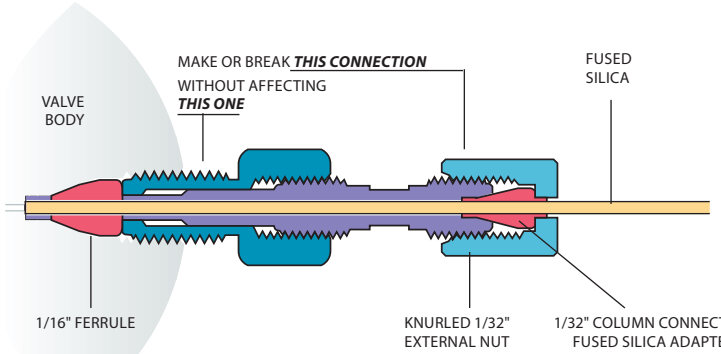
The larger bore designs have external threads on the liner, while the capillary version does not.



0.25 mm bore
(IZERA1.5C, shown in photo at left)



0.50 mm and 1.0 mm bore
(IZERA1.5M and IZERA1.5)



INTERNAL TO EXTERNAL FS ADAPTER
(IZERA1.5) shown installed in a valve

External unions

1/32" ULTRA LOW MASS

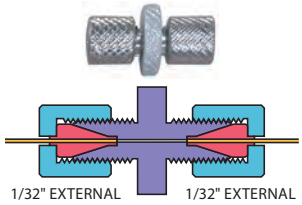
The 1/32" external union is specially designed for use with capillary columns in GC. It is very low mass and does not require wrenches to seal. Use *only* with one-piece fused silica adapters, since metal ferrules will distort the detail. Standard material is 300 series stainless.

Note: Order fused silica adapters (for ferrules) separately, *see box, below right.*

Bore	*Prod No*	*Price*
0.25 mm	EU.5	$25.00
0.50 mm	EU.5L	25.00
1/32"	EU.5T	

Call for a quote.

1/32" EXTERNAL UNION



For use with GC capillary columns (EU.5)

1/32" FUSED SILICA FERRULES

Package of 5.

Tubing OD		*Prod No*	*Price*
	≤ 0.25 mm	FS.25-5	$31.50
0.25 mm	≤ 0.36 mm	FS.36-5	31.50
0.36 mm	≤ 0.40 mm	FS.4-5	31.50
0.40 mm	≤ 0.50 mm	FS.5-5	31.50
0.50 mm	≤ 0.80 mm	ZF.5V-5	31.50

CAUTION

Polymeric ferrules are strongly recommended for 1/16" and 1/32" external details. Metal ferrules may distort the fitting.

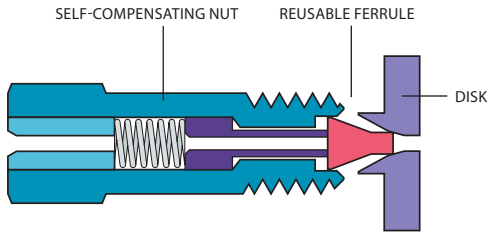
Injector nut for Agilent 6850, 6890, 7890, and 5890, Series I and II

This self-compensating nut is a direct replacement for the standard nut on the split/splitless injectors of Agilent 6890 and 5890 series GCs. This retrofit offers enhanced ferrule reusability and temperature stability, resulting in fingertight leak-free connections over the full programmed temperature range of mass spectrometry and gas chromatography.

The design of our fused silica fittings ensures stable, leak-free connections at temperatures up to 400°C, and undistorted ferrules that are easily removed and reused. Columns may be changed without the risk of the leaks which can devastate systems such as mass spectrometers or atomic emission detectors. This is accomplished with a spring-loaded self-compensating nut which provides a constant sealing force as the temperature varies.

To use this nut, the split/splitless disk must also be upgraded; the new disk will also work with older HP nuts and ferrules.

Call for a quote.

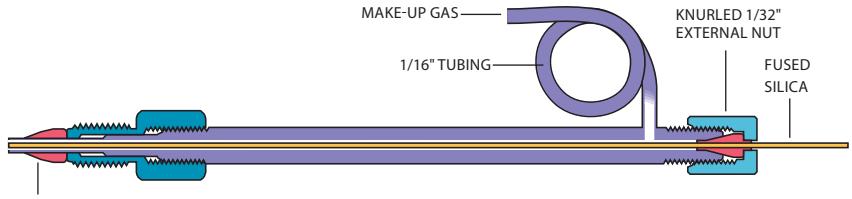


SELF-COMPENSATING NUT
for Agilent GCs

Fused silica make-up adapters

The fused silica make-up adapter connects a fused silica capillary column to a valve or detector while adding a make-up gas. In the reverse mode it works like a splitter, without the uneven or erratic split seen with basic tees. Two lengths are available. Order 1/32" fused silica adapter ferrules separately *(see box on facing page)*.

Call for a quote.



FUSED SILICA MAKE-UP ADAPTER
(FSMUA1.5)

CONVERSIONS

100 µm = .004"
150 µm = .006"

0.25 mm = .010"
0.50 mm = .020"
0.75 mm = .030"

1.0 mm = .040"
1.5 mm = .060"
2.0 mm = .080"

4.6 mm = .180"
6.0 mm = .236"
6.4 mm = .253"

7.0 mm = .275"
10.0 mm = .400"

27.0 mm = 1.08"

1/32" = 0.8 mm
1/16" = 1.6 mm
1/8" = 3.2 mm

1/4" = 6.4 mm
3/8" = 9.5 mm
1/2" = 12.7 mm

VALCO FITTINGS

UNIONS

Unions join two pieces of tubing of the same OD. Select the union with the bore that matches the ID of the tubing. If the IDs are different, choose the union with a bore which matches the smaller tube bore. Standard material is 300 series stainless steel.

- **Internal** unions have female threads and a fitting detail for zero volume fittings. The nuts have male (external) threads.
- **External** unions have male threads, requiring a nut with internal threads.
- **External/internal** unions have male threads on one end and female threads on the other, for connecting a standard zero dead volume fitting to an existing tube which already has an external nut made up on it.

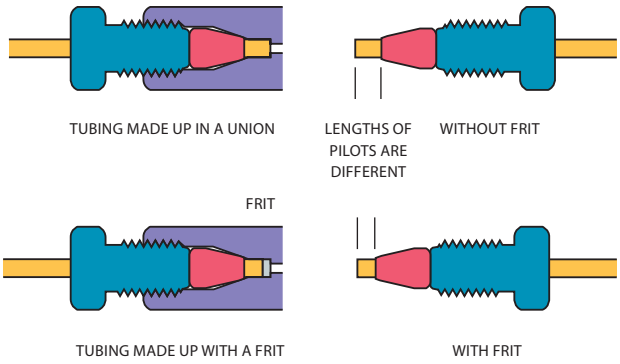
Internal fittings are almost always the best with tubing of 1/8" OD or smaller. They make a stronger connection and offer the lower volume necessary for high performance instrumentation. Also, because 1/16" external fittings have very thin, easily distorted walls, they are not as durable as 1/16" internal fittings. In sizes larger than 1/8", external fittings are generally easier to make up because of less thread friction.

Bulkhead versions can be mounted through an instrument panel or on a bracket. The fitting body is undercut so that it bites into the panel when the mounting nut is tightened, eliminating the need for a lock washer. An O-ring can be installed between the body and the panel to allow operation in purged environments. Typically the mounting nut goes inside the instrument, so that the long threaded portion will be out of sight. In the external/internal bulkhead unions, the mounting nut is on the side with the Valco internal fitting.

TECH TIP

Filtering capability can be added to a union by inserting a screen or frit into it before making up the fittings. However, when a fitting detail has a screen or frit in it, the pilot depth is reduced, so that the ferrule makes up closer to the tube end than it otherwise would. If that tube is used in any other Valco fitting, it will introduce unswept volume. Our filter design takes this into account, allowing our fittings to remain truly interchangeable.

Filters . . . . . pages 36-39
Frits and screens. 40



TECH TIP

Through-bore union installation

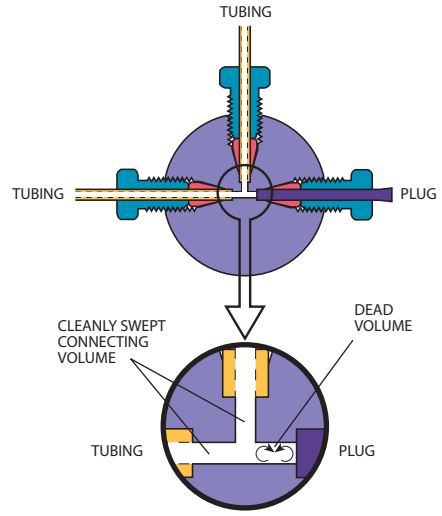
Because the tubing will pass all the way through a through-bore union, we suggest making up the first tube in a standard Valco fitting to establish the proper length of tubing extending beyond the ferrule. Install this made-up connection in the through-bore union; then the second tube can be butted against it for a zero volume connection.

MORE INFO

Reducing unions to connect two tubes with different ODs . . . . . p 24-25
Unions with 1/4-28 fittings 56

DEAD VOLUME

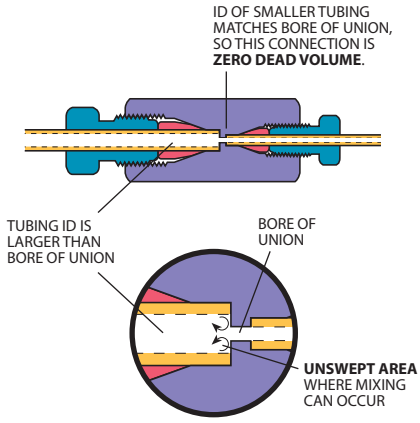
"Dead volume" is created in obvious situations such as the one shown.



1/16" Tee
(ZT1)

UNSWEPT VOLUME

Even in connections which are by most definitions "zero dead volume", unswept volume may be created where large ID transitions occur. The amount of mixing depends on the amount of mismatch in the IDs.

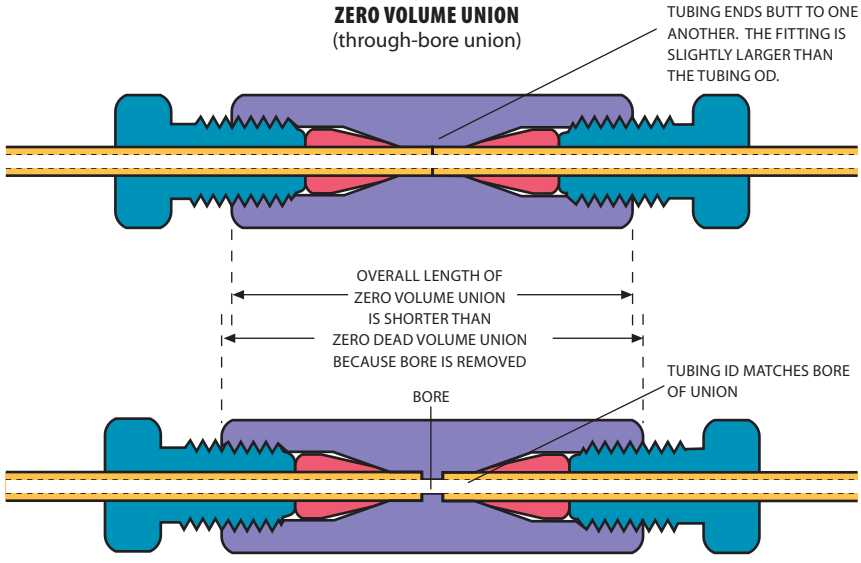


1/8" to 1/16" Reducing union
(ZRU21)

ZERO VOLUME VS. ZERO DEAD VOLUME

A true zero volume fitting is one in which no part of the fitting actually becomes a part of the flow path. The only Valco fittings which fit this description are our through-bore unions, which allow tubing to butt end-to-end. (So these are only zero volume if the tube ends are perfectly square.) All other fittings are designed with zero *dead* volume: that is, there is no volume introduced by the fitting which is not cleanly swept.

COMPARISON OF ZERO VOLUME VS. ZDV



ZERO DEAD VOLUME UNION
(capillary bore union)

CONVERSIONS

0.25 mm = .010"
0.50 mm = .020"
0.75 mm = .030"

1.0 mm = .040"
1.5 mm = .060"
2.0 mm = .080"

4.6 mm = .180"
6.0 mm = .236"
6.4 mm = .253"

7.0 mm = .275"
10.0 mm = .400"

27.0 mm = 1.08"

1/32" = 0.8 mm
1/16" = 1.6 mm
1/8" = 3.2 mm

1/4" = 6.4 mm
3/8" = 9.5 mm
1/2" = 12.7 mm

VALCO FITTINGS

Internal unions

STAINLESS STEEL

Standard material is 300 series stainless. Also available in Hastelloy C, gold-plated stainless, and titanium.

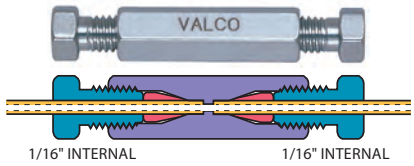
Tubing OD	*Bore*	*Prod No*	*Price*
Standard internal unions			
1/32"	0.15 mm	ZU.5XC	$34.00
	0.25 mm	ZU.5	27.00
	0.50 mm	ZU.5L	24.00
	1/32"	ZU.5T	27.00
1/16"	0.15 mm	ZU1XC	34.00
	0.25 mm	ZU1C	23.00
	0.50 mm	ZU1M	21.00
	0.75 mm	ZU1	18.00
	1.0 mm	ZU1L	18.00
	1/16"	ZU1T	18.00
1/8"	0.75 mm	ZU2	16.00
	2.0 mm	ZU2L	16.00
	1/8"	ZU2T	16.00

Call for a quote on 1/4".

Tubing OD	*Bore*	*Prod No*	*Price*	*Bulkhead panel hole diameter*
Bulkhead internal unions				
1/32"	0.25 mm	ZBU.5	$34.00	5/16"
1/16"	0.15 mm	ZBU1XC	40.00	5/16"
	0.25 mm	ZBU1C	29.00	5/16"
	0.50 mm	ZBU1M	26.00	5/16"
	0.75 mm	ZBU1	24.00	5/16"
	1.0 mm	ZBU1L	24.00	5/16"
	1/16"	ZBU1T	24.00	5/16"
1/8"	0.75 mm	ZBU2	22.00	7/16"
	2.0 mm	ZBU2L	22.00	7/16"

Call for a quote on 1/4" and other bore options for 1/32".

INTERNAL UNION



Standard bore – ends of tubing seat squarely at bottoms of fitting details (ZU1)

Bulkhead internal union – metal (ZBU1)

TECH TIP

Through-bore union installation

A through-bore union is indicated by "T" at the end of the product number.

Because the tubing will pass all the way through a through-bore union, we suggest making up the first tube in a standard Valco fitting to establish the proper length of tubing extending beyond the ferrule. Install this made-up connection in the through-bore union; then the second tube can be butted against it for a zero volume connection.

TECH TIP

1/16", 1/8", and 1/4" external Valco fitting components are compatible with Parker and Swagelok fittings.

MORE INFO

360 µm unions 43-44
Internal unions, high pressure PEEK 51

CONVERSIONS

0.25 mm = .010"
0.50 mm = .020"
0.75 mm = .030"

1.0 mm = .040"
1.5 mm = .060"
2.0 mm = .080"

4.6 mm = .180"
6.0 mm = .236"
6.4 mm = .253"

7.0 mm = .275"
10.0 mm = .400"

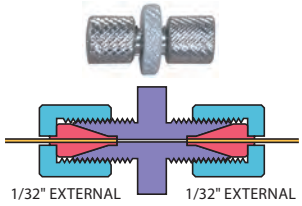
27.0 mm = 1.08"

1/32" = 0.8 mm
1/16" = 1.6 mm
1/8" = 3.2 mm

1/4" = 6.4 mm
3/8" = 9.5 mm
1/2" = 12.7 mm

External unions — 1/32" ULTRA LOW MASS

1/32" EXTERNAL UNION



For use with GC capillary columns
(EU.5)

The 1/32" external union is specially designed for use with capillary columns in GC. It is very low mass and does not require wrenches to seal. Use *only* with one-piece fused silica adapters, since metal ferrules will distort the detail. Standard material is 300 series stainless.

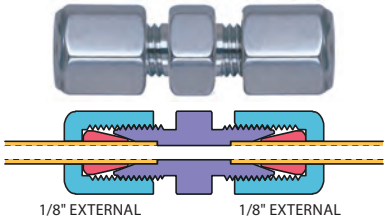
Note: Order fused silica adapters (for ferrules) separately, *page 17*.

Bore	*Prod No*	*Price*
0.25 mm	EU.5	$25.00
0.50 mm	EU.5L	25.00
1/32"	EU.5T	

Call for a quote.

External unions

EXTERNAL UNION



Standard bore
(EU2L)

Bulkhead external union
(EBU2L)

Standard material is 300 series stainless. Also available in Hastelloy C and gold-plated stainless.

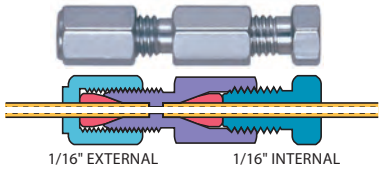
Note: Because 1/16" external fittings have very thin, easily distorted walls, they are not as durable as 1/16" internal fittings. We recommend the use of external/internal unions *(below)* when connecting to an installed external nut.

		Standard		Bulkhead		*Bulkhead panel hole diameter*
Tubing OD	*Bore*	*Prod No*	*Price*	*Prod No*	*Price*	
1/8"	2.0 mm	EU2L		EBU2L	$22.00	5/16"

Call for a quote. Also available in other bore sizes and 1/4".

External/internal unions

EXTERNAL/INTERNAL UNION



Standard bore – adapts existing external fittings to Valco zero volume internal fittings
(EZU1)

Bulkhead external/internal union
(EZBU1)

Standard material is 300 series stainless. Also available in Hastelloy C and gold-plated stainless.

		Standard		Bulkhead		*Bulkhead panel hole diameter*
Tubing OD	*Bore*	*Prod No*	*Price*	*Prod No*	*Price*	
1/16"	0.25 mm	EZU1C	$29.00	EZBU1C	$35.00	5/16"
	0.50 mm	EZU1M	29.00	EZBU1M	35.00	5/16"
	0.75 mm	EZU1	22.00	EZBU1	27.00	5/16"
	1/16"	EZU1T	22.00	EZBU1T		5/16"

Call for a quote. Also available in 1/32" and 1/8".

REDUCING UNIONS

Reducing unions join two tubes of different outside diameters. Standard material is 300 series stainless.

- **Internal reducing unions** have female threads and a fitting detail for zero volume fittings. The nuts have male (external) threads.
- **External reducing unions** have male threads, requiring a nut with internal threads.
- **External/internal** and **internal/external reducing unions** have male threads on one end and female threads on the other. We recommend the use of external/internal fittings when connecting to an existing external nut.

With tubing of 1/8" OD or smaller, internal fittings are almost always the better choice. They make a stronger connection and offer the lower volume necessary for high performance instrumentation. Also, because 1/16" external fittings have very thin, easily distorted walls, they are not as durable as 1/16" internal fittings. In sizes larger than 1/8", external fittings are generally easier to make up because of less thread friction.

Bulkhead versions can be mounted through an instrument panel or on a bracket. The fitting body is undercut so that it bites into the panel when the mounting nut is tightened, eliminating the need for a lock washer. An O-ring can be installed between the body and the panel to allow operation in purged environments. Typically the mounting nut goes inside the instrument, so that the long threaded portion will be out of sight. In the external/internal bulkhead unions, the mounting nut is on the side with the Valco internal fitting.

Internal reducing unions

These unions connect two sizes of tubing, using zero dead volume internal fittings on each end. In the bulkhead version, the bulkhead nut is on the side with smaller tubing.

Standard material is 300 series stainless. Also available in Hastelloy C, gold-plated stainless, and titanium.

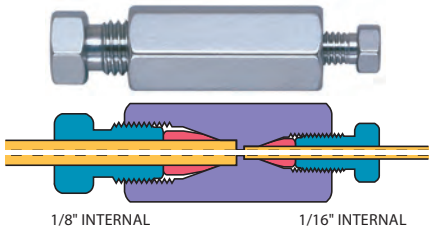
Tubing OD	*Bore*	*Prod No*	*Price*
Standard internal reducing unions			
1/16" to 1/32"	0.15 mm	ZRU1.5XC	$40.00
	0.25 mm	ZRU1.5	28.00
	0.50 mm	ZRU1.5L	28.00
	1/32"	ZRU1.5T	27.00
1/8" to 1/16"	0.25 mm	ZRU21C	23.00
	0.75 mm	ZRU21	17.00
	1/16"	ZRU21T	17.00
1/4" to 1/16"	1/16"	ZRU41T	18.00

Call for a quote on other sizes.

Tubing OD	*Bore*	*Prod No*	*Price*	*Bulkhead panel hole diameter*
Bulkhead internal reducing unions				
1/16" to 1/32"	0.25 mm	ZBRU1.5	$34.00	5/16"
1/8" to 1/16"	0.75 mm	ZBRU21	23.00	5/16"
	1/16"	ZBRU21T	23.00	5/16"
1/4" to 1/8"	2.0 mm	ZBRU42L	24.00	7/16"

Call for a quote on other sizes.

INTERNAL REDUCING UNION



Standard bore (ZRU21)

Bulkhead internal reducing union – metal (ZBRU21)

CONVERSIONS

0.25 mm	= .010"		1/32"	= 0.8 mm	
0.50 mm	= .020"		1/16"	= 1.6 mm	
0.75 mm	= .030"		1/8"	= 3.2 mm	
1.0 mm	= .040"		1/4"	= 6.4 mm	
1.5 mm	= .060"		3/8"	= 9.5 mm	
2.0 mm	= .080"		1/2"	= 12.7 mm	
4.6 mm	= .180"		5/16"	= .312" = 7.9 mm	
6.0 mm	= .236"		3/8"	= .375" = 9.5 mm	
6.4 mm	= .253"		7/16"	= .437" = 11.1 mm	
7.0 mm	= .275"				
10.0 mm	= .400"				
27.0 mm	= 1.08"				

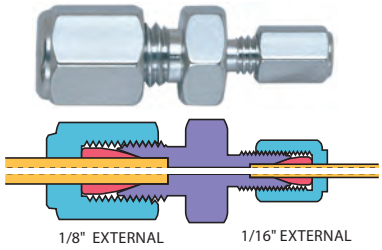
TECH TIP

1/16", 1/8", and 1/4" external Valco fitting components are compatible with Parker and Swagelok fittings.

MORE INFO

Internal reducing unions, high pressure PEEK . . . . . page 51
Standard unions 22
Unions with 1/4-28 fittings 56

EXTERNAL REDUCING UNION



Standard bore (ERU21)

External reducing unions

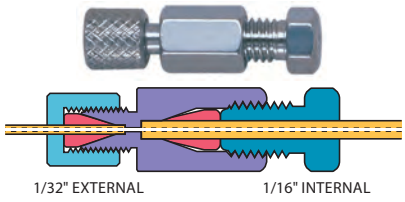
These unions connect two sizes of tubing, using external fittings on each end. Standard material is 300 series stainless. Custom bulkhead versions are available in OEM quantities.

Note: Because 1/16" external fittings have very thin, easily distorted walls, they are not as durable as 1/16" internal fittings. We recommend the use of 1/16" internal fittings when possible.

Tubing OD	*Bore*	*Prod No*	*Price*
Standard external reducing unions			
1/8" to 1/16"	0.75 mm	ERU21	$22.00
	1/16"	ERU21T	22.00

Call for a quote on other sizes, bores, and bulkhead versions.

INTERNAL/EXTERNAL REDUCING UNION



Standard bore (EZRU.51)

Bulkhead internal/external reducing union (EZBRU.51)

Internal/external reducing unions

These reducing unions are the opposite of the ones above. The larger size tubing is made up with an internal fitting and the smaller size tubing is made up with an external fitting. In the bulkhead version, the bulkhead nut is on the side with the internal fitting. Standard material is 300 series stainless.

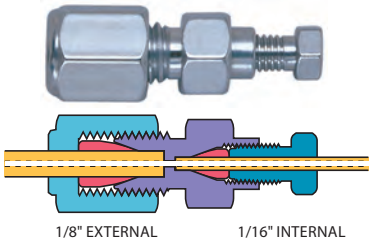
Internal/external reducing unions are typically used to connect 1/16" stainless steel tubing to fused silica tubing.

These unions include a stainless steel ferrule for the 1/16" SS tube, but because of the variety of fused silica ODs and corresponding ferrules, a 1/32" fused silica adapter must be ordered separately. *(See page 17.)* Only polymeric or soft metal ferrules should be used with 1/32" external details.

		Standard		**Bulkhead**		*Bulkhead panel hole diameter*
Tubing OD	*Bore*	*Prod No*	*Price*	*Prod No*	*Price*	
1/16" to 1/32"	0.25 mm	EZRU.51	$31.00	EZBRU.51	$37.00	5/16"

Call for a quote on other bores.

EXTERNAL/INTERNAL REDUCING UNION



Standard bore (EZRU21)

Bulkhead external/internal reducing union (EZBRU21)

External/internal reducing unions

In these reducing unions, the larger size tubing is made up with an external fitting and the smaller size tubing is made up with an internal fitting. In the bulkhead version, the bulkhead nut is on the side with the internal fitting. Other configurations, such as an external nut on the locking nut side, are available on special request.

Standard material is 300 series stainless. Also available in Hastelloy C, gold-plated stainless, and titanium.

		Standard		**Bulkhead**		*Bulkhead panel hole diameter*
Tubing OD	*Bore*	*Prod No*	*Price*	*Prod No*	*Price*	
1/8" to 1/16"	0.75 mm	EZRU21	$21.00	EZBRU21	$26.00	5/16"
	1/16"	EZRU21T		EZBRU21T	26.00	5/16"
1/4" to 1/16"	0.75 mm	EZRU41	22.00	EZBRU41		7/16"

Call for a quote. Call for a quote on other sizes and bores.

VALCO FITTINGS

Tees

Tees connect three lines. Standard material is 300 series stainless, except for 0.15mm bore which comes standard in 316 stainless. Also available in Hastelloy C, gold plated stainless, and titanium. Mounting holes are standard in 1/8" models, and optional in others. Call for more information.

Tubing OD	*Bore*	*Prod No*	*Price*
1/32"	0.25 mm	ZT.5	$37.00
1/16"	0.15 mm	ZT1XCS6	40.00
	0.25 mm	ZT1C	34.00
	0.50 mm	ZT1M	29.00
	0.75 mm	ZT1	24.00
	1.00 mm	ZT1L	24.00
1/8"	0.75 mm	ZT2	25.00
	2.00 mm	ZT2L	25.00

Call for a quote on 1/4" and other bore options for 1/32".

Crosses

Crosses connect four lines. Standard material is 300 series stainless, except for 0.15mm bore which comes standard in 316 stainless. Also available in Hastelloy C, gold plated stainless, and titanium. Call for information about versions with mounting holes.

Tubing OD	*Bore*	*Prod No*	*Price*
1/16"	0.15 mm	ZX1XCS6	$55.00
	0.25 mm	ZX1C	48.00
	0.50 mm	ZX1M	42.00
	0.75 mm	ZX1	37.00
	1.00 mm	ZX1L	37.00

Call for a quote on 1/32", 1/8", and 1/4".

Manifolds

1/16" manifolds connect 4 - 16 inlet lines to a single outlet. The unique angled entry of our design minimizes dispersion. Standard materials are PEEK or Nitronic 60.

1/8" manifolds connect 4 - 12 inlet lines to a single outlet. Standard material is 300 series stainless steel.

Call for a quote.

SURFACE MOUNTING TEES AND CROSSES

1/8" tees and crosses have two threaded mounting holes (8-32).

To mount 1/32" and 1/16" tees and crosses, order mounting kit below.
Mounting kit includes:
- Standard bracket SABB
- Clamp ring CR4
- Screws and nuts

Mounting kit . . . . DVBRKIT

Some configurations are available with two through holes. Consult factory.

TECH TIP

To join tubes of different ODs, use the fitting sized for the largest tube along with IZR reducers for the smaller tubes.

IZR reducer. . . . . page 27

TECH TIP

A manifold used with an SD flowpath multi-position valve allows HPLC column selection with a single valve.
See page 121 for an illustration.

SD UW valves. . . page 114

SEE ALSO

PEEK tees. . . . . page 51
PEEK crosses 51

Internal reducers FOR 360 µm TUBING

Directly connect 360 µm tubing into a 1/16" or 1/32" Valco valve or fitting detail, providing a positive leak-free seal with zero dead volume. These are the same design as our larger internal reducers shown below. All versions have a stainless steel body, with 360 µm nut/ferrule materials as indicated.

Tubing OD	*For use with*	*Nut/ferrule material*	*Prod No*	*Price*
1/32" to 360 µm	Metal tubing	Stainless/stainless	C360IZR.5TS6	$42.00
	PEEK tubing	PEEK/glass-filled PEEK	C360IZR.5TS6PK	49.00
	Fused silica	SS/gold-plated nickel	C360IZR.5TS6FS	48.00
1/16" to 360 µm	Metal tubing	Stainless/stainless	C360IZR1S6	49.00
	PEEK tubing	PEEK/glass-filled PEEK	C360IZR1S6PK	49.00
	Fused silica	SS/aluminum	C360IZR1S6AL	52.00
		SS/gold-plated nickel	C360IZR1S6FS	52.00

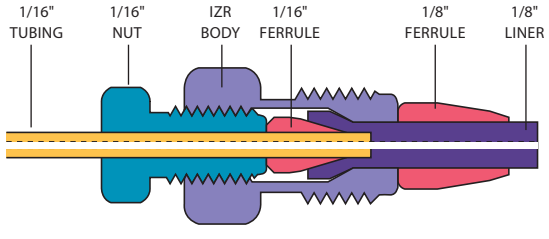
Internal reducers FOR 1/32" THROUGH 1/4" TUBING

Valco's internal reducer (IZR) allows smaller tubing to be used in valves with fitting details for larger tubing, forming a positive leak-free seal with zero dead volume. The small line from your system goes directly into the IZR and the sample goes directly into the valve, without the short pieces of connecting tubing required if a reducing union was used instead. (A reducing ferrule would also work, but makes a seal of less integrity.) Once the fitting is installed, only one wrench is required to remove and reinstall it.

A second version has a 2 micron stainless steel frit pressed into the end of the liner, adding filtering capability. However, we suggest using these only as a final or backup filter, with a standard filter (*see page 38*) as the primary filter. Because IZRs have a much smaller surface area than the standard filter, they tend to plug too often if used in a stand-alone capacity.

Tubing OD	*Bore*	*Prod No*	*Price*
Without frit			
1/16" to 1/32"	0.25 mm	IZR1.5	$23.00
	0.50 mm	IZR1.5L	21.00
	1/32"	IZR1.5T	21.00
1/8" to 1/16"	0.25 mm	IZR21C	16.00
	0.50 mm	IZR21	14.00
	1.00 mm	IZR21L	14.00
	1/16"	IZR21T	14.00
With 2µ frit			
1/8" to 1/16"	1.00 mm	IZR21LF	20.00

Call for a quote on 1/4" reducers and other versions with 2µ frit.



VALCO'S UNIQUE INTERNAL REDUCER
(IZR21)

IZR LINER WITH PRESSED-IN FRIT

360 MICRON FITTINGS

See our extensive line of 360 µm fittings . . . . . pages 43-44

CONVERSIONS

0.25 mm = .010"
0.50 mm = .020"
0.75 mm = .030"

1.0 mm = .040"
1.5 mm = .060"
2.0 mm = .080"

4.6 mm = .180"
6.0 mm = .236"
6.4 mm = .253"

7.0 mm = .275"
10.0 mm = .400"

27.0 mm = 1.08"

1/32" = 0.8 mm
1/16" = 1.6 mm
1/8" = 3.2 mm

1/4" = 6.4 mm
3/8" = 9.5 mm
1/2" = 12.7 mm

VALCO FITTINGS

Male pipe to Valco internal adapters

Male pipe adapters make a minimum volume connection from the female pipe fittings on pressure gauges and regulators to Valco zero dead volume internal fittings. Standard material is 300 series stainless. Also available in Hastelloy C and titanium.

NPT male	*ZDV fitting*	*Bore*	*Prod No*	*Price*
1/8"	1/16"	1.0 mm	PZA21	$15.00
		1/16"	PZA21T	15.00
	1/8"	1.0 mm	PZA22	15.00
1/4"	1/16"	1.0 mm	PZA41	15.00
	1/8"	2.0 mm	PZA42L	15.00

Call for a quote on other sizes.

Female pipe to Valco internal adapters

Female pipe adapters make a minimum volume connection from the male pipe fittings typically found in gas distribution plumbing to Valco zero dead volume internal fittings. Standard material is 300 series stainless. Also available in Hastelloy C and titanium.

NPT female	*ZDV fitting*	*Bore*	*Prod No*	*Price*
1/8"	1/16"	1.0 mm	FPZA21	$34.00
1/4"	1/8"	2.0 mm	FPZA42L	18.00

Pipe to Valco external adapters

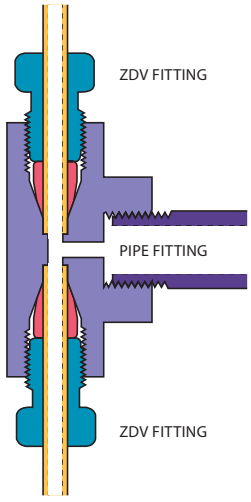
Pipe adapters make a minimum volume connection from pipe fittings to Valco external fittings. Available for both female and male connectors. Standard material is 300 series stainless.

Call for a quote.

Manifold pipe adapters

These manifolds, which go from one or two pipe fittings to three or more Valco zero dead volume fittings, minimize the number of connections between a regulator and the various carrier gas lines in a chromatographic system. The models with two pipe fittings go a step further, allowing the support of a gauge, a second regulator, or a valve leading to a separate system. Additional Valco zero dead volume fittings can be machined on a special order basis. Standard material is 300 series stainless. Also available in Hastelloy C and titanium by special order.

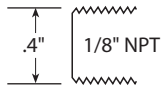
Call for a quote.



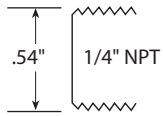
MANIFOLD PIPE ADAPTER
One pipe fitting to Valco ZDV fittings

TECH TIP

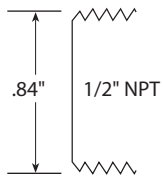
NPT, National Pipe Thread, is a standard developed a long time ago by people without rulers. 1/8" NPT is nowhere close to 1/8"! Measure the diameter of the fitting across the narrow end. You can also count the number of threads in a 1" section. Then look at the diagrams below to determine the correct size needed.



27 threads per inch



18 threads per inch



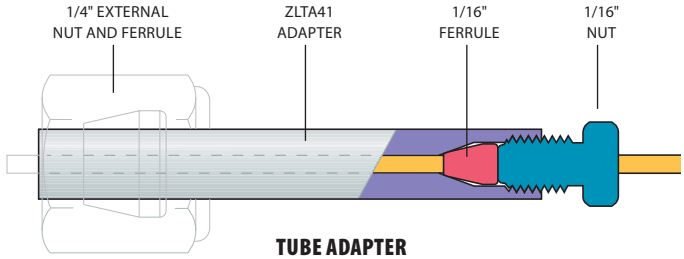
14 threads per inch

Tube adapters

These external adapters are ideal for connecting 1/16" tubing to a detector or injector with a 1/4" fitting. The shorter size is used with 1/4" external fittings while the longer works with 1/4" internal or external fittings. (1/16" nut and ferrule are included; 1/4" nut and ferrule are not.) Standard material is 300 series stainless.

	Length	*Bore*	*Prod No*	*Price*
1/4" to 1/16"	0.7"	1/16"	ZTA41	$13.00
	1.8"	1/16"	ZLTA41	15.00
	2.8"	1/16"	ZXLTA41	

Call for a quote.



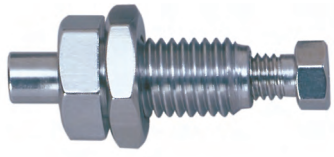
TUBE ADAPTER
(ZLTA41)

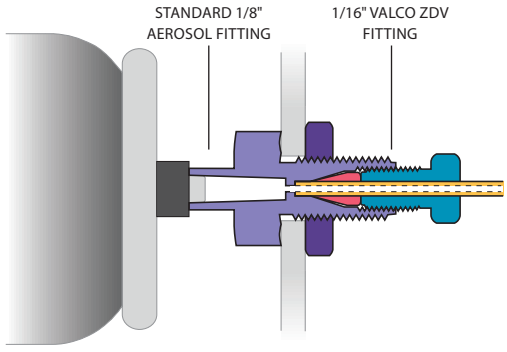
Aerosol adapter bulkhead union

This unique fitting provides an easy, direct method of connecting the nozzle of a standard aerosol can to a 1/16" Valco zero dead volume fitting.

As with all Valco bulkhead fittings, the flange is undercut to act as a "lock nut" against the instrument wall. Standard material is 300 series stainless.

Call for a quote.





AEROSOL ADAPTER BULKHEAD UNION
(ZBAA1)

CONVERSIONS

0.25 mm = .010"
0.50 mm = .020"
0.75 mm = .030"

1.0 mm = .040"
1.5 mm = .060"
2.0 mm = .080"

4.6 mm = .180"
6.0 mm = .236"
6.4 mm = .253"

7.0 mm = .275"
10.0 mm = .400"

27.0 mm = 1.08"

1/32" = 0.8 mm
1/16" = 1.6 mm
1/8" = 3.2 mm

1/4" = 6.4 mm
3/8" = 9.5 mm
1/2" = 12.7 mm

VALCO FITTINGS

Fill ports

FOR VALCO AND METAL CHEMINERT VALVES

Fill ports provide direct syringe connections to valves and fittings, with the polymeric ferrule compressing a liner to seal around the needle. These fill ports are for use with metal valves.

	Prod No	*Price*	
For use with blunt tip needle			
For 1/16" fittings and injectors - 22 ga	VISF-1	$9.50	
For use with 2" 22 gauge blunt tip needle			
For 1/16" fittings and injectors	VISF-2	16.00	
Replacement liners and ferrules			
Liner for VISF-1	VISL-1	2.75	
Liner for VISF-2 or VISF-A	VISL-2	2.75	
Ferrule for VISF-1 or VISF-2	ZF1VISF	4.75	

Call for a quote on 1/32" and 1/8" fill ports.

Fill ports

FOR 1/16" POLYMERIC CHEMINERT VALVES

These fill ports provide direct syringe connections to polymeric valves and fittings. Since the fitting detail in the high pressure Cheminert valve is unique, be sure to order the high pressure version for polymeric HPLC injectors. For use with 22 gauge blunt tip needle.

	Prod No	*Price*	
For high pressure injectors (C2, C3, C4, and C52 series injectors)	C-VISF-1H	Call for a quote.	
For fittings and low pressure injectors (C22Z and C62Z series injectors)	C-VISF-1	$12.00	
Replacement liners and ferrules			
Liner for C-VISF-1	VISL-1	2.75	
Liner for C-VISF-1H	VISL-1H	Call for a quote.	
Ferrule for C-VISF-1 (or 1H)	ZF1VISF	4.75	

Call for a quote.

Zero dead volume fill ports

The ZVISF-1 is a unique fill port fitting designed so that a leaktight seal is formed against the face of the bottom of the fitting detail instead of at the end of an angular ferrule, resulting in a true zero dead volume connection with no carry over or sample loss. The polymer bushing snaps into the knurled PEEK nut, providing the convenience of a one-piece fitting. An ultrathin metal sleeve surrounds and supports the portion of the bushing which extends into the pilot of the fitting detail, preventing the bushing from mushrooming and getting stuck in the pilot as the fitting is tightened.

For use with 22 gauge blunt tip needle.

Call for a quote.

MORE INFO

Cheminert valves

Model C2 . . . . . 140, 144
Model C4 . . . . . 141, 145

CONVERSIONS

0.25 mm = .010"
0.50 mm = .020"
0.75 mm = .030"

1.0 mm = .040"
1.5 mm = .060"
2.0 mm = .080"

4.6 mm = .180"
6.0 mm = .236"
6.4 mm = .253"

7.0 mm = .275"
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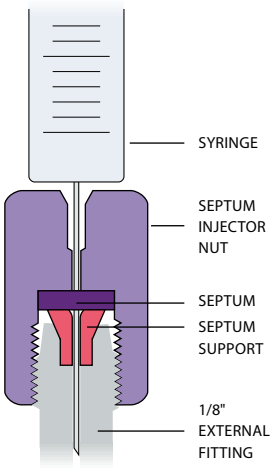
1/32" = 0.8 mm
1/16" = 1.6 mm
1/8" = 3.2 mm

1/4" = 6.4 mm
3/8" = 9.5 mm
1/2" = 12.7 mm



SEPTUM INJECTOR NUT
with septum and support (EN2SI)

Septum injector nuts

Septum injector nuts are a simple way to provide syringe access to any point of a gas or liquid system. The injector nut includes a Valcon T polyimide septum support which accepts a standard 1/4" GC septum. The nut's 1/8" external fitting detail can connect directly to common external type fittings, or can be adapted to Valco internal fittings using an external/internal union or reducing union. The thread is 5/16-20 which is a standard external thread.

		Prod No	*Price*
Septum injector nut with support		EN2SI	$23.00
Replacement support		ZF2SI	6.25
Septum, low bleed, pkg. of 10		SI4G	18.00

Female luer adapters

Female luer adapters provide direct syringe connections to zero dead volume fittings and valves.

	Fitting	*Prod No*	*Price*
Female luer to:	1/32"	ZLA-.5	Call for a quote.
	1/16"	ZLA-1	$15.00
	1/8"	ZLA-2	30.00

Call for a quote.

Loop fill port assembly

FOR CHEMINERT VALVES

The loop fill port assembly, for use with Cheminert HPLC and UHPLC valves, permits sample loading and manual injection from the front of the valve. It includes an aluminum bracket, two syringe fill ports (for 3/4" or 2" needles), a bulkhead union, and two pieces of stainless tubing: one piece is 0.013" ID with a volume of 7 µl, and the other is 0.50 mm ID and 17 µl.

Call for a quote.

VALCO FITTINGS

HPLC COLUMN END FITTINGS

Although our column end fittings look like ordinary reducing unions, they are machined with a conical recess to match a specific column ID so that there are no abrupt or irregular diameter changes which can cause loss of theoretical plates. *(See illustrations, below.)* This optimization results in an assortment of column end fittings for each column OD. To receive full benefit of this design, use column end fittings only with the specific column ID for which they are intended. We can design special fittings for unusual sizes or OEM use.

If a temporary frit is used during column packing, the frit OD should match the column OD. Permanent frits should have an OD matched to the column ID, and should be pressed in to give the lowest dead volume. Our frits are available in a variety of pore sizes, and we offer titanium and Hastelloy C frits for systems sensitive to exposed stainless steel.

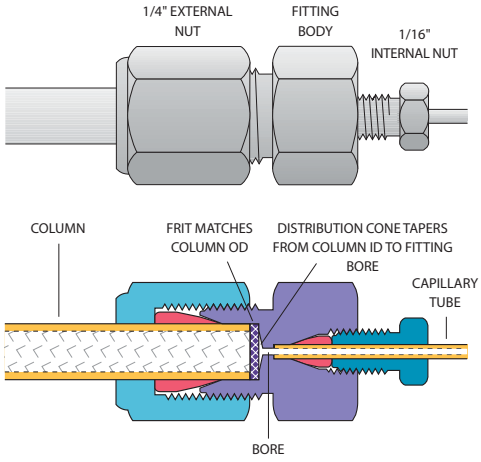
All column end fittings are rated to 10,000 psi. However, the functional limit is dictated by the yield strength of the tubing used with the fitting.

Standard 1/4", 3/8", and 1/2" columns are usually packed at 8,000 -10,000 psi, which is right at the yield strength for the tubing commonly used. Columns with 1" ID have a yield strength of 6,000 - 8,000 psi, and the fitting will not hold if the system pressure exceeds that limit.

Our all-PEEK Nanovolume® column end fittings *(page 47)* feature fingertight zero dead volume connections with 100 or 150 micron bore. PEEK sleeves permit use with any fused silica tubing.

EXTERNAL COLUMN END FITTING

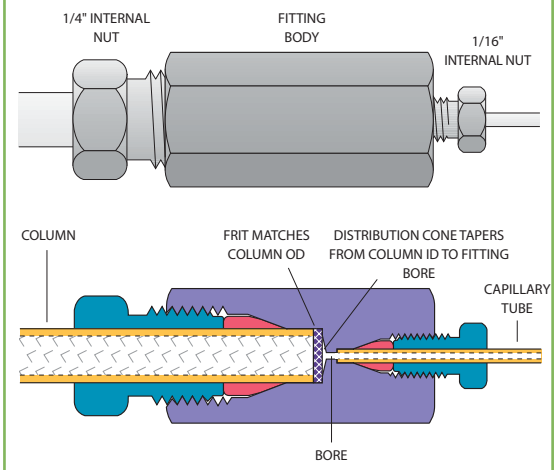
1/4" to 1/16", 4.6 mm column ID, with removable frit



(ECEF414.6F)

INTERNAL COLUMN END FITTING

1/4" to 1/16", 4.6 mm column ID, with removable frit



(CEF414.6F)

TECH TIP

Standard column end fittings are Type 316 stainless, but since the column wall and frit form over 99% of the column surface area, standard fittings with titanium frits can generally be used on inert columns.

TECH TIP

When packing columns, use Valco "through-type" unions to couple the column to the packing reservoir.

Size	*Prod No*
1/16" union	ZU1T
1/8" union	ZU2T
1/4" union	ZU4T

Through-type unions for packing columns..... page 22

CONVERSIONS

100 µm = .004"
150 µm = .006"

0.25 mm = .010"
0.50 mm = .020"
0.75 mm = .030"

1.0 mm = .040"
1.5 mm = .060"
2.0 mm = .080"

4.6 mm = .180"
6.0 mm = .236"
6.4 mm = .253"

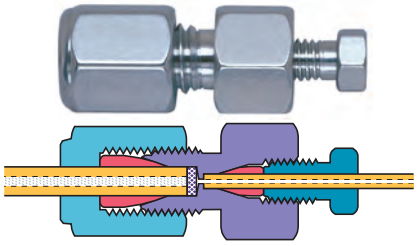
7.0 mm = .275"
10.0 mm = .400"

27.0 mm = 1.08"

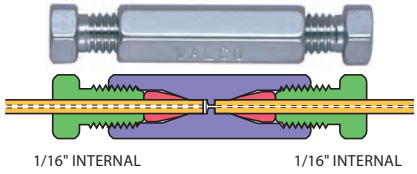
1/32" = 0.8 mm
1/16" = 1.6 mm
1/8" = 3.2 mm

1/4" = 6.4 mm
3/8" = 9.5 mm
1/2" = 12.7 mm

MICROBORE COLUMN END FITTINGS

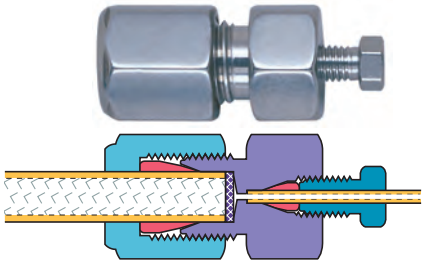


External (ECEF211.0)



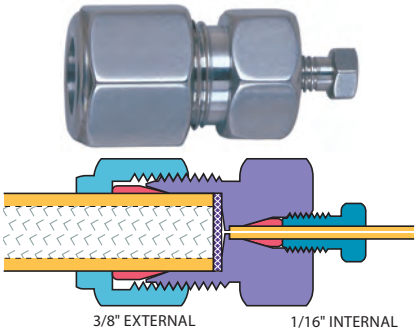
Internal (CEF1)

ANALYTICAL COLUMN END FITTINGS



External with removable frit (ECEF414.6F)

SEMI-PREP AND PREP COLUMN END FITTINGS



External (ECEF617.0)

NANOBORE COLUMN END FITTINGS
100 µm and 150 µm bore CEF's . . . . . .page 47
MORE INFO Replacement frits 34

Microbore column end fittings (1.0 mm – 2.0 mm COLUMN ID)

Standard material is Type 316 stainless.

				Without frit	
	Bore	*Column ID*		*Prod No*	*Price*
External column end fittings					
1/16" to	1/16"	0.25 mm	1.0 mm	ECEF111.0	$18.00
1/8" to	1/16"	0.25 mm	1.0 mm	ECEF211.0	17.00
Internal column end fittings					
1/16" to	1/32"	0.25 mm	1.0 mm	CEF1.5	
	1/16"			CEF1	18.00
1/8" to	1/32"	0.25 mm	1.0 mm	CEF2.51.0	
	1/16"	0.25 mm	1.0 mm	CEF211.0	34.00
			2.0 mm	CEF212.0	34.00

Call for a quote. Also available with removable 2µ frit.

Analytical column end fittings (2.0 mm – 4.6 mm COLUMN ID)

Standard material is Type 316 stainless.

				Without frit		Removable 2µ frit	
	Bore	*Column ID*		*Prod No*	*Price*	*Prod No*	*Price*
External column end fittings							
1/4" to	1/16"	0.4 mm	2.1 mm	ECEF412.1	$17.00	ECEF412.1F	$18.00
			4.6 mm	ECEF414.6	17.00	ECEF414.6F	18.00

Call for a quote on other column IDs. Also available with internal fittings.

Semi-preparative and preparative column end fittings

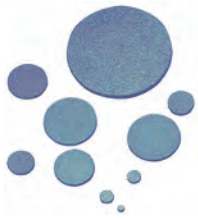
Standard material is Type 316 stainless.

				Without frit		Removable 2µ frit	
	Bore	*Column ID*		*Prod No*	*Price*	*Prod No*	*Price*
External column end fittings							
3/8" to	1/16"	0.40 mm	7.0 mm	ECEF617.0	$25.00	ECEF617.0F	
1/2" to	1/16"	0.75 mm	10.0 mm	ECEF8110.0	27.00	ECEF8110.0F	$29.00

Call for a quote on other column IDs and sizes.

VALCO FITTINGS

Replacement frits for column end fittings

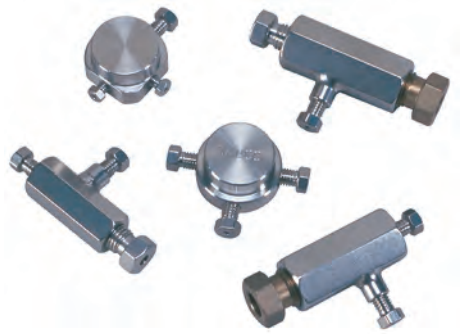


1/16", 1/8" and 1/4" frits are sold in packages of 10.
3/8", 1/2", and 1" frits are sold individually.
Other sizes may be available or special-ordered in OEM quantities.

			Stainless steel		Hastelloy C	
	Pore Size	*Frit thickness*	*Prod No*	*Price*	*Prod No*	*Price*
Package of 10:						
1/16" frits	0.5µ	0.75 mm	.5FR1-10	$13.50	.5FR1HC-10	
	2µ	0.75 mm	2FR1-10	13.50	2FR1HC-10	
1/8" frits	0.5µ	1.00 mm	.5FR2-10	13.50	–	–
	2µ	1.00 mm	2FR2-10	13.50	2FR2HC-10	$25.00
1/4" frits	0.5µ	1.00 mm	.5FR4-10	13.50	–	–
	2µ	1.00 mm	2FR4-10	13.50	2FR4HC-10	
Each:						
3/8" frits	2µ	1.00 mm	2FR6	$1.50	2FR6HC	
1/2" frits	2µ	1.00 mm	2FR8	2.00	2FR8HC	
1" frits	2µ	1.50 mm	2FR1K	2.50	2FR1KHC	

Call for a quote. Also available in pore size of 10µ and in Titanium.

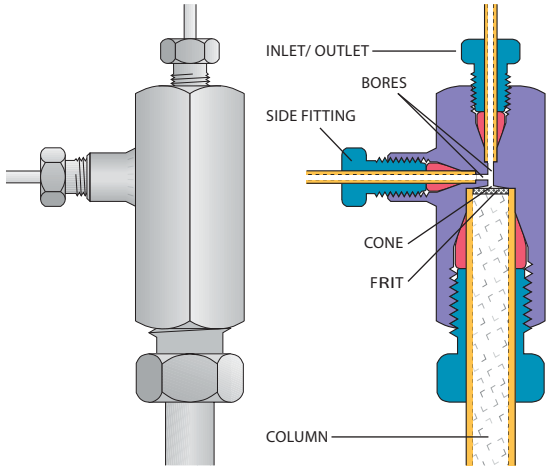
Post-column reaction tee fitting



The tee column end fitting (TCEF) has a third connection perpendicular to the normal flowpath. The TCEF permits post-column derivation, or may be used as a curtain flow column inlet fitting. Standard material is Type 316 stainless.

Column OD	*Cone OD*	*Inlet/outlet OD*	*Bore*	*Side OD*	*Bore*	*Prod No*	*Price*
1/16"	1.0 mm	1/32"	0.25 mm	1/32"	0.25 mm	TCEF1.5.5C	
			0.90 mm			TCEF1.5.5T	
		1/16"	0.25 mm	1/16"	0.25 mm	TCEF111	
1/8"	1.0 mm	1/16"	0.50 mm	1/16"	0.50 mm	TCEF211	
			1.65 mm		0.40 mm	TCEF211T	
1/4"	4.6 mm	1/16"	0.25 mm	1/16"	0.25 mm	TCEF411C	
			0.75 mm		0.75 mm	TCEF411	
			1.65 mm			TCEF411T	
		1/8"	0.75 mm	1/16"	0.75 mm	TCEF421	
3/8"	6.0 mm	1/16"	0.75 mm	1/16"	0.75 mm	TCEF611	
			1.65 mm			TCEF611T	
1/2"	9.0 mm	1/16"	0.75 mm	1/16"	0.75 mm	TCEF811	
			1.65 mm			TCEF811T	

Call for a quote.

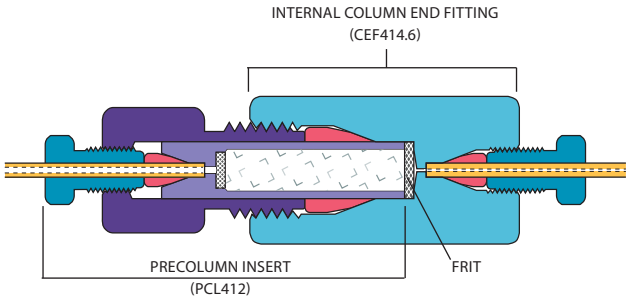


POST-COLUMN REACTION FITTING
(TCEF411)

Precolumns (guard columns)

Precolumns are available in 2 cm and 5 cm lengths, and can be filled with either 5µ packing or 37 - 44µ pellicular packing. Both lengths are used in conjunction with a column end fitting. When packed for high efficiency they can be used as analytical columns, but a more typical use is as a guard column installed between the injector and the analytical column. Standard material is Type 316 stainless.

Call for a quote on 1/4" x 2 cm or 1/4" x 5 cm systems.



1/4" X 2 CM PRECOLUMN SYSTEM
(PCS412F)

Fingertight HPLC cartridge precolumns

This cartridge-based system is designed for use as a precolumn or concentrator column in HPLC and FIA applications. It is particularly suited to applications requiring frequent changes; snap-on seals are replaceable, the cartridge is reusable, and the tubing connections are stable since the end fittings do not rotate as the assembly is tightened. Standard material is Type 316 stainless, with PEEK seals and 2µ titanium frits.

Call for a quote.

NOTE

As a courtesy to our OEM customers, VICI does not supply pre-packed columns.

CONVERSIONS

100 µm = .004"
150 µm = .006"

0.25 mm = .010"
0.50 mm = .020"
0.75 mm = .030"

1.0 mm = .040"
1.5 mm = .060"
2.0 mm = .080"

4.6 mm = .180"
6.0 mm = .236"
6.4 mm = .253"

7.0 mm = .275"
10.0 mm = .400"

27.0 mm = 1.08"

1/32" = 0.8 mm
1/16" = 1.6 mm
1/8" = 3.2 mm

1/4" = 6.4 mm
3/8" = 9.5 mm
1/2" = 12.7 mm

FILTERS

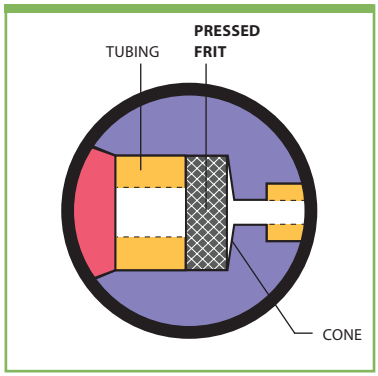
Valco's unique filter design results in extremely low internal volume and simplifies filter element replacement. Filter bodies are "coned" for uniform flow and maximum filter surface area. The filters are made entirely of metal, so they can be used at any instrumentation temperature. While the standard metal is 316 series stainless, filters can be made from alloys that can be used in virtually any application.

There are many flow elements of analytical instruments which require protection from foreign particles, such as orifices that may become plugged or surfaces that may get scratched. However, conventional filtering devices may have too large a volume to be consistent with good system performance – particularly in chromatographic applications.

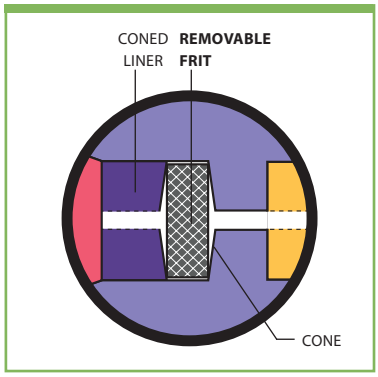
We offer a choice of three different filtering elements. All styles are available in bulkhead configurations for mounting on a panel or instrument wall. (Please note that since frits and screens have significantly different thicknesses, they cannot be used interchangeably in the same filter body.)

- **PRESSED FRITS**, permanently installed in the filter, are recommended where contaminants are the exception and not the rule. The frits are 2µ stainless.
- **REMOVABLE FRITS** are the best choice for maximum filtration, or if the application requires Hastelloy C or titanium. However, they allow more mixing and tend to clog more than screens. A 2µ frit is included with the filter, but 0.5, 2, and 10µ replacement frits are available in three materials.
- **REMOVABLE SCREENS** plug less rapidly and provide lower pressure drop than frits. Since they are thinner, there is less mixing and dispersal than might occur with a frit, but frits provide better filtration. A 2µ screen is included with the filter, and 2 and 10µ stainless replacement screens may be ordered.

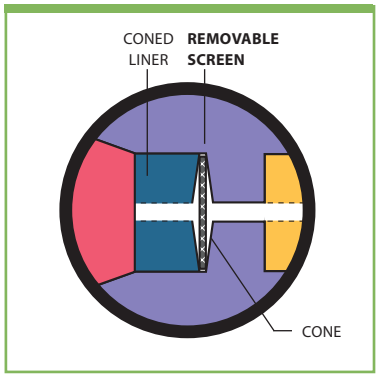
PRESSED FRIT



REMOVABLE FRIT



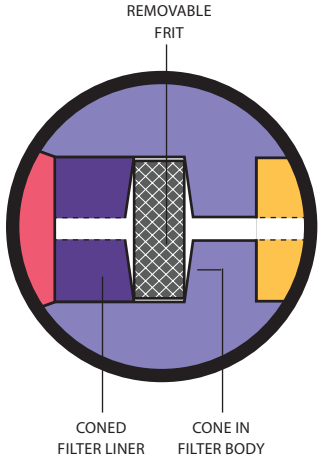
REMOVABLE SCREEN



Filters with removable frits are designed to compensate for the thickness of the filter element – the resulting pilot depths are identical with the rest of the Valco product line, facilitating interchangeability of *made up* fittings. Therefore, although our filters look very much like our unions, they are not interchangeable with unions; a filter with its frit removed should not be substituted for a union, because the space designed for the frit introduces dead volume into the system. In addition, since filter bodies are coned, they will have dead volume when used as a union even if the tubing is made up in the filter with a longer, non-standard pilot length.

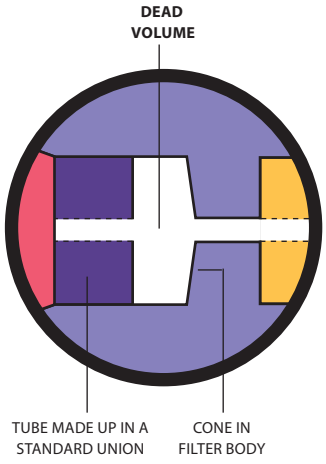
FILTER WITH REMOVABLE FRIT

Correct installation:
Coned for uniform flow and maximum filter surface

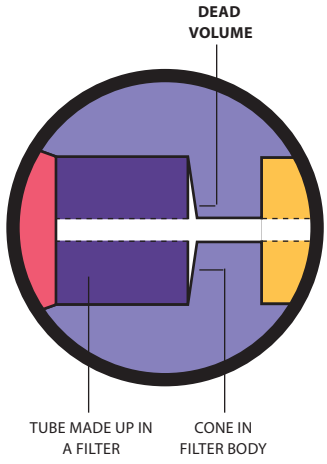


FILTER WITH FRIT REMOVED BEING USED AS A REDUCING UNION

Bad installation:
Dead volume is created where frit should be



Bad installation:
Cone in filter body creates dead volume



MORE INFO

Biocompatible filters..... pages 58-60
In-line filters for 1/4-28 fittings 58
Mobile phase filters.....58-60

VALCO FITTINGS

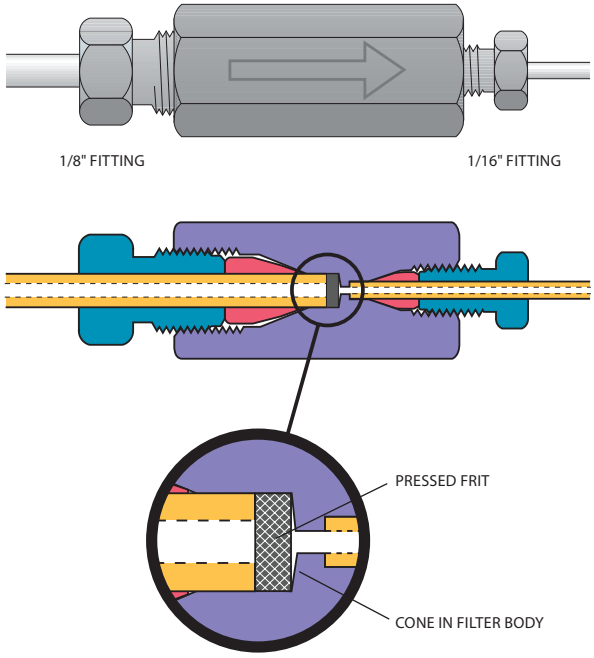
Pressed frit filters

Pressed frit filters contain a permanently installed stainless steel 2µ frit, and are recommended for applications where contaminants are the exception and not the rule – that is, when the sample is generally clean but you wish to guard against the stray burr from a carelessly prepared tube end that might find its way into the flowpath. Standard material is Type 316 stainless.

Pressed frit filters have an arrow imprinted on the body to make it easy to differentiate them from unions, and to indicate the recommended flow direction.

		Standard		Bulkhead	
	Bore	*Prod No*	*Price*	*Prod No*	*Price*
1/16" to 1/16"	0.75 mm	ZUF1	$20.00	ZBUF1	$26.00

Call for a quote on other sizes.



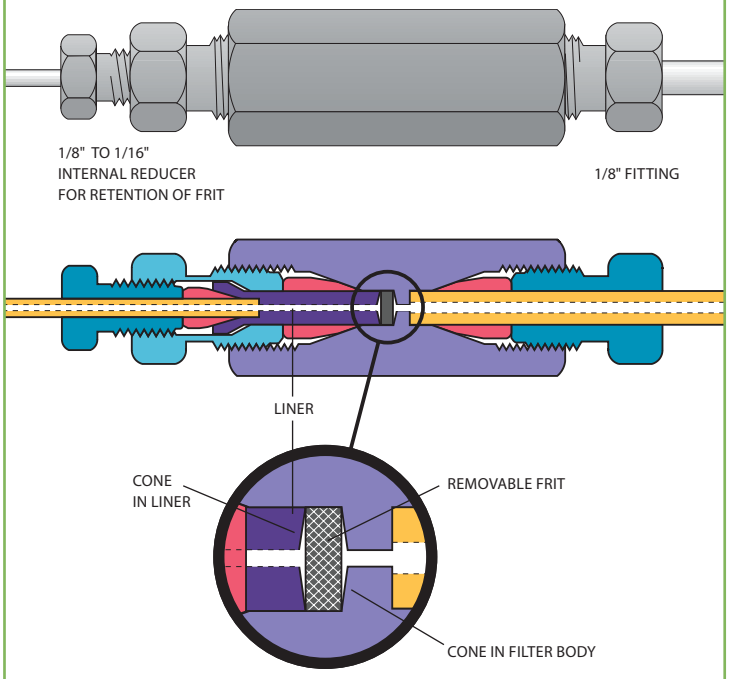
REDUCING FILTER WITH A PRESSED FRIT
1/8" to 1/16"
(ZRUF21)
Arrow on filter body shows direction of flow.

Removable frit filters

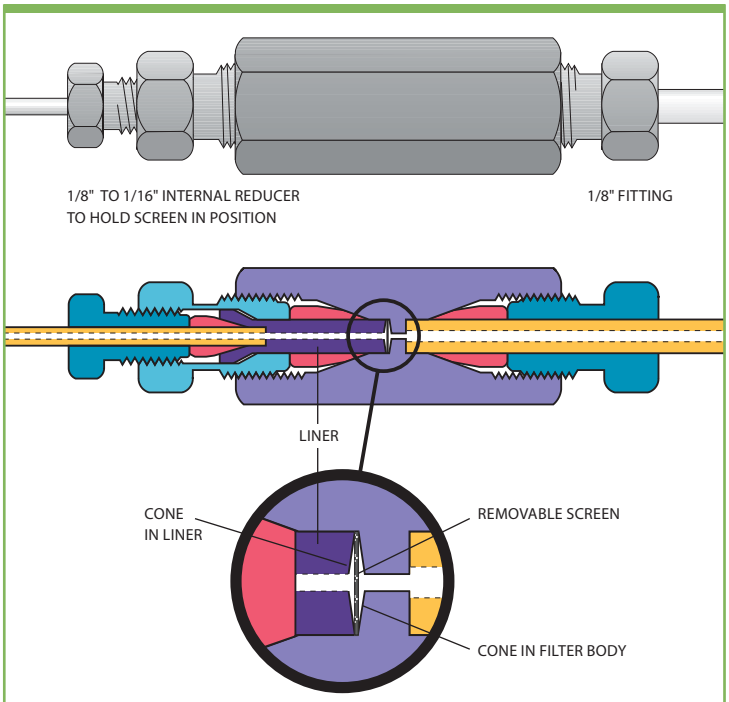
These filters come with a removable 2µ frit. The standard frit can be replaced with any frit of the proper diameter, *but not by a screen*. These filters are suitable for streams with frequent contamination, since the filtering element is easily changed. Standard material is Type 316 series stainless.

		Standard	
	Bore	*Prod No*	*Price*
1/16" to 1/16"	0.25 mm	ZUFR1CF	$44.00
	0.50 mm	ZUFR1F	33.00

Call for a quote on other sizes and bulkhead versions.



REDUCING FILTER WITH A REMOVABLE FRIT
1/8" to 1/16"
(ZRUFR21F)
No arrow on filter body.



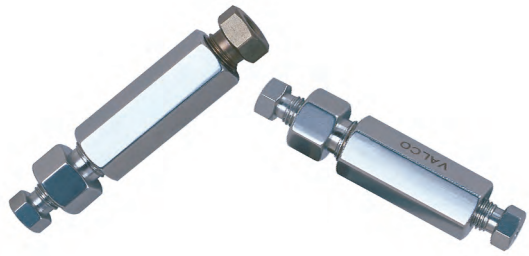
REDUCING FILTER WITH A REMOVABLE SCREEN
1/8" to 1/16"
(ZRUFR21)
No arrow on filter body.

Removable screen filters

These filters come with a removable 2µ screen. The standard screen can be replaced with any screen of the proper diameter, *but not by a frit*. These filters are suitable for streams with frequent contamination, since the filtering element is easily changed. Standard material is Type 316 series stainless.

		Standard		Bulkhead	
Description	*Bore*	*Prod No*	*Price*	*Prod No*	*Price*
1/16" to 1/16"	0.50 mm	ZUFR1	$33.00	ZBUFR1	$40.00
1/8" to 1/16"	0.75 mm	ZRUFR21	33.00	ZBRUFR21	
1/8" to 1/8"	2.00 mm	ZUFR2	33.00	ZBUFR2	

Call for a quote on other sizes.



MORE INFO

Replacements for filters
Frits . . . . . page 40
Screens. 40

CONVERSIONS

0.25 mm = .010"
0.50 mm = .020"
0.75 mm = .030"

1.0 mm = .040"
1.5 mm = .060"
2.0 mm = .080"

4.6 mm = .180"
6.0 mm = .236"
6.4 mm = .253"

7.0 mm = .275"
10.0 mm = .400"

27.0 mm = 1.08"

1/32" = 0.8 mm
1/16" = 1.6 mm
1/8" = 3.2 mm

1/4" = 6.4 mm
3/8" = 9.5 mm
1/2" = 12.7 mm

5/16" = .312" = 7.9 mm
3/8" = .375" = 9.5 mm
7/16" = .437" = 11.1 mm

TECH TIP

Should you use a filter with a frit or one with a screen?

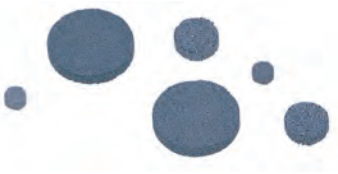
Screens have much higher flow capacity (Cv), but frits are the best choice for maximum filtration or if your application requires Hastelloy C or titanium. However, since they are thicker than screens, frits allow more mixing, and the downside of their superior filtration is that they clog more often than screens.

Note! The difference in thickness also means that frits and screens **cannot** be used interchangeably in the same fitting body:

A frit must always be replaced with a frit.
A screen must always be replaced with a screen.

VALCO FITTINGS

Replacement frits



Other sizes may be available or special ordered in OEM quantities.
Note: If a filter was ordered with a removable frit, the frit ***cannot*** be replaced with a screen.

	Pore size	Frit thickness	Stainless steel (Package/10) Prod No	Price	Hastelloy C (Package/10) Prod No	Price
1/32" frits						
Pkg of 5:	0.5µ	0.25 mm	.5FR.5-5	$27.50	–	–
	2µ	0.25 mm	2FR.5-5	27.50	–	–
1/16" frits						
Pkg of 10:	0.5µ	0.75 mm	.5FR1-10	13.50	.5FR1HC-10	
	2µ	0.75 mm	2FR1-10	13.50	2FR1HC-10	
	10µ	0.75 mm	10FR1-10	13.50	–	–
1/8" frits						
Pkg of 10:	0.5µ	1.00 mm	.5FR2-10	13.50	.5FR2HC-10	
	1µ	1.00 mm	1FR2-10	13.50	1FR2HC-10	
	2µ	1.00 mm	2FR2-10	13.50	2FR2HC-10	$25.50
	10µ	1.00 mm	10FR2-10	13.50	–	–
1/4" frits						
Pkg of 10:	0.5µ	1.00 mm	.5FR4-10	13.50	–	–
	2µ	1.00 mm	2FR4-10	13.50	2FR4HC-10	
	10µ	1.00 mm	10FR4-10	13.50	10FR4HC-10	

Call for a quote on other sizes. Also available in Titanium.

Replacement screens

Other sizes may be available or special ordered in OEM quantities. 20µ and 75µ screens are also available.
Note: If a filter was ordered with a removable screen, the screen ***cannot*** be replaced with a frit.

	Pore size	Screen thickness	Stainless steel (Package/10) Prod No	Price
1/32" screens				
Pkg of 10:	1µ	0.050 mm	1SR.5-10	$20.00
	2µ	0.075 mm	2SR.5-10	13.50
1/16" screens				
Pkg of 10:	1µ	0.050 mm	1SR1-10	20.00
	2µ	0.075 mm	2SR1-10	13.50
1/8" screens				
Pkg of 10:	1µ	0.050 mm	1SR2-10	19.50
	2µ	0.075 mm	2SR2-10	13.50
1/4" screens				
Pkg of 10:	2µ	0.075 mm	2SR4-10	15.00
	10µ	0.125 mm	10SR4-10	15.00

Call for a quote on other pore sizes/screen thicknesses.

TECH TIP

Our screen materials are described in terms of *nominal* micron retention. For example, a screen with a 2 µ pore size will retain *most* particles 2 µ or larger, but the *absolute* retention will be of particles 7-8 µ in diamter or larger. This is true only of the smallest pore screens:

Pore size	*Nominal* retention	*Absolute* retention
1µ	1µ	6-7µ
2µ	2µ	7-8µ
10µ	10µ	11-13µ

WHICH FRIT FITS MY FILTER?

1/16" frit fits:
ZUFR.5F
ZBUFR.5F
ZRUFR1.5F
ZBRUFR1.5F

1/8" frit fits:
ZUFR1CF
ZBUFR1CF
ZUFR1F
ZBUFR1F
ZRUFR21F
ZBRUFR21F

1/4" frit fits:
ZUFR2F
ZBUFR2F
ZRUFR41F
ZBRUFR41F
ZRUFR42F
ZBRUFR42F

WHICH SCREEN FITS MY FILTER?

1/16" screen fits:
ZUFR.5
ZBUFR.5
ZRUFR1.5
ZBRUFR1.5

1/8" screen fits:
ZUFR1C
ZBUFR1C
ZUFR1
ZBUFR1
ZRUFR21
ZBRUFR21

1/4" screen fits:
ZUFR2
ZBUFR2
ZRUFR41
ZBRUFR41
ZRUFR42
ZBRUFR42

Custom socket wrenches

These socket wrenches have a slot to slip over the tubing, making them especially useful when nuts are difficult to access with an open end wrench. The SWH4 works with all types of 1/4" hex nuts, such as Valco 1/16" ZDV fitting nuts. The SWH3 fits our 1/32" nuts.

	Prod No	*Price*
3/16"	SWH3	
1/4"	SWH4	$11.00

Call for a quote.

TECH TIP

If a fused silica tube breaks off in a through-type union, remove the nuts and the tube opposite the broken one. Clear the fitting by passing a **drill** or wire of the appropriate diameter into the unbroken side and through the center of the fitting.

Our **ferrule removal kit** can be used to remove ferrules from tee and cross fittings.

Ferrule removal kits

Remove polymeric ferrules stuck in fitting details. One version is for 1/32" and 360 micron ferrules, and the other version is for 1/16" and 1/8" ferrules.

	Prod No	*Price*
For 360 µm, FS, and 1/32"	FRK1	$24.00
For 1/16" and 1/8"	FRK2	105.00

FOR 360 MM AND 1/32" FERRULES

FOR 1/16" AND 1/8" FERRULES

Hex key set

The hex key set has a wrench to fit any socket head screw on any VICI valve or actuator. Includes the following sizes: .050", 1/16", 5/64", 3/32", 7/64", 1/8", 9/64", and 5/32".

Prod No	*Price*
HKS	$13.00

Open end wrenches

	For use with	*Prod No*	*Price*
3/16" x 1/4"	1/32" and 1/16" nuts	OEW	$6.25
3/8" x 7/16"	1/8" nuts	OEW-2	13.00
1/2" x 9/16"	1/4" nuts	OEW-3	13.00

MORE INFO

Tools for valves
Pencil magnet . . . . p 192
Valve spanner handle. 193
Tightening tools
for 360 µm fittings . . . 49
for PEEK fittings. 49
Tubing
accessories 69, 72

Pin vise and drill index

The drill index has drills sized from 0.0135" to 0.039" (0.34 to 1 mm). These are useful tools when a fused silica tube breaks in a union *(see Tech Tip above)*, and for enlarging the inner diameter of fused silica adapters.

Prod No	*Price*
PV	$61.00

CHEMINERT FITTINGS

INERT AND BIOCOMPATIBLE

Cheminert fittings are ideally suited for applications requiring a biocompatible, inert, metal-free flowpath. Wetted materials are PFA, FEP, CTFE, or PEEK, and uniform flow passages minimize mixing. All connections have zero dead volume. Cheminert fittings are available for high and low pressure applications.

HIGH PRESSURE FITTINGS

Cheminert high pressure fittings are rated at 5000 psi with fingertight nuts, well beyond the burst strength of most PEEK tubing. These fittings are machined from high quality inert polymers to the same exacting tolerances as our popular Valco zero dead volume fittings, and the taper angle and detail design conform to the industry standard established by the Valco line.

NANOVOLUME® FITTINGS

VICI Nanovolume® fittings generally have bore sizes of 100-150 µm (.004" - .006"), with some as small as 50 µm (.002"). The minimal transfer volume contributed by Nanovolume® components makes them especially beneficial in applications with flow rates in the µl/min range, when the transfer volume can be critical.

360 MICRON NANOVOLUME® FITTINGS

These high pressure fittings permit direct connection of 360 micron OD fused silica, PEEK, stainless, or electroformed nickel tubing without the use of liners. The ferrule snaps into the nut so that the fitting is "one-piece", but the ferrule remains free to rotate as the nut is tightened so that the tube doesn't twist. Because of the compact size and fine 2-56 threads, a leak-free connection that seals at pressures in excess of 20,000 psi can be easily formed with the available manual tool.

1/32" NANOVOLUME® FITTINGS

1/32" fittings, with 100 µm or 150 µm bore, are ideal for high resolution capillary chromatography. Rated at 5,000 psi with fingertight nuts, they will remain leak-tight well beyond the burst strength of most PEEK tubing. These fittings are machined from high quality inert polymers to the same exacting tolerances as our popular Valco zero dead volume fittings, and the taper angle and detail design conform to the industry standard established by the Valco line.

MORE INFO

TECH TIP

For instructions on making up our 360 µm fittings, see Technical Note 509 in the Support section of **vici.com**.

TECH TIP

For optimal zero dead volume connections, make sure your tubing meets the best industry standards. OD tolerance should be nominal dimension ± .002".

Fractional dimension	*Nominal dimension*
1/32"	.031"
1/16"	.062"
1/8"	.125"
1/4"	.250"
3/8"	.375"
1/2"	.500"

CONVERSIONS

10,000 psi = 689.5 bar
20,000 psi = 1,378.9 bar

360 MICRON NANOVOLUME® FITTINGS

- For direct connection of 360 µm tubing
- Work with metal, fused silica, or PEEK
- Up to 40,000 psi (liquid) with metal tubing
- Snap-in rotating ferrule for "one-piece" fitting with no tubing twist
- Eliminate use of troublesome liners

360 µm fittings are dedicated for use with either fused silica, metal, or PEEK tubing. Components cannot be mixed or used with a different tubing material.

SEE ALSO

360 µm fittings
For fused silica tubing, 10,000+ psi liq . . . pg 44
For metal tubing, up to 40,000 psi liq. 44

up to 10,000 psi liq* FOR PEEK OR FUSED SILICA TUBING

These fittings are constructed from premium grade natural PEEK material. They are intended for use with PEEK or fused silica tubing at pressures up to 10,000 psi, or the maximum pressure for which the tubing is rated, whichever is lower. Quick-mount versions have integral base with double stick tape to secure fittings to a surface, making sure that the fitting is stable and fragile tubing isn't broken.

*or burst pressure of tubing

Nut/ferrules, caps, plugs, tightening tool — FOR 360 µm TUBING

		Prod No	Price
	Nut/ferrule	C360NFPKG	$13.00
	Cap	C360CPKG	13.00
	Plug	C360PPK	11.00
	Tightening tool	C360ET	11.00

DIRECT CONNECTIONS TO 1/32" AND 1/16"

360 µm internal reducers (IZRs) connect 360 µm tubing to 1/16" or 1/32" details in Valco valves or fittings, providing a positive leak-free seal with zero dead volume.

IZRs . . . . . page 27

MORE INFO

1/32" Nanovolume® fittings 45-47
Injectors with 360 micron fittings. . 134

CONVERSIONS

50 µm = .002"
100 µm = .004"
150 µm = .006"

0.25 mm = .010"
0.50 mm = .020"
0.75 mm = .030""

1/32" = 0.8 mm
1/16" = 1.6 mm

Unions and reducing unions — FOR 360 µm TUBING

	Bore size:	50 micron		100 micron		150 micron	
		Prod No	Price	Prod No	Price	Prod No	Price
	Union	C360UPKG2	$52.00	C360UPKG4	$48.00	C360UPKG6	$44.00
	Union, quick mount	C360QUPKG2	70.00	C360QUPKG4	65.00	C360QUPKG6	60.00
	Reducing union, 1/16" to 360 µm	—	—	—	—	C360RU1PK6	34.00

Tees and crosses — FOR 360 µm TUBING

	Bore size:	50 micron		100 micron		150 micron	
		Prod No	Price	Prod No	Price	Prod No	Price
	Tee, quick mount	C360QTPKG2	$88.00	C360QTPKG4	$82.00	C360QTPKG6	$76.00
	Cross, quick mount	C360QXPKG2	106.00	C360QXPKG4	100.00	C360QXPKG6	94.00

CHEMINERT FITTINGS

360 MICRON NANOVOLUME® FITTINGS

10,000 psi liq and above* FOR FUSED SILICA TUBING

These fittings are constructed from HPLC grade stainless steel, with a stainless steel nut and a special ferrule which is precision machined from electroformed nickel. For optimal sealing characteristics, the ferrule is gold plated.

*or burst pressure of tubing

Nut/ferrules and caps — FOR 360 µm FS TUBING

		Prod No	Price
	Nut/ferrule	C360NFFS	$35.00
	Cap	C360CFS	34.00

Unions and reducing unions — FOR 360 µm FS TUBING

		50 micron bore		100 micron bore		150 micron bore	
		Prod No	Price	Prod No	Price	Prod No	Price
	Union	C360UFS2	$89.00	C360UFS4	$84.00	C360UFS6	$80.00
	Reducing union, 1/32" to 360 µm	C360RU.5FS2	76.00	C360RU.5FS4	71.00	C360RU.5FS6	67.00
	Reducing union, 1/16" to 360 µm	—	—	—	—	C360RU1FS6	63.00

up to 40,000 psi liq ** FOR METAL TUBING

Our highest pressure Nanovolume® fittings are constructed of HPLC grade stainless steel, including stainless steel nut and ferrule. These fittings are optimized for use with stainless or electroformed nickel tubing.

**or burst pressure of tubing. Higher pressures may be possible with smaller IDs. Consult factory.

Nut/ferrules and caps — FOR 360 µm TUBING

		Prod No	Price
	Nut/ferrule	C360NFS6	$13.00
	Cap	C360C	21.00

Unions and reducing unions — FOR 360 µm TUBING

		50 micron bore		100 micron bore		150 micron bore	
		Prod No	Price	Prod No	Price	Prod No	Price
	Union	C360US62	$63.00	C360US64	$59.00	C360US66	$55.00
	Reducing union, 1/32" to 360 µm	C360RU.5S62	50.00	C360RU.5S64	46.00	C360RU.5S66	42.00
	Reducing union, 1/16" to 360 µm	—	—	—	—	C360RU1S66	38.00

SEE ALSO

360 µm fittings
For PEEK or FS tubing, 10,000 psi liq . . . . . pg 43

DIRECT CONNECTIONS TO 1/32" AND 1/16"

Valco 360 micron internal reducers (IZRs) directly connect 360 µm tubing to 1/16" or 1/32" Valco valve or fitting details, providing a positive leak-free seal with zero dead volume.

IZRs . . . . . page 27

TECH TIP

Use these **metal 360 micron nuts** with nano injectors:
C72MX . . . . . page 134

MORE INFO

360 µm tubing
Electroformed nickel. 67
PEEK 69
1/32" Nanovolume® fittings 45-47

CONVERSIONS

50 µm = .002"
100 µm = .004"
150 µm = .006"

1/32" = 0.8 mm
1/16" = 1.6 mm

5,000 psi*

1/32" NANOVOLUME® FITTINGS

Designed for high resolution capillary HPLC, Cheminert Nanovolume® connectors include our one-piece 1/32" fingertight fittings, with a patented** collapsible ferrule that makes finger-tight nanovolume connections a snap. These fittings work with a variety of tubing, including PEEK, fused silica, and 1/32" electroformed nickel. Liners adapt the fittings for use with fused silica.

To avoid potential confusion, all fittings utilizing the Cheminert collapsible ferrule are made of black PEEK; fittings with a standard Valco ZDV fitting detail are natural PEEK.

Nuts, ferrules, and plugs — FOR 1/32" TUBING

Valves and fittings are supplied with the appropriate quantity of nuts and ferrules. However, if additional fittings are required, they may be ordered separately. The two internal nuts include collapsible ferrules as an integral part of the fitting; the external nut must be used with the separate ferrule listed below.

		Prod No	Price
	Internal nut with collapsible ferrule *For use with:* Fittings below, and on pages 46-47	C-NNFFPK	$8.50
	External nut *For use with:* Unions on page 46 Column end fittings on page 47 *Requires collapsible PEEK ferrule, below*	C-EN.5FPKB	Call for a quote.
	Collapsible PEEK ferrule *For use with:* External nut, above	ZGF.5PK	4.75
	Internal plug *For use with:* Fittings on pages 45-46	C-NPFPK	Call for a quote.

Unions — FOR 1/32" TUBING

		100 µm bore		150 µm bore	
		Prod No	Price	Prod No	Price
	Union for 1/32" PEEK or EFNi tubing. *Does not require liners.*	C-NEU.5XFPK	$46.00	C-NEU.5FPK	$38.00

Reducing unions — 1/16" TO 1/32" TUBING

Call for a quote.

		150 µm bore	
		Prod No	Price
	Reducing union, 1/16" to 1/32" tubing	C-NERU1FPK	Call for a quote.

Tees, y's, and crosses — FOR 1/32" TUBING OR FS* TUBING

Call for a quote.

			100 µm bore		150 µm bore	
			Prod No	Price	Prod No	Price
 CROSS IS SHOWN. TEE AND Y ARE SIMILAR.	For 1/32" tubing or fused silica*	Tee	C-NTXFPK	Call for a quote.	C-NTFPK	Call for a quote.
		Y	C-NYXFPK	Call for a quote.	C-NYFPK	Call for a quote.
		Cross	C-NXXFPK	Call for a quote.	C-NXFPK	Call for a quote.

*A liner is needed for use with fused silica. Order 27 mm length, page 46.

TECH TIP

Our liners adapt Nanovolume® tees, Y's, and crosses for use with fused silica tubing. They must be ordered separately.

Liners ..... page 46

MORE INFO

* or burst pressure of tubing

** U.S. Patent No. 6,575,501

TECH TIP

Use our internal nuts with collapsible ferrules for old style Cheminert CN2 and CN4 valves.

C-NNFFPK $8.50
For use with:
6 port valve CN2-4346
4 port internal sampling injector CN4-4344

C-NNFLFPK $9.75
For use with:
10 port valve CN2-4340

C-NVISF fill port for 26 gauge needles — Call for a quote
For use with: CN2 valves.

Consult factory regarding CN2 and CN4 valves.

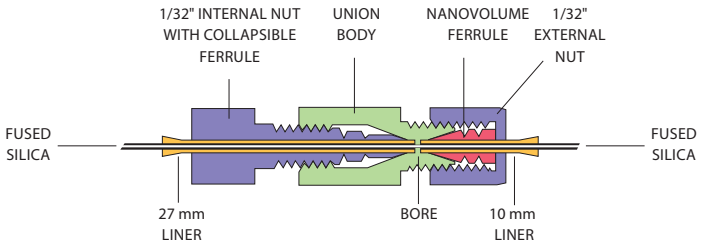
CHEMINERT FITTINGS

Unions

FOR FUSED SILICA TUBING

Call for a quote.

		100 µm bore		150 µm bore	
	FS tubing OD	*Prod No*	*Price*	*Prod No*	*Price*
Union for fused silica tubing Includes liners. 	125 -175 µm	C-NEU.5XFPK.15		C-NEU.5FPK.15	
	175 -225 µm	C-NEU.5XFPK.20		C-NEU.5FPK.20	
	225 -275 µm	C-NEU.5XFPK.25		C-NEU.5FPK.25	
	275 -325 µm	C-NEU.5XFPK.30		C-NEU.5FPK.30	
	325 -375 µm	C-NEU.5XFPK.35		C-NEU.5FPK.35	



UNION FOR USE WITH FUSED SILICA
(C-NEU.5FPK.35)
Liners included

Liners for 1/32" connectors

FOR USE WITH FUSED SILICA TUBING

Use these natural PEEK liners to adapt 1/32" connectors to the most common sizes of fused silica tubing.

The 27 mm liners are for internal nuts with collapsible ferrules. 10 mm liners are for use with external nuts. Sold in packages of 5.

Call for a quote.

	For tubing OD	*Prod No*	*Price*
27 mm liners Use with internal nuts C-NNFFPK or C-NNFLFPK 	125 - 175 µm	C-NL.15L-5	
	175 - 225 µm	C-NL.20L-5	
	225 - 275 µm	C-NL.25L-5	
	275 - 325 µm	C-NL.30L-5	
	325 - 375 µm	C-NL.35L-5	$48.75
10 mm liners Use with external nut C-EN.5FPKB	125 - 175 µm	C-NL.15S-5	
	175 - 225 µm	C-NL.20S-5	
	225 - 275 µm	C-NL.25S-5	
	275 - 325 µm	C-NL.30S-5	
	325 - 375 µm	C-NL.35S-5	

1/32" Nanovolume® frits

These frits are the answer to filtration of 1/32" Nanovolume® fitting connections. A mere .25 mm (0.010") thin and 1/32" in diameter, they can be placed in any 1/32" fitting detail and add minimal volume. Sold in packages of 5 frits.

Pore size	*Prod No*	*Price*
0.2 micron	.2FR.5-5	
0.5 micron	.5FR.5-5	*$27.50*
2 micron	2FR.5-5	*6.75*

TECH TIP

Use **27 mm liners**
with internal nuts with collapsible ferrules:

Use **10 mm liners**
with external nuts:

MORE INFO

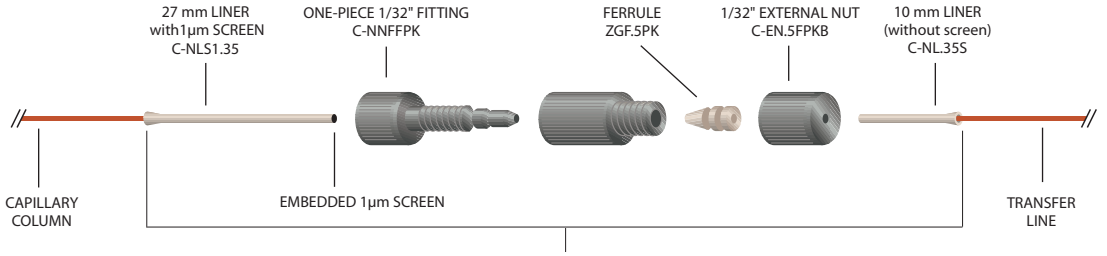
SCREEN EMBEDDED IN END OF LINER
for column end fittings

NANOVOLUME® COLUMN END FITTINGS

Nanovolume® column end fittings include two liners to adapt the 1/32" fitting to fused silica. The 27 mm liner, used inside the internal nut, has a 1 µm 316 stainless steel screen embedded in the PEEK to provide closure for fused silica columns, and the 10 mm liner is used with the external nut.

The design utilizes our one-piece 1/32" fingertight fittings, with a patented* collapsible ferrule. To avoid potential confusion, all fittings utilizing the Cheminert collapsible ferrule are made of black PEEK. The liners are natural PEEK. Sold individually.

*U.S. patent no. 6,575,501.



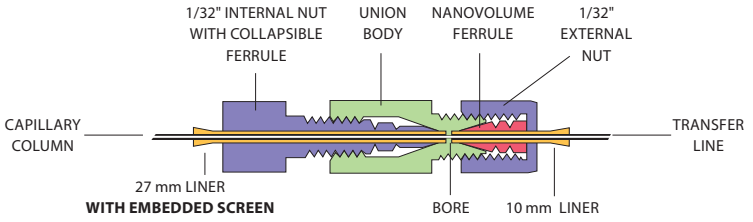
COLUMN END FITTING FOR 360 MM FUSED SILICA COLUMNS
(C-NEF.5FPK.35S1)

Column end fittings

FOR FUSED SILICA CAPILLARY COLUMNS

Call for a quote.

		100 µm bore		150 µm bore	
	For tubing OD	*Prod No*	*Price*	*Prod No*	*Price*
Column end fitting for fused silica tubing Includes liners 	125 - 175 µm	C-NEF.5XFPK.15S1		C-NEF.5FPK.15S1	
	175 - 225 µm	C-NEF.5XFPK.20S1		C-NEF.5FPK.20S1	
	225 - 275 µm	C-NEF.5XFPK.25S1		C-NEF.5FPK.25S1	
	275 - 325 µm	C-NEF.5XFPK.30S1		C-NEF.5FPK.30S1	
	325 - 375 µm	C-NEF.5XFPK.35S1		C-NEF.5FPK.35S1	



COLUMN END FITTING
(C-NEF.5FPK.35S1) Liners included

Replacement liners for column end fittings

FOR FS CAPILLARIES

Use these liners with Nanovolume® column end fittings to adapt to the most common sizes of fused silica tubing. Natural PEEK, with embedded screen to provide full closure for fused silica capillaries. Sold individually.

Call for a quote.

	For tubing OD	*Prod No*	*Price*
27 mm liners for column end fittings	125 - 175 µm	C-NLS1.15	
	175 - 225 µm	C-NLS1.20	
	225 - 275 µm	C-NLS1.25	
	275 - 325 µm	C-NLS1.30	
	325 - 375 µm	C-NLS1.35	$32.00

TECH TIP

Liners with embedded screens are also available for 1/16" PEEK tubing. Consult the factory for sizes and product numbers.

CONVERSIONS

100 µm = .004"
150 µm = .006"

0.25 mm = .010"
0.50 mm = .020"
0.75 mm = .030"

1.0 mm = .040"
1.5 mm = .060"
2.0 mm = .080"

4.6 mm = .180"
6.0 mm = .236"
6.4 mm = .253"

7.0 mm = .275"
10.0 mm = .400"

27.0 mm = 1.08"

1/32" = 0.8 mm
1/16" = 1.6 mm
1/8" = 3.2 mm

1/4" = 6.4 mm
3/8" = 9.5 mm
1/2" = 12.7 mm

CHEMINERT FITTINGS

Internal nuts

HIGH PRESSURE PEEK

PEEK nuts are used in Cheminert polymeric valves with zero dead volume fittings. They can also be used as alternatives to standard stainless steel Valco nuts when polymeric ferrules are used (up to approximately 125°C). Fingertight nuts have a knurled surface designed to provide sufficient sealing force on the ferrule without wrenches. Hex style nuts allow wrench tightening; however, since they are polymeric, they can break and are recommended for use only when space is limited and fingers won't fit. Sold in packages of 10.

Caution: PEEK nuts are intended for use only with polymeric ferrules, which seal with lower force than their stainless steel counterparts. Overtightening can result in breakage.

