VICI

VALCO • CHEMINERT

TOOLS FOR SCIENCE AND MEDICINE



INJECTORS
VALVES
FITTINGS
TUBING
SYRINGES
DETECTORS

CATALOG 70 INT

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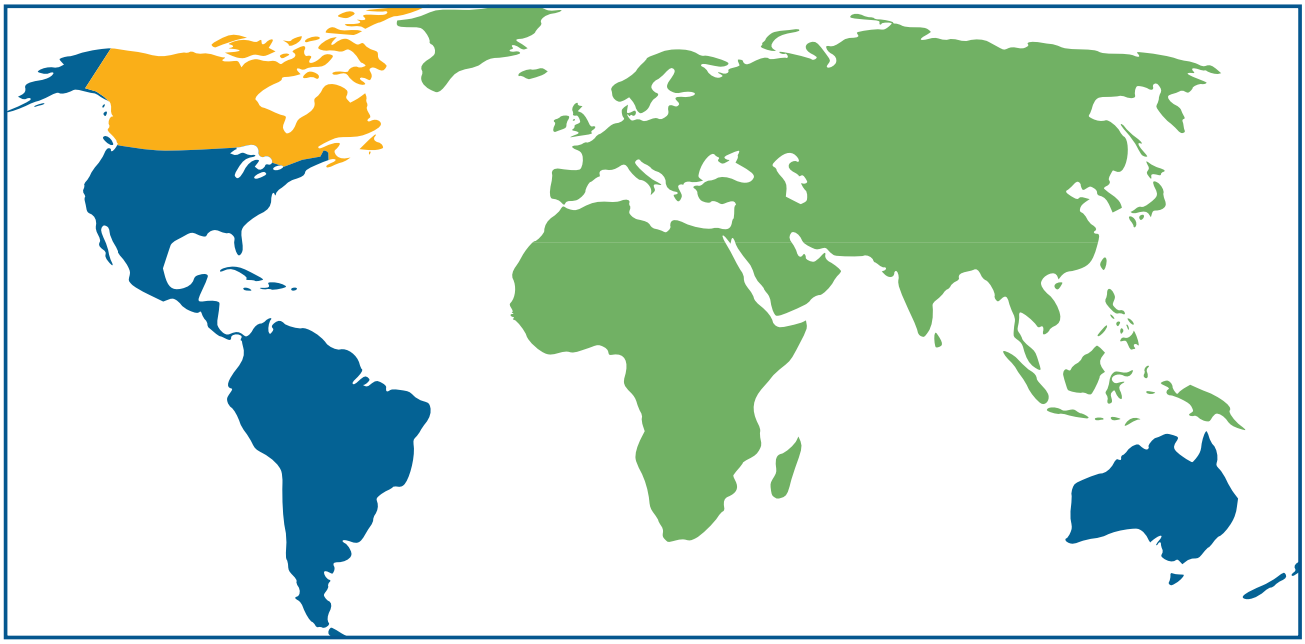
REGULATIONS

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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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

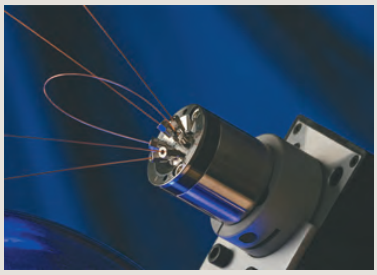


10K, 15K, AND 20K PSI INJECTORS AND SELECTORS

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. . . . . PAGES 127,135
Selectors (150 µm). . . . . PAGES 127, 154-155



MICROBORE® (250 µm)

Injectors . . . . . PAGES 128, 136
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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 pre-cut or 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

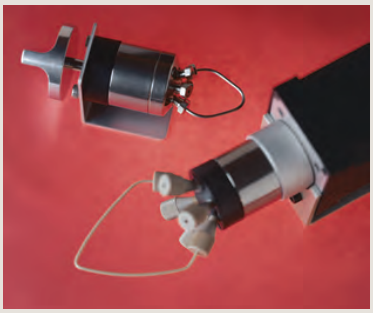
HIGH PERFORMANCE LIQUID CHROMATOGRAPHY

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").

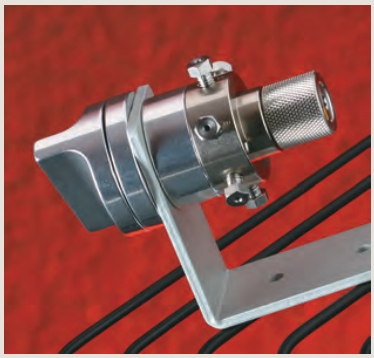
Injectors .....PAGES 129, 138-147
Internal sample injectors...129, 139, 141, 145
Selectors 156-157



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.

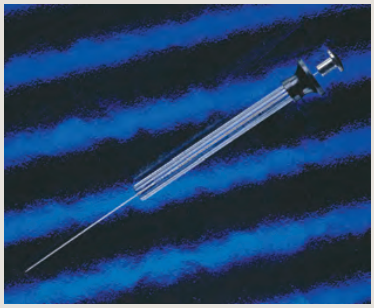
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SYRINGES

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 pre-cut or 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.

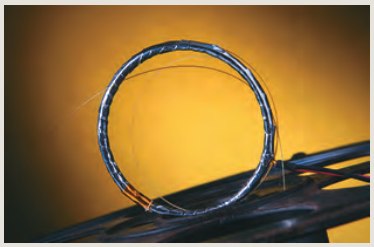
Product information . . . . . PAGE 61

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.



Fast temperature programmer ..... PAGE 204
Column/fan modules 205
Column bundles 224
Nickel-clad FS tubing for resistive heating 68

PULSED DISCHARGE DETECTORS

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

Product information ..... PAGES 210-215



THERMAL CONDUCTIVITY DETECTOR

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

Product information ..... PAGE 217

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 78-87, 90-91
Internal sample injectors 88-89, 95
Selectors 84-85, 104-113



DIAPHRAGM VALVES

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

Product information ..... PAGES 122-125



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.

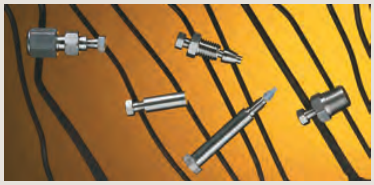
ValcoBond® columns ..... PAGES 226-229
ValcoPLOT® columns 230-235



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.

Product information ..... PAGES 8-41



MORE FOR GC

Gas purifiers ..... PAGES 216, 238-239
Injector nut for HP 5890/6890 19
Low mass external unions 18
Oxygen removal system ..... WWW.VICI.COM
Reduced breakdown injection port liners 237
Trace gas analyzers 206-209
Tubing
Stainless steel 73-75
Nickel-clad FS tubing 66

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

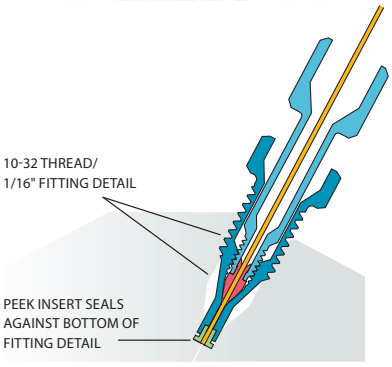
The VICI FTP-200 has up to four channels, with multiple temperature inputs for unparalleled precision heating at ramp rates up to 2,000°C/minute. Independently heat four GC components using up to eight temperature states, eliminating the need for a conventional oven and making portable GC possible at 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

- Operation 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.



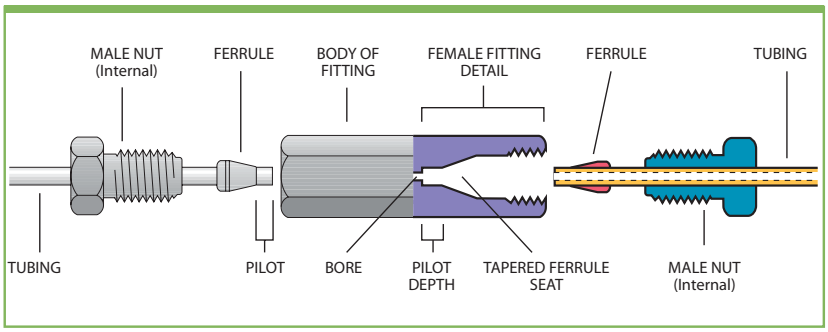
VALCO FITTINGS

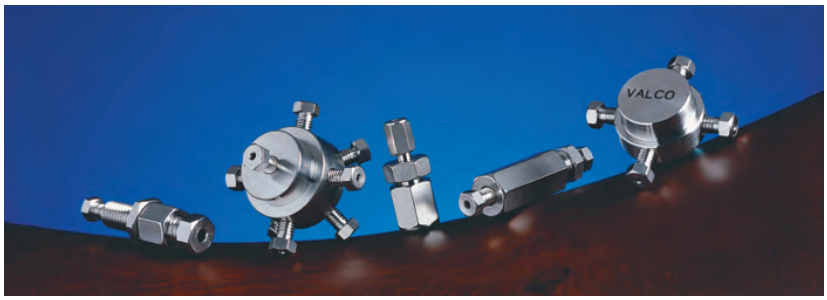


THE INDUSTRY STANDARD

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. 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

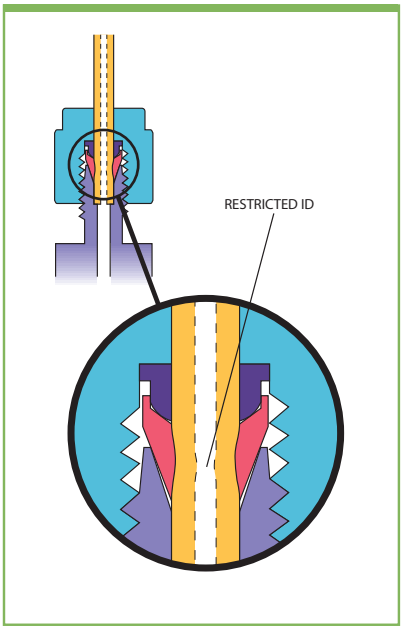


FIGURE 3.
VALCO COMPRESSION FITTING – NO ID RESTRICTION

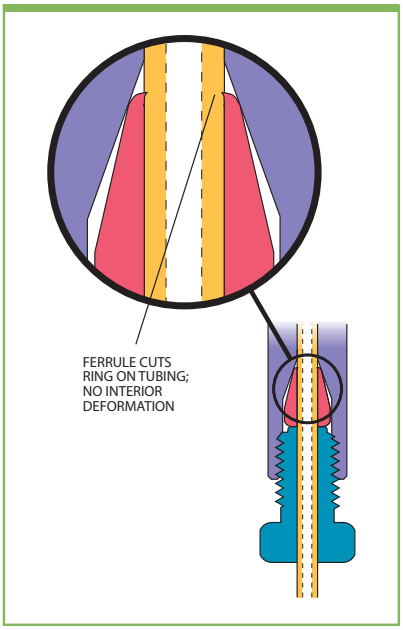
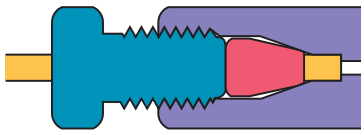
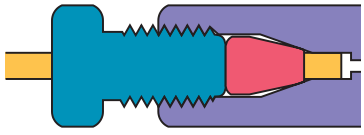


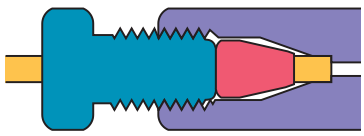
FIGURE 4.
CORRECT AND INCORRECT SEATING OF TUBING IN A FITTING DETAIL



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

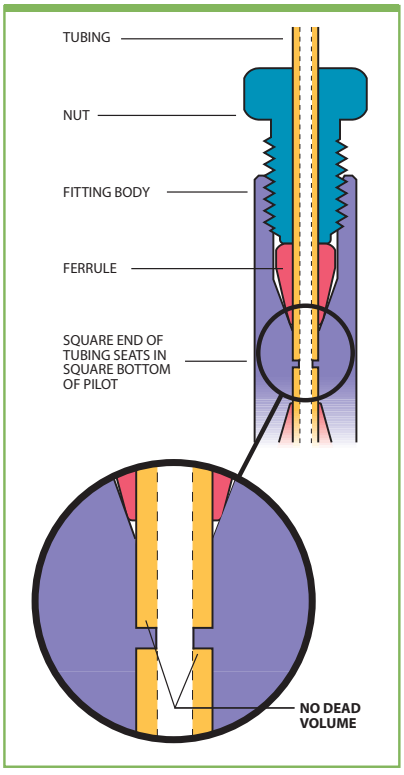
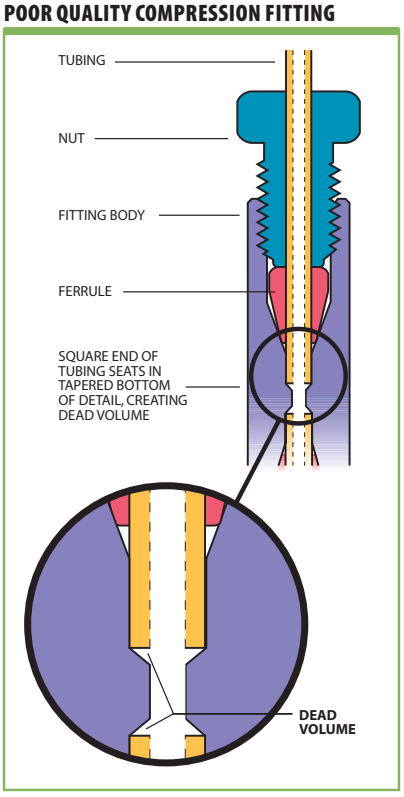


FIGURE 6.
POOR QUALITY COMPRESSION FITTING





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

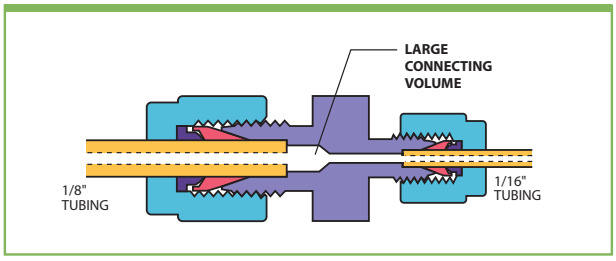


FIGURE 8.
VALCO ZDV REDUCING UNION

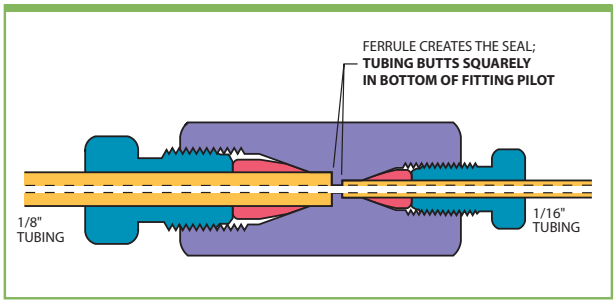
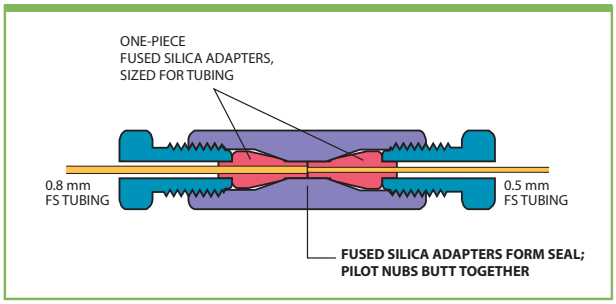


FIGURE 9.
VALCO ZDV THROUGH-BORE UNION



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.

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

* Not a stock item. Please contact us for a quote. Also available in 1/4".



Controlled radius nuts

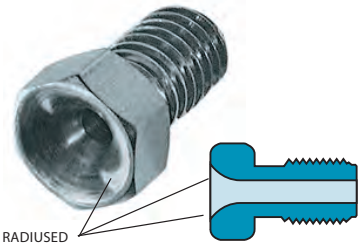
STAINLESS STEEL AND PEEK

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*
Stainless steel			
1/16"	Standard	.43"	ZN1R
	Short	.30"	ZSN1R
1/8"	Standard	.57"	ZN2R*
PEEK			
1/16"	Hex	.45"	ZN1RPK*
	Fingertight	.88"	ZN1RFPK

* Not a stock item. Please contact us 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 43
HPLC column end fittings 32-35
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.

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

* PTFE-coated threads standard.

Also available in 3/8", 1/2", and 1" external nuts. Please contact us for a quote.

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.

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

* Not a stock item. Please contact us 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.

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

* Not a stock item. Please contact us 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.

(Package/10)	**Stainless, Type 303** *Prod No*	**Stainless, Type 316** *Prod No*	**Stainless, Gold-plated** *Prod No*
1/32"	–	ZF.5S6-10	ZF.5GP-10
1/16"	ZF1-10	ZF1S6-10	ZF1GP-10
1/8"	ZF2-10	ZF2S6-10	ZF2GP-10
1/4"	–	ZF4S6-10	ZF4GP-10*

* Not a stock item. Please contact us for a quote.

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

* Not a stock item. Please contact us for a quote.

(Package/10)	**Brass** *Prod No*
1/32"	ZF.5B-10
1/16"	ZF1B-10
1/8"	ZF2B-10

Also available in 1/4".

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"
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





Polymeric ferrules

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

* Not a stock item. Please contact us for a quote.

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

* Not a stock item. Please contact us for a quote.
Also available in 1/4", 3/8", and 1/2".

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

* Not a stock item. Please contact us 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 43



VALCO FITTINGS

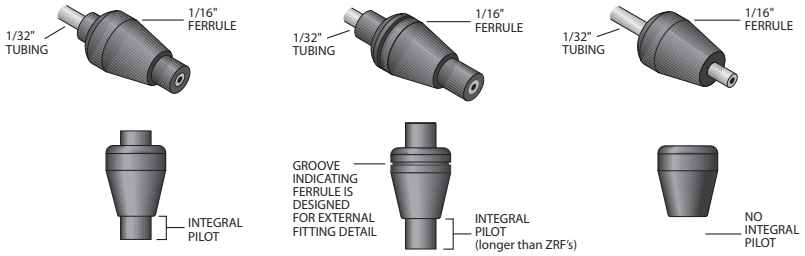
REDUCING FERRULES

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.

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

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



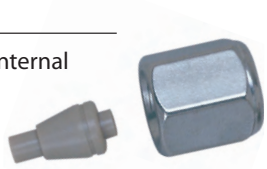
PEEK REDUCING FERRULE WITH INTERNAL NUT
(Nut sold separately.)

External reducing ferrules

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

(Package/5)	**PEEK** *Prod No*
1/8" to 1/16"	EZRF21PK-5
1/4" to 1/8"	EZRF42PK-5

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.

(Package/5)	**PEEK** *Prod No*	**Valcon Polyimide** *Prod No*
1/8" to 1/16"	RF21PK-5	RF21V-5

Also available in other sizes, and in glass-filled PTFE, CTFE, and virgin 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
1/4" ≈ 6.4 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.

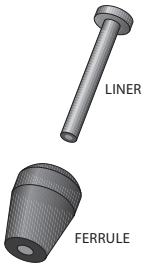
Virgin polyimide is produced as Vespel®.

MORE INFO

360 micron fittings .... pages 43-44
Fused silica
Unions 18, 43-44
Fittings..... 18-19, 43-44, 47
Ferrule removal kits.... 41
Pin vise and drill index 41

REPLACEMENT PARTS

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



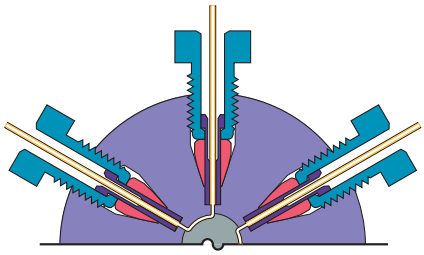
REMOVABLE FSR ADAPTER
Exploded view

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.

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

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.

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

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

Also available in other sizes.

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

Also available in other sizes.



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.

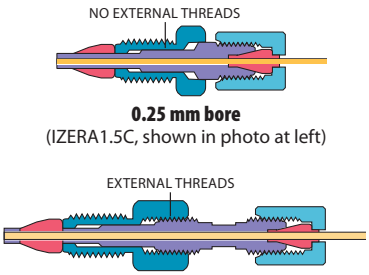
Note: Order 1/32" fused silica adapter ferrules separately *(see box below)*.

	Bore	*Prod No*
1/16" to 1/32"	0.25 mm	IZERA1.5C
	0.5 mm	IZERA1.5M
	1.0 mm	IZERA1.5



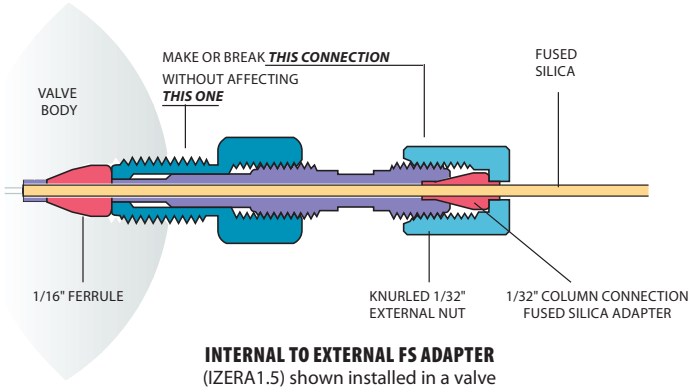
IZERA DESIGNS

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

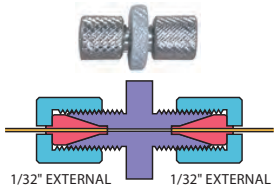
The 1/32" external union is specially designed for use with capillary columns in GC. It is very low mass and does not require wrenches to seal. Use *only* with one-piece fused silica adapters, since metal ferrules will distort the detail. Standard material is 300 series stainless.

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

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

* Not a stock item. Please contact us 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*
	≤ 0.25 mm	FS.25-5
0.25 mm	≤ 0.36 mm	FS.36-5
0.36 mm	≤ 0.40 mm	FS.4-5
0.40 mm	≤ 0.50 mm	FS.5-5
0.50 mm	≤ 0.80 mm	ZF.5V-5

CAUTION

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





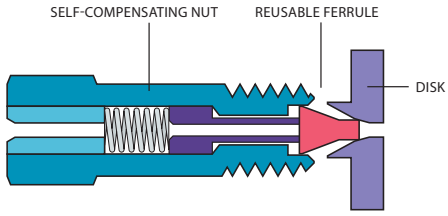
Injector nut for Agilent 6850, 6890, 7890, and 5890, Series I and II

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.



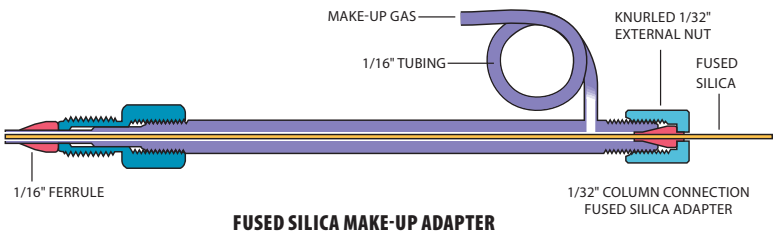
SELF-COMPENSATING NUT
for Agilent GCs

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.

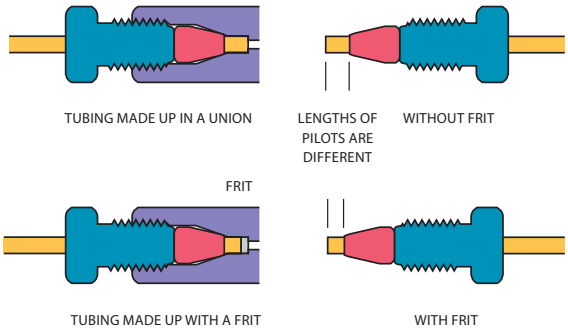
Internal fittings are almost always the best with tubing of 1/8" OD or smaller. They make a stronger connection and offer the lower volume necessary for high performance instrumentation. Also, because 1/16" external fittings have very thin, easily distorted walls, they are not as durable as 1/16" internal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

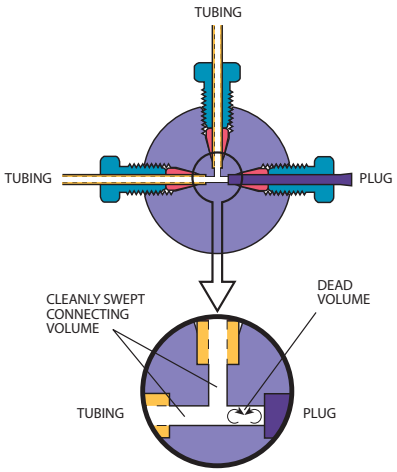
MORE INFO

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



DEAD VOLUME

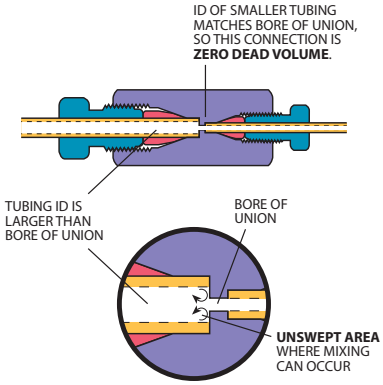
"Dead volume" is created in obvious situations such as the one shown.



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.

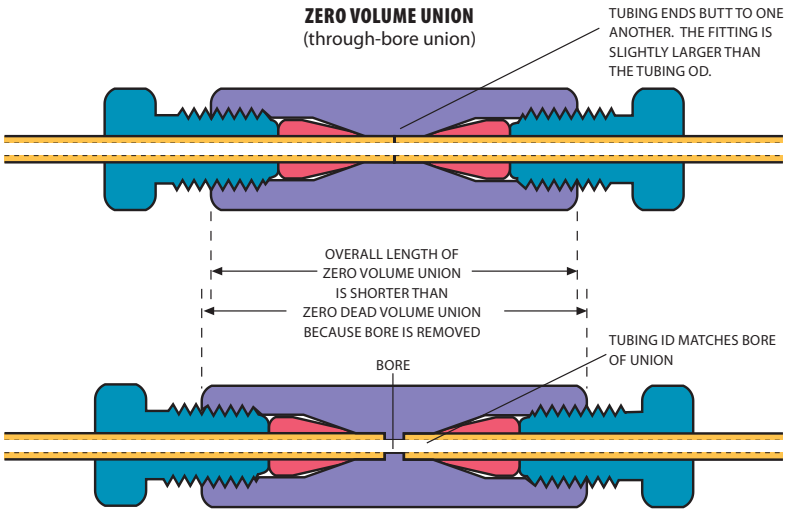


1/8" to 1/16" Reducing union
(ZRU21)

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.

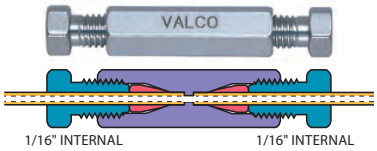
Tubing OD	*Bore*	*Prod No*
Standard internal unions		
1/32"	0.15 mm	ZU.5XC
	0.25 mm	ZU.5
	0.50 mm	ZU.5L
	1/32"	ZU.5T
1/16"	0.15 mm	ZU1XC
	0.25 mm	ZU1C
	0.50 mm	ZU1M
	0.75 mm	ZU1
	1.0 mm	ZU1L
	1/16"	ZU1T
1/8"	0.75 mm	ZU2
	2.0 mm	ZU2L
	1/8"	ZU2T

Also available in 1/4".

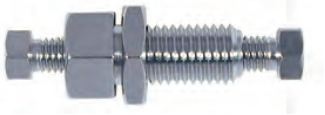
Tubing OD	*Bore*	*Prod No*	*Bulkhead panel hole diameter*
Bulkhead internal unions			
1/32"	0.25 mm	ZBU.5	5/16"
1/16"	0.15 mm	ZBU1XC	5/16"
	0.25 mm	ZBU1C	5/16"
	0.50 mm	ZBU1M	5/16"
	0.75 mm	ZBU1	5/16"
	1.0 mm	ZBU1L	5/16"
	1/16"	ZBU1T	5/16"
1/8"	0.75 mm	ZBU2	7/16"
	2.0 mm	ZBU2L	7/16"

Also available in other bore sizes and 1/4".

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

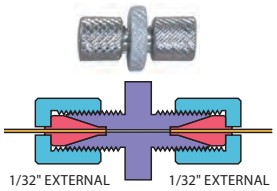
The 1/32" external union is specially designed for use with capillary columns in GC. It is very low mass and does not require wrenches to seal. Use *only* with one-piece fused silica adapters, since metal ferrules will distort the detail. Standard material is 300 series stainless.

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

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

* Not a stock item. Please contact us for a quote.

1/32" EXTERNAL UNION



For use with GC capillary columns
(EU.5)

External unions

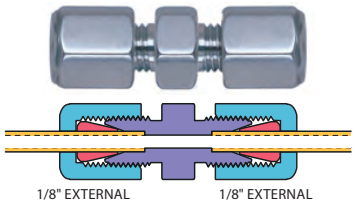
Standard material is 300 series stainless. Also available in Hastelloy C and gold-plated stainless.

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.

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

* Not a stock item. Please contact us for a quote.
Also available in other bore sizes and 1/4".

EXTERNAL UNION



Standard bore
(EU2L)



Bulkhead external union
(EBU2L)

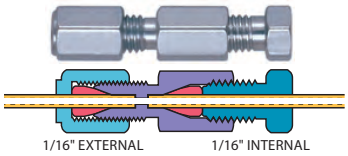
External/internal unions

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

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

* Not a stock item. Please contact us for a quote.
Also available in 1/32" and 1/8".

EXTERNAL/INTERNAL UNION



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



Bulkhead external/internal union
(EZBU1)



VALCO FITTINGS

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.

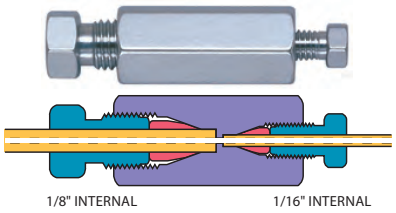
Tubing OD	*Bore*	*Prod No*
Standard internal reducing unions		
1/16" to 1/32"	0.15 mm	ZRU1.5XC
	0.25 mm	ZRU1.5
	0.50 mm	ZRU1.5L
	1/32"	ZRU1.5T
1/8" to 1/16"	0.25 mm	ZRU21C
	0.75 mm	ZRU21
	1/16"	ZRU21T
1/4" to 1/16"	1/16"	ZRU41T

Also available in other sizes.
Please contact us for a quote.

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

Also available in other sizes.
Please contact us for a quote.

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

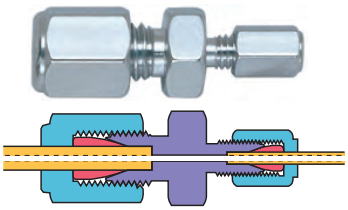
1/16", 1/8", and 1/4" external Valco fitting components are compatible with Parker and Swagelok fittings.

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

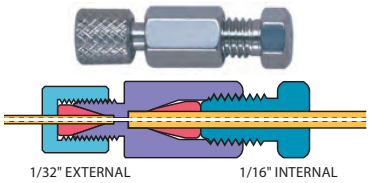
These unions connect two sizes of tubing, using external fittings on each end. Standard material is 300 series stainless. Custom bulkhead versions are available in OEM quantities.

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*
Standard external reducing unions		
1/8" to 1/16"	0.75 mm	ERU21
	1/16"	ERU21T

Please contact us for a quote on bulkhead versions and other sizes and bores.

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.

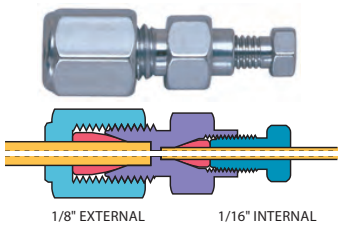
Internal/external reducing unions are typically used to connect 1/16" stainless steel tubing to fused silica tubing.

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.

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

Please contact us 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.

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

* Not a stock item. Please contact us for a quote.
Also available in 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*
1/32"	0.25 mm	ZT.5
1/16"	0.15 mm	ZT1XCS6
	0.25 mm	ZT1C
	0.50 mm	ZT1M
	0.75 mm	ZT1
	1.00 mm	ZT1L
1/8"	0.75 mm	ZT2
	2.00 mm	ZT2L

Also available in other bore sizes and 1/4". Please contact us for a quote.



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*
1/16"	0.15 mm	ZX1XCS6
	0.25 mm	ZX1C
	0.50 mm	ZX1M
	0.75 mm	ZX1
	1.00 mm	ZX1L

Also available in 1/32", 1/8", and 1/4". Please contact us for a quote.

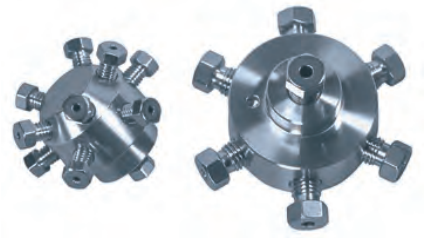


Manifolds

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*
1/32" to 360 µm	Metal tubing	Stainless/stainless	C360IZR.5TS6
	PEEK tubing	PEEK/glass-filled PEEK	C360IZR.5TS6PK
	Fused silica	SS/gold-plated nickel	C360IZR.5TS6FS
1/16" to 360 µm	Metal tubing	Stainless/stainless	C360IZR1S6
	PEEK tubing	PEEK/glass-filled PEEK	C360IZR1S6PK
	Fused silica	SS/aluminum	C360IZR1S6AL
		SS/gold-plated nickel	C360IZR1S6FS

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

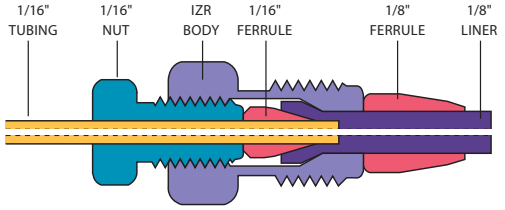


Valco's internal reducer (IZR) allows smaller tubing to be used in valves with fitting details for larger tubing, forming a positive leak-free seal with zero dead volume. The small line from your system goes directly into the IZR and the sample goes directly into the valve, without the short pieces of 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*
Without frit		
1/16" to 1/32"	0.25 mm	IZR1.5
	0.50 mm	IZR1.5L
	1/32"	IZR1.5T
1/8" to 1/16"	0.25 mm	IZR21C
	0.50 mm	IZR21
	1.00 mm	IZR21L
	1/16"	IZR21T
With 2µ frit		
1/8" to 1/16"	1.00 mm	IZR21LF

1/4" reducers and versions with 2µ frit are also available.
Please contact us for a quote.



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*
1/8"	1/16"	1.0 mm	PZA21
		1/16"	PZA21T
	1/8"	1.0 mm	PZA22
1/4"	1/16"	1.0 mm	PZA41
	1/8"	2.0 mm	PZA42L

Also available in other sizes.
Please contact us for a quote.



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*
1/8"	1/16"	1.0 mm	FPZA21
1/4"	1/8"	2.0 mm	FPZA42L



Pipe to Valco external adapters

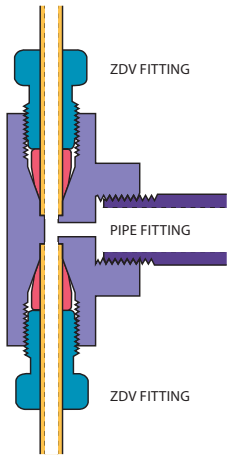
Pipe adapters make a minimum volume connection from pipe fittings to Valco external fittings. Available for both female and male connectors. Standard material is 300 series stainless.

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.

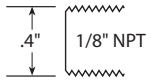
Call for a quote.



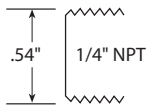
MANIFOLD PIPE ADAPTER
One pipe fitting to Valco ZDV fittings

TECH TIP

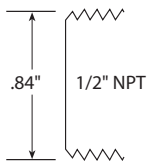
NPT, National Pipe Thread, is a standard developed a long time ago by people without rulers. 1/8" NPT is nowhere close to 1/8"! Measure the diameter of the fitting across the narrow end. You can also count the number of threads in a 1" section. Then look at the diagrams below to determine the correct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



27 threads per inch



18 threads per inch



14 threads per inch

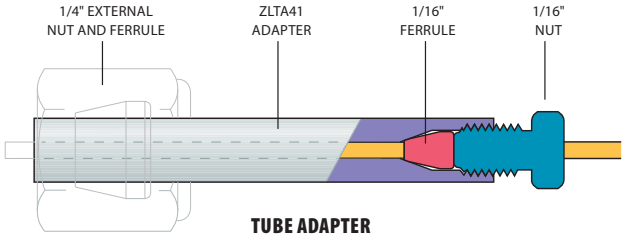


Tube adapters

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*
1/4" to 1/16"	0.7"	1/16"	ZTA41
	1.8"	1/16"	ZLTA41
	2.8"	1/16"	ZXLTA41*

*Not a stock item. Please contact us for a quote.



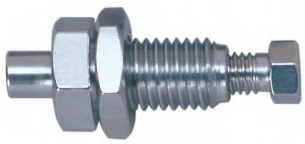
TUBE ADAPTER
(ZLTA41)

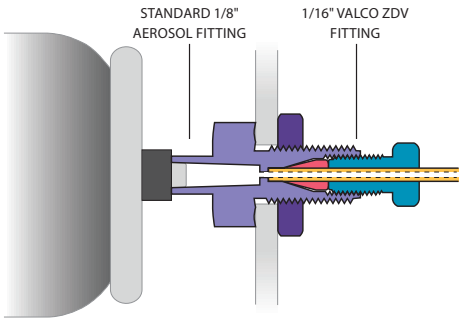
Aerosol adapter bulkhead union

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	
For use with blunt tip needle		
For 1/16" fittings and injectors - 22 ga	VISF-1	
For use with 2" 22 gauge blunt tip needle		
For 1/16" fittings and injectors	VISF-2	
Replacement liners and ferrules		
Liner for VISF-1	VISL-1	
Liner for VISF-2 or VISF-A	VISL-2	
Ferrule for VISF-1 or VISF-2	ZF1VISF	

1/32" and 1/8" fill ports are also available. Please contact us for a quote.

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	
For high pressure injectors (C2, C3, C4, and C52 series injectors)	C-VISF-1H*	
For fittings and low pressure injectors (C22Z and C62Z series injectors)	C-VISF-1	
Replacement liners and ferrules		
Liner for C-VISF-1	VISL-1	
Liner for C-VISF-1H	VISL-1H*	
Ferrule for C-VISF-1 (or 1H)	ZF1VISF	

* Not a stock item. Please contact us 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"

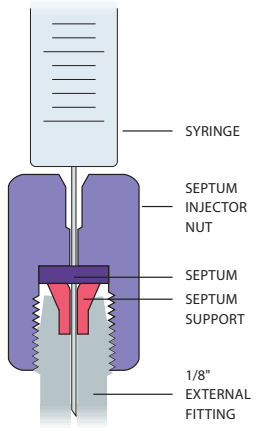
7.0 mm ≈ .275"
10.0 mm ≈ .400"

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

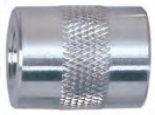




SEPTUM INJECTOR NUT
with septum and support (EN2SI)

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
Septum injector nut with support		EN2SI
Replacement support		ZF2SI
Septum, low bleed, pkg. of 10		SI4G

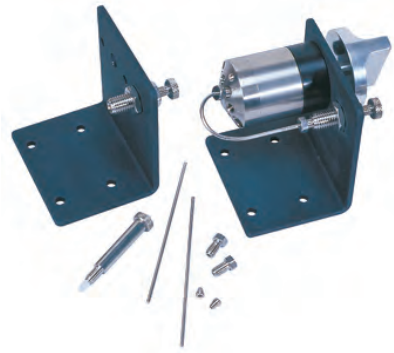


Female luer adapters

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

	Fitting	*Prod No*
Female luer to:	1/32"	ZLA-.5*
	1/16"	ZLA-1
	1/8"	ZLA-2

* Not a stock item. Please contact us 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.

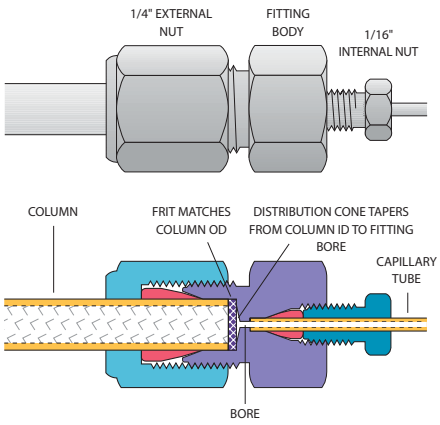
All column end fittings are rated to 10,000 psi. However, the functional limit is dictated by the yield strength of the tubing used with the fitting.

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

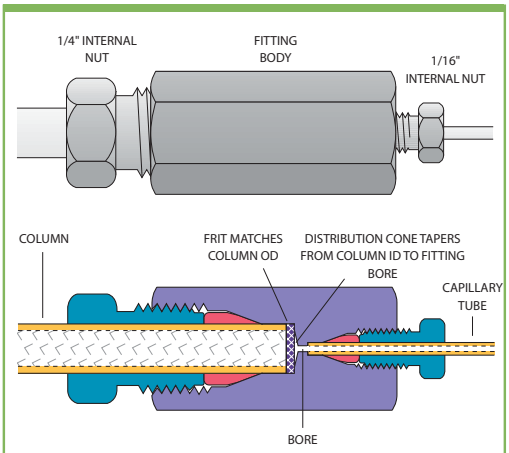
1/4" to 1/16", 4.6 mm column ID, with removable frit



(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

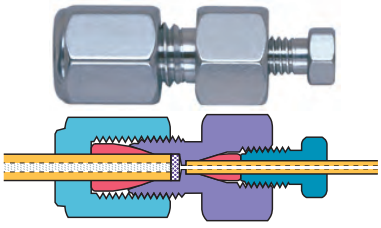
Through-type unions for packing columns..... page 22

CONVERSIONS

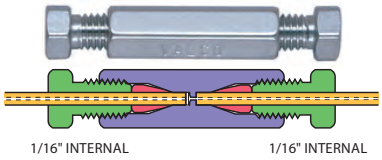
100 µm	≈	.004"
150 µm	≈	.006"
0.25 mm	≈	.010"
0.50 mm	≈	.020"
0.75 mm	≈	.030"
1.0 mm	≈	.040"
1.5 mm	≈	.060"
2.0 mm	≈	.080"
4.6 mm	≈	.180"
6.0 mm	≈	.236"
6.4 mm	≈	.253"
7.0 mm	≈	.275"
10.0 mm	≈	.400"
27.0 mm	≈	1.08"
1/32"	≈	0.8 mm
1/16"	≈	1.6 mm
1/8"	≈	3.2 mm
1/4"	≈	6.4 mm
3/8"	≈	9.5 mm
1/2"	≈	12.7 mm



MICROBORE COLUMN END FITTINGS

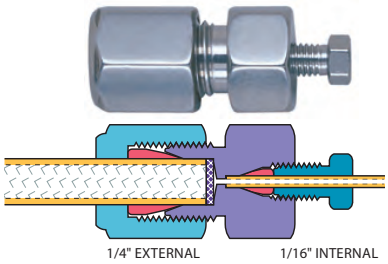


External (ECEF211.0)



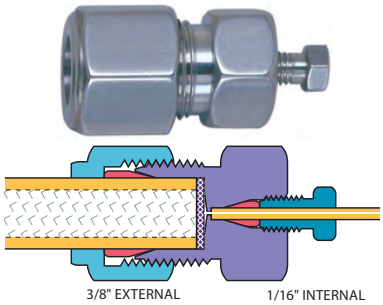
Internal (CEF1)

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.

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

* Not a stock item. Please contact us 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.

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

Please contact us 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.

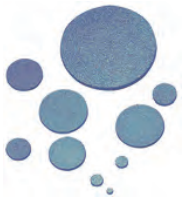
	Bore	*Column ID*	**Without frit** *Prod No*	**Removable 2µ frit** *Prod No*
External column end fittings				
3/8" to	1/16"	0.40 mm	7.0 mm	ECEF617.0	ECEF617.0F*
1/2" to	1/16"	0.75 mm	10.0 mm	ECEF8110.0	ECEF8110.0F

* Not a stock item. Please contact us for a quote.
Also available in other column IDs and sizes.



VALCO FITTINGS

Replacement frits for column end fittings

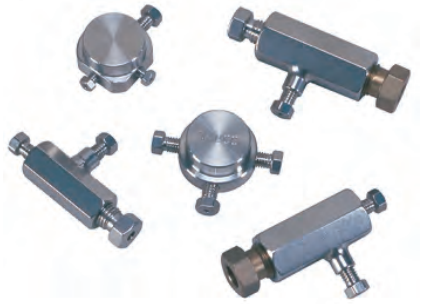


1/16", 1/8" and 1/4" frits are sold in packages of 10.
3/8", 1/2", and 1" frits are sold individually.
Other sizes may be available or special-ordered in OEM quantities.

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

* Not a stock item. Please contact us for a quote.
Also available in pore size of 10µ and in Titanium.

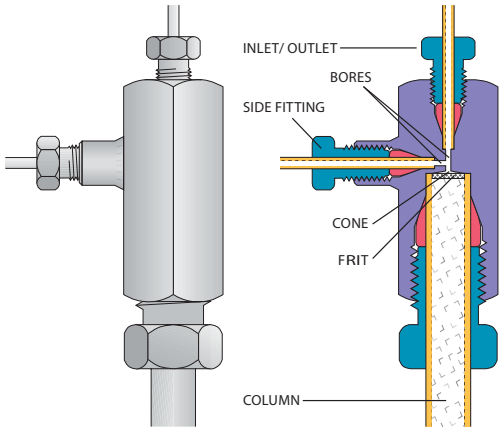
Post-column reaction tee fitting



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*
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*

* Not a stock item. Please contact us for a quote.



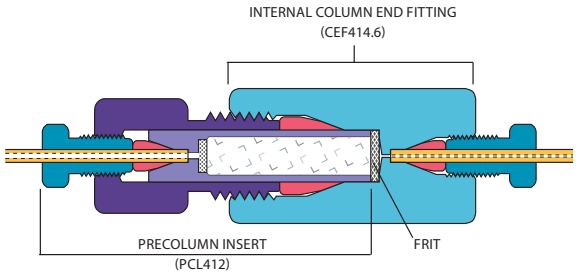
POST-COLUMN REACTION FITTING
(TCEF411)



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)

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



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.



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.

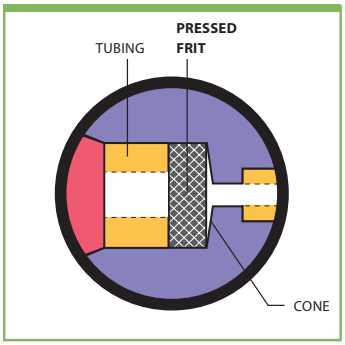
There are many flow elements of analytical instruments which require protection from foreign particles, such as orifices that may become plugged or surfaces that may get scratched. However, conventional filtering devices may have too large a volume to be consistent with good system performance – particularly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

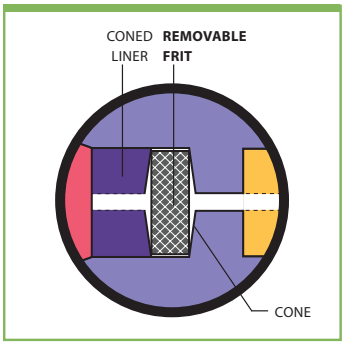


- **PRESSED FRITS**, permanently installed in the filter, are recommended where contaminants are the exception and not the rule. The frits are 2µ stainless.
- **REMOVABLE FRITS** are the best choice for maximum filtration, or if the application requires Hastelloy C or titanium. However, they allow more 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.