			PEEK (Package/10)	
		Length	*Prod no*	*Price*
1/32" fingertight		.42"	ZN.5FPK-10	$35.00
		.54"	LZN.5FPK-10	42.50
1/16" fingertight		.88"	ZN1FPK-10	35.00
1/16" hex		.45"	ZN1PK-10	30.00
		.62"	MZN1PK-10	30.00
		.87"	LZN1PK-10	35.00
1/8" hex		.62"	ZN2PK-10	35.00

Ferrules

HIGH PRESSURE PEEK AND GLASS-FILLED PEEK

PEEK ferrules seal by the increased friction from compression. Use PEEK ferrules with PEEK fittings and glass-filled PEEK with stainless steel fittings. Sold in packages of 10.

	PEEK (Package/10)		Glass-filled PEEK (Package/10)	
	Prod No	*Price*	*Prod No*	*Price*
1/32"	ZF.5PK-10	$35.40	ZF.5PKG-10	
1/16"	ZF1PK-10	35.40	ZF1PKG-10	$42.50
1/8"	ZF2PK-10	35.40	ZF2PKG-10	

Call for a quote. Available in other sizes.

Ferrules

GROOVED PEEK

These patented ferrules* feature a grooved design that permits the ferrule to grip the tube in multiple places. They work great on tubing that is softer than the ferrule material. For example, PEEK grooved ferrules work well on PTFE or FEP tubing. If you are using PEEK tubing, we recommend our high pressure PEEK ferrules, above. Sold in packages of 10.

*U.S. patent no. 6,575,501

	Grooved PEEK (Package/10)	
	Prod No	*Price*
1/32"	ZGF.5PK-10	$47.50
1/16"	ZGF1PK-10	42.50

POLYMERS AT A GLANCE

PEEK (PK)..... page 248
Chemical resistance; up to 125°C

MORE INFO

Tightening tool for hex-head PEEK nuts 49

No twist one-piece fittings

FOR 1/32" AND1/16" TUBING

- Snap-in ferrule rotates freely
- Choice of ferrule materials
- Choice of fitting lengths

No-twist fittings offer the convenience of a one-piece fitting while solving a problem inherent to such designs. In other one-piece designs, the ferrule rotates against the fitting detail, creating particulates. The no twist design has a separate ferrule that snaps into the nut, so it's attached but still free to avoid rotation during tightening.

Since the ferrule is not machined onto the nut, it can be made from a different material; PEEK nut with PEEK ferrule, or PEEK nut with CTFE ferrule – the possibilities are endless. Optional ferrule materials available – FEP, PFA, PTFE, and glass-filled PTFE. Call for availability.

		Length		Glass-filled PEEK ferrule (Package/5) Prod No	Price	PEEK ferrule (Package/5) Prod No	Price	CTFE ferrule (Package/5) Prod No	Price
1/32" fingertight		.57"		ZNF.5FPKG-5	$48.75	ZNF.5FPK-5	$48.75	–	–
1/16" fingertight		1.06"		ZNF1FPKG-5	95.00	ZNF1FPK-5	✆	ZNF1FKF-5	✆
1/16" hex	Short	.64"		ZNF1PKG-5	✆	ZNF1PK-5	✆	ZNF1KF-5	✆
	Medium	.82"		MZNF1PKG-5	✆	MZNF1PK-5	✆	MZNF1KF-5	✆
	Long	1.07"		LZNF1PKG-5	✆	LZNF1PK-5	✆	LZNF1KF-5	✆

✆ Call for a quote.

CONVERSIONS

0.25 mm = .010"
0.50 mm = .020"
0.75 mm = .030"

1.0 mm = .040"
1.5 mm = .060"
2.0 mm = .080"

4.6 mm = .180"
6.0 mm = .236"
6.4 mm = .253"

7.0 mm = .275"
10.0 mm = .400"

27.0 mm = 1.08"

1/32" = 0.8 mm
1/16" = 1.6 mm
1/8" = 3.2 mm

1/4" = 6.4 mm
3/8" = 9.5 mm
1/2" = 12.7 mm

Tightening tools

FOR VALCO AND CHEMINERT FITTINGS

These handy tools make it fast and easy to tighten hex-head fittings.

- The red version is for use with the C360 series fittings shown on pages 43-44.
- The green tool is for any 1/32" fitting with a 3/16" hex head nut.
- The blue version fits the 1/4" hex common in fittings for 1/16" tubing.
- The black tool is designed especially for the unique 1/16" tube fittings with 6-40 threads used in the C25G selector on page 160.

Color	For use with	Prod No	Price
Red	360 µm fittings	C360ET	$10.50
Green	1/32" fittings (6-40 threads)	CNFT	✆
Blue	1/16" fittings	ZNFT	9.50
Black	6-40 fittings for C25G selectors	CGFT	✆

✆ Call for a quote.

CHEMINERT FITTINGS

Plugs and caps

HIGH PRESSURE PEEK

PEEK plugs and caps are available in knurled fingertight and wrench-tight hex nut designs, for use in valves or fittings. *(See discussion of PEEK nuts on page 48.)* PEEK caps include a PEEK nut and ferrule.

	Length	*Prod No*	*Price*	
PEEK plugs				
1/32" fingertight	.610"	ZP.5FPK	$12.00	
	.730"	LZP.5FPK	12.00	
1/16" fingertight	1.14"	ZP1FPK	11.00	
1/16" hex	1.00"	MZP1PK	11.00	
1/8" hex	1.005"	ZP2PK	14.00	
PEEK caps				
1/16" fingertight	1.290"	ZC1FPK	$14.00	

Also available in 1/2-20. Call for a quote on other sizes.

PEEK plugs

FOR HIGH PRESSURE POLYMERIC VALVES

These PEEK plugs are for use ***only*** in Cheminert HPLC PAEK valves (C1-C5 series) since the fitting detail in these valves has an extended pilot length.

	Length	*Prod No*	*Price*	
1/16" fingertight	1.210"	C-ZP1FPK	$13.00	

Call for a quote on hex-head versions.

POLYMERS AT A GLANCE

PEEK (PK)..... page 248
Chemical resistance; up to 125°C

TECH TIP

Ferrules for high pressure PEEK fittings are available in PEEK and PFA.

PEEK ferrules 48
PFA ferrules 15

MORE INFO

Low pressure plugs.... 55
Tightening tool for hex-head PEEK nuts 49

CONVERSIONS

0.25 mm = .010"
0.50 mm = .020"
0.75 mm = .030"

1.0 mm = .040"
1.5 mm = .060"
2.0 mm = .080"

4.6 mm = .180"
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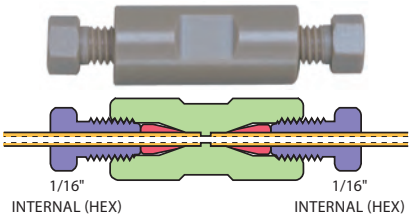
27.0 mm = 1.08"

1/32" = 0.8 mm
1/16" = 1.6 mm
1/8" = 3.2 mm

1/4" = 6.4 mm
3/8" = 9.5 mm
1/2" = 12.7 mm



INTERNAL UNION – PEEK
Standard bore version
(ZU1PK)

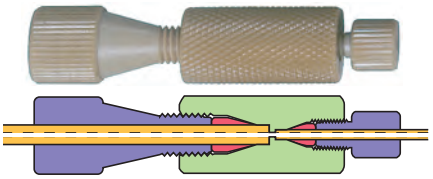
Internal unions

HIGH PRESSURE PEEK

1/16" nuts are available in a choice of fingertight or hex.

		Standard		Bulkhead		*Bulkhead panel hole diameter*
Tubing OD	*Bore*	*Prod No*	*Price*	*Prod No*	*Price*	
1/16" fingertight	0.25 mm	ZU1CFPK	$23	ZBU1CFPK	$28	3/8"
	0.50 mm	ZU1MFPK	20	ZBU1MFPK	☎	
	0.75 mm	ZU1FPK	18	ZBU1FPK	☎	
1/16" hex	0.25 mm	ZU1CPK	23	ZBU1CPK	☎	
	0.75 mm	ZU1PK	18	ZBU1PK	☎	

☎ Call for a quote on other sizes and bulkhead versions.



INTERNAL REDUCING UNION – PEEK
Standard bore
(ZRU1.5FPK)

Internal reducing unions

HIGH PRESSURE PEEK

These unions connect two different sizes of tubing, with zero dead volume internal fittings on each end. In the bulkhead version, the bulkhead nut is on the side with smaller tubing. The 1/32" and 1/16" nuts are fingertight; 1/8" nuts are hex, for wrench tightening. A version with 1/16" and 1/8" hex nuts is also available.

Tubing OD	*Bore*	*Prod No*	*Price*
1/16" to 1/32"	0.25 mm	ZRU1.5FPK	$30
	1/32"	ZRU1.5TFPK	30
1/8" to 1/16"	0.75 mm	ZRU21FPK	24

Call for a quote on other sizes and bulkhead versions.

NANOVOLUME® REDUCING UNION – PEEK
(ZERU1.5FPK)

Internal/external reducing union

HIGH PRESSURE PEEK

Tubing OD	*Bore*	*Prod No*	Price
1/16" to 1/32"	0.20 mm	ZERU1.5FPK	☎

☎ Call for a quote on other sizes and bulkhead versions.

Tees

HIGH PRESSURE PEEK

1/16" PEEK nuts are fingertight.

PEEK tees

Tubing OD	*Bore*	*Prod No*	*Price*
1/16"	1.00 mm	ZT1LFPK	$35.00

Call for a quote on other sizes.

Crosses

HIGH PRESSURE PEEK

Call for a quote on high pressure PEEK crosses.

CHEMINERT FITTINGS

LOW PRESSURE FITTINGS

Cheminert low pressure fittings are ideally suited for flow injection analysis, low pressure liquid chromatography, and stream sampling devices. They may be safely used at pressures up to 500 psi and temperatures to 50°C. Two designs of low pressure tube end fittings are available.

Flangeless tube end fittings utilize a collapsible ferrule, which grips the tubing as the fitting is tightened without significantly reducing the tube ID.

Standard tube end fittings are retained on polymeric tubing by a flange formed with a Cheminert flanging tool.

Flangeless tube end fittings 1/4-28

Flangeless tube end fittings eliminate the flanging tool required with standard tube end fittings. The nut turns on the tubing as freely as with our flanged fitting, eliminating the possibility of cracking or unscrewing that can occur when plastic tubing is subjected to twisting as fittings are connected.

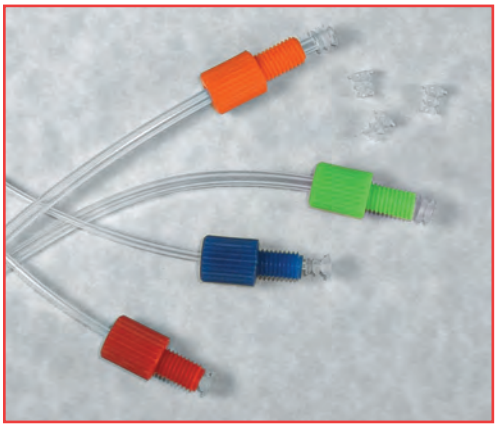
Cheminert flangeless fittings include our patented* collapsible ferrule design. This innovative design utilizes a one-piece ferrule engineered to collapse as it is tightened. The collapse occurs in a narrow area, resulting in a very effective seal with virtually no distortion of the tubing ID and no dead volume. The assembly is rated at 500 psi liquid when tightened by hand. Since only the tubing and the ferrule come into contact with the solution, the result is an inert system.

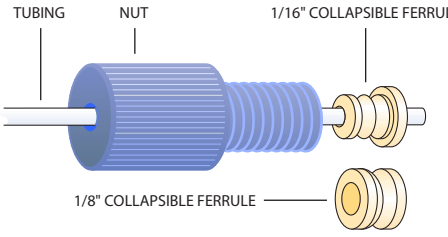
Cheminert tube end fittings come in twelve different colors for system color coding, and work with any 1/16" or 1/8" OD polymeric tubing. Use CTFE ferrules for soft tubing (PTFE, FEP, etc.) and PEEK ferrules for harder tubing (PEEK, ETFE, polyurethane, etc.)

* Patent No. 6,575,501

		1/16" OD		1/8" OD	
		Prod No	*Price*	*Prod No*	*Price*
Flangeless fittings with CTFE ferrules *(package/5)*	Black	CFL-1BK	$12.00	CFL-2BK	$12.00
	Blue	CFL-1BE	12.00	CFL-2BE	12.00
	Brown	CFL-1BR	12.00	CFL-2BR	12.00
	Green	CFL-1G	12.00	CFL-2G	12.00
	Natural	CFL-1N	12.00	CFL-2N	12.00
	Red	CFL-1R	12.00	CFL-2R	12.00
	White	CFL-1W	12.00	CFL-2W	12.00
Assorted flangeless fittings *(package/12, one of each color)*	with CTFE ferrule	CFL-1A	24.00	CFL-2A	24.00
	with PEEK ferrule	CFL-1A-PK	24.00	CFL-2A-PK	24.00
Setting tool		CST	6.50	CST	6.50
Replacements					
PEEK ferrules	*(package/10)*	CFL-CB1PK	$29.00	CFL-CB2PK	$29.00
CTFE ferrules	*(package/10)*	CFL-CB1KF	29.00	CFL-CB2KF	29.00
PEEK nuts	*(package/10)*	CFL-1PK	26.00	CFL-2PK	26.00

Also available in dark gray, lavender/pink, orange, purple, and yellow.

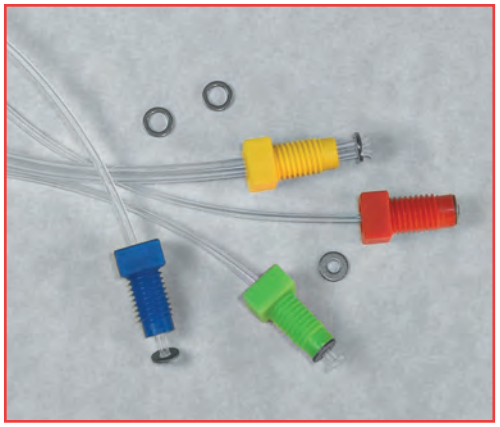


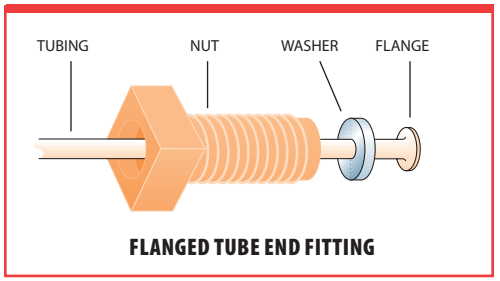


FLANGELESS TUBE END FITTING

CONVERSIONS

0.25 mm = .010"	7.0 mm = .275"
0.50 mm = .020"	10.0 mm = .400"
0.75 mm = .030"	27.0 mm = 1.08"
1.0 mm = .040"	1/32" = 0.8 mm
1.5 mm = .060"	1/16" = 1.6 mm
2.0 mm = .080"	1/8" = 3.2 mm
4.6 mm = .180"	1/4" = 6.4 mm
6.0 mm = .236"	3/8" = 9.5 mm
6.4 mm = .253"	1/2" = 12.7 mm





FLANGED TUBE END FITTING

Standard flanged tube end fittings 1/4-28

The basic component of the Cheminert system is the polypropylene nut, retained on PTFE or FEP tubing by a flange formed with a Cheminert flanging tool *(page 54)*. This is an excellent method for connecting fluorocarbon tubing, as there is no reduction of the inside diameter and no binding or twisting of the tubing when the fitting is tightened. A mating of the parts is achieved with zero dead volume, making this an ideal fitting for biological systems.

Cheminert tube end fittings come in twelve different colors for system color coding, and are available for 1/16" or 1/8" OD fluorocarbon tubing. (While in theory other polymers could be molded to form a flange, only fluorocarbons such as PTFE, PFA, or FEP have low-temperature malleability and good form retention at operating temperatures.) Tube end fittings attach directly to Cheminert valves and fittings, and are easily joined to each other with a union. Tightening by hand is all that is required to make a leak-free seal at 500 psi liquid, although for long term reliability a wrench could be used to apply an additional 1/8 turn.

Packages include the same number of washers as fittings.

		1/16" OD		1/8" OD	
		Prod No	*Price*	*Prod No*	*Price*
Flanged fittings *(package/10)*	Natural	CF-1N	$14.00	CF-2N	$14.00
	White	CF-1W	14.00	CF-2W	14.00
Washers *(package/10)*		CF-W1	3.25	CF-W2	3.25

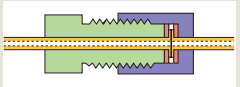
Also available in black, blue,brown, dark gray, green, lavender/pink, orange, purple,red, and yellow.

TECH TIP

To make up standard flanged tube end fittings, use the flanging tool on page 54.

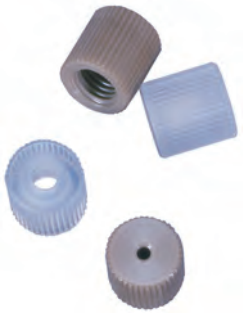
TECH TIP

Use our external nut tube end fittings to make true zero volume butt connections without a coupling.



MORE INFO

High pressure fittings ..... pp 42-51
PTFE and FEP tubing..... 72
C42 injectors 151
C45 selectors 161



External nuts for flanged tube ends 1/4-28

External nuts with female 1/4-28 threads are designed for use on tubing with a flanged end, just like the standard tube end fittings. Use them instead of a union or coupling to make a zero volume butt connection. Sold in packages of 5.

	CTFE	
	Prod No	*Price*
1/16"	CEN1KF	$30.00

Call for a quote on 1/8" nuts.
Also available in PEEK.

Nuts and ferrules 1/2-20

Nuts and ferrules for C42 injectors and C45 selectors with 1/2-20 fittings

	Prod No	*Price*
Delrin nut	CFL-4D	$6.50
PPS nut	CFL-4PPS	15.00
CTFE ferrule	CFL-CB4KF-S	5.25

Call for a quote on CTFE nuts.

CHEMINERT FITTINGS

Cheminert flanging tools

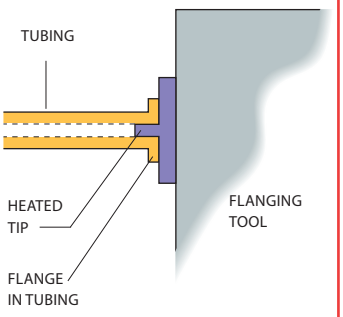
NON-CE

The flanging tool makes the flange which retains the standard 1/4-28 tube end fitting and washer on PTFE or FEP tubing. With this tool, lengths of tubing may be easily assembled to any required dimension. The time required is approximately 5 to 10 seconds per flange.

Flanging tools are available for 110 VAC or 230 VAC, and come complete with tips for 0.75 mm, 1.0 mm, and 2.00 mm ID tubing, a tubing holder for gripping the tubing during the flanging operation, a razor blade for tube cutting, and instructions.

		Prod No	*Price*
Flanging tools	110 VAC	CFT-110	$230
Flanging tips	for tubing ID ≤ 1.00 mm	CFT-TM	30
	for tubing ID ≤ 1.50 mm	CFT-TL	30

Other sizes of replacement flanging tips are available.



FORMING A TUBING FLANGE

Easy-Flange kits

FROM VICI JOUR

The Easy-Flange flange-rolling tool uses mechanical force to form a flange on 1/16" - 1/8" OD PTFE tubing, offering an excellent non-electric alternative to a heated flanging tool.

The quality of the flange is excellent, since it is formed without stressing the tubing by heat. The specially designed negative conical profile of the flange-forming component yields an ideal shape for maximum sealing properties.

Prod No	*Price*
JR-201540	$216.40

The Easy-Flange kit includes:

Plastic box	Flanging discs with:
Clean-cut tubing cutter	0.5 mm SS pin for PEEK tubing
6 feet of PTFE tubing, 1/16" x 0.75 mm ID	0.8 mm polymer pin
	0.8 mm titanium pin
	1.3 mm polymer pin
	1.3 mm titanium pin

MORE INFO

Standard tube end fittings . . . . . page 53
Clean-cut tubing cutter 72

Plugs 1/4-28

Plugs can be used to close off an unused port in a 1/4-28 valve or manifold. Sold in packages of 5.

Also available with 1/2-20 threads for C42R and C45R valves.

PEEK (Package/5)		CTFE (Package/5)	
Prod No	*Price*	*Prod No*	Price
CPPK	$14.00	CPKF	$39.00

Low pressure PEEK plugs 10-32

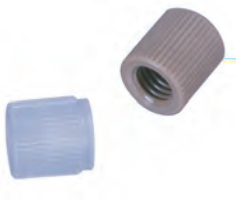
These all-PEEK plugs are for use in Cheminert PEEK fittings and low pressure polymeric valves (C20Z series). For high pressure polymeric valves (C1-C5 series), use the plugs on page 50. Sold individually.

	*Length of nut**	PEEK (Sold individually) *Prod No*	*Price*
1/16" hex	.62"	MZP1PK	$10.70
1/16" long hex	.87"	LZP1PK	
1/16" fingertight	.88"	ZP1FPK	10.70

Call for a quote.

Caps 1/4-28

Caps are used to close off lines with 1/4-28 tube end fittings. Sold in packages of 5.



PEEK (Package/5)		CTFE (Package/5)	
Prod No	*Price*	*Prod No*	*Price*
CCPK-5	$37.50	CCKF-5	$75.00

CONVERSIONS

0.25 mm = .010"
0.50 mm = .020"
0.75 mm = .030"

1.0 mm = .040"
1.5 mm = .060"
2.0 mm = .080"

4.6 mm = .180"
6.0 mm = .236"
6.4 mm = .253"

7.0 mm = .275"
10.0 mm = .400"

27.0 mm = 1.08"

1/32" = 0.8 mm
1/16" = 1.6 mm
1/8" = 3.2 mm

1/4" = 6.4 mm
3/8" = 9.5 mm
1/2" = 12.7 mm

CHEMINERT FITTINGS

Unions — CHEMINERT TO CHEMINERT — 1/4-28 TO 1/4-28

PEEK and CTFE unions include flangeless 1/4-28 fittings for tubing OD indicated.

Polypropylene union bodies are for use with flanged tubing only and do not include any fittings.

		PEEK		CTFE	
OD	*Bore*	*Prod No*	*Price*	*Prod No*	*Price*
1/16"	0.25 mm	CUCPK		CUCKF	$25.00
	0.50 mm	CUPK		CUKF	21.00
	0.75 mm	CUMPK	$21.00	CUMKF	21.00

Call for a quote. Also available for 1/8" tubing.

		Polypropylene	
		Prod No	*Price*
1/8" *(Pkg/5)*	Butt connection	JR-060-5	$12.50

Unions — CHEMINERT TO 1/16" ZDV — 1/4-28 TO 10-32

Include flangeless 1/4-28 and ZDV 10-32 fittings for 1/16" tubing.

		CTFE	
OD	*Bore*	*Prod No*	*Price*
1/16"	0.25 mm	CZUCKF	$25.00

Also available in PEEK and 316 stainless bodies.

Bulkhead unions — CHEMINERT TO CHEMINERT — 1/4-28 TO 1/4-28

Include flangeless 1/4-28 fittings for tubing OD indicated.

		PEEK		CTFE		316 Stainless	
OD	*Bore*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
1/16"	0.50 mm	CBUPK		CBUKF	$25.00	CBUS6	
	0.75 mm	CBUMPK	$25.00	CBUMKF		CBUMS6	
1/8"	1.50 mm	CBULPK	25.00	CBULKF	25.00	CBULS6	$21.00

Call for a quote. 1/16" OD is also available in 0.25 mm bore.

Tees — 1/4-28

Include flangeless 1/4-28 fittings for tubing OD indicated.

		CTFE	
Tubing OD	*Bore*	*Prod No*	*Price*
1/16"	0.25 mm	CTCKF	$42.00
	0.50 mm	CTKF	35.00
	0.75 mm	CTMKF	35.00
1/8"	1.50 mm	CTLKF	35.00

Also available in PEEK.

CALL FOR QUOTES

Unions,1/4-28 to 1/2-20

Bulkhead unions, 1/4-28 to 10-32

CONVERSIONS

0.25 mm = .010"
0.50 mm = .020"
0.75 mm = .030"

1.0 mm = .040"
1.5 mm = .060"
2.0 mm = .080"

4.6 mm = .180"
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1/32" = 0.8 mm
1/16" = 1.6 mm
1/8" = 3.2 mm

1/4" = 6.4 mm
3/8" = 9.5 mm
1/2" = 12.7 mm

Mixing tees 1/4-28

Include flangeless 1/4-28 fittings for tubing OD indicated.

		CTFE	
Tubing OD	*Bore*	*Prod No*	*Price*
1/16"	0.75 mm	CM1XKF	$70.00

Also available in PEEK and 1/8" fittings.

Adapter CHEMINERT 1/4-28 TO VALCO 10-32 ZDV

This adapter permits Valco 10-32 fittings to be installed into any 1/4-28 fitting detail. (Nut and ferrule are not included.)

Bore	*Prod No*	*Price*
0.50 mm	ZLCA1PK	$23.00

Luer adapters LUER TO 1/4-28 OR 10-32

Luer adapters make a leak-tight connection from luer to 1/4-28 threads.

			PEEK		CTFE		PFA	
		Bore	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
1/4-28 male to	Female luer	1.50 mm	CFLAPK	$18.00	CFLAKF	$18.00	CFLAPFA	$18.00
	Male luer	1.50 mm	CMLAPK	18.00	CMLAKF	Call for a quote .	CMLAPFA	18.00

Call for a quote .

Luer adapter bulkhead unions LUER TO 1/4-28 OR 10-32

Our luer adapter bulkhead union connects a male or female luer to 1/4-28 or 10-32 fittings. These are the ideal fittings for through-the-panel syringe injections. The 1/4-28 versions include flangeless fittings for 1/16" OD tubing. Versions with 10-32 connections (for 1/16" OD tubing) include a fingertight PEEK nut and a ferrule of the same material as the union.

			PEEK		CTFE	
		Bore	*Prod No*	*Price*	*Prod No*	*Price*
Female luer	to 1/4-28	1.50 mm	CBUFLPK	$28.00	CBUFLKF	Call for a quote .
	to 10-32	1.00 mm	ZBUFLPK	Call for a quote .	ZBUFLKF	$26.00
Male luer	to 10-32	1.00 mm	ZBUMLPK	26.00	ZBUMLKF	Call for a quote .

Call for a quote .

CALL FOR QUOTES

Crosses,1/4-28

Manifolds,1/4-28

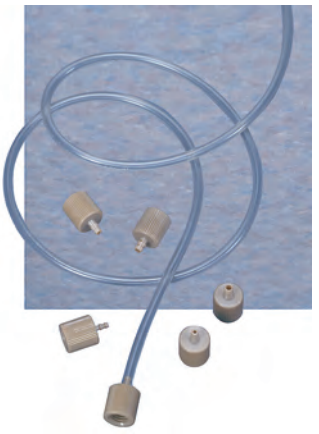
Tube adapters have male 1/4-28 threads going to 1/4" or 1/8" OD tubing.

Pipe adapters connect 1/4-28 fittings to male or female NPT.

CHEMINERT FITTINGS

Perifit fittings

FOR PERISTALTIC PUMP TUBING



The Cheminert Perifit is a unique fitting with a barb on one end and a 1/4-28 female fitting on the other end, for connecting a FIA line with the most commonly used peristaltic tubing. The fitting is compact and easy to install while providing a secure, trouble-free connection. A Perifit can be used as a "stop" on standard inexpensive Tygon® tubing, eliminating the need to buy the more expensive pre-cut tubing with pre-installed stops. Unlike many competitive systems, Perifits are reusable as the tubing wears.

Three sizes of Perifits are available to cover the range of tubing most commonly used in FIA.

For use with tubing sizes	*Prod No*	*Price*
0.50 to 1.02 mm ID	C-PFS	$7.75
1.12 to 1.65 mm ID	C-PFM	7.75
1.85 to 2.29 mm ID	C-PFL	8.85

Mobile phase filters

DIRECT CONNECT

Cheminert mobile phase filters provide point-of-use filtering of common HPLC or FIA solvents. They are designed to connect directly to 1/8" OD PTFE or PEEK tubing using a simple press fit. The filter housing is PTFE and includes a 2 or 10 micron titanium frit.

Pore size	*Prod No*	*Price*
10 micron	C-MPFTI10	$21.00

Also available in 2 micron.

Biocompatible filters

This all-PEEK filter can be placed in any 1/16" line, providing filtration to 0.5 microns. The filter can be changed without tools, since both the filter housing and the fittings are designed to be hand tightened. The filter element is PEEK-encapsulated titanium.

		Prod No	*Price*
Filter for 1/16" tubing	0.5 mm bore	ZU1FPK.5	$95.00
Replacement filter element	0.5 micron pore size	C-F1.5TI	$5.35

Call for a quote .

In-line filters

1/4-28

These convenient filters can be simply dropped into any 1/4-28 fitting detail. Constructed of PTFE and CTFE, with a 316 stainless low-pressure-drop screen.

Pore size	*Prod No*	*Price*
2 micron	CFE-S2	$7.00
10 micron	CFE-S10	7.00
75 micron	CFE-S75	7.00

Last Drop mobile phase filters

FROM VICI JOUR

The Last Drop mobile phase filter allows more analyses per batch of mobile phase and helps reduce hazardous waste. The flat filter element sits parallel to the bottom of the reservoir, allowing the Last Drop to filter all but the last 2% of the mobile phase from the reservoir without drawing air into the system. Compare this with conventional cylindrical filters that can begin to draw air into the system when nearly 10% of the solvent remains in the reservoir.

The Last Drop mobile phase filter consists of a 316 stainless or PTFE filter element pressed into an inert PTFE housing. The top of the housing has a PEEK tripod which slips into 1.5, 2.2, or 3.5 mm ID pump inlet lines. It will also work with our 1/16" and 1/8" flangeless fittings.

Use the metal-free PTFE version for sensitive biochromatography applications in which metal surfaces may corrode or interact with samples.

	Filter element	*Prod No*	*Price*
Last Drop filter, 2.5µm	PTFE	JR-9000-0520	$21.80
	Stainless steel	JR-9000-0530	21.80

Last Drop filter/spargers

FROM VICI JOUR

The Last Drop filter/sparger combines filtration and sparging in a single unit. The PTFE housing contains a mobile phase filter with either a stainless steel or a PTFE filter element.

Spargers have a porosity of 10 microns.

The filter/sparger features a PEEK tripod connector for the solvent line, and a 1/4-28 nut and ferrule for the sparging line.

	Filter element	*Prod No*	*Price*
Last Drop filter/sparger, 2.5 µm filter, 10 µm sparger	PTFE	JR-9000-0602	$68.20
	Stainless steel	JR-9000-0640	68.20

CONVERSIONS

0.25 mm = .010"
0.50 mm = .020"
0.75 mm = .030"

1.0 mm = .040"
1.5 mm = .060"
2.0 mm = .080"

4.6 mm = .180"
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27.0 mm = 1.08"

1/32" = 0.8 mm
1/16" = 1.6 mm
1/8" = 3.2 mm

1/4" = 6.4 mm
3/8" = 9.5 mm
1/2" = 12.7 mm

CHEMINERT FITTINGS

No-Met biocompatible mobile phase filters

FROM VICI JOUR

In the growing number of applications involving the separation of biomolecules, stainless steel in the flowpath is not acceptable. High salt buffers can corrode stainless steel, and the metal ions released from metallic filters may contaminate or otherwise react with the biomolecules of interest.

The No-Met polyethylene filter is designed for these applications, with inert polymeric fittings and 20 µm filter effectively eliminating metal contamination from the fluid path. Use them for IC and biochromatography applications.

Because they are hydrophobic, No-Met filters may initially require some priming with methanol or acetonitrile. They can be used up to a maximum flow rate of 500 ml/min*.

* Flow rates measured with methanol/water (1:1), ultrasonically degassed. Flow rates can vary with solvent and tubing ID.

	Prod No	*Price*
No-Met mobile phase filter, 1/8"	JR-32178	$18.20
Replacement element	JR-32179	2.65

Stainless steel mobile phase filters and helium spargers

FROM VICI JOUR

Mobile phase filters protect your HPLC system from small particles in the mobile phase. These filters are made from 316 stainless and PEEK or PTFE, and are suitable for use with most solvents.

Helium spargers offer an inexpensive way to prepare and maintain mobile phases free of dissolved gases. Connect these spargers to a regulated supply of helium gas (0 - 400 ml/min) to remove dissolved gases from the mobile phase. Spargers are made from 10 micron porosity stainless steel.

* Flow rates measured with methanol/water (1:1), ultrasonically degassed. Flow rates can vary with solvent and tubing ID.

Tubing OD	*Porosity*	*Suggested Max. Flow Rate (ml/min)**	*Prod No*	*Price*
1/16"	2 µm	35	JR-367016-2	$18.20
	10 µm	35	JR-367016-10	18.20
	20 µm	35	JR-367016-20	18.20
1/8"	2 µm	35	JR-367008-2	18.20
	10 µm	100	JR-367008-10	18.20
	20 µm	120	JR-367008-20	18.20

CONVERSIONS

0.25 mm = .010"
0.50 mm = .020"
0.75 mm = .030"

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1.5 mm = .060"
2.0 mm = .080"

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1/16" = 1.6 mm
1/8" = 3.2 mm

1/4" = 6.4 mm
3/8" = 9.5 mm
1/2" = 12.7 mm

VICI caps

FROM VICI JOUR

The VICI cap is the most economical way to helium sparge and deliver HPLC mobile phases. The insert is manufactured from PTFE, with a polypropylene screw cap and an EPDM* O-ring which is resistant to commonly used HPLC solvents.

VICI caps fit GL45 threaded bottles, and are available with 2, 3, or 4 ports with 1/4-28 threads for 1/8" or 1/16" tubing. Unused ports can be plugged as required.

Each VICI cap includes the cap with insert and o-ring, and the appropriate number of PPS nuts, ETFE ferrules, and colored polypropylene fingertight sleeves for solvent line identification.

*Ethylene Propylene Diene Monomer

	Prod No	*Price*
2 ports	JR-S-11001	$41.40
3 ports	JR-S-11002	43.60
4 ports	JR-S-11003	45.90

One-piece fingertight column coupler

FROM VICI JOUR

Choose from a variety of coupler IDs, indicated by the color of the sleeve (which parallels the color-coding of our PEEK tubing on pages 70-71). A unique feature of this column coupler is that it adapts automatically to fit all pilot lengths – Valco, Waters, Upchurch, Rheodyne, etc. Since the tubing bottoms out in any fitting detail, added void volume is minimal. Material is PEEK. Colors are red, yellow, blue, and orange.

Bore	*Color*	*Prod No*	*Price*
0.13 mm ID	Red	JR-26501	$24.50
0.17 mm ID	Yellow	JR-26502	24.50
0.25 mm ID	Blue	JR-26503	24.50
0.50 mm ID	Orange	JR-26504	24.50

COUPLER SHOWN INSTALLED BETWEEN TWO COLUMNS
(columns not included)

TECH TIP

The VICI cap is intended only for continuous helium sparging, not for building up a helium atmosphere within the solvent bottle.

MORE INFO

Bulkhead connectors . . . . . pages 56-57
Flangeless fittings 52
Plugs, 1/4-28 55
Polymeric tubing 72

LIQUID HANDLING

LIQUID HANDLING PUMPS, M SERIES

CE

The Cheminert® M Series liquid handling pump is a syringe-free pump capable of delivering a bidirectional flow over six orders of magnitude.

The M Series is a positive displacement pump, which means that it is self-priming and tolerant of any gas which may find its way into the fluid lines. There is no separate fill cycle, and the capacity is unlimited.

Three models are offered — the M6 with a flow range of 5 nl/min to 5 ml/min (10 ml/min intermittent), and the M50 with a range of 100 nl/min to 25 ml/min (35 ml/min intermittent). The M6 is also available in a high pressure model, the M6HP, rated to 1500 psi.

RS-232 and RS-485 communication protocols are incorporated into the microprocessor-driven controller.

The included software package controls flow rates, flow direction, and metered volumes.

Operating principle

At the core of the pump is a polymeric rotor housing four pistons in inert cylinders. As the microstepper motor turns the rotor, the pistons float on a stationary cam; at any given moment, one piston is filling, one is dispensing, and the other two are in transit between the fill and dispense positions.

Liquid handling pumps

OPTIONS

- Alternate materials for enhanced chemical resistance, biocompatibility, and lifetime.

Contact us for more information.

		Prod No	Price
M6	**5 nl to 5 ml range**		
M6 pump with:	Controller and stepper motor	CP2-4841-F1	$2840
	Stepper motor (no controller)	CP2-4841-SF1	2240
M6 pump only		CP2-4841-D	1590
M6HP	**5 nl to 5 ml range**		
M6HP pump with:	Controller and stepper motor	CP2-4841-F1-HP	3840
	Stepper motor (no controller)	CP2-4841-SF1-HP	3240
M6HP pump only		CP2-4841-D-HP	2590
M50 pumps	**100 nl to 25 ml range**		
M50 pump with:	Controller and stepper motor	CP3-8182-F2	3060
	Stepper motor (no controller)	CP3-8182-SF2	2460
M50 pump only		CP3-8182-D	1760
Accessories and replacement parts			
Pump motor	M6	CP-DSM	550
	M6HP	CP-DSM	550
	M50	CP-DSM2	600
Controller	M-Force	CP-CMF	600
Standoff assembly*	2"	2SOAMPCP	60
	3"	3SOAMPCP	60
	4"	4SOAMPCP	60
	6"	6SOAMPCP	60

* Adding a standoff will change the backlash. Consult factory for further information.

APPLICATIONS

- Flow cytometry, cell and drug perfusion
- HTS and robotic systems
- Infusion and microdialysis
- Micro diluters/dispensers for nl to ml range applications
- Micro liquid transfers (nl) for micro arrays
- Microtiter plate dispensing using multiposition valves

WATCH A VIDEO

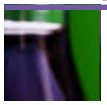
The continuous fill/ dispense design of this pump is demonstrated in a youtube video..

TECH TIP

Use a standoff assembly if the motor must be separated from the pump head. Standoffs are available in lengths of 2", 3", 4", and 6".

SPECIFICATIONS

	M6	M6HP	M50
Continuous minimum flow	5 nl/min	5 nl/min	100 nl/min
Continuous maximum flow	5 ml/min	5 ml/min	25 ml/min
Maximum back pressure	100 psi	1500 psi	100 psi
Gravimetric precision			
for 125 µl	0.50%	0.50%	0.80%
for 1.25 ml	0.05%	0.05%	0.10%
Pump internal volume (µl)	100 ± 2 µl	100 ± 2 µl	625 ± 10 µl



LIQUID HANDLING

40,000 PSI ULTRA-HIGH PRESSURE INJECTOR SYSTEM

The VICI 40K injector is comprised of six miniature air actuated needle valves, plumbed to simulate the flow path of a conventional rotor/stator injector. An integral controller sends the on/off positioning signals to each valve, coordinating them to perform load, inject, and flush functions.

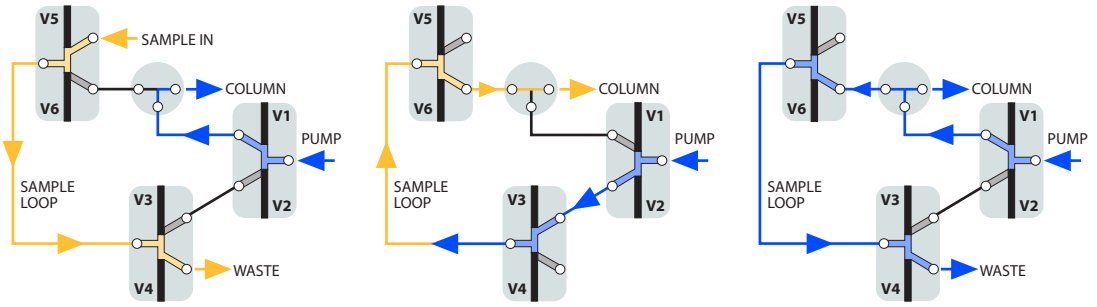
There are three methods for sending positioning commands to the injector:

- Manual control with the push buttons on the controller
- Laboratory computer via serial port communication
- Contact closure inputs

Ultra-high pressure injector system — FOR LIQUIDS

Prod No	*Price*
SPSS40	Call for a quote

SCHEMATIC DIAGRAM



Load

V1 Open V4 Open
V2 Closed V5 Open
V3 Closed V6 Closed

Inject

V1 Closed V4 Closed
V2 Open V5 Closed
V3 Open V6 Open

Flush

V1 Open V4 Open
V2 Closed V5 Closed
V3 Closed V6 Open

DIMENSIONS

TECH TIP

For more information, contact our technical department.

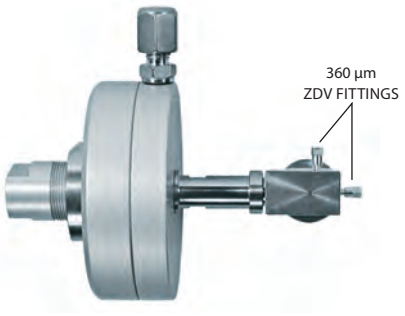
40,000 PSI ULTRA-HIGH PRESSURE VALVES

The ultra-high pressure valves that are the heart of our SPSS40 *(previous page)* are now available individually, in 1/16", 1/32", and 360 micron versions.

There are three types – a two port on/off valve, a dual on/off valve, and a 3-way prime/purge valve. *(See page 198-199 for flowpath schematics.)* The dual on/off configuration has two individually controlled outlets with a common inlet (or vice versa), emulating a rotary three way valve.

Implementation requires a single three-way solenoid: application of 50 psi opens the valve; venting the air allows the spring to return the valve to the closed position. A fitting for 1/8" air supply tubing is included; two fittings are included for dual valves. *(Fitting: prod no EAOR21, page 196.)*

ON/OFF VALVE



Ultra-high pressure valves

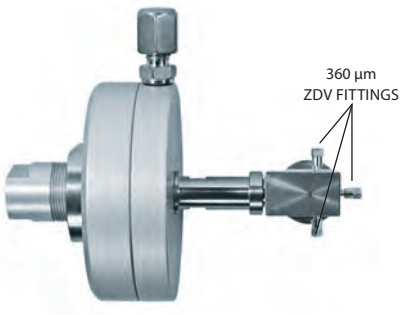
FOR LIQUIDS

Fittings	Bore	Prod No	Price
On/off valves			
360 µm	0.15 mm	ASFVO40K360	$900
1/32"	0.15 mm	ASFVO40K.5	800
1/16"	0.15 mm	ASFVO40K1	750
Prime/purge valves			
360 µm	0.15 mm	ASFV40K360	$935
1/32"	0.15 mm	ASFV40K.5	835
1/16"	0.15 mm	ASFV40K1	785
Dual on/off valves			
360 µm	0.15 mm	ASFVOD40K360	$1560
1/32"	0.15 mm	ASFVOD40K.5	1400
1/16"	0.15 mm	ASFVOD40K1	1325

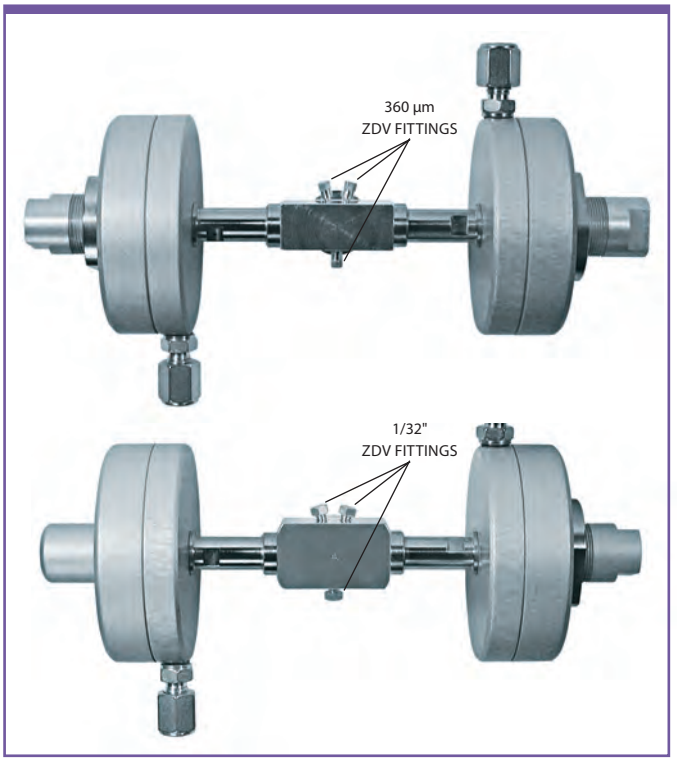
SPECIFICATIONS

Pressure
40,000 psi liq
Temperature
50°C

PRIME/PURGE VALVE



DUAL ON/OFF VALVES



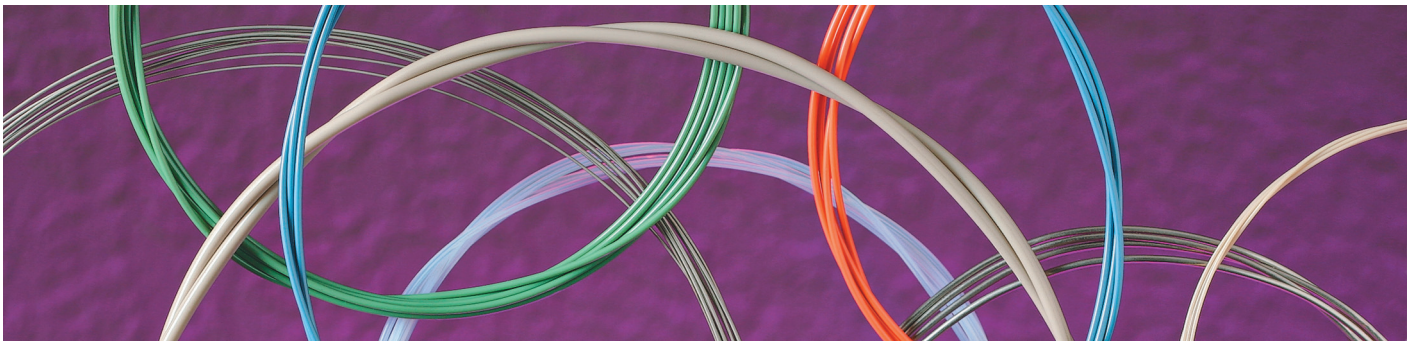
STANDARD ON/ OFF AND PRIME/ PURGE VALVES

2,000 psi to 10,000 psi valves . . . pages 198-199

TECH TIP

Three dual on/off valves comprise the ultra-high pressure injector system, SPSS40, on the facing page.

TUBING



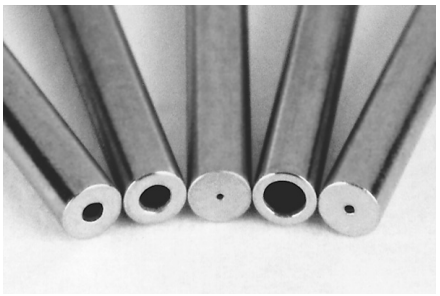
METAL AND POLYMERIC

Use of our precision cut and finished tubing along with VICI fittings and valves maintains the flow uniformity and cleanliness required by high performance systems.

We offer chromatography grade tubing in ODs of 360 µm, 1/32", 1/16", and 1/8". Tubing can be ordered in economical pre-cut standard lengths, or can be custom cut to meet your specific instrumentation requirements. All VICI metal tubing is chromatographic grade seamless drawn tubing of the highest available quality. Stainless tubing is 316 series.

VICI CUTTING AND CLEANING

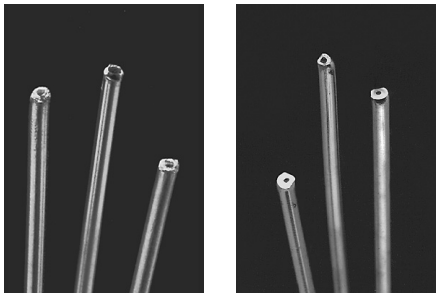
VICI's electrolytic cutting process yields polished tubing with flat ends. Each piece of VICI pre-cut metal tubing is specially cleaned with micro-filtered steam from deionized water to remove both organic and inorganic contaminants, representing a major improvement over the common practice of using organic solvents to "clean" tubing. Our test reports have been confirmed by most of the major instrument suppliers: the VICI process provides analytically clean tubing.



ELECTROLYTICALLY CUT AND POLISHED TUBING FROM VICI

IMPROPER CUTTING

Tools commonly used to cut tubing in the general laboratory environment – such as wire cutters, files, jewelers' saws, and most tubing cutters – can leave uneven ends and burrs, which create potential for dead volumes or leaks . These non-precision cutters are likely to generate particulates and deform inner and outer diameters, which can introduce dead volume and flow anomalies.



AVOID UNEVEN ENDS AND BURRS, DUE TO FILES (L) AND PLIER CUTS (R)

TECH TIP

Fifty years of Valco experience show that the particles left in poorly cut tubing are the number one cause of valve damage.

TECH TIP

For optimal zero dead volume connections, make sure your tubing meets the best industry standards—OD tolerance should be nominal dimension ± .002".

Fractional dimension	Nominal dimension
1/32"	.031"
1/16"	.062"
1/8"	.125"
1/4"	.250"
3/8"	.375"
1/2"	.500"

THREE SIZES OF ELECTROFORMED NICKEL TUBING

1/16" OD x .040" ID | 1/32" OD x .004" ID | 360 µm OD x .001" ID

ELECTROFORMED NICKEL TUBING

Our microbore EFNi tubing is made by electroplating nickel over a diamond-drawn mandrel in a continuous process. When the mandrel is removed, an internal surface with a mirror-like 1-2 microinch finish remains. The ductile nature of nickel allows the tubing to be easily manipulated. Unlike glass- or silica-lined stainless, EFNi can accept tight bends and cutting without heating, and does not release damaging glass fragments or silica particles.

COMPARISON OF INTERIOR FINISHES

A comparison of the interiors of commonly used tubing (below) shows the quality of the electroformed nickel tubing surface. (All photos are 500x magnification.) The rough interior surface of the mill-drawn Nickel 200 tubing has potential for carryover or cross contamination, and both the Nickel 200 and the stainless steel contain pits, voids, striations, and particles – problems which intensify as the ID decreases.

ELECTROFORMED NICKEL (EFNI) | NICKEL 200 ALLOY | TYPE 316 STAINLESS STEEL

COMPARISON OF INTERIOR FINISHES OF COMMONLY USED TUBING

CUSTOM ID/OD

Custom IDs/ODs are available upon request.

PRICING PER FOOT

For pricing purposes, the length is rounded up to the next foot. For example, a 5" piece is charged as one foot; an 18" piece as two feet. The price per foot is based on the length of each piece, not the total quantity ordered. Cutting and cleaning charges are included in the price per foot for EFNi tubing.

CONVERSIONS

0.05 mm = .002"
0.10 mm = .004"
0.12 mm = .005"

0.25 mm = .010"
0.50 mm = .020"
0.75 mm = .030"

1.0 mm = .040"
1.5 mm = .060"
2.0 mm = .080"

4.6 mm = .180"
6.0 mm = .236"
6.4 mm = .253"

7.0 mm = .275"
10.0 mm = .400"

27.0 mm = 1.08"

1/32" = 0.8 mm
1/16" = 1.6 mm
1/8" = 3.2 mm

1/4" = 6.4 mm
3/8" = 9.5 mm
1/2" = 12.7 mm

360 µm OD EFNi tubing — CUSTOM LENGTHS

See pricing note in box at left.

Tubing ID	*Prod No*	*Max length*	*Price/ft*
.001"	TEFNI.101	1 foot	$18
.002"	TEFNI.102	2 feet	18
.004"	TEFNI.104	20 feet	18
.005"	TEFNI.105	20 feet	18
.007"	TEFNI.107	20 feet	18

1/32" OD EFNi tubing — CUSTOM LENGTHS

See pricing note in box at left.

Tubing ID	*Prod No*	*Max length*	*Price/ft*
.002"	TEFNI.502	2 feet	$18
.004"	TEFNI.504	20 feet	18
.005"	TEFNI.505	20 feet	18
.007"	TEFNI.507	20 feet	18
.010"	TEFNI.510	30 feet	18
.012"	TEFNI.512	30 feet	18
.015"	TEFNI.515	30 feet	18
.020"	TEFNI.520	30 feet	18

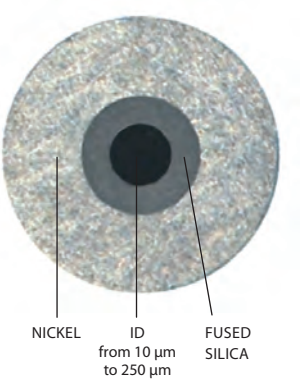
1/16" OD EFNi tubing — CUSTOM LENGTHS

See pricing note in box at left.

Tubing ID	*Prod No*	*Max length*	*Price/ft*
.020"	TEFNI120	30 feet	$18
.030"	TEFNI130	50 feet	18
.040"	TEFNI140	50 feet	18

NICKEL-CLAD FUSED SILICA TUBING

- Inert, flexible transfer lines
- Improved heat transfer
- Thick wall version allows direct connection using metal ferrules
- Rated for up to 40,000 psi (dependant on size and plating thickness)



CROSS SECTION
Nickel-clad FS tubing

We take polyimide-coated fused silica (FS) and remove the polyimide layer. Then we electrochemically plate the FS with pure nickel. The resulting nickel-plated FS tube provides superior heat transfer to the FS lining, permitting use as a flexible transfer line with the best qualities of silica-lined stainless but with improved heat transfer and a shorter bend radius.

For high pressure applications, we recommend using our 316 stainless ferrules.

Nickel-clad fused silica tubing is available in IDs from 10 µm to 700 µm, permitting use of metal ferrules for improved leak-tight connections.

1/32" (800 µm) OD nickel-clad fused silica

Tubing ID	*Prod No*	*Price/ft*
10 µm	TNFS800010	$20
15 µm	TNFS800015	20
20 µm	TNFS800020	20
25 µm	TNFS800025	20
50 µm	TNFS800050	20
100 µm	TNFS800100	20
180 µm	TNFS800180	20
250 µm	TNFS800250	20

1/16" OD nickel-clad fused silica

Tubing ID	*Prod No*	*Price/ft*
50 µm	TNFS1600050	$20
75 µm	TNFS1600075	20
100 µm	TNFS1600100	20
200 µm	TNFS1600200	20
250 µm	TNFS1600250	20
300 µm	TNFS1600300	20
400 µm	TNFS1600400	20
500 µm	TNFS1600500	20
700 µm	TNFS1600700	20

TECH TIP

For best results, order clad tubings in the precise length required. Clean cuts are difficult to achieve with the tools normally available.

PRICING PER FOOT

For pricing purposes, the length is rounded up to the next foot. For example, a 5" piece is charged as one foot; an 18" piece as two feet. The price per foot is based on the length of each piece, not the total quantity ordered. Cutting and cleaning charges are included in the price per foot for TNF tubing.

TECH TIP

VICI electrochemically plates fused silica tubing with pure nickel. This strengthens the tubing and allows direct connections using metal ferrules while maintaining the chemical benefits of the wetted surfaces inside.

CONVERSIONS

50 µm = .002"
75 µm = .003"
100 µm = .004"

125 µm = .005"
150 µm = .006"
180 µm = .007"

205 µm = .008"
250 µm = .010"
305 µm = .012"

380 µm = .015"
510 µm = .020"

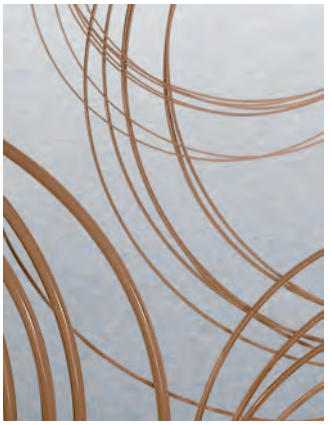
760 µm = .030"
1015 µm = .040"

800 µm = 1/32"
1600 µm = 1/16"

NATURAL PEEK TUBING

PEEK tubing has the strength required to withstand continuous use at HPLC pressure without swelling or bursting, and is not affected by halide salts, high strength buffers, or other aggressive mobile phases that corrode stainless steel. The polymer surface will not leach metal ions into the eluent or extract metal-sensitive components from the sample. Note however that dichloromethane, THF, and DMSO may cause swelling in PEEK, and concentrated nitric and sulphuric acid will attack PEEK.

OD and ID tolerances for our PEEK tubing are ±.0005" for 360 micron tubing; ±.001" for 1/32" and1/16" tubing; and ±.003" for 1/8".



MAXIMUM PRESSURE FOR PEEK TUBING

Tubing ID	Maximum Pressure
360 µm	
.002"	5200 psi
.004"	4400 psi
.005"	4000 psi
.006"	3500 psi
1/32"	
.0025"	6600 psi
.005"	6000 psi
.010"	5800 psi
.015"	3900 psi
1/16"	
.005"	6100 psi
.010"	5600 psi
.020"	4500 psi
.030"	3500 psi
1/8"	
.060"	3600 psi
.088"	2500 psi

SEE ALSO

Polymeric tubing
PTFE ..... page 72
FEP..... 72
ETFE..... 72

CUSTOM PEEK TUBING

We offer PEEK tubing custom-manufactured to meet your specific OD, ID, and color requirements. The OD range is .014" (360 micron) to 1/8", with a minimum ID of .002" for tubing up to 1/16" OD. (Maximum ID varies according to the OD.) Color coding can be solid or striped.

360 µm PEEK tubing

CUSTOM LENGTHS

Custom-length 360 µm PEEK tubing is square-cut and ready to use. Specify the length required, in inches or feet. For pricing of custom length tubing, the length is rounded up to the next foot. For example, a 5" piece is charged as one foot; an 18" piece as two feet.

	.002" ID		.004" ID		.005" ID		.006" ID	
	Prod No	*Price/ft*	*Prod No*	*Price/ft*	*Prod No*	*Price/ft*	*Prod No*	*Price/ft*
Priced per foot	TPK.102	$4.50	TPK.104	$4.50	TPK.105	$4.50	TPK.106	$4.50

1/32" OD PEEK tubing

	.0025" ID		.005" ID		.010" ID		.015" ID	
Length	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
10 feet	TPK.502-10FT	$30	TPK.505-10FT	$30	TPK.510-10FT	$26	TPK.515-10FT	$26
25 feet	TPK.502-25FT	75	TPK.505-25FT	75	TPK.510-25FT	65	TPK.515-25FT	65
100 feet	TPK.502-100FT	300	TPK.505-100FT	300	TPK.510-100FT	260	TPK.515-100FT	260

1/16" OD PEEK tubing

	.006" ID		.010" ID		.020" ID		.030" ID	
Length	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
10 feet	TPK106-10FT	$30	TPK110-10FT	$30	TPK120-10FT	$27.50	TPK130-10FT	$27.50
25 feet	TPK106-25FT	75	TPK110-25FT	75	TPK120-25FT	68.75	TPK130-25FT	68.75
100 feet	TPK106-100FT	300	TPK110-100FT	300	TPK120-100FT	275	TPK130-100FT	275

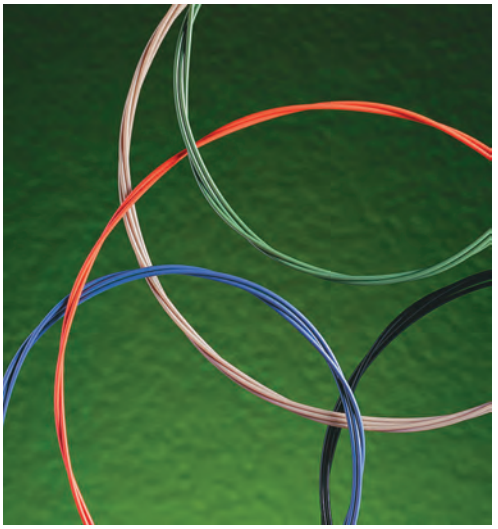
1/8" OD PEEK tubing

	.060" ID		.088" ID	
Length	*Prod No*	*Price*	*Prod No*	*Price*
10 feet	TPK260-10FT	$40	TPK288-10FT	$40
25 feet	TPK260-25FT	100	TPK288-25FT	100
100 feet	TPK260-100FT	400	TPK288-100FT	400

PEEK TUBING ELBOWS

Tubing elbows (90° and 180°) are ideal for routing 1/16" PEEK tubing through an LC system. These elbows are proportioned to bend PEEK tubing at the optimum radius for maximum chemical resistance and burst pressure. Installation is simple – just snap the tubing into the elbow.

Package of 5:	*Prod No*	*Price*
90° elbow	JR-357090-5	$8
180° elbow	JR-357180-5	9



COLOR-CODED PEEK TUBING

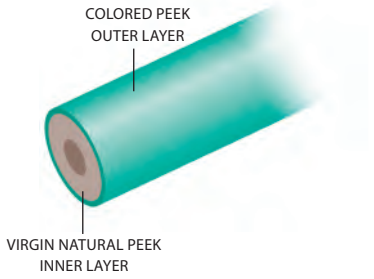
Color-coded tubing helps you identify the ID of your PEEK tubing, since each ID is a different color. Use this tubing where maximum chemical resistance and biocompatibility are required. OD and ID tolerances are ±.001".

1/16" OD Dual layer color-coded PEEK tubing CUSTOM LENGTHS

Our dual layer PEEK tubing eliminates any concern that a critical sample stream could be contaminated by pigments used to color code the tubing. It looks like any other color-coded tubing at first glance, but a closer look reveals that the pigmented layer* surrounds a separate but integrally-bonded inner layer of natural PEEK.

Tubing ID	*Color*	*bar*	*psi*	*Prod No*	*Price/ft*
.004"	Black	460	6700	JR-TD-5804	$3.90
.005"	Red	420	6100	JR-TD-6007	2.80
.007"	Yellow	400	5800	JR-TD-6008	2.80
.010"	Blue	386	5600	JR-TD-6009	2.80
.020"	Orange	350	4500	JR-TD-6010	2.80
.030"	Green	240	3500	JR-TD-6011	2.80

DUAL LAYER COLOR-CODED PEEK TUBING



*All colorants used in the manufacture of this tubing are RoHS-compliant (Restriction of Hazardous Substances)

1/16" OD Striped color-coded PEEK tubing — CUSTOM LENGTHS

A stripe* is added to the outside, so dye never contacts the fluid stream.

Specify the length required, in inches or feet. For pricing custom tubing, the length is rounded up to the next foot. For example, a 5" piece is charged as one foot; an 18" piece as two feet.

Tubing ID	*Color*	*bar*	*psi*	*Prod No*	*Price/ft*
.004"	Black	460	6700	JR-T-5804	$3.90
.005"	Red	420	6100	JR-T-5999	2.70
.007"	Yellow	400	5800	JR-T-6000	2.70
.010"	Blue	386	5600	JR-T-6001	2.70
.020"	Orange	350	4500	JR-T-6002	2.70
.030"	Green	240	3500	JR-T-6003	2.70
.040"	Grey	165	2400	JR-T-60031	2.70

1/16" OD Solid color-coded PEEK tubing — CUSTOM LENGTHS

All colorants used in the manufacturing of this tubing are RoHS-compliant.

Specify the length required, in inches or feet. For pricing custom tubing, the length is rounded up to the next foot. For example, a 5" piece is charged as one foot; an 18" piece as two feet.

Tubing ID	*Color*	*bar*	*psi*	*Prod No*	*Price/ft*
.0025"	Natural	460	6700	JR-T-5998	$2.70
.004"	Black	460	6700	JR-T-6020	2.70
.005"	Red	420	6100	JR-T-6007	2.70
.006	Purple	410	5950	JR-T-6030	2.70
.007"	Yellow	400	5800	JR-T-6008	2.70
.010"	Blue	386	5600	JR-T-6009	2.70
.015"	Grey	365	5300	JR-T-6040	2.70
.020"	Orange	350	4500	JR-T-6010	2.70
.030"	Green	240	3500	JR-T-6011	2.70

CONVERSIONS

10 ft = 3.05 m
25 ft = 7.62 m
100 ft = 30.48 m

50 µm = .002"
100 µm = .004"
125µm = .005"
150 µm = .006"

0.25 mm = .010"
0.50 mm = .020"
0.75 mm = .030"

1.0 mm = .040"
1.5 mm = .060"
2.0 mm = .080"

4.6 mm = .180"
6.0 mm = .236"
6.4 mm = .253"

7.0 mm = .275"
10.0 mm = .400"

27.0 mm = 1.08"

1/32" = 0.8 mm
1/16" = 1.6 mm
1/8" = 3.2 mm

1/4" = 6.4 mm
3/8" = 9.5 mm
1/2" = 12.7 mm

TUBING

PTFE, FEP, AND ETFE TUBING

Polymeric tubing is square cut and ready to use. Each package of polymeric tubing contains one piece of the specified length.

See also PEEK tubing, pages 69-71.

1/16" OD polymeric tubing

	.006" ID		.010" ID		.015" ID		.020" ID		.030" ID	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
PTFE										
10 feet	TTF106-10FT	$15.00	TTF110-10FT	$15.00	TTF115-10FT	$15.00	TTF120-10FT	$15.00	TTF130-10FT	$15.00
25 feet	TTF106-25FT	37.50	TTF110-25FT	37.50	TTF115-25FT	37.50	TTF120-25FT	37.50	TTF130-25FT	37.50
100 feet	TTF106-100FT	150	TTF110-100FT	150	TTF115-100FT	150	TTF120-100FT	150	TTF130-100FT	150

	.010" ID		.020" ID		.030" ID	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
FEP						
10 feet	TFEP110-10FT	$16.00	TFEP120-10FT	$16.00	TFEP130-10FT	$16.00
25 feet	TFEP110-25FT	40.00	TFEP120-25FT	40.00	TFEP130-25FT	40.00
100 feet	TFEP110-100FT	160.00	TFEP120-100FT	160.00	TFEP130-100FT	160.00
ETFE						
10 feet	TTZ110-10FT	25.00	TTZ120-10FT	25.00	TTZ130-10FT	25.00
25 feet	TTZ110-25FT	62.50	TTZ120-25FT	62.50	TTZ130-25FT	62.50
100 feet	TTZ110-100FT	250	TTZ120-100FT	250	TTZ130-100FT	250

1/8" OD polymeric tubing

	.030" ID		.060" ID		.085" ID	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
PTFE						
10 feet	TTF230-10FT	$20.00	TTF260-10FT	$20.00	TTF285-10FT	$20.00
25 feet	TTF230-25FT	50.00	TTF260-25FT	50.00	TTF285-25FT	50.00
100 feet	TTF230-100FT	200.00	TTF260-100FT	200.00	TTF285-100FT	200.00

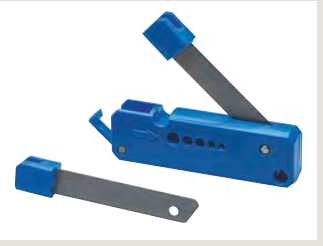
	.060" ID	
	Prod No	Price
FEP		
10 feet	TFEP260-10FT	$20.00
25 feet	TFEP260-25FT	50.00
100 feet	TFEP260-100FT	200.00
ETFE		
10 feet	TTZ260-10FT	35.00
25 feet	TTZ260-25FT	87.50
100 feet	TTZ260-100FT	350.00

TUBING CLIP – THE LC TUBING ORGANIZER

The tubing clip holds 1/16" and 1/8" polymer tubing precisely where you want them in your beakers, flasks, bottles, etc. up to 4 mm wall thickness. The stainless steel spring ensures a long lifetime.

Package of 5:	*Prod No*	*Price*
Tubing clip	JR-9001-5	$11

CLEAN-CUT POLYMER TUBING CUTTER



For leak-free tubing connections in an LC system, right angles and clean cuts are essential. The Clean-Cut makes burr-free perpendicular cuts on polymeric tubing without distorting the outside diameter or closing the inside diameter. The handy pocket-sized tool features a unique safety locking mechanism to secure the blade when not in use.

	Prod No	*Price*
Clean-Cut tubing cutter	JR-797	$16.50
Replacement blade	JR-798	2.20

SEE ALSO

PEEK tubing
Natural . . . . . page 69
Color-coded 70-71
Striped 71

CUSTOM LENGTHS

Custom lengths of PTFE tubing up to a maximum of 250 feet available on request. Additional charges may apply.

TUBING POLYMERS

PTFE Inert; very soft, easily cold flows. Produced as Teflon®

FEP Chemically resistant like PTFE, but lower creep and higher friction. More transparent than PTFE.

ETFE Resistant to most chemical attack; some chlorinated solvents will cause tubing to swell. Produced as Tefzel®

CONVERSIONS

10 ft = 3.05 m
25 ft = 7.62 m
100 ft = 30.48 m

METAL TUBING, BULK QUANTITIES

Bulk metal tubing is not electrolytically cut or cleaned. The annealing process provides tubing which is sufficiently clean for most chromatography applications. *(See note at left for cleaned custom length tubing.)*

Specify the length required, in inches or feet. For pricing of custom length tubing, the length is rounded up to the next foot. For example, a 5" piece is charged as one foot; an 18" piece as two feet. Add $2 cutting/cleaning charge for each length.

CLEANED CUSTOM LENGTH TUBING

You can order custom length tubing which has been electrolytically cut, deburred, and steam cleaned. Please contact VICI or your local distributor for product numbers and pricing.

The maximum lengths available depends on the ID of the tubing:

Tubing ID	Max length
.005"	3 ft
.007"	5 ft
.010"	10 ft
.020"	20 ft
.026"	40 ft
.030"	50 ft
>.030"	50 ft

Tubing up to 6 feet in length will be supplied straight. Longer tubes will be supplied coiled.

CONVERSIONS

50 µm = .002"
75 µm = .003"
100 µm = .004"
125µm = .005"
150 µm = .006"

0.25 mm = .010"
0.50 mm = .020"
0.75 mm = .030"

1.0 mm = .040"
1.5 mm = .060"
2.0 mm = .080"

4.6 mm = .180"
6.0 mm = .236"
6.4 mm = .253"

7.0 mm = .275"
10.0 mm = .400"

27.0 mm = 1.08"

1/32" = 0.8 mm
1/16" = 1.6 mm
1/8" = 3.2 mm

1/4" = 6.4 mm
3/8" = 9.5 mm
1/2" = 12.7 mm

360 µm OD metal tubing

BULK QUANTITIES

	75 µm ID		150 µm ID	
	Prod No	*Price/ft*	*Prod No*	*Price/ft*
316 stainless	TSS360075	$6.00	TSS360150	$6.00

1/32" OD metal tubing

BULK QUANTITIES

	.005" ID		.007" ID		.010" ID		.020" ID	
	Prod No	*Price/ft*	*Prod No*	*Price/ft*	*Prod No*	*Price/ft*	*Prod No*	*Price/ft*
316 stainless	TSS.505	$3.50	TSS.507	$3.50	TSS.510	$3.50	TSS.520	$3.50
Nickel 200	—	—	—	—	TNI.510	18.00	TNI.520	18.00

1/16" OD metal tubing

BULK QUANTITIES

	.005" ID		.010" ID		.012" ID		.015" ID	
	Prod No	*Price/ft*	*Prod No*	*Price/ft*	*Prod No*	*Price/ft*	*Prod No*	*Price/ft*
316 stainless	TSS105	$3.50	TSS110	$3.50	TSS112	$3.50	TSS115	$3.50
Hastelloy C	—	—	THC110	48.70				
Nickel 200	TNI105	10.50	TNI110	10.50				

	.020" ID		.026" ID		.030" ID		.040" ID	
	Prod No	*Price/ft*	*Prod No*	*Price/ft*	*Prod No*	*Price/ft*	*Prod No*	*Price/ft*
316 stainless	TSS120	$3.50	TSS126	$3.50	TSS130	$3.50	TSS140	$3.50
Hastelloy C	THC120	48.70	—	—	THC130	48.70	THC140	48.70
Nickel 200	TNI120	10.50	—	—	TNI130	10.50	TNI140	10.50

1/8" OD metal tubing

BULK QUANTITIES

Type 316 stainless tubing is also available in .010 and .020" ID's.

	.030" ID		.040" ID		.060" ID	
	Prod No	*Price/ft*	*Prod No*	*Price/ft*	*Prod No*	*Price/ft*
316 stainless	TSS230	$4.75	TSS240	$4.75	TSS260	$4.75

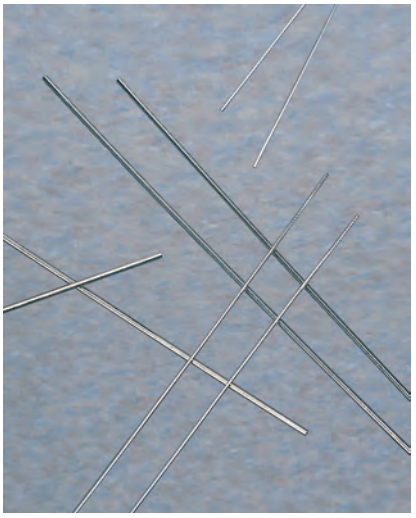
	.067" ID		.085" ID	
	Prod No	*Price/ft*	*Prod No*	*Price/ft*
316 stainless	TSS267	$4.75	TSS285	$4.75

Also available in Hastelloy C, Nickel 200, and Inconel 600. Call for a quote.

PRE-CUT STAINLESS TUBING

These packages of pre-cut Type 316 stainless tubing provide an economical solution to the problems that are caused by "seat-of-the-pants" cutting in the lab or field. They are priced to give a savings over the $2 per cut charge for custom-cut tubing.

All tubing is electrolytically cut and specially steam-cleaned with micro-filtered steam from deionized water, which removes both organic and inorganic contaminants.



1/32" OD stainless tubing

PRE-CUT KITS

	.005" ID		.010" ID		.020" ID	
Length	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
2 pieces per package						
5 cm	T5N5D	$9.50	T5N10D	$9.50	T5N20D	$9.50
10 cm	T10N5D	10.50	T10N10D	10.50	T10N20D	10.50
20 cm	T20N5D	11.60	T20N10D	11.60	T20N20D	11.60
30 cm	T30N5D	14.70	T30N10D	14.70	T30N20D	14.70
50 cm	T50N5D	16.80	T50N10D	16.80	T50N20D	16.80
100 cm	—	—	T100N10D	26.30	T100N20D	26.30
10 pieces per package						
5 cm	T5N5-10	44.10	T5N10-10	44.10	T5N20-10	44.10
10 cm	T10N5-10	48.30	T10N10-10	48.30	T10N20-10	48.30
20 cm	T20N5-10	57.80	T20N10-10	57.80	T20N20-10	57.80
30 cm	T30N5-10	66.20	T30N10-10	66.20	T30N20-10	66.20
50 cm	T50N5-10	79.00	T50N10-10	79.00	T50N20-10	79.00
100 cm	—	—	T100N10-10	121.00	T100N20-10	121.00
50 pieces per package						
5 cm	T5N5-50	200.00	T5N10-50	200.00	T5N20-50	200.00
10 cm	T10N5-50	221.00	T10N10-50	221.00	T10N20-50	221.00
20 cm	T20N5-50	284.00	T20N10-50	284.00	T20N20-50	284.00
30 cm	T30N5-50	310.00	T30N10-50	310.00	T30N20-50	310.00
50 cm	T50N5-50	373.00	T50N10-50	373.00	T50N20-50	373.00
100 cm	—	—	T100N10-50	588.00	T100N20-50	588.00
100 pieces per package						
5 cm	T5N5-100	378.00	T5N10-100	378.00	T5N20-100	378.00
10 cm	T10N5-100	420.00	T10N10-100	420.00	T10N20-100	420.00
20 cm	T20N5-100	510.00	T20N10-100	510.00	T20N20-100	510.00
30 cm	T30N5-100	567.00	T30N10-100	567.00	T30N20-100	567.00
50 cm	T50N5-100	683.00	T50N10-100	683.00	T50N20-100	683.00
100 cm	—	—	T100N10-100	1124.00	T100N20-100	1124.00

TECH TIP

Fifty years of experience have shown that the particles left in poorly cut tubing are the number one cause of valve damage.

CONVERSIONS

5 cm	=	1.97"
10 cm	=	3.94"
20 cm	=	7.87"
30 cm	=	11.82"
50 cm	=	19.68"
100 cm	=	39.37"
0.12 mm	=	.005"
0.25 mm	=	.010"
0.50 mm	=	.020"
0.75 mm	=	.030"
1.0 mm	=	.040"
1.5 mm	=	.060"
2.0 mm	=	.080"
4.6 mm	=	.180"
6.0 mm	=	.236"
6.4 mm	=	.253"
7.0 mm	=	.275"
10.0 mm	=	.400"
27.0 mm	=	1.08"
1/32"	=	0.8 mm
1/16"	=	1.6 mm
1/8"	=	3.2 mm
1/4"	=	6.4 mm
3/8"	=	9.5 mm
1/2"	=	12.7 mm

1/16" OD stainless tubing

PRE-CUT KITS

	.005" ID		.010" ID		.020" ID		.030" ID		.040" ID	
Length	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
2 pieces per package										
5 cm	T5C5D	$8.40	T5C10D	$8.40	T5C20D	$8.40	T5C30D	$8.40	T5C40D	$8.40
10 cm	T10C5D	9 .50	T10C10D	9 .50	T10C20D	9 .50	T10C30D	9 .50	T10C40D	9 .50
20 cm	T20C5D	10 .50	T20C10D	10 .50	T20C20D	10 .50	T20C30D	10 .50	T20C40D	10 .50
30 cm	T30C5D	12.60	T30C10D	12.60	T30C20D	12.60	T30C30D	12.60	T30C40D	12.60
50 cm	T50C5D	14.70	T50C10D	14.70	T50C20D	14.70	T50C30D	14.70	T50C40D	14.70
100 cm	—	—	T100C10D	23.10	T100C20D	23.10	T100C30D	23.10	T100C40D	23.10
10 pieces per package										
5 cm	T5C5-10	39.90	T5C10-10	39.90	T5C20-10	39.90	T5C30-10	39.90	T5C40-10	39.90
10 cm	T10C5-10	42.00	T10C10-10	42.00	T10C20-10	42.00	T10C30-10	42.00	T10C40-10	42.00
20 cm	T20C5-10	50.40	T20C10-10	50.40	T20C20-10	50.40	T20C30-10	50.40	T20C40-10	50.40
30 cm	T30C5-10	57.80	T30C10-10	57.80	T30C20-10	57.80	T30C30-10	57.80	T30C40-10	57.80
50 cm	T50C5-10	69.30	T50C10-10	69.30	T50C20-10	69.30	T50C30-10	69.30	T50C40-10	69.30
100 cm	—	—	T100C10-10	105.00	T100C20-10	105.00	T100C30-10	105.00	T100C40-10	105.00
50 pieces per package										
5 cm	T5C5-50	179.00	T5C10-50	179.00	T5C20-50	179.00	T5C30-50	179.00	T5C40-50	179.00
10 cm	T10C5-50	200.00	T10C10-50	200.00	T10C20-50	200.00	T10C30-50	200.00	T10C40-50	200.00
20 cm	T20C5-50	252.00	T20C10-50	252.00	T20C20-50	252.00	T20C30-50	252.00	T20C40-50	252.00
30 cm	T30C5-50	273.00	T30C10-50	273.00	T30C20-50	273.00	T30C30-50	273.00	T30C40-50	273.00
50 cm	T50C5-50	345.00	T50C10-50	345.00	T50C20-50	345.00	T50C30-50	345.00	T50C40-50	345.00
100 cm	—	—	T100C10-50	515.00	T100C20-50	515.00	T100C30-50	515.00	T100C40-50	515.00
100 pieces per package										
5 cm	T5C5-100	331.00	T5C10-100	331.00	T5C20-100	331.00	T5C30-100	331.00	T5C40-100	331.00
10 cm	T10C5-100	373.00	T10C10-100	373.00	T10C20-100	373.00	T10C30-100	373.00	T10C40-100	373.00
20 cm	T20C5-100	462.00	T20C10-100	462.00	T20C20-100	462.00	T20C30-100	462.00	T20C40-100	462.00
30 cm	T30C5-100	499.00	T30C10-100	499.00	T30C20-100	499.00	T30C30-100	499.00	T30C40-100	499.00
50 cm	T50C5-100	600.00	T50C10-100	600.00	T50C20-100	600.00	T50C30-100	600.00	T50C40-100	600.00
100 cm	—	—	T100C10-100	987.00	T100C20-100	987.00	T100C30-100	987.00	T100C40-100	987.00

CLEANED CUSTOM LENGTH TUBING

You can order custom length tubing which has been electrolytically cut, deburred, and steam cleaned. Please contact VICI or your local distributor for product numbers and pricing.

The maximum lengths available depends on the ID of the tubing:

Tubing ID	Max length
.005"	3 ft
.007"	5 ft
.010"	10 ft
.020"	20 ft
.026"	40 ft
.030"	50 ft
>.030"	50 ft

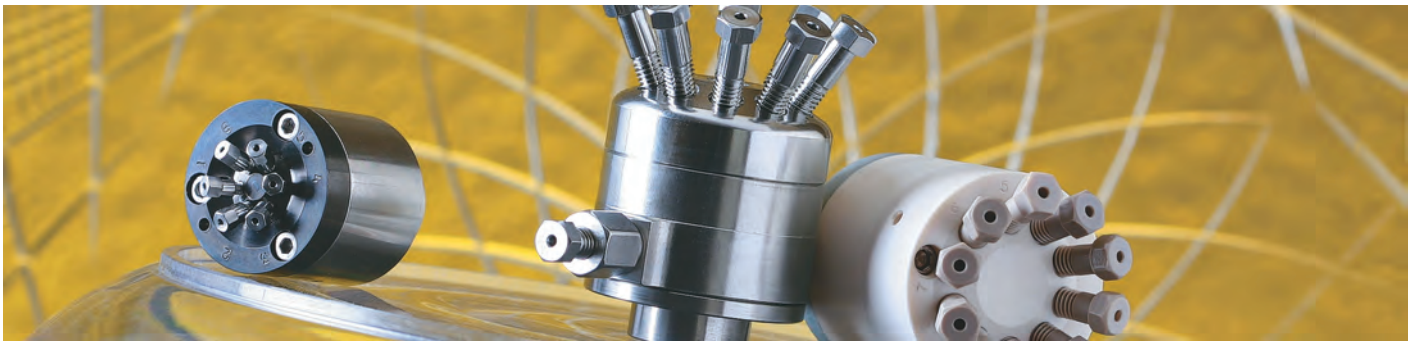
Tubing up to 6 feet in length will be supplied straight. Longer tubes will be supplied coiled.

VOLUME CHART

Tubing ID	Volume		Tubing ID	Volume	
	µl/cm	*µl/in*		*µl/cm*	*µl/in*
.005"	0.13	0.32	.030"	4.56	11.58
.010"	0.51	1.29	.040"	8.11	20.59
.015"	1.14	2.90	.060"	18.24	46.33
.020"	2.03	5.15	.070"	24.83	63.06
.025"	3.17	8.04	.085"	36.61	92.99

Typical ID tolerances for our tubing are ±.001". This is much tighter than normal commercial grades of tubing; however, it is enough to result in noticeable error if exact volumes are not measured.

VALVE SELECTION



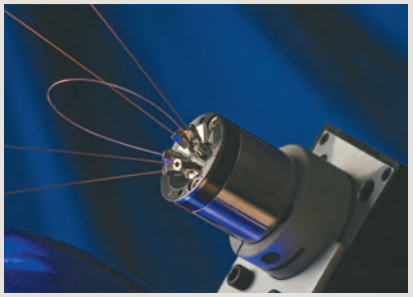
A QUICK OVERVIEW OF OUR LINE-UP

UHPLC

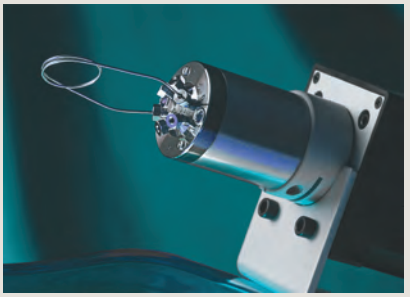
10K, 15K, AND 20K PSI INJECTORS AND SELECTORS

Cheminert UHPLC injectors, switching valves, and selectors with 360 micron, 1/32", or 1/16" fittings minimize internal volume and eliminate dead volume. Ideal for high speed, high throughput techniques.

NANOVOLUME® (100-150 µm)



MICROBORE® (250 µm)



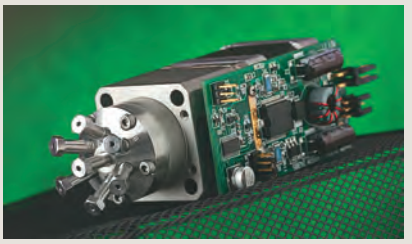
40,000 PSI ULTRA-HIGH PRESSURE INJECTOR SYSTEM

The VICI 40K UHPLC injector is comprised of six miniature air actuated needle valves, plumbed to simulate the flowpath of a conventional 6 port injector.

FOR OEMs

INTEGRATED MOTOR/VALVES

See our low and high pressure integrated motor/injector and motor/selector assemblies designed specifically to be built into OEM systems.



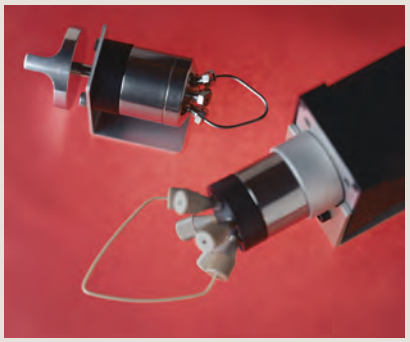
HPLC

INJECTORS AND SELECTORS

CHEMINERT

Cheminert valves for HPLC up to 5,000 psi include 4, 6, 8, and 10 port injectors, a through-the-handle front-loading injector, a continuous flow injector, and selectors with 4, 6, 8, and 10 positions. A submicroliter injector offers injection volume as small as 4 nanoliters. Valves feature 1/32" or 1/16" zero dead volume fittings with bore sizes from 0.10 mm (.004") to 0.75 mm (.030").

Injectors ..... PAGES 138-147
Internal sample injectors..... 139, 141, 145
Selectors 156-157



VALCO

Valco offers a diverse line in terms of number of ports, fitting sizes, and materials of construction. 3, 4, 6, 8, 10, 12 port versions are offered, with 1/32", 1/16", or 1/8" fittings. Alloys and polymer composites for rotors and bodies can meet virtually any system requirement. However, longest lifetime is provided by our Cheminert coated-stator injectors.

Injectors .....PAGES 96-98
Internal sample injectors.....95
Selectors 114-115

LC/FIA

LOW PRESSURE VALVES AND SELECTORS

The Cheminert line offers two position valves with 4, 6, 8, 10, 12, or 14 ports, and stream selectors that can choose from as many as 28 streams.

Two position valves are available with 1/16" Valco ZDV fittings or 1/4-28 fittings for 1/16" or 1/8" tubing. Selectors offer those options plus a model with 1/2-20 fittings for 1/4" tubing and 20-28 stream versions with 6-40 fittings for 1/16" tubing.

Valves..... PAGES 148-151
Internal sample injectors.....150
Selectors 158-161

GC

VALCO INJECTORS AND SELECTORS

Valco GC valves have been in almost all commercially-produced gas chromatographs from the time that valves originally began to replace other injection methods. New designs are smaller and easier to service, but still exhibit the quality and value that made them the industry standard.

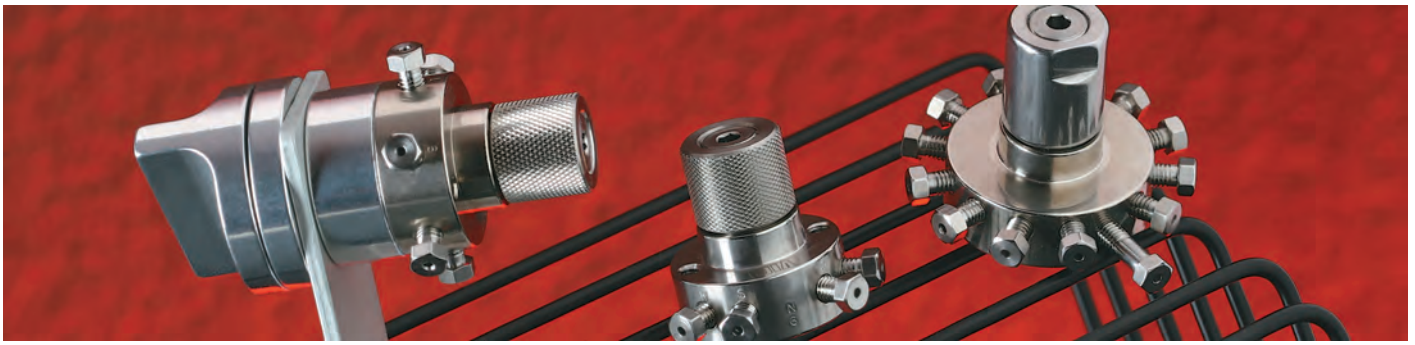
Valves.....PAGES 86-94
Internal sample injectors.....88-89
Selectors 104-113

DIAPHRAGM VALVES

The VICI diaphragm valve is designed for trouble-free use in applications requiring minimal maintenance and maximum lifetime.

Product information..... PAGES 122-124

VALCO VALVES



FOR INJECTION, SWITCHING, AND STREAM SELECTION

- 1/32", 1/16", 1/8", or 1/4" Valco ZDV fittings
- 3, 4, 6, 8, 10, 12, and 14 port and internal sample two position versions
- Five multiposition flowpath configurations with as many as 16 positions
- A variety of materials for hostile environments and continuous use at elevated temperature
- Can be configured for use at temperatures up to 350°C or pressures up to 10,000 psi

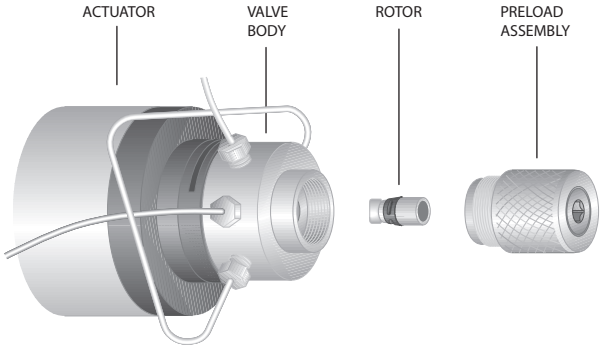
DESIGN

The Valco design lends itself to a unique variety of connecting slots and port arrangements. The rotor is held in place by a preload assembly, which allows rotor replacement without removing loops and tubing and without disengaging the valve from the actuator or mounting bracket.

In addition, the preload assembly ensures that the valve is always reassembled to the factory-set tension.

TWO POSITION INJECTOR and valve descriptions are on pages 82-83; product numbers and prices begin on page 87. For information on **SELECTORS**, refer to pages 84-85.

EXPLODED VIEW OF A VALCO VALVE



SEE ALSO

Valve descriptions

Valco valve product numbers

Applications

LEAK TESTING

The standard test methods for cross-port and outport leakage ensure valve performance at pressures and temperatures up to the specifications listed. For valves used on mass spectrometers or for ultra-trace fixed gas analysis, we recommend an optional test method utilizing a helium mass spectrometer, which provides data on mechanical leaks and on those due to seal porosity and permeability. With this method, we can certify leak rates as low as 10^{-10} cc-atm/sec.

Please consult the factory prior to ordering, since the minimum leak rate will vary widely depending on valve configuration.

LEAK RATES FOR GAS SAMPLING VALVES

The actual minimum leak rates attainable vary widely with seal material and valve type. In general, the acceptable leak rates fall into three ranges. *(See chart below.)*

In order to seal to less than 10^{-7}, the valve loading tension is increased, which somewhat lowers the maximum operating temperature and the valve lifetime. Currently, only select material can seal to 10^{-8} in most valve styles. Valcon M rotor material can seal to 10^{-10}, but has a temperature limit of 50°C.

Not all valves can achieve these leak rates. As a general rule, the larger the valve seal and port size, the higher the leak rate.

TEST METHOD FOR LIQUID SAMPLING VALVES

The standard test method for liquid valves is a pressure drop over time for both crossport and outport leakage, using isopropanol at the specified test pressure. This test is designed to ensure proper performance at the specification limit.

RANGES FOR ACCEPTABLE LEAK RATES

10^{-4} to 10^{-5} cc-atm/sec	**Commercial use** Not normally sold by VICI
10^{-6} to 10^{-7} cc-atm/sec	**General GC use** Standard tension and components
10^{-8} to 10^{-10} cc-atm/sec	**Ultra trace gas analysis** (ppb range) Higher tension and specially processed stator and rotor material

OPTIONAL LEAK TESTING WITH HELIUM MASS SPECTROMETER

To order a valve certified to have helium leak rates less than 10^{-7} cc-atm/sec, add the suffix "Z" to the valve product number. Call factory for additional cost.

Certified valves are supplied with gold-plated stainless steel ferrules.

We can generally tell you what leak rate is possible prior to manufacturing the valve.

RELIABLY CLEAN

All finished valve bodies are ultrasonically cleaned with water soluble detergents and then rinsed with hot deionized water. Finally they are given a thorough cleaning with steam from deionized water.

During valve assembly each part is cleaned with isopropanol and dried with filtered and dehumidified air. The valves are then heated and switched prior to being leak tested.

PRECAUTIONS

After unpacking the valve, do not remove the protective tape from the valve ports until you are ready to install the valve. As supplied, all surfaces are clean and free of contaminants, and must be kept clean to prevent valve damage. Open ports and fittings cause unnecessary risk of particulate matter entering the valve and scratching the sealing surfaces, which is the most frequent cause of premature valve failure.

The most common source of contamination is particulates from tubing or unfiltered samples, or samples which leave a solid residue on drying (e.g. buffers). Care should be taken that particles do not enter the valve.

SEE ALSO

Materials
Metals. . . pages 246-247
Polymers 248
Valve rotors. 249

Valco valve product numbers
GC 87-94
HPLC 95-98
Selector 104-115

TECH TIP

See **Technical Note 201, "Operation Notes and Cleaning Instructions"** for more detailed information about unpacking and handling the valve. This and other technical tips may be found in the support section of **vici.com**.

TECH TIP

For optimal zero dead volume connections, make sure your tubing meets the best industry standards. The OD tolerance should be nominal dimension ± .002".

Fractional dimension	Nominal dimension
1/32"	.031"
1/16"	.062"
1/8"	.125"
1/4"	.250"
3/8"	.375"
1/2"	.500"

MATERIALS OF CONSTRUCTION

The standard valve body material is Nitronic 60, a gall-resistant stainless steel which has proven superior to Type 316 or 303 in the majority of applications. Valves may also be ordered in Hastelloy C-22, Inconel 600, Type 316 stainless, Monel 400, Nickel 200, Nitronic 50, or Titanium.

Medium temperature GC valves have a rotor made of Valcon E, a polyaryletherketone/PTFE composite. The high temperature versions use a polyimide/PTFE/carbon composite designated Valcon T. Valcon H, a carbon-fiber-reinforced, PTFE-lubricated inert polymer, is standard in HPLC valves.

Appropriate fittings are supplied with all valves. Valves rated at 1000 psi or less have Type 303 stainless ferrules; those rated above 1000 psi have Type 316 stainless ferrules. A valve ordered with an optional body material is supplied with ferrules of the same material as the body, with Type 316 stainless nuts.

SPECIFYING A SPECIAL BODY MATERIAL

To specify a special valve body material, add the material code to the end of the valve product number, and add the amount listed in charts to the base price.

Example:
An A4C6WE (air actuated 1/16" 6 port valve with a 4" standoff) made of Hastelloy C-22 would be designated A4C6WEHC.
The cost is $875 + $180 = $1055.

Due to design requirements, several special grades of stainless steel may be used where "HPLC grade" is noted. The specific types include Nitronic 60, Type 316 stainless steel, and Type 316L stainless steel. VICI will select the material to be used based on availability and quality. HPLC grade stainless is the standard material for all Valco two position valves and high pressure multiposition valves.

SPECIAL BODY MATERIAL— CODES AND PRICES

TWO POSITION VALVES

Body material	*Code*	**1/32" fittings**	**1/16" and 1/8" fittings**	**1/4" fittings**
HPLC grade Stainless steel	SS	Standard	Standard	Standard
Hastelloy C-22	HC	$240	$180	$240
Inconel 600	IN	240	180	240
Monel 400	M4	305	240	305
Nickel	NI	420	370	420
Nitronic 50	N5	180	180	180
Titanium *	TI	305	240	305

** Not available for WT, UWT, or T series valves (high temperature) due to material temperature limit.*

SELECTORS

		1/16" and 1/8" fittings		**1/4" fittings**
Body material	*Code*	*SC and SD flowpaths*	*SF and ST flowpaths*	*SD, SC, SF flowpaths*
HPLC grade Stainless steel	SS	Standard, most versions	Standard, most versions	Standard
Hastelloy C-22	HC	$305	$370	$420
Inconel 600	IN	305	370	420
Monel 400	M4	305	370	420
Nickel	NI	610	725	840
Nitronic 50	N5	305	370	420
Titanium *	TI	305	370	420

** Not available for WT, UWT, or T series valves (high temperature) due to material temperature limit.*

TWO POSITION INJECTORS AND SWITCHING VALVES

Two position injectors and switching valves have many applications, as shown in the section beginning on page 99. In this catalog, Valco two position valves are divided into GC and HPLC sections, with the GC section starting on page 86 and the HPLC section on page 95.

Valco GC valves have been in almost all commercially-produced gas chromatographs from the time that valves originally began to replace other injection methods. New designs are smaller and easier to service, but still exhibit the quality and value that made them the industry standard.

A pioneer in products for High Performance Liquid Chromatography, Valco continues to offer a diverse line in terms of number of ports, fitting sizes, and materials of construction. Valco valves offer a wide range of rotor and body materials, with alloys and polymer composites capable of meeting virtually any system requirement. However, longest life-time is provided by our Cheminert coated-stator injectors.

SPECIFICATIONS, VALCO TWO POSITION VALVES

	Standard rotor material	*Maximum pressure*	*Maximum temp*
Sampling and switching valves			
GC	Valcon E	400 psi gas	225°C
	Valcon T	300 psi gas	330°C
	Valcon E2	100 psi gas	75°C
HPLC	Valcon H	5000 psi liq	75°C
Internal sample injectors			
GC	Valcon E	1000 psi liq	175°C
HPLC	Valcon H	5000 psi liq	75°C

PORT DIAMETERS

Fitting size	*Standard port diameter*	
1/32"	0.25 mm	(.010")
1/16"	0.40 mm	(.016")
	0.75 mm	(.030")
1/8"	0.75 mm	(.030")
1/4"	4.0 mm	(.156")
For special port diameters, please consult factory.		

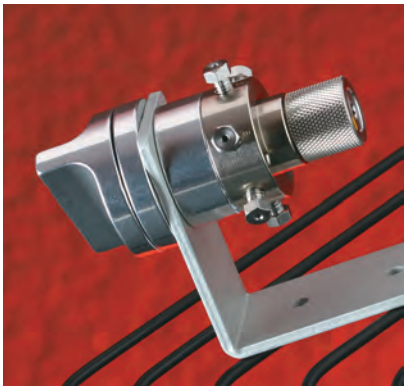
OPTIONAL ROTORS

Valcon M	400 psi	50°C
Valcon P	400 psi	175°C
Valcon R	400 psi	75°C
Valcon TF	200 psi	50°C
See page 249 for a discussion of rotor materials.		

MORE INFO

Applications

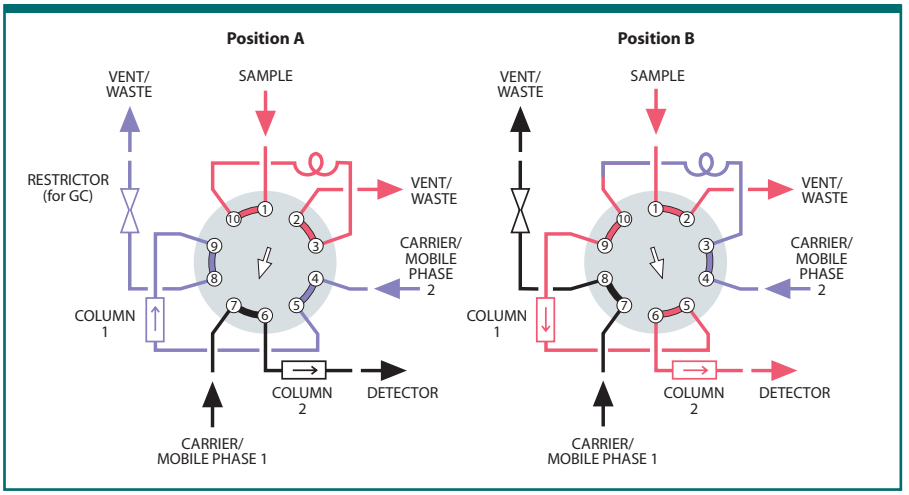
Valco valves

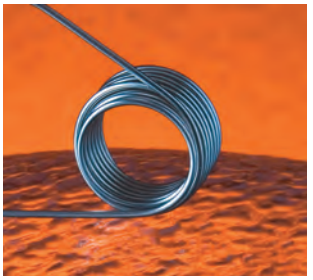


SAMPLE INJECTORS

Since the most common method of sample injection utilizes a 6 port valve with an external sample loop, 6 port valves are often referred to as "injectors". However, as the Applications section shows, 6 port valves can do more than inject sample, and 8 and 10 port valves can be sample injectors at the same time they're also being backflushers or column switchers. One more variation is the 4 port internal sample injector *(pages 88-89 and 95)*, which is used when the sample size must be smaller than the smallest available loop. The internal sample "loop" is actually an engraved connecting slot on the rotor which is sized to contain a specified amount of sample.

10 PORT VALVE — **LOOP SAMPLING WITH BACKFLUSH OF PRE-COLUMN TO VENT**





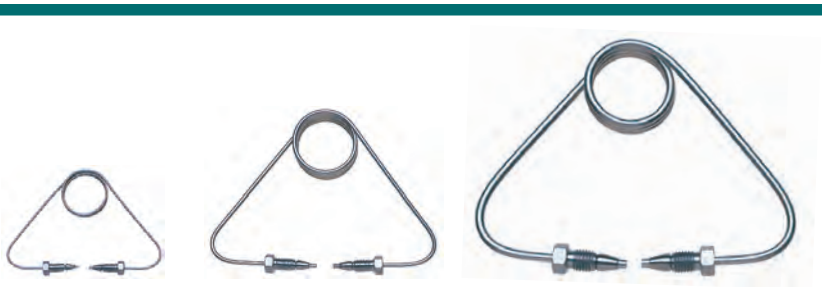
SAMPLE LOOPS

Loops are electrolytically cut and electrochemically polished to ensure square, burr-free ends, then cleaned with microfiltered steam from deionized water. Standard material is Type 316 stainless, but loops can be supplied in electroformed nickel, Hastelloy C, Nickel 200, titanium, or several polymers. Consult the factory for availability.

Valco sample loops are accurately sized for each valve type. However, with small volume loops, the tolerance on the ID of the tubing (±0.001") can have a significant effect on the volume. Therefore, loop volumes and loop appearance may differ from batch to batch.

SEE APPLICATION VIDEOS

See VICI valve applications in motion at vici.com> support> valve applications.



1/32"
0.25 mm bore

1/16"
0.40 and 0.75 mm bore

1/8"
0.75 mm bore

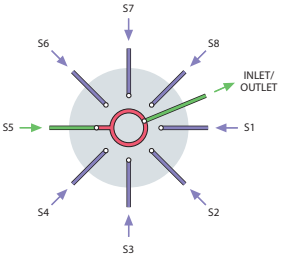
VALCO SELECTORS

Instead of the back and forth switching of two position valves, selectors (multiposition valves) step incrementally through continuous revolutions (bi-directionally with universal and modular universal actuators). While we can supply older models, all the valves in this catalog have a preload assembly. This design allows the rotor to be inspected or replaced without taking the valve off the actuator, and valves ordered with a microelectric actuator are permanently aligned.

FLOWPATH CONFIGURATIONS

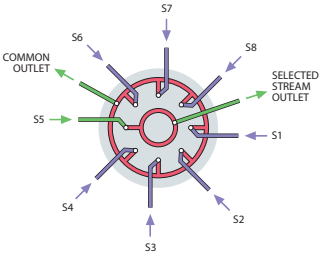
SD (DEAD-ENDED) valves select one of 4 to 16 dead-ended streams, directing it through the valve outlet to a sample valve, pressure sensor, detector, column, etc. The same configuration can also direct one stream to a number of outlets for fraction collection.

SD – Dead-end



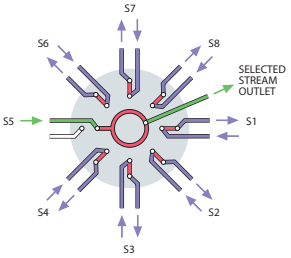
SC (COMMON OUTLET) selectors are similar to SDs, except that instead of being dead-ended the non-selected streams flow to a common outlet.

SC – Common outlet



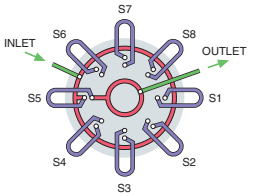
SF (FLOW-THROUGH) selectors are similar to SDs and SCs, selecting a stream and sending it to the outlet. However, SFs allow the non-selected streams to flow through individual outlets instead of a common outlet.

SF – Flow-through



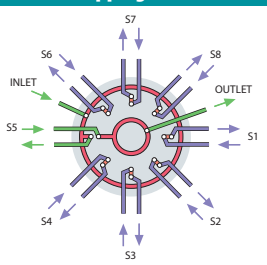
ST (TRAPPING) selectors are used for multi-column, multi-sample, or multi-trap operations.

ST – Trapping



STF (TRAPPING/FLOW-THROUGH) selectors are similar to STs, with the single difference being that the non-selected streams are returned to their own vents or sources rather than being dead-ended or trapped as they are in the standard ST configuration.

STF – Trapping/ flow-throw



PORT DIAMETERS

LOW PRESSURE

Fitting size	*No. of positions*	*Standard port diameter*	
SD			
1/16"	4 - 16	0.75 mm	(.030")
1/8"	4 - 16	1.0 mm	(.040")
1/4"	4 - 10	4.0 mm	(.156")
SC			
1/16"	4 - 16	1.0 mm	(.040")
1/8"	4 - 16	1.0 mm	(.040")
1/4"	4 - 8	4.0 mm	(.156")
SF			
1/16"	4 - 16	1.0 mm	(.040")
1/8"	4 - 16	1.0 mm	(.040")
1/4"	4 - 8	4.0 mm	(.156")
ST			
1/16"	4 - 16	0.75 mm	(.030")
1/8"	4 - 16	1.0 mm	(.040")
STF			
1/16"	4 - 16	0.75 mm	(.030")
1/8"	4 - 16	1.0 mm	(.040")

PORT DIAMETERS

HIGH PRESSURE

Fitting size	*No. of positions*	*Standard port diameter*	
SD			
1/16"	4 - 12	0.40 mm	(.016")
1/8"	4, 6, 8	0.75 mm	(.030")
ST			
1/16"	4, 6	0.40 mm	(.016")

LOW PRESSURE SELECTORS

Valco low pressure selectors are available with 1/16", 1/8", or 1/4" fittings. (For port diameters, refer to the chart on the facing page.) The 1/16" and 1/8" selectors can be ordered with 4, 6, 8, 10, 12, or 16 positions, in any of the five flowpath configurations. Selectors with 1/4" fittings are available in SD, SC, and SF flowpaths: SDs have 4, 6, 8, or 10 positions; SCs and SFs have 4, 6, or 8 positions.

Although not shown in this catalog, these selectors are also available in a higher temperature version. While actual specifications vary with the configuration, typical specifications are 200 psi and 330°C. Optional internal purge is available for SD, SC, SF, and ST flowpaths with 1/16" or 1/8" fittings. Consult our technical staff for more information.

SPECIFICATIONS, VALCO SELECTORS

LOW PRESSURE

Fittings size	*Number of positions*	*Standard rotor material*	*Maximum pressure*	*Maximum temp*	*Maximum pressure*	*Maximum temp*
			SD Dead-end flowpath		**SC Common outlet flowpath**	
1/16"	4 - 16	Valcon E	400 psi gas	200°C	200 psi gas	200°C
1/8"	4 - 8	Valcon E	400 psi gas	200°C	200 psi gas	200°C
	10 - 16	Valcon E	200 psi gas	200°C	200 psi gas	200°C
1/4"	4 - 8	Valcon E2	100 psi gas	75°C	100 psi gas	75°C
			SF Flow-through flowpath		**ST Trapping flowpath**	
1/16"	4 - 16	Valcon E	200 psi gas	200°C	200 psi gas	200°C
1/8"	4 - 16	Valcon E	200 psi gas	200°C	200 psi gas	200°C
1/4"	4 - 8	Valcon E2	100 psi gas	75°C		
			STF Trapping/Flow-through flowpath			
1/16"	4 - 16	Valcon E	200 psi gas	200°C		
1/8"	4 - 16	Valcon E	200 psi gas	200°C		

Note: All low pressure 1/16" and 1/8" valves are also available in versions up to 330°C.

HIGH PRESSURE SELECTORS

Valco high pressure selectors are available in SD and ST flowpaths. SD selectors with 1/16" fittings are available in 4, 6, 8, 10, or 12 positions, while 1/8" selectors can be ordered with 4, 6, 8, or 10 positions. ST flowpath UW selectors have 1/16" fittings, with either 4 or 6 positions. (For port diameters, refer to the chart on the facing page.)

SPECIFICATIONS, VALCO SELECTORS

HIGH PRESSURE

Fittings size	*Number of positions*	*Standard rotor material*	*Maximum pressure*	*Maximum temp*	*Maximum pressure*	*Maximum temp*
			SD Dead-end flowpath		**ST Trapping flowpath**	
1/16"	4 - 12	Valcon E	5000 psi liq	75°C	5000 psi liq	75°C
1/8"	4 - 8	Valcon E	5000 psi liq	75°C		

MORE INFO

Loops, if required, are found on corresponding valve pages.

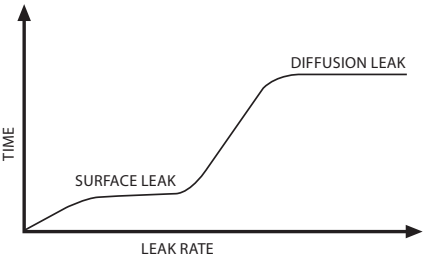
For special port diameters, please consult the factory.

VALCO VALVES

INTERNALLY PURGED INJECTORS AND SELECTORS

- Protect your work – block any possible diffusion from the atmosphere
- Protect your workplace – safely vent any fugitive emissions from the valve
- Available on 1/16" and 1/8" UW and MW type valves with E, P, or M rotor material

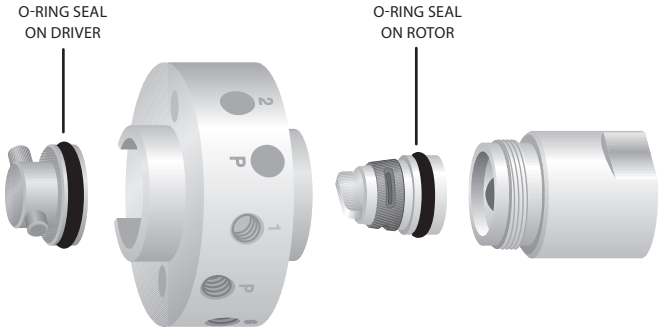
The measurement of low ppb gas concentrations may necessitate the purging of any leakage across the sealing surfaces and/or any diffusion through the sealing material. Designs which employ a "purging groove" on the rotor are successful at capturing surface leaks, but are ineffective at purging the air which diffuses through the polymeric rotor.

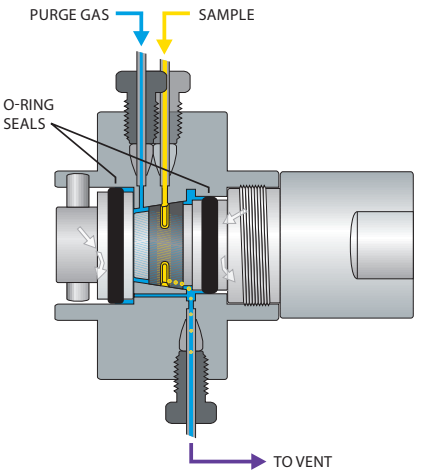


Valco offers two methods for capturing and purging both types of leakage – a built-in internal purge and an external purge housing. The built-in purge feature offers significant advantages over the older external purge housing, which must still be used on the smaller W type valves. Size and weight are dramatically reduced, and the valve rotor is easy to access. (A purge housing must be removed for rotor replacement.)

The purge feature can also serve as a safety measure, containing fugitive emissions when pyrophoric, toxic, or carcinogenic materials are present in the sample stream.

See product number charts on facing page. Contact the factory to inquire about internallyl purged selectors and other two position sizes.





NOTE: ONLY ONE VALVE PORT IS INDICATED, SO THAT THE PURGE DESIGN MAY BE CLEARLY SEEN.

CROSS SECTION – INTERNALLY PURGED VALVE

MASS SPEC LEAK RATE CERTIFICATION

We offer mass spec leak rate certification. Please contact the factory to discuss your application.

SEE ALSO

External purge housing 182

Internally purged
Sampling and switching valves

1/16" FITTINGS, 0.75 MM PORTS (.030")

SPECIFICATIONS

400 psi gas
225°C max
Valve body: Nitronic 60
Rotor: Valcon E

OPTIONS

- 3 and 12 port valves available
- 3", 4:, and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium *(see pages 246-247)*

Includes 2" standoff. Not available in manual version.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Sample loops are not included with valves. Order separately.

Internally purged
Med temp
1/16" 0.75 mm




	4 Ports		6 Ports		8 Ports		10 Ports	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
With air actuator	A2C4UWEPI	$895	A2C6UWEPI	$950	A2C8UWEPI	$1005	A2C10UWEPI	$1005
With universal act.	EUDA-2C4UWEPI	1515	EUDA-2C6UWEPI	1570	EUDA-2C8UWEPI	1625	EUDA-2C10UWEPI	1625
Replacement valve	DC4UWEPI	630	DC6UWEPI	685	DC8UWEPI	740	DC10UWEPI	740
Replacement rotor	SSAC4UWEPI	105	SSAC6UWEPI	105	SSAC8UWEPI	105	SSAC10UWEPI	105

INTERNALLY PURGED 10 PORT VALVE
1/16" fittings, 2" standoff

INTERNALLY PURGED INTERNAL SAMPLE INJECTOR
1/16" fittings, 2" standoff

Internally purged
Internal sample injectors

1/16" FITTINGS, 0.75 MM PORTS (.030")

SPECIFICATIONS

1000 psi liq
175°C max
Valve body: Nitronic 60
Rotor: Valcon E

OPTIONS

- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium *(see pages 246-247)*

Includes 2" standoff. Not available in manual version.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

Internally purged
Med temp
Internal sample
1/16" 0.75 mm

Sample volume	.2 µl		.5 µl		1 µl		2 µl	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
With air actuator	A2CI4UWE.2PI	$945	A2CI4UWE.5PI	$945	A2CI4UWE1PI	$945	A2CI4UWE2PI	$945
With universal act.	EUDA-2CI4UWE.2PI	1565	EUDA-2CI4UWE.5PI	1565	EUDA-2CI4UWE1PI	1565	EUDA-2CI4UWE2PI	1565
Replacement valve	DCI4UWE.2PI	680	DCI4UWE.5PI	680	DCI4UWE1PI	680	DCI4UWE2PI	680
Replacement rotor	SSACI4UWE.2PI	105	SSACI4UWE.5PI	105	SSACI4UWE1PI	105	SSACI4UWE2PI	105

VALCO VALVES

Internal sample injectors

1/32" FITTINGS, 0.25 MM PORTS (.010")

Med temp
Internal sample
1/32" 0.25 mm

Includes 2" standoff. Manual version is not available without standoff.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

SPECIFICATIONS

1000 psi liq
175°C max
Valve body: Nitronic 60
Rotor: Valcon E

Sample volume	.06 µl		.1 µl		.2 µl		.5 µl	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual w/ standoff	2NI4WE.06	$830	2NI4WE.1	$830	2NI4WE.2	$830	2NI4WE.5	$830
With air actuator	A2NI4WE.06	995	A2NI4WE.1	995	A2NI4WE.2	995	A2NI4WE.5	995
With universal act.	EUHA-2NI4WE.06	1590	EUHA-2NI4WE.1	1590	EUHA-2NI4WE.2	1530	EUHA-2NI4WE.5	1530
Replacement valve	DNI4WE.06	730	DNI4WE.1	730	DNI4WE.2	730	DNI4WE.5	730
Replacement rotor	SSANI4WE.06	79	SSANI4WE.1	79	SSANI4WE.2	79	SSANI4WE.5	79

OPTIONS

- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium *(see pages 246-247)*

Internal sample injectors

1/16" FITTINGS, 0.40 MM PORTS (.016")

Med temp
Internal sample
1/16" 0.40 mm

Includes 2" standoff. Manual version has no standoff.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

SPECIFICATIONS

1000 psi liq
175°C max
Valve body: Nitronic 60
Rotor: Valcon E

Sample volume	.06 µl		.1 µl		.2 µl		.5 µl	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	Price
Manual	CI4WE.06	$655	CI4WE.1	$655	CI4WE.2	$655	CI4WE.5	$655
Manual w/ standoff	2CI4WE.06	705	2CI4WE.1	705	2CI4WE.2	705	2CI4WE.5	705
With air actuator	A2CI4WE.06	870	A2CI4WE.1	870	A2CI4WE.2	870	A2CI4WE.5	870
With universal act.	EUHA-2CI4WE.06	1465	EUHA-2CI4WE.1	1465	EUHA-2CI4WE.2	1465	EUHA-2CI4WE.5	1465
Replacement valve	DCI4WE.06	605	DCI4WE.1	605	DCI4WE.2	605	DCI4WE.5	605
Replacement rotor	SSACI4WE.06	79	SSACI4WE.1	79	SSACI4WE.2	79	SSACI4WE.5	79

OPTIONS

- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium *(see pages 246-247)*
- Also available with 6 and 8 ports. See application illustration on page 99.

INTERNAL SAMPLE INJECTOR
1/16" fittings, air actuator
with 2" standoff

MORE INFO

VALCO VALVES

Internal sample injectors

1/16" FITTINGS, 0.75 MM PORTS (.030")

SPECIFICATIONS

1000 psi liq
175°C max
Valve body: Nitronic 60
Rotor: Valcon E

Includes 2" standoff. Manual version has no standoff.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

Med temp
Internal sample
1/16" 0.75 mm

OPTIONS

- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium *(see pages 246-247)*
- Available in an internally purged version for trace level analysis *(pages 86-87)*
- Also available with 6 and 8 ports. See application illustration on page 99.

Sample volume	.2 µl		.5 µl		1 µl		2 µl	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual	CI4UWE.2	$665	CI4UWE.5	$665	CI4UWE1	$665	CI4UWE2	$665
Manual w/ standoff	2CI4UWE.2	705	2CI4UWE.5	705	2CI4UWE1	705	2CI4UWE2	705
With air actuator	A2CI4UWE.2	870	A2CI4UWE.5	870	A2CI4UWE1	870	A2CI4UWE2	870
With universal act.	EUDA-2CI4UWE.2	1490	EUDA-2CI4UWE.5	1490	EUDA-2CI4UWE1	1490	EUDA-2CI4UWE2	1490
Replacement valve	DCI4UWE.2	605	DCI4UWE.5	605	DCI4UWE1	605	DCI4UWE2	605
Replacement rotor	SSACI4UWE.2	79	SSACI4UWE.5	79	SSACI4UWE1	79	SSACI4UWE2	79

Internal sample injectors

1/8" FITTINGS, 0.75 MM PORTS (.030")

SPECIFICATIONS

1000 psi liq
175°C max
Valve body: Nitronic 60
Rotor: Valcon E

Includes 2" standoff. Manual version has no standoff.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

Med temp
Internal sample
1/8" 0.75 mm

OPTIONS

- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium *(see pages 246-247)*
- Available in an internally purged version for trace level analysis *(pages 86-87)*
- Also available with 6 and 8 ports. See application illustration on page 99.

Sample volume	.2 µl		.5 µl		1 µl		2 µl	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual	I4UWE.2	$655	I4UWE.5	$655	I4UWE1	$655	I4UWE2	$655
Manual w/ standoff	2I4UWE.2	705	2I4UWE.5	705	2I4UWE1	705	2I4UWE2	705
With air actuator	A2I4UWE.2	870	A2I4UWE.5	870	A2I4UWE1	870	A2I4UWE2	870
With universal act.	EUDA-2I4UWE.2	1490	EUDA-2I4UWE.5	1490	EUDA-2I4UWE1	1490	EUDA-2I4UWE2	1490
Replacement valve	DI4UWE.2	605	DI4UWE.5	605	DI4UWE1	605	DI4UWE2	605
Replacement rotor	SSAI4UWE.2	79	SSAI4UWE.5	79	SSAI4UWE1	79	SSAI4UWE2	79

TECH TIP

For low ppb gas concentrations, we offer versions of the valves on this page with an internal purge feature to vent any leakage across the sealing surfaces and/or any diffusion through the sealing material. *(see pages 86-87)*

INTERNAL SAMPLE INJECTOR
1/8" fittings, universal actuator
with 2" standoff

VALCO VALVES

Sampling and switching valves

1/32" FITTINGS, 0.25 MM PORTS (.010")

Med temp | 1/32" | 0.25 mm

Includes 4" standoff. Manual version not available without standoff.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Sample loops are not included with valves. Order separately.




	4 Ports		6 Ports		8 Ports		10 Ports	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual with standoff	4N4WE	$780	4N6WE	$835	4N8WE	$890	4N10WE	$890
With air actuator	A4N4WE	945	A4N6WE	1000	A4N8WE	1055	A4N10WE	1055
With universal actuator	EUHA-4N4WE	1540	EUHA-4N6WE	1595	EUHA-4N8WE	1650	EUHA-4N10WE	1650
Replacement valve	DN4WE	680	DN6WE	735	DN8WE	790	DN10WE	790
Replacement rotor	SSAN4WE	79	SSAN6WE	79	SSAN8WE	79	SSAN10WE	79

SPECIFICATIONS

400 psi gas
225°C max
Valve body: Nitronic 60
Rotor: Valcon E

OPTIONS

- 3 and 12 port valves available
- 2", 3", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium *(see pages 246-247)*

Sampling and switching valves

1/32" FITTINGS, 0.25 MM PORTS (.010")

High temp | 1/32" | 0.25 mm

Includes 4" standoff. Manual version not available without standoff.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Sample loops are not included with valves. Order separately.

	4 Ports		6 Ports		8 Ports		10 Ports	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual with standoff	4N4WT	$780	4N6WT	$835	4N8WT	$890	4N10WT	$890
With air actuator	A4N4WT	945	A4N6WT	1000	A4N8WT	1055	A4N10WT	1055
With universal actuator	EUHA-4N4WT	1540	EUHA-4N6WT	1595	EUHA-4N8WT	1650	EUHA-4N10WT	165 0
Replacement valve	DN4WT	680	DN6WT	735	DN8WT	790	DN10WT	790
Replacement rotor	SSAN4WT	79	SSAN6WT	79	SSAN8WT	79	SSAN10WT	79

SPECIFICATIONS

300 psi gas
350°C max
Valve body: Nitronic 60
Rotor: Valcon T

OPTIONS

- 3 and 12 port valves available
- 2", 3", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium *(see pages 246-247)*

6 PORT VALVE
1/32" fittings, universal actuator
with 4" standoff

1/32" Stainless steel loops

Each stainless steel loop includes two stainless nuts and two stainless ferrules. Order special fittings separately.

These loops are for use with valves on this page.

Volume	*Prod No*	*Price*	*Volume*	*Prod No*	*Price*
2 µl	SL2NW	$28	25 µl	SL25NW	$28
5 µl	SL5NW	28	50 µl	SL50NW	30
10 µl	SL10NW	28	100 µl	SL100NW	30
15 µl	SL15NW	28	250 µl	SL250NW	34
20 µl	SL20NW	28	500 µl	SL500NW	41

ABOUT LOOPS

- Other materials are available in many sizes: Electroformed Nickel, Nickel 200, PEEK, and PTFE
- Sample loop shape and dimensions may vary from batch to batch due to fluctuations in tubing ID. Loop volume is controlled as closely as possible, but is not calibrated.

MORE INFO

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Sampling and switching valves

1/16" FITTINGS, 0.40 MM PORTS (.016")

SPECIFICATIONS

400 psi gas
225°C max
Valve body: Nitronic 60
Rotor: Valcon E

OPTIONS

- 3 and 12 port valves available
- 2", 3", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium *(see pages 246-247)*
- Smaller and larger bores available in most configurations.

Includes 4" standoff. Manual version has no standoff
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Sample loops are not included with valves. Order separately.

Med temp
1/16" 0.40 mm




	4 Ports		6 Ports		8 Ports		10 Ports	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual	C4WE	$605	C6WE	$660	C8WE	$715	C10WE	$715
Manual with standoff	4C4WE	655	4C6WE	710	4C8WE	765	4C10WE	765
With air actuator	A4C4WE	820	A4C6WE	875	A4C8WE	930	A4C10WE	930
With universal actuator	EUHA-4C4WE	1415	EUHA-4C6WE	1470	EUHA-4C8WE	1525	EUHA-4C10WE	1525
Replacement valve	DC4WE	555	DC6WE	610	DC8WE	665	DC10WE	665
Replacement rotor	SSAC4WE	79	SSAC6WE	79	SSAC8WE	79	SSAC10WE	79

Sampling and switching valves

1/16" FITTINGS, 0.40 MM PORTS (.016")

SPECIFICATIONS

300 psi gas
350°C max
Valve body: Nitronic 60
Rotor: Valcon T

OPTIONS

- 3 and 12 port valves available
- 2", 3", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium *(see pages 246-247)*
- Smaller and larger bores available in most configurations.

Includes 4" standoff
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Sample loops are not included with valves. Order separately.

High temp
1/16" 0.40 mm

	4 Ports		6 Ports		8 Ports		10 Ports	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual with standoff	4C4WT	$655	4C6WT	$710	4C8WT	$765	4C10WT	$765
With air actuator	A4C4WT	820	A4C6WT	875	A4C8WT	930	A4C10WT	930
With universal actuator	EUHA-4C4WT	1415	EUHA-4C6WT	1470	EUHA-4C8WT	1525	EUHA-4C10WT	1525
Replacement valve	DC4WT	555	DC6WT	610	DC8WT	665	DC10WT	665
Replacement rotor	SSAC4WT	79	SSAC6WT	79	SSAC8WT	79	SSAC10WT	79

10 PORT VALVE
1/16" fittings, air actuator
with 4" standoff

ABOUT LOOPS

- Other materials are available in many sizes: Electroformed Nickel, Hastelloy C, Nickel 200, PEEK, PTFE, and Titanium
- Loops > 2 ml are made from 1/8" OD tubing with TIG welded 1/16" tube ends.
- Sample loop shape and dimensions may vary from batch to batch due to fluctuations in tubing ID. Loop volume is controlled as closely as possible, but is not calibrated.

1/16" Stainless steel loops

Each stainless steel loop includes two stainless nuts and two stainless ferrules. Order special fittings separately.

These loops are for use with valves on this page.

Volume	*Prod No*	*Price*	*Volume*	*Prod No*	*Price*	*Volume*	*Prod No*	*Price*
2 µl	SL2CW	$25	25 µl	SL25CW	$25			
5 µl	SL5CW	25	50 µl	SL50CW	25	1 ml	SL1KCW	$39
10 µl	SL10CW	25	100 µl	SL100CW	25	2 ml	SL2KCW	50
15 µl	SL15CW	25	250 µl	SL250CW	30	5 ml	SL5KCW	58
20 µl	SL20CW	25	500 µl	SL500CW	34	10 ml	SL10KCW	76

VALCO VALVES

Sampling and switching valves

1/16" FITTINGS, 0.75 MM PORTS (.030")

Med temp

1/16″ **0.75 mm**

Includes 4" standoff. Manual version has no standoff.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Sample loops are not included with valves. Order separately.




	4 Ports		6 Ports		8 Ports		10 Ports	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual	C4UWE	$605	C6UWE	$660	C8UWE	$715	C10UWE	$715
Manual with standoff	4C4UWE	655	4C6UWE	710	4C8UWE	765	4C10UWE	765
With air actuator	A4C4UWE	820	A4C6UWE	875	A4C8UWE	930	A4C10UWE	930
With universal act.	EUDA-4C4UWE	1440	EUDA-4C6UWE	1495	EUDA-4C8UWE	1550	EUDA-4C10UWE	1550
Replacement valve	DC4UWE	555	DC6UWE	610	DC8UWE	665	DC10UWE	665
Replacement rotor	SSAC4UWE	79	SSAC6UWE	79	SSAC8UWE	79	SSAC10UWE	79

4 PORT VALVE
1/16" fittings, air actuator
with 4" standoff

SPECIFICATIONS

400 psi gas
225°C max
Valve body: Nitronic 60
Rotor: Valcon E

OPTIONS

- 3, 12 and 14 port valves available
- 2", 3", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium *(see pages 246-247)*
- For trace analysis, we offer a version which purges any leakage across the sealing surfaces and/or any diffusion through the sealing material. *(see pages 86-87)*
- Larger bore available

Sampling and switching valves

1/16" FITTINGS, 0.75 MM PORTS (.030")

High temp

1/16″ **0.75 mm**

Includes 4" standoff.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Sample loops are not included with valves. Order separately.

	4 Ports		6 Ports		8 Ports		10 Ports	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual with standoff	4C4UWT	$655	4C6UWT	$710	4C8UWT	$765	4C10UWT	$765
With air actuator	A4C4UWT	820	A4C6UWT	875	A4C8UWT	930	A4C10UWT	930
With universal act.	EUDA-4C4UWT	1440	EUDA-4C6UWT	1495	EUDA-4C8UWT	1550	EUDA-4C10UWT	1550
Replacement valve	DC4UWT	555	DC6UWT	610	DC8UWT	665	DC10UWT	665
Replacement rotor	SSAC4UWT	79	SSAC6UWT	79	SSAC8UWT	79	SSAC10UWT	79

SPECIFICATIONS

300 psi gas
350°C max
Valve body: Nitronic 60
Rotor: Valcon T

OPTIONS

- 3, 12 and 14 port valves available
- 2", 3", and 6" standoffs
- Materials as listed above
- Larger bore available

1/16" Stainless steel loops

Each stainless steel loop includes two stainless nuts and two stainless ferrules.
Order special fittings separately.

These loops are for use with valves on this page.

Volume	*Prod No*	*Price*	*Volume*	*Prod No*	*Price*	*Volume*	*Prod No*	*Price*
5 µl	SL5CUW	$25	25 µl	SL25CUW	$25	1 ml	SL1KCUW	$39
10 µl	SL10CUW	25	50 µl	SL50CUW	25	2 ml	SL2KCUW	50
15 µl	SL15CUW	25	100 µl	SL100CUW	25	5 ml	SL5KCUW	58
20 µl	SL20CUW	25	250 µl	SL250CUW	30	10 ml	SL10KCUW	76
			500 µl	SL500CUW	34			

ABOUT LOOPS

- Other materials are available in many sizes: Electroformed Nickel, Hastelloy C, Nickel 200, PEEK, PTFE, and Titanium
- Loops > 2 ml are made from 1/8" OD tubing with TIG welded 1/16" ends or reducing unions.
- Sample loop shape and dimensions may vary from batch to batch due to fluctuations in tubing ID. Loop volume is controlled as closely as possible, but is not calibrated.

Sampling and switching valves

1/8" FITTINGS, 0.75 MM PORTS (.030")

SPECIFICATIONS

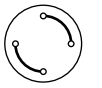
400 psi gas
225°C max
Valve body: Nitronic 60
Rotor: Valcon E

OPTIONS

- 3, 12 and 14 port valves available
- 2", 3", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium *(see pages 246-247)*
- For trace analysis, we offer a version which purges any leakage across the sealing surfaces and/or any diffusion through the sealing material. *(see pages 86-87)*
- Larger bore available

Includes 4" standoff. Manual version has no standoff.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Sample loops are not included with valves. Order separately (*see facing page*).

Med temp
1/8" 0.75 mm




	4 Ports		6 Ports		8 Ports		10 Ports	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual	4UWE	$605	6UWE	$660	8UWE	$715	n/a	
Manual with standoff	44UWE	655	46UWE	710	48UWE	765	410UWE	$765
With air actuator	A44UWE	820	A46UWE	875	A48UWE	930	A410UWE	930
With universal act.	EUDA-44UWE	1440	EUDA-46UWE	1495	EUDA-48UWE	1550	EUDA-410UWE	1550
Replacement valve	D4UWE	555	D6UWE	610	D8UWE	665	D10UWE	665
Replacement rotor	SSA4UWE	79	SSA6UWE	79	SSA8UWE	79	SSA10UWE	79

10 PORT VALVE
1/8" fittings, universal actuator with 4" standoff

Sampling and switching valves

1/8" FITTINGS, 0.75 MM PORTS (.030")

SPECIFICATIONS

300 psi gas
350°C max
Valve body: Nitronic 60
Rotor: Valcon T

OPTIONS

- 3, 12 and 14 port valves available
- 2", 3", and 6" standoffs
- Materials as listed above
- Larger bore available

Includes 4" standoff. Manual version not available without standoff.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Sample loops are not included with valves. Order separately.

High temp
1/8" 0.75 mm

	4 Ports		6 Ports		8 Ports		10 Ports	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual with standoff	44UWT	$665	46UWT	$710	48UWT	$765	410UWT	$765
With air actuator	A44UWT	820	A46UWT	875	A48UWT	930	A410UWT	930
With universal act.	EUDA-44UWT	1440	EUDA-46UWT	1495	EUDA-48UWT	1550	EUDA-410UWT	1550
Replacement valve	D4UWT	555	D6UWT	610	D8UWT	665	D10UWT	665
Replacement rotor	SSA4UWT	79	SSA6UWT	79	SSA8UWT	79	SSA10UWT	79

ABOUT LOOPS

- Other materials are available in many sizes: Electroformed Nickel, Hastelloy C, Nickel 200, PEEK, PTFE, and Titanium
- Loops <100 µl are made from 1/16" OD tubing with TIG welded 1/8" tube ends.
- Sample loop shape and dimensions may vary from batch to batch due to fluctuations in tubing ID. Loop volume is controlled as closely as possible, but is not calibrated.

1/8" Stainless steel loops

Each stainless steel loop includes two stainless nuts and two stainless ferrules.
Order special fittings separately.

These loops are for use with valves on this page.

Volume	*Prod No*	*Price*	*Volume*	*Prod No*	*Price*	*Volume*	*Prod No*	*Price*
10 µl	SL10UW	$39	100 µl	SL100UW	$30	5 ml	SL5KUW	$44
15 µl	SL15UW	39	250 µl	SL250UW	30	10 ml	SL10KUW	62
20 µl	SL20UW	39	500 µl	SL500UW	33	20 ml	SL20KUW	110
25 µl	SL25UW	39	1 ml	SL1KUW	33			
50 µl	SL50UW	39	2 ml	SL2KUW	36			

VALCO VALVES

Sampling and switching valves

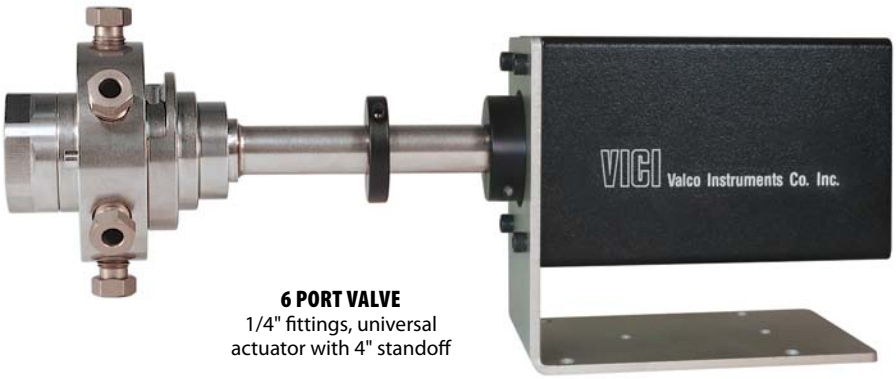
1/4" FITTINGS, 4.0 MM PORTS (.156")

Low temp

1/4" 4.0 mm

Includes 4" standoff. Manual version not available without standoff.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Sample loops are not available.

	4 Ports		6 Ports		8 Ports	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual with standoff	4VL4MWE2	$1220	4VL6MWE2	$1275	4VL8MWE2	$1330
With air actuator	A4VL4MWE2	1310	A4VL6MWE2	1365	A4VL8MWE2	1420
With universal actuator	EUTA-4VL4MWE2	1950	EUTA-4VL6MWE2	2005	EUTA-4VL8MWE2	2060
Replacement valve	DVL4MWE2	1045	DVL6MWE2	1100	DVL8MWE2	1155
Replacement rotor	SSAVL4MWE2	184	SSAVL6MWE2	184	SSAVL8MWE2	184



6 PORT VALVE
1/4" fittings, universal actuator with 4" standoff

SPECIFICATIONS

100 psi gas
75°C max
Valve body: Nitronic 60
Rotor: Valcon E2

OPTIONS

- 2", 3", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium *(see pages 246-247)*

MORE INFO

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Internal sample injectors — 1/16" FITTINGS, 0.40 MM PORTS (.016") AND 0.25 MM COLUMN PORT DIAMETER (.010")

SPECIFICATIONS

5000 psi liq
75°C max
Valve body: Nitronic 60
Rotor: Valcon H

Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

5,000 psi
Internal sample
1/16" 0.40 mm

OPTIONS

- 2", 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium *(see pages 246-247)*
- 1/32" fittings with 0.25 mm bore (.010") also available. Consult factory for product number and pricing.

Sample volume	.06 µl		.1 µl		.2 µl		.5 µl	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual	CI4W.06	$655	CI4W.1	$655	CI4W.2	$655	CI4W.5	$655
With universal actuator	EUHA-CI4W.06	1465	EUHA-CI4W.1	1465	EUHA-CI4W.2	1465	EUHA-CI4W.5	1465
Replacement valve	DCI4W.06	605	DCI4W.1	605	DCI4W.2	605	DCI4W.5	605
Replacement rotor	SSACI4W.06	79	SSACI4W.1	79	SSACI4W.2	79	SSACI4W.5	79

INTERNAL SAMPLE INJECTOR
1/16" fittings, 0.40 mm ports

INTERNAL SAMPLE INJECTOR
1/16" fittings, 0.75 mm ports,

Internal sample injectors — 1/16" FITTINGS, 0.75 MM PORTS (.030")

SPECIFICATIONS

5000 psi liq
75°C max
Valve body: Nitronic 60
Rotor: Valcon H

Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

5,000 psi
Internal sample
1/16" 0.75 mm

OPTIONS

- 2", 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium *(see pages 246-247)*
- 1/32" fittings with 0.25 mm bore (.010") also available. Consult factory for product number and pricing.

Sample volume	.2 µl		.5 µl		1 µl		2 µl	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual	CI4UW.2	$705	CI4UW.5	$705	CI4UW1	$705	CI4UW2	$705
With universal actuator	EUDA-CI4UW.2	1490	EUDA-CI4UW.5	1490	EUDA-CI4UW1	1490	EUDA-CI4UW2	1490
Replacement valve	DCI4UW.2	655	DCI4UW.5	655	DCI4UW1	655	DCI4UW2	655
Replacement rotor	SSACI4UW.2	79	SSACI4UW.5	79	SSACI4UW1	79	SSACI4UW2	79

VALCO VALVES

Injectors and switching valves

1/16" FITTINGS, 0.40 MM PORTS (.016")

5,000 psi
Analytical
1/16" 0.40 mm

Universal actuator: 24 VDC, with autosensing 24 VDC power supply. Includes serial interface. See page 174 for other interface options.
Sample loops are not included with valves. Order separately.

	 4 Ports		 6 Ports		 8 Ports		 10 Ports	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual	C4W	$605	C6W	$660	C8W	$715	C10W	$715
With universal actuator	EUHA-C4W	1415	EUHA-C6W	1470	EUHA-C8W	1525	EUHA-C10W	1525
Replacement valve	DC4W	555	DC6W	610	DC8W	665	DC10W	665
Replacement rotor	SSAC4W	79	SSAC6W	79	SSAC8W	79	SSAC10W	79

6 PORT VALVE
1/16" fittings, 0.40 mm ports

SPECIFICATIONS

5000 psi liq
75°C max
Valve body: Nitronic 60
Rotor: Valcon H

OPTIONS

- 3 and 12 port valves available
- 2", 3", 4", and 6" standoffs
- 1/32" and 1/16" versions available with 0.25 mm (.010") bore
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium *(see pages 246-247)*

1/16" Stainless steel loops

Each stainless steel loop includes two stainless nuts and two stainless ferrules. Order special fittings separately.

These loops are for use with valves on this page.

Volume	*Prod No*	*Price*	*Volume*	*Prod No*	*Price*
2 µl	SL2CW	$25	100 µl	SL100CW	$25
5 µl	SL5CW	25	250 µl	SL250CW	30
10 µl	SL10CW	25	500 µl	SL500CW	34
15 µl	SL15CW	25	1 ml	SL1KCW	39
20 µl	SL20CW	25	2 ml	SL2KCW	50
25 µl	SL25CW	25	5 ml	SL5KCW	58
50 µl	SL50CW	25	10 ml	SL10KCW	76

ABOUT LOOPS

- Other materials available in many sizes: Electroformed Nickel, Hastelloy C, Nickel 200, PEEK, PTFE, and Titanium
- Loops > 2 ml are made from 1/8" OD tubing with TIG welded 1/16" tube ends or reducing unions.
- Sample loop shape and dimensions may vary from batch to batch due to fluctuations in tubing ID. Loop volume is controlled as closely as possible, but is not calibrated.

MORE INFO

Actuators
Air ..... page 179
Manual 190
Microelectric 176
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Materials
Metals 246-247
Polymers 248
Valve rotors 249
Standoff
assemblies 187

Injectors and switching valves

1/16" FITTINGS, 0.75 MM PORTS (.030")

SPECIFICATIONS

5000 psi liq
75°C max
Valve body: Nitronic 60
Rotor: Valcon H

OPTIONS

- 3, 12, and 14 port valves available
- 2", 3", 4", and 6" standoffs
- 1/32" and 1/16" versions available with 0.25 mm (.010") bore
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium *(see pages 246-247)*

Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Sample loops are not included with valves. Order separately.

5,000 psi
Semi-prep
1/16" 0.75 mm

	4 Ports		6 Ports		8 Ports		10 Ports	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual *	C4UW	$605	C6UW	$660	C8UW	$715	C10UW	$715
With universal actuator	EUDA-C4UW	1415	EUDA-C6UW	1470	EUDA-C8UW	1525	EUDA-C10UW	1525
Replacement valve	DC4UW	555	DC6UW	610	DC8UW	665	DC10UW	665
Replacement rotor	SSAC4UW	79	SSAC6UW	79	SSAC8UW	79	SSAC10UW	79

* Manual version is not recommended.

8 PORT VALVE
1/16" fittings, 0.75 mm ports

1/16" Stainless steel loops

Each stainless steel loop includes two stainless nuts and two stainless ferrules. Order special fittings separately.

These loops are for use with valves on this page.

Volume	*Prod No*	*Price*	*Volume*	*Prod No*	*Price*
3 µl	SL3CUW	$25	100 µl	SL100CUW	$25
5 µl	SL5CUW	25	250 µl	SL250CUW	30
10 µl	SL10CUW	25	500 µl	SL500CUW	34
15 µl	SL15CUW	25	1 ml	SL1KCUW	39
20 µl	SL20CUW	25	2 ml	SL2KCUW	50
25 µl	SL25CUW	25	5 ml	SL5KCUW	58
50 µl	SL50CUW	25	10 ml	SL10KCUW	76

ABOUT LOOPS

- Other materials available in many sizes: Electroformed Nickel, Hastelloy C, Nickel 200, PEEK, PTFE, and Titanium
- Loops > 2 ml are made from 1/8" OD tubing with TIG welded 1/16" tube ends or reducing unions.
- Sample loop shape and dimensions may vary from batch to batch due to fluctuations in tubing ID. Loop volume is controlled as closely as possible, but is not calibrated.

VALCO VALVES

Injectors and switching valves

1/8" FITTINGS, 0.75 MM PORTS (.030")

5,000 psi
Semi-prep
1/8" | 0.75 mm

Manual 10 port includes 2" standoff.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Sample loops are not included with valves. Order separately.




	4 Ports		6 Ports		8 Ports		10 Ports	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual (not recommended)	4UW	$655	6UW	$710	8UW	$765	210UW	$765
With universal actuator	EUDA-4UW	1490	EUDA-6UW	1545	EUDA-8UW	1600	EUDA-10UW	1600
Replacement valve	D4UW	605	D6UW	660	D8UW	715	D10UW	715
Replacement rotor	SSA4UW	79	SSA6UW	79	SSA8UW	79	SSA10UW	79

SPECIFICATIONS

5000 psi liq
75°C max
Valve body: Nitronic 60
Rotor: Valcon H

OPTIONS

- 3 and 12 port valves available
- 2", 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium *(see pages 246-247)*

Injectors and switching valves

1/8" FITTINGS, LARGE BORE

5,000 psi
Prep
1/8" | Large bore

Manual 10 port includes 2" standoff.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Sample loops are not included with valves. Order separately.

	4 Ports 1.7 mm (.067")		6 Ports 1.7 mm (.067")		8 Ports 1.3 mm (.050")		10 Ports 1.0 mm (.040")	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual (not recommended)	L4UW	$710	L6UW	$765	L8UW	$820	2L10UW	$820
With universal actuator	EUDA-L4UW	1545	EUDA-L6UW	1600	EUDA-L8UW	1655	EUDA-L10UW	1655
Replacement valve	DL4UW	660	DL6UW	715	DL8UW	770	DL10UW	770
Replacement rotor	SSAL4UW	111	SSAL6UW	111	SSAL8UW	111	SSAL10UW	111

SPECIFICATIONS

5000 psi liq
75°C max
Valve body: Nitronic 60
Rotor: Valcon H

OPTIONS

- 2", 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium *(see pages 246-247)*

1/8" Stainless steel loops

Each stainless steel loop includes two stainless nuts and two stainless ferrules. Order special fittings separately.

These loops are for use with valves on the chart above.

Volume	*Prod No*	*Price*	*Volume*	*Prod No*	*Price*
For semi-prep valves (0.75 mm bore)			**For semi-prep and prep valves (0.75 mm and large bore)**		
10 µl	SL10UW	$39	100 µl	SL100UW	$30
15 µl	SL15UW	39	250 µl	SL250UW	30
20 µl	SL20UW	39	500 µl	SL500UW	33
25 µl	SL25UW	39	1 ml	SL1KUW	33
50 µl	SL50UW	39	2 ml	SL2KUW	36
			5 ml	SL5KUW	44
			10 ml	SL10KUW	62
			20 ml	SL20KUW	110

ABOUT LOOPS

- Other materials are available in many sizes: Electroformed Nickel, Hastelloy C, Nickel 200, PEEK, PTFE, and Titanium
- Loops < 100 µl are made from 1/16" OD tubing with TIG welded 1/8" tube ends.
- Sample loop shape and dimensions may vary from batch to batch due to fluctuations in tubing ID. Loop volume is controlled as closely as possible, but is not calibrated.

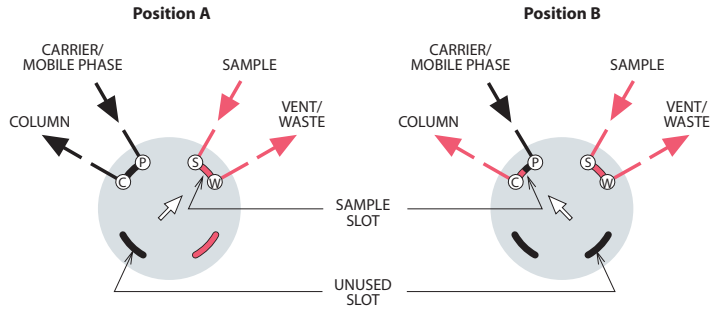
4 PORT VALVE
1/8" fittings

MORE INFO

SEE VIDEOS OF APPLICATIONS

See VICI valve applications in motion in the support section of vici.com.

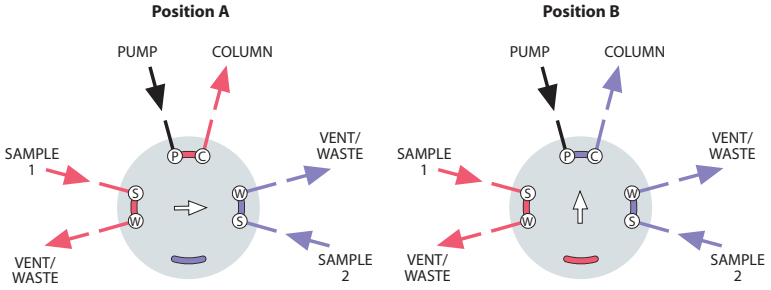
4 PORT – INTERNAL SAMPLE INJECTOR



MICROVOLUME SAMPLE INJECTION

The internal sample (fixed volume) flowpath is used when very small sample volumes are required. The sample size is determined by a passage engraved on the valve rotor, allowing precise, repeatable injections. In Position A, the sample flows through the sample passage while the mobile phase flows through to the column. The third passage is inactive. In Position B, the sample passage is in line with the column and the mobile phase injects the contents of the sample passage onto the column. The passage which was inactive in Position A allows the sample to continue flowing without interruption.

6 PORT – INTERNAL SAMPLE INJECTOR (MODEL CI6)

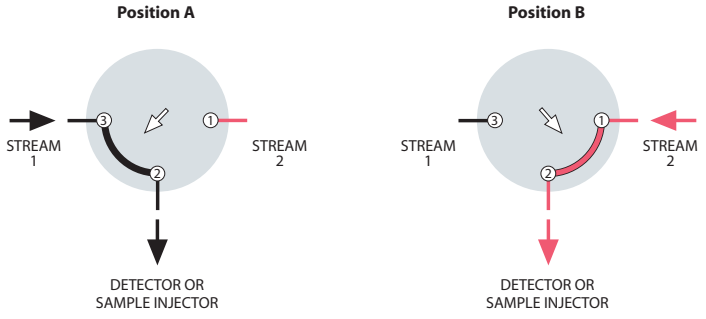


DUAL MICROVOLUME SAMPLE INJECTION

This microvolume injector can be used to alternate between two different samples. Each time the valve is switched, a sample is injected. By connecting the two sample inlets in series, the valve injects the sample each time the valve switches. This is particularly useful in heavy duty cycle operations to maximize valve lifetime. The valve can also be used to make alternating injections of the same sample onto two different columns by swapping sample/ waste and pump/column connections.

Note: This CI6 valve is not shown in this catalog. Call for details.

3 PORT – SWITCHING VALVE



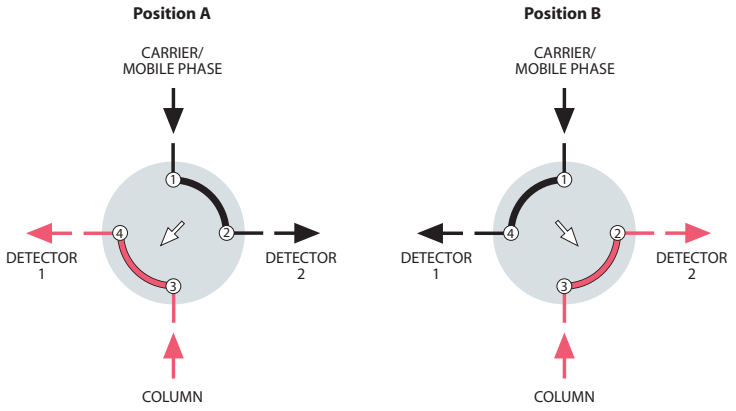
STREAM SELECTION WITHOUT MAINTAINED FLOW

This arrangement allows one of two sample points to flow to a sample injector or detector while blocking the other sample point's flow.

Availability of 3 port valves is limited, and a 4 port valve can be substituted in most applications by using a plug in the unused port. The 4 port valve also permits the non-selected inlet to flow, which may be preferable in some cases.

VALCO VALVES

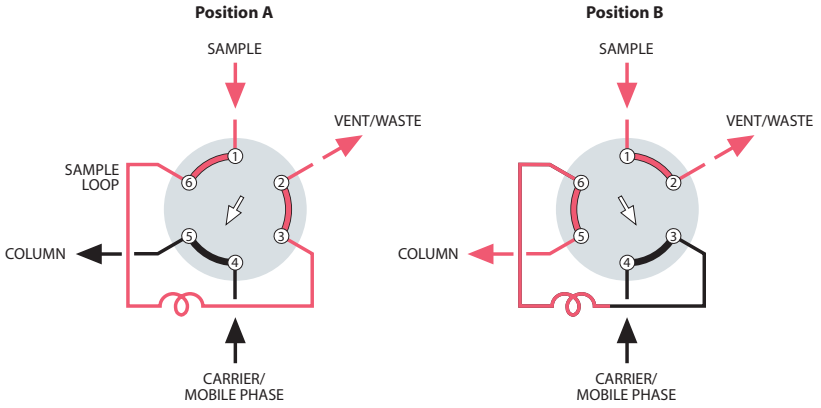
4 PORT – SWITCHING VALVE



DETECTOR SELECTION FROM TWO COLUMNS OR ONE COLUMN AND AUXILIARY CARRIER

This unique configuration allows analyses of different parts of one analysis with two different detectors, without splitting or multiple injections. For example, fixed gases can be analyzed with a thermal conductivity detector, followed by the analysis of a hydrocarbon fraction with a flame ionization detector.

6 PORT – EXTERNAL SAMPLE INJECTOR

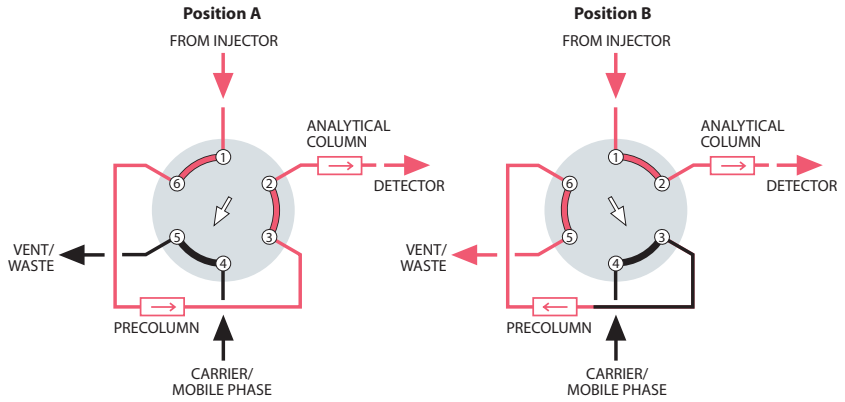


SAMPLE INJECTION

With the valve in Position A, sample flows through the external loop while the mobile phase flows directly through to the chromatographic column. When the valve is switched to Position B, the sample contained in the sample loop and valve flow passage is displaced by the mobile phase and is carried onto the column.

Note: This is especially critical for partially-filled loops. The flow direction of the mobile phase through the loop should be opposite (backflush) to the flow direction during the loading of the loop.

6 PORT – COLUMN SWITCHING

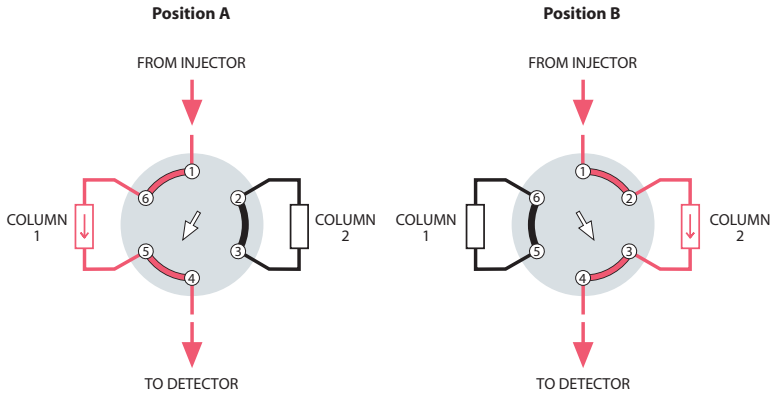


BACKFLUSH OF PRECOLUMN TO VENT

This plumbing scheme allows slower eluting components (end cut) which are not of interest to be backflushed to vent. Often a shorter version of the analytical column is used as the precolumn. Once all the components of interest have entered the main column (at port 2), the valve switches, backflushing the precolumn to vent and reducing analysis time.

Note: An auxiliary source of carrier or mobile phase is required for this application.

6 PORT – COLUMN SELECTION

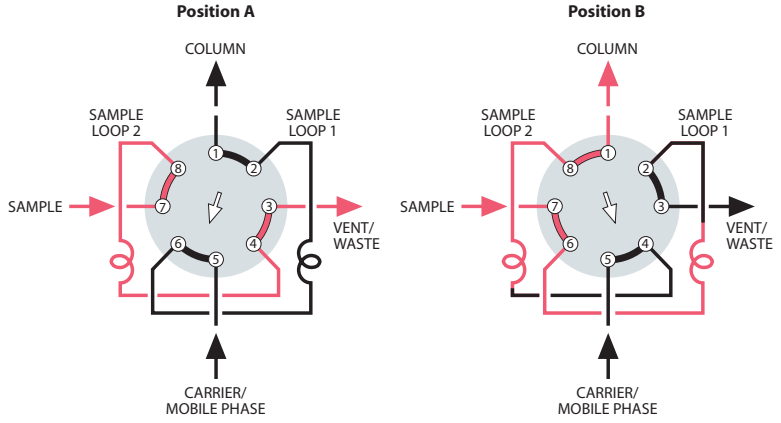


TWO COLUMN SELECTION

When two different columns are required at frequent intervals at similar oven temperatures, a 6 port valve can provide rapid selection of the one to be used. The column not in use is protected by a blanket of inert mobile phase and may be rapidly brought to equilibrium when required.

Note: If flow must be maintained to the non-selected column, an 8 or 10 port valve is required.

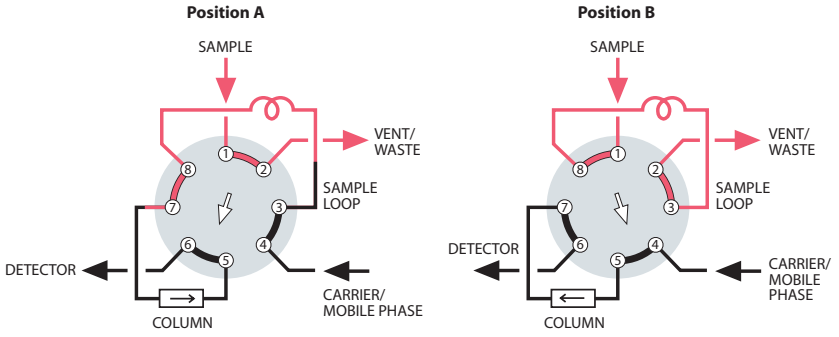
8 PORT – DUAL EXTERNAL SAMPLE INJECTOR



SAME SAMPLE TO DIFFERENT LOOPS

In a dual external sample loop configuration, sample is injected in both positions. In Position A, Loop 2 is loaded while the mobile phase flows through Loop 1 and onto the column. In Position B, the Loop 2 sample is injected into the column and another sample is loaded into Loop 1. When the valve is returned to Position A, the Loop 1 sample is injected onto the column and Loop 2 is reloaded.

8 PORT – SAMPLING/SWITCHING

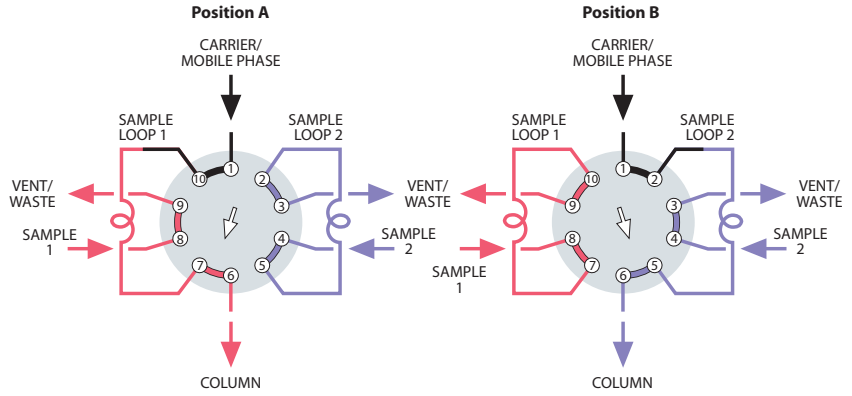


LOOP SAMPLING WITH BACKFLUSH TO DETECTOR

One valve functions as both a sampling and a backflush valve, simplifying operation and reducing cost. When components of interest are detected, the strongly retained components are backflushed and removed from the column without temperature programming.

VALCO VALVES

10 PORT – DUAL EXTERNAL SAMPLING



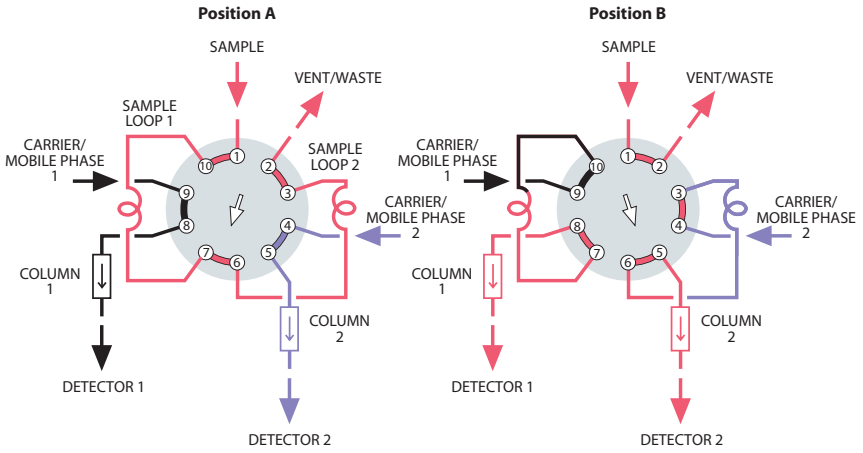
TWO DIFFERENT SAMPLES TO SAME COLUMN

A 10 port valve permits alternate injections from the two loops, which may be identical or of different sizes. This technique replaces a 4 port sample selector and a 6 port sample injector.

In Position A, Loop 2 is loaded with sample 2 while the mobile phase flows through Loop 1 and onto the column.

In Position B, the Loop 2 sample is injected onto the column and Loop 1 is loaded with sample 1. When the valve is returned to Position A, the Loop 1 sample is injected onto the column and Loop 2 is reloaded with sample 2.

10 PORT – DUAL EXTERNAL SAMPLING

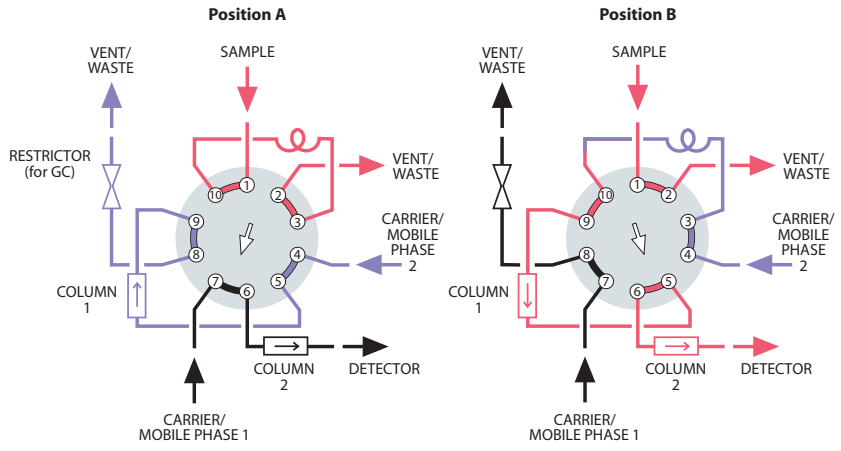


SIMULTANEOUS INJECTION OF THE SAME SAMPLE ONTO SEPARATE COLUMNS

In Position A, sample fills the two loops in series. In Position B, the sample is simultaneously injected into two separate flow systems. A single autosampler used with this flowpath can automate two analytical procedures for the same sample.

In an important non-chromatographic application, the roles of carrier and sample are reversed, permitting two different quantities of two different materials to be dispensed together, as in automatic dilution.

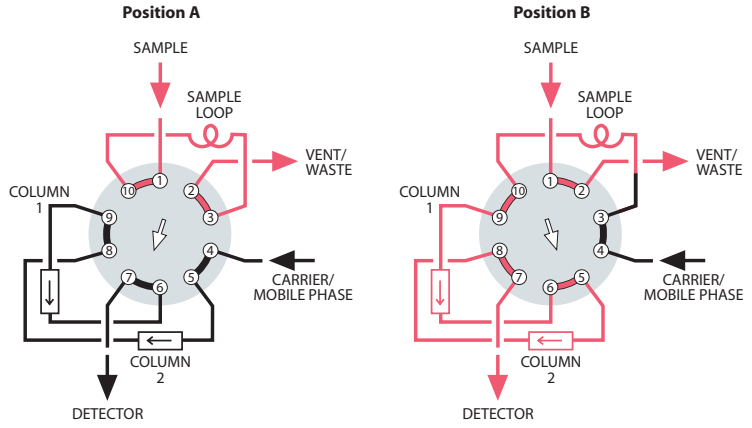
10 PORT – SAMPLING/SWITCHING



LOOP SAMPLING WITH BACKFLUSH OF PRE-COLUMN TO VENT

When components of interest have low boiling points, this plumbing scheme allows "heavy" components with long retention times to be backflushed to waste. After the sample loop is loaded in Position A, the valve is switched to Position B to inject the sample onto column 1. As soon as all components of interest have entered column 2, the valve is switched back to Position A. Column 1 is backflushed to vent during the analysis, reducing the total analysis time.

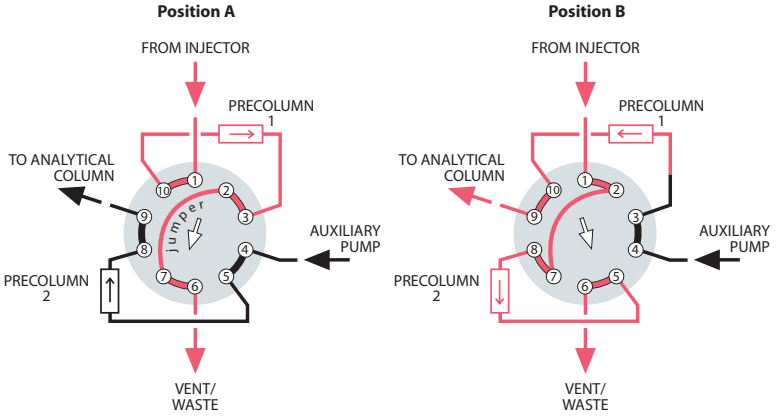
10 PORT – SAMPLING/SWITCHING



LOOP SAMPLING WITH TWO COLUMN SEQUENCE REVERSAL

This is ideal for fixed-gas-from-CO_2 analysis where no "high boilers" are present. Column 1 is packed with a porous polymer and Column 2 with molecular sieve. The sample loop is loaded in Position A. When the valve is switched, the loop contents are sent onto Column 1. As the inorganic gases and methane leave Column 1 and enter Column 2, the valve is returned to Position A, reversing the column sequence. CO_2 now leaves Column 1, becoming the first peak. The inorganics and methane are separated by the molesieve and pass through the porous polymer column to the detector.

10 PORT – COLUMN SWITCHING

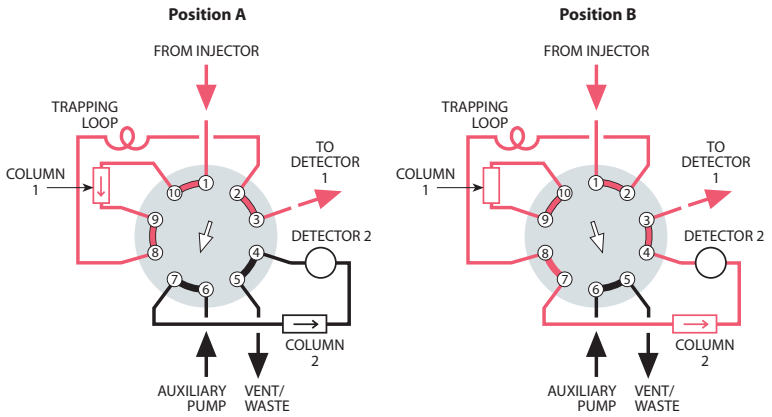


SAMPLE ENRICHMENT (CLEANUP) USING DUAL PRECOLUMNS

Sample is injected by a separate injector onto one of two precolumns (stripper). Early eluting components vent at port 6 while components of interest are retained on the stripper. When the valve is switched, a new injection is made onto the second stripper while components retained on the first stripper are backflushed onto the analytical column at port 9.

Note: This application requires an auxiliary pump at port 4.

10 PORT – COLUMN SWITCHING



HEART CUT TRAPPED IN A LOOP AND INJECTED ONTO A SECOND COLUMN

Sample is injected (using a separate injector) onto an analytical column. Early eluting components (front cut) pass through a trapping loop and are detected (at port 3). The valve is then switched, and the center (or heartcut) which was retained in the trapping loop is injected onto the second column to the detector (at port 4). Late eluting components (end cut) are trapped on the first column. When the valve is switched again, the end cut passes through the trapping loop to the first detector, completing the analysis.

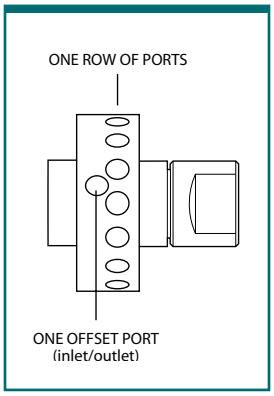
VALCO VALVES

DEAD-END FLOWPATH
SD configuration

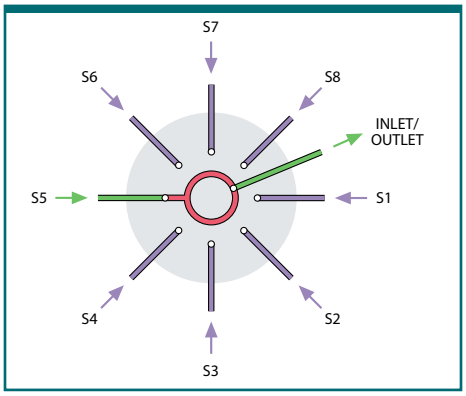
SD valves select one of 4 to 16 dead-ended streams. The selected stream flows from the outlet to a sample valve, pressure sensor, detector, column, etc. The same flowpath can also be used to direct one stream to a number of outlets in applications such as fraction collection.

For an application suggestion, see page 116.

SIDE VIEW



SCHEMATIC OF SD FLOWPATH



SD selectors, low pressure

1/16" FITTINGS, 0.75 MM PORTS (.030")

Low pressure | SD Dead-end | 1/16" | 0.75 mm

Includes 2" standoff. Ask about closemount assembly if valve will not be heated.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

SPECIFICATIONS

400 psi gas
200°C max
Valve body: Nitronic 60
Rotor: Valcon E

	6 Position		10 Position		12 Position		16 Position	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual *	2CSD6MWE	$920	2CSD10MWE	$1005	2CSD12MWE	$1085	2CSD16MWE	$1085
With air actuator	A2CSD6MWE	1125	A2CSD10MWE	1210	A2CSD12MWE	1290	A2CSD16MWE	1290
With universal act.	EUTA-2CSD6MWE	1605	EUTA-2CSD10MWE	1690	EUTA-2CSD12MWE	1770	EUTA-2CSD16MWE	1770
Replacement valve	DCSD6MWE	700	DCSD10MWE	785	DCSD12MWE	865	DCSD16MWE	865
Replacement rotor	SSACSD6MWE	112	SSACSD10MWE	112	SSACSD12MWE	112	SSACSD16MWE	112

* Manual version is not recommended.

10 POSITION SD SELECTOR
1/16" fittings, 2" standoff

OPTIONS

- 4 and 8 positions available
- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium *(see pages 246-247)*
- Larger bore available except 16 position
- Internally purged version

TECH TIP

For low ppb gas concentrations, we offer versions of the valves on this page with an internal purge feature to vent any leakage across the sealing surfaces and/or any diffusion through the sealing material. Available with 1/16" or 1/8" fittings; not available with 1/4" fittings. *(see page 86)*

MORE INFO

SD selectors, low pressure

1/8" FITTINGS, 1.0 MM PORTS (.040")

SPECIFICATIONS

4-8 Positions:
400 psi gas
200°C max
10-16 Positions:
200 psi gas
200°C max
Valve body: Nitronic 60
Rotor: Valcon E

Includes 2" standoff. Ask about closemount assembly if valve will not be heated.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

Low pressure
SD Dead-end
1/8" 1.0 mm

	6 Position		10 Position		12 Position		16 Position	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual (not recommended)	2SD6MWE	$920	2SD10MWE	$1005	2SD12MWE	$1085	2SD16MWE	$1085
With air actuator	A2SD6MWE	1125	A2SD10MWE	1210	A2SD12MWE	1290	A2SD16MWE	1290
With universal actuator	EUTA-2SD6MWE	1605	EUTA-2SD10MWE	1690	EUTA-2SD12MWE	1770	EUTA-2SD16MWE	1770
Replacement valve	DSD6MWE	700	DSD10MWE	785	DSD12MWE	865	DSD16MWE	865
Replacement rotor	SSASD6MWE	112	SSASD10MWE	112	SSASD12MWE	112	SSASD16MWE	112

OPTIONS

- 4 and 8 positions available
- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium *(see pages 246-247)*
- Internally purged version

SD selectors, low pressure

1/4" FITTINGS, 4.0 MM PORTS (.156")

SPECIFICATIONS

100 psi gas
75°C max
Valve body: Nitronic 60
Rotor: Valcon E2

Includes 2" standoff. Ask about closemount assembly if valve will not be heated.
Manual version not available.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

Low pressure
SD Dead-end
1/4" 4.0 mm

	4 Position		6 Position		8 Position		10 Position	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
With air actuator	AH2VLSD4MWE2	$1800	AH2VLSD6MWE2	$1855	AH2VLSD8MWE2	$1940	AH2VLSD10MWE2	$1940
With universal actuator	EUTA-2VLSD4MWE2	2045	EUTA-2VLSD6MWE2	2100	EUTA-2VLSD8MWE2	2185	EUTA-2VLSD10MWE2	2185
Replacement valve	DVLSD4MWE2	1140	DVLSD6MWE2	1195	DVLSD8MWE2	1280	DVLSD10MWE2	1280
Replacement rotor	SSAVLSD4MWE2	200	SSAVLSD6MWE2	200	SSAVLSD8MWE2	200	SSAVLSD10MWE2	200

OPTIONS

- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium *(see pages 246-247)*

10 POSITION SD SELECTOR
1/4" fittings, 2" standoff

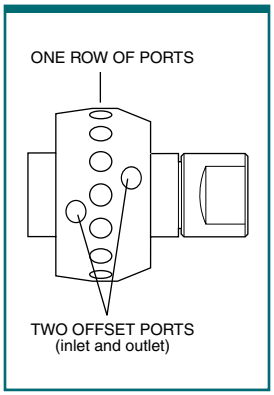
VALCO VALVES

COMMON OUTLET FLOWPATH
SC configuration

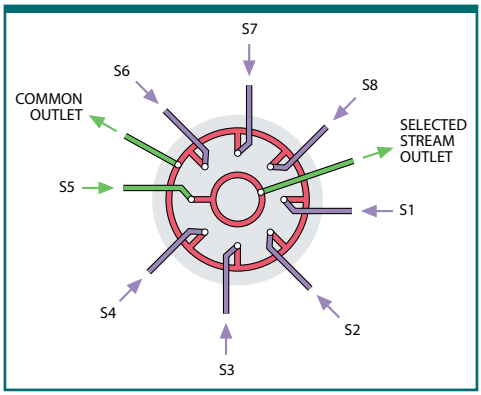
SC selectors are similar to the SD configuration, except that instead of being dead-ended the non-selected streams flow to a common outlet.

For an application suggestion, see page 117.

SIDE VIEW



SCHEMATIC OF SC FLOWPATH



SC selectors

1/16" FITTINGS, 1.0 MM PORTS (.040")

Low pressure
SC Common outlet
1/16" 1.0 mm

Includes 2" standoff. Ask about closemount assembly if valve will not be heated.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

SPECIFICATIONS

200 psi gas
200°C max
Valve body: Nitronic 60
Rotor: Valcon E

	6 Position		10 Position		12 Position		16 Position	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual *	2CSC6MWE	$950	2CSC10MWE	$1035	2CSC12MWE	$1115	2CSC16MWE	$1115
With air actuator	A2CSC6MWE	1155	A2CSC10MWE	1240	A2CSC12MWE	1320	A2CSC16MWE	1320
With universal actuator	EUTA-2CSC6MWE	1635	EUTA-2CSC10MWE	1720	EUTA-2CSC12MWE	1800	EUTA-2CSC16MWE	1800
Replacement valve	DCSC6MWE	730	DCSC10MWE	815	DCSC12MWE	895	DCSC16MWE	895
Replacement rotor	SSACSC6MWE	122	SSACSC10MWE	122	SSACSC12MWE	122	SSACSC16MWE	122

* Manual version is not recommended.

6 POSITION SC SELECTOR
1/16" fittings, 2" standoff

OPTIONS

- 4 and 8 positions available
- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium *(see pages 246-247)*
- Internally purged version

TECH TIP

For low ppb gas concentrations, we offer versions of the valves on this page with an internal purge feature to vent any leakage across the sealing surfaces and/or any diffusion through the sealing material. Available with 1/16" or 1/8" fittings; not available with 1/4" fittings. *(see page 86)*

MORE INFO

SC selectors

1/8" FITTINGS, 1.0 MM PORTS (.040")

SPECIFICATIONS

200 psi gas
200°C max
Valve body: Nitronic 60
Rotor: Valcon E

Includes 2" standoff. Ask about closemount assembly if valve will not be heated.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

Low pressure
SC Common outlet
1/8" 1.0 mm

	6 Position		10 Position		12 Position		16 Position	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual (not recommended)	2SC6MWE	$950	2SC10MWE	$1035	2SC12MWE	$1115	2SC16MWE	$1115
With air actuator	A2SC6MWE	1155	A2SC10MWE	1240	A2SC12MWE	1320	A2SC16MWE	1320
With universal actuator	EUTA-2SC6MWE	1635	EUTA-2SC10MWE	1720	EUTA-2SC12MWE	1800	EUTA-2SC16MWE	1800
Replacement valve	DSC6MWE	730	DSC10MWE	815	DSC12MWE	895	DSC16MWE	895
Replacement rotor	SSASC6MWE	122	SSASC10MWE	122	SSASC12MWE	122	SSASC16MWE	122

OPTIONS

- 4 and 8 positions available
- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium *(see pages 246-247)*
- Larger bore available except 16 position
- Internally purged version

SC selectors

1/4" FITTINGS, 4.0 MM PORTS (.156")

SPECIFICATIONS

100 psi gas
75°C max
Valve body: Nitronic 60
Rotor: Valcon E2

Includes 2" standoff. Ask about closemount assembly if valve will not be heated.
Manual version not available.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

Low pressure
SC Common outlet
1/4" 4.0 mm

	4 Position		6 Position		8 Position	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
With air actuator	AH2VLSC4MWE2	$1830	AH2VLSC6MWE2	$1885	AH2VLSC8MWE2	$1970
With universal actuator	EUTA-2VLSC4MWE2	2075	EUTA-2VLSC6MWE2	2130	EUTA-2VLSC8MWE2	2215
Replacement valve	DVLSC4MWE2	1170	DVLSC6MWE2	1225	DVLSC8MWE2	1310
Replacement rotor	SSAVLSC4MWE2	200	SSAVLSC6MWE2	200	SSAVLSC8MWE2	200

OPTIONS

- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium *(see pages 246-247)*

6 POSITION SC SELECTOR
1/4" fittings, 2" standoff

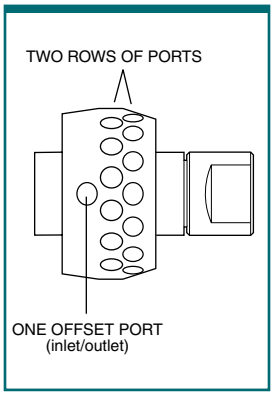
VALCO VALVES

FLOW-THROUGH FLOWPATH
SF configuration

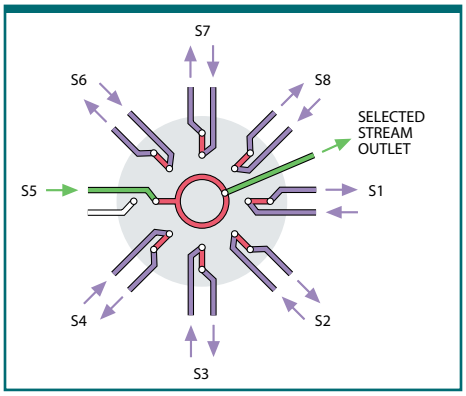
SD and SC valves select and isolate one of 4 to 16 streams, with the remainder dead-ended in the SD and flowing to a common outlet in the SC. The SF selector is similar, but carries the evolution a step further with the non-selected streams flowing through individual outlets.

For an application suggestion, see page 118.

SIDE VIEW



SCHEMATIC OF SF FLOWPATH



SF selectors

1/16" FITTINGS, 1.0 MM PORTS (.040")

Low pressure
SF
Flow-through
1/16″ 1.0 mm

Includes 2" standoff. Ask about closemount assembly if valve will not be heated.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

SPECIFICATIONS

200 psi gas
200°C max
Valve body: Nitronic 60
Rotor: Valcon E

	6 Position		10 Position		12 Position		16 Position	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual *	2CSF6MWE	$1070	2CSF10MWE	$1155	2CSF12MWE	$1235	2CSF16MWE	$1235
With air actuator	A2CSF6MWE	1275	A2CSF10MWE	1360	A2CSF12MWE	1440	A2CSF16MWE	1440
With universal actuator	EUTA-2CSF6MWE	1755	EUTA-2CSF10MWE	1840	EUTA-2CSF12MWE	1920	EUTA-2CSF16MWE	1920
Replacement valve	DCSF6MWE	850	DCSF10MWE	935	DCSF12MWE	1015	DCSF16MWE	1015
Replacement rotor	SSACSF6MWE	122	SSACSF10MWE	122	SSACSF12MWE	122	SSACSF16MWE	122

* Manual version is not recommended.

8 POSITION SF SELECTOR
1/16" fittings, 2" standoff

OPTIONS

- 4 and 8 positions available
- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium *(see pages 246-247)*
- Internally purged version

TECH TIP

For low ppb gas concentrations, we offer versions of the valves on this page with an internal purge feature to vent any leakage across the sealing surfaces and/or any diffusion through the sealing material. Available with 1/16" or 1/8" fittings; not available with 1/4" fittings. *(see page 86)*

MORE INFO

SF selectors

1/8" FITTINGS, 1.0 MM PORTS (.040")

SPECIFICATIONS

200 psi gas
200°C max
Valve body: Nitronic 60
Rotor: Valcon E

Includes 2" standoff. Ask about closemount assembly if valve will not be heated.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

Low pressure
SF Flow-through
1/8" 1.0 mm

	6 Position		10 Position		12 Position		16 Position	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual (not recommended)	2SF6MWE	$1070	2SF10MWE	$1155	2SF12MWE	$1235	2SF16MWE	$1235
With air actuator	A2SF6MWE	1275	A2SF10MWE	1360	A2SF12MWE	1440	A2SF16MWE	1440
With universal actuator	EUTA-2SF6MWE	1755	EUTA-2SF10MWE	1840	EUTA-2SF12MWE	1920	EUTA-2SF16MWE	1920
Replacement valve	DSF6MWE	850	DSF10MWE	935	DSF12MWE	1015	DSF16MWE	1015
Replacement rotor	SSASF6MWE	122	SSASF10MWE	122	SSASF12MWE	122	SSASF16MWE	122

OPTIONS

- 4 and 8 positions available
- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium *(see pages 246-247)*
- Larger bore available except 16 position
- Internally purged version

SF selectors

1/4" FITTINGS, 4.0 MM PORTS (.156")

SPECIFICATIONS

100 psi gas
75°C max
Valve body: Nitronic 60
Rotor: Valcon E2

Includes 2" standoff. Ask about closemount assembly if valve will not be heated.
Manual version is not available.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

Low pressure
SF Flow-through
1/4" 4.0 mm

	4 Position		6 Position		8 Position	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
With air actuator	AH2VLSF4MWE2	$1960	AH2VLSF6MWE2	$2015	AH2VLSF8MWE2	$2100
With universal actuator	EUTA-2VLSF4MWE2	2205	EUTA-2VLSF6MWE2	2260	EUTA-2VLSF8MWE2	2345
Replacement valve	DVLSF4MWE2	1300	DVLSF6MWE2	1355	DVLSF8MWE2	1440
Replacement rotor	SSAVLSF4MWE2	200	SSAVLSF6MWE2	200	SSAVLSF8MWE2	200

OPTIONS

- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium *(see pages 246-247)*

6 POSITION SF SELECTOR
1/4" fittings, 2" standoff

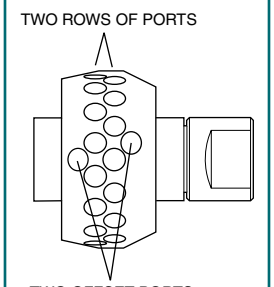
VALCO VALVES

TRAPPING FLOWPATH
ST configuration

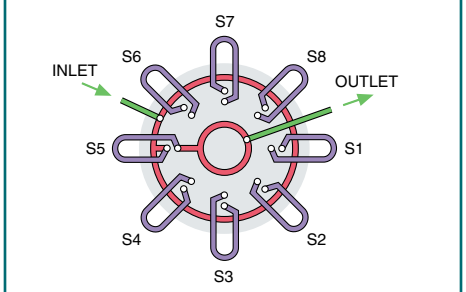
ST selectors are used for multi-column, multi-sample, or multi-trap operations. Each of the 4 to 16 positions is associated with a pair of ports to connect devices such as columns, loops, spargers in purge and trap systems, sample vessels, adsorption tubes, collection vials, etc.

For an application suggestion, see page 119.

SIDE VIEW



SCHEMATIC OF ST FLOWPATH



ST selectors, low pressure

1/16" FITTINGS, 0.75 MM PORTS (.030")

Low pressure | ST Trapping | 1/16" | 0.75 mm

Includes 2" standoff. Ask about closemount assembly if valve will not be heated.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

SPECIFICATIONS

200 psi gas
200°C max
Valve body: Nitronic 60
Rotor: Valcon E

	6 Position		10 Position		12 Position		16 Position	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual *	2CST6MWE	$1070	2CST10MWE	$1155	2CST12MWE	$1235	2CST16MWE	$1235
With air actuator	A2CST6MWE	1275	A2CST10MWE	1360	A2CST12MWE	1440	A2CST16MWE	1440
With universal actuator	EUTA-2CST6MWE	1755	EUTA-2CST10MWE	1840	EUTA-2CST12MWE	1920	EUTA-2CST16MWE	1920
Replacement valve	DCST6MWE	850	DCST10MWE	935	DCST12MWE	1015	DCST16MWE	1015
Replacement rotor	SSACST6MWE	122	SSACST10MWE	122	SSACST12MWE	122	SSACST16MWE	122

* Manual version is not recommended.

8 POSITION ST SELECTOR
1/16" fittings, 2" standoff

OPTIONS

- 4 and 8 positions available
- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium *(see pages 246-247)*
- Internally purged version

1/16" Stainless steel loops

Each stainless steel loop includes two stainless nuts and two stainless ferrules. Order special fittings separately. **Request matched loops when loops will be installed on a single valve.**

These loops are for use with valves on this page.

Volume	*Prod No*	*Price*	*Volume*	*Prod No*	*Price*
50 µl	SL50CSTP	$26	1 ml	SL1KCSTP	$40
100 µl	SL100CSTP	26	2 ml	SL2KCSTP	51
250 µl	SL250CSTP	26	5 ml	SL5KCSTP	59
500 µl	SL500CSTP	36	10 ml	SL10KCSTP	77

ABOUT LOOPS

- Other materials are available in many sizes: Electroformed Nickel, Hastelloy C, Nickel 200, PEEK, PTFE, and Titanium
- 1/16" loops > 2 ml are made from 1/8" OD tubing with TIG welded 1/16" tube ends or reducing unions.
- Sample loop shape and dimensions may vary from batch to batch due to fluctuations in tubing ID. Loop volume is controlled as closely as possible, but is not calibrated.

MORE INFO

ST selectors, low pressure

1/8" FITTINGS, 1.0 MM PORTS (.040")

SPECIFICATIONS

200 psi gas
200°C max
Valve body: Nitronic 60
Rotor: Valcon E

Includes 2" standoff. Ask about closemount assembly if valve will not be heated.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

Low pressure
ST Trapping
1/8" 1.0 mm

	6 Position		10 Position		12 Position		16 Position	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual (not recommended)	2ST6MWE	$1070	2ST10MWE	$1155	2ST12MWE	$1235	2ST16MWE	$1235
With air actuator	A2ST6MWE	1275	A2ST10MWE	1360	A2ST12MWE	1440	A2ST16MWE	1440
With universal actuator	EUTA-2ST6MWE	1755	EUTA-2ST10MWE	1840	EUTA-2ST12MWE	1920	EUTA-2ST16MWE	1920
Replacement valve	DST6MWE	850	DST10MWE	935	DST12MWE	1015	DST16MWE	1015
Replacement rotor	SSAST6MWE	122	SSAST10MWE	122	SSAST12MWE	122	SSAST16MWE	122

OPTIONS

- 4 and 8 positions available
- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium *(see pages 246-247)*
- Larger bore available except 16 position
- Internally purged version

10 POSITION ST SELECTOR
1/8" fittings, 2" standoff

TECH TIP

Standard ST type valves are not suitable for trace gas analysis applications. For low ppb gas concentrations, we offer versions of these valves with an internal purge feature to vent any leakage across the sealing surfaces and/or any diffusion through the sealing material. Consult the factory.