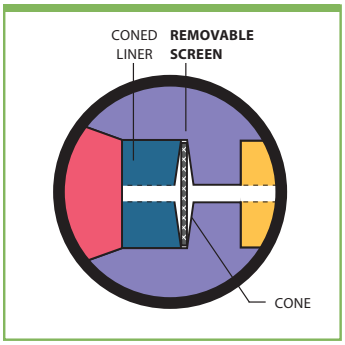
PRESSED FRIT



REMOVABLE FRIT



REMOVABLE SCREEN

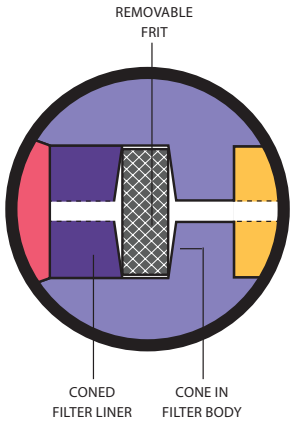




Filters with removable frits are designed to compensate for the thickness of the filter element – the resulting pilot depths are identical with the rest of the Valco product line, facilitating interchangeability of *made up* fittings. Therefore, although our filters look very much like our unions, they 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.

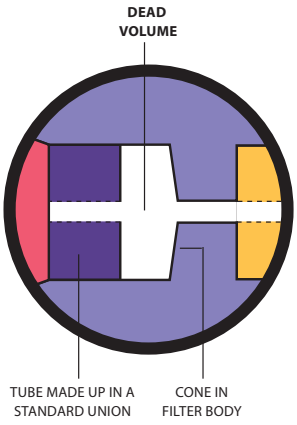
FILTER WITH REMOVABLE FRIT

Correct installation:
Coned for uniform flow and maximum filter surface

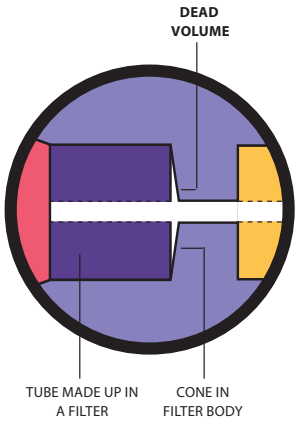


FILTER WITH FRIT REMOVED BEING USED AS A REDUCING UNION

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

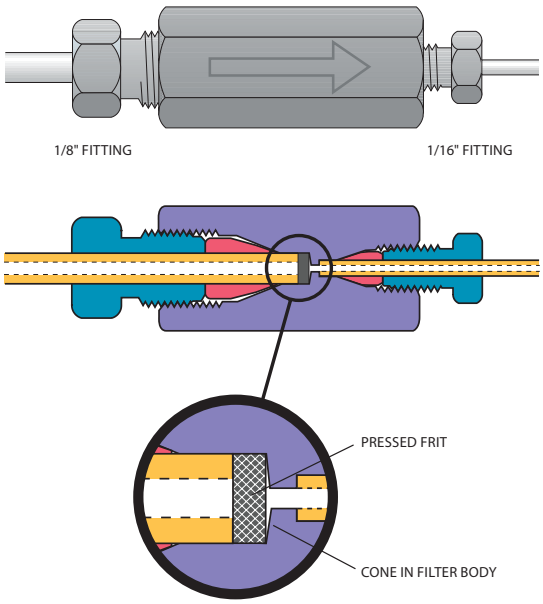
Pressed frit filters contain a permanently installed stainless steel 2µ frit, and are recommended for applications where contaminants are the exception and not the rule – that is, when the sample is generally clean but you wish to guard against the stray burr from a carelessly prepared tube end that 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*	*Prod No*
1/16" to 1/16"	0.75 mm	ZUF1	ZBUF1

Please contact us 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.

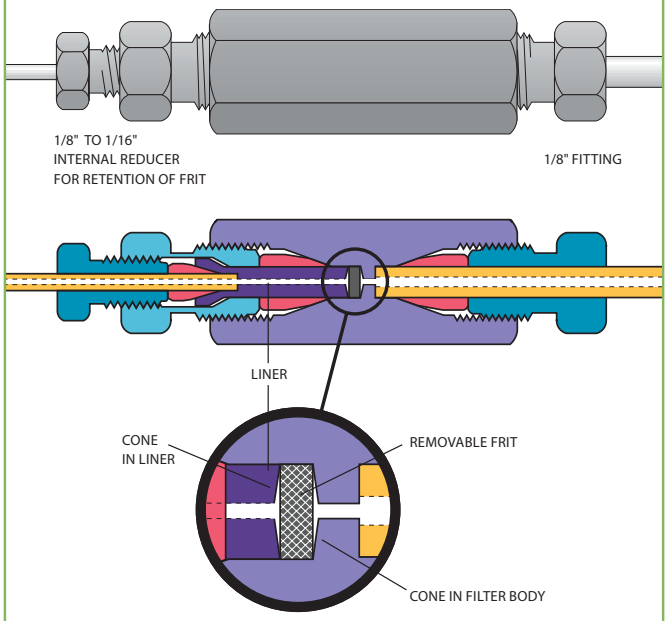
Removable frit filters

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.

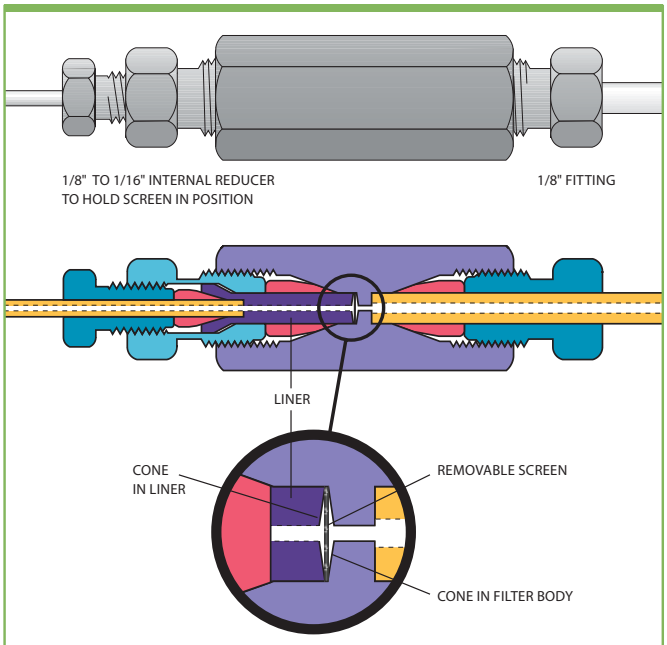
		Standard
	Bore	*Prod No*
1/16" to 1/16"	0.25 mm	ZUFR1CF
	0.50 mm	ZUFR1F

Please contact us for a quote on bulkhead versions and other sizes.





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



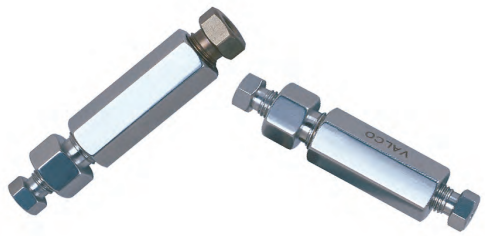
REDUCING FILTER WITH A REMOVABLE SCREEN
1/8" to 1/16"
(ZRUFR21)
No arrow on filter body.

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.

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

* Not a stock item. Please contact us for a quote.
Also available in 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	Hastelloy C (Package/10) Prod No
1/32" frits				
Pkg of 5:	0.5µ	0.25 mm	.5FR.5-5	–
	2µ	0.25 mm	2FR.5-5	–
1/16" frits				
Pkg of 10:	0.5µ	0.75 mm	.5FR1-10	.5FR1HC-10*
	2µ	0.75 mm	2FR1-10	2FR1HC-10*
	10µ	0.75 mm	10FR1-10	–
1/8" frits				
Pkg of 10:	0.5µ	1.00 mm	.5FR2-10	.5FR2HC-10*
	1µ	1.00 mm	1FR2-10	1FR2HC-10*
	2µ	1.00 mm	2FR2-10	2FR2HC-10
	10µ	1.00 mm	10FR2-10	–
1/4" frits				
Pkg of 10:	0.5µ	1.00 mm	.5FR4-10	–
	2µ	1.00 mm	2FR4-10	2FR4HC-10*
	10µ	1.00 mm	10FR4-10	10FR4HC-10*

* Not a stock item. Please contact us for a quote.
Also available in Titanium and in other sizes.

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
1/32" screens			
Pkg of 10:	1µ	0.050 mm	1SR.5-10
	2µ	0.075 mm	2SR.5-10
1/16" screens			
Pkg of 10:	1µ	0.050 mm	1SR1-10
	2µ	0.075 mm	2SR1-10
1/8" screens			
Pkg of 10:	1µ	0.050 mm	1SR2-10
	2µ	0.075 mm	2SR2-10
1/4" screens			
Pkg of 10:	2µ	0.075 mm	2SR4-10
	10µ	0.125 mm	10SR4-10

Please contact us for a quote on other pore sizes and 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
3/16"	SWH3*
1/4"	SWH4

* Not a stock item. Please contact us 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
For 360 µm, FS, and 1/32"	FRK1
For 1/16" and 1/8"	FRK2



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
HKS

Open end wrenches

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



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
PV

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

Cheminert fittings
High pressure 42-51
Low pressure 52-61
Nanovolume® 42-47
Valco fittings 8-41

TECH TIP

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

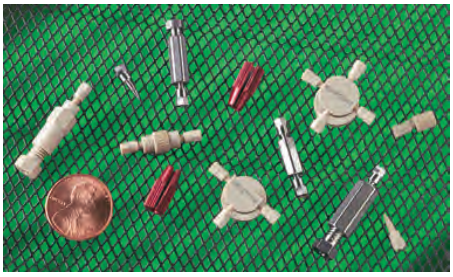
TECH TIP

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
	Nut/ferrule	C360NFPKG
	Cap	C360CPKG
	Plug	C360PPK
	Tightening tool	C360ET

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 37



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	Prod No	Prod No
	Union	C360UPKG2	C360UPKG4	C360UPKG6
	Union, quick mount	C360QUPKG2	C360QUPKG4	C360QUPKG6
	Reducing union, 1/16" to 360 µm	—	—	C360RU1PK6

Tees and crosses

FOR 360 µm TUBING

	Bore size:	50 micron	100 micron	150 micron
		Prod No	Prod No	Prod No
	Tee, quick mount	C360QTPKG2	C360QTPKG4	C360QTPKG6
	Cross, quick mount	C360QXPKG2	C360QXPKG4	C360QXPKG6



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
	Nut/ferrule	C360NFFS
	Cap	C360CFS

Unions and reducing unions — FOR 360 µm FS TUBING

		50 micron bore *Prod No*	**100 micron bore** *Prod No*	**150 micron bore** *Prod No*
	Union	C360UFS2	C360UFS4	C360UFS6
	Reducing union, 1/32" to 360 µm	C360RU.5FS2	C360RU.5FS4	C360RU.5FS6
	Reducing union, 1/16" to 360 µm	—	—	C360RU1FS6

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
	Nut/ferrule	C360NFS6
	Cap	C360C

Unions and reducing unions — FOR 360 µm TUBING

		50 micron bore *Prod No*	**100 micron bore** *Prod No*	**150 micron bore** *Prod No*
	Union	C360US62	C360US64	C360US66
	Reducing union, 1/32" to 360 µm	C360RU.5S62	C360RU.5S64	C360RU.5S66
	Reducing union, 1/16" to 360 µm	—	—	C360RU1S66

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 37



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
	Internal nut with collapsible ferrule *For use with:* Fittings below, and on pages 46-47	C-NNFFPK
	External nut *For use with:* Unions on page 46 Column end fittings on page 47 *Requires collapsible PEEK ferrule, below*	C-EN.5FPKB*
	Collapsible PEEK ferrule *For use with:* External nut, above	ZGF.5PK
	Internal plug *For use with:* Fittings on pages 45-46	C-NPFPK*

* Not a stock item. Please contact us for a quote.

Unions — FOR 1/32" TUBING

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

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

Please contact us for a quote on this non-stock item.

		150 µm bore Prod No
	Reducing union, 1/16" to 1/32" tubing	C-NERU1FPK

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

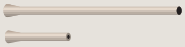
Please contact us for a quote on these non-stock items.

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

* 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

360 µm fittings 43-44
1/32" Nanovolume® column end fittings 47
Tubing
Electroformed nickel.....67
PEEK 69
Unions for fused silica tubing..... 43-44, 46

* 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
For use with:
6 port valve CN2-4346
4 port internal sampling injector CN4-4344



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



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



Consult factory regarding CN2 and CN4 valves.



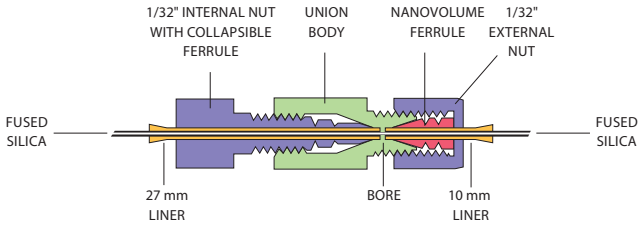
CHEMINERT FITTINGS

Unions

FOR FUSED SILICA TUBING

Please contact us for a quote on these non-stock items.

		100 µm bore	150 µm bore
	FS tubing OD	*Prod No*	*Prod No*
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.

	For tubing OD	*Prod No*
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
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*

* Not a stock item. Please contact us for a quote.

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*
0.2 micron	.2FR.5-5*
0.5 micron	.5FR.5-5
2 micron	2FR.5-5

* Not a stock item. Please contact us for a quote.

TECH TIP

Use **27 mm liners**

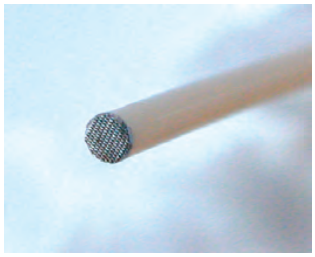
with internal nuts with collapsible ferrules:


Use **10 mm liners**

with external nuts:


MORE INFO

360 µm fittings 43-44
1/32" Nanovolume® Fittings 45
External nuts 45
Internal nuts with collapsible ferrules 45
Liners for column end fittings 47
More unions for fused silica 43-44



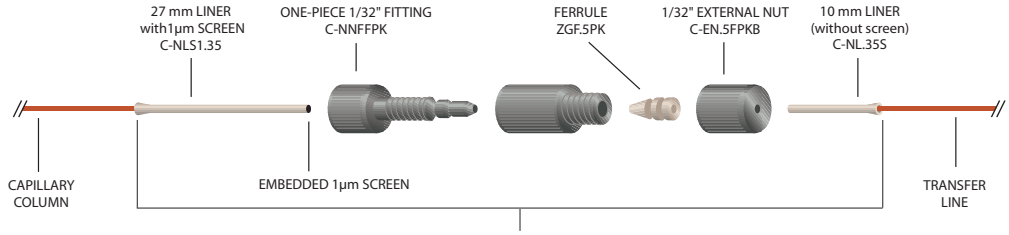
SCREEN EMBEDDED IN END OF LINER
for column end fittings

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

Please contact us for a quote on these non-stock items.

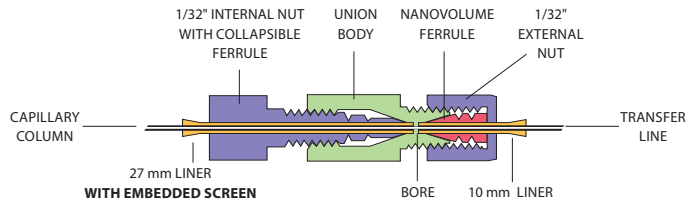
		100 µm bore	150 µm bore
	For tubing OD	*Prod No*	*Prod No*
Column end fitting for fused silica tubing Includes liners 	125 - 175 µm	C-NEF.5XFPK.15S1	C-NEF.5FPK.15S1
	175 - 225 µm	C-NEF.5XFPK.20S1	C-NEF.5FPK.20S1
	225 - 275 µm	C-NEF.5XFPK.25S1	C-NEF.5FPK.25S1
	275 - 325 µm	C-NEF.5XFPK.30S1	C-NEF.5FPK.30S1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

Replacement liners for column end fittings

FOR FS CAPILLARIES

Natural PEEK, with embedded screen to provide full closure for fused silica capillaries. Sold individually. Non-stock items. Please contact us for a quote.

	For tubing OD	*Prod No*
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



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

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.

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

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



* Not-stock item. Please contact us for a quote. Also 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
1/32"	ZGF.5PK-10
1/16"	ZGF1PK-10



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*	**PEEK ferrule** *(Package/5)* *Prod No*	**CTFE ferrule** *(Package/5)* *Prod No*
1/32" fingertight		.57"		ZNF.5FPKG-5	ZNF.5FPK-5	–
1/16" fingertight		1.06"		ZNF1FPKG-5	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*

* Not-stock item. Please contact us 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*
Red	360 µm fittings	C360ET
Green	1/32" fittings (6-40 threads)	CNFT*
Blue	1/16" fittings	ZNFT
Black	6-40 fittings for C25G selectors	CGFT*

* Not-stock item. Please contact us 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*	
PEEK plugs			
1/32" fingertight	.610"	ZP.5FPK	
	.730"	LZP.5FPK	
1/16" fingertight	1.14"	ZP1FPK	
1/16" hex	1.00"	MZP1PK	
1/8" hex	1.005"	ZP2PK	
PEEK caps			
1/16" fingertight	1.290"	ZC1FPK	

Also available in 1/2-20 and other sizes. Please contact us for a quote.

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*	
1/16" fingertight	1.210"	C-ZP1FPK	

Also available in hex-head versions. Please contact us for a quote.

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"
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



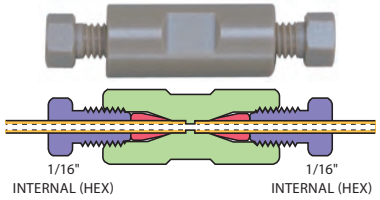
Internal unions

HIGH PRESSURE PEEK

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

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

* Not-stock item. Please contact us for a quote.
Also available in bulkhead versions and other sizes.



INTERNAL UNION – PEEK
Standard bore version
(ZU1PK)

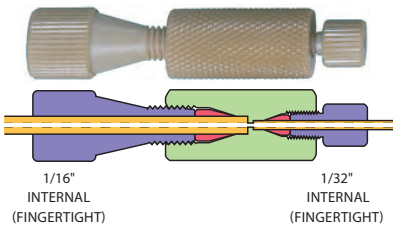
Internal reducing unions

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*
1/16" to 1/32"	0.25 mm	ZRU1.5FPK
	1/32"	ZRU1.5TFPK
1/8" to 1/16"	0.75 mm	ZRU21FPK

Call for a quote on other sizes and bulkhead versions.



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

Internal/external reducing union

HIGH PRESSURE PEEK

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

* Not-stock item. Please contact us for a quote.
Also available in bulkhead versions and other sizes.



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

Tees

HIGH PRESSURE PEEK

1/16" PEEK nuts are fingertight.

Tubing OD	*Bore*	**PEEK tees** *Prod No*
1/16"	1.00 mm	ZT1LFPK

Please contact us 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.

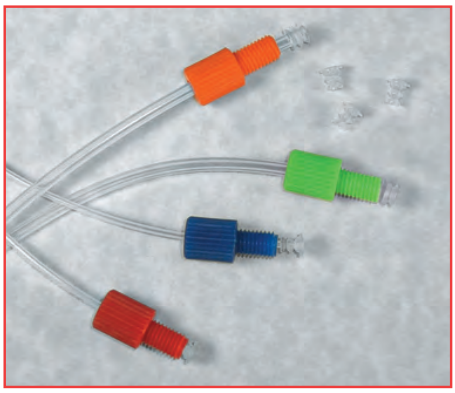
Cheminert flangeless fittings include our patented* collapsible ferrule design. This innovative design utilizes a one-piece ferrule engineered to collapse as it is tightened. The collapse occurs in a narrow area, resulting in a very effective seal with virtually no distortion of the tubing ID and no 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.

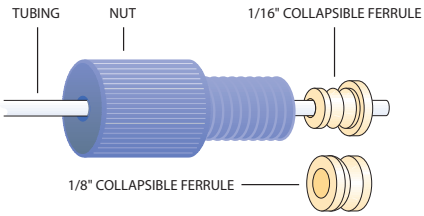
Cheminert tube end fittings come in twelve different colors for system color coding, and work with any 1/16" or 1/8" OD polymeric tubing. Use CTFE ferrules for soft tubing (PTFE, FEP, etc.) and PEEK ferrules for harder tubing (PEEK, ETFE, polyurethane, etc.)

* Patent No. 6,575,501

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

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

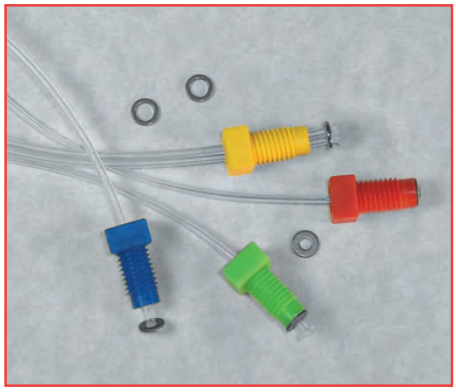


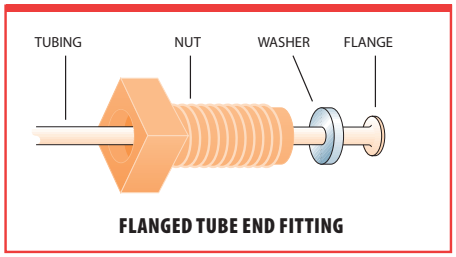


FLANGELESS TUBE END FITTING

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

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



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*
1/16"	CEN1KF

Please contact us 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
Delrin nut	CFL-4D
PPS nut	CFL-4PPS
CTFE ferrule	CFL-CB4KF-S

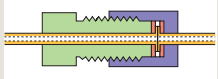
Please contact us for a quote on CTFE nuts.

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



CHEMINERT FITTINGS

Cheminert flanging tools

NON-CE

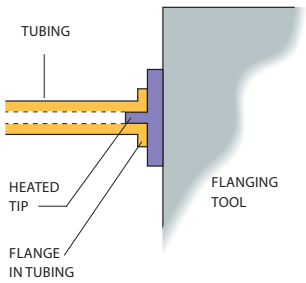
The flanging tool makes the flange which retains the standard 1/4-28 tube end fitting and washer on PTFE or FEP tubing. With this tool, lengths of tubing may be easily assembled to any required dimension. The time required is approximately 5 to 10 seconds per flange.

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
Flanging tools	110 VAC	CFT-110
Flanging tips	for tubing ID ≤ 1.00 mm	CFT-TM
	for tubing ID ≤ 1.50 mm	CFT-TL

Other sizes of replacement flanging tips are also available. Please contact us for a quote.





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
JR-201540

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) Prod No	CTFE (Package/5) Prod No
CPPK	CPKF

Low pressure PEEK plugs 10-32



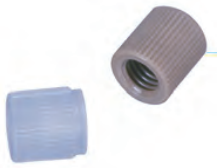
These all-PEEK plugs are for use in Cheminert PEEK fittings and low pressure polymeric valves (C20Z series). For high pressure polymeric valves (C1-C5 series), use the plugs on page 50. Sold individually.

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

* Non-stock item. Please contact us 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) Prod No	CTFE (Package/5) Prod No
CCPK-5	CCKF-5

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*	*Prod No*
1/16"	0.25 mm	CUCPK*	CUCKF
	0.50 mm	CUPK*	CUKF
	0.75 mm	CUMPK	CUMKF



* Non-stock item. Please contact us for a quote. Also available for 1/8" tubing.

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



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*
1/16"	0.25 mm	CZUCKF



Also available in PEEK and 316 stainless bodies.
Please contact us for a quote.

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*	*Prod No*	*Prod No*
1/16"	0.50 mm	CBUPK*	CBUKF	CBUS6*
	0.75 mm	CBUMPK	CBUMKF*	CBUMS6*
1/8"	1.50 mm	CBULPK	CBULKF	CBULS6

* Non-stock item. Please contact us 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*
1/16"	0.25 mm	CTCKF
	0.50 mm	CTKF
	0.75 mm	CTMKF
1/8"	1.50 mm	CTLKF



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"
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





Mixing tees 1/4-28

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

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

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*
0.50 mm	ZLCA1PK

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*	*Prod No*	*Prod No*
1/4-28 male to	Female luer	1.50 mm	CFLAPK	CFLAKF	CFLAPFA
	Male luer	1.50 mm	CMLAPK	CMLAKF*	CMLAPFA

* Non-stock item. Please 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*	*Prod No*
Female luer	to 1/4-28	1.50 mm	CBUFLPK	CBUFLKF*
	to 10-32	1.00 mm	ZBUFLPK*	ZBUFLKF
Male luer	to 10-32	1.00 mm	ZBUMLPK	ZBUMLKF*

* Non-stock item. Please 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.

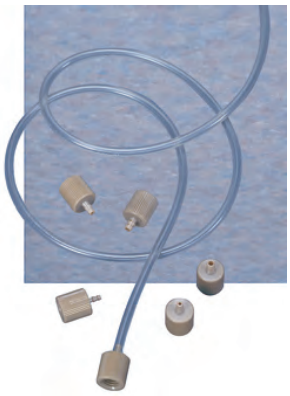




CHEMINERT FITTINGS

Perifit fittings

FOR PERISTALTIC PUMP TUBING



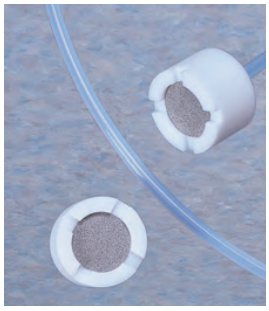
The Cheminert Perifit is a unique fitting with a barb on one end and a 1/4-28 female fitting on the other end, for connecting a FIA line with the most commonly used peristaltic tubing. The fitting is compact and easy to install while providing a secure, trouble-free connection. A Perifit can be used 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*
0.50 to 1.02 mm ID	C-PFS
1.12 to 1.65 mm ID	C-PFM
1.85 to 2.29 mm ID	C-PFL

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*
10 micron	C-MPFTI10

Also available in 2 micron. Please contact us for a quote.

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
Filter for 1/16" tubing	0.5 mm bore	ZU1FPK.5*
Replacement filter element	0.5 micron pore size	C-F1.5TI



* Non-stock item. Please contact us 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*
2 micron	CFE-S2
10 micron	CFE-S10
75 micron	CFE-S75





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*
Last Drop filter, 2.5µm	PTFE	JR-9000-0520
	Stainless steel	JR-9000-0530



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*
Last Drop filter/sparger, 2.5 µm filter, 10 µm sparger	PTFE	JR-9000-0602
	Stainless steel	JR-9000-0640

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

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
No-Met mobile phase filter, 1/8"	JR-32178
Replacement element	JR-32179

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*
1/16"	2 µm	35	JR-367016-2
	10 µm	35	JR-367016-10
	20 µm	35	JR-367016-20
1/8"	2 µm	35	JR-367008-2
	10 µm	100	JR-367008-10
	20 µm	120	JR-367008-20

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"

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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
2 ports	JR-S-11001
3 ports	JR-S-11002
4 ports	JR-S-11003

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*
0.13 mm ID	Red	JR-26501
0.17 mm ID	Yellow	JR-26502
0.25 mm ID	Blue	JR-26503
0.50 mm ID	Orange	JR-26504





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.

Two 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 1 µl/min to 25 ml/min (35 ml/min intermittent). The M6 is also available in a high pressure model, 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
M6	**5 nl to 5 ml range**	
M6 pump with:	Controller and stepper motor	CP2-4841-F1
	Stepper motor (no controller)	CP2-4841-SF1
M6 pump only		CP2-4841-D
M6HP	**5 nl to 5 ml range**	
M6HP pump with:	Controller and stepper motor	CP2-4841-F1-HP
	Stepper motor (no controller)	CP2-4841-SF1-HP
M6HP pump only		CP2-4841-D-HP
M50 pumps	**100 nl to 25 ml range**	
M50 pump with:	Controller and stepper motor	CP3-8182-F2
	Stepper motor (no controller)	CP3-8182-SF2
M50 pump only		CP3-8182-D
Accessories and replacement parts		
Pump motor	M6	CP-DSM
	M6HP	CP-DSM
	M50	CP-DSM2
Controller	M-Force	CP-CMF
Standoff assembly*	2"	2SOAMPCP
	3"	3SOAMPCP
	4"	4SOAMPCP
	6"	6SOAMPCP

* 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

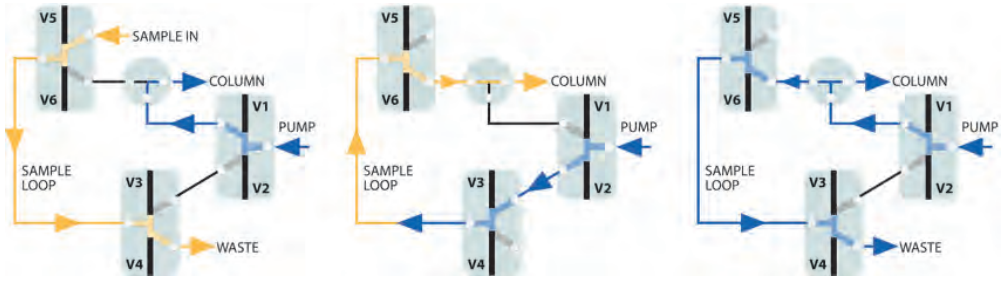


Ultra-high pressure injector system — FOR LIQUIDS

Prod No

SPSS40

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.



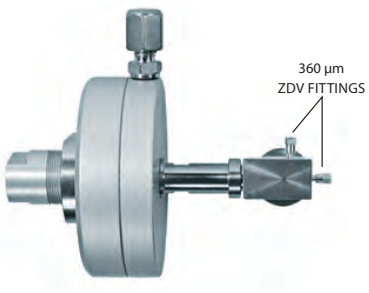
40,000 PSI ULTRA-HIGH PRESSURE VALVES

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 198-63 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

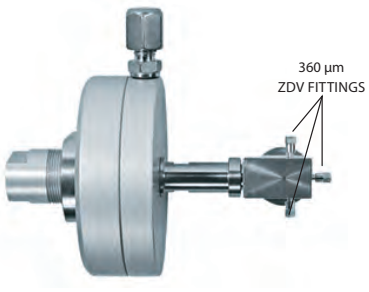
FOR LIQUIDS

Fittings	*Bore*	*Prod No*
On/off valves		
360 µm	0.15 mm	ASFVO40K360
1/32"	0.15 mm	ASFVO40K.5
1/16"	0.15 mm	ASFVO40K1
Prime/purge valves		
360 µm	0.15 mm	ASFV40K360
1/32"	0.15 mm	ASFV40K.5
1/16"	0.15 mm	ASFV40K1
Dual on/off valves		
360 µm	0.15 mm	ASFVOD40K360
1/32"	0.15 mm	ASFVOD40K.5
1/16"	0.15 mm	ASFVOD40K1

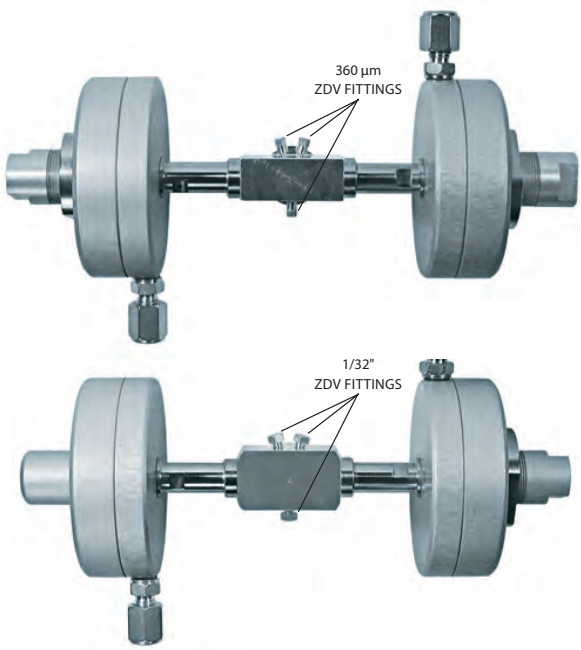
SPECIFICATIONS

Pressure
40,000 psi liq
Temperature
50°C

PRIME/PURGE VALVE



DUAL ON/OFF VALVES



STANDARD ON/ OFF AND PRIME/ PURGE VALVES

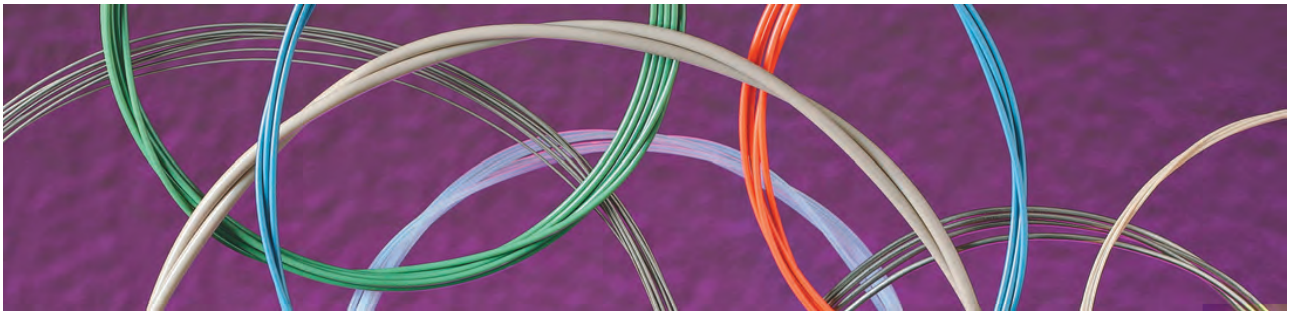
2,000 psi to 10,000 psi valves . . . pages 198-199



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

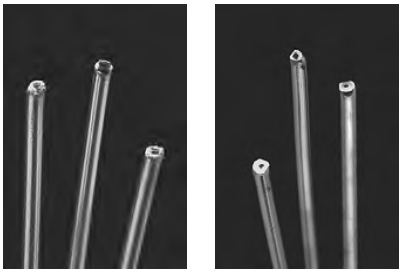
VICI's electrolytic cutting process yields polished tubing with flat ends. Each piece of VICI pre-cut metal tubing is specially cleaned with micro-filtered steam from deionized water to remove both organic and inorganic contaminants, representing a major improvement over the common practice of using 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.

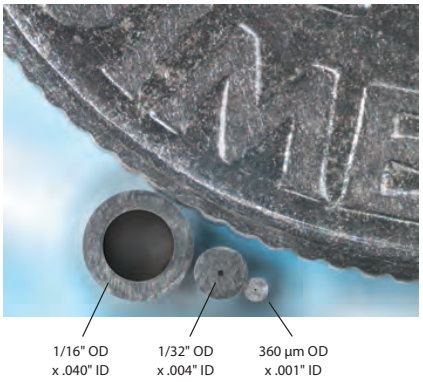
TECH TIP

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



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*
.001"	TEFNI.101	1 foot
.002"	TEFNI.102	2 feet
.004"	TEFNI.104	20 feet
.005"	TEFNI.105	20 feet
.007"	TEFNI.107	20 feet

1/32" OD EFNi tubing — CUSTOM LENGTHS

See pricing note in box at left.

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

1/16" OD EFNi tubing — CUSTOM LENGTHS

See pricing note in box at left.

Tubing ID	*Prod No*	*Max length*
.020"	TEFNI120	30 feet
.030"	TEFNI130	50 feet
.040"	TEFNI140	50 feet

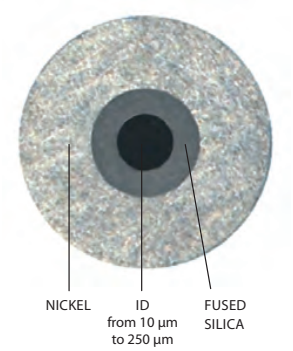


TUBING

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)

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.



CROSS SECTION
Nickel-clad FS tubing

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*
10 µm	TNFS800010
15 µm	TNFS800015
20 µm	TNFS800020
25 µm	TNFS800025
50 µm	TNFS800050
100 µm	TNFS800100
180 µm	TNFS800180
250 µm	TNFS800250

1/16" OD nickel-clad fused silica

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

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"

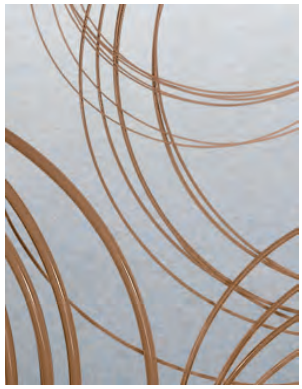
380 µm ≈ .015"
510 µm ≈ .020"

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".

1/32" OD PEEK tubing

	.0025" ID	.005" ID	.010" ID	.015" ID
Length	*Prod No*	*Prod No*	*Prod No*	*Prod No*
5 meters	TPK.502-5M	TPK.505-5M	TPK.510-5M	TPK.515-5M
10 meters	TPK.502-10M	TPK.505-10M	TPK.510-10M	TPK.515-10M
25 meters	TPK.502-25M	TPK.505-25M	TPK.510-25M	TPK.515-25M

1/16" OD PEEK tubing

	.006" ID	.010" ID	.020" ID	.030" ID
Length	*Prod No*	*Prod No*	*Prod No*	*Prod No*
5 meters	TPK106-5M	TPK110-5M	TPK120-5M	TPK130-5M
10 meters	TPK106-10M	TPK110-10M	TPK120-10M	TPK130-10M
25 meters	TPK106-25M	TPK110-25M	TPK120-25M	TPK130-25M

1/8" OD PEEK tubing

	.060" ID	.088" ID
Length	*Prod No*	*Prod No*
5 meters	TPK260-5M	TPK288-5M
10 meters	TPK260-10M	TPK288-10M
25 meters	TPK260-25M	TPK288-25M

MAXIMUM PRESSURE FOR PEEK TUBING

Tubing ID	Maximum Pressure
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

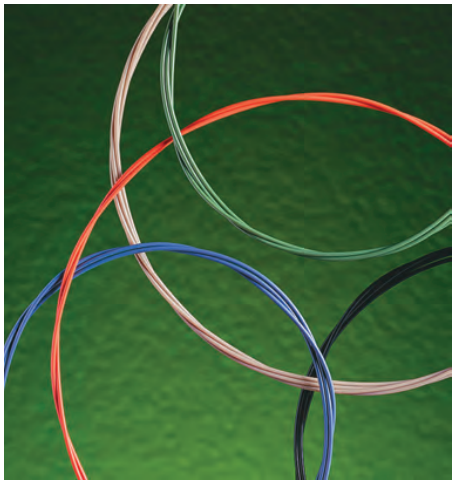
We offer PEEK tubing custom-manufactured to meet your specific OD, ID, and color requirements. The OD range is .014" (360 micron) to 1/8", with a minimum ID of .002" for tubing up to 1/16" OD. (Maximum ID varies according to the OD.) Color coding can be solid or striped.

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*
90° elbow	JR-357090-5
180° elbow	JR-357180-5



COLOR-CODED PEEK TUBING

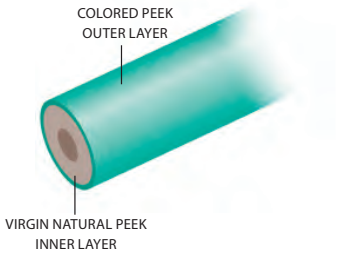
Color-coded tubing helps you identify the ID of your PEEK tubing, since each ID is a different color. Use this tubing where maximum chemical resistance and biocompatibility are required. Tolerances are ±.002" on the OD and ±.001" on the ID.

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*
.004"	Black	460	6700	JR-TD-5804
.005"	Red	420	6100	JR-TD-6007
.007"	Yellow	400	5800	JR-TD-6008
.010"	Blue	386	5600	JR-TD-6009
.020"	Orange	350	4500	JR-TD-6010
.030"	Green	240	3500	JR-TD-6011

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 meters.

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

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 meters.

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

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

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



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 *Prod No*	.010" ID *Prod No*	.015" ID *Prod No*	.020" ID *Prod No*	.030" ID *Prod No*
PTFE					
5 meters	TTF106-5M	TTF110-5M	TTF115-5M	TTF120-5M	TTF130-5M
10 meters	TTF106-10M	TTF110-10M	TTF115-10M	TTF120-10M	TTF130-10M
25 meters	TTF106-25M	TTF110-25M	TTF115-25M	TTF120-25M	TTF130-25M

	.010" ID *Prod No*	.020" ID *Prod No*	.030" ID *Prod No*
FEP			
5 meters	TFEP110-5M	TFEP120-5M	TFEP130-5M
10 meters	TFEP110-10M	TFEP120-10M	TFEP130-10M
25 meters	TFEP110-25M	TFEP120-25M	TFEP130-25M
ETFE			
5 meters	TTZ110-5M	TTZ120-5M	TTZ130-5M
10 meters	TTZ110-10M	TTZ120-10M	TTZ130-10M
25 meters	TTZ110-25M	TTZ120-25M	TTZ130-25M

1/8" OD polymeric tubing

	.030" ID *Prod No*	.060" ID *Prod No*	.085" ID *Prod No*
PTFE			
5 meters	TTF230-5M	TTF260-5M	TTF285-5M
10 meters	TTF230-10M	TTF260-10M	TTF285-10M
25 meters	TTF230-25M	TTF260-25M	TTF285-25M

	.060" ID *Prod No*
FEP	
5 meters	TFEP260-5M
10 meters	TFEP260-10M
25 meters	TFEP260-25M
ETFE	
5 meters	TTZ260-5M
10 meters	TTZ260-10M
25 meters	TTZ260-25M

TUBING CLIP – THE LC TUBING ORGANIZER

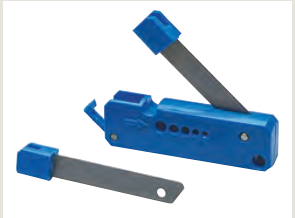


The tubing clip holds 1/16" and 1/8" polymer tubing precisely where you want them in your beakers, flasks, bottles, etc. up to 4 mm wall thickness. The stainless steel spring ensures a long lifetime.

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

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
Clean-Cut tubing cutter	JR-797
Replacement blade	JR-798

SEE ALSO

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

CUSTOM LENGTHS

Custom lengths of PTFE, FEP, and ETFE tubing up to 75 meters 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.)*

To order, specify the length required in 1 meter increments.

360 µm OD metal tubing

BULK QUANTITIES

	75 µm ID *Prod No*	150 µm ID *Prod No*
316 stainless	TSS360075	TSS360150

1/32" OD metal tubing

BULK QUANTITIES

	.005" ID *Prod No*	.007" ID *Prod No*	.010" ID *Prod No*	.020" ID *Prod No*
316 stainless	TSS.505	TSS.507	TSS.510	TSS.520
Nickel 200	—	—	TNI.510	TNI.520

1/16" OD metal tubing

BULK QUANTITIES

	.005" ID *Prod No*	.010" ID *Prod No*	.012" ID *Prod No*	.015" ID *Prod No*
316 stainless	TSS105	TSS110	TSS112	TSS115
Hastelloy C	—	THC110		
Nickel 200	TNI105	TNI110		

	.020" ID *Prod No*	.026" ID *Prod No*	.030" ID *Prod No*	.040" ID *Prod No*
316 stainless	TSS120	TSS126	TSS130	TSS140
Hastelloy C	THC120	—	THC130	THC140
Nickel 200	TNI120	—	TNI130	TNI140

1/8" OD metal tubing

BULK QUANTITIES

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

	.030" ID *Prod No*	.040" ID *Prod No*	.060" ID *Prod No*
316 stainless	TSS230	TSS240	TSS260

	.067" ID *Prod No*	.085" ID *Prod No*
316 stainless	TSS267	TSS285

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

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"	90 cm
.007"	150 cm
.010"	300 cm
.020"	600 cm
.026"	1200 cm
.030"	1500 cm
>.030"	1500 cm

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

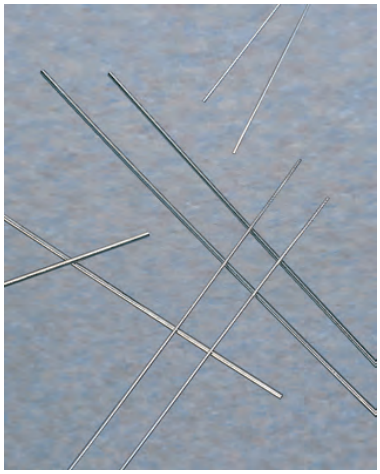


TUBING

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 charge for custom-cut tubing.

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



1/32" OD stainless tubing

PRE-CUT KITS

Length	.005" ID Prod No	.010" ID Prod No	.020" ID Prod No
2 pieces per package			
5 cm	T5N5D	T5N10D	T5N20D
10 cm	T10N5D	T10N10D	T10N20D
20 cm	T20N5D	T20N10D	T20N20D
30 cm	T30N5D	T30N10D	T30N20D
50 cm	T50N5D	T50N10D	T50N20D
100 cm	—	T100N10D	T100N20D
10 pieces per package			
5 cm	T5N5-10	T5N10-10	T5N20-10
10 cm	T10N5-10	T10N10-10	T10N20-10
20 cm	T20N5-10	T20N10-10	T20N20-10
30 cm	T30N5-10	T30N10-10	T30N20-10
50 cm	T50N5-10	T50N10-10	T50N20-10
100 cm	—	T100N10-10	T100N20-10
50 pieces per package			
5 cm	T5N5-50	T5N10-50	T5N20-50
10 cm	T10N5-50	T10N10-50	T10N20-50
20 cm	T20N5-50	T20N10-50	T20N20-50
30 cm	T30N5-50	T30N10-50	T30N20-50
50 cm	T50N5-50	T50N10-50	T50N20-50
100 cm	—	T100N10-50	T100N20-50
100 pieces per package			
5 cm	T5N5-100	T5N10-100	T5N20-100
10 cm	T10N5-100	T10N10-100	T10N20-100
20 cm	T20N5-100	T20N10-100	T20N20-100
30 cm	T30N5-100	T30N10-100	T30N20-100
50 cm	T50N5-100	T50N10-100	T50N20-100
100 cm	—	T100N10-100	T100N20-100

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

Length	.005" ID Prod No	.010" ID Prod No	.020" ID Prod No	.030" ID Prod No	.040" ID Prod No
2 pieces per package					
5 cm	T5C5D	T5C10D	T5C20D	T5C30D	T5C40D
10 cm	T10C5D	T10C10D	T10C20D	T10C30D	T10C40D
20 cm	T20C5D	T20C10D	T20C20D	T20C30D	T20C40D
30 cm	T30C5D	T30C10D	T30C20D	T30C30D	T30C40D
50 cm	T50C5D	T50C10D	T50C20D	T50C30D	T50C40D
100 cm	—	T100C10D	T100C20D	T100C30D	T100C40D
10 pieces per package					
5 cm	T5C5-10	T5C10-10	T5C20-10	T5C30-10	T5C40-10
10 cm	T10C5-10	T10C10-10	T10C20-10	T10C30-10	T10C40-10
20 cm	T20C5-10	T20C10-10	T20C20-10	T20C30-10	T20C40-10
30 cm	T30C5-10	T30C10-10	T30C20-10	T30C30-10	T30C40-10
50 cm	T50C5-10	T50C10-10	T50C20-10	T50C30-10	T50C40-10
100 cm	—	T100C10-10	T100C20-10	T100C30-10	T100C40-10
50 pieces per package					
5 cm	T5C5-50	T5C10-50	T5C20-50	T5C30-50	T5C40-50
10 cm	T10C5-50	T10C10-50	T10C20-50	T10C30-50	T10C40-50
20 cm	T20C5-50	T20C10-50	T20C20-50	T20C30-50	T20C40-50
30 cm	T30C5-50	T30C10-50	T30C20-50	T30C30-50	T30C40-50
50 cm	T50C5-50	T50C10-50	T50C20-50	T50C30-50	T50C40-50
100 cm	—	T100C10-50	T100C20-50	T100C30-50	T100C40-50
100 pieces per package					
5 cm	T5C5-100	T5C10-100	T5C20-100	T5C30-100	T5C40-100
10 cm	T10C5-100	T10C10-100	T10C20-100	T10C30-100	T10C40-100
20 cm	T20C5-100	T20C10-100	T20C20-100	T20C30-100	T20C40-100
30 cm	T30C5-100	T30C10-100	T30C20-100	T30C30-100	T30C40-100
50 cm	T50C5-100	T50C10-100	T50C20-100	T50C30-100	T50C40-100
100 cm	—	T100C10-100	T100C20-100	T100C30-100	T100C40-100

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:

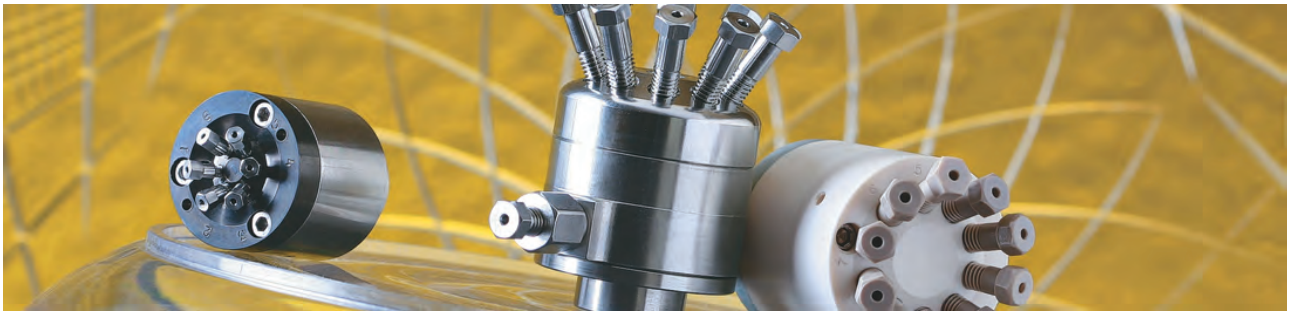
Tubing ID	Max length
.005"	90 cm
.007"	150 cm
.010"	300 cm
.020"	600 cm
.026"	1200 cm
.030"	1500 cm
>.030"	1500 cm

VOLUME CHART

Tubing ID	Volume µl/cm	Volume µl/in	Tubing ID	Volume µl/cm	Volume 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

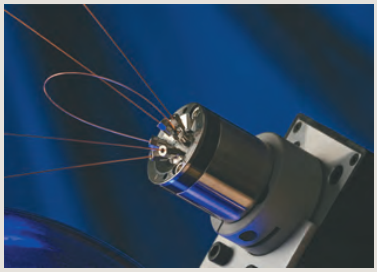
UHPLC

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.

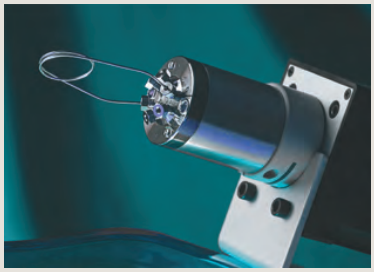
NANOVOLUME® (100-150 µm)

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



MICROBORE® (250 µm)

Injectors ..... PAGES 127, 136-137
Internal sample injectors..... 137
Selectors 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

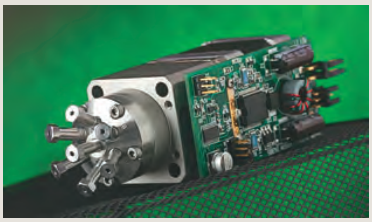


FOR OEMs

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..... PAGES 162, 164, 166
Low pressure injectors..... 168-169
Selectors 170-171







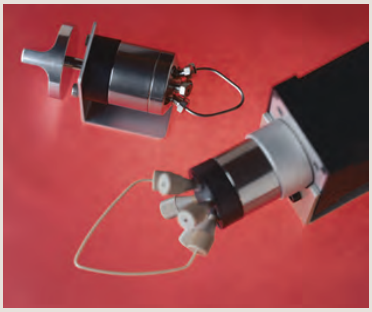
HPLC

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



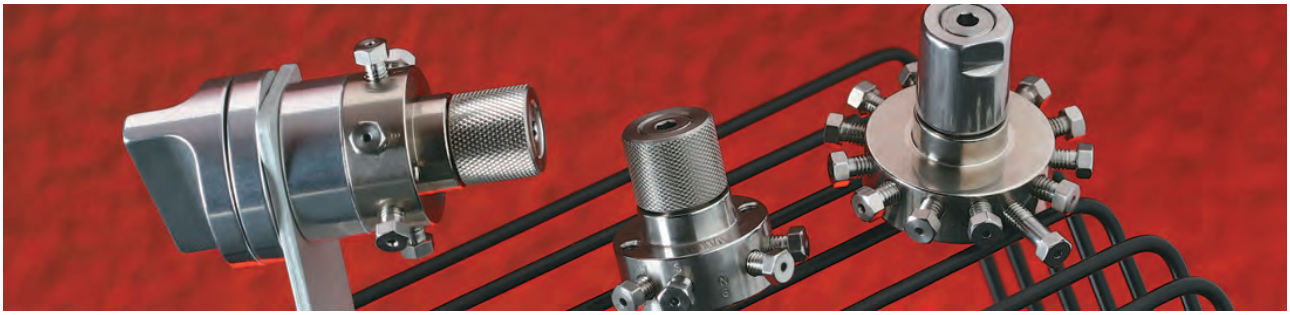
DIAPHRAGM VALVES

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

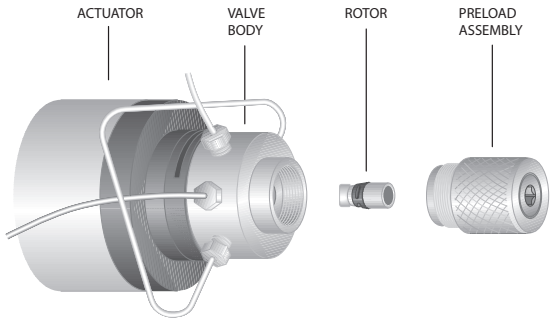
DESIGN

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
Cheminert
injectors 129-131
selectors. 132-133
Diaphragm 122-123
Valco
two pos 82-83
selectors. 84-85

Valco valve product numbers
GC 87-94
HPLC 95-98
Selector 104-115

Applications
Two position 99-103
Selector 116-121

Decoding Valco valve product no's . . . 258-261



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

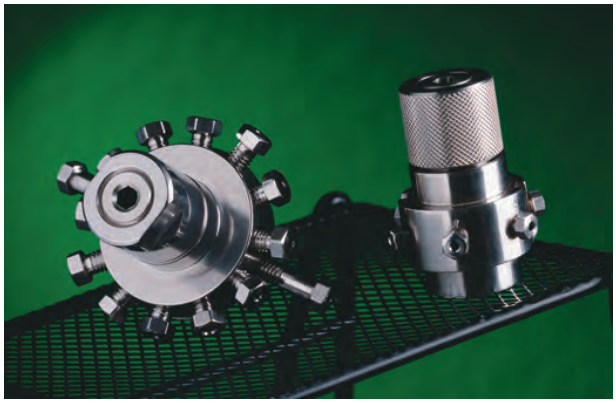
OPTIONAL LEAK TESTING WITH HELIUM MASS SPECTROMETER

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.
Example:
An A4C6WE (air actuated 1/16" 6 port valve with a 4" standoff) made of Hastelloy C-22 would be designated A4C6WEHC.

Due to design requirements, several special grades of stainless steel may be used where "HPLC grade" is noted. The default material is Nitronic 60, but Type 316 stainless steel is also an option.

SPECIAL BODY MATERIAL CODES

Body material	*Code*
HPLC grade Stainless steel	S6
Hastelloy C-22	HC
Inconel 600	IN
Monel 400	M4
Nickel	NI
Nitronic 50	N5
Titanium *	TI

** Not available for high temperature valves (WT, UWT, or T series) due to material temperature limit.*



VALCO VALVES

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

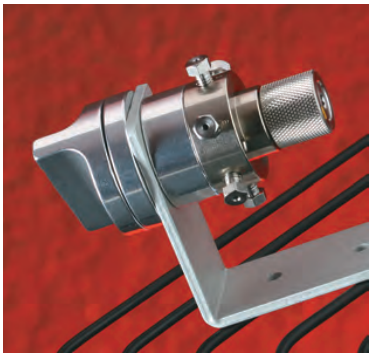
Valcon M	400 psi	50°C
Valcon P	400 psi	175°C
Valcon R	400 psi	75°C
Valcon TF	200 psi	50°C

See page 249 for a discussion of rotor materials.

MORE INFO

Applications
Two position 99-103
Selector 116-121

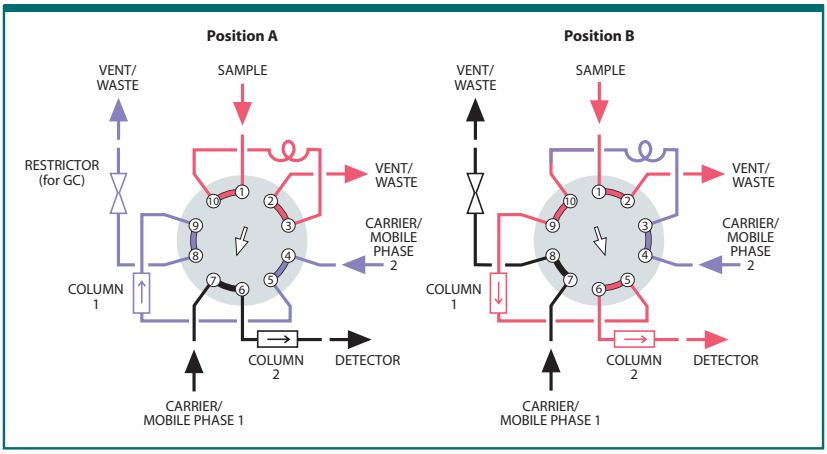
Valco valves
GC 87-94
HPLC 95-98
Selector 104-115

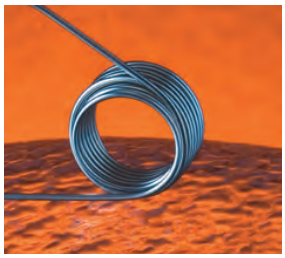


SAMPLE INJECTORS

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**





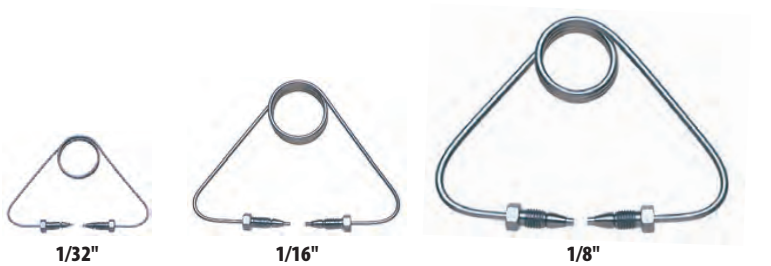
SAMPLE LOOPS

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 VALVES

VALCO SELECTORS

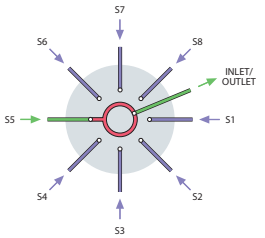
Instead of the back and forth switching of two position valves, selectors (multiposition valves) step incrementally through continuous revolutions (bi-directionally with universal and microelectric actuators). While we can supply older models, all the valves in this catalog have a preload assembly. This 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

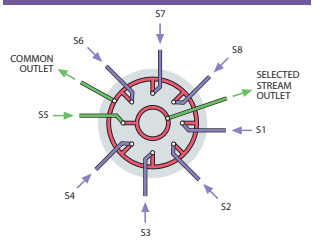
SD (DEAD-ENDED) valves select one of 4 to 16 dead-ended streams, directing it through the valve outlet to a sample valve, pressure sensor, detector, column, etc. The same configuration can also direct one stream to a number of outlets for fraction collection.

SD – Dead-end



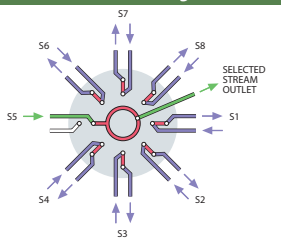
SC (COMMON OUTLET) selectors are similar to SDs, except that instead of being dead-ended the non-selected streams flow to a common outlet.

SC – Common outlet



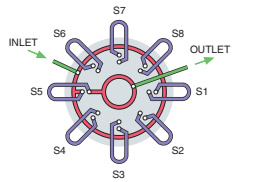
SF (FLOW-THROUGH) selectors are similar to SDs and SCs, selecting a stream and sending it to the outlet. However, SFs allow the non-selected streams to flow through individual outlets instead of a common outlet.

SF – Flow-through



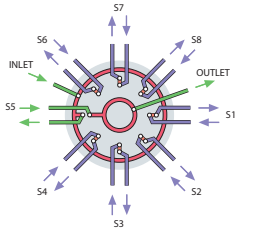
ST (TRAPPING) selectors are used for multi-column, multi-sample, or multi-trap operations.

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

Actuation .. pp 172-179

Applications . 116-121

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Specifying a special body material 81

Selector prices
Low pressure
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SC..... 106-107
SF..... 108-109
ST..... 110-111
STF..... 112-113
High pressure
SD 114
ST.....115

Loops, if required, are found on corresponding valve pages.

For special port diameters, please consult the factory.

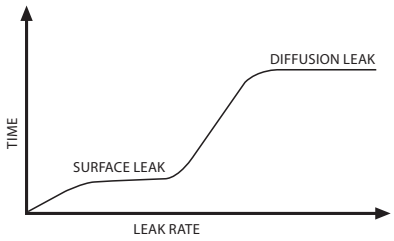


VALCO VALVES

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

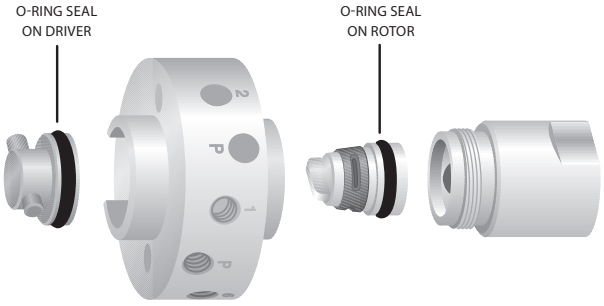
The measurement of low ppb gas concentrations may necessitate the purging of any leakage across the sealing surfaces and/or any diffusion through the sealing material. Designs which employ a "purging groove" on the rotor are successful at capturing surface leaks, but are ineffective at purging the air which diffuses through the polymeric rotor.



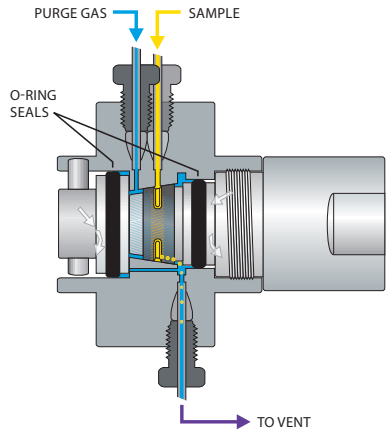
Valco offers two methods for capturing and purging both types of leakage – a built-in internal purge and an external purge housing. The built-in purge feature offers significant advantages over the older external purge housing, which must still be used on the smaller W type valves. Size and weight are 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
175°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 *(See pages 246-247)*

Includes 2" standoff. Not available in manual version.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes RS232/485 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 *Prod No*	6 Ports *Prod No*	8 Ports *Prod No*	10 Ports *Prod No*
With air actuator	A2C4UWEPI	A2C6UWEPI	A2C8UWEPI	A2C10UWEPI
With universal act.	EUDA-2C4UWEPI	EUDA-2C6UWEPI	EUDA-2C8UWEPI	EUDA-2C10UWEPI
Replacement valve	DC4UWEPI	DC6UWEPI	DC8UWEPI	DC10UWEPI
Replacement rotor	SSAC4UWEPI	SSAC6UWEPI	SSAC8UWEPI	SSAC10UWEPI



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 *(see pages 246-247)*

Includes 2" standoff. Not available in manual version.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes RS232/485 serial interface. See page 174 for other interface options.



Internally purged
Med temp
Internal sample
1/16" 0.75 mm

Sample volume	.2 µl *Prod No*	.5 µl *Prod No*	1 µl *Prod No*	2 µl *Prod No*
With air actuator	A2CI4UWE.2PI	A2CI4UWE.5PI	A2CI4UWE1PI	A2CI4UWE2PI
With universal act.	EUDA-2CI4UWE.2PI	EUDA-2CI4UWE.5PI	EUDA-2CI4UWE1PI	EUDA-2CI4UWE2PI
Replacement valve	DCI4UWE.2PI	DCI4UWE.5PI	DCI4UWE1PI	DCI4UWE2PI
Replacement rotor	SSACI4UWE.2PI	SSACI4UWE.5PI	SSACI4UWE1PI	SSACI4UWE2PI



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 RS232/485 serial interface. See page 174 for other interface options.



Sample volume	.06 µl *Prod No*	.1 µl *Prod No*	.2 µl *Prod No*	.5 µl *Prod No*
Manual w/ standoff	2NI4WE.06	2NI4WE.1	2NI4WE.2	2NI4WE.5
With air actuator	A2NI4WE.06	A2NI4WE.1	A2NI4WE.2	A2NI4WE.5
With universal act.	EUHA-2NI4WE.06	EUHA-2NI4WE.1	EUHA-2NI4WE.2	EUHA-2NI4WE.5
Replacement valve	DNI4WE.06	DNI4WE.1	DNI4WE.2	DNI4WE.5
Replacement rotor	SSANI4WE.06	SSANI4WE.1	SSANI4WE.2	SSANI4WE.5

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
  (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 RS232/485 serial interface. See page 174 for other interface options.



Sample volume	.06 µl *Prod No*	.1 µl *Prod No*	.2 µl *Prod No*	.5 µl *Prod No*
Manual	CI4WE.06	CI4WE.1	CI4WE.2	CI4WE.5
Manual w/ standoff	2CI4WE.06	2CI4WE.1	2CI4WE.2	2CI4WE.5
With air actuator	A2CI4WE.06	A2CI4WE.1	A2CI4WE.2	A2CI4WE.5
With universal act.	EUHA-2CI4WE.06	EUHA-2CI4WE.1	EUHA-2CI4WE.2	EUHA-2CI4WE.5
Replacement valve	DCI4WE.06	DCI4WE.1	DCI4WE.2	DCI4WE.5
Replacement rotor	SSACI4WE.06	SSACI4WE.1	SSACI4WE.2	SSACI4WE.5

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
  (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

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Microelectric 176
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Valve rotors 249
Standoff
assemblies 187



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 *(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.

Includes 2" standoff. Manual version has no standoff.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes RS232/485 serial interface. See page 174 for other interface options.



Med temp
Internal sample
1/16" 0.75 mm

Sample volume	.2 µl	.5 µl	1 µl	2 µl
	Prod No	*Prod No*	*Prod No*	*Prod No*
Manual	CI4UWE.2	CI4UWE.5	CI4UWE1	CI4UWE2
Manual w/ standoff	2CI4UWE.2	2CI4UWE.5	2CI4UWE1	2CI4UWE2
With air actuator	A2CI4UWE.2	A2CI4UWE.5	A2CI4UWE1	A2CI4UWE2
With universal act.	EUDA-2CI4UWE.2	EUDA-2CI4UWE.5	EUDA-2CI4UWE1	EUDA-2CI4UWE2
Replacement valve	DCI4UWE.2	DCI4UWE.5	DCI4UWE1	DCI4UWE2
Replacement rotor	SSACI4UWE.2	SSACI4UWE.5	SSACI4UWE1	SSACI4UWE2

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

OPTIONS

- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium *(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.

Includes 2" standoff. Manual version has no standoff.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes RS232/485 serial interface. See page 174 for other interface options.



Med temp
Internal sample
1/8" 0.75 mm

Sample volume	.2 µl	.5 µl	1 µl	2 µl
	Prod No	*Prod No*	*Prod No*	*Prod No*
Manual	I4UWE.2	I4UWE.5	I4UWE1	I4UWE2
Manual w/ standoff	2I4UWE.2	2I4UWE.5	2I4UWE1	2I4UWE2
With air actuator	A2I4UWE.2	A2I4UWE.5	A2I4UWE1	A2I4UWE2
With universal act.	EUDA-2I4UWE.2	EUDA-2I4UWE.5	EUDA-2I4UWE1	EUDA-2I4UWE2
Replacement valve	DI4UWE.2	DI4UWE.5	DI4UWE1	DI4UWE2
Replacement rotor	SSAI4UWE.2	SSAI4UWE.5	SSAI4UWE1	SSAI4UWE2

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 RS232/485 serial interface. See page 174 for other interface options.
Sample loops are not included with valves. Order separately.






	4 Ports *Prod No*	6 Ports *Prod No*	8 Ports *Prod No*	10 Ports *Prod No*
Manual with standoff	4N4WE	4N6WE	4N8WE	4N10WE
With air actuator	A4N4WE	A4N6WE	A4N8WE	A4N10WE
With universal actuator	EUHA-4N4WE	EUHA-4N6WE	EUHA-4N8WE	EUHA-4N10WE
Replacement valve	DN4WE	DN6WE	DN8WE	DN10WE
Replacement rotor	SSAN4WE	SSAN6WE	SSAN8WE	SSAN10WE

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
(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 RS232/485 serial interface. See page 174 for other interface options.
Sample loops are not included with valves. Order separately.

	4 Ports *Prod No*	6 Ports *Prod No*	8 Ports *Prod No*	10 Ports *Prod No*
Manual with standoff	4N4WT	4N6WT	4N8WT	4N10WT
With air actuator	A4N4WT	A4N6WT	A4N8WT	A4N10WT
With universal actuator	EUHA-4N4WT	EUHA-4N6WT	EUHA-4N8WT	EUHA-4N10WT
Replacement valve	DN4WT	DN6WT	DN8WT	DN10WT
Replacement rotor	SSAN4WT	SSAN6WT	SSAN8WT	SSAN10WT

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
(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*	*Volume*	*Prod No*
2 µl	SL2NW	25 µl	SL25NW
5 µl	SL5NW	50 µl	SL50NW
10 µl	SL10NW	100 µl	SL100NW
15 µl	SL15NW	250 µl	SL250NW
20 µl	SL20NW	500 µl	SL500NW

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.

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Standoff assemblies ..187



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 *(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 RS232/485 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 *Prod No*	6 Ports *Prod No*	8 Ports *Prod No*	10 Ports *Prod No*
Manual	C4WE	C6WE	C8WE	C10WE
Manual with standoff	4C4WE	4C6WE	4C8WE	4C10WE
With air actuator	A4C4WE	A4C6WE	A4C8WE	A4C10WE
With universal actuator	EUHA-4C4WE	EUHA-4C6WE	EUHA-4C8WE	EUHA-4C10WE
Replacement valve	DC4WE	DC6WE	DC8WE	DC10WE
Replacement rotor	SSAC4WE	SSAC6WE	SSAC8WE	SSAC10WE

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

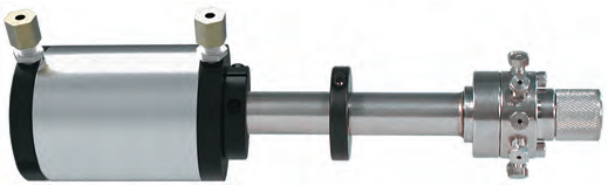
OPTIONS

- 3 and 12 port valves available
- 2", 3", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium *(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 RS232/485 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 *Prod No*	6 Ports *Prod No*	8 Ports *Prod No*	10 Ports *Prod No*
Manual with standoff	4C4WT	4C6WT	4C8WT	4C10WT
With air actuator	A4C4WT	A4C6WT	A4C8WT	A4C10WT
With universal actuator	EUHA-4C4WT	EUHA-4C6WT	EUHA-4C8WT	EUHA-4C10WT
Replacement valve	DC4WT	DC6WT	DC8WT	DC10WT
Replacement rotor	SSAC4WT	SSAC6WT	SSAC8WT	SSAC10WT



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*	*Volume*	*Prod No*	*Volume*	*Prod No*
2 µl	SL2CW	25 µl	SL25CW		
5 µl	SL5CW	50 µl	SL50CW	1 ml	SL1KCW
10 µl	SL10CW	100 µl	SL100CW	2 ml	SL2KCW
15 µl	SL15CW	250 µl	SL250CW	5 ml	SL5KCW
20 µl	SL20CW	500 µl	SL500CW	10 ml	SL10KCW



VALCO VALVES

Sampling and switching valves

1/16" FITTINGS, 0.75 MM PORTS (.030")

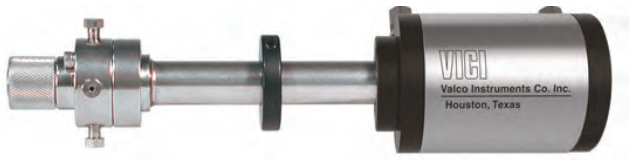
Med temp

1/16" **0.75 mm**

Includes 4" standoff. Manual version has no standoff.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes RS232/485 serial interface. See page 174 for other interface options.
Sample loops are not included with valves. Order separately.



	4 Ports *Prod No*	6 Ports *Prod No*	8 Ports *Prod No*	10 Ports *Prod No*
Manual	C4UWE	C6UWE	C8UWE	C10UWE
Manual with standoff	4C4UWE	4C6UWE	4C8UWE	4C10UWE
With air actuator	A4C4UWE	A4C6UWE	A4C8UWE	A4C10UWE
With universal act.	EUDA-4C4UWE	EUDA-4C6UWE	EUDA-4C8UWE	EUDA-4C10UWE
Replacement valve	DC4UWE	DC6UWE	DC8UWE	DC10UWE
Replacement rotor	SSAC4UWE	SSAC6UWE	SSAC8UWE	SSAC10UWE



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
  (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 RS232/485 serial interface. See page 174 for other interface options.
Sample loops are not included with valves. Order separately.

	4 Ports *Prod No*	6 Ports *Prod No*	8 Ports *Prod No*	10 Ports *Prod No*
Manual with standoff	4C4UWT	4C6UWT	4C8UWT	4C10UWT
With air actuator	A4C4UWT	A4C6UWT	A4C8UWT	A4C10UWT
With universal act.	EUDA-4C4UWT	EUDA-4C6UWT	EUDA-4C8UWT	EUDA-4C10UWT
Replacement valve	DC4UWT	DC6UWT	DC8UWT	DC10UWT
Replacement rotor	SSAC4UWT	SSAC6UWT	SSAC8UWT	SSAC10UWT

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*	*Volume*	*Prod No*	*Volume*	*Prod No*
5 µl	SL5CUW	25 µl	SL25CUW	1 ml	SL1KCUW
10 µl	SL10CUW	50 µl	SL50CUW	2 ml	SL2KCUW
15 µl	SL15CUW	100 µl	SL100CUW	5 ml	SL5KCUW
20 µl	SL20CUW	250 µl	SL250CUW	10 ml	SL10KCUW
		500 µl	SL500CUW		

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 *(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

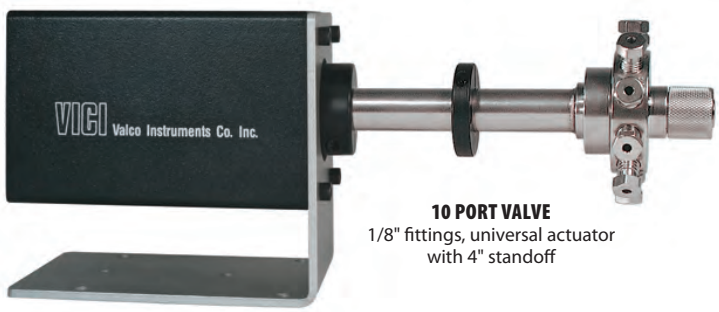
Includes 4" standoff. Manual version has no standoff.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes RS232/485 serial interface. See page 174 for other interface options.
Sample loops are not included with valves. Order separately (*see facing page*).

Med temp
1/8" **0.75 mm**






	4 Ports *Prod No*	6 Ports *Prod No*	8 Ports *Prod No*	10 Ports *Prod No*
Manual	4UWE	6UWE	8UWE	n/a
Manual with standoff	44UWE	46UWE	48UWE	410UWE
With air actuator	A44UWE	A46UWE	A48UWE	A410UWE
With universal act.	EUDA-44UWE	EUDA-46UWE	EUDA-48UWE	EUDA-410UWE
Replacement valve	D4UWE	D6UWE	D8UWE	D10UWE
Replacement rotor	SSA4UWE	SSA6UWE	SSA8UWE	SSA10UWE



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 RS232/485 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 *Prod No*	6 Ports *Prod No*	8 Ports *Prod No*	10 Ports *Prod No*
Manual with standoff	44UWT	46UWT	48UWT	410UWT
With air actuator	A44UWT	A46UWT	A48UWT	A410UWT
With universal act.	EUDA-44UWT	EUDA-46UWT	EUDA-48UWT	EUDA-410UWT
Replacement valve	D4UWT	D6UWT	D8UWT	D10UWT
Replacement rotor	SSA4UWT	SSA6UWT	SSA8UWT	SSA10UWT

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*	*Volume*	*Prod No*	*Volume*	*Prod No*
10 µl	SL10UW	100 µl	SL100UW	5 ml	SL5KUW
15 µl	SL15UW	250 µl	SL250UW	10 ml	SL10KUW
20 µl	SL20UW	500 µl	SL500UW	20 ml	SL20KUW
25 µl	SL25UW	1 ml	SL1KUW		
50 µl	SL50UW	2 ml	SL2KUW		



VALCO VALVES

Sampling and switching valves

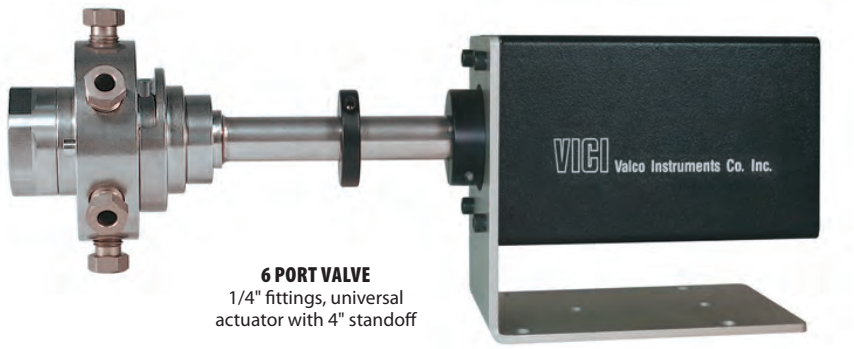
1/4" FITTINGS, 4.0 MM PORTS (.156")

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 RS232/485 serial interface. See page 174 for other interface options.
Sample loops are not available.

	 4 Ports *Prod No*	 6 Ports *Prod No*	 8 Ports *Prod No*
Manual with standoff	4VL4MWE2	4VL6MWE2	4VL8MWE2
With air actuator	A4VL4MWE2	A4VL6MWE2	A4VL8MWE2
With universal actuator	EUTA-4VL4MWE2	EUTA-4VL6MWE2	EUTA-4VL8MWE2
Replacement valve	DVL4MWE2	DVL6MWE2	DVL8MWE2
Replacement rotor	SSAVL4MWE2	SSAVL6MWE2	SSAVL8MWE2



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
  (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
50°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 *(see pages 246-247)*
- 1/32" fittings with 0.25 mm bore (.010") also available. Consult factory for product number and pricing.

Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes RS232/485 serial interface. See page 174 for other interface options.



5,000 psi
Internal sample
1/16″ 0.40 mm

Sample volume	.06 µl *Prod No*	.1 µl *Prod No*	.2 µl *Prod No*	.5 µl *Prod No*
Manual	CI4W.06	CI4W.1	CI4W.2	CI4W.5
With universal actuator	EUHA-CI4W.06	EUHA-CI4W.1	EUHA-CI4W.2	EUHA-CI4W.5
Replacement valve	DCI4W.06	DCI4W.1	DCI4W.2	DCI4W.5
Replacement rotor	SSACI4W.06	SSACI4W.1	SSACI4W.2	SSACI4W.5



INTERNAL SAMPLE INJECTOR
1/16" fittings, 0.40 mm ports
(0.25 mm column port)



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
50°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 *(see pages 246-247)*
- 1/32" fittings with 0.25 mm bore (.010") also available. Consult factory for product number and pricing.

Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes RS232/485 serial interface. See page 174 for other interface options.



5,000 psi
Internal sample
1/16″ 0.75 mm

Sample volume	.2 µl *Prod No*	.5 µl *Prod No*	1 µl *Prod No*	2 µl *Prod No*
Manual	CI4UW.2	CI4UW.5	CI4UW1	CI4UW2
With universal actuator	EUDA-CI4UW.2	EUDA-CI4UW.5	EUDA-CI4UW1	EUDA-CI4UW2
Replacement valve	DCI4UW.2	DCI4UW.5	DCI4UW1	DCI4UW2
Replacement rotor	SSACI4UW.2	SSACI4UW.5	SSACI4UW1	SSACI4UW2



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 RS232/485 serial interface. See page 174 for other interface options.
Sample loops are not included with valves. Order separately.



	4 Ports *Prod No*	6 Ports *Prod No*	8 Ports *Prod No*	10 Ports *Prod No*
Manual	C4W	C6W	C8W	C10W
With universal actuator	EUHA-C4W	EUHA-C6W	EUHA-C8W	EUHA-C10W
Replacement valve	DC4W	DC6W	DC8W	DC10W
Replacement rotor	SSAC4W	SSAC6W	SSAC8W	SSAC10W



6 PORT VALVE
1/16" fittings, 0.40 mm ports

SPECIFICATIONS

5000 psi liq
50°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
(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*	*Volume*	*Prod No*
2 µl	SL2CW	100 µl	SL100CW
5 µl	SL5CW	250 µl	SL250CW
10 µl	SL10CW	500 µl	SL500CW
15 µl	SL15CW	1 ml	SL1KCW
20 µl	SL20CW	2 ml	SL2KCW
25 µl	SL25CW	5 ml	SL5KCW
50 µl	SL50CW	10 ml	SL10KCW

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

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Injectors and switching valves

1/16" FITTINGS, 0.75 MM PORTS (.030")

SPECIFICATIONS

5000 psi liq
50°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
  (see pages 246-247)

Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes RS232/485 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 *Prod No*	 6 Ports *Prod No*	 8 Ports *Prod No*	 10 Ports *Prod No*
Manual *	C4UW	C6UW	C8UW	C10UW
With universal actuator	EUDA-C4UW	EUDA-C6UW	EUDA-C8UW	EUDA-C10UW
Replacement valve	DC4UW	DC6UW	DC8UW	DC10UW
Replacement rotor	SSAC4UW	SSAC6UW	SSAC8UW	SSAC10UW

* 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*	*Volume*	*Prod No*
3 µl	SL3CUW	100 µl	SL100CUW
5 µl	SL5CUW	250 µl	SL250CUW
10 µl	SL10CUW	500 µl	SL500CUW
15 µl	SL15CUW	1 ml	SL1KCUW
20 µl	SL20CUW	2 ml	SL2KCUW
25 µl	SL25CUW	5 ml	SL5KCUW
50 µl	SL50CUW	10 ml	SL10KCUW

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 RS232/485 serial interface. See page 174 for other interface options.
Sample loops are not included with valves. Order separately.






	4 Ports *Prod No*	6 Ports *Prod No*	8 Ports *Prod No*	10 Ports *Prod No*
Manual (not recommended)	4UW	6UW	8UW	210UW
With universal actuator	EUDA-4UW	EUDA-6UW	EUDA-8UW	EUDA-10UW
Replacement valve	D4UW	D6UW	D8UW	D10UW
Replacement rotor	SSA4UW	SSA6UW	SSA8UW	SSA10UW

SPECIFICATIONS

5000 psi liq
50°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
  (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 RS232/485 serial interface. See page 174 for other interface options.
Sample loops are not included with valves. Order separately.

	4 Ports 1.7 mm (.067") *Prod No*	6 Ports 1.7 mm (.067") *Prod No*	8 Ports 1.3 mm (.050") *Prod No*	10 Ports 1.0 mm (.040") *Prod No*
Manual (not recommended)	L4UW	L6UW	L8UW	2L10UW
With universal actuator	EUDA-L4UW	EUDA-L6UW	EUDA-L8UW	EUDA-L10UW
Replacement valve	DL4UW	DL6UW	DL8UW	DL10UW
Replacement rotor	SSAL4UW	SSAL6UW	SSAL8UW	SSAL10UW

SPECIFICATIONS

5000 psi liq
50°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
  (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*	*Volume*	*Prod No*
For semi-prep valves (0.75 mm bore)		**For semi-prep and prep valves (0.75 mm and large bore)**	
10 µl	SL10UW	100 µl	SL100UW
15 µl	SL15UW	250 µl	SL250UW
20 µl	SL20UW	500 µl	SL500UW
25 µl	SL25UW	1 ml	SL1KUW
50 µl	SL50UW	2 ml	SL2KUW
		5 ml	SL5KUW
		10 ml	SL10KUW
		20 ml	SL20KUW

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

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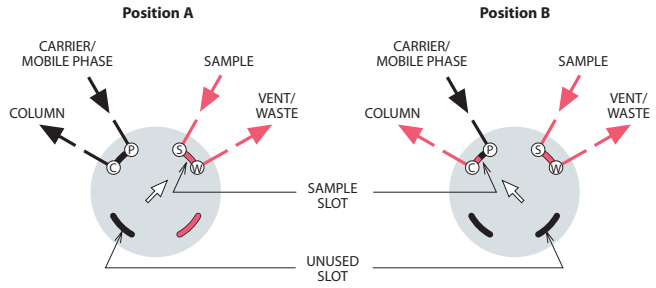
VALCO VALVES



SEE VIDEOS OF APPLICATIONS

See VICI valve applications in motion in the support section of vici.com.

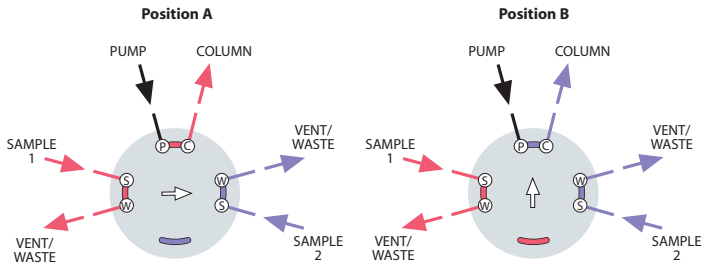
4 PORT – INTERNAL SAMPLE INJECTOR



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)

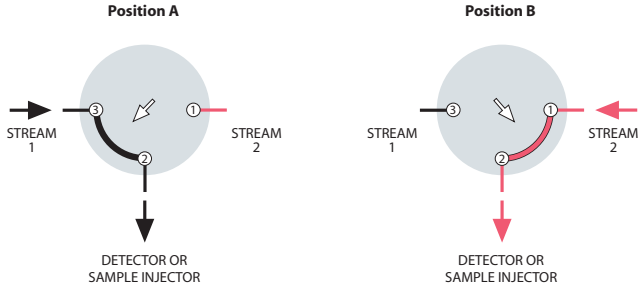


DUAL MICROVOLUME SAMPLE INJECTION

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

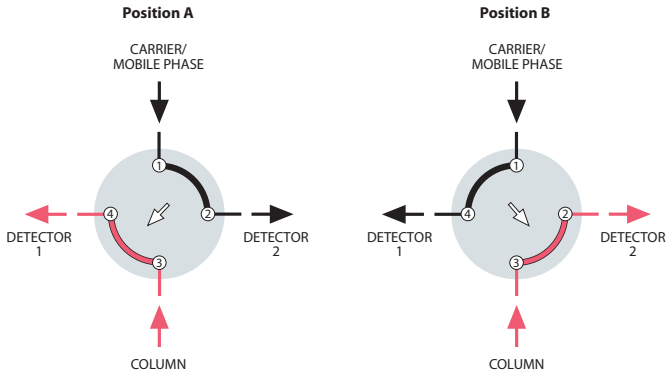
This arrangement allows one of two sample points to flow to a sample injector or detector while blocking the other sample point's flow.

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

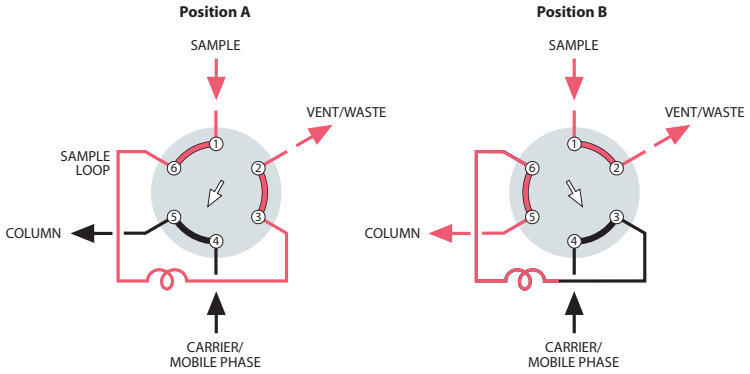
4 PORT – SWITCHING VALVE



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

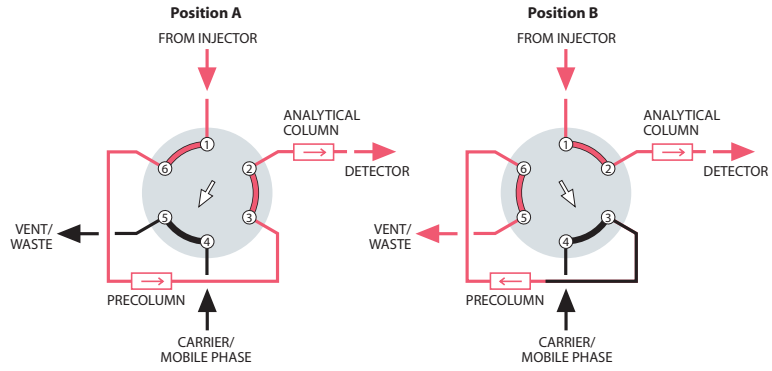


SAMPLE INJECTION

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



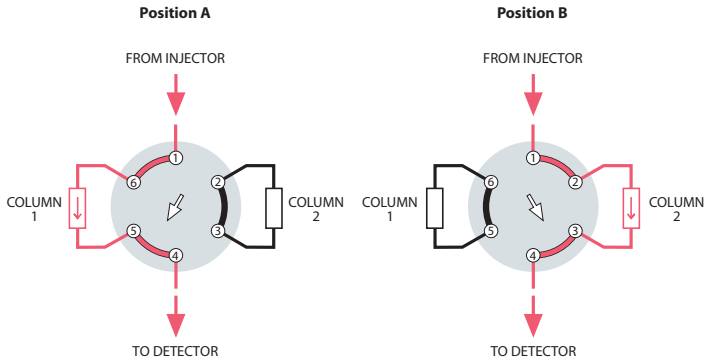
BACKFLUSH OF PRECOLUMN TO VENT

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

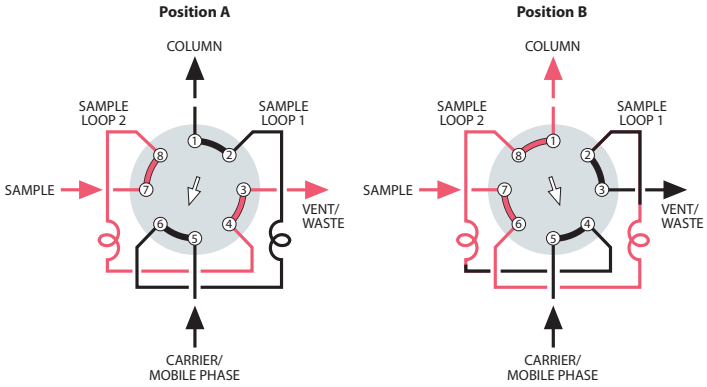


TWO COLUMN SELECTION

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.

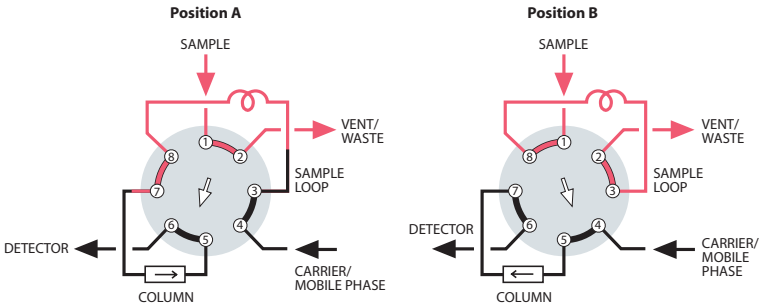
8 PORT – DUAL EXTERNAL SAMPLE INJECTOR



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



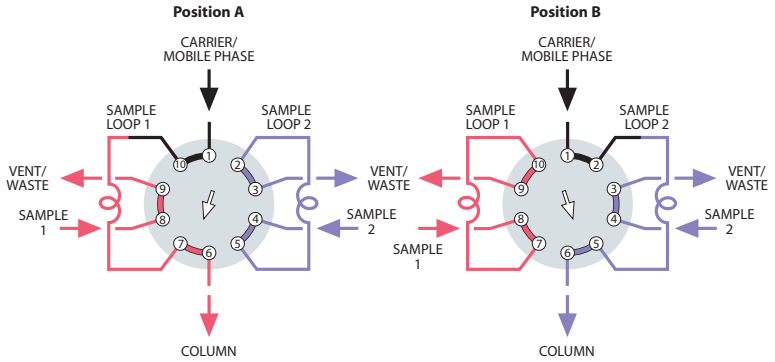
LOOP SAMPLING WITH BACKFLUSH TO DETECTOR

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



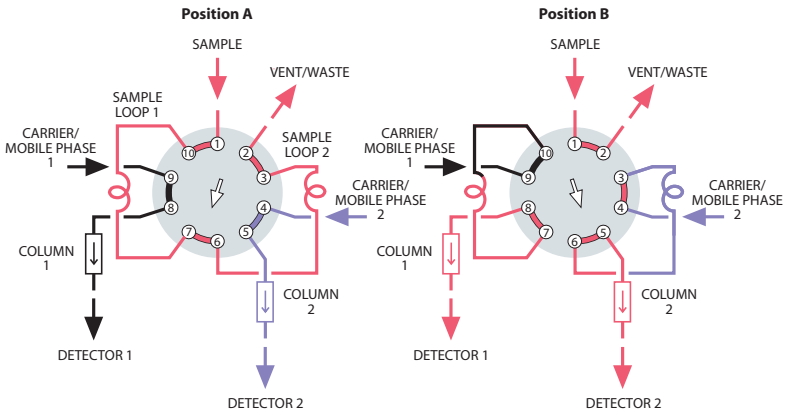
TWO DIFFERENT SAMPLES TO SAME COLUMN

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

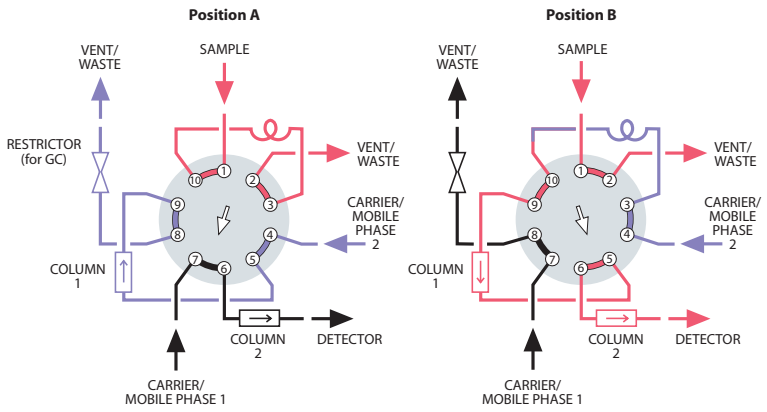


SIMULTANEOUS INJECTION OF THE SAME SAMPLE ONTO SEPARATE COLUMNS

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

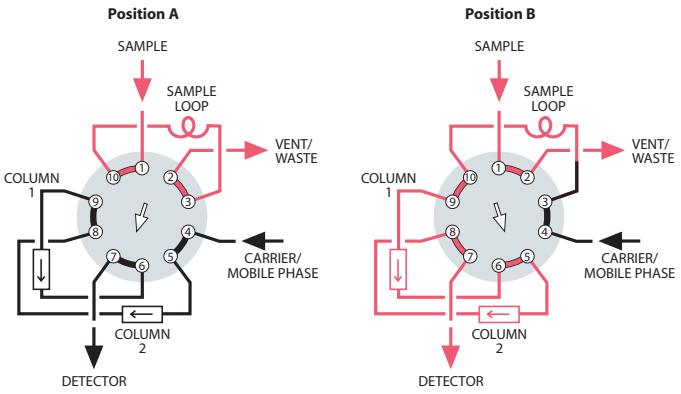


LOOP SAMPLING WITH BACKFLUSH OF PRE-COLUMN TO VENT

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.