ABOUT LOOPS

- Other materials are available in many sizes: Electroformed Nickel, Hastelloy C, Nickel 200, PEEK, PTFE, and Titanium
- 1/8" loops < 100 µl are made from 1/16" OD tubing with TIG welded 1/8" tube ends.
- Sample loop shape and dimensions may vary from batch to batch due to fluctuations in tubing ID. Loop volume is controlled as closely as possible, but is not calibrated.

1/8" Stainless steel loops

Each stainless steel loop includes two stainless nuts and two stainless ferrules. Order special fittings separately. **Request matched loops when loops will be installed on a single valve.**

These loops are for use with valves on this page.

Volume	*Prod No*	*Price*	*Volume*	*Prod No*	*Price*
100 µl	SL100STP	$32	1 ml	SL1KSTP	$36
250 µl	SL250STP	32	2 ml	SL2KSTP	37
500 µl	SL500STP	34	5 ml	SL5KSTP	45
			10 ml	SL10KSTP	63

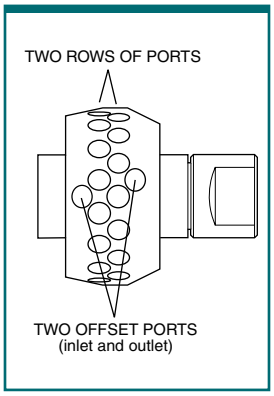
VALCO VALVES

TRAPPING/FLOW-THROUGH FLOWPATH
STF configuration

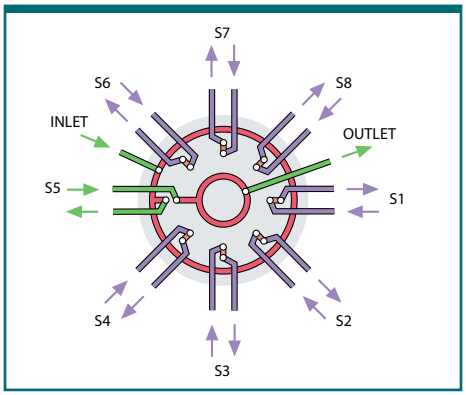
The STF selector is a variation of the ST flowpath, with the single difference that the non-selected streams are returned to their own vents or sources rather than being dead-ended or trapped as they are in the standard ST configuration.

For an application suggestion, see page 120.

SIDE VIEW



SCHEMATIC OF STF FLOWPATH



STF selectors

1/16" FITTINGS, 0.75 MM PORTS (.030")

Low pressure

STF Trap/ flow-throw

1/16" | 0.75 mm

Includes 2" standoff. Ask about closemount assembly if valve will not be heated.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

SPECIFICATIONS

200 psi gas
200°C max
Valve body: Nitronic 60
Rotor: Valcon E

	6 Position		10 Position		12 Position		16 Position	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual *	2CSTF6MWE	$1105	2CSTF10MWE	$1190	2CSTF12MWE	$1270	2CSTF16MWE	$1270
With air actuator	A2CSTF6MWE	1310	A2CSTF10MWE	1395	A2CSTF12MWE	1475	A2CSTF16MWE	1475
With universal actuator	EUTA-2CSTF6MWE	1790	EUTA-2CSTF10MWE	1875	EUTA-2CSTF12MWE	1955	EUTA-2CSTF16MWE	1955
Replacement valve	DCSTF6MWE	885	DCSTF10MWE	970	DCSTF12MWE	1050	DCSTF16MWE	1050
Replacement rotor	SSACSTF6MWE	122	SSACSTF10MWE	122	SSACSTF12MWE	122	SSACSTF16MWE	122

* Manual version is not recommended.

8 POSITION STF SELECTOR
1/16" fittings, 2" standoff

OPTIONS

- 4 and 8 positions available
- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium *(see pages 246-247)*
- Internally purged version

TECH TIP

For low ppb gas concentrations, we offer versions of the valves on this page with an internal purge feature to vent any leakage across the sealing surfaces and/or any diffusion through the sealing material. Available with 1/16" or 1/8" fittings; not available with 1/4" fittings. *(see page 86)*

MORE INFO

STF selectors

1/8" FITTINGS, 1.0 MM PORTS (.040")

SPECIFICATIONS

200 psi gas
200°C max
Valve body: Nitronic 60
Rotor: Valcon E

Includes 2" standoff. Ask about closemount assembly if valve will not be heated.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

Low pressure
STF
Trap/flow-throw
1/8"
1.0 mm

	6 Position		10 Position		12 Position		16 Position	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual (not recommended)	2STF6MWE	$1105	2STF10MWE	$1190	2STF12MWE	$1270	2STF16MWE	$1270
With air actuator	A2STF6MWE	1310	A2STF10MWE	1395	A2STF12MWE	1475	A2STF16MWE	1475
With universal actuator	EUTA-2STF6MWE	1790	EUTA-2STF10MWE	1875	EUTA-2STF12MWE	1955	EUTA-2STF16MWE	1955
Replacement valve	DSTF6MWE	885	DSTF10MWE	970	DSTF12MWE	1050	DSTF16MWE	1050
Replacement rotor	SSASTF6MWE	122	SSASTF10MWE	122	SSASTF12MWE	122	SSASTF16MWE	122

OPTIONS

- 4 and 8 positions available
- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium *(see pages 246-247)*
- Larger bore available except 16 position
- Internally purged version

10 POSITION STF SELECTOR
1/8" fittings, 2" standoff

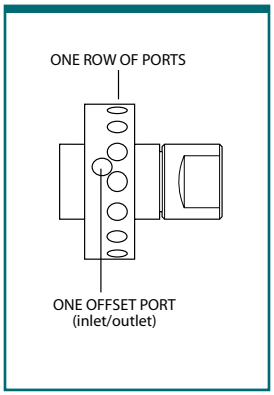
VALCO VALVES

DEAD-END FLOWPATH
SD configuration

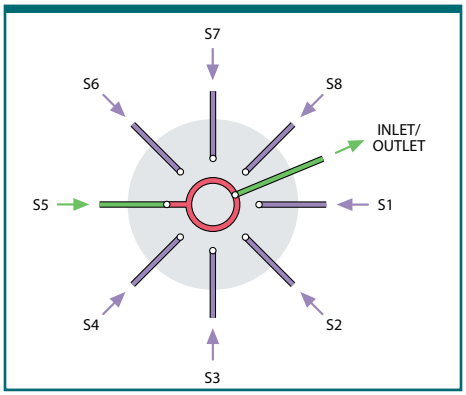
SD valves select one of 4 to 12 dead-ended streams. The selected stream flows from the valve outlet to a sample valve, pressure sensor, detector, column, etc. This configuration may also be used to direct one stream to a number of outlets for applications such as fraction collection.

For an application suggestion, see page 121.

SIDE VIEW



SCHEMATIC OF SD FLOWPATH



SD selectors, high pressure

1/16" FITTINGS, 0.4 MM PORTS (.016")

5,000 psi
SD
Dead-end
1/16″ | 0.40 mm

Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

	4 Position		6 Position		10 Position	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual *	CSD4UW	$865	CSD6UW	$920	CSD10UW	$1005
With universal act.	EUTA-CSD4UW	1600	EUTA-CSD6UW	1655	EUTA-CSD10UW	1740
Replacement valve	DCSD4UW	695	DCSD6UW	750	DCSD10UW	835
Replacement rotor	SSACSD4UW	112	SSACSD6UW	112	SSACSD10UW	112

* Manual version is not recommended.

SPECIFICATIONS

5000 psi liq
75°C max
Valve body: Nitronic 60
Rotor: Valcon E

SD selectors, high pressure

1/8" FITTINGS, 0.75 MM PORTS (.030")

5,000 psi
SD
Dead-end
1/8″ | 0.75 mm

Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

	4 Position		6 Position		8 Position	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual *	SD4UW	$865	SD6UW	$920	SD8UW	$1005
With universal act.	EUTA-SD4UW	1600	EUTA-SD6UW	1655	EUTA-SD8UW	1740
Replacement valve	DSD4UW	695	DSD6UW	750	DSD8UW	835
Replacement rotor	SSASD4UW	112	SSASD6UW	112	SSASD8UW	112

* Manual version is not recommended.

6 POSITION SD SELECTOR
1/8" fittings

SPECIFICATIONS

5000 psi liq
75°C max
Valve body: Nitronic 60
Rotor: Valcon E

OPTIONS

- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium *(see pages 246-247)*

• 1/16" VERSION:

- 4 and 8 positions available
- Larger bore available except 10 and 12 positions

1/8" VERSION:

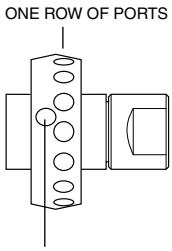
- Larger bore available except 8 positions

BOTH COLUMN ENDS SELECTED
ST configuration

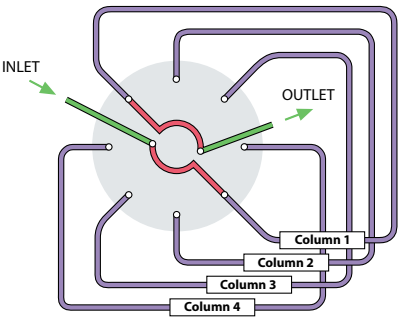
ST selectors are used for multi-column, multi-sample, or multi-trap operations. This valve can be used between an injector and detector to permit manual or automated HPLC column selection.

For an application suggestion, see page 121.

SIDE VIEW



SCHEMATIC OF ST FLOWPATH



ST selectors, high pressure

1/16" FITTINGS, 0.4 MM PORTS (.016")

SPECIFICATIONS

5000 psi liq
75°C max
Valve body: Nitronic 60
Rotor: Valcon E

OPTIONS

- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium *(see pages 246-247)*
- Low pressure, high temperature versions available. (Consult factory.)

Manual versions are not available.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

5,000 psi
ST Trapping
1/16" 0.40 mm

	4 Columns or Loops		6 Columns or Loops	
	Prod No	*Price*	*Prod No*	*Price*
With universal actuator	EUTA-CST4UW	$1690	EUTA-CST6UW	$1745
Replacement valve	DCST4UW	785	DCST6UW	840
Replacement rotor	SSACST4UW	122	SSACST6UW	122

4 POSITION ST SELECTOR
1/16" fittings

1/16" Stainless steel loops

Each stainless steel loop includes two stainless nuts and two stainless ferrules. Order special fittings separately. **Request matched loops when loops will be installed on a single valve.**

These loops are for use with valves on this page.

Volume	*Prod No*	*Price*	*Volume*	*Prod No*	*Price*
10 µl	SL10CSTUW	$26	250 µl	SL250CSTUW	$32
15 µl	SL15CSTUW	26	500 µl	SL500CSTUW	35
20 µl	SL20CSTUW	26	1 ml	SL1KCSTUW	40
25 µl	SL25CSTUW	26	2 ml	SL2KCSTUW	51
50 µl	SL50CSTUW	26	5 ml	SL5KCSTUW	59
100 µl	SL100CSTUW	26	10 ml	SL10KCSTUW	77

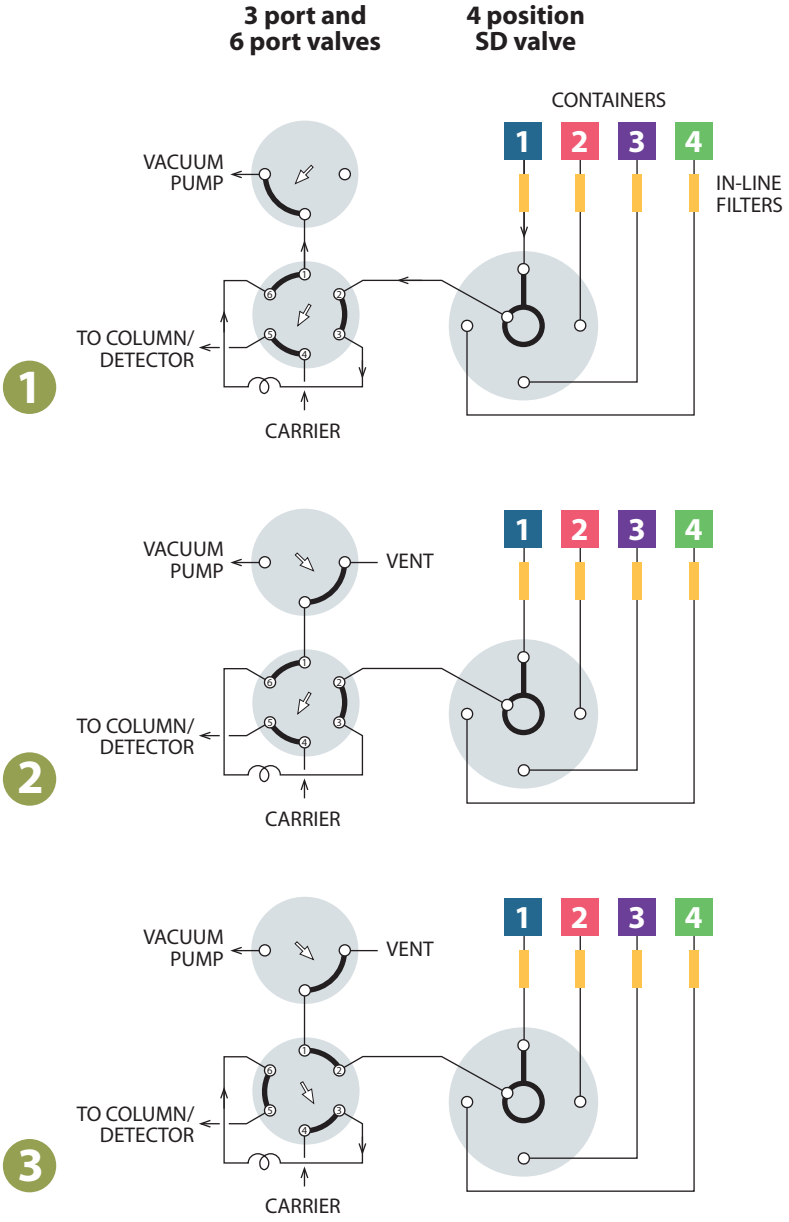
MORE INFO

ABOUT LOOPS

- Other materials are available in many sizes: Electroformed Nickel, Hastelloy C, Nickel 200, PEEK, PTFE, and Titanium
- Loops > 2 ml are made from 1/8" OD tubing with TIG welded 1/16" tube ends or reducing unions.
- Sample loop shape and dimensions may vary from batch to batch due to fluctuations in tubing ID. Loop volume is controlled as closely as possible, but is not calibrated.

VALCO VALVES

SD FLOWPATH – LOW PRESSURE



STREAM SELECTION WITH DEAD-ENDED STREAMS

SD valves select one of 4 to 16 dead-ended streams. The selected stream flows from the valve outlet to a sample valve, pressure sensor, detector, column, etc. The same configuration may also be used to direct one stream to a number of outlets for applications such as fraction collection.

This example illustrates automated sampling of non-pressurized containers.

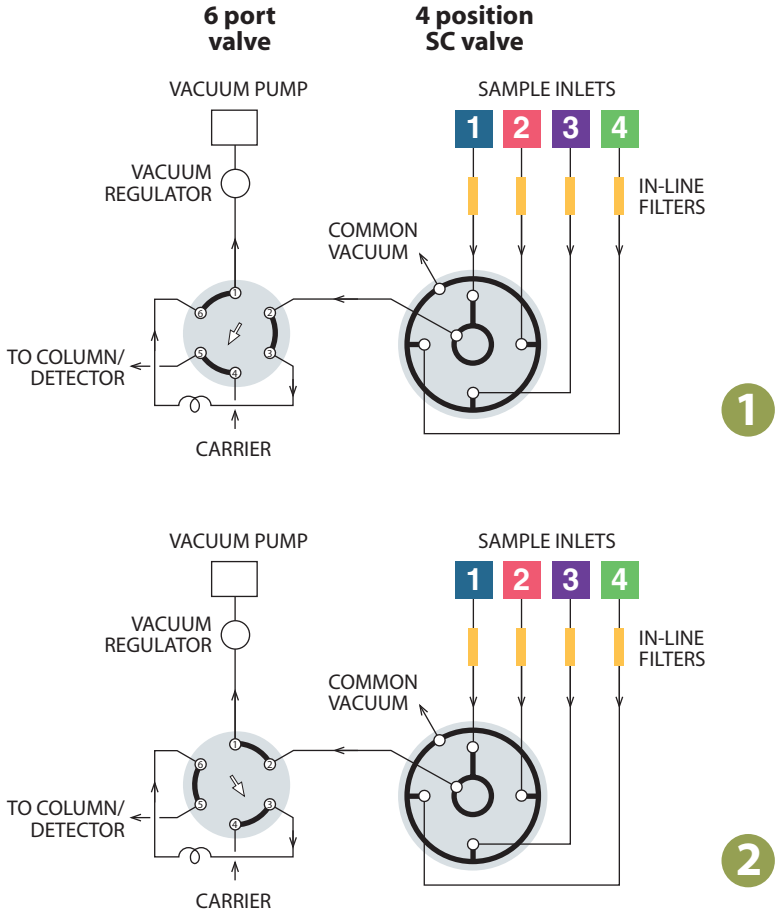
1 A vacuum pump is used to move sample from the containers to a 6 port sampling valve. 2 The 3 port valve is used to block the vacuum flow through the sampling valve to allow the sample within the loop to equilibrate at atmospheric pressure. 3 The 6 port valve is then switched, injecting the sample. This method eliminates any possible effect from pressure differences among the containers, providing accurate and repeatable results. All three valves can be automated with air or electric actuators for unattended operation.

The SD flowpath isolates the unselected sample streams, but the potential exists for extraneous sample or contaminants to be in the lines when containers are first connected. To avoid problems, either prepurge each line or allow sufficient sampling time for the line to purge prior to injection.

MORE INFO

SD prices
Low pressure . . 104-105
High pressure 114
Application
High pressure SD . . 121

SC FLOWPATH



STREAM SELECTION WITH CONTINUOUS FLOW TO A COMMON OUTLET

SC selectors are similar to the SD configuration, except that instead of being dead-ended the non-selected streams flow to a common outlet. They are also available in 4, 6, 8, 10, 12, or 16 position versions.

The SC configuration is ideal for air quality monitoring, illustrated in this example.

The application is essentially the same as the one shown for the SD selectors on the previous page, except that the non-selected streams are continuously pulled through the valve, insuring that the most current sample will be provided as each point is selected for analysis. 1 The sample loop on the 6 port valve is loaded from Stream 1. 2 The 6 port valve is switched, injecting the sample. Both valves can be automated with air or electric actuators for unattended operation.

SEE VIDEOS

See these applications in motion at vici.com > support > valve applications.

MORE INFO

Actuators
Air ..... page 178
Modular universal ..176
Universal 174-175
SC prices 106-107

TECH TIP

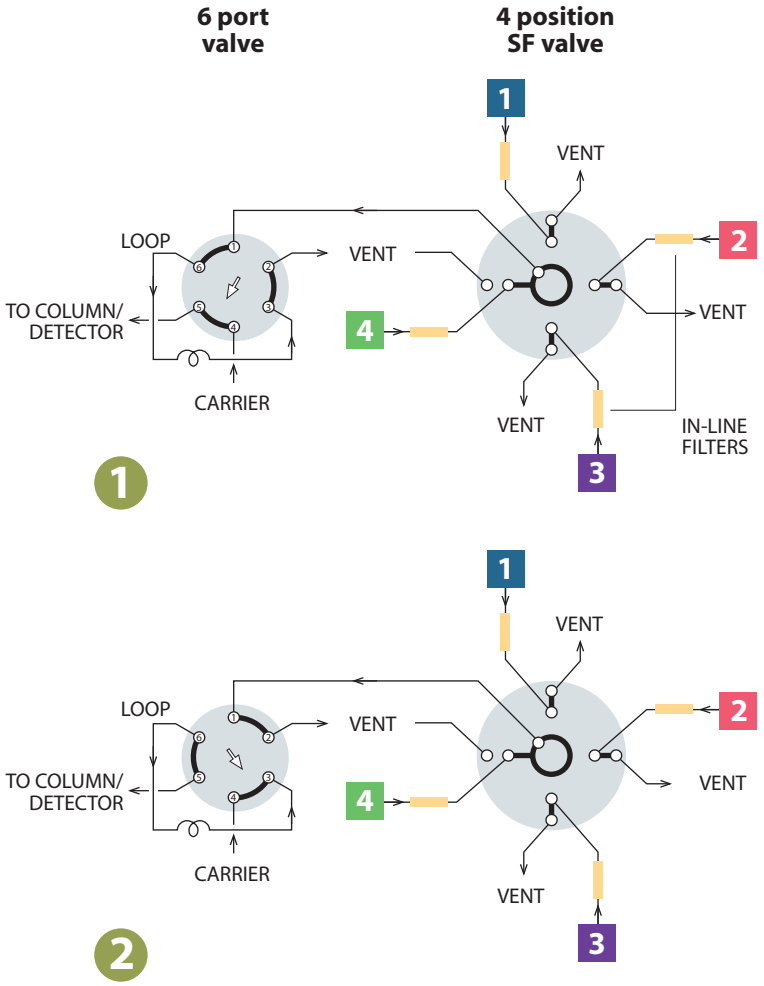
Because the most common cause of valve failure is stray particulates entering the valve, we strongly recommend the use of in-line filters at sample entry points.

Our ZUFR filters feature inexpensive and easily replaceable low pressure drop filter screens (2 or 10 micron). The filters are available in 1/16", 1/8", and 1/4" standard, reducing, and bulkhead versions.

Filters ..... pages 36-37, 39

VALCO VALVES

SF FLOWPATH



STREAM SELECTION WITH CONTINUOUS FLOW TO INDIVIDUAL OUTLETS

SD and SC valves select and isolate one of 4 to 16 streams, with the remainder dead-ended in the SD and flowing to a common outlet in the SC. The SF selector is similar, but carries the evolution a step further with the non-selected streams flowing through individual outlets.

This is the ideal solution when reactions or process streams with differing upstream pressures must be analyzed, and can also provide independent containment of toxic or noxious streams. An SF selector together with a 6 port sampling valve and pneumatic or electric actuators comprise a complete sampling system for the automated analysis of up to 16 sample points.

Note that streams 1 and 4 are vented while streams 2 and 3 are returned to their sources in this example.

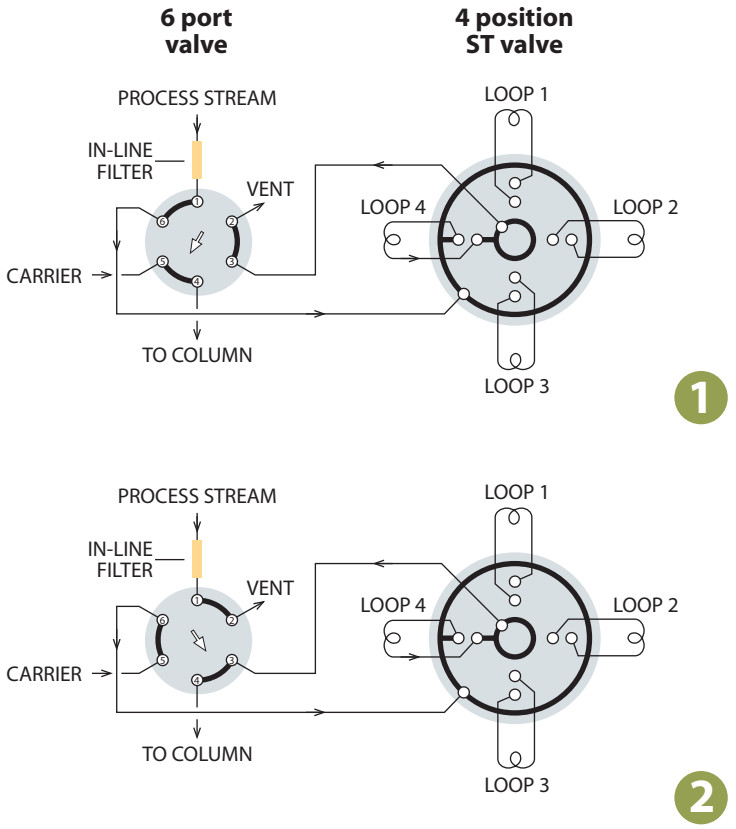
Mode 1 shows sample loading from stream 4, while mode 2 shows sample injected onto the analytical column.

MORE INFO

Actuators
Air . . . . . page 178
Modular universal . . 176
Universal 174-175

SF prices 108-109

ST FLOWPATH – LOW PRESSURE



SAMPLE TRAPPING APPLICATIONS FOR 4 TO 16 STREAMS

ST selectors are used for multi-column, multi-sample, or multi-trap operations. The ST configuration is available in both MW and UW type designs.

A typical application, shown here, is the collection of fractions at timed intervals for analysis at a later time. Valves can be ordered with matched loops already installed.

In this example, the 6 port valve shown is used to select between 1 collection/trapping and 2 analysis/desorption. Both valves can be supplied with pneumatic or electric actuators to automate these functions.

SEE VIDEOS

See these applications in motion at vici.com > support > valve applications.

MORE INFO

TECH TIP

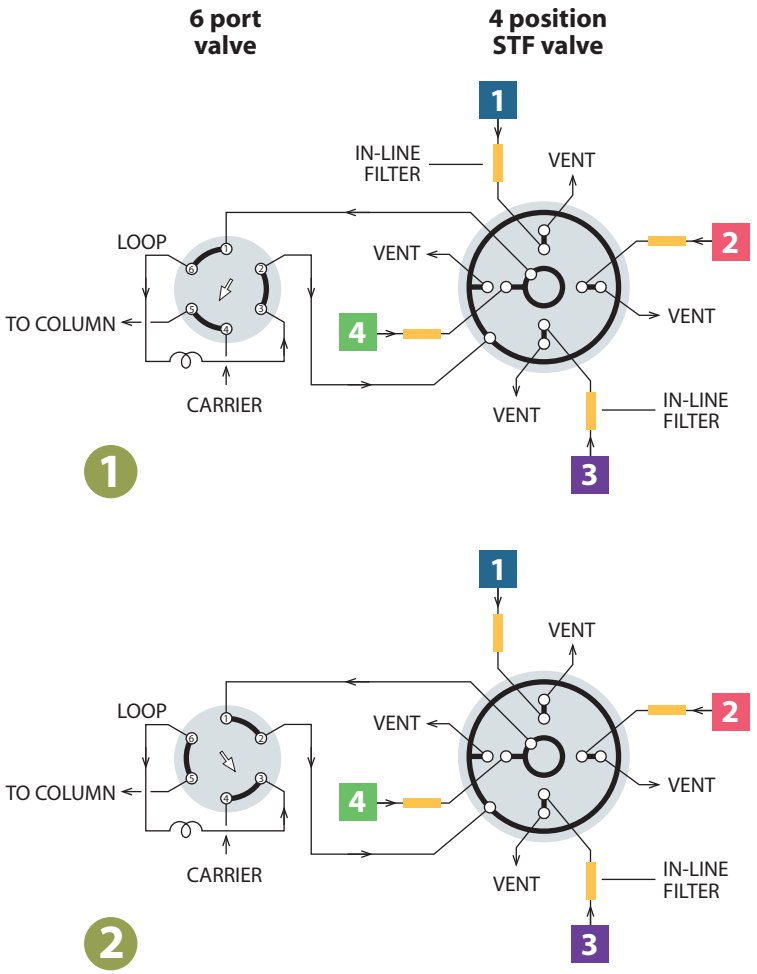
Because the most common cause of valve failure is stray particulates entering the valve, we strongly recommend the use of in-line filters at sample entry points.

Our ZUFR filters feature inexpensive and easily replaceable low pressure drop filter screens (2 or 10 micron). The filters are available in 1/16", 1/8", and 1/4" standard, reducing, and bulkhead versions.

Filters . . . . . pages 36-37, 39

VALCO VALVES

STF FLOWPATH



SAMPLE TRAPPING WITH CONTINUOUS FLOW TO INDIVIDUAL OUTLETS

The STF selector is a variation of the ST flowpath, with the single difference that the non-selected streams are returned to their own vents or sources rather than being dead-ended or trapped as they are in the standard ST configuration. This is ideal for reactor processes in which removal of substantial amounts of sample would upset the equilibrium within the reactor, or if the stream is toxic or noxious and must be isolated.

An STF selector on an air or electric actuator along with a similarly equipped 6 port valve comprise a complete sampling system for the automated analysis of up to 16 sampling points.

TECH TIP

Because the most common cause of valve failure is stray particulates entering the valve, we strongly recommend the use of in-line filters at sample entry points.

Our ZUFR filters feature inexpensive and easily replaceable low pressure drop filter screens (2 or 10 micron).

The filters are available in 1/16", 1/8", and 1/4" standard, reducing, and bulkhead versions.

Filters . . . . . pages 36-37, 39

SEE VIDEOS

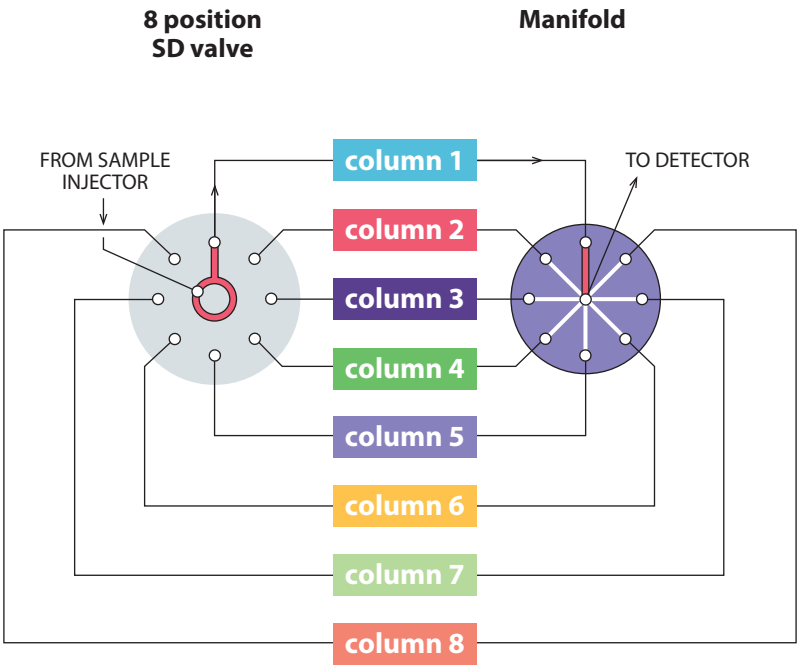
See these applications in motion at vici.com > support > valve applications.

MORE INFO

Actuators
Air . . . . . page 178
Modular universal . . 176
Universal 174-175

STF prices 112-113

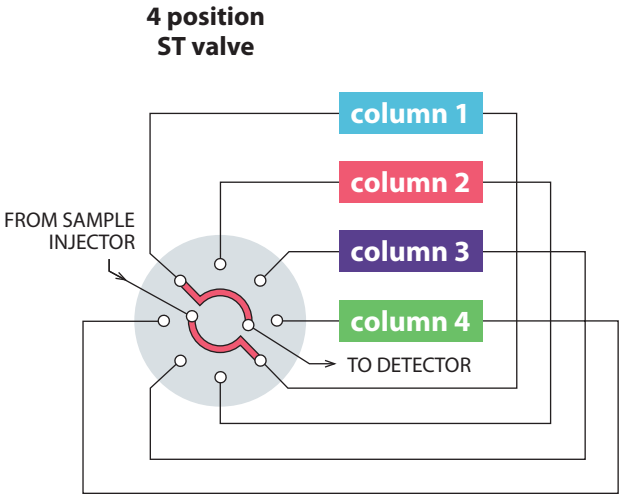
SD FLOWPATH – HIGH PRESSURE



HPLC COLUMN SELECTION FOR UP TO 10 COLUMNS

This example illustrates an SD (UW type) selector used for HPLC column selection. This allows multiple columns to be installed permanently in the system, eliminating instrument downtime and leakage potential resulting from having to change columns repeatedly. The SDUW valve selects only column inlets – the column outlets are connected to the detector via a low-volume manifold. The manifold is sold separately.

ST FLOWPATH – HIGH PRESSURE

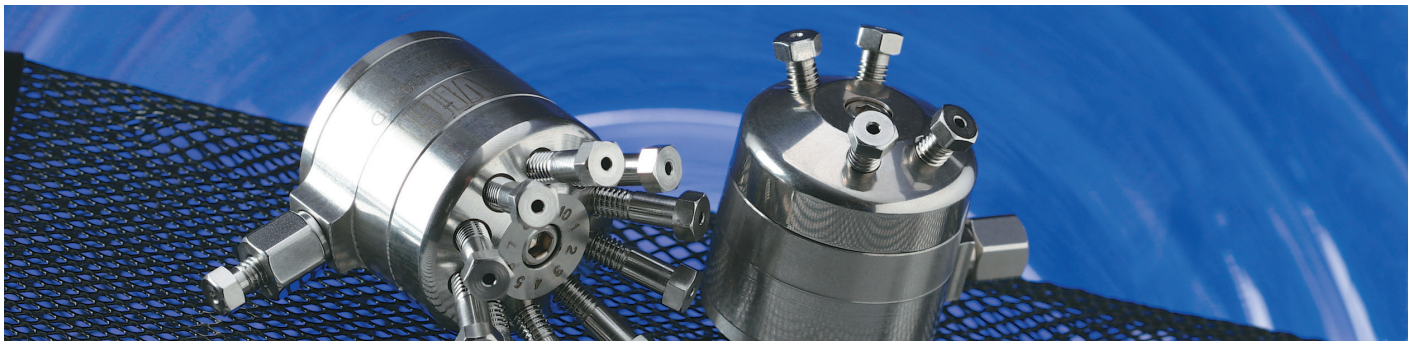


HPLC COLUMN SELECTION FOR 4 OR 6 COLUMNS

Up to 6 HPLC columns can be rapidly accessed by column selection valves, eliminating the instrument downtime involved in exchanging columns and the leakage due to repeated changing of tubing fittings. The columns are installed as a part of the loop system, as shown in this drawing. A 6 position valve can support 6 columns.

MORE INFO

DIAPHRAGM VALVES



FOR CONTINUOUS AUTOMATED OPERATION

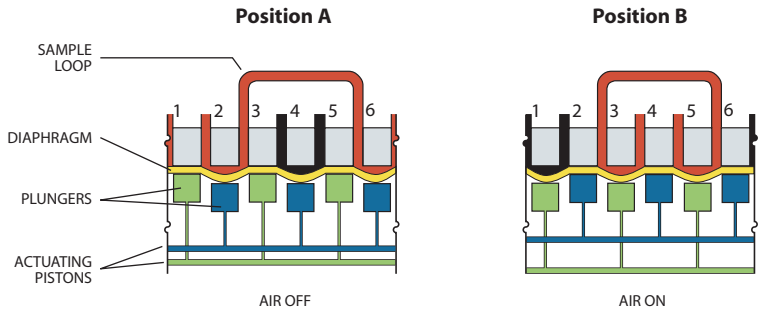
- Only 35 mm (1.375") in diameter
- >1,000,000 cycle lifetime
- Three configurations – 6 port, 10 port, and 4 port internal sample
- Built in actuator
- 1/16" or 1/32" Valco zero dead volume fittings

The VICI mini diaphragm valve is designed for trouble-free use in applications requiring minimal maintenance and maximum lifetime, making it an ideal choice for the process industry, automated lab analyzers, or continuous-monitoring environmental analyses.

DESIGN

The mini diaphragm valve consists of plungers and ports arranged in a circular pattern, with the plungers controlled by the reciprocation action of two air actuated pistons. Maintenance procedures are greatly simplified, since a single screw holds the valve together and locating pins ensure proper alignment. Extremely long lifetime, very short actuation time (10 milliseconds), minimum internal dead volume, and reliability have made this type of valve very successful in process gas chromatography for both sample injection and column switching.

CROSS SECTION VIEW OF A DIAPHRAGM VALVE

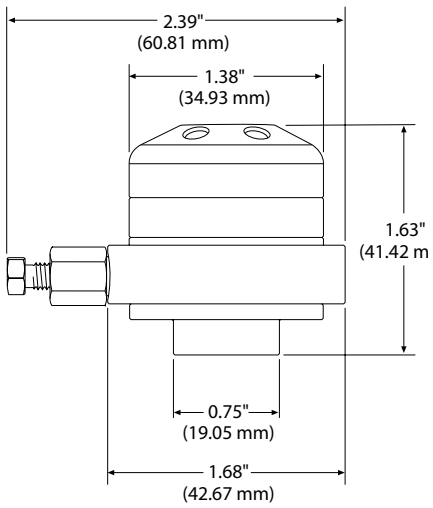


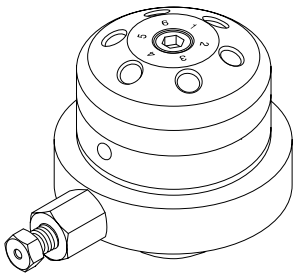
TECH TIP

For optimal zero dead volume connections, make sure your tubing meets the best industry standards. OD tolerance should be nominal dimension ± .002".

Fractional dimension	Nominal dimension
1/32"	.031"
1/16"	.062"
1/8"	.125"
1/4"	.250"
3/8"	.375"
1/2"	.500"

DIAPHRAGM VALVE DIMENSIONS





DIMENSIONS

As shown in the drawing at left, the VICI diaphragm valve with built-in actuator comprises a very compact package. The valve and fittings (without purge ring) weigh only 240 grams.

VALVE FITTINGS

The valve cap has Valco 1/32" or 1/16" ZDV fitting details – a rugged design which allows easy replacement of tubing or of the valve itself.

Standard bore size is 0.40 mm (.016"). Optional bore sizes are 0.25 mm (.010") and 0.75 mm (.030").

LIFETIME

Diaphragm valve lifetime can exceed 1,000,000 cycles at ambient temperature or 500,000 cycles at 175°C.

ACTUATION

Actuator air (50-60 psi) is supplied to a side port with 10-32 female threads, permitting use of a variety of compression or barbed fittings. A 3-way solenoid is required for actuation. *(See page 180.)*

OPTIONAL MOUNTING KIT

The mounting kit consists of a ring which is mounted on a flat surface. A slot allows the ring to be tightened around the collar of the valve.

TEMPERATURE/PRESSURE SPECIFICATIONS

Diaphragm valves can be operated at temperatures up to 200°C, at 300 psi. The standard valve is for applications in which the sample is above ambient pressure. An optional version works with subambient pressures, such as when the sample is "pulled" through the valve by a vacuum pump.

MATERIALS OF CONSTRUCTION

The cap is Nitronic 60 stainless (optional Hastelloy C or Type 316 stainless), with remaining metal parts of 300 series stainless. The diaphragm is formed from a specialized polyimide.

PURGE OPTION

Purging improves sensitivity when a diaphragm valve is used in conjunction with a VICI Pulsed Discharge Detector, for example, since air cannot diffuse into the flow path.

The optional purge ring, easy to install on any VICI diaphragm valve, is equipped with two 1/16" ports for the purge gas inlet and outlet.

Switching/sampling valves with a purge ring have a maximum temperature of 175°C.

Purge ring

ACTUATION

A 3-way solenoid is required for actuation.

3-way solenoid . . . p 180

MORE INFO

Materials

Metals. 246-247

Valve descriptions

Cheminert
Injectors and valves 129-131
Selectors 132-133
Valco
Injectors and valves 82-83
Selectors 84-85

DIAPHRAGM VALVES

Diaphragm valves

1/32" FITTINGS, 0.25 MM PORTS (.010")

Process GC

1/32" **0.25 mm**

Includes stainless steel nuts and ferrules.
A 3-way solenoid is required for actuation. Order separately on page 180.

4 port .5 µl internal sample

Prod No	*Price*
DV13-1114-.5	$1260

4 port 1 µl internal sample

Prod No	*Price*
DV13-1114-1	$1260

6 port sampling/switching

Prod No	*Price*
DV13-1116	$1260

10 port multifunctional

Prod No	*Price*
DV13-1110	$1470

SPECIFICATIONS

Internal sample:
750 psi liq
50°C max
Sampling/switching:
300 psi gas
175°C max
Sample:
Above ambient pressure*
Nitronic 60 valve body
Polyimide diaphragm

* For vacuum applications, contact the factory.

Diaphragm valves

1/16" FITTINGS, 0.40 MM PORTS (.016")

Process GC

1/16" **0.40 mm**

Includes stainless steel nuts and ferrules.
A 3-way solenoid is required for actuation. Order separately on page 180.

4 port .5 µl internal sample

Prod No	*Price*
DV23-2114-.5	$1085

4 port 1 µl internal sample

Prod No	*Price*
DV23-2114-1	$1085

6 port sampling/switching

Prod No	*Price*
DV23-2116	$1085

10 port multifunctional

Prod No	*Price*
DV23-2110	$1260

SPECIFICATIONS

Internal sample:
750 psi liq
50°C max
Sampling/switching:
300 psi gas
175°C max
Sample:
Above ambient pressure*
Nitronic 60 valve body
Polyimide diaphragm

* For vacuum applications, contact the factory.

Diaphragm valves

1/16" FITTINGS, 0.75 MM PORTS (.030")

Process GC

1/16" **0.75 mm**

Includes stainless steel nuts and ferrules.
A 3-way solenoid is required for actuation. Order separately on page 180.

4 port .5 µl internal sample

Prod No	*Price*
DV23-3114-.5	$1085

4 port 1 µl internal sample

Prod No	*Price*
DV23-3114-1	$1085

6 port sampling/switching

Prod No	*Price*
DV23-3116	$1085

10 port multifunctional

Prod No	*Price*
DV23-3110	$1260

SPECIFICATIONS

Internal sample:
750 psi liq
50°C max
Sampling/switching:
300 psi gas
175°C max
Sample:
Above ambient pressure*
Nitronic 60 valve body
Polyimide diaphragm

* For vacuum applications, contact the factory.

6 PORT DIAPHRAGM VALVE
1/16" fittings

Parts and accessories

		Prod No	*Price*
Purge ring		DV22-PURGE	$80
Mounting kit		DVBRKIT	20
Replacement diaphragms			
Polyimide	.010" bore	DV22-21D	$80
	.016" bore	DV22-21D	80
	.030" bore	DV22-31D	85
PTFE		DV22-22D	65

Sample loops

Each stainless steel loop includes two stainless nuts and ferrules.

Volume	*Prod No*	*Price*	*Volume*	*Prod No*	*Price*
1/16"					
2 µl	CSL2	$25	250 µl	CSL250	$34
5 µl	CSL5	25	500 µl	CSL500	34
10 µl	CSL10	25	1 ml	CSL1K	39
20 µl	CSL20	25	2 ml	CSL2K	50
50 µl	CSL50	25	5 ml	CSL5K	58
100 µl	CSL100	34	10 ml	CSL10K	76
1/32"					
1 µl	CSLN1K	$39			
2 µl	CSLN2K	50			
5 µl	CSLN5K	53			
10 µl	CSLN10K	66			

OPTIONS

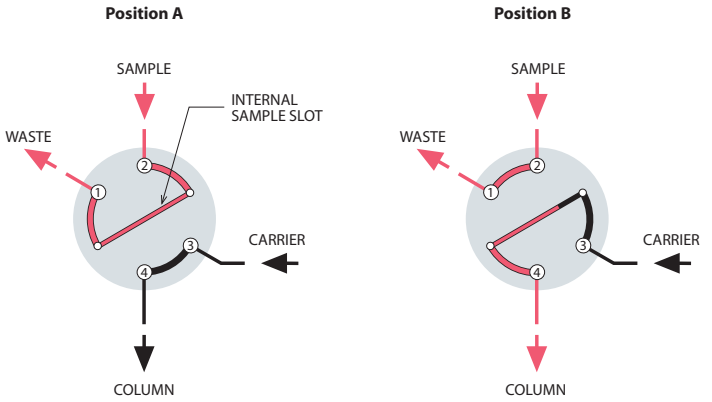
- High temperature version is available for range of 250-300 °C
- Materials:
  Hastelloy C
  Type 316 stainless

For more information, refer to the metals info on pages 246-247.

MORE INFO

More applications . . . pp 99-103
3-way solenoid 180

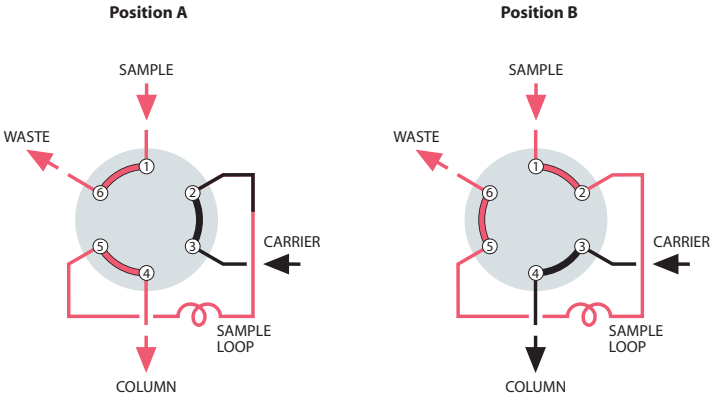
4 PORT – SAMPLE INJECTOR



MICROVOLUME SAMPLE INJECTION

The internal sample (fixed volume) flowpath is used when very small sample volumes are required. The sample size is determined by a passage engraved on the valve cap, allowing precise, repeatable injections. In Position A, the sample flows through the sample passage while the carrier flows through to the column. In Position B, the sample passage is in line with the column and the carrier injects the contents of the sample passage into the column.

6 PORT – SAMPLE INJECTOR

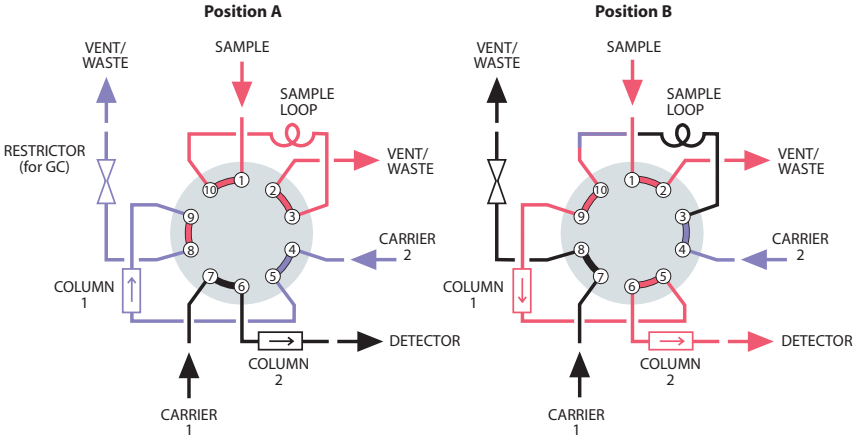


SAMPLE INJECTION

With the valve in Position A, sample flows through the external loop while the carrier flows directly through to the column. When the valve is switched to Position B, the sample contained in the sample loop and valve flow passage is injected into the column.

MORE INFO
More applications .....pages 100-101

10 PORT – SAMPLE INJECTOR



LOOP SAMPLING WITH BACKFLUSH OF PRE-COLUMN TO VENT

When components of interest are low boiling, this plumbing scheme allows "heavy" components with long retention times to be backflushed to waste. After the sample loop is loaded in Position A, the valve is switched to Position B to inject the sample into column 1. As soon as all components of interest have entered column 2, the valve is switched back to Position A. Column 1 is backflushed to vent during the analysis, reducing the total analysis time.

MORE INFO
More applications .....pages 102-103

CHEMINERT VALVES

FOR INJECTION, SWITCHING, AND STREAM SELECTION

- Pressure ratings from 100 psi to 20,000 psi liq
- Inert, biocompatible construction
- Automated operation – pneumatic or electric
- 4, 6, 8, and 10 port and internal sample two position models
- Multiposition stream selection versions with up to 28 positions

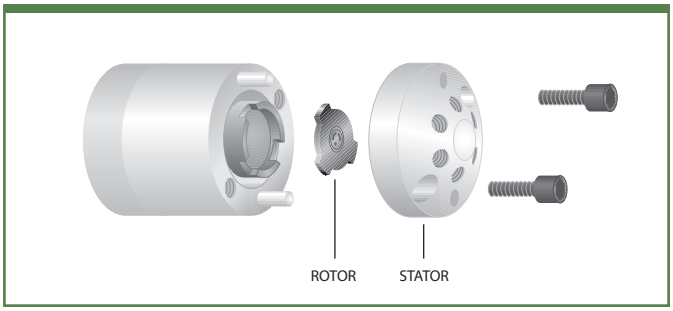
DESIGN

The basic Cheminert design involves a flat rotor which is engraved with slots which connect the ports. A stator is held at a constant, preset force against the rotor.

When repairs are required, all that is necessary for rotor access is the removal of two or three screws. Remove the old rotor and replace it, put the screws back in and tighten them, and the valve is ready for use at the factory-set pressure specification. No adjustments are possible, much less required. Other advantages of the design include easy panel mounting, low actuating torque, and compact size.

The flat plate design offers flow paths for basic flow switching, sample injection, and stream selection up to 10 positions (28 positions in some models).

EXPLODED VIEW OF A CHEMINERT VALVE



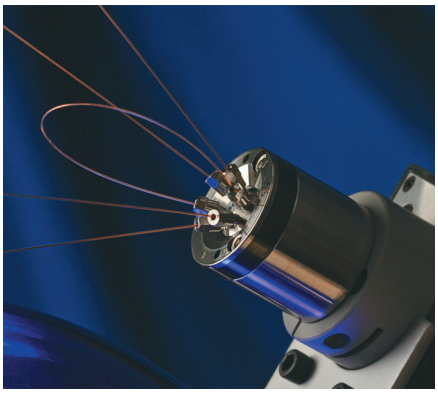
MATERIALS OF CONSTRUCTION

UHPLC models have stators of specially coated stainless steel, with PAEK rotors.

HPLC models have stators of Nitronic 60 stainless steel, PAEK, Hastelloy C, or titanium, all of which are compatible with common HPLC solvents. Many are available with a proprietary long-life coating. Valcon H rotors are used with metal stators, and Valcon E with PAEK.

LOW PRESSURE models have PPS stators and rotors of Valcon E2, a proprietary reinforced PTFE composite.

SEE ALSO

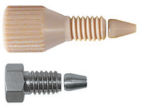


NANOVOLUME® VALVES

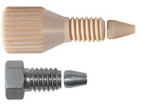
Cheminert Nanovolume® injectors, switching valves, and selectors are ideal for high speed, high throughput techniques which demand a valve and fitting system that minimize internal volume and eliminate dead volume.

A proprietary rotor material and stator coating achieve pressures to 20,000 psi. All models are compatible with any VICI actuation option.

NANOVOLUME® INJECTORS AND SWITCHING VALVES

Application	Fittings		Bore size	Pressure rating	More info
UHPLC 20,000 psi 15,000 psi 10,000 psi	360 micron		100 or 150 µm	20,000 psi	vici.com
				15,000 psi	PAGE 134
				10,000 psi	vici.com
	1/32" stainless		100 or 150 µm	20,000 psi	vici.com
				15,000 psi	PAGE 135
				10,000 psi	vici.com
	1/16" stainless		150 µm	15,000 psi	vici.com
				10,000 psi	vici.com
HPLC 5,000 psi	1/32" PEEK or stainless		100 or 150 µm	5,000 psi	PAGE 138

NANOVOLUME® INTERNAL SAMPLE INJECTORS

Application	Fittings		Bore size	Sample sizes	Pressure rating	More info
UHPLC 20,000 psi 15,000 psi 10,000 psi	360 micron		100 µm	4, 10, or 20 nl	20,000 psi	vici.com
					15,000 psi	vici.com
					10,000 psi	vici.com
			150 µm	10, 20, or 30 nl	20,000 psi	vici.com
					15,000 psi	vici.com
					10,000 psi	vici.com
	1/32" stainless		100 µm	4, 10, or 20 nl	20,000 psi	vici.com
					15,000 psi	vici.com
					10,000 psi	vici.com
			150 µm	10, 20, or 30 nl	20,000 psi	vici.com
					15,000 psi	PAGE 135
					10,000 psi	vici.com
	1/16" stainless		150 µm	10, 20, or 50 nl	20,000 psi	vici.com
					15,000 psi	vici.com
					10,000 psi	vici.com
HPLC 5,000 psi	1/32" PEEK or stainless		100 µm or 150 µm	4, 10, or 20 nl	5,000 psi	PAGE 139

NANOVOLUME® SELECTORS

Application	Fittings		Bore size	Pressure rating	More info
UHPLC 20,000 psi 15,000 psi 10,000 psi	1/32" stainless		100 or 150 µm	20,000 psi	vici.com
				15,000 psi	PAGE 154
				10,000 psi	vici.com
	1/16" stainless		150 µm	20,000 psi	vici.com
				15,000 psi	PAGE 155
				10,000 psi	vici.com

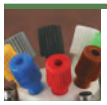
NANOVOLUME® VALVES ON VICI.COM

For complete lists of all valve options described here, go to:
www.vici.com/cval/cval_nano.php

TECH TIP

For optimal zero dead volume connections, make sure your tubing meets the best industry standards. OD tolerance should be nominal dimension ± .002".

Fractional dimension	Nominal dimension
1/32"	.031"
1/16"	.062"
1/8"	.125"
1/4"	.250"
3/8"	.375"
1/2"	.500"

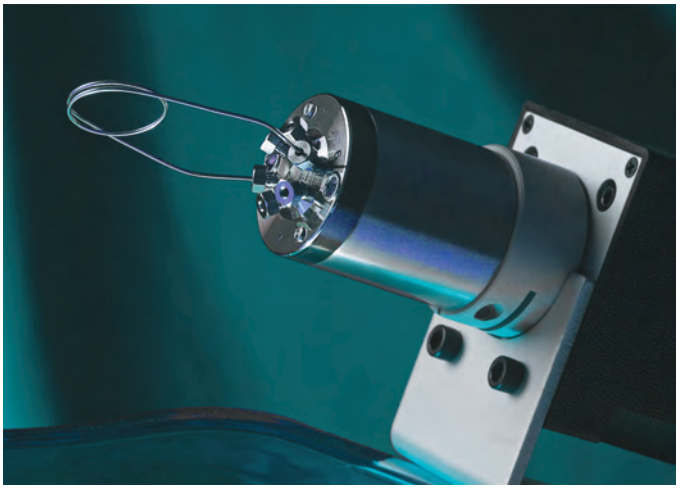


CHEMINERT VALVES

UHPLC VALVES

Cheminert UHPLC injectors, switching valves, and selectors are ideal for high speed, high throughput techniques which demand a valve and fitting system that minimize internal volume and eliminate dead volume.

VICI offers UHPLC versions for nanobore and microbore applications.



NANOVOLUME® UHPLC VALVES

See previous page for information about Nanovolume® UHPLC injectors, switching valves, and selectors.

MICROBORE UHPLC INJECTORS AND SWITCHING VALVES

Application	Fittings		Bore size	Pressure rating	Catalog page
UHPLC 20,000 psi	1/32" stainless		250 µm	20,000 psi	vici.com
				15,000 psi	vici.com
UHPLC 15,000 psi				10,000 psi	vici.com
UHPLC 10,000 psi	1/16" stainless		250 µm	20,000 psi	vici.com
				15,000 psi	PAGE 136
				10,000 psi	vici.com

MICROBORE UHPLC INTERNAL SAMPLE INJECTORS

Application	Fittings		Bore size	Sample sizes	Pressure rating	Catalog page
UHPLC 20,000 psi	1/32" stainless		250 µm	20, 50, or 100 nl	20,000 psi	vici.com
					15,000 psi	vici.com
UHPLC 15,000 psi					10,000 psi	vici.com
UHPLC 10,000 psi	1/16" stainless		250 µm	20, 50, or 100 nl	20,000 psi	vici.com
					15,000 psi	PAGE 137
					10,000 psi	vici.com

MICROBORE UHPLC SELECTORS

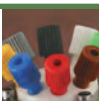
Application	Fittings		Bore size	Pressure rating	Catalog page
UHPLC 20,000 psi	1/32" stainless		250 µm	20,000 psi	vici.com
				15,000 psi	vici.com
UHPLC 15,000 psi				10,000 psi	vici.com
UHPLC 10,000 psi	1/16" stainless		250 µm	20,000 psi	vici.com
				15,000 psi	PAGE 155
				10,000 psi	vici.com

UHPLC VALVES AT VICI.COM

For more information on all valve options listed here, go to:
www.vici.com/cval/cval_uhplc.php

MORE INFO

Nanovolume® injectors and selectors 127



HPLC INJECTORS AND SWITCHING VALVES

Application	Fittings	Bore size		Ports	Catalog page
NANOVOLUME 5,000 psi	1/32" PEEK or stainless 	100 or 150 µm	Injector or switching valve	6 and 10	PAGE 138
MICROBORE 5,000 psi	1/16" stainless 	0.25 mm	Injector or switching valve	4, 6, 8, and 10	PAGE 140
			Through-the-handle injector	6	PAGE 142
			Continuous flow through-the-handle injector	6	PAGE 142
			Continuous flow injector	6	PAGE 143
ANALYTICAL 5,000 psi	1/16" stainless 	0.40 mm	Injector or switching valve	4, 6, 8, and 10	PAGE 144
			Through-the-handle injector	6	PAGE 146
			Continuous flow through-the-handle injector	6	PAGE 146
			Continuous flow injector	6	PAGE 147

The **THROUGH-THE-HANDLE INJECTOR** (front-loading) is designed for direct replacement of existing competitive models. These injectors are manual, with position feedback standard.

In the 6 port **CONTINUOUS FLOW THROUGH-THE-HANDLE INJECTOR**, an engraving on the stator maintains pump flow to the column during most of the switching cycle, virtually eliminating pressure spikes. Because the handle is integral to the design, all Model C1CF valves are manual, with position feedback standard.

The **CONTINUOUS FLOW INJECTOR** is designed to maintain pump flow during most of the switching cycle, virtually eliminating pressure spikes. This valve is available with a variety of actuation options.

HPLC **INTERNAL SAMPLE INJECTORS**

Application	Fittings	Bore size	Sample sizes	Catalog page
NANOVOLUME 5,000 psi	1/32" PEEK or stainless 	100 µl	4 nl, 10 nl, or 20 nl	PAGE 139
MICROBORE 5,000 psi	1/16" stainless 	0.15 mm	10 nl, 20 nl, or 50 nl	PAGE 141
ANALYTICAL 5,000 psi	1/16" stainless 	0.25 mm	0.1 µl, 0.2 µl, or 0.5 µl	PAGE 145

AUTOSAMPLER REPLACEMENTS

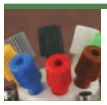
We supply direct replacements for injectors in many popular autosamplers. Call technical support to determine which replacement is best for your application.

SEMI-PREP HPLC

Our basic injector/ switching valves are available with flow passages optimized for semi-preparative HPLC. Choose from 4, 6, 8, or 10 port versions. Contact our sales or technical support departments for more information.

MORE INFO

HPLC selectors 132
Injectors and selectors for OEMs 162-171



CHEMINERT VALVES

LOW PRESSURE INJECTORS

	Fittings	Bore size	Specifications	Ports	Catalog page
VALCO ZDV FITTINGS Low pressure	1/16" PEEK (10-32) 	0.75 mm	250 psi liq/ 75° C	4, 6, 8, and 10	PAGE 148
CHEMINERT 1/4-28 FITTINGS Low pressure	1/4-28 for 1/16" tubing 	0.75 mm	250 psi liq/ 75° C	4, 6, 8, and 10	PAGE 149
	1/4-28 for 1/8" tubing 	1.50 mm	250 psi liq/ 75° C	4, 6, 8, and 10	PAGE 149
1/2-20 FITTINGS Low pressure	1/2-20 for 1/4" tubing 	2.8 mm - 4.6 mm (varies with number of ports)	100 psi liq/ 50° C	4, 6, and 8	PAGE 151

LOW PRESSURE VALVES WITH ZERO DEAD VOLUME FITTINGS (10-32 thread) are shipped with standard PEEK nuts and ferrules. Zero dead volume fingertight fittings and nuts and ferrules of other materials may be ordered separately. Standard specifications are 100 psi gas/250 psi liquid at 75°C. On request, the pressure rating can be as high as 600 psi liquid. ***Caution:*** Metal fittings will damage the threads and details of low pressure valves. Use of metal fittings voids the warranty.

LOW PRESSURE VALVES FOR 1/4-28 FITTINGS come with multicolored Cheminert 1/4-28 flangeless fittings for 1/16" or 1/8" OD tubing (depending on the valve model.) Valve caps have female threads for direct connection of lines – no couplings are required.

LOW PRESSURE **INTERNAL SAMPLE INJECTORS**

Application	Fittings	Bore size	Specifications	Sample sizes	Catalog page
VALCO ZDV FITTINGS Low pressure	1/16" PEEK (10-32) 	0.40 mm	250 psi liq/ 75° C	0.2 µl, 0.5 µl, or 1.0 µl	PAGE 150
CHEMINERT 1/4-28 FITTINGS Low pressure	1/4-28 for 1/16" tubing 	0.50 mm	250 psi liq/ 75° C	4, 6, 8, and 10	PAGE 150

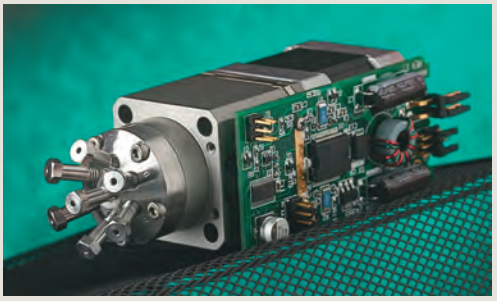
CAUTION

Metal fittings will damage the threads and details of C20Z series valves (models C22Z, C24Z, C25Z). Use of metal fittings in a C20Z valve voids the warranty.

TECH TIP

Our life tests indicate that these valves will typically give more than 100,000 cycles before requiring any service. This assumes that the fluid used is free of particulates and not reactive toward the valve components. If the stream may contain particulates, or if it has high salt content which could precipitate within the sample lines, use an in-line filter.
Note: Valves with purge ports are available on request.

MORE INFO



INJECTORS FOR OEMS

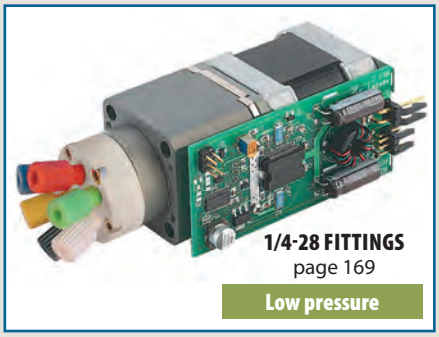
INTEGRATED MOTOR/INJECTOR ASSEMBLIES

Cheminert's HPLC and low pressure integrated motor/injectors are assemblies designed specifically to be built into an OEM system. Using the well-proven Cheminert injector designs and the 24 volt motor from our popular microelectric actuators, they need only to be connected to the instrument's power supply.

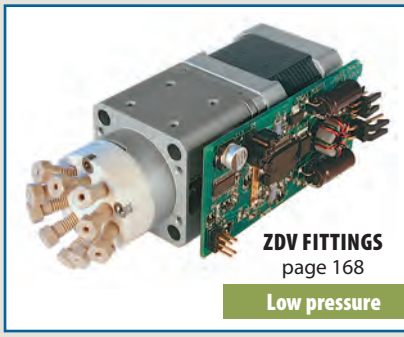
Control is simplified to require a single contact closure; the injector's position is determined by whether the closure is held high or low. There's even an easy way for the instrument to confirm the valve's position by sensing the output from a built-in sensor. In the default control mode, one contact closure shifts the injector to inject and a second is required to shift it back to load. A simple jumper change shifts the mode to single contact closure, in which a contact closure moves the injector from load to inject, where it remains until the contact is broken and the injector reverts to the load position. Jumper settings can also be modified to change the motor's degree of rotation so it can be used with any of the valve models available.

All these features are built into a compact and lightweight package and are available in 4, 6, 8, and 10 port configurations. Serial communication via RS-232 or RS-485 is optional.

HPLC
Microbore, page 162
Analytical, page 166
5,000 psi



1/4-28 FITTINGS
page 169
Low pressure

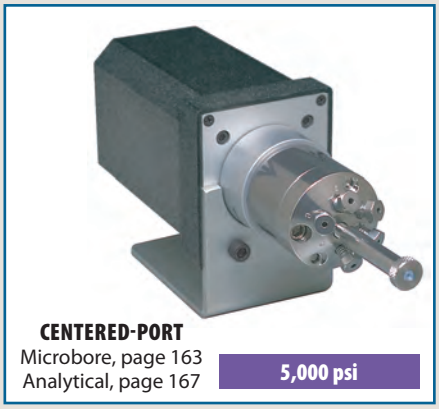


ZDV FITTINGS
page 168
Low pressure

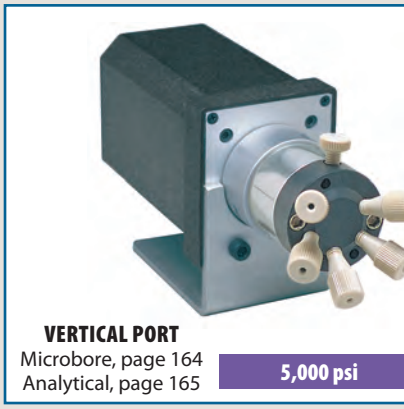
AUTOSAMPLER AND OTHER OEM INJECTORS

CENTERED-PORT INJECTORS offer a syringe injection port centered on the rear face of the valve (opposite the handle or actuator), allowing convenient syringe insertion when the valve is mounted on an actuator inside an instrument.

The **VERTICAL PORT INJECTOR** is designed specifically for use in an autosampler. It is like our standard injector except that the sample port is perpendicular to the valve axis. This permits the valve and actuator to be installed horizontally, while the syringe loads the injector vertically.



CENTERED-PORT
Microbore, page 163
Analytical, page 167
5,000 psi



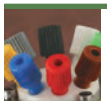
VERTICAL PORT
Microbore, page 164
Analytical, page 165
5,000 psi

UNIVERSAL ACTUATOR

The VICI universal actuator operates virtually any Valco or Cheminert rotary valve – two position and selector alike – greatly simplifying the electronic aspect of instrument design. See pages 174-175.

OEM SELECTOR VALVES

See page 133 for selector (multiposition) valves for OEMs.



CHEMINERT VALVES

UHPLC AND HIGH PRESSURE SELECTORS

UHPLC SELECTORS offer pressure ratings of 20,000 psi, 15,000 psi and 10,000 psi with 1/32" and 1/16" fittings for nanobore and microbore applications.

Our **HPLC SELECTOR** with Valco ZDV fitting details is available with 4, 6, 8, or 10 positions. Stators are available in Nitronic 60 stainless, titanium, and Hastelloy C-22, with rotors of Valcon H, all of which are compatible with common HPLC solvents. PAEK stators are used in combination with Valcon E rotors. This valve is the backbone of the Cheminert **HPLC COLUMN SELECTOR SYSTEM**, which includes two stream selection valves mounted on a single microelectric actuator. (Columns are not included.)

Consult the factory for information about a **UHPLC COLUMN SELECTOR SYSTEM**.

HPLC COLUMN SELECTOR SYSTEM

	Fittings		Bore size	Positions	Catalog page
NANOVOLUME 20,000 psi 15,000 psi 10,000 psi	1/32" stainless		150 µm (100 µm optional)	4, 6, 8, and 10	PAGE 154
	1/16" stainless		150 µm	20,000 psi	vici.com
MICROBORE 20,000 psi 15,000 psi 10,000 psi	1/32" stainless		250 µm	4, 6, 8, and 10	vici.com
	1/16" stainless		250 µm	4, 6, 8, and 10	PAGE 155

HPLC SELECTORS

	Fittings		Bore size	Positions	Catalog page
STREAM SELECTOR 5,000 psi	1/16" stainless		0.40 mm	4, 6, 8, and 10	PAGE 156
COLUMN SELECTOR SYSTEM 5,000 psi	1/16" stainless		0.40 mm	6, 8, and 10	PAGE 157

UNIVERSAL ACTUATOR

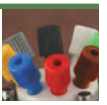
VICI's universal actuator operates virtually any Valco or Cheminert rotary valve – two position and selector alike – greatly simplifying the electronic aspect of instrument design. See page 174.

CAUTION

Metal fittings will damage the threads and details of C25Z, C25G, and C65Z series valves.

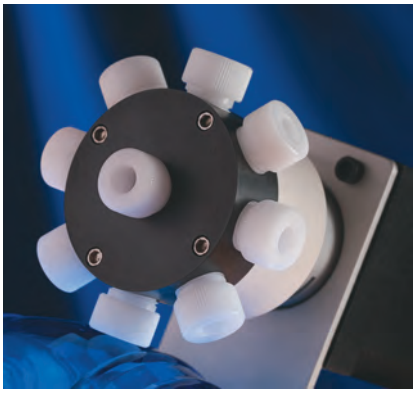
Use of metal fittings in these valves voids the warranty.

MORE INFO



LOW PRESSURE SELECTORS

	Fittings	Bore size	Specifications	Positions	Catalog page
VALCO ZDV FITTINGS Low pressure	1/16" PEEK (10-32) 	0.75 mm	250 psi liq/ 75° C	4, 6, 8, 10, 12, and 14	PAGE 158
CHEMINERT 1/4-28 FITTINGS Low pressure	1/4-28 for 1/16" tubing 	0.75 mm	250 psi liq/ 75° C	4, 6, 8, and 10	PAGE 159
	1/4-28 for 1/8" tubing 	1.50 mm	250 psi liq/ 75° C	4, 6, 8, and 10	PAGE 159
20-28 STREAMS Low pressure	1/16" PEEK (6-40) 	0.67 mm - 0.56 mm	100 psi liq/ 50° C	20, 24, and 28	PAGE 160
1/2-20 FITTINGS Low pressure	1/2-20 for 1/4" tubing 	2.9 mm - 4.6 mm (varies with number of ports)	100 psi liq/ 50° C	4, 6, and 8	PAGE 161



SELECTORS FOR OEMS

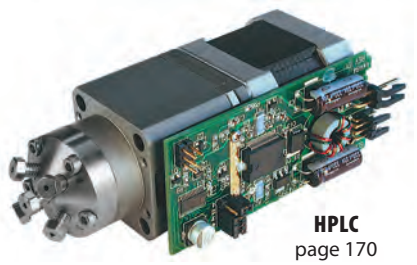
INTEGRATED MOTOR/STREAM SELECTORS

Cheminert's HPLC and low pressure integrated motor/ stream selectors are assemblies designed specifically to be built into an OEM system. The compact, light-weight package is available in 4, 6, 8, and 10 position configurations.

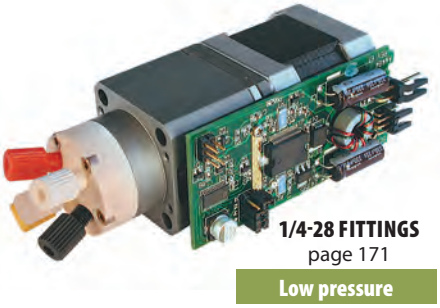
Using the well-proven Cheminert stream selector design and the 24 volt motor from our microelectric actuators, the Models C55, C65, and C65Z need only to be connected to an instrument's power supply. A single momentary contact closure steps the valve to the next position; a separate contact closure moves the valve to position 1 (Home).

See how our stream selectors can simplify your instrument design and minimize time to market – all while trimming your costs.

Serial communication via RS-232 or RS-485 is optional.

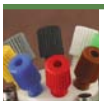


HPLC
page 170
5,000 psi



1/4-28 FITTINGS
page 171
Low pressure

OEM INJECTORS
See pages 131 for injectors for OEMs.



CHEMINERT VALVES

UHPLC Nanovolume® valves
15,000 psi

360 MICRON FITTINGS, 150 MICRON BORE (.006")

15,000 psi

Nanobore

360 µm | 150 µm

Model C72MX includes stainless 360 micron fittings.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

6 Port

10 Port

	Prod No	*Price*	*Prod No*	*Price*
Coated stainless stator				
Manual	C72MX-6676	$1290	C72MX-6670	$1400
With universal actuator	C72MX-6676EUHA	2150	C72MX-6670EUDA	2285
Replacement valve	C72MX-6676D	1290	C72MX-6670D	1400
Replacement rotor	C72M-66R6	100	C72M-66R0	100
Replacement stator	C72M-6C76	840	C72M-6C70	950

SPECIFICATIONS

15,000 psi liq
50°C max
Stator: Stainless with inert coating
Rotor: Valcon E3

OPTIONS

- 100 micron (.004") bore
- Internal sample injector (4 - 20 nl)
- 10,000 and 20,000 psi versions available
- 4 and 8 port versions available

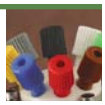
6 PORT VALVE
360 micron fittings

TECH TIP

Increasing the pressure rating shortens valve lifetime.

MORE INFO

360 micron Nanovolume® fittings . . . . . .pp 42-44



UHPLC Nanovolume® valves

15,000 psi

1/32" VALCO STAINLESS FITTINGS, 150 MICRON BORE (.006")

SPECIFICATIONS

15,000 psi liq
50°C max
Stator: Stainless with inert coating
Rotor: Valcon E3

OPTIONS

- 100 micron (.004") bore
- 250 micron (.010") bore
- 10,000 and 20,000 psi versions available
- 4 and 8 port versions available

Model C72NX includes stainless nuts and ferrules.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

15,000 psi | Nanobore | 1/32" | 150 µm

	6 Port		10 Port	
	Prod No	*Price*	*Prod No*	*Price*
Coated stainless stator				
Manual	C82NX-6676	$1190	C82NX-6670	$1300
With universal actuator	C82NX-6676EUHA	2050	C82NX-6670EUDA	2185
Replacement valve	C82NX-6676D	1190	C82NX-6670D	1300
Replacement rotor	C72N-66R6	100	C72N-66 R0	100
Replacement stator	C72N-6C76	840	C72N-6C70	985

6 PORT VALVE
1/32" Valco stainless fittings

Sample loops

Each stainless steel loop includes two stainless 1/32" Valco fittings. Pressure rating > 20,000 psi.

Volume	*Prod No*	*Price*
1 µl	CSLN1K	$39
1.5 µl	CSLN1.5K	39
2 µl	CSLN2K	50
5 µl	CSLN5K	53
10 µl	CSLN10K	66

INTERNAL SAMPLE INJECTOR
1/32" Valco stainless fittings

UHPLC Nanovolume® internal sample injectors

15,000 psi

1/32" VALCO STAINLESS FITTINGS, 150 MICRON BORE (.006")

SPECIFICATIONS

15,000 psi liq
50°C max
Stator: Stainless with inert coating
Rotor: Valcon E3

OPTIONS

- 100 micron (.004") bore
- 250 micron (.010") bore
- 10,000 and 20,000 psi versions available

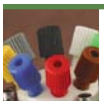
MORE INFO

1/32" Valco nuts and ferrules..... pp 12, 14

Model C74NX includes stainless nuts and ferrules.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

15,000 psi | Nanobore | Internal sample | 1/32" | 150 µm

Sample size:	10 nanoliters		20 nanoliters		30 nanoliters	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Coated stainless stator						
Manual	C84NX-6674-.01	$1190	C84NX-6674-.02	$1190	C84NX-6674-.03	$1190
With universal actuator	C84NX-6674-.01EUHA	2050	C84NX-6674-.02EUHA	2050	C84NX-6674-.03EUHA	2050
Replacement valve	C84NX-6674-.01D	1190	C84NX-6674-.02D	1190	C84NX-6674-.03D	1190
Replacement rotor	C74N-66R-.01	100	C74N-66R-.02	100	C74N-66R-.03	100
Replacement stator	C74N-6C7	890	C74N-6C7	890	C74N-6C7	890



CHEMINERT VALVES

UHPLC microbore valves
15,000 psi

1/16" VALCO FITTINGS, 0.25 MM PORTS (.010")

15,000 psi | Microbore | 1/16" | 0.25 mm

Model C72X includes stainless steel nuts and ferrules.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.




	4 Port		6 Port		8 Port		10 Port	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual	C82X-1674	$990	C82X-1676	$990	C82X-1678	$1045	C82X-1670	$1100
With universal act.	C82X-1674EUHA	1850	C82X-1676EUHA	1850	C82X-1678EUDA	1930	C82X-1670EUDA	1985
Replacement valve	C82X-1674D	990	C82X-1676D	990	C82X-1678D	1045	C82X-1670D	1100
Replacement rotor	C72-16R4	100	C72-16R6	100	C72-16R8	100	C72-16R0	100
Replacement stator	C72-1C74	670	C72-1C76	670	C72-1C78	720	C72-1C70	830

SPECIFICATIONS

15,000 psi liq
50°C max
Stator: Stainless with inert coating
Rotor: Valcon E3

OPTIONS

- 0.15 mm ports (.006")
- 10,000 and 20,000 psi versions available

6 PORT VALVE
1/16" Valco stainless fittings

Stainless steel sample loops

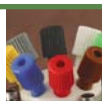
Each loop includes two stainless steel nuts and ferrules.

These loops are for use with valves on this page.

Volume	*Prod No*	*Price*	*Volume*	*Prod No*	*Price*	*Volume*	*Prod No*	*Price*
2 µl	CSL2	$25	20 µl	CSL20	$ 25	250 µl	CSL250	$34
5 µl	CSL5	25	50 µl	CSL50	25	500 µl	CSL500	34
10 µl	CSL10	25	100 µl	CSL100	34	1 ml	CSL1K	39

ABOUT LOOPS

- Metal loops > 2 ml are made from 1/8" OD tubing with TIG welded 1/16" tube ends or reducing unions, and are not suitable for UHPLC use.
- Sample loop shape and dimensions may vary from batch to batch due to fluctuations in tubing ID. Loop volume is controlled as closely as possible, but is not calibrated.



UHPLC microbore internal sample injectors
15,000 psi

1/16" VALCO FITTINGS, 0.25 MM PORTS (.010")

SPECIFICATIONS

15,000 psi liq
50°C max
Stator: Stainless with inert coating
Rotor: Valcon E3

Model C74X includes stainless steel nuts and ferrules.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

15,000 psi
Microbore
Internal sample
1/16" | 0.25 mm

OPTIONS

- 0.15 mm ports (.006")
- Other internal volumes are available on request
- 10,000 and 20,000 psi versions available

Sample volume	20 nanoliters		50 nanoliters		100 nanoliters	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual	C84X-1674-.02	$990	C84X-1674-.05	$990	C84X-1674-.1	$990
With universal actuator	C84X-1674-.02EUHA	1850	C84X-1674-.05EUHA	1850	C84X-1674-.1EUHA	1850
Replacement valve	C84X-1674-.02D	990	C84X-1674-.05D	990	C84X-1674-.1D	990
Replacement rotor	C74-16R-.02	100	C74-16R-.05	100	C74-16R-.1	100
Replacement stator	C74-1C7	690	C74-1C7	690	C74-1C7	690

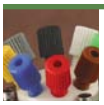
INTERNAL SAMPLE INJECTOR
1/16" Valco stainless fittings

TECH TIP

Increasing the pressure rating shortens valve lifetime.

MORE INFO

Actuators
Microelectric 176
Universal 174-175
Materials
Metals..... 246-247
Polymers 248
Valve rotors.....249



CHEMINERT VALVES

Nanovolume® valves
5,000 psi

1/32" FITTINGS, 100 MICRON PORTS (.004")

5,000 psi | Nanobore | 1/32" | 100 µm

Model C2N includes nuts and ferrules.
Valves with stainless stators have stainless fittings.
Valves with PAEK stators have PEEK fittings.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

	6 Port		10 Port	
	Prod No	*Price*	*Prod No*	*Price*
N60 stainless stator				
Manual	C2N-4006	$975	C2N-4000	$1085
With universal actuator	C2N-4006EUHA	1835	C2N-4000EUHA	1945
Replacement valve	C2N-4006D	975	C2N-4000D	1085
Replacement rotor	C2N-40R6	97	C2N-40R0	97
Replacement stator	C2N-4C06	810	C2N-4C00	925
PAEK stator				
Manual	C2N-4346	$1095	C2N-4340	$1205
With universal actuator	C2N-4346EUHA	1955	C2N-4340EUHA	2065
Replacement valve	C2N-4346D	1095	C2N-4340D	1205
Replacement rotor	C2N-43R6	97	C2N-43R0	97
Replacement stator	C2N-4C46	925	C2N-4C40	1040

SPECIFICATIONS

5,000 psi liq
50°C max
Stator: Metal
Rotor: Valcon H

5,000 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E

OPTIONS

- 150 micron (.006") and 250 micron (.010") ports

6 PORT NANOVOLUME VALVE
1/32" stainless ZDV fittings

Sample loops

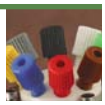
Each stainless loop includes two stainless steel nuts and ferrules.
Each PEEK loop includes two PEEK nuts and ferrules.

These loops are for use with valves on this page.

	Stainless steel		PEEK	
Volume	*Prod No*	*Price*	*Prod No*	*Price*
1 µl	CSLN1K	$39	CSLN1KPK	$40
2 µl	CSLN2K	50	CSLN2KPK	45
5 µl	CSLN5K	53	CSLN5KPK	53
10 µl	CSLN10K	66	CSLN10KPK	66

ABOUT LOOPS

- Sample loop shape and dimensions may vary from batch to batch due to fluctuations in tubing ID. Loop volume is controlled as closely as possible, but is not calibrated.



Nanovolume® internal sample injectors
5,000 psi

1/32" FITTINGS, 100 MICRON PORTS (.004")

SPECIFICATIONS

5,000 psi liq
50°C max
Stator: Metal
Rotor: Valcon H

5,000 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E

OPTIONS

• 0.15 mm ports (.006")

Model C4N includes nuts and ferrules.
Valves with stainless stators have stainless fittings.
Valves with PAEK stators have PEEK fittings.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

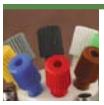
5,000 psi
Nanobore
Internal sample
1/32" | 100 µm

Sample volume	4 nanoliters		10 nanoliters		20 nanoliters	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
N60 stainless stator						
Manual	C4N-4004-.004	$970	C4N-4004-.01	$970	C4N-4004-.02	$970
With universal actuator	C4N-4004-.004EUHA	1830	C4N-4004-.01EUHA	1830	C4N-4004-.02EUHA	1830
Replacement valve	C4N-4004-.004D	970	C4N-4004-.01D	970	C4N-4004-.02D	970
Replacement rotor	C4N-40R-.004	97	C4N-40R-.01	97	C4N-40R-.02	97
Replacement stator	C4N-4C0	810	C4N-4C0	810	C4N-4C0	810
PAEK stator						
Manual	C4N-4344-.004	$1090	C4N-4344-.01	$1090	C4N-4344-.02	$1090
With universal actuator	C4N-4344-.004EUHA	1950	C4N-4344-.01EUHA	1950	C4N-4344-.02EUHA	1950
Replacement valve	C4N-4344-.004D	1090	C4N-4344-.01D	1090	C4N-4344-.02D	1090
Replacement rotor	C4N-43R-.004	97	C4N-43R-.01	97	C4N-43R-.02	97
Replacement stator	C4N-4C4H	925	C4N-4C4H	925	C4N-4C4H	925

INTERNAL SAMPLE INJECTOR
1/32" PEEK ZDV fittings

MORE INFO

Actuators
Microelectric 176
Universal 174-175
Materials
Metals..... 246-247
Polymers 248
Valve rotors.....249



CHEMINERT VALVES

Microbore valves

1/16" VALCO FITTINGS, 0.25 MM PORTS (.010")

5,000 psi | Microbore | 1/16" | 0.25 mm

Model C2 includes nuts and ferrules.
Valves with metal stators have stainless steel nuts and ferrules of the stator material.
Valves with PAEK stators have PEEK nuts and ferrules.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Note: The fitting detail pilot depth in PAEK HPLC stators is slightly longer than standard.

	4 Port		6 Port		8 Port		10 Port	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
N60 stainless stator								
Manual	C2-1004	$590	C2-1006	$590	C2H-1008	$645	C2H-1000	$700
With universal act.	C2-1004EUHA	1450	C2-1006EUHA	1450	C2H-1008EUHA	1505	C2H-1000EUHA	1560
Replacement valve	C2-1004D	590	C2-1006D	590	C2H-1008D	645	C2H-1000D	700
Replacement rotor	C2-10R4	76	C2-10R6	76	C2-10R8H	76	C2-10R0H	76
Replacement stator	C-1C04	405	C-1C06	405	C-1C08H	460	C-1C00H	520
PAEK stator								
Manual	C2-1344	$710	C2-1346	$710	C2H-1348	$765	C2H-1340	$820
With universal act.	C2-1344EUHA	1570	C2-1346EUHA	1570	C2H-1348EUHA	1625	C2H-1340EUHA	1680
Replacement valve	C2-1344D	710	C2-1346D	710	C2H-1348D	765	C2H-1340D	820
Replacement rotor	C2-13R4	76	C2-13R6	76	C2-13R8H	76	C2-13R0H	76
Replacement stator	C-1C44	520	C-1C46	520	C-1C48H	580	C-1C40H	635
Titanium stator								
Manual	C2-1034	$895	C2-1036	$895	C2H-1038	$950	C2H-1030	$1005
With universal act.	C2-1034EUHA	1755	C2-1036EUHA	1755	C2H-1038EUHA	1810	C2H-1030EUHA	1865
Replacement valve	C2-1034D	895	C2-1036D	895	C2H-1038D	950	C2H-1030D	1005
Replacement rotor	C2-10R4	76	C2-10R6	76	C2-10R8H	76	C2-10R0H	76
Replacement stator	C-1C34	710	C-1C36	710	C-1C38H	765	C-1C30H	825

SPECIFICATIONS

5,000 psi liq
75°C max
Stator: Metal
Rotor: Valcon H

5,000 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E

OPTIONS

- Continuous flow version is available as Model C6. *See page 143.*
- Hastelloy C stators
- Loop fill port assembly for injection from front of the valve. *See page 31.*
- 0.15 mm (0.006") bore

10 PORT VALVE
1/16" PEEK ZDV fittings

Sample loops

Each metal loop includes two stainless steel nuts and ferrules.
Each PEEK loop includes two PEEK nuts and ferrules.

These loops are for use with valves on pages 140, 142, 143, 144, 146, 147, 163, 164, 165, and 167.

	Stainless Steel		PEEK (for PAEK stators)	
Volume	*Prod No*	*Price*	*Prod No*	*Price*
2 µl	CSL2	$25	CZSL2PK	$31
5 µl	CSL5	25	CZSL5PK	31
10 µl	CSL10	25	CZSL10PK	31
20 µl	CSL20	25	CZSL20PK	28
50 µl	CSL50	25	CZSL50PK	25
100 µl	CSL100	34	CZSL100PK	25
250 µl	CSL250	34	CZSL250PK	31
500 µl	CSL500	34	CZSL500PK **	38
1 ml	CSL1K	38	CZSL1KPK **	50
2 ml	CSL2K	50	CZSL2KPK **	69
5 ml	CSL5K	58	CZSL5KPK **	106
10 ml	CSL10K	76		

*** max pressure 2500 psi*

Titanium

Prod No	*Price*
CSL10TI	$55
CSL20TI	55
CSL50TI	55
CSL100TI	55
CSL250TI	88
CSL500TI	165
CSL1KTI	260

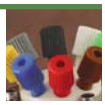
ABOUT LOOPS

- Other materials are available in many sizes: Electroformed Nickel, Hastelloy C, Nickel 200, and PTFE.
- Metal loops > 2 ml are made from 1/8" OD tubing with TIG welded 1/16" tube ends or reducing unions.
- Sample loop shape and dimensions may vary from batch to batch due to fluctuations in tubing ID. Loop volume is controlled as closely as possible, but is not calibrated.

OPTIONAL FLOWPATH

Model C2 6 port valves can also be ordered with a dual 3-way rotor, as described in EPA Method 555.

To specify this flowpath, substitute "6X" for "6" in the valve or rotor prod no (e.g. C2-1006XEUHA).



Nanoliter internal sample injectors

1/16" VALCO FITTINGS, 0.15 MM PORTS (.006")

SPECIFICATIONS

5,000 psi liq
75°C max
Stator: Metal
Rotor: Valcon H

5,000 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E

OPTIONS

- 100, 200, and 500 nl sample volumes are also available in 0.25 mm bore. *See page 145.*
- Loop fill port assembly for injection from front of the valve. *See page 31.*
- 0.25 mm (0.010") bore

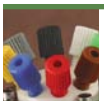
Model C4 includes nuts and ferrules.
Valves with stainless stators have stainless fittings.
Valves with PAEK stators have PEEK fittings.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Note: The fitting detail pilot depth in PAEK HPLC stators is slightly longer than standard.

5,000 psi
Microbore
Internal sample
1/16" 0.15 mm

Sample volume	10 nanoliters		20 nanoliters		50 nanoliters	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
N60 stainless stator						
Manual	C4-0004-.01	$750	C4-0004-.02	$750	C4-0004-.05	$750
With universal actuator	C4-0004-.01EUHA	1610	C4-0004-.02EUHA	1610	C4-0004-.05EUHA	1610
Replacement valve	C4-0004-.01D	750	C4-0004-.02D	750	C4-0004-.05D	750
Replacement rotor	C4-00R-.01	87	C4-00R-.02	87	C4-00R-.05	87
Replacement stator	C4-0C0	580	C4-0C0	580	C4-0C0	580
PAEK stator						
Manual	C4-0344-.01	$870	C4-0344-.02	$870	C4-0344-.05	$870
With universal actuator	C4-0344-.01EUHA	1730	C4-0344-.02EUHA	1730	C4-0344-.05EUHA	1730
Replacement valve	C4-0344-.01D	870	C4-0344-.02D	870	C4-0344-.05D	870
Replacement rotor	C4-03R-.01	87	C4-03R-.02	87	C4-03R-.05	87
Replacement stator	C4-0C4	695	C4-0C4	695	C4-0C4	695

INTERNAL SAMPLE INJECTOR
1/16" stainless ZDV fittings

MORE INFO



CHEMINERT VALVES

Microbore through-the-handle injectors

1/16" VALCO FITTINGS, 0.25 MM PORTS (.010")

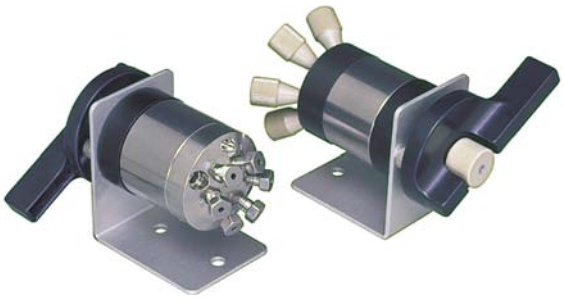
5,000 psi | Microbore | Through-handle | 1/16" | 0.25 mm

Model C1 is available only in manual version. Position feedback included. Includes nuts and ferrules.

Valves with stainless stators have stainless fittings.

Valves with PAEK stators have PEEK fittings.

Note: The fitting detail pilot depth in PAEK HPLC stators is slightly longer than standard.



THROUGH-THE-HANDLE INJECTORS
1/16" ZDV fittings, manual with knob

	Prod No	Price
N60 stainless stator		
6 port injector	C1-1006	$735
Replacement rotor	C1-10R6	76
Replacement stator	C-1C06	405
PAEK stator		
6 port injector	C1-1346	$855
Replacement rotor	C1-13R6	76
Replacement stator	C-1C46	520
Replacement injector fitting		
	C-261	$41

SPECIFICATIONS

5,000 psi liq
75°C max
Stator: Metal
Rotor: Valcon H

5,000 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E

OPTIONS

- Titanium and Hastelloy stators available.
- 0.40 mm bore (.016") on page 146.

Microbore continuous flow through-the-handle injectors

1/16" VALCO FITTINGS, 0.25 MM PORTS (.010")

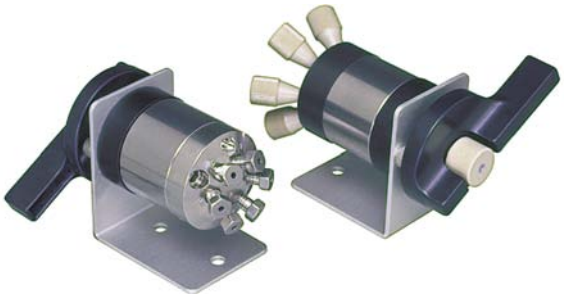
5,000 psi | Microbore | Continuous flow | Through-handle | 1/16" | 0.25 mm

Model C1CF is available only in manual version. Position feedback included. Includes nuts and ferrules.

Valves with stainless stators have stainless fittings.

Valves with PAEK stators have PEEK fittings.

Note: The fitting detail pilot depth in PAEK HPLC stators is slightly longer than standard.



CONTINUOUS FLOW THROUGH-THE-HANDLE INJECTORS
1/16" ZDV fittings, manual with knob

	Prod No	Price
N60 stainless stator		
6 port injector	C1CF-1006	$790
Replacement rotor	C1-10R6	76
Replacement stator	C-1C06	405
PAEK stator		
6 port injector	C1CF-1346	$915
Replacement rotor	C1-13R6	76
Replacement stator	C-1C46	520
Replacement injector fitting		
	C-261	$41

SPECIFICATIONS

5,000 psi liq
75°C max
Stator: Metal
Rotor: Valcon H

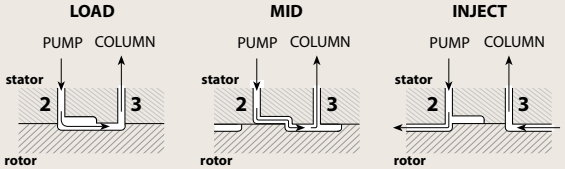
5,000 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E

OPTIONS

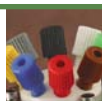
- 0.40 mm bore (.016") on page 146.

CONTINUOUS FLOWPATH THROUGH-THE-HANDLE INJECTORS

An engraving on the stator maintains pump flow between the pump connection port (2) and the column connection port (3) during most of the switching cycle, virtually eliminating pressure spikes.



MODEL C1CF



Microbore continuous flow injectors

1/16" VALCO FITTINGS, 0.25 MM PORTS (.010")

SPECIFICATIONS

5,000 psi liq
75°C max
Stator: Metal
Rotor: Valcon H

5,000 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E

OPTIONS

- 0.40 mm bore (.016") on page 147.

Model C6 includes nuts and ferrules.
Valves with stainless stators have stainless fittings.
Valves with PAEK stators have PEEK fittings.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Note: The fitting detail pilot depth in PAEK HPLC stators is slightly longer than standard.

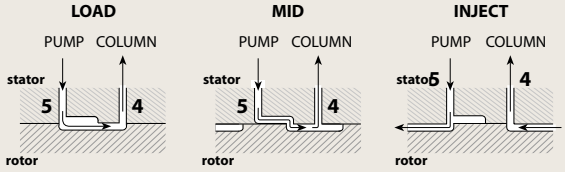
5,000 psi
Microbore
Continuous flow
1/16"
0.25 mm

CONTINUOUS FLOW INJECTOR
1/16" stainless ZDV fittings

	Prod No	*Price*
N60 stainless stator		
Manual	C6-1006	$645
With universal actuator	C6-1006EUHA	1505
Replacement valve	C6-1006D	645
Replacement rotor	C2-10R6	76
Replacement stator	C6-1C06	460
PAEK stator		
Manual	C6-1346	$765
With universal actuator	C6-1346EUHA	1625
Replacement valve	C6-1346D	765
Replacement rotor	C2-13R6	76
Replacement stator	C6-1C46	545

CONTINUOUS FLOWPATH INJECTORS

An engraving on the stator maintains pump flow between the pump connection port (5) and the column connection port (4) during most of the switching cycle, virtually eliminating pressure spikes.