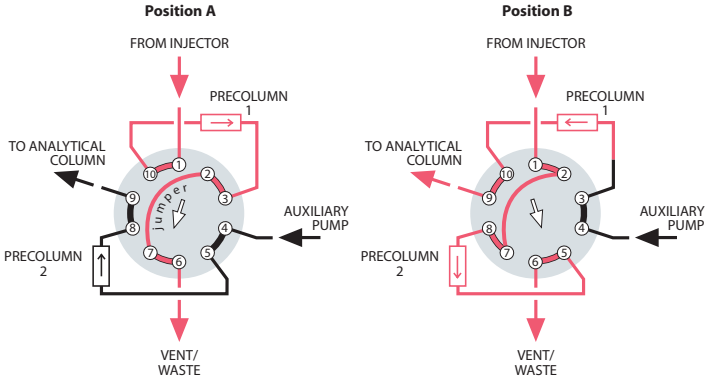
10 PORT – SAMPLING/SWITCHING



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

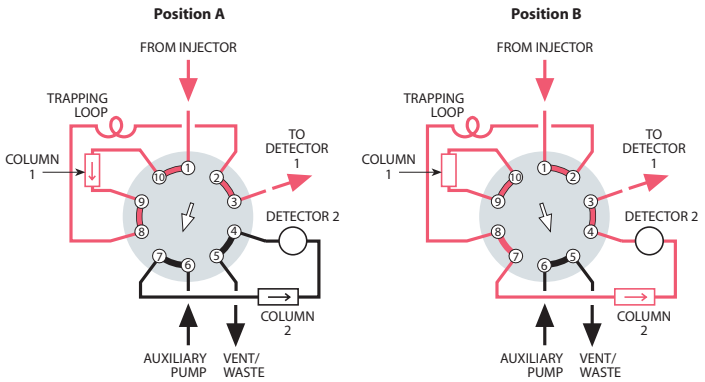


SAMPLE ENRICHMENT (CLEANUP) USING DUAL PRECOLUMNS

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.



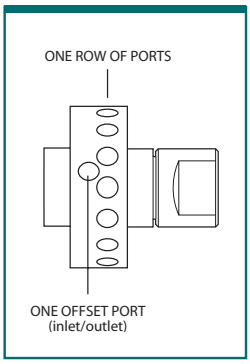
VALCO VALVES

DEAD-END FLOWPATH
SD configuration

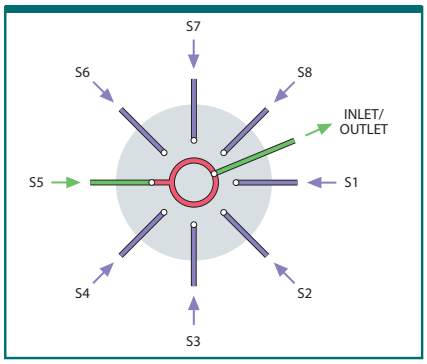
SD valves select one of 4 to 16 dead-ended streams. The selected stream flows from the outlet to a sample valve, pressure sensor, detector, column, etc. The same flowpath can also be used to direct one stream to a number of outlets in applications such as fraction collection.

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 RS232/485 serial interface. See page 174 for other interface options.

	6 Position *Prod No*	10 Position *Prod No*	12 Position *Prod No*	16 Position *Prod No*
Manual *	2CSD6MWE	2CSD10MWE	2CSD12MWE	2CSD16MWE
With air actuator	A2CSD6MWE	A2CSD10MWE	A2CSD12MWE	A2CSD16MWE
With universal act.	EUTA-2CSD6MWE	EUTA-2CSD10MWE	EUTA-2CSD12MWE	EUTA-2CSD16MWE
Replacement valve	DCSD6MWE	DCSD10MWE	DCSD12MWE	DCSD16MWE
Replacement rotor	SSACSD6MWE	SSACSD10MWE	SSACSD12MWE	SSACSD16MWE

* Manual version is not recommended.



10 POSITION SD SELECTOR
1/16" fittings, 2" standoff

SPECIFICATIONS

400 psi gas
200°C max
Valve body: Nitronic 60
Rotor: Valcon E

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

Application..... page 116
Actuators
Air 178
Microelectric 176
Universal 174-175
Materials
Metals..... 246-247
Polymers 248
Valve rotors.....249
Mounting hardware
Closemount 190
Standoff.....187



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 RS232/485 serial interface. See page 174 for other interface options.

Low pressure
SD Dead-end
1/8" 1.0 mm

	6 Position *Prod No*	10 Position *Prod No*	12 Position *Prod No*	16 Position *Prod No*
Manual (not recommended)	2SD6MWE	2SD10MWE	2SD12MWE	2SD16MWE
With air actuator	A2SD6MWE	A2SD10MWE	A2SD12MWE	A2SD16MWE
With universal actuator	EUTA-2SD6MWE	EUTA-2SD10MWE	EUTA-2SD12MWE	EUTA-2SD16MWE
Replacement valve	DSD6MWE	DSD10MWE	DSD12MWE	DSD16MWE
Replacement rotor	SSASD6MWE	SSASD10MWE	SSASD12MWE	SSASD16MWE

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 RS232/485 serial interface. See page 174 for other interface options.

Low pressure
SD Dead-end
1/4" 4.0 mm

	4 Position *Prod No*	6 Position *Prod No*	8 Position *Prod No*	10 Position *Prod No*
With air actuator	AH2VLSD4MWE2	AH2VLSD6MWE2	AH2VLSD8MWE2	AH2VLSD10MWE2
With universal actuator	EUTA-2VLSD4MWE2	EUTA-2VLSD6MWE2	EUTA-2VLSD8MWE2	EUTA-2VLSD10MWE2
Replacement valve	DVLSD4MWE2	DVLSD6MWE2	DVLSD8MWE2	DVLSD10MWE2
Replacement rotor	SSAVLSD4MWE2	SSAVLSD6MWE2	SSAVLSD8MWE2	SSAVLSD10MWE2

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



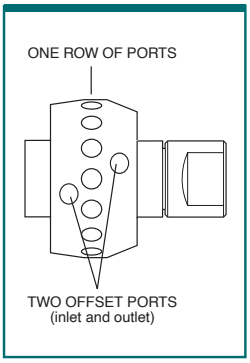
VALCO VALVES

COMMON OUTLET FLOWPATH
SC configuration

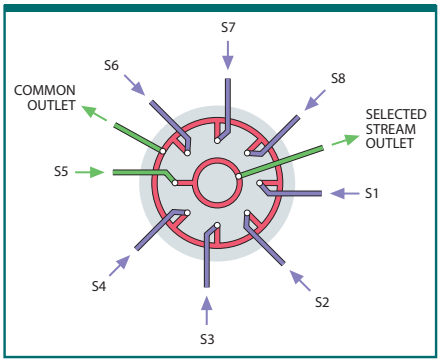
SC selectors are similar to the SD configuration, except that instead of being dead-ended the non-selected streams flow to a common outlet.

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 RS232/485 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 *Prod No*	10 Position *Prod No*	12 Position *Prod No*	16 Position *Prod No*
Manual *	2CSC6MWE	2CSC10MWE	2CSC12MWE	2CSC16MWE
With air actuator	A2CSC6MWE	A2CSC10MWE	A2CSC12MWE	A2CSC16MWE
With universal actuator	EUTA-2CSC6MWE	EUTA-2CSC10MWE	EUTA-2CSC12MWE	EUTA-2CSC16MWE
Replacement valve	DCSC6MWE	DCSC10MWE	DCSC12MWE	DCSC16MWE
Replacement rotor	SSACSC6MWE	SSACSC10MWE	SSACSC12MWE	SSACSC16MWE

* 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

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Microelectric 176
Universal 174-175
Materials
Metals..... 246-247
Polymers 248
Valve rotors.....249
Mounting hardware
Closemount 190
Standoff.....187



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 RS232/485 serial interface. See page 174 for other interface options.

Low pressure
SC Common outlet
1/8" 1.0 mm

	6 Position *Prod No*	10 Position *Prod No*	12 Position *Prod No*	16 Position *Prod No*
Manual (not recommended)	2SC6MWE	2SC10MWE	2SC12MWE	2SC16MWE
With air actuator	A2SC6MWE	A2SC10MWE	A2SC12MWE	A2SC16MWE
With universal actuator	EUTA-2SC6MWE	EUTA-2SC10MWE	EUTA-2SC12MWE	EUTA-2SC16MWE
Replacement valve	DSC6MWE	DSC10MWE	DSC12MWE	DSC16MWE
Replacement rotor	SSASC6MWE	SSASC10MWE	SSASC12MWE	SSASC16MWE

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 RS232/485 serial interface. See page 174 for other interface options.

Low pressure
SC Common outlet
1/4" 4.0 mm

	4 Position *Prod No*	6 Position *Prod No*	8 Position *Prod No*
With air actuator	AH2VLSC4MWE2	AH2VLSC6MWE2	AH2VLSC8MWE2
With universal actuator	EUTA-2VLSC4MWE2	EUTA-2VLSC6MWE2	EUTA-2VLSC8MWE2
Replacement valve	DVLSC4MWE2	DVLSC6MWE2	DVLSC8MWE2
Replacement rotor	SSAVLSC4MWE2	SSAVLSC6MWE2	SSAVLSC8MWE2

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



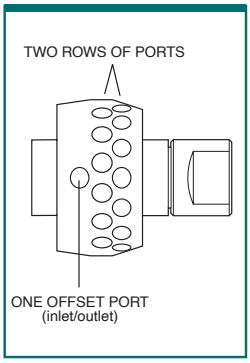
VALCO VALVES

FLOW-THROUGH FLOWPATH
SF configuration

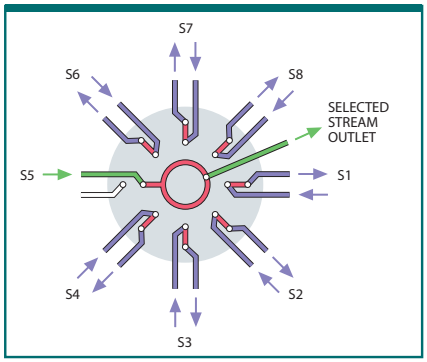
SD and SC valves select and isolate one of 4 to 16 streams, with the remainder dead-ended in the SD and flowing to a common outlet in the SC. The SF selector is similar, but carries the evolution a step further with the non-selected streams flowing through individual outlets.

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 RS232/485 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 *Prod No*	10 Position *Prod No*	12 Position *Prod No*	16 Position *Prod No*
Manual *	2CSF6MWE	2CSF10MWE	2CSF12MWE	2CSF16MWE
With air actuator	A2CSF6MWE	A2CSF10MWE	A2CSF12MWE	A2CSF16MWE
With universal actuator	EUTA-2CSF6MWE	EUTA-2CSF10MWE	EUTA-2CSF12MWE	EUTA-2CSF16MWE
Replacement valve	DCSF6MWE	DCSF10MWE	DCSF12MWE	DCSF16MWE
Replacement rotor	SSACSF6MWE	SSACSF10MWE	SSACSF12MWE	SSACSF16MWE

* 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

Application..... page 118
Actuators
Air 178
Microelectric 176
Universal 174-175
Materials
Metals..... 246-247
Polymers 248
Valve rotors.....249
Mounting hardware
Closemount 190
Standoff.....187



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 RS232/485 serial interface. See page 174 for other interface options.

Low pressure
SF Flow-through
1/8" 1.0 mm

	6 Position *Prod No*	10 Position *Prod No*	12 Position *Prod No*	16 Position *Prod No*
Manual (not recommended)	2SF6MWE	2SF10MWE	2SF12MWE	2SF16MWE
With air actuator	A2SF6MWE	A2SF10MWE	A2SF12MWE	A2SF16MWE
With universal actuator	EUTA-2SF6MWE	EUTA-2SF10MWE	EUTA-2SF12MWE	EUTA-2SF16MWE
Replacement valve	DSF6MWE	DSF10MWE	DSF12MWE	DSF16MWE
Replacement rotor	SSASF6MWE	SSASF10MWE	SSASF12MWE	SSASF16MWE

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

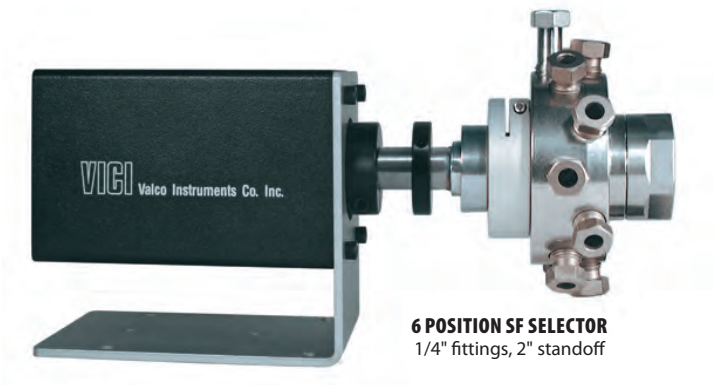
Includes 2" standoff. Ask about closemount assembly if valve will not be heated.
Manual version is not available.
Universal actuator: 24 VDC, with autosensing 24 VDC power supply.
Includes RS232/485 serial interface. See page 174 for other interface options.

Low pressure
SF Flow-through
1/4" 4.0 mm

	4 Position *Prod No*	6 Position *Prod No*	8 Position *Prod No*
With air actuator	AH2VLSF4MWE2	AH2VLSF6MWE2	AH2VLSF8MWE2
With universal actuator	EUTA-2VLSF4MWE2	EUTA-2VLSF6MWE2	EUTA-2VLSF8MWE2
Replacement valve	DVLSF4MWE2	DVLSF6MWE2	DVLSF8MWE2
Replacement rotor	SSAVLSF4MWE2	SSAVLSF6MWE2	SSAVLSF8MWE2

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



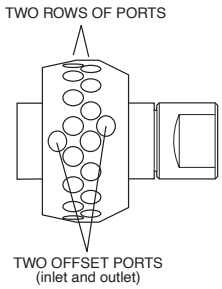
VALCO VALVES

TRAPPING FLOWPATH
ST configuration

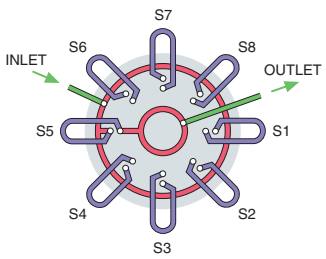
ST selectors are used for multi-column, multi-sample, or multi-trap operations. Each of the 4 to 16 positions is associated with a pair of ports to connect devices such as columns, loops, spargers in purge and trap systems, sample vessels, adsorption tubes, collection vials, etc.

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 RS232/485 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 *Prod No*	10 Position *Prod No*	12 Position *Prod No*	16 Position *Prod No*
Manual *	2CST6MWE	2CST10MWE	2CST12MWE	2CST16MWE
With air actuator	A2CST6MWE	A2CST10MWE	A2CST12MWE	A2CST16MWE
With universal actuator	EUTA-2CST6MWE	EUTA-2CST10MWE	EUTA-2CST12MWE	EUTA-2CST16MWE
Replacement valve	DCST6MWE	DCST10MWE	DCST12MWE	DCST16MWE
Replacement rotor	SSACST6MWE	SSACST10MWE	SSACST12MWE	SSACST16MWE

* 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*	*Volume*	*Prod No*
50 µl	SL50CSTP	1 ml	SL1KCSTP
100 µl	SL100CSTP	2 ml	SL2KCSTP
250 µl	SL250CSTP	5 ml	SL5KCSTP
500 µl	SL500CSTP	10 ml	SL10KCSTP

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

Application..... page 119
Actuators
Air 178
Microelectric 176
Universal 174-175
Materials
Metals..... 246-247
Polymers 248
Valve rotors.....249
Mounting hardware
Closemount 190
Standoff.....187



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 RS232/485 serial interface. See page 174 for other interface options.

Low pressure
ST Trapping
1/8" 1.0 mm

	6 Position *Prod No*	10 Position *Prod No*	12 Position *Prod No*	16 Position *Prod No*
Manual (not recommended)	2ST6MWE	2ST10MWE	2ST12MWE	2ST16MWE
With air actuator	A2ST6MWE	A2ST10MWE	A2ST12MWE	A2ST16MWE
With universal actuator	EUTA-2ST6MWE	EUTA-2ST10MWE	EUTA-2ST12MWE	EUTA-2ST16MWE
Replacement valve	DST6MWE	DST10MWE	DST12MWE	DST16MWE
Replacement rotor	SSAST6MWE	SSAST10MWE	SSAST12MWE	SSAST16MWE

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*	*Volume*	*Prod No*
100 µl	SL100STP	1 ml	SL1KSTP
250 µl	SL250STP	2 ml	SL2KSTP
500 µl	SL500STP	5 ml	SL5KSTP
		10 ml	SL10KSTP



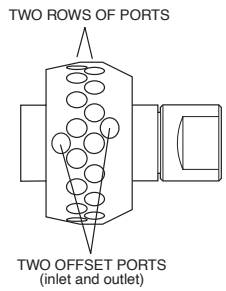
VALCO VALVES

TRAPPING/FLOW-THROUGH FLOWPATH
STF configuration

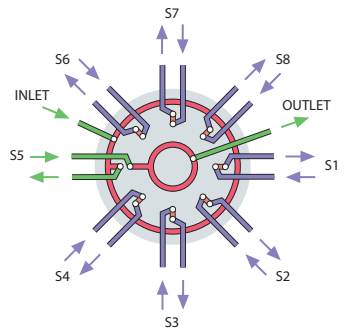
The STF selector is a variation of the ST flowpath, with the single difference that the non-selected streams are returned to their own vents or sources rather than being dead-ended or trapped as they are in the standard ST configuration.

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 RS232/485 serial interface. See page 174 for other interface options.

	6 Position *Prod No*	10 Position *Prod No*	12 Position *Prod No*	16 Position *Prod No*
Manual *	2CSTF6MWE	2CSTF10MWE	2CSTF12MWE	2CSTF16MWE
With air actuator	A2CSTF6MWE	A2CSTF10MWE	A2CSTF12MWE	A2CSTF16MWE
With universal actuator	EUTA-2CSTF6MWE	EUTA-2CSTF10MWE	EUTA-2CSTF12MWE	EUTA-2CSTF16MWE
Replacement valve	DCSTF6MWE	DCSTF10MWE	DCSTF12MWE	DCSTF16MWE
Replacement rotor	SSACSTF6MWE	SSACSTF10MWE	SSACSTF12MWE	SSACSTF16MWE

* Manual version is not recommended.



8 POSITION STF SELECTOR
1/16" fittings, 2" standoff

SPECIFICATIONS

200 psi gas
200°C max
Valve body: Nitronic 60
Rotor: Valcon E

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

Application..... page 120
Actuators
Air 178
Microelectric 176
Universal 174-175
Materials
Metals..... 246-247
Polymers 248
Valve rotors.....249
Mounting hardware
Closemount 190
Standoff.....187



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 RS232/485 serial interface. See page 174 for other interface options.

Low pressure
STF
Trap/ flow-throw
1/8" 1.0 mm

	6 Position *Prod No*	10 Position *Prod No*	12 Position *Prod No*	16 Position *Prod No*
Manual (not recommended)	2STF6MWE	2STF10MWE	2STF12MWE	2STF16MWE
With air actuator	A2STF6MWE	A2STF10MWE	A2STF12MWE	A2STF16MWE
With universal actuator	EUTA-2STF6MWE	EUTA-2STF10MWE	EUTA-2STF12MWE	EUTA-2STF16MWE
Replacement valve	DSTF6MWE	DSTF10MWE	DSTF12MWE	DSTF16MWE
Replacement rotor	SSASTF6MWE	SSASTF10MWE	SSASTF12MWE	SSASTF16MWE

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



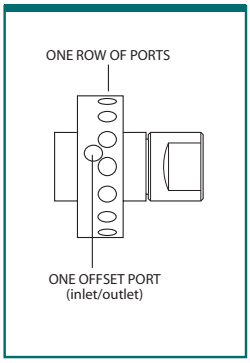
VALCO VALVES

DEAD-END FLOWPATH
SD configuration

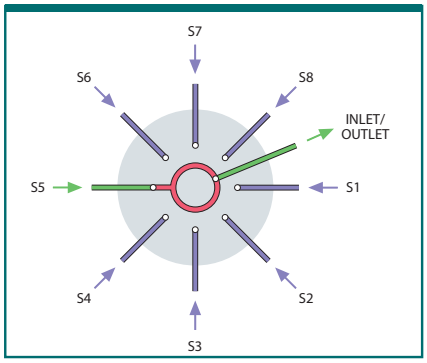
SD valves select one of 4 to 12 dead-ended streams. The selected stream flows from the valve outlet to a sample valve, pressure sensor, detector, column, etc. This configuration may also be used to direct one stream to a number of outlets for applications such as fraction collection.

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 RS232/485 serial interface. See page 174 for other interface options.

	4 Position *Prod No*	6 Position *Prod No*	10 Position *Prod No*
Manual *	CSD4UW	CSD6UW	CSD10UW
With universal act.	EUTA-CSD4UW	EUTA-CSD6UW	EUTA-CSD10UW
Replacement valve	DCSD4UW	DCSD6UW	DCSD10UW
Replacement rotor	SSACSD4UW	SSACSD6UW	SSACSD10UW

* 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 RS232/485 serial interface. See page 174 for other interface options.

	4 Position *Prod No*	6 Position *Prod No*	8 Position *Prod No*
Manual *	SD4UW	SD6UW	SD8UW
With universal act.	EUTA-SD4UW	EUTA-SD6UW	EUTA-SD8UW
Replacement valve	DSD4UW	DSD6UW	DSD8UW
Replacement rotor	SSASD4UW	SSASD6UW	SSASD8UW

* Manual version is not recommended.

SPECIFICATIONS

5000 psi liq
75°C max
Valve body: Nitronic 60
Rotor: Valcon E



6 POSITION SD SELECTOR
1/8" fittings

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

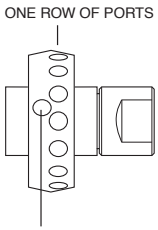


BOTH COLUMN ENDS SELECTED
ST configuration

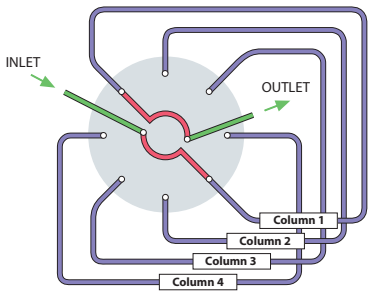
ST selectors are used for multi-column, multi-sample, or multi-trap operations. This valve can be used between an injector and detector to permit manual or automated HPLC column selection.

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")

5,000 psi
ST Trapping
1/16" **0.40 mm**

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 RS232/485 serial interface. See page 174 for other interface options.

	4 Columns or Loops *Prod No*	6 Columns or Loops *Prod No*
With universal actuator	EUTA-CST4UW	EUTA-CST6UW
Replacement valve	DCST4UW	DCST6UW
Replacement rotor	SSACST4UW	SSACST6UW



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*	*Volume*	*Prod No*
10 µl	SL10CSTUW	250 µl	SL250CSTUW
15 µl	SL15CSTUW	500 µl	SL500CSTUW
20 µl	SL20CSTUW	1 ml	SL1KCSTUW
25 µl	SL25CSTUW	2 ml	SL2KCSTUW
50 µl	SL50CSTUW	5 ml	SL5KCSTUW
100 µl	SL100CSTUW	10 ml	SL10KCSTUW

MORE INFO

Application..... page 121
Actuators
Air 178
Microelectric 176
Universal 174-175
Materials
Metals..... 246-247
Polymers 248
Valve rotors.....249
Mounting hardware
Closemount 190
Standoff.....187

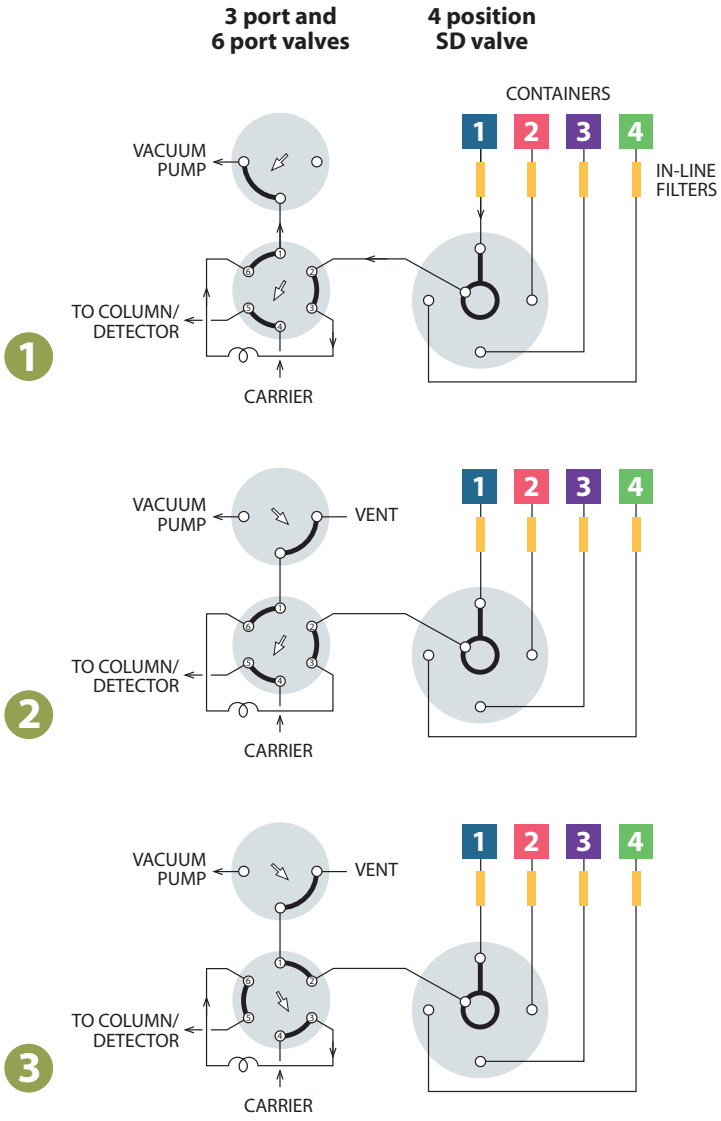
ABOUT LOOPS

- 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.

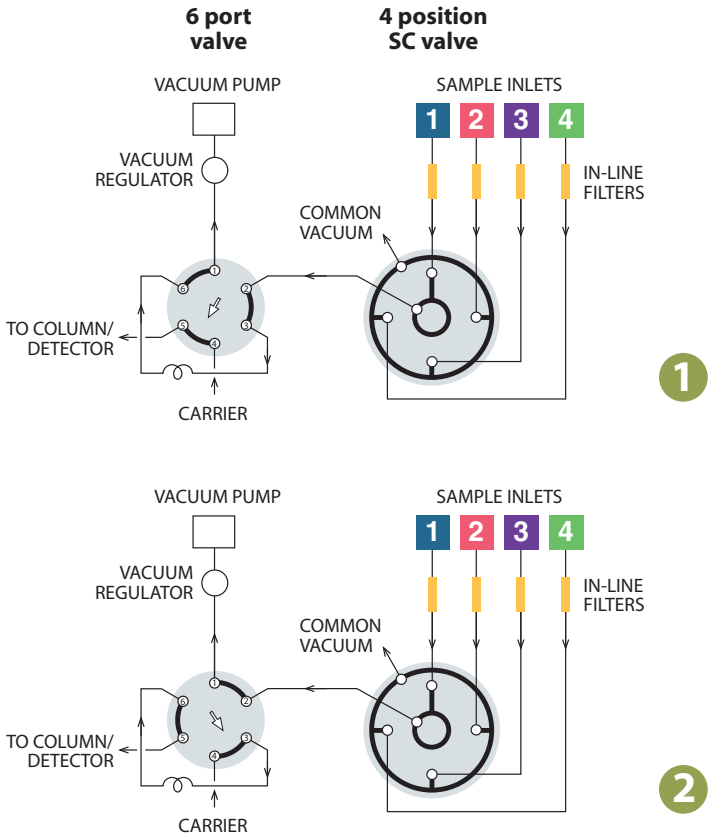
The SD flowpath isolates the unselected sample streams, but the potential exists for extraneous sample or contaminants to be in the lines when containers are first connected. To avoid problems, either prepurge each line or allow sufficient sampling time for the line to purge prior to injection.

MORE INFO

SD options
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
Microelectric 176
Universal 174-175
SC options 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.

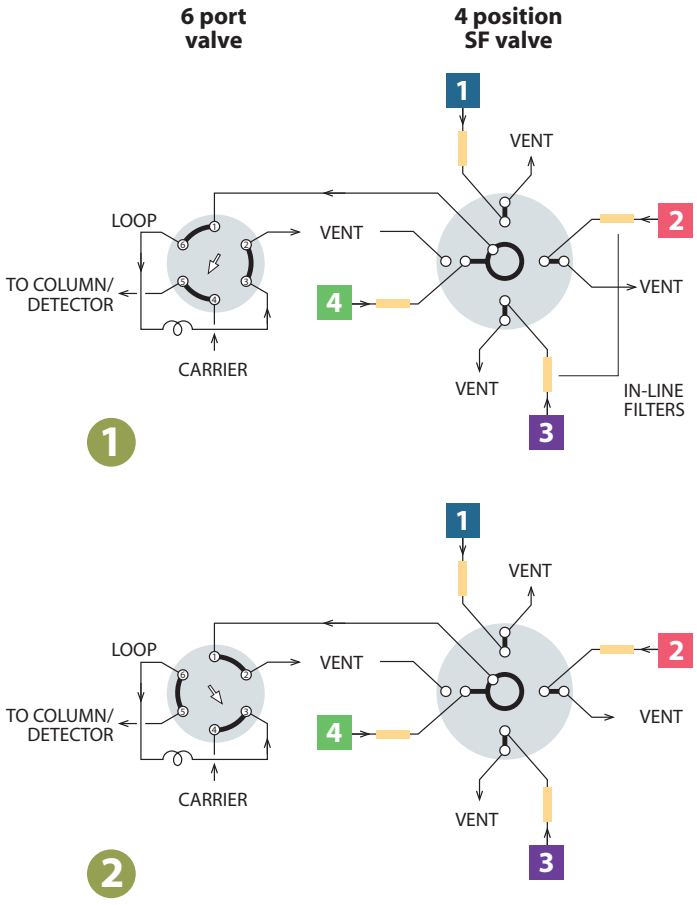
Our ZUFR filters feature inexpensive and easily replaceable low pressure drop filter screens (2 or 10 micron). The filters are available in 1/16", 1/8", and 1/4" standard, reducing, and bulkhead versions.

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.

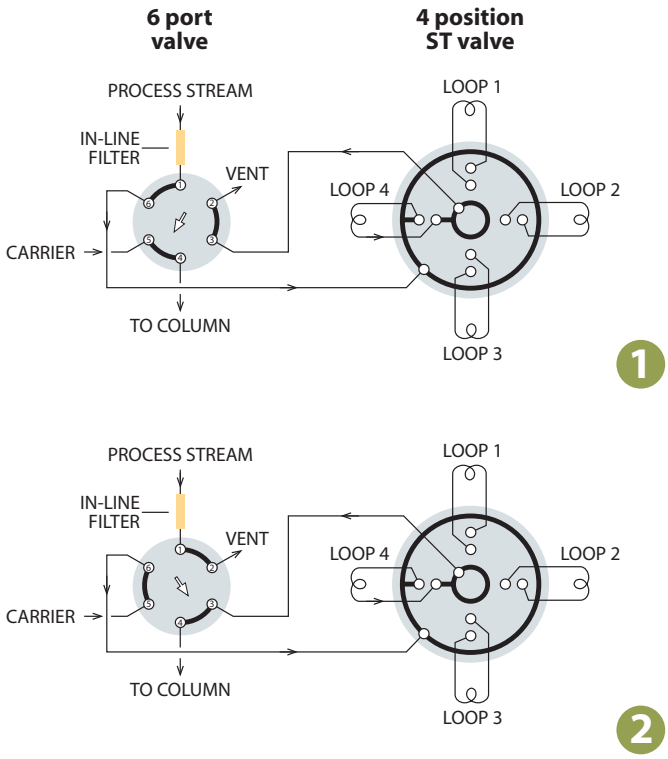
MORE INFO

Actuators
Air ..... page 178
Microelectric 176
Universal 174-175

SF options 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

ST options
Low pressure . . 110-111
High pressure 115
Application
High pressure ST . . . 121

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.

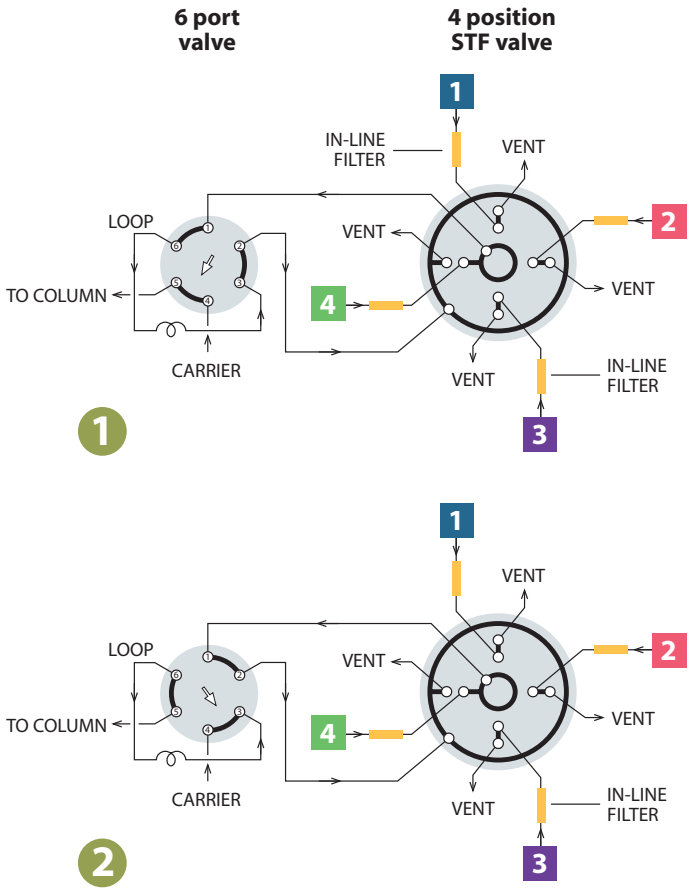
Our ZUFR filters feature inexpensive and easily replaceable low pressure drop filter screens (2 or 10 micron). The filters are available in 1/16", 1/8", and 1/4" standard, reducing, and bulkhead versions.

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.

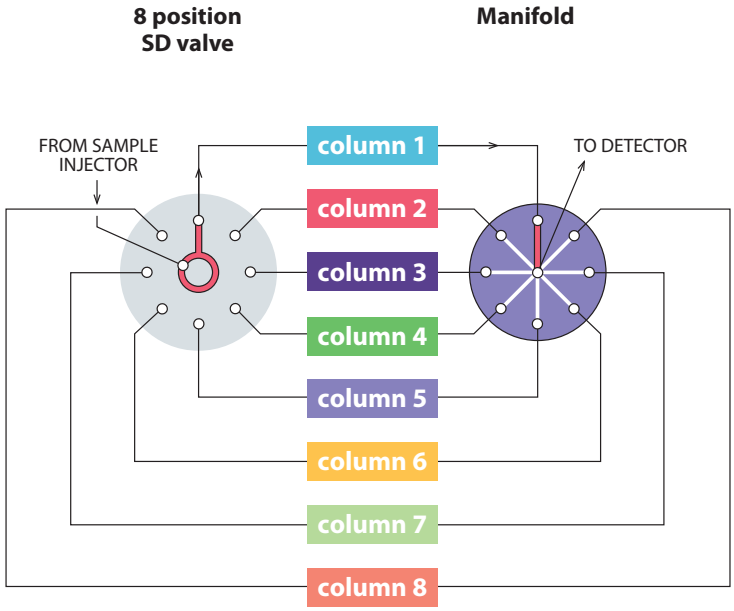
MORE INFO

Actuators
Air ..... page 178
Microelectric 176
Universal 174-175

STF options 112-113



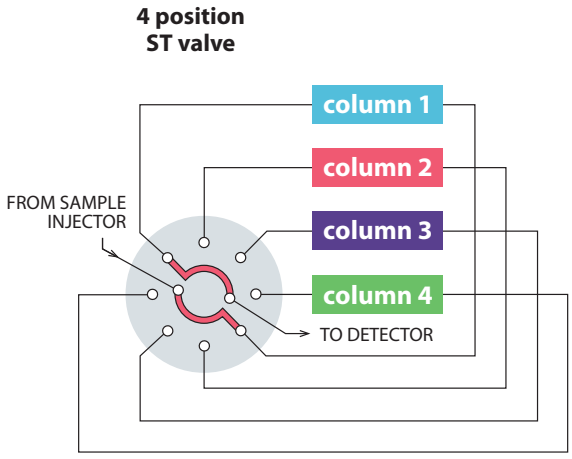
SD FLOWPATH – HIGH PRESSURE



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

Options
SD high pressure . . . 114
ST high pressure 115
Application
Low pressure SD . . . 116
Low pressure ST . . . 119
Manifolds 26

DIAPHRAGM VALVES



FOR CONTINUOUS AUTOMATED OPERATION

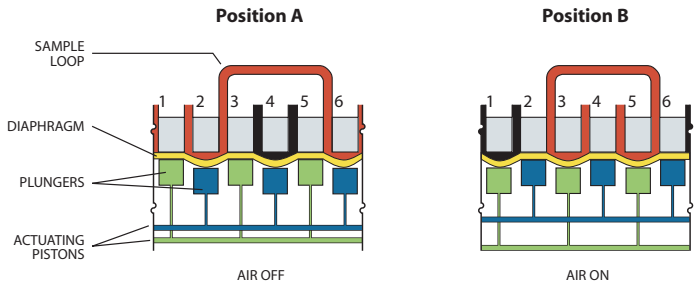
- Only 35 mm (1.375") in diameter
- >1,000,000 cycle lifetime
- Three configurations – 6 port, 10 port, and 4 port internal sample
- Built in actuator
- 1/16" or 1/32" Valco zero dead volume fittings

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



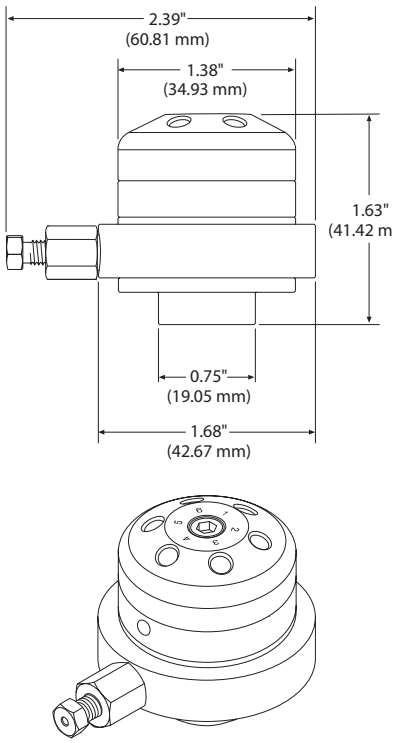
TECH TIP

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	4 port 1 µl internal sample	6 port sampling/switching	10 port multifunctional
Prod No	*Prod No*	*Prod No*	*Prod No*
DV13-1114-.5	DV13-1114-1	DV13-1116	DV13-1110

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	4 port 1 µl internal sample	6 port sampling/switching	10 port multifunctional
Prod No	*Prod No*	*Prod No*	*Prod No*
DV23-2114-.5	DV23-2114-1	DV23-2116	DV23-2110

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	4 port 1 µl internal sample	6 port sampling/switching	10 port multifunctional
Prod No	*Prod No*	*Prod No*	*Prod No*
DV23-3114-.5	DV23-3114-1	DV23-3116	DV23-3110

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
Purge ring		DV22-PURGE
Mounting kit		DVBRKIT
Replacement diaphragms		
Polyimide	.010" bore	DV22-21D
	.016" bore	DV22-21D
	.030" bore	DV22-31D
PTFE		DV22-22D

Sample loops

Each stainless steel loop includes two stainless nuts and ferrules.

Volume	*Prod No*	*Volume*	*Prod No*
1/16"			
2 µl	CSL2	250 µl	CSL250
5 µl	CSL5	500 µl	CSL500
10 µl	CSL10	1 ml	CSL1K
20 µl	CSL20	2 ml	CSL2K
50 µl	CSL50	5 ml	CSL5K
100 µl	CSL100	10 ml	CSL10K
1/32"			
1 µl	CSLN1K		
2 µl	CSLN2K		
5 µl	CSLN5K		
10 µl	CSLN10K		



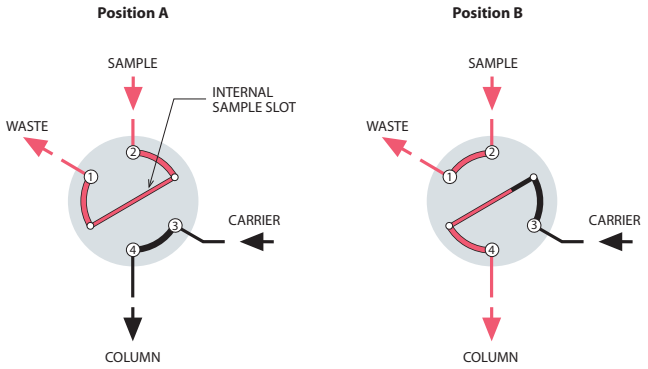
OPTIONS
- High temperature version is available for range of 250-300 °C
- Materials:
  Hastelloy C
  Type 316 stainless

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

MORE INFO
More applications . . . pp 99-103
3-way solenoid 180



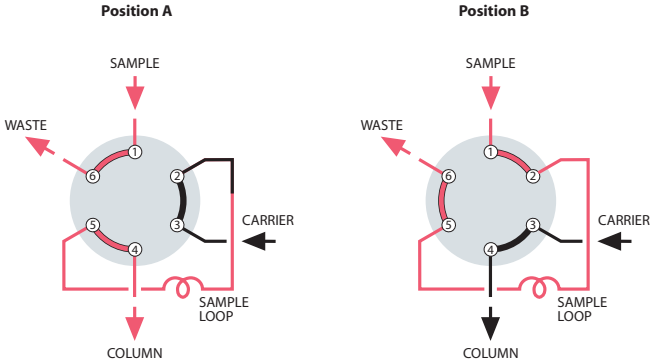
4 PORT – SAMPLE INJECTOR



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

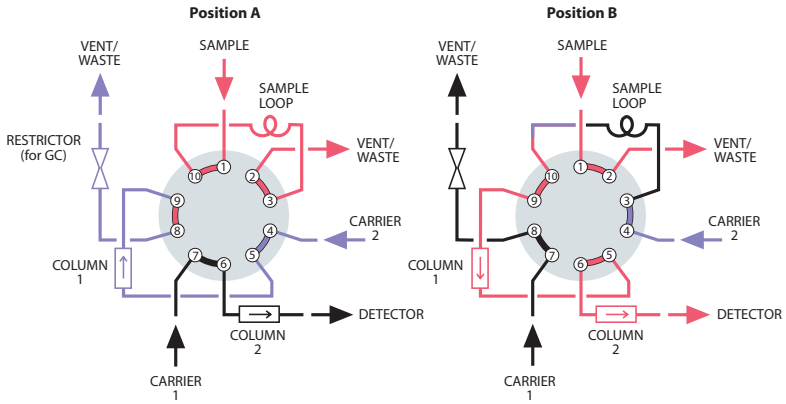


SAMPLE INJECTION

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

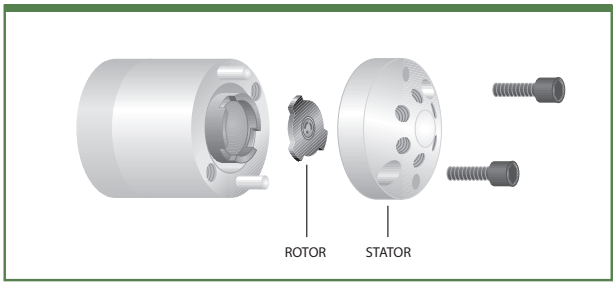
DESIGN

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

Decoding product no's for Cheminert valves 256-257

Actuation 172-179

Applications .. 152-153

Materials

Metals..... 246-247
Polymers 248
Valve rotors.....249

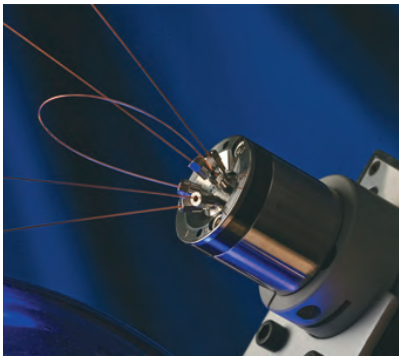
Valve descriptions

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Cheminert valve product numbers

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UHPLC 134-137, 154-155





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"

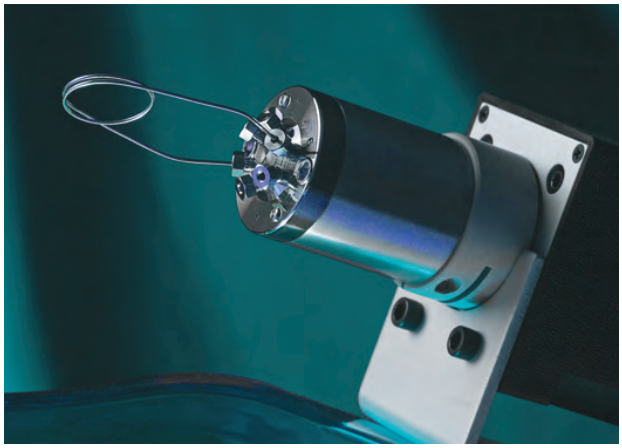


CHEMINERT VALVES

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
15,000 psi				10,000 psi	vici.com
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
15,000 psi					10,000 psi	vici.com
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
15,000 psi				10,000 psi	vici.com
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

Decoding product no's for Cheminert valves 256-257

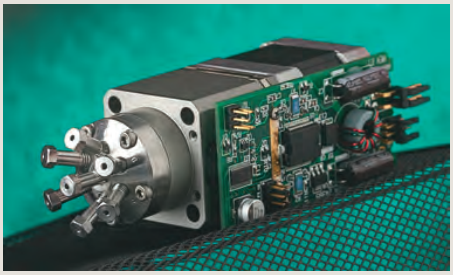
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HPLC 129
Low pressure 130
Nanovolume®.....127
Selectors 132-133
UHPLC..... 127, 128
Diaphragm 122-123
Valco
Injectors.....82-83
Selectors 84-85

Cheminert valve product numbers
HPLC.....138-147, 162-167
Low pressure....148-151, 168-169
Nanovolume™...134-135, 138-139, 154-155
OEM 162-171
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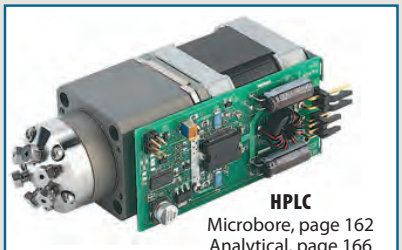
INJECTORS FOR OEMS

INTEGRATED MOTOR/INJECTOR ASSEMBLIES

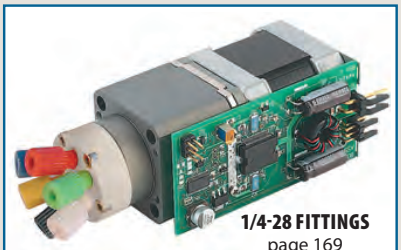
Cheminert's HPLC and low pressure integrated motor/injectors are assemblies designed specifically to be built into an OEM system. Using the well-proven Cheminert injector designs and the 24 volt motor from our popular microelectric actuators, they need only to be connected to the instrument's power supply.

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.

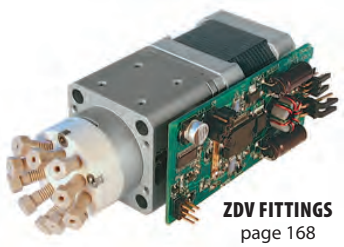
All these features are built into a compact and lightweight package and are available in 4, 6, 8, and 10 port configurations. Serial communication via RS-232 or RS-485 is optional.



HPLC
Microbore, page 162
Analytical, page 166
5,000 psi



1/4-28 FITTINGS
page 169
Low pressure

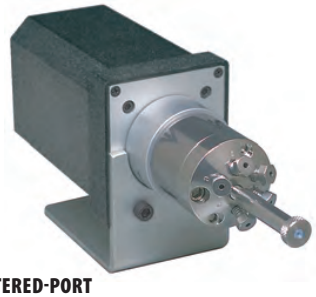


ZDV FITTINGS
page 168
Low pressure

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	1/32" stainless		150 µm (100 µm optional)	4, 6, 8, and 10	PAGE 154
15,000 psi					
10,000 psi	1/16" stainless		150 µm	20,000 psi	vici.com
MICROBORE 20,000 psi	1/32" stainless		250 µm	4, 6, 8, and 10	vici.com
15,000 psi					
10,000 psi	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

Actuation 172-179

Applications .. 152-153

Materials
Metals..... 246-247
Polymers 248
Valve rotors.....249

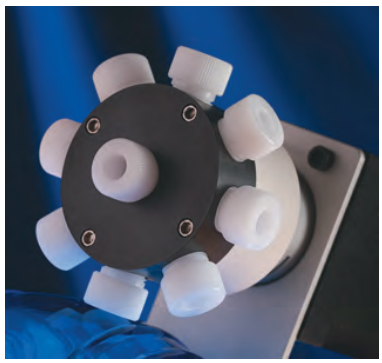
Cheminert valve product numbers
HPLC.....138-147, 162-167
Low pressure....148-151, 168-169
Nanovolume™...134-135, 138-139, 154-155
OEM 162-171
Selectors..... 154-161
UHPLC 134-137, 154-155



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

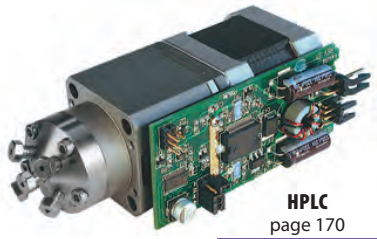
INTEGRATED MOTOR/STREAM SELECTORS

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.

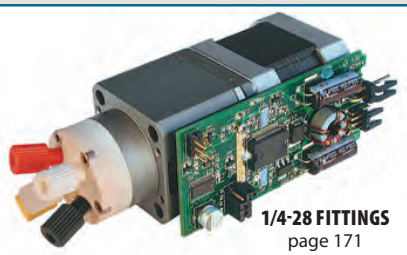
Using the well-proven Cheminert stream selector design and the 24 volt motor from our microelectric actuators, the Models C55, C65, and C65Z need only to be connected to an instrument's power supply. A single momentary contact closure steps the valve to the next position; a separate contact closure moves 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 RS232/485 serial interface. See page 174 for other interface options.



6 Port



10 Port

	Prod No	*Prod No*
Coated stainless stator		
Manual	C72MX-6676	C72MX-6670
With universal actuator	C72MX-6676EUHA	C72MX-6670EUDA
Replacement valve	C72MX-6676D	C72MX-6670D
Replacement rotor	C72M-66R6	C72M-66R0
Replacement stator	C72M-6C76	C72M-6C70

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



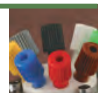
6 PORT VALVE
360 micron fittings

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 RS232/485 serial interface. See page 174 for other interface options.

15,000 psi | Nanobore | 1/32" | 150 µm





	6 Port *Prod No*	10 Port *Prod No*
Coated stainless stator		
Manual	C82NX-6676	C82NX-6670
With universal actuator	C82NX-6676EUHA	C82NX-6670EUDA
Replacement valve	C82NX-6676D	C82NX-6670D
Replacement rotor	C72N-66R6	C72N-66 R0
Replacement stator	C72N-6C76	C72N-6C70



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*
1 µl	CSLN1K
1.5 µl	CSLN1.5K
2 µl	CSLN2K
5 µl	CSLN5K
10 µl	CSLN10K





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** *Prod No*	**20 nanoliters** *Prod No*	**30 nanoliters** *Prod No*
Coated stainless stator			
Manual	C84NX-6674-.01	C84NX-6674-.02	C84NX-6674-.03
With universal actuator	C84NX-6674-.01EUHA	C84NX-6674-.02EUHA	C84NX-6674-.03EUHA
Replacement valve	C84NX-6674-.01D	C84NX-6674-.02D	C84NX-6674-.03D
Replacement rotor	C74N-66R-.01	C74N-66R-.02	C74N-66R-.03
Replacement stator	C74N-6C7	C74N-6C7	C74N-6C7



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 RS232/485 serial interface. See page 174 for other interface options.






	4 Port	6 Port	8 Port	10 Port
	Prod No	*Prod No*	*Prod No*	*Prod No*
Manual	C82X-1674	C82X-1676	C82X-1678	C82X-1670
With universal act.	C82X-1674EUHA	C82X-1676EUHA	C82X-1678EUDA	C82X-1670EUDA
Replacement valve	C82X-1674D	C82X-1676D	C82X-1678D	C82X-1670D
Replacement rotor	C72-16R4	C72-16R6	C72-16R8	C72-16R0
Replacement stator	C72-1C74	C72-1C76	C72-1C78	C72-1C70

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.

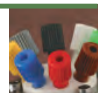
These loops are for use with valves on this page.

Volume	*Prod No*	*Volume*	*Prod No*	*Volume*	*Prod No*
2 µl	CSL2	20 µl	CSL20	250 µl	CSL250
5 µl	CSL5	50 µl	CSL50	500 µl	CSL500
10 µl	CSL10	100 µl	CSL100	1 ml	CSL1K



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 RS232/485 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	*Prod No*	*Prod No*
Manual	C84X-1674-.02	C84X-1674-.05	C84X-1674-.1
With universal actuator	C84X-1674-.02EUHA	C84X-1674-.05EUHA	C84X-1674-.1EUHA
Replacement valve	C84X-1674-.02D	C84X-1674-.05D	C84X-1674-.1D
Replacement rotor	C74-16R-.02	C74-16R-.05	C74-16R-.1
Replacement stator	C74-1C7	C74-1C7	C74-1C7



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 RS232/485 serial interface. See page 174 for other interface options.

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 *Prod No*	10 Port *Prod No*
N60 stainless stator		
Manual	C2N-4006	C2N-4000
With universal actuator	C2N-4006EUHA	C2N-4000EUHA
Replacement valve	C2N-4006D	C2N-4000D
Replacement rotor	C2N-40R6	C2N-40R0
Replacement stator	C2N-4C06	C2N-4C00
PAEK stator		
Manual	C2N-4346	C2N-4340
With universal actuator	C2N-4346EUHA	C2N-4340EUHA
Replacement valve	C2N-4346D	C2N-4340D
Replacement rotor	C2N-43R6	C2N-43R0
Replacement stator	C2N-4C46	C2N-4C40



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.

Volume	Stainless steel *Prod No*	PEEK *Prod No*
1 µl	CSLN1K	CSLN1KPK
2 µl	CSLN2K	CSLN2KPK
5 µl	CSLN5K	CSLN5KPK
10 µl	CSLN10K	CSLN10KPK

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 RS232/485 serial interface. See page 174 for other interface options.



5,000 psi
Nanobore
Internal sample
1/32″ 100 µm

Sample volume	4 nanoliters *Prod No*	10 nanoliters *Prod No*	20 nanoliters *Prod No*
N60 stainless stator			
Manual	C4N-4004-.004	C4N-4004-.01	C4N-4004-.02
With universal actuator	C4N-4004-.004EUHA	C4N-4004-.01EUHA	C4N-4004-.02EUHA
Replacement valve	C4N-4004-.004D	C4N-4004-.01D	C4N-4004-.02D
Replacement rotor	C4N-40R-.004	C4N-40R-.01	C4N-40R-.02
Replacement stator	C4N-4C0	C4N-4C0	C4N-4C0
PAEK stator			
Manual	C4N-4344-.004	C4N-4344-.01	C4N-4344-.02
With universal actuator	C4N-4344-.004EUHA	C4N-4344-.01EUHA	C4N-4344-.02EUHA
Replacement valve	C4N-4344-.004D	C4N-4344-.01D	C4N-4344-.02D
Replacement rotor	C4N-43R-.004	C4N-43R-.01	C4N-43R-.02
Replacement stator	C4N-4C4H	C4N-4C4H	C4N-4C4H



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 RS232/485 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	*Prod No*	*Prod No*	*Prod No*
N60 stainless stator				
Manual	C2-1004	C2-1006	C2H-1008	C2H-1000
With universal act.	C2-1004EUHA	C2-1006EUHA	C2H-1008EUHA	C2H-1000EUHA
Replacement valve	C2-1004D	C2-1006D	C2H-1008D	C2H-1000D
Replacement rotor	C2-10R4	C2-10R6	C2-10R8H	C2-10R0H
Replacement stator	C-1C04	C-1C06	C-1C08H	C-1C00H
PAEK stator				
Manual	C2-1344	C2-1346	C2H-1348	C2H-1340
With universal act.	C2-1344EUHA	C2-1346EUHA	C2H-1348EUHA	C2H-1340EUHA
Replacement valve	C2-1344D	C2-1346D	C2H-1348D	C2H-1340D
Replacement rotor	C2-13R4	C2-13R6	C2-13R8H	C2-13R0H
Replacement stator	C-1C44	C-1C46	C-1C48H	C-1C40H
Titanium stator				
Manual	C2-1034	C2-1036	C2H-1038	C2H-1030
With universal act.	C2-1034EUHA	C2-1036EUHA	C2H-1038EUHA	C2H-1030EUHA
Replacement valve	C2-1034D	C2-1036D	C2H-1038D	C2H-1030D
Replacement rotor	C2-10R4	C2-10R6	C2-10R8H	C2-10R0H
Replacement stator	C-1C34	C-1C36	C-1C38H	C-1C30H

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)	Titanium
Volume	*Prod No*	*Prod No*	*Prod No*
2 µl	CSL2	CZSL2PK	
5 µl	CSL5	CZSL5PK	
10 µl	CSL10	CZSL10PK	CSL10TI
20 µl	CSL20	CZSL20PK	CSL20TI
50 µl	CSL50	CZSL50PK	CSL50TI
100 µl	CSL100	CZSL100PK	CSL100TI
250 µl	CSL250	CZSL250PK	CSL250TI
500 µl	CSL500	CZSL500PK **	CSL500TI
1 ml	CSL1K	CZSL1KPK **	CSL1KTI
2 ml	CSL2K	CZSL2KPK **	
5 ml	CSL5K	CZSL5KPK **	
10 ml	CSL10K		

*** 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 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 RS232/485 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 *Prod No*	20 nanoliters *Prod No*	50 nanoliters *Prod No*
N60 stainless stator			
Manual	C4-0004-.01	C4-0004-.02	C4-0004-.05
With universal actuator	C4-0004-.01EUHA	C4-0004-.02EUHA	C4-0004-.05EUHA
Replacement valve	C4-0004-.01D	C4-0004-.02D	C4-0004-.05D
Replacement rotor	C4-00R-.01	C4-00R-.02	C4-00R-.05
Replacement stator	C4-0C0	C4-0C0	C4-0C0
PAEK stator			
Manual	C4-0344-.01	C4-0344-.02	C4-0344-.05
With universal actuator	C4-0344-.01EUHA	C4-0344-.02EUHA	C4-0344-.05EUHA
Replacement valve	C4-0344-.01D	C4-0344-.02D	C4-0344-.05D
Replacement rotor	C4-03R-.01	C4-03R-.02	C4-03R-.05
Replacement stator	C4-0C4	C4-0C4	C4-0C4



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
Nuts
Metal. 12
PEEK 48
Ferrules
Metal. 14
PEEK 48



CHEMINERT VALVES

Microbore continuous flow through-the-handle injectors

1/16" VALCO FITTINGS, 0.25 MM PORTS (.010")

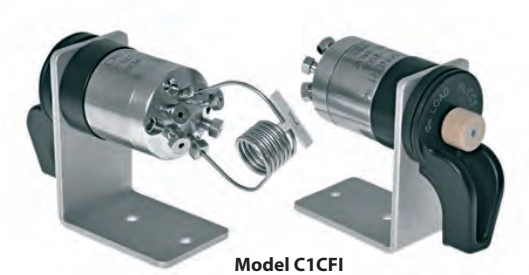
5,000 psi
Microbore
Continuous flow
Through-handle
1/16" 0.25 mm

Model C1CFI 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.



Prod No

N60 stainless stator	
6 port injector	C1CFI-1006
Replacement rotor	C1-10R6
Replacement stator	C1CF-1C06
PAEK stator	
6 port injector	C1CFI-1346
Replacement rotor	C1-13R6
Replacement stator	C1CF-1C46
Replacement injector fitting	
	C-261



Model C1CFI
1/16" ZDV fittings

SPECIFICATIONS

5,000 psi liq
75°C max
Stator: Metal
Rotor: Valcon H

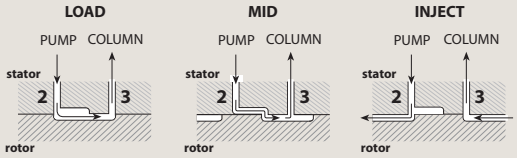
5,000 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E

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 C1CFI



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 RS232/485 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



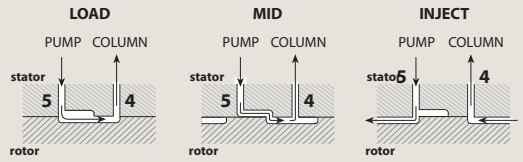
CONTINUOUS FLOW INJECTOR
1/16" stainless ZDV fittings



	Prod No
N60 stainless stator	
Manual	C6-1006
With universal actuator	C6-1006EUHA
Replacement valve	C6-1006D
Replacement rotor	C2-10R6
Replacement stator	C6-1C06
PAEK stator	
Manual	C6-1346
With universal actuator	C6-1346EUHA
Replacement valve	C6-1346D
Replacement rotor	C2-13R6
Replacement stator	C6-1C46

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

Actuators
Microelectric 176
Universal 174-175
Materials
Metals..... 246-247
Polymers 248
Valve rotors.....249
Nuts
Metal.....12
PEEK 48
Ferrules
Metal.....14
PEEK 48

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.



Volume	**Stainless Steel** *Prod No*	**PEEK (for PAEK stators)** *Prod No*	**Titanium** *Prod No*
2 µl	CSL2	CZSL2PK	
5 µl	CSL5	CZSL5PK	
10 µl	CSL10	CZSL10PK	CSL10TI
20 µl	CSL20	CZSL20PK	CSL20TI
50 µl	CSL50	CZSL50PK	CSL50TI
100 µl	CSL100	CZSL100PK	CSL100TI
250 µl	CSL250	CZSL250PK	CSL250TI
500 µl	CSL500	CZSL500PK **	CSL500TI
1 ml	CSL1K	CZSL1KPK **	CSL1KTI
2 ml	CSL2K	CZSL2KPK **	
5 ml	CSL5K	CZSL5KPK **	
10 ml	CSL10K	*** 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 RS232/485 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
Prod No



6 Port
Prod No



8 Port
Prod No



10 Port
Prod No

N60 stainless stator				
Manual	C2-2004	C2-2006	C2H-2008	C2H-2000
With universal actuator	C2-2004EUHA	C2-2006EUHA	C2H-2008EUHA	C2H-2000EUHA
Replacement valve	C2-2004D	C2-2006D	C2H-2008D	C2H-2000D
Replacement rotor	C2-20R4	C2-20R6	C2-20R8H	C2-20R0H
Replacement stator	C-2C04	C-2C06	C-2C08H	C-2C00H
PAEK stator				
Manual	C2-2344	C2-2346	C2H-2348	C2H-2340
With universal actuator	C2-2344EUHA	C2-2346EUHA	C2H-2348EUHA	C2H-2340EUHA
Replacement valve	C2-2344D	C2-2346D	C2H-2348D	C2H-2340D
Replacement rotor	C2-23R4	C2-23R6	C2-23R8H	C2-23R0H
Replacement stator	C-2C44	C-2C46	C-2C48H	C-2C40H
Titanium stator				
Manual	C2-2034	C2-2036	C2H-2038	C2H-2030
With universal actuator	C2-2034EUHA	C2-2036EUHA	C2H-2038EUHA	C2H-2030EUHA
Replacement valve	C2-2034D	C2-2036D	C2H-2038D	C2H-2030D
Replacement rotor	C2-20R4	C2-20R6	C2-20R8H	C2-20R0H
Replacement stator	C-2C34	C-2C36	C-2C38H	C-2C30H

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 41.*



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*	*Prod No*	*Prod No*
2 µl	CSL2	CZSL2PK	
5 µl	CSL5	CZSL5PK	
10 µl	CSL10	CZSL10PK	CSL10TI
20 µl	CSL20	CZSL20PK	CSL20TI
50 µl	CSL50	CZSL50PK	CSL50TI
100 µl	CSL100	CZSL100PK	CSL100TI
250 µl	CSL250	CZSL250PK	CSL250TI
500 µl	CSL500	CZSL500PK **	CSL500TI
1 ml	CSL1K	CZSL1KPK **	CSL1KTI
2 ml	CSL2K	CZSL2KPK **	
5 ml	CSL5K	CZSL5KPK **	
10 ml	CSL10K		

*** 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")



5,000 psi
Analytical
Internal sample
1/16" 0.25 mm

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

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 RS232/485 serial interface. See page 174 for other interface options.
Note: The fitting detail pilot depth in PAEK HPLC stators is slightly longer than standard.

OPTIONS

- 0.05 µl sample volumes are also available.
- Loop fill port assembly for injection from front of the valve. *See page 41.*

Sample volume	0.1 µl *Prod No*	0.2 µl *Prod No*	0.5 µl *Prod No*
N60 stainless stator			
Manual	C4-1004-.1	C4-1004-.2	C4-1004-.5
With universal actuator	C4-1004-.1EUHA	C4-1004-.2EUHA	C4-1004-.5EUHA
Replacement valve	C4-1004-.1D	C4-1004-.2D	C4-1004-.5D
Replacement rotor	C4-10R-.1	C4-10R-.2	C4-10R-.5
Replacement stator	C4-1C0	C4-1C0	C4-1C0
PAEK stator			
Manual	C4-1344-.1	C4-1344-.2	C4-1344-.5
With universal actuator	C4-1344-.1EUHA	C4-1344-.2EUHA	C4-1344-.51EUHA
Replacement valve	C4-1344-.1D	C4-1344-.2D	C4-1344-.5D
Replacement rotor	C4-13R-.1	C4-13R-.2	C4-13R-.5
Replacement stator	C4-1C4	C4-1C4	C4-1C4
Titanium stator			
Manual	C4-1034-.1	C4-1034-.2	C4-1034-.5
With universal actuator	C4-1034-.1EUHA	C4-1034-.2EUHA	C4-1034-.5EUHA
Replacement valve	C4-1034-.1D	C4-1034-.2D	C4-1034-.5D
Replacement rotor	C4-10R-.1	C4-10R-.2	C4-10R-.5
Replacement stator	C4-1C3	C4-1C3	C4-1C3



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 continuous flow through-the-handle injectors

1/16" VALCO FITTINGS, 0.40 MM PORTS (.016")

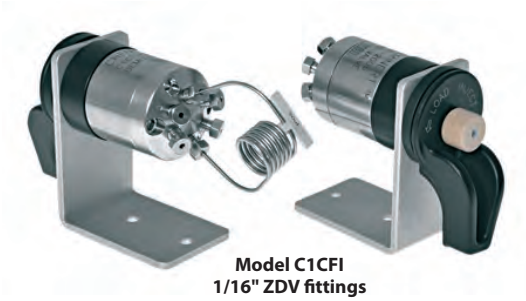
5,000 psi
Analytical
Continuous flow
Through-handle
1/16" 0.40 mm

Model C1CFI 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.



Prod No

N60 stainless stator	
6 port injector	C1CFI-2006
Replacement rotor	C1-20R6
Replacement stator	C1CF-2C06
PAEK stator	
6 port injector	C1CFI-2346
Replacement rotor	C1-23R6
Replacement stator	C1CF-2C46
Replacement injector fitting	
	C-261



Model C1CFI
1/16" ZDV fittings

SPECIFICATIONS

5,000 psi liq
75°C max
Stator: Metal
Rotor: Valcon H

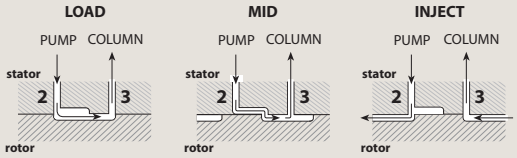
5,000 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E

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 C1CFI



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 RS232/485 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



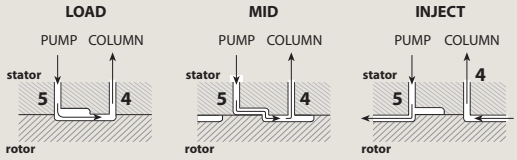
CONTINUOUS FLOW INJECTOR
1/16" stainless ZDV fittings



	Prod No
N60 stainless stator	
Manual	C6-2006
With universal actuator	C6-2006EUHA
Replacement valve	C6-2006D
Replacement rotor	C2-20R6
Replacement stator	C6-2C06
PAEK stator	
Manual	C6-2346
With universal actuator	C6-2346EUHA
Replacement valve	C6-2346D
Replacement rotor	C2-23R6
Replacement stator	C6-2C46

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

Actuators
Microelectric 176
Universal 174-175
Materials
Metals..... 246-247
Polymers 248
Valve rotors.....249
Nuts
Metal.....12
PEEK 48
Ferrules
Metal.....14
PEEK 48

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)**	
Volume	*Prod No*	*Prod No*	**Titanium** *Prod No*
2 µl	CSL2	CZSL2PK	
5 µl	CSL5	CZSL5PK	
10 µl	CSL10	CZSL10PK	CSL10TI
20 µl	CSL20	CZSL20PK	CSL20TI
50 µl	CSL50	CZSL50PK	CSL50TI
100 µl	CSL100	CZSL100PK	CSL100TI
250 µl	CSL250	CZSL250PK	CSL250TI
500 µl	CSL500	CZSL500PK **	CSL500TI
1 ml	CSL1K	CZSL1KPK **	CSL1KTI
2 ml	CSL2K	CZSL2KPK **	
5 ml	CSL5K	CZSL5KPK **	
10 ml	CSL10K		

*** 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 RS232/485 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	*Prod No*	*Prod No*	*Prod No*
Manual	C22Z-3184	C22Z-3186	C22Z-3188	C22Z-3180
With universal act.	C22Z-3184EUHA	C22Z-3186EUHA	C22Z-3188EUHA	C22Z-3180EUHA
Replacement valve	C22Z-3184D	C22Z-3186D	C22Z-3188D	C22Z-3180D
Replacement rotor	C12-314	C12-316	C12-318	C12-310
Replacement stator	C22Z-384	C22Z-386	C22Z-388	C22Z-380

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*	*Prod No*	*Prod No*
5 µl	CZSL5FEP	CZSL5TF	CZSL5PK
10 µl	CZSL10FEP	CZSL10TF	CZSL10PK
20 µl	CZSL20FEP	CZSL20TF	CZSL20PK
50 µl	CZSL50FEP	CZSL50TF	CZSL50PK
100 µl	CZSL100FEP	CZSL100TF	CZSL100PK
250 µl	CZSL250FEP	CZSL250TF	CZSL250PK
500 µl	CZSL500FEP	CZSL500TF	CZSL500PK
1 ml	CZSL1KFEP	CZSL1KTF	CZSL1KPK
2 ml	CZSL2KFEP	CZSL2KTF	CZSL2KPK

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 RS232/485 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	*Prod No*	*Prod No*	*Prod No*
Manual	C22-3184	C22-3186	C22-3188	C22-3180
With universal actuator	C22-3184EUHA	C22-3186EUHA	C22-3188EUHA	C22-3180EUHA
Replacement valve	C22-3184D	C22-3186D	C22-3188D	C22-3180D
Replacement rotor	C22-314	C22-316	C22-318	C22-310
Replacement stator	C22-384	C22-386	C22-388	C22-380

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 RS232/485 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	*Prod No*	*Prod No*	*Prod No*
Manual	C22-6184	C22-6186	C22-6188	C22-6180
With universal actuator	C22-6184EUHA	C22-6186EUHA	C22-6188EUHA	C22-6180EUHA
Replacement valve	C22-6184D	C22-6186D	C22-6188D	C22-6180D
Replacement rotor	C22-614	C22-616	C22-618	C22-610
Replacement stator	C22-684	C22-686	C22-688	C22-680

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*	*Prod No*	*Prod No*
20 µl	CFSL20FEP	CFSL20TF	CFSL20PK
50 µl	CFSL50FEP	CFSL50TF	CFSL50PK
100 µl	CFSL100FEP	CFSL100TF	CFSL100PK
250 µl	CFSL250FEP	CFSL250TF	CFSL250PK
500 µl	CFSL500FEP	CFSL500TF	CFSL500PK
1 ml	CFSL1KFEP	CFSL1KTF	CFSL1KPK
2 ml	CFSL2KFEP	CFSL2KTF	CFSL2KPK

MORE INFO

Actuators
Microelectric 176
Universal 174-175
Materials
Polymers 248
Valve rotors.....249

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 RS232/485 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	*Prod No*	*Prod No*
Manual	C24Z-2184-.2	C24Z-2184-.5	C24Z-2184-1
With universal actuator	C24Z-2184-.2EUHA	C24Z-2184-.5EUHA	C24Z-2184-1EUHA
Replacement valve	C24Z-2184-.2D	C24Z-2184-.5D	C24Z-2184-1D
Replacement rotor	C24-10R-.2	C24-10R-.5	C24-10R-1
Replacement stator	C24Z-1C8	C24Z-1C8	C24Z-1C8

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 RS232/485 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	*Prod No*	*Prod No*
Manual	C24-2184-.5	C24-2184-1	C24-2184-2
With universal act.	C24-2184-.5EUHA	C24-2184-1EUHA	C24-2184-2EUHA
Replacement valve	C24-2184-.5D	C24-2184-1D	C24-2184-2D
Replacement rotor	C24-10R-.5	C24-10R-1	C24-10R-2
Replacement stator	C24-1C8	C24-1C8	C24-1C8

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 RS232/485 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") *Prod No*	 6 Ports 3.2 mm (.125") *Prod No*	 8 Ports 2.8 mm (.110") *Prod No*
With universal actuator	C42R-8144EUTA	C42R-8146EUTA	C42R-8148EUTA
Replacement valve	C42R-8144D	C42R-8146D	C42R-8148D
Replacement rotor	C42R-81R4	C42R-81R6	C42R-81R8
Replacement stator	C42R-8C44	C42R-8C46	C42R-8C48



Fittings 1/2-20

	Prod No
Delrin nut	CFL-4D
CTFE ferrule	CFL-CB4KF-S

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 RS232/485 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") *Prod No*	 6 Ports 3.9 mm (.155") *Prod No*
With universal actuator	C42R-9144EUTA	C42R-9146EUTA
Replacement valve	C42R-9144D	C42R-9146D
Replacement rotor	C42R-91R4	C42R-91R6
Replacement stator	C42R-9C44	C42R-9C46

MORE INFO

Actuators
Microelectric 176
Universal 174-175
Materials
Metals..... 246-247
Polymers 248
Valve rotors.....249



CHEMINERT VALVES

APPLICATIONS FOR CHEMINERT TWO POSITION VALVES

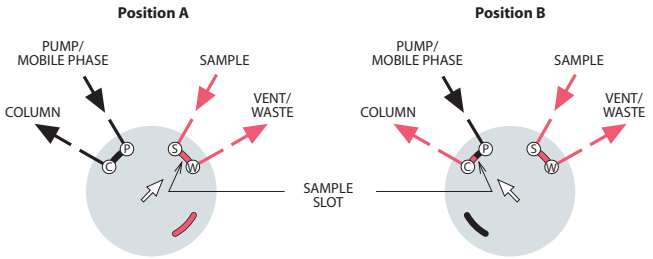
These illustrations show basic sample injection techniques using Cheminert two position valves. With rare exceptions, there is no difference between switching valves and external volume sampling valves, so the same valve can be used for either function.

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.

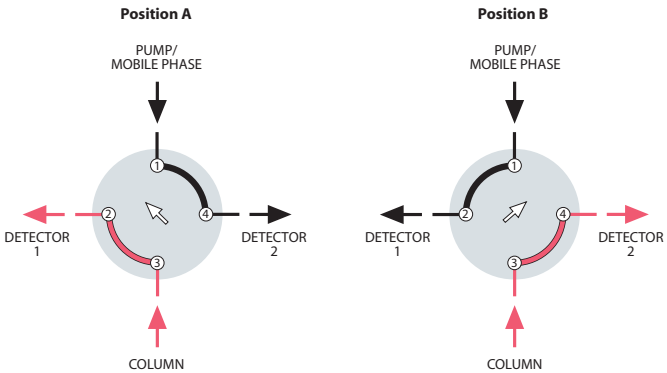
4 PORT – INTERNAL SAMPLE INJECTOR



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

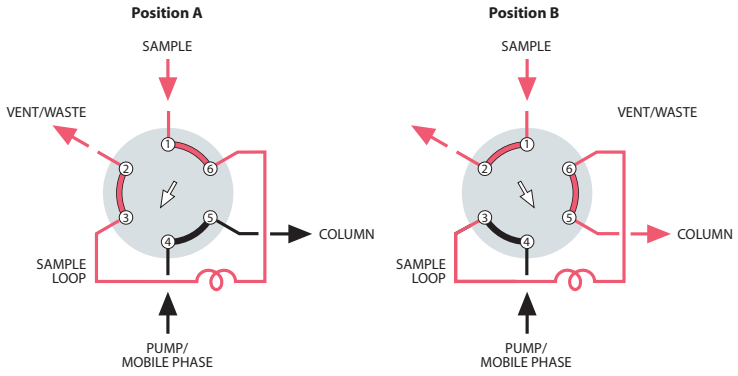


DETECTOR SELECTION FROM TWO COLUMNS OR ONE COLUMN AND AUXILIARY CARRIER

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



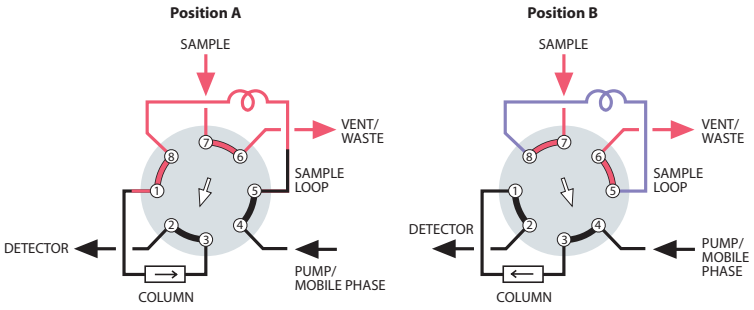
SAMPLE INJECTION

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

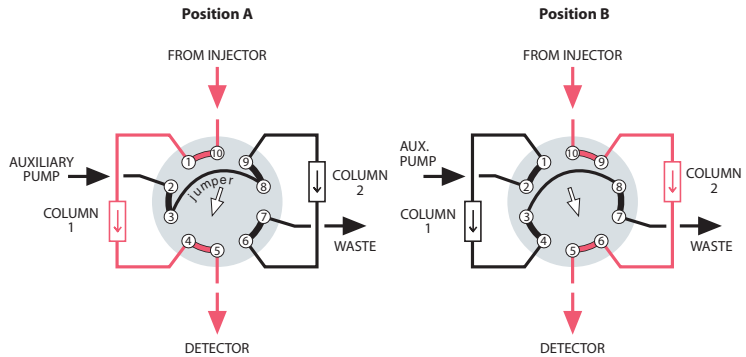


LOOP SAMPLING WITH BACKFLUSH TO DETECTOR

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



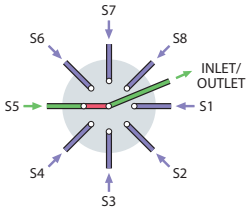
CHEMINERT VALVES

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 RS232/485 serial interface.
See page 174 for other interface options.



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

	6 Position *Prod No*	8 Position *Prod No*	10 Position *Prod No*
With universal actuator	C85NX-6676EUHA	C85NX-6678EUHA	C85NX-6670EUHA
Replacement valve	C85NX-6676D	C85NX-6678D	C85NX-6670D
Replacement rotor	C75N-66R6	C75N-66R8	C75N-66R0
Replacement stator	C75N-6C76	C75N-6C78	C75N-6C70



10 POSITION SELECTOR
1/32" stainless Valco fittings



15,000 psi UHPLC microbore selectors

1/16" VALCO FITTINGS, 0.25 MM PORTS (.010")

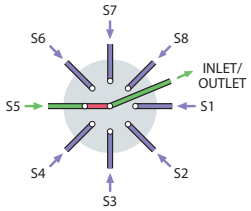
SPECIFICATIONS

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 RS232/485 serial interface.
See page 174 for other interface options.



15,000 psi
Microbore
Stream selector
1/16"
0.25 mm

	6 Position *Prod No*	8 Position *Prod No*	10 Position *Prod No*
With universal actuator	C85-1676EUHA	C85-1678EUHA	C85-1670EUHA
Replacement valve	C85-1676D	C85-1678D	C85-1670D
Replacement rotor	C75-16R6	C75-16R8	C75-16R0
Replacement stator	C75-1C76	C75-1C78	C75-1C70



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



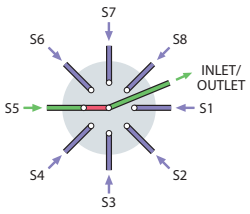
CHEMINERT VALVES

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 RS232/485 serial interface.
See page 174 for other interface options.



	4 Position *Prod No*	6 Position *Prod No*	8 Position *Prod No*	10 Position *Prod No*
N60 stainless stator				
Manual	C5-2004	C5-2006	C5H-2008	C5H-2000
With universal actuator	C5-2004EUHA	C5-2006EUHA	C5H-2008EUHA	C5H-2000EUHA
Replacement valve	C5-2004D	C5-2006D	C5H-2008D	C5H-2000D
Replacement rotor	C5-20R4	C5-20R6	C5-20R8H	C5-20R0H
Replacement stator	C5-2C04	C5-2C06	C5-2C08H	C5-2C00H
PAEK stator				
Manual	C5-2344	C5-2346	C5H-2348	C5H-2340
With universal actuator	C5-2344EUHA	C5-2346EUHA	C5H-2348EUHA	C5H-2340EUHA
Replacement valve	C5-2344D	C5-2346D	C5H-2348D	C5H-2340D
Replacement rotor	C5-23R4	C5-23R6	C5-23R8H	C5-23R0H
Replacement stator	C5-2C44	C5-2C46	C5-2C48H	C5-2C40H
Titanium stator				
Manual	C5-2034	C5-2036	C5H-2038	C5H-2030
With universal actuator	C5-2034EUHA	C5-2036EUHA	C5H-2038EUHA	C5H-2030EUHA
Replacement valve	C5-2034D	C5-2036D	C5H-2038D	C5H-2030D
Replacement rotor	C5-20R4	C5-20R6	C5-20R8H	C5-20R0H
Replacement stator	C5-2C34	C5-2C36	C5-2C38H	C5-2C30H

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

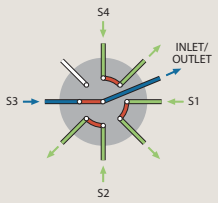


6 POSITION SELECTOR
1/16" stainless Valco fittings

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 36



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

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

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 RS232/485 serial interface. See page 174 for other interface options.

	6 Column *Prod No*	8 Column *Prod No*	10 Column *Prod No*
N60 stainless stator			
System	C5-2006EUTDA	C5H-2008EUTDA	C5H-2000EUTDA
Replacement rotor	C5-20R6	C5-20R8H	C5-20R0H
PAEK stator			
System	C5-2346EUTDA	C5H-2348EUTDA	C5H-2340EUTDA
Replacement rotor	C5-23R6	C5-23R8H	C5-23R0H

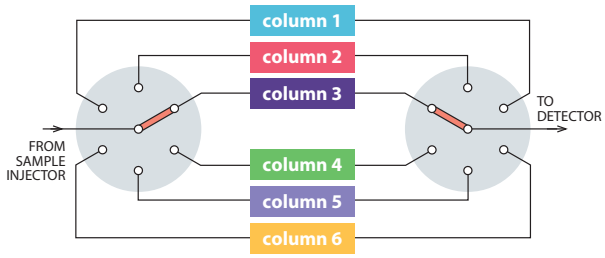
Note: Contact factory for replacement valves and stators, as valves for dual drive assemblies have mirror image stators.

Prod No **RS-232 interface cable**
I-22697



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

Actuators
Microelectric 176
Universal 174-175
Materials
Metals..... 246-247
Polymers 248
Valve rotors.....249
Standoff
assemblies 187-189



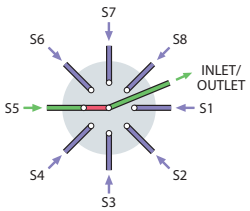
CHEMINERT VALVES

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 RS232/485 serial interface.
See page 174 for other interface options.



	6 Position *Prod No*	8 Position *Prod No*	10 Position *Prod No*	14 Position *Prod No*
Manual	C25Z-3186	C25Z-3188	C25Z-3180	C25Z-31814
With universal act.	C25Z-3186EUHA	C25Z-3188EUHA	C25Z-3180EUHA	C25Z-31814EUHA
Replacement valve	C25Z-3186D	C25Z-3188D	C25Z-3180D	C25Z-31814D
Replacement rotor	C15-310	C15-310	C15-310	C25Z-325
Replacement stator	C25Z-386	C25Z-388	C25Z-380	C25Z-38-14

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.

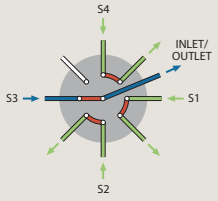


10 POSITION SELECTOR
1/16" PEEK ZDV fittings

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")

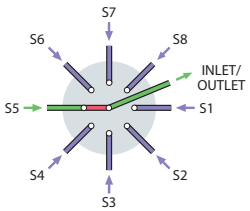
SPECIFICATIONS

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 RS232/485 serial interface.
See page 174 for other interface options.



Low pressure
Stream selector
1/4-28 Internal
1/16" 0.75 mm

	4 Position *Prod No*	6 Position *Prod No*	8 Position *Prod No*	10 Position *Prod No*
Manual	C25-3184	C25-3186	C25-3188	C25-3180
With universal actuator	C25-3184EUHA	C25-3186EUHA	C25-3188EUHA	C25-3180EUHA
Replacement valve	C25-3184D	C25-3186D	C25-3188D	C25-3180D
Replacement rotor	C25-314	C25-316	C25-318	C25-310
Replacement stator	C25-384	C25-386	C25-388	C25-380

Stream selectors

1/4-28 FITTINGS FOR 1/8" TUBING, 1.50 MM PORTS (.060")

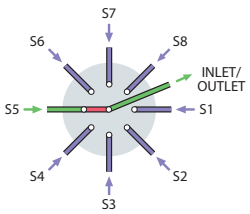
SPECIFICATIONS

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 RS232/485 serial interface.
See page 174 for other interface options.



Low pressure
Stream selector
1/4-28 Internal
1/8" 1.50 mm

	4 Position *Prod No*	6 Position *Prod No*	8 Position *Prod No*	10 Position *Prod No*
Manual	C25-6184	C25-6186	C25-6188	C25-6180
With universal actuator	C25-6184EUHA	C25-6186EUHA	C25-6188EUHA	C25-6180EUHA
Replacement valve	C25-6184D	C25-6186D	C25-6188D	C25-6180D
Replacement rotor	C25-614	C25-616	C25-618	C25-610
Replacement stator	C25-684	C25-686	C25-688	C25-680

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

Actuators
Microelectric 176
Universal 174-175
Materials
Metals..... 246-247
Polymers 248
Valve rotors.....249
Standoff
assemblies 187-189



10 POSITION SELECTOR
1/4-28 Cheminert flangeless fittings



CHEMINERT VALVES

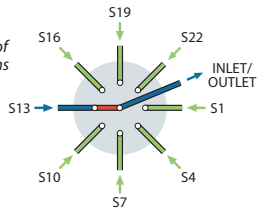
Stream selectors

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 RS232/485 serial interface.
See page 174 for other interface options.

(For clarity, only eight of the twenty-four streams are illustrated.)



	20 Position 0.67 mm (.026") *Prod No*	24 Position 0.61 mm (.024") *Prod No*	28 Position 0.56 mm (.022") *Prod No*
With universal actuator	C25G-24520EUTA	C25G-24524EUTA	C25G-24528EUTA
Replacement valve	C25G-24520D	C25G-24524D	C25G-24528D
Replacement rotor	C25G-24R20	C25G-24R24	C25G-24R28
Replacement stator	C25G-2C520	C25G-2C524	C25G-2C528

SPECIFICATIONS

100 psi liq
50°C max
Stator: PEEK
Rotor: Valcon M

OPTIONS

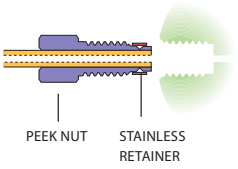
- Fittings for use with 1/32" tubing
- 2", 3", 4", and 6" standoffs
- Consult the factory for optional materials.

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*	
6-40 one piece nut/bushing with retainer	1/16"	CNNF1PK	
	1/32"	CNNF.5PK	
Tightening tool		CGFT	



6-40 FITTING



24 POSITION SELECTOR
1/16" 6-40 PEEK fittings

MORE INFO

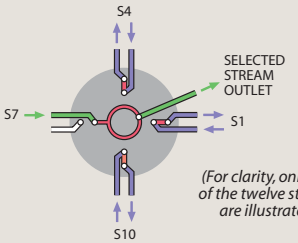
See Technical Note 824 for installation of these fittings.
www/vici.com/support/tn/tn824.pdf

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

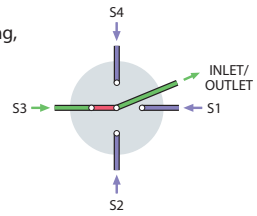
SPECIFICATIONS

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 RS232/485 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") *Prod No*	6 Position 3.2 mm (.125") *Prod No*	8 Position 2.8 mm (.110") *Prod No*
With universal actuator	C45R-8144EUTA	C45R-8146EUTA	C45R-8148EUTA
Replacement valve	C45R-8144D	C45R-8146D	C45R-8148D
Replacement rotor	C45R-81R4	C45R-81R6	C45R-81R8
Replacement stator	C45R-8C44	C45R-8C46	C45R-8C48



Fittings 1/2-20

	Prod No
Delrin nut	CFL-4D
CTFE ferrule	CFL-CB4KF-S

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

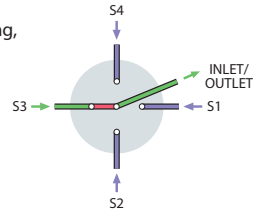
SPECIFICATIONS

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 RS232/485 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") *Prod No*	6 Position 3.9 mm (.155") *Prod No*
With universal actuator	C45R-9144EUTA	C45R-9146EUTA
Replacement valve	C45R-9144D	C45R-9146D
Replacement rotor	C45R-91R4	C45R-91R6
Replacement stator	C45R-9C44	C45R-9C46

MORE INFO

Actuators
Microelectric 176
Universal 174-175
Materials
Metals..... 246-247
Polymers 248
Valve rotors.....249



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	*Prod No*	*Prod No*	*Prod No*
N60 stainless stator				
With integrated actuator	C52-1004I	C52-1006I	C52-1008I	C52-1000I
Add RS-232 interface	C52-1004IA	C52-1006IA	C52-1008IA	C52-1000IA
With motor/sensor only	C52-1004I-S	C52-1006I-S	C52-1008I-S	C52-1000I-S
With motor only	C52-1004IX	C52-1006IX	C52-1008IX	C52-1000IX
Replacement rotor	C2-10R4	C2-10R6	C2-10R8H	C2-10R0H
Replacement stator	C52-1C04	C52-1C06	C52-1C08	C52-1C00
PAEK stator				
With integrated actuator	C52-1344I	C52-1346I	C52-1348I	C52-1340I
Add RS-232 interface	C52-1344IA	C52-1346IA	C52-1348IA	C52-1340IA
With motor/sensor only	C52-1344I-S	C52-1346I-S	C52-1348I-S	C52-1340I-S
With motor only	C52-1344IX	C52-1346IX	C52-1348IX	C52-1340IX
Replacement rotor	C2-13R4	C2-13R6	C2-13R8H	C2-13R0H
Replacement stator	C52-1C44	C52-1C46	C52-1C48	C52-1C40



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 RS232/485 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
N60 stainless stator	
Manual	C3-1006
With universal actuator	C3-1006EUHA
Replacement valve	C3-1006D
Replacement rotor	C2-10R6
Replacement stator	C3-1C06
PAEK stator	
Manual	C3-1346
With universal actuator	C3-1346EUT
Replacement valve	C3-1346D
Replacement rotor	C2-13R6
Replacement stator	C3-1C46



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, 163, 164, 165, and 167.

	Stainless Steel	**PEEK (for PAEK stators)**
Volume	*Prod No*	*Prod No*
2 µl	CSL2	CZSL2PK
5 µl	CSL5	CZSL5PK
10 µl	CSL10	CZSL10PK
20 µl	CSL20	CZSL20PK
50 µl	CSL50	CZSL50PK
100 µl	CSL100	CZSL100PK
250 µl	CSL250	CZSL250PK
500 µl	CSL500	CZSL500PK **
1 ml	CSL1K	CZSL1KPK **
2 ml	CSL2K	CZSL2KPK **
5 ml	CSL5K	CZSL5KPK **
10 ml	CSL10K	*** 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

Actuators
Microelectric 176
Universal 174-175
Materials
Metals..... 246-247
Polymers 248
Valve rotors.....249



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 RS232/485 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
N60 stainless stator	
Manual	C2V-1006
With universal actuator	C2V-1006EUHA
Replacement valve	C2V-1006D
Replacement rotor	C2-10R6
Replacement stator	C2V-1C06
PAEK stator	
Manual	C2V-1346
With universal actuator	C2V-1346EUHA
Replacement valve	C2V-1346D
Replacement rotor	C2-13R6
Replacement stator	C2V-1C46



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")

5,000 psi | **Analytical** | **Vertical port** | **1/16"** | **0.40 mm**

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 RS232/485 serial interface. See page 174 for other interface options.
Note: The fitting detail pilot depth in PAEK HPLC stators is slightly longer than standard.