MODEL C6

MORE INFO

ABOUT LOOPS

- Other materials are available in many sizes: Electroformed Nickel, Hastelloy C, Nickel 200, and PTFE.
- Metal loops > 2 ml are made from 1/8" OD tubing with TIG welded 1/16" tube ends or reducing unions.
- Sample loop shape and dimensions may vary from batch to batch due to fluctuations in tubing ID. Loop volume is controlled as closely as possible, but is not calibrated.

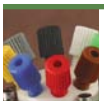
Sample loops

Each metal loop includes two stainless steel nuts and ferrules.
Each PEEK loop includes two PEEK nuts and ferrules.

These loops are for use with valves on pages 140, 142, 143, 144, 146, 147, 163, 164, 165, and 167.

	Stainless Steel		**PEEK (for PAEK stators)**		**Titanium**	
Volume	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
2 µl	CSL2	$25	CZSL2PK	$31		
5 µl	CSL5	25	CZSL5PK	31		
10 µl	CSL10	25	CZSL10PK	31	CSL10TI	$55
20 µl	CSL20	25	CZSL20PK	28	CSL20TI	55
50 µl	CSL50	25	CZSL50PK	25	CSL50TI	55
100 µl	CSL100	34	CZSL100PK	25	CSL100TI	55
250 µl	CSL250	34	CZSL250PK	31	CSL250TI	88
500 µl	CSL500	34	CZSL500PK **	38	CSL500TI	165
1 ml	CSL1K	39	CZSL1KPK **	50	CSL1KTI	260
2 ml	CSL2K	50	CZSL2KPK **	69		
5 ml	CSL5K	58	CZSL5KPK **	106		
10 ml	CSL10K	76				

*** max pressure 2500 psi*



CHEMINERT VALVES

Analytical valves

1/16" VALCO FITTINGS, 0.40 MM PORTS (.016")

5,000 psi | Analytical | 1/16" | 0.40 mm

Model C2 includes nuts and ferrules.
Valves with metal stators have stainless steel nuts and ferrules of the stator material.
Valves with PAEK stators have PEEK nuts and ferrules.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Note: The fitting detail pilot depth in PAEK HPLC stators is slightly longer than standard.

	4 Port		6 Port		8 Port		10 Port	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
N60 stainless stator								
Manual	C2-2004	$425	C2-2006	$425	C2H-2008	$480	C2H-2000	$535
With universal actuator	C2-2004EUHA	1285	C2-2006EUHA	1285	C2H-2008EUHA	1340	C2H-2000EUHA	1395
Replacement valve	C2-2004D	425	C2-2006D	425	C2H-2008D	480	C2H-2000D	535
Replacement rotor	C2-20R4	76	C2-20R6	76	C2-20R8H	76	C2-20R0H	76
Replacement stator	C-2C04	230	C-2C06	230	C-2C08H	290	C-2C00H	345
PAEK stator								
Manual	C2-2344	$545	C2-2346	$545	C2H-2348	$600	C2H-2340	$655
With universal actuator	C2-2344EUHA	1405	C2-2346EUHA	1405	C2H-2348EUHA	1460	C2H-2340EUHA	1515
Replacement valve	C2-2344D	545	C2-2346D	545	C2H-2348D	600	C2H-2340D	655
Replacement rotor	C2-23R4	76	C2-23R6	76	C2-23R8H	76	C2-23R0H	76
Replacement stator	C-2C44	345	C-2C46	345	C-2C48H	405	C-2C40H	460
Titanium stator								
Manual	C2-2034	$730	C2-2036	$730	C2H-2038	$785	C2H-2030	$840
With universal actuator	C2-2034EUHA	1590	C2-2036EUHA	1590	C2H-2038EUHA	1645	C2H-2030EUHA	1700
Replacement valve	C2-2034D	730	C2-2036D	730	C2H-2038D	785	C2H-2030D	840
Replacement rotor	C2-20R4	76	C2-20R6	76	C2-20R8H	76	C2-20R0H	76
Replacement stator	C-2C34	565	C-2C36	565	C-2C38H	620	C-2C30H	650

SPECIFICATIONS

5,000 psi liq
75°C max
Stator: Metal
Rotor: Valcon H

5,000 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E

OPTIONS

- Continuous flow version is available as Model C6. *See page 143.*
- Hastelloy C stators
- Semi-prep version with 0.75 mm ports (.030") available
- Loop fill port assembly for injection from front of the valve. *See page 31.*

6 PORT VALVE
1/16" stainless ZDV fittings

Sample loops

Each metal loop includes two stainless steel nuts and ferrules.
Each PEEK loop includes two PEEK nuts and ferrules.

These loops are for use with valves on pages 140, 142, 143, 144, 146, 147, 163, 164, 165, and 167.

	Stainless Steel		PEEK (for PAEK stators)		Titanium	
Volume	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
2 µl	CSL2	$25	CZSL2PK	$31		
5 µl	CSL5	25	CZSL5PK	31	CSL10TI	$55
10 µl	CSL10	25	CZSL10PK	31	CSL20TI	55
20 µl	CSL20	25	CZSL20PK	28	CSL50TI	55
50 µl	CSL50	25	CZSL50PK	25	CSL100TI	55
100 µl	CSL100	34	CZSL100PK	25	CSL250TI	88
250 µl	CSL250	34	CZSL250PK	31	CSL500TI	165
500 µl	CSL500	34	CZSL500PK **	38	CSL1KTI	260
1 ml	CSL1K	39	CZSL1KPK **	50		
2 ml	CSL2K	50	CZSL2KPK **	69		
5 ml	CSL5K	58	CZSL5KPK **	106		
10 ml	CSL10K	76				

*** max pressure 2500 psi*

ABOUT LOOPS

- Metal loops > 2 ml are made from 1/8" OD tubing with TIG welded 1/16" tube ends or reducing unions.
- Other materials are available in many sizes.

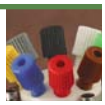
AUTOSAMPLER REPLACEMENT VALVES

The Cheminert Model C2 6 port valve is an excellent replacement for the valve originally supplied in many autosamplers, including autosamplers manufactured by Beckman, Gilson, Spark-Holland, CTC, Thermo Fisher, and Varian. Call technical support to determine which replacement is best for your application.

OPTIONAL FLOWPATH

Model C2 6 port valves can also be ordered with a dual 3-way rotor, as described in EPA Method 555.

To specify this flowpath, substitute "6X" for "6" in the valve or rotor prod no (e.g. C2-2006XEUHA).



Analytical internal sample injector

1/16" VALCO FITTINGS, 0.25 MM PORTS (.010")

SPECIFICATIONS

5,000 psi liq
75°C max
Stator: Metal
Rotor: Valcon H

5,000 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E

OPTIONS

- 0.05 µl sample volumes are also available.
- Loop fill port assembly for injection from front of the valve. *See page 31.*

Model C4 includes nuts and ferrules.
Valves with metal stators have stainless steel nuts and ferrules of the stator material.
Valves with PAEK stators have PEEK nuts and ferrules.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Note: The fitting detail pilot depth in PAEK HPLC stators is slightly longer than standard.

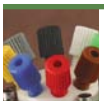
5,000 psi
Analytical
Internal sample
1/16"
0.25 mm

Sample volume	0.1 µl		0.2 µl		0.5 µl	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
N60 stainless stator						
Manual	C4-1004-.1	$585	C4-1004-.2	$585	C4-1004-.5	$585
With universal actuator	C4-1004-.1EUHA	1445	C4-1004-.2EUHA	1445	C4-1004-.5EUHA	1445
Replacement valve	C4-1004-.1D	585	C4-1004-.2D	585	C4-1004-.5D	585
Replacement rotor	C4-10R-.1	76	C4-10R-.2	76	C4-10R-.5	76
Replacement stator	C4-1C0	405	C4-1C0	405	C4-1C0	405
PAEK stator						
Manual	C4-1344-.1	$705	C4-1344-.2	$705	C4-1344-.5	$705
With universal actuator	C4-1344-.1EUHA	1565	C4-1344-.2EUHA	1565	C4-1344-.51EUHA	1565
Replacement valve	C4-1344-.1D	705	C4-1344-.2D	705	C4-1344-.5D	705
Replacement rotor	C4-13R-.1	76	C4-13R-.2	76	C4-13R-.5	76
Replacement stator	C4-1C4	520	C4-1C4	520	C4-1C4	520
Titanium stator						
Manual	C4-1034-.1	$890	C4-1034-.2	$890	C4-1034-.5	$890
With universal actuator	C4-1034-.1EUHA	1750	C4-1034-.2EUHA	1750	C4-1034-.5EUHA	1750
Replacement valve	C4-1034-.1D	890	C4-1034-.2D	890	C4-1034-.5D	890
Replacement rotor	C4-10R-.1	76	C4-10R-.2	76	C4-10R-.5	76
Replacement stator	C4-1C3	725	C4-1C3	725	C4-1C3	725

INTERNAL SAMPLE INJECTOR
1/16" stainless ZDV fittings

MORE INFO

Actuators
Microelectric 176
Universal 174-175
Materials
Metals..... 246-247
Polymers 248
Valve rotors.....249



CHEMINERT VALVES

Analytical through-the-handle injectors

1/16" VALCO FITTINGS, 0.40 MM PORTS (.016")

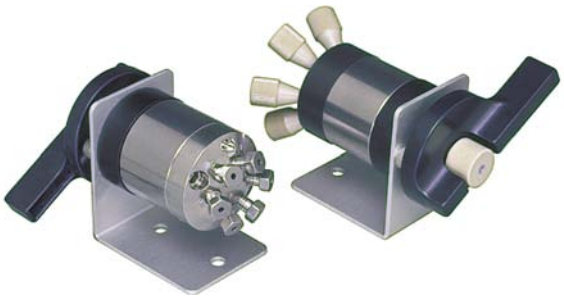
5,000 psi | Analytical | Through-handle | 1/16" | 0.40 mm

Model C1 is available only in manual version. Position feedback included. Includes nuts and ferrules.

Valves with stainless stators have stainless fittings.

Valves with PAEK stators have PEEK fittings.

Note: The fitting detail pilot depth in PAEK HPLC stators is slightly longer than standard.



THROUGH-THE-HANDLE INJECTORS
1/16" ZDV fittings, manual with knob

	Prod No	Price
N60 stainless stator		
6 port injector	C1-2006	$570
Replacement rotor	C1-20R6	76
Replacement stator	C-2C06	285
PAEK stator		
6 port injector	C1-2346	$690
Replacement rotor	C1-23R6	76
Replacement stator	C-2C46	400
Replacement injector fitting		
	C-261	$41

SPECIFICATIONS

5,000 psi liq
75°C max
Stator: Metal
Rotor: Valcon H

5,000 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E

OPTIONS

- Titanium stators available.
- 0.25 mm bore (.010") on page 142.

Analytical continuous flow through-the-handle injectors

1/16" VALCO FITTINGS, 0.40 MM PORTS (.016")

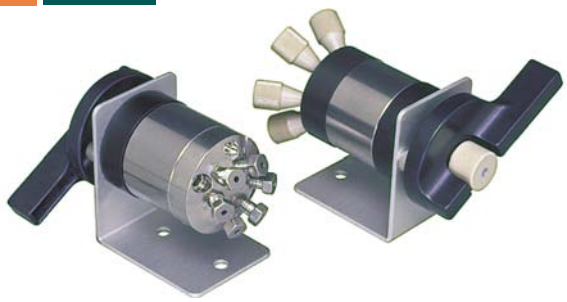
5,000 psi | Analytical | Continuous flow | Through-handle | 1/16" | 0.40 mm

Model C1CF is available only in manual version. Position feedback included. Includes nuts and ferrules.

Valves with stainless stators have stainless fittings.

Valves with PAEK stators have PEEK fittings.

Note: The fitting detail pilot depth in PAEK HPLC stators is slightly longer than standard.



CONTINUOUS FLOW THROUGH-THE-HANDLE INJECTORS
1/16" ZDV fittings, manual with knob

	Prod No	Price
N60 stainless stator		
6 port injector	C1CF-2006	$625
Replacement rotor	C1-20R6	76
Replacement stator	C-2C06	285
PAEK stator		
6 port injector	C1CF-2346	$745
Replacement rotor	C1-23R6	76
Replacement stator	C-2C46	400
Replacement injector fitting		
	C-261	$41

SPECIFICATIONS

5,000 psi liq
75°C max
Stator: Metal
Rotor: Valcon H

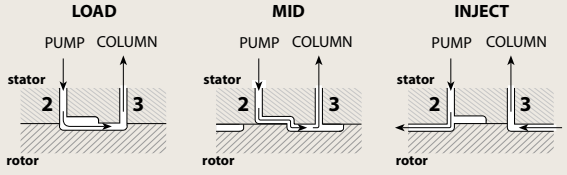
5,000 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E

OPTIONS

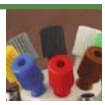
- 0.25 mm bore (.010") on page 142.

CONTINUOUS FLOWPATH THROUGH-THE-HANDLE INJECTORS

An engraving on the stator maintains pump flow between the pump connection port (2) and the column connection port (3) during most of the switching cycle, virtually eliminating pressure spikes.



MODEL C1CF



Analytical continuous flow injectors

1/16" VALCO FITTINGS, 0.40 MM PORTS (.016")

SPECIFICATIONS

5,000 psi liq
75°C max
Stator: Metal
Rotor: Valcon H

5,000 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E

OPTIONS

- 0.25 mm bore (.010") on page 143.

Model C6 includes nuts and ferrules.
Valves with stainless stators have stainless fittings.
Valves with PAEK stators have PEEK fittings.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Note: The fitting detail pilot depth in PAEK HPLC stators is slightly longer than standard.

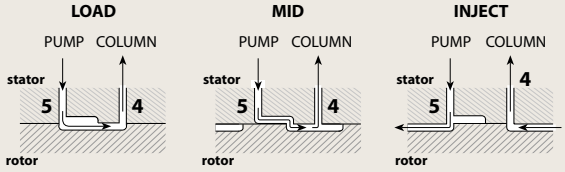
5,000 psi
Analytical
Continuous flow
1/16" 0.40 mm

CONTINUOUS FLOW INJECTOR
1/16" stainless ZDV fittings

	Prod No	Price
N60 stainless stator		
Manual	C6-2006	$480
With universal actuator	C6-2006EUHA	1340
Replacement valve	C6-2006D	480
Replacement rotor	C2-20R6	76
Replacement stator	C6-2C06	285
PAEK stator		
Manual	C6-2346	$600
With universal actuator	C6-2346EUHA	1460
Replacement valve	C6-2346D	600
Replacement rotor	C2-23R6	76
Replacement stator	C6-2C46	400

CONTINUOUS FLOWPATH INJECTORS

An engraving on the stator maintains pump flow between the pump connection port (5) and the column connection port (4) during most of the switching cycle, virtually eliminating pressure spikes.



MODEL C6

MORE INFO

ABOUT LOOPS

- Other materials are available in many sizes: Electroformed Nickel, Hastelloy C, Nickel 200, and PTFE.
- Metal loops > 2 ml are made from 1/8" OD tubing with TIG welded 1/16" tube ends or reducing unions.
- Sample loop shape and dimensions may vary from batch to batch due to fluctuations in tubing ID. Loop volume is controlled as closely as possible, but is not calibrated.

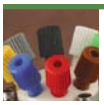
Sample loops

Each metal loop includes two stainless steel nuts and ferrules.
Each PEEK loop includes two PEEK nuts and ferrules.

These loops are for use with valves on pages 140, 142, 143, 144, 146, 147, 163, 164, 165, and 167.

	Stainless Steel		PEEK (for PAEK stators)		Titanium	
Volume	Prod No	Price	Prod No	Price	Prod No	Price
2 µl	CSL2	$25	CZSL2PK	$31		
5 µl	CSL5	25	CZSL5PK	31		
10 µl	CSL10	25	CZSL10PK	31	CSL10TI	$55
20 µl	CSL20	25	CZSL20PK	28	CSL20TI	55
50 µl	CSL50	25	CZSL50PK	25	CSL50TI	55
100 µl	CSL100	34	CZSL100PK	25	CSL100TI	55
250 µl	CSL250	34	CZSL250PK	31	CSL250TI	88
500 µl	CSL500	34	CZSL500PK **	38	CSL500TI	165
1 ml	CSL1K	39	CZSL1KPK **	50	CSL1KTI	260
2 ml	CSL2K	50	CZSL2KPK **	99		
5 ml	CSL5K	58	CZSL5KPK **	106		
10 ml	CSL10K	76				

*** max pressure 2500 psi*



CHEMINERT VALVES

Valves WITH 1/16" VALCO ZDV FITTINGS

0.75 MM PORTS (.030")

Low pressure
10-32 ZDV
1/16" 0.75 mm

Model C22Z includes Valco ZDV PEEK nuts and ferrules.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Sample loops are not included with valves. Order separately.




	4 Port		6 Port		8 Port		10 Port	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual	C22Z-3184	$275	C22Z-3186	$275	C22Z-3188	$305	C22Z-3180	$330
With universal act.	C22Z-3184EUHA	1135	C22Z-3186EUHA	1135	C22Z-3188EUHA	1165	C22Z-3180EUHA	1190
Replacement valve	C22Z-3184D	275	C22Z-3186D	275	C22Z-3188D	305	C22Z-3180D	330
Replacement rotor	C12-314	53	C12-316	53	C12-318	53	C12-310	53
Replacement stator	C22Z-384	158	C22Z-386	158	C22Z-388	190	C22Z-380	215

SPECIFICATIONS

250 psi liq
75°C max
Stator: PPS
Rotor: Valcon E2

OPTIONS

- Purge option
- Other polymeric rotors and stators are available.
- 12 and 14 port versions are available.

10 PORT VALVE
1/16" PEEK ZDV fittings

Sample loops

Loops include PEEK nuts and ferrules. Loops smaller than 500 µl are made from 1/16" OD tubing; loops 500 µl or bigger are made from 1/8" OD tubing with polymeric unions and 1/16" ends.

These loops are for use with valves on this page.

	FEP		PTFE		PEEK	
Volume	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
5 µl	CZSL5FEP	$25	CZSL5TF	$25	CZSL5PK	$31
10 µl	CZSL10FEP	25	CZSL10TF	25	CZSL10PK	31
20 µl	CZSL20FEP	23	CZSL20TF	23	CZSL20PK	28
50 µl	CZSL50FEP	19	CZSL50TF	19	CZSL50PK	25
100 µl	CZSL100FEP	19	CZSL100TF	19	CZSL100PK	25
250 µl	CZSL250FEP	23	CZSL250TF	23	CZSL250PK	31
500 µl	CZSL500FEP	25	CZSL500TF	25	CZSL500PK	38
1 ml	CZSL1KFEP	30	CZSL1KTF	30	CZSL1KPK	50
2 ml	CZSL2KFEP	38	CZSL2KTF	38	CZSL2KPK	69

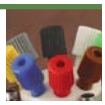
ABOUT LOOPS

- Sample loop shape and dimensions may vary from batch to batch due to fluctuations in tubing ID. Loop volume is controlled as closely as possible, but is not calibrated.

PURGE OPTION

The purge option permits a flow of liquid or gas to flush the valve interior of potentially toxic or corrosive components. We recommend this option for applications using materials (such as salt solutions) that could damage the metal parts of the valve.

Consult our technical staff for details.



Valves WITH 1/4-28 FITTING DETAILS FOR 1/16" TUBING — 0.75 MM PORTS (.030")

SPECIFICATIONS

250 psi liq
75°C max
Stator: PPS
Rotor: Valcon E2

Model C22 includes multicolored Cheminert 1/4-28 flangeless fittings for 1/16" tubing.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Sample loops are not included with valves. Order separately.

Low pressure
1/4-28 Internal
1/16" 0.75 mm

6 PORT VALVE
1/4-28 fittings

	4 Port		6 Port		8 Port		10 Port	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual	C22-3184	$275	C22-3186	$275	C22-3188	$365	C22-3180	$390
With universal actuator	C22-3184EUHA	1135	C22-3186EUHA	1135	C22-3188EUHA	1225	C22-3180EUHA	1250
Replacement valve	C22-3184D	275	C22-3186D	275	C22-3188D	365	C22-3180D	390
Replacement rotor	C22-314	53	C22-316	53	C22-318	53	C22-310	53
Replacement stator	C22-384	158	C22-386	158	C22-388	250	C22-380	280

Valves WITH 1/4-28 FITTING DETAILS FOR 1/8" TUBING — 1.50 MM PORTS (.060")

SPECIFICATIONS

250 psi liq
75°C max
Stator: PPS
Rotor: Valcon E2

Model C22 includes multicolored Cheminert 1/4-28 flangeless fittings for 1/8" tubing.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Sample loops are not included with valves. Order separately.

Low pressure
1/4-28 Internal
1/8" 1.50 mm

	4 Port		6 Port		8 Port		10 Port	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual	C22-6184	$275	C22-6186	$275	C22-6188	$365	C22-6180	$390
With universal actuator	C22-6184EUHA	1135	C22-6186EUHA	1135	C22-6188EUHA	1225	C22-6180EUHA	1250
Replacement valve	C22-6184D	275	C22-6186D	275	C22-6188D	365	C22-6180D	390
Replacement rotor	C22-614	53	C22-616	53	C22-618	53	C22-610	53
Replacement stator	C22-684	158	C22-686	158	C22-688	250	C22-680	280

Sample loops

Loops include flangeless fittings with white color nuts.
Loops smaller than 250 µl are made from 1/16" OD tubing; loops 250 µl or bigger are made from 1/8" OD tubing.

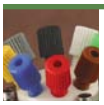
These loops are for use with valves on this page.

	FEP		PTFE		PEEK	
Volume	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
20 µl	CFSL20FEP	$18	CFSL20TF	$18	CFSL20PK	$25
50 µl	CFSL50FEP	18	CFSL50TF	18	CFSL50PK	25
100 µl	CFSL100FEP	18	CFSL100TF	18	CFSL100PK	25
250 µl	CFSL250FEP	18	CFSL250TF	18	CFSL250PK	25
500 µl	CFSL500FEP	20	CFSL500TF	20	CFSL500PK	30
1 ml	CFSL1KFEP	25	CFSL1KTF	25	CFSL1KPK	40
2 ml	CFSL2KFEP	30	CFSL2KTF	30	CFSL2KPK	63

MORE INFO

ABOUT LOOPS

- Sample loop shape and dimensions may vary from batch to batch due to fluctuations in tubing ID. Loop volume is controlled as closely as possible, but is not calibrated.



CHEMINERT VALVES

Internal sample injectors

1/16" VALCO ZDV FITTINGS, 0.40 MM PORTS (.016")

Low pressure
Internal sample
10-32 ZDV
1/16" 0.40 mm

Model C24Z includes Valco ZDV PEEK nuts and ferrules.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

SPECIFICATIONS

250 psi liq
75°C max
Stator: PPS
Rotor: Valcon E2

Sample volume	0.2 µl		0.5 µl		1 µl	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual	C24Z-2184-.2	$275	C24Z-2184-.5	$275	C24Z-2184-1	$275
With universal actuator	C24Z-2184-.2EUHA	1135	C24Z-2184-.5EUHA	1135	C24Z-2184-1EUHA	1135
Replacement valve	C24Z-2184-.2D	275	C24Z-2184-.5D	275	C24Z-2184-1D	275
Replacement rotor	C24-10R-.2	53	C24-10R-.5	53	C24-10R-1	53
Replacement stator	C24Z-1C8	158	C24Z-1C8	158	C24Z-1C8	158

OPTIONS

- 2.0 µl sample volumes are also available.
- Purge option

INTERNAL SAMPLE INJECTOR
1/16" PEEK ZDV fittings

Internal sample injectors, 1/4-28 FOR 1/16" TUBING

0.50 MM PORTS (.020")

Low pressure
Internal sample
1/4-28 Internal
1/16" 0.50 mm

Model C24 includes multicolored Cheminert 1/4-28 flangeless fittings for 1/16" tubing.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

SPECIFICATIONS

250 psi liq
75°C max
Stator: PPS
Rotor: Valcon E2

Sample volume	0.5 µl		1 µl		2 µl	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual	C24-2184-.5	$275	C24-2184-1	$275	C24-2184-2	$275
With universal act.	C24-2184-.5EUHA	1135	C24-2184-1EUHA	1135	C24-2184-2EUHA	1135
Replacement valve	C24-2184-.5D	275	C24-2184-1D	275	C24-2184-2D	275
Replacement rotor	C24-10R-.5	53	C24-10R-1	53	C24-10R-2	53
Replacement stator	C24-1C8	158	C24-1C8	158	C24-1C8	158

OPTIONS

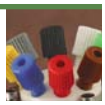
- 0.2 µl sample volumes are also available.
- Purge option
- Other polymeric rotors and stators are available. Consult the factory for prices and information.

INTERNAL SAMPLE INJECTOR
1/4-28 fittings

PURGE OPTION

The purge option permits a flow of liquid or gas to flush the valve interior of potentially toxic or corrosive components. We recommend this option for applications using materials (such as salt solutions) that could damage the metal parts of the valve.

Consult our technical staff for details.



Valves WITH 1/2-20 FITTINGS FOR 1/4" TUBING — 2.9 – 3.2 MM (.110" – .125") PORTS

SPECIFICATIONS

100 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E2

Manual version not available.
Model C42R includes Cheminert 1/2-20 flangeless fittings for 1/4" tubing, Delrin nuts, and CTFE ferrules.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply. Includes serial interface. See page 174 for other interface options.

Low pressure
1/2-20 Internal
1/4" 2.8 - 3.2 mm

OPTIONS

- 10 port version available with 2mm (.080") bore
- Other polymeric rotors and stators are available.

	4 Ports 3.2 mm (.125")		6 Ports 3.2 mm (.125")		8 Ports 2.8 mm (.110")	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
With universal actuator	C42R-8144EUTA	$1400	C42R-8146EUTA	$1455	C42R-8148EUTA	$1510
Replacement valve	C42R-8144D	495	C42R-8146D	550	C42R-8148D	605
Replacement rotor	C42R-81R4	110	C42R-81R6	110	C42R-81R8	110
Replacement stator	C42R-8C44	425	C42R-8C46	425	C42R-8C48	425

Fittings 1/2-20

	Prod No	*Price*
Delrin nut	CFL-4D	$6.50
CTFE ferrule	CFL-CB4KF-S	5.25

Call for a quote on CTFE or PPS 1/2-20 nuts and plugs..

6 PORT VALVE
1/2-20 fittings

Valves WITH 1/2-20 FITTINGS FOR 1/4" TUBING — 3.9 – 4.6 MM (.155" – .180") PORTS

SPECIFICATIONS

100 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E2

Manual version not available.
Model C42R includes Cheminert 1/2-20 flangeless fittings for 1/4" tubing, Delrin nuts, and CTFE ferrules.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply. Includes serial interface. See page 174 for other interface options.

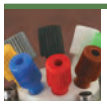
Low pressure
1/2-20 Internal
1/4" 3.9 - 4.6 mm

OPTIONS

- Other polymeric rotors and stators are available.

	4 Ports 4.6 mm (.180")		6 Ports 3.9 mm (.155")	
	Prod No	*Price*	*Prod No*	*Price*
With universal actuator	C42R-9144EUTA	$1400	C42R-9146EUTA	$1455
Replacement valve	C42R-9144D	495	C42R-9146D	550
Replacement rotor	C42R-91R4	110	C42R-91R6	110
Replacement stator	C42R-9C44	425	C42R-9C46	425

MORE INFO



CHEMINERT VALVES

APPLICATIONS FOR CHEMINERT TWO POSITION VALVES

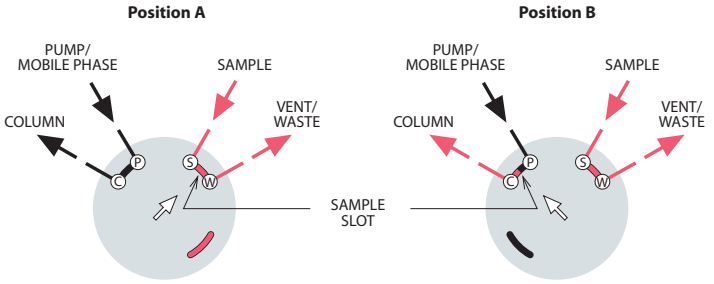
These illustrations show basic sample injection techniques using Cheminert two position valves. With rare exceptions, there is no difference between switching valves and external volume sampling valves, so the same valve can be used for either function.

The unique advantage of 8 and 10 port valves is that they reduce extra column volume by combining sampling and switching functions in a single valve. This minimizes expense, maintenance, service, and risk of leaks as compared to multiple 6 port valve systems.

SEE VIDEOS

See VICI valve applications in motion in the support section of vici.com.

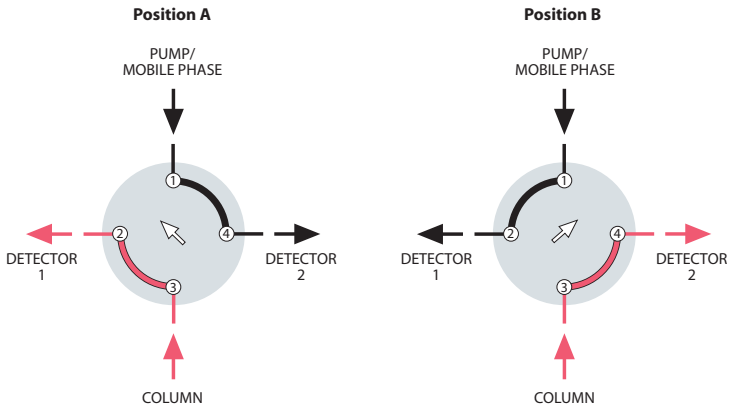
4 PORT – INTERNAL SAMPLE INJECTOR



MICROVOLUME SAMPLE INJECTION

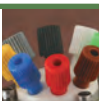
The internal sample (fixed volume) flowpath is used when very small sample volumes are required. The sample size is determined by a passage engraved on the valve rotor, allowing precise, repeatable injections. In Position A, the sample flows through the sample passage while the mobile phase flows through to the column. The third passage is inactive. In Position B, the sample passage is in line with the column and the mobile phase injects the contents of the sample passage into the column. The passage which was inactive in Position A allows the sample to continue flowing without interruption.

4 PORT – SWITCHING VALVE

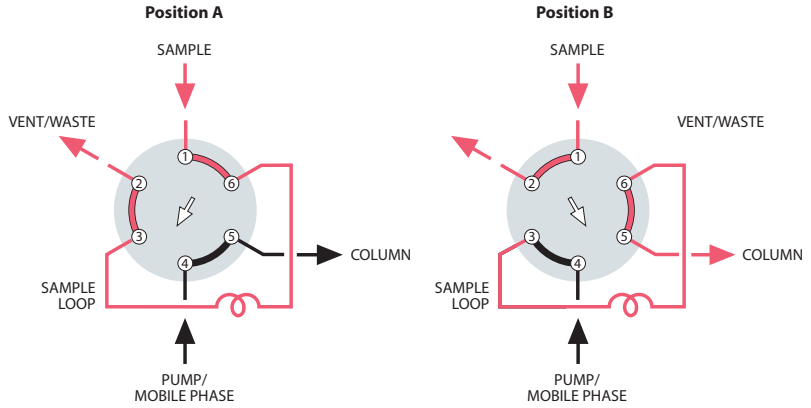


DETECTOR SELECTION FROM TWO COLUMNS OR ONE COLUMN AND AUXILIARY CARRIER

This unique configuration allows analyses of different parts of one analysis with two different detectors, without splitting or multiple injections.



6 PORT – EXTERNAL SAMPLE INJECTOR



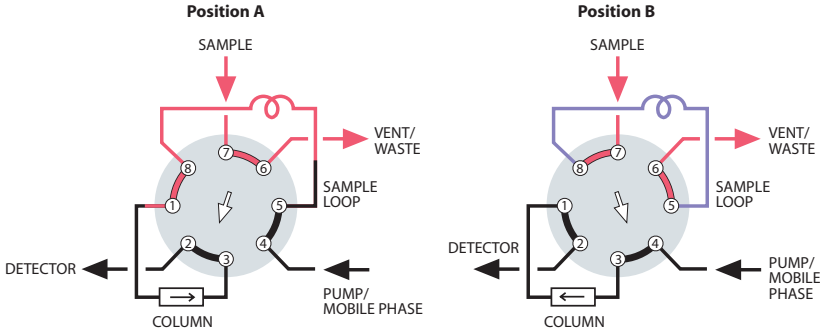
SAMPLE INJECTION

With the valve in Position A, sample flows through the external loop while the mobile phase flows directly through to the column. When the valve is switched to Position B, the sample contained in the sample loop and valve flow passage is displaced by the mobile phase and is carried into the column.

Note: Especially for partial-filled loops, the flow direction of the mobile phase through the loop should be opposite (backflush) to the flow direction during the loading of the loop.

More applications .....pages 100-101

8 PORT – SAMPLING/SWITCHING

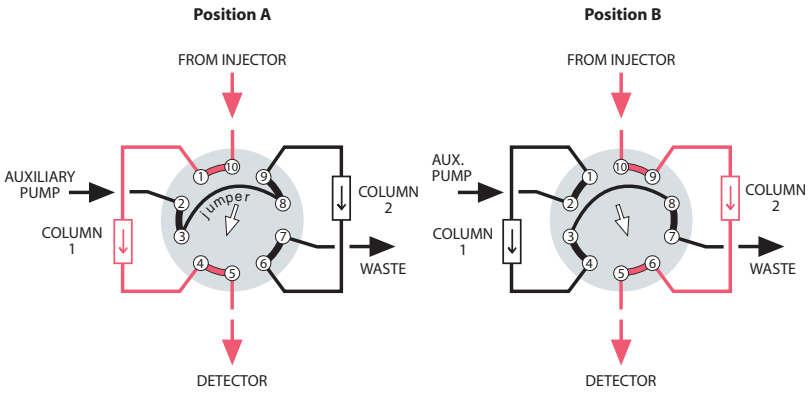


LOOP SAMPLING WITH BACKFLUSH TO DETECTOR

One valve performs the functions of sampling and backflush valves, simplifying operation and reducing cost. When components of interest are detected, the strongly retained components are backflushed and removed from the column without temperature programming.

More applications ..... page 101

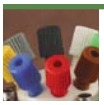
10 PORT – SAMPLING/SWITCHING



ALTERNATE COLUMN REGENERATION

When columns must be regenerated following each analysis, this technique permits automation of the process. While one column performs the analysis, the second column undergoes regeneration through use of an auxiliary pump. Once the first analysis is complete, the valve is switched and the regenerated column is ready for analytical use.

More applications .....pages 102-103



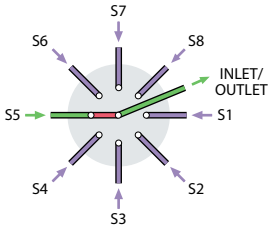
CHEMINERT VALVES

15,000 psi UHPLC Nanovolume® selectors

1/32" VALCO FITTINGS, 150 MICRON PORTS (.006")

15,000 psi
Nanobore
Stream selector
1/32" 150 µm

Model C85NX includes Valco stainless steel fittings.
Manual version not available.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.



	6 Position		8 Position		10 Position	
	Prod No	*Pric e*	*Prod No*	*Price*	*Prod No*	*Price*
With universal actuator	C85NX-6676EUHA	$2135	C85NX-6678EUHA	$2190	C85NX-6670EUHA	$2245
Replacement valve	C85NX-6676D	1275	C85NX-6678D	1330	C85NX-6670D	1385
Replacement rotor	C75N-66R6	100	C75N-66R8	100	C75N-66R0	100
Replacement stator	C75N-6C76	975	C75N-6C78	1030	C75N-6C70	1070

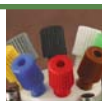
SPECIFICATIONS

15,000 psi liq
50°C max
Stator: Stainless with inert coating
Rotor: Valcon E3

OPTIONS

- 100 micron (.004") bore
- 250 micron (.010") bore
- 10,000 and 20,000 psi versions available
- 4 positions

10 POSITION SELECTOR
1/32" stainless Valco fittings



15,000 psi UHPLC microbore selectors

1/16" VALCO FITTINGS, 0.25 MM PORTS (.010")

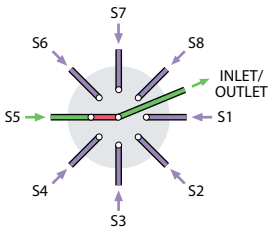
SPECIFICATIONS

15,000 psi liq
50°C max
Stator: Stainless with inert coating
Rotor: Valcon E3

OPTIONS

- 150 micron (.006") bore
- 10,000 and 20,000 psi versions available
- 4 positions

Model C85 includes Valco stainless steel fittings.
Manual version not available.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.



15,000 psi
Microbore
Stream selector
1/16"
0.25 mm

	6 Position		8 Position		10 Position	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
With universal actuator	C85-1676EUHA	$1785	C85-1678EUHA	$1860	C85-1670EUHA	$1895
Replacement valve	C85-1676D	925	C85-1678D	980	C85-1670D	1035
Replacement rotor	C75-16R6	100	C75-16R8	100	C75-16R0	100
Replacement stator	C75-1C76	750	C75-1C78	805	C75-1C70	885

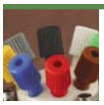
10 POSITION SELECTOR
1/16" stainless Valco fittings

TECH TIP

Increasing the pressure rating shortens valve lifetime.

MORE INFO

Actuators
Microelectric 176
Universal 174-175
Materials
Metals..... 246-247
Polymers 248
Valve rotors.....249



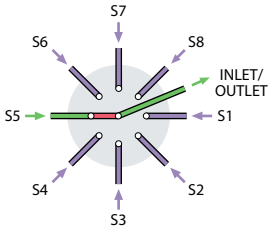
CHEMINERT VALVES

HPLC stream selectors

1/16" VALCO ZDV FITTINGS, 0.40 MM PORTS (.016")

5,000 psi
Stream selector
10-32 ZDV
1/16" 0.40 mm

Model C5 includes nuts and ferrules.
Valves with metal stators have stainless steel nuts and ferrules of the stator material.
Valves with PAEK stators have PEEK nuts and ferrules.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply. Includes serial interface. See page 174 for other interface options.



	4 Position		6 Position		8 Position		10 Position	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
N60 stainless stator								
Manual	C5-2004	$510	C5-2006	$510	C5H-2008	$565	C5H-2000	$620
With universal actuator	C5-2004EUHA	1370	C5-2006EUHA	1370	C5H-2008EUHA	1425	C5H-2000EUHA	1490
Replacement valve	C5-2004D	510	C5-2006D	510	C5H-2008D	565	C5H-2000D	620
Replacement rotor	C5-20R4	76	C5-20R6	76	C5-20R8H	76	C5-20R0H	76
Replacement stator	C5-2C04	280	C5-2C06	280	C5-2C08H	335	C5-2C00H	395
PAEK stator								
Manual	C5-2344	630	C5-2346	630	C5H-2348	685	C5H-2340	740
With universal actuator	C5-2344EUHA	1490	C5-2346EUHA	1490	C5H-2348EUHA	1545	C5H-2340EUHA	1160
Replacement valve	C5-2344D	630	C5-2346D	630	C5H-2348D	685	C5H-2340D	740
Replacement rotor	C5-23R4	76	C5-23R6	76	C5-23R8H	76	C5-23R0H	76
Replacement stator	C5-2C44	395	C5-2C46	395	C5-2C48H	450	C5-2C40H	510
Titanium stator								
Manual	C5-2034	815	C5-2036	815	C5H-2038	870	C5H-2030	925
With universal actuator	C5-2034EUHA	1675	C5-2036EUHA	1675	C5H-2038EUHA	1730	C5H-2030EUHA	1785
Replacement valve	C5-2034D	815	C5-2036D	815	C5H-2038D	870	C5H-2030D	925
Replacement rotor	C5-20R4	76	C5-20R6	76	C5-20R8H	76	C5-20R0H	76
Replacement stator	C5-2C34	585	C5-2C36	585	C5-2C38H	625	C5-2C30H	680

SPECIFICATIONS

5000 psi liq
75°C max
Stator: Metal
Rotor: Valcon H
5000 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E

OPTIONS

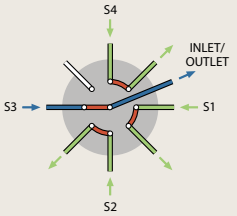
- 2", 3", 4", and 6" standoffs
- Hastelloy C stator
- Optional 0.15 mm (.006") and 0.25 mm (.010") bores available
- Optional 0.75 mm (.030") bore for Prep HPLC available

6 POSITION SELECTOR
1/16" stainless Valco fittings

OPTIONAL FLOWPATH

Model C5F, the flow-through version, is similar to the C5 but its non-selected streams continue flowing through individual outlets.
3, 4, and 5 positions are available.

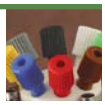
Consult the factory for C5F prices and information.



Model C5F schematic diagram

MORE INFO

Manifolds ..... page 26



HPLC column selector systems

WITH 1/16" VALCO ZDV FITTINGS, 0.40 MM PORTS (.016")

SPECIFICATIONS

5000 psi liq
75°C max
Stator: Metal
Rotor: Valcon H
5000 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E

The system comprises two stream selection valves mounted on a single universal actuator. *(See plumbing diagram below.)* The actuator as supplied is set up for control via serial interface, but other options are available. *(See page 174.)*

5,000 psi
Column selector system
10-32 ZDV
1/16" 0.40 mm

Model C5 column selector system includes nuts and ferrules.
Valves with stainless stators have stainless fittings.
Valves with PAEK stators have PEEK fittings.
Includes universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.

OPTIONS

- 2", 3", 4", and 6" standoffs
- Hastelloy C stator
- Optional 0.25 mm (.010") and 0.15 mm (.006") bores available
- Optional 0.75 mm (.030") bore for Prep HPLC available

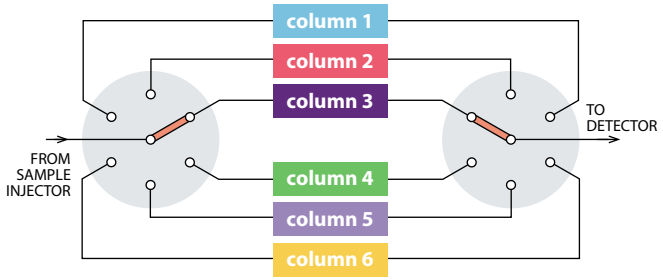
	6 Column		8 Column		10 Column	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
N60 stainless stator						
System	C5-2006EUTDA	$2340	C5H-2008EUTDA	$2450	C5H-2000EUTDA	$2560
Replacement rotor	C5-20R6	76	C5-20R8H	76	C5-20R0H	76
PAEK stator						
System	C5-2346EUTDA	2580	C5H-2348EUTDA	2690	C5H-2340EUTDA	2800
Replacement rotor	C5-23R6	72	C5-23R8H	72	C5-23R0H	72

Note: Contact factory for replacement valves and stators, as valves for dual drive assemblies have mirror image stators.

Prod No	*Price*
RS-232 interface cable	
I-22697	$31

HPLC COLUMN SELECTOR SYSTEM
Columns not included

SCHEMATIC



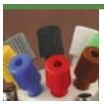
ORDERING STATORS

Valves for dual drive assemblies have mirror image stators. Consult Technical Support for correct product number before ordering.

UHPLC COLUMN SELECTOR SYSTEMS

Consult the factory for more information on UHPLC systems.

MORE INFO



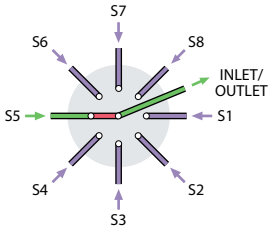
CHEMINERT VALVES

Stream selectors

1/16" VALCO ZDV FITTINGS, 0.75 MM PORTS (.030")

Low pressure
Stream selector
10-32 ZDV
1/16" 0.75 mm

Model C25Z includes Valco ZDV PEEK nuts and ferrules.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.



	6 Position		8 Position		10 Position		14 Position	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual	C25Z-3186	$320	C25Z-3188	$360	C25Z-3180	$385	C25Z-31814	$495
With universal act.	C25Z-3186EUHA	1180	C25Z-3188EUHA	1220	C25Z-3180EUHA	1245	C25Z-31814EUHA	1355
Replacement valve	C25Z-3186D	320	C25Z-3188D	360	C25Z-3180D	385	C25Z-31814D	495
Replacement rotor	C15-310	53	C15-310	53	C15-310	53	C25Z-325	53
Replacement stator	C25Z-386	190	C25Z-388	220	C25Z-380	250	C25Z-38-14	370

SPECIFICATIONS

250 psi liq
75°C max
Stator: PPS
Rotor: Valcon E2

OPTIONS

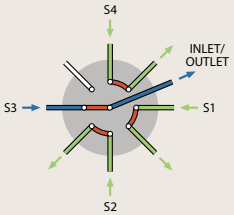
- 4 and 12 positions available
- 2", 3", 4", and 6" standoffs
- Other polymeric materials are available. Consult the factory.

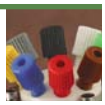
10 POSITION SELECTOR
1/16" PEEK ZDV fittings

OPTIONAL FLOWPATH

Model C25ZF, the flow-through version, is similar to the C25Z but its non-selected streams continue flowing through individual outlets, instead of being dead-ended. 3, 4, 5, 6, and 7 positions are available.

Consult the factory for C25ZF prices and information.





Stream selectors

1/4-28 FITTINGS FOR 1/16" TUBING, 0.75 MM PORTS (.030")

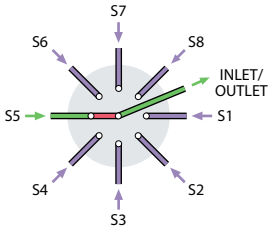
SPECIFICATIONS

250 psi liq
75°C max
Stator: PPS
Rotor: Valcon E2

OPTIONS

- 2", 3", 4", and 6" standoffs
- CTFE stator

Model C25 includes multicolored Cheminert 1/4-28 flangeless fittings for 1/16" tubing.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply. Includes serial interface. See page 174 for other interface options.



Low pressure
Stream selector
1/4-28 Internal
1/16" 0.75 mm

	4 Position		6 Position		8 Position		10 Position	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual	C25-3184	$320	C25-3186	$320	C25-3188	$425	C25-3180	$445
With universal actuator	C25-3184EUHA	1180	C25-3186EUHA	1180	C25-3188EUHA	1285	C25-3180EUHA	1305
Replacement valve	C25-3184D	320	C25-3186D	320	C25-3188D	425	C25-3180D	445
Replacement rotor	C25-314	53	C25-316	53	C25-318	53	C25-310	53
Replacement stator	C25-384	190	C25-386	190	C25-388	295	C25-380	320

Stream selectors

1/4-28 FITTINGS FOR 1/8" TUBING, 1.50 MM PORTS (.060")

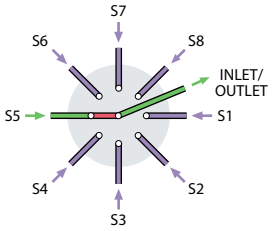
SPECIFICATIONS

250 psi liq
75°C max
Stator: PPS
Rotor: Valcon E2

OPTIONS

- 2", 3", 4", and 6" standoffs
- CTFE stator

Model C25 includes multicolored Cheminert 1/4-28 flangeless fittings for 1/8" tubing.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply. Includes serial interface. See page 174 for other interface options.



Low pressure
Stream selector
1/4-28 Internal
1/8" 1.50 mm

	4 Position		6 Position		8 Position		10 Position	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Manual	C25-6184	$320	C25-6186	$320	C25-6188	$425	C25-6180	$445
With universal actuator	C25-6184EUHA	1180	C25-6186EUHA	1180	C25-6188EUHA	1285	C25-6180EUHA	1305
Replacement valve	C25-6184D	320	C25-6186D	320	C25-6188D	425	C25-6180D	445
Replacement rotor	C25-614	53	C25-616	53	C25-618	53	C25-610	53
Replacement stator	C25-684	190	C25-686	190	C25-688	295	C25-680	320

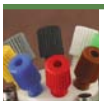
OPTIONAL FLOWPATH

Model C25F is the flow-through version of C25. (See discussion on facing page.) 3, 4, 5, 6, and 7 positions are available.

Consult the factory for C25F prices and information.

MORE INFO

10 POSITION SELECTOR
1/4-28 Cheminert flangeless fittings



CHEMINERT VALVES

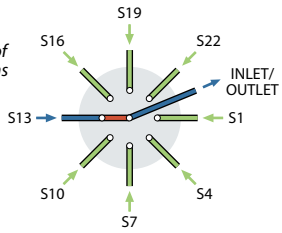
Stream selectors

1/16" CHEMINERT FITTINGS

Low pressure
Stream selector
6-40 flat bottom
1/16"

Model C25G includes 6-40 PEEK nut/bushings for 1/16" OD tubing.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface.
See page 174 for other interface options.

(For clarity, only eight of the twenty-four streams are illustrated.)



SPECIFICATIONS

100 psi liq
50°C max
Stator: PEEK
Rotor: Valcon M

OPTIONS

- Fittings for use with 1/32" tubing
- 2", 3", 4", and 6" standoffs
- Consult the factory for optional materials.

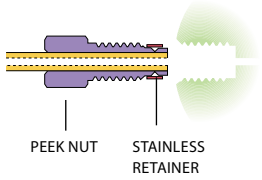
	20 Position 0.67 mm (.026")		24 Position 0.61 mm (.024")		28 Position 0.56 mm (.022")	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
With universal actuator	C25G-24520EUTA	$1545	C25G-24524EUTA	$1625	C25G-24528EUTA	$1655
Replacement valve	C25G-24520D	700	C25G-24524D	780	C25G-24528D	810
Replacement rotor	C25G-24R20	116	C25G-24R24	116	C25G-24R28	116
Replacement stator	C25G-2C520	500	C25G-2C524	560	C25G-2C528	590

Fittings

6-40

The C25G selector uses unique 6-40 fittings for flat-bottomed fitting details. As the fitting is tightened, the grooved area (supported by the stainless retainer) compresses enough to grip the tube for a low pressure connection. The bushing/nut is natural PEEK.

	Tube size	*Prod No*	*Price*	
6-40 one piece nut/bushing with retainer	1/16"	CNNF1PK	$9.75	
	1/32"	CNNF.5PK	9.75	
Tightening tool		CGFT	21.00	



6-40 FITTING

24 POSITION SELECTOR
1/16" 6-40 PEEK fittings

MORE INFO

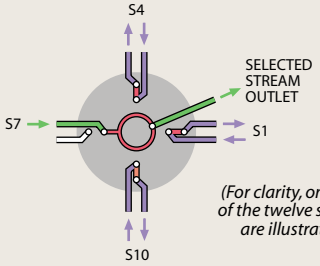
See Technical Note 824 for installation of these fittings.
www/vici.com/support/tn/tn824.pdf

OPTIONAL FLOWPATHS

Model C25G valves select and isolate one of 20-28 streams, with the remainder dead-ended.

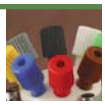
Model C25GF, the flow-through version, is similar to the C25G but its non-selected streams continue flowing through individual outlets. 10, 12, and 14 positions are available.

Call for pricing and information.



(For clarity, only four of the twelve streams are illustrated.)

MODEL C25GF SCHEMATIC



Stream selectors WITH 1/2-20 FITTINGS FOR 1/4" TUBING — 2.9 – 3.2 MM (.110" – .125") PORTS

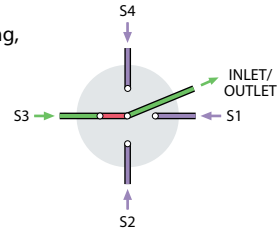
SPECIFICATIONS

100 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E2

OPTIONS

- Other polymeric rotors and stators are available.
- 10 position version available.

Manual version not available.
Model C45R includes Cheminert 1/2-20 flangeless fittings for 1/4" tubing, Delrin nuts, and CTFE ferrules.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply. Includes serial interface. See page 174 for other interface options.



Low pressure
Stream selector
1/2-20 Internal
1/4" 2.8 - 3.2 mm

	4 Position 3.2 mm (.125")		6 Position 3.2 mm (.125")		8 Position 2.8 mm (.110")	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
With universal actuator	C45R-8144EUTA	$1460	C45R-8146EUTA	$1515	C45R-8148EUTA	$1570
Replacement valve	C45R-8144D	555	C45R-8146D	610	C45R-8148D	665
Replacement rotor	C45R-81R4	120	C45R-81R6	120	C45R-81R8	120
Replacement stator	C45R-8C44	425	C45R-8C46	425	C45R-8C48	425

Fittings 1/2-20

	Prod No	*Price*
Delrin nut	CFL-4D	$6.50
CTFE ferrule	CFL-CB4KF-S	5.25

Call for a quote on CTFE nuts and 1/2-20 plugs.

8 POSITION SELECTOR
1/2-20 fittings

Stream selectors WITH 1/2-20 FITTINGS FOR 1/4" TUBING — 3.9 – 4.6 MM (.155" – .180") PORTS

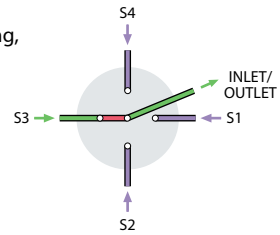
SPECIFICATIONS

100 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E2

OPTIONS

- Other polymeric rotors and stators are available.

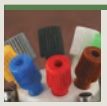
Manual version not available.
Model C45R includes Cheminert 1/2-20 flangeless fittings for 1/4" tubing, Delrin nuts, and CTFE ferrules.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply. Includes serial interface. See page 174 for other interface options.



Low pressure
Stream selector
1/2-20 Internal
1/4" 3.9 - 4.6 mm

	4 Position 4.6 mm (.180")		6 Position 3.9 mm (.155")	
	Prod No	*Price*	*Prod No*	*Price*
With universal actuator	C45R-9144EUTA	$1460	C45R-9146EUTA	$1515
Replacement valve	C45R-9144D	555	C45R-9146D	610
Replacement rotor	C45R-91R4	120	C45R-91R6	120
Replacement stator	C45R-9C44	425	C45R-9C46	425

MORE INFO



CHEMINERT VALVES

Integrated motor/valves

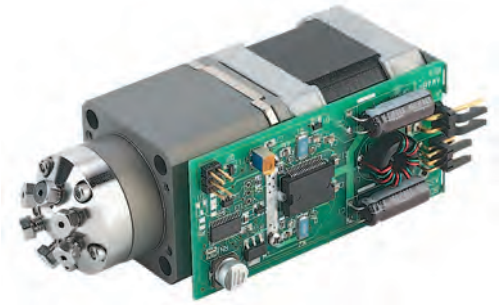
1/16" VALCO FITTINGS, 0.25 MM PORTS (.010")

5,000 psi
Microbore
Integrated
1/16" 0.25 mm
CE ready*

Model C52 includes nuts and ferrules.
Valves with stainless stators have stainless fittings.
Valves with PAEK stators have PEEK fittings.
See page 131 for more information on integrated motor/valves.
Also available in vertical port version. Contact the factory.
Note: The fitting detail pilot depth in PAEK HPLC stators is slightly longer than standard.




	4 Port		6 Port*		8 Port		10 Port	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
N60 stainless stator								
With integrated actuator	C52-1004I	$950	C52-1006I	$950	C52-1008I	$1005	C52-1000I	$1060
Add RS-232 interface	C52-1004IA	980	C52-1006IA	980	C52-1008IA	1035	C52-1000IA	1090
With motor/sensor only	C52-1004I-S	800	C52-1006I-S	800	C52-1008I-S	855	C52-1000I-S	910
With motor only	C52-1004IX	750	C52-1006IX	750	C52-1008IX	805	C52-1000IX	860
Replacement rotor	C2-10R4	76	C2-10R6	76	C2-10R8H	76	C2-10R0H	76
Replacement stator	C52-1C04	405	C52-1C06	405	C52-1C08	460	C52-1C00	520
PAEK stator								
With integrated actuator	C52-1344I	1070	C52-1346I	1070	C52-1348I	1125	C52-1340I	1180
Add RS-232 interface	C52-1344IA	1100	C52-1346IA	1100	C52-1348IA	1155	C52-1340IA	1210
With motor/sensor only	C52-1344I-S	920	C52-1346I-S	920	C52-1348I-S	975	C52-1340I-S	1030
With motor only	C52-1344IX	870	C52-1346IX	870	C52-1348IX	925	C52-1340IX	980
Replacement rotor	C2-13R4	76	C2-13R6	76	C2-13R8H	76	C2-13R0H	76
Replacement stator	C52-1C44	520	C52-1C46	520	C52-1C48	580	C52-1C40	635



6 PORT INTEGRATED MOTOR/VALVE
1/16" stainless ZDV fittings

SPECIFICATIONS

5,000 psi liq
50°C max
Stator: N60 stainless
Rotor: Valcon H
5,000 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E

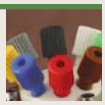
OPTIONS

- **Vertical port version**. (Model C52V) Contact the factory for more information.
- Optional 0.40 mm (.016") and 0.75 mm ports (.030") available
- Titanium and Hastelloy stators available
- Serial communication via RS-232 or RS-485 is available.

* CE READY

Since these integrated VICI motor/valves are designed as components to be embedded into other systems, they do not include a power supply. They have been tested according to the following EMC Standards:
EN61326-1: 2006
Conducted emissions
Radiated emissions

However, these results do not substitute for, preclude, or guarantee passage of any or all relevant compliance testing as required for a final product that includes these components.



Microbore centered port injectors

1/16" VALCO FITTINGS, 0.25 MM PORTS (.010")

SPECIFICATIONS

5000 psi liq
75°C max
Stator: N60 stainless
Rotor: Valcon H

5000 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E

OPTIONS

- Titanium and Hastelloy stators available

Model C3 includes nuts and ferrules.
Valves with stainless stators have stainless fittings.
Valves with PAEK stators have PEEK fittings.
Includes syringe fill port for 22 gauge 3/4" and 2" needle.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Note: The fitting detail pilot depth in PAEK HPLC stators is slightly longer than standard.

5,000 psi
Microbore
Centered port
1/16"
0.25 mm

	Prod No	*Price*
N60 stainless stator		
Manual	C3-1006	$645
With universal actuator	C3-1006EUHA	1505
Replacement valve	C3-1006D	645
Replacement rotor	C2-10R6	76
Replacement stator	C3-1C06	460
PAEK stator		
Manual	C3-1346	$765
With universal actuator	C3-1346EUT	1610
Replacement valve	C3-1346D	765
Replacement rotor	C2-13R6	76
Replacement stator	C3-1C46	580

6 PORT CENTERED PORT INJECTOR
1/16" stainless ZDV fittings

Sample loops

Each metal loop includes two stainless steel nuts and ferrules. Each PEEK loop includes two PEEK nuts and ferrules.

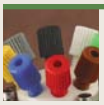
These loops are for use with valves on pages 140, 142, 143, 144, 146, 147, 162, 163, 164, 165, and 167.

	Stainless Steel		**PEEK (for PAEK stators)**	
Volume	*Prod No*	*Price*	*Prod No*	*Price*
2 µl	CSL2	$25	CZSL2PK	$31
5 µl	CSL5	25	CZSL5PK	31
10 µl	CSL10	25	CZSL10PK	31
20 µl	CSL20	25	CZSL20PK	28
50 µl	CSL50	25	CZSL50PK	25
100 µl	CSL100	34	CZSL100PK	25
250 µl	CSL250	34	CZSL250PK	31
500 µl	CSL500	34	CZSL500PK **	38
1 ml	CSL1K	39	CZSL1KPK **	50
2 ml	CSL2K	50	CZSL2KPK **	69
5 ml	CSL5K	58	CZSL5KPK **	100
10 ml	CSL10K	76	*** max pressure 2500 psi*	

ABOUT LOOPS

- Other materials are available in many sizes: Electroformed Nickel, Hastelloy C, Nickel 200, and PTFE.
- Metal loops > 2 ml are made from 1/8" OD tubing with brazed or welded 1/16" tube ends or reducing unions.
- Sample loop shape and dimensions may vary from batch to batch due to fluctuations in tubing ID. Loop volume is controlled as closely as possible, but is not calibrated.

MORE INFO



CHEMINERT VALVES

Microbore vertical port injectors

1/16" VALCO FITTINGS, 0.25 MM PORTS (.010")

5,000 psi
Microbore
Vertical port
1/16″ | 0.25 mm

Model C2V includes nuts and ferrules.
Valves with stainless stators have stainless fittings.
Valves with PAEK stators have PEEK fittings.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Note: The fitting detail pilot depth in PAEK HPLC stators is slightly longer than standard.

SPECIFICATIONS

5000 psi liq
75°C max
Stator: N60 stainless
Rotor: Valcon H
5000 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E

OPTIONS

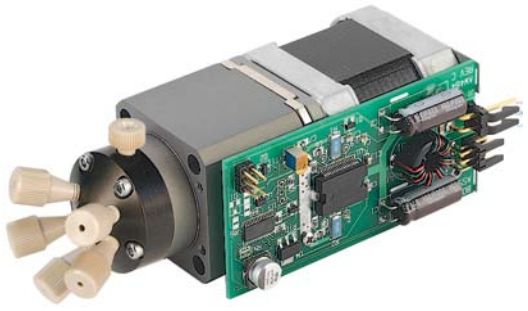
- Titanium and Hastelloy stators available

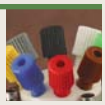
	Prod No	*Price*
N60 stainless stator		
Manual	C2V-1006	$645
With universal actuator	C2V-1006EUHA	1505
Replacement valve	C2V-1006D	645
Replacement rotor	C2-10R6	76
Replacement stator	C2V-1C06	460
PAEK stator		
Manual	C2V-1346	$765
With universal actuator	C2V-1346EUHA	1625
Replacement valve	C2V-1346D	765
Replacement rotor	C2-13R6	76
Replacement stator	C2V-1C46	580

6 PORT VERTICAL PORT INJECTOR
1/16" PEEK ZDV fittings

INTEGRATED MOTOR/VERTICAL PORT INJECTOR

Available in analytical and microbore versions. Contact the factory for information.





Analytical vertical port injectors

1/16" VALCO FITTINGS, 0.40 MM PORTS (.016")

SPECIFICATIONS

5000 psi liq
75°C max
Stator: N60 stainless
Rotor: Valcon H

5000 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E

OPTIONS

- Titanium and Hastelloy stators available

Model C2V includes nuts and ferrules.
Valves with stainless stators have stainless fittings.
Valves with PAEK stators have PEEK fittings.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Note: The fitting detail pilot depth in PAEK HPLC stators is slightly longer than standard.

5,000 psi
Analytical
Vertical port
1/16"
0.40 mm

	Prod No	Price
N60 stainless stator		
Manual	C2V-2006	$480
With universal actuator	C2V-2006EUHA	1340
Replacement valve	C2V-2006D	480
Replacement rotor	C2-20R6	76
Replacement stator	C2V-2C06	290
PAEK stator		
Manual	C2V-2346	$600
With universal actuator	C2V-2346EUHA	1460
Replacement valve	C2V-2346D	600
Replacement rotor	C2-23R6	76
Replacement stator	C2V-2C46	405

6 PORT VERTICAL PORT INJECTOR
1/16" PEEK ZDV fittings

MORE INFO

Actuators
Microelectric 176
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Materials
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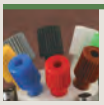


CHEMINERT VALVES

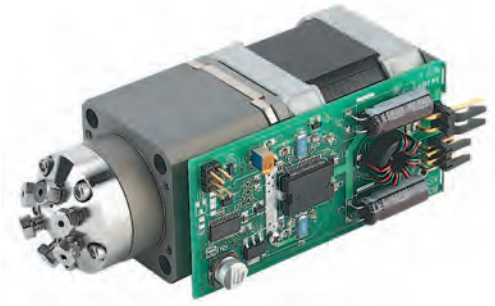
Integrated motor/valves

1/16" VALCO FITTINGS, 0.40 MM PORTS (.016")

5,000 psi
Analytical
Integrated
1/16″ 0.40 mm
CE ready*

Model C52 includes nuts and ferrules.
Valves with stainless stators have stainless fittings.
Valves with PAEK stators have PEEK fittings.nuts and ferrules.
See page 131 for more information on integrated motor/valves.
Note: The fitting detail pilot depth in PAEK HPLC stators is slightly longer than standard.

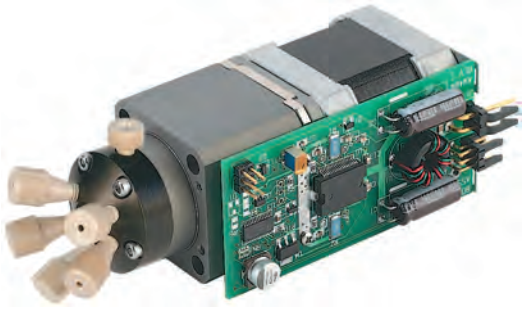
	4 Port		6 Port*		8 Port		10 Port	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
N60 stainless stator								
With integrated actuator	C52-2004I	$800	C52-2006I	$800	C52-2008I	$855	C52-2000I	$910
Add RS-232 interface	C52-2004IA	830	C52-2006IA	830	C52-2008IA	885	C52-2000IA	940
With motor/sensor only	C52-2004I-S	650	C52-2006I-S	650	C52-2008I-S	705	C52-2000I-S	760
With motor only	C52-2004IX	600	C52-2006IX	600	C52-2008IX	655	C52-2000IX	710
Replacement rotor	C2-20R4	76	C2-20R6	76	C2-20R8H	76	C2-20R0H	76
Replacement stator	C52-2C04	230	C52-2C06	230	C52-2C08	285	C52-2C00	345
PAEK stator								
With integrated actuator	C52-2344I	920	C52-2346I	920	C52-2348I	975	C52-2340I	1030
Add RS-232 interface	C52-2344IA	950	C52-2346IA	950	C52-2348IA	1005	C52-2340I	1060
With motor/sensor only	C52-2344I-S	770	C52-2346I-S	770	C52-2348I-S	825	C52-2340I-S	880
With motor only	C52-2344IX	720	C52-2346IX	720	C52-2348IX	775	C52-2340IX	830
Replacement rotor	C2-23R4	76	C2-23R6	76	C2-23R8H	76	C2-23R0H	76
Replacement stator	C52-2C44	345	C52-2C46	345	C52-2C48	405	C52-2C40	460



6 PORT INTEGRATED MOTOR/VALVE
1/16" stainless ZDV fittings

6 PORT VERTICAL PORT INTEGRATED MOTOR/VALVE

Contact the factory for information on this option.



SPECIFICATIONS

5,000 psi liq
50°C max
Stator: N60 stainless
Rotor: Valcon H

5,000 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E

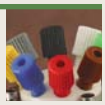
OPTIONS

- **Vertical port version**. (Model C52V) Contact the factory for more information.
- Optional 0.25 mm (.010") and 0.75 mm ports (.030″) available
- Titanium and Hastelloy stators available
- Serial communication via RS-232 or RS-485 is available.

* CE READY

Since these integrated VICI motor/valves are designed as components to be embedded into other systems, they do not include a power supply. They have been tested according to the following EMC Standards:
EN61326-1: 2006
Conducted emissions
Radiated emissions

However, these results do not substitute for, preclude, or guarantee passage of any or all relevant compliance testing as required for a final product that includes these components.



Analytical centered port injectors

1/16" VALCO FITTINGS, 0.40 MM PORTS (.016")

SPECIFICATIONS

5000 psi liq
75°C max
Stator: N60 stainless
Rotor: Valcon H
5000 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E

OPTIONS

- Titanium and Hastelloy stators available

Model C3 includes nuts and ferrules.
Valves with stainless stators have stainless fittings.
Valves with PAEK stators have PEEK fittings.
Includes syringe fill port for 22 gauge 3/4" and 2" needle.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes serial interface. See page 174 for other interface options.
Note: The fitting detail pilot depth in PAEK HPLC stators is slightly longer than standard.

5,000 psi
Analytical
Centered port
1/16"
0.40 mm

	Prod No	Price
N60 stainless stator		
Manual	C3-2006	$480
With universal actuator	C3-2006EUHA	1340
Replacement valve	C3-2006D	480
Replacement rotor	C2-20R6	76
Replacement stator	C3-2C06	290
PAEK stator		
Manual	C3-2346	$600
With universal actuator	C3-2346EUHA	1460
Replacement valve	C3-2346D	600
Replacement rotor	C2-23R6	76
Replacement stator	C3-2C46	405

6 PORT CENTERED PORT INJECTOR
1/16" stainless ZDV fittings

Sample loops

Each metal loop includes two stainless steel nuts and ferrules. Each PEEK loop includes two PEEK nuts and ferrules.

These loops are for use with valves on pages 140, 142, 143, 144, 146, 147, 162, 163, 164, 165, and 167.

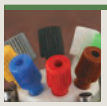
	Stainless Steel		PEEK (for PAEK stators)	
Volume	Prod No	Price	Prod No	Price
2 µl	CSL2	$25	CZSL2PK	$31
5 µl	CSL5	25	CZSL5PK	31
10 µl	CSL10	25	CZSL10PK	31
20 µl	CSL20	25	CZSL20PK	28
50 µl	CSL50	25	CZSL50PK	25
100 µl	CSL100	34	CZSL100PK	25
250 µl	CSL250	34	CZSL250PK	31
500 µl	CSL500	34	CZSL500PK **	38
1 ml	CSL1K	39	CZSL1KPK **	50
2 ml	CSL2K	50	CZSL2KPK **	69
5 ml	CSL5K	58	CZSL5KPK **	100
10 ml	CSL10K	76		

*** max pressure 2500 psi*

ABOUT LOOPS

- Other materials are available in many sizes: Electroformed Nickel, Hastelloy C, Nickel 200, and PTFE.
- Metal loops > 2 ml are made from 1/8" OD tubing with brazed or welded 1/16" tube ends or reducing unions.
- Sample loop shape and dimensions may vary from batch to batch due to fluctuations in tubing ID. Loop volume is controlled as closely as possible, but is not calibrated.

MORE INFO



CHEMINERT VALVES

Integrated motor/valves

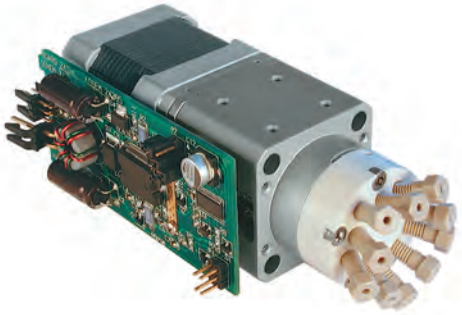
1/16" VALCO ZDV FITTINGS, 0.75 MM PORTS (.030")

Low pressure
Integrated
10-32 ZDV
1/16" 0.75 mm
CE ready*

Model C62Z includes Valco ZDV PEEK nuts and ferrules.
Sample loops are not included with valves. Order separately.




	4 Port		6 Port		8 Port		10 Port	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
With integrated actuator	C62Z-3184I	$670	C62Z-3186I	$670	C62Z-3188I	$700	C62Z-3180I	$720
Add RS-232 interface	C62Z-3181IA	700	C62Z3186IA	700	C62Z-3188IA	730	C62Z-3180IA	750
With motor and sensor only	C62Z-3184I-S	520	C62Z-3186I-S	520	C62Z-3188I-S	550	C62Z-3180I-S	570
Replacement rotor	C62-314	53	C62-316	53	C62-318	53	C62-310	53
Replacement stator	C62Z-384	142	C62Z-386	142	C62Z-388	172	C62Z-380	195



10 PORT INTEGRATED MOTOR/VALVE
1/16" PEEK ZDV fittings

SPECIFICATIONS

250 psi liq
50°C max
Stator: PPS
Rotor: Valcon E2

OPTIONS

- Other polymeric rotors and stators are available
- Consult the factory for prices and information.
- Serial communication via RS-232 or RS-485 is available.

Sample loops

Loops include PEEK nuts and ferrules.
Loops less than 500 µl are made from 1/16" OD tubing; loops 500 µl or greater are made from 1/8" OD tubing with polymeric unions and 1/16" ends.

These loops are for use with valves on this page.

	FEP		PTFE		PEEK	
Volume	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
5 µl	CZSL5FEP	$25	CZSL5TF	$25	CZSL5PK	$31
10 µl	CZSL10FEP	25	CZSL10TF	25	CZSL10PK	31
20 µl	CZSL20FEP	23	CZSL20TF	23	CZSL20PK	28
50 µl	CZSL50FEP	19	CZSL50TF	19	CZSL50PK	25
100 µl	CZSL100FEP	19	CZSL100TF	19	CZSL100PK	25
250 µl	CZSL250FEP	23	CZSL250TF	23	CZSL250PK	31
500 µl	CZSL500FEP	25	CZSL500TF	25	CZSL500PK	38
1 ml	CZSL1KFEP	30	CZSL1KTF	30	CZSL1KPK	50
2 ml	CZSL2KFEP	38	CZSL2KTF	38	CZSL2KPK	69

ABOUT LOOPS

Sample loop shape and dimensions may vary from batch to batch due to fluctuations in tubing ID. Loop volume is controlled as closely as possible, but is not calibrated.

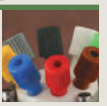
* CE READY

Since these integrated VICI motor/valves are designed as components to be embedded into other systems, they do not include a power supply. They have been tested according to the following EMC Standards:
EN61326-1: 2006
Conducted emissions
Radiated emissions

However, these results do not substitute for, preclude, or guarantee passage of any or all relevant compliance testing as required for a final product that includes these components.

MORE INFO

Materials
Metals..... 246-247
Polymers 248
Valve rotors.....249



Integrated motor/valves

1/4-28 FITTING DETAILS FOR 1/16" TUBING, 0.75 MM PORTS (.030")

SPECIFICATIONS

250 psi liq
50°C max
Stator: PPS
Rotor: Valcon E2

OPTIONS

- Serial communication via RS-232 or RS-485 is available.

Model C62 includes multicolored Cheminert flangeless fittings for 1/16" tubing.
Sample loops are not included with valves. Order separately.

Low pressure
Integrated
1/4-28 Internal
1/16" 0.75 mm
CE ready*




	4 Port		6 Port		8 Port		10 Port	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
With integrated actuator	C62-3184I	$670	C62-3186I	$670	C62-3188I	$755	C62-3180I	$775
Add RS-232 interface	C62-3184IA	700	C62-3186IA	700	C62-3188IA	785	C62-3180IA	805
With motor and sensor only	C62-3184I-S	520	C62-3186I-S	520	C62-3188I-S	605	C62-3180I-S	625
Replacement rotor	C62-314	53	C62-316	53	C62-318	53	C62-310	53
Replacement stator	C62-384	158	C62-386	158	C62-388	250	C62-380	270

Integrated motor/valves

1/4-28 FITTING DETAILS FOR 1/8" TUBING, 1.50 MM PORTS (.060")

SPECIFICATIONS

250 psi liq
50°C max
Stator: PPS
Rotor: Valcon E2

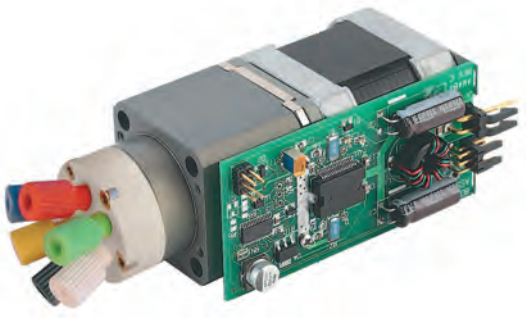
OPTIONS

- Serial communication via RS-232 or RS-485 is available.

Model C62 includes multicolored Cheminert flangeless fittings for 1/8" tubing.
Sample loops are not included with valves. Order separately.

Low pressure
Integrated
1/4-28 Internal
1/8" 1.50 mm
CE ready*

	4 Port		6 Port		8 Port		10 Port	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
With integrated actuator	C62-6184I	$670	C62-6186I	$670	C62-6188I	$755	C62-6180I	$775
Add RS-232 interface	C62-6184IA	700	C62-6186IA	700	C62-6188IA	785	C62-6180IA	805
With motor and sensor only	C62-6184I-S	520	C62-6186I-S	520	C62-6188I-S	605	C62-6180I-S	625
Replacement rotor	C62-614	53	C62-616	53	C62-618	53	C62-610	53
Replacement stator	C62-684	158	C62-686	158	C62-688	250	C62-680	270



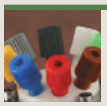
6 PORT INTEGRATED MOTOR/VALVE
1/4-28 fittings

Sample loops

Loops include flangeless fittings with natural color nuts.
Loops less than 250 µl are made from 1/16" OD tubing;
loops 250 µl or greater are made from 1/8" OD tubing.

These loops are for use with valves on this page.

	FEP		PTFE		PEEK	
Volume	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
20 µl	CFSL20FEP	$18	CFSL20TF	18	CFSL20PK	$25
50 µl	CFSL50FEP	18	CFSL50TF	18	CFSL50PK	25
100 µl	CFSL100FEP	18	CFSL100TF	18	CFSL100PK	25
250 µl	CFSL250FEP	18	CFSL250TF	18	CFSL250PK	25
500 µl	CFSL500FEP	20	CFSL500TF	20	CFSL500PK	30
1 ml	CFSL1KFEP	25	CFSL1KTF	25	CFSL1KPK	40
2 ml	CFSL2KFEP	30	CFSL2KTF	30	CFSL2KPK	63



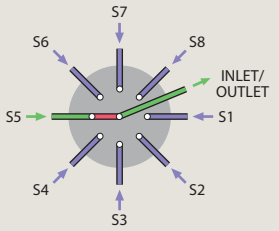
CHEMINERT VALVES

Integrated motor/stream selectors

1/16" VALCO ZDV FITTINGS, 0.40 MM PORTS (.016")

5,000 psi
Integrated
Stream selector
10-32 ZDV
1/16" 0.40 mm
CE ready*

Model C55 includes nuts and ferrules.
Valves with stainless stators have stainless fittings.
Valves with PAEK stators have PEEK fittings.
See page 133 for more information on integrated motor/selectors.



	4 Position		6 Position		8 Position		10 Position	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
N60 stainless stator								
With integrated actuator	C55-2004I	$885	C55-2006I	$885	C55-2008I	$940	C55-2000I	$995
Add RS-232 interface	C55-2004IA	915	C55-2006IA	915	C55-2008IA	970	C55-2000IA	1025
With motor/sensor only	C55-2004I-S	735	C55-2006I-S	735	C55-2008I-S	790	C55-2000I-S	845
With motor only	C55-2004IX	685	C55-2006IX	685	C55-2008IX	740	C55-2000IX	775
Replacement rotor	C5-20R4	76	C5-20R6	76	C5-20R8H	76	C5-20R0H	76
Replacement stator	C55-2C04	280	C55-2C06	280	C55-2C08	335	C55-2C00	395
PAEK stator								
With integrated actuator	C55-2344I	1005	C55-2346I	1005	C55-2348I	1605	C55-2340I	1115
Add RS-232 interface	C55-2344IA	1035	C55-2346IA	1035	C55-2348IA	1090	C55-2340IA	1145
With motor/sensor only	C55-2344I-S	855	C55-2346I-S	855	C55-2348I-S	910	C55-2340I-S	965
With motor only	C55-2344IX	805	C55-2346IX	805	C55-2348IX	860	C55-2340IX	915
Replacement rotor	C5-23R4	76	C5-23R6	76	C5-23R8H	76	C5-23R0H	76
Replacement stator	C55-2C44	395	C55-2C46	395	C55-2C48	450	C55-2C40	510

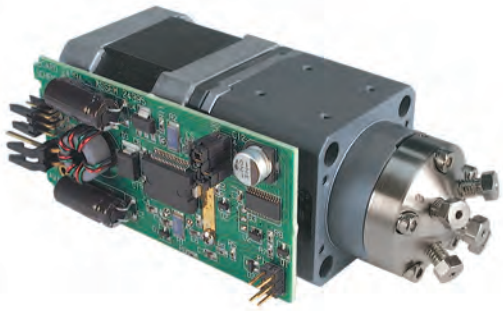
SPECIFICATIONS

5000 psi liq
50°C max
Stator: Metal
Rotor: Valcon H

5000 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E

OPTIONS

- Optional bore:
  0.25 mm (.010")
  0.75 mm (.030")
- 4 and 8 positions available
- Stators are availalbe in other metals and polymeric materials. Rotors are available in other materials
- Serial communication via RS-232 or RS-485 is available.



6 POSITION INTEGRATED MOTOR/SELECTOR
1/16" stainless ZDV fittings

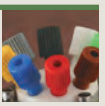
CE * CE READY

Since these integrated VICI motor/valves are designed as components to be embedded into other systems, they do not include a power supply. They have been tested according to the following EMC Standards:
EN61326-1: 2006
Conducted emissions
Radiated emissions

However, these results do not substitute for, preclude, or guarantee passage of any or all relevant compliance testing as required for a final product that includes these components.

MORE INFO

Materials



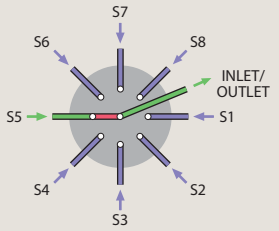
Integrated motor/stream selectors

1/16" VALCO ZDV FITTINGS, 0.75 MM PORTS (.030")

SPECIFICATIONS

250 psi liq
50°C max
Stator: PPS
Rotor: Valcon E2

Model C65Z includes Valco ZDV PEEK nuts and ferrules.
See page 133 for more information on integrated motor/selectors.



Low pressure
Integrated
Stream selector
10-32 ZDV
1/16" 0.75 mm
CE ready*

	4 Position		6 Position		8 Position		10 Position	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
With integrated actuator	C65Z-3184I	$705	C65Z-3186I	$705	C65Z-3188I	$745	C65Z-3180I	$765
Add RS-232 interface	C65Z-3184IA	735	C65Z-3186IA	735	C65Z-3188IA	775	C65Z-3180IA	795
With motor and sensor only	C65Z-3184I-S	555	C65Z-3186I-S	555	C65Z-3188I-S	595	C65Z-3180I-S	615

Integrated motor/stream stream selectors

1/4-28 FITTINGS FOR 1/16" TUBING, 0.75 MM PORTS (.030")

SPECIFICATIONS

250 psi liq
50°C max
Stator: PPS
Rotor: Valcon E2

Model C65 includes multicolored Cheminert flangeless fittings for 1/16" tubing.
See page 133 for more information on integrated motor/selectors.

Low pressure
Integrated
Stream selector
1/4-28 Internal
1/16" 0.75 mm
CE ready*

	4 Position		6 Position		8 Position		10 Position	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
With integrated actuator	C65-3184I	$705	C65-3186I	$705	C65-3188I	$800	C65-3180I	$820
Add RS-232 interface	C65-3184IA	735	C65-3186IA	735	C65-3188IA	830	C65-3180IA	850
With motor and sensor only	C65-3184I-S	555	C65-3186I-S	555	C65-3188I-S	650	C65-3180I-S	670

Integrated motor/stream stream selectors

1/4-28 FITTINGS FOR 1/8" TUBING, 1.50 MM PORTS (.060")

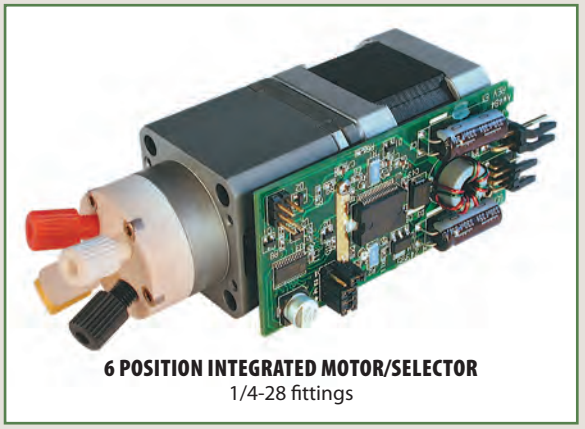
SPECIFICATIONS

250 psi liq
50°C max
Stator: PPS
Rotor: Valcon E2

Model C65 includes multicolored Cheminert flangeless fittings for 1/8" tubing.
See page 133 for more information on integrated motor/selectors.

Low pressure
Integrated
Stream selector
1/4-28 Internal
1/8" 1.50 mm
CE ready*

	4 Position		6 Position		8 Position		10 Position	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
With integrated actuator	C65-6184I	$705	C65-6186I	$705	C65-6188I	$800	C65-6180I	$820
Add RS-232 interface	C65-6184IA	735	C65-6186IA	735	C65-6188IA	830	C65-6180IA	850
With motor and sensor only	C65-6184I-S	555	C65-6186I-S	555	C65-6188I-S	650	C65-6180I-S	670



6 POSITION INTEGRATED MOTOR/SELECTOR
1/4-28 fittings

*** CE READY**
See note on facing page.

ACTUATORS

AND ACCESSORIES

Two position valves switch back and forth between Load and Inject, or Position A and Position B. Selectors operate in continuous revolutions by incremental steps. There are several ways to actuate each type of valve, along with a number of supporting controllers and devices to interface the actuators with computer-controlled systems.

With the exception of low pressure Cheminert selectors, we recommend that selectors be purchased with air or electric actuators. While a manual detent assembly is available, the higher turning torque of our other selector designs makes them more difficult to position accurately by hand.

ELECTRIC ACTUATION

UNIVERSAL ACTUATOR

The universal actuator operates virtually any Valco or Cheminert rotary valve – two position and selector alike – greatly simplying the electronic aspect of instrument design. A manual controller is included; current interface options include RS232/485, USB, and BCD.

Universal actuator ..... pages 174-175

MICROELECTRIC ACTUATOR

The microelectric actuator features automatic valve alignment, high-speed switching, compact size, 24 VDC power input, and reversible direction (in the selector model).

Microelectric actuators can be operated manually via a controller with toggle switch and position-indicating LEDs, or can be connected to an external data system for fully automated control. Built-in multidrop RS-232 (RS-485 optional) facilitates bidirectional communications.

Two position ..... page 176
Selector 176

AIR ACTUATION

Air actuators are useful in situations where any spark could be disastrous or where there is no electricity available. They are small, relatively inexpensive, very rugged and dependable, and field-serviceable. Low gas consumption and light-weight, compact construction make the air actuator suitable for aerospace flight hardware applications as well as laboratory or process applications.

With the addition of a DVI (digital valve interface) to translate the timed event signals into the necessary air pulses, air actuators can be automatically switched by a data system, integrator, or controller.

Two position .....page 179
Selector 178

MANUAL ACTUATION

Simplicity and low cost are the main advantages of manual actuation. Some models can be ordered with position feedback, an option which sends a signal to start a data system when the valve is switched.

Manual knobs and handles .....page 190
Position feedback 181

SEE ALSO

Actuators

Air .....pages 178-179
Universal electric..... 174-175
Microelectric.....176

Controllers and Accessories

410 4-way solenoid air valve.....180
DVI Digital valve interface 181
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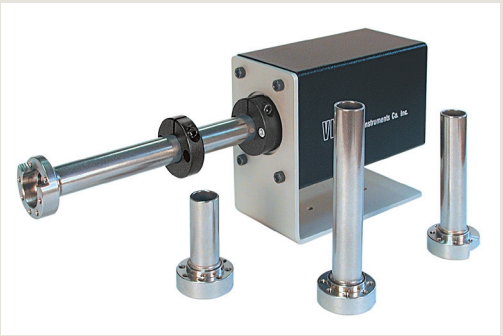
MSVA2 Manifold 3-way solenoid valve assembly 180
PFAF Position feedback for air actuators.....181
RAD Right angle drive 186

Mounting Hardware

Closemount assembly 190
Standoff assembly..... 187-189

STANDOFF ASSEMBLIES

All valves, no matter what their actuation mode, can be ordered with a standoff assembly. The standoff is an extension shaft mounted between the handle or actuator and the valve, allowing the valve to be installed within a heated zone while the actuator or handle remains outside at ambient temperature. The standoff extends through the oven wall, and is secured by a clamp ring supplied with the assembly. Standard standoff assembly lengths are 2", 3", 4", and 6". Other lengths can be special-ordered at additional cost.



Standoff assemblies .....page 187

UNIVERSAL ACTUATORS

- CE certified
- One actuator works with two position valves *and* selectors
- Simplified, universal communication protocol
- Variety of interfaces
- Three versions for various valve torque requirements

Three universal actuator models – high speed, medium speed/medium torque, and high torque – cover our entire line of Valco and Cheminert valves and selectors, with their wide range of turning torques.

Actuators include a universal 24 VDC power supply and a manual controller. An OEM version that excludes these items is also available. The standard interface allows simple positioning commands – Step and Home for selectors, A and B for two position – via direct input signals from switch closures, relay contacts, or TTL-compatible interfaces. A more extensive command set is available with the optional RS-232, RS-485, USB, or BCD interfaces.

Universal actuators

Standard voltage 24 VDC. Includes autosensing 24 VDC power supply. Does not include mounting hardware. Order separately.

	High speed (EUH)		Medium torque (EUD)		High torque (EUT)	
Interface	*Prod no*	*Price*	*Prod no*	*Price*	*Prod no*	*Price*
Standard	EUH	$800	EUD	$825	EUT	$845
RS-232 *	EUHA	860	EUDA	885	EUTA	905
RS-485 *	EUHF	860	EUDF	885	EUTF	905
USB	EUHB	860	EUDB	885	EUTB	905
BCD	EUHC	860	EUDC	885	EUTC	905

*Actuators ordered with a serial interface come with a switchable 232/485 board. If ordered with suffix A, switch will be preset for RS-232. If ordered with suffix F, switch will be preset for RS-485.

HARDWARE NOTE

While the actuators are universal, the valve mounting hardware is not. The product numbers shown do not include the hardware required for mounting a valve, since the necessary hardware depends on the valve type.

- If you are ordering the actuator for use with an ***existing valve***, call our sales or technical staff to determine the correct hardware needed.
- If you want to order the universal actuator with a ***new valve***, simply use the product number in the valve chart and we'll provide the correct hardware.

KEYED STANDOFFS FOR SELECTORS

Keyed standoff assemblies are used with selectors on universal actuators, to key the valve body to the actuator and standoff so that the actuators can self-align and operate valves with any number of positions.

Valco selectors are not keyed unless ordered with a universal actuator. To install a universal actuator on an existing Valco selector, the key (pin) must be removed from the actuator clamp ring assembly. This can be done easily with a pair of pliers.

See page 189, top and bottom illustrations, for drawings of keyed standoff assemblies with modular universal actuators.

MORE INFO

Microelectric actuators 176

MOUNTING HARDWARE

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Standoff mounting hardware 187

CHEMINERT UHPLC INJECTOR
on universal actuator

CHEMINERT LC INJECTOR
on universal actuator

VALCO GC INJECTOR
on universal actuator

CHEMINERT HPLC SELECTOR
on universal actuator

VALCO GC SELECTOR
on universal actuator

WHICH MODEL FOR WHICH INJECTOR/TWO POSITION VALVE?

	VALCO GC		VALCO HPLC	
Fitting size	*Bore size*	*Actuator model*	*Bore size*	*Actuator model*
1/32"	0.25 mm	EUH	—	—
1/16"	0.40 mm	EUH	0.40 mm	EUH
1/16"	0.75 mm	EUD	0.75 mm	EUD
1/8"	0.75 mm	EUD	0.75 mm	EUD
1/4"	4.0 mm	EUT	—	—

CHEMINERT	HPLC *Actuator model*	UHPLC *Actuator model*	Low Pressure *Actuator model*
4 and 6 ports *	EUH	EUH *	EUH
8 and 10 ports	EUH	EUD	EUH

* 20,000 psi UHPLC versions use EUD.

WHICH MODEL FOR WHICH SELECTOR?

VALCO	*Actuator model*
All valves	EUT

CHEMINERT	HPLC *Actuator model*	UHPLC *Actuator model*
4 and 6 ports *	EUH	EUH *
8 and 10 ports	EUD	EUD

* 20,000 psi versions use EUD.

CHEMINERT		Low Pressure
Model C25	*page 159*	EUH
Model C25Z	*page 158*	EUH
Model C25G	*page 160*	EUT
Model C45R	*page 161*	EUT

MICROELECTRIC ACTUATORS

- CE certified
- Optional position indication
- Compact stepper motor design
- Automatic self-alignment with keyed selector valves
- Variety of control modes with optional interfaces
  - Step and home functions with contact closure *(standard)*
  - Direct position access via BCD interface
  - Position access/confirmation via serial interface

One multiposition actuator can be used on any selector, from 2 to 96 positions, so you can stock only one type of actuator even if you have 4, 6, 8, 10, 12, and 16 position valves. Valve position memory is maintained even in the event of a power failure.

The direction reversal feature means that if a 6 position stream selection valve is on stream 1 and you select stream 6, you have the option of stepping "backwards" to stream 6 instead of passing through 2, 3, 4, and 5. The RS-232 input offers various commands like position access, direction control, shortest route, etc. (The RS-232 cable must be ordered separately. *See page opposite.*)

The two position microelectric actuator features exclusive stall-sensing circuitry which eliminates problems associated with valve/actuator misalignment. This means that you can stock one actuator for valves that turn 30°, 36°, 45°, 60°, 90°, or anything in between.

An actuator can be specified with closemount hardware, with a standoff, or with just the standoff mounting hardware, if your valve already has a standoff.

Microelectric actuators are designed for room temperature use. Valves mounted in ovens require a standoff assembly, which locates the actuator out of the heated zone.

Microelectric actuators — FOR TWO POSITION VALVES

Standard voltage 24 VDC. Includes autosensing 24 VDC power supply.
Consult the charts at right to determine which actuator model is best suited for your valve.

	w/closemount assembly		w/2" standoff assembly		For use with existing standoff	
Description	*Prod no*	*Price*	*Prod no*	*Price*	*Prod no*	*Price*
Highest speed actuator	EQ	$780	EQ2	$780	EQS	$735
High speed actuator	EH	780	EH2	780	EHS	735
Medium torque actuator	EP	780	EP2	780	EPS	735
High torque actuator	ED	840	ED2	840	EDS	800
Highest torque actuator	ET	840	ET2	840	ETS	800

Microelectric actuators — FOR SELECTORS

Standard voltage 24 VDC. Includes autosensing 24 VDC power supply.

	w/keyed closemount assembly		w/keyed 2" standoff assembly		For use with existing standoff	
Description	*Prod no*	*Price*	*Prod no*	*Price*	*Prod no*	*Price*
High speed actuator	EMH	$1020	EMH2	$1020	EMHS	$990
High torque actuator	EMT	1085	EMT2	1085	EMTS	1040

WHICH MODEL FOR WHICH INJECTOR/ TWO POSITION VALVE?

VALCO *Fitting size*	*Bore size*	GC *Actuator model*	HPLC *Actuator model*
1/32"	0.25 mm	EH	EP
1/16"	0.40 mm	EH	EP
1/16"	0.75 mm	ED	ED
1/8"	0.75 mm	ED	ED
1/4"	4.0 mm	ET	—

CHEMINERT	*Actuator model*
C74X, 8 & port *	ED
All other valves	EH

WHICH MODEL FOR WHICH SELECTOR?

VALCO	*Actuator model*
All valves	EMT

CHEMINERT	HPLC *Actuator model*	UHPLC *Actuator model*
4 and 6 ports *	EMH	EMH *
8 and 10 ports	EMD	EMD

* 20,000 psi versions use EMD.