	Prod No
N60 stainless stator	
Manual	C2V-2006
With universal actuator	C2V-2006EUHA
Replacement valve	C2V-2006D
Replacement rotor	C2-20R6
Replacement stator	C2V-2C06
PAEK stator	
Manual	C2V-2346
With universal actuator	C2V-2346EUHA
Replacement valve	C2V-2346D
Replacement rotor	C2-23R6
Replacement stator	C2V-2C46



6 PORT VERTICAL PORT INJECTOR
1/16" PEEK ZDV fittings

MORE INFO

Actuators
Microelectric 176
Universal 174-175
Materials
Metals..... 246-247
Polymers 248
Valve rotors.....249



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
Prod No



6 Port*
Prod No

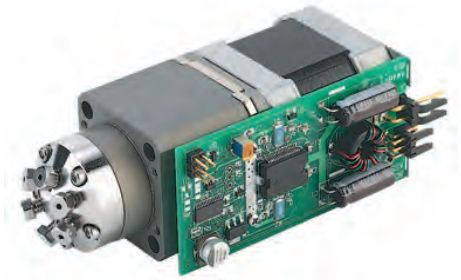


8 Port
Prod No



10 Port
Prod No

N60 stainless stator				
With integrated actuator	C52-2004I	C52-2006I	C52-2008I	C52-2000I
Add RS-232 interface	C52-2004IA	C52-2006IA	C52-2008IA	C52-2000IA
With motor/sensor only	C52-2004I-S	C52-2006I-S	C52-2008I-S	C52-2000I-S
With motor only	C52-2004IX	C52-2006IX	C52-2008IX	C52-2000IX
Replacement rotor	C2-20R4	C2-20R6	C2-20R8H	C2-20R0H
Replacement stator	C52-2C04	C52-2C06	C52-2C08	C52-2C00
PAEK stator				
With integrated actuator	C52-2344I	C52-2346I	C52-2348I	C52-2340I
Add RS-232 interface	C52-2344IA	C52-2346IA	C52-2348IA	C52-2340IA
With motor/sensor only	C52-2344I-S	C52-2346I-S	C52-2348I-S	C52-2340I-S
With motor only	C52-2344IX	C52-2346IX	C52-2348IX	C52-2340IX
Replacement rotor	C2-23R4	C2-23R6	C2-23R8H	C2-23R0H
Replacement stator	C52-2C44	C52-2C46	C52-2C48	C52-2C40



6 PORT INTEGRATED MOTOR/VALVE
1/16" stainless ZDV fittings

SPECIFICATIONS

5,000 psi liq
50°C max
Stator: N60 stainless
Rotor: Valcon H

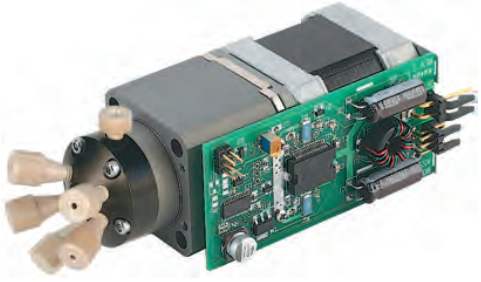
5,000 psi liq
50°C max
Stator: PAEK
Rotor: Valcon E

OPTIONS

- **Vertical port version**. (Model C52V) Contact the factory for more information.
- Optional 0.25 mm (.010") and 0.75 mm ports (.030") available
- Titanium and Hastelloy stators available
- Serial communication via RS-232 or RS-485 is available.

6 PORT VERTICAL PORT INTEGRATED MOTOR/VALVE

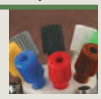
Contact the factory for information on this option.



* 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")

5,000 psi
Analytical
Centered port
1/16" **0.40 mm**

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 RS232/485 serial interface. See page 174 for other interface options.
Note: The fitting detail pilot depth in PAEK HPLC stators is slightly longer than standard.



	Prod No
N60 stainless stator	
Manual	C3-2006
With universal actuator	C3-2006EUHA
Replacement valve	C3-2006D
Replacement rotor	C2-20R6
Replacement stator	C3-2C06
PAEK stator	
Manual	C3-2346
With universal actuator	C3-2346EUHA
Replacement valve	C3-2346D
Replacement rotor	C2-23R6
Replacement stator	C3-2C46



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, 163, 164, 165, and 167.

	Stainless Steel	**PEEK (for PAEK stators)**
Volume	*Prod No*	*Prod No*
2 µl	CSL2	CZSL2PK
5 µl	CSL5	CZSL5PK
10 µl	CSL10	CZSL10PK
20 µl	CSL20	CZSL20PK
50 µl	CSL50	CZSL50PK
100 µl	CSL100	CZSL100PK
250 µl	CSL250	CZSL250PK
500 µl	CSL500	CZSL500PK **
1 ml	CSL1K	CZSL1KPK **
2 ml	CSL2K	CZSL2KPK **
5 ml	CSL5K	CZSL5KPK **
10 ml	CSL10K	*** 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

Actuators
Microelectric 176
Universal 174-175
Materials
Metals..... 246-247
Polymers 248
Valve rotors.....249



CHEMINERT VALVES

Integrated motor/valves

1/16" VALCO ZDV FITTINGS, 0.75 MM PORTS (.030")

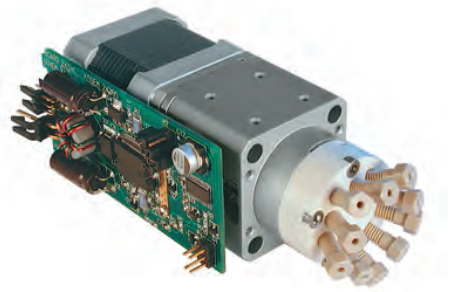
Low pressure
Integrated
10-32 ZDV
1/16" 0.75 mm
CE ready*

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	*Prod No*	*Prod No*	*Prod No*
With integrated actuator	C62Z-3184I	C62Z-3186I	C62Z-3188I	C62Z-3180I
Add RS-232 interface	C62Z-3184IA	C62Z-3186IA	C62Z-3188IA	C62Z-3180IA
With motor and sensor only	C62Z-3184I-S	C62Z-3186I-S	C62Z-3188I-S	C62Z-3180I-S
Replacement rotor	C62-314	C62-316	C62-318	C62-310
Replacement stator	C62Z-384	C62Z-386	C62Z-388	C62Z-380



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*	*Prod No*	*Prod No*
5 µl	CZSL5FEP	CZSL5TF	CZSL5PK
10 µl	CZSL10FEP	CZSL10TF	CZSL10PK
20 µl	CZSL20FEP	CZSL20TF	CZSL20PK
50 µl	CZSL50FEP	CZSL50TF	CZSL50PK
100 µl	CZSL100FEP	CZSL100TF	CZSL100PK
250 µl	CZSL250FEP	CZSL250TF	CZSL250PK
500 µl	CZSL500FEP	CZSL500TF	CZSL500PK
1 ml	CZSL1KFEP	CZSL1KTF	CZSL1KPK
2 ml	CZSL2KFEP	CZSL2KTF	CZSL2KPK

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 *Prod No*	6 Port *Prod No*	8 Port *Prod No*	10 Port *Prod No*
With integrated actuator	C62-3184I	C62-3186I	C62-3188I	C62-3180I
Add RS-232 interface	C62-3184IA	C62-3186IA	C62-3188IA	C62-3180IA
With motor and sensor only	C62-3184I-S	C62-3186I-S	C62-3188I-S	C62-3180I-S
Replacement rotor	C62-314	C62-316	C62-318	C62-310
Replacement stator	C62-384	C62-386	C62-388	C62-380

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

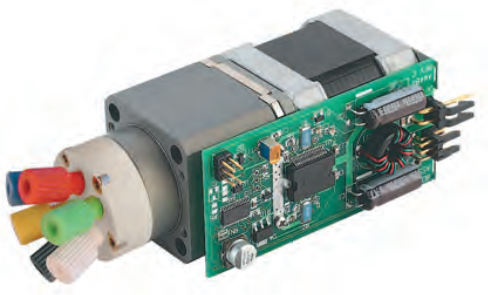
OPTIONS

- 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 *Prod No*	6 Port *Prod No*	8 Port *Prod No*	10 Port *Prod No*
With integrated actuator	C62-6184I	C62-6186I	C62-6188I	C62-6180I
Add RS-232 interface	C62-6184IA	C62-6186IA	C62-6188IA	C62-6180IA
With motor and sensor only	C62-6184I-S	C62-6186I-S	C62-6188I-S	C62-6180I-S
Replacement rotor	C62-614	C62-616	C62-618	C62-610
Replacement stator	C62-684	C62-686	C62-688	C62-680



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.



Volume	FEP *Prod No*	PTFE *Prod No*	PEEK *Prod No*
20 µl	CFSL20FEP	CFSL20TF	CFSL20PK
50 µl	CFSL50FEP	CFSL50TF	CFSL50PK
100 µl	CFSL100FEP	CFSL100TF	CFSL100PK
250 µl	CFSL250FEP	CFSL250TF	CFSL250PK
500 µl	CFSL500FEP	CFSL500TF	CFSL500PK
1 ml	CFSL1KFEP	CFSL1KTF	CFSL1KPK
2 ml	CFSL2KFEP	CFSL2KTF	CFSL2KPK



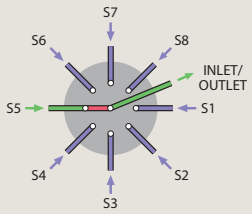
CHEMINERT VALVES

Integrated motor/stream selectors

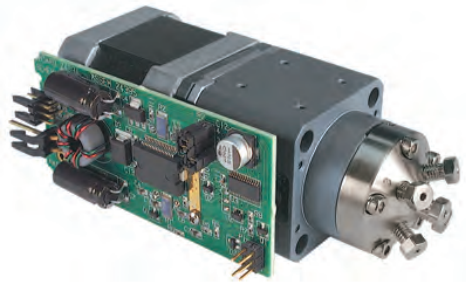
1/16" VALCO ZDV FITTINGS, 0.40 MM PORTS (.016")

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 *Prod No*	6 Position *Prod No*	8 Position *Prod No*	10 Position *Prod No*
N60 stainless stator				
With integrated actuator	C55-2004I	C55-2006I	C55-2008I	C55-2000I
Add RS-232 interface	C55-2004IA	C55-2006IA	C55-2008IA	C55-2000IA
With motor/sensor only	C55-2004I-S	C55-2006I-S	C55-2008I-S	C55-2000I-S
With motor only	C55-2004IX	C55-2006IX	C55-2008IX	C55-2000IX
Replacement rotor	C5-20R4	C5-20R6	C5-20R8H	C5-20R0H
Replacement stator	C55-2C04	C55-2C06	C55-2C08	C55-2C00
PAEK stator				
With integrated actuator (Includes RS-232 interface)	C55-2344I	C55-2346I	C55-2348I	C55-2340I
	C55-2344IA	C55-2346IA	C55-2348IA	C55-2340IA
With motor/sensor only	C55-2344I-S	C55-2346I-S	C55-2348I-S	C55-2340I-S
With motor only	C55-2344IX	C55-2346IX	C55-2348IX	C55-2340IX
Replacement rotor	C5-23R4	C5-23R6	C5-23R8H	C5-23R0H
Replacement stator	C55-2C44	C55-2C46	C55-2C48	C55-2C40



6 POSITION INTEGRATED MOTOR/SELECTOR
1/16" stainless ZDV fittings

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.

* 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



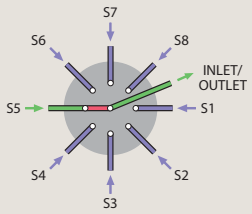
Integrated motor/stream selectors

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 *Prod No*	6 Position *Prod No*	8 Position *Prod No*	10 Position *Prod No*
With integrated actuator	C65Z-3184I	C65Z-3186I	C65Z-3188I	C65Z-3180I
Add RS-232 interface	C65Z-3184IA	C65Z-3186IA	C65Z-3188IA	C65Z-3180IA
With motor and sensor only	C65Z-3184I-S	C65Z-3186I-S	C65Z-3188I-S	C65Z-3180I-S

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 *Prod No*	6 Position *Prod No*	8 Position *Prod No*	10 Position *Prod No*
With integrated actuator	C65-3184I	C65-3186I	C65-3188I	C65-3180I
Add RS-232 interface	C65-3184IA	C65-3186IA	C65-3188IA	C65-3180IA
With motor and sensor only	C65-3184I-S	C65-3186I-S	C65-3188I-S	C65-3180I-S

Integrated motor/stream stream selectors

1/4-28 FITTINGS FOR 1/8" TUBING, 1.50 MM PORTS (.060")

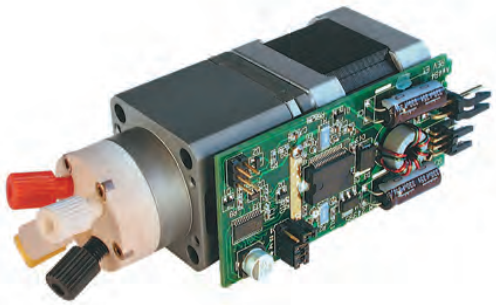
SPECIFICATIONS

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 *Prod No*	6 Position *Prod No*	8 Position *Prod No*	10 Position *Prod No*
With integrated actuator	C65-6184I	C65-6186I	C65-6188I	C65-6180I
Add RS-232 interface	C65-6184IA	C65-6186IA	C65-6188IA	C65-6180IA
With motor and sensor only	C65-6184I-S	C65-6186I-S	C65-6188I-S	C65-6180I-S



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.

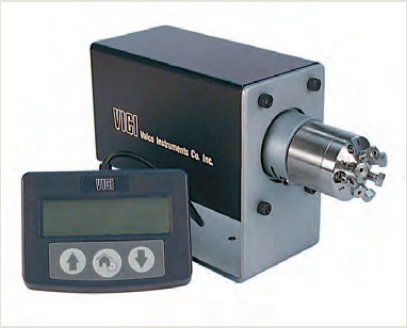
With the exception of low pressure Cheminert selectors, we recommend that selectors be purchased with air or electric actuators. While a manual detent assembly is available, the higher turning torque of our other selector designs makes them more difficult to position accurately by hand.

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

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

SEE ALSO

Actuators

Air ..... pages 178-179
Universal electric. 174-175
Microelectric. 176

Controllers and Accessories

V-SV-S52 4-way solenoid air valve 180
DVI Digital valve interface 181
HSSA High speed switching accessory 182
V-SV-S53 5-way three position solenoid air valve 180
PFAF Position feedback for air actuators ... 181
RAD Right angle drive 186

Mounting Hardware

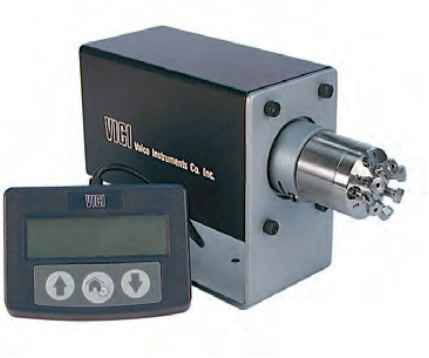
Closemount assembly 190
Standoff assembly 187-189

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*	*Prod no*	*Prod no*
Standard	EUH	EUD	EUT
RS-232 *	EUHA	EUDA	EUTA
RS-485 *	EUHF	EUDF	EUTF
USB	EUHB	EUDB	EUTB
BCD	EUHC	EUDC	EUTC

*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 and microelectric 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 or microelectric actuator. To install an 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 microelectric actuators.

MORE INFO

Microelectric actuators 176

MOUNTING HARDWARE

Closemount hardware . . . . . page 190
Right angle drive 186
Standoff assemblies . . 187
Standoff mounting hardware 187





CHEMINERT UHPLC INJECTOR
on universal actuator



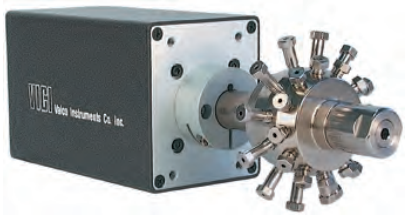
CHEMINERT LC INJECTOR
on universal actuator



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.

Description	w/closemount assembly *Prod no*	w/2" standoff assembly *Prod no*	For use with existing standoff *Prod no*
Highest speed actuator	EQ	EQ2	EQS
High speed actuator	EH	EH2	EHS
Medium torque actuator	EP	EP2	EPS
High torque actuator	ED	ED2	EDS
Highest torque actuator	ET	ET2	ETS

Microelectric actuators — FOR SELECTORS

Standard voltage 24 VDC. Includes autosensing 24 VDC power supply.

Description	w/keyed closemount assembly *Prod no*	w/keyed 2" standoff assembly *Prod no*	For use with existing standoff *Prod no*
High speed actuator	EMH	EMH2	EMHS
High torque actuator	EMT	EMT2	EMTS

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

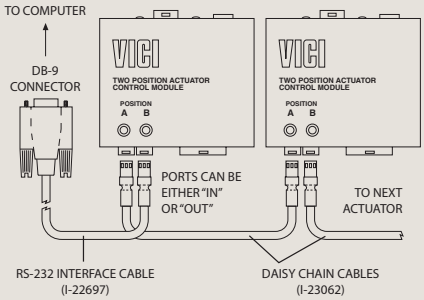
Universal actuators 174-175



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 RS-232/485 interface option can be daisy-chained for control from a single serial port. A chain of actuators requires only one RS-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*
55 cm (22")	RS-232/485	I-23062
1 m (39")	RS-232/485	I-23062-3.3
1.5 m (5')	RS-485	I-23062-5
3 m (10')	RS-485	I-23062-10
6 m (20')	RS-485	I-23062-20

RS-232/485 interface cable

	Prod No
RS-232/485 interface cable	I-22697

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
BCD cable	Microelecric or universal actuator to	Agilent 6890 GC	V-EMPMCR-HP6890
		Agilent 6890 Network GC	V-EMPMCR-HP6890N
		Agilent 7890 GC	V-EMPMCR-HP6890N
For 4 and 6 column selector * *(page 157)*			
Remote cable	Microelectric or universal actuator to	Agilent 1100/1200 LC	V-EMPMCR-HP1100
		Waters Alliance LC	V-EMPMCR-WA2690
For 8 and 10 column selector * *(page 157)*			
Remote cable	Microelectric or universal actuator to	Agilent 1100 LC	V-EMPMCR-HP1100-10
		Waters Alliance LC	V-EMPMCR-WA2690-10

* Requires a specific software setting in the actuator control module

MOUNTING HARDWARE

Closemount hardware . . . . . page 190
Right angle drive 186
Standoff assemblies . . 187
Standoff mounting hardware 187

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

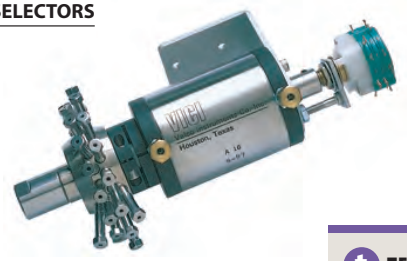
The recommended method for implementing a selector (multi-position) air actuator requires only a single 4-way solenoid. Up to 80 psig may be used without damaging the valve or actuator. Bottled instrument air or nitrogen is recommended.

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	*Prod No*	*Prod No*
4 position	A4	A42	A4S
6 position	A6	A62	A6S
8 position	A8	A82	A8S
10 position	A10	A102	A10S
12 position	A12	A122	A12S
16 position	A16	A162	A16S

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	*Prod No*	*Prod No*
4 position	AT4	AT44	AT4S
6 position	AT6	AT64	AT6S
8 position	AT8	AT84	AT8S
10 position	AT10	AT104	AT10S
12 position	AT12	AT124	AT12S
16 position	AT16	AT164	AT16S

Replacement O-rings

Includes a complete set of O-rings for a multiposition air actuator.

	Prod No
Standard	ORMP
High temp	ORTMP



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

Closemount hardware . . . . . page 190
Right angle drive 186
Standoff assemblies . . 187
Standoff mounting hardware 187



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.

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 *Prod No*	**With 4" standoff assembly** *Prod No*	**For use with existing standoff** *Prod No*
Number of ports in valve	3, 4	90° rotation	A90	A904	A90S
	6	60° rotation	A60	A604	A60S
	8	45° rotation	A45	A454	A45S
	10	36° rotation	A36	A364	A36S
	12	30° rotation	A30	A304	A30S

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 *Prod No*	**With 2" standoff assembly** *Prod No*	**For use with existing standoff** *Prod No*
Number of ports in valve	3, 4	90° rotation	AT90	AT902	AT90S
	6	60° rotation	AT60	AT602	AT60S
	8	45° rotation	AT45	AT452	AT45S
	10	36° rotation	AT36	AT362	AT36S
	12	30° rotation	AT30	AT302	AT30S

Replacement O-rings

Includes a complete set of O-rings for a two position air actuator.

	Prod No
Standard	OR
High temp	ORT



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
Standard	F-TCFB
High temp	F-TCF



F-TCFB



F-TCF

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
V-SV-S53 180
5-way three position solenoid air valve
PFAF 181
Position feedback



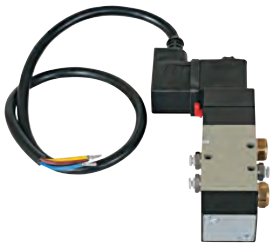
ACTUATORS AND ACCESSORIES

4-Way solenoid air valve CE

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
110 VAC	V-SV-S52-120VAC
240 VAC	V-SV-S52-240VAC
24 VAC	V-SV-S52-24VAC
24 VDC	V-SV-S52-24VDC



3-Way solenoid air valve CE

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
110 VAC	V-SV-S32-120VAC
240 VAC	V-SV-S32-240VAC
24 VAC	V-SV-S32-24VAC
24 VDC	V-SV-S32-24VDC



5-Way 3 position solenoid air valve CE

FOR TWO POSITION AIR ACTUATORS

This 5-way solenoid air valves with 1/8" tube connections is recommended to switch two position air actuators. It applies air to the actuator only during switching and alleviates problems associated with continuous air pressure.

	Prod No
110 VAC	V-SV-S53-120VAC
240 VAC	V-SV-S53-240VAC
24 VAC	V-SV-S53-24VAC
24 VDC	V-SV-S53-24VDC



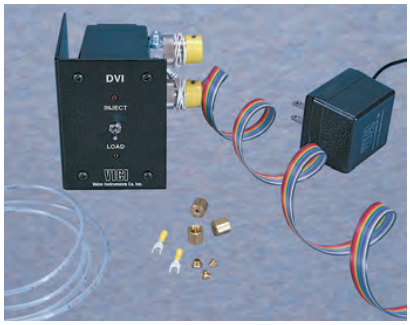
MORE INFO

Actuators
Air ..... pages 178-179
Microelectric 176
Universal electric 174-175

Mounting Hardware
Closemount hardware ..... page 190
Right angle drive 186
Standoff assemblies .. 187
Standoff mounting hardware 187



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
110 VAC	DVI
230 VAC	DVI-220

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
PFAF

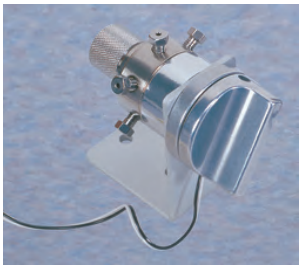


Position feedback FOR MANUAL VALVES

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
For Valco W type valves	4 port	PFW90
	6 port	PFW60
	8 and 10 port	PFW36
For Cheminert valves	C2 series except 4 port *	PFC2
	C2 series, 4 port *	PFC4
	C4 series	PFC4

* Can also be used with C22 series.



MORE INFO

Valco W type valves . . . . . page 96
Cheminert valves
C2 series. 140, 144
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
HSSA



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

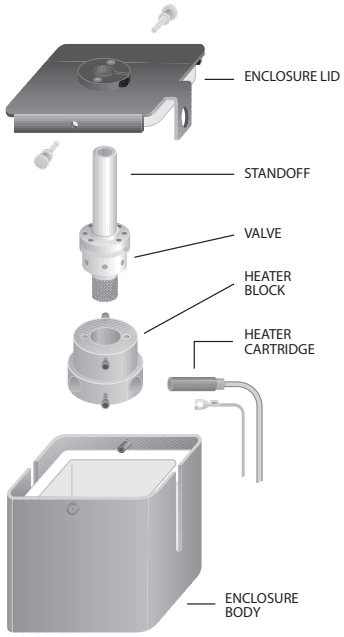
Contact the factory for information on internally purged valves which are not on pages 86-87.





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*	**With heater cartridge*** *Prod No*	**Without heater cartridge** *Prod No*
1 valve	4" x 4-1/4" x 3-5/8"d	65W/350°C	HVEA	HVEAX
		65W/350°C **	HVEAN	HVEANX
	4-1/4" x 5-1/8" x 3-5/8"d	65W/350°C	HVEB	HVEBX
		65W/350°C **	HVEBN	HVEBNX
	8" x 8" x 6"d	100W/350°C	HVEC	HVECX
2 valves	8" x 5-1/4" x 4"d	125W/350°C	HVE2	HVE2X
3 valves	13-1/2" x 5-3/4" x 4"d	150W/350°C	HVE3	HVE3X
6 valves	13-3/4" x 8" x 6"d	300W/350°C	HVE6	HVE6X

* Heater cartridges are not CE-certified
** 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

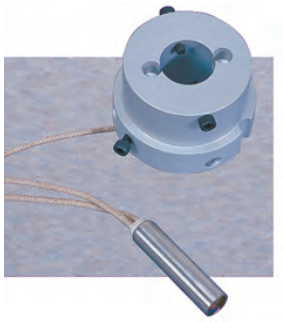


Heater assemblies

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*
For use with HVEA or HVEB	65W/350°C	HA1
For use with HVEC	100W/350°C	HA1T
For use with HVE2	125W/350°C	HA2
For use with HVE3	150W/350°C	HA3
For use with HVE6	300W/350°C	HA6



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
1 valve	Low mass heater block	HBS
1 valve	Standard heater block	HB
1 valve, 1/32" Valco	Standard heater block	HB1N



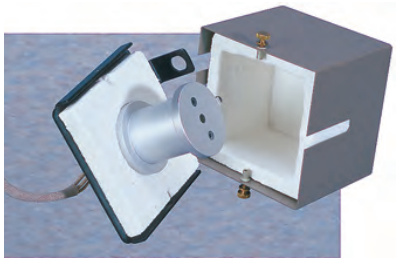
Heater cartridges

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*
65W, 110 VAC	I-21208-32
65W, 220 VAC	I-21208-33
100W, 110 VAC	I-21208-05
100W, 220 VAC	I-21208-06

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*	**With heater cartridge*** *Prod No*	**Without heater cartridge** *Prod No*
1 column	4" x 4-1/4" x 3-5/8"d	65W/350°C	HCE1	HCE1X
	4-1/4" x 5-1/8" x 3-5/8"d	65W/350°C	HCEB	HCEBX
	8" x 8" x 6"d	100W/350°C	HCEC	HCECX
2 columns	8" x 5-1/4" x 4"d	125W/350°C	HCE2	HCE2X
Column mandrel (heater assembly not included with column mandrel)			CM	

* Heater cartridges are not CE-certified



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
0°C to 399°C	110 VAC	ITC10399
	230 VAC	ITC10399-220
Replacement thermocouple		I-21014-01

MORE INFO
Temperature Programmer for Fast GC . . . . . page 204

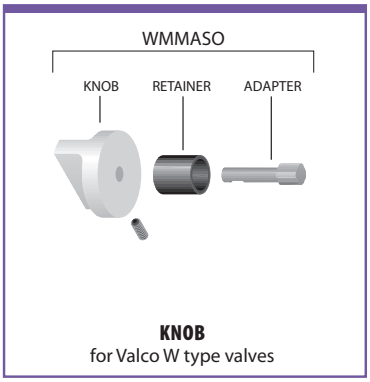


Knobs and handles

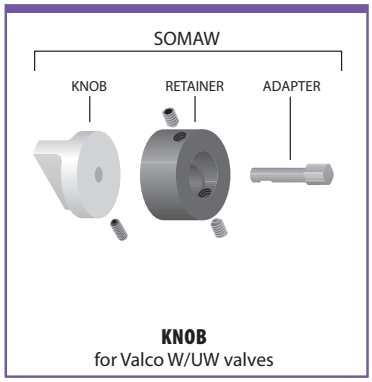
FOR USE WITH A STANDOFF

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.

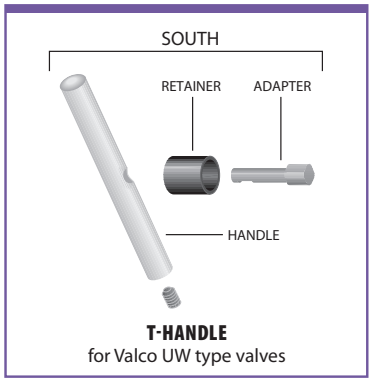
	Prod No
Knob for a W type valve	WMMASO
Knob for a W/UW type valve	SOMAW
T-handle for a UW type valve	SOUTH
Handle for a UW type valve	SOMAP
Handle with position feedback for a W/uw type valve	SOMAPPF



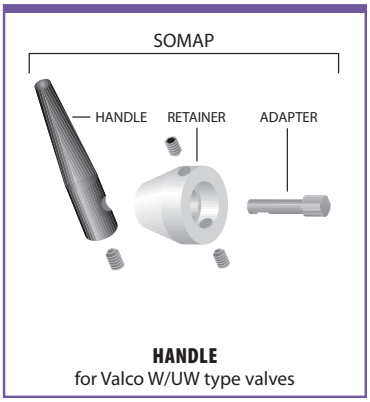
KNOB
for Valco W type valves



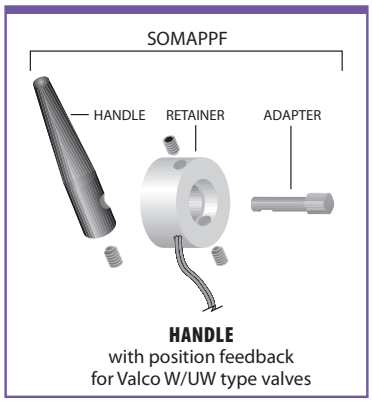
KNOB
for Valco W/UW valves



T-HANDLE
for Valco UW type valves



HANDLE
for Valco W/UW type valves



HANDLE
with position feedback
for Valco W/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

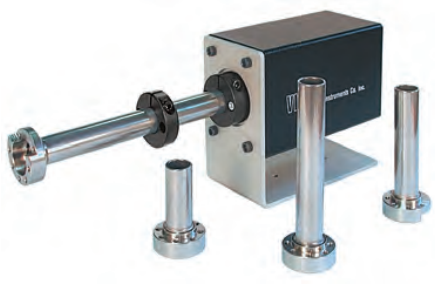
TECH TIP

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 *Prod No*	Clamp ring *Prod No*	Screws *Prod No*
Air actuators				
For Valco two position valves	with 1 or 2 mounting holes	4SOA	CR3	HWSC-SC8-6
	with no mounting holes	4SOAMP	CR3	HWSC-SC8-6
For Valco selectors		4SOAMP	CR3	HWSC-SC8-6
For Cheminert valves		4SOAMP	CR3	HWSC-SC8-6
Microelectric actuators				
For Valco two position valves	with 1 or 2 mounting holes	2SOA	CR8	HWSC-SC8-8B
	with no mounting holes	2SOAMP	CR8	HWSC-SC8-8B
For Valco selectors		2SOAMMP	CR10	HWSC-SC8-6TDH
For Cheminert two position valves		2SOAMP	CR3	HWSC-SC8-8B
For Cheminert selectors		2SOAMMP	CR10	HWSC-SC8-6TDH
Universal actuators				
For Valco two position valves	with 1 or 2 mounting holes	2SOA	CR8	HWSC-SC8-8B
	with no mounting holes	2SOAMP	CR8	HWSC-SC8-8B
For Valco selectors		2SOAMMP	CR10	HWSC-SC8-6TDH
For Cheminert two position valves		2SOAMP	CR3	HWSC-SC8-8B
For Cheminert selectors		2SOAMMP	CR10	HWSC-SC8-6TDH

Standoff assemblies — FOR MANUAL VALVES

Includes knob, standoff assembly, retainer, and adapter. For illustration, see page 186.

		Prod No
For Valco W/UW two position valves rated <5000 psi	with 1 or 2 mounting holes	4SOWK
	with no mounting holes	4SOWKMP
For Valco UW two position valves rated >5000 psi	with 1 or 2 mounting holes	4SOUTH
	with no mounting holes	4SOUTHMP
For Cheminert valves		4SOWKMP



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

CONVERTING FROM CLOSEMOUNT TO STANDOFF

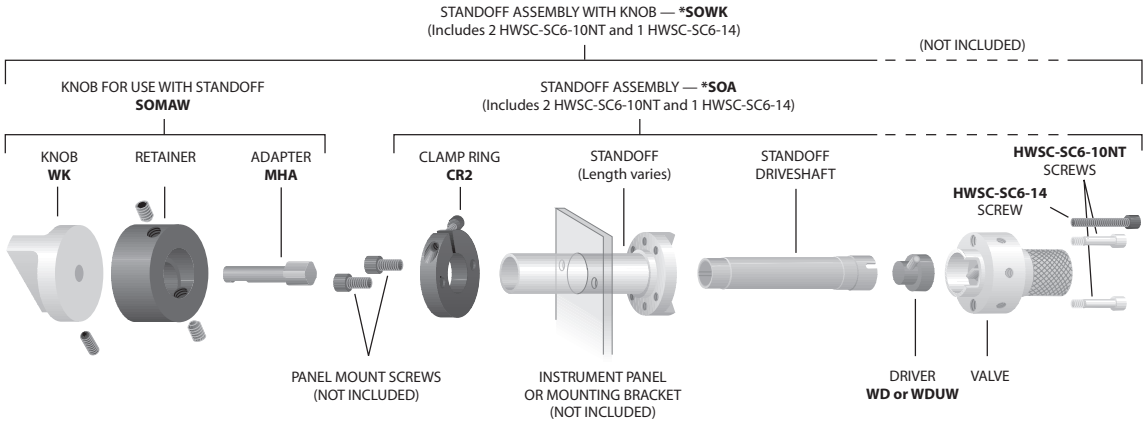
If you are converting an actuated valve from a closemount to a standoff application, the clamp ring and screws which secure the standoff to the actuator are **not included** in the standoff assembly. Order clamp ring and screws in addition to the standoff assembly.

MORE INFO

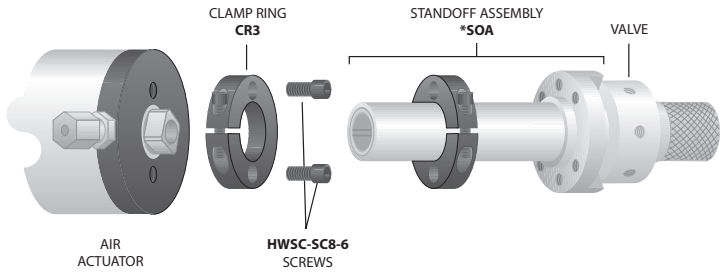
For illustrations of standoffs on valves and actuators, see pages 188-189.



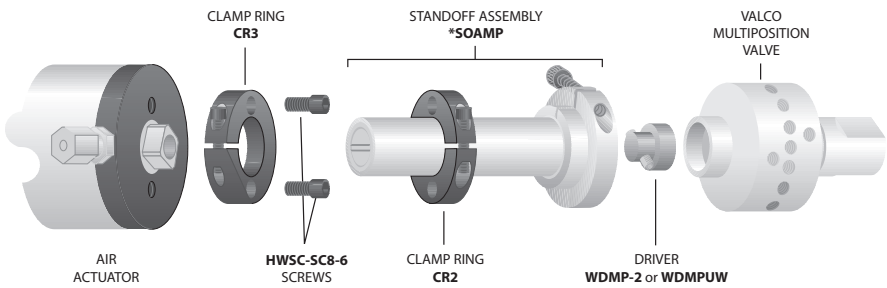
STANDOFF – VALCO TWO POSITION VALVE – MANUAL



STANDOFF – VALCO TWO POSITION VALVE – AIR ACTUATOR

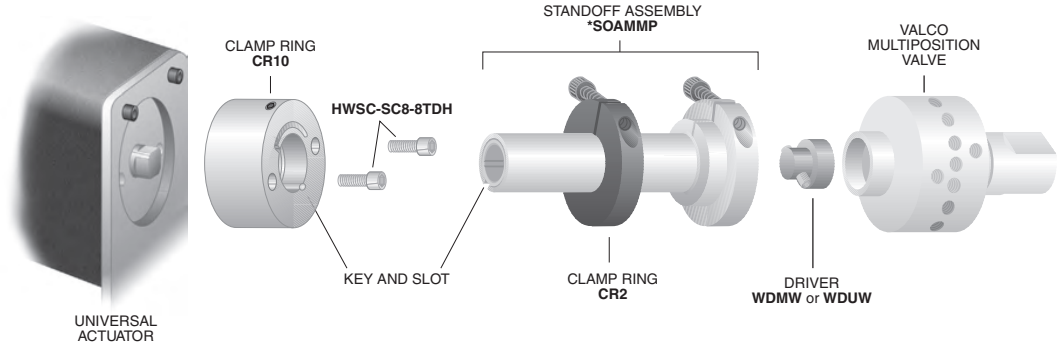


STANDOFF – VALCO SELECTOR – AIR ACTUATOR

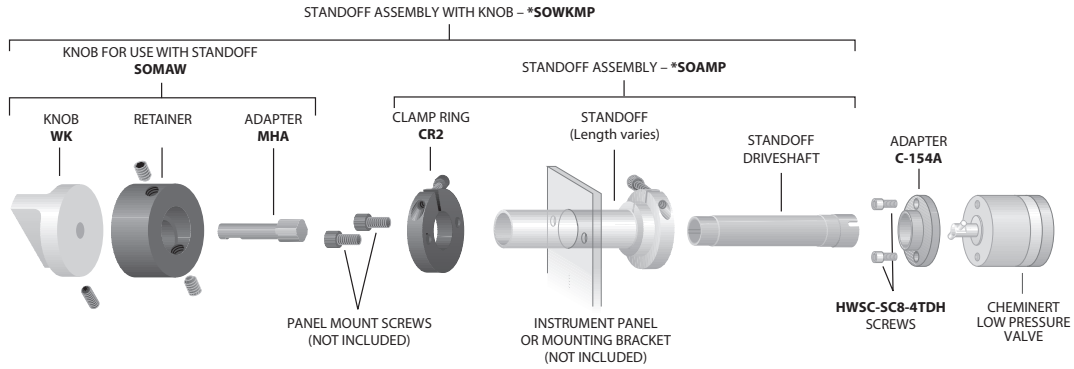




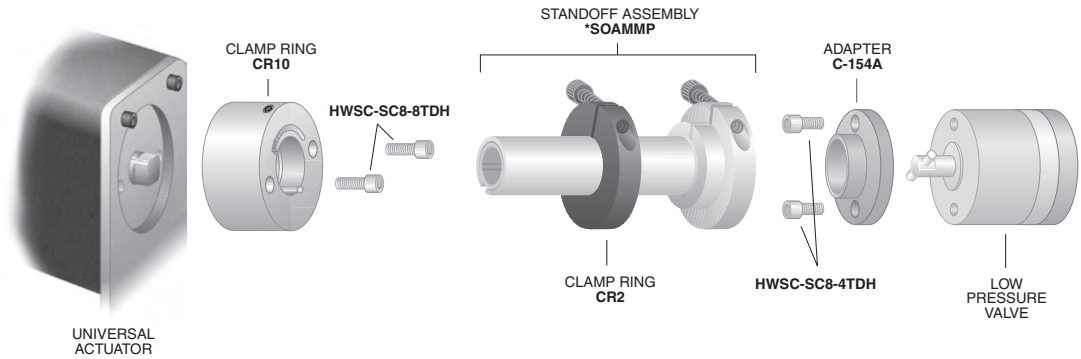
KEYED STANDOFF – VALCO SELECTOR – UNIVERSAL OR MICROELECTRIC ACTUATOR



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
For valves with	threaded mounting holes	WMMA
	unthreaded mounting holes	WMMA10

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
Air actuators		
For Valco two position valves	with 1 or 2 mounting holes	CMH
	with no mounting holes	CMHMP
For Valco selectors		CMHMP
For Cheminert valves	high pressure	CMH11H
	low pressure *(includes required adapter)*	CMH11L
Universal and microelectric actuators		
For Valco two position valves	with 1 or 2 mounting holes	CMH12H
	with no mounting holes	CMH12H
For Valco selectors (UW and MW type)		CMH13
For Cheminert two position valves	high pressure	CMH12H
	low pressure *(includes required adapter)*	CMH12L
For Cheminert selectors	high pressure	CMH13H
	low pressure *(includes required adapter)*	CMH13L

TECH TIP

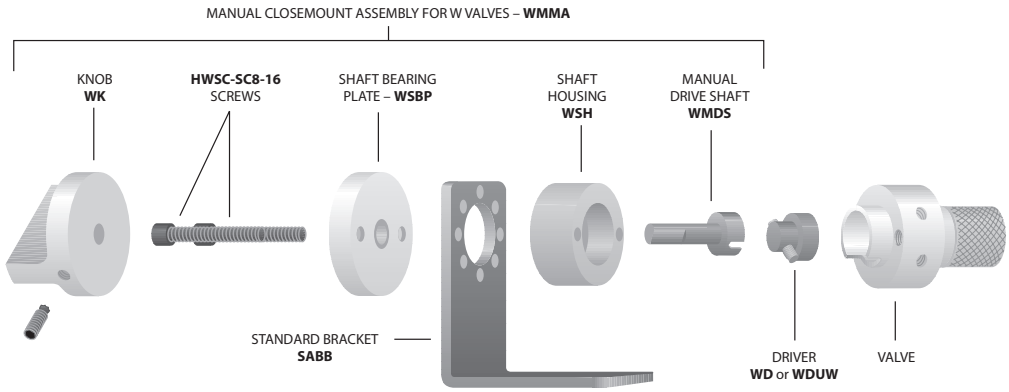
If you need the ***actuator as well as the hardware***, you can order it complete with the appropriate hardware or with the required standoff already installed.

Actuators

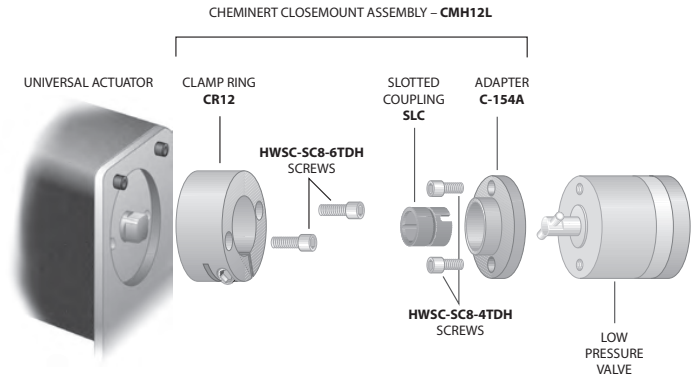
Air . . . . . pages 178-179
Microelectric 176
Universal elec . . . 174-175



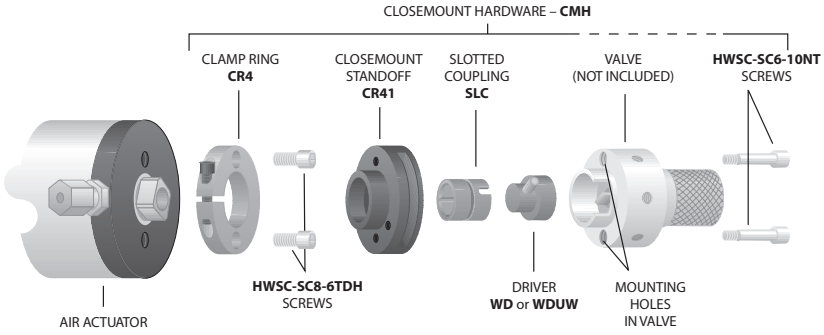
CLOSEMOUNT – VALCO VALVE – MANUAL



CLOSEMOUNT – CHEMINERT VALVE (Low pressure two position) – UNIVERSAL OR MICROELECTRIC ACTUATOR



CLOSEMOUNT– VALCO VALVE (1 or 2 mounting holes) – AIR ACTUATOR





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
3/16"	SWH3
1/4"	SWH4

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
HKS



Open end wrenches

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



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
PM



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.

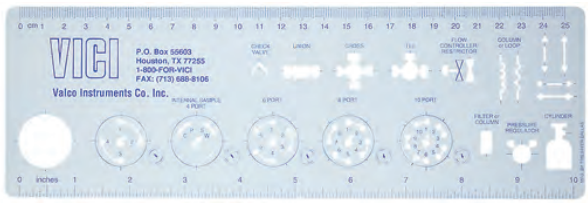
Prod No
PV



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.

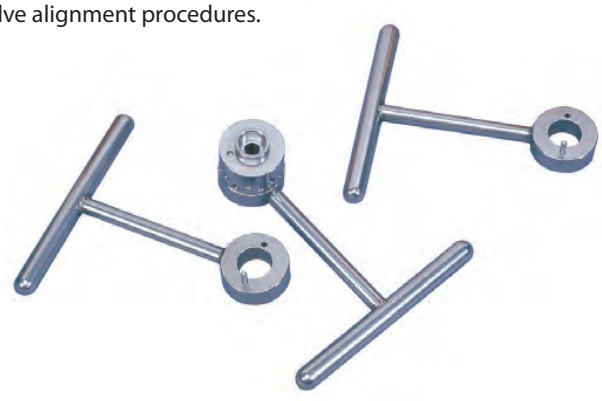
Prod No
TEMPLATE1



Valve spanner handle

A special tool for gripping a multiposition valve body. It is especially useful during valve alignment procedures.

Prod No
VSH



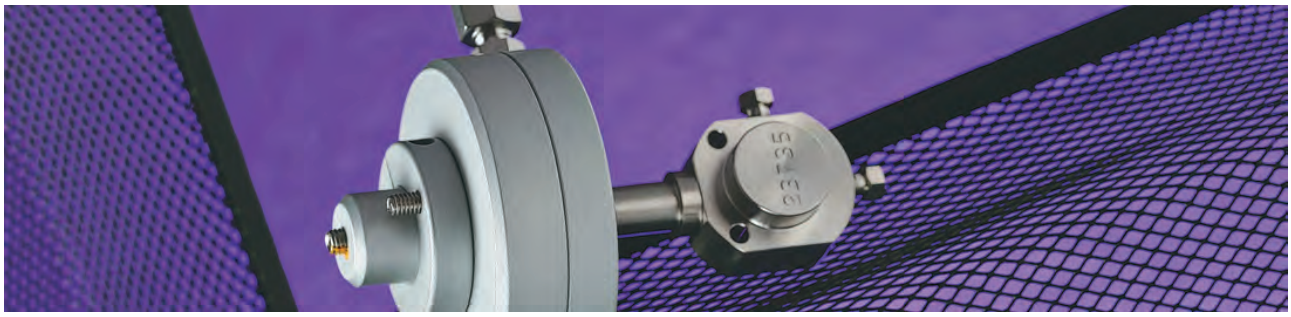
Mirror

Helpful to get access to valve serial numbers and to check discharge on pulsed discharge detectors (PDD).

Prod No
MR



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

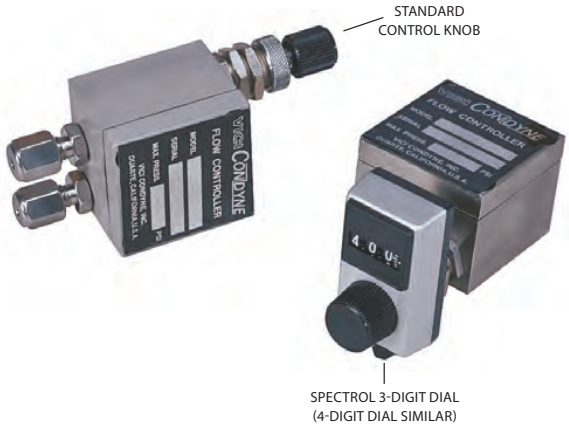
Standard fittings
- 1/8" external tube fittings (EAOR22)

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.