CHEMINERT		Low Pressure
Model C25	*page 159*	EMH
Model C25Z	*page 158*	EMH
Model C25G	*page 160*	EMT
Model C45R	*page 161*	EMT

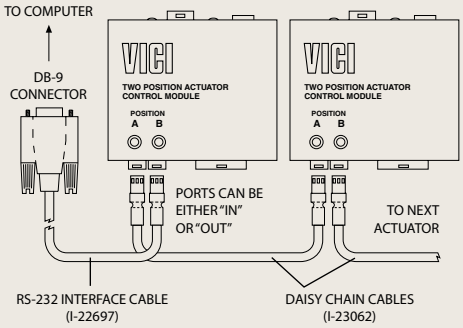
MORE INFO

Universal actuators 174-175

DAISY CHAIN CABLES

Daisy chain cables permit a single serial port (RS-232/485) to control multiple actuators – newer two position microelectric and universal.

See Technical Note 421 for further information.



Daisy chain cables

FOR UNIVERSAL AND MICROELECTRIC ACTUATORS

- More layout flexibility
- Economical

Microelectric and universal actuators with the RS232/485 interface option can be daisy-chained for control from a single serial port. A chain of actuators requires only one sRS-232/485 interface cable, plus a 3-pin daisy chain cable for each additional actuator.

Note that for reliable RS-232 communication, cables should be no longer than one meter; longer lengths can affect the signal integrity. The RS-485 protocol provides reliable communication over longer lengths.

Length	*Protocol*	*Prod No*	*Price*
22" (.55 mm)	RS-232/485	I-23062	$35
39" (1 m)	RS-232/485	I-23062-3.3	38
5' (1.5 m)	RS-485	I-23062-5	40
10' (3 m)	RS-485	I-23062-10	50
20' (6 m)	RS-485	I-23062-20	60

RS-232/485 interface cable

	Prod No	*Price*
RS-232/485 interface cable	I-22697	$31

Plug-and-play cables

FOR UNIVERSAL AND MICROELECTRIC ACTUATORS

Plug-and-play cables will allow a direct connection and control betweeen a specific instrument and a microelectic or universal actuator. Contact technical support for other instruments.

			Prod No	*Price*
BCD cable	Modular universal actuator to	Agilent 6890 GC	V-EMPMCR-HP6890	$75
		Agilent 6890 Network GC	V-EMPMCR-HP6890N	105
		Agilent 7890 GC	V-EMPMCR-HP6890N	75
For 4 and 6 column selector * *(page 157)*				
Remote cable	Modular universal actuator to	Agilent 1100/1200 LC	V-EMPMCR-HP1100	120
		Waters Alliance LC	V-EMPMCR-WA2690	120
For 8 and 10 column selector * *(page 157)*				
Remote cable	Modular universal actuator to	Agilent 1100 LC	V-EMPMCR-HP1100-10	95
		Waters Alliance LC	V-EMPMCR-WA2690-10	120

* Requires a specific software setting in the actuator control module

MOUNTING HARDWARE

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AIR ACTUATORS

Air actuators offer reliable performance under the most stringent conditions. Low gas consumption and lightweight, compact construction make the air actuator suitable for aerospace flight hardware applications as well as laboratory or process applications.

The standard air actuator is rated for up to 80 psig at temperatures up to 70°C. Generally speaking, valves which will be heated require a standoff assembly, which locates the air actuator out of the heated zone and supports both the valve and actuator. A high temperature model permits both valve and actuator to be mounted within an oven (175°C maximum), but it is not recommended for use below 50°C.

AIR ACTUATORS FOR SELECTORS

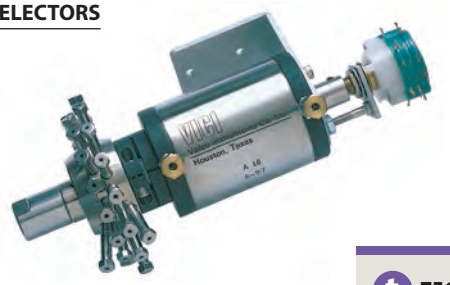
The recommended method for implementing a selector (multi-position) air actuator requires only a single 4-way solenoid. Up to 80 psig may be used without damaging the valve or actuator. Bottled instrument air or nitrogen is recommended.

If plant air from compressors must be used, an oil separator and water dryer are required.

Multiposition air actuators include a rotary switch which may be connected to a digital readout of your own design.

Standard air actuators

FOR SELECTORS



Temperature range 0-70°C
Standoff version includes a 2" standoff. 3", 4", and 6" standoffs are also available.

	With closemount assembly		With 2" standoff assembly		With standoff mounting hardware	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
4 position	A4	$425	A42	$425	A4S	$385
6 position	A6	425	A62	425	A6S	385
8 position	A8	425	A82	425	A8S	385
10 position	A10	425	A102	425	A10S	385
12 position	A12	425	A122	425	A12S	385
16 position	A16	425	A162	425	A16S	385

High temperature air actuators

FOR SELECTORS

Temperature range 50-175°C
Standoff version includes a 4" standoff. 2", 3", and 6" standoffs are also available.

	With closemount assembly		With 4" standoff assembly		With standoff mounting hardware	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
4 position	AT4	$425	AT44	$425	AT4S	$385
6 position	AT6	425	AT64	425	AT6S	385
8 position	AT8	425	AT84	425	AT8S	385
10 position	AT10	425	AT104	425	AT10S	385
12 position	AT12	425	AT124	425	AT12S	385
16 position	AT16	425	AT164	425	AT16S	385

Replacement O-rings

Includes a complete set of O-rings for a multiposition air actuator.

	Prod No	*Price*
Standard	ORMP	$17
High temp	ORTMP	21

TECH TIP

The actuator's rotation must be properly matched to the valve's. If you are converting a manual valve to air actuation and have any doubts about which actuator and hardware you need, call our sales or technical staff for assistance.

ORDER TIP

To purchase a ***valve with an air actuator installed***, go directly to valve ordering information.

MORE INFO

Solenoid air valve for selectors 180

Mounting Hardware

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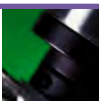


AIR ACTUATORS FOR TWO POSITION VALVES

The recommended method for implementing a two position air actuator is a manifold solenoid valve assembly (MSVA2, *page 180*), a block-mounted pair of 3-way solenoids that pulses air to the actuator to switch it from position to position. If air is applied continuously, the continuous rotational force applied to the valve can cause sideloading, leaking, and additional wear.

Typical actuation pressure is 40 to 50 psig, but up to 80 psig may be used.

Ideally, only enough air pressure should be used to switch the valve in 1/3 to 1/2 second. Bottled instrument air or nitrogen is recommended. If plant air from compressors must be used, an oil separator and water dryer are required.

A high speed switching accessory (HSSA) can upgrade valve switching times to less than 30 ms with air or 8 ms with helium. A position feedback (PFAF) with contact closures in both positions is also available as an option.

TECH TIP

Here's what you'll get when you order:

Air actuator with a **closemount assembly**

Air actuator with a **4" standoff assembly**

Air actuator **for use with an existing standoff**

MORE INFO

HSSA. . . . . page 182
High speed switching accessory
MSVA2 180
Manifold solenoid valve assembly
PFAF 181
Position feedback

Standard air actuators

FOR TWO POSITION VALVES

Temperature range 0-70°C
Standoff version includes a 4" standoff. 2", 3", and 6" standoffs are also available.

			With closemount assembly		With 4" standoff assembly		For use with existing standoff	
			Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Number of ports in valve	3, 4	90° rotation	A90	$265	A904	$265	A90S	$225
	6	60° rotation	A60	265	A604	265	A60S	225
	8	45° rotation	A45	265	A454	265	A45S	225
	10	36° rotation	A36	265	A364	265	A36S	225
	12	30° rotation	A30	265	A304	265	A30S	225

High temperature air actuators

FOR TWO POSITION VALVES

Temperature range 50-175°C
Standoff version includes a 2" standoff. 3", 4", and 6" standoffs are also available.

			With closemount assembly		With 2" standoff assembly		For use with existing standoff	
			Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Number of ports in valve	3, 4	90° rotation	AT90	$265	AT902	$265	AT90S	$225
	6	60° rotation	AT60	265	AT602	265	AT60S	225
	8	45° rotation	AT45	265	AT452	265	AT45S	225
	10	36° rotation	AT36	265	AT362	265	AT36S	225
	12	30° rotation	AT30	265	AT302	265	AT30S	225

Replacement O-rings

Includes a complete set of O-rings for a two position air actuator.

	Prod No	*Price*
Standard	OR	$15
High temp	ORT	17

Actuator compression fittings

FOR ALL AIR ACTUATORS

Includes 1/8" compression to 10-32 male thread, plus 1/8" brass ferrule and hex nut.

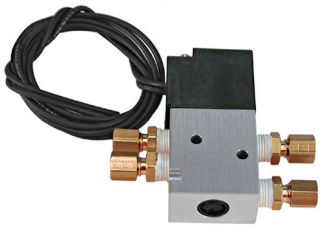
	Prod No	*Price*
3 piece fitting assembly	F-TCF	$3.25

410 4-Way solenoid air valve

FOR SELECTOR AIR ACTUATORS

This 4-way solenoid air valve with 1/8" tube fittings is the simplest method of stepping a selector air actuator. Energizing the solenoid steps the valve to its next position, and de-energizing the solenoid resets the mechanical ratchet in the actuator. This implementation, not recommended for two position actuators, can be useful when only a limited number of external events is available on the data system.

	Prod No	*Price*
110 VAC	410-120VAC	$105
240 VAC	410-240VAC	105
24 VAC	410-24VAC	105
24 VDC	410-24VDC	105

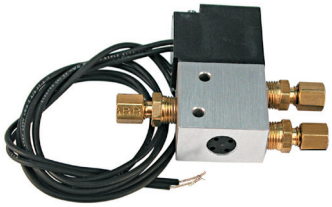


310 3-Way solenoid air valve

FOR DIAPHRAGM VALVES

This 3-way solenoid with 1/8" tube connections is perfect for switching spring-return valves such as our on/off or prime/purge valves (pages 198-199) or the DV23 diaphragm valves on page 124. Energizing the solenoid provides air to the actuator, while removing power from the solenoid allows the valve to return to its original state. Use of this solenoid is not recommended for rotary valves.

	Prod No	*Price*
110 VAC	310-120VAC	$105
240 VAC	310-240VAC	105
24 VAC	310-24VAC	105
24 VDC	310-24VDC	105

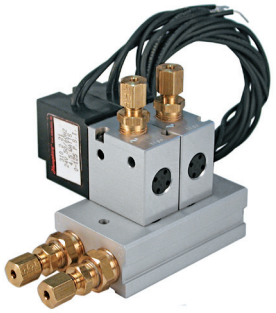


MSVA2 Manifold 3-way solenoid valve assembly

FOR TWO POSITION AIR ACTUATORS

The recommended way to switch two position air actuated valves is to "pulse" a pair of 3-way solenoid valves. This method applies air to the actuator only during switching, and alleviates problems associated with continuous air pressure. The MSVA is a block-mounted pair of 3-way solenoid air valves with 1/8" tube connections, available in 24 VDC, 24 VAC, 120 VAC, and 240 VAC models.

	Prod No	*Price*
110 VAC	MSVA2-120VAC	$230
240 VAC	MSVA2-240VAC	230
24 VAC	MSVA2-24VAC	230
24 VDC	MSVA2-24VDC	230



MORE INFO

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Mounting Hardware

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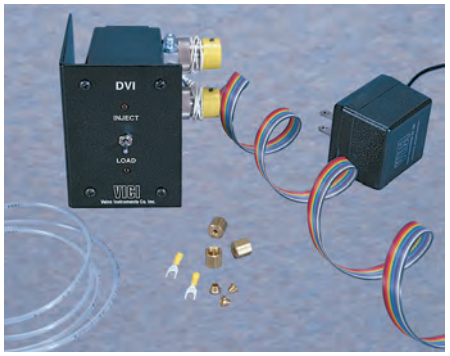


DVI Digital valve interface (NON-CE) FOR TWO POSITION AIR ACTUATORS

We highly recommend the DVI for use with two position air actuators. It sends a two second pulse of air to switch the valve and then vents the air, simulating switching by hand and eliminating the potential for damaging the valve or actuator with continuously-applied pressure. It also features LED position indication, manual and remote operation, and a contact closure output on arrival to the INJECT position, a feature which can be used to start a run or integration. The DVI is available for 110 or 230 VAC.

	Prod No	*Price*
110 VAC	DVI	$260
230 VAC	DVI-220	260

Position feedback FOR TWO POSITION AIR ACTUATORS

The optional position feedback (PFAF) can be field installed on any two position standard air actuator. Each position provides a contact closure for TTL logic level signals.

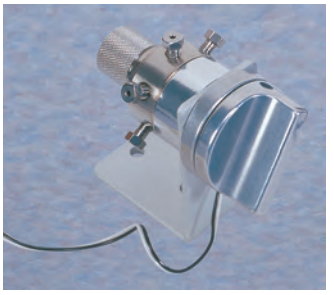
Prod No	*Price*
PFAF	$160

Position feedback FOR MANUAL VALVES

An optional position feedback is available for manual Valco W type and Cheminert C2 and C4 series valves (standard on Cheminert C1 valves). The continuous contact closure, provided only while the valve is in the inject position, can be used to start a chromatograph or data system.

		Prod No	*Price*
For Valco W type valves	4 port	PFW90	$90
	6 port	PFW60	90
	8 and 10 port	PFW36	90
For Cheminert valves	C2 series except 4 port *	PFC2	90
	C2 series, 4 port *	PFC4	90
	C4 series	PFC4	90

* Can also be used with C22 series.



MORE INFO

Valco W type valves . . . . . page 96
Cheminert valves
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C4 series. 141, 145
C22 series 149

High speed switching accessory

FOR TWO POSITION AIR ACTUATORS

The HSSA is an add-on for our standard air actuators, providing increased air or helium flow for the fast actuation required in microbore chromatography or partial loop injections. Normal switching time for a C6W with 100 psi air is 180 ms. With the HSSA that drops to 20 ms; substitute 100 psi helium and the valve switches in 8 ms. Usually the HSSA is used in conjunction with the DVI on the preceding page.

Prod No	*Price*
HSSA	Call for a quote.

PURGE HOUSINGS

The purpose of any purging method is to eliminate diffusion from the atmosphere into the valve, or to safely vent fugitive emissions from the valve. This is best accomplished with our *internal* purge design, now available in many Valco two position valves and multiposition selector valves. These designs have the purge fittings machined into the valve body, so the valve is as easy to use and maintain as non-purged versions.

However, there are some valves which will not readily accommodate the internal purge design. In these instances, the older *external* purge housing (shown below) can be used. This housing can be retrofitted to existing valves if they have two threaded mounting holes through the valve body. For existing valves without these mounting holes, it is more economical to purchase a new valve with the internal purge feature built in.

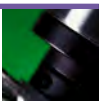
Field installation of the purge housing is typically not recommended. Please call our service department for information and pricing to have a purge housing factory-installed on your existing valve. The purge housing requires an integral standoff assembly, which must be ordered with the housing.

Note: The purge housing limits the maximum temperature of the purged valve to 175°C, regardless of the valve specifications.

The internal purge is available on UW type valves with 1/16" fittings. See two position listings on page 87 for availability. Most Valco low pressure selectors on pages 104-113 are available with a built in purge option. Our technical support staff can provide specifics regarding availability and cost.

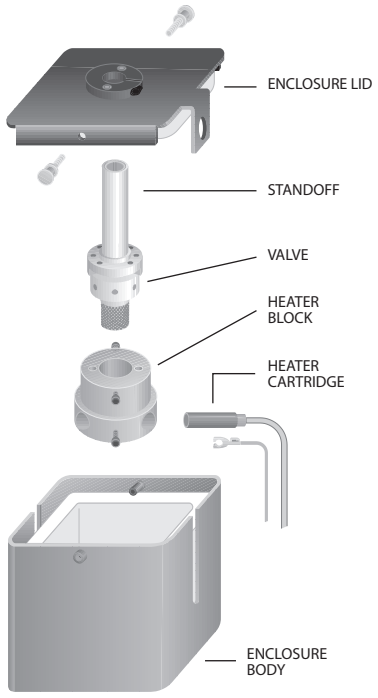
INTERNALLY PURGED VALVES

Contact the factory for information on internally purged valves which are not on pages 86-87.



HEATED VALVE ENCLOSURE

For one valve (HVEA)



HEATED VALVE ENCLOSURES

These insulated enclosures allow valves to be operated at temperatures independent of other controlled zones of analytical instruments. The compact construction and minimum power dissipation enable mounting within larger, lower temperature zones without significantly raising the larger oven's minimum temperature or impairing its programmability.

All enclosures include a heater block and a heater cartridge with line cord. The product number chart lists the heater size typically required to heat the valve(s) to the indicated temperature. Holes are provided in the heater block for Perkin Elmer, Agilent, and other temperature sensors, with an additional thermocouple hole permitting temperature readout. Since 1/32" W type valves are smaller, they require a special heater block; enclosures for 1/32" valves are denoted by asterisk (*) in the price chart below.

Note: Heated valve enclosures provide a way to heat valves. A GC's auxiliary temperature zone controller or a device such as our ITC (instrumentation temperature controller) is required to maintain the valves at a set temperature.

Includes insulated enclosure and heater assembly (standard heater block, heater cartridge, line cord). Standard voltage: 110 VAC. For a 230 VAC model, add -220 to the product number. Insulation is 1/2" thick, so internal dimensions are 1" smaller than the exterior size given below.

Heated valve enclosures (NON-CE) FOR TWO POSITION VALVES AND SELECTORS

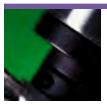
Capacity	*Exterior dimensions (Interior approx 1" smaller)*	*Rating*	*Prod No*	*Price*
1 valve	4" x 4-1/4" x 3-5/8"d	65W/350°C	HVEA	$260
		65W/350°C *	HVEAN	260
	4-1/4" x 5-1/8" x 3-5/8"d	65W/350°C	HVEB	260
		65W/350°C *	HVEBN	260
	8" x 8" x 6"d	100W/350°C	HVEC	385
2 valves	8" x 5-1/4" x 4"d	125W/350°C	HVE2	320
3 valves	13-1/2" x 5-3/4" x 4"d	150W/350°C	HVE3	385
6 valves	13-3/4" x 8" x 6"d	300W/350°C	HVE6	575

** for use with 1/32" valves*

MORE INFO

ITC ..... page 185
Instrumentation temperature controller

Heated column enclosures.....185
Heater assemblies 184
Heater blocks.....184
Heater cartridges.....184

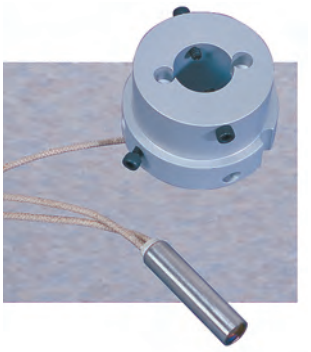


Heater assemblies

A heater assembly includes a standard heater block, heater cartridge, and line cord. Heater cartridges are also available individually. Consult the factory for price and availability.

Standard voltage is 110 VAC. For a 230 VAC model, add -220 to the product number.

	Rating	*Prod No*	*Price*
For use with HVEA or HVEB	65W/350°C	HA1	$110
For use with HVEC	100W/350°C	HA1T	210
For use with HVE2	125W/350°C	HA2	110
For use with HVE3	150W/350°C	HA3	190
For use with HVE6	300W/350°C	HA6	290



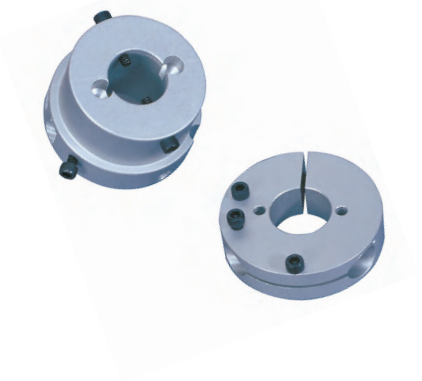
Heater blocks

FOR SINGLE VALVES

There are two single valve heater block designs: standard and low mass. The low mass heater block, which has a .075" diameter hole for sensor or thermocouple, works well for two position valves. The standard heater block is a high mass, multipurpose design which can be used with any Valco valve. It is designed so that sample loops or short columns can be wound directly on it.

Heater blocks do not include a heater cartridge.

		Prod No	*Price*
1 valve	Low mass heater block	HBS	$60
1 valve	Standard heater block	HB	80
1 valve, 1/32" Valco	Standard heater block	HB1N	80



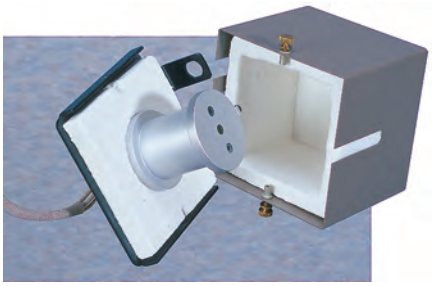
Heater cartridges

FOR SINGLE VALVE HEATER BLOCKS

The cartridge size is 1.5" long by 3/8" diameter. Consult the factory to purchase cartridges for larger heater blocks.

Rating	*Prod No*	*Price*
65W, 110 VAC	I-21208-32	$45
65W, 220 VAC	I-21208-33	45
100W, 110 VAC	I-21208-05	50
100W, 220 VAC	I-21208-06	55

MORE INFO
Heated valve enclosures . . . . . page 183



Heated column enclosures (NON-CE)

Heated column enclosures allow a column to be operated at temperatures independent of other controlled zones in the instrument. They are similar in construction to our heated valve enclosures *(page 183)*, except instead of a valve heater block they contain a column mandrel which will accept 1/8" columns up to 10' long. The HCE2 can have a heated valve installed adjacent to the heated column, with a valve heater block ordered separately.

Includes one column mandrel, insulated enclosure, and heater assembly (standard heater block, heater cartridge, line cord). Standard voltage: 110 VAC. For a 230 VAC model, add -220 to the product number. Insulation is 1/2" thick, so internal dimensions are 1" smaller than the exterior size given below.

Capacity	*Exterior dimensions (Interior approx 1" smaller)*	*Rating*	*Prod No*	*Price*
1 column	4" x 4-1/4" x 3-5/8"d	65W/350°C	HCE1	$260
	4-1/4" x 5-1/8" x 3-5/8"d	65W/350°C	HCEB	260
	8" x 8" x 6"d	100W/350°C	HCEC	390
2 columns	8" x 5-1/4" x 4"d	125W/350°C	HCE2	315
Column mandrel (heater assembly not included with column mandrel)			CM	70

ITC Instrumentation temperature controller (NON-CE)

The ITC is an isothermal proportional controller for use in the thermal systems common to analytical instrumentation, and is often used with heated valve enclosures. The desired temperature is set in 1°C increments on the front panel. A thermocouple sensor provides quick recognition of temperature changes. The power to the heater can be attenuated from 0-90% in 10% increments, an easy-to-use feature which improves temperature stability at the set point to 0.5°C. Maximum output current is 10 amps.

The ITC is available with a range of 0°C to 399°C, in 110 VAC or 230 VAC.

		Prod No	*Price*
0°C to 399°C	110 VAC	ITC10399	$425
	230 VAC	ITC10399-220	425
Replacement thermocouple		I-21014-01	25

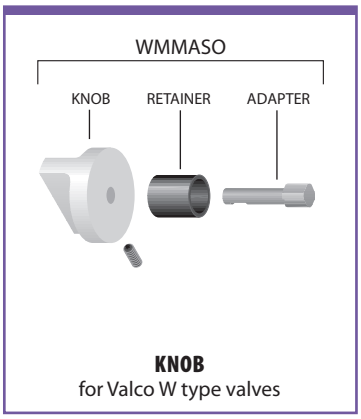
MORE INFO
Temperature Programmer for Fast GC ..... page 204

Knobs and handles

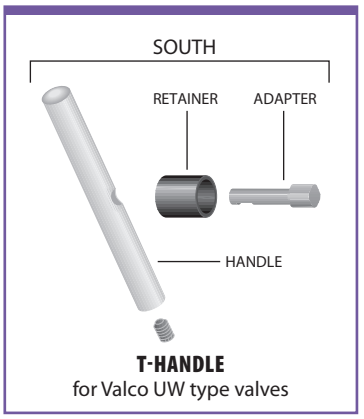
FOR USE WITH A STANDOFF

If you already have a spare standoff assembly *(see facing page)* but lack the knob or retainer, or have an actuated valve on a standoff which you'd like to convert to manual use, here's what you'll need. Includes knob or handle, retainer, and adapter.

	Prod No	*Price*
Knob for a W type valve	WMMASO	$28
T-handle for a UW type valve	SOUTH	22



KNOB
for Valco W type valves



T-HANDLE
for Valco UW type valves

RAD Right angle drive

FOR TWO POSITION ACTUATORS

Some installations don't work so well with the valve and actuator installed in the typical in-line configuration. The right angle drive is a 90° gearbox which permits the actuator or handle to be installed at a right angle to the valve.

The RAD fits all VICI two position electric and air actuators, but it cannot be used with valves with 1/4" fittings.

Because the RAD works with a variety of actuators and valves, the proper mounting hardware must be ordered separately.

Consult the factory for help with your application.

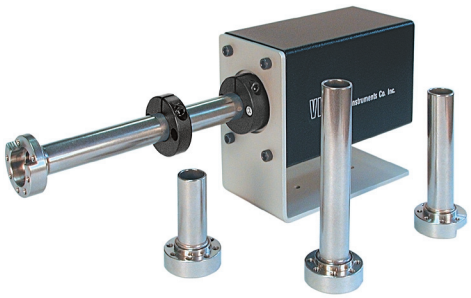
Valve mounting hardware is not included

TECH TIP

RADs add a slight amount of backlash and load. The backlash is not an issue with two position valves on microelectric or universal actuators, since the actuators locate and remember the stopping point. However, for two position valves on other actuators and for all selectors, we recommend that the valves have ports no smaller than .016".

The additional load may mean that a valve that ordinarily requires an ED actuator might require an ET when used with a right angle drive.

If you have any questions, please consult our technical support.



STANDOFF ASSEMBLIES

Valves which will be installed in ovens or heated zones require a standoff assembly, which locates the actuator out of the heated zone and supports both the valve and the handle or actuator. The 5/8" outside diameter standoff tube extends through the oven wall and is secured by means of a clamp ring supplied with the assembly.

If you are converting an actuated valve from a closemount to a standoff application, order the appropriate clamp ring and two screws in addition to the standoff assembly. Consult the factory for availability of non-standard lengths.

Selectors on universal actuators use a special standoff assembly (SOMMP) which is keyed to both valve and actuator. The key guarantees proper alignment and positioning of the valve.

Product numbers show the most common length of standoffs: 4" for air actuators and manual knobs, 2" for electric actuators. Standoff assemblies are available in lengths of 2", 3", and 6". To order a 6" standoff instead of a 4" one, change the 4 at the beginning of the product number to a 6.

Standoff assemblies and mounting hardware — FOR ACTUATORS

		Standoff assembly		Clamp ring		Screws	
		Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
Air actuators							
For Valco two position valves	with 1 or 2 mounting holes	4SOA	$50	CR3	$10	HWSC-SC8-6	$.55
	with no mounting holes	4SOAMP	50	CR3	10	HWSC-SC8-6	.55
For Valco selectors		4SOAMP	50	CR3	10	HWSC-SC8-6	.55
For Cheminert valves		4SOAMP	50	CR3	10	HWSC-SC8-6	.55
Modular universal actuators							
For Valco two position valves	with 1 or 2 mounting holes	2SOA	50	CR8	12	HWSC-SC8-8B	.55
	with no mounting holes	2SOAMP	50	CR8	12	HWSC-SC8-8B	.55
For Valco selectors		2SOAMMP	75	CR10	18	HWSC-SC8-6TDH	.55
For Cheminert two position valves		2SOAMP	50	CR3	10	HWSC-SC8-8B	.55
For Cheminert selectors		2SOAMMP	75	CR10	18	HWSC-SC8-6TDH	.55
Universal actuators							
For Valco two position valves	with 1 or 2 mounting holes	2SOA	50	CR8	12	HWSC-SC8-8B	.55
	with no mounting holes	2SOAMP	50	CR8	12	HWSC-SC8-8B	.55
For Valco selectors		2SOAMMP	75	CR10	18	HWSC-SC8-6TDH	.55
For Cheminert two position valves		2SOAMP	50	CR3	10	HWSC-SC8-8B	.55
For Cheminert selectors		2SOAMMP	75	CR10	18	HWSC-SC8-6TDH	.55

Standoff assemblies — FOR MANUAL VALVES

Includes knob, standoff assembly, retainer, and adapter. For illustration, see page 188.

			Prod No	*Price*
For Valco two position valves	Most types	with 1 or 2 mounting holes	4SOWK	$75
		with no mounting holes	4SOWKMP	75
	Semi-prep or preparative HPLC	with 1 or 2 mounting holes	4SOUTH	75
		with no mounting holes	4SOUTHMP	75
For Cheminert valves			4SOWKMP	75

TECH TIP

If you need the ***actuator as well as the hardware***, you can order it complete with the appropriate hardware or with the required standoff already installed.

Actuators

Air . . . . . pages 178-179
Modular universal 176
Universal elec . . . 174-175

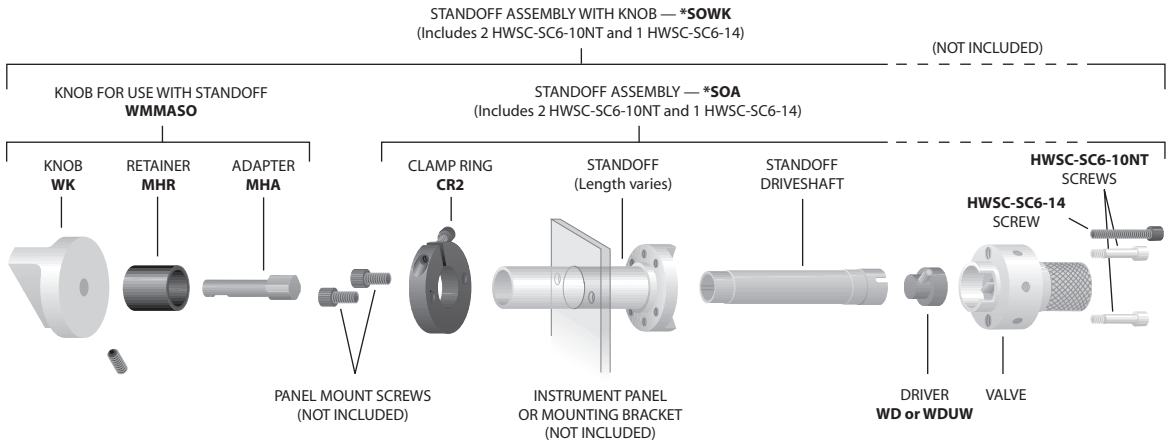
CONVERTING FROM CLOSEMOUNT TO STANDOFF

If you are converting an actuated valve from a closemount to a standoff application, the clamp ring and screws which secure the standoff to the actuator are **not included** in the standoff assembly. Order clamp ring and screws in addition to the standoff assembly.

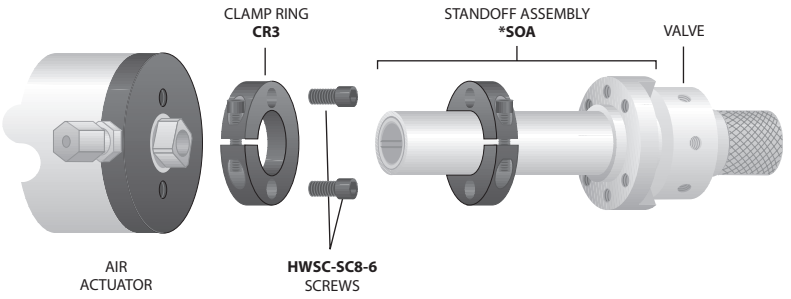
MORE INFO

For illustrations of standoffs on valves and actuators, see pages 188-189.

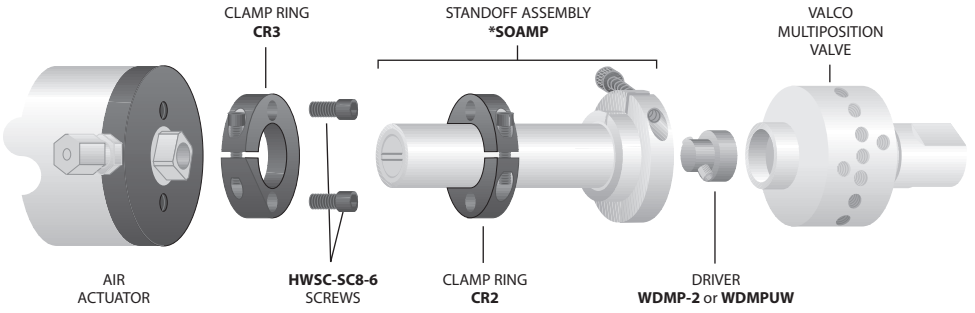
STANDOFF – VALCO TWO POSITION VALVE – MANUAL



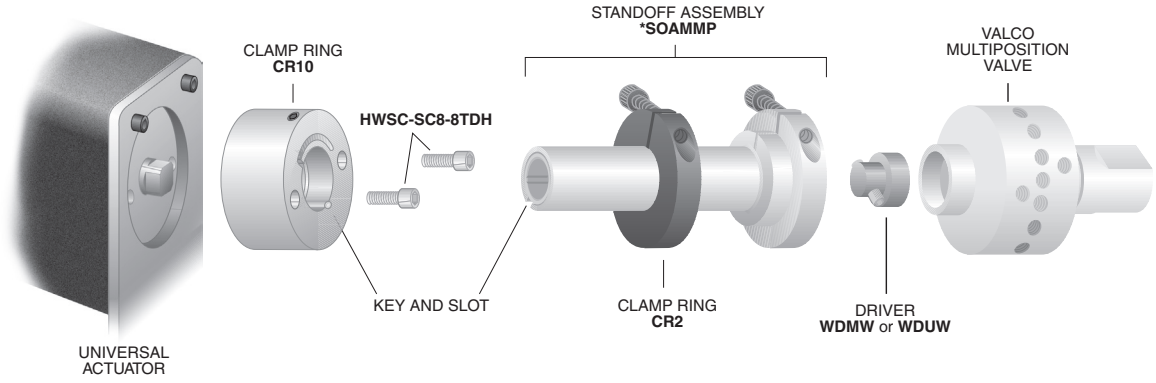
STANDOFF – VALCO TWO POSITION VALVE – AIR ACTUATOR



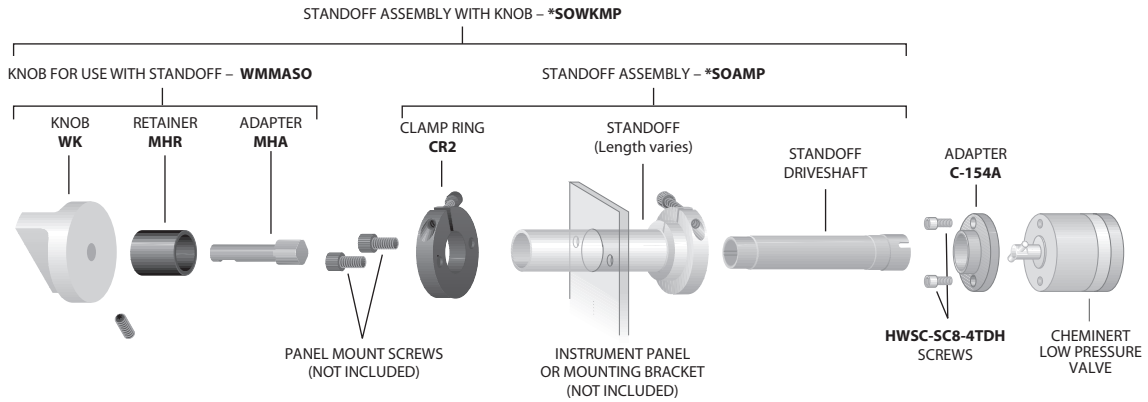
STANDOFF – VALCO SELECTOR – AIR ACTUATOR



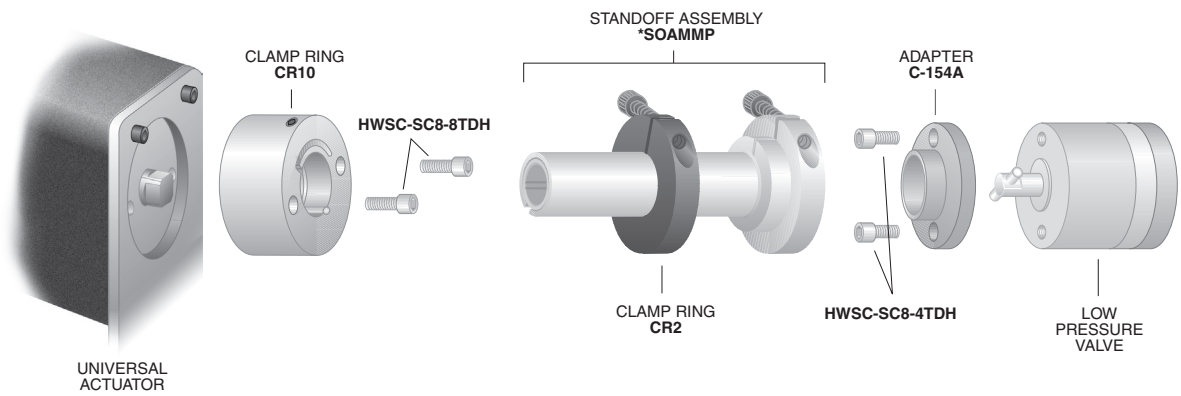
KEYED STANDOFF – VALCO SELECTOR – UNIVERSAL OR MICROELECTRIC ACTUATOR



STANDOFF – CHEMINERT TWO POSITION VALVE – MANUAL



KEYED S TANDOFF– CHEMINERT SELECTOR – UNIVERSAL OR MICROELECTRIC ACTUATOR



CLOSEMOUNT HARDWARE

If a valve is not going to be heated beyond the temperature range of the actuator, closemount hardware often makes the cleanest installation.

Closemount hardware — FOR MANUAL VALVES

If you have a Valco W Type valve with no hardware and want a knob on it, or if you are converting an air or electrically actuated two position valve to manual use, this is what you need. There are two versions: one for valves with threaded mounting holes and one for valves with unthreaded mounting holes. (If your valve has no mounting holes, you will have to use it with a standoff.)

		Prod No	*Price*
For valves with	threaded mounting holes	WMMA	$40
	unthreaded mounting holes	WMMA10	40

Closemount hardware — FOR ACTUATORS

Order the appropriate closemount hardware if you want to change your valve and actuator from a standoff to a closemount connection. Two mounting screws are included. If air and standard electric actuators require different mounting screws, two of each screw are included with the closemount hardware.

		Prod No	*Price*
Air actuators			
For Valco two position valves	with 1 or 2 mounting holes	CMH	$25
	with no mounting holes	CMHMP	25
For Valco selectors		CMHMP	25
For Cheminert valves	high pressure	CMH11H	25
	low pressure *(includes required adapter)*	CMH11L	25
Universal and microelectric actuators			
For Valco two position valves	with 1 or 2 mounting holes	CMH12H	25
	with no mounting holes	CMH12H	25
For Valco selectors (UW and MW type)		CMH13	25
For Cheminert two position valves	high pressure	CMH12H	25
	low pressure *(includes required adapter)*	CMH12L	25
For Cheminert selectors	high pressure	CMH13H	25
	low pressure *(includes required adapter)*	CMH13L	25

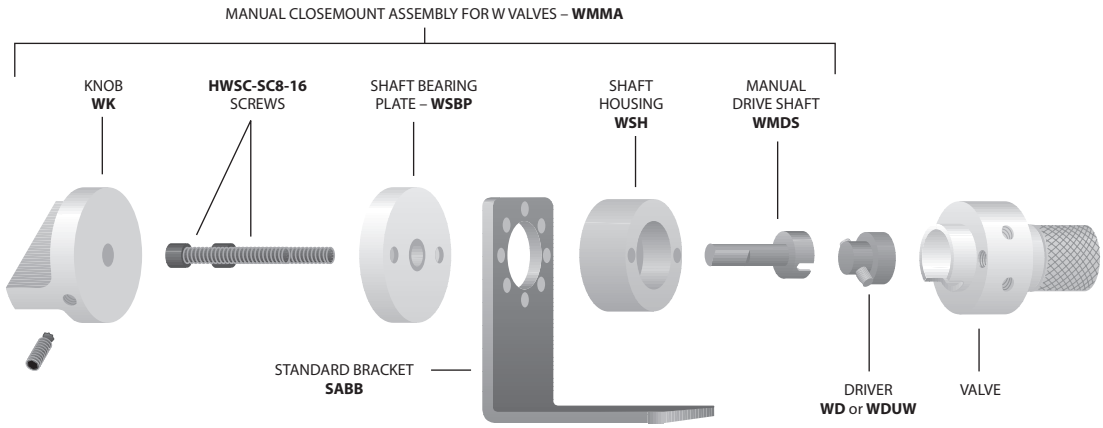
TECH TIP

If you need the ***actuator as well as the hardware***, you can order it complete with the appropriate hardware or with the required standoff already installed.

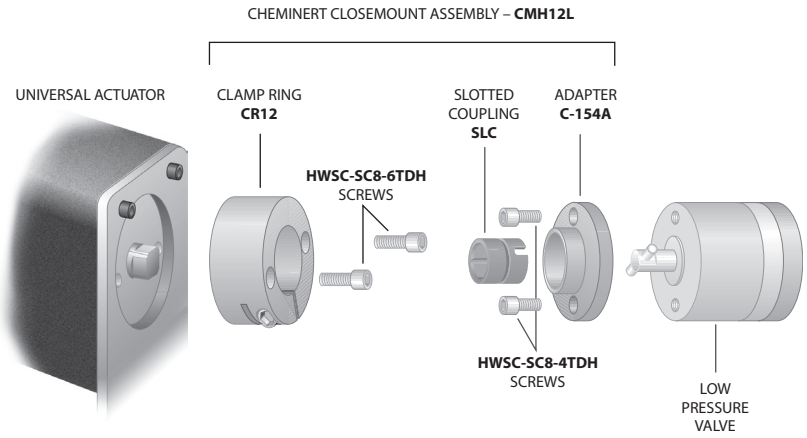
Actuators

Air . . . . . pages 178-179
Microelectric 176
Universal elec . . . 174-175

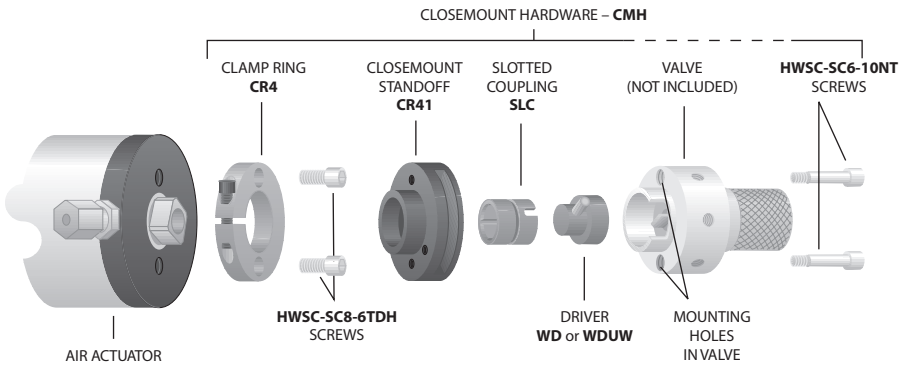
CLOSEMOUNT – VALCO VALVE – MANUAL

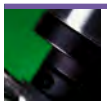


CLOSEMOUNT – CHEMINERT VALVE (Low pressure two position) – UNIVERSAL OR MICROELECTRIC ACTUATOR



CLOSEMOUNT– VALCO VALVE (1 or 2 mounting holes) – AIR ACTUATOR





ACTUATORS AND ACCESSORIES

As a convenience to our customers, we stock several standard tools that are useful for working with valves, fittings, and other products from VICI. In addition, we offer custom tools which are designed and machined in our factory to facilitate use of specific VICI products.

Custom socket wrench

These socket wrenches with a slot to slip over the tubing are the perfect tool for installing fittings when proximity of the ports makes it difficult to get a normal open end wrench in position. The SWH3 fits the 3/16" hex head on our 1/32" ZDV fittings; the SWH4 works with the 1/4" hex nuts for 1/16" fittings.

	Prod No	*Price*
3/16"	SWH3	
1/4"	SWH4	$11

Call for a quote.

Hex key set

The hex key set has a wrench to fit any socket head screw on any VICI valve or actuator. Includes .050", 1/16", 5/64", 3/32", 7/64", 1/8", 9/64", and 5/32" sizes.

Prod No	*Price*
HKS	$13

Open end wrenches

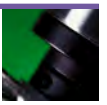
	For use with	*Prod No*	*Price*
3/16" x 1/4"	1/32" and 1/16" nuts	OEW	$6.25
3/8" x 7/16"	1/8" nuts	OEW-2	13.00
1/2" x 9/16"	1/4" nuts	OEW-3	13.00

Pencil magnet

A pencil-type magnet is useful for removing the rotor from Valco valves when the rotor must be replaced or rotated. The process of disassembly and assembly is described in Technical Note 201, which may be found in the support section at www.vici.com.

Prod No	*Price*
PM	$6

MORE INFO
Ferrule removal kit . . p 41



Pin vise and drill index

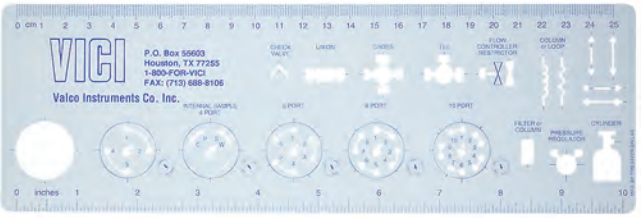
The drill index has drills sized from 0.0135" to 0.039" (0.34 to 1 mm). These are useful tools when a fused silica tube breaks in a union, or for enlarging the inner diameter of fused silica adapters.

Prod No	*Price*
PV	$61

Template

This tool is useful for working out plumbing and valve switching schematics. It features templates for two position valves with 4, 6, 8, and 10 ports with indications of both positions, as well as various flow symbols. For added convenience, the sides are edged with metric and inch rulers.

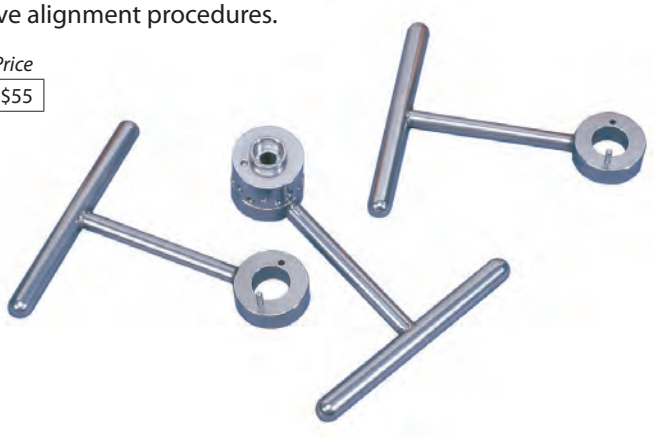
Prod No	*Price*
TEMPLATE1	$5



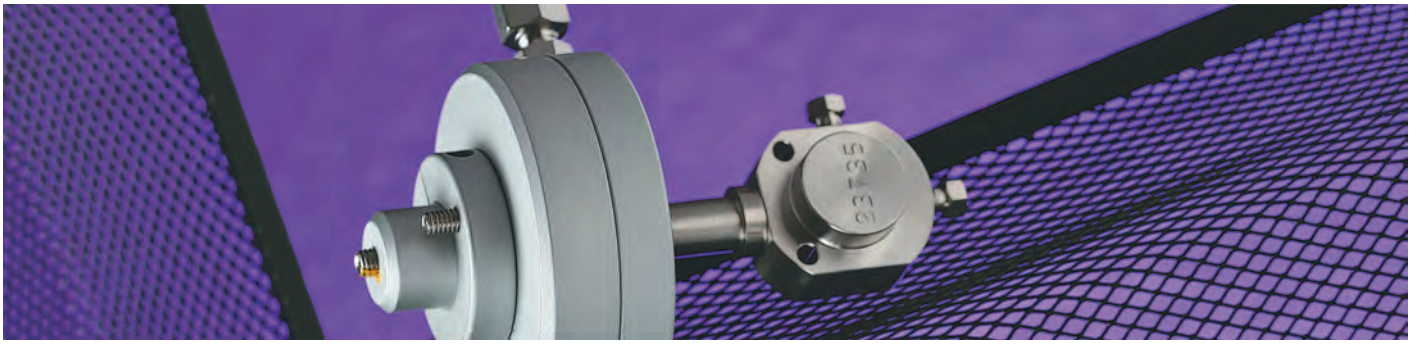
Valve spanner handle

A special tool for gripping a multiposition valve body. It is especially useful during valve alignment procedures.

Prod No	*Price*
VSH	$55



CONTROL DEVICES



FLOW, PRESSURE, AND ON/OFF

This section includes stainless needle valves, our combination on/off needle valves, high pressure prime/purge and on/off valves, and VICI pressure regulators and flow controllers.

Because cast parts can introduce porosity and contamination, every VICI control device is assembled from components which are precision-machined from bar stock. This assures that every item has the same high quality workmanship, with careful assembly and testing to rigid standards.

GAS FLOW CONTROLLERS

Flow controllers provide a stable flow rate under varying pressure. VICI flow controllers are precision machined from aluminum or stainless bar stock to eliminate the contamination often found in die cast parts. Positive flow shut-off is provided by an integral Viton®-sealed adjustment valve. With all our flow controllers, the inlet pressure must exceed the outlet pressure by 10 psi.

WHICH KIND OF CONTROLLER?

An **upstream-referenced** controller maintains the flow rate as long as the upstream (inlet) pressure is held constant.

A **downstream-referenced** controller maintains a constant flow under constant downstream (outlet) pressure.

MORE INFO

Gas flow controllers
Model 100.... page 195
Model 202.....196
Model 300.....197

Model 100 gas flow controller

UPSTREAM REFERENCED – FIXED SPAN

SPECIFICATIONS

Preset max flow rates
150 mL/min to
10 liters/min
(N_2 at 40 psi).

Maximum inlet pressure
200 psi

Maximum temperature
100°C

Standard fittings
- 1/8" external tube fittings (EAOR22)

Other fittings are available. Contact the factory for further information.

The Model 100 is available in a variety of preset maximum flow rates, from 150 mL/min to 10 liters/min (N_2 at 40 psi). Any flow controller in this series can be ordered with a 10-turn Spectrol digital dial (3 or 4 digits) to provide a visual indication of the flow setting.

All flow rates listed below are based on N_2 at 40 psi inlet pressure. Maximum inlet pressure is 200 psi.

	Aluminum body Viton diaphragm		Aluminum body SS diaphragm		SS body Viton diaphragm		SS body SS diaphragm	
Flow rate/min	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
With standard control knob								
0 - 150 mL	FC10AV1K	$255	FC10AS1K	$270	FC10SV1K	$475	FC10SS1K	$485
0 - 250 mL	FC10AV2K	255	FC10AS2K	270	FC10SV2K	475	FC10SS2K	485
0 - 850 mL	FC10AV3K	255	FC10AS3K	270	FC10SV3K	475	FC10SS3K	485
0 - 1.2 L	FC10AV4K	255	FC10AS4K	270	FC10SV4K	475	FC10SS4K	485
0 - 4.5 L	FC10AV5K	255	FC10AS5K	270	FC10SV5K	475	FC10SS5K	485
0 - 10.0 L	FC10AV6K	255	FC10AS6K	270	FC10SV6K	475	FC10SS6K	485
With Spectrol 3-digit dial								
0 - 150 mL	FC10AV1S3	295	FC10AS1S3	310	FC10SV1S3	515	FC10SS1S3	530
0 - 250 mL	FC10AV2S3	295	FC10AS2S3	310	FC10SV2S3	515	FC10SS2S3	530
0 - 850 mL	FC10AV3S3	295	FC10AS3S3	310	FC10SV3S3	515	FC10SS3S3	530
0 - 1.2 L	FC10AV4S3	295	FC10AS4S3	310	FC10SV4S3	515	FC10SS4S3	530
0 - 4.5 L	FC10AV5S3	295	FC10AS5S3	310	FC10SV5S3	515	FC10SS5S3	530
0 - 10.0 L	FC10AV6S3	295	FC10AS6S3	310	FC10SV6S3	515	FC10SS6S3	530
With Spectrol 4-digit dial								
0 - 150 mL	FC10AV1S4	300	FC10AS1S4	325	FC10SV1S4	530	FC10SS1S4	540
0 - 250 mL	FC10AV2S4	300	FC10AS2S4	325	FC10SV2S4	530	FC10SS2S4	540
0 - 850 mL	FC10AV3S4	300	FC10AS3S4	325	FC10SV3S4	530	FC10SS3S4	540
0 - 1.2 L	FC10AV4S4	300	FC10AS4S4	325	FC10SV4S4	530	FC10SS4S4	540
0 - 4.5 L	FC10AV5S4	300	FC10AS5S4	325	FC10SV5S4	530	FC10SS5S4	540
0 - 10.0 L	FC10AV6S4	300	FC10AS6S4	325	FC10SV6S4	530	FC10SS6S4	540

ALTERNATE FITTING TYPES

Models 100 and 300
The standard is the EAOR22 1/8" external tube fitting.

Alternative fitting types are ZAOR22 and ZAOR12, listed on page 196. Order separately.

Model 202
The standard 1/8" NPT female pipe thread with pipe adapters to 1/16" OD tubing are included.

For 1/8" OD tubing, order PZA22 on page 28.

Model 202 gas flow controller

UPSTREAM-REFERENCED — ADJUSTABLE SPAN

The Model 202 provides a unique span adjustment permitting it to be used for a variety of flow ranges. The span valve can adjust the flow range from a minimum flow as small as 5.0 mL/min up to a maximum flow of 1.6 L/min. After the span is adjusted, the control stem has a full 10 turns of resolution between the minimum and maximum flow rates.

When the flow controller is equipped with a Spectrol digital dial, settings are reproducible to better than 1%.

All flow rates listed below are based on N_2 at 40 psi inlet pressure. Maximum inlet pressure is 200 psi.

SPECIFICATIONS

Flow range
Infinitely adjustable
Min: 5 mL/min
Max: 1.6 L/min
(N_2 at 40 psi)

Maximum inlet pressure
200 psi

Maximum temperature
100°C

Standard fittings
- 1/8" NPT female pipe threads
- Pipe adapters to 1/16" OD tubing are included.

Other fittings are available. *(See below)*

Aluminum body Viton diaphragm		Aluminum body SS diaphragm		SS body Viton diaphragm		SS body SS diaphragm	
Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
With standard control knob							
FC22AV1K	$280	FC22AS1K	$295	FC22SV1K	$520	FC22SS1K	$535
With Spectrol 3-digit dial							
FC22AV1S3	325	FC22AS1S3	335	FC22SV1S3	550	FC22SS1S3	575
With Spectrol 4-digit dial							
FC22AV1S4	335	FC22AS1S4	350	FC22SV1S4	575	FC22SS1S4	590

SPECTROL 3-DIGIT DIAL
(4-DIGIT DIAL SIMILAR)

STANDARD
CONTROL KNOB

ADAPTERS USED FOR VALCO AND CONDYNE CONTROL DEVICES

Description			*Prod No*	*Price*	*Used for*
External 1/8" to	5/16-24 O-ring seal		EAOR22	$29	Model 100 controller (standard) Model 300 controller (standard)
	10-32 O-ring seal		EAOR21	29	Air actuated prime/purge and on/off valves
Valco 1/8" internal to	5/16-24 O-ring seal		ZAOR22	14	Model 100 controller (optional) Model 300 controller (optional)
Valco 1/16" internal to	5/16-24 O-ring seal		ZAOR12	15	Model 100 controller (optional) Model 300 controller (optional)
	10-32 O-ring seal		ZAOR11	14	Diaphragm valve On/off valves (optional)

ALTERNATE FITTING TYPES

Models 100 and 300
The standard is the EAOR22 1/8" external tube fitting.

Alternative fitting types are ZAOR22 and ZAOR12, listed at left. Order separately.

Model 202
The standard 1/8" NPT female pipe thread with pipe adapters to 1/16" OD tubing are included.

For 1/8" OD tubing, order PZA22 on page 28.

Model 300 gas flow controller

DOWNSTREAM-REFERENCED – FIXED SPAN

SPECIFICATIONS

Maximum flow rate
1.6 L/min
with ambient
downstream pressure

Maximum inlet pressure
200 psi

Maximum temperature
100°C

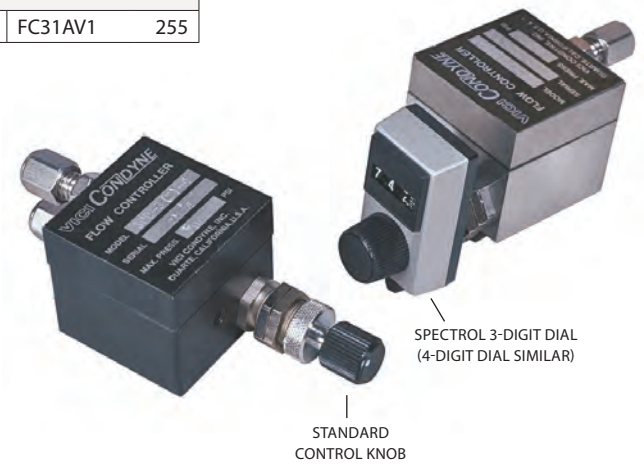
Standard fittings

- 1/8" external tube fittings (EAOR22)

Other fittings are available. *(See facing page)* Contact the factory for further information.

The Model 300 flow controller provides a stable flow rate when upstream pressure conditions vary, as long as the downstream pressure remains constant.

	Aluminum body Viton diaphragm		Aluminum body SS diaphragm		SS body Viton diaphragm		SS body SS diaphragm	
Flow rate/min	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
With standard control knob								
0 - 200 mL	FC30AV1K	$255	FC30AS1K	$270	FC30SV1K	$475	FC30SS1K	$485
0 - 300 mL	FC30AV2K	255	FC30AS2K	270	FC30SV2K	475	FC30SS2K	485
0 - 800 mL	FC30AV3K	255	FC30AS3K	270	FC30SV3K	475	FC30SS3K	485
0 - 1.6 L	FC30AV4K	255	FC30AS4K	270	FC30SV4K	475	FC30SS4K	485
With Spectrol 3-digit dial								
0 - 200 mL	FC30AV1S3	295	FC30AS1S3	300	FC30SV1S3	515	FC30SS1S3	530
0 - 300 mL	FC30AV2S3	295	FC30AS2S3	300	FC30SV2S3	515	FC30SS2S3	530
0 - 800 mL	FC30AV3S3	295	FC30AS3S3	300	FC30SV3S3	515	FC30SS3S3	530
0 - 1.6 L	FC30AV4S3	295	FC30AS4S3	300	FC30SV4S3	515	FC30SS4S3	530
With Spectrol 4-digit dial								
0 - 200 mL	FC30AV1S4	300	FC30AS1S4	325	FC30SV1S4	530	FC30SS1S4	540
0 - 300 mL	FC30AV2S4	300	FC30AS2S4	325	FC30SV2S4	530	FC30SS2S4	540
0 - 800 mL	FC30AV3S4	300	FC30AS3S4	325	FC30SV3S4	530	FC30SS3S4	540
0 - 1.6 L	FC30AV4S4	300	FC30AS4S4	325	FC30SV4S4	530	FC30SS4S4	540
With screwdriver adjustable operator								
0 - 750 mL	FC31AV1	255						



WHICH KIND OF CONTROLLER?

An **upstream-referenced** controller maintains the flow rate as long as the upstream (inlet) pressure is held constant.

A **downstream-referenced** controller maintains a constant flow under constant downstream (outlet) pressure.

SEE VIDEO OF MODEL 300

Watch a VICI YouTube video demonstrating the principle of a downstream-referenced flow controller.

ON/OFF AND PRIME/PURGE VALVES

Valco high pressure on/off or prime/purge valves feature quality engineering, precision machining, and extremely low internal volume (< 2 µl), making them the ideal choice in the most demanding liquid or supercritical fluid chromatography or extraction systems.* The on/off function is self-explanatory; in prime/purge models, mobile phase flows around the needle when the valve is closed, relieving the back pressure from the column. When the valve opens, mobile phase vents to waste to prime the pump.

Standard models provide leak-tight operation up to 10,000 psi (690 bar) at 100°C, with high temperature versions rated up to 6,000 psi/300°C. A 1/16" fitting model with a larger bore and a 1/8" fitting model are available for high flow applications.

The valve needle is made from a special high strength alloy which is resistant even to the buffer salts which might accidentally precipitate inside the valve. Seals are fluorocarbon (standard temp) or polyimide (high temp), with valve bodies machined from HPLC grade stainless steel, ensuring long lifetime in even the most demanding situations.

The on/off and prime/purge valves are available in manual or air/CO_2 actuated versions. Automated valves require a single 3-way solenoid. *(see page 180)* Applying 50 psi opens the valve; venting the air allows the spring to return the valve to the closed position.

On/off valves

STANDARD TEMPERATURE – HIGH PRESSURE

		Manual with 1" knob		Air actuated with 1" standoff	
Fitting size	*Bore*	*Prod No*	*Price*	*Prod No*	*Price*
1/16"	0.50 mm	SFVO	$175	ASFVO	$290
	0.75 mm	SFVOL	215	ASFVOL	320

SPECIFICATIONS

10,000 psi liq
100°C max
Fittings: 1/16"

On/off valves

HIGH TEMPERATURE – MEDIUM PRESSURE

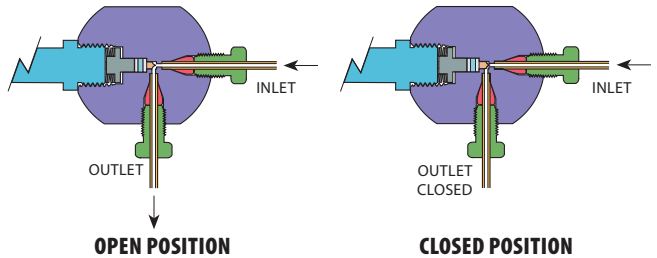
		Manual with 2" knob		Manual with 4" knob		Air actuated with 2" standoff		Air actuated with 4" standoff	
Fitting size	*Bore*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
1/16"	0.50 mm	SFVOHT	$240	SFVOHT4	$280	ASFVOHT	$340	ASFVOHT4	$400
	0.75 mm	SFVOLHT	320	SFVOLHT4	365	ASFVOLHT	390	ASFVOLHT4	430
1/8"	1.50 mm	–	–	–	–	ASFVO2HT	400	ASFVO2HT4	470

SPECIFICATIONS

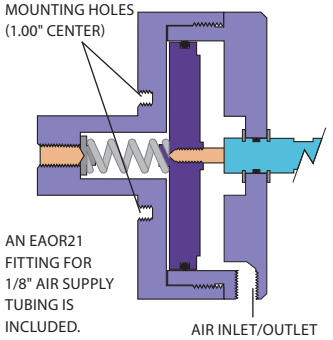
6,000 psi liq
300°C max
Fittings: 1/16"
2,000 psi liq
300°C max
Fittings: 1/8"

**For liquids. Not suitable for use with gases.*

ON/OFF VALVE

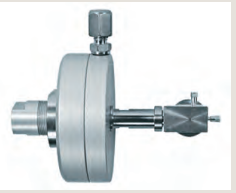


AIR ACTUATOR OPTION



ULTRA-HIGH PRESSURE 40K ON/OFF AND PRIME/PURGE VALVES

40,000 psi valves . . . . p 65



SEE ALSO

3-way solenoid . page 180

Prime/purge valves

STANDARD TEMPERATURE – HIGH PRESSURE

SPECIFICATIONS

10,000 psi liq
100°C max
Fittings: 1/16"

		Manual with 1" knob		Air actuated with 1" standoff	
Fitting size	*Bore*	*Prod No*	*Price*	*Prod No*	*Price*
1/16"	0.50 mm	SFV	$180	ASFV	$290
	0.75 mm	SFVL	215	ASFVL	320

Prime/purge valves

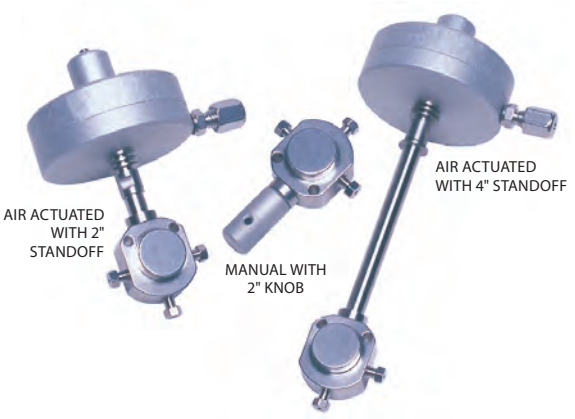
HIGH TEMPERATURE – MEDIUM PRESSURE

SPECIFICATIONS

6,000 psi liq
300°C max
Fittings: 1/16"
2,000 psi liq
300°C max
Fittings: 1/8"

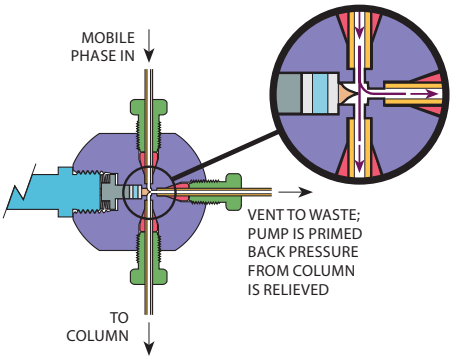
		Manual with 2" knob		Manual with 4" knob		Air actuated with 2" standoff		Air actuated with 4" standoff	
Fitting size	*Bore*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
1/16"	0.50 mm	SFVHT	$260	SFVHT4	$320	ASFVHT	$340	ASFVHT4	$400
	0.75 mm	SFVLHT	320	SFVLHT4	365	ASFVLHT	390	ASFVLHT4	430
1/8"	1.50 mm	–	–	–	–	ASFV2HT	400	ASFV2HT4	47s0

For liquids. Not suitable for use with gases.

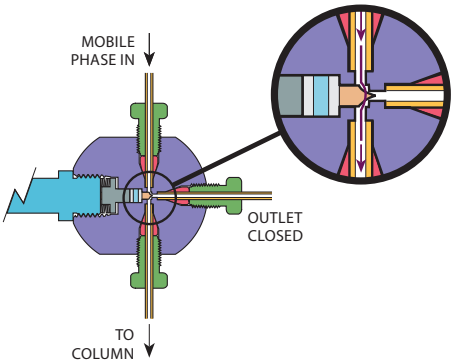


ON/OFF AND PRIME/PURGE VALVES
Types of actuation

PRIME/PURGE VALVE



OPEN POSITION



CLOSED POSITION

COMBO VALVES

These needle and shut-off valves provide flow control and positive shut-off without damage to the needle. Since the flow setting is not changed by turning the valve on and off, they are ideal for providing hydrogen and air to an FID, or for supplying make-up or combustion gas in a wide variety of applications.

Flow is set using the screwdriver adjustment on the center of the on/off knob.

Valve bodies are anodized aluminum or stainless steel, with Viton® O-ring seals. Maximum temperature is 100°C, with maximum inlet pressure of 100 psig. The valve can be panel-mounted in an 11/16" or 3/4" hole, using hardware supplied, and all are supplied with Valco 1/16" ZDV fittings. Other configurations are available in OEM quantity upon request.

The standard knob is silver-colored and .62" long. Colored knobs for gas or rate flow identification are available in blue, green, red, or black, .62" or 1.25" long. Knob length and color must be specified at time of order, as these cannot be changed after assembly.

Combo valves

1/16" VALCO ZDV FITTINGS

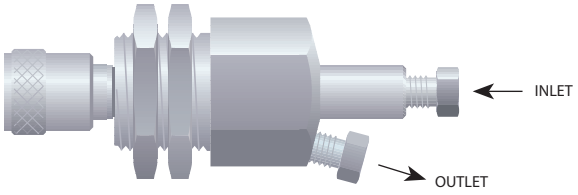
Maximum flow @ 40 psi He or N2

	Aluminum body		Stainless body	
	Prod No	*Price*	*Prod No*	*Price*
10 ml/min	CNV1A10S1	$96	CNV1S10S1	$150
50 ml/min	CNV1A50S1	96	CNV1S50S1	150
150 ml/min	CNV1A150S1	96	CNV1S150S1	150
250 ml/min	CNV1A250S1	96	CNV1S250S1	150
500 ml/min	CNV1A500S1	96	CNV1S500S1	150

Standard knob is silver-colored and .62" long.
Contact the factory for combo valves with a knob in blue, green, red, or black.
Knobs are available in .62" and 1.25" lengths.

SPECIFICATIONS

Inlet pressure
100 psi
Maximum temperature
100°C



COMBO VALVES WITH OPTIONAL COLORED KNOBS

CONDYNE COMBO VALVES

Very similar in function to the design on the facing page, these are refined versions of the hex-bodied combo valves originally made by Condyne.

Standard construction features an anodized aluminum body with Viton® O-ring seals. Maximum inlet pressure is 100 psi, with a maximum temperature of 100°C. The valve can be panel mounted through an 11/16" or 3/4" diameter hole. Valco 1/16" fittings are standard, but 1/8" fittings are also available. Nuts and ferrules are included.

Typically, the knob color is used as an indicator of the rated flow, with standard colors listed in the table below. Non-standard knob colors can be specified when ordering; however, knobs cannot be changed after initial assembly.

A longer version of the knob is also available, as is a nickel-plated all brass valve (in OEM quantities). Consult the factory regarding these options.

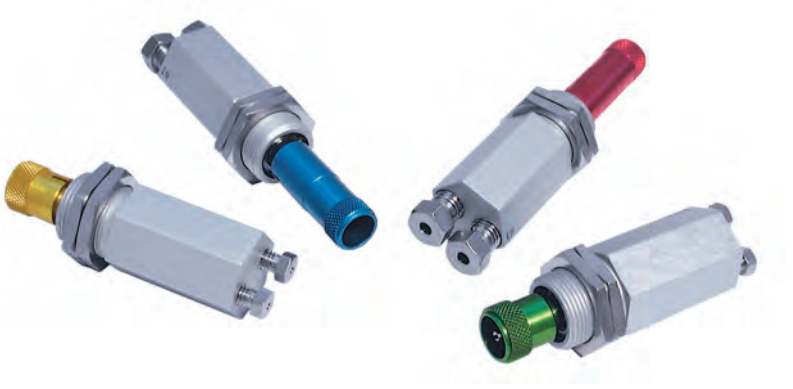
Condyne combo valves — 1/16" OR 1/8" VALCO ZDV FITTINGS

SPECIFICATIONS

Maximum inlet pressure
100 psi
Maximum temperature
100°C

Maximum flow @ 40 psi He or N2

		1/16" Valco fittings		1/8" Valco fittings	
	Knob color	*Prod No*	*Price*	*Prod No*	*Price*
10 ml/min	Green	CVA10GS1	$115	CVA10GS2	$115
50 ml/min	Red	CVA50RS1	115	CVA50RS2	115
150 ml/min	Blue	CVA150US1	115	CVA150US2	115
500 ml/min	Black	CVA500BS1	115	CVA500BS2	115
1 liter/min	Yellow	CVA1KYS1	115	CVA1KYS2	115



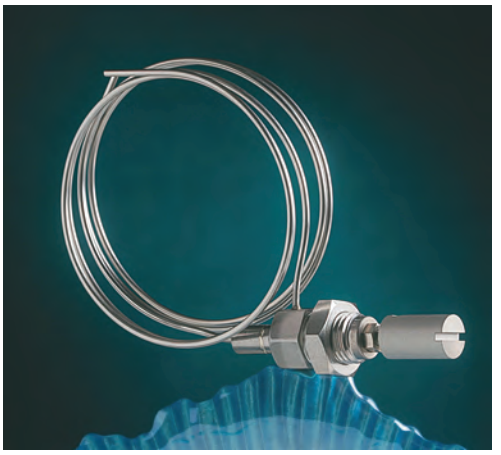
MICROMETERING VALVES

Micrometering (needle) valves combine the ease of connection associated with Valco zero dead volume fittings with convenient bulkhead mounting. Very low internal volume and precision design make this valve ideal for use as a gas control valve in chromatographic systems.

The Viton® model is rated at 225°C, while a version with Kalrez™ seals is capable of continuous operation at 315°C. This allows a needle valve to be mounted directly within a heated oven, facilitating control of flow switching in multidimensional systems while keeping the gases at oven temperature.

Valves are rated for maximum of 1000 psi gas. They are individually tested on a mass spectrometer leak detector to a helium leak rate specification of < 1 x 10^{-8} atm cc/sec.

An unlubricated version with a specially polished seat was designed to be used with our pulsed discharge detectors, and should be used upstream of any ultrapure gas system. There is also a 1/16" tube version.



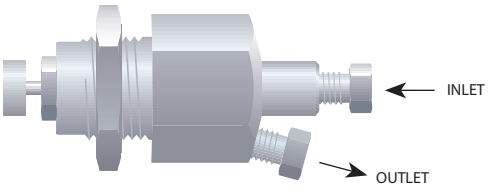
1/16" micrometering valves

WITH VALCO FITTINGS

Seal	*Lubrication*	*Prod No*	*Price*
Standard: 2–225 ml/min@ 15 psig N2 inlet			
Viton	Lubricated	ZBNV1	$150
	Non-lubricated	ZBNV1-D	175
Kalrez	Non-lubricated	ZBNV1-KZ	200
Fine control: 2–175 ml/min@ 15 psig N2 inlet			
Viton	Lubricated	ZBNV1F	165
	Non-lubricated	ZBNV1F-D	195
Kalrez	Non-lubricated	ZBNV1F-KZ	220
Low flow: 2–90 ml/min@ 40 psig N2 inlet			
Viton	Lubricated	ZBNV1LF	150
	Non-lubricated	ZBNV1LF-D	180
Kalrez	Non-lubricated	ZBNV1LF-KZ	210

SPECIFICATIONS

Maximum pressure
1000 psi gas
Maximum temperature
Viton 225°C
Kalrez 315°C



1/16" micrometering valves

WITH 18" TUBES

Seal	*Lubrication*	*Prod No*	*Price*
Fine control: 2–175 ml/min@ 15 psig N2 inlet			
Viton	Lubricated	BNV1	$150
	Non-lubricated	BNV1-D	175
Kalrez	Non-lubricated	BNV1-KZ	200
Low flow: 2–90 ml/min@ 40 psig N2 inlet			
Viton	Lubricated	BNV1LF	150
	Non-lubricated	BNV1LF-D	180
Kalrez	Non-lubricated	BNV1LF-KZ	210

SPECIFICATIONS

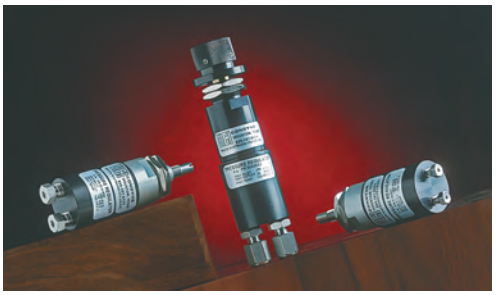
Maximum pressure
1000 psi gas
Maximum temperature
Viton 225°C
Kalrez 315°C

OPTIONAL

- Dual outlet versions are available in most configurations.
- A cap is available to protect the setting from getting changed by accidental contact. (Product No. ZBNV1-C)

Contact the factory for more information on these options.

PRESSURE REGULATORS



VICI regulators are machined from aluminum bar stock and then hard-anodized to provide contamination-free service. They feature a stainless steel diaphragm and Viton®-sealed stainless poppet. The compact size (1.125" diameter by 2" long for regulator, 3" long for combo version) saves panel space and permits installation anywhere that an 11/16" hole can be located. Mounting hardware is supplied.

The VICI combo regulator is a combination regulator and shut-off valve. The pressure is set using the screwdriver adjustment in the center of the on/off knob. Turning the knob counterclockwise provides positive shutoff, while clockwise rotation restores gas pressure to within 0.5 psi of the setpoint.

Available with outlet pressure ranges of 0-15 psi, 0-30 psi, or 0-60 psi, VICI regulators can be ordered with 1/16" or 1/8" Valco internal fittings or 1/8" external fittings. Other configurations are available in OEM quantities.

Maximum operating temperature is 100°C, and maximum supply pressure is 250 psig. The influence of supply pressure on outlet pressure is less than 0.1 psi per 10 psi change in supply pressure.

Compact pressure regulators

NO KNOB OR SHUT-OFF FEATURE

SPECIFICATIONS

Maximum inlet pressure
250 psi

Maximum temperature
100°C

Wetted materials
- Anodized aluminum
- Stainless steel
- Viton

- Enhanced thermal stability, linearity, and shock resistance
- Compact size (1.125" diameter by 2" long)

Pressure range	1/16" Valco internal fittings		1/8" Valco internal fittings		1/8" External fittings	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	Price
0-15 psi	PR51A15Z1	$220	PR51A15Z2	$220	PR51A15E2	$220
0-30 psi	PR51A30Z1	220	PR51A30Z2	220	PR51A30E2	220
0-60 psi	PR51A60Z1	220	PR51A60Z2	220	PR51A60E2	220

Combo pressure regulators

WITH SHUT-OFF FEATURE

SPECIFICATIONS

Maximum inlet pressure
250 psi

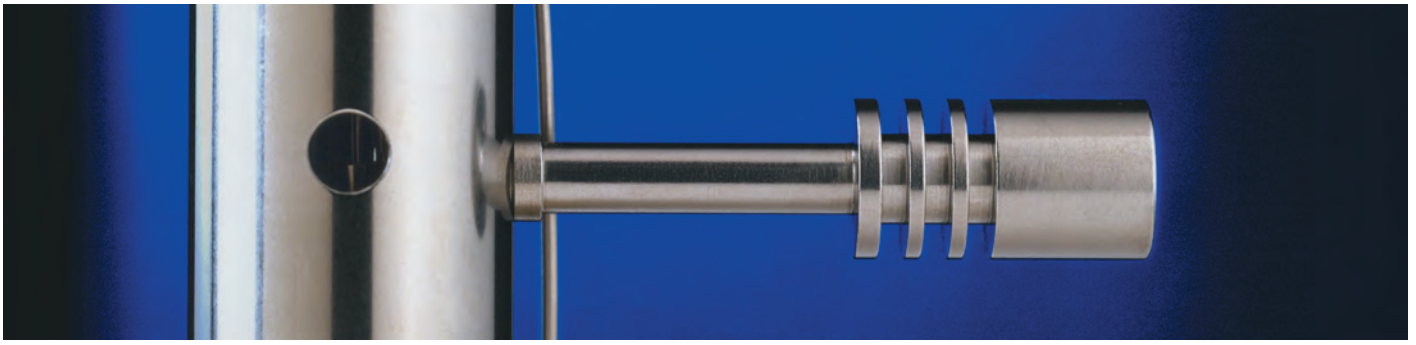
Maximum temperature
100°C

Wetted materials
- Anodized aluminum
- Stainless steel
- Viton

The VICI combo regulator is a combination regulator and shut-off valve. The pressure is set using the screwdriver adjustment in the center of the on/off knob. Turning the knob counterclockwise provides positive shutoff, while clockwise rotation restores gas pressure to within 0.5 psi of the setpoint.

Pressure range	1/16" Valco internal fittings		1/8" Valco internal fittings		1/8" External fittings	
	Prod No	*Price*	*Prod No*	*Price*	*Prod No*	*Price*
0-15 psi	PR50A15Z1	$250	PR50A15Z2	$250	PR50A15E2	$250
0-30 psi	PR50A30Z1	250	PR50A30Z2	250	PR50A30E2	250
0-60 psi	PR50A60Z1	250	PR50A60Z2	250	PR50A60E2	250

INSTRUMENTATION



SPECIFICATIONS

Number of heated zones		1 to 4
Programmable temperature states		8 per zone
Max ramp rate	5m column	1,200°C/min
	15m column	500°C/min
Accuracy	Isothermal	0.1°C
	Programmed	<0.5°C, in most cases
Interfaces		RS-232, GPIO
Dimensions		6" w x 5" h x 4.75" deep

NEW! MULTICHANNEL TEMPERATURE PROGRAMMER FOR FAST GC

- Eliminates hot and cold spots in high speed GC!
- Up to four independently programmable zones with eight states of rapid heating and cooling
- For use with nickel-wire-wrapped resistively-heated columns
- The single nickel wire serves as heating element and temperature sensor
- Terminal mode control or user-friendly interface and control/monitor program running on Windows
- Can be designed into your portable GC or added to any existing GC or analyzer

The FTP-200 is a highly-configurable temperature controller with as many as four channels that can be programmed to ramp independently or simultaneously. The zones use a temperature-predictive algorithm and thermocouple or RTD input for precise control of multiple columns or related transfer lines, injector, etc. The controller operates at a high frequency, allowing precise control of ramping rates as high as 2000° C per minute.

The primary channel, specifically designed for precision temperature programming of low mass nickel-wire-wrapped columns, utilizes the nickel as both the heating element and the temperature sensor. This reduces the mass of the column, reduces the lag time between target temperature and actual temperature, and enables the use of a safe, low voltage to heat the column. A small fan cools the column to the starting temperature.

A graphical user interface, or GUI, provides user-friendly programming and data reporting. For users who prefer basic operation with raw data, control via a set of serial commands is accomplished via a terminal emulation or communication software running on a PC-compatible computer.

ORDERING INFORMATION

The FTP-200 can be configured many ways. The simplest version has only the main channel; the maximum is four. Beyond that, it can be ordered with or without an enclosure, and with or without a power supply. If it has a power supply, it can be specified with a US power cord, a European power cord, or no power cord at all. There is also a choice of temperature-sensing options.

After the basic controller is configured, the column/fan, transfer lines, and other possible options must be considered. Contact VICI to discuss your needs.

NEW! COLUMN/FAN MODULES

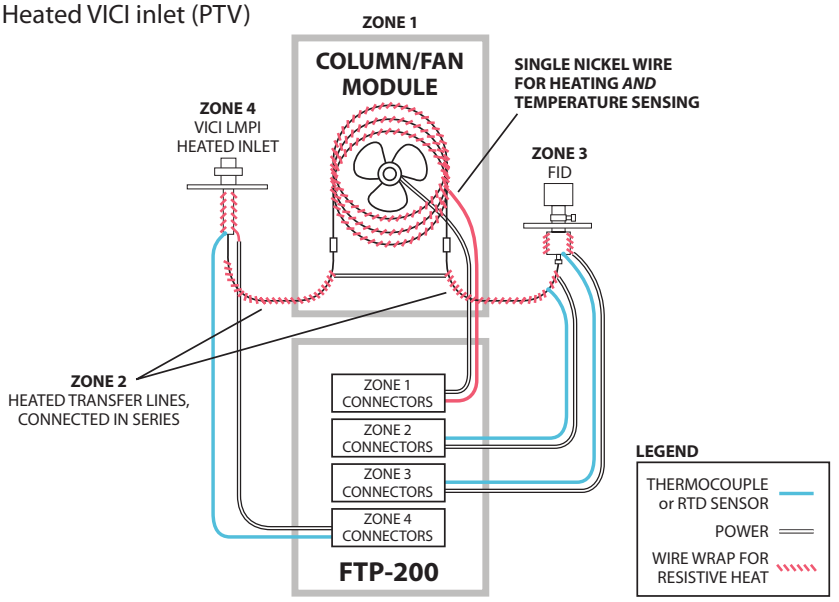
- For use with our FTP-200 multichannel temperature programmer
- Includes column, fan, transfer lines, sensors, and connections in one unit
- Wide selection of column types, sizes, and phases
- Choice of high-flow fans for fast cooling
- Resistively-heated transfer lines with a low mass 40 gauge "K" thermocouple

When you buy an FTP-200 and specify the components to be assembled into one of these modules, the FTP-200 and module leave the factory configured for plug-and-play implementation.

Shown below is an example used to produce a one minute SimDis analysis.

SYSTEM SCHEMATIC: SimDis ANALYSIS

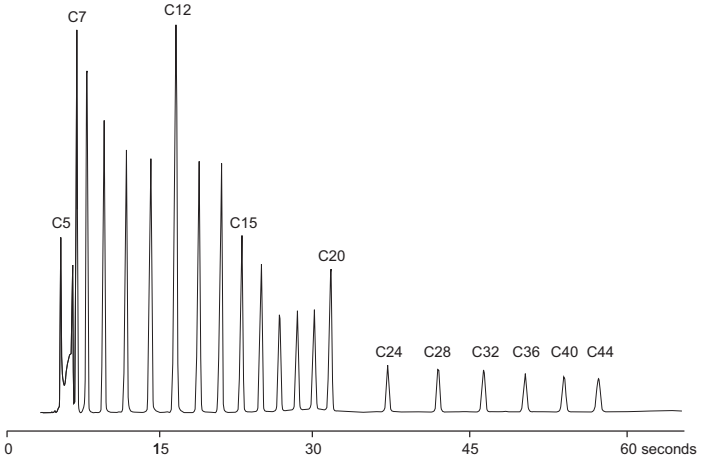
- Nickel-wire-wrapped MTX-1 column, 5 m x 0.25 mm x 0.25 µm, fan-cooled
- Heated transfer lines
- Heated VICI FID
- Heated VICI inlet (PTV)



OPTIONS

Column	Fused silica, metal, or packed Any phase 1 m x 100 µm to 30 m x 530 µm
Fan	60 mm, 92 mm, or 120 mm 12, 24, or 48 VDC
Transfer lines	Choice of lengths up to 1 meter
Mounting	Wall mount or free-standing, with or without legs

1 MINUTE SimDis ANALYSIS WITH THE FTP-200



SimDis

Column:	MXT-1 5 m x 0.25 mm x 0.25 µm, Nickel-wire
Temperatures	
Column:	35°C to 390°C at 350°C/min
Inlet (PTV):	35°C to 390°C at 800°C/min, hold 35 seconds
Transfer lines:	40°C to 390°C at 600°C/min, hold 25 seconds
Detector:	Valco FID, 390°C

INSTRUMENTATION

TRACE GAS ANALYZERS

- Turnkey applied gas chromatograph
- Suitable for lab, mobile, or process application
- MDQs for most analytes < 1 ppb
- Fully integrated, stand-alone operation
- Fast temperature zones

VICI Trace Gas Analyzers (TGAs) are fully configured and tested gas chromatographs designed for use in high purity and ultra high purity analysis. Each instrument is fully configured and tested per user requirements. A full documentation package delivered with each instrument includes a method validation report, capability data, bill of materials, and method parameters.

TURNKEY ANALYZER

Configurations for most bulk, specialty, and electronics gases are available. Standard configurations include He, H_2, N_2, Ar, O_2, CO, CO_2, CH_4, C_2H_4, C_3H_6, CF_4, C_2F_6, C_3F_8, NF_3, HBr, AsH_3, PH_3, B_2H_6, SiF_4, and SiH_4.

LAB, MOBILE, OR PROCESS

Trace Gas Analyzers can be set up for single run analysis or batch sampling, or to run continuously for process monitoring. This makes the TGA an ideal option for bench-top applications in the lab or for continuous duty in a process. With the optional sampling system, the instrument can do batch or individual analysis from a fill manifold or trailer fill stanchion, or from a variety of sample points in a process.

MDQS < 1 PPB

Currently our conservative guarantee for MDL with a reasonable RSD is 10 ppb for atmospheric components, day-in and day-out. But some of our clients find that once the analyzer is installed and running continuously in ultra high purity applications, the instruments are able to routinely integrate and quantify at levels of less than 1 ppb.

STAND-ALONE OPERATION

VICI TGAs provide a complete stand-alone solution for autonomous chromatographic analysis, from sample prep to final report. Everything is included in the TGA housing, from the computer with all the necessary software and hardware to the touch-enabled wide screen display. A wireless mouse and keyboard are also included.

TGAs can be specified with an optional Gas Sampling System (GSS), which provides up to 64 streams and four calibration gases and associated methods. When a TGA is configured with the GSS option, the user can enable a batch routine to introduce a selected sample and method, run the analysis with replicates, store the data, integrate the chromatogram, and calculate the results. With the optional Statistical package, results of averaged samples can be easily acquired for use in calibration and system validation checks.

Resultant data can be printed via a network printer or to a local user-provided printer. The same results can be output to an analog signal for DCS and other control schemes, or to the OPC server for database or spreadsheet updates. Functionality for copper-based LAN connection and secured WIFI make the instrument available and data accessible.

FAST TEMPERATURE ZONES

Optional Fast Temperature Programmer (FTP) technology can be used for up to four temperature zones. Those zones can be columns, preconcentrators, heated transfer lines, traps, valves, or detectors.

Ramping capability varies based upon the mass of the item to which the heat is being applied. For example, a 5 m x .32 mm fused silica capillary column can be ramped and controlled at rates up to 3000°C/min, while a 30 m MXT style column may only ramp at 120°C/min.

Each zone can be run independently or programmed to track another zone. Each independent zone also has accomodation to power a fan or cryo-valve as the means of rapid cooling.

UNPARALLELED VICI EXPERTISE

While VICI TGAs embody the latest improvements in the VICI Trace Gas Analyzer product line, we have have been a standard for analysis in the pure gas industry for more than 35 years.

We continue to be the primary manufacturer of every major component in our systems, from valves and detectors to electrometers.

MODULAR DESIGN

The design of the TGA allows a very wide range of applications to be run on a single instrument. The standard modules are:

- **Detectors**
  Standard configurations use one or two detectors; however, with the modular approach as many as eight detectors can be used. Depending on the requirements detectors can be run in parallel or in series.

  Detectors can be any combination of FID, microTCD, IMS, RGD, or pulsed discharge detectors (PDDs) operating in PDHID, PDPID, or PDECD modes. For example, a PDHID and a microTCD running the same sample provide a useable range from <5 ppb up to >99% concentration.

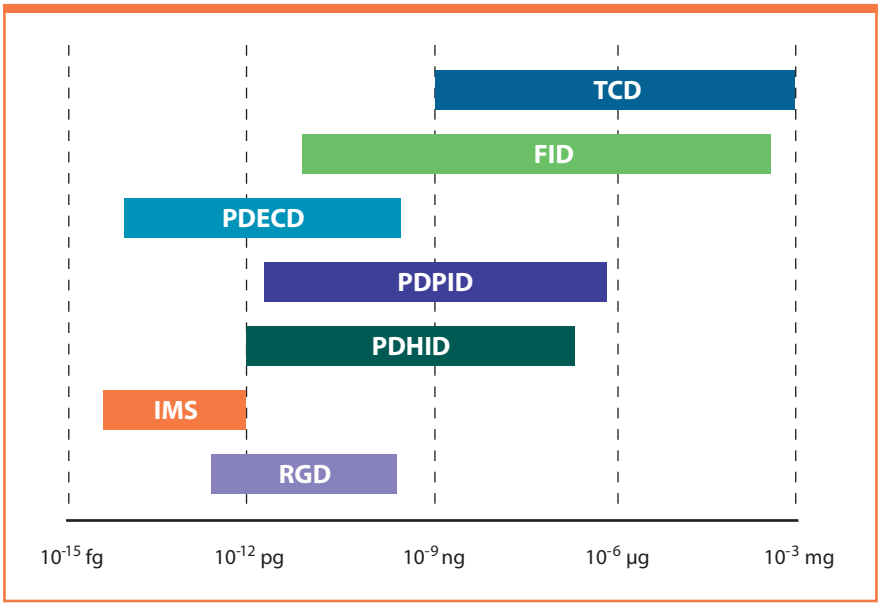
- **Oven/temperature zones**
  The TGA offers support for 12 programmable thermal zones and up to four fast temperature programmed (FTP) zones. FTP zones can be micropacked columns, metal open tubular columns, capillary columns, programmable rate injectors, vaporizers, retention gap, or absorbers/concentrators.

- **Valve controls**
  Support is available for up to 16 air actuated and four electrically actuated two position valves, plus four electrically actuated multiposition valves.

  The multiposition valves can be configured in our Gas Sampling System option (GSS) to provide a stream selector module, in which each stream can run its own unique method. With this arrangement, batches of samples can be run, or, if these sample points are from process streams, the stream and results can be fed back to the plant control network.

  The Automatic Calibration option is a configuration that allow user-configurable system suitability checks to be run within a batch of samples or at particular times of day.

LINEAR DYNAMIC RANGE OF TGA DETECTOR OPTIONS



FOR MORE INFORMATION

We'd be happy to discuss how a TGA could work with your application and requirements. Just give us a call.

SEE ALSO

Microvolume TCD . . . . . page 217
Pulsed discharge detectors. 210-215

INSTRUMENTATION

ADVANTAGES OF MODULAR DESIGN

Redundancy
In addition to the wide dynamic range and low level sensitivity, the TGA can be configured for redundancy so that there is always a hot backup for any two-channel method.

Multiple methods
With the highly flexible graphical user interface (GUI), a single TGA with two or more detectors can be configured for a wide range of methods on a wide variety of gas types. We routinely provide instruments with the standard two detectors plus two additional detectors added as an option. In this setup, two detectors are configured with methods for five or more bulk gases, while the other two run another method and gas type or remain on standby as "hot backup".

Higher throughput, high speed ovens
If you need to clear heavy compounds or contamination from an injected sample or require a long ramping method for a series of compounds, we can configure one or more modular fast temperature programmed zones to drastically increase throughput. As an added benefit, the FTP zones improve peak shape and height-to-width ratios, which translates into lower LDL performance

Simplified service
TGA configuration is often highly modular (depending on the analysis), simplying service and replacement if there is ever a need. If the methods and service requirements for your instrument ever change, the modular design also allows a much easier path for upgrades.

SPECIFICATIONS

	TGA6K4U	TGA6K7U
Dimensions	17"W x 23.5"L x 7"H	17"W x 22"L x 12.25"H
Weight	30 pounds	45 pounds
Max. number of detectors	2	2
Carrier gas	Purified helium Detector and sample gas dependent	
Carrier gas flow rate	< 70 ml/min per detector, regulated @ 80 psig	
Actuator gas	Helium or instrument air regulated @ 60 psig	
Electrical requirements	100-120 VAC or 220-240 VAC, 50/60 Hz	

SECURE TELEMETRY

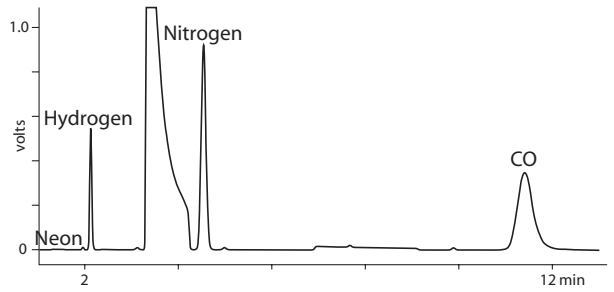
While the TGA is a fully functional standalone GC, there are those times when a brief look is all that is required to verify that a batch of samples is running smoothly. Why put on your PPE and walk out into the plant or waltz across the lab to check? Just point your PC browser to the TGA's secured web service, provide the proper user name and password, and access a fully-configurable interface to the TGA.

The system can be configured for various levels of access:

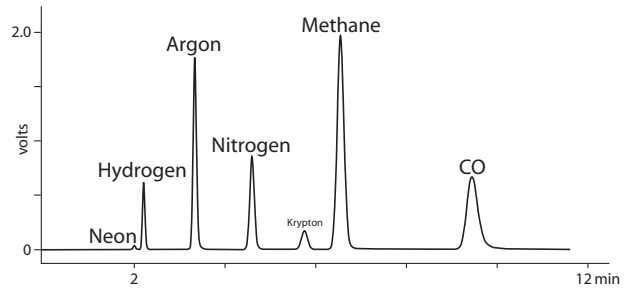
- **View Only** – User has access to integration and reports.
- **Select/Start Analysis** – User can load a sample and initiate a run, a batch of runs, or a sequence.
- **Calibration Update** – User can update or modify calibrations.
- **Method Change** – User can manipulate the method, valve timing, flows, integration parameters, and temperature programs.