Flow rate/min	**Aluminum body Viton diaphragm** *Prod No*	**Aluminum body SS diaphragm** *Prod No*	**SS body Viton diaphragm** *Prod No*	**SS body SS diaphragm** *Prod No*
With standard control knob				
0 - 150 mL	FC10AV1K	FC10AS1K	FC10SV1K	FC10SS1K
0 - 250 mL	FC10AV2K	FC10AS2K	FC10SV2K	FC10SS2K
0 - 850 mL	FC10AV3K	FC10AS3K	FC10SV3K	FC10SS3K
0 - 1.2 L	FC10AV4K	FC10AS4K	FC10SV4K	FC10SS4K
0 - 4.5 L	FC10AV5K	FC10AS5K	FC10SV5K	FC10SS5K
0 - 10.0 L	FC10AV6K	FC10AS6K	FC10SV6K	FC10SS6K
With Spectrol 3-digit dial				
0 - 150 mL	FC10AV1S3	FC10AS1S3	FC10SV1S3	FC10SS1S3
0 - 250 mL	FC10AV2S3	FC10AS2S3	FC10SV2S3	FC10SS2S3
0 - 850 mL	FC10AV3S3	FC10AS3S3	FC10SV3S3	FC10SS3S3
0 - 1.2 L	FC10AV4S3	FC10AS4S3	FC10SV4S3	FC10SS4S3
0 - 4.5 L	FC10AV5S3	FC10AS5S3	FC10SV5S3	FC10SS5S3
0 - 10.0 L	FC10AV6S3	FC10AS6S3	FC10SV6S3	FC10SS6S3
With Spectrol 4-digit dial				
0 - 150 mL	FC10AV1S4	FC10AS1S4	FC10SV1S4	FC10SS1S4
0 - 250 mL	FC10AV2S4	FC10AS2S4	FC10SV2S4	FC10SS2S4
0 - 850 mL	FC10AV3S4	FC10AS3S4	FC10SV3S4	FC10SS3S4
0 - 1.2 L	FC10AV4S4	FC10AS4S4	FC10SV4S4	FC10SS4S4
0 - 4.5 L	FC10AV5S4	FC10AS5S4	FC10SV5S4	FC10SS5S4
0 - 10.0 L	FC10AV6S4	FC10AS6S4	FC10SV6S4	FC10SS6S4



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 38.



CONTROL DEVICES

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 gas

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 *Prod No*	Aluminum body SS diaphragm *Prod No*	SS body Viton diaphragm *Prod No*	SS body SS diaphragm *Prod No*
With standard control knob			
FC22AV1K	FC22AS1K	FC22SV1K	FC22SS1K
With Spectrol 3-digit dial			
FC22AV1S3	FC22AS1S3	FC22SV1S3	FC22SS1S3
With Spectrol 4-digit dial			
FC22AV1S4	FC22AS1S4	FC22SV1S4	FC22SS1S4



SPECTROL 3-DIGIT DIAL
(4-DIGIT DIAL SIMILAR)

STANDARD
CONTROL KNOB

ADAPTERS USED FOR VALCO AND CONDYNE CONTROL DEVICES

Description			*Prod No*	*Used for*
External 1/8" to	5/16-24 O-ring seal		EAOR22	Model 100 controller (standard) Model 300 controller (standard)
	10-32 O-ring seal		EAOR21	Air actuated prime/purge and on/off valves
Valco 1/8" internal to	5/16-24 O-ring seal		ZAOR22	Model 100 controller (optional) Model 300 controller (optional)
Valco 1/16" internal to	5/16-24 O-ring seal		ZAOR12	Model 100 controller (optional) Model 300 controller (optional)
	10-32 O-ring seal		ZAOR11	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 38.



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 gas

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.

Flow rate/min	**Aluminum body Viton diaphragm** *Prod No*	**Aluminum body SS diaphragm** *Prod No*	**SS body Viton diaphragm** *Prod No*	**SS body SS diaphragm** *Prod No*
With standard control knob				
0 - 200 mL	FC30AV1K	FC30AS1K	FC30SV1K	FC30SS1K
0 - 300 mL	FC30AV2K	FC30AS2K	FC30SV2K	FC30SS2K
0 - 800 mL	FC30AV3K	FC30AS3K	FC30SV3K	FC30SS3K
0 - 1.6 L	FC30AV4K	FC30AS4K	FC30SV4K	FC30SS4K
With Spectrol 3-digit dial				
0 - 200 mL	FC30AV1S3	FC30AS1S3	FC30SV1S3	FC30SS1S3
0 - 300 mL	FC30AV2S3	FC30AS2S3	FC30SV2S3	FC30SS2S3
0 - 800 mL	FC30AV3S3	FC30AS3S3	FC30SV3S3	FC30SS3S3
0 - 1.6 L	FC30AV4S3	FC30AS4S3	FC30SV4S3	FC30SS4S3
With Spectrol 4-digit dial				
0 - 200 mL	FC30AV1S4	FC30AS1S4	FC30SV1S4	FC30SS1S4
0 - 300 mL	FC30AV2S4	FC30AS2S4	FC30SV2S4	FC30SS2S4
0 - 800 mL	FC30AV3S4	FC30AS3S4	FC30SV3S4	FC30SS3S4
0 - 1.6 L	FC30AV4S4	FC30AS4S4	FC30SV4S4	FC30SS4S4
With screwdriver adjustable operator				
0 - 750 mL	FC31AV1			



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.



CONTROL DEVICES

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

Fitting size	Bore	Manual with 1" knob Prod No	Air actuated with 1" standoff Prod No
1/16"	0.50 mm	SFVO	ASFVO
	0.75 mm	SFVOL	ASFVOL

SPECIFICATIONS

10,000 psi liq
100°C max
Fittings: 1/16"

On/off valves

HIGH TEMPERATURE – MEDIUM PRESSURE

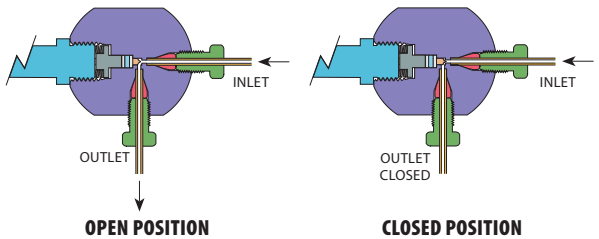
Fitting size	Bore	Manual with 2" knob Prod No	Manual with 4" knob Prod No	Air actuated with 2" standoff Prod No	Air actuated with 4" standoff Prod No
1/16"	0.50 mm	SFVOHT	SFVOHT4	ASFVOHT	ASFVOHT4
	0.75 mm	SFVOLHT	SFVOLHT4	ASFVOLHT	ASFVOLHT4
1/8"	1.50 mm	–	–	ASFVO2HT	ASFVO2HT4

SPECIFICATIONS

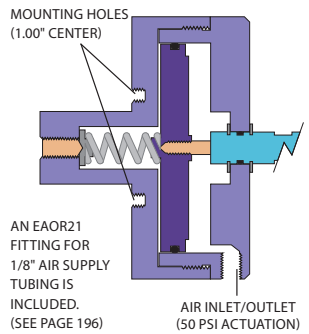
6,000 psi liq
300°C max
Fittings: 1/16"
2,000 psi liq
300°C max
Fittings: 1/8"

*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*	*Prod No*
1/16"	0.50 mm	SFV	ASFV
	0.75 mm	SFVL	ASFVL

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"

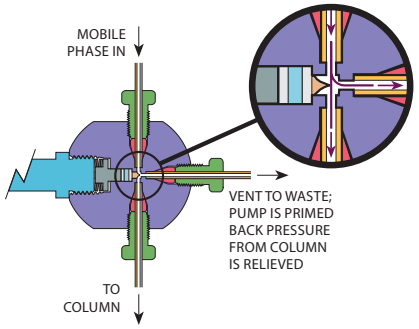
		Manual with 2" knob	Manual with 4" knob	Air actuated with 2" standoff	Air actuated with 4" standoff
Fitting size	*Bore*	*Prod No*	*Prod No*	*Prod No*	*Prod No*
1/16"	0.50 mm	SFVHT	SFVHT4	ASFVHT	ASFVHT4
	0.75 mm	SFVLHT	SFVLHT4	ASFVLHT	ASFVLHT4
1/8"	1.50 mm	–	–	ASFV2HT	ASFV2HT4

For liquids. Not suitable for use with gases.



ON/OFF AND PRIME/PURGE VALVES
Types of actuation

PRIME/PURGE VALVE





CONTROL DEVICES

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

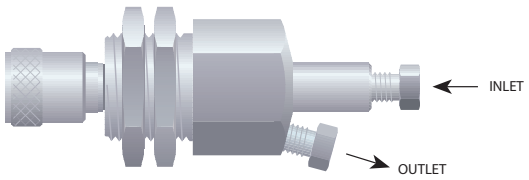
Maximum flow @ 40 psi He or N_2

	Aluminum body *Prod No*	Stainless body *Prod No*
10 ml/min	CNV1A10S1	CNV1S10S1
50 ml/min	CNV1A50S1	CNV1S50S1
150 ml/min	CNV1A150S1	CNV1S150S1
250 ml/min	CNV1A250S1	CNV1S250S1
500 ml/min	CNV1A500S1	CNV1S500S1

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 gas
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 gas
Maximum temperature
100°C

Maximum flow @ 40 psi He or N_2

		1/16" Valco fittings	1/8" Valco fittings
	Knob color	*Prod No*	*Prod No*
10 ml/min	Green	CVA10GS1	CVA10GS2
50 ml/min	Red	CVA50RS1	CVA50RS2
150 ml/min	Blue	CVA150US1	CVA150US2
500 ml/min	Black	CVA500BS1	CVA500BS2
1 liter/min	Yellow	CVA1KYS1	CVA1KYS2





CONTROL DEVICES

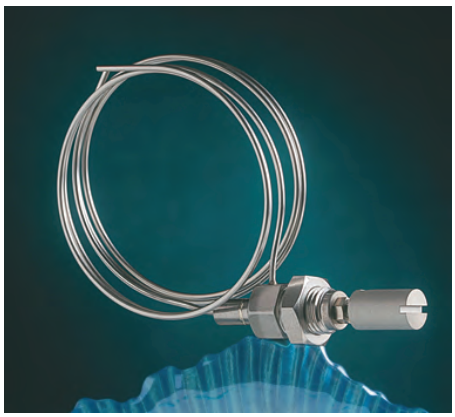
MICROMETERING VALVES

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 $< 1 \times 10^{-8}$ 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.



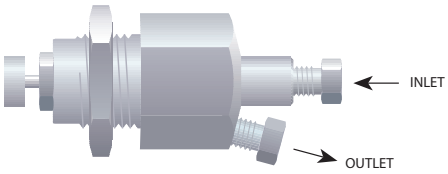
1/16" micrometering valves

WITH VALCO FITTINGS

Seal	*Lubrication*	*Prod No*
Standard: 2–225 ml/min @ 15 psig N_2 inlet		
Viton	Lubricated	ZBNV1
	Non-lubricated	ZBNV1-D
Kalrez	Non-lubricated	ZBNV1-KZ
Fine control: 2–175 ml/min @ 15 psig N_2 inlet		
Viton	Lubricated	ZBNV1F
	Non-lubricated	ZBNV1F-D
Kalrez	Non-lubricated	ZBNV1F-KZ
Low flow: 2–90 ml/min @ 40 psig N_2 inlet		
Viton	Lubricated	ZBNV1LF
	Non-lubricated	ZBNV1LF-D
Kalrez	Non-lubricated	ZBNV1LF-KZ

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*
Fine control: 2–175 ml/min @ 15 psig N_2 inlet		
Viton	Lubricated	BNV1
	Non-lubricated	BNV1-D
Kalrez	Non-lubricated	BNV1-KZ
Low flow: 2–90 ml/min @ 40 psig N_2 inlet		
Viton	Lubricated	BNV1LF
	Non-lubricated	BNV1LF-D
Kalrez	Non-lubricated	BNV1LF-KZ

SPECIFICATIONS

Maximum pressure
1000 psi gas
Maximum temperature
Viton 225°C
Kalrez 315°C



OPTIONAL

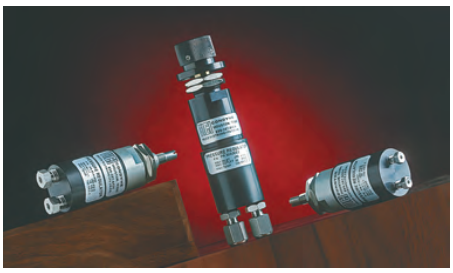
- Dual outlet versions are available in most configurations.
- A cap is available to protect the setting from getting changed by accidental contact. (Product No. ZBNV1-C)



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 gas

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** *Prod No*	**1/8" Valco internal fittings** *Prod No*	**1/8" external fittings** *Prod No*
0-15 psi	PR51A15Z1	PR51A15Z2	PR51A15E2
0-30 psi	PR51A30Z1	PR51A30Z2	PR51A30E2
0-60 psi	PR51A60Z1	PR51A60Z2	PR51A60E2

Combo pressure regulators

WITH SHUT-OFF FEATURE



SPECIFICATIONS

Maximum inlet pressure
250 psi gas

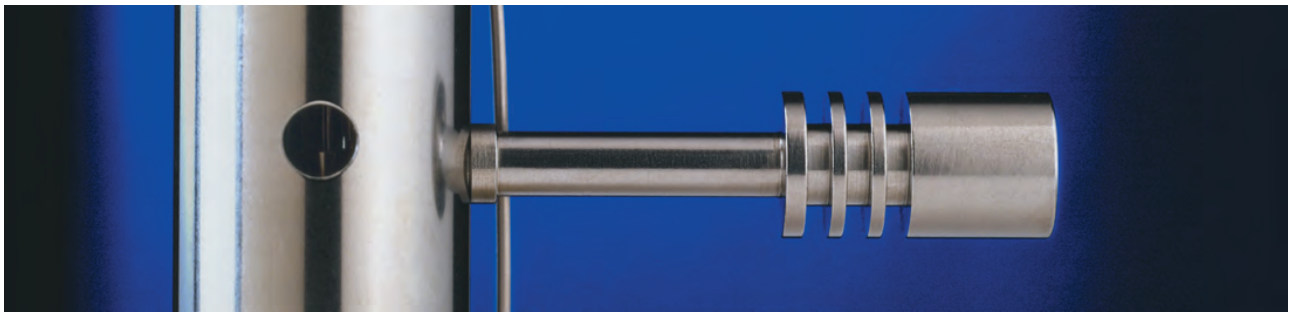
Maximum temperature
100°C

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** *Prod No*	**1/8" Valco internal fittings** *Prod No*	**1/8" external fittings** *Prod No*
0-15 psi	PR50A15Z1	PR50A15Z2	PR50A15E2
0-30 psi	PR50A30Z1	PR50A30Z2	PR50A30E2
0-60 psi	PR50A60Z1	PR50A60Z2	PR50A60E2

INSTRUMENTATION





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

SPECIFICATIONS

Number of heated zones		1 to 4
Programmable temperature states		8 per zone
Max ramp rate	5 m column	1,200°C/min
	15 m 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	

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

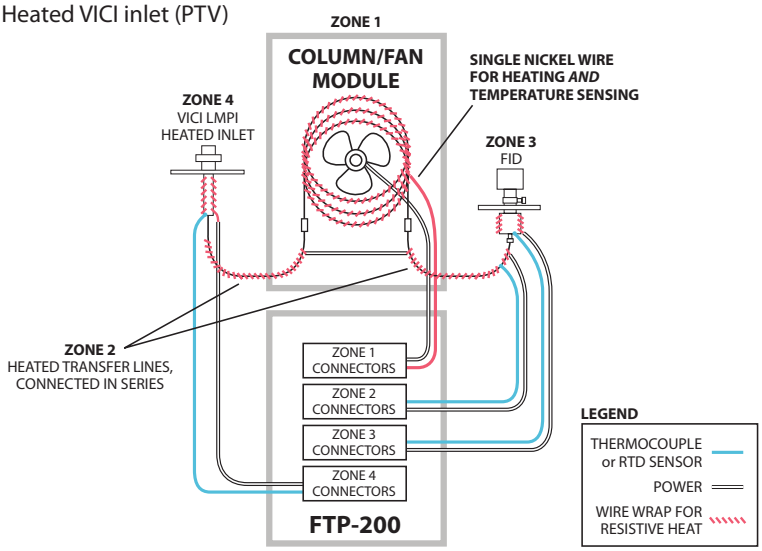
- For use with our FTP-200 multichannel temperature programmer
- Includes column, fan, transfer lines, sensors, and connections in one unit
- Wide selection of column types, sizes, and phases
- Choice of high-flow fans for fast cooling
- Resistively-heated transfer lines with a low mass 40 gauge "K"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

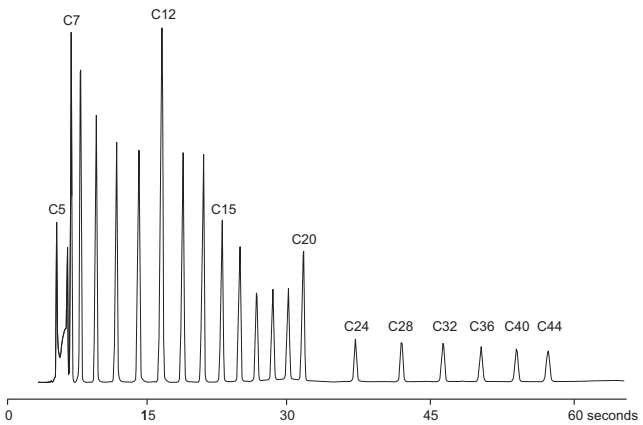
- Nickel-wire-wrapped MTX-1 column, 5 m x 0.25 mm x 0.25 µm, fan-cooled
- Heated transfer lines
- Heated VICI FID
- Heated VICI inlet (PTV)



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

- Suitable for lab, process, or mobile application
- MDQs for most analytes < 1 ppb
- Turnkey applied gas chromatograph
- 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.



LAB, PROCESS, OR MOBILE

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 options for sampling by valve, syringe port, or 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. For multiple method applications, this very low LDL can be coupled with range extension up to 100%.

TURNKEY ANALYZER

Configurations for most bulk, specialty, and electronics gases are available. Standard configurations include He, H_2, N_2, Ar, O_2, BF_3, 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.

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.

Resultant data can be printed via a network printer or to a local user-provided printer. The base instrument provides results displayed on the front panel, transmitted through the RS-232 serial port, and published through the OPC server. Optional outputs include 4-20 mA analog trending, as well as Modbus and Profibus communication protocols. With the optional Statistical package, results of averaged samples can be easily acquired for use in calibration and system validation checks. Functionality for copper-based LAN or optional WIFI connection 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.

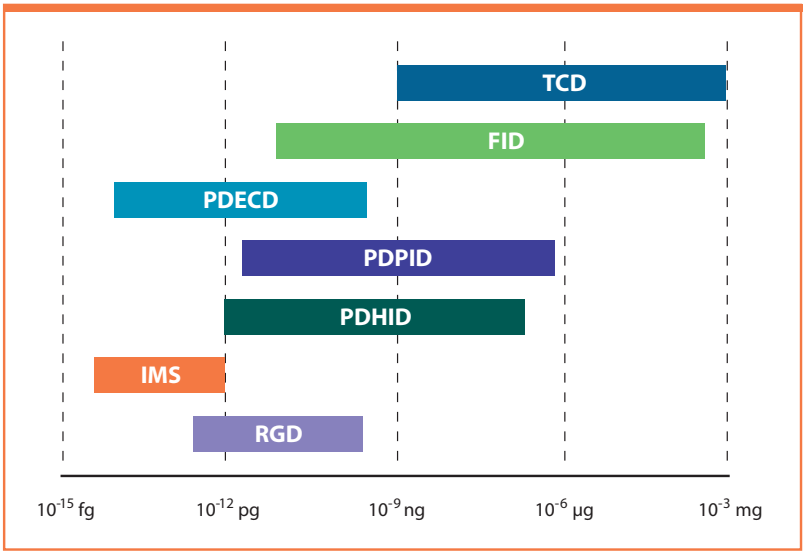
- **Oven/temperature zones**
  The TGA offers support for 12 programmable thermal zones and up to four fast temperature programmed (FTP) zones. FTP zones can be micropacked columns, metal open tubular columns, capillary columns, programmable rate injectors, vaporizers, retention gap, or absorbers/concentrators.

- **Valve controls**
  Support is available for up to 16 air actuated and four electrically actuated two position valves, plus four electrically actuated multiposition valves.

  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.

  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), simplifying 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	43.2 cm W x 59.7 cm L x 17.8 cm H	43.2 cm W x 55.9 cm L x 31.1 cm H
Weight	13.6 kg	20.4 kg
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	

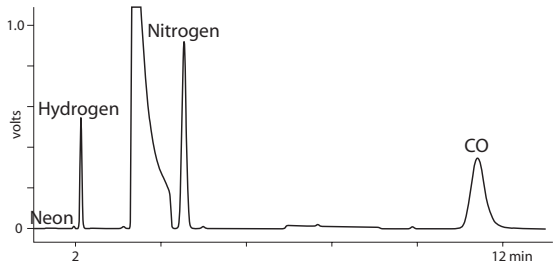
TELEMETRY OPTIONS

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 optional secure web-based interface, provide the proper user name and password, and access the full functionality of the TGA.

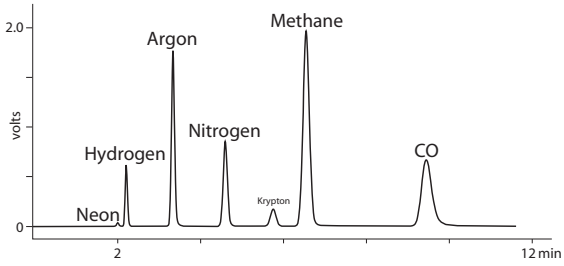
We can provide remote support through a number of methods which can be tailored to your company's security policies. With appropriate IT approval/assistance, the TGA can be accessed through a secure connection from the internet, allowing a technician to provide needed assistance without a road trip for a service call. A real time and money saver! And remote support after the sale is free for life with a Valco TGA.



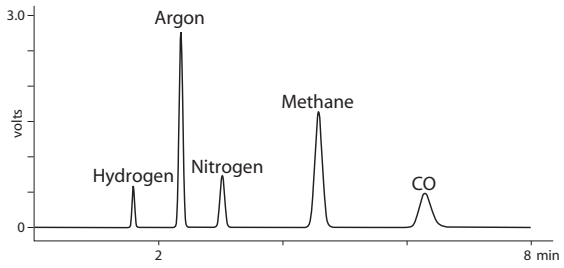
TRACE IMPURITIES in ARGON — **1 ml of 1 ppm blend**



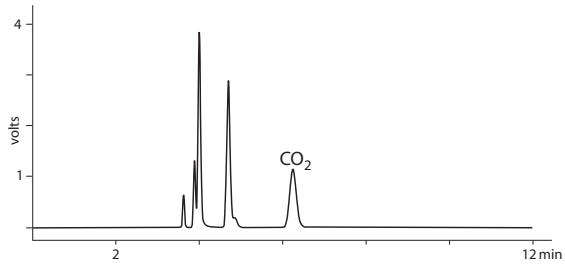
TRACE IMPURITIES in HELIUM — **1 ml of 2 ppm blend**



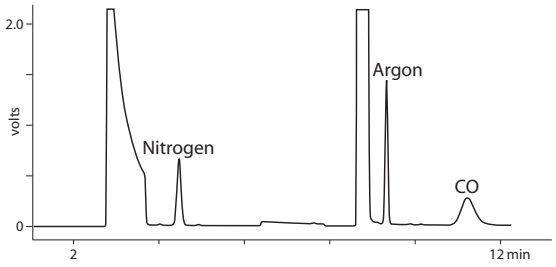
TRACE IMPURITIES in CARBON DIOXIDE — **1 ml of 1 ppm blend**



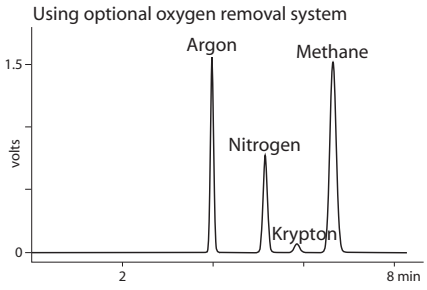
TRACE IMPURITIES in HELIUM, CHANNEL A — **1 ml of 2 ppm blend**



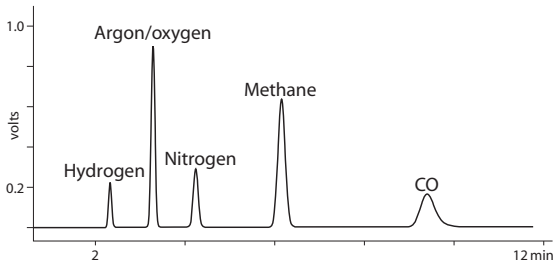
TRACE IMPURITIES in HYDROGEN — **1 ml of 1 ppm blend**



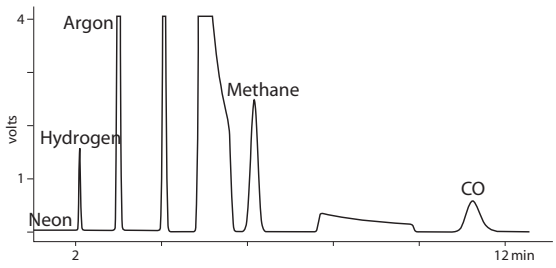
TRACE IMPURITIES in OXYGEN — **1 ml of 1 ppm blend**



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

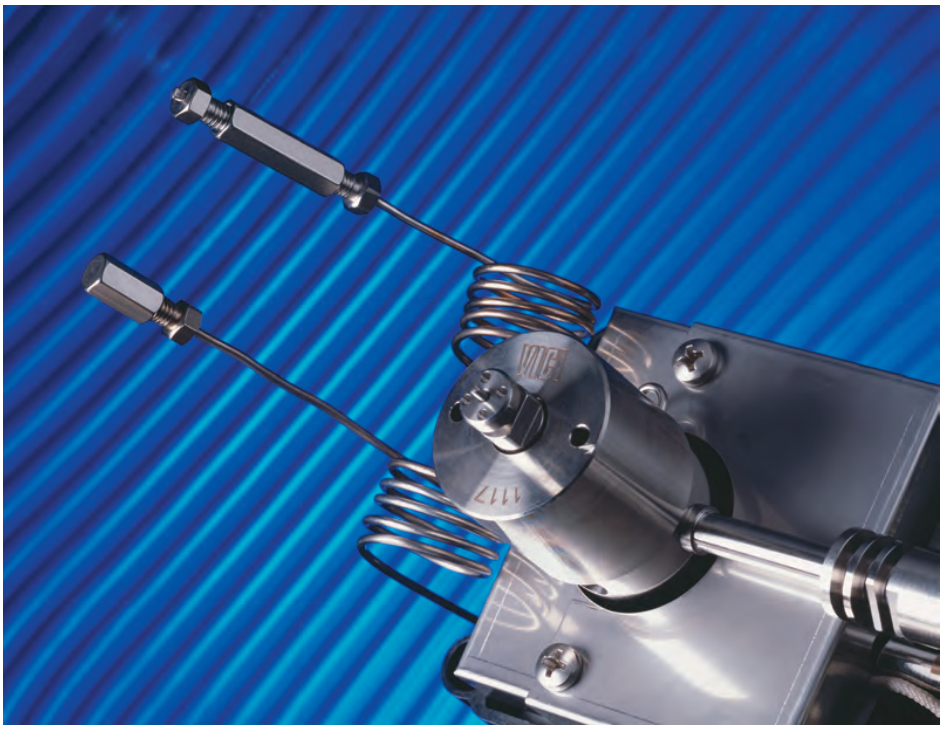
NON-RADIOACTIVE, MULTIPLE MODE ELECTRON CAPTURE / HELIUM PHOTOIONIZATION

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 picogram (10^{-12}) or femtogram (10^{-15}) 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

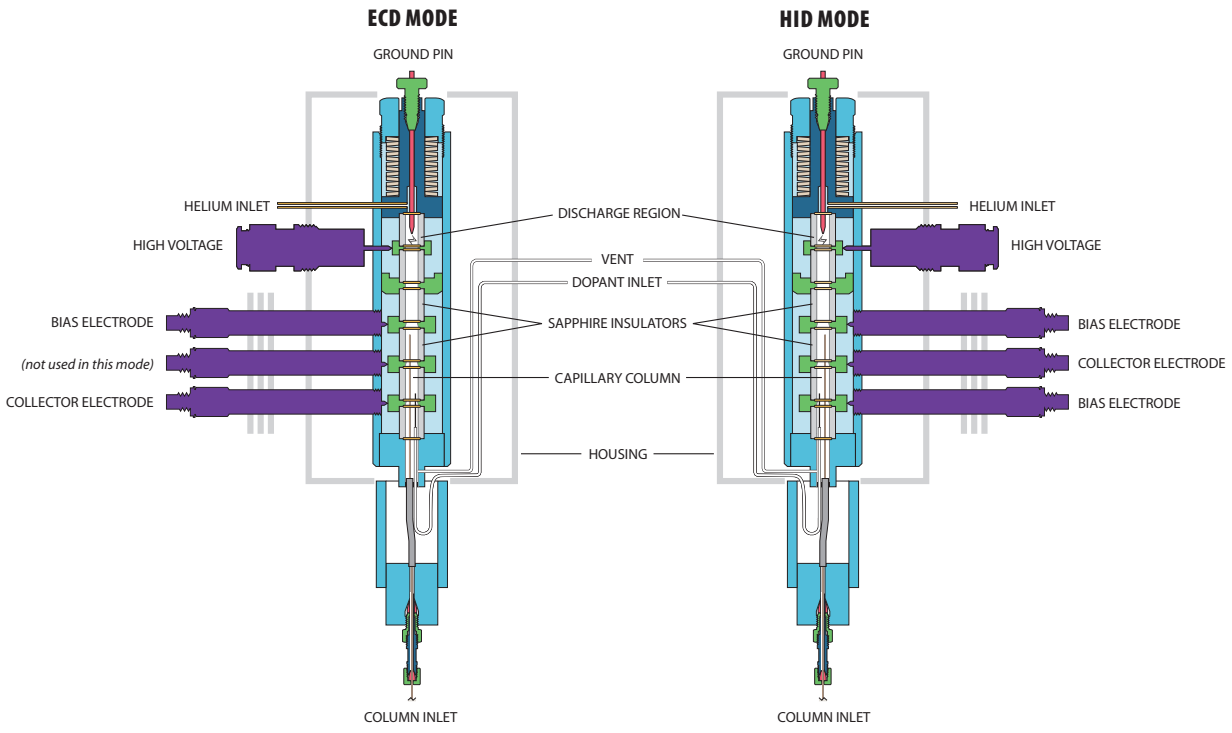
CE

STAND-ALONE SYSTEM

Detector system includes detector cell, pulser, controller, electrometer, and helium purifier.

	110 VAC *Prod No*	230 VAC *Prod No*
Mode-selectable universal electron capture / photoionization detector system	D-2	D-2-220
Detectors optimized for trace level work in helium photoionization mode. Optimized for packed column use.	D-2-I	D-2-I-220

SCHEMATIC – MODEL D-2





INSTRUMENTATION

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.

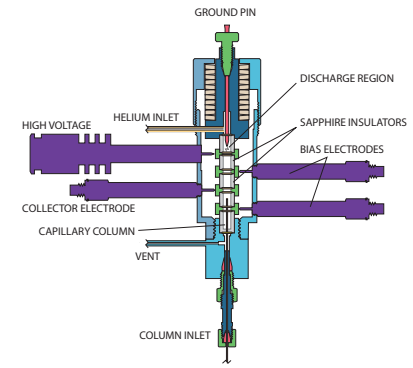


Models D-2-IM and D-3-IM-7890 CE HELIUM PHOTOIONIZATION

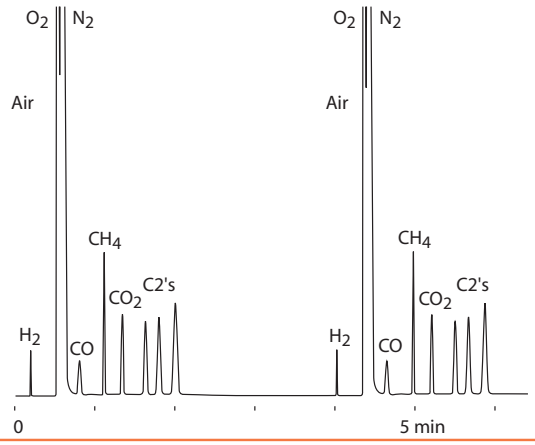
Detector cell only optimized for helium photoionization mode

			Prod No
miniPDD system	Includes:		D-2-IM
	Controller	PD-C2	
	Pulser	PD-M2	
	Helium purifier	HP2	
	Fittings kit	PD-KIt-IM	
miniPDD plug-in system for Agilent 7890		110 VAC	D-3-IM-7890
		230 VAC	D-3-IM-7890-220
miniPDD cell only			PD-D2-IM

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

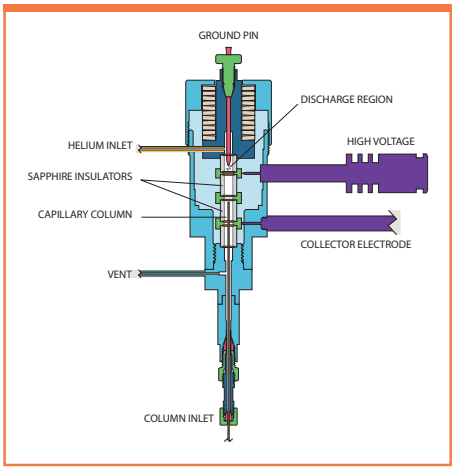
Detector optimized for trace level work in helium photoionization mode

		110 VAC *Prod No*	230 VAC *Prod No*
Plug-in system for Agilent 7890	Standard	D-3-I-7890	D-3-I-7890-220
	miniPDD	D-3-IM-7890	D-3-IM-7890-220
Plug-in system for Agilent 6890		D-3-I-HP	D-3-I-HP-220

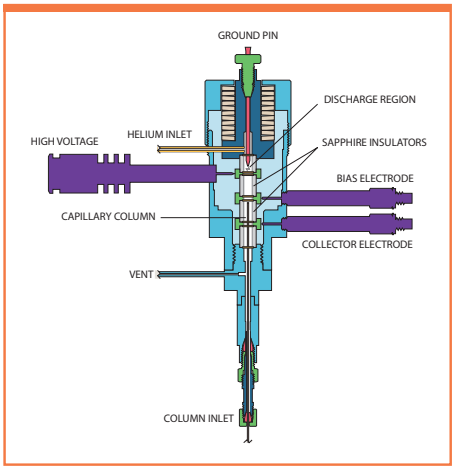


D-3-I-HP PLUG-IN SYSTEM
for Agilent 6890 GC

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

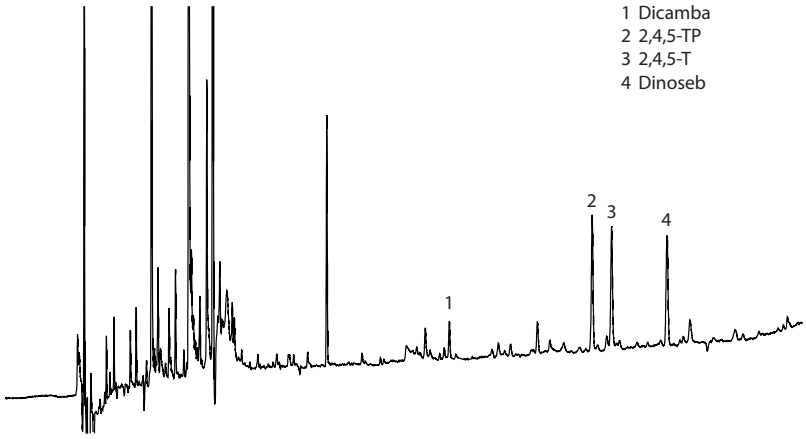
Detectors optimized for trace level work in helium photoionization mode

		110 VAC *Prod No*	230 VAC *Prod No*
Specialized detector for	HP 5890	D-4-I-HP58	D-4-I-HP58-220
	Shimadzu GC 14 *	D-4-I-SH14-R	D-4-I-SH14-R-220
	Shimadzu GC 17, 2010, 2014 *	D-4-I-SH17-R	D-4-I-SH17-R-220
	Thermo Trace GC *	D-4-I-TQ-R	D-4-I-TQ-R-220
	Varian 3800 *	D-4-I-VA38-R	D-4-I-VA38-R-220
	* Uses existing GC FID electrometer.		
	For all other GCs	D-4-I	D-4-I-220 CE



INSTRUMENTATION

PDD – MODEL D-2

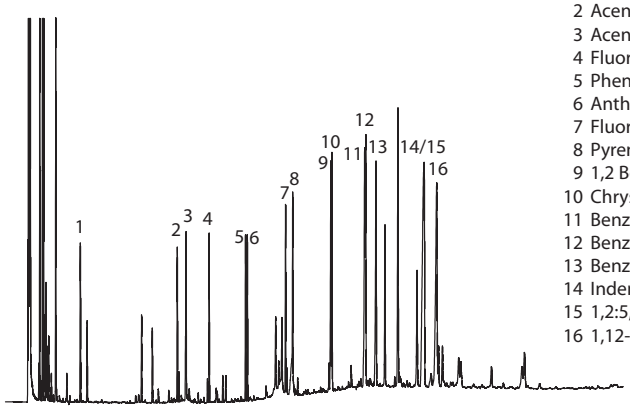


1 Dicamba
2 2,4,5-TP
3 2,4,5-T
4 Dinoseb

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

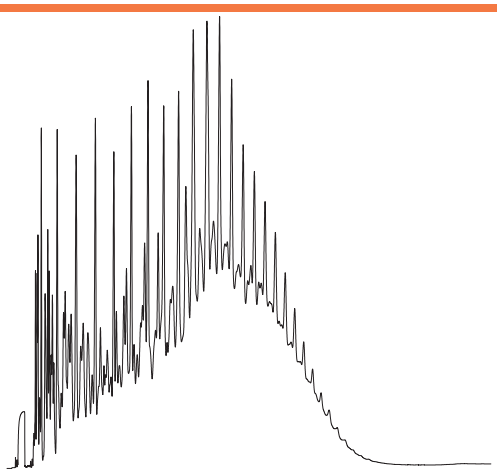


1 Naphthalene
2 Acenaphthalene
3 Acenaphthene
4 Fluorene
5 Phenanthrene
6 Anthracene
7 Fluoranthene
8 Pyrene
9 1,2 Benzanthracene
10 Chrysene
11 Benzo(b)fluoranthene
12 Benzo(k)fluoranthene
13 Benzo(a)pyrene
14 Indeno (1,2,3-C.d)pyrene
15 1,2:5,6-Dibenzanthracene
16 1,12-Benzoperylene

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

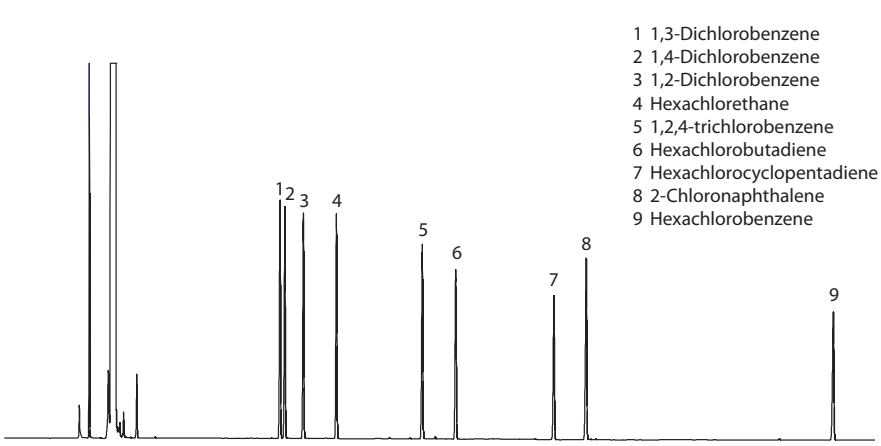


SIMULATED DISTILLATION IN TWO MINUTES

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.



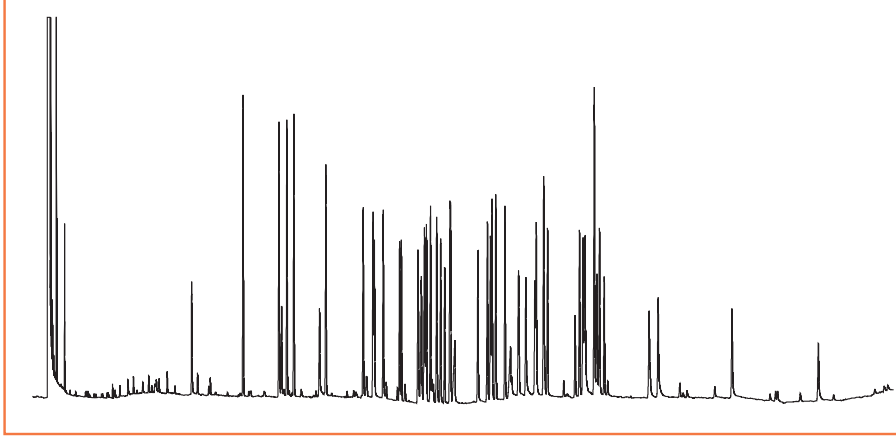
PDD – MODEL D-3



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

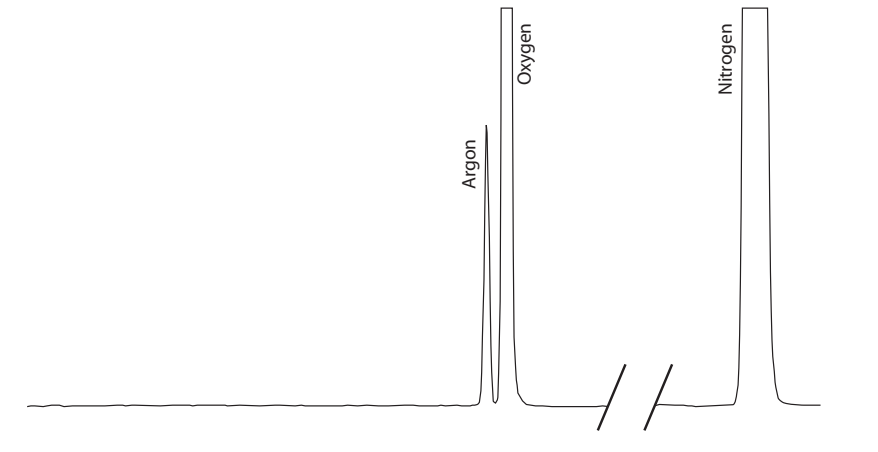
PDD – MODEL D-3



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



INSTRUMENTATION

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

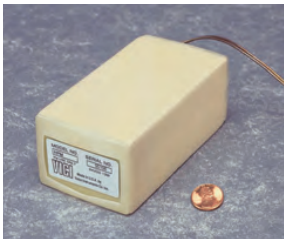
Includes universal power supply.

	110 VAC *Prod No*	230 VAC *Prod No*
Helium purifier	HP2	HP2-220
Nitrogen purifier	NP2	NP2-220

Replacement getter assembly	
Helium	I-23572HP2
Nitrogen	I-23572NP2

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 10 ppb H_2O, H_2, O_2, N_2, NO, NH_3, CO, CO_2, and CH_4, based on 10 ppm total inlet impurities. Other impurities removed include CF_4, CCl_4, SiH_4 and light hydrocarbons.	Outlet impurities less than 10 ppb H_2O, H_2, O_2, NO, NH_3, CO, and CO_2, based on 10 ppm 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 *Prod No*	230 VAC *Prod No*
Helium purifier	HPM	HPM-220
Nitrogen purifier	NPM	NPM-220

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

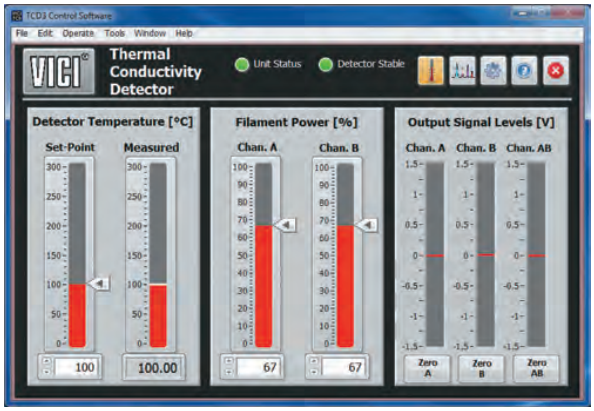
Like our venerable TCD-2, our new TCD-3 is a dual filament, stand-alone unit consisting of the detector housing and separate controller. However, the analog controls of the TCD-2 are replaced with full digital control implemented via a user interface or command console commands. Thermal stability is 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.

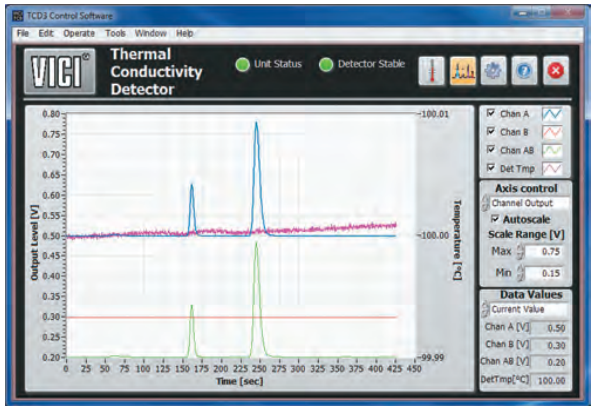
TCD CONTROL PROGRAM

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 *Prod No*	230 VAC *Prod No*
Entire unit (cell, electronics, power supply, cables, and fittings)	Nickel-iron filaments	TCD3-NIFE	TCD3-NIFE-220
	Tungsten-rhenium filaments	TCD3-WRE	TCD3-WRE-220
Cell/oven assembly only, dual filament	Nickel-iron filaments	TCD3-NIFED	TCD3-NIFED-220
	Tungsten-rhenium filaments	TCD3-WRED	TCD3-WRED-220
TCD controller only		TCD3-C	TCD3-C-220

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.





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

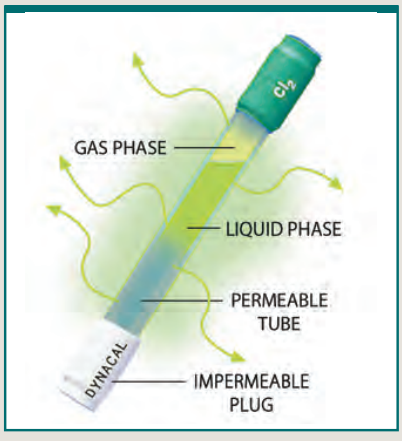


WAFER DEVICES

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.

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.

Automated	Manual
• 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	• Concentrations are calculated manually • Required temperature and flow rates are set manually • Internal pump or external gas source
MODEL 235 – Basic • Provides continuous dilution • Maintains a constant carrier flow through the permeation chamber  CE	**MODEL 230 – Basic** • Provides continuous dilution • Maintains a constant carrier flow through the permeation chamber  CE
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	**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
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	**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



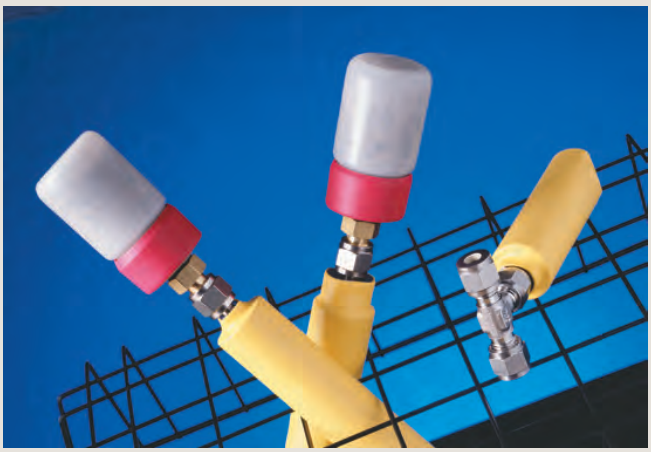
CALIBRATION GAS STANDARDS

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

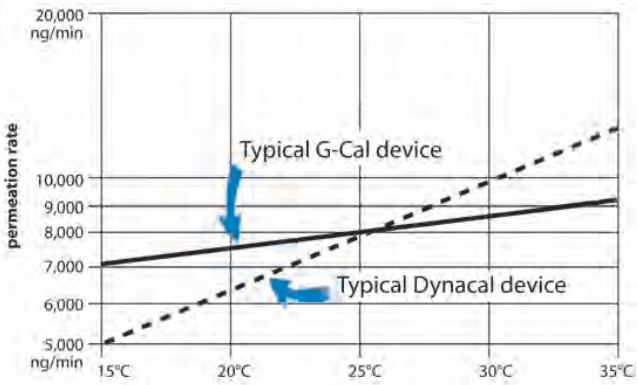
G-Cal permeation tubes offer a proven and repeatable means of generating desired gas or vapor concentrations. The permeant gas escapes through the proprietary membrane system and mixes with a carrier gas (nitrogen is the most common) at a controlled flow rate to obtain a known mixture in ppm or ppb. 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.

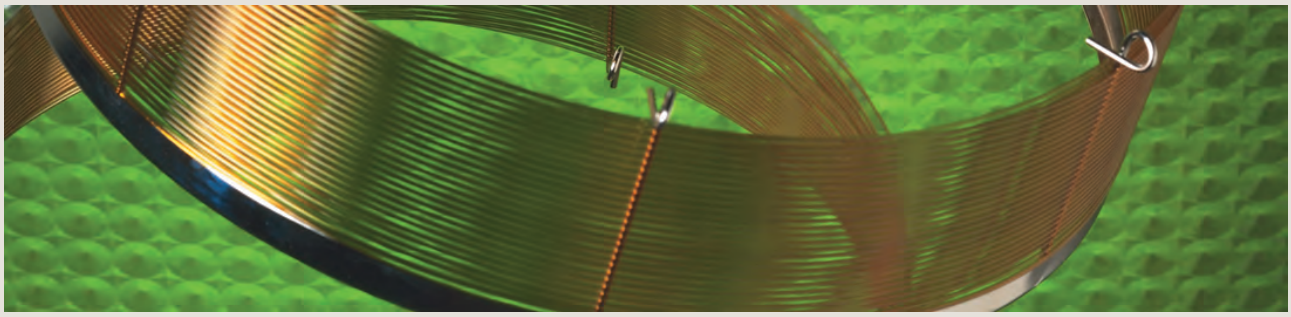
All G-Calibrators have stainless steel fittings and FEP tubing throughout.

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

GC CAPILLARY COLUMNS

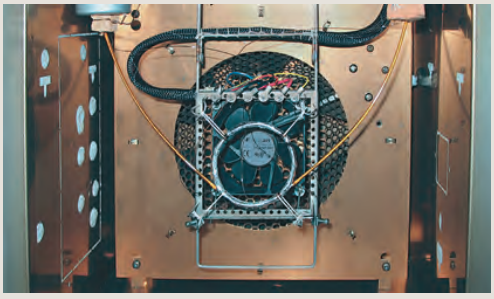


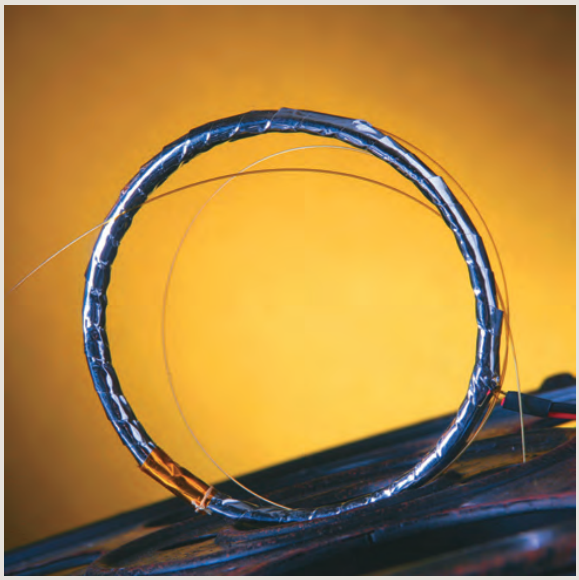
VALCOBOND® AND VALCOPLOT®
From VICI Metronics

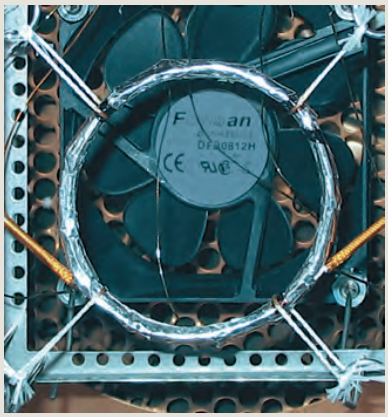
COLUMNS BUNDLED FOR RESISTIVE HEATING

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

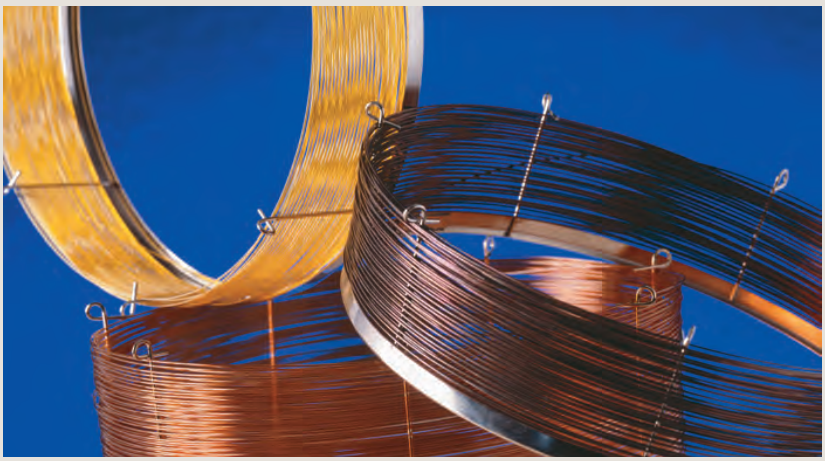
In addition to these column bundles, VICI offers nickel-clad fused silica tubing for resistive heating, column/fan modules, and a multichannel fast temperature programmer.



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:

1/32" ultra low mass external unions . . . . p. 18
FS adapter ferrules 17
GC detectors . 210-15, 217
GC valves 87-94
GC stream selectors 104-113
Gas purifiers 216, 238-239
Inlet discs (injector nuts) for HP 7890, 6890 and 5890 19
Reduced breakdown injection port liners 237



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

	*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

** Film thickness in µm.*

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

	*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

** Film thickness in µm.*

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.*



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

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

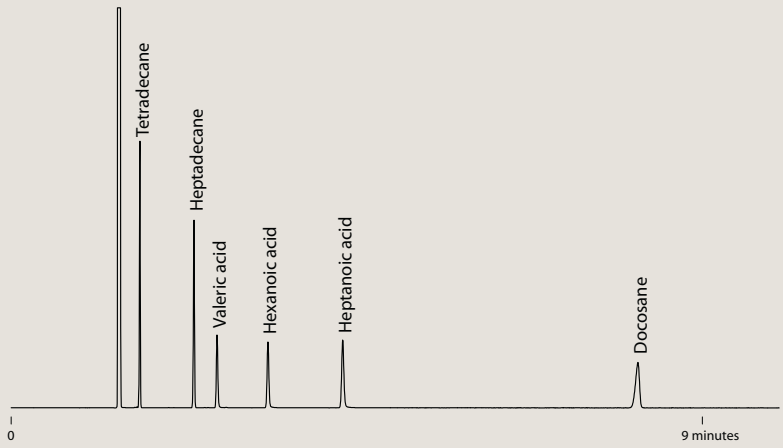
Call for information on additional column lengths and phase thicknesses.

TEMPERATURE SPECS

Temperature specifications can be found in the columns section of vici.com.



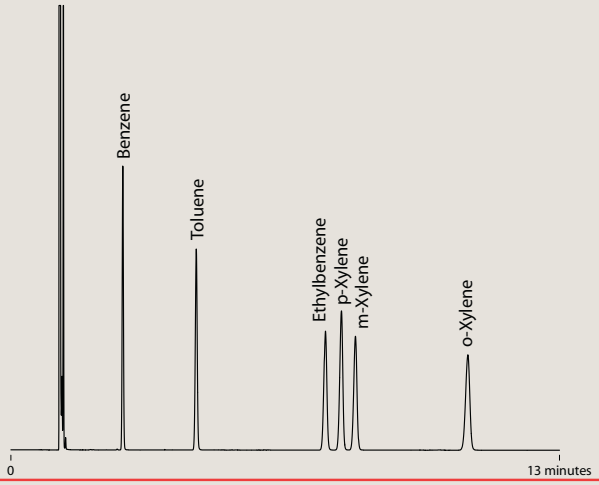
VB-WAX



FREE FATTY ACIDS

Column:	VB-Wax 30 m x .25 mm x .25 µm
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 30 m x .25 mm x .25 µm
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 30 m x .53 mm x 1.00 µm
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.*

VALCOPLOT MOLESIEVE 5Å – FUSED SILICA

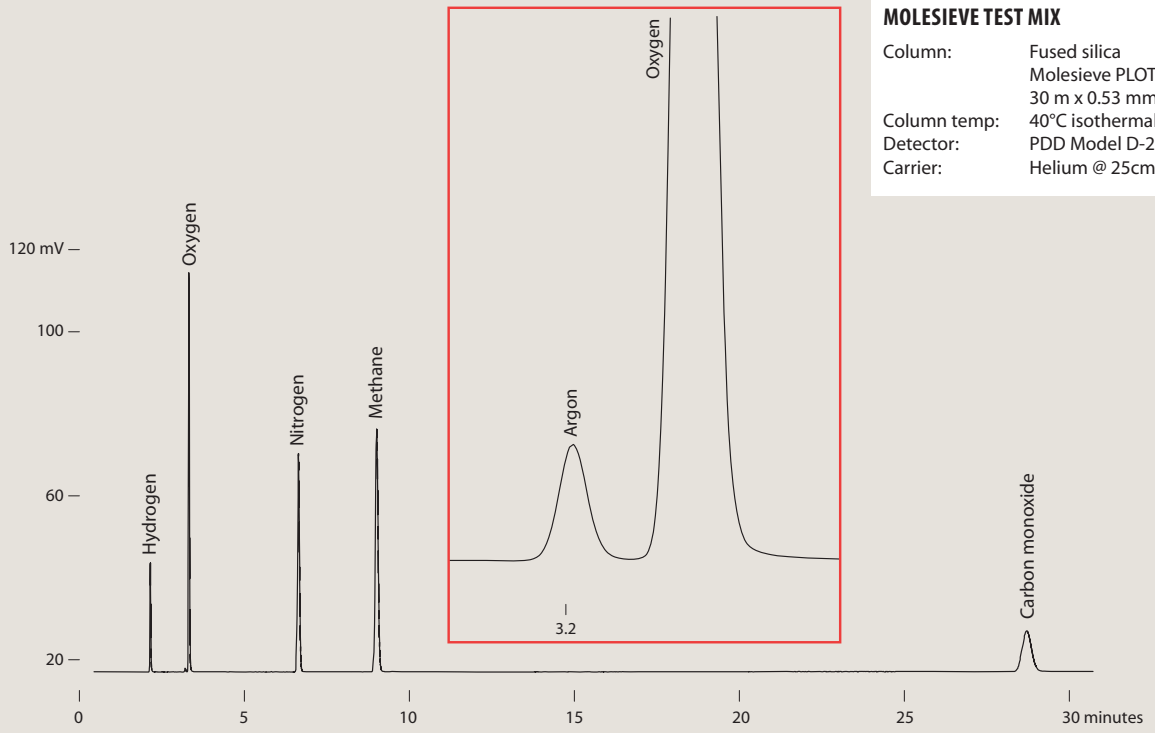


MOLESIEVE TEST MIX

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



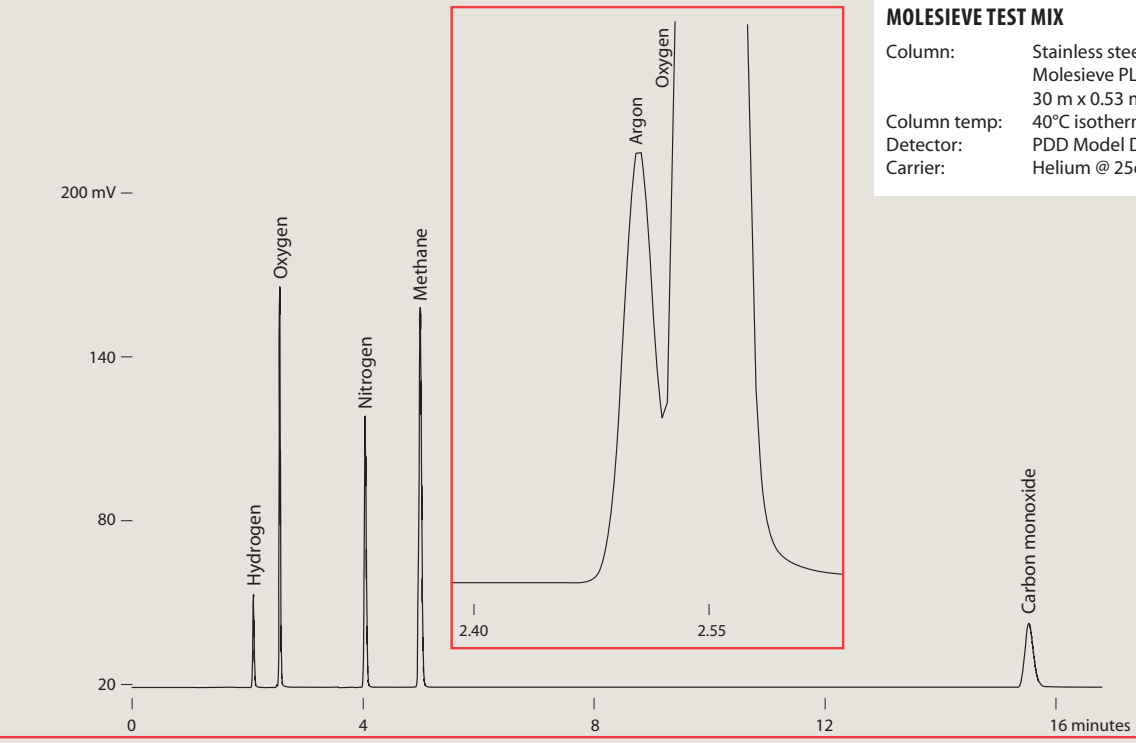
VALCOPLOT MOLESIEVE 5Å – FUSED SILICA



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 Al_2O_3
CP-Al_2O_3/KCl
CP-Al_2O_3/Na_2SO_4
Rt-alumina-PLOT
Al_2O_3/KCl
Al_2O_3/Na_2SO_4

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.*

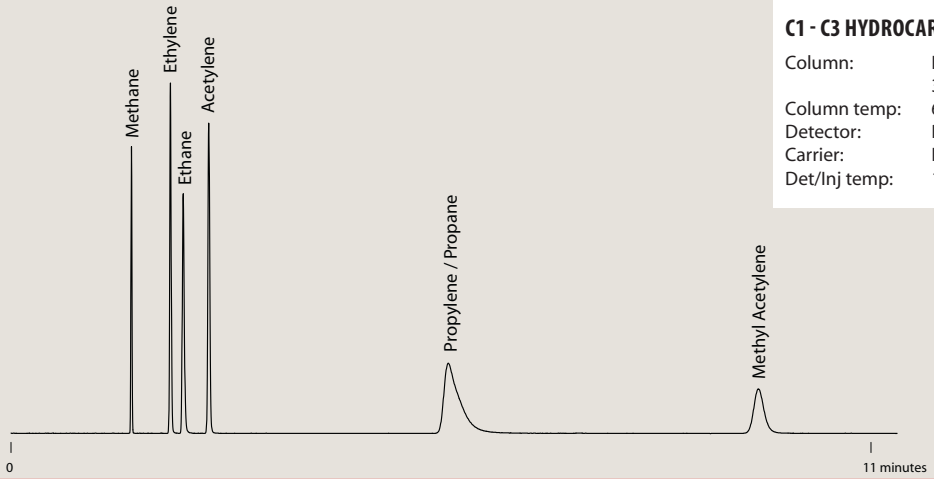
MORE SIZES

Call for information on additional column lengths.

TEMPERATURE SPECS

Temperature specifications can be found in the columns section of vici.com.

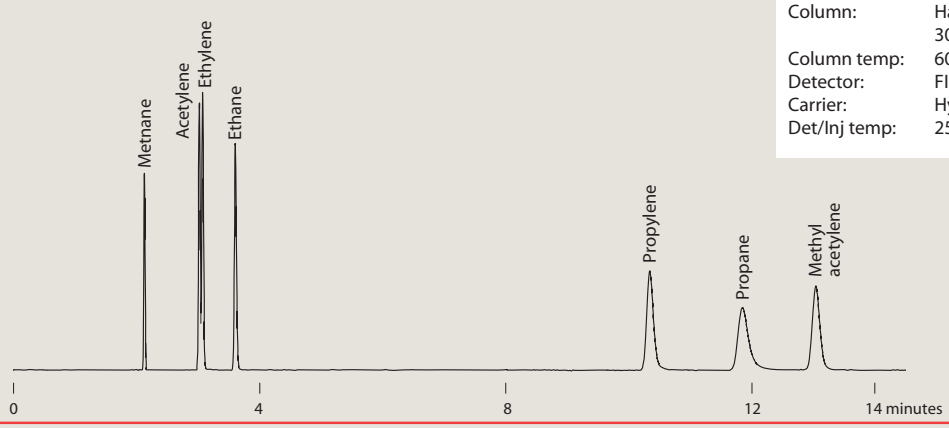
VALCOPLOT A



C1 - C3 HYDROCARBONS

Column:	HayeSep A PLOT 30 m x .53 mm x 20.0 µm
Column temp:	60°C isothermal
Detector:	PDD
Carrier:	Helium
Det/Inj temp:	165°C

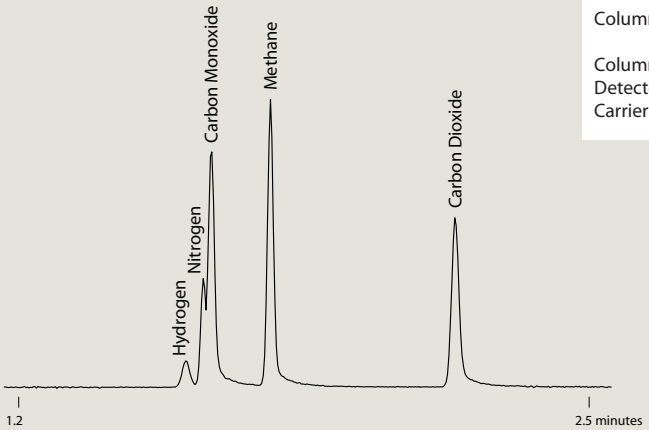
VALCOPLOT D



C1 - C3 HYDROCARBONS

Column:	HayeSep D PLOT 30 m x .53 mm x 20.0 µm
Column temp:	60°C isothermal
Detector:	FID
Carrier:	Hydrogen
Det/Inj temp:	250°C

VALCOPLOT D



GAS MIXTURE

Column:	HayeSep D PLOT 30 m x .53 mm x 20.0 µm
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.



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 ensure 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.

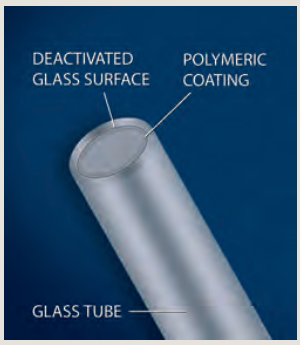


REDUCED BREAKDOWN INJECTION PORT LINERS

- 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.

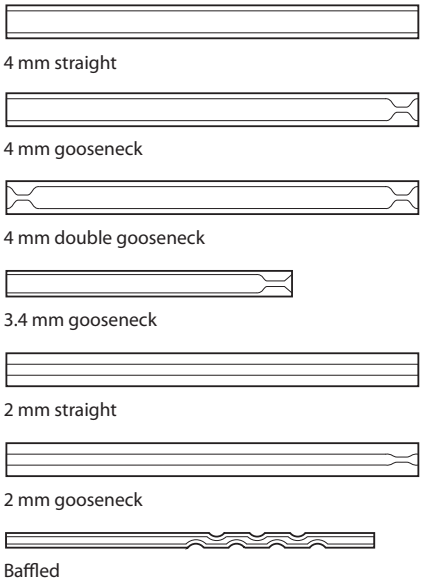


Reduced breakdown injection port liners

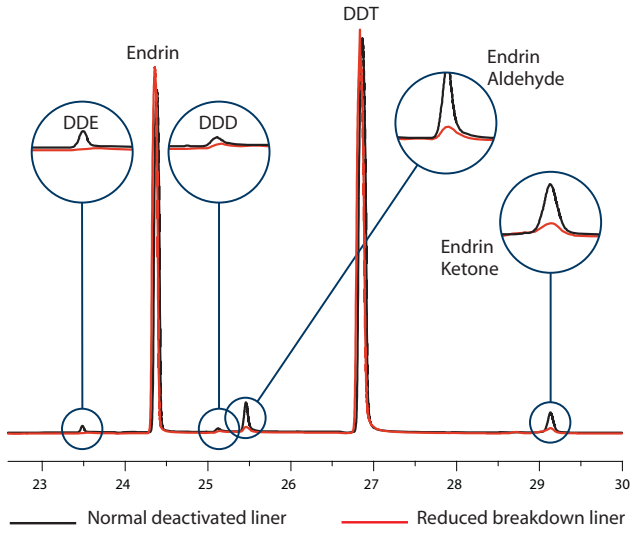
Package of 5 liners.

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



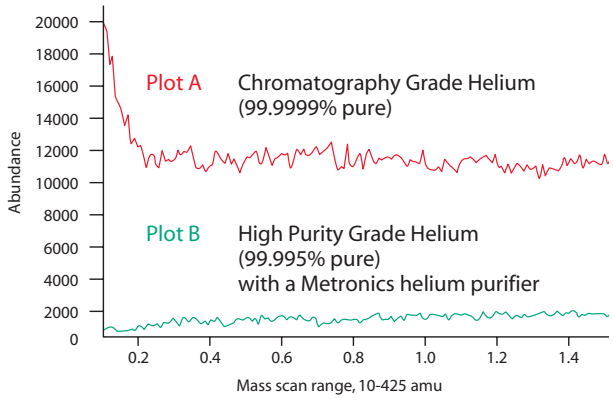
GAS-SPECIFIC PURIFIERS AND CONTAMINANT TRAPS
From VICI Metronics

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.

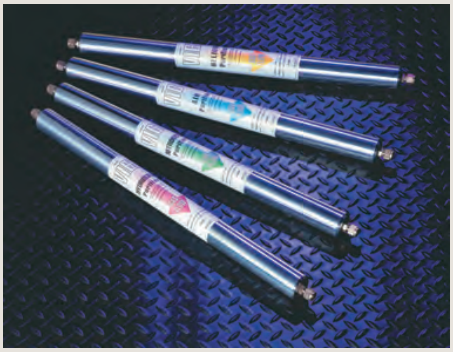
BETTER THAN 99.9999% PURITY FROM A 99.995% CYLINDER



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

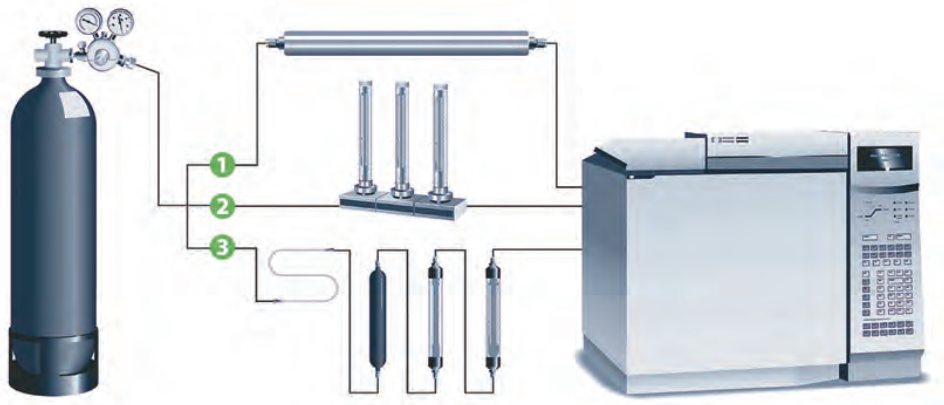
SPECIFICATIONS

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	30000 l 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.

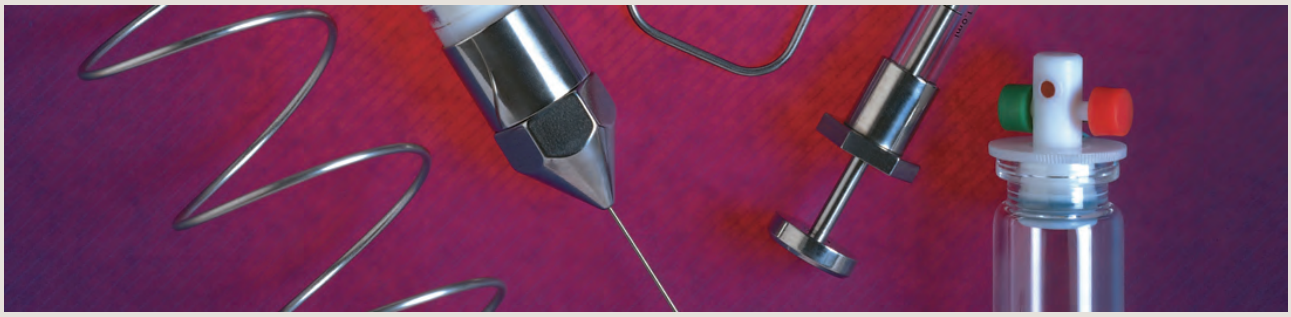


PPB AT OUTLET

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	

ANALYTICAL SYRINGES



PLUS MININERT VALVES AND MICRO SYRINGES
From VICI Precision Sampling

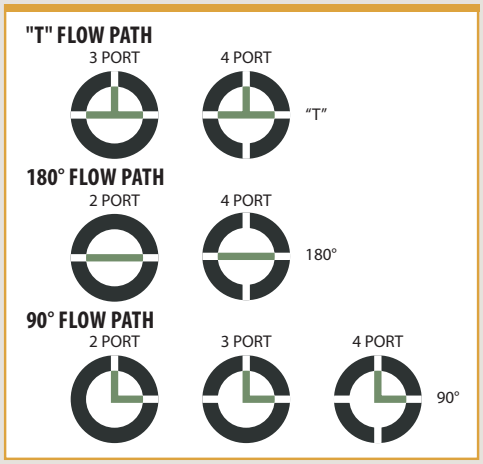
MICRO VALVES FOR GC AND LC

- 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

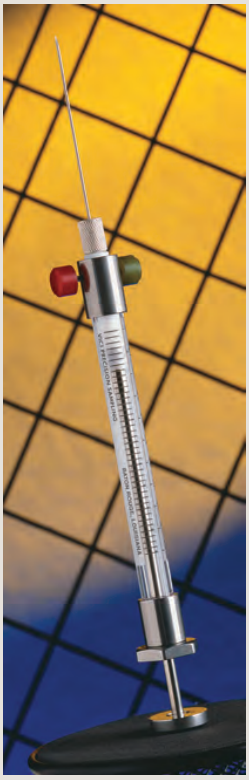
SPECIFICATIONS

200 psi
.060" bore
1/4-28 fitting detail
All polymer-based materials



MORE INFO
1/4-28 fittings . . . . . .pages 52-53, 56-57





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

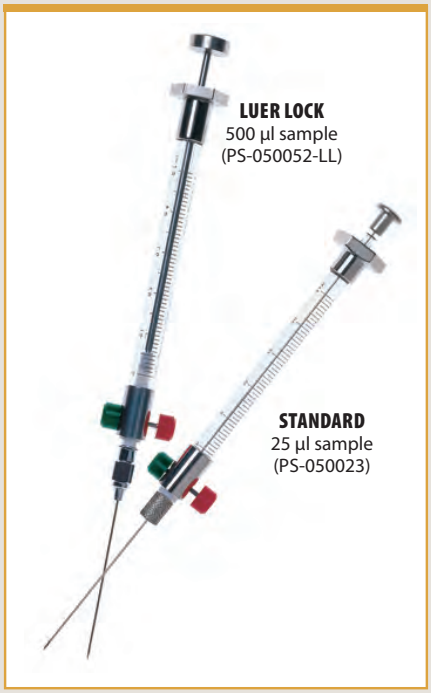
The A-2 features a push-button valve for 250 psi sample storage in syringes as small as 25 µl. Small liquid samples with low-boiling components are not lost through evaporation, as often occurs with ordinary syringes.

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

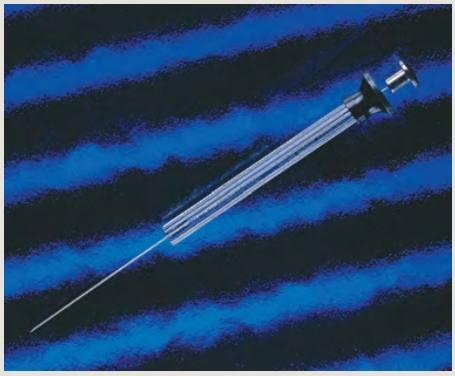
FOR GC

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.

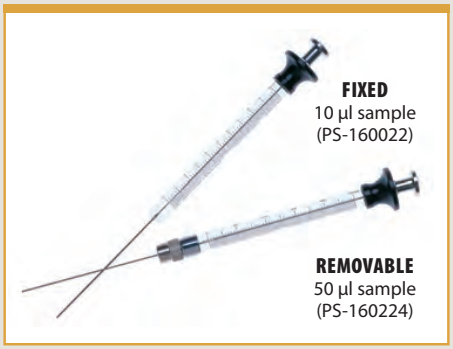
Choose between a fixed or removable needle version. Replacement needles are open end bevel type, sized .019" x .005" x 2.25", and come complete with an integral PTFE seal for a low dead volume connection and a leak-tight fit.

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



	Fixed needle	Removable needle
Sample size	*Prod No*	*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

	Bevel, open end
(Pkg/3)	*Prod No*
.019" x .005" x 2.25"	PS-123050

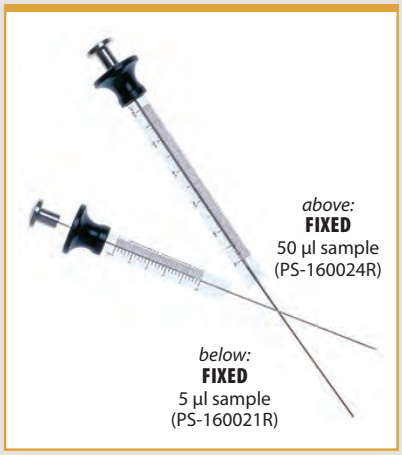
Syringes for HPLC injectors

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



	Fixed needle	Removable needle
Sample size	*Prod No*	*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

	Blunt, open end
(Pkg/3)	*Prod No*
.019" x .005" x 2.25"	PS-123050R

SEE ALSO

Fill ports. . . . . page 30
Luer adapters 31





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.

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

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*
13 mm-425	PS-614158
15 mm-425	PS-614160
18 mm-400	PS-614161

Cap/thread size	*Prod No*
20 mm-400	PS-614170
24 mm-400	PS-614163
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.

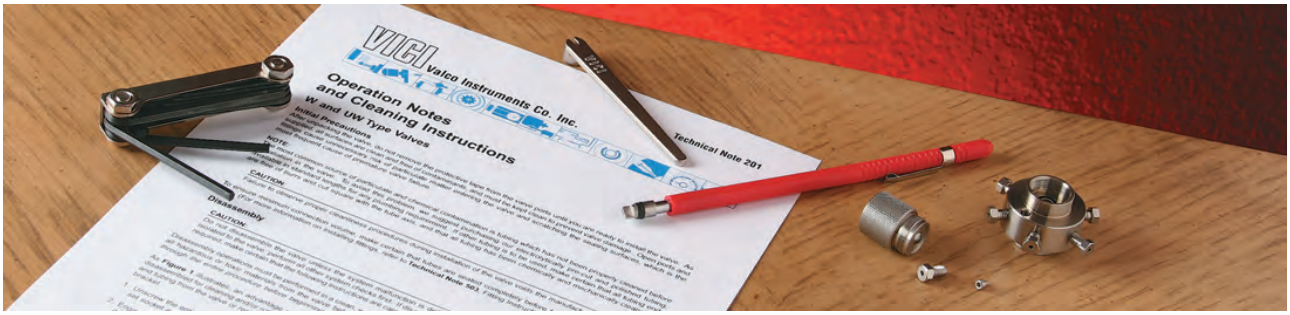
For C or D syringe	PS-654050
For Luer-tip syringe	PS-654051

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

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.

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.

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.



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.

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.



GENERAL REFERENCE

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.

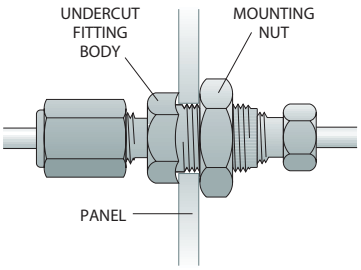
B

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.



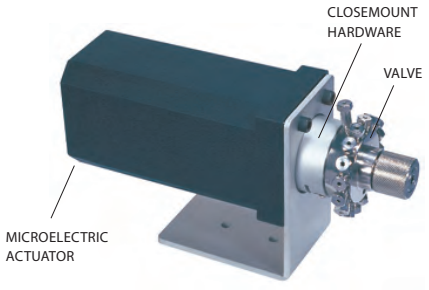
Butt connection: a type of connection in which the two tube ends are directly and squarely in contact, usually effected with a through-type union. Typically used with fused silica connections, or small bore metal tubing.

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.



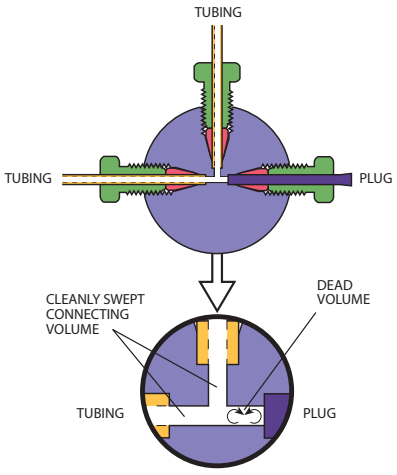
Compression fitting: a style of fitting in which a threaded nut compresses a tapered ferrule onto tubing as the nut is tightened. Valco metal ferrules cut a ring into the tubing wall while polymer types rely on surface compression to form a seal.

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.



GENERAL REFERENCE

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**.

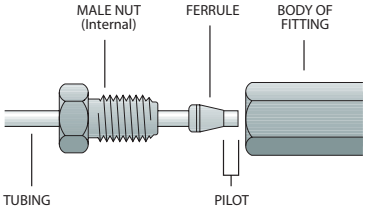
Nut: the tensioning component of a compression fitting. As the threaded nut is tightened into the fitting detail, it pushes the ferrule forward into the tapered ferrule seat, causing it to make up on the tube.

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.

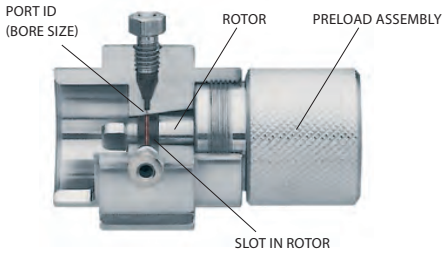
Preload assembly: the part of a Valco valve which supplies the spring force to the rotor. Most are knurled for hand tightening, but the ones for selectors have a hex for wrench tightening.

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

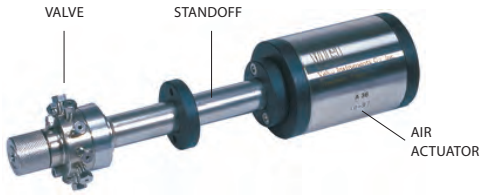
SFE: Supercritical Fluid Extraction. An extraction technique using a fluid in its supercritical state as the extraction medium. Some liquids and mixtures maintained above a critical temperature and pressure exhibit properties of both the liquid and gas phases of the element. These are defined as supercritical. 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

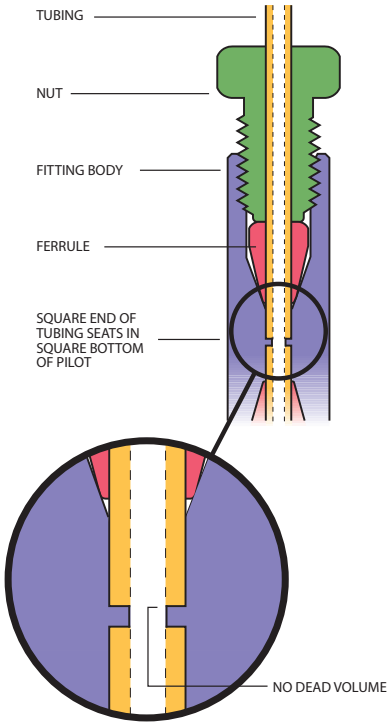
Wetted surfaces: the surfaces which are contacted by the sample stream.

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
1	6.8948	0.06895	0.06805
10	68.948	0.6895	0.6805
20	137.896	1.379	1.361
30	206.844	2.0685	2.0415
40	275.792	2.758	2.722
50	344.74	3.4475	3.4025
60	413.688	4.137	4.083
70	482.636	4.8265	4.7635
80	551.584	5.516	5.444
90	620.532	6.2055	6.1245
100	689.48	6.895	6.805
125	861.85	8.61875	8.50625
150	1034.22	10.3425	10.2075
175	1206.59	12.06625	11.90875
200	1378.96	13.79	13.61
225	1551.33	15.51375	15.31125
250	1723.7	17.2375	17.0125
275	1896.07	18.96125	18.71375
300	2068.44	20.685	20.415
325	2240.81	22.40875	22.11625
350	2413.18	24.1325	23.8175
375	2585.55	25.85625	25.51875
400	2757.92	27.58	27.22
425	2930.29	29.30375	28.92125
450	3102.66	31.0275	30.6225
475	3275.03	32.75125	32.32375

psi	KPa	BAR	Atm
500	3447.4	34.475	34.025
525	3619.77	36.19875	35.72625
550	3792.14	37.9225	37.4275
575	3964.51	39.64625	39.12875
600	4136.88	41.37	40.83
625	4309.25	43.09375	42.53125
650	4481.62	44.8175	44.2325
675	4653.99	46.54125	45.93375
700	4826.36	48.265	47.635
725	4998.73	49.98875	49.33625
750	5171.1	51.7125	51.0375
775	5343.47	53.43625	52.73875
800	5515.84	55.16	54.44
825	5688.21	56.88375	56.14125
850	5860.58	58.6075	57.8425
875	6032.95	60.33125	59.54375
900	6205.32	62.055	61.245
925	6377.69	63.77875	62.94625
950	6550.06	65.5025	64.6475
975	6722.43	67.22625	66.34875
1000	6894.8	68.95	68.05
1100	7584.28	75.845	74.855
1200	8273.76	82.74	81.66
1300	8963.24	89.635	88.465
1400	9652.72	96.53	95.27
1500	10342.2	103.425	102.075

psi	KPa	BAR	Atm
1600	11031.68	110.32	108.88
1700	11721.16	117.215	115.685
1800	12410.64	124.11	122.49
1900	13100.12	131.005	129.295
2000	13789.6	137.9	136.1
2500	17237	172.375	170.125
3000	20684.4	206.85	204.15
3500	24131.8	241.325	238.175
4000	27579.2	275.8	272.2
4500	31026.6	310.275	306.225
5000	34474	344.75	340.25
5500	37921.4	379.225	374.275
6000	41368.8	413.7	408.3
6500	44816.2	448.175	442.325
7000	48263.6	482.65	476.35
7500	51711	517.125	510.375
8000	55158.4	551.6	544.4
8500	58605.8	586.075	578.425
9000	62053.2	620.55	612.45
9500	65500.6	655.025	646.475
10,000	68947.6	689.48	680.46
15,000	103,421.4	1,034.21	1,020.69
20,000	137,895.1	1,378.95	1,360.9
40,000	275,790.3	2,757.9	2,721.84

TEMPERATURE CONVERSIONS

℃	°F	℃	°F	℃	°F	℃	°F	℃	°F	℃	°F	℃	°F	℃	°F	℃	°F
-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

CE RoHS 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:

Cheminert® flanging tools . . . . . page 54
Digital valve interface
DVI. 181
DVI-220 181
Dynacalibrator® Model 120 220
G-calibrators (all) 223
Heated valve enclosures (all). 183
Heated column enclosures (all) 185
Heater assemblies and cartridges (all) 184
Instrumentation temperature controller
ITC10399 185
ITC10399-200. 185

* 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 EUH

C5-2006EUH:
C5 stream selector, 0.40 mm ports, Valcon H rotor,
Nitronic 60 stator, 6 positions, universal actuator without interface

C22Z - 3 1 8 0 EUHA

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 - 6 6 7 4 -.01 EUH

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.		Microelectric
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

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.

A	0-70°C	Air
AH	high torque	
AT	50-150°C	
See chart below.		Microelectric
See chart below.		Universal
[blank] (not recommended)		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.

C	1/16"
[blank]	1/8"
VL	1/4"

FLOWPATH

5. REQUIRED.

SD
SC
SF
ST
STF

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")



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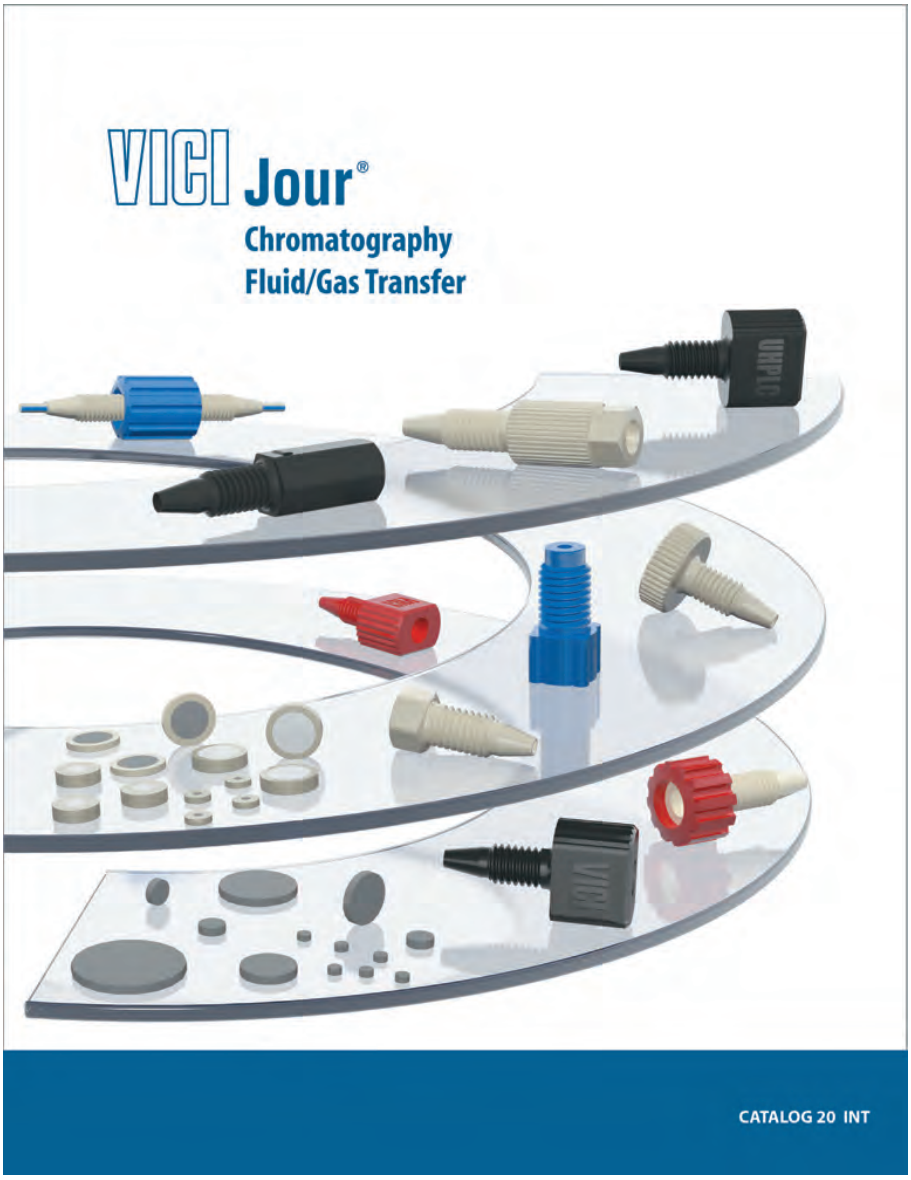
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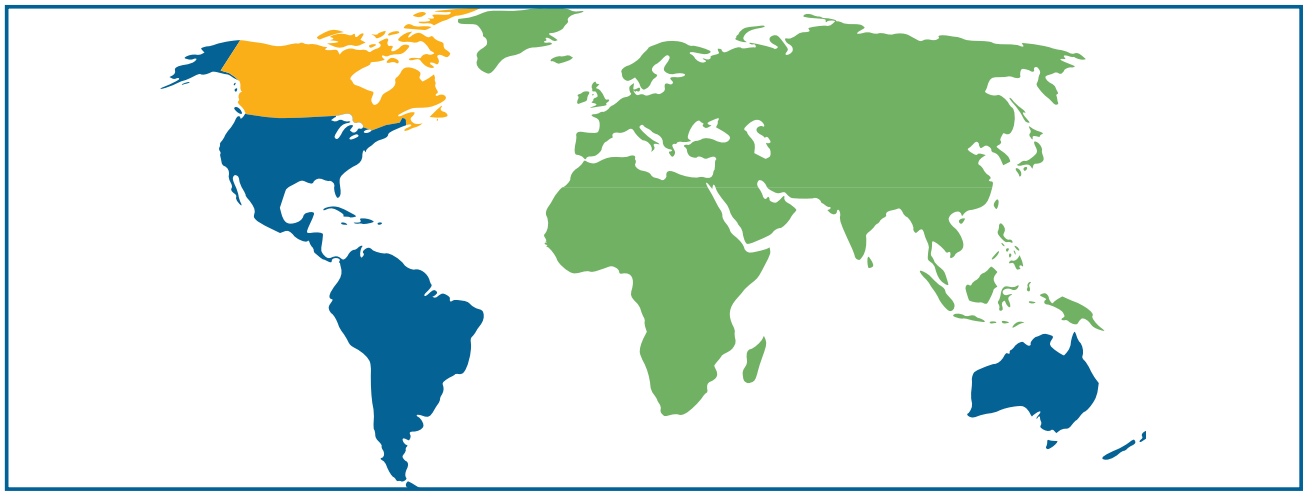
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