We can provide remote support through a number of methods which can be tailored to your company's security policies. With appropriate IT approval/assistance, the TGA can be accessed through a secure connection from the internet, allowing a technician to provide needed assistance without a road trip for a service call. A real time and money saver! And remote support after the sale is free for life with a Valco TGA.

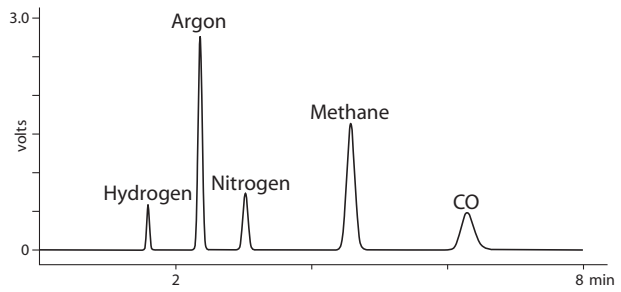
TRACE IMPURITIES in ARGON — **1 ml of 1 ppm blend**



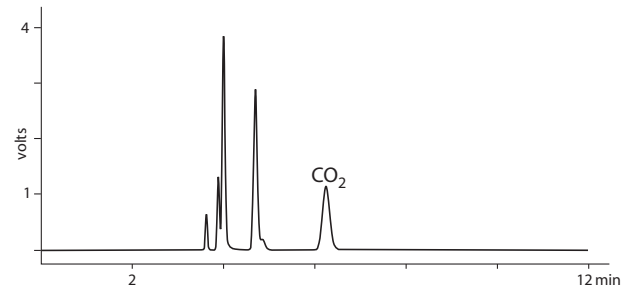
TRACE IMPURITIES in HELIUM — **1 ml of 2 ppm blend**



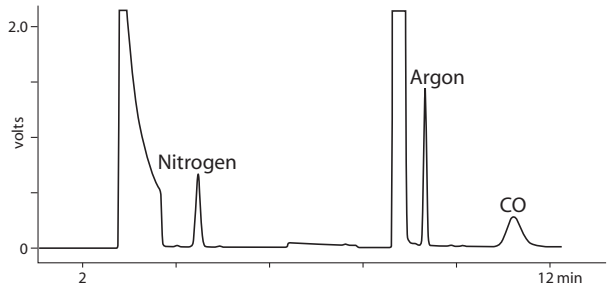
TRACE IMPURITIES in CARBON DIOXIDE — **1 ml of 1 ppm blend**



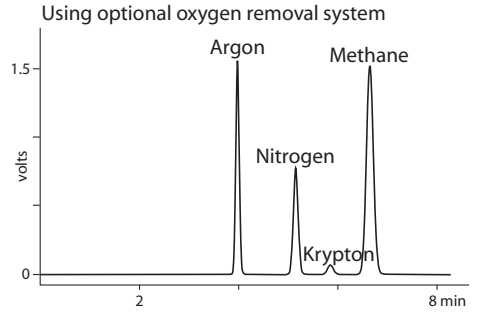
TRACE IMPURITIES in HELIUM, CHANNEL A — **1 ml of 2 ppm blend**



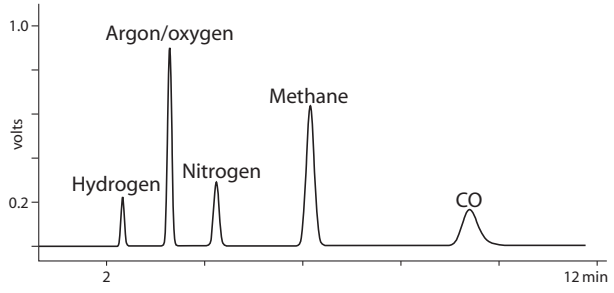
TRACE IMPURITIES in HYDROGEN — **1 ml of 1 ppm blend**



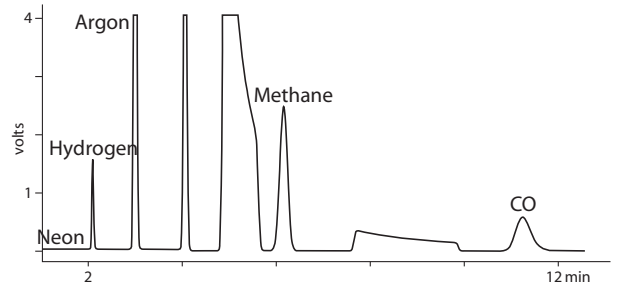
TRACE IMPURITIES in OXYGEN — **1 ml of 1 ppm blend**



TRACE IMPURITIES in HYDROGEN BROMIDE — **1 ml of 1 ppm blend**



TRACE IMPURITIES in NITROGEN — **1 ml of 1 ppm blend**



INSTRUMENTATION

PULSED DISCHARGE DETECTORS

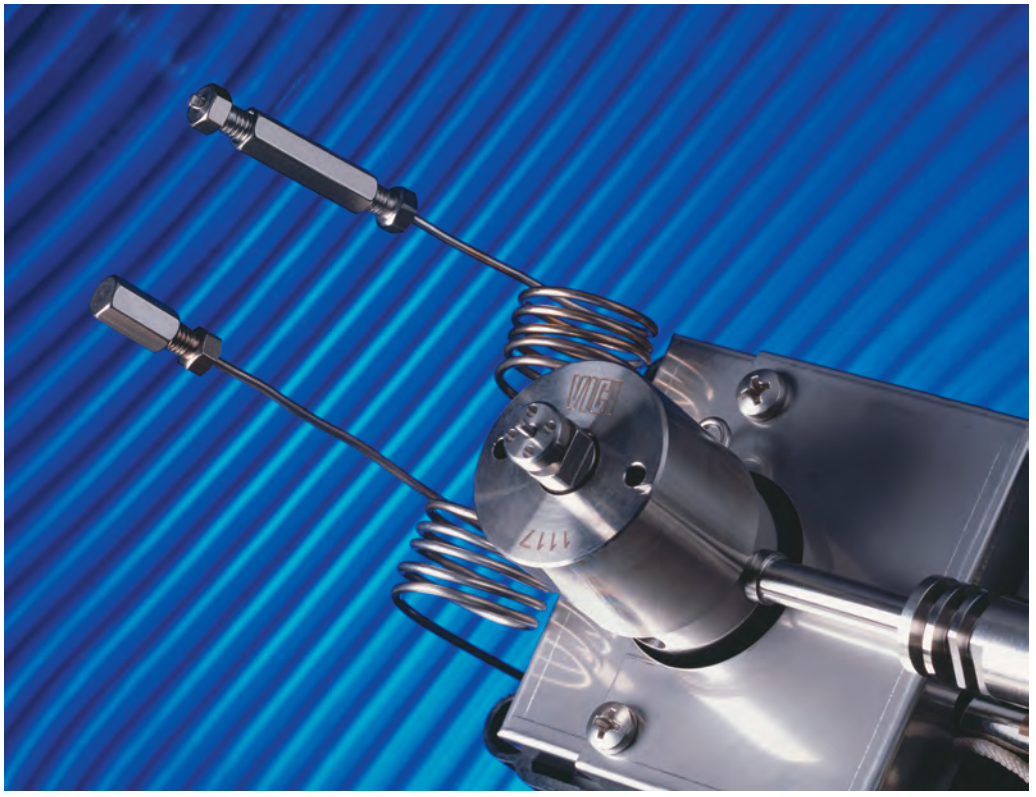
NON-RADIOACTIVE, MULTIPLE MODE ELECTRON CAPTURE / HELIUM PHOTOIONIZATION

VICI PDDs (pulsed discharge detectors) utilize a stable, low powered, pulsed DC discharge in helium as an ionization source. Eluants from the column, flowing counter to the flow of helium from the discharge zone, are ionized by photons from the helium discharge. The bias electrode(s) focus the resulting electrons toward the collector electrode, where they cause changes in the standing current which are quantified as the detector output. Performance is equal to or better than detectors with conventional radioactive sources.

In the electron capture mode, the PDD is a selective detector for monitoring high electron affinity compounds such as freons, chlorinated pesticides, and other halogen compounds. For this type of compound, the minimum detectable quantity (MDQ) is at the femtogram (10^{-15}) or picogram (10^{-12}) level.

In the helium photoionization mode, the PDD is a universal, non-destructive, high sensitivity detector. The response to both inorganic and organic compounds is linear over a wide range. Response to fixed gases is positive (increase in standing current), with an MDQ in the low ppb range.

The PDD in helium photoionization mode is an ideal replacement for FIDs in petrochemical or refinery environments, where the hydrogen and flame can be problematic. In addition, when the discharge gas is doped with argon, krypton, or xenon (depending on the desired cutoff point), the PDD functions as a specific photoionization detector for selective determination of aliphatics, aromatics, amines, and other species.



R&D 100 AWARD WINNER

SEE ALSO

Pulsed discharge detectors
miniPDD ..... page 212
Model D-2.....211
Model D2-IM 212
Model D-3.....213
Model D-4.....213

Plug-and-play detectors
for Agilent 6890 213
for Agilent 7890 213
for other GCs 213

Trace gas analyzers 206-209

MODEL D-2

The D-2 is a dual mode, universal detector system which can be retro-fitted to your older GC. The D-2-I is optimized for trace level work in the helium photoionization mode. The stand-alone systems include detector, controller, electrometer, HP2 helium purifier *(see page 216)*, and power supply.

PDD Model D-2

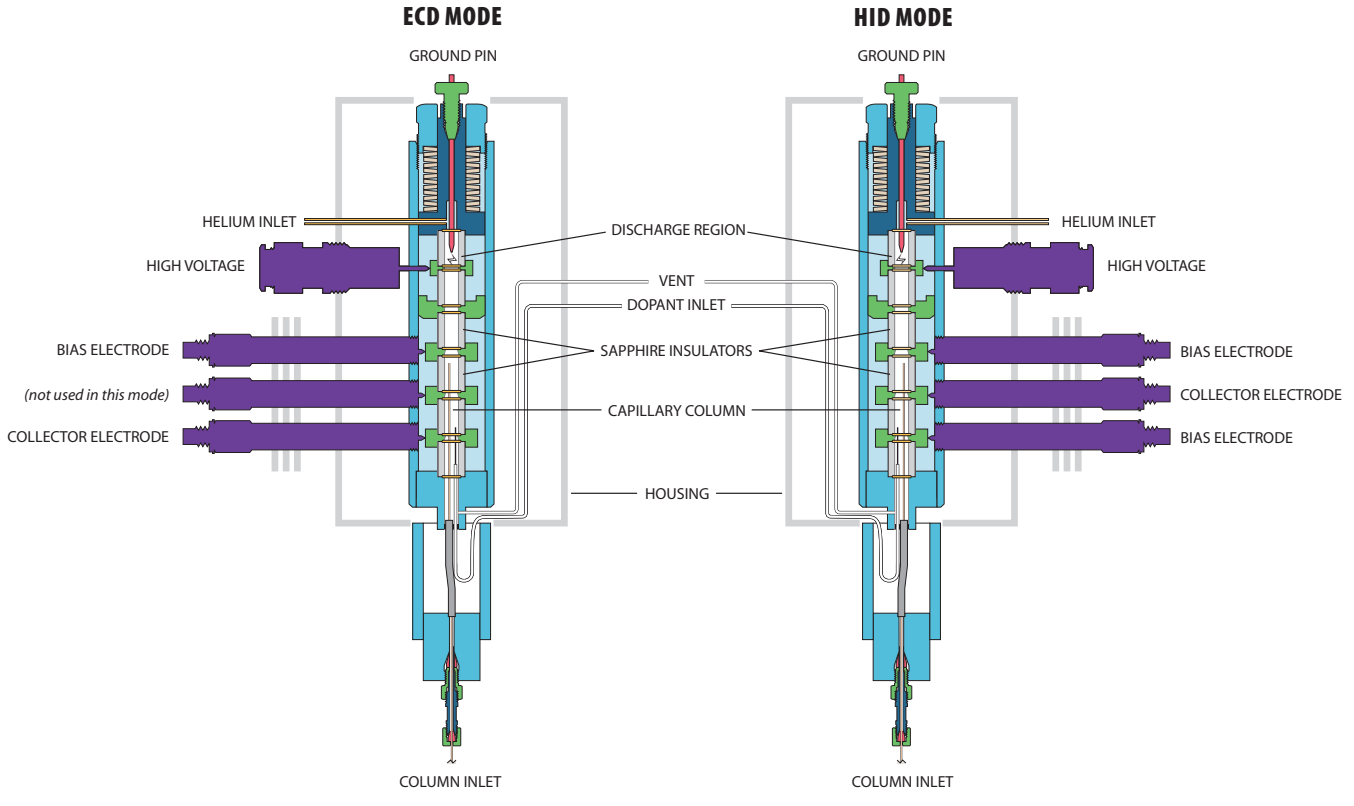
CE

STAND-ALONE SYSTEM

Detector system includes detector cell, pulser, controller, electrometer, and helium purifier.

	110 VAC		230 VAC	
	Prod No	*Price*	*Prod No*	*Price*
Mode-selectable universal electron capture / photoionization detector system	D-2	$5940	D-2-220	$5940
Detectors optimized for trace level work in helium photoionization mode. Optimized for packed column use.	D-2-I	5615	D-2-I-220	5615

SCHEMATIC – MODEL D-2



miniPDD HELIUM IONIZATION DETECTORS

The newest member of the PDD family is also the smallest and thriftiest. The miniPDD uses about one fifth (20%) the amount of helium as the D-3 and D-4 versions, giving up only a bit of sensitivity and dynamic range in return. It is approximately one half the size of the D-4, but has nearly the same sensitivity – about 100 ppb for fixed gases. With its reduced size, weight, and helium consumption, it is particularly well suited to portable applications, or to any situation in which the high cost of helium becomes a consideration.

The miniPDD system includes a controller, with integral electrometer, pulser, helium purifier, and fittings kit. The fittings kit includes almost everything the customer might need to connect and run the detector in a chromatographic system.

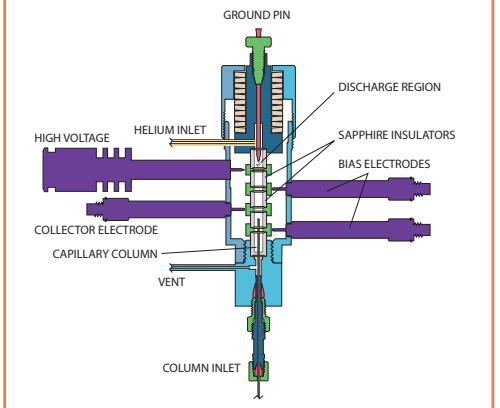
The new D-3-IM-7890 makes installation on the 7890 GC as simple as the standard D-3-I-7890. Just plug and play. Includes everything you need to get going, fast and easy.

PDD Model D2-IM CE HELIUM PHOTOIONIZATION

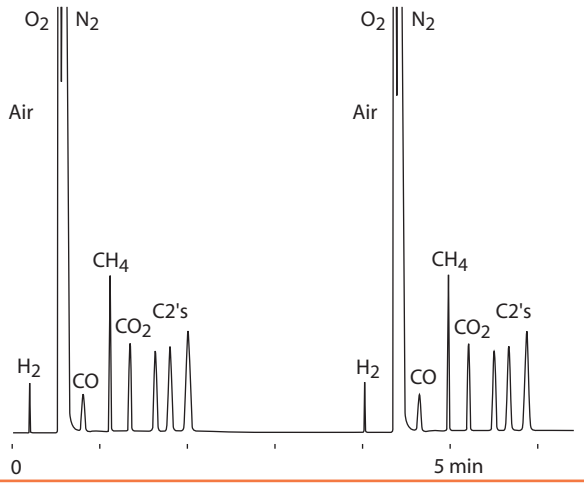
Detector cell only optimized for helium photoionization mode

			Prod No	*Price*
miniPDD system	Includes: Controller Pulser Helium purifier Fittings kit	 PD-C2 PD-M2 HP2 PD-Klt-IM	D-2-IM	$6910
miniPDD plug-in system for Agilent 7890		110 VAC	D-3-IM-7890	8300
		230 VAC	D-3-IM-7890-220	8300
miniPDD cell only			PD-D2-IM	3500

SCHEMATIC – MODEL D-2-IM



miniPDD – MODEL D-2-IM



TWO CONSECUTIVE RUNS OF LIGHT HYDROCARBONS IN AIR

Detector:	miniPDD Model PD-2-IM
Detector temp:	150°C
Column:	100/120 ShinCarbon 1.4 m x 0.53 mm Silcosteel
Resistive heat:	30°C (0.9 min) to 230°C at 100°C/min (hold 1 min)
Sample:	2000 ppm in air, 2 µL size
Carrier:	Helium
Discharge gas:	Helium

PLUG-AND-PLAY DETECTORS FOR AGILENT 7890 AND 6890

Model D-3 is designed for plug-and-play installation on the popular Agilent 6890 and 7890, and is optimized for trace level work in the helium photoionization mode.

Both versions utilize the electonics and power supply of the host GC.

PDD Model D-3

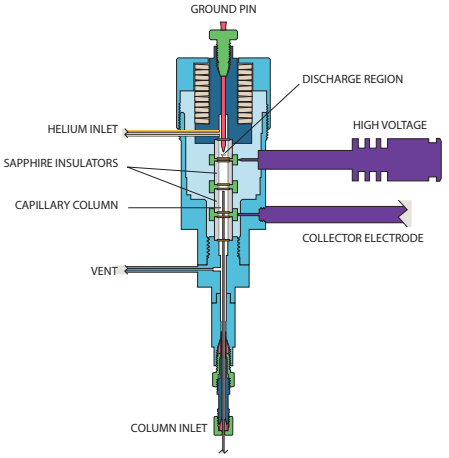
HELIUM PHOTOIONIZATION

Detector optimized for trace level work in helium photoionization mode

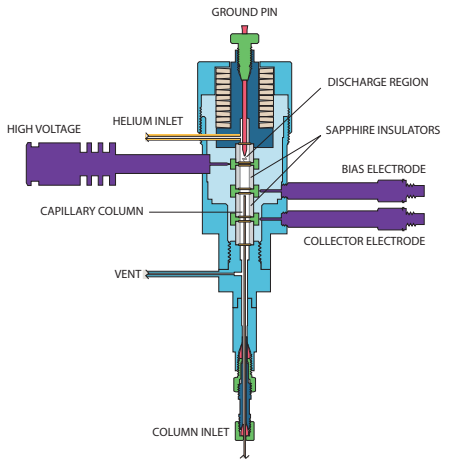
		110 VAC		230 VAC	
		Prod No	*Price*	*Prod No*	*Price*
Plug-in system for Agilent 7890	Standard	D-3-I-7890	$6705	D-3-I-7890-220	$6705
	miniPDD	D-3-IM-7890	8300	D-3-IM-7890-220	8300
Plug-in system for Agilent 6890		D-3-I-HP	6705	D-3-I-HP-220	6705

D-3-I-HP PLUG-IN SYSTEM
for Agilent 6890 GC

SCHEMATIC – MODEL D-3



SCHEMATIC – MODEL D-4



PLUG-AND-PLAY DETECTORS FOR OTHER GCS

Pulsed Discharge Detector Model D-4 is available in versions for easy installation on most of the GCs in current use, including the Varian 3800; Shimadzu 14, 17, 2010, and 2014; ThermoFinnigan Trace, Mega, and Top; and Hewlett Packard 5890. The D-4 is single mode, optimized for trace level work in the helium photoionization mode.

PDD Model D-4

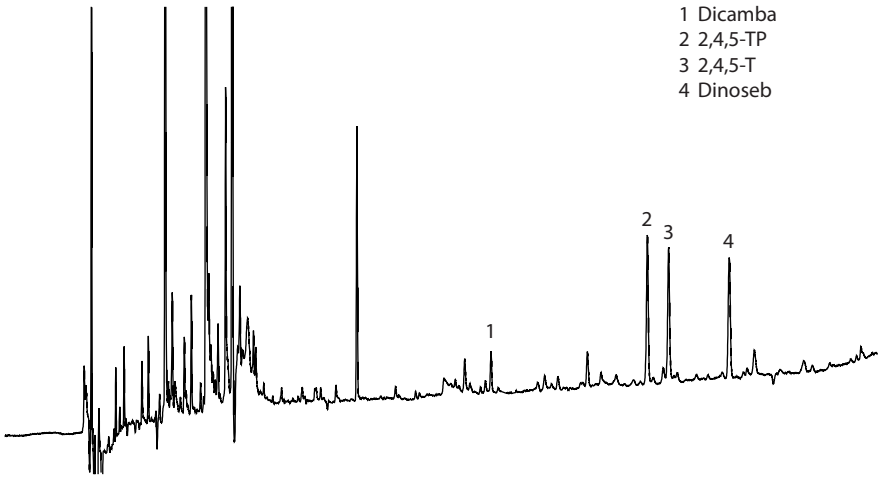
HELIUM PHOTOIONIZATION

Detectors optimized for trace level work in helium photoionization mode

		110 VAC		230 VAC	
		Prod No	*Price*	*Prod No*	*Price*
Specialized detector for	HP 5890	D-4-I-HP58	$5615	D-4-I-HP58-220	$5615
	Shimadzu GC 14 *	D-4-I-SH14-R	4210	D-4-I-SH14-R-220	4210
	Shimadzu GC 17, 2010, 2014 *	D-4-I-SH17-R	4210	D-4-I-SH17-R-220	4210
	Thermo Trace GC *	D-4-I-TQ-R	4210	D-4-I-TQ-R-220	4210
	Varian 3800 *	D-4-I-VA38-R	4210	D-4-I-VA38-R-220	4210
	* Uses existing GC FID electrometer.				
	For all other GCs	D-4-I	5510	D-4-I-220 CE	5510

INSTRUMENTATION

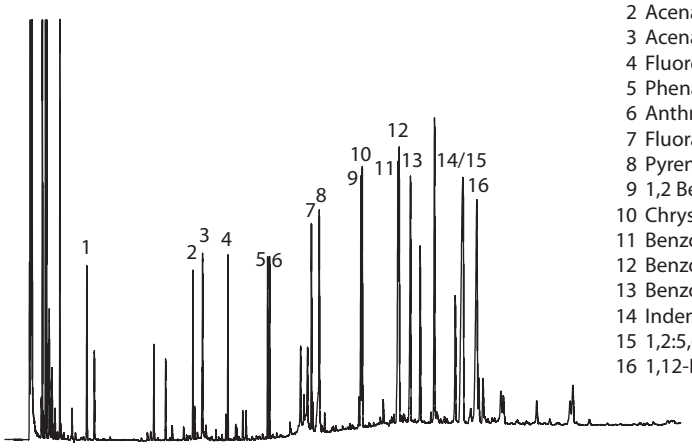
PDD – MODEL D-2



HERBICIDES IN SOIL SAMPLES USING EPA METHOD 8151

Detector:	PDD Model D-2
Mode:	Electron capture
Sample:	Environmental soil (1 g)
Detector temp:	320°C
Column:	ValcoBond VB-5 30 m x 0.25 mm x 0.25 µm
Column temp:	60°C (2 min), 20°C/min to 180°C, 4°C/min to 220°C, 40°C/min to 300°C (5 min)
Injector temp:	200°C
Sample volume:	2 µL (solvent microextraction), 1:15 split
Discharge gas:	Helium
Dopant gas:	Helium/argon
Attenuation:	1

PDD – MODEL D-2

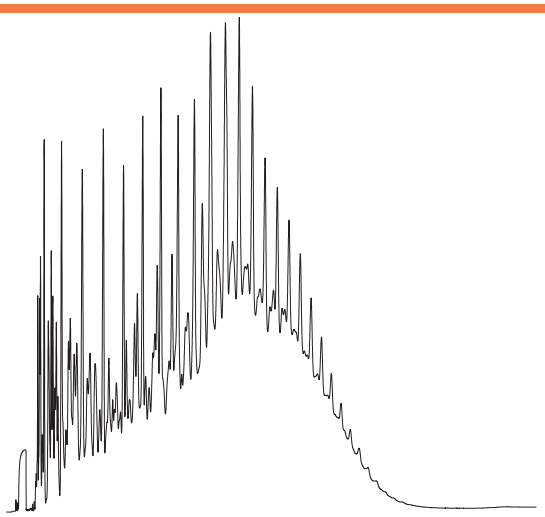


1 Naphthalene
2 Acenaphthalene
3 Acenaphthene
4 Fluorene
5 Phenanthrene
6 Anthracene
7 Fluoranthene
8 Pyrene
9 1,2 Benzanthracene
10 Chrysene
11 Benzo(b)fluoranthene
12 Benzo(k)fluoranthene
13 Benzo(a)pyrene
14 Indeno (1,2,3-C.d)pyrene
15 1,2:5,6-Dibenzanthracene
16 1,12-Benzoperylene

PAH RESIDUES IN AN ENVIRONMENTAL SOIL SAMPLE SPIKE

Detector:	PDD Model D-2
Mode:	Helium photoionization
Sample:	Environmental soil (1 g)
Detector temp:	300°C
Column:	ValcoBond VB-35 30 m x 0.25 mm x 0.25 µm
Column temp:	120°C for 3 min, 15°C/min to 310°C for 15 min
Injector temp:	275°C
Sample volume:	2 µL (solvent microextraction), 1:15 split
Discharge gas:	Helium
Dopant gas:	none
Attenuation:	1

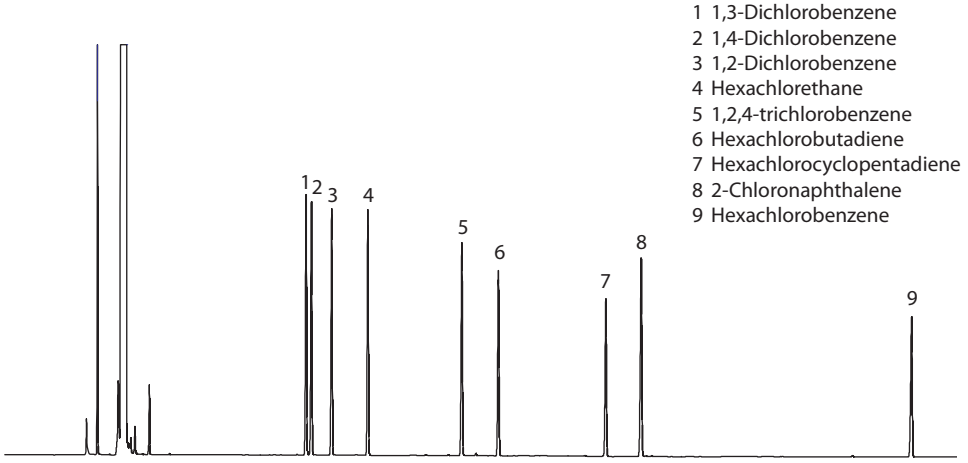
miniPDD – MODEL D-2-IM



SIMULATED DISTILLATION IN TWO MINUTES

Detector:	miniPDD
Detector temp:	320°C
Column:	ValcoBond® VB-1 5 m x 0.25 mm x 0.20 µm
Column temp:	40°C initial for 0.1 min to 320°C at 150°C/min
Injector temp:	Cold on-column injection
Carrier gas:	Helium
Reference gas:	Helium
Sample:	Reference Gas Oil (RGO) provided by Separation Systems, Inc.

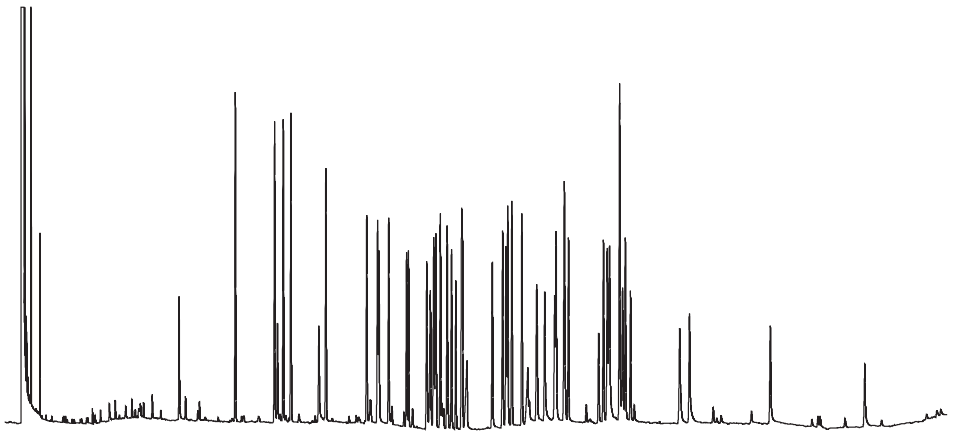
PDD – MODEL D-3



CHLORINATED HYDROCARBONS

Detector:	PDD Model D-3 Helium photoionization
Detector temp:	280°C
Column:	ValcoBond VB-5 30 m x 0.25 mm x .25 µm
Column temp:	60°C initial to 320°C at 10°C/min
Injector temp:	280°C
Carrier gas:	Helium
Concentration:	5 mg/ml

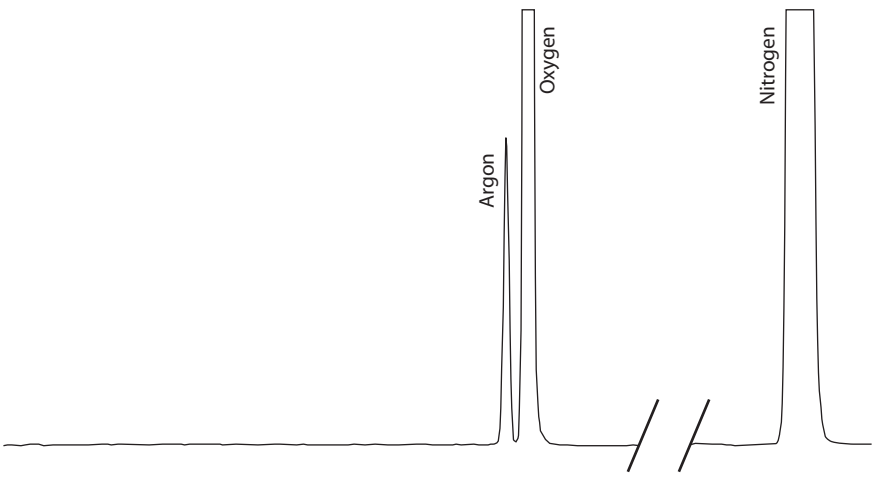
PDD – MODEL D-3



NITROGEN- AND PHOSPHOROUS-CONTAINING PESTICIDES

Detector:	PDD Model D-3 Helium photoionization
Detector temp:	280°C
Column:	ValcoBond VB-5 30 m x 0.25 mm x .25 µm
Column temp:	60°C initial to 320°C at 10°C/min
Head pressure:	15 psi
Injector temp:	280°C
Injector:	Split 1:10
Carrier gas:	Helium
Concentration:	2.5 mg/ml

PDD – MODEL D-3



AIR

Detector:	PDD Model D-3 Helium photoionization
Detector temp:	300°C
Column:	ValcoPLOT VP-Molesieve 30 m x 0.53 mm x 0.50 µm
Column temp:	Ambient
Injector temp:	250°C
Discharge gas:	Helium
Carrier gas:	Helium

HELIUM AND NITROGEN PURIFIERS

Carrier gas purity is essential in any application requiring extreme sensitivity. Impurities limit detector sensitivity and can even destroy capillary columns

STANDARD HELIUM AND NITROGEN PURIFIERS

The Valco HP2 provides "point-of-use" purification of helium or other noble gases, such as Ar, Ne, Kr, and Xe, to sub-ppm levels of reactive gaseous impurities. The NP2 is similar, purifying nitrogen to sub-ppm levels of gaseous impurities.

The purification substrate in Valco gas purifiers is a non-evaporable gettering alloy. This stable alloy is contained in a welded assembly, so the purifiers can be used safely in industrial applications with minimal precautions. The getter is activated by heating, which eliminates the oxide film on the particle surface and allows helium to diffuse into the bulk of the getter particles. The HP2 and NP2 feature a self-regulating design which eliminates the possibility of thermal runaway and maintains the getter material at the optimum temperature.

Standard helium and nitrogen purifiers CE

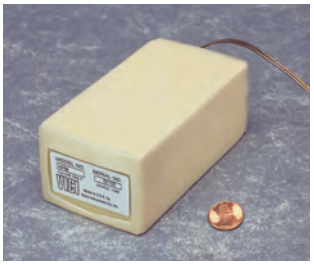
Includes universal power supply.

	110 VAC		230 VAC	
	Prod No	*Price*	*Prod No*	*Price*
Helium purifier	HP2	$860	HP2-220	$860
Nitrogen purifier	NP2	860	NP2-220	860

Replacement getter assembly		
Helium	I-23572HP2	$430
Nitrogen	I-23572NP2	430

SPECIFICATIONS

	Helium purifier	Nitrogen purifier
CE certified	Yes	Yes
Gases purified	He, Ne, Ar, Kr, Xe, Rn	N_2 only
Max. operating pressure	1000 psig	
Impurities removed	Outlet impurities less than 10ppb H_2O, H_2, O_2, N_2, NO, NH_3, CO, CO_2, and CH_4, based on 10ppm total inlet impurities. Other impurities removed include CF_4, CCl_4, SiH_4 and light hydrocarbons.	Outlet impurities less than 10ppb H_2O, H_2, O_2, NO, NH_3, CO, and CO_2, based on 10ppm total inlet impurities. Other impurities removed include CF_4, CCl_4, SiH_4 and light hydrocarbons.
Impurities ***not*** removed	He, Ne, Ar, Kr, Xe, Rn	CH_4, He, Ne, Ar, Kr, Xe, Rn, N_2



MINI HELIUM AND NITROGEN PURIFIERS

Valco Miniature Helium and Nitrogen Purifiers (HPM and NPM) are designed for installation in a GC's flow path immediately upstream of the injector. They will remove any contaminants introduced by flow controllers, elastomeric tube seals, pressure regulators, crude traps, or other system components that are not completely clean and leak-tight.

Mini helium and nitrogen purifiers CE

Includes universal power supply.

	110 VAC		230 VAC	
	Prod No	*Price*	*Prod No*	*Price*
Helium purifier	HPM	$520	HPM-220	$520
Nitrogen purifier	NPM	520	NPM-220	520

SEE ALSO
Gas specific purifiers and contaminant traps . . . . . pages 238-239

NEW! THERMAL CONDUCTIVITY DETECTOR

- Now with serial control or user friendly interface and control/monitor program on Windows
- Enhanced thermal stability
- Smaller, compact controller housing

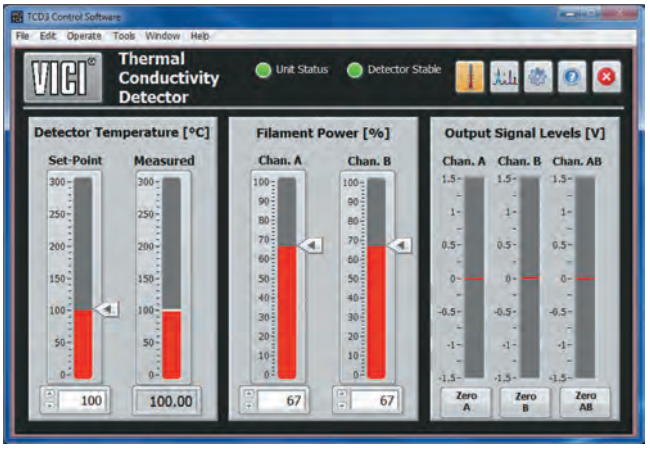
Like our venerable TCD-2, our new TCD-3 is a dual filament, stand-alone unit consisting of the detector housing and separate controller. However, the analog controls of the TCD-2 are replaced with full digital control implemented via a user interface or command console commands. Thermal stability is maintained in the detector to within 0.010°C, producing a stable, low-noise signal.

The TCD-3 controller generates an independent analog output signal for each of the detector filaments. In additional, a referenced analog output signal is generated by subtracting the output signal of one filament channel from the other. Each of these three output signals is provided in two full-scale spans: a ±1 volt scale and a ±10 volt scale.

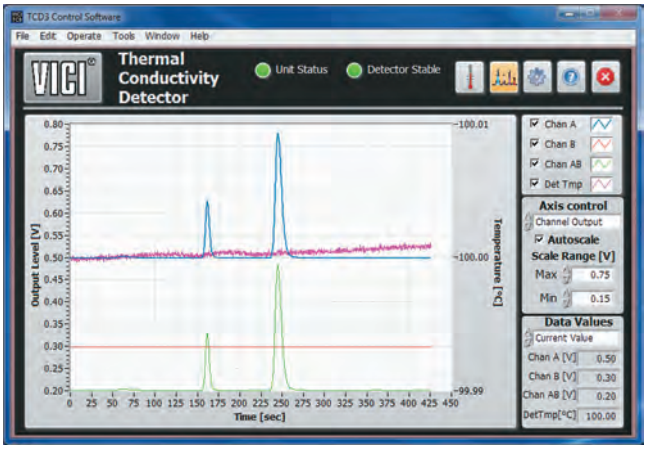
TCD CONTROL PROGRAM

The Windows-based control program makes it easy to set parameters such as detector temperature and filament power and to monitor unit perforance.

SCREEN CAPTURE – CONTROL SCREEN



SCREEN CAPTURE – GRAPH SCREEN



TCD Thermal conductivity detectors CE

		110 VAC		230 VAC	
		Prod No	*Price*	*Prod No*	*Price*
Entire unit (cell, electronics, power supply, cables, and fittings)	Nickel-iron filaments	TCD3-NIFE	$3655	TCD3-NIFE-220	$3655
	Tungsten-rhenium filaments	TCD3-WRE	3655	TCD3-WRE-220	3655
Cell/oven assembly only, dual filament	Nickel-iron filaments	TCD3-NIFED	1220	TCD3-NIFED-220	1220
	Tungsten-rhenium filaments	TCD3-WRED	1220	TCD3-WRED-220	1220
TCD controller only		TCD3-C	2540	TCD3-C-220	2540

CALIBRATION GAS STANDARDS

PERMEATION DEVICES AND CALIBRATION GAS GENERATORS
From VICI Metronics

VICI Metronics, Inc. in Poulsbo, Washington is the leading manufacturer of devices and instruments that are used in the generation of calibration gas standards, including Dynacal® and G-Cal permeation tubes and Dynacalibrator® and G-Cal calibration gas generators. Their product line also includes gas purifiers and contaminant traps, as well as explosives, narcotics, and chemical warfare dopants for TSA airport security (ammonia, DCM, and BHT), law enforcement, border patrol, military, and other trace detection industry professionals.

CALIBRATION GAS STANDARDS

The purpose of a calibration gas standard is to establish a reference point for the verification of an analysis. Permeation tube rates can be certified using standards traceable to NIST by the most basic and accurate laboratory procedure – measuring the gravimetric weight loss over a known period of time at a known temperature. Permeation rate data is already established for hundreds of different compounds, and rates for new compounds can be easily certified using NIST-traceable standards.

ADVANTAGES

Calibration devices from VICI Metronics offer several advantages over cylinder-supplied gas calibration standards. Multi-component gas mixtures can be easily generated with NIST traceability employing established EPA and ASTM protocols by using the appropriate combination of permeation devices. The technique also allows the removal of a single component from a gas mixture by simply removing the appropriate permeation device.

A wide range of concentrations can be generated by simply varying the dilution flow rate and/or the set point temperature. In addition, the small size and inherent stability of perm tubes allow us to inventory thousands for delivery from stock. Because of the size and the limited quantity of chemical fill, we can offer overnight delivery via air express.

By contrast, bottled trace level (ppb and ppm) standards can be very expensive, and calibrations requiring multiple components over a wide range of concentrations require a large number of gas cylinders, consuming valuable lab space. Problems can also arise from degradation of the standard within the cylinder, from changes in cylinder pressure, and from interaction of calibration components and surfaces.

TO ORDER

For prices or more information about specific compounds available in permeation devices, contact VICI Metronics:

Toll-free 877–737–1887
Tel 360–697–9199
metronics@vici.com

vicimetronics.com

DYNACAL® PERMEATION DEVICES

- Ideal for lab environments
- Require a temperature-controlled environment
- Inexpensive calibration solution
- Smaller than G-Cal devices
- More accurate than G-Cal devices

Dynacal permeation devices are small, inert capsules containing a pure chemical compound in a two phase equilibrium between its gas phase and its liquid or solid phase. At a constant temperature, the device emits the compound through its permeable portion at a constant rate. Devices are typically inserted into a carrier flow to generate test atmospheres for calibrating gas analyzer systems, testing hazardous gas alarms, or conducting long-term studies of effects on materials or biological systems – in short, any situation requiring a stable concentration of a specific trace chemical.


TUBULAR DEVICES

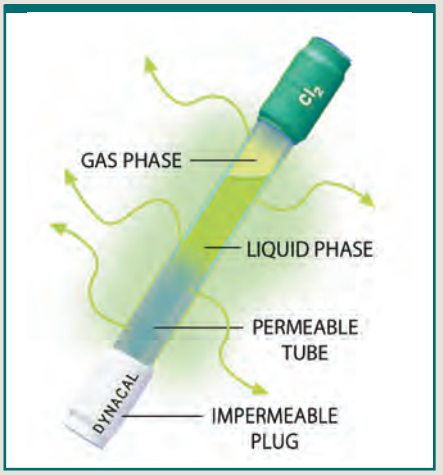

EXTENDED LIFE TUBULAR


WAFER DEVICES

TUBULAR DEVICES

The tubular device, or "perm tube", is a sealed permeable cylinder containing the desired permeant reference material. Release of the chemical occurs by permeation through the walls of the PTFE tube for the entire length between the impermeable plugs. A wide range of rates – typically from 5 ng/min to 50,000 ng/min – can be achieved by varying the length and thickness of the tube. These are the most widely used of the various permeation devices.

PARTS OF A TUBULAR DEVICE



EXTENDED LIFE TUBULAR DEVICES

Our unique extended life tubular (XLT) device is a standard perm tube coupled to an impermeable stainless steel reservoir. This design offers a range of permeation rates corresponding to a tubular device, but has a significantly enhanced lifetime – by a factor of 3 for a 5 cm (active length) device or a factor of 12 for a 1 cm device.

WAFER DEVICES

Wafer devices have only a small permeable window, or wafer, so permeation rates are typically lower than rates for tubular devices. Since permeation occurs only through the polymeric wafer, the permeation rate is controlled by varying the wafer material, the thickness of the wafer, and the diameter of the permeation opening. Gases whose high vapor pressure at normal permeation temperatures prevent their containment in a tubular device can be contained in a wafer device. Wafer devices are available in different styles to allow use in calibrators made by various manufacturers.

COMPOUNDS AVAILABLE IN DYNACAL PERM DEVICES

Literally hundreds of compounds are available in our permeation devices. This list is merely representative of the range we offer. Contact us if you don't see what you're looking for.

Ammonia
Benzene
Carbon disulfides
Carbon tetrachloride
Chlorine
Dichloromethane
Dimethyl sulfide
Ethanol
Ethylene oxide
Freon
Formaldehyde
Hydrogen cyanide
Hydrogen fluoride
Hydrogen sulfide
Iodine
Isopropyl alcohol
Mercury
Methanol
Methyl bromide
MTBE
Nitrogen dioxide
Octane
Sulfur dioxide
Sulfur hexafluoride
Thiophene
Toluene
Vinyl acetate
Water
Xylenes

SEE ALSO
G-Cal perm tubes. . .p. 222

CALIBRATION GAS STANDARDS

DYNACALIBRATOR® CALIBRATION GAS GENERATORS

- ***New*** optional second dilution stage for dilution ratios as high as 1,000,000:1
- Base units deliver precise concentrations from ppb to high ppm
- Choice of base configuartions, with manual or automated flow control and metering
- Trace gas source provided by Dynacal® permeation devices
- Proprietary temperature control system accurate to ±0.01°C

VICI Metronics Dynacalibrators facilitate verification of the accuracy of analytical data from air pollution monitoring, industrial hygiene surveys, odor surveys, and other instruments measuring gas concentration. All models calibrate to NIST traceable standards.

Base designs utilize our Dynacal® permeation devices to generate and deliver precise concentrations ranging from ppb to high ppm for hundreds of different compounds. Permeation chambers are big enough to accomodate several devices for higher output concentrations or multi-component mixtures.

The new dual-stage dilution option (available on the automated models below) expands this range by six orders of magnitude. Units can even be configured without an oven, for cylinder gas dilution.

TO ORDER

For prices or more information, contact VICI Metronics:

Toll-free 877–737–1887
Tel 360–697–9199
metronics@vici.com

vicimetronics.com

MODEL 120 PORTABLE DYNACALIBRATORS

- Completely portable
- Pump powered by rechargeable battery or a 12 VDC source (inverter with cigarette lighter plug provided)
- Available temperature control from 5°C above ambient to 100°C
- Utilizes permeation devices – no bulky cylinders

Standard features on Model 120 include a glass or PTFE permeation chamber with screw cap access, solid state proportional temperature controller with digital readout of set point and chamber temperature, heater switch with LED indicator, flowmeter and flow control valve, span and overflow outlets, 12 VDC internal pump, activated charcoal scrubber, and molded fiberglass case.

MODEL 120

Non-CE, use restricted within the EU.

MODEL 150 DYNACALIBRATORS

- Temperature control with an accuracy of ±0.01°C from 5°C above ambient to 110°C
- Ultra compact
- PPB to high PPM range
- Optional Hastelloy C permeation chamber

At only 6" wide x 15" deep x 7" high and 10.5 pounds, the Dynacalibrator Model 150 is a compact calibrator capable of delivering the precise concentrations you require. A passivated glass-coated stainless steel permeation chamber houses the permeation device(s). (Carrier and dilution flow rates must be supplied and measured externally.) The digital temperature controller maintains the chamber temperature at a set point with an accuracy of ±0.01°C, traceable to NIST standards. The wide range of temperature settings (5°C above ambient to 110°C) means the end user can generate a wide range of volumetric concentrations for both low and high vapor pressure chemical compounds, establishing or changing the desired volumetric concentration by simply varying the carrier flow.

MODEL 150

SEE ALSO

Dynacal permeation tubes. . . . . .p. 219

DYNACALIBRATOR BASE CONFIGURATIONS

Base configurations are customized to meet user requirements for dilution gas and carrier gas flow capacities.

<table>
<tr><th>Automated</th><th>Manual</th></tr>
<tr><td>• User sets either the flow rate or the concentration via touch screen
• Required temperature and concentration or flow rate are set and controlled automatically
• External gas source</td><td>• Concentrations are calculated manually
• Required temperature and flow rates are set manually
• Internal pump or external gas source</td></tr>
<tr><td>MODEL 235 – Basic
• Provides continuous dilution
• Maintains a constant carrier flow through the permeation chamber
 
CE</td><td>MODEL 230 – Basic
• Provides continuous dilution
• Maintains a constant carrier flow through the permeation chamber
 
CE</td></tr>
<tr><td>MODEL 345 – Intermediate/Extended concentration range
• In the zero mode, scrubbed dilution flow is delivered to the outlet, allowing the end user to establish zero before sampling
• Full range of mode capability
CE</td><td>MODEL 340 – Intermediate
• Zero function as described at left
CE

MODEL 450 – Extended concentration range
• Mode switch selects among standby (through), zero, span 1 (low concentration), and span 2 (high concentration) modes
CE</td></tr>
<tr><td>MODEL 505 – Dual chamber
• Two separate permeation chambers with independent temperature control systems
• Chamber 1 and chamber 2 can run independently, or be used together to combine trace components
• Solenoid valves allow the carrier flows to be switched from the dilution stream to a vent port, allowing chamber 1, chamber 2, chamber 1 + chamber 2, or zero
 
CE</td><td>MODEL 500 – Dual chamber
• Two separate permeation chambers with independent temperature control systems
• Chamber 1 and chamber 2 can run independently, or be used together to combine trace components.
• Solenoid valves allow the carrier flows to be switched from the dilution stream to a vent port, allowing chamber 1, chamber 2, chamber 1 + chamber 2, or zero
 
CE</td></tr>
</table>

CALIBRATION GAS STANDARDS

G-CAL PERMEATION DEVICES

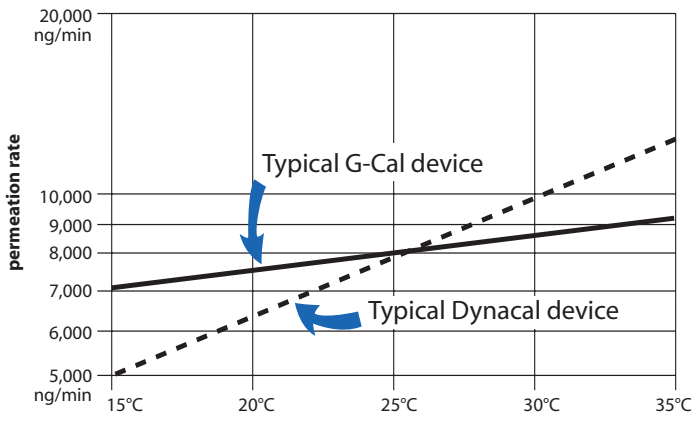
- Excellent for use in the field
- Can be operated at room temperature
- Can handle Arsine and Phosphine
- Longer lifetime than Dynacal devices

G-Cal permeation tubes offer a proven and repeatable means of generating desired gas or vapor concentrations. The permeant gas escapes through the proprietary membrane system and mixes with a carrier gas (nitrogen is the most common) at a controlled flow rate to obtain a known mixture in ppm or ppb. Applications include calibration of gas monitoring systems and chromatographs, accuracy check of gas detectors, and generation of known test atmospheres for a specific application.

G-Cal devices exhibit the lowest temperature sensitivity among available similar products. The permeation rate through the polymeric membrane used in G-Cal devices changes only 1-3% per degree C, eliminating the need for a temperature-controlled chamber. Most G-Cal devices are guaranteed for 12 months operating life.

Over 100 different substances are available, including Arsine, Phosphine, and gas phase devices such as CO, NO, and Methane. Available permeation rates range from less than 100 ng/min to 50,000 ng/min. Each G-Cal device is individually calibrated and verified to generate a given mass output per unit time (ng/min) at a set point temperature. A graph which shows an estimated permeation rate vs. temperature from 0 to 50°C is included with each device.

COMPARISON OF G-CAL PERMEATION DEVICES AND DYNACAL PTFE PERMEATION DEVICES



COMPOUNDS AVAILABLE IN G-CAL PERM TUBES

Literally hundreds of compounds are available in our permeation devices. This list is merely representative of the range we offer. Contact us if you don't see what you're looking for.

Ammonia
Arsine *
Benzene
Carbon Dioxide *
Carbon Monoxide *
Carbonyl Sulfide
Chloroform
DMMP
Dichloromethane
Dimethyl Sulfide
Dimethyl Formamide
Ethyl Chloride
Ethyl Mercaptan
Ethylene Oxide
Freons
Hydrogen Fluoride
Hydrogen Sulfide
Methane *
Methanol
Methyl Mercaptan
Nitric Oxide *
Nitrogen Dioxide
Nitrous Oxide *
Phosphine *
Propylene Oxide
Sulfur Dioxide
Sulfur Hexafluoride
Thiophene
Toluene
Water
Xylenes

** Available only in G-Cal permeation devices.*

SEE ALSO
Dynacal perm tubes . . . . . .p. 219

G-CAL CALIBRATION GAS GENERATORS

- Portable and rugged – ideal for field use
- Ambient temperature from 15°C to 45°C
- Built-in pump
- Carrier gas flow rates from 100-1000 or 200-4000 cc/min
- Models with oven for constant temperature control at cold field sites

G-Calibrators are rugged portable units specifically designed to be used with our patented Series 23 G-Cal permeation devices to generate known concentrations (ppb to ppm) of various gases and liquid vapors. This combination offers the easiest method of calibrating toxic gas detection equipment, gas analyzers, and chromatographs commonly used in chemical, petrochemical, paper, power, and related industries.

Due to its patented permeation technology, the permeation rate of a G-Cal device remains fairly stable when exposed to changing temperatures. For most applications, this feature eliminates the need for the temperature-controlled oven.

Models with an oven have a single fixed temperature point (35° - 50°C). Models powered by a 12 VDC NiCad rechargeable battery also include a 110 VAC external charger.

All G-Calibrators have stainless steel fittings and FEP tubing throughout.

G-Calibrators

NON-CE. USE RESTRICTED IN EU

Flow range	*Battery*	*Oven*	*Prod No.*
100-1000 cc/min	1.5 VDC	no	2301
	12 VDC NiCad	no	2310-10
		yes	2330-10
200-4000 cc/min	12 VDC NiCad	no	2310-20
		yes	2330-20

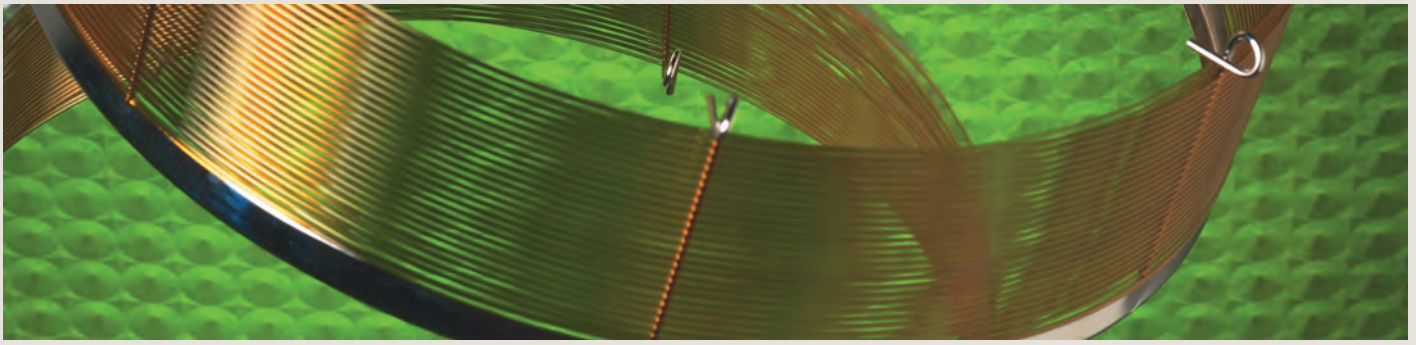
TO ORDER

For prices or more information, contact VICI Metronics:

Toll-free 877–737–1887
Tel 360–697–9199
metronics@vici.com

vicimetronics.com

GC CAPILLARY COLUMNS

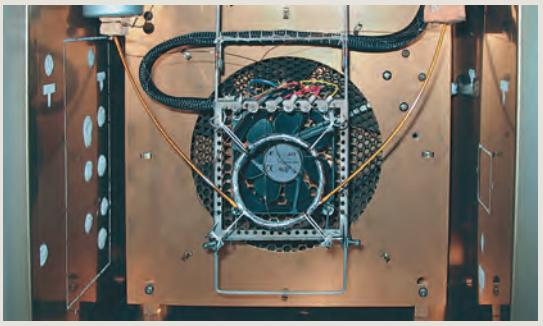


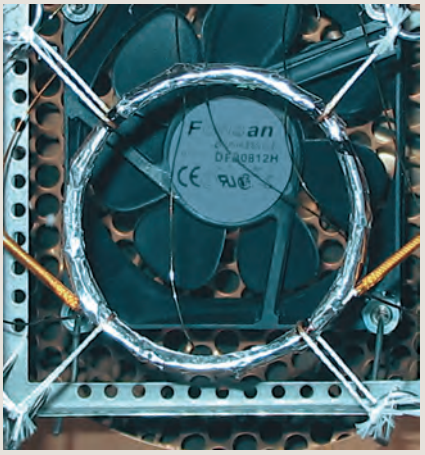
VALCOBOND® AND VALCOPLOT®
From VICI Metronics

COLUMNS BUNDLED FOR RESISTIVE HEATING

We can supply many of our ValcoBond columns wrapped with nickel wire and packaged into a neat insulated bundle for resistively heated Fast GC applications.

Contact us to discuss your specific needs.



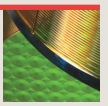


RESISTIVELY-HEATED COLUMN
installed in traditional column oven

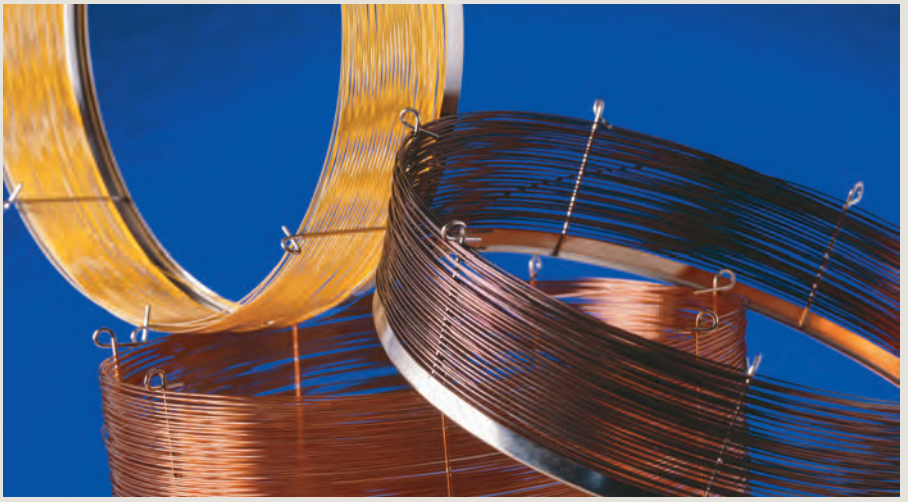
MORE PRODUCTS FOR FAST GC

In addition to these column bundles, VICI offers nickel-clad fused silica tubing for resistive heating, column/fan modules, and a multichannel fast temperature programmer.

Nickel-clad FS tubing . . . . . page 68
Column/fan modules 205
Fast temperature programmer 204



ValcoBond® and ValcoPLOT® capillary columns meet the highest quality standards for resolution, retention characteristics, inertness, bleed, and reproducibility.



VALCOBOND® CAPILLARY COLUMNS

- Individually tested
- High temperature range
- Competitive pricing

We use proprietary liquid phase processing to produce low bleed characteristics while maintaining identical retention characteristics to the phases you are used to.

VALCOBOND PHASES

PAGES 226 - 229

VB-1	100% dimethylpolysiloxane
VB-5	(5%-Phenyl)-methylpolysiloxane
VB-35	(35%-Phenyl)-methylpolysiloxane
VB-50/608	(50%-Phenyl)-methylpolysiloxane
VB-624	(6% Cyanopropyl-phenyl)-methylpolysiloxane
VB-1701	(14% Cyanopropyl-phenyl)-methylpolysiloxane
VB-Wax	Polyethylene glycol (PEG)
VB-FLUORO	Bonded fluorosilicone phase

VALCOPLOT® CAPILLARY COLUMNS

- Widest polarity range
- Faster than micropacked

Now you can reduce run time by replacing your packed columns with ValcoPLOT HayeSep capillary PLOT columns, with phases available only from VICI. Our proprietary phase processing produces the first capillary PLOT columns with characteristics identical to HayeSep packed columns.

VALCOPLOT PHASES

PAGES 230 - 234

ValcoPLOT Molesieve 5Å	
ValcoPLOT Metal Molesieve 5Å	
ValcoPLOT Alumina KCl	
ValcoPLOT Alumina Na_2SO_4	
ValcoPLOT A	High purityDivinylbenzene/ethyleneglycoldimethacrylate
ValcoPLOT B	Divinylbenzene/polyethyleneimine
ValcoPLOT C	Divinylbenzene/acrylonitrile
ValcoPLOT D	High purity Divinylbenzene
ValcoPLOT N	Divinylbenzene/ethyleneglycoldimethacrylate
ValcoPLOT P	Divinylbenzene/styrene
ValcoPLOT Q	Divinylbenzene
ValcoPLOT R	Divinylbenzene/N-vinyl-2-pyrollidinone
ValcoPLOT S	Divinylbenzene/4-vinylpyridine

PRODUCTS FOR GC

Other useful products for gas chromatography include:

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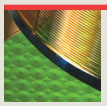


GC CAPILLARY COLUMNS

VB-1

100% DIMETHYLPOLYSILOXANE

PRIMARY APPLICATIONS

- Amines
- Flavors
- Fragrances
- Hydrocarbons
- Pesticides
- PCBs
- Phenols
- Sulfur compounds
- EPA Methods 504, 551, 1618
- NIOSH Methods 1300-1301, 1400-1403, 1450, 1501, 2005

REPLACES

DB-1, DB-1ms, HP-1, HP-1MS, Ultra-1, Rtx-1, Rtx-1MS, SPB-1, MDN-1, BP-1, CP-Sil 5 CB, GB-1, 007-1, OV-1, SE-30, AT-1 and ZB-1

	*df**	*Prod No*
0.10 mm ID		
10 meters	0.10	CFS-A01010-010B
	0.20	CFS-A01010-020B
	0.40	CFS-A01010-040B
20 meters	0.10	CFS-A02010-010B
	0.20	CFS-A02010-020B
	0.40	CFS-A02010-040B
0.15 mm ID		
10 meters	0.15	CFS-A01015-015B
	1.00	CFS-A01015-100B
0.18 mm ID		
10 meters	0.10	CFS-A01018-010B
	0.18	CFS-A01018-018B
	0.40	CFS-A01018-040B
	1.00	CFS-A01018-100B
20 meters	0.10	CFS-A02018-010B
	0.18	CFS-A02018-018B
	0.40	CFS-A02018-040B
	1.00	CFS-A02018-100B
40 meters	0.18	CFS-A04018-018B
	0.40	CFS-A04018-040B

** Film thickness in µm.*

	*df**	*Prod No*
0.25 mm ID		
15 meters	0.10	CFS-A01525-010B
	0.25	CFS-A01525-025B
	0.50	CFS-A01525-050B
	1.00	CFS-A01525-100B
30 meters	0.10	CFS-A03025-010B
	0.25	CFS-A03025-025B
	0.50	CFS-A03025-050B
	1.00	CFS-A03025-100B
	1.50	CFS-A03025-150B
60 meters	0.10	CFS-A06025-010B
	0.25	CFS-A06025-025B
	0.50	CFS-A06025-050B
	1.00	CFS-A06025-100B
0.32 mm ID		
15 meters	0.10	CFS-A01532-010B
	0.25	CFS-A01532-025B
	0.50	CFS-A01532-050B
	1.00	CFS-A01532-100B
	3.00	CFS-A01532-300B
	5.00	CFS-A01532-500B
30 meters	0.10	CFS-A03032-010B
	0.25	CFS-A03032-025B
	0.32	CFS-A03032-032B
	0.50	CFS-A03032-050B
	1.00	CFS-A03032-100B
	2.00	CFS-A03032-200B
	3.00	CFS-A03032-300B
	4.00	CFS-A03032-400B
	5.00	CFS-A03032-500B

	*df**	*Prod No*
0.32 mm ID continued		
60 meters	0.10	CFS-A06032-010B
	0.25	CFS-A06032-025B
	0.50	CFS-A06032-050B
	1.00	CFS-A06032-100B
	3.00	CFS-A06032-300B
	5.00	CFS-A06032-500B
0.53 mm ID		
15 meters	0.15	CFS-A01553-015B
	0.50	CFS-A01553-050B
	1.00	CFS-A01553-100B
	1.50	CFS-A01553-150B
	3.00	CFS-A01553-300B
	5.00	CFS-A01553-500B
30 meters	0.15	CFS-A03053-015B
	0.50	CFS-A03053-050B
	1.00	CFS-A03053-100B
	1.50	CFS-A03053-150B
	3.00	CFS-A03053-300B
	5.00	CFS-A03053-500B
60 meters	1.00	CFS-A06053-100B
	1.50	CFS-A06053-150B
	3.00	CFS-A06053-300B
	5.00	CFS-A06053-500B

VB-35

(35%PHENYL)-METHYLPOLYSILOXANE

PRIMARY APPLICATIONS

- Drugs
- Pesticides
- Herbicides
- PAHs
- Pharmaceuticals
- PCBs
- EPA Method 8081A (organochlorine pesticides)

REPLACES

DB-35, AT-35, MDN-35, DB-35ms, Rtx-35, BP-35, HP-35, Rtx-35MS, 007-11, HP-35MS, Sup-Herb, ZB-35

	*df**	*Prod No*
0.25 mm ID		
15 meters	0.25	CFS-C01525-025B
	0.50	CFS-C01525-050B
30 meters	0.25	CFS-C03025-025B
	0.50	CFS-C03025-050B
60 meters	0.25	CFS-C06025-025B
	0.50	CFS-C06025-050B

** Film thickness in µm.*

	*df**	*Prod No*
0.32 mm ID		
15 meters	0.25	CFS-C01532-025B
	0.50	CFS-C01532-050B
30 meters	0.25	CFS-C03032-025B
	0.50	CFS-C03032-050B
60 meters	0.50	CFS-C06032-050B

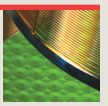
	*df**	*Prod No*
0.53 mm ID		
15 meters	0.50	CFS-C01553-050B
	1.00	CFS-C01553-100B
30 meters	0.50	CFS-C03053-050B
	1.00	CFS-C03053-100B
60 meters	1.00	CFS-C06053-100B

MORE SIZES

Call for information on additional column lengths and phase thicknesses.

TEMPERATURE SPECS

Temperature specifications can be found in the Columns section of vici.com.



VB-5

(5% PHENYL)-METHYLPOLYSILOXANE

	df*	Prod No
0.10 mm ID		
10 meters	0.10	CFS-B01010-010B
	0.20	CFS-B01010-020B
20 meters	0.10	CFS-B02010-010B
	0.20	CFS-B02010-020B
0.18 mm ID		
10 meters	0.18	CFS-B01018-018B
	0.40	CFS-B01018-040B
15 meters	0.18	CFS-B01518-018B
20 meters	0.18	CFS-B02018-018B
	0.40	CFS-B02018-040B
30 meters	0.18	CFS-B03018-018B
40 meters	0.18	CFS-B04018-018B
	0.40	CFS-B04018-040B
0.25 mm ID		
15 meters	0.10	CFS-B01525-010B
	0.25	CFS-B01525-025B
	0.50	CFS-B01525-050B
	1.00	CFS-B01525-100B
30 meters	0.10	CFS-B03025-010B
	0.25	CFS-B03025-025B
	0.50	CFS-B03025-050B
	1.00	CFS-B03025-100B
60 meters	0.10	CFS-B06025-010B
	0.25	CFS-B06025-025B
	0.50	CFS-B06025-050B
	1.00	CFS-B06025-100B

	df*	Prod No
0.32 mm ID		
15 meters	0.10	CFS-B01532-010B
	0.25	CFS-B01532-025B
	0.50	CFS-B01532-050B
	1.00	CFS-B01532-100B
	2.00	CFS-B01532-200B
	3.00	CFS-B01532-300B
	5.00	CFS-B01532-500B
30 meters	0.10	CFS-B03032-010B
	0.25	CFS-B03032-025B
	0.50	CFS-B03032-050B
	1.00	CFS-B03032-100B
	2.00	CFS-B03032-200B
	3.00	CFS-B03032-300B
	5.00	CFS-B03032-500B
60 meters	0.10	CFS-B06032-010B
	0.25	CFS-B06032-025B
	0.50	CFS-B06032-050B
	1.00	CFS-B06032-100B
	2.00	CFS-B06032-200B
	3.00	CFS-B06032-300B
	5.00	CFS-B06032-500B

	df*	Prod No
0.53 mm ID		
15 meters	0.50	CFS-B01553-050B
	1.00	CFS-B01553-100B
	1.50	CFS-B01553-150B
	2.00	CFS-B01553-200B
	3.00	CFS-B01553-300B
	5.00	CFS-B01553-500B
30 meters	0.50	CFS-B03053-050B
	1.00	CFS-B03053-100B
	1.50	CFS-B03053-150B
	2.65	CFS-B03053-265B
	3.00	CFS-B03053-300B
	5.00	CFS-B03053-500B
60 meters	1.00	CFS-B06053-100B
	1.50	CFS-B06053-150B
	2.00	CFS-B06053-200B
	3.00	CFS-B06053-300B
	5.00	CFS-B06053-500B

PRIMARY APPLICATIONS

Drugs
Herbicides
Hydrocarbons
PCBs
Pesticides
Phenols
Semi-volatiles
Sulfur compounds

REPLACES

DB-5, DB-5ms, HP-5, HP-5MS, Ultra-5, Rtx-5, Rtx-5MS, Rtx-5sil MS, SPB-5, MDN-5, BP-5, CP-Sil 8 CB, GB-5, 007-5, OV-5, SE-54, AT-5, and ZB-5

** Film thickness in µm.*

VB-50/608

(50%PHENYL)-METHYLPOLYSILOXANE

	df*	Prod No
0.25 mm ID		
15 meters	0.25	CFS-D01525-025B
	0.50	CFS-D01525-050B
30 meters	0.15	CFS-D03025-015B
	0.25	CFS-D03025-025B
	0.50	CFS-D03025-050B
60 meters	0.25	CFS-D06025-025B
	0.50	CFS-D06025-050B

	df*	Prod No
0.32 mm ID		
15 meters	0.50	CFS-D01532-050B
	1.00	CFS-D01532-100B
30 meters	0.25	CFS-D03032-025B
	0.50	CFS-D03032-050B
	1.00	CFS-D03032-100B
60 meters	0.50	CFS-D06032-050B
	1.00	CFS-D06032-100B

	df*	Prod No
0.53 mm ID		
15 meters	0.50	CFS-D01553-050B
	1.00	CFS-D01553-100B
30 meters	0.50	CFS-D03053-050B
	1.00	CFS-D03053-100B
60 meters	0.50	CFS-D06053-050B
	1.00	CFS-D06053-100B

PRIMARY APPLICATIONS

Drugs
Pharmaceuticals
Herbicides
Steroids
PAHs
Tocopherols
PCBs
EPA Methods
Pesticides
508, 608. 8080

REPLACES

DB-17, AT-50, SP-2250, DB-17ms, BPX-50, SP-17, DB-608, 007-17, SPB-608, HP-50+, SPB-50, ZB-50, Rtx-50

** Film thickness in µm.*

TO ORDER

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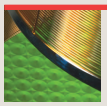

GC CAPILLARY COLUMNS

VB-Wax

100% BONDED POLYETHYLENE GLYCOL

PRIMARY APPLICATIONS

Alcohols
Aldehydes
Aromatics
Flavors
Fragrances
Organic Acids
Solvents

	df*	Prod No
0.10 mm ID		
10 meters	0.10	CFS-G01010-010A
20 meters	0.10	CFS-G02010-010A
0.18 mm ID		
10 meters	0.18	CFS-G01018-018A
20 meters	0.18	CFS-G02018-018A
0.25 mm ID		
15 meters	0.25	CFS-G01525-025A
30 meters	0.25	CFS-G03025-025A
	0.50	CFS-G03025-050A
	1.00	CFS-G03025-100A
60 meters	0.25	CFS-G06025-025A

** Film thickness in µm.*

	df*	Prod No
0.32 mm ID		
15 meters	0.25	CFS-G01532-025A
	0.50	CFS-G01532-050A
	1.00	CFS-G01532-100A
30 meters	0.25	CFS-G03032-025A
	0.50	CFS-G03032-050A
	1.00	CFS-G03032-100A
60 meters	0.25	CFS-G06032-025A
	0.50	CFS-G06032-050A
0.53 mm ID		
15 meters	0.50	CFS-G01553-050A
	1.00	CFS-G01553-100A
30 meters	0.50	CFS-G03053-050A
	1.00	CFS-G03053-100A
60 meters	1.00	CFS-G06053-100A

REPLACES

DB-WAX, DB-WAXetr, HP-WAX, HP-InnoWAX, HP-20M, CB-WAX, Stabilwax, RtxWAX, SUPEROX II, SUPELCOWAX-10, BP-20, CP-WAX 52 CB, GB-WAX, 007-CW, OV-WAX, AT-WAX, and ZB-WAX

VB-624/1301

(6% CYANOPROPYL-PHENYL)-METHYLPOLYSILOXANE

PRIMARY APPLICATIONS

EPA Methods

501.3	602
502.2	8010
503.1	8015
524.2	8020
601	8240

	df*	Prod No
0.18 mm ID		
10 meters	1.00	CFS-E01018-100A
20 meters	1.00	CFS-E02018-100A
20 meters	1.80	CFS-E02018-180A
40 meters	1.00	CFS-E04018-100A
0.20 mm ID		
25 meters	1.12	CFS-E02520-112A
0.25 mm ID		
15 meters	1.40	CFS-E01525-140A
30 meters	1.40	CFS-E03025-140A
60 meters	1.40	CFS-E06025-140A

** Film thickness in µm.*

	df*	Prod No
0.32 mm ID		
15 meters	1.80	CFS-E01532-180A
30 meters	1.80	CFS-E03032-180A
60 meters	1.80	CFS-E06032-180A
0.53 mm ID		
15 meters	3.00	CFS-E01553-300A
30 meters	3.00	CFS-E03053-300A
60 meters	3.00	CFS-E06053-300A
75 meters	3.00	CFS-E07553-300A

REPLACES

DB-624, HP-624, HP-VOC, Rtx-624, Rtx-Volatiles, BP-624, Vocol, 007-624, 007-502, NON-PAKD, 624, ZB-624

TO ORDER

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VB-1701

(14% CYANOPROPYL-PHENYL)-METHYLPOLYSILOXANE

PRIMARY APPLICATIONS

Drugs, PAHs, PCBs, Pesticides, Phenols, Solvents Tranquilizers

	df*	Prod No
0.25 mm ID		
15 meters	0.25	CFS-F01525-025A
	0.50	CFS-F01525-050A
30 meters	0.25	CFS-F03025-025A
	0.50	CFS-F03025-050A
60 meters	0.25	CFS-F06025-025A
	0.50	CFS-F06025-050A
0.32 mm ID		
15 meters	0.25	CFS-F01532-025A
	0.50	CFS-F01532-050A
	1.00	CFS-F01532-100A

** Film thickness in µm.*

	df*	Prod No
0.32 mm ID continued		
30 meters	0.25	CFS-F03032-025A
	0.50	CFS-F03032-050A
	1.00	CFS-F03032-100A
60 meters	0.25	CFS-F06032-025A
	0.50	CFS-F06032-050A
	1.00	CFS-F06032-100A
0.53 mm ID		
15 meters	0.50	CFS-F01553-050A
	1.00	CFS-F01553-100A
30 meters	0.50	CFS-F03053-050A
	1.00	CFS-F03053-100A
60 meters	0.50	CFS-F06053-050A
	1.00	CFS-F06053-100A

REPLACES

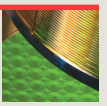
DB-1701, 007-1701, HP-1701, CP-Sil 19 CB, Rtx-1701, SPB-1701, BP-10, ZB-1701

MORE SIZES

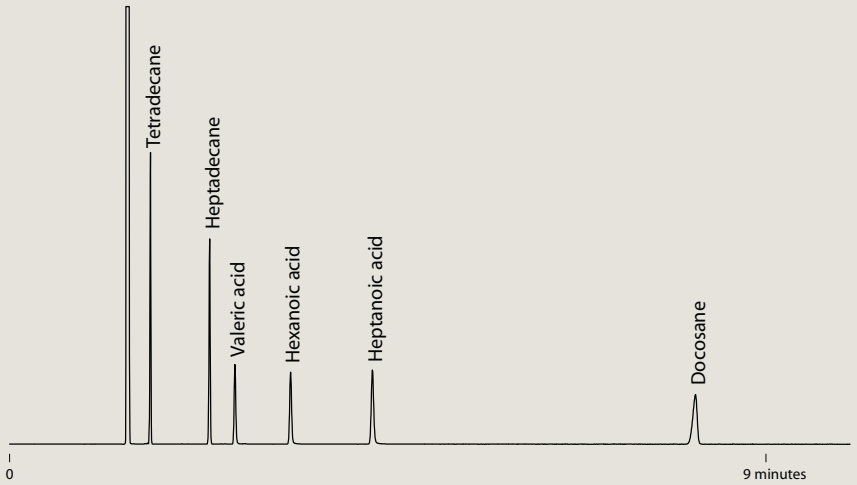
Call for information on additional column lengths and phase thicknesses.

TEMPERATURE SPECS

Temperature specifications can be found in the columns section of vici.com.



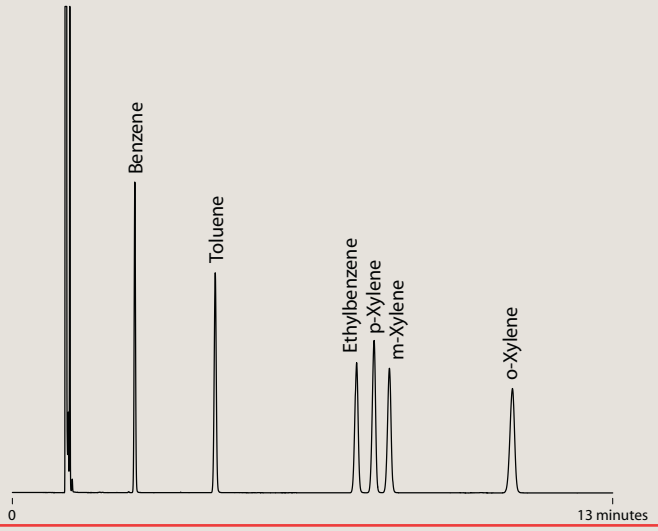
VB-WAX



FREE FATTY ACIDS

Column:	VB-Wax 30m x .25mm x .25µm
Column temp:	170°C isothermal
Detector:	FID
Carrier:	Hydrogen at 40 cm/sec
Injector:	Split 100:1
Det/Inj temp:	220°C

VB-WAX



BTEX

Column:	VB-Wax 30m x .25mm x .25µm
Column temp:	40°C isothermal
Detector:	FID
Carrier:	Hydrogen
Injector:	.5 µl 100:1 split
Det/Inj temp:	220°C

VB-WAX

GLYCOLS

Sample:	50 ppm EG, PG
Column:	VB-Wax 30m x .53mm x 1.00µm
Column temp:	80°C for 1 min, to 200°C @ 20°C/min, hold 5 min
Detector:	FID
Carrier:	Helium at 5 psi
Injector:	1 µl splitless, .5 min
Det/Inj temp:	220°C

Molesieve 5Å

PRIMARY APPLICATIONS

Gases

REPLACES

GS-Molesieve 5A
HP-PLOT Molesieve
CP-Molesieve 5A
Rt-Msieve-5A
MXT-Msieve-51
PLT-5A

ValcoPLOT Molesieve 5Å PLOT columns offer greatly enhanced analytical efficiency at economical prices. Our proprietary bonding technology ensures that the particles stay put even when columns are used with valves. Our thick film columns separate Ar/O_2 without the need for cryogenic equipment. The thin film columns offer fast elution of carbon monoxide with near perfect peak symmetry.

Fused silica

	*df**	*Prod No*
0.32 mm ID		
15 meters	10	CFS-X1532-100
	20	CFS-X1532-200
30 meters	10	CFS-X3032-100
	20	CFS-X3032-200

Fused silica

	*df**	*Prod No*
0.53 mm ID		
15 meters	20	CFS-X1553-200
	50	CFS-X1553-500
30 meters	20	CFS-X3053-200
	50	CFS-X3053-500

Stainless steel

	*df**	*Prod No*
0.53 mm ID		
15 meters	20	CSS-X1553-200
30 meters	20	CSS-X3053-200
	50	CSS-X3053-500

** Film thickness in µm.*

TO ORDER

For more sizes and to order, contact us:

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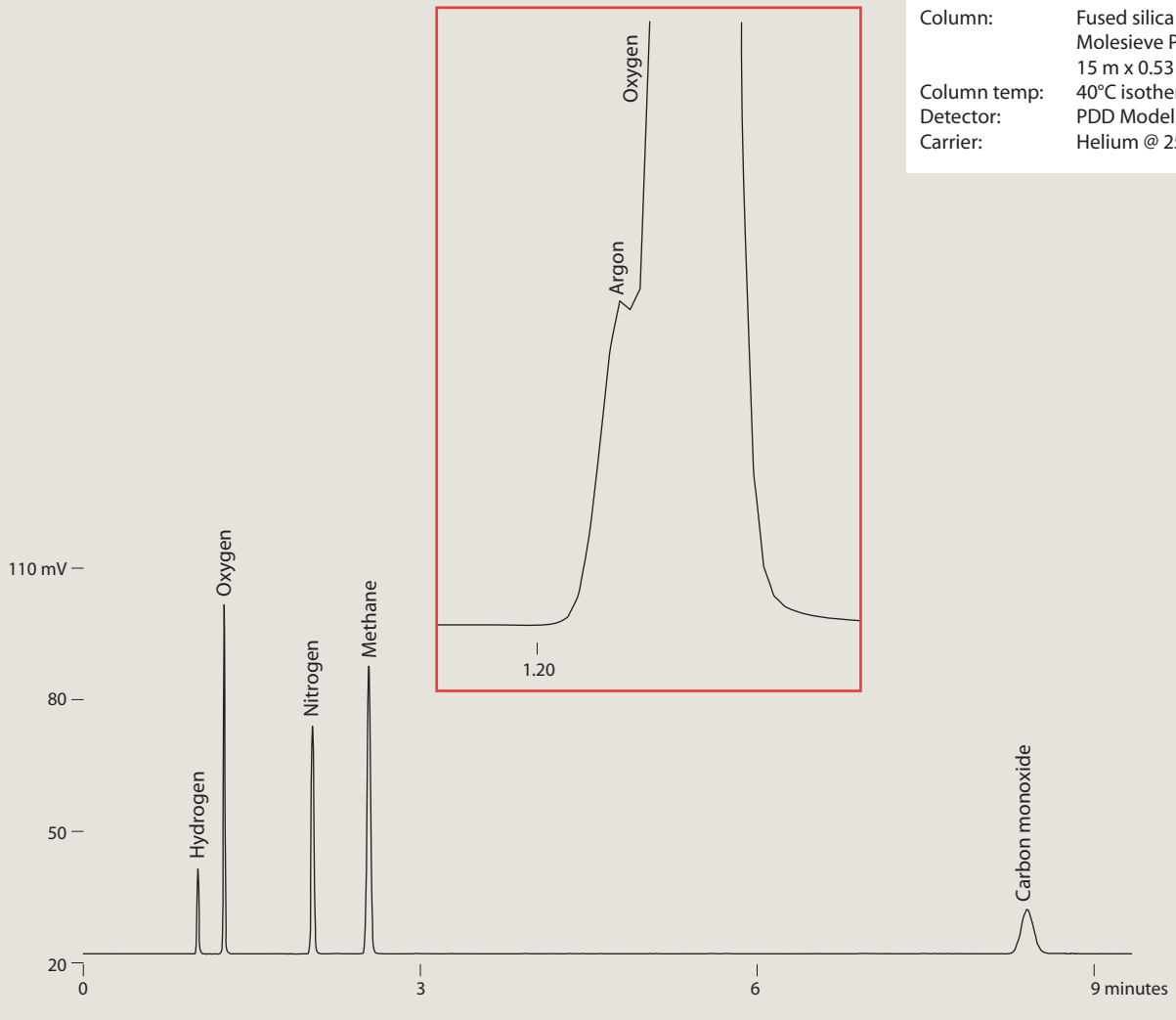
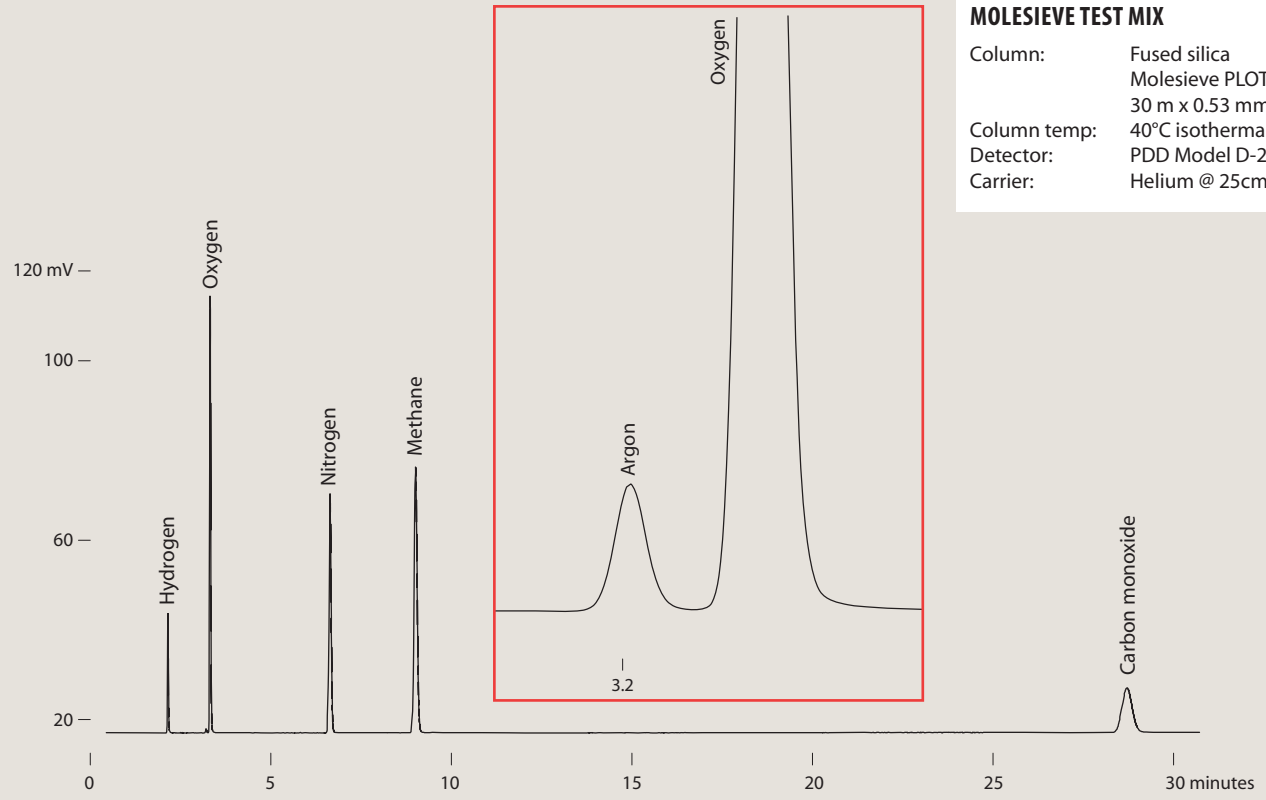
VALCOPLOT MOLESIEVE 5Å – FUSED SILICA



MOLESIEVE TEST MIX

Column:	Fused silica Molesieve PLOT 15 m x 0.53 mm x 20.0 µm
Column temp:	40°C isothermal
Detector:	PDD Model D-2
Carrier:	Helium @ 25 cm/sec

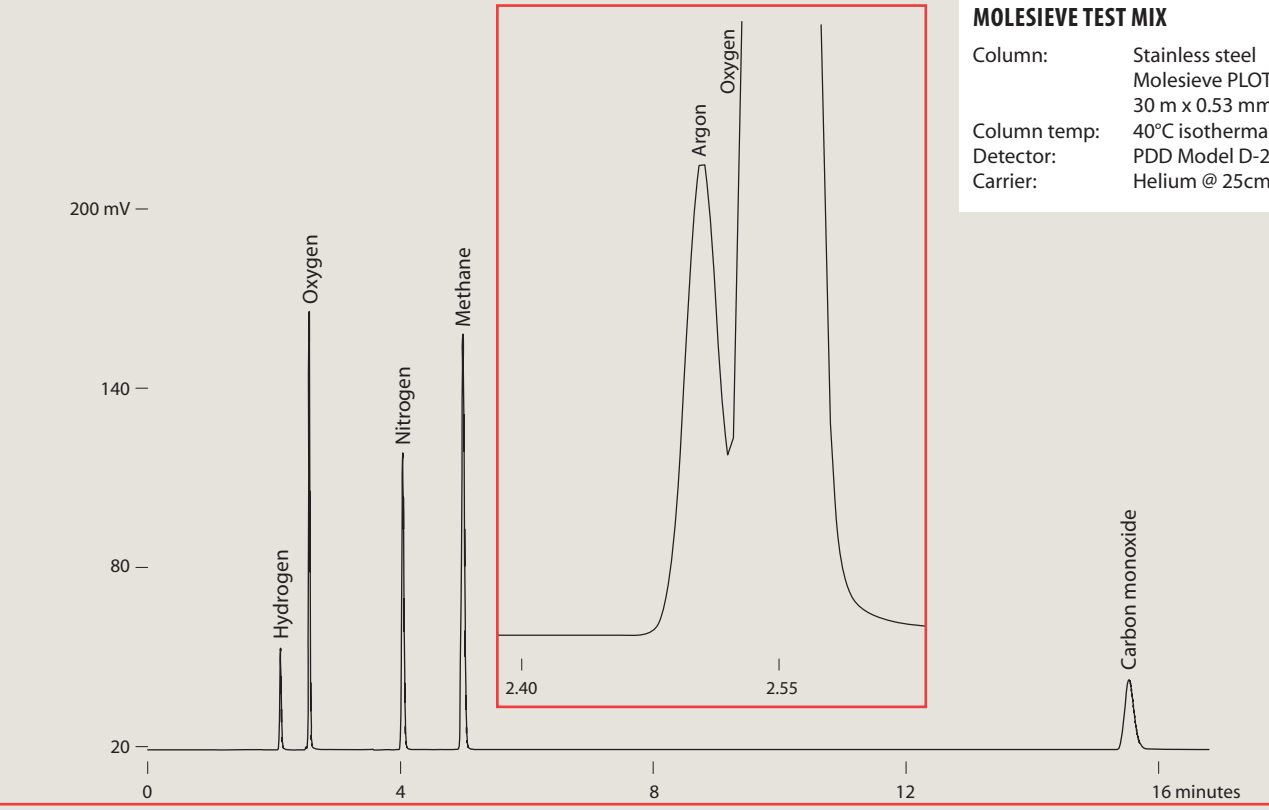
VALCOPLOT MOLESIEVE 5Å – FUSED SILICA



MOLESIEVE TEST MIX

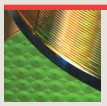
Column:	Fused silica Molesieve PLOT 30 m x 0.53 mm x 50.0 µm
Column temp:	40°C isothermal
Detector:	PDD Model D-2
Carrier:	Helium @ 25cm/sec

VALCOPLOT MOLESIEVE 5Å – STAINLESS STEEL



MOLESIEVE TEST MIX

Column:	Stainless steel Molesieve PLOT 30 m x 0.53 mm x 20.0 µm
Column temp:	40°C isothermal
Detector:	PDD Model D-2
Carrier:	Helium @ 25cm/sec



GC CAPILLARY COLUMNS

Alumina

ALUMINUM OXIDE

PRIMARY APPLICATIONS

C1 - C5 hydrocarbons

With ValcoPLOT Al_2O_3 PLOT columns there's no need for cryogenic equipment to analyze C1 - C5 hydrocarbons in a main stream of C1 - C5 hydrocarbons. ValcoPLOT Al_2O_3 columns are deactivated with small salt crystals stable to 200°C. KCl deactivation produces a relatively apolar column while Na_2SO_4 produces columns exhibiting increased retention of unsaturated hydrocarbons.

REPLACES

GS-Alumina
HP-PLOT Al203
CP-Al203/KCl
CP-Al203/Na2SO4
Rt-alumina-PLOT
Al203/KCl
Al203/Na2SO4

VP-Alumina/KCl

	Fused silica df*	Prod No
0.32 mm ID		
15 meters	5	CFS-Y1532-050
30 meters	5	CFS-Y3032-050
0.53 mm ID		
15 meters	10	CFS-Y1553-100
30 meters	10	CFS-Y3053-100
50 meters	10	CFS-Y5053-100

VP-Alumina/Na_2SO_4

	Fused silica df*	Prod No
0.32 mm ID		
15 meters	5	CFS-Z1532-050
30 meters	5	CFS-Z3032-050
0.53 mm ID		
15 meters	10	CFS-Z1553-100
30 meters	10	CFS-Z3053-100
50 meters	10	CFS-Z5053-100

** Film thickness in µm.*

ValcoPLOT A

HIGH PURITY DIVINYLBENZENE/ETHYLENEGLYCOLDIMETHACRYLATE

PRIMARY APPLICATIONS

Solvents
Light gases
Light hydrocarbons
Residual solvents

	Fused silica df*	Prod No
0.32 mm ID		
15 meters	10	CFS-PA1532-100
30 meters	10	CFS-PA3032-100
0.53 mm ID		
15 meters	20	CFS-PA1553-200
30 meters	20	CFS-PA3053-200

** Film thickness in µm.*

ValcoPLOT D

HIGH PURITY DIVINYLBENZENE

PRIMARY APPLICATIONS

Solvents
Hydrocarbons
Alcohols
Sulfur compounds
Residual solvents
Halogenated hydrocarbons

	Fused silica df	Prod No
0.32 mm ID		
15 meters	10	CFS-PD1532-100
30 meters	10	CFS-PD3032-100
0.53 mm ID		
15 meters	20	CFS-PD1553-200
30 meters	20	CFS-PD3053-200

** Film thickness in µm.*

ValcoPLOT Q

DIVINYLBENZENE

NOTE

We highly recommend ValcoPLOT D, which has retention characteristics similar to ValcoPLOT Q but is made from higher purity raw materials.

	Fused silica df*	Prod No
0.32 mm ID		
15 meters	10	CFS-PQ1532-100
30 meters	10	CFS-PQ3032-100
0.53 mm ID		
15 meters	20	CFS-PQ1553-200
30 meters	20	CFS-PQ3053-200

** Film thickness in µm.*

MORE SIZES

Call for information on additional column lengths.

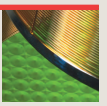
TEMPERATURE SPECS

Temperature specifications can be found in the columns section of vici.com.

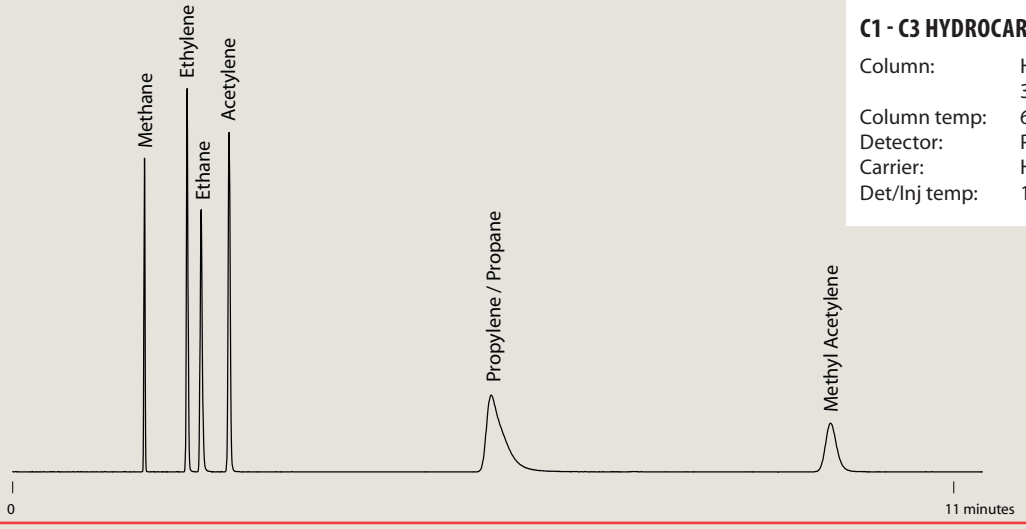
TO ORDER

Contact VICI Metronics:

Toll-free. . . . 877–737–1887
Tel 360–697–9199
Fax 360–697–6682
columns@vici.com



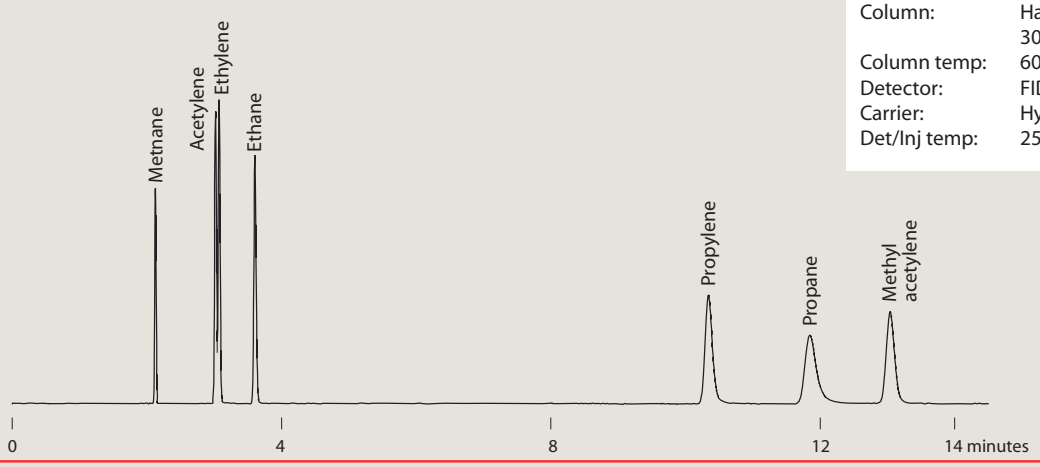
VALCOPLOT A



C1 - C3 HYDROCARBONS

Column:	HayeSep A PLOT 30m x .53mm x 20.0µm
Column temp:	60°C isothermal
Detector:	PDD
Carrier:	Helium
Det/Inj temp:	165°C

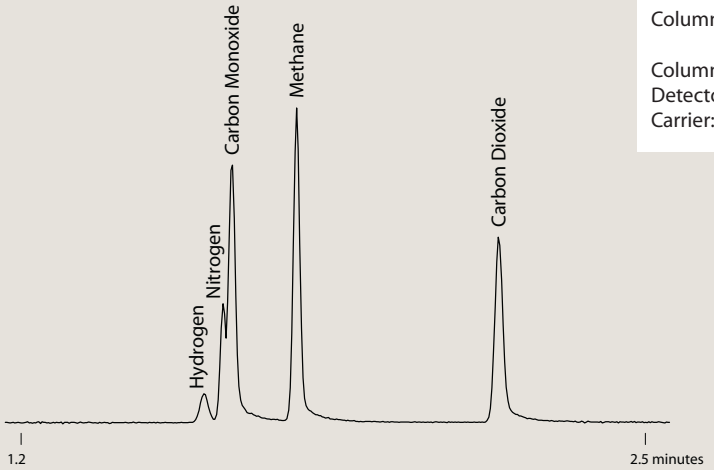
VALCOPLOT D



C1 - C3 HYDROCARBONS

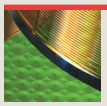
Column:	HayeSep D PLOT 30m x .53mm x 20.0µm
Column temp:	60°C isothermal
Detector:	FID
Carrier:	Hydrogen
Det/Inj temp:	250°C

VALCOPLOT D



GAS MIXTURE

Column:	HayeSep D PLOT 30m x .53mm x 20.0µm
Column temp:	40°C isothermal
Detector:	PDD
Carrier:	Helium



GC CAPILLARY COLUMNS

ValcoPLOT B

DIVINYLBENZENE/POLYETHYLENEIMINE

Fused silica

	df*	Prod No
0.32 mm ID		
15 meters	10	CFS-PB1532-100
30 meters	10	CFS-PB3032-100

	df*	Prod No
0.53 mm ID		
15 meters	20	CFS-PB1553-200
30 meters	20	CFS-PB3053-200

ValcoPLOT C

DIVINYLBENZENE/ACRYLONITRILE

Fused silica

	df*	Prod No
0.32 mm ID		
15 meters	10	CFS-PC1532-100
30 meters	10	CFS-PC3032-100

	df*	Prod No
0.53 mm ID		
15 meters	20	CFS-PC1553-200
30 meters	20	CFS-PC3053-200

ValcoPLOT N

DIVINYLBENZENE/ETHYLENEGLYCOLDIMETHACRYLATE

Fused silica

	df*	Prod No
0.32 mm ID		
15 meters	10	CFS-PN1532-100
30 meters	10	CFS-PN3032-100

	df*	Prod No
0.53 mm ID		
15 meters	20	CFS-PN1553-200
30 meters	20	CFS-PN3053-200

ValcoPLOT P

DIVINYLBENZENE/STYRENE

Fused silica

	df*	Prod No
0.32 mm ID		
15 meters	10	CFS-PP1532-100
30 meters	10	CFS-PP3032-100

	df*	Prod No
0.53 mm ID		
15 meters	20	CFS-PP1553-200
30 meters	20	CFS-PP3053-200

ValcoPLOT R

DIVINYLBENZENE/N-VINYL-2-PYROLLIDINONE

Fused silica

	df*	Prod No
0.32 mm ID		
15 meters	10	CFS-PR1532-100
30 meters	10	CFS-PR3032-100

	df*	Prod No
0.53 mm ID		
15 meters	20	CFS-PR1553-200
30 meters	20	CFS-PR3053-200

ValcoPLOT S

DIVINYLBENZENE/4-VINYLPYRIDINE

Fused silica

	df*	Prod No
0.32 mm ID		
15 meters	10	CFS-PS1532-100
30 meters	10	CFS-PS3032-100

	df*	Prod No
0.53 mm ID		
15 meters	20	CFS-PS1553-200
30 meters	20	CFS-PS3053-200

** Film thickness in µm.*

MORE SIZES

Call for information on additional column lengths.

TEMPERATURE SPECS

Temperature specifications can be found in the columns section of vici.com.

TO ORDER

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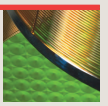
Toll-free. . . . 877–737–1887
Tel 360–697–9199
Fax 360–697–6682
columns@vici.com



VB-Fluoro capillary columns

100% BONDED FLUOROSILICONE

PRIMARY APPLICATIONS

- Aldehydes
- CFCs
- Explosives
- Ketones
- PAHs
- Silanes
- Unsaturated compounds

REPLACES

Rtx-200, DB-200, DB-210, and VF-200

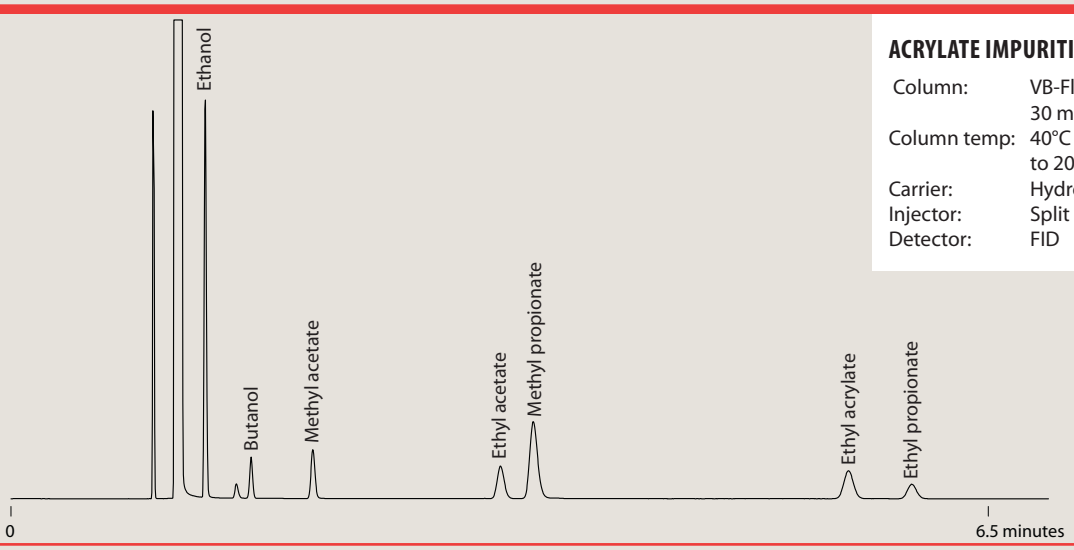
VB-Fluoro capillary columns feature unique selectivity created by high fluorine affinity to analyte lone pair electrons. This is coupled with thermal stability similar to low polarity phases such VB-1 and VB-5.

Low bleed characteristics make VB-Fluoro columns well suited for MS and ECD applications, and the high thermal stability allows their use as a complementary column for most high temperature applications which commonly utilize low polarity stationary phases.

	*df**	*Prod No*
0.25 mm ID		
30 meters	0.25	CFS-N03025-025
0.53 mm ID		
30 meters	1.00	CFS-N03053-100

** Film thickness in µm.*

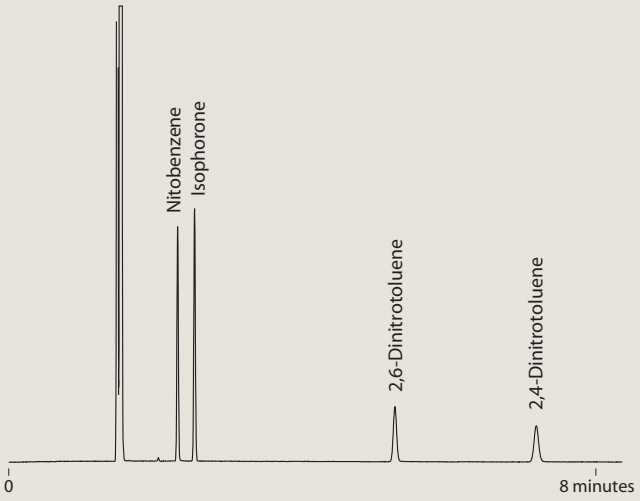
VB-FLUORO



ACRYLATE IMPURITIES

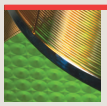
Column:	VB-Fluoro 30 m x .53 mm x 1.00 µm
Column temp:	40°C for 5 min, to 200°C @ 10°C/min
Carrier:	Hydrogen at 35 cm/sec
Injector:	Split 100:1
Detector:	FID

VB-FLUORO



EXPLOSIVES

Column:	VB-Fluoro 30 m x .53 mm x 1.00 µm
Column temp:	Isothermal 200°C
Carrier:	Hydrogen at 35 cm/sec
Injector:	Split 100:1
Detector:	FID



DEACTIVATED FUSED SILICA (GUARD COLUMNS)

- Non-polar deactivation
- Maximum temperature: 325°C / 350°C
- Useful as transfer line, guard column, or long retention gap
- Tested to insure inertness

Product numbers below are for columns without a cage.
To order a column with a cage, add -C at the end of the product number.
Sold individually unless otherwise noted in product number chart.

Deactivated fused silica

	Prod No
0.10 mm ID	
1 meter	DFS-00110
1 meter, pkg/10	DFS-00110-10
5 meters	DFS-00510
10 meters	DFS-01010
0.18 mm ID	
1 meter	DFS-00118
1 meter, pkg/10	DFS-00118-10
5 meters	DFS-00518
10 meters	DFS-01018
0.25 mm ID	
1 meter	DFS-00125
1 meter, pkg/10	DFS-00125-10
5 meters	DFS-00525
15 meters	DFS-01525

	Prod No
0.32 mm ID	
1 meter	DFS-00132
1 meter, pkg/10	DFS-00132-10
5 meters	DFS-00532
15 meters	DFS-01532
0.53 mm ID	
1 meter	DFS-00153
1 meter, pkg/10	DFS-00153-10
5 meters	DFS-00553
15 meters	DFS-01553

TEMPERATURE SPECS

Temperature specifications can be found in the columns section of vici.com.

TO ORDER

Contact VICI Metronics:

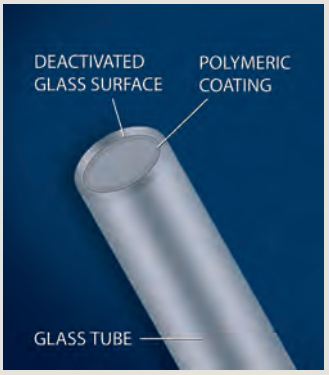
Toll-free. . . . 877–737–1887
Tel 360–697–9199
Fax 360–697–6682
columns@vici.com

REDUCED BREAKDOWN INJECTION PORT LINERS

- Reduce breakdown of Endrin and DDT
- Increase the interval between liner changes

DDT and Endrin are easily degraded in the injection port; with non-deactivated liners and those filled with non-deactivated glass wool, Endrin breakdown can be as high as 98%. EPA method 8081A states, "If degradation of either DDT or Endrin exceeds 15%, take corrective action before proceeding with calibration."

VICI reduced breakdown liners are produced by applying a highly-crosslinked siloxane over a conventionally deactivated liner. The resulting liner contributes less to breakdown than any other component of the injection system.

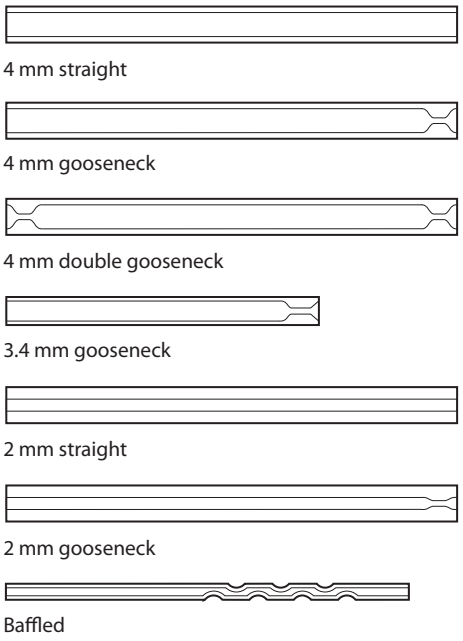


Reduced breakdown injection port liners

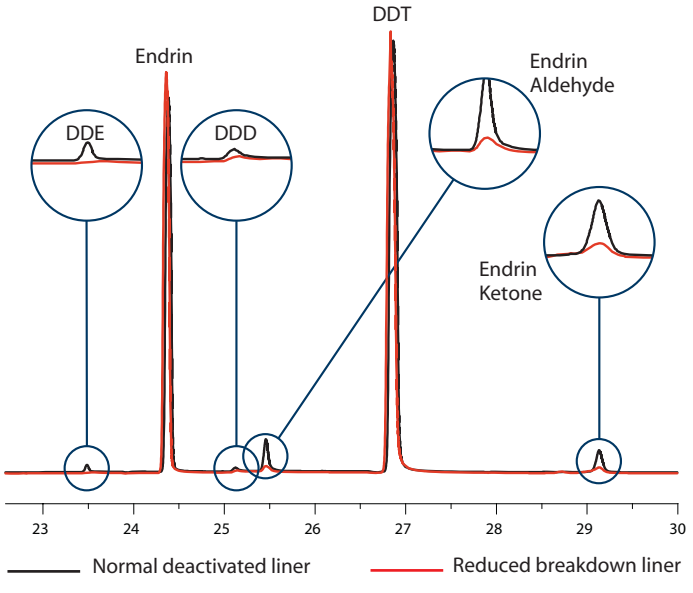
Package of 5 liners.

For injector	*Description*	*Prod No*
Agilent/Thermo	2 mm straight splitless	LNR-HP2-5
	4 mm straight splitless	LNR-HP4-5
	2 mm gooseneck	LNR-GS2-5
	4 mm gooseneck	LNR-GS4-5
	4 mm double gooseneck	LNR-DGS4-5
Gerstel CIS-4/PTV	Baffled	LNR-CIS4-B-5
Varian CP-1177	2 mm gooseneck	LNR-GS2-5
	4 mm gooseneck	LNR-GS4-5
Varian 1078/1079	2 mm gooseneck	LNR-VARGS2-5
	3.4 mm gooseneck	LNR-VAR3.4-5

CROSS SECTIONS OF LINERS



PESTICIDES WITH 4 MM SINGLE GOOSENECK LINER (LNR-GS4-5)



GAS PURIFICATION

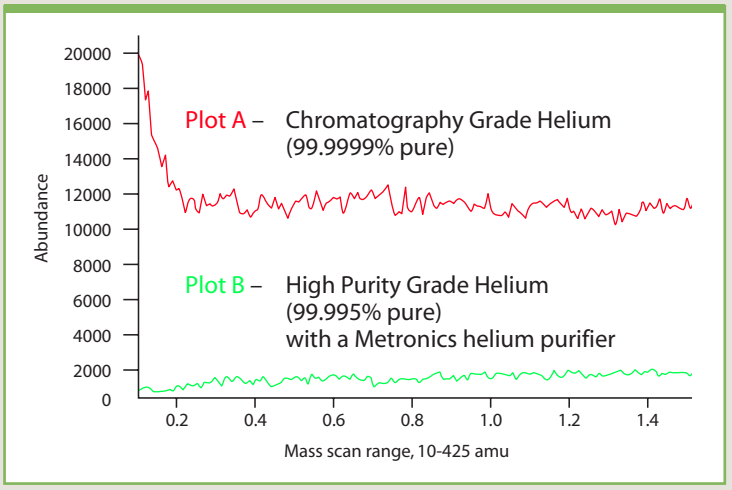
GAS-SPECIFIC PURIFIERS AND CONTAMINANT TRAPS
From VICI Metronics

GAS SPECIFIC PURIFIERS AND CONTAMINANT TRAPS

- Speedy ROI – produce better than 99.9999% purity from a 99.995% cylinder
- Provide point-of-use gas purification of helium, hydrogen, methane, nitrogen, carbon dioxide, or air
- Reduce gas impurities from high PPM to low PPB levels
- Decrease baseline noise and increase GC/MS sensitivity
- Replace three traps with one purifier

Gas purity is critical to GC performance. Several types of contaminants are detrimental – notably moisture, hydrocarbons, and oxygen. VICI Metronics gas purifier modules are designed to be placed in-line with the GC carrier or detector gas supply to remove these contaminants from the analytical gases prior to their entering the GC. Gas purification is optimized by a multiple bed format. Each bed functions at a lower contaminant concentration, resulting in a series of contaminant concentration gradients across the length of the gas purifier.

BETTER THAN 99.9999% PURITY FROM A 99.995% CYLINDER



VICI Metronics gas purifiers dramatically reduce contaminant levels and absorb a greater variety of contaminants than other gas purification products. Advanced materials and design features guarantee that the modules will produce gases that are at least a factor of ten higher than a 99.9999% "chromatography grade" cylinder of gas when the purifier is supplied by a 99.995% cylinder. The cost difference between the two grades of gas will pay for the cost of the gas purifier several times over during its operating life.

SEE ALSO
Helium and nitrogen purifiers 216-217

Gas specific purifiers

Description	*1/8" fitting*	*1/4" fitting*
Helium purifier	P100-1	P100-2
Hydrogen purifier	P200-1	P200-2
Nitrogen purifier	P300-1	P300-2
Nitrogen purifier for LC/MS apps	P310-1	P310-2
Purifier for nitrogen generators	P350-1	P350-2
Air purifier	P400-1	P400-2
Methane purifier*	P500-1	P500-2
Carbon dioxide (gas) purifier	P600-1	P600-2
Carbon dioxide (liquid) purifier	P700-1	P700-2

*12" long

Contaminant traps

Description	*1/8" fitting*	1/4" fitting
Moisture trap	T100-1	T100-2
Hydrocarbon trap	T200-1	T200-2
Oxygen trap	T300-1	T300-2
Sulfur trap*	T400-1	T400-2
Sulfur trap	T401-1	T401-2
Mercury trap*	T700-1	T700-2

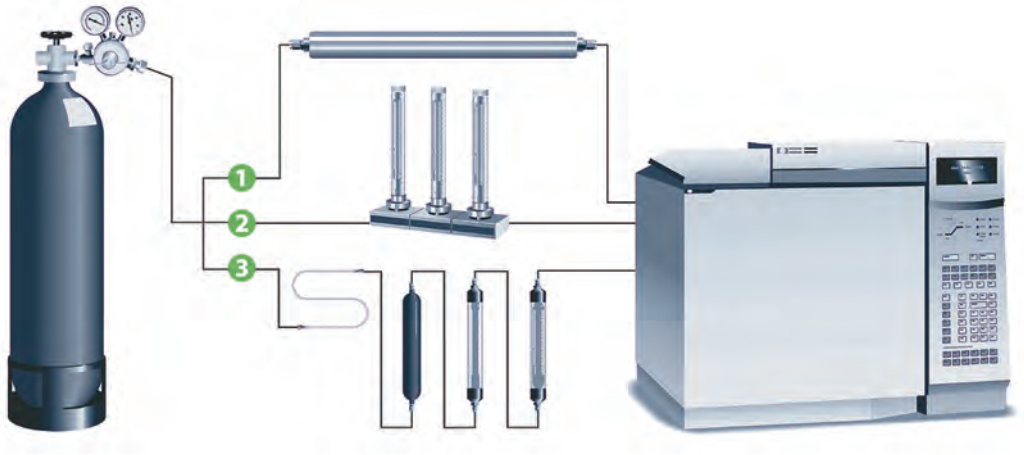
SPECIFICATIONS

22.5" long x 1.5" diameter
(Purifiers with * are 12" long)

Max inlet pressure	1000 psi (6895 kPa)
Recommended flow	500 mL/min
Capacity	30,000L with 50 ppm impurities at inlet

FITTINGS AND GAS PURITY

Every connection in your gas delivery system has the potential for leaks; the more fittings you have, the greater the potential. Using 1 a VICI Metronics purifier or trap minimizes the number of fittings as compared to 2 a typical manifold system or 3 contaminant trap configuration with multiple components.



PPB AT OUTLET

BASED ON 50 PPM NOMINAL INLET CONCENTRATION LEVEL

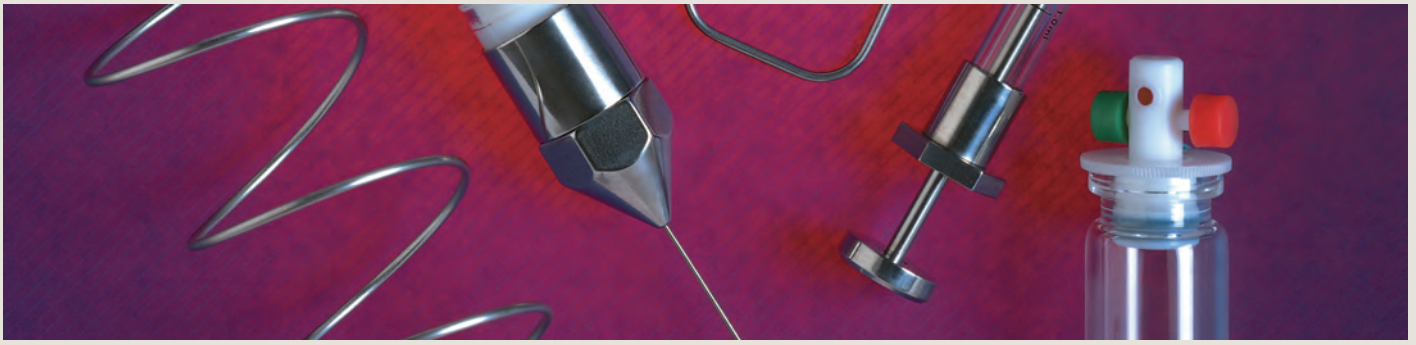
	CO	*CO_2*	*O_2*	*H_2O*	*Sulfur compounds*	*Non-methane hydrocarbons*
Helium purifier	<1	<1	<1	<1	<1	<3
Hydrogen purifier	<1	<1	<1	<1	<1	<3
Air purifier				<1		<3
Methane purifier	<1	<1	<1	<1	<1	<3
Nitrogen purifier	<1	<1	<1	<1	<1	<3
Nitrogen purifier for LC/MS apps				<25	<25	<25
Purifier for nitrogen generators				<25	<25	<25
Moisture trap				<1		
Hydrocarbon trap						<3
Oxygen trap			<1	<1		
Sulfur trap				<1	<1	

TO ORDER

For prices or more information about our gas purifiers, contact VICI Metronics:

Toll-free 877–737–1887
Tel 360–697–9199
metronics@vici.com
vicimetronics.com

ANALYTICAL SYRINGES



PLUS MININERT VALVES AND MICRO SYRINGES
From VICI Precision Sampling

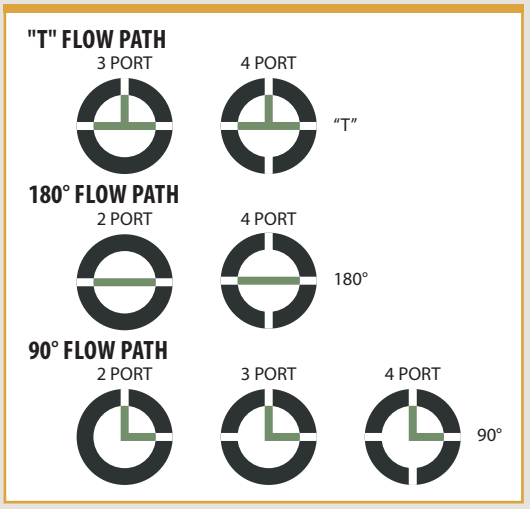
MICRO VALVES FOR GC AND LC

- 200 psi helium test, .060" bore
- Compact 1" design
- Convenient panel mount
- Variety of configurations

Simplify your liquid or gas handling application with a VICI Precision Sampling Micro valve. The unique design of the fitting detail allows a leak-free seal with no potential for rotor damage from overtightening. Internal parts are PEEK and PTFE.

Order 1/4-28 fittings separately.

FLOW PATH CONFIGURATIONS



Micro valves for GC and LC

	Prod No
"T" flow path	
3 ports	PS-660100
4 ports	PS-660110
180° flow path	
2 ports	PS-660200
4 ports	PS-660210
90° flow path	
2 ports	PS-660300
3 ports	PS-660310
4 ports	PS-660320

SPECIFICATIONS

200 psi
.060" bore
1/4-28 fitting detail
All polymer-based materials

MORE INFO

1/4-28 fittings . . . . . .pages 52-53, 56-57

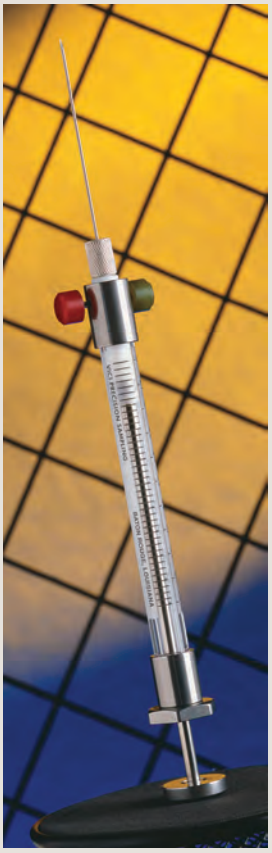
TO ORDER

Toll-free . . . 800–828–1653
Tel 225–927–1128
precision@vici.com

FOR OUR COMPLETE LINE OF PRODUCTS

Visit our website at **vicipreciscionsampling.com** or call us for a catalog.

ANALYTICAL SYRINGES



PRESSURE-LOK® GAS SYRINGES

VICI Precision Sampling's patented Pressure-Lok® syringes feature a PTFE plunger tip, stress-formed by a special process to ensure a leak-tight seal. The self-lubricating plunger tip stays smooth for the life of the syringe, with none of the seizing or residue buildup associated with conventional all-metal plungers.

The needle is sealed by a PTFE sleeve, or packing, which effectively isolates the sample from the needle cement and prevents any possible dissolution of the adhesive or contamination of the sample. All Pressure-Lok syringes feature ultra smooth bores, easily replaceable parts, low dead volume, crisp clean graduations, and precision calibration.

Series A-2

FOR GC

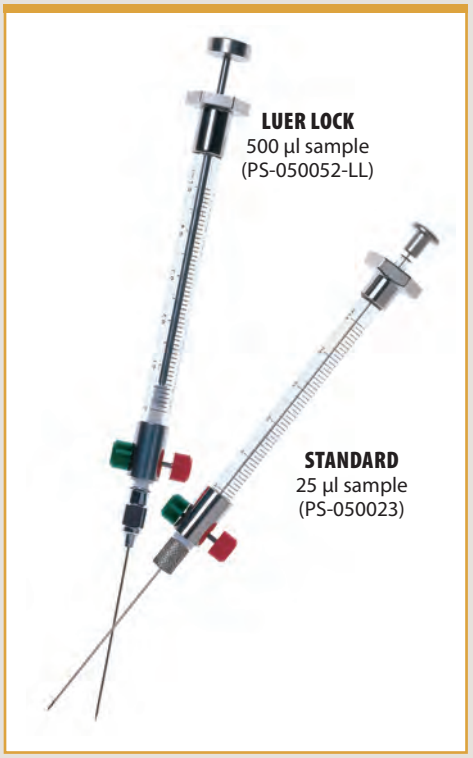
The A-2 features a push-button valve for 250 psi sample storage in syringes as small as 25 µl. Small liquid samples with low-boiling components are not lost through evaporation, as often occurs with ordinary syringes.

The positive rear stop (in 250 µl and larger sizes) prevents plunger blowout at elevated pressures. The Series A-2 syringe has all the standard Pressure-Lok features such as a PTFE plunger tip, PTFE-sealed needle, and ultrasmooth bore. Replacement components are available for easy repairs.

SPECIFICATIONS

Removable needles
Bevel, open end
Needle size:
.028" x .005" x 2" (25, 50, and 100 µl)
.029" x .012" x 2" (all other sample sizes)
250 psi max, gases and liquids

Sample size	**Standard** *Prod No*	**Luer lock** *Prod No*
25 µl	PS-050023	PS-050043-LL
50 µl	PS-050024	PS-050044-LL
100 µl	PS-050025	PS-050045-LL
250 µl	PS-050031	PS-050051-LL
500 µl	PS-050032	PS-050052-LL
1 ml	PS-050033	PS-050053-LL
2 ml	PS-050034	PS-050054-LL
5 ml	PS-050035	PS-050055-LL
10 ml	PS-050036	PS-050056-LL



Replacement needles

SERIES A-2

Pkg/3:	*Size*	**Bevel, open end** *Prod No*	**Side port, taper** *Prod No*
Pressure-Lok	.028" x .005" x 2"	PS-943050	—
	.029" x .012" x 2"	PS-943051	PS-943052
Luer	.028" x .005" x 2"	PS-943060	—
	.028" x .012" x 2"	PS-943061	PS-943062

SAFETY NOTE

To prevent possible injury, proper safety precautions should always be observed when pressurizing glass cylinders such as syringes.

VICI syringes are not for medical use.

ANALYTICAL SYRINGES

Series C-160

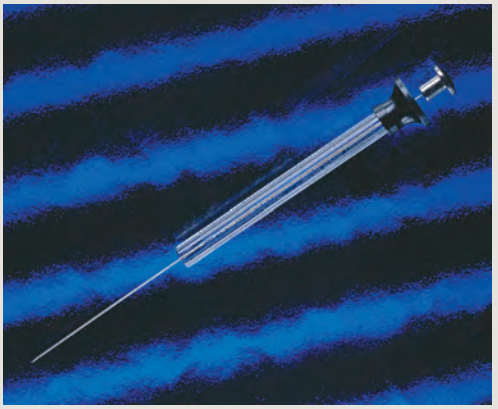
FOR GC

The C-160 offers day-in, day-out dependability at an economical price. A plunger tip of stress-formed virgin PTFE is self-lubricating and durable, and the PTFE needle seat at the rear of the needle prevents possible dissolution of the needle cement or contamination of the sample.

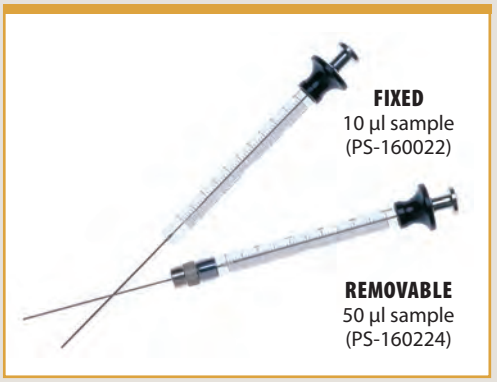
Choose between a fixed or removable needle version. Replacement needles are open end bevel type, sized .019" x .005" x 2.25", and come complete with an integral PTFE seal for a low dead volume connection and a leak-tight fit.

SPECIFICATIONS

Fixed and removable needles
Bevel, open end
Fixed needle size: .019" x .005" x 2"
Removable needle size: .019" x .005" x 2.25"
250 psi max, gases and liquids



Sample size	Fixed needle Prod No	Removable needle Prod No
5 µl	PS-160021	PS-160221
10 µl	PS-160022	PS-160222
25 µl	PS-160023	PS-160223
50 µl	PS-160024	PS-160224
100 µl	PS-160025	PS-160225



Replacement needles

SERIES C-160

(Pkg/3)	Bevel, open end Prod No
.019" x .005" x 2.25"	PS-123050

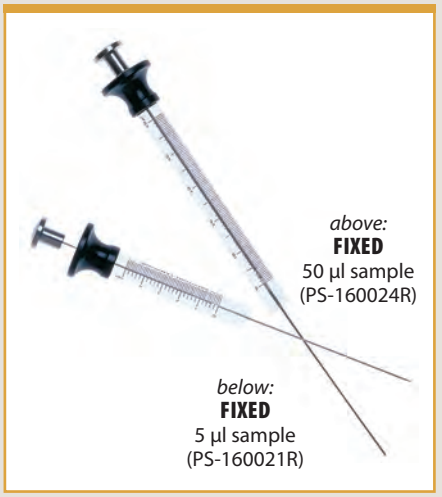
Syringes for HPLC injectors

VALCO, CHEMINERT, AND RHEODYNE

Syringes used to fill a loop on a sample injection valve have needles with blunt, smooth ends. For a sample to be delivered with any repeatability, the end of the needle must contact the bottom of the valve's fitting detail uniformly and seal on the outside of the tip. All Precision Sampling syringes for valve injections have smooth, burr-free ends that fit the valve fitting details perfectly. The standard HPLC syringe is our basic C-160 with a 2" long 22 gauge blunt tip needle.

SPECIFICATIONS

Removable needles
Blunt tip, open end
Needle size: 22 gauge x 2"
250 psi max



Sample size	Fixed needle Prod No	Removable needle Prod No
5 µl	PS-160021R	PS-160221R
10 µl	PS-160022R	PS-160222R
25 µl	PS-160023R	PS-160223R
50 µl	PS-160024R	PS-160224R
100 µl	PS-160025R	PS-160225R

Replacement needles

FOR HPLC INJECTORS

(Pkg/3)	Blunt, open end Prod No
.019" x .005" x 2.25"	PS-123050R

SEE ALSO

Fill ports. . . . . page 30
Luer adapters 31

TO ORDER

Toll-free . . . 800–828–1653
Tel 225–927–112
precision@vici.com

FOR OUR COMPLETE LINE OF PRODUCTS

Visit our website at **viciprecisionsampling.com** or call us for a catalog.

MININERT™ VALVES

Mininert™ push-button valves are highly dependable, leak-tight closures for screw-cap vials and other laboratory containers. When used with a glass vial, only PTFE and glass are in contact with the contents. Their unique features make Mininert valves the ideal closure for calibration standards, air- or moisture-sensitive fluids, derivatizing reagents, or volatile chemicals. Operation is extremely simple – push the green button to open the valve, insert the needle through the septum and take a sample, withdraw the needle, and push the red button to close the valve.

Valves for vials

The screw-cap Mininert is available in a variety of sizes. The crimp-top valve for 13 mm ID glassware slides into the neck of the vial and features a threaded flange which is turned to provide a leak-tight fit. Sold in packages of 12.

Cap/thread size	*Prod No*	*Cap/thread size*	*Prod No*
13 mm-425	PS-614158	20 mm-400	PS-614170
15 mm-425	PS-614160	24 mm-400	PS-614163
18 mm-400	PS-614161	Crimp top	PS-614250

Valves with threaded fittings

Our threaded designs offer positive on/off fluid control as an in-line valve or syringe access as a termination valve at a sample point. In-line valves are 1/4-28 male to male or 1/4-28 female to female. Termination valves are offered in 1/4-28 male or female and 1/8" NPT male or female.

	Prod No
In-line valves	
1/4-28 male to male	PS-631205
1/4-28 female to female	PS-631206
Termination valves	
1/4-28 male	PS-631201
1/4-28 female	PS-631203
1/8" NPT male	PS-631202
1/8" NPT female	PS-631204

Mininert syringe valves

These convenient add-on valves allow our Series C and D syringes to store samples at up to 250 psi. The valve body is all PTFE, with a stainless steel stem. Also available to fit luer-tip syringes from any manufacturer. All accept traditional luer needles.

For C or D syringe	PS-654050
For Luer-tip syringe	PS-654051

Replacement septa and septum installation tool

These silicone septa fit all Mininert valves. The installation tool is a handy device for quickly removing and replacing needle seal septa.

Septa, *pkg/50*	PS-644350
Installation tool	PS-644850

SPECIFICATIONS

TEMPERATURES

Mininert valves can be used at temperature up to 40°C (105°F). However, after use at high temperatures, the valve may leak slightly when cooled to room temperature.

MATERIALS

PTFE is highly inert and may be used with most common materials. It is particularly useful for working with most acids and organic solvents. However, problems may be encountered when used with organometallics and some strong bases. We recommend actual exposure tests before use with any material.

PRESSURE

The sealing ability of Mininert valves is more than adequate for containing most volatile liquids and gases at low pressures. Mininert valves have been used as high as 120 psi without leakage, but this is ***not*** a recommendation for pressurizing glass containers to these levels. Such pressurization of glass containers can be extremely dangerous.

VALVES FOR VIALS

VALVES WITH THREADED FITTINGS

SYRINGE VALVES

SEPTA AND INSTALLATION TOOL

GENERAL REFERENCE

HELPFUL PRODUCT INFORMATION

This section contains background information to supplement the product discussions on the preceding pages. You will find a glossary of terms, safety and trademark information, and discussions of the mechanical and chemical properties of the materials used in the manufacturing of our products. Additional information, including a complete library of technical notes and manuals, can be found in the support section of our website at **www.vici.com**.

SAFETY

1. Never tighten or loosen a fitting or valve connection while it is pressurized. Provisions should be made within the system to release pressure via suitable valve components.
2. Do not exceed pressure or temperature specifications. Note that in many cases, the system pressure is limited by the tubing used, not the fittings.
3. The use of toxic or hazardous fluids requires extra caution during operation or maintenance. The user is responsible for ensuring safe operation and for understanding the nature of the fluids and chemistry involved.
4. The use of thread lubricants or sealants is required only on tapered pipe threads. These sealants and lubricants may have different temperature limits or chemical compatibility than the valves or fittings.

CAUTION

The improper selection or use of components or systems described herein can cause personal injury or property damage.

The system designer and user are solely responsible for the selection of products suitable for the specific requirements of the application, as well as proper installation, operation, and maintenance of these products.

Compatibility with hazardous fluid streams, environmental conditions, and mechanical requirements are the responsibility of the user.

WARRANTY

This Limited Warranty gives the Buyer specific legal rights, and a Buyer may also have other rights that vary from state to state.

For a period of 365 calendar days from the date of shipment, Valco Instruments Company, Inc. (herein-after Seller) warrants the goods to be free from defect in material and workmanship to the original purchaser. During the warranty period, Seller agrees to repair or replace defective and/or nonconforming goods or parts without charge for material or labor OR at Seller's option demand return of the goods and tender repayment of the price. Buyer's exclusive remedy is repair or replacement of defective and nonconforming goods OR at Seller's option return of the goods and repayment of the price.

Seller excludes and disclaims any liability for lost profits, personal injury, interruption of service, or for consequential incidental or special damages arising out of, resulting from, or relating in any manner to these goods.

This Limited Warranty does not cover defects, damage, or nonconformity resulting from abuse, misuse, neglect, lack of reasonable care, modification, or the attachment of improper devices to the goods. This Limited Warranty does not cover expendable items, such as but not limited to valve seals or ferrules. This warranty is VOID when repairs are performed by a non-authorized service center or representative.

If you have any problem locating an authorized service center or representative, please call, fax, or write the Service Department, listed at left.

At Seller's option, repairs or replacements will be made on site or at the factory. If repairs or replacements are to be made at the factory, Buyer shall return the goods prepaid and bear all the risks of loss until delivered to the factory. If Seller returns the goods, they will be delivered prepaid and Seller will bear all risks of loss until delivery to Buyer. Buyer and Seller agree that this Limited Warranty shall be governed by and construed in accordance with the laws of the State of Texas.

The warranties contained in this agreement are in lieu of all other warranties expressed or implied, including the warranties of merchantability and fitness for a particular purpose.

This Limited Warranty supersedes all prior proposals or representations oral or written and constitutes the entire understanding regarding the warranties made by the Seller to Buyer. This Limited Warranty may not be expanded or modified except in writing signed by the parties hereto.

GENERAL REFERENCE

PROPERTIES OF METALS

STAINLESS STEEL, TYPE 316

This is the standard tubing material for chromatography, suitable for a wide variety of applications. It is cold drawn seamless, not welded, with close tolerances held on both ID and OD. We neither recommend nor offer Type 304 stainless steel for analytical applications.

Austenitic stainless steels may be used for most chromatographic applications. Type 316 is most commonly used for HPLC because of its superior chloride ion resistance.

STAINLESS STEEL, TYPE 303

Recommended for GC use and general purpose connections, combining excellent machining characteristics with good resistance to corrosion and high temperature oxidation. Susceptible to attach by chlorides, iodides, and bromides.

STAINLESS STEEL, GOLD-PLATED

Improved inertness and high-integrity sealing for applications such as ultra pure gas analysis.

ELECTROFORMED NICKEL (EFNI)

We electroplate pure nickel over a diamond drawn mandrel in a continuous process, then carefully separate and remove the mandrel from the tubing. The result is an extremely inert and smooth interior surface (1–2 microinch finish). It is widely used for transfer lines, since it minimizes the potential for carryover or cross contamination often found with mill-drawn Nickel 200, due to its rough interior surface. Unlike glass- or silica-lined stainless, EFNI can easily accept tight bends and cutting without heating, and does not release damaging glass fragments or silica particles. Electroformed nickel has more in common with fused silica than drawn nickel tubing in terms of surface inertness and smoothness.

HASTELLOY C® SERIES

This is the material most often recommended for corrosion resistance – it works when nothing else will. This versatile nickel-chromium molybdenum alloy has excellent resistance to most acids, including strong oxidizers such as ferric and cupric chlorides; nitric, formic and acetic acids; wet chlorine; sea water and brine solutions; and mixtures containing nitric acid or oxidizing acids with chloride ions. VICI uses only HC-22 for fittings and valve stators, rather than the older and less corrosion resistant HC-276.

The best choice for most special applications where HPLC grade stainless cannot be used, Hastelloy C has excellent resistance to pitting, stress corrosion cracking, and oxidizing atmospheres up to temperatures well beyond any other standard components of the chromatographic system.

INCONEL 600

One of the few metals which can be used with hot, strong solutions of magnesium chloride. Good for most severely corrosive environments at elevated temperatures. Resistant to sulfuric and hydrofluoric acid, and to all concentrations of phosphoric acid at room temperature. Poor resistance to nitric acid.

MP35N

MP35N is a biocompatible cobalt-nickel-chromium alloy offering an excellent combination of mechanical strength and resistance to corrosion from salt water, chloride solutions, mineral acids, and hydrogen sulfides. It is available as an optional material for valves, fittings, and pumps.

MONEL 400

High resistance to hydrochloric, hydrofluoric, and sulfuric acid under reducing conditions. Attacked by oxidizing acid salts and hypochlorites. High resistance to chlorinated solvents and nearly all alkalis.

PROPERTIES OF METALS

NICKEL 200

Excellent resistance to caustics, high temperature halogens and hydrogen halides, and salts other than oxidizing halides. Good resistance to caustic soda and other alkalis except ammonium hydroxide.

The industry standard nickel alloy tubing, containing trace amounts of copper, carbon, silicon, and other elements which impart certain mechanical characteristics. Like our 316 stainless, this tubing is cold drawn to close ID and OD specifications, and is suitable for many applications where a relatively inert and low cost nickel is required. While more inert than 316 SS in most applications, it is still absorptive and has a relatively rough interior. Use electroformed nickel tubing for applications requiring a high level of inertness or finish.

NITRONIC 50

Good resistance to chlorides, sulfuric acid, and sea water. Resistant to sulfur gases such as hydrogen sulfide and sulfur dioxide.

NITRONIC 60

Chemical resistance is similar to Type 316 stainless, but its resistance to galling and oxidation make it superior to Type 316 or 303 in the majority of applications. This is the standard material in Valco and Cheminert metal valve lines.

TITANIUM

Although it is more difficult to machine than common alloys containing aluminum and vanadium, Valco uses Grade 2 pure titanium in order to avoid possible contamination of the sample stream with these metals.

Good for organic and inorganic salts except aluminum and calcium chlorides, and all alkalis except boiling concentrated potassium hydroxide. Good with dilute, low temperature formic, lactic, sulfuric, hydrochloric, and phosphoric acids, but rapidly attacked by hydrofluoric acid. Good with dilute nitric acid at low temperatures; corrodes at high concentrations and temperatures. Can ignite with fuming nitric acid. Attacked by oxalic acid, concentrated phosphoric acid, hot trichloroacetic acid, and zinc chloride.

Due to the nature of this metal, valves made of titanium typically have a shorter lifetime than HPLC grade stainless steel or Hastelloy C-22.

ZIRCONIUM

Excellent resistance to hydrochloric acid, good with hot sulfuric acid at concentrations up to 70% and boiling nitric acid at up to 90%. Attacked by hydrofluoric acid.

BRASS

Used where a soft metal ferrule is desirable but no corrosive materials are present. Although Valco brass ferrules work as replacements in inexpensive commercial brass fittings, they are generally not recommended for chromatography applications.

GENERAL REFERENCE

PROPERTIES OF POLYMERS

CTFE

Chlorotrifluoroethylene, is the generic name for the material produced as Kel-F® and as Aclar®. It is very resistant to all chemicals except THF and some halogenated solvents, and is resistant to all inorganic corrosive liquids, including oxidizing acids. CTFE can be used at temperatures up to 100°C. Swells in ketones.

ETFE

Ethyltrifluoroethylene is the generic name for the material such as Tefzel®. A fluoropolymer used for sealing surfaces, it is resistant to most chemical attack; however, some chlorinated chemicals will cause a physical swelling of ETFE tubing.

FEP

Fluorinated ethylene propylene is another member of the fluorocarbon family with similar chemical properties. It is generally more rigid than PTFE, with somewhat increased tensile strength. It is typically more transparent than PTFE, slightly less porous, and less permeable to oxygen. FEP is not as subject to compressive creep at room temperature as PTFE, and because of its slightly higher coefficient of friction is easier to retain in a compression fitting.

PAEK

Polyaryletherketone is the generic name for the family of polyketone compounds. *(See PEEK.)* PAEK includes PEK, PEEK, PEKK, and PEKEKK, which differ in physical properties and, to a lesser degree, in inertness.

VICI utilizes a range of proprietary PAEK-based composites (PEEK and others) for valve and fitting components. These composites resist all common HPLC solvents and dilute acids and bases. However, concentrated or prolonged use of halogenated solvents may cause the polymer to swell. Avoid concentrated sulfuric or nitric acids (over 10%).

PEEK

Considered relatively inert and biocompatible, polyetheretherketone tubing can withstand temperatures up to 100°C. Under the right circumstances, .005" – .020" ID tubing can be used up to 5000 psi for a limited time, and 0.030" to 3000 psi. Larger IDs are typically good to 500 psi. These limits are substantially reduced at elevated temperatures and in contact with some solvents or acids.

Its mechanical properties allow PEEK to replace stainless in many situations and in some environments where stainless would be too reactive. However, PEEK can be somewhat absorptive of solvents and analytes, notably methylene chloride, DMSO, THF, and high concentrations of sulfuric and nitric acid.

PEEK, GLASS-FILLED

This form of PEEK has better mechanical properties than natural PEEK, and performs extremely well in products such as ferrules.

PFA

Perfluoroalkoxy is a fluorocarbon with chemical and mechanical properties similar to FEP. More rigid than either PTFE or FEP. Commonly used for injection molded parts.

PPS

Polyphenylene sulphide is the generic name for the material produced as Fortron®, Ryton®, and others. It is very resistant to all solvents, acids, and bases.

PTFE

Polytetrafluoroethylene is the generic name for the class of materials such as Teflon®. It offers superior chemical resistance but is limited in pressure and temperature capabilities. Because it's so easy to handle, it is often used in low pressure situations where stainless steel might cause adsorption. PTFE tubing is relatively porous, and compounds of low molecular weight can diffuse through the tubing wall.

PTFE, GLASS-FILLED

This form of PTFE is nearly as inert as the virgin but is much more mechanically stable.

POLYIMIDE, GRAPHITE

A graphite-filled polyimide. Due to its brittle nature, it is usually used only for reducing ferrules.

POLYIMIDE, VIRGIN

Not recommended for general use due to its tendency to be sticky and brittle at high temperatures. Often used as a high temperature electrical insulator.

POLYIMIDE, VALCON

A high temperature (350°) graphite-reinforced polyimide composite used for all FS and FSR ferrules (fused silica adapters) and many standard ferrules. Valcon polyimide is specially prepared by a process know as Hot Isostatic Pressing (HIP) prior to being machined into individual adapters. This two step process yields a fused silica adapter with high temperature stability far exceeding that of parts produced by molding. It cannot be used with steam or with bases such as strong alkali and aqueous ammonia solutions.

POLYPROPYLENE

Widely used polymer for non-wetted parts. Attacked by strong oxidizers, aromatic and chlorinated hydrocarbons.

PVDF

PVDF, polyvinylidene fluoride, has excellent resistance to most mineral and organic acids, aliphatic and aromatic hydrocarbons, and halogenated solvents. Poor resistance to acetone, MEK, THF, and potassium and sodium hydroxide. Often supplied as Kynar®.

PROPERTIES OF ROTOR MATERIALS

A variety of polymeric composites have been developed to meet a variety of customer requirements for rotors, since no single material will perform satisfactorily in all situations. This brief summary of each polymer's particular features and potential drawbacks is provided to allow the user to make a more informed valve selection. Consult our technical specialists for any additional questions. *VICI polymer composites are proprietary formulations: only the generic compound class can be discussed.*

VALCON E

A polyaryletherketone/PTFE composite, the E material receives wide GC use in what had previously been a problematic gap between the optimum temperature ranges of P and T, and in HPLC applications where the temperature requirement is higher than what can be handled by the H material and where a lower pressure limit can be tolerated. (Standard specs are 400 psi at 225°C, but higher pressure ratings are possible at reduced temperatures.) However, this polymer cannot be used in prolonged contact with high concentrations of sulfuric and nitric acids, DMSO, THF, or liquid methylene chloride.

VALCON E2

A proprietary reinforced TFE composite, Valcon E2 works well at lower pressures and is suitable for temperatures up to 75°C. This material is resistant to most chemicals but should not be used in prolonged contact with high concentrations of sulfuric and nitric acids, DMSO, or liquid methylene chloride.

VALCON E3

An engineered polyaryletherketone, this high-strength composite resists all common HPLC solvents and dilute acids and bases. However, concentrated or prolonged use of halogenated solvents may cause the polymer to swell. Avoid concentrated sulfuric or nitric acids (over 10%).

VALCON H

This composite, a carbon fiber reinforced, PTFE-lubricated inert engineering polymer, has long been the standard for typical HPLC applications in which pressures are around 5000 psi and temperatures are not more than 75°C. It is not unusual for these valves to be ordered for use at 7000 psi, and less frequently for use at 10,000 psi. However, at that point the lifetime may be shortened by as much as 50%.

Valcon H is the rotor material used in the W and UW series, where no rotor material letter is added (as: C10W or AC6UW).

VALCON M

This material, basically a hydrocarbon in structure, is the most impermeable to light gases of all the rotor materials currently available, with wide acceptance in low-temperature (50°C maximum) trace gas applications. Avoid use with aromatic hydrocarbons.

VALCON P

This composite, the majority of which is PTFE and carbon, was the standard choice for most GC applications before the development of Valcon E. (Standard specs are 400 psi at 175°C.) Routinely used at 1000 psi, 75°C, it can also be used at temperatures approaching 200°C with decreased sealing tension; however, at that point Valcon E is probably a better choice from a lifetime standpoint. Valcon E can replace P in most applications.

VALCON R

While rarely used today, Valcon R (a PTFE composite) still finds use in low temperature/pressure situations which require its nearly universal chemical inertness. Of the chemicals encountered in commercial practice, only molten sodium and fluorine at elevated temperatures and pressures produce any detrimental effects. Its most severe limitation is that it cannot go over 75°C, even at only 400 psi.

VALCON T

This polyimide/PTFE/carbon composite has been used successfully for many years and still cannot be surpassed when applications demand operating temperatures in the 250°C – 350°C range. (Standard specs for most series are 300 psi at 330°C.) However, at temperatures below 150°C there is a tendency for the seal material to stick to the valve body, making the valve difficult to turn and causing the rotor to crack in extreme cases. (Technical Notes for high temperature valves, available in the support section of vici.com, contain instructions for reconditioning the material if this condition should arise.) The T material is susceptible to attack from steam, ammonia, hydrazines (anhydrous liquids or vapor), primary and secondary amines, and solutions having a pH of 10 or more. Chemical reagents which act as powerful oxidizing agents (nitric acid, nitrogen tetroxide, etc.) must also be avoided. Valcon T can be used in "hot" GPC/SEC applications with O-dichlorobenzene as a solvent.

VALCON TF

This is the series designation for a valve with a virgin PTFE seal. Its mechanical characteristics are poor compared to the other choices, but occasionally its use is dictated by the presence of oxidizing agents too strong even for the R material.

VALCON X

This designation indicates a proprietary polyimide blend with chemical properties similar to Valcon T, but with higher compressive strength.

NOTES

The specifications in the discussions on this page are for **two position valves**.

Multiposition selectors generally have lower pressure and temperature limits due to the more complex seal design.

Actual specifications for each valve series are shown on the appropriate pages throughout the valve sections of the catalog. If a valve is to be used at a pressure higher than the given standard, please contact the factory for ordering information.

A

Adapter: a type of fitting which provides a method of joining two components of differing thread types or systems.

Analytical column: a long narrow tube packed or coated with one of many available chemically diverse compounds that can separate the components in a sample according to their boiling point, polarity, molecular size, or combination thereof. A column of some kind is used with most chromatographic techniques.

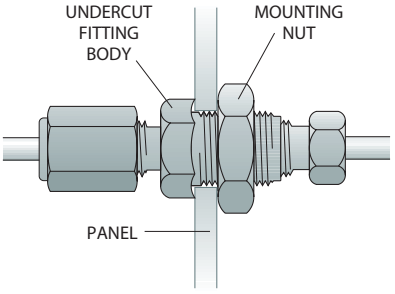
B

Backflush: the use of valving to reverse the flow through a column in order to "backflush" or purge heavier components from the column.

Biocompatibility: defines the materials used in a system (i.e. fittings, tubing, and valves) that do not change the bioactivity of the biological substances that come into contact with the surface of these materials. Note that in chromatographic systems, the tubing and column contribute over 99% of the surface area and the valves and fittings are insignificant.

Bore: the diameter of the minimum orifice through the fitting; see **capillary bore, through-type bore,** and **large bore**.

Bulkhead fitting: a type of fitting in which the fitting body is inserted through an instrument panel or mounting bracket, to which it is affixed with a mounting nut. The Valco fitting body is uniquely undercut so that it "bites" into the panel when the mounting nut is tightened, eliminating the need for a lock washer.



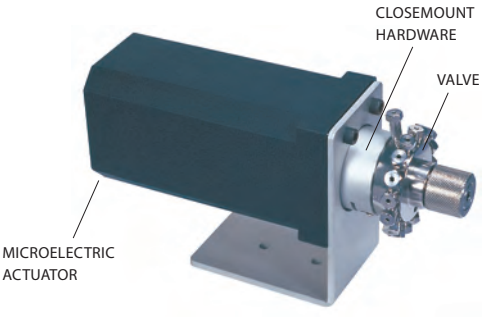
Butt connection: a type of connection in which the two tube ends are directly and squarely in contact, usually effected with a through-type union. Typically used with fused silica connections, or small bore metal tubing.

C

Cap: a cap is used to dead-end a piece of tubing which has a nut and ferrule installed.

Capillary bore: the smallest available standard orifice in a given fitting design (usually 0.25 mm). Typically denoted by suffix "C" in the product number.

Closemount hardware: the mounting components providing the most direct, shortest attachment of valve to actuator.



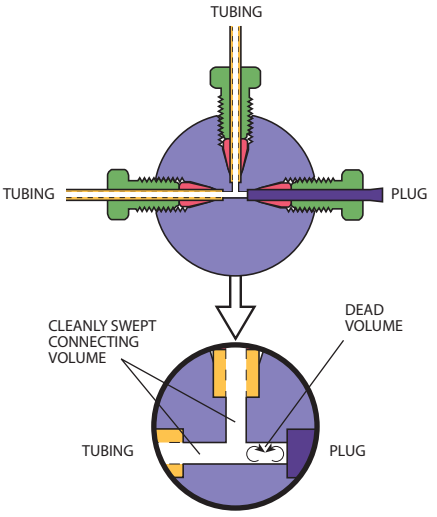
Compression fitting: a style of fitting in which a threaded nut compresses a tapered ferrule onto tubing as the nut is tightened. Valco metal ferrules cut a ring into the tubing wall while polymer types rely on surface compression to form a seal.

Connecting volume: the volume between two or more connections. This may be cleanly swept, thus not contributing to peak distortion, or may be "dead volume" such as that found in fittings with larger bores than the connecting tubing.

Cross: a type of distribution fitting which connects four pieces of tubing, arranging them in the pattern of a cross.

D

Dead volume: *(drawing at right)* any volume which a component introduces to a system that is not cleanly swept and relies on diffusion to clear the space. See **Connecting volume**.



Detail: see **Fitting detail**.

Distribution fitting: a generic term for tees, crosses, and manifolds, which provide multiple access points to "distribute" a gas or liquid through a system. *CAUTION!* Using a distribution fitting in reverse to coalesce multiple streams may create dead volume. Special manifolds are available for this application.

E

External fitting: a type of compression fitting in which the fitting body has male threads; an external *nut* has female threads.

EXTERNAL UNION

EXTERNAL REDUCING UNION

F

FIA: Flow Injection Analysis. A simple and versatile analytical technique for automating wet chemical analyses based on the manipulation of a sample zone formed from the injection of the sample into a continuous stream of fluid used as a carrier.

Ferrule: one of the components of a compression fitting; the conical piece of metal or plastic that compresses onto the tube as it is forced into a tapered seat. Valco metal ferrules are unique in that they attach to and seal at the tube by cutting a shallow ring into it, instead of by actually swaging it. This is preferable since it introduces no flow restriction.

Filter: a type of union or reducing union which traps the particulates in a stream. The filtering element is typically a mesh screen or sintered frit.

Fitting detail: one of the components of a compression fitting; if the tube, nut, and ferrule comprise the male part of the fitting, the fitting detail is the female part. It includes the threads for the nut, the tapered ferrule seat, and the pilot.

Flanged fitting: a type of fitting used with fluoropolymer tubing (PTFE, FEP) in which a flange is made at the tube end. Connections are made at the flange either by compressing the flange into a flat detail (typically 1/4-28 threaded) or by butting two flanges together. A special flanging tool forms the flanges.

Flangeless fitting: similar in application to the flanged fitting, but the flange is not required. A ferrule system is used which grips/compresses the tube. This fitting type can be used with virtually any polymeric tubing since the tube end does not have to be formed, but simply square cut. Typically used in 1/4-28 threaded fittings, it is usually interchangeable with flanged fittings.

Frit: a filter element typically made of stainless, Hastelloy, Titanium, or polymers, usually 0.75 mm or 1 mm thick. Frits may provide better filtration than screens, but because they are thicker there is greater mixing potential, and they typically result in increased pressure drop.

G

GC: Gas Chromatography. An analytical method incorporating an injection system, analytical column, controlled temperature zone, and detector. An inert carrier gas moves the sample through the column, which separates the sample components into discrete bands which are measured as they pass through the detector.

Guard column: a column used in series between the injector and analytical column to prevent certain types of components from entering the analytical column.

H

HPLC: High Performance Liquid Chromatography. An analytical system consisting of an injector, pump, analytical column, and detector. Using a liquid mobile phase, the sample is pumped through the column, where it is separated into discrete sample component bands which are detected and measured as the bands elute from the column.

I

ID: internal diameter.

Inert: technically, unreactive with other substances; however, in the instrumentation field, "inert" is a relative term. Often polymers are termed inert but are soluble in some fluids and can react with some compounds.

Internal fitting: a type of compression fitting in which the fitting body has female threads; an internal *nut* has male threads.

INTERNAL UNION

INTERNAL REDUCING UNION

L

LC: Liquid Chromatography. Any of a variety of low to medium pressure techniques which use a liquid mobile phase as the carrier to move sample. Similar to HPLC.

Large bore: a bore that is larger than the standard for a given fitting; a fitting ordered with a large bore will have a larger flow orifice than the standard or capillary bore fitting of the same design. Denoted by suffix "L" in the product number.

Luer adapter: an adapter that connects a tapered luer fitting (square nib) of a syringe to a tube or tube fitting.

M

Make up: the point at which a ferrule, nut, and tube are assembled in the fashion which will effect a leak-free seal. In most compression fittings, that is accomplished by compressing the tube with the small end of the ferrule. With Valco metal ferrules, the ferrule usually makes up on the tube by cutting a shallow ring in it.

Manifold: a type of distribution fitting in which a single source is directed to multiple outlets, or vice versa. *CAUTION!* Using a common distribution fitting in reverse to merge multiple streams may create dead volume. Special manifolds are available for this application.

Microbore column: a liquid chromatography column of narrow bore (typically 2 mm or less) for improved resolution.

N

Nanovolume®: a trademark registered to Valco Instruments Co. Inc, applied to our nanobore components with bore sizes less than 250 µm (0.010").

NPT: National Pipe Thread; a standardized tapered pipe fitting. See **pipe thread**.

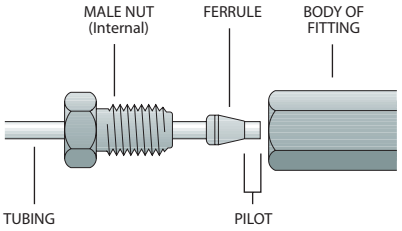
Nut: the tensioning component of a compression fitting. As the threaded nut is tightened into the fitting detail, it pushes the ferrule forward into the tapered ferrule seat, causing it to make up on the tube.

O

OD: outside diameter.

P

Pilot: the tubing which extends beyond the ferrule in a made-up fitting, or the integral portion of a ZRF internal reducing ferrule which extends beyond the ferrule. See also **Pilot depth**.



Pilot depth: the length of the tubing diameter cavity beyond the tapered ferrule seat within a fitting detail. Valco fitting pilot depths are tightly controlled to facilitate the interchangeability of components without the risk of leaks or dead volume. The one exception is Cheminert high pressure valves with polymeric stators which have a longer pilot depth.

Pipe thread: the external or internal threads of a fitting designed to effect a metal-to-metal seal on the conical thread faces. This type of fitting does not "bottom out" in the detail. Typically used with PTFE tape or other compound to lubricate the threads; however, since the diffusion rate of air components through the PTFE tape is considerable, pipe fittings should not be used in systems where leakage rates are critical.

Port: the connection, orifice, seal, or septum, etc., through which sample may be added (injected) or withdrawn.

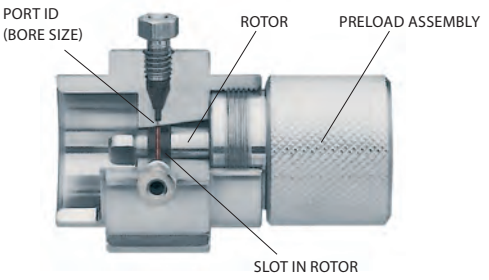
Preload assembly: the part of a Valco valve which supplies the spring force to the rotor. Most are knurled for hand tightening, but the ones for selectors have a hex for wrench tightening.

R

Reducing ferrule: a ferrule which allows a smaller tube to be used in a fitting detail designed for a larger tube. Caution should be taken if standard reducing ferrules (RF) without integral pilots are used, since dead volume may be created in the fitting pilot depth.

Reducing union: a fitting which joins two tubes of different ODs. The bore of the fitting should typically match the ID of the smaller tube.

Rotor: the internal rotating part of a Valco valve. It contains the engraved slots which connect the ports on the stator or cap.



Rotor visible in cutaway valve

S

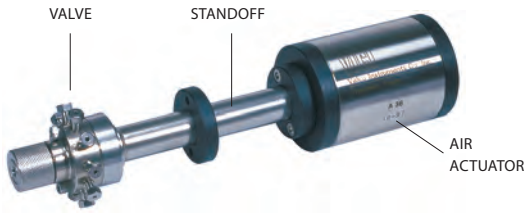
SFE: Supercritical Fluid Extraction. An extraction technique using a fluid in its supercritical state as the extraction medium. Some liquids and mixtures maintained above a critical temperature and pressure exhibit properties of both the liquid and gas phases of the element. These are defined as supercritical. CO_2 is a common supercritical fluid. Extreme caution must be used with supercritical CO_2, since uncontrolled expansion (leaks) can be very hazardous due to the substantial stored energy.

SFC: Supercritical Fluid Chromatography. An analytical technique using a supercritical fluid (see **SFE**) as the mobile phase/carrier.

Screen: a replaceable filter element generally made of Type 316 stainless steel, usually 0.003" thick. Screens clog less frequently than frits, and because they are thinner there is less mixing; however, they are less effective filters.

Sideloading: any force on the valve rotor other than the proper rotational force along the axis of the rotor, often resulting in leakage or increased wear. It is typically caused by actuation misalignment, over-rotation, or improper mounting of the valve.

Standard bore: a bore which was chosen as the standard for a particular fitting, typically based on the most common tubing ID used with that fitting.



Standoff: an extension between a valve and actuator which allows the valve to be installed in a different temperature zone than the actuator. Standoffs come in several different lengths.

Stator: the stationary component of a valve. Typically, it contains the fittings as well as one of the fluid sealing surfaces. In Valco valves, the stator is called the valve body.

T

Tee: a type of distribution fitting which connects three pieces of tubing, arranging them in the pattern of a "T".

Through-type bore: a bore which is slightly larger than the OD of the tubing which is used with the given fitting. A union with a through-type bore allows the tube ends to butt directly together, or for one tube to run completely through the fitting. Denoted by suffix "T" in the product number. In order to assure correct pilot lengths, we recommend that ferrules be made up on the tubing in a standard union.

U

Union: a fitting for connecting two pieces of tubing of the same OD.

Unswept volume: the volume of any portion of a fitting which is in the flowpath but which is a different diameter than the primary flow orifice through the tubing/fitting assembly, or any area not directly swept by the fluid flow. This can also be known as "dead volume" if it is very poorly swept.

W

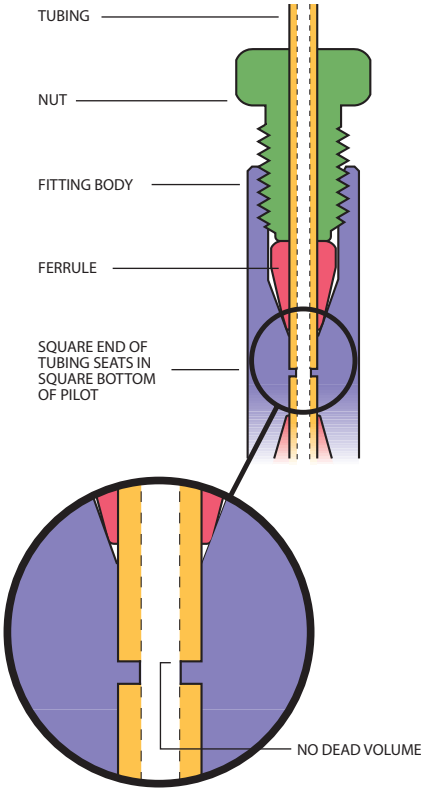
Wetted surfaces: the surfaces which are contacted by the sample stream.

Y

Y: a type of distribution fitting which connects three pieces of tubing, arranging them in the pattern of a "Y". Occasionally referred to as a "wye".

Z

Zero dead volume (ZDV): describes a connection which does not add volume to the system beyond what an extension of tubing would in its place.



Zero volume: while often used interchangeably with zero dead volume, it ideally describes a fitting design in which there is no internal volume, such as a through-type union designed to butt-fit two pieces of tubing.

GENERAL REFERENCE

LENGTH CONVERSIONS – mm to inches

mm	inches	mm	inches	mm	inches
0.12	.005"	0.75	.030"	6.0	.236"
0.15	.006"	1.0	.040"	6.4	.253"
0.25	.010"	1.5	.060"	7.0	.276"
0.40	.016"	2.0	.080"	10.0	.400"
0.50	.020"	4.6	.180"		

LENGTH CONVERSIONS – inches to mm

inches	mm	inches	mm
1/32"	0.8	3/8"	9.5
1/16"	1.6	1/2"	12.7
1/8"	3.2	1"	25.4
1/4"	6.4		

PRESSURE CONVERSIONS

psi	KPa	BAR	Atm	psi	KPa	BAR	Atm	psi	KPa	BAR	Atm
1	6.8948	0.06895	0.06805	500	3447.4	34.475	34.025	1600	11031.68	110.32	108.88
10	68.948	0.6895	0.6805	525	3619.77	36.19875	35.72625	1700	11721.16	117.215	115.685
20	137.896	1.379	1.361	550	3792.14	37.9225	37.4275	1800	12410.64	124.11	122.49
30	206.844	2.0685	2.0415	575	3964.51	39.64625	39.12875	1900	13100.12	131.005	129.295
40	275.792	2.758	2.722	600	4136.88	41.37	40.83	2000	13789.6	137.9	136.1
50	344.74	3.4475	3.4025	625	4309.25	43.09375	42.53125	2500	17237	172.375	170.125
60	413.688	4.137	4.083	650	4481.62	44.8175	44.2325	3000	20684.4	206.85	204.15
70	482.636	4.8265	4.7635	675	4653.99	46.54125	45.93375	3500	24131.8	241.325	238.175
80	551.584	5.516	5.444	700	4826.36	48.265	47.635	4000	27579.2	275.8	272.2
90	620.532	6.2055	6.1245	725	4998.73	49.98875	49.33625	4500	31026.6	310.275	306.225
100	689.48	6.895	6.805	750	5171.1	51.7125	51.0375	5000	34474	344.75	340.25
125	861.85	8.61875	8.50625	775	5343.47	53.43625	52.73875	5500	37921.4	379.225	374.275
150	1034.22	10.3425	10.2075	800	5515.84	55.16	54.44	6000	41368.8	413.7	408.3
175	1206.59	12.06625	11.90875	825	5688.21	56.88375	56.14125	6500	44816.2	448.175	442.325
200	1378.96	13.79	13.61	850	5860.58	58.6075	57.8425	7000	48263.6	482.65	476.35
225	1551.33	15.51375	15.31125	875	6032.95	60.33125	59.54375	7500	51711	517.125	510.375
250	1723.7	17.2375	17.0125	900	6205.32	62.055	61.245	8000	55158.4	551.6	544.4
275	1896.07	18.96125	18.71375	925	6377.69	63.77875	62.94625	8500	58605.8	586.075	578.425
300	2068.44	20.685	20.415	950	6550.06	65.5025	64.6475	9000	62053.2	620.55	612.45
325	2240.81	22.40875	22.11625	975	6722.43	67.22625	66.34875	9500	65500.6	655.025	646.475
350	2413.18	24.1325	23.8175	1000	6894.8	68.95	68.05	10,000	68947.6	689.48	680.46
375	2585.55	25.85625	25.51875	1100	7584.28	75.845	74.855	15,000	103,421.4	1,034.21	1,020.69
400	2757.92	27.58	27.22	1200	8273.76	82.74	81.66	20,000	137,895.1	1,378.95	1,360.9
425	2930.29	29.30375	28.92125	1300	8963.24	89.635	88.465	40,000	275,790.3	2,757.9	2,721.84
450	3102.66	31.0275	30.6225	1400	9652.72	96.53	95.27				
475	3275.03	32.75125	32.32375	1500	10342.2	103.425	102.075				

TEMPERATURE CONVERSIONS

℃	℉	℃	℉	℃	℉	℃	℉	℃	℉	℃	℉	℃	℉	℃	℉	℃	℉
-40	-40	20	68	80	176	140	284	200	392	260	500	320	608	500	932	800	1472
-35	-31	25	77	85	185	145	293	205	401	265	509	325	617	525	977	825	1517
-30	-22	30	86	90	194	150	302	210	410	270	518	330	626	550	1022	850	1562
-25	-13	35	95	95	203	155	311	215	419	275	527	335	635	575	1067	875	1607
-20	-4	40	104	100	212	160	320	220	428	280	536	340	644	600	1112	900	1652
-15	5	45	113	105	221	165	329	225	437	285	545	345	653	625	1157	925	1697
-10	14	50	122	110	230	170	338	230	446	290	554	350	662	650	1202	950	1742
-5	23	55	131	115	239	175	347	235	455	295	563	375	707	675	1247	975	1787
0	32	60	140	120	248	180	356	240	464	300	572	400	752	700	1292	1000	1832
5	41	65	149	125	257	185	365	245	473	305	581	425	797	725	1337		
10	50	70	158	130	266	190	374	250	482	310	590	450	842	750	1382		
15	59	75	167	135	275	195	383	255	491	315	599	475	887	775	1427		

REGULATIONS

REACH

As a worldwide supplier of products for the analytical instrument market, we work hard to make sure those products comply with regulatory requirements around the world.
All machined products (valves, fittings, etc.) are *fully* RoHS/REACH/WEEE* compliant. Most of the electrical products we manufacture are also CE tested and certified. Only a few legacy products are not CE certified.

Following is a list of items in this catalog which are ***not*** CE and/or RoHS compliant:

* CE Conformité Européene (European Conformity)
REACH Registration, Evaluation, Authorization, and Restriction of Chemical Substances
RoHS Restriction of Hazardous Substances Directive
WEEE Waste Electrical and Electronic Equipment Directive

PATENTS

Among important US patents held by VICI are the following. Others are pending and may have been granted by the time of publication.

Adaptive temperature controller	7442902
	8642931
	8772680
Controlled radius nuts	6247731
Diaphragm valve	6202698
Dopant delivery system for ion mobility and ion trap mobility spectrometry	8084000
Heated rotary valve for GC	9234608
No-twist one-piece fitting	7316777
Permeation tube	6030436
Pulsed discharge detectors	6133740
	6842008
	6933771
	7091044
	7507586
	7601543
	8192692
	8829914
	8963554
	9188570
Purification of CO_2	6511528
	6099619
	5858068
Syringe-free, bi-directional, positive displacement pump	6079313
Tube sealing bushing (collapsible bushing)	6575501
Ultra pure gas process	6074459
XL valves	6193213

TRADEMARKS

Cheminert	Valco Instruments Co. Inc. and VICI AG International
Condyne	VICI Metronics Inc.
Delrin	E.I. duPont de Nemours
Dynacal	VICI Metronics Inc.
Dynacalibrator	VICI Metronics Inc.
Fortron	Fortron Industries Corp.
Hamilton	Hamilton Company
Hastelloy C	Haynes International Inc.
HayeSep	Hayes Separations, Inc.
IBM	International Business Machines
Inconel 600	Huntington Alloys, Inc.
Kalrez	DuPont Dow Elastomers
Kel-F	3M Company
Kynar	Elf Atochem North America Inc.
Metronics	VICI Metronics Inc.
Micro-Flo	Valco Instruments Co. Inc.
Mininert	Valco Instruments Co. Inc.
Monel	Inco Alloys Intl Inc.
Nanovolume	Valco Instruments Co. Inc.
Nickel 200	Inco Alloys Intl Inc
Nitronic	AK Steel Corporation
Parker	Parker Hannifin Co.
PEEK	Victrex Manufacturing Ltd.
Perifit	Valco Instruments Co. Inc.
Pressure-Flo	Valco Instruments Co. Inc.
Pressure-Lok	Valco Instruments Co. Inc.
Ryton	Phillips Petroleum Co.
Swagelok	Crawford Fitting Company
Teflon	E.I. duPont de Nemours
Tefzel	E.I. duPont de Nemours
Tygon	Saint-Gobain Performance Plastics
Valco	Valco Instruments Co. Inc. and VICI AG International
ValcoBond	Valco Instruments Co. Inc.
ValcoPLOT	Valco Instruments Co. Inc.
Vespel	E.I. duPont de Nemours
Viton	DuPont Performance Elastomers
VICI	Valco Instruments Co. Inc. and VICI AG International
VICI Jour	Valco Instruments Co. Inc. and VICI AG International
Waters	Waters Associates

GENERAL REFERENCE

Cheminert valve product numbers all begin with the valve model (C1, C22, C25Z, C72MU, etc.) and a hyphen. Following the hyphen are four numbers which indicate port size, rotor and stator materials, and the number of ports. Internal sample injectors also include the sample size. The final letters indicate actuation. (Keep in mind that some combinations are not possible, so check with sales for your actual requirements.)

NOTE!

This chart is for decoding existing product numbers, ***not*** for inventing new ones. Some options can not work with certain valve types and designs!

VALVE TYPE

1. REQUIRED.

UHPLC INJECTORS

C72MH	10k psi	Nanovolume® injector	360 µm fittings
C72MX	15k psi		
C72MU	20k psi		
C82NH	10k psi	Nanovolume® injector	1/32" fittings
C82NX	15k psi		
C82NU	20k psi		
C84NX	15k psi	Nanovolume® internal sample injector	1/32" fittings
C82H	10k psi	Microbore injector	1/16" fittings
C82X	15k psi		
C82U	20k psi		
C84H	10k psi	Internal sample injector	1/16" fittings
C84X	15k psi		

HPLC INJECTORS

C2N	5k psi	Nanovolume® injector	1/32" fittings
C4N	5k psi	Nanovolume® internal sample injector	1/32" fittings
C1	5k psi	Through-the-handle injector	1/16" fittings
C1CF	5k psi	Continuous flow through-the-handle injector	
C2	5k psi	Microbore/analytical valve	
C4	5k psi	Internal sample injector	
C6	5k psi	Continuous flow injector	

LOW PRESSURE INJECTORS

C22Z	Low pressure	Injector	1/16" ZDV fittings
C22			1/4-28 fittings
C24Z	Low pressure	Internal sample injector	1/16" ZDV fittings
C24			1/4-28 fittings
C42R	Low pressure	Injector	1/2-20 fittings

UHPLC SELECTORS

C85NH	10k psi	Nanovolume® selector	1/32" fittings
C85NX	15k psi		
C85H	10k psi	Microbore selector	1/16" fittings
C85X	15k psi		
C85U	20k psi		

HPLC SELECTORS

C5	5k psi	Stream selector	1/16" fittings

LOW PRESSURE SELECTORS

C25Z	Low pressure	Stream selector	1/16" ZDV fittings
C25			1/4-28 fittings
C25G	Low pressure	Stream selector	6-40 fittings
C45R	Low pressure	Stream selector	1/2-20 fittings

OEM INJECTORS

C2V	5k psi	Vertical port injector	
C3	5k psi	Centered port injector	
C52	5k psi	Integrated motor/ valve	HPLC
C52V	5k psi		Vertical port
C62Z	Low pressure	Integrated motor/ valve	ZDV fittings
C62			1/4-28 fittings

OEM SELECTORS

C55	5k psi	Integrated motor/ selector	HPLC
C65Z	Low pressure	Integrated motor/ selector	ZDV fittings
C65			1/4-28 fittings

- (HYPHEN)

2. REQUIRED.

Place a hyphen (-) after the Cheminert valve type.

Examples:

C1 - 1 3 4 6

C1-1346:
C1 through-the-handle injector, 0.25 mm ports,
Valcon E rotor, PAEK stator, 6 ports, manual (blank = manual)

C5 - 2 0 0 6 E

C5-2006EUH:
C5 stream selector, 0.40 mm ports, Valcon H rotor,
Nitronic 60 stator, 6 positions, universal actuator without interface

C22Z-3180EUHA:
C22Z low pressure injector with ZDV fittings, 0.75 mm ports,
Valcon E2 rotor, PPS stator, 10 ports, universal actuator with
RS-232 interface

C84NX-6674-.01EUH:
C84NX UHPLC nanovolume internal sample injector rated at 15,000 psi, 150 micron ports (.006"), Valcon E3 rotor, coated stainless stator, 4 ports, 10 nl internal sample size, universal actuator without interface

PORT SIZE

3. REQUIRED.

0	0.15 mm	(.006")
1	0.25 mm	(.010")
2	0.40 mm	(.016")
3	0.75 mm	(.030")
4	100 µm	(.004")*
	or	
	1.00 mm	(.040")
5	1.25 mm	(.050")
6	150 µm	(.006")*
	or	
	1.50 mm	(.060")
7	2.00 mm	(.080")
8	3.18 mm	(.125")
9	4.60 mm	(.180")

* for nanovolume valves

ROTOR MATERIAL

4. REQUIRED.

0	Valcon H
1	Valcon E2
2	Valcon T
3	Valcon E
4	Valcon M
5	Valcon E5
6	Valcon E3
7	Valcon TF
8	Valcon P
9	Valcon X

STATOR MATERIAL

5. REQUIRED.

0	Nitronic 60
1	CTFE
2	Hastelloy C **
3	Titanium **
4	PAEK
5	Valcon E4
6	*[not used]*
7	PVDF (low pressure)
	Coated stainless ***
8	PPS
9	Coated stainless

** These stator materials are coated when in a C70 or C80 series valve

*** Stator code "7" indicates coated stainless for C70 or C80 series valves

PORTS / POSITIONS

6. REQUIRED.

Ports (Two position)	
4	4
6	6
8	8
0	10
12	12
14	14
Positions (Selectors)	
4	4
6	6
8	8
0	10
12	12
14	14
20	20
24	24
28	28

INTERNAL SAMPLE SIZE

7. Optional.
For internal sample injector

.004	0.004 µl	(4 nl)
.01	0.01 µl	(10 nl)
.02	0.02 µl	(20 nl)
.05	0.05 µl	(50 nl)
.1	0.1 µl	
.2	0.2 µl	
.5	0.5 µl	
1	1.0 µl	
2	2.0 µl	

Put a hyphen (-) before the sample size in the product number.

ACTUATOR

8. REQUIRED.

A	0-70°C	Air
See chart below.		Micro-electric
See chart below.		Universal
[blank] (no code letter; shipped with knob)		Manual
D	(for use with existing actuator)	Driver only

NOTE!

This chart is for decoding existing product numbers, ***not*** for inventing new ones.

Some options cannot work with certain valve types and designs!

UNIVERSAL ACTUATORS

See pages 174-175.	High speed	Medium torque Medium speed	High torque
Without interface	EUH	EUD	EUT
With RS-232	EUHA	EUDA	EUTA
With RS-485	EUHF	EUDF	EUTF
With USB	EUHB	EUDB	EUTB
With BCD	EUHC	EUDC	EUTC

MICROELECTRIC ACTUATORS

See page 176.	Two position	Multiposition
Highest speed	EQ	
High speed	EH	EMH
Medium torque	EP	
High torque	ED	EMT
Highest torque	ET	

GENERAL REFERENCE

2

The simplest way to determine a **Valco two position valve** product number is to call our sales department and discuss the features you require. But if you want to decipher an existing product number, refer to this chart and the examples on the facing page for guidelines. (Keep in mind that some combinations are not possible, so check with sales for your actual requirements.)

Every letter and number has a meaning in its proper order and sequence. The shaded columns indicate codes that are required in every product number, and the non-shaded columns offer possibilities of optional features.

NOTE!

This chart is for decoding existing product numbers, ***not*** for inventing new ones. Some options can not work with certain valve types and designs!

ACTUATOR		
1. REQUIRED. Valve is shipped with manual knob unless specified otherwise.		
A	0-70°C	Air
AT	50-150°C	
See chart below.		Modular universal
See chart below.		Universal
[blank] (no code letter; shipped with knob)		Manual
D	(for use with existing actuator)	Driver only

STANDOFF ASSEMBLY LENGTH	
2. Optional. Specify if required.	
2	2" standoff
3	3" standoff
4	4" standoff
6	6" standoff

BORE SIZE	
3. Optional. For standard bore, leave blank.	
[blank]	Standard bore
L	Large bore

FITTINGS SIZE	
4. REQUIRED. For 1/8" fittings, leave blank.	
N	1/32"
C	1/16"
[blank]	1/8"
VL	1/4"

INTERNAL SAMPLE INJECTOR
5. Optional. Requires 4 ports. Also specify sample size (10).
I

UNIVERSAL ACTUATORS

See pages 174-175.	High speed	Medium torque Medium speed	High torque
Without interface	EUH	EUD	EUT
With RS-232	EUHA	EUDA	EUTA
With RS-485	EUHF	EUDF	EUTF
With USB	EUHB	EUDB	EUTB
With BCD	EUHC	EUDC	EUTC

MICROELECTRIC ACTUATORS

See page 176.	Two position
Highest speed	EQ
High speed	EH
Medium torque	EP
High torque	ED
Highest torque	ET

Examples:

4 N 8 W T

4N8WT:
Manual (blank = manual), 4" standoff, standard bore, 1/32" valve, 8 ports, W type, Valcon T rotor, standard Nitronic 60 body

EUH C I 4 W E .1

EUHCI4WE.1:
Universal actuator with no interface, no standoff assembly, standard bore, 1/16" valve, internal sample, 4 ports, W type, Valcon E rotor, standard N60 body, 0.1 µl sample

A 3 6 UW P HC

A36UWPHC:
Air actuator, 3" standoff, standard bore, 1/8" (blank = 1/8"), 6 ports, UW type, Valcon P rotor, Hastelloy C body material

EUDC- 2 L 6 UW P

EUDC-2L6UWP:
Universal actuator with BCD interface, 2" standoff, large bore (.067" instead of .030"), 1/8" (blank = 1/8"), 6 ports, UW type, Valcon P rotor, standard Nitronic 60 body

NUMBER OF PORTS
6. REQUIRED.
3
4
6
8
10
12
14

VALVE TYPE
7. REQUIRED.
W
UW
MW

ROTOR MATERIAL	
8. REQUIRED.	
[blank]	Valcon H
E	Valcon E
E2	Valcon E2
M	Valcon M
P	Valcon P
R	Valcon R
T	Valcon T
TF	Valcon TF

SPECIAL BODY MATERIAL	
9. Optional. Body material is Nitronic 60 SS unless specified otherwise.	
S6	Type 316 SS
HC	Hastelloy C
IN	Inconel 600
M4	Monel 400
NI	Nickel 200
N5	Nitronic 50
TI	Titanium

INTERNAL SAMPLE SIZE	
10. Optional. Also specify "I" at Item 5.	
.06	0.06 µl
.1	0.1 µl
.2	0.2 µl
.5	0.5 µl
1	1.0 µl
2	2.0 µl

NOTE!
This chart is for decoding existing product numbers, ***not*** for inventing new ones. Some options can not work with certain valve types and designs!

TECH TIP
The letter "C" after number of ports specifies smaller bore than standard.
Example: DC6CW, bore size 0.25 mm

GENERAL REFERENCE

Product numbers for **Valco selectors**, like those for two position valves, are composed of letters and numbers which have their meaning based on the position in the product number. The simplest way to determine a Valco valve product number is to call our sales department and discuss the features you require. The chart below and the examples opposite may help decode the product number you have, or direct you toward all the features you must specify for a selector. (Keep in mind that some combinations are not possible, so check with sales for your actual requirements.)

The shaded columns indicate codes that are required in every product number, and the non-shaded columns offer possibilities of optional features.

NOTE!

This chart is for decoding existing product numbers, ***not*** for inventing new ones. Some options can not work with certain valve types and designs!

ACTUATOR		STANDOFF ASSEMBLY LENGTH		BORE SIZE		FITTINGS SIZE		FLOWPATH
1. REQUIRED. We strongly recommend that selectors be ordered with air or electric actuators. If no actuator is specified, the valve is shipped with a manual knob.		2. Optional. Specify if required.		3. Optional. For standard bore, leave blank.		**4. REQUIRED.** For 1/8" fittings, leave blank.		**5. REQUIRED.**
A	0-70°C	**2**	2" standoff	**[blank]**	Standard bore	**C**	1/16"	**SD**
AH	high torque	**3**	3" standoff	**L**	Large bore	**[blank]**	1/8"	**SC**
AT	50-150°C	**4**	4" standoff			**VL**	1/4"	**SF**
See chart below.	Modular universal	**6**	6" standoff					**ST**
See chart below.	Universal							**STF**
[blank] (not recommended)	Manual							
D	(for use with existing actuator) Driver only							

UNIVERSAL ACTUATORS

See pages 174-175.	High speed	Medium torque Medium speed	High torque
Without interface	EUH	EUD	EUT
With RS-232	EUHA	EUDA	EUTA
With RS-485	EUHF	EUDF	EUTF
With USB	EUHB	EUDB	EUTB
With BCD	EUHC	EUDC	EUTC

MICROELECTRIC ACTUATORS

See page 176.	Multiposition
High speed	EMH
High torque	EMT

Examples:

A 2 VL SC 6 MW E2

A2VLSC6MWE2:
Air actuated, 2" standoff, 1/4" valve, SC flowpath, 6 positions, MW type, Valcon E2 rotor, standard Nitronic 60 body

UMT 4 C SD 4 UW

UMT4CSD4UW:
Modular universal actuator, 4" standoff, 1/16" valve, SD flowpath, 4 positions, UW type, Valcon E (blank = E) rotor, standard N60 body

EUT 3 ST 10 MW T HC

EUT3ST10MWTHC:
Universal actuator with no interface, 3" standoff, 1/8" (blank = 1/8") valve, ST flowpath, 10 positions, MW type, Valcon T rotor, Hastelloy C body

NUMBER OF POSITIONS
6. REQUIRED.
4
6
8
10
12
16

VALVE TYPE
7. REQUIRED.
MW Low pressure
UW High pressure

ROTOR MATERIAL	
8. REQUIRED.	
[blank]	Valcon E (UW valve only)
E	Valcon E
E2	Valcon E2
M	Valcon M
P	Valcon P
R	Valcon R
T	Valcon T
TF	Valcon TF

SPECIAL BODY MATERIAL	
9. Optional. Body material is Nitronic 60 SS unless specified otherwise.	
S6	Type 316 SS
HC	Hastelloy C
IN	Inconel 600
M4	Monel 400
NI	Nickel 200
N5	Nitronic 50
TI	Titanium

NOTE!
This chart is for decoding existing product numbers, ***not*** for inventing new ones. Some options can not work with certain valve types and designs!

TECH TIP
The letter "C" after number of ports specifies smaller bore than standard.
Example:
DVLSF4CMWE2,
bore size 3mm (.118")

CONTACT US

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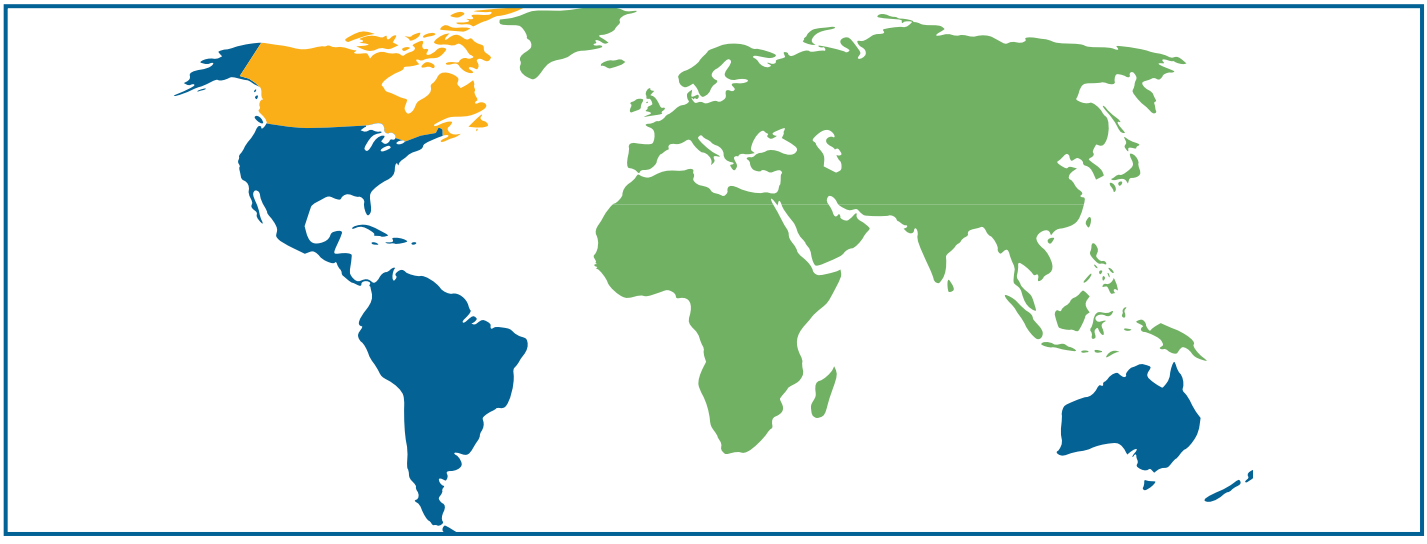

CONDITIONS OF SALE

There is no minimum order.
Terms are net 30 days.
Prices subject to change without notice. All prices are in U.S. dollars.

RETURNS

No returns will be accepted more than 90 days after shipment for any reason. Before 90 days, no returns will be accepted without prior authorization. If it is necessary to return material to us, please contact our Sales Department for a return authorization number and forwarding instructions. Inspect shipments upon receipt and report shortages and incorrect or damaged material to us immediately.

Important! Damaged shipments must remain with the original packaging for freight company inspection.

Returned material will be subject to a restocking charge of 20% for catalog items. Special orders cannot be returned unless defective.

REPAIRS

For repair return authorization or information about factory refurbishments, contact our Service Department.

TECHNICAL SERVICE

Our capable staff is waiting to assist you with your technical questions and application needs.

NOTICE

VICI reserves the right to correct errors and change prices, designs, or specifications without notice or liability. The information in this catalog is correct to the best of our knowledge but is not guaranteed to be so. VICI assumes no responsibility with respect thereto.

REGULATIONS

As a worldwide supplier of products for the analytical instrument market, we work hard to make sure those products comply with regulatory requirements around the world.

CE RoHS REACH

All machined products (valves, fittings, etc.) are *fully* RoHS/REACH/WEEE compliant. Most of the electrical products we manufacture are also CE tested and certified. Only a few legacy products are not CE certified.

See page 255 for a list of non-CE items.

50th ANNIVERSARY
1968-2018

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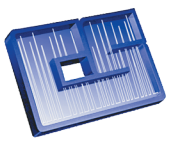

